FEDERAL AVIATION AGENCY

4A17
Revision 5
LOCKHEED
1649A-98

February 11, 2013

AIRCRAFT SPECIFICATION NO. 4A17

This data sheet which is part of Type Certificate No. 4A17 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Civil Air Regulations.

Type Certificate Holder — Lockheed Martin Aeronautics Company
86 South Cobb Drive
Marietta, Georgia 30063-0655

Type Certificate Holder Record — Lockheed Aircraft Corporation
California Division
Burbank, California

I - Model 1649A-98, Approved March 29, 1957

Engines — 4 Wright Compound 988TC18EA-2 with .355 reduction gear ratio and 6.52:1 turbo drive ratio.

Fuel — Grade 115/145 (See NOTE 4 for low gear fuel)

Engine limits (*See NOTE 4 for limits with 100/130 and 108/130 grade fuel)*

Low impeller ratio 6.46:1
Maximum continuous:
(Sea level) 51.0 in.Hg., 2650 rpm (2860 hp)
(Straight line manifold pressure variation with alt. to 4800 ft.)
49.5 in.Hg., 2650 rpm (2920 hp)
Takeoff (2.75 minutes):
(Sea level) 58.5 in.Hg., 2900 rpm (3400 hp)
(Straight line manifold pressure variation with alt. to 4000 ft.)
56.0 in.Hg., 2900 rpm (3400 hp)
High impeller ratio 8.67:1
Maximum continuous:
(10,800 ft.) 48.5 in.Hg., 2600 rpm (2415 hp)
(Straight line manifold pressure variation with alt. to 16,400 ft.)
47.0 in.Hg., 2600 rpm (2450 hp)

Airspeed limits (Calibrated)

Vno (Normal Operation)	300 mph (261 knots)
Above 18,800 ft. reduce speed 6 knots for each additional 1000 ft.	
Vne (Never exceed)	338 mph (294 knots)
NOTE. The C.A.S. is 294 knots at sea level increasing to 299 knots C.A.S. at 13,300 ft.	
Above 13,300 ft. reduce speed 6 knots for each additional 1000 ft.	
Va (Maneuvering)	227 mph (197 knots)
Vf (Takeoff position 80%)	213 mph (185 knots)
Vf (Landing position 100%)	184 mph (160 knots)
Vlo (Landing gear operation)	*213 mph (185 knots)
Vle (Landing gear extension)	213 mph (185 knots)
Landing light extension	213 mph (185 knots)
Mach. No. - Never exceed .57	
*Main landing gear when used as a "speed brake"	270 mph (234 knots)

Page No.	1	2	3	4	5	6	7	8
Rev. No.	4	3	3	3	3	5	3	3

C.G. range

See NOTE 1(b) for required loading and gear retraction moment.

Condition	Weight (lbs.)	Landing Gear	Fwd. Limit Sta.	Fwd. Limit %MAC	Aft Limit Sta.	Aft Limit %MAC
Takeoff	158,700	Down	683.4	22.2	-	-
	160,000	Down	693.5	28.5	699.1	32.0
	116,000 (or less)	Down	671.9	15.0	699.1	32.0
Landing	123,000	Down	673.9	16.2	699.1	32.0
	116,000	Down	671.9	15.0	699.1	32.0
	105,000	Down	671.9	15.0	699.1	32.0
	80,000	Down	671.9	15.0	683.1	22.0
(AFT limit is straight line from 32.0% at 105,000 lbs. to 22.0% at 80,000 lbs.)						
Cruising Flight	158,700	Up	679.8	19.9	702.3	34.0
	160,000	Up	693.5	28.5	702.3	34.0
	116,000 (or less)	Up	667.2	12.0	702.3	34.0

For a graphic illustration of C.G. limits, see Limitations Portion, Section 1, or Airplane Flight Manual, Lockheed Report No. 11560.

Weight limits *(See NOTE 4 for limits with low grade fuel)*

Landing 123,000 lbs.
Takeoff 160,000 lbs. with auto-feathering (Dump valves are required.

Maximum zero fuel weight 117,000 lbs.
See NOTE 1(e) for fuel loading.
3-Engine ferrying 118,000 lbs. See CAA Approved Airplane Flight Manual for applicable restrictions.

