

**UNIT MODIFICATION CONFIGURATION CONTROL/  
DOCUMENT**

**FOR VERSION 2AA-02300-0001**

**OF THE MDA-A PRODUCT**

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# 1 SCOPE

This document provides a traceable matrix that defines the software/firmware/hardware revisions being released, the compatibility with other software/firmware/hardware revisions and the top-level Multi-Function Digital Adapter - Aircraft (MDA-A) revision level that will support the MDA-A software/firmware/hardware being released. The MDA-A is a new hardware product that currently uses the same software and firmware as its predecessor, the MDA. The MDA-A is qualified for an airborne environment and is configured as a dual MDA unit. The MDA software/firmware items as installed on the MDA-A will support the Black Digital Mode capability and the Four Trunk Mode capability, as well as enhance the MDA-A Crypto Resync and Crypto Alarm functionality. The MDA software/firmware has been verified at the Joint Interoperability Test Command (JITC), and acceptance by the end-customer. The top-level product revision control is being documented by release of this modification control document and the top-level Bill of Materials (BOM) for the MDA-A product.

This modification control document describes the changes made to MDA-A product since the last revision. If an upgrade spanning several versions is being performed, it is recommended that site personnel read the description documents for all versions between the currently operating one and the one being installed. However, since this is an initial release for the MDA-A using MDA software and firmware, there are no changes for this release but this document establishes the baseline for future changes.

The software/firmware/hardware changes required for the future new functionality will be initiated via Engineering Change Request (ECR) actions.

## 1.1 Identification

The top level revisions being released is Telecore P/N 2AA-02300-0001.

The Configuration Items (CI)s, Software, Firmware and Hardware, being affected by this release are identified in Table 1. These items are being released in this revision of the MDA. The table identifies those CIs and components that have changed for this release. This document lists all special instructions required to install and properly use the described versions of software, firmware, and hardware.

## 1.2 System Overview

The MDA-A has been designed as dual aircraft version of the MDA. The original MDA was designed as a functional replacement for the Dual Trunk Adapter (DTA) and Dual Phone Adapter (DPA). The MDA-A design will provide a space-efficient option for using the MDA in aircraft or other robust environment applications.

A new data capability has been added that allows secure data to be transported through the Raytheon Secure Digital Switch (SDS) or Digital Small Switch (DSS) switches (DSS and DSS-2A) utilizing the existing bandwidth. This data capability utilizes the existing security

authentication procedures (SAL's), provided by the Raytheon switch, to provide an authenticated multi-level secure data capability.

## **2 REFERENCED DOCUMENTS**

<b><u>DOCUMENT NUMBER</u></b>	<b><u>DOCUMENT TITLE</u></b>
2AA-02391	MDA-A User's Manual
2SC-00145	MDA-A and SNMP FAT Procedure

### 3 VERSION DESCRIPTION

The table below lists the software, firmware, and hardware included with this product release. If hardware, or CPLD changes are included with this release, the upgrade **must** be made by Telecore at it's facility.

ITEM NUMBER	ITEM NAME	REV	INSTALLED AS FILENAME	CHANGED THIS RELEASE
1	2AA-00452 SOFTWARE BSP REVISION LEVEL	-0700	boot.bin	N
2	2AA-00455 SOFTWARE MLPPP REVISION LEVEL	-0600	mdamlppp.out	N
3	2AA-00453 APPLICATION SOFTWARE REVISION LEVEL	-1801	mda.out	N
4	2AA-00459 DSP APPLICATION REVISION LEVEL	-1100	mda.hex	N
5	2AA-00421 FPGA REVISION LEVEL	-0900	mda.jbc	N
6	2AA-00428 DSP APPLICATION REVISION LEVEL	-0000	mda_blk.hex	N
7	2AA-00417 FPGA REVISION LEVEL	-0200	mda_blk.jbc	N
8	2AA-00420 MDA CONFIGURATION FILE	-0000	config.mda	N
9	2AA-00489 MDA CPLD	-0100	NA	N
10	2AA-02300 MDA-A TOP LEVEL BOM	-0001	NA	Y

Table 1 Release Versions

#### 3.1 Class I Changes Installed

Class I changes to software are made in order to add new functionality. Each change is listed in this document by Engineering Change Request (ECR) number.

