EC-JET

PRINTER
USER MANUAL

EC-JET400

Excellent EC-JET • Intelligent Choice

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EC-JET shall not be liable for any loss or damage arising from the use of any information, particulars or errors in this user manual, or maintenance carried out by unauthorized personnel, or any incorrect use of the product, whatsoever.

At all times the printer must be operated with EC-JET approved spares and consumables. Maintenance not identified in this user manual must be carried out by EC-JET engineers or authorized distributors.

About this Manual

The purpose of this user manual is to provide the operator with sufficient information to operate the EC-JET Ink Jet Printer.

Products described in this user manual are subject to continuous development, and reviews of this user manual will be made accordingly in subsequent editions or reissues.

Safety

Warnings and Cautions

At appropriate points within the text of this manual, additional safety statementswill be displayed. These are designed to alert your attention to hazards and important information that assists you in carrying out your activities on this printer safely and efficiently. Each safety statement has a separate meaning so that you can identify the importance of the information provided. Examples and descriptions of safety statements have been provided as follows:

WARNING: A WARNING ALERTS YOU TO HARMFUL OR POTENTIALLY LETHAL ACTIVITIES. A DESCRIPTION OF THE HAZARD IS GIVEN AND THE CONSEQUENCES OF IGNORING THEM. A WARNING CAN ALSO BE SHOWN AS A SPECIFIC HAZARD, FOR EXAMPLE, EYE PROTECTION (SEE BELOW).

THE EYE PROTECTION WARNING ICON IS SHOWN THROUGHOUT THE MANUAL TO INDICATE THAT APPROVED EYE PROTECTION, WHICH CONFORMS TO EUROPEAN AND INTERNATIONAL SAFETY STANDARDS, MUST BE WORN WHEN CARRYING OUT INK OR SOLVENT RELATED ACTIVITIES.

CAUTION: A caution alerts the user to activities that may cause damage to equipment or reduce its operating efficiency, but is not directly hazardous to personnel.

NOTE: A Note provides important additional information but is not safety related. The hand icon may not always be shown depending on the importance of the Note. A Note with a hand icon indicates that you should take particular notice of the information provided.

Lethal Voltages

WARNING: LETHAL VOLTAGE. DANGEROUS VOLTAGES ARE PRESENT IN THIS EQUIPMENT WHEN ELECTRICAL POWER IS APPLIED. THERE IS A DANGER OF DEATH OR INJURY FROM ELECTRIC SHOCK.

UNDER NO CIRCUMSTANCES ARE YOU TO ATTEMPT TO OPEN THE PRINTER COVER OR ATTEMPT TO REMOVE OR ADJUST ANY COMPONENTS FITTED WITHIN THE PRINTER. ONLY FULLY TRAINED EC-JET APPROVED SERVICE ENGINEERS ARE QUALIFIED TO OPEN THE PRINTER COVER.

Operation

All users operating the printer must be aware of the following hazards associated with ink jet printers. The following safety information should be made available to all personnel and is applicable to anybody in the printer's operating environment. Only fully trained and competent personnel should operate or maintain EC-JET printers. If you are in any doubt as to your ability to operate or maintain the printer, DO NOT DO SO; consult your supervisor for guidance or contact your local EC-JET distributor who will be happy to advise you.

1. DO NOT smoke or use naked flames in the vicinity of the printer. The printer contains flammable inks and solvents.

2. ALWAYS ensure that the printer electrical supply is isolated prior to performing cleaning or maintenance activities. Lethal voltages are present in the printer cabinet and printhead when mains power is applied which can cause death or serious injury if the correct electrical procedures are not observed. When a mains operated external alarm is connected to the external alarm socket, this must be disconnected before any maintenance activities are carried out. Never attempt to remove the printer cover. The printer cover must only be removed by qualified EC-JET service engineers.

3. ALWAYS check that all covers are correctly fitted to the printer before you use it. If you are not sure, ask your supervisor for guidance. Covers act as safety barriers and also ensure the printer retains its electromagnetic compatibility.

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4.   It is recommended that the printer is situated at least 600 mm from floor level for your comfort.

Inks and Solvents

Whenever inks and solvents are used, safety eyeglasses to the appropriate European and International Directives must be worn. Solvent resistant gloves must be worn when contact with inks or solvents is likely.

The effects of solvents and inks are potentially harmful. Prior to use, ensure the printing area is properly ventilated and the Material Safety Data Sheets have been read and fully understood. If you are unsure, contact your supervisor for guidance.

If the Material Safety Data Sheets have not been supplied or are not available, please contact your local EC-JET distributor. ALWAYS refer to the Material Data Safety Sheets before working with inks and solvents.

Store all inks and solvents in original containers, in a well ventilated cabinet and away from heat sources. Ensure all spilt ink or ink deposits are removed immediately using the correct solvent for the ink used.

First Aid

Ensure that first aid information is readily available in the event of ingestion, inhalation, or contact with the skin or eyes. Ideally all operators should be trained in First Aid and should be aware of the effects of working with flammable and toxic substances. All operators should have access to the ink and solvent Material Safety Data Sheets, which explain the hazards and medical action to be taken if first aid is necessary.

Eye Contact

Flush eyes using clean running water for a minimum of 10 minutes. Obtain immediate medical attention.

Skin Contact

Remove any contaminated clothing and wash the affected skin area thoroughly with proprietary cleaner. Do NOT attempt to use solvents to remove ink from skin.

Inhalation

Evacuate the person into a fresh air environment. If the person experiences any difficulty in breathing, obtain immediate medical attention.

Ingestion

Do NOT induce vomiting; obtain immediate medical attention and give the casualty half a litre of water to drink.

In Case of Emergency

If the printer needs to be stopped quickly due to an emergency, press the red [stop] key on the printer to stop the printing and switch the printer power switch on the rear panel of the printer to the 'O' (off) position. Call for medical assistance as required.

Noise Emissions

The noise emission level from this printer does not exceed 70 dB. This means that there is no hazard to hearing and, therefore, no legal requirement for ear protection to be worn when working in the vicinity of this printer.

Contents

Using this Manual

The manual is divided into the sections described below, together with appendices containing useful reference information, and an index.

Safety

Do not ignore this section, safety is in your own interest as well as ours. Preventative measures are described here, together with first aid procedures to be followed in the event of an accident.

Introduction

This gives a brief description of the EC-JET printer.

Controls and Indicators

Describes how the display is divided into menus with a message area, menu options and status information. Illustrations of the keyboard identify the keys and define the function of special keys and key combinations.

Getting Started

Describes how to switch on, create a simple message, start the printer, print the message, make adjustments and shut down the printer.

Using the System

This details all of the functions available on the printer. An illustrated overview of all the menus shows their hierarchy and purpose. A worked example explains how to create, edit and delete messages, list errors, change the system setup, and other facilities provided through the menu options. By using the SETUP menu certain system information, such as the language to be used, the date and time, etc., can be changed.

Diagnostics

All EC-JET printers includes diagnostics software to help identify and rectify operational problems.

Routine Maintenance

In addition to regular maintenance procedures, this section shows how to clean or replace air filters, replenish ink and solvent, clean the printhead and complete basic maintenance procedures.

Warning and Fault Messages

This section describes the system error and fault messages which the user may see displayed. These messages are described in turn together with possible causes and corrective actions.

Troubleshooting

This section deals with the most likely problems you may encounter and how to correct them, as a user. Other problems should be dealt with by EC-JET or an authorized EC-JET distributor. Authorized EC-JET distributors are trained by EC-JET to maintain and repair your printer in a safe and professional manner. They are also kept up-to-date with the very latest technical information. Do not risk damage or loss by using unauthorized organisations!

Technical Specification

Details all relevant technical data.

Appendices

Describe how to install and set up the printer, explain factors that affect print quality.

Introduction

A Safety section has been provided at the front of this manual for your use. You are strongly advised to read the Safety section carefully before attempting to use the EC-JET printer.

Printer System Overview

The EC-JET printers provide a means of application of printed information onto a wide range of products. This information would typically be the date, production codes, consumer information, product or corporate identification, product traceability, and many others.

The printer is normally fixed to a production line in such a way that printing takes place as the product passes the printhead. The presence of the product and printing can be synchronized using a product detecting sensor.

The printer consists of a cabinet and a printhead. The cabinet houses the electronics module, the ink system and a power supply. The cabinet also supports a full QWERTY keyboard and message screen display. The printhead is attached to the rear of the cabinet via a flexible conduit.

The printhead is supplied with ink by the ink system which the printhead forms into a continuous stream of ink drops which recycle to the ink system. When printing is required, drops of ink for printing the message are deflected from the stream out of the printhead onto the product, providing a non-contact method of printing. The process is controlled by the electronics module which also stores the messages to be printed. The message is programmed using the keyboard and display.

EJ01

System Description

The EC-JET printers are designed to provide versatile, uninterrupted operation in factory environments

The models available, together with available raster types and compatible printheads are as follows.

EJ02

PRINTER MODEL	PRINTHEAD TYPE	RASTER TYPES	CHARACTERS
EC-JET 200	MIDI 60um	7 GEN STD 12 GEN STD 16 GEN STD	5、7、9、12、16
EC-JET 300	MIDI 60um	7 GEN STD 12 GEN STD 16 GEN STD 24 GEN STD	5、7、9、12、16、24
EC-JET 400	MIDI 60um	7 GEN STD 12 GEN STD 16 GEN STD 24 GEN STD 32 GEN STD 34 GEN STD	5、7、9、12、16、24

Operating Simplicity

Easy start-up and shutdown requires minimal operator intervention. Messages are easily created using the built-in QWERTY keyboard, and the printer offers print adjustment and message editing facilities.

Real-time System Control

Ink and solvent levels, viscosity, pressure and charge, are continuously monitored by the computer module and the results can be viewed on the display panel using the DIAGNOSTICS menu.

Diagnostics

A comprehensive diagnostics package is built into the printer to enable problems to be identified and rectified quickly.

Printhead Design

The printhead is robustly designed for industrial environments. It is hermetically sealed and is permanently attached to the printer itself by a 2 metre (or optionally 4 metre) length of conduit.

Printing Drops

To form a printed pattern, each drop must be directed to a different place on the product being printed. To achieve this, the drops pass through a charge electrode (within the printhead), which applies a different charge to each drop. This causes the flightpath of the drops to differ as they travel between two deflector plates. When the drops reach the product, they form one line of drops called a raster. As the product passes under the printhead, rasters are laid down side by side to form the printed message.

Leaving Gaps

Unprinted drops in a raster carry no charge and are therefore not deflected. These drops are captured by a gutter in the printhead, and returned to the ink tank. Gaps between rasters (perhaps to separate readable characters) are created by the printer simply not printing a raster as the product continues to move past the printhead.

Detecting Products

A photocell or product detecting sensor is used to inform the printer when the product has been detected. After a predefined delay, the first raster of the pattern will be printed, followed by the remaining rasters of the pattern, as described above.

Conveyor Speed

For production setups using a conveyor, variation in conveyor speed can produce variation in the appearance of the printed message. If the product is moving very slowly, the rasters could be printed too close together and the characters formed would be too thin. Conversely, if the product is moving very fast, the rasters could be printed too far apart, resulting in unprinted gaps between the rasters. This problem is overcome by either varying the print width (through a user menu option) to match the production of rasters with the conveyor speed, or by using a shaft encoder to control the rate at which each raster is printed in relation to the conveyor movement.

Ink Blockage Prevention

It is essential to use the correct solvent for the ink being used, i.e. the solvent used in the ink base: MEK solvent for MEK based ink, ETHANOL solvent for ETHANOL based ink, etc.

The principle of continuous ink jet printing has proved to be the most effective means of printing with an ink which is required to dry instantly, within a second, on almost any surface.

Blockages

If ink is required to dry on the product it will also have a tendency to dry in the printer, with a possibility of causing a blockage. The continuous ink jet printer overcomes this problem by continuously producing the print drops in operation. Although the ink is evaporating quickly during this process, it does not cause a nozzle blockage, as there is a constant replacement of ink in the nozzle.

Automatic Cleaning at Shutdown

A potential problem arises on shutdown when ink is left in the nozzle; as it is fast drying it will soon dry and clog up the nozzle. To overcome this, special procedures to clear the nozzle are necessary.

With EC-JET printers the clean up procedures at shutdown are achieved by an automatic flushing system.

On shutdown, the ink is removed from the ink nozzle assembly by suction through a purge line. Just prior to shutdown, a solvent flush system introduces solvent into the printhead, and runs solvent through the nozzle and gutter, thus clearing ink from these vital components. This automatic procedure makes it unnecessary to clean the printhead on shutdown.

Velocity of Drop

Ink velocity can impose a minor change in the mass of a drop, which will affect the final printing position of the drop. However, precise placement of drops is more dependent on the speed of the drops as they travel through the deflector plates.

For this reason, the velocity Of drop (VOD) is constantly monitored and compared with the optimum (VOD reference) value printed on the printhead conduit. A "feedback loop" is used to increase or decrease ink pressure, thus maintaining the correct speed of drops for accurate placement and therefore quality of print.

The following illustrates this in principle:

EJ03

Nozzle   Charge Electrode

VOD

Conduit

Phase Sensor   Deflector Plates   VOD Sensor
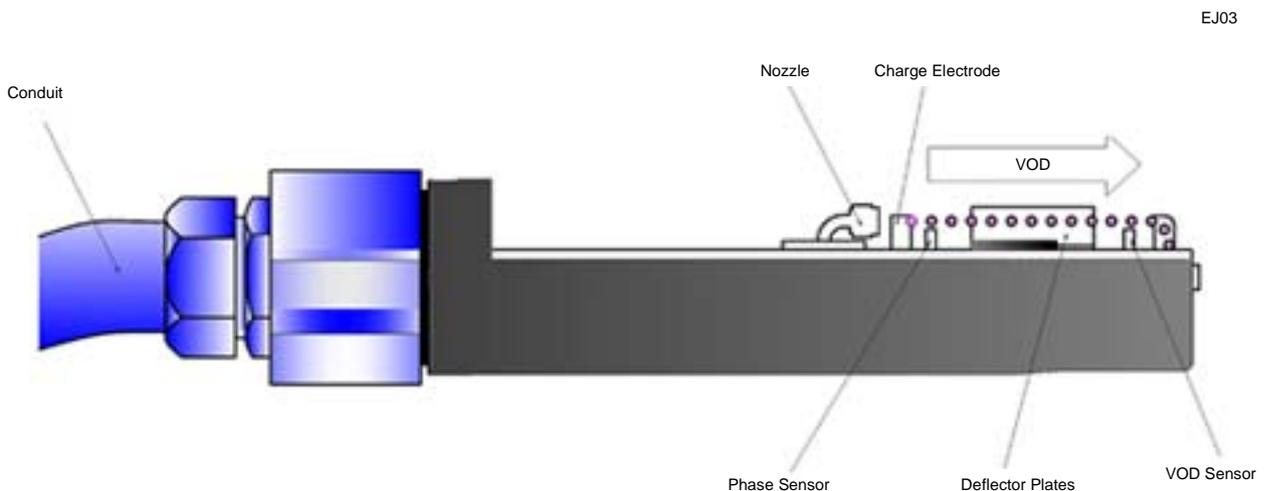
Principles of Operation

Conduit to control unit and ink system

Temperature sensor

Nozzle

Deflector plates

Print pattern being created

Chare electrode

Phase sensor

VOD sensor

Gutter

EJ04
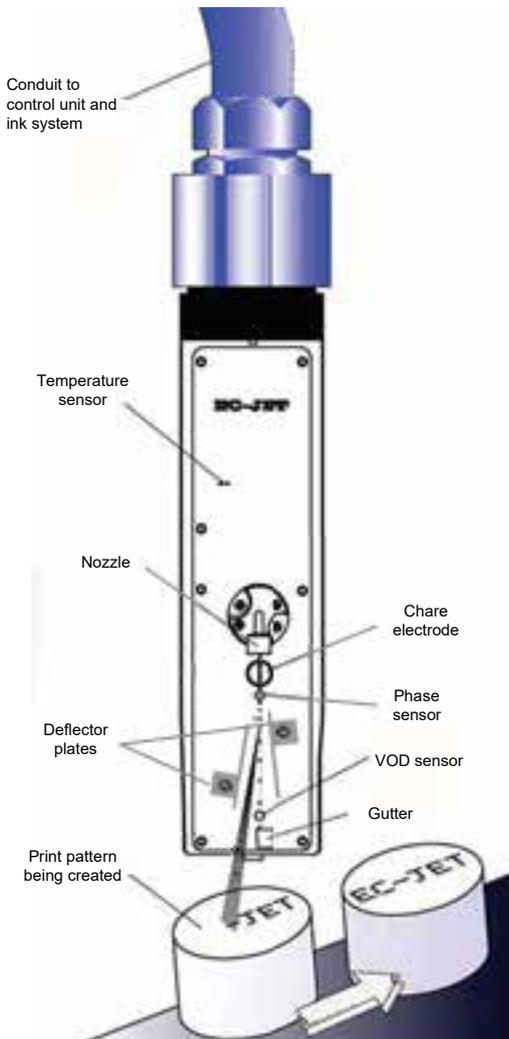
A conducting ink is supplied under pressure to an ink gun and forced out through a small nozzle of typically 50 to 70 microns in diameter. As it passes through the nozzle the liquid is piezo-electrically pulsed (modulated) and the stream breaks up into a continuous series of drops which are equally spread and are of the same size.

Surrounding the jet at the point where the drops separate from the liquid stream is a charge electrode. A voltage is applied between the charge electrode and the drop stream. When the drop breaks off from the stream it carries a charge proportional to the applied voltage at the instant at which it breaks off. By varying the charge electrode voltages at the same rate as the drops are produced, it is possible to charge every drop to a predetermined level.

The drop stream continues its flight and passes between two deflector plates which are maintained at a constant potential, typically plus and minus 5 kilovolts. In the presence of this field a drop is deflected towards one of the plates by an amount proportional to the charge carried. Drops which are uncharged are undeflected and are collected by a gutter to be recycled into the ink tank. Those drops which are charged, and, therefore, deflected, are printed on the substrate, which is travelling at a degrees to the direction of the drop deflection.

