PROCEDURE FOR SETTING UP AN AIR NAVIGATION RACE Dated 1/8/2022

- 1. **GENERAL NOTES**
 - 1.1. <u>Permission</u> The first issue is the Permission that needs to be obtained. In South Africa we need to comply with AIC 19.1 to host a special air event. The form can be found on our website.
 - 1.2. Then we need to <u>advertise</u>. Make sure it is on the SAPFA <u>calendar</u>. Then open the <u>Entry form</u> on the SAPFA website. Send out an advert to the SAPFA members via <u>Mailchimp</u>. And Send out an advert via the Rally Competitions <u>WhatsApp</u> group.
 - 1.3. **Rules and Regulations** Before using these instructions you should be familiar with the Rules and Regulations of the specific events.

The Rules and Regulations are contained in: Rules and Regulations AIR NAVIGATION RACE - 2022 Edition available at https://www.fai.org/sites/default/files/2022_gac_anr_rules_and_regulations_v4.pdf

1.4. <u>Software</u> The ANR software is available at the following link together with very useful documentation and video links. <u>https://github.com/ArminZ/ANR_Scoring_And_Visualisation/releases</u>

You might have a problem with Microsoft SQL Database in which case search for the latest copy (min 2016) of "SqlLocalDB.msi" and install it first.

There are many alternative ways to do each of the following tasks. I describe the task, with some tips, tricks and rules, then to some specific instructions using specific software and tools.

The original concept was to have 4 Parcours per competition, and fly them simultaneously. I find that it is impossible to make 4 parcours with similar difficultly. I also find it a waste to fly the return journey back to the airfield. I set up a single parcour in a U shape with the start and finish near the airfield. The competitors then fly the same parcour sequentially with 5 minute separation. These instructions will allow you to follow either set up, but decide before you start if you want 1 parcour or more...

- 1.5. <u>Directory and File Structure:</u> I use the following directory structure and file names. These instructions follow this structure. E:\Flying\Rally\2017\170616 ANR Brits with sub directories of Emails, Training 1, Training 2, Competition 1, Competition 2 etc.
- 1.6. **Planning:** Your could either do the initial planning on a Printed Map or using Ozi Explorer or even Google Earth.
- 1.7. <u>Map Size:</u> Consider the printed map size before placing way points. The software requires a map of Width 180 mm x Height 150 mm. At 1: 200 000 = 19.438 Nm x 16.199 Nm. At 1: 150 000 = 14.579 Nm x 12.149 Nm.

At 1: 100 000 = 9.719 Nm x 8.099 Nm.

To draw the printed map boundaries on the planning map, you can place a way point at one corner and then project the other corners using the above distances.

1.8. <u>Maps:</u> It is necessary to produce a special map for the software. Using the above distances you could crop a map to the size, but it might be easier to use oziexplorer to print the required map image.

Option 1: Open the JPG Map image in your photo editor and rotate exactly horizontal, resize and crop to the above dimensions. You will need to determine the <u>exact coordinates</u> of the top left and bottom right corners. Save as below.

Option 2: Open the map in OziExplorer, place a waypoint for one of the corner makers eg NW and write down the exact coordinate for the NW waypoint in decimal degrees. Now project NE waypoint using the above distance. Similarly from the NE waypoint project the SE waypoint, and similarly the SW waypoint. Write down the exact coordinate of the SE waypoint. Now join the corners with a route. Now you need ADOBE WRITER. Print the map to scale, a little larger, with these corner makers to ADOBE WRITER. Now open the file in your photo editor, Paint Shop Pro, Adobe Photo Shop, or Corel Draw. Rotate exactly horizontal, and crop exactly. Then save as below.

Once you have selected the size, and created the image file, rotate to exactly horizontal and then it must be saved with a name of the top left coordinate and bottom right coordinate in decimal degrees, eg: -25.278433_27.641357_-25.55_28.00.jpg

Option 3: A world file may also be created for a more accurate import. See https://en.wikipedia.org/wiki/World_file for description of the format and also a world file calculator at the bottom.

