Thermal 2 Exposure Head

Firmware Version 1.04d Release Notes and Installation Procedure

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1. GETTING STARTED (PLEASE READ)

This document provides release information for thermal 2 firmware version 1.04d — a significant upgrade from thermal 2 firmware version 1.03x — and general information for thermal 2 exposure heads installed on host devices.

Note: This document does not provide specific information about any host platform.

Formatting conventions used in this document:

- All references to monitor commands are in `courier font`. Monitor commands for the exposure head are preceded by the `TH2 >` prompt and monitor commands for the host are preceded by the >> prompt.
- All references to NVS parameters are in *italics*.
- All references to scripts are underlined.

2. LASER SAFETY PRACTICES

To use this document, you *must* have attended an exposure head introductory course given by the service-training department, the product specialist, or the engineering support team. You must be familiar with the safety precautions when working with a thermal head.

DANGER: Never operate the host device with the write laser beam on and a door open. Do not use the service bypass jigs to bypass the door interlocks.

3. RELATED RESOURCES

- Thermal 2 exposure head home page: **TechPlanet** > **Output** > **Heads** > **Thermal 2 Head** (http://techplanet.creo.com/output/heads/thermal_2/nav/index.htm)
- Thermal 2 exposure head firmware: **TechPlanet** > **Output** > **Heads** > **Thermal 2 Head > Control/settings > Firmware releases** (http://techplanet.creo.com/firmware/CTP/Head/Thermal2/versions.htm)
- Thermal 2 exposure head controls and settings: **TechPlanet** > **Output** > **Heads** > **Thermal 2 Head > Control/settings** (http://techplanet.creo.com/output/heads/thermal_2/nav/control-set.htm)
- Thermal 2 exposure head troubleshooting: **TechPlanet** > **Output** > **Heads** > **Thermal 2 Head > Troubleshooting** (http://techplanet.creo.com/output/heads/thermal_2/nav/troubles.htm)
- Service Shell: **TechPlanet** > **Output** > **Service Tools** > **Service Shell** (http://techplanet.creo.com/output/service_tools/service_shell/nav/v2-x/index.htm)

4. PRELIMINARY CHECKLIST

Before you upgrade the exposure head firmware, complete the following preliminary checklist:

1. ☐ **Verify the state of the host device.** If the device isn't functioning correctly before you upgrade the exposure head firmware, it is unlikely that the device will function correctly after the upgrade.

2. ☐ **Verify the hardware version of the exposure head** by typing the following monitor commands:

   ```
   >> redirect pass

   >> th2 "ver"
   ```

   If the "`Control board`" version is less than 2, upgrade the exposure head hardware before you upgrade the exposure head firmware.

3. ☐ **Determine if an upgrade of the host firmware is required.** An upgrade of the host firmware is *not* required to upgrade the exposure head firmware. However, an upgrade of the host firmware may be required to take advantage of the new functionality of the exposure head.

4. ☐ **Ensure the following files are available**: thermal 2 firmware version 1.04d (**th2fmw104d.bin** and/or **th2fmw104d.hex**).

5. ☐ **Ensure the following applications are *not* running**:

   - Allegro Workstation
   - Print Console
   - Prinergy

5. UPGRADING THE FIRMWARE

1. Generate baseline plots `plot 1` and **inchgrid.ps**. Comparing plots generated before and after the upgrade helps you troubleshoot any problems with image quality, geometric correction, or the geometric positioning of the exposure head.

2. Verify the baseline NVS parameters on the exposure head by typing:

   ```
   >> redirect enable
   ```

   Wait for the message `Redirect Mode=Enable` to appear.

   ```
   TH2 > prm diff
   ```

   For more information see *Appendix D: Backing Up and Restoring NVS Parameters*.

3. Save the baseline NVS parameters on the exposure head by typing:

   ```
   TH2 > prm save
   ```

   For more information see *Appendix D: Backing Up and Restoring NVS Parameters*.

4. Save a readable version of the NVS parameters on the exposure head by typing:

   ```
   TH2 > prm dump
   ```

   For more information see *Appendix D: Backing Up and Restoring NVS Parameters*.

