ENGINEERING AUTHORIZATION APPROVAL FORM

EA no.	B737NG-EA-21-050R3
Subject	PRIMARY AND SECONDARY HEAT EXCHANGER CLEANING
Type	NON AD
Method of Compliance	CLEANING
Applicability	Xxxx B737-800/900ER FLEETS
Material Needed	NO
Priority	NORMAL
Estimate MH	± 2.0 EST.MANHOURS
Special Tools	YES
Affected Document	YES
Required Inspection Item Task	NO

Approved By: **Date:** **December 22, 2015**

xxx

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Priority	NORMAL
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Affected Document	YES
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ENGINEERING AUTHORIZATION

SUBJECT : **PRIMARY AND SECONDARY HEAT EXCHANGER CLEANING**		NO	: B737NG-EA-21-050R3
		DATE	: December 22, 2015
		REFERENCE	: *SEE REFERENCES*
CATEGORY	: RECOMMENDED	A/C TYPE	: B737-800/900ER
SECTION	: LINE MAINTENANCE	EFFECTIVITY	: *SEE EFFECTIVITY*
TYPE	: CLEANING		
DUE DATE	: *SEE COMPLIANCE*	WT/ARM CHANGE	: NONE
PRIORITY	: NORMAL		
ATTENTION	: LM, PPC, QA, STORE	EST. MAN HOURS	: *SEE EST. MAN-HOURS*

REASON OF REVISION

This Engineering Authorization content several information and procedures related to the Heat Exchanger and Plenum/Diffuser Assembly Cleaning. B737NG-EA-21-050R3 was sent to change several Effectivities of aircraft and Accomplishment Instruction.

REASON

The primary heat exchanger is the first unit of the air cycle system through which engine bleed air passes to be cooled. The heat exchanger is a counter flow plate-fin type. Failure of the heat exchanger may cause discrepancies to the air conditioning system. One of the failure that may exist if there is no regularly Heat Exchanger Cleaning are certainly harmful happening with the Air Conditioning System and Engine Bleed Air, for this reason the need Primary and Secondary Heat Exchanger cleaning inquiry.

DESCRIPTION

In this Engineering Authorization provides alternate instructions to perform primary and secondary heat exchangers using a simple method (On-Wing). According to the BOEING Aircraft Maintenance Manual AMM 21-51-03 these cleaning area are covering Lower Wing-to-Body Fairing-Under Wing Box, using access panels of Ram Air Inlet Mixing Duct Panel-Forward, ECS Access Door and ECS High Pressure Access Door.

EFFECTIVITY

All Lion Air and Batik Air's B737-800/900ER fleets.

PREPARED BY

Renni Ekaputri

DISTRIBUTION	LM	PPC	QA	STORE	FILE

All Lion Air's B737-800:
PK-LJQ, PK-LJR, PK-LJS, PK-LJU, PK-LJV, PK-LJW, PK-LJY, PK-LKG, PK-LKH, PK-LKI, PK-LKJ, PK-LKK, PK-LKP, PK-LKQ, PK-LKR, PK-LKS, PK-LKU, PK-LKT, PK-LKW, PK-LKV, PK-LKZ, and on.

All Lion Air's B737-900ER:
PK-LFG, PK-LFF, PK-LFH, PK-LFI, PK-LFJ, PK-LFK, PK-LFP, PK-LFL, PK-LFM, PK-LFO, PK-LFQ, PK-LFR, PK-LFS, PK-LFT, PK-LFU, PK-LFV, PK-LFW, PK-LFY, PK-LFZ, PK-LGJ, PK-LGK, PK-LGL, PK-LGM, PK-LGO, PK-LGP, PK-LGQ, PK-LGR, PK-LGS, PK-LGT, PK-LGU, PK-LGV, PK-LGW, PK-LGY, PK-LGZ, PK-PK-LHH, PK-LHI, PK-LHJ, PK-LHK, PK-LHL, PK-LHM, PK-LHQ, PK-LHO, PK-LHP, PK-LHR, PK-LHS, PK-LHT, PK-LHU, PK-LHV, PK-LHW, PK-LHY, PK-LHZ, PK-LJF, PK-LJG, PK-LJH, PK-LJI, PK-LJJ, PK-LJK, PK-LJL, PK-LJM, PK-LJO, PK-LJP, PK-LJT, PK-LJZ, PK-LKF, PK-LKL, PK-LKO, PK-LKM, and on.

