

2024 Keqiao World Drone Racing Open International Sporting Rules

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The rules for the 2024 Keqiao World Drone Racing Open International are based on the F9U class rules.

Note: F9U class rules are part of the FAI Sporting Code - Section 4 Aeromodelling - Volume F9 Drone Sport.

Drone Racing consists of several multi-rotor model aircraft flying together through a closed racing circuit.

The generic term 'model' will be used in the present document.

Each model is operated by an FPV (First Person View) pilot who is considered as the competitor. The pilot must be equipped with a headset goggle that allows him/her to pilot from the video picture of the on-board camera which is transmitted in real time on his/her headset goggle.

The FPV pilot is assisted during the race by one and only one helper who stays next to him/her during the whole flight. The helper is mandatory. He/she may be another competitor.

The main task of the helper is to keep the model in visual line of sight. He/she must inform the FPV pilot of anything occurring that can affect his/her piloting, especially about safety. If the helper requests the FPV pilot to land or to cut off the motors, he/she must do it immediately. In case of emergency, the helper is authorized to shut off the transmitter in order to trigger the fail-safe device.

1. GENERAL SPECIFICATIONS FOR MODELS

The model must be equipped with a fail-safe device, the triggering of which stops the motors.

The following are strictly forbidden:

- Pre-programmed manoeuvring device.
- System for automatic positioning and/or path rectification in longitude, latitude or height.

Note: Software recovery modes such as "Flip over after crash" (also known as 'Turtle mode') or "Crash recovery" and automatic system which can be activated by the pilot in order to level back the model after a crash are permitted.

1.1. Weight and size

The total weight of the model including all equipment necessary for flight (including batteries) shall not exceed 1 kg.

The axes of all motors must fit within a circle of 330 mm diameter.

1.2. Motorization

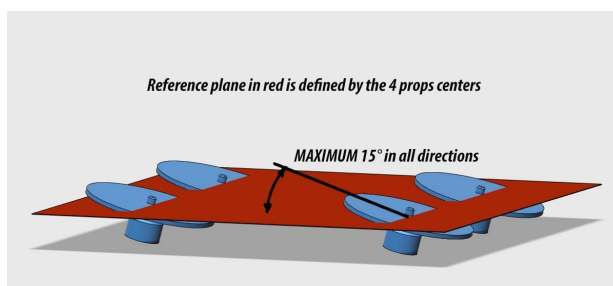
Only electric motors are allowed.

Battery pack up to 6 S is allowed.

The voltage for each cell must not exceed 4.25 V when fully charged. This means a maximum voltage of 17 V for a 4S battery pack, and 25.5 volts for a 6S battery pack.

The voltage measurement of the battery pack will be performed before each race.

The reference plane is defined with propellers centres. Each motor can be tilted up to 15° maximum angle in each direction.



1.3. Propellers

Maximum diameter: 6 inches (15.2 cm).

Full metal propellers are forbidden.

1.4. Radio control (RC) equipment

Any 2.4 GHz spread spectrum technology RC equipment may be used.

Use of a TBS Crossfire radio module 868 MHz / 915 MHz or any other 900 MHz module on the RC equipment is authorised.

In any case, the radio module must be set to 100 mW maximum.

Note: 433 MHz frequency is not authorised in China.

In order to limit risk of potential problems during the races with unwanted interference, the organiser may define restrictions for use of RC systems equipment outside the racing circuit.

In case of use of non-authorized RC equipment, penalty going up to disqualification from the 2024 Keqiao World Drone Racing Open International of the concerned competitor may arise (See 7.2).

1.5. Video system

Analog and digital video devices operated on 5.8 GHz band may be used for piloting.

Note: It is expected to use the Raceband (band R) corresponding to the following frequencies: 5658 MHz - 5695 MHz - 5732 MHz - 5769 MHz - 5806 MHz - 5843 MHz - 5880 MHz - 5917 MHz.

The maximum output power emission authorised on ground and in flight for any analogic and digital video transmitter is 25 mW. In addition, the video output must be centred on the different Raceband frequencies with a 30 MHz maximum bandwidth. Broadcast of an additional signal with the video transmitter is not authorised.

Any digital video device must be set to 25 Mbps maximum.

Note: In situation of video issues, the organiser may request use of a certain type of VTX antennas with the appropriate polarization.