##### 3.1.1 New Features

There are no Class I new features in this version of the MDA software, firmware, or hardware.

##### 3.1.2 Enhancements

There are no Class I enhancements in this version of the MDA software, firmware, or hardware.

#### 3.2 Class II Changes Installed

Class II software changes are made to enhance existing features and to solve known problems. Each change is listed in this document by Engineering Change Request (ECR) number.

### 3.2.1 Enhancements

There are no Class II enhancements in this version of the MDA software, firmware, or hardware.

### 3.2.2 Problems Corrected

There are no Class II problems corrected in this version of the MDA software, firmware, or hardware.

### 3.3 Component Compatibility

The MDA has multiple software and firmware components for a given release. Table 2 in Section 3.6 provides a full compatibility chart for each revision.

### 3.4 Installation Instructions

**These upgrade instructions are provided for reference only and for use by trained personnel who are familiar with the MDA-A, the hardware, and the load procedures.**

Prior to upgrade, the user must obtain some information from the MDA-A. The software or firmware of each MDA must be obtained as well as the IP address of the 100 Mb Ethernet port. This information can be obtained from the front panel Statistics Menu information screen of each MDA. The files will be upgraded using the File Transfer Protocol (FTP) facility to transfer the required file(s) to the MDA-A from a remote computer.

The MDA-A is programmed both by in circuit programming (a hardware programming pod attached to a PC) and by the system microprocessor during the initial stages of the system boot sequence. The CPLD is only programmable through in-circuit programming. If a CPLD change is required, the unit must be made at Telecore's facility. The program files that are used by the microprocessor are stored in flash memory as binary files. The program files are loaded into flash memory by using the standard File Transfer Protocol (FTP) software that is available on a Personal Computer (PC) running the Windows NT, 2000, XP, 98 or 95 operating systems.