All Batik Air's B737-800:
PK-LBL, PK-LBK, PK-LBQ, PK-LBR, PK-LBS, PK-LBT, PK-LBU, PK-LBV, PK-LBW, and on.

All Batik Air's B737-900ER:
PK-LBG, PK-LBH, PK-LBM, PK-LBO, PK-LBI, PK-LBJ, and on.

COMPLIANCE

Initial threshold may be accomplished at the nearest phase check, and repetitive cleaning of this Engineering Authorization should be performed on *each* and *every 3 Phase* (equal to 3000 FH atau 2250 FC) interval.

EST.MAN-HOURS

The tables below show an estimate of the task-hours necessary to do this cleaning for B737-900ER and B737-800 airplanes. This estimate is for direct labor only, done by an experienced crew.

No	Task	Task-Hours
1	Open air condition compartment access panels	0.5
2	Clean LH Heat Exchanger	0.5
3	Clean RH Heat Exchanger	0.5
4	Close air condition compartment access panels	0.5
Total Task Hour		**2.0**

WEIGHT AND BALANCE

None

REFERENCES

This Engineering Authorization should be performed using **the last revision** in accordance of the references:

1. Boeing AMM 21-51-03-000-801, Revision 58, October 15, 2015.
2. Boeing AMM 21-00-00, Revision 58, October 15, 2015.
3. Boeing AMM 24-22-00, Revision 58, October 15, 2015.
4. Boeing AMM 36-00-00, Revision 58, October 15, 2015.
5. Reliability Summary No.RA-01/III/2013.

PUBLICATION AFFECTED

Publication	Chapter-Section
737 Maintenance Manual	21-51

MATERIAL REQUIREMENTS

None

SPECIAL TOOL AND EQUIPMENT

Special tools/equipment requirement:

1. Deactivator-Check Valve. *Ref: COM-2462*.
2. Backflush, A/C Pack Heat Exchanger. *Ref: SPL-1607*.
3. Backflush Equipment, Bleed Air Hose. *Ref: SPL-13921*.
4. Regulated Cold Water Source, 0-69 Psig. *Ref: STD-3926*.

ACCOMPLISHMENT INSTRUCTION

CAUTION: KEEP THE WORK AREA, WIRES AND ELECTRICAL BUNDLES CLEAN OF METAL PARTICLES OR CONTAMINATION WHEN YOU USE TOOLS. UNWANTED MATERIAL, METAL PARTICLES OR CONTAMINATION CAUGHT IN WIRE BUNDLES CAN CAUSE DAMAGE TO THE BUNDLES. DAMAGED WIRE BUNDLES CAN CAUSE SPARKS OR OTHER ELECTRICAL DAMAGE.

NO	DESCRIPTION	PERFORMED BY	DATE
Read all step of this EA making sure that you have understood of the work to be performed. If you have any discrepancy or if any step is not clear consult to engineer that originated this EA.			
A. PREPARATION			
1.	Set the L PACK and R PACK switches on the P5-10 Air Conditioning Panel to the OFF position and install DO-NOT-OPERATE tags on the switches.		
2.	Set the ISOLATION VALVE switch on the P5-10 air conditioning panel to the OPEN position.		
3.	To get access to the Left pack heat exchangers, do this step: Open this access panel: **Number** / **Name/Location** 192CL / ECS Access Door		