A digital video recorder (DVR) will be provided by the organiser in order to permit to review races as necessary in case of doubt or complaint.

In order to limit risk of potential problems during the races with unwanted emission, the organiser may define restrictions for use of video transmitters outside the racing circuit.

In case of non-authorized activation of a video transmitter, penalty going up to disqualification from the 2024 Keqiao World Drone Racing Open International of the concerned competitor may arise (See 7.2).

1.6. LED light device

In order to provide for the public the best view of the models during the races and to facilitate the task of the judges, each model will be equipped with a LED light device including possibility to choose the colour so that each model in flight will have a different colour.

The following specifications must be respected:

- Minimum of 32 RGB LED light bulbs, or minimum length of 280 mm of RGB LED strips with obfuscated light source (such a COB LED). In either scenario, the LED light should be uniformly distributed across all the arms of the model, allowing it to be clearly visible from any angle.
- Required colours: Blue - Green - Red - Yellow - Cyan - Magenta.
- Capability to easily switch before the race to the colour assigned to the pilot concerned.

Note: In order to improve the understanding of the races by the public and simplify organisation, the colours will be allocated according to the order of the pilots in the race.

1.7. Identification mark

Each model shall carry the 3 (three) letters national identification mark followed by the FAI Sporting Licence ID number.

The letters and numbers must be readable (unaided) at arm's length, and appear at least once on each model.

2. NUMBER OF MODELS

Each competitor may use throughout the entire 2024 Keqiao World Drone Racing Open International a maximum of 3 (three) models.

A model can be used by only one competitor during the 2024 Keqiao World Drone Racing Open International.

In case of an infringement to those rules, the competitor(s) concerned will be disqualified from the 2024 Keqiao World Drone Racing Open International (See 7.2).

3. MODEL PROCESSING

3.1. Model processing before the beginning of the competition

A model processing will be done by the organiser in parallel with the official practice session.

Each competitor can register up to three models.

The organizer will mark each registered model with an easily visible, difficult to falsify identification such as a sticker or a paint mark.

If one of the models registered is lost or destroyed due to causes not applicable to the competitor concerned, the competitor shall have the right to present a replacement model for registration and processing up to one hour before the official starting time of the first qualifying round.

During the competition, on request of the event director, or the Supervisor judge, or the FAI Jury, any model may be checked by the organizer after the race to ensure it fits the specifications.

A competitor whose model is not compliant may be disqualified from the 2024 Keqiao World Drone Racing Open International (See 7.2).

3.2. Model checking before the race

Before each race, a pre-flight checking of the models will be done in the preparation area. Each pilot concerned by the race will have the possibility to check a spare model.

The video frequency and transmitter power emission will be checked before the start of the race after the models had been placed on the pods.

The pilots will have no more the possibility to replace their model by the checked spare model as long as the video frequency and transmitter power emission will have been positively done. Any technical problem after that will be considered a race incident with no possibility to change the model.

4. PRACTICE FLIGHTS

An official practice session will be organised in parallel with the model processing.

The practice session will be organised by groups with four pilots and an allocated flight time for each group of 3 minutes.

Each pilot can do as many circuit laps within the allowed flight time. Once the flight time is over, the pilots still in flight must go immediately to the landing area without finishing the current lap.

In case of a crash, and when the model cannot go on, the model must stay on the ground with motors cut off until the end of the practice session. The competitor cannot request another practice time except if the reason for the crash cannot be attributed to him.

Flights on the racing circuit other than those authorized by the organiser are strictly forbidden. In case of a violation of that rule, penalty going up to disqualification from the 2024 Keqiao World Drone Racing Open International of the concerned competitor may arise (See 7.2).

5. ORGANISATION OF THE COMPETITION

The competition will be organized on the basis of three stages:

- Qualification stage (rounds for qualification for the elimination stage).
- Elimination stage (to qualify for the final stage by successive elimination rounds).
- Final stage.

Each round for the qualification stage and the elimination stage is organized by groups (subdivision of the round corresponding to the number of pilots flying at the same time in the same race).

5.1. Timekeeping

Timekeeping will be done with an electronic timing system with appropriate redundancy in order to ensure complete and permanent reliability of the timekeeping.

