

AUTO FLIGHT - CAT IIIa AUTOLAND INSTALLATION

1. PLANNING INFORMATION

A. SB EFFECTIVITY

Aircraft affected:

MODEL	SN
Embraer 195()	19000050, 19000067, 19000157, 19000169 thru 19000172, 19000196, 19000244, 19000245, 19000256, 19000258, 19000270, 19000276, 19000280, 19000281, 19000290, 19000297, and 19000300.

In-production effectivity:

The subject presented in this bulletin does not affect any in-production aircraft.

B. CONCURRENT REQUIREMENTS

Make sure that PRIMUS EPIC Field-Loadable Software System (LOAD 23.1) (ref. SB190-31-0033, or a higher version, has been installed before the accomplishment of this bulletin.

C. REASON

(1) HISTORY

Operators have requested the installation of the Category IIIa Autoland system in the aircraft. Therefore, it is necessary to install the autopilot rudder servo.

(2) OBJECTIVE

To install the autopilot rudder servo, and upload the Primus EPIC APM options to enable the Autoland function.

(3) EXPECTED BENEFITS

This modification is intended to enable aircraft to perform automatic landings with a system certified for Category IIIa Operation (CAT IIIa).

(4) REVISION HISTORY

None.

D. DESCRIPTION

The modification described in this bulletin consists in:

- Installation of an autopilot rudder servo;
- Installation of the autopilot servo bracket for the rudder servo;
- Installation of an autopilot rudder cable;
- Installation of a placard on the autopilot servo bracket for the rudder servo;
- Installation of a placard on the autopilot rudder servo;
- Electromagnetic Interference (EMI) test (covered by AUTOLAND test procedure),
- Upload of the Aircraft Personality Module (APM) Options.
- AUTOLAND operational test on the ground;
- AUTOLAND operational verification flight.

To do this, it is necessary to gain access to the cockpit area and to the forward avionics compartment in zone 123.

NOTE: The modification presented in this bulletin does not affect Fatigue Critical Structure (FCS).

E. COMPLIANCE

This bulletin may be accomplished at any time, at the operator's discretion.

F. APPROVAL

The technical aspects of this Service Bulletin are approved by: Agência Nacional de Aviação Civil (ANAC).

G. ESTIMATED MANPOWER

This estimate is for direct labor only, performed by experienced personnel, and does not include the time to plan, prepare, or inspect the work.

It is assumed that all the tools, parts, and other means are readily available when necessary.

This estimate does not include the sealant, paint, or adhesive curing time.

- Disassembly: 0.32 man-hours.
- Modification: 2.50 man-hours.
- Assemblage: 0.32 man-hours.
- Test: 1.50 man-hours.

H. WEIGHT AND BALANCE

- Change in basic weight: + 7.107 lb (+ 3.224 kg).
- Change in basic moment: + 313.378 lb.in (+ 3.868 kg.m).

I. SOFTWARE ACCOMPLISHMENT SUMMARY

None.

J. REFERENCES

AMM 190/()	Aircraft Maintenance Manual PART II - 20-00-00 and 20-10-09 - STANDARD PRACTICES-AIRFRAME.
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AMM 190/()	Aircraft Maintenance Manual PART II - 22-11-04, 22-11-05, 22-11-06, and 22-11-09 - AUTO FLIGHT.
AMM 190/()	Aircraft Maintenance Manual PART II - 24-41-02 and 24-42-02 - ELECTRICAL POWER.
AMM 190/()	Aircraft Maintenance Manual PART II - 31-41-00 - INDICATING/RECORDING SYSTEMS.
AMM 190/()	Aircraft Maintenance Manual PART II - 45-45-00 - CENTRAL MAINTENANCE SYSTEM.
SB190-31-0033	INDICATING/RECORDING SYSTEMS - LOAD 23.1 VERSION FOR PRIMUS EPIC FIELD-LOADABLE SOFTWARE SYSTEM.

