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System Description, Installation, and Maintenance Manual

JetWave™ MCS-8562 Terminal

Model	Part Number
Modman	90400012-0001 or 90400012-0002
APM	90401121
FMA	90002609-001
KANDU	90404518
BUC-HPA	90003227-003

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TRANSMITTAL INFORMATION

THIS IS AN INITIAL RELEASE OF JETWAVE MCS-8562 TERMINAL SDIM ATA NO. 23-15-84 AND IS ISSUED FOR USE IN SUPPORT OF THE FOLLOWING:

Table TI-1 shows the applicable components.

Table TI-1. Applicable Components

Component PN	Nomenclature
90400012-0001 or 90400012-0002	Modman
90401121	APM
90002609-001	FMA
90404518	KANDU
90003227-003	BUC-HPA

Revision History

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

Table TI-2. Revision History

Revision	Revision Date
0	11 Nov 2020

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RECORD OF REVISIONS

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

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

Revision Number	Revision Date	Date Put in Manual	By		Revision Number	Revision Date	Date Put in Manual	By

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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: A TR may be active, incorporated, or deleted. “Active” is entered by the holder of the 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 “Deleted” means a TR has been replaced by another TR, a TR number will not be issued, or a TR has been deleted.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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LIST OF EFFECTIVE PAGES

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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.

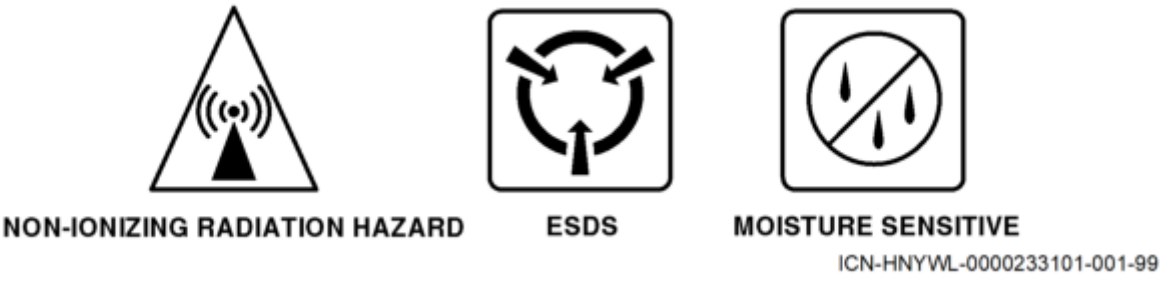

Figure INTRO-1. Symbols

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™ MCS-8562 Terminal. The radome selected must be approved by Honeywell in order to meet the performance standards. The radome installation will depend on the radome selected by the installer for each aircraft type. 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

The following Part Numbers and variants cover the various JetWave™ MCS-8562 Terminal hardware configurations:

- 90400012-0001 or 90400012-0002 - Modman
- 90401121 - APM
- 90002609-001 - FMA
- 90404518 - KANDU
- 90003227-003 BUC-HPA

4. Organization

This manual includes the following sections:

- INTRODUCTION
- SECTION 1 - SYSTEM DESCRIPTION
- SECTION 2 - SYSTEM PRE-CONFIGURATION
- SECTION 3 - INSTALLATION
- SECTION 4 - SOFTWARE CONFIGURATION
- SECTION 5 - SYSTEM COMMISSIONING
- SECTION 6 - TROUBLESHOOTING
- SECTION 7 - MAINTENANCE AND REPAIR
- APPENDIX A
- APPENDIX B
- APPENDIX C
- APPENDIX D

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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. Check for the latest version of the publication.

- The United States GPO Style Manual (available at http://www.gpo.gov/fdsys/pkg/GPO-STYLEMANUAL-2008/content-detail.html)
- IEEE Std 260.1, Standard Letter Symbols for Units of Measurement (available from the American National Standards Institute at http://www.ansi.org)
- ASME Y14.38, Abbreviations for Use on Drawings and Related Documents (available from the American National Standards Institute at http://www.ansi.org)
- ASME Y14.5, Dimensioning and Tolerancing (available from the American National Standards Institute at http://www.ansi.org)
- ANSI/IEEE Std 91, Graphic Symbols for Logic Functions (available from the American National Standards Institute at http://www.ansi.org)
- CAGE codes and manufacturers' addresses are available at https://cage.dla.mil
- IEEE 315/ANSI Y32.2, Graphic Symbols for Electrical and Electronics Diagrams (available from the American National Standards InstituteInstitute at http://www.ansi.org)
- ARINC 791P1-3 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.

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

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

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

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

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:

Table INTRO-1. List of Acronyms and Abbreviations

Term	Full Term
AC	alternating current
ACPR	adjacent channel power ratio
AES	aircraft earth station
AISD	aircraft information service domain
AIM	aircraft interface mount
AIT	Avionics Interface Technologies
AMIP	open antenna to modem interface protocol

Table INTRO-1. List of Acronyms and Abbreviations (Cont)

Term	Full Term
ANSI	American National Standards Institute
APM	airplane personality module
ARINC	Aeronautical Radio, Incorporated
ASC	antenna subsystem controller
ASME	American Society of Mechanical Engineers
ATA	Air Transport Association
AWG	American wire gauge
BDC	block down-converter
BIT	built-in test
BITE	built-in test equipment
BOSS	Broadband Off-board Services System
BRS	business and regional aviation segment
BUC	block up-converter
C	Celsius
CAGE	commercial and government entity
CAT	commercial air transport
CBIT	continuous built-in test
CIR	committed information rate
cm	centimeter
csv	comma separated values
dB	decibel
DER	designated engineering representative
DHCP	dynamic host configuration protocol
DIN	device identifier number
DNS	domain name system
EIRP SD	effectively isotropic radiated power spectral density
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

Table INTRO-1. List of Acronyms and Abbreviations (Cont)

Term	Full Term
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	internet service provider
Ka	part of the radio frequency spectrum: 26.5 thru 40 GHz
KANDU	Ku/Ka band aircraft network data 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

Table INTRO-1. List of Acronyms and Abbreviations (Cont)

Term	Full Term
mA	milliampere
Mbps	megabits per second
MCU	modular concept unit
MHz	megahertz
MIB	management information base
MIR	maximum information rate
mm	millimeter
Modman	modem manager
MOP	maximum operating power
ms	millisecond
NA	not applicable
NEXT	near end cross talk
Nm	Newton meter
NMS	network management system
O&I	outline and installation
OAE	outside antenna equipment
OID	object identifier
OMT	orthogonal mode transducer
OTA	over the air
Pa	pascal
PCU	position control unit
PFD	power flux density
PIESD	passenger information and entertainment services domain
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

Table INTRO-1. List of Acronyms and Abbreviations (Cont)

Term	Full Term
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
TNC	threaded Neill-Concelman
TPK	terminal provisioning key
TX	transmit
UNC	unified coarse thread
USB	universal serial bus
USMS	United States Measurement System
VAC	volt alternating current
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
WGS	wideband global SATCOM
WOW	weight on wheels

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SECTION 1 – SYSTEM DESCRIPTION

1. JetWave™ MCS-8562 Terminal Overview

The JetWave™ MCS-8562 Terminal 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.

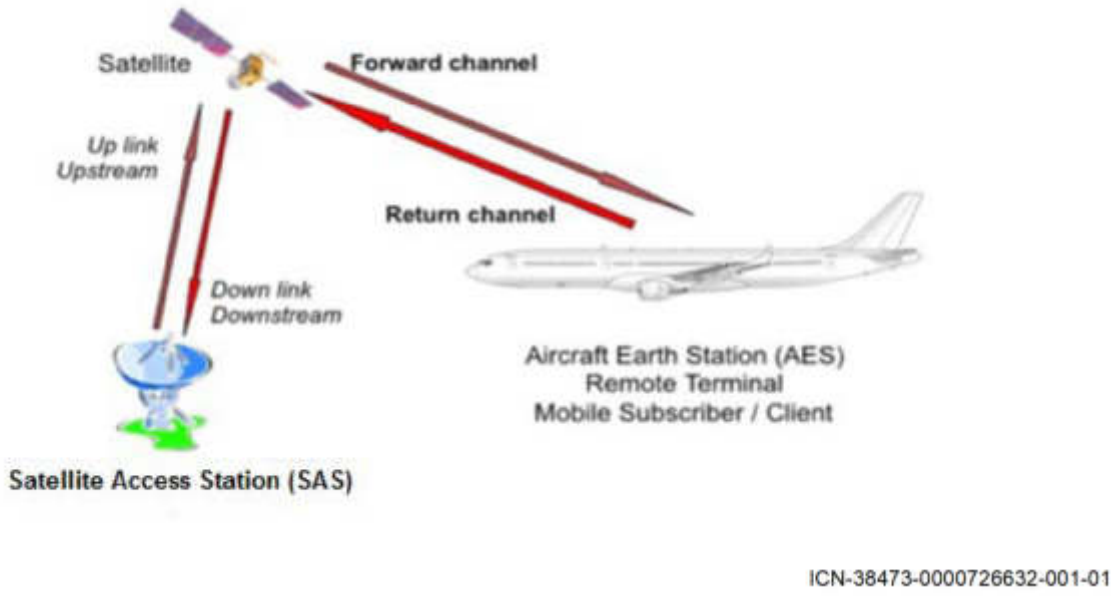

Figure 1-1. Ka-Band System

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™ MCS-8562 Terminal operating frequency range is 29 to 31 GHz (TX, Ka-band) and 19.2 to 21.2 GHz (RX, K-band). The JetWave™ MCS-8562 Terminal system also supports an external modem to operate in frequency range of 29 to 31 GHz (TX, Ka-band) and 19.2 to 21.2 GHz (RX, K-band).

A. JetWave™ MCS-8562 Terminal LRUs

The JetWave™ MCS-8562 Terminal is made up of the LRUs in Table 1-1.

Table 1-1. JetWave™ MCS-8562 Terminal LRUs

LRU	PN
Modman	90400012-0001 or 90400012-0002
APM	90401121
KANDU	90404518
BUC-HPA	90003227-003
FMA	90002609-001

B. JetWave™ MCS-8562 Terminal 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 BUC-HPA leading particulars.

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

Table 1-2. Modman Leading Particulars

Characteristic	Specification
Part Number	90400012-0001 or 90400012-0002
Length	15.32 inches (389.1 mm) maximum
Width	5.02 inches (127.5 mm) maximum
Height	7.88 inches (200.2 mm) maximum
Weight	14.0 pounds (6.35 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	60 watts maximum NOTE: Honeywell recommends that wiring and cooling is designed for 100 watts in order to allow for seamless upgrades to the Modman with enhanced capability at a later date.
Power dissipation	59 watts maximum
Cooling	48.5 lb/hr (22 kg/hr) at 104°F (40°C)
Operating temperature	-40°F (-40°C) to 158°F (70°C)
Mounting information	4-MCU, forced-air, ARINC 600 series tray
Maintenance	No scheduled maintenance required
Interfaces	J1A - PODD, PIESD, and AISD J1B - APM, Aircraft, PODD, PIESD, AISD, and KANDU J1C - IF to/from BUC-HPA and aircraft power

Table 1-3. APM Leading Particulars

Characteristic	Specification
Part Number	90401121
Length	4.515 inches (114.68 mm) without connector
Width	4.015 inches (101.98 mm) maximum
Height	1.315 inches (33.40 mm) maximum
Weight	12 ounces (0.34 kg) maximum
Operating voltage	5 VDC, 45 mA maximum

Table 1-3. APM Leading Particulars (Cont)

Characteristic	Specification
Power consumption	Power supplied by Modman
Power dissipation	0.3 watts maximum
Cooling	No forced-air cooling required
Operating temperature	5°F (-15°C) to 158°F (70°C)
Maintenance	No scheduled maintenance required
Interface	J1 - Modman

Table 1-4. KANDU Leading Particulars

Characteristic	Specification
Part Number	90404518
Length	11.020 inches (279.91 mm) maximum
Width	9.075 inches (230.50 mm) maximum
Height	4.760 inches (120.90 mm) maximum
Weight	8.8 pounds (4.0 kg) maximum
Operating voltage	115 VAC, 400 Hz
Power consumption	200 watts maximum average power when installed with Class A FMA
Power dissipation	50 watts maximum average power when installed with Class A FMA
Cooling	See 90405004 Outline and Installation Drawing for the KANDU for cooling clearance requirement 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 - BUC-HPA, OAE, and maintenance J4 - Ethernet (quadrax)

Table 1-5. BUC-HPA Leading Particulars

Characteristic	Specification
Part Number	90003227-003
Length	16.55 inches (420.4 mm) maximum
Width	9.01 inches (228.9 mm) maximum

Table 1-5. BUC-HPA Leading Particulars (Cont)

Characteristic	Specification
Height	2.08 inches (52.8 mm) maximum
Weight	11.5 pounds (5.2 kg) maximum (including thermal pad) BUC-HPA 10.75 pounds (4.9 kg) nominal Thermal pad 0.75 pounds (0.34 kg) nominal
Operating voltage	115 VAC, 400 Hz
Power consumption	220 watts maximum at MOP 96-122 VAC
Power dissipation	200 watts maximum at MOP 96-122 VAC
Cooling	Conductive - cooled through the baseplate with thermal pad. BUC-HPA will mute the transmit RF signal if the hottest point on the aircraft baseplate exceeds 185°F (85°C). BUC-HPA will automatically un-mute once BUC-HPA cools below 167˚F (75˚C).
Operating temperature	-67°F (-55°C) to 185°F (85°C)
Maintenance	No scheduled maintenance required
Interfaces	J1 - Aircraft power input J2 - Control interface from KANDU J3 - RF TX to OAE J4 - IF RX from OAE J5 - IF TX from Modman J6 - IF RX to Modman

Table 1-6. FMA Leading Particulars

Characteristic	Specification
Part Number	90002609-001
Length	23.03 inches (585 mm) maximum
Width	35.72 inches (907.3 mm), maximum reflector sweep volume
Height	9.39 inches (238.51 mm) maximum
Weight	88 pounds (39.92 kg) maximum NOTE: The lifting fixture is 5.5 pounds (2.5 kg)
Operating voltage	38 VDC and 24 VDC for IMU supplied by the KANDU
Operating temperature	-67°F (-55°C) to 158°F (70°C)
Power dissipation	160 W @ steady state
Cooling	Natural convection and radiation only

Table 1-6. FMA Leading Particulars (Cont)

Characteristic	Specification
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 BUC-HPA J5 - RF TX from BUC-HPA

2. Honeywell JetWave™ MCS-8562 Terminal Architecture

This section describes the 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.

The JetWave™ MCS-8562 Terminal behaves in the same manner as the JW1.0 system in operation apart from the responding to requests for different TX/RX polarization and/or frequency band switching as commanded by the ACM based on the Inmarsat satellite topology.

The JetWave™ MCS-8562 Terminal wideband system also supports an optional external modem and is capable of switching between the commercial bands and Non-Commercial bands of operation. The switch between services is controlled by an external Modman discrete, GUI menu option and/or external SNMP branch which will indicate to the terminal dynamically which mode of operation it should be in.

The external modem operates in a standalone mode of operation where modem parameters such as satellite target longitude, beam polarity, frequency band etc are passed to the Modman by user entering the parameters into the GUI.

Refer to Figure 1-2 for the JetWave™ MCS-8562 Terminal block diagram.

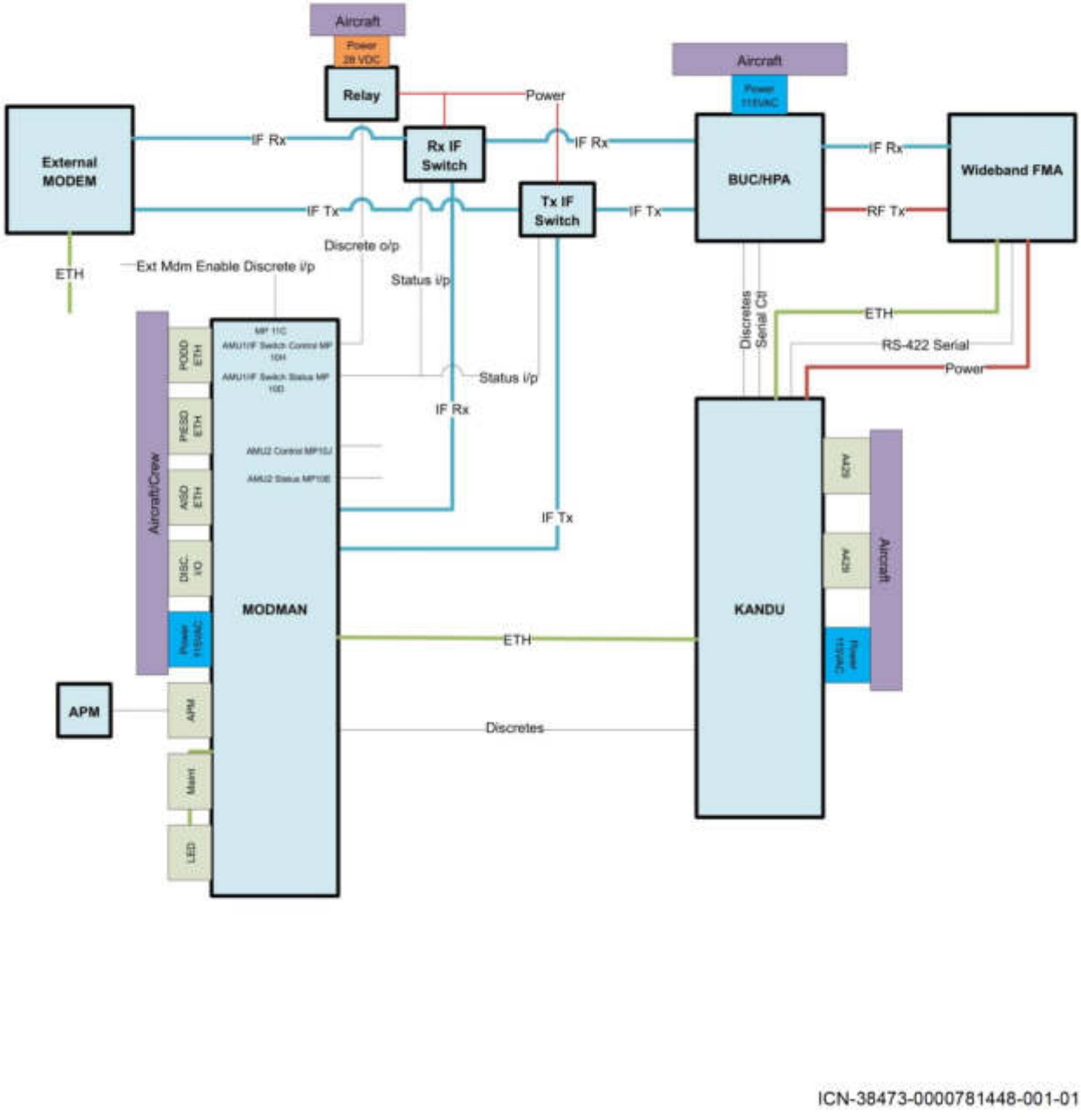

Figure 1-2. JetWave™ MCS-8562 Terminal Block Diagram

The JetWave™ MCS-8562 Terminal LRUs are as follows:

A. FMA

- The FMA includes an aperture.
- The FMA contains an LNA for amplification of signals in the receive path.
- The FMA includes the mechanical pointing system, positioner, motors and sensors, and an IMU to detect movement of the platform.
- The FMA accepts the transmit Ka-band signal from the BUC-HPA.
- The FMA antenna K-band receive path is amplified by the LNA, down-converted and sent to the BUC-HPA.
- The FMA receives power from the KANDU.
- The FMA accepts the control interface from the KANDU and lets the antenna aperture report status, BITE, and IMU position back to the KANDU.

