

TFX Head

Installation Procedure for ThermoFlex Output Device

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Revision History

Revision	Date	Author	Comments
1	June 2000	André Blignaut / Bill McMullan	Initial release.
2	Jan 2001	Bill McMullan	Chapter 7.3 updated
3	Oct 2001	Maureen Gill	Adjusted commands “set foc rcvrgain” to “foc rcvrgain”

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1. LASER SAFETY PRACTICES

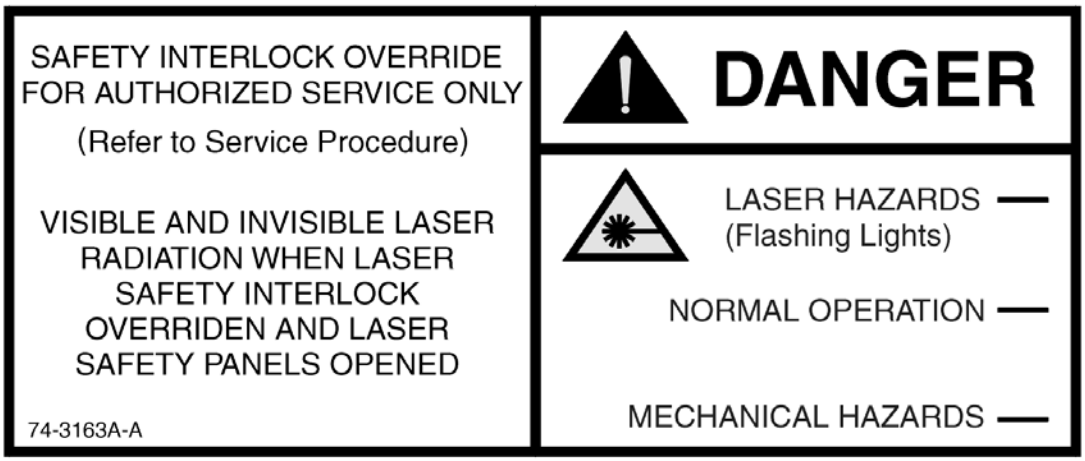
Note: Unless otherwise specified, Output Device refers to the CreoScitex ThermoFlex.

To use this document the FSE (Field Service Engineer) must have attended and passed a thermal introductory course and be familiar with the safety precautions when working with a thermal Output Device.

When any interlocked access panel relied upon for laser safety is opened, power is automatically removed from both the write laser and the focus laser. With a TFX head, the safety interlock override will **NOT** re-energize either the autofocus laser or the write laser diodes for any position of the key.

Mechanical functions can be restored by turning the key upward to the 45° position labeled "LASER/MECHANICAL HAZARDS (Flashing Lights)". (Note: the warning label pictured below is incorrectly labeled). However, in the course of a normal TFX head installation there is no requirement for enabling mechanical motion with the table up.

The safety label below is displayed beside the key switch and inside the power box on the Output Device.



Service personnel are issued with their own key and must order a replacement key if it is lost. There is a spare key under the key switch, fixed to the panel by a bolt, which can be removed using a 3mm hex key tool. This key is for emergency use only and must be securely bolted back in place on the panel after use. If this key is missing, it should be brought to the attention of both the customer and your service team leader.

The service key can only be removed from the key switch when it is in the middle position (key horizontal) indicating that the interlock circuit is intact (normal operation). When the key is inserted in the key switch it cannot be accidentally left in place, since it protrudes out of the enclosure and prevents the enclosure panel from being installed.



DANGER:
Do not tamper with the key switch. The key can only be removed from the key switch while in the middle position (key horizontal).

2. RELATED DOCUMENTS

- Additional information and troubleshooting guides for the TFX head can be found at http://intranet.creo.com/support/html/heads/tfx/index.htm
- Air Jet Plate Assembly
- TFX Debris Removal System (http://intranet.creo.com/support/html/Output/ThermoFlex/proced.htm)
- TFX Window Replacement (http://intranet.creo.com/support/html/Output/ThermoFlex/proced.htm)
- TFX debris removal system – customer cleaning procedure
- Media setup procedures: http://intranet.creo.com/support/html/media/flexo_therm.htm

3. WHAT'S DIFFERENT ON THE TFX HEAD

- The TFX is not a "Square Spot" head. The edges of halftone dots, when viewed with a 50x or higher power microscope, are much more jagged compared to those written with Thermal 1.x Heads.
- The command set used to communicate with TFX heads is different than Thermal 1.x Heads. A detailed listing of these differences is outside the scope of this document and only the basic syntax structure is given here. Some of the commands and parameters necessary for setting up the TFX head are found within this document.
- Changes made to head firmware parameters are immediately written to non-volatile memory. You do not need to do *nvs save* to make the parameter change permanent. Therefore it is very important keep track of any changes made during diagnostics or testing, and to undo any unwanted changes on completion of testing.

4. OVERVIEW

This document describes the procedures for installing/removing TFX heads on ThermoFlex 5067F and 5280F engines. It is not applicable to TFX heads in any other CreoScitex output device. It also gives the procedure for doing a head "tilt" series, and provides basic information on relevant TFX head communications and firmware.

