



AIRCRAFT MAINTENANCE MANUAL

FAN BALANCE - INSPECTION/CHECK

EFFECTIVITY: ALL

1. General

- A. These procedures give the necessary instructions to do the engine fan trim balance.
- B. These procedures are applicable to the LH/RH engines.
- C. The procedures in this section are given in the sequence below. The tasks identified with (♦) are part of the Scheduled Maintenance Requirements Document (SMRD).

TASK NUMBER	DESCRIPTION	EFFECTIVITY
72-21-03-700-801-A	ENGINE FAN - TRIM BALANCE (WITH THE BALANCER/ANALYZER KIT - GSE 162)	ALL
72-21-03-700-802-A	ENGINE FAN - TRIM BALANCE (WITH BALANCE EQUIPMENT COMMERCIALLY AVAILABLE)	ALL



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 72-21-03-700-801-A

EFFECTIVITY: ALL

2. ENGINE FAN - TRIM BALANCE (WITH THE BALANCER/ANALYZER KIT - GSE 162)

A. General

- (1) Obey the instructions below to do the fan trim balance.
- (2) The Balancer/Analyzer Kit (GSE 162) was used for the example of the fan trim balance procedure developed below. If you use an other instrument or of other make, refer to ([AMM TASK 72-21-03-700-802-A/600](#)).

B. References

REFERENCE	DESIGNATION
72-00-21 (Rolls-Royce IPC)	-
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 49-10-00-910-802-A/200	APU - START
AMM TASK 49-10-00-910-803-A/200	APU - SHUTDOWN
AMM TASK 49-13-00-910-802-A/200	APU - START
AMM TASK 49-13-00-910-803-A/200	APU - SHUTDOWN
AMM TASK 72-21-03-700-802-A/600	ENGINE FAN - TRIM BALANCE (WITH BALANCE EQUIPMENT COMMERCIALY AVAILABLE)
AMM TASK 72-31-01-400-801-A/400	FAN SPINNER - INSTALLATION

C. Zones and Accesses

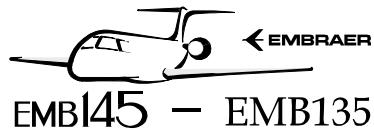
ZONE	PANEL/DOOR	LOCATION
410		LH Powerplant
420		RH Powerplant
272	272DR	Rear electronic compartment

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
GSE 162	Balancer/Analyzer Kit	To do the fan trim balance	
GSE 166	Smart Chart Software	To do the fan trim balance	

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Ladder	To get access to the EVM and the Engine	1



AIRCRAFT
MAINTENANCE MANUAL

F. Consumable Materials

Not Applicable

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Trim balance weight	72-00-21 (Rolls-Royce IPC)	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Operating the balance instrument
1	Does the task	Cockpit

I. Preparation ([Figure 601](#)) ([Figure 603](#))

SUBTASK 841-002-A

- (1) To prevent N1 fluctuation and permit correct readouts during the fan trim balance procedure, let the aircraft stay in the direction of the wind.
- (2) Open access panel 272DR to get access to the EVM.
- (3) Connect EVM interface cable P/N 14626 to EVM test connector in the rear electronic compartment.
- (4) Extend EVM interface cable P/N 14626 (externally to the airplane) from the EVM to the balancer/analyizer instrument near the front area. Connect to the EVM adapter the connector ENG.1 or ENG.2 as applicable.
- (5) Connect velocimeter cable P/N 11210-2.5 to the EVM adapter.
- (6) NOTE: Fit EVM interface cable P/N 14626 to the right main landing gear with a correct bracket.

Connect INPUT CABLE (POWER) AND SIGNAL P/N 8998 to the VELOCIMETER CABLE connector.

- (7) Connect POWER CABLE DC ADAPTER P/N 3140-20A or 3140-20B to the 28 V DC point of the aft galley.
- (8) Connect DC EXTENSION CABLE P/N 3529 to the POWER CABLE ADAPTER connector and to the INPUT CABLE (POWER) AND SIGNAL connector.
- (9) Connect the strobe light P/N 8620 to the balancer/analyizer instrument.
- (10) Get access to the fan spinner and record the P/N of the mass balances and the related angular positions, if applicable.

NOTE: The attaching point coincident with the reflective tape will be the balance reference 0° (12-hour) angular position at the fan spinner.



EMB145 – EMB135

AIRCRAFT
MAINTENANCE MANUAL

- (11) Apply an adhesive strip of reflective tape P/N Chadwick & Helmuth 10444 to the fan spinner. The strip of reflective tape must be coincident with one of the mass balance attaching points.
- (12) Energize the aircraft with a DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)) or start the APU ([AMM TASK 49-10-00-910-802-A/200](#) for APU T-62T-40C11 or [AMM TASK 49-13-00-910-802-A/200](#) for APU T-62T-40C14).
- (13) Energize the balancer/analyser instrument with 28 V DC. Use the 28 V DC source of the aft galley (see figure 601) or use an 28 V DC external power supply and see if the equipment starts the self-test routine.