B. BUC-HPA

- Contains a BUC to convert the transmit IF frequencies (950-2000 MHz) to Ka-band frequencies (29-31 GHz)
- Contains an HPA to increase the signal strength for transmission by the antenna
- Contains an RX L-band interface in which passes through from the FMA to the Modman
- Accepts 115 VAC aircraft power.

C. KANDU

- Receives commands from the Modman through an Ethernet interface to configure the antenna/BUC-HPA 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 BUC-HPA 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 BUC-HPA along the IF frequency between 950-1950 MHz.
- Supplies the user interfaces to the aircraft and passengers as follows:
  - The PODD interfaces provide service to the passengers through the use of Ethernet (10/100/1000 Base T).
  - The PIESD interfaces provide services to passenger entertainment devices installed on the aircraft (in flight entertainment systems). This system uses Ethernet (10/100/1000 Base T).

- The AISD interfaces provide services to the aircraft/cockpit, such as the electronic flight bag, data load, etc. This system uses Ethernet (10/100/1000 Base T) interfaces.
- The discrete I/O for aircraft status and for reporting system status.

- Has two LEDs to provide power and fault status on the LRU front panel.
- Accepts 115 VAC from the aircraft.
- Manages the BIT for the complete AES.
- Contains the modem, which transmits and receives to/from the BUC-HPA.
- Controls the BUC-HPA and KANDU (and through it, the OAE) through the Ethernet interface and RS-422 discretes.
- Controls the IF Switch through discretes.

E. APM

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

F. External Modem and IF switch (Optional)

- Transmits and receives to/from the BUC-HPA
- Switch Modem signal to/from BUC-HPA.

3. JetWave™ MCS-8562 Terminal Modes of Operation

The JetWave™ MCS-8562 Terminal supports the following modes of operation:

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

A. Power On Mode

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

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

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

B. System Initialization Mode

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

While in System Initialization Mode, the RS422, discrete signal and the Ethernet interfaces are available and active on all the JetWave™ MCS-8562 Terminal 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 BUC-HPA, 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 satellite connection is initiated subject to the system meeting the following conditions – aircraft is in the air, there is no geographic restriction, the antenna has a line of sight to the satellite, and the system has completed Cable Calibration and Antenna Alignment. Ground operation is possible if the GTE is asserted. The user traffic can be started once the antenna is pointed correctly to the satellite and the terminal locks on to the satellite for providing the connectivity. The system enables all the supported services like continuous BITE, SNMP, GUI, user services, etc. in this mode.

AES remains in Normal Operation Mode until either the occurrence of a critical fault, or it is commanded to another mode. Operation with the Modman internal modem vs. the External Modem are sub-modes of Normal Operation Mode. In the external modem mode, satellite information such as frequency band and satellite target is entered into the mission configuration via the GUI, and signal to the BUC-HPA is switched to the external modem with the IF switch. In the internal modem mode, the IF signal path is switch back to Modman with the IF switch.

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

D. Critical Fault Mode

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

E. Data Load Mode

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

F. Commanded Mode

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

4. About Inmarsat Services

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

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

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

SECTION 2 – SYSTEM PRE-CONFIGURATION

1. AES Configuration Data

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

The AES configuration data is a set of configuration files, stored on the APM. Each configuration file contains a set of airplane-unique parameters. The parameters define the configuration of the AES necessary for the initialization and operation of the Honeywell JetWave™ MCS-8562 Terminal AES system. The AES configuration data holds information such as:

- Aircraft tail registration number
- Aircraft structural blockage information
- ARINC 429 label definition set for positioning and steering used by the KANDU
- WOW input and polarity, etc
- USER operational preferences
- LAN network configuration data
- Ability to download software and offload log over the air.

A. AES System Configurations

The details of the ARINC 429 labels required for the JetWave™ MCS-8562 Terminal are mentioned in the table below:

Table 2-1. ARINC 429 Label List

Label Set	Required ARINC 429 Labels	Description	Source	Maximum Transmit Delay (msec)	Maximum Transmit Interval (msec)	Approximate Resolution
Label	For best accuracy	Preferred Label Set				
150	Yes	UTC Time		Nil	1000	1s
260	Yes	Date			1000	1 day
254 /110	Yes	Present Position – Latitude / GNSS Latitude	Hybrid /GNSS	160 /1000	100 /20	0.000172°
255 /111	Yes	Present Position – Longitude /GNSS Longitude	Hybrid /GNSS	160 /1000	100 /20	0.000172°
261 /76	Yes	Altitude /GNSS Altitude (MSL)	Hybrid /GNSS	65 /1000	40 /20	0.125 ft
132 /314	Yes /No	True Heading	Hybrid /INS	110	50	0.0055° /0.4°
324	Yes	Pitch Angle	INS	50	20	0.011°
325	Yes	Roll Angle	INS	50	20	0.01°

Table 2-1. ARINC 429 Label List (Cont)

Label Set	Required ARINC 429 Labels	Description	Source	Maximum Transmit Delay (msec)	Maximum Transmit Interval (msec)	Approximate Resolution
330	Yes	Yaw Rate	INS	50	20	0.015 degrees/sec
326	Yes	Pitch Rate	INS	50	20	0.015 degrees/sec
327	Yes	Roll Rate	INS	50	20	0.015 degrees/sec
175 /112/312	Yes	Ground Speed /GNSS Ground Speed	Hybrid /GNSS/INS	110 /Nil	40	0.125 knots (kn)
Label	Acceptable Replacement to Primary					
125		UTC Time	INS	1200	200	0.1 min.
Label	Optional ARINC 429 labels					
137 /313/103	N/A	True Track	INS	N/A	1 Hz	N/A
270	N/A	IRS Discrete Word #1	INS	N/A	1 Hz	N/A
315	N/A	Horizontal Stabilization	Installation dependent	N/A	1 Hz	N/A

The AES system configuration includes the aircraft installation information.

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

To view and make sure the AES configuration data is correct, navigate to the “Configuration Files” information pages under the “Other Information & Control” menu. Figure 5-4 shows the typical configuration file Information page.

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

B. Regulatory Log Configuration Parameters

The regulatory log configuration parameters file (APM file - reglog.cfg) contains details of the remote server for transferring the regulatory log data, downloading new software, and offloading Jetwave logs.

C. Aircraft Service Configuration

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

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

The following airframe specific information is required for creating the JetWave™ MCS-8562 Terminal configuration files:

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

Refer to APPENDIX D for more details.

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SECTION 3 – INSTALLATION

1. Overview

A. Installation Procedure Overview for the JetWave™ MCS-8562 Terminal

This section includes information about installing the equipment in the core JetWave™ MCS-8562 Terminal. 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 C for the installation reference checklist.

Complete the Airframe Specific Information sheet in APPENDIX D. Follow the guidelines in APPENDIX D to request a new APM configuration. For new configurations, provide this sheet to Honeywell so an APM file can be generated. Existing APM configuration files are reusable and can typically be used for subsequent installations on aircraft of the same model. Installers are encouraged to ensure an APM file is available before beginning an installation. If unsure, replacement and/or new APM configuration files can be requested from the online form on the ASDS portion of the Honeywell portal. Note that the typical lead time between APM file request and APM file is 20 business days, so installers should work this issue early in the installation process.

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

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

The JetWave™ MCS-8562 Terminal installation procedure includes:

- the Modman, APM, Maintenance Panel and Discrete wiring
- the KANDU
- the AIM or the LAIM
- the BUC-HPA Thermal Pad and the BUC-HPA
- the FMA
- Cabling and drawings.
- Optional installation of external modem and IF switch.

Refer to Table 3-5 for a detailed explanation of the discrete signals required for correct operation of the system.

The overview of the installation procedure for the JetWave™ MCS-8562 Terminal is as follows:

(1) Install adapter plate for the FMA. For Fuselage Mount Configurations, install either the ARINC 791 style antenna interface mount (AIM) or non ARINC 791 local antenna interface mount (LAIM), depending on the selected installation option. Installation shall be per instructions related to each configuration. The adapter plates required for mounting the OAE are available in installation kits from Honeywell and various other suppliers.

(2) Install the OAE and JetWave™ MCS-8562 Terminal components in accordance with the installation drawings provided.

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

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

(5) Apply power to the system.

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

2. JetWave™ MCS-8562 Terminal Internal LRU Installation

A. Modman

Install the Modman in a standard 4-MCU tray. The customer is responsible for providing the mounting tray, the mating ARINC 600 connector, contacts, all the cabling for the installaton as well as any installation measures necessary to prevent the Modman from being exposed to dripping water.

Refer to Figure 3-6 or Figure 3-7 for outline and installation information, and Figure 3-12 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 3-1. Mating Connector

Mating Connector	Radiall P/N
ARINC 600 Connector	NSXN2B875S00

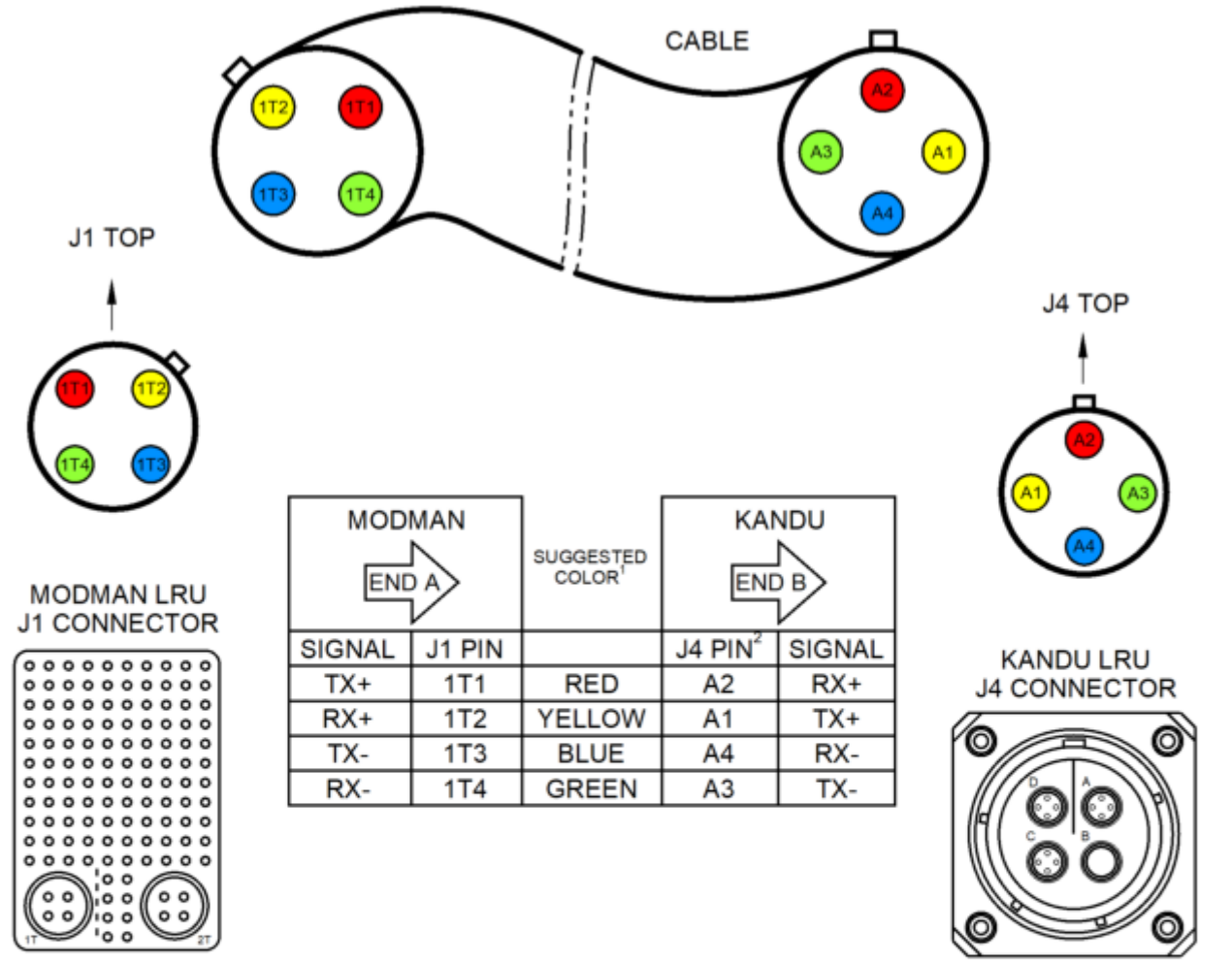
Table 3-2. Modman ARINC 600 Connector

Connector PN	Description	Qty
PN 620 601 191	ARINC 600 connector shell Size 2 with inserts	1
Insert A: PN 620176008	Arrangement Q11, Shell Size 2: Size 8 quadrax contact for Ethernet connections	 11
Insert B: PN: 620361 PN 620176008	Arrangement 120Q2, Shell Size 2: Size 22 Socket Contacts Size 8 quadrax contact for Ethernet connections	 118 2
Insert C: PN: 620240	Arrangement 12F5C2, Shell Size 2: #12 pin contacts	 4

Table 3-2. Modman ARINC 600 Connector (Cont)

Connector PN	Description	Qty
PN: 620230	#16 pin contacts	1
PN: not included	Size 16 optical contacts (not used)	5
PN: 620022	Size 5 coax contact for RF connections	2

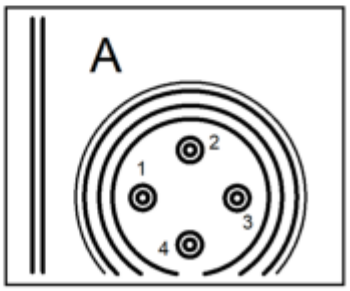
NOTE: While engineering the JetWave™ MCS-8562 Terminal LRU interconnections, make sure the LRU quadrax terminations do not distort natural wire orientations. There are geometric relationships that must be maintained between the quadrax contact and the natural twist of the star-quad wire. Wire bend radii and clamping conditions typical of aircraft installations should not cause deviation from NEXT parameters of the ARINC 664 compliant Star Quad cables for Ethernet interfaces terminating on Quadrax receptacles. Refer to the applicable interconnection diagrams for the indicator that the connector rotation of the wire is in a clockwise direction. Refer to Figure 3-1 for information on Recommended Interconnect Wiring Pin Numbering.



MODMAN (END A)		SUGGESTED COLOR[1]	KANDU (END B)	
SIGNAL	J1 PIN		J4 PIN[2]	SIGNAL
TX+	1T1	RED	A2	RX+
RX+	1T2	YELLOW	A1	TX+
TX-	1T3	BLUE	A4	RX-
RX-	1T4	GREEN	A3	TX-

NOTE:

1. Above colors are based on specific cable part number and are example only. If other colors are used, impedance pair integrity must be maintained.
2. Use pin locations and numbering identified above; do not use manufacturer-specific quadrax pin numbering.
3. The contact key/keyway is not generally visible after quadrax pins are installed.
4. The connection may include a bulkhead connector in which case the pin-to-pin continuity between Modman and KANDU must be maintained.
5. Quadrax cable impedance pairs appear on opposite and non-adjacent wires as viewed from the end of the cable cross-section. Those impedance pairs on non-adjacent wires must be terminated into the signal pairs on non-adjacent pins in the Quadrax contact.



J4-A CONNECTOR DETAIL

ICN-38473-0000702455-001-01

Figure 3-1. Recommended Interconnect Wiring Diagram

(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 BUC-HPA must meet the recommended insertion loss. Refer to Table 3-3. The allowed insertion loss should account for any optional IF switch components.

NOTE: The VSWR specification is for the cables, and not for the total VSWR of the installation.

Table 3-3. Insertion Loss Between Modman and BUC-HPA

Insertion Loss at 50 MHz	Insertion Loss at 950 MHz	Insertion Loss at 1,450 MHz	Insertion Loss at 1,950 MHz
Loss in TX path must be less than 3.1 dB	Minimum loss of 11 dB	TX and RX cable loss must be matched within 1 dB Maximum loss of 18 dB	TX and RX coax cables should be 50 ohms with a VSWR of less than 1.5:1 Maximum loss of 21.2 dB **NOTE:** TX and RX cables must have a minimum isolation of 100 dB

NOTE: The isolation specification may need to be increased if the TX and RX cables are in close proximity to high power RF signals in the 950 MHz to 1,950 MHz band, e.g. cellular base stations.

(5) If the loss in the chosen cable is too small, an equalizer or attenuator should be inserted in the IF path. The choice of parts is detailed in Table 3-4.

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

Table 3-4. Modman Insertion Loss Values

	Insertion Loss @ 950 MHz		
	< 6.5 dB	**≥ 6.5 dB, <11dB**	**≥ 11dB**
Equalizer in TX path	10.5 dB Minicircuits, PN TAT-10R5DC-1+ (10.5 dB equalizer) or equivalent	4.8 dB Minicircuits, PN TAT-4R8DC-1+ (4.8 dB equalizer) or equivalent	None
Attenuator in RX path	10.5 dB Minicircuits, PN TAT-10R5-1+ (10.5 dB attenuator) or equivalent	4.8 dB Minicircuits, PN TAT-4R8-1+ (4.8 dB attenuator) or equivalent	None

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

B. IF Switch

(1) The JetWave™ MCS-8562 Terminal system is capable of supporting an external modem. To install the external modem, the IF coaxial cable path requires an IF switch. Honeywell's recommended configuration uses military specification P/N M3928/10-05 for the IF Switches, along with a control relay (P/N LM-1210-E-MADJV from Applied Avionics, Inc.) capable of driving the current required by the switches. If the application differs from the recommended configuration, please consult Honeywell. Refer to Figure 3-12 for the applicable interconnect diagram.

C. APM

The APM can be installed in any orientation. Refer to Figure 3-8 for outline and installation information and Figure 3-12 for the applicable interconnect diagram.

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

There are no clearance requirements for the APM.

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

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

The APM must be electrically bonded to the airframe through contact with the base of the unit or through a bonding cable attached to M3 earth stud. Do not exceed 4.1 in-lb plus an allowance for the lock mechanism used. The APM bonding resistance must be less than or equal to 2.5 mΩ.

D. Maintenance Panel

If the JetWave™ MCS-8562 Terminal is not wired to other systems on the aircraft, the discrete I/O and Ethernet ports must be brought out to a suitable maintenance panel to allow for system checks and routine maintenance, such as system software upgrades. The discrete I/O and Ethernet ports needed are as follows:

(1) Discrete Outputs:

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

- Optional: System available (Modman MP13E) open/ ground output connected to a lamp
- Optional: Data link available (Modman MP13F) open/ ground output connected to a lamp.

(2) Discrete Inputs:

- Mandatory: Local data load enable (Modman MP10B) connected to a normally open switch with a GND to enable
- Mandatory: Ground transmit. Ground transmit enable may be hard-wired for the desired behavior at the Modman connector (Modman MP11D) connected to a normally open switch with a GND to enable.
- Optional: Public service disable (Modman MP11E) connected to a normally open switch with a GND to enable
- Optional: Modman reset (Modman MP10C) connected to a normally open switch with a GND to enable
- Optional: External Modem Enable (Modman MP11C) open/ground to switch between internal and external modem mode
- Optional: Weight-on-Wheels (Modman MP11A) connected to determine Air/Ground Status, as configured by the AES system configuration data.