5. If you are using Splot, download the serial bootloader from the host:

a) Type the following:

```
TH2 > redirect disable
```

Wait for the message `Redirect Mode=Disable` to appear.

```
>> set head type 3
```

No wait required. Ignore any errors

```
>> set hmgr type 3
```

No wait required. Ignore any errors

```
>> head program
```

Wait for the message `exposure head coming online (programming mode)` to appear. This takes up to 60 seconds.

```
>> head boot
```

Wait for the message `EH Boot command (3) Complete` to appear. This takes 2 minutes.

```
>> fload head code
```

Wait for the message `Begin ASCII transfer now ...` to appear. This takes 15 seconds.

b) From the **Term** menu, select **Upload File**. Under **File Type**, select **Text Files**.

c) Locate the file **th2fmw104d.hex**.

d) Load the exposure head firmware by typing:

```
>> head end
```

For more information, see *Appendix A: Terminal Program Setup, Appendix C: Background Information on Downloading Firmware*, and the host documentation.

6. If you are using Service Shell, download the firmware from a local drive:

Note: Downloads from network drives, or remote locations, will fail.

a) To initiate the firmware download, type `download <path>\th2fmw104d.bin` at the command line.

For more information see *Appendix A: Terminal Program Setup, Appendix C: Background Information on Downloading Firmware*, and the host documentation.

Note: The exposure head automatically upgrades the NVS parameters when the firmware initializes for the first time.

7. Generate plots `plot 1` and **inchgrid.ps**. The quality of the `plot 1` and the geometric correction and geometric positioning of the **inchgrid.ps** should be unaffected.

8. After verifying the state of the host device, save the baseline NVS parameters on the exposure head by typing:

```
TH2 > prm save
```

For more information see *Appendix D: Backing Up and Restoring NVS Parameters*.

6. DOWNGRADING THE FIRMWARE

CAUTION: Do not downgrade the exposure head firmware unless your product support specialists instructs you to do so. Newer versions of exposure head firmware include new algorithms, improved algorithms, problem fixes, and support for newer versions of hardware.

When downgrading, the original firmware version of the exposure head is the minimum firmware version for that head. Exposure heads shipped from the factory have been integrated with specific versions of exposure head firmware. The firmware will ensure that all algorithms and NVS parameters are upgraded appropriately, but the firmware cannot ensure that all algorithms and NVS parameters are downgraded appropriately.

If you still wish to downgrade exposure head firmware, it is acceptable to downgrade to the *previously installed version*. Downgrade the firmware using the following procedure:

1. If you are using Splot, download the serial bootloader from the host to the exposure head:

   a) Type the following:

   ```
   TH2 > redirect disable
   ```

   Wait for the message `Redirect Mode=Disable` to appear.

   ```
   >> set head type 3
   ```

   No wait required. Ignore any errors.

   ```
   >> set hmgr type 3
   ```

   No wait required. Ignore any errors.

   ```
   >> head program
   ```

   Wait for the message `exposure head coming online (programming mode)` to appear. This takes up to 60 seconds.

   ```
   >> head boot
   ```

   Wait for the message `EH Boot command (3) Complete` to appear. This takes 2 minutes.

   ```
   >> fload head code
   ```

   Wait for the message `Begin ASCII transfer now ...` to appear. This takes 15 seconds.

   b) From the **Term** menu, select **Upload File**. Under **File Type**, select **Text Files**.

   c) Locate the previous version.

   d) Type the following:

   ```
   >> head end
   ```

For more information see *Appendix A: Terminal Program Setup*, *Appendix C: Background Information on Downloading Firmware*, and the host documentation.

2. If you are using Service Shell, download the firmware from a local drive.

Note: Downloads from network drives, or remote locations, will fail.

a) To initiate the firmware download, type:

```
download <path>\<previous file>
```

at the command line.

For more information see *Appendix A: Terminal Program Setup*, *Appendix C: Background Information on Downloading Firmware*, and the host documentation.

3. Save a readable version of the NVS parameters on the exposure head by typing:

```
TH2 > prm dump
```

For more information see *Appendix D: Backing Up and Restoring NVS Parameters*.

