F3 HELICOPTER - Technical Meeting Minutes 2023

March, 5th 2023 - Web-Meeting

Report by: Stefan Wolf

Present:

Name	Country	Title
Stefan Wolf	GER	Chairman F3 Helicopter
Eladi Lozano Garcia	ESP	Member F3 Helicopter
Robert Holzmann	AUT	Member F3 Helicopter
Remi Romagnan	FRA	Member F3 Helicopter
Miguel Ramos	PHI	Member F3 Helicopter
Daisuke Mizumachi	JPN	Alternate Member F3 Helicopter
Antonis Papadopoulos	GRE	CIAM President
Massimo Semoli	SUI	CIAM Secretary
Peter Uhlig	GER	CIAM Delegate
Julie Fisher	GBR	CIAM Delegate
Peter Keim	NED	CIAM Delegate
Faruk Yeginsoy	SUI	CIAM Delegate
Aymat Carles	ESP	CIAM Delegate
Zoran Pelagic	SVK	Chairman Space Models
Ian Kaynes	GBR	Chairman F1 Free Flight
Kostas Zachariadis	GRE	Observer

MINUTES - PROPOSALS

Note: i) Copy and paste a blank table if there are more proposals than there are tables provided; delete those tables that are not required.
ii) Add the proposal agenda paragraph number and proposal title in the first blank cell.

Page 9	**Class: F3C**		
a	**5.4.3 General Characteristics**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **YES** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red*):

a) AREA: The swept area of the lifting rotor cannot exceed 250dm^2. For helicopters with multiple rotors whose rotor shafts are more than one rotor diameter apart the total swept area of both rotors cannot exceed 250dm^2. For helicopters with multiple rotors whose rotor shafts are less than one rotor diameter apart the swept area of both rotors (counting the area of superposition only once) cannot exceed 250dm^2. The tail rotor must be driven by the main rotor and must not be driven by a separate engine/motor.

b) WEIGHT: The weight of the model aircraft (with fuel / with batteries) must not exceed 6.5 kg.

c) MOTOR: Internal combustion engine displacement: no restrictions.
Electric motors are limited to a maximum no load voltage of 51 volts for the propulsion circuit.

d) GYROS: The use of pre-programmed flight manoeuvres is forbidden. The use of automatic position (latitude and longitude) locking devices and altitude locking devices, whether with external references or not, are forbidden.

e) ROTOR BLADES: All-metal main or tail rotor blades are prohibited.

It is expressly pointed out that in the event of an infringement of the General Characteristics, the pilot concerned must expect sanctions. The ~~amount~~ level of the sanctions depends on the type and severity of the infringement. Paragraph C.19 in the currently valid version of the CIAM General Rules applies here.

	S-C Voting *(prior to the Technical Meeting)*:	For: 8	Against: 0	Abstain: 0
	Technical Meeting Voting:	For: 9	Against: 0	Abstain: 2
	Comments *(if necessary)*:			

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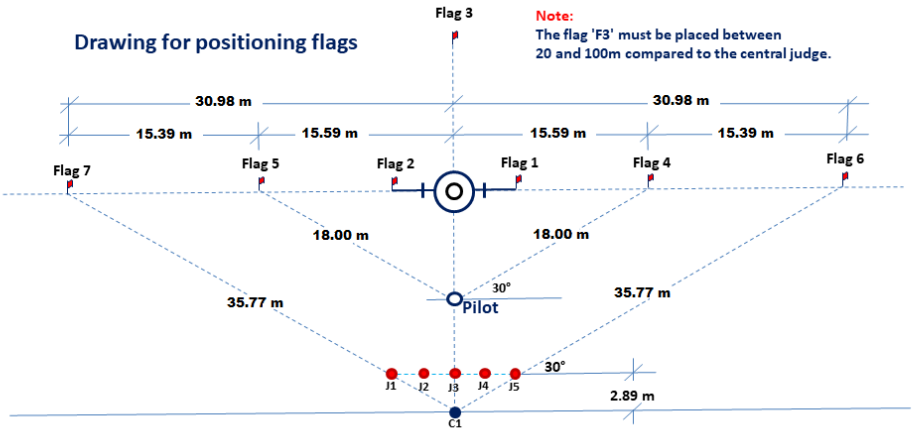
b	**5.4.A F3C Contest Layout**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:



Note 1: The flags (or cones) F4 and F5 serve as references for the 120 ° frame of the pilots.
Note 2: The flags (or cones) F6 and F7 serve as references for the 120 ° frame of the judges.

S-C Voting *(prior to the Technical Meeting)*:	For: 9	Against: 0	Abstain: 0
Technical Meeting Voting:	For: 9	Against: 0	Abstain: 1
Comments *(if necessary)*:			

Page 16	**Class: F3C**

c	**Annex 5D 5D.2 Schedule P**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

5D.2 SCHEDULE P

P1: PIE (UU) **K=1.5**

MA takes off vertically from the helipad, ascends to 2 m then hovers for 2 seconds. MA ascends flying backwards on a 45° line while simultaneously performing a 180° pirouette in any direction, stops over the flag 1 (2) and hovers for 2 seconds. MA performs a 5 m radius descending/ascending vertical half circle while simultaneously performing a full 360° pirouette, stops over the flag 2 (1) and hovers for 2 seconds. MA descends forwards on a 45° line while performing a 180° pirouette in any direction then stops over the helipad for 2 seconds, descends and lands into the helipad.

P2: DOUBLE SWALLOW TAIL (UU) **K=1.5**

MA takes off vertically from the helipad to 4.5 m then hovers for at least 2 seconds, descends backwards down to the flag 1 (2) and hovers for 2 seconds at a height of 2 m, ascends forward climbing at an angle of 45° until it again reaches a height of 4.5 m, then ascends backwards until it reaches the flag 1 (2) at a height of 7 m then hovers for at least 2 seconds. MA then flies forward descending to the opposite flag 2 (1) then hovers for at least 2 seconds at a height of 2 m, flies backwards ascending at an angle of 45° until it reaches a height of 4.5 m then ascends forwards until it reaches the flag 2 (1) at a height of 7 m then hovers for at least 2 seconds. MA flies backwards descending until it reaches the centre line at 4.5 m height then hovers for at least 2 seconds before landing in the helipad.

P6: TWO LOOPS (UU) K=1.0

MA flies straight and level for a minimum of 10 m, performs an inside loop before the centerline where the MA is exactly vertical in upward position at the centerline, followed by a straight line and performs a second inside loop where the MA is exactly vertical in downward position at the centerline, followed by a straight and level flight of at least 10 m and at the same height as when entering the figure.

