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Moving-Map Composers System Version 3.4P Acceptance Test Procedures Developed for the Finnish Air Force

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14. ABSTRACT

This document provides detailed Acceptance Test Procedures (ATP) to be followed during the final test and evaluation of the Naval Research Laboratory (NRL) Moving-Map Composer (MMC) version 3.4P software, developed for the Finnish Air Force (FAF). The ATP will be performed on a FAF-owned Digital Alpha computer, currently located at NRL, during the Test Readiness Review (TRR) #1 and during installation and training in Finland.

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MOVING-MAP COMPOSERS SYSTEM VERSION 3.4P ACCEPTANCE TEST PROCEDURES DEVELOPED FOR THE FINNISH AIR FORCE

I. INTRODUCTION

This document provides detailed Acceptance Test Procedures (ATP) to be followed during the final test and evaluation of the Naval Research Laboratory (NRL) Moving-Map Composer (MMC) System version 3.4P, developed for the Finnish Air Force (FAF). A pre-ATP will be performed on a FAF-owned Digital Alpha computer, configured with a FAF Digital Memory Unit (DMU) and DMU Interface (DMUI), during the Test Readiness Review (TRR) #2 scheduled for January 16-17, 2002 at NRL. The pre-ATP at NRL will specifically exclude part II (SET UP MMC SYSTEM) of this document. **The FAF must provide a test Aircraft Optical Disk (AOD) to support the pre-ATP.** Upon successful completion of TRR#2 and agreement by NRL and FAF of acceptable performance of the MMC System during the pre-ATP, all FAF MMC System hardware will be shipped to Finland. The formal ATP will be performed in Halli, Finland.

MMC 3.4P is being developed to perform the following functions for the FAF:

- Process and archive Finnish-produced geotiff Images into Compressed Aeronautical Chart (CAC) map data, compliant to the Tessellated Spheroid (TS) Projection System.
- Allow the user to change the system color palette for a given map scale during geotiff → CAC processing.
- Design / build AOD images from user-specified CAC data;
- Write completed AOD images to militarized Write-Once Read-Many (WORM) disks;
- Design / build Mission Planning System (MPS) Compact Disk Images (CDI) from user-specified CAC data and Digital Terrain Elevation Data (DTED);
- Write MPS-CDIs to Recordable Compact Disks (CD-R) for mission planning purposes;
- Write AODIs and processed CAC data to CD-Rs for archival.
- Recycle (where possible) failed AODs;
- Print final AOD and MPS image compositions, chart images, and AOD summaries.

Figure 1 provides an overview of the hardware platform hosting MMC 3.4P. Figure 2 provides a diagram of hardware connections from this platform to major hardware peripherals. Note that as of Design Review (DR) Meeting #1, FAF does not own all the hardware peripherals that MMC supports. Specifically, FAF does not own a Howtek scanner or Seiko color printer, both of which are supported by MMC. In addition, FAF does not have a GPIB board, which is required for installation of the scanner. References to all other unavailable hardware (i.e., scanner, color printer, and GPIB board) are highlighted in yellow in this document. If FAF is interested in procuring this equipment, options regarding their purchase can be discussed during TRR #2.

Several sections within this ATP involve data processing. Table 1 provides a complete listing of required data sources.

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Section	Source CD Label	Description
III.1 PROCESS MAP DATA	Finland 1:2M Geotiff Source #1	FAF 1:2M scale geotiff chart data
III.4 PROCESS MAP DATA	Finland 1:500k Geotiff Source #1	FAF 1:500K scale geotiff chart data
VIII.1 INSTALL A NEW COLOR PALETTE AND RE-BUILD COMPOSITION	*Finland 1:2M Geotiff Source #2.*	FAF 1:2M scale geotiff data including a new color palette

Table 1. Required ATP source geotiff chart data

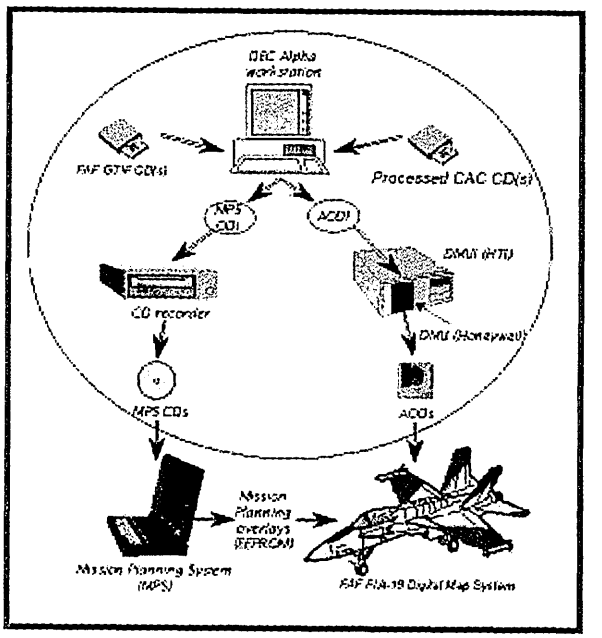

Figure 1. Overview of FAF MMC System Hardware Platform

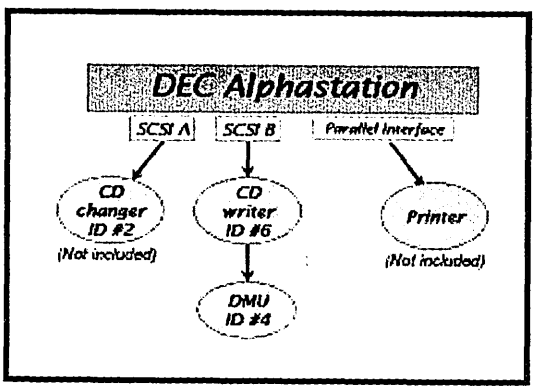

Figure 2. FAF MMC System Hardware Connections

Note: FAF has not procured CD changer or printer.

II. SET UP MMC SYSTEM

This section provides all of the necessary steps for setting up the MMC System and making it available for use.

1. **Unpack all equipment** from their boxes.

2. **Parts List:** (1) DEC Alpha CPU, (1) monitor, (1) DMUI, (1) DMU, (1) CD-writer, (1) keyboard, (1) mouse, (1) high-density SCSI-II to high-density SCSI-II cable, (1) Centronix to high density SCSI-II cable, (1) SCSI-I terminator, (1) SCSI-II high density terminator (4) power cords, (1) box of CD-Rs.

3. **Arrange equipment in workspace:**

   a. Set DMUI on a table, place Alpha CPU next to the DMUI, place the CD writer on top of DMUI, and place CD changer on top of the CD writer.
   b. Place monitor, keyboard, and mouse next to the stack of equipment.
   c. Place scanner on a table with enough clearance for the moving scanner bed.

4. **Connect peripherals to the back of the CPU:**

   a. Monitor: Plug the monitor's video cable into the video port on the CPU (lower half of CPU panel, 1st horizontal port).
   b. Keyboard / Mouse: Plug the keyboard and mouse into their respective ports on the CPU box (middle part of panel - there is a line above the keyboard port and a circle with an arrow above the mouse port).
   c. Scanner: Not applicable.
   d. CD changer: Not applicable.
   e. CD writer: Plug the high-density SCSI-II to high-density SCSI-II cable into the external SCSI-II port on the CPU box (below the monitor port, 2nd horizontal port). Plug the other end of this cable into the left-most SCSI-II port on the CD writer. Plug a SCSI-II terminator into the right-most CD writer SCSI-II port.
   f. DMUI: Plug the Centronix - High Density SCSI-II cable into the middle SCSI-II port on the CD writer. Plug the other end of the cable into either of the DMUI SCSI-I ports. Plug a SCSI-I terminator into the remaining SCSI-I port on the DMUI.
   g. DMU: (If not pre-installed in DMUI) Place DMU in DMUI opening and connect the DMU Optic plug to J2 on the DMU and connect the DMU power plug to J1.

