PILOT OPERATING HANDBOOK

Earthstar Odyssey

26 June 2015

Revision History

Date	Page/Paragraph	Change to

Experimental Aircraft Pilot Operating Handbook

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This aircraft is amateur-built and is registered in the Experimental category [FAR, Part 91.121(g)] as per Order 8130.2 and AC20-27, operable by LSA and certificated pilots.

This handbook, believed to be complete and accurate at the time of publication, may not contain all the information needed to safely operate the aircraft described. By virtue of its experimental amateur-built status, all persons entering this aircraft do so at their own risk.

Manual Date: 26 June 2015

Aircraft	
Parts manufacturer	Earthstar Aircraft 11990 Earthstar Place Santa Margarita, CA 93453
Model	Earthstar Odyssey
Serial number	Jaybird 1
Registrations number	N114SV
Engine	
Model	HKS 700T
Serial number	240007
Propeller	
Manufacturer	Aerolux
Serial number	F3R387
Dynon SV-MAP-270 SkyView	
Navigation Mapping Software Certificate Code	M-A64F09
License Code	C9FD39
Emergency locator transmitter	ACK E-04 ELT 406 MHz
	Beacon ID: 2DC86 A46F2 FFBFF
	Registration date: 9 April 2014

1.0 General

1.1 Airframe specifications

Length:	18’ 3”
Height:	5’ 3”
Empty weight:	608 lbs.
Maximum gross weight:	1000 lbs.
Main gear track:	52”
Wheel base:	70.5”
Cabin height:	floor to ceiling - 42”
	seat to ceiling - 37”
Cabin width:	41”
Cabin length:	68”
Wing span:	26’
Wing area:	124 sq. ft.
Wing loading:	8.06 lb/sf
Wing aspect ratio:	5.78
Wing washout:	1.6 degrees
Flap travel:	0 to 45 degrees down
Glide ratio (L/D)	11:1

1.2 Powerplant specifications

Engine:	HKS 700T, with integral propeller-drive reduction gear in the 2.61:1 configuration
Maximum power: (at 5300 rpm)	80 hp

Maximum torque: (at 5000 rpm)	81.13 ft lb (120.73 kg/m, 110 Nm)
Weight:	143 lbs. (with oil tank, oil cooler, intercooler)
Maximum power loading:	.80 hp/127 lb (w/o tank, cooler, intercooler) .63
Engine mount:	10 x 1.25 mm bolts in rubber isolators, 4 pieces
Injection system:	Dual electronic
Manifold pressure:	Base Atm + 11.6 psi
	Boost up function 1 Atm + 14.3 psi
Fuel pressure:	44 psi at intake manifold
Ignition unit:	Dual CDI (capacitive discharge type)
Spark plugs:	HKS S40i (Denso IK24C11, heat range #8)
Alternator performance:	280W DC (at 4,000 - 5,300 rpm)
Air filter:	K&N tapered
Fuel filter:	Mesh type, 15 microns maximum
Turbo after oiler	Canton Accusump 24-154 (if installed)
Starter:	12 V/0.6 KW (engagement via gear reduction and overrunning clutch)
Propeller:	Aerolux, ground adjustable pitch, 3 blade, right rotation pusher, 71.0” (1803mm) diameter

1.3 Equipment

OAT/CAT gauge:	Dynon SV-D700
Attitude gyro:	Dynon SV-D700
Directional gyro:	Dynon SV-D700
Altimeter:	Dynon SV-D700

Accelerometer:	Dynon SV-D700
Airspeed indicator:	Dynon SV-D700
Compass - precision:	Dynon SV-D700
Run-time meter:	Dynon SV-D700
EFIS	Dynon SV-EMS-220 module
GPS receiver	Dynon SV-GPS-250 module
Battery backup	Dynon SV-BAT-320 module
Navigation mapping software	Dynon SV-MAP-270 module
Intercom:	Dynon SV-INTERCOM-2S
Mode S transponder	Dynon SV-XPNDR-262 module
ADS-B receiver	Dynon SV-ADSB-470 module
Radio	Dynon SV-COM-C25
Flight sensors	Dynon SV-ADAHRS-200
Emergency locator transmitter	ACK E-04 406 MHz
Fuel pumps:	Bosch 0 580 464 070
Fuel gauge:	Visual