NOTE: To energize with 28 V DC, it is necessary to PUSH the related circuit breaker and push the hot jug button to the ON position. Refer to figure 601.

J. Engine Fan Trim Balance ([Figure 601](#)) ([Figure 602](#)) ([Figure 603](#))

SUBTASK 750-002-A

- (1) **NOTE:** The Fan Trim Balance procedure is done with the engine in operation, on the ground, with the rotor speed equal to 87% of N1. If the pressure altitude/ ambient temperature does not permit the engine to get 87% of N1, do the engine fan balance at a later date or try to balance at a slightly lower N1 speed limited to a minimum value of 85%.

Engine Fan Trim Balance

- WARNING:**
- BEFORE YOU APPLY POWER TO THE ENGINE, MAKE SURE THAT THERE ARE NO PERSONS NEAR THE ENGINE EXHAUST AREA ([AMM MPP 71-00-00/200](#)). THIS WILL PREVENT INJURY TO PERSONS.
 - WHEN YOU USE THE STROBE LIGHT WITH THE ENGINE IN OPERATION, WEAR EARPLUGS TO PROTECT YOUR EARS. VERY HIGH NOISE CAN CAUSE HARM TO YOUR EARS.
 - BE CAREFUL WHEN YOU OPERATE THE STROBE LIGHT TO PREVENT INJURY TO PERSONS AND DAMAGE TO THE EQUIPMENT.

CAUTION: • BEFORE YOU START THE ENGINE, MAKE SURE THAT THERE ARE NO OBJECTS NEAR THE ENGINE AIR INTAKE. THESE OBJECTS CAN GO INTO THE ENGINE AND CAUSE DAMAGE TO IT.

- TO PREVENT DAMAGE TO EQUIPMENT, MAKE SURE THAT THERE ARE NO OTHER AIRCRAFT NEAR THE EXHAUST AREA ([AMM MPP 71-00-00/200](#)).
- TO AVOID DAMAGE TO THE EQUIPMENT, PUT CHOCKS AT THE AIRCRAFT WHEELS AND SET THE PARKING BRAKE AND NORMAL BRAKES.
- WHEN YOU OPERATE THE STROBE LIGHT, BE CAREFUL WITH LOOSE ITEMS SUCH AS PENS, PENCILS, IDENTIFICATION BADGE, GLASSES OR OTHER SMALL ITEMS. THESE ITEMS CAN GO INTO THE ENGINE AND CAUSE DAMAGE TO IT.

(a) Do the fan balance trim. Obey the instructions of the balancer/analyser equipment help menu or instructions given in EMB-145LP Fan Balance User Guide No. 14683-3R.

(2) Balance Mass Installation.

WARNING: • DO NOT TOUCH THE COMPONENTS OF THE ENGINE AND AIR INTAKE (IF IN ICING CONDITION) UNTIL THEY ARE COOL. THE TEMPERATURE STAYS HIGH AFTER THE ENGINE STOPS. THE HIGH TEMPERATURES CAN CAUSE INJURY TO PERSONS.

- REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN [AMM MPP 71-00-00/200](#) WHEN YOU INSTALL THE FAN MASS BALANCES TO PREVENT INJURY TO PERSONS AND DAMAGE TO MATERIAL.

CAUTION: • THE ATTACHMENT POINTS ON THE FAN SPINNER (12 POINTS) ARE USED TO INSTALL THE MASS BALANCES.

- INSTALL ONLY ONE MASS BALANCE AT EACH ATTACHMENT POINT.
- DO NOT INSTALL A FLAT WASHER AT THE ATTACHMENT POINT WHERE YOU INSTALL THE MASS BALANCE.
- A MAXIMUM OF 5 BALANCE BOLT LOCATIONS CAN BE USED AT EACH OF THE 12 POSITIONS.
- THE TOTAL FAN MASS LIMIT IS 45.5 GRAMS.
- THE ONLY AVAILABLE MASS BALANCES ARE THOSE WITH THE P/N GIVEN IN THE ROLLS-ROYCE IPC (72-00-21).

(a) Install the fan mass balances at the fan spinner attachment points as necessary. Obey the instructions below:

- 1 Remove the bolt from the fan spinner.



AIRCRAFT MAINTENANCE MANUAL

- 2 Remove and discard the flat washer.
- 3 Install the mass balance.
- 4 Install the bolt. Torque it ([AMM TASK 72-31-01-400-801-A/400](#)).