K. OTHER PUBLICATIONS AFFECTED

AIPC 190/()	Aircraft Illustrated Parts Catalog - 22-11-06 - AUTO FLIGHT.
AFM 190	Airplane Flight Manual
AOM 190	Airplane Operations Manual

2. MATERIAL INFORMATION

A. MATERIAL - PRICE AND AVAILABILITY

(1) MATERIAL AVAILABLE FROM EMBRAER

The material below required for the accomplishment of this bulletin will be available from Embraer.

The estimated delivery date will be provided by Embraer upon request.

The prices are for reference only, subject to confirmation upon receipt of orders.

When ordering, specify SB 190-22-0004 and Top Kit PN BS1902200040001, which comprises PN 190-03970-603.

REF	TOP KIT PN	Unit Price (US\$)	TOP KIT EFFECTIVITY
01	BS1902200040001	341.66	SB EFFECTIVITY.

B. INDUSTRY SUPPORT INFORMATION

Embraer will provide the necessary support for the accomplishment of this service bulletin with the Embraer Technical Representatives or through the Embraer Fleet Technical Center. See address below:

Embraer - Empresa Brasileira de Aeronáutica S.A.
ATT.: Product Support Engineering - EFTC
Phone: 55 12 3927 6693 or 55 12 3927 3144
E-mail: 170flightcontrol@embraer.com.br

C. MATERIAL NECESSARY FOR EACH AIRCRAFT

When applicable, the use of alternative or similar parts in place of the one specified in the kits is allowable, provided that these alternative or similar parts are approved by Embraer as indicated in the related Embraer Technical Publications or through a formal Embraer communication channel.

The necessary expendable or consumable parts presented in the AMM Tasks referred to in this bulletin should be procured from the operator's inventories or ordered as spares.

The complementary information, when necessary, is presented as Notes in the respective Table.

For ordering information and Top Kit effectivity refer to section [2. MATERIAL INFORMATION](#) of this Bulletin.

(1) TOP KITS AND KITS

PN 190-03970-603					
NEW PN	DESCRIPTION	OLD PN	QTY SUP	QTY USED	DISP
NAS509-4	Nut	-	02	02	2
MS24665-134	Cotter pin	-	02	02	2
NAS1149FN332P	Washer	-	04	04	2
NAS1149F0432P	Washer	-	05	05	2
MS20995C20	Lock wire	-	500 mm	AR	6
171-06712-401	Cable assy	-	01	01	2
170-03487-401	Cable assy	-	01	01	2
AN4-6A	Bolt	-	04	04	2

(2) MATERIAL AVAILABLE FROM OTHER VENDORS

Order the Compact Disk listed in the table below from Embraer as a spare part or directly from Honeywell:

Honeywell CD-ROM Part Number	APM OPTIONS Part Number	Aircraft SN	Functionality
DM7038966-104	TT7038966-104	19000172, 19000196, 19000244, 19000276 and 19000281	CATIII, ADF, AHEAD, VDL2, no HF

Honeywell CD-ROM Part Number	APM OPTIONS Part Number	Aircraft SN	Functionality
DM7038966-106	TT7038966-106	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, ADSB, no RAAS, no HF
DM7038966-107	TT7038966-107	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, no HF, no ADSB, no RAAS
DM7038966-108	TT7038966-108	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, ADSB, RAAS, no HF
DM7038966-109	TT7038966-109	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, RAAS, no HF, no ADSB
DM7038966-136	TT7038966-136	19000157 and 19000169	CATIII, AHEAD, VDLA

Honeywell CD-ROM Part Number	APM OPTIONS Part Number	Aircraft SN	Functionality
DM7038966-146	TT7038966-146	19000050 and 19000067	CATIII, AHEAD, VDL2

DISPOSITION: 2 = Incorporate part bearing NEW PN
6 = Apply as required

QUANTITY: AR = As Required

- (a) Contact Honeywell for the necessary documentation or current material prices, availability and lead-times at one of the addresses below:

Honeywell Aerospace Electronic Systems
Attn: Customer Response Center
P.O. Box 21111
Phoenix, AZ 85036-1111
U.S.A.
Phone: 1-877-484-2979
Fax: 1-602-822-7272
International Direct Dial Phone: 1-602-436-0272

or

e-mail: cas-software-distribution@honeywell.com
Phone: 602-436-6900
Fax: 602-822-7272
Toll free fax: 877-484-2980
Michelle Miller
Phone: 602-436-0290

D. MATERIAL NECESSARY FOR EACH SPARE

The material listed below, required for the accomplishment of this bulletin, should be ordered from Embraer as spare parts.