For the qualifying stage, timekeeping for each model will be triggered when the model passes the gate equipped with the timekeeping sensor(s). After taking off from the start area, the model must go directly to the gate equipped with the timekeeping sensor(s).

For the elimination stage, final stage, timekeeping will be triggered at the start of the race when the start signal is sounded.

5.2. Procedure for the start of the race

The start of the race will be done as follows:

- After the models have been placed on the start area, the pilots will have two minutes maximum to be ready to start.
- After the pilots will have confirmed to be ready to the starter, and in any case no later than the two minutes delay above, 'Pilots, arm your quads' will be clearly announced.
- About three seconds after this announcement and taking care of a similar time for all races, there will be a brief and intelligible sound signal for the start of the race without proceeding a countdown (such as 3, 2, 1) before the start signal.

The starter must immediately stop the race and do a new start when he/she considers that there has been a technical problem with the start signal. Before the restart, the pilots will be given the opportunity to change the battery pack on their model.

Pilot(s) starting before the start signal (model not touching any point of its start area) will be disqualified from the race. The race will not be stopped in order to continue with the other pilots.

5.3. Qualification stage

Each competitor will be entitled to participate to 3 (three) qualification rounds.

The qualification rounds will be organised, as much as possible, with 4 (four) competitors per group. Composition and flight order of the groups will be determined with random drawing. The draw will be different for each qualifying round.

Every qualifying round will be run with 3 consecutive laps to complete and 3 minutes flight time allowed for that. When the competitor has completed 3 laps or when the flight time allowed is over, he/she must land the model.

Reflights will be flown at the end of the concerned round.

Races with fewer than the required number of competitors (4 or 6), for example in case of withdrawal of a competitor, will be put at the end of the draw of the round, in order to allow a complete competitors race with competitor(s) that have been granted a reflight in that qualifying round.

If necessary, the last groups of each qualifying round may be rearranged by the supervisor judge (under supervision of a Jury member) in order to achieve as much as possible a minimum of 3 competitors per group.

The result of each competitor in a qualification round is the registered times for each valid lap completed (with a maximum of 3).

A ranking will be established at the end of the qualifying stage taking into account the average of the 3 fastest times registered to perform a valid lap in all the qualifying rounds. The competitors getting only 2 registered times to perform a valid lap are ranked after those with times taking into account the average of their 2 times, which in turn are ranked ahead those with only 1 registered time to perform a valid lap. Those who have been able to get any registered time are ranked at the end.

Note: *The fastest times may be done in the same qualifying round or in different ones.*

In situation of a tie for the last place(s) for selection to the elimination stage, the 4th best time recorded to perform one valid circuit lap result will be considered to split the tie, and then if necessary the 5th one, and so on. In case the times are not sufficient, a tie-break flight will be organized between the competitors still concerned by the tie.

5.4. Elimination stage

64 competitors will be selected from the qualification stage for the elimination stage.

All elimination rounds will be organised with 4 (four) pilots per group.

All races will be run with 3 consecutive laps to complete and 3 minutes flight time allowed for that. When the competitor has completed 3 laps or when the flight time allowed is over, he/she must land the model.

The placing for each race is determined by considering the registered time to complete 3 laps.

Those who do not finish their flight will be placed in the race considering the number of laps they did complete and the registered time in which those laps were completed. Disqualified competitor(s) will be placed at the end after the competitors getting a registered time or having not finished their first lap.

The two best placed in each race will be directly selected for the next round.

In case of a tie for the second place, the placing in the ranking established at the end of the qualifying stage will be considered to define who is selected for the next round.

Double elimination

Instead of direct elimination of the competitors placed third and fourth in each race of any elimination

round, the double elimination sequence will be applied.

This sequence allows competitors eliminated in elimination rounds to continue to fly still getting possibility to access the final.

Competitors placed third and fourth in any race of the double elimination sequence are definitively eliminated.

Organisation of the races

For the first elimination round, the composition of the groups for the races is defined considering the ranking established at the end of the qualifying stage.

The composition of the races for the first elimination round and the organisation of the rounds up to the final and are detailed in the Annex.

5.5. Final stage

Three finals will be planned: Overall Final - Junior final - Women final.

Each final will be run with a single race on 3 (three) laps.

In any final race, those who will not finish their flight will be ranked considering the distance completed (number of laps and part of the last lap completed), disqualified competitors being placed at the end.

