

TFX Head

Head Firmware Version 1.32 Release Notes

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1. SCOPE AND INTRODUCTION (PLEASE READ)

This document :

- describes important changes to the TFX Head firmware that come with version 1.32.
- outlines procedures for upgrading head firmware.

Thermoflex® devices use both the MPE and MCE. The words 'MPE' or 'MCE' are used when listed commands apply to only one type of device. The generic word 'host' is used when listed commands and procedures apply to both the MPE and the MCE.

The appendices provide a reference guide for backing up and restoring NVS parameters as well as the procedure for loading TFX Head Firmware.

This document uses the following formatting conventions:

- TFX commands contained within procedures that are to be typed are in `Courier font` and are preceded by `TFX >`. Exceptions are commands contained in an explanation of a new feature. These commands are in **bold**.
- Host commands contained within procedures that are to be typed are in `Courier font` and are preceded by >>. Exceptions are commands contained in an explanation of a new feature. These commands are in **bold**.
- All nvs parameters are in *italics.*

2. LASER SAFETY PRACTICES

To use this document the FSE (Field Service Engineer) **must** have attended a Thermal introductory course given by the service-training department, the product specialist, or the engineering support team. The FSE must be familiar with the safety precautions when working with a Thermoflex device.

DANGER! Never operate the Thermoflex 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 DOCUMENTS

- Firmware Commands and NVS Parameters, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Control/settings** (http://techplanet.creo.com/output/heads/tfx/nav/control-set.htm)
- TFX Errors, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Troubleshooting** (http://techplanet.creo.com/output/heads/tfx/nav/troubles.htm)
- Service Shell program, available at the Service Shell TechPlanet site: **TechPlanet** > **Output** > **Service Tools** > **Service Shell** > **Downloads** (http://techplanet.creo.com/output/service_tools/service_shell/nav/v2-x/downloads.htm)

- TFX Head homepage, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** (http://techplanet.creo.com/output/heads/tfx/nav/index.htm)
- Controlled Releases, available at: **TechPlanet** > **Output** > **All CTP Devices** > **Control/settings** (http://techplanet.creo.com/output/computer_to_plate/all_ctp/nav/control-set.htm)
- TFX Firmware Releases, available at: **TechPlanet** > **Output** > **Heads** > **TFX Head** > **Downloads** > **Firmware Releases** (http://techplanet.creo.com/firmware/ctp/Head/TFX/versions.htm)

4. COMMON ACRONYMS

MPE	Master Processor Electronics
MCE	Master Control Electronics
CEH	Creo Exposure Head
CTP	Computer to Plate
NVS	Non-Volatile-Storage
PRM	Head Non-Volatile Parameters

5. PRELIMINARY CHECKLIST (COMPLETE BEFORE YOU BEGIN)

☐ Have a terminal program running, with direct access to the diagnostic port on the TFX head. For information on configuring the Service Shell terminal program, see Appendix A.

CAUTION: You cannot upgrade the TFX firmware using the redirect enable/disable feature.

☐ Type the following command in the host window:

```
>> list version
```

On MPE devices, record the following:

"MPE Firmware version": _____

On MCE devices, record the following:

"Version": _____

☐ Type the following command in the TFX window:

```
TFX > ver
```

Then record the following:

"Firmware": _____

"Build": _____

"Xilinx": _____

☐ **If you are performing a field upgrade to the TFX head firmware:** It is mandatory that the head firmware and the host firmware be synchronized. Upgrade the host code first, and then upgrade the TFX head firmware to a version compatible with the host firmware. To determine which firmware versions are compatible, refer to the controlled releases page (for details refer to the Related Documents section).

The upgrade procedure is as follows:

1. Upgrade host firmware (read all firmware release notes between versions to ensure you perform all necessary steps).
2. Reboot and ensure the system is functioning correctly.
3. Upgrade TFX head firmware (using this document).

☐ **If you are installing a new or replacement head:** It is mandatory that the TFX head firmware and the host firmware be synchronized. Prior to installing the head, the host firmware should be upgraded to a version that is compatible with the replacement head firmware. To determine which firmware versions are compatible, refer to the controlled releases page (for details refer to the Related Documents section).

☐ Have the TFX Head firmware version 1.32.bin file available (HT132R2591.BIN).

☐ Ensure "Allegro™", "PrintConsole", and "Prinergy®" software is not running.

6. UPGRADE PROCEDURE

1. **If any field upgrade is required**, upgrade the host firmware.
2. Back up the head NVS. Refer to Appendix B for the procedure.
3. Load the new firmware. Refer to Appendix C for the procedure.
4. Generate some test plots to ensure that plot quality has not noticeably degraded because of the upgrade.