NEW PN	DESCRIPTION	OLD PN	QTY SUP	QTY USED	DISP
2R5310A	Autopilot rudder servo	-	01	01	2
291302A	Rudder servo bracket	-	01	01	2
171-05712-607	Placard	-	02	02	2

DISPOSITION: 2 = Incorporate part bearing NEW PN

QUANTITY: AR = As Required

E. REIDENTIFIED PARTS

None.

F. TOOLING - PRICE AND AVAILABILITY

Remote Terminal Software RT19.02+DLS5.0.2 is required for the accomplishment of this Bulletin. If necessary, the Tools Compact Disk PN TM7035299-016 should be procured from the operator's inventories or ordered from Honeywell.

3. ACCOMPLISHMENT INSTRUCTIONS

- NOTE:** 1) Obey all of the WARNINGS and CAUTIONS included in the referenced manuals and procedures.
- 2) The Manuals and other documents are referred to by acronyms or using a simplified form. Refer to section [1.J. REFERENCES](#) for a more complete definition.

The steps below outline the general accomplishment instructions.

- A. Make sure that PRIMUS EPIC Field-Loadable Software System (LOAD 23.1) (ref. SB190-31-0033), or a higher version, has been installed before or in conjunction with the accomplishment of the steps below.

WARNING : MAKE SURE THAT THE AIRCRAFT IS IN A SAFE CONDITION BEFORE YOU DO THE MAINTENANCE PROCEDURES. THIS IS TO PREVENT INJURY TO PERSONS AND/OR DAMAGE TO THE EQUIPMENT.

- B. Make sure that the aircraft is safe for maintenance. Refer to AMM TASK 20-00-00-910-801-A/200 - Aircraft Maintenance Safety Procedures - Standard Procedures.

WARNING : MAKE SURE THAT POWERPLANT START/STOP SWITCHES 1 AND 2 ARE IN THE STOP POSITION. THIS IS NECESSARY TO PREVENT ELECTRICAL SHOCK OR DAMAGE TO THE EQUIPMENT.

- C. On the control pedestal, put a DO NOT OPERATE tag on the POWERPLANT control panel.

WARNING : MAKE SURE THAT THE APU CONTROL MASTER SWITCH IS SET AT OFF. THIS IS TO PREVENT AN ACCIDENTAL OPERATION OF THE APU. IF THE APU OPERATES ACCIDENTALLY, INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT CAN OCCUR.

- D. On the overhead panel, put a DO NOT OPERATE tag on the APU CONTROL panel.

- E. Disconnect the external AC/DC power suppliers from the aircraft. Refer to AMM TASK 24-42-02-860-802-A/200 - Disconnection of the external AC power supply from the

aircraft - Aircraft/System Configuration and AMM TASK 24-41-02-860-802-A/200 - Disconnection of the external DC power supply from the aircraft - Aircraft / System Configuration .

F. Put the DO NOT OPERATE tag to the external AC/DC power receptacles.

WARNING : MAKE SURE THAT THE BATT 1 AND BATT 2 SWITCHES ARE SET AT OFF. IF THE SWITCHES ARE NOT IN THE OFF POSITION, SOME BUSES WILL BE ENERGIZED. WHEN YOU DO WORK NEAR THESE BUSES, AN ELECTRICAL SHOCK CAN OCCUR AND CAUSE INJURIES TO YOU AND DAMAGE TO THE AIRCRAFT.

