Trendsetter VLF - Imaging Speed Upgrade

F & S (20W) to V (40W) Installation Procedure

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Creo Products Inc.
3700 Gilmore Way
Burnaby, BC
Canada V5G 4M1

(604) 451-2700

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Revision History

Revision	Date	Author	Comments
PRE	14 Jan 2003	Angus Gillon	Based on Water-Cooled Head Upgrade, V2.5 (72-3086A)
A	22 Aug 2003	Angus Gillon	Added info for Entry Level (non-Quantum) devices

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1. OVERVIEW

This upgrade installs the water-cooled Thermal Head 1.7x to increase TS VLF imaging speed by up to 2.8 times. The actual imaging speed increase depends on the type of plates being imaged. The increase in plates per hour throughput depends on the plate sizes, operator plate handling proficiency, and the imaging speed increase.

This upgrade can be applied to all TS VLF machines that have an air-cooled 20W/24V Thermal Head 1.0 (the F-model) or 0.7 (the S-model). The upgrade is fairly simple for machine serial numbers from B200, including water cooling, debris removal, new trailing edge clamps, and a firmware upgrade. Earlier serial numbers may require more extensive changes, such as carriage replacement, cutting holes in the frame, replacing circuit boards, adding a laser safety keyswitch, and others.

2. RELATED DOCUMENTS

To upgrade to a V2.8 water-cooled head, refer also to:

Trendsetter VLF – Imaging Speed Upgrade F & S (20W) to V(40W) Site Questionnaire and Parts Order Form (725-00021)

Trendsetter VLF – Imaging Speed Upgrade V1.7x to V2.8 Installation Procedure (725-00023)

Thermal Exposure Head Installation Procedure (77-0038)

VLF Platesetter/Trendsetter VLF UDRC-B Installation/Upgrade Procedure (72-3428)

TEH1.x Dehumidifier Unit (DHU) Install Procedure (77-0225).

24V/20W to 48V/40W Laser Power Supply Retrofit, TS VLF (77-0062)

PolyScience Chiller Installation (73-3324)

Laser Plate Fly-off Upgrade, VLF Engine (72-3096)

S*IO Laser Safety Key-switch Field Retrofit, TS VLF (72-3341)*

Carriage Replacement, VLF Engine (72-3095)

Thermal Exposure Head Mounting Conversion Procedure (77-0056)

RFI Enhancement Upgrade, TS VLF (72-3093)

EMI Filter Relocation, TS VLF (72-3091)

Power-Loss Brake Field Upgrade Procedure (73-3669)

Trendsetter VLF Power Wiring Diagram (73-3316)

Document numbers are shown without the version letter. Please use the most current released version.

3. TOOLS REQUIRED

- metric Allen key set
- screwdriver set
- small metric wrench set
- needle-nose pliers
- electrical side cutting pliers

Other tools required are listed at the beginning of each upgrade procedure – see Section 2: Related Documents and Appendix A, C and D.

4. SAFETY

Several procedures in this upgrade involve working with the high voltage circuit. In these situations, or whenever you feel safer by doing so, unplug the machine from the main power. Move cables and hoses to safe locations before drilling holes near them.

Be very careful when working with tools – particularly air driven types. Bits and cutters can break if the tool is not held steady when operating. Always wear safety glasses. Always wear hearing protection when using air tools.

When working on the machine you must be grounded to the machine with a static wrist strap, and the machine must always be grounded to earth.

- When plugged into a power receptacle, the machine is grounded to 'earth' automatically.
- When the machine is not plugged into a power receptacle, both you and the machine are free to float at a higher potential than 'earth'. Discharge could occur if you touch an object at 'earth' potential and this may damage ESD sensitive components. For this reason, a separate ground wire must be connected between the machine (power-box) and some other item at 'earth' potential such as a screw attached to a metal electrical outlet box. The site engineer is required to devise a suitable method to ground the machine to 'earth' potential when it is unplugged from the main power source.

5. UPGRADING FROM F OR S (20W) TO V (40W)

1. Complete and submit the *Trendsetter VLF – Imaging Speed Upgrade F& S (20W) to V (40W) Site Questionnaire and Parts Order Form* (725-00021A) well in advance of the upgrade to determine all the components required.

   The completed Parts Order Form at the back of the Site Questionnaire will provide Order Management with the information needed to issue a kit tailored to the machine, using configurable BOM 02-4487A. The kit will contain common parts, plus any FCO upgrades that are essential for successful implementation of the V-Head upgrade.

2. Save the NVS parameters in a hex dump file using `<<fsave all>>` and in a text file using `<<nvs dump>>`.

3. Remove the air-cooled F-head.

- Turn off the power to the device, with the table down and the plate door closed.
- Remove the right side panel, the three front panels, the left side panel, the two rear panels, and the top center panel.
- Remove the two lower right side (front and rear) trim pieces covering the base-frame.
- Disconnect the air-cooling hoses and electrical cables from the imaging head. Refer to *Thermal Exposure Head, Installation Procedure (77-0038).*
- Disconnect the mate-and-lock electrical connector at the head blower, located in the fan box area of the machine. Blower operation is not required for the V-Head, but the blower can remain mounted inside the fan box.

4. Complete the upgrades below, if they are required. If the upgrade is already installed, skip to the next step.

   Note: Starting with B770, the P33 imaging head (32-4180A) is being shipped with all entry-level[1] Trendsetter VLFs. These devices will only require firmware parameter changes to upgrade their speed (they still require a sales order before the upgrade). Skip to the MPE Firmware Configuration section.

   Before starting the upgrades, please read the procedures and the firmware release notes carefully

Trailing Edge Clamps

Remove the standard trailing edge magnetic clamps and replace them with the new ones that have the green "V2.5+" label on them. Save the packaging from the new clamps for returning the old clamps to Creo. The clamps must be placed on the sheet-metal carrier for shipping.

To replace the clamps:

- Unload the plate from the drum.
- Use the command << `putclamp` >> to place the clamps on the drum in the park position beside the leading edge clamps.
- Remove the back panels to reach the clamps. Do not override the safety loop while reaching in to the drum.
- Swap the clamps one at a time so the new ones will be in the right position. Care should be taken due to the high strength of the magnets.
- Use the command << `getclamp park` >> to retrieve the clamps from the drum.

[1] Entry-level (non-Quantum) imaging is intended for use in controlled environments with less stringent quality requirements. Entry-level devices have guaranteed registration and image repeatability (like Quantum devices) but they do not have guaranteed machine-to-machine image accuracy or temperature compensation. They use non-Quantum thermal imaging, including dynamic auto focus.

- Load and unload a plate to verify operation of the clamps.

48V Power Supplies

Replace the 24V power supply to the head with a 48V power supply. Install the new power supplies, cabling, relay, fuse and label. Mate the head adapter cable (10-3896) to cables 10-3516 and 10-3517 in the flex track.

Refer to *24V-48V Laser Power Supply Retrofit (77-0062)*.

Note: The V-Head should not be installed until later in the speed upgrade procedure. If the head is mounted on the carriage, be careful not make electrical connections to it until the upgraded power supply system and safety interlock system have been thoroughly tested.

Hose Tray

The V-head water cooling components are packaged together inside a larger (∅1-3/4") hose assembly that has both internal and external sections. The liquid lines are joined at the lower right base-frame with threaded fittings. There are quick-disconnects on both ends of the liquid lines for connection to the head and the chiller. The liquid lines must be drained before the threaded connections at the base-frame are broken.

A portion of the internal hose assembly travels inside the hose tray when the head moves. To keep this hose assembly from doubling up and becoming snagged, new supports or separators must be installed inside the hose tray. There are two types of hose supports or separators. The one chosen depends upon the style (wire or sheet metal) of hose tray that is installed.

The external and internal hose assemblies join at the hose cuff. The hose cuff is flange mounted to the base-frame.

- Feed one end of the interior hose assembly (50-1558) through the elliptical hole in the wire hose tray and attach the plastic hose cuff (57-5081). See Figure 1.
- Mount the water lines to the mounting plate (57-4884) and secure the plate to the base-frame. See Figure 1.
- Attach the hose mounting bracket (57-5790) and hose clamps (52-4746) to the carriage. Secure the hose. See Figure 2.

