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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 Class A Forced Air KRFU	90401028-001
JetWave™ System Class A Conduction Cooled KRFU, Version 1	90401028-002
JetWave™ System Class A Conduction Cooled KRFU, Version 2	90401028-003
JetWave™ System Class B Forced Air KRFU	90401027-001
JetWave™ System Class B Conduction Cooled KRFU, Version 1	90401027-002
JetWave™ System Class B Conduction Cooled KRFU, Version 2	90401027-003
JetWave™ System Class A Conduction Cooled KRFU, Version 2, FMA	90401027-004
JetWave™ System 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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ECCN: 7E994

Publication Number D201401000049, Revision 1

Initial 16 Jan 2015
Revised 16 Sep 2015

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

Document Number: D201401000049, Revision 1

16 Sep 2015

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TRANSMITTAL INFORMATION

TO THE 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 Class A Forced Air KRFU
90401028-002	JetWave™ System Class A Conduction Cooled KRFU, Version 1
90401028-003	JetWave™ System Class A Conduction Cooled KRFU, Version 2
90401027-001	JetWave™ System Class B Forced Air KRFU
90401027-002	JetWave™ System Class B Conduction Cooled KRFU, Version 1
90401027-003	JetWave™ System Class B Conduction Cooled KRFU, Version 2
90401027-004	JetWave™ System Class A Conduction Cooled KRFU, Version 2, FMA
90401027-005	JetWave™ System 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

This revision is a full replacement. All changed pages have a new date. Revision bars identify the changed data.

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.

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
All	Global Change: The editorial changes and data that were moved or reformatted are not identified with revision bars.	All
All	Global Change: Some paragraphs, tables, and figures have been renumbered and are not identified with revision bars.	All
All	Global Change: Added Component PNs 90401027-004 and 90401027-005.	All
All	Due to the extent and complexity of changes made in this revision, individual changes are not detailed and revision bars are not used.	All

RECORD OF REVISIONS

When revisions are received, insert revised pages, record the date, and initial.

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

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Subheading and Page	Date	Subheading and Page	Date
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A-11	*16 Sep 2015		
A-12	16 Sep 2015		
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B-2	*16 Sep 2015		
B-3	*16 Sep 2015		
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INTRODUCTION

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 INTRO-1 show non-ionizing radiation hazard, ESDS, and moisture sensitive devices.

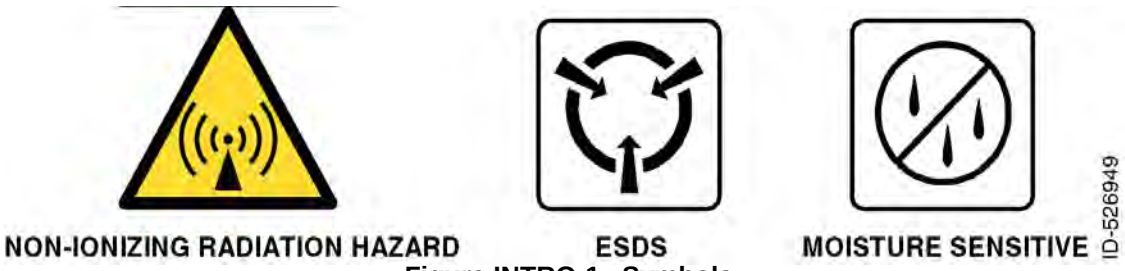

Figure INTRO-1. Symbols

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.

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.

3. Part Numbers

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

- 90401028-001 - JetWave™ System Class A Forced Air KRFU
- 90401028-002 - JetWave™ System Class A Conduction Cooled KRFU, Version 1
- 90401028-003 - JetWave™ System Class A Conduction Cooled KRFU, Version 2
- 90401027-001 - JetWave™ System Class B Forced Air KRFU
- 90401027-002 - JetWave™ System Class B Conduction Cooled KRFU, Version 1
- 90401027-003 - JetWave™ System Class B Conduction Cooled KRFU, Version 2
- 90401027-004 - JetWave™ System Class A Conduction Cooled KRFU, Version 2, FMA
- 90401027-005 - JetWave™ System Class A Forced Air KRFU, Version 2, FMA
- 90400017-XXX - A791 Radome Package
- 90400016-XXX - Non-A791 Radome Package.

4. Organization

This manual includes the following sections:

- 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 - JetWave™ system network performance data (MIB objects and SNMP traps)
- APPENDIX C - Installation information sheets
- APPENDIX D - Installation checklist
- APPENDIX E - Airframe specific information required for configuration.

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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:

- 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)
- H4/H8 CAGE Codes (available from DLA Logistics Information Services at http://www.logisticsinformationservice.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.

7. Precautions

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

CAUTION: 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.

CAUTION: 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.

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
BRS	business and regional aviation segment
BUC	block up-converter
C	Celsius
CAGE	commercial and government entity
CAT	commercial air transport
CBIT	continuous built-in test
CIR	committed information rate
cm	centimeter
CSU	cabin services unit
dB	decibel
DER	designated engineering representative
DHCP	dynamic host configuration protocol
DID	data item description
DNS	domain name system

List of Acronyms and Abbreviations (Cont)

Term	Full Term
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
IRU	inertial reference unit
ISDN	integrated services digital network
ISP	Inmarsat service provider or internet service provider

List of Acronyms and Abbreviations (Cont)

Term	Full Term
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
ms	millisecond
NA	not applicable
NEXT	near end cross talk
Nm	Newton meter
NMS	network management system
OAE	outside aircraft equipment
OID	object identifier
OMT	orthogonal mode transducer
Pa	pascal
PCU	position control unit
PIESD	passenger information and entertainment services domain

List of Acronyms and Abbreviations (Cont)

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
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

List of Acronyms and Abbreviations (Cont)

Term	Full Term
WOW	weight on wheels

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DESCRIPTION AND OPERATION

1. Overall JetWave™ System Architecture

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 1-1.

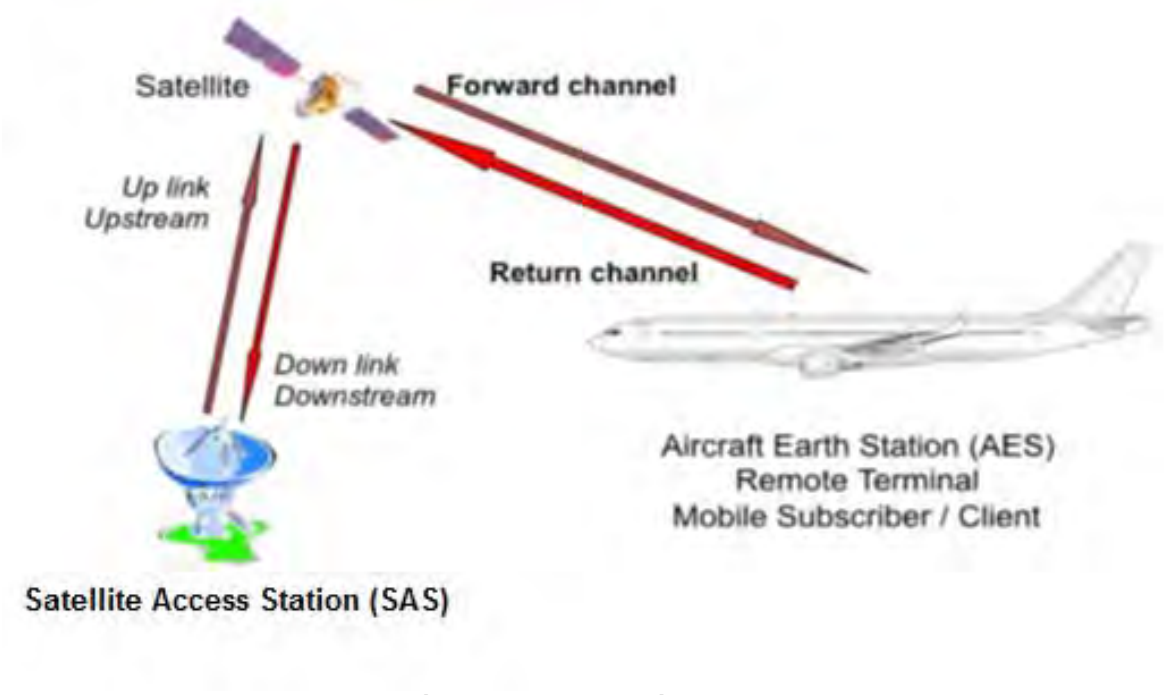

Figure 1-1. Ka-Band System

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 1-1..

Table 1-1. JetWave™ System LRUs

LRU	PN
Modman	90400012-0001

Table 1-1. JetWave™ System LRUs (Cont)

LRU	PN
APM	90401121
KANDU	90401566
KRFU CC1	90401203
KRFU CC2	90402346
KRFU	90401202
FMA	90000380-1
TMA	904000013-0001
A791 FM radome	90400017
Non-A791 FM radome	90400016

B. JetWave™ System LRU Leading Particulars

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

(2) Refer to Table 1-3 for the APM leading particulars.

(3) Refer to Table 1-4 for the KANDU leading particulars.

(4) Refer to Table 1-5 for the KRFU leading particulars.

(5) Refer to Table 1-6 for the TMA leading particulars.

(6) Refer to Table 1-7 for the FMA leading particulars.

(7) Refer to Table 1-8 for the B757 FMA radome perticulars.

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Table 1-2. Modman Leading Particulars

Characteristic	Specification
Length	14.41 inches (366.0 mm) maximum
Width	5.02 inches (127.5 mm) maximum
Height	7.88 inches (200.2 mm) maximum
Weight	14.00 pounds (6.4 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

Table 1-2. Modman Leading Particulars (Cont)

Characteristic	Specification
Cooling	48.5 lb/hr (22 kg/hr) at 104°F (40°C)
Operating temperature	5°F (-15°C) to 131°F (55°C)
Mounting information	4-MCU, forced-air, ARINC 600 series tray
Maintenance	No scheduled maintenance required
Interfaces	J1A - PODD, PIESD, and AISD J1B - APM, Aircraft, APM, PODD, PIESD, AISD, and KANDU J1C - IF to/from KRFU and aircraft power

Table 1-3. APM Leading Particulars

Characteristic	Specification
Length	4.50 inches (101.6 mm) without connector
Width	4.00 inches (79.8 mm) maximum
Height	1.3 inches (33 mm) maximum
Weight	12 ounces (0.34 kg) maximum
Operating voltage	5 VDC, 300 mA maximum, from the Modman
Power consumption	0.3 watts maximum
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 1-4. KANDU Leading Particulars

Characteristic	Specification
Length	11.02 inches (28 cm) maximum
Width	9.075 inches (23.05 cm) maximum
Height	4.76 inches (12.1 cm) 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

Table 1-4. KANDU Leading Particulars (Cont)

Characteristic	Specification
Power dissipation	50 watts Class A maximum average power 42 watts Class B maximum average power
Cooling	Cooling clearance is 2.0 inches (5.1 cm) above and 1 inch (2.54 cm) at the sides minimum No forced-air cooling required
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 1-5. KRFU Leading Particulars

Characteristic	Specification
Conduction-cooled 1 configuration:	
Length	16.55 inches (42.0 cm) maximum
Width	10.03 inches (25.5 cm) maximum
Height	2.08 inches (7.1 cm) maximum
Weight	11.30 pounds (5.1 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	150 watts maximum
Power dissipation	132 watts maximum
Cooling	Conductive-cooled through the baseplate with thermal pad
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
Conduction-cooled 2 configuration:	

Table 1-5. KRFU Leading Particulars(Cont)

Characteristic	Specification
Length	16.55 inches (42.0 cm) maximum
Width	9.01 inches (22.9 cm) maximum
Height	2.08 inches (7.1 cm) maximum
Weight	11.30 pounds (5.1 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	150 watts at maximum output power
Power dissipation	132 watts at maximum output power
Cooling	Conductive-cooled through the baseplate with thermal pad
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 (45.8 cm) maximum
Width	9.01 inches (22.9 cm) maximum
Height	3.23 inches (8.4 cm) maximum
Weight	14.6 pounds (6.6 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	150 watts at maximum output power
Power dissipation	132 watts at maximum output 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)
Maintenance	No scheduled maintenance required

Table 1-5. KRFU Leading Particulars(Cont)

Characteristic	Specification
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 1-6. TMA Leading Particulars

Characteristic	Specification
Length	13.38 inches (339.9 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 consumption	85 watts at maximum output power
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 1-7. FMA Leading Particulars

Characteristic	Specification
Length	23.03 inches (585 mm) maximum
Width	35.72 inches (907.3 mm), maximum reflector sweep volume
Height	9.40 inches (238.8 mm) maximum
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
Power consumption	160 watts maximum

Table 1-7. FMA Leading Particulars

Characteristic	Specification
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 1-8. B757 FMA Radome Leading Particulars

Characteristic	Specification
Length	95.472 inches (585 mm) maximum
Width	43.881 inches (907.3 mm), maximum
Height	11.892 inches (238.8 mm) maximum
Weight	53.5 pounds (24.27 kg) maximum

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 compliant to ARINC 791 standard.
- Class B satellite terminal: For use on BRS. This uses the compact TMA.

Both terminal types share the same core avionics, differing only in the antenna assembly. Each LRU in the system (APM, Modman, KRFU, KANDU, and OAE) is designed to work only with other Honeywell LRUs, not with third-party LRUs. Refer to Figure 1-2 for the JetWave™ system block diagram.

