EMBRAER

# TRANSMITTAL LETTER

## 1. DESCRIPTION

This sheet transmits Revision 02 to Service Bulletin 190-22-0003.

This is a complete reissue of the Bulletin.

This revision incorporates the information presented in the Information Notice related to the previous issues of this Service Bulletin, as listed below:

None.

## 2. ADDITIONAL ACTION

Aircraft that have complied with the previous issue of this bulletin do not need any additional action.

## 3. RECORD OF REVISION

Basic issue: 20/Dec/2007.

Revision 01: 30/Jan/2008.

Revision 02: 11/Jun/2008.

## 4. HIGHLIGHTS

The topics, affected pages, and a brief description of the content-related changes introduced by this revision are presented below.

Revision bars are put in the left margin of each page to show the location of the significant changes. Text displacement and text format changes are not indicated.

| TOPIC/PAGE | DESCRIPTION OF REVISION |
|---|---|
| 1. PLANNING INFORMATION | |
| 1.C. REASON/02 | Added reason for Revision 02. |
| 3. ACCOMPLISHMENT INSTRUCTIONS | |
| Step 3.K./12 | Corrected text to GROUND TEST. |
| Step 3.M./14 | Included note about reason for the flight test. |
| FIGURES | |
| Figure 2 / 16 | Changed figure. |

EMBRAER

# SERVICE BULLETIN

## AUTO FLIGHT - CAT IIIa AUTOLAND INSTALLATION

## 1. PLANNING INFORMATION

### A. SB EFFECTIVITY

Aircraft affected:

| MODEL | SN |
|---|---|
| Embraer 190( ) | 19000051, 19000058 thru 19000060, 19000062, 19000066, 19000072, 19000078 thru 19000081, 19000086, 19000102, 19000106, 19000112, 19000113, 19000117, 19000119, 19000121, 19000123, 19000127, 19000129, 19000133, 19000135, 19000139, and 19000145. |

In-production effectivity:

Embraer 190( ) model aircraft SN 19000152 and on optionally have an equivalent modification factory-incorporated.

### B. CONCURRENT REQUIREMENTS

Make sure that PRIMUS EPIC Field-Loadable Software System (LOAD 21.2) (ref. SB190-31-0015, 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.

(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

**REVISION 01:** To include aircraft SN 19000058, 19000062, 19000072, 19000078, 19000081, 19000102, 19000106, 19000112, 19000119, 19000121, 19000129, 19000133, 19000135, 19000139, and 19000145 in the service effectivity.

**REVISION 02:** To modify the information to execute the flight test.

## 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 test in flight.

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

## 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 promptly 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: + 6.90 lb (+ 3.128 kg).

– Change in basic moment: + 392.87 lb.in (+ 4.53 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. |
| 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. |
| SB190-31-0015 | INDICATING/RECORDING SYSTEMS - PRIMUS EPIC FIELD-LOADABLE SOFTWARE SYSTEM LOAD 21.2 UPLOAD. |

## 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

The material required for the accomplishment of this bulletin will be available from Embraer 25 weeks after receipt of orders, at the reference price of US$ 304.99 , subject to confirmation upon receipt of orders.

When ordering, specify SB190-22-0003, KIT PN BS1902200030001, which comprises PN 190-03970-603.

(1) 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) 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 |

| NEW PN | DESCRIPTION | OLD PN | QTY SUP | QTY USED | DISP |
|---|---|---|---|---|---|
| 171-05712-607 | Placard | - | 02 | 02 | 2 |

(3) 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 | Customer Aircraft SN |
|---|---|---|
| DM7038335-179 | TT7038335-179 | 19000059, 19000066, 19000079, 19000086, 19000117, and 19000127. (equipped with HF for Ferry Flight) |
| DM7038335-180 | TT7038335-180 | 19000059, 19000066, 19000079, 19000086, 19000117, and 19000127. |
| DM7038335-181 | TT7038335-181 | 19000051, 19000060, 19000080, 19000113, and 19000123. (equipped with HF for Ferry Flight) |
| DM7038335-182 | TT7038335-182 | 19000051, 19000060, 19000080, 19000113, and 19000123. |
| DM7038335-185 | TT7038335-185 | 19000121, 19000129, 19000135, and 19000145. |
| DM7038335-178 | TT7038335-178 | 19000058, 19000062, 19000072, 19000078, 19000081, 19000102, 19000106, 19000112, 19000119, 19000133, and 19000139. |

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

QUANTITY: AR = As Required

(4) 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

## B. INDUSTRY SUPPORT INFORMATION

(1) 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

Refer to paragraph 2. MATERIAL INFORMATION of this Bulletin.