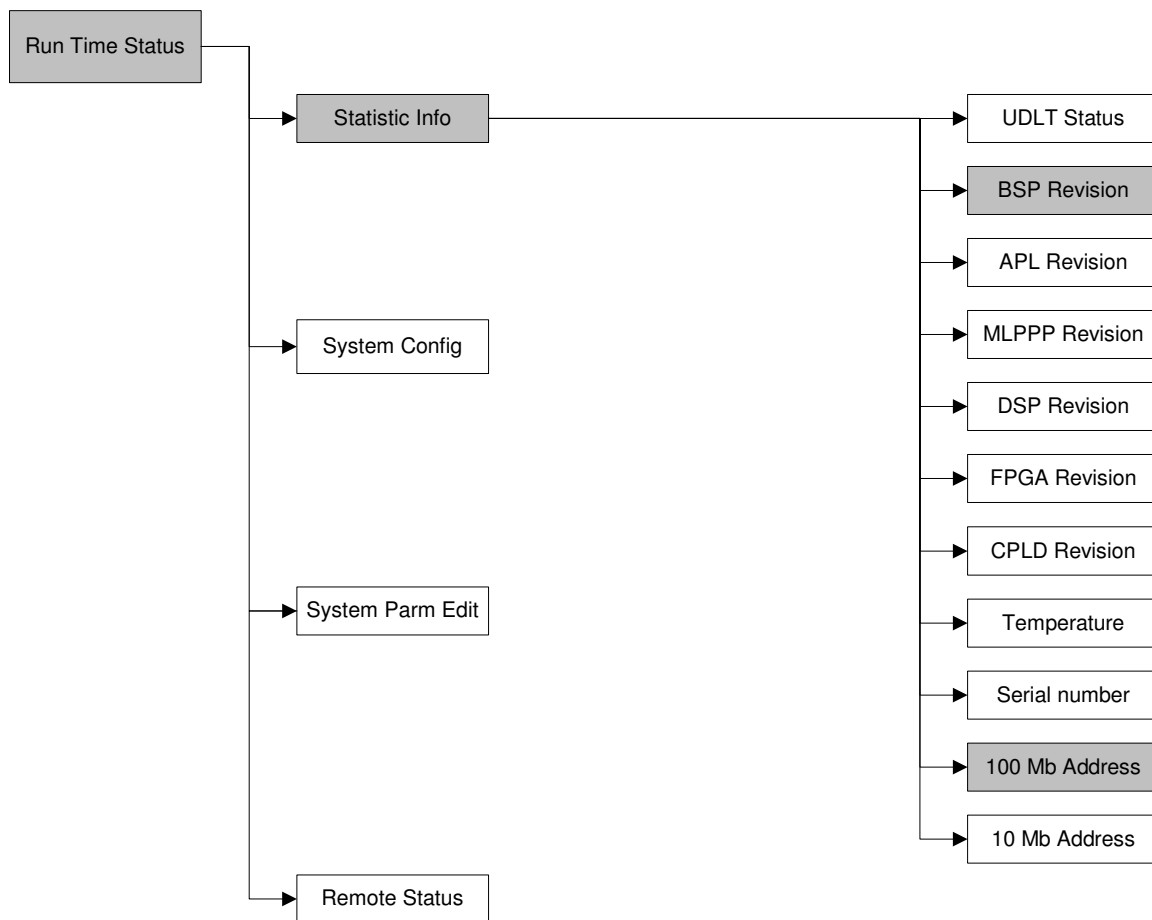
**Special cabling is required to upgrade the MDA-A.** The specialty cable is used to make the Ethernet connection to J4 and J9 of the MDA-A. If the end user does not have access to the specialty cabling, then the unit must be returned to Telecore for upgrade. In addition, the following equipment is necessary to upgrade the MDA-A: 1. A Windows-based PC with a 10 Mbit or 10/100 Mbit Ethernet Interface. 2. Ethernet LAN (Local Area Network) 10/100 switch. 3. Standard CAT-5 Ethernet cable, approximately 15ft in length (the PC must be connected to the switch that is connected to the MDA-A).

### 3.4.1 Obtaining Files for Upgrade

Before starting, read the instructions for installing the software/firmware below. Obtain all the necessary files outlined in the instructions below and as detailed in Table 1 from Telecore Configuration Management or other controlled source.

### 3.4.2 Determining the MDA-A IP addresses and the BSP Versions

Internally, the MDA-A contains two MDA units. The Ethernet address must be determined for each side of the unit. Likewise, each side of the MDA-A unit must be upgraded separately. The MDA-A's 100 Mb Ethernet address and the BSP revision can be retrieved on an operational unit by scrolling through the Statistics Menu. The Ethernet address needed is displayed under the heading "100 Mb Ethernet" and the BSP revision needed is displayed under the heading "BSP Revision".



During the procedures which follow, the current settings of the MDA will be lost. Before continuing with the installation, record the current configuration of the MDA software component so that it can be re-configured after the upgrade process is complete.

### 3.4.3 MDA BSP (SKIP THIS SECTION IF NO BSP UPGRADE IS NECESSARY)

Based on the BSP revision obtained in 3.4.2, the user may need to upgrade the BSP. The BSP only needs to be upgraded if the version is other than -07. **Only upgrade the BSP if your BSP version is something other than -07.** The following upgrade instructions assume an IP Address of 192.168.0.217. The end user would substitute the IP Address obtained in section 3.4.2.

At the PC, open a Command Window.

In the command window, change to the directory where the files are located.

At the command prompt, type ftp 192.168.0.217<return>. Substituting the IP address obtained in section 3.4.2.

You will see a request for a user name and a password. Simply press the return key until you see the FTP prompt. (You should now see the prompt, “FTP>”.)