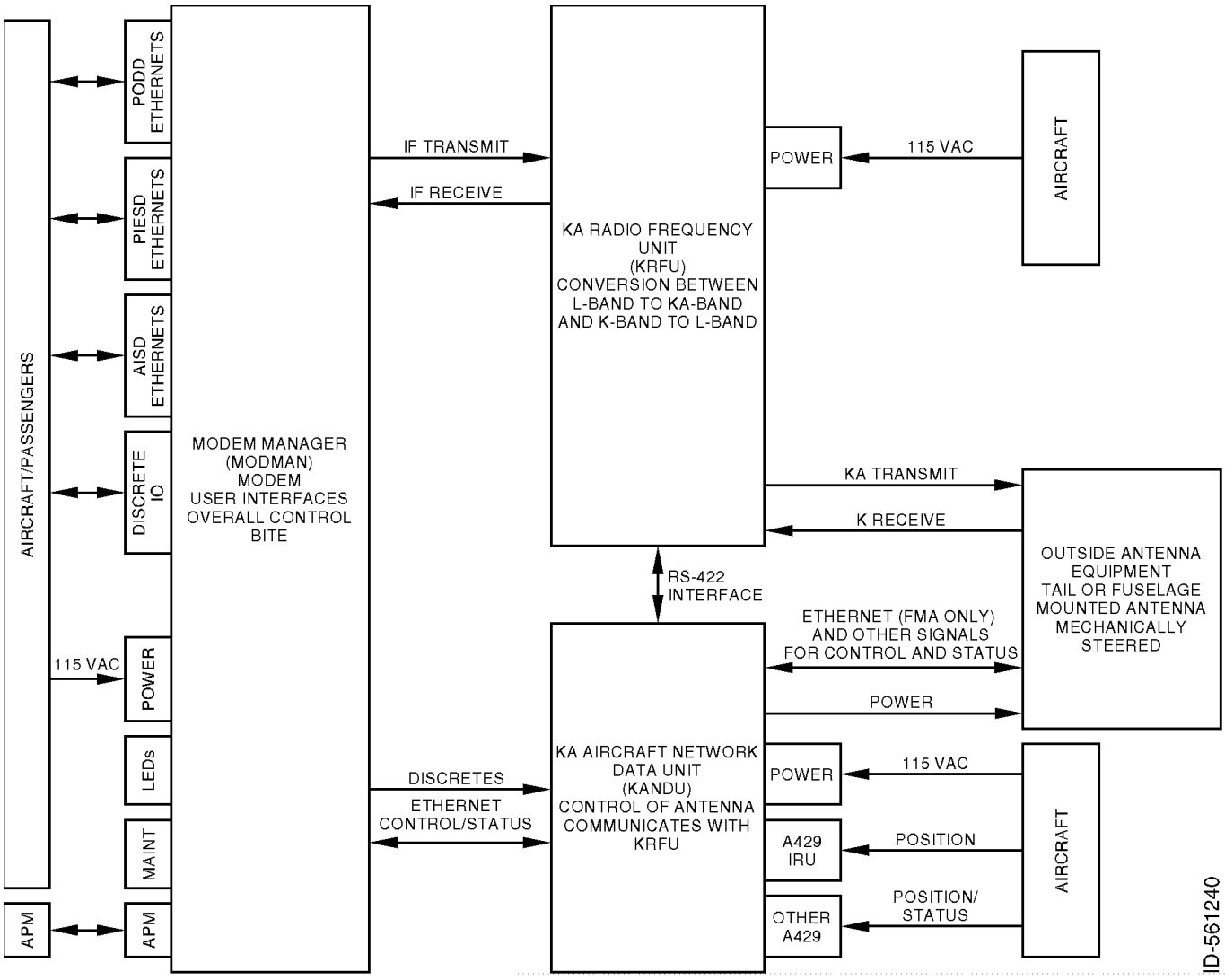


Figure 1-2. JetWave™ System Block Diagram

The JetWave™ system LRUs are as follows:

A. Outside Antenna Equipment

- The OAE is made up of a mechanically steered antenna:
  - Either fuselage mount or tail mount
  - Radome package.
- 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 INU to detect movement of the platform.
- The TMA or FMA accepts the transmit Ka-band signal from the KRFU for the antenna.
- The antenna K-band receive path is amplified by the LNA and sent to the KRFU by the TMA or FMA.
- 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 gyro position back to the KANDU.
- Radome packages are unique to each fuselage and can be made up of the kits that follow:
    - Radome kit
    - A791 compliant AIM or LAIM kit
    - Skirt fairing.

    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 (29-30GHz)
- An HPA increases 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.

- It 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 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.

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 429 TX mute between the Modman and the KANDU is not implemented (manufacturer specific RS422 signaling is used instead).
- Manufacturer-specific circuits 1 to 6 carry a BUC Mute signal, a Filter Select signal, and an 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).
- There are LED indicators on the front panel of the Modman to show status.

Refer to JetWave™ AES system Configuration, AES Configuration Data for the details of ARINC 429 labels required for the JetWave™ System.

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 continuous 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, Access system, 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, Access system, 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, Access System, 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. Additionally, LRUs individually provide ARINC 615A data loading via their configured ports. The APM and the KRFU do not support ARINC 615A data loading individually and are data loaded via the Modman and the KANDU, respectively. The system can exit to Data Load Mode when local data load discrete is asserted.

F. Commanded Mode

The system also provides a Commanded Mode of operation which may be initiated through the SNMP when the aircraft is on ground. This mode provides access to user initiated tests for system testing e.g. manual antenna alignment, initiating automatic antenna alignment, transmit cable calibration, manual antenna pointing to defined location, etc.

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.

INSTALLATION

1. Overview

A. JetWave™ System Components

The JetWave™ system includes five LRUs:

- Modman
- APM
- KANDU
- KRFU
- OAE - either a TMA or FMA.

NOTE: OAE equipment must be installed within an approved radome.

B. Installation Procedure Overview for the JetWave™ System

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

(1) Install adapter plate for the FMA. The adapter plates required for mounting the FMA are available in installation kits from various suppliers.

(2) The TMA is installed on the top ribs of the tail of the aircraft. In some cases an install bracket can be used.

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

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

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

(6) Apply power to the system.

(7) Do the post-installation checks.

(8) Test the system on the ground if local regulations permit.

2. Certification and Approvals

All antenna installations must be inspected and approved by an FAA authorized Designated Engineering Representative and must be documented on FAA form 8110-3.

3. On-ground Testing and Commissioning

NOTE: There are restrictions to testing the JetWave™ system for the commissioning process.

NOTE: Each country has its own restrictions to on-ground testing and transmission. Verify regulations before testing the system. Particular attention must be observed the first time the system is turned on and able to transmit. At this point the system will download a map detailing the areas where transmission is and is not allowed. This map will take effect on the next power-up.

A. Testing and Commissioning Process with Restrictions

(1) The JetWave™ system under normal operating conditions mutes and disables the modem when the Air/Ground status in "On Ground".

(2) The Air/Ground status will be set to "On Ground" when one of the conditions that follow are met:

- Weight on wheels discrete is enabled in the system configuration and is indicating "Weight on Wheels".
- The ground speed is less than 50 knots.
- The JetWave™ system is configured to receive ground speed labels on an ARINC 429 bus but the ground speed readings have not been available for longer than 20 seconds.

(3) Ground transmission can be enabled by asserting the ground transmit discrete of JetWave™ system.

(a) The ground operation depends on location and country of aircraft registration.

(b) The reason for restrictions on transmission from the current aircraft location can be accessed through the GUI Home page under text display “Reasons for Transmission mute”.

(4) On completion of JetWave™ LRU installation activities, the AES system needs to be commissioned by associating the installed JetWave™ AES system to a specific SSPP. This SSPP may correspond to an actual VAR but may also point to a test VAR in case the actual VAR or SSPP is not known at the time the terminal integration is finalised. The operational life commences once the AES system is commissioned.

(5) For the testing and commissioning process, the aircraft must be positioned so to have a clear line of sight to the satellite.

(6) To control the transmission of the terminal within certain locations and at different heights, the terminal stores and uses a geographical map. The map indicates regions around the globe where the terminal may legally transmit. The map is provided by Inmarsat and requested by the terminal when it first enters the network. The terminal will retrieve the map file from the Inmarsat server using the FTP protocol over a SVN. The SVN used for the geo restrictions maps shall be [2] NSD Management VLAN.

(7) The APM is configured with information pertaining to the aircraft and the terminal installation. The two important aspects of APM configuration with respect to commissioning of the terminal are as follows:

- The private authentication key which is used to uniquely identify the logging data transmitted by the aircraft to the regulatory server on the ground.
- The aircraft identification “Tail ID”.

(8) The Modman houses the ACM.

(a) The ACM directly connects and interacts with the JetWave™ NMS.

(b) The ACM embeds a private secret key that allows it to be recognized by the NMS as a “Satellite Router”.

(c) At the time of manufacturing of Modman, the serial numbers of the Modman and associated DIDs of the ACM are communicated to the Inmarsat service provider as part of pre-provisioning.

(d) The Modman and associated DIDs of the ACM also allocated a specific SSPP. This SSPP is required to verify the terminal connectivity to the NMS.

(9) When commissioning a terminal, a VAR has to assign a service plan to the subscriber which becomes effective by associating an SSPP to the JetWave™ AES system.

4. JetWave™ System LRU Installation

This section includes information about installing the equipment in the core JetWave™ system. Contact 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.

A. 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 panel to allow for system checks and routine maintenance, such as system software upgrades. The discrete I/O and Ethernet ports that are needed are as follows:

(1) Discrete Outputs:

- System available (Modman MP13E) connected to a lamp
- Data link available (Modman MP13F) connected to a lamp.

(2) Discrete Inputs:

- Local data load enable (Modman MP10B) connected to a normally open switch
- Ground transmit enable (Modman MP11D) connected to a normally open switch
- Public service disable (Modman MP11E) connected to a normally open switch
- Modman reset (Modman MP10C) connected to a normally open switch.

(3) Ethernet Port:

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

NOTE: The AVI 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 2-33 thru Figure 2-36.

B. 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 2-24 for outline and installation information, and Figure 2-33 thru Figure 2-36 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 2-1 provides the connector part numbers for the Modman rear connector. The mating connector (Radiall PN NSXN2B875S00) is supplied by the customer.

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

NOTE: While engineering the JetWave™ System LRU interconnections, make sure the GXA LRU quadrax terminations do not distort natural wire distortions. 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 A664 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 21.2 dB at 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 2-2.

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

Table 2-2. 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 TA-10R5DC1 or equivalent	4.8 dB Minicircuits, PN TA-4R8DC1 or equivalent	None
Attenuator in RX path	10.5 dB Minicircuits, PN TAT-10R5-1 or equivalent	4.8 dB Minicircuits, PN TAT-4R8-1 or equivalent	None

C. APM

The APM can be installed in any orientation. Refer to Figure 2-25 for outline and installation information and Figure 2-33 thru Figure 2-36 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) when you torque the screws.

Connect the APM to the Modman with cable made up of two twisted shielded 24 AWG pairs with Teflon insulation or aerospace grade shielded CAT5/CAT5e cable, with a maximum length of 9.8 feet (3 m).

The APM to Modman pendant cable, Honeywell recommends ECS PN 92240 or equivalent that is a composite (a shielded conductor bundle) construction to support the environmental conditions required.

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.

D. KANDU

Refer to Figure 2-26 for outline and installation information. Refer to Figure 2-33 thru Figure 2-36 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 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 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-C-87104/2 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-C-87104/2 for the routing of the RX-IF signals between the Modman and KRFU. The RX-IF interface to be labeled green.

(g) The bulkhead interface design must be jam-nut or flange in consultation. If flange design connector is used, it must be installed such that the flange is located on the pressurized area of the aircraft. If jam nut connector is used, jam-nut connector should utilize a lock wire.

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

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

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

(e) 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)).

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

The bulkhead interface is as follows:

(g) 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.

(h) 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 KRFU and OAE-TMA if KANDU is installed in pressurized location inside aircraft.

(i) 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.

(j) The bulkhead interface design could be either jam-nut or flange in consultation. If flange design connector is used, it must be installed such that the flange is located on the pressurized area of the aircraft. If jam nut connector is used, jam-nut connector should utilize a lock wire.

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

(l) 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 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 area must be provided around the mounting hole of the equipment base plate. A diameter of the conductive area must be 0.12 inch (3 mm) larger than the diameter of the washer.
- The KANDU must include a 0.59 inch (15 mm) diameter bonding measuring point on one of the attachment tabs, as near as possible to the bonding element, but not on the bonding element.

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

E. KRFU

A waveguide is used for the KRFU to OAE RF TX connection. The waveguide run must 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 total loss number is met.

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 2-27, Figure 2-28, and Figure 2-29 for outline and installation information. Refer to Figure 2-33 thru Figure 2-36 for the applicable interconnect diagram.

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

For FMA configuratiions, Honeywell recommends that the WR28 to WR34 adapter is put at the KRFU end of the cable.

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.

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

The KRFU to TMA connection must be WR28 for TX, coax for RX. The KRFU to FMA WR34 connection needs to include an adapter for TX to adapt from WR28 to WR34.

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, not exceed 2 dB.

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

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

The operation of the AES is limited if the conduction-cooled KRFU is installed under the radome and the mounting plate temperature exceeds 185°F (85°C).

If the shutdown temperature is exceeded, a low-power mode (non-RF communicating) is entered until the temperature reduces to approximately ten degrees below the shutdown temperature. Refer to Figure 3-20 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 area must be provided around the mounting hole of the equipment base plate.
    - A diameter of the conductive area must be 0.12 inch (3 mm) larger than the diameter of the washer.
- The KRFU must include a 0.59 inch (15 mm) diameter bonding measuring point on one of the attachment tabs, as near as possible to the bonding element, but not on the bonding element.

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 wiht the TMA or FMA installation instructions in subsequent sections.

F. KRFU Thermal Pad Kit

(1) General

(a) 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 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 2-3.

Table 2-3. 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 kit, do as follows:

(a) Turn the KRFU conduction unit over to expose bottom side.

(b) The thermal pad kit is made up of two different pads. There is a clear backing material protecting the tacky side of the pads and a white opaque backing material protecting the non-tacky side of the pads.

(c) Remove the clear protective backing to expose the tacky side of the thermal pad PN MPW0000118.

(d) Apply tacky side of thermal pad to the bottom side of unit as shown in Figure 2-1.

1 Making sure to keep a setback dimension of 0.032 to 0.125 inch (0.79 to 3.18 mm) around the edges of the installed thermal pad.

(e) Remove the clear protective backing to expose the tacky side of thermal pad PN MPW0000122.

(f) Apply the pad flush to the interior edge of the thermal pad PN MPW0000118, in order to maintain consistent setback dimension of 0.032 to 0.125 inch (0.79 to 3.18 mm) around the edges of the installed thermal pad.

NOTE: The configuration of the mounting feet shown in Figure 2-1 is representative only and may not be the exact configuration for all KRFUs.

Figure 2-1. 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.**

(g) 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.

G. Deleted

H. Deleted

I. Tail Mount Antenna

(1) Introduction

The TMA assembly is to be installed on the top of the tail empennage of the aircraft. For the JetWave™ system to correctly point the antenna, the installation offsets should not exceed more than 1 degree off heading, pitch or roll with respect to principle axis of aircraft. Depending on the airframe, the LRUs and assemblies that follow would be installed outside aircraft fuselage as part of tail mount OAE:

- The TMA assembly
- KRFU LRU
- Radome assembly
- Radome fairing (if required).

