Thermal ThermoFlex
MPE Firmware Version 1.40 Release Notes

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1. SCOPE

This document describes the important changes to the ThermoFlex firmware that come with version 1.40. This release contains fixes and optimizations to improve operation. Formatting conventions used in this document are outlined in Appendix A and common acronyms used are defined in Appendix B.

2. PRELIMINARY CHECKLIST (READ BEFORE YOU BEGIN!)

Please ensure the following checklist is performed before the upgrade is started.

1. ☐ Using the **list version** command, record the following:

   current MPE version: _____

   current head version: _____

2. ☐ Ensure you have the TFTS_140.HEX file available.

3. ☐ Version 1.40 is only compatible with TFX Head Version 1.04 and above.

   If the current head version is less than 1.04, then you will need to upgrade the head after the MPE has been upgraded.

4. ☐ Version 1.40 is only compatible with the new Magnetek controlled drum vacuum system.

5. ☐ Ensure that you allocate at least 4 hours for upgrading and testing the system.

3. UPGRADE PROCEDURE

To upgrade the MPE firmware, please perform the following steps:

1. Save all current NVS using both the **fsave all** command (see Appendix C) and the **nvs dump diff** command. Save the files to the workstation directory E:\Service\Nvs. Use the file names S<#>_<nnn>.mem for the fsave all file, and S<#>_V<nnn>.dif for the nvs dump diff file (# is the machine number, and nnn is the current (before upgrade) version number.

   fsave all file name: _____

   nvs dump diff file name: _____

2. load new firmware (see Appendix D).

3. issue the **nvs upgrade <previous version>** command (for example: **nvs upgrade 1.00**).

4. reset the machine with the **reset** command.

4. NVS CHANGES

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

NVS System	Param Name	Old Default	New Default	Upgrade Value	Description	Refer to Section
al	***dvkg***	**800**	**---**	**---**	Drum vacuum servo gain	5.6
al	***dvlkg***	**---**	**700**	**700**	Drum vacuum servo gain for loading	5.6
al	***dvpkg***	**---**	**500**	**700**	Drum vacuum servo gain for plotting	5.6
al	***dvls***	**---**	**100**	**100**	Drum vaccum loose sampling threshold	5.6
al	***dvts***	**---**	**10**	**10**	Drum vacuum tight sampling threshold	5.6
al	***dvthresh***	**---**	**20**	**20**	Drum vacuum threshold	5.6

5. NEW FEATURES

5.1 Film Loads At Higher Vacuum Level

As a result of problems loading film using the drag strip, the drag strip is no longer recommended for film loading. The vacuum level when loading film was set at half the setpoint (*media <n> dvsp*) in order to reduce interaction between the drum vacuum and the film when using the drag strip. After the film was loaded, the vacuum level was brought up to the setpoint value. This version of firmware uses the setpoint value only during loading and imaging. This may also have the side effect of reducing the drum vacuum oscillation problems when running the drum vacuum system at low setpoint values (i.e. 3”Hg or less).

5.2 Operator Prompts

Operator prompts for Print Console are properly implemented in this release to match with the current implementation of Print Console Operator Prompts.

5.3 Drum Vacuum Diagnostic Command

A new diagnostic command, **drumvac diag cycle [bit]**, has been added to facilitate testing each relay in the relay board.

5.4 Head Stage Lockout

Previously, problems occurred when using diagnostic commands with the head stage. This release prevents commands from being sent and queued up at the task controlling the head stage when the head stage is busy. This prevents the system from hanging as it is wont to do when using the head stage in diagnostics.

5.5 Foot Pedal Response Improved

Changes were made to increase the response of the foot pedal and also fix a bug which sometimes required the operator to press on the pedal 2 or more times to start drum movement. The foot pedal control now also automatically stops when it arrives at the end of the plate requiring the operator to release the pedal before continuing.