There are some slight outward differences between beta and early production TFX heads (eg. the lack of a window, and the presence of a nose-piece cooling fan beta heads). This document refers to production heads only.

Information and procedures on setting up ThermoFlex media with the TFX are given in separate documents.

The formatting for this document is as follows:

- The prompts "TFX>" and ">>" indicate commands and parameters corresponding to the TFX head and MPE respectively. See Section 10 "Communications with the Head" in this document for additional information.
- *All nvs and TFX head parameters are in italics*
- `Commands typed into the diagnostic port or workstation are in courier font`

The main steps for head installation are:

1. Removing the existing TFX Head (if required)
2. Mounting the new head on the carriage
3. Adjusting the head
4. Checking and adjusting image quality

5. REMOVING THE TFX HEAD FROM THE CARRIAGE

Tools Required:

- Anti-static wrist strap
- TFX connect/disconnect tool (Part no. 90-1096A-B) NOTE: position of tool inside machine to be determined.
- Paper towels

WARNING: The TFX head is much more static sensitive than Thermal 1.x Heads. You must wear a properly grounded wrist strap at all times while handling and installing the head. The ThermoFlex machine must be plugged into the AC wall supply for the wrist strap to be grounded.

The TFX head can be removed without removing the Debris Removal System hardware. However, in most cases it is easier to remove and install the head with debris removal hoses disconnected.

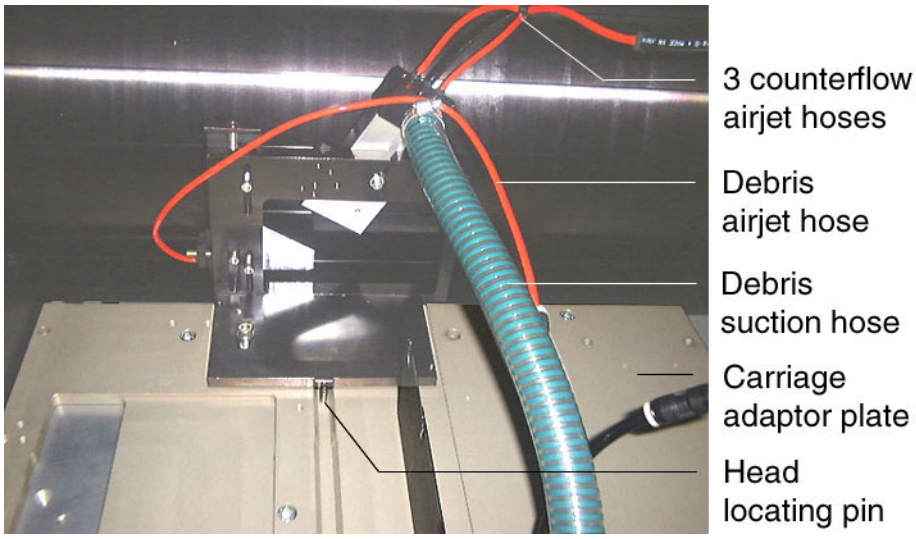


Figure 1: Debris Removal System

1. Before turning the machine power off, check that the carriage is in the home position:
   Type `>>carriage home`
   This step is not crucial to the head removal procedure, but head access is easier when it is in the home position.

2. Turn the ThermoFlex off at the main power switch.
   Do not unplug it from the wall.

3. Turn the Chiller off.

4. Disconnect the five electrical cables attached at the rear of the head:

   - head power (9 pin 3x3 mate'n lock)
   - clock signals cable (9 pin female D)
   - MPE communications cable (20 pin ribbon)
   - head serial monitor port (9 pin male D)
   - hot link (BNC) cable

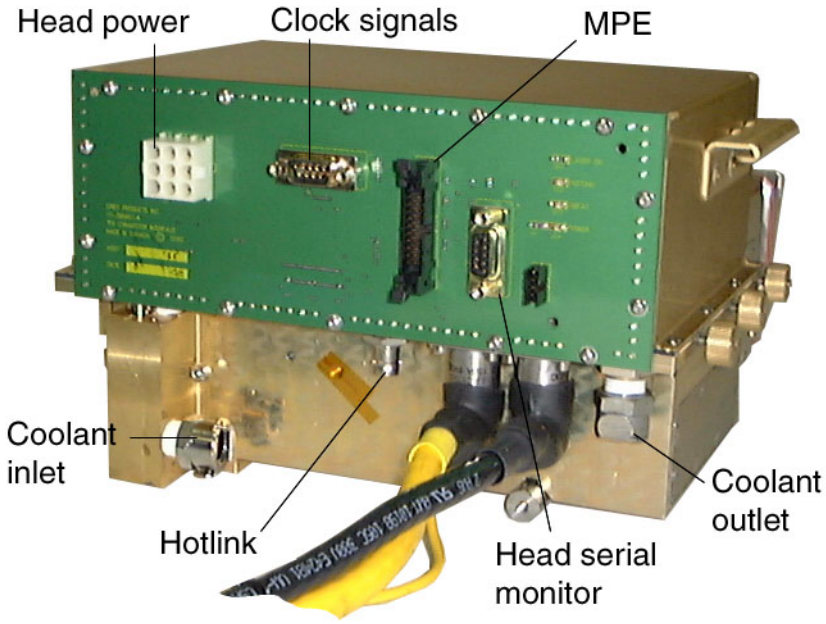


Figure 2: Cable and coolant connections

5. Hold paper towels under the cooling hoses to catch any coolant that runs out and disconnect the two cooling hoses (CPC connectors). Wipe up any coolant that drips onto the carriage or cable track.