K. Follow-on

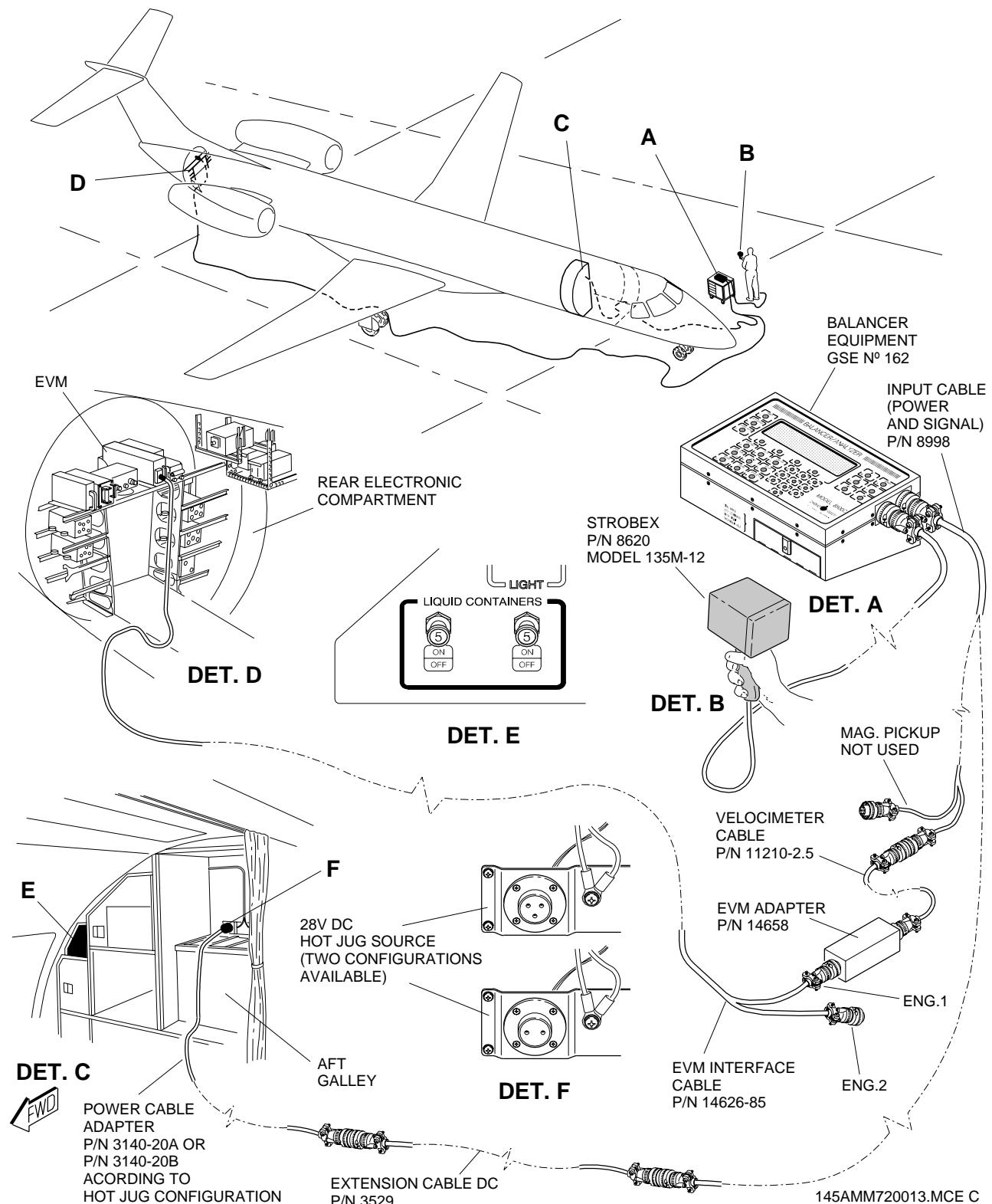
SUBTASK 842-002-A

- (1) Deenergize the aircraft with a DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)) or stop the APU ([AMM TASK 49-10-00-910-803-A/200](#) for APU T-62T-40C11 or [AMM TASK 49-13-00-910-803-A/200](#) for APU T-62T-40C14).
- (2) Deenergize the balancer/analyser equipment from the 28 V DC power supply.
- (3) Disconnect EVM interface cable P/N 14626 from the EVM test connector in the rear electronic compartment.
- (4) Disconnect from the EVM adapter connector ENG.1 or ENG.2 as applicable.
- (5) Disconnect velocimeter cable P/N 11210-2.5 from the EVM adapter.
- (6) Disconnect the INPUT CABLE (POWER) AND SIGNAL P/N 8998 from the VELOCIMETER CABLE connector.
- (7) Disconnect DC POWER CABLE ADAPTER P/N 3140-20A or 3140-20B from the 28 V DC point of the aft galley.
- (8) Disconnect DC EXTENSION CABLE DC P/N 3529 from the DC POWER CABLE ADAPTER connector and from the INPUT CABLE (POWER) AND SIGNAL connector.
- (9) Disconnect the strobe light, from the balance instrument (GSE 162).
- (10) Remove of adhesive strip of reflective tape from the fan spinner.
- (11) Close access panel 272DR.

