Europa Functional Flight Test Program

Only for use by Bud Yerly/Custom Flight Creations Inc. on post maintenance checkouts and for initial flights.

Date: August, 2016

Prior to first flight attempt, ensure the following:

Use of a Go Pro/Contour inflight camera with recording ability is recommended.

1 Complete ANNEX E, Annual Condition inspection and Fix all discrepancies
Check flap and aileron rig is even.

2 Aircraft Controls
- Flight controls free/full travel/no slop
- Flaps/Ailerons even properly trimmed.
- Sight from behind and check wing/flap shadow for even straight line.
- Stabs even and trim tabs functioning correctly
- Brakes solid, no dragging or spongyness
- Nosewheel brakeout checked (for shimmy)
- Pull poorly aligned wheel pants off to check and maintain brakes

3 Fuel System
- Cleanned by filling and pumping out tank through filters at least twice.
- Install new filters - Check for leaks
- Fuel Selector Valve checked and marked
- Fuel sight guage checked and marked
- 912 /Jabiru - Check aux pump delivers sufficient fuel
  gravity feed delivers 150% of takeoff FF
- 914 Check both pumps (assure separate power source for Aux Pump)

4 Electrical
- Panel connections secure/no intermittant problems
- Battery/Master operates & wiring secure
- Main/Aux fuel pump circuits operational
- Engine Displays programed with limits & documentation
- Recommend warnings at only Max RPM,CYL Temp, Oil Temp,
- Min Oil / Fuel Pressure
- Analog guages display properly with ranges & limits
- Flight display/Instruments programed and documented
- Switches clearly marked and functional

5 Airspeed/Altimeter calibrated and leak checked
- At a minimum:
- Static Check: Draw 1inch Hg = 1000' and 135-145 Kts
- Pitot Check: 1inch Hg = 135-145 Kts.
- Each should hold for a minute
- All placards and airspeeds marked on faces.

6 Aircraft Documents
- Airframe and Powerplant logs
- Airworthyness Certificate and Registration complete
- **Specific Aircraft Checklists and Engine Checklist available**
- Wt. & Balance documented
- Check Center of envelope for first flight

Europa Functional Flight Test Program

Contd.

7 Engine Checks
- Pre Lube accomplished
- Check for leaks
- Fire sleeve and heat shields OK
- Throttle Cables smooth and tight
- Choke operational
- Carb Heat / Heater opens/closes securely
- Thrust line per manufacturer
  - Offset 1-1.25" at 22" either side of prop C/L
- Cowl seals and ducting adequate

8 Engine Run In
- Tie Down Aircraft Securely
- Start engine
- Check oil in 5 seconds or abort
- Spinner / Propellor running smooth
- No excess vibration and prop balanced.
- Monitor for leaks and temperatures
- Alternator charges / warning lights operate
- Idle for 10 minutes (Engine should idle for 20 minutes without over-temp.)
- Shutdown
- Check for leaks
- Check cylinder temperature vs handheld thermometer
- Check Oil Temp
- Check Oil Level for changes
- Check Coolant Level for Changes

9 High power engine run
- Tie aircraft down securely
- Warm up engine
- Runup Mag check
- Exercise Propellor
- Tilt aircraft tilted back on tail and do the following:
- Check full power (constant speed props in fine pitch).
- (Static RPM should be at least 400 rpm below redline max)
- Check full power with only mechanical pump 912/Jabiru
- Check full power with only aux pump (914)
- Check prop controller for full range fine to coarse
- Note runup and full power temps and pressures
- Idle cool down and shutdown.
- Check for leaks

10 Avionics Checks
- Check radio for range and clarity with engine running
- Intercom clear and the radio works with ICS off
- Transponder check altitude encodor vs altitude
- GPS / Nav and displays operational
- ELT functions
- Carbon Monoxide Detectors & Warning lights OK
- All avionics operate with full panel powered up
- Check avionics for heating issues
- Check alternator output with all avionics and strobes on

11 Test Pilot
- Select and interview test pilot
- Familiarize him with all systems and operations
- Contact Insurance company for flight coverage

Europa Functional Flight Test Program

Contd.