6. Disconnect the diode power cables using the TFX cable connect/disconnect tool (90-1096A-B).



Figure 3: Cable connect/disconnect tool

The two pins on the tool fit into the corresponding holes on the head side of the connector. The tool is properly mated when the pins are fully inserted and the tool lies flush with the connector. If the tool handle is flipped in the wrong direction, the tool will not correctly mate with the connector.
Pull the tool handle backwards all the way to disconnect the cables. The intermediate handle position will not fully disconnect the connector.

IMPORTANT: After the diode power cables have been disconnected from the cable tray, short them together using the ESD jumper. The head must be transported with the diode power cables shorted together. The ESD jumper is the tinned copper 90º angle-bracket attached to the power cables.

7. Disconnect the air hoses from the desiccant box.
   For ease of operation, disconnect the rear hose (ie. the hose furthest from drum) at the fitting on the desiccant box, and disconnect the front hose at the fitting on the front of the head.

8. Loosen the six M4 flexure blade clamping nuts (three on each side of the head).
   The head will now be sitting free on the carriage.



WARNING:
Be careful not to bump the head nosepiece on any protrusions while removing the head.

9. Using the handles on either side of the head, slide the head backwards away from the drum (to clear the debris removal bracket) while simultaneously lifting the back end of the head upwards. Be careful not to snag the power cables while lifting the head.

10. After removing the head, plug (block) the head desiccant fittings using the plugs on the replacement head; if no replacement head is available seal the fittings using tape. If the hose from the desiccant box is still attached to the head, remove it from the head and re-attach it to the desiccant box.

6. MOUNTING THE HEAD ON THE CARRIAGE

Tools Required:

- Anti-static wrist strap
- TFX connect/disconnect tool (Part no. 90-1096A-B) NOTE: position of tool inside machine to be determined.
- Paper towels

WARNING: The TFX head is much more static sensitive than Thermal 1.x Heads. You must wear a properly grounded wrist strap at all times while handling and installing the head. The ThermoFlex must be plugged into the AC wall supply for the wrist strap to be grounded.

This procedure assumes the debris removal system is already installed on the carriage (although not necessarily optimally adjusted). If the debris system is not yet installed, install it before installing the head. If the debris removal system was previously aligned correctly, it does not need to be realigned after head installation. (See **Error! Reference source not found.**)

Disconnection and reconnection of some the debris air jet and counter-flow supply hoses may be necessary to install the head.

1. Remove any media that is on the drum
2. Turn the ThermoFlex off at the main power switch.
   Do not unplug the AC supply from the wall.
3. Turn the Chiller off.
4. Loosen the six M4 nuts on the sides of the head (three on each side) before mounting the head on the carriage adapter plate.
   Leave a few mm clearance between the nuts and the head; this will make it easier to slide the head into the flexure blade slots.



WARNING:
Be careful not to bump the head, particularly the nosepiece, while installing the head.

5. Place the head on the carriage adapter plate - be careful not to bump the nosepiece against the debris removal bracket. Check that the head guide rod is seated in the V-groove and that the nuts clear the flexure blade slots. If the head is seated properly it should be able to slide smoothly back-and-forth about 1 cm in the groove.
6. Gently push the head towards the drum until the spacer on the front of the guide rod contacts the locating pin (this can be checked by looking beneath

the nose-piece from the home side while shining from the away side using a flashlight.)

7. Inspect the nose-piece of the head and ensure that it does not touch the debris removal bracket or air jets.
If the nose-piece is touching any part of the debris removal system, either the debris removal system, the head, or both are not properly seated (check that the head is not skewed on the guide rod or caught up on the flexure blades.)

8. With the head guide rod contacting the locating pin, lightly push the head down and forward simultaneously with one hand while tightening the six M4 nuts on the sides of the head (three on each side). Ensure that the head does not twist or lift up as the nuts are tightened.
This step is the one most likely to cause problems with alignment and subsequently with imaging artifacts.

9. Connect the two hoses from the desiccant box to the head (if the desiccant fittings are plugged, remove the plugs first.)

10. Connect the diode power cables using the TFX connect/disconnect tool (90-1096A-B).
Remove the ESD jumper from the head side of the connector. The jumper must be left with the connector – do not discard or remove it.

