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JetWave™ System

System Description and Installation Manual

This guide provides procedures for installation, configuration, and operation of the equipment listed below.

Model	Part Number
JetWave™ System MCS 8200 Class A Forced Air KRFU	90401028-001
JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 1	90401028-002
JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 2	90401028-003
JetWave™ System MCS 8250 Class A Modman, Version 2	90406164-001
JetWave™ System MCS 8250 Class A KANDU, Version 2	90406164-XXX
JetWave™ System MCS 8250 Class A Conduction Cooled KRFU, Version 2	90406164-XXX
JetWave™ System MCS 8000 Class B Forced Air KRFU	90401027-001
JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 1	90401027-002
JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 2	90401027-003
JetWave™ System MCS 8000 Class A Conduction Cooled KRFU, Version 2, FMA	90401027-004
JetWave™ System MCS 8000 Class A Forced Air KRFU, Version 2, FMA	90401027-005
A791 Radome Package	90400017-XXX
Non-A791 Radome Package	90400016-XXX

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JetWave™ System, System Description, Installation, and Maintenance Manual

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3 Mar 2017

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TRANSMITTAL INFORMATION

TO HOLDERS OF JETWAVE™ SYSTEM SDIM, ATA NO. 23-15-29 (PUB. NO. D201401000049), ISSUED FOR USE IN SUPPORT OF THE FOLLOWING:

Table TI-1 shows the applicable components.

Table TI-1. Applicable Components

Component PN	Nomenclature
90401028-001	JetWave™ System MCS 8200 Class A Forced Air KRFU
90401028-002	JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 1
90401028-003	JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 2
90406164-001	JetWave™ System MCS 8250 Class A Modman, Version 2
90406164-XXX	JetWave™ System MCS 8250 Class A KANDU, Version 2
90406164-XXX	JetWave™ System MCS 8250 Class A Conduction Cooled KRFU, Version 2
90401027-001	JetWave™ System MCS 8000 Class B Forced Air KRFU
90401027-002	JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 1
90401027-003	JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 2
90401027-004	JetWave™ System MCS 8000 Class A Conduction Cooled KRFU, Version 2, FMA
90401027-005	JetWave™ System MCS 8000 Class A Forced Air KRFU, Version 2, FMA
90400017-XXX	A791 Radome Package
90400016-XXX	Non-A791 Radome Package

Revision History

Table TI-2 shows the revision history of this SDIM.

Table TI-2. Revision History

Revision	Revision Date
0	16 Jan 2015
1	16 Sep 2015
2	6 Nov 2015
3	17 Aug 2016
4	3 Mar 2017

This revision is a full replacement. All changed pages have a new date. Revision bars identify the changed data. See Transmittal information for history of revisions to this SDIM.

Remove and discard all pages of the manual and replace them with the attached pages. Write the revision number, revision date, and replacement date on the Record of Revisions page.

Revision bars mark the technical data that changed in this revision; those changes are described in the Table of Highlights. Editorial changes are not marked with a revision bar.

The table of highlights tells users what has changed as a result of the revision. The table consists of three columns.

The Task/Page column identifies the blocks of changed information, such as a task, subtask, graphic, or parts list, and the page on which that block starts. Revision marks, when provided, identify the location of the change within the block.

The Description of Change column tells about the change or changes within each block. The description of change is often preceded by a paragraph or figure reference that applies to the block of information.

The Effectivity column tells the user the part number(s) to which the block of information applies. The default value for this column is “All.” “All” means that the block applies to all parts.

Table of Highlights

Page	Description of Change	Effectivity
	Global Change: Changed the content and format to agree with the Honeywell processes in effect at the time of the release of this revision. These changes are not identified with revision bars. Global Change: The editorial changes and data that were moved or reformatted are not identified with revision bars. Global Change: All paragraphs, tables, and figures have been renumbered and are not identified with revision bars.	All
T-1	Added MCS 8200 and MCS 8000 to all model. Added MCS 8250 Class A Modman Version 2, KANDU Version 2 and Conduction Cooled Version 2.	All
TI-1	Revised nomenclature in Table TI-1 for all part numbers. Added MCS 8250 Class A Modman Version 2, KANDU Version 2 and Conduction Cooled Version 2.	All
TI-1 thru TI-5	Updated for Revision 4.	All
SBL-1	Added SB JETWAVE-23-0002, Rev 3 and SB JETWAVE-23-0003, Rev 0.	All
1-2	Revised nomenclature in Paragraph 3 for all part numbers. Added MCS 8250 Class A Modman Version 2, KANDU Version 2 and Conduction Cooled Version 2.	All
1-3	Updated Paragraph 1.5.B. to show the latest Honeywell template information.	All
1-4	Updated CAGE code website address to https://cage.dla.mil/search.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
2-1	Paragraph 2.1, revised the title from “Overall Jetwave System Architecture” to “Jetwave System Overview”.	All
2-2	Table 2-1, revised the PN for TMA from 904000013-0001 to 904000013-0001.	All
2-3	Table 2-4, revised the operating temperature range and deleted APM in Interfaces.	All
2-5	Table 2-6, Added the KANDU variant 2 reference to Cooling.	All
2-5	Table 2-7, revised the specifications for weight, power consumption, power dissipation and cooling for conduction-cooled 1 configuration.	All
2-6	Table 2-7, revised the specifications for power consumption, power dissipation and cooling for conduction-cooled 2 configuration and the specifications for power consumption for Forced air configuration.	All
2-7	Table 2-7, revised the specifications for power dissipation and operating temperature for forced air configuration.	All
2-12	Paragraph 2.3, Revised Step 3 to "ARINC 791 TX Mute between the Modman and the KANDU is optional, the Honeywell implementation uses RS422 signaling on manufacturer-specific circuits 3 to 4 instead”.	
2-13	Paragraph 2.4B, revised “the Modman starts continuous BITE” with “the Modman starts additional POST and BITE”.	All
2-13	Paragraph 2.4C, revised “Access system” with “GUI”.	All
2-13	Paragraph 2.4D, revised “Access system” with “GUI”.	All
2-13	Paragraph 2.4E, revised “Access system” with “GUI”.	All
2-14	Paragraph 2.4F, revised “SNMP” to “GUI” and deleted “manual antenna alignment”.	All
2-14	Paragraph 2.4F, added new step “The system will exit the commanded mode by a System reset”.	All
3-1	Paragraph 3.1, revised to add additional configuration data information.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
3-1	Table 3-1, removed the Primary/Secondary concept. Grouped Combined the rows for Labels 254, 255, 261, 132, 175 and Labels 112, 110, 111, 76 and 314. Removed rows for Labels 331, 332 and 333.	All
3-2	Table 3-1, removed the Acceptable Replacement to Primary Labels 361 and 312 and added Labels 125.	All
3-3	Paragraph 3.1C, deleted “Weight on Wheels” in the airframe specification information.	All
3-3	Paragraph 3.1C, revised to add OTA access.	All
4-1	Paragraph 4.1, moved the existing steps from Paragraph 4.2.	
4-1	Paragraph 4.1A, deleted “Provide” and revised as “For new configurations”.	All
4-1	Paragraph 4.1A, added new subsection for Jetwave System installation procedure.	All
4-1	Paragraph 4.1A, merged the existing bullets (1) and (2) to include “or”.	All
4-2	Paragraph 4.1A, deleted the existing bullets (7), (8) and (9). Added “on completion of post installation checks” to bullet (6). Paragraph 4.2, revised the title to add the word “Internal”.	All
4-3	Paragraph 4.2A.(4), revised to update 60 dB to 120 dB.	All
4-4	Added input signal range note that follows Table 4-2.	All
4-4	Paragraph 4.2B, revised to add APM to Modman interconnect cable ARINC standards and PN of the cable.	All
4-5	Paragraph 4.2C.(2), Added descriptions for Front Panel Enable Mode, Discrete Signal Ground (Modman MP12F) and Discrete Signal Ground (KANDU J1-B).	All
4-6	Table 4-3, revised “Ground to open transition” to “Open to ground transition” and “Open to ground transition” to “Ground to open transition” for Local Data Load.	All
4-6	Table 4-3, revised “Change” to “Mandatory” for Ground Transmit Enable.	All
4-7	Table 4-3, revised front panel enable mode description.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
4-8	Paragraph 4.3(1), added reference to Figure 4-26 and updated Step (1)(g).	All
4-9	Paragraph 4.3, Moved the existing Step (2)(a) to (1)(g). Added Steps (2)(a), (2)(b) and (2)(c) for KANDU receptacle A3J, KANDU receptacle A3J2 and KANDU receptacle A3J3.	All
4-14	Paragraph 4.6, revised the title as “KRFU”.	All
4-15	Added Paragraph 4.6B title “KRFU Thermal Pad Kit”. Added existing steps from Paragraph 4.6B under Paragraph 4.A General.	All
4-16	Paragraph 4.6A, revised to amend the operation of the AES and added an additional step for conduction-cooled KRFU.	All
4-17	Paragraph 4.6D, revised the bullet as “The KRFU includes bonding measuring points on the chassis bosses which are not used for mounting feet.”	All
4-17	Step 4.6E.(1)(e), changed the reference to 4.6.	All
4-20	Paragraph 4.7G, added “per ARINC791 P1-2”.	All
4-22	Paragraph 4.7I I(b), added "or LAIM."	All
4-27	Paragraph 4.7I(6), revised a step to change “2 dB” to “stay within 0.5 to 2 dB”.	All
4-28	Paragraph 4.7I(6)(d), added offset to procedure.	All
4-29	Figure 4-14, updated the TMA RF TX and RF J4 interface connector and bonding strap locations graphic to include an additional view.	All
4-32	Paragraph 4.7.(6)(g), revised “KANDU to KRFU” to “MODMAN to KRFU”.	All
4-33	Paragraph 4.7.(6)(g)4, removed the default position.	All
4-39	Paragraph 4.9, added new paragraph for “Radome Installation Bonding Resistance”.	All
4-40	Paragraph 4.10, added new paragraph for “Inspection of Waveguide”.	All
4-41	Table 4-10, revised Conductor Type “Single conductor, stranded” as “Twisted pair”.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
4-41	Paragraph 4-11, revised “Variant 1” as “Variant 2” in the step referring to Figure 4-26.	All
4-41	Paragraph 4-11, added reference to new Figure 4-24.	All
4-43	Paragraph 4.11, added note stating that the Fuselage Mount Radome is offered as a standard part with varying skirts to the step referring to Figure 4-32.	All
4-55 and 4-56	Figure 4-24, add new figure for APM Outline and Installation Drawing.	All
4-63 thru 4-71	Figure 4-27, updated to the latest engineering drawing.	All
4-82 thru 4-101	Figures 4-31 and 4-32, updated to the latest engineering drawings.	All
4-106 thru 4-143	Figures 4-34 thru 4-37, updated to the latest engineering drawings.	All
5-1	Paragraph 5.1A, added a new step for the APM system configuration minimum. Revised to add “or if all of the LRUs are not at the same software release level, then”.	All
5-1	Paragraph 5.1B, revised to add “unless APM configuration does specify other port / IPs settings”. Paragraph 5.1C, revised the maintenance port data.	All
5-2	Paragraph 5.1C, revised Title from “Procedure” to “Overview” and the maintenance port data.	All
5-2	Paragraph 5.1C, revised Step (2) as per SB JETWAVE-23-0002 and SB JETWAVE-23-0003.	All
5-4	Paragraph 5.1D, revised Title from “Setup of 615A Data Loader Application (AIT Flight Simulyzer v3.0.0)” to “Procedure (AIT Flight Simulyzer v3.0.0)”.	All
5-15	Paragraph 5.1, Step D.(3)(s), revised the step stating to refer to the applicable SB.	
6-1	Paragraph 6.1, revised the step for “Satellite Search”.	All
	Added a new bullet for GoGo for distribution partners.	

Table of Highlights (Continued)

Page	Description of Change	Effectivity
6-2	Paragraph 6.1, revised “maximum spot beam capacity” to “defined Maximum Information Rate” and “or Minimum” as “for 95% of the time”. Revised to state that the updates do not adversely affect system safety, operational capabilities and does not impact flight crew workload. Revised to remove "On the next power up"	All
6-3	Paragraph 6.1B, Step (2), replaced “Flight Load result” with “test report”. Paragraph 6.2, revised to add additional information on certifications for antenna installations.	All
6-3	Paragraph 6.3B, revised the title as “System Health and Configuration”.	All
6-4	Figure 6-1, revised the title to delete “AES User Level”.	All
6-5	Paragraph 6.3B, added step “The laptop's Ethernet port will need to be configured with a static IP address of 172.29.55.x, where x is 10 or above“. Replaced “open the link index.html” with “enter 172.29.55.1 in the address bar”.	
6-9	Paragraph 6.3B, added a note to follow the appropriate Jetwave Service Bulletin to validate the software currently installed.	All
6-10	Paragraph 6.3C, revised the title from “Modman Reset Input” to “Discrete Input Testing”. Updated Step 6.3C(1) and added Step (2). Replaced Figure 6-8 with the latest version. Added Note that follows Step 6.3D.	All
6-11	Paragraph 6.3E, updated the first note that follows Step E.	All
6-12	Paragraph 6.4, added a new step for cable calibration.	All
6-12 and 6-13	Paragraph 6.4, “AES Menu Access System” is replaced by “GUI”. Paragraph 6.4, added additional information for full Optimization of Jetwave system.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
6-13	Paragraph 6.5A, revised to add “or replacement” condition.	All
6-13	Paragraph 6.5A, Step (2), revised the physical installation procedure.	All
6-14	Paragraph 6.6A., Step (3) revised the requirement for antenna alignment.	All
6-14	Paragraph 6.6A, Step (5), replaced “open the link index.html” with “enter 172.29.55.1 in the address bar”. Step 6.6C(1), revised to add information for Geo stationary satellite.	All
6-15	Steps 6.5C, Step (1), updated Figure 6-13 to latest.	All
6-15	Paragraph 6.6B, Step (2) and Step (3), revised to change “headings” to “true headings”. Added note to Paragraph 6.6B, Step (3) referring to the values displayed.	All
6-16	Step 6.6B, Step (4), revised to change “headings” to “true headings”.	All
6-17	Step 6.6B, Step (4), updated Figure 6-14 to latest.	All
6-17 and 6-18	Step 6.6A, Step (2), revised step (2) and added "If AES Configuration System KANDU Ground Speed.	All
6-18	Step 6.7A(5), revised control of the transmission of the terminal.	All
6-19	Paragraph 6.7A, added a note to give information that the 360 degree connectivity access can be limited for the Jetwave system.	All
6-19	Paragraph 6.7A, Figure 6-15 was revised to include the latest data.	All
7-2	Paragraph 7.2A, Step (1), added note for the health status page.	All
7-3	Paragraph 7.2A. Step (1), updated Figure 7.3 to latest.	All
7-6	Paragraph 7.2B, Step (5) updated Figure 7.5 to latest.	All
7-7	Paragraph 7.2D, revised “By closure of the Modman reset pin (MP10C) to ground” as “By grounding the Modman Reset Pin (MP10C)”	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
7-7	Paragraph 7.2F, Step (2), added a note to refer to Saint Gobain SRM for FMA radome.	
7-14	Table 7-1, added L1 code 0x23 with description “Modman input discretes from LRU”.	All
7-16	Table 7-3, added “Modman input discretes from KANDU (23)” under L1 column with 0x 00 under L2 Code and “Unknown” under L2 Description column.	All
7-22	Table 7-6, deleted entries 0x 0002, 0x 0003 and 0x 0004 L3 codes under L2 Regulatory Log (07).	All
7-22	Table 7-6, revised the description for L3 code 0x 0003 under L2 Information Events (08).	All
7-22	Table 7-6, added L3 codes 0x 0004 thru 0008 under L2 Information Events (08).	All
7-22	Table 7-6, added new L2 Code.	All
7-25	Table 7-6, revised L3 Code IP security.	All
7-26	Table 7-6, revised Repair Action for L3 Codes 0x 0007 thru 0x 000B.	All
7-27 thru 7-29	Table 7-6, revised L2 code software runtime (FE) completely.	All
7-30	Table 7-6, deleted the L2 entires Fan (07) and “Failed on startup (08)”. Under L2 entry BDC (2A), added new L3 code 0x 0002.	All
7-31	Table 7-6, revised L3 description and added new L3 code for L2 entry Software runtime (FE) and Repair Action.	All
7-34	Table 7-6, added L3 codes 0x 0008 and 0x 0009.	All
	Revised Repair Action for L3 Codes 0x 0007 thru 0x 000A and L2 code Software runtime (FE) completely.	
7-35 and 7-36	Table 7-6, revised L2 code Software runtime (FE) completely.	All
7-38	Table 7-6, added new L3 codes 0x 00087 and 0x 00088.	All
7-39	Table 7-6, revised L3 description texts “CCA Initialization to read as “Azimuth Axis Low temperature High Current” and “Azimuth Axis Low temperature High Current” to read as “Elevation Axis Low temperature High Current”.	All
7-40	Table 7-6, revised Repair Action for L3 code 0x 0007.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
7-41 thru 7-43	Table 7-6, revised L2 code Software runtime (FE) completely.	All
7-43	Table 7-6, moved L3 code 0x 0022 and its L3 description and repair action entries under L2 Unknown (00).	All
7-44	Table 7-6, moved L2 code ASC (01) to KANDU (06). Deleted entry ASC (05).	All
7-45	Table 7-6, added new L2 code “Temperature Multiple LRU (F9)” and new L3 codes 0x 0080 thru 0x 0088.	All
7-46	Table 7-6, added L3 codes.	All
7-47 thru 7-50	Table 7-6, revised L2 code Software runtime (FE) completely.	All
7-51	Table 7-6, added GPS input for L1, L2, time label (31), and L3 GNSS sensor status word.	All
7-52	Table 7-6, deleted entry L2 BUC mute (04) and added new L3 code 0x 0003.	All
7-54	Table 7-6, added new L3 code.	All
7-55	Table 7-6, Added L3 code 0 x 0004.	All
7-70 and 7-71	Table 7-6, under GNSS sensor status word (80), added L3 code 0x 0008. Under IRS Discrete word (81), revised L3 Description “Align mode / Not Ready” to read as “Self Test Mode”, “Revisionary Altitude mode” to read as “Initialization Mode” and “Normal mode” to read as “Acquisition Mode”. Added L3 code 0x 0008.	All
7-70 thru 7-73	Table 7-6, added L2 Ground speed (43), Body Pitch Acceleration (50), Body Roll Acceleration (51) and Body Yaw Acceleration (52). Added new L3 codes for L2 codes GNSS sensor status word (80) and IRS discrete word (81).	All
7-96	Tale 7-6, added 0x 0002 to L3 code and description. Step 7.3 (1)(b)1, revised to add additional step to validate communication cabling.	All
7-97	Step 7.3.(1)(i)3, revised to add information on software validation.	All
7-98	Paragraph 7.6, updated Figure 7-9 to latest.	All
C-2	Revised the figure reference as Figures 4-21 and 4-22.	All