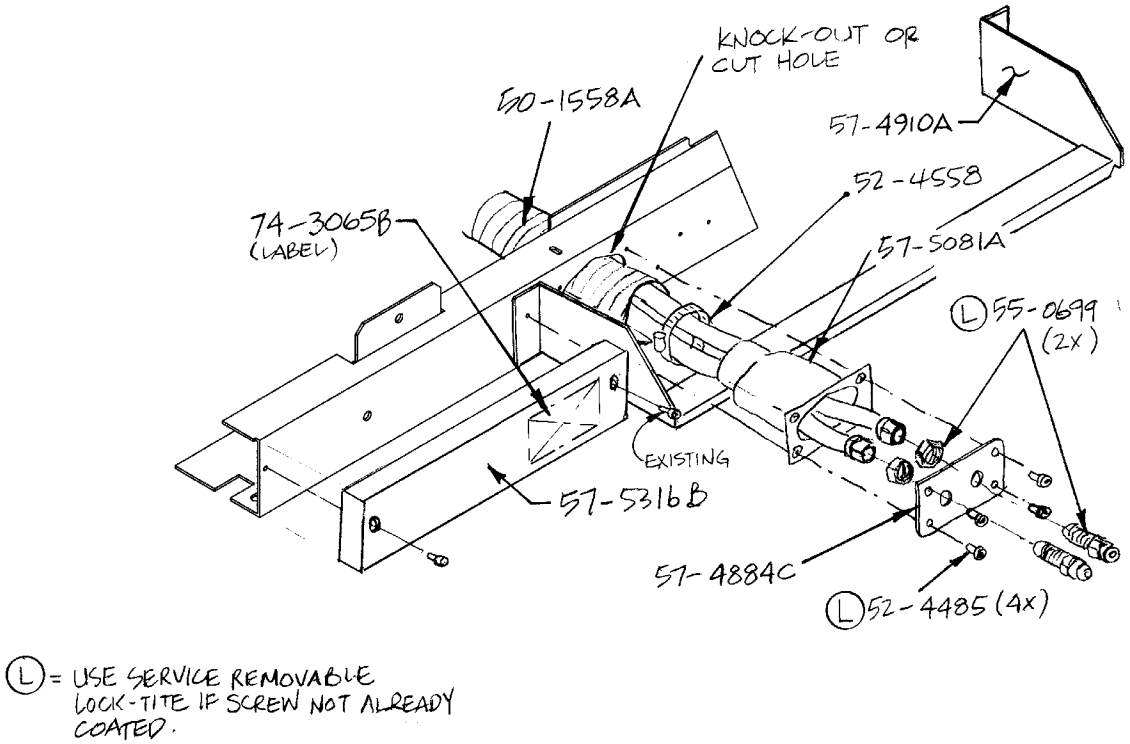


Figure 1: Mounting Water-Cooling Hoses and Strain Bracket

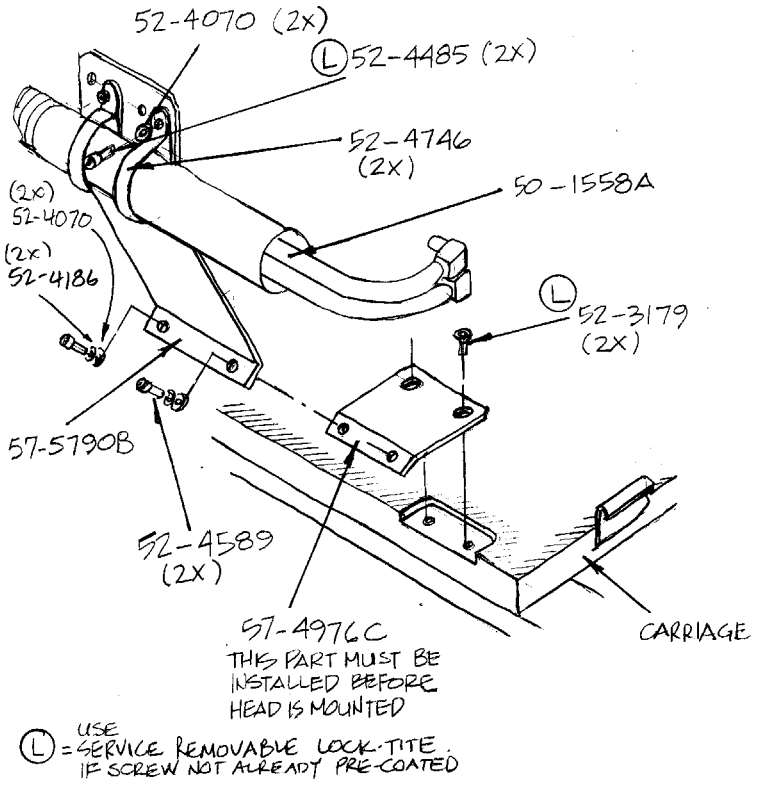


Figure 2: Hose and Bracket Connections at Head

- If the machine has a wire style hose tray, install the hose support/separator pieces (57-5031). If the machine has a sheet metal style hose tray, install hose support piece 57-5680. The hose support pieces must be placed correctly to work properly (see Figure 3).

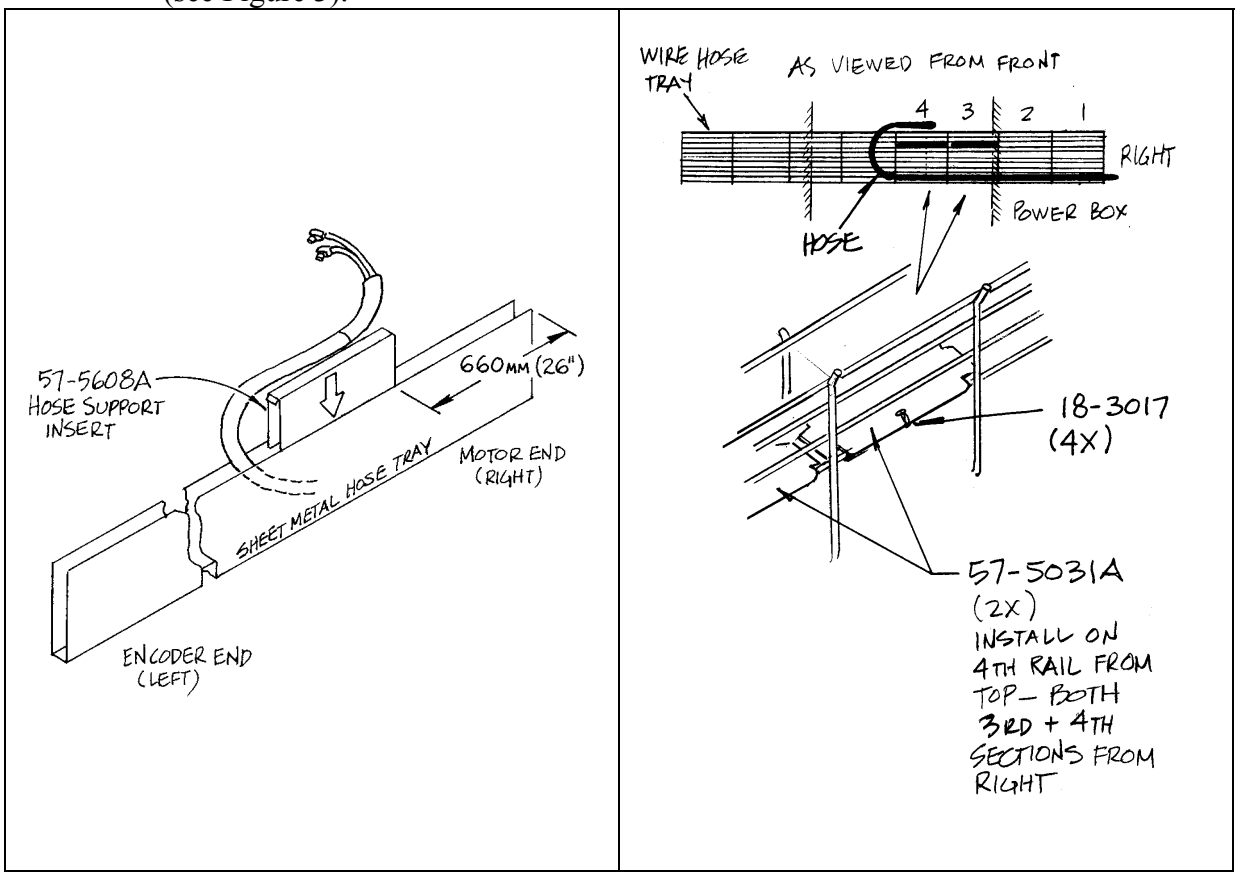


Figure 3: Hose Support/Separator Inserts

- Install a new cable strain/hose support bracket (57-4910), using the lower side trim pieces, including replacement part 57-5316. Use the existing M5 cap screws.

  This new bracket is designed to support hoses for the chiller and debris removal systems. It also protects cable connectors from damage or accidental disconnection if a cable is kicked or stepped on.

- If not already attached, affix a warning label (74-3065) to the new lower side trim piece (57-5316). See Figure 1.

- Install the releasable hose mounting strap (18-3265) and cable tie mounts (18-3132) to the strain bracket. See Figure 4.

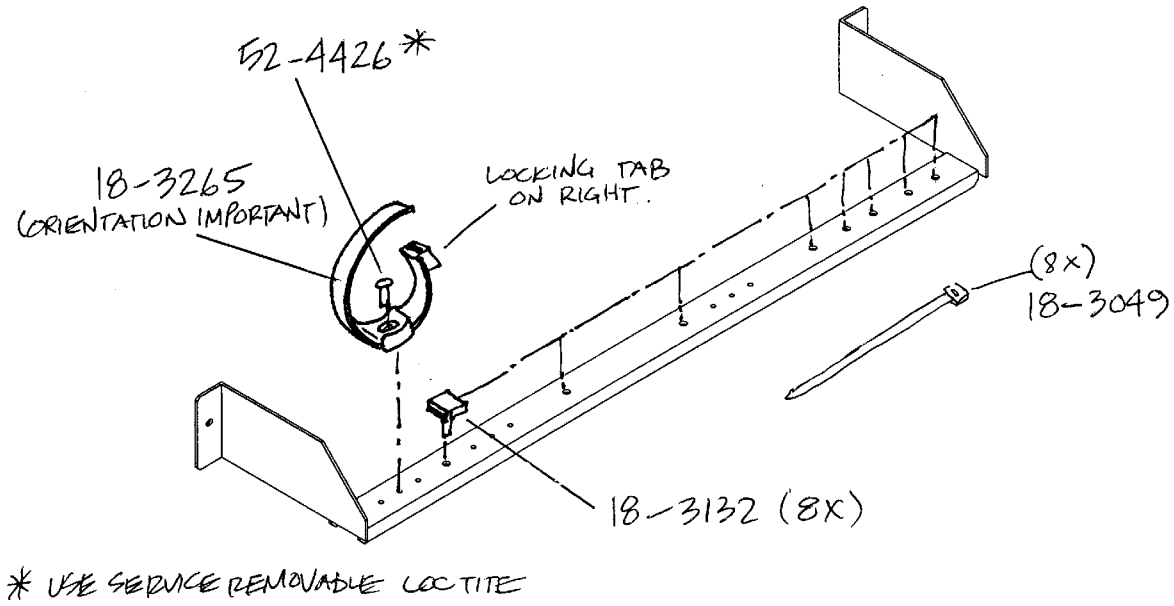


Figure 4: Mounting Cable Restraints to Strain Bracket

Power-Loss Resistive Brake

The power-loss brake is located inside the power box, on the left hand side wall, below the drum servo amp and beside the ventilation fan. Refer to *Power-Loss Brake Field Upgrade Procedure (73-3669)*.

Debris Removal

If required, install debris removal. Refer to the *VLF Platesetter/Trendsetter VLF UDRC-B Installation/Upgrade, 40W, V Head (72-3428)*.

Dehumidifier Unit (DHU)

Refer to *TEH1.x Dehumidifier Unit (DHU) Install Procedure (77-0225A)*.

V-Head (224-channel)

Install a 224-channel ultra-fast thermal head (32-4182A). Refer to *Thermal Head 1.7x Installation Procedure (77-0074)*.

Plate Fly-Off Detector

Does not apply to devices that have serial numbers from B200 on.

Install the improved plate fly-off detection system, if required. Refer to *Laser Plate Fly-off Upgrade, VLF Engine (72-3096)*.

SIO Laser Safety Keyswitch

Does not apply to devices that have serial numbers from B200 on.

Install the SIO laser safety keyswitch system, if required. Refer to S*IO Laser Safety Key-switch Field Retrofit, TS VLF (72-3341)*. Ensure that the device operates properly upon completion of this upgrade.

Note: The keyswitch upgrade kit will include either Version B or Version C of cable 10-3497x (MDA-SIO-PDB). Version C has a flat ground braid attached to the cable shield. The ground braid on this cable is required for RF bonding done during the RF immunity upgrade (72-3093A). The kit (05-0106 for the RF immunity upgrade will also include cable Version C. If the SIO keyswitch upgrade kit does not have Version C, borrow it from the RF immunity upgrade kit for this machine.