- 1.9. **Accuracy:** Google Earth is sufficiently accurate for planning the route.
- 1.10. <u>Naming:</u> Use the following names for the way points and in this order: SP, 0,1,2,3,...7,8,9,FP. Once the turn point have been imported into Google Earth name the file any thing that is logical eg. Training 1, Training 2, Competition 1, Competition 2 etc. Now joint the turn points accurately with a path. The path is all that is used in the next step. The Parcours paths must be named A, B, C, D. If you use other names, the scoring software will fail. Two paths must also be created for the take off lines called eg: TKOF_RWY02 and TKOF_RWY20.

Comment from Armin: it is also important that, in case you create several paths, the orientation is consistent. Consistent orientation means that you create all paths from start to end. Inconsistent means that you would create one path from end to start and the rest from start to end. This would result in garbled prohibited zones in the output kml file.

1.11. <u>Rules for Waypoints:</u> The distance for each Air Navigation Race tests will not be less than 15 Nm. and not more than 25 Nm. The difference in the length of the 4 race tracks will not be more than +/- 2%. While there are no rules for number of turn points and leg lengths, I suggest 10 to 12 Max (including Start and Finish) turn points with a minimum leg of 1.5 Nm. START should be about 2-3nm away from TOP, and FINISH should be about 2-3nm away from LDP.

- 1.12. Maximum Points: AirObserver's software allows: Max 30 waypoints, Max 30 En-route Points.
- 1.13. <u>Times:</u> The current software uses Local Time, so the start list must be prepared in Local Time. If there is a time offset in the scoring you can correct the start list to compensate.

If you download the Canway loggers using FFA Skytrack, use the .gpx format. (There are errors in the way FFA Skytrack writes the .gac file, the second line (Date) is 2 digits short, and the B records are 4 characters short. These can be corrected manuals, if you must.

2. SET UP THE WAYPOINTS IN GOOGLE EARTH

- 2.1. Load Google Earth
- 2.2. Define Corner Markers: Use the corner markers defined above. NW, NE, SE, SW.
- 2.3. Define the Start Point, Waypoint and Finish Point: Use SP, 0,1,2,3,...7,8,9,FP.. The start and finish should be defined features on the ground and on the map, however the rest of the turn point could be defined features for an easy route, but does not need to be for a more difficult route.
- 2.4. To work out the distance between two waypoints, Use Show Ruler.
- 2.5. Add a Path: Use Add Path and accurately join the start point in sequence to the finish. Name these paths as A, B, C,D. (The first one for each event must be named A.) With the cursor on the path name, right click properties and then measurement. This should be between 15 to 25 Nm.
- 2.6. Write it down: Measure the distance from the Take off to Start, the Path Length and distance from Finish to TKOF. Calculate Takeoff to Start time = Distance / 80 Kts x 60 + 3 minutes. And round off to whole minutes. Calculate Parcour Duration = Distance / 80 kts x 60 minutes.
- 2.7. Check other airspaces etc by loading the AIRSPACE DATABASE. Make sure you are not in conflict with air spaces.
- 2.8. Sort the Waypoints: If the way point are not in order, the can be moved up and down the list by left clicking and dragging.
- 2.9. Name the Initial Waypoint File: With the cursor on the top of the list, right click and "Rename" to some logical name. eg. Training 1, Training 2, Competition 1, Competition 2 etc. name.
- 2.10. Save the Initial Waypoint File: With the cursor on the top of the list, right click and "Save Place As" use the .kml file format.
- 2.11. The PATH is the only object that is converted in the following steps.