5.6 Changing of Drum Vacuum Gain During Plot

The additional NVS parameter, *al dvpkg*, is intended to be used in circumstances where drum vacuum oscillations are experienced when imaging large pieces of media. By setting this to a lower value than the drum vacuum load gain, *al dvlkg* (which is renamed from *al dvkg*), the vacuum system may be more stable during imaging and less likely to oscillate. A typical value may be in the range of 300-500 and it may take some experimentation to set this value. If there are no problems with drum oscillations, please set both parameters to the same value (**nvs upgrade** should do this automatically setting *al dvpkg* equal to the value of *al dvkg* before the upgrade).

Additional NVS parameters were added to enable the tuning of when drum vacuum errors are reported. The *dvls* and *dvts* parameters specify how many samples outside of our thresholds are required for an error condition (regulation error) for loading and plotting conditions, respectively. These values will need to be increased or decreased to loosen or tighten tolerances. The *dvthresh* parameter sets the error threshold for vacuum pressure regulation. The warning threshold is 60% of this value. Increasing this parameter adjusts the size of the window where vacuum pressure is allowed to fluctuate. **Please leave these parameters at their default values unless problems are encountered with drum vacuum operation.**

5.7 Usage Counter

There is now a counter in firmware to keep track of total imaged area in square inches. The parameter used is *state imaging tai* and is updated at the end of every plot. Note that it does not distinguish between successful and failed plots but simply updates based on the number of swaths that were plotted. There is no protection on this variable and it can be reset at anytime through the diagnostic port.

5.8 Flash Cover Safety

To increase safety, the flash cover now causes a door open error when opened during imaging (or anytime the drum is in velocity mode). Thus, it is no longer possible to perform diagnostic plots with the flash cover in the open position (workstation plots will lock the flash cover as part of the loading sequence).

Also, to facilitate flyoff recover, the flash cover is unlocked whenever a door on the device is opened. This allows the operator to move the plate back out onto the table should the plate be recoverable.

5.9 Chiller Monitoring

Changes were made in order to guarantee that the chiller is always on. These changes consist of the addition of a monitoring loop that checks the output bits responsible for enabling the chiller pump and compressor and setting those output bits should they be cleared with the exception of when the **chiller [pump] off** commands are used. As a result, the **act** commands that deal with chiller operation will no longer function.

6. BUG FIXES

6.1 Loading Sequence More Robust

Changes have been made to the loading sequence to make it more robust than in version 1.21 of the Thermoflex firmware. For example, the unload sequence will allow for the operator to back out of unloading the plate and return to the inspect cycle by moving the flashcover back when the plate is partially unloaded to cover the load sensor.

These changes combined with the foot pedal improvements contribute to a much improved load/unload sequence in terms of user-friendliness.

6.2 Scaling Problem Fixed

A scaling issue was seen at several customer sites where the image would be shorter in the mainscan direction by the same order of magnitude as if no scaling had been applied. Usually, this would be resolved simply by resending the job. After monitoring one such affected site closely, it was discovered that the flyoff sensor was being tripped during the load sequence, specifically, during the inspect cycle. This was probably the result of protruding pieces of tape or media during this process. Since the flyoff was not reported in an obvious manner and essentially covered up by subsequent presses of the foot pedals, there was no indication of the origin of the error from the firmware. The status of the drum was changed as a result of this error to indicate a flyoff. Scaling is not applied to the current image by the firmware when the status of the drum (*plate_loc d status*) is not 1 indicating that the drum is allocated.

To fix this problem, the flyoff sensor is disabled during the inspect cycle. Flyoffs while the plate is being rolled onto the drum will still be detected as will flyoffs during imaging.

6.3 Brisque SCSI Reset

This release fixes a problem with Brisque connectivity where a reset of the SCSI bus during startup by Brisque requires the *scsi init* command to be issued on the diagnostic port in order to connect to the device.

7. KNOWN DEFICIENCIES

- On some machines, certain NVS values may be incorrect upon loading this version of firmware. Specifically, the parameter *carriage msspeed* is set the 2000 (the default value for

3244 machines) instead of 800 as it should be for Thermoflex. In addition, please verify that all verbose values are set to zero (unless specifically set to a value for troubleshooting purposes). It has been noted in testing that *verbose redirect* is sometimes set to 255.

