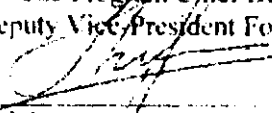


JOINT STOCK COMPANY
«Sukhoi Civil Aircraft»

«APPROVED»
SSJ Program Chief Designer -
1st Deputy Vice President For Development

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TECHNICAL DECISION
On RRJ-95B Aircraft Continued Airworthiness

№RRJ0000-OR-001-3894/A

A. Explanations

There were cases of failure to retract landing gear during takeoff with Aircraft RRJ-95B RA-89007 (Ser. №95015) on 22.01.2013 and Aircraft RRJ-95B RA-89009 (Ser. №95017) on 18.01.2013. The Aircraft returned to the departure airport. Landings were performed in accordance with FCOM recommendations. The operating time of RRJ-95B RA-89007 (Ser. №95015) amounted to 1505 hours, and 989 landings. The operating time of RRJ-95B RA-89009 (Ser. №95017) amounted to 697 hours, and 446 landings.

In Aircraft RRJ-95B RA-89007 (Ser. №95015) at takeoff after positioning the landing gear control handle to retraction the landing gear did not retract according to the indication, and on EWD appeared CAS messages L/G GEAR FAULT, L/G GEAR NOT UNLOCKED, L/G DOOR NOT CLOSED.

In Aircraft RRJ-95B RA-89009 (Ser. №95017) at takeoff after positioning the landing gear control handle to retraction the landing gear did not retract according to the indication, and on EWD appeared CAS messages L/G GEAR FAULT, L/G GEAR NOT UNLOCKED, L/G DOOR NOT CLOSED.

After the aircraft landings there were performed AMM tasks:

- 32-10-00-220-801 "Detailed inspection of the main landing gear and main landing gear doors";

- 32-12-00-210-801 "General visual inspection of the main landing gear brackets of the attachment links of the upper doors, the brackets of the attachment links of the lower doors and the brackets of the attachment links of the inboard doors";

- 32-12-00-210-802 "General visual inspection of the main landing gear links of the upper doors and the lower door rods";

- 32-20-00-220-802 «Detailed inspection of the nose landing gear and nose landing gear doors";

- 32-31-00-720-801 "Check for operability of the control system of retraction and main extension of the landing gear";

- 32-32-15-210-801 "General visual inspection of the main landing gear inboard door actuation cylinders".

Based on the results of the performed tasks there were no negative remarks.

The Aircraft RRJ-95B RA-89007 (Ser. №95015) and Aircraft RRJ-95B RA-89009 (Ser. №95017) underwent troubleshooting for the cause of failure to retract the landing gear through operations for integrity of the electrical circuits and absence of short circuits between:

- LDG GEAR control panel and the electrical and hydraulic module of the landing gear retraction/extension control (LGCHM);

- LGCHM and the electronic unit of the landing gear retraction/extension control (LGSCU);

- LDG GEAR control panel and LGSCU.

During check of Aircraft RRJ-95B RA-89009 (Ser. №95017) it was detected that between LGCHM and LGSCU there was inconsistency of the connector 8-G323-j actual contact numbers in comparison to the electric circuit diagram values. According to the connection diagram this electrical circuit is included in operation of LGCHM pressure transducer №2, which in its turn is the element of the built-in control of the landing gear retraction/extension system.

Before correction of the deviations, the operability check was done of the landing gear retraction/extension system with recording the landing gear retraction/extension system operation parameters by the data recording system: processing the data from the LGSCU bus and the brake system control unit BCU by TH2TIKM recording system. The analysis of the recordings confirmed the impact of the detected defect on the system operation, namely: non-connection of the LGCHM pressure transducer №2 is perceived by the system as a failure of one of two channels of the system in course of the landing gear retraction/extension.

The detected deviations were corrected by repair of the connector 8-G323-j with reconnection of the contacts. After the corrective actions, the landing gear retraction/extension

system operability was checked with recording of the system operation parameters by the data recorders. The analysis of the data recorders processing confirmed elimination of the detected deviations. Both channels of the system function properly.