By varying the charge on the individual drops, whatever pattern is required (including alphanumeric characters) may be printed. A series of drops deflected across the substrate is known as a raster.

Controls and Indicators

This section describes the user interface for the EC-JET printer - the screen display, keyboard keys, function keys and cursor control keys.

Front Panel

The front panel layout is shown below.

EJ05
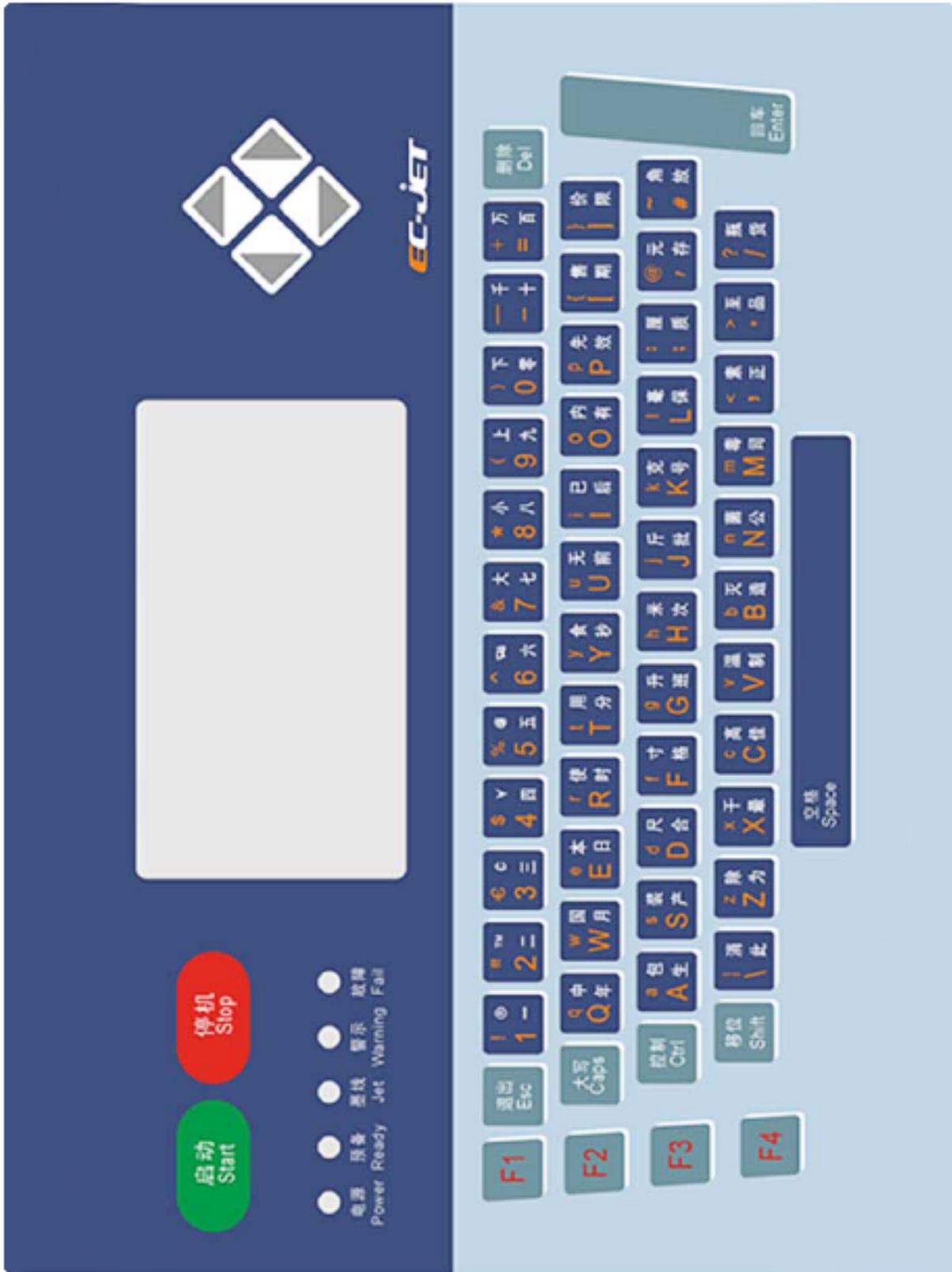
Screen Display

The screen is an LCD (Liquid Crystal Display) on which information about the printer is shown. The display can be divided into main areas:

EJ06

Screen Display Area

Operation Display Area

Message Display Area   Message Selection Cursors

CURRENT MESSAGE   1

F1：Edit Message   F2：Check Status
F3：New Message   F4：Change Setup

| VOD | 00000 | PRESSURE | 000 | PHASE | |

Jet Off   2006-03-24   14:01:38

Status Line

Time/Date Display Area
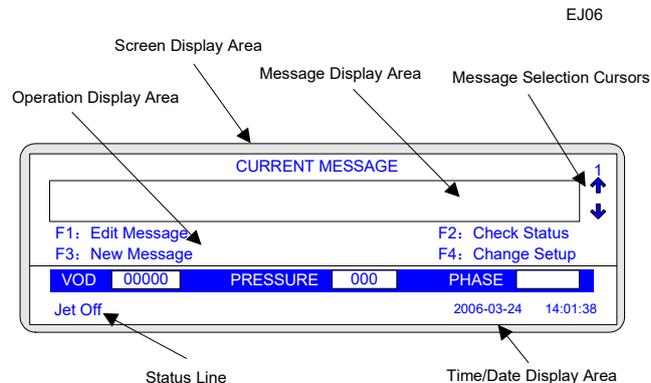
Message Display

This part of the display area is used for displaying, creating and editing messages to be printed.

Operation Menual Display

This is used to display the operation message.

Cursor Selection

The cursor keys can be used to select messages 1 to 60. Alternatively, simply press numbers 1 to 60 on the keyboard to select messages 1 to 60 respectively.

Apperance Line

This is used to display valve of VOD,pressure and phase.

Status Line

The status line is present in all menu displays. It is used to convey warning messages and print failure conditions, to the operator.

Time / Date Display

This display time and date.

LED Status Indicators

There are five indicators on the top left of the keyboard.

power   This is a red LED which, when illuminated, indicates that the power supply is switched on.

ready   This indicates that the power is on, the printer is ready to print.

Jet   When illuminated, the jet is running and the printer is ready to print.

warning   This indicator is illuminated when a warning is issued by the system. The warning message is displayed in the status line of the display.

fail   When illuminated, this indicates that a serious printer failure has occurred. In this event, it may be necessary to contact your local EC-JET distributor.

Start and Stop keys

Start Key

This initiates the start-up sequence which is responsible for carrying out internal checks and regulating the ink flow until it is ready for printing. Once ready, the machine will display the CURRENT MESSAGE screen.

Stop Key

This initiates the shutdown sequence which purges the nozzle of ink and automatically carries out procedures to clean the nozzle. This prevents a potentially serious blockage of the nozzle caused by dried ink.

Simply press the [stop] key and the printer will initiate the shutdown sequence, which takes approximately three minutes. While the machine is shutting down, the following status message will be displayed in the status line of the display:

EJ07

CURRENT MESSAGE	1
TEST PRINT	↑ ↓
F1：Stop Print	F2：Check Status
F3：Printing	F4：Change Setup
VOD 00000 PRESSURE 007 PHASE 13	
Waiting For SHUTDOWN⋯	2006-03-24 14:01:38
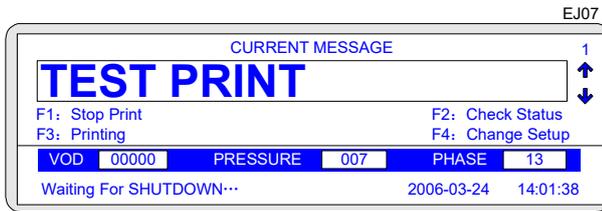
Wait for the system to carry out its shutdown functions, which among other things, includes clearing the nozzle of the printhead.

When the printer has finished the shutdown sequence, the following message will appear in the status line of the display:
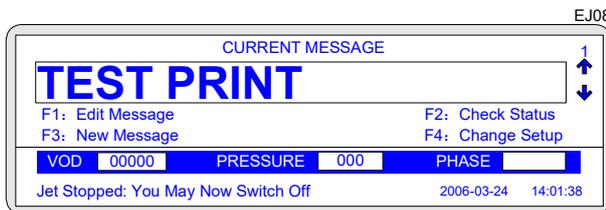
EJ08

CURRENT MESSAGE	1
TEST PRINT	↑ ↓
F1：Edit Message	F2：Check Status
F3：New Message	F4：Change Setup
VOD 00000 PRESSURE 000 PHASE	
Jet Stopped: You May Now Switch Off	2006-03-24 14:01:38

The machine may now be switched off by the power switch at the rear of the printer.

EJ09
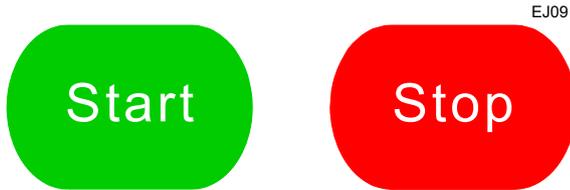
Start key
This starts the jet and adjusts the system to ensure the printer is ready to print

Stop key
This initiates the shutdown cycles which clean the system and prepare the printer for the next start

CAUTION: Never switch off until the printer tells you to do so when it displays: "Jet Stopped: You may now switch off", in the status line of the display. Whenever the Start or Stop keys are pressed, the CURRENT MESSAGE screen is displayed.

Cursor Control Keys

The up/down arrow keys are used to select messages and move up and down through the options of a menu. The left/right arrow keys are used to scroll through the multiple choices/values of a menu option.

The cursor keys are also used to move the edit cursor when creating or editing patterns to be printed.

EJ10
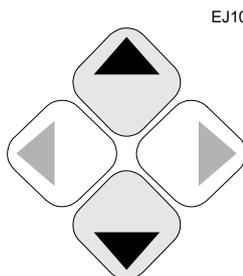
Left/Right arrow keys

Use left/right arrow keys to Select from the range of values or choices for the Current option, and press the [enter] key to activate the choice.

EJ11
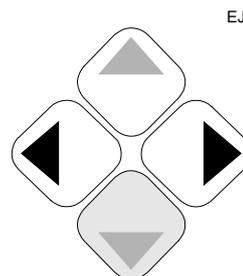
Up/Down arrow keys

Use up/down arrow keys to locate option and press [enter] key to select the option. The > symbol will move to the right with the current value shown in inverse video.

Function Keys

These are used to select options and other menus. They are labelled F1, F2 , F3 and F4 and they occupy the area to the left of the keyboard.

The options each key selects are shown on the menu displays.

Text Control Keys

The [caps] key is used to lock the keyboard into upper case and also to make use of European characters.

The [del] key deletes the character at the current cursor position without moving the cursor. If insert mode is on, the character previous to the cursor is deleted and the cursor (and all characters to the right) are moved left.

The [shift] key is held down to type upper case (Capital) characters and those characters shown on the top right of some keys.

General Control Keys

The [esc] key always returns you to the previously selected menu.

The [enter] key is your way of telling the printer that you have finished making your selection and you want the printer to act upon it.

The [ctrl] (or Control) key is used to extend the use of standard keys. For example, by making it possible to use European characters, and small cursor movements while editing.

General Control Keys

The [esc] key always returns you to the previously selected menu.

The [enter] key is your way of telling the printer that you have finished making your selection and you want the printer to act upon it.

The [ctrl] (or Control) key is used to extend the use of standard keys.

Character Keys

These are arranged in the familiar QWERTY layout, the most common computer keyboard layout.

Four sections can be used as follows:

Usual Mode: to sent to the printer the bottom left of the character

Holding the [shift] key down while pressing a key will sent to the printer the top left of its character.

Holding the [ctrl] key down while pressing a key will sent to the printer the bottom right of its character.

Holding the [shift] key and the [ctrl] key down together will sent to the printer the top right of its character.

Caps Knock Mode: this mode can be used by pressing [caps] key while in Usual Mode, to sent to the printer the top ringt of the character.

Holding the [shift] key down while pressing a key will sent to the printer the bottom left of its character.

Holding the [ctrl] key down while pressing a key will sent to the printer the top right of its character.

Holding the [shift] key and the [ctrl] key down together will sent to the printer the bottom right of its character.

Ctrl Knock Mode: this mode can be used by pressing [ctrl] key and [caps] key together while in Usual Mode, to sent to the printer the bottom left of the character.

Holding the [shift] key down while pressing a key will sent to the printer the top right of its character.

Holding the [ctrl] key down while pressing a key will sent to the printer bottom left of its character.

Holding the [shift] key and the [ctrl] key down together will sent to the printer the top left of its character.

Ctrl Caps Knock Mode: this mode can be used by pressing [ctrl] key and [caps] key while in Caps Knock Mode, or pressing [caps] key while in Ctrl Knock Mode, to sent to the printer top right of its character.

Holding the [shift] key while pressing a key will sent to the printer the bottom right of its character.

Holding the [ctrl] key down while pressing a key will sent to the printer the top left of its character.

Holding the [shift] key and the [ctrl] key down together will sent to the printer the bottom left of its character.

Advanced Editing Features

To make editing easier and give further control over the appearance of messages, there are a number of extra features available from the keyboard.

Moving to Start and End of Message

To move the cursor to the start of the message, hold the [shift] key down and press the left arrow key. To move the cursor to the end of the message, hold the [shift] key down and press the right arrow key.

Moving to Pixel (Drop) Locations

Each character of a message is made up of a number of drops. Each drop is called

a pixel. The cursor can be moved up or down and left or right one pixel at a time, by using the [ctrl] key in conjunction with the cursor control (arrow) keys.

This is useful when the spacing between characters needs to be adjusted to improve readability and/or appearance. Also, this makes it possible to adjust the position along a vertical axis, perhaps to centralize a 7 high field against a 16 high field.

The following table summarises the advanced editing features, and shows the key depressions which enable you to use them:

EJ14

Press an arrow key for its special function:

Hold down:	◀	▶	▲	▼
shift	Moves cursor to Beginning of message	Moves cursor to end of message	Moves cursor to top of message	Moves cursor to Bottom of message
ctrl	Moves cursor One pixel to the left	Moves cursor One pixel to the right	Moves cursor One pixel towards top of field	Moves cursor One pixel towards bottom of field

Getting Started

This section of the manual is intended to help you understand the setting-up of the printer and tells you how to switch it on, program a simple message, start the printer jet, print the message and stop the printer.

Apart from familiarising you with the machine and some of the most frequently used software, it will enable you to verify that all is well and the printer and accessories have reached you in good condition.

Installation

The printer should always be installed by a fully trained, EC-JET approved, service engineer. Guarding and safety interlocks should all be in place and working correctly. EC-JET can accept no liability for damage to either machine or personnel in the event of the printer being installed, moved or maintained by unauthorized and/or untrained personnel.

If the printer is relocated or changes to the production line are made, information on how to install and set up the printer can be found in "Appendix 1: Installation and Setting Up".

Power Connection

The EC-JET range of printers are designed to operate on a single-phase 50/60 Hz AC supply of 90 to 240 V. This means that any AC voltage within this range will power the printer satisfactorily.

Before connecting to the power supply, make sure the ON/OFF switch is in the OFF position. The wires in this electrical supply lead are coloured in accordance with the following code:

EJ16

GREEN-YELLOW	EARTH (E)
BLUE	NEUTRAL (N)
BROWN	LIVE (L)
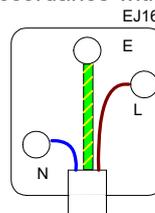
WARNING: THIS PRINTER MUST BE EARTHED. THIS PRINTER MUST ONLY BE WIRED BY A QUALIFIED ELECTRICIAN. EC-JET CAN ACCEPT NO RESPONSIBILITY FOR ANY DAMAGE CAUSED TO EITHER MACHINE OR PERSONNEL DUE TO INCORRECT OR FAULTY WIRING

Starting (switching on) the Printer

Plug the printer into a suitable supply and switch the printer power switch at the rear right of the machine to on.

The following screen is displayed when power is switched on:

EJ17

There will be a delay of a few seconds while the computer logic carries out internal checks. When these checks are complete, the following display will be seen:

EJ18
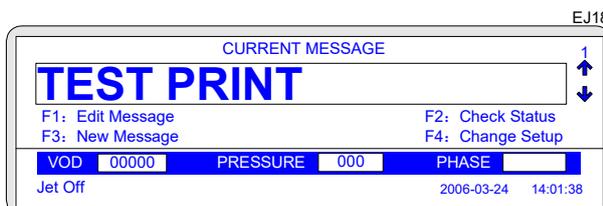
The printer is now switched on and awaiting further commands. Explanation of screen contents are detailed in "Controls and Indicators".

Checking the Current Status of the Printer

The EC-JET printer provides two on-screen visual guides as to its current status (condition) - the System Status Line and the PRINT STATUS screen.

System Status Line

System Failures

System failures occur when a condition is detected that prevents normal printer operation.

If a System Failure message is displayed, contact your local distributor immediately. Note any information from the display as this will help diagnosis of the problem.

Print Failures

Print Failures occur when a condition is detected that affects printing.

If a Print Failure occurs, a message is displayed on the System Status Line and, if the jet is running, a jet shutdown sequence is started.

System Warnings

System Warnings inform the user of problems which may affect the operation of the printer but are not serious enough to shutdown the printer. However, they should be acted upon at the earliest possible opportunity.

Information Messages

There are two basic types of information messages; these are user prompts and current task information. User prompts give helpful information on how to perform the selected function. Current task messages inform you of the process which the printer is currently performing.

Print Status Screen

The PRINT STATUS screen shows the current state of the printer with respect to jet status, ink and solvent levels and print count, and lists errors logged in the system.