S-C Voting *(prior to the Technical Meeting)*:	For: 12	Against: 3	Abstain: 0
Technical Meeting Voting:	For: 9	Against: 0	Abstain: 1
Comments *(if necessary)*:			

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d

Annex 5D 5D.2 Schedule P-P9 Autorotation | **Submitted by:** **F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

5D.2 SCHEDULE P

P9: 180° Autorotation (DU) K=1.0

MA flies straight and level for a minimum of 10 m at a minimum altitude of 20 m. ~~Manoeuvre begins~~ ~~w~~**W**hen ~~model aircraft~~ **MA** crosses an imaginary plane that extends vertically upward from a line drawn from the center judge out through the helipad~~.~~**,** MA must be in the autorotation state ~~when it cuts this plane~~, the engine must be off (or at idle) at this point and the MA must be descending. The 180° turn must start at this point and the turning and descending rate must be constant from this point to a point just before touchdown on the helipad. The flight path of the MA must appear as a semi-circle when viewed from above, starting at the vertical plane and ending at a line drawn from the center judge through the helipad. The MA's flight path must never be parallel to the ground or judge's line.

Scoring criteria for landing: See ANNEX 5E Paragraph 5E.6.11.

S-C Voting *(prior to the Technical Meeting)*:	For: 4	Against: 3	Abstain: 0
Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
Comments *(if necessary)*:			

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e

Annex 5D 5D.3 Schedule F | **Submitted by:** **F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

5D.3 SCHEDULE SF/F

F1: TULIP WITH 1/2 PIROUETTES (UU) **K=1.5**

MA climbs vertically 2 m from the helipad and hovers for at least two seconds, ascends backwards in a downward curved quarter circle with a radius of 5 m while simultaneously performing a 180° nose-to-pilot pirouette until it reaches the flag 1 (2) at a height of 7 m then hovers for at least 2 seconds. MA descends backwards in a downward arcing semi-circle of 2.5m radius while simultaneously performing a 180° nose-to-pilot pirouette until it reaches the centreline at a height of 7 m then hovers for at least 2 seconds. MA then descends forward in a downward arcing semi-circle of 2.5 m radius while simultaneously performing a 180° nose-to-pilot pirouette until it reaches the flag 2 (1) at a height of 7 m then hovers for at least 2 seconds. MA then descends forward in a downward curved quarter circle with a radius of 5 m while simultaneously performing a 180° nose-to-pilot pirouette then stops over the helipad at 2 m for 2 seconds, descends and lands into the helipad.

F4: REVERSE CUBAN EIGHT (DD) **K=1.0**

MA flies straight and level for at least 10 m then executes a half roll in any direction at least 10 m before entering a 5/8 outside loop. When MA is descending at 45° and upright it executes a half roll in any direction at the centreline into inverted flight followed by a 3/4 outside loop. When MA is again descending at 45° and upright it executes another half roll in any direction at the centreline into inverted flight, continuing through the first partial loop in this attitude. MA then flies a minimum of 10 m straight and level, executes a half roll in either direction back to upward flight continuing straight and level for at least 10 m.

F5: STANDING TRIANGLE (UU) **K=1.0**

MA flies straight and level for at least 10 m then executes a half roll in any direction followed by an inverted flight of a minimum of 10 m then ascends at the centreline by completing a 1/8 pushed loop to an angle of 45°. MA continues with a straight line followed by a pushed 3/8 loop to upright level flight. After a short straight flight a level centred full horizontal roll in any direction should be completed followed by another short straight flight, another pushed 3/8 loop into a straight line descent at an angle of 45°, then completes a 1/8 pushed loop finishing on the centreline.
MA continues inverted flight for a minimum of 10 m followed by a half roll in any direction finishing upright into straight and level flight of at least 10 m at the same altitude as manoeuvre entry.

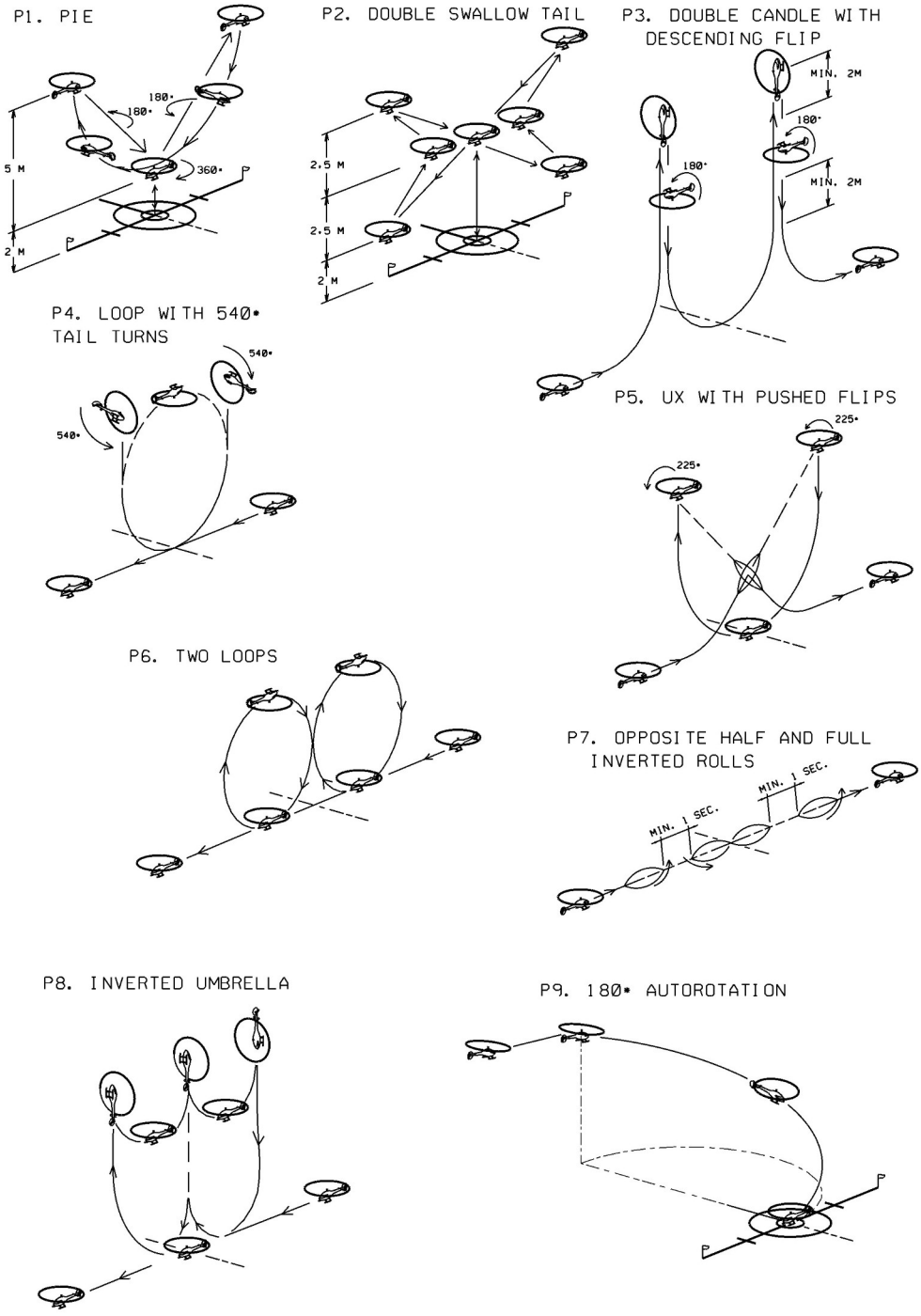
Note 1: Before and after the centred roll the MA fly a straight line, these lines must be of equal length.
Note 2: The 1/8 loops must be executed such that the 45° ascend as well as the 45° descend starts and ends exactly on the centreline.