	Remove this access panel: **Number** | **Name/Location** 192BL | ECS Ram Air Inlet Mixing Duct Panel - Forward		
4.	To get access to the Right pack heat exchangers, do this step: Open this access panel: **Number** | **Name/Location** 192DR | ECS High Pressure Access Door Open this access panel: **Number** | **Name/Location** 192CR | ECS Access Door Remove this access panel: **Number** | **Name/Location** 192BR | ECS Ram Air Inlet Mixing Duct Panel - Forward		
5.	Remove the bolts and the washers that attach the ram air inlet duct access panel to the ram air inlet duct.		
6.	Remove the ram air inlet duct access panel. **NOTE:** You must remove the access panel so that the cleaning water will not accumulate in the ram air inlet duct.		
7.	Remove the bolts and washers that attach the plenum/diffuser access panels to the plenum/diffuser assemblies for the primary and secondary heat exchangers.		
8.	Remove the bolt, washers, and nut that attach the bonding jumper to the forward access panel.		
9.	Remove the plenum/diffuser access panels and the gaskets.		
10.	To install the backflusher, SPL-1607 heat exchanger cleaning heads, do these steps: (a) Install the backflush units (cleaning heads) in		

	these locations: (i) The applicable backflush unit is used to clean the left pack primary heat exchanger or the right pack secondary heat exchanger. (ii) The applicable backflush unit is used to clean the left pack secondary heat exchanger or the right pack primary heat exchanger.		
	CAUTION: Do not apply force to the plenum/diffuser assembly when you install the cleaning heads of the heat exchanger. You can cause damage to the plenum/diffuser assembly. (b) Carefully insert the supply tubes of the cleaning head into the access holes in the plenum/diffuser assembly so that the ends of the supply tubes point toward the exit of the heat exchanger.		
	CAUTION: Do not tighten the screws on the cleaning head too much. Too much torque will cause damage to the plenum/diffuser. (c) Carefully tighten the screws on the cleaning head so that the rubber seals of the cleaning head just make good contact with the plenum/diffuser.		
	(d) Do the above steps again to install the cleaning head for the other heat exchanger.		
11.	If the SPL-1607 backflusher has a water supply valve and air supply valve, make sure that they are closed. **NOTE:** Not all configurations of the backflush equipment have the water supply valve and air supply valve.		
12.	Install the plug assembly (C21003-87) into the ram air exhaust outlet duct.		
13.	Install plastic sheeting to seal off the plenum/diffuser as follows: (a) Remove the two clamps that attach the flexible duct between the elbow duct at the aft end of the plenum/diffuser and the ram air exhaust duct		

	(TASK 21-51-24-000-801).		
	(b) Remove the flexible duct.		
	(c) Install a piece of plastic sheeting to cover the opening of the elbow duct that is attached to the aft end of the plenum/diffuser.		
	(d) Secure the plastic sheeting to the end of the elbow duct with the clamps that are used to install the flexible duct.		
14.	Connect the water line of the 0 to 60 PSIG regulated cold water source, STD-3926, to the water supply hose of the backflush equipment. (a) Do not start the flow of water at this time.		
15.	Do these steps if you want to use the airplane APU pneumatic air to back flush the heat exchangers: (a) Open this access panel: **Number** | **Name/Location** 192DR | ECS High Pressure Access Door		
	(b) Look at the dual duct pressure indicator on the P5-10 air conditioning panel to make sure that there is no pressure in the pneumatic system. (i) If there is pressure in the pneumatic system, then remove the pressure as follows: a) Do this step: Remove Pressure from the Pneumatic System, TASK 36-00-00-860-806.		
	(c) Do the two steps that follow at the same time to prepare to supply pneumatic air to the backflush equipment: **WARNING:** Wear gloves that will give you protection from hot surfaces when you connect or disconnect pneumatic fittings. The ground air connector can be very hot if the packs have been operated		

	immediately before this procedure. You can badly burn your hands if you touch a hot ground air connector. (i) Install the deactivator, SPL-2462, in the ground pneumatic connector to hold the check valve open.		
	(ii) Connect the bleed air hose, SPL-13921, supplied with the backflush equipment to the ground pneumatic connector. **NOTE:** The air hose connector holds the deactivator, SPL-2462, in position.		
	(d) Connect the other end of the air hose that you just connected to the ground pneumatic connector to the air inlet fitting on the backflush equipment air hose.		
16.	If you use a ground pneumatic air source to back flush the heat exchangers, do this step: (a) Connect the ground pneumatic air supply line to the air inlet fitting on the backflush equipment.		
B. HEAT EXCHANGER CLEANING **CAUTION:** Do not use soap or a detergent solution to clean the heat exchangers. Use cold water only. Soap or a detergent solution can cause damage to the air cycle machine.			
1.	Use the backflusher, SPL-1607 to clean the heat exchanger: **NOTE:** You must do these steps for each of the heat exchangers. (a) Connect the air hose to the cleaning head.		
	(b) Connect the water supply hose to the cleaning head.		
	(c) If you are using airplane pneumatic system air for the air source, do this step: (i) Do this task: Supply Pressure to the		