- Mandatory: Tx Control mute (KANDU J1D) connected to a normally open switch with a GND to enable.
- Mandatory: Front Panel Enable Mode (Modman MP10F) connected to a normally open switch with a GND to enable
- Discrete Signal Ground (Modman MP12F), to be used as the ground reference for the other Modman discrete inputs
- Discrete Signal Ground (KANDU J1-B), to be used as the ground reference for the KANDU discrete inputs and ARINC-429 and RS-422. This signal must be grounded, even if no KANDU discrete signals are connected.

(3) Ethernet Port:

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

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

For LRU pin details, refer to the applicable system interconnect diagram, Figure 3-12.

Refer to Table 3-5 for a list of I/O discretes.

Table 3-5. Discretes Table

Discrete I/O	Pin	Description	Mandatory / Optional
Weight-on-Wheels (WOW)	Modman J1-MP11A	Use and sense of the Weight on Wheels input is to determine Air/Ground Status, as configured by the AES system configuration data. Signal type: Input	Optional
Local Data Load	Modman J1-MP10B	The discrete shall request the Modman to change mode in the following manner: - Open to ground transition: Request for data load mode to be entered - Ground to open ground transition: Request for reset of system (if in data load mode) Signal type: Input	Mandatory

Table 3-5. Discretes Table (Cont)

Discrete I/O	Pin	Description	Mandatory / Optional
TX Control	KANDU J1-D	The discrete shall disable the transmission of signals when grounded, and allow transmission when open. Signal type: Input	Mandatory
Public Services Disable	Modman J1-MP11E	The discrete shall disable the PODD interfaces when grounded, and enable PODD interfaces when open. Signal type: Input	Optional
Ground Transmit Enable	Modman J1-MP11D	The discrete shall request the AES when in normal operation mode to ignore Air/Ground status and provide user service. - Ground = Enable RF transmission on the ground. - Open = Normal. Signal type: Input	Mandatory
Modman Reset	Modman J1-MP10C	This discrete can be used to reset the Modman (and, in turn the entire AES) - Ground = Modman/AES reset - Open = Modman/AES normal operation - Signal type: Input	Optional

Table 3-5. Discretes Table (Cont)

Discrete I/O	Pin	Description	Mandatory / Optional
Data Link Available	Modman J1-MP13F	The Data Link Available ARINC 791 IO discrete output shall be grounded when user service is available (data connections are available for use), and open when user service is not available. Signal type: Output (closure to ground)	Optional
System Available	Modman J1-MP13E	The System Available ARINC 791 IO discrete output shall be open when the AES system is in critical fault mode, and grounded at all other times (including power on sequence) Signal type: Output (closure to ground)	Optional

Table 3-5. Discretes Table (Cont)

Discrete I/O	Pin	Description	Mandatory / Optional
Front Panel Enable Mode	Modman J1-B Pin 10F	The front panel enable mode discrete enables the Modman front panel connectors when asserted. - Ground = Enable Front Panel Connector - Open = Disable Front Panel Connector. Signal type: Input. Recommended that this discrete is hardwired to ground or connected to a maintenance panel switch.	Mandatory
External Modem Enable	Modman J1-B Pin 11C	The modem mode is configured by the AES system configuration data. - Ground State Internal indicates A791 Discrete Ground State = Internal modem, Open State = External modem - Ground State External indicates A791 Discrete Ground State = External modem, Open State = Internal modem	Optional

NOTE: The following ARINC 791 discretes are not supported:

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

3. KANDU

Refer to Figure 3-9 for outline and installation information. Refer to Figure 3-12 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.

A. KANDU to FMA bulkhead interconnect specification is as follows:

(1) Power and control signals required for the JetWave™ MCS-8562 Terminal 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.

(2) 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)).

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

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

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

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

(7) KANDU receptacle A3J4 is TVP00RGQF-21-75P (Amphenol) or equivalent. Mates with TV06RQF-21-75S (Amphenol) or equivalent for Ethernet interface.

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

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

(b) The jam nut shall be capable of accepting locking wire.

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

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

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

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

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

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

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

4. BUC-HPA

A. General

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

(2) Refer to Figure 3-10 for outline and installation information. Refer Figure 3-12 for the applicable interconnect diagrams.

B. BUC-HPA Thermal Pad Kit

(1) The thermal pad kit, PN SCD-90402388, is intended to provide a conduction interface between the bottom surface of the BUC-HPA conduction-cooled PN 90003227-003 and airplane cold plate or mounting panel. Before mounting units on the airplane, the thermal pad must be installed on the units.

(2) Kit Contents

(a) The thermal pad kit, PN SCD-90402388, contains the parts identified in Table 3-6.

Table 3-6. Thermal Pad Kit

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

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

NOTE: The configuration of the mounting feet and connectors shown in Figure 3-2 is representative only and may not be the exact configuration for all BUC-HPAs.

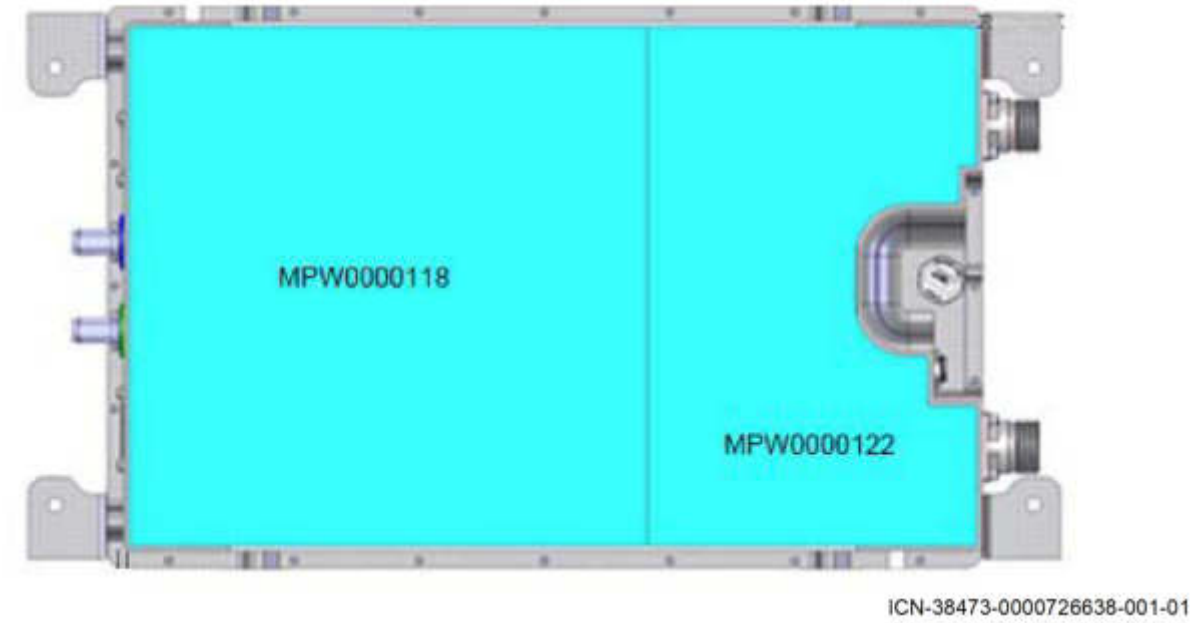


Figure 3-2. BUC-HPA Thermal Pads

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 BUC-HPA DUE TO OVERHEATING.

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

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

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

C. BUC-HPA - Waveguide/coax RF Losses

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

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

The TX path interconnect loss between the BUC-HPA and the FMA must not exceed 1.5 dB in the frequency range of 29 to 31 GHz. The loss is from BUC-HPA flange to antenna flange.

The RX path interconnect between the BUC-HPA and the FMA must not exceed 2.0 dB in the frequency range of 950 to 1950 MHz.

D. BUC-HPA - Thermal Conduction Path

The transmit operation of the AES is muted if the conduction-cooled BUC-HPA exceeds the temperature indicated in Table 1-5.

The conduction-cooled BUC-HPA relies on heat conduction through its base to a thermally conductive path in order to minimize the BUC-HPA temperature. Conduction to the aircraft mounting plate is dependent on proper installation of the BUC-HPA thermal pad. The outline and installation drawings in Figure 3-10 provide thermal pad installation instructions.

If the shutdown temperature is exceeded, a low-power mode (non-RF communicating) is entered until the temperature reduces to approximately 10° below the shutdown temperature. The temperature measurement on BUC-HPA is done internal to the unit with 5° offset to the baseplate that is calibrated to compensate for the temperature difference. However with different heating pattern the real temperature can deviate from the reading.

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 BUC-HPA must be electrically bonded to the airframe through contact with the base of the unit as follows:

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

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

The BUC-HPA bonding and BUC-HPA interconnection details from and to the FMA are detailed along with the FMA installation instructions in subsequent sections.

E. BUC-HPA/Waveguide Installation

(1) BUC-HPA Installation Location with the FMA (if applicable)

(a) The BUC-HPA install location is airframe specific.

(b) The BUC-HPA can be installed inside the aircraft or external to the aircraft under the radome. Honeywell recommends that the BUC-HPA is installed external to the aircraft, under the radome to keep the loss below the value specified in Paragraph 3.4.C.

(c) The BUC-HPA must be installed close to fuselage mount antenna assembly so as to minimize the waveguide/coax RF losses on the RF interconnect. Refer to Paragraph 3.4.C.

5. Fuselage Mount Antenna

A. Introduction

The OAE FMA assembly will be installed on the top of the fuselage of the aircraft. For the JetWave™ MCS-8562 Terminal to correctly point the antenna, the installation offsets should not exceed more than 1° off heading, pitch or roll with respect to principle axis of aircraft. Depending on the airframe, as part of the OAE FMA, the LRUs and assemblies that follow will be installed outside aircraft:

- FMA LRU
- BUC-HPA LRU (if installed outside aircraft)

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

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

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

NOTE: The ARINC 791 AIM is intended to be a common design solution across multiple aircraft platforms. The only variable is the skirt and seal that change with the aircraft specific fuselage contour.

or

The non ARINC 791 design has a common LAIM plate that is intended to be used across all platforms. The variables in this design solution are the ring fairing that the radome attaches to and the LAIM to fuselage interface brackets. The ring fairing is a design and shape specific to the fuselage contour at the aircrafts installation location, as are the LAIM to fuselage interface brackets.

Refer to the FMA outline and installation drawing in Figure 3-11, the BUC-HPA outline and installation drawings in Figure 3-10. Refer to the interconnect diagrams in Figure 3-12.

Refer to Table 3-7 for special tools, fixtures, and equipment for the FMA installation.

Table 3-7. Special Tools for FMA Installation

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

B. The FMA Installation General

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

C. Advisories

The JetWave™ MCS-8562 Terminal FMA and the BUC-HPA subsystems include components that radiate RF and microwave emissions in the band between 29.0 and 31.0 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/CM2 INSIDE THE AIRCRAFT.**

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

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

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

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

D. Unpacking and Inspection

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

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

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

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

NOTE: Refer to Paragraph 3.6. Inspection of Waveguide.

E. OAE Installation

Installation hardware is available in ARINC 791 Style configurations and non ARINC 791 style configurations. Equivalent acceptable hardware may be designed by the customer or procured from other sources.

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

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

F. Airframe Structural Modifications

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

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

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

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

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

G. Mounting Guidelines

This section describes the mounting guidelines for fuselage mount OAE.

Physical Placement:

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

The FMA maybe installed anywhere on top of the aircraft, with due consideration for aerodynamic loading and potential for interference with adjacent systems.

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

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

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

H. FMA Bonding

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

The FMA assembly and BUC-HPA must be bonded to the airframe.

Consult the airframe manufacturer for the correct torque values.

I. FMA Installation Procedure

Following installation activities are detailed in subsequent sections:

- Installation of the FMA.
- Connecting the waveguide, RF coax interface to the FMA.
- Installation of BUC-HPA and bonding straps.
- Installation of waveguide and coax between FMA and BUC-HPA.
- Connecting Bulkhead Interface, BUC-HPA power and control interfaces.

(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 3-3.

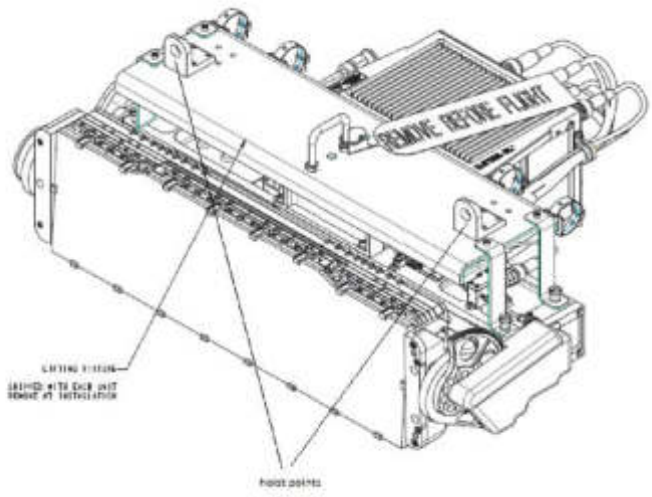


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Figure 3-3. FMA Assembly

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

(c) Remove the FMA lifting fixture by removing the mounting hardware. Store the lifting fixture and mounting hardware for future use if the FMA should need to be removed from the Aircraft. Refer to Figure 3-4.

NOTE: Honeywell cannot accept the FMA lifting fixture for reuse.

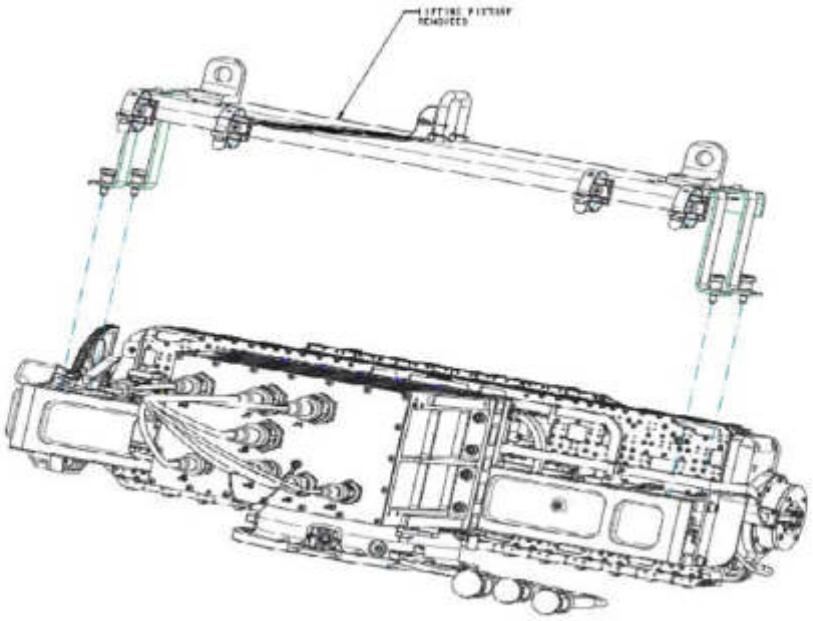

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Figure 3-4. FMA Assembly Lifting Fixture Removal

(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.

(3) Tx Waveguide and Rx Coax Interconnection between the FMA and the BUC-HPA. These interconnections can either be customer designed and furnished, or purchased from Honeywell. For Honeywell interconnections, installation details are as follows:

(a) For installation design requirements and instructions associated with the waveguide and coax cable in between the FMA and the BUC-HPA (RF Kit P/N 90409025-02), refer to the following documents:

1 Tx Waveguide options available from Honeywell

a For the 90404802 Pass 4.0 Tx Waveguide (included in RF Kit P/N 90409025-02), refer to Honeywell drawings 90404969 (Pass 4.0 Waveguide Outline and Installation) and 90410128 (WR34 to WR28 JetWave waveguide kit).

2 Rx Coax

a For the 90410125-02 RX Coax Cable Assy (included in RF Kit P/N 90409025-02), refer to Honeywell drawing 90410125 (JetWave 2.0 BUC-HPA to FMA IF RX cable assy).

b When attaching the Rx coax cable to the FMA 2.92mm coax connector, torque the connector nut to between 7.0 in·lb and 10.0 in·lb (0.8 Nm to 1.1 Nm) using a calibrated torque wrench.

c When attaching the Rx coax cable to the BUC-HPA TNC connector, torque the connector nut to between 12.5 in·lb and 14.5 in·lb (1.4 Nm to 1.6 Nm) using a calibrated torque wrench.

(4) Connecting the FMA Interface, BUC-HPA Power, and Control Interfaces

The control signals for the BUC-HPA are supplied from the KANDU and are connected to BUC-HPA J2 receptacle.

FMA signal ground is the reference ground for communication between FMA and KANDU, refer to Figure 3-12 for installation details.

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

The IF TX and IF RX signals to BUC-HPA are supplied from the Modman. These signals are routed through the bulkhead interface. Refer to the FMA interconnection diagram Figure 3-12 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 BUC-HPA 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 BUC-HPA J2 receptacle.

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

(c) Remove the protective covers from the BUC-HPA J5 and BUC-HPA 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 BUC-HPA 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.

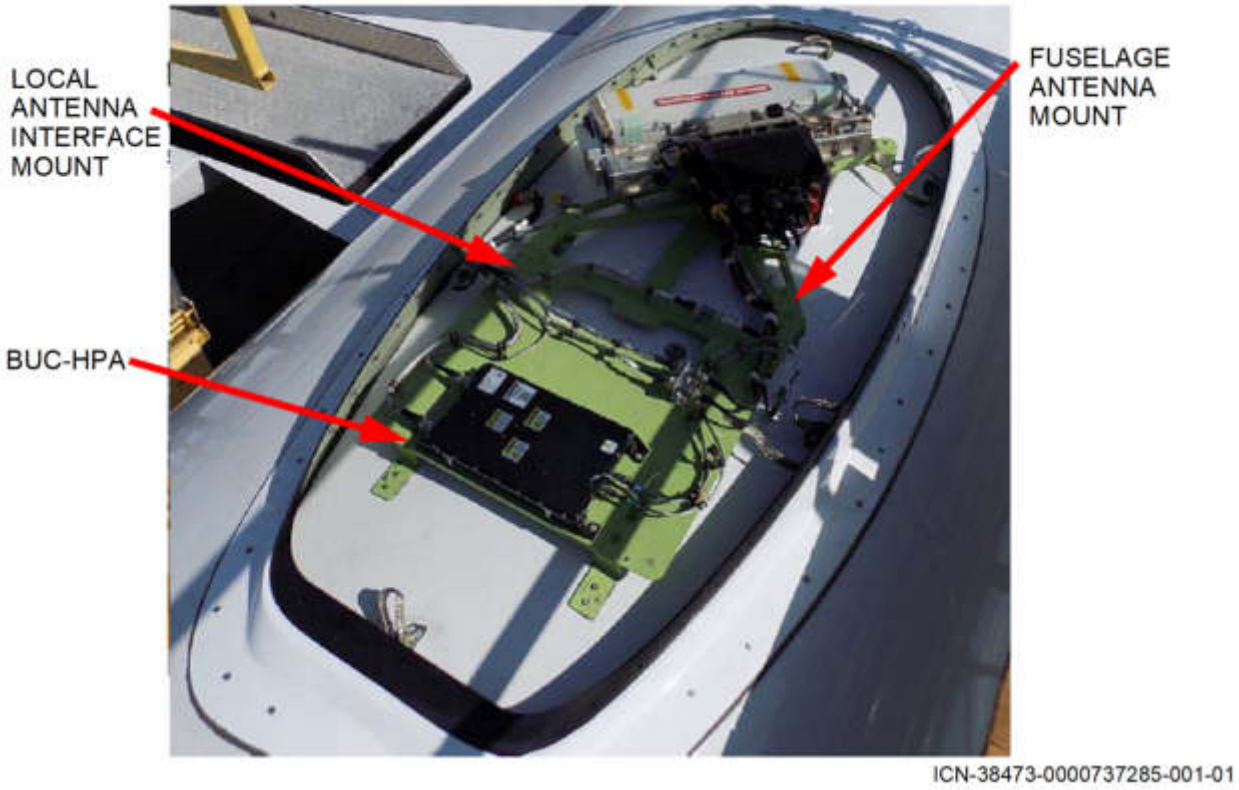

Figure 3-5. LAIM Assembly with FMA and BUC-HPA Placement on Aircraft (Typical Installation)

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

6. Inspection of Waveguide

A. FMA Human Exposure to RF EM Fields

WARNING: **THE JetWave™ MCS-8562 Terminal 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™ MCS-8562 Terminal 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 2° below its mounting plane.

