



# FLIGHT TEST CHECKS

<b>AUTO-PILOT INSTALLATIONS</b>		<b>LAA/FT-AP Issue 1</b>
A/C Type:	Reg:	Date:
Auto-pilot Make/Model:		

- Notes: 1. *Valid PFRC issued by LAA Engineering required prior to flight.*  
 2. Do not attempt to carry out this flight test without first reading and understanding the guidance material in Technical Leaflet TL 3.19.  
 3. Check items 1 to 4 first on the ground then, if found satisfactory, also in flight.  
 4. Circle SAT (satisfactory) or UNSAT as appropriate

## GENERAL

1. Check both of the required auto-pilot 'disengage' switches for suitable location and operation.

SAT	UNSAT	Comments:
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2. If fitted, check the correct operation and effectiveness of the audible 'auto-pilot disengaged/maximum force' warning horn.

SAT	UNSAT	Comments:
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3. Check the operation of both roll and pitch servo break-out systems as appropriate.  
 Note: Servos must maintain steady break-out torque but not disengage. If the servo disengages, adjustment or replacement may be necessary.

SAT	UNSAT	Comments:
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4. Check that radio transmissions from installed avionics from several frequencies throughout the available range do not affect servo operation.

SAT	UNSAT	Comments:
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5. The aircraft is to be flown at normal approach speed, power off with full flaps, auto-pilot off. Medium rudder sideslips are to be carried out to port and starboard. The aileron control is then to be released and the ability for the down wing to rise is to be checked.

	Port Sideslip (port wing low)	Stbd Sideslip (stbd wing low)	COMMENTS
Ailerons released	SAT / UNSAT	SAT / UNSAT	

6. Check that the auto-pilot (roll) and/or (pitch) systems, when engaged, do not induce airframe vibrations or flutter at airspeeds up to maximum level speed ( $V_H$ ), but not exceeding  $V_{NE}$  and not exceeding maximum engine RPM.

SAT	UNSAT	$V_H =$ kts. Comments:
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## ROLL SPECIFIC FUNCTIONS

7. Check that the auto-pilot (roll) system is able to maintain a wings-level and uniform rate turn condition to within  $\pm 10^\circ$  in normal use through light to moderate turbulence and that the correct system loop gain is set by ensuring that the auto-pilot (roll) system operates at a suitable rate but does not jitter.

SAT	UNSAT	Comments:
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8. Where coupled to a navigational system, check that the auto-pilot (roll) system is able to intercept and maintain a track, VOR, heading, etc. State the maximum angle off-track that the system is capable of acquiring the selected track.

SAT	UNSAT	Comments: Max off-track acquisition angle achieved: (Note: Max off-track acquisition angle possible is $180^\circ$ )
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9. Check that with the auto-pilot (roll) servo at maximum deflection obtainable, by use of the auto-pilot roll control (if fitted), either in normal use or in the event of a malfunction (simulated servo runaway) the roll response is not excessive and does not cause extreme deviations in the flight path assuming that corrective action begins within a reasonable time. From level flight, if corrective action is taken four seconds after initiation of the simulated runaway, roll angle should not at any time exceed 60 degrees.

To be checked at a representative range of different airspeeds / power settings and in left and right hand roll directions.

Note: Where auto-pilot roll control is not fitted it is permissible to roll the aircraft to 60 degrees using the aircraft aileron control (auto-pilot engaged) then release it and record the time taken for the auto-pilot to return the aircraft to a wings level attitude. The time taken should be more than four seconds.

SAT	UNSAT	Comments:
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## PITCH SPECIFIC FUNCTIONS Tick if not applicable

10. Check that the auto-pilot (pitch) system is able to maintain altitude in normal use to within  $\pm 30$  feet through light to moderate turbulence and that the correct system loop gain is set by ensuring that the system operates at a suitable rate but does not jitter.

SAT	UNSAT	Max altitude excursion observed:                      feet. Comments:
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11. Where an auto-pilot (roll) system is also fitted, check that the auto-pilot (pitch) system is able to hold altitude to within  $\pm 30$  feet while entering, during and exiting rate one turns each way commanded by the auto-pilot (roll) system.

SAT	UNSAT	Max altitude excursion observed:                      feet. Comments:
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12. If automatic pitch trim control is fitted, check that the pitch trim system operates in the correct sense to relieve loads on the auto-pilot (pitch) servo.