5. **Power connections:**

   NOTE: All equipment requires uninterrupted 60Hz, 115VAC. NRL recommends that high quality power converters be used in Finland to insure a stable power source (e.g. EGLAR GPS1000 Power Conditioner). The DMU and DMUI are especially sensitive to power fluctuations, which can damage the equipment.

   a. Verify the power supplies of the CPU and all peripherals are switched to use 60hz power.
   b. Connect power cords to each peripheral (CPU, monitor, DMUI, CD writer, CD changer, and scanner) and then plug to an unplugged power strip.
   c. Verify that all equipment is turned OFF at their individual power switches BEFORE plugging in power strip.

d. Plug in and turn on power strip.
e. Turn on the peripherals:
   i. First turn on DMUI (first using the power switch located on the back of the box, then with the switch on the front).
   ii. Next turn on CD writer, CD changer, scanner, and monitor.
f. Turn on the MMC System CPU.

6. **Check device configuration and boot MMC System:**

a. Wait until the MMC System's " >>>" prompt is displayed.
b. Check that the CD writer's red HDD light is *off*. If it is *on*, press the RESET button on the front of the CD writer (which will turn it off), then, at the ">>>" prompt on the MMC System monitor, type **INIT**.
c. When the ">>>" prompt returns on the MMC System monitor, wait 5-10 seconds, then type **SHOW DEVICE**. You should see the following listing (except the highlighted devices, if still unavailable):

DEVICE ID	Device name	Description
DKA0	RZ29B	System disk
DKA100	RZ29B	MMC disk (Disk 1 of Volume Set)
DKA200	RZ29B	MMC disk (Disk 2 of Volume Set)
DKA400	RRD45	Internal CDROM drive
DVA0		
MKB400	YNGMINDS TURBO STUDIO	CD Writer
EWA0		00-00-F8-00-E7-43
PKA0	SCSI Bus ID 7	Internal SCSI Bus - A
PKB0	SCSI Bus ID 7	External SCSI Bus - B

If this listing is incomplete or inaccurate: turn off the CPU, then turn off the power strip, next, turn the power strip back on, and then turn the CPU on. Repeat the steps in II.6 until the listing is complete or after two attempts, call NRL.

d. When the device listing is correct, type **B** (for boot) at the ">>>" prompt. It will take about 3 minutes to completely boot the system.

7. **Login:**
Username: **MMC**
Password: **8675309**

8. **ATP Pass:**

✓ System boots up correctly and user is able to log in. Yes ☐ No ☐

9. **Exceptions Noted:**

III. PROCESS MAP DATA

In this section, you will create the processed map data that will be used throughout the rest of the ATP. For FAF, the source data for MMC to process are geotiff map files. MMC reads geotiff map files from CD and can only process one scale of geotiff data on any given CD. The volume label and directory structure for the geotiff map files are defined in Appendix A. Table 2 lists the source data CDs that are required for this section. **MMC will not process FAF map data that does not conform to the map data and directory structure formats listed in Appendix A.**

CD Label	Description
Finland 1:2M Geotiff Source #1	FAF 1:2M scale charts
Finland 1:500K Geotiff Source #1	FAF 1:500K scale charts

Table 2. Required source data CDs for this section

1. **Install CDROM containing source Geotiff map files:**
   a. Install CDROM labeled: *Finland 1:2M Geotiff Source #1.*
   b. From the MMC main menu, click on *Tools*, then *Data Processing.*
   c. Under *Process Scale*, select *JNC(1:2M).*
   d. From the **CDROM Site** window, select CDROM drive *7*, click on *Scan Readers.*
   e. Once the Volume ID of the CDROM is shown (FAF_GTIF), click *Start Processing.*
   f. This CDROM contains source data that will be processed using the existing color palette (therefore, it does not contain a new color palette file). In section VIII titled "Install A New Color Palette And Re-Build Composition", data are processed using a new color palette. Click *Yes* to use the system color palette (see Appendix A for more details).
2. **Process the Geotiff map files:**
   a. The **GeoTIF Processing Window** displays information about disk usage, processing options, and advanced options.
   b. Select the Advanced Options menu ands click on the *Optimization* option. Now, click on the *Finalize Automatically* box to insert a check status.
   c. Review the **GeoTIF Processing Window** information, making sure that the *Finalize Automatically* option is "checked," then click *Accept.*

      NOTE: When *Finalize Automatically* is checked, MMC will not allow more data at the same map scale to be processed until this data has been archived and/or deleted from the system. If more than one CDROM of map data at a given scale requires processing, do not select *Finalize Automatically* until the final source CDROM has been processed.

   d. A bitmap of the map segments to be processed from this geotiff data is displayed. Verify the approximate geographic extents of the map coverage shown and if correct, click *Yes.*
   e. A processing meter appears near the bitmap coverage of the data to be processed. The bitmap displays map segments that have not been processed and compressed. The bitmap

becomes smaller as more map segments are processed. Once processing is complete, click *Acknowledge*, and then click *Okay*.

3. **Review the Processed map data (FAF CAC) on hard drive:**
   a. From the main menu, click on *Coverages*, then *Include Processed Coverage*.
   b. Select *PROCESSED-HD-MAP5* in the dialog box, and then click *OK*.
   c. On the toolbar (located at the bottom of the MMC window), change the map projection of the display from *Mercator* to *North Polar* and use the button to zoom into the location of the map coverage.
   d. Move the mouse to the location of the map coverage and click the right mouse button.
   e. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

      NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

   f. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

4. **Process Another Map Scale:**
   a. From the MMC main menu, click on *File*, then *New*.
   b. Repeat steps III.1-3 for the CDROM labeled: *Finland 1:500k Geotiff Source #1*.
   c. In step III.1.c, select *TPC(1:500k)* and in step III.3.b, select *PROCESSED-HD-MAP3*.

5. **ATP Pass:**

✓ Geotiff map data was processed.	Yes ☐	No ☐
✓ FAF CAC is correctly geo-referenced.	Yes ☐	No ☐
✓ Color fidelity of the FAF CAC is acceptable.	Yes ☐	No ☐

6. **Exceptions Noted:**

IV. ARCHIVE AND LOG FAF CAC

This section describes the procedures used to archive FAF CAC files since they may be used to create new AODIs. FAF CAC files are logged to update and maintain the MMC source database.

1. **Archive the FAF CAC:**
   a. From the main menu, click on the *Tools* option, then *CDROM Options*, and then *Archive Data to CDROM*.
   b. From the **Archive to CDROM** window, click on *File*, then click *PreMaster*, and then click *Processed CAC Data*. Select the map scale *JNC(1:2M)*.
   c. If data already exists on the system, MMC will ask if you wish to delete it. Click *Yes*, then click *Yes* again to verify that you wish to proceed.
   d. Enter a descriptive title for the processed map data (e.g. First Processed 1 to 2M) using a combination of letter and number characters.
   e. When pre-mastering is complete, click *OK* and insert a blank CD-R with the label-up in the CD writer.
   f. From the **Archive to CDROM** window, click on *File*, then *Cut*.
   g. Write down the MMC-assigned name of the archived data (e.g. SC-2000-A-MAP5-X00001) and then click *Yes*;
   h. Wait until the CD writer has finished writing to the CD-R (i.e. no red or blinking green lights are on) then, remove the CD-R from the CD writer.

