

DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION

A21SO  
Revision 7  
Embraer S.A.  
EMB-110P1  
EMB-110P2  
  
October 8, 2014

TYPE CERTIFICATE DATA SHEET NO A21SO

This data sheet which is part of Type Certificate No. A21SO prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder                      Embraer S.A.  
Av. Brigadeiro Faria Lima, 2.170  
12227-901 -- São José dos Campos -- SP  
Brazil

Type Certificate Holder Record            Empresa Brasileira de Aeronáutica S.A. (EMBRAER)  
changed company name to Embraer S.A. effective  
November 19, 2010.

I. - Model EMB-110P1 Bandeirante (Normal Category), Approved August 18, 1978

Engine    2 Pratt & Whitney of Canada Ltd.  
Pratt & Whitney PT6A-34

Fuel     JP-4, JP-5, Jet A, Jet A-1 and Jet B, to conforming to P&W specifications PWA522 or  
CPW 46.  
See NOTE 4.

Oil    In accordance with P&W Specification PWA521 or CPW202 (MIL-L-23699A).

<u>Engine Limits</u>	<u>PROP SHAFT SPEED</u>	<u>N<sub>1</sub> GAS GENERATOR SPEED</u>	<u>TIT (° C)</u>
Take-off	750	2200	101.5 790
Max. Continuous	750	2200	101.5 790
Starting	---	---	---
Max. Reverse (1 min.)	400	2068	1090 (2 sec.) 925 (10 sec.) 790

Propeller and Propeller Limits            2 Hartzell HC-B3TN-3C/T10178H-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-5, 5P, 6P, 12P, 17P  
or  
2 Hartzell HC-B3TN-3D/T10178HB-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P 17P;  
or  
2 Hartzell HC-B3TN-3C/T10178-HB-8R  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P, 17P  
or  
2 Hartzell HC-B3TN-3C/T10178-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-5, 5P, 6P, 12P, 17P

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

or  
2 Hartzell HC-B3TN-3D/T10178B-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P, 17P  
or  
2 Hartzell HC-B3TN-3C/T10178B-8R  
Diameter: 93 in. (No further reduction permitted.)  
Spinner: Hartzell D3434-6, 6P, 12P, 17P.  
Pitch settings at 30 in. sta.  
Reverse:  $-11^{\circ} \pm 0.5^{\circ}$   
Feather:  $+88.1^{\circ} \pm 0.1^{\circ}$   
Primary pick-up angle:  $+20.2^{\circ} \pm 0.2^{\circ}$   
Secondary low pitch stop angle:  $14^{\circ} \pm 1^{\circ}$

Airspeed Limits

Max. Operating Speed (See POH and ANAC approved AFM)	265 mph	(230 knots)
Maneuvering Speed (See POH and ANAC approved AFM)	195 mph	(169 knots)
Maximum Landing Gear Extended and Operating (Extension and Retraction) Speed	168 mph	(146 knots)
Maximum Flap Extension Speed		
25% ( $9.5^{\circ}$ )	207 mph	(180 knots)
100 % ( $38^{\circ}$ )	170 mph	(148 knots)

C. G. Range

(Landing Gear Extended)  
(See NOTE 5)

(+255.5) to (+272.0) at 12,500 lbs.  
(+251.3) to (+272.0) at 8818 lbs. or less  
Straight line variation between points given.

Moment change due to retraction of landing gear: 10068 in. lb.  
(The C. G. is shifted forward with retraction of landing gear).

Empty Weight C. G. Range  
(See NOTE 5)

None

Maximum Weight  
(See NOTE 5)

Take-off	12,500 lbs.	
Landing	12,015 lbs.	(See NOTE 8)
Zero Fuel	12,015 lbs.	(See NOTE 1)
Ramp	12,566 lbs.	

Minimum Crew

Day VFR operations - (1) pilot  
All other operations - See POH/AFM.

Number of Seats

21 seats  
Crew (+19)  
See loading instructions for passenger loading.  
See NOTE 9 for cargo version.

Maximum Baggage

(Passenger Configuration)

705 lb. (+409) or, as optional 926 lbs.  
(+409) (per EMBRAER Drawing Nos. 110P1-863-40-51 and  
110P1-856-24)

Maximum Cargo

(Cargo Configuration)

Class "E" Compartment  
3977 lb. See cargo loading instructions.  
Maximum floor loading 100 lb./sq. ft.