4. Verify that there are no differences between the readable versions of the NVS parameters generated in step 4 of section 5, and step 3 of section 6.

7. NEW FEATURES

The following features were implemented or modified in thermal 2 firmware version 1.04d.

7.1 Log Receiver Gain in Head Diagnostics

Version 1.04d allows you to log head data for diagnostic purposes. To view the head data points that can be logged, and their state, type:

```
TH2 > eng
TH2> log sample
```

Receiver gain is sample point 19. When logging receiver gain, a new data point is stored every time that the receiver gain changes value. To enable or disable receiver gain, type:

```
TH2 > log sample 19 <enable|disable>
```

7.2 Allow MCE to Turn Focus Laser On and Off

Some media are very sensitive, and can be exposed by the focus laser, particularly when the focus laser dwells over one part of the plate. To prevent the focus laser from creating artifacts on these media, version 1.04d includes MCE commands to turn the focus laser on and off. Anytime the head is performing tasks which require the focus laser, including edge detection, focus learn, or imaging, the MCE must turn the focus laser on. At other times, the MCE can turn the focus laser off.

Note: This feature is not implemented in the MPE devices.

7.3 Add Automatic Gain Control (AGC)

The thermal 2 head supports a variety of media with varying characteristics. Some of these media have measurable variations in focus sum from plate-to-plate, or across a single plate. Sometimes these variations exceed head limitations, resulting in plot failures or image problems.

To compensate for variations in sum version 1.04d includes automatic gain control (AGC). AGC adjusts the receiver gain, which helps to keep the sum constant from plate-to-plate, and across a single plate.

There are three new parameters that control AGC, all found in the FOC parameter block:

- The first, *agcenable,* allows you to enable or disable AGC. When *agcenable* is set to 'TRUE', then AGC is active and controls the focus sum.
- The second, *agcsum,* specifies the nominal sum that you want to achieve. The default value is 1200.
- The third parameter, *agcsamples*, specifies how many mainscan samples you want to use when controlling the receiver gain. A high number results in a slower response, with fewer adjustments to receiver gain. A low number results in a faster response, but this number should not be set to less than 4, or throughput issues could develop. For most applications, 8 samples is the optimal setting.

AGC works better on some media than others. Media with fluctuating sum in the subscan direction, or media with slowly changing sums in the mainscan direction, work best with AGC. AGC cannot compensate for media where the sum fluctuates rapidly in the mainscan direction, and can actually worsen the performance on these media. AGC cannot compensate for a noisy sum signal.

8. PROBLEMS FIXED

This section lists problems that have been fixed in thermal 2 firmware version 1.04d.

8.1 Changing Parameters with a Breakout Board (PR #857)

In thermal 2 firmware version 1.02 and later, a problem occurred on setups that connect directly to the head using the breakout board. Communicating with the head through the host, which is the norm, or connecting to an open head, were both fine. The problem with the breakout board setup was characterized by an unusually long processing time when changing certain head parameters. This problem is resolved.

8.2 System Parameters and Non-current Media (PR #673)

In previous firmware versions, the system parameters were updated any time that a MED parameter changed. This resulted in a situation where changing non-current MED parameters returned an error, because of a fault with an unrelated system parameter. To fix this problem, the system parameters are only updated when changing parameters in the active MED slot.

8.3 Eliminate Datalogger Overrun (No PR)

The datalogger can handle only a set number of data points. An overrun was occurring when collecting data points 1, 3, 6, 14, 16, and 18 at the same time. In order to diagnose head problems, you may need to log all of these data points at once, so this problem is fixed. Unfortunately, overruns will still occur when collecting many more data points at once.

8.4 Fix BP Hold Current Calculation (PR #909)

The focus hold current calculation was slightly too low on the first iteration every time. The difference between the desired value and the actual value was so small that it had no real impact on performance, but this problem is resolved, regardless. The fix reduced the time that it takes to calculate BP hold current from 30 seconds to 15 seconds.