**D. MATERIAL NECESSARY FOR EACH SPARE**

None.

**E. REIDENTIFIED PARTS**

None.

**F. TOOLING - PRICE AND AVAILABILITY**

Remote Terminal Software RT17.7+DLS4.0.4 is required for the accomplishment of this Bulletin. If necessary, the Tools Compact Disk PN TM7035299-009 should be procured from the operator's inventories or ordered from Honeywell.

## 3. ACCOMPLISHMENT INSTRUCTIONS

The steps below outline the general accomplishment instructions.

A. Make sure that PRIMUS EPIC Field-Loadable Software System (LOAD 21.2) (ref. SB190-31-0015 - PRIMUS EPIC LOAD 21.2 INSTALLATION), 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. See 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. See Figure 1.

I. 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 | Customer Aircraft SN |
|---|---|---|
| DM7038335-179 | TT7038335-179 | 19000059, 19000066, 19000079, 19000086, 19000117, and 19000127. (equipped with HF for Ferry Flight) |
| DM7038335-180 | TT7038335-180 | 19000059, 19000066, 19000079, 19000086, 19000117, and 19000127. |
| DM7038335-181 | TT7038335-181 | 19000051, 19000060, 19000080, 19000113, and 19000123. (equipped with HF for Ferry Flight) |
| DM7038335-182 | TT7038335-182 | 19000051, 19000060, 19000080, 19000113, and 19000123. |
| DM7038335-185 | TT7038335-185 | 19000121, 19000129, 19000135, and 19000145. |
| DM7038335-178 | TT7038335-178 | 19000058, 19000062, 19000072, 19000078, 19000081, 19000102, 19000106, 19000112, 19000119, 19000133, and 19000139. |

**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 2.A. MATERIAL - PRICE AND AVAILABILITY.

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

J. 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.

K. After the Autoland installation, perform a GROUND TEST simulating an AUTOLAND 1 approach and a landing procedure.

(1) Remove the DO NOT OPERATE tag from the external AC/DC power receptacles.

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

(3) 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.

**NOTE:** Before starting the next Step 3.K.(6), 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.

(4) Remove the DO NOT OPERATE tag from the POWERPLANT control panel.

(5) Remove the DO NOT OPERATE tag from the APU control panel.

(6) Verify if there is no ″AUTOLAND 1 NOT AVAIL″ message (cyan color) on the Engine Indicating and Crew Alerting System (EICAS).

(7) On the OPR CONFIG MCDU PAGE, make sure that AUTOLAND Enable has been set.

(8) 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.

(9) Return the SSPCs to the original configuration.

(10) On the Central Maintenance Computer (CMC), perform 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.

(11) On the CMC, perform 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.

(12) On the CMC, perform 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.

L. Restore the aircraft to normal.

M. Perform a TEST 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 test must be conducted by a pilot qualified in AUTOLAND operation.

3) The test 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 test card is included to perform these check points. Refer to Figure 2. In case the results of the test are not approved, it is necessary to contact Embraer at the address given in 2.B. INDUSTRY SUPPORT INFORMATION.

