Trendsetter VLF / VLF Platesetter
20 Watt Thermal Head

Debris Removal System Installation

Particulate Ablative Media

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Creo
3700 Gilmore Way
Burnaby, BC
Canada V5G 4M1
(604) 451-2700

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Revision History

Revision	Date	Author	Comments
A	21 Jan.2002	R. Baggett	Release on ECO E399
B	24 May 2002	J.Kibblewhite	Fixed typo in section 7.3 (extra 0 in 45000) Updated branding.
C	12 Feb 2003	J.Kibblewhite	In Section 3, added references to the Order Form and to the UDRC Site Preparation document. Changed UDRC-B to UDRC-BP. Released on ECO CA00204.

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1 ABOUT THIS DOCUMENT

This document describes how to field install the UDRC-BP debris removal system for particulate ablative media on a Trendsetter VLF fitted with a 20W (F speed) Thermal Head.

2 ABOUT THE DEBRIS REMOVAL UPGRADE

The debris removal system safely collects particles liberated by the media when exposed to high power laser energy during imaging.

3 SITE INSPECTION

To ensure that the correct parts kit is supplied, you must complete the *Order Form for Output Device Upgrades to Add a Universal Debris Removal Cabinet (UDRC-BP), 750-00025A,* and e-mail it to Order Management at UDRC.Order@creo.com.

The order form is available on TechPlanet at:
http://techplanet.creo.com/output/heads/debris_removal/nav/install.htm#order-license.

Two other documents also need to be completed and returned to Order Management:

- *Site Questionnaire for Debris Removal Upgrade, 20W, F-speed (72-3656B)* http://techplanet.creo.com/output/computer_to_plate/vlf_trendsetter/nav/upgrades.htm#debris
- *UDRC Configuration B (Dust Collection) Site Preparation & Requirements (73-3724A)* http://techplanet.creo.com/output/heads/debris_removal/nav/install.htm.

All outstanding FCOs and preventative maintenance must also be completed before doing the debris removal upgrade.

4 PRE-INSTALLATION PREPARATIONS

After the *Site Questionnaire for Debris Removal Upgrade, 20W, F-speed (72-3656B)* document has been completed, there may be some preparation work required before the Debris Removal System can be installed.

- If the carriage needs to be replaced, please refer to the Trendsetter VLF Carriage Replacement Procedure, Doc. No. 72-3095A on TechPlanet.
- If it necessary to cut the holes in the lower right base-frame, please refer to Appendix A.
- If it is necessary to install a new bulkhead connector panel, please refer to Appendix B.

5 RELATED DOCUMENTS

- 30-1163B Air Jet Plate Installation Document
- 50-2117B TEH 1.X Debris Removal Nozzle Installation Procedure http://techplanet.creo.com/output/heads/debris_removal/nav/proced.htm
- UDRC Installation Procedure (generic) http://techplanet.creo.com/output/heads/debris_removal/nav/install.htm

- 77-0038B Thermal Exposure Head Installation Procedure
  http://techplanet.creo.com/output/heads/thermal/nav/install.htm

6 TOOLS REQUIRED

- hammer, ball-peen
- 1/4” drift punch (or 1/2” steel rod to drive knock-out using hammer)
- common hex key set, metric
- common small screwdriver set, standard and Phillips
- needle-nose pliers
- electrical side cutting pliers
- static strap
- Loctite 222 or 242 and 515 (Only required for head/nozzle/TK plate assembly)
- 1/8” Hex Key
- 7mm wrench (or small crescent wrench)
- knife, diagonal cutters, or scissors for cutting tubing and cable ties
- measuring tape or ruler

7 DETAILED PROCEDURE

7.1 Saving NVS parameters

1. Log onto the diagnostic terminal.
2. Turn on the Capture feature then type “`fsave all`” to download all the NVS parameters in machine-readable form. In Windows Explorer, open the .txt file in Notepad and remove anything that is not data, except for the very last line ("end of NVS memory dump").
3. Save the file in the workstation service directory (E:\service).

7.2 Upgrading firmware

MPE firmware must be:

- version 2.40 or higher for the VLF Platesetter
- version 1.5 or higher for the Trendsetter VLF
- version 1.1 or higher for the Trendsetter VLF Autoloader

For more information see the TechPlanet CD or TechPlanet live on the intranet:
http://intranet.creo.com/support/firmware/ctp/ctp_versions.htm

7.3 Removing the Thermal Head

1. Position the carriage mid-way along the track. (`carriage moveto 45000`)
2. Remove the top center panel for easier access to the head.
3. Disconnect the air hoses, cables and flex track.
4. Remove the Thermal Head from the output device as detailed in the Thermal Head Installation Document (Creo P/N 77-0038B).

7.4 Installing the Air jet Plate

The air jet replaces the whisker jet in functionality. Its purpose is to blow the byproducts of imaging various media away from the write beam, thus preserving image quality. Without this, image artifacts such as ticks and wisps may be seen on the imaged plate.

The parts kit required is 30-1136B, which is one part of the nozzle kit, P/N 50-2113B.

Note: Please do not confuse the terms air jet plate and air jet block. The air jet block is the part on the front of the thermal head that houses the shutter, and is also known as the shutter block or nosepiece.

1. Remove the existing quick release fitting from the bottom of the air jet block with a 7mm wrench (or crescent wrench). Leave the fitting attached to the $^{5}/_{32}$" tubing, bundle the tubing, and secure to the back of the Thermal Head as shown in **Figure 1** below.

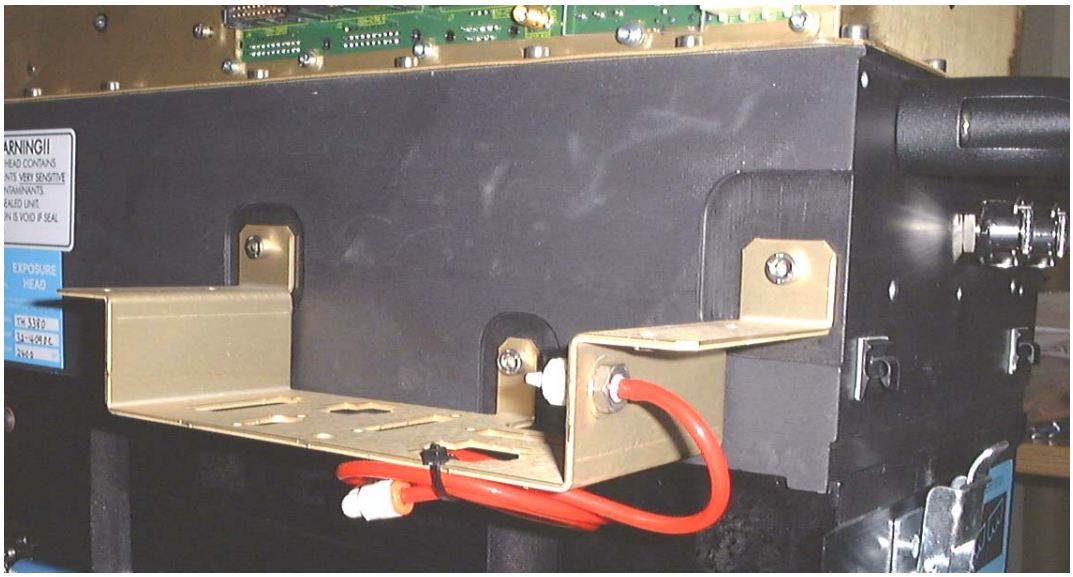


Figure 1: Original Whisker Jet Tubing Disconnected and Secured

2. Install the mounting bracket as shown in Figure 2: **Installation Diagram of Air Jet Plate on New Air Jet Block**
3. below. Loosely bolt on the two 10-32 button head screws and M5 washers**.** Use Loctite 242.

Note: Do not use metric hex keys to install the 10-32 screws as the screw heads can be easily stripped. The proper, $^{1}/_{8}$" imperial hex key should be used.

Mount the air jet plate assembly to the air jet block with three M4 flat-head screws, and the single M4 cap screw. Use Loctite 242 on screws. The longer, M4 cap screw is threaded into the PEM nut in the bracket as shown in **Figure 2: Installation Diagram of Air Jet Plate on New Air Jet Block**

4. below. Tighten the mounting bracket first. Then tighten each of the 4 air jet plate screws in steps, moving between screws so that the gasket is compressed uniformly.
Do not over-tighten the air jet plate mounting screws.

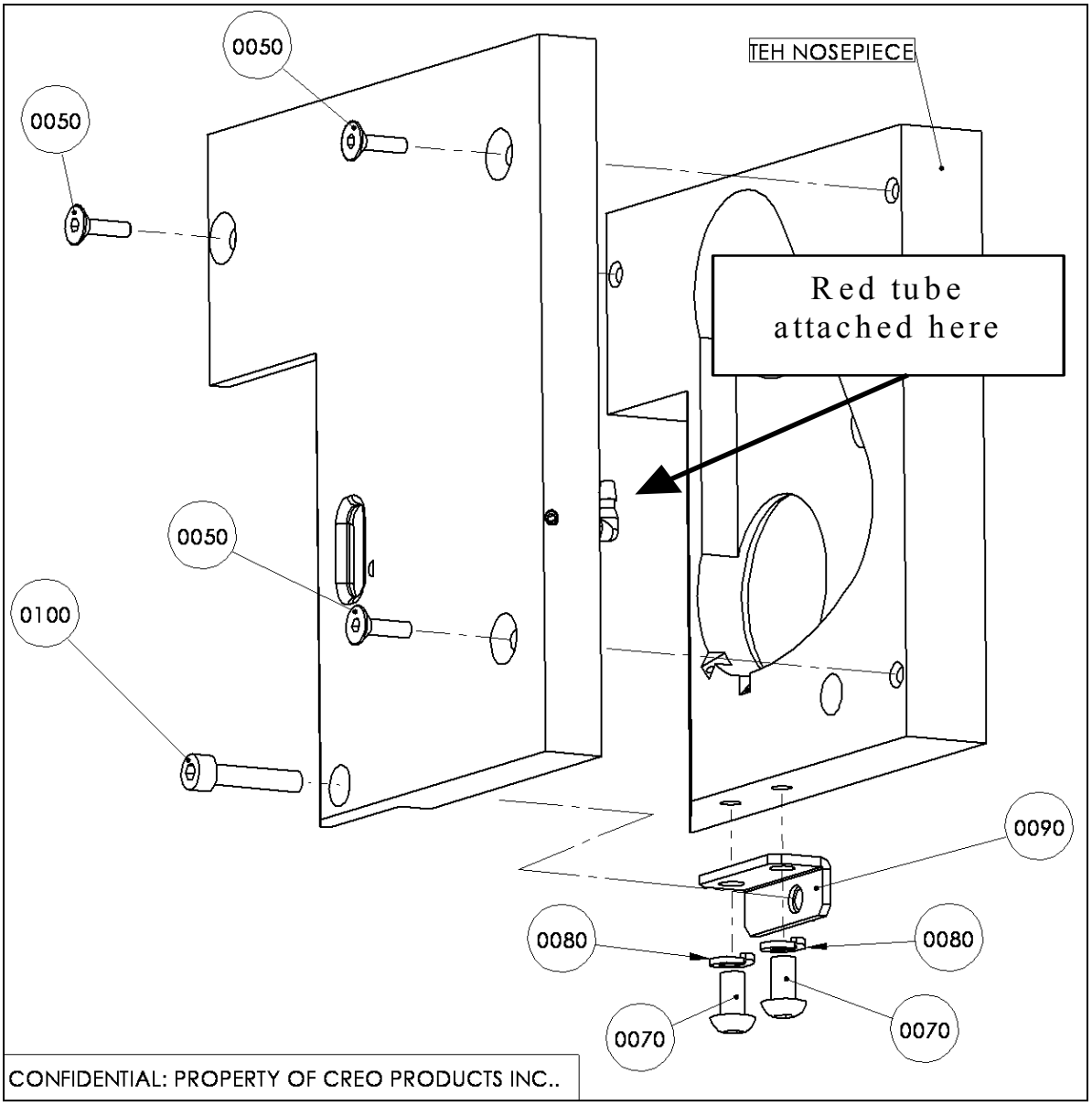


Figure 2: Installation Diagram of Air Jet Plate on New Air Jet Block

7.5 Installing the debris nozzle kit

With the air jet plate installed, all parts required for the installation of the nozzle itself are included in the assembled kit 50-2117B, which is included in the Nozzle Kit, P/N 50-2113B.