8.5 Fix Write Laser Stroke Settings during Calculations (PR #922)

When stroke width and stroke offset were moved from LVD to MED, some write laser calculations were overlooked. Version 1.04d ensures that the `ldd calibrate` command uses the blocker offset settings, so that LDD *currentfactor* settings are trustworthy. The target current calculation when the write laser is turned on is also changed, so that it takes the actual stroke width into account and generates a more accurate starting point. These fixes make the head setup and write laser performance faster and more stable.

8.6 Fix Flat Panel and Low-Speed Imaging (No PR)

In previous versions of firmware, focus problems occurred on flat-panel devices. Further investigation showed that those problems actually occurred on all devices at very low drum speeds: the focus calculations didn't handle the low-speed case correctly, resulting in a bad focus profile. This issue is resolved.

8.7 Fix Focus Timeout Calculations (No PR)

During our flat-panel and low-speed imaging tests, several problems were found with the way that focus learn and drum synchronization timeouts were calculated. Problems generating the two timeouts resulted in errors when imaging at very low drum speeds, when imaging on flat panel devices, and when imaging with FOC verbosity turned up. By introducing an SCLK distortion factor for flat panel, scaling the timeouts with drum speed, and measuring the effect that verbosity has on throughput, these problems are resolved.

8.8 Fix Focus Mode 3 (No PR)

Focus mode 3 is a special mode that is used for engineering work. The plot sequence for this focus mode was incorrect, resulting in a drum synchronization timeout on every image. Re-examining the plot sequence resolves this issue.

Note: Focus mode 3 should not be used in the field under any circumstances.

8.9 Change Defined Value for Focus Diode Upgrade (No PR)

In thermal 2 firmware, we use a constant to determine the minimum focus laser current. A critical hardware upgrade to the focus diode requires that we change this constant value. By updating the constant, we ensure that version 1.04d firmware will support all thermal 2 hardware platforms.

9. NVS PARAMETER CHANGES

The following NVS parameters have changed in thermal 2 firmware version 1.04d:

NVS Parameter	Comment	See Section
foc agcsamples	new	7.3
foc agcenable	new	7.3
foc agcsum	new	7.3

10. REQUIRED ENHANCEMENTS AND KNOWN LIMITATIONS

The next release of thermal 2 firmware will implement the following required enhancements and/or correct the following known limitations in thermal 2 firmware version 1.04d:

- In hotlink test mode, the number of symbols received on the hotlink will be periodically displayed on the monitor as positive feedback.
- Additional diagnostic functions will be implemented to aid the Media Support Tool.

11. GLOSSARY OF COMMON TERMS

Host	Generic term referring to any output device on which an exposure head is installed.
Exposure Head	Generic term referring to any Creo exposure head.
Thermal 2, TH2	The thermal 2 exposure head is a second-generation thermal exposure head manufactured by Creo Inc. The TH2 exposure head has a maximum of 240 pixels and can deliver a maximum of approximately 18.5 to 23W power on plate.
Tfx, TFX	The Tfx exposure head is a second-generation thermal exposure head manufactured by Creo Inc. The Tfx exposure head has a maximum of 64 pixels and can deliver a maximum of approximately 60W power on plate.
Thermal 1.0 / 1.7x	The thermal 1.0 / 1.7x exposure head is a first-generation thermal exposure head manufactured by Creo Inc.
Monitor Redirection	The thermal 2 exposure head implements its own diagnostic port. Monitor redirection allows you to access the diagnostic port through the host.
NVS	Non-volatile storage. Note that non-volatile storage includes battery-backed up RAM, flash, EEPROM, and so on.
NVS Parameters	NVS parameters allow the exposure head to permanently save calibration and configuration parameters.

APPENDIX A: TERMINAL PROGRAM SETUP

To upgrade firmware, save and/or restore NVS parameters, and execute scripts, you need a terminal program to communicate with the host. The terminal program may be run from either DOS (or a DOS window) or it may be used with a Windows® style interface. It is assumed that the user will run either Service Shell or Splot on the system workstation. The user may need to modify the instructions for other terminal programs and/or other workstations.

Service Shell

Service Shell is the preferred terminal program for all Creo applications. You can find the latest version of Service Shell, along with documentation on how to set up and run Service Shell, on the Service Shell TechPlanet page (http://techplanet.creo.com/output/service_tools/service_shell/nav/v2-x/index.htm).