The PRINT STATUS screen is accessed by pressing the F2 key from the CURRENT MESSAGE screen. (See"Using the System" - "Checking the PrinterStatus")

Creating a Simple Message

Select the New Message option by pressing [F3]. If there are no messages stored in the printer memory, selecting F3 : New Message from the CURRENT MESSAGE screen will display the MESSAGE HEIGHT menu:
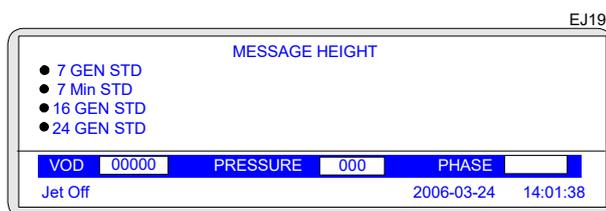
EJ19

```
                          MESSAGE HEIGHT
  ● 7 GEN STD
  ● 7 Min STD
  ● 16 GEN STD
  ● 24 GEN STD

  VOD   00000      PRESSURE    000        PHASE
  Jet Off                            2006-03-24    14:01:38
```

Select the raster type you require by moving the cursor next to it and pressing [enter].

The EDIT MESSAGE screen will then be displayed:

EJ20

```
                          EDIT MESSAGE


  F1：7 HIGH Caps                        F2：Bold Off
  F3：Field Type                         F4：Key-Name
  VOD   00000      PRESSURE    000        PHASE
  Jet Off                            2006-03-24    14:01:38
```
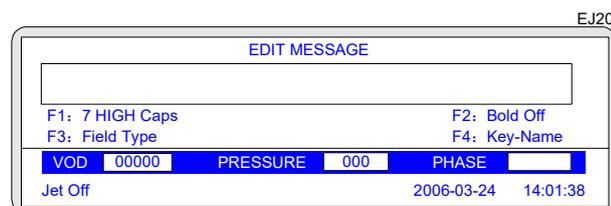
Type in your message, which will appear in the message area of the display as you type it, and press the [enter] key when you have finished. You can use the Field Type function to include a time, date or sequential count, by pressing the [F3] key. This option is fully described later. See "Using the System".

The character set can be altered by pressing [F1]. Each time the [F1] key is pressed, a different character is selected.

In the following example, the simple message "TEST PRINT" has been typed:

EJ21

```
                    EDIT MESSAGE

  TEST PRINT

  F1：7 HIGH Caps                  F2：Bold Off
  F3：Field Type                   F4：Key-Name

  VOD   00000    PRESSURE   000    PHASE

  Jet Off                          2006-03-24   14:01:38
```
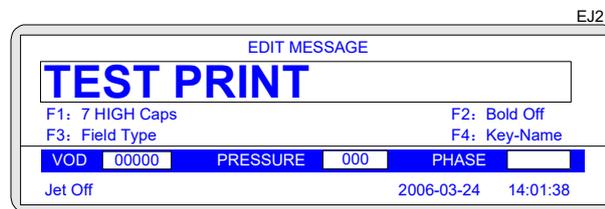
Press the [esc] key to exit the EDIT MESSAGE screen and the CURRENT MESSAGE screen will be displayed:

EJ22

```
                  CURRENT MESSAGE              1

  TEST PRINT

  F1：Edit Message                 F2：Check Status
  F3：New Message                  F4：Change Setup

  VOD   00000    PRESSURE   000    PHASE

  Jet Off                          2006-03-24   14:01:38
```
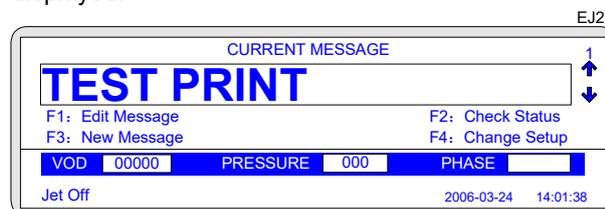
Now press the [start] key on the keyboard. The following message will be displayed in the status line:

"Starting Jet : Please Wait"

When the system is ready to print, the message will disappear and the function key assignments will change as shown below:

EJ23

```
                  CURRENT MESSAGE              1

  TEST PRINT

  F1：Stop Print                   F2：Check Status
  F3：Printing                     F4：Change Setup

  VOD   00000    PRESSURE   000    PHASE

  Waiting for STARTUP...           2006-03-24   14:01:38
```
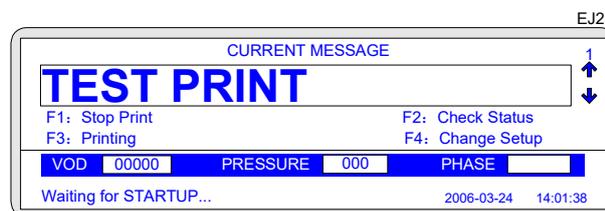
The [F1] key is now primed to "Stop Print", ready to stop the print if you need to.

NOTE: Printing will stop but the jet itself will remain running. The Stop Print function of the [F1] key is NOT to be confused with the panel mounted [stop] key which initiates shutdown of the printer.

Printing

Check that everything is secure (i.e. the printhead is clamped in place at the correct distance from the printing surface) and start the conveyor. Printing should take place immediately, and if everything is set up correctly, print quality should be good.

If print quality is poor, recheck all your settings and refer to the "Troubleshooting" section of this manual.

If the cause of the problem still cannot be identified, call your local EC-JET distributor.

Stopping (switching off) the Printer

CAUTION: NEVER STOP the printer by the mains power switch while in the Printing or Jet Running modes; printhead problems could be caused, and thorough cleaning of the system would be necessary.

Simply press the [stop] key and the printer will initiate the shutdown sequence, which takes approximately three minutes. While the machine is shutting down, the following status message will be displayed in the status line of the display:

EJ24

```
                    CURRENT MESSAGE                    1    ↑
                                                            ↓
TEST PRINT
 F1：Stop Print                        F2：Check Status
 F3：Printing                          F4：Change Setup

 VOD    00000        PRESSURE    000        PHASE

 Waiting for SHUTDOWN...                    2006-03-24    14:01:38
```

Wait for the system to carry out its shutdown functions, which includes clearing the nozzle of the printhead. When the printer has finished its shutdown sequence, the following message will appear

in the status line of the display:

EJ25

```
                    CURRENT MESSAGE                    1    ↑
                                                            ↓
TEST PRINT
 F1：Edit Message                      F2：Check Status
 F3：New Message                       F4：Change Setup

 VOD    00000        PRESSURE    000        PHASE

 Jet Stopped: You May Now Switch Off        2006-03-24    14:01:38
```

The machine may now be switched off by the power switch at the rear of the printer.

Using the System

The system is driven by menus which provide options to be selected or changed to suit the requirements of the user.

This illustration shows an overview of all the menus and their hierarchical relationship.

EJ26

START UP SCREEN

CURRENT MESSAGE

Change message (F1)

EDIT MESSAGE

MESSAGE HEIGHT

(if no message in memory)

(F1) Character Size

(F2) Bold On/Off

(F3) Field Type
(New field)

SELECT FIELD TYPE

TIME

TIMED MESSAGE

SEQUENTIAL NUMBER

DATE FORMAT

DATE

LOGO

REMOTE

New Message (F3)

(F4)
(For Chinese Character)

KEY NAME

UNIQUE CODE

PINYIN

Status Setup (F2)

PRINT STATUS

(F1)

ERROR LIST

Change Setup (F4)

SETUP

* PASSWORD
* PRINT HEIGHT
* SCALE HEIGHT
* PRINT WIDTH
* PRINT DELAY
* PRINT COUNT
* REVERSE MESSAGE
* BOLD RATIO
* SET TIME
* SET DATE
* AUX IN
* PHOTOCELL
* SHAFT ENCODER
* CONDUIT LENGTH
* HEAD HEIGHT
* PRINT HEAD CODE
* INK SELECTION
* CALIBRATE PRINT HEAD
* ALARM SET UP
* CHANGE PASSWORD
* CHANGE LANGUAGE
* REMOTE SETUP MENUE
* DIAGNOSTIC MENU
* SOLV ADD TIME

Moving around the Menus

The CURRENT MESSAGE screen is the first to be displayed after the start up procedure has been completed, and at this stage it is necessary to press one of the function keys (F1 through F4) to select the appropriate menu.

Selecting Menus

Menus are selected either by pressing a function key (as described above) or, in some cases, a further menu may be selected in response to a menu option being selected. For example, you will see later that by selecting the Change Language option of the SETUP menu, a menu entitled CHANGE LANGUAGE will be selected. This is to prompt you to choose which language you wish the system to use.

Menu Options

Each option of a menu is preceded by either a black or white "bullet". A black bullet indicates the option can be selected, a white bullet indicates the option is for display only and cannot be altered.

For example, some options can be selected during message creation but not message editing. Similarly, the Set Time option in the SETUP menu cannot be used when the printer is printing.

Locating menu options

Menu options are located by scrolling up or down using the up/down arrow control keys. See "Controls and Indicators". The menu cursor is a "greater than" symbol (>), which moves up and down the options (replacing the option bullet with itself) to show which option it is pointing to.

Selecting and changing options

When the menu cursor is pointing to the required option, the option is selected by pressing the [enter] key. If the option is a direct command (e.g. Print Height from the SETUP menu), the command will be executed.

Normally however, menu options show a value on the right of the display, separated by a colon. When the [enter] key is pressed on such a menu option, the menu cursor will move right to replace the colon, and the value will be highlighted. At this point, the new value can be typed in from the keyboard and the [enter] key pressed to enter the new value.

The system will validate the change and reject it if it is out of range or the wrong type of data (numeric data in an alphabetic field, and vice versa).

In some instances, a set range of options is offered for selection, e.g. Photocell "Off", "Enabled", "Remote" or "Triggered". In these cases, the left and right arrow keys are used to select the desired option and then the [enter] key is pressed as described above.

Going back

The [esc] key enables you to ¡°escape¡± from the current option (leaving its current value intact), in which case the menu cursor is moved left to occupy the bullet position of the menu option once again.

Similarly, if the menu cursor is only pointing to a menu option, the [esc] key will "escape" from the current menu, returning to the previously selected menu.

Selecting and Editing Messages

The Current Message Screen

After switching the printer on, the title screen will be displayed, followed shortly afterwards by the CURRENT MESSAGE screen:

Options and Display

The options and display data are as follows:

F1 : Change Message   this will display the EDIT MESSAGE screen.

F2 : Check Status   this will display the PRINT STATUS screen.

F3 : New Message   this will display the MESSAGE HEIGHT menu.

F4 : Change Setup   this will display the SETUP menu.

To the right of the message window are two arrows. Using the up and down arrow keys, the user may scroll through the message list. As the arrow key is pressed, the next message will be displayed in the message window, and the CURRENT MESSAGE number will change as appropriate.

Editing a Message

To edit a message, scroll until the message for editing appears on the screen and select F1: Change Message. The EDIT MESSAGE screen will be displayed and the message can be edited as described in the remainder of this section.

EJ28

```
                    EDIT MESSAGE

   TEST PRINT

   F1：7 HIGH Caps              F2：Bold Off
   F3：Field Type               F4：Key-Name

   VOD   00000    PRESSURE   000    PHASE

   Jet Off                    2006-03-24   14:01:38
```
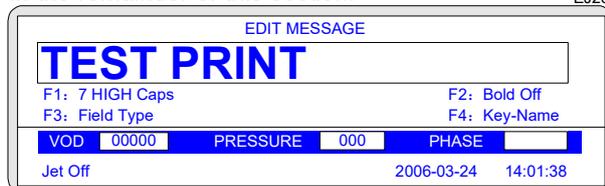
F1: Size   Press F1 until the required character set is displayed

F2: Bold On/Off   Toggle Bold on or off

F3: Field Type   Time

                              Timed Message

                              Sequential Number

                              Date

                              Remote

                              Logo

F4:Chinese Character Input Mode   Press F4 will change to Chinese Chareacter Input Mode as Key Name, QuWei(Unique Code, (PinYing, Phonet), when pressing F1 to chose Chinese Character

Creating a New Message

The sequence in which a new message is created depends on the number of messages currently stored in the printer memory.

If there are no messages stored, select F3 : New Message. The MESSAGE HEIGHT menu will be displayed.

If there are one to four messages stored, scroll to the next available message number and select F3 : New Message. The MESSAGE HEIGHT menu will be displayed.

If there are five messages stored (i.e. memory store full), you have to delete an existing message before you can create a new one. Scroll to the message number that you want to replace and select F3 : New Message. Before the previous message is deleted, the printer will request confirmation by displaying the following on the status line:

"Press F3 to confirm deletion"

If no key is pressed within 10 seconds and the user attempts to delete the message, the warning will be redisplayed. Pressing [F3] will confirm the deletion and the MESSAGE HEIGHT menu will be displayed:

EJ29

```
                    MESSAGE HEIGHT

   > 7 GEN STD
   ● 7 Min STD
   ● 16 GEN STD


   VOD   00000    PRESSURE   000    PHASE

   Jet Off                    2006-03-24   14:01:38
```

User Manual
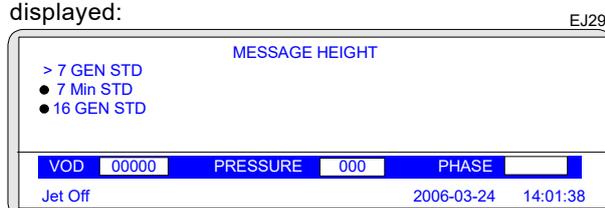
The number of Message Height rasters available depends on the type of printhead in use. Select the raster type you require by moving the cursor next to it and pressing [enter].

The EDIT MESSAGE screen will then be displayed and the message can be created as described in "Getting Started" and the remainder of this section.

Message Description

Message Structure

A message is made up of one or several fields of the following types:

Time

Timed Messages

Sequential Numbers

Date

Remote Fields

Logo

Messages are created and edited using the EDIT MESSAGE menu. Creating text is simply a case of entering characters via the keyboard. Sequential numbers, times and dates are created by making choices from menus displayed after pressing [F3] for Field Type.

The Message Cursor

The message cursor is completely different to the menu cursor described earlier. Its position in a message is made visible by flashing the character it occupies, between normal and inverse display:

Cursor Position

EJ30

EDIT MESSAGE

TEST PRINT

| F1：7 HIGH Caps | F2：Bold Off |
| F3：Field Type | F4：Key-Name |

| VOD | 00000 | PRESSURE | 000 | PHASE | |

Jet Off   2006-03-24   14:01:38
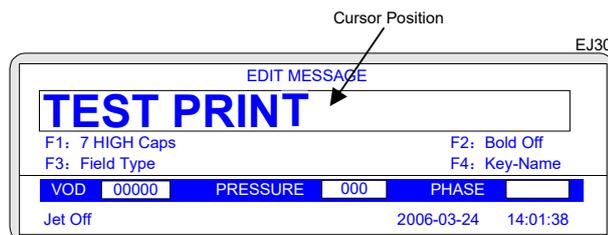
The cursor size will relate to the last selected field. This means that its size will remain fixed, even as it moves through fields of different character heights. As soon as a field is selected (by pressing the [enter] key), the cursor will readjust to the character size of the selected field.

Character Height

Before creating a field, the character height of the field must first be set by choosing the character type from those available. This is achieved by pressing the [F1] key of the EDIT MESSAGE menu until the desired character set is displayed:

EJ31

EDIT MESSAGE

TEST

| F1：7 HIGH Caps | F2：Bold Off |
| F3：Field Type | F4：Key-Name |

| VOD | 00000 | PRESSURE | 000 | PHASE | |

Jet Off   2006-03-24   14:01:38
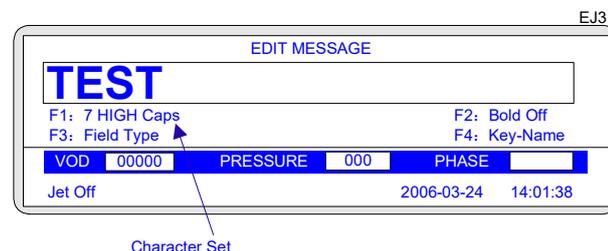
Character Set

The character sets available in Chinese as follows: 7 Chines, 12 Chinese, 16 Chinese. The character sets availables in English, number and symbol as follwos: 5 HighCaps, 7 HighFull, 16 HighFull, 16 HighCaps, LogoEdit.

NOTE: The numerical value in each raster type and character set indicates the height of the printed characters in pixels (drops).

The following table describes the character sets available for each raster type:

EJ32

Raster Type	CHARACTER SETS												
	5 HighCaps	7 Gen Std	7 HighCaps	7 Chinese	9 HighCaps	12 HighCaps	12 Chinese	16 HighCaps	16 Chinese	16 HighFull	24 HighCaps	24 Chinese	Logo Edit
7 Gen Std	✓	✓	✓	✓									✓
7 Min Std	✓	✓	✓	✓									✓
12 Gen Std	✓	✓	✓	✓	✓	✓	✓						✓
16 Gen Std	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
24 Gen Std	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
32 Gen Std	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
34 Gen Std	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTE: If [F3] is pressed to create a new message, the message area is cleared, thus destroying the current message, and the message area of the EDIT MESSAGE screen would be empty.

As a precaution, [F3] must be pressed a second time to confirm the message deletion.

Message Fields

Date Fields

These are created by pressing key [F3] from the Field Type menu of the EDIT MESSAGE screen. The format can be defined and an offset in terms of days can be applied so that sell or use by dates can automatically be calculated by the printer.

Time Fields

These are also created using a menu selected from the Field Type menu of the EDIT MESSAGE screen. Similarly, the time format can be selected from a range of choices to suit requirements.

Timed Message Fields

These are also created using a menu selected from the Field Type menu of the EDIT MESSAGE screen. Up to 10 timed messages can be stored in the system, each comprising up to 20 characters.

Each message is assigned a time from which it is to be printed. It will continue to be printed until another timed message becomes due. This will then print until another timed message becomes due, and so on.

Sequential Numbers

These are also created by pressing key [F3] using a menu selected from the FIELD TYPE menu of the EDIT MESSAGE screen, the legth of the numbers Maximum 20.

The count(s) will increment each time a product is detected.

Logo Fields

Only available if logos are included in the software.

It enables logos to be placed into the message area.

Passwords

A password system is used to control access to various printer functions.

Entering the Password

The PASSWORD menu will be active if the password function has been turned On in the SETUP menu (see "Changing the System Setup").

