Trendsetter 400/800
Planned Maintenance Procedure

Customer:_____ **Serial#:_____** **Date:_____**

SP#:_____ **Service Rep:_____**

Perform this procedure at least every six months on every customer device. Increase the frequency to three months at *high risk* sites at the discretion of Creo Service personnel.

Schedule regular Planned Maintenance (PM) visits with each customer in your region. When you are unable to honor the scheduled visit, reschedule the PM within a reasonable period of time.

Total time required: approximately 8 hours

The eight-hour estimate includes Thermal Head and External Chiller PM but does *NOT* include repairs and adjustments not listed here.

Additional documents required:

For *Thermal Head PM*, use:

http://techplanet.creo.com/output/heads/thermal/nav/pm.htm
Detailed procedure (719-00011A) at
http://techplanet.creo.com/output/heads/thermal/content/docs/719-00011A-C-PR01.pdf

TH1.0 head install procedure (77-0038B) at
http://techplanet.creo.com/output/heads/thermal/content/docs/77-0038B-C-PR01.pdf

or

TH1.7 head install procedure (77-0074A) at
http://techplanet.creo.com/output/heads/thermal/content/docs/77-0074A-D-PR01.pdf

Debris removal nozzle cleaning procedure (73-3667A) at
http://techplanet.creo.com/output/heads/thermal/content/docs/73-3667A-C-PR01.pdf

TH1/1.7 lens cleaning procedure (77-0125A) at

http://techplanet.creo.com/output/heads/thermal/content/docs/77-0125A-D-PR01.pdf

For optional *External Chiller PM*, use

http://techplanet.creo.com/docs/Chiller_PM.pdf

Perform this PM procedure in conjunction with the base Trendsetter® (TS) PM.

Supplies required:

For TS 400/800 PM, order:

- TS3, TS3/8 PM kit - 518-00565A
- TS4, TS8, TSM (MCE) PM kit - 518-00566A

For thermal head, order

- Lens cleaning kit (04-0012B)

For external chiller:

- Electric motor oil – SAE 10 or 20 – in a suitable dispenser
- 4 liters (1 gallon) of Pre-mixed coolant (82-1032A)
- Clean 4 liter (1 gallon) container
- Funnel
- Paper towels
- Vacuum cleaner — Neslab only

Tools Required

In addition to standard CSE toolkit contents, you will need:

- Force gauge (e.g. fishing scale -- for carriage belt tensioning)
- Brecoflex meter (for drum belt tensioning)
- Latex gloves

Prior to Starting

Obtain permission from the customer to do the preventive maintenance on the system.

The procedure is divided into numbered sections so that you can divide the PM procedures according to customer schedule. Each section can be performed independently. After each section, you can return the device to operational status.

Estimate six hours for the full PM and up to three additional hours for thermal head and chiller maintenance:

Recorder maintenance	6 hours
Thermal head maintenance	2 hours
External chiller maintenance	0.5 to 1 hour

Note: Increase these estimates for a firmware upgrade, FCOs, and/or repairs.

Time estimates are indicated in brackets in italics, for example, Logging general information (*20 min.*).

If possible, work with an operator or maintenance person while doing the work.

- Explain proper maintenance of the system to the operator, and point out any lack of maintenance that you notice.
- Take inventory of any spares on site as well as parts that should be returned to Creo.

IMPORTANT:

- Check to see if any FCOs are required, and arrange to have the parts shipped to the site.
- Check that you have the current controlled release CD on hand for upgrading firmware.

1. LOGGING GENERAL INFORMATION (*20 MIN.*)

1. Update customer information if necessary (that is, supervisor/operator names, phone /fax/modem line numbers, address information, Creo workstation login names/passwords, etc.).
2. Verify that the customer is performing regular system backups on the workstation computer.
3. Make an NVS backup using Service Shell on the device workstation:
    - Click **Scripts**
    - Click **Device**
    - Double-click **Firmware Upgrade**
    - Click **Backup NVS**
    - Back up copies of NVS will be filed in **x:\serviceshell\firmware**
    - Copy the NVS backup files to your laptop.
4. Check the device's Controlled Release version:
    - Use Service Shell **Version Checker** to identify all components that are installed.
    - Update any components to make the device compliant with the Controlled Release.

