

REVISIONS			
LTR	DESCRIPTION	DATE	APVD
C	RP0754 – Miscellaneous	02-04-17	JJD
D	RT6559 – Miscellaneous	03-03-03	JJD
E	RU2027 – Miscellaneous	03-05-02	JJD

Statement A, Unlimited

1.0 Scope: This drawing details the requirements for the Cabin Wireless LAN Antenna, equipment type number PMAA-2000.

- The part number is 013-1978-010.
- Paragraph(s), table(s) and/or figure(s) followed by “**█**” indicate a change by the latest revision.
- All Sheets are the Same Revision Status.
- Metric units may apply.

Authorized Vendors, Vendor Part Numbers, CAL Status, and CAGE or FSCM are as defined in the Rockwell Collins, Inc. database(s).

UM Each (EA)		VENDOR ITEM DRAWING			
CONTRACT NO		Rockwell Collins, Inc. 400 Collins Rd NE Cedar Rapids, IA 52498			
PREP	J.M.Barth 01-03-13				
CHK	J.J.Day 01-03-13	CWLU Antenna, PMAA-2000			
ENGR	W.H.Bell APVD 01-03-13				
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2.0

Applicable Documents: The following documents of the issue in effect on the date of invitation for bids form a part of this drawing to the extent specified herein.

Industry Standards

ANSI-J-STD-001	Requirements for Soldered Electrical and Electronic Assemblies
IPC A-610C	Acceptability for Electronic Assemblies
ISO 2669	Environmental Tests for Aircraft Equipment – Steady-State Acceleration Second Edition
RTCA DO-160	Environmental Conditions and Test Procedures for Airborne Equipment
RTCA DO-178	Software Considerations in Airborne Systems and Equipment Certification; Errata
Reference 2.1-1	
IEEE 802.3	Information Technology—Telecommunications and information exchange between system—Local and Metropolitan Area Networks—Specific Requirements—Part 3: Carrier Sense Multiple Access With Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications [ANSI/IEEE Std 802.3, 1993 Edition].
Reference 2.1-2	
IEEE 802.11-1999	Information Technology—Telecommunications and Information Exchange Between Systems—Local and Metropolitan Area Networks— Specific Requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY)
Reference 2.1-3	
IEEE 802.11b-1999	Supplement to Standard for Information Technology— Telecommunications and Information Exchange Between System—Local and Metropolitan Area Networks—Specific Requirements—Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY)
Reference 2.1-4	
	Design Assurance Guidance for Airborne Electronic Hardware (RTCA/DO-254) Radio Technical Commission for Aeronautics (RTCA), Inc.; 1140 Connecticut Avenue, NW, Suite 1020, Washington, DC 20036-4001; April 19, 2000 [RTCA/DO-254].

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- Reference 2.1–5 Environmental Conditions and Test Procedures for Airborne Equipment; (RTCA/DO–160D) Radio Technical Commission for Aeronautics (RTCA), Inc.; One McPherson Square 1425 K Street, NW, Suite 500, Washington, DC 20005 [RTCA/DO–160D, July 29, 1997].
- Reference 2.1–6 European Telecommunication Standard ETS 300 328 A1 July 1997 Radio Equipment and Systems (RES); Wideband Transmission System; Technical Characteristics and Test Conditions for Data Transmission Equipment Operating in the 2.4 gigahertz (GHz) ISM Band and Using Spread Spectrum Modulation Techniques European Telecommunications Standards Institute, Postal Address: F–06921 Sophia Antipolis CEDEX – France.
- Reference 2.1–7 USA FCC Parts 15.247 and 15.205
- Reference 2.1–8 Japan MPT Ordinance for Regulatory Radio Equipment, Article 49–20.
- Reference 2.1–9 Ethernet Local Area Network (ELAN) [ARINC–646]
- Reference 2.1–10 Aircraft Network and Server Unit (ANSU), December 17, 1999 [ARINC 763–1]
- Reference 2.1–11 RFC 0793 Transmission Control Protocol [TCP]
- Reference 2.1–12 RFC 0791 Internet Protocol [IP]
- Reference 2.1–13 Airworthiness Standards: Transport Category Airplanes (FAR Part 25). Federal Aviation Regulations Part 25, January 1, 1994. [FAR Part 25].
- Reference 2.1–14 ISO 2669
- Reference 2.1–15 System Requirements Document for the Wireless LAN Unit (WLU–2001), Integrated Information System Product Line, PNR 832–9526–001.
- Reference 2.1–16 Supplier Quality System Requirements, PNR 074–8432–119.
- Reference 2.1–17 Supplier Quality Evaluation Requirements, RC–QMS–M–301.
- Reference 2.1–18 Fabrication Practices, PNR 580–5800–001
- Reference 2.1–19 Front Panel (artwork and screening), PNR 621–9826–001