The PASSWORD menu actually appears after the CURRENT MESSAGE screen, as a result of pressing the [F4] key (Change Setup), [F1] key (Change Message) and [F3] key (New Message):

EJ33

```
                    CURRENT MESSAGE                    1

 TEST PRINT

 F1：Edit Message              F2：Check Status
 F3：New Message              F4：Change Setup

 VOD  00000      PRESSURE   000      PHASE

 Jet Off                              2006-03-24   14:01:38
```
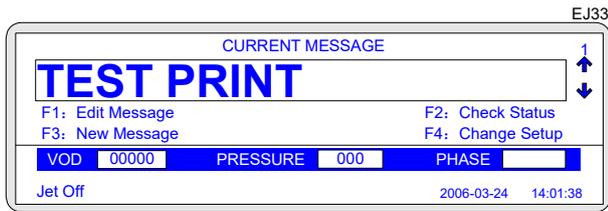
The PASSWORD menu is used as described below:

EJ34

```
                       PASSWORD
   >  Password
   ●  Print Height
   ●  Scale Height
   ●  Print Width

 VOD  00000      PRESSURE   000      PHASE

 Jet Off                              2006-03-24   14:01:38
```
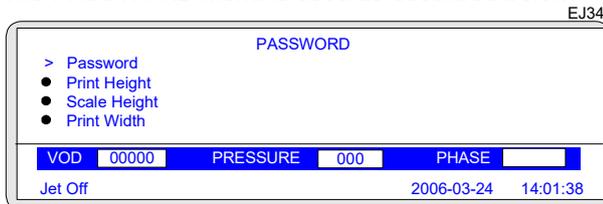
Type in the password and press the [enter] key.

To get you started, the passwords in your machine have been set to "EC-JET1" for User Level 1 access, and "EC-JET2" for User Level 2 access.

It is recommended that you continue to use these passwords, but you may wish to use the Change Password option of the SETUP menu to alter the passwords (see "Changing the System Setup").

Password Levels

Base Level

This is the default level when the password isn't known. The user can only perform simple operations such as start, stop and check status.

User Level 1

The user has restricted access to the SETUP menu. Allowed to change Level 1 password only.

User Level 2

The user has full access to the SETUP menu. Restricted access to the DIAGNOSTICS menu is allowed. Full access to all user menus and functions is allowed. Allowed to change User Level 1 and User Level 2 passwords.

Creating, Editing and Deleting Message Fields

An example message comprising all types of field, is used here to show how to create and modify message fields:

EJ35

```
                     EDIT MESSAGE                     1

 TEST  sell by dd mmmm yy    *********
        BATCH 9999          hh:mm Night Shift        ➡

 F1：7 HIGH Caps              F2：Bold Off
 F3：Field Type              F4：Key-Name
 VOD  00000      PRESSURE   000      PHASE

 Jet Off                              2006-03-24   14:01:38
```

or

EJ36

```
                     EDIT MESSAGE

 TEST PRINT  Phduction:2006.08.14
              BATCH:9999          24:30 Nightshift     ➡

 F1：7 HIGH Caps              F2：Bold Off
 F3：Field Type              F4：Key-Name
 VOD  00000      PRESSURE   000      PHASE

 Jet Off                              2006-03-24   14:01:38
```
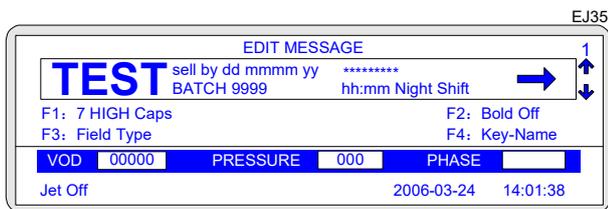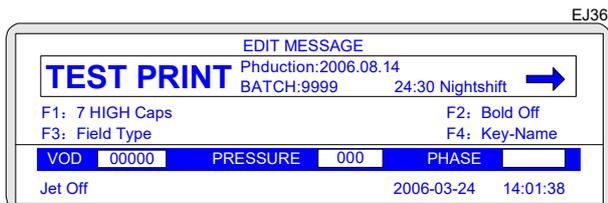
The message used has a complete mix of all field types:

Time

Timed Message

Sequential Number

Date

Logo

Remote

In the following pages, you will be shown how to create this message and therefore how to use the message editing menus.

Deleting Text Characters

You may use the [del] key to delete the character immediately whilst typing the text a Text Field.

Editing Fields

A field may be edited by pressing the [enter] key while the cursor is anywhere in the field.

Text Fields

The left/right arrow keys can be used to move the cursor to a character in the field, change and delete it.

Other Fields

When the [enter] key is pressed with the cursor anywhere in a Date, Time, Timed Message or Sequential Number field, the appropriate menu will be displayed. For example, if the [enter] key is pressed while the cursor is located in a Sequential Number field, the SEQUENTIAL NUMBER menu will be displayed:

EJ37

```
                         SEQUENTIAL NUMBER
  ●  Reset Number
  ●  Hexadecimal
  ●  Common Number
  >  Start Number

  VOD   00000      PRESSURE     000       PHASE

  Jet Off                          2006-03-24    14:01:38
```
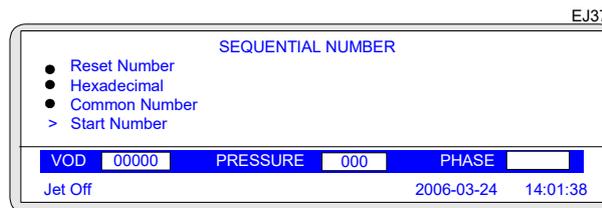
The field can thus be altered in the same way it was originally created (see later "Creating: "Date", "Time", "Timed Message", "Sequential Number"Fields").

Deleting Fields

All fields (whether Date, Time, Timed Message, Sequential Number, Logo or Remote) are deleted in the same way.

Quite simply, move the cursor to any character within the field to be deleted, hold the [ctrl] key down and press the [del] key; the field will vanish from the display. The left/right arrow keys may then be used to position the cursor where needed.

Creating Date Fields

These are useful for sell by dates, use by dates, or any date related to statistical information.

Before creating the date field, we will satisfy the example being used here, by creating a text field reading: "Sell by" in the top of our display. With the cursor located in the next available space, press the [F1] key to changethe character set being used to "7 High Full":

EJ38

```
                          EDIT MESSAGE
  TEST

  F1：7 HIGH Caps                       F2：Bold Off
  F3：Field Type                        F4：Key-Name

  VOD   00000      PRESSURE     000       PHASE

  Jet Off                          2006-03-24    14:01:38
```
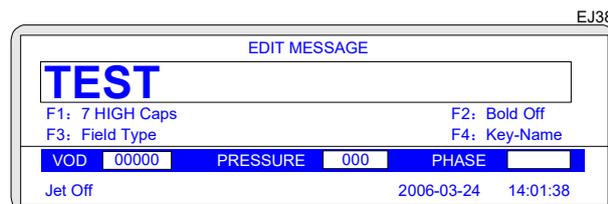
Notice the new size of the cursor. The cursor is located in a position not already occupied by a field, so type in the words "Sell by":

User Manual

EJ39

```
                          EDIT MESSAGE                    1
    TEST  Sell by                                         ⬆
                                                          ⬇
    F1：7 HIGH Caps                      F2：Bold Off
    F3：Field Type                       F4：Key-Name

    VOD   00000    PRESSURE    000       PHASE

    Jet Off                              2006-03-24   14:01:38
```

The cursor is located at the end of the text so press the space bar to create some space between the text and the date field we are about to create.

Now press [F3] from the EDIT MESSAGE screen and this will display the SELECT FIELD TYPE menu:

EJ40

```
                       SELECT FIELD TYPE
      >  Time
      ●  Timed Message
      ●  Sequential No.
      ●  Date

      VOD   00000    PRESSURE    000      PHASE

      Jet Off                             2006-03-24   14:01:38
```

Press the down arrow key until the menu cursor is pointing to the Date option of the menu, as shown above, and press the [enter] key to display the Date FORMAT menu:

EJ41

```
                         DATE FORMAT
      >  dd mmm yy
      ●  dd.mm.yy
      ●  dd.mmm.yyyy
      ●  mmm.dd.yy

      VOD   00000    PRESSURE    000      PHASE

      Jet Off                             2006-03-24   14:01:38
```

The DATE FORMAT menu gives the option to select from the following range of predefined formats:

dd mmm yy	e.g. 23 JUN 00
dd.mm.yy	e.g. 23.06.00
dd mmm yyyy	e.g. 23 JUN 2000
mm dd yy	e.g. JUN 23 00
mmm dd yyyy	e.g. JUN 23 2000
mm/dd/yy	e.g. 06/23/00
yy.mm.dd	e.g. 00.06.23
d	Day of week (0 through 6 - Sun to Sat)
d (1-7)	Day of week (1 through 7 - Mon to Sun)
dd	Day of month (1 through 31)
jjj	Julian date (1 through 366)
ww	Week number (1 through 52)
m m	Month Number (1 through 12)
m m m	Month (e.g. JAN, FEB, etc.)
y	Last digit of year (0 through 9)
yy	Last two digits of year (00 through 99)
yyy	Full year (2000)
ddd	Full day(000)

The most commonly used date formats are available complete, as shown above (e.g. mm/dd/yy). The individual date segments shown separately (e.g. dd) are provided to allow you to create non-standard

formats of your own.

For the purpose of this example we will choose the format "dd mmm yy" which will read (for example) "11 NOV 00", when the message is actually printed on that day.

This is done by moving the cursor to the required format using the up/down arrow keys until the menu cursor is pointing to it. The format is then selected by pressing the [enter] key.

The following menu will then be displayed:

EJ42

```
                        DATE
    >   Offset:
    ●   Format


    VOD    00000     PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

Offset   Number of days to be added to current date to create printed date. Range 0 through 7,300 days

Format   Format (see above) in which date will be printed

The format shown in the DATE menu cannot be changed; it is shown for information only. If you do wish to alter it, press the [esc] key to return to the DATE FORMAT menu, and start again.

The date offset may be changed by pressing the [enter] key to move the menu cursor to the value, typing in the new value and pressing the [enter] key to activate the change.

If the date offset and format shown is correct (as on the menu above), press the [enter] key until the EDIT MESSAGE screen is displayed, which will show the new date field added:

EJ43

```
                   EDIT MESSAGE            1
    TEST  Sell by dd mmm yy
    F1：7 HIGH Caps           F2：Bold Off
    F3：Field Type            F4：Key-Name
    VOD    00000     PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

Notice that the actual date is not shown at this stage because we are still editing. When editing is finished, the "dd mmm yy" will be replaced with the relevant information from the current date.

NOTE: If you do move the menu cursor in the DATE menu, pressing the [enter] key will not be enough to accept the date. You will need to move the cursor back to the Offset option, press the [enter] key to select theoption, then press the [enter] key again.

Creating Sequential Number Fields

These are useful for batch numbers, item counts, etc.

Before creating the sequential number field, we will satisfy the example being used here, by creating a text field which reads "BATCH", underneath the "Sell By" date of our display.

EJ43

```
                   EDIT MESSAGE            1
    TEST  Sell by dd mmm yy
    F1：7 HIGH Caps           F2：Bold Off
    F3：Field Type            F4：Key-Name
    VOD    00000     PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

There is no need to change the Character Set but we do need to move the cursor so it is underneath the "Sell By" date. To do this, use the down arrow key to move the cursor to the bottom of the message area, and then the left arrow key to move the cursor to where we want our batch number to begin:

EJ44

The cursor is now located in a position not already occupied by a field, so type in the word"BATCH":

EJ45

Now use the right arrow key to move the cursor one space to the right, ready to accommodate the sequential number field. Note that, as mentioned earlier, moving the cursor in this way automatically defines our "BATCH"text as a text field.

Press [F3] (Field Type) from the EDIT MESSAGE screen and this will display the SELECT FIELD TYPE menu:

EJ46

Use the menu cursor to locate the Sequential No. option and press the [enter] key. The SEQUENTIAL NUMBER menu will be displayed:

EJ47

Reset Number	Used to reset the Current Number to the Start Number and set the Repeat Count to zero.
Current Number	Displays the current number
Start Number	Up to 10 alphanumeric characters
End Number	Up to 10 alphanumeric characters
Interval	Value by which to increment or decrement. For example if this was set to 5 with a Start Number of 00, the counting sequence would be 0, 5, 10, 15, and so on. Range 1 through 127
No. of Repeats	Number of times the sequential number will be printed before it is incremented by the Interval value set above.
Range	1 through 65535
Repeat Count	Number of times the sequential number has been printed for its current value. Maximum value No. of Repeats minus 1.
Repeated Count	0

Decremental Count

To count down from a number, simply set the End Number to a value less than the Start Number.

For our example, use the arrow key to locate the End Number, press the [enter] key to select it and type in the value 0000 and press the [enter] key. In response to this, the system will default to a Start Number of 9999 and a Current Number of 9999:

EJ48

```
                    SEQUENTIAL NUMBER
    >   Reset Number
    ●   Hexadecimal
    ●   Common Number
    ●   Start Number

    VOD    00000      PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

When satisfied that the sequential number has been setup correctly, press the [esc] key to return to the EDIT MESSAGE screen:

EJ49

```
                    EDIT MESSAGE                    1
    TEST  Sell by dd mmm yy
          BATCH： 9999
    F1： 7 HIGH Caps                  F2： Bold Off
    F3： Field Type                   F4： Key-Name

    VOD    00000      PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

Notice the value is set to the start number of 9999.

Creating Time Fields

For our example, hold the [shift] key down and press the right arrow key to take the cursor to the end of the field (see "Advanced Editing Features"). Use the right arrow key to move the cursor a few characters to the right. There is no need to change the character set, so just press the [F3] function key to display the SELECT FIELD TYPE menu:

EJ50

```
                    SELECT FIELD TYPE
    >   Time
    ●   Timed Message
    ●   Sequential No.
    ●   Date

    VOD    00000      PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

Locate the Time option and press the [enter] key to display the TIME menu:

EJ51

```
                         TIME
    >   hh.mm
    ●   hh.mmpm
    ●   hhmm
    ●   hhmmPm

    VOD    00000      PRESSURE    000      PHASE
    Jet Off                        2006-03-24    14:01:38
```

Choose from the range of formats:

hh:mm	24 hour clock hours and minutes
hh:mmpm	12 hour clock hours and minutes
hhmm	24 hour clock hours and minutes
hhmmpm	12 hour clock hours and minutes
hh (24h)	24 hour clock hours
hh (12h)	12 hour clock hours
mm	minutes
ss	seconds

Use the up/down arrow keys to locate the desired format, in our case hh:mm, and press the [enter] key to select that format and return to the EDIT MESSAGE screen:

EJ52

```
                EDIT MESSAGE                    1
  TEST  Sell by dd mmm yy
        BATCH 9999        hh:mm
  F1：7 HIGH Caps                  F2：Bold Off
  F3：Field Type                   F4：Key-Name
  VOD   00000    PRESSURE   000    PHASE
  Jet Off                     2006-03-24   14:01:38
```
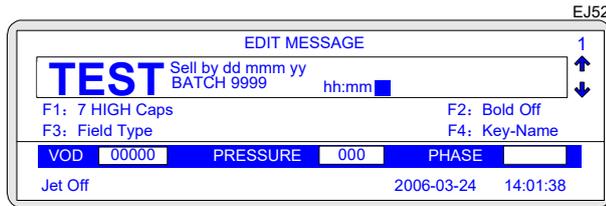
The current time will replace the hh:mm when editing is complete.

Creating Timed Message Fields

Up to 10 timed messages are allowed per Timed Message field, each associated with a unique time at which the timed message will appear in the current printer message. In this example, we will set a timed message to occur at 12 midnight

(zero hours) to read: "Night Shift".

Press the [F3] key from the EDIT MESSAGE screen to display the SELECT FIELD TYPE menu:
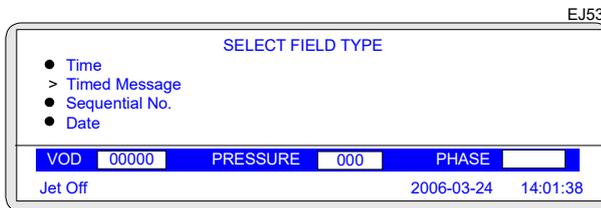
EJ53

```
                SELECT FIELD TYPE
      ●  Time
      >  Timed Message
      ●  Sequential No.
      ●  Date
  VOD   00000    PRESSURE   000    PHASE
  Jet Off                     2006-03-24   14:01:38
```

Locate the Timed Message option and press the [enter] key to display the TIMED MESSAGE menu:

EJ54

```
                TIME MESSAGE
      >  Next Message
      ●  Timed
      ●  Message

  VOD   00000    PRESSURE   000    PHASE
  Jet Off                     2006-03-24   14:01:38
```
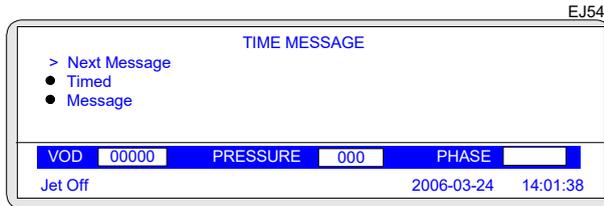
Next Message	Scroll through existing timed messages (if this field is being edited), or create an additional timed message if the field is being created for the first time.
Time	Time at which to begin printing timed message.
Message	Text to be printed from the time set above. Maximum 20 characters

If several timed messages were created - for example one to start at 10:15, one at 12 noon and another at 15:00 hours - the first would begin from 10:15 through to 12 noon, the second would print from 12 noon to 15:00 and the third would print from 15:00 to 10:15, and so on.

To create the timed message, use the menu cursor to locate and change the options as shown in the TIMED MESSAGE menu above. Use a space or separator (/ . : ; , etc.) between the hours and minutes. Press the [esc] key to return to the EDIT MESSAGE screen:

EJ55

```
                EDIT MESSAGE                    1
  TEST  Sell by dd mmm yy
        BATCH 9999        hh:mm  Night Shift
  F1：7 HIGH Caps                  F2：Bold Off
  F3：Field Type                   F4：Key-Name
  VOD   00000    PRESSURE   000    PHASE
  Jet Off                     2006-03-24   14:01:38
```

The message has been inserted where we left the message cursor.