Table of Highlights (Continued)

Page	Description of Change	Effectivity
C-3	Paragraph 1.A, in the table, revised the item description for the parameter “Electrical wiring - APM to Modman”.	All
C-5	Revised the figure reference from 4-21 to Figures 4-30.	All
C-7	Revised the figure reference as Figures 4-21 and 4-22.	All
	Paragraph 1.B, in the table, revised the item description for the parameter “Electrical wiring - APM to Modman”.	
C-11	Revised the figure reference as Figures 4-21 and 4-22.	All
	Paragraph 1.C, in the table, revised the item description for the parameter “Electrical wiring - APM to Modman”.	
C1 thru C6	Paragraph 1, rearranged and renumbered the tables in Appendix E as follows: Table C-1. Value Added Reseller (VAR/DP) Table C-2. Aircraft Information Table C-3. Air Data Inertial Reference Unit/Multi Mode Receiver Table C-4. ARINC 429 Labels Table C-5. Airframe Structural Blockage Information Table C-6. Weight on Wheels Table C-7. ARINC Tx Mute and Tail Sector Mute Switch Table C-8. ARINC791 Equipped Table C-9. Modman Serial Number Table C-10. Modman Ethernet Configuration Table Table C-11. KRFU Location Table C-12. Antenna Location Table C-13. Waveguide Manufacturer Table C-14. Radome Manufacturer Revised Table D-7 title and added additional rows for new entry “Tail Sector Mute Switch Wired”. Added Table C-9 for Modman Serial Number and Table C-10 for Modman Ethernet Configuration Table.	All

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RECORD OF REVISIONS

For each revision, write the revision number, revision date, date put in the manual, and your initials in the applicable column.

NOTE: Refer to the Revision History in the TRANSMITTAL INFORMATION section for revision data.

Revision Number	Issue Date	Date Inserted	Inserted by (initial)

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RECORD OF TEMPORARY REVISIONS

Instructions on each page of a temporary revision tell you where to put the pages in your manual. Remove temporary revision pages only when discard instructions are given. For each temporary revision, put the applicable data in the record columns on this page.

Definition of Status column: TR may be active, incorporated, or deleted. “Active” is entered by the holder of manual. “Incorporated” means a TR has been incorporated into the manual and includes the revision number of the manual when the TR was incorporated. “Deleted” means a TR has been replaced by another TR, a TR number will not be issued, or a TR has been deleted.

Temporary Revision Number	Status	Page Number	Issue Date	Date Put in Manual	By	Date Removed From Manual	By

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SERVICE BULLETIN LIST

Service Bulletin Number	Subject	Manual Rev. Number	Manual Rev. Date
JETWAVE-23-0001, Rev. 0	COMMUNICATIONS - JETWAVE™ SYSTEM - Software Upgrade for the GXA System Line Replaceable Units (LRU)	3	17 Aug 2016
JETWAVE-23-0002, Rev 3	COMMUNICATIONS - JETWAVE™ SYSTEM - Software Release for the GXA System Line Replaceable Units (LRU)	4	3 Mar 2017
JETWAVE-23-0003, Rev 0	COMMUNICATIONS - JETWAVE™ SYSTEM - Software Release for the GXA System Line Replaceable Units (LRU)	4	3 Mar 2017

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SECTION 8 - MAINTENANCE AND REPAIR

APPENDIX A

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LIST OF TABLES

LIST OF FIGURES

SECTION 1
INTRODUCTION

1.1 How to Use This Manual

A. General

(1) This manual provides information about the installation of the AES Systems.

(2) Standard maintenance procedures that technicians must know are not given in this manual.

(3) This publication is written in agreement with the ATA Specification.

(4) Warnings, cautions, and notes in this manual give the data that follows:

- A WARNING gives a condition or tells personnel what part of an operation or maintenance procedure, which if not obeyed, can cause injury or death.
- CAUTION gives a condition or tells personnel what part of an operation or maintenance procedure, which if not obeyed, can cause damage to the equipment.
- A NOTE gives data, not commands. The NOTE helps personnel when they do the related instruction.

(5) Warnings and cautions go before the applicable paragraph or step. Notes follow the applicable paragraph or step.

B. Observance of Manual Instructions

(1) All personnel must carefully obey all safety, quality, operation, and shop procedures for the unit.

(2) All personnel who operate equipment and do maintenance specified in this manual must know and obey the safety precautions.

C. Symbols

(1) The symbols and special characters are in agreement with IEEE Publication 260 and IEC Publication 27. Special characters in text are spelled out.

(2) The signal mnemonics, unit control designators, and test designators are shown in capital letters.

(3) The signal names followed by an “*” show an active low signal.

(4) The symbols in Figure 1-1 show non-ionizing radiation hazard, ESDS, and moisture sensitive devices.

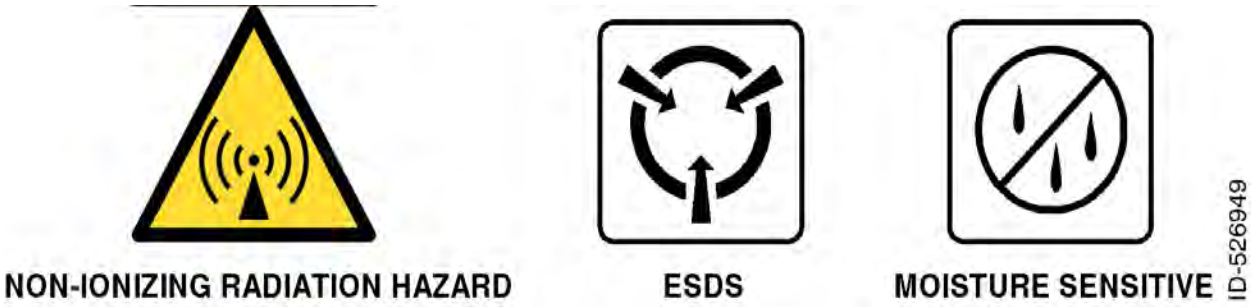

Figure 1-1. Symbols

D. Units of Measure

(1) Measurements, weights, temperatures, dimensions, and other values are expressed in the USMS followed by the appropriate SI metric units in parentheses. Some standard tools or parts such as drills, taps, bolts, nuts, etc. do not have an equivalent.

E. Illustration

(1) Supplemental illustrations use a suffix number to the basic figure number. For example, if Figure 501-5 is used, it signifies that it is an illustration of the item identified by index number 5 in Figure 501.

(2) Illustrations with no specific designation are applicable to all units.

1.2 Scope

This manual provides detailed information for avionics technicians about the wiring and installation of every component of the JetWave™ System. The installer is responsible for the approval and certification of system components on the aircraft, and for the installation of wiring in the aircraft.

1.3 Part Numbers

This manual applies to the JetWave™ System components described below:

- 90401028-001 - JetWave™ System MCS 8200 Class A Forced Air KRFU
- 90401028-002 - JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 1
- 90401028-003 - JetWave™ System MCS 8200 Class A Conduction Cooled KRFU, Version 2
- 90406164-001 - JetWave™ System MCS 8250 Class A Modman, Version 2
- 90406164-XXX- JetWave™ System MCS 8250 Class A KANDU, Version 2
- 90406164-XXX- JetWave™ System MCS 8250 Class A Conduction Cooled KRFU, Version 2
- 90401027-001 - JetWave™ System MCS 8000 Class B Forced Air KRFU
- 90401027-002 - JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 1
- 90401027-003 - JetWave™ System MCS 8000 Class B Conduction Cooled KRFU, Version 2
- 90401027-004 - JetWave™ System MCS 8000 Class A Conduction Cooled KRFU, Version 2, FMA

- 90401027-005 - JetWave™ System MCS 8000 Class A Forced Air KRFU, Version 2, FMA
- 90400017-XXX - A791 Radome Package
- 90400016-XXX - Non-A791 Radome Package.

1.4 Organization

This manual includes the following sections:

- SECTION 1 INTRODUCTION - Information about the JetWave™ system
- DESCRIPTION AND OPERATION - General description and operation of the JetWave™ system
- INSTALLATION - Information and procedures for the installation of the JetWave™ system
- APPENDIX A - Environmental specifications for every piece of equipment available with the JetWave™ system
- APPENDIX B - Installation information sheets
- APPENDIX C - Installation checklist
- APPENDIX D - Airframe specific information required for configuration.

1.5 Customer Support

A. Honeywell Aerospace Online Technical Publications Website

(1) Go to the Honeywell Online Technical Publications Website at http://www.myaerospace.com.

- To download or see publications online
- To order a publication
- To tell Honeywell of a possible data error in a publication.

B. Honeywell Aerospace Contact Team

(1) If you do not have access to the Honeywell Technical Publications Website, or if you need to speak to personnel about non-Technical Publication matters, the Honeywell Aerospace Contact Team gives 24/7 customer service to Air Transport & Regional, Business & General Aviation, and Defense & Space customers around the globe.

(2) Aerospace Technical Support

- Telephone: 800-601-3099 (Toll Free U.S.A./Canada)
- Telephone: 602-365-3099 (International).

1.6 References

A. Honeywell/Vendor Publications

(1) Related Honeywell publications in this manual are shown in the list that follows:

- Not Applicable

B. Other Publications

(1) These publications are standard references. Check for the latest version of the publication.

- The United States GPO Style Manual (available at http://www.gpo.gov/fdsys/pkg/GPO-STYLEMANUAL-2008/content-detail.html)
- IEEE Std 260.1, Standard Letter Symbols for Units of Measurement (available from the American National Standards Institute at http://www.ansi.org)
- ASME Y14.38, Abbreviations for Use on Drawings and Related Documents (available from the American National Standards Institute at http://www.ansi.org)
- ASME Y14.5, Dimensioning and Tolerancing (available from the American National Standards Institute at http://www.ansi.org)
- ANSI/IEEE Std 91, Graphic Symbols for Logic Functions (available from the American National Standards Institute at http://www.ansi.org)
- CAGE codes and manufacturers' addresses are available at https://cage.dla.mil
- IEEE 315/ANSI Y32.2, Graphic Symbols for Electrical and Electronics Diagrams (available from the American National Standards InstituteInstitute at http://www.ansi.org)
- ARINC 791P1-2 Mark I Aviation Ku-Band and Ka-Band Satellite Communication System, Part 1, Physical Installation and Aircraft Interfaces.

1.7 Precautions

When working with avionics and satellite communications equipment, be aware of the following warnings and cautions.

WARNING: TO PREVENT RADIO FREQUENCY OVEREXPOSURE, THE AREAS WHICH THE RISK EXISTS IS BASED UPON THE LOCATION OF THE ANTENNA AND THE INSTALLED HARDWARE END STOPS. TECHNICIANS WORKING IN CLOSE PROXIMITY OF THE ANTENNA MUST BE PROTECTED BY DISABLING THE TRANSMITTER BEFORE THEY APPROACH THAT AREA OF THE AIRCRAFT.

WARNING: SERVICE TECHNICIANS MUST OBEY STANDARD SAFETY PRECAUTIONS, SUCH AS WEARING SAFETY GLASSES, TO PREVENT PERSONAL INJURY WHILE INSTALLING OR PERFORMING SERVICE ON THIS SYSTEM.

CAUTION: TURN OFF POWER BEFORE DISCONNECTING ANY TERMINAL FROM WIRING. DISCONNECTING THE TERMINAL WITHOUT TURNING POWER OFF MAY CAUSE VOLTAGE TRANSIENTS THAT CAN DAMAGE THE TERMINAL.

CAUTION: THIS EQUIPMENT INCLUDES ITEMS THAT ARE ELECTROSTATIC DISCHARGE SENSITIVE DEVICES. ELECTROSTATIC DISCHARGE SENSITIVE DEVICES ARE SUBJECT TO DAMAGE BY EXCESSIVE LEVELS OF VOLTAGE AND/OR CURRENT. THE LOW-ENERGY SOURCE THAT MOST COMMONLY DESTROYS ESDS DEVICES IS THE HUMAN BODY, WHICH, IN CONJUNCTION WITH NONCONDUCTIVE GARMENTS AND FLOOR COVERINGS, GENERATES AND RETAINS STATIC ELECTRICITY. TO ADEQUATELY PROTECT ESDS DEVICES, THE DEVICE AND EVERYTHING THAT CONTACTS IT MUST BE BROUGHT TO GROUND POTENTIAL BY PROVIDING A CONDUCTIVE SURFACE AND DISCHARGE PATHS. USE STANDARD INDUSTRY PRECAUTIONS TO KEEP RISK OF DAMAGE TO A MINIMUM WHEN TOUCHING, REMOVING, OR SERVICING THE EQUIPMENT.

1.8 Acronyms and Abbreviations

A. General

(1) The abbreviations are used in agreement with ASME Y14.38.

(2) Acronyms and non-standard abbreviations used in this publication are as follows:

List of Acronyms and Abbreviations

Term	Full Term
AC	alternating current
ACM	aeronautical core module
AES	aircraft earth station
AISD	airline information services domain
AIM	aircraft interface mount
AIT	Avionics Interface Technologies
AMIP	open antenna to modem interface protocol
ANSI	American National Standards Institute
APM	aeronautical personality module
ARINC	Aeronautical Radio, Incorporated
ASC	antenna subsystem controller
ASME	American Society of Mechanical Engineers
ATA	Air Transport Association
AWG	American wire gauge
BDC	block down-converter
BIT	built-in test
BITE	built-in test equipment
BOSS	Broadband Off-board Services System
BRS	business and regional aviation segment
BUC	block up-converter
C	Celsius
CAGE	commercial and government entity

List of Acronyms and Abbreviations (Continued)

Term	Full Term
CAT	commercial air transport
CBIT	continuous built-in test
CIR	committed information rate
cm	centimeter
dB	decibel
DER	designated engineering representative
DHCP	dynamic host configuration protocol
DID	data item description
DNS	domain name system
DP	distribution partner
EMEA	Europe, the Middle East, and Africa
ESDS	electrostatic discharge sensitive
EST	Eastern Standard Time
F	Fahrenheit
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FMA	fuselage mount antenna
FTP	file transfer protocol
FXS	foreign exchange subscriber
GHz	gigahertz
GPO	Government Printing Office
GPS	global positioning system
GNSS	global navigation satellite system
GSC	global signaling channel
GTE	ground transmit enable
GUI	graphic user interface
HPA	high-power amplifier
hPa	hectopascal
HTP	horizontal tail plane
Hz	hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	intermediate frequency
IMU	inertial measurement unit
in-lb	inch-pound
I/O	input and output
IP	Internet protocol
IRS	inertial reference system

List of Acronyms and Abbreviations (Continued)

Term	Full Term
IRU	inertial reference unit
ISDN	integrated services digital network
ISP	Inmarsat service provider or internet service provider
Ka	part of the radio frequency spectrum: 26.5 thru 40 GHz
KANDU	Ku/Ka band aircraft network data unit
KRFU	Ku/Ka band radio frequency unit
kg	kilogram
Ku	part of the radio frequency spectrum: 12 thru 18 GHz
LAIM	local aircraft interface mount
LAN	local area network
LED	light emitting diode
LNA	low noise amplifier
LRU	line replaceable unit
LSAP	loadable software airplane part
m	meter
mΩ	milliohm
mA	milliampere
Mbps	megabits per second
MCU	modular concept unit
MHz	megahertz
MIB	management information base
MIR	maximum information rate
mm	millimeter
Modman	modem manager
MOP	maximum operating power
ms	millisecond
NA	not applicable
NEXT	near end cross talk
Nm	Newton meter
NMS	network management system
O&I	outline and installation
OAE	outside antenna equipment
OID	object identifier
OMT	orthogonal mode transducer
OTA	over the air
Pa	pascal
PCU	position control unit
PIESD	passenger information and entertainment services domain

List of Acronyms and Abbreviations (Continued)

Term	Full Term
PN	part number
PODD	passenger owned devices domain
POTS	plain old telephone system
POST	power-on self test
PSI	pound per square inch
RF	radio frequency
RFM	radio frequency module
RMA	return material authorization
RSSI	receive signal strength indicator
RX	receive
SAS	satellite access station
SATCOM	satellite communication
SDIM	system description, and installation manual
SLA	service level agreement
SNMP	simple network management protocol
SSPP	service subscriber plan
SVN	secure virtual network
TMA	tail mount antenna
TNC	threaded Neill-Concelman
TPK	terminal provisioning key
TX	transmit
UNC	unified coarse thread
USB	universal serial bus
USMS	United States Measurement System
VAC	volt alternating current
VAR	value added reseller
VDC	volt direct current
VLAN	virtual local area network
VoIP	voice over Internet protocol
VPN	virtual private network
VSAT	very small aperture terminal
VTP	vertical tail plane
WAN	wide area network
WOW	weight on wheels

SECTION 2
DESCRIPTION

2.1 JetWave™ System Overview

The JetWave™ SATCOM system supplies a broadband communication link that can be used to supply data, video, and voice communications for passengers communications and entertainment. The AES communicates to the SAS through a satellite as shown in Figure 2-1.