1. As per **Figure 3**, install the nozzle with two of the M3 screws, using *two Belleville washers per screw*. **Do not over tighten these screws as the threads are easily stripped**. Note that a spare screw and washer are included in the kit and should not be used unless necessary. The mounting holes nearest the sharp end of the nozzle should be used for all VLF applications, allowing the nozzle to sit flush with the air jet plate as shown in **Figure 3**.

CAUTION: Failure to install the nozzle in the correct position for the output device may result in mechanical interference with the rotating drum clamps and damage to the output device and thermal head.

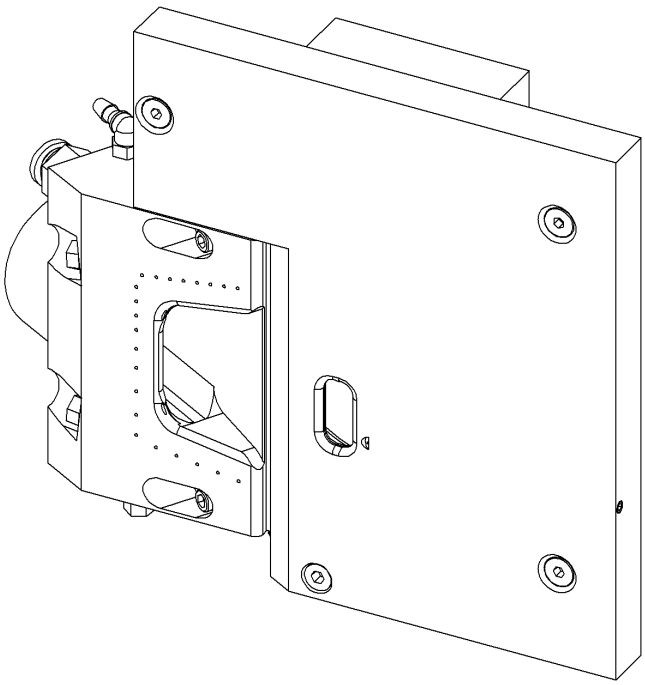


Figure 3: Nozzle Installed for VLF Drum Clamps

2. Refer to Figure 4. Cut ~300mm of red, ¼" pneumatic tubing and slide one end over the barb fitting on the air jet plate assembly. Cut ~150mm of red tubing and insert into the fixed orifice fitting on the nozzle assembly. Trim the two red tubes for best fit into the Y fitting. Insert the ¼" elbow socket fitting into the single end of the Y fitting.

3. Cut a ~160mm length of blue ¼" pneumatic hose from the hose included in the kit, and slide one end of the hose over the barb fitting on the nozzle as shown in Figure 4. Install a ¼" to ¼" elbow fitting on the end of the blue hose. Secure this tube and the Y-fitting to the front of the head with an adhesive cable tie mount and cable tie as shown in **Figure 4**.

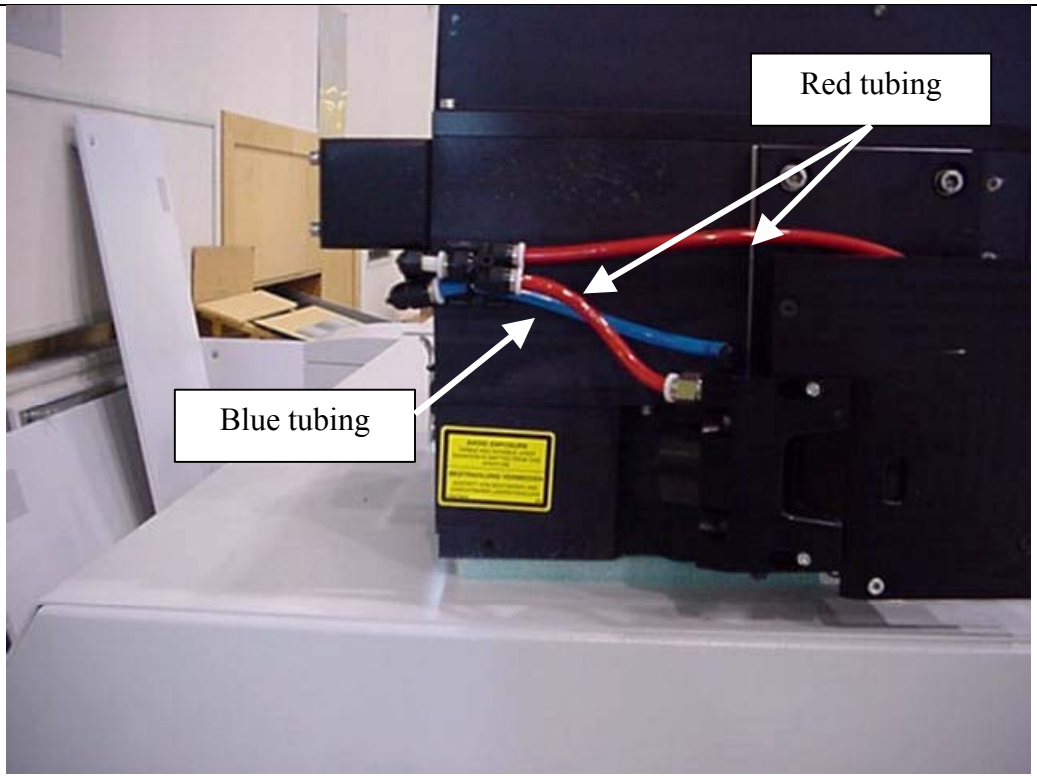


Figure 4

4. Cut ~230mm of red pneumatic tubing and insert into the ¼" elbow fitting at the front of the Thermal Head. Run this tubing along the side of the Head. Insert the end of this tubing into a second ¼" elbow fitting. Trim the tubing for the best fit. Cut a ~230mm length of the blue ¼" pneumatic hose and insert one end into the elbow fitting at the corner of the head. This hose should run along the side of the head, directly below the red tubing. Install another ¼" to ¼" elbow fitting on the end of this hose. Secure both tubes to the side of the head with two adhesive cable tie mounts and cable ties provided. This configuration is shown in **Figure 5**.

Note: Before adhering the cable tie mounts to the Thermal Head, clean the areas on the head where the cable tie mounts will be installed with alcohol or acetone to remove any residue. Do not over tighten the cable ties as this may crimp the tubing.

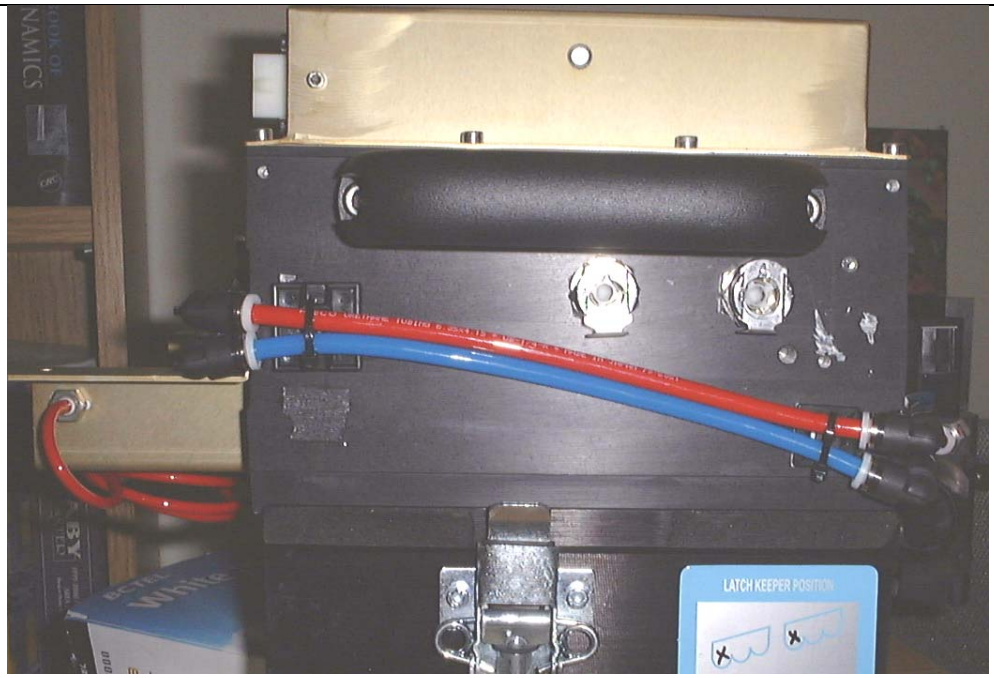


Figure 5: Hose Installation at Side of Thermal Head

5. Install the regulator as shown in **Figure 6**. Make sure the arrow on the regulator points in the direction of flow, and the markings on the gauge face outward. The gauge can be rotated into the proper position. Secure the regulator to the back of the Thermal Head with cable tie mounts and cable ties. Make sure there is no interference with the cable track or cables.

Note: For output devices equipped with metric tubing in cable track, install the 6mm to ¼" adapter elbow (identifiable by one black, one white collar) at the inlet of the regulator, with a short piece of red ¼" tubing.

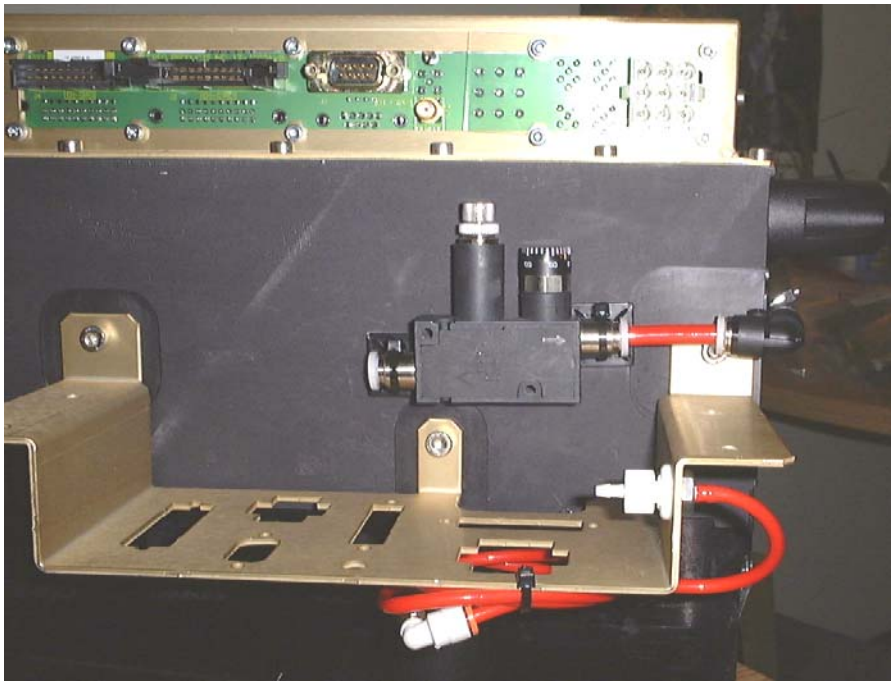


Figure 6: Regulator Installed at Rear of Thermal Head

6. **Before the Head can be re-installed**, it is necessary to install the vacuum hose support brackets on the carriage. See **Figure 7**.

