POWERPLANT (ENGINE) GROUND RUN - MAINTENANCE PRACTICES

EFFECTIVITY: ALL

1. General

A. This section gives the procedures to do the engine ground-run procedures. These procedures are applicable to the two engines.

B. 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*
71-00-01-910-801-A	ENGINE START PROCEDURE (NORMAL)	ALL
71-00-01-910-802-A	ENGINE START PROCEDURE (COLD WEATHER)	ALL
71-00-01-910-803-A	ENGINE DRY MOTORING PROCEDURE (START CYCLE WITHOUT FUEL/IGNITION)	ALL
71-00-01-910-804-A	ENGINE STOP PROCEDURE	ALL
71-00-01-910-805-A	ENGINE CROSS START	ALL
71-00-01-910-806-A	ENGINE START WITH A TRANSFER HOSE	ALL
71-00-01-910-807-A	ENGINE EMERGENCY SHUTDOWN	ALL

TASK 71-00-01-910-801-A
EFFECTIVITY: ALL

2. ENGINE START PROCEDURE (NORMAL)

A. General

(1) This procedure gives the necessary instructions to operate the engine when you must make sure that the operation of the engine or related systems is correct.

(2) In cold weather, more preparations such as preheating can be necessary. The procedure to operate the engine in cold weather is given in (AMM TASK 71-00-01-910-802-A/200).

(3) The engine compartment clean condition is important. The strong airflow causes unwanted material to come into the engine. Always fully clean and examine the area at the beginning and at the end of the task to keep the inlet area clean.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM SDS 76-12-00/1	
AMM TASK 12-11-01-600-801-A/300	FUEL-TANK PRESSURE REFUELING - SERVICING
AMM TASK 12-12-01-600-801-A/300	ENGINE - SERVICING
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 20-40-03-860-801-A/200	CONNECT THE PNEUMATIC START UNIT TO THE AIRCRAFT
AMM TASK 26-10-00-700-801-A/500	-
AMM TASK 26-10-00-700-802-A/500	-
AMM TASK 31-31-00-700-803-A/500	FDR DATA - PERSONAL COMPUTER DOWNLOADING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 49-10-00-910-802-A/200	APU - START
AMM TASK 49-13-00-910-802-A/200	APU - START
AMM TASK 71-00-01-910-802-A/200	ENGINE START PROCEDURE (COLD WEATHER)
AMM TASK 71-00-01-910-803-A/200	ENGINE DRY MOTORING PROCEDURE (START CYCLE WITHOUT FUEL/IGNITION)
AMM TASK 71-00-01-910-804-A/200	ENGINE STOP PROCEDURE

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 012	Wheel chock	To hold the aircraft	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit
1	To monitor the engine operation	In the safety area near the engine

I. Preparation (Figure 201)

SUBTASK 841-002-A

WARNING: REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE GROUND-RUN PROCEDURES.

CAUTION: FOR THESE PROCEDURES, OBEY THE POWERPLANT OPERATING LIMITATIONS GIVEN IN (AMM MPP 71-00-00/200).

(1) Remove the engine inlet and exhaust covers, if applicable.

(2) Examine the engine air inlet for blockage.

(3) Remove all protections caps and covers from the aircraft.

(4) Make sure that the LDG safety pins are installed (AMM TASK 32-00-01-910-801-A/200).

(5) Install chocks to all wheels and apply the parking brake.

(6) Make sure that the Reversionary Panel is at the NORM position.

(7) Energize the aircraft with an External DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

(8) See the fuel quantity on the EICAS and the engine oil level on the MFD (Figure 201). Complete the fuel quantity (AMM TASK 12-11-01-600-801-A/300) or oil quantity (AMM TASK 12-12-01-600-801-A/300) as necessary.

(9) To start the engine with an external pneumatic power source, connect the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) and make sure that APU BLEED pushbutton is set to the CLOSED position (Figure 201).

CAUTION:
- EMBRAER AND HAMILTON SUNDSTRAND DO NOT RECOMMEND APU OPERATION DURING THE AIRCRAFT DEICING/ANTI-ICING PROCEDURE. IF THE APU IS KEPT IN OPERATION DURING THE DEICING/ANTI-ICING PROCEDURE, DAMAGE CAN OCCUR TO IT. IF THE APU OPERATION IS VERY NECESSARY, MAKE SURE THAT THE APU BLEED VALVE IS CLOSED, PACKS ARE SET TO OFF, AND THE DEICING/ANTI-ICING FLUID WILL NOT BE APPLIED DIRECTLY TO OR NEAR THE APU AIR INLET.
- REMOVE ALL DEICING/ANTI-ICING FLUID BUILD-UP BEFORE THE ENGINE OR THE APU STARTS. IF NOT, DAMAGE TO COMPONENTS CAN OCCUR.

(10) To start the engine with the APU as a pneumatic power source, start the APU (AMM TASK 49-10-00-910-802-A/200 or AMM TASK 49-13-00-910-802-A/200 as applicable) and make sure that the APU BLEED pushbutton is positioned to the OPEN position (Figure 201).

(11) Do a check of the engine thrust lever for free movement, no play, and full travel.

(12) Adjust the seat and pedals as necessary.

(13) Make sure that all switches/controls of the systems not used for the engine start are OFF/CLOSED.

(14) Set/keep these switches and controls as follows (Figure 201):

- Engine thrust lever to IDLE.
- Bus Ties to AUTO.
- Shed Buses to AUTO.
- AC Power to ON.
- Backup Battery to ON.
- Avionics Masters to ON.
- Ignition to AUTO.
- Start/Stop selector to STOP.
- Electrical Hydraulic Pumps to OFF.
- Crossbleed to OPEN or AUTO.
- Bleed Air to CLOSED.
- Air Conditioning Packs to OPEN if the APU is on and the APU Bleed is OPEN.
- Clocks set.

(15) NOTE: This step start the recording function of the FDR which will overwrite the data stored in the FDR.

On the exterior lights panel (overhead panel), set the RED BCN switch to the ON position (Figure 201).

(16) If it is necessary to keep the data stored in the FDR, open the FDR circuit breaker on the circuit breaker panel or if it is necessary to keep the FDR on, do an FDR downloading according to AMM TASK 31-31-00-700-803-A/500.

(17) Do a check on the Fire Detection System (AMM TASK 26-10-00-700-801-A/500) or (AMM TASK 26-10-00-700-802-A/500) as applicable.

(18) Make sure that the Engine Hydraulic Pump Shutoff buttons are guarded OFF (Figure 201).

(19) Close the windows.