S-C Voting *(prior to the Technical Meeting)*:	For: 12	Against: 3	Abstain: 0
Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
Comments *(if necessary)*:			

f

Annex 5D 5D-P: F3C Manoeuvre Schedule P | **Submitted by:** | **F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:



S-C Voting *(prior to the Technical Meeting)*:	For: 12	Against: 3	Abstain: 0
Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
Comments *(if necessary)*:			

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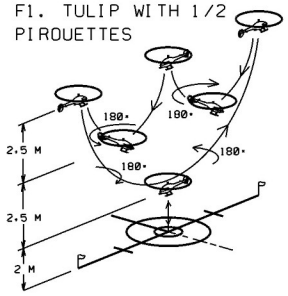
g

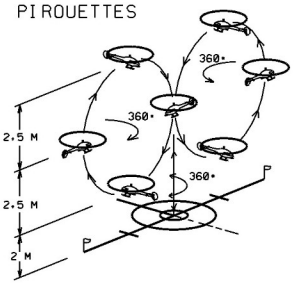
Annex 5D 5D-SF/F: F3C Manoeuvre Schedule SF/F — **Submitted by:** **F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

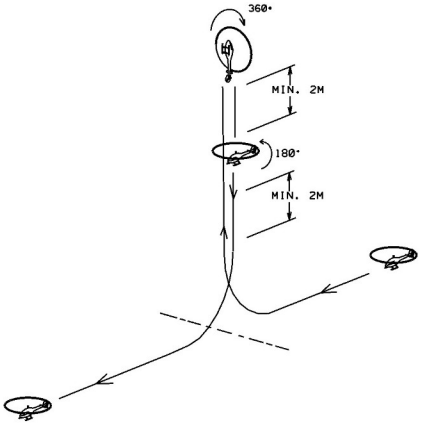
F1. TULIP WITH 1/2 PIROUETTES



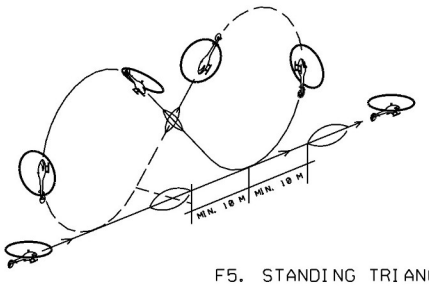
F2. LAID EIGHT WITH PIROUETTES



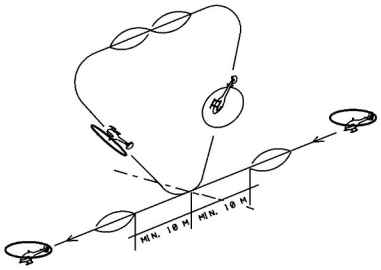
F3. CANDLE WITH 360° TAIL TURN AND 180° PUSHED FLIP



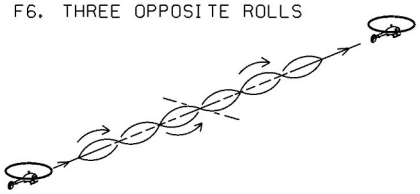
F4. REVERSE CUBAN EIGHT



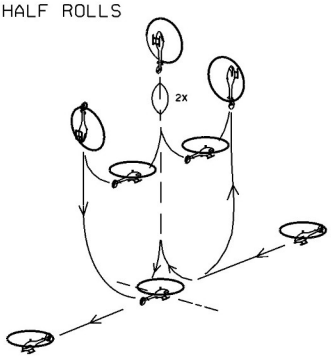
F5. STANDING TRIANGLE



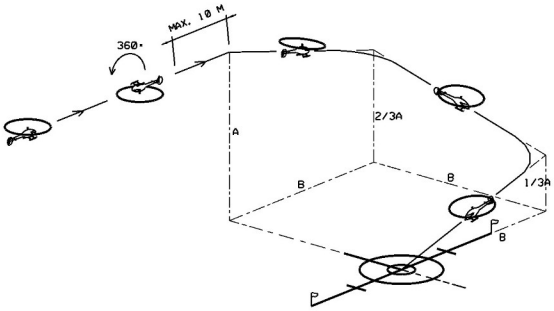
F6. THREE OPPOSITE ROLLS



F7. INVERTED UMBRELLA WITH HALF ROLLS



F8. AUTOROTATION WITH FLIP AND TWO 90° TURNS



S-C Voting *(prior to the Technical Meeting)*:	For: 12	Against: 3	Abstain: 0
Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
Comments *(if necessary)*:			

Page 24	**Class: F3C**

h	**5E.6.11 Autorotations**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

The manoeuvre begins and ends as announced by the caller. The end must be after the landing. Because the autorotation can contain several flying manoeuvres, the announced beginning can be before the engine is powered off or set to idle. The manoeuvre description must clearly state, when the engine has to be powered off or set to idle position. In order to obtain the maximum score, the MA must have executed the flying manoeuvres exactly as described in the manoeuvre description, and after the smooth landing the MA tailboom must be parallel to the judges' line. If the flight path is

stretched, shortened or deviated from, in order to reach the landing circle, the manoeuvre must be downgraded. The required flight path gives maximum score, but there will be downgrades of 1 or 2 points depending of the severity of the path deviation. For example: If the flight path clearly points to a landing close to one of the flags, but the path is stretched to reach the circle, the score can only be a maximum of 6 (corresponding to outside the circles), and there will be an additional downgrade of 2 points for the stretch. This means the score can only be a maximum of 4. If the model lands without stretching, the maximum score would have been a 6.