2. GENERAL MAINTENANCE (*30 MIN.*)

1. Check for water or oil in the water trap of air filters.
2. Check the entire machine for obvious loose screws.
   When checking the screws, use only light wrench pressure as the Loctite bond is easily broken.

   If screws are loose, clean off the old Loctite® as thoroughly as possible, re-apply Loctite and re-tighten the screw.
3. Replace all damaged and worn parts.
   Make a note of any questionable areas in the *Comments* section of the *PM checklist*.
4. Check the overall system for rust and paint damage.
5. Ensure that the customer does not use film cleaner on any Trendsetter components. Cleaning of components should be done with isopropyl alcohol.

3. ENGINE (*2.5 HR.*)

1. Check that the system air pressure is correct before and during CTP operations.

   - Read the system pressure using **`ale`** (MPE) or **`system`** (MCE) commands rather than trusting the gauge on the regulator.
   - Adjust the Trendsetter's internal air pressure to 552 kPa (80 psi) if necessary. On MPE "B" version machines, use **`pressure cal`** for extremely accurate pressure readings through firmware.
   - Check the accuracy of your toolkit pressure gauge by attaching it to a 552 kPa (80 psi) line in the Trendsetter and comparing it with the output from the **`ale`** (MPE) command.

   System Pressure: _____ kPa/psi

2. Check the pressure on the air lines for the trailing edge clamps (TEC) and the roller.

   Regulators mounted on the engine manifold control the pressure on these lines. Both should normally be set to 207 kPa (30 psi), but some plates will require lower roller pressure. See the appropriate *Media Technical Note* for the correct roller pressure if in doubt.

   The TEC and roller regulators do not bleed as they are adjusted. They only bleed when the lines are vented (that is, when the solenoid is turned "off".). For this reason, when the air line is pressurized, the regulator should only be adjusted in the direction of increasing pressure (clockwise, or an inward turn of the knob).

   If it is necessary to reduce the pressure setting, release the solenoid to de-pressurize the air line, then back out the adjustment knob and re-actuate the solenoid to allow another measurement.

3. Inspect leading edge clamp (LEC) pivot blocks for cracks.

4. Check the drum position for loading:

   For *MPE*:

   - **`set al lepos`** - provides the load position
   - **`drum move lepos`** <load position>
   - **`lec on`**
   - **`drum idle`**
   - **`drum`**

   If drum position does not equal load position, update **`lepos`** and investigate why it changed:

   - **`set al lepos`** <xxxxx>
   - **`nvs save al lepos`**

For *MCE*:

- **`set mh loadpos`** - provides the load position
- **`drum move loadpos`** <load position>
- **`lec on`**
- **`drum idle`**
- **`drum`**

If drum position does not equal load position, update **`loadpos`** and investigate why it changed:

- **`set mh loadpos`** <xxxxx>
- **`nvs save mh lepos`**

5. Adjust the LE cylinder rod ends such that the clamps are open 1.4mm at the ends, 1.2mm in the center, and 1.3mm between them (± 0.1 mm) when the LEC backbone is down and engaged.

1.4 ± .1mm	1.3 ± .1mm	1.2 ± .1mm	1.2 ± .1mm	1.3 ± .1mm	1.4 ± .1mm

Adustment is easiest if the TECs are on the drum and the roller is temporarily removed.

If an individual LEC is out of tolerance, shims should be added or removed as required.

See drawing at http://techplanet.creo.com/idoc/50/1087B/E/50-1087B-E-AD01.pdf

6. Check the LE cylinder sensors and sensor magnets and adjust as necessary:

For *MPE*:

- Adjust the sensors by manually moving the backbone (with the system air off) and using a tester to provide the feedback.

  Do not use the diagnostic terminal because it does not indicate where the sensor actually trips during the actuation but only indicates that it has done so by the end of stroke.

- The backbone sensors should trip within 3mm to 5mm (1/8 in. to 1/5 in.) of end of stroke, regardless of backbone slop (axial to the drum.)
  In other words, the sensor should trip within this distance when the backbone is pulled axially all the way toward the sensor in question, and when it is moved fully the other way.

For *MCE*:

- Confirm that all sensors are functional using:

`lec on`

`lec`

`lec off`

`lec`

- All sensors should change state correctly.