Minimum crew

3. Pilot and Co-pilot at +190 and Flight Engineer at +226.

Passengers

Maximum 99 (CAR 4b.362 as amended to 12-31-53). See Approved Weight and Balance Report for actual number and location.

Baggage

Maximum capacity of internal baggage and storage compartments:

		Vol. (cu. ft.)	Max. Floor Loading, psf	Cap. (lbs.)	Compt. C.G.
(A)	Fwd. cargo compartment			1860	405
	fwd. portion F.S. 333 to 490	93	70		
(B)	Fwd. cargo compartment			2920	549
	aft portion F.S. 490 to 610	146	70		
(C)	Aft cargo compartment			2540	855
	fwd. portion F.S. 815 to 930	127	70		
(D)	Aft cargo compartment			3800	1017
	aft portion F.S. 930 to 1140	190	70		
	Coat closet L.H. (entrance)			320	1001
	Coat closets R.H. (aft)			425	1154
	Coat closets L.H.(aft)			165	1164
	Wash water			500	907

Galley area between Stations 930 and 1014 and 10" from airplane centerline R.H. side is structurally satisfactory for a maximum total load of 2300 pounds, with a maximum unit floor loading of 70 lbs. per sq. ft.

Galley storage area between Station 930 and 950 and 10" from airplane centerline, L.H. side is structurally satisfactory for a maximum total load of 500 lbs. with a maximum unit floor loading of 90 lbs. per sq. ft.

Fuel capacity — See NOTE 1(c) regarding "Unusable Fuel and System Oil."

	Total Tank Cap		Usable Tank Cap		
Tanks 5 and 6 (inboard)	1370 gal. ea.	16440 lbs.	1365 gal. ea.	16380 lbs.	(+720)
Tanks 2 and 3 (middle)	1385 gal. ea.	16620 lbs.	1375 gal. ea.	16500 lbs.	(+711)
Tanks 1 and 4 (outboard)	1344 gal. ea.	16128 lbs.	1335 gal. ea.	16020 lbs.	(+701)
Tank 7 (center)	1646 gal.	9876 lbs.	1625 gal.	9810 lbs.	(+723)
Totals	9844 gal.	59064 lbs.	9785 gal.	58710 lbs.	

Oil capacity — See Note 1 (c) regarding "Unusable Fuel and System Oil."

Hamilton Standard Propeller Installation:			
2 inboard tanks	(45 gal. ea.)	675 lbs.	(+616)
2 outboard tanks	(45 gal. ea.)	675 lbs.	(+648)
1 auxiliary tank	(66 gal.)	495 lbs.	(+642)
Curtis Propeller Installation:			
2 inboard tanks	(47.5 gal. ea)	712.5 lbs.	(+616)
2 outboard tanks	(47.5 gal. ea)	712.5 lbs.	(+648)
1 auxiliary tank	(66 gal.)	495 lbs.	(+642)

Serial Nos. eligible — 1649A/1001 through 1649A/1048.

Required equipment — In addition to the pertinent required basic equipment specified in CAR 4b, the following items of equipment must be installed:
Items 1(a), (b) or (c); 101(a) or (b); 103(a); 104(a); 105(a); 106(a); 107(a); 200(a) or (b); 201(a); 202(a); 203(a); 204(a); 205(a); 206(a); 300(a) or (b); 301(a); 302(a); 303(a); 400; 440; 441(a); 508(a).

Specifications Pertinent to All Models

Datum — 774.8 in. forward of jig point. (Screwhead on bottom surface of wing at B.L. 41.52 and rear wing beam.)

MAC — 159.6 inches. Leading edge of MAC at Sta. 648.

Leveling means — Leveling plate under fuselage floor at ref. Sta. 657.

Control surface movements

Main surfaces (boost on) -	Elevator	39° up	20° down
	Aileron	23° up	16° down
	Rudder	29° right	29° left
Tabs (main surfaces in neutral)			
	Elevator	23° up	23° down
	Aileron	17° up	17° down
	Rudder	26° right	26° left

Flaps 38° total angular travel.