Scoring criteria for Autorotation landings:
~~Landing gear inside 1m circle = Maximum 10 points.~~
~~Rotor shaft points to inside of 1m circle = Maximum 9 points.~~
~~Landing gear inside 3m circle = Maximum 8 points.~~
~~Rotor shaft points to inside of 3m circle = Maximum 7 points.~~
~~Rotor shaft points to outside of 3m circle = Maximum 6 points.~~
Rotor shaft points inside the 1m circle = Maximum 10 points.
Rotor shaft points on the 1m circle = Maximum 9 points.
Rotor shaft points inside of 3m circle = Maximum 8 points.
Rotor shaft points on the 3m circle = Maximum 7 points.
Rotor shaft points outside of 3m circle = Maximum 6 points.

Note: If a flying manoeuvre is missed out or if the engine is not powered off (or not set to idle position), the score for the complete figure shall be zero.

S-C Voting *(prior to the Technical Meeting)*:	For: 7	Against: 1	Abstain: 0
Technical Meeting Voting:	For: 7	Against: 3	Abstain: 0
Comments *(if necessary)*:			

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i	**Annex 5D F3C Manoeuvre Descriptions and Diagrams**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

The manoeuvre schedules are listed below with the starting and ending direction (UU = Upwind - Upwind; DD = Downwind - Downwind; DU = Downwind - Upwind; UD = Upwind - Downwind) of each manoeuvre, relative to the wind, as indicated. The competitor has 9 minutes to complete the P schedule and 8 minutes to complete the SF and the F schedule. Schedule P will be flown for the preliminary rounds 1 through 4. Schedule SF/F will be flown for the semi final and final rounds.

SCHEDULE P

P1. ~~VORTEX~~ **PIE**..... (UU)
P2. ~~DIAMOND 4~~ **DOUBLE SWALLOW TAIL**..... (UU) (FLY BY)
P3. DOUBLE CANDLE WITH DESCENDING FLIP ..... (DD)
P4. LOOP WITH 540° TAIL TURNS ..... (UU)
P5. UX WITH PUSHED FLIPS..... (DD)
P6. ~~OVAL WITH HALF ROLLS AND FLIP~~ **TWO LOOPS**..... (UU)
P7. OPPOSITE HALF AND FULL INVERTED ROLL ..... (DD)
P8. INVERTED UMBRELLA..... (UU) (FLY BY)
P9. 180° AUTOROTATION ..... (DU)

SCHEDULE SF/F

F1. ~~VERTICAL HOURGLASS WITH PIROUETTES 90°/180°~~**TULIP WITH ½ PIROUETTES**..... (UU)
F2. LAID EIGHT WITH PIROUETTES..... (UU) (FLY BY)

	F3. CANDLE WITH 360° TAIL TURN AND 180° PUSHED FLIP…….. (UU) F4. ~~DOUBLE CANDLE WITH HALF FLIPS AND HALF ROLLS~~**REVERSE CUBAN EIGHT**..…… (DD) F5. ~~DOUBLE STALL TURNS WITH HALF ROLLS AND FLIP~~ **STANDING TRIANGLE**…….…… (UU) F6. THREE OPPOSITE ROLLS.....……..…….. (DD) F7. INVERTED UMBRELLA WITH HALF ROLLS …… (UU) (FLY BY) F8. AUTOROTATION WITH FLIP AND TWO 90° TURNS ……..…….…… (DU)			
	S-C Voting *(prior to the Technical Meeting)*:	For: 12	Against: 3	Abstain: 0
	Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
	Comments *(if necessary)*:			

Page 25	**Class: F3N**		
j	**5.11.2 General Characteristics**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **YES** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

The swept area of the lifting rotor is not limited. The engine displacement is not limited. ~~The use of pre-programmed flight manoeuvres is forbidden.~~
Limitations are:
a) WEIGHT: The weight of the MA (with fuel or with batteries) must not exceed 6,5 kg.
b) BATTERIES: Electric motors are limited to a maximum no load voltage of 51 volts for the propulsion circuit.
c) GYROS: The use of pre-programmed flight manoeuvres is forbidden. The use of automatic position (latitude and longitude) locking devices and altitude locking devices, whether with external references or not, are forbidden.
d~~c~~) ROTOR BLADES: All-metal main or tail rotor blades are prohibited.

It is expressly pointed out that in the event of an infringement of the General Characteristics, the pilot concerned must expect sanctions. The ~~amount~~ level of the sanctions depends on the type and severity of the infringement. Paragraph C.19 in the currently valid version of the CIAM General Rules applies here.

	S-C Voting *(prior to the Technical Meeting)*:	For: 8	Against: 0	Abstain: 0
	Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
	Comments *(if necessary)*:			

Page 25	**Class: F3N**		
k	**5.11.7 Scoring**	**Submitted by:**	**F3 Heli S/C**

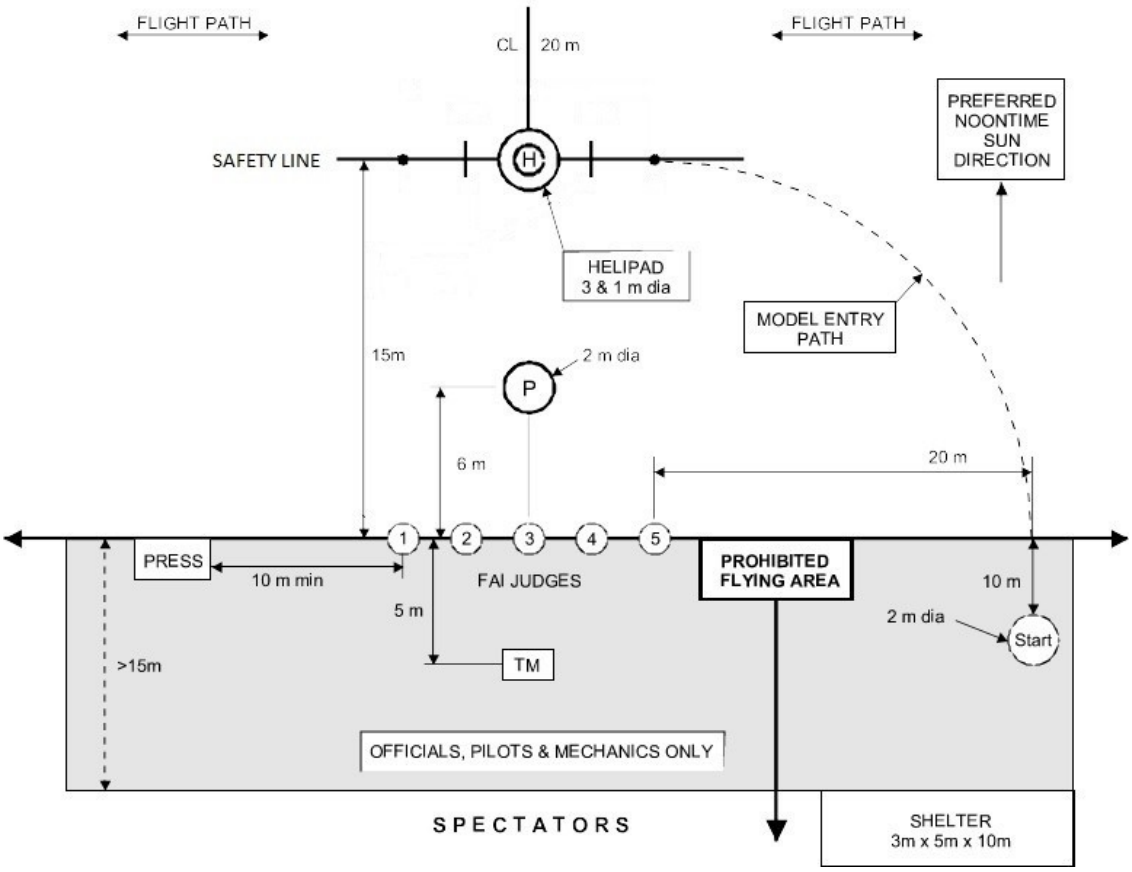
Amended at the Technical Meeting? **YES** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