(20) Set the TAKE OFF data as follows (Figure 201):

- Set MFD1 (or 2) to the TO page (AMM SDS 76-12-00/1).
- Push the STORE pushbutton, on the powerplant panel (overhead panel). A bug comes into view on the right side of the REF TO TEMP inscription on the TO page.
- Set the ambient temperature, with the DEC/INC switch. Refer to the ATC Ground Control/Tower as a source of static air temperature (SAT).
- Push the STORE pushbutton to record the TO data and change the bug to the REF A ICE inscription.
- Set the anti-icing condition as necessary, with the DEC/INC switch. Turn to DEC to set the anti-icing OFF condition and turn to INC to set the anti-icing ON condition.
- Push the STORE pushbutton to record the A ICE data. The bug goes out of view on the right side of the REF A ICE inscription on the TO page.
- The TO and A ICE data are shown amber after their setting until the engine starts. When the engine starts, the TO and A ICE data change from amber to cyan.

J. Engine Start Procedure (Normal) (Figure 201)

SUBTASK 910-002-A

CAUTION: DURING THE START PROCEDURES, OBEY THE PRECAUTIONS BELOW:

- IF A START IS ABORTED FOR SOME CAUSE (HUNG START, COMPRESSOR SURGE, COMPRESSOR STALL AT LOW N2 SPEEDS), LET THE ENGINE STOP BEFORE YOU DO THE STARTING PROCEDURE AGAIN.
- IF THERE IS NO POSITIVE INDICATION OF OIL PRESSURE DURING THE STARTING CYCLE, ABORT THE START. FIND THE CAUSE OF THE INCORRECT INDICATION.
- IF THE ITT INCREASES QUICKLY TO AS HIGH AS 800°C (1472°F), ABORT THE START.
- AFTER AN ABORTED START, DO A DRY MOTORING (AMM TASK 71-00-01-910-803-A/200), BEFORE YOU START THE ENGINE AGAIN.

(1) Set the crossfeed switch as applicable(Figure 201).

CAUTION: DAMAGE TO THE FUEL PUMP WILL OCCUR IF IT OPERATES WITH NO FUEL (DRY OPERATION). THUS, SEE THE FUEL LEVEL IN THE FUEL TANKS BEFORE YOU TURN ON THE FUEL PUMP.

(2) NOTE: At each engine start, change from one electrical pump to the other.

Set one electrical fuel pump to ON (Figure 201).

(3) Release the protective guard and set the start switch as follows (Figure 201):

(a) Set the start switch to RUN and momentarily set it to START (Figure 201).

(4) Monitor the engine parameters (ITT, OIL PRESSURE, N1, N2, and FF), on the EICAS display (Figure 201).

NOTE:
- Do not alternate/reset FADECs while the power levers are operated.
- The IGN A (B) indication goes out view on the EICAS display. This shows that the start cycle is completed.

K. Follow-on

SUBTASK 842-002-A

(1) Set the Electrical Panel as applicable.

(2) Operate the APU as applicable.

(3) Set the Electric Hydraulic Pumps to AUTO (Figure 201).

(4) Set the Ice Protection as necessary.

CAUTION: BEFORE YOU REMOVE THE EXTERNAL DC POWER SUPPLY, MAKE SURE THAT THE GPU PUSHBUTTON IS SET TO THE OFF (RELEASED) POSITION (FIGURE 201).

(5) Remove the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200) from the aircraft, if applicable.

(6) Remove the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) from the aircraft, if applicable.

NOTE: To stop the engine, refer to AMM TASK 71-00-01-910-804-A/200.

TASK 71-00-01-910-802-A
EFFECTIVITY: ALL

3. ENGINE START PROCEDURE (COLD WEATHER)

A. General

(1) This procedure gives the necessary instructions to operate the engine in cold weather conditions. This procedure is used when you must make sure that the operation of the engine or related systems is correct.

(2) The engine compartment clean condition is important. The strong airflow causes unwanted material to come into the engine. Always fully clean and examine the area at the beginning and at the end of the task to keep the inlet area clean.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM SDS 76-12-00/1	
AMM TASK 12-11-01-600-801-A/300	FUEL-TANK PRESSURE REFUELING - SERVICING
AMM TASK 12-12-01-600-801-A/300	ENGINE - SERVICING
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 20-40-03-860-801-A/200	CONNECT THE PNEUMATIC START UNIT TO THE AIRCRAFT
AMM TASK 26-10-00-700-801-A/500	-
AMM TASK 26-10-00-700-802-A/500	-
AMM TASK 31-31-00-700-803-A/500	FDR DATA - PERSONAL COMPUTER DOWNLOADING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 49-10-00-910-802-A/200	APU - START
AMM TASK 49-13-00-910-802-A/200	APU - START
AMM TASK 71-00-01-910-804-A/200	ENGINE STOP PROCEDURE
TASK 71-00-01-910-003-A	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 012	Wheel chock	To hold the aircraft	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit
1	To monitor the engine operation	In the safety area near the engine

I. Preparation (Figure 201)

SUBTASK 841-003-A

WARNING: REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE OPERATION PROCEDURES.

CAUTION: FOR THESE PROCEDURES, OBEY THE ENGINE OPERATING LIMITATIONS GIVEN IN (AMM MPP 71-00-00/200).

(1) Remove the engine inlet and exhaust covers.

(2) Examine the engine air inlet for blockage.

(3) Remove all protectives caps and covers from the aircraft.

(4) Make sure that the LDG safety pins are installed (AMM TASK 32-00-01-910-801-A/200).

(5) Install chocks to all wheels and apply the parking brake.

(6) Make sure that the Reversionary Panel is at the NORM position.

(7) Energize the aircraft with an External DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

(8) See the fuel quantity on the EICAS and the engine oil level on the MFD (Figure 201). Complete the fuel quantity (AMM TASK 12-11-01-600-801-A/300) or oil quantity (AMM TASK 12-12-01-600-801-A/300) as necessary.

(9) To start the engine with an external pneumatic power source, connect the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) and make sure that APU BLEED pushbutton is set to the CLOSED position (Figure 201).

CAUTION:
- EMBRAER AND HAMILTON SUNDSTRAND DO NOT RECOMMEND APU OPERATION DURING THE AIRCRAFT DEICING/ANTI-ICING PROCEDURE. IF THE APU IS KEPT IN OPERATION DURING THE DEICING/ANTI-ICING PROCEDURE, DAMAGE CAN OCCUR TO IT. IF THE APU OPERATION IS VERY NECESSARY, MAKE SURE THAT THE APU BLEED VALVE IS CLOSED, PACKS ARE SET TO OFF, AND THE DEICING/ANTI-ICING FLUID WILL NOT BE APPLIED DIRECTLY TO OR NEAR THE APU AIR INLET.
- REMOVE ALL DEICING/ANTI-ICING FLUID BUILD-UP BEFORE THE ENGINE OR THE APU STARTS. IF NOT, DAMAGE TO COMPONENTS CAN OCCUR.