Overall final

The two best placed in the last elimination round (one race) and the two best placed in the last round of the double elimination sequence (one race) are selected for the final to determine their final ranking from 1st to 4th place.

Junior final

A Junior final will be organised subject junior competitors from at least four nations participate to the 2024 Keqiao World Drone Racing Open International.

The four best placed juniors in the overall individual classification are selected for this final to determine their final ranking from 1st to 4th for the junior individual classification.

***Note:** The Junior final will not be organised if more than 2 (two) juniors are selected for the overall final. In that situation, the juniors participating in the overall final will be placed in the junior classification considering their ranking in the overall final; the other junior(s) will be placed considering their ranking in the overall individual classification.*

Women final

A Women final will be organised subject female competitors from at least four nations participate to the 2024 Keqiao World Drone Racing Open International.

The four best placed women in the overall individual classification are selected for this final to determine their final ranking from 1st to 4th for the women individual classification.

***Note:** The Women final will not be organised if more than 2 (two) women are selected for the overall final. In that situation, the women participating in the overall final will be placed in the women classification considering their ranking in the overall final; the other women will be placed considering their ranking in the overall individual classification.*

6. FLIGHT OCCURRENCES

6.1. Obstacle damaged or destroyed during the race

When an obstacle is accidentally damaged or destroyed during a race, the pilots will be informed by the starter as soon as possible of the incident and how to proceed.

In the case where it concerns an obstacle to be crossed (air gate, tunnel,...), the decision may be to continue to cross the obstacle, or to give permission to bypass it, or to stop the race. When bypassing of the concerned obstacle is authorized, pilots must do their best not to take advantage of the situation.

In case it concerns an obstacle to be avoided, the race will continue except if it is decided differently considering for example that safety is impacted. When race continues, pilots must do their best to follow the track and not to take advantage of the situation.

6.2. Faults and penalties

In the case a pilot does not fly on the expected way (does not cross an obstacle, misses a pylon or flag, does a circuit cut ...) the corresponding circuit lap will not be validated. The pilot may try to execute immediately and on a safe manner a manoeuvre to correct the mistake.

If the pilot corrects its mistake, the lap will be validated.

If during this manoeuvre the pilot has a collision with another model, the pilot will be disqualified for the race.

6.3. Crash

If a model cannot go on after a crash, it must stay on the ground with motors cut off until the end of the race.

The pilot must clearly indicate that he/she stopped the race by removing his/her headset goggle.

The pilot and the helper must then stay quiet in their position until the race is finished for all pilots.

6.4. Safety issue

A pilot can be requested to stop to fly if it is considered the model no longer meets acceptable safety standards. It could be for example the case when a model is damaged after a collision or after a crash, or when the battery is dangling.

In case of a serious safety issue, the starter may decide to stop the race and disqualify the pilot(s) eventually responsible of the safety issue. A restart of the race will be done for the pilots who had not been disqualified and were still in the air when the safety issue occurred.

7. DISQUALIFICATION

7.1. Disqualification from the race

A pilot may be disqualified from a race in the following circumstances:

- Start before the start signal (See 5.2).
- Collision with another model when executing a manoeuvre to correct a mistake (See 6.2).
- Circuit exit (crossing of the safety line).
- Flying after having removed even temporarily his/her headset goggle.
- Celebratory manoeuvre, especially after the pilot finishes.
- Hazardous piloting or safety issue.

The disqualification is decided by the starter or, where applicable, by the judge assigned to the concerned pilot.

When a pilot is disqualified, he/she must land as soon as he/she has been informed. In any case, the result of the pilot for the race will not be validated.

Pilot(s) disqualified will be placed for the race after the other pilots. In case more than one pilot is disqualified from the race, the pilots concerned will be placed taking into account the qualification stage ranking.

If a pilot disqualified from a race is considered not being sufficiently cooperative to land, the concerned pilot may be disqualified from the 2024 Keqiao World Drone Racing Open International.

7.2. Disqualification from the 2024 Keqiao World Drone Racing Open International

A disqualification from the 2024 Keqiao World Drone Racing Open International is decided by the event director with the consent of the FAI Jury.

A competitor who is disqualified from the event is placed at the end of the ranking with a 'DISQ' mention.