Taxi and Groundhandling Checks

1 Cockpit and familiarization check
   Switches, controls, fuel selectors, trim, flaps
   must be identifiable blindfolded.
2 Aircraft Preflight and ground procedures review
   Cockpit checklist flow / engine data readouts familiar
3 Engine Start and Warmup
   Strap in and canopy/door closing checks
4 Low speed taxi tests
   (Determine ground handling adequate)
   Pull chocks and taxi at a walk
   Check steering / differential brakes
   Turns of 90 and 180 degrees and reversals
   Monitor engine temps
   Correct for spongy brakes, too tight nosewheel or sloppy tailwheel.
5 High Speed Taxi Tests
   (Determines runup procedures / brakes authority, transition
   from stop to near takeoff speed and decelleration to taxi.)

Run	Speed	Power	Clean	Flaps
1st	10-20	1/2		
2nd	20-35	full		
3rd	35-45	full		
Notes:				

   Check nose wheel for shimmy
   If tailwheel won't come up by 35 or Nose won't lift off at 35,
   reaccomplish Wt. and Bal and stab pitch checks.
6 Aborted takeoff: Accellerate to Takeoff and Abort distance check.

Run	Speed	Power	Flaps	Distance to Stop
1st	45-55	full	Up	
2nd	45-55	full	Down	

   Not recommended for tail draggers.

Europa Functional Flight Test Program

Contd.

First Flight Requirements:

Airport:	Coordinate with ATC or Airport Manager
	Fire and Rescue Available
	Hangar available for maintenance and storage
	Communications for ground crew
	Runway at least 3000'
	Overruns, clear areas for emergency landing
Weather:	3000 - 5
Winds:	0-5kts down the runway
	Runway Dry
Ground Crew:	Knowledgeable of Aircraft
	Assist with maintenance and preflight
	Assist with strap in
	Assist with door latching/canopy closing
	Assist with fire on start or
	Aircraft recovery and rescue
Test Pilot	Current and proficient in this order:
	Current medical and bi-annual
	Acro/stalls/unusual attitude in last 30 days
	Familiar and current in aircraft and type
	Last 30-60-90 should have 5/10/15 sorties to be very proficient.
	Re-familiarize with specific aircraft displays and systems

Preflight planning for first flight

Avoid Crowds and Well Wishers / Family

Pilot Preflight: Weather, NOTAMS, Airport Coordination
TOLD, Aircraft Checklist Review
Review forms and documented maintenance work done
Brief ground crew on flight
(STTO fly overhead 15-30 minutes low approaches and land)
CG in range (carry no excess gear)

Emergency Procedures Review

Abort TO	Throttle Idle, Brakes Apply
Fire on Start	Fuel off, Continue Cranking Engine / Extinquish fire
Runway Departure	Abort, Engine off, Fuel off, Exit aircraft
Blown Tire TO	Abort, Opposite Controls and Brakes
Blown Tire on Land	Opposite Controls and Brakes
Ground Crew Brief	Emergencies which they must help recover aircraft and, or expected actions to assist.

Aircraft Preflight:

Fuel - 1/2 tank or 4 times duration
Fuel valve on main
Expected airspeed ranges and placards

Vx	
Vy	
Va	
Vfe	
Vne	

Brakes fully operational and firm
Trim indicator & position check
Aircraft prelight IAW Checklist
Before engine start:
Check strap in and canopy ops
Flight Control movement
Com Check with ground

Flight Number 1.

Objective:	Initial flight reliability
Duration:	15-30 minutes.

Procedures:

Start Taxi Normal
Announce first flight to ATC/Unicom as coordinated

Takeoff: Check vibration/rotation/acceleration normal
TO: 1.1 Vs 50-55 Normal
1.3 Vs 60-65 Kts. Max
Climb 1.5 Vs 75-90 Kts. Flaps Up
Note Max RPM, Engine Cyl and Oil Temp/Pressure

Do not throttle back until approximately 1000 ft. AGL

Retract monowheel above 50 ft. AGL
or as required to accellerate and climb.
Maintain 2000 AGL minimum at 90Kts over airport
Check for vibration / trim / flutter