EFFECTIVITY: ALL

Fan Balancer/Analyzer Installation (Chadwick & Helmuth 8500C)

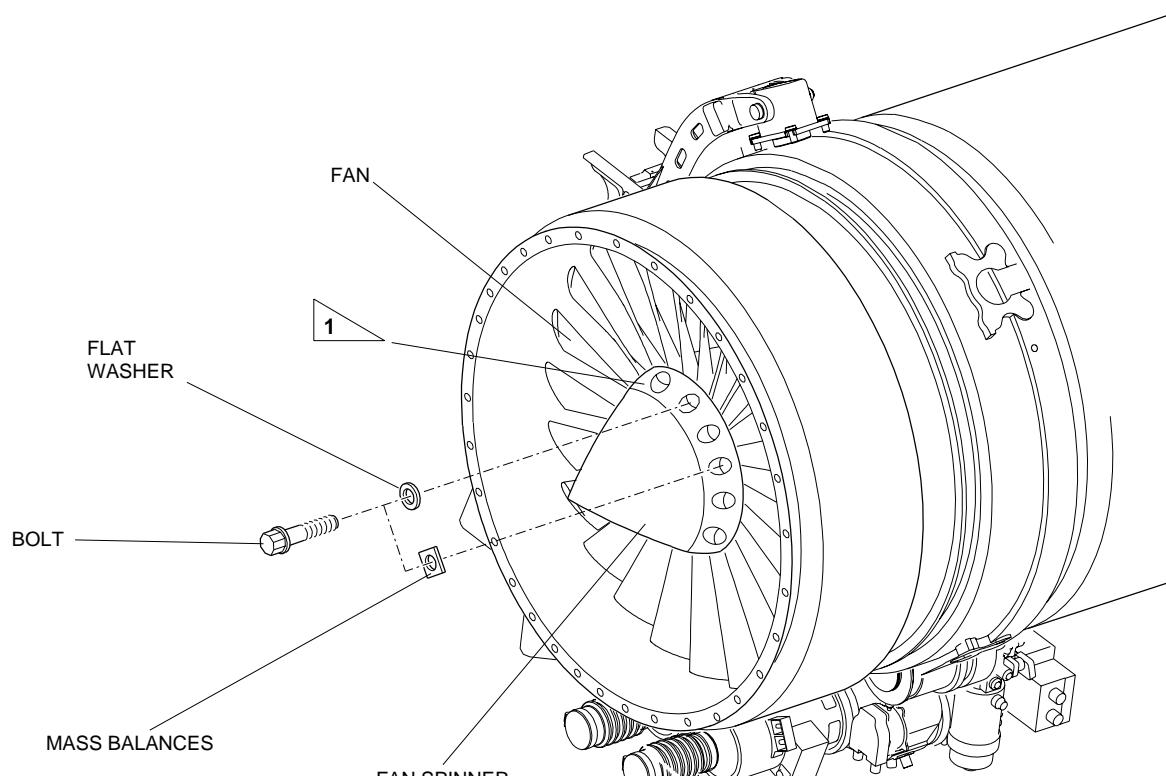
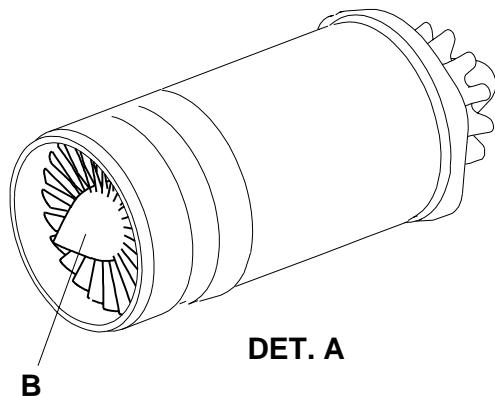
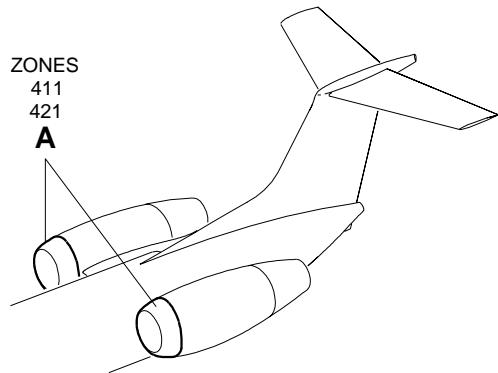
Figure 601