Disqualification from the 2024 Keqiao World Drone Racing Open International may be considered in the following situations:

- Use of an equipment that does not conform to the rules.
- Deliberate very dangerous and/or unsporting behaviour.

8. REFLIGHTS

Possibility of an individual reflight will only be considered for the qualification stage.

The reflights will be organised at the end of the qualifying round concerned, or as part of any race that have fewer than the required number of competitors.

For any competitor being granted a reflight, the original flight for which the competitor has been granted the reflight is then definitively cancelled.

For the rest of the competition (elimination stage, final stage), individual reflights will not be awarded. In those situations, a video issue or collision with another model will be considered as a race incident with no reflight possibility.

9. FINAL CLASSIFICATION

9.1. Overall individual classification

The individual overall classification concerns all competitors (including juniors and women) and will be established as described in the following table.

Place	
1	1 st in final
2	2 nd in final
3	3 rd in final
4	4 th in final
5	3 rd in race 61
6	4 th in race 61
7	3 rd in race 59
8	4 th in race 59
9 to 12	3 rd and 4 th in races 57 and 58 with final placing according to provisional ranking after qualifying stage
13 to 16	3 rd and 4 th in races 53 and 54 with final placing according to provisional ranking after qualifying stage
17 to 24	3 rd and 4 th in races 49 to 52 with final placing according to provisional ranking after qualifying stage
25 to 32	3 rd and 4 th in races 41 to 44 with final placing according to provisional ranking after qualifying stage
33 to 48	3 rd and 4 th in races 33 to 40 with final placing according to provisional ranking after qualifying stage
49 to 64	3 rd and 4 th in races 25 to 32 with final placing according to provisional ranking after qualifying stage
65 and beyond	Placing resulting from the additional rounds sequence. In case of ties, provisional ranking after qualifying stage will be considered to split the tie for the concerned competitors.

9.2. Junior individual classification

The junior individual classification will be done considering:

- placing in the junior final (or in the overall final) for the concerned juniors;
- ranking in the overall individual classification for the other juniors.

9.3. Women individual classification

The women individual classification will be done considering:

- placing in the women final (or in the overall final) for the concerned women;
- ranking in the overall individual placing for the other women.

10. INTERRUPTION OF THE COMPETITION

The competition should be interrupted or the start delayed by the event director in the following circumstances:

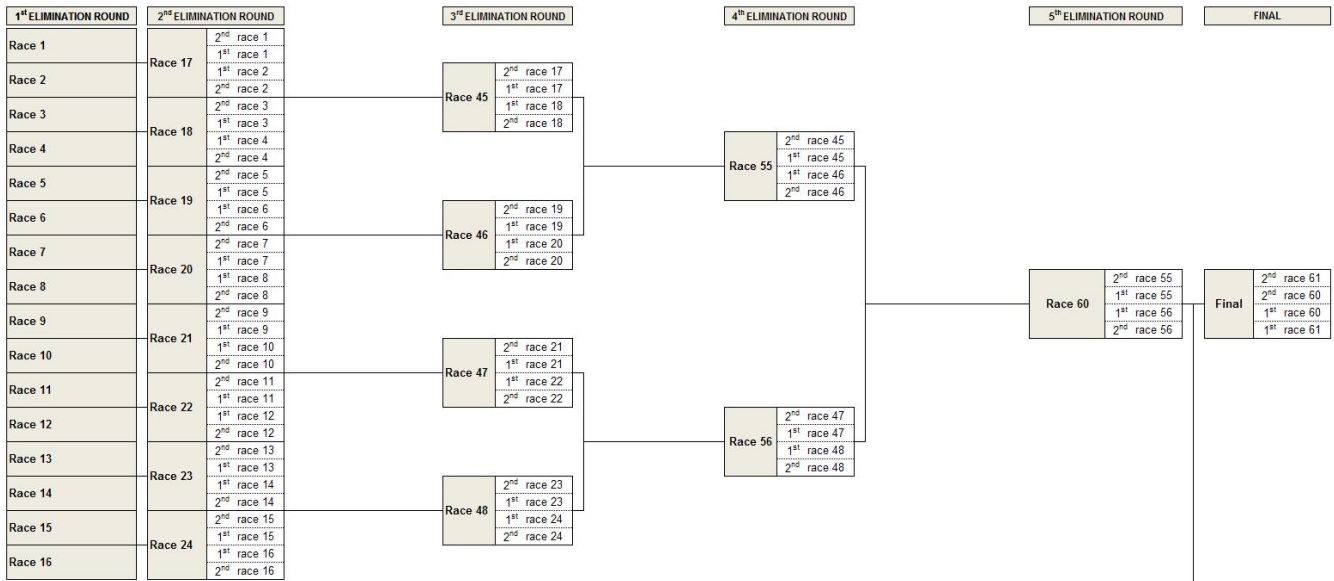
- Wind continuously stronger than 9 m/s measured at 2 m above the ground near the preparation area for at least one (1) minute.
- Due to atmospheric conditions (rain, stormy condition,...) in which it would be dangerous to continue to fly.
- Other exceptional circumstances such as for example incident affecting safety or requiring access for emergency services.