G. On the overhead panel, on the ELECTRIC control panel, put DO NOT OPERATE tags on BATT 1 and BATT 2 switches.

H. Do the servo installation procedure as follows:

- (1) Install autopilot rudder servo bracket PN 291302A in conjunction with autopilot rudder servo PN 2R5310A in accordance with AMM TASK 22-11-06-400-802-A/400 - Autopilot Rudder-Servo Bracket - Installation. Refer to [Figure 1](#).
- (2) Install autopilot rudder cable PN 171-06712-401 and PN 170-03487-401 in accordance with AMM TASK 22-11-09-400-801-A/400 - Autopilot Rudder Cable - Installation.
- (3) Install placard PN 171-05712-607 on autopilot rudder servo bracket (identified with PN 170-28307-407) in accordance with AMM TASK 20-10-09-400-801-A/400 - Placards and Markings - Installation. Refer to [Figure 1](#).
- (4) Install placard PN 171-05712-607 on autopilot rudder servo (identified with PN 170-28306-407) in accordance with AMM TASK 20-10-09-400-801-A/400 - Placards and Markings - Installation. Refer to [Figure 1](#).

I. Remove the DO NOT OPERATE tag from the external AC/DC power receptacles.

J. On the overhead panel, on the ELECTRIC control panel, remove the DO NOT OPERATE tags from BATT 1 and BATT 2 switches.

K. Connect the external AC/DC power suppliers to the aircraft. Refer to AMM TASK 24-42-02-860-801-A/200 - Connection of the external AC power supply to the aircraft -

Aircraft/System Configuration and AMM TASK 24-41-02-860-801-A/200 - Connection of the external DC power supply to the aircraft - Aircraft / System Configuration.

- L. Remove the DO NOT OPERATE tag from the POWERPLANT control panel.
- M. Remove the DO NOT OPERATE tag from the APU control panel.
- N. Do the full upload of the applicable APM Options, as indicated in table below. Refer to the applicable AMM TASK 45-45-00-470-801-A/200 - Aircraft Field-Loadable Software Uploading.

Honeywell CD-ROM Part Number	APM OPTIONS Part Number	Aircraft SN	Functionality
DM7038966-104	TT7038966-104	19000172, 19000196, 19000244, 19000276 and 19000281	CATIII, ADF, AHEAD, VDL2, no HF
DM7038966-106	TT7038966-106	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, ADSB, no RAAS, no HF
DM7038966-107	TT7038966-107	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, no HF, no ADSB, no RAAS
DM7038966-108	TT7038966-108	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, ADSB, RAAS, no HF

Honeywell CD-ROM Part Number	APM OPTIONS Part Number	Aircraft SN	Functionality
DM7038966-109	TT7038966-109	19000245, 19000256, 19000258, 19000270, 19000280, 19000290, 19000297 and 19000300	CATIII, RAAS, no HF, no ADSB
DM7038966-136	TT7038966-136	19000157 and 19000169	CATIII, AHEAD, VDLA
DM7038966-146	TT7038966-146	19000050 and 19000067	CATIII, AHEAD, VDL2

NOTE: 1. Compact Disk listed in table above required for the accomplishment of this bulletin should be ordered from Embraer or directly from Honeywell. Refer to paragraph [Item 2.C.\(2\)](#).

2. Do not use the Data-Loader Management Unit (DMU) to perform the APM Options transfer.

- O. Check if the part number of the APM Options is in accordance with table above. Refer to AMM TASK 31-41-00-970-801-A/200 - Configuration Monitor System (CMS) - System Configuration Check.
- P. After the Autoland installation, carry out a GROUND TEST simulating an AUTOLAND 1 approach and a landing procedure.

NOTE: Before starting the next [Step 3.P.\(1\)](#), make sure that all galley inserts (ovens, coffee makers, etc., of G1, G2 and G3 galleys) are turned on and remain in this state during all functional checks.

- (1) Verify if there is no "AUTOLAND 1 NOT AVAIL" message (cyan color) on the Engine Indicating and Crew Alerting System (EICAS).
- (2) On the OPR CONFIG MCDU PAGE, make sure that AUTOLAND Enable has been set.