Splot

If Splot is functioning properly, a terminal prompt appears when you press Enter. If the terminal prompt does not appear, use the following procedure to ensure the terminal program is set up correctly:

1. From the **Term menu**, make sure that **Input Mode** is selected. If it is not selected, click **Input Mode**.
2. From the **Term** menu, select **Port…**. Make sure that the correct serial port is selected.
3. From the **Term** menu, select **Port Setting…**. Make sure that the baud rate is set to the correct value for the host device, parity is none, data bits are 8, and stop bits is 1.

APPENDIX B: MONITOR REDIRECTION

The exposure head includes a diagnostic port for use during development and production of the exposure head. The advantages of a diagnostic port are:

- Since all diagnostic routines are implemented within the exposure head, no support for the diagnostic routines is necessary in the host.
- Since no support for the diagnostic routines is necessary in the host, modification and/or enhancement of the diagnostic routines does not require synchronized upgrades of the host and the exposure head.
- The exposure head does not require a host for the majority of development and production.

The disadvantages of a diagnostic port are:

- The exposure head diagnostic routines are not accessible from the host.
- The diagnostic port of the exposure is not accessible once the exposure head is closed.

To compensate for the disadvantages, monitor redirection will redirect the diagnostic port of the exposure head through the host to the diagnostic terminal of the host.

Using redirect enable

Enable monitor redirection by typing:

```
>> redirect enable
```

When monitor redirection is enabled, the host's diagnostic terminal displays only diagnostic information from the exposure head. All monitor commands are handled by the exposure head.

Using redirect pass

Enable monitor redirection in passthrough mode by typing:

```
>> redirect pass
```

When monitor redirection is enabled in passthrough mode, the diagnostic terminal of the host displays diagnostic information from both the host and the exposure head. All monitor commands are handled by the host (although the host passes through monitor commands intended for the exposure head).

Note: Enabling verbose information on the host and/or the exposure head platforms will degrade system performance when in passthrough mode.

Using th2 "xxx"

When monitor redirection is enabled in passthrough mode, the host handles all monitor commands entered on the diagnostic terminal. However, the host will recognize monitor commands intended for the exposure head if you type:

```
>> th2 "xxx"
```

In this example, the host passes the monitor command `xxx`, to be handled by the exposure head.

Using redirect disable

Monitor redirection can be disabled by typing:

```
>> redirect disable
```

When monitor redirection is disabled, the diagnostic terminal of the host will only display diagnostic information from the host and all monitor commands will be handled by the host.

APPENDIX C: BACKGROUND INFORMATION ON DOWNLOADING FIRMWARE

You can download firmware to the exposure head using various algorithms and configurations. To understand the algorithms and configurations, you need to understand the exposure head. The exposure head consists of the following:

- The datalink port on the exposure head is used for communicating with the host.

- The diagnostic port on the exposure head is used during development and production of the exposure head. It is the most efficient method of accessing the exposure head; however, the diagnostic port on the exposure head is not accessible when the exposure head is closed.
- The flash in the exposure head is used for permanent storage of the firmware bundle (and NVS parameters, test jig waveforms, and so on). The flash is not used during normal operation of the exposure head.
- The RAM in the exposure head is used to execute firmware. During initialization, the firmware bundle is loaded from flash into RAM.
- The bootloader ROM in the exposure head is used to download the serial bootloader stored in the host. The bootloader ROM and serial bootloader allow you to download firmware to the exposure head, even if the flash in the exposure head is corrupt (or erased).
- The reset line from the host to the exposure head allows the host to reset the exposure head when required.
- The boot line from the host to the exposure head allows the host to select between the two bootstrap methods of the exposure head. The bootloader ROM in the exposure head will either boot from flash or prepare for a serial download from the host.

Note the following important points about downloading firmware to the exposure head:

- If the flash is corrupt (or erased), the host is required to download the serial bootloader stored in the host to the exposure head. As a result, only the default (and original) method used to download firmware to the exposure head will succeed.
- Once the flash is erased, you must successfully complete a firmware download. Since the firmware executes from the RAM in the exposure head, the firmware will continue to execute as normal. However if the exposure head is reset or power to the exposure head is cycled, the bootloader ROM in the exposure head will not be able to boot from flash.