      NOTE: Even if MMC displays a message saying the write has finished, **wait** until the CD writer's Read (green) and Write (red) lights stop blinking! The green Disc and 8x lights will stay on. A message advising the user to immediately log and review the archived data appears. Click on the OK button to dismiss the message.

   i. Label the CD-R with the descriptive and MMC-assigned name then, insert it into the CDROM drive.
   j. From the **Archive to CDROM** window, click on *File* then, *Close*.
2. **Log the FAF CAC:**
   a. From the main menu, click on the *Tools* option, then *Media Options*, then *Log Media*.
   b. From the **CDROM Site** window, select CDROM drive *7*, click on *Scan Readers*, then *Start Processing*.
   c. When logging is complete, remove CD-R from CDROM drive.
3. **Archive and log another map scale:**
   a. Repeat steps IV.1-2 for the *TPC(1:500k)* scale map data.
   b. In IV.1.b, select the map scale *TPC(1:500k)*.
4. **ATP Pass:**

✓ The processed map data has been archived and logged. Yes ☐ No ☐

5. **Exceptions Noted:**

V. DESIGN A MMC COMPOSITION

This section describes the procedures that are used to design a composition. A composition is a user-defined geographic coverage area (or set of areas) saved as a series of bitmaps. A composition includes a bitmap for each contiguous geographic area, within each TS zone, and at each map scale required to build the user's AOD image or MPS image.

1. **Display the existing logged coverage bitmap:**
   a. From the main menu, click on the *File* option, then *New*.
   b. If the Build Type Mode (either *AOD* or *MPS*, just below menu bar on far right) is not set to *AOD*, change it by clicking on *Preferences*, then *Composing MPS ON*, then *Compose AOD*, and then click *Yes*.
   c. On the toolbar, change the map scale to *JNC(1:2M)* and change the map projection of the display from *Mercator* to *North Polar*.
   d. From the main menu, click on *Overlays*, then *Available Coverage*.
   e. If needed, use the button on the toolbar to zoom.
   f. MMC will display the coverage of the logged CD at the selected scale.
2. **Design a composition:**
   a. From the lower-left corner of the toolbar, select the button to define an area of coverage. Define a small area, less than the available coverage.
   b. MMC will display your defined areas in colored boxes (the color reflects the TS zone of the data).
   c. To check the size of the composition, from the main menu, click on *Windows*, then *Composition Data Size Display* to see a meter showing how much space has been used.
3. **Add another map scale:**
   a. On the toolbar, change the map scale to *TPC(1:500k)* and change the map projection of the display from *Mercator* to *North Polar*.
   b. From the main menu, click on the *Overlays* option, then *Available Coverage*.
   c. Repeat step V.2.
   d. You may switch to any map scale to add more coverage or delete coverage (where map data is available) using the buttons located on the toolbar.
4. **Save your composition** when you are satisfied with your defined coverage(s):
   a. From the main menu, click on the *File* option, then *SaveAs Final Composition*. When prompted for a filename, type **ATP1** and click *OK*, then enter a descriptive title and click *OK*. A confirmation window now appears with assigned numbers for the composition. Click *Yes* to confirm and close the window. This saves your composition to the hard disk.
5. **Open the Final Composition:**
   a. From the main menu, click on the *File* option, then *Open Final Composition* (this must be done even if the composition is still active in MMC, see note below);
   b. Scroll through the list of available compositions and select the ***AOD*** composition **ATP1** (*not* the ***MPS*** composition) you just created. Note that MMC has saved both an AOD and MPS

version of the **ATP1** composition. All MMC compositions created in AOD mode are also valid MPS compositions, but not all compositions created in MPS mode are valid AOD compositions. In particular, an AOD composition is more restrictive than an MPS composition in maximum size limit and amount of map coverage that can be contained within a scale and zone. MMC will display your templates on the world map. You may modify the map view on the tool bar by changing the map scale and projection or by using the zoom-in button.

NOTE: An active composition that has been saved as a final composition may still be modified as long as the modifications are saved using a different composition name. Modifications made after a final composition has been saved may result in an invalid composition. Therefore, as a security measure, MMC *requires* that a final composition be opened. Once opened, the composition *cannot* be modified. All compositions are saved to the hard disk.

6. **ATP Pass:**

✓ A MMC final composition named **ATP1** containing map data at two scales has been created, saved, and opened. Yes ☐ No ☐

7. **Exceptions Noted:**

VI. BUILD, REVIEW AND ARCHIVE A NEW AODI AND MPS-CDI

This section describes the procedures that are used to build new AODI and MPS images. When a new image is built the area of coverage must be defined, and source data are identified and processed. Newly created images should be reviewed for acceptability and archived for future use.

1. **Build the AODI and MPS image (In AOD Mode, MMC automatically builds both):**

   a. From the main menu, click on the *Tools* option, then *AOD Options*, and then *Build AOD Image*. A dialog box will appear asking you to verify that you want to build the AOD image, click *Yes*.

   b. Another dialog box appears asking if its OK to clear the build area and begin a new build. Click on *Clear and Begin* then, click on *New Build* to dismiss the box.

   c. MMC will pop up a **Data Source** window showing which data sources (e.g., FAF CAC CDs) are needed.

   d. MMC will also pop-up the **CDROM Site** window. Load and process the necessary CDs one at a time using the *Scan Readers* and *Start Processing* buttons.

   e. Once all the CDs have been read and processed, the **Data Source** window will disappear and MMC will build the MPS and AOD images.

   f. ***Wait*** until MMC states that the image build is complete before continuing with the next step. Click *Acknowledge* when the build is complete.

2. **Review the AOD image and Archive to CD:**

   a. From the main menu, click on the *File* option, then *Open Image*, select *AOD*, and then select *Hard Disk* and click on the newly built image name. This will open the AOD Image on hard disk that you just built.

   b. To check that MMC will view the map data from the AOD image, click on *Preferences*, then *View [drop-down list]*, and verify that *View AOD from hard disk* is selected. MMC should set the correct view type to the current map image by default.

   c. View the CAC data in the AOD image:

      i. Move the mouse to the location of the map coverage and click the right mouse button.

      ii. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

      NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

      iii. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

   d. Archive the AOD Image to CD-R:

      i. From the main menu, click on the *Tools* option, then *CDROM Options*, and then *Archive Data to CDROM.*

ii. From the **Archive to CDROM** window, click on *File*, then click *PreMaster*, Under *PreMaster*, select *AOD*. Mark this CD-R as **AOD1**.

iii. If data already exists on the system, MMC will ask if you wish to delete it. Click *Yes*, then click *Yes* again to verify that you wish to proceed.

iv. Enter a descriptive title for the processed map data (e.g. First Processed 1 to 2M) using a combination of letter and number characters.

v. When pre-mastering is complete, click *OK* and insert a blank CD-R with the label-up in the CD writer.

vi. From the **Archive to CDROM** window, click on *File*, then *Cut*.

vii. Write down the MMC-assigned name of the archived data (e.g. SC-2000-A-MAP5-X00001) and then click *Yes*;

viii. Wait until the CD writer has finished writing to the CD-R (i.e. no red or blinking green lights are on) then, remove the CD-R from the CD writer.