- (3) Turn off radio altimeter 1 or 2 on the Multifunction Control Display Unit (MCDU) by opening the related Solid State Power Controller (SSPC)s. Verify if the "AUTOLAND 1 NOT AVAIL" advisory message (cyan color) is displayed on the EICAS.
- (4) Return the SSPCs to the original configuration.
- (5) On the Central Maintenance Computer (CMC), carry out the autopilot aileron servo loaded test. During the test follow the instructions shown on each page of the screen.
 - (a) CMC MAIN MENU
 - (b) SYSTEM DIAGNOSTICS
 - (c) 22 - AUTO FLIGHT
 - (d) 11 - AUTOPILOT A1 (or A2)
 - (e) AFCS APA1 (or APA2) AILERON LOADED TEST

NOTE: On the TEST RESULTS page, all bullets must show in green. If one or more bullets show in red, refer to the table given in AMM TASK 22-11-04-710-801-A/500 - Autopilot Aileron Servo - Operational Test to get the FIM tasks related to each bullet shown on the test screen.

- (6) On the CMC, carry out the Autopilot Elevator Servo loaded test. During the test, follow the instructions shown on each page of the screen.
 - (a) CMC MAIN MENU
 - (b) SYSTEM DIAGNOSTICS
 - (c) 22 - AUTO FLIGHT
 - (d) 11 - AUTOPILOT A1 (or A2)
 - (e) AFCS APA1 (or APA2) ELEVATOR LOADED TEST

NOTE: On the TEST RESULTS page, all bullets must show in green. If one or more bullets show in red, refer to the table given in AMM TASK 22-11-05-710-801-A/500 - Autopilot Elevator Servo - Operational Test to get the FIM tasks related to each bullet shown on the test screen.

(7) On the CMC, carry out the autopilot rudder servo loaded test. During the test, follow the instructions shown on each page of the screen.

- (a) CMC MAIN MENU
- (b) SYSTEM DIAGNOSTICS
- (c) 22 - AUTO FLIGHT
- (d) 11 - AUTOPILOT A1 (or A2)
- (e) AFCS APA1 (or APA2) RUDDER LOADED TEST

NOTE: On the TEST RESULTS page, all bullets must show in green. If one or more bullets show in red, refer to the table given in AMM TASK 22-11-06-710-801-A/500 - Autopilot Rudder Servo - Operational Test to get the FIM tasks related to each bullet shown on the test screen.

Q. Restore the aircraft to normal.

R. Carry out a verification flight in which must be included:

NOTE: 1) This flight is intended to check the rudder servo installation since AUTOLAND operations occur in a critical flight phase.

- 2) The verification flight must be conducted by a pilot qualified in AUTOLAND operation.
- 3) The verification flight must be performed at an airport equipped with a Category II (CAT II) or a Category III (CAT III) Instrument Landing System (ILS) beam with Visual Meteorological Conditions (VMC).