3. CREATE THE PARCOURS

- 3.1. Open Air Navigation Race Software
- 3.2. Save the database to your competition directory.
- 3.3. Define a competition and click use.
- 3.4. Set Up this program with your defaults. (You need to do this now as some options cannot be activated after you import results.)
- 3.4.1. Settings/Common
- 3.4.2. Flight Track Properties 5.0 & Black
- 3.4.3. Default Intersection Points Properties / 3.0 / Blue / Radius 0.1 / Show Yes.
- 3.4.4. Database file (Leave this blank. You will need to select each time you start the program)
- 3.4.5. Settings/Parcour Default
- 3.4.6. Close Channels / Default for SP and FP 5.0 / Green / Show/
- 3.4.7. Border 5.0 Blue
- 3.4.8. <u>Settings/Penalties</u>
- 3.4.9. Max Penalty Points (0=unrestricted) (This is the new rule)
- 3.4.10. SAVE and now you can continue with Tools
 - 3.5. Notes: Logger data import: Use .gpx (The .gac format has some conversion issues from the FFA software). Parcour PDF export: Yes
- 3.6. Tools /Route Generator.
- 3.7. Define the channel width and height
- 3.8. Open *.kml route file (The one created above)
- 3.9. Click on the path and add to selected.
- 3.10. Now Save layer as *.kml file. This will save as eg Competition 1_out.kml
- 3.11. Open the file in Google Earth (Competition 1_out.kml)
- 3.12. Fix the prohibited areas by deleting odd points in these areas, usually this is the inside area called "PROH A Left" or "PROH A Right". Note that the prohibited area must extend ~ 1.5 Nm to the left and right of the start, but move this area away from the airfield and the circuit, to avoid erroneous scores, eg before the competitors have lined up for the start.

- 3.13. Add the Take Off Lines. Add a path with two points across the Take off Point, usually half way down the runway or abeam the windsock. This path must be placed into the folder TakeOffLines. Naming convention: Take-off line names must start with the word TKOF. Examples:TKOF_RWY21, TKOF_WEST
- 3.14. Now position the cursor on (Competition 1_out.kml) and "Save Places As" (Use .kml format and replace)

4. PHOTO SHEETS

4.1. Rules for Photograph sheets: A photo sheet containing the Start and Finish Points is required.

4.2. Open a Template

- 4.2.1. Load Corel Paint Shop Pro Photo.
- 4.2.2. Open some previously saved photos for a similar ANR. Only open .pspimage files, not .jpg files.
- 4.2.3. Delete previous photos and modify the tittle.
- 4.2.4. Save the template to the new ANR directory.
- 4.3. To Take and Insert Turnpoint Photos
 - 4.3.1. Go to Google Earth. Go to the route. Centre the desired photo centrally on the screen. Click off 'route' and Click off that particular CP.
 - 4.3.2. Go back to Corel. 'Screen Shot. 'Start'. R-click to activate photo cutting tool. L-click and drag to take photo. Return to Corel "Enhance photo" "One Stop Photo Fix".
 - 4.3.3. Edit'.' Copy'. Click on the correct position on the photo sheet. 'Edit'. 'Paste as New Layer. Disable the Crop cutting tool, and click on Arrow tool to position correctly. R-click on the photo "Arrange". "Send to bottom". Reposition the circle and the title by clicking on the edge of the circle to enable it to move.
- 4.4. Save the Photo Sheet. When you have completed a photosheet, save it as .pspimage and also a format suitable for your printing process ie .jpg or .pdf.
- 4.5. Print one per crew.
- 4.6. You are now ready for the competition. Remember to take along a colour printer.

5. **COMPETITORS**

5.1. Create a text file of competitors, Surname, First Name and save as Competitors.csv

6. SETTING UP THE COMPETITION

- 6.1. Open Air Navigation Race Software. Save the database to your competition directory.
- 6.2. Maps / legacy map Import. Use the same name as your Competition for that map. eg Competition 1
- 6.3. Parcours / Import. Import from Google Earth (*.kml) Import the file (Competition 1_out.kml) and save.
- 6.4. Parcours / Overview. Use Channel Base, Pen 5.0 Blue (Check) Pen for SP and FP 5.0 Green (Check).
- 6.5. Print the Parcour Map Export / Scale 1:200000 (or as selected in 1 above). Show Calculation Table NO. This document is saved by default to C:\Users\Public\Documents\AirNavigationRace. Save it to your competition directory, so that is easier to find.
- 6.6. Modify the Parcour Map.

Edit the header as follows.

Map scale = 1:200 000 Time to Start 00.0 Nm / (00:00+3:00) = 00:00 min Parcour length = 00.00 NM Time = 00:00 Min (@80 kt) Width = 0.5 NM Add <u>Start</u> and <u>Finish</u> onto the Map. (This necessary to avoid competitors flying the wrong way around.