NOTE: Even if MMC displays a message saying the write has finished, **wait** until the CD writer's Read (green) and Write (red) lights stop blinking! The green Disc and 8x lights will stay on. A message advising the user to immediately log and review the archived data appears. Click on the OK button to dismiss the message.

iv. Label the CD-R with the descriptive and MMC-assigned name then, insert it into the CDROM drive.

v. From the **Archive to CDROM** window, click on *File* then, *Close*.

e. Review the archived AOD image from CD (repeat steps a-c within this section), under *Open Image*, select *AOD*, and then select *CDROM*. Load the **AOD1** CD and use the **CDROM Site** window to verify under *Preferences* that *View AOD from CDROM* is selected.

3. **Review the MPS image and Archive to CD:**

a. Follow the instructions for the previous section (VI.2a-e); however, select *MPS* instead of *AOD*. Under *Preferences*, verify that *View MPS* is selected. Mark this CD-R as **MPS1**.

b. After verifying **MPS1** on MMC, install the **MPS1 CD** on a MPS system and review the map data. **Verify that the correct color palettes for all map scales relevant to this map data are installed on the MPS system.**

NOTE: An AOD image *contains* internal color palettes that are copied from the MMC system palette directory during AOD build. A later change to the MMC system color palettes will *not* affect the color fidelity of a given AOD image. However, a MPS image *does **not** contain* internal color palettes and relies on the installed system palettes (e.g. MMC, MPS system). Therefore, a color palette change will severely degrade the color fidelity of previously built MPS images. This will become apparent in section X.8 where image color palettes are checked for obsolescence.

4. **ATP Pass:**

✓ The final composition **ATP1** was used to build MPS and AOD images.

Yes ☐ No ☐

- ✓ The **AOD1** and **MPS1** images were reviewed and verified on the hard disk.

  Yes ☐ No ☐

- ✓ The **AOD1** and **MPS1** images were archived to CDs, then reviewed from the archived CDs.

  Yes ☐ No ☐

- ✓ The MPS CD (**MPS1**) was verified on a MPS system without error.

  Yes ☐ No ☐

5. **Exceptions Noted:**

VII. WRITE AN AODI TO AN AOD AND REVIEW

This section describes the procedures that are used to write an AODI to an AOD and then view the newly written image from the AOD.

1. **Mount an AOD in the DMU:**
   a. Turn off the DMU via the power switch located in front.
   b. Use side A of the **ATP TEST** AOD. Write down the serial number of the AOD (located on side A). Make sure the write-protect tab is off (both arrows are pointing up) and visually inspect the AOD glass to make sure it is free from dust or debris being careful *not to touch the glass*. Use a lens cloth to clean, if required.
   c. Install side A of the **ATP TEST** AOD in the DMU (side A label will be visible when installed).
   d. Close and secure the DMU door.
   e. Turn on the DMU.
   f. Wait approximately 30 seconds after turning on the DMU for initialization to complete before continuing.
2. **Open the AODI:**
   a. From the main menu, click on the *File* option, and then click *New*.
   b. Again, from the main menu, click on the *File* option, then click *Open Image*, select *AOD*, and then select *CDROM*.
   c. Load the **AOD1** CD using the **CDROM Site** window, select drive 7, click on *Scan Readers*, then *Start Processing*.
3. **Write to the AOD:**
   a. From the main menu, click on the *Tools* option, then *AOD Options*, and then *Copy AOD Image to WORM*.
   b. Click *Yes* in the confirmation window to proceed.
   c. Type the serial number of the AOD and the AOD side in the dialog box, then click *Accept*.
   d. A processing meter appears that updates the percent of the AOD write that is complete. When the processing meter is completely yellow, the AOD write has finished and a dialog box will appear stating that the write is complete and noting any recoverable errors encountered during the process. Click *Acknowledge*.

      NOTE: Recoverable write errors are not uncommon and can be caused by dust, debris, or fingerprints on the AOD glass. If 25 *consecutive* write errors are encountered, MMC will abort the write process, in which case, the AOD may be recycled (which is described later in section IX.2). If several hundred recoverable write errors are encountered, this may indicate that the AOD media is bad (e.g. glass bubbles) or very dirty, or that the DMU may be failing. A fatal error is an error that prohibits the successful completion of the AOD writing process (e.g. 25 consecutive write errors, DMU writer hardware failure, power failure, etc.).
4. **Review the AOD from the DMU:**
   a. From the main menu, click the *File* option, then *Open Image*, select *AOD*, and select *DMU*.
   b. View the FAF CAC from the AOD:
      i. Move the mouse to the location of the map coverage and click the right mouse button.

ii. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

iii. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

c. When finished reviewing the map data from the AOD, from the main menu, click on *File*, then *New*.

d. Leave the **ATP TEST** AOD installed and the DMU power turned on.

5. **ATP Pass:**

✓ The **AOD1** AOD image was written to the **ATP TEST** AOD without any fatal errors.

Yes ☐ No ☐

✓ The map data on **ATP TEST** was reviewed and verified on MMC. Yes ☐ No ☐

6. **Exceptions Noted:**

VIII. INSTALL A NEW COLOR PALETTE AND RE-BUILD COMPOSITION

In this section, you will install a new color palette on MMC when processing more source geotiff map data. *There is no stand-alone program on MMC to install a color palette without processing additional map data.* In other words, a new color palette can only be generated as part of processing new map data. A separate PC-based program named **MAKEPAL.EXE** that is provided by NRL must be used to convert a Finnish color palette text file into a binary color palette file (see Appendix A for Finnish color palette file format). The binary color palette file and its associated geotiff map files are then transferred to a CDROM. This CDROM is the source for MMC to begin processing. For the ATP, a CD containing Finnish 1:2M geotiff data including a new color palette has been created to demonstrate this procedure.

NOTE: Color palettes *should remain static* since changing a color palette will require re-processing of all previous map data at a given scale and render all archived AODI and MPS media obsolete. **This function should be used sparingly.**

1. **Process Map Data:**
   a. Install the CDROM labeled: *Finland 1:2M Geotiff Source #2.*
   b. From the MMC main menu, click on *Tools*, then *Data Processing.*
   c. Under *Process Scale*, select *JNC(1:2M).*
   d. From the **CDROM Site** window, select CDROM drive *7*, click on *Scan Readers.*
   e. Once the Volume ID of the CDROM is shown (FAF_GTIF), click *Start Processing.*

   NOTE: A dialog box will appear that states: "A SCAC (Scanned Compressed Aeronautical Chart) exists for this scale, but the processed data has NOT been deleted. The SCAC must be logged in and reviewed and the processed data must be DELETED off the hard drive for this scale before processing can continue". You may click *Delete Processed Data Now,* or delete the processed map data from the main menu under the *System* option. The term SCAC is actually a misnomer from a previous version of MMC when processed map data was derived solely from scanned paper charts.

   f. This CDROM contains a new color palette file, so a warning dialog box appears (figure 3) stating that the color palette installed on the CDROM does not match the MMC system palette. Click on *Yes Build New Palette.*

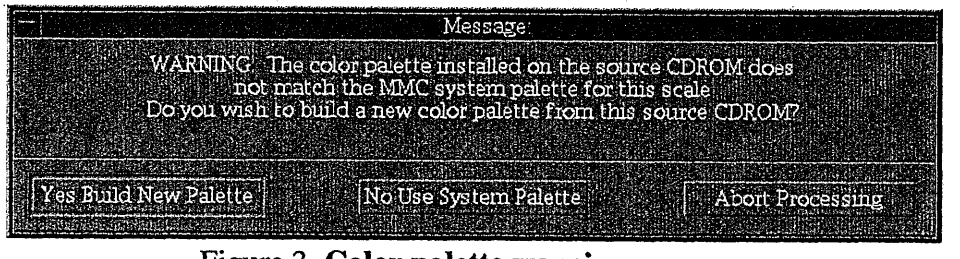

Figure 3. **Color palette warning message**

g. A **Summary Information** window (figure 4) is displayed that lists cautions and recommendations to consider before creating a new color palette (use the scroll bar to read *all* recommendations). **Please read this information carefully!** Click on *I AGREE* to proceed.