The exact install location of the TMA assembly and KRFU is airframe specific.

The radome, radome fairing (if required), and TMA/KRFU to aircraft interface brackets are airframe specific and the details are not covered in this manual.

Consideration must be given when deciding where to install the antenna on the factors that follow:

- Other antennas or equipment that may block the JetWave™ antenna from being able to see the satellite
- The JetWave™ antenna blocking other antennas
- Potential interference by the JetWave™ transmitted signal degrading the received signal of other aircraft RF systems
- Potential interference by other RF systems degrading the received signal of the JetWave™ system.

The TMA complies with form as defined in JetWave™ TMA outline and installation drawing in Figure 2-30, the KRFU outline and installation drawing Figure 2-28, and the interconnect diagram in Figure 2-33.

Refer to Table 2-4 for special tools, fixtures, and equipment for the TMA installation.

Table 2-4. Special Tools for TMA Installation

Number	Description	Source
NA	Hoist system	Commercially available

Antenna clearance for sweep volume is 12 inches (304.8 mm) minimum around dish sweep area.

(2) TMA Installation General

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

The installer must select the appropriate gauge of wire as specified in the TMA interconnection diagram in Figure 2-33 for power and control connections. Interconnect cables must be routed away from sources of potential electromagnetic interference.

(3) Advisories

The JetWave™ TMA 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 should 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 TAIL MOUNT ANTENNA, HONEYWELL DEEMS IT NECESSARY TO ASSURE OEM FUSELAGE ATTENUATION EXCEEDS 19.48 dB FOR TAIL 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 30.3 FEET (9.24 METERS) OF THE TAIL MOUNT ANTENNA ASSEMBLY DURING RADIO FREQUENCY TRANSMISSION

WARNING: DURING ANTENNA OPERATION (TRANSMISSION), ENSURE MINIMUM EXPOSURE OF ALL PERSONNEL TO ANY REFLECTED, SCATTERED, OR DIRECT BEAMS.

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

(4) TMA 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:

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

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

(c) Visually inspect the units for any shipping damage.

(5) TMA Installation Kit Details

Other than the parts list specified in Figure 2-5, the installation kit for waveguide and coax assemblies, wiring assemblies, brackets, clamps and mounting assembly will be airframe specific. Refer to airframe specific wiring diagram for details.

Table 2-5. TMA Installation Kits

PN	Description
SCD-90402677	WR42 to 2.92 mm coax adapter

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

(6) TMA Airframe Structural Modifications

For the installation of TMA, structural modifications to the tail empennage of the airframe may be required to accommodate the additional mass of the antenna assembly and aerodynamic loads.

The aerodynamic loads are dependent on the aircraft type as well as the installation location of the tail mount antenna assembly and KRFU on the aircraft, and are therefore installation specific.

The appropriately qualified personnel should derive the loads and perform a structural analysis to verify the suitability of the modifications.

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

(7) TMA Mounting Guidelines

This section describes the mounting guidelines for the tail mount OAE.

The radome installation is aircraft specific.

The airframe manufacturer can be consulted to determine the torque requirements for mounting the TMA assembly, KRFU, radome, and radome fairing for each unique installation.

(8) TMA Physical Placement

The TMA and KRFU must be mounted on the top of the tail empennage for clear satellite communications. Figure 2-2 shows a typical installation location for the tail mount antenna assembly on an aircraft.

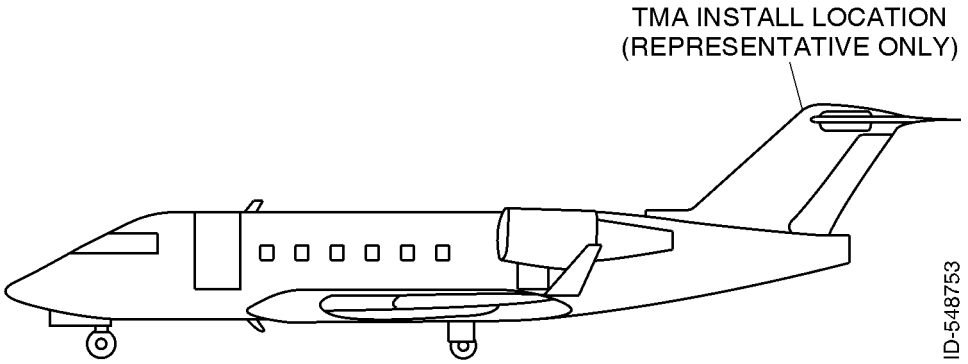


Figure 2-2. TMA Installation Location

(9) TMA Interface Mount Brackets (if Required)

Depending on the airframe, there may be a need to install a TMA to airframe interface mount brackets, which adapts to the tail empennage of the aircraft and in turn supplies a firm flat base for the TMA assembly.

This is not detailed in this document as the requirement of antenna interface mount is air frame specific.

(10) TMA Radome and Radome Fairing

Depending on the airframe, there may be a need to install radome fairing which adapts to the tail empennage of the aircraft.

This is not detailed in this document as the requirement of radome fairing is airframe specific.

(11) TMA Assembly

The tail mount OAE assembly is typically mounted on the Ku SATCOM radio slot on top of empennage of the aircraft vertical stabilizer.

Consult the airframe manufacturer for identification of appropriate airframe specific installation slots on the empennage.

The isometric rear and front views of the TMA assembly is shown in Figure 2-3.

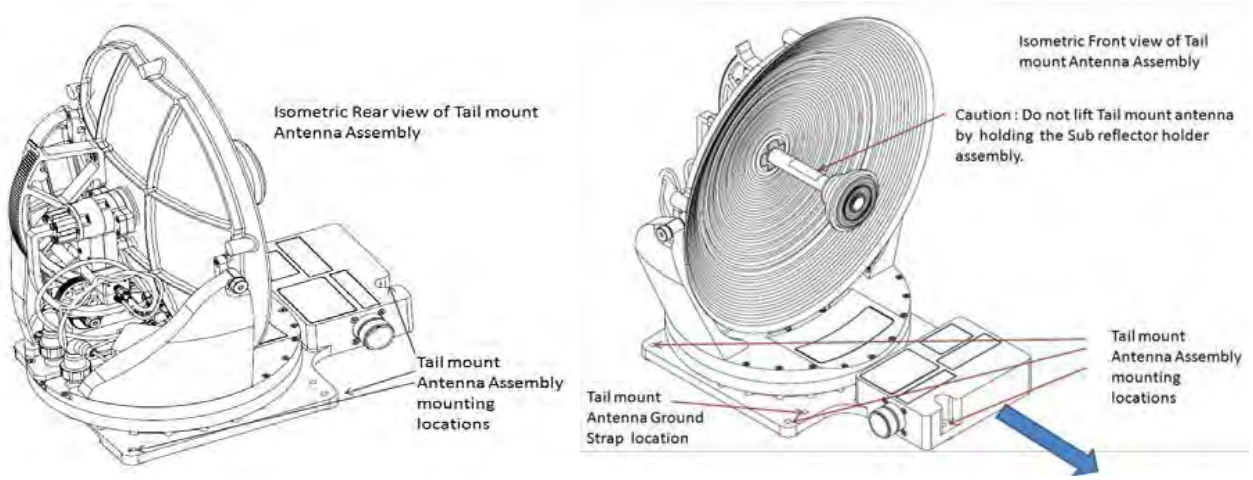


Figure 2-3. TMA Assembly Isometric View

The TMA assembly attaches to the base in five (05) locations. Refer to Figure 2-3 and Figure 2-30 for details.

(12) TMA Assembly Orientation

Orientation of the TMA assembly is defined with respect to the principal axes of the aircraft. The TMA assembly is to be installed such that the TMA J2 connector side is located towards the front of aircraft as indicated by the arrow as shown in Figure 2-3.

(13) KRFU Installation Location with the TMA

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

The KRFU can be installed either on front or rear of tail mount antenna assembly horizontally or vertically depending on space availability.

The KRFU is conduction cooled through the base plate with thermal pad. Mount the Honeywell recommended thermal pad (refer to KRFU Thermal Pad Kit installation in section 3.F.) while installing KRFU LRU.

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 with interconnect losses not exceeding 0.6 dB on the transmit path and 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 2-4.

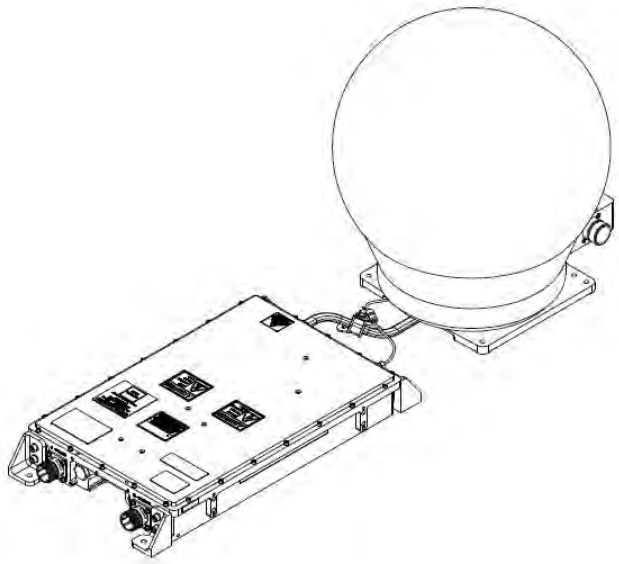


Figure 2-4. KRFU and TMA Interconnect Arrangement

(14) 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.

J. 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.

The installation activities are detailed in subsequent sections as follows:

- Connecting the waveguide, RF coax interface to the TMA.
- Positioning and installation of the TMA assembly onto tail empennage antenna slot/antenna interface mount, installation of bonding straps.
- Installation of the KRFU and bonding straps.
- Installation of the waveguide and coax between the TMA and KRFU.
- Connecting the TMA interface, KRFU power, and control interfaces.
- Position and installation of the radome.

(1) 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.

(2) Installation of the TMA Assembly

(a) Carefully position and secure the TMA assembly to antenna interface mount / tail empennage structure by making sure that the aligning stubs are aligned and fitted correctly to the TMA alignment groves.

(b) Loosely connect and hand tight the TMA assembly with fasteners at the five mounting locations. Apply the specified torque to the fasteners in defined sequence for firmly mounting to the antenna interface mount / tail empennage of the aircraft.

(c) Connect the bonding strap to the TMA assembly. Refer to Figure 2-5 for the bonding strap location.

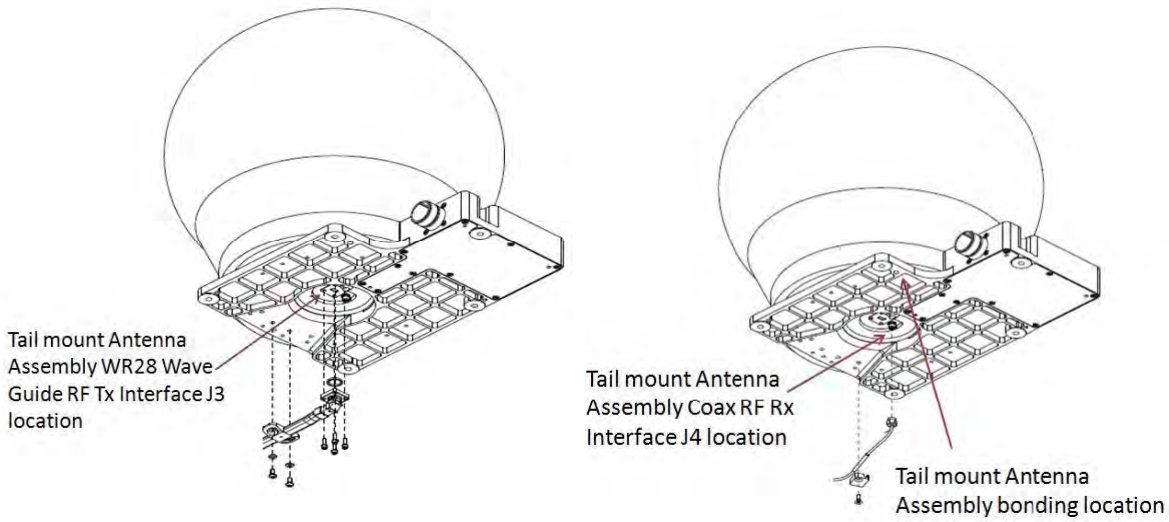


Figure 2-5. TMA RF TX J3 and RF RX J4 Interface Connector and Bonding Strap Locations

(3) KRFU Installation

(a) Make sure that the thermal pads are attached to the bottom of the KRFU. Refer to Section 3.F. KRFU Thermal Pad Kit.

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

1 The adapter allows connection between a WR-42 waveguide cover flange UG595/U per MIL-DTL-3922/54 (modified with threaded mounting holes) and a 2.92 mm coaxial connector.

2 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.

3 The WR42 waveguide to 2.92 mm coaxial connector adapter is shown in Figure 2-6.

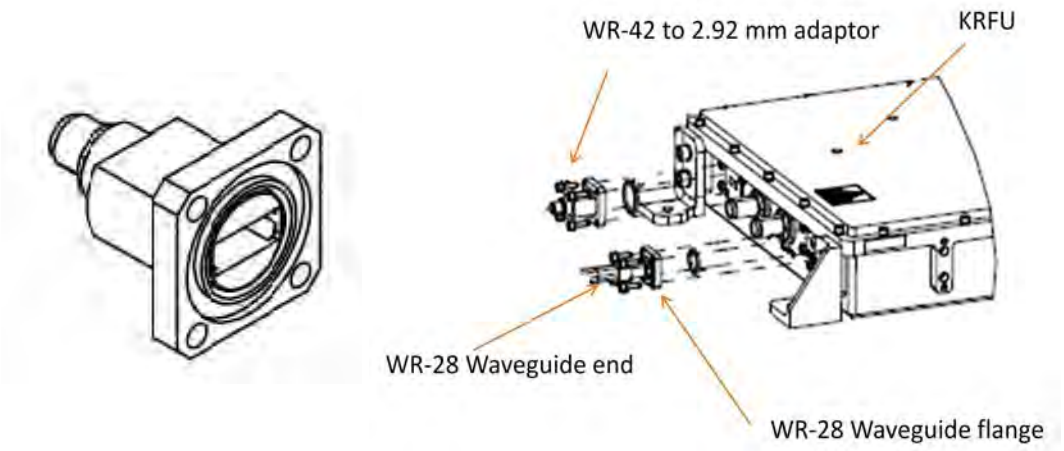


Figure 2-6. WR42 Waveguide to 2.92 mm Coaxial Connector Adapter

(c) 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.