At the FTP prompt, type the following commands:

```
FTP>bin <return>
FTP>put 2AA-00452-07.bin boot.bin <return>
FTP>close<return>
FTP>quit <return>
```

You should now be back at the command prompt

Start a telnet connection from the PC command window command line by entering:

```
telnet 192.168.0.217. Again substituting your IP address. (You should see the prompt,
“MDA>”.)
```

To begin the programming of the BSP type the following at the MDA prompt:

```
MDA>progBoot
```

The MDA will begin the initial reprogram of the BSP. The cursor will stay at the end of the command line for a short time, then it will scroll flash erasing messages. This may take some time so wait a while before proceeding.

```
flashBootErase: Erasing block address = 0x8000000
.
flashBootErase: Erasing block address = 0x83f0000
flash programming complete
value=23=0x17
```

After the messages finish, the procedure is complete. Log out of the telnet connection by

closing the window.

Turn the power to the MDA OFF, wait a few seconds and turn the power to the MDA back on. Wait a few minutes for the MDA to recover.

The new BSP is now loaded on the MDA. The MDA LCD display will show, “APPLICATION CODE NEEDED”.

Press scroll button to display the current IP Address.

### **3.4.4 MDA Application Software/DSP/MLPPP Software/FPGA Firmware**

At the PC open a DOS window (Command Window).

At the DOS prompt type

ftp 192.168.0.217 <return>. Substituting the IP address determined in section 3.4.2 or obtained at the end of section 3.4.3.

You will see a request for a user name and a password. Simply press the return key until you see the FTP prompt. (You should now see a prompt FTP> )

#### **Load Application Software**

At the FTP prompt type the following commands:

```
FTP>cd /apl <return>
```

```
FTP>bin <return>
```

```
FTP>put 2AA-00453-1801.out mda.out <return>
```

#### **Load Software Configuration File (Only needs to be loaded if BSP is loaded)**

```
FTP>put 2AA-00420-00.mda config.mda <return>
```

#### **Load MLPP Software**

```
FTP>put 2AA-00455-0600.out mdamlppp.out <return>
```

#### **Load FPGA Files**

```
FTP>cd ..
```

```
FTP>cd /usr <return>
```

```
FTP>put 2AA-00417-0200.jbc mda_blk.jbc <return>
```

```
FTP>put 2AA-00421-0900.jbc mda.jbc <return>
```

#### **Load DSP Software**

```
FTP>put 2AA-00428-0000.hex mda_blk.hex <return>
```

```
FTP>put 2AA-00459-09.hex mda.hex <return>
```

```
FTP>close <return>
```

```
FTP>quit <return>
```

You should now be back at the DOS prompt

At the PC, open a TELNET session into the MDA and enter the following command at the

console:

```
telnet 192.168.0.217
```

Again substituting your IP address. (You should see the prompt, “MDA>”.)

Execute the following Command at the user prompt. The following command does NOT need to be executed if the BSP is loaded in section 3.4.3.

```
MDA> rm “/usr/system.dbf”<return>
```

Turn the power to the MDA OFF, wait a few seconds and turn the power to the MDA back ON. Wait a few minutes for the MDA to recover. The new versions of the MDA firmware will be used to reprogram the MDA during the power up process of the MDA. *NOTE: The status of the firmware reprogramming process is displayed on the LCD display.* The new software and firmware are now loaded on the MDA.

Configure the MDA for desired operation.

### **3.4.5 Special Configuration Instructions for MDA Application Software Upgrade**

When loading 2AA-00453-1600 or higher on to an MDA connected to an existing circuit, it is imperative that the installer understands that the crypto resync settings must be configured appropriately for the circuit in which the MDA is to be connected. Following the upgrade procedure previously described, the crypto resync capability of the MDA will be initialized to the following settings:

- Resync Frequency : 10 seconds
- Resync Delay : 3 seconds
- Crypto Invert : No

Resync Frequency – This setting is the time between assertions of the resync signal after the initial Resync Delay. This setting also provides for disabling of the Resync logic in the MDA.

Resync Delay – This setting is the time between physical link failure and the first assertion of the resync signal.