Certification basis *(See NOTE 5 for eligibility under regulations prior to March 13, 1956)* — Type Certificate No. 4A17 (CAR 4b as amended to December 31, 1953, including:
CAR 4b.353(e)(1) and (e)(2) as amended by CAB waiver, Order No. S-702 dated August 24, 1955;
CAR 4b.611(b) as amended by CAB waiver, Order No. S-719 dated December 22, 1955
CAR 4b.612(b)(5) as amended by CAB waiver, Order No. S-792 dated March 21, 1957; and the following amendments:
Amendment 4b-1, (dated May 18, 1954), complete.
Amendment 4b-2, (dated August 25, 1955), paragraphs 3, 4, 5, 7, 8, 9, 10, 19, 20, 23, 24, 25, 26, 27, 28, 29, 33, 34, 35, 36, 37, 38, 41, 43, 44, 49, 50, 51, 52.
Amendment 4b-3, (dated March 13, 1956), paragraphs 3, 4, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 21 through 33, 39, 41, 44, 45, 46, 54, 55, 60, and 62.)
The Model 1649A has been examined and found to comply with the Standards of Transport Category A of Annex 8 to the Convention on International Civil Aviation, entitled "Airworthiness of Aircraft," as amended to April 1952.
Compliance with the ditching requirements of CAR 4b has been demonstrated.
Maximum approved operating altitude 25,000 ft.

Production basis	Production Certificate No. 600.
Export eligibility	Eligible for export to all countries, subject to the provisions of MOP 2-4, except as follows: Canada - Landplane eligible Skiplane - not eligible

Equipment:

Propellers and Propeller Accessories (except De-Icing Equipment)

1	(a).	(1)	4 Propellers - Ham. Std. hubs 43H60, blades 6993B-4, hydromatic reversible with synchrophase	3267 lbs. (+518)
			Diameter: Max. 16' 10", min. allowable for repairs 16' 5-16", no further reduction permitted.	
			Pitch setting at 72 in. sta.: Low pitch +18.5°, reverse pitch -17.0°.	
			Propeller feathering pitch setting must prevent engine windmilling (+83.0°)	
			Operation with auto-feathering inoperative is not approved.	
		(2)	4 Propeller spinners - Ham. Std. 507945	116 lbs. (+517)
		(3)	4 Feathering pumps, Adel 28359-10	90 lbs. (+623)
		(4)	4 Governors - Ham. Std. 5U21-5	66 lbs. (+540)
		(5)	4 Propeller control box assemblies Ham. Std. 518416A	11 lbs. (+207)
		(6)	4 Brush block bracket assemblies Ham. Std. 501355	34 lbs. (+521)
		(7)	1 Synchrophaser - Electro-mechanical Ham. Std. 501210	34 lbs. (+193)
		(8)	1 Synchrophaser - Electronic Ham. Std. 510801	20 lbs. (+140)
	(b).	(1)	4 Propellers - Ham. Std. hubs 43H60, blades 6993B-4, hydromatic reversible with synchronizing	3258 lbs. (+518)
			Diameter: Max. 16' 10", min. allowable for repairs 16' 5-1/16", no further reduction permitted.	
			Pitch settings at 72 in. sta.: Low pitch +18.5°, reverse -17.0°	
			Propeller feathering pitch setting must prevent engine windmilling (+83.0°).	
			Operation with auto-feathering inoperative is not approved.	
		(2)	4 Propeller spinners - Ham. Std. 507945	116 lbs. (+517)
		(3)	4 Feathering pumps, Adel 28359-10	90 lbs. (+623)
		(4)	4 Governors - Ham. Std. 5U21-5	66 lbs. (+540)
		(5)	4 Propeller control box assemblies Ham. Std. 518416A	11 lbs. (+207)
		(6)	4 Brush block assemblies Ham. Std. 519709	32 lbs. (+521)
		(7)	1 Synchronizer - Ham. Std. 322518	40 lbs. (+193)
	(c).	(1)	4 Propellers - Curtiss hub C634S-C602, blades 958-1C4-2, electric reversible with synchronizing.	2822 lbs. (+518)
			Diameter: Max. 16' 10". Dia. reduction for repairs not permitted.	
			Pitch settings at 72 in. sta.: Low pitch +20.3°, reverse pitch -15.3°	
			Propeller feathering pitch setting must prevent engine windmilling (+86-1/2°)	
			Operation with auto-feathering inoperative is not approved.	
		(2)	4 Propeller spinners - Curtiss #156752	170 lbs. (+517)
		(3)	4 Alternators - Curtiss #155413	16 lbs. (+542)
		(4)	1 Synchronizer - Curtiss #15610Z	42 lbs. (+195)
		(5)	2 Voltage boosters - Curtiss #1554-2-A	40 lbs. (+574)