FDPE Board

Does not apply to devices that have serial numbers from B200 on.

Install the new FDPE board in the card cage, if required. Refer to Appendix B – Installing the FDPE (Fast Data Path Electronics) Board.

Carriage

Does not apply to devices that have serial numbers from B200 on.

The new V-Head requires a carriage with the triple draw-latch mounting system and machined pocket(s) to mount a water-cooling hose bracket. Depending upon the age of the machine, this may involve carriage replacement or a simpler conversion upgrade.

- Replace the carriage if it does not have machined pockets. Refer to *Carriage Replacement, VLF Engine (72-3095)*.
- Also replace the carriage if it has machined pockets but does not have the draw latch mounting system. Refer to *Thermal Exposure Head, Mounting Conversion Procedure (77-0056)*.
- Attach the new hose mounting bracket (57-4976) to the carriage. See Figure 2.

  Note: It is strongly recommended that you bring one spare flex-tube (57-3407) to the site if a carriage replacement is required. This tube can be easily damaged during re-installation.

RFI Immunity

Does not apply to devices that have serial numbers from B200 on.

The new V-Head requires an RFI immunity upgrade. This upgrade involves the addition of a RF bonding strap and 75Ω coax cable between head and power box, installation of a choke and filter, and shield bonding three replacement cables to the power box.

Refer to *RFI Enhancement Upgrade, TS VLF (72-3093)*.

Note: Version C of cable MDA-SIO-PDB may already be on the machine. This version, featuring a ground braid extension, may have been installed with the SIO keyswitch upgrade.

Cutting the Base-Frame

Does not apply to devices that have serial numbers from B200 on.

The base-frame may need to be cut for the water-cooling hose cuff, as detailed in Appendix D. Inspect the right side of the base-frame.

- If there is an elliptical hole covered with a separate blanking panel, then remove this blanking panel.
- If there is an elliptical hole filled with a fitted knock-out, then remove the knock-out. Refer to Appendix C – Finishing a Base-frame that has Knock-outs.
- If there is no elliptical hole, then cutting is required. Refer to Appendix D – Cutting holes through the side of the base-frame. A special punch toolkit, 50-1606A, is available from Service Logistics if the base-frame requires cutting.

Bulkhead Connector Panel

Does not apply to devices that have serial numbers from B200 on.

The chiller requires a new internal signal cable. The bulkhead connector panel that is mounted in the base-frame may need replacing to accommodate this new cable in earlier TS VLFs. In changing to the new bulkhead connector panel, the external AC power cord and strain relief in some earlier TS VLFs will need to be changed.

- Ensure that power to the device is off, with the table down and the plate door closed.
- Disconnect all electrical and pneumatic services to the machine at the bulkhead connector panel.
- Remove the blanking panel (unscrew it or knock it out with a hammer and drift punch, depending upon the type of panel) that covers the ‘Chiller-Filter’ 15-pin opening in the bulkhead connector panel. Do not remove the knock-out or plastic panel covering the cutout that is marked “Spare”.

  Note: If the bulkhead panel does not have the label “Chiller-Filter”, you must install the new style panel from the upgrade kit. [The “Chiller-Filter” label is the easiest way to distinguish the new panel from the old.]. Refer to: Appendix A – Swapping Bulkhead Connector Panels.

  If the EMI filter, bracket and AC inlet cover are on lower right base-frame, these parts must be unfastened to make room for swapping the bulkhead connector panel, then reattached and a wiring check done.

- Attach the 'Chiller-Filter' cable (10- 3852) to the bulkhead connector panel. Route the cable to the satellite board via the cable duct. Ensure that the swinging table counterweight will not snag cable(s) coming from rear of bulkhead connector panel. Connect J31 and J34 to the satellite board. See Figure 5.

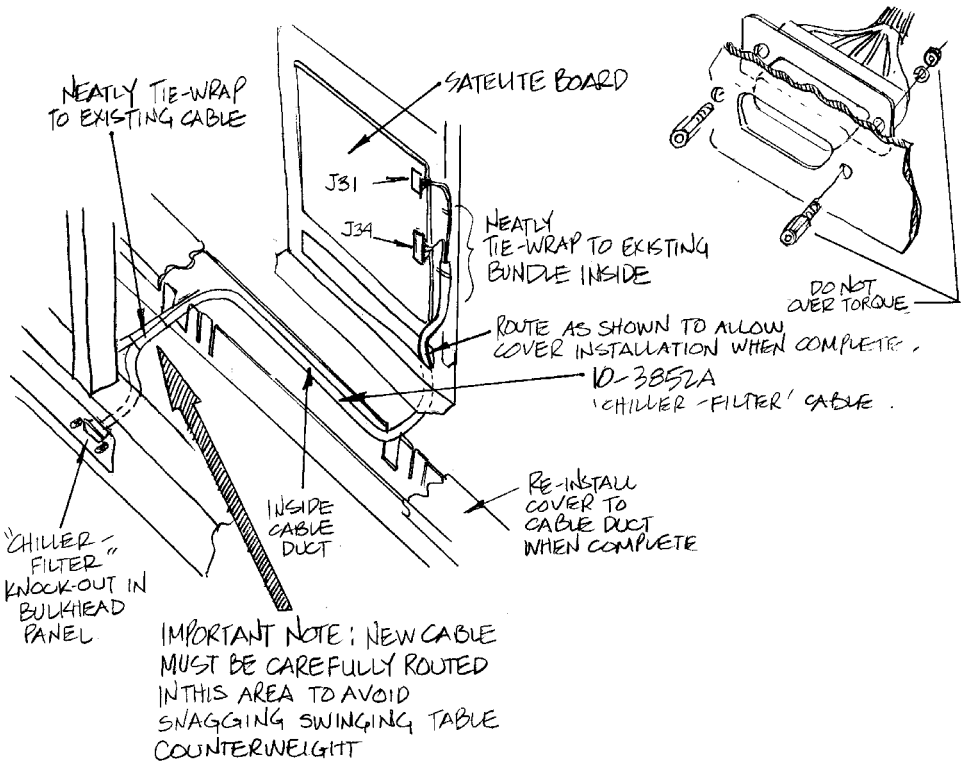


Figure 5: Installing Chiller-Filter Cable

SCSI Cable

Does not apply to devices that have serial numbers from B200 on.

SCSI cables on some early TS VLFs that do not have molded plug ends need to be replaced, since experience has shown that the non-molded (shell) types are too easily damaged. A special nut plate provides improved mounting reliability of the SCSI plug to the bulkhead connector panel for those machines that do not already have it installed.

EMI Filter

Does not apply to devices that have serial numbers from B200 on.

The EMI filter relocation upgrade involves moving the filter from the power box to the lower right base-frame, installation of a mounting bracket and AC inlet cover, and completing some wiring changes. A longer ground strap between the engine casting and base-frame grounding point is installed for improved routing around new inlet cover.

If the EMI filter is not mounted to the base-frame near the bulkhead connector panel, complete the *EMI Filter Relocation, TS VLF (72-3091).*

Cleanup

- Check that all ground connections are securely attached.
- Check for neatness and completeness of wire routing and clearance for swinging table counterweight.
- Vacuum up all metal chips and other foreign material inside the machine.
- Wipe away any oily spots on the painted surfaces of the base-frame.
- If not done already, reconnect the main airline and electrical cables to the TS VLF bulkhead connector panel and base-frame.
- Re-install all exterior panels.

External Chiller

A new external chiller is required to cool the 40W head with a liquid mixture of water and glycol. The chiller must be located near the right side of the TS VLF and will require a separate power source. A closed loop system circulates liquid through the head.

- Connect the assembled external chiller (hose assembly 50-1557 and electrical cable) to the device. See document 73-3238 for chiller set-up and test details.
- Attach cables and hoses to the strain relief bracket.
- Arrange and secure all cables and hoses to strain bracket as suggested in Figure 6 and Figure 7.