	Pneumatic System with the APU, TASK 36-00-00-860-803.		
	(d) If you are using ground pneumatic air for the air source, do this step: **CAUTION:** Do not supply more than 30 psig of ground air pressure to the heat exchangers. Too much pressure can cause damage to the heat exchangers or the ram air exit ducts. (i) Start the ground air source and adjust the pressure regulator to a maximum of 30 psig.		
	(e) If installed, slowly open the air supply valve on the manifold of the cleaning tool.		
	(f) Slowly open the water supply valve on the water source (0-60 PSIG).		
	(g) If installed, slowly open the water supply valve on the manifold of the cleaning tool.		
	(h) Clean the heat exchanger for 5 minutes.		
	(i) Close the water supply valve on the water source (0-60 PSIG) and continue to supply air for an additional 2 minutes.		
	(j) If you are using airplane pneumatic system air, set the APU BLEED switch on the P5-10 panel to OFF.		
	(k) If you are using ground pneumatic air for the air source, set the valve on the ground pneumatic cart to the off position.		
	WARNING: Put on gloves for protection from the hot water in the hoses. Hot water can burn you. (l) Disconnect the air hose from the cleaning head.		
	(m) Disconnect the water supply hose from the cleaning head.		

	(n) Do the steps above, as necessary, for the other heat exchangers.		
2.	If not already done, close the valve at the water source.		
3.	Disconnect the water line from the water source (0-60 PSIG) and the water supply hose of the backflush equipment.		
4.	If you used a ground air supply for the air source, do this step: (a) Stop the operation of the ground air source.		
	(b) Disconnect the ground air supply line from the air hose inlet fitting.		
5.	If you used airplane pneumatic system air for the air source, do these steps: (a) If not already done, set the APU BLEED switch on the P5-10 panel to the OFF position.		
	(b) If installed, open the air supply valve on the backflusher equipment.		
	WARNING: Put on gloves for protection from hot surfaces when you connect or disconnect pneumatic fittings. Pack operation can make the ground air connector very hot. A hot ground air connector will burn your bare hands. (c) Disconnect the bleed air hose, SPL-13921, from the ground pneumatic connector and from the air hose inlet fitting.		
	WARNING: Put on gloves for protection from hot surfaces when you connect or disconnect pneumatic fittings. Pack operation can make the ground air connector very hot. A hot ground air connector will burn your bare hands. (d) Remove the check valve deactivator from the ground pneumatic connector.		

	(e) Close this access panel: **Number** / **Name/Location** 192DR / ECS High Pressure Access Door		
6.	To remove the heat exchanger cleaning heads, do these steps: (a) If not already done, disconnect the air hose from the cleaning head.		
	(b) If not already done, disconnect the water supply hose from the cleaning head.		
	(c) Loosen the screws on the cleaning head.		
	(d) Carefully remove the cleaning head.		
7.	Install the plenum/diffuser access panels and the gaskets with the bolts and washers.		
8.	Put the bonding jumper in its position and install the bolts, washers, and nut.		
9.	Install the ram air inlet access panel with the bolts and washers.		
10.	Remove the plug assembly (C21003-87) from the ram air exhaust duct.		
11.	Remove the plastic sheeting from the elbow duct at the aft end of the plenum/diffuser as follows: (a) Remove the clamp that secures the plastic sheeting to the elbow duct.		
	(b) Remove the plastic sheeting.		
	(c) Install the flexible duct between the elbow duct at the aft end of the plenum/diffuser and the ram air exhaust duct (TASK 21-51-24-400-801).		
	(d) Install the clamps to secure the flexible duct: (i) Tighten the clamps to 15 (± 2) inch-pounds.		