EFFECTIVITY: ALL

Fan Spinner Masses Attachment Points

Figure 602 - Sheet 1



DET. B

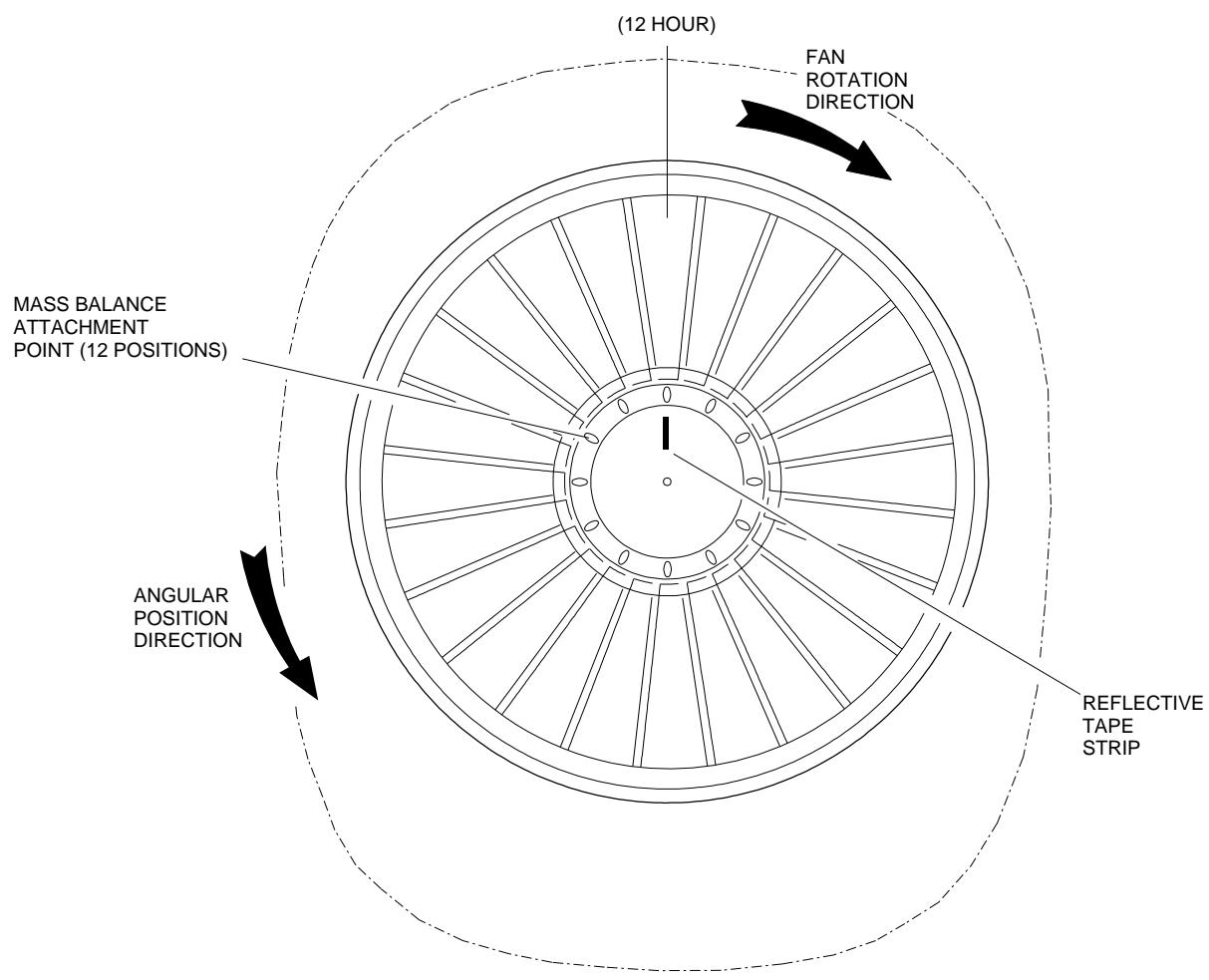
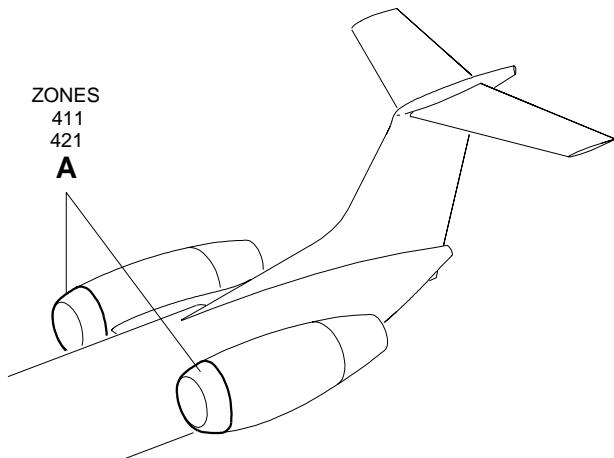
1 ATTACHING POINTS (12 POSITIONS)
FOR INSTALLATION OF MASS BALANCES.

145AMM720010.MCE A

EFFECTIVITY: ALL

Fan Spinner Masses Attachment Points

Figure 602 - Sheet 2


DET. A

145AMM720012.MCE B



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

TASK 72-21-03-700-802-A

EFFECTIVITY: ALL

3. ENGINE FAN - TRIM BALANCE (WITH BALANCE EQUIPMENT COMMERCIALLY AVAILABLE)

A. General

(1) Obey the instructions below to do the fan trim balance.