Engines and Engine Accessories - Fuel and Oil System

100.	Fuel Dump Valves (See NOTE 3 regarding use of dump valves)			
	(a)		6 Whittaker Type 116305	38 lbs. (+756)
101.	Unusable fuel and system oil (See NOTE 1(c) for definition).			
	(a)		For -98 P.P. install. with Ham. Std. propeller Item 1(a) consisting of 1 auxiliary oil tank.	
		(1)	Total unusable fuel	443 lbs. (+714)
			(a) System fuel	89 lbs. (+680)
			(b) Total tank unusable fuel (difference of total tank and usable quantity given under Fuel capacity)	354 lbs. (+721)
		(2)	System oil	702 lbs. (+580)

	(b) For -98 P.P. install. with Curtiss electric propeller Item 1(c) consisting of 1 auxiliary oil tank.	
	(1) Total unusable fuel	443 lbs. (+714)
	(a) System fuel	89 lbs. (+680)
	(b) Total tank unusable fuel (difference of total tank and usable quantity given under Fuel capacity)	354 lbs. (+721)
	(2) System Oil	540 lbs. (+588)
102.	4 Starters	
	(a) Eclipse Type 36E004	113 lbs. (+605)
	(b) J&H Type JH17230	107 lbs. (+605)
103.	4 Oil Coolers	
	(a) AiResearch Type 87161	237 lbs. (+594)
104.	4 Engine-driven fuel pumps	
	(a) Thompson Type TF-2100	16 lbs. (+593)
105.	7 Auxiliary fuel pumps	
	(a) Romec Type RR-11530-D	88 lbs. (+745)
106.	4 De-icer or vacuum pumps	
	(a) Pesco Type 3P-485	40 lbs. (+602)
107.	4 Hydraulic pumps	
	(a) New York Air Type 65WC06001-5 or -6	86 lbs. (+602)
	(b) Vickers Type AA-61573-L-3	100 lbs. (+602)
108.	1 auxiliary oil pump	
	(a) Pesco Type 012634-010-04	10 lbs. (+664)

Landing Gear

200.	2 Main gear shock struts	
	(a) LAC Part No. 661088-11	1422 lbs. (+729)
	(b) LAC Part No. 661088-13	1434 lbs. (+729)
201.	Nose gear shock strut	
	(a) Cleveland Type 9616	392 lbs. (+194)
202.	4 main wheel-brake assemblies	
	(a) 17.00-20, Type III	
	(1) Goodyear	
	(a) 4 wheels Part No. 9541026	495 lbs. (+729)
	(b) 4 brake assemblies Part No. 9560364	704 lbs. (+729)
203.	4 Main gear tires, Type III tubeless	
	(a) 17.00-20, 24 ply rating nylon (use actual wt.)	(+729)
204.	2 Nose wheel assemblies	
	(a) 34 x 9.9 Type VII	
	(1) Goodrich Part No. 3-913	79 lbs. (+186)
205.	2 Nose gear tires	
	(a) 34 x 9.9 Type VII tubeless 10 ply rating nylon (use actual wt.)	(+186)
206.	2 Main Landing gear drag strut dampers	
	(a) LAC Dwg. No. 661090-1	205 lbs. (+712)