12.	Operate the air conditioning pack for five minutes. To operate the pack, do this task: Supply Conditioned Air with a Cooling Pack, TASK 21-00-00-800-803. **NOTE:** This will remove any remaining water in the ram air ducts and the air cycle machine bearings.		
13.	Stop the air conditioning pack. To stop the pack, do this task: Remove Conditioned Air Supplied by a Cooling Pack, TASK 21-00-00-800-804.		
C. PUT THE AIRPLANE BACK TO ITS USUAL CONDITION			
1.	Do this task: Remove Pressure from the Pneumatic System, TASK 36-00-00-860-806.		
2.	If you cleaned the left pack heat exchangers, do this step: Close this access panel: **Number** / **Name/Location**: 192CL / ECS Access Door Install this access panel: **Number** / **Name/Location**: 192BL / ECS Ram Air Inlet Mixing Duct Panel-Forward		
3.	If you cleaned the right pack heat exchangers, do this step: Close this access panel: **Number** / **Name/Location**: 192CR / ECS Access Door; 192DR / ECS High Pressure Access Door Install this access panel: **Number** / **Name/Location**: 192BR / ECS Ram Air Inlet Mixing Duct Panel-Forward		
4.	Remove electrical power if it is not necessary. To remove electrical power, do this task: Remove Electrical Power, TASK 24-22-00-860-812		
All above steps have been done without any deviation.			

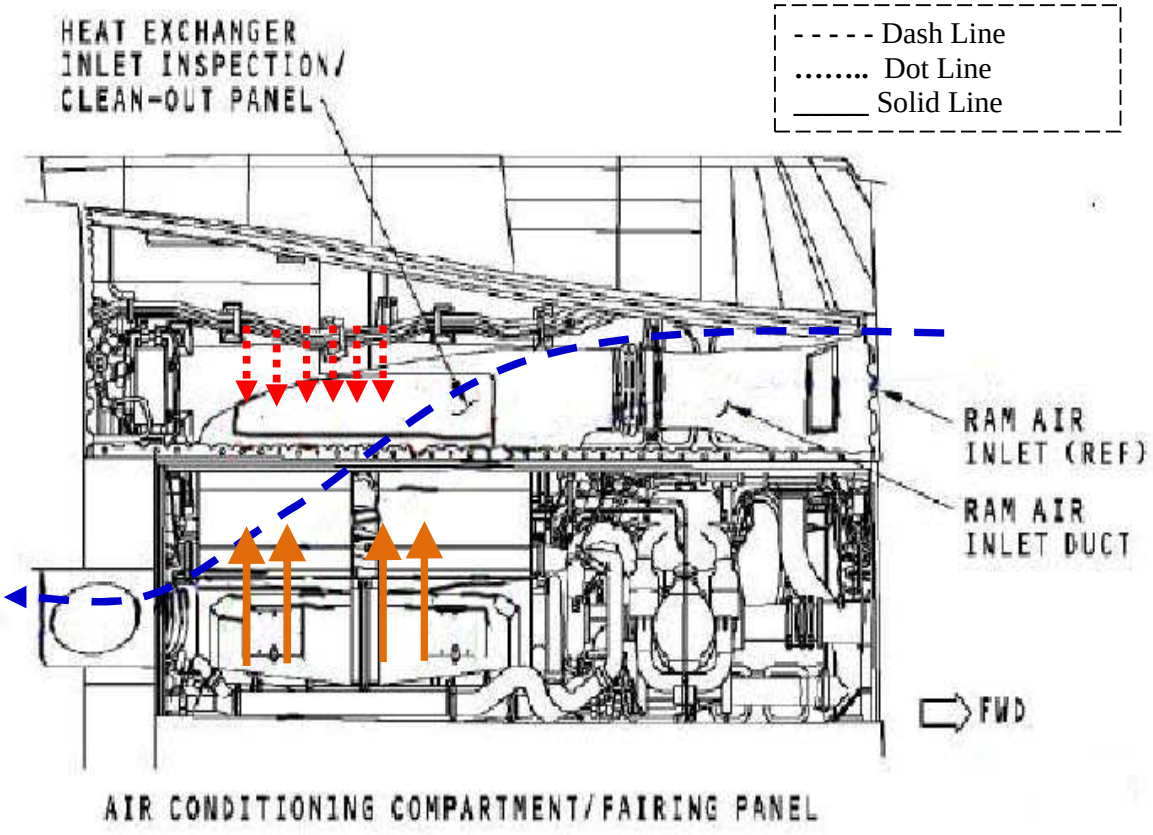

FIGURE 1: HEAT EXCHANGER AND PLENUM/DIFFUSER ASSEMBLY AT AIR CONDITIONING COMPARTMENT/FAIRING PANEL

Note:

- *The dash line* is a normal airflow particularly conducting at the Ram Air Inlet.
- *The dot line* is indicating an unidirectional flow with the normal airflow from Ram Air Inlet Duct.
- *The solid line* is depicting a counter-flow fluid direction from a ground air source or airplane pneumatic air that assures maximum performance because it is exactly perpendicular from the normal airflow.

Backflush flow can force out the dust and dirt that trapped inside the heat exchanger itself.

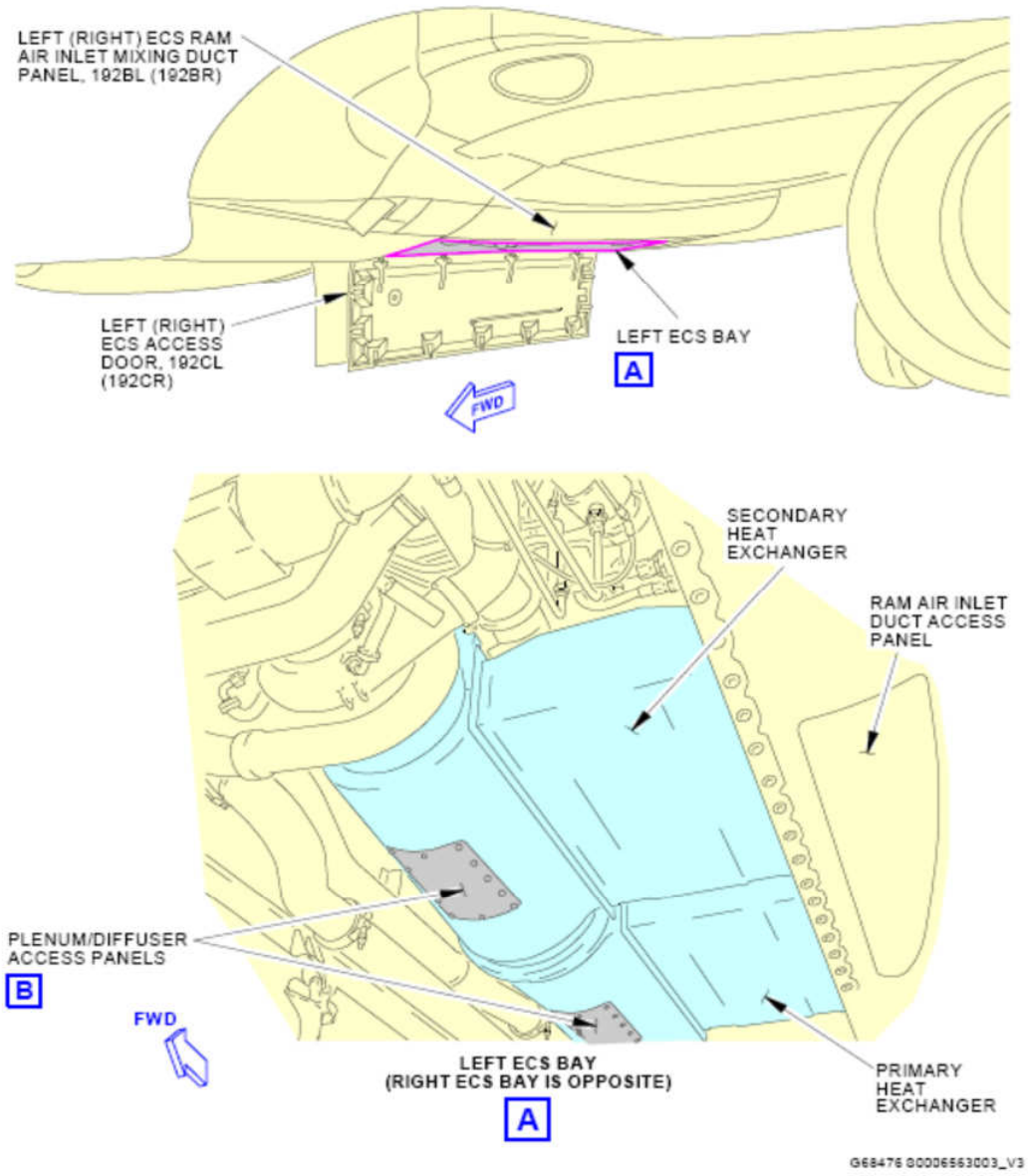

FIGURE 2: HEAT EXCHANGER AND PLENUM/DIFFUSER ASSEMBLY CLEANING 21-51-03-990-801 (SHEET 1 OF 3)