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Acronyms and Abbreviations

ARINC	Aeronautical Radio, Inc
CCR	Country Code Roaming
CWLU	Cabin Wireless LAN Function of WLU
DSSS	Direct Sequence Spread Spectrum
FHSS	Frequency Hopping Spread Spectrum
GHz	Gigahertz, 1 Billion Cycles per Second
NSU	Network Server Unit
FTP	File Transfer Protocol
IEEE	Institute of Electrical and Electronic Engineers
I/O	Input/Output
LAN	Local Area Network
MAA	Microwave Airborne Antenna
MHz	Megahertz, 1 Million Cycles per Second
MTBF	Mean Time Between Failures
MTBUR	Mean Time Between Unscheduled Removals
MTTR	Mean Time to Repair
PMAA	Portable Microwave Airborne Antenna
RC	Rockwell Collins
RF	Radio Frequency
RLU	Radio LAN Unit Component of the WLU-2001
RTCA	Radio Technical Commission for Aeronautics
SIU	Server Interface Unit
SRD	System Requirement Document
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TFTP	Trivial FTP
TWLU	Terminal Wireless LAN function of WLU
TX	Transmit
WAN	Wide Area Network
WLU	Wireless LAN Unit
WoW	Weight-on-Wheels

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- 3.0 Requirements:
- 3.1 Electrical:
- 3.1.1 The PMAA–2000 shall have electrical characteristics. (See Table I).
- 3.2 Mechanical:
- 3.2.1 Connector:
- 3.2.1.1 The PMAA–2000 shall have a Type N female connector in accordance with M39012/02–0503.
- 3.2.1.2 The PMAA–2000 shall have a coax cable with a length of 8.65 inches, measured from the edge of the mounting base, to the start of the connector crimp, ± 1.0 inches.
- 3.2.1.3 The PMAA–2000 coaxial cable shall be M17/60–RG142.
- 3.2.2 Mechanical Configuration: See Figure 2 herein.
- 3.2.3 Equipment Size and Mounting:
- 3.2.3.1 The PMAA–2000 shall have outside dimensions and mounting hole locations as defined in Figure 2 herein.
- 3.2.4 Equipment Weight: The PMAA–2000 shall have a weight not to exceed 0.65 pounds.
- 3.2.5 Markings: As a minimum, markings shall include the manufacturer’s name or trademark or cage code, the manufacturer’s part number, revision letter, serial number or date code, and the Rockwell Collins part number, and hardware revision. Where part size precludes marking, the smallest part container shall contain the required markings.
- 3.2.6 Color: Radome shall be gray per manufacturer’s standard.
- 3.3 Environmental:
- 3.3.1 Environmental / Electro–Magnetic Interference (EMI) Certification:
The PMAA–2000 shall be tested in accordance with RTCA/DO–160 requirements. See Table II.
- 3.3.2 Materials: The PMAA–2000 shall be constructed of materials, which are nontoxic and fire retardant to meet the following standards: FAR 25.853, CFR Title 14 Part 25.869.
- 3.3.3 Industry Regulatory Requirements: The PMAA–2000 shall be designed to meet DO–254 Level E, and to be compliant with FCC Part 15, European Test Requirement ETS 300 328, and Japan Test Requirement RCR STD–33. [2.1–4, 2.1–6, 2.1–7, and 2.1–8].