SAT	UNSAT	Comments:
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13. Where no automatic pitch trim control is fitted, check that the pitch trim annunciator system is operating and in the correct sense.

SAT	UNSAT	Comments:
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14. Where no automatic pitch trim is fitted, from a trimmed airspeed of  $V_{S1}$  (stall speed, flaps up) x 2.0 and following gradual reduction of engine power, check that the altitude hold system will slip to prevent the airspeed from decaying to  $V_{S1}$  x 1.2. Record the minimum airspeed reached at auto-pilot slip and, following auto-pilot disengagement, comment on the out-of-trim stick force required to prevent excessive pitch rate and the resulting stick-free pitch rate.  
 Note: Where a pre-programmable airspeed limit protection feature is installed, for this test it must be temporarily disabled or set to a value below  $V_{S1}$ .

SAT	UNSAT	$V_{S1} \times 2.0 =$ kts/mph	Observed Min speed = kts/mph
		$V_{S1} \times 1.2 =$ kts/mph	
		Comments: Out of trim forces: Stick free pitch rate:	

15. Where electric pitch trim is fitted, from trimmed level flight, simulate a pitch trim runaway by operating the pitch trim nose up continuously for four seconds and check at a representative range of airspeeds, but initially at a low speed for safety reasons, that there is no hazardous effect - e.g. extreme stick force, pitch rate, aircraft attitude, etc. Check that the auto-pilot (pitch) system slips but does not disengage. If the servo disengages, adjustment or replacement may be necessary. Repeat these checks with nose down trim. Following operation of the pitch trim for four seconds from trimmed normal cruise speed, upon manual auto-pilot disengagement comment on the out-of-trim force required to maintain steady level flight and the resulting stick-free pitch rate, nose up and down.

SAT	UNSAT	Comments: Out of trim force: Stick free pitch rate:
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16. By use of the auto-pilot climb or descent control, if fitted, set to the maximum rate obtainable, either in normal use or in the event of a malfunction (simulated servo runaway) check that the pitch response is not excessive and does not cause extreme deviations in the flight path assuming that corrective action begins within a reasonable time. From level flight, if corrective action is taken four seconds after initiation of the simulated runaway, pitch change should not at any time exceed 20 degrees. To be checked at a representative range of different airspeeds / power settings and in both pitch-up and pitch-down directions.

SAT	UNSAT	Comments:
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17. Where automatic climb and descent mode with vertical speed value selection is fitted, check that a representative range of rates of climb and descent achieved and maintained are within 20% of that selected.

SAT	UNSAT	Comments:
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18. Where pre-programmable airspeed limit protection is available, when selecting the maximum vertical speed setting, check that the maximum climb or descent rate is limited to an airspeed of no less than  $V_{S1} \times 1.5$  in the climb and no more than  $V_{NE} \times 0.9$  in the descent.

SAT	UNSAT	Maximum Vertical Speed Selectable = _____ fpm	
		$V_{S1} \times 1.5 =$ kts/mph	Observed Min climb speed = kts/mph
		$V_{NE} \times 0.9 =$ kts/mph	Observed Max descent speed = kts/mph
Comments:			

19. Where automatic climb and descent mode *without* pre-programmable airspeed limit protection is fitted, check that when the maximum vertical speed setting is selected, from normal trimmed cruise speed and with full power applied, the aircraft will not slow to less than  $V_{S1} \times 1.5$  in the climb nor when at idle power the aircraft will not accelerate to more than  $V_{NE} \times 0.9$  in the descent.

SAT	UNSAT	$V_{S1} \times 1.5 =$ kts/mph	Observed Min climb speed = kts/mph
		$V_{NE} \times 0.9 =$ kts/mph	Observed Max descent speed = kts/mph
Comments:			

20. Where automatic altitude capture mode is fitted, check that the altitude at which the aircraft levels and maintains is within  $\pm 30$  feet of that selected.

SAT	UNSAT	Comments:
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21. I certify that I have flown the above aircraft and that the above checks have been carried out to my satisfaction.

Name:	Signed:	Date:	Licence No.:
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Once completed, send this form to LAA Engineering.

**Important note:** *Following conclusion of satisfactory flight test, the modified aircraft must not be flown until issue of modification final approval.*