<u>Fuel Capacity</u>	454 gallons (227 gallons each tank) (+283.5) Unusable fuel 7.4 gallons (3.7 gallons each tank)
<u>Oil Capacity</u>	9.2 quarts in each engine (+226.4) 1 quart in each oil radiator (+226.0)
Max. Operating Altitude	25,000 ft.
<u>Temperature Operating Limits</u>	Maximum: 43° C or ISA + 40° C, whichever is lower Minimum: -50° C

II - Model EMB-110P2 Bandeirante (Normal Category) Approved October 1, 1979

<u>Engine</u>	2 Pratt & Whitney of Canada Ltd. Pratt & Whitney PT6A-34
<u>Fuel</u>	JP-4, JP-5, Jet A, Jet A-1 and Jet B, conforming to P&W specifications PWA522 or CPW46. See NOTE 4.

Oil In accordance with P&W Specification PWA521 or CPW202 (MIL-L-23699A).

<u>Engine Limits</u>	<u>PROP</u>		<u>N<sub>1</sub> GAS</u>	
	<u>SHP</u>	<u>SHAFT</u>	<u>GENERATOR</u>	<u>TIT(°C)</u>
Take-off	750	2200	101.5	790
Max. Conditions	750	2200	101.5	790
Starting	---	---	---	1090 (2 sec.) 925 (10 sec.)
Max. Reverse (1 min.)	400	2068		790

Propeller and Propeller Limits 2 Hartzell HC-B3TN-3C/T10178H-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-5, 5P, 6P, 12P 17P;  
or  
2 Hartzell HC-B3TN-3D/T10178HB-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P, 17P;  
or  
2 Hartzell HC-B3TN-3C/T10178HB-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P, 17P,  
or  
2 Hartzell HC-B3TN-3C/T10178-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-5, 5P, 6P, 12P, 17P  
or  
2 Hartzell HC-B3TN-3C/T10178B-8R,  
Diameter: 93 in. (No further reduction permitted).  
Spinner: Hartzell D3434-6, 6P, 12P, 17P.  
Pitch settings at 30 in. sta.  
Reverse: -11° ± 0.5°  
Feather: +88.1° ± 0.1°  
Primary pick-up angle: +20.2° ± 0.2°  
Secondary low pitch stop angle: 14° ± 1°

<u>Airspeed Limits</u> (IAS)	Max. Operating Speed	265 mph	(230 knots)
	(See POH and ANAC approved AFM)		
	Maneuvering Speed	195 mph	(169 knots)
	(See POH and ANAC approved AFM)		
	Maximum Landing Gear Extended and Operating (Extension and Retraction) Speed	168	(146 knots)
	Maximum Flap Extension Speed		
	25% (9.5°)	207 mph	(180 knots)
	100 % (38°)	170 mph	(148 knots)

<u>C. G. Range</u> (Landing Gear Extended) (See NOTE 5)	(+255.5) to (+272.0) at 12,500 lbs.
	(+251.3) to (+272.0) at 8818 lbs. or less Straight line variation between points given.
	Moment change due to retraction of landing gear: 10068 in. lb. (The C. G. is shifted forward with retraction of landing gear).

<u>Empty Weight C. G. Range</u> (See NOTE 5)	None
---	------

<u>Maximum Weight</u> (See NOTE 5)	Take-off	12,500 lbs.
	Landing	12,015 lbs. (See NOTE 8)
	Zero Fuel	12,015 lbs.
	Ramp	12,566 lbs. (See NOTE 1)

<u>Minimum Crew</u>	Day VFR operations - (1) pilot All other operations - See POH/AFM.
---------------------	---

<u>Number of Seats</u>	21 seats Crew (+19), passenger variable See loading instructions for passenger loading.
------------------------	---

<u>Maximum Baggage</u>	529 lbs. (+417) or, as optional 705 lbs. (+409) per EMBRAER Drawing 110P1-856-10)
------------------------	--

<u>Fuel Capacity</u>	454 gallons (227 gallons each tank) (+283.5) Unusable fuel 7.4 gallons (3.7 gallons, each tank)
----------------------	--

<u>Oil Capacity</u>	9.2 quarts in each engine (+226.4) 1 quart in each oil radiator (+226.0)
---------------------	---

<u>Max. Operating Altitude</u>	25,000 ft.
--------------------------------	------------

<u>Temperature Operating Limits</u>	Maximum 43° C or ISA + 40° C, whichever is lower Minimum -50° C
-------------------------------------	--

DATA PERTINENT TO ALL MODELS

<u>Datum</u>	269.68" forward of the 28% wing chord line (frame 16). The 28% wing chord line is 37.13" forward of the rear jack points.
--------------	--