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- 4.0 Quality Assurance Provisions:
- 4.1 Qualification Requirements: Qualification shall consist of the necessary tests and inspections required to verify conformance to section 3.0 herein.
- 4.2 Quality Conformance Inspection: The suppliers shall be responsible for those in-process controls and inspections necessary to supply a product consistently conforming to the requirements of this drawing.
The procuring activity reserves the right to inspect for any of the requirements of this drawing to determine the acceptability of a lot and to reject nonconforming parts or lots containing nonconforming parts, on the basis of the test results so obtained.
- 4.3 Design Change Approval: Any changes in form, fit, function, materials, or performance that affect the part or materials defined by this drawing, must be approved by the cognizant procuring activity prior to the incorporation of the proposed changes.
- 4.4 Design and Construction:
- 4.4.1 Workmanship: Workmanship shall be in accordance with ANSI/J-STD-001, Class II or greater, IPC-610, and 580-5800-001. Locking devices are required. Reference 2.2-2.
- 4.4.2 Personnel Safety: The PMAA-2000 shall be free of sharp edges, and hot surfaces that may cause injury to maintenance personnel during installation, operation and maintenance of the equipment.
- 4.5 Reliability:
- 4.5.1 The PMAA-2000 shall have a mean time between failure (MTBF) of greater than or equal to 100,000 operational hours in an avionics environment.
- 4.5.2 The PMAA-2000 shall have a mean time between unscheduled removals (MTBUR) of greater than or equal to 70,000 operational hours.
- 5.0 Preparation For Delivery:
- 5.1 The parts shall be packaged in a manner that will afford adequate protection against contamination, corrosion, deterioration and physical damage during shipment and storage. Parts shall be packaged so they will be easily accessible without damaging the parts.
- 6.0 Notes: This section is not applicable to this drawing.

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TABLE IElectrical Characteristics

Parameter	Performance
Frequency	2.4000 – 2.5000 GHz
Polarization	Right Hand Circular (RHCP)
Impedance	50 Ohms
Voltage Standing Wave Ratio (VSWR)	1.5:1 Maximum
Power (Continuous)	1 Watt Minimum
Antenna Gain	7.5 dBic Minimum, 9.25 dBic Maximum
3 Decibel (dB) Beamwidth	60° Maximum in E – Plane 60° Maximum in H – Plane
Front-to-Back Ratio	20 dB Minimum
Axial Ratio	4.5 dB Maximum

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TABLE IIEnvironmental Characteristics

Section	Test	Category (DO-160D unless indicated otherwise)
4.0	Temperature and Altitude	A2, maximum altitude 50,000 ft
5.0	Temperature Variation	B
6.0	Humidity	A
7.0	Operational Shocks and Crash Safety	
	Operational Shocks	B, 6 g sawtooth, 11 ms
	Crash Safety Impulse	B, 20 g sawtooth, 11 ms
	Crash Safety Sustained	B, 20 g, 3 seconds
8.0	Vibration (reference Figure 1)	Category S Category T Category T
		Standard Random: Curve C Robust Random: Curve C1 High Level Short Duration Sinusoidal: Curve R
9.0	Explosion Proofness	X (No test required)
10.0	Waterproofness	W ^(1.)
11.0	Fluids Susceptibility	X (No test required)
12.0	Sand and Dust	X (No test required)
13.0	Fungus Resistance	F
14.0	Salt Spray	X (No test required)
15.0	Magnetic Effects	Z
16.0	Power Input	X (No test required)
17.0	Voltage Spike	X (No test required)
18.0	Audio Frequency Conducted Susceptibility – Power Inputs	X (No test required)
19.0	Induced Signal Susceptibility	X (No test required)
20.0	Radio Frequency Susceptibility (Radiated and Conducted)	X (No test required)
21.0	Emissions of Radio Frequency Energy	X (No test required)
22.0	Lightning Induced Transient Susceptibility	A3/E3
23.0	Lightning Direct Effects	X (No test required)
24.0	Icing	X (No test required)