(d) Install an O-ring and mount the adapter onto KRFU J4 with four screws. Firm tight the WR42 waveguide to 2.92 mm coaxial connector to KRFU waveguide flange for all fasteners in opposite sequences. Do not use power tools to torque connection.

(e) Attach the KRFU assembly to the KRFU interface mount with fasteners and tighten. Minimum torque recommended to compress the thermal pad is 22 in-lb (2.5 Nm). Apply torque to the fasteners in defined sequence for firmly mounting to the antenna interface mount or the tail empennage of the aircraft. Do not use power tools to torque connection.

(f) Install one end of the ground straps to the antenna interface mount or the tail empennage structure plate at labeled ground points with screw and washers.

(g) Install the other end of the ground straps to grounding points on the KRFU. The KRFU bonding strap arrangement is shown in Figure 2-7.

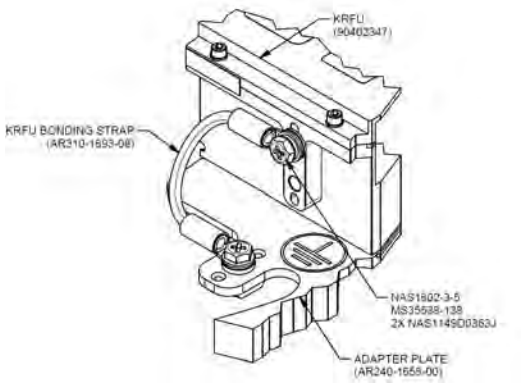


Figure 2-7. KRFU Bonding Strap Arrangement

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

(a) Loosely attach the waveguide and coax support brackets to antenna interface mount or the tail empennage structure. The flexible wave guide and coax cable assembly kit and its routing is aircraft specific.

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

(c) Loosely connect WR28 flexible waveguide to TMA J3 waveguide flange with sealing gasket. Hand tight the fasteners.

(d) Loosely attach the waveguide and coax support brackets to the antenna interface mount or the tail empennage structure.

(e) Loosely connect the waveguide to KRFU with a sealing gasket.

(f) Apply torque to KRFU waveguide flange for all fasteners in defined sequences as recommended.

(g) Firmly attach the waveguide support brackets to the adapter plate or the tail empennage structure.

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 2-8.

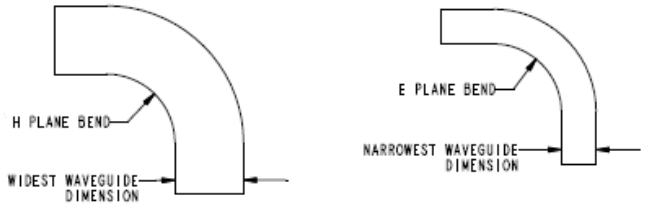


Figure 2-8. View of H Plane and E Plane Bends

(5) Connecting the TMA interface, KRFU Power, and Control Interface

Power and control signals for the TMA assembly is supplied from the KANDU and is connected to TMA J2 receptacle. Install location of KANDU is airframe specific. KANDU could be installed in unpressurized area near the tail empennage of the aircraft or inside pressurized area of the aircraft. In case of KANDU install location is inside pressurized location, the KANDU to KRFU and KANDU to TMA interconnect may be routed through a Bulkhead Interface connector.

Control signals for the KRFU is supplied from the KANDU and is connected to KRFU J2 receptacle. 115 VAC power supply for KRFU is supplied from aircraft power and is connected to KRFU J1 receptacle. IF TX and IF RX signals to KRFU are supplied from Modman. Refer to the TMA interconnection diagram Figure 2-33 for details.

(a) Remove the protective covers from the TMA J2 and KANDU J2 receptacles. Visually inspect connectors and make sure that the pins are straight and not damaged.

1 Clean the connectors with the contact cleaner and connect the cable assembly for tail mount from KANDU J2 receptacle to TMA J2 receptacle.

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

(b) Remove the protective covers from the KRFU J2 and KANDU J3 receptacles. Visually inspect 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 tail mount from KANDU J3 receptacle to KRFU J2 receptacle.

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

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

1 Clean the connectors with the contact cleaner before connecting.

a TX-IF connects from the Modman through the bulkhead J4B to KRFU J5.

b RX-IF connects from the Modman through the bulkhead J3B to KRFU J6.

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 KRFU and Modman or the bulkhead interface feed through ends.

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

(d) Make sure that all 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 tail mount antenna.

On completion of LRU interconnection and applying power to TMA, the tail mount antenna will move in azimuth and elevation direction and move itself to its home position. The default position is 0° in azimuth and 45° in elevation if the TMA is not talking to the rest of the system, otherwise the default position is configured by a setting in the APM.

(6) Radome and Radome Fairing Installation with the TMA Interface Mount

Radome and fairing installation is aircraft specific. See aircraft specific SDIM for details.

NOTE: Before removing the Tail Mount Radome, Honeywell recommends manually steering the TMA to a safe antenna orientation position using the JetWave™ GUI. The TMA parking position is included in the AES System Configuration File and this can be accessed through the GUI web interface and by navigating to Configuration File page.Consult aircraft specific SDIM for detailed instructions.

K. TMA Alignment

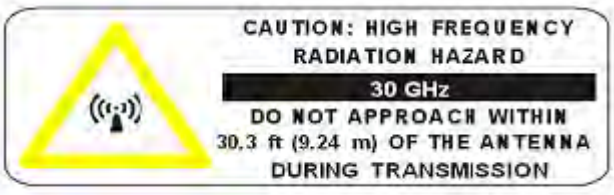
On completion of physical installation of the TMA, the installed antenna system has to be aligned and calibrated for any possible installation offsets. The antenna alignment for the JetWave™ system is designed to be performed automatically once initialized through a GUI interface.

It is recommended to do the antenna alignment calibration after initial installation and whenever the OAE-TMA is removed and replaced. Only qualified avionics personnel who are knowledgeable in the technical and safety issues related to the antenna systems should perform the alignment procedures provided in this SDIMM.

Refer to Section 4.Q. for the TMA and FMA Antenna Alignment Procedure.

L. TMA Human Exposure to RF EM Fields

WARNING: THE JETWAVE™ SYSTEM IS A SOURCE OF NON-IONIZING RADIATION.



(1) The Minimum Safe Distance:

- TMA = 30.3 feet (9.24 m).

NOTE: The minimum safe distance for occupational/controlled exposure is determined based on the computational method specified in FCC Office of Engineering and

Technology; Bulletin Number 65, Edition 97-01: *Evaluating compliance with FCC Guidelines for human exposure to Radio Frequency Electromagnetic fields.*

(2) The areas which the risk exists are based upon the location of the antenna. This means personnel operating on the apron, transient personnel, and the general population in the controlled exposure category will not be exposed to levels in excess of the limits. Maintenance personnel working close to the tail must be protected by disabling the transmitter before they approach that area of the aircraft.

(3) The JetWave™ system incorporates three fail-safe features to limit the potential for human exposure to non-ionizing radiation:

(a) The system will not transmit unless the receiver is receiving a valid signal, therefore if the received signal were to become blocked the transmitter would be disabled.

(b) The antenna subsystem includes a hardware end-stop that prevents the antenna pointing more than two degrees below the horizontal.

(c) An input into the JetWave™ system wired on the aircraft to a switch in the aircraft, to disable the RF transmission. This switch would be used to prevent any radiation from the antenna in the event of aircraft operations in the vicinity of the antenna, for instance when de-icing the aircraft. This would be achieved by a defined procedure on the aircraft.

M. Fuselage Mount Antenna

(1) 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 notexceed more than 1 degree 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
- A791 based AIM or the LAIM
- Radome skirt fairing.

The exact install location of the A791 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 A791 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 A791 based AIM and the LAIM solutions differ in that the AIM is intended to be broadly applicable accross all airframes. The LAIM, however refers to a solution that would be designed specifically for the exact airframe that the JetWave™ system is installed on. The LAIM solution will vary between airframes, in some cases by a large amount. All specific figures and references to the LAIM that are included in this manual are only an example of generic LAIM solutions. The user must not infer applicability or design direction for the LAIM from any related material presented herin.

Refer to the FMA outline and installation drawing in Figure 2-31, the KRFU outline and installation drawings in Figure 2-27, Figure 2-28, and Figure 2-29, and the radome outline and installation drawing in Figure 2-32. Depending on the aricraft configuration, refer to the interconnect diagrams in Figure 2-34 for the KRFU installed inside the fuselage, Figure 2-35, or Figure 2-36 for external KRFU.

Refer to Table 2-6 for special tools, fixtures, and equipment for the FMA installation.

Table 2-6. Special Tools for FMA Installation

Number	Description	Source
NA	Hoist system	Commercially available

(2) The FMA Installation General

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

(3) 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.

CAUTION: 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.

(4) 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:

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

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

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

(5) FMA Installation Kits

Other than the parts list specified in Table 2-7, the installation kit for the A791 based AIM or the LAIM, waveguide and coax assemblies, wiring assemblies, brackets, clamps, and mounting assembly will be airframe specific. Refer to airframe specific wiring diagram for details. The radome skirt fairing will be airframe specific. The LAIM will be a custom solution for a particular airframe.

Table 2-7. FMA installation Kits

PN	Description
SCD-90402677	WR42 to 2.92 mm coax adapter

Table 2-7. FMA installation Kits(Cont)

PN	Description
90404243	RF component kit (KRFU to FMA waveguide and RX coax cable FMA to KRFU)

(6) 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.

(7) 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.

Figure 2-9 shows a typical installation location for the fuselage mount OAE on an aircraft.

Honeywell recommends not installing the FMA at the mid fuselage station location of the aircraft near the wings or slightly aft of the wings.

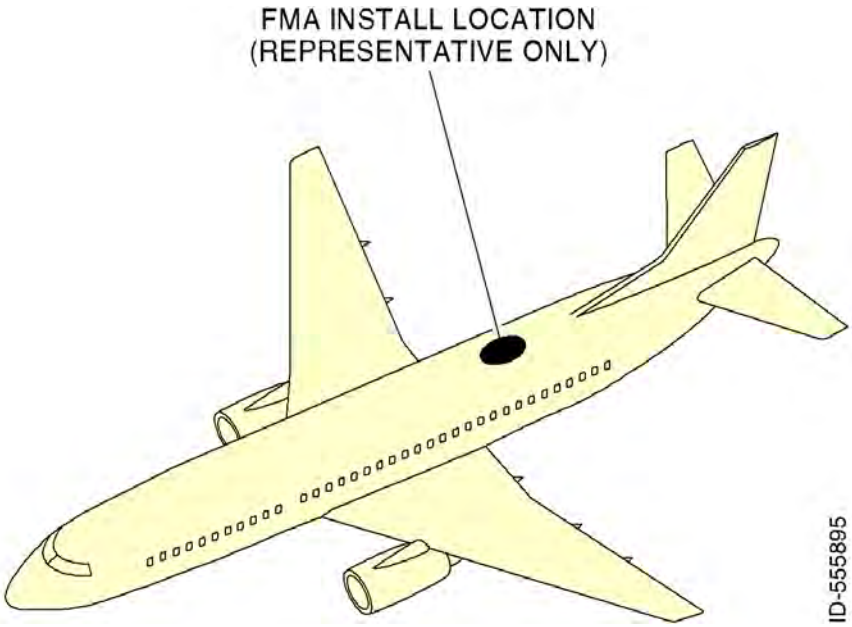


Figure 2-9. FMA Install Location

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

Depending on the airframe, the A791 based AIM or LAIM is installed to provide a firm flat base for installation of the FMA and KRFU. These are detailed in the next sections.

(8) Installation Guidelines for the A791 Based AIM

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 2-10 shows a typical ground strap connection.

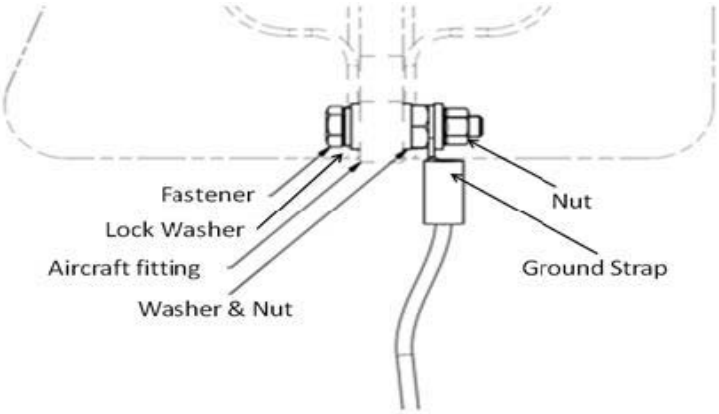


Figure 2-10. Typical Ground Strap Arrangement for A791 Compliant Fittings

The aircraft coordinate system orientation and fitting layout are shown in Figure 2-11.

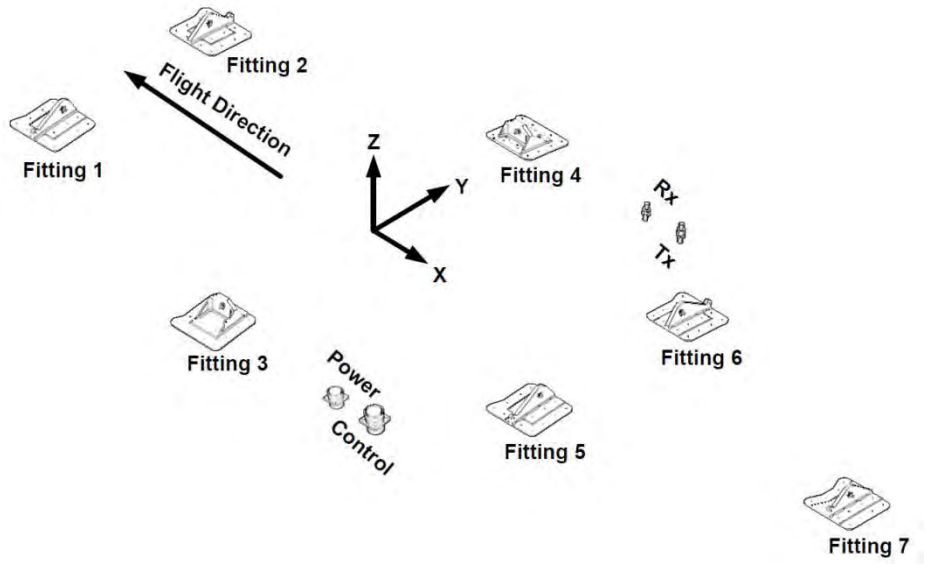


Figure 2-11. Aircraft Coordinate System Orientation and Fitting Layout

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

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

(c) 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.