Cruise Check Cruise RPM and MP and temps/pressures

Rig Check Heavy wing / ball centered
Pitch trim
Check IAS/TAS vs GPS

If all goes well, climb to about 3000 AGL

Stability checks
Gentle 15 degree turns note rudder/ball
Gradually increase to 20-30 degree turns
Slow to pattern speed Vfe-5 kts or about 80Kts.
Extend Flaps slowly to full down in increments
Check Trim transients/ roll transients
Slow to Vso + 10 Kts. (65-70Kts)
Check descent rate with power off clean
Check descent rate with power off with flaps full
Accellerate to climb see if it will climb with full flaps
Retract flaps / gear (mono)

Landing
Reenter the pattern
Fly a no flap low approach, go around at 70 Kts. Min.
(Determine the go around ability of the aircraft)
Fly dirty low approach, go around at 70 Kts. Min.
(Get feel of the plane near runway in slow flight.
Fly full stop using 70Kts. Min. until flare.
(Hold off until landing attitude.)

After Landing:
Straight ahead no sharp turns until taxi speed.
Taxi Back
Postflight and debrief.

Post first flight check at a minimum:

Review video is present.
Engine area for leaks of coolant, oil, or fuel
Cockpit area for fuel leaks around filler, fuel lines or senders
Correct any initial out of trim conditions with tabs
Aileron tab of 1/4 inch by 6 inches should be the max out of rig.
Elevator trim should trim out any approach speed down to 60Kts.
Note any shimmy or nose/tailwheel steering/ gear problems
Log all cylinder head and oil temperatures / pressures
Investigate and attempt to fix any problems discovered during flight
Annotate all discrepancies and when ready, clear for flight two.
Check fuel filters and for fuel leaks.

Preflight planning for 2nd flight

Pilot Preflight: Weather, NOTAMS, Airport Coordination
TOLD, Aircraft Checklist Review
Review forms and documented work done
Brief ground crew on flight
(STTO fly overhead 15-30 minutes low approaches and land)
CG in range (carry no excess gear)

Emergency Procedures Review

Abort TO	Throttle Idle, Brakes Apply
Fire on Start	Fuel off, Continue Cranking Engine / Extinquish fire
Runway Departure	Abort, Engine off, Fuel off, Exit aircraft
Blown Tire TO	Abort, Opposite Controls and Brakes
Blown Tire on Land	Opposite Controls and Brakes
Ground Crew Brief	Emergencies which they must help recover aircraft and, or expected actions to assist.

Aircraft Preflight:

Fuel - 1/2 tank or 4 times duration
Fuel valve on main
Airspeed ranges and placards

Vx	
Vy	
Va	
Vfe	
Vne	

Brakes fully operational and firm
Trim indicator & position check
Aircraft prelight IAW Checklist
Before engine start check strap in and canopy ops
Flight Control movement
Com Check with ground

Flight Number 2

Objective:	Recheck of 1st flight data and corrections
Duration:	15-45 minutes.

Procedures:

Start Taxi Normal

Takeoff: Check vibration/rotation/acceleration normal

TO:	1.1Vs	50-55 Kts.
	1.3 Vs	60-65 Kts.
Climb	1.5 Vs	75-90 Kts. Flaps Up

Note Max RPM, Engine Cyl and Oil Temp/Pressure

Do not throttle back until 1000 ft. AG

Time climb at 90 Kts to 4000 AGL
Maintain 4000 AGL minimum at 90Kts
Note engine temps during the climb
Check for vibration / trim / flutter
Cruise Check Note 75% Power to work area.

Rig Check

Heavy wing / ball/rudder trim required
Pitch trim no vauge spots
Check IAS/TAS vs GPS

Stability checks

Gentle 15 degree turns note rudder/ball
Gradually increase to 20-30 degree turns
Increase airspeed to 100Kts Note trim
Increase airspeed to 120Kts Note trim
Roll rapidly to 45 degrees and release stick both ways.
A/C should maintain bank and pitch falls off slightly.
Abrupt Pitch 2 Gs and release to determine fugoid.
Increase airspeed to 160 Kts in increments

Approach to Stall

Slow to Vso clean and check for burble/stall clues
Recover
Slow to pattern a/s Vl/d max +5 or Vfe-5 kts or 80Kts.
Extend Flaps / A/B in increments
Check Trim transients/ roll transients
Slow to Vso + 10 Kts. (65-70Kts)
Check descent rate with power off clean
Check descent rate with power off with flaps full
Accellerate to climb see if it will climb with full flaps
Accomplish power off approach to stall.
Accomplish power off full flap approach to stall.
Note recovery and which way it breaks.
Slowly approach stall until break both clean and dirty.
Recover
Accomplish accellerated stall below 90 Kts.