Monitor Redirection Disabled

In a closed head, the datalink port is accessible through the host. This is the default (and original) method used to download firmware to the exposure head. Note that since the algorithm downloads the serial bootloader stored in the host to the exposure head, this algorithm succeeds even if the exposure head is not functional.

If you are using Splot, download the firmware using an S-record file format and an ASCII protocol:

1. Connect a workstation with a terminal program to the diagnostic port of the host.
2. Configure the terminal program to use the correct serial port, the correct baud rate for the host device, no parity, eight data bits, and one stop bit. The download protocol should be configured for an ASCII download using a '~' character for a pace character.
3. Download the serial bootloader from the host to the exposure head by typing:

   ```
   TH2 > redirect disable
   ```

   Wait for the message `Redirect Mode=Disable` to appear.

```
>> set head type 3
```

No wait required. Ignore any errors.

```
>> set hmgr type 3
```

No wait required. Ignore any errors.

```
>> head program
```

Wait for the message `exposure head coming online (programming mode)` to appear. This takes up to 60 seconds.

```
>> head boot
```

Wait for the message `EH Boot command (3) Complete` to appear. This takes 2 minutes.

Once the serial bootloader is downloaded to the exposure head, the red LED on top of the exposure head that is closer to the drum will flash once per second.

Note: You must complete all the remaining steps. If you abort the firmware download or the firmware download fails, the flash of the exposure head will be corrupted. If the exposure head is reset or power to the exposure head is cycled, the exposure head will not be able to load and execute firmware.

4. Erase the flash on the exposure head by typing:

   ```
   >> fload head code
   ```

   Wait for the message `Begin ASCII transfer now ...` to appear.

5. From the **Term** menu, select **Upload File**. Under **File Type**, select **Text Files**.

4. Locate the file **th2fmw104d.hex**.

   While downloading the firmware to the exposure head, the red LED on top of the head that is farther from the drum will flash. The firmware download typically requires ten to 20 minutes depending on the efficiency of the terminal program, workstation, and host.

5. Load the exposure head firmware by typing:

   ```
   >> head end
   ```

If you are using Service Shell, download the firmware using a binary file format and a binary protocol:

1. Connect a workstation with a terminal program to the diagnostic port of the host.

2. Configure the terminal program to use the correct serial port and the correct baud rate for the host device.

WARNING: Do not edit the binary file in any way.

3. Download the firmware from a local drive. To initiate the firmware download, type:

   ```
   download <path>\<previous file>
   ```

   at the command line.

Note: Downloads from network drives or remote locations will fail.

Once the serial bootloader is downloaded to the exposure head, the red LED on top of the exposure head that is closer to the drum will flash once per second. While downloading the firmware to the exposure head, the red LED on top of the head that is farther from the drum will flash. The firmware download takes approximately 5 to 10 minutes, depending on the efficiency of the terminal program, workstation, and host.

Note: Service Shell automatically performs all of the manual steps you perform when using Splot.

Monitor Redirection Enabled

In a closed head, the diagnostic port is not accessible. However, monitor redirection allows you to access the diagnostic port of the exposure head through the host. You cannot download firmware to the exposure head using this configuration.

APPENDIX D: BACKING UP AND RESTORING NVS PARAMETERS

NVS parameters allow the exposure head to permanently save calibration and configuration parameters. Before upgrading the firmware of exposure head, it is important to backup the NVS parameters in the event it becomes necessary to revert to the previously installed version.

Note the following important points about NVS parameters in the exposure head:

- The exposure head automatically saves changes to the NVS parameters.
- If you upgrade exposure head firmware, upgrades of the NVS parameters will occur automatically when the firmware is executed for the first time.
- If you downgrade exposure head firmware to the previously installed version, it is not necessary to restore the NVS parameters.

Baseline NVS Parameters

The exposure head implements baseline NVS parameters to allow you to save a snapshot or baseline of the NVS parameters that are saved in the head.