(c) An input into the JetWave™ MCS-8562 Terminal 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.

Any waveguide received that contains more than one dent is unacceptable and must be returned to the vendor. Dents must not exhibit obvious signs of mechanical rework such as file marks or rough edges, where it is obvious that small tools have damaged what should be a precisely machined waveguide.

The very outer edge of the waveguide does not generally contain critical portions of the waveguide structure that affect performance. Therefore the outer edge of the waveguide may include small dents, marks, machine tool marks, etc so long as the damage does not structurally impair the waveguide. The outer surface may contain bending, tool marks or handling damage. A new waveguide that contains large numbers of dents or marks such that it appears not to be a new article shall be rejected and returned to the vendor. If more than 25% of the waveguide surface is marred in any way , the component must be rejected and returned to the vendor for rework.

Any evidence of nicks, surface pits, surface etching or scratches on the waveguide are acceptable as long as the flaw has been caused by the manufacturing process, i.e. brazing, cleaning, honing, a tool and no larger than 0.030 inch etc. The number or shape of the nicks, pits or scratches are not limited unless greater than 25% of the waveguide appears to have sustained overall damage of one or more types. Any waveguide having more than 25% of the surface damaged in this way is not acceptable and must be returned to the vendor.

The surface finish of the waveguide must not exceed 125 micro inch finish. All measurements will be made in an area free of braze material. The surface finish will not pertain to any area where excess braze material has flowed on the back of the waveguide.

7. Cabling and Drawings

Refer to Table 3-8 for the cabling requirements.

Table 3-8. Cabling Requirements

Cable	Conductor Type	Single Point	Multiple Point	Minimum Conductor Coverage by Shield
Power Lines	Twisted pair	NA	NA	NA
Ethernet Data	Quadrax, twisted pair	-	Yes	100%
RF	Coaxial, waveguide	-	Yes	100%

Table 3-8. Cabling Requirements (Cont)

Cable	Conductor Type	Single Point	Multiple Point	Minimum Conductor Coverage by Shield
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™ MCS-8562 Terminal, follow the cabling requirements listed below:

- Ethernet LAN/WAN cables must meet flammability and TIA/EIA568-A CAT 5E requirements.
- When routing JetWave™ MCS-8562 Terminal signals, avoid long wiring runs adjacent with other signals that could increase the risk of Electro-Magnetic Coupling.
- 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 3-12 for wire size recommendations.

Refer to Figure 3-6 for the Modman (PN 90400012-0001) outline and installation drawing.

Refer to Figure 3-7 for the Modman (PN 90400012-0002) outline and installation drawing.

Refer to Figure 3-8 for the APM (PN 90401121) outline and installation drawing.

Refer to Figure 3-9 for the KANDU (PN 90404518) outline and installation drawing.

Refer to Figure 3-10 for the BUC-HPA (PN 90003227-003), conduction-cooled 1 (maximum operating temperature of 185°F (85°C)), outline and installation drawing.

Refer to Figure 3-11 for the FMA (PN 90002609-001) outline and installation drawing.

Refer to Figure 3-12 for the JetWave™ MCS-8562 Terminal - FMA (90410870) system interconnect diagram.

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TABLE 1. JETWAVE MODMAN PART NUMBER

PART NUMBER	DESCRIPTION
90400012-0001	ASSY, JETWAVE MODMAN

25. PICTORIAL LABELS SHOWN HERIN ARE USED FOR ORIENTATION AND LOCATION PURPOSES.

24. UNIT EXPORT CONTROL CLASSIFICATION NUMBER IS 5A002.a.2.e.

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

22. CAUTION LABEL: CAUTION 115 VAC.

21. TAMPER PROOF LABEL.

20. CAUTION LABEL: ESD DUST COVER.

19. CAUTION LABEL: ESD SENSITIVE.

18. DELETED.

17. MOD DOT LABEL.

16. HONEYWELL IDENTIFICATION LABEL INCLUDES:
    MANUFACTURER'S NAME: HONEYWELL
    MANUFACTURER'S LEGAL NAME (FROM REV L ONWARD): EMS TECHNOLOGIES CANADA LTD
    DESCRIPTION: ASSY, JETWAVE MODMAN
    HARDWARE P/N: 90400012-0001
    REV: (CURRENT REVISION)
    S/N: (SERIAL NUMBER)
    DATE: (CURRENT DATE)
    WEIGHT: (WEIGHT IN kg AND lb)
    CAGE CODE: 38473
    MADE IN: CANADA
    TCCA WFG: 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, 320-800 Hz.
    POWER FACTOR: 0.813 MINIMUM LEADING; 0.679 MINIMUM LAGGING ±0.1 KVA LOAD.
    POWER CONSUMPTION: 60W MAXIMUM AT 115 VAC (320-800Hz).
    CURRENT: 0.52A MAXIMUM AT 115 VAC, 400 Hz.
    POWER DISSIPATION: 56W MAXIMUM AT 115 VAC (320-800Hz).

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 PB-134-LT (POLYESTER POWDER, SANDTEX BLACK)APPLIED AND CURED PER MANUFACTURER'S INSTRUCTIONS.

7. MATERIAL:
    CHASSIS – ALUMINUM ALLOY 5052-H32, .063 THK PER AMS4016.

6. ELECTROSTATIC DISCHARGE SENSITIVE (ESD), HANDLE PER IPC-A-610 AND ANSI/ESD S20.20.

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 (ASM Y14.5M-1994.

NOTES, UNLESS OTHERWISE SPECIFIED:

TABLE 2. JETWAVE MODMAN CONNECTOR IDENTIFICATION 13

REF DES	PART NUMBER	MATING CONNECTOR	REMARKS
J1	RADIALL 620601191	RADIALL NSXN2DB7SS00	J1-A TOP INSERT ARRANGEMENT Q11 (11X SIZE 8 QUADRAX)
			J1-B MIDDLE INSERT ARRANGEMENT 12D02 (118X #22 CONTACTS, 2X SIZE 8 QUADRAX)
			J1-C BOTTOM INSERT ARRANGEMENT 12F502 (4X #12 CONTACTS, 1X #16 CONTACTS, 5X SIZE 16 OPTICAL, 2X SIZE 5 COAX)

TABLE 3. JETWAVE 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 8.12 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

TABLE 4. MODIFICATION STATUS TABLE

MOD NUMBER	IMPLEMENTED BY	REMARKS	LRU SERIAL NUMBER EFFECTIVITY	LRU REV NUMBER EFFECTIVITY
1	SB: ATA 90400012-23-0001	AERONAUTICAL CORE MODULE OSCILLATOR REPLACEMENT	UP TO AND INCLUDING 00000708	UP TO AND INCLUDING REV J

ICN-38473-0000781449-001-01

Figure 3-6. (Sheet 1 of 4) Modman Outline and Installation Drawing (90400012-0001)

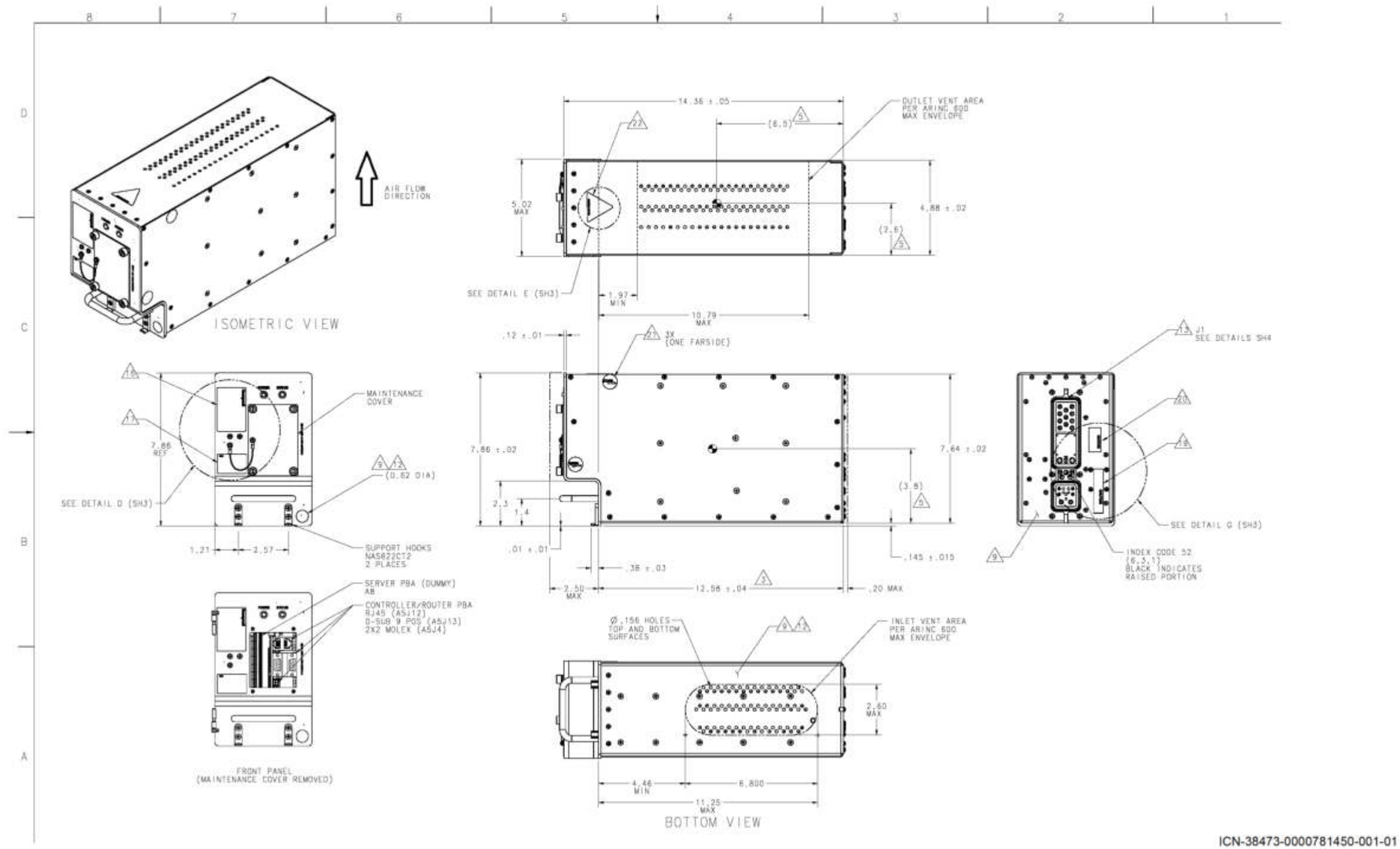
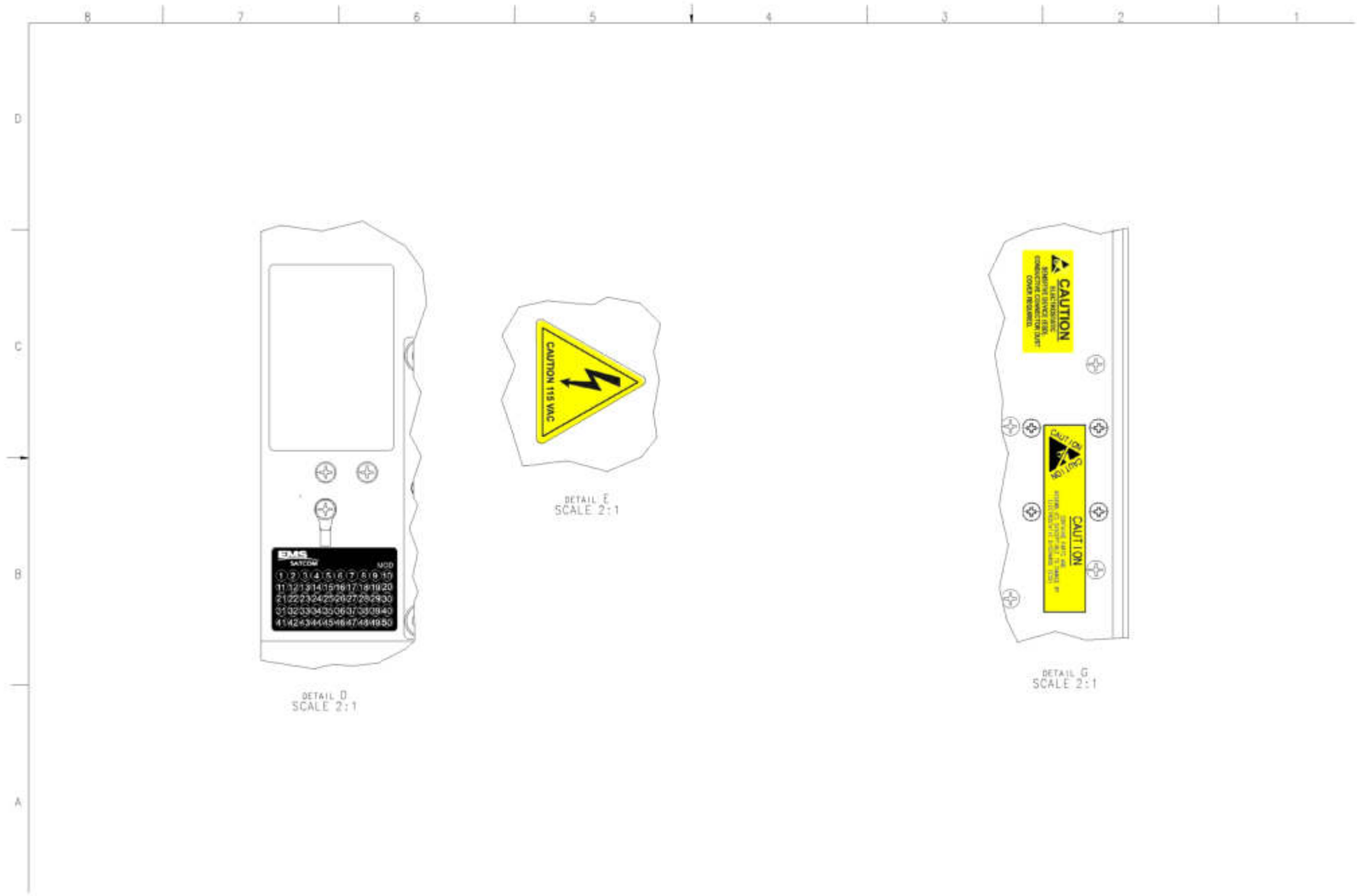
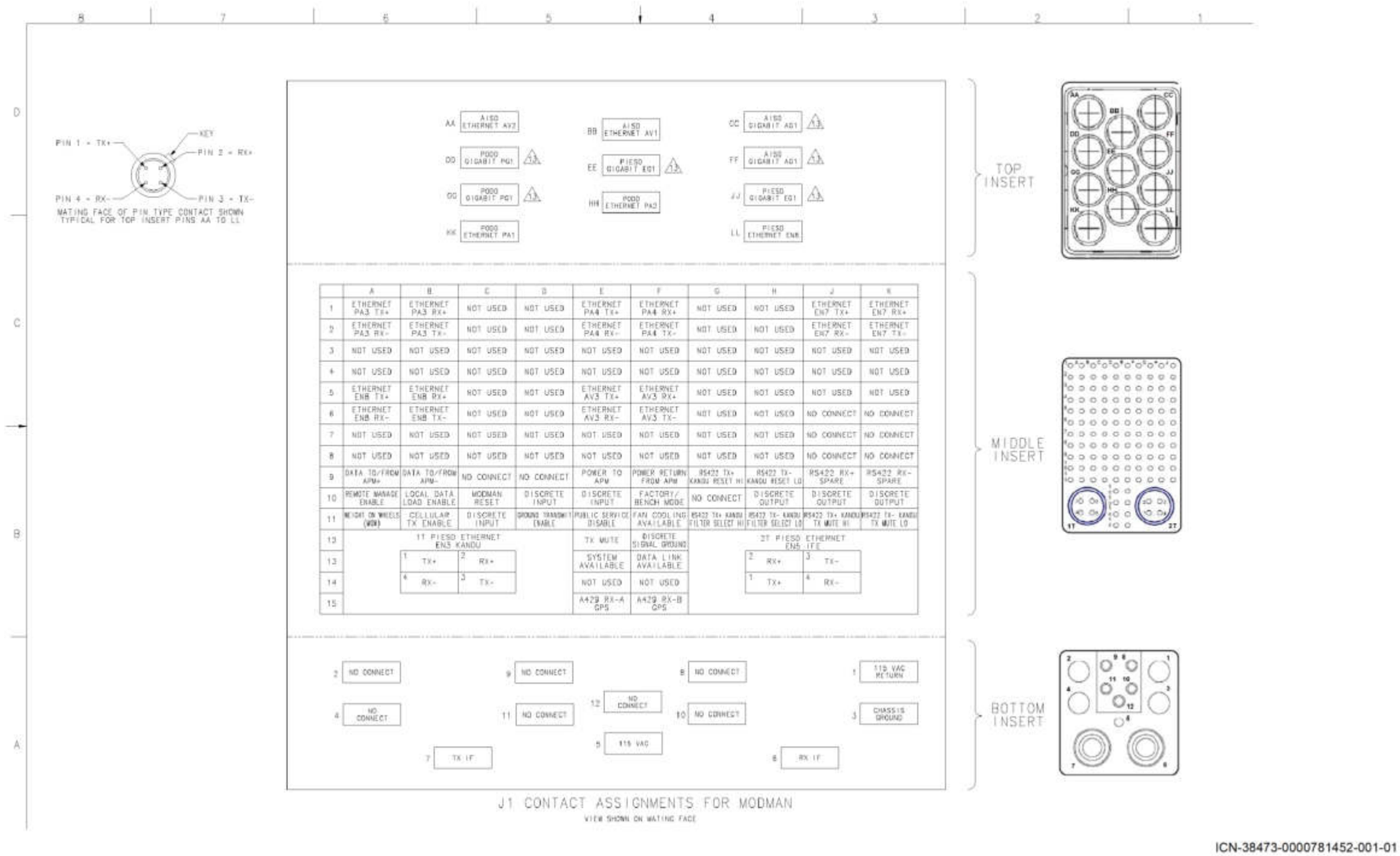


Figure 3-6. (Sheet 2 of 4) Modman Outline and Installation Drawing (90400012-0001)



ICN-38473-0000781451-001-01

Figure 3-6. (Sheet 3 of 4) Modman Outline and Installation Drawing (90400012-0001)



	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
13	1T P1E0 ETHERNET EN5 KANDU				TX MUTE	DISCRETE SIGNAL GROUND	2T P1E0 ETHERNET EN5 ITE			
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				

Figure 3-6. (Sheet 4 of 4) Modman Outline and Installation Drawing (90400012-0001)

25. ENVIRONMENTAL QUALIFICATION CHARACTERISTICS PER IS-90405204 JETWAVE MODMAN AND APM ENVIRONMENTAL QUALIFICATION TEST PROCEDURE FOR BOEING.