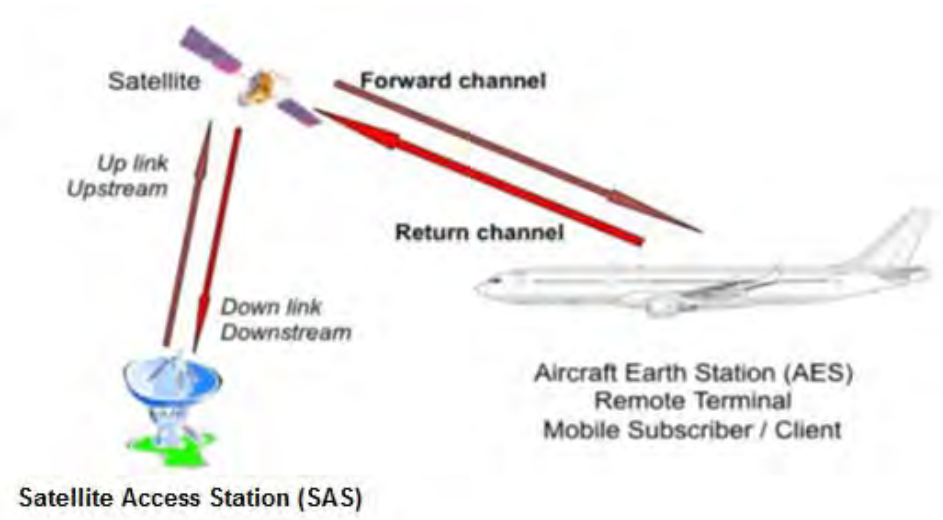

Figure 2-1. Ka-Band System

A Modman is provided within the AES to enable two-way communications. The forward channel provides a communication path from the SAS to the AES. The return channel provides a communication path from the AES to the SAS. The AES receives in the forward channel in K-band and transmits in the Ka-band. The AES system provides the RF data link between the aircraft and the servicing satellite. An AES system includes an antenna which is steered towards the servicing satellite by mechanical means. The JetWave™ system operating frequency range is 29 to 30 GHz (TX, Ka-band) and 19.2 to 20.2 GHz (RX, K-band).

A. JetWave™ System LRUs

The JetWave™ system is made up of the LRUs in Table 2-1, Table 2-2, and Table 2-3.

Table 2-1. JetWave™ System LRUs

LRU	PN
Modman	90400012-0001
Modman Variant 2	90400012-0002
APM	90401121
KANDU	90401566
KANDU Variant 2	90404518
KRFU Conduction Cooled Variant 1	90401203
KRFU Conduction Cooled Variant 2	90402346
KRFU Forced Air Cooled	90401202
FMA	90000380-1
TMA	90400013-0001
A791 FM radome	90400017-XXX
Non-A791 FM radome	90400016-XXX

Table 2-2. A791 Style Radome Package Variant

Aircraft	A791 Style Radome Package Variant
A319/A320/A321	90400017-01
A330/A340	90400017-02
A350	90400017-03
A380	90400017-04
B737/B757	90400017-05
B747	90400017-06
B777	90400017-08
B787	90400017-09
B767	90400017-10

Table 2-3. Non A791 Style Radome Package Variant

Aircraft	Non A791 Style Radome Package Variant
A319/A320/A321	90400016-01
A330/A340	90400016-02
A350	90400016-03
A380	90400016-04
B737/B757	90400016-05
B747	90400016-06
B777	90400016-08
B787	90400016-09
B767	90400016-10

B. JetWave™ System LRU Leading Particulars

(1) Refer to Table 2-4 for the Modman leading particulars.

(2) Refer to Table 2-5 for the APM leading particulars.

(3) Refer to Table 2-6 for the KANDU leading particulars.

(4) Refer to Table 2-7 for the KRFU leading particulars.

(5) Refer to Table 2-8 for the TMA leading particulars.

(6) Refer to Table 2-9 for the FMA leading particulars.

(7) Refer to Table 2-10 for the B757 FMA radome particulars..

Table 2-4. Modman Leading Particulars

Characteristic	Specification
Length	15.32 inches (389.1 mm) maximum
Width	5.02 inches (127.5 mm) maximum
Height	7.88 inches (200.2 mm) maximum
Weight	14.0 pounds (6.35 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	60 watts maximum NOTE: Honeywell recommends that wiring and cooling is designed for 100 watts in order to allow for seamless upgrades to the Modman with enhanced capability at a later date.
Power dissipation	59 watts maximum
Cooling	48.5 lb/hr (22 kg/hr) at 104°F (40°C)
Operating temperature	-40°F (-40°C) to 158°F (70°C)

Table 2-4. Modman Leading Particulars (Continued)

Characteristic	Specification
Mounting information	4-MCU, forced-air, ARINC 600 series tray
Maintenance	No scheduled maintenance required
Interfaces	J1A - PODD, PIESD, and AISD J1B - APM, Aircraft, PODD, PIESD, AISD, and KANDU J1C - IF to/from KRFU and aircraft power

Table 2-5. APM Leading Particulars

Characteristic	Specification
Length	4.515 inches (114.68 mm) without connector
Width	4.015 inches (101.98 mm) maximum
Height	1.315 inches (33.40 mm) maximum
Weight	12 ounces (0.34 kg) maximum
Operating voltage	5 VDC, 300 mA maximum, from the Modman
Power consumption	Power supplied by Modman
Power dissipation	0.3 watts maximum
Cooling	No forced-air cooling required
Operating temperature	5°F (-15°C) to 131°F (55°C)
Maintenance	No scheduled maintenance required
Interface	J1 - Modman

Table 2-6. KANDU Leading Particulars

Characteristic	Specification
Length	11.020 inches (279.91 mm) maximum
Width	9.075 inches (230.50 mm) maximum
Height	4.760 inches (120.90 mm) maximum
Weight	8.8 pounds (4.0 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	200 watts Class A maximum average power 115 watts Class B maximum average power
Power dissipation	50 watts Class A maximum average power 42 watts Class B maximum average power
Cooling	See 90401567 Outline and Installation Drawing for cooling clearance requirement See 90405004 Outline and Installation Drawing for the KANDU Variant 2 for cooling clearance requirement No forced-air cooling required

Table 2-6. KANDU Leading Particulars (Continued)

Characteristic	Specification
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Maintenance	No scheduled maintenance required
Interfaces	J1 - Aircraft and Modman J2 - Power to OAE and IMU (38.5 and 24 VDC) J3 - KRFU, OAE, and maintenance J4 - Ethernet (quadrax)

Table 2-7. KRFU Leading Particulars

Characteristic	Specification
Conduction-cooled 1 configuration:	
Length	16.55 inches (420.4 mm) maximum
Width	10.03 inches (254.8 mm) maximum
Height	2.08 inches (52.8 mm) maximum
Weight	12.00 pounds (5.4 kg) maximum (including thermal pad) KRFU 11.25 pounds (11.25 kg) nominal Thermal pad 0.75 pounds (0.34 kg) nominal
Operating voltage	115 VAC, 400 Hz
Power consumption	300 watts maximum at transmit amplifier saturation. 220 watts maximum at MOP for 100% duty cycle. 127watts typical at MOP for 50% duty cycle when the base plate is at 77°F (25°C). 55 watts typical with transmit mute.
Power dissipation	200 watts maximum at MOP for 100% duty cycle. 115 watts typical at MOP for 50% duty cycle when the base plate is at 77°F (25°C). 55 watts typical with transmit mute.
Cooling	Conductive - cooled through the baseplate with thermal pad. KRFU will mute the transmit RF signal if the hottest point on the aircraft baseplate exceeds 185°F (85°C) to reduce heat dissipation. KRFU will automatically un-mute once KRFU cools below 167˚F (75˚C).
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Maintenance	No scheduled maintenance required
Interfaces	J1 - Aircraft power input J2 - Control interface from KANDU J3 - RF TX to OAE J4 - RF RX from OAE J5 - IF TX from Modman J6 - IF RX to Modman

Table 2-7. KRFU Leading Particulars (Continued)

Characteristic	Specification
Conduction-cooled 2 configuration:	
Length	16.55 inches (420.4 mm) maximum
Width	9.01 inches (228.8. mm) maximum
Height	2.08 inches (52.8 mm) maximum
Weight	11.30 pounds (5.1 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	300 watts maximum at transmit amplifier saturation. 220 watts maximum at maximum nominal system transmit power. 185 watts typical at maximum nominal system transmit power when base plate is at 77°F (25°C). 210 watts typical at maximum nominal system transmit power when KRFU base plate is at 158°F (70°C).
Power dissipation	260 watts maximum at transmit amplifier saturation. 200 watts maximum at maximum nominal system transmit power. 167 watts typical at maximum nominal system transmit power when base plate is at 77°F (25°C). 192 watts typical at maximum nominal system transmit power when KRFU base plate is at 158°F (70°C).
Cooling	Conductive - cooled through the baseplate with thermal pad. Operating temperature -67°F (-55°C) to 158°F (70°C). KRFU will mute the transmit RF signal if the hottest point on KRFU baseplate exceeds 158°F (70°C).
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Maintenance	No scheduled maintenance required
Interfaces	J1 - Aircraft power input J2 - Control interface from KANDU J3 - RF TX to OAE J4 - RF RX from OAE J5 - IF TX from Modman J6 - IF RX to Modman
Forced air configuration:	
Length	18.05 inches (458.5 mm) maximum
Width	9.01 inches (228.8 mm) maximum
Height	3.230 inches (82.04 mm) maximum
Weight	14.6 pounds (6.6 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	300 watts maximum at transmit amplifier saturation. 220 watts maximum at maximum nominal system transmit power. 185 watts typical at maximum nominal system transmit power.

Table 2-7. KRFU Leading Particulars (Continued)

Characteristic	Specification
Power dissipation	260 watts maximum at transmit amplifier saturation. 200 watts maximum at maximum nominal system transmit power. 167 watts typical at maximum nominal system transmit power.
Cooling	Forced air, 169.8 lb/hr (77 kg/hr) at 104°F (40°C) at sea level
Operating temperature	-67°F (-55°C) to 158°F (70°C) KRFU will mute the transmit RF signal if insufficient cooling air is supplied.
Maintenance	No scheduled maintenance required
Interfaces	J1 - Aircraft power input J2 - Control interface from KANDU J3 - RF TX to OAE J4 - RF RX from OAE J5 - IF TX from Modman J6 - IF RX to Modman

Table 2-8. TMA Leading Particulars

Characteristic	Specification
Length	13.70 inches (348.0 mm) maximum
Width	12.00 inches (304.8 mm), maximum reflector sweep volume
Height	13.57 inches (344.7 mm) maximum
Weight	10 pounds (4.55 kg)
Operating voltage	38.5 VDC and 24 VDC for IMU supplied by the KANDU
Power dissipation	85 watts maximum
Cooling	Natural convection and radiation only
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Maintenance	No scheduled maintenance required
Interfaces	J2 - Power/control interface from KANDU J3 - RF TX from KRFU J4 - RF RX to KRFU

Table 2-9. FMA Leading Particulars

Characteristic	Specification
Length	23.03 inches (585 mm) maximum
Width	35.72 inches (907.3 mm), maximum reflector sweep volume
Height	9.39 inches (238.51 mm) maximum

Table 2-9. FMA Leading Particulars

Characteristic	Specification
Weight	83 pounds (37.6 kg) maximum NOTE: The lifting fixture is 5.5 pounds (2.5 kg)
Operating voltage	38 VDC and 24 VDC for IMU supplied by the KANDU
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Power dissipation	135 W @ steady state
Cooling	Natural convection and radiation only
Maintenance	No scheduled maintenance required
Interfaces	P1 - Power from KANDU P2 - Control interface from KANDU P3 - IMU power and control from KANDU J4 - RF RX to KRFU J5 - RF TX from KRFU

Table 2-10. JetWave™ Fuselage Mount Radome Leading Particulars

Characteristic	Specification
Length	95.472 inches (242.99 mm) (typical)
Width	43.881 inches (1,114.58 mm) (typical)
Height	11.892 inches (302.06 mm) (typical)
Weight	53.5 pounds (24.27 kg) (typical)

2.2 Honeywell JetWave™ System Architecture

This section describes the Inmarsat AES system that Honeywell has implemented for the following classes of terminal:

- Class A aftermarket satellite terminal: For use on CAT types of aircraft. This uses a FMA assembly. The terminal can also be used in the large aircraft segment of the BRS.
- Class A OEM satellite terminal: For use on CAT types of aircraft but will be designed with consideration given to the ARINC 791 standard.
- Class B satellite terminal: For use on BRS. This uses the compact TMA.

Refer to Figure 2-2 for the JetWave™ system block diagram.

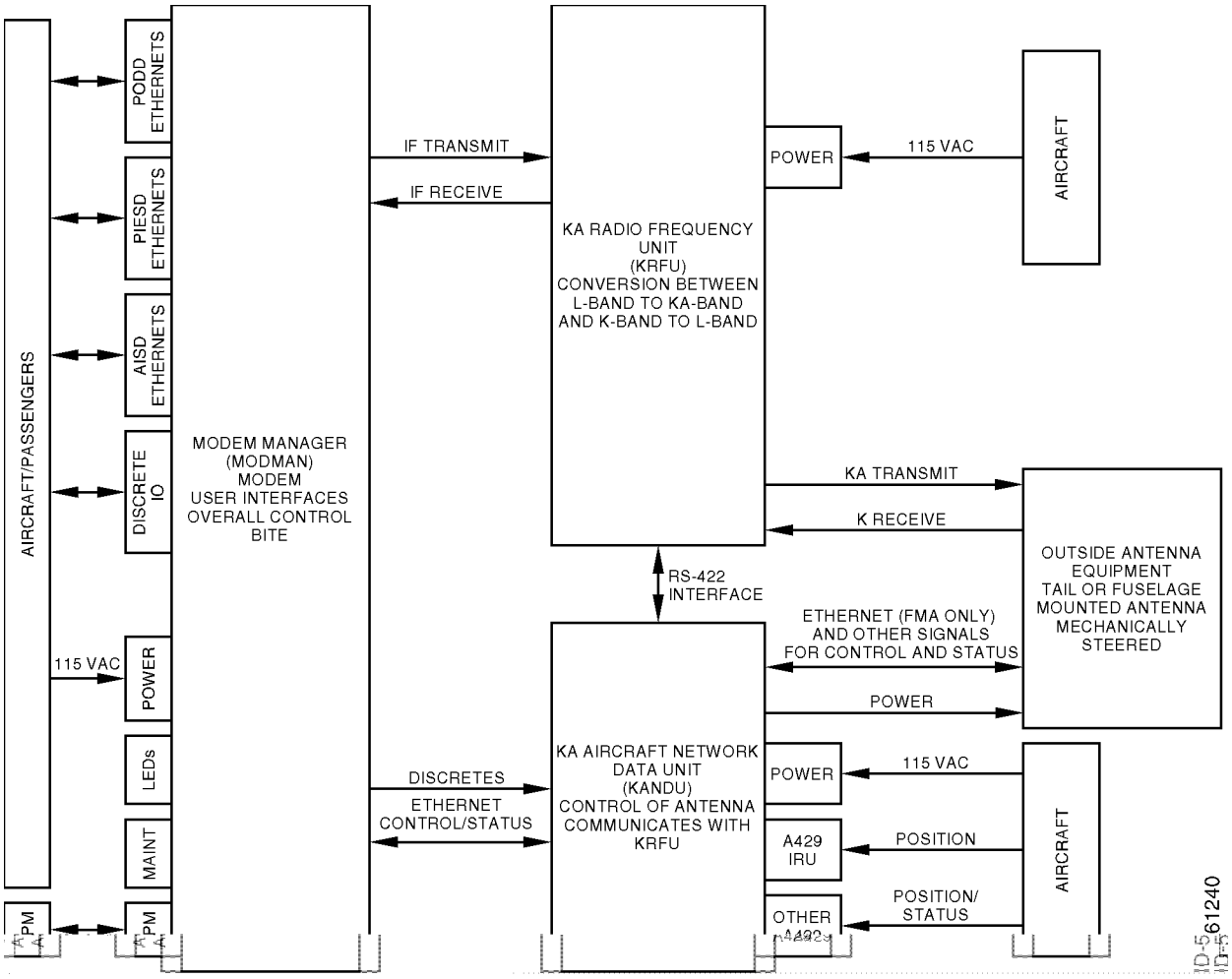

Figure 2-2. JetWave™ System Block Diagram

The JetWave™ system LRUs are as follows:

A. Outside Antenna Equipment

- The OAE can include the following components:
  - Mechanically steered antenna - either fuselage mount or tail mount.
  - Radome package - fuselage mount configuration only (tail mount individual radomes are available per aircraft type).
  - KRFU

- RF component kit - fuselage mount configuration only. (tail platforms installation kits containing RF interconnects are available depending on aircraft type).
- OAE installation kit (optional, for ARINC 791 style configuration only).

- The antenna includes an aperture.
- The OAE is powered by the KANDU.
- Contains an LNA for amplification of signals in the receive path.
- Includes the mechanical pointing system, positioner, motors and sensors, and an IMU to detect movement of the platform.
- The TMA or FMA accepts the transmit Ka-band signal from the KRFU.
- The TMA or FMA antenna K-band receive path is amplified by the LNA and sent to the KRFU.
- The TMA or FMA receives power from the KANDU.
- The TMA or FMA accepts the control interface from the KANDU and lets the antenna aperture report status, BITE, and IMU position back to the KANDU.
- RF component kits are available for both ARINC 791 Style and Non ARINC 791 style configurations. The RF component kit includes: Tx waveguide, Rx coax cable, Rx coax to waveguide adapter, sealing o-rings, and waveguide and adapter attachment.
- Radome packages are unique to each fuselage and can be made up of the kits that follow:

Table 2-11. Radome Packages

ARINC 791 Style Radome Package	Non ARINC 791 Style Radome Package
Fuselage mount radome	Fuselage mount radome
ARINC 791 style AIM kit (aircraft specific)	Skirt fairing (aircraft specific)
	LAIM KIT
	Radome attach hardware kit

NOTE: Not all aircraft will have a skirt fairing.