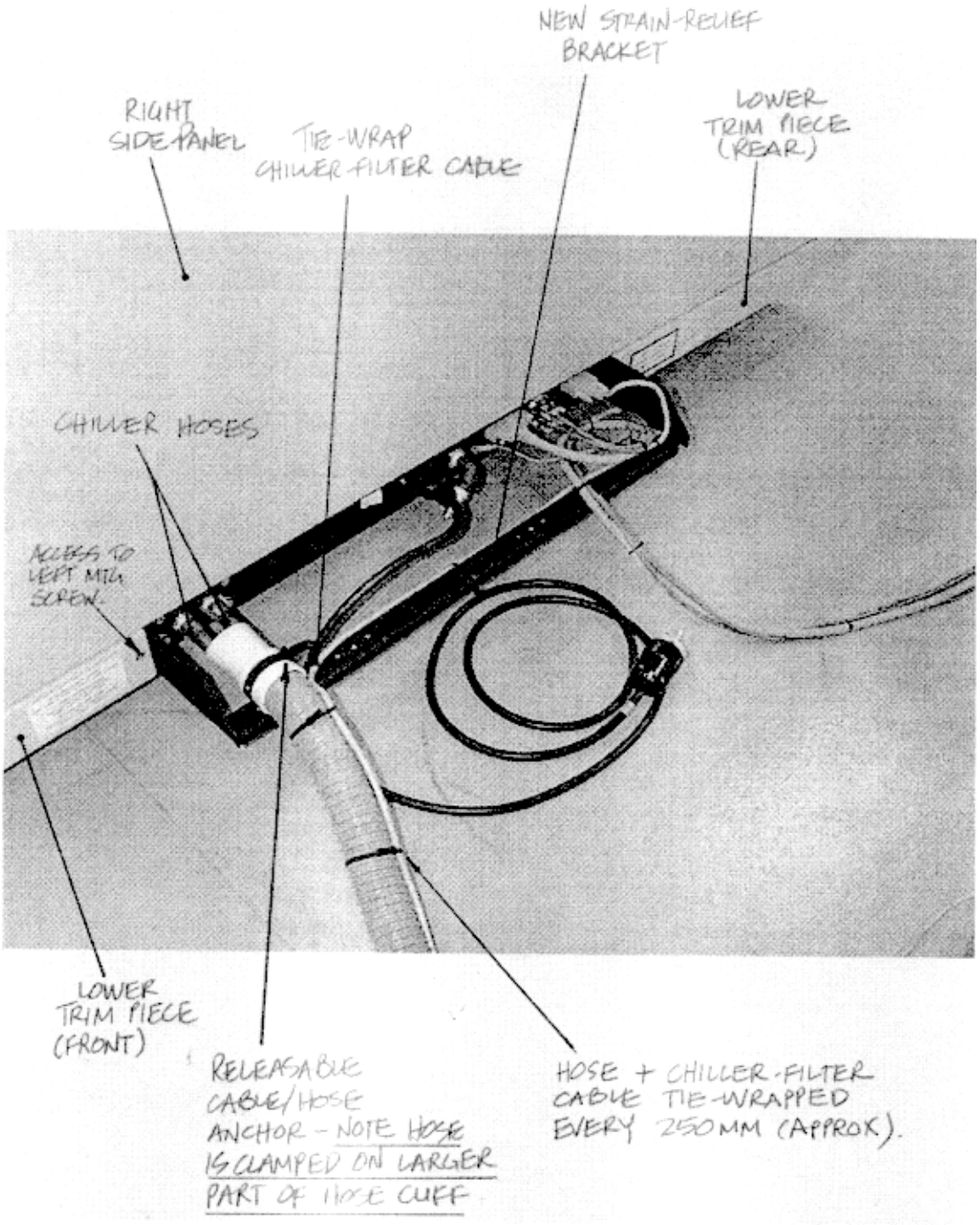


Figure 6: Suggested Cable and Hose Mounting for Neatness and Strain Relief

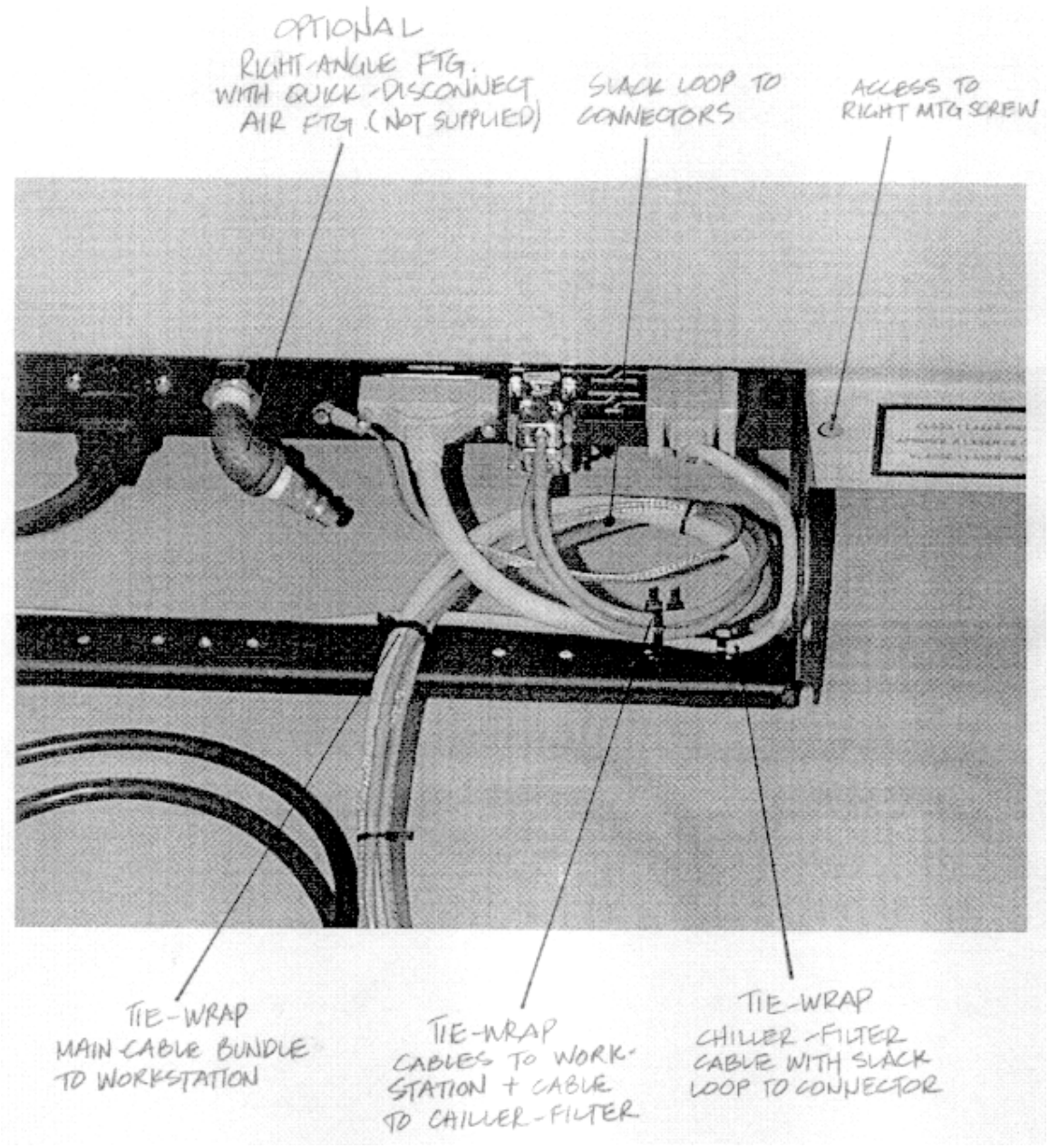


Figure 7: Detail View of Cable Strain Relief System

MPE Firmware - version 2.00 or later

MPE firmware version 2.00 or later is required for operation at V2.8 speed. Thermal head firmware Version 1.83 or higher is required for compatibility with the MPE firmware.

Obtain MPE firmware from the Controlled Release (version 2.0 or higher) on TechPlanet: http://techplanet.creo.com/output/computer_to_plate/vlf_trendsetter/nav/control-set.htm (for Trendsetter VLF) and http://techplanet.creo.com/output/computer_to_plate/vlf_trendsetter_al/nav/control-set.htm (for Trendsetter VLF Autoloader)

- Load the MPE firmware hex file using the commands `<<reset boot>>` and `<<fload bank 0>>`. See the firmware release notes for more details.
- Complete the firmware upgrade by typing the upgrade command: `<<nvs upgrade X.XX>>`. Use the actual version number you are upgrading from. See the firmware release notes for exact details. If anything goes wrong with the NVS parameters you can reload the saved parameters without reloading the old firmware, then try the upgrade command again.
- Set the configuration code for drum speed limit.

  The configuration code determines the maximum drum speed allowed and sets `al maxmsz`. This step requires a password from the Response Center and has a two-minute time limit for activation after a reset.

Quantum Devices

From the first column of Table 1, select the correct configuration code based on the model number and speed factor. For example, a Trendsetter 4557 Quantum at 2.8 times speed has a configuration code of TV128. The maximum drum speed is automatically increased (within safe limits) when fewer head channels are used. See Figure 8 for a key to the configuration codes.

Table 1: Configuration Codes for Drum Speed Limit
(Quantum Devices)

Configuration code	Model (max plate size)	Speed factor	Standard swidth	Automatic NVS Settings	
				Maximum drum speed	al maxmsz*
TV128[2]	4557	2.8	224	292	1169
TV125	4557	2.5	224	257	1169
TV120	4557	2.0	224	206	1169
TV110	4557	1.0	192	121	1169
TV107	4557	0.7	128	81	1169
TV228[2]	5067	2.8	224	292	1296
TV225	5067	2.5	224	257	1296
TV220	5067	2.0	224	206	1296

[2] 2.8 times speed should only be enabled on new devices or for customers who qualify for the V2.8 upgrade option. Some customers are required to pay for the upgrade to V2.8, depending on when they purchased their device. The default configuration will allow imaging at 2.0 times speed.

Configuration code	Model (max plate size)	Speed factor	Standard swidth	Automatic NVS Settings	
				Maximum drum speed	al maxmsz*
TV210	5067	1.0	192	121	1296
TV207	5067	0.7	128	81	1296
TV328[2]	5080	2.8	224	292	1296
TV325	5080	2.5	224	257	1296
TV320	5080	2.0	224	206	1296
TV310	5080	1.0	192	121	1296
TV307	5080	0.7	128	81	1296
TV428[2]	5467	2.8	224	245	1398
TV425	5467	2.5	224	229	1398
TV420	5467	2.0	224	181	1398
TV410	5467	1.0	192	106	1398
TV407	5467	0.7	128	71	1398
TV528[2]	5880	2.8	224	260	1499
TV525	5880	2.5	224	229	1499
TV520	5880	2.0	224	181	1499
TV510	5880	1.0	192	106	1499
TV507	5880	0.7	128	71	1499

*maxmsz values increased by 26 mm to allow for exceptions

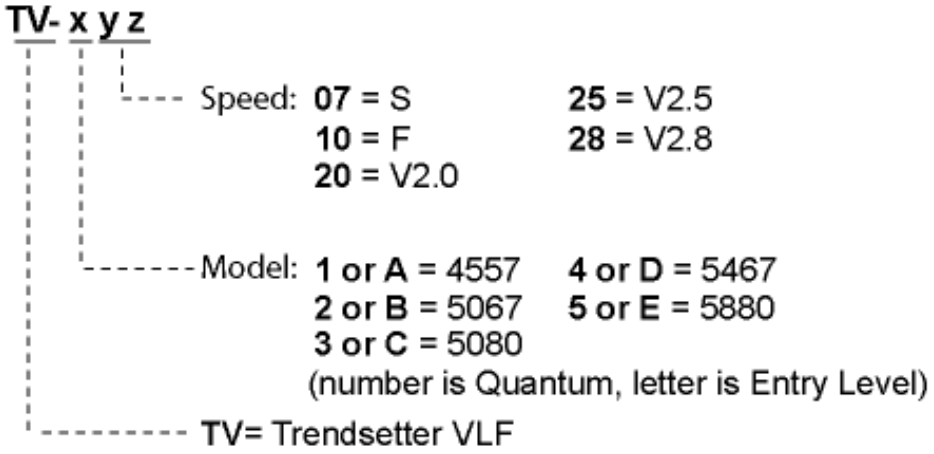


Figure 8: Key to Configuration Codes

- Within 2 minutes after a system reset, enter `<<config "password" "TVxxx">>` (including the quotation marks). "TVxxx" is the configuration code selected from Table 1 and "password" is the password provided by the Response Center.

  If an error message displays, see Table 2 for the possible cause.

Table 2: Configuration Command Error Messages

Error Message	Cause	Corrective Action
`invalid parameter`	Command entered too late	Reset the device and try again
`password incorrect`	Password not recognized	Check the password with the Response Center
`not a valid machine type`	Configuration code not recognized	Check that you used the correct code from Table 1.

- Set the drum encoder NVS parameters to work with the encoder. A reset is required to activate the new settings.

  `set drum tpr 9000` [use `5000` if a Heidenhain digital shaft encoder is installed)

  `set drum ted 0`

  `nvs save drum`

  `reset`

- Increase the speed tolerance between the hall sensors and the servo.

  `set drum maxdiff 1000`

  `nvs save drum`

- Check that `carriage psteps` is set to 68 and change if necessary.

  `set carriage psteps 68`

  `nvs save carriage`

- Set the drum speed as shown in Table 3, then save the drum speed with `<<nvs save hdm>>`.

Table 3: Drum Speeds

Drum Size	Media[3]	V2.5 Drum Speed (rpm)	V2.8 Drum Speed (rpm)	Command example
5080	KPG ThermalGold	257	292	set hdm 1 ds 292
5080	PDI Prisma	192	192	set hdm 2 ds 192
5880	KPG ThermalGold	225	260	set hdm 1 ds 260
5880	PDI Prisma	171	171	set hdm 2 ds 171

- Check that the other media and hdm parameters are set the same as they were before the upgrade.
- Enable debris removal:

```
set sys dbin 1

nvs save sys

set media # abl 1
```
(use valid media number for # and repeat for all media)

```
nvs save media #
```

Note: Debris removal turns on automatically at drum speeds above 178 RPM.

Entry Level (non-Quantum) Devices with P33 Imaging Heads (32-4180A)

- From the first column of Table 4, select the correct configuration code based on the model number and speed factor. For example, a Trendsetter 4557 non-Quantum at 2.8 times speed has a configuration code of TVA28. The maximum drum speed is automatically increased (within safe limits) when fewer head channels are used. See Figure 8 for a key to the configuration codes.

[3] For other media types, consult the *CTP Media Imaging Performance Database* on TechPlanet at http://techplanet.creo.com/consumables/media/content/docs/Media_Database.xls.

Table 4: Configuration Codes for Drum Speed Limit
(Entry Level Devices with P33 Heads)

Configuration code	Model (max plate size)	Speed factor	Standard swidth	Automatic NVS Settings	
				Maximum drum speed (rpm) at swidth	al maxmsz* (mm)
TVA28	4557	2.8	224	292	1169
TVA25	4557	2.5	224	257	1169
TVA20	4557	2.0	224	206	1169
TVA10	4557	1.0	192	121	1169
TVA07	4557	0.7	128	81	1169
TVB28[2]	5067	2.8	224	292	1296
TVB25	5067	2.5	224	257	1296
TVB20	5067	2.0	224	206	1296
TVB10	5067	1.0	192	121	1296
TVB07	5067	0.7	128	81	1296
TVC28[2]	5080	2.8	224	292	1296
TVC25	5080	2.5	224	257	1296
TVC20	5080	2.0	224	206	1296
TVC10	5080	1.0	192	121	1296
TVC07	5080	0.7	128	81	1296
TVD28[2]	5467	2.8	224	260	1398
TVD25	5467	2.5	224	229	1398
TVD20	5467	2.0	224	181	1398
TVD10	5467	1.0	192	106	1398
TVD07	5467	0.7	128	71	1398
TVE28[2]	5880	2.8	224	260	1499
TVE25	5880	2.5	224	229	1499
TVE20	5880	2.0	224	181	1499
TVE10	5880	1.0	192	106	1499
TVE07	5880	0.7	128	71	1499

*maxmsz values increased by 26 mm to allow for exceptions

- Within 2 minutes after a system reset, enter <<config "password" "TVxxx">> (including the quotation marks). "TVxxx" is the configuration code selected from Table 4 and "password" is the password provided by the Response Center.

  If an error message displays, see Table 2 for the possible cause.

- Change the swidth and soffset to the new speed settings:

  S speed: swidth = 128

  F speed: swidth = 192

  V speed: swidth = 224

- Set the drum speed as shown in Table 3, then save the drum speed with <<nvs save hdm>>.

6. HEAD SETUP AT NEW DRUM SPEED

Plot at the new drum speed and complete the normal head installation procedures, including the focus and power series.

The parameter <<hdm # wpower>> will probably be only a half watt to a few watts higher than before the speed increase (for V1.7x to V2.8 upgrades).

If you see a "**servo-stat checksum**" error, you can ignore it.

Note: The higher speed requires a new PLL mode called SCLOCK16 which is enabled automatically by the drum speed selected with <<hdm # ds>>. The old SCLOCK32 mode is still used for the lower speeds. If you are testing the higher drum speeds with <<drum spin>> and <<plot on>> commands, ensure that the V2.8 drum speed is saved in the hdm parameters and the correct media mode is selected with <<mode media #>>. These settings will ensure that the correct PLL mode is enabled.

APPENDIX A - SWAPPING BULKHEAD CONNECTOR PANELS

Objective

To replace older style bulkhead panels with a new style two-piece bulkhead panel (57-8539 + 57-8540) 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.

About 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 Needed

- Allow 1 hour for Version B replacement
- Allow 2-1/4 hours for Version A replacement, including AC power cord and SCSI cable replacement

Tools Needed

- 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

Preparation

- Perform this procedure only when instructed by the main upgrade procedure.
- 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 bulkhead connector panel originally equipped on the machine is Version 'A' or Version 'B'. The Version B panel is the one with the rectangular power receptacle (and without the Chiller-Filter connector location).
- 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 the AC inlet cover and EMI filter bracket and move them aside.
2. Remove the plastic airline from the back of the main air fitting.
3. Disconnect the SCSI connector from the panel.
4. If the EMI filter is mounted in the power box, disconnect the main power box cable (10-3513x) from the back of the power switch. See Figure A1.

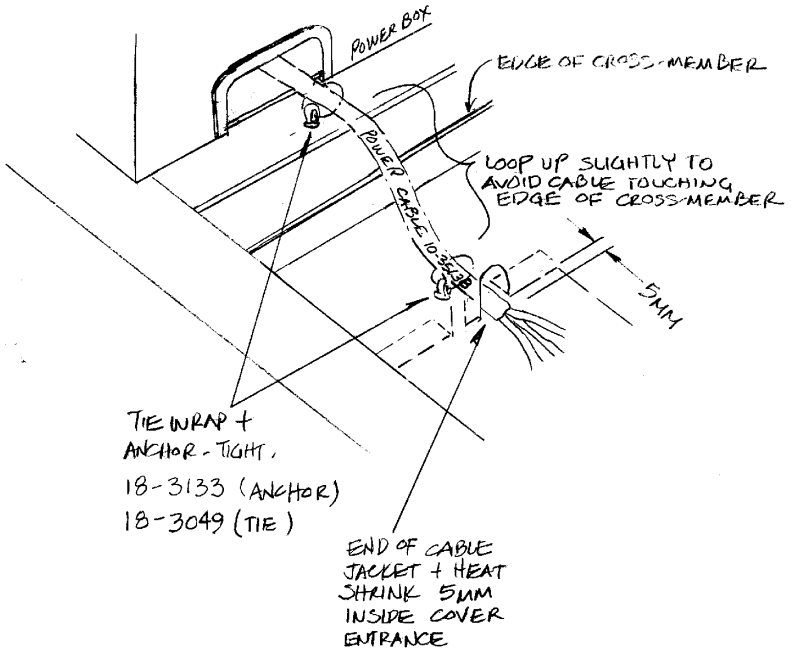


Figure A1: Positioning and Anchoring of Power Box Cable 10-3513C

Note: If the EMI filter relocation upgrade was not completed previously, power box cable 10-3513x (AC EMI-PDB) will be replaced with a newer type that has ring

terminals for connection to the EMI filter. This new cable is supplied with kit 05-0034 and will be routed and connected when relocating the EMI filter later in the V-Head upgrade procedure.

5. Detach both 9-pin ribbon cables from the panel.
6. **[Version A only]** Disconnect the external power cable from the back of power switch. There are two cable types, one for North America/Japan (NA) and one primarily for Europe (EU). For NA, disconnect the black and white wires. For EU, disconnect the brown and blue wires.
7. **[Version A only]** Disconnect the external power cord ground wire (green) from the primary grounding point on the floor of the base-frame.
8. **[Version A only]** Loosen/remove strain relief on the external power cord and extract the cord from the panel.
9. **[Version B only]** Disconnect the receptacle ground wire (green) from the primary grounding point on the floor of the base-frame.
10. Remove the bulkhead connector panel from inside the base-frame.
11. Unscrew and remove the main air fitting from the panel using a 1" socket, ratchet wrench and 1" combination wrench.
12. Remove the power switch from the panel by squeezing its inside mounting ears and prying loose the backing spacer.
13. **[Version B only]** Disconnect the two twisted receptacle wires (black and white) from the back of the power switch.
14. **[Version B only]** Remove the receptacle.
15. Swap the bulkhead connector panel with the new style.
16. Install the main air fitting into the panel.



Caution: Remember to use Teflon tape or Loctite 545 Thread Sealant on air fittings and carefully inspect the inside of the fittings prior to assembly. Any loose bits of Teflon tape circulating through the system will cause future problems with pneumatic components with small orifices

17. Install the power switch, ensuring that the 'Off' or '0' position is on the left-hand side.
18. Install the power receptacle, ensuring that the clamp screw is at the 12 o'clock position.
19. Connect the two twisted wires (black and white) from the receptacle to the back of the power switch. Connect to the switch terminals as follows; Pin 1-black to #11 and Pin N-white to #21. See Figure A2.

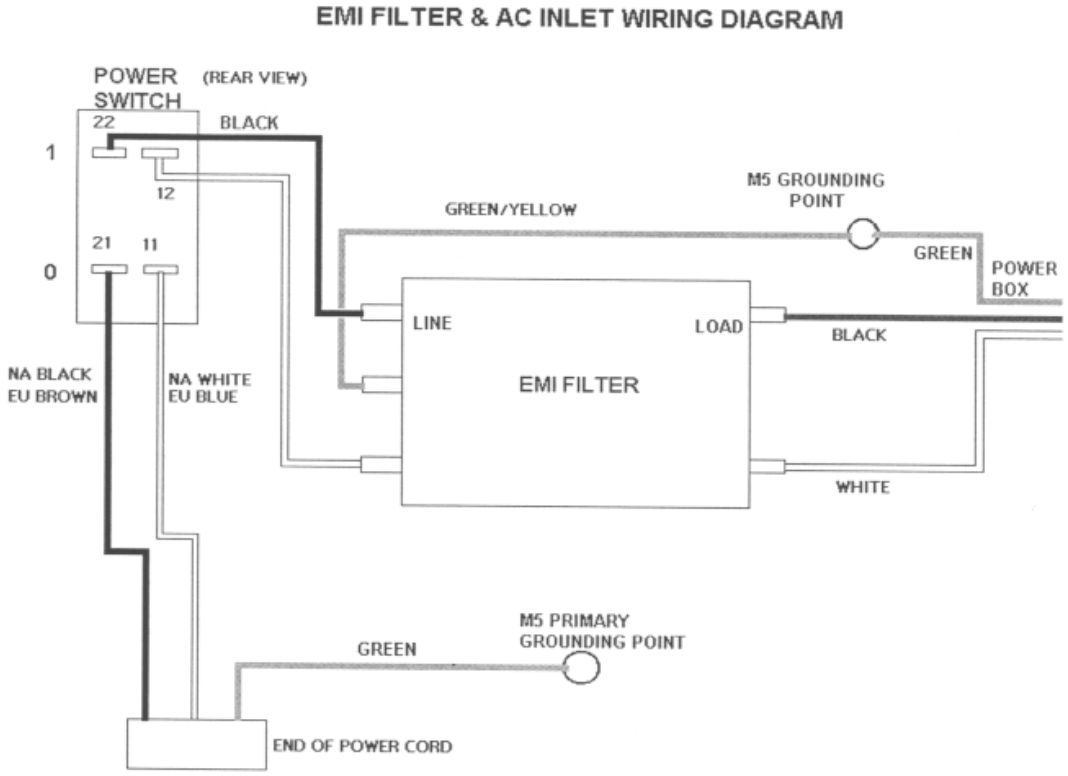


Figure A2: Standardized EMI Filter and AC Inlet Wiring Diagram for TS VLF

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

20. **[Version A only]** Reposition the bulkhead panel in the base-frame. Temporarily hold it in place with two finger-tightened bolts.
21. **[Version A only]** Remove the cover from the two wiring ducts. Locate the Serial cable (10-1430A) and follow it back to the power box. Cut the tie wraps holding it to the main bundle. Carefully work slack towards the bulkhead connector panel.

Caution: Do not pull on the cable, since this may stretch and break the conductors inside the cable. If there is not enough length of slack, then disconnect and remove this cable from the duct and install a replacement.

22. **[Version A only]** Check and adjust the routing of the diagnostic cable (10-1431A) to its cutout in the bulkhead connector panel.
23. **[Version A only]** If the SCSI cable is the older open shell type, remove it and route a replacement. Connect the cable to the card cage backplane.

24. **[Version A only]** Remove the bolts that are temporarily holding the bulkhead connector panel to the base-frame. This makes it easier to install connectors and other parts to the back of the panel.
25. Install both 9-pin connectors on the bulkhead panel.



Caution: The small hex-stud standoffs in the DB connectors are very fragile. Over-tightening will break them off. It is recommended that spares be taken to the site.

26. Attach the 'Chiller-Filter' cable (10-3852A) to the bulkhead connector panel. Proper routing of this cable will be completed later.
27. Attach the SCSI connector to the bulkhead panel.
28. Attach the airline to the fitting on the bulkhead panel.
29. Install mounting bolts and fasten the bulkhead panel to the base-frame.
30. Attach the green ground wire from the AC power cord to the primary grounding point on the base-frame. Ensure that the star washer is installed between the ring terminal and the base-frame to break the painted surface. See Figure A2.
31. **If the EMI filter relocation upgrade (72-3091A) was previously done on this machine:**
    - Attach the ring terminals of the main power box cable (10-3513C) to the filter.

    Note: Ensure that the 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.

    - Reattach the filter bracket and AC inlet cover to the lower right base-frame. Mounting of the AC inlet cover can be simplified to two mounting points nearest the right end-rail of the base-frame. Ensure that star washers are inserted between the brackets and the base-frame to adhere to the painted surfaces.
    - Position and tie wrap the main power-box cable (10-3513C) to the base-frame, as shown in Figure A1.

    If the EMI filter is not located on the lower right base-frame:

    - Leave the power box cable (10-3513x) unattached. This cable will be replaced during the EMI filter relocation procedure later in the V-Head upgrade.
32. Return to the main upgrade procedure.

APPENDIX B - INSTALLING THE FDPE (FAST DATA PATH ELECTRONICS) BOARD

Objective

Follow these steps to field install an FDPE (Fast Data Path Electronics) board in place of the old DPE (Data Path Electronics) board.

Estimated Time Needed

- Allow 15 minutes

Preparation

- Perform this procedure only when instructed by the main upgrade procedure.
- Ensure that the machine base-frame, you and your tools are electrically grounded.

Steps

- ❑ Remove the DPE (Data Path Electronics) board from the main card cage.
- ❑ Visually check that the FDPE (Fast Data Path Electronics) board has memory ICs installed.
- ❑ Install the FDPE board in the slot previously occupied by the DPE board.
- ❑ Remove the PHI (Parallel Head Interface) board.
- ❑ Locate the coaxial cable that previously served the PHI board and connect it into the new FDPE board.
- ❑ Return to the main upgrade procedure.

APPENDIX C – FINISHING A BASE-FRAME THAT HAS KNOCK-OUTS

Objective

To upgrade a TS VLF base-frame that has a fitted elliptical filler knock-out for a 40w (1.7x) water cooling system.

Estimated Time Needed

- Allow 15 minutes

Tools Needed

- Ball peen hammer
- Drift punch (~∅1/4")
- Finishing file, round or partial round.
- Black touch-up paint

Preparation

- Perform this procedure only when instructed by the main upgrade procedure.
- Ensure that the machine is disconnected from all electrical and air energy sources.
- Ensure that the machine base-frame, you and your power tools are electrically grounded.
- Ensure that the main electrical cable is moved out of the way so that it will not be accidentally damaged when removing the knock-out from the base-frame.

Steps

- Twist and break the tack welds on the fitted elliptical knock-out, using a drift punch and hammer hits.
- **Ablative Media:** If the ablative media option is to be installed at the same time as the 40w (1.7x) head upgrade, remove the circular knock-out as well. Otherwise, leave it covered.
- If there are bits of metal (welds) inside the hole(s) that you knocked out, file them smooth to provide the assembly clearances that will be needed later.
- Use touch-up paint to cover the bare steel exposed on the inside edges of the hole(s).
- Return to the main upgrade procedure.

APPENDIX D - CUTTING HOLES IN SIDE OF BASE-FRAME

Objective

To upgrade an existing TS VLF frame that does not already have holes (or knockouts) for the water-cooling and debris removal systems. If this upgrade is for water-cooling only, a hole will be cut for the debris removal hose but then covered, using a blanking panel kit (50-1524A).

Estimated Time Needed

- Allow 4 hours

Parts Needed

Punch kit 50-1606A (shown in Figure D10. Order in advance from Service Logistics)

Contains:

- 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" airline with quick disconnect.
- Union, 3/8" to 5/8"

Tools Needed (not supplied in punch kit)

- Paper and masking tape
- Vacuum cleaner
- Thinners (for cleaning up oil and preparing for paint)
- Touch up paint: semi-gloss black (primerless)
- Paper cups
- Cotton swabs
- Hearing protection (ear muffs or foam plugs)
- Safety glasses
- Paper towels

Preparation

- Perform this procedure only when instructed by the main upgrade procedure.
- Ensure that the machine base-frame, you and your power tools are electrically grounded.
- Use newspaper and masking tape to prevent chips from getting inside the machine.
- Carefully follow the sequence of drilling and punching steps. If the punching is completed in the wrong order, 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 the holes, inside and out. A clean hole protects cable insulation and hands.
- 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 procedure you will be asked to mask over small holes once they are drilled. This prevents accidents caused by mistakenly drilling to a larger size in later steps.
- Read the instructions at the end of this Appendix on how to properly use air-tool equipment and chassis punches.
- Wear safety glasses. Wear hearing protection when using air-tools.

Steps

- ❑ Attach the frame-drilling template, using both captive screws. Position the large chamfered corner of the template in the upper right corner. See Figure D1.
- ❑ Drill ∅1/8” pilot holes (12x) where the drill bushings are located in the template. Use oil. Keep the drill straight and do not use much force – the drill can be easily snapped with a side-load. See Figure D1.
- ❑ Remove the template.
- ❑ Identify and drill the ∅4.2mm hole (1x). De-burr the outside edge only, since there is no access to the other side and no possibility of a burr snagging a cable or person. See Figure D2.

- Tap the ∅4.2mm hole for a M5 screw. See Figure D2.
- Place a small piece of masking tape over the newly tapped M5 hole and the pre-existing M5 tapped hole (located right mounting screw when mounting template).
- Identify and drill the ∅5.0mm holes (4x). De-burr both sides of the holes. See Figure D2.
- Tap the ∅5.0mm holes (4x) for M6 screws. See Figure D2.
- Place a small piece of masking tape over each newly tapped M6 hole.
- Identify and drill the ∅¼" holes (2x). De-burr both sides of hole. See Figure D2.
- Place a small piece of masking tape over each ∅¼" hole.
- Identify the remaining ∅1/8" holes (5x) and drill them with a ∅3/8" bit. See Figure D2.
- Use a ∅1" punch to open up the top and bottom holes of the diamond pattern (2x). Go easy and use plenty of oil inside the punch. You will have to remove a slug from inside the tool after completing each hole. Use a 7/16" socket. See Figure D3.
- Use a ∅3/4" punch to open up the left and right holes of the diamond pattern (2x) and the hole on the far right (1x). Go easy and use plenty of oil inside the punch. You will have to remove a slug from inside the tool after completing each hole. Use a 7/16" socket. See Figure D4.
- Use a ∅1-1/2" punch to open up the left and right holes of the diamond pattern (2x). Ensure that both lead-cutting edges of the punch are orientated at the 12 o'clock 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. See Figure D5.
- Use ∅2" punch to open up the remaining ∅¾" hole. See Figure D5.
- Use a straight edge to scribe tangent lines between the arcs of the diamond-patterned holes. See Figure D6.
- Use the air tool and rotary file to carefully trim unwanted metal back to the line that you have drawn. Beware of the air blast from the tool. Protect your eyes and avoid blowing chips into machine. Finish the cut edges with a hand file. The shape should resemble that shown in Figure D7.
- Use de-burring tool to remove sharp edges on both sides of the elliptical shaped hole.
- Vacuum all chips and other debris from inside the machine. Wipe the oil from the metal surfaces using thinners, including the exposed metal where the holes have been cut.
- Paint the exposed edges of holes, using touch-up paint and cotton swabs.
- Return to the main upgrade procedure.

Operating Air Tools

User instructions for both types of air tools are included in the toolkit. The air tools are to be operated with air that is filtered and regulated by the Trendsetter VLF. The kit is supplied with a quick disconnect hose, whose union is plumbed into the system as follows:

1. Shut-off the air supply to the Trendsetter VLF by disconnecting the main airline from the bulkhead panel (or use the airline's shut-off valve, if there is one).
2. Locate the T-fitting on the end of the manifold. Disconnect the line that comes from the filter-regulator system and attach the union and hose to it. See Figure D8.
3. Remember to shut off the air supply to the Trendsetter VLF before disconnecting the union and air-tool line when finished.
4. Squirt two drops of air-tool oil into the air inlet of the tool before using it at the start of each day.
5. Always wear safety glasses and hearing protection when using air tools.

Operating Chassis Punches

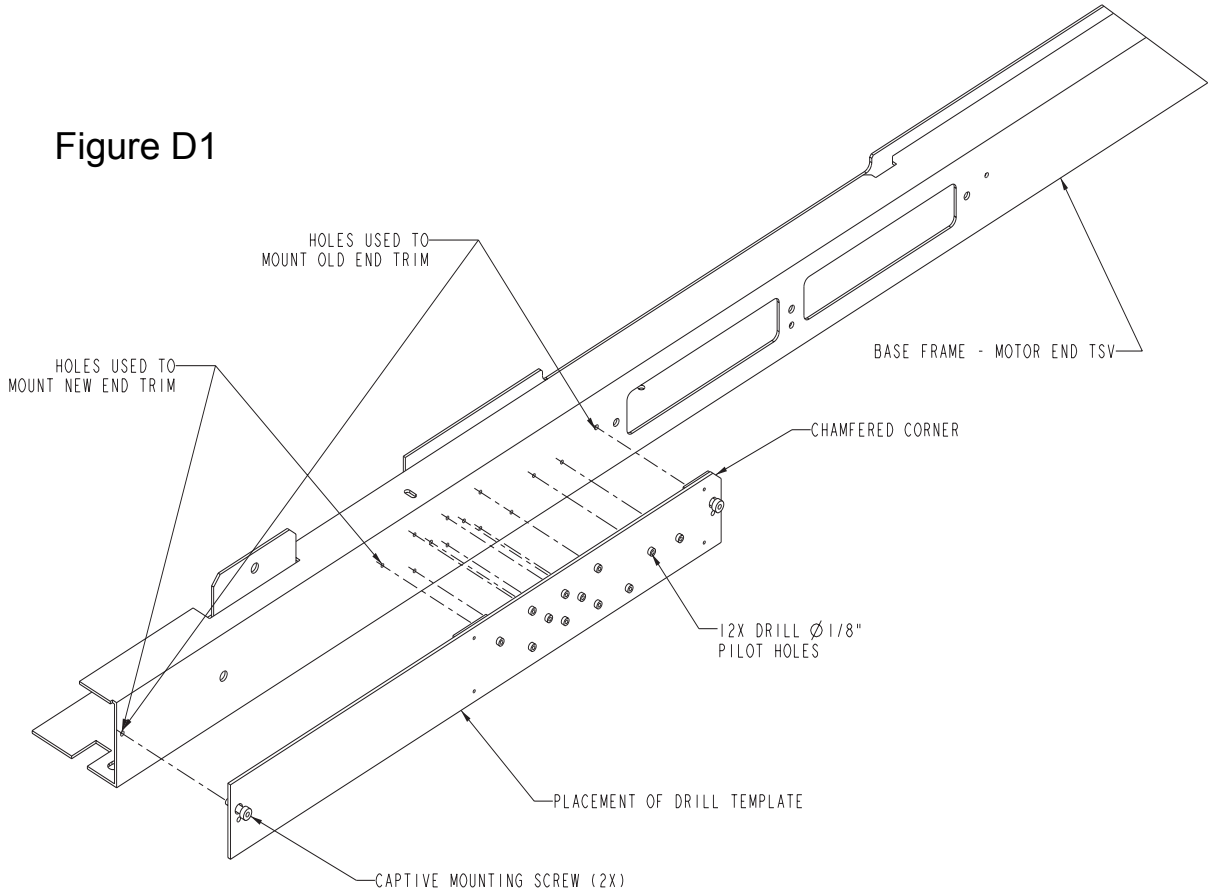
User instructions for the chassis punches are included in the toolkit. Although the punches split the slug, some slugs become stuck inside the tool. To clear the tool if this happens:

1. Once a hole has been made in the base-frame, remove the tool and unscrew the draw-bolt a few turns. See Figure D9-2.
2. Turn the tool over and, while gripping the die, bang the head of the draw-bolt on the floor. This action will tend to move slug closer to the open end of the die. See Figure D9-3.
3. Unscrew the draw-bolt a few more turns and repeat Step 2. Eventually, the punch will become completely unscrewed from the draw-bolt and the slugs pushed free of the die.

Other Tool Notes

1. The scriber point is stored backwards in the tool holder when not in use. The threaded collet holds the point.
2. The V-hook bits are stored in the body of the handle when not in use.

Figure D1


HOLES USED TO
MOUNT OLD END TRIM
HOLES USED TO
MOUNT NEW END TRIM
BASE FRAME - MOTOR END TSV
CHAMFERED CORNER
12X DRILL Ø 1/8"
PILOT HOLES
PLACEMENT OF DRILL TEMPLATE
CAPTIVE MOUNTING SCREW (2X)

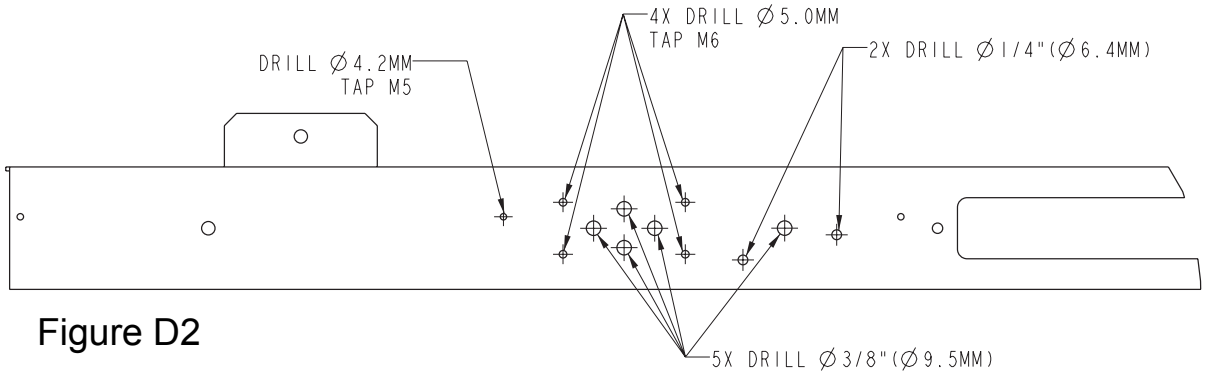


Figure D2

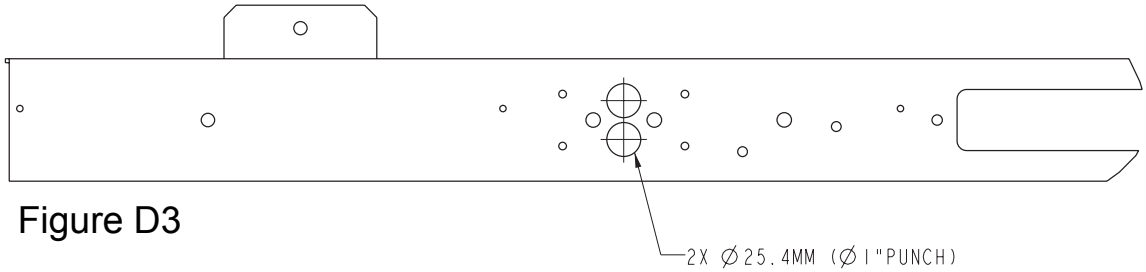


Figure D3

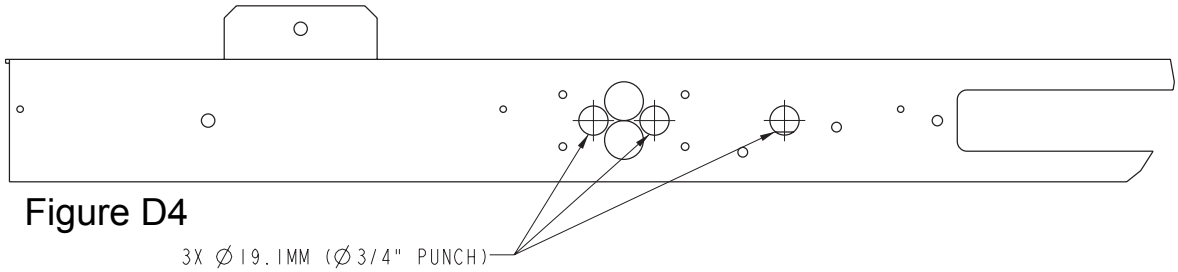


Figure D4

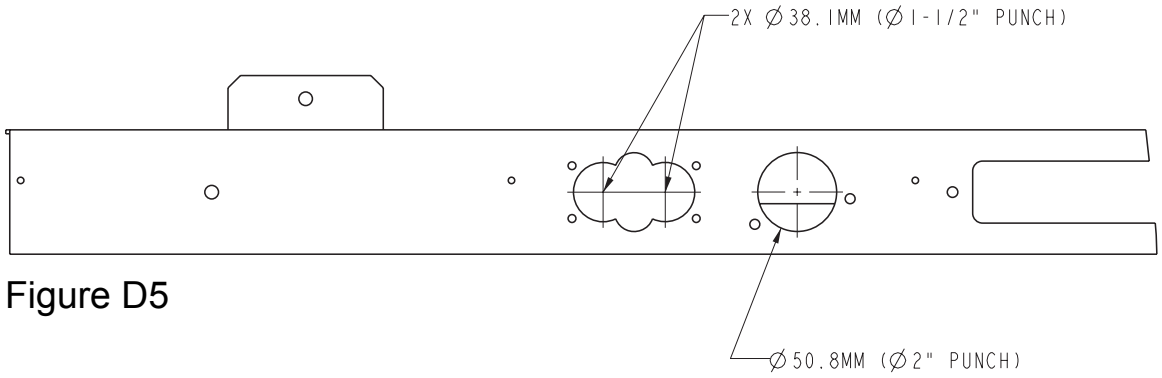


Figure D5

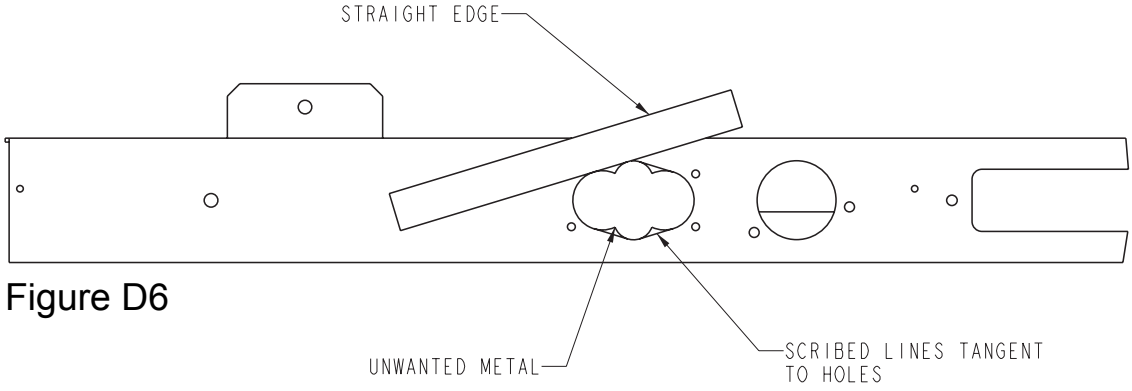


Figure D6

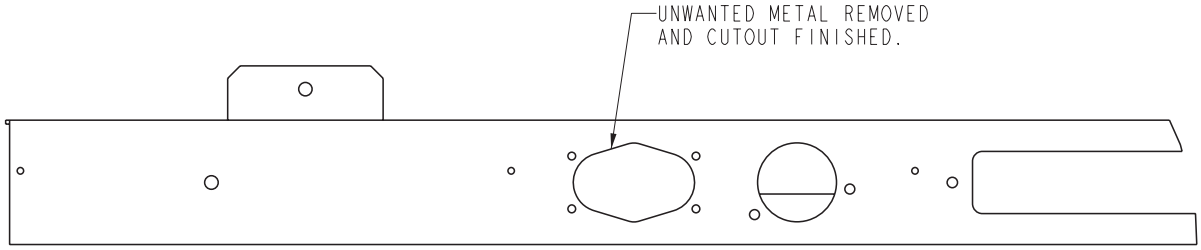


Figure D7

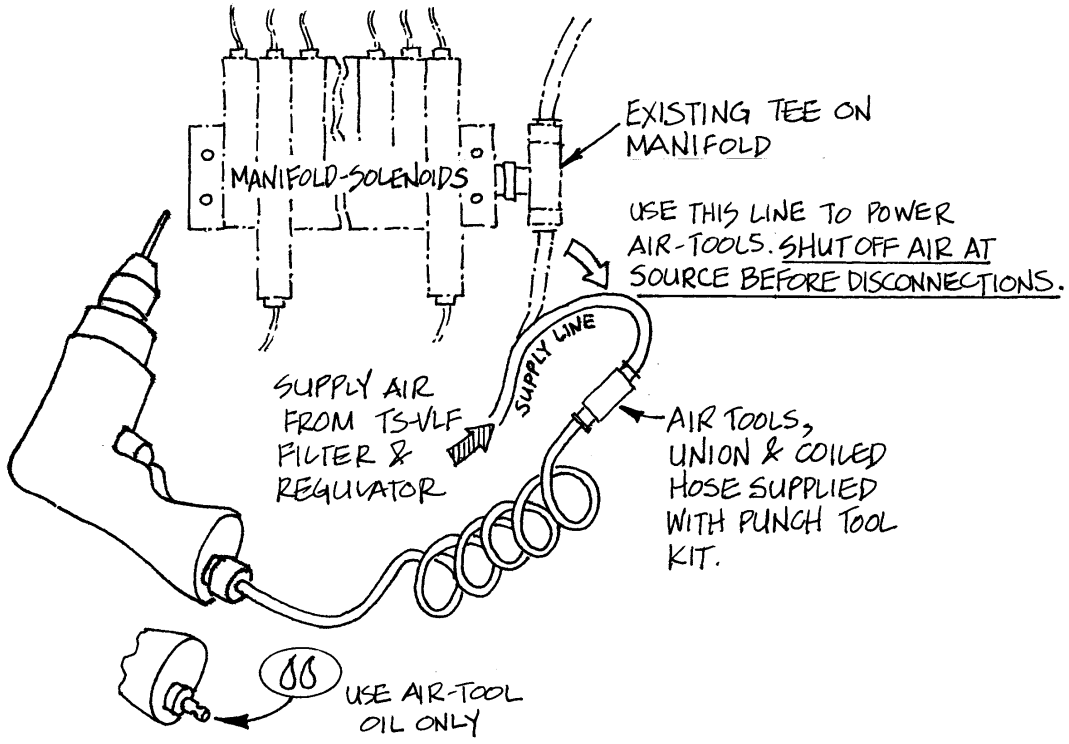


Figure D8: Plumbing Air Tools into System Air Supply

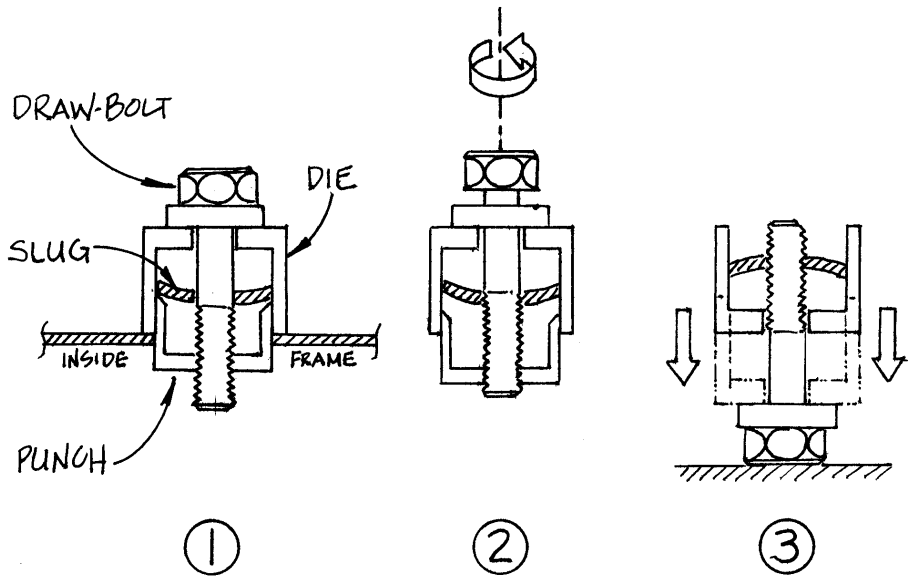


Figure D9: Removing Stuck Slugs from Chassis Punch

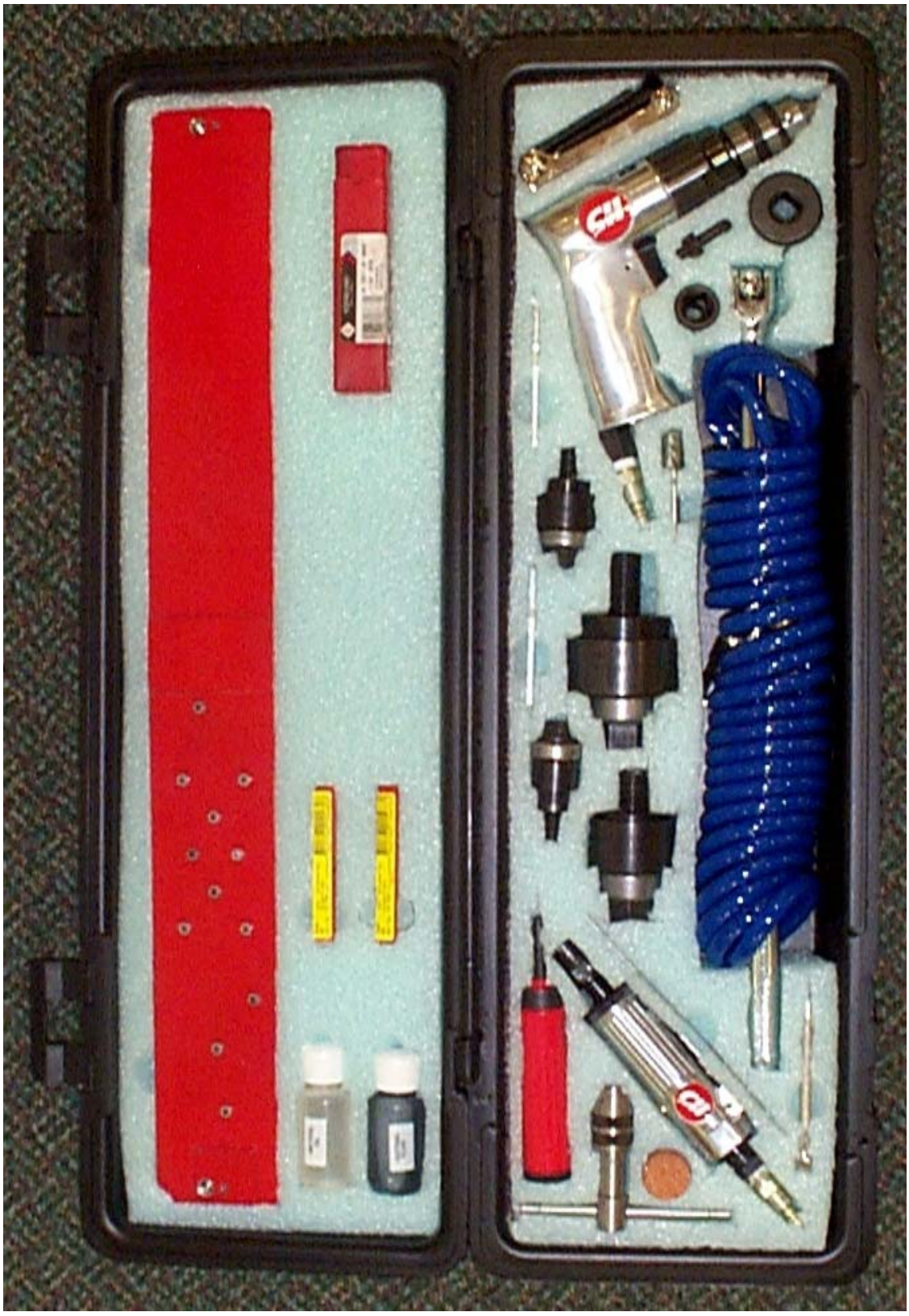


Figure D10: Special Punch Kit 50-1606A
(available through Service Logistics)