The number of judges is at least three, and no more than five. At least 20% but not more than 40% of the judges must not have judged at the previous World Championships. If only three (3) judges are used, all marks will be counted for the score of the round. By using four (4) or five (5) judges, the highest and lowest mark of each manoeuvre will be discarded.
In the Set Manoeuvre flight each manoeuvre is given a score between 0 and 20 points by each judge. A manoeuvre that is not completed or not flown according to the description shall be scored zero (0) points. If a manoeuvre is scored zero points all judges must agree. In the freestyle or music freestyle flights the scoring is done after the flight according to the scoring criteria.
In the Set Manoeuvre flights, only manoeuvres that are completed in the flight time of 8 minutes will receive a score. If the flight time for the Freestyle or Music Freestyle program is less than ~~three~~ ~~**3:20 minutes**~~ **3 minutes and 20 seconds** or more than ~~four~~ ~~**3:40**~~ ~~minutes~~ **3 minutes and 40 seconds**,

	there shall be a downgrade of 5% for the flight. A flight shorter than two or longer than five minutes shall be scored zero points. Manoeuvres must be performed where they can be seen clearly by the judges. If a judge, for some reason beyond the control of the competitor, is not able to follow the model aircraft through the entire manoeuvre, he may put a “Not Observed” (N.O.) mark. In this case, his score will, for that particular manoeuvre, be set to the average score given by the other judges, rounded to the nearest whole point.			
	S-C Voting *(prior to the Technical Meeting)*:	For: 3	Against: 1	Abstain: 0
	Technical Meeting Voting:	For: 9	Against: 1	Abstain: 1
	Comments *(if necessary)*:			

Page 26	**Class: F3N**			
l	**5.11.10 Flight Program – Freestyle Flight**		**Submitted by:**	**F3 Heli S/C**
	Amended at the Technical Meeting? **YES** *(delete as appropriate)* (*If “yes” then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*: **Freestyle Flight** Each competitor is given a flight timeframe of at least ~~three~~ ~~**3:20 minutes**~~ **3 minutes and 20 seconds**, and no more than ~~four~~ ~~**3:40** minutes~~ **3 minutes and 40 seconds**. During this time there are no restrictions for the flight or the performed manoeuvres except those regarding safety. The play-back of music is not allowed. The flight time begins when the helper gives a distinctive hand signal and finishes only with another distinctive helper hand signal.			
	S-C Voting *(prior to the Technical Meeting)*:	For: 3	Against: 1	Abstain: 0
	Technical Meeting Voting:	For: 9	Against: 1	Abstain: 1
	Comments *(if necessary)*:			

Page 27	**Class: F3N**			
m	**5.11.A F3N Contect Layout Area**		**Submitted by:**	**F3 Heli S/C**
	Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If “yes” then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:			



S-C Voting *(prior to the Technical Meeting)*:	For: 7	Against: 1	Abstain: 0
Technical Meeting Voting:	For: 10	Against: 0	Abstain: 1
Comments *(if necessary)*:			

Page 28	**Class: F3N**

n	**5F.1 F3N Set Manoeuvre Descriptions**	**Submitted by:**	**F3 Heli S/C**

Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:

(a) The list of Set Manoeuvres contains ~~30~~ **25** manoeuvres (listed below) and ten optional manoeuvres. The optional manoeuvres must be selected by the organiser at least 6 months prior to the competition from a list that is available from the F3 Helicopter Subcommittee Chairman. This list will be revised by the F3 Helicopter Subcommittee on a yearly basis and will be approved by the CIAM Bureau.

(b) The competitor or his caller must announce the name and start and finish of each manoeuvre. All aerobatic manoeuvres start and end with a straight and level flight of 10 metres minimum length parallel to the judges' line. All manoeuvres from stationary flight start and end with a hovering of at least 1 second with the MA parallel or vertical to the flight line. All manoeuvres (considering also entry and exit) should be performed symmetrical to the centre line. The drawings in paragraph ~~5.11.12~~ **5F.2** illustrate the manoeuvres, in case of a dispute the following text takes precedence over the drawings. All manoeuvres can also be flown in opposite direction to that shown in the drawings.

Number Description **K-Factor**

1.1. Double Immelmann **K=4.0**

MA performs a half inside loop immediately followed by a half roll to upright flight. After a straight flight of about 20 meters MA performs a half outside loop, again immediately followed by a half roll to upright flight.

1.2 Double roll backwards **K=4.5**
MA enters in upright backward flight and performs two consecutive axial rolls.

1.3 4-point roll **K=4.5**
MA enters in upright forward flight and then performs 4 quarter rolls, separated each by a recognizable straight segment of the same duration.

1.4 Outside loop with half rolls **K=5.0**
MA performs a half roll to inverted flight, followed by a recognizable straight segment and then enters an outside loop (upward). After the loop, MA flies another recognizable straight segment, followed by a half roll to upright flight**.**

1.5 Inverted horizontal eight **K=6.0**
MA enters in inverted forward flight parallel to the judges' line, performs a 90°-turn to a straight flight above the centre line and then performs a horizontal eight, consisting of two 360° circles.
The manoeuvre is not intended as a hover manoeuvre. In case of low flying speed and banking angle less than 45deg, severe downgrade will apply.

~~**1.6 Backward knife edge pirouette** **K=5.5**~~
~~MA enters in upright backward flight, transitions to a slight ascent (max 15°) and performs a quarter roll. After a recognizable straight segment MA performs a 360°-pirouette, followed by another straight segment and a quarter roll in opposite direction to the first to upright backward flight.~~

1.~~7~~ 6 Four pushed half flips **K=5.5**
MA hovers in upright position, then performs four half pushed flips (forward) each separated by a hovering of 2 seconds. MA maintains its position during the manoeuvre.