7. PRM CHANGES

The following table details which head parameters have changed in this release.

NVS Parameter	Comment	Description	See Section
set med *edgesr*	added	New MED parameter "edgesr" added.	9.1
set foc *agcenable*	added	New FOC parameter "agcenable" added.	9.2
set foc *agcsum*	added	New FOC parameter "agcsum" added.	9.2
set foc *agcsamples*	added	New FOC parameter "agcsamples" added	9.2

The following table details which system parameters have changed in this release.

Index	System Parameter	Comment	Read by Host	Written by Host	See Section
40	SCLK Distortion Factor	added	No	No	

8. BUG FIXES

- The TFX head monitors internal voltage levels, to ensure that the head is operating at safe power levels. If any of the voltages fall outside of the specified voltage limits, the TFX head shuts down. In the case of the +5V and -5V supplies, the voltage alarm values were too strict, so the firmware was disabling functional heads. In V1.32 firmware, we adjusted the +5V and -5V voltage limits to make them more reasonable.
- The TFX head allows logging of data points, for diagnostic purposes. Previously, if certain focus points were logged simultaneously, the logger would overflow and the data would be lost. In V1.32 we updated the logging system, so that it could collect the most common data points simultaneously with no overruns.
- When auto-focus is enabled in the TFX head, we check to see that the drum is spinning and we are receiving proper imaging signals. If we don't receive the correct signals in a certain amount of time, then auto-focus fails and any plot will stop. In previous versions of firmware, this time limit for receiving signals was hard-coded, making it needlessly strict at low drum speeds, and far too loose at high drum speeds. To make the error check more reasonable, we now calculate our time limit based on the actual drum speed from the host.
- When all of the diodes were off and we queried the power, we would occasionally see very high readings. This was due to a firmware bug, in which were subtracting a large value from a smaller value. In V1.32 we fixed this, so that we always see power readings of zero when the power is off. This will also ensure that missing or dead diodes are actually marked 'dead' by the TFX **cal** command.

9. NEW FUNCTIONALITY

9.1 Overdrive Focus Laser during Seam Detection

On the Thermoflex Wide II platform, we image using staggered seams. In order to properly locate the seams, seam detection was implemented. Seam detection is very similar to edge detection, using the head's focus servo to measure the focus sum.

In order to ensure the most accurate reading, we overdrive the focus laser during edge detection. By overdriving, we are able to obtain a much sharper, more accurate, position reading.

We added the *med <media index> edgesr* NVS parameter to accomplish the overdrive. During seam detection, we use the *edgesr* value to determine the focus laser power, rather than the default *sr* value. At all other times, we use the default *sr* value to determine the focus laser power. To obtain the sharpest possible sum profile we typically set *edgesr* to 0.011. However, we can set *edgesr* to be as high as *sr* (but no higher), in the case of highly-integrating media, or highly-reflective media.

9.2 Automatic Gain Control (AGC)

The TFX head supports a variety of media with varying characteristics. Some of these media have measurable variations in focus sum from sheet-to-sheet, or across a single sheet. To compensate for these variations V1.32 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. Because flexo media is typically very smooth with small sum variations, AGC is disabled on TFX heads by default.

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.

9.3 Log Receiver Gain in Head Diagnostics

The TFX head can log data for diagnostic purposes. In order to monitor automatic gain control, we can log the receiver gain in firmware V1.32.

To view the head data points that can be logged, and their state, type:

```
TFX > eng
TFX> 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>
```

9.4 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 spot on the media. To prevent the focus laser from creating artifacts, version 1.32 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.

9.5 Blank-Skipping

Some images have large blank regions. In order to increase imaging speed, blank-skipping occurs over those blank regions.

During blank-skipping, the carriage speeds up and no image data is passed to the head. As the head approaches the end of the blank region, the carriage slows to imaging speed and the normal image signaling resumes.

In TFX firmware V1.32, we added hand-shaking between the head and the host, to ensure that the swath count remains updated following blank-skipping. This will allow us retain image synchronization between the head and host, while reducing plotting time.

10. APPENDIX A: SERVICE SHELL SETUP

ServiceShell version 2.5 or higher is required for the TFX head. ServiceShell is the preferred terminal utility for most applications on the TFX head.

Information on ServiceShell, including downloads, is available on the ServiceShell page on TechPlanet (for details refer to the Related Documents section).

11. APPENDIX B: BACKING UP AND RESTORING NVS PARAMETERS

Before upgrading the firmware of any machine, it is important to backup the current head parameters in case it becomes necessary to revert to the previously installed version of firmware.