24. UNIT EXPORT CONTROL CLASSIFICATION NUMBER IS 5A002.a.1.a.

23. SPATIAL MODEL DEFINED BY 90400059-0002_REVC.STP

22. CAUTION LABEL: CAUTION 115 VAC.

21. TAMPER PROOF LABEL.

20. CAUTION LABEL: ESD DUST COVER.

19. CAUTION LABEL: ESD SENSITIVE.

18. DELETED.

17. MOD DOT LABEL.

16. HONEYWELL IDENTIFICATION LABEL INCLUDES:
    HONEYWELL NAME
    DESCRIPTION: JETWAVE MODMAN VAR 2
    HARDWARE P/N: 90400012-0002
    REV: (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
    2D BARCODE PARAMETERS AS DEFINED IN ATA 2000 AND WILL CONTAIN:
    CAGE CODE
    SERIAL NUMBER
    HARDWARE P/N
    DATE OF MANUFACTURE

15. INSTALLATION CLEARANCE: ARINC 600 STANDARD 4 MCU LRU.

14. COOLING: BLOW-THROUGH/DRAW-THROUGH.
    STANDARD: AIR FLOW AT 22 KG/HR AT 40°C
    WITH PRESSURE DROP OF 50±30Pa (5±3MM WATER)
    FAN FILTRATION REQUIREMENTS: NONE

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: 0.98 MINIMUM LEADING; 0.8 MINIMUM LAGGING ±0.1 KVA LOAD.
    POWER CONSUMPTION: 80W MAXIMUM AT 115 VAC (360-800Hz).
    CURRENT: 0.52A MAXIMUM AT 115 VAC, 400 Hz.
    POWER DISSIPATION: 59W MAXIMUM AT 115 VAC (360-800Hz).
    NOTE: HONEYWELL RECOMMENDS THAT WIRING AND COOLING IS
    DESIGNED FOR 100 WATTS IN ORDER TO ALLOW FOR SEAMLESS UPGRADE TO THE MODMAN WITH
    ENHANCED CAPABILITY AT A LATER DATE.

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

9. INDICATED AREAS ARE FREE FROM POWDER COAT FINISH.

8. FINISH:
    METAL TREATMENT: CHEMICAL CONVERSION COATED PER MIL-DTL-5541,
    TYPE II, CLASS 3
    EXTERIOR FINISH: PRISM POWDER COAT P8134LT (POLYESTER POWDER,
    SATIN SANTEX BLACK)APPLIED AND CURED PER MANUFACTURER'S INSTRUCTIONS.

7. MATERIAL:
    CHASSIS - ALUMINUM ALLOY 5052-H32, .063 THK PER AMS-QQ-A-250/8 OR AMS 4016.

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 4 MCU PER
    ARINC SPECIFICATION 791.

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

NOTES, UNLESS OTHERWISE SPECIFIED:

TABLE 1. JETWAVE MODMAN PART NUMBER

PART NUMBER	DESCRIPTION
90400012-0002	JETWAVE MODMAN VAR 2

TABLE 2. JETWAVE MODMAN CONNECTOR IDENTIFICATION 13

REF DES	PART NUMBER	MATING CONNECTOR	REMARKS
J1	RADIALL 620601191	RADIALL N5XN2BB75500 WITH EMI BACKSHELL GLENAIR 527-212MA6B8C4S-1	J1-A TOP INSERT ARRANGEMENT Q11 (11X SIZE 8 QUADRAX) J1-B MIDDLE INSERT ARRANGEMENT 12Q02 (11BX #22 CONTACTS, 2X SIZE 8 QUADRAX) J1-C BOTTOM INSERT ARRANGEMENT 12FS02 (4X #12 CONTACTS, 1X #16 CONTACTS, 5X SIZE 16 OPTICAL, 2X SIZE 5 COAX)

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Figure 3-7. (Sheet 1 of 4) Modman Outline and Installation Drawing (90400012-0002)

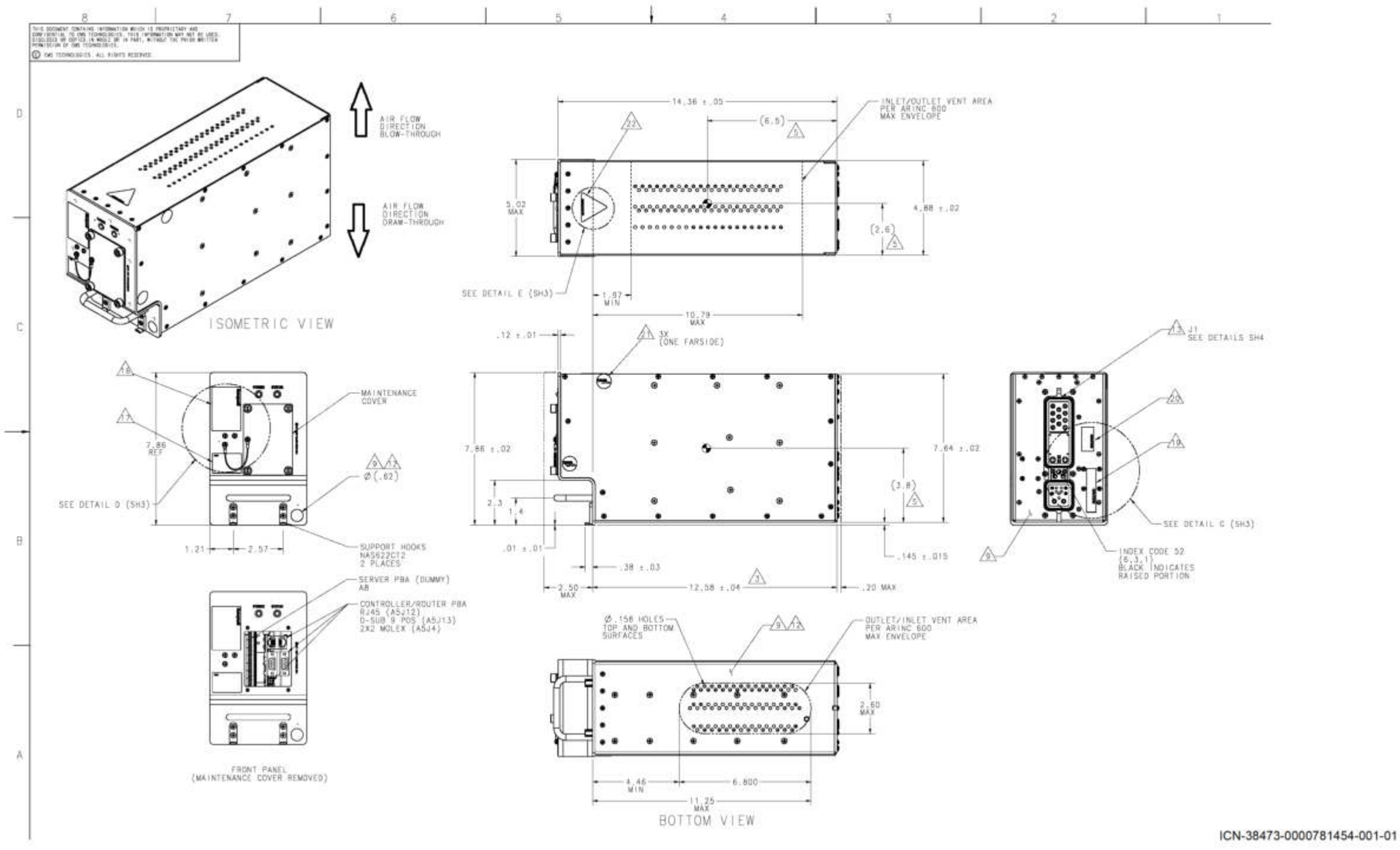


Figure 3-7. (Sheet 2 of 4) Modman Outline and Installation Drawing (90400012-0002)

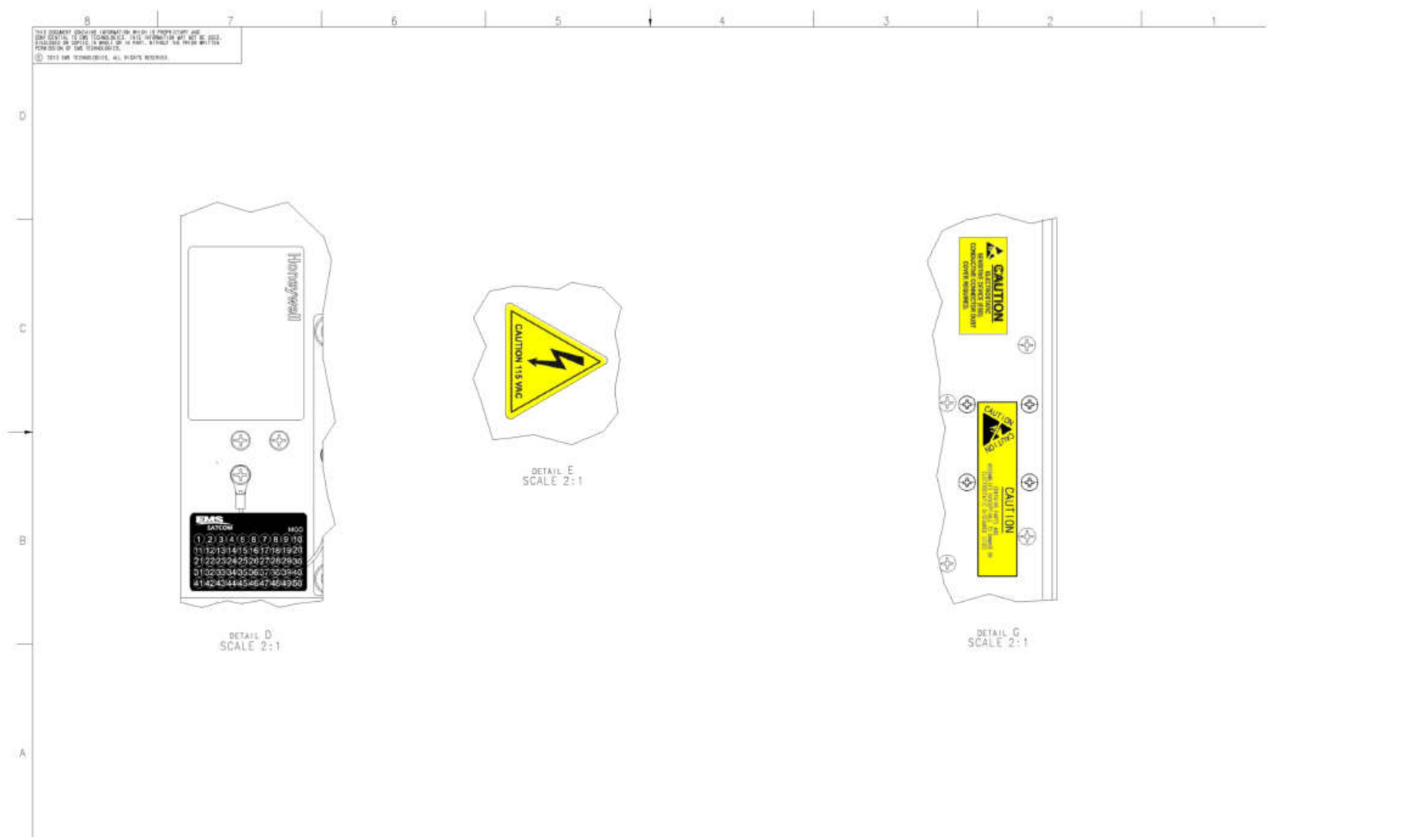
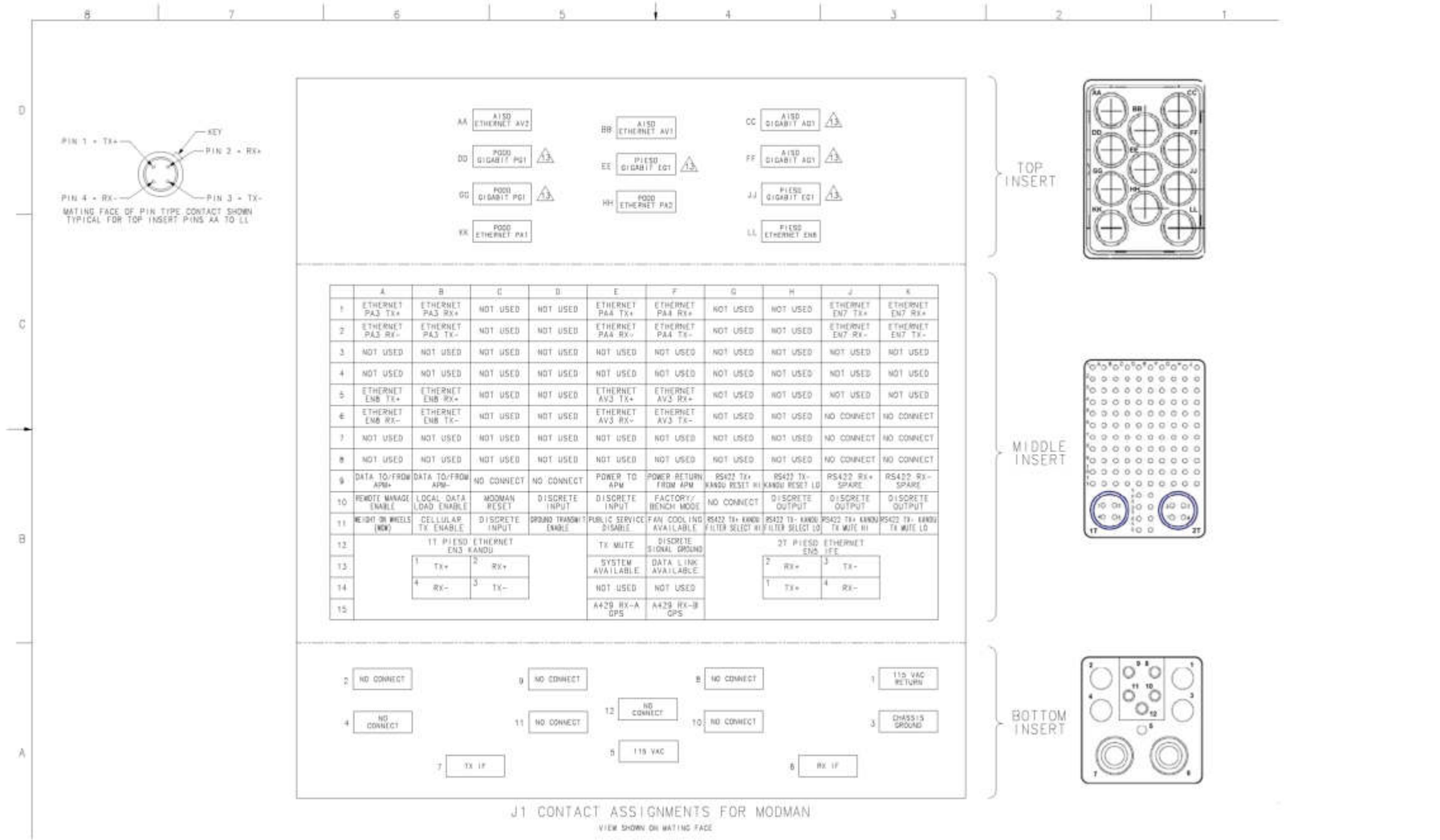


Figure 3-7. (Sheet 3 of 4) Modman Outline and Installation Drawing (90400012-0002)



	A	B	C	D	E	F	G	H	J	K
1	ETHERNET PA2 TX+	ETHERNET PA2 RX+	NOT USED	NOT USED	ETHERNET PA4 TX+	ETHERNET PA4 RX+	NOT USED	NOT USED	ETHERNET EN7 TX+	ETHERNET EN7 RX+
2	ETHERNET PA2 RX-	ETHERNET PA2 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 P1ESD ETHERNET EN3 KANDU				TX MUTE	DISCRETE SIGNAL GROUND	2T P1ESD 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 OPS	A429 RX-B OPS				

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Figure 3-7. (Sheet 4 of 4) Modman Outline and Installation Drawing (90400012-0002)

22. UNIT EXPORT CONTROL CLASSIFICATION NUMBER IS EAR99.

21. SPATIAL MODEL DEFINED BY 90405762_REVD.STP

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. SHEET METAL BEND LINES.

15. LOCATE UNIT NAMEPLATE APPROXIMATELY WHERE SHOWN. HONEYWELL NAMEPLATE INCLUDES:
HONEYWELL NAME
DESCRIPTION: ASSY, JETWAVE APM
HARDWARE P/N: 90401121
REV: (CURRENT REV)
S/N: (SERIAL NUMBER)
DATE: (CURRENT DATE)
WEIGHT: (IN kg AND lb)
CAGE CODE: 38473
MADE IN: CANADA
TCCA MFG: 325-92
2D BARCODE PARAMETERS AS DEFINED IN ATA 2000 AND WILL CONTAIN:
CAGE CODE
SERIAL NUMBER
HARDWARE P/N
DATE OF MANUFACTURE

14. ELECTROSTATIC SENSITIVE CONNECTOR DUST COVER (MS90376-12RB, NAS831-12C, 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 22-25 IN-LBS. VALUES ARE IN ADDITION TO ANY PREVAILING TORQUE.

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 PB-134-LT (POLYESTER POWDER, SANDTEX BLACK) APPLIED AND CURED PER MANUFACTURER'S INSTRUCTIONS.

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

5. ELECTRICAL:
INPUT VOLTAGE: +5 VDC NOMINAL (MIN.REQUIRED BY APM 3.5 VDC) SUPPLIED BY THE JETWAVE MODMAN
POWER CONSUMPTION : 0.3W (MAX)
POWER DISSIPATION : 0.3W (MAX)
CABLE LENGTH BETWEEN MODMAN AND APM SHALL NOT EXCEED 3 METERS.