Minimum of Two Timed Messages

One timed message is not enough. Based on this example so far, the system will wait until midnight before printing the message, which is exactly what we have asked for. However, it will not stop printing

until another timed message occurs. Since the only message defined so far occurs at midnight, the system will print until one minute before midnight, whereupon it will start printing again at midnight. In other words, once it starts printing, it will never stop.

In practice, therefore, it is necessary to have at least two timed messages in a field.

Although we can edit the Timed Message field by pressing the [enter] key to display the TIMED MESSAGE menu, the menu will only allow alteration of existing Timed Messages which were created when the field was generated.

Since we cannot add another Timed Message, we will have to delete the field we have just created, and start again.

To do this, make sure the cursor is somewhere in the timed message field we have just created, hold the [ctrl] key down and press the [del] key; the field will vanish from the display:

Now to create the timed message as we did before, to occur at 12 midnight (zero hours) to read: "Night Shift".

EJ56

	EDIT MESSAGE		1 ↑↓
TEST	Sell by dd mmm yy BATCH 9999	hh:mm	
F1: 7 HIGH Caps		F2: Bold Off	
F3: Field Type		F4: Key-Name	
VOD	00000	PRESSURE 000	PHASE
Jet Off		2006-03-24	14:01:38

Press the [F3] key from the EDIT MESSAGE screen to display the SELECT FIELD TYPE menu:

EJ57

SELECT FIELD TYPE
● Time
> Timed Message
● Sequential No.
● Date

| VOD | 00000 | PRESSURE 000 | PHASE |
| Jet Off | | 2006-03-24 | 14:01:38 |

Locate the Timed Message option and press the [enter] key to display the TIMED MESSAGE menu.

Create the timed message, using the menu cursor to locate and change the options as before:

EJ58

TIME MESSAGE
> Next Message
● Timed   :00:00
● Message   :Night Shift

| VOD | 00000 | PRESSURE 000 | PHASE |
| Jet Off | | 2006-03-24 | 14:01:38 |

Now to create another timed message to start at 6 a.m. and read "Day Shift".

Use the up arrow key to locate the Next Message option and press the [enter] key. This will clear the Time and Message options ready to input the next Timed Message - although our "Night Shift" message has disappeared from view, it has been stored in the system.

Now create the "Day Shift" timed message by using the menu cursor to locate andchange the options:

EJ59

TIME MESSAGE
> Next Message
● Timed   :00:00
● Message   :Day Shift

| VOD | 00000 | PRESSURE 000 | PHASE |
| Jet Off | | 2006-03-24 | 14:01:38 |

Now press the [esc] key to return to the EDIT MESSAGE screen:

EJ60

```
                    EDIT MESSAGE              1
   TEST  Sell by dd mmm yy
         BATCH 9999
                    hh:mm  Day Shift
   F1： 7 HIGH Caps              F2： Bold Off
   F3： Field Type              F4： Key-Name

   VOD   00000     PRESSURE   000      PHASE

   Jet Off                  2006-03-24   14:01:38
```

Notice that the last created timed message is displayed in the message area. This will be replaced with the appropriate message at the time of printing.

The "Day Shift" text will print from 6 a.m. to 0:00 (midnight) and the "Night Shift" text will print from 0:00 (midnight) until 6 a.m.

Creating Remote Fields

This only applies if your software has been enabled to use the facility. A remote field reserves an area in the message for data to be entered from a remote computer. Several remote fields can be created, in which case the data received from the remote computer will be used to fill the first remote field, then the second, and so on.

Position the cursor in an unoccupied part of the message area where the Remote field is to appear and choose the Remote option from the SELECT FIELD TYPE menu to display the REMOTE menu:

EJ62

```
                SELECT FIELD TYPE
   ●  Sequential No.
   ●  Date
   ●  Remote
   >  LOGO

   VOD   00000     P
   Jet Off
```

```
                      REMOTE
   >  Number of Characters


   VOD   00000     PRESSURE   000      PHASE
   Jet Off                  2006-03-24   14:01:38
```

Press the [enter] key to select the option, and type in the number of characters to be downloaded into the field from the remote computer.

Press the [enter] key and the EDIT MESSAGE screen will be displayed:

EJ55

```
                    EDIT MESSAGE              1
   TEST  Sell by dd mmm yy
         BATCH 9999
                    hh:mm  Night Shift
   F1： 7 HIGH Caps              F2： Bold Off
   F3： Field Type              F4： Key-Name
   VOD   00000     PRESSURE   000      PHASE

   Jet Off                  2006-03-24   14:01:38
```

Note that the remote field we have created is denoted by a row of asterisks (*) sequivalent to the number of characters we specified in the REMOTE menu.

Creating Logo Fields

This only applies if your software has been configured with logos.

Position the cursor in an unoccupied part of the message area where the logo is to appear and choose the Logo option from the SELECT FIELD TYPE menu; this will open the LOGO menu:

EJ62

```
            SELECT FIELD TYPE
  ●  Sequential No.
  ●  Date
  ●  Remote
  >  LOGO                                    LOGO
                          >  LOGO
  VOD    00000              LOGO 2
  Jet Off                   LOGO 3
                            LOGO 4

                          VOD    00000    PRESSURE    000      PHASE

                          Jet Off                      2006-03-24   14:01:38
```
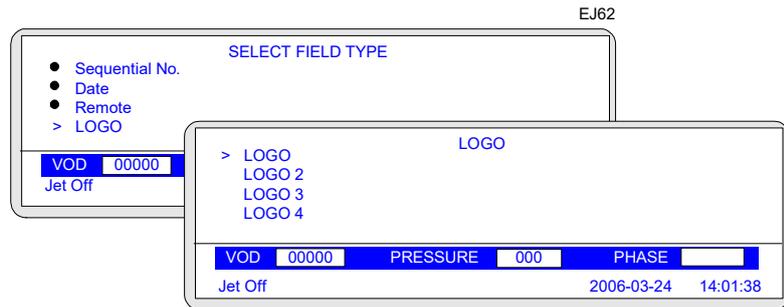
Use the up/down arrow keys to locate the Logo you wish to use and press the [enter] key to activate the choice. The Logo (in this case an arrow symbol) will be inserted in the message at the current cursor position:

EJ63

```
                EDIT MESSAGE                1
   TEST    Sell by dd mmm yy                ↑
           BATCH 9999      hh:mm  Day Shift  ↓
   F1：7 HIGH Caps                 F2：Bold Off
   F3：Field Type                  F4：Key-Name
   VOD    00000    PRESSURE    000      PHASE

   Jet Off                      2006-03-24   14:01:38
```
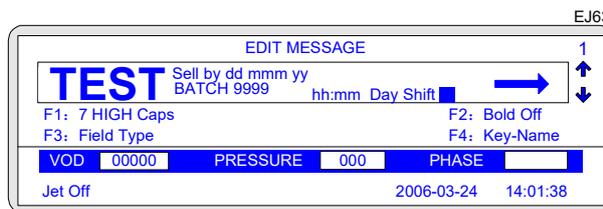
Printing the Message

To print the message created in this example, press the [esc] key to exit editing and display the CURRENT MESSAGE screen. Press the [start] button on the keyboard, start the conveyor, and the message should start printing as defined. After having worked this example, try several variations to get the feel of creating your own messages.

Checking the Printer Status

The PRINT STATUS screen shows the current state of the printer with respect to jet status, ink and solvent levels, print count and lists errors logged in the system.

To check the current printer status, press the [F2] key from the CURRENT MESSAGE screen.

EJ64

```
                PRINT STATUS
   F1: Error List   Count      :
                    Status     :
                    Solvent    :
                    Ink        :
   VOD    00000    PRESSURE    000      PHASE

   Jet Off                      2006-03-24   14:01:38
```
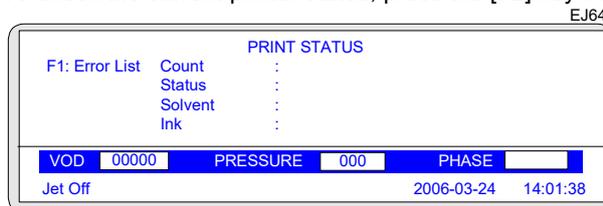
F1   Displays ERROR LIST menu (see below)

Count   Shows the number of prints made by the printer.

          This value can be reset to 0 (zero) from the SETUP menu (see later "Changing the System Setup")

Status   Shows the operational status of the printer:

          "Jet Off" - The jet has been stopped.

          "Starting Jet" - The printer is starting the jet.

          "Jet Running" - The jet is running but printing is stopped.

          "Printing" - The jet is running and the printer is ready to print.

          "Stopping Jet" - The printer is stopping the jet.

Ink   Shows status of ink level check:

          OK - Ink level is acceptable

          LOW - Add one bottle of ink

          (see "Routine Maintenance")

Solvent   Shows status of solvent level check:

OK - Solvent level is acceptable

LOW - Add one bottle of solvent

(see "Routine Maintenance")

The ink and solvent levels should show OK. If not, they must be refilled with the correct ink or solvent.

CAUTION: Only ONE bottle of APPROVED Ink or Solvent should be added when the level is reported LOW. If the level is still reported LOW after adding one bottle of ink or solvent, it could be that the level sensors are faulty. In this case you should contact your local EC-JET Distributor.

Listing Error Messages

The printer maintains a current error list. This list will display any errors which have occurred since the printer was switched on and is a record of the errors reported on the status line of the display.

The ERROR LIST menu can be viewed by pressing [F2] from the CURRENT MESSAGE screen to display the PRINT STATUS screen, then press [F1] to display the ERROR LIST menu.

EJ65

EDIT MESSAGE

TEST

F1：7 HIGH Caps   F2：Bold Off
F3：Field Type   F4：Key-Name

VOD 00000   PRESSURE 000   PHASE
Jet Off

PRINT STATUS

F1: Error List   Count   :
                  Status   :
                  Solvent   :
                  Ink   :

VOD 00000   PRESSURE 000   PHASE
Jet Off

WARNING MESSAGES LIST

>   3.04 Solvent Low

VOD 00000   PRESSURE 000   PHASE
Jet Off   2006-03-24   14:01:38
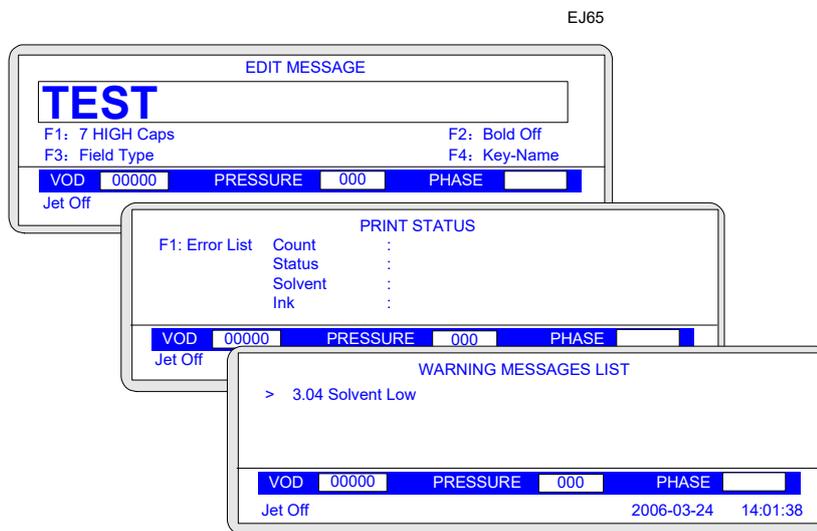
The errors in the ERROR LIST menu will be deleted automatically when the power is switched off, after shutdown or when the error is cleared. (For a detailed list of the different error messages and their meanings, see "Error Messages").

Changing the System Setup

Many system functions can be altered to suit individual requirements; this is achieved by using the SETUP menu:

EJ66
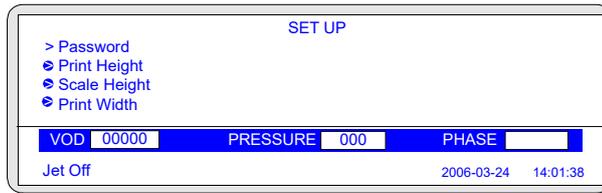
```
                              SET UP
         > Password
         ⇗ Print Height
         ⇗ Scale Height
         ⇗ Print Width

        ┌─────────────────────────────────────────────────┐
        │ VOD │ 00000 │    PRESSURE │ 000 │    PHASE │    │ │
        └─────────────────────────────────────────────────┘
        Jet Off                        2006-03-24    14:01:38
```

- Print Delay
- Print Count
- Reverse Message
- Bold Ratio
- Set Time
- Set Date
- Aux In
- Photocell
- Shaft Encoder
- Conduit Length
- Head Height
- Print Head Code
- Ref Modulation
- Ink Selection
- Calibrate Print Head
- Alarm Setup
- Alarm Warning
- Change Password
- Change Language
- Remote Setup Menu
- Diagnostic Menu
- Solv Add Time

The options available will depend on the current status of the printer. The following table shows which options are available and when.

EJ67

Setup Menu Options	USER LEVEL 1 PASSWORD			USER LEVEL 2 PASSWORD		
	Jet Off	Jet Running	Printing	Jet Off	Jet Running	Printing
Password	●	●	●	●	●	●
Print Height	●	●	●	●	●	●
Scale Height	●	●	●	●	●	●
Print Width	●	●	●	●	●	●
Print Delay	●	●	●	●	●	●
Print Count	●	●	●	●	●	●
Reverse Message	●	●	○	●	●	○
Bold Ratio	●	●	○	●	●	○
Set Time	●	●	○	●	●	○
Set Date	●	●	○	●	●	○
Aux In	○	○	○	●	●	○
Photocell	●	●	○	●	●	○
Shaft Encoder	●	●	○	●	●	○
Conduit Length	—	—	—	●	○	○
Head Height	—	—	—	●	○	○
Print head Code	—	—	—	●	○	○
Ref Modulation	—	—	—	●	●	●
Ink Selection	—	—	—	●	○	○
Calibrate Print Head	—	—	—	○	●	●
Alarm Set Up	—	—	—	—	—	—
Alarm Warning	—	—	—	●	●	○
Change Password	—	—	—	●	●	●
Change Language	—	—	—	●	●	●
Remote Setup Menu	—	—	—	●	●	●
Diagnostic Menu	—	—	—	●	●	●
Solv Add Time	—	—	—	○	○	○

Password

On: Enable password

Off: Disable password

Can be turned to Off so the user can enter and exit menus at will without having to use the password. If the password option is turned to Off at User Level 1, then only User Level 1 options will be displayed until a higher level password has been entered. This value is retained on switching off the printer.

Print Height

Allows the user to select a suitable print height for optimum print quality.

This range can be tuned to individual requirements, by adjusting the print height over a range of -30% to +30%.

Scale Height

This enables a greater print height range and can be used to eliminate deflector plate/gutter clipping at maximum and minimum drop deflection.

Print Width

Minimum width (i.e. the fastest the printer can print) is 0. The width of printed characters may be increased by increasing the stored value. When used in conjunction with Shaft Encoder "On" the width is equivalent to shaft encoder pulses between rasters.

Print Delay

This is the delay between prints (Photocell Off/Enable) or the delay between the photocell triggering and print appearing on the product (Photocell Triggered).

NOTES:

1.   Too small a delay may result in a "3.02 Over Speed (Print Go)" warning.

2.   Minimum width and delay settings are interactive to allow sufficient time between printing for Phasing and VOD to occur. On entering a value less than the minimum against the Print Delay option, the following message will be displayed:

<div align="center">"Value not set: too small"</div>

Increase the Print Delay value in increments of 1 until you enter a value that is accepted; this is the minimum delay.

Print Count

This display shows the number of products printed so far. To reset or change this value, type in the required number.

Reverse Message

The print must be stopped to change this option.

Off: the message will be printed as on the display.

On: the message will be printed right to left.

Bold Ratio

A bold ratio of 1 is equivalent to standard print, e.g. one vertical line of drops per vertical in a 7 HI raster or two vertical lines of drops per vertical in a 16 HI raster. Simply enter the ratio required.

NOTE: If large, dense print is required, a bold ratio of 9 and a print height of +30% may produce the required density.

To change this option on an existing pattern printing must be stopped, the ratio changed and the pattern edited.

Set Time

Printing must be stopped to change this option. Simply enter, in a 24 hour format, the time required.

Set Date

Printing must be stopped to change this option. Simply enter the date required in Day, Month, Year order.

Photocell

Printing must be stopped to change this option. Select the required setting by using the left or right arrow keys.

This can be set to any of the following values:

Triggered   One trigger equals one print.

Enabled   The printer will print continuously as long as the photocell remains triggered.

Remote   The printer will print upon receipt of a signal from the remote computer, via the RS¨C232 link.

Off   Printer ignores the photocell signal and will print continuously at a rate dictated by the Print Width and Print Delay settings.

Shaft Encoder

The print must be stopped to change this option. Select "On" if a shaft encoder is to be used, or "Off" if it is not.

(See "Appendix 1: Installation and Setting Up" for shaft encoder setup).

Conduit Length

The jet must be stopped to set up this option. Select the appropriate conduit length for the printhead fitted by using the left or right arrow keys.

Head Height

The jet must be stopped to set up this option. Pressure varies by 5 units for every metre above and below the printer. You may change the value between -0.5 and +0.5 metres, however, printheads are currently a maximum of 4 metres in length, so the maximum value here should be 4.0. Simply specify, in terms of half or whole meters, how far above or below the printer the printhead is mounted. For practical purposes, the measurement should be made from the space bar of the keyboard to the printhead nozzle assembly. If the printhead is mounted below the printer, the value should be input in the following format - X.Xm. If the printhead is mounted above the printer it is not necessary to place a + in front of the value. The value may be entered simply as - X.Xm.

NOTE: Care must be exercised with this option; poor printer performance will result if incorrectly set.