- The balance procedures must obey the instructions in the operation manual of a commercially available balance equipment.
- Figure 603 gives the instructions for you to make the connecting cable, which is necessary if you use the N1 accelerometer signal from the EVM connector.

NOTE: The EVM accelerometer signal output is calibrated for a sensitivity of 50 mv/g. Open the access panel to get access to the EVM (see figure 604).

B. References

REFERENCE	DESIGNATION
72-00-21 (Rolls-Royce IPC)	-
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 49-10-00-910-802-A/200	APU - START
AMM TASK 49-10-00-910-803-A/200	APU - SHUTDOWN
AMM TASK 49-13-00-910-802-A/200	APU - START
AMM TASK 49-13-00-910-803-A/200	APU - SHUTDOWN
AMM TASK 72-31-01-400-801-A/400	FAN SPINNER - INSTALLATION

C. Zones and Accesses

ZONE	PANEL/DOOR	LOCATION
410		LH Powerplant
420		RH Powerplant
272	272DR	Rear electronic compartment

D. Tools and Equipment

ITEM	DESCRIPTION	PURPOSE	QTY
	Balance analyzer commercially available	To do the fan trim balance	

E. Auxiliary Items

ITEM	DESCRIPTION	PURPOSE	QTY
Commercially available	Ladder	To get access to the EVM and the Engine	1



EMB145 - EMB135

AIRCRAFT
MAINTENANCE MANUAL

(Continued)

ITEM	DESCRIPTION	PURPOSE	QTY
Made with material commercially available	Connecting cable (See figure 603)	To connect the Balance instrument to the EVM	1

F. Consumable Materials

SPECIFICATION (BRAND)	DESCRIPTION	QTY
Commercially available	Reflective tape strip	AR

G. Expendable Parts

ITEM	IPC REFERENCE (VENDOR REFERENCE)	QTY
Trim balance weight	72-00-21 (Rolls-Royce IPC)	AR

H. Persons Recommended

QTY	FUNCTION	PLACE
1	Does the task	Operating the balance instrument
1	Does the task	Cockpit

I. Preparation

SUBTASK 841-003-A

- (1) To prevent N1 fluctuation and permit correct readouts during the fan trim balance procedure, let the aircraft stay in the direction of the wind.
- (2) Get access to the fan spinner and record the P/N of balances masses, and their related angular positions, if applicable.
NOTE: The attaching point coincident with the reflective tape will be the 0° (12-hour) angular position at the fan spinner.
- (3) Apply an adhesive strip of reflective tape on the fan spinner if applicable. The strip of reflective tape must be coincident with one of the mass balance attaching points.
- (4) Energize the aircraft with a DC Power Supply ([AMM TASK 20-40-01-860-801-A/200](#)) or start the APU ([AMM TASK 49-10-00-910-802-A/200](#) for APU T-62T-40C11 or [AMM TASK 49-13-00-910-802-A/200](#) for APU T-62T-40C14).

J. Engine Fan Trim Balance ([Figure 603](#)) ([Figure 604](#)) ([Figure 602](#))

SUBTASK 750-003-A

- (1) **NOTE:** The Fan Trim Balance procedure is done with the engine in operation, on the ground, with the rotor speed equal to 87% of N1. If the pressure altitude/ ambient temperature does not permit the engine to get 87% of N1, do the engine fan balance at a later date or try to balance at a slightly lower N1 speed limited to a minimum value of 85%.

Engine Fan Trim Balance

WARNING: BEFORE YOU APPLY POWER TO THE ENGINE, MAKE SURE THAT THERE ARE NO PERSONS NEAR THE ENGINE EXHAUST AREA ([AMM MPP 71-00-00/200](#)). THIS WILL PREVENT INJURY TO PERSONS.

- CAUTION:**
- BEFORE YOU START THE ENGINE, MAKE SURE THAT THERE ARE NO OBJECTS NEAR THE ENGINE AIR INTAKE. THESE OBJECTS CAN GO INTO THE ENGINE AND CAUSE DAMAGE TO IT.
 - TO PREVENT DAMAGE TO EQUIPMENT, MAKE SURE THAT THERE ARE NO OTHER AIRCRAFT NEAR THE EXHAUST AREA ([AMM MPP 71-00-00/200](#)).
 - TO PREVENT DAMAGE TO THE EQUIPMENT, PUT CHOCKS AT THE AIRCRAFT WHEELS AND SET THE PARKING BRAKE AND NORMAL BRAKES.
 - THE SENSITIVITY OF THE ACCELEROMETER OF THE EVM INSTALLED ON THE AIRCRAFT IS EQUAL TO 50 mv/g.
 - AFTER THE TRIM FAN-BALANCE PROCEDURE, THE RECOMMENDED UNBALANCE VIBRATION LEVEL IS 0.1 IPS (Peak) at 87% N1 AND MUST NOT EXCEED 0.3 IPS (Peak).
- (a) Do the Engine Fan Trim Balance. Obey the instructions of operation manual of the balance equipment.
- (2) Balance Mass Installation