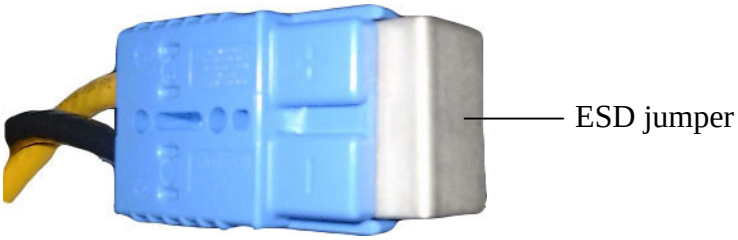


Figure 4: Diode power connector

- The two pins on the TFX connect/disconnect tool fit into the corresponding holes on the head side of the connector. The tool is properly mated when the pins are fully inserted and the tool lies flush with the connector. If the tool handle is flipped in the wrong direction, the tool will not mate with the connector correctly.

- Push the tool handle forwards all the way to fully engage the two halves of the diode power connector.

11. Connect the cooling hoses. Before connecting, push in the locking release tab on the head hose fittings to ensure they are open (they should already be open). The hose will not connect if the fitting is locked, but the O-ring on the hose connector can be damaged if attempting a connection to a locked fitting. A leak will result.

    The hoses are not interchangeable – they must be correctly connected to ensure proper coolant flow direction. The input hose (straight CPC connector) is connected to the home side of the head; the output hose (90º CPC

connector) is connected to the away side of the head. Wipe up any coolant that drips onto the carriage or cable track when connecting the hoses.

12. Connect the remaining 5 electrical cables:

    - hot link (BNC)
    - head power (9 pin 3x3 mate'n lock)
    - MPE communications cable (20 pin ribbon)
    - clock signals cable (9 pin female D)
    - head serial monitor port (9 pin male D)

    See Figure 2: Cable and coolant connections

Note: These are the only five electrical connections to the head (excluding the diode power cables). No other cables, ground straps etc. should be connected to the head.

13. Check that both debris air jet hoses are connected. One or both may have been disconnected at the PISCO couplings during head removal.

14. Spin the drum by hand to check the clearance between the drum and the head, the debris removal fittings, and hoses.

15. Turn the Chiller on. Check that the temperature set point for the coolant is 23C (if the chiller has been off for a while it may take a few minutes for the coolant to reach this temperature.)

16. Turn the ThermoFlex power on and wait for the "Exposure Head: Laser is ready" message at the end of the boot sequence. This takes about 30 seconds.

17. After the system has finished booting, type

    ```
    >>stage init
    ```

6.1 Zeroing the head on the drum

After every head installation, the zeroing procedure must be done to ensure accurate automatic media thickness checking when media is loaded.

1. Remove any media that is on the drum
2. To initialize the drum, type
   `>>drum init`
3. To determine which media has been configured for the drum, type
   `>> list media`.
   (The drum is usually either media 7 or media 8.)
4. Type `>> mode media <n>` where n is the media index from step 3 corresponding to drum.
5. Type `>>stage install tfx`

6. Type `>>stage` and take note of the stage position.
   (This is typically a number in the range 2000 +/- 250.)
7. Type `>>set al dfp <stage position from preceding step>`
8. Type `>>nvs save al`
9. `Type >>stage home`

Possible problems:

The drum has a very low reflectivity, and the "`>>stage install tfx`" command will not work properly if the sum signal is too low. If the command does not work, check that media <drum> *sr* value is 0.02. If the signal is still too low, **temporarily** increase the focus amplifier gain:

TFX> `foc rcvrgain`

Record the value returned – **it must be reset to this value if any changes are made to it.**

The sum signal can be increased by increasing *rcvrgain*:

TFX> `foc rcvrgain <new value>`

The maximum is 15.

7. CHECKING AND ADJUSTING THE IMAGE QUALITY

7.1 Media setup

Refer to the appropriate TFX Media Setup document to check and set the

- media surface reflectivity
- focus (surface depth)
- exposure (diode power)

Each media setup document gives the procedures for finding and setting these parameters for the particular media.

7.2 Image quality

Run a *TFX_ITP1_AAxBB.tif* (AAxBB = plate dimensions) plot and examine for artifacts and overall quality. If possible, in the case of flexo media, use the hardest durometer plate that the customer would normally use (eg. DPH in the case of Cyrel). This will provide a more demanding test of the setup conditions.

- Check solid areas for cleanliness and absence of debris or reflective banding.
- Check tints for moiré.
- For flexo media, examine the plate before and after processing. Check the processed plate for dot height if a dot height gauge is available. Pay particular attention to the dot height in the highlights. On an un-calibrated plate all 5% and higher highlight dots should rise to printing height. Full printing height is the same height as the solid areas rise to.

If the quality is considered acceptable the head installation is complete.

If the quality is considered unacceptable, refer to the TFX Troubleshooting procedures at http://intranet.creo.com/support/html/heads/Tfx/troubles.htm.

7.3 Head parameter backup

When the head installation is complete and you are satisfied with the image quality, back up the head parameters. At present (June 2000) this can only be done using Procomm. If Procomm is unavailable, omit the parameter backup.