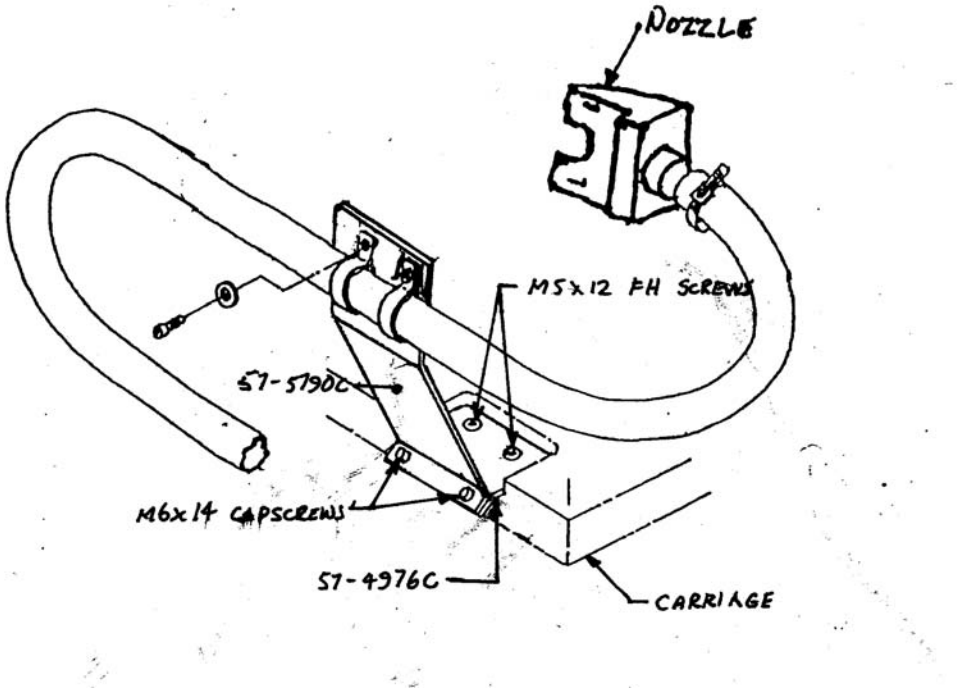


Figure 7

7. Re-install the Head on the carriage as per the *Thermal Head Installation* document, making sure it is seated against the z-locating set-screw. Connect the red air supply tubing in the cable track to the regulator. If 6mm tubing is used in the cable track (e.g. on newer Trendsetters), then the 6mm to ¼" adapter elbow must be installed at the inlet to the pressure regulator with a short piece of ¼" tubing. If the existing air supply line in the cable track is 5/32", it will need to be changed to ¼" tubing. See "*Installing the 1/4" red air supply line"*.

8. If there is a blue ¼" tube installed in the cable track, trim it to length and connect it to the elbow fitting with the blue line previously installed. If the blue tubing is not installed, it will be necessary to do so. See "*Installing the 1/4" red air supply line"*.

9. Before imaging or spinning the drum, idle the drum and rotate slowly by hand, checking that there is no mechanical interference between the air jet plate components and the drum clamps.

10. As the air jet blows directly onto the media, and near the imaging optics, it is important that the air used be clean and dry. Inspect the output device compressed air filters (consult device documentation) and confirm that they are in good condition. If the filters appear dirty, they should be replaced. Consult output device documentation.

11. Locate the output device air manifold and inspect the solenoid for the air jet supply tubing (usually marked "TEH" or "Thermal"). **If there is a throttle valve or speed control installed on this solenoid, it should be opened completely.**

12. With the air jet device air turned on (e.g. "act dblow on") adjust the regulator installed on the back of the Thermal Head until it reads 45 psi. This will provide a constant flow of ~20

SCFH to the air jet regardless of moderate fluctuations in the output device manifold pressure. If a pressure of 45 psi is not obtainable, Check for crimped tubing. Repair any crimps found and try to reset the regulator pressure to 45 psi.

13. Re-zero the Head and complete the re-installation**. When moving the head on the carriage with the set-screw, ensure that there is sufficient clearance between the air jet plate components and the drum clamps**. The air jet plate may affect the optimum exposure required by the media, so a proper media setup should be done during the Thermal Head re-installation. Consult the appropriate media set-up documents. Also confirm that the air jet plate is effective in eliminating ablation related artifacts (e.g. tick marks), and that the air jet is not lifting the edge of the plate (this appears as a section of the plate edge that is out of focus and underexposed). Please see next section (6) for further details.

7.6 Installing the 1/4" red air supply line

1. Change the adapter in the “Thermal” Solenoid Valve on the pneumatic manifold to 1/8” NPT x 1/4" Tube. Insert one end of the 6.5M length of ¼” red tubing into the adaptor.
2. If the ¼” blue tubing for the vacuum sensor has not been installed in the cable track, it will also have to be installed at this time.

   Feed the required tubing through the cable track as required. It is acceptable to use the 5/32” tube to pull the new tubes through the cable track.

7.7 Installing the vacuum analog sensor board and sensor line

1. Attach the board assembly to the bracket, using spacers and M3*6 screws. See Figure 8: **Analogue Sensor Mount (line/cable directions optional)**
[Vacuum port is the barbed fitting closest to the PCB.]

2. .
3. Attach the bracket to the bottom of the engine casting (motor side), using one (or two, if there are two tapped holes in the frame) M6*12 screw. See **Figure 8**.

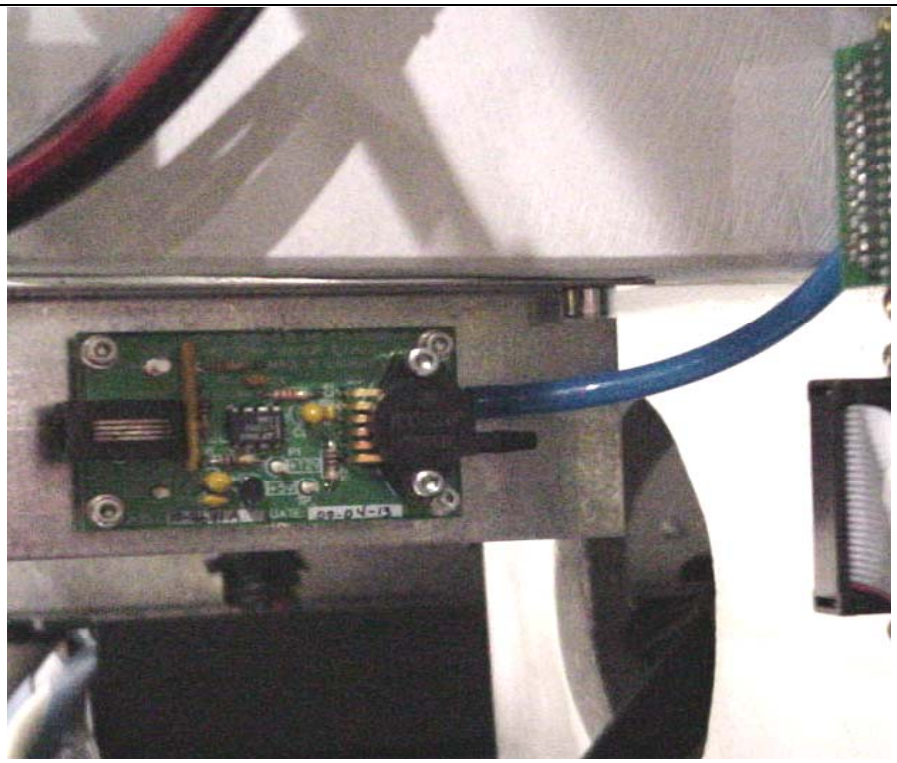


Figure 8: Analogue Sensor Mount (line/cable directions optional) [Vacuum port is the barbed fitting closest to the PCB.]

4. Attach the jumper cable to the analog board and to the J38 Port (RH SENSOR). See **Figure 9**.

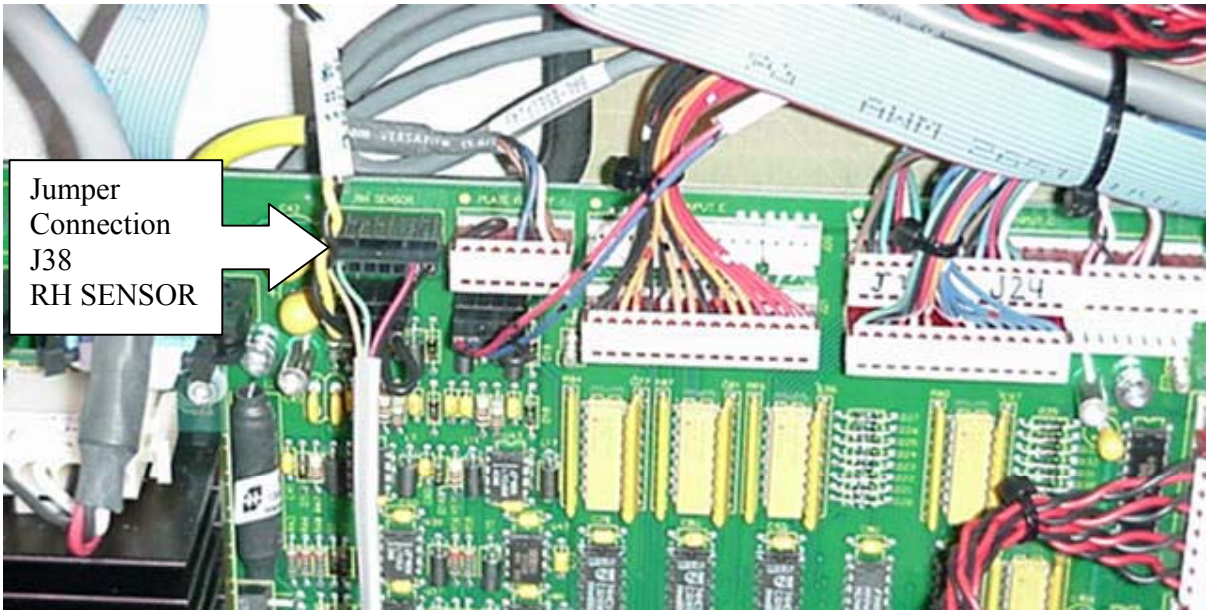


Figure 9: Jumper Cable Port Connector

5. If the blue vacuum sensor tube has been installed at the factory, one end of it will be tucked up behind the engine satellite board. If it wasn't, you will already have installed one in the cable track. Trim to length as required and attach to the vacuum sensor port on the sensor board (the port closest to the PCB). See **Figure 8**.

6. Route and secure the tubing to suit.

7.8 Installing the internal debris hose

Note: The vacuum hose support brackets must be installed on the carriage before the Head is re-installed.

1. Remove the left hand side head cooling hose from the hose tray. Disconnect it from the blower elbow fitting. This hose will not be used with this installation.

2. Loosen the hose clamp on the blower elbow and turn the elbow towards the filter box. Remove the cooling hose from the filter box stub and attach to the blower elbow fitting. See **Figure 10**. The cooling airflow through the Head will now be reversed and it will be drawing cooling air from inside of the machine.