WARNING:

- DO NOT TOUCH THE COMPONENTS OF THE ENGINE AND AIR INTAKE (IF IN ICING CONDITION) UNTIL THEY ARE COOL. THE TEMPERATURE STAYS HIGH AFTER THE ENGINE STOPS. THE HIGH TEMPERATURES CAN CAUSE INJURY TO PERSONS.
- REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN [AMM MPP 71-00-00/200](#) WHEN YOU INSTALL THE FAN MASS BALANCES TO PREVENT INJURY TO PERSONS AND DAMAGE TO MATERIAL.

CAUTION: • THE ATTACHMENT POINTS ON THE FAN SPINNER (12 POINTS) ARE USED TO INSTALL THE MASS BALANCES.

- INSTALL ONLY ONE MASS BALANCES AT EACH ATTACHMENT POINT.
- DO NOT INSTALL A FLAT WASHER AT THE ATTACHMENT POINT WHERE YOU INSTALL THE MASS BALANCES.
- A MAXIMUM OF 5 BALANCE BOLT LOCATIONS CAN BE USED AT EACH OF THE 12 POSITIONS.
- THE TOTAL FAN MASS LIMIT IS 45.5 GRAMS.
- THE ONLY AVAILABLE MASS BALANCES ARE THOSE WITH THE P/N GIVEN IN THE ROLLS-ROYCE IPC (72-00-21).

(a) Install the fan mass balances at the fan spinner attachment points as necessary. Obey the instructions below:

- 1 Remove the bolt from the fan spinner.
- 2 Remove and discard the flat washer.
- 3 Install the mass balances.
- 4 Install the bolt. Torque it ([AMM TASK 72-31-01-400-801-A/400](#)).

K. Follow-on

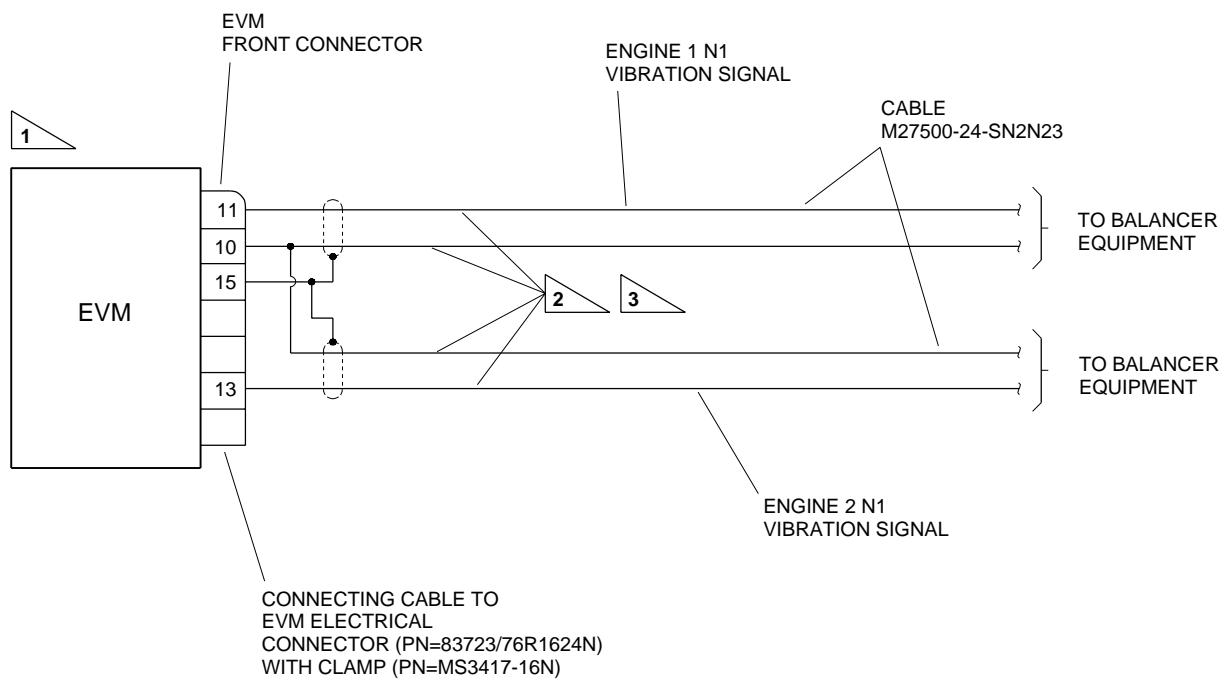
SUBTASK 842-003-A

- (1) Disconnect the balancing system cables.
- (2) Remove the DC power source from the aircraft ([AMM TASK 20-40-01-860-801-A/200](#)) or stop the APU ([AMM TASK 49-10-00-910-803-A/200](#) for APU T-62T-40C11 or [AMM TASK 49-13-00-910-803-A/200](#) for APU T-62T-40C14) if applicable.
- (3) Close access panel 272DR if applicable.