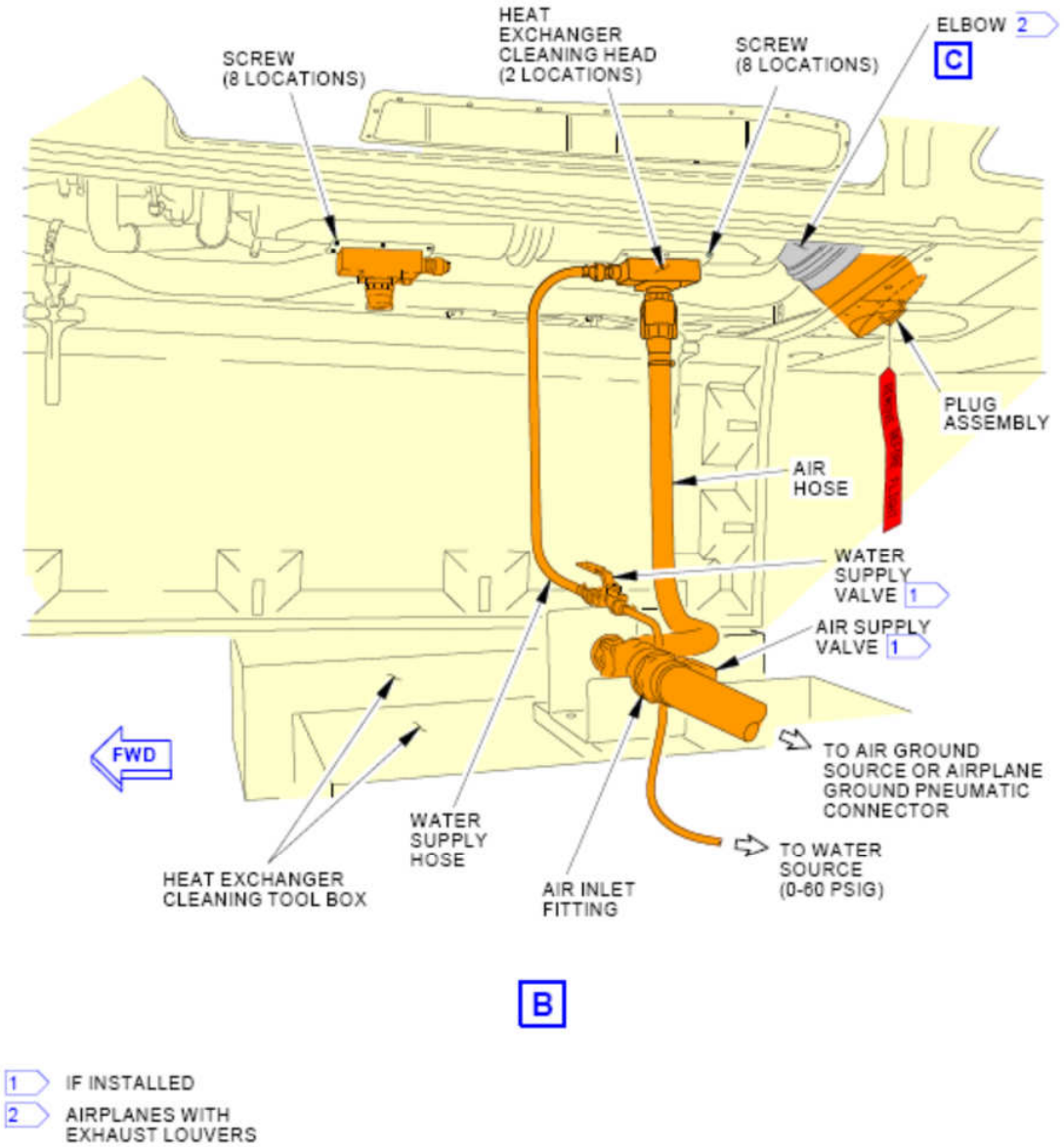

FIGURE 2: HEAT EXCHANGER AND PLENUM/DIFFUSER ASSEMBLY CLEANING 21-51-03-990-801 (SHEET 2 OF 3)

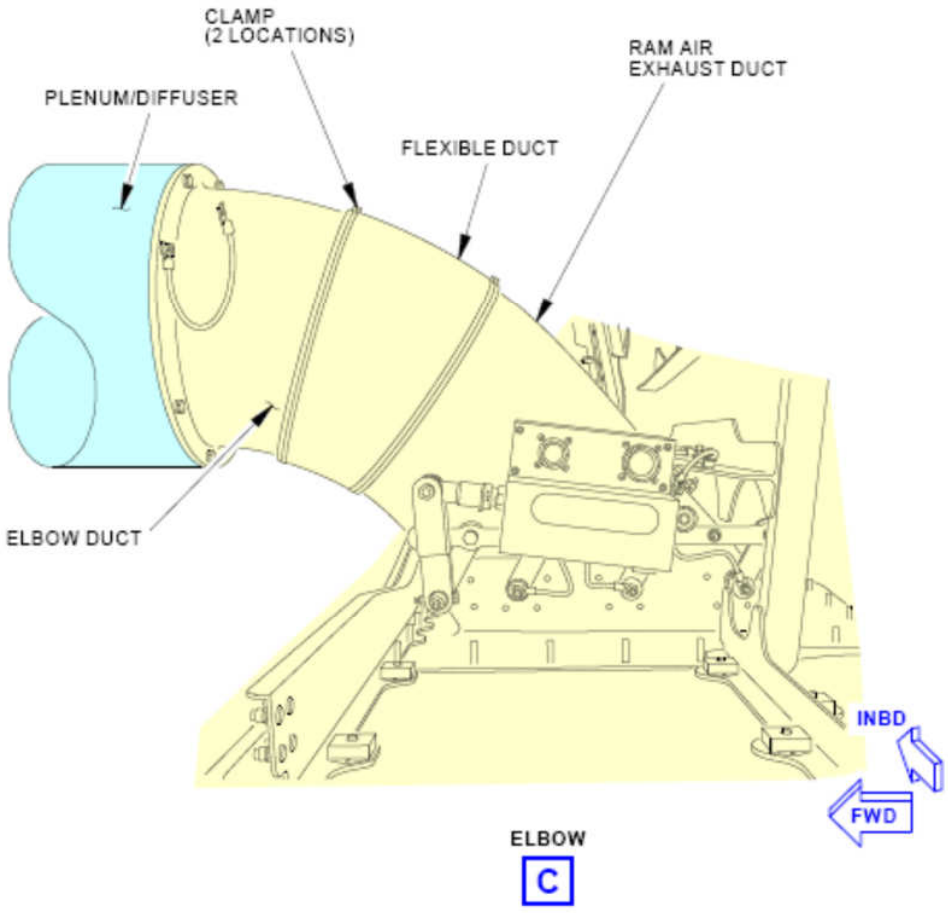

FIGURE 2: HEAT EXCHANGER AND PLENUM/DIFFUSER ASSEMBLY CLEANING 21-51-03-990-801 (SHEET 3 OF 3)

ENGINEERING AUTHORIZATION

NO. : B737NG-EA-21-050R3	DATE : December 22, 2015
Aircraft Reg:	

STATION:			STARTED TIME:		FINISHED TIME :
RII : YES ☐ NO ☑			ACTUAL MAN HOURS		
INSPECTED BY			RELEASED BY		
SIGN	STAMP	DATE	SIGN	AUTH. NO. STAMP	DATE