7. Check that the roller moves symmetrically, particularly when moving toward the drum. A hollow “clunk” should be heard when a properly adjusted roller contacts the drum.

   Asymmetrical movement can cause plate marking and/or image misalignment.

8. Check that the roller can be spun freely by hand when the backbone is up.
9. Clean the roller.
10. Check the roller cylinder sensors and sensor magnets and adjust as necessary, as described above for the LEC sensors.
11. Clean TECs of any debris attracted to the magnets.
12. Check the TEC gap:
    - Position the drum so that the trailing edge clamps are over the steel bands
    - Use **`tec on`** to engage the TEC cylinders.
    - Use **`tec unlock`** to release the clamps.
    - Use **`tec off`** to move the backbone off the drum.
    - Move the drum to a position where the backbone can be moved back onto the drum without the clamps in the way.
    - Check that the TEC gap (between the lock unlock mushroom and the drum) is 0.50 mm to 1.00 mm. (.02 in. to .04 in.).
    - If the clearance is incorrect, adjust it at the TE cylinder rod ends.
13. Turn off the air and use your finger to move the TEC lock cylinder to the “lock” and “unlock” positions while pushing the TEC backbone toward the drum.

    Some resistance is to be expected, but the mechanism should not catch or bind.

    If there is excessive friction or binding, check the individual clamps for distortion and damage.

14. Check the TE cylinder sensors and sensor magnets and adjust as necessary, as described above for the LEC sensors.
15. Use **`time engine`** for *MPE* or **`engine time`** for *MCE* to check the timing of the engine cylinders.

    Set the flow control valves so the cylinders move freely and evenly in accordance with the timings given below.

    Newer Trendsetters have only 3 speed controls per backbone, so the adjustable cylinder must be matched to the non-adjustable side.

This may make it impossible to match the values in the table below.

Remember that symmetrical movement of each backbone is more important than minor variances in timing.

Finally, move each backbone using the blue solenoid buttons to check that cylinder movement is consistent.

If the first cycle takes longer than subsequent ones, it may indicate a leaky cylinder.

400/800 Engine timing

leading edge retract:	0.6 sec ± 0.1 sec
leading edge extend:	0.5 sec ±0.1 sec
roller retract:	0.6 sec ±0.1 sec
roller extend:	0.3 sec ±0.1 sec
trailing edge retract:	0.9 sec ±0.3 sec
trailing edge lock retract:	0.3 sec ±0.1 sec
trailing edge lock extend:	0.3 sec ±0.1 sec
trailing edge extend:	0.9 sec ±0.1 sec

Note: These times may vary because of the way firmware polls the sensors. Do not adjust if by an additional ±0.5 sec.

16. Check the drum for cleanliness and particularly for high spots.
    See http://techplanet.creo.com/docs/clendrum.pdf for details.)

17. Check the condition of the drum's anodized finish, particularly in the area around the Leading Edge Clamps.

18. Inspect the drum motor belt for wear.

    If wear is evident, check alignment and replace the belt if necessary. See http://techplanet.creo.com/docs/ts3_bltrepl.PDF for details.

19. Use a frequency meter to check the drum motor belt for proper tension. See http://techplanet.creo.com/docs/324_drmblt.pdf.

    If set **`config dt = 0`** (45-52 Hz)

    If set **`config dt = 1`** or **`2`** (70 Hz)

20. Check carriage motor belt for proper tension. See http://techplanet.creo.com/output/computer_to_plate/trendsetter_3244/content/docs/CarriageBeltTension.pdf for details.

21. Ensure the carriage rails and leadscrew are properly lubricated.
    Notes: that the carriage motor may stall if the leadscrew grease is dirty or too thick with age.

Note also that the grease on the rails is primarily to prevent rusting of the high-carbon steel, and the critical area is the inside of the v-grooves (rather than the top of the rails.)

4. POWER & ELECTRONICS CABINET (*20 MIN.*)

1. With the power off, check that all terminal block screws are tight.
2. For *MPE,* measure system voltages on the ALE board to ensure they are within the tolerances shown:

   12V _____ volts (±0.6V)

   5V _____ volts(± 0.25V)

   -12V _____ volts (±0.6V)

   Note: This step may be omitted for TS4 or TS8 because of access difficulty.