Crypto Invert – This setting inverts the asserted and de-asserted outputs of the Resync logic.

### **3.4.6 Inter-MDA Communications Configuration**

When loading 2AA-00453-1600 or higher on to an MDA connected to an existing circuit, it is imperative that the installer understands that the period of time between the sync loss detection and software link failure detection is now configurable. The MDA provides four time periods that are selectable from the front panel of the MDA.

Short                      Inter MDA link fails in approximately 4-5 seconds.

Medium	: Inter MDA link fails in approximately 10-12 seconds.
Long	: Inter MDA link fails in approximately 20-22 seconds.
Extended	: Inter MDA link fails in approximately 30-35 seconds.

When the Inter MDA link fails, communications on the UDLT channels are stopped and not restarted until the link recovers. This failure is what causes the phones to appear unplugged to the switch.

### **3.4.7 Special Configuration Instructions for MDA Black Digital Parameters**

The fade, failure, and chatter durations apply only to Black Digital mode. They are benign (not functional) in all other modes. The front panel parameter's configurations prevent the user from configuring unsupported durations.

Two basic combinations of fade and failure are supported by the MDA: fade duration equal to failure duration and fade duration less than failure duration. When the parameters are equal, the fade duration is ignored and the MDA operates as if the "fade" state did not exist. Otherwise, while the MDA is failing, it will enter a "fade" state from the time the fade duration is expired until the failure duration is expired (ignoring the possible recovery scenario).

**Note: Typical configuration based on simulated failures in a lab environment (may not reflect real world environment).**

#### **Fade**

The fade duration should be configured as the shortest possible duration of link failure that the user should be aware of. Ideally, this will be one second. If the link has high bit errors or frame loss then a higher duration of two to five seconds might be required. Anything greater probably indicates an unusable link.

#### **Failure**

The failure duration should be configured as the shortest possible duration of link failure that the switch should be aware of. Any value greater than twenty seconds will likely be truncated by the failure of the underlying protocol. Users desiring a faster indication of failure should use a number closer to the fade duration. For example, if the fade duration was one second, the failure duration should be from five to ten seconds. Longer durations may be desired if the user wishes to tolerate longer periods of timeout with the possibility of operating in more failure-prone links.

#### **Chatter**

The chatter duration should be configured as the shortest possible duration of link synchronization that indicates the link is usable again. Ideally, this value should be greater than the fade duration, to provide assurance that the link is fully recovered and ready for use. The

longer the chatter, the less likely the link will bounce up and down from the user's perspective after a fade or failure. However, if the user wishes to exit fades in a timely matter, the chatter duration should be configured as short as possible. A shorter chatter will allow the link to recover from fade in a shorter period of time. To prevent every fade from resulting in a failure, this value is required to be less than the difference between the fade and failure durations.

### **Relation to crypto re-sync**

Crypto re-sync is initiated whenever the link has failed and the synchronization status bit has failed as well. If the crypto loses sync within a fade condition, the re-sync will not be initiated and the link must go through a failure condition. The crypto re-sync is closely tied to the chatter duration. A longer delay of the crypto re-sync will extend the chatter duration (in reality) because the cryptos must recover for the link to recover. Ideally, the crypto re-sync initial delay should be less than or equal to the chatter duration.

### **Example configurations:**

Version 17 behavior:

Fade duration: 1 second

Failure duration: 1 second

Chatter duration: 1 second

Non-lossy link

Fade duration: 1 second

Failure duration: 10 seconds

Chatter duration: 3 seconds

Lossy link:

Fade duration: 3 seconds

Failure duration: 20 seconds

Chatter duration: 5 seconds

Very lossy link:

Fade duration: 5 seconds

Failure duration: 30 seconds

Chatter duration: 3 seconds

### 3.5 Possible Problems and Known Errors

There are no known errors with this version of the MDA Application.