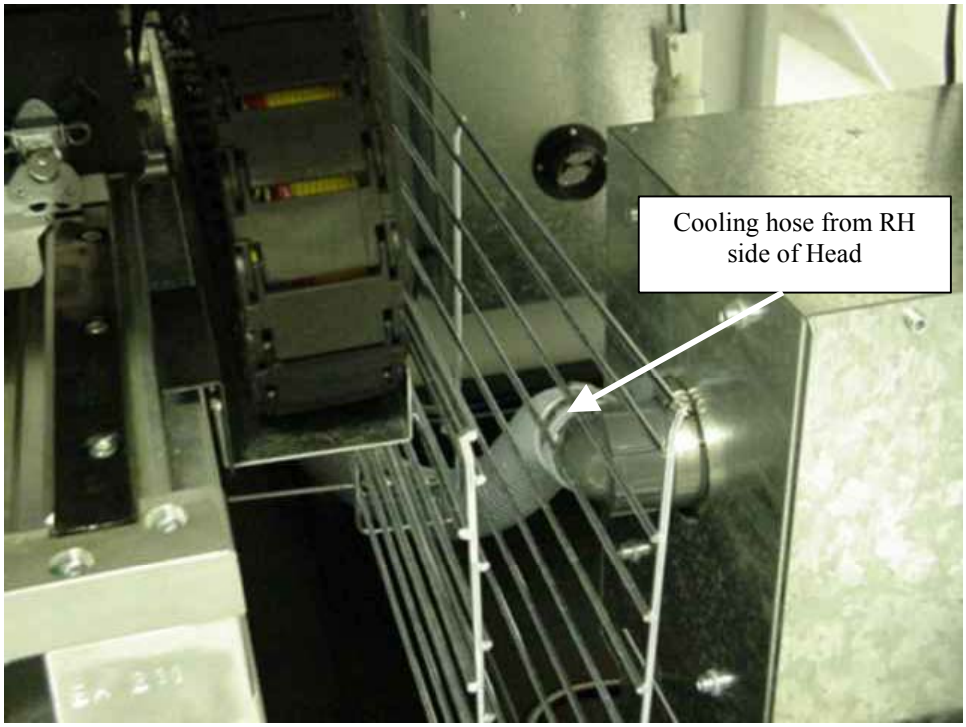


Figure 10

3. The internal vacuum hose has the mesh sleeve installed. Clamp the end of the shorter section of exposed hose to the debris nozzle.

4. Run the vacuum hose inside of the Head air-cooling hose and clamp to the hose support brackets with two insulated clamps and M5 x 10 capscrews and flat washers. See **Figure 11**.

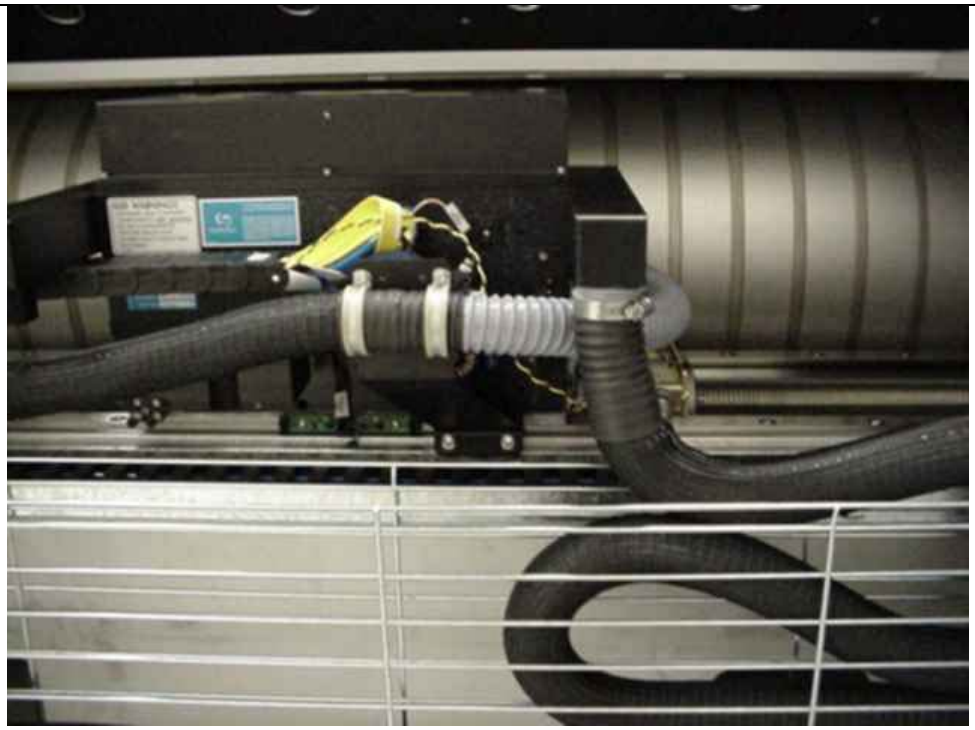


Figure 11

5. Lay the vacuum hose in the hose tray, under the right hand side head cooling hose.
6. Run the debris vacuum hose the length of the hose tray to the power box end of the machine.

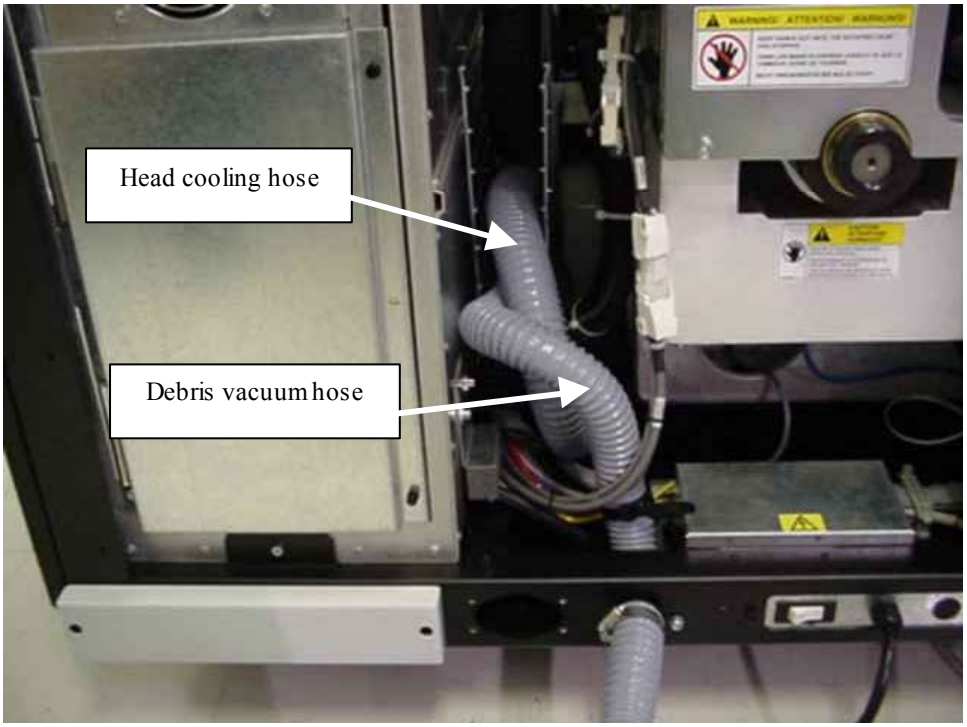


Figure 12

7. Move the Head to the Home end. Arrange the vacuum hose so that it conforms to the Head cooling hose as close as possible. See **Figure 13**.

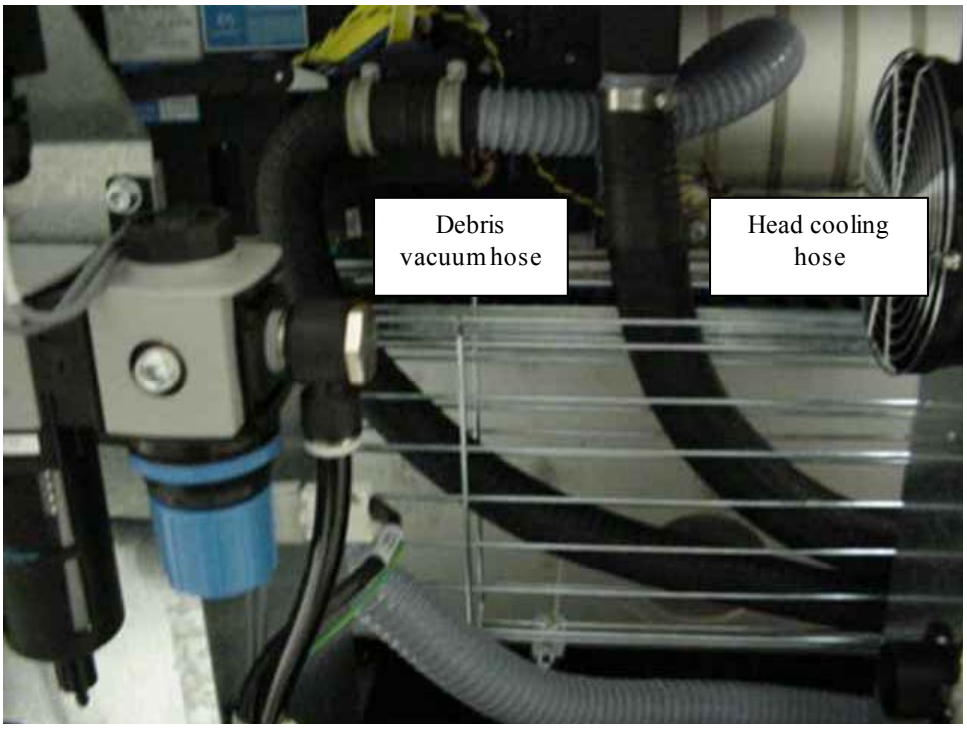


Figure 13

7.9 Attaching the external debris hose and control cable

1. Remove the lower front trim panel on the power box end of the machine.
2. Using a hammer and drift punch, remove the round knock-out plug in the lower frame.
3. Trim the internal vacuum hose to length (if required) and clamp to the bulkhead connector. Secure the hose to the strain bracket with a releasable clamp and install the bracket using two M6 nuts with washers. See **Figure 14**.

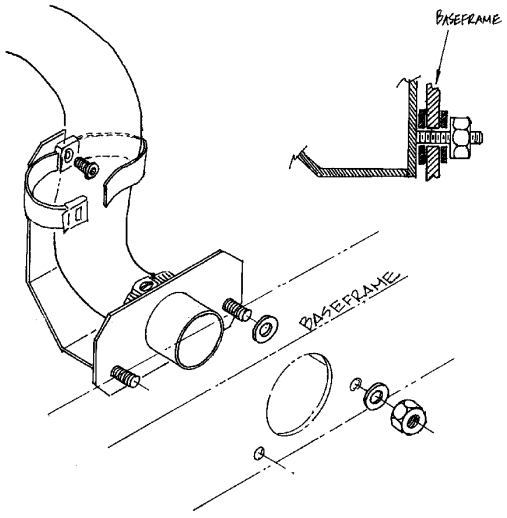


Figure 14: Internal Hose Attachment at Bulkhead (Trendsetter VLF)

4. Fit the replacement lower front trim panel. This will require one of the mounting screws to be relocated.

5. Clamp one end of the external vacuum hose to the stub of the attachment bracket. Clamp the other end to the hose barb fitting on the lower back of the URDC-B unit.

6. If not already done, attach 'Chiller-Filter' cable (10-3852) to the bulkhead connector panel.

7. Route internal 'Chiller-Filter' cable (10-3852) to satellite board via cable duct. Ensure swinging table counterweight will not snag cable(s) coming from rear of bulkhead connector panel. Connect J31 and J34 to satellite board. See **Figure 15**.