During check of Aircraft RRJ-95B RA-89007 (Ser. №95015), the electrical circuits integrity failure was detected in the electrical connection between LGCHM and LGSCU: the line between the connector 8-G323-j contact 12 and the connector 12-G323-J1 contact 7 is broken, and the impedance amounts to 840 ohm. There were no negative remarks to the other electrical circuit. According to the connection diagram this electrical circuit is included in operation of LGCHM pressure transducer №1, which in its turn is the element of the built-in control of the landing gear retraction/extension system.

The detected deviations were corrected by replacement of wiring at the segment between LGCHM and LGSCU: between the connector 8-G323-j contact 12 and the connector 12-G323-J1 contact 7. After the corrective actions, the landing gear retraction/extension system operability was checked with recording of the system operation parameters by the data recorders. The analysis of the data recorders processing confirmed elimination of the detected deviations. Both channels of the system function properly.

For the purpose of establishing the reason for failure to retract the landing gear and checking the landing gear retraction/extension system correct functioning in Aircraft RRJ-95B RA-89007 (Ser. №95015) and Aircraft RRJ-95B RA-89009 (Ser. №95017) jointly with the manufacturer of the system MESSIER-BUGATTI-DOWTY the readout was done of the performance history through error codes in LGSCU, including the data of the flight when the landing gear failed to retract. Failures matrix of the whole operational time was developed through the LGSCU. The analysis of the recordings decoding showed that prior to that flight there was a presence of an internal bug of LGSCU, that appeared when the aircraft was put to electrical power and the unit was powered up (P_BJT FAIL), which caused switching off one of the system's channel: the channel that did not have a defect in the circuit. Then, after setting the landing gear control handle to «UP» position for the landing gear retraction, in the course of the system internal testing transition to the other channel took place but as the result of the defect in switching on the LGCHM pressure transducer №2 of Aircraft RRJ-95B RA-89009 (Ser. №95017) (or the LGCHM pressure transducer №1 of Aircraft RRJ-95B RA-89007 (Ser. №95015)), both channels of the landing gear position control system happened to be non-operational, and the system performed inhibition of the landing gear retraction cycle.

Based on the results of the performed research of the landing gear retraction/extension system functioning, SCAC and MESSIER-BUGATTI-DOWTY shall develop appropriate measures for elimination of the system operation deviations. Pending completion of the planned activities, to mitigate the risk of repetition of cases of failure to retract the landing gear during operation of Aircraft RRJ-95B fleet, it is necessary to perform the corrective actions which were developed by SCAC and presented hereunder.

B. Corrective actions

The Operators of Aircraft RRJ-95B at the next maintenance activities to perform monitoring the landing gear retraction/extension system functioning and condition of the Aircraft cable net per the following tasks:

1. Perform AMM Task 52-31-00-720-801 «Check for operability of the control system of retraction and main extension of the landing gear» channel after channel with alternate switching off the LGSCU channels, the channels switching off to perform as follows: ch. 1 (Circuit breaker: F1-57); ch. 2 (Circuit breaker: F2-48).

If there are no detected discrepancies – continue normal operation of Aircraft.

2. If after performing ref.1 operations, discrepancies are detected perform the following operations:

• Check the circuits integrity in accordance with the table (terminal 13 of connector 8-G323-j is not active):

From		To	
Connector	Contact	Connector	Contact
8-G323-j	1	18-F311-B	19 36
	2	12-G323-J2	76
		12-G323-J5	76
	3	18-F311-B	20 30
		12-G323-J2	77
	4	12-G323-J5	77
		12-G323-J2	71
	5	12-G323-J5	71
		12-G323-J2	70
	6	12-G323-J5	70
		12-G323-J2	74
	7	12-G323-J5	74
		12-G323-J2	73
	8	12-G323-J5	73
		12-G323-J2	49
9	12-G323-J5	49	
	18-F311-A	11	
11	Aircraft body		
12	12-G323-J1	7	
14	Aircraft body		
15	12-G323-J4	7	

• Check the connector 8-G323-j wiring insulation impedance, for which apply by a mega ohmmeter the operating voltage 500 V to the contacts of the controlled line, at that, the insulation impedance in normal climatic conditions should be ≥ 20 mega ohm.

3. If after performing ref. 2 operations, discrepancies are detected it is necessary for the Operator to inform the Aircraft manufacturer about such deviations in order to obtain the information on the corrective actions via e-mail: customercare@scac.ru.