11.1 What is the NVS?

The NVS provides storage for machine-dependent parameters that must remain intact between power cycles.

Saving individual NVS parameters is automatic in the TFX Head. Whenever a parameter is changed, it is updated in the head parameter subsystem.

11.2 Backing up the NVS Parameters

We back up NVS parameters by creating a baseline in the head. Later, we can compare our NVS settings, and restore the baseline settings, if required. To create a baseline, type:

```
TFX > prm save
```

It is also helpful to have a readable copy of the head parameters archived. To display all of the parameters on the monitor, type:

```
TFX > prm dump
```

The parameter dump can be saved from the terminal window to a text file, for future reference.

11.3 Restoring the NVS Parameters

If the head NVS parameters are corrupted, it may be necessary to restore them. To restore the parameters, complete the following steps.

1. Type:

   ```
   TFX > prm diff
   ```

   This will display the changes made in the NVS since the baseline was established. Look closely at the differences and see if you can spot the problem. If you can, make the necessary changes.

2. If many parameters are corrupted, or if you cannot spot the problem, you may wish to restore all of the parameters. To restore all parameters to their baseline settings, type:

   ```
   TFX > prm restore
   ```

12. APPENDIX C: LOADING TFX HEAD FIRMWARE

WARNING: Do NOT load head firmware via the host using `redirect enable`. This will cause the machine to crash and the firmware will not load successfully.

You can load TFX firmware using ServiceShell. Refer to Appendix A for information on how to set up these utilities.

12.1 Manually Loading Firmware using Service Shell

Service Shell version 2.5 or higher is required for loading TFX firmware. When using ServiceShell, the ht132r2951.bin file **must** be on a local drive, and the name **must not** be changed. Follow these steps to load TFX firmware using Service Shell:

1. Ensure that you have access to the diagnostic port on the TFX head and that the terminal program is running correctly. For more detailed instructions on the terminal program, refer to the ServiceShell page on TechPlanet (for details refer to the Related Documents section).
2. Back up the head NVS parameters following the procedure in Appendix B.
3. Load the firmware bundle by typing:

   ```
   TFX > download <filename>
   ```

   Note that <filename> must contain the full path and filename of the .bin file.

12.2 Loading Firmware using FirmwareUpgrade.spt

You can automatically upgrade all firmware components at once using the FirmwareUpgrade.spt script. This script will perform all necessary backups, providing a simple downgrade path if that becomes necessary.

For detailed information on FirmwareUpgrade.spt, right-click on the script name in Service Shell (as below), or refer to the d:\ServiceShell\scripts\device folder on your computer. In order to upgrade TFX firmware, you need FirmwareUpgrade.spt version 3.45 or higher.



Follow these steps to load TFX firmware using FirmwareUpgrade.spt:

1. In Service Shell, load FirmwareUpgrade.spt, found under the 'Device' tab.
2. Execute this script. This script will upgrade all device code to the latest version, including head firmware, as the user chooses.

12.3 Recovering From Firmware Load Error

If a problem occurs during a firmware load and the head stops communicating through the serial port, the firmware will need to be reloaded using the head bootstrap. In order to load the firmware using the bootstrap, follow these steps:

1. Open a host terminal window using the procedure outlined in Appendix A.
2. On an MPE device, ensure that the *head type* parameter is set to 2. On an MCE device, ensure that the *hmgr type* parameter is set to 2.
3. Prepare to load the head firmware by typing:

   ```
   >> head program
   ```

   Wait for the host to respond with:

   ```
   Head Data link: exposure head coming online
   ```

   This will take roughly 30 seconds.
4. Enable the bootstrap by typing:

   ```
   >> head boot
   ```

   Wait for the host to respond with:

   ```
   EH Boot Command Complete
   ```

   This will take several minutes.
5. Ensure that the bootstrap is functioning in the head window. Check for the '`SBT>`' prompt to make sure.
6. Once the bootstrap is functioning, you can load the firmware using the standard procedure outlined in the previous section.
7. After the load has successfully completed, reset the head from the host by typing:

   ```
   >> head end
   ```

```
>> reset
```

13. APPENDIX D: TFX HEAD VERSION INFORMATION

The following table lists the TFX Head firmware versions, along with any relevant data. Version entries displayed in **bold** are the supported releases.

TFX Head Firmware Version	Build Number	Notes
0.50	1477	Pre-release version.

1.04	1568	First release of TFX Head Firmware.
1.14	1901	Updated API, support for high-power and gapless imaging.
1.23	2299	Updated to CEH, support for staggered seams and imaging on sleeves.
1.24	2299	Patch fix for bug in V1.23.
1.32	2951	Support for blank-skipping.