B. KRFU

- Is made up of a BUC to convert the transmit IF frequencies (950-1950 MHz) to Ka-band frequencies (29-30 GHz)
- An HPA to increase the signal strength for transmission by the antenna
- Contains a BDC to convert the received K-band frequencies (19.2-29.2 GHz) to IF (950-1950 MHz)
- Accepts 115 VAC aircraft power.

C. KANDU

- Receives commands from the Modman through an Ethernet interface to configure the antenna/KRFU and reports status over this Ethernet interface.
- Contains the positioning algorithm to allow the pointing of the antenna with inputs from the IRU, information from the RSSI detector in the Modman, and the IMU from the antenna.
- Provides power and control to the antenna.
- Provides control signals to the KRFU through the RS-422 interface.
- Accepts 115 VAC aircraft power.

D. Modman

- Is the overall controller of the system.
- Receives and transmits information to the KRFU along the IF frequency between 950-1950 MHz.
- Supplies the user interfaces to the aircraft and passengers as follows:
  - The PODD interfaces provide service to the passengers through the use of Ethernet (10/100/1000 Base T).
  - The PIESD interfaces provide services to passenger entertainment devices installed on the aircraft (in flight entertainment systems). This system uses Ethernet (10/100/1000 Base T).
  - The AISD interfaces provide services to the aircraft/cockpit, such as the electronic flight bag, data load, etc. This system uses Ethernet (10/100/1000 Base T) interfaces.
  - The discrete I/O for aircraft status and for reporting system status.
- Has two LEDs to provide power and fault status on the LRU front panel.
- Accepts 115 VAC from the aircraft.
- Manages the BIT for the complete AES.
- Contains the modem, which transmits and receives to/from the KRFU.
- Controls the KRFU and KANDU (and through it, the OAE) through the Ethernet interface and RS-422 discretes.

E. APM

- The APM holds the configuration data for the system.
- Is powered by the Modman.

2.3 Honeywell Implementation

The Honeywell implementation varies from the ARINC 791 configuration as follows:

- No ARINC 629 support is provided (optional in ARINC 791).
- No EN1 Ethernet functionality between the KRFU and KANDU is provided (the provisioned standard inter-wiring is not utilized).
- ARINC 791 TX Mute between the Modman and the KANDU is optional, the Honeywell implementation uses RS422 signaling on manufacturer-specific circuits 3 to 4 instead.
- Manufacturer-specific circuits 1 to 6 carry a BUC Mute signal, a Filter Select signal, and a KANDU Reset signal.
- The RSSI function is in the Modman.
- No EN2 Ethernet interface functionality between the KANDU and OAE on the TMA variant (the provisioned standard inter-wiring is not utilized).
- The A350 variant of the ARINC 791 style configuration, has AIM kit fittings that deviate from the ARINC 791 coordinate listing for the 7 fitting.
- There are LED indicators on the front panel of the Modman to show status.

Refer to SECTION 3 SYSTEM PRE-CONFIGURATION, AES Configuration Data for the details of ARINC 429 labels required for the JetWave™ System.

2.4 JetWave™ System Modes of Operation

The JetWave™ system supports the following modes of operation:

- Power On
- System Initialization
- Normal Operation
- Critical Fault
- Data-Load
- Commanded.

A. Power On Mode

Each LRU enters Power On Mode when power is applied. RF transmission is disabled in this mode.

In this mode, the Modman does POST and other invasive tests. If no failures are detected, the system enters into the system initialization mode.

NOTE: SNMP and continuous BITE are not available at all times during this mode.

B. System Initialization Mode

In the System Initialization Mode, the Modman starts additional POST and BITE, system access, and SNMP services. The Modman attempts to establish communication with KANDU and OAE. The RF transmission is disabled in this mode.

While in System Initialization Mode, the RS422, discrete signal and the Ethernet interfaces are available and active on all the JetWave™ LRUs which are powered up. In Modman, when powered up, the power supply to APM is available on Modman P23B connector. When power is applied to the KANDU LRU, the Antenna Power and IMU power is available on the KANDU receptacle J2. Refer to the applicable interconnection diagrams for the electrical specifications of these interfaces.

There is no timeout for system initialization since the Modman, the KRFU, and the KANDU LRUs (which power the OAE) are powered independently from the aircraft power supply.

Once the communication with other LRUs is established, the BITE parameters of other LRUs are extracted and more system wide testing is performed. The system wide testing includes the hardware compatibility checks, software part number compatibility check, checking for availability of important input data and configuration files, etc. If there are no critical failures, the system enters into the Normal Operating Mode.

C. Normal Operating Mode

In Normal Operating Mode, the RF transmission is enabled and establishment of satellite connection is initiated subject to the system meeting the following conditions – aircraft is in the air, there is no geographic restriction, and the antenna has a line of sight to the satellite. Ground operation is possible if the GTE is asserted and regulatory conditions do not restrict it. The user traffic can be started once the antenna is pointed correctly to the satellite and the terminal locks on to the satellite for providing the connectivity. The system enables all the supported services like continuous BITE, SNMP, GUI, user services, etc. in this mode.

The system enters the Normal Operating Mode approximately 5 minutes after continuous power is applied to the last LRU.

D. Critical Fault Mode

The system enters into Critical Fault Mode when any LRU reports a critical fault that cannot be recovered and will affect satellite connectivity. The RF transmission is muted and user services are disconnected. The system may support minimal services like SNMP, continuous BITE, GUI, etc. in this mode.

E. Data Load Mode

The system enters Data Load Mode when aircraft is on ground and local data load discrete on the Modman is asserted. The SNMP, GUI, and continuous BITE services may not be supported in data load mode. The RF transmission is disabled in data load mode. The Modman provides ARINC 615A Ethernet data loading to itself and other LRUs through its own interface in Data Load Mode. Data Load mode can be entered from "Normal Operating mode", "System Initialization mode", or "Critical Fault mode". The system will exit Data Load Mode once the local data load discrete is de-asserted.

F. Commanded Mode

The system also provides a Commanded Mode of operation which may be initiated through the GUI when the aircraft is on ground. This mode provides access to user initiated tests for system testing, initiating automatic antenna alignment, transmit cable calibration, manual antenna pointing to defined location, etc.
The system will come out of the commanded mode by a System reset.

2.5 About Inmarsat Services

The JetWave™ system is made up of a fleet of Ka-band broadband satellite network from Inmarsat. The Inmarsat-5 (I-5) geostationary satellites have high power Ka-band steerable and fixed spot beams that supply global in-flight connectivity services to business, commercial, and government aviation customers around the world.

The JetWave™ AES provides Ka-band communication utilizing an airborne VSAT. The AES communicates through a satellite to an SAS. TX and RX interface provided within the AES enables two-way communication. The forward channel provides a communication path from the SAS to the AES. The return channel provides a communication path from the AES to the SAS.

The JetWave™ system may not be available on the ground or in the air in certain geographical areas. Some countries do not allow access to this service in their airspace. The service availability would also depend on the country in which the aircraft is registered with. The aircraft operators may approach the respective Value Added Resellers/Distribution Partners for further details where JetWave™ services are not available.

SECTION 3
SYSTEM PRE-CONFIGURATION

3.1 AES Configuration Data

NOTE: Any tools for preparing the config files for the terminal must be licensed from Honeywell.

The AES configuration data is a set of configuration files, stored on the APM. Each configuration file contains a set of airplane-unique parameters. The parameters define the configuration of the AES necessary for the initialization and operation of the Honeywell JetWave™ AES system. The AES configuration data holds information such as:

- Aircraft tail registration number
- Aircraft structural blockage information
- ARINC 429 label definition set for positioning and steering used by the KANDU
- WOW input and polarity, etc
- USER operational preferences
- BOSS configuration data
- LAN network configuration data
- Default satellite configuration.

A. AES System Configurations

The details of the ARINC 429 labels required for the JetWave™ System are mentioned in the table below:

Table 3-1. ARINC 429 Label List

Label Set	Required ARINC 429 Labels	Description	Source	Maximum Transmit Delay (Msec)	Maximum Transmit Interval (Msec)	Approximate Resolution
Label	**For best accuracy**	**Preferred Label Set**				
150	Yes	UTC Time		Nil	1000	1°
260	Yes	Date			1000	1 day
254 /110	Yes	Present Position – Latitude /GNSS Latitude	Hybrid /GNSS	160 /1000	100 /20	0.000172°

Table 3-1. ARINC 429 Label List

255 /111	Yes	Present Position – Longitude /GNSS Longitude	Hybrid /GNSS	160 /1000	100 /20	0.000172°
261 /76	Yes	Altitude /GNSS Altitude (MSL)	Hybrid /GNSS	65 /1000	40 /20	0.125 ft
132 /314	Yes /No	True Heading	Hybrid /INS	110	50	0.0055° /0.4°
324	Yes	Pitch Angle	INS	50	20	0.011°
325	Yes	Roll Angle	INS	50	20	0.01°
330	Yes	Yaw Rate	INS	50	20	0.015 degrees/sec
326	Yes	Pitch Rate	INS	50	20	0.015 degrees/sec
327	Yes	Roll Rate	INS	50	20	0.015 degrees/sec
175 /112/312	Yes	Ground Speed /GNSS Ground Speed	Hybrid /GNSS/ INS	110 /Nil	40	0.125 knots (kn)
Label	**Acceptable Replacement to Primary**					
125		UTC Time	INS	1200	200	0.1 min.

The AES system configuration includes the aircraft installation information.

NOTE: The AES System configuration file update is not a field activity. This is done by the equipment supplier as part of production process. On completion of AES system installation activities, the installer can view and verify the AES configuration settings through the GUI as described in this section.

To view and make sure the AES configuration data is correct, navigate to the “Configuration Files” information pages under the “Other Information & Control” menu. Figure 6-4 shows the typical configuration file Information page.

NOTE: The AES system does not lose its configuration data because of the loss of its primary power. The validity of the AES configuration content is determined by the AES system with a checksum process. The checksum is done at the time of each power-up. An invalid checksum results in the AES system reverting to the default values.

B. Regulatory Log Configuration Parameters

The regulatory log configuration parameters file (APM file - reglog.cfg) contains details of the remote server to use to transfer the regulatory log data.

C. Aircraft Service Configuration

There are a number of functions that an Ethernet port can support namely, data traffic, data loading, GUI, AES logs extraction (maintenance function) and status/control (through the SNMP). The terminal can be configured to indicate whether an Ethernet port supports traffic, data loading, SNMP etc, such as AG1 SNMP, and data loading, EG1 traffic, using the aircraft service configuration file.

Once the items have been loaded into the APM the Modman reads the APM once at power-on and passes the appropriate data to the relevant LRU or uses the information locally.

The following airframe specific information is required for creating the JetWave™ configuration files:

- Applicable ARINC 429 Label Definition sets from Aircraft IRS/IRU and GNSS
- Discrete input availability and its polarity
- User Ethernet Ports which are to be configured and the type of services to be enabled (such as Data Load, SNMP, GUI and OTA access).
- Aircraft blockage data.

Refer to APPENDIX D on Page D-1 for more details.

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SECTION 4
INSTALLATION

4.1 Overview

A. Installation Procedure Overview for the JetWave™ System

This section includes information about installing the equipment in the core JetWave™ system. Contact VAR/DP/Honeywell about installation kits that include mating connectors and cables.

Honeywell recommends that LRUs be installed in accessible locations that are compatible with the environmental levels that the equipment is certified to handle.

Refer to APPENDIX D for the installation reference checklist.

Complete the Airframe Specific Information sheet in APPENDIX D. For new configurations, provide this sheet to Honeywell so an APM file can be generated.

NOTE: ARINC 429 labels may be obtained from the aircraft ADIRU or MMR or other suitable equipment, providing they meet the required update rate, latency and accuracy.

NOTE: For FMA located in Non-ARINC791 defined positions, a structural blockage map will have to be defined for the aircraft.

The JetWave™ system installation procedure includes:

- the Modman, APM, Maintenance Panel and Discrete wiring
- the KANDU
- the AIM or the LAIM
- the KRFU Thermal Pad and the KRFU
- the FMA or the TMA
- the Radome
- Cabling and drawings.

Refer to Table 4-3 for a detailed explanation of the discrete signal required for correct operation of the GX system.

The overview of the installation procedure for the JetWave™ system is as follows:

(1) Install adapter plate for the FMA. For Fuselage Mount Configurations, install either the ARINC 791 style antenna interface mount (AIM) or non ARINC 791 local antenna interface mount (LAIM), depending on the selected installation option. Installation shall be per instructions related to each configuration. The adapter plates required for mounting the OAE are available in installation kits from Honeywell and various other suppliers.
or
The TMA tail configuration requires that the TMA and KRFU be installed on the aircraft tail tip under a radome specific to the tail on that aircraft. Installation brackets and provisions are specific to each tail platform.

(2) Install the OAE and JetWave™ components in accordance with the installation drawings provided.

(3) Install wiring in accordance with the interconnection diagram. The cables and adapters are available as installation kits from various suppliers.

(4) Do wiring and RF cable checks to make sure they are installed correctly and meet the installation requirements.

(5) Apply power to the system.

(6) Install radome after completion of post installation checks.

4.2 JetWave™ System Internal LRU Installation

A. Modman

Install the Modman in a standard 4-MCU tray. The customer is responsible for providing the mounting tray, the mating ARINC 600 connector, contacts, as well as all the cabling for the installaton.

Refer to Figure 4-22 for outline and installation information, and Figure 4-34 thru Figure 4-37 for the applicable interconnect diagram.

There are no special tools, fixtures, and equipment required for the Modman installation.

Minimum clearance for the Modman: 1.0 inch (25.4 mm) clearance from top face, 0.5 inch (12.7 mm) clearance from all the other faces not interfacing with the mounting tray.

(1) The Modman mounting kits are as follows:

The customer is responsible for providing the mounting tray. Carlisle Interconnect Technologies supplies 4-MCU ARINC 600 kits in various configurations, contact Carlisle at www.carlisleit.com.

(2) The Modman connectors are as follows:

Table 4-1 provides the connector part numbers for the Modman rear connector. The mating connector (Radiall PN NSXN2B875S00) is supplied by the customer.

Table 4-1. ARINC 600 Connectors

Connector PN	Description	Qty
Radiall PN 620 601 191	ARINC 600 connector shell Size 2 with inserts	1
Insert A: Radiall PN 620075050	Arrangement Q11, Shell Size 2: Size 8 quadrax contact for Ethernet connections	 11
Insert B: PN: D38999/26FH35PN D38999/26FD35PN Radiall PN 620075050	Arrangement 120Q2, Shell Size 2: #22 contacts Size 8 quadrax contact for Ethernet connections	 118 2

Table 4-1. ARINC 600 Connectors (Continued)

Connector PN	Description	Qty
Insert C:	Arrangement 12F5C2, Shell Size 2:	
PN: D38999/26FE6PN	#12 contacts	4
PN: D38999/26FE6PN	#16 contacts	1
PN: not included	Size 16 optical contacts (not used)	5
PN: 620022	Size 5 coax contact for RF connections	2

NOTE: While engineering the JetWave™ System LRU interconnections, make sure the GXA LRU quadrax terminations do not distort natural wire orientations. There are geometric relationships that must be maintained between the quadrax contact and the natural twist of the star-quad wire. Wire bend radii and clamping conditions typical of aircraft installations should not cause deviation from NEXT parameters of the ARINC 664 compliant Star Quad cables for Ethernet interfaces terminating on Quadrax receptacles. Refer to the applicable interconnection diagrams for the indicator that the connector rotation of the wire is in a clockwise direction.

(3) The Modman bonding is as follows:

The Modman must be electrically bonded to the airframe. Make sure that the mating surfaces are free from contaminants such as paints or other non-conductive elements. A bonding test point is available on the front panel. The bonding resistance must be less than or equal to 2.5 mΩ.

(4) The TX and RX IF cables between the Modman and KRFU must have a minimum loss of 11dB at 950 MHz and a maximum loss of 18 dB at 1,450 MHz and 21.2 dB at 1,950 MHz.

If the chosen cable loss is too small, an equalizer should be inserted in the TX path and an attenuator in the RX path. The choice of parts are detailed in Table 4-2.

NOTE: An attenuator cannot be used in the TX path as the TX path also passes the reference to the KRFU and the attenuator will introduce too much loss to that portion of the signal.

- The loss at 50 MHz in the TX path must be less than 3.1 dB.
- The TX and RX cable loss should be matched within 1dB at 1,450 MHz.
- The TX and RX coax cables should 50 ohms with a VSWR of less than 1.5:1.
- The TX and RX cables must have a minimum isolation at 2,150 MHz of 120 dB.
    - The isolation specification may need to be increased if the TX and RX cables are in close proximity to high power RF signals in the 950 MHz to 1,950 MHz band, e.g. cellular base stations.

Table 4-2. Modman Cable Loss Values

	Cable Loss @ 950 MHz		
	< 6.5 dB	**≥ 6.5 dB, <11 dB**	**≥ 11 dB**
Equalizer in TX path	10.5 dB Minicircuits, PN TAT-10R5DC1+ (10.5 dB equalizer) or equivalent	4.8 dB Minicircuits, PN TAT-4R8DC11+ (4.8 dB equalizer) or equivalent	None
Attenuator in RX path	10.5 dB Minicircuits, PN TAT-10R5-1+ (10.5 dB attenuator) or equivalent	4.8 dB Minicircuits, PN TAT-4R8-1+ (4.8 dB attenuator) or equivalent	None

NOTE: Input signal range: -79 to -5 dBm. Output signal range -30 to +5 dBm. Incross talk requirement: -25 dBc. Output cross talk requirement: -40 dBc.