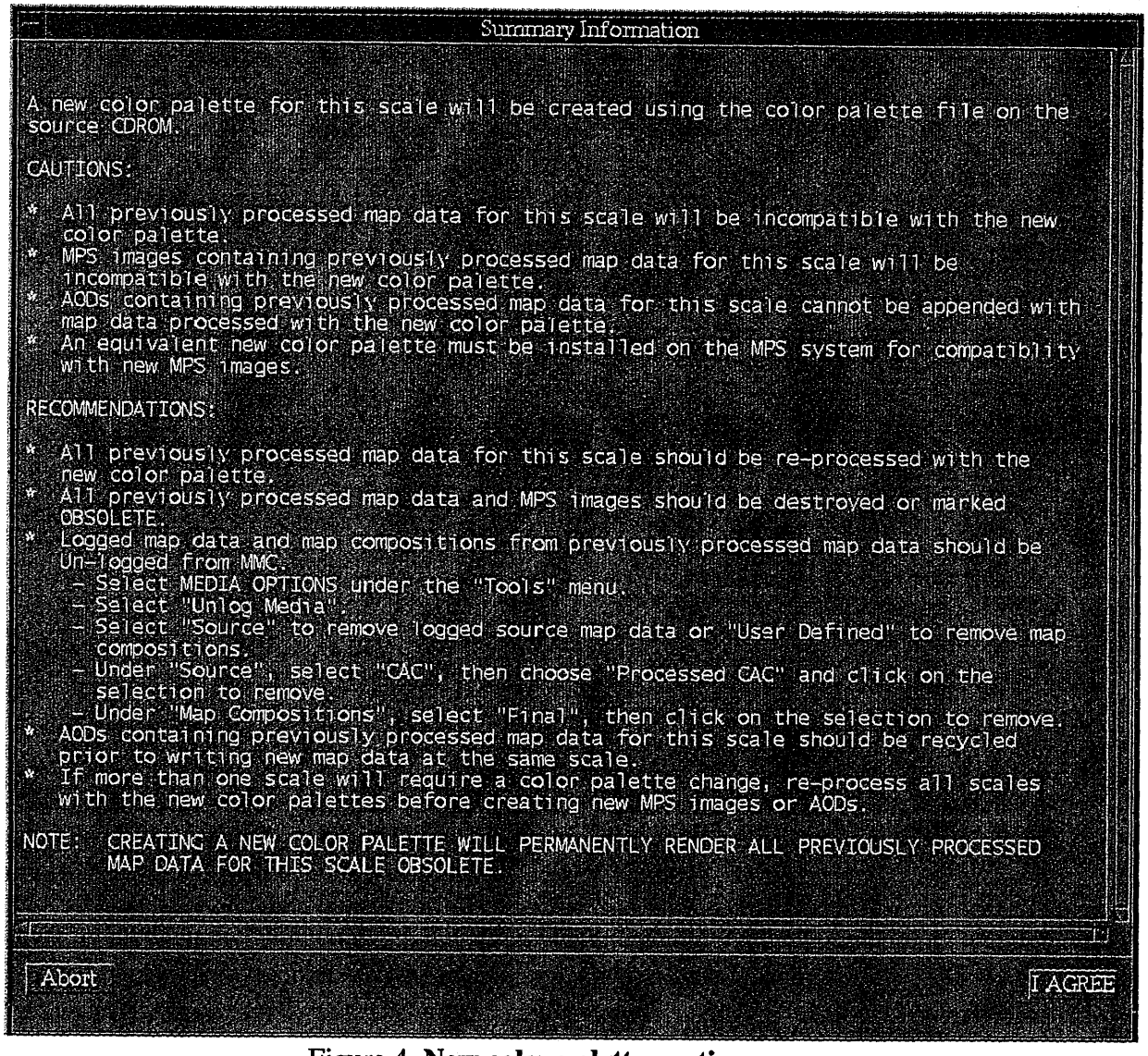

Figure 4. **New color palette caution summary**

h. If logged map data sources exist for this map scale, a message will appear that states you must unlog these sources prior to continuing. To automatically unlog these sources, click *Yes* to the UNLOG sources message.

NOTE: Installing a new color palette renders all previously processed map data for the same scale obsolete and also renders all previous AOD Images and MPS Images obsolete. Any color palette changes made on MMC must also be made on the MPS system. A color palette with changes to only the last sixteen entries (241-256) does **NOT** require re-processing since only the first 240 color entries are used in map processing.

2. **Process the Geotiff map files:**

   a. The **GeoTIF Processing Window** displays information about disk usage, processing options, and advanced options.

   b. Select the Advanced Options menu ands click on the *Optimization* option. Now, click on the *Finalize Automatically* box to insert a check status.

   c. Review the **GeoTIF Processing Window** information, making sure that the *Finalize Automatically* option is "checked," then click *Accept.*

   NOTE: When *Finalize Automatically* is checked, MMC will not allow more data at the same map scale to be processed until this data has been archived and/or deleted from the system. If more than one CDROM of map data at a given scale requires processing, do not select *Finalize Automatically* until the final source CDROM has been processed.

   d. A bitmap of the map segments to be processed from this geotiff data is displayed. Verify the approximate geographic extents of the map coverage shown and if correct, click *Yes.*

   e. A processing meter appears near the bitmap coverage of the data to be processed. The bitmap displays map segments that have not been processed and compressed. The bitmap becomes smaller as more map segments are processed. Once processing is complete, click *Acknowledge*, and then click *Okay.*

3. **Review the Processed map data (FAF CAC) on hard drive:**

   a. From the main menu, click on *Coverages*, then *Include Processed Coverage.*

   b. Select *PROCESSED-HD-MAP5* in the dialog box, and then click *OK.*

   c. On the toolbar (located at the bottom of the MMC window), change the map projection of the display from *Mercator* to *North Polar* and use the button to zoom into the location of the map coverage.

   d. Move the mouse to the location of the map coverage and click the right mouse button.

   e. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

   NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

   f. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

4. **Archive and Log Processed Map Data**:

   a. Archive the FAF CAC:

      i. From the main menu, click on the *Tools* option, then *CDROM Options*, and then *Archive Data to CDROM.*

      ii. From the **Archive to CDROM** window, click on *File*, then click *PreMaster*, and then click *Processed CAC Data.* Select the map scale *JNC(1:2M).*

      iii. If data already exists on the system, MMC will ask if you wish to delete it. Click *Yes*, then click *Yes* again to verify that you wish to proceed.

      iv. Enter a descriptive title for the processed map data (e.g. First Processed 1 to 2M) using a combination of letter and number characters.

v. When pre-mastering is complete, click *OK* and insert a blank CD-R with the label-up in the CD writer.

vi. From the **Archive to CDROM** window, click on *File*, then *Cut*.

vii. Write down the MMC-assigned name of the archived data (e.g. SC-2000-A-MAP5-X00001) and then click *Yes*;

viii. Wait until the CD writer has finished writing to the CD-R (i.e. no red or blinking green lights are on) then, remove the CD-R from the CD writer.