1.4 Instrument readings

Engine idle:	1300 to 1600 rpm
L/R mag drop @ 3000 rpm:	<200 rpm
Exhaust gas temperature (maximum):	1436 degrees F (780 degrees C)
Cylinder head temperature (maximum):	356 degrees F (180 degrees C)
Oil pressure (range):	17 - 71 psi at intake manifold

Oil pressure (idle):	17 psi minimum
Oil pressure (cruise):	71 psi minimum at 5,300 rpm
Oil temperature (range):	122 degrees F min - 212 max degrees F
	optimum range 170 - 194 degrees F
Bus voltage:	12.2 VDC, minimum
Alternator current:	100W at 1740 rpm; 280W at 5300 rpm
Cruise fuel flow:	3 - 4 gph

1.5 Airspeed indicator markings

White arc:	Bottom Vso 38 mph, top Vfe 60 mph (in position 1)
Green arc:	Bottom Vsi 38 mph, top Vno 80 mph (full flaps)
Yellow arc:	Va 91 - 120 mph
Red line:	Vne 120 mph

1.6 Fuels and lubricants

Fuel:	Aviation 100LL
Oil type:	NO aircraft engine oils. Only Mobile 1, 100% synthetic for automobile engines (API minimum SJ), at least 5W-40W highly recommended
Oil volume:	3 quarts (2.8 liters)

2.0 Limitations

(Sea level, ISA, IAS @ gross weight)

Empty weight:	608 lbs.
Gross weight (@ 6g):	1000 lbs.
Useful load:	398 lbs.
Baggage capacity: (with two persons)	28 lbs.
Service ceiling:	16,500’
Design ultimate load factors (@ gross weight):	6g+, 4g-
Never exceed speed (Vne):	120 mph
Maximum direct cross wind component:	25 mph
Minimum turning circle:	20.5’
Engine redline:	5300 rpm
Fuel capacity:	10 gal useable, 60.7 lbs. (37.85 liters useable, 27.5 kg)

3.0 PERFORMANCE

3.1	Takeoff distance, hard surface (@ gross weight)	
	No flaps, no wind:	250’
	To clear 50’ obstacle:	800’
3.2	Landing distance, hard surface	
	Flaps @ 40, no wind:	125’
	To clear 50’ obstacle:	500’
3.3	Other	
	Stall (1/2 to full flaps - Vso):	37 mph
	Stall (no flaps - Vs1):	44 mph
	Touchdown:	55 mph
	Rotation (Vr):	55 mph
	Final approach (full flaps, Vref)	60 mph
	Best angle of climb (Vx)	60 mph
	Best rate of climb (Vy)	70 mph
	Rate of climb	1200 fpm
	Maximum full flap extended (Vfe)	80 mph
	Best glide (max L/D+11.1, Vglide)	55 mph
	Cruise - climb @ 5000 rpm	85 mph
	Maneuvering (Va)	91 mph
	Never exceed (Vne)	120 mph

4.0 Weight and balance

4.1 Weight

Nominal empty weight	608 lb.
Nominal gross weight	1000 lb.
N114SV actual weight empty	608 lb.
N114SV operating (calculated) gross weight each flight: EW + pilot and passenger + fuel + baggage	1000 lb.

4.2 Balance

See calculated allowable flight range in Appendix 2.

See Appendix 2 for the Weight and Balance Check Sheet.