B. APM

The APM can be installed in any orientation. Refer to Figure 4-24 for outline and installation information and Figure 4-34 thru Figure 4-37 for the applicable interconnect diagram.

There are no special tools, fixtures, and equipment required for the APM installation.

There are no clearance requirements for the APM.

Use 0.164-32 UNC-2A corrosion resistant mounting fasteners. Do not exceed 25 in-lb (2.8 Nm) or minimum ultimate tensile strength of 125 KSI (861.845 newton/millimeter²) when you torque the screws.

APM to Modman interconnect cable must use ARINC 664 compliant 2 shielded twisted pair 24 AWG (or aerospace grade shielded Cat 5/Cat 5E minimum) PN ECS 922404 or equivalent, with a maximum length of 9.8 feet (3 m).

The APM must be electrically bonded to the airframe through contact with the base of the unit or through a bonding cable attached to M3 earth stud. The APM bonding resistance must be less than or equal to 2.5 mΩ.

C. Maintenance Panel

If the JetWave™ system is not wired to other systems on the aircraft, the discrete I/O and Ethernet ports must be brought out to a suitable maintenance panel to allow for system checks and routine maintenance, such as system software upgrades. The discrete I/O and Ethernet ports needed are as follows:

(1) Discrete Outputs:

NOTE: Discrete outputs are normally open and capable of sinking 20 mA of current with a maximum voltage of 36 VDC as per ARINC 763.

- System available (Modman MP13E) open/ ground output connected to a lamp

- Data link available (Modman MP13F) open/ ground output connected to a lamp.

(2) Discrete Inputs:

- Local data load enable (Modman MP10B) connected to a normally open switch with a GND to enable
- Ground transmit enable (Modman MP11D) connected to a normally open switch with a GND to enable
- Public service disable (Modman MP11E) connected to a normally open switch with a GND to enable
- Modman reset (Modman MP10C) connected to a normally open switch with a GND to enable
- Tx mute (KANDU J1D) connected to a normally open switch with a GND to enable.
- Front Panel Enable Mode (Modman MP10F) connected to a normally open switch with a GND to enable
- Discrete Signal Ground (Modman MP12F), to be used as the ground reference for the other Modman discrete inputs
- Discrete Signal Ground (KANDU J1-B), to be used as the ground reference for the KANDU discrete inputs

(3) Ethernet Port:

- AV1 (Modman TP BB1 thru 4) connected to a RJ45 Ethernet connector

NOTE: The AV1 is the default data loading port, any other Ethernet ports can be selected as long as the APM configuration file is configured to allow that port to data load.

For LRU pin details, refer to the applicable system interconnect diagram, Figure 4-34 thru Figure 4-37.

Refer to Table 4-3 for a list of I/O discretes.

Table 4-3. Discretes Table

Discrete I/O	Pin	Description	Mandatory / Optional
Weight-on-Wheels (WOW)	ModMan J1-MP11A	Use and sense of the Weight on Wheels input is to determine Air/Ground Status, as configured by the AES system configuration data. Signal type: Input	Optional

Table 4-3. Discretes Table (Continued)

Discrete I/O	Pin	Description	Mandatory / Optional
Local Data Load	ModMan J1-MP10B	The discrete shall request the ModMan to change mode in the following manner: • Open to ground transition: Request for data load mode to be entered • Ground to open ground transition: Request for reset of system (if in data load mode) Signal type: Input	Mandatory
TX Control	KANDU J1-D	The discrete shall disable the transmission of signals when grounded, and allow transmission when open. Signal type: Input	Mandatory
Public Services Disable	ModMan J1-MP11E	The discrete shall disable the PODD interfaces when grounded, and enable PODD interfaces when open. Signal type: Input	Optional
Ground Transmit Enable	ModMan J1-MP11D	The discrete shall request the AES when in normal operation mode to ignore Air/Ground status and provide user service. • Ground = Enable RF transmission on the ground. • Open = Normal. Signal type: Input	Mandatory

Table 4-3. Discretes Table (Continued)

Discrete I/O	Pin	Description	Mandatory / Optional
ModMan Reset	ModMan J1-MP10C	This discrete can be used to reset the ModMan (and, in turn the entire AES) • Ground = Mod-Man/AES reset • Open = Mod-Man/AES normal operation • Signal type: Input	Optional
Data Link Available	ModMan J1-MP13F	The Data Link Available ARINC 791 IO discrete output shall be grounded when user service is available (data connections are available for use), and open when user service is not available. Signal type: Output (closure to ground)	Optional
System Available	ModMan J1-MP13E	The System Available ARINC 791 IO discrete output shall be open when the AES system is in critical fault mode, and grounded at all other times (including power on sequence) Signal type: Output (closure to ground)	Optional
Front Panel Enable Mode	ModMan J1-B Pin 10F	The front panel enable mode discrete enables the Modman front panel connectors when asserted. • Ground = Enable Front Panel Connector • Open = Disable Front Panel Connector. Signal type: Input	Mandatory

NOTE: The following ARINC 791 discretes are not supported:

- Cell Transmit Enable (ModMan J1-MP11B)
- Remote Management Enable (ModMan J1-MP10A)
- Cooling System Available (ModMan J1-MP11F).

4.3 KANDU

Refer to Figure 4-25 and Figure 4-26 for outline and installation information. Refer to Figure 4-34 thru Figure 4-37 for the applicable interconnect diagram.

There are no special tools, fixtures, and equipment required for the installation of the KANDU.

The customer is responsible for the bulkhead connectors.

(1) KANDU to FMA bulkhead interconnect specification is as follows:

(a) Power and control signals required for the JetWave™ system LRUs installed outside the aircraft will be routed through the power and control bulkhead interface connectors which will be sealed to maintain cabin pressure (max 14.5 PSI (1,000 hPa)) inside the cabin.

(b) Maximum round trip wiring interconnection resistance between KANDU A3J2 and OAE-FMA- A5P1 must not exceed 0.326 ohms (considering the 16 AWG wire cables of length 32.8 feet (10 m)).

(c) It is recommended to use hermetically sealed MIL-DTL-38999 series III, insert 19-35, normal keying with 66 contacts as KANDU bulkhead control connector for KANDU interwiring to the OAE-FMA. To be labeled as BI-control.

(d) It is recommended to use hermetically sealed MIL-DTL-38999 series III, insert 17-8, normal keying with eight contacts as KANDU bulkhead power connector. To be labeled as BI-power.

(e) It is recommended to use TNC/N-Type hermetically sealed bulkhead interface in accordance with MIL-STD-348 for the routing of the TX-IF signals between the Modman and KRFU. The TX-IF interface to be labeled blue.

(f) It is recommended to use TNC hermetically sealed bulkhead interface in accordance with MIL-STD-348 for the routing of the RX-IF signals between the Modman and KRFU. The RX-IF interface to be labeled green.

(g) KANDU receptacle A3J4 is TVPOORGQF-21-75P (Amphenol) or equivalent. Mates with TV06RQF-21-75S (Amphenol) or equivalent for Ethernet interface.

(h) The following bulkhead connector design principles are recommended:

1 The connector shall use a flange integrated into the connector shell with an integrated seal and a washer and jam nut.

2 The jam nut shall be capable of accepting locking wire.

3 The integrated flange shall be mounted on the pressurized side of the aircraft, with the jam nut on the exterior unpressurized side

(i) It is recommended that the bulkhead interface be installed such that receptacle pins are on the pressurized area and receptacle sockets are on the unpressurized side of the aircraft.

(j) The bulkhead interface connectors must be electrically bonded to the aircraft.

or

(2) KANDU to TMA interconnect specification is as follows:

(a) KANDU receptacle A3J1 is MIL-DTL-38999/20FD19PN, series Ill, flange mount receptacle, insert 15-19, normal keying, with 19 pin-type contacts of size 20 AWG. Mates with D38999/26FD19SN for aircraft interface.

(b) KANDU receptacle A3J2 is MIL-DTL-38999/20FC4SN, series Ill, flange mount receptacle, insert 13-4, normal keying, with four socket-type contacts of size 16 AWG. Mates with D38999/26FC4PN for power output.

(c) KANDU receptacle A3J3 is MIL-DTL-38999/20FG35PN, series III, flange mount receptacle, insert 21-35, normal keying, with 79 pin-type contacts of size 22 AWG. Mates with D38999/26FG35SN for control interface.

(d) Maximum round trip wiring interconnection resistance between KANDU A3J2 and OAE-TMA A5J2 must not exceed 0.684 ohms (considering 20 AWG wire cables of length 32.8 feet (10 m)).

The bulkhead interface is as follows:

(a) It is recommended to use MIL-DTL-38999 series III, insert 19-35, normal keying with 66 contacts as KANDU bulkhead control connector for KANDU inter-wiring to MODMAN if KANDU is installed in an unpressurized location inside aircraft.

(b) It is recommended to use hermetically sealed MIL-DTL-38999 series III, insert 19-35, normal keying with 66 contacts as KANDU bulkhead control connector for KANDU inter-wiring to KRFU and OAE-TMA if KANDU is installed in pressurized location inside aircraft.

(c) It is recommended to use MIL-DTL-38999 series III, insert 17-8, normal keying with eight contacts as KANDU bulkhead power connector if 115 VAC power is not provisioned in unpressurized location of aircraft.

(d) The following bulkhead connector design principles are recommended:

1 The connector shall use a flange integrated into the connector shell with an integrated seal and a washer and jam nut.

2 The jam nut shall be capable of accepting locking wire.

3 The integrated flange shall be mounted on the pressurized side of the aircraft, with the jam nut on the exterior unpressurized side.

(e) Bulkhead interface must be installed such that receptacle pins are on the pressurized area and receptacle sockets are on unpressurized side of the aircraft.

(f) The bulkhead interface connectors should be electrically bonded to the aircraft.

(3) The KANDU must be electrically bonded to the airframe through contact with the base of the unit as follows:

- At least one of the two provided mechanical attachment points for electrical bonding must be used for bonding the KANDU to the airframe. Make sure that the all mating surfaces in the bonding path are free from contaminants such as paints or other non-conductive elements.
- One 0.65 inch (16.5 mm) diameter circular and one 0.65 inch (16.5 mm) diameter by 1.02 inch (25.9 mm)diameter elongated conductive area is provided around two of the mounting holes of the equipment base plate.
- The KANDU includes a 0.59 inch (15 mm) diameter bonding measuring point on one of the attachment tabs, close to the bonding element, but not on the bonding element.

KANDU bonding to the aircraft must be achieved through the mounting structure (fasteners) and KANDU A3J1-A.

The KANDU bonding resistance measured from the measuring point and the surface the unit is mounted must be less than 2.5 mΩ.

4.4 Installation Guidelines for the A791 Based AIM (If applicable)

The skirt fairing comes attached to the ARINC 791 based AIM plate. The installation sequence suggested for mounting A791 based AIM is as follows:

- Install the A791 based AIM bonding straps.
- Install the A791 based AIM fittings to the aircraft fuselage.
- Mount the A791 based AIM.
- Install the A791 based AIM bonding straps to the A791 based AIM assembly.

Before putting the A791 based AIM assembly onto aircraft, install bonding straps to the aircraft fittings. Refer to the airframe specific kits and assembly drawings for fastener details. Figure 4-1 shows a typical ground strap connection.

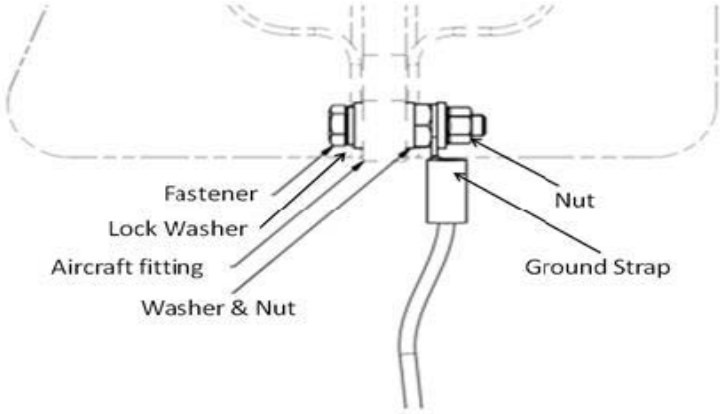

Figure 4-1. Typical Ground Strap Arrangement for A791 Compliant Fittings

The aircraft coordinate system orientation and fitting layout are shown in Figure 4-2.

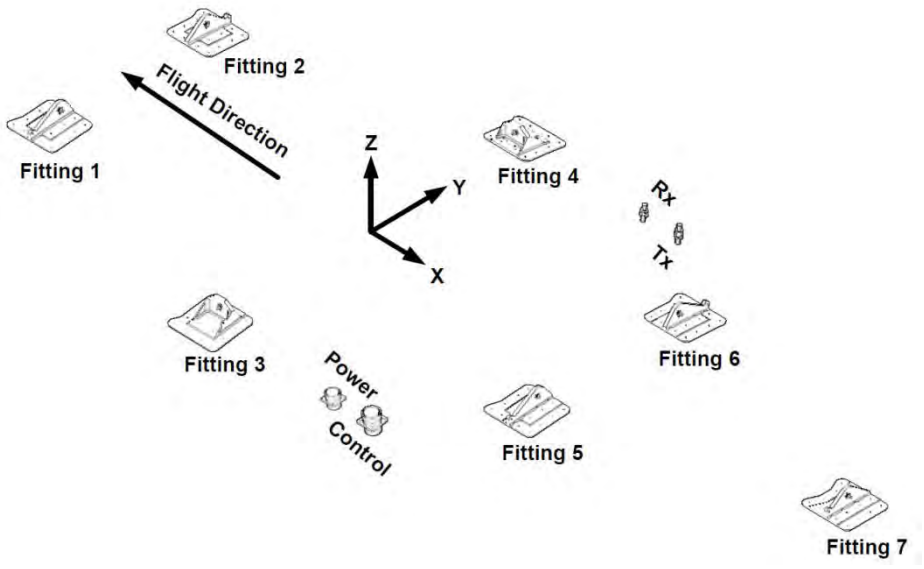

Figure 4-2. Aircraft Coordinate System Orientation and Fitting Layout

(1) Position and install the A791 based AIM fittings onto aircraft fittings for fittings #1, #2, #5, #6, and #7.

(2) Use the alignment tools to make sure that the fitting slip in X-direction is centered for fittings #2, #6, and #7.

(3) Make sure that all the fittings are oriented vertically with the alignment tools to help when you lower the A791 based AIM onto aircraft fittings and the installed fittings pass through openings in A791 based AIM.

(4) Put the A791 based AIM assembly onto aircraft with an aircraft servicing hoist. Attach the hoist to the A791 based AIM adapter plate at three locations labeled “Hoist Point”. Make sure that the previously installed fittings on aircraft are still oriented vertically so that they will pass through the openings in the adapter plate as AIM assembly is lowered onto aircraft. Refer to Figure 4-3.

(5) Refer to the airframe specific kits and assembly for fastener specifications to install A791 complaint AIM fittings to aircraft fittings.

NOTE: Consult airframe manufacturer for choosing the correct torque values.

(6) Wet the fuselage skin with water on skirt seal contact area before you put the AIM assembly on aircraft.