When an interruption occurs during an official flight, this flight is cancelled.

If the competition cannot go on, the final ranking will be the last available provisional ranking.

- ANNEX - Organisation of the elimination stage

1- Organisation



DOUBLE ELIMINATION SEQUENCE											
Race 25	4 th race 1		3 rd race 17								
	3 rd race 2		2 nd race 31								
	3 rd race 3		1 st race 32								
	4 th race 4		4 th race 18								
Race 26	4 th race 5		3 rd race 19								
	3 rd race 6		2 nd race 29								
	3 rd race 7		1 st race 30								
	4 th race 8		4 th race 20								
Race 27	4 th race 2		3 rd race 18		2 nd race 35		3 rd race 45				
	3 rd race 1		2 nd race 32		1 st race 33		2 nd race 43				
	3 rd race 4		1 st race 31		1 st race 34		1 st race 44				
	4 th race 3		4 th race 17		2 nd race 36		4 th race 46				
Race 28	4 th race 6		3 rd race 20		2 nd race 33		3 rd race 47				
	3 rd race 5		2 nd race 30		1 st race 35		2 nd race 41				
	3 rd race 8		1 st race 29		1 st race 36		1 st race 42				
	4 th race 7		4 th race 19		2 nd race 34		4 th race 48				
Race 29	4 th race 9		3 rd race 21		2 nd race 39		3 rd race 46				
	3 rd race 10		2 nd race 26		1 st race 37		2 nd race 44				
	3 rd race 11		1 st race 25		1 st race 38		1 st race 43				
	4 th race 12		4 th race 22		2 nd race 40		4 th race 45				
Race 30	4 th race 13		3 rd race 23		2 nd race 37		3 rd race 48				
	3 rd race 14		2 nd race 28		1 st race 39		2 nd race 42				
	3 rd race 15		1 st race 27		1 st race 40		1 st race 41				
	4 th race 16		4 th race 24		2 nd race 38		4 th race 47				
Race 31	4 th race 10		3 rd race 22								
	3 rd race 9		2 nd race 25								
	3 rd race 12		1 st race 26								
	4 th race 11		4 th race 21								
Race 32	4 th race 14		3 rd race 24								
	3 rd race 13		2 nd race 27								
	3 rd race 16		1 st race 28								
	4 th race 15		4 th race 23								

2- Composition of the races for the 1st elimination round

Race 1	Placed 1	Placed 17	Placed 33	Placed 49
Race 2	Placed 16	Placed 32	Placed 48	Placed 64
Race 3	Placed 8	Placed 24	Placed 40	Placed 56
Race 4	Placed 14	Placed 30	Placed 46	Placed 62
Race 5	Placed 4	Placed 20	Placed 36	Placed 52
Race 6	Placed 12	Placed 28	Placed 44	Placed 60
Race 7	Placed 6	Placed 22	Placed 38	Placed 54
Race 8	Placed 10	Placed 26	Placed 42	Placed 58
Race 9	Placed 9	Placed 25	Placed 41	Placed 57
Race 10	Placed 5	Placed 21	Placed 37	Placed 53
Race 11	Placed 11	Placed 27	Placed 43	Placed 59
Race 12	Placed 3	Placed 19	Placed 35	Placed 51
Race 13	Placed 13	Placed 29	Placed 45	Placed 61
Race 14	Placed 7	Placed 23	Placed 39	Placed 55
Race 15	Placed 15	Placed 31	Placed 47	Placed 63
Race 16	Placed 2	Placed 18	Placed 34	Placed 50