### 3.6 MDA-A Unit Modification Nameplate

The unit modification nameplate is located on the rear of the chassis. A unit modification number table is located on the nameplate and will be marked to represent the unit modification number. The marking of the unit modification number will be done in a manner that will be visible and permanent. The highest number marked on the unit modification table will represent the level of the modification for that particular unit (i.e. if 01, 02, and 03 are marked on the unit modification table, then the unit is considered to be at modification 03). The unit assembly, software, and firmware revision levels that are associated with the unit modification number are provided in Section 3.7 of this document. Upon software, firmware, or hardware updates of the unit, the nameplate on the rear panel of the unit shall be marked to the appropriate modification number.

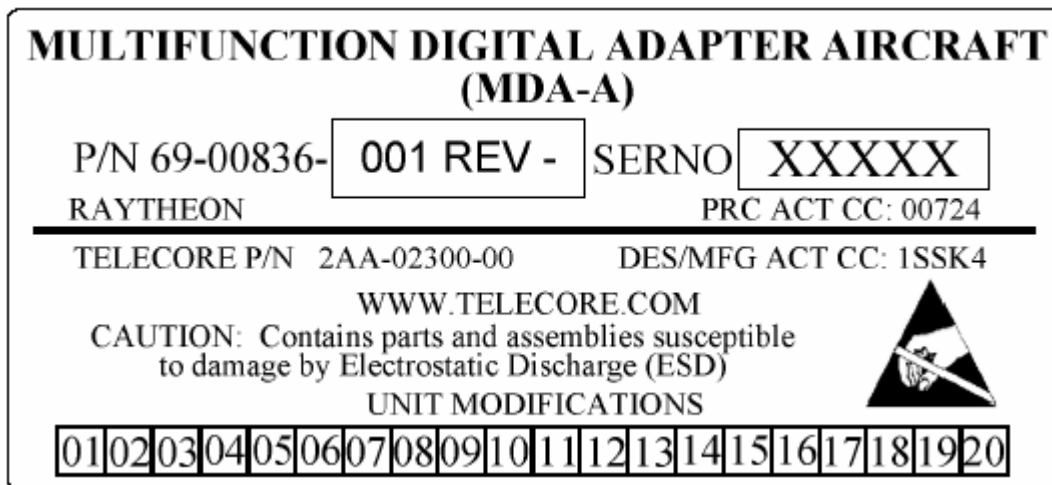


Figure 1. Unit Modification Nameplate.

If it's necessary, in the future, to change the dash number or roll the revision of the Raytheon product number, the end user must also update the last three (3) digits and revision of the Raytheon part number. When done at the Telecore, Telecore shall apply the last three (3) digits of the Raytheon unit part number (the dash number) and revision (letter) on a HellermannTyton, P/N. TAG11L-789, 0.65" x 0.2", laser, polyester, permanent pressure sensitive adhesive label and affixed it to the serial number plate at the top level assembly of the product. For convenience, the serial number label is initially printed with a default dash number and revision number. Dash number shall be specified in the sourcing customer's purchase order.

### **3.7 MDA-A Configuration Control/Software & Firmware Component Compatibility Table**

The MDA has BSP, Application, and DSP software and FPGA and CPLD firmware. The following table identifies the version compatibility within the MDA. Please note that some versions of MDA Application software only show two digit dash numbers for the item revisions. The revisions can be extended with two additional zeros. For example, a -00 on the display is equivalent to revision -0000. Newer versions of Application Software display all four digits.

The bolded items in Table 2 indicate the components changed from its previous version.