~~**1.8 Tic-toc (Metronome)** **K=6.0**~~
~~MA hovers and then is rotated (Nose up) about 135°. It then starts rotating alternately about the lateral axis by about 90° forward or backward. Both 45° positions have to be reached at least three times. The tail rotor stays almost in the same position during the manoeuvre**.**~~

1.~~9~~ 7 360°-turn with roll **K=6.0**
MA enters in upright forward flight in the center of the window and then after a straight and level flight section performs a quarter (inside) loop to a vertical climb. Just before the stall, MA performs a 360°-pirouette to a vertical (backward) dive, followed by another quarter (inside) loop to upright flight and an axial backward rollcentered on the main judge's line.
Note 1: The 1/4 input and output loop must be the same size.
Note 2: The exit must be at the same height as the entrance.
Note 3: Axial backward roll, must not have a straight line after 1/4 of loop and must be centered on the centreline of the window.

1.~~10~~ 8 Standing 8 **K=8.0**
MA enters in forward upright flight parallel to judge line. After passing centerline, MA performs half inside loop, followed by half outside loop. MA is now at the top of the standing 8 on the centerline, and performs fast half pirouette. MA now performs half outside backwards loop, followed by half inside backwards loop. MA is now back to starting point on centerline, and exits in backwards upright flight. All loop segments must have same radius.

~~**1.11 Spike** **K=7.0**~~
~~MA enters in upright forward flight. MA performs a 2-point half roll, followed by minimum 10m inverted flight. MA then performs ¼ outside loop and ascents vertically. MA then descents vertically and performs ¼ inside backwards loop with same radius as before, followed by minimum 10m upright backwards flight. MA then performs a 2-point half roll, and exits in backward inverted flight on the same line as the manoeuvre was started.~~

1.~~12~~ 9 Inverted backwards horizontal eight **K=7.0**
MA enters in inverted backward flight parallel to the judges' line, performs a 90°-turn to a straight flight above the centre line and then performs a horizontal eight, consisting of two 360° circles with the tail

always pointing in flight direction.
The manoeuvre is not intended as a hover manoeuvre. In case of low flying speed and banking angle less than 45°, a severe downgrade will apply.

1.~~13~~ 0 Rolling circle **K=7.5**
MA performs a horizontal circle while it performs consecutive axial rolls. MA speed, rolling rate and the radius of the circle should be constant.

1.~~14~~ 1 4 rainbows with half rolls **K=7.5**
MA performs a rainbow (a semicircle with the lateral axis always vertical to the flight path) to a recognizable stop, then a stationary half roll to another stop. Then it enters another rainbow to a stop on the position of the start of the manoeuvre, followed by another half roll and continues like that, until four rainbows and four half rolls are completed.

1.~~15~~ 2 Funnel **K=7.5**
MA enters in inverted flight and performs a quarter pirouette. MA then performs three superimposed circles in lateral inverted flight with the rotor disk tilt at least 45 degree from a horizontal plane. The diameter of the circles should be at least 10 meters.

1.~~16~~ 3 Tumbling Circuit **K=8.0**
MA enters in backwards upright flight parallel tojudge line. Before passing centerline MA performs ¼ backward inside loop, which stops on the centerline. MA then completes a horizontal circle while doing sequence of half forward outside loops and half backward inside loops. Circle must include a minimum4 of these sequencesdistributed equally. When passing centerline again, MA performs ¼ forward outside loop, and exits in forward inverted flight on same line as manoeuvre was started.

1.~~17~~ 4 Triple pirouetting flip **K=7.5**
MA hovers on centreline and then starts pirouetting. At the same time or after one pirouette the MA starts to flip three times while it continues to perform pirouettes continuously. There should be at least one pirouette during each 360° flip (2 pirouettes are shown only as an example in the drawing). MA finishes by stopping in the same hover position and orientation as the starting point. Pirouettes and rotations should have a constant rate.

1.~~18~~ 5 Cuban eight backwards **K=8.0**
MA enters in upright backward flight and performs a 5/8 inside loop to a 45° downline. The MA performs a half roll centred on the downline, followed by a ¾ inside loop and another half roll centred in the 45°downline. MA then finishes the first partial loop to upright backward flight. The tail of the MA should always point in the direction of flight.

1.~~19~~ 6 Pirouetting loop **K=8.0**
MA enters in upright flight and starts performing pirouettes when reaching the centreline. The MA then performs an insideloop while constantly performing pirouettes about the yaw axis. During the one loop there must be at least 2, but not more than 6 pirouettes. The pirouettes should be distributed equally through the loop and stop on centreline before exiting.

1.~~20~~ 17 Backward rolling circle **K=9.0**
MA enters in upright backward flight and performs a horizontal circle while it performs consecutive axial rolls. MA speed, rolling rate and the radius of the circle should be constant. The tail of the MA should always point in the direction of flight. Rolling should start and stop on centreline. MA exits in backward upright flight.

1.~~21~~ 18 Waltz **K=8.5**
MA enters in inverted flight and on centreline immediately performs a quarter pirouette, tail rotates to circle centre and enters a funnel. After a quarter funnel MA performs a complete smaller funnel (max. half diameter of the first) then continues with another quarter larger funnel, followed again by a complete smaller funnel etc. After the larger funnel is completed there is again a complete smaller funnel, followed immediately on centreline by another quarter pirouette to the exit in inverted flight. The diameter of the large funnel should be at least 20 meters.

1.~~22~~ 19 Double 4-point Tic-toc **K=8.0**

MA hoverstail in on centreline and is then rotated nose up by pulled flip to approx. 135°. It then starts rotating alternately about the lateral axis for about 45° in each direction. Both 45°-positions have to be reached one time for one tic-toc. The MA then rotates by 90° on a clock face.It performs another tic-toc in this position, then again performs another 90° rotation and so on, until it has performed two complete rotations of a clock face while executing tic-tocs. The MA should describe a circular shape during the manoeuvre. The 90° rotations can be performed either whenthe model reaches one of the two end positions, or integrated in the movement back, before the next tic-toc is performed.

1.~~23~~ 0 Pirouetting funnel **K=8.5**
MA enters in invertedflight and then starts pirouetting whereas it performs three superimposed circles in lateral inverted flight with the rotor disk tilt at least 45 degree from a horizontal plane. The diameter of the circles should be at least 10 meters and there should be at least three pirouettes during each circle.MA exits in inverted flight.