Engine Performance:

Set cruise power and note trim and airspeeds
Record engine temps/pressures/flows
Set max continuous power and do same.
Fly box pattern check A/S vs GS at Vso and Cruise

Landing

Reenter the pattern
Fly a clean low approach, go around at 70 Kts. Min.
Fly dirty low approach, go around at 70 Kts. Min.
Fly touch and goes / low app. as conditions permit
Fly full stop pattern rolling out at 70Kts. Min.
Cross threshold no slower than 1.2 Vfe or 55 Kts.
Bounce landing, **GO AROUND!**, reattempt.

After Landing:

Taxi Back

Postflight as before and debrief.

Post flight check at a minimum:

Engine area for leaks of coolant, oil, or fuel
Cockpit area for fuel leaks around filler, fuel lines or senders
Correct any out of trim conditions with tabs
Aileron tab of 1/4 inch by 6 inches should be the max out of rig.
Elevator trim should trim out any approach speed down to 60Kts.
Note any shimmy or nose gear problems
Log all cylinder head and oil temperatures / pressures
Investigate and correct any problems discovered during flight
Check fuel filters and consider changing main.

Flight Number 3 or Refly of Profile 2

Accomplish 2nd flight profile until airframe and engine are operational within

Some conditions to consider for operational

Engine:

Idle on ground at 20 minutes without exceeding CHTmax - 50F
Takeoff power on climb for 5 minutes without exceeding CHTmax
Climb at engine continuous power setting to 10,000 MSL minimum.
with all engine instruments in the green.
Cruise with all instruments in the green.
Absolutely no leaks.
Engine/prop smooth at all power settings.

Airframe:

Trim hands off at cruise in pitch and roll with ball centered.
Trim hands off in climb with only rudder to center the ball.
Fly ball centered with tabs set for single pilot and dual.
Stall warning 5 knots prior to stall.
Airspeed indicator calibrated from:
Vsfe, Vsfo, Vclimb, V cruise, Vne minus 20.
No vibration in controls or airframe.
No vibration in controls or airframe.
Safely fly from Vso to Vne with normal control pressures.

Flight Profile 4

Expanding the envelope:
Fly profiles above although in the Euorpa POH
verify numbers in the book for your propeller/engine combo.

Check engine stays in limits during flights.

Flight test using CFC performance testing parameters.
Time to climb at variing speeds
Best rate
Best angle

Cruise tests at various power settings
Propeller testing
Max range or best ANMPP

This is normally accomplished in three flights

Flight Profile 5

Systems integration tests.

Normally flown with an observer pilot.

Com range checks
Navigation checks
Autopilot setup and checks

Flight Profile 6
Emergency proceedure tests.
Climb to at least 5000 AGL.
Stall characteristics:
AOA and stall warn testing and tuning
Stall strip performance and deep stall attempt.
Accellerated Stall and break tendancy check.
Engine Failure Scenarios
Engine out (with idle engine)
Glide ratio flaps fully down and gear (mono)
Propeller stuck full fine/full course and go around capability
Max speed with fixed pitch propeller before overspeed of engine.
Level flight possible at what power setting (normally 25 to 30 HP or 36-4000 RPM)
Electric Trim Failure:
Pitch Trim Failure full down, full up.
Aileron Trim Failure full left / right.
Motor Glider Only Engine shutdown, feather and restart.
Be over a suitable airdrome should engine not restart.
Engine shutdown and windmill restart speed needed.
Propeller feather (if available) and glide ratio check.
Unfeather to restart with starter
Unfeather to restart with windmilling only.
Pattern / Landing Emergencies:
No flap landing (conv and trigear)
Simulated engine out landing. (Idle engine)
Partial power performance in pattern. (Engine power set at 35 HP)