Electrical Equipment

300.	Generators	
	(a) 6 D.C. Eclipse Type 30E02	381 lbs. (+601)
	(b) 4 D.C. Eclipse Type 30E02	254 lbs. (+606)
301.	Batteries	
	(a) 2 batteries 24 volts 36 amp. hr.	152 lbs. (+283)
302.	Inverters	
	(a) 3 Eclipse Type 1518-1(F or later)	110 lbs. (+363)
	(b) 1 Eclipse Type 32E03	62 lbs. (+481)
303.	Alternators	
	(a) 2 Pioneer Type 1632-1	12 lbs. (+580)

Interior Equipment

400. CAA Approved Airplane Flight Manual. (A Manual containing information required for the Airplane Flight Manual may be carried in lieu thereof in aircraft operated under the provisions of Parts 40, 41 and 42 of the Civil Air Regulations.) The following table identifies the airplane flight manuals and revisions thereto currently approved for each airplane:

Model	Report No.	Date of Issue or Revision
1649A-98	L.R. 11560	May 29, 1958

401.	Surface control equipment	
	(a) 1 Elevator booster Assembly LAC Dwg. No. 476741-7 or -9	112 lbs. (+1406)
	(b) 1 Rudder booster Assembly LAC Dwg. No. 476742-3 or -5	112 lbs. (+1406)
	(c) 1 Aileron booster Assembly LAC Dwg. No. 476740-5 or -7	112 lbs. (+788)
420.	2 cabin superchargers	
	(a) AiResearch Type 57970	205 lbs. (+653)
421.	2 Cabin supercharger drive shaft and disconnect assemblies	
	(a) LAC Dwg. No. 470093-8 and 644384-3	59 lbs. (+624)
422.	2 Cabin heaters	
	(a) Surface combustion Type D77A63	48 lbs. (+820)
423.	2 Cabin recirculating fans	
	(a) Joy Type X702-164	60 lbs. (+853)
424.	Cabin Refrigeration Installation including	
	(a) 2 Cooling units AiResearch Type 205520-1 or -2	62 lbs. (+720)
	(b) 2 Heat exchanger cooling blowers, AiResearch Type 49240-1 or -2	36 lbs. (+702)
	(c) 2 Primary heat exchangers AiResearch Type 19658	70 lbs. (+684)
	(d) 2 Secondary heat exchangers AiResearch Type 81118-1	92 lbs. (+720)
	(e) 2 Water separators AiResearch Type 84160-1-2	24 lbs. (+779)
440.	Emergency ladder or emergency chute See Approved Master Equipment List for approved locations, types, weights and arms for various configurations.	
441.	Fixed Oxygen system	
	(a) TWA installation in accordance with LAC Dwg. No. 478278 including:	
	(1) 2 Kidde Type No. 870326 cylinders	125 lbs. (+215)

De-icing Equipment

500.	Wing de-icer boots	
	(a) Goodrich Type 22 Pneumatic	254 lbs. (+659)
501.	Empennage de-icer	
	(a) Goodrich Type 21 and 22 Pneumatic	127 lbs. (+1351)
502.	Nose radome de-icer boot	
	(a) Goodrich Type 21 Pneumatic	23 lbs. (+105)
508.	Windshield Wipers	
	(a) 1 Dual Alco installed in accordance with LAC Dwg. No. 326072-500 or 326072-502	10 lbs. (+184)

NOTE 1. (a) Current weight and balance including list of equipment included in certificated empty weight, and loading instructions, must be in each aircraft at the time of original certification and at all times thereafter (except in the case of air carrier operators having an approved weight control system). See approved Master Equipment List (LAC Report 11866) for list of approved items of equipment in addition to those items listed in this specification.

(b) The airplane must be loaded so that the C.G. is within the specified limits at all times, with the effects of fuel use, gear retraction, and movement of crew and passengers from their assigned positions being considered (retraction of the main and nose gears causes the C.G. to move forward; a value of 208,000 in. lbs. is a satisfactory approximation of the change in moment for all approved wheel items). At takeoff, the airplane shall be loaded so that, due to fuel use, the C.G. cannot move forward of 15% MAC. A 34% aft C.G. limit (gear retracted) for cruising flight may be used when the effect of passenger and crew movements from their assigned positions has been taken into account.