(d) 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 2-12.

(e) 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.

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

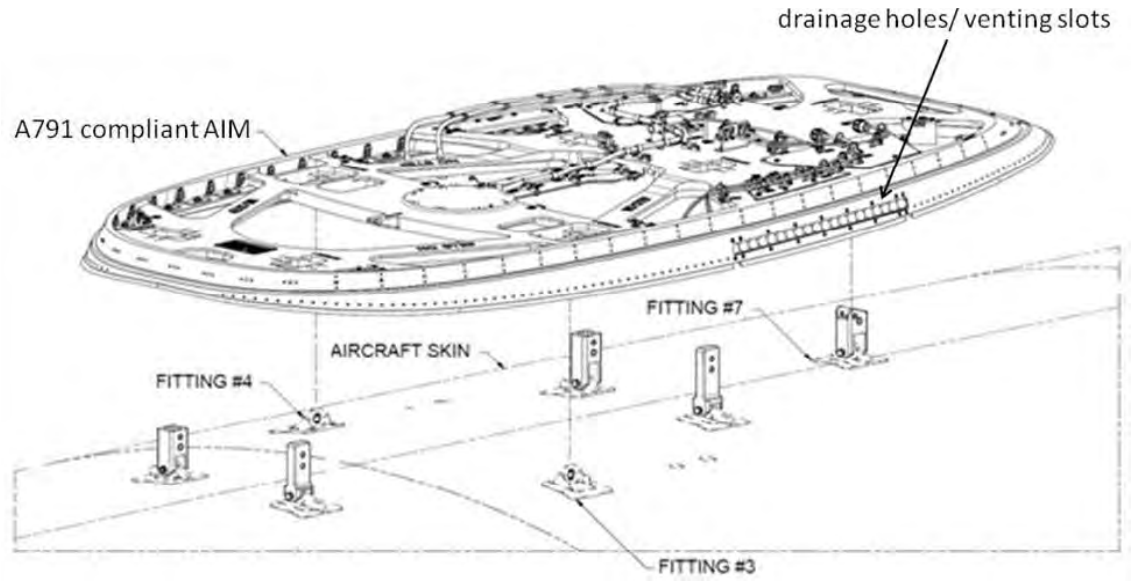


Figure 2-12. AIM Assembly Placement on Aircraft

(9) Installation Guidelines for the LAIM

NOTE: The LAIM is custom designed to the aircraft they will be installed on.

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

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

Install the LAIM and Radome Shirt Bonding Straps

(a) 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.

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

Install the LAIM to the Aircraft Fuselage

(a) Make sure that all the fittings are oriented vertically with the alignment tools, to help when you lower the LAIM onto aircraft fittings.

(b) Put the LAIM assembly onto aircraft install location. Refer to Figure 2-13 for a generic LAIM installation on airframe structure.

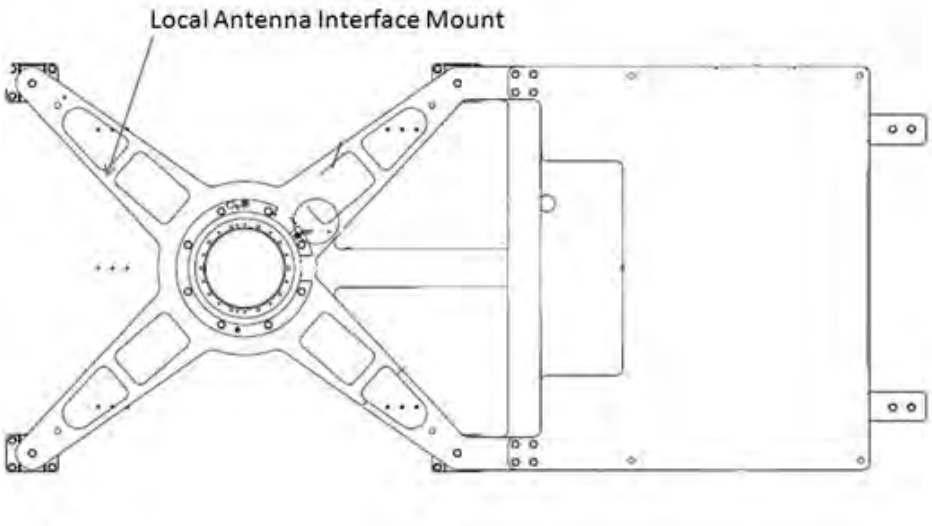


Figure 2-13. LAIM Assembly

(c) 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.

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

Install the Radome Skirt Fairing

(a) Before mounting the radome skirt fairing assembly onto aircraft, make sure that all the fittings are oriented vertically with the alignment tools, to help when you lower the radome skirt fairing assembly onto the aircraft fittings.

(b) 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 2-14 shows the radome skirt assembly along with LAIM.

(c) The radome skirt fairing assembly is mounted firmly with 39 fastener points through aircraft skin into gusset attached to the outer flange of the intercostals and into gusset attached to the inner flange of the intercostals (1 at the forward center and 19 on each side).

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

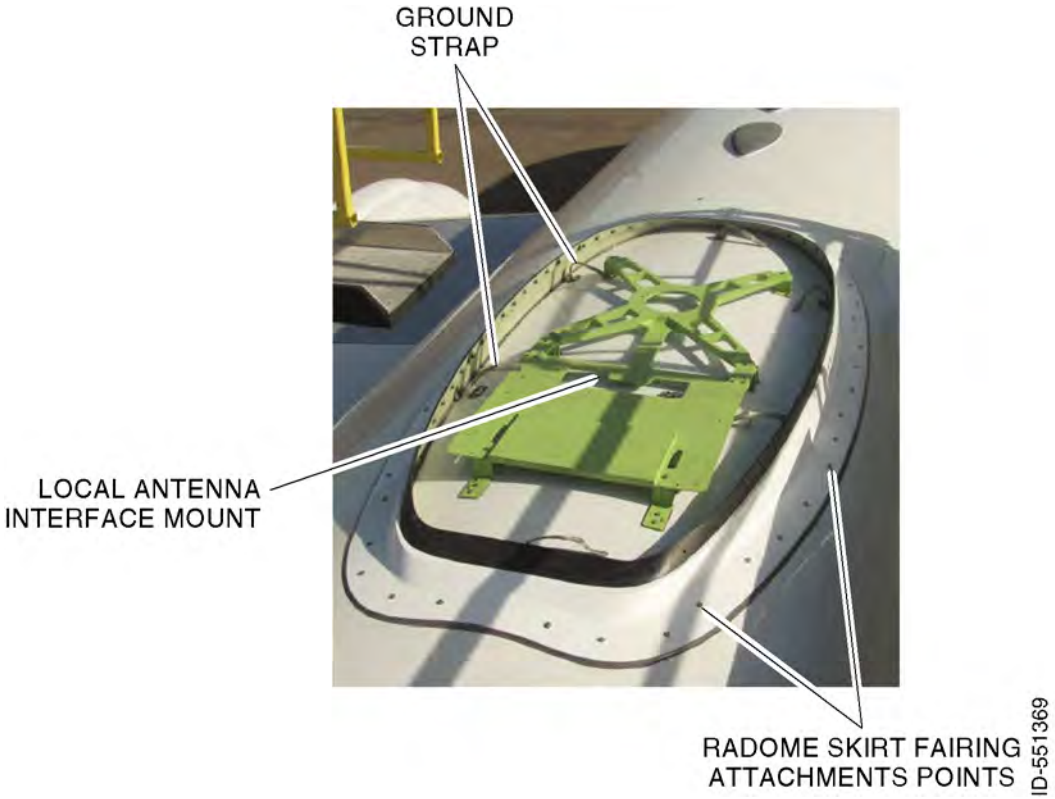


Figure 2-14. Radome Skirt Fairing and LAIM Assembly Position on Aircraft

(10) 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.

N. 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 2-15.

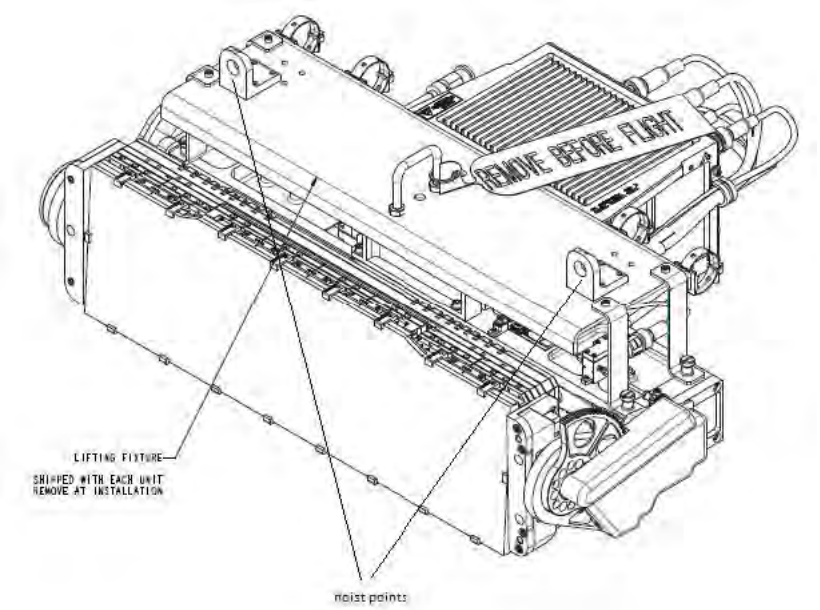


Figure 2-15. FMA Assembly

(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. Make sure that the pigtails do not interfere to avoid damage.

(c) Remove the FMA lifting fixture. Refer to Figure 2-16.

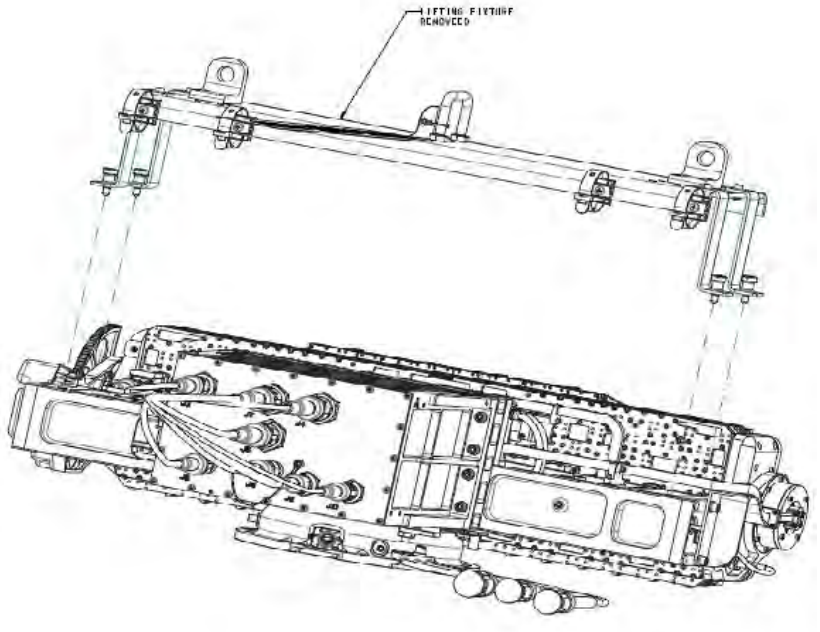


Figure 2-16. FMA Assembly Lifting Fixture Removal

(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 2-10 for the FMA ground strap connection.

(3) Waveguide and RF Coax Interconnection to FMA Assembly

(a) Waveguide and RF coax interconnect designs are aircraft specific. Consult aircraft specific SDIM for detailed installation instructions.

(b) 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. Connect the WR34 waveguide assembly to the FMA receptacle J3

(4) KRFU Installation Location

(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 Thermal Pad Kit installation Section 4.F., 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.

(f) It is recommended to use flexible waveguide / Coax RF interface with interconnect losses not to exceed 1.5 dB on the transmit path and 2.9 dB on the receive path between the KRFU and FMA assembly. Honeywell has developed a RF component kit (90404243) containing a suitable waveguide and coaxial cable.

(5) KRFU Installation

Refer to Section 4.K.(3). KRFU Installation procedure.

(6) 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. 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.

(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.

(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 2-17.

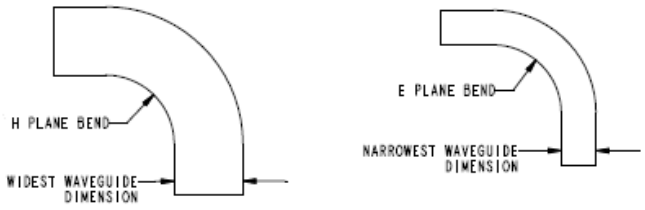


Figure 2-17. View of H Plane and E Plane Bends

(7) 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 are routed through bulkhead interface. Refer to the appropriate FMA interconnection diagram Figure 2-34, Figure 2-35, or Figure 2-36 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 2-18 for the A791 based AIM and Figure 2-18 for the LAIM.