4. INDICATES APPROXIMATE CENTRE OF GRAVITY.

3. WEIGHT: 0.34 kg (0.75 lb) 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. JETWAVE APM PART NUMBER

PART NUMBER	MIN REV	DESCRIPTION
90401121	F	ASSY, JETWAVE APM

TABLE 2. J1 CONNECTOR CONTACT ASSIGNMENTS 11

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. JETWAVE APM CONNECTOR IDENTIFICATION 11

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

TABLE 4. JETWAVE APM ENVIRONMENTAL QUALIFICATION REQUIREMENTS 13

ENVIRONMENTAL CONDITIONS	RTCA/DO-160G SPECIFICATION	REQUIREMENTS
OPERATING LOW TEMPERATURE	SECTION 4.5, CAT. A2	-15°C
OPERATING HIGH TEMPERATURE	SECTION 4.5, CAT. A2	+70°C
ALTITUDE	D6-36440G V.1 SECTION 7.2.1.3	25000 FT
OVERPRESSURE	SECTION 4.6	199 KPa (-20000 FT)
DECOMPRESSION	D6-36440G V.1 SECTION 7.2.1.3	81.2 KPa (6 KFT) TO 9.12 KPa (45.1 KFT) WITHIN 2 SECONDS
TEMPERATURE VARIATION	SECTION 5.0, CAT. B	5°C MIN. PER MINUTE
HUMIDITY	SECTION 6.0, CAT. A	NON-OPERATING, 10 CYCLES 85% RH @ 38°C 95% RH @ 65°C
OPERATIONAL SHOCK	SECTION 7.0, CAT. A	3 SHOCKS OF 6G, 11MS, 6 DIRECTIONS
CRASH SAFETY SUSTAINED	SECTION 7.0, CAT. B	18 G, 3 SEC, 6 DIRECTIONS
CRASH SAFETY IMPULSE	SECTION 7.0, CAT. B	1 SHOCK OF 20G, 11 MS, 6 DIRECTIONS
VIBRATION	SECTION 8.1, CAT. S	PERFORMANCE LEVEL CURVE B3
VIBRATION	SECTION 8.1	PERFORMANCE LEVEL CURVE C SUPPLEMENTAL TEST
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	

E90405762-1-D

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Figure 3-8. (Sheet 1 of 2) APM Outline and Installation Drawing (90401121)

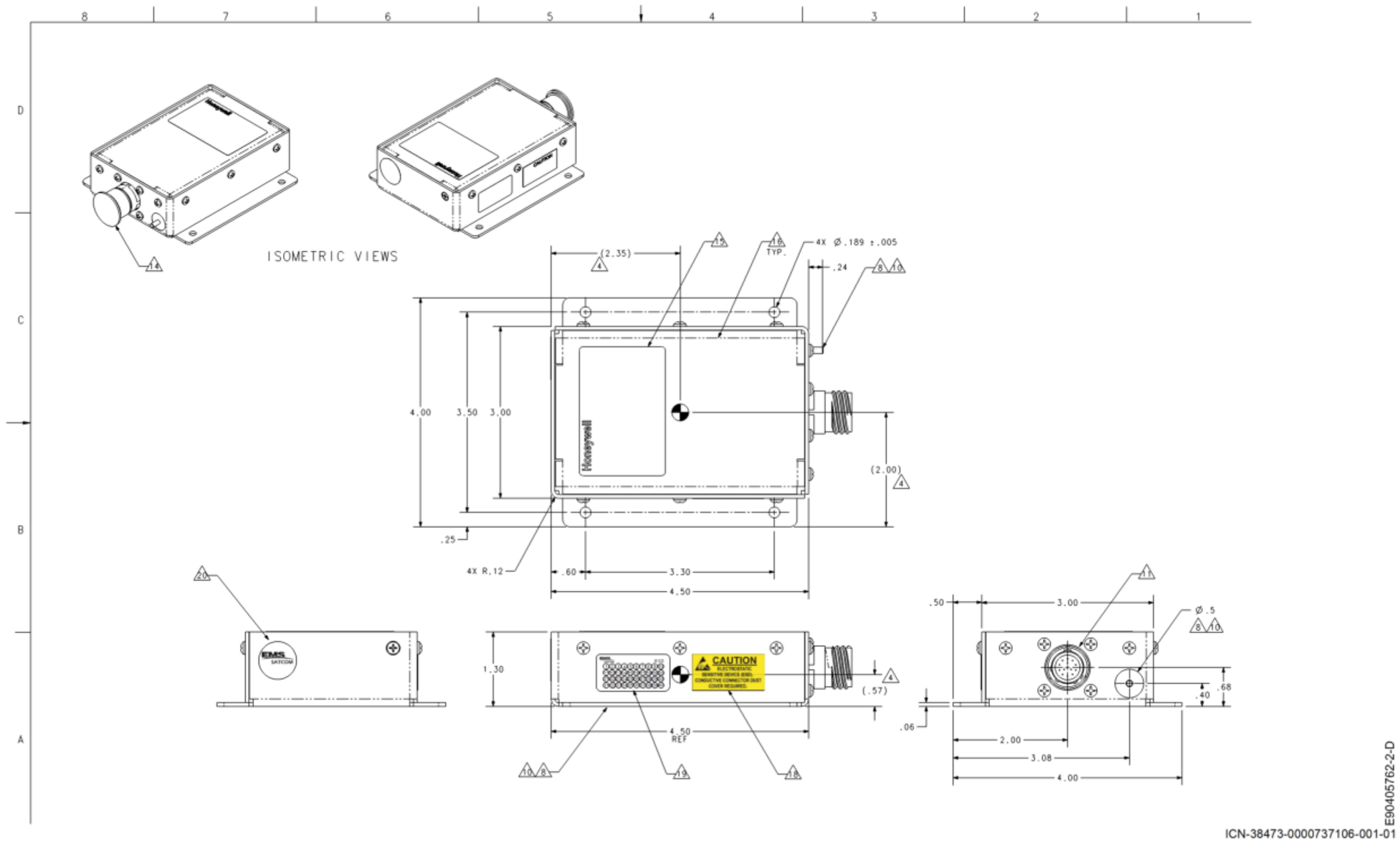

Figure 3-8. (Sheet 2 of 2) APM Outline and Installation Drawing (90401121)

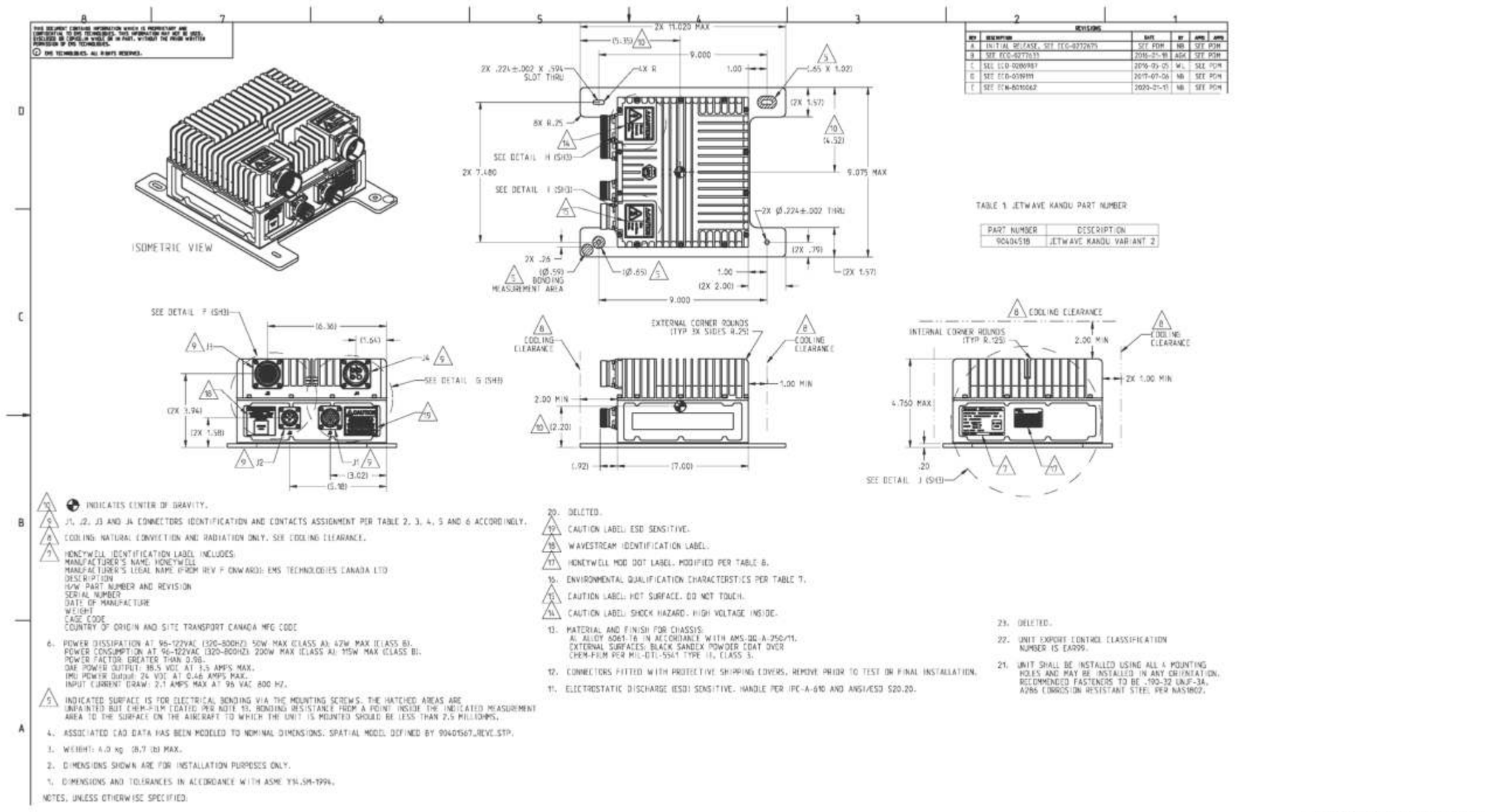

Figure 3-9. (Sheet 1 of 4) KANDU Outline and Installation Drawing (90404518)

TABLE 2: JETWAVE Ka KANDU EXTERNAL CONNECTORS IDENTIFICATION (9)

REF. DES	PART NUMBER	MATES WITH	FUNCTION	REMARKS
J1	D38999/20FD19PN (AMPHENOL)	D38999/26FD19SN (AMPHENOL)	AIRCRAFT INTERFACE	19 PIN
J2	D38999/20FC4SN (AMPHENOL)	D38999/26FC4PN (AMPHENOL)	POWER OUTPUT	4 SOCKET
J3	D38999/20FE35PN (AMPHENOL)	D38999/26FG35SN (AMPHENOL)	CONTROL INTERFACE	79 PIN
J4	TVP00RGDF-21-75P (AMPHENOL)	TVD6RQF-21-75S (AMPHENOL)	ETHERNET INTERFACE	4 PIN QUADRAX

TABLE 4: J2 POWER OUTPUT CONNECTOR RECEPTACLE PIN ASSIGNMENTS (9)

PIN NUMBER	FUNCTION
A	OAE POWER (38.5 VDC)
B	OAE POWER RETURN
C	IMU POWER (24 VDC)
D	IMU POWER RETURN

TABLE 5: J3 CONTROL INTERFACE CONNECTOR RECEPTACLE PIN ASSIGNMENTS (9)

CONTACT	FUNCTION	CONTACT	FUNCTION	CONTACT	FUNCTION
1	RS-422: KANDU TO SCM HI	28		55	
2	RS-422: KANDU TO SCM LO	29		56	
3	RS-422: KRFU TO KANDU HI	30		57	
4	RS-422: KRFU TO KANDU LO	31		58	RS-422: KANDU TO IMU HI
5	RS-422: KANDU TO KRFU HI	32	RS-422: KANDU TO OAE HI	59	RS-422: KANDU TO IMU LO
6	RS-422: KANDU TO KRFU LO	33	RS-422: KANDU TO OAE LO	60	
7	KRFU FILTER SELECT HI	34		61	
8	KRFU FILTER SELECT LO	35		62	SPARE
9	KRFU TX MUTE HI	36	RS-422: OAE TO KANDU HI	63	
10	KRFU TX MUTE LO	37	RS-422: OAE TO KANDU LO	64	
11	KRFU RESET HI	38		65	
12	KRFU RESET LO	39		66	
13	SPARE	40	FMA TX MUTE	67	RS-422: IMU TO KANDU LO
14	SPARE	41	FMA TX MUTE SIGNAL RETURN	68	RS-422: MAINTENANCE RX HI
15		42		69	RS-422: MAINTENANCE RX LO
16		43		70	
17		44		71	
18		45		72	
19		46		73	
20		47		74	SPARE
21		48		75	
22		49		76	RS-422: IMU TO KANDU HI
23		50	RS-422: SCM TO KANDU HI	77	
24		51	RS-422: SCM TO KANDU LO	78	
25		52	RS-422: MAINTENANCE TX HI	79	
26		53	RS-422: MAINTENANCE TX LO		
27		54			

TABLE 3: J1 AIRCRAFT INTERFACE CONNECTOR PIN ASSIGNMENTS (9)

PIN NUMBER	FUNCTION
A	CHASSIS GROUND
B	SIGNAL GROUND
C	TX MUTE ARINC
D	TX CONTROL
E	FILTER SELECT HI
F	115 VAC RETURN
G	115 VAC POWER
H	/ RESET LO
J	IRS A429 HI
K	IRS A429 LO
L	SPARE
M	FILTER SELECT LO
N	TX MUTE HI
P	TX MUTE LO
R	AUX A429 HI
S	AUX A429 LO
T	/ RESET HI
U	SPARE
V	SPARE

TABLE 6: J4 ETHERNET INTERFACE CONNECTOR QUADRAX INSERT ASSIGNMENTS (9)

CONTACT	FUNCTION
A-1	EN3 TX+
A-3	EN3 TX-
A-2	EN3 RX+
A-4	EN3 RX-
A-5	EN3 SHIELD
B-1	EN1 TX+ (SPARE)
B-3	EN1 TX- (SPARE)
B-2	EN1 RX+ (SPARE)
B-4	EN1 RX- (SPARE)
B-5	(SPARE)
C-1	EN2 TX+
C-3	EN2 TX-
C-2	EN2 RX+
C-4	EN2 RX-
C-5	EN2 SHIELD
D-1	EN4 TX+
D-3	EN4 TX-
D-2	EN4 RX+
D-4	EN4 RX-
D-5	EN4 SHIELD

TABLE 7: JETWAVE Ka KANDU ENVIRONMENTAL QUALIFICATION CHARACTERISTICS

ENVIRONMENTAL CONDITIONS	LIMITS	RTCA/DO-160E SPECIFICATION
GROUND SURVIVAL LOW TEMPERATURE	-55°C	SECTION 4.5.1, CAT D2
OPERATING LOW TEMPERATURE	-55°C	SECTION 4.5.2, CAT D2
GROUND SURVIVAL HIGH TEMPERATURE	+85°C	SECTION 4.5.3, CAT D2
OPERATING HIGH TEMPERATURE	+70°C	SECTION 4.5.4, CAT D2
IN-FLIGHT LOSS OF COOLING	NOT APPLICABLE	SECTION 4.5.5, CAT Z
ALTITUDE	55000 FT	SECTION 4.6.1, CAT D2 EXTENDED TO 55000 FT FROM 51000 FT
DECOMPRESSION	6000 FT TO 55000 FT	SECTION 4.6.2, CAT A2 EXTENDED 6000 FT TO 55000 FT
OVER PRESSURE	199 KPA (-20000 FT)	SECTION 4.6.3, CAT A2 EXTENDED TO 199 KPA (-20000 FT) FROM 170 KPA (-15000 FT)
TEMPERATURE VARIATION	+10°C/MIN	SECTION 5, CAT A
HUMIDITY	85% RH @38°C 95% RH @65°C	SECTION 6, CAT B
OPERATIONAL SHOCK	3 SHOCK OF 6 G, 11 MS, 6 DIRECTIONS 3 SHOCK OF 6 G, 20 MS, 6 DIRECTIONS	SECTION 7, CAT B & E
CRASH SAFETY IMPULSE	1 SHOCK OF 20 G, 11 MS, 6 DIRECTIONS 1 SHOCK OF 20 G, 20 MS, 6 DIRECTIONS	SECTION 7, CAT B & E
CRASH SAFETY SUSTAINED	18 G, 3 SECS, 6 DIRECTIONS	SECTION 7, CAT B
VIBRATION	ROBUST RANDOM CURVE E & E1	SECTION 8, CAT R
EXPLOSIVE ATMOSPHERE	AIRCRAFT ZONE III	SECTION 9, CAT E
WATER PROOFNESS	CONDENSING AND SPRAYED	SECTION 10, CAT Y & R
FLUIDS SUSCEPTIBILITY	DE-ICING FLUID (ETHYLENE GLYCOL) HYDRAULIC FLUIDS (PHOSPHATE ESTER AS1241 TYPE IV & TYPE VI)	SECTION 11, CAT F
SAND AND DUST	DUST	SECTION 12, CAT D
FUNGUS RESISTANCE	BY ANALYSIS	SECTION 13, CAT F
SALT FOG		SECTION 14, CAT S
ICING		SECTION 24, CAT A

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Figure 3-9. (Sheet 2 of 4) KANDU Outline and Installation Drawing (90404518)

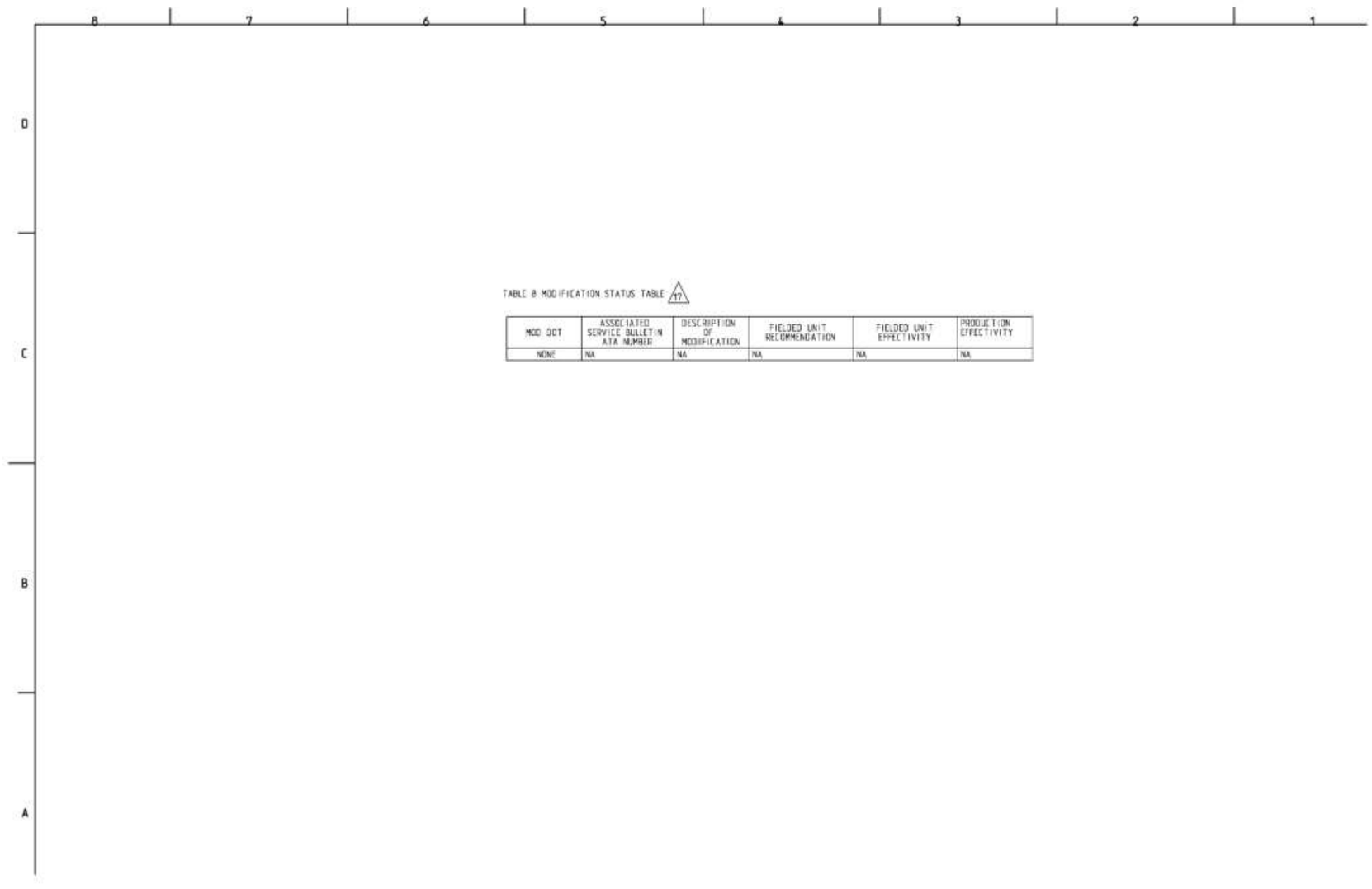

TABLE 8 MODIFICATION STATUS TABLE (17)

MOD DOT	ASSOCIATED SERVICE BULLETIN ATA NUMBER	DESCRIPTION OF MODIFICATION	FIELDED UNIT RECOMMENDATION	FIELDED UNIT EFFECTIVITY	PRODUCTION EFFECTIVITY
NONE	NA	NA	NA	NA	NA