1.24 1 Four point tic-toc reversal **K=9.0**
MA hovers on centreline tail in and is then rotated nose up by pulled flip to 135°. It then starts rotating alternately about the lateral axis for about 45° in each direction. Both 45°-positions have to be reached one time for one tic-toc. The MA then rotates by 90° clockwise on a clock face. It performs another tictoc in this position, then again performs another 90° rotation and so on, until it has performed one complete rotation of a clock face while executing tic-tocs. The MA now immediately begins a full rotation in the opposite direction, following the same tic toc steps. The MA should describe a circular shape during the manoeuvre.
The 90° rotations can be performed either when the model reaches one of the two end positions, or integrated in the movement back, before the next tic-toc is performed.

1.~~25~~ 2 Pirouetting globe **K=9.0**
MA enters in upright flight and then performs four pirouetting loops. During each loop, the flight path is changed in a way, that the next loop is rotated about 45° (seen from above) until a complete globe has been described. The MA exits the manoeuvre at the same altitude but in opposite direction to the beginning. During each loop, the MA must perform at least two pirouettes. The pirouettes should be distributed equally through the loop.

~~**1.26 Duus Iglo** **K=9.0**~~
~~Viewed from above, the manoeuvre shows an X. The centre point of the X is on the centreline. MA enters in 1 of the 4 outer points in the X in upright hovering and boom pointing to centre of the X. Model then performs half pulled rainbow, while also doing an integrated half pirouette. Top of rainbow must be at the centre of the X. MA then makes a sharp quarter aileron roll, and completes second half of the rainbow while making another integrated half pirouette until model hovers inverted shortly. The boom still points to centre of the X, but now in another of the 4 outer points.~~
~~Same sequence is then repeated 3 more times, until MA is backat the starting point. Hovering will be inverted after the first and third legs.~~

1.~~27~~ 3 Rolling Circle Tail Reversal **K=9.5**
MA enters in forward upright flight parallel to judge line. Immediately after passing centreline, MA starts a horizontal rolling circle. After each quarter of the circle, MA performs a half elevator flip. After each half flip the roll input direction must be changed. After a complete circle and the four half flips, MA exits in forward upright flight. Speed and height of MA should be constant during complete manoeuvre.

1.~~28~~ 4 Funnel with half rolls **K=9.5**
MA enters in inverted flight and performs a quarter pirouette. MA then performs three superimposed circles in lateral inverted flight with the rotor disk tilt at least 45 degree from a horizontal plane. After each half funnel except the last the MA performs a half rollcentred on the centreline. After three funnels and five half rollsthe MA exits in upright flight. The diameter of the circles should be at least 10 metres.

~~**1.29 Pirorainbow X reversal** **K=11.0**~~
~~MA hovers over the centre line with an angle of 45°, then enters the manoeuvre with a rainbow, a not stationary flip that follows an arched flight path of at least 10 meters length. During the rainbow the MA performs one pirouette in each direction, with the reverse on the top of the rainbow. Then another rainbow (with pirouette reversal) leads back to the starting point. MA then continues with these rainbowsrotating in 90° steps CW or CCW, until the four outer points of an X (viewed from above) are~~

~~reached and MA hovers where it started the manoeuvre. MA does not perform any part of the pirouettes, when hovering in the centre. During the stops at the four outer points, rotor disk must be horizontal but there should be no hovering.~~

1.~~30~~ 25 Vertical Tic Toc Eight **K=10.5**

Model enters in upright forward flight and performs a quarter roll to knife edge on centreline, MA then performs a half tic-toc loop. On the top of the loop MA performs a half pirouette, and then continues up with another half tic-toc loop while keeping the tail in the flight direction. On top of this second circle MA performs a halfroll. It completes the upper tic-toc loop with the tail in the flight direction. It then performs another half pirouette and completes the lower tic-toc loop with the nose in the flight direction. Model exists in upright forward flight.

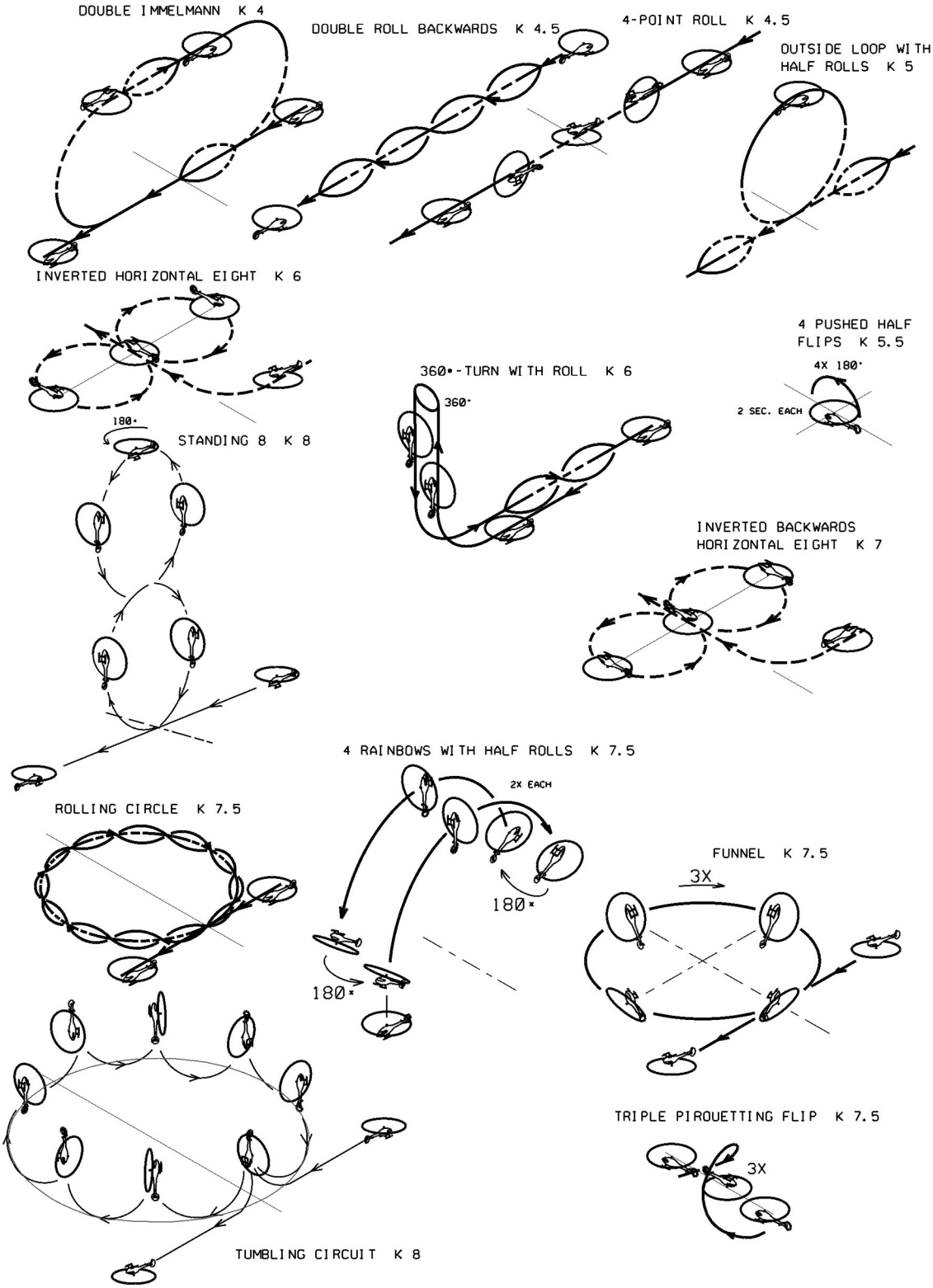
During the manoeuvre the longitudinal axis of the model always follows the flight path.