NOTE: Even if MMC displays a message saying the write has finished, **wait** until the CD writer's Read (green) and Write (red) lights stop blinking! The green Disc and 8x lights will stay on. A message advising the user to immediately log and review the archived data appears. Click on the OK button to dismiss the message.

ix. Label the CD-R with the descriptive and MMC-assigned name then, insert it into the CDROM drive.

x. From the **Archive to CDROM** window, click on *File* then, *Close*.

b. Log the FAF CAC:

i. From the main menu, click on the *Tools* option, then *Media Options*, then *Log Media*.

ii. From the **CDROM Site** window, select CDROM drive *7*, click on *Scan Readers*, then *Start Processing*.

iii. When logging is complete, remove CD-R from CDROM drive.

c. Mark all archived media containing the original 1:2M FAF CAC data as ***obsolete*** (e.g. **AOD1**, **MPS1**, SC-2000-A-MAP5-X00001).

3. **Design a MMC Composition:**

a. To demonstrate MMC error checking, from the main menu, click on the *File* option, then *Open Final Composition*, and then select the AOD composition **ATP1**. If the re-processed map data does not contain at least the same map coverage as the old map data, MMC will display a warning message that not all sources for the composition are available. MMC will not allow the AOD composition **ATP1** to be opened, click *Acknowledge*.

b. However, the composition may be included as part of another composition. This will allow the user to access the composition **ATP1**, insert additional coverage, and then save a new final composition. From the main menu, click the *Coverages* option, then *Include Final Composition*, and then select the AOD composition **ATP1**. A warning message may appear that states not all of the map data exists for composition **ATP1**. Click *Acknowledge* to continue. The **ATP1** composition should now be loaded in MMC.

c. For the purpose of the ATP, no coverage should be displayed at the 1:2M scale, since this map coverage was unlogged. Coverage should exist at the 1:500k scale. Verify that the 1:500k coverage remains for the included **ATP1** composition by changing the map scale to *TPC (!:500K)*, and the map projection of the display from *Mercator* to *North Polar*.

d. Add the new 1:2M processed map data to the current composition:

i. **Display the existing logged coverage bitmap:**

i. From the main menu, click on the *File* option, then *New*.

ii. If the Build Type Mode (either *AOD* or *MPS*, just below menu bar on far right) is not set to *AOD*, change it by clicking on *Preferences*, then *Composing MPS ON*, then *Compose AOD*, and then click *Yes*.

iii. On the toolbar, change the map scale to *JNC(1:2M)* and change the map projection of the display from *Mercator* to *North Polar*.

iv. From the main menu, click on *Overlays*, then *Available Coverage*.

v. If needed, use the button on the toolbar to zoom.

vi. MMC will display the coverage of the logged CD at the selected scale.

ii. **Design a composition:**

i. From the lower-left corner of the toolbar, select the button to define an area of coverage. Define a small area, less than the available coverage.

ii. MMC will display your defined areas in colored boxes (the color reflects the TS zone of the data).

iii. To check the size of the composition, from the main menu, click on *Windows*, then *Composition Data Size Display* to see a meter showing how much space has been used.

e. Save this final composition as **ATP2**:

From the main menu, click on the *File* option, then *SaveAs Final Composition*. When prompted for a filename, type **ATP2** and click *OK*, then enter a descriptive title and click *OK*. A confirmation window now appears with assigned numbers for the composition. Click *Yes* to confirm and close the window. This saves your composition to the hard disk.

f. Open the final AOD composition **ATP2**:

i. From the main menu, click on the *File* option, then *Open Final Composition* (this must be done even if the composition is still active in MMC, see note below);

ii. Scroll through the list of available compositions and select the ***AOD*** composition **ATP2** you just created.

2. **ATP Pass:**

✓ A new palette for the 1:2M scale was created and installed as the new MMC system palette for this scale. Yes ☐ No ☐

✓ The new geotiff map data was processed, reviewed, archived, and logged.

Yes ☐ No ☐

✓ A new MMC final composition named **ATP2** was constructed by including the **ATP1** composition and adding the newly processed 1:2M map data. Yes ☐ No ☐

3. **Exceptions Noted:**

IX. BUILD NEW AODI / MPS-CDI AND RECYCLE AOD

This section describes the procedures that are used to build a new AODI and MAP/CDI, recycle an AOD and then write the images on the AOD. Step 2 demonstrates error checking for proper color palette usage. Recycling allows remaining space on a previously used AOD to be utilized for new AOD images.

1. **Build a new AODI and MPS-CDI:**
   a. Follow the procedures listed in section VI titled Build, Review, and Archive a new AODI and MPS-CDI.
   b. Mark the respective AODI and MPS-CDI CDROMs as: **AOD2** and **MPS2**.
2. **Attempt to Append AOD2 to ATP TEST AOD:**
   a. With the **ATP TEST** AOD still installed and the DMU power on, **Open the AODI:**
   b. From the main menu, click on the *File* option, and then click *New*.
   c. Again, from the main menu, click on the *File* option, then click *Open Image*, select *AOD*, and then select *CDROM*.
   d. Load the **AOD2** CD using the **CDROM Site** window, select drive 7, click on *Scan Readers*, then *Start Processing*.
3. **Write to the AOD:**
   a. From the main menu, click on the *Tools* option, then *AOD Options*, and then *Copy AOD Image to WORM*.
   b. Click *Yes* in the confirmation window to proceed.
   c. Type the serial number of the AOD and the AOD side in the dialog box, then click *Accept*.
   d. MMC will display an error stating that a color palette conflict exists between the current image (**AOD2**) and the map data existing on the **ATP TEST** AOD. This error check prohibits the writing of two (or more) different color palettes at a given map scale (and zone).

      NOTE: The Cockpit Digital Map System uses a single color palette per map scale and zone. Without the error check shown above, the color fidelity of an AOD using two color palettes for the same map scale would become corrupt since the digital map system would only reference one color palette. As a precautionary measure, MMC does not allow a partial append (e.g. appending the 1:500k portion of **AOD2** to the **ATP TEST** AOD, where the palettes do not conflict).
3. **Recycle AOD:**

   Since an AOD is a write-only medium, an AOD can only be appended with additional information and not overwritten. However, MMC provides a recycle function that essentially "erases" the current map information by writing a new superdirectory with null pointers. This allows the AOD to be written again as if it were blank, but with less available disk space. *Note: any pre-existing images on the AOD are lost during the recycle operation.*

   a. From the main menu, click on the *Tools* option then, *AOD Options* and then, *AOD Recycle*.

b. The **AOD Recycle** window is displayed. In this window, click on the *File* option, then *Open*. MMC will access the DMU and read the map information from the AOD (and may take between 30 to 60 seconds).

c. Information regarding the AOD is displayed in the **AOD Recycle** window, which includes the amount of disk space that will remain available and the remaining number of times the AOD can be written.

d. Review this information. Then, in the **AOD Recycle** window, click on the *Tools* option, followed by *Recycle*.

e. Once the **AOD Recycle** window indicates the AOD has been successfully recycled, click on *File*, then *Close*.