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Figure 3-9. (Sheet 3 of 4) KANDU Outline and Installation Drawing (90404518)

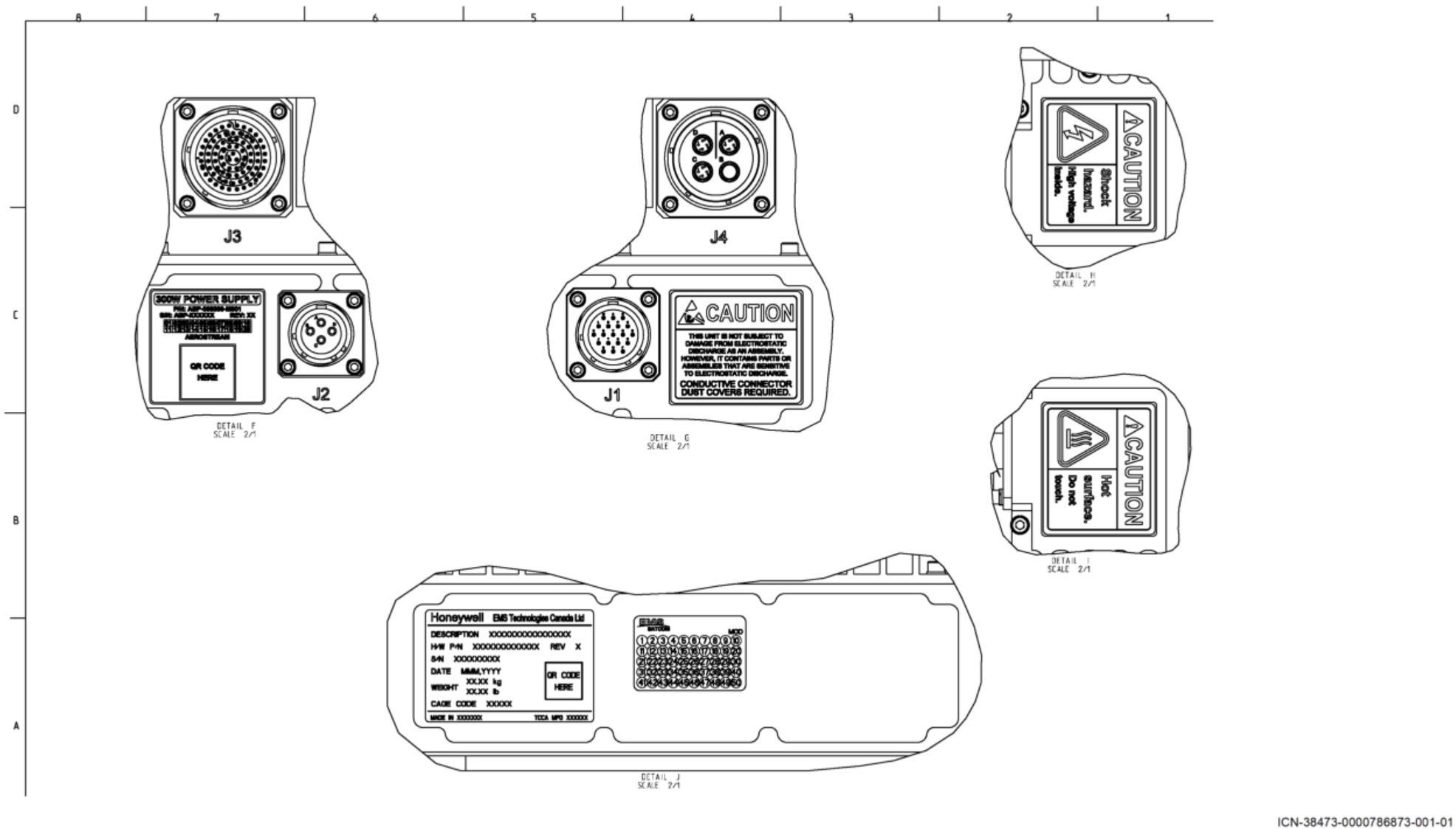

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Figure 3-9. (Sheet 4 of 4) KANDU Outline and Installation Drawing (90404518)

NOTES: UNLESS OTHERWISE SPECIFIED:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5-2009.
   UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES.
   TOLERANCES ON:
   .XX ± .01
   .XXX ± .005
   ∠ ± 2

2. DIMENSIONS SHOWN ARE FOR INSTALLATION PURPOSES ONLY.

3. WEIGHT: 11.5 LB [5.2 KG] MAX.

4. ASSOCIATED CAD DATA HAS BEEN MODELED TO NOMINAL DIMENSIONS.

5. WAVESTREAM IDENTIFICATION LABEL.

6. POWER DISSIPATION AT 96-122VAC (320-800Hz): 200 W MAX.
   POWER CONSUMPTION AT 96-122VAC (320-800Hz): 220 W MAX.
   CURRENT DRAW IN AMPERES: 2.3A AT MAXIMUM NOMINAL SYSTEM TRANSMIT POWER
   POWER FACTOR: 0.97 MINIMUM AT MAXIMUM LOAD.

7. HONEYWELL IDENTIFICATION LABEL INCLUDES:
   - HONEYWELL NAME
   - DESCRIPTION JW-2 BUC-HPA-VX
   - HARDWARE PART NUMBER AND REVISION
   - SERIAL NUMBER
   - DATE OF MANUFACTURE
   - WEIGHT
   - CAGE CODE
   - HARDWARE MOD STRIKE ARRAY
   - COUNTRY OF ORIGIN
   - EPA
   - TCCA MFG CODE

   BARCODE INCLUDES:
   - CAGE CODE
   - SERIAL NUMBER
   - HARDWARE P/N
   - DATE OF MANUFACTURE

8. COOLING:
   CONDUCTION THROUGH THE BASEPLATE WITH THERMAL PADS. AIRCRAFT ADAPTER PLATE SURFACE THAT MAKES CONTACT WITH THE BUC-HPA MUST HAVE SURFACE FLATNESS OF .010 INCH MAX. THERMAL PAD MATERIAL: T-FLEX 560, .060 IN THICK, TOTAL SURFACE AREA: 107.0 IN^2. DURING INSTALLATION, THE THERMAL PAD IS COMPRESSED BY 25%, CORRESPONDING TO 30 PSI OF PRESSURE, TO FILL .045 IN GAP. INSTALL THERMAL PAD KIT, SHIPPED WITH THE UNIT, IN ACCORDANCE WITH INSTALLATION INSTRUCTIONS SCD-90402386.

9. BUC/PA EXTERNAL CONNECTORS IDENTIFICATION PER TABLE 2.
   J1 AND J2 CONNECTORS CONTACTS ASSIGNMENT PER TABLE 3 AND 4 ACCORDINGLY.

10. ⌖ INDICATES CENTER OF GRAVITY.

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

12. CONNECTORS FITTED WITH PROTECTIVE SHIPPING COVERS, REMOVE PRIOR TO TEST OR FINAL INSTALLATION.

13. MATERIAL AND FINISH FOR CHASSIS AND MOUNTING FEET:
    AL ALLOY 6061-T6 OR T651 PER SAE-AMS4027, SAE-AMS4117, AMS-QQ-A-250/11 OR AMS-QQ-A-200/8.
    EXTERNAL SURFACES: PRISM POWDER COATINGS LTD. PB-134-LT BLACK SANOTEX POWDER COAT OVER CHEM-FILM PER MIL-DTL-5541 TYPE II CLASS 3.

14. CAUTION LABEL: SHOCK HAZARD. HIGH VOLTAGE INSIDE.

15. CAUTION LABEL: HOT SURFACE. DO NOT TOUCH.

16. WARNING LABEL: HAZARDOUS RF ENERGY.
    DO NOT TURN ON WITHOUT PROPER OUTPUT TERMINATION.
    DO NOT LOOK INTO OR TOUCH OUTPUT OPENING.

17. CAUTION LABEL: ELECTROSTATIC DISCHARGE.

18. REGULATORY INFORMATION FOR CE, FAA, FCC, ETC.

19. INDICATED SURFACES ARE INTENDED FOR ELECTRICAL BONDING TESTS. BONDING RESISTANCE FROM THE MEASUREMENT AREAS TO SURFACE ON AIRCRAFT TO WHICH THE UNIT IS MOUNTED SHOULD BE LESS THAN 2.5 MILLIOHMS.

TABLE 1: BUC-HPA CONDUCTION COOLED, PART NUMBERS

PART NUMBER	DESCRIPTION
90003227-001	BUC-HPA-V1
90003227-002	BUC-HPA-V2
90003227-003	BUC-HPA-V3

TABLE 2: BUC-PA EXTERNAL CONNECTORS IDENTIFICATION

REF. DES	PART NUMBER	MATES WITH	FUNCTION	REMARKS
J1	D38999/20FC4PN	D38999/26FC4SN	POWER INPUT	4 PIN
J2	D38999/20FC35PN	D38999/26FC35SN	CONTROL INTERFACE	22 PIN
J3	M3922/54-003	M3922/59-005 (THRU HOLE FLANGE)	RF TX INTERFACE	WR-28 WAVEGUIDE FLANGE PER MIL-DTL-3922/54 (UG599/U) (.112-40 UNC-2B)
J4	TNC FEMALE PER MIL-C-87104/2	TNC MALE PER MIL-C-87104/2	IF INPUT RX INTERFACE	LABELED ORANGE
J5	TNC FEMALE PER MIL-C-87104/2	TNC MALE PER MIL-C-87104/2	IF TX INTERFACE	LABELED BLUE
J6	TNC FEMALE PER MIL-C-87104/2	TNC MALE PER MIL-C-87104/2	IF OUTPUT RX INTERFACE	LABELED GREEN

TABLE 3: J1 POWER CONNECTOR CONTACT ASSIGNMENTS

PIN NUMBER	SIGNAL NAME
A	115 VAC POWER
B	115 VAC RETURN
C	CHASSIS GROUND
D	SPARE

TABLE 4: J2 CONTROL CONNECTOR CONTACT ASSIGNMENTS

CONTACT NUMBER	SIGNAL NAME
1	EN1: TX LOW
2	TX MUTE 2 HI
3	TP13-1 (SPARE)
4	TP13-2 (SPARE)
5	TX MUTE 1 HI
6	TX MUTE 1 LO
7	RESET HI
8	RESET LO
9	KEYLINE/MUTE HI
10	KEYLINE/MUTE LO
11	RS-422: BUC-PA TO KANDU HI
12	RS-422: BUC-PA TO KANDU LO
13	TP19-1 (SPARE)
14	EN1: RX HIGH
15	EN1: RX LOW
16	TX MUTE 2 LO
17	RS-422: KANDU TO BUC-PA HI
18	RS-422: KANDU TO BUC-PA LO
19	TP17-1 (SPARE)
20	TP19-2 (SPARE)
21	EN1: TX HIGH
22	TX MUTE 2/KEYLINE CONFIG

20. UNIT EXPORT CLASSIFICATION NUMBER IS 7A994.

21. SURFACE FINISH IS CHEM-FILM PER MIL-DTL-5541 TYPE II, CLASS 3 WITH NO POWDER COAT.

22. MATERIAL AND FINISH FOR J3 WAVEGUIDE FLANGE:
    AL ALLOY 6061-T6 IN COOORDANCE WITH AMS-QQ-A-250/11.
    NI PLATE PER QQ-N-290, CLASS 1, SEMI-BRIGHT, CORROSION PROTECTION GRADE F THRU G (.0002 THICK MIN) OVER NI PLATE PER AMS-C-26074, CLASS 4 (.0005 THICK MINIMUM).

23. UNIT SHALL BE INSTALLED USING ALL FOUR MOUNTING HOLES AND MAY BE INSTALLED IN ANY ORIENTATION. RECOMMENDED FASTENERS ARE .190-32 UNJF-3A CRES-A286, 160KSI MINIMUM ULTIMATE TENSILE STRENGTH. EACH OF THE FOUR MOUNTING FEET MUST BE IN FULL CONTACT WITH THE MOUNTING SURFACE AND MUST REMAIN SO FOR THE BUC-HPA TO SUFFICIENTLY DISSIPATE HEAT. TO ENSURE FULL CONTACT OCCURS, IT IS RECOMMENDED THAT EACH FASTENER BE TORQUED TO 10 IN-LBF GREATER THAN THE RUNNING TORQUE MEASURED WHEN THE MOUNTING FOOT FULLY CONTACTS THE MOUNTING SURFACE.

24. WARNING HAZARDOUS RF ENERGY:
    DO NOT TURN ON WITHOUT PROPER OUTPUT TERMINATION.
    DO NOT LOOK INTO OR TOUCH OUTPUT OPENING.

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Figure 3-10. (Sheet 1 of 3) BUC-HPA Outline and Installation Drawing (90003227-003)

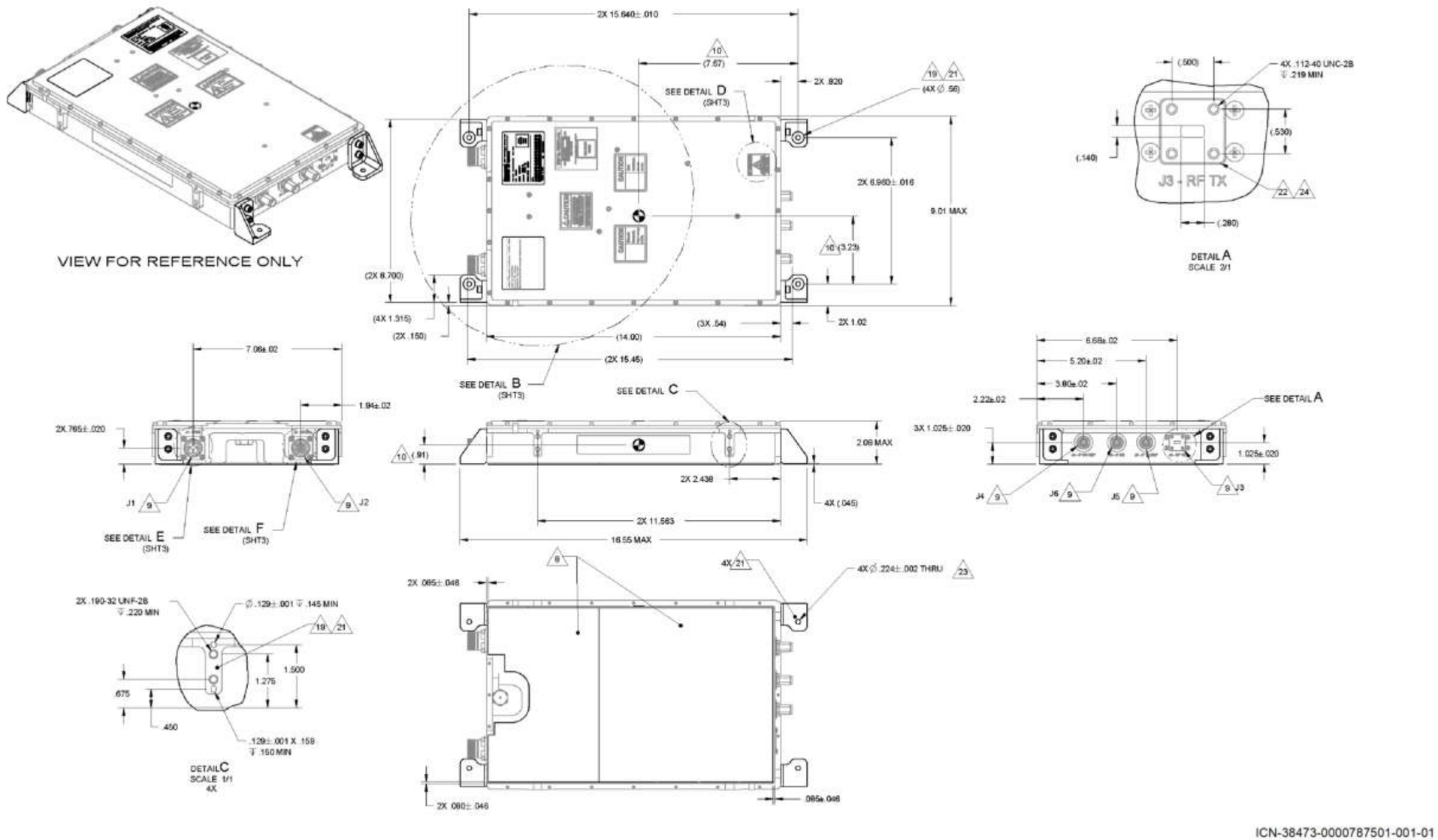

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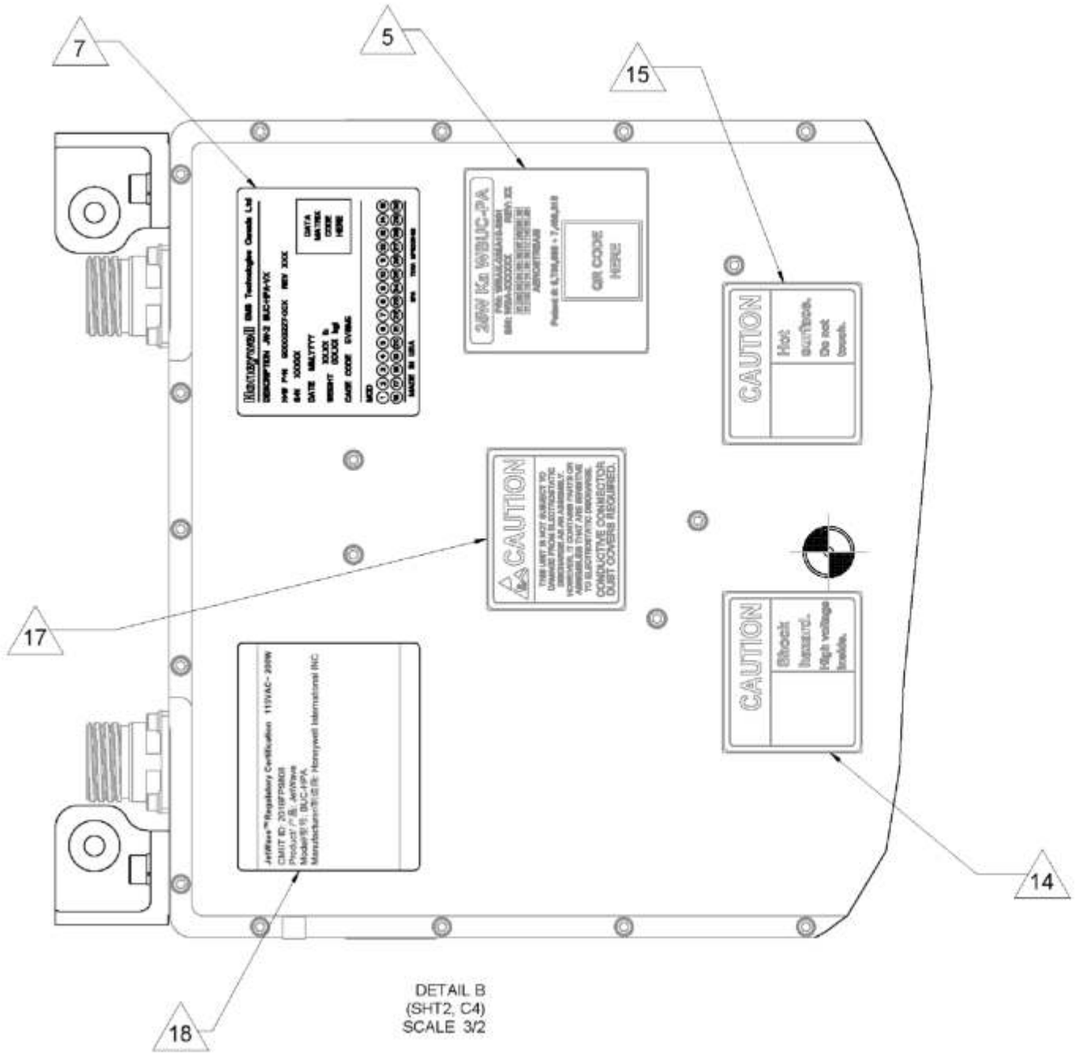
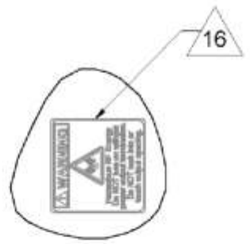
Figure 3-10. (Sheet 2 of 3) BUC-HPA Outline and Installation Drawing (90003227-003)