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

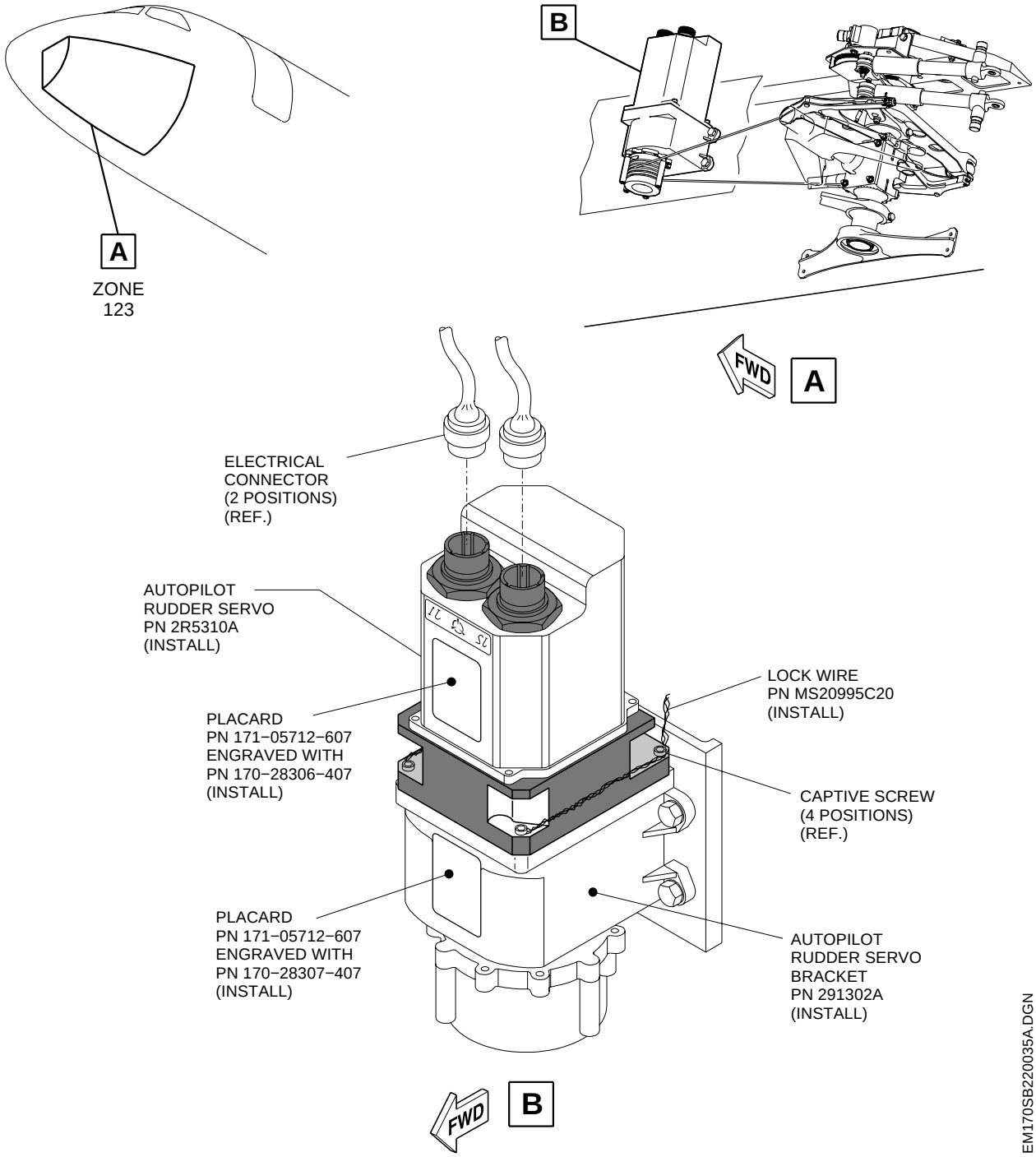


FIGURE 1 - AUTOPILOT RUDDER SERVO INSTALLATION
(SHEET 01 OF 01)


## 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.

EM170SB220038A.DGN

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

# 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.
TECHNICAL PUBLICATIONS
AV. BRIGADEIRO FARIA LIMA, 2170
SÃO JOSÉ DOS CAMPOS - SP - 12227-901
BRASIL
Fax: ++ 55 12 3927-7546
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<br>[ ] SERVICE EXPERIENCE DOES NOT JUSTIFY<br>[ ] OPERATIONAL ENVIRONMENT DOES NOT JUSTIFY<br>[ ] 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:* |