<u>Leveling Means</u>	Plumb from the support in the upper internal part of frame 16 using as reference a mark on the floor.
-----------------------	---

<u>Control Surface Movements</u>	Elevator	22°	± 1°	Up
		20°	± 1°	Down
	Rudder	25°	± 1°	Left
		25°	± 1°	Right
	Aileron	22°	± 1°	Up
		14°	± 1°	Down
	Flap	38°	± 1°	Down
	Elevator Tab		± 1°	
	Left Tab	32°	± 2°	Up and Down
	Right tab fixed (non-operational)			
	Aileron			
	Tab (left):			
	Manual	18°	± 3°	Up and Down
	Automatic			
	Aileron	Up	22°	
	Aileron Tab	Up	16°	± 2° (anti servo)
	Aileron	Down	14°	
	Aileron Tab	Down	8°	± 2° (anti-servo)
	Rudder			
	Tab			
	Manual	Right	12°	± 2°
		Left	11°	± 2°
	Automatic			
Rudder	Right	25°	- rudder	
Tab	12°	± 1°	Left (Servo)	
Rudder	Left	25°	- rudder tab	
	4.5°	± 1°	left (anti-servo)	

Serial Numbers Eligible

A Brazilian Certificate of Airworthiness for Export endorsed as noted under "Import Requirements" must be submitted for each individual aircraft for which application for U.S. certification is made.

Import Requirements

An FAA Standard Airworthiness Certificate may be issued on the basis of a Brazilian Certificate of Airworthiness for Export signed by a representative of the Agência Nacional de Aviação Civil (ANAC) of Brazil, formerly the Centro Tecnico Aeroespacial (CTA) of Brazil, containing the following statement: "The airplane covered by the certificate has been examined, tested, and found to conform to the type design approved under Type Certificate No. A21SO and to be in condition for safe operation." (See NOTE 6).

Certification Basis

The EMB-110P1 was certificated showing compliance with: FAR 23 through Amendment 7, effective September 14, 1969, FAR 23.1529, Amendment 8, effective February 5, 1970: FAR 23.1441 through 23.1449, Amendment 9, effective June 17, 1970; FAR 23.1351(c)(4), Amendment 14, effective December 20, 1973; FAR 23.977, Amendment 17, effective February 1, 1977; FAR 23.785, Amendment 19, effective July 18, 1977; FAR 23.49, 23.65, 23.67, 23.77, and 23.1581 through 23.1589, Amendment 21, effective March 1, 1978; Equivalent safety level for FAR 23.1545(a) (Air Speed Indicator Marked in IAS); FAR 25.1439; Basic, effective December 24, 1964; FAR 25.787, 25.853., 25.855, 25.857, Amendment 32, effective May 1, 1972; (FAR 25 requirements for all cargo operations only) SFAR 27 through Amendment 1, effective January 1, 1975; FAR 36 through Amendment 6, effective June 24, 1977, FAR 135, Appendix A, effective June 19, 1970.

Compliance has been shown with the ice protection requirements of FAR 23.1419, Amendment 23-14, effective December 20, 1973.

Service Bulletins are approved by the ANAC. This approval is considered FAA approval. (This approval pertains to the design data only).

Date of application for EMB-110P1; June 22, 1978. Type Certificate No. A21SO issued August 18, 1978.

Date of application for EMB-110P2 is March 22, 1977. T.C. A21SO amended to include P2.

The EMB-110P2 was certificated showing compliance with the same regulations as EMB-110P1, except FAR 25.1439 and 25.857, which are applicable to cargo configurations only.

Certain models of the EMB-110P1 and EMB-110P2 also comply with SFAR 41A, effective April 14, 1980. See NOTE 5.

#### Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

The "Basic Equipment Checklist," "Chart A," lists all the required and optional equipment and is included in the POH and ANAC approved AFM.

NOTE 1. Current weight and balance report including list of equipment included in certificated empty weight and loading instructions must be provided for each aircraft at the time of original certification. The certificated empty weight and corresponding center-of-gravity location must include system (undrainable) oil (not included in oil capacity) and unusable fuel (not included in usable fuel) as follows:

Fuel	93 lbs.	at	(+285.8)
Oil	1.1 lbs.	at	(+226.4)

NOTE 2. All placards required in the Pilots Operating Handbook and ANAC Approved Airplane Flight Manual must be installed in the appropriate locations.

The following Pilot's Operating Handbook and ANAC Approved Airplane Flight Manual is required: EMBRAER Publication No. TP-110P1/176, dated August 18, 1978 (with appropriate revisions).