S-C Voting *(prior to the Technical Meeting)*:	For: 3	Against: 2	Abstain: 0
Technical Meeting Voting:	For: 7	Against: 1	Abstain: 3
Comments *(if necessary)*:			

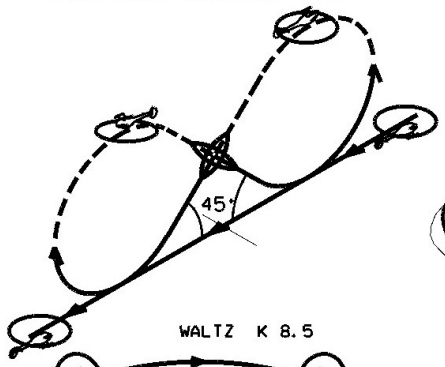
Page 32	Class: F3N

o	5F.2 Set Manoeuvre Drawings	Submitted by:	F3 Heli S/C

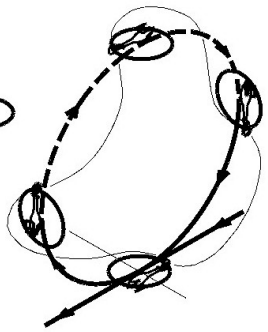
Amended at the Technical Meeting? **NO** *(delete as appropriate)* (*If "yes" then, type in the amended proposal with deletions as strikethrough and new text in bold underlined red)*:



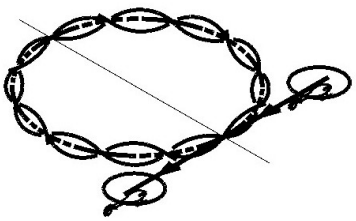
CUBAN EIGHT BACKWARDS K 8



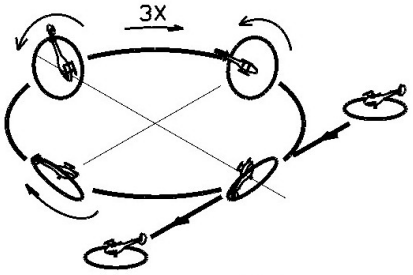
PIROUETTING LOOP K 8



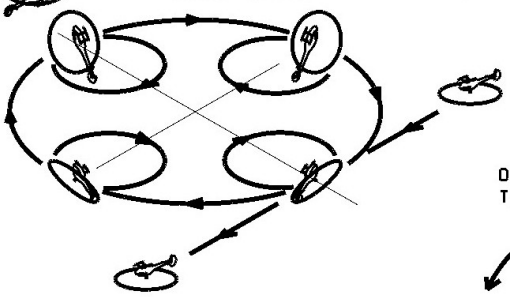
BACKWARD ROLLING CIRCLE K 9



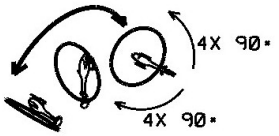
PIROUETTING FUNNEL K 8.5



WALTZ K 8.5

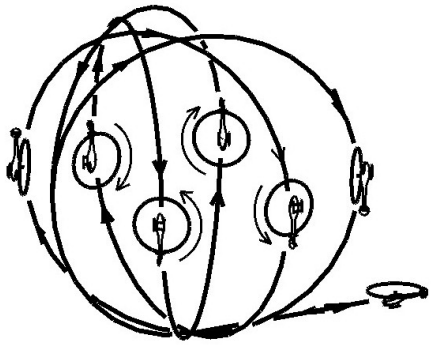


DOUBLE 4-POINT
TIC TOC K 8

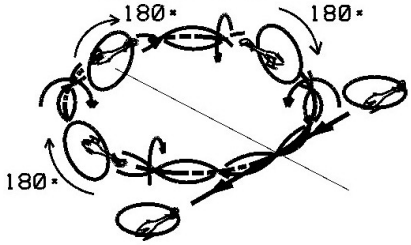


4-POINT TIC TOC REVERSAL K 9

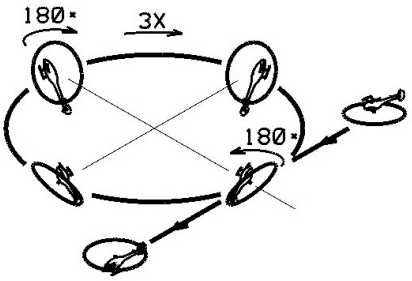
PIROUETTING GLOBE K 9



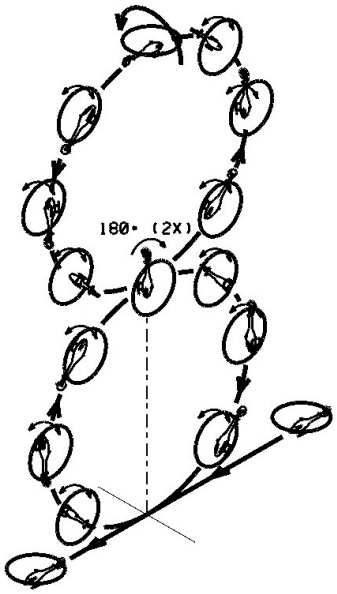
ROLLING CIRCLE TAIL
REVERSAL K 9.5



FUNNEL WITH HALF ROLLS K 9.5



VERTICAL TIC TOC
EIGHT K 10.5



	S-C Voting *(prior to the Technical Meeting)*:	For: 3	Against: 2	Abstain: 0
	Technical Meeting Voting:	For: 7	Against: 1	Abstain: 3
	Comments *(if necessary)*:			

I will ask for an early implementation on June, 1st 2023 for the following proposals:

F3N: 5.11.A F3N CONTEST LAYOUT AREA
F3N: 5.11.2 General Characteristics
F3C: 5E.6.11 Autorotations
F3C: 5.4.3 General Characteristics
F3C: 5.4.A F3C CONTEST LAYOUT AREA
F3C: ANNEX 5D 5D.2 SCHEDULE P – P9: 180° Autorotation

F3 Helicopter Technical Meeting

Stefan Wolf