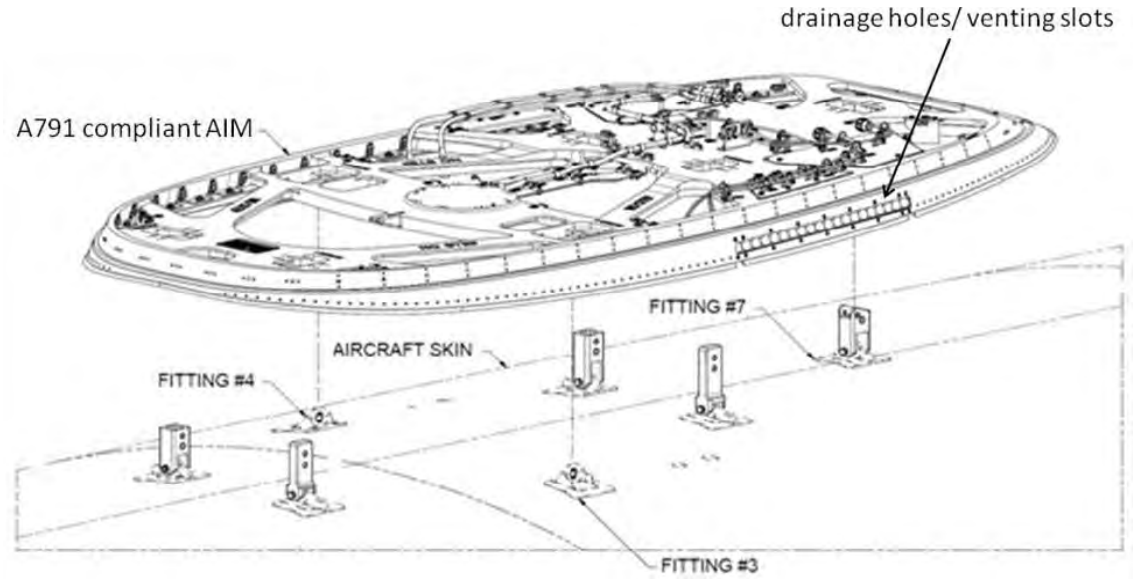

Figure 4-3. AIM Assembly Placement on Aircraft

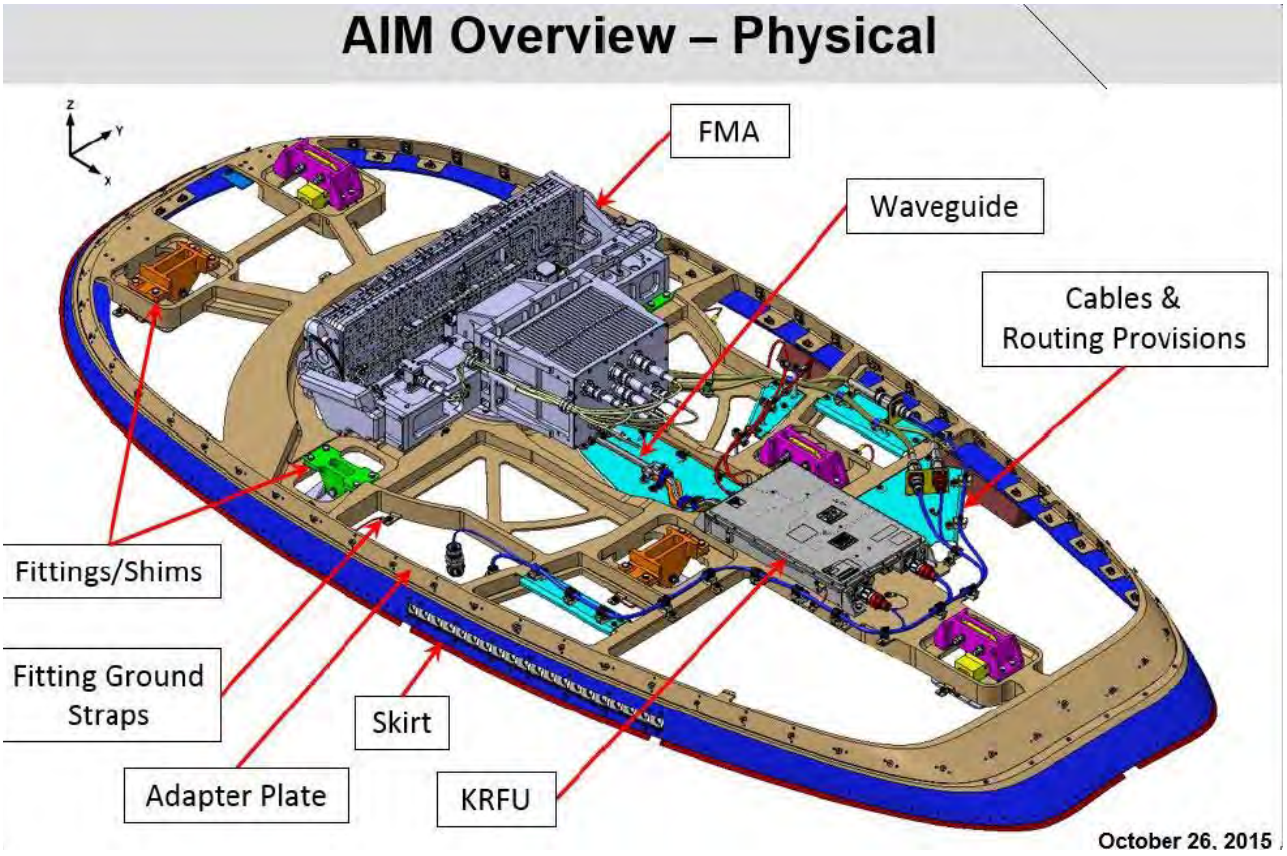

Figure 4-4. A791 Based AIM Assembly with FMA and KRFU Placement on Aircraft

4.5 Installation Guidelines for the LAIM (If applicable)

NOTE: Please see Figure 4-33 LAIM outline and installation drawing, 90404861, for installation details.

The installation sequence suggested for mounting the LAIM is as follows:

- Install the LAIM and radome skirt fairing bonding straps.
- Install the LAIM to the aircraft fuselage.
- Install the radome skirt fairing.

A. Install the LAIM and Radome Skirt Fairing Bonding Straps

(1) Before mounting the LAIM assembly onto the aircraft, install bonding straps to aircraft fittings. There are eight bonding straps. Six of the bonding straps are installed between the bonding points and the radome skirt fairing. Two bonding straps are installed between the bonding points and the LAIM structure.

(2) Refer to the airframe specific kits and assembly drawings for fastener details.

B. Install the LAIM to the Aircraft Fuselage

(1) Put the LAIM assembly onto aircraft install location. Refer to Figure 4-5 for a generic LAIM installation on airframe structure.

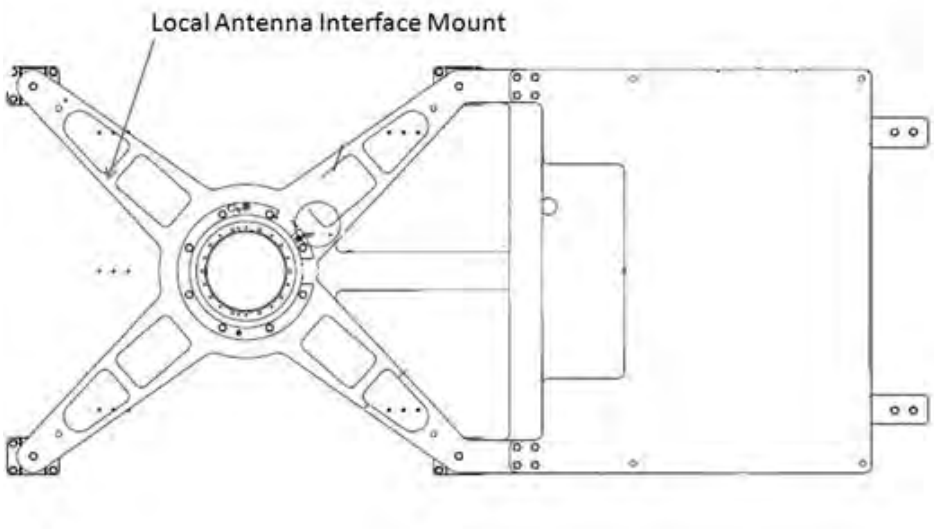

Figure 4-5. LAIM Assembly

(2) The LAIM gets attached to aircraft structure at six machined fitting locations. Forward four fittings each have four attachment points, through the aircraft skin to the intercostals. The two aft fittings each have four attachment points through aircraft skin to the stringer rivet hole locations. Machined brackets will get attached to intercostals with fasteners.

(3) Refer to the airframe specific kits and assembly for fastener specifications to install LAIM to aircraft.

C. Install the Radome Skirt Fairing

(1) Put the radome skirt fairing assembly onto the aircraft. Refer to the airframe specific kits and assembly for fastener specifications to install radome skirt fairing assembly to aircraft. Figure 4-6 shows the radome skirt assembly along with LAIM.

(2) The skirt fairing assembly is mounted to the aircraft with fasteners through the outer flange. The skirt fairing does not have holes pre-drilled in the flange. The determination of location and number of holes for the installation is the responsibility of the installer. Internal aircraft structure to accept the skirt fairing fasteners is also the installers responsibility.

NOTE: Consult airframe manufacturer for choosing the correct torque values.

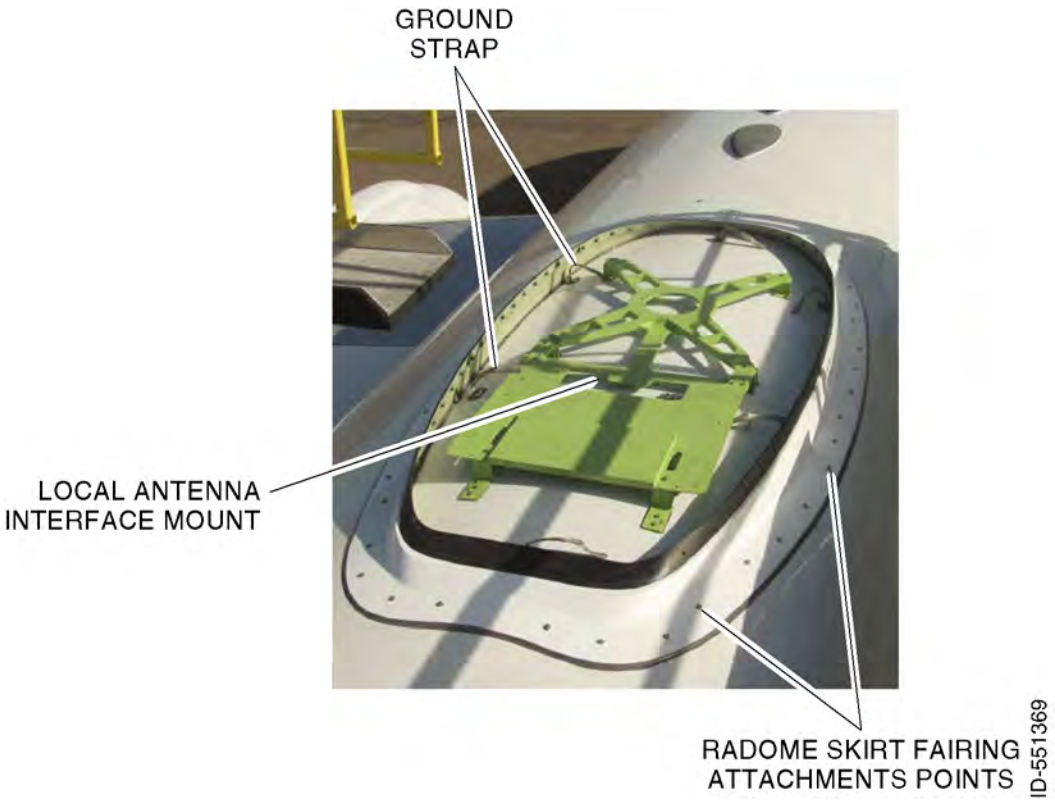

Figure 4-6. Radome Skirt Fairing and LAIM Assembly Position on Aircraft

4.6 KRFU

A. General

(1) There are no special tools, fixtures, or equipment required for the installation of the KRFU.

(2) The TX path interconnect loss between the KRFU and the FMA must not exceed 1.5 dB. The loss is from KRFU flange to antenna flange.

B. KRFU Thermal Pad Kit

(1) The thermal pad kit, PN SCD-90402388, is intended to provide a conduction interface between the bottom surface of the KRFU conduction units of two configurations, PN 90401203 and PN 90402346, and airplane cold plate or mounting panel. Before mounting units on the airplane, the thermal pad must be installed on the units.

(2) Kit Contents

(a) The thermal pad kit, PN SCD-90402388, contains the parts identified in Table 4-4.

Table 4-4. Thermal Pad Kit Contents

PN	Description	Quantity
MPW0000118	Thermal pad, conduction, 60 Mil T-Flex Ka airborne, Part 1	1
MPW0000122	Thermal pad, conduction, 60 Mil T-Flex Ka airborne, Part 2	1

(3) To install the thermal pad, refer to document Thermal Pad K, GXA KRFU Conduction SCD-90402388. It can be found at Jetwave Customer Support .

NOTE: The configuration of the mounting feet shown in Figure 4-7 is representative only and may not be the exact configuration for all KRFUs.

Figure 4-7. KRFU Thermal Pads

CAUTION: **THE THERMAL PAD OPAQUE PROTECTIVE BACKING MUST BE REMOVED FROM BOTH THERMAL PADS BEFORE USE IN THE FINAL APPLICATION. FAILURE TO DO SO CAN RESULT IN PREMATURE SHUTDOWN OF THE KRFU DUE TO OVERHEATING.**

(b) Immediately before installing the KRFU into the aircraft, remove white opaque protective backing on both pads to expose the non-tacky side of the thermal pad.

NOTE: If the KRFU unit is to be shipped or stored before installation, do NOT remove the white opaque backing on the thermal pads.

NOTE: Honeywell does not recommend applying the thermal pad to the KRFU if the KRFU is to be shipped or stored. KRFU thermal pad installation should be done shortly before actual KRFU installation.

C. KFRU - Waveguide/coax RF Losses

A waveguide is typically used for the KRFU to OAE RF TX connection. The waveguide run should include a short length of seamless flexible waveguide along the routing to accommodate tolerances. The waveguide must have mounting points to interface to the attachment points provided.

NOTE: A coax cable can be used in the place of the waveguide as long as the maximum insertion loss allowable for the KRFU to OAE RF TX connection is not exceeded.

The requirements for waveguide installation vary for each aircraft.

NOTE: Make sure the waveguide is connected before powering the KRFU. Always connect J1 last and disconnect J1 first (J1 contains the A/C power).

Refer to Figure 4-27, Figure 4-28, and Figure 4-29 for outline and installation information. Refer to Figure 4-34 thru Figure 4-37 for the applicable interconnect diagram.

The TX path interconnect loss between the KRFU and the TMA must not exceed 0.6 dB.

The RX path interconnect loss between the KRFU and the TMA must be a minimum of 0.5 dB, and not exceed 2 dB.

The RX path interconnect between the KRFU and the FMA must not exceed 2.9 dB.

NOTE: RX connection requires a transition from coax to WR42 at the KRFU.

Honeywell recommends that a WR42 to coax adapter is put at the KRFU end of the cable.

D. KRFU - Thermal Conduction Path

The transmit operation of the AES is muted if the conduction-cooled KRFU is installed under the radome and its temperature exceeds the temperature indicated in the outline and installation drawings. Refer to Figure 4-27 thru Figure 4-29.

The conduction-cooled KRFU is dependent on heat conduction through its base to a thermally conductive path in order to minimize the KRFU temperature. Conduction to the aircraft mounting plate is dependent on proper installation of the KRFU thermal pad. The outline and installation drawings in Figure 4-30 thru Figure 4-32 provide detailed thermal pad installation instructions.

If the shutdown temperature is exceeded, a low-power mode (non-RF communicating) is entered until the temperature reduces to approximately 10° below the shutdown temperature. Refer to Figure 7-3 for the temperature status report.

NOTE: When the aircraft is on the ground and the AES is transmitting, and the ambient outside temperature is very hot, then the mounting plate temperature can be exceeded. The exact outside air temperature and operating conditions are installation dependent. Consult with your hardware supplier for further details.

The KRFU must be electrically bonded to the airframe through contact with the base of the unit as follows:

- At least one of the four mechanical attachment points must be used for electrical bonding.
    - Make sure that the mating surfaces are free from contaminants such as paints or other non-conductive elements.
- A circular or elongated conductive areas are provided around two or more of the mounting holes of the equipment base plate.
- The KRFU includes bonding measuring points on the chassis bosses which are not used for mounting feet.

The KRFU bonding resistance measured from the measuring point and the surface upon which the unit is mounted, must be less than 2.5 mΩ.

The KRFU bonding and KRFU interconnection details from and to either the TMA or FMA are detailed along with the TMA or FMA installation instructions in subsequent sections.

E. KRFU/Waveguide Installation

(1) KRFU Installation Location with the FMA (if applicable)

(a) The KRFU install location is airframe specific.

(b) The KRFU can be installed inside the aircraft or external to the aircraft under the radome. Honeywell recommends that the KRFU is installed external to the aircraft, under the radome.

(c) When the KRFU is installed under the radome the conduction cooled variant must be used. This variant achieves cooling through its base plate and must be installed with the provided thermal pad to ensure a good thermal path between the KRFU and the AIM or LAIM. Refer to KRFU, before you install the KRFU LRU.

(d) When the KRFU is installed inside the aircraft either the conduction cooled or forced air cooled variant may be used.

(e) The KRFU must be installed close to fuselage mount antenna assembly so as to minimize the waveguide/coax RF losses on the RF interconnect. Refer to Paragraph 4.6.C

4.7 Fuselage Mount Antenna (If applicable)

A. Introduction

The OAE FMA assembly will be installed on the top of the fuselage of the aircraft. For the JetWave™ system to correctly point the antenna, the installation offsets should not exceed more

than 1° off heading, pitch or roll with respect to principle axis of aircraft. Depending on the airframe, as part of the OAE FMA, the LRUs and assemblies that follow will be installed outside aircraft:

- FMA LRU
- KRFU LRU (if installed outside aircraft)
- Radome assembly
- ARINC 791 based AIM or the LAIM
- Radome skirt fairing.
- ARINC 791 OAE installation kit (optional, for ARINC 791 installs only)

The exact install location of the ARINC 791 based AIM or LAIM and KRFU is airframe specific.

The KRFU can be installed on the inside or outside the fuselage of the aircraft. Honeywell recommends to install the KRFU on the ARINC 791 based AIM or LAIM outside the fuselage of the aircraft.

The radome, skirt fairing, and FMA/KRFU to aircraft interface brackets are airframe specific and said details are not covered by this manual.

NOTE: The ARINC 791 AIM is intended to be a common design solution across multiple aircraft platforms. The only variable is the skirt and seal that change with the aircraft specific fuselage contour.
or
The non ARINC 791 design has a common LAIM plate that is intended to be used across all platforms. The variables in this design solution are the ring fairing that the radome attaches to and the LAIM to fuselage interface brackets. The ring fairing is a design and shape specific to the fuselage contour at the aircrafts installation location, as are the LAIM to fuselage interface brackets.

Refer to the FMA outline and installation drawing in Figure 4-31, the KRFU outline and installation drawings in Figure 4-27, Figure 4-28, and Figure 4-29, and the radome outline and installation drawing in Figure 4-32. Depending on the aircraft configuration, refer to the interconnect diagrams in Figure 4-35 for the KRFU installed inside the fuselage, and Figure 4-36 or Figure 4-37 for external KRFU.

Refer to Table 4-5 for special tools, fixtures, and equipment for the FMA installation.

Table 4-5. Special Tools for FMA Installation

Number	Description	Source
NA	Hoist system	Commercially available
NA	Torque wrench	Commercially available
066101	5/16” crowsfoot spanner/wrench	Mountz (CAGE: 0HL78)

B. The FMA Installation General

Before installing any components or cabling, read all notes on drawings and read all installation procedures.

C. Advisories

The JetWave™ FMA and the KRFU subsystems include components that radiate RF and microwave emissions in the band between 29.0 and 30.0 GHz.

All service technicians and operators must be informed of the potential hazards of RF and microwave radiation. When installing and servicing equipment, exercise the safety precautions that follow.