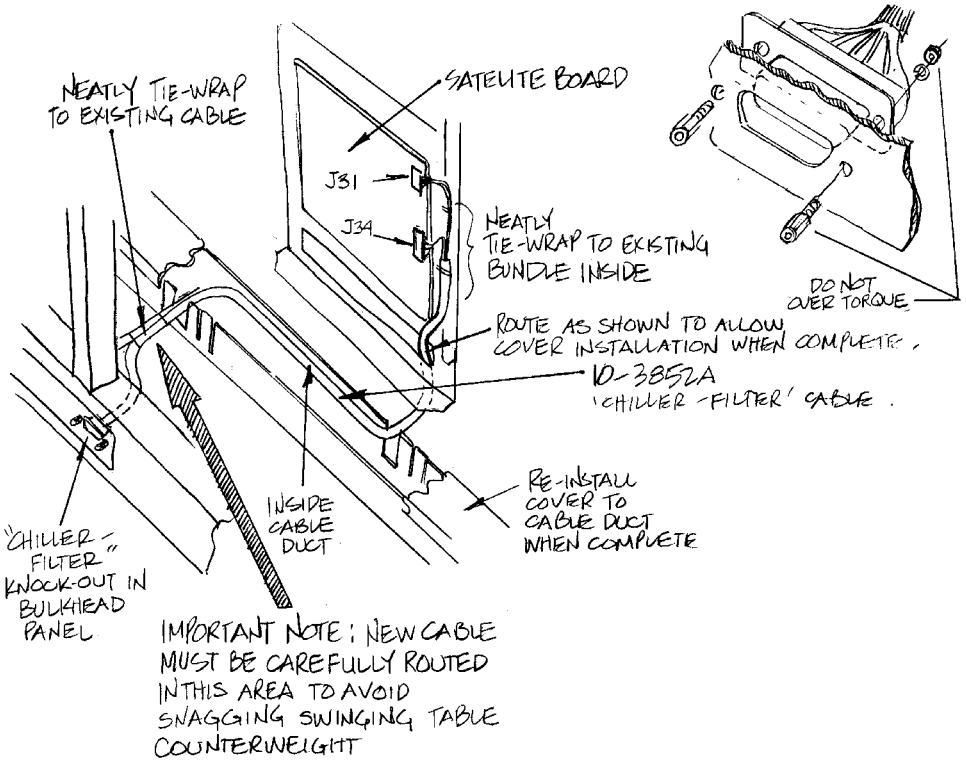


Figure 15: 'Chiller-Filter' Cable Installation

8. Connect the external signal cable to the DB-15 'Chiller-Filter' port on the bulkhead connector panel and to the port on the lower back of the URDC-B unit.

9. Route the external cable to the filter unit along the debris hose. Provide slack and tie wrap the cable to the strain bracket and external debris hose.

7.10 Final mechanical checks

1. Check all connections to the head (electrical cables, air line, and debris hose). Ensure that the head ground wire ring terminal is installed with a star washer under the screw attaching the flex track bracket to the head.

2. Cycle the carriage head along the full length of the track to check the location of the tie wrap, and adjust if necessary.

3. Check the tightness of all the clamps on the debris hose.

4. Check the integrity of all the electrical connections on the bulkhead connector panel.

5. Clean all horizontal surfaces around the engine.
6. Check the hose connections and electrical connections to the filter unit.
7. Check clearance between nozzle and clamps.
8. Re-install any panels that were removed.

7.11 Integration and testing

1. Power up the machine.
2. Set the NVS parameters as follows:
   `set sys dbin 1` - sets the debris_blower_installed flag to TRUE.
   `set media # abl 1` - sets the #th media to ablative.
   `set media # dr 1` - turns on the air to the Tick Kill and the nozzle Air Curtain.
3. An analog sensor system is used to monitor the performance of the debris removal system. Vacuum pressure is measured at the nozzle. There are three vacuum set points, low stop, low warning and high stop, which can be set. To set each of these set-points, use the following commands:
   - To set the low stop: `> set sys dbls 6`
   - To set the low warning: `>set sys dblw 8`
   - To set the high stop: `> set sys dbhs 30`

   The machine will suspend at the end of a plot if the vacuum read is lower than the low stop value entered or higher than the high stop value entered and error messages will be displayed. If the vacuum read is between the low stop and the low warning, imaging will continue but warning messages will be sent to the workstation. The table below explains the set-points logic.

Table 1: Vacuum Setpoints

Vacuum Setpoint	Possible Causes	Effect	Error Message
Low Stop **NVS** : sys dbls 1 Piece; 6" H_2O	Filter full Severe leaks Hoses or sensor lines not connected Failure of analog board/jumper	**Unsolicited error message every 30 seconds for 15 seconds. **Should be fixed ASAP**	External Debris Blower Not Connected or Filters Full (Vacuum Level # is below #)
Low Warning **NVS** : sys dblw 1 Piece; 8" H_2O	Filter almost full Severe leaks Hoses or sensor lines not connected Failure of analog board/jumper	**Unsolicited error message every 30 seconds for 15 seconds. Problems are less severe than under Low Stop causes.	External Debris Blower Filters Almost Full (Vacuum Level # is below #)
High Stop **NVS** : sys dbhs	The inlet of the debris nozzle is blocked	**Unsolicited error message every 30	External Debris Blower System

Vacuum Setpoint	Possible Causes	Effect	Error Message
1 Piece; 30" H_2O		seconds for 15 seconds	Blocked (Vacuum Level # is above #)
*NOTE: In the 1.50 VLF TS firmware release, the unsolicited error message is displayed every 10 seconds. The next VLF TS release will display unsolicited error message as describe above.			

7.12 Masks:

There are 2 firmware masks for the debris removal system for Trendsetter VLF and Trendsetter VLF AL:

1) mask 25 – "Chiller/Blower sensor cbl.": This will mask the cable detects to both the dblower and the chiller. For this installation, mask this cable **(mask 25 on).**
2) mask 27 – "Dblower Filter Fault.": This will mask the filter present switch inside the dblower cabinet. For this installation, turn this mask off. (**mask 27 off**).

7.13 Useful commands:

`dr on` – Start Debris Removal

Note: : `dr on` is a convenient command to start the cabinet's blower motor and to show the corrected/null vacuum pressure at the nozzle. It will automatically turn off the blower after 10 minutes, if no imaging is initiated, or it can be turned off using `dr off` command. In normal operation, the blower will turn off after 10 minutes from the end of the last plot.

`dr off` – Turn off Debris Removal

`dr` – lists status of debris blower

`act dblow on | off` – Is used to manually turn on/off the compressed air to the Tick Killer plate and to the Nozzle Air Curtain. This command has no effect on the normal operation of the system.

4. Perform function tests as required and check plot quality.

8 TROUBLESHOOTING

8.1 Plate Lifting and Tick Marks

Plate lifting occurs if the air jet is blowing too hard. When the first few or last few swaths are being imaged, the strong air jet can cause the plate edge to flutter. This appears on the image as a section at the edge that goes in and out of focus.

Tick marks occur if the air jet is not blowing away debris hard enough. A plot 12 (100% solid) is the best pattern to diagnose tick mark problems.

The objective in setting the appropriate air pressure is to find an air pressure that provides high enough flow to kill tick marks, but low enough not to cause the plate to lift.

Adjust the air pressure regulator appropriately to fix whichever problem is present. There has never been a situation yet where both problems occur simultaneously. If such a situation occurs, please report it to Vince Beyer at ext. 5918.

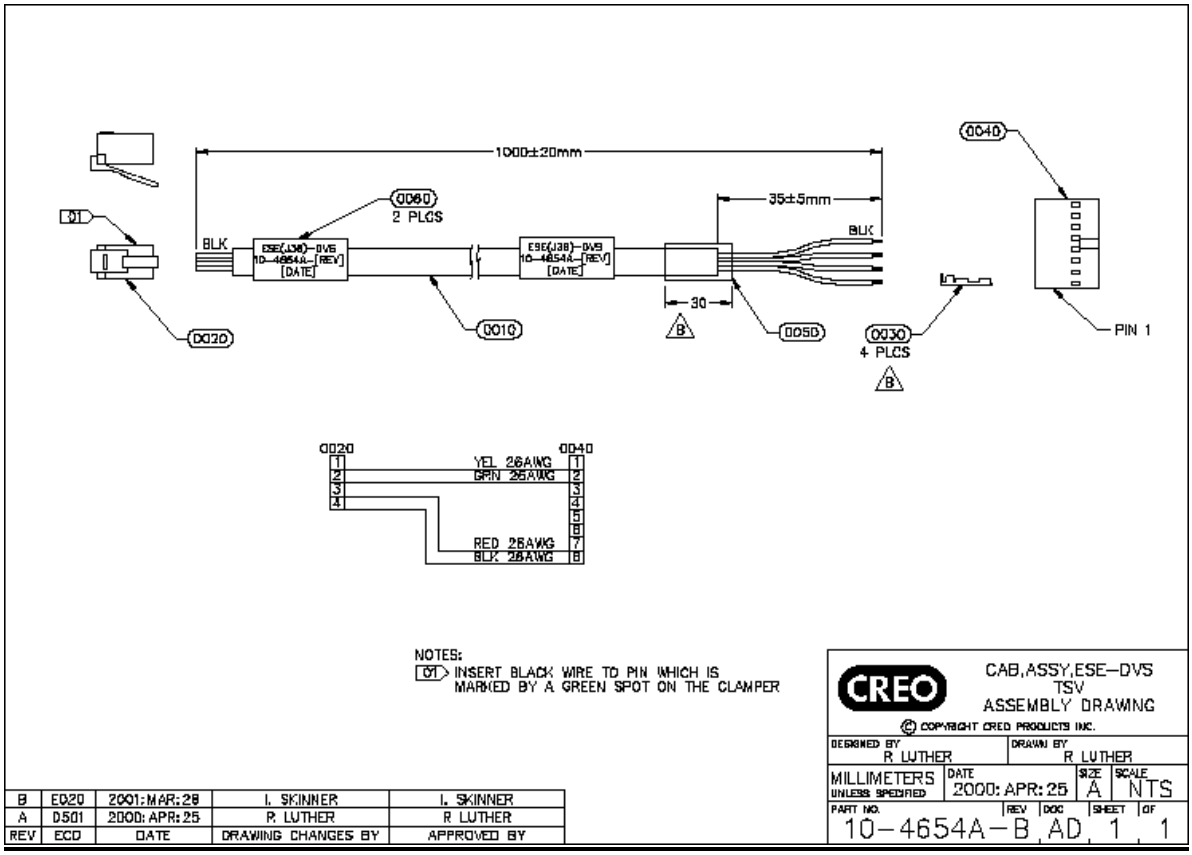
To confirm that plate lifting is the problem of the apparent focus problem, the air pressure can be set to 0 psi, and if the focus problem goes away, then it was caused by plate lifting.

8.2 Analog Vac/Press Sensor Board (10-4641A)

See the *External Debris Blower System Blocked (High Vacuum)* troubleshooting document at http://intranet.creo.com/support/troubleshooting/drs01.htm for details.

8.3 Cabling

Jumper cable 10-4654A – some of these cables have been incorrectly wired in the past. Refer to the wiring diagram below for troubleshooting this cable if problems are suspected.



APPENDIX A - CUTTING HOLES THROUGH THE SIDE OF THE BASE FRAME

Objective:

To upgrade an existing TS VLF frame that does not already have holes (or knockouts) for water cooling and debris removal systems. The following procedure is for creating the holes for the water-cooling components as well as the Debris Removal components.