Procedure

1. Type TFX>`prm save`

   This will save a copy (non-readable) of the current head parameters in NVS. Differences between this saved copy and any changes that are made in the future can be checked using "TFX> `prm diff`".

2. Select for Y-modem transfer protocol by choosing either (i) the protocol button on the bottom menu bar; or (ii) from the main menu bar choose Options/Data Options/Transfer Protocol, then for Current Transfer Protocol select "Ymodem"

3. Type TFX> `parm send`

   (Note the spelling is "parm" not "prm")

4. From the menu bar choose Data/Receive File. This will automatically begin transfer into the file "headprm.prf" located in the Procomm Plus/Download directy (ie. the directory specified for file downloads in by the Procomm "paths" selection option).

5. When the transfer is complete, rename "headprm.prf" as "*HTnnn.prf*", where *nnn* is the head serial number, and copy the file onto the workstation in a service directory.

IMPORTANT: reset the transfer protocol to RAW ASCII (otherwise normal Procomm communications to the head will not work).

8. SETTING HEAD TILT

8.1 Tilt series using Dylux media (preferred method)

Adjusting the head tilt is NOT part of the normal head installation procedure. However, a tilt series may be necessary to correct cases where moiré or the orthogonality artifact is particularly objectionable. The tilt is adjusted by means of a ¼-80 jacking screw located on the home side of the head.

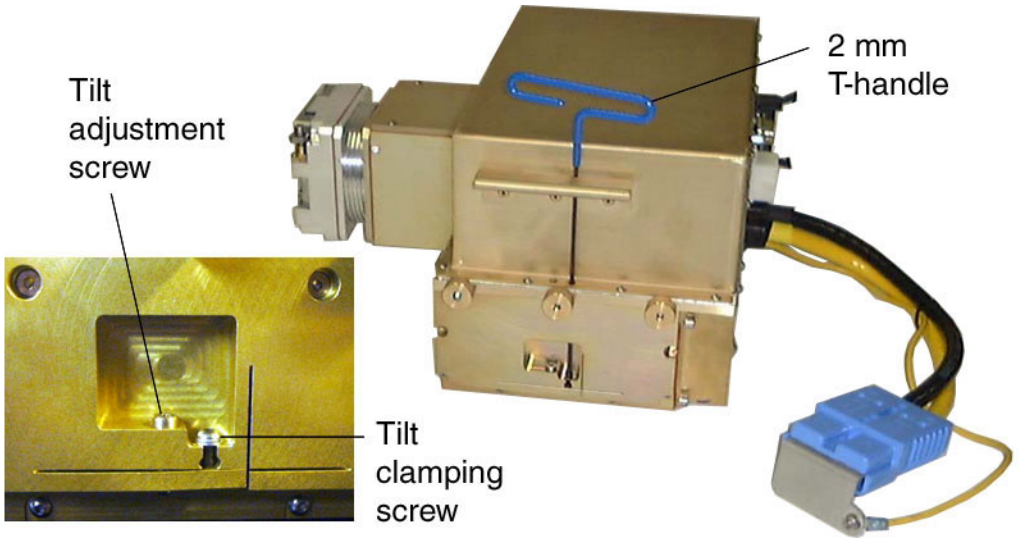


Figure 5: Tilt adjustment mechanism. The T-handle is shown inserted into the tilt adjustment clamping screw.

Tools required:

- 2mm Allen key, shaft length 15cm (6 in.) T-handle recommended (90-1100)
- Dylux media (pieces are supplied with each machine)
- Procomm script “TFX_ManTilt” or SPLOT equivalent script

1. Pull the flash cover back to expose the drum (If necessary use `flashcvr unlock`)
2. To turn the drum vacuum on, type >> `drumvac on`
3. Manually load a small piece of Dylux proofing media - at least 8” (around drum) x 16” (along drum). (A procedure for manually loading media is given in Appendix I). If no Dylux is available, see section “Tilt series using Flexo media”.
4. Type `>>list media` and record the index for the media configured for Dylux.
5. Type >> `mode media <index for Dylux>`
6. To record the value of the mode 1 mis parameter, type `>>set mode 1 mis`

7. Set the mis to a convenient size for the series
   >> `set mode 1 mis 14400`

8. Type >> `stage zero`

   Note: Wait for this command to complete before proceeding to the next step.

9. Raise the ThermoFlex table. Loosen the clamp screw that locks the tilt adjustment. Insert the 2mm T-handle Allen key through the rear slot (labelled "C" for clamp) in the TFX side-handle, and into the rear guide hole. The clamp screw cannot be seen behind the flex blade - you must 'feel' the tool engaging the head of the screw.

10. Loosen the six flexure blade nuts (3 on each side). If the head moved while loosening the nuts, gently push the head forwards towards the drum to reseat the head against the guide rod locating pin.