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TABLE II (CONTINUED)

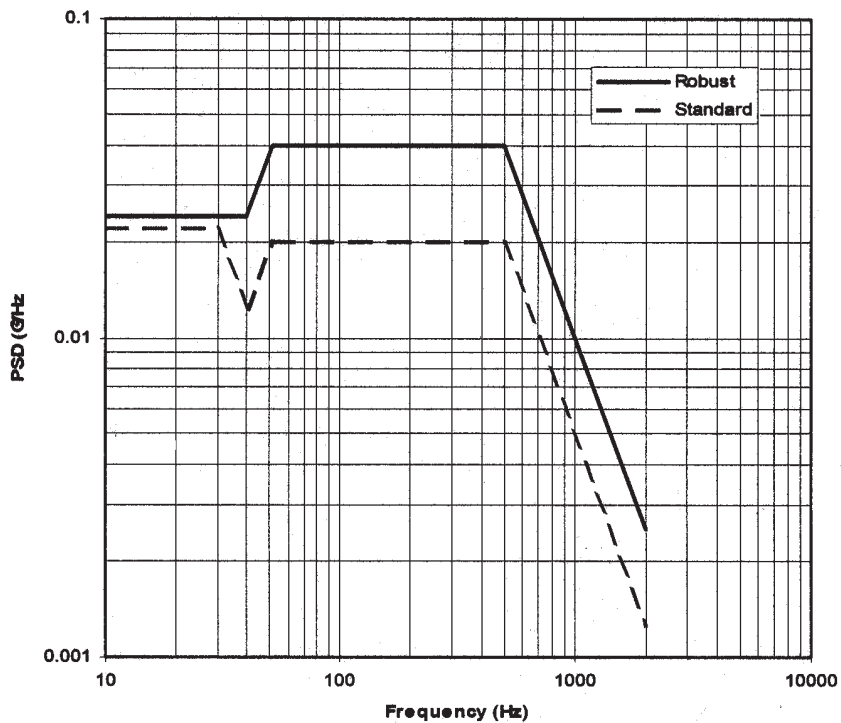
Environmental Characteristics

Section	Test	Category (DO-160D unless indicated otherwise)
25.0	Electrostatic Discharge (ESD)	A
N/A	Flammability/Smoke/Toxicity	ABD 031 Issue C; FAR 25.853, Parts I, IV, V of Appendix F.
N/A	Constant Acceleration	ISO 2669 Category C, Severity Grade 4

Note:

1. Waterproofness is required in all mounting orientations except with the coaxial pigtail vertically "up" and with the radome facing "up".

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Composite Vibration Curves

TABLE III
Vibration

Standard Level		Robust Level	
60 minutes per axis		3 hours per axis	
$G_{RMS} = 4.15$		$GRMS = 5.83$	
Frequency (Hz)	Level (g ² /Hz)	Frequency (Hz)	Level (g ² /Hz)
10.0	0.02200	10.0	0.0240
30.0	0.02200	40.0	0.0240
40.316	0.01220	51.7	0.0400
51.7	0.02000	500.0	0.0400
500.0	0.02000	2000.0	0.0025
2000.0	0.00125		

Standard: Composite curve, which exceeds DO-160D Curve C.

FIGURE 1
Vibration Levels

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MILLIMETERS [INCHES].
APPLICABLE TOLERANCES: ANGLES; $\pm 0.5^\circ$
MILLIMETERS; X = ± 0.5 , XX = ± 0.02
[INCH] DECIMALS; .XX = ± 0.02 , .XXX = ± 0.008

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