Table 2 MDA Component Compatibility Table

2AA-00400-00 Unit Dash Number	BSP 2AA-00452 Revision Level	MLPPP 2AA-00455 Revision Level	APL 2AA-00453 Revision Level	DSP Application 2AA-00459 Revision Level	DSP Libraries 3SL-00002 0200 Revision Level	DSP Libraries 2AA-00458 Revision Level	DSP G.729 2AA-00457 Revision Level	FPGA 2AA-00421 Revision Level	DSP Blk Dig 2AA-00428 Revision Level	DSP Libraries 3SL-00002 0300 Revision Level	FPGA Blk Dig Application 2AA-00417 Revision Level	Config 2AA-00420 Revision Level	CPLD 2AA-00489 Revision Level	Top Level Assembly 2AA-02310 Revision Level	Top Level BOM 2AA-02300 Revision Level	ECO/ECR/EC RU/ Notes
01	-0700	-0600	-1801	-1100	0200	NA	-0000	-0900	-0000	0300	-0200	-0000	-0100	-0100	<b>-0001</b>	

Notes:

1. 3SL-00002-0200 and 2AA-00457 are compiled into the DSP application 2AA-00459 which is then downloaded to the MDA and burned into FLASH memory after final assembly of the unit.
2. 3SL-00002-0300 is compiled into the DSP application 2AA-00428 which is then downloaded to the MDA and burned into FLASH memory after final assembly of the unit.
3. Under normal Telecore procedures and practices, each Telecore product is assigned a unique block of MAC addresses. During the manufacturing of a product the S/N, from the serial number plate, is entered and is used by the BSP software to derive and assign a unique MAC address for each unit. This ensures that there will NEVER be duplicate MAC addresses on a network. For the MDA-A product, the BSP software is NOT being changed. This was done because the MDA-A product is considered a subset of the current MDA product, already in production. As such, the MDA-A product will use the same block of MAC addresses as the MDA product. To avoid overlap of MAC addresses for the MDA-A product, the MDA-A serial numbers will begin at 150XX (Pre-Production units will be 15001 through 15019, Production units will start at 15021).
4. Any software developed for use on the MDA-A, internally qualified by Telecore, approved by the customer, and certified through the JITC shall also be qualified for use on the MDA product. Any software developed for use on the MDA, internally qualified by Telecore, approved by the customer, and certified through the JITC COULD ALSO POSSIBLY be used on the MDA-A product. However, in addition to the JITC software certification, the MDA-A product must also be certified, tested, and included in the AIRBORNE plane configuration. The airborne plane configuration will ultimately control the software which is loaded and delivered on the MDA-A product. So, even though a later version of software may be certified for use on the MDA product, the MDA-A product will use whatever the latest version of software is that was certified, tested, and included in the AIRBORNE plane configuration. If a fixed site version of the MDA-A is required at a later time, and doesn't require AIRBORNE plane configuration

control, but needs to use the LATEST version of the MDA software, then a NEW configuration (New Top Level Telecore P/N, New S/N plate, Latest revision MDA software) will be assigned for this configuration. This will AVOID confusion associated with having multiple deliverable configurations and revisions of the same product root part numbers.

5. Internally, the MDA-A contains two MDA units. The MDA-A is a dual MDA adapted to the airborne environment. Facing the front of the MDA-A unit, Bay 1 is the right side and Bay 2 is the left side. To allow for different IP addresses on the two units it's necessary to assign different Serial Numbers (S/Ns) to the individual internal MDAs contained inside the MDA-A. As such, the Top Level MDA-A unit will always be assigned an ODD Serial Number on the serial number plate. The ODD serial number on the serial number plate will ALWAYS correspond to the RIGHT SIDE (BAY 1) MDA. The Bay 2 MDA is internally assigned S/N plate serial number +1, the next EVEN S/N. So, if the serial number plate is 15001, then internally the BAY 1 MDA will use S/N 15001 and the Bay 2 MDA will use S/N 15002.



## 4 NOTES

### 4.1 Glossary

APL	Application software
BSP	Board Support Package
CPLD	Complex Programmable Logic Device
DSP	Digital Signal Processor
ECR	Engineering Change Request
ECRU	Engineering Change Request Update
FPGA	Field Programmable Gate Array
FTP	File Transfer Protocol
IP	Internet Protocol
LAN	Local Area Network
MDA	Multifunction Digital Adapter
MDA-A	Multifunction Digital Adapter - Airborne
NA	Not Applicable
NCA	National Command Authority
PC	Personal Computer
SCI	Software Configurable Item
VDD	Version Description Document