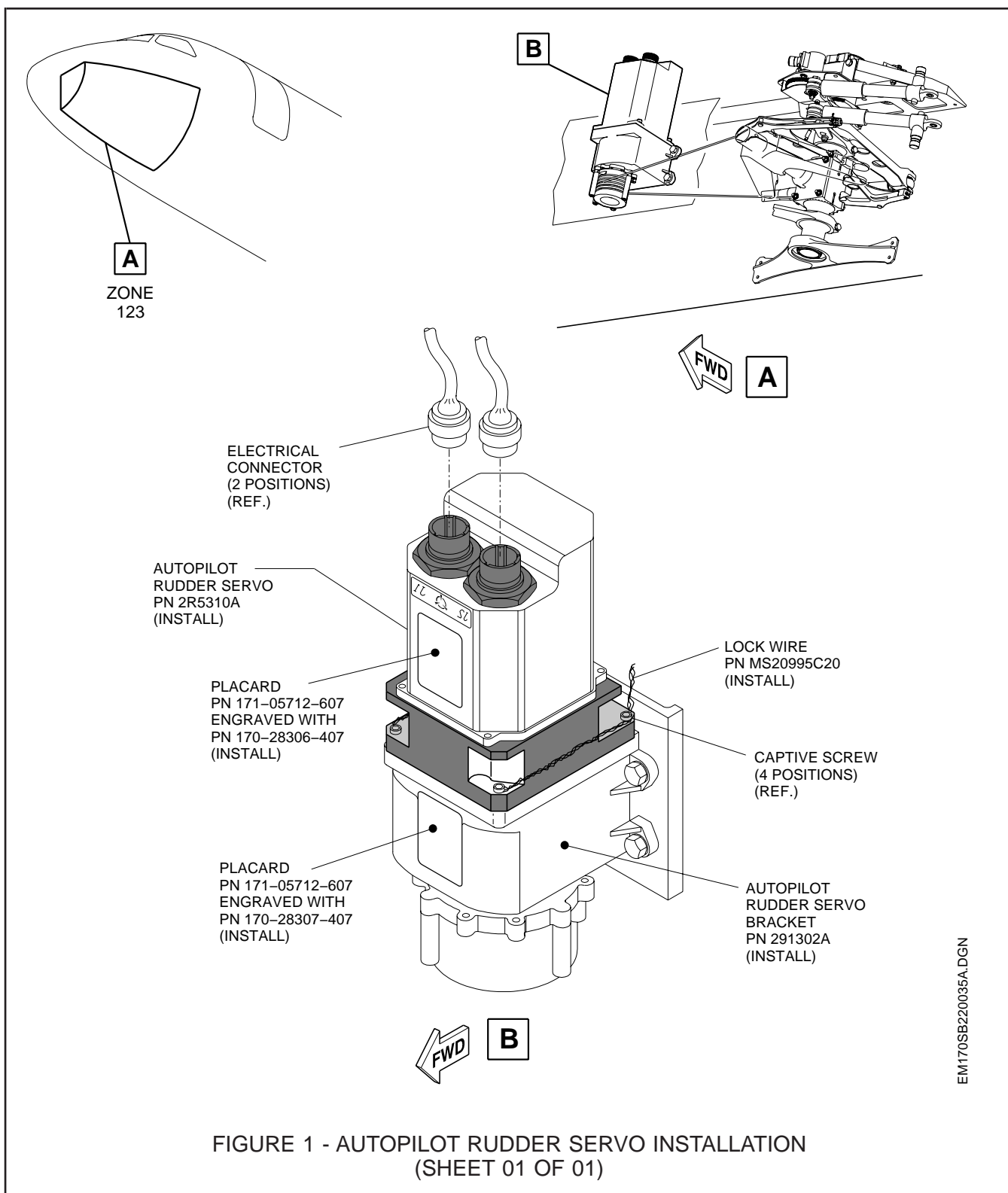
As a reference, a flight card is included to perform these check points. Refer to [Figure 2](#). In case the results of the verification flight are not approved, it is necessary to contact Embraer at the address given in [2.B. INDUSTRY SUPPORT INFORMATION](#).


S. Enter the accomplishment of this bulletin in the applicable documents.

NOTE: 1) Please inform us by e-mail fleet.reliability@embraer.com.br of the aircraft manufacturer serial number and the SB incorporation date, specifying the SB

Part(s) incorporated or whether the whole SB has been incorporated. This will enable Embraer to consider your aircraft configuration when providing future modifications.

- 2) To formally inform that the SB has been incorporated fleet-wide or that the SB will not be incorporated, so that Embraer can update the affected technical publications, use the “Service Bulletin Full-Fleet Incorporation Report” form, which is available on the Flyembraer portal (<http://www.flyembraer.com>).
- 3) Use the attached “Service Bulletin Evaluation” form to send us your comments regarding this SB. Your feedback will be much appreciated as an aid to help us improve the quality of the SBs.