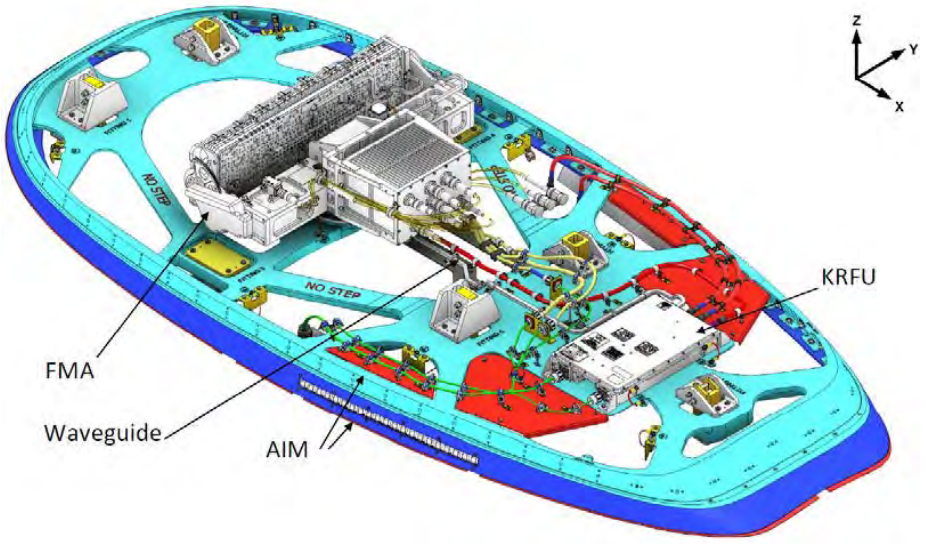


Figure 2-18. A791 Based AIM Assembly with FMA and KRFU Placement on Aircraft

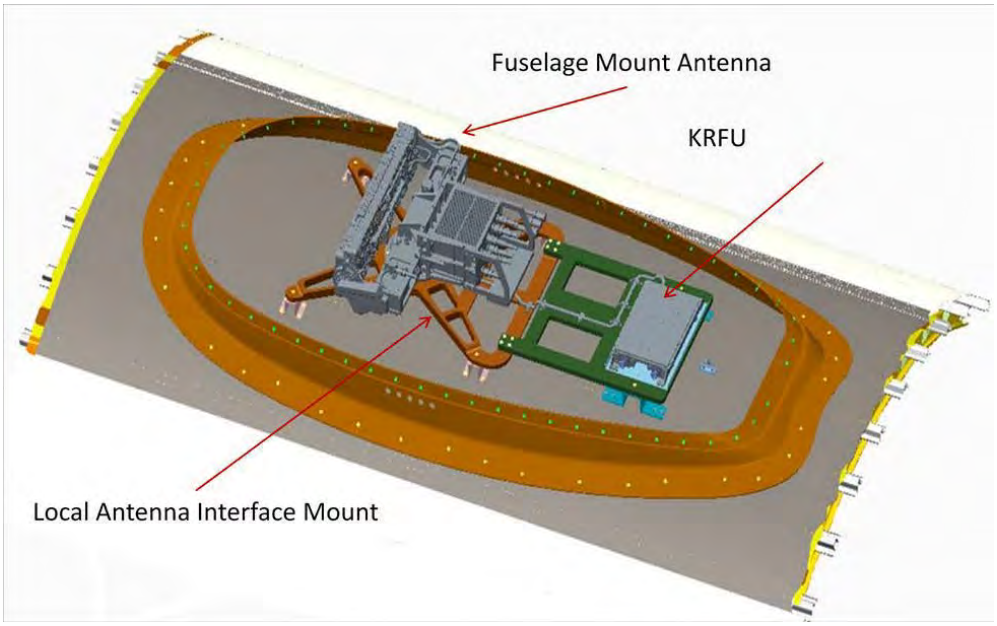


Figure 2-19. LAIM Assembly with FMA and KRFU Placement on Aircraft

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.

(8) AIM/LAIM Radome Installation

The radome installation is aircraft specific. See aircraft specific SDIM for details.

Depending on the AIM selected, the radome gets installed differently.

With the A791 based AIM, the Radome will be installed on the A791 based AIM.

With the LAIM, the radome will be installed on the Radome skirt fairing assembly. Refer to the and Figure 2-20.

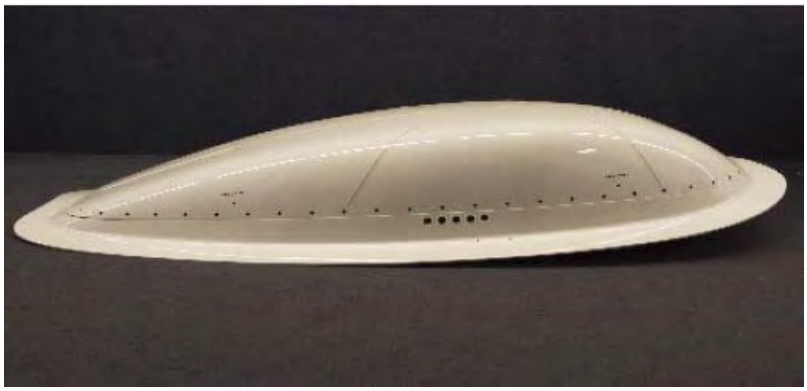


Figure 2-20. Radome Assembly Mounted on Radome Skirt Fairing (LAIM)

O. FMA Alignment

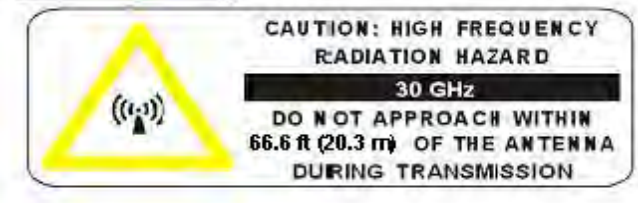
On completion of physical installation of the FMA, the installed antenna system has to be aligned and calibrated for any possible installation offsets. The antenna alignment for the JetWave™ system is designed to be performed automatically once initialized through a GUI interface.

It is recommended to do the antenna alignment calibration after initial installation and whenever the OAE-FMA is removed and replaced. Only qualified avionics personnel who are knowledgeable in the technical and safety issues related to the antenna systems should do the alignment procedures provided in this SDIMM.

Refer to Section 4.Q. TMA and FMA Antenna Alignment Procedure.

P. FMA Human Exposure to RF EM Fields

WARNING: THE JETWAVE™ SYSTEM IS A SOURCE OF NON-IONIZING RADIATION.



(1) The Minimum Safe Distance:

- FMA = 66.6 feet (20.3 m).

NOTE: The minimum safe distance for occupational/controlled exposure is determined based on the computational method specified in FCC Office of Engineering and Technology; Bulletin Number 65, Edition 97-01: *Evaluating compliance with FCC Guidelines for human exposure to Radio Frequency Electromagnetic fields.*

(2) The areas which the risk exists are based upon the location of the antenna. This means personnel operating on the apron, transient personnel, and the general population in the controlled exposure category will not be exposed to levels in excess of the limits. Maintenance personnel working close to the tail must be protected by disabling the transmitter before they approach that area of the aircraft.

(3) The JetWave™ system incorporates three fail-safe features to limit the potential for human exposure to non-ionizing radiation:

(a) The system will not transmit unless the receiver is receiving a valid signal, therefore if the received signal were to become blocked the transmitter would be disabled.

(b) The antenna subsystem includes a hardware end-stop that prevents the antenna from pointing more than two degrees below its mounting plane.

(c) An input into the JetWave™ system wired on the aircraft to a switch in the aircraft, to disable the RF transmission. This switch would be used to prevent any radiation from the antenna in the event of aircraft operations in the vicinity of the antenna, for instance when de-icing the aircraft. This would be achieved by a defined procedure on the aircraft.

Q. TMA and FMA Antenna Alignment Procedure

(1) Antenna Assembly Orientation

For the JetWave™ system to point to the servicing satellite correctly, it is important to align the antenna assembly after installation. The TMA/FMA assembly has a built in IMU and its orientation must be aligned with respect to the principal axes of the aircraft which is determined through aircraft IRS.

(a) To do the automatic antenna alignment calibration, aircraft should have a functional IRS, interfaced with the KANDU through A429 interface, and should have the required ARINC 429 labels as defined in the APM configuration file.

(b) During the physical installation, the IMU principal axes of the TMA/FMA is aligned with those of the aircraft within ± 1° on the pitch, roll, and yaw axis. The installation offsets, are then estimated by the KANDU automatically from data received from the aircraft Inertial Navigational System and the TMA/FMA IMU assembly.

(c) It is recommended to do the automatic antenna alignment calibration with the Radome installed. The antenna alignment process can be initiated through the GUI interface. The JetWave™ system GUI service is supported on AV1 and AG1 10/100 Base T Ethernet interfaces. Modman static IP assigned is 172.29.55.1 and the port number for the AES GUI service is 80.

(2) Automatic Antenna Alignment GUI Interface

The JetWave™ system GUI service is supported on AV1 and AG1 10/100 Base T Ethernet interfaces. Modman static IP assigned is 172.29.55.1 and the port number for the AES GUI service is 80.

(a) On any Internet browser (Internet Explorer 8 compatible), open the link "index.html". The Login page appears. Figure 2-21 shows the Login page.

Figure 2-21. GUI Login Page

(b) Enter the username and password below to access the maintenance interface.

- Username: "Maintenance" and Password: "Earthbound".

(3) Positioning of Aircraft for Antenna Alignment

(a) On the GUI Calibrate Antenna Alignment page, as shown in Figure 2-22, the current location of aircraft in terms of latitude and longitude is indicated along with the longitude of the servicing Geo stationary satellite.

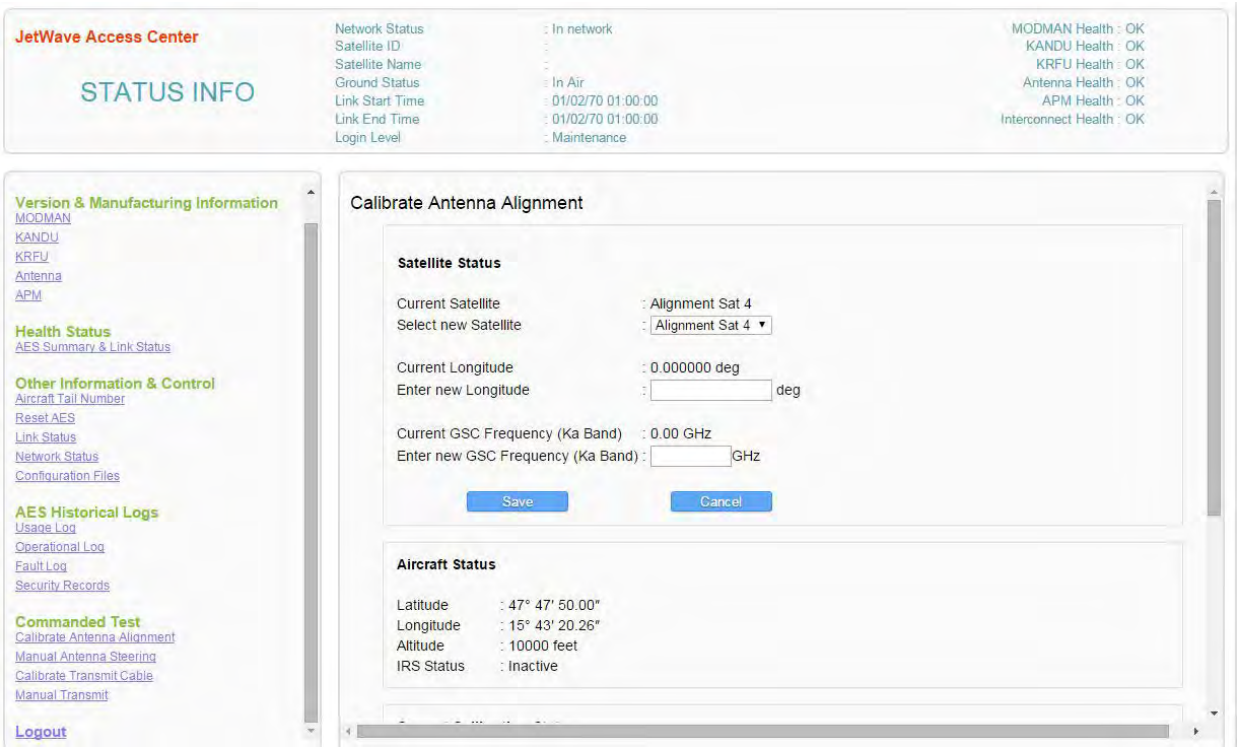


Figure 2-22. GUI Calibrate Antenna Alignment Page

(b) For the automatic antenna alignment calibration, it is recommended to tow and put the aircraft in an open area away from aircraft hangers such that there is clear visibility to the open sky with the heading of the aircraft pointed in one of four recommended aircraft heading values displayed on the GUI antenna calibration page.

(c) The automatic antenna alignment calibration can be carried out at up to four different aircraft headings. Out of the available headings, it is required to do only one automatic alignment calibration while the aircraft heading is toward one of the preferred directions.

(d) The recommended values are dependent on the radome and these values are estimated by the KANDU based on the input from the aircraft IRS and the selected satellite coordinates.

NOTE: It is advised not to do the automatic antenna alignment during rains with heavily clouded sky.

(4) Automatic Antenna Alignment

The JetWave™ system uses the following input parameters during the antenna alignment procedure:

- Aircraft IRS data
- OAE IMU data

- RSSI as reported from the Modman.

(a) The GUI page indicates the status of the aircraft. In order to proceed with the antenna calibration process, all LRUs of the JetWave™ system need to be powered up with aircraft IRS system functioning and providing valid inputs. The GUI page indicates the IRS status.

(b) Once the aircraft is aligned to within ± 5 degrees of any of the recommended aircraft heading, the grayed out on the “Initiate” button will be changed, indicating the system readiness to commence the antenna alignment process.

(c) The GUI Antenna Alignment Calibration progress status bar is shown in Figure 2-23.

(d) On successful completion of the antenna calibration, the statues changes to "Aligned".