   This will automatically change the pressure reference from which the Solvent Add value is calculated and shown on the MONITOR JET menu.

Print Head Code

This can only be entered if the jet is stopped. It will also need re-entering if a PCB or software is replaced.

To be used when a new printhead has been fitted to the printer and/or when a reset to default has occurred. The 14 digits are encoded as follows:

EJ68
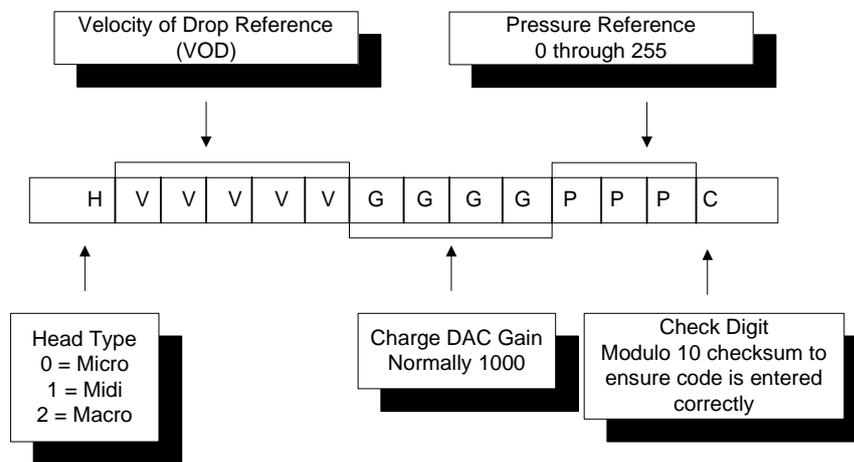
Ref. Modulation

Displays the current Reference Modulation. A new reference value may be added with a User Level 2 password.

Ink Selection

A choice between MEK, Ethanol or Pigmented.

Alarm

The jet must be stopped to change this option. When a printer warning or failure occurs, the system activates an internal alarm tone (beeper) and an LED on the front panel. In a warning condition the alarm tone is pulsed twice, whereas in a failure condition the alarm tone sounds continuously.

This option allows different combinations of events to be selected to trigger the alarm relay. Selecting the Alarm option will display the following menu:

```
                                              EJ69
                    ALARM
  >  Off                  :
  ●  Fail Only            :
  ●  Fail or Warn         :
  ●  Print Disabled       :

  VOD    00000    PRESSURE   000      PHASE
  Jet Off                     2006-03-24   14:01:38
```
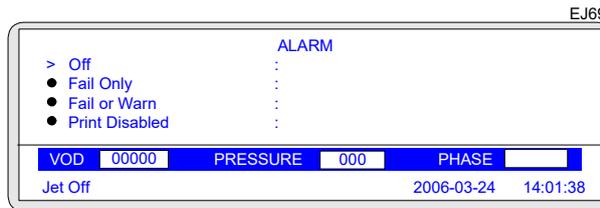
The options in the above menu are shown with their default settings. Any combination of the event options may be configured by setting them to on (Yes) or off (No).

Mode

Pulsed: The external alarm operates as normal, i.e. if a System Warning occurs, the alarm will pulse on and off twice simultaneously with the beeper. If a System Failure or Print Failure occurs, the alarm will still sound continuously.

Continuous: The external alarm will sound continuously while a System Warning is present.

Failure

The external alarm will sound continuously only when a Print Failure occurs.

Warning

The external alarm will pulse on and off twice each time a System Warning occurs, or continuously while a System Warning is present, depending on the Mode setting.

Print Disabled

The alarm will remain On while the printer cannot print, that is, while the jet is not running or for any reason that it cannot print, e.g. when the printhead cover has been removed. As soon as the printer is ready to print or is printing, the alarm will switch off.

Ink and Solvent

The external alarm will sound only when the "3.03 Ink Low" or "3.04 Solvent Low" System Warnings are present. The alarm will be either pulsed or continuous depending on the Mode setting.

NOTE: Selecting the options Warning and Ink and Solvent has the same effect as selecting just Warning.

Change Password

Selecting this option and pressing the [enter] key, the PASSWORD menue will be displayed, first ask you to enter the original password:

```
                                              EJ70
                    PASSWORD
  ●  Enter Password:


  VOD    00000    PRESSURE   000      PHASE
  Jet Off                     2006-03-24   14:01:38
```
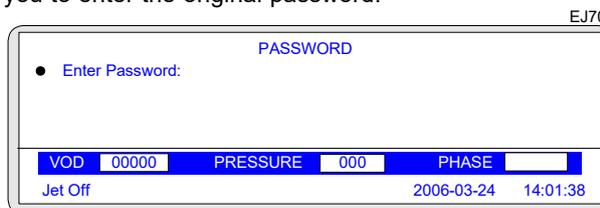
If the User Level 1 password is typed into this screen, the CHANGE PASSWORD menu is displayed with the option to change only the User Level 1 password:

```
                                              EJ71
                    PASSWORD
  ●  Level 1:


  VOD    00000    PRESSURE   000      PHASE
  Jet Off                     2006-03-24   14:01:38
```
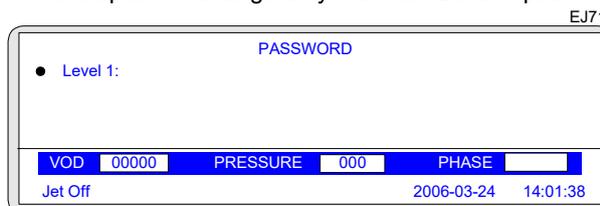
Press the [enter] key to select the option, type in the new password and press the [enter] key. Finally, press the [esc] key to exit the CHANGE PASSWORD menu. If a User Level 2 password had been typed

into the PASSWORD screen, the CHANGE PASSWORD menu would have provided the option of changing both levels of password:

```
                                                              EJ72
  ┌─────────────────────────────────────────────────────────┐
  │                   CHANGE PASSWORD                        │
  │   >  ECJET1      :                                       │
  │   ●  ECJET2      :                                       │
  │   ●  ECJET3      :                                       │
  │                                                          │
  │   VOD   00000    PRESSURE    000      PHASE              │
  │   Jet Off                         2006-03-24   14:01:38  │
  └─────────────────────────────────────────────────────────┘
```
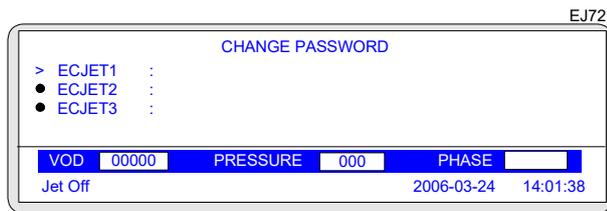
Change Language

Printing must be stopped to change this option. It allows the user to define which language the screens and menus are displayed in.

Diagnostic Menu

Allows the user to access certain parameters to confirm correct printer operation.

Entry to the DIAGNOSTICS menu is made by using the up/down arrow keys to locate the Diagnostic Menu option from the SETUP menu:

```
                                                              EJ80
  ┌─────────────────────────────────────────────────────────┐
  │                       SET UP                             │
  │   ● Change Password                                      │
  │   ● Change Language                                      │
  │   ● Remote Setup Menu                                    │
  │   > Diagnostic Menu                                      │
  │   VOD   00000    PRESSURE    000      PHASE              │
  │   Jet Off                         2006-03-24   14:01:38  │
  └─────────────────────────────────────────────────────────┘
```
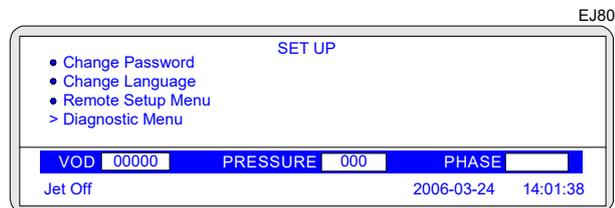
Alternatively, a short cut may be used by pressing the [D] key on the keyboard.

```
                                                              EJ81
  ┌─────────────────────────────────────────────────────────┐
  │                    DIAGNOSTICS                           │
  │   ● Start Jet                                            │
  │   ● Stop Jet                                             │
  │   > Quick Start Jet                                      │
  │   ● Start Print                                          │
  │   VOD   00000    PRESSURE    000      PHASE              │
  │   Jet off                         2006-03-24   14:01:38  │
  └─────────────────────────────────────────────────────────┘
```
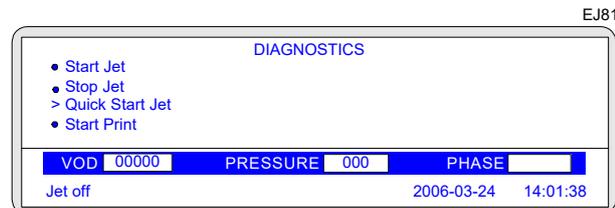
The menu option selected will be the one which was selected the last time the DIAGNOSTICS menu was used.

The options available from the DIAGNOSTICS menu are described in another chapter of this manual

Solvent Add Time

This shows the total time that the printer has added solvent since the printer has been switched on.

Diagnostics

There are a large number of diagnostic functions. However, not all functions are valid at all times - some are only valid when the jet is stopped (e.g. "Clear Nozzle"); some are valid only when the jet is running and printing is stopped (e.g. "Start Print"), and some are only valid when both the jet and printing have been started (e.g. "Test Print").

To keep the size of the diagnostics menu small, and to prohibit the use of functions which are invalid for the current state of the printer, only valid functions are displayed and are selectable at any given time.

This is in addition to menu variations due to the password level.

EJ82

Diagnostic Option	USER LEVEL 2 PASSWORD		
	Jet Off	Jet Running	Printing
Start Jet	●	—	—
Stop Test	—	●	—
Quick Start Jet	●	—	—
Start Print	—	●	—
Stop Print	—	—	●
Test Print	—	—	●
Clear Nozzle	●	—	—
Nozzle Flush	○	○	○
Flush Shutdown	●	●	●
Monitor Jet	●	●	●
System Times	●	●	●
System Config	●	●	—
Set Pressure	○	○	○
Filter Purge	●	—	—
Clear Message Area	○	○	○
Change Msg Online	○	○	○
Auto Phase	○	○	○
VOD Correction	○	○	○
VOD Warm Up	○	○	○
Dac Cal Mode	○	○	○
Dac Cal Valve	○	○	○
Alarm Test	○	○	○
Test Pattern	○	○	○
System Flush	○	○	○
Valve Test	○	○	○

When an entry is selectable and has a parameter, the user may change the value of the parameter (e. g. "Set Pressure" in service diagnostics). When an entry is not selectable and has a parameter, entry is used to display information only and the user cannot change the value (e.g. "Set Pressure"in user diagnostics).

Start Print

Makes the printer ready to print, i.e. as per the [start] button but without returning to the "CURRENT MESSAGE" screen.

Printing will not be started and the following message will be displayed if there is no message stored in the printer memory:

"Print Not Started : No Message"

Note that this has a lower level function than the main start button which sets, for example, Phase Fault "On" when pressed. Start Print will leave Phase Fault in its current state.

Test Print

Triggers patterns manually from the keyboard.

This is the equivalent of a photocell trigger and starts the print. If a shaft encoder is in use and the line is stopped then the pattern will only be printed when the line restarts.

The command is only valid if the photocell mode has been set to "Triggered" in the SETUP menu and the printhead cover is fitted. The command is ignored if printing is already taking place

One of the following messages will be displayed on the status line:

"Test Print : Print Started"

"Test Print : Invalid Photocell Mode"

"Test Print : Already Printing"

"Test Print : Cover Off"

Stop Print

Stops printing but does not shutdown the jet.

The following message will be displayed while stopping printing:

"Stop Print : Please Wait"

Start Jet

Attempts to start the jet but does not start printing.

The following message will be displayed while starting the jet:

"Starting Jet : Please Wait"

Quick Start Jet

Starts the jet without printing.

Please note this operation does not check any of the following:

- Ink

- Solvent

- Service time

- Phase

- VOD

- Modulation

i.e. it simply switches the jet on at the reference running pressure and reference modulation.

The following message will be displayed while starting the jet:

"Starting Jet : Please Wait"

WARNING: THIS COMMAND WILL START THE JET EVEN IF THE INK LEVEL IS LOW.

THE PUMP MAY BE DAMAGED IF IT IS RUN WITHOUT INK.

Stop Jet

Stops the jet as normal (i.e. as per the [stop] button, but without returning to the CURRENT MESSAGE screen)

The following message will be displayed in the status line of the display while stopping the jet:

"Stopping Jet : Please Wait"

and when the jet has stopped, the following message will be displayed:

"Jet Stopped : You May Now Switch Off"

Clear Nozzle

This option allows you to specify the number of Clear Nozzle sequences you wish to run on the printhead. A minimum of three Clear Nozzle sequences is recommended in an attempt to clear a blockage or obstruction. The routine of three Clear Nozzle sequences should be repeated no more than 10 times.

The following message will appear in the status line of the display while the Clear Nozzle sequence is being performed:

"Clearing Nozzle : Please Wait"

During this cycle, the printhead must be inverted and the correct type of solvent applied to the nozzle. The procedure for clearing the nozzle is described later in this manual. (See "Troubleshooting - Clearing the Printhead Nozzle")

Flush Shut Down

The Flush Shutdown routine introduces solvent into the printhead and nozzle, during jet shutdown, to remove any ink in preparation for a period of non-use. The option has three settings:

Off   This is the disabled setting. When set to Off, the printer will not carry out the flush part of the flush shutdown routine when the jet is stopped.

On   This is the enabled setting. When set to On, the printer will carry out the flush part of the flush shutdown routine when the jet is stopped.

Auto   This is the default setting for normal operation. In this mode, the decision as to whether or not a flush shutdown is performed is dependent on the time since the previous flush shutdown, as follows:

-   for ethanol inks, if the time since the previous flush shutdown is less than 40 minutes (80 minutes for a 4 metre conduit), a non-flush shutdown will be performed.

-   for all other inks, if the time since the previous flush shutdown is less than 15 minutes (30 minutes for a 4 metre conduit), a non-flush shutdown will be performed.

NOTE: For a successful overnight shutdown, the printer should be run for greater than the times specified above.

As with any shutdown routine, it is most important that the printer is allowed to complete the full routine and is not switched off before the following message is displayed:

"Jet Stopped : You May Now Switch Off"

Monitor Jet

Displays the MONITOR JET screen:

```
                                                           EJ83
  ┌──────────────────────────────────────────────────┐
  │                    MONITOR JET                     │
  │  Press        :000          Slov Add     :185      │
  │  VOD          :00000        Ref VOD      :21081     │
  │  MOD          :200          Ref Press    :181       │
  │  Phase        :0            Read Press   :002       │
  │                                                    │
  │  ▌VOD   00000   PRESSURE    000  HASE        ▐     │
  │                                                    │
  │   Jet Off                   2006-03-24   14:01:38  │
  └──────────────────────────────────────────────────┘
```
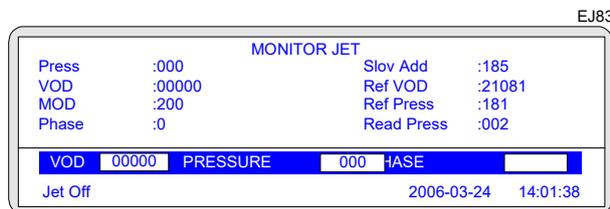
This groups together the ink and solvent control parameters on a single screen.

The parameters are displayed only; they cannot be changed by the user.

This menu can also be called up from the DIAGNOSTICS menu by simply pressing the [M] key regardless of the current position of the menu cursor

The parameters of the MONITOR JET screen are described as follows:

Press

The pressure currently set on the pressure DAC (same as Set Pressure)

VOD

21080 is the most perfect VOD value.

NOTE: The warning "No VOD Readings" will be displayed on the status line when a valid VOD has not been obtained for 15 minutes. The warning will be redisplayed every 15 minutes while no VOD readings are obtained.

MOD

The current modulation voltage.

Phase

The current phase value (same as Phase option described later in this section).

Solv Add

When Press (Set Pressure) exceeds this value, solvent will be automatically added by the printer (same as Solvent Add on the PRESSURE REFS screen).

Ref VOD

The reference VOD as input with the printhead code.

Ref MOD

The reference modulation determined by the last printhead calibration or set by the user (same as Ref Modulation in the SETUP menu).

Read Press

The current read pressure being measured by the pressure transducer. This will normally be the same as Press (Set Pressure), accurate to +14 bits.and -14 bits.

Your local EC-JET distributor may ask you to read-off the values shown against some of the above parameters to help diagnose any problems you may have.

System Times (System Timing Information)

The SYSTEM TIMES menu shows statistical information on the number of hours the power has been on and the jet has been running, the filter life expired and the time due until service.

The menu is called up from the DIAGNOSTICS menu:

EJ84

```
                DIAGNOSTICS
 ●  Flush Shutdown
 ●  Monitor Jet
 >  System Times
 ●  System Config

   VOD    00000
 Jet Off
```

```
                    SYSTEM TIMES
 >  Power On
 ●  Jet Running
 ●  Filter Change
 ●  Service

   VOD    00000     PRESSURE    000      PHASE
 Jet Off                          2006-03-24    14:01:38
```
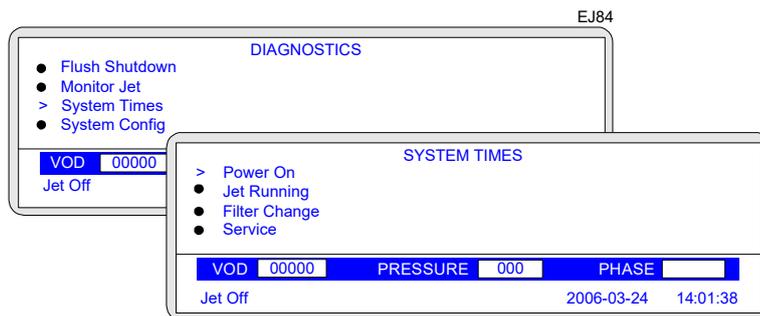
Power On

Number of hours power has been on.