(10) To start the engine with the APU as a pneumatic power source, start the APU (AMM TASK 49-10-00-910-802-A/200 or AMM TASK 49-13-00-910-802-A/200 as applicable) and make sure that the APU BLEED pushbutton is set to the OPEN position (Figure 201).

(11) Do a check of the engine thrust lever for free movement, no play, and full travel.

(12) Adjust the seat and pedals as necessary.

(13) Make sure that all switches/controls of the systems not used for the engine start are OFF/CLOSED.

(14) Set/keep these switches and controls as follows (Figure 201):

- Engine thrust lever to IDLE.
- Bus Ties to AUTO.
- Shed Buses to AUTO.
- AC Power to ON.
- Backup Battery to ON.
- Avionics Masters to ON.
- Ignition to AUTO.
- Start/Stop selector to STOP.
- Electrical Hydraulic Pumps to OFF.
- Crossbleed to OPEN.
- Bleed Air to CLOSED.
- Clocks set.

(15) NOTE: This step start the recording function of the FDR which will overwrite the data stored in the FDR.

On the exterior lights panel (overhead panel), set the RED BCN switch to the ON position (Figure 201).

(16) If it is necessary to keep the data stored in the FDR, open the FDR circuit breaker on the circuit breaker panel or if it is necessary to keep the FDR on, do an FDR downloading according to AMM TASK 31-31-00-700-803-A/500.

(17) Do a check on the Fire Detection System (AMM TASK 26-10-00-700-801-A/500) or (AMM TASK 26-10-00-700-802-A/500) as applicable.

(18) Make sure that the Engine Hydraulic Pump Shutoff buttons are guarded OFF (Figure 201).

(19) Close the windows.

(20) Set the TAKE OFF data as follows (Figure 201):

- Set MFD1 (or 2) to the TO page (AMM SDS 76-12-00/1).
- Push the STORE pushbutton. A bug comes into view on the right side of the REF TO TEMP inscription on the TO page.
- Set the ambient temperature, with the DEC/INC switch. Refer to the ATC Ground Control/Tower as a source of static air temperature (SAT).
- Push the STORE pushbutton to record the TO data and change the bug to the REF A ICE inscription.
- Set the anti-icing condition as necessary, with the DEC/INC switch. Turn to DEC to set the anti-icing OFF condition and turn to INC to set the anti-icing ON condition.
- Push the STORE pushbutton to record the A ICE data. The bug goes out of view on the right side of the REF A ICE inscription on the TO page.
- The TO and A ICE data are shown amber after their setting until the engine starts. When the engine starts, the TO and A ICE data change from amber to cyan.

J. Engine Start Procedure (Cold Weather) (Figure 201)

SUBTASK 910-003-A

CAUTION: DURING THE START PROCEDURES, OBEY THE PRECAUTIONS BELOW:

- DO NOT START THE ENGINE UNTIL YOU ARE SURE THAT ALL ICE DEPOSITS WERE REMOVED FROM THE AIR INLET.
- IF A START IS ABORTED FOR SOME CAUSE (HUNG START, COMPRESSOR SURGE, COMPRESSOR STALL AT LOW N2 SPEEDS), LET THE ENGINE STOP BEFORE YOU DO THE STARTING PROCEDURE AGAIN.
- IF THERE IS NO POSITIVE INDICATION OF OIL PRESSURE DURING THE STARTING CYCLE, ABORT THE START. FIND THE CAUSE OF THE INCORRECT INDICATION.
- IF THE ITT INCREASES QUICKLY TO AS HIGH AS 800°C (1472°F), ABORT THE START.
- IF AN ABORTED START OCCURS, DO A DRY MOTORING (TASK 71-00-01-910-003-A), BEFORE YOU START THE ENGINE AGAIN.

NOTE: • With the air temperature at 10°C (50°F) or below, or at the first sign of ice on any surface, do as follows.

• If the anti-icing system is ON, with no ice on the fan blades, the thrust will increase at colder ambient temperatures, but will stay approximately the same at warmer ambient temperature, due to the added effect of bleed air usage.

(1) Set the crossfeed switch as applicable (Figure 201).

CAUTION: DAMAGE TO THE FUEL PUMP WILL OCCUR IF IT OPERATES WITH NO FUEL (DRY OPERATION). THUS, CHECK THE FUEL LEVEL IN THE FUEL TANKS BEFORE YOU TURN ON THE FUEL PUMP.

(2) NOTE: At each engine start, change from one electrical pump to the other.

Set one electrical fuel pump to ON (Figure 201).

(3) Set the ignition switch to ON (Figure 201).

NOTE: For the first start of the day or if it is 90 minutes since the engine was last started, it is recommended that the engine be started with the ignition switch at the ON position. After a successful start, move the ignition switch back to the AUTO position.

(4) Set the engine air inlet to OPEN (Figure 201).

(5) Release the protective guard and set the start switch as follows (Figure 201):

(a) Set the start switch to RUN and momentarily set it to START (Figure 201).

CAUTION: ICE INGESTION AND POSSIBLE ENGINE DAMAGE OR FLAME OUT CAN OCCUR IF YOU USE THE ENGINE ANTI-ICING SYSTEM ONLY AFTER THE ICE BUILD-UP IS VISIBLE FROM THE COCKPIT.

(6) Set the ICE DETECTION OVERRIDE master switch to the ENG position except during ice protection system test (Figure 201).

(7) NOTE: • Monitor the vibration for signs of ice. Ice on the fan blades can increase the vibration at fan speeds less than 50% N1.

• For fan speeds of more than 50% N1, the vibration caused by icing is not frequent. If the vibration occurs at more than 50% N1 speed, there can be other causes for the vibration.

If the vibration increases while in the icing conditions and at low speeds, increase the fan speed to 60% N1, minimum, for 3 to 5 seconds, then decrease it back to the necessary thrust.

(8) NOTE: If the vibration continues the same or increases, refer to AMM MPP 71-00-00/200.

To make sure that the vibration is caused by the ice, increase the fan speed to 75% N1 minimum and then decrease it back to the necessary thrust.

(9) NOTE: • Do not alternate/reset FADECs while the power levers are operated.

- The IGN A (B) indication goes out view on the EICAS display. This shows that the start cycle is completed.

Monitor the engine parameters (ITT, OIL PRESSURE, N1, N2, and FF), on the EICAS display (Figure 201).

K. Follow-on

SUBTASK 842-003-A

(1) Set the Electrical Panel as applicable.

(2) Operate the APU as applicable.

(3) Set the Electric Hydraulic Pumps to AUTO (Figure 201).

(4) Set the Ice Protection as necessary.

CAUTION: BEFORE YOU REMOVE THE EXTERNAL DC POWER SUPPLY, MAKE SURE THAT THE GPU PUSHBUTTON IS SET TO THE OFF (RELEASED) POSITION (FIGURE 201).