In addition, for those aircraft which have been approved for operation at increased weights permitted by SFAR 41A, a placard must be installed in the cockpit, in clear view of the pilot, which reads as follows:

"THIS AIRPLANE IS APPROVED IN ACCORDANCE WITH SFAR 41A FOR MAXIMUM TAKEOFF WEIGHT OF 13,007 LBS. AND MAXIMUM LANDING WEIGHT OF 12,566 LBS."

NOTE 3. The service life limits of the main structural parts are listed in the EMBRAER Maintenance Planning Guide, T.P. 110P2/145. These are summarized below:

Wing and wing carry-through structure - 30,000 hours

Front spar, lower boom to fuselage attachments (P/N's 4A-2111.00.03, 4A-2111.00.04, 4A-1231.50.04, 4A-1231.50.06) - 17,000 hours

Engine mount - 21,000 hours

Main landing gear: Piston tube, P/N 14333:

.15,900 landings (for all models), or

.12,700 landings (for SFAR 41A aircraft - See NOTE 5), or

.As determined by the equation:

$$N = N_1 + N_0 \frac{(15,9000 - N_1)}{15,900}$$

for aircraft modified per SB 110-32-047 (increase in maximum landing weight) or per SB 110-00-003 (modifications to permit operation according to SFAR 41A)

N = new life limit of the piston tube.

N<sub>1</sub> = accumulated landings of the piston tube at the date of modification

N<sub>0</sub> = 12,700 landings for SB 110-00-003, or 13,700 landings for SB 110-32-047

Half drag strut, P/N 14284-A and 14334-A: 18,750 landings.

NOTE 4: If fuel conforming to specifications PWA522 or CPW46 is not available it is permissible to use aviation gasoline MIL-G-7752 of all grades for a total time period not exceeding 150 hours during any overhaul period.

NOTE 5. Aircraft modified in accordance with EMBRAER Drawing Number 110-P1-9000, Rev. 1, or S.B. 110-00-003 comply with requirements of SFAR 41A, effective April 14, 1980. For those aircraft, the following C. G. Ranges and Weights are applicable:

C. G. Range (Landing Gear Extended)	For Landing:	(+256.9) to (+272.0) at 12,566 lbs.
		(+255.0) to (+272.0) at 12,015 lbs.
		(+251.3) to (+272.0) at 8,818 lbs. or less
Straight line variation between points given.		
	For Takeoff:	(+257.8) to (+272.0) at 13,007 lbs.
		(+256.9) to (+272.0) at 12,566 lbs.
		(+255.6) to (+272.0) at 12,566 lbs.
		(+251.3) to (+272.0) at 8818 lbs. or less
Straight line variation between points given.		
Moment change due to retraction of landing gear: 10068 in lbs.		
(The CG is shifted forward with retraction of the landing gear).		

Empty Weight CG Range None

Maximum Weight	Takeoff:	13,007 lbs.
	Landing:	12,566 lbs.
	Zero Fuel:	12,015 lbs.
	(See NOTE 1)	
	Ramp	13,073 lbs.

NOTE 6. The airworthiness certificate on those aircraft which have been approved for operation at increased weights as permitted by SFAR 41A shall be endorsed as follows:

"This airplane at weights in excess of 5,700 kg does not meet the airworthiness requirements of ICAO, as prescribed by Annex 8 of the Convention of International Civil Aviation."

NOTE 7. For cargo version operation, Model EMB-110P1 must be equipped with:

- Cargo net for 9 g (EMBRAER Drawing 110P1-9878-10-01).
- Anti-smoke curtain (EMBRAER Drawing 110P1-9878-10-15).
- Smoke detection system (EMBRAER Drawing 110P1-9788-10-01).
- Protective breathing system and full face oxygen masks (EMBRAER Drawing 110P1-710-10).
- Retention cargo net ( 3 g).

NOTE 8. Models EMB-110P1 and EMB-110P2 may increase the maximum landing weight to 12,500 lbs. if modified in accordance with EMBRAER SB 110-32-047.

The following C.G. range is applicable.

C. G. Range (Landing Gear Extended)	For Landing:	(+256.5) to (+272.0) at 12,500 lbs.
		(+255.0) to (+272.0) at 12,015 lbs.
		(+251.3) to (+272.0) at 8,818 lbs. or less
	For Takeoff:	(+255.6) to (+272.0) at 12,500 lbs.
		(+251.3) to (+272.0) at 8,818 lbs. or less
Straight line variation between points given.		

NOTE 9. Cargo version must be maintained in accordance with the original certification requirements of a 10 or more passenger aircraft.

....END....