- The advantage of baseline NVS parameters is that you can easily manipulate and compare NVS parameters without any additional tools.
- The disadvantage of baseline NVS parameters is that you are dependent on the exposure head firmware and hardware functioning normally.

Thus baseline NVS parameters are a useful tool but do not replace the readable versions or backups of NVS parameters.

For example, if you encounter problems after upgrading the exposure head firmware, you can use the baseline NVS parameters to determine what, if any, differences there are in the NVS parameters. To do this, use the following steps:

1. Before you upgrade the exposure head firmware, save the baseline NVS parameters (step 3 of section 5).

2. If you encounter problems with the host after you complete the head firmware upgrade, type the command:

   ```
   TH2>prm diff
   ```

   to compare the current, unsaved NVS parameters with the baseline NVS parameters. This will allow you to determine what, if any, changes have been made to the NVS parameters.

Using prm dump

To display the NVS parameters, type:

```
TH2 > prm dump
```

Note: This displays all NVS parameters. The only exceptions are NVS parameters that are not accessible using monitor commands and are intended for engineering use only.

Using prm diff

Compare the NVS parameters to the baseline NVS parameters by typing:

```
TH2 > prm diff
```

This command verifies the baseline NVS parameters and then compares them to the current, unsaved NVS parameters. The following differences are displayed:

- Any NVS parameters that differ from the baseline NVS parameters.
- Any NVS parameters that do not exist in the baseline NVS parameters.

Note: When the exposure head firmware is upgraded there are often a *small* number of NVS parameters that do not exist in the baseline NVS parameters. When the baseline NVS parameters have never been saved, there are a *significant* number of NVS parameters that do not exist in the baseline NVS parameters.

Using prm save

Save the current, unsaved NVS parameters to the baseline NVS parameters by typing:

```
TH2 > prm save
```

This command verifies the NVS parameters, erases the baseline NVS parameters, and saves the current values to the baseline NVS parameters.

Using prm restore

Note: `prm restore` will delete any unsaved changes that have been made to the NVS parameters.

Restore the NVS parameters from the baseline NVS parameters by typing:

```
TH2 > prm restore
```

This command verifies the baseline NVS parameters, and restores the NVS parameters from the existing baseline. Any NVS parameters that do not exist in the baseline NVS parameters are ignored.

Using Service Shell Scripts

The Service Shell script nvsdump.spt will dump a readable version of the NVS parameters and the Service Shell script nvsrestore.spt will restore the readable version of the NVS parameters. For more information about Service Shell scripts refer to the TechPlanet Sertvice Shell page (http://techplanet.creo.com/output/service_tools/service_shell/nav/v2-x/index.htm).

APPENDIX E: HOST/EXPOSURE HEAD COMPATIBILITY

Exposure head firmware is backwards-compatible. As a result, it is not necessary to upgrade the host when upgrading the exposure head firmware. However, it may be necessary to upgrade the host firmware to take advantage of the new functionality of the exposure head.

Host/exposure head compatibility is no longer a major issue for the following reasons:

- The exposure head includes a diagnostic port used during development and production of the exposure head. Since all diagnostic routines are implemented within the exposure head, no support for the diagnostic routines is required in the host. The host only needs to provide a generic implementation of monitor redirection.
- The exposure head defines the errors strings associated with the error codes. The host only needs to implement a generic algorithm to retrieve the error string associated with the error codes.
- The exposure head defines and manages the NVS parameters required by the exposure head. However, the host implements the *head*, *hdp*, and *hdm* NVS parameters which will vary as required by Thermal 1.0 / 1.7x. Note that when using Application Protocol 1+ on MCE platforms, the *head*, *hdp*, and *hdm* parameters will not be accessible through the MCE interface.

Thus the only compatibility issue involves the handling of the *head*, *hdp*, and *hdm* NVS parameters. The exposure head firmware compatibility with thermal 1.0/1.7x is defined in the following table:

Thermal 2 Firmware Version	Thermal 1.0/1.7x Firmware Version
0.30x	1.38
0.31x	1.70
1.00x	1.70
1.01x	1.80
1.02x	1.9x
1.03x	1.9x
1.04x	1.9x