- 6.7. Map (Print 2 per competitor). PLEASE NOTE THAT THIS MAP MUST BE PRINTED AT CUSTOM SCALE 100%.
- 6.8. You are now ready to run the competition.

7. RUNNING THE COMPETITION

- 7.1. Participants / Import list from CSV
- 7.2. Crews. Set Up the competing crews.
- 7.3. Qualification Round / Set Up Competition 1
 - 7.3.1. Name/ Parcour

- 7.3.2. Then enter the lats and longs of the start line is decimal degrees. (No symbols). While you could enter these manually, you can import the start line by using (TKOF line from *kml). This is the path that was created in 3.11 above.
- 7.3.3. Parcour duration from 2.6 above.
- 7.3.4. Take-Off to Start line from 2.6 above.
- 7.3.5. Interval between take off applies to multiple routes are to be flow simultaneously.
- 7.3.6. Interval between start block applies to single competitor flying the same route or block of competitors flying simultaneous route.
- 7.3.7. Number of route. This is how many parcours are flow simultaneously.
- 7.3.8. Save qualification round.
- 7.4. Auto Fill Start List.
 - 7.4.1. Adjust the first take off as per your schedule. Times must be set in local time.
 - 7.4.2. Save qualification round.
 - 7.4.3. Export Start List to PDF and Print for all competitors.
 - 7.4.4. You are now read to hand out the papers and loggers.

7.5. Accommodating Aircraft with different speeds.

7.5.1. This can be achieved by calculating the Start List in a spreadsheet as follows.

Competition: KFC COMP2								Separation	Distance to Start	Parcour length		
Participants list								5	3		24.7	
CNumber	Nationality	Pilot Lastname	Pilot Firstname	Navigator Lastname	Navigator Firstname	AC	SPEED KTS	Start Time	Time to Start	Start Gate	Time	End Gate
01	KFC	Verbaan	Gert	Tolmay	Francois	Beech Bonanza ZS- KCC	120	12:00	00:03:30	12:03:30	00:12:21	12:15:51
02	KFC	Meintjes	Leon	Weeber	Tobie	RV10 / N246RS	100	12:05:00	00:03:48	12:08:48	00:14:49	12:23:37
03	KFC	Shaw	John	Shaw	Chris	C177 /ZS-IFY	90	12:10:00	00:04:00	12:14:00	00:16:28	12:30:28
04	KFC	Nel	Johann	Nel	Susan	Jabaru ZS-CNS	80	12:15:00	00:04:15	12:19:15	00:18:31	12:37:46

7.6. Now modify the Start List in Air Navigation Race Software with the calculated valves and save.

PRODUCING THE RESULTS

8.

- 8.1. In Air Observer, download the Track file.
- 8.2. In Air Observer, load flight log and the export to .GAC.
- 8.3. If you download the Canway loggers using FFA Skytrack, use the .GPX format. I suggest you also download the .GAC format to view in AirObserver only. (There are errors in the way FFA Skytrack writes the .gac file, the second line (Date) is 2 digits short, and the B records are 4 characters short. These can be corrected manuals, if you must.
- 8.4. In Air Navigation Race software got to Results. Import .GAC. or .GPX from the Canway Loggers.
- 8.5. Check Penalties and correct if necessary.
- 8.6. Add the Landing Penalties as a new line.
- 8.7. Print. Export results to PDF
- 8.8. Once all the competitors have been scored. Export List Top Results.

9. FINAL RESULTS

9.1. The latest version of the ANR Software will allow you to export the individual competition results to excel, and you can them combined them in excel for the whole competition.

10. **MONEY**

- 10.1. Please balance the cash receipts with the competitors, subtract the cash spent on printing etc. You can do this on the Final Results Sheet.
- 10.2. Pay the balance to SAPFA's Bank Account at Deposits into:
 South African Power Flying Association Nedbank, Brits
 Br Code 187-646
 Account No 1876 019840
 Please use the Rally Name as reference so we can link the deposit to the entry.
- 10.3. You can email the calculations to and slips to Mauritz du Plessis at <u>whitehouse@worldonline.co.za.</u>