EFFECTIVITY: ALL

Engine Fan Balance - Connecting Cable Diagram

Figure 603

CONNECTING CABLE DIAGRAM


1 THIS CONNECTING CABLE DIAGRAM IS APPLICABLE
IF YOU USE THE N1 ACCELEROMETER SIGNAL FROM
THE EVM CONNECTOR.

2 MINIMUM CONNECTING CABLE LENGTH 82 ft (25 m).

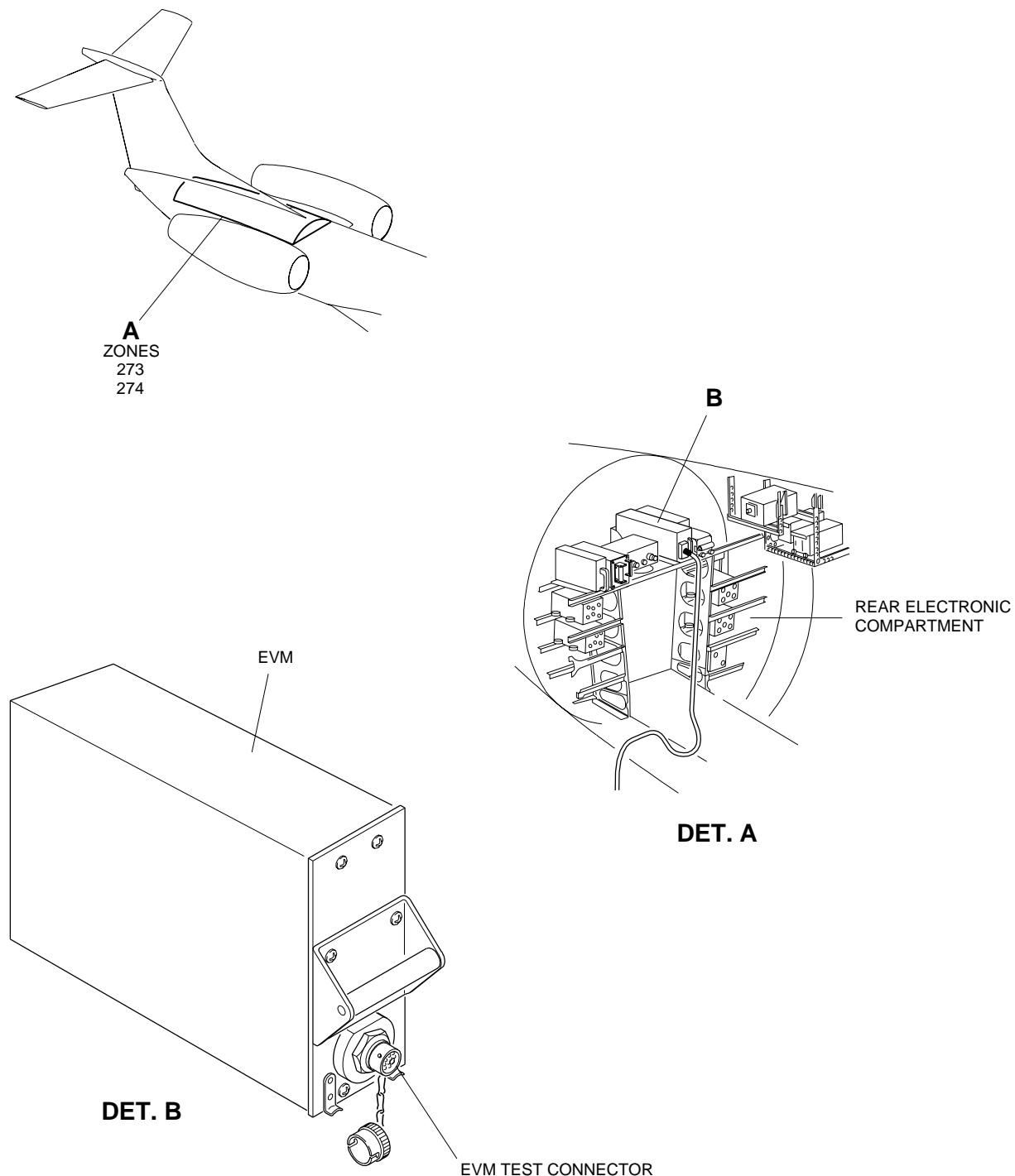
3 THE CABLES ARE INSULATED AND SHIELDED.

145AMM720011.MCE C

EFFECTIVITY: ALL

Engine Fan Balance - EVM Location

Figure 604



145AMM720014.MCE A