If only the Debris Removal System is to be installed at this time, you can delete the steps related to the holes for the water-cooling components. The Debris Removal System holes are the 2" dia. and two ¼" dia. holes that are on the right hand side of the jig when facing it on the machine frame.

Estimated time to complete this procedure:

- Allow 4 hours. (1 hour for Debris Removal holes only)

Preparation and Caution notes:

- Obtain Special Punch Tool Kit
- Ensure machine base-frame, you and power tools are electrically grounded.
- Use newspaper and masking tape to block chips from entering the machine's interior.
- Carefully follow the sequence of drilling and punching steps. If you get the punching order wrong, some holes may be very difficult to complete because metal will be missing to support a draw bolt.
- Do not skip the process of de-burring all holes inside and out. A clean hole protects cable insulation and operator flesh.
- Always determine where a drill will poke through the base-frame before starting a hole. This will prevent accidental damage to electrical cables and other items.
- Throughout the process of creating the series of holes, you will be asked to mask over various small hoes after completion. This is a way to prevent accidents caused by mistakenly drilling to a larger size in later steps.
- Read instructions on how to properly use air-tool equipment and chassis punches.
- Wear safety glasses. Wear hearing protection when using air-tools.

Steps:

- ❑ Attach frame drilling template using both captive screws. The large chamfered corner on the template is to be positioned in upper right corner. Figure A1.
- ❑ Drill ∅1/8" pilot holes (12x) where drill bushings exist in template. Use oil. Keep drill straight and do not use much force – the drill can be easily snapped with a side-load. Figure A1.
- ❑ Remove template.
- ❑ Identify and drill ∅4.2mm hole (1x). De-burr outside edge only since there's no access to the other side and no possibility of a burr snagging a cable or person. Figure A2.
- ❑ Tap ∅4.2mm hole from previous step for M5 screw. Figure A2.

- For safety, place a small piece of masking tape over newly tapped M5 hole and pre-existing M5 tapped hole (located right mounting screw when mounting template).
- Identify and drill ∅5.0mm holes (4x). De-burr both sides of hole. Burrs could cut cables or people. Figure A2.
- Tap ∅5.0mm holes (4x) for M6. Figure A2.
- For safety, place small piece of masking tape over newly tapped M6 holes.
- Identify and drill ∅¼" holes (2x). De-burr both sides of hole. Burrs could cut cables or people. Figure A2.
- For safety, place a small piece of masking tape over each ∅¼" hole.
- Identify remaining ∅1/8" holes (5x) and drill with ∅3/8" bit. Figure A2.
- Use ∅1" Punch to open up top and bottom holes of diamond pattern (2x). Go easy and use plenty of oil on the inside punch - will have to remove slug from inside tool after completing each hole. Requires 7/16" socket. Figure A3.
- Use∅3/4" Punch to open up left and right holes of diamond pattern (2x) and hole on far right (1x). Go easy and use plenty of oil on inside punch - will have to remove slug from inside tool after completing each hole. Requires 7/16" socket. Figure A4.
- Use ∅1-1/2" Punch to open up left and right holes of diamond pattern (2x). Ensure both lead-cutting edges of the punch are orientated at the 12 and 6 o'clock position. This ensures a straight hole since the punch will bite squarely into the frame and not be influenced by the neighboring 1" diameter holes. Figure A5.
- Use ∅2" Punch to open up remaining ∅¾" hole. Figure A5.
- Use straight edge and scribe tangent lines between the arcs of the diamond patterned holes. Figure A6.
- Use air tool and rotary file to carefully trim unwanted metal back to this line. Beware of air blast from the tool and protect eyes and avoid blowing chips into machine. Finish cut edges with hand file. Shape should resemble that shown in Figure A7.
- Use de-burring tool and remove sharp edges on both sides of the elliptical shaped hole. Burrs could cut cables or people.
- Vacuum all chips from inside machine and wipe oil from metal surfaces with thinners. Include exposed metal where holes have been cut.
- Use touch up paint and Q-tips to paint exposed edges of holes.
- Return to main procedure.

Required Tools – Not supplied in punch kit:

- Paper and masking tape
- Vacuum cleaner
- Thinners to clean up oil and prep for paint
- Touch up paint: semi-gloss black (primerless)
- Paper cups
- Q-tips
- Hearing Protection in the form of ear muffs or foam plugs
- Safety glasses
- Paper towels

Required tools – Special punch kit as shown in Figure A10 includes:

- Frame drilling template with captive mounting screws
- Allen key set, Metric: 4mm
- ∅¾" Chassis Punch (∅0.75"/19.1 mm hole), 3/8" draw-bolt, 7/16" socket
- ∅1" Chassis Punch (∅1.0"/25.4 mm hole), 3/8" draw-bolt, 7/16" socket
- ∅1-1/2" Chassis Punch (∅1.5"/38.1 mm hole), ¾" draw-bolt, 1" socket
- ∅2" Chassis Punch (∅2.0"/50.8 mm hole), ¾" draw-bolt, 1" socket
- ½" drive flex handle wrench (16" long)
- 1" hex socket – ½" drive
- 7/16" hex socket – ½" drive
- Twist drill, short, ∅1/8" for pilot holes
- Twist drill, ∅4.2mm for M5 threads
- Twist drill, ∅5.0mm for M6 threads
- Twist drill, ∅¼"
- Twist drill, ∅3/8"
- Die grinder with wrenches, air operated
- Burr/rotary bit on ¼" shank for die grinder
- Grinding stone on ¼" shank for die grinder
- Drill with key, air operated
- Straight edge and scriber
- Burr removal tool: Vee-hook type
- Tap, M5
- Tap, M6
- T-handle for taps
- Oil for taping/drilling/punching
- Oil for air tools
- 3/8" air line with quick disconnect.
- Union, 3/8" to 5/8"

Air Tool Operation:

Operator instructions for both types of air tools are included with the toolkit – read them. The air tools are to be operated with air filtered and regulated by the TS VLF. The kit is supplied with a quick disconnect hose and union to that is plumbed into the system as follows:

1. Shut-off air supply to TS VLF. To do this, disconnect main air-line from bulkhead panel or use shut-off valve on that line if it exists.
2. Locate T-fitting on end of manifold. Disconnect line that comes from filter-regulator system and attach union and hose to it. Figure A8.
3. Remember to shut-off air supply to TS VLF before disconnecting union and air-tool line when finished.
4. Squirt just two drops of air-tool oil into the air inlet of tool prior to each day of use.
5. It is very important you wear safety glasses and hearing protection when using air tools

Chassis Punch Operation:

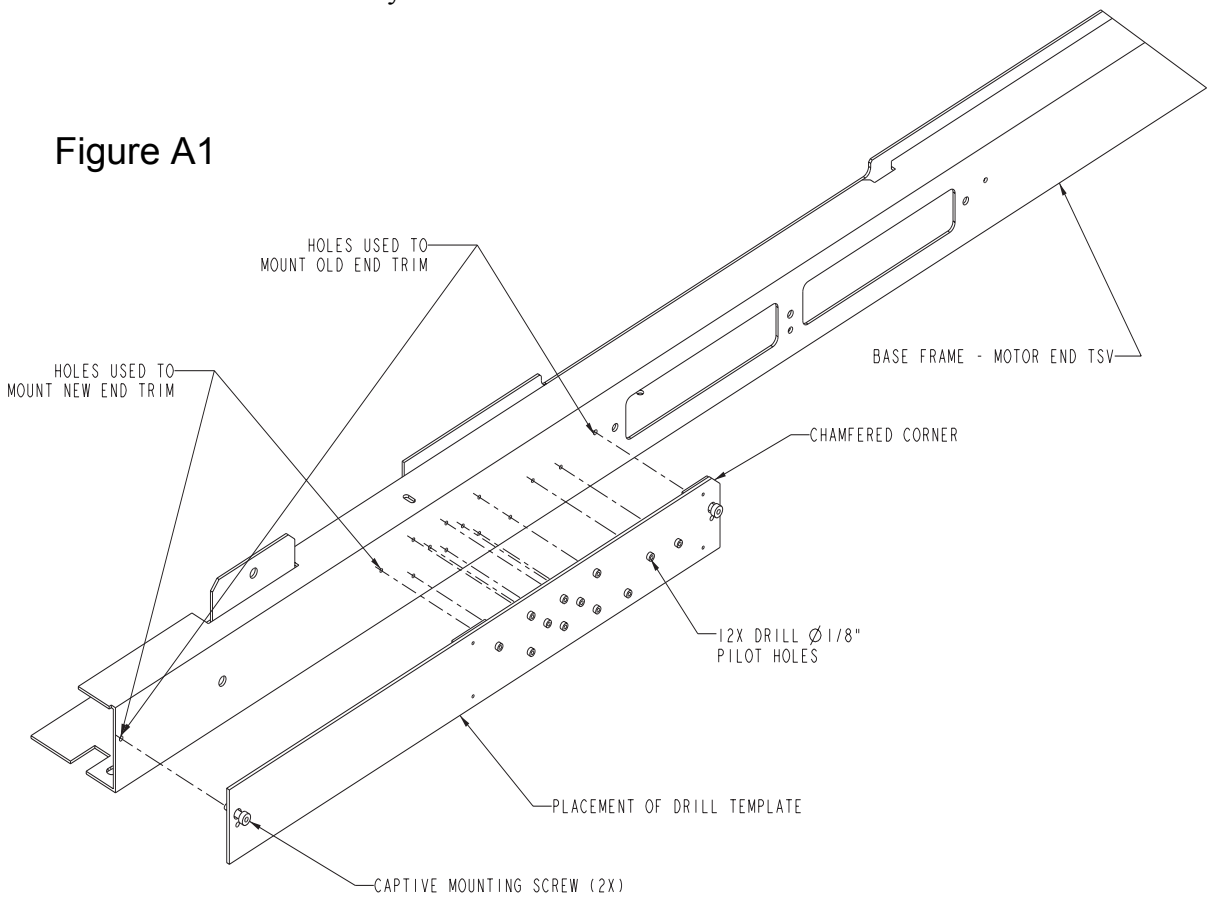
User instructions for the chassis punches are included with tool-kit – read them. Although the punches split the slug, some slugs become stuck inside the tool. The following describes how to clear the tool if this happens. Refer to figure A9.

1. Once hole has been made in base-frame, remove tool and unscrew draw-bolt a few turns. Figure A9-2.
2. Turn over tool and while gripping die, bang head of draw-bolt onto the floor. This action will tend to move slug closer to the open end of die. Figure A9-3.
3.
4. Unscrew the draw-bolt a few more turns and repeat previous steps. Eventually, the punch will become completely unscrewed from the draw-bolt and the slugs pushed free of the die.

Other tool notes:

1. Scriber point is stored backwards in tool holder when not in use. Threaded collet retains point.
2. V-hook bits stored in body of handle when not in use.

Figure A1



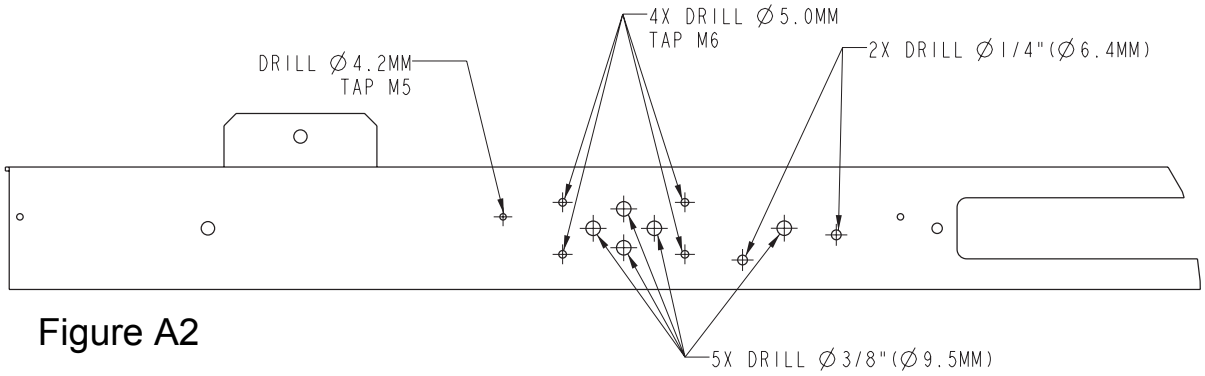


Figure A2

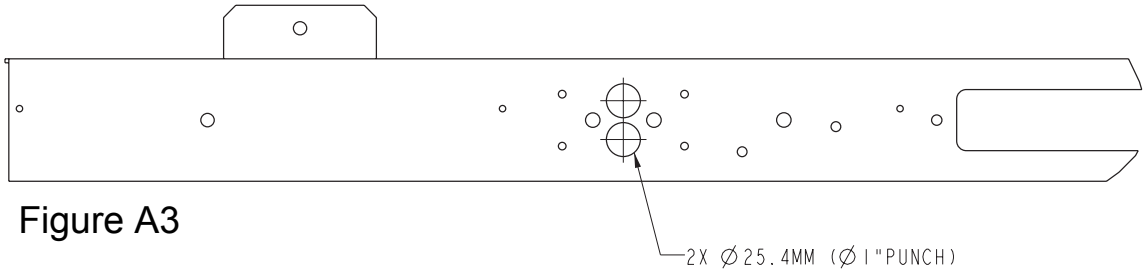


Figure A3

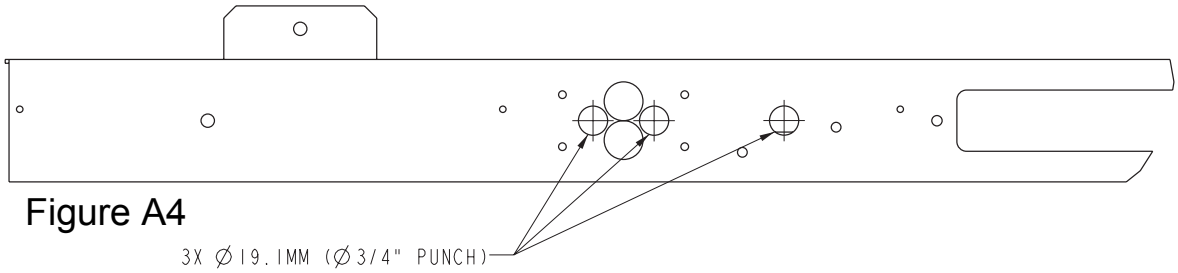


Figure A4

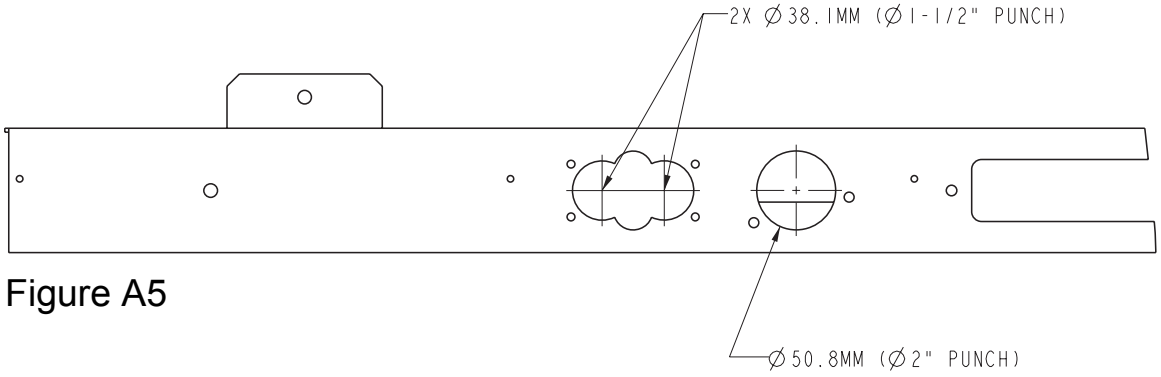


Figure A5

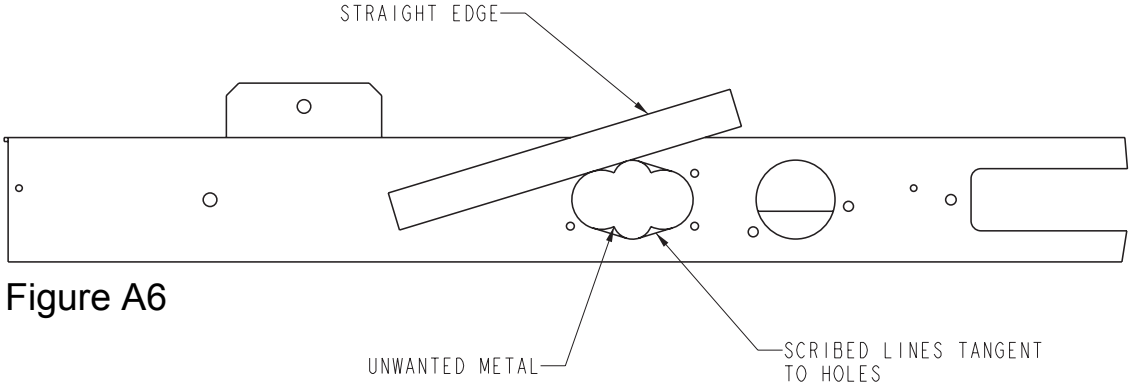


Figure A6

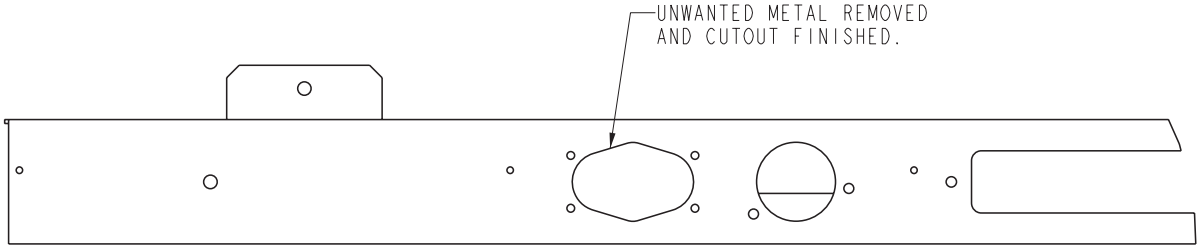


Figure A7

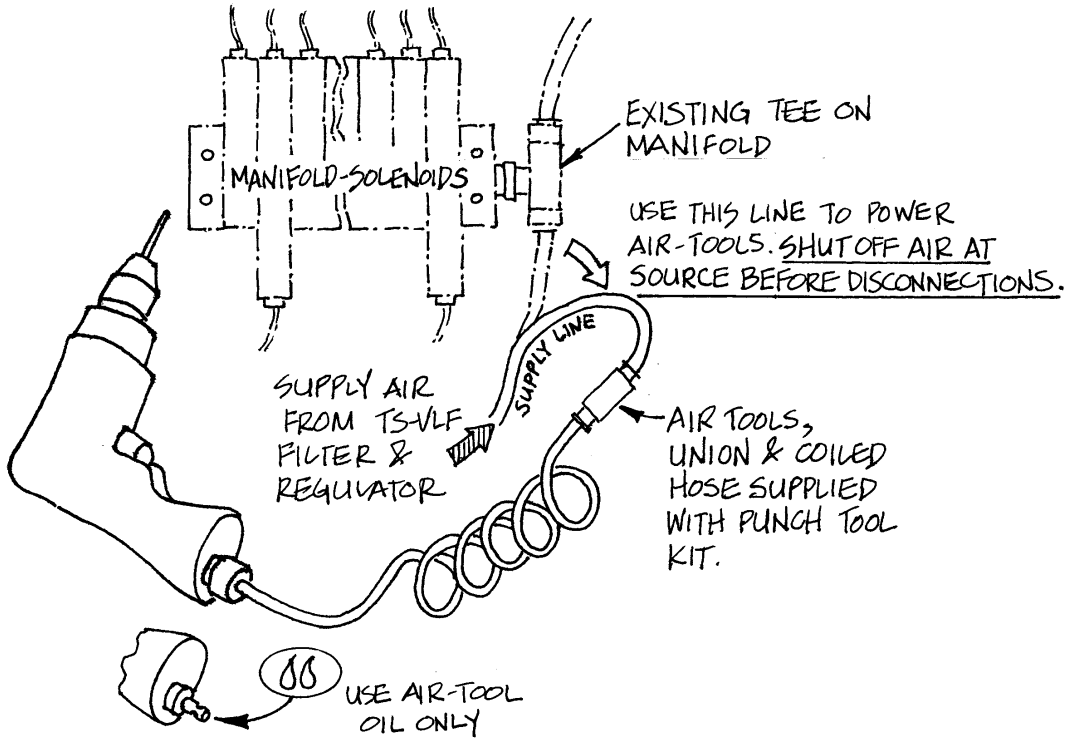


Figure A8: Plumbing Air Tools into System Air Supply of TS VLF.

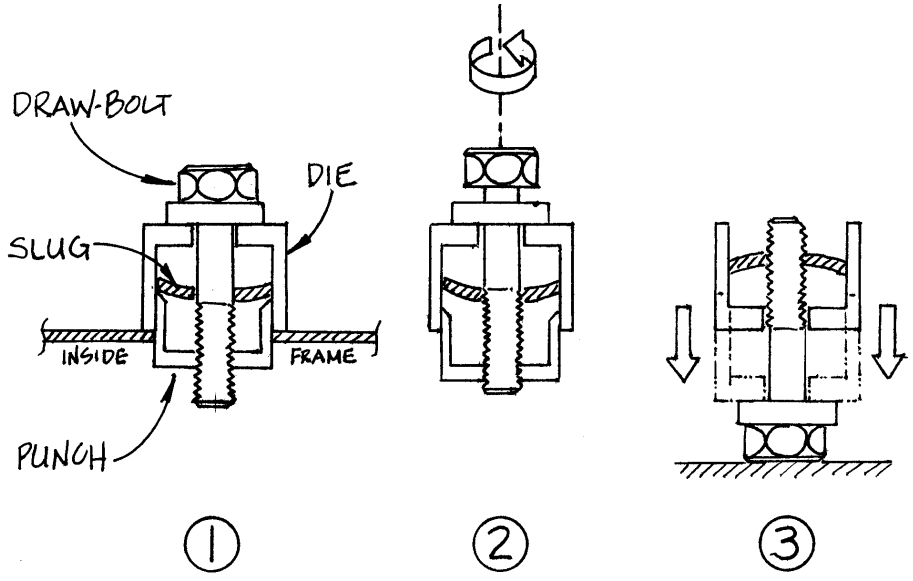


Figure A9: Helpful Hint for Removing Stuck Slugs from Chassis Punch.

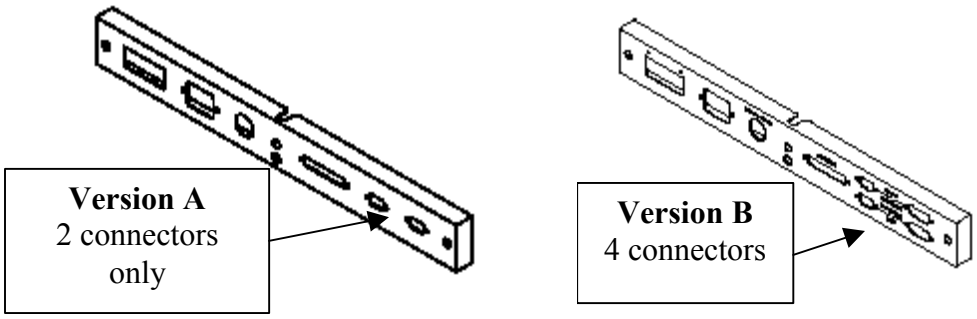


Figure A10: Special Punch Kit 50-1606 (available through Service Logistics).

APPENDIX B - SWAPPING BULKHEAD CONNECTOR PANELS

Objective:

To replace older style (Version A) bulkhead panels with a new style two-piece bulkhead panel (57-8539A + 57-8540A) in preparation for a 15-pin, DB style connector/cable needed by 'Chiller-Filter' system. This new panel provides a 15-pin cutout for 'Spare' use but is not required for this upgrade so it should remain covered or filled.



Additional notes regarding Version 'A' bulkhead connector panels:

If the machine has this style of bulkhead connector panel then the following applies:

- The 9-pin 'Serial' cables (10-1430A) may be too short to reach its cutout in the new style bulkhead connector panel. If not enough slack length exists, then the cable will have to be replaced.
- If the machine has an older shell type SCSI cable, it will be replaced by the molded plug style SCSI cable. This cable was shipped on all machines equipped with the Version 'A' bulkhead connector panel but may have since been field replaced by the newer type cable.

Estimated time to complete this procedure:

- Allow 2-1/4 hours for Version A replacement including AC power cord and SCSI cable replacement
- Version B bulkhead panels do not need to be replaced.

Preparation:

- Ensure machine is disconnected from all electrical and air energy sources.
- Ensure machine base-frame, you and your power tools are electrically grounded.
- Determine if the SCSI cable is the preferred molded plug type or the older open shell type.
- You will be required to disconnect terminal leads on the power switch and receptacle so pay close attention to the proper location of wires when reconnecting.

- For safety, tag each of the two 9-pin ribbon cables with its name as labeled on the face of the bulkhead panel (Serial versus Diagnostics). This will ensure the cables are not inadvertently installed in the wrong cutout of the replacement connector bulkhead panel.

Steps:

1. If the EMI filter relocation upgrade (72-3091A) was previously done on this machine, the filter bracket and AC inlet cover on the lower right base-frame will prevent removal of the bulkhead connector panel. Unfasten AC inlet cover and EMI filter bracket and move aside.
2. Remove plastic airline from back of main air fitting.
3. Disconnect the SCSI connector from the panel.
4. If the EMI filter is mounted in the power-box, disconnect main power-box cable (10-3513x) from back of power switch.
5. Detach both 9-pin ribbon cables from panel.
6. Disconnect external power cable from back of power switch - there are two cable types, one for North America/Japan (NA) and one primarily for Europe (EU). Disconnect wires as follows: black and white for NA or brown and blue for EU.
7. Disconnect external power cord ground wire (green) from primary grounding point on floor of base-frame.
8. Loosen/remove strain relief on external power cord and extract cord from panel.
9. Remove bulkhead connector panel from inside base-frame.
10. Unscrew and remove the main air fitting from panel using 1” socket, ratchet wrench and 1” combination wrench.
11. Remove power switch from panel by squeezing inside mounting ears and pry loose backing spacer.
12. Swap bulkhead connector panel with new style.
13. Install the main air fitting into panel. Remember to use Teflon tape or Loctite 545 Thread Sealant on air fittings. Carefully inspect inside of fittings prior to assembly. Any loose bits of Teflon tape circulated through the system will cause future problems with pneumatic components with small orifices.
14. Install power switch ensuring the ‘Off’ or ‘0’ position is on the left-hand side.
15. Install power receptacle ensuring the clamp screw is at the 12 o’clock position.
16. Connect two twisted wires (black and white) from receptacle to back of power switch. Connections to the switch terminals as follows; Pin‘1’-black to #11 and Pin‘N’-white to #21. Figure A2.
17. Reposition bulkhead panel into base-frame. Temporarily hold it in place with two finger-tightened bolts.

18. Remove cover from two wiring ducts. Locate 'Serial' cable (10-1430A) and follow it back to power-box. Cut tie wraps holding it to the main bundle. Carefully work slack towards bulkhead connector panel. Do not pull on cable since this may stretch and break conductors within the cable itself. If there is not enough slack length then disconnect and remove this cable from the duct and install replacement.

19. Check and adjust the routing of the 'Diagnostic' cable (10-1431A) to its cutout in the bulkhead connector panel.

20. If SCSI cable is older open shell type then remove and route replacement. Connect cable to card-cage back-plane.

21. Remove bolts temporarily holding bulkhead connector panel to base-frame. This makes it easier to install connectors and other parts to the back of the panel.

22. Install both 9-pin connectors to bulkhead panel. Use caution when reinstalling small hex-stud standoffs in DB connectors - they are very fragile and over tightening will break them off. Spares should be taken to site – just in case.

23. Attach 'Chiller-Filter' cable (10-3852A) to the bulkhead connector panel. Proper routing of this cable is detailed in the Debris Removal System installation procedure.

24. Attach SCSI connector to bulkhead panel.

25. Attach air-line to fitting on bulkhead panel.

26. Install mounting bolts and fasten bulkhead panel to base-frame.

27. Attach green ground wire from the AC power cord to primary grounding point on base-frame. Ensure star washer is installed between ring terminal and base-frame to break the painted surface. Figure A2.

If the EMI filter relocation upgrade (72-3091A) was previously done on this machine:

1. Attach ring terminals of main power-box cable (10-3513C) to the filter.

   Special note regarding wiring: For the purpose of standardization, ensure colour wiring and switch terminal connections match those shown in Figure A2. This may entail changing connections that were wired differently before the V-Head upgrade.

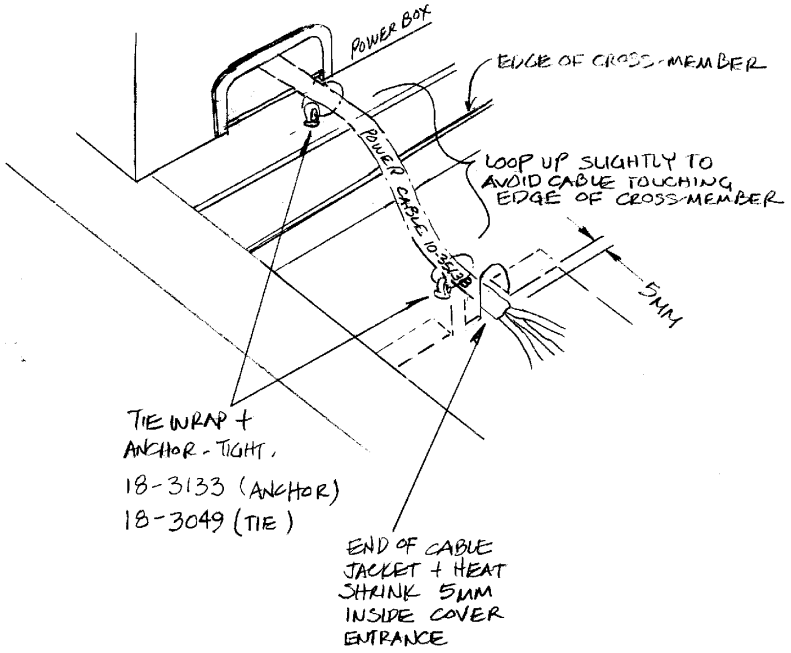
2. Reattach filter bracket and AC inlet cover to the lower right base-frame. Mounting of AC inlet cover can be simplified to two mounting points nearest the right end-rail of the base-frame. Ensure star washers are sandwiched between brackets and base-frame to bite into painted surfaces.

3. Position and tie wrap main power-box cable (10-3513C) to base-frame as shown in Figure A1.

4. Return to main upgrade procedure.

Tools required:

- Allen keys: 2.5mm, 3mm, 5mm
- ½" Ratchet wrench with 1" socket (min socket depth 0.9"/23mm) for air fitting
- Open ended or closed ended wrench for 1" nut – 12" long
- Teflon tape or Loctite 545 Thread Sealant for air fittings
- Side-cutters
- Needle-nose pliers
- Open ended wrenches: 3/16" (2 separate wrenches required) and ¼".
- Spare spacer-nuts for DB style connectors (52-3101)
- Spare 4-40 nuts (52-4449) and lock washers (52-3058) for DB style connectors
- Spare standoffs for SCSI connector (57-3994B)
- Small blade screw driver
- Service removable Loctite



FigureA1: Positioning and Anchoring of Power Box Cable (10-3513C)

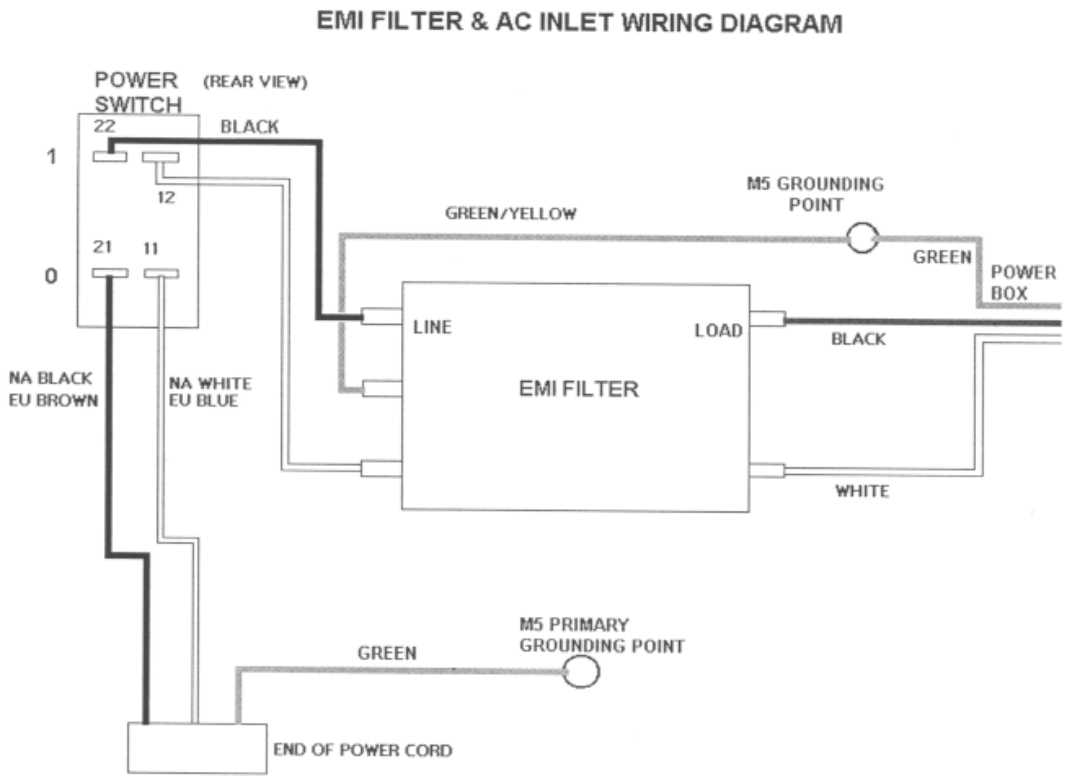


Figure A2: Standardized EMI Filter and AC Inlet Wiring Diagram for TS VLF

CAUTION: Match colour position of black wire on "LOAD" side to black wire on "LINE" side of EMI filter. Failure to do so will lead to electrical malfunction.