NOTE: You may need scroll down to the bottom of the **AOD Recycle** window to view the text showing whether the recycle was successful or not.

4. **Write AOD2 to the Recycled ATP TEST AOD:**

a. From the main menu, click on the *Tools* option then, *AOD Options* and then, on *AOD Recycle*.

b. MMC shows a message stating that the AOD has been recycled, click *Write* to continue.

c. Review the AOD:

i. From the main menu, click the *File* option, then *Open Image*, select *AOD*, and select *DMU*.

ii. View the FAF CAC from the AOD:

i. Move the mouse to the location of the map coverage and click the right mouse button.

ii. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

iii. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

e. When finished reviewing the map data from the AOD, from the main menu, click on *File*, then *New*.

5. **ATP Pass:**

✓ Error check prohibited an AOD append with a conflicting color palette from **AOD2**.

Yes ☐ No ☐

✓ **ATP TEST** AOD was recycled and the **AOD2** image was successfully written and reviewed.

Yes ☐ No ☐

6. **Exceptions Noted:**

X. BUILD AN MPS-CDI WITH FAF DTED AND PROCESSED MAP DATA

This section describes the procedures that are used to build an MPS-CDI. Prior to building any MPS composition, the user must first log all the necessary NIMA data sources. As a standard practice, NRL recommends that the user login every available data source as it is received from NIMA. In this section, we create an MPS with DTED data. Available DTED coverage is contained in a very large data set (i.e., selection of a large area of coverage could take 1-2 full days to build). The ATP demonstrates this function by defining a much smaller area of DTED coverage.

1. **Log in a FAF DTED CD:**
   a. Insert the FAF DTED CD: **FAF DTED #1** in the CDROM drive (see Appendix A for FAF DTED directory structure format).
   b. From the main menu, click on the *Tools* option, then *Media Options*, and then *Log Media.*
   c. MMC will display the **CDROM Site** window. Select CD reader #7, click on *Scan Readers*, then *Start Processing*. MMC will prompt for a descriptive title for the CD.
2. **Display the existing DTED coverage overlay:**
   a. From the main menu, click on the *File* option, then *New.*
   b. Change the Build Type Mode by clicking on *Preferences* then, *Composing AOD ON* then, *Compose MPS.*
   c. On the toolbar, change the scale to *DTED_1.*
   d. From the main menu, click on *Overlays*, then *Available Coverage.*
   e. Zoom into your area of interest using the button.
   f. MMC will display the coverage of the DTED CD you logged.

   NOTE: All DTED coverage is displayed only in Mercator projection.
3. **Design an MPS composition using DTED and processed map data:**
   a. From the lower left-hand corner of the toolbar, select the button to define a small (approximately 20 MB) area of DTED coverage.
   b. MMC displays defined DTED area(s) in colored boxes (where the color reflects the TS zone of the data). Verify the size of the MPS before proceeding (use the *Windows* menu *Composition Data Size* option). If the MPS is too large, use one of the delete data tools to remove some of the DTED from the composition.
   c. From the main menu, click on *Coverages*, then *Include Final Composition.*
   d. Select the ***MPS*** composition **ATP2.**
4. **Save your work** when finished. On the main menu, click on the *File* option, then *SaveAs Final Composition.* When prompted for a filename type **ATP3,** click *OK* then, enter a descriptive title and click *OK* again. A confirmation window now appears with assigned numbers for the composition. Click *Yes* to confirm and close the window. This saves your work to the hard disk.
5. **Now reopen this composition.** (As a security measure, MMC requires you to open a final composition and *not modify it* prior to building the MPS-CDI).
   a. From the main menu, click on the *File* option, then *Open Final Composition.*

b. Scroll through the list of available compositions and select the ***MPS*** composition **ATP3** that you just created. MMC will display your composition on the world map.

NOTE: An AOD composition also exists for **ATP3**, even though **ATP3** includes DTED data. This is the case because the CAC portion of the composition fits within the constraints of an AOD build. However, since DTED cannot reside on an AOD image, the DTED portion of the AOD composition **ATP3** would not be built. An AOD composition is more restrictive than a MPS composition in maximum size and the amount of map coverage that can be contained within a scale and zone.

6. **Build the MPS image:**
   a. From the main menu, click on the *Tools* option, then *MPS Options*, then *Build MPS Image*.

7. **Review the MPS image and Archive it to CD** (see section VI.3).
   a. Mark this CD-R as **MPS3**.
   b. After verifying **MPS3** on MMC, install the **MPS3 CD-R** on a MPS system and review the map data. **Verify that the correct color palettes for all map scales relevant to this map data are installed on a Mission Planning System.**

   NOTE: MMC does not display DTED data. To ensure accuracy, MPS DTED data must be reviewed and verified on a MPS.

8. **Re-check obsolete MPS image:**
   a. To verify that the color palette change took place in section VIII, load the ***obsolete*** MPS image **MPS1**.
   b. From the main menu, click on the *File* option, then *Open Image*, select *MPS*, and then select *Hard Disk* and click on the newly built image name. This will open the AOD Image on hard disk that you just built.
   c. To check that MMC will view the map data from the AOD image, click on *Preferences*, then *View [drop-down list]*, and verify that *View MPS* is selected. MMC should set the correct view type to the current map image by default.
   d. View the CAC data in the AOD image:
      i. Move the mouse to the location of the map coverage and click the right mouse button.
      ii. In the **Map Coverage** window, view and scroll the FAF CAC and verify its geo-referenced accuracy and color fidelity (note that the mouse must be positioned inside the **Map Coverage** window to display accurate color fidelity in *Virtual Colors* mode).

      NOTE: To provide accurate color fidelity of the map data, the MMC display must be set to *Use Virtual Colors* (see MMC main menu under *Preferences*, then *Display Options).*

      vi. When finished viewing the map data, click on *File*, then *Close* in the **Map Coverage** window.

e. Archive the AOD Image to CD-R:

   i. From the main menu, click on the *Tools* option, then *CDROM Options*, and then *Archive Data to CDROM.*

ii. From the **Archive to CDROM** window, click on *File*, then click *PreMaster*, Under *PreMaster*, select *AOD*. Mark this CD-R as **MPS1**.

iii. If data already exists on the system, MMC will ask if you wish to delete it. Click *Yes*, then click *Yes* again to verify that you wish to proceed.

iv. Enter a descriptive title for the processed map data (e.g. First Processed 1 to 2M) using a combination of letter and number characters.

v. When pre-mastering is complete, click *OK* and insert a blank CD-R with the label-up in the CD writer.

vi. From the **Archive to CDROM** window, click on *File*, then *Cut*.

vii. Write down the MMC-assigned name of the archived data (e.g. SC-2000-A-MAP5-X00001) and then click *Yes*;

viii. Wait until the CD writer has finished writing to the CD-R (i.e. no red or blinking green lights are on) then, remove the CD-R from the CD writer.