In addition to the equipment specified in Sections 1.2 and 1.3, the following items are included in the Aircraft Empty Weight:

Aeroleds sunlight .2, Aeroleds brackets, AveoflashLP LSA led strobes and running lights

Aerolux 3-blade ground adjustable prop

Batteries: one lead acid polymer

Oil: 3 qts, or more, depending on oil reservoir

Unusable fuel: 1/2 gal

Seats and pads

5.0 Normal procedures

5.1 Preflight checklist

POH and documents:	On board
Fuel visual check:	Perform
Battery master:	Off
Controls:	Free
Oil level:	Between 1/3 - 2/3
Prop and spinner:	Check
Air and oil cooling inlets:	Clear
Aileron locks:	Remove and stow
Tires, pants and fairings	Check
Rudder cables:	Check
Fuselage static port:	Clean and unblocked
Pitot tube cover:	Remove and stow
Pitot tube:	Clean and unblocked
General airframe:	Examine
Harnesses:	Check
Seats and cushions:	Adjust
Chocks/tie downs/rings:	Remove and stow

5.2 Start-up

Circuit breakers:	Check
Controls:	Free
All switches:	Off

Brakes:	Apply
Throttle:	Idle
Master:	On
Fuel pump:	On
Prop area:	Clear
Mags:	Both
Starter:	Engage
Throttle:	Approx. 2,000 rpm
Oil pressure:	Check
Bus voltage/current:	Check
Avionics master:	On
Strobes/lights:	On
Radio:	On and test frequency

5.3 Run-up (before takeoff check)

Brakes	As necessary
Controls:	Free
Trim:	Neutral
Alternate fuel pump:	Test
Throttle:	Approx. 1,750, not more than 57 psi
Mags:	L, both, R, both (no limit in engine rpm drop; engine should keep running
Oil pressure	10 - 95 psi
Oil temperature	Min. 122 degrees F

	CHT	Min. 200 degrees F
	Throttle:	Idle
	Avionics:	Check
	Altitude:	Adjust to field level
	Doors:	Latched
	Flaps:	Set for takeoff
5.4	Takeoff	
	Oil temperature	Min. 125 degrees F
	Throttle:	Full open slowly
	Brakes:	Release
	Gauges:	Monitor
	Rotation rpm:	5300 rpm
	Rotate:	>55 mph
5.5	Climb	
	Best angle (Vx):	60 mph
	Best rate (Vy):	70 mph
5.6	Cruise	
	Trim:	As needed
	Throttle:	4500 to 5000 rpm
	Red-line:	5300 rpm, 5 minute maximum
	Bus voltage and ammeter:	Monitor (12 - 14.5 V)
	All gauges:	Monitor
	Course:	Monitor

	Airspace restrictions:	Observe
	Weather conditions:	Monitor
	Icing conditions/OAT	Monitor
5.7	Approach	
	Downwind:	75 mph IAS, 500’/minute descent
	Cross and final:	65 mph IAS, 500’/minute descent
	Flaps:	As needed
	Touchdown speed:	Approx. 45 mph
5.9	Shutdown	
	Turbo cool down	CHT not to exceed 248 degrees F
	Radio:	Off
	Ignition switch:	Off
	Lights:	Off
	Magnetos:	Off
	Master switch:	Off

Fuel systems

- Clean fuel tank
- Clean or change fuel pump filter (Bosch 0450905280 / F 5280)
- Clean inlet strainers
- Inspect condition and security of fuel lines
- Pressurize and check fuel system for leaks
- Inspect throttle linkage

Cabin - inspect

- Door structure and mounts
- Door latches
- Lexan windows for cracks, pits, or other damage
- Condition of seats and cushions
- Condition of harnesses and attachment points
- Check elevator trim operation
- Check flap operation
- Check rudder pedal operation
- Check rudder pedal cables and attachments
- Check brake system, cables and associated attachments
- Check control stick, linkage, and push/pull tubes (both ends)

Instruments - inspect

- Master/starter contactors and associated wiring
- Instrument lines and attachments
- Pitot system for leaks