   Measure voltages at the power supplies to ensure they are within the tolerances shown:

   24V _____volts (±1.2V) (PS2 – Solenoids & plate flyoff)

   12V _____volts (± 0.6V) (PS3 – Carriage electronics)

   5V _____volts (± 0.25V)

   -12V _____volts (±0.6V)

   85V _____volts (±4.3V) (PS4 – Carriage motor)

   48V _____volts (±2.0V) (PS4 – Carriage motor) if CA00752 installed or serial number is >TE238

   24V _____volts (±1.2V) (PS5 – Thermal Head 1.0), or

   48V _____volts and _____ volts (±2.4V) (2 power supplies – Thermal Head 1.7, Thermal II)

   For *MCE,* measure voltages at the power supplies to ensure they are within the tolerances shown:

   24V _____volts (±1.0V) (PS1)

   48V _____volts (±2.0V) (PS2)

   48V _____volts (±2.0V) (PS3)

   48V _____volts (±2.0V) (PS4)

3. Check all cooling and air flow fans for appropriate air flow and noise level.
4. Check for sensors that are bypassed:

   For *MPE*:

   - `set al`

   If any sensors are set to 0, enable them (set to 1) and replace or adjust the sensor(s).

For *MCE*:

- **`scan bstatus`**

Use **`scan <sensor name> b off`** to enable all sensors in the bypassed list and replace or adjust the sensor(s).

5. INTERNAL COOLING SYSTEM (HEAT EXCHANGER) (*20 MIN.*)

1. Access the reservoir through the rear dress panel fan box side.

   If the device is a TS8 (MPE(100 label #16)) or TSM (MCE), remove the two screws on the angle bracket that hold the reservoir in place and tip the reservoir out of the opening to access the black input cap with the quick disconnect fitting.

2. Remove the quick disconnect input line.

3. Remove the input cap.

4. Check the coolant level in the reservoir.
   Top it up with 60-40 ethylene glycol if necessary. (82-1032A chemical, premixed coolant, 40%, 4 liter)

5. Clean the strainer:

   - Pull the strainer from the underside of the cap.
   - Clean the strainer using compressed air blowing from the outside towards the inside. (Or rinse strainer in running water.)
   - Replace the strainer firmly into the underside of the cap.
   - Replace the cap in the reservoir-hand tight. You may have to use a wrench if o-ring friction prevents tightening.
   - Make sure the release tab, marked CPC, on the female quick disconnect fitting is pressed in and the fitting is ready to accept the male input fitting.
   - Snap the input fitting into place with the hose leading from the rear of the reservoir (away from the drum).
   - Put the reservoir back in place in the fan box, and replace the angle bracket.

6. Oil the pump motor on a yearly basis:

   - Pry off the 2 plastic caps.
   - Fill each with a teaspoon of SAE 10W oil and recap.

   Nothing has to be done to the pump itself.

7. Start the machine to make sure there are no obvious leaks especially on the black input cap *before* leaving the site.

6. MAIN FRAME (*1 HR.*)

1. Check lid and front panel gas strut for leaks and failure.
2. For TS3, check the side panel rollout rails for damage and ease of motion.
3. Check door seals for wear.
4. Check for excessive paint damage.
   Make note of this in the *Comments* section in the *PM checklist*.
5. Check the plate exit door for damage and loose parts.
6. Check the load ramp for damage and loose parts.
7. Check load ramp and plate exit door cylinders for smooth operation, loose parts, and wear.
8. Check to make sure that rod-end pins for the load ramp and plate exit door are secure. Older Trendsetters use removable pins to connect the cylinder ends to the ramp or door. These pins have ball-type locking mechanisms (like the drum roller pins) that can fail in service.

   Newer Trendsetters use a locking collar (secured with a hex screw) to secure the load ramp pin, and have machine screws instead of rod-end pins on the exit door cylinder.
9. Clean and inspect the glass load ramp. Note any damage in the *Comments* section in the *PM checklist*.

7. WORKSTATION CABINET (*5 MIN.*)

1. With the power off, check that all cables are properly seated.

8. THERMAL HEAD *(2 HR.)*

Perform the PM procedure for Thermal Head PM as described in the *1.x Thermal Head PM Procedure* (http://techplanet.creo.com/output/heads/thermal/nav/maint.htm).