(5) Remove the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200) from the aircraft, if applicable.

(6) Remove the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) from the aircraft, if applicable.

NOTE: To stop the engine, refer to AMM TASK 71-00-01-910-804-A/200.

TASK 71-00-01-910-803-A
EFFECTIVITY: ALL

4. ENGINE DRY MOTORING PROCEDURE (START CYCLE WITHOUT FUEL/IGNITION)

A. General

(1) This procedure gives the necessary instructions to do an engine dry motoring. This procedure is used when you purge the engine to remove fuel and/or fuel vapor caught in the engine interior after an unsatisfactory start.

(2) The engine compartment clean condition is important. The strong airflow causes unwanted material to come into the engine. Always fully clean and examine the area at the end of the task to keep the inlet area clean.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 12-12-01-600-801-A/300	ENGINE - SERVICING
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 20-40-03-860-801-A/200	CONNECT THE PNEUMATIC START UNIT TO THE AIRCRAFT
AMM TASK 26-10-00-700-801-A/500	-
AMM TASK 26-10-00-700-802-A/500	-
AMM TASK 31-31-00-700-803-A/500	FDR DATA - PERSONAL COMPUTER DOWNLOADING
AMM TASK 32-00-01-910-801-A/200	LG SAFETY PIN - INSTALLATION AND REMOVAL
AMM TASK 49-10-00-910-802-A/200	APU - START
AMM TASK 49-13-00-910-802-A/200	APU - START

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 012	Wheel chock	To hold the aircraft	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit
1	To monitor the engine operation	In the safety area near the engine

I. Preparation (Figure 201)

SUBTASK 841-004-A

WARNING: REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE OPERATION PROCEDURES.

CAUTION: FOR THESE PROCEDURES, OBEY THE POWERPLANT OPERATING LIMITATIONS GIVEN IN (AMM MPP 71-00-00/200).

(1) Remove the engine inlet and exhaust covers.

(2) Examine the engine air inlet for blockage.

(3) Remove all protection caps and covers from the aircraft.

(4) Make sure that the LDG safety pins are installed (AMM TASK 32-00-01-910-801-A/200).

(5) Install chocks to all wheels and apply the parking brake.

(6) Make sure that the Reversionary Panel is at the NORM position.

(7) Energize the aircraft with an External DC Power Supply (AMM TASK 20-40-01-860-801-A/200).

(8) See the engine oil level on the MFD (Figure 201). Complete the oil quantity (AMM TASK 12-12-01-600-801-A/300) as necessary.

(9) To start the engine with an external pneumatic power source, connect the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) and make sure that APU BLEED pushbutton is set to the CLOSED position (Figure 201).

CAUTION:
- EMBRAER AND HAMILTON SUNDSTRAND DO NOT RECOMMEND APU OPERATION DURING THE AIRCRAFT DEICING/ANTI-ICING PROCEDURE. IF THE APU IS KEPT IN OPERATION DURING THE DEICING/ANTI-ICING PROCEDURE, DAMAGE CAN OCCUR TO IT. IF THE APU OPERATION IS VERY NECESSARY, MAKE SURE THAT THE APU BLEED VALVE IS CLOSED, PACKS ARE SET TO OFF, AND THE DEICING/ANTI-ICING FLUID WILL NOT BE APPLIED DIRECTLY TO OR NEAR THE APU AIR INLET.
- REMOVE ALL DEICING/ANTI-ICING FLUID BUILD-UP BEFORE THE ENGINE OR THE APU STARTS. IF NOT, DAMAGE TO COMPONENTS CAN OCCUR.

(10) To start the engine with the APU as a pneumatic power source, start the APU (AMM TASK 49-10-00-910-802-A/200 or AMM TASK 49-13-00-910-802-A/200 as applicable) and make sure that the APU BLEED pushbutton is set to the OPEN position (Figure 201).

(11) Adjust the seat and pedals as necessary.

(12) Make sure that all switches/controls of the systems not used for the engine start are OFF/CLOSED.

(13) Set/keep these switches and controls as follows (Figure 201):

- Engine thrust lever to IDLE.
- Bus Ties to AUTO.
- Shed Buses to AUTO.
- AC Power to ON.
- Backup Battery to ON.
- Avionics Masters to ON.
- Ignition to OFF.
- Start/Stop selector to STOP.
- Electrical Hydraulic Pumps to OFF.
- Crossbleed to OPEN.
- Bleed Air to CLOSED.
- Air Conditioning Packs to OPEN if the APU is on and APU Bleed is OPEN.
- Clocks set.

(14) NOTE: This step start the recording function of the FDR which will overwrite the data stored in the FDR.

On the exterior lights panel (overhead panel), set the RED BCN switch to the ON position (Figure 201).

(15) If it is necessary to keep the data stored in the FDR, open the FDR circuit breaker on the circuit breaker panel or if it is necessary to keep the FDR on, do an FDR downloading according to AMM TASK 31-31-00-700-803-A/500.

CAUTION: DAMAGE TO THE ENGINE FUEL PUMP WILL OCCUR IF IT OPERATES WITH NO FUEL (DRY OPERATION).

(16) Set the FUEL PUMP PWR switch to ON.

CAUTION: DO NOT TRY TO DRY-MOTOR THE ENGINE WITH ONLY ONE FADEC IN OPERATION. THE IGNITION SYSTEM CONTROLLED BY THE OTHER FADEC WILL ENERGIZE ABOVE 14% N2 (2250 RPM) AND COMBUSTION CAN OCCUR.

(17) Momentarily set the FADEC RESET/ALTN switch to ALTN and make sure that the FADEC in control indication, on the EICAS screen, changes from A to B or vice versa.

(18) Do a check on the Fire Detection System (AMM TASK 26-10-00-700-801-A/500) or (AMM TASK 26-10-00-700-802-A/500) as applicable.

(19) Make sure that the Engine Hydraulic Pump Shutoff buttons are guarded OFF (Figure 201).

(20) Close the windows.

J. Engine Dry Motoring Procedure (Figure 201)

SUBTASK 910-004-A

(1) Set the crossfeed switch to OFF (Figure 201).

(2) Check that the message “IGN OFF” comes into view on the EICAS.

CAUTION: OBEY THE ATS OPERATING LIMITATIONS (COOLING PERIODS). REFER TO AMM MPP 71-00-00/200.

(3) NOTE: Release the protective guard before you set the start switch as follows (Figure 201).

Set the start switch to RUN and momentarily set it to START (Figure 201). At the same time, start the stopwatch.

CAUTION: ABORT THE DRY MOTORING CYCLE IF YOU SEE THAT THE N2 DOES NOT INCREASE OR THERE IS NO OIL PRESSURE INDICATION.

(4) See, on the EICAS, that the N2 increases and the FF stays at ZERO (Figure 201).

(5) After 30 seconds, set the start switch to STOP (Figure 201).

K. Follow-on

SUBTASK 842-004-A

(1) Set the Electrical Panel as applicable.

(2) Operate the APU as applicable.

(3) Set the Electric Hydraulic Pumps to AUTO (Figure 201).

(4) Set the Ice Protection as required.

CAUTION: BEFORE YOU REMOVE THE EXTERNAL DC POWER SUPPLY, MAKE SURE THAT THE GPU PUSHBUTTON IS SET TO THE OFF (RELEASED) POSITION (FIGURE 201).

(5) Remove the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200) from the aircraft, if applicable.

(6) Remove the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) from the aircraft, if applicable.

TASK 71-00-01-910-804-A
EFFECTIVITY: ALL

5. ENGINE STOP PROCEDURE

A. General

(1) This procedure gives the necessary instructions to stop the engine.

B. References

REFERENCE	*DESIGNATION*
AMM TASK 12-12-01-600-801-A/300	ENGINE - SERVICING
AMM TASK 71-12-01-000-802-A/400	ENGINE LOWER COWLING - REMOVAL
AMM TASK 71-12-01-400-802-A/400	ENGINE LOWER COWLING - INSTALLATION

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
413		LH Engine lower cowling
423		RH Engine lower cowling

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
Commercially available	Ladder	To get access to the engine	1

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit
1	To monitor the engine operation	In the safety area near the engine

I. Engine Stop Procedure (Figure 201)

SUBTASK 910-005-A

(1) Set the thrust lever to IDLE.

(2) NOTE: If the engine BLEED 1/2 switch is pushed, release it before you do the subsequent step.

Release the protective guard and set the START/STOP switch to STOP (Figure 201).

J. Follow-on

SUBTASK 842-005-A

(1) Set the Electrical Panel as applicable.

(2) Set the Electric Hydraulic Pumps to OFF (Figure 201).

(3) Set the Ice Protection to OFF (Figure 201).

(4) Put the ladder in the work area.

WARNING: DO NOT TOUCH THE COMPONENTS OF THE ENGINE UNTIL THEY ARE COOL. THE TEMPERATURE STAYS HIGH AFTER THE ENGINE STOPS. THE HIGH TEMPERATURES CAN CAUSE INJURY TO PERSONS.

(5) Open the engine lower cowling (AMM TASK 71-12-01-000-802-A/400).

(6) See the engine oil tank level (AMM TASK 12-12-01-600-801-A/300). Fill as necessary.

(7) Do a check on all fittings which were disconnected/connected during the maintenance procedures to make sure that there are no leaks and that they are correctly safetied. Correct the incorrect conditions found.

(8) Do a check on all components related to the maintenance procedures to make sure that they are correctly attached and safetied, and that there are no leaks. Repair the incorrect conditions found.

(9) Close the engine lower cowling (AMM TASK 71-12-01-400-802-A/400).

(10) Remove the ladder.

(11) To prevent corrosion in the compressor stages and damage to the fan, put covers on the engine inlet and exhaust when possible. When there is freezing precipitation or sufficient wind to turn the engine, it is specially important to cover the engine.

TASK 71-00-01-910-805-A
EFFECTIVITY: ALL

6. ENGINE CROSS START

A. General

(1) This procedure gives the necessary instructions to do an engine cross start. This procedure is used when you need to start one engine assisted by the other engine.

(2) The engine compartment clean condition is important. The strong airflow causes unwanted material to come into the engine. Always fully clean and examine the area at the end of the task to keep the inlet area clean.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 12-11-01-600-801-A/300	FUEL-TANK PRESSURE REFUELING - SERVICING
AMM TASK 12-12-01-600-801-A/300	ENGINE - SERVICING
AMM TASK 20-40-01-860-801-A/200	ENERGIZATION OF THE AIRCRAFT WITH AN EXTERNAL POWER SOURCE
AMM TASK 20-40-03-860-801-A/200	CONNECT THE PNEUMATIC START UNIT TO THE AIRCRAFT
AMM TASK 71-00-01-910-804-A/200	ENGINE STOP PROCEDURE

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 012	Wheel chock	To hold the aircraft	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit
1	To monitor the engine operation	In the safety area near the engine

I. Preparation (Figure 201)

SUBTASK 841-005-A

WARNING: REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE OPERATION PROCEDURES.

CAUTION: FOR THESE PROCEDURES, OBEY THE POWERPLANT OPERATING LIMITATIONS GIVEN IN (AMM MPP 71-00-00/200).

(1) Make sure that the engine inlet and exhaust covers were removed.

(2) Examine the engine air inlet of the inoperative engine for blockage.

(3) Make sure that all protection caps and covers were removed from the aircraft.

(4) Make sure that there are chocks at all wheels and the parking brake was applied.

(5) Make sure that the Reversionary Panel is at the NORM position.

(6) See the fuel quantity on the EICAS and the engine oil level on the MFD (Figure 201). Complete the fuel quantity (AMM TASK 12-11-01-600-801-A/300) or oil quantity (AMM TASK 12-12-01-600-801-A/300) as necessary.

(7) Make sure that all switches/controls of the systems not used for the engine start are OFF/CLOSED.

(8) Set/keep these switches and controls as follows (Figure 201):

- Engine thrust lever to IDLE (engine off).
- Bus Ties to AUTO.
- Shed Buses to AUTO.
- AC Power to ON.
- Backup Battery to ON.
- Avionics Masters to ON.
- Ignition to AUTO.
- Start/Stop selector to STOP (engine off).
- Electrical Hydraulic Pumps to OFF.
- Crossbleed to OPEN or AUTO.
- APU bleed to CLOSED.
- Bleed Air (inoperative engine) to CLOSED.
- Bleed Air (Operative engine) to OPEN.
- Clocks set.

(9) Make sure that the Engine Hydraulic Pump Shutoff buttons are guarded OFF (Figure 201).

J. Engine Cross Start Procedure (Figure 201)

SUBTASK 910-006-A

(1) Adjust the N2 parameter of the engine in operation to more than 80%.

(2) NOTE: Release the protective guard before you set the start switch as follows (Figure 201).

Set the start switch of the engine to be assisted to RUN and momentarily set it to START.

(3) Monitor the engine parameters (ITT, OIL PRESSURE, N1, N2, and FF), on the EICAS display (Figure 201).

NOTE:
- Do not alternate/reset FADECs while the power levers are operated.
- The IGN A (B) indication goes out view on the EICAS display. This shows that the start cycle is completed.

K. Follow-on

SUBTASK 842-006-A

(1) Set the Electrical Panel as applicable.

(2) Set the Electric Hydraulic Pumps to AUTO (Figure 201).

(3) Set the Ice Protection as necessary.

CAUTION: BEFORE YOU REMOVE THE EXTERNAL DC POWER SUPPLY, MAKE SURE THAT THE GPU PUSHBUTTON IS SET TO THE OFF (RELEASED) POSITION (FIGURE 201).

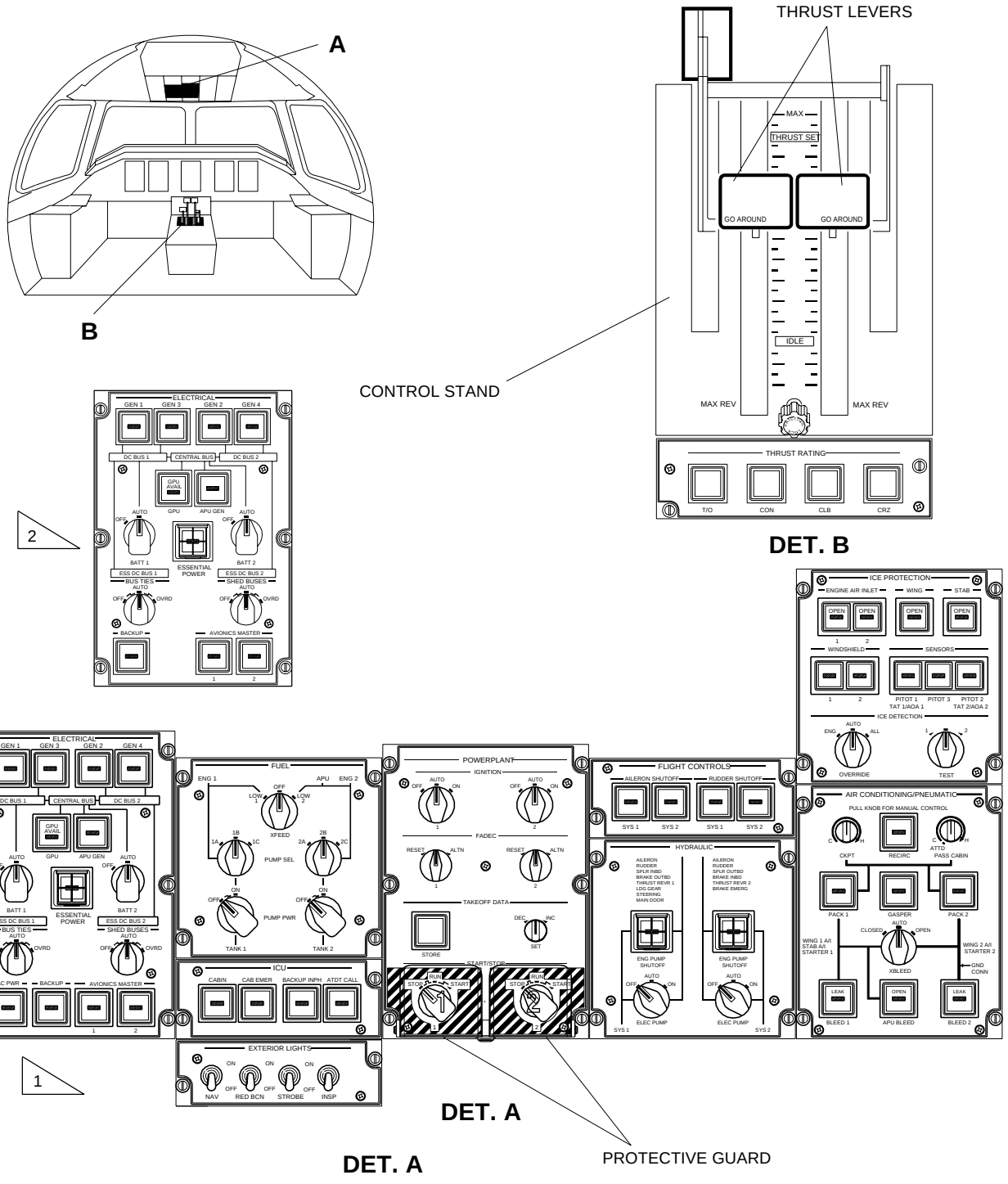
(4) Remove the External DC Power Supply (AMM TASK 20-40-01-860-801-A/200) from the aircraft, if applicable.

(5) Remove the External Pneumatic Power Source (AMM TASK 20-40-03-860-801-A/200) from the aircraft, if applicable.

NOTE: To stop the engine, refer to AMM TASK 71-00-01-910-804-A/200.

EFFECTIVITY: ALL

Engine Starting - Indicating and Control Locations
Figure 201 - Sheet 1



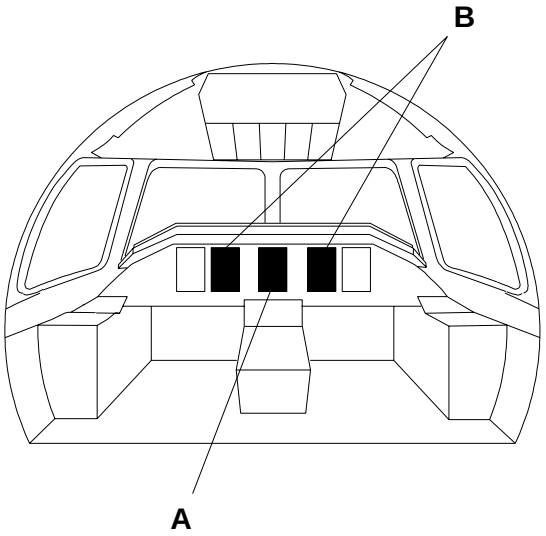
1 AIRCRAFT WITH AC STATIC INVERTER INSTALLED

2 AIRCRAFT WITH AC STATIC INVERTER NOT INSTALLED

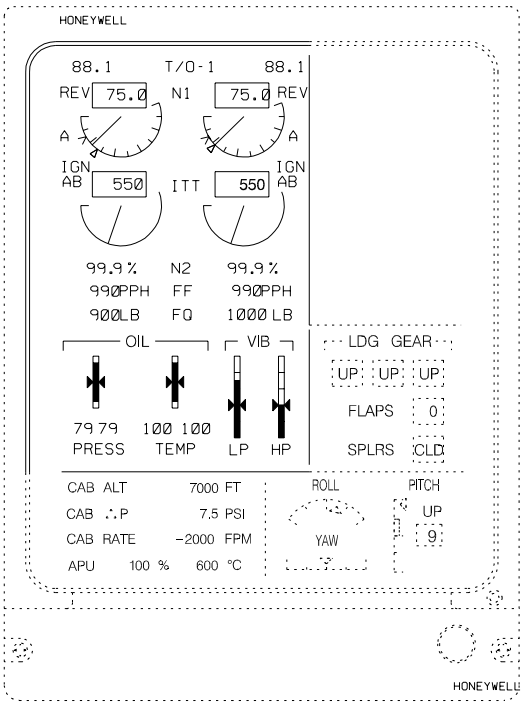
EM145AMM710235A.DGN

EFFECTIVITY: ALL

Engine Starting - Indicating and Control Locations
Figure 201 - Sheet 2

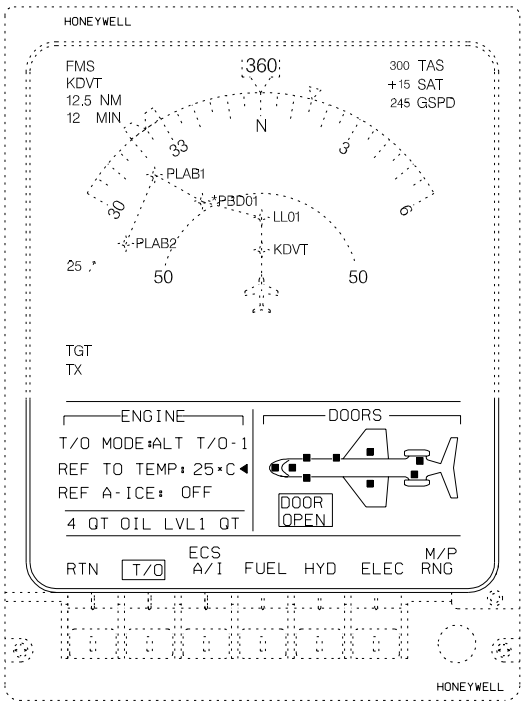


EICAS DISPLAY



DET. A

MFD DISPLAY



DET. B

EM145AMM710257A.DGN

TASK 71-00-01-910-806-A
EFFECTIVITY: ALL

7. ENGINE START WITH A TRANSFER HOSE

A. General

(1) This procedure gives the necessary instructions to start one engine of the aircraft with the airflow from other aircraft also equipped with Rolls-Royce AE3007A - series engines.

(2) The engine compartment clean condition is important. The strong airflow causes unwanted material to come into the engine. Always fully clean and examine the area at the end of the task to keep the inlet area clean.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 06-41-01/100	-
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 71-00-01-910-801-A/200	ENGINE START PROCEDURE (NORMAL)

C. Zones and Accesses

ZONE	*PANEL/DOOR*	*LOCATION*
272	272CR	Aft Compartment - RH

D. Tools and Equipment

ITEM	*DESCRIPTION*	*PURPOSE*	*QTY*
GSE 273	Lock-Open Pneumatic Starting Valve	To lock the Engine Start Ground Connection Check Valve at the open position	
GSE 012	Wheel Chock	To hold the aircraft	
Commercially available	Coupling and Adapter Assembly	To connect the hose to the Engine Start Ground Connection Check Valve	
Commercially available	Hose with minimum length of 15 m, protected by overbraid for working pressure of 50 psig and temperature of 250°C	To transfer the airflow of one engine to the engine of other aircraft	

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	To start, monitor and stop the source engine	In the cockpit

(Continued)

QTY	FUNCTION	PLACE
1	To start the engine that receives the airflow	In the cockpit

I. Preparation (Figure 202)

SUBTASK 841-006-A

WARNING:
- **REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE OPERATION PROCEDURES.**
- **MAKE SURE THAT ALL WHEEL CHOCKS ARE IN CORRECT POSITION.**

(1) Park the two aircraft so that the RH wing of one aircraft overlaps the LH wing of the other aircraft (Figure 202).

(2) Open access door 272CR (AMM MPP 06-41-01/100) on the two aircraft.

(3) Install the Lock-Open Pneumatic Starting Valve (GSE 273) to the Engine Start Ground Connection Check Valve of the aircraft that will supply the airflow to start the engine of the other aircraft (Figure 202).

CAUTION: MAKE SURE THAT THE BOLT TO LOCK GSE 273 IS AT THE CORRECT POSITION TO PREVENT DAMAGE TO THE AIRCRAFT.

(4) Connect the Coupling of the transfer hose in the Engine Start Ground Connection Check Valve on the two aircraft.

J. Engine Start with a Transfer Hose (Figure 202)

SUBTASK 910-007-A

(1) On the air conditioning/pneumatic overhead panel of the source aircraft, set these switches as follows:

- APU BLEED - closed
- BLEED 1 - closed
- CROSS BLEED - closed
- BLEED 2 - open

(2) On the air conditioning/pneumatic overhead panel of the aircraft that receives the airflow, set these switches as follows:

- APU BLEED - closed
- BLEED 1 - closed
- CROSS BLEED - closed
- BLEED 2 - closed

(3) Start the RH engine of the aircraft that supplies the airflow to the other aircraft. Refer to AMM TASK 71-00-01-910-801-A/200.

CAUTION:
- DO NOT OPERATE THE ENGINE IN MAXIMUM THRUST FOR MORE THAN 5 MINUTES.
- MAKE SURE THAT THE ITT DOES NOT EXCEED THE OPERATIONAL LIMITS.

(4) On the source aircraft, advance the thrust lever to reach 95% N2.

(5) Start the RH engine of the aircraft that receives the airflow from the other aircraft. Refer to AMM TASK 71-00-01-910-801-A/200.

K. Follow-on

SUBTASK 842-007-A

(1) Remove the transfer hose from the two aircraft.

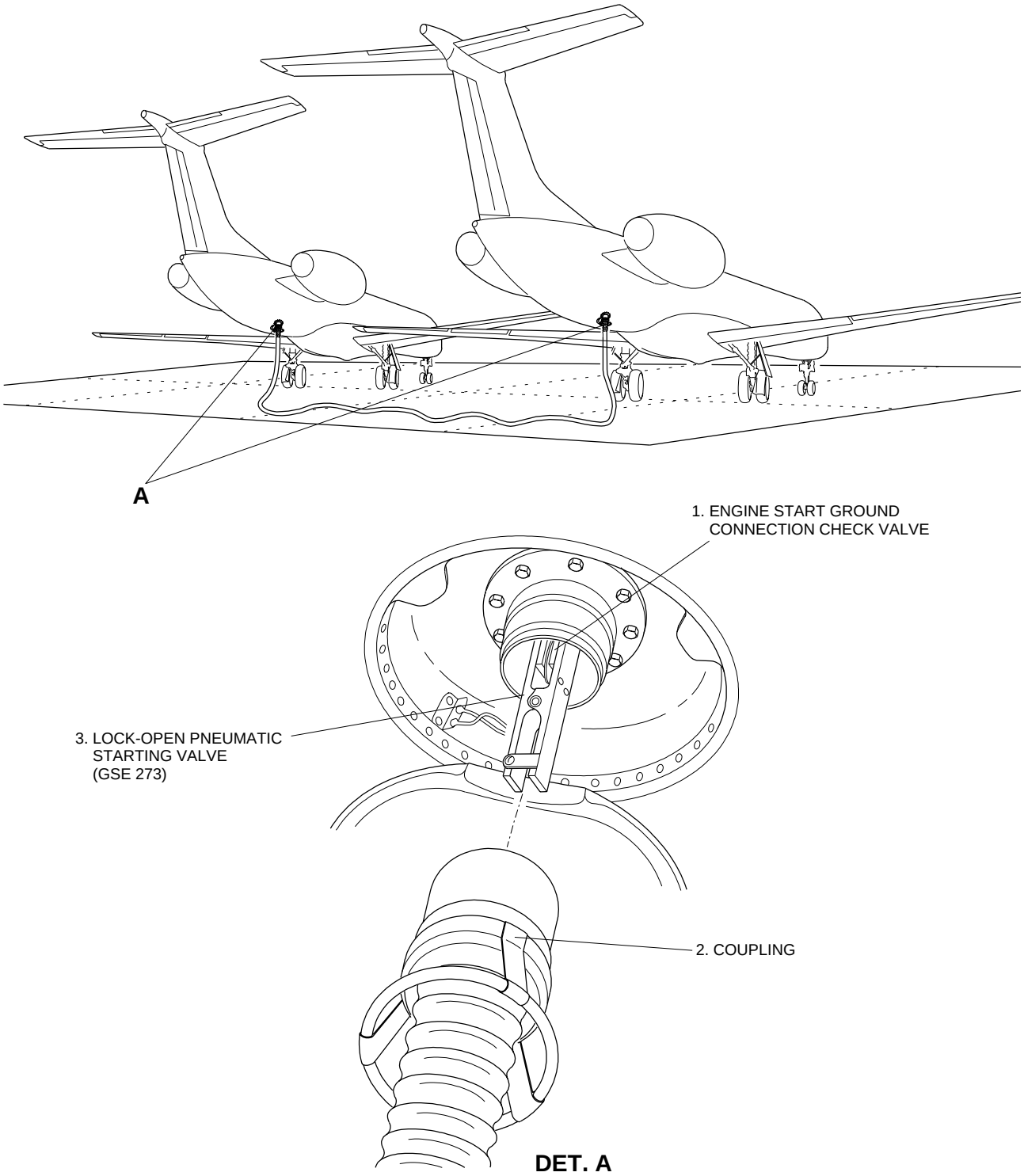
WARNING: BE CAREFUL WITH THE HIGH TEMPERATURE DURING THE GSE REMOVAL.

(2) Remove the Lock-Open Pneumatic Starting Valve from the Engine Start Ground Connection Check Valve.

(3) Close access door 272CR AMM MPP 06-41-01/100 on the two aircraft.

EFFECTIVITY: ALL

Engine Start with a Transfer Hose - Component Locations
Figure 202



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TASK 71-00-01-910-807-A
EFFECTIVITY: ALL

8. ENGINE EMERGENCY SHUTDOWN

A. General

(1) This procedure gives the necessary instructions to shutdown the engine in case of fire.

(2) Make sure that there is a pneumatic source available to do the dry motoring.

B. References

REFERENCE	*DESIGNATION*
AMM MPP 71-00-00/200	- MAINTENANCE PRACTICES
AMM TASK 71-00-01-910-803-A/200	ENGINE DRY MOTORING PROCEDURE (START CYCLE WITHOUT FUEL/IGNITION)
IGFER, section 7	-
Rolls-Royce MM CSP 34022 05-50-00	-

C. Zones and Accesses

Not Applicable

D. Tools and Equipment

Not Applicable

E. Auxiliary Items

Not Applicable

F. Consumable Materials

Not Applicable

G. Expandable Parts

Not Applicable

H. Persons Recommended

QTY	*FUNCTION*	*PLACE*
1	Does the task	Cockpit

I. Engine Emergency Shutdown Procedure (Figure 201)

SUBTASK 910-008-A

WARNING:
- **REFER TO THE GROUND SAFETY PRECAUTIONS GIVEN IN (AMM MPP 71-00-00/200) WHEN YOU DO THE ENGINE GROUND-RUN PROCEDURES.**
- **DURING THE START PROCEDURES, MAKE SURE THAT THERE IS A FIRE FIGHTER (OUTSIDE OBSERVER), WHO FULLY KNOWS IGFER, SECTION 7, WITH A FIRE EXTINGUISHER (CO2) NEAR THE AIRCRAFT TO MONITOR THE ENGINE OPERATION. USE THE REAR INTERPHONE SYSTEM (RAMP) FOR COMMUNICATIONS BETWEEN THE COCKPIT AND THE OUTSIDE OBSERVER.**

(1) If the warning message ENG 1 (2) FIRE is shown on the EICAS together with aural warning or there are visual signs of engine fire with no cockpit indication, do as follows:

(a) Set the thrust lever to IDLE.

(b) Set the START/STOP switch to STOP.

(c) Set the IGNITION switch to OFF.

(d) Set the related fuel pumps to OFF.

(e) Pull (do not turn) the Fire Extinguishing Handle.

(f) Inform the outside observer that a dry motoring will be done within 30 to 60 seconds (AMM TASK 71-00-01-910-803-A/200).

CAUTION: FOR THESE PROCEDURES, OBEY THE ATS OPERATING LIMITATIONS GIVEN IN (AMM MPP 71-00-00/200).

(g) Momentarily set the START/STOP switch to START and then set it to RUN. This causes the engine to dry-motor and the fire to blow out. Continue to motor the engine with the starter for 30 seconds and observe if all indications of fire are gone. This is the only way to extinguish a fire in the engine core.

(h) If the fire message or signs of fire stay on the EICAS after the dry motoring, set the START/STOP switch to STOP and tell the outside observer to extinguish the fire.

(i) If the fire message or signs of fire continue, rotate the Fire Extinguishing Handle (first shot).

(j) Wait for 10 seconds.

(k) If the fire message or signs of fire continue, rotate the Fire Extinguishing Handle (second shot).

NOTE: If the fire message or signs of fire continue, do the procedures to extinguish the fire according to the Instructions for Ground Fire Extinguishing and Rescue (IGFER, section 7).

(2) Make sure that these switches and controls are set as follows:

- CROSSFEED - OFF
- Related Fuel Pumps - OFF
- Related Bleed - CLOSE
- Related Generators - OFF
- Electric Hydraulic Pumps - OFF
- Ice Protection - OFF

(3) Make sure that the Fuel Shutoff Valve closed (E1 (2) FUELSOV CLSD advisory message on the EICAS).

J. Follow-on

SUBTASK 842-008-A

WARNING: DO NOT TRY TO START THE ENGINE AGAIN.

(1) Inspect the engine. Refer to the latest revision of the Rolls-Royce MM CSP 34022 05-50-00.