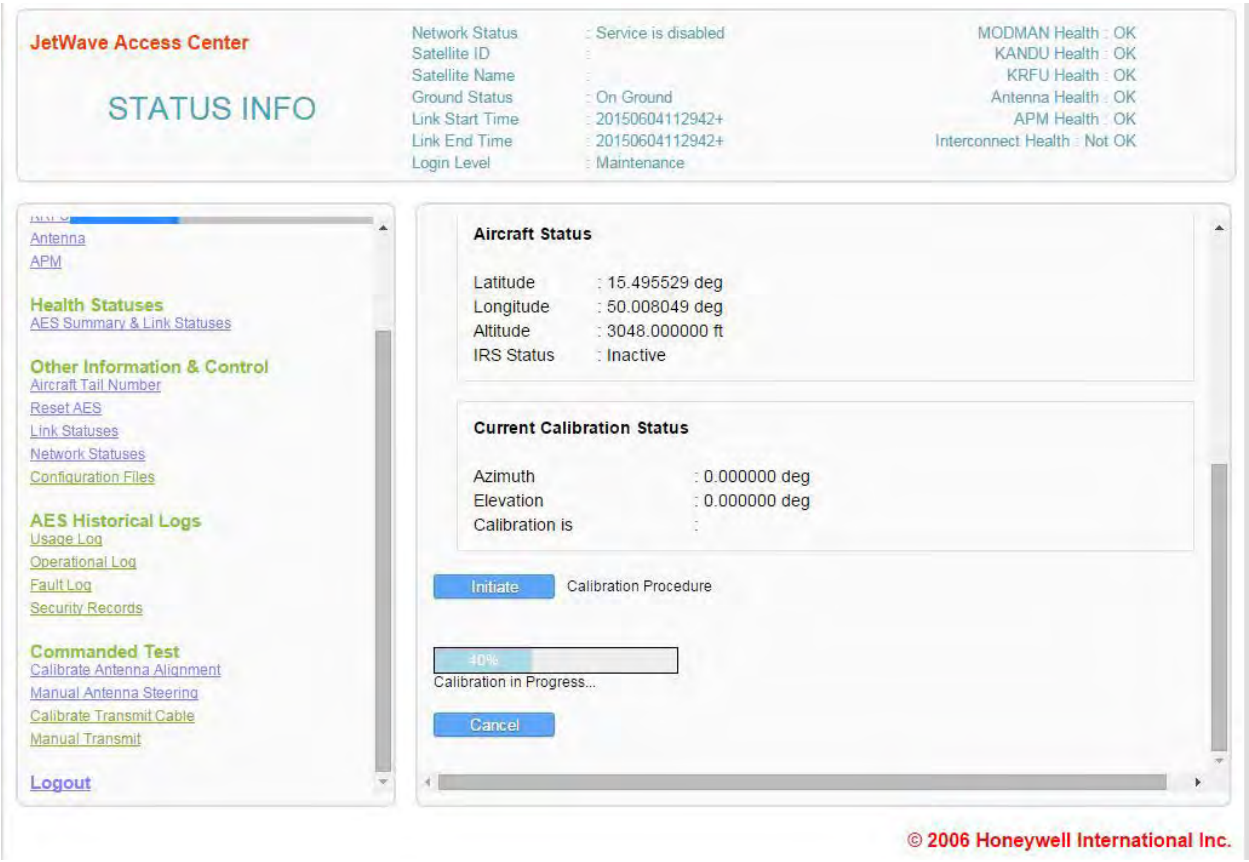


Figure 2-23. GUI Antenna Alignment Calibration Page Extract

5. Electrical Installation

For details about electrical installation, refer to Figure 2-33 thru Figure 2-36 for the system interconnect diagrams.

6. Cabling Requirements

Refer to Table 2-8 for the cabling requirements.

Table 2-8. Cabling Requirements

Cable	Conductor Type	Single Point	Multiple Point	Minimum Conductor Coverage by Shield
Power Lines	Single conductor, stranded	NA	N/A	N/A
Ethernet Data	Quadrax, twister pair	-	Yes	100%
RF	Coaxial, waveguide	-	Yes	100%
A429	Twisted pair, stranded	-	Yes	95%
RS-422	Twisted pair, shielded	-	Yes	100%
Discrete	Twisted pair, shielded, KANDU Single conductor, shielded, grounds		Yes	100%

When installing the JetWave™ system, follow the cabling requirements listed below:

- Ethernet LAN/WAN cables must meet flammability and TIA/EIA568-A CAT 5E requirements.
- Carlisle IT (ECS) 422404 or NF24Q100-01 is recommended for Quadrax connections.
- Twisted shielded pairs must meet ARINC 791 wiring requirements or equivalent.

Refer to Figure 2-33, Figure 2-34, Figure 2-35, and Figure 2-36 for wire size recommendations.

7. Drawings and Diagrams

Refer to Figure 2-24 for the Modman outline and installation drawing.

Refer to Figure 2-25 for the APM outline and installation drawing.

Refer to Figure 2-26 for the KANDU outline and installation drawing.

Refer to Figure 2-27 for the KRFU PN 90401203, conduction-cooled 1, outline and installation drawing.

Refer to Figure 2-28 for the KRFU PN 90402346, conduction-cooled 2, outline and installation drawing.

Refer to Figure 2-29 for the KRFU PN 90401202, forced air cooled, outline and installation drawing.

Refer to Figure 2-30 for the TMA outline and installation drawing.

Refer to Figure 2-31 for the FMA outline and installation drawing.

Refer to Figure 2-32 for the Fuselage Mount Radome outline and installation drawing.

Refer to Figure 2-33 for the JetWave™ System - TMA interconnect diagram.

Refer to Figure 2-34 for the JetWave™ System - FMA (baseline) interconnect diagram.

Refer to Figure 2-35 for the JetWave™ System - Boeing Specific FMA (external KRFU) interconnect diagram.

Refer to Figure 2-36 for the JetWave™ System - A350 Specific FMA interconnect diagram.

24. UNIT EXPORT CONTROL CLASSIFICATION NUMBER IS 7E994.

23. SPATIAL MODEL DEFINED BY 90400059-0001_REVC.STP

22. CAUTION LABEL: CAUTION 115 VAC.

21. TAMPER PROOF LABEL.

20. CAUTION LABEL: ESD DUST COVER.

19. CAUTION LABEL: ESD SENSITIVE.

18. FCC/INDUSTRY CANADA LABEL.

17. H/W S/W MOD DOT LABEL.

16. HONEYWELL IDENTIFICATION LABEL INCLUDES:
    HONEYWELL NAME
    DESCRIPTION: ASSY, GXA MODMAN
    HARDWARE P/N: 90400012-0001
    REV: (CURRENT REVISION)
    SOFTWARE P/N: (SOFTWARE PART NUMBER)
    VER: (CURRENT REVISION)
    S/N: (SERIAL NUMBER)
    DATE: (CURRENT DATE)
    WEIGHT: (WEIGHT IN kg AND lb)
    CAGE CODE: 38473
    MADE IN: CANADA
    TCCA MFG: 325-92

15. ENVIRONMENTAL CONDITIONS: SEE TABLE 3.

14. COOLING: BLOW-THROUGH/DRAW-THROUGH PER ARINC 600 LEVEL 1
    STANDARD: AIR FLOW AT 22 KG/HR AT 40°C
    WITH PRESSURE DROP OF 50±30Pa (5±3MM WATER)

13. CONNECTOR J1
    SEE TABLE 2 FOR CONNECTOR IDENTIFICATION.
    SEE SHEET 4 FOR CONNECTOR PIN OUTS.
    ARINC 600 INDEX CODE 52 (6,3,1) BLACK INDICATES RAISED PORTION.
    NOTE THAT AG1[CC,FF]/EG1[EE,JJ]/PG1[DD,GG] USE TWO CONNECTORS PER CONNECTION.

12. ELECTRICAL BONDING SHALL BE THROUGH CONTACT WITH THE
    BASE OF UNIT. BONDING TEST POINT AVAILABLE ON FRONT PANEL.
    DC BONDING RESISTANCE SHALL BE 2.5 MILLIOHMS OR LESS.

11. ELECTRICAL:
    INPUT POWER: 115 VAC, 360-800 Hz.
    POWER FACTOR: 0.813 MINIMUM LEADING; 0.679 MINIMUM LAGGING ±0.1 KVA LOAD.
    POWER CONSUMPTION: 60W MAXIMUM AT 115 VAC(360-800Hz).
    CURRENT: 0.52A MAXIMUM AT 115 VAC, 400 Hz.
    POWER DISSIPATION: 59W MAXIMUM AT 115 VAC(360-800Hz).

10. THIS UNIT SHALL BE MOUNTED ONLY IN AN ARINC 600 TRAY WITH A MATCHING
    CONNECTOR SCHEME.

9. INDICATED AREAS ARE FREE FROM PAINT AND PRIMER.

8. FINISH:
    METAL TREATMENT: CHEMICAL CONVERSION COATED PER MIL-DTL-5541,
    TYPE II, CLASS 3
    EXTERIOR FINISH: PRISM POWDER COAT PB134LT (POLYESTER POWDER,
    SATIN SANTEX BLACK)APPLIED AND CURED PER MANUFACTURER'S INSTRUCTIONS.

7. MATERIAL:
    CHASSIS - ALUMINUM ALLOY 5052-H32, .063 THK PER QQ-A-250/8

6. ELECTROSTATIC DISCHARGE SENSITIVE (ESD), HANDLE PER IPC-A-610.

5. ◔ DENOTES CENTRE OF GRAVITY - LOCATION IS APPROXIMATE.

4. WEIGHT: 14.0 LBS (6.35 KG) MAXIMUM.

3. DENOTES DIMENSION FROM FRONT PANEL TO REAR PANEL WALL.
    DIMENSION DOES NOT INCLUDE SCREW HEAD PROTRUSIONS AND CONNECTOR.

2. THIS UNIT MEETS THE DIMENSIONAL REQUIREMENTS OF A 4MCU PER
    ARINC SPECIFICATION 791.

1. DIMENSIONS AND TOLERANCES IAW Y14.5M-1994.

NOTES, UNLESS OTHERWISE SPECIFIED:

TABLE 2. GXA MODMAN CONNECTOR IDENTIFICATION 13

REF. DES	PART NUMBER	MATING CONNECTOR	REMARKS
J1	RADIALL 620601191	RADIALL NSXN2B875S00	J1-A TOP INSERT ARRANGEMENT Q11 (11X SIZE 8 QUADRAX)
			J1-B MIDDLE INSERT ARRANGEMENT 12QQ2 (118X #22 CONTACTS, 2X SIZE 8 QUADRAX)
			J1-C BOTTOM INSERT ARRANGEMENT 12F5C2 (4X #12 CONTACTS, 1X #16 CONTACTS, 5X SIZE 16 OPTICAL, 2X SIZE 5 COAX)

TABLE 3. GXA MODMAN ENVIRONMENTAL QUALIFICATION REQUIREMENTS

ENVIRONMENTAL CONDITIONS	RTCA/DO-160G SPECIFICATION	REQUIREMENTS
OPERATING LOW TEMPERATURE	SECTION 4.0, CAT. A1	-15°C
OPERATING HIGH TEMPERATURE	SECTION 4.0, CAT. A1	+55°C
ALTITUDE	SECTION 4.0, CAT. A1	15000 FT
OVERPRESSURE	SECTION 4.0, CAT. A1	170 KPa (-15000 FT)
DECOMPRESSION	SECTION 4.0, CAT. A1	75.25 KPa (8 KFT) TO 9.12 KPa (55 KFT) WITHIN 15 SECONDS
TEMPERATURE VARIATION	SECTION 5.0, CAT. B	5°C MIN. PER MINUTE
HUMIDITY	SECTION 6.0, CAT. B	NON-OPERATING, 10 CYCLES 85% RH @ 38°C 95% RH @ 65°C
OPERATIONAL SHOCK	SECTION 7.0, CAT. B	3 SHOCKS OF 6G, 11MS, 6 DIRECTIONS
CRASH SAFETY SUSTAINED	SECTION 7.0, CAT. B	UP 3.0G, DOWN 6.0G, FORWARD 18.0G, AFT 1.5G SIDE 4.5G, 3 SECS
CRASH SAFETY IMPULSE	SECTION 7.0, CAT. B	1 SHOCK OF 20G, 11 MS, 6 DIRECTIONS
VIBRATION	SECTION 8.0, CAT. S	PERFORMANCE LEVEL CURVE B2
EXPLOSIVE ATMOSPHERE	SECTION 9.0, CAT. X	NOT APPLICABLE
WATERPROOFNESS	SECTION 10.0, CAT. Y	
FLUIDS SUSCEPTIBILITY	SECTION 11.0, CAT. X	NOT APPLICABLE
SAND AND DUST	SECTION 12.0, CAT. X	NOT APPLICABLE
FUNGUS RESISTANCE	SECTION 13.0, CAT. F	BY ANALYSIS
SALT FOG	SECTION 14.0, CAT. X	NOT APPLICABLE
ICING	SECTION 24.0, CAT. X	NOT APPLICABLE
ESD	SECTION 25.0, CAT. A	
FLAMMABILITY	SECTION 26.0, CAT. C	BY ANALYSIS

E90400059-0001-1-C

Figure 2-24. Modman Outline and Installation Drawing (Sheet 1 of 4)

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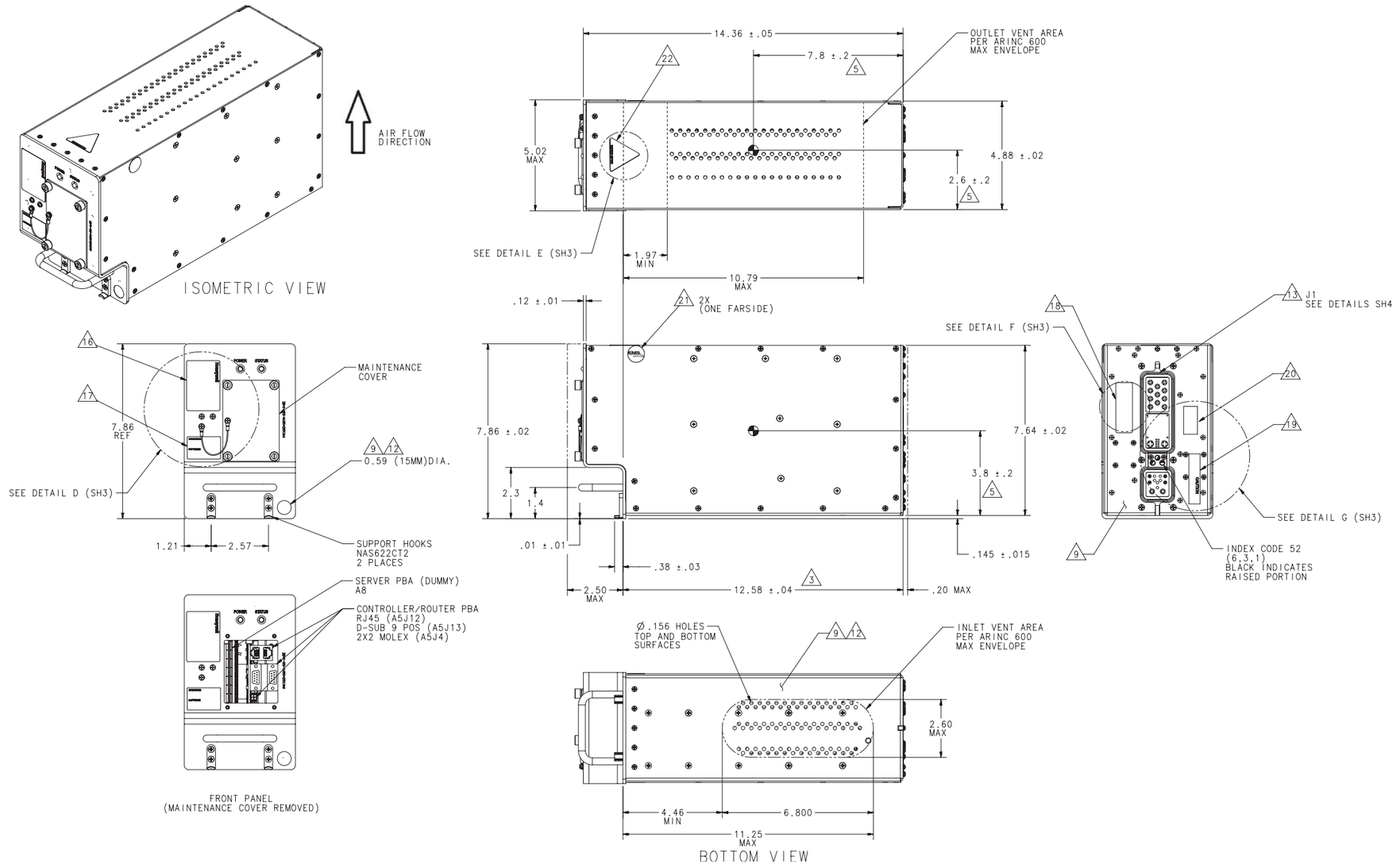