WARNING: THIS EQUIPMENT RADIATES HIGH FREQUENCY RADIATION AND POSES A RADIATION HAZARD. CONSIDERING THE WORST CASE CONDITION OF 100 PERCENT REFLECTION FOR THE FUSELAGE MOUNT ANTENNA, HONEYWELL DEEMS IT NECESSARY TO ASSURE OEM FUSELAGE ATTENUATION EXCEEDS 21.03 DB FOR FUSELAGE MOUNTED ANTENNAS SYSTEM INSTALLATION. THIS IS THE MINIMUM ATTENUATION REQUIRED FROM THE AIRCRAFT FUSELAGE TO ATTENUATE THE KA-BAND RADIATION TO MEET A SAFE HUMAN EXPOSURE OF 1 MW/CM^2 INSIDE THE AIRCRAFT.

WARNING: SERVICE TECHNICIANS AND OPERATORS MUST EXERCISE CARE TO KEEP CLEAR OF THE ANTENNA'S BEAM WHILE PERFORMING OPERATIONAL TESTS OR INSTALLATION VERIFICATION PROCEDURES. DO NOT APPROACH WITHIN 66.6 FEET (20.3 METERS) OF THE FUSELAGE MOUNTED ANTENNA ASSEMBLY DURING RADIO FREQUENCY TRANSMISSION.

WARNING: DURING ANTENNA OPERATION (TRANSMISSION), MAKE SURE THAT MINIMIZE THE EXPOSURE OF ALL PERSONNEL TO ANY REFLECTED, SCATTERED, OR DIRECT BEAMS.

WARNING: SERVICE TECHNICIANS MUST OBEY STANDARD SAFETY PRECAUTIONS, SUCH AS WEARING SAFETY GLASSES, TO PREVENT PERSONAL INJURY WHILE INSTALLING OR PERFORMING SERVICE ON THIS UNIT.

CAUTION: THE FUSELAGE MOUNT OAE ASSEMBLY IS ELECTROSTATIC-SENSITIVE. STANDARD ELECTROSTATIC-SENSITIVE HANDLING PROCEDURES MUST BE OBSERVED.

D. Unpacking and Inspection

This section describes how to make sure that the equipment is in good condition after shipping. To unpack and inspect the equipment do as follows:

(1) Unpack the equipment components from the shipping container.

(2) Make sure that all components of the fuselage mount OAE subsystem as indicated on the parts list/bill of materials are included.

(3) Visually examine the units for any shipping damage.

NOTE: Refer to Section 4.10 Inspection of Waveguide.

E. FMA Installation Kits

FMA installation kits are available in ARINC 791 Style configurations and non ARINC 791 style configurations. See Table 4-6 and Table 4-7 for details on available installation kits for each configuration.

For the ARINC 791 configuration; the seven aircraft side fittings, internal structural modifications, internal wiring, and bulkhead connectors are the responsibility of the installer.

For the non ARINC 791 configuration; the LAIM to fuselage interface brackets, skirt fairing attach points, internal structural modifications, internal wiring, and external OAE power and control and IF coax interconnects and routing hardware, are the responsibility of the installer.

Table 4-6. Special Tools for FMA Installation

Number	Description	Source
NA	Hoist system	Commercially available
NA	Torque wrench	Commercially available
066101	5/16” crowsfoot spanner/wrench	Mountz (CAGE: 0HL78)

Table 4-7. Non ARINC 791 Style Installation Kit

Radome Package 90400016-YYY	RF component Kit 90404243-01
Radome	Waveguide
Radome hardware kit	Rx coax
LAIM kit	WR42 to coax adapter
Skirt fairing	O-rings
	Waveguide and adapter screws

F. Airframe Structural Modifications

For the installation of OAE-FMA, structural modifications to the airframe may be required in the region where the OAE-FMA is to be mounted to accommodate the additional mass of the antenna assembly and resulting aerodynamic loads.

The aerodynamic loads are dependent on the aircraft type as well as the installation location of the OAE-FMA on the aircraft, and are therefore installation specific.

Bird strike and rapid decompression need to be considered for analysis and structural substantiation.

The appropriately qualified personnel should derive the loads and do a structural analysis to make sure of the suitability of the modifications.

The installer is responsible for all structural modifications to the aircraft.

G. Mounting Guidelines

This section describes the mounting guidelines for fuselage mount OAE.

Physical Placement:

The aircraft fuselage mount OAE is installed on top of the fuselage for clear satellite communications per ARINC791 P1-2.

Figure 4-8 shows a typical installation location for the fuselage mount OAE on an aircraft.

The FMA may be installed anywhere on the top of the aircraft, Honeywell recommends not installing the FMA at the mid fuselage station near the wing or slightly aft of the wing due to higher aero loads.
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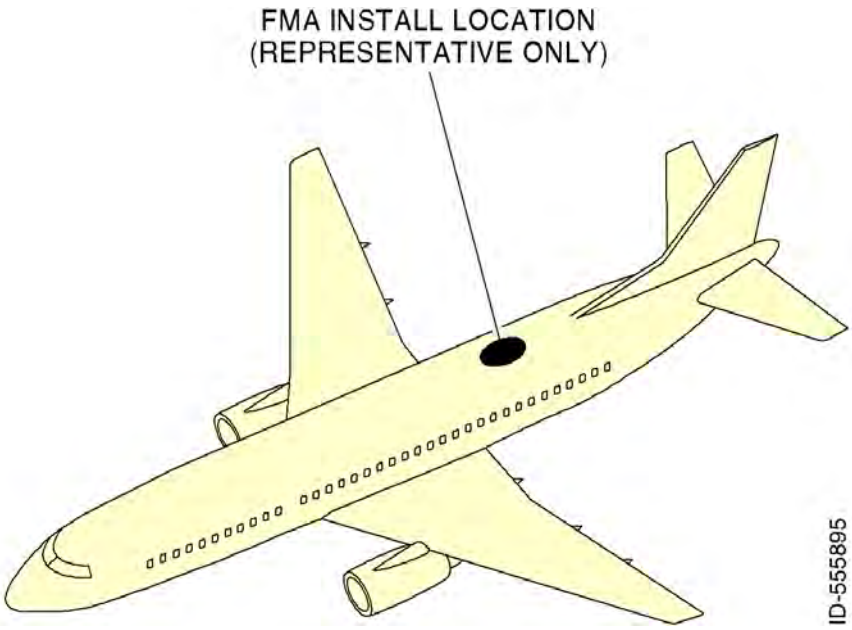

Figure 4-8. FMA Install Location

The fuselage antenna assembly and KRFU (if installed outside the aircraft) will be mounted on the antenna interface mount and it supplies a means to secure all equipment and wiring mounted on it.

Depending on the airframe, the AIM/LAIM is installed to provide a firm flat base for installation of the FMA and KRFU. These are detailed in the next sections. For customers who want to build their own AIM, please reference the third-party OAE specification, SP-90405087.

H. FMA Bonding

The bonding straps are installed before proceeding with installation of FMA assembly on the A791 based AIM or LAIM.

The FMA assembly and KRFU must be bonded to the airframe.

Consult the airframe manufacturer for the correct torque values.

I. FMA Installation Procedure

Following installation activities are detailed in subsequent sections:

- Installation of the FMA.
- Connecting the waveguide, RF coax interface to the FMA.
- Installation of KRFU and bonding straps.
- Installation of waveguide and coax between FMA and KRFU.

- Connecting Bulkhead Interface, KRFU power and control interfaces.
- Position and installation of radome.

(1) Installation of the FMA Assembly

(a) Align the FMA assembly above adapter plate with an aircraft service hoist. Attach hoist to the FMA lifting fixture at two locations on each side of fixture. Refer to Figure 4-9.

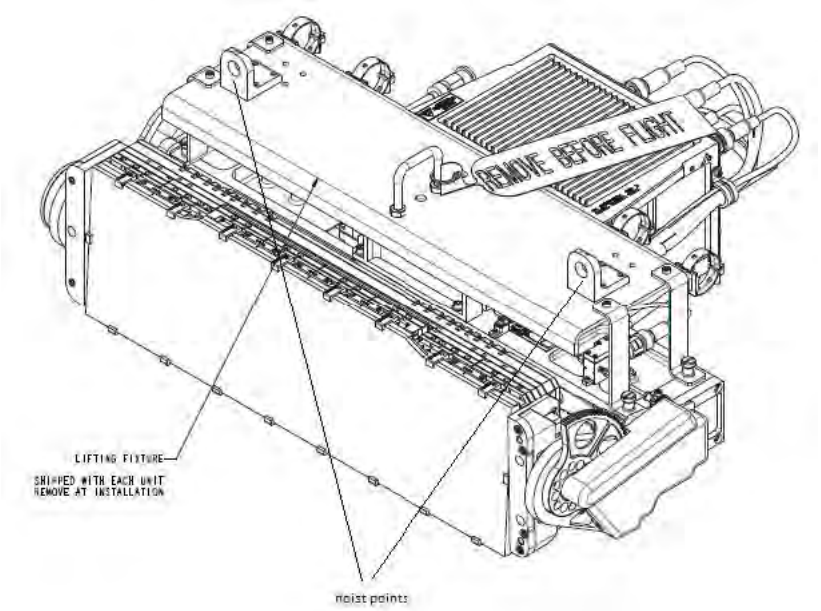

Figure 4-9. FMA Assembly

(b) Put the FMA onto the FMA mounting holes with alignment pins and make sure that the waveguide flange is pointed to the rear of the AIM or LAIM. Make sure that the pigtails do not interfere to avoid damage.

(c) Remove the FMA lifting fixture. Refer to Figure 4-10.

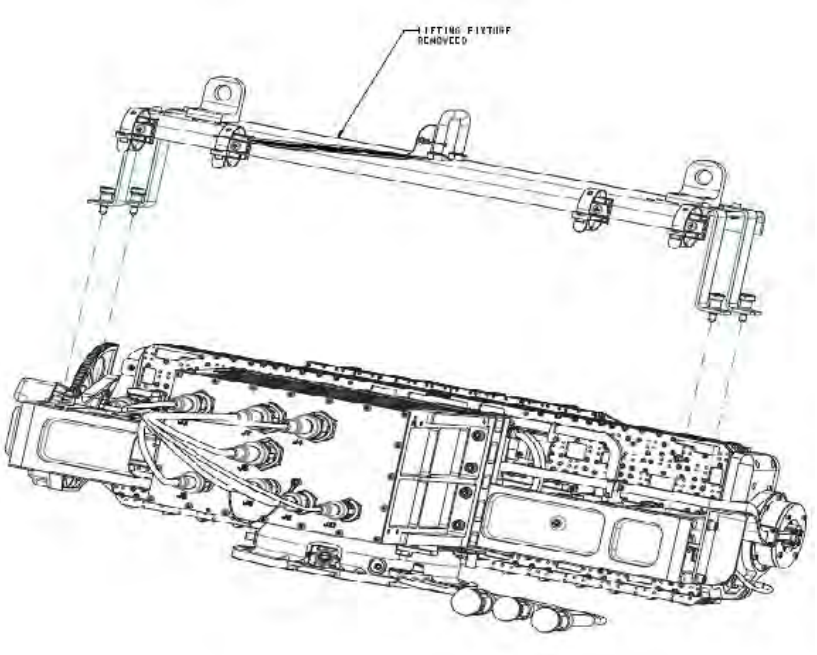

Figure 4-10. FMA Assembly Lifting Fixture Removal

(d) The orientation of the FMA assembly is defined with respect to the principal axes of the aircraft.

(e) Attach the FMA to the AIM with screws and flat washers. The AIM is provisioned with captive nuts. Refer to the airframe specific kits and assembly for fastener specifications and required torque. Mounting holes in base are accessed from the top between the antenna and turntable by rotating the assembly in azimuth.

(f) Remove protective cap from disconnect plug on harness.

1 Visually inspect connector and make sure that there are no debris in cavities.

2 Visually inspect the center conductor and verify that it is still straight and the finish is intact.

(2) FMA Bonding Requirements

(a) Install one end of bonding straps to AIM at labeled bonding points with screw and washers.

(b) Install the other end of bonding straps to bonding points on the FMA base. Refer to the airframe specific kits and assembly for fastener specifications and required torque. Refer to Figure 4-1 for the FMA ground strap connection.

(3) Waveguide and RF Coax Interconnection to FMA Assembly

(a) A common RF component kit exists for each installation type. The ARINC 791 style installation uses PN 90404243-02. The non ARINC 791 style installation uses PN 90404243-01. Installation drawings specific to each kit are available.

Remove protective cap on FMA J4 (2.92 mm female coax) and FMA J3. Connect K-type disconnect plug to K-type disconnect receptacle J4 on the FMA and torque to 7 in-lb (0.79 Nm) or as specified by the cable manufacturer. Connect the WR34 waveguide assembly to the FMA receptacle J3.

(4) Installation of the Waveguide and Coax Interconnect between the FMA and Externally Mounted KRFU

(a) Loosely attach the waveguide and coax support brackets to the AIM or LAIM. The flexible wave guide and coax cable assembly kit and its routing are aircraft specific.

(b) Remove the protective covers from the FMA J3 RF TX. Visually examine connector ends and make sure that there is no debris in the cavities.

(c) Loosely connect the WR34 flexible waveguide to the FMA J3 waveguide flange with sealing gasket. Hand tighten the fasteners.

(d) Loosely attach the waveguide and coax support brackets to the AIM or LAIM.

(e) Loosely connect the WR34 to WR28 waveguide adapter to the KRFU with sealing gasket. Apply torque to the waveguide adapter flange for all fasteners as recommended.

(f) Loosely connect the waveguide assembly to the KRFU with a sealing gasket. Make sure the O-ring is seated correctly in the KRFU TX waveguide flange when mating the waveguide as there is no retaining mechanism. If maintenance is conducted which requires uncoupling the waveguide from the KRFU TX port, inspect the flange for dirt or debris and O-ring for damage or if it is misshapen. If required, replace the O-ring and clean the waveguide flange interfaces.

(g) Apply torque to the KRFU waveguide flange for all fasteners as recommended.

(h) Firmly attach waveguide support brackets to adapter plate.

The minimum allowable bend radius to the center line for flexible waveguide is 1 inch (25.4 mm) in H plane (bend along the long axis of the waveguide) and 0.5 inch (12.7 mm) in E plane (bend along the short axis of the waveguide). The minimum allowable bend radius for the coax cable is 0.25 inch (6.35 mm). Refer to Figure 4-11.

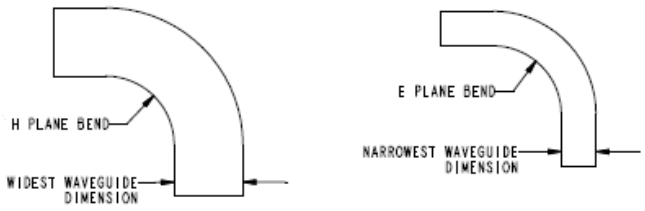

Figure 4-11. View of H Plane and E Plane Bends

(5) Connecting the FMA Interface, KRFU Power, and Control Interfaces

The control signals for the KRFU are supplied from the KANDU and are connected to KRFU J2 receptacle.

The 115 VAC power supply for the KRFU is supplied from the aircraft power and is connected to KRFU J1 receptacle.

The IF TX and IF RX signals to KRFU are supplied from the Modman. These signals are routed through the bulkhead interface. Refer to the appropriate FMA interconnection diagram Figure 4-35, Figure 4-36 and Figure 4-37 for details.

(a) Remove the protective covers from the FMA P2 and KANDU J2 receptacles. Visually examine the connectors and make sure that the pins are straight and undamaged.

1 Clean the connectors with the contact cleaner and connect the cable assembly for fuselage mount from the KANDU J2 receptacle to the FMA P1, P2, and P3 receptacles.

2 Make sure that the over braid of the cable assembly is terminated to connectors at both the FMA and KANDU ends.

(b) Remove the protective covers from the KRFU J2 and KANDU J3 receptacles. Visually examine the connectors and make sure that the pins are straight and undamaged.

1 Clean the connectors with the contact cleaner and connect the cable assembly for fuselage mount from the KANDU J3 receptacle to the KRFU J2 receptacle.

2 Make sure that the over braid of the cable assembly is terminated to connectors at both the KRFU and KANDU ends.

(c) Remove the protective covers from the KRFU J5 and KRFU J6 receptacles. Visually examine the connector ends and ensure there is no debris in central connector cavity.

1 Clean the connectors with the contact cleaner before connecting.

2 Make sure that the TX-IF coax cable is banded blue and RX-IF coax cable is banded green at connector ends.

3 Make sure that the over braid of the cable assembly is terminated to connectors at both the KRFU and bulkhead interface feed through ends.

4 The over braid can be terminated to the connector shield/housing or directly to the housing.

(d) Make sure that all the cable assembly routing are firmly held with wire clamps in accordance with the airframe specific wiring diagram and there are no obstruction to the free movement of the FMA. Refer to Figure 4-4 for the A791 based AIM and Figure 4-12 for the LAIM.