NOTE: Even if MMC displays a message saying the write has finished, **wait** until the CD writer's Read (green) and Write (red) lights stop blinking! The green Disc and 8x lights will stay on. A message advising the user to immediately log and review the archived data appears. Click on the OK button to dismiss the message.

vii. Label the CD-R with the descriptive and MMC-assigned name then, insert it into the CDROM drive.

viii. From the **Archive to CDROM** window, click on *File* then, *Close*.

f. Review the archived AOD image from CD (repeat steps a-c within this section), under *Open Image*, select *AOD*, and then select *CDROM*. Load the **AOD1** CD and use the **CDROM Site** window to verify under *Preferences* that *View AOD from CDROM* is selected.

g. After verifying **MPS1** on MMC, install the **MPS1 CD** on a MPS system and review the map data. **Verify that the correct color palettes for all map scales relevant to this map data are installed on the MPS system.**

h. Set the map scale to *TPC(1:500k)*. The color palette for this scale *was not* changed and this map data should look accurate.

i. Set the map scale to *JNC(1:2M)*. The color palette for this scale *was* changed and this map data should *not* look accurate.

NOTE: This check emphasizes the importance of either destroying or clearly marking as **OBSOLETE** any processed map data product that was created with an obsolete color palette.

9. **ATP Pass:**

✓ A FAF DTED CD has been logged on MMC. Yes ☐ No ☐

✓ A MPS composition named **ATP3** consisting of processed map data and DTED has been created. Yes ☐ No ☐

✓ A MPS image named **MPS3** was built, archived, and verified (on MMC and MPS).

Yes ☐ No ☐

✓ The obsolete **MPS1** image was reviewed with the new color palette to show color degradation. Yes ☐ No ☐

10. **Exceptions Noted:**

XI. ACKNOWLEDGEMENTS

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APPENDIX A: MAP DATA FORMAT INTERFACE CONTROL DOCUMENT

I. INTRODUCTION

Appendix A provides detailed information on the data formats and directory structure of the Finnish source map data that may be processed by MMC version 3.4P. In addition to the Finnish-particular map data that MMC 3.4P supports (as defined below), MMC also is designed to read the following data types and associated directory structure:

- Compressed Aeronautical Chart (CAC): *The Navy Standard Compressed Aeronautical Chart Database, NOARL Report 8 (Lohrenz and Ryan), July 1990.*
- Digital Terrain Elevation Data (DTED): *Performance Specification for Digital Terrain Elevation Data, MIL-PRF-89020A, April 1996.*
- Mission Planning System (MPS) images: *Interface Control Document for Mission Planning System Optical Disk Image Version 6+C, NRL/MR/7441—97-8046 (Trenchard, et al), June 1997.*
- Aircraft Optical Disk (AOD) images: *Engineering Bulletin for Interface Control Document for the Honeywell Ground Support Station Optical Disk Subsystem, Part number 8507985-1, Used with the Honeywell Digital Video Mapping Set, Part Number 8506200-911, Engineering Bulletin EB8513923 (Ronish), April 1989.*

The following sections consist of Finnish-specific data types that are processed and supported in MMC to produce MPS and AOD images as defined in the documents listed above.

NOTE: The Finnish MMC 3.4P system is initially installed with CAC color palettes. When a color palette has been changed to support Finnish processing at a particular scale, CAC data produced by the National Imagery and Mapping Agency (NIMA) for the given scale will be incompatible with MMC.

II. FAF GEOTIFF FILE FORMAT AND DIRECTORY STRUCTURE

1. MMC 3.4P supports geotiff files that conform to the Geotiff format specification version 1.8.1 (see http://www.remotesensing.org/geotifff/spec/geotifffhome.html for a full definition). MMC has tested sample Finnish geotiff map data and will support both Model Transformation Tag and Model Pixel Scale / Model Tiepoint Tag geocoding. However, due to cost constraints, MMC cannot extensively test all possible geocoding and geokey combinations, but has successfully tested Finnish implementations used to date. MMC *only* supports the *Transverse Mercator* projection when the geotiff model type is *Projected.*
2. For MMC to identify and process source media, all FAF geotiff CDROMs *must* have a volume identification of **FAF_GTIF**. Otherwise, MMC will *not* process the map data. The geotiff producer is responsible for providing the CDROM volume identification.
3. A FAF geotiff CDROM may contain any number of geotiff files for a *single* map scale and one optional *palette.bin* file. All geotiff files must contain a *TIF* suffix (e.g. *ABCDEFGH.TIF*) and all files must reside in the root directory.

III. FAF COLOR PALETTE FORMAT

1. NRL provides the FAF with a PC-based utility program called **MAKEPAL.EXE** (see section VIII). This utility program will convert a Finnish text color palette file into a *palette.bin* file. The *palette.bin* file may be written in addition to the source geotiff files on a **FAF_GTIF** CDROM. The utility program is designed to be executed on a Win NT operating system and will read a Finnish ASCII text color palette of the form:

```
#    R   G   B
---  ---  ---  ---
 1 => 0   0   0
 2 => 0  99  15
 3 => 0 137 158
          .
          .
          .
```

2. The Finnish ASCII text palette is limited to a maximum of 256 colors with valid R,G,B values ranging from 0 to 255. The program will *only* read the first 240 color palette values because the first 240 colors are reserved for map data (the remaining 16 colors are reserved for mission planning overlays). If less than 240 colors are used for the map data, the remaining map data colors must be filled with zeros (i.e. "0 0 0"). If fewer than 240 colors exist, or an R, G, or B value is out of range, the **MAKEPAL.EXE** program will not execute correctly.

3. The geotiff producer is responsible for creating the *palette.bin* file and writing this file to the **FAF_GTIF** CDROM. The *palette.bin* file is the color palette that will be used by MMC to process the geotiff files on the **FAF_GTIF** CDROM. If the *palette.bin* file is <u>exactly</u> the same as the MMC system palette for the *map scale selected*, MMC will use the system color palette. If *any* difference is detected between the *palette.bin* and the MMC system palette for the map scale selected, then MMC will prompt the user to either install the new palette (which will then become the new system palette for that scale) or ignore the new palette and use the MMC system palette.

4. A *palette.bin* file is optional for a **FAF_GTIF** CDROM. If a *palette.bin* file does not exist on a **FAF_GTIF** CDROM, MMC will use the system color palette for that scale by default.

IV. FAF DTED FORMAT

1. The FAF DTED files must conform to the structure defined in MIL-PRF-89020A, Performance Specification Digital Terrain Elevation Data (April 1996) in section 3.14.

2. MMC 3.4P will support *only* DTED level 1. DTED level 1 post (elevation) spacing is defined in section 3.9 of the DTED military specification.

3. The directory structure *and* file naming convention of FAF DTED must conform to the format defined in the DTED military specification, section 3.14.2 *with the exception* that FAF DTED is not required to have a gazetteer, a DMED file, text files, or the GAZETTE or TEXT directories.

4. For MMC to identify and process FAF DTED, all FAF DTED CDROMs *must* have a volume identification of **FAF_DTED***xxx* (where *xxx* is a <u>unique</u> number ranging from **500-999**).

Otherwise, MMC will *not* process the data. The FAF DTED producer is responsible for providing the CDROM volume identification.

APPENDIX B: ACROYNMS

AOD	Aircraft Optical Disk
AODI	Aircraft Optical Disk Image
ATP	Acceptance Test Procedures
CAC	Compressed Aeronautical Chart
CD-R	Compact Disk - Recordable
DMU	Digital Memory Unit
DMUI	Digital Memory Unit Interface
DTED	Digital Terrain Elevation Data
FAF	Finnish Air Force
MMC	Moving Map Composer
MPS	Mission Planning System
MPS-CDI	Mission Planning System – Compact Disk Image
NRL	Naval Research Laboratory
TRR	Test Readiness Review
TS	Tessellated Spheroid Projection System
WORM	Write-Once Read Many