11. Lower the table and wait for the head to reset.

12. Check the focus error number (second column of streaming numbers) to verify that the head has not moved - the values must be less than 10:
    `TFX> foc install on`

13. Run the Procomm script "TFX_ManTilt" to do the tilt series using the following script parameters:

Mode #	1
Initial Offset (in.)	0.5
Pattern Width (in.)	0.5
MPE Plot Pattern	11
Media #	<MPE media index for Dylux>
Pattern Spacing (inches)	0.1
Desired # of Plot Strips	25 or more

Note: Because this is a manual series, keep track of how many turns of the tilt screw you make and whether the turns were clockwise or counterclockwise. TIP: keep track of the turns by writing them on the media under each strip after each plot has completed.

Note: Each time the ThermoFlex table is opened the carriage automatically moves home. This is not part of the script but an unavoidable function of the ThermoFlex firmware.

After each plot strip in the series completes, the script pauses and the drum stops with the exposed media visible at the flash cover. Adjust the tilt screw during these pauses as follows:

i. Raise the table and use the 2mm T-Handle to adjust the tilt screw. The tilt screw is accessed by inserting the T-handle through the front slot (labelled "T" for tilt) of the TFX handle, and into the forward guide hole. The T-Handle can be left in the tilt screw through the duration of the series.

ii. After each adjustment of the tilt screw, lightly push the head down and forward simultaneously with one hand to ensure the head is contacting the locating pin.

14. Complete the first plot strip in the series without changing the tilt screw - this serves as the reference position. After this initial strip is complete, begin the series by turning the screw one full turn either clockwise or counterclockwise.

What to look for: Incorrect tilt will emphasize differences at the orthogonality correction boundaries of the plot strips. When the tilt is improperly set, one of the orthogonality corrections will stand out as being much darker, or much lighter, than the neighboring sections. As the tilt screw is turned, this portion of the plot will change from darker to lighter, or vice-versa depending on the direction of the turns. Clockwise and counterclockwise adjustments are indicated beneath each strip. These adjustments are very coarse, but are used here for illustrative purposes to emphasize the effect of head tilt.

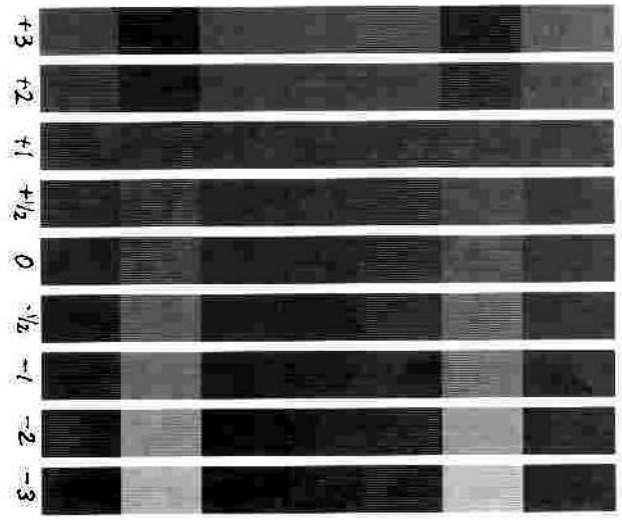


Figure 6: Tilt series. Clockwise and counterclockwise adjustments are indicated beneath each strip. These adjustments are very coarse, but are used here for illustrative purposes to emphasize the effect of head tilt. The best setting here would be near "+1".

15. Proceed with half or full turns until it has become obvious that one section of the plot has gone from being lighter to being darker (or vice-versa) than its neighboring sections. This process will likely involve turning the screw only a few times clockwise and/or counterclockwise to improve the tilt setting.

16. Fine-tune the adjustments by using < ¼ turns to find the tilt position at which the plot strip looks the most uniform, where no portion is significantly darker or significantly lighter than surrounding portions. This is the optimal tilt setting.

Note: Pattern 11 is more demanding than half-tone screens and it is likely that there is no position where the plot looks absolutely uniform.

17. After the optimal tilt setting has been set, lightly push the head down and forward with one hand while carefully tightening the six flexure blade nuts on the sides of the head. Pay particular attention that when tightening the nuts the head does not lift upwards or bind on the flexure blades. This is the most crucial step in the procedure - moving the head here will often mean having to repeat the tilt series.

18. Plot another strip to verify the head did not move while tightening the nuts. If there is no obvious change in the pattern, proceed with the next step. If it appears that the pattern did change significantly, loosen the nuts and repeat the plot. If necessary, repeat steps 16 to 19 until there is no change in the pattern after the tightening the nuts.

19. Tighten the clamping screw that locks the tilt adjustment.

20. Plot another strip to verify that the head did not move while tightening the clamping screw.

21. Exit the TFX_ManTilt script.

22. Reset the mode 1 *mis* parameter to its original value:
    `>> set mode 1 mis <value recorded in step 6>`

23. Turn the drum vacuum off using
    `>> drumvac off`

8.2 Tilt series using Flexo media

Flexo media can be used to do a tilt series if Dylux is unavailable. The procedure is similar but there are important exceptions.

See Figure 5: Tilt adjustment mechanism for the screw location.