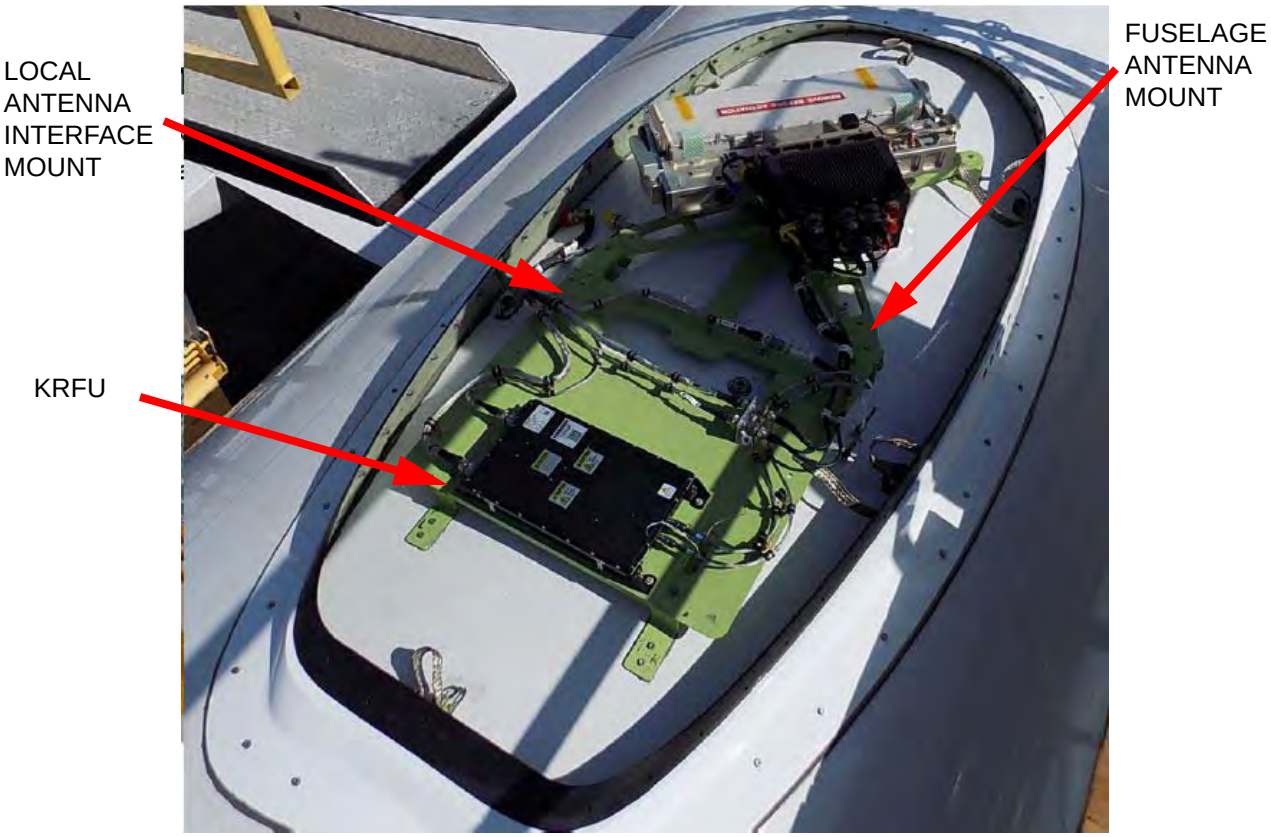

Figure 4-12. LAIM Assembly with FMA and KRFU Placement on Aircraft

On completion of the LRU interconnection and applying power to the FMA, the FMA will stay in its current position until it is told to move by the KANDU.

(6) KRFU Installation Location with the TMA (if applicable)

The KRFU install location at the top of aircraft tail empennage is airframe specific.

The KRFU can be installed either forward or aft of the tail mount antenna assembly. The KRFU can also be installed in any orientation as long as space permits, interconnection routing is feasible, and adequate thermal conduction path is maintained. Antenna blockage analysis/review should be carried out to ensure that acceptable system performance is maintained.

The conduction cooled KRFU variant requires mounting of the Honeywell recommended thermal pad to aircraft structure capable of handling KRFU thermal loads. Refer to Paragraphs 4.6.A, 4.6.B and 4.6.C.

The forced air cooled KRFU variant may be used as an alternate installation option. A duct and in line fan may be used to drawn hot air from the KRFU integrated heat sink and duct it down to lower sections of the tail/empennage structure.

The KRFU must be installed close to the TMA assembly so as to minimize the waveguide/coax RF losses on the RF interconnect.

It is recommended to use flexible waveguide/coax RF interface and with interconnect losses not exceeding 0.6 dB on the transmit path and stay within 0.5 to 2 dB on the receive path between the KRFU and the TMA assembly.

The typical KRFU LRU and TMA assembly (swept volume model of antenna shown) interconnect arrangement is shown in Figure 4-13.

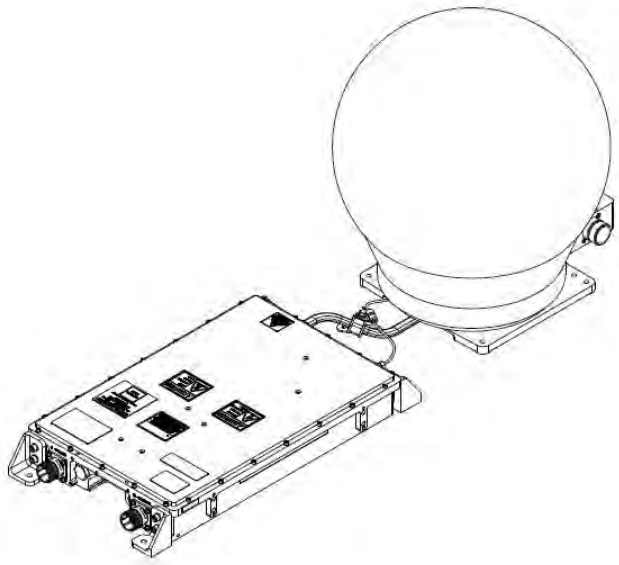

Figure 4-13. KRFU and TMA Interconnect Arrangement

(a) TMA Bonding Requirements

The ground straps are installed before proceeding with installation of the TMA assembly on the antenna adapter plate or on the tail empennage airframe structure. The TMA assembly and KRFU must be bonded to the airframe.

Consult the airframe manufacturer for the correct torque values.

(b) OAE TMA Installation Procedure

Before doing any installation procedures, the installer must read and be aware of the safety advisories listed in this manual. Only authorized technical personnel who are trained in general aviation workmanship and have a basic understanding of satellite communication systems should proceed with the following installation procedure.

1 Connecting the Tx waveguide and RF Rx coax interfaces to the TMA per Step (c).

2 Positioning and installation of the TMA assembly onto tail tip antenna slot/antenna interface mount; installation of bonding straps per Step (d).

3 Installation of the KRFU and bonding straps per Step (e).

4 Installation of the waveguide and coax between the TMA and KRFU per Step (f).

5 Connecting the TMA interface, KRFU power, and control interfaces per Step (g).

6 Position and installation of the radome per Step (h).

(c) Waveguide and RF Coax interconnection to Tail Antenna assembly

The waveguide and RF coax interconnect designs are aircraft specific. Consult aircraft specific SDIM for detailed installation instructions.

NOTE: The waveguide and RF coax shall be connected to the TMA prior to installing the TMA to the aircraft.

1 Remove the protective covers from the Rx coax, waveguide, TMA J4 RF RX port, and TMA J3 RF TX port. Visually inspect waveguide and connector ends and make sure that there is no debris in the cavities.

2 Connect the Rx coax cable connector to the TMA J4 port. Torque to 8 to 9 lbf in (0.904 to 1.017 Nm). Route the coax cable under the provided strain relief bracket as required. In some cases the coax strain relief bracket is a stand alone part and in others it is integral to the waveguide secondary flange.

3 Connect the WR28 flexible waveguide to TMA J3 waveguide flange with the correct o-ring (Honeywell PN MS29513-013). Torque Honeywell recommended fasteners (Honeywell part number 90403559) per the aircraft specific Honeywell installation drawing.

4 Attach the waveguide secondary flange to the bottom of the TMA using the Honeywell recommended fasteners (PN MS51957-27 screw, with NAS620C6 flat washer). Torque per the aircraft specific Honeywell installation drawing. Ensure that the coax cable is not pinched when securing the waveguide secondary flange (if it has integrated coax strain relief feature).

(d) Installation of the TMA Assembly

1 Carefully position the TMA assembly to the mounting bracket/tail structure by aligning the TMA mounting clearance holes with the threaded attachments on the aircraft mounting side. As an option, the TMA mounting bracket/tail structure may be designed to integrate alignment pins that will mate with the alignment hole and slot on the base of the TMA (see outline and installation drawing for details). For the JetWave™ system to correctly point the antenna, the installation offsets should not exceed more than 1° off heading, pitch or roll with respect to principle axis of aircraft.

2 Install and hand tighten #10 fasteners at the five mounting point locations. Fastener selection and fastener installation torque requirements are aircraft/installation specific and are the responsibility of the installer.

3 Connect the bonding strap to the TMA assembly. Refer to Figure 4-14 for the bonding strap location. Add bond joint sealant as required by installers specific standard operating procedures.

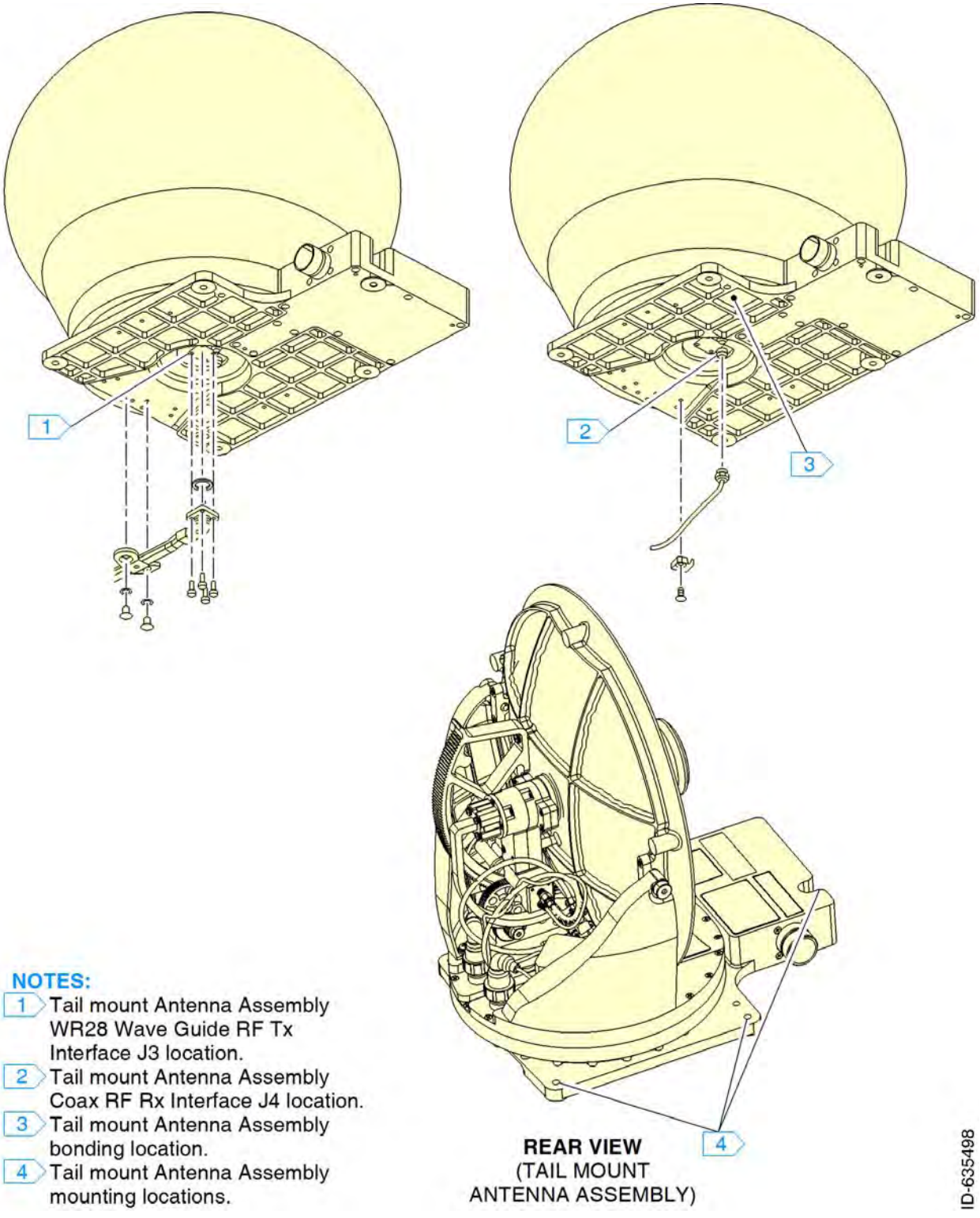

Figure 4-14. TMA RF TX J3 and RF RX J4 Interface Connector and Bonding Strap Locations

(e) KRFU Installation

1 Make sure that the thermal pads are attached to the bottom of the KRFU. Refer to Section 4.6. KRFU.

2 Before proceeding with the KRFU installation, connect the WR42 waveguide to 2.92 mm coaxial connector adapter to KRFU J4 RF RX.

a The adapter allows connection between the Rx WR-42 waveguide port on the KRFU and a 2.92mm coaxial connector.

b The WR42 waveguide side of the adapter has a mechanical flange interface with four 0.117 inch (2.97 mm) diameter through holes for mating with KRFU J4.

c The WR42 waveguide to 2.92 mm coaxial connector adapter is shown in Figure 4-15.

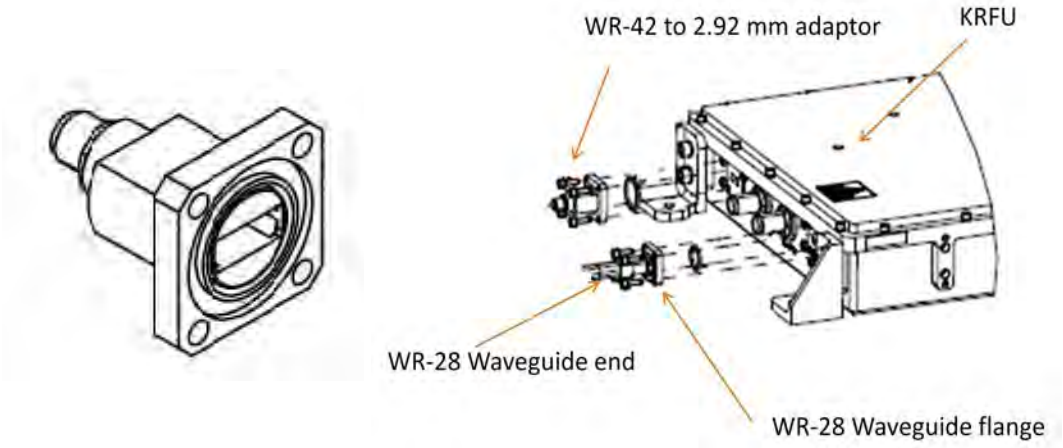

Figure 4-15. WR42 Waveguide to 2.92 mm Coaxial Connector Adapter

3 Remove the protective covers from the KRFU J4 and WR42 waveguide to 2.92 mm coaxial connector. Visually inspect connector ends and make sure that there is no debris in the cavities.

4 Install an MS29513-016 O-ring and mount the adapter onto KRFU J4 with four screws (recommended screw is Honeywell part number 90403559). Make sure the O-ring is seated correctly in the KRFU TX waveguide flange when mating the waveguide as there is no retaining mechanism. If maintenance is conducted which requires uncoupling the waveguide from the KRFU TX port, inspect the flange for dirt or debris and O-ring for damage or if it is misshapen. If required, replace the O-ring and clean the waveguide flange interfaces. Torque the four screws in an X pattern. Torque per Honeywell provided aircraft specific installation instructions. Do not use power tools to torque the screws.

5 Attach the KRFU assembly to the KRFU interface mount with fasteners and tighten. Selection of KRFU attachment fasteners are the responsibility of the installer Minimum torque recommended to compress the thermal pad is 22 in-lb (2.5 Nm). Minimum torque shall be validated by the installer for the attachment screws

selected. Apply torque to the fasteners in defined sequence for firmly mounting to the antenna interface mount or the tail structure of the aircraft. Do not use power tools to torque connection.

6 Install one end of the ground straps to the antenna interface mount or the tail structure plate at labeled ground points with screw and washers. Install bond connection joint sealant as required by installers standard procedures.

7 Install the other end of the ground straps to grounding points on the KRFU. The KRFU bonding strap arrangement is shown in Figure 4-16. Install bond connection joint sealant as required by installers standard procedures.

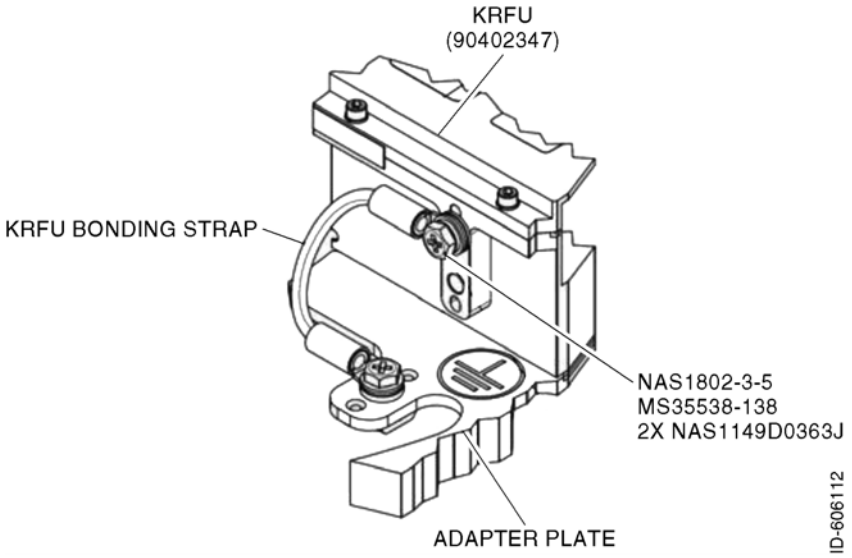

Figure 4-16. KRFU Bonding Strap Arrangement

(f) Installation of the Waveguide and Coaxial Cable Interconnect Between the TMA and KRFU

1 Support of the length of waveguide and coax cable between TMA and KRFU is aircraft specific. See aircraft specific installation procedures for details. Any support bracket connections would typically be done at this stage in the install.

2 Attach Tx waveguide flange to KRFU J3 port using recommended screws (Honeywell part number 90403559). Torque screws in X pattern per torque value in aircraft specific installation drawing. Prior to assembly, place o-ring PN MS29513-013 between the flange faces in waveguide o-ring groove

3 Complete any final installation requirements on waveguide and coax supports.

The minimum allowable bend radius to the center line for flexible waveguide is 1 inch (25.4 mm) in H plane (bend along the long axis of the waveguide) and 0.5 inch (12.7