- **stage stop** command will not stop a **stage zero** command, it will only stop the current stage movement.
- Stage backs away from media before every load and zeroes with every load – there is no way to suspend stage movements for 2 or more consecutive plates of the same thickness.
- If head verbose is set to 1 and then a **stage zero** is performed, the machine will crash. This is believed to be caused by an excessive amount of information trying to be sent from the head and the communication channel overloads
- The debris nozzle will contact the media if an operation from diagnostics is performed which leaves the laser on (and a **laser off** command is not done) and then a **stage zero** command is entered. This occurs because the laser is still on while the stage moves the head – this results in the media being imaged in one spot for many seconds. The outcome is a burned crater in the media and the drum moves for inspection will cause further media damage since the nozzle will be in full contact.
- The debris nozzle will also contact the media as above if the standby laser current (*hdm # wpowers*) is not set to 0. The tell tale sign that it was standby current vs. the laser full on is that instead of a crater you will be able to see a nice rectangle about the size of the laser spot.
- Communication with the TFX head is minimal through use of the **redirect enable** command.
- Typing **redirect enable** while using a 1.7x head will cause the diagnostic port to be unusable until a reset occurs.
- Exposure head overtemp shutdown error is only an unsolicited message and Print Console doesn't log these yet.
- Error recovery during a load is still not ideal in some areas and may be aggravated by the necessity to use full taping for thick medias.
- Blank skip may cause a head focus error at the end of some plots when the image comes within 0.3" of the edge of the media. This should not adversely affect image quality and only occurs when blank skip is enabled.

Appendix A: Formatting Conventions

The formatting conventions used in this document are as follows:

all NVS parameters are in italics and

commands to be typed into the diagnostic terminal are in bold as well as the diagnostic command responses.

Appendix B: Common Acronyms

MPE	Main Processor Electronics
CTP	Computer to Plate (this includes Trendsetters and Platesetters)
NVS	Non-Volatile-Storage
TTS	Thermal 3244 Trendsetter
TTSS	Thermal Trendsetter Spectrum
TTSP	Thermal Proofsetter
T324	Thermal 3244 Platesetter
GVLF	Green VLF Platesetter
TVLF	Thermal VLF Platesetter
GVTS	Green VLF Trendsetter
TVTS	Thermal VLF Trendsetter
TFTS	Thermal ThermoFlex
TEE	Trendsetter Engine Electronics
DVAC	Drum Vacuum System (ThermoFlex)
DR	External Debris Removal

Appendix C: Backing UP and Restoring NVS RAM

The NVS RAM in recorder machines provides the following:

- Storage for machine-dependent "configuration and calibration parameters" that must remain intact between power cycles.
- Storage for "state variables" that allow a machine to resume where it left off if power is cycled during loading or imaging.

At power-up, the contents of NVS RAM are copied to regular volatile RAM in the recorder and that is where they are used by the firmware. If any of these parameters are changed for any reason they must be copied back to NVS RAM or the changes will not be preserved after the next power-up. Changing individual NVS parameters is therefore a two-step process:

1. A parameter is first changed in a volatile RAM copy of the parameter
2. The changed value is saved (i.e. copied) to the NVS memory

Generally, there is no need to change "state" variables in NVS RAM since they simply contain a record of where the machine is (or was) during various tasks.

Whenever firmware is upgraded in a recorder machine, some of the NVS calibration and configuration parameters will typically need to be upgraded as well. Simply loading new firmware into a machine will not upgrade the NVS. Steps must be taken to ensure that the NVS is properly configured for the new firmware. This process may be partly or wholly accomplished with the **nvs upgrade** command available from the recorder monitor. In some cases, however it will be necessary for the installer to make certain upgrade configurations depending on the hardware that is present in the particular machine. Instructions on how and when to use **nvs upgrade** as well as any special machine-dependent upgrade procedures will be included near the beginning of this release note.

IMPORTANT: BEFORE UPGRADING THE FIRMWARE OF ANY RECORDER MACHINE YOU MUST BACKUP THE CONTENTS OF THE CURRENT NVS MEMORY IN CASE IT BECOMES NECESSARY TO REVERT TO THE PREVIOUSLY INSTALLED VERSION OF FIRMWARE!

Procedure to Backup and Restore NVS

Previous release notes specified two separate procedures for backing up and restoring NVS memory. There is now only one simplified procedure to follow. This procedure is used to save the entire 32k of NVS RAM. The "**fsave all**" monitor command is used to download the NVS memory to a file and the "**fload memory**" command is used to upload the NVS memory from a file. An overview of the general procedure is shown below

Backing up NVS:

1. Open a log file to collect data that is displayed on the monitor screen
2. Issue a monitor command to allow the desired data to be displayed (and therefore also collected in the log file).
3. Close the log file

Restoring NVS:

1. Issue a command at the monitor that readies the recorder to read a log file.
2. Send the log file to the recorder

Detailed instructions for accomplishing these general steps using various terminal configurations are given in further on in this appendix. An NVS dump file made according to the procedure that follows will be exactly 79508 bytes long. If your file is exactly this long there is a very high probability that it is not corrupt. If you require more assurance concerning the integrity of the file you may examine it with a text editor or listing utility and check for the following:

- The file must consist of exactly 995 lines.
- The first 992 lines will be 78 characters long and look similar to the following

```
S2258000004E56532056657273696F6E203200AAAA55555555555555555555555555555555AABD
```

- Line 993 will be 76 characters long and look similar to the following:

```
S224807FE05555555D5555755575D55DD775555555AA6EAAABBAAAAAAE998E823A4A9FFED671
```

- Lines 994 and 995 (the last two lines) will look exactly like this:

```
S9030000FC
END OF NVS MEMORY DUMP - Close log file and hit [Y] (Y/N)
```

Terminal Program Setup

The PCPLUS terminal utility is usually used for NVS backup and restore. This utility 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 terminal program will be run on the system workstation. If it is run on another PC it may be necessary to change all the hard drive reference letters in this appendix from E: to C:. Any files created on the C: drive of a separate PC (i.e. terminal) should be copied over to the workstation on drive E: for archival purposes The following subsections show the necessary changes to the default configurations of the PCPLUS programs.

Setting up PROCOMM Plus for DOS (version 2.0)

Hit "Alt-S" and select "Protocol Options" and "General Options"
Set "Abort transfer if CD lost" to "No"

Hit "Esc" to return to "Protocol Options" menu and choose "Ascii"
Set "Character Pacing (milliseconds)" to "0"
Set "Line Pacing (1/10 sec)" to "0"
Set" Pace Character" to "126"
Save and exit

Setting up PROCOMM Plus for Windows 95 (version 4.0)

Under "Setup" - "System" - "System Options…"
Select "Data" Tab
Select "Path" Tab
On the "Capture Path" entry line, set a path for the capture file. For example, E:\NVS (This specifies only the capture file path, not the filename itself). The filename will be prompted for at the time a download is begun.
Select "OK"

Under "Setup" - "Data" - "Transfer Protocol…"
Under "CR options - upload" select "Don't translate CR"
Under "LF options - upload" select "Don't translate LF"
Under "CR options - download" select "Don't translate CR"
Under "LF options - download" select "Don't translate LF"
Be sure to NOT check the "Use" box (therefore there is no need to specify "~" for the line pace character).
Select "OK"

Under "Setup" - "Data" - "Setup Files…"
Under "Meta Keys" select "None"
Under "Translate Table" select "None"
Under "Capture" select "None"
Select "Setup" (brings up "Capture File Options" window).