1. Pull the flash cover back to expose the drum (If necessary use `>>flashcvr unlock`)

2. Turn on the drum vacuum:
   `>> drumvac on`

3. Manually load a piece of flexo media. A small piece can be used, but it should be at least 16” (around drum) x 16” (along drum). (A procedure for manually loading media is given in Appendix I).

4. Type `>> list media`
   Note the MPE media index for the type of flexo (Cyrel, BASF etc.) that is being used.

5. Type `>> mode media <index for flexo>`

6. Determine the TFX “med” index <k> and the MPE media index <n> for the type of flexo material to be used in the series. This can be done by starting at k=0, issuing the command `TFX> set med <k> Name` and incrementing k until the match is found. In most cases k = n-1

7. The tilt series will be done at 50% of the normal exposure setting:
   `TFX> set med <k> stroke`
   Record the stroke (ie. power) setting for the media.

8. Set the power to 50% of the value recorded above:
   `TFX> set med <k> stroke all <power/2> mw`

9. Record the value of the mode 1 mis parameter:
   `>> set mode 1 mis`

10. Set the mis to a convenient size for the series
    `>> set mode 1 mis 28000`

11. Type `>> stage zero`

Note: Wait for this command to complete before proceeding to the next step.

12. Raise the ThermoFlex table. Loosen the clamp screw that locks the tilt adjustment. Insert the 2mm T-handle Allen key through the rear slot (labelled "C" for clamp) in the TFX side-handle, and into the rear guide hole. The clamp screw cannot be seen behind the flex blade - you must feel the tool engaging the head of the screw.

13. Loosen the six flexure blade nuts (3 on each side). If the head moved while loosening the nuts, gently push the head forwards towards the drum to reseat the head against the guide rod locating pin.

14. Close the table and wait while the head resets.

15. Check the focus error number (second column of streaming numbers) to verify that the head has not moved - the values must be less than 10:
    `TFX> foc install on`

16. Run the Procomm script "TFX_ManTilt" to do the tilt series using the following script parameters:

Mode #	1
Initial Offset (in.)	0.5
Pattern Width (in.)	0.5
MPE Plot Pattern	50
Media #	<MPE media index for flexo>
Pattern Spacing (inches)	0.1
Desired # of Plot Strips	25 (any large number is OK)

Note: Because this is a manual series, keep track of how many turns of the tilt screw you make and whether the turns were clockwise or counterclockwise. TIP: keep track of the turns by writing them on the media under each strip after each plot has completed.

Note: Each time the ThermoFlex table is opened the carriage automatically moves home. This is not part of the script but a function of the ThermoFlex firmware.

17. After each plot strip in the series completes, the script pauses and the drum stops with the exposed media visible at the flash cover. Adjust the tilt screw during these pauses as follows:

i. Raise the table and use the 2mm T-Handle to adjust the tilt screw. The tilt screw is accessed by inserting the T-handle through the front slot (labelled "T" for tilt) of the TFX handle, and into the forward guide hole. The T-Handle can be left in the tilt screw through the duration of the series.

ii. After each adjustment of the tilt screw, lightly push the head down and forward simultaneously with one hand to ensure the head is contacting the locating pin.

18. Complete the first plot strip in the series without changing the tilt screw - this serves as the reference position. After this initial strip is complete, begin the series by turning the screw one full turn either clockwise or counterclockwise.

What to look for: Incorrect tilt will emphasize differences at the orthogonality correction boundaries of the plot strips. When the tilt is improperly set, one of the orthogonality corrections will stand out as being much darker, or much lighter, than the neighboring sections. As the tilt screw is turned, this portion of the plot will change from darker to lighter, or vice-versa depending on the direction of the turns. See Figure 6: Tilt series.

19. Turn the screw 2 full turns counterclockwise and plot another strip.

20. Increment the tilt screw ¼ turn clockwise and plot. Repeat the ¼ turn increments until the screw has been turned a total of 2 full turns clockwise past the reference position. This will involve a total of sixteen "¼ turns" and there should be 18 plot strips on the media (17 plots in the series plus the reference plot in step 18).

21. Remove the flexo from the drum and examine it on a light table.

Determine which of the series plots is most uniform (where no one portion of the strip is significantly darker, or significantly lighter than neighboring portions.) This is the optimal tilt setting and should be within 2 turns of the original (reference) tilt position.

Note: Because the plot is underexposed it will emphasize tilt artifacts. It is likely that there will be no tilt position where the plot looks absolutely uniform.

If none of the plot strips have gone from darker to lighter, the optimal tilt setting is more than two full turns from the original setting. Do another series, extending it in either the clockwise or counterclockwise direction as necessary.

22. Turn the tilt screw to its optimal position, as determined in the previous step.

Note: Before setting the tilt screw, remember that the current tilt position is probably not the initial reference position – its set to whatever it was at the end of the last series. Be very aware of this and take it into consideration when making this adjustment.