 IFR APPROACH – AUTOLAND APPROACH	
No associated EICAS messages	CHECK
Autoland ENABLED on the MCDU	CHECK
Landing Speeds on MCDU	PERFORM
A/P – ON	PERFORM
AT – ON	PERFORM
ILS frequency set on both MCDU	CHECK
Navigation Source – V/L	PERFORM
BARO / RA selector knob (both) – RA	PERFORM
DH (Decision Height) – 50ft	PERFORM
Final course on both PFDs – SET	CHECK
IFR approach procedure	PERFORM
Upon heading to intercept the localizer – F/D mode APP button – PRESS	FMA CHECK
Prior to FAF – Landing Configuration – ESTABLISH	PERFORM
AUTOLAND 1 armed on status Approach Annunciator	FMA CHECK
Rudder Trim zero	PERFORM
Upon localizer capture : F/D lateral mode – LOC	FMA CHECK
Upon glideslope capture : F/D vertical mode – GS	FMA CHECK
PFD select Speed – SET	PERFORM
Crossing 1500 ft AGL and configured to CAT III : AUTOLAND 1 active on Status Approach Annunciator	FMA CHECK
Rudder servo engages and is tested by commanding a slight movement of pedals in both directions	CHECK
ILS approach	PERFORM
Airplane normal Behavior	CHECK
Aural message : " APPROACH MINIMUMS "	CHECK
Aural message : " MINIMUMS"	CHECK
Aural message : " 50 ", "40 ", " 30 ", " 20 ", " 10 " on the appropriate height	CHECK
ALIGN on PFD at 150 ft	FMA CHECK
FLARE on PFD at 50 ft	FMA CHECK
RETARD on PFD at 30 ft	FMA CHECK
DROT/RLOUT on PFD after touchdown	FMA CHECK
Automatic A/P disconnection after 5 sec	CHECK
Airplane normal landing behavior	CHECK
Brakes – normal apply until stop	PERFORM
AFTER LANDING NORMAL PROCEDURES (AFM)	PERFORM

CAUTION: Do not hesitate to execute a go around if required.

FIGURE 2 - AUTOLAND OPERATIONAL TEST CARD
(SHEET 01 OF 01)

EM170SB220038A.DGN



SERVICE BULLETIN EVALUATION

THE PURPOSE OF THIS FORM IS TO COLLECT DATA THAT WILL BE USED TO IMPROVE THE QUALITY OF OUR SERVICE BULLETINS AND UPDATE THE TECHNICAL PUBLICATIONS. PLEASE FILL IN FORM AND RETURN IT TO:

EMBRAER - EMPRESA BRASILEIRA DE AERONÁUTICA S.A.
EFTC - SERVICE BULLETIN ENGINEERING
AV. BRIGADEIRO FARIA LIMA, 2170
SÃO JOSÉ DOS CAMPOS - SP - 12227-901
BRASIL
Fax: + 55 12 3927-6600 (ext. 1624)
e-mail: service.bulletin@embraer.com.br

S.B. Title:

S.B.: (Number / Rev.)

Operator:

Aircraft serial number affected: (per S.B. effectivity list)

PRE-ACCOMPLISHMENT EVALUATION: (Check applicable squares below)

☐ WILL BE ACCOMPLISHED ON FIRST A/C

☐ WILL BE ACCOMPLISHED AS REQUIRED

☐ WILL BE ACCOMPLISHED ON FLEET

☐ DECISION DEFERRED (Explain below)

☐ WILL NOT BE ACCOMPLISHED:

- ☐ UNECONOMICAL
- ☐ SERVICE EXPERIENCE DOES NOT JUSTIFY
- ☐ OPERATIONAL ENVIRONMENT DOES NOT JUSTIFY
- ☐ OTHER (Explain below)

POST-ACCOMPLISHMENT EVALUATION: (Check applicable squares below)

ESTIMATED MANPOWER: ☐ OK ☐ NOT OK (Explain Below)

MATERIAL & KITS: ☐ OK ☐ NOT OK (Explain Below)

ACCOMPLISHMENT INSTRUCTIONS: ☐ OK ☐ NOT OK (Explain Below)

FIGURES: ☐ OK ☐ NOT OK (Explain Below)

SB GENERAL EVALUATION: ☐ OK ☐ NOT OK (Explain Below)

COMMENTS: (Bulletin quality/ Difficulties found at the time of incorporation/ Suggested improvements/ Other)

Organization:

Fax:

Phone:

E-mail:

Address:

Prepared by:(Name/Title)

Date:

