



43s Ink Jet Printer

Service Manual

P/N 361451-21

Revision: AB, April 2003

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43s Compliance Information

For Customers in the U.S.A.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.



Warning

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide responsible protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits.

The user may find the following booklet prepared by the Federal Communications Commission helpful: [How to Identify and Resolve Radio-TV Interference Problems](#). This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-00-00345-4.

This equipment has been tested and certified for compliance with U.S. regulations regarding safety and electrical emissions by TUV Rheinland of North America, Inc.

For Customers in Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Ministry of Communications.

This equipment has been tested and certified for compliance with Canadian regulations regarding safety and electrical emissions by TUV Rheinland of North America, Inc.

Pour la clientèle du Canada

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

Cet équipement est certifié CSA.

For Customers in the European Union

This equipment displays the CE mark to indicate conformance to the following legislation.

Applicable EMC standards:

- BS EN55022 Class B 1998 Emissions standards for information technology equipment
- BS EN61000-3-2 2000 Harmonic Current Emissions
- BS EN61000-3-3 1995 Voltage Fluctuation and flicker
- BS EN61000-6-2 1999 Immunity standard for Industrial Environment
- BS EN61000-4-2 1995 ESD Requirements
- BS EN61000-4-3 1997 Radiated Susceptibility
- BS EN61000-4-4 1995 Electrical Fast Transient Burst Requirement
- BS EN61000-4-5 1995 Surges Requirements
- BS EN61000-4-6 1996 Conducted Susceptibility
- BS EN61000-4-11 1994 Voltage Dips and Interruptions

Customer Support and Training

Contact Information

If you have any questions or need assistance, please contact Videojet Technologies Inc. at 1-800-843-3610 (for all customers within the United States). Outside the U.S., customers should contact their Videojet Technologies Inc. distributor or subsidiary for assistance.

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Service Program

About *Tot al* Source Commitment

Tot al Source® TOTAL SERVICE PLUS RELIABILITY, is the Videojet Technologies Inc. commitment to provide you - our customer - the complete service you deserve.

The *Tot al* Source Commitment

The Videojet *Tot al* Source® Service Program is an integral part of our business in providing marks, codes, and images where, when, and how often customers specify for packages, products, or printed materials. Our commitment includes:

- Applications support.
- Installation services.
- Maintenance training.
- Customer response centre.
- Technical support.
- Field service.
- Extended hours phone assistance.
- Parts and supplies.
- Repair service.

Customer Training

If you wish to perform your own service and maintenance on the printer, Videojet Technologies Inc. highly recommends you complete a Customer Training Course on the printer.

Note: *The manuals are intended to be supplements to (and not replacements for) **Videojet Technologies Inc.** Customer Training.*

For more information on Videojet Technologies Inc. Customer Training Courses, call 1-800-843-3610 (within the United States only). Outside the U.S., customer should contact a Videojet subsidiary office or their local Videojet distributor for further information.

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About this Guide

Welcome to the Service Manual for the Videojet 43s Inkjet printer.

This manual is intended as a reference guide for trained service personnel and contains the following information:

- installation and calibration instructions;
- disassembly and reassembly instructions for field-replaceable components;
- a technical description of the principles of operation of the printer;
- a troubleshooting guide;
- a quick reference guide to the control software which describes the function of each menu item.

Writing Conventions

Positional References

Unless stated to the contrary, positions and directions such as left, right, front, rear, clockwise and anti-clockwise are given with respect to the printer when viewed from the front.

Units of Measurement

This handbook uses metric units of measurement. The equivalent imperial measures are included in parenthesis.

Associated Publications

The following publications are related to this document:

- Videojet 43s Ink Jet Printer Instructions for Use, Part Number: 361450.

Language Codes

When ordering manuals, be sure to add the 2-digit language code to the end of the part number. For example, the Spanish version of this manual is part number 361451-04.

Code	Language	Availability (see note)	
01	English (US)	*	+
02	French	*	
03	German	*	
04	Spanish	*	
05	Portuguese	*	
06	Japanese	*	
07	Russian		
08	Italian	*	
09	Dutch		
10	Chinese (Simplified)	*	
11	Arabic		
12	Korean		
13	Thai		
14	Icelandic		
15	Norwegian		
16	Finnish		
17	Swedish		
18	Danish		
19	Greek		
20	Hebrew		
21	English (UK)	*	+
23	Polish		

Note: Initial availability of the Instructions for Use is indicated by an asterisk (*). Availability of the Service Manual is indicated by a plus sign (+). For more information, consult your Videojet distributor or subsidiary.

Installation and Inspection

The equipment described in this handbook must be installed and subsequently inspected at the recommended intervals by qualified service and maintenance personnel.

Mains Power Supply

Ensure that the mains electrical supply is within the range indicated by the label adjacent to the mains inlet on the printer. If the voltage ratings differ, do not use the printer until you have consulted your local supplier.

Use only the mains power cable supplied with the printer. This cable must terminate in an approved, three-pole, mains plug which has a protective ground conductor.

Keep electrical power cables, sockets and plugs clean and dry at all times.

Grounding

The equipment must be connected only to an a.c. power supply, which has a protective ground conductor in accordance with IEC requirements or applicable local regulations. Any interruption of the protective ground conductor or disconnection of the protective ground terminal may render the apparatus dangerous.

Hazard Information

This section contains important hazard notices. You must read these notices before using the printer.

The hazard information is prioritised into typographically distinct warning and caution notices as follows:



Warning

Warning notices denote a potential hazard to the health and safety of users. These notices clearly state the nature of the respective hazard and the means by which it can be avoided.

Warning notices, together with the warning symbol shown on the left, appear in full in the preliminary pages and at their points of application in the manual. They are presented in the typographical style of this notice.



Caution

Cautionary notices denote a potential hazard to the physical integrity of equipment/software but not a danger to personnel. These notices clearly state the nature of the hazard and the means by which it can be avoided.

Cautionary notices appear in full in the preliminary pages and at their points of application in the manual. They are presented in the typographical style of this notice.

Warning Notices



Warning

LETHAL VOLTAGES. Lethal voltages are present within this equipment when it is connected to the mains electrical supply. Only trained and authorized personnel may carry out maintenance work. Observe all statutory electrical safety codes and practices. Unless it is necessary to run the printer, disconnect the printer from the mains electrical supply before removing the covers or attempting any service or repair activity, otherwise death or personal injury may result.



Warning

HANDLING INK, SOLVENT AND TOP-UP. The ink, solvent and top-up are irritating to the eyes and respiratory system. To prevent personal injury when handling these substances:

Always wear protective clothing and rubber gloves.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

Apply barrier hand cream before handling ink.

If ink or top-up contaminates the skin, wash immediately with soapy water. **DO NOT** use washdown or solvent to clean ink stains from the skin.



Warning

RISK OF PERSONAL INJURY. To avoid spillage of ink or top-up, do not remove the foil seal from the bottle prior to replenishing the ink or top-up reservoir.



Warning

FIRE AND HEALTH HAZARD. The ink, solvent and top-up are volatile and flammable. They must be stored and handled in accordance with local regulations.

Do not smoke or use a naked flame in the vicinity of these substances.

Immediately after use remove any tissue or cloths that become saturated with these substances. Dispose of all such items in accordance with local regulations.

In the event that any ink, solvent or top-up container is not completely empty after use, it should be resealed. Only full bottles are recommended for use when replenishing ink or top ups; partially filled bottles should be disposed of in accordance with local regulations.



Warning

WASTE INK. When setting up the nozzle, direct the ink stream into a beaker or suitable container. To avoid contamination of the ink supply in the printer, do not re-use any ink collected in this way. Dispose of all waste ink in accordance with local regulations.



Warning

VAPOUR HAZARD. Prolonged breathing of top-up or cleaning fluid vapour may cause drowsiness and/or effects similar to alcoholic intoxication. Use only in open, well-ventilated areas.



Warning

FUSES FIRE HAZARD. To ensure continued protection against the risk of fire, replace fuses only with the specified type and rating.

**Warning**

TOXIC HAZARD. The cleaning agent is poisonous if taken internally. Do not drink. Seek medical attention immediately if ingested.

**Warning**

HANDLING CLEANING AGENT. The cleaning agent is irritating to the eyes and respiratory system. To prevent personal injury when handling this substance:

Always wear protective rubber gloves and clothing.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

Apply barrier hand cream before handling ink.

If cleaning agent contaminates the skin, rinse off with running water for at least 15 minutes.

**Warning**

FIRE AND HEALTH HAZARD. The cleaning agent is volatile and flammable. It must be stored and handled in accordance with local regulations.

Do not smoke or use a naked flame in the vicinity of the cleaning agent.

Immediately after use remove any tissue or cloths that become saturated with cleaning agent. Dispose of all such items in accordance with local regulations.

**Warning**

PERSONAL INJURY. Airborne particles and substances are a health hazard. Do not use high pressure compressed air for cleaning purposes.



Warning

EARTH CONTINUITY. To ensure safe earthing the resistance between the mains lead earth wire and the test points must be less than 1Ω.



Warning

HANDLING INK, SOLVENT AND TOP-UP. A high ac voltage is present at the inverter and backlight.

Extreme caution is required when diagnosing failure in these areas.

Caution Notices



Caution

EQUIPMENT DAMAGE. Only Videojet-trained personnel may carry out installation and maintenance work. Any such work undertaken by unauthorized personnel may damage the printer and will invalidate the warranty.



Caution

DEGRADED PERFORMANCE. Machine functions that only Videojet-trained personnel can access are set at Password Level 3 (MASTER password), these functions must not be given as customer options.



Caution

ELECTROSTATIC SENSITIVE DEVICES. The printed circuit boards contain static sensitive devices. A suitably grounded, antistatic wrist strap must be worn when working on or handling printed circuit boards.

**Caution**

FALSE READINGS. To avoid the risk of false readings, the pump zero offset should only be calibrated when there is no ink in the system and the pump is off.

**Caution**

PRINT QUALITY. To ensure high print quality, ink viscosity must be checked and must be correct prior to attempting modulation calibration.

**Caution**

INCORRECT MEASUREMENT. If the temperature compensation factor is not used, the end result could be incorrect by as much as 40%.

**Caution**

EQUIPMENT DAMAGE. Never attempt to bend the gutter. Its position is fixed.

**Caution**

DAMAGE TO CHARGE ELECTRODE. Take care not to deform the charge electrode slot when rotating the charge electrode.

**Caution**

CHARGE CABLE. Ensure that the charge cable is not pulled out of its position in the rear face of the deflector block assembly.

**Caution**

EQUIPMENT DAMAGE. Never attempt to bend the gutter. It is in a fixed position.



Caution

EQUIPMENT DAMAGE. The I/O Board LEDS connector must not be used to drive anything other than LEDs as specified otherwise damage may occur.



Caution

EXCESSIVE USE OF TOP-UP OR SOLVENT. As solvent is used during the stop cycle, repeatedly stopping and starting the printer can lead to excessive use of top-up or solvent and may lead to a Mixer Tank High error.



Caution

QUICK STOP. After a Quick Stop machine should not be left in this state for any length of time as drying ink may make restarting difficult.



Caution

EQUIPMENT DAMAGE. To avoid the risk of overfilling or spillage, never replenish ink or top-up unless the relevant low icon is shown.

Ensure that ink bottle is completely empty before removing.



Caution

EQUIPMENT DAMAGE. Do not fit or remove any connector on the printer whilst power is on, otherwise the printer may be damaged.



Caution

CLEANING MATERIALS. To avoid damage to the printer components use only soft brushes and lint free cloths for cleaning. Do not use high pressure air, cotton waste or abrasive materials.

**Caution**

EQUIPMENT DAMAGE. Ensure that the cleaning agent is compatible with the ink used before carrying out printhead cleaning otherwise the printhead may be damaged.

**Caution**

EQUIPMENT DAMAGE. The printhead must be completely dry before attempting to start the printer otherwise the printhead may be damaged.

**Caution**

PRINTER OVERHEATING. Report all overheating incidents to a maintenance engineer.

**Caution**

RISK OF DATA LOSS. Ensure the correct message name is selected for message deletion as no message selection confirmation prompt is given.

**Caution**

RISK OF DATA LOSS. All messages apart from the TEST MESSAGE will be deleted.

**Caution**

RISK OF DATA LOSS. The Clear Message option, when selected, does not ask for confirmation to clear the message.

**Caution**

RISK OF DATA LOSS. The Delete user field option does not ask for confirmation to delete a User Field.

Introduction

The printer is tested and commissioned prior to dispatch to the customer. If further on-site commissioning is required, refer to the “Troubleshooting” section of this manual.

Each installation must be approached on an individual basis due to variations in production line build specifications. Supposedly identical production lines can vary significantly due to customer requirements or modifications.

Each installation *must* be preceded by a site survey to establish the necessary information relevant to the production line and printer. In some cases it may be impossible to install a printer; it is therefore of vital importance that all the installation criteria are met before attempting installation. The site survey form *must* be completed as fully as possible by the sales engineer.

Missing or ambiguous information should be clarified by telephone or fax prior to the installation procedure.



Warning

LETHAL VOLTAGES. Lethal voltages are present within this equipment when it is connected to the mains electrical supply. Only trained and authorized personnel may carry out maintenance work. Observe all statutory electrical safety codes and practices. Unless it is necessary to run the printer, disconnect the printer from the mains electrical supply before removing the covers or attempting any service or repair activity, otherwise death or personal injury may result.



Caution

EQUIPMENT DAMAGE. Only Videojet-trained personnel may carry out installation and maintenance work. Any such work undertaken by unauthorized personnel may damage the printer and will invalidate the warranty.

Commissioning

Preparation for Use

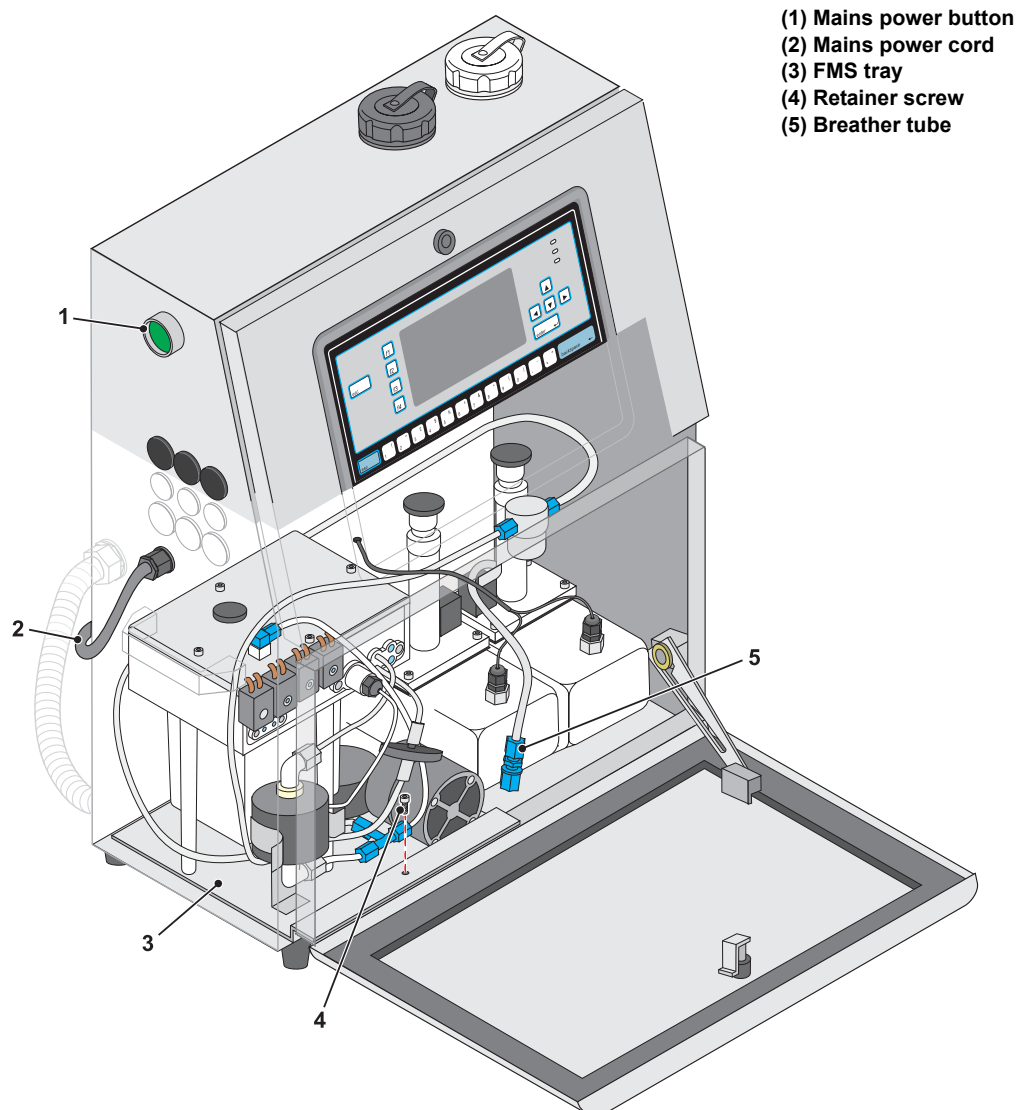


Figure 2-1. Beginning the commissioning process

Fitting the breather tube

- 1 Open the ink compartment door as shown in Figure 2-1.
- 2 Remove the retaining screw (Item 4 in Figure 2-1) and lift the FMS tray (3) forwards and out of the printer.
- 3 Remove the blue bulkhead fitting from the end of the breather tube (5) and attach the fitting to the round hole in the floor of the ink compartment (near the back wall, just to the left of the ink reservoir).
- 4 Reattach the breather tube to the newly-mounted fitting.

Start up calibration and testing

- 5 Connect the mains power cord (2) to an electrical supply and press the mains power button (1) to switch the printer on. The printer PSU will automatically detect and adjust to the mains voltage.

The printer remains uninitialized and the quick screen is displayed on the LCD panel.

- 6 If nothing is visible on the LCD display, press , then press  and *L*. Press any key to set the contrast when the LCD is visible.
- 7 Select *Enter Password* from the *Password* menu and enter the Master password.
- 8 Perform a full system reset to clear any erroneous configuration information. To do this, select *Full System Reset* from the *Configure* menu. Select *Initialize*.
- 9 Perform the following checks and calibration procedures located in Chapter 5:
 - a. "Pressure Zero Offset Calibration" on page 5-4
 - b. "Cooling Fan Check" on page 5-4
 - c. "I/O Board LED Check" on page 5-5
 - d. "Reset Run Hours" on page 5-7
 - e. "Set EHT Range" on page 5-9
 - f. "Set EHT Trip Level (for printhead setup only)" on page 5-10

Be sure to follow these procedures in the order listed above.

Filling the ink system

- 10 Remove the filler plug (Item 2 in Figure 2-2).
- 11 Prime the mixer bowl (3) with approximately 250 ml of the correct ink using a syringe and a length of 40 mm x 6 mm tube. The *Mixer Low* icon will cease to be displayed when approximately 250 ml is added to the mixer bowl.

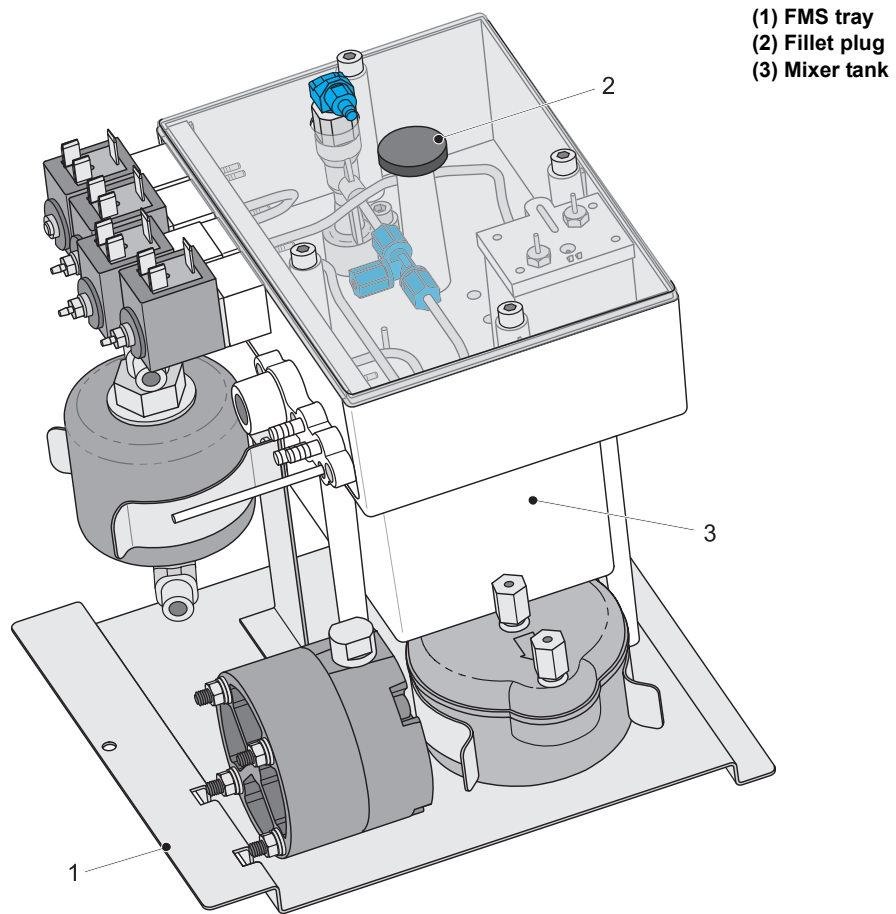


Figure 2-2. Ink Mixer Tank and Filler Plug Location



Warning

HANDLING INK, SOLVENT AND TOP-UP. The ink, solvent and top-up are irritating to the eyes and respiratory system. To prevent personal injury when handling these substances:

Always wear protective clothing and rubber gloves.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

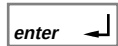
Apply barrier hand cream before handling ink.

If ink or top-up contaminates the skin, wash immediately with soapy water. DO NOT use washdown or solvent to clean ink stains from the skin.

- 12** Ensure that the complete 250 ml is added before proceeding.
- 13** Refit the filler plug (2) to the top of the FMS. Then, replace the FMS tray (1) and the retainer screw.

**Caution**

INCORRECT CALIBRATION. Do not forget to re-insert the FMS tray in the printer. Leaving the the FMS tray out will cause the calibrations performed later to be incorrect (the FMS must be level).

- 14 Pour the remaining ink into the ink reservoir (black cap on top of the printer).
- 15 Fill the top-up reservoir (white cap on top of the printer) with one litre of the appropriate top-up solvent.
- 16 From the *System* menu, select *Fill Mixer Tank* and press . The pump will start and the mixer tank will fill. The pump will stop automatically when the ink level is satisfactory.
- 17 Switch the power off.
- 18 Remove the electrical connectors from the top up add solenoid valve (V1).

Aligning the ink stream

- 19 Remove the printhead cover, nozzle seal and gutter plug (retain the seal and plug for refitting if the machine has to be transported).
- 20 Switch the printer on.
- 21 Enter the Master password.
- 22 Enter the FIN number on the bottle of ink (see “Fluid Identification Number (FIN)” on page 5-12).
- 23 Perform a nozzle flush operation to clean any debris out of the print head (see “Nozzle Flush” on page 5-17).
- 24 Align the printhead (see “Printhead Alignment” on page 11-7).

VMS calibration

- 25 Wait 20 minutes to allow the system temperature to stabilize.
- 26 Press the information button denoted by the *i* key on the bottom left of the keypad.
- 27 Observe “visc set” and “visc actual.” If these two numbers are more than three seconds apart, wait until the difference drops to three seconds (or less).
- 28 Once “visc set” and visc actual” are within +/- 3 seconds of one another, select *VMS chamber calibration* from the *Calibration* menu.

- 29 Ensure that *Automatic* is selected and press enter.
- 30 Wait for the printer to confirm that calibration of the VMS has been completed.
- 31 Press the information key again and verify that “visc set” and visc actual” are now identical.

Final configuration and testing

- 32 Replace the connectors removed from valve V1.
- 33 Perform the following checks and calibration procedures located in Chapter 5:
 - a. “Calibrate 285 V Rail” on page 5-15
 - b. “Nozzle Flush” on page 5-17
 - c. “Strobe LED Check” on page 5-17
 - d. “Modulation Calibration (Manual)” on page 5-20
 - e. “Phase Profile Adjustment” on page 5-23
 - f. Select *Auto Modulate* from the *Calibrate* menu and then wait until the printer informs you that it has finished
 - g. “Phase Offset Calibration” on page 5-24
 - h. “Print Charge Value Calibration” on page 5-25
 - i. “Setting EHT Tables for Printing” on page 5-26
 - j. “Clean Shutdown Check” on page 5-27
 - k. “Set EHT Trip Level (Normal Operation)” on page 5-27
 - l. “Print Height Test” on page 5-29

These procedures must be done in the order shown above.

Test print

- 34 Input a message. The message must contain a six-digit incrementing counter.
- 35 Place an earthed print collector dish under the printhead.
- 36 Select the created message for printing.

37 Select Continuous Print mode:

- a. From the *Print* menu, select *Continuous Print*.
- b. From the *Continuous print* sub-menu, set *Continuous mode* to *Time Mode* and *Time Mode Delay* to 50.

**38** From the *Configure* menu, select *Photocell Levels* and set the state of the photocell 1 level to *Active High* or *Active Low* as required.

- 39** The printer should now be printing continuously. Let the printer complete a minimum of 250,000 prints. Use the counter to monitor the number of messages printed. Monitor the printer to ensure that the system functions correctly.
- 40** At regular intervals access the *Calibrate* menu and select the *Diagnostics Screen*. Monitor the machine parameters and check that they remain stable. Typical *Diagnostics Screen* values are shown in Table 2-1.

Note: The values provided are typical. The exact figures will vary slightly for each machine depending on the model, ink type and ambient conditions.

Machine Parameter	Typical Value (see Note above)	Dependency
Ink Pressure	32	Ink type, Pressure set value.
Cabinet Temperature	35	Ambient temperature.
Viscosity Set Point	29	Ink type, Ambient temperature.
Phase Angle	Any value (must be stable)	Correct Jet Break-up.
Ink Temperature	25	Ambient temperature
Head Temperature	25	Ink type, heater set point.
Viscosity Actual	29	Indicated value ± 1 compared to Viscosity Set Point = correct viscosity.
Phase Profile	08-09 (Ideal)	Phase charge, charge value, Phase pick-up position
Ink (Reservoir Tank)	☐ Low ☒ Covered	Level Detect covered - OK Level Detect uncovered - LOW
Sol (Top-up Reservoir)	☐ Low ☒ Covered	Level Detect covered - OK Level Detect uncovered - LOW or EMPTY
VMS	☐ ☒ Full ☐ ☐ ☒ Filling ☒ ☒ Emptying ☐ Empty	VMS chamber Sequence
Mix	☐ ☐ ☐ ☒ High ☐ ☐ ☒ On ☒ ☐ Low ☒ Empty ☒ ☒	MIXER TANK CONDITION High - Tank level too High On - Tank level OK Low - Tank level too Low

Table 2-1: Typical diagnostics screen values

- 1 After 250,000 prints have been satisfactorily completed, press **f1** and ensure that the printer performs a clean shutdown.

Note: If the machine does not provide an adequate clean start-up or shutdown during these procedures, it is possible that air may have become trapped in the flush pump and flush pipework. See "Removing trapped air" on page 2-9.

Removing trapped air

- 1 Remove the front and rear covers from the printhead.
- 2 Slacken the jet valve (V11) screws.
- 3 Place tissue paper around the printhead and jet valve to absorb solvent when the priming procedure commences.



Warning

HANDLING CLEANING AGENT. The cleaning agent is irritating to the eyes and respiratory system. To prevent personal injury when handling this substance:

Always wear protective rubber gloves and clothing.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

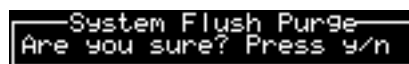
Apply barrier hand cream before handling ink.

If cleaning agent contaminates the skin, rinse off with running water for at least 15 minutes.

- 4 From the *System* menu, select *System Flush Purge*.



- 5 Press .
- 6 Press Y to confirm or N to cancel the operation.



The machine starts and the flush pump is actuated. During the actuation of the flush pump, solvent is ejected from beneath the jet valve.

- 7 Allow the machine to run for approximately 30 seconds before pressing F1 (Abort Flush.).
- 8 Tighten the jet valve (V11) screws and dry the printhead.

- 9 Switch on the mains electrical supply to the machine and perform a clean start and clean stop.
- 10 Evaluate the clean start/clean stop performance. Repeat the procedure if necessary.

Passwords

Liase with the customer and find out which machine functions they want available to relevant personnel and which passwords they want to use. Set the Passwords for Levels 1 and 2.



Caution

DEGRADED PERFORMANCE. Machine functions that only Videojet-trained personnel can access are set at Password Level 3 (MASTER password), these functions must not be given as customer options.

Notes: *You must be at Password Level 3 to set Password Levels. Do not divulge the master password to the customer.*

Setting up Shifts

Liase with the customer to confirm shift requirements (if any). The example below show how to set a shift system where the day is split into three shifts with each shift numbered from 1 and shift 1 starting at 0700.

- 1 From the *Configure* menu, select *Set Shifts*. The Set Shifts sub-menu is displayed.



- 2 Set the shift parameters as follows:

Start hour of shift 1 = 7

Start minutes of shift 1 = 0

Character for shift 1 = 1

Shift length (hours) = 8

Shift length (minutes) = 0

Notes: You must delete the Character for shift 1 using the Backspace or Delete key before entering a new value.

Once you enter a start time and length, the other shifts are calculated automatically.

- 3 Using the Shift criteria defined above, the insertion of a shift at approximately 15:00 would provide a shift number of 2.

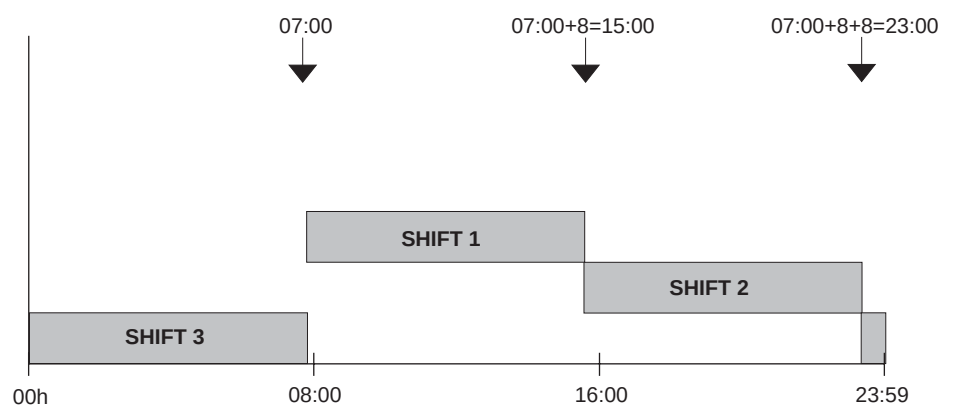


Figure 2-3. Shift Setting Diagram

Production Line Setup

Typical Installation

A typical installation is shown in Figure 2-4, where the printer (6) is mounted on a printer stand (5). The printhead (4) is configured to print vertically via a clamp (2) and bracket (3) assembly. A lamp stack (1) is fitted to the printer stand.

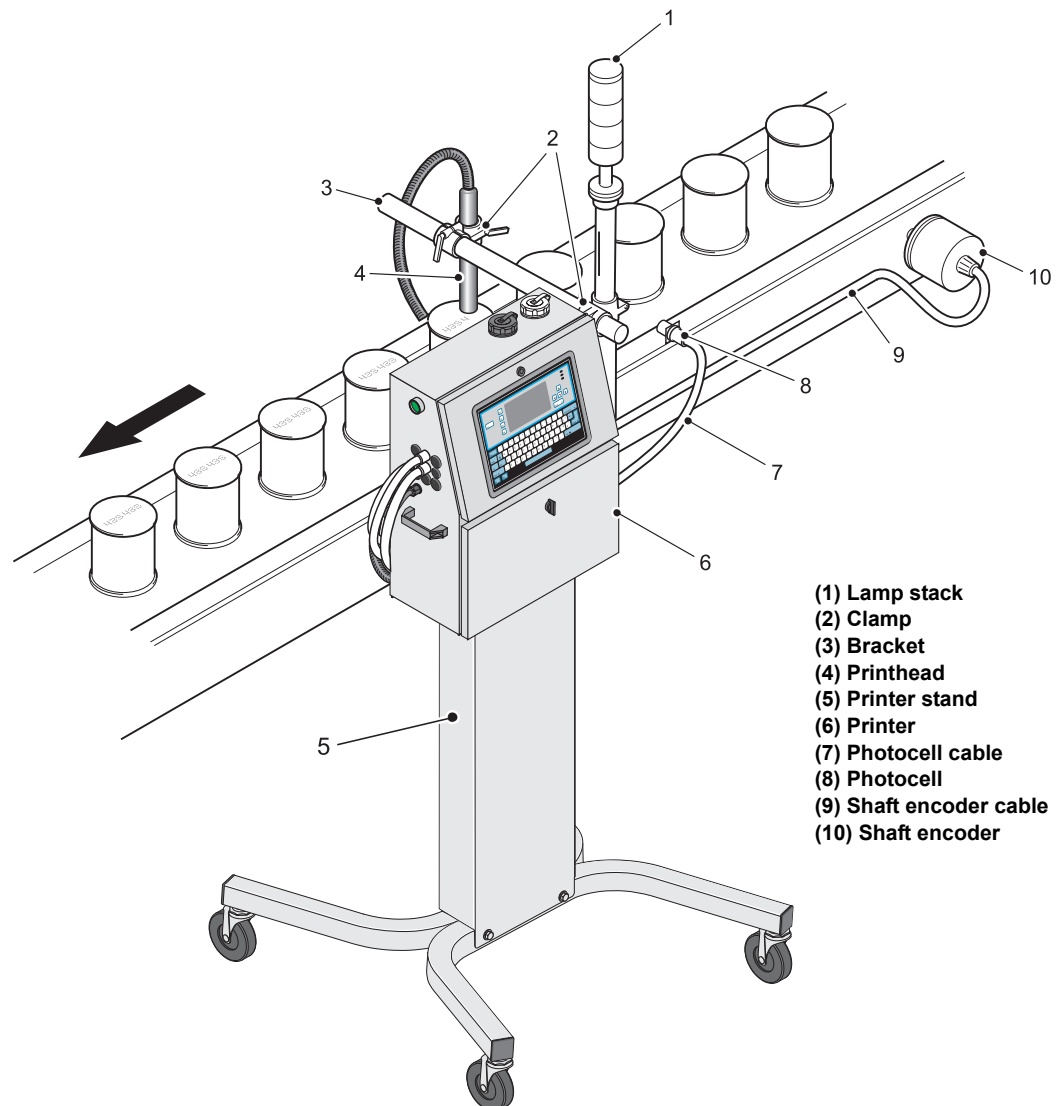


Figure 2-4. Typical Production Line Installation

Throw Distance

The optimum throw distance from the printhead to the product is 8 mm.

Shaft Encoder

Internal Source

If no external shaft encoder is to be fitted then set the *Shaft Encoder Source* to *Internal*, via the *Configure* menu. However, if the line speed varies then a shaft encoder must be fitted in order to maintain constant message width.

A *Width* (Message Parameters) of 1 will provide the fastest print that the printer can achieve in each font using the Internal Shaft Encoder option. The message width is increased by approximately 3% for each increment.

External Source

If an external shaft encoder is fitted then set the *Shaft Encoder Source* to *External*, via the *Configure* menu.

Figure 2-4 shows an external shaft encoder (10) connected via a cable (9) to the SHAFT ENCODER connector on the connector panel.

The printer can be configured to accept two shaft encoder (quadrature) outputs. This allows the printer to compensate for changes in direction of the production line.



Caution

ELECTROSTATIC SENSITIVE DEVICES. The printed circuit boards contain static sensitive devices. A suitably grounded, antistatic wrist strap must be worn when working on or handling printed circuit boards.

If a quadrature shaft encoder is to be used you must do the following:

- 1 Set jumper JB2 (Item 2 in Figure 2-5) to position B.
- 2 Download the appropriate special software to the printer.
- 3 Set the *Width Value* to 1.
- 4 Disable Print Trigger 2.

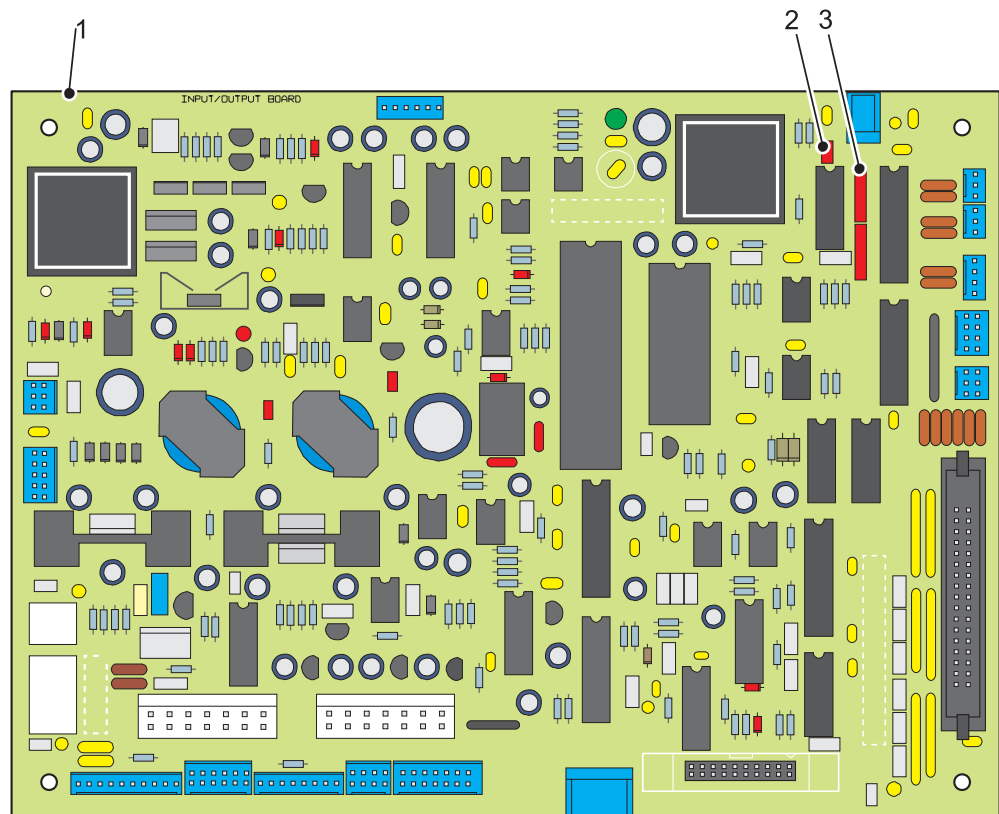
Note: Using quadrature shaft encoders to determine changes of direction disables the width function (i.e. it must be set to 1). If width control is required, an external divider box must be provided.

Product Sensors

Figure 2-4 shows a photocell (8) connected via a cable (7) to PRINT TRIGGER 1 on the connector panel.

The printer can be configured to use two product sensors (PRINT TRIGGER 1 and PRINT TRIGGER 2).

Note: The PRINT TRIGGER 2 option requires the use of non-standard system software.



- (1) Input/Output board
- (2) Sensor 2/Quadrature shaft encoder jumper JB2
- (3) Print trigger 1 and 2 jumper JB1

Figure 2-5. I/O Board, Product Sensor and Shaft Encoder Jumper Location

- 1 The photocells may be either NPN or PNP devices. Set Jumper JB1 (Item 3 in Figure 2-5) on the I/O board to match the device type.

Table 2-2 lists the settings for jumper JB1.

Print trigger	Device type	Jumper 1	Pins	Jumper 2	Pins
1	NPN	A	1	C	3
1	PNP	B	2	D	4
2	NPN	F	6	H	8
2	PNP	G	7	I	9

Table 2-2: Jumper JB1 Settings

- 2 Connect the printer to the mains supply and set the on/off switch to I (on).
- 3 Select the *Photocell Setup* option from the *Configure* menu.
- 4 Set the relevant Photocell level(s) to *Active high* or *Active low* dependant upon the device type. (NPN = Active high; PNP = Active low).

Selecting Fluids

A complete range of inks, top-up fluids and cleaning solutions for the 43s are available from Videojet. These fluids can be ordered either as individual bottles or as kits that contain several bottles of ink, as well as the corresponding top-up fluid and cleaning solution.

See the current 43s ink catalogue for more information on currently-available fluids.

Ink and Solvent Storage

You must follow the precautions listed below for ink and solvent storage:

- All inks and solvents should be stored and used in a well-ventilated area and protected in case of fire.
- Store and ship the inks and solvents out of direct sunlight within the temperature range 5 °C to 50 °C.
- When shipping inks or solvents, comply with the local laws and regulations.
- The risk of fire is an important consideration when storing/shipping inks and solvents. Aqueous inks and solvents present a low fire risk as they will not burn or support combustion. Inks based on water/alcohol mixtures may burn if sufficient alcohol is present. Solvent-based inks pose a greater fire risk. Consult the appropriate product data sheet on the exact nature of the ink/solvent.
- Use powder or dry foam to extinguish fires and ensure electrical supply is turned off. A fire blanket may be used to smother small local fires. If in doubt consult the local fire authority.
- Wipe up any spillage immediately with absorbent material and dispose of safely. If spillage is large, ventilate the area.
- Dispose of ink and solvents in accordance with the local regulations.
- Do not dispose of inks and solvents into the local drains.



Warning

HANDLING INK, SOLVENT AND TOP-UP. The ink, solvent and top-up are irritating to the eyes and respiratory system. To prevent personal injury when handling these substances:

Always wear protective clothing and rubber gloves.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

Apply barrier hand cream before handling ink.

If ink or top-up contaminates the skin, wash immediately with soapy water. DO NOT use washdown or solvent to clean ink stains from the skin.



Warning

FIRE AND HEALTH HAZARD. The ink, solvent and top-up are volatile and flammable. They must be stored and handled in accordance with local regulations.

Do not smoke or use a naked flame in the vicinity of these substances.

Immediately after use remove any tissue or cloths that become saturated with these substances. Dispose of all such items in accordance with local regulations.

In the event that any ink, solvent or top-up container is not completely empty after use, it should be resealed. Only full bottles are recommended for use when replenishing ink or top ups; partially filled bottles should be disposed of in accordance with local regulations.



Warning

VAPOUR HAZARD. Prolonged breathing of top-up or cleaning fluid vapour may cause drowsiness and/or effects similar to alcoholic intoxication. Use only in open, well-ventilated areas.

Introduction

To download new operating software to the flash memory in the printer use either:

- Microsoft Windows version 3.xx Terminal mode in conjunction with the Debug Monitor option from the System menu.
- Microsoft Windows version 95/98/2000 HyperTerminal mode in conjunction with LCD option from the System menu.

Notes: It is possible to download new versions of the same software but it is not possible to install different language firmware or firmware from a different machine variant. A security feature of the 43s prevents the download of any firmware other than an upgrade of the firmware, which was originally supplied.

Requirements

The following equipment is required:

- An IBM compatible PC (with Microsoft Windows version 3.xx, 95, 98 or 2000 installed).
- A copy of the new operating software on disk.
- A suitable serial communications cable to connect between the PC and printer connector COMM1.

Windows 3.xx Procedure

Checking the Communications Link

Before attempting to download new software check the communications link between the PC and the printer.

- 1 Using a pre-configured connection cable, connect Com1 of the PC to COMM1 of the 43s Printer.
- 2 On the PC, run the Terminal program (Windows Accessories Group).
- 3 Select the Communications option from the Settings menu and set the following options:

Baud Rate: 9600

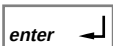
Data Bits: 8

Stop Bits: 1

Parity: None

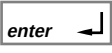
Flow Control: None

Connector: Com1 (assuming Com1 is the port to be used)

- 4 Click OK to confirm the settings.
- 5 If required, this set up can be saved for future use by selecting *Save As* from the File menu and saving the communications set up as, for example, 43S.trm.
- 6 Ensure that port COMM1 on the printer is set to corresponding baud rate, data bits, stop bits and parity settings.
- 7 From the *Data Logging* menu, select the *Serial Port Functionality* option.
- 8 Set *Status* to *Disable* and press.
- 9 From the *System* menu select Debug Monitor.
- 10 Set Com1 to the active port. The prompt MON> should appear in the PC Terminal Window.
- 11 To confirm that the communications link is effective press  on the PC. The prompt MON> should appear a second time, e.g.:
MON>
MON>
- 12 Press X and then  on the PC to return the printer to normal control.

- 13 From the Data Logging menu, select the Serial Port Functionality option.
- 14 Reset Status to Enable.

Using Microsoft Windows 3.xx to Download Firmware

- 1 Connect the serial communications cable between the serial port of the PC and printer connector COMM1.
- 2 From the *System* menu select *Debug Monitor*.
- 3 Select LCD and press . The printer screen displays MON>.
- 4 On the PC, double-click on *Terminal* (normally located in *Accessories* group).

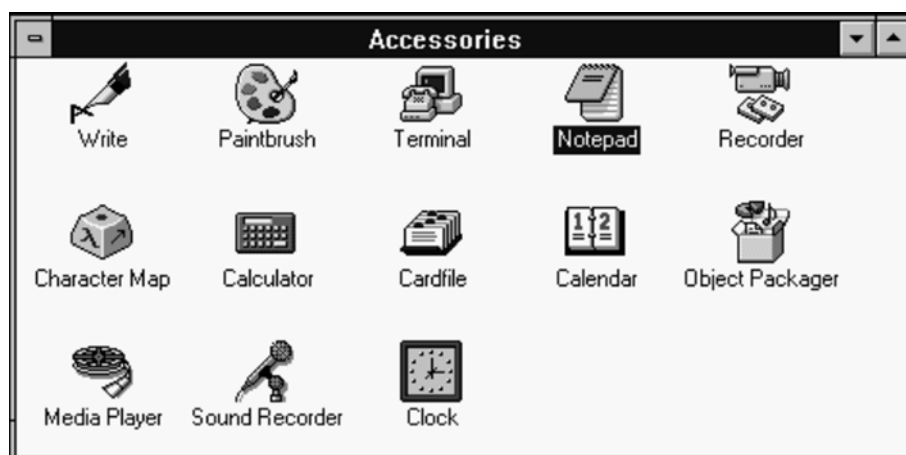
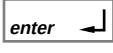
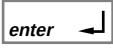
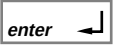
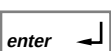
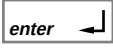
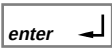
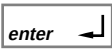
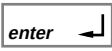


Figure 4-1. Windows 3.xx Accessories Group

- 5 Type *BO* on the printer keypad and press .
- 6 Press the *Y* key to confirm. The screen display becomes blank and the Terminal Window displays MON>.
- 7 On the PC, type *ER* and press  to erase the printer flash EEPROM.
- 8 The PC Terminal Window displays the message; "Blank check failed, Erasing Flash."
- 9 After approximately 10 seconds the Terminal Window displays the message, "Blank check passed."
- 10 The PC Terminal Window then displays MON>.
- 11 On the PC type *DU<SPACE>1* and press . 0 (zero) is displayed in the Terminal Window.

- 12 On the PC press  + T (Transfers menu), select *Send Text File* and press  .
- 13 To select the new operating software file from the *Send Text File Window*, proceed as follows:
 - a. From the *Drives:* menu, select *a:*.
 - b. From the *List Files of Type* menu, select *All files [*.*)]*.
 - c. Select the relevant file e.g. *4601 fla* and press  . The file downloads to the printer.

An indicator at the bottom on the Terminal Window displays the progress of the download.
- 14 After approximately 20 minutes the Terminal Window displays MON>.
- 15 At the terminal MON> prompt, type: *SET#4000#3ffff#0* and press  .
- 16 At the terminal MON> prompt, type: *SET#1000#37ff#0* and press  .
- 17 At the terminal MON> prompt, type: *SET#200#400#0* and press  .
- 18 Type *RUN* on the PC keyboard and press  to activate and run the new operating software.
- 19 Carry out a full system reset (see *Configure Menu*, page 105).

Windows 95/98/2000 Procedure

Checking the Communications Link

- 1 Before attempting to download new software check the communications link between the PC and the printer.
- 2 Using a pre-configured connection cable, connect COM1 of the PC to COMM1 of the 43s Printer.
- 3 On the PC run the HyperTerminal program.

The *Connection Description* window opens requesting a title and an icon for the new connection.

- 4 Enter the details and click *OK*.

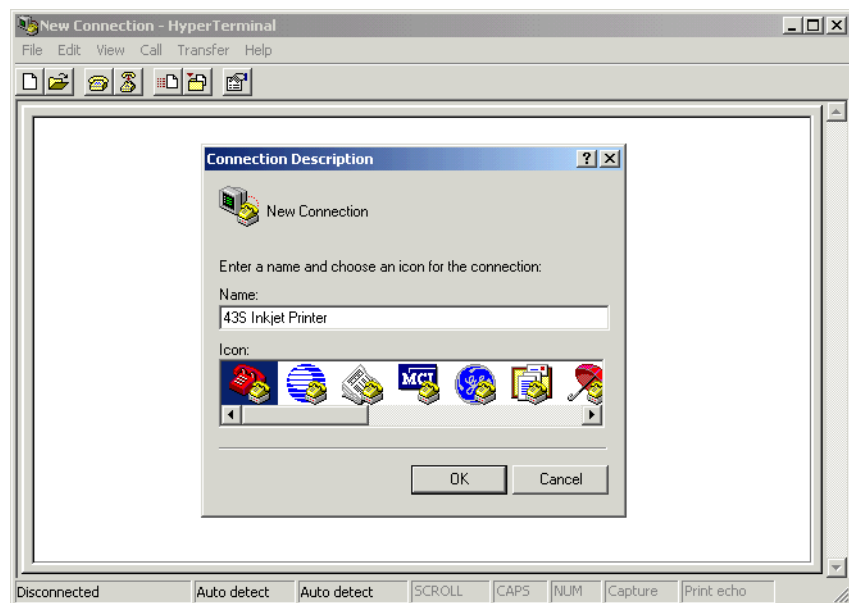


Figure 4-2. New Connection Menu (Windows 2000)

The *Connect To* dialogue box appears.

- 5 Change the *Connect Using* edit box to *Com1*.



Figure 4-3. *Connect To* Menu (Windows 2000)

- 6 When the COM1 properties menu is displayed, ensure the settings are as follows:

Baud Rate: 9600

Data Bits: 8

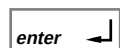
Stop Bits: 1

Parity: None

Flow Control: None

Connector: Com1 (assuming Com1 is the port to be used)

- 7 Click OK to confirm the settings.
- 8 If required, this set up can be saved for future use by selecting *Save As* from the *File* menu and saving the communications set up as, for example, *43S.trm*.
- 9 Ensure that port COMM1 on the printer is set to corresponding baud rate, data bits, stop bits and parity settings.
- 10 From the *Data Logging* menu, select the *Serial Port Functionality* option and set *Status* to *Disable*.
- 11 From the *System* menu select *Debug Monitor*.
- 12 Set Com1 to the active port. The prompt MON> should appear in the PC HyperTerminal Window.
- 13 To confirm that the communications link is effective press



on the PC. The prompt MON> should appear a second time, e.g.:

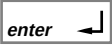
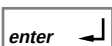
MON>

MON>

- 14 Press X and then  on the PC to return the printer to normal control.
- 15 From the *Data Logging* menu, select the *Serial Port Functionality* option and reset *Status* to *Enable*.

Using Windows 95, 98 or 2000 to Download Firmware

To use Microsoft Windows 95, 98 or 2000 for a firmware download, proceed as follows:

- 1 Connect the serial communications cable between the serial port of the PC and printer connector COMM1.
- 2 Select the *System* menu.
- 3 Select LCD and press . The printer screen displays MON>.
- 4 Access Windows HyperTerminal
(normally located by clicking Start/Programs/ Accessories/ Communications/HyperTerminal).
- 5 Follow the instructions for establishing a connection (see "Preparation for Use" on page 2-2).
- 6 Type *BO* on the printer keypad and press .
- 7 Press the *Y* key to confirm. The screen display becomes blank and the HyperTerminal Window displays MON>.
- 8 On the PC, type *ER* and press  to erase the printer flash EEPROM.
- 9 The PC HyperTerminal Window displays the message: "Blank check failed, Erasing Flash."
- 10 After approximately 10 seconds the HyperTerminal Windows displays the message, "Blank check passed."
- 11 The PC HyperTerminal Window displays MON>.
- 12 On the PC type *DU<SPACE>1* and press . 0 (zero) is displayed in the HyperTerminal Window.
- 13 On the PC press  + *T* (Transfer menu), select *Send Text File* and press .

- 14** To select the new operating software file from the Send Text File Window, proceed as follows:

- a. From the *Look in* field, select A.
- b. From the *Files of Type* box, select *All files* [*.*].
- c. Select the relevant file e.g. *4701.flc* and click *Open*. The file downloads to the printer.

An indicator at the bottom on the Terminal Window displays the progress of the download.

- 15** After approximately 20 minutes the Terminal Window displays MON>.
- 16** At the terminal MON> prompt, type: *SET#4000#3ffff#0* and press  .
- 17** At the terminal MON> prompt, type: *SET#1000#37fff#0* and press  .
- 18** At the terminal MON> prompt, type: *SET#200#400#0* and press  .
- 19** Type *RUN* on the PC keyboard and press  to activate and run the new operating software.
- 20** Carry out a full system reset (see “Configure Menu” on page 7-11).

Boot Monitor Recovery Procedure

If a data communications error occurs whilst downloading a new software Flash File or the system memory becomes corrupted, the system may “lock-up.” If this situation occurs, use the following recovery procedure:

- 1 Switch off the 43s unit.
- 2 Remove the I/O board to allow access to the CPU.
- 3 Connect test point TMR1 to the chassis (0 V) with a test lead. TMR1 is the test point closest to R12.

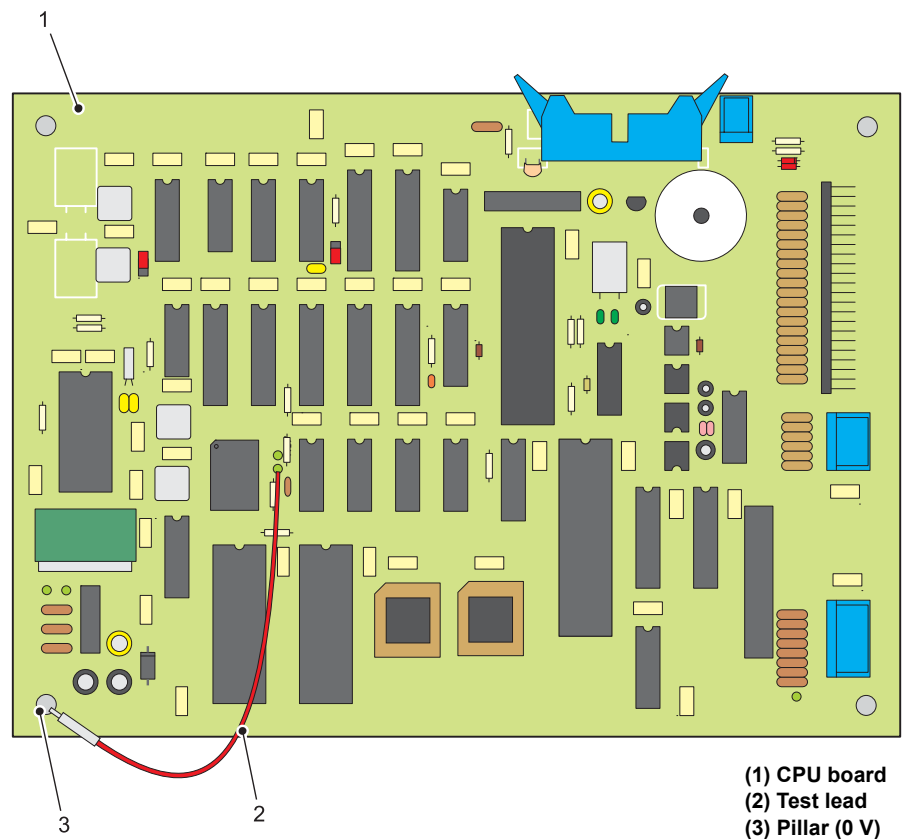


Figure 4-4. Connection of TMR1 to chassis

- 4 Replace the I/O board and connections.
- 5 Connect a PC to the Comms port.
- 6 Switch on the printer.
- 7 Run the PC in Windows Terminal Mode and establish communication.
- 8 At the PC type ER.
- 9 Switch off the printer and remove the test lead from the CPU.
- 10 Switch on the printer and download new software using the download procedure.

The printer will now be operational.

Introduction

The system calibration and test procedures described below should be performed as necessary to commission the machine after repairs have been carried out. All or part of the procedure may be required, as indicated in the failure diagnosis and repair instructions at the beginning of this section. The procedures may also be used as an aid to fault finding.

Earth Continuity Test



Warning

EARTH CONTINUITY. To ensure safe earthing the resistance between the mains lead earth wire and the test points must be less than 1Ω .

Using the multimeter, test between the mains lead earth wire (Item 1 in Figure 5-1) and the following points:

- PSU cover (2)
- PCB mounting bracket (3)
- LCD cover plate (4)
- Electronics compartment door (5)
- Ink system compartment door (6)
- FMS tray (see Item 3 in Figure 2-2. on page 2-4)
- Earth point on printhead (located under the rear cover).

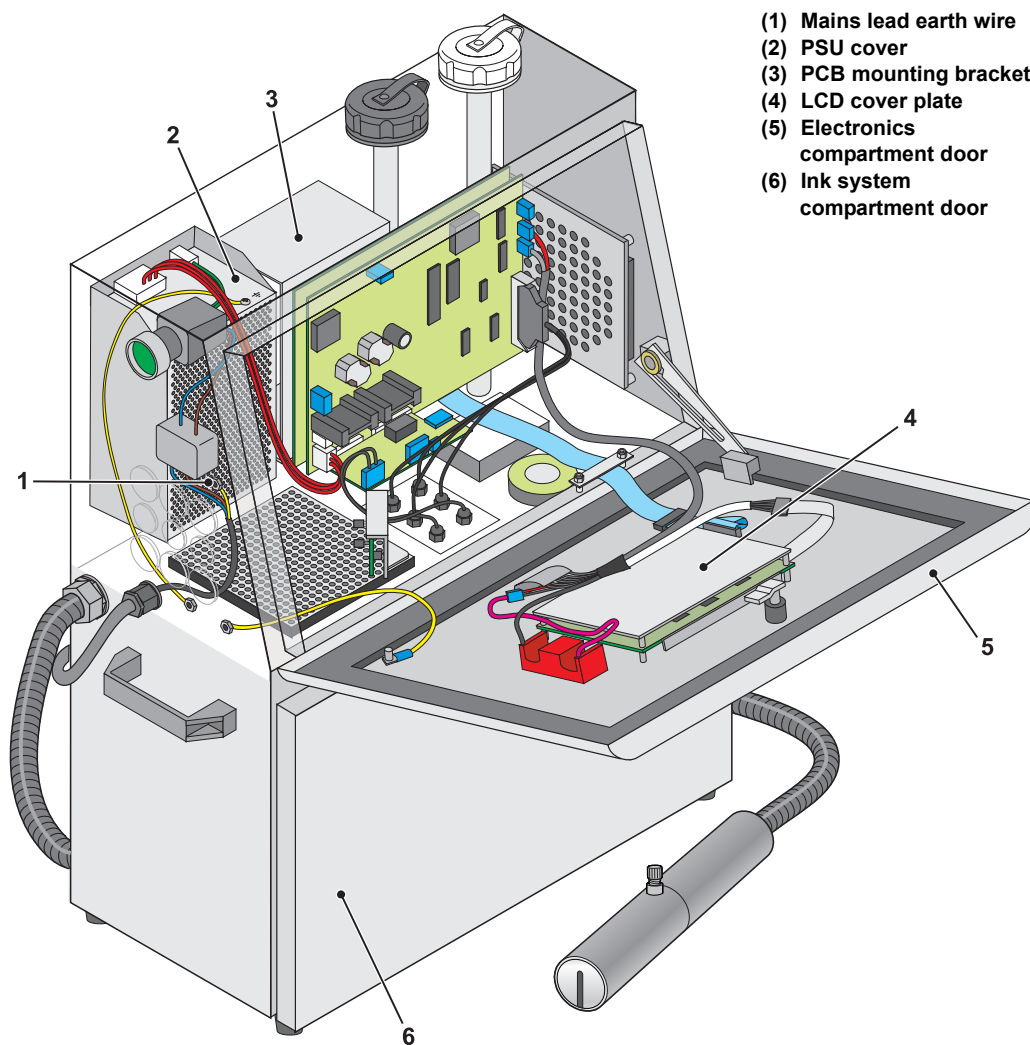


Figure 5-1. Earth Continuity Test Points

Machine Power-Up

- 1 Connect the printer to the mains power supply and press the mains power button.
- 2 Ensure that the machine initializes correctly.
- 3 If the LCD is not visible, press **f3**, and then **ctrl** + **L**. When the LCD is readable, press any key to set the contrast.
- 4 If there is no ink in the system, check that the *Ink Out* icon is displayed.



Pressure Zero Offset Calibration



Caution

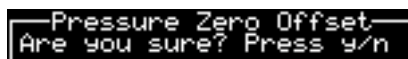
FALSE READINGS. To avoid the risk of false readings, the pressure zero offset should only be calibrated when there is no ink in the system and the pump is off.

Calibrate the pressure zero offset as follows:

- 1 From the *Calibrate* menu select the *Pressure Zero Offset* option.



- 2 Press .
- 3 Press Y to confirm or N to cancel the operation.



The ink system pressure is automatically set to zero relative to local atmospheric pressure. There is no visual indication that the calibration has been performed.

Cooling Fan Check

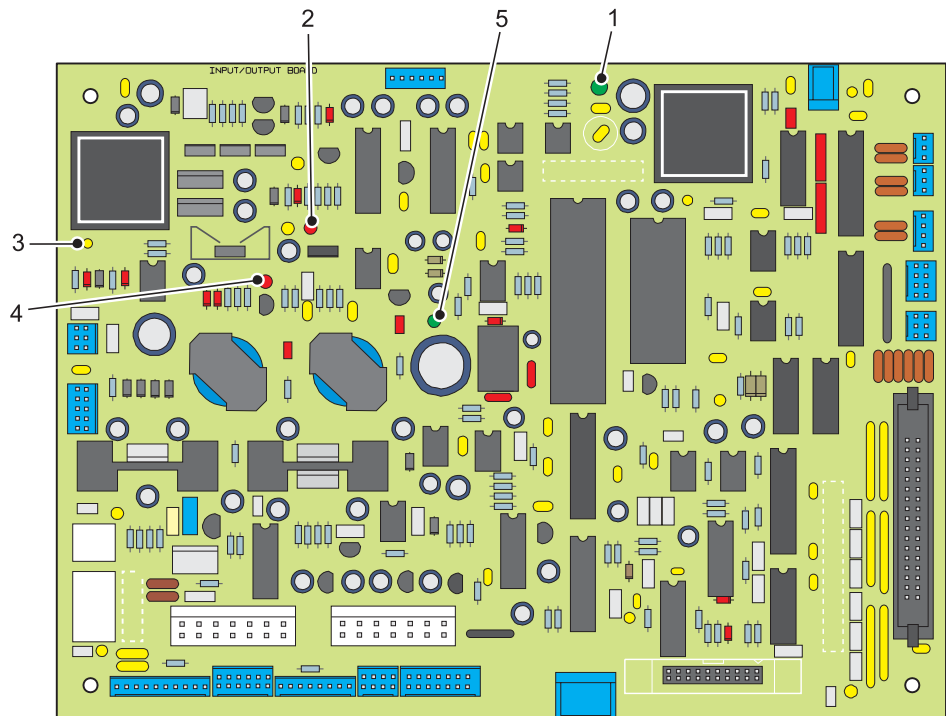
Check that the electronics compartment cooling fan is operating correctly (i.e. blowing air through the electronics compartment).

Note: The cooling fan does not rotate until the machine has been switched on for 2 to 4 minutes.

I/O Board LED Check

Check that LEDs 1, 3, 4 and 5 on the I/O board are illuminated and that LED2 is dimly illuminated. The LEDs represent the following voltage rails:

<i>LED 1 (green)</i>	+12 V customer's isolated supply for shaft encoder/ photocell.
<i>LED 2 (clear/illuminates red)</i>	285 V (+15 V = dim with printhead cover off, +285 V = bright with printhead cover on).
<i>LED 3 (yellow)</i>	-24 V supply.
<i>LED 4 (red)</i>	-15 V supply.
<i>LED 5 (green)</i>	+24 V valve/pump/heater supply.



- | | |
|---------------------------|--------------------------|
| (1) LED 1 (green); +10 V | (4) LED 4 (red); -15 V |
| (2) LED 2 (red); +285 V | (5) LED 5 (green); +24 V |
| (3) LED 3 (yellow); -24 V | |

Figure 5-2. I/O Board Status LED Location

Voltage Checks

Check the voltages on the POWER connector, situated at the bottom left-hand corner of the I/O board. Use Pin 2 as the 0 V reference.

Figure 5-3 is a representation of the POWER connector with the voltages shown for each pin.

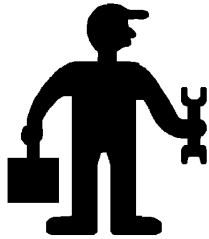
Notes: Allow $\pm 5\%$ tolerance on all voltages except -24V which is allowed at $\pm 10\%$. The power connector must be connected to the I/O board to carry out this check.

PIN 4 -15V	PIN 8 -24V
PIN 3 +5 V	PIN 7 0 V
PIN 2 0 V	PIN 6 +24 V
PIN 1 +15 V	PIN 5 +5 V

Figure 5-3. I/O board POWER connector

Reset Run Hours

If the *Service* icon is displayed, the time until the next service is due must be entered to remove it.

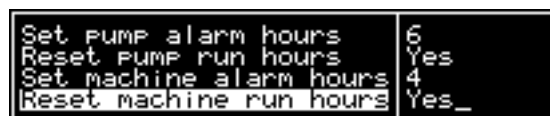


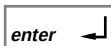
Proceed as follows:

- 1 From the *Data Logging* menu select *Reset Run Hours*.



- 2 Press .
- 3 Select *Set pump alarm hours*. Enter the number of hours until the next ink system or pump service is due.
- 4 Set *Reset pump run hours* to *Yes*.

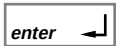


- 5 Refer to the "Maintenance Schedule" on page 9-1 and configure *Set machine alarm hours* to the number of hours until the next machine service is due.
- 6 Set *Reset machine run hours* to *Yes*.
- 7 Press  to save the settings.

Gutter Fault and Charge Error Disable

- 1 From the *System* menu select *Charge Error Shutdown Disable*.



- 2 Press .
- 3 Select *Charge error* and toggle to *Disable*.



- 4 Select *Gutter fault* and toggle to *Disable*.
- 5 Press  to disable both functions.

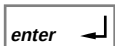
Set EHT Range

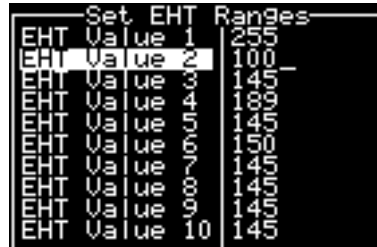
(preliminary settings for printhead and EHT table setup)

Ensure that the printhead is clean and dry before setting the EHT range and trip level. The preliminary settings ensure that EHT trip is prevented when setting up the printhead and calibrating the EHT table.

- 1 Fit the printhead cover.
- 2 From the *Calibrate* menu select *EHT Range Set*.



- 3 Press .
- 4 Select *EHT Value 1* and set the value to 255.



- 5 Select *EHT Value 10* and set the value to 255.
- 6 Press  to save the settings.

Set EHT Trip Level (for printhead setup only)

- 1 Fit the printhead cover.
- 2 From the *Calibrate* menu select *EHT Trip Level Set*.



- 3 Press . The display shows “Setting EHT trip level.”
- 4 After approximately one minute the display changes to “EHT trip set successful.”
- 5 Press .

Filling the Ink System



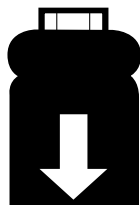
If the Ink Out icon is displayed, remove the filler plug from the top of the FMS and prime the mixer bowl with 250 ml of ink using a syringe and a length of 40 mm x 6 mm diameter plastic tube.

***Note:** The Ink Out icon will clear from the display before all the ink is added to the mixer tank but ensure that the entire 250 ml of ink is added.*

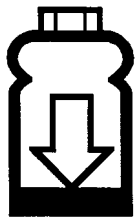


Caution

EQUIPMENT DAMAGE. Ensure that the ink comes from a sealed bottle and that at least one of the bottles from the same batch has been tested to ensure that the viscosity is correct.



If the *Ink Level Low* icon is displayed, pour the remaining ink into the ink reservoir with the black filler cap (4-slot spider).



If the *Top Up Level Low* icon is displayed, pour the top up into the reservoir with the white filler cap (3-slot spider) with one litre of the appropriate top up solvent.

Fluid Identification Number (FIN)

To ensure that the correct FIN for the ink in use has been entered into the machine, proceed as follows:

- 1 From the *Calibrate* menu select *Set Ink Type* and press .



- 2 Check that the *Fluid ID No.* displayed corresponds with ink and top-up being used with the machine. If the FIN, Ink Part No. and Top-up Part No. have previously been entered and are correct, press .



If the FIN number does not correspond with the ink and top-up being used with the machine, enter the correct values and press

.

Notes: Refer to the ink bottle for the correct FIN number.

FIN numbers should be entered without punctuation. Do not attempt to separate the digits with slashes, spaces or any other character.

Fill Mixer Tank

If the ink level in the mixer tank is less than 250 ml then it will be below the ink pick up pipe. The machine will not reach operating pressure or top up ink. If this is the case, begin at step 1, below. If there is more than 250 ml in the mixer tank, proceed to step 5.

- (1) FMS tray
- (2) Filler plug
- (3) Mixer tank

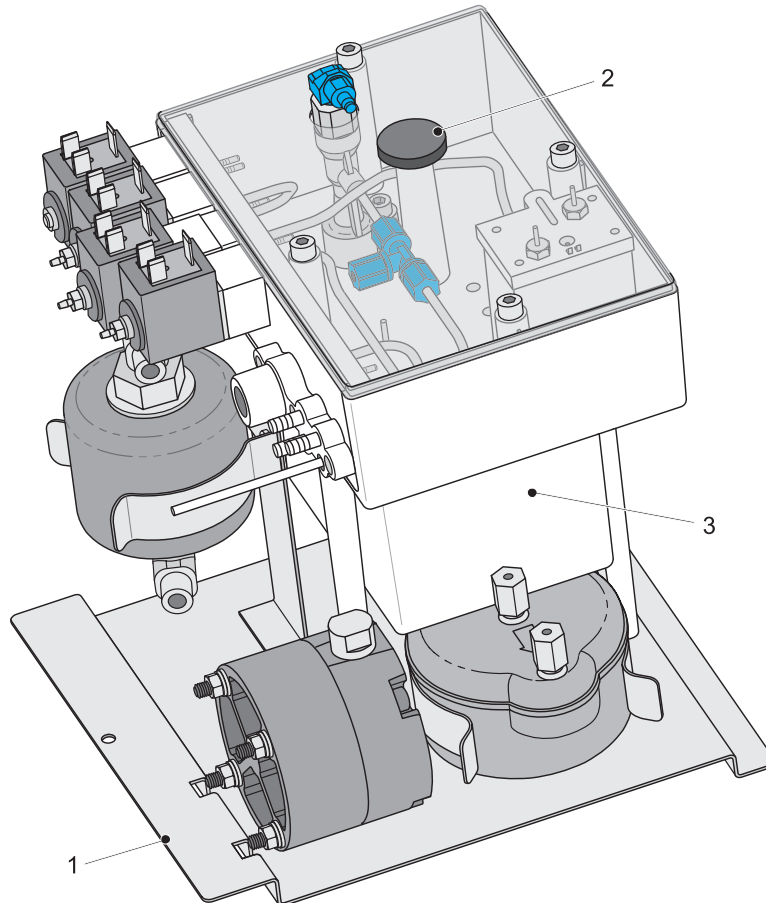


Figure 5-4. Ink Mixer Tank and Filler Plug Location

- 1 Remove the filler plug (Item 2 in Figure 5-4) from the top of the FMS.
- 2 Prime the mixer bowl (3) with approximately 250 ml of the correct ink using a syringe and a length of 40 mm x 6 mm tube. The *Ink Out* icon will cease to be displayed when approximately 250 ml is added to the mixer bowl.
- 3 Ensure that the complete 250 ml is added before proceeding.
- 4 Refit the filler plug (2) to the top of the FMS.

- 5 From the *System* menu select *Fill Mixer Tank*.



- 6 Press . The pump starts and the mixer tank fills. When the level of ink is OK, the pump stops (this may take several minutes).

Calibrate 285 V Rail

To calibrate the 285 V supply, proceed as follows:

- 1 Remove the electrical connectors to the Feed Valve (V6) on the FMS and the Top-up Addition Valve (V1) on the top
- 2 Ensure the printhead cover is fitted and press **f1** to start the Jet.

***Notes:** An inkjet will not be produced at the printhead as Valve V6 has been disabled. The machine will shut down if disable charge and gutter detect errors are not disabled.*

- 3 On the I/O card connect a DVM, set to measure 285 V, between TP2 (+ve) and TP1 (0 V).
- 4 Set the 285 V rail to 285 V $\pm$ 1 by adjusting VR1 on the I/O board. Disconnect the multimeter.
- 5 Seal VR1 adjustment screw using a suitable sealing compound. Refit the electrical connectors to valves V6 and V1.

VMS Calibration



Caution

EQUIPMENT DAMAGE. Ensure that the ink comes from a sealed bottle and that at least one of the bottles from the same batch has been tested to ensure that the viscosity is correct.

- 1 Remove the solvent addition actuator coil.
- 2 Start the jet by pressing **f1**.
- 3 From the *Calibrate* menu select *VMS Chamber Calibration*.



- 4 Press **enter**. The display shows “Calibrating VMS Chamber.” After approximately 3 minutes this changes to “VMS Chamber Calibrated.”
- 5 Refit the solvent addition valve actuator.

Nozzle Flush

- 1 Slacken the knurled screw on top of the printhead and remove the front cover. Support the printhead in a suitable stand and place a container underneath to catch any surplus solvent.
- 2 From the *System* menu select *Nozzle Flush*.



- 3 Press .
- 4 The nozzle orifice should be irrigated with washdown to clear any blockages.

The nozzle flush remains operational for 2 minutes but can be aborted at any time by pressing , *Abort Flush*.

Strobe LED Check

Check that the red strobe LED (situated behind the charge electrode) is illuminated.

Ink Jet Alignment

- 1 Press **f1** to start the jet.
- 2 Ensure that the jet is in the correct position with the charge electrode (see Figure 5-5) and is passing through the centre of the charge electrode slot with an equidistant gap (1) either side. Check also that the jet is parallel to the sides of the charge electrode slot.

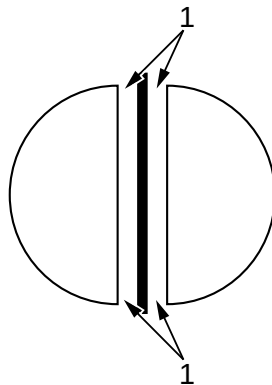


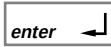
Figure 5-5. Ink Jet Alignment

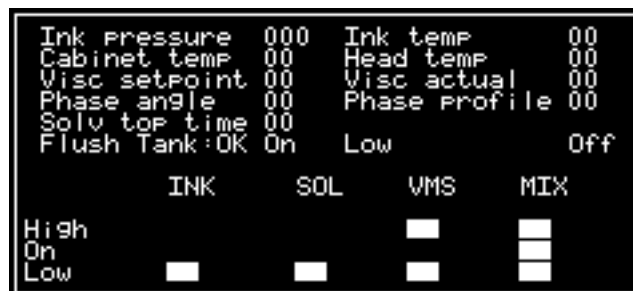
- 3 If the inkjet alignment is not correct set up the printhead alignment as described in “Printhead Alignment” on page 11-7.

Head Heater Temperature and Ink Pressure

- 1 From the *Calibrate* menu select *Diagnostics* screen.



- 2 Press .
- 3 Check that *Ink pressure* and *Head temperature* are set to the correct values.



Notes: The correct values are part of the FIN and should have been set automatically when the FIN was entered in the Select Ink Type window. See "Fluid Identification Number (FIN)" on page 5-12 for more information.

The Head temperature is typically 35 but can vary for some inks. Ensure that the temperature set point is correct for the ink being used (refer to the last 2 digits of the FIN).

Ink pressure is typically 32 but can vary for some inks. Ensure that the pressure set point is correct for the ink being used (refer to the 9th and 10th digits of the FIN).

The head heater will not turn on if a gutter fault is present.

Modulation Calibration (Manual)



Caution

PRINT QUALITY. To ensure high print quality, ink viscosity must be checked and must be correct prior to attempting modulation calibration.

Disable the Rolling Phase

- 1 From the *System* menu select *Rolling Phase Disable*.



- 2 Press .
- 3 Toggle to *Disable* then press .



Adjust the modulation value

- 4 From the *Calibrate* menu select *Modulation Set Level*.



- 5 Press .

- 6 View the position of the jet break-off. Adjust the *Modulation Set Value* until the modulation level is 5.



- 7 Observe the jet in the viewing area illuminated by the strobe LED.
- 8 While observing the jet, slowly increase the modulation until the satellites start to merge with the main drops.
- 9 Continue to increase the modulation until all the satellites have just merged and record this value as V_{min} .
- 10 Continue to increase the modulation until the break up point starts to move away from the nozzle (turning point) and record this value as V_{tp} .
- 11 Set the modulation voltage, V_{set} half way between V_{min} and V_{tp} .

$$V_{set} = V_{min} + \frac{V_{tp} - V_{min}}{2}$$

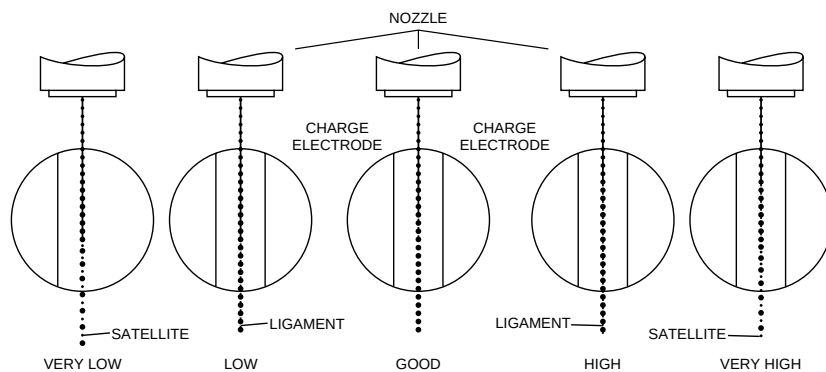
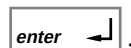


Figure 5-6. Inkjet Break-off Point

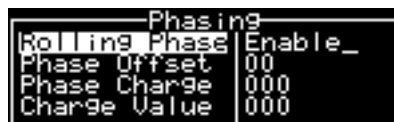
- 12 When a good break-off point is achieved, press .

Enable the Rolling Phase

13 From the *System* menu select *Rolling Phase Disable* and press



14 Toggle to *Enable* then press .

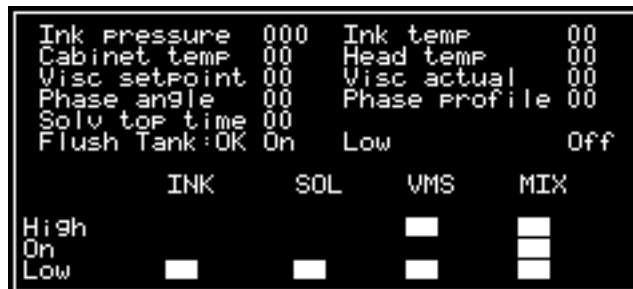


Phase Profile Adjustment

- 1 Ensure that the phase detector is approximately 1 mm from the ink jet. If not, align the printhead as described in “Printhead Alignment” on page 11-7.
- 2 From the *Calibrate* menu select *Diagnostics* screen.

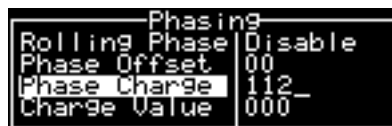


- 3 Press .
- 4 Check that the Phase profile is 8 ± 1 .



If the Phase profile is incorrect, adjust it as follows:

- a. Remain in the Diagnostics screen and press + L,C.
- b. The display shows “Phase Charge.”



- c. Press or to adjust the Phase Charge until the correct Phase profile is displayed then press .
- d. Press to exit the Diagnostics screen.

- 5 Ensure that the jet is 4 mm $\pm$ 0.25 mm from the +ve EHT plate. Also ensure that the 0 V EHT plate is parallel to the jet. If any adjustments are required, refer to the printhead alignment procedure in “Printhead Alignment” on page 11-7.

Phase Offset Calibration

Set the phase offset to 11.

Print Charge Value Calibration

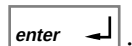
- 1 Enter a test message that represents the specific customer requirement.
- 2 From the *Calibrate* menu select *Charge Value*.



- 3 Press .
- 4 Set a value of 150. Do not press .



- 5 Take print samples, decreasing the charge value in steps of 10 until the print quality becomes poor. It may be necessary to clean the gutter when poor print quality is produced.
- 6 Return to a charge value of 150 and increase it in steps of 10 until the print quality becomes poor.
- 7 Adjust the character height as necessary to prevent over or under deflection.
- 8 Set the charge value, which gives the best print quality and press



Setting EHT Tables for Printing

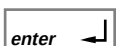
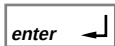
- 1 Select Message 1 for printing. Set the *Character Height* for the currently selected message to 1.
- 2 From the *Calibrate* menu select *EHT Range Set*.



- 3 Press .
- 4 Set *EHT Value 1* to 150.

A screenshot of the 'Set EHT Ranges' menu. The menu is displayed on a black background with white text. The title 'Set EHT Ranges' is at the top. Below it, there is a list of EHT values and their corresponding settings:

Set EHT Ranges	
EHT Value 1	255
EHT Value 2	100
EHT Value 3	145
EHT Value 4	189
EHT Value 5	145
EHT Value 6	150
EHT Value 7	145
EHT Value 8	145
EHT Value 9	145
EHT Value 10	145

- 5 Press .
- 6 Reduce the value in steps of 10. Press  after inputting each value and take print samples until the minimum readable character is achieved (gutter clipping). Set this value.
- 7 Set the *Character Height* for the currently selected message to 10.
- 8 Set *EHT Value 10* to 200. Increase the value in steps of 10 and take print samples until the maximum readable character is achieved. Note this value and decrease it by 10.

Note: If gutter clipping occurs, clean the gutter before proceeding.

Note: It is only necessary to reduce the value by 10 if there is evidence of over deflection. If there is no evidence of over deflection at the maximum EHT setting of 255, leave the setting at 255. If over deflection occurs, clean the +ve EHT plate before continuing.

- 9 After calibration of the EHT table as detailed above, the EHT trip sensitivity must be recalibrated as instructed in "Set EHT Trip Level (Normal Operation)" on page 5-27.

Clean Shutdown Check

Stop the jet by pressing **f1**. Ensure that the shutdown procedure operates correctly, i.e. the feed and return tubes are cleared of ink and solvent.

Note: If the machine does not provide an adequate clean start-up or shutdown during these procedures, it is possible that air may have become trapped in the flush pump and flush pipework. See "Removing trapped air" on page 2-9.

Set EHT Trip Level (Normal Operation)

- 1 Ensure the printhead is clean and dry.
- 2 Fit the printhead cover.
- 3 From the *Calibrate* menu select *EHT Trip Level Set*.



- 4 Press **enter**. The display shows "Setting EHT trip level."
- 5 After approximately one minute the display changes to "EHT Trip Test successful."
- 6 Press **enter**.

EHT Trip Test

This procedure must be performed after replacing one or more of the following components:

- I/O PCB
- EHT block assembly
- EHT module

It is NOT necessary perform this procedure during the commissioning process.

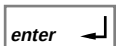


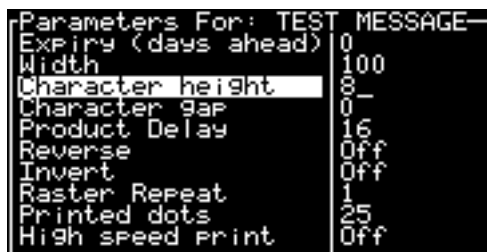
Warning

FIRE HAZARD. This procedure may cause a spark at the printhead. Make sure this procedure is conducted in a well-ventilated area that is free of combustibles such as open ink or top up containers. Use only the recommended tools.

- 1 Open the ink compartment door.
- 2 Remove the electrical connector from Feed Valve V6. This will prevent an ink jet being formed at the printhead nozzle.
- 3 From the *Messages* menu, select *Message Parameters*.



- 4 Press .
- 5 Select *Character height*.



- 6 Set the *Character height* to 10 then press .

- 7 To prevent the machine from shutting down, set the charge/gutter detect to DISABLE as instructed in "Gutter Fault and Charge Error Disable" on page 5-8.
- 8 Fit the modified EHT printhead cover (this cover is included in the Service Tool Kit described in "Service tool kit" on page 13-1).
- 9 Perform a Quick start from the system menu.
- 10 Insert the EHT Trip Tool (this item is also included in the Service Tool Kit) between the +ve deflection plate and the 0V plate. The point of the tool should be towards the +ve plate (lower).
- 11 Ensure that the machine shuts down with an EHT trip indicated on the LCD.
- 12 Refit the electrical connector to Valve V6.
- 13 Close the compartment door.

Print Height Test

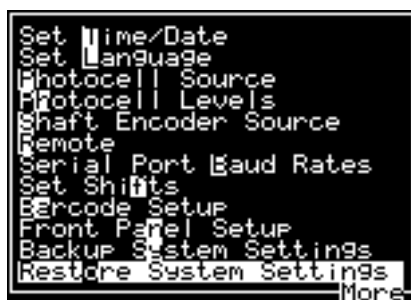
Take two print samples with the printhead between 14 mm and 24 mm from the substrate. Make sure that the minimum and maximum print height specifications are met:

- A 5 drop high message must print a message down to a minimum height of 2 mm.
- A 24 drop high message must print a message up to a maximum of 9 mm.

Restore Calibration Parameters

To restore the previously calibrated parameters:

- 1 From the *Configure* menu select *Restore System Settings*.

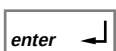


- 2 Press  to restore the settings.

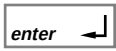
Enable Gutter Detect and Charge Check

- 1 From the *System* menu select *Charge Error Shutdown Disable*.



- 2 Press .
- 3 Select *Charge error* and toggle to *Enable*.



- 4 Select *Gutter fault* and toggle to *Enable*.
- 5 Press  to enable both functions.

This section describes the main components and interconnections. It includes the following tables, which detail connector pin outs:

- Table 6-1 CON CPU CON_K Keypad Connector
- Table 6-2 CPU CON_232 RS232 Serial Interface
- Table 6-3 CPU CON_B I/O Board Interface
- Table 6-4 CPU CON_S RID Synchronous Port
- Table 6-5 CPU CON_P Power Input Connector
- Table 6-6 CPU CON_D Charge Data To I/O
- Table 6-7 CPU CON_L LCD Interface
- Table 6-8 CPU CON_LAN Serial Port
- Table 6-9 I/O Connector PEC1
- Table 6-10 I/O Connector PEC2
- Table 6-11 I/O Connector SENC
- Table 6-12 I/O Connector LEDS
- Table 6-13 I/O Connector T/LIGHT
- Table 6-14 I/O Connector LEVELS
- Table 6-15 I/O Connector CON_B1
- Table 6-16 I/O Connector CON_EX
- Table 6-17 I/O Connector PIGS
- Table 6-18 I/O Connector VALVES
- Table 6-19 I/O Connector CON_BM2
- Table 6-20 I/O Connector CON_BM2
- Table 6-21 I/O Connector P/TRANS
- Table 6-22 I/O Connector HEAD_2
- Table 6-23 I/O Connector CON_BM1
- Table 6-24 I/O Connector HEAD_1
- Table 6-25 I/O Connector CON_P0
- Table 6-26 I/O Connector POWER
- Table 6-27 I/O Connector CH/MOD

- Table 6-28 I/O Connector EHT/FAN
- Table 6-29 I/O Connector FAN_FAIL
- Table 6-30 I/O Connector CON_D
- Table 6-31 I/O Connector B/LIGHT
- Table 6-32 I/O Board Jumper
- Table 6-33 I/O Board Test Points and LEDs
- Table 6-34 PSU Board General Specification
- Table 6-35 PSU Board Output Specifications

Main Assemblies

The printer comprises four main assemblies:

- Cabinet
- Printhead
- Electronics system
- Ink system

Cabinet

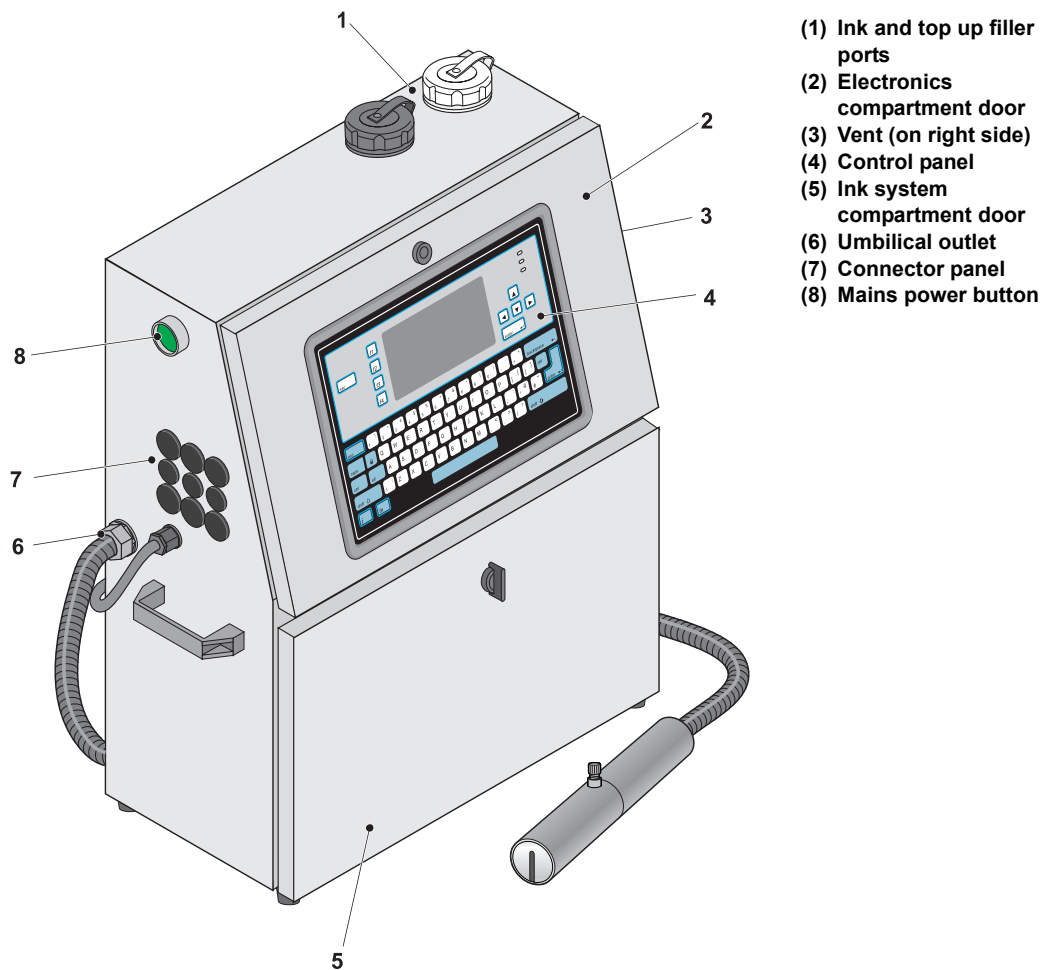


Figure 6-1. Printer Cabinet

The 43s cabinet is constructed of stainless steel. The following additional features are integrated into this structure:

- The ink and top up reservoir caps (1) are provided for easy filling of the internal reservoirs. They are constructed of a plastic material.
- The electronics compartment door (2) is mounted on two hinges and its seal is water resistant when closed. A locking mechanism and compartment key prevent unauthorized access to the potentially lethal voltages housed here. See “Control Electronics” on page 6-14 for more information on the contents of this compartment.
- A vent (3) allows cooling air to enter the cabinet through a filter element.
- The control panel (4) provides the user interface to the printer. See “Control Panel” on page 6-9 for more information.
- The ink system compartment door (5) is mounted on two hinges and its seal is water resistant when closed. See “Ink System” on

page 6-42 for more information on the contents of this compartment.

- The umbilical that connects the printer cabinet to the printhead is attached to the cabinet via a threaded fitting, secured with appropriate nuts and washers.
- The connector panel provides inputs for several types of external devices. See “Connector Panel” on page 6-11 for more information.

Printhead

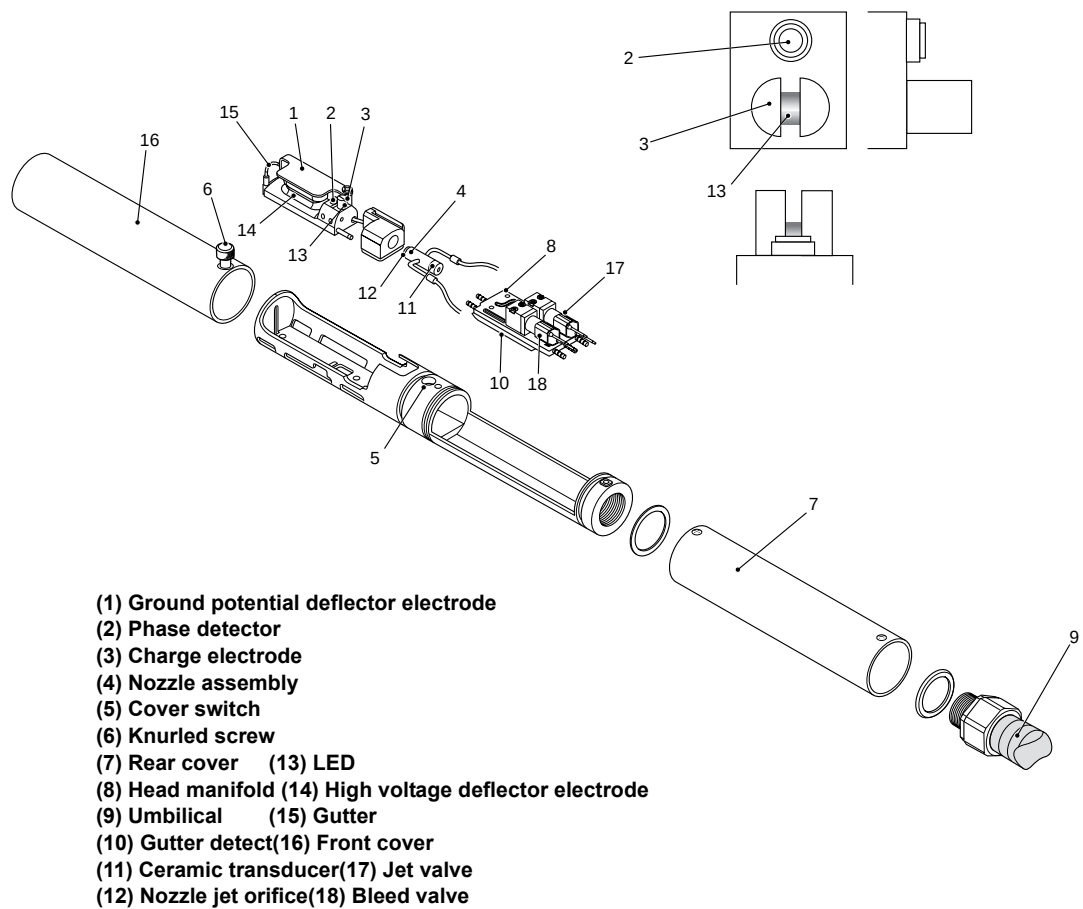


Figure 6-2. Printhead

Construction

The printhead consists of a chassis on which are mounted the following components:

- The nozzle assembly (4) which forms the ink into a stream of droplets as described below:

The jet valve (17) delivers ink from the ink system to the nozzle assembly.

The bleed valve (18) mounted on the heater module block is normally closed, only opening during purging, flushing of the nozzle and start up and shutdown.

The bleed valve when energized removes air from the feed and return pipework and the nozzle when being purged.

A vacuum is also applied through the bleed valve to the nozzle during a nozzle flush.

The ceramic transducer (11) is fed with a modulation signal. The transducer causes the nozzle assembly to vibrate along its length

so that the ink stream from the nozzle jet orifice is formed into individual droplets.

The nozzle jet orifice (12) has a diameter of 60 microns.

- The Light Emitting Diode (LED) (13) is located behind the charge electrode (3). The LED is strobed at the modulation frequency so that the position of individual droplets can be observed with a magnifying glass (x10 minimum). The charge electrode applies an electrical charge to each individual ink droplet. The charge applied to the droplet is variable and affects the position of the droplet on the substrate.
- The phase detector (2) senses the strength of the electrical charge applied to the ink droplets and adjusts the charge pulse timing accordingly.
- The ground potential deflector electrode (1) and the high voltage deflector electrode (14) are parallel rectangular plates. The deflector electrodes generate a constant electrostatic field through which the electrically charged ink droplets pass. The charged ink droplets are deflected by the electrodes, the amount of deflection is dependent on the charge applied to the ink droplet.
- The gutter (15) is the return path for ink droplets which are not used for printing. The gutter delivers the ink back to the ink system.
- The front cover (16) is secured to the printhead by a knurled screw (6). The front cover protects the printhead components. Removal of the cover is sensed by the printer via the cover switch (5). When the cover is removed the voltage to the deflector electrodes is turned off.
- The rear cover (7) protects the printhead internal electrical wiring and ink system tubing.
- The umbilical (9) contains the electrical wiring and ink system tubing from the printer.
- The head heater (8) maintains the temperature of the ink; it consists of a heating element and a temperature sensor.
- The jet valve (17) is mounted on the heater module block. The valve is open whilst printing and closed during the flushing cycle.
- The gutter detect (10) senses when ink is present in the gutter. It's ink feed tubes are metallic and a signal is fed to one of them. A signal return lead is connected to the other. When ink (which is conductive) is present, the signal passes through it to the return lead. The gutter detect signal is then fed, via the umbilical, to the I/O board in the electronics system.

Wiring diagrams for the printhead electrical and ink systems are shown in Figure 6-3 and Figure 6-4.

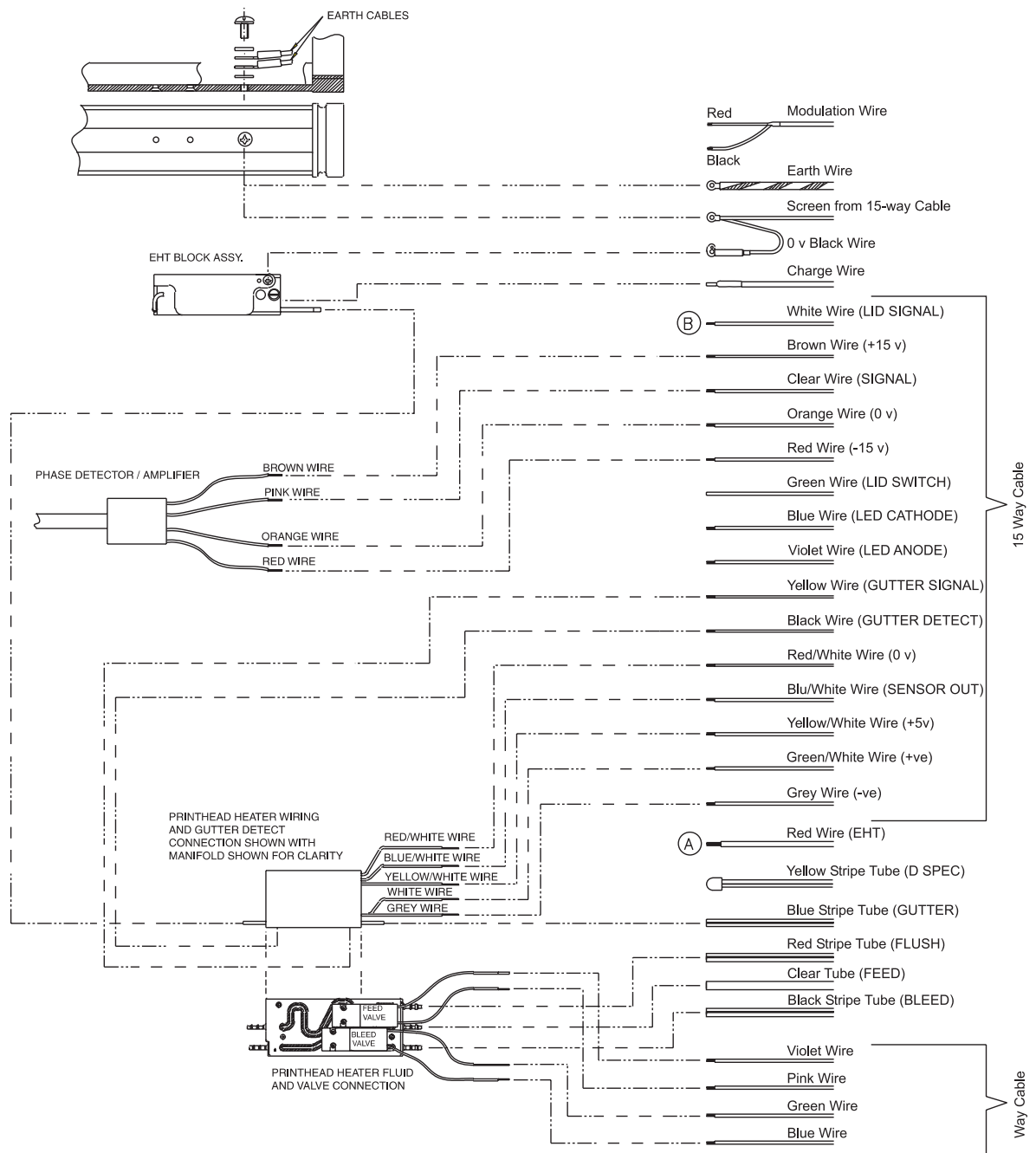


Figure 6-3. Printhead Electrics and Ink System Wiring Diagram

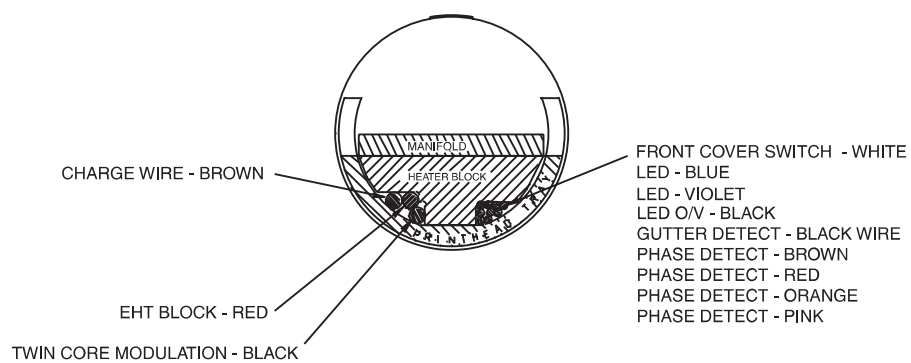


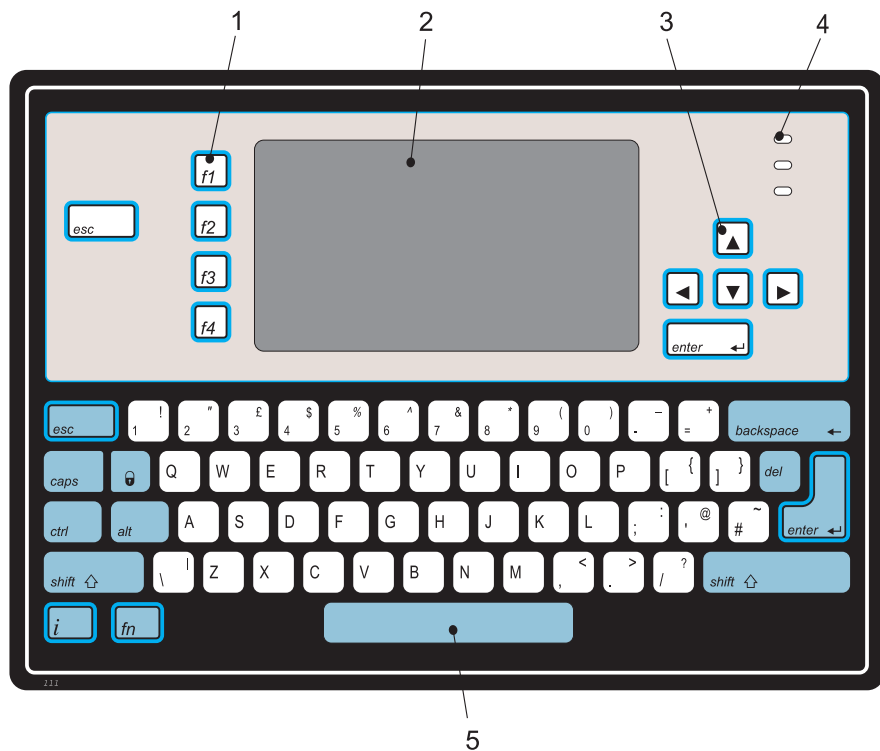
Figure 6-4. Wire routing under printhead manifold block

Electronics System

The printer electronics system comprises the following:

- Control panel.
- Connector panel.
- Control electronics.
- Electronics modules.

Control Panel



- (1) Function keys (4) Status LEDs
 (2) Liquid Crystal Display (LCD) (5) Keypad
 (3) Arrow keys

Figure 6-5. Control Panel

The control panel consists of the following:

- A 70 key industrial grade membrane keypad (5). The keypad is self-adhesive for ease of mounting and is fixed to the electronics compartment door.
- A 240 x 128 pixel backlit Liquid Crystal Display (LCD) (2). The display has a viewing area of 120 mm x 64 mm. The display is mounted on four insulated studs, which in turn are mounted on the back of the electronics compartment door.
- Basic printer control is provided by four function keys (1) to the left of the LCD screen:

f1 Clean start or stop the ink jet.

f2 Select a message for printing.

f3 Access the menu screen.

f4 Display key status and character set(s) selected for the keypad.

- The arrow keys (3) to the right of the display allow you to navigate through the software menu system.
- The light emitting diodes (4) on the top right of the display indicate the system status as follows;

LAMP(S) ILLUMINATED	SYSTEM STATUS
RED	Any fault that prevents printing, e.g. jet not running, EHT trip.
AMBER and GREEN	The printer requires user intervention to prevent a system fault occurring, e.g. ink or top-up low.
GREEN	The printer is able to print correctly.

Connector Panel

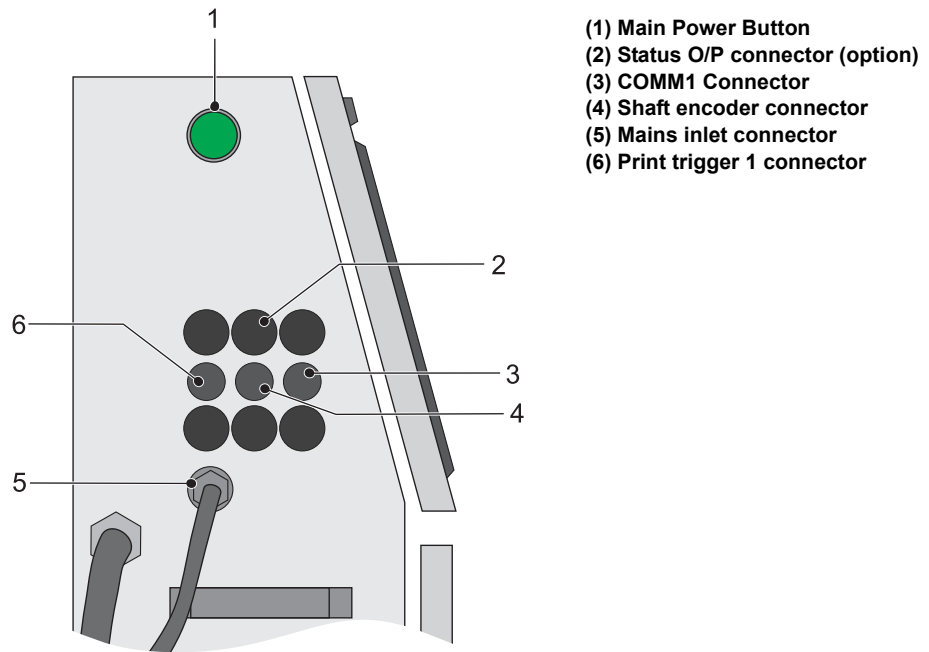


Figure 6-6. Connector Panel

The connector panel is a stainless steel pre-drilled plate fitted to the printer base and secured by four screws. The connector panel is fitted with the components listed below.

- A mains inlet connector (5) and main power button (1).
- A 3 way DIN connector (6) for print trigger 1.
- A 4 way DIN connector (4) for a shaft encoder.
- A 5 way DIN connector (3) for an RS-232 serial communications link. RS-232 can only be used over relatively short distances (15 meters maximum).
- A 6-way DIN connector (2) for a set of status traffic lights (optional).

Print Trigger 1 Connector

The printer provides a 12V 200mA DC total output for use by a photoelectric Cell (PEC), inductive proximity detector or micro switch. The pin allocation of the print trigger 1 connector (Item 6 in Figure 6-6) is as follows:

Pin	Function
DIN Pin 1	+12V DC supply to sensor.
DIN Pin 2	Sensor output.
DIN Pin 3	0V DC common.

Shaft Encoder Connector

The printer provides a 12 V (200 mA DC total) output for use by a shaft encoder with a maximum frequency of 100 kHz. The pin allocation of the shaft encoder connector (Item 4 in Figure 6-6) is as follows:

Pin	Function
DIN Pin 1	+12 V DC supply to shaft encoder.
DIN Pin 2	Shaft encoder output "A."
DIN Pin 3	Shaft encoder output "B."
Din Pin 4	0V DC common.

Note: The shaft encoder output must of the PUSH/PULL type.

COMM 1 Connector

The printer has an RS-232 communication port linked to the COMM1 connector (Item 3 in Figure 6-6) the pin allocation is as follows:

Pin	Function
DIN Pin 1	0VDC common.
DIN Pin 2	Transmit data out from the printer.
DIN Pin 3	Received data into the printer.
Din Pin 4	DTR output from the printer.
Din Pin 5	DCD input to the printer.

Status O/P Connector

The printer provides an output for a set of status traffic lights via the STATUS O/P connector. The pin allocation of the connector (Item 2 in Figure 6-6) is as follows:

Pin	Function
Din Pin 1	Red lamp negative supply.
Din Pin 2	Amber lamp negative supply.
DIN Pin 3	Green lamp negative supply.
Din Pin 4	+24V DC supply to the strobe/siren.
Din Pin 5	Strobe/siren negative supply.
DIN Pin 6	+24V DC common to the traffic lights.

Control Electronics

General

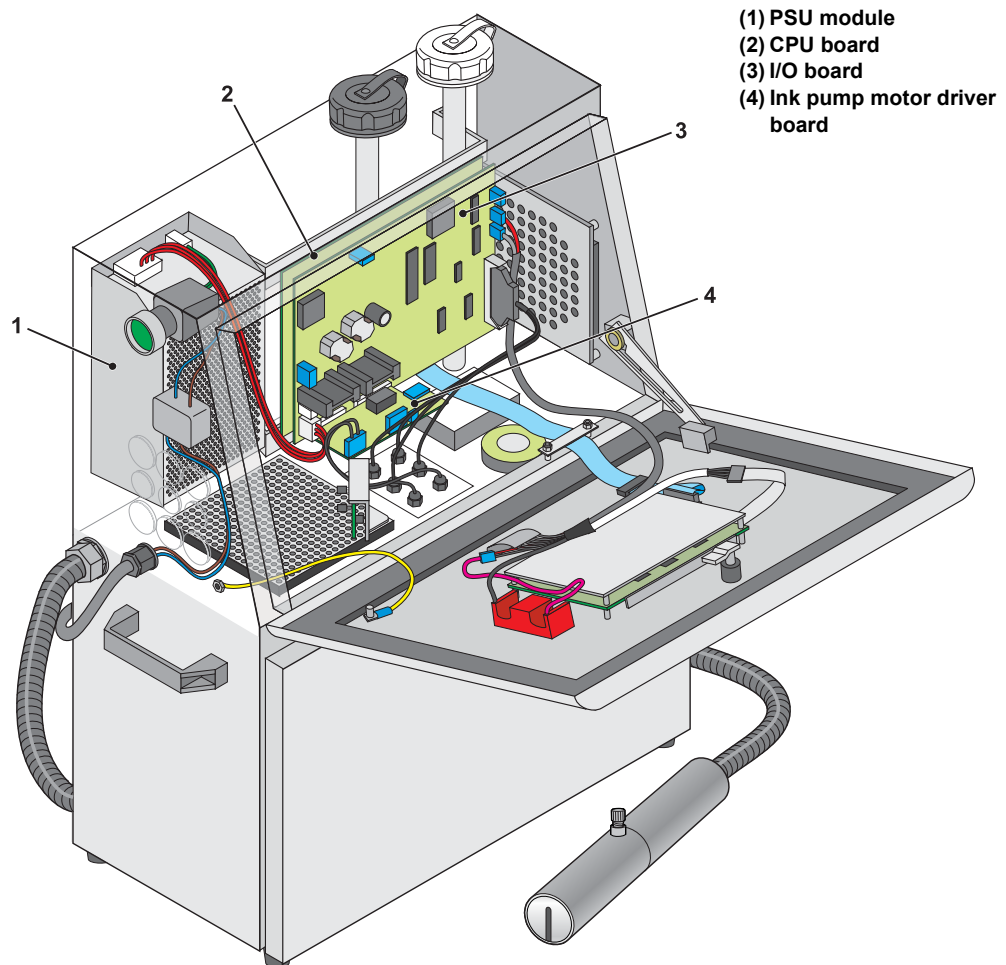


Figure 6-7. Control Electronics

The control electronics in 43s printers is based on a common Central Processing Unit (CPU) board (2), and an INPUT/OUTPUT (I/O) board (3).

For the 43S printer to operate as designed, it has three other electronic component parts. These are the modular power supply (PSU) (1), the Liquid Crystal Display (LCD) and the integral keypad. The PSU connects directly to the I/O board, but the LCD and KEYPAD connect directly to the CPU. Note that the LCD backlight inverter connects to the I/O board.

The printer can be interrogated over a serial link in order to assess performance. This serial link can be a direct RS-232 connection to a local personal computer or via a MODEM and the telephone network.

CPU Board

The CPU Board circuit diagram is included Appendix A in this manual.

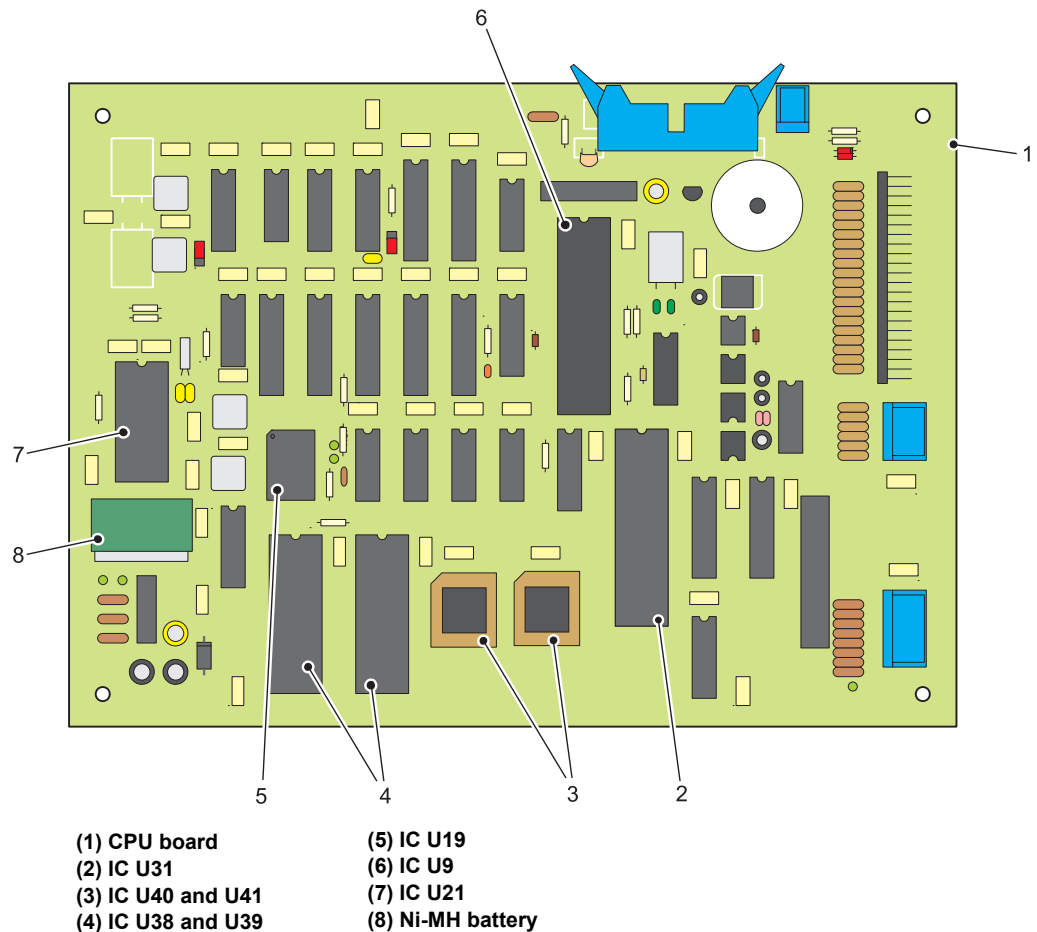


Figure 6-8. CPU Board Major Components

Major Components

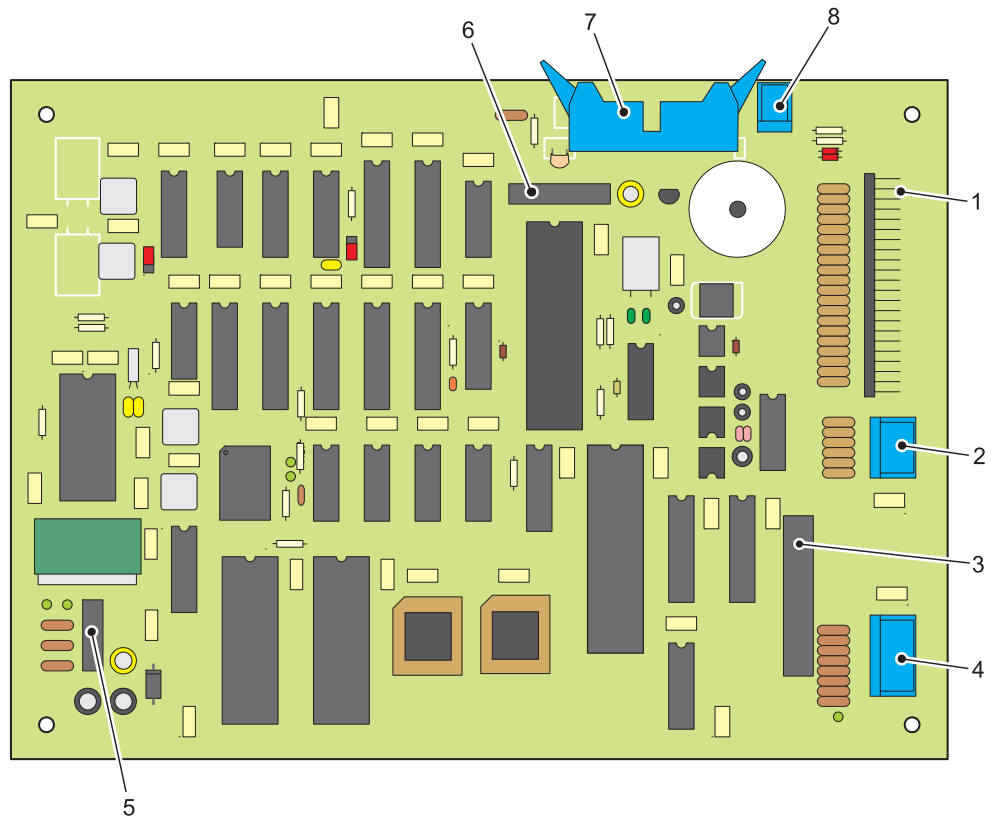
The CPU board (Item 1 in Figure 6-8) contains the hardware and software for system control. It comprises the following major components:

- The CPU board (1) is a multi-layered motherboard that monitors and controls all of the major printer functions. The board interfaces with the I/O board, PSU module, expansion board (if fitted) and external devices (if connected) to provide an integrated product coding system.
- Integrated Circuit (IC) U31 (2) produces keyboard drive signals to determine which key has been pressed.
- IC U40 and IC U41 (3) are flash memory devices and are programmed by Videojet to hold the following information:
application software
printer default setup

- IC U38 and IC U39 (4) are two integrated circuit Random Access Memory (RAM) devices that contain the printer configuration, calibration and message storage memory. To avoid loss of data when the printer is switched off they are backed up by a Nickel Metal Hydride (Ni-MH) battery.
- IC U19 (5) is the microprocessor that monitors incoming data from the I/O ports and translates software commands into machine statements that control the electronic system and ink system to produce a printed message.
- IC U21 (7) is a Real Time Clock (RTC) which contains a clock/calendar. It has a battery backup so that the current time and date do not have to be manually set each time the printer is switched on.
- The Ni-MH battery (8) supplies the voltage necessary to retain Real Time Clock (RTC) and RAM data when the printer is switched OFF. The battery is automatically charged when the printer is switched ON.
- IC U9 (6) is a Dual Universal Asynchronous Receive Transmit (DUART) which can be configured to interface with different devices to transmit and receive data.

Connectors

The CPU board connectors shown in Figure 6-9. Pinout details are given in the tables that follow.



(1) CON_K (Interboard connector)
 (2) CON_232
 (3) CON_B (Interboard connector)
 (4) CON_S

(5) CON_P (Interboard connector)
 (6) CON_D (Interboard connector)
 (7) CON_L
 (8) CON_LAN

Figure 6-9. CPU Board Connectors

CON_K (Item 1 in Figure 6-9) is connected to the keypad					
Pin	Signal	Function	Pin	Signal	Function
1	GND	EMC earth connection	12	SL1	Scan line 1
2	ALT	ALT key	13	SL2	Scan line 2
3	CTL	Control key	14	SL3	Scan line 3
4	SFT	Shift key	15	SL4	Scan line 4
5	0V	Scan line 7	16	SL5	Scan line 5
6	SL7	Return line 0	17	SL6	Scan line 6
7	RL0		18	RL4	Return line 4
8	RL1	Return line 1	19	RL5	Return line 5
9	RL2	Return line 2	20	RL6	Return line 6
10	RL3	Return line 3	21	RL7	Return line 7
11	SL0	Scan line 0	22	GND	EMC earth connection

Table 6-1: CON CPU CON_K Keypad Connector

CON_232 (2) is a RS232 serial communications port (COM1) and can be connected to any other device which supports RS232.					
Pin	Signal	Function	Pin	Signal	Function
1	TXDA	Transmit data	4	DCD	Data carrier detect
2	DTR	Data terminal ready	5	COM	Common
3	RXDA	Receive data	6	-	+8V

Table 6-2: CPU CON_232 RS232 Serial Interface

CON_B (3) is an interboard connector which connects the CPU board to the I/O board.					
Pin	Signal	Function	Pin	Signal	Function
1	0 V	Common	11	opto I/O	Expansion board enable
2	Sel2	Not used	12	adc	A/D converter output enable
3	ex1	Photocell 1 input	13-20	cb0 to cb7	Control bus bits 0 to 7
4	ex2	Phase detector	21-28	db0 to db7	Data bus bits 0 to 7
5	ex3	A-D end of conversion	29	qddc	D/A converter output enable
6	ex4	Phase detector	30	levels	Optical level sensors select
7	ex5	Photocell 2/shaft encoder quadrature input	31	I/O	PPI enable
8	sel3	Print/phase	32	sft-enc	Shaft encoder input
9	strobe	LED strobe	33	extra1	Traffic light enable
10	PWM	Pump control (pulse width modulation)	34	contrast	LCD contrast voltage

Table 6-3: Table 5 CPU CON_B I/O Board Interface

CON_S (4) is a high speed synchronous port					
Pin	Signal	Function	Pin	Signal	Function
1	TXD	Asynchronous transmit output	5	SDATA	Synchronous data
2	RXD	Asynchronous receive input	6	SDEN0	Synchronous enable 0
3	0 V	Asynchronous data common	7	SDEN1	Synchronous enable 1
4	SCLK	Synchronous clock	8	0 V	Synchronous common

Table 6-4: CPU CON_S RID Synchronous Port

CON_P (5) is an interboard connector which connects the CPU board to the I/O board.					
Pin	Signal	Function	Pin No.	Signal	Function
1 to 4	0 V	Common in out from PSU (via I/O)	11 and 12	- 15 V	- 15 V input from PSU (via I/O)
5 to 8	+5 V	+5 V input from PSU (via I/O)	13 and 14	GND	via I/O
9 and 10	+15 V	+15 V input from PSU (via I/O)			

Table 6-5: CPU CON_P Power Input Connector

CON_D (6) is an interboard connector which connects the CPU board to the I/O board.		
Pin	Signal	Function
1 to 8	00 - 07	Droplet charge data
9 and 10	0 V	Common
11 to 20	-	Not used at present

Table 6-6: CPU CON_D Charge Data To I/O

CON_L (7) is connected to the LCD.					
Pin	Signal	Function	Pin	Signal	Function
1	GND	Ground	8	Ia1	Control bus bit 7
2	0 V		9	-	Not connected
3	VCC	+5 V	10	RESET	LCD controller reset
4	CONTRAST	LCD contrast	11 to 18	ad0 to ad7	Data lines
5	WR	Write	19	0 V	Font Select
6	RD	Read	20	sel5	Select inverse video
7	lcd ce	LCD chip enable			

Table 6-7: CPU CON_L LCD Interface

CON_LAN (8) is a serial communications port (COM2). The logic level signals at this connector are converted by the optional expansion card for use with a modem, 20 mA current loop or RS485 interface.

Pin	Signal	Function	Pin	Signal	Function
1	+15 V	+15 VDC power	5	DTR	Data terminal ready
2	VCC	+5 VDC power	6	0 V	Common
3	RXDB	Receive data	7	RXDB	Receive data (via inverter)
4	TXDB	Transmit data	8	TXDB	Transmit data (via inverter)

Notes: Pins 7 and 8 of the CPU CON_LAN serial port are for use with a modem. Link W3 (8) must be fitted if COM2 is to be used with the optional expansion card and internal modem.
Link W3 must be removed if COM2 is to be used with the expansion card 20 mA current loop or RS485 interface.

Table 6-8: CPU CON_LAN Serial Port

I/O Board

The I/O board Figure 22 (3) is mounted over the CPU board and interfaces the printer to the following:

- the ink system;
- product sensors;
- external devices.

The I/O board is connected to the CPU board via interboard connectors CON_B1, CON_D and CON_P0. The I/O Board Circuit Diagram is included Appendix A in this manual.

Major Components

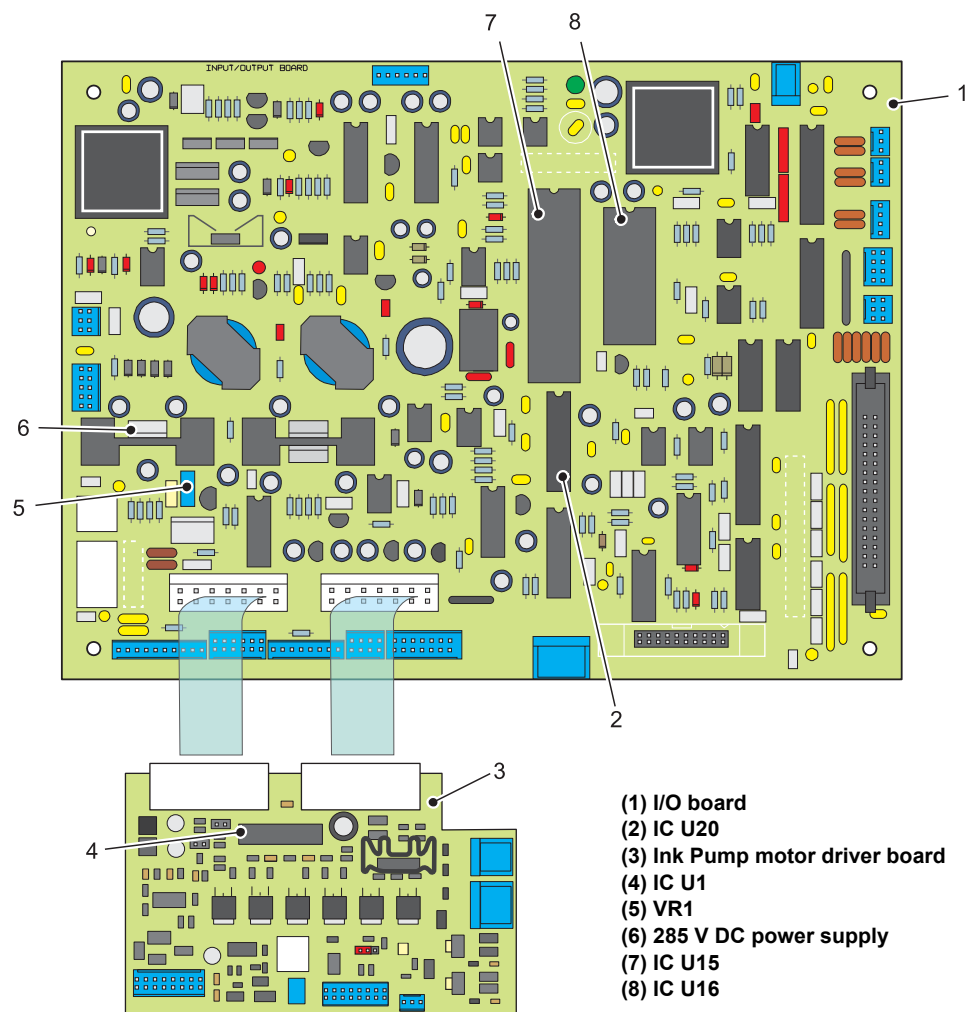


Figure 6-10. I/O Board Major Components

- IC U20 (2) is a Quadruple Digital to Analogue Converter (QDAC) which converts digital inputs into analogue 0 to +5 volt signals to control functions on the I/O board.
- The ink pump motor drive board (3) acts as an interface between the I/O board and the ink system pump motor, it is connected to the I/O board via connectors CON_BM1 and CON_BM2. IC U1 (4)

acts as the ink pump motor controller. A circuit diagram of the board is supplied in Appendix A in this manual.

- The 300 VDC power supply (6) provides the voltage supply to the charge amplifier which is used to charge the ink droplets.
- IC U15 (7) is a Programmable Peripheral Interface (PPI) which is used to read the states of various sensors and control functions and to switch control valves and some supervisory lines.
- IC U16 (8) is an Analogue to Digital Converter (ADC) which is used to convert analogue inputs from the ink system into an 8 bit value for ink system control.

Connectors

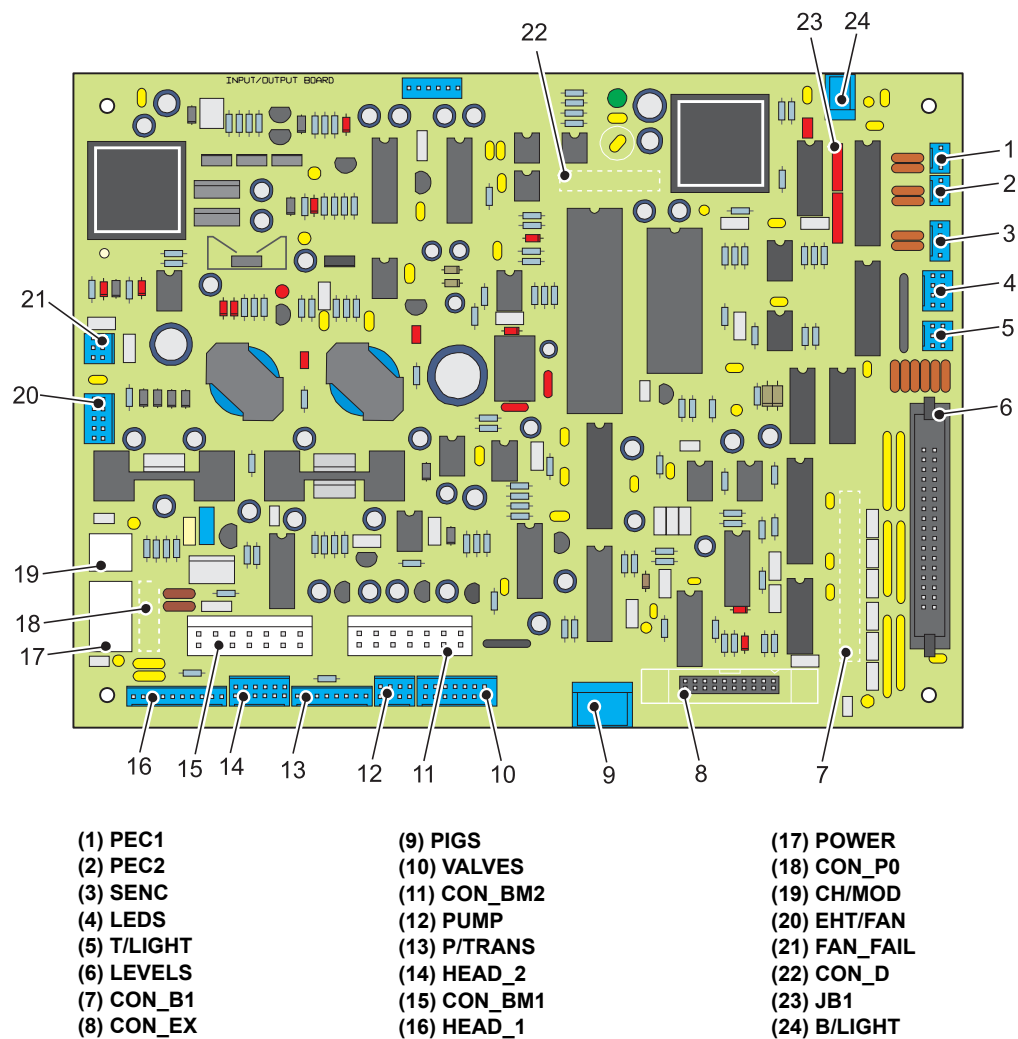


Figure 6-11. I/O Board Connectors

PEC1 (1) - Product sensor 1 via the connector panel.		
Pin No.	Signal	Function
1	+V0	Positive DC supply to sensor
2	EXT PEC 1/2	Input from sensor
3	0 V	Common

Table 6-9: I/O Connector PEC1

PEC2 (2) - Product sensor 2 via the connector panel.		
Pin No.	Signal	Function
1	+V0	Positive DC supply to sensor
2	EXT PEC 1/2	Input from sensor
3	0 V	Common

Table 6-10: I/O Connector PEC2

SENC (3) - Shaft encoder via the connector panel.		
Pin No.	Signal	Function
1	+V0	Positive DC supply to shaft encoder
2	SHAFT ENCODER A	Input A from shaft encoder
3	SHAFT ENCODER B	Input B from shaft encoder
4	0 V	Common

Table 6-11: I/O Connector SENC

LEDS (4) - LEDs are fitted on the front panel to mimic traffic lights.					
Pin	Signal	Function	Pin	Signal	Function
1	Red +	Red LED anode (+)	5	Red -	Red LED cathode (-)
2	Yellow +	Yellow LED anode (+)	6	Yellow -	Yellow LED cathode (-)
3	Green +	Green LED anode (+)	7	Green -	Green LED cathode (-)
4	Strobe +	Strobe LED anode (+)	8	Strobe -	Strobe LED cathode (-)

Table 6-12: I/O Connector LEDS

**Caution**

EQUIPMENT DAMAGE. The I/O Board LEDS connector must not be used to drive anything other than LEDs as specified otherwise damage may occur.

T/LIGHT (5) - Status traffic lights via the connector panel.					
Pin	Signal	Function	Pin	Signal	Function
1	+24 V	+24 V DC to all lights	4	0 V GREEN	Negative supply for green lamp
2	0 V RED	Negative supply for red lamp	5	+24 V	+24 V DC to strobe/siren
3	0 V AMBER	Negative supply for amber lamp	6	0 V STROBE	Negative supply for strobe

Table 6-13: I/O Connector T/LIGHT

LEVELS (6) - Ink system level sensors.					
Pin	Signal	Function	Pin	Signal	Function
1	+5 V	+5 V, Mixer low sensor LED anode	18	+5 V	+5 V, VMS high sensor photo transistor collector
2	+5 V	+5 V, Mixer low sensor photo transistor collector	19	0 V	0 V, VMS high sensor LED cathode
3	0 V	0 V, Mixer low sensor LED cathode	20	lev5	VMS high sensor output
4	lev1	Mixer low sensor output	21	+5 V	+5 V, Ink res. low sensor LED anode
5	+5 V	+5 V, Mixer OK sensor LED anode	22	+5 V	+5 V Ink res. low sensor photo transistor collector
6	+5 V	+5 V, Mixer OK sensor photo transistor collector	23	0 V	0 V, Ink res. low sensor LED cathode
7	0 V	0 V, Mixer OK sensor LED cathode	24	lev6	Ink res. low sensor output
8	lev 2	Mixer OK sensor output	25	+5 V	+5 V, Solvent res. low sensor LED anode
9	+5 V	+5 V, Mixer high sensor LED anode	26	+5 V	+5 V, solvent res. low sensor photo transistor collector
10	+5 V	+5 V, Mixer high sensor photo transistor collector	27	0 V	0 V, Solvent res. low sensor LED cathode
11	0 V	0 V, Mixer high sensor LED cathode	28	lev7	Solvent res. low sensor output
12	lev3	Mixer high sensor output	29	+15 V	
13	+5 V	+5 V, VMS low sensor LED anode	30	0 V	
14	+5 V	+5 V, VMS low sensor photo transistor collector	31	- 15 V	
15	0 V	0 V, VMS low sensor LED cathode	32	0 V	
16	lev4	VMS low sensor output	33	GND	
17	+5 V	+5 V, VMS high sensor LED anode	34	GND	

Table 6-14: I/O Connector LEVELS

CON_B1 (7) - Interboard connector to I/O board to the CPU board.					
Pin	Signal	Function	Pin	Signal	Function
1	0 V		11	opto I/O	E
2	-	Not used	12	adc	A/D converter output enable
3	pec1	Photocell 1 output	13 to 20	cb0 to cb7	Control bus bits 0 to 7
4	phase det	Phase detector	21 to 28	db0 to db7	Data bus bits 0 to 7
5	ADEO C	A-D end of conversion	29	qddc	D/A converter output enable
6	phase det	Phase detector	30	levels	Optical level sensors enable
7	pec2	Photocell 2/shaft encoder quadrature output	31	pcs3	PPI enable
8	print/phase	Print/phase	32	shaft enc	Shaft encoder output
9	strobe	LED strobe	33	extra 1	Traffic light enable
10	pwm	Pump control (pulse width modulation)	34	contrast	LCD contrast

Table 6-15: Table 17 I/O Connector CON_B1

CON_EX (8) - Interboard connector to I/O board to the optional expansion board.					
Pin	Signal	Function	Pin	Signal	Function
1	VCC	+5 V DC	15	TACHO	For use with external DC tachometer
2 to 9	db0 to db7	Data bus bits 0 to 7	16	0 V	
10		External message select	17	0 V	
11		Opto-isolated output select	18	+24 V	
12	cb6	Control bus bit 6 (not used)	19	- 24 V	
13	cb7	Control bus bit 7 (not used)	20	GND	
14	cb0	Control bus bit 0 (not used)			

Table 6-16: I/O Connector CON_EX

PIGS (9) - Will be used in future models for an ink heater/cooler system.					
Pin	Signal	Function	Pin	Signal	Function
1	+24 V		4	0 V	
2	BULK HEAT		5	HEATER	Heater/cooler on/off
3	+24 V		6	0 V	

Table 6-17: I/O Connector PIGS

VALVES (10) - Ink system solenoid valves.					
Pin	Signal	Function	Pin	Signal	Function
1	+24 V	+24 V DC to solvent top up valve V1	9	+24 V	+24 V DC to feed valve V6
2	- ve	Solvent top up valve control signal	10	- ve	Ink feed valve control signal
3	+24 V	+24 V DC to Ink top up valve V2	11	+24 V	+24 V DC to gutter valve V8
4	- ve	Ink top up valve control signal	12	- ve	Gutter valve control signal
5	+24 V	+24 V DC to VMS diverter valve V3	13	+24 V	+24 V DC auto power off
6	- ve	VMS diverter valve control signal	14	- ve	Auto power off control signal
7	+24 V	+24 V DC to solvent flush valve V4	15	+24 V	+24 V DC to purge valve V10
8	- ve	Solvent flush valve control signal	16	- ve	Purge valve control signal

Table 6-18: I/O Connector VALVES

CON_BM2 (11) - Ink pump motor driver board.					
Pin	Signal	Function	Pin	Signal	Function
1	B OUT	Stator drive B (green)	5	HC	Position signal from Hall effect sensor C (green)
2	A OUT	Stator drive A (black)	6	0 V	Hall effect sensor -ve supply
3	C OUT	Stator drive C (white)	7	HB	Position signal from Hall effect sensor B (white)
4	+6 V	Hall effect sensor +ve supply	8	HA	Position signal from Hall effect sensor A (blue)

Table 6-19: I/O Connector CON_BM2

PUMP (12) - Ink system pump.					
Pin	Signal	Function	Pin	Signal	Function
1	B OUT	Stator drive B	5	HC	Position signal from Hall effect sensor C
2	A OUT	Stator drive A	6	0 V	Hall effect sensor -ve supply
3	C OUT	Stator drive C	7	HB	Position signal from Hall effect sensor B
4	+6 V	Hall effect sensor +ve supply	8	HA	Position signal from Hall effect sensor A

Table 6-20: I/O Connector CON_BM2

P/TRANS (13) - Ink system temperature sensor and the pressure transducer.					
Pin	Signal	Function	Pin	Signal	Function
1	+10 V	+10 V DC supply voltage to transducer	5	BULK INK TEMPERATURE	Output from mixer tank temperature sensor
2	+ve	+ve output from transducer	6	0 V	0 V to temperature sensor
3	- ve	- ve output from transducer	7	+5 V	+5 V DC to temperature sensor
4	0 V	0 V to transducer	8	GND	

Table 6-21: I/O Connector P/TRANS

HEAD_2 (14) - Printhead connector 2 via the umbilical					
Pin	Signal	Function	Pin	Signal	Function
1	VCC	+5 V DC	7	0 V	
2	Not used		8	+5 V	+5 V DC to temp sensor
3	Not used		9	HE temp	Head temp sensor output
4	0 V		10	0 V	0 V to temp sensor
5	VCC	+5 V DC	11		Head heater return
6	Fire sensor	Fire sensor (not used at present)	12	+24 V	+24 V to head heater

Table 6-22: I/O Connector HEAD_2

CON_BM1 (15) - Ink pump motor driver board.					
Pin	Signal	Function	Pin	Signal	Function
1	+24 V	Supplies to motor control board	5	ENABLE	Enable ink pump motor
2	0 V		6	PRESS TRANS I/P	Pressure transducer input
3	+15 V		7	REQ PRESS I/P	Requested pressure input
4	- 15 V		8	GND	

Table 6-23: I/O Connector CON_BM1

HEAD_1 (16) - Printhead connector 1 via the umbilical.					
Pin	Signal	Function	Pin	Signal	Function
1	+12 V	+12 V DC to phase detector amplifier	6	0 V	0 V connection to LED cathodes
2	- 12 V	- 12 V DC to phase detector amplifier	7	STROBE LED	Strobe signal to LED anode
3	0 V	0 V connection to phase detector amplifier	8		Signal from phase detector amp
4	GUTTER DETECT	Oscillator signal to gutter detect	9	LID SWITCH	+ve to lid switch
5	0 V	0 V connection to gutter detect	10	0 V	0 V connection to lid switch

Table 6-24: I/O Connector HEAD_1

CON_P0 (17) - Interboard connector from I/O board to CPU board. It carries the DC voltages from the PSU.					
Pin	Signal	Function	Pin	Signal	Function
1 to 4	0 V	0 V	11 and 12	- 15 V	- 15 V DC to CPU
5 to 8	+5 V	+5 V DC to CPU	13 and 14	GND	
9 and 10	+15 V	+15 V DC to CPU			

Table 6-25: I/O Connector CON_P0

POWER (18) - PSU.					
Pin	Signal	Function	Pin	Signal	Function
1	15 V	15 V DC from PSU	5	+5 V	+5 V DC from PSU
2	0 V	0 V from PSU	6	+24 V	+24 V DC from PSU
3	+5 V	+5 V DC from PSU	7	0 V	0 V from PSU
4	- 15 V	- 15 V DC from PSU	8	- 24 V	- 24 V DC from I/O board

Table 6-26: I/O Connector POWER

CH/MOD (19) - Printhead via the umbilical.					
Pin	Signal	Function	Pin	Signal	Function
1	CHARGE	Charge amplifier output	3	mod 1a	Modulation 0 V
2	0 V CHARGE	Charge amplifier 0 V	4	mod 1b	Modulation signal output

Table 6-27: I/O Connector CH/MOD

EHT/FAN (20) - Cooling fan and EHT module.					
Pin	Signal	Function	Pin	Signal	Function
1	0 V	0 V	6	EHT +	+ve supply to EHT module
2	+24 V SW	+24 V DC (switched)	7	EHT -	- ve supply to EHT module
3	PUMP	+24 V DC	8	VCC	+5 V DC
4	+24 V SW	+ 24 V DC (switched) fan	9	Lev 8	Spare digital input
5	FAN	- ve fan supply	10	0 V	0 V

Table 6-28: I/O Connector EHT/FAN

FAN_FAIL (21) - Fan failure sensor PCB.					
Pin	Signal	Function	Pin	Signal	Function
1	+ve in	Fan fail +ve input	4		
2	+5 V	+5 V DC supply to fan fail PCB	5	0 V	0 V supply to fan fail PCB
3			6	- ve in	Fan fail -ve input

Table 6-29: I/O Connector FAN_FAIL

CON_D (22) - Interboard connector from I/O board to CPU board.					
Pin	Signal	Function	Pin	Signal	Function
1 to 8	dd0 to dd7	Droplet charge data	10	0 V	Common
9	-	Not used	11-20	-	Not used

Table 6-30: I/O Connector CON_D

B/LIGHT (24) - Backlight of the Liquid Crystal Display (LCD)		
Pin	Signal	Function
1	+24 V	+24 V DC to backlight inverter
2	- ve BKLT	Backlight -ve supply
3	GND	

Table 6-31: I/O Connector B/LIGHT

JB1 (23)	Used to configure the photocell inputs PEC1 and PEC2. PEC1 is connected to product error 1 via the connector panel. PEC2 is connected to product error 2 via the connector panel.
----------	---

Table 6-32: I/O Board Jumper

Test point	Signal
TP1 (14)	0 V.
TP2 (8)	+285 V DC charge amplifier supply.

LED	Colour	Function
LED1 (11)	green	Customer 10 V isolated supply present.
LED2 (9)	red	Charge amplifier supply.

Table 6-33: I/O Board Test Points and LEDs

Test point	Signal
TP3 (12)	Ink temperature at viscometer delivery line.
TP4 (7)	Charge voltage to print-head.
TP5 (13)	Ink system pressure (1 V — 1 bar).
TP6 (4)	Modulation drive voltage to printhead.
TP7 (2)	Phase detector output prior to hedgehog clipping.
TP8 (3)	0 V.
TP9 (1)	+5 V (can be used with logic probe).

LED	Colour	Function
LED3 (6)	yellow	-24 V.
LED4 (5)	red	-15 V charge amplifier.
LED5 (10)	green	+24 V valve/fan/heater supply.

Table 6-33: I/O Board Test Points and LEDs

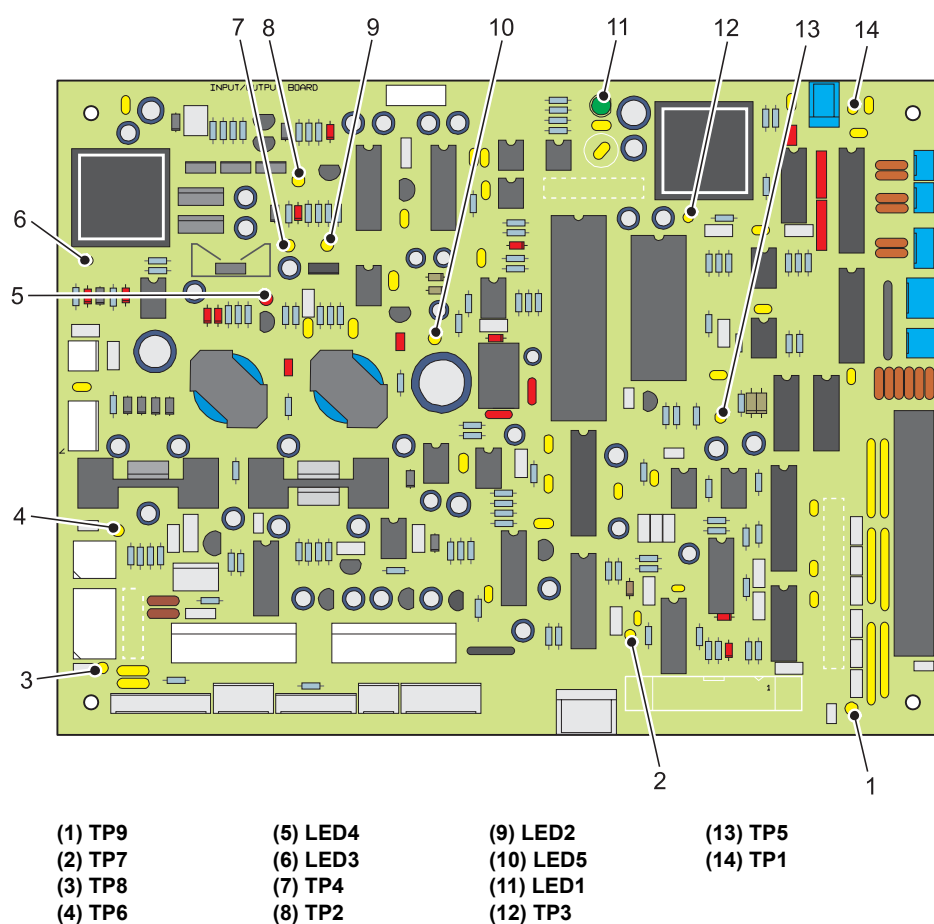


Figure 6-12. I/O Board Test Points and LEDs

Ink Pump Motor Driver Board

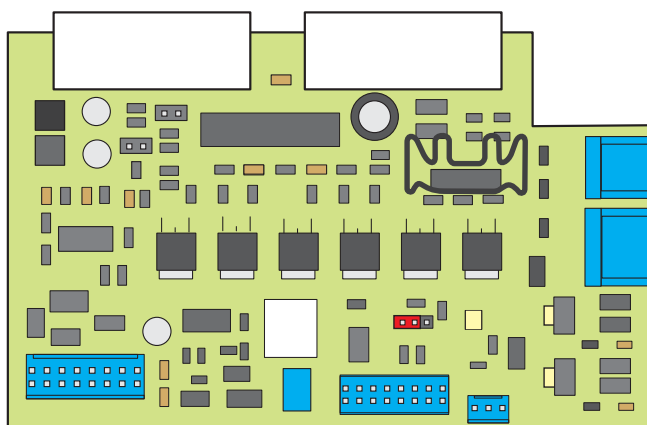


Figure 6-13. Ink Pump Motor Driver Board

The Ink Pump Motor Driver Board circuit diagram is included Appendix A in this manual.

The Ink Pump Motor Driver Board is a separate plug-in PCB, which is based on the Motorola MC33033 controller. It contains the controller logic and drive circuits to control the three phase brushless motor with Hall effect position sensors, which are used to drive the pump.

The speed of the motor is determined by the Pulse Width Modulation (PWM) input from the I/O board and feedback from the pressure transducer. The PWM level is buffered by U4A and the pressure signal is inverted by U4B. These signals are combined in the error amplifier U4C with an offset generated by R24 and the -12 V supply. U4C and U4D form an integrator with a time constant of 100 ms defined by C6 and R18. The output of the integrator is coupled to the motor controller via diode D1 preventing the input to the controller becoming negative. The effect of the pressure feedback and the integrator reduces the motor speed as the pressure reaches the level set by the PWM input. The motor speed is regulated by the controllers internal PWM circuit.

The motor controller IC receives position signals from the hall effect sensors on the motor. The internal logic determines which of the output drivers are active. The output drivers drive six power FETs which switch power to the motor coils. Only two FETs, one P channel top FET and one N channel bottom FET are on at any time. The sources of the bottom FETs are fed through a sensing resistor, which feeds a voltage proportional to the motor current into the controller. If the voltage exceeds 100 mV, equivalent to a 2 A motor current, the controller uses its internal PWM system to reduce the motor drive current.

The amplifier/integrator U4 power supply is ± 12 V derived from the ± 15 V supplies from the I/O board. And the motor supply is taken

from the +24 V supply via an adjustable 3 A regulator set to a nominal 22.5 V. The Hall effect sensors are supplied from the 6.25 V reference supply from the controller IC.

The motor controller PCB has two links fitted to enable the sensors to be either 60 degree or 120 degree types controlling the direction of the motor. The normal configuration of the board has no links fitted.

The controller is also capable of driving a brushed motor by setting the sensor inputs to a fixed configuration and using only two of the motor driver outputs. This can be most easily achieved by wiring the motor connector to the required configuration. It is then possible to use the same motor controller and I/O boards in machines using both brushed and brushless motors without changing the board set up.

Also included on this board is a circuit to oscillate the gutter valve on and off at a pre-selectable frequency of

3 Hz or 6 Hz. Selectable by J4, which can also disable the circuit. The effect of this circuit is to reduce the solvent consumption caused by sucking back excess air. This valve oscillation only occurs when the machine is printing, or is ready to print. i.e. EHT is on, therefore it is inhibited when the EHT is off via J5 and J3 pin 1 going low. When the EHT is on ISO1 shorts out R44 therefore pulling the reference on U7 pin 13 up and enabling a square wave output from the comparator U7d.

The Quad Op-Amp U7 forms an astable oscillator which creates a triangular wave output on pin 8 which is fed into the comparator to generate the square wave output required to switch Q7 on and off. R 40 is used to adjust the mark/space ratio of the signal.

There is also a small circuit designed to prevent the feed valve from overheating if left on for long periods.

The valve requires an electrical signal of 24 V for it to switch on, although once it is switched on it only requires approximately 12 V to remain energized. A hit and drop circuit is used which switches R47 in series with the feed valve 250 ms after retracting, reducing the voltage flowing across it. This is achieved by Q8 becoming turned on when the feed valve is switched on by J2 pin 10 going low. 250 ms later C13 charges up allowing the gate voltage to drop and for Q8 to turn off.

D5 protects the I/O board from damage due to C11 discharging during power down. D2 & D6 are flywheel diodes which reduce the back EMF generated by the gutter valve, and the feed valve, respectively.

The 43S motor control PCB contains additional “hit and hold” circuits to control the “Feed” and “Bleed” pico valves mounted within the printhead. These valves require 24 V for about 50 ms for them to open, after which the drive voltage must reduce to 12 V to hold them open

without excessive dissipation. This is achieved with the circuit shown in Figure 6-14.

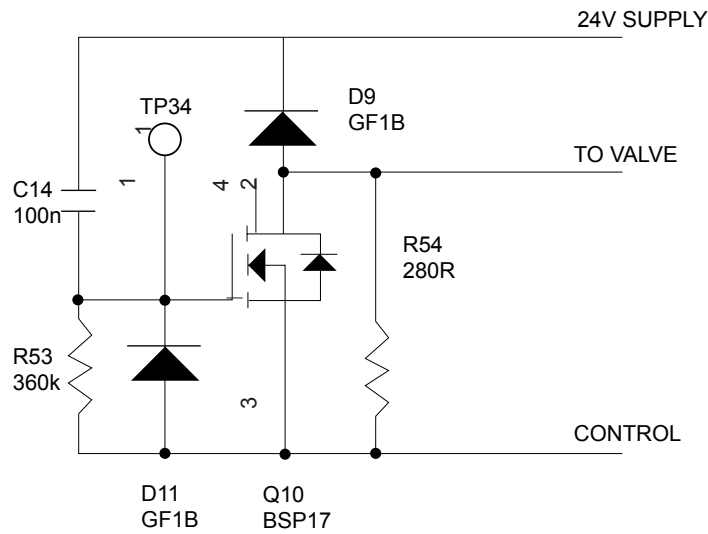


Figure 6-14. Pico Valve Control Circuit

The valve is connected between TO VALVE line and the 24 V SUPPLY line.

When the valve is switched on the IO PCB driver pulls the "CONTROL" line low, which pulls the source of the FET low. The gate is held high by C14, and the FET is turned on, and the drain remains close to the CONTROL rail, thus the valve has 24 V across it.

As R53 charges C14, after approximately 50 ms the gate/source voltage drops to a point where the FET turns off, effectively leaving the valve in series with R54. As this is 280 ohms and the valve is 280 ohms, there is a potential of 12 V across the valve.

When the software turns the valve off, the CONTROL line is made open circuit by the IO PCB driver.

The valves resistance and R54 in series pull the CONTROL line up to 24 V, which discharges C14 via D11.

D9 ensures that the back EMF from the valves inductance does not exceed the FET's maximum voltage rating.

PSU Board

General Specification

The PSU (Item 1 in Figure 6-7) is a switch mode power supply with the following general specification:

Input voltage	88 VAC to 260 VAC.
Input frequency	47 Hz to 63 Hz.
Inrush current (cold)	15 A at 115 VAC, 30 A at 230 VAC.
Operating temperature	0 to 50 °C.
Storage temperature	-20 to 85 °C.
Cooling	Free air convection.
Efficiency	80% typical.
Holdup time	20 ms.
Overvoltage type	crowbar, trip point 5.9 V to 7 V.
Overload protection	Foldback.
Switching frequency	>30 Kilohertz (kHz).
Designed to comply with	UL478, 1012, CSA22.2, VDE0806.
EMI	Meets FCC class "B".

Table 6-34: PSU Board General Specification

Output Specification

Output Voltage (V)	Load A			Tolerance (+/- %)	Ripple Noise (mV)	Line Reg (%)	Load Reg (%)
	Min	Rated	Max				
+5	0.5	4	8	1	50	1	1
+15	0	0.5	1	10	100	2	8
-15	0	0.5	1	10	100	2	8
+24 V	0.1	2	2.5	5	150	1	5

Table 6-35: PSU Board Output Specifications

Notes: Each output can provide up to a maximum load, but total load cannot exceed 85 W continuously.

+5 V output is adjusted to +/- 1% at 60% rated load at factory.

Tolerance is measured with all outputs at 60% rated load.

Line regulation is measured from low line to high line at rated load.

Load regulation is measured by +/- 40% load change from 60% rated load, and all other outputs is kept at 60% rated load.

Ripple and noise is measured by using a 12" twisted wire terminated with a 47 μ F capacitor.

Efficiency is measured at rated load.

All parameters except line regulation are specified at 115/230 VAC input, rated load, 25 $\times$ C ambient.

Electronics Modules

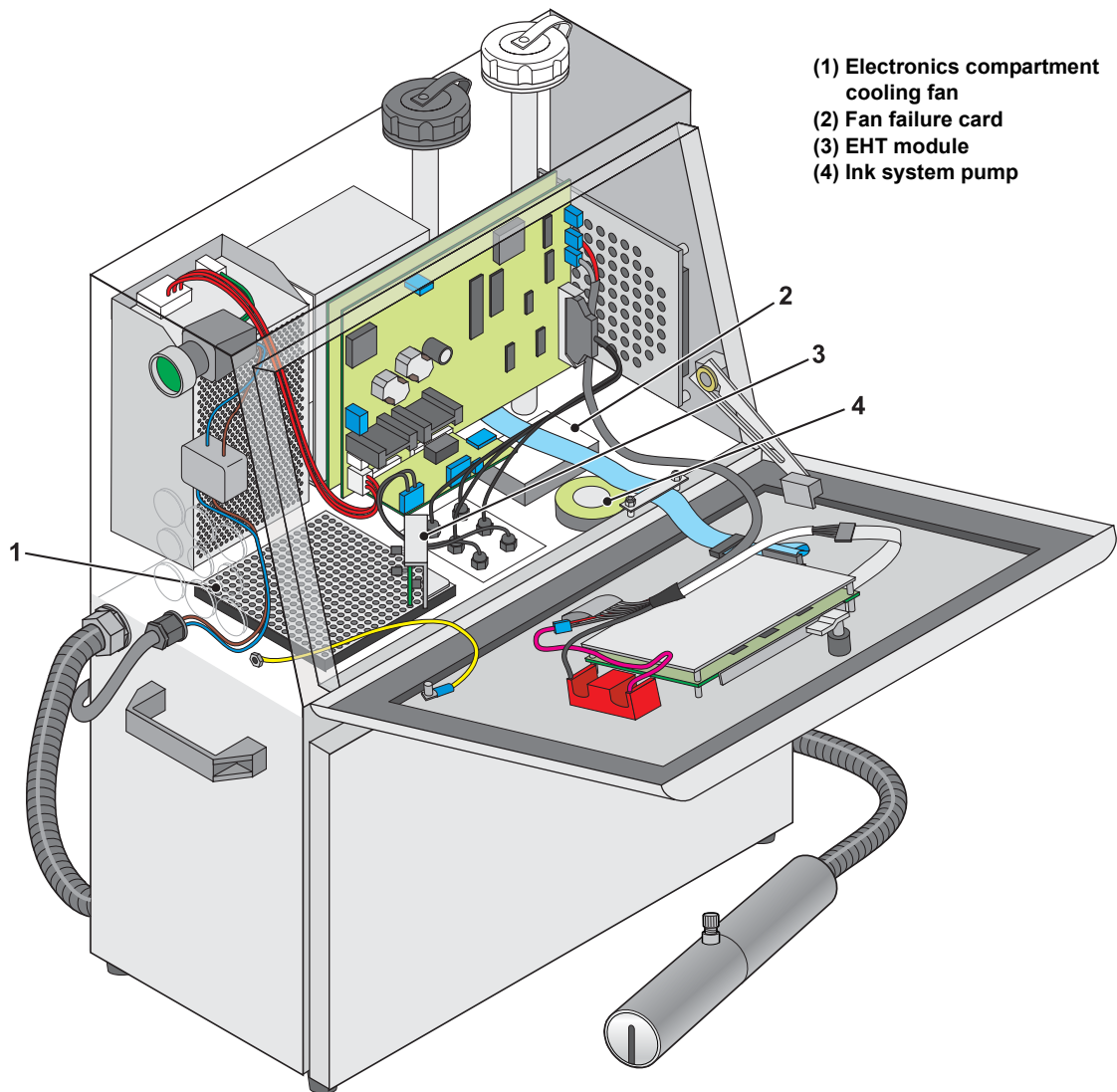


Figure 6-15. Printer Electronics Modules

Electronics Compartment Cooling Fan

The electronics compartment cooling fan (Item 1 in Figure 6-15) draws filtered air over the electronics system to cool it. The fan is also used to dilute and disperse vapour produced from the ink system. A fan failure card (3) monitors the flow of cooling air in the filter compartment, if the fan fails then the flow of cooling air stops, this is detected by the fan failure card which outputs an alarm signal to the CPU via the I/O board.

EHT Module

The EHT module (2) generates the extra high tension voltage required by the high voltage deflector electrode.

Ink System Pump

The ink system pump (4) provides the flow of ink to drive the ink system. The motor is a brushless DC type. The pump head is a geared type producing ink flow from two rotating meshed gears.

Mains Input Circuit

The AC mains supply (Figure 6-16) is supplied, via three core cable to the mains filter. The line and neutral lines are fed to the On/Off switch. After the on/off switch the line and neutral lines are fed to TB1 connector on the PSU. The mains fuse is located in the PSU (See “PSU Module Fuse Replacement” on page 8-8 for more information). This fuse is rated T3A 110-240V.

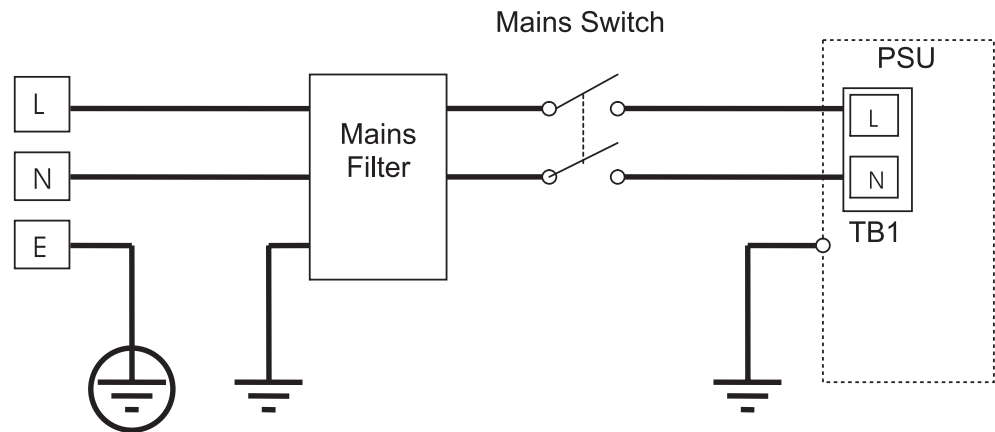


Figure 6-16. Mains Input Circuit

Ink System

General

The ink system provides a continuous supply of ink to the printhead at the correct pressure and at the correct temperature/viscosity combination. The ink system is housed in the printer cabinet and the components are interconnected by PTFE tubing. Figure 6-18. on page 6-43 shows the ink system components.

Solenoid Valves

The flow of ink in the ink system is controlled by eight solenoid operated spool valves. Except for valves V11 and V12, the valves (see Figure 6-17) are all of the same design. The valves are single-acting, operated by an electrical actuator (solenoid) with spring return. The flow is from the common port (C) (3) to the normally open port (R) (1) when the valve is not energized (off). When energized (on) the flow is from the common port to the normally closed port (P) (2). Valves V11 and V12 are miniature shut-off valves and are mounted on the heater block within the printhead.

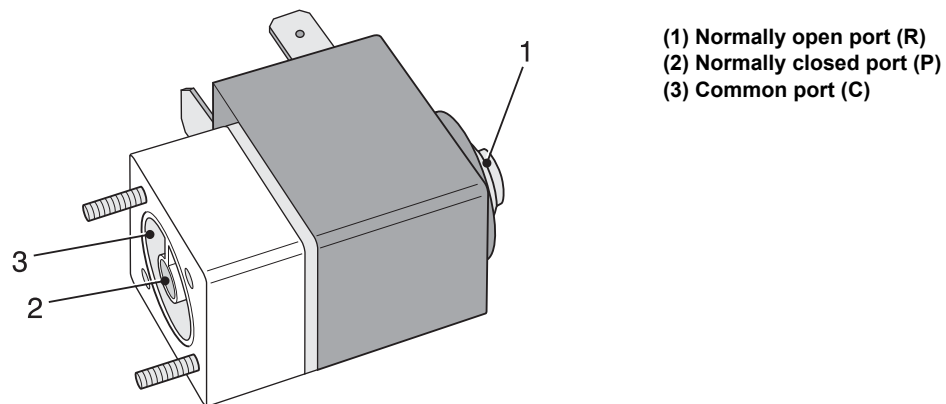
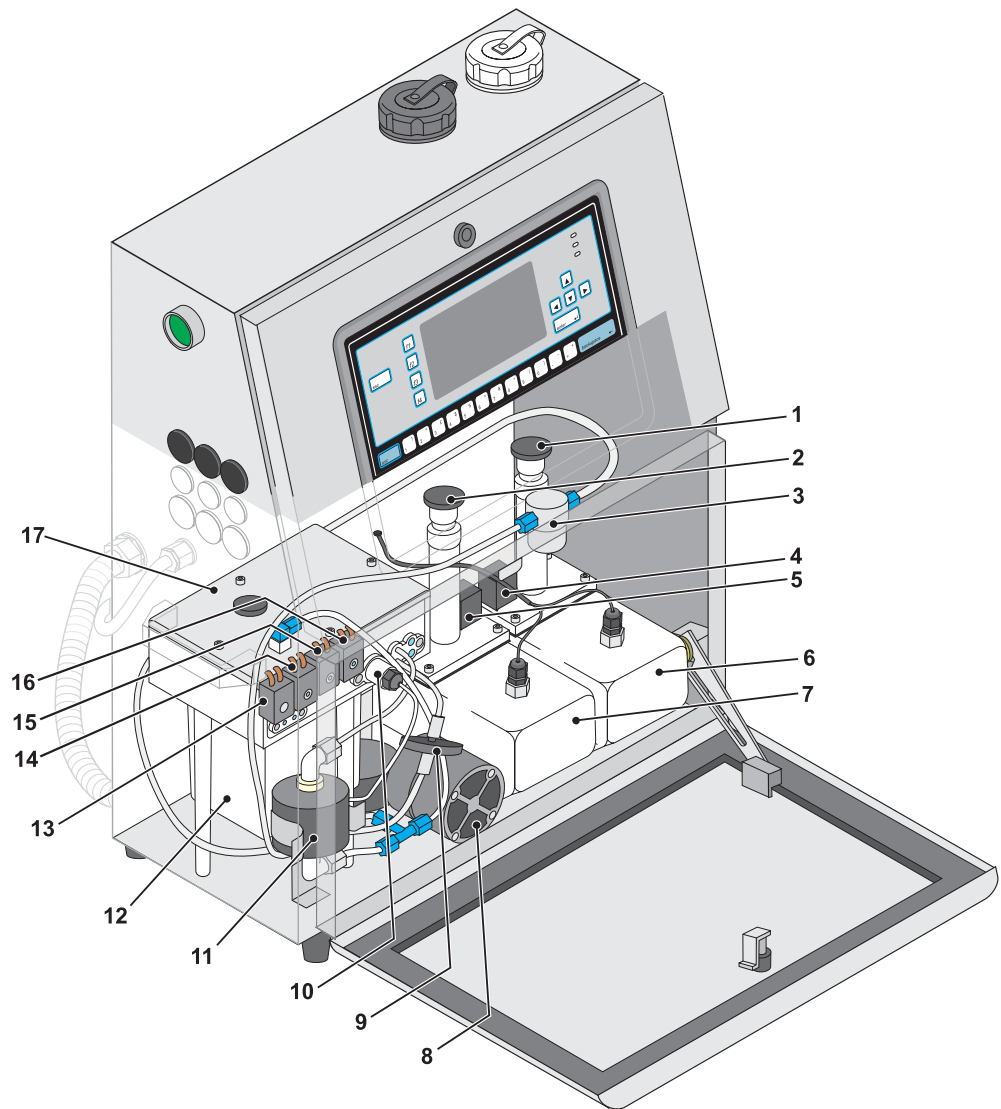


Figure 6-17. Solenoid Valve

V1 Solvent Top-up Valve (located at the solvent top-up reservoir)

When V1 (Item 4 in Figure 6-18) is energized, solvent top-up is drawn through the valve under vacuum from the venturi.

V1 is pulsed for 1 second intervals when the VMS system detects that the ink viscosity is at least 1 second too thick.



- | | |
|---|-------------------------------------|
| (1) Top up reservoir manifold | (10) Pressure transducer housing |
| (2) Ink reservoir manifold | (11) Main filter |
| (3) Ink system pump | (12) Mixer tank |
| (4) Solenoid valve V1 (Top Up Addition valve) | (13) Solenoid valve V6 (Ink) |
| (5) Solenoid valve V2 (Ink Addition valve) | (14) Solenoid valve V8 (Gutter) |
| (6) Top up reservoir | (15) Solenoid valve V3 (VMS) |
| (7) Ink reservoir | (16) Solenoid valve V7 (Flush pump) |
| (8) Flush pump | (17) FMS |
| (9) Pre pump filter | |

Figure 6-18. Ink System Components

V2 Ink Top-up Valve (located at the ink reservoir)

When V2 (5) is energized, replenishment ink is drawn through the valve under vacuum from the venturi.

V2 is energized when the level of the ink in the FMS mixer tank falls below the "Mixer tank OK" ink level detector.

V3 VMS Diverter Valve (located on the FMS ink system)

The VMS diverter valve (15) controls the flow of ink into the VMS chamber via restrictor (R1), which controls the ink viscosity.

V3 is energized when the VMS system becomes operational under software control or when the ink level falls below the VMS “low level detect” probe.

V3 is de-energized after a short time delay once ink is detected by the VMS “high level” detect probe.

The time taken for ink to flow out of the VMS chamber through a restrictor orifice between the high and low level detect probes determines the ink viscosity.

When V3 is de-energized, the flow of ink is directed into FMS mixer tank.

V6 Feed Valve (located on the FMS ink system)

The feed valve (13) is used to control the flow of ink to the printhead.

When V6 is energized, ink is allowed to flow to V11 in the printhead and out through the nozzle.

V7 Flush Valve (located on the FMS ink system)

The flush valve (16) provides either vacuum (which is derived from the suction side of the main system pump) or pressure to the flush solvent which controls the flush pump to direct flushing solvent to the nozzle during “clean jet start” and “shutdown.”

The flush pump is primed by vacuum being applied to the flush pump diaphragm when V7 is de-energized.

System ink pressure is applied to the flush pump diaphragm to direct pressurized solvent to the nozzle when V7 is energized

V8 Gutter Valve (located on the FMS ink system)

The gutter valve (14) directs the vacuum generated by the Venturi jet pump.

When V8 is energized, vacuum is applied to the printhead gutter, which returns unused ink (non-printed drops) to the FMS mixer tank for recirculation.

When V8 is de-energized, vacuum is applied to the return tube of the nozzle for umbilical purging. V8 is also de-energized momentarily during “jet start up” and “shutdown.”

***Note:** V12 is also energized during these operations.*

V11 Jet Valve (located in the printhead)

V11 when energized allows the flow of ink to the nozzle during printing.

V12 Bleed Valve (located in the printhead)

V12 when energized allows ink to flow through the nozzle return pipe.

V12 is energized during printhead/umbilical purging and momentarily during “jet start up,” “shutdown” and during nozzle flush.

Top Up and Ink Reservoirs

The ink and top up reservoirs (Items 6 and 7 in Figure 6-18) are of similar design and each have a capacity of 1.2 litres. Located on the top of each reservoir is a manifold (1,2) which consist of the mounting points for the solenoid valves (1 valve on the ink manifold 2 on the top up manifold) and the filler tube for top up or ink. Each reservoir houses an internal low level sensor.

Ink System Filters

The ink system has six filters:

Main System Filter (located inside the filter compartment)

The primary purpose of the main system filter is to provide filtered ink to the nozzle for printing and to the VMS.

Owing to the type of filter media used in the main system filter, which provides a large surface area to catch particulates, it also offers a long service life.

The filter has two filtration ratings, which are selected dependant upon the type of ink used for the printing application.

Pigmented inks utilize the lower filtration rating, typically 20 microns due to the pigment used to colour the ink having a relatively large particulate size.

Machines using non-pigmented inks generally have a smaller filtration rating, typically 5 microns.

The filter housing also provides an important means of damping the small pressure oscillations caused by the gear pump during normal operation.

Pre Pump Filter (located inside the filter compartment)

The Pre-pump filter filters all the ink prior to entering the main system pump.

The filter medium is stainless steel with a filtration rating of 30 microns.

Pre Head Filter (located below the FMS printhead manifold)

The pre head filter is a secondary filter to the main system filter.

When the main system filter is exchanged for a new item during routine servicing, contaminants may accidentally be introduced into the system pipe work. The pre head filter is fitted to trap these particulates.

The filter medium is stainless steel with a filtration rating of 8 microns.

Nozzle Filter (located behind the nozzle in the printhead)

The nozzle filter which is fitted to the “clean” nozzle assembly during manufacture is a “last chance” filter, designed to prevent ingress of particulates into the nozzle whilst being assembled at the factory or fitted as a spare part during servicing.

The filter medium is stainless steel with a filtration rating of 18 microns.

Flush Filter (located near flush pump)

The flush filter is designed to remove any particulates from the flushing solvent prior to being delivered to the nozzle during “clean jet start” and “stop” routines.

The filter is fitted in the pipeline after the flush pump rather than in-line before the flush pump eliminating the possibility of introducing contaminants into the flush line in the event of the flush pump being exchanged for a new item.

The filter medium is stainless steel with a filtration rating of 8 microns.

VMS Filter (located inside FMS top box)

The VMS filter is a “last chance” filter designed to catch contaminants, which may be introduced during the replacement of the main system filter and thereby obstruct the inlet restrictor orifice (R1) of the VMS system.

The filter medium is stainless steel with a filtration rating of 75 microns.

Fluid Management System (FMS)

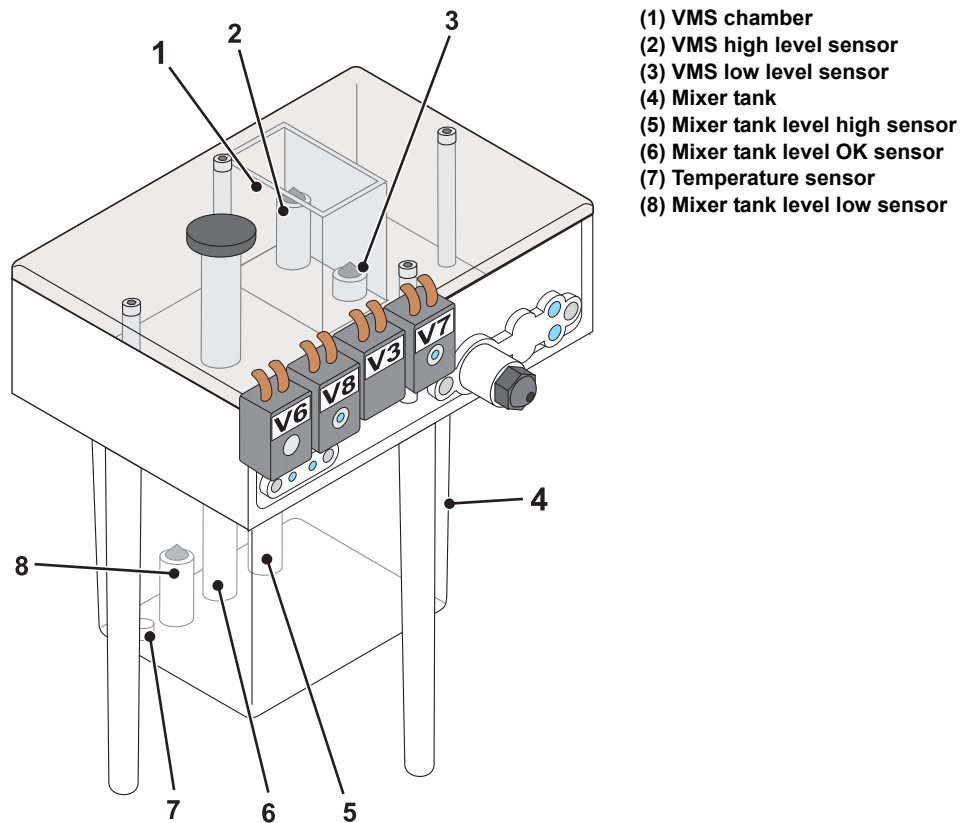


Figure 6-19. FMS Components

The FMS (Item 17 in Figure 6-18) has solenoid valves V3, V6, V8 and V7 externally mounted on it. It houses the following components:

- Mixer tank (Item 4 in Figure 6-19).
- Mixer tank level high sensor (5).
- Mixer tank level OK sensor (6).
- Mixer tank level low sensor (8).
- Mixer tank ink temperature sensor (7).
- Viscosity Monitoring System (VMS) (1).

Viscosity Monitoring System (VMS) Chamber

(located inside the FMS top box)

The VMS chamber is small and incorporated as part of the FMS ink system top box moulding.

The top of the VMS chamber is covered by an injection moulded cover, which is secured with a gasket and four screws.

The VMS top cover incorporates a pre formed stainless steel pipe, which is connected to V3 via a PTFE tube. The pipe allows ink into the VMS chamber during the filling period.

The VMS chamber has two ink level detectors, “High” and “Low”. These detectors can be of the optical or metal rod conductivity type. The detector type is dependent upon the type of machine. The 43S machine uses the optical type detector.

At the bottom of the VMS chamber is a restrictor orifice (R2), which provides a controlled flow of ink out of the chamber. For operation, see “V3 VMS Diverter Valve (located on the FMS ink system)” on page 6-44.

Venturi (Jet Pump) (located inside the FMS top box)

The Venturi jet pump provides a partial vacuum (typically, 0.6 bar) but more importantly a forced flow of air through the gutter return line.

The velocity of the air flow inside the gutter tube draws the non printed ink along the tube and returns it through the Venturi jet pump and into the FMS mixer tank for re-use.

The vacuum derived from the Venturi jet pump is created by the flow of high-pressure ink through a small diameter tube (inlet tube) into a slightly larger diameter tube (outlet tube).

The jet of ink is directed out of the inlet tube and into the outlet tube. The inlet and outlet tubes are directly in line with each other and a suction port or third tube is located at the point between the inlet and outlet tubes. The gutter return tube is connected to this suction port.

The high velocity of the jet of ink as it enters the outlet tube causes air to be drawn from the suction port and into the jet. The higher the jet velocity the higher the flow rate generated at the suction port.

Pressure Transducer (located on the FMS system manifold)

The pressure transducer (Item 10 in Figure 6-18) monitors the ink system pressure, providing continuous electrical feedback to the system electronics and pump control system to maintain (within limits) a constant printing pressure.

Ink System Pump (located on the ceiling of the ink system compartment)

The ink system pump (Item 3 in Figure 6-18) is a positive displacement gear pump driven by a 24 V dc brushless motor.

The pump provides stable ink pressure to the nozzle during printing and also provides a flow of ink to the VMS and Venturi jet pump for drawing unused ink from the printhead and returning it to the FMS ink system for recirculation.

Flush Pump (located close to the FMS)

The flush pump (Item 8 in Figure 6-18) is a simple diaphragm type pump consisting of two injection moulded pump housings, a flexible diaphragm, two check valves and housings.

A flange of the diaphragm (the diaphragm is located in a cavity in one the two housings) acts as a sealing gasket when the two housings are bolted together. The housing containing the diaphragm cavity also has an ink connection which allows either ink under pressure or vacuum to move the diaphragm backwards and forwards.

The other housing contains the two check valves:

- The input check valve only allows flow into the pump and is connected to a pipe, which draws flushing solvent from the top-up reservoir.
- The output check valve only allows flow out of the pump and is connected to a pipe that feeds the flush solvent to the manifold in the printhead.

During operation, the diaphragm is controlled by V7.

When vacuum (generated by the suction of the main system pump) is applied to the diaphragm, flush solvent is drawn from the top-up reservoir and into the pump cavity to prime the pump.

During “clean start” and “stop” cycles, pressure is applied to the diaphragm through the switching of V7. The input check valve seals close, forcing flushing solvent through the output check valve to the printhead and through V11.

Printhead Operation

Ink Jet Information

An electrically conductive ink is supplied under pressure by the ink system to the nozzle assembly (Item 2 in Figure 6-20) via the ink feed pipe (3). An ink stream is formed as the ink is forced out of the nozzle jet orifice (1). A modulation signal is applied to a ceramic transducer which is clamped to the nozzle assembly. The transducer crystals (4 and 5) causes the nozzle assembly to vibrate longitudinally, breaking up the ink stream into droplets, a small distance away (the break up point) from the nozzle jet orifice. The frequency of modulation on a standard Si printhead is 76.8 kHz. The nozzle has a damping mass (6 and 7) attached to the rear of the transducer to mechanically “tune” the nozzle assembly to the modulation frequency.

The ink droplets are produced at the same rate as the modulation frequency, are uniform in size and separated by equal distances. The nozzle orifice diameter is 60 microns.

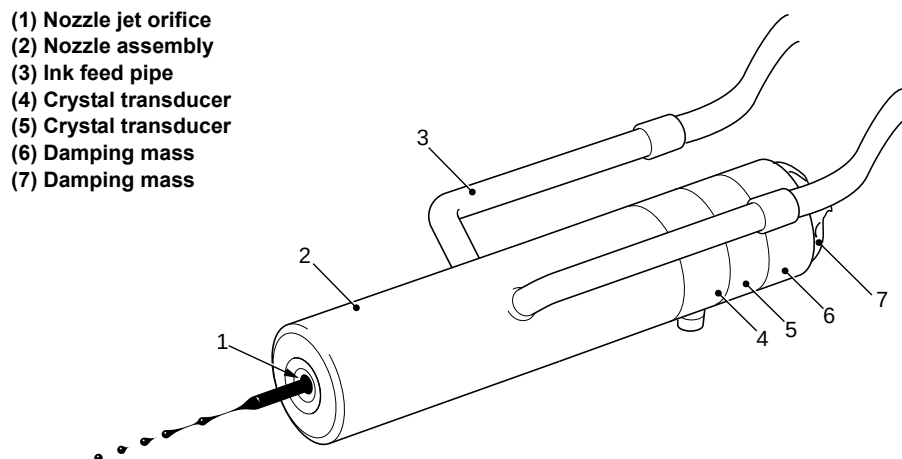


Figure 6-20. Ink Jet Formation

Droplet Charging

The charge electrode (Item 1 in Figure 6-21) is positioned at the break up point of the ink stream and extends for several drops either side of it. This allows a tolerance for break up position and shields the ink stream from the influence of the other electrostatic fields. The distance between the nozzle assembly (2) and the charge electrode is 2 mm.

- 1 Charge electrode
2 Nozzle assembly

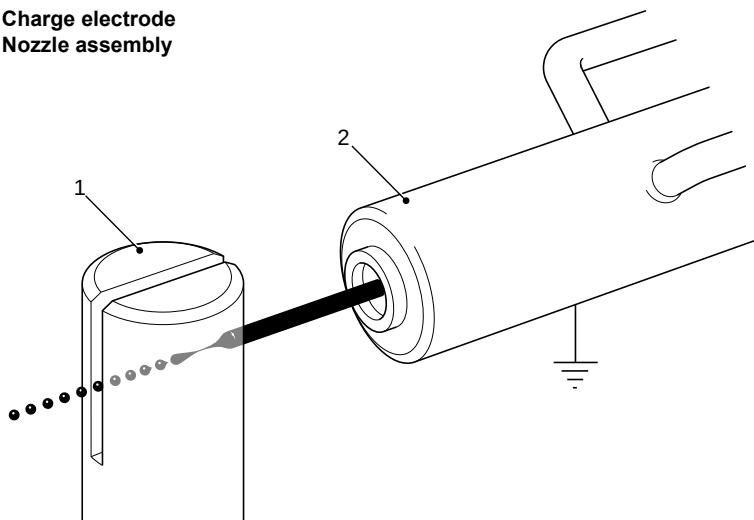


Figure 6-21. Charge Electrode

The ink stream and the charge electrode can be considered as the two electrodes of a capacitor. By raising the charge electrode to a specific positive voltage (with a charge pulse) the section of the ink system within the charge electrode will have a negative charge induced on it. When a drop of ink then breaks from the jet it will have trapped on it a charge directly proportional to that on the charge electrode. If the positive voltage is then removed from the charge electrode, the negative charge on the jet will discharge through the ink jet and nozzle assembly to ground. However, the drop of ink which has become detached from the jet cannot discharge as it no longer has a conductive path to ground.

Droplet Deflection

After passing through the charge electrode the droplet stream passes through an electrostatic field maintained by the deflector electrodes which are connected to a high tension supply (typically 6 kV). The negatively charged droplets are deflected by the field towards the high voltage deflector electrode (Item 5 in Figure 6-22). The distance a drop is deflected is proportional to the charge carried, which is in turn proportional to the voltage applied to the charge electrode when the drop became detached from the ink jet.

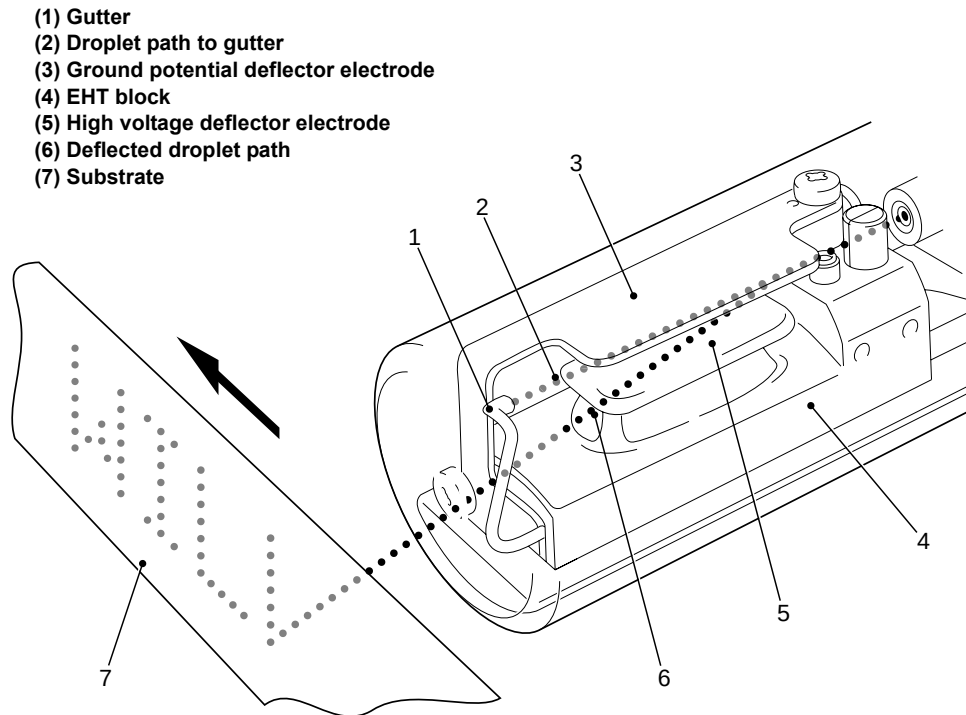


Figure 6-22. Droplet Deflection

The charged droplets once deflected (6) leave the printhead to form characters in a dot matrix format on the substrate (7). Droplets which are not required for printing are not charged and are therefore not deflected.

Ink System Operation

Function

The functions of the ink system are as follows:

- Deliver ink to the nozzle at a constant pressure and temperature.
- Ensure sufficient ink and solvent are available.
- Ensure that the ink is kept at a viscosity value corresponding to the ink temperature and the type of ink in use.
- Generate a vacuum for gutter suction.

Operation

The pump draws ink from the mixer tank and circulates it round a system divided into several paths. After circulation the unused ink is returned to the mixer tank.

Circulation ensures that the ink remains thoroughly mixed and any addition of ink or solvent will be rapidly mixed in.

Filtered ink is fed from the pump to three sub-systems:

- The VMS.
- The printhead nozzle.
- The venturi, which applies a vacuum to the nozzle or the gutter to perform the following operations:
 - a. To remove debris from the nozzle during flushing.
 - b. To draw solvent through the umbilical tubes (thus cleaning them) during shut down.
 - c. To collect non-deflected ink droplets, via the gutter, when printing.

The returned ink or solvent is fed back to the mixer tank via a baffle to reduce frothing.

Figure 6-23 shows the overall operation of the ink system.

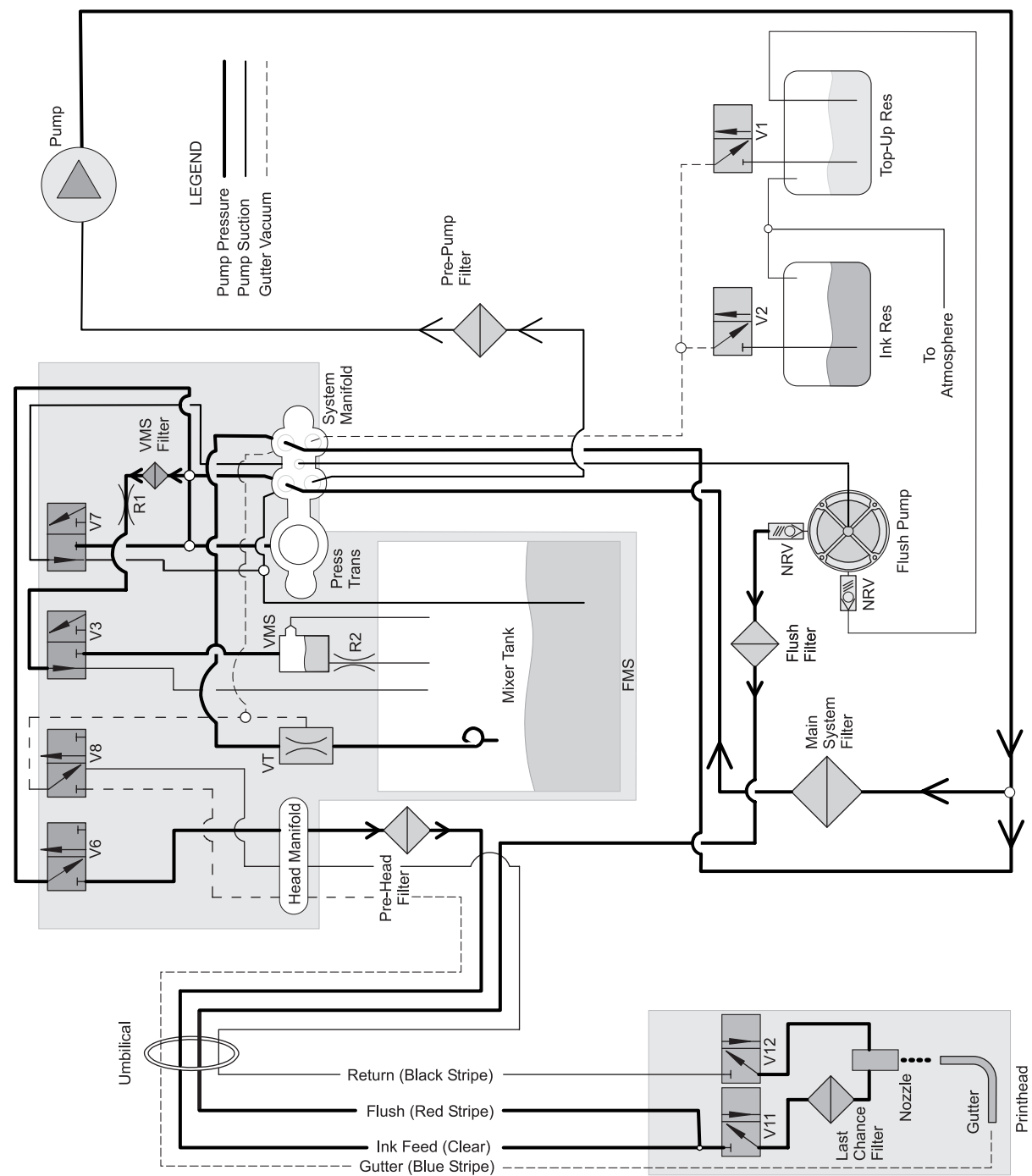


Figure 6-23. Ink system overview

Valves and restrictors in Figure 6-23 are represented as follows:

V1	Solvent Top Up Valve	V11	Jet Valve
V2	Ink Top Up Valve	V12	Bleed Valve
V3	VMS Diverter Valve	R1	Restrictor 1
V6	Feed Valve	R2	Restrictor 2
V7	Flush Valve	VT	Venturi
V8	Gutter Valve		

Viscosity Monitoring System Sequence

The viscosity of the ink is checked by the Viscosity Monitoring System (VMS) whenever the jet is running.

This procedure is as follows:

- 1 Solenoid valve V3 opens directing ink into the VMS chamber, which is an integral part of the FMS.
- 2 Ink flows into the VMS chamber via V3 and restrictor R1 until the high level sensor is covered. At this point V3 closes, stopping the flow of ink into the chamber.
- 3 The ink flows out of the chamber through a large restrictor into the mixer tank until the low level sensor is uncovered. The CPU in the electronics system measures the time that this takes. V3 energizes and the chamber starts to fill again.
- 4 The time taken for the ink to run out of the chamber is dependent on its viscosity; the thicker the ink, the longer it will take to drain. The viscosity of the ink is affected by solvent loss during normal machine operation as well as by its temperature, which is monitored by a sensor in the mixer tank.
- 5 The CPU compares the time taken for the ink to drain against a value calculated by the software. The software takes into account the type of ink (entered during system calibration) and its temperature.
- 6 If the ink is too thick (i.e. the time to drain is longer than the calculated value) solenoid valve V1 opens. The pump draws solvent from the top up reservoir, adding it in small doses to the mixer tank every 2nd VMS cycle until the viscosity is correct (see "Top Up Addition to Mixer Tank" on page 6-65).
- 7 The viscosity monitoring sequence is repeated each time that the low level sensor in the VMS chamber is uncovered.

Note: Ink is only added to the mixer tank when the tank level is below the OK level sensor.

Clean Start

This method starts on flush (pure solvent) in order to dissolve any ink residues in the jet orifice. It then bleeds on flush to remove air from the nozzle before switching to ink, eliminating ink splash and spray during start-up.

The Clean Start Jet Sequence is as follows:

The solvent from the filter is forced through the umbilical connection to the printhead. At the printhead, the solvent enters the heater manifold and passes into the main fluid path between the jet valve and the nozzle. The solvent continues along the main fluid path to the ("last chance") filter, removing ink residues along the way before the solvent enters the nozzle.

The jet starts when the nozzle becomes pressurised by the solvent flow. If the previous stop was a clean stop, the jet will consist of almost pure solvent. The flow of solvent quickly removes any ink residues in the jet orifice. Fluid in the jet is caught by the gutter and directed to the mixer tank.

Once the solvent is flowing through the jet, the jet valve opens, merging ink with the solvent. The bleed valve then opens to increase the fluid flow through the nozzle, removing any trapped air bubbles from the nozzle body. Once the bleed valve opens, the flush pump valve (V7) switches off, preventing further solvent from being pumped into the nozzle. The flush pump returns to its priming stroke and the non-return valves in the pump prevent fluid from the printhead returning to the umbilical connection.

Approximately ten seconds after the flush pump switches off, the bleed valve closes and ink continues to flow through the jet at 4 bar. Modulation is switched on and the ink pressure changes to give the correct jet velocity. Heater manifold temperature is allowed to reach the correct value before enabling the phasing checks on the jet.

Mnemonic ^a	Function in Sequence
P0	Turn Phasing off to ensure jet is not charged at start-up
PH	Hide bad phasing (due to phasing being disabled)
PUC	Place pump into closed loop control mode
G1	Grace period on
VG1	Enable gutter valve (V8) to prevent ink being sucked out of the bleed tube resulting in a jet kick when the bleed solenoid opens
W2000	Wait for 2 seconds
PU40	Set the pump pressure to 4 bar
W15000	Wait for 15 seconds before starting to allow the flush pump to charge, in case the flush pump has been previously emptied

Mnemonic ^a	Function in Sequence
G0	Grace period off
L	Log occurrence of current sequence
VL1	Enable flush pump valve (V7) to pressurise flush pump
W4000	Wait for 4 seconds
VP1	Enable bleed valve (V12)
W100	Wait for 0.1 second
VF1	Enable jet valve (V11)
W500	Wait for 0.5 second
VR1	Enable ink feed valve (V6) to merge ink with solvent steam
W1500	Wait for 1.5 seconds
VP0	Disable bleed valve (V12)
W5000	Wait for 5 seconds
VL0	Disable flush pump valve (V7) to re-charge the flush pump
W1000	Wait for 1 second
VP1	Enable bleed valve (V12) to remove air from the nozzle body
W10000	Wait for 10 seconds
VP0	Disable bleed valve (V12)
W2000	Wait for 2 seconds
PUD	Place pump into default loop control mode
M1	Enable modulation
PUC	Place pump into closed loop control mode
WH	Wait for head temperature
P1	Enable phasing
WC	Wait for pre-run checks
PS	Show bad phasing
E1	Enable EHT
Ready to Print	

- a. These mnemonics can be used when you select any one of the following from the System menu: *Set jet start sequence*, *Set jet stop sequence*, *Set jet flush sequence*, *Set jet clean start sequence*, *Set system flush purge sequence* or *Set jet clean stop sequence*.

Quick Start

This method starts without a flushing sequence, and uses the ink supply to bleed air from the nozzle.

Mnemonic	Function in Sequence
P0	Turn Phasing off to ensure jet is not charged at start-up
PH	Hide bad phasing (due to phasing being disabled)
PUC	Place pump into closed loop control mode
G1	Grace period on
VG1	Enable gutter valve (V8) to prevent ink being sucked out of the bleed tube resulting in a jet kick when the bleed solenoid opens
W2000	Wait for 2 seconds
PU40	Set the pump pressure to 4 bar
G0	Grace period off
L	Log occurrence of current sequence
W3000	Wait for 3 seconds
VR1	Enable ink feed valve (V6)
W2000	Wait for 2 seconds
VP1	Enable bleed valve (V12)
W100	Wait for 0.1second
VF1	Enable jet valve (V11) to merge ink with solvent steam
W10000	Wait for 10 seconds
VP0	Disable bleed valve (V12)
PUD	Place pump into default loop control mode
M1	Enable modulation
PUC	Place pump into closed loop control mode
WH	Wait for head temperature
P1	Enable phasing
WC	Wait for pre-run checks
PS	Show bad phasing
E1	Enable EHT
Ready to print	

Clean Stop

This method switches from ink to flush in order to purge the nozzle. This method allows time for the manifold, nozzle and jet orifice to be purged of ink before stopping the jet.

The Clean Stop Jet Sequence is as follows:

Deflector plate voltages are switched off before beginning this sequence. The ink pressure is set to 4 bar and the modulation voltage switches off. To increase the ink flow through the nozzle body, the bleed valve switches on.

The flush pump valve switches on applying solvent pressure to the printhead. Pure solvent is forced through the filter to the printhead mixing solvent into the ink stream in the heater manifold.

Approximately one second after the solvent starts to mix with the ink, the feed valve (V6) in the cabinet switches off, removing ink pressure from the printhead. Ink ceases to flow into the heater manifold and the solvent flushes ink from the nozzle body. Five seconds later the bleed valve switches off and then switches on again, introducing solvent into the jet valve, which inhibits ink residues forming whilst the machine is switched off. The jet valve (on the heater manifold) switches off, ensuring that no ink diffuses into the solvent. At this point, no ink should be present in the nozzle body.

The gutter valve switches off, increasing the suction on the bleed system. After a short pause, the bleed valve switches off. After another short pause, the gutter valve switches on to clear any fluid from the gutter. Once the gutter valve switches off, the main ink pump also switches off.

Mnemonic	Function in Sequence
G1	Enable grace period
E0	Disable EHT
W1000	Wait for 1 second
PU40	Set the pump pressure to 4 bar
W5000	Wait for 5 seconds
G0	Disable grace period
L	Log occurrence of current sequence
P0	Disable phasing
M0	Disable modulation
VP1	Enable bleed valve (V12)
W10000	Wait for 10 seconds
VL1	Enable flush pump valve (V7) to pressurise flush pump
W1500	Wait for 1.5 seconds

Mnemonic	Function in Sequence
VR0	Disable ink feed valve (V6)
W1500	Wait for 1.5 seconds
VF0	Disable jet valve (V11)
VP0	Disable bleed valve (V12)
VL0	Disable flush pump valve (V7) to recharge flush pump
W30000	Wait for 30 seconds to clear the gutter line
W30000	Wait for 30 seconds to clear the gutter line
W30000	Wait for 30 seconds to clear the gutter line
W30000	Wait for 30 seconds to clear the gutter line
PUD	Place pump into default loop control mode
PU00	Disable pump (set pressure to 0 bar)
W1000	Wait for 1 second
VG0	Disable gutter valve

Quick Stop

Note: This sequence is used to manually stop the jet for a short period, or to automatically stop the jet during an EHT trip, charge error, etc.

This method switches off the ink without flushing the nozzle or manifold. Hence the manifold and the nozzle are full of ink when the jet stops. The machine must not be left in this state for long periods, as drying ink in the jet orifice may make restarting difficult. This procedure is primarily intended for situations where the machine may be stopped and restarted several times in quick succession. Under these conditions, the use of solvent may become excessive and cause dilution of the ink.

Mnemonic	Function in sequence
L	Log occurrence of current sequence
E0	Disable EHT
W1000	Wait for 1second
P0	Disable phasing
VP1	Enable bleed valve (V12)
W100	Wait for 0.1second
VF0	Disable jet valve (V11)
VP0	Disable bleed valve (V12)
W30000	Wait for 30 seconds to clear gutter
W30000	Wait for 30 seconds to clear gutter
VR0	Disable ink feed valve (V6)
M0	Disable modulation
PU00	Disable pump (set pressure to 0 bar)
W1000	Wait for 1 second
VG0	Disable gutter valve (V8)

Nozzle Flush

When Nozzle flush is selected, the vacuum from the venturi is applied to the return side of the nozzle, creating suction at the nozzle orifice. Solvent is applied to the nozzle orifice to clear any blockage.

Nozzle flush will automatically time out after 2 minutes but can be stopped at any time before that by pressing

f1 Abort Flush.

A nozzle flush can be started with the jet running or stopped. If the jet is running, selecting Nozzle flush will first of all de-energize feed valve V6 to stop the flow of ink to the nozzle.

Ink Addition to Mixer Tank

When the level of fluid in the mixer tank falls below the level OK sensor, the ink top up valve V2 is energized. Ink from the reservoir flows round the system into the mixer tank until the level OK sensor is covered. V2 is then de-energized.

Top Up Addition to Mixer Tank

The time taken for the VMS chamber to empty is checked by the software against a reference value. The reference value is derived from a "time to empty algorithm" stored in the CPU memory. It takes into account the type of ink in the machine (entered by the operator during calibration) and the ink temperature as measured by the sensor in the mixer tank. If the actual time to empty is greater than the reference value, the viscosity of the ink is too high. Solvent top up valve V1 is energized for up to 5 seconds every 2nd VMS sequence until the

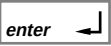
Introduction

This section describes the menus available in the printer control software. The function of each menu option is briefly described below.

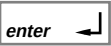
Using the Menus

Using the Arrow Keys

To select a menu:

- 1 Press  or  until the menu is highlighted.
- 2 Press .

To select an item from a menu:

- 3 Press  or  until the option is highlighted.
- 4 Press .

Note: If there are too many items on the menu to display on screen, the label *More* appears adjacent to the top and/or bottom of the menu to indicate more menu entries above or below those currently displayed. Scroll through the items by repeatedly pressing  or .

Using the Keypad

To select a menu or item press the combination of the *Alt* key and the letter highlighted in the menu or item name.

For example, press  +M to select the *Messages* menu.  +E is useful to access the *Editor* menu while editing a message.

Entering Text, Numbers and Toggle Values

To enter text into a field, simply type the required text or special character using the keypad.

Numerical values can be entered using keys 0 to 9, or by pressing  to increase the value or  to decrease the value.

 plus  or  increases or decreases a numerical value by +10 and -10 respectively.

Toggle values (e.g. on/off) can be changed by pressing  or . These keys are also used in some menu options to set and unset attributes.

Esc Key

If at any time you want to exit a menu without changing any settings, press .

Messages Menu

Messages Menu	Menu Option	Function
	Select Print Message	Opens the Select Message menu. Select a message to be printed or edited.
	Message Parameters	Opens the Parameters For: menu for the selected message. All parameters can be changed.
	Default parameters	Opens the Default Parameters menu. The default parameters, used for new messages, can all be changed.
	Edit Message	Opens the Select Message to Edit menu. The selected message is opened in an edit screen. To save the edited message, go to the Editor menu
	New Message	Opens the New Message dialogue. The user is prompted to enter the new message name. The new message can then be typed in the edit screen. To save the new message, go to the Editor menu. The parameters for a new message are set to the default values.
	Delete Message	Opens the Select Message to Delete menu. The selected message is deleted.
	Copy Message	Opens the Copy Message dialogue. Enter a message name to copy From: and a message name to copy To:. If the message name to copy to is an existing message, an Already exists. Overwrite it? dialogue is opened (answer with Y or N). Otherwise a new message is created.
	Message Select Source	Opens the Message Select Source dialogue, with options Internal or External.
	Edit External Select Table	Opens the External Message Select menu. Enter the names of the messages you want to be available to the external source. The external message names can be added, edited and deleted. Press F2 to select message names from a list of those available.
	Delete All Messages	Deletes all internal messages.
	Show Free Message Space	Displays the Memory Space screen, showing message space free, work space free and the largest block of message RAM.
	Quit	Returns to the quick screen.

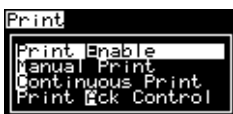
Editor Menu

Editor Menu	Menu Option	Function
	Select Font	Opens the Select Font menu. The selected font is applied to the selected text in the message.
	Insert User Field	Opens the Select user field menu. The contents of the user field is copied into the message at print time e.g. expiry date, shift code.
	Modify Attributes	Opens the Set Attributes menu. One or more attributes can be set. Set attributes are shown as highlighted. The set attributes are applied to the selected text in the message. (Attributes are properties which can be applied to individual characters).
	In-line Attributes	Opens the Select Attribute menu. One selected attribute is applied to text about to be typed in the message.
	Copy Text	Copies the selected text to the clipboard.
	Paste Text	Pastes the text from the clipboard at the cursor position.
	Set Keyboard Type	Opens the Select keyboard Type menu. Select the keyboard type to be used for the edit session. Characters from more than one language alphabet can be included in a message.
	Save Message	Saves the message being edited and continues editing.
	Save and Exit	Saves the message being edited and exits the editor screen.
	Clear Message	Deletes the entire content of the message being edited.
	Abandon	Exits the editor screen without saving any changes to the message.

User Fields Menu

User Fields Menu	Menu Option	Function
	Edit user field	Opens the Select user field to edit menu. Options are all the existing user fields. Selecting a text field opens an individual dialogue for the new user field with Text and Attribute options. Selecting a counter field opens a menu with options for the counter parameters. Selecting a logo field opens the Edit logo screen.
	New user field	Adds a new user field to the selected message. Opens the New User Field dialogue with Name and Description fields. Selecting a Text description opens the New Field dialogue with Text and Attribute fields. Selecting a Counter description opens the New counter dialogue with fields for the counter parameters. Selecting a Logo description opens the Edit logo screen.
	Delete user field	Opens the Select user field to delete menu with options of all existing user fields.
	Reset Counter	Opens the Select counter to reset menu with options of all existing counters.

Print Menu

Print Menu	Menu Option	Function
	Print Enable	Opens the Print Control menu. The PRINT option can be toggled between Enable and Disable.
	Manual Print	Printing is normally triggered from an external device, i.e. photocell or internal timer. Use manual print to print one copy of the selected message when the print command is given. This feature can be used to check the printer operation whilst off-line. The photocell must be uncovered to use manual print.
	Continuous Print	The message is printed repeatedly without an external trigger. Opens the Continuous print dialogue. Continuous mode can be toggled between Off, SE Mode and Time Mode. SE mode delay and Time mode delay can be individually adjusted between 1 and 10000 pulses. SE mode uses external shaft encoder pulses to set the gap between the start of each print. Time Mode uses internally generated pulses to set the gap between the start of each print.
	Print Ack Control	Sends a signal to an external control system normally via COMM1. Same as the Print acknowledge on the Print Control menu. The Print acknowledge option can be set to Off, After Comp, After Print or After both. The Print ACK code option can be set between 1 and 255.

Password Menu

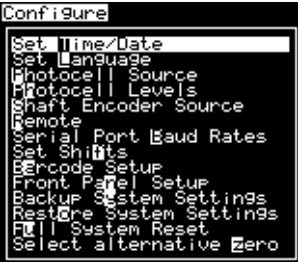
Password Menu	Menu Option	Function
	Enter Password	Opens the Enter Password dialogue, together with the Current password level. The user is prompted to enter a password to change to a different password level.
	Clear Password	The password is cleared for the current access level and access is returned to password level 0.
	Set Password for level 1	Opens the New Password dialogue. The user is prompted to enter a new password for level 1.
	Set Password for level 2	Opens the New Password dialogue. The user is prompted to enter a new password for level 2.
	Set Password Levels	Opens the Change Password level menu. This has options for the Quick Screen and each of the menus. When an option is selected, a further dialogue appears with options to change the password level for each option available in the menu. The password levels can be set in the range 0 to 3, where level 0 has no password protection. This option is for use by trained service personnel only.
	Automatic Logout	Enabling the automatic logout feature instructs the printer to automatically log users out (revert to access level 0) after several minutes of inactivity (no keyboard input). This feature is designed to protect the printer from access by unauthorized users.

System Menu

System Menu	Menu Option	Function
	Status	Displays the fault list, containing the possible faults with current faults highlighted
	Clean Start Jet	The ink jet is started and Starting the jet is displayed. A flush and bleed sequence is performed to eliminate ink splashing and spray before ink is fed to the nozzle.
	Quick Start Jet	The ink jet is started and Starting the jet is displayed. Use Quick Start if the machine has been off for less than half an hour.
	Clean Stop Jet	The ink jet is stopped, the nozzle and related ink system pipes are cleaned
	Quick Stop Jet	The ink jet is stopped. The nozzle and manifold remain full of ink. Use Quick Stop if the machine will be off for less than half an hour.
	Nozzle Flush	The nozzle orifice is cleansed by the application of solvent and a suction action. The flush continues for two minutes unless <i>F1</i> is pressed to abort it.
	System Flush Purge	The machine is started and the flush pump operated. This function purges air from the flush system during commissioning or when air has been introduced to the flush system during a fault, etc. Press <i>Enter</i> and a dialogue opens: Are you sure YES-NO.
	Umbilical Purge	When using Umbilical Purge the umbilical feed and return tubes must be disconnected from the nozzle feed and return tubes. Loop the umbilical feed and return tubes together and cap the nozzle feed and return tubes - see Umbilical Purge maintenance procedure. Opens the Umbilical Purge dialogue. Select <i>Enable</i> to start and <i>Disable</i> to stop the umbilical purge.
	Fill Mixer Tank	Used during commissioning only, to prime the mixer tank to the correct level.
	Charge Error Shutdown	Opens the Machine Control dialogue. Charge error can be toggled between Enable and Disable.
	Gutter Fault Shutdown	Opens the Machine Control dialogue. Gutter fault can be toggled between Enable and Disable.

System Menu	Menu Option	Function
	Rolling Phase Disable	Opens the Phasing dialogue. Rolling Phase can be toggled between Enable and Disable. Rolling phase must always be enabled during normal printer operations to ensure best print quality. It does this by automatically checking and adjusting the small changes in the timing of the signal pulse applied to the charge electrode. Rolling phase must be disabled to view the position of the ink jet break-off, as the strobe LED which monitors the timing of the pulse applied to the charge electrode appears to make the ink drops move. Therefore when checking the break up of the jet it is important to disable rolling phase.
	Debug Monitor	Monitors the electronic system to detect possible hardware or software faults. This facility should only be used by experienced Videojet-trained engineers.
	Set Jet Start Sequence	Allows setting of the timing and sequence of the valves in the ink system for the jet start process. Opens the Jet Startup sequence dialogue with a warning. This facility should only be used by experienced Videojet-trained engineers.
	Set Jet Stop Sequence	Allows setting of the timing and sequence of the valves in the ink system for the jet stop process. Opens the Jet Shutdown sequence dialogue with a warning. This facility should only be used by experienced Videojet-trained engineers.
	Set Jet Flush Sequence	Allows setting of the timing and sequence of the valves in the ink system for the jet flush process. Opens the Jet flush sequence dialogue with a warning. This facility should only be used by experienced Videojet-trained engineers.
	Set Jet Clean Start Sequence	Allows setting of the timing and sequence of the valves in the ink system for the jet clean start process. Opens the Jet clean start sequence dialogue with a warning. This facility should only be used by experienced Videojet-trained engineers.
	Set System Flush Purge Sequence	Allows setting of the timing and sequence of the valves in the ink system for the flush purge process. Opens the System flush purge sequence with a dialogue and warning. This facility should only be used by experienced Videojet-trained engineers.
	Set Jet Clean Stop Sequence	Allows setting of the timing and sequence of the valves in the ink system for the jet purge process. Opens the Jet clean stop sequence dialogue with a warning. This facility should only be used by experienced Videojet-trained engineers.

Configure Menu

Configure Menu	Menu Option	Function
	Set Time/Date	Allows the Real Time Clock (RTC) in the printer to be set to the local time and date. Opens the Set time/date menu. The parameters that can be set are: Day, Month, Year, Day number, Hour, Minutes, Seconds.
	Set Language	Allows the language used for the display to be set. Opens the Select prompt language menu with the language options available (available languages depend on the model type of the machine). Selecting a language automatically sets the appropriate keyboard type for that language.
	Photocell Source	Selects the photocell source to be used. Opens the Print Control menu. Photocell source can be toggled between External 1 and External 2. (NB External 2 requires special software).
	Photocell Levels	Selects the active level for the photocells. Opens the Photocell levels dialogue. Photocell 1 and Photocell 2 can be toggled individually between Active high and Active low.
	Shaft Encoder Source	An external shaft encoder should be used where there may be variations in the speed at which the product passes the printhead. Opens the Print Control menu. SE source can be toggled between External (when an external shaft encoder is used) and Internal (when an internal timer is used).
	Remote	An RS-232 serial port can be selected for communication with other devices. Opens the Select Port for Remote dialogue. Options are Off, COM1 and COM2.
	Serial Port Baud Rates	Allows the baud rates for the serial ports to be set. Opens the Configure serial ports menu. The baud rate can be set to 75, 110, 150, 300, 600, 1200, 2400, 4800, 9600 or 19200 baud.
	Set Shifts	Opens the Set shifts menu. The shift start time, the length of the shift and the shift identification character can be set (see Figure 2-3. on page 2-11.)
	Barcode Setup	Opens the Barcode Bar/Space Ratios menu. Up to four bar widths and four space widths can be set.

Configure Menu	Menu Option	Function
	LCD Contrast	Opens the LCD Contrast menu. LCD Contrast can be set to a value from 0 to 255. Also, Back Light Saver can be set to Enable or Disable and Key pad buzzer can be set to Enable or Disable.
	Backup System Settings	Parameters set during the calibration process are saved to memory, overwriting any previously saved parameters.
	Restore System Settings	Previously saved parameters and settings are read from memory, undoing any recent changes.
	Full System Reset	Opens the System Restart dialogue. This gives three options: Initialize, where the printer is restored to the factory system settings Reset - keep messages, where the backed up system settings are restored and any stored messages are kept. Reset - all messages deleted, where the backed up system settings are restored and any stored messages are deleted.
	Select Alternative Zero	Opens the Select alternative zero dialogue. Alternative zero symbol can be set to one of several available zero characters.

Calibrate Menu

Note: The FIN is a 12 digit code. The following example shows the ink performance information that is contained within the 12 digits.

110/110/47/ 32/ 35
 (VISCOSITY CURVE) (PRESSURE) x10 bar (TEMPERATURE)

Calibrate Menu	Menu Option	Function
	Diagnostics Screen	Opens the Diagnostics screen. This displays information on the ink system status, which can be useful when diagnosing printer faults.
	Fluid ID Number	Opens the Fluid ID Number screen. This displays a list of Fluid Identification Numbers (FINs) that may be used with the 43S.
	Ink Number	Opens the Ink Number dialogue. This is used to select the ink part number.
	Topup Number	Opens the Topup Number dialogue. This is used to select the topup fluid part number.
	Heater Set Point	Opens the Ink System dialogue. Running Pressure and Ink temperature can be adjusted. The Heater Set Point is automatically set when the FIN is entered (units are 10x Temp °C).
	Set Running Pressure	Opens the Ink System dialogue. Running Pressure and Ink temperature can be adjusted. The Running Pressure is automatically set when the FIN is entered (units are 10x press bar).
	Pressure Zero Offset	The Pump Zero Offset option allows the ink system pressure to be set to zero relative to local atmospheric pressure; this operation should be carried out with no ink in the system and the pump not running. Opens the Pump Zero Offset dialogue, containing “Are You Sure?” which must be confirmed with Y or cancelled with N.
	VMS Chamber Calibration	This function calibrates the Viscosity Monitoring System for the ink currently selected. When calibrating the VMS, ensure that the ink in the mixer tank has been added from a new bottle; if not, drain the tank and replenish with fresh ink.
	Modulation Set Level	The modulation voltage can be set manually to achieve optimum jet breakup. Opens the Machine Control dialogue. The Modulation set value can be adjusted between 1 and 99.

Calibrate Menu	Menu Option	Function
	Auto Modulate	This option automatically sets the modulation voltage to achieve optimum jet breakup. Ensure that Rolling Phase is enabled when performing an Auto Modulate.
	Phase Charge Set	Opens the Phasing menu. The Phase Charge value can be adjusted between 0 and 255. This value should normally be set to 8 ± 1 and is the value of Phase Profile shown in the Diagnostics screen. The distance the phase detector is from the jet can affect the value required for good phasing; the distance should be approximately 1 mm.
	Phase Offset Set	Opens the Phasing menu. The Phase Offset value can be adjusted between 0 and 15. The Phase Offset should normally be set to the standard value of 11.
	Manual Phase	Opens the Phasing menu. The Manual Phase Angle value can be adjusted between 0 and 15. This option can be used to set the phase angle to the last one used and stop the phasing changes. This effectively freezes the drop-lets when viewed against the printhead LED.
	Charge Value	This option is used to adjust the amount of charge applied to the ink droplets in order to achieve optimum print quality. Opens the Phasing menu. The Charge Value can be adjusted between 0 and 255.
	EHT Range Set	This option sets the upper and lower limits of the EHT field so that good quality print is achieved at all character height settings. Opens the Set EHT Ranges dialogue. EHT Value 1 through to EHT Value 10 can be adjusted to between 0 and 255. If F2 is pressed while the Set EHT Ranges dialogue is displayed then all values are automatically calibrated.
	EHT Trip Level Set	This option calibrates the trip level for the EHT circuit.

Data Logging Menu

Data Logging Menu	Menu Option	Function
	Software Part No.	Displays the software version installed.
	Compilation Date/Author	Displays the date the software was compiled and the name of the author.
	Product Counter	Opens the Product counter dialogue with “Reset Counter and Display it?” fields. Select Yes or No for each field.
	View Run Hours	Displays the Pump run hours and Machine run hours.
	Reset Run Hours	Opens a dialogue with the following options: Set pump alarm hours, range 0-65535 Reset pump run hours, Yes or No Set machine alarm hours, range 0-65535 Reset machine run hours, Yes or No The running hours should be reset only under exceptional circumstances by trained service personnel.
	Serial Port Functionality	Opens the Configure data logging dialogue with fields for the parameters required for data logging via a serial port.
	Log onto remote	Connects to a remote device.
	Log off remote	Disconnects from a remote device.
	Enter Service Information	Opens the Enter Service Information dialogue. The printer location, modem telephone number, customer name and address can be entered.

Introduction

This section contains complete instructions for the removal and installation of the components and sub-assemblies listed below:

Component	Page	Component	Page
I/O Board	8-2	Flush Pump	8-25
CPU Board	8-5	Solenoid Valves	8-26
Power Supply Unit	8-6	Fan	8-27
PSU Fuses	8-6	Fan Failure Card	8-30
LCD/Backlight Assembly	8-10	EHT Module	8-32
Keypad	8-12	Head Manifold	8-33
Ink or Top Up Reservoir Sensor	8-15	Phase Detector	8-35
Fluid Management System	8-16	EHT Block	8-37
Ink System Pump	8-19	Nozzle Assembly	8-39
Main Filter	8-22	Umbilical	8-41



Warning

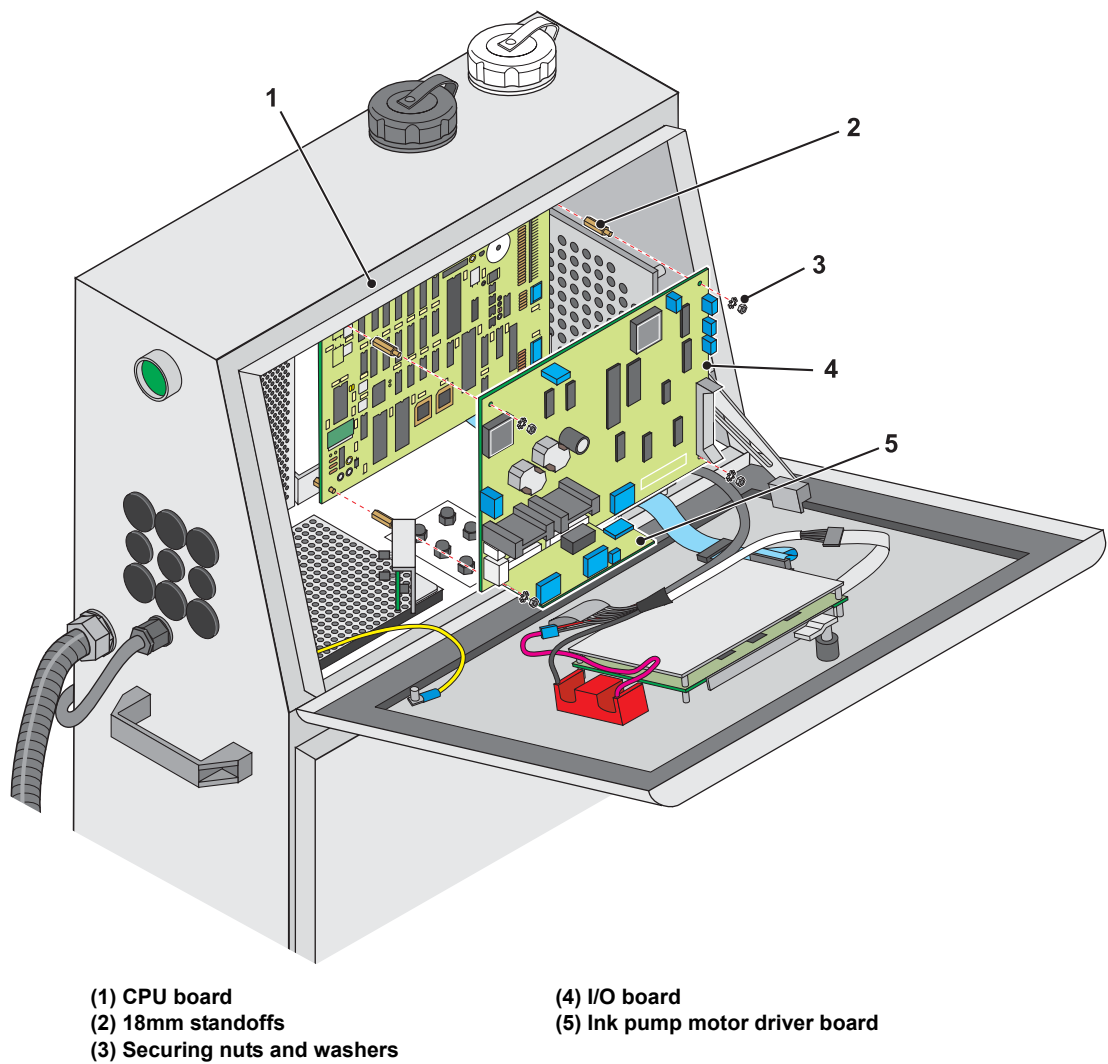
LETHAL VOLTAGES. Lethal voltages are present within this equipment when it is connected to the mains electrical supply. Only trained and authorized personnel may carry out maintenance work. Observe all statutory electrical safety codes and practices. Unless it is necessary to run the printer, disconnect the printer from the mains electrical supply before removing the covers or attempting any service or repair activity, otherwise death or personal injury may result.



Caution

ELECTROSTATIC SENSITIVE DEVICES. The printed circuit boards contain static sensitive devices. A suitably grounded, antistatic wrist strap must be worn when working on or handling printed circuit boards.

I/O Board



- (1) CPU board
- (2) 18mm standoffs
- (3) Securing nuts and washers

- (4) I/O board
- (5) Ink pump motor driver board

Figure 8-1. I/O Board and CPU Board

Removal

- 1 Remove the ink pump motor driver board (Item 5 in Figure 8-1) from the I/O board (4). Note the orientation for Installation.
- 2 Remove all connectors from the I/O board noting their position and orientation for Installation.
- 3 Remove and retain the six securing nuts and washers (3). Pull the I/O board away from the CPU board (1) taking care not to damage the interboard connectors.

Installation

- 1 Position the I/O board (Item 4 in Figure 8-1) on the 18 mm stand-offs (2) with the component side facing out and the LEVELS connector at the bottom right.
- 2 Push the I/O board on to the CPU board (2), ensuring that the interboard connectors mate correctly.
- 3 Secure the I/O board using the six nuts and washers retained in step 3 of the removal procedure.
- 4 Reconnect the connectors.
- 5 Refit the ink pump motor driver board as noted in step 1 of the removal process.

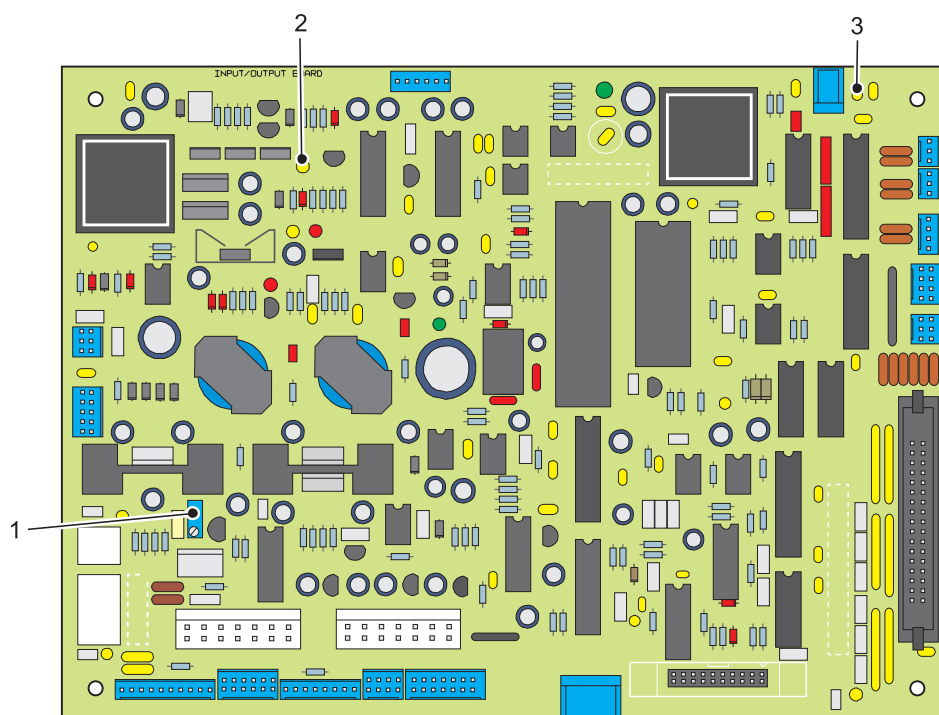
Calibration

When a new I/O board is fitted, you must calibrate the 285 V rail limit as described below:

- 1 Reconnect power to the printer and switch on the printer.
- 2 Set a digital voltmeter to a range suitable for measuring 285 V DC.
- 3 Connect the positive probe to TP2 (Item 2 in Figure 8-2) and the negative probe to TP1 (3).
- 4 Adjust VR1 (1) to give a reading of 285 V $\pm$ 1 V.
- 5 When the adjustment is complete, seal VR1 with a suitable sealing compound.

Note: The jet must be running and the EHT ON to perform the calibration.

- 6 Re-calibrate the system (see “Restore Calibration Parameters” on page 5-24) and calibrate the modulation value (see “Modulation Calibration (Manual)” on page 5-16.)



- (1) VR1
- (2) TP2
- (3) TP1

Figure 8-2. I/O Board Calibration

CPU Board

Removal

- 1 Remove the I/O board.
- 2 Remove all connectors from the CPU board, noting their position and orientation for Installation.
- 3 Remove and retain the six 18 mm stand-offs (1) and remove the CPU board.
- 4 Note the position of all links on the old CPU board.

Installation

***Note:** If the flash EPROMs on the new CPU board have not been pre-loaded with the 43s Boot Monitor Program, transfer the flash Eproms from the old CPU board to the new CPU board*

- 1 Set the links on the new CPU board as noted above.
- 2 Position the CPU board (Item 2 in Figure 8-1) on the six 10 mm stand-offs (6) with the component side facing outwards and CON_K at the top left
- 3 Secure the CPU board with the six 18 mm stand-offs (1) retained at Removal step 3.
- 4 Refit the connectors.
- 5 Refit the I/O board and download the correct software for the machine type.
- 6 Calibrate the system.

Power Supply Unit

Removal

- 1 Turn off the mains power switch and disconnect the mains power cord from the outlet.
- 2 Open the electronics compartment door.
- 3 Disconnect the DC power cable from the POWER connector on the I/O board.
- 4 Using a Nut Runner, loosen the two M4 nuts just above the power supply unit (PSU) by 2 turns.

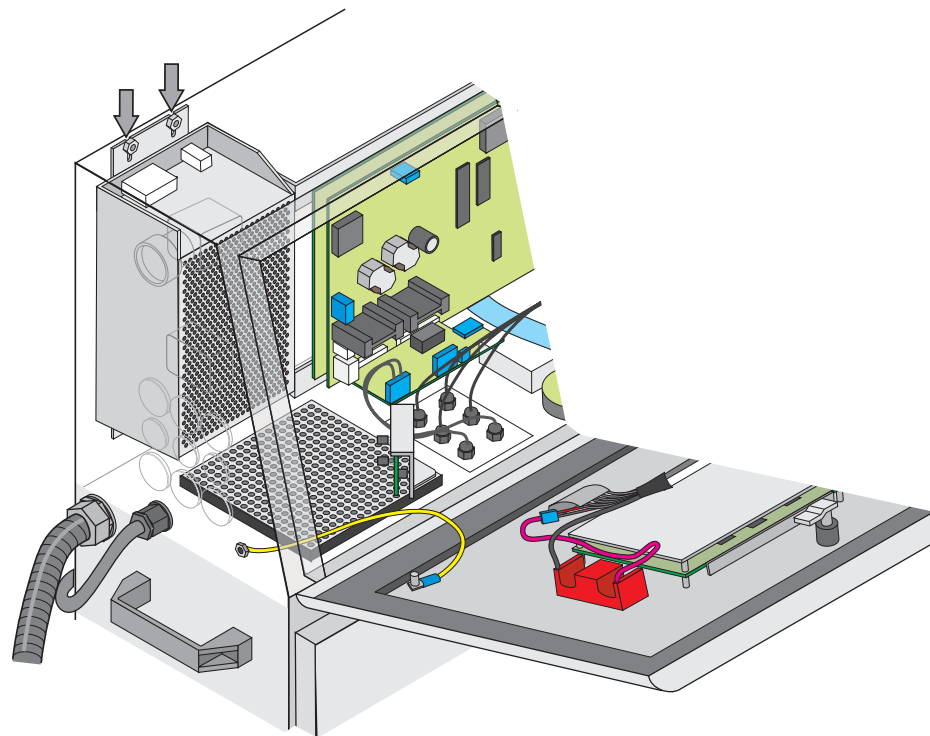


Figure 8-3. M4 Nut Location

- 5 Lift the PSU until its mounting bracket clears the shelf below it.

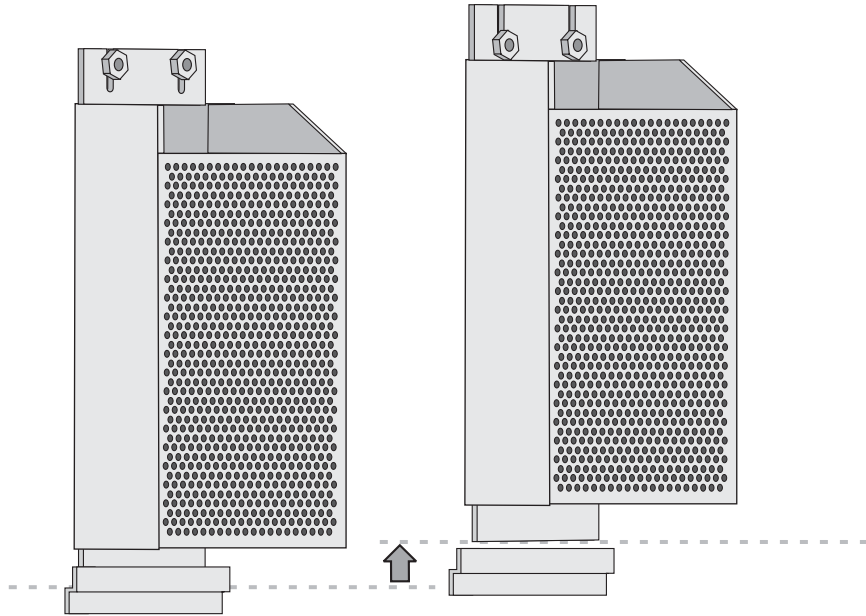


Figure 8-4. Freeing the Power Supply from the Mounting Shelf

- 6 Pull the bottom of the PSU forward until bottom of the mounting bracket is in front of the shelf that held it up.
- 7 Lower the PSU until its mounting bracket clears the two nuts at the top.
- 8 Gently pull the PSU outwards to allow access to the cable connections.
- 9 Disconnect the mains connector and earth leads.
- 10 Lift out the PSU module, taking care that the DC power lead does not catch on any other components.
- 11 Remove the PSU mounting bracket by unscrewing the four M3x8 CSK screws that connect it to the PSU.

- 1 Position the PSU mounting bracket on the back of the PSU and fix it in place using the four screws retained in step 11 of the removal procedure.
- 1 Hold the PSU above the cooling fan in the electronics compartment.
- 2 Connect the mains input lead to the connector on the base of the CPU and reconnect the earth leads.
- 3 Tilt the top of the PSU slightly forward and slide the slots on the top end of the PSU mounting bracket onto the two M4 nuts in the top rear of the electronics compartment.
- 4 Tilt the lower end of the PSU backwards until its mounting bracket is flush with the rear wall of the electronics compartment. If necessary, raise the PSU until the lower end of its mounting bracket clears the shelf beneath it.
- 5 Slide the PSU downwards onto the shelf.
- 6 Connect the DC power cable to the POWER connector on the I/O board.

PSU Module Fuse Replacement

To replace PSU module internal fuse, proceed as follows:

- 1 Remove the PSU module as described above.
- 2 Remove and retain the cover 4 retaining screws at the base of the PSU and lift off the cover.

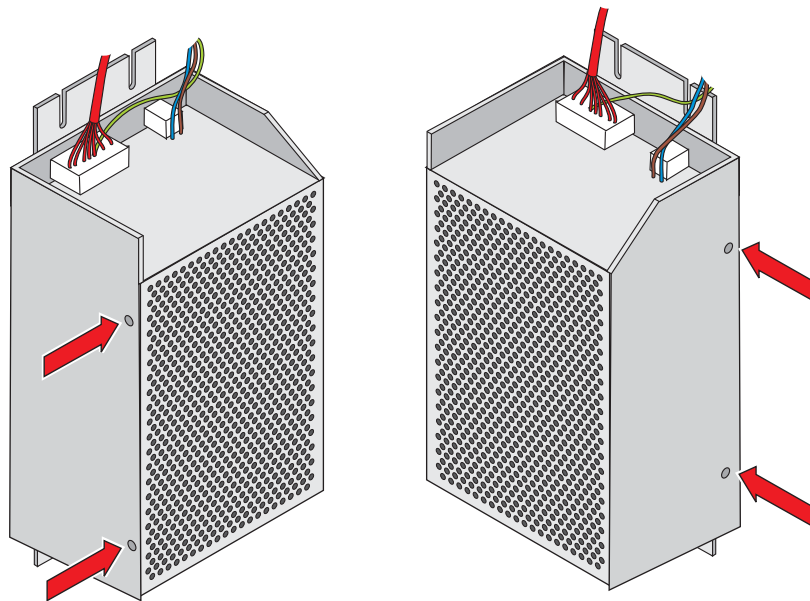


Figure 8-5. PSU Cover Retaining Screws

- 3 Remove the fuse F1 from its holder (at the upper right-hand corner of the PCB).

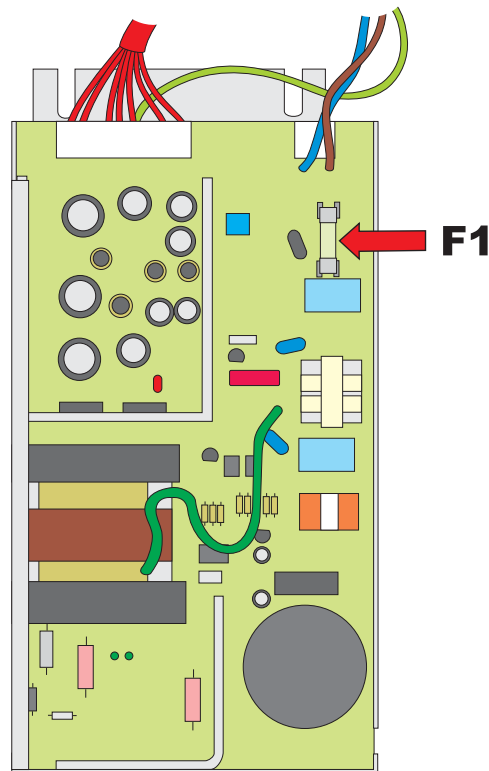


Figure 8-6. Location of PSU Fuse F1

- 4 Replace the fuse with one of identical value and voltage rating (T3A 250V). F1 is a fast acting glass tube fuse, 5.5 mm diameter, 21 mm long.
- 5 Refit the PSU cover and secure it with the screws removed at step 2.
- 6 Refit the PSU as described above.

LCD and Backlight Inverter Assembly

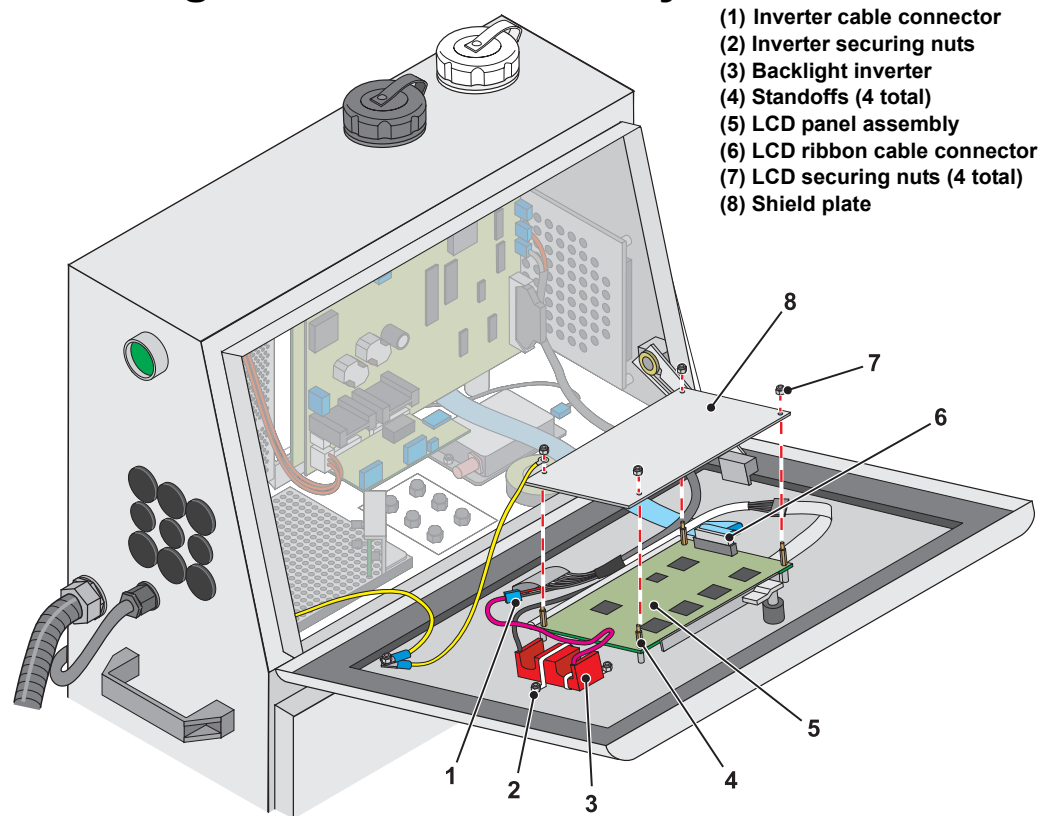


Figure 8-7. Removing the LCD Panel

Removal

To remove the LCD and backlight panel assembly, proceed as follows:

- 1 Open the electronics compartment door.
- 2 Remove the four securing nuts (Item 7 in Figure 8-7) and lift off the shield plate (8). Set both nuts and plate aside.
- 3 Disconnect the LCD ribbon cable (6) and the backlight cable (1).
- 4 Remove the four standoffs (4) and set aside.
- 5 Remove the two nuts (2) that secure the backlight inverter to the compartment door.
- 6 Lift the LCD panel assembly (5) and the backlight inverter (3) off the compartment door as a single unit (these two items are wired together as a single assembly).
- 7 If you are planning to replace either the LCD or the backlight inverter, strip the casing that covers the splice between the LCD's pink wires and the backlight inverter's white wires. Disconnect (cut) the wires.

Installation

To refit the LCD and backlight panel assembly, proceed as follows:

- 1** If you have separated the LCD and the backlight inverter, connect them now. Follow these steps:
 - a. New LCDs have a connector at the end of the pink wire pair. If you are installing a new LCD, cut this connector off and strip the end of the wires.
 - b. Solder the end of one of the pink wires to one of the white wires coming out of the backlight inverter (it doesn't matter which wire is connected to which). Then, solder the other wire pair.
 - c. Sheath each of the exposed wire joins in a suitable non-conductive material.
 - d. Sheath the entire connection.
- 2** Fit the LCD panel (Item 5 in Figure 8-7) and backlight inverter (3) over the four mounting posts on the electronics compartment door.
- 3** Replace the four standoffs (4) removed in step 4 of the removal procedure.
- 4** Reconnect the inverter cable connector (1) and the LCD ribbon cable connector (6).
- 5** Replace the shield plate (8) and secure with the four nuts (7) removed in step 2 of the removal process.
- 6** Secure the backlight inverter with the two nuts (2) removed in step 5 of the removal procedure.

Keypad

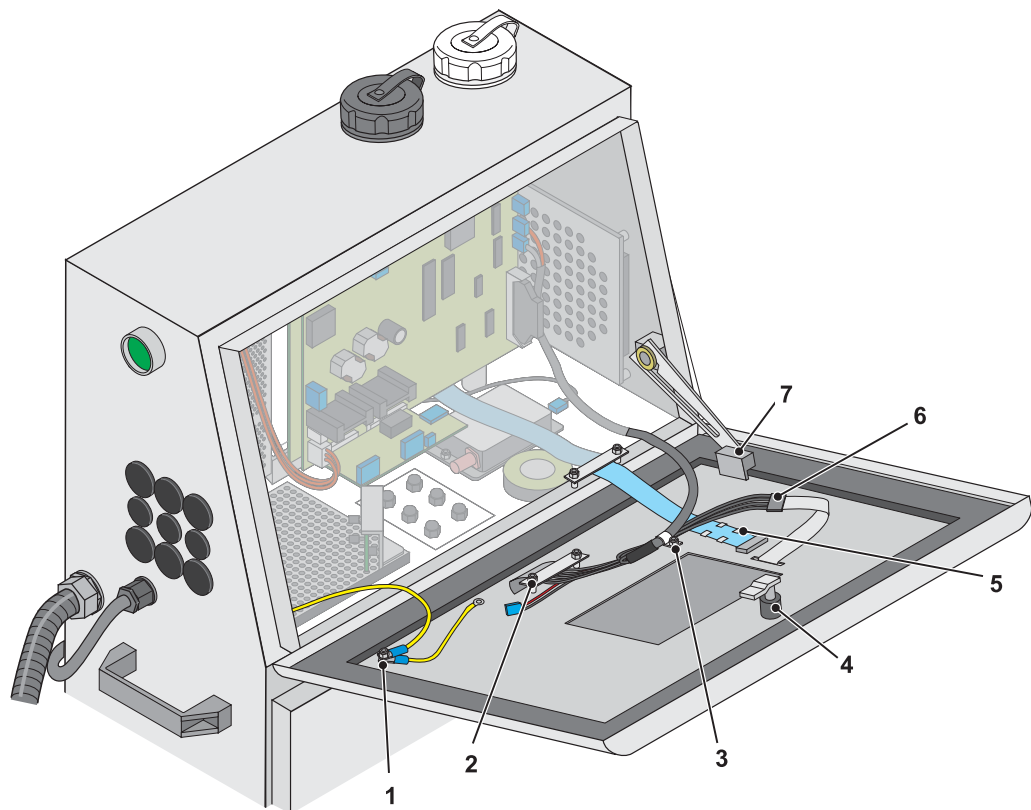


Figure 8-8. Replacing the keypad, part 1

Removal

Once attached, the keypad cannot be removed from the electronics compartment door. The entire door must be replaced in order to exchange the keypad. Follow these steps:

- 1 Remove the keypad and backlight inverter assemblies (see "LCD and Backlight Inverter Assembly" on page 8-10).
- 2 Remove the nut holding down the ground wires (Item 1 in Figure 8-8).
- 3 Remove the two nuts (2) that attach the ribbon cable connector to the door. Set the nuts and the metal plates aside. Disconnect the ribbon cable.
- 4 Remove the nut (3) that attaches the keypad cable to the compartment door. Set the plastic sleeve aside.
- 5 Remove and retain the door lock (4).
- 6 Bend back the metal fingers (5) to release the ribbon cable.
- 7 Disconnect the remaining ribbon cable (6).
- 8 Remove the screw that fixes the door guide rail to the door (7).

- 9 Remove the five bolts (not pictured) that attach the door hinge to the printer casing.
- 10 Remove and discard the compartment door.

Installation

- 1 Align the hinge of a new compartment door to the five holes in the printer casing.
- 2 Fix the hinge and door assembly in place using the five bolts retained in step 9 of the removal process.
- 3 Reattach the guide rail using the screw retained in step 8 of the removal process.

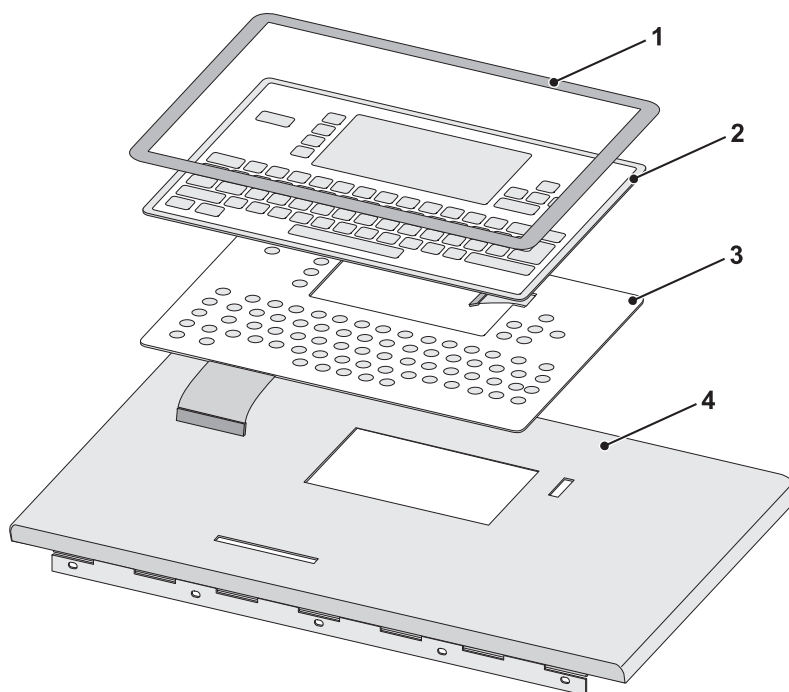


Figure 8-9. Replacing the keypad, part 2

- 4 Close the compartment door.
- 5 Peel off the backing of a new keypad membrane (Item 3 in Figure 8-9). Insert the two attached ribbon cables through the slots in the compartment door. Carefully line up and the membrane and press it into place.



Caution

Use extreme caution in aligning these items. The adhesive is both strong and permanent. You will not get a second chance.

- 6** Remove the backing from a new keypad (2) and fix it in position on the keypad plate.
- 7** Peel off the backing of a new overlay retainer (1) and press it in position.
- 8** Open the compartment door.
- 9** Reattach the ribbon cable disconnected in step 7 of the removal process.
- 10** Wrap two new finger plates around the ribbon cable released in step 6 of the removal process. Remove the backing from the finger plates and press onto the compartment door.
- 11** Replace the door lock (4).
- 12** Reattach the keypad cable using the plastic sleeve and nut (3) retained in step 4 of the removal procedure.
- 13** Reattach the ribbon cable (2) disconnected in step 3 of the removal procedure. Lock the connector in place using the retained plates and nuts.
- 14** Reattach the ground wires to the compartment door using the nut retained in step 2 of the removal process.
- 15** Refit the LCD and backlight assembly (see LCD and Backlight Installation, page 115).

Ink and Top Up Reservoir Sensor

Removal

- 1 Immediately above the sensor is a connector that joins the two leads coming out of the sensor to a cable that originates in the electronics compartment. Unclip this connector to separate the lead wires from the cable.
- 2 Unscrew the sensor from the threaded receptacle on top of the reservoir and lift it out.

Installation

- 1 Screw the level detector into the receptacle in the tank.
- 2 Join the connector at the end of the reservoir sensor lead wires to the end of the cable disconnected in step 1 of the removal process.

Exchanging the Sensor and LED

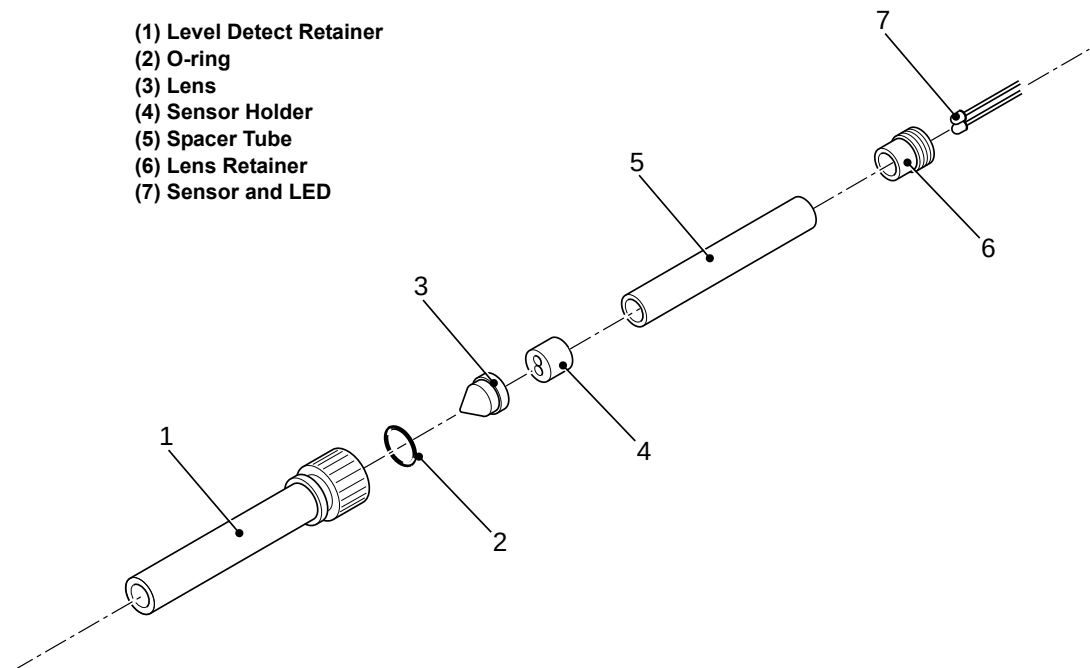


Figure 8-10. Level Detector

- 1 Remove the sensor from the tank as described above.
- 2 Unscrew the lens retainer (Item 6 in Figure 8-10) and thread it over the trailing leads of the sensor and LED.

Fluid Management System (FMS)



Warning

HANDLING INK, SOLVENT AND TOP-UP. The ink, solvent and top-up are irritating to the eyes and respiratory system. To prevent personal injury when handling these substances:

Always wear protective clothing and rubber gloves.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

Apply barrier hand cream before handling ink.

If ink or top-up contaminates the skin, wash immediately with soapy water. DO NOT use washdown or solvent to clean ink stains from the skin.

Removal

- 1 Open the ink compartment.
- 2 Remove the retainer screw (Item 3 in Figure 8-11. on page 8-17) and lift the FMS tray (4) forwards and out of the printer.
- 3 Remove the filler plug (1) and drain the ink system using a syringe and a length of plastic tubing.
- 4 Each of the electronic lead wires coming out of the bottom of the FMS is attached via a connector clip. Disconnect all of these clips. Note the colour and destination of each sensor lead.
- 5 Remove and retain the two screws securing the printhead manifold (situated underneath the valves). Pull the manifold clear of the ink system (take care to retain the manifold O-rings).
- 6 Remove the electrical connectors from the valves (2) V3, V6, V7 and V8.
- 7 Remove and retain the three screws securing the system manifold (6). Pull the manifold clear of the ink system (take care to retain the manifold O-rings).
- 8 Disconnect the system top up tube at the Jaco T fitting (located behind the ink tank manifold).

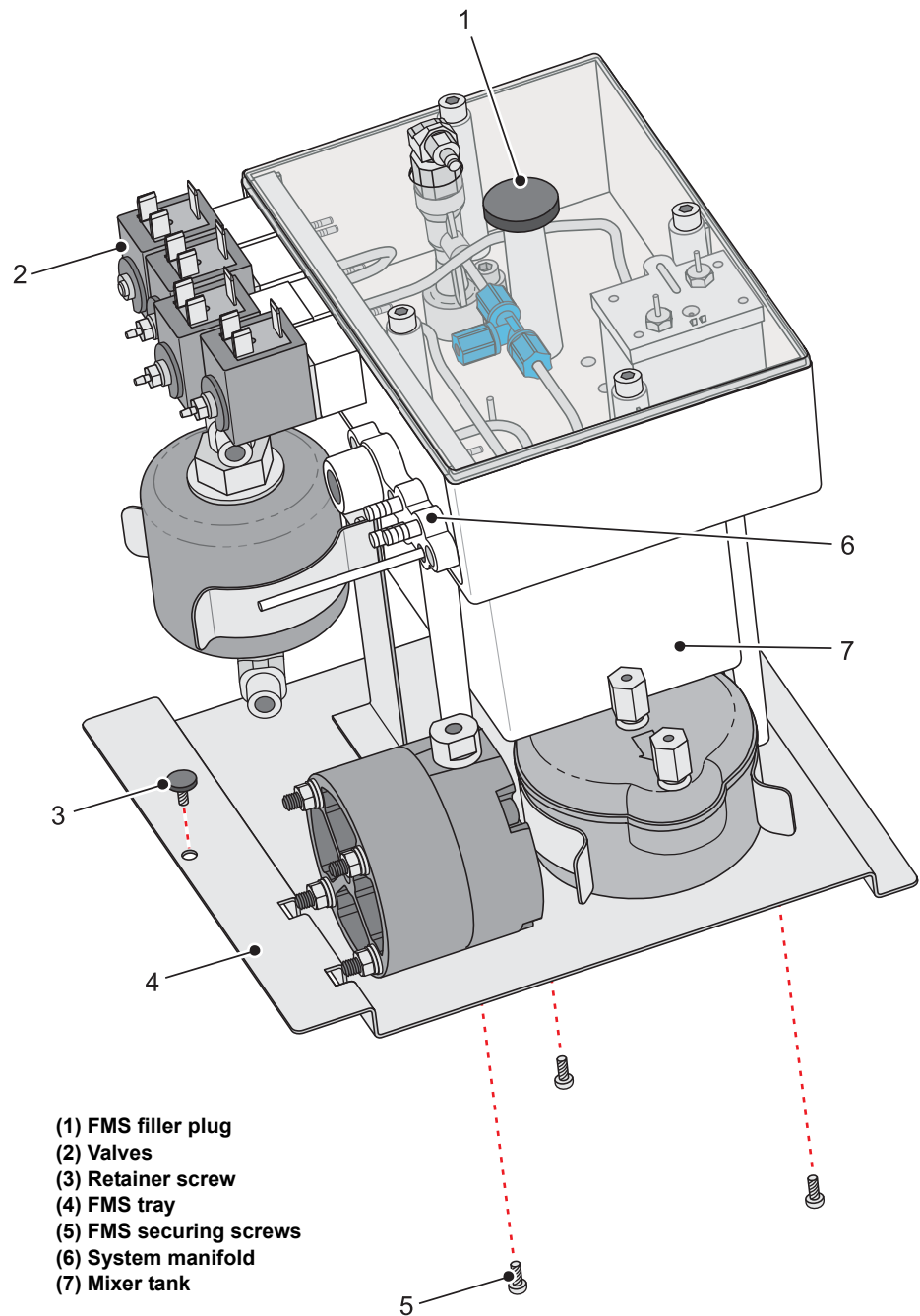


Figure 8-11. Fluid Management System Removal

- 9 Locate the three screws (5) that secure the FMS mounting pillars to the FMS tray. Remove and retain the screws. The FMS can now be removed from the printer.

Installation

- 1 Place the FMS in position and secure it to the FMS tray using the screws retained in step 9 of the removal procedure.

- 2** Fit the system manifold (6) to the FMS and secure it to the ink system with the three screws retained in step 6 of the removal procedure (ensure all the O-rings are refitted in their correct positions).
- 3** Refit the electrical connectors to the valves (2) V3, V6, V8 and V10.
- 4** Refit the system top up tube behind the ink manifold.
- 5** Fit the printhead manifold in position beneath the valves and secure it using the two screws retained in step 6 of the removal procedure (ensure all the O-rings are refitted in their correct positions).
- 6** Reattach all the electronic leads on the bottom of the FMS to the appropriate connector clips.
- 7** Commission the ink system as described in “Commissioning” on page 2-2.
- 8** Recalibrate the VMS (see “VMS Calibration” on page 5-16).

Ink System Pump

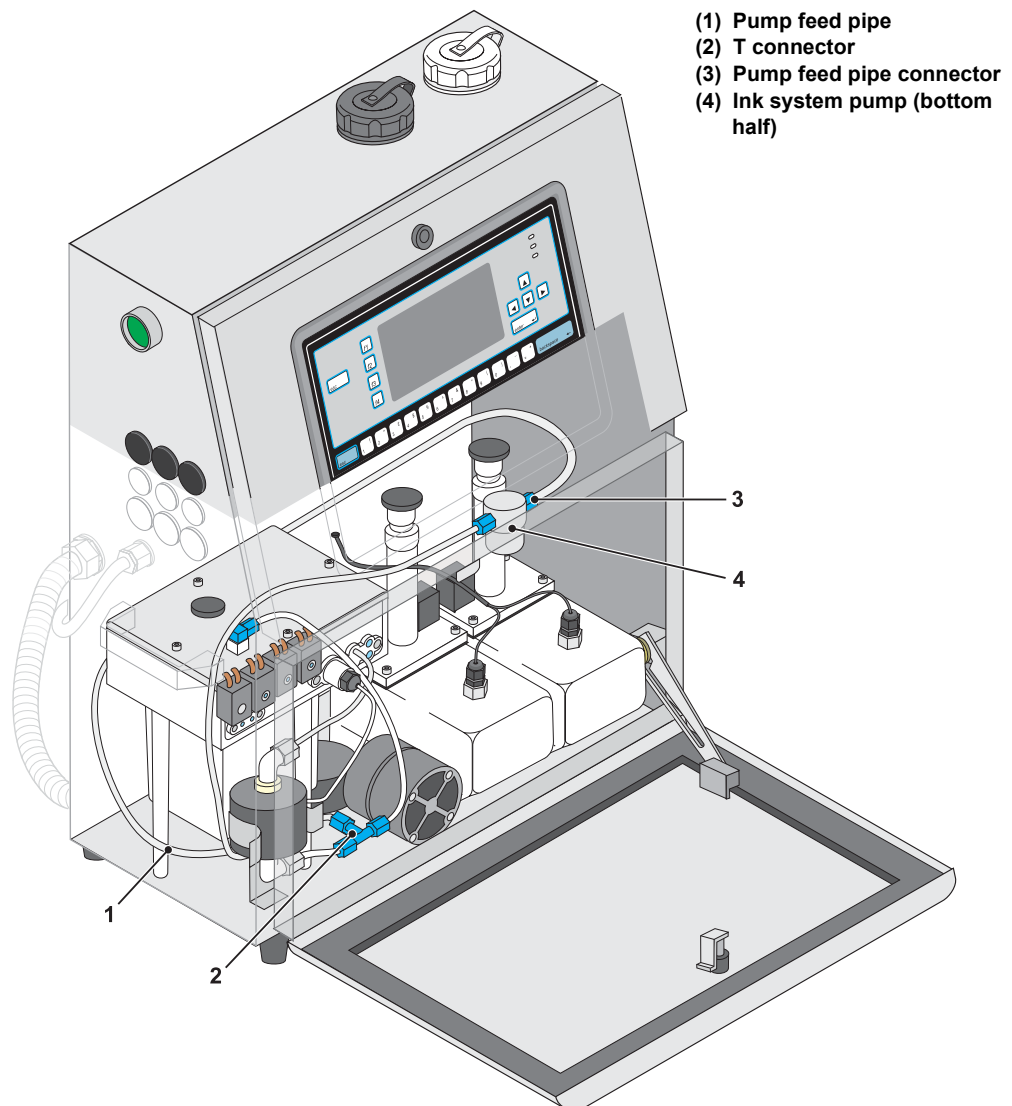


Figure 8-12. Ink System Pump Removal, part 1

Removal

- 1 Open the ink compartment door.
- 2 Disconnect the end of the pump feed pipe (Item 1 in Figure 8-12) from the T connector (2) in front of the FMS. This will prevent ink being siphoned from the ink system when the pump is disconnected.
- 3 Place a wad of tissue or absorbent cloth underneath the pump to catch any ink spillage.
- 4 Disconnect the pump feed (3) and outlet pipes from the pump.

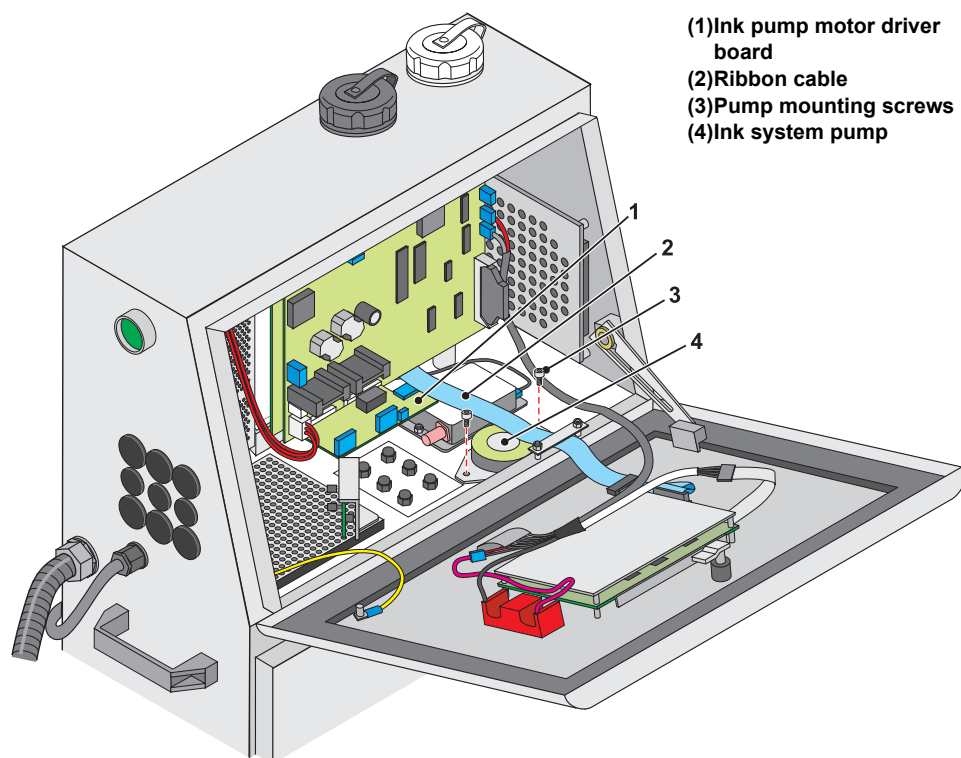


Figure 8-13. Ink System Pump Removal, part 2

- 5 Open the electronics compartment.
 - 6 Disconnect the PUMP connector from the I/O board. It is on the bottom edge of the board, below the ink pump motor driver board (Item 1 in Figure 8-13).
- Hint: follow the wires coming out of the pump (4).*
- 7 Use the arrow on the pump head to note orientation.
 - 8 Remove and retain the two screws (3) securing the pump.
 - 9 Gently move the ribbon cable (2) to the right and out of the way.
 - 10 Withdraw the pump and its sealing gasket. Discard the gasket.

Installation

- 1 Ensure that the pump is the correct type for the machine.
- 2 Place the pump in position, with a new sealing gasket fitted between the pump and the compartment floor. Ensure that the pump orientation is correct.
- 3 Secure the pump to the bulkhead, using the two screws retained in step 8 of the removal process.
- 4 Connect the PUMP connector (3) to the I/O board.
- 5 Connect the ink feed and outlet pipes to the pump.

- 6** Connect the end of the ink feed pipe to the T connector in front of the FMS. Remove the tissue or cloth (placed to catch ink spillage) from beneath the pump.

Main Filter

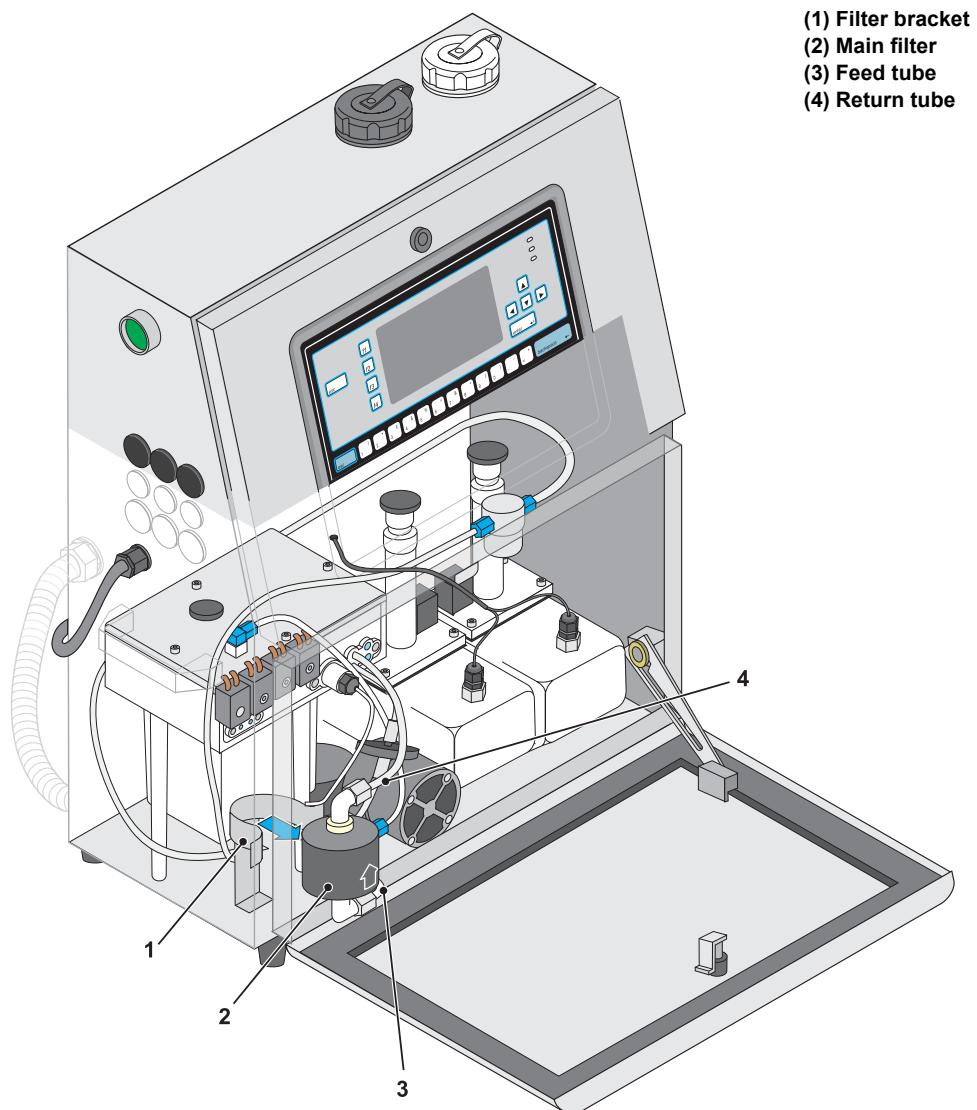


Figure 8-14. Main Filter

Replacement

When replacing the main filter, it is recommended that you follow the steps below to ensure that any contaminants that may have found their way into the new filter prior to installation are trapped by the old filter prior to disposal.

- 1 Open the ink system compartment door.
- 2 Pull the main filter (2) out of the filter bracket (1). Note that it may be easier to slide the filter upwards and out of the bracket than it is to pull the filter directly outwards.
- 3 Place a wad of tissue or absorbent cloth underneath the filter to catch any ink spillage.
- 4 Disconnect the ink feed tube (3) from the old filter and connect it to the bottom of the new filter. Note that the bottom of the filter

can be identified by the presence of an additional nub (see Figure 8-15).

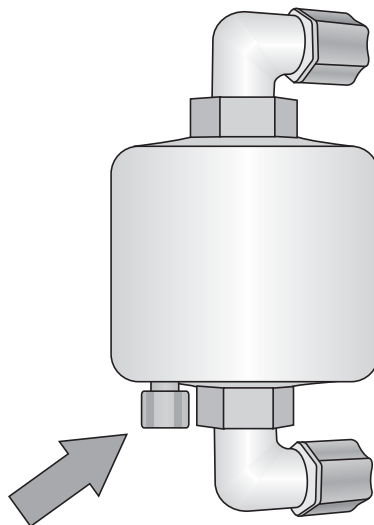


Figure 8-15. Location of nub on bottom of main filter

- 5 Push the new filter into place in the bracket.
- 6 Place a short length of 6mm PTFE tube (15 cm/6 inches should be enough) between the outlet of the new filter and the inlet of the old filter (the filters should now be linked together in series).
- 7 Allow the printer to run for approximately 30 minutes.
- 8 Remove the additional tubing connected in step 6.
- 9 Disconnect the ink outlet tube (4) from the old filter and attach it to the top of the new filter.
- 10 Discard the old filter.
- 11 Close the ink system compartment door.

Removal

Use this procedure when you need to remove the filter temporarily for maintenance, but are not replacing it.

- 1 Open the ink system compartment door.
- 2 Pull the main filter (2) out of the filter bracket (1). Note that it may be easier to slide the filter upwards and out of the bracket than it is to pull the filter directly outwards.
- 3 Place a wad of tissue or absorbent cloth underneath the filter to catch any ink spillage.
- 4 Disconnect the ink feed (3) and outlet (4) tubes from the filter.

Installation

Use this procedure to replace a filter that has been temporarily removed for maintenance purposes.

- 1 Connect the ink feed and outlet tubes to the filter. Comply with the flow direction marked on the filter.
- 2 Push the filter back into the filter bracket.
- 3 Close the ink system compartment door.

Flush Pump

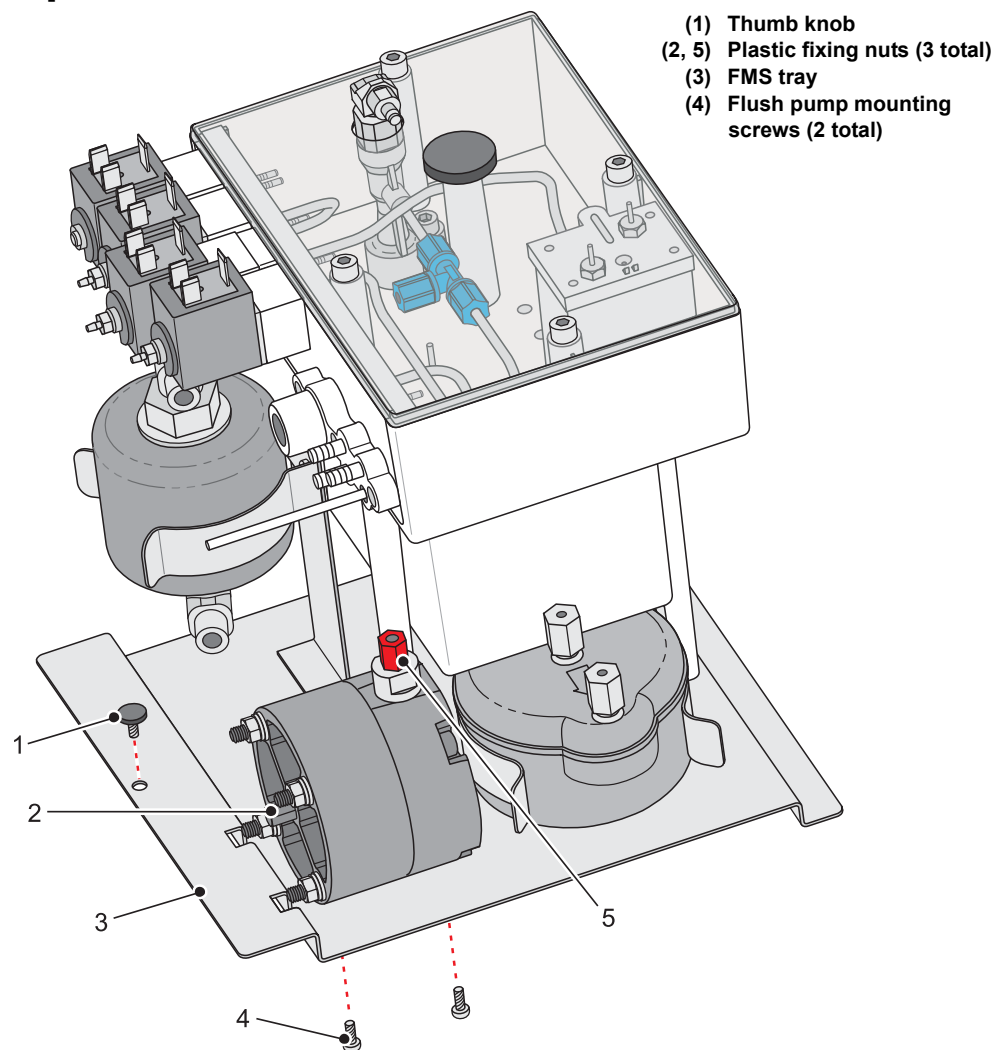


Figure 8-16. Flush Pump Removal

Removal

- 1 Remove and retain the thumb knob (Item 1 in Figure 8-16).
- 2 Lift the FMS tray (3) forwards out of the ink compartment.
- 3 The flush pump is secured by two mounting screws (4) accessed from underneath the FMS tray. Remove and retain the two screws.
- 4 Remove and retain the plastic fixing nut (2, 5) on each of the hose connectors and withdraw the hoses. Note that a third plastic fixing nut (green) is not pictured because it would appear behind the flush pump in this figure. This nut and hose should also be removed.

Installation

Installation is the reverse of removal.

Solenoid Valves

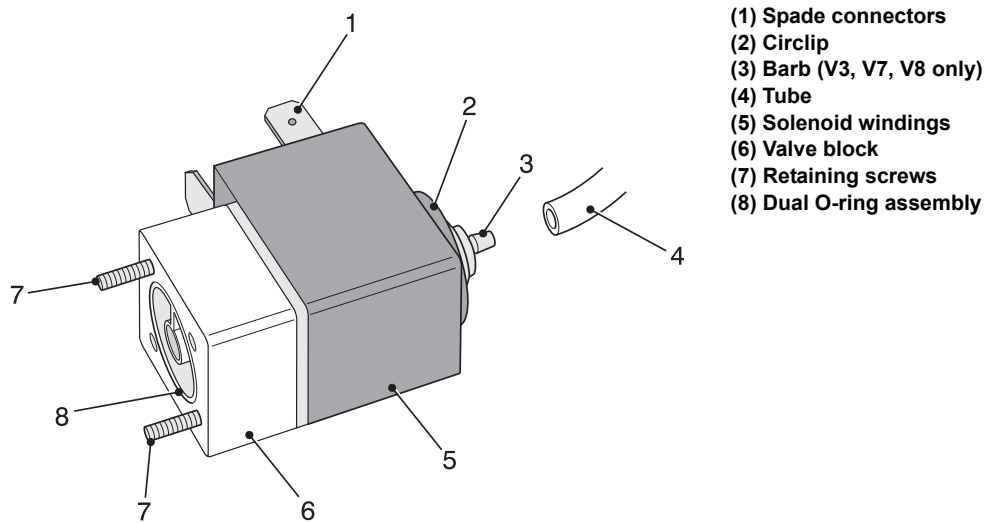


Figure 8-17. Solenoid Valve Components

Removal

- 1 Remove the electrical connectors from the spade connector terminals (Item 1 in Figure 8-16) from the coil of the valve.
- 2 Remove the tube (4) from the barb (3) if present (valves V3, V7 and V8).
- 3 Remove the circlip (2) and slide the solenoid windings (5) off the valve block (6) (note the orientation of the solenoid).
- 4 Remove and retain the two screws (7) securing the valve block to the manifold.
- 5 Remove the valve block, complete with O-ring assembly. Retain the O-ring assembly (8).

Installation

- 1 Fit the O-ring assembly (8) retained in step 6 of the Removal procedure to the valve block (6).
- 2 Fit the valve block to the manifold and secure it with the two screws (7) retained in step 4 of the removal process. Slide the solenoid windings (5) on to the valve block and secure with the circlip.

- 3 Refit the electrical connector onto the spade connector (1). See Table 8-1 for the correct connections.

Valve	Wire colours
V3	Green/blue
V6	Black/white
V7	Orange/yellow
V8	Red/brown

Table 8-1: Valve wire connections

- 4 Refit the tube (4) on to the barb on the valve (if present).

Fan



Caution

EQUIPMENT DAMAGE. Take care to ensure that the fan fail sensor is not damaged when removing or installing the filter housing.

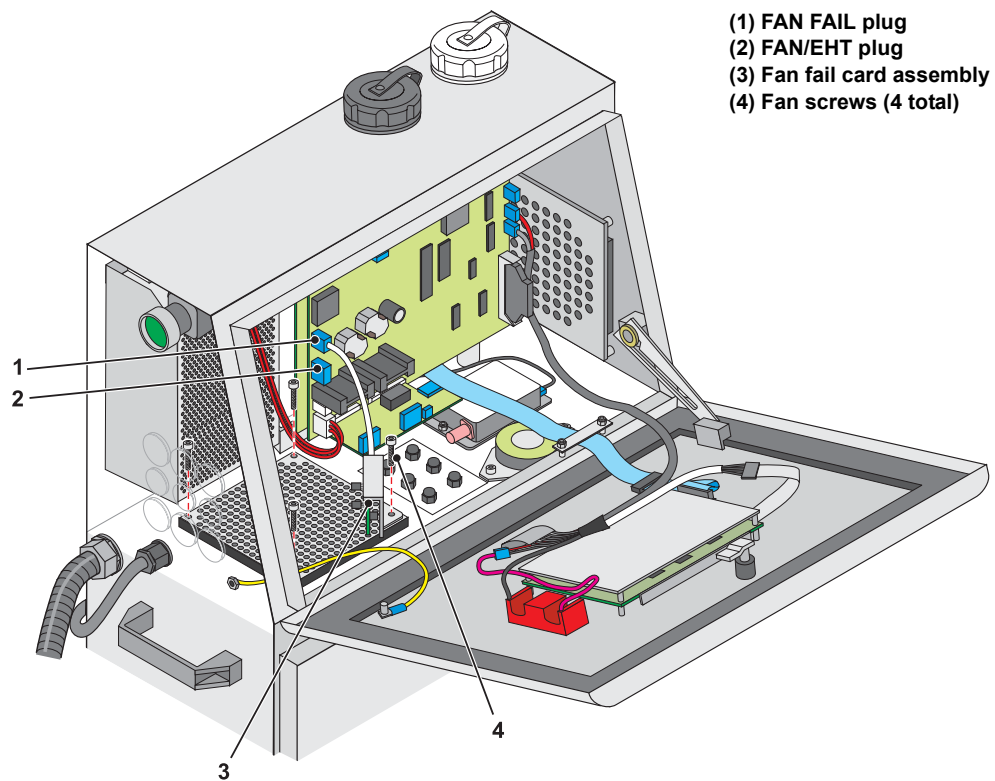


Figure 8-18. Removing the electronics compartment fan

Removal

- 1 Disconnect the FAN FAIL plug (Item 1 in Figure 8-18) from the I/O board.
- 1 Disconnect the FAN/EHT plug (2) from the I/O board.
- 2 Identify the two leads that go to the fan (pins 4 and 5) and remove them from the FAN/EHT plug by pressing the crimp release lugs on the side. Make a note of the colour and destination of each lead.
- 3 Remove and retain the four screws (4) that secure the fan to the floor of the electronics compartment.
- 4 Set the fan fail card assembly (3) aside.
- 5 Remove the grille that covers the fan and set it aside.
- 6 Remove the fan from the electronics compartment.

Installation

- 1** Place the fan in position in the electronics compartment. Make sure the arrow on the fan is pointing downwards (the fan blows down into the ink compartment). Align the mounting holes in the fan to the mounting holes in the electronics compartment.
- 2** Place the grille that covers the fan on top of the fan, aligning the mounting holes as necessary.
- 3** Insert and tighten three screws in the following positions: left rear, right rear, left front. Do not insert the right front screw at this time.
- 4** Position the fan fail card assembly over the right front mounting hole in the fan grille.
- 5** Insert the fourth screw through the fan fail card mounting bracket, fan grille and fan. tighten.
- 6** Insert the crimped ends of the fan power lead into the FAN/EHT plug in the positions noted in Removal step 2. It may be necessary to open the crimp release lugs to enable the crimp to lock back into position inside the connector.
- 7** Connect the FAN/EHT plug to the I/O board.
- 8** Connect the plug from the fan fail board to the FAN FAIL connector on the I/O board.

Fan Failure Card

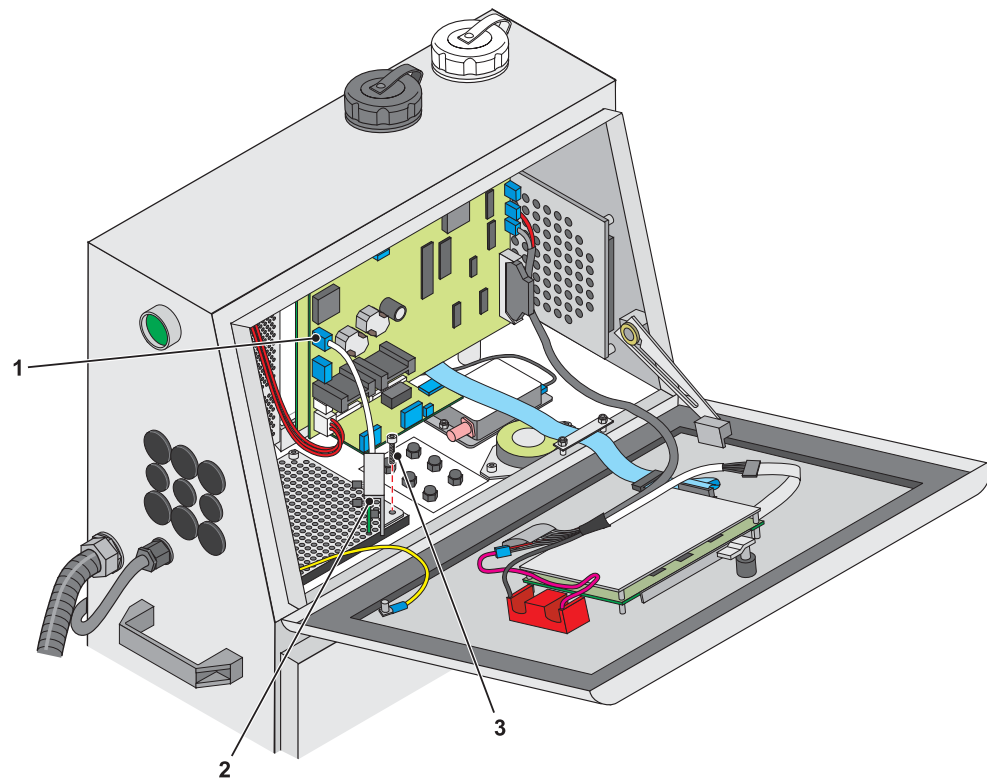


Figure 8-19. Removing the fan fail card

Removal

The fan failure card is located in the electronics compartment, with two temperature sensors protruding out over the fan.

- 1 Open the electronics compartment.
- 2 Disconnect the FAN FAIL connector (Item 1 in Figure 8-19) from its location on the left edge of the I/O board.
- 3 Remove and retain the mounting screw (3) that attaches the fan fail card (2) and its mounting bracket to the fan assembly.
- 4 Rotate the bracket forward until you can see the face of the fan fail card. Remove and retain the screw securing the fan failure card to its bracket.
- 5 The fan failure card can be separated from its bracket and removed.

Installation

- 1** Place the card against the bracket with its sensors facing outward.
- 2** Secure the card with the screw retained in step 3 of the removal process.
- 3** Positioning the bracket in place on top of the fan assembly.
- 4** Secure the bracket with the screw retained in step 2 of the removal process.
- 5** Connect the FAN FAIL connector to the I/O board.

EHT Module

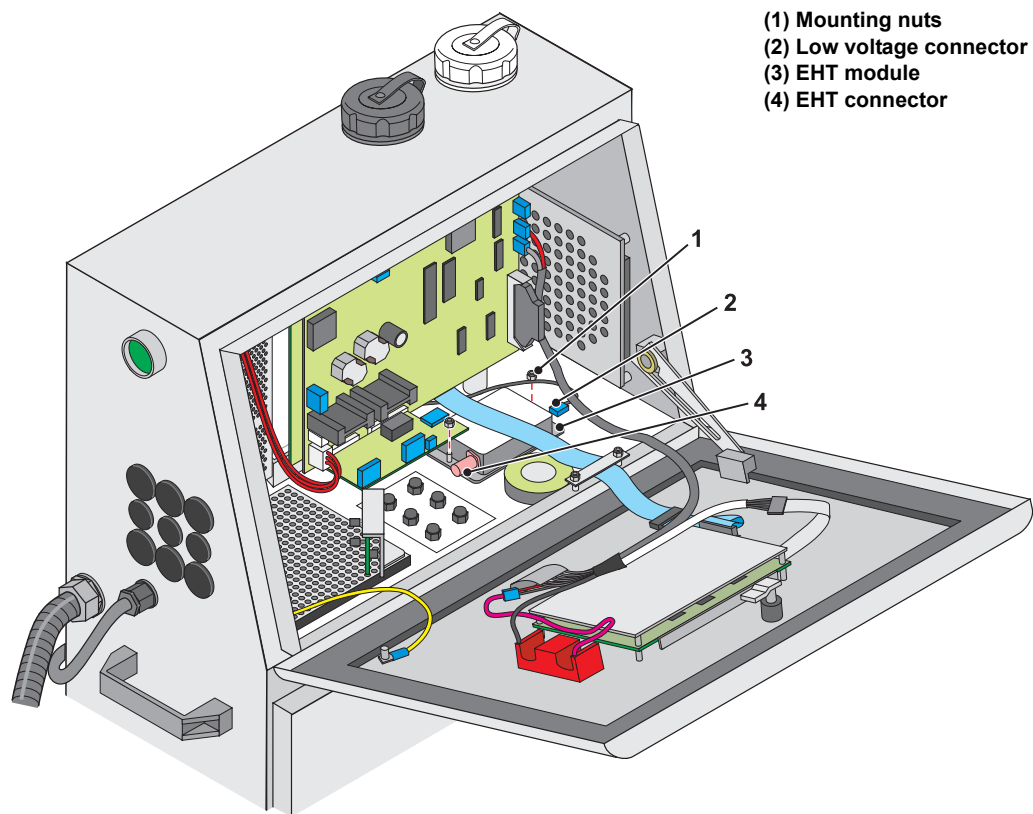


Figure 8-20. EHT Module Removal

Removal

- 1 Open the electronics compartment door.
- 2 Remove the two nuts (Item 1 in Figure 8-20) securing the EHT module (3) to the compartment floor.
- 3 Remove the EHT connector (4) from the EHT module.
- 4 Lift the EHT module clear of the printer housing and disconnect the low voltage connector (2).

Installation

- 1 Fit the low voltage connector to the base of the EHT module and fit the module over the two screws in the electronics compartment floor.
- 2 Fit the EHT connector (4) to the left end of the module.
- 3 Replace the two nuts removed in step 2 of the removal procedure.

Head Manifold

The head manifold incorporates the gutter detect module and the head heater.

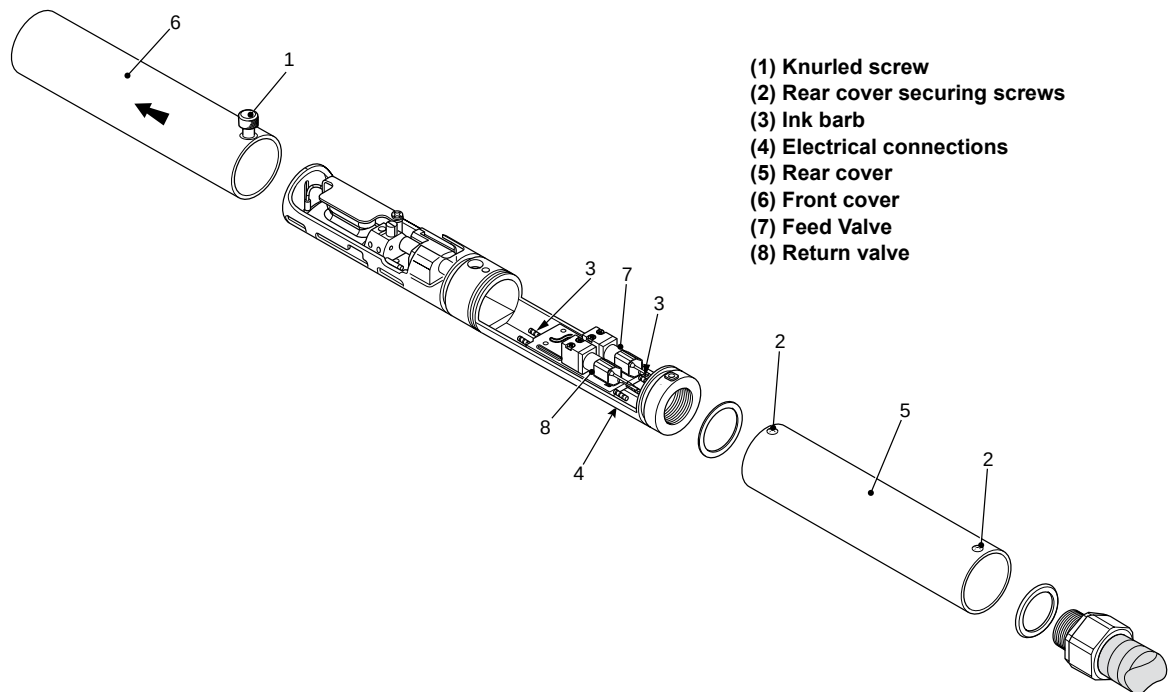


Figure 8-21. Head Manifold

Removal

- 1 Slacken the knurled screw (Item 1 in Figure 8-21) and slide the front cover (6) off the printhead.
- 2 Remove and retain the two rear cover securing screws (2).
- 3 Slide the rear cover (5) back over the umbilical until it is clear of the printhead.
- 4 Remove the heat shrink from the five electrical connections (4) at the rear of the head heater. Make a note of how the wires are connected and then unsolder the connections.
- 5 Disconnect the electrical connections to the feed valve (7) and return valve (8).
- 6 Remove the tubes from the barbs (3) from the front and rear of the head manifold.
- 7 Remove the two screws under the print head tray that secure the head heater/manifold in place.
- 8 The head heater can now be removed from the printhead.

Installation

- 1** Place the head heater in position on the printhead, with the electrical connections to the rear.
- 2** Replace the screws securing the head heater/manifold in place on the print head tray.
- 3** Slide a new length of heat shrink on to one side of each of the electrical connections. Resolder the connections (as noted in Removal step 4) and slide the heat shrink over each soldered joint.
- 4** Reconnect the electrical connections to the feed valve and return valve.
- 5** Push the ink tubes (3) on to the connectors at each end of the head manifold.
- 6** Slide the rear cover (5) into position on the printhead and secure it with the two screws (2) Removal step 2.
- 7** Slide the front cover on to the printhead and secure it with the knurled screw (1).

Phase Detector

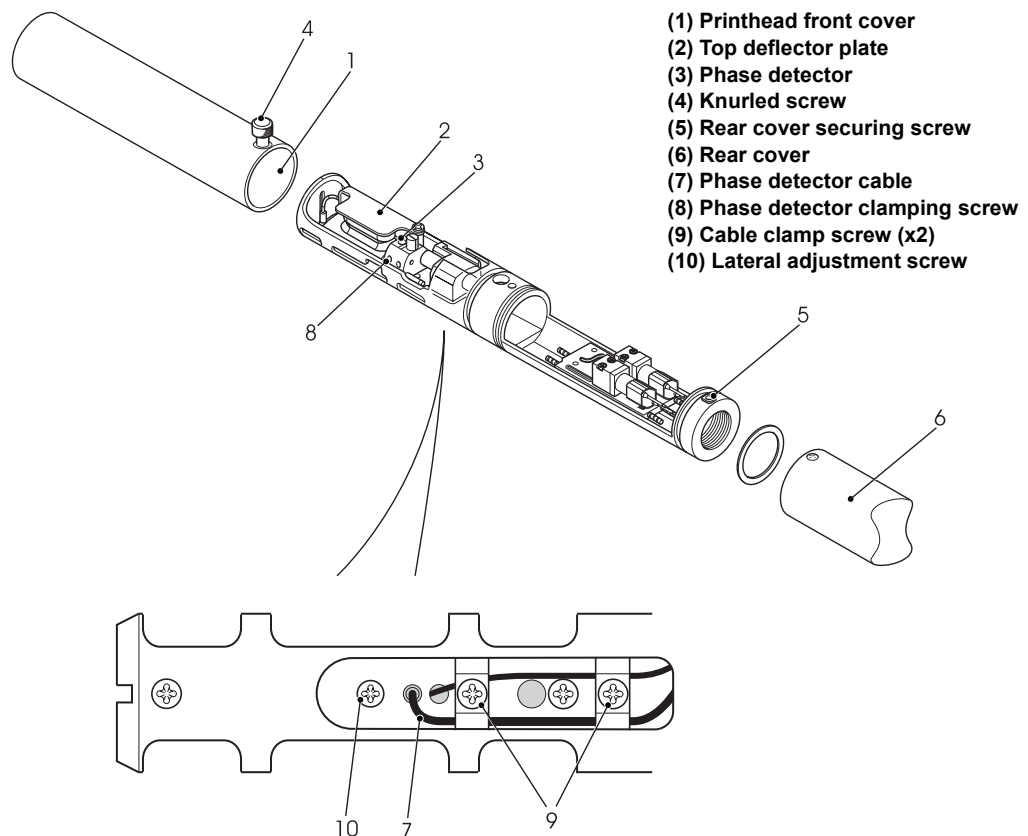


Figure 8-22. Phase Detector Removal and Installation

Removal

- 1 Slacken the knurled screw (Item 4 in Figure 8-22) and slide the front cover off the printhead.
- 2 Remove and retain the two rear cover securing screws (5) and slide the rear cover (6) back until it is clear of the printhead.
- 3 Remove the heat shrink from the connections between the phase detector and the cable loom. Make a note of how the wires are connected and desolder the connections.
- 4 Slacken the phase detector clamping screw (8) and slide out the detector. If necessary, slacken the lateral adjustment screw (10).
- 5 Slacken the rear cable clamp screws (9) to release the phase detector cable.
- 6 Remove the phase detector from the printhead.

Installation

- 1** Route the phase detector cable (7), through the cable clamps (9) to the rear of the printhead. Tighten the rear cable clamp screws (9), making sure that the clamp does not crush the cables.
- 2** Slide the phase detector into its mounting hole and position it so that the top of the detector is 1mm below the printhead nozzle orifice. Tighten the clamping screw (8) to hold the detector in position.
- 3** Slide lengths of heat shrink on to one side of each of the phase detector connections. Resolder the connections (as noted in step 3 of the removal procedure) and slide the heat shrink over each soldered joint.
- 4** Start the jet and ensure that the phase profile is correct (see “Phase Profile Adjustment” on page 5-18).
- 5** Slide the rear cover (6) back into position and secure it with the two screws (5) retained in step 2 of the removal procedure.
- 6** Slide the front cover (1) into position and secure it using the knurled screw (4).

EHT Block

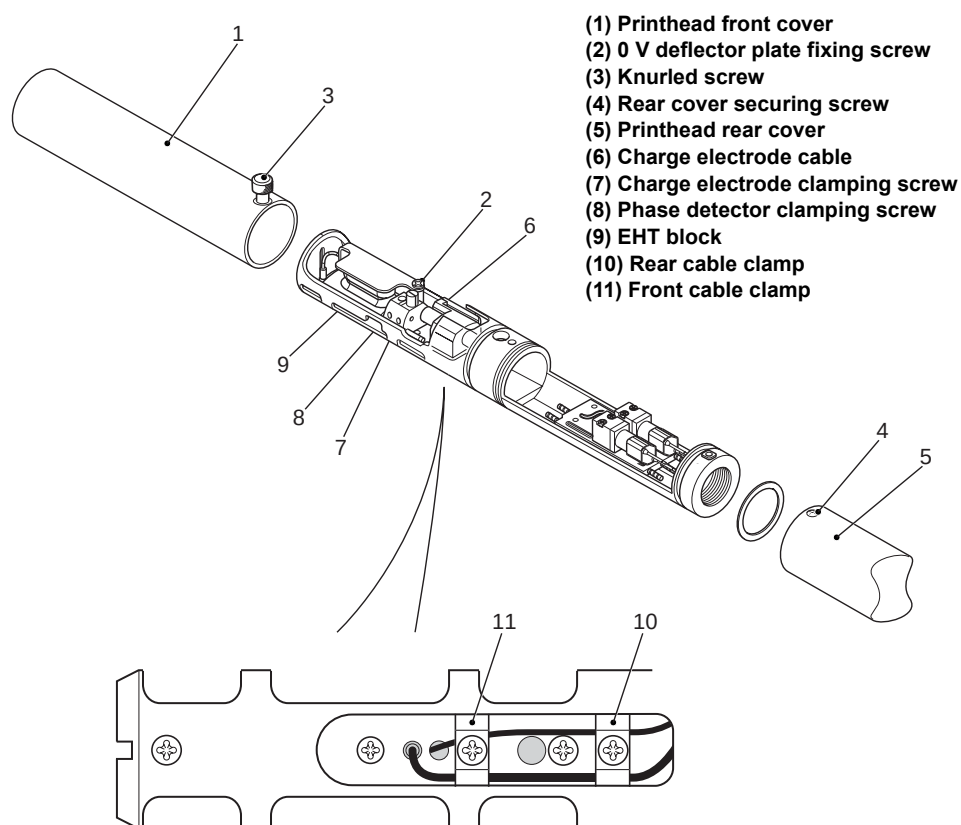


Figure 8-23. EHT Block Removal and Installation

Removal

- 1 Slacken the knurled screw (Item 3 in Figure 8-23) and slide the front cover (1) from the printhead.
- 2 Remove and retain the two rear cover securing screws (4).
- 3 Slide the rear cover back until it is clear of the printhead.
- 4 Cut the wires to the EHT housing.
- 5 Remove the two cable clamps (10 and 11).
- 6 Disconnect the strobe LED wires – coloured blue and violet.
- 7 Loosen the phase detector clamping screw (8). Slide the phase detector out of the EHT block, through the bottom of the printhead.
- 8 Loosen the charge electrode clamping screw (7) and pull the charge electrode cable (6) from the EHT block.
- 9 Remove and retain the 0 V detector plate fixing screw (2) and deflector plate. Pull the 0 V connecting cable away from the EHT block.
- 10 Remove and retain the two EHT block securing screws which are situated below the block.

- 11** Remove the EHT block, disconnecting the gutter return pipe as the block is removed.

Installation

- 1** Place the EHT block in position, connecting the gutter return pipe at the same time. Secure the block with the two screws retained at Removal step 9.
- 2** Refit the 0 V deflector plate and 0 V connecting cable removed at Removal step 7. Secure them with the fixing screw retained at Removal step 8.
- 3** Fit the charge electrode cable (6) to the EHT block and tighten the clamping screw (7).
- 4** Slide the phase detector back into the EHT block from the bottom of the printhead. Position the top of the phase detector 1mm below the nozzle orifice. Tighten the clamping screw (8).
- 5** Refit the front and rear cable clamps (10 and 11) taking care that the cables are routed correctly through the channels in the clamps and not crushed when the clamps are tightened.
- 6** Exchange the EHT housing and 22 M Ω resistor for new items, and solder the resistor into the housing.
- 7** Using the supplied potting compound, fill the EHT housing up to the top and cover with the supplied lid.
- 8** Carry out a full alignment procedure on the printhead (see "Printhead Alignment" on page 11-7).
- 9** Slide the rear printhead cover (5) into position and secure it using the two screws (4) Removal step 2.
- 10** Slide the front cover (1) into position and secure it using the knurled screw.

Nozzle Assembly

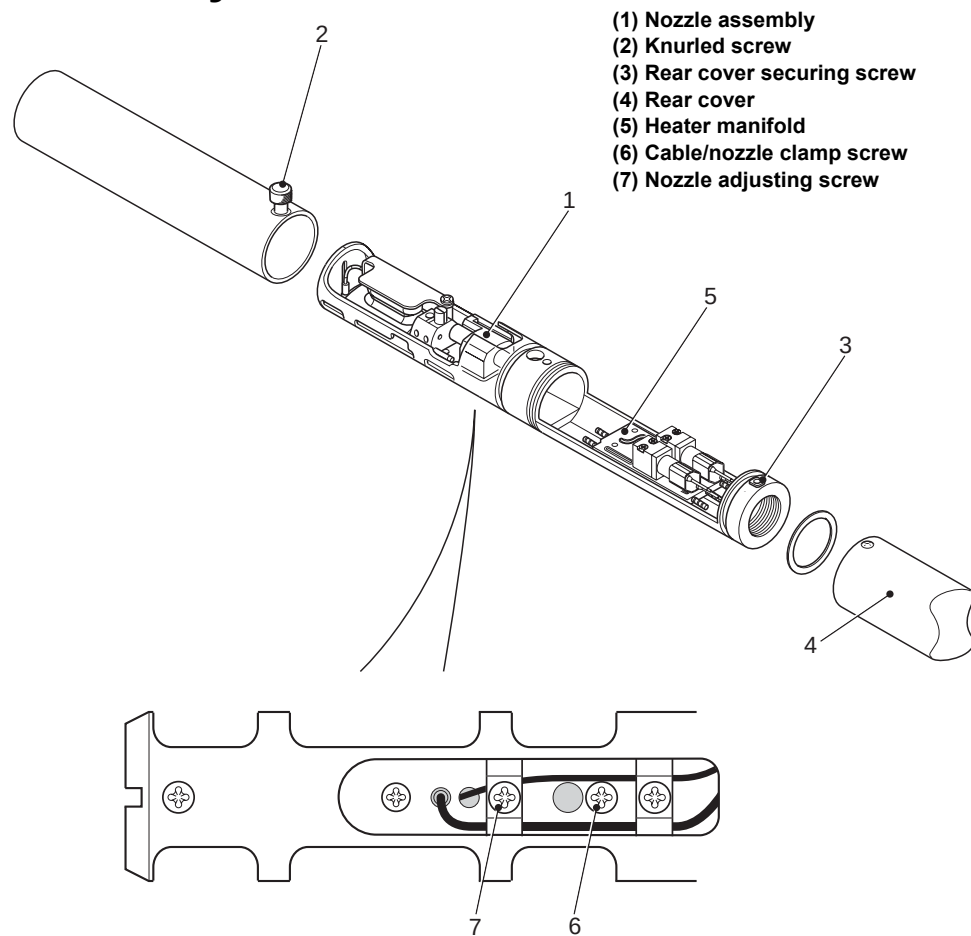


Figure 8-24. Printhead Nozzle Removal and Replacement

Removal

- 1 Slacken the knurled screw (Item 2 in Figure 8-24) and slide the front cover off the printhead.
- 2 Remove and retain the two rear cover securing screws (3) and slide the rear cover (4) off the printhead.
- 3 Identify the leads from the nozzle to the wiring loom. Remove the heat shrink and desolder the connections.
- 4 Disconnect the ink feed and return tubes from the heater manifold (5).
- 5 Remove and retain the cable/nozzle clamp screw (6) and the nozzle adjusting screw (7).
- 6 Slide out the nozzle assembly (complete with last chance filter).

Note: Ensure that the new nozzle is the correct type prior to installation:

Installation

- 1** Slide the nozzle assembly into position and secure it using the cable/nozzle clamp screw (6) and the nozzle adjusting screw (7).
- 2** Tighten the lateral clamping screws (5).
- 3** Reconnect the ink feed and return tubes to the heater manifold (5).
- 4** Slide a length of heat shrink over the nozzle electrical leads, resolder the connections to the wiring loom and cover the soldered joints with the heat shrink.
- 5** Select Nozzle Flush from the software menu option and irrigate the nozzle orifice with washdown.
- 6** Slide the rear cover back into position and secure it with the two screws (3) retained at Removal step 2.
- 7** Align the printhead (see “Printhead Alignment” on page 11-7).
- 8** Refit the front cover and secure it with the knurled screw (2).
- 9** Calibrate the modulation value (see “Modulation Calibration (Manual)” on page 5-16).

Umbilical

The umbilical is attached to the printer by a lock nut.

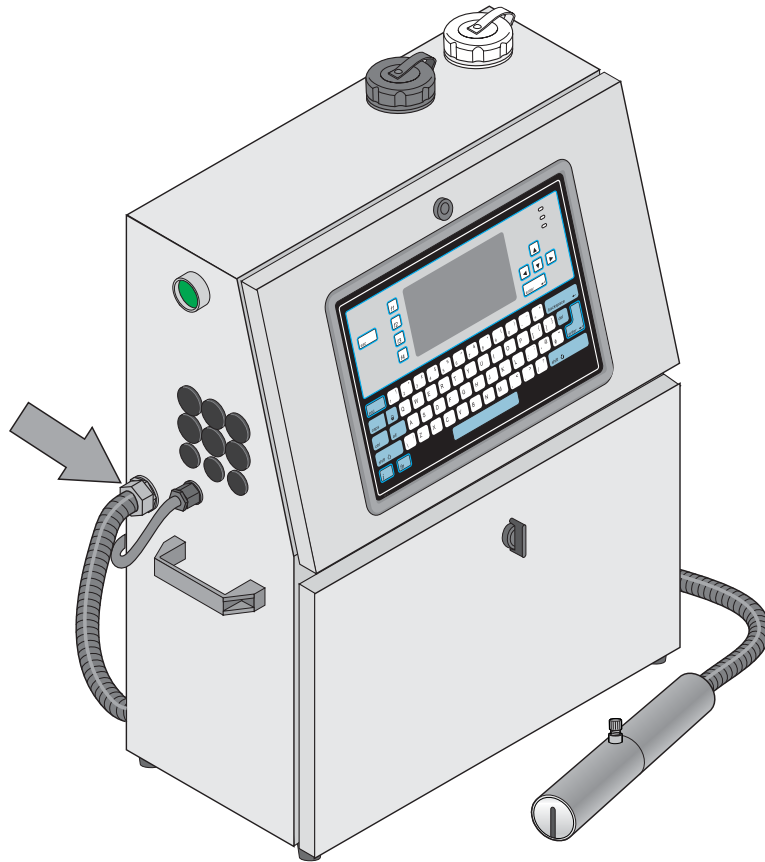


Figure 8-25. Umbilical connection to the 43s printer

Removal

- 1 Ensure the electrical supply is disconnected from the printer.
- 2 Disconnect the red-striped tube (Item 6 in Figure 8-26) and the clear tube (5) from the brown, pill-shaped filters (3, 4) in the ink system.
- 3 Disconnect the blue striped tube (2) (in some cases, this tube is green striped rather than blue) and the black-striped tube (1) from printhead manifold on the FMS.
- 4 Follow these four tubes up to the bulkhead that divides the ink compartment from the electronics compartment. Slacken the bulkhead tube gland nuts and withdraw the tubes through the bulkhead.
- 5 Disconnect the yellow-striped tube from the positive air pump (if fitted).

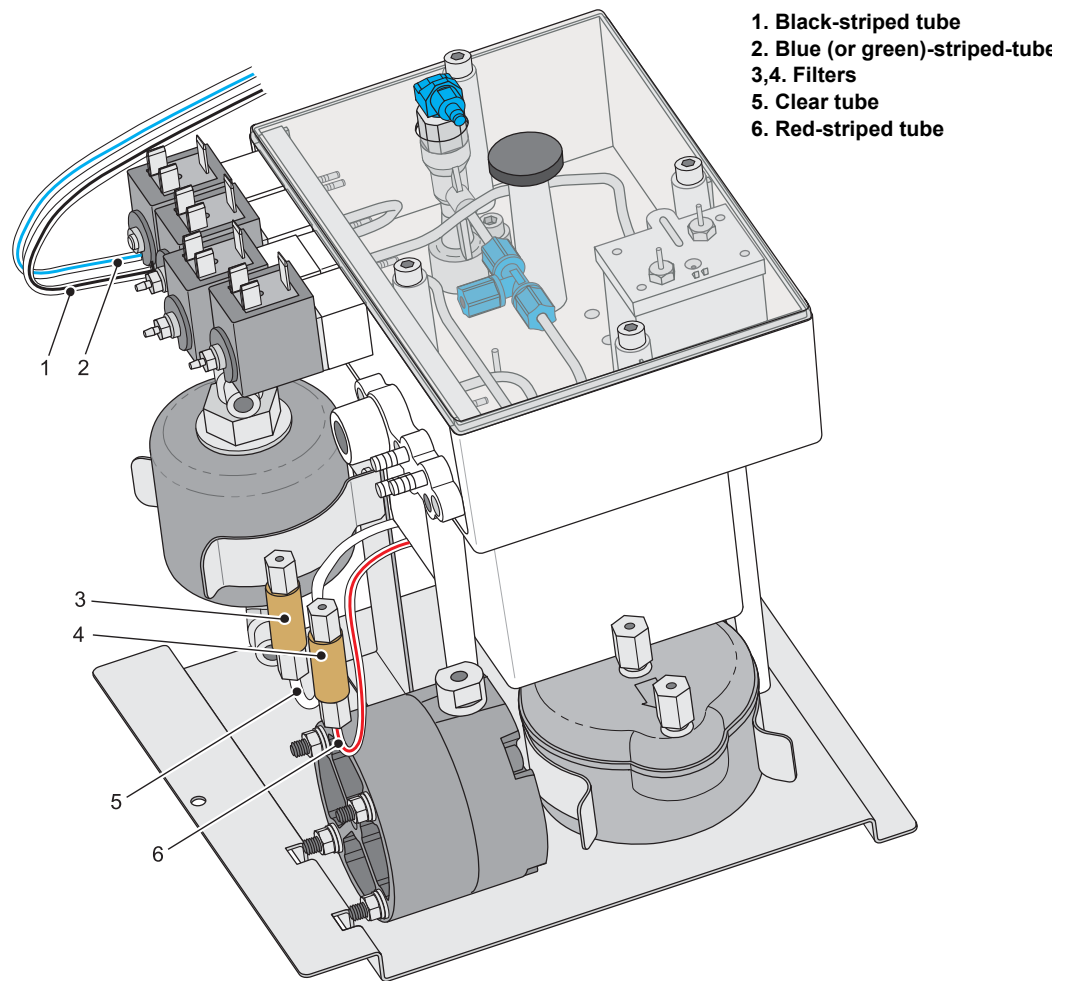


Figure 8-26. Umbilical tube connections

- 6 Disconnect the modulation cable from the I/O board connector labelled CH/MOD.
- 7 Disconnect the multi-core cable from the connectors Head_1 and Head_2 on the I/O board.
- 8 Disconnect the four-way cable from the I/O board connector labelled VALVES.
- 9 Disconnect the EHT plug from the EHT module.
- 10 Remove the power supply unit to gain access to the cables below (see "Power Supply Unit" on page 8-6).
- 11 Disconnect the umbilical earth wire from the earth stud. The umbilical earth stud is the middle stud in the row of three earth studs near the bottom of the left wall of the compartment.
- 12 Remove and retain the cable screen clamp screw (located near the umbilical entry to the cabinet).
- 13 Undo and remove the umbilical lock nut.

- 14 Withdraw the umbilical, cables and tubes through the umbilical hole.

Installation

- 1 Fit the new umbilical, cables and tubes through the umbilical hole.
- 2 Fit and tighten the umbilical lock nut.
- 3 Strip the insulation to reveal the screen of the 15-way and 4-way modulation cable to allow the cable clamp to make a sound electrical contact with the outer screen of the cable.
- 4 Fit and tighten the cable screen clamp screw.
- 5 Connect the umbilical earth wire to the earth stud at the side of the cabinet.
- 6 Refit the power supply unit (see "Power Supply Unit" on page 8-6).
- 7 Connect the EHT plug into the EHT module.
- 8 Connect the four-way cable to the I/O board connector labelled VALVES.
- 9 Connect the multi-core cable to the connectors (Head_1 and Head_2) on the I/O board.
- 10 Connect the modulation cable to the I/O board connector. (CH/MOD)
- 11 Connect the yellow striped tube to the air pump (if fitted).
- 12 Pass the remaining tubes through the bulkhead tube glands and tighten the nuts.
- 13 Connect the blue (or green)-striped tube and the black-striped tube to the printhead manifold located on the FMS. The blue-striped cable goes on the left of the three outlets. The black-striped tube goes on the middle one.
- 14 Connect the red striped tube and the clear tube to the filters in the ink system from which they were disconnected.
- 15 Perform an umbilical purge (see "Umbilical Purge" on page 11-5) and flush purge.
- 16 Ensure no leaks are present from the fluid connections during the above procedure.

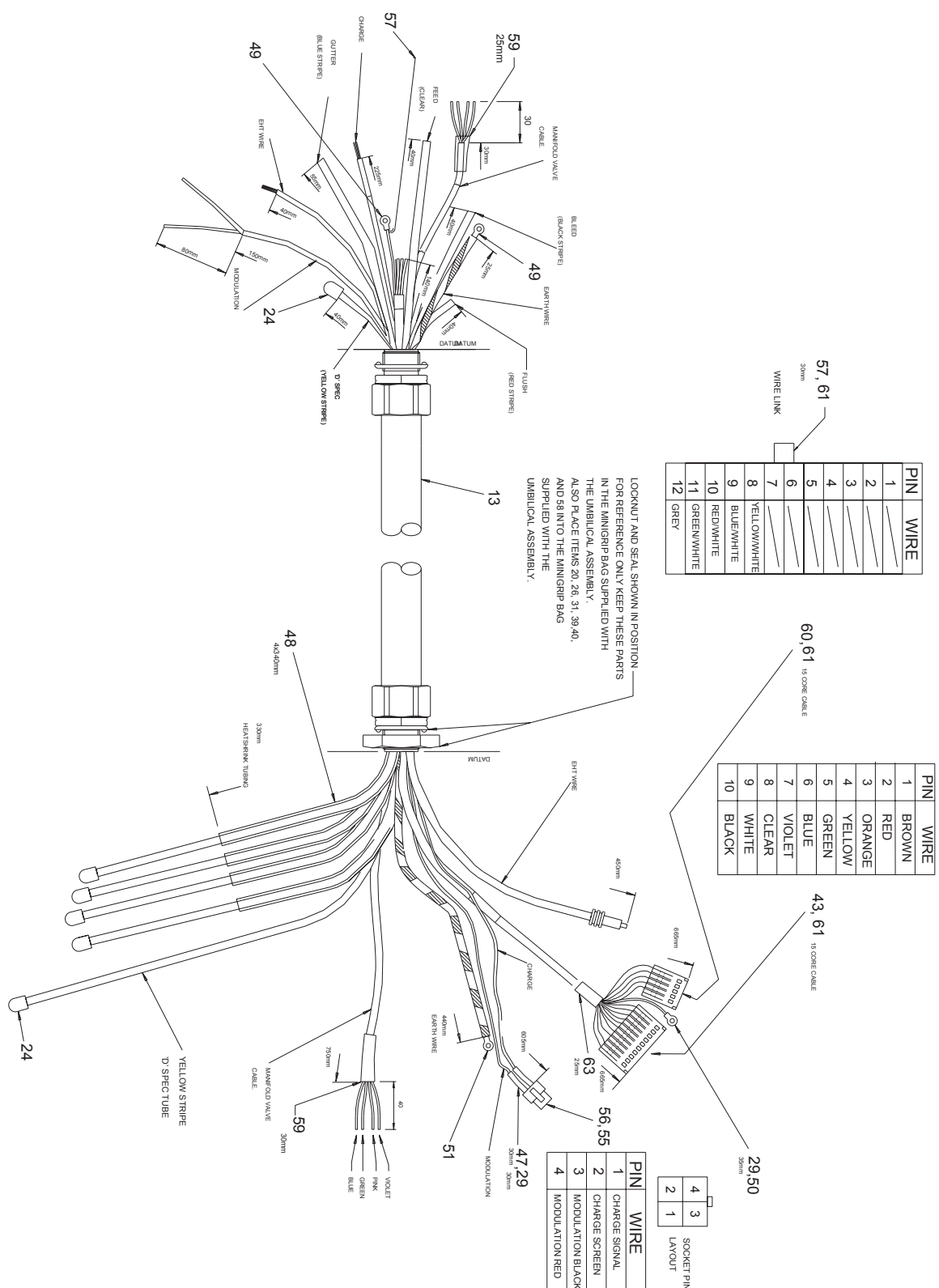


Figure 8-27. Umbilical Connection Details

Maintenance Schedule

9

The following preventative maintenance schedule must be carried out by a suitably trained maintenance technician.

Actual intervals depend on machine running hours. The figures below are based on eight hours usage per day. If the actual usage is higher, the intervals should be reduced.

Task	Daily	Weekly	6 Months	24 Months	Reference
Check Printhead, clean as required	✓				page 6-50
Clean Printer Cabinet		✓			page 6-3
Visual inspection of connections and fittings		✓			page 6-11
Clean EHT block		✓			page 6-40
Replace main ink filter			✓		page 6-45
Replace pre-pump filter			✓		page 6-45
Replace cooling fan dust filter*		✓			page 8-27
Replace "last chance" filter in printhead			✓		page 8-39
Replace ink pump §				✓	page 8-19

* May be required as often as every few days or as infrequently as once a month depending on factory conditions.

§ Check and replace only if necessary

Table 9-1: Preventative Maintenance Schedule



Warning

LETHAL VOLTAGES. Lethal voltages are present within this equipment when it is connected to the mains electrical supply. Only trained and authorized personnel may carry out maintenance work. Observe all statutory electrical safety codes and practices. Unless it is necessary to run the printer, disconnect the printer from the mains electrical supply before removing the covers or attempting any service or repair activity, otherwise death or personal injury may result.



Warning

HANDLING INK, SOLVENT AND TOP-UP. The ink, solvent and top-up are irritating to the eyes and respiratory system. To prevent personal injury when handling these substances:

Always wear protective clothing and rubber gloves.

Always wear goggles with side-shields or a face mask. It is also advisable to wear safety glasses when carrying out maintenance.

Apply barrier hand cream before handling ink.

If ink or top-up contaminates the skin, wash immediately with soapy water. **DO NOT** use washdown or solvent to clean ink stains from the skin.



Caution

ELECTROSTATIC SENSITIVE DEVICES. The printed circuit boards contain static sensitive devices. A suitably grounded, antistatic wrist strap must be worn when working on or handling printed circuit boards.

Introduction

Before carrying out the fault finding and repairs described in this section it is advisable to move the printer from the production line to a clean environment.

When a fault condition occurs, the first step in diagnosing the fault should be to check the following:

- The fault and status icons displayed on the display.
- The status LEDs on the I/O board.

Table 10-1 on page 10-6 through Table 10-4 on page 10-8 list the possible faults. The tables contain either remedial action or a reference to more detailed fault finding information.

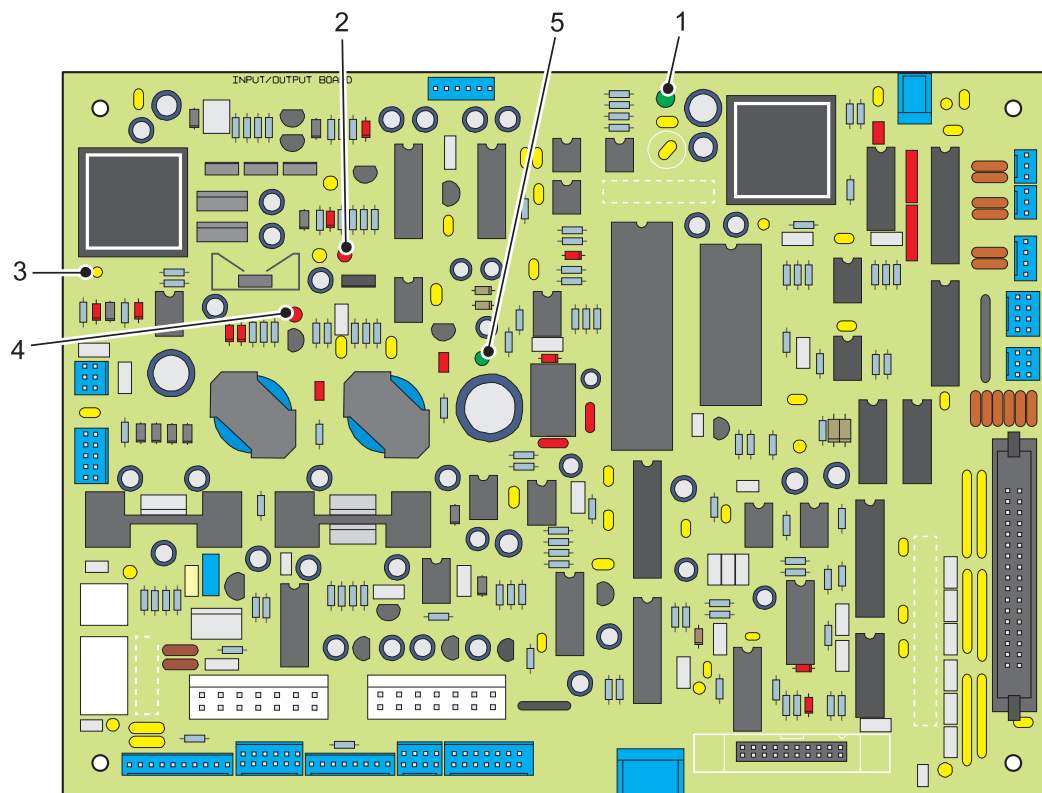
By using the schematics and the associated tables to check signal voltages and waveforms, the faulty component or sub-assembly can be pinpointed.

Fault Finding

Printer Fails to Initialize

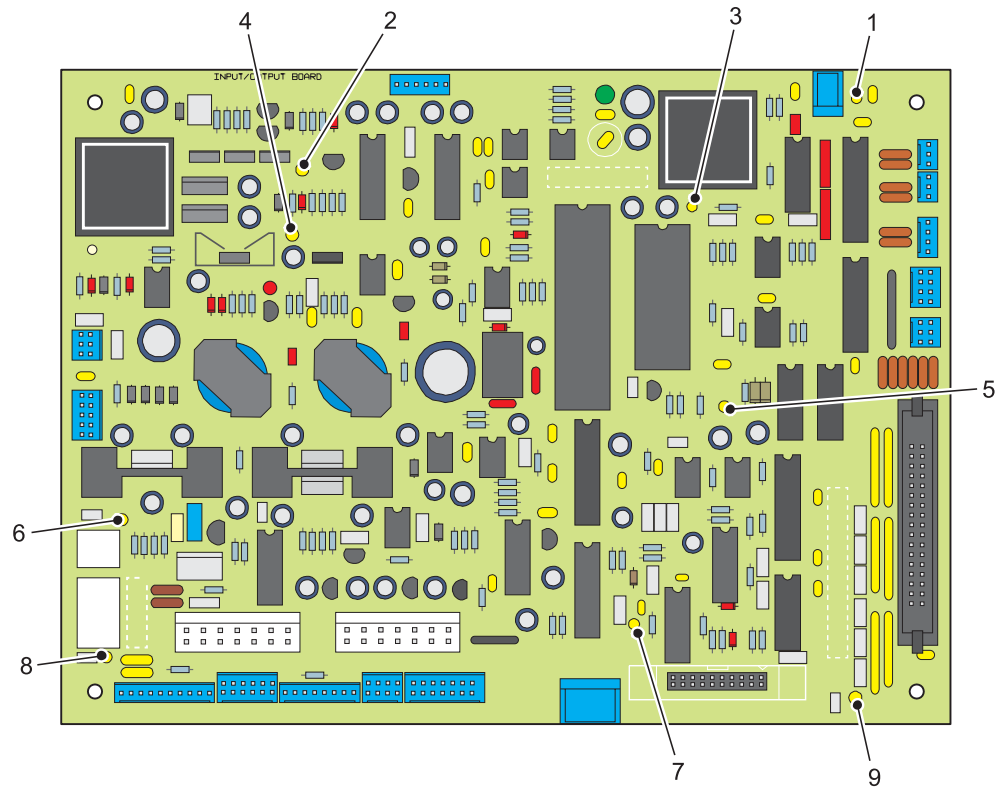
Possible Cause	Remedial Action
No mains supply	Check that mains supply is available and switched on.
Mains input cable disconnected or faulty	1. Check that mains input cable is connected. 2. Check continuity of cable. Repair or replace if faulty.
Printer mains fuse(s) failed	Check the F1 fuse in the PSU (see "PSU Module Fuse Replacement" on page 8-8). Replace if necessary.
Faulty mains switch	Check mains power button for continuity. Replace if faulty.
Cable between mains switch and PSU is disconnected or faulty	1. Check cable connections. Reconnect if necessary. 2. Check cable for continuity. Replace if faulty.
PSU faulty or PSU output not reaching the I/O board	1. Check LEDs 1, 2 (dim or bright), 3, 4 and 5 on I/O board (see "I/O Board Test Points and LEDs" on page 6-35). 2. If any LED is extinguished go through steps 9 to 11 in that order.
Cable between PSU and I/O board is faulty or disconnected	1. Check that cable is connected. Reconnect if necessary. 2. Check cable for continuity, replace if faulty.
PSU fuse failed	Check fuse, replace if necessary (see "PSU Module Fuse Replacement" on page 8-8).
PSU faulty	Replace PSU (see "Power Supply Unit" on page 8-6).
I/O or CPU board failed	1. Check that LEDs 1, 2 (dim or bright), 3, 4 or 5 on I/O board are illuminated ("I/O Board Test Points and LEDs" on page 6-35). 2. Change I/O board (see "I/O Board" on page 8-2). If fault remains then change CPU board ("CPU Board" on page 8-5).

Note: LED2 on the I/O board has a clear lens that glows red when illuminated.



- | | |
|--|--|
| (1) LED 1 (green); +12 V isolated supply | (3) LED 3 (yellow); -24 V |
| (2) LED 2 (red); | (4) LED 4 (red); -15 V |
| 285 V (bright) charge amplifier supply | (5) LED 5 (green); +24 V valve/ pump/heater supply |
| (+15 V (dim); no printhead cover fitted) | |

Figure 10-1. I/O Board Status LED Location



TP1 = 1	TP4 = 4	TP7 = 7
TP2 = 2	TP5 = 5	TP8 = 8
TP3 = 3	TP6 = 6	TP9 = 9

Figure 10-2. I/O Board Test Point Locations

Display Faults

Backlight



Warning

LETHAL VOLTAGES. A high AC voltage is present at the inverter and backlight.

Extreme caution is required when diagnosing failure in these areas.

Note: Some DVMs may not show the 1000 V AC correctly. Use an oscilloscope fitted with a high voltage probe to measure the voltage.

Possible Cause	Remedial Action
Backlight shut down by screen saver facility	Press any key on the keypad to restart the backlight.
Backlight inverter faulty	1. Check for 24 V DC at 3 way input connector on backlight converter (Pins 1 and 2 on I/O board B/LIGHT connector). 2. Check for 1000 V AC at output leads from backlight inverter (Pins 3 and 5). 3. If 24 V DC present but 1000 V AC missing, change the LCD/backlight assembly (see "LCD and Backlight Inverter Assembly" on page 8-10).
Cable from I/O board to backlight is disconnected or faulty	1. If 24 V DC is not present at backlight inverter but is present at Pins 1 and 3 of B/LIGHT connector on I/O board, check that the cable is connected between the two. 2. Check cable for continuity, replace if faulty.
Backlight faulty	If 1000 V AC is present at output of backlight inverter but backlight not illuminated, change the LCD/Backlight assembly (see "LCD and Backlight Inverter Assembly" on page 8-10).
I/O or CPU board faulty	1. Check for 24 V DC on pins 1 and 3 of B/LIGHT connector on I/O board. If voltage not present, change I/O board (see "I/O Board" on page 8-2). 2. If changing the I/O board does not clear the fault, change the CPU board (see "CPU Board" on page 8-5).

Table 10-1: Display Backlight Failure

Display

Possible Cause	Remedial Action
LCD contrast not set correctly.	Press  + L. When the LCD is readable, press any key to set contrast.
Ribbon cable between CPU board and LCD is faulty.	Check cable for continuity. Replace if faulty.
I/O board or CPU board faulty.	Change I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
LCD faulty.	Change LCD assembly (see “LCD and Backlight Inverter Assembly” on page 8-10).

Table 10-2: Display Failure

Keypad Faults

Possible Cause	Remedial Action
Ribbon cable between CPU board and keypad is disconnected or faulty	1. Check that cable is connected. 2. Check cable for continuity, replace if faulty.
CPU board faulty	Exchange CPU board (see “CPU Board” on page 8-5).
Keypad faulty	Exchange keypad (see “Keypad” on page 8-12).

Table 10-3: Keypad Failure

Display Icons

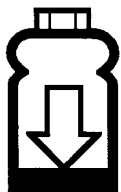
Icon	Name	Possible Cause	Remedial Action
	Ink Level Low	Ink top up or solvent top up reservoir empty. The part number of the ink or solvent is also displayed.	3. Top up the empty reservoir with ink or solvent as necessary (see “Filling the Ink System” on page 5-11). Check that the icon is no longer displayed. If it is still displayed, proceed to Step 2.
	Top Up Level Low	Cable between sensor and I/O board is faulty or disconnected.	4. Check that cable is connected to CONN LEVELS on the I/O board. (see “CPU Board” on page 8-5 for connector location).
		Sensor faulty.	5. If sensor faulty, replace FMS (see “Fluid Management System (FMS)” on page 8-16).
		I/O or CPU board faulty	6. Replace I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
	Mixer Tank Level High	The mixer tank level is genuinely too high (i.e. the level high sensor is covered with ink). or There is a fault in the level high sensor circuit and a fault is being indicated even though the sensor is not covered.	For troubleshooting instructions, see “Mixer Tank Level High” on page 10-12.

Table 10-4: Display Icons

Icon	Name	Possible Cause	Remedial Action
	Viscosity Error	Top up reservoir empty.	Fill the top up reservoir with solvent and run the machine to correct the viscosity.
		Top up reservoir valve (V1) not functioning correctly.	Change valve (see “Solenoid Valves” on page 8-26), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
		Valve V1 stuck internally.	Clean valve V1 (see “Valve Cleaning” on page 11-1). Replace valve (see “Solenoid Valves” on page 8-26) if fault remains.
		VMS inlet restrictor blocked.	Clean inlet restrictor (see “VMS Inlet Restrictor Cleaning” on page 11-2).
		VMS outlet blocked.	Clean outlet restrictor (see “VMS Outlet Cleaning” on page 11-3).
		VMS level sensor or cable faulty.	Check that cable is connected. Replace FMS if sensor faulty (see “Fluid Management System (FMS)” on page 8-16), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
		I/O board faulty.	Replace I/O board (see “I/O Board” on page 8-2).
	Service	Filters require replacement.	1. Exchange the filters for new items (see “Main Filter” on page 8-22). 2. Reset the pump run hours (see “Data Logging Menu” on page 7-14).
	Printhead Cover Open	Printhead cover is not fitted correctly.	Re-fit the cover.

Table 10-4: Display Icons

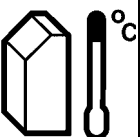
Icon	Name	Possible Cause	Remedial Action
	Gutter Fault	Nozzle blocked.	1. Perform nozzle flush (see “Nozzle Flush” on page 6-64). 2. Check that the jet is going into the gutter. Repeat nozzle flush 3 or 4 times if required.
		Nozzle misaligned.	Re-align printhead (see “Printhead Alignment” on page 11-7).
		Faulty gutter detect circuit.	Replace gutter detect module (see “Head Manifold” on page 8-33), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
	EHT Trip	Dirty or wet printhead.	Clean and thoroughly dry printhead (see “Umbilical Purge” on page 11-5).
		EHT trip out of calibration.	Re-calibrate EHT trip (see “Set EHT Trip Level (Normal Operation)” on page 5-27).
		Faulty EHT circuit.	Replace faulty component/EHT Module (see “EHT Module” on page 8-32), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
	Cabinet Too Hot	Environment too hot for printer.	Measure ambient temperature. If it is greater than 45°C, move the printer to a cooler position or reduce ambient temperature by improving ventilation etc.
		Printer air inlet or outlet blocked.	Check that the printer is level and that the inlet (grille on the bottom of the printer) and outlet (vent on printer's right side) are clear.
		Fan failed (Fan failed icon is displayed)	Check for 24 V DC across pins 4 and 5 on the EHT/FAN connector on the I/O board. If the voltage is present, replace the fan (see “Fan” on page 8-28).
		Fan failure card faulty	Replace fan failure card (see “Fan Failure Card” on page 8-30).
		I/O board faulty	Replace I/O board (see “I/O Board” on page 8-2).
		CPU board faulty	Replace CPU board (see “CPU Board” on page 8-5).

Table 10-4: Display Icons

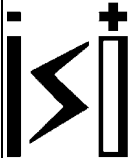
Icon	Name	Possible Cause	Remedial Action
	Charge Error	Dirty printhead	Clean printhead (see “Umbilical Purge” on page 11-5).
		Viscosity incorrect	Refer to the viscosity error icon in this table for possible causes and remedial action.  Visc
		Modulation incorrect	Adjust as required (see “Modulation Calibration (Manual)” on page 5-20).
		Head heater circuitry faulty	Replace head heater (see “Head Manifold” on page 8-33), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
		Faulty nozzle assembly or modulation circuitry	Replace nozzle (see “Nozzle Assembly” on page 8-39), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
		Charge electrode or circuitry faulty	Replace EHT Block cabling (see “EHT Block” on page 8-37), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
		Phase detector or circuitry faulty	Replace phase detector cabling (see “Phase Detector” on page 8-35), I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).

Table 10-4: Display Icons

Mixer Tank Level High

To determine why the Mixer Tank Level High icon is displayed, proceed as follows:

- 1 Remove the thumb knob (Item 2 in Figure 10-3) and lift the FMS tray (3) forwards and out of the printer.
- 2 Remove the filler plug (1) from the FMS (4).
- 3 Use a syringe and plastic tube, remove 100 ml of ink from the FMS to uncover the level high sensor.
- 4 If the icon is no longer displayed, the level high sensor is working
- 5 If the icon remains on the display, the level high sensor circuit is faulty.

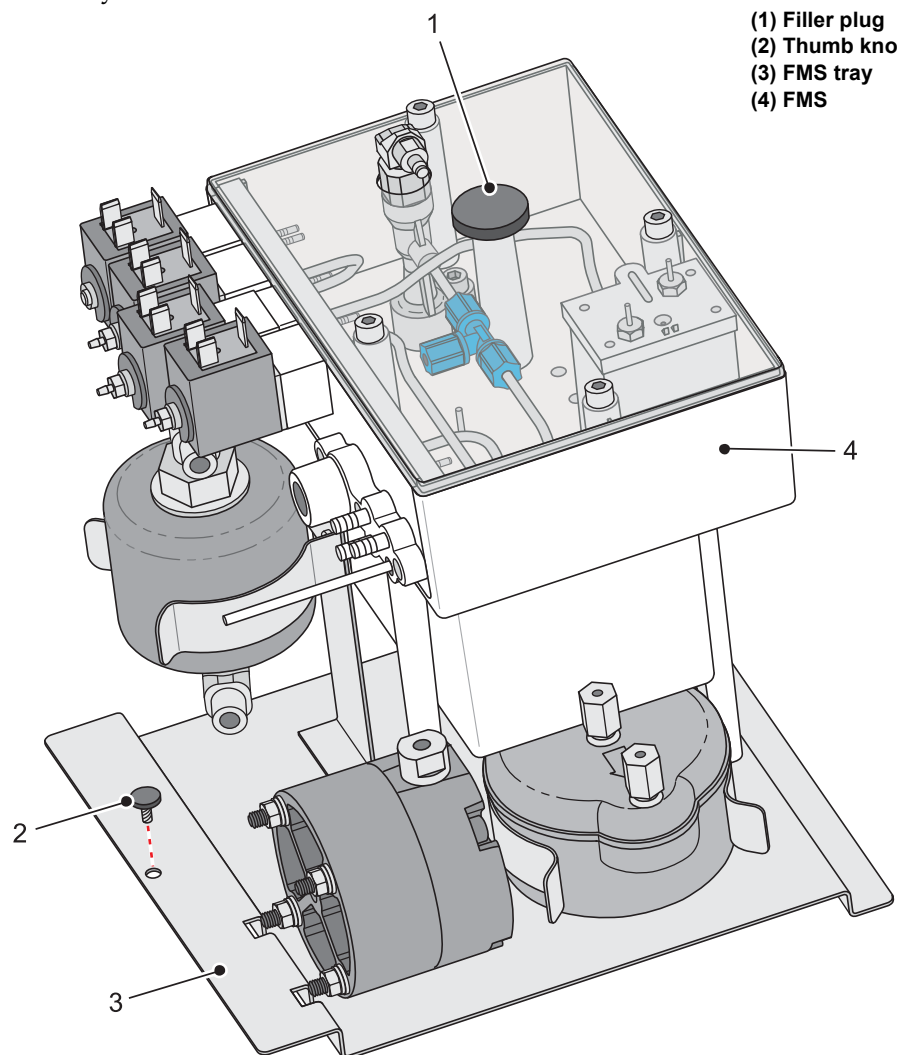


Figure 10-3. Location of FMS Filler Plug

Note: Before carrying out the checks listed in Table 10-5, add 100 ml of ink to the FMS to ensure that the mixer tank level OK sensor is covered.

Fault	Possible Cause	Remedial Action
Mixer Tank Level High-Sensor Covered	VMS incorrectly calibrated	Check ink viscosity (see “Press to enable both functions.” on page 5-30). If incorrect, drain the mixer tank and refill with new ink (see “Fill Mixer Tank” on page 5-13). Recalibrate the VMS (see “VMS Calibration” on page 5-16).
	Mixer OK, sensor or cable faulty	Go to the Diagnostic screen of the Calibrate menu (see “Calibrate Menu” on page 7-12). If Mixer OK is OFF then the sensor circuit is faulty. Check that the sensor cable is connected. Replace FMS (see “Fluid Management System (FMS)” on page 8-16) if level sensor is faulty. Replace I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).
	Faulty valve on ink or top up reservoir	Replace valve if faulty (see “Solenoid Valves” on page 8-26).
	Valve stuck internally	Clean valve V2 (ink) and V1 (top up) (see “Valve Cleaning” on page 11-1). Replace valve if fault remains (see “Solenoid Valves” on page 8-26).
Mixer Tank Level High-Sensor uncovered	Cable between Mixer level high sensor and I/O is faulty or disconnected	Check that cable is connected
	Mixer level high sensor circuit faulty	If sensor faulty, replace FMS (see “Fluid Management System (FMS)” on page 8-16). Replace I/O board (see “I/O Board” on page 8-2) or CPU board (see “CPU Board” on page 8-5).

Table 10-5: Mixer Tank Level High Possible Causes

Cleaning and Adjustment

11

Valve Cleaning

- 1 Remove the valve (see “Solenoid Valves” on page 8-26).
- 2 Remove the valve plate retaining screws (Item 1 in Figure 11-1). Retain the screws and note the orientation of the plate.
- 3 Pull the valve stem (2) and the valve plate (3) away from the valve block (4).

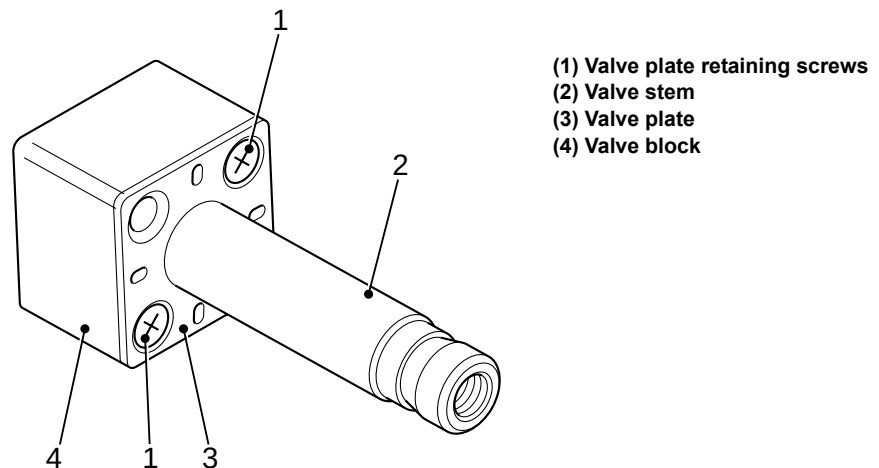


Figure 11-1. Valve Components

- 4 Disassemble the internal valve components (Figure 11-2) noting the orientation of each.
- 5 Clean all the components in a suitable Videojet solvent washdown.
- 6 Reassemble the internal valve components.
- 7 Fit the valve plate to the valve block and secure it using the two screws removed in step 2.
- 8 Refit the valve in the printer.

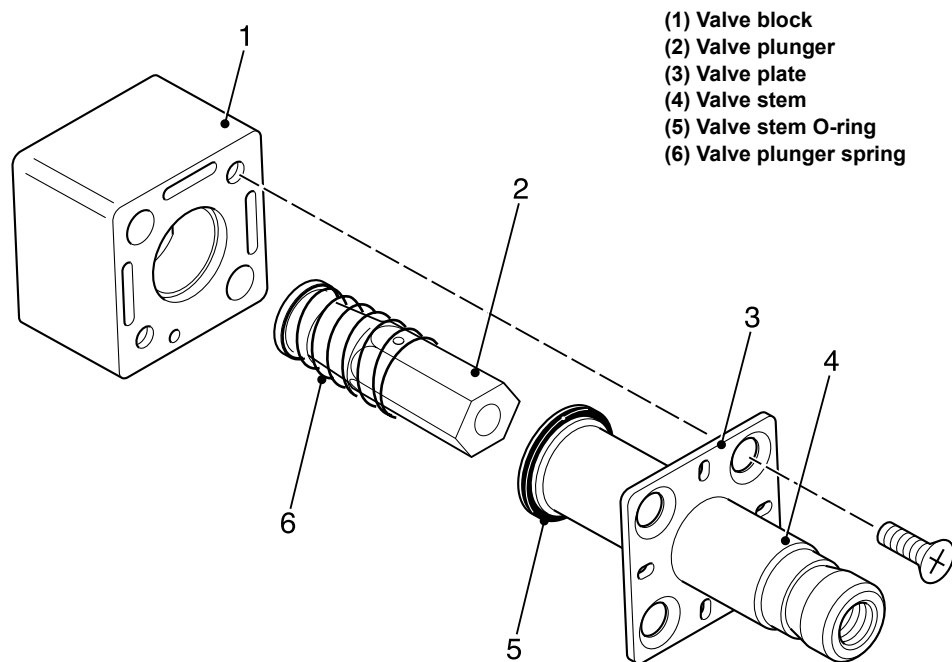


Figure 11-2. Valve Internal Components

VMS Inlet Restrictor Cleaning

- 1 Remove valve V3 from the FMS valve plate (see “Fluid Management System (FMS)” on page 8-16).
- 2 Pull the VMS restrictor block (Item 3 in Figure 11-3) away from the valve body (2). Retain the two O-rings from the VMS restrictor block and the two O-rings from the valve body.
- 3 Wash the restrictor block with solvent. Blow through the restrictor orifice (4) with an air line or force solvent through it.
- 4 Hold the restrictor block up to the light and check that the orifice is clear.
- 5 Refit the restrictor block over the valve retaining screws, with the O-rings (5) facing outwards.

- 6 Refit the valve (see "Solenoid Valves" on page 8-26).

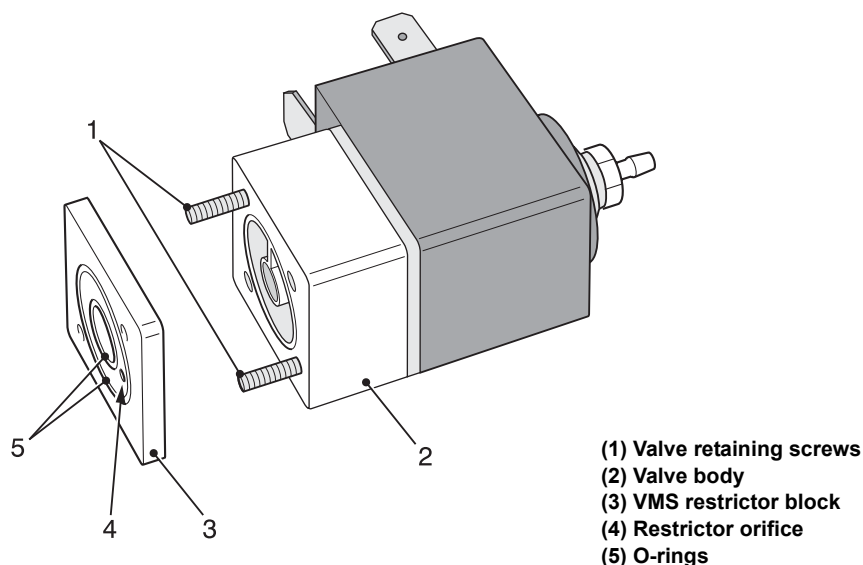


Figure 11-3. VMS Restrictor Cleaning

VMS Outlet Cleaning

- 1 Remove all screws from the top of the FMS; retain all screws, washers and seals.
- 2 Remove the top of the FMS.
- 3 Remove the four retaining screws (Item 1 in Figure 11-4) from the top of the VMS chamber (3) remove the lid (2) and sealing gasket located under the lid. Note the orientation of the gasket.
- 4 Carefully run a fine wire through the outlet orifice in the bottom of the chamber.
- 5 Syringe a small amount of ink into the VMS chamber and check that it runs out into the mixer tank below.
- 6 When the outlet is clear, refit the VMS chamber lid and gasket and secure it using the four screws removed at step 3.
- 7 Refit the top of the FMS using the screws removed at step 1.

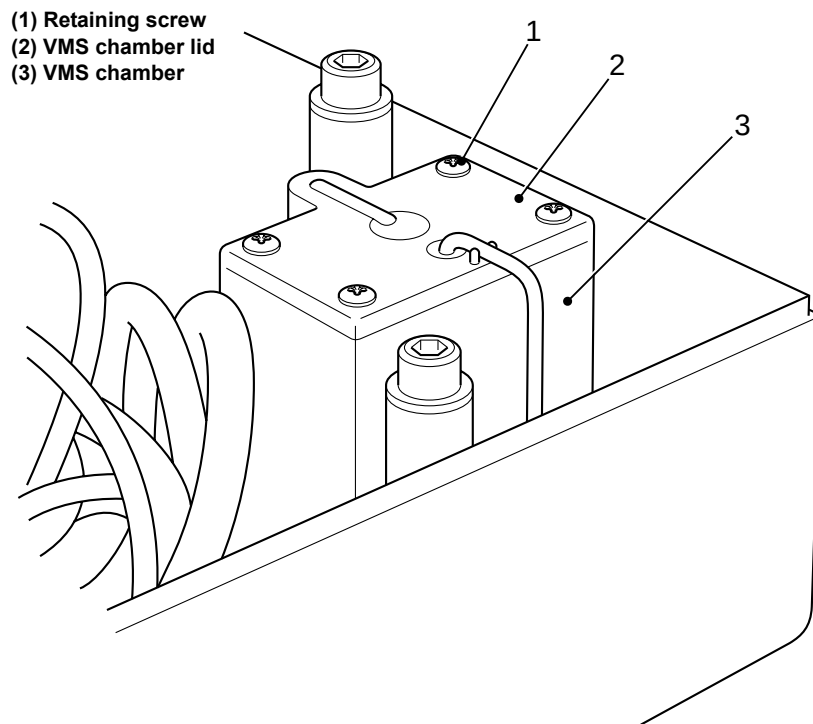


Figure 11-4. VMS chamber

Umbilical Purge

Carry out an umbilical purge:

- to prevent debris from blocking the nozzle if the printer hasn't been used for a long time;
- if contamination of the umbilical is suspected;
- if a new umbilical has been fitted.

Follow these steps:

- 1 Set the mains switch to off and disconnect the printer from the mains supply.
- 2 Loosen the knurled screw (Item 2 in Figure 11-5) and remove the printhead front cover (3).

- (1) Ground potential deflector electrode
 (2) Knurled screw
 (3) Front cover
 (4) Rear cover securing screws
 (5) Rear cover
 (6) Printhead body

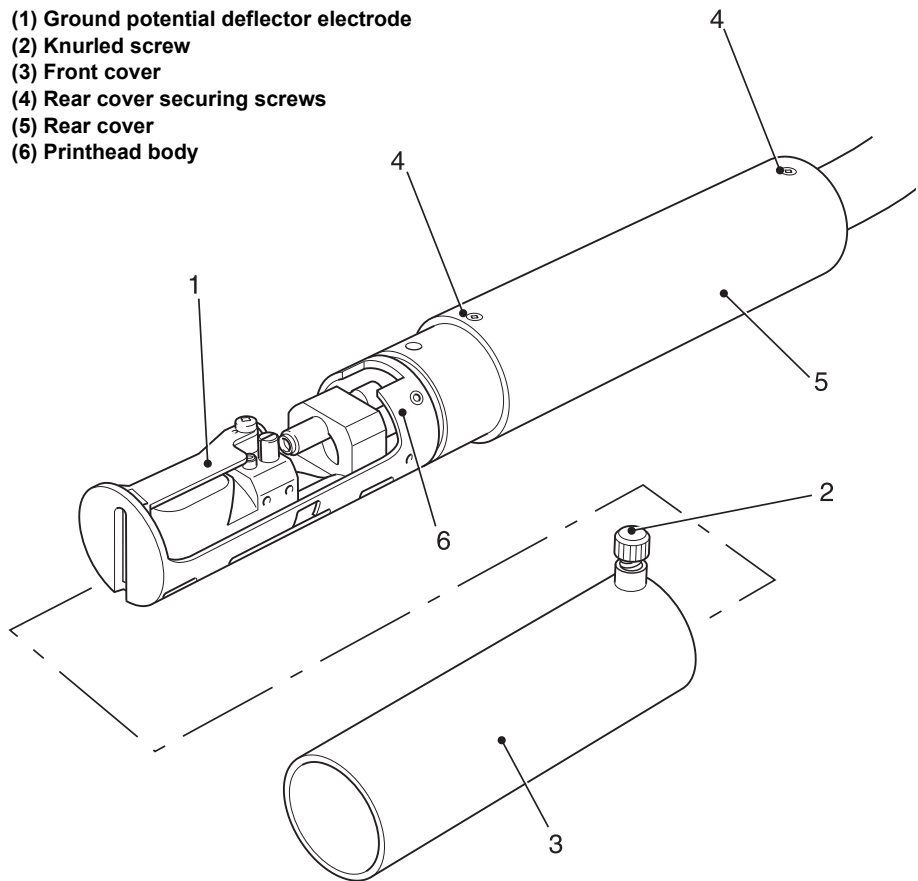


Figure 11-5. Printhead Assembly

- 3 Remove the rear cover securing screws (4) and slide the rear cover (5) off the printhead body (6).
- 4 Remove nozzle tubes from the manifold barbs then fit a short loop of tube between the two barbs to link them together.
- 5 Connect the printer to the mains supply and set the mains supply to on.

- 6 Select the *Umbilical Purge* option from the *System* menu.
- 7 Select *Enable* and press  or  to start the umbilical purge.



- 8 After fifteen minutes stop the umbilical purge, by selecting *Disable* from the *Umbilical Purge* option.



- 9 Disconnect the short loop of tubing then reconnect the nozzle tubes back onto the barbs.
- 10 Slide the rear cover back into position on the printhead and secure it using the two screws (4) removed at step
- 11 Refit the front over (3) and secure it with the knurled screw (2).

Printhead Alignment

- 1 Slacken the knurled nut and remove the front cover from the printhead.
- 2 Secure the printhead vertically in a suitable stand with the nozzle pointing downwards. Place a suitable container beneath the printhead to catch the ink.
- 3 Disable Gutter Detect and Charge Check as follows:
 - a. Access the *System* menu.
 - b. Select *Gutter Fault Shutdown Disable*.
 - c. In the *Machine Control* sub-menu, select *Gutter Fault* and toggle to *Disable*.



- d. Select *Charge Error* and toggle to *Disable*.
- e. Press .

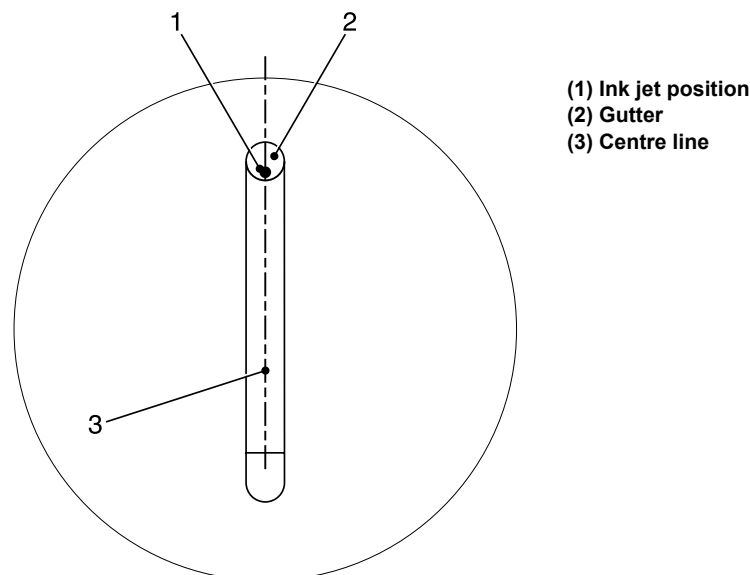


Figure 11-6. Ink Jet to Gutter Position

- 4 Perform a quick start from the system menu. When the ink jet has started, check that the ink jet is in the correct position in the gutter (Figure 11-6).

Important! You must perform a quick start rather than a clean start when you are aligning the printhead during the commissioning process. However, if you are aligning the printhead of a printer that has already

been in operation for some time, you may perform either a quick start or a clean start at this point.



Caution

EQUIPMENT DAMAGE. Never attempt to bend the gutter. Its position is fixed.

- 5 Adjust the ink jet position if necessary using the lateral adjustment screws (Item 3 in Figure 11-7) and height adjustment screw (4). When the adjustment has been made ensure that the lateral adjustment screws are tight and the ink jet position is correct.

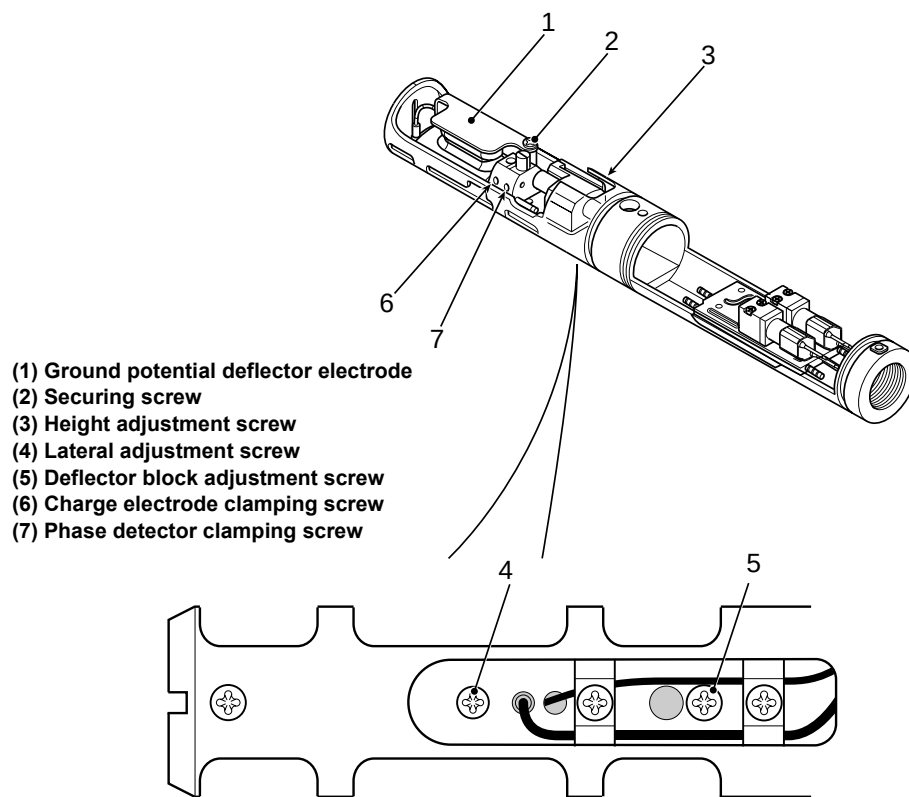


Figure 11-7. Printhead Adjustment Screw Location

- 6 When ink jet position is correct in the gutter, check the ink jet is flowing through the centre of the charge electrode slot parallel to the sides of the slot (Figure 11-8).

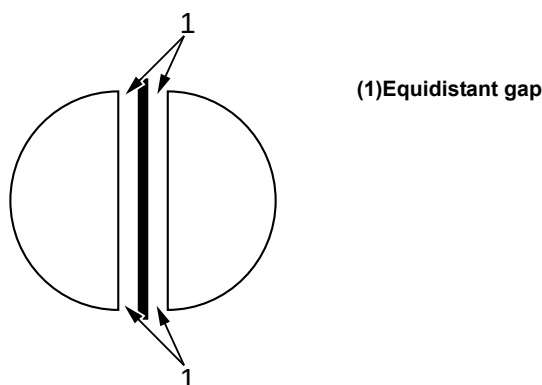


Figure 11-8. Ink Jet Flow Through Charge Electrode



Caution

DAMAGE TO CHARGE ELECTRODE. Take care not to deform the charge electrode slot when rotating the charge electrode.



Caution

CHARGE CABLE. Ensure that the charge cable is not pulled out of its position in the rear face of the deflector block assembly.

- 7 To centralize the ink jet flow through the charge electrode:
- 8 Release the lateral adjustment screw (Item 4 in Figure 11-7).
 - a. Move the block until the jet is in the correct position. Secure the adjustment screw and recheck jet position.
 - b. For parallel adjustment release the charge electrode clamping screw (6).
 - c. Rotate the charge electrode until the jet is parallel to, and in the centre of the slot.
 - d. Secure the clamping screw ensuring that the charge cable is clamped.
- 9 Check that the ink jet is approximately 1 mm away from the phase detector. To adjust, release the phase detector clamping screw (7) and move the phase detector sensor to the correct position. Secure the phase detector clamping screw.

- 10 When ink jet alignment is correct, reposition the ground potential deflector electrode and secure.
- 11 From the *Machine Control* sub-menu:
 - a. Select *Gutter Fault* to enable *Gutter Detect*.
 - b. Select *Charge Error* to enable *Charge Check*.



How to Use This Parts List

- 1 The illustrations and the associated tables give ordering information for the available spare parts for the 43s printer.
- 2 Where a component is not illustrated the letters “NI” appears against the entry for the item.
- 3 Items that do not have a part number listed are not orderable individually. There are two types of such items:
 - Standardized hardware items (nuts, bolts, etc.). You should be able to find such items at a local hardware store
 - Items that are only available as part of a parts kit

Optional Parts and Accessories

Table 12-3 through Table 12-7 give lists of optional parts, accessories, and documentation. There are no illustrations associated with these tables.

43s Ink Jet Printer

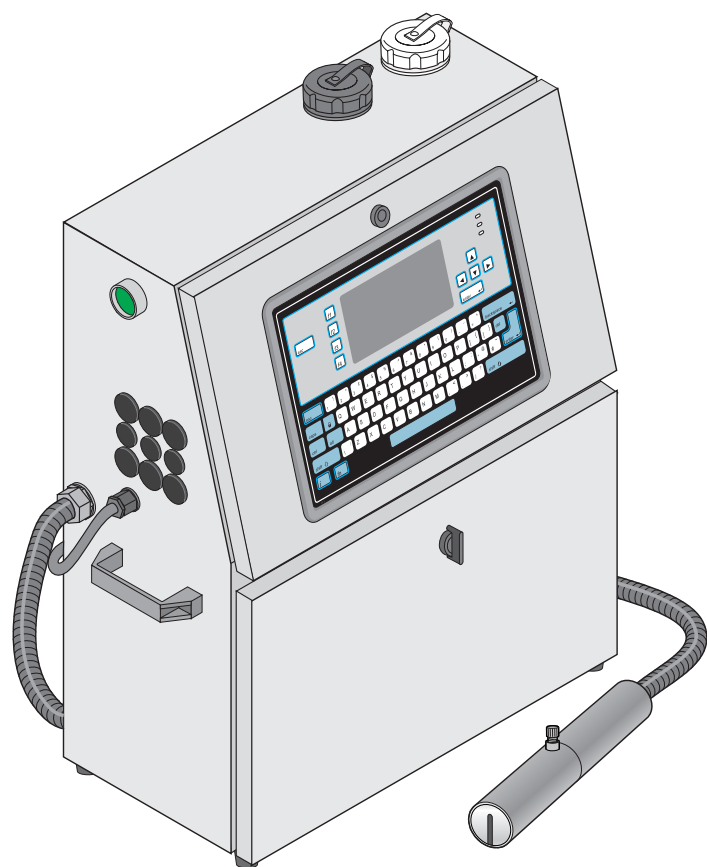


Figure 12-1. 43s Ink Jet Printer

Part number	Description	Part number	Description
378200-01	43s printer, US English	378200-12	43s printer, Korean
378200-02	43s printer, French	378200-13	43s printer, Thai
378200-03	43s printer, German	378200-14	43s printer, Icelandic
378200-04	43s printer, Spanish	378200-15	43s printer, Norwegian
378200-05	43s printer, Portuguese	378200-16	43s printer, Finnish
378200-06	43s printer, Japanese	378200-17	43s printer, Swedish
378200-07	43s printer, Russian	378200-18	43s printer, Danish
378200-08	43s printer, Italian	378200-19	43s printer, Greek
378200-09	43s printer, Dutch	378200-20	43s printer, Hebrew
378200-10	43s printer, Simplified Chinese	378200-21	43s printer, UK English
378200-11	43s printer, Arabic	378200-23	43s printer, Polish

Table 12-1: 43s printer part numbers

Stands and Lamp Stacks

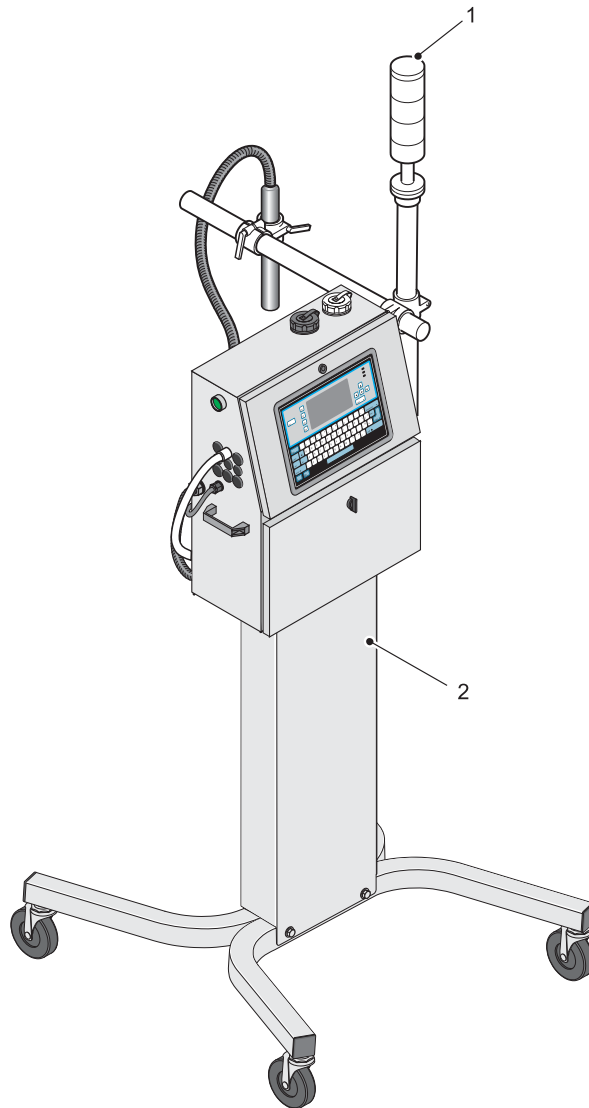


Figure 12-2. Stand and Traffic Light System

Fig ref.	Part number	Description	Qty
1	378176	Lamp stack/Beacon	1
NI	378177	Traffic light cable assembly	1
2	378150	Mobile floor stand	1
NI	378155	Stationary floor stand	1
NI	378158	Table top stand	1

Table 12-2: Stand and Traffic Light System

Encoders and Encoder Accessories

Not illustrated.

Part number	Description
378178	IP65 2500 pulses shaft encoder
378179	IP65 5000 pulses shaft encoder
378180	Measuring wheel
378181	Diaphragm coupling
378182	Flange plate adapter
378183	Angle bracket
378184	3M cable (encoder)
378185	5M cable (encoder)
378191	5000 shaft encoder kit
378192	3M encoder cable
378193	6M encoder cable

Table 12-3: Encoders and encoder accessories

Product Detectors and Detector Accessories

Not illustrated.

Part number	Description
378195	Inductive proximity product sensor
378196	Proximity photocell (MDI)
378197	Fiber optic converter
378198	Single core fiber optic cable
378199	Twin core fiber optic cable
378200	Fiber optic photocell (SDI)
378201	MDI photocell bracket kit

Table 12-4: Product detectors and detector accessories

Networking Accessories

Not illustrated.

Part number	Description
378207	43s RS485 Kit
378208	RS485 networking connection box
378209	PC RS485 kit
378210	4 conductor twisted pair (22 guage) shielded cable
378211	LAN interconnector

Table 12-5: Networking accessories

Other Accessories

Not illustrated.

Part number	Description
378188	Electric positive air kit
378189	Un-interruptible power supply
378203	Message selector/opto cable assembly
378204	Volt relay cable assembly
378205	RS-232 interconnector cable
378175	Print head cleaning station

Table 12-6: Other accessories

Documentation

Not illustrated.

Part number	Description
361450-01	43S Ink Jet Printer Instructions for Use
361451-01	43S ink Jet Printer Service Manual

Table 12-7: Documentation

Software

Not illustrated.

Part number	Description
378216	Blueprint (incl hardkey)
378217	Blueprint Pro (incl hardkey)
378218	License kit
378219	Editor Pro module
378220	Monitoring and configuration module
378221	Networking module
378222	Extra license
378223	Calibration and diagnostic module
378224	Production reports module
378225	Multi-access module
378226	3M communication cable (RS-232)

Table 12-8: Software

Major Sub-Assemblies

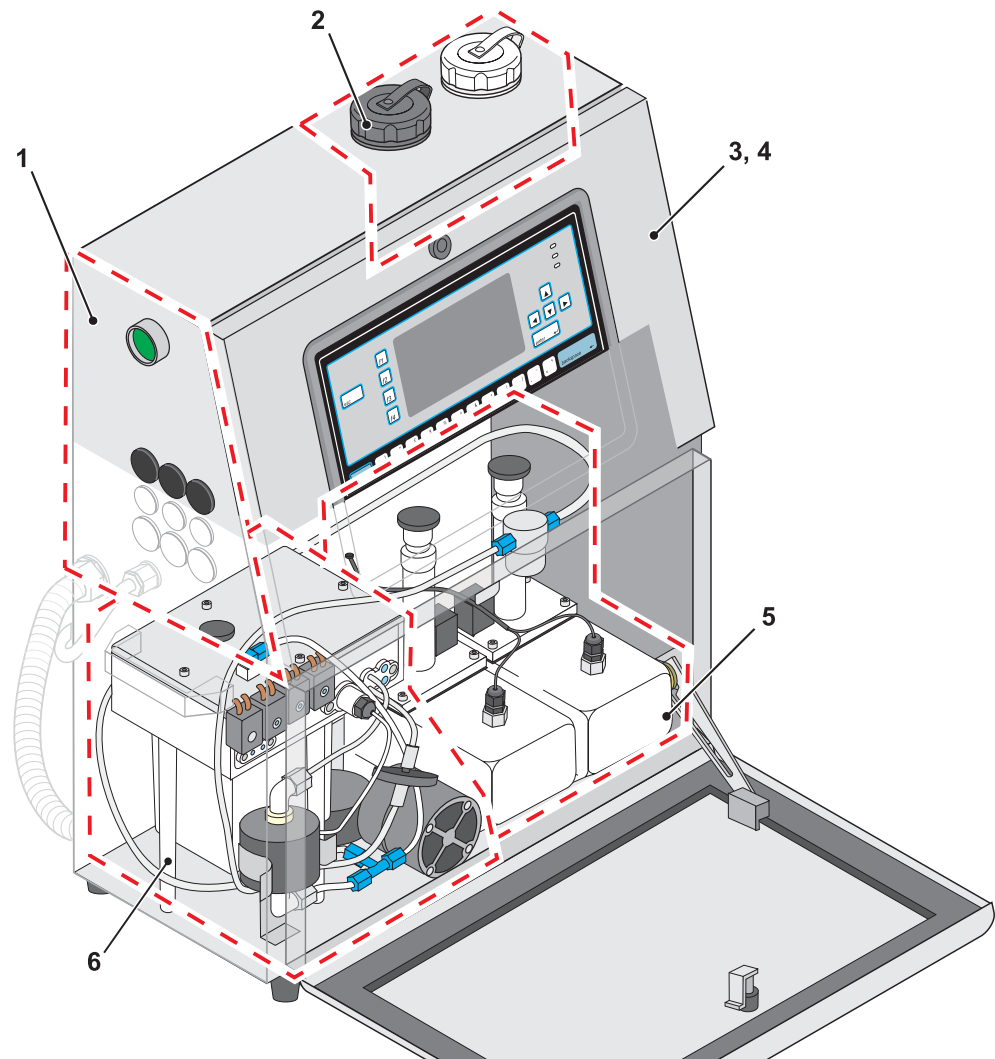


Figure 12-3. Major Sub-Assemblies

Fig ref.	Description	Qty	Remarks
1	Connector panel & wiring	1	See Figure 12-5
2	Ink and top up filler caps	1	See Figure 12-10
3	Keypad/compartament door	1	See Figure 12-4
4	Electronics compartment (interior)	1	See Figure 12-6
NI	Printhead assembly and umbilical	1	See Figure 12-7
5	Ink bottles and ink system pump	1	See Figure 12-9
6	FMS platform	1	See Figure 12-8

Table 12-9: Major Sub-Assemblies

Keypad and LCD

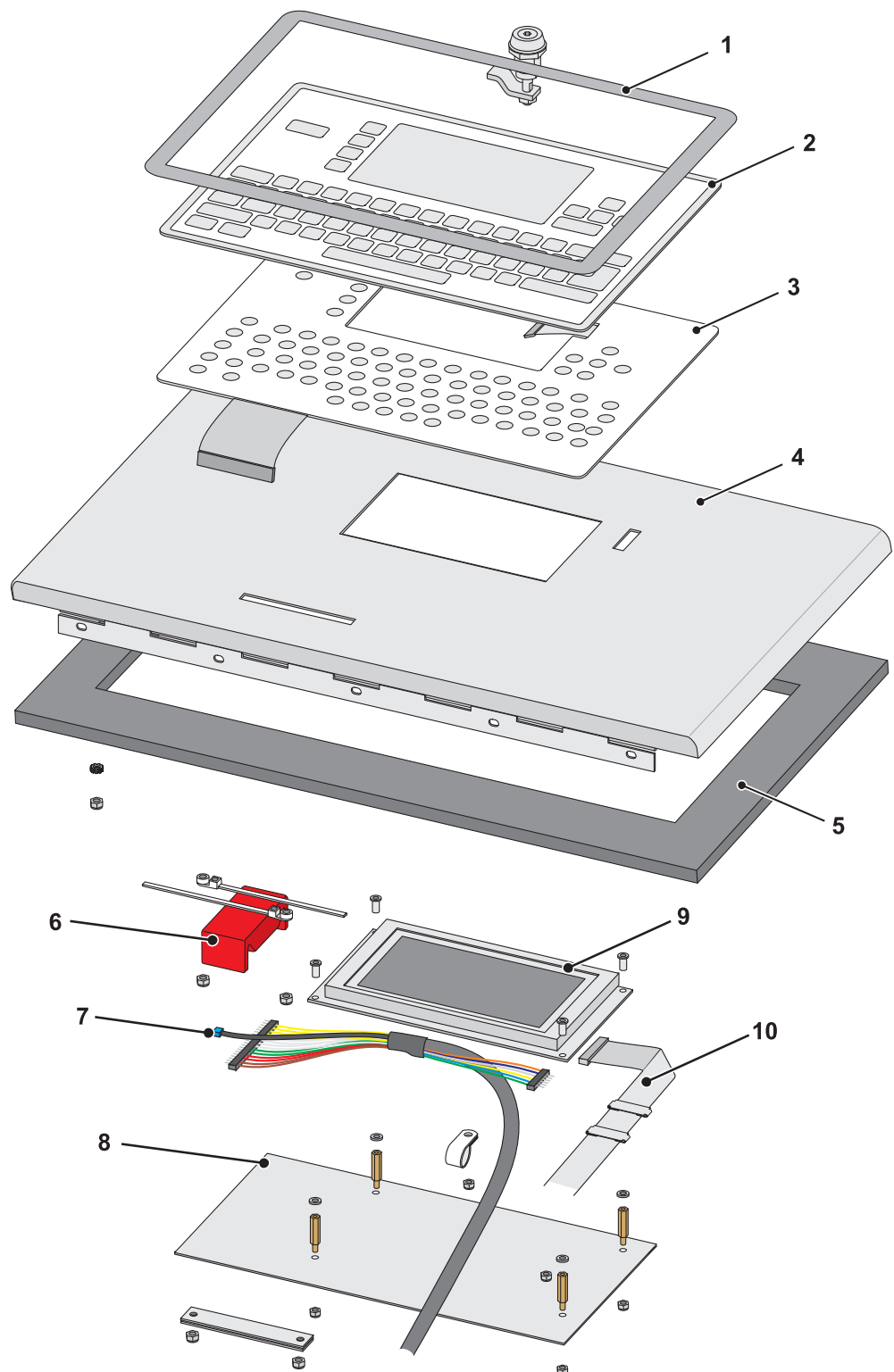


Figure 12-4. Keypad and LCD

Fig ref.	Part number	Description	Qty
1 through 5	378297-07	Kit, door and keypad, Russian	1
	378297-10	Kit, door and keypad, Chinese	
	378297-101	Kit, door and keypad, UK/USA	
	378297-102	Kit, door and keypad, European	
	378297-103	Kit, door and keypad, Turk/Scandinavian	
	378297-105	Kit, door and keypad, Katakana	
	378297-107	Kit, door and keypad, Bulgarian	
	378297-108	Kit, door and keypad, East European	
	378297-11	Kit, door and keypad, Arabic	
	378297-115	Kit, door and keypad, Farsi	
	378297-12	Kit, door and keypad, Korean	
	378297-13	Kit, door and keypad, Thai	
	378297-19	Kit, door and keypad, Greek	
	378297-20	Kit, door and keypad, Hebrew	
	378297-23	Kit, door and keypad, Polish	
1		Keypad bezel	1
2		Keypad overlay	1
3		Keypad circuit assy.	1
4		Electronics compartment door	1
5	378322	Gasket - top door	1
6	378336	Backlight Inverter	1
7	378343	Keypad harness	1
8	378332	Display panel cover	1
9	378289	LCD Panel	1
10	378311	Keypad/LCD ribbon cable	1

Table 12-10: Top Moulding, Keypad and LCD

Connector Panel

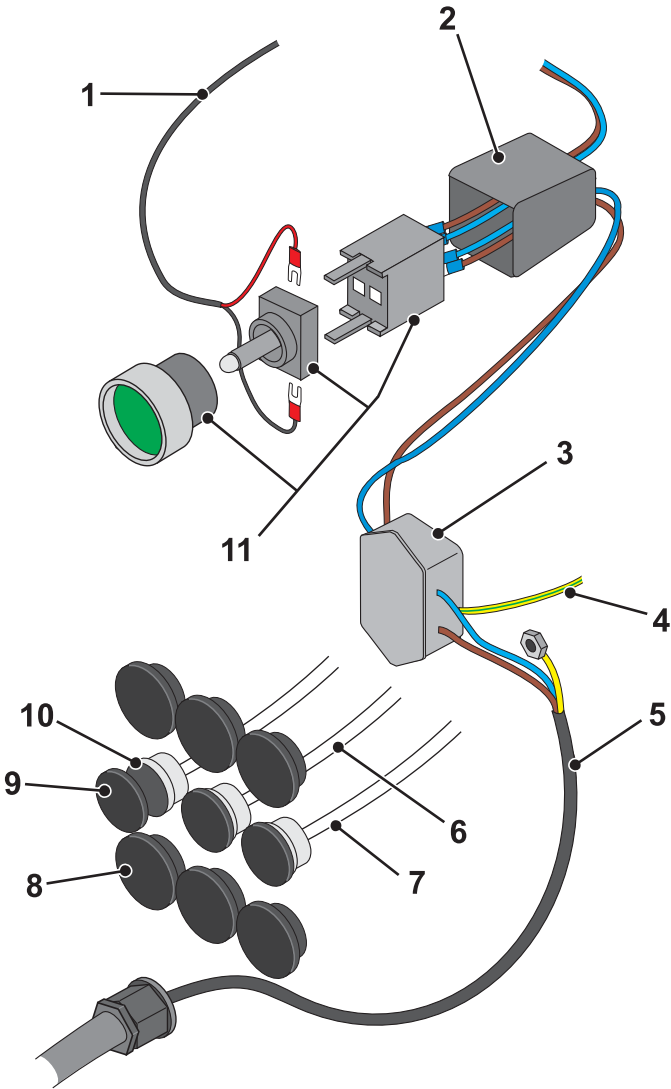


Figure 12-5. Connector Panel

Fig ref.	Part number	Description	Qty
1	378312	Switch LED Cable	1
2	378313	Switch Cable Assembly	1
3	378368	Mains Power Filter	1
4	378317	Mains Filter Ground Wire	1
5	217019	Mains cable assembly (U.S.)	1
	378316	Mains cable assembly (International)	
6	378194	Shaft encoder cable (with port)	1
7	378308	RS-232 cable (with port)	1
8	378321	Blanking plug, 18mm	6

Table 12-11: Connector Panel

Fig ref.	Part number	Description	Qty
9	378320	Blanking plug, 14mm	3
10	378314	Photo Cell Cable	1
11	378333	Switch	1

Table 12-11: Connector Panel

Electronics Compartment

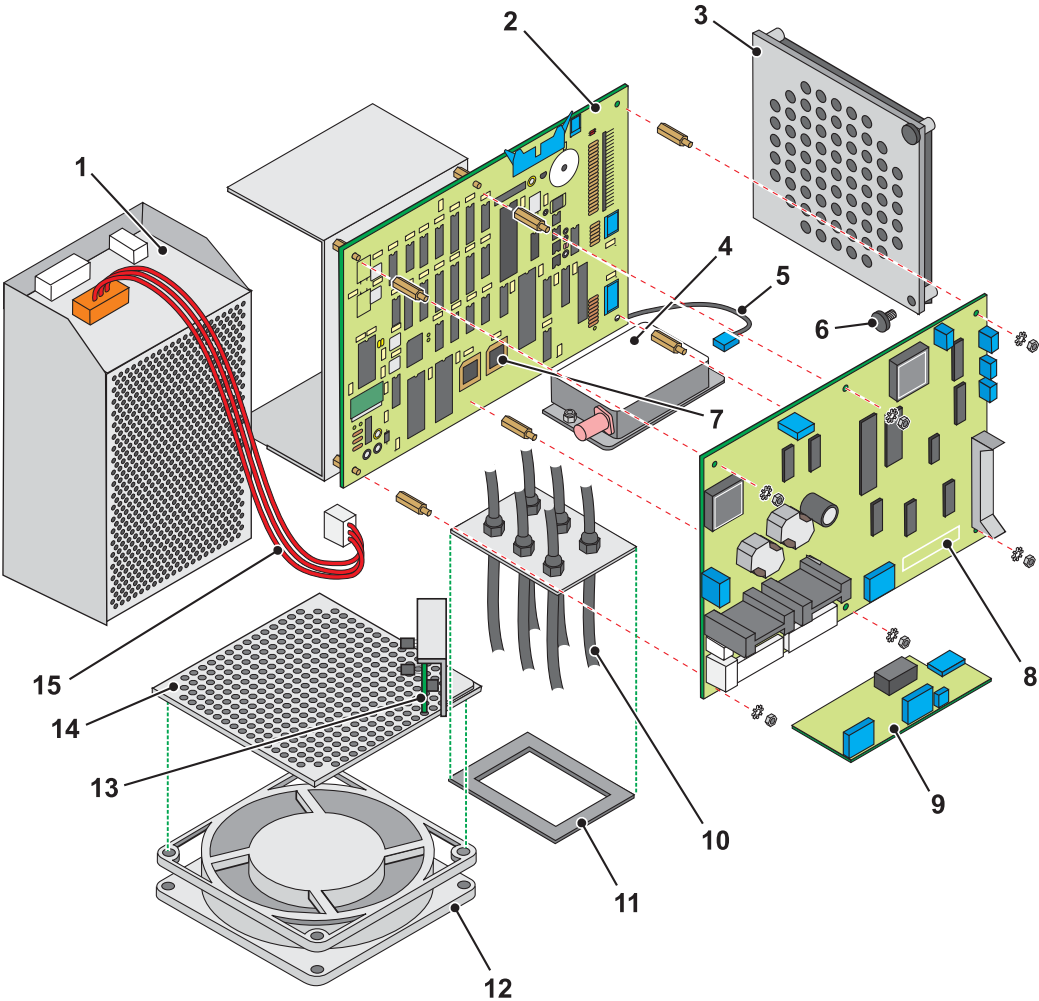


Figure 12-6. Electronics Compartment

Fig ref.	Part number	Description	Qty
1	378288	PSU	1
2	378237	CPU board	1
3	378245	Fan filter assembly	1
4	378292	EHT module	1
5	378310	EHT cable assembly	1
6	378256	Thumb knob	2
7	378344	Unprogrammed flash memory	2
8	378285	I/O board	1
9	378287	Ink pump motor driver board	1
10	378300	Main Harness	1

Table 12-12: Electronics Compartment

Fig ref.	Part number	Description	Qty
11	378345	Gland plate gasket	1
12	378293	Fan	1
13	378286	Fan fail PCB	1
14	378335	Fan grill assembly	1
15	378318	Power harness	1

Table 12-12: Electronics Compartment

Printhead Assembly

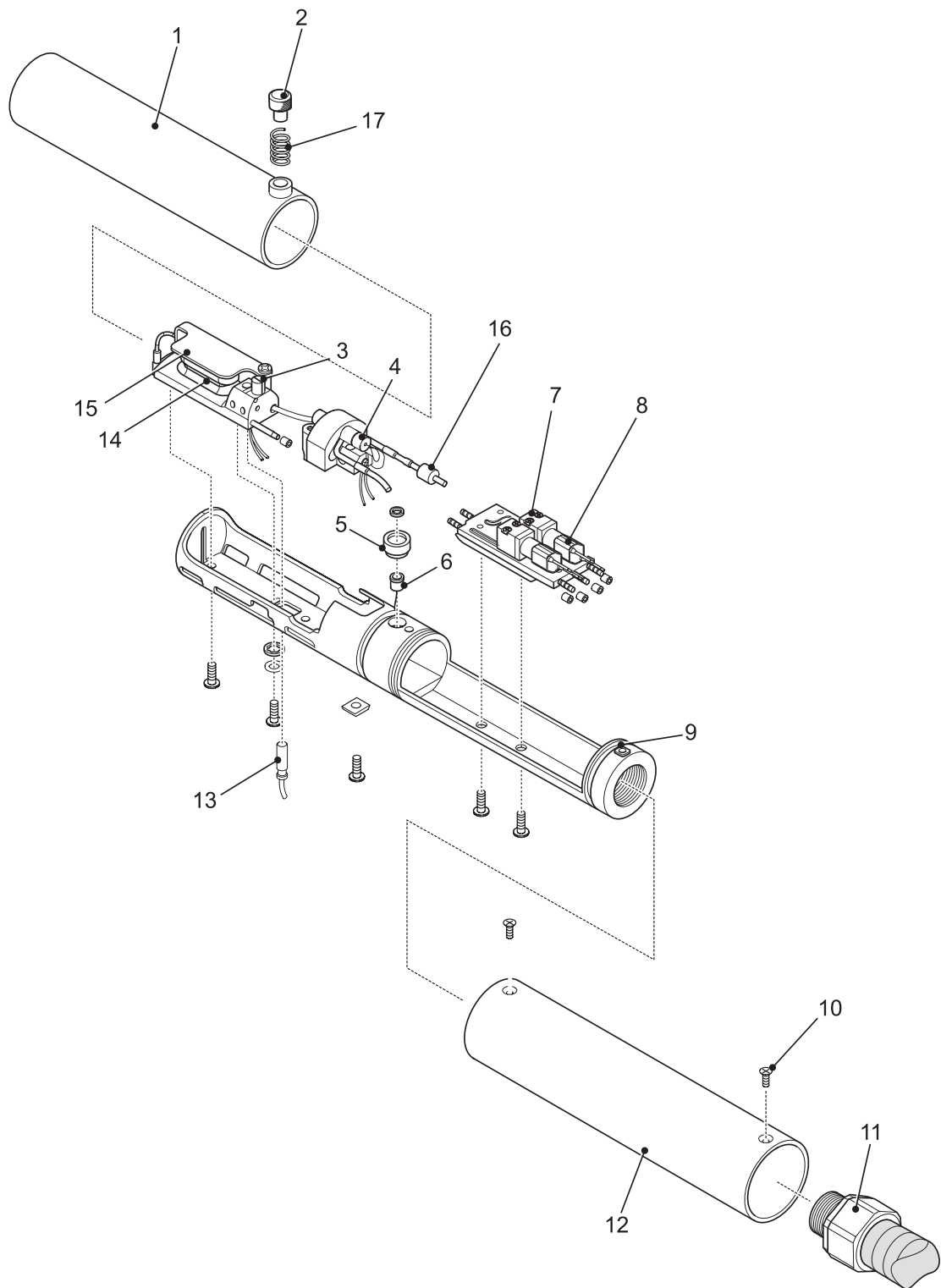


Figure 12-7. Printhead Assembly

Fig ref.	Part number	Description	Qty
1	378300	Front cover	1
2	378268	Lid switch thumbscrew	2
3	378302	Charge electrode/LED assy.	1
4	378233	Nozzle assembly	1
5	378304	Insert, lid switch	1
6	378306	Cover switch assy.	2
7	378299	Head heater assy.	1
8	378260	Pico valve	1
9	378358	O-ring 25.81 x 3.53 CS	1
10		M2 5 x 6 cask head st. st. screw	2
11	part of 378298	Umbilical	1
12	378301	Rear cover	1
13	378236	Phase detector assy.	1
14	378307	EHT block assy.	1
NI	378303	22 meg EHT resistor (inside EHT block)	1
15	378305	0 V plate	1
16	378242	Last chance filter	1
17	378319	Spring	1
NI	378298	Printhead assembly (entire printhead and umbilical)	1

Table 12-13: Printhead Assembly

FMS Platform

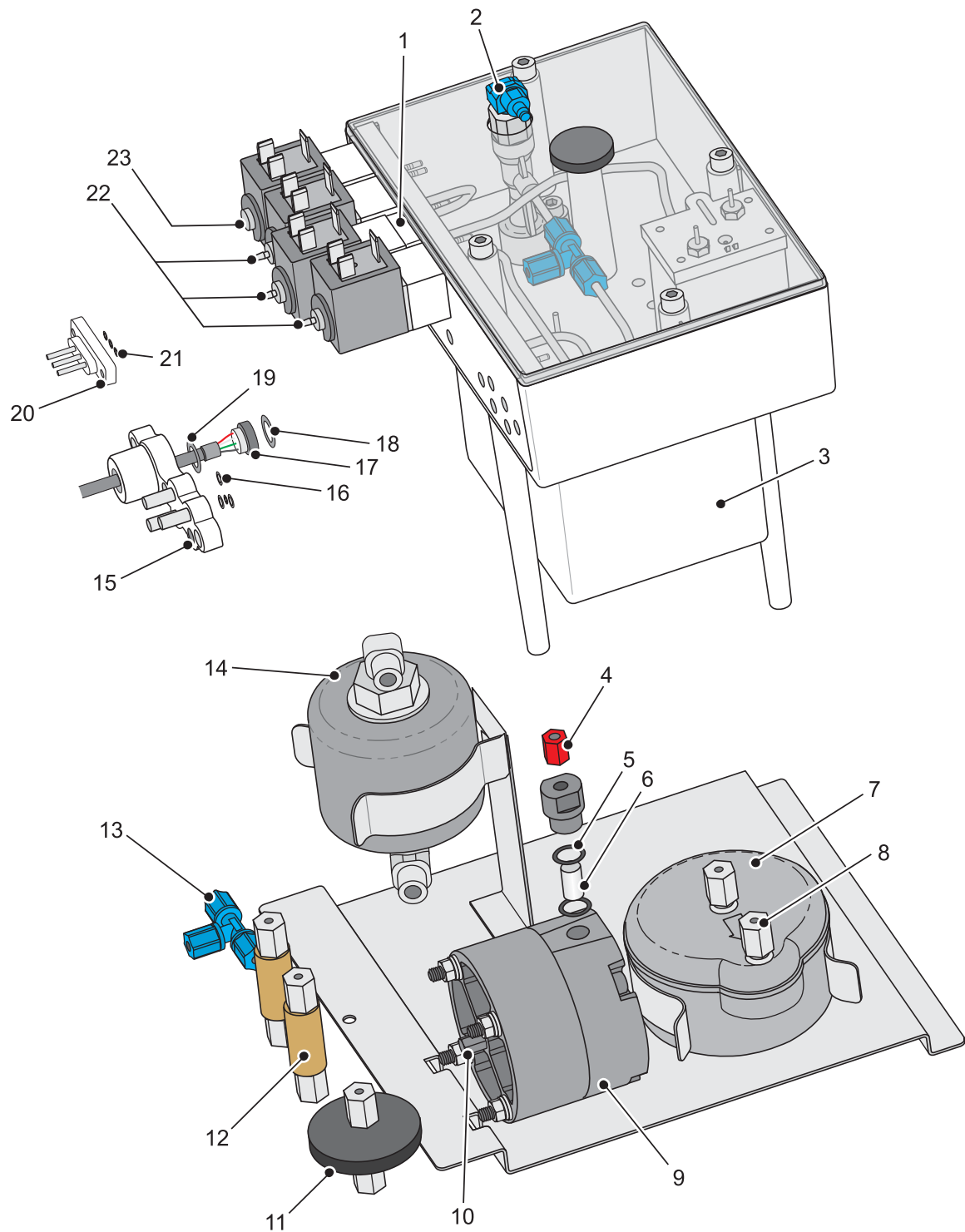


Figure 12-8. FMS Platform

Fig ref.	Part number	Description	Qty	Remarks
1	378289	VMS restrictor block	1	between V3 and FMS
2	378278	Venturi assembly	1	
3	378253	FMS assembly	1	
4	378277-03	Flush pump tube connector (red)	1	
5	378348	6.07 x 1.78 O-ring	4	
6	378266	Non return valve	2	
7	378244	Pressure damper	1	
8	378273	Jaco nut	2	
9	378270	Flush pump assembly	1	
NI	378257	Flush pump diaphragm	1	inside flush pump
10	378277-01	Flush pump tube connector (black)	1	
NI	378277-02	Flush pump tube connector (green)	1	on left side of flush pump
11	378240	Pre-pump filter	1	
12	378239	In-line filter	2	
13	378276	Festo tee	1	
14	378238	Main ink system filter	1	
15	378265	System manifold	1	
16	378351	4.47 x 1.78 O-ring	3	
17	378254	Pressure transducer	1	
18	378350	Pressure transducer front O-ring	1	
19	378352	Pressure transducer rear O-ring	1	
20	378263	Printhead manifold	1	
21	378349	1.78 x 1.78 O-ring	4	
22	378247	Solenoid Valve, 3-port (Valves V3, V7 and V8)	3	
23	378246	Solenoid Valve, 2-port (Valves V1, V2 and V6)	3	V1 and V2 are shown on page 12-18.
NI	378334	Valve O-rings (20 pack)		
NI	378243	75 micron VMS filter	1	tiny white filter in FMS

Table 12-14: FMS platform

Ink Bottles and Ink System Pump

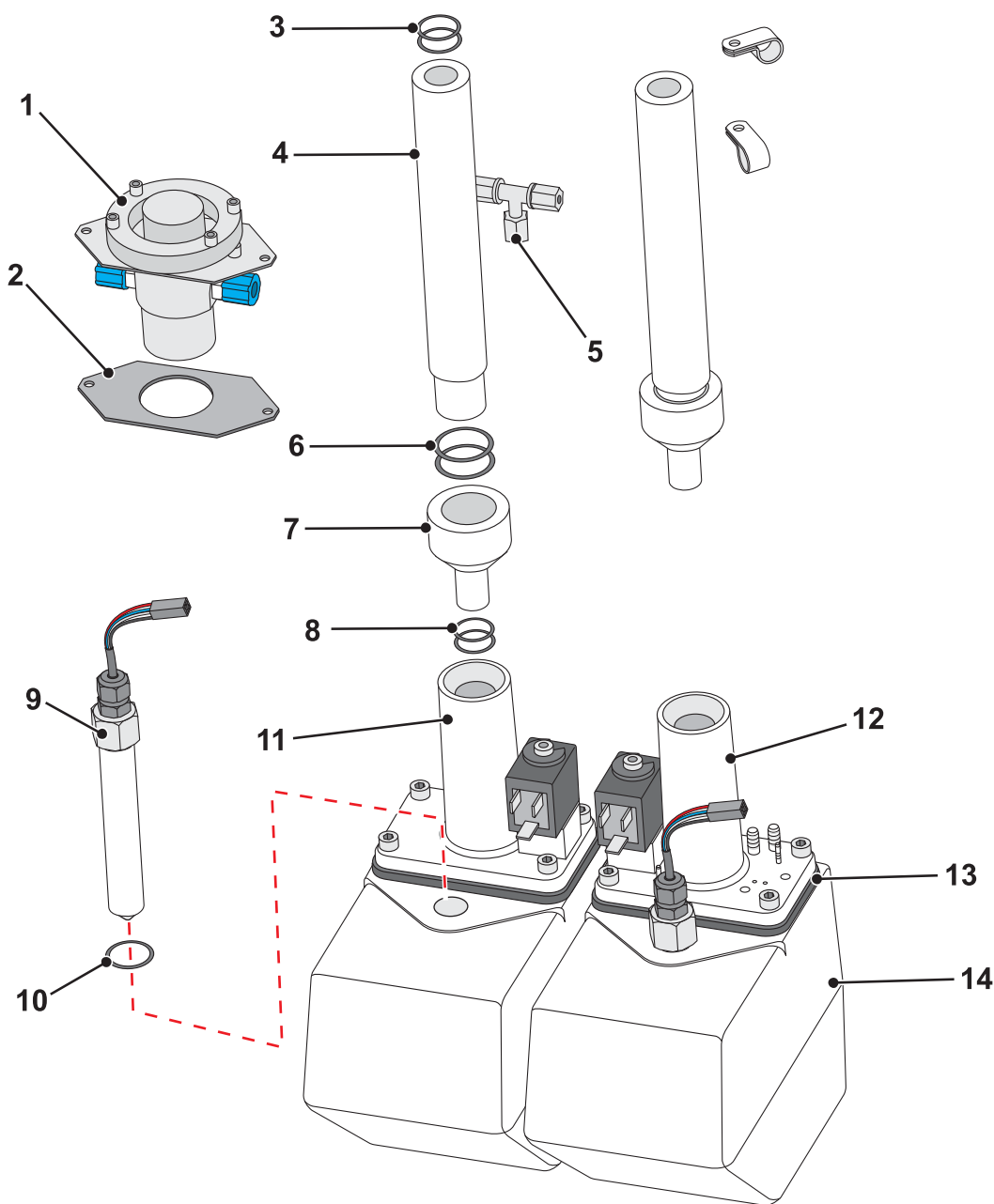


Figure 12-9. Ink Bottles and Ink System Pump

Fig ref.	Part number	Description	Qty
1	378252	Pump	1
2	378264	Pump seal	1
3	378355	O-ring (15.6/1.78)	4
4	378330	Down tube	2
5	378275	Jaco 1/8" tee	1

Table 12-15: Ink Bottles and Ink System Pump

Fig ref.	Part number	Description	Qty
6	378356	O-ring (20.4/1.78)	4
7	378329	2x down tube adapter	2
8	378357	O-ring (14.0/1.78)	4
9 through 14	378255	Ink system kit	1
9	378262	Level detect assembly	2
10	378267	Level detect seal	2
11	378340	Ink tank manifold	1
12	378342	Solvent tank manifold	1
13	378341	Manifold gasket	2
14	378339	Solvent/ink tank	2
NI	378269	Level detect sensor kit (pack of 5 level detect assemblies)	
NI	378279	1/8" tube, clear	
NI	378280	1/8" tube, green stripe	
NI	378281	1/8" tube, black stripe	
NI	378282	1/8" tube, yellow stripe	
NI	378283	6mm x 4mm PTFE tubing	

Table 12-15: Ink Bottles and Ink System Pump

Ink Filler Caps

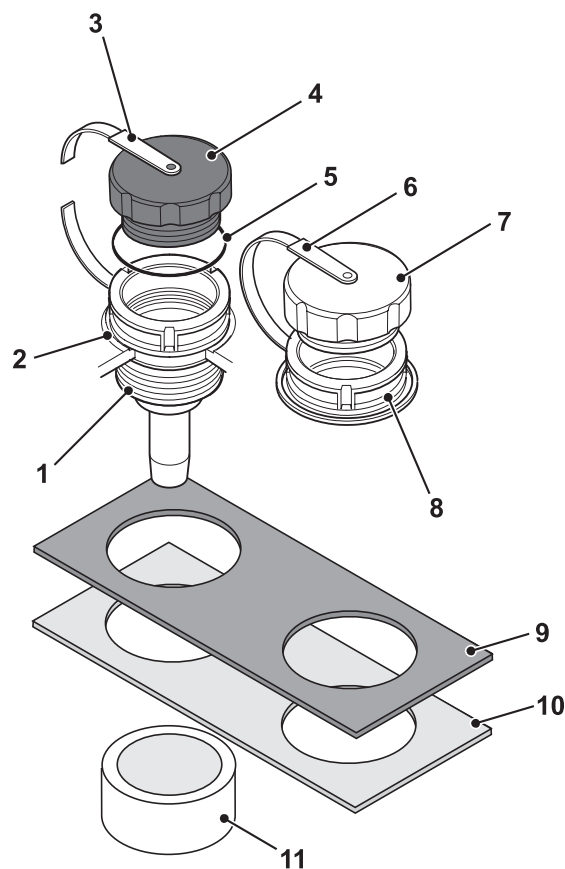


Figure 12-10. Ink filler caps

Fig ref.	Part number	Description	Qty
1	378271	Filler housing, ink	1
2	378354	O-ring (53.64/2.62)	2
3	378326	Cap retainer black	1
4	378327	Ink cap	1
5	378353	O-ring (45.69/2.62)	2
6	378325	Cap retainer white	1
7	378328	Top-up cap	1
8	378272	Filler housing, top-up	1
9	378331	Housing plate gasket	1
10	378346	Housing plate	1
11	378347	Housing nut	2

Table 12-16: Ink filler caps

Miscellaneous Parts

Not illustrated.

Part Number	Description	Qty
378323	Gasket - bottom door	1
378324	Cabinet Feet	4
378338	Machine cabinet key	1

Table 12-17: Miscellaneous parts

Tools and Spare Part Kits

13

Tools

Videojet recommends a variety of tools to service the 43s printer.

Basic start up kit

The basic start up kit (P/N 378232) includes the following:

Description	Part Number
Safety glasses	217091
Squeeze bulb	217086
Wash bottle, 250cc	202047
Latex gloves	209953
Hand cleaner	SP212321
Cleaning pan, steel	217035

Service tool kit

The Service tool kit (P/N 378228) consists of the following:

Description	Part Number
Pipe pliers	378381
Tube cutter	217075
Nut driver set	217076
Allen hex driver set	217077
Pozi drive screwdriver #1	217078
Pozi drive screwdriver #0	217079
Nozzle adjusting tool	378370
Manifold flush block	378372
Precision knife	217043
Spare blades for precision knife	217044
Ultra sonic bath	217080

Description	Part Number
Reverse action tweezers	217081
Syringes, with slip tips	217082
Wrench, open end, 8mm x 10 mm	217083
Din socket wrench	217084
IC removal tool, mini-fit	217085
Pump priming adapter	378371
3m teflon tubing 1/8 x 1/16"	217089
Filler cup wrench	378369
Electronics compartment key	378338
Printhead cleaning station	378337
Blow bulb	217086
Eye piece x 10	355269
Serial download cable	378373
EHT trip tool	378374
EHT printhead cover	378375

Other tools

Additional tools that may be useful for service personnel include the following:

- a laptop computer with Windows NT 4 or greater installed
- The standard Videojet-issued tool kit with DVM and oscilloscope

Spare parts kits

Ink system filter kit

The ink system filter kit (P/N 378229) contains the following:

Description	Part Number
Fan filter element	378245
Main ink system filter	378238
Pre-pump filter	378240

Basic spare parts kit

The basic spare parts kit (P/N 378230) contains the following:

Description	Part Number
Ink system filter kit (above)	378229
Fuses, 5 amp (pack of 10)	378261
3 port solenoid valve	378247
2 port solenoid valve	378246
Pico valve	378260
VMS restrictor block	378289
Nozzle assembly	378233
Valve O-rings (20 pack)	378334
Nozzle adjusting tool	378370
Printhead cleaning station	378337

Comprehensive spare parts kit

The comprehensive spare parts kit (P/N 378231) contains the following:

Description	Part Number
Basic spare parts kit	378230
CPU board	378237
PSU	378288
I/O board	378285
EHT Module	378292
Pressure transducer	378254
Pressure transducer O-ring, front	378350
Pressure transducer O-ring, back	378352
System manifold	378265
Phase detector assembly	378236
Charge electrode assembly	378302
22 Meg EHT resistor	378303
Level sense kit	378269

Circuit Diagrams

A

Overview

This section contains the following foldout circuit diagrams:

- CPU Board
- I/O Board
- Pump Motor Control Board