23. After the optimal tilt setting has been set, lightly push the head down and forward with one hand while carefully tightening the six flexure blade nuts on the sides of the head. Pay particular attention that when tightening the nuts the head does not lift upwards or bind on the flexure blades. This is the most crucial step in the procedure - moving the head here will often mean having to repeat the tilt series.

24. Tighten the clamping screw that locks the tilt adjustment.

25. Exit the TFX_ManTilt script if it is still running.

26. Load another piece of media and plot a 50% pattern (the power should still set to under expose the media) to compare with the optimal setting found in the series.
    ```
    >> plot 50 5
    ```
    This is to ensure the head did not move while clamping it and the tilt screw.

27. Compare this plot on a light table with the optimal setting from the tilt series. This is somewhat subjective and is one of the disadvantages of using flexo for the tilt series. If it is not significantly different from the optimal, proceed to the step 27. If it does appear to have changed significantly, the two most likely problems are:

    - head moved or bound on the flexure blades while locking it down
    - setting the tilt incorrectly (eg. not keeping track of the number of turns)

    Loosen the six flexure nuts and gently push the head forward to ensure it is properly seated against the guide rod locating pin. Carefully tighten the nuts, making sure the head is not being lifted or binding on the flexure blades, and do another plot 50. If this has not corrected the problem, repeat the tilt series.

28. Reset the power for the flexo media to its original value
    ```
    TFX> set med k stroke all <power recorded in step 7> mw
    ```

29. Reset the mode 1 *mis* parameter to its original value:
    ```
    >> set mode 1 mis <value recorded in step 9>
    ```

30. Turn the drum vacuum off
    ```
    >>drumvac off
    ```

9. MPE/HEAD FIRMWARE VERSIONS

Minimum required firmware versions are:

- Head: TFX version 0.43 or later
- MPE: ThermoFlex-TFX version 1.00 or later

The versions can be queried with the MPE command `>>list version`, and the head command `TFX> ver`

10. COMMUNICATION WITH THE HEAD

Early releases of firmware (prior to version 1.00) will not allow transparent communication to the TFX head through the MPE. Note that this is different to the case with Thermal 1.x heads. There are two methods of communicating with the head:

1. Via the MPE

   Switching communication between the head and the MPE can be accomplished using the commands "`redirect enable`" and "`redirect disable`".

   When the MPE is active (as indicated here by the prompt ">>") use the command

   ```
   >> redirect enable
   ```

   to redirect communication from the MPE to the head. You will know that head communication is active by the appearance of the prompt "TFX>". This may take a few seconds and will require hitting the ENTER key at least once. To switch back to the MPE, use the command

   ```
   TFX> redirect disable
   ```

Head communication is **SLOW** using this method - you can easily over-type the keyboard. Hence Method 2 is preferred wherever possible.

2. Using two COM: ports

This is currently the preferred method, and requires either a computer with two com: ports, or two computers (eg. a laptop and the workstation). Communication to the MPE is done in the usual manner through the diag port.

To connect the second com: port to the head:

1. Locate the head serial communications cable. The cable end (9 pin, female D connector) can be found on the floor inside the ThermoFlex near the point where the cable tray harness enters the power distribution box. It may or may not be labeled as “TFX” or “TFX Head”. It can be accessed by opening the ThermoFlex side panel (away side), pulling the cable out, and closing the panel over it. **Remember not to leave the cable outside the machine at the end of the site visit.**

Note: This cable is short. Another serial cable must be used as an extension to conveniently reach a laptop.

2. Talk to this port using either Procomm or Sterm (Splot) with settings

   Baud rate: 115200
   Parity: None
   Data bits: 8
   Stop bits: 1

Successful communication is indicated by the appearance of the head prompt "TFX>".

APPENDIX I - PROCEDURE FOR MANUALLY LOADING MEDIA

The following procedure can be used for manually loading media. Manual loading is more convenient for doing set up plots (eg. for focus, or exposure) where only relatively small pieces of media are required.

1. Type `>> flashcvr unlock` (unlocks flash cover, if necessary)
2. Type `>> drum idle`
3. Type `>> drumvac on` (turn on the drum vacuum)
4. Type `>> set mode 1 mis` (record the value – it must be reset to this at the conclusion of testing/setup)
5. Type `>> set mode 1 mis <xx>` where xx is the desired length of the test plot in the mainscan direction. The units are in dpi. For example, setting xx = 2400 will result in a 1 inch plot; 9600 corresponds to 4 inches, etc.
6. Slide back the flash cover and spin the drum by hand until the registration bars are upright. Align the media against the registration bars and tape it on.
7. Close the flash cover.
8. Type `>> mode media <n>` (where n is the appropriate MPE media index)
9. Type `>> stage zero`
10. When the stage zero command finishes, the machine is ready for plotting.
11. After the plotting is finished, the media can be unloaded:
    a. Open the flash cover
    b. Type `>> drum idle`
    c. Rotate the drum by hand until the media is in position to be un-taped and removed.
12. When all testing is finished, or if a workstation plot is needed:
    a. Type
    `>> set mode 1 mis <value recorded in step 4>`
    b. Type `>> drumvac off`