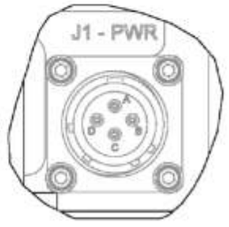


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Figure 3-10. (Sheet 3 of 3) BUC-HPA Outline and Installation Drawing (90003227-003)

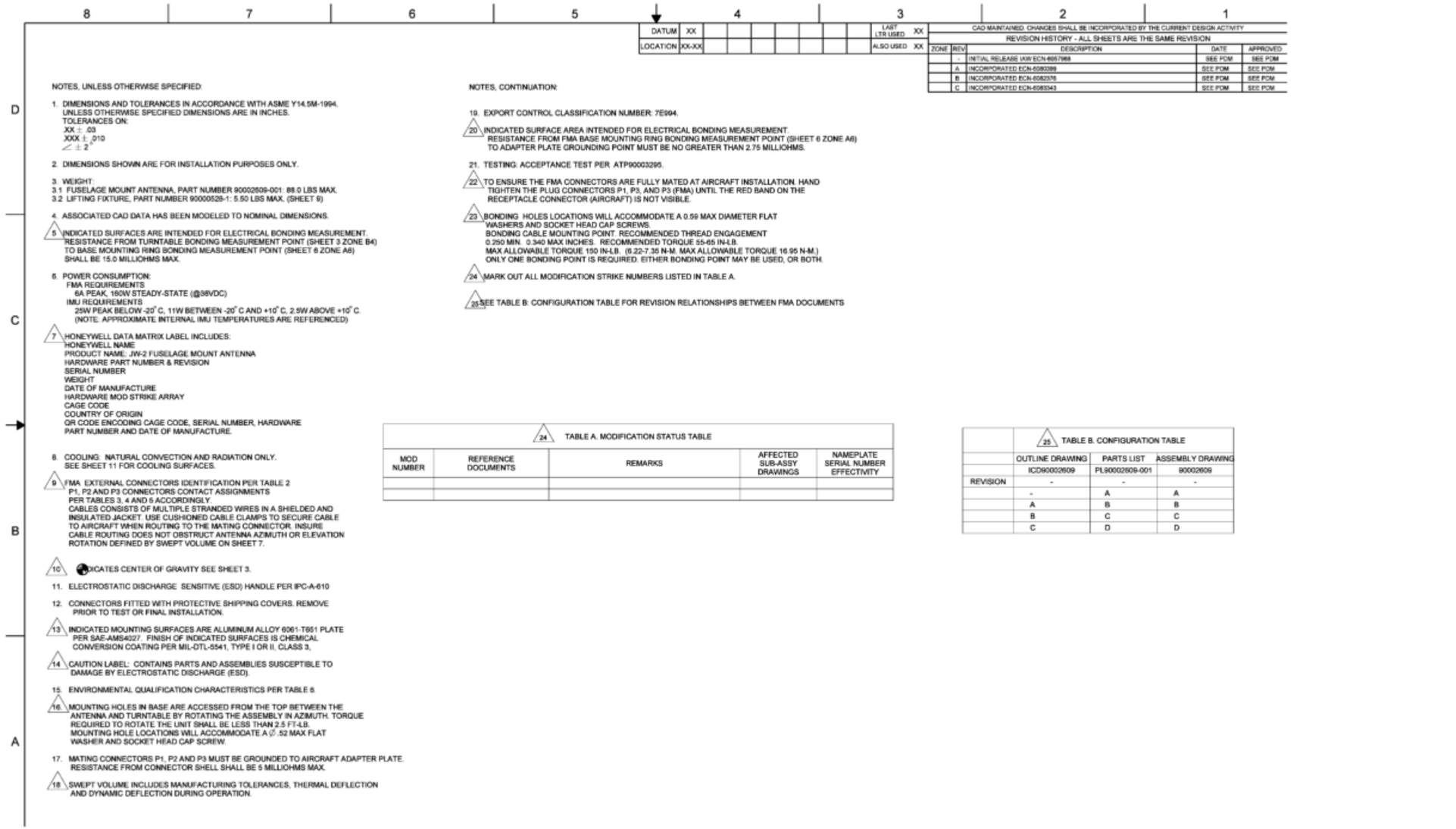


Figure 3-11. (Sheet 1 of 14) FMA Outline and Installation Drawing (90002609-001)

TABLE 1: JW-2 WB FMA PART NUMBER

PART NUMBER	DESCRIPTION
90002609-001	JW-2 WB FMA ASSEMBLY

TABLE 2: FMA EXTERNAL CONNECTORS IDENTIFICATION

REF. DES.	PART NUMBER	MATES WITH	FUNCTION	REMARKS
P1	PART NUMBER D38999/26FC4PN AMPHENOL CAGE CODE: 02660	PART NUMBER D38999/20FC4SN AMPHENOL CAGE CODE: 02660 SEE NOTE 17	POWER INPUT	4 PIN
P2	PART NUMBER D38999/26FB35PN AMPHENOL CAGE CODE: 02660	PART NUMBER D38999/20FB35SN AMPHENOL CAGE CODE: 02660 SEE NOTE 17	SIGNAL INTERFACE	13 PIN
P3	PART NUMBER D38999/26FB35PA AMPHENOL CAGE CODE: 02660	PART NUMBER D38999/20FB35SA AMPHENOL CAGE CODE: 02660 SEE NOTE 17	TX MUTE / IMU	13 PIN
J4	2.92mm FEMALE PART NUMBER SF1115-6045 SV MICROWAVE, INC CAGE CODE: 95077	2.92mm MALE SEE DETAIL F SHEET 8 MATING COAX DIMENSIONS	IF RX INTERFACE	NA
J5	PART NUMBER 90000804-001 HONEYWELL CAGE CODE: 5VWN5	SEE DETAIL E SHEET 8 MATING WAVEGUIDE DIMENSIONS	RF TX INTERFACE (WR34)	NA

TABLE 3: P1 POWER CONNECTOR CONTACT ASSIGNMENT (22)

PIN	SIGNAL
A	38VDC_POWER
B	38VDC_POWER_RETURN
C	FMA CHASSIS GROUND
D	SPARE

TABLE 4: P2 SIGNAL CONNECTOR CONTACT ASSIGNMENT (22)

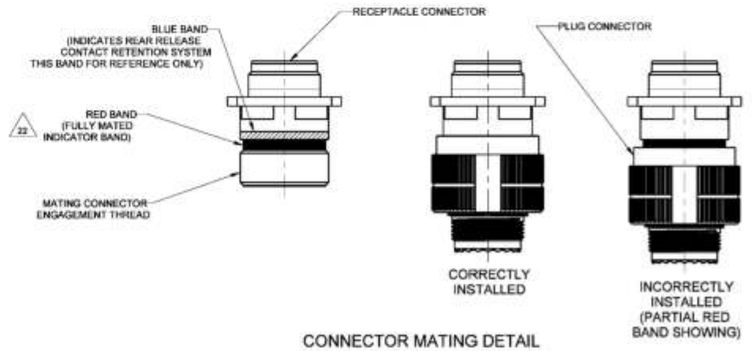
PIN	SIGNAL
1	MAINTENANCE_ETHERNET_TX+
2	MAINTENANCE_ETHERNET_TX-
3	MAINTENANCE_ETHERNET_RX+
4	MAINTENANCE_ETHERNET_RX-
5	CMD_STATUS_422_TX_HI
6	CMD_STATUS_422_TX_LO
7	CMD_STATUS_422_RX_HI
8	CMD_STATUS_422_RX_LO
9	CMD_STATUS_422_REFERENCE GROUND
10	SPARE
11	SPARE
12	SPARE
13	SPARE

TABLE 5: P3 TX MUTE / IMU CONNECTOR CONTACT ASSIGNMENT (22)

PIN	SIGNAL
1	IMU_TO_KANDU_422_DATA_HI
2	IMU_TO_KANDU_422_DATA_LO
3	KANDU_TO_IMU_422_DATA_HI
4	KANDU_TO_IMU_422_DATA_LO
5	IMU 24 V POWER
6	IMU 24 V POWER RETURN
7	TX SECTOR_MUTE_SWITCH
8	TX SECTOR_MUTE_SWITCH_RETURN
9	SPARE
10	SPARE
11	SPARE
12	SPARE
13	SPARE

TABLE 6: FMA ENVIRONMENTAL QUALIFICATION CHARACTERISTICS

ENVIRONMENTAL CONDITIONS	LIMITS	RTCA DO-160G SPECIFICATION
GROUND SURVIVAL LOW TEMPERATURE	-55°C	SECTION 4.5.1, CAT F2
OPERATING LOW TEMPERATURE	-55°C	SECTION 4.5.2, CAT F2
GROUND SURVIVAL HIGH TEMPERATURE	+110°C	SECTION 4.5.3, CAT F2
OPERATING HIGH TEMPERATURE	+70°C	SECTION 4.5.4, CAT F2
IN-FLIGHT LOSS OF COOLING	NOT APPLICABLE	NOT APPLICABLE
ALTITUDE	55,000 FT	SECTION 4.6.1, CAT F2
DECOMPRESSION	EXTENDED FROM 6,000 FEET TO 55,000 FEET WITHIN 2 SECONDS	SECTION 4.6.2, CAT A2
OVER PRESSURE	EXTENDED TO -20,000 FEET	SECTION 4.6.3, CAT A2
TEMPERATURE VARIATION	10°C / MIN.	SECTION 5, CAT A
HUMIDITY	85% RH AT 38°C 95% RH AT 65°C	SECTION 6, CAT B
OPERATIONAL SHOCK	3 SHOCKS OF 6G/11MS IN 6 DIRECTIONS 3 SHOCKS OF 6G/20MS IN 6 DIRECTIONS	SECTION 7, CAT B & E
CRASH SAFETY IMPULSE	1 SHOCK OF 20G/11MS IN 6 DIRECTIONS 1 SHOCK OF 20G/20MS IN 6 DIRECTIONS	SECTION 7, CAT B
CRASH SAFETY SUSTAINED	18G IN EACH OF THREE AXIS 18G FORWARD 18G REVERSE 3.1G UP 6.2G DOWN 3.9G SIDE	SECTION 7, CAT B & E
VIBRATION	RANDOM CURVE C AND C1	SECTION 8, CAT S & R
EXPLOSIVE ATMOSPHERE	ENVIRONMENTAL II	SECTION 9, CAT E & H
WATERPROOFNESS	CONDENSING AND DRIP	SECTION 10, CAT Y & W
FLUIDS SUSCEPTIBILITY	DE-ICING FLUID (SPRAY TEST ONLY)	SECTION 11, CAT F
SAND AND DUST	DUST, POWDERED CARBON, & COTTON LINT	SECTION 12, CAT D & S
FUNGUS RESISTANCE	BY ANALYSIS	SECTION 13, CAT F
SALT FOG	CAT S	SECTION 14, CAT S
ICING	CAT B	SECTION 24, CAT B



CONNECTOR MATING DETAIL

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Figure 3-11. (Sheet 2 of 14) FMA Outline and Installation Drawing (90002609-001)

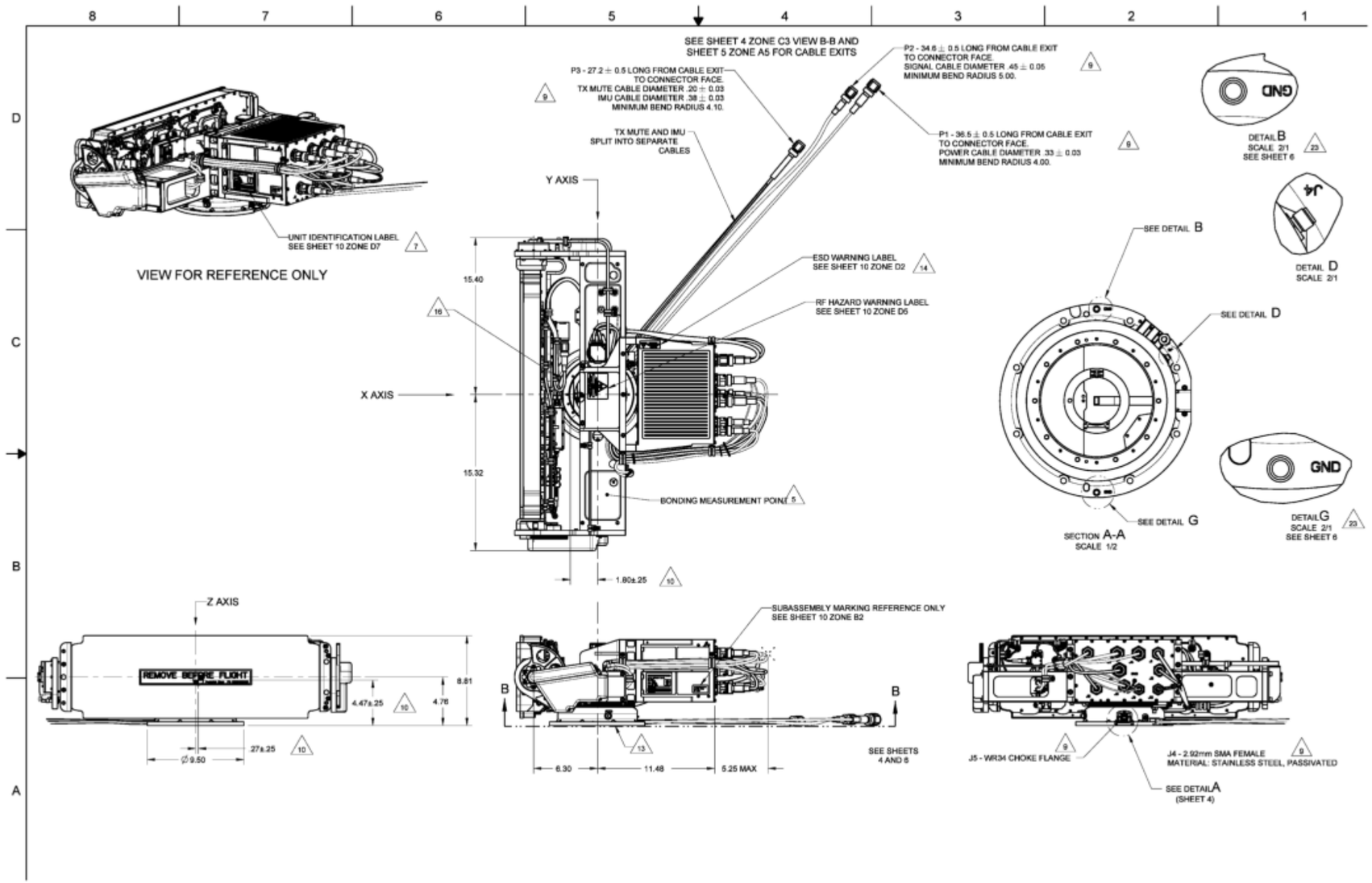

Figure 3-11. (Sheet 3 of 14) FMA Outline and Installation Drawing (90002609-001)

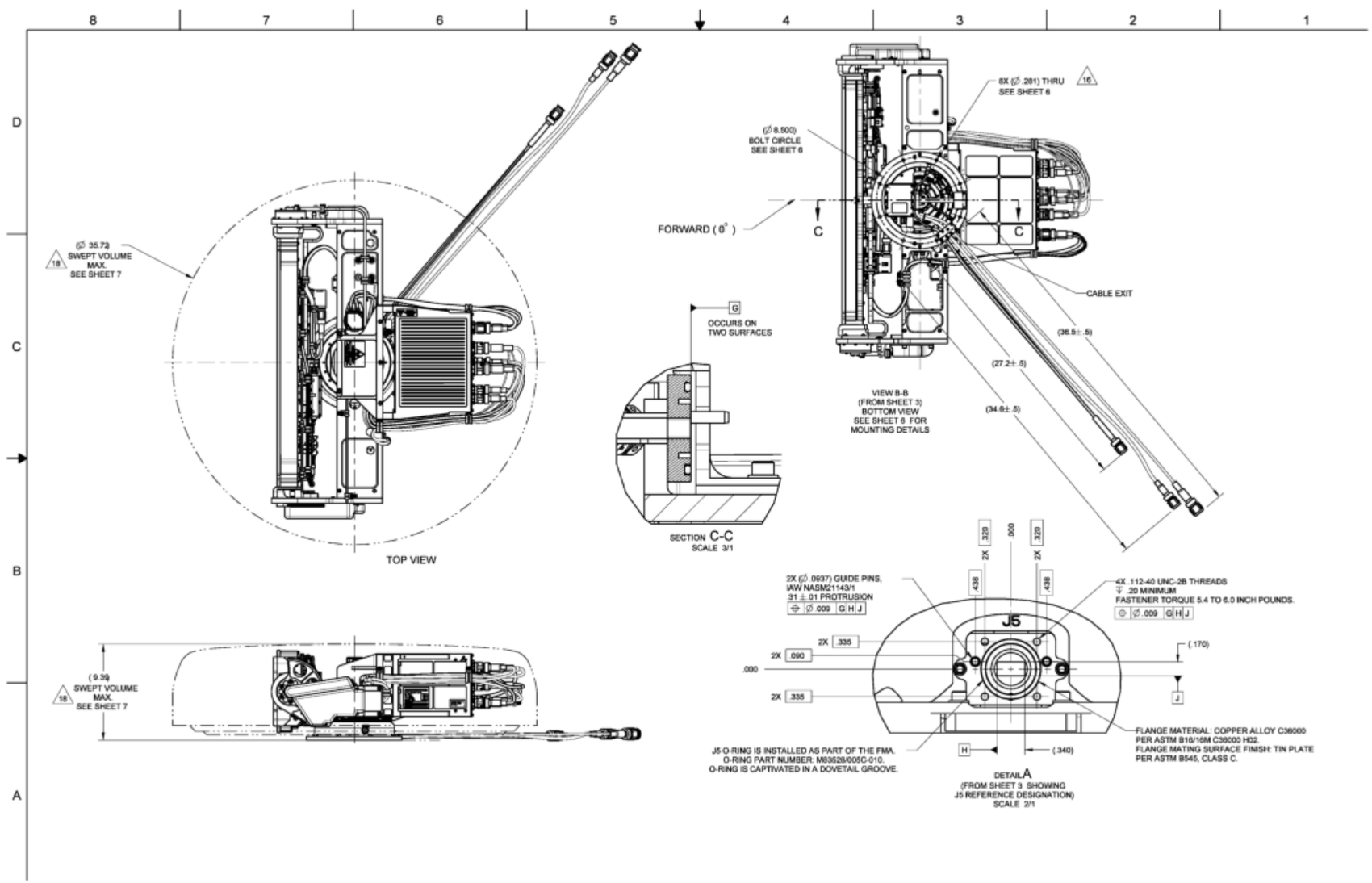

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Figure 3-11. (Sheet 4 of 14) FMA Outline and Installation Drawing (90002609-001)