In "Capture File Options" window"
Disable "Write text as it appears on screen"
Disable "Write filtered text with no emulation escapes"
Enable "Write raw text including all escapes"
Enable "Overwrite existing capture file"
Enable "Query for file name when capture is started"

Detailed NVS Backup Procedure

Steps	Using PCPLUS in a DOS window	Using PCPLUS with windows interface
Prepare recorder to dump all NVS	**fsave all** Y/N prompt appears, ignore for now	**fsave all** Y/N prompt appears, ignore for now
Open log file	**Alt-F1** Pop-up window prompts for a filename	**Alt-F1** Pop-up window prompts for a filename
Name log file	Enter a path plus a name that includes the firmware version before upgrade e.g. **E:\NVS\xxx.MEM** (where xxx is the version number).	Enter filename (without path or extension) that includes the firmware version before upgrade. e.g. **xxx**. (where xxx is the version number). Pcplus adds a ".CAP" extension to this name and uses the previously defined path. Click "OK".
Dump entire NVS to log file	**Y** Data is displayed as it is dumped. The dump will take a few minutes. Eventually the following message is displayed: END OF NVS MEMORY DUMP - Close log file and hit [Y] (Y/N)	**Y** Data is displayed as it is dumped. The dump will take a few minutes. Eventually the following message is displayed: END OF NVS MEMORY DUMP - Close log file and hit [Y] (Y/N)
Close log file	**Alt-F1**	**Alt-F1**
Confirm end of download	**Y**	**Y**
Rename file	Not necessary	Rename the file: **E:\NVS\xxx.CAP** To: **E:NVS\xxx.MEM**

Detailed NVS Restore Procedures

Steps	Using PCPLUS in a DOS window	Using PCPLUS with windows interface
Initialize NVS	**nvs init all creo** All NVS firmware defaults written to NVS	**nvs init all creo** All NVS firmware defaults are written to NVS
Reset the recorder	**reset** Ensures NVS is copied to active RAM	**reset** Ensures NVS is copied to active RAM
Prepare recorder to receive all NVS	**fload memory** "Begin upload…" message appears	**fload memory** "Begin upload…" message appears
Prepare to upload	**PgUp** Pop-up window prompts for protocol	Select "Data" - "Send File"
Select ASCII	**A** Filename prompt appears	ASCII protocol was already selected when PCPLUS was set up.
Enter NVS filename	Enter the path and name of the previously saved configuration file e.g. **E:\FW\xxx.MEM** after hitting ENTER the upload will begin. Pace characters are displayed as the upload progresses. This stops when the upload completes. This will be followed by a "Transfer Successful" message.	Navigate to **E:\FW\xxx.MEM** and Select "Open" Button. The load begins and a "progress" window appears that tracks the progress of the load. When transfer is 100% done a "Transfer Successful" message will appear. Close the progress window.
Reset the recorder	**reset** Ensures NVS is copied to active RAM	**reset** Ensures NVS is copied to active RAM

Appendix D: Loading Firmware

Before loading firmware it is assumed that the installer is running either "Procomm Plus" for DOS or "Procomm Plus" for Windows 95 at the system workstation. It is further assumed that all of the necessary program options have been set up as described in Appendix C "Backing Up And Restoring NVS" and that the "Allegro" software is not running on the workstation.

Steps	Using PCPLUS in a DOS window	Using PCPLUS with windows interface	Using Windows "Terminal" Program
Copy firmware to workstation hard drive:	Create a directory on the WS hard drive to hold the new firmware. Give it a meaningful name that includes the version number for example: **E:\FW\xxx**	Create a directory on the WS hard drive to hold the new firmware. Give it a meaningful name that includes the version number for example: **E:\FW\xxx**	
Jump to the bootstrap loader	**reset boot** (Bootstrap loader will sign on and display messages)	**reset boot** (Bootstrap loader will sign on and display messages)	
Change baud rate to 38400	hit **Alt-P**, select menu item **7**, hit **Esc**	Click baud rate button and select 38400	
ready to load	**fload bank 0**	**fload bank 0**	
Prepare to upload	**PgUp** (A pop-up window prompts for protocol)	Select "Data" - "Send File"	
Select ASCII	**A** (Filename prompt appears)	(ASCII protocol is already selected)	
Enter firmware filename	Enter the path and name of the firmware. Hitting ENTER starts upload Pace characters displayed during load and stop when complete	Navigate to the path and firmware file name. Select the "Open" The load begins. Progress is graphically displayed.	
Reset	**reset**	**reset**	
Change baud rate to 9600	hit **Alt-P**, select menu item **5**, hit **Esc**	Click baud rate button and select 9600	