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Figure 2-24. Modman Outline and Installation Drawing (Sheet 2 of 4)

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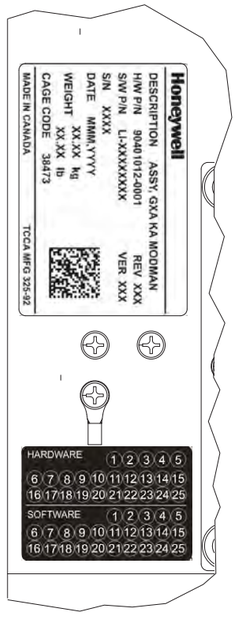
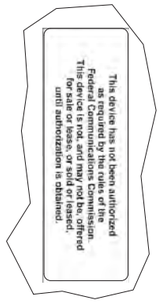
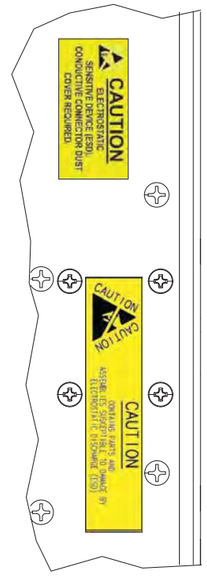


DETAIL D
SCALE 2:1

DETAIL E
SCALE 2:1



DETAIL F
SCALE 2:1



DETAIL G
SCALE 2:1

E90400059-0001-3-C

Figure 2-24. Modman Outline and Installation Drawing (Sheet 3 of 4)

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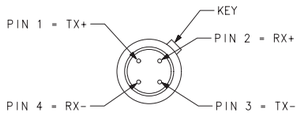
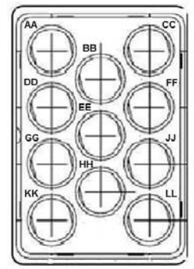


MATING FACE OF PIN TYPE CONTACT SHOWN
TYPICAL FOR TOP INSERT PINS AA TO LL

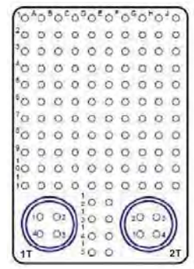
TOP INSERT



AA AISD ETHERNET AV2
BB AISD ETHERNET AV1
CC AISD GIGABIT AG1 13
DD PODD GIGABIT PG1 13
EE PIESD GIGABIT EG1 13
FF AISD GIGABIT AG1 13
GG PODD GIGABIT PG1 13
HH PODD ETHERNET PA2
JJ PIESD GIGABIT EG1 13
KK PODD ETHERNET PA1
LL PIESD ETHERNET EN6

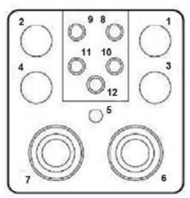
MIDDLE INSERT

	A	B	C	D	E	F	G	H	J	K
1	ETHERNET PA3 TX+	ETHERNET PA3 RX+	NOT USED	NOT USED	ETHERNET PA4 TX+	ETHERNET PA4 RX+	NOT USED	NOT USED	ETHERNET EN7 TX+	ETHERNET EN7 RX+
2	ETHERNET PA3 RX-	ETHERNET PA3 TX-	NOT USED	NOT USED	ETHERNET PA4 RX-	ETHERNET PA4 TX-	NOT USED	NOT USED	ETHERNET EN7 RX-	ETHERNET EN7 TX-
3	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
4	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
5	ETHERNET EN8 TX+	ETHERNET EN8 RX+	NOT USED	NOT USED	ETHERNET AV3 TX+	ETHERNET AV3 RX+	NOT USED	NOT USED	NOT USED	NOT USED
6	ETHERNET EN8 RX-	ETHERNET EN8 TX-	NOT USED	NOT USED	ETHERNET AV3 RX-	ETHERNET AV3 TX-	NOT USED	NOT USED	NO CONNECT	NO CONNECT
7	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NO CONNECT	NO CONNECT
8	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NO CONNECT	NO CONNECT
9	DATA TO/FROM APM+	DATA TO/FROM APM-	NO CONNECT	NO CONNECT	POWER TO APM	POWER RETURN FROM APM	RS422 TX+ KANDU RESET HI	RS422 TX- KANDU RESET LO	RS422 RX+ SPARE	RS422 RX- SPARE
10	REMOTE MANAGE ENABLE	LOCAL DATA LOAD ENABLE	MODMAN RESET	DISCRETE INPUT	DISCRETE INPUT	FACTORY/ BENCH MODE	NO CONNECT	DISCRETE OUTPUT	DISCRETE OUTPUT	DISCRETE OUTPUT
11	WEIGHT ON WHEELS (WOW)	CELLULAR TX ENABLE	DISCRETE INPUT	GROUND TRANSMIT ENABLE	PUBLIC SERVICE DISABLE	FAN COOLING AVAILABLE	RS422 TX+ KANDU FILTER SELECT HI	RS422 TX- KANDU FILTER SELECT LO	RS422 TX+ KANDU TX MUTE HI	RS422 TX- KANDU TX MUTE LO
12	1T PIESD ETHERNET EN3 KANDU				TX MUTE	DISCRETE SIGNAL GROUND	2T PIESD ETHERNET EN5 IFE			
13	1 TX+	2 RX+			SYSTEM AVAILABLE	DATA LINK AVAILABLE	2 RX+	3 TX-		
14	4 RX-	3 TX-			NOT USED	NOT USED	1 TX+	4 RX-		
15					A429 RX-A GPS	A429 RX-B GPS				



BOTTOM INSERT

2 NO CONNECT
9 NO CONNECT
8 NO CONNECT
1 115 VAC RETURN
4 NO CONNECT
11 NO CONNECT
12 NO CONNECT
10 NO CONNECT
3 CHASSIS GROUND
5 115 VAC
7 TX IF
6 RX IF



J1 CONTACT ASSIGNMENTS FOR MODMAN
VIEW SHOWN ON MATING FACE

E90400059-0001-4-C

Figure 2-24. Modman Outline and Installation Drawing (Sheet 4 of 4)

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22. UNIT EXPORT CONTROL CLASSIFICATION NUMBER IS 7E994.

21. DELETED

△20 LOCATE VOID LABEL APPROXIMATELY WHERE SHOWN.

△19 LOCATE MOD DOT LABEL APPROXIMATELY WHERE SHOWN.

△18 LOCATE ESD CAUTION LABEL APPROXIMATELY WHERE SHOWN.

17. DELETED.

△16 LOCATE FCC/INDUSTRY CANADA LABEL APPROXIMATELY WHERE SHOWN.

△15 LOCATE UNIT NAMEPLATE APPROXIMATELY WHERE SHOWN. HONEYWELL NAMEPLATE INCLUDES:
HONEYWELL NAME
PRODUCT NAME: ASSY,GXA APM
HARDWARE P/N: 90401121
REV: (CURRENT REV)
SOFTWARE P/N: N/A
VERSION: N/A
S/N: (SERIAL NUMBER)
DATE: (CURRENT DATE)
WEIGHT: (IN kg AND lb)
CAGE CODE: 38473
MADE IN: CANADA
TCCA MFG: 325-92

△14 ELECTROSTATIC SENSITIVE CONNECTOR DUST COVER (MS90376-12RB, NAS 831-12C, CAPLUGS CEC-12 OR EQUIVALENT).

13. ENVIRONMENTAL CONDITIONS: SEE TABLE 4.

12. COOLING: APM CAN OPERATE WITHOUT THE NEED OF ANY FORCED AIR COOLING.

△11 CONNECTOR J1
SEE TABLE 3 FOR CONNECTOR IDENTIFICATION
SEE TABLE 2 FOR CONNECTOR PIN OUTS.

△10 ELECTRICAL BONDING SHALL BE EITHER: THROUGH CONTACT WITH THE BASE OF UNIT; OR THROUGH A BONDING CABLE ATTACHED TO M3 EARTH STUD.

DC BONDING RESISTANCE SHALL BE 2.5 mΩ OR LESS.

9. MOUNTING FASTENERS TO BE .164-32 UNC-2A, CORROSION RESISTANT STEEL, MINIMUM ULTIMATE TENSILE STRENGTH OF 125 KSI.
TORQUE REQUIREMENTS FOR MOUNTING SCREWS ARE 25 IN-LBS MAX.

△8 BASE OF UNIT AND M3 EARTH STUD ARE FREE FROM PAINT AND PRIMER.

7. FINISH:
METAL TREATMENT: CHEMICAL CONVERSION COATED PER MIL-DTL-5541, TYPE II, CLASS 3
EXTERIOR FINISH: PRISM POWDER COAT PB134LT (POLYESTER POWDER, SATIN SANTEX BLACK)APPLIED AND CURED PER MANUFACTURER'S INSTRUCTIONS.

6. MATERIAL:
CHASSIS - ALUMINUM ALLOY 5052-H32 PER QQ-A-250/8

5. ELECTRICAL:
INPUT VOLTAGE: +4.2V DC NOMINAL SUPPLIED BY THE GXA MODMAN.
POWER CONSUMPTION : 0.3W (MAX)
POWER DISSIPATION : 0.3W (MAX).

△4 ⌖ INDICATES APPROXIMATE CENTRE OF GRAVITY

3. WEIGHT: 0.34 kg (12 OZ) MAXIMUM.

2. THIS UNIT MEETS THE DIMENSIONAL REQUIREMENTS OF ARINC 791-1.

1. DIMENSIONS AND TOLERANCES IAW Y14.5M-1994.

NOTES, UNLESS OTHERWISE SPECIFIED:

TABLE 1. GXA APM PART NUMBER

PART NUMBER	DESCRIPTION
90401121	ASSY, GXA APM

TABLE 2. J1 CONNECTOR CONTACT ASSIGNMENTS

PIN NUMBER	SIGNAL NAME
1	SERIAL DATA FROM [/TO] APM +
2	SERIAL DATA FROM [/TO] APM -
3	NC
4	NC
5	POWER TO APM (5V)
6	POWER RETURN FROM APM
7	CHASSIS GROUND
8-13	SPARE

TABLE 3. GXA APM CONNECTOR IDENTIFICATION

REF. DES	PART NUMBER	MATING CONNECTOR
J1	AMPHENOL D38999/20FB35PN	AMPHENOL D38999/26FB35SN OR EQUIVALENT.

TABLE 4. GXA APM ENVIRONMENTAL QUALIFICATION REQUIREMENTS

ENVIRONMENTAL CONDITIONS	RTCA/DO-160G SPECIFICATION	REQUIREMENTS
OPERATING LOW TEMPERATURE	SECTION 4.0, CAT. A1	-15°C
OPERATING HIGH TEMPERATURE	SECTION 4.0, CAT. A1	+55°C
ALTITUDE	SECTION 4.0, CAT. A1	15000 FT
OVERPRESSURE	SECTION 4.0, CAT. A1	199 KPa (-20000 FT)
DECOMPRESSION	SECTION 4.0, CAT. A1	75.25 KPa (8 KFT) TO 9.12 KPa (55 KFT) WITHIN 15 SECONDS.
TEMPERATURE VARIATION	SECTION 5.0, CAT. B	5°C MIN. PER MINUTE
HUMIDITY	SECTION 6.0, CAT. B	NON-OPERATING, 10 CYCLES 85% RH @ 38°C 95% RH @ 65°C
OPERATIONAL SHOCK	SECTION 7.0, CAT. B	3 SHOCKS OF 6G, 11MS, 6 DIRECTIONS
CRASH SAFETY SUSTAINED	SECTION 7.0, CAT. B	18 G, 3 SECS, 6 DIRECTIONS
CRASH SAFETY IMPULSE	SECTION 7.0, CAT. B	1 SHOCK OF 20G, 11 MS, 6 DIRECTIONS
VIBRATION	SECTION 8.0, CAT. S	PERFORMANCE LEVEL CURVE B2
EXPLOSIVE ATMOSPHERE	SECTION 9.0, CAT. X	NOT APPLICABLE
WATERPROOFNESS	SECTION 10.0, CAT. Y	
FLUIDS SUSCEPTIBILITY	SECTION 11.0, CAT. X	NOT APPLICABLE
SAND AND DUST	SECTION 12.0, CAT. D	DUST SECTION 12.3.1
FUNGUS RESISTANCE	SECTION 13.0, CAT. F	BY ANALYSIS
SALT FOG	SECTION 14.0, CAT. X	NOT APPLICABLE
ICING	SECTION 24.0, CAT. X	NOT APPLICABLE
ESD	SECTION 25.0, CAT. A	
FLAMMABILITY	SECTION 26.0, CAT. C	

E90401592-1-D

Figure 2-25. APM Outline and Installation Drawing (Sheet 1 of 2)