(c) "Unusable Fuel and System Oil" and all hydraulic fluid must be included in the certificated weight empty. (See Item 101)
Unusable fuel is that quantity of fuel in the system and in the tanks which is unavailable to the engines under critical flight conditions as defined in CAR 4b.416. This unusable fuel, includes "system fuel" which is defined as the quantity required to fill the system and tanks to the tank outlet level when the airplane is in the ground level attitude. The fuel gages are calibrated with the unusable fuel level as the zero datum. The total amount of fuel (Unusable included in Item 101) is as follows:

Model	Total Usable Fuel (lbs. @ 6 lbs/gal.	Total Unusable Fuel (lbs. @ lbs/gal.)
1649A-98	58710	443

System oil is that amount of oil required to fill the oil systems and tanks to the tank outlets to the engines. The propeller feathering oil is not considered usable oil, and, when applicable, is included in "System Oil." The oil tank capacities shown in this specification include only the usable oil for which the tanks are placarded. Dipstick readings indicate the amount of usable oil.

Model	With Oil Transfer System	Prop. Item Installed	Usable Oil (lbs.)	System Oil (lbs.)
1649A-98	Yes	1(a) or (b)	1845	702
	Yes	1(c)	1920	540

(d) Fuel dumping. When fuel dump valves (Item 100) are installed per NOTE 3, the amount of usable fuel, over and above the unusable fuel listed in Item 101, remaining after dumping is as follows:

	Gallons remaining in tanks			
Model	Tank 7	1 & 4	2 & 3	5 & 6
1649A		203 each	219 each	4 each

(e) Fuel loading and usage.
(1) Fuel must be distributed and used in a manner that will permit compliance with the lateral balance limitations in the CAA Approved Airplane Flight Manual.
(2) For minimum fuel at any takeoff weight, refer to fuel loading and usage chart in the pertinent Approved Operating Manual.
(3) Fuel in Tank No. 7 will reduce the operational zero fuel weight by the amount of fuel therein at takeoff.
(4) By reason of structural limitations, the following fuel quantities shall not be exceeded during landing operations:

Model	Tanks 5, 6 & 7	2 & 3	1 & 4
1649A-98	No limitations	825 gal. ea.	825 gal. ea.

NOTE 2. The following placards must be installed:
(a) In full view of the pilots and flight engineer:
(1) "This airplane must be fueled and the fuel used in accordance with instructions contained in the CAA Approved Airplane Flight Manual."
(2) "This airplane shall be operated in accordance with the Operating Limitations in the CAA Approved Airplane Flight Manual."
(b) On the forward side of door at Station 260:
"This door must be locked open during all take-offs and landings."

NOTE 3. Fuel dump valves (Item 100) must be installed for operation of the airplane at weights in excess of maximum landing weight. Refer to CAA Approved Airplane Flight Manual for limitations and cautionary procedures to be observed during the dumping of fuel.

NOTE 4. The Wright compound 988TC18EA-2 engine is eligible for use with grade 100/130 and 108/135 fuel at the following ratings with automatic rich mixture settings only for all operations including cruise:

With low impeller gear ratio 6.46:1

Maximum continuous:

(Sea level) 44.0 in.Hg., 2600 rpm (2380 hp)

(Straight line manifold pressure variation with altitude to 9400 ft.)

41.5 in.Hg., 2600 rpm (2450 hp)

Takeoff (2.75 minutes):

(Sea level) 51.0 in.Hg., 2900 rpm (2880 hp)

(Straight line manifold pressure variation with altitudes to 8500 ft.)

48.0 in.Hg., 2900 rpm (2950 hp)

With high impeller ratio 8.67:1

Operation with grade 100/130 and 108/135 fuel is not permitted.

When using the above grade fuel and power ratings, the airplane weight limitations are as follows:

Landing:	123,000 lbs.
Takeoff:	139,500 lbs. at fwd. C.G., 141,700 lbs. at aft C.G.
Maximum zero fuel weight:	117,000 lbs.

NOTE 5. Airplanes modified for cargo operation and incorporating structural changes described by LAS Drawings 4009985, 4012584, 4012632 through 4012638, and 4012755 are eligible for certification under the Certification basis on page 2 but excluding the provisions of Amendments 4b-3 dated March 13, 1956. This provides eligibility for operation of the aircraft under SR-411B.

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