Jet Running

Number of hours the jet has been running.

Filter Change

Recommended hours left until a main ink filter change is required. Starts at 2000 and counts down by the number of hours the jet has been running.

Service

Recommended hours left until service required. Starts at 2000 and counts down by the number of hours the jet has been running.

System Config (System Configuration Information)

It is useful to know at a glance what versions of software or data PROMS are fitted, what raster type is being used and which type of printhead is fitted to the printer.

All this information is shown in the SYSTEM CONFIGURATION menu which is displayed by selecting the System Config option from the DIAGNOSTICS menu:

EJ85

```
                DIAGNOSTICS
 ●  Flush Shutdown
 ●  Monitor Jet
 ●  System Times
 >  System Config

   ┌─────────────────┐
   │ VOD   00000     │
   └─────────────────┘
   Jet Off
```

```
                SYSTEM CONFIG
 >  Head Type
 ●  SW Version
 ●  Logic Version
 ●  Raster Type

 ┌──────────────────────────────────────────┐
 │ VOD  00000    PRESSURE  000    PHASE      │
 └──────────────────────────────────────────┘
 Jet Off                 2006-03-24   14:01:38
```
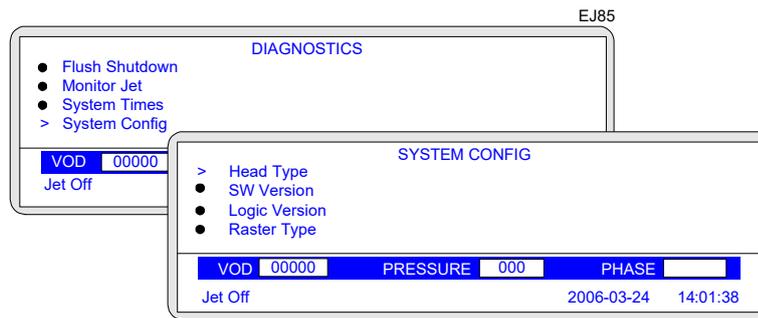
Head Type

Shows the printhead type fitted to the printer: Micro, Midi or Macro.

Raster Type

Rasters are created by an algorithm which compensates for interaction between drops in flight. Several raster types exist, each catering for different operating conditions. This option of the menu displays a separate screen which shows which raster types your printer is using.

SW Version

Shows the version number of the software installed in your printer.

The values shown are for display purposes only; they cannot be altered.

Phase

Shows the current phase position, updated while the jet is running.

Set Pressure

Displays the current pressure set on the pressure DAC.

Your local distributor may ask you to use this option to:

1. Diagnose and/or check for any pressure loss.

2. Purge the filter without resetting the filter time, e.g. if changing ink only.

3. Clean out printhead by use of the venturi vacuum.

4. Use Quick Start Jet to try and obtain VOD measurements and ascertain if ink is thick or thin.

Filter Purge

Used by EC-JET approved Service Engineers when a new main ink filter is fitted:

On   Sets a fixed pressure of 120 bits to purge the new filter and resets the Filter Change time to 2000 hours.

Off   Sets the pressure back to zero.

Routine Maintenance

There are two levels of routine maintenance: User - performed by the operator, and Service - performed by EC-JET Trained Service Engineers.

User maintenance is required daily (each time the printer is used) and weekly.

Service (scheduled) maintenance is required after every 2000 jet running hours.

The following table defines the user maintenance requirements for EC-JET printers:

EJ86

	Inspect	Clean	Replace/Replenish
Printer Cabinet	Daily/each time used	Weekly or as required	Not applicable
Printhead	Daily/each time used	Weekly or as required	Not applicable
Ink & Solvent	At start up and during use	Not applicable	As required
Air Filter	Weekly in normal conditions Daily in very dusty/contaminated conditions	Weekly or as required	As required

Cleaning the Printer Cabinet

General

The exterior of the printer can be cleaned using a soft cloth lightly soaked in a mild detergent.

CAUTION: Do not use abrasive cleaning agents. Do not use excessive pressure when wiping over the LCD screen; excessive pressure can cause damage.

Ink Spillages

If ink is accidentally spilled onto the exterior of the printer the following procedures are recommended:

WARNING: ALWAYS WEAR RUBBER GLOVES AND SAFETY GLASSES WHEN HANDLING SOLVENT. DO NOT USE SOLVENTS IN CONFINED AREAS WITHOUT ADEQUATE VENTILATION.

CAUTION: Use only EC-JET solvent. Ensure that the solvent matches the type used in the printer.

CAUTION: Do not use excessive amounts of solvent. It is not recommended that solvent is used frequently to remove ink from the front panel and LCD screen as this can lead to deterioration of the membrane surface.

Front Panel and LCD   Wipe the front panel clean using a soft cloth lightly soaked in solvent. Do not apply excessive pressure to the LCD screen.

Cleaning the Printhead

Shut down the printer by pressing the [stop] button on the front panel and wait until the status line of the display indicates that the jet has been stopped with the following message:

"Jet Stopped : You May Now Switch Off"

Power to the printer can then be switched off.

WARNING: POTENTIALLY LETHAL VOLTAGES ARE PRESENT WITHIN THE PRINTHEAD. BE SURE ALL POWER IS SWITCHED OFF BEFORE THE PRINTHEAD IS OPENED FOR INSPECTION AND CLEANING.

Cleaning Solvent

CAUTION: It is most important that the cleaning solvent should match the ink used in the printer. Use of the wrong cleaning fluid is likely to result in print failures.

Printhead Cleaning Procedure

While wearing approved, solvent resistant gloves: Remove the printhead cover tube and hold the printhead as shown below. Place a suitable container underneath and wash the entire printed circuit board (PCB) surface with the appropriate solvent. Do not use the wrong solvent; make sure it is the solvent corresponding to the ink type being used in the printer.

Simply squirt the solvent in short bursts onto the affected parts with a short delay between bursts to allow ink to dissolve. The surplus solvent will run down the printhead and can be collected in the container for disposal.

Allow the printhead to dry completely by letting it stand for a few minutes. Do not dry the printhead with a cloth or towel as this may leave fibres that could interfere with the printed drops. Particular care should be taken to ensure that the space between the nozzle and charge electrode is free of solvent. If not, it can usually be removed by inverting the wash bottle and blowing off the excess solvent.

WARNING: MOST INK BASES ARE FLAMMABLE. IT IS THEREFORE IMPORTANT TO DISPOSE OF THE WASTE CLEANING FLUID IN ACCORDANCE WITH LOCAL REGULATIONS.

CAUTION: Do NOT be tempted to immerse the printhead in solvent or an ultrasonic bath. THIS MAY DAMAGE THE PRINTHEAD AND WILL VOID THE WARRANTY.

EJ87

REPLENISHING INK AND SOLVENT

Using the bottles supplied, replenish the system with ink and solvent by emptying the bottles into the appropriate fillers on top of the printer. The solvent filler cap is coloured white, and the ink filler cap (to the right of the solvent filler) is coloured black.

The solvent bottle is emptied into the left hand filler by pushing the bottle down firmly to pierce the foil seal, then turning half a turn either way to cut the foil seal and allow solvent to drain into the system.

Watch the solvent drain into the system. The PRINT STATUS screen should show "Solvent OK". Remove the solvent bottle carefully, ensuring that it is empty, and refit the filler cap.

Now fill the machine with ink in the same way. The ink cannot be seen as it leaves the bottle and drains into the system, it should therefore be left in place for 1-2 minutes to allow sufficient time for the bottle to empty. The PRINT STATUS screen should show "Ink OK". Remove the ink bottle, being very careful not to spill any ink which may be left in the bottle.

NOTE: The printer will not start if ink or solvent are low.

CAUTION: Use only EC-JET ink and solvent. Do not add any more ink or solvent until requested

by the printer overfilling could seriously damage the printer.

Cleaning/Replacing the Air Filter

To clean or replace the air filter, steps should be followed as:

To the machine that its number before SN: C5000:

1. Open the cover.

2.   Pull the air filter from side of cabinet .

3.   Clean the filter or replace it

4.   Refit the cleaned filter in its housing or fit a replacement filter if it is changed.

5.   Close up the cover.

To the machine that its number after SN: C5000

1.   Hold up the front of machin lightly.

2.   and the air filter should be found.

3.   Take out the air filter

4.   Clean the filter or replace a new one.

5.   Refit the cleaned or the new filter in its housing.

Warning and Fault Messages

This section describes the printer warning messages for the EC-JET printers.

The error messages may occur at any time and are NOT a direct response to user commands, although a user response may be required.

Each system warning is given a unique code number which identifies the type and source of the error, and is followed by a short description when displayed on the screen, e.g.:

"3.03 Ink Low"

Summary of Warning Messages

System Failures

These prevent normal printer operation.

Print Failures

These occur when the software detects a problem which affects printing.

2.00	Print Head Temperature
2.01	Deflector Voltage
2.02	Charge
2.03	VOD
2.04	300V Power Supply
2.05	Temperature/Deflector
2.06	Ink Tank Empty
2.16	Internal Spillage Fault

System Warnings

These are errors which are not serious enough to shut down the printer, but give advance warning of potential problems.

3.00	No VOD Adjustments
3.01	Jet Shut Down Incomplete
3.02	Over Speed (Print Go)
3.03	Ink Low
3.04	Solvent Low
3.05	Print Go / Remote Data
3.06	Service Time
3.07	Print Head Cover Off
3.08	Print Head Not Fitted
3.09	New Print Head Fitted
3.10	Charge Calibration Range
3.11	Safety Override Detected
3.12	Low Pressure
3.13	Modulation
3.14	Over Speed (Variable Data)
3.16	Memory Failure
3.18	No Message Stored In Memory

System Failures

System failures occur when the software detects a condition which prevents normal printer operation.

If a system failure is reported by the printer, contact your local distributor immediately.

WARNING: LETHAL VOLTAGE. UNKNOWN HIGH VOLTAGES MAY BE PRESENT WITH SOME SYSTEM FAILURES. DO NOT TAMPER WITH THE PRINTER OR PRINTHEAD. WAIT UNTIL THE FAILURE SHUTDOWN IS COMPLETE.

Print Failures

Print Failures occur when the software detects a problem which affects printing.

When a Print Failure occurs a message is displayed on the screen status line and a jet shutdown sequence is started.

The internal alarm buzzer is switched on, the 'print ready' line set low and the alarm relay is activated (if enabled).

The keyboard is inactive while the shutdown is taking place.

When the shutdown sequence is complete the Print Failure screen is displayed:

```
                                                          EJ90
  ┌─────────────────────────────────────────────────────┐
  │                    PRINT FAILURE                     │
  │  Print Failure 2.00 Print Head Temperature           │
  │                                                      │
  │                                                      │
  │  VOD  00000    PRESSURE   000      PHASE             │
  │  Print failure                  2006-03-24  14:01:38 │
  └─────────────────────────────────────────────────────┘
```
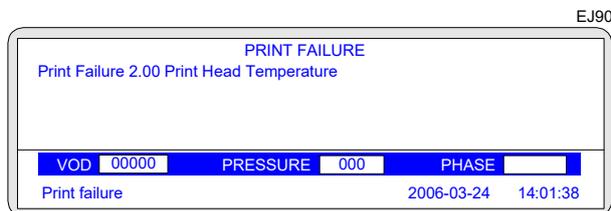
The user should normally select F1 to reset the printer.

Following a print failure shutdown, the software sets:

- pressure to zero

- EHT off

- all valves closed

- 300V off these settings cannot be altered until the print failure has been cleared (i.e. the jet cannot be restarted).

The following pages give a brief description of each Print Failure and what should be done to correct it. In each case, if the suggested action does not rectify the error condition, you should contact your local distributor.

2.00 Printhead Temperature

The printhead temperature sensor indicates that a temperature around or in the printhead has exceeded the safe operating limit. This may mean that a fire has occurred within the head cover.

Possible causes

- Excessive local heat source:

    Relocate the printhead away from the heat source.

- Fire in the printhead:

    Have your printer checked by your local engineer.

2.01 Deflector Voltage

The voltage on the deflector plates has discharged which is normally caused by ink build-up.

Possible causes

- Excess build-up of ink on deflector plates:

    Clean the printhead as described earlier in this manual (see "Routine Maintenance").

- Static discharge:

    Check for any source of excess static electricity.

- Printhead still wet after cleaning:

Allow the printhead to fully dry before starting the jet.

- Debris or fibres creating a discharge path:

Clean the printhead and check for fibres.

2.02 Charge

This failure occurs when the jet is being started, or when it is running.

Possible causes

- Blocked nozzle or misaligned jet:

Carry out the nozzle clear procedure described in the Troubleshooting section of this manua (see "roubleshooting - Clearing the Printhead Nozzle").

- Printhead code or modulation values set incorrectly:

Check the Printhead and Modulation (MOD) values printed on the printhead serial number label found on the conduit, with the stored values. (see "Changing the System Setup").

2.03 Velocity Of Ddrop

This failure may occur when the jet is being started.

Possible causes

- Misaligned jet:

Carry out the nozzle clear procedure described in the Troubleshooting section of this manual. (see "Troubleshooting - Clearing the Printhead Nozzle").

- Printhead code or modulation values set incorrectly:

Check the Printhead and Modulation values printed on the printhead serial number label found on the conduit, with the stored values. (see "Changing the System Setup").

- Build-up of ink on the sensors:

Clean the printhead.

- Blocked filter:

Contact your local EC-JET distributor for assistance.

2.04 300V Power Supply

Possible cause

- The 300 volt power supply output is out of tolerance or has failed:

Call your local EC-JET distributor.

2.05 Temperature/Deflector

A failure has occurred which the printer has not been able to fully identify (see Print Failures "2.00" and "2.01").

2.06 Ink Tank Empty

This failure occurs when the ink level sensor has been indicating low for a predetermined time:

Micro 8 hours

Midi 8 hours

Macro 3 hours

This prevents the ink from running out completely if the user fails to top up the ink reservoir following an "Ink Low" error (see System Warning "3.03"). This failure only occurs when the jet is running since the jet cannot be started when the ink is low.

2.16 Internal Spillage Fault

This may occur either at switch on, or during normal running. A sensor within the ink system detects the unwanted presence of ink or solvent within the cabinet tray.

Possible causes

- The ink or solvent tanks have been overfilled.

- A leak has developed within the ink system.

- A Luer fitting has become loose on the main filter or damper.

To cure the fault, the cause needs to be rectified and the ink tray completely cleaned and dried. Contact your local EC-JET distributor.

System Warnings

System Warnings inform the user of problems which may affect the operation of the printer but are not serious enough to require a shutdown.

When a System Warning occurs, a message is displayed on the screen status line for a minimum time of approximately 3 seconds.

The internal alarm buzzer is sounded twice and the alarm relay activated twice (if enabled) using 1 second pulses.

The error will remain on display after the 3 second interval until the user presses any key, or another error occurs, or a warning message is displayed, e.g.:
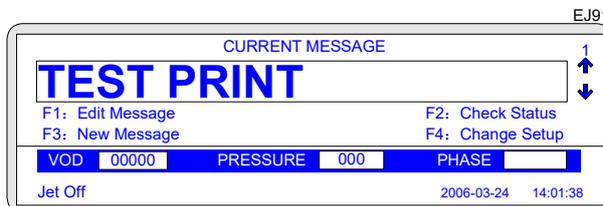
All warnings and faults are logged and may be displayed by selecting F2 : Check Status and then F1 : Error List from the Print Status screen which displays all errors that have occurred:
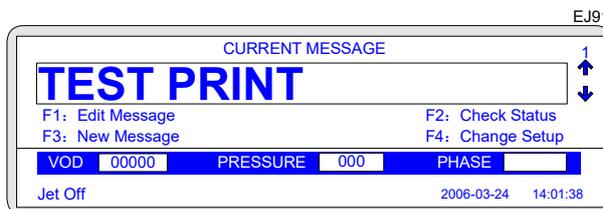
The following pages describe the System Warnings, together with the actions to be taken (if any).

3.00 No VOD Adjustments

This warning can occur when the jet is being started, or when the jet has been running for some time.

Possible causes

- Printhead code values are set incorrectly:

  Check the Printhead and Modulation values printed on the printhead serial number label found on the conduit, with the stored values. (see "hanging the System Setup").

- Ink viscosity is excessively out of range:

  Allow the printer to run to bring the viscosity back into range.

- There is a pressure loss in the system:

  Call your local EC-JET distributor.

3.01 Jet Shut Down Incomplete

This indicates that the printer was previously switched off while the jet was running or before the printer had completed the shutdown routine. Completion of the shutdown routine is important and must be allowed to finish.

The warning does not stop the printer from functioning. It will be reported at every subsequent printer start-up until a jet shutdown routine is fully completed. Press the [stop] key and wait for the message:

"Jet Stopped : You May Now Switch Off "

3.02 Over Speed (Print Go)

This indicates that the printer may have missed printing at least one pattern or is receiving false triggers from the photocell.

When the Photocell Mode is set to Trigger, each print delay is started following the photocell trigger.

At the end of the delay a "print go" is issued to start printing. If the printer has not printed the last pattern by this time, the warning is reported and the new pattern is not printed. In effect, this will mean that alternate objects will NOT be printed on.

This warning may also occur when the Photocell mode is set to Enable or Off. In these modes the print delay specifies the space between patterns. If the delay is set to a small value (less than 55) then this error may occur.

The warning applies to the currently printing pattern - t is reset automatically when printing is restarted.

Possible cause

-   The next object has arrived at the printhead before the last pattern is complete because:

    1. The line speed is too fast.

    2. The pattern is too long compared to the size of the objects to be printed on.

-   The photocell is giving false triggers.

-   The print delay is too small for Photocell Modes "Off" and "Enable".

-   The Photocell or Shaft Encoder modes have been altered and print started in Diagnostics rather than by pressing the [start] key.

3.03 Ink Low

If the ink level sensor indicates that the ink reservoir is low then this warning is given. It is cleared automatically when a sufficient amount of ink is added.

DO NOT put in more than one bottle. If the ink low condition is detected before the jet is started, then the jet cannot be

started until the ink tank is replenished.

If the condition is detected while the jet is running, the jet will continue to run for several hours until the ink is dangerously low, at which point a failure will occur (see Print Failure "2.06").

3.04 Solvent Low

If the solvent level sensor indicates that the solvent reservoir is low then, this warning is given. It is cleared automatically when a sufficient amount of solvent is added to the reservoir.

DO NOT put in more than one bottle. If the solvent low condition is detected before the jet is started, then the jet cannot be started until the solvent tank is replenished.

If the condition is detected while the jet is running, the jet will continue to run regardless, but no attempt will be made to add solvent.

3.05 Print Go / Remote Data

A "print go" has occurred and printing data has not been received from the remote interface.

3.06 Service Time

When the jet is started, the time remaining to the next service is checked. If it is zero or negative then this warning is reported and the jet is started as normal.

The time to the next service can be set directly by the service engineer on the System Times menu in Diagnostics.

This warning will be reported on every jet start up until the service time has been reset.

3.07 Print Head Cover Off

This warning is reported if the printhead cover is removed.

The supply to the EHT plates is switched off (by hardware) when the cover is removed.

WARNING: THERE IS A LINK WHICH, WHEN FITTED, DISABLES THIS AUTOMATIC SHUT OFF. THEREFORE, THE PRESENCE OF THIS WARNING IS NOT A GUARANTEE THAT THE EHT IS OFF.

Printing is suspended when the cover is removed and is resumed a few seconds after the cover is refitted.

The warning applies to the currently printing pattern - it is reset automatically when printing is restarted.

3.08 Bad Print Head Code

At start up the software checks the type of printhead that is fitted. If it does not recognise the printhead type this warning is reported.

The system will continue to operate on the assumption that the printhead has not been changed, and will continue with the same printhead type as used previously (i.e. the currently stored NVR printhead type).

If a new type of printhead has been fitted, but has not been detected correctly, the modulation frequency, voltage, etc., will all be incorrect. Therefore, the jet will not break up properly, and a phase fault (2.02) will probably occur when starting the jet.

3.09 New Print Head Fitted

At start up the software checks the type of printhead fitted. The last printhead type used is stored in the printer¡¯s memory.

If the currently fitted type is not the same as the type stored in memory then this error is reported and the type in memory is updated.

This warning should only ever occur when a new printhead is fitted. If it occurs at other times then the memory may be corrupt, or the printhead connector faulty.

Under normal circumstances this warning just confirms that the printhead type has been changed. The defaults for VOD, modulation, etc., will be used, until the user enters a new printhead code in the SETUP menu.

If the wrong type of printhead has been detected for any reason, the modulation frequency, voltage, etc., will all be incorrect. Therefore, the jet will not break up properly, and a phase fault (2.02) may occur when starting the jet, or poor print quality may result.

3.10 Charge Calibration Range

Contact your local EC-JET distributor if this error is reported.

3.11 Safety Override Detected

This warning message alerts the user when the safety override link is fitted.

WARNING: DO NOT START THE PRINTER WHEN THIS ERROR MESSAGE IS PRESENT. PRINTER SAFETY CIRCUITS AND SENSORS WILL NOT BE FUNCTIONING. IN THE EVENT OF THIS ERROR MESSAGE OCCURRING, SWITCH OFF THE PRINTER AND CONTACT YOUR LOCAL EC-JET DISTRIBUTOR IMMEDIATELY.

3.12 Low Pressure

When starting the jet the printer has detected a loss of ink pressure, which will effect the printer¡¯s performance.

Possible causes

- The main ink filter is blocked.

- Pump output is low.

Contact your local EC-JET distributor.

3.14 Over Speed (Variable Data)

This indicates that the printer has missed at least one pattern because it cannot generate the pattern's variable data (e.g. sequential numbers) at the required rate - i.e. the printer was still generating pixel data for the next "print go" when the "print go" occurred.

The warning applies to the currently printing pattern - it is reset automatically when printing is restarted.

Possible cause

- The amount of variable data in the pattern is too long for the current rate of print triggers. Reduce the amount of variable data, if possible.

NOTE: This warning indicates the printer cannot generate pixels fast enough, whereas System Warning 3.02 indicates the printer cannot print the rasters fast enough.

This warning is only likely to occur for fast rasters (e.g. rasters smaller than 16 drops for Micro printheads), where pixel generation by the software is slower than the rate at which the hardware can print rasters.

3.16 Memory Failure

Possible cause

- The battery backup has failed (exhausted battery). Recharge the battery by switching the printer on for 24 hours. Otherwise, contact your local EC-JET distributor.

3.17 Memory Corrupt

The system will still function but some values may have been reset to their defaults.

Possible cause

- The battery backup has failed (exhausted battery). Recharge the battery by switching the printer on for 24 hours. Otherwise, contact your local EC-JET distributor.

3.18 No Message Stored In Memory

This warning is reported if there is no message stored in memory. Printing cannot be started if there is no message stored.

Possible causes

- The user has cleared the message memory by selecting [F3] (New Message) and has then failed to enter a new message.
- The battery backup has failed:

    Contact your local EC-JET distributor.

Troubleshooting

Introduction

This section provides general advice on fault diagnosis on the EC-JET Ink Jet Printers, as well as specific procedures for identifying and rectifying faults. Fault diagnosis is complicated by the number of variables involved in producing good print quality. Fast, non-contact printing involves fluid dynamics, physics, electronics, computing and chemistry.

Many of the faults that could occur within the printer are self-diagnosed by the integral software. Upon diagnosis, the operator is alerted by way of error messages (warnings and faults) which appears in the status line of the display screen.

Before attempting any fault diagnosis for the first time, operators are advised to familiarize themselves with the "Warning and Fault Messages" section of this manual, as it contains information which is useful in rectifying many simple faults.

Problems can be found to have either a single cause or several combined causes. The complications arising from the simultaneous failure of several different components make it impossible to consider such faults in this user manual. In this section, individual problems are linked to their most probable causes. The most successful fault diagnosis technique will be found by investigating each problem, separately, in turn. Do not begin by assuming the most complicated combination of faults; always start by investigating the most simple possibilities.

Where to Start

All problems with printer operation are distinguished from each other by the symptoms displayed. These symptoms can be obvious faults with the print quality; error messages on the display; or any other signs by which it is apparent that the printer is not functioning correctly. When the symptoms have been correctly identified, the possible cause(s) of the symptoms the printer is displaying can be investigated.

The recommended fault diagnosis sequence is as follows:

1. Collect as much information as possible on ALL the symptoms that the printer is displaying, including error messages, print samples and signs of electrical or mechanical malfunctions.

2. Use the "Identifying Faults¡" sub-section to identify all the possible causes of the symptoms that the printer is displaying.

3. Start with the most probable cause, and investigate each of the possible causes in turn. This will eliminate all the possible causes that are not responsible for the problem, until the actual cause is established.

4. When the actual cause of the symptoms has been established, use the "Problem Solving" sub-section to perform the necessary adjustments and repairs to rectify the fault.

5. Finally, check that the printer operates correctly and that any error messages have been cleared, and that there is not a second fault causing supplementary symptoms.

If, after rectifying one fault the symptoms have not been eliminated, continue with the fault diagnosis until all faults have been identified and rectified. Only when all faults have been eliminated, and the printer is operating correctly, has the fault diagnosis been completed.

The "Identifying Faults" sub-section includes lists of symptoms (by print sample and by description), and gives references to fault codes which identify the particular type of fault.

The "Problem Solving" sub-section provides problem solving instructions for each fault code number, and defines checks, adjustments and repair procedures for all the faults identified in "Identifying Faults". These procedures explain how to check whether the fault is present and how to rectify it.

Use the following list of action points to approach fault diagnosis in a logical way:

-   If possible, ask whoever found the problem to describe it in detail, including any action taken.

-   Do not jump to conclusions. Take the time to examine the printer carefully. Is there sufficient ink and solvent? Are there any signs of ink leakage? Are there any loose wiring connections?

-   Check the Print Status option for any error messages that have been logged.

- Make use of the Diagnostics options to check and record the jet monitoring parameters of Pressure, Velocity Of Drop, Modulation and Phase. Compare these with the reference values and identify any out-of-specification measurements. (See "Diagnostics")
- Make print samples (if possible) and examine the prints carefully for signs of print quality problems.
- Only when all of the symptoms have been noted should an attempt be made to identify the possible cause of the problem.

Identifying Faults

Some faults are best identified by the appearance of the print when a sample of the test pattern is printed. Other faults may not permit a print to be made, or may produce other symptoms such as fault messages. To accommodate these differences, this sub-section is divided into two parts: "dentifying Faults by Print Sample" and "Identifying Faults by Symptom".

Identifying Faults by Print Sample

This part of the manual is intended to help distinguish between different types of print fault, in order to identify the possible causes.

There are several ways in which print quality can be affected, and in some cases print quality problems can be caused by more than one fault. For most faults, it is not difficult to identify the cause of the problem, but some faults have similar symptoms, making accurate diagnosis a little more difficult. For example, a low modulation problem can give similar symptoms to high viscosity.

In cases where the cause of the print fault is not immediately obvious from the print sample, secondary symptoms should always be sought that will help to distinguish between the possible causes. In the example above, the current modulation would need to be checked, and the pressure, the Velocity Of Drop, and the operation of the ink system components investigated. These additional pieces of information will then enable you to decide which of the possible causes is the reason for the print fault.

The following list classifies faults by the appearance of the print samples they produce. The list shows print samples of the standard test pattern which can be compared with samples taken from the printer under investigation. Below each sample, or set of samples, is a brief description of the fault symptoms. Also provided are the possible causes of the fault and a reference to a particular fault code number in the "Problem Solving - Print Samples" part, where the problem and its method of rectification is described in more detail.

NOTE: Throughout this manual, reference to the "top" of the print means the part of the pattern closest to the negative deflector plate of the printhead (i.e. the least deflected drop).

EJ93

Top (or bottom) of pattern missing
Gutter Clipping···FC05

Section of the pattern missing or distorted.
Printhead Cover Catch (obstruction in cover slot)······························FC06

Uneven stretching of the pattern.
Shaft Encoder Faults (shaft encoder slipping)·······························FC09
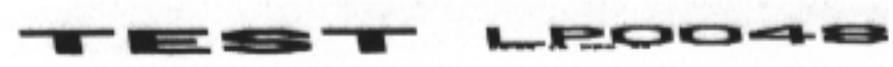
Squashed print. Pattern not blurred.
Deflector Voltage Faults···FC10

Product tilting along the axis of the conveyor travel.
Vibration Problems··FC36

Product tilting across the axis of the conveyor travel.
Vibration Problems··FC36

High frequency vibration along the axis of the conveyor travel.
Vibration Problems··FC36

High frequency vibration across the axis of the conveyor travel.
Vibration Problems··FC36

Identifying Faults by Symptom

When it is not possible to identify a fault by the visible effect on the print sample, it becomes necessary to look for other symptoms. For example, it may not be possible to start the jet satisfactorily, so it will be impossible to obtain any sort of print. However, in most circumstances there will be some obvious indication as to the nature of the fault, the best example being the fault messages displayed in the screen status line.

The " Warning and Fault Messages" section lists all of the warning and fault messages. This section also gives a detailed explanation of the condition that the printer control logic has detected which has resulted in the particular message being displayed.

If there is no fault message, or if the message on its own is not enough to identify the problem, refer to the following list of symptoms to identify the possible cause of the fault. The list is organised to group the symptoms into the five different stages of printer operation:

1. Before switching on.
2. After switching on.
3. When the jet is started.
4. During printing.
5. After the jet is stopped.

Note that these groupings only indicate the earliest point at which the symptom could be observed; the symptom could also be observed later in the cycle of printer operation. For example, solvent contamination might be observed at any time, but it is included in the first group because it is possible to check this symptom before switching on.

The text below each symptom describes the different types of fault that can give rise to the symptom, with references to fault code numbers by which the faults are identified in the "Problem Solving " sub-section, where the problem and its method of rectification is described in more detail.

Symptom and Possible Causes   Fault Code

BEFORE SWITCHING ON

Ink deposits in the printhead or on the cover slot.

Jet Alignment Problems FC32
Ink leaking from gutter

Gutter Problems FC35

AFTER SWITCHING ON

Ink leaking from gutter.

Gutter Problems FC35

Low pressure warning on start-up.

Pressure Loss (mechanical) FC12

Partial or total pressure loss

Pressure Loss (mechanical) FC12

Discrepancy between Set and Read Pressures

Pressure Loss (mechanical) FC12

WHEN THE JET IS STARTED

No jet at start-up.

Jet Alignment Problems (nozzle blockage) FC32

Messy printhead at start-up.

Jet Alignment Problems (nozzle out of alignment) FC32

No VOD adjustment on start-up.

Pressure Loss (mechanical) FC12

Blocked gutter.

Gutter Problems FC35

Jet catching printhead cover slot.

Printhead Cover Catch FC06

Jet Alignment Problems FC32

Ink leaking from gutter or poor gutter action.

Gutter Problems FC35

DURING PRINTING

Poor print quality .... Refer to "Identifying Faults by Print Sample"

Jet velocity reduces - increased VOD reading.

Gutter Problems FC35

Messy print, missing drops

Gutter clipping FC05

Printhead cover catch FC06

No Print

Print Delay value incorrectly set FC39

Part of message missing FC40

AFTER THE JET IS STOPPED

Poor purge of nozzle at shutdown.

Gutter Problems FC35

Problem Solving

This sub-section describes the faults identified in the previous sub-section "Identifying Faults".

For each fault, identified by a fault code (FC) number, procedures are given for confirming the presence of the fault, and actions necessary to rectify the fault.

Fault codes not referenced in this manual are faults that can only be rectified by a Service Engineer.

## Problem Solving - Print Samples

FC05 Gutter Clipping

Diagnosis

This fault is also known as "gutter catch" and is similar to the associated problem of Printhead Cover Catch. The problem occurs when the least deflected drops clip the gutter and are thus not printed.

If the jet is misaligned on the gutter, the least deflected drops may catch the edge of the gutter. This will cause the loss of the drops from the top of the print pattern.

As printing continues, the ink will build up on the gutter edge and the print loss will increase, sometimes leading to deflector plate shorting and EHT failures.

The following diagram illustrates the problem:

Misalignment
(anticlockwise)

EJ94

This drop obstructed by gutter
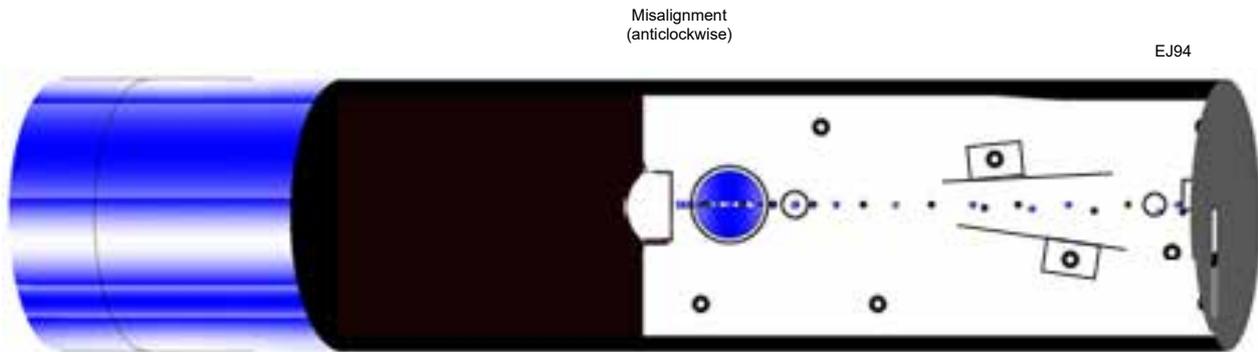
PRINT SAMPLE(Gutter clipping)

EJ95
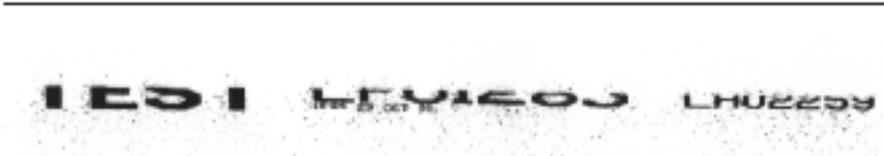
This print sample shows gutter clipping, resulting in loss of the top part of the print.

Cause and Cure

Check the EHT settings (see - "Changing the System Setup"). Check the jet alignment.

FC06 Printhead Cover Catch

Diagnosis

This problem is caused by the most deflected drops catching the edge of the exit slot in the printhead cover, and thus failing to be printed.

The following diagram illustrates the condition:

EJ96

Cover clipping zone
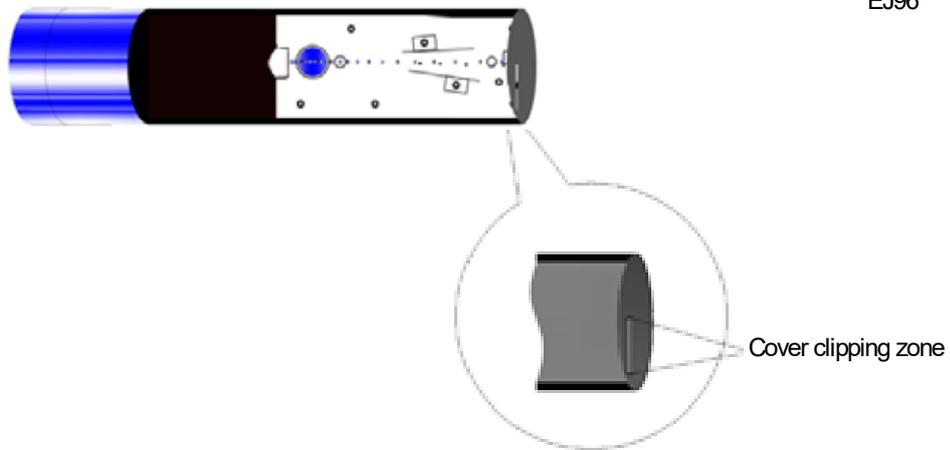
NOTE: It is sometimes possible for the least deflected drops to clip the cover slot, in which case the effect is