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Título/Title

A330-200 MRTT. ATA 24: Electrical System Ground Test Requirements for Civil Configuration

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Resumen/Summary

The object of this Technical Note is to define the requirements for the on ground tests to be performed on the Electrical System in the A330 MRTT, in order to check its proper functioning.

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A	Initial Release	See cover	See cover
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B	Battery Discharge Audible Warning test included		
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1. INTRODUCTION

1.1 Scope

The object of this Technical Note is to define the requirements for the on ground tests to be performed on the Electrical System in the A330 MRTT in its civil configuration, in order to check its proper functioning.

1.2 Applicability

This Technical Note is applicable to A330-200 MRTT aircraft for the RAAF.

1.3 Applicable documents and specifications

Doc Reference	Title
NT-FA-SGE-05011	A330-200-MRTT- ECS (ATA21). Ground Test Program Requirements
N/A	A330 AMM Royal Australian Air Force

Table 1. Documents referenced

Electrical principal diagrams reference	Title
ME F252A9000	Power outlets general purposes
MF F256A7000	Power outlets for MEDEVAC
PN F246A1000	TR3 distribution
PN F246A1001	TR4 distribution
PN F246A1002	DC Re-allocable
PN F246A1003	DC-Re-allocable 2
PU F243A2000	TR3
PU F243A2001	TR4
PU F243A2002	TIE CONTACTOR CONTROL
XA F242A6000	Galley shedding modification
XN F245A1000	AC distribution for PODS
XN F245A1001	AAR power extension
XN F245A1002	AAR power extension II
XN F245A1004	Generator failure signal
XN F245A1005	Console controls
XN F245A1006	Console Master Panel

Table 2. Wiring diagrams

Modified electrical wiring diagrams reference	Title
24-22-06	AC Main Generation Gen 2 SWTG & INDG Sh 2/4 Pag 1
24-22-07	AC Main Generation Gen 2 SWTG & INDG Sh 2/4 Pag 1
24-23-02	AC Auxiliary Gen CTL & INDG Sh 2/4 Pag 1
24-51-01	AC main distribution GLC1
24-51-04	AC main distribution GLC2
24-51-05	AC main distribution control
24-56-01	Galley supply CTL. FWD & MID galley
25-18-01	Equipment/Furnishings Additional cockpit electrical power. Electrical outlet

Table 3. Modified wiring diagrams of green A/C

1.4 Abbreviations and definitions

1.4.1 Abbreviations

AC	Alternating current
A/C	Aircraft
AAR	Air to Air Refuelling
AMM	Aircraft Maintenance Manual
ARC	Air Refuelling Computer
ARO	Air Refuelling Operator
BCCS	Boom Computing Control System
C.B.	Circuit Breaker
DC	Direct current
EEN	Electrical Extension Network
MCO	Mission Coordinator Operator
MFCD	Multi-Function Control Display
MFD	Multi-Function Display
P/B	Push Button
SW	Switch
TR	Transformer rectifier

2. AIRCRAFT AND SYSTEM CONFIGURATION

Previously to perform the testing of electrical system, it must be checked that the following tests have been performed:

2.1 Power supply

Previously to perform any test, it must be checked that continuity tests of power wires which carry the main electrical power from power sources to bus bars, as well as their return power wires, have been made successfully.

The aircraft shall be supplied by one GPU unless otherwise specified.

In tests described in paragraphs 5.2.1. and 5.2.3. power will be provided by the aircraft generators since engines will be running.

2.2 Aircraft environment

The aircraft shall be on ground. If not specified in the test, all the engines and the APU shall be shut down.

The corresponding system wiring continuity tests shall have been made successfully.

That equipment and components of the corresponding system shall have been properly installed and according to the applicable documentation, and that they are fully operatives.

2.3 Systems required to be operational before the test

Basic aircraft systems will operative before the test.

3. TEST EQUIPMENT AND REQUIRED INSTRUMENTATION

In order to perform the set of tests described in paragraph 5, two external GPUs of 115/200 VAC, 3-phase, 400 Hz (90KVA each one) test equipment is required.

For testing the wiring continuity, and so as to measure the voltage as indicated in the test descriptions, a digital multimeter model Fluke 8060 A or equivalent can be used.

Modified CBMU floppy disk for civil configuration.

In order to monitor the voltages an oscilloscope will be used.

4. PREVIOUS REQUIREMENTS TO TEST

Prior to perform any test, the following requirements must be met:

1. It shall be checked that adequate means to electrical equipment fire extinguishing are present at the aircraft proximity.

2. For the test which do not need neither the IDGs nor APU, it shall be checked that the fuel tanks are empty and there is no risk of explosion

3. It shall be checked that batteries are connected properly, and that have been recharged to their full capacity recently.

4. It shall be checked that all the control switches and selectors of the electrical installation are in OFF position.

It shall be checked that no other works, which prevent the test right execution, are being performed in the aircraft.

5. ELECTRICAL SYSTEM TEST DESCRIPTION

5.1 Previous assumptions

TBD

5.2 Electrical system tests descriptions

The modification of ATA 24 electrical system affects installation of AC and DC distribution, although in the civil configuration DC generation, operation, control and monitoring of Electrical Extension Network, EEN, will not be operative. Galley shedding will be the same as in the green A/C and new TR3 and TR4 will be de-energized.

Before performing the tests related to ATA24, ensure that the C.B. listed below are OPEN

FIN	Designation	Panel	Location
A1ME	POWER OUTLETS BUSINESS	5001VE	TBA
A7ME	OUTLETS CTL C.B.	5001VE	TBA
A1MF	POWER OUTLETS MEDEVAC	5001VE	TBA
A5MF	MEDEVAC OUT CLT	5001VE	TBA
A2PU	TR4 SPLY	715VU (TBC)	TBA
A6PU	TR3 SPLY	715VU (TBC)	TBA
A9PU	TR3 MONG	722VU (TBC)	TBA
A11PU	TR4 MONG	721VU (TBC)	TBA
A5XN	A6XN CB	722VU (TBC)	TBA
A13XN	A4XP CB	722VU (TBC)	TBA
A26XN	HVPS1	721VU (TBC)	TBA
A27XN	HVPS2	721VU (TBC)	TBA
A28XN	A7XP CB	721VU (TBC)	TBA
A29XN	HVPS3	722VU (TBC)	TBA
A30XN	HVPS4	722VU (TBC)	TBA
A31XN	A8XP CB	722VU (TBC)	TBA
A48XN	A5XP CB	721VU (TBC)	TBA
A54XN	A3XP CB	721VU (TBC)	TBA
A8UZ	AUDIO EIRA1/LA1	742VU	TBA
A9UZ1	AUDIO CAPT/FO	742VU	TBA
A9UZ7	AUDIO DAMU	742VU	TBA
A9UZ5	AUDIO V/UHF1	742VU	TBA
A9UZ10	AUDIO SCIU2/3	742VU	TBA
A20UR1	RMS1	742VU	TBA
A2SH1	IFF 1	742VU	TBA
A4UH1	RT1	742VU	TBA
A3UV	Control Unit	742VU	TBA
A4UV1	RT V/UHF1	742VU	TBA

5.2.1 Electrical system general test

WARNING: Before power is supplied to the aircraft, make certain that electrical circuits upon which work is in progress are isolated.

Number	Action	Expected result
000	Apply task 24-41-00-861-801 of AMM24-00-00 (page 501: Energisation of the aircraft from External Power Receptacle.	Those described in the AMM.
001	Measure AC power: voltage and current in the following busbars: • Busbar A3XP, A5XP, A7XP, placed in panel 721VU	There is no power in the busbars.

	• Busbar A4XP, A6XP, A8XP placed in panel 722VU,	
002	Measure DC power: voltage and current in the following busbars: • Busbar A1PP, placed in panel 721VU, where the C.B.-A1PN (DC A7PP C.B.) is placed • Busbar A2PP, placed in panel 722VU, where the C.B.-A25PN (DC A8PP C.B.) is placed • Busbar A100PP, placed in panel 721VU, where the C.B.-A5PN (DC A3PP C.B.) is placed • Busbar A200PP, placed in panel 722VU, where the C.B.-A18PN (DC A4PP C.B.) is placed	There is no power in the busbars.
003	Do the EIS start procedure (EWD DU, SD DU only) (Ref. TASK 31-60-00-860-801).	Those described in the AMM.
004	On the ECAM control panel, push the EL/AC key	ELEC AC page comes into view in the SD. No indication of TR3 and TR4 is displayed
005	On the ECAM control panel, push the EL/DC key	ELEC DC page comes into view in the SD. No indication of TR3 and TR4 and new busbars is displayed
006	On the MCDU, get the SYSTEM REPORT/TEST ELEC:DC page (Ref. TASK 45-10-00-860-808).	
007	Perform subtask 24-00-00-710-063 so as to check the A/C energization with the batteries 1 and 2	Those described in the AMM
008	Measure AC power: voltage and current in the following busbars: • Busbar A3XP, A5XP, A7XP, placed in panel 721VU • Busbar A4XP, A6XP, A8XP placed in panel 722VU,	There is no power in the busbars.
009	Measure DC power: voltage and current in the following busbars: • Busbar A1PP, placed in panel 721VU, where the C.B.-A1PN (DC A7PP C.B.) is placed • Busbar A2PP, placed in panel 722VU, where the C.B.-A25PN (DC A8PP C.B.) is placed • Busbar A100PP, placed in panel 721VU, where the C.B.-A5PN (DC A3PP C.B.) is placed • Busbar A200PP, placed in panel 722VU, where the C.B.-A18PN (DC A4PP C.B.) is placed	There is no power in the busbars.
010	Start the APU (Ref. TASK 49-00-00-860-801).	Those described in the AMM
011	Start the engines (Ref. TASK 71-00-00-860-808).	Those described in the AMM
012	On the ELEC control panel 235VU, release the GEN1, GEN2 and APU GEN pushbutton switches.	Those described in the AMM
013	Perform subtask 24-00-00-710-070 so as to perform the Generators Switching Test	Those described in the AMM
014	Measure AC power: voltage and current in the following busbars: • Busbar A3XP, A5XP, A7XP, placed in panel 721VU • Busbar A4XP, A6XP, A8XP placed in panel 722VU,	There is no power in the busbars.

015	Measure DC power: voltage and current in the following busbars: • Busbar A1PP, placed in panel 721VU, where the C.B.-A1PN (DC A7PP C.B.) is placed • Busbar A2PP, placed in panel 722VU, where the C.B.-A25PN (DC A8PP C.B.) is placed • Busbar A100PP, placed in panel 721VU, where the C.B.-A5PN (DC A3PP C.B.) is placed • Busbar A200PP, placed in panel 722VU, where the C.B.-A18PN (DC A4PP C.B.) is placed	There is no power in the busbars.
016	Stop the engines (Ref. TASK 71-00-00-860-809	
017	Stop the APU (Ref. TASK 49-00-00-860-802).	
018	Do the EIS stop procedure (Ref. TASK 31-60-00-860-802	
019	De-energize the aircraft electrical	

5.2.2 A/C Galleys shedding logic

WARNING: Before power is supplied to the aircraft, make certain that electrical circuits upon which work is in progress are isolated.

Number	Action	Expected result
000	Start the engines (Ref. TASK 71-00-00-860-808).	Those described in the AMM
001	In the avionics compartment, on the AC/DC main power center 710VU: - make sure that the MC system RCCBs are OPEN (green window) but not RCCB 23MC (red window).	
002	On the ELEC control panel 235VU: - push the GEN1 pushbutton switch - release the GEN2 pushbutton switch.	On the ELEC control panel 235VU: - the OFF legend of the GEN2 pushbutton switch comes on. On the AC/DC main power center 710VU: - the MC system RCCBs are OPEN (green window) but not RCCB 111MC (red window).
003	Measure voltage in busbar 115XP	The busbar is energised
004	On the ELEC control panel 235VU: - release the COMMERCIAL pushbutton switch.	On the ELEC control panel 235VU: - the OFF legend of the COMMERCIAL pushbutton switch comes on. On the AC/DC main power center 710VU: - the MC system RCCBs are OPEN (green window).
005	Measure voltage in busbar 115XP	The busbar is not energised
006	Stop the engines (Ref. TASK 71-00-00-860-809)	

5.2.3 C/B monitoring function

For the realization of this test, the CBMU shall have been uploaded with the floppy disk containing the civil configuration.

Number	Action	Expected result
000	Energize the aircraft electrical circuits (Ref. TASK 24-41-00-861-801)	Those described in the AMM
001	Make sure that this(these) circuit breaker(s) is(are) closed: ---------- PANEL DESIGNATION FIN LOCATION ---------- 721VU DATA LOADER 3TD L13 721VU DLS/DLRB SPLY 27TD S20 721VU L/G SAFETY VLV 3GA S12 721VU CMC 1 SWTG 4TM1 U07 721VU CBMU 2XD X05 722VU MCDU 2 7CA2 C47 722VU CMC 2 3TM2 D45 722VU LGCIU 2 2GA U38 722VU CMC 2 SWTG 4TM2 W40 742VU LGCIU 1 1GA L63 742VU CMC 1 3TM1 N72 742VU MCDU 3 7CA3 N71 742VU MCDU 1 7CA1 Q61	
002	Perform Subtask 24-53-00-860-056	
003	Perform subtask 24-53-00-970-052 for the uploading of the CBMU Database (using the civil configuration floppy disk)	Those described in the AMM
004	Ensure that no error message appears on the SD C.B. page	Those described in the AMM
005	Perform subtask 24-53-00-280-052 to do a check of the Reference of the Data Loaded into the CBMU	Those described in the AMM
006	Perform Subtask 24-53-00-860-057 so as to recover initial configuration	Those described in the AMM
007	De-energize the aircraft electrical circuits (Ref. TASK 24-41-00-862-801).	Those described in the AMM

5.2.4 Airstairs Functioning on batteries

WARNING: Before power is supplied to the aircraft, make certain that electrical circuits upon which work is in progress are isolated.

Number	Action	Expected result
000	Ensure that the A/C is de-energized and that the batteries 1 and 2 are charged at 80% of their capacity.	
001	Push BAT1, and BAT2 pushbutton switches	ON SD: BAT1 and BAT2 are displayed in white normally (situation expected), - in amber when the battery is faulty, as sensed by the System Data Analog Concentrator (SDAC).

		DC BAT busbar: - in green normally, - in amber if there is no voltage on the busbar 3PP, - replaced by amber XX when busbar 3PP status information is not available from Electrical Contactor Management Unit 1 (ECMU1) or the Battery Charge Limiter (BCL).
002	Record during all this test the voltage values of batteries by using an oscilloscope.	
003	Ensure that the C.B. of the Airstairs A1NS, A2NS and A3NS located on 5001VE panel are closed	
004	Perform a cycle of extension by operating the controls on the AIRSTAIR CONTROL PANEL.	Airstairs will be able to be extended normally
005	Switch on the airstair lights by using the controls on the AIRSTAIR CONTROL PANEL	Airstairs lights on
006	Switch off the airstair lights by using the controls on the AIRSTAIR CONTROL PANEL	Airstairs lights off
007	Perform a cycle of extension by operating the controls on the AIRSTAIR CONTROL PANEL.	Airstairs will be able to be retracted normally
008	Release BAT1, and BAT2 pushbutton switches	All indications on SD goes off.

5.2.5 Battery Discharge Warning Test

AUDIBLE WARNING TEST (BATTERIES SELECTED WITH AIRCRAFT SHUT-DOWN)					
1	On ground, the aircraft shall be de-energised (ground power unit disconnected and generators not running),				
2	Batteries (if not already connected) will be connected to the aircraft				
3	Depress battery pushbutton switches				
4	The operator shall confirm that the audible warning horn is activated on the flight – deck.				
5	Release the battery pushbutton switches				
6	The operator shall confirm that the audible warning horn is no longer activated				
SUCCESS CRITERIA:					
The audible warning signal must automatically activate in the flight deck when the aircraft is in shut – down mode and the battery pushbuttons are depressed. The audible warning shall automatically de-activate when the batteries are disconnected.					
RESULTS:		WARNING ON		WARNING OFF	
		PASS	FAIL	PASS	FAIL
IN SHUT DOWN – BATTERIES CONNECTED				N/A	N/A
IN SHUT DOWN – BATTERIES DISCONNECTED		N/A	N/A		

COMMENTS:

5.2.6 Cockpit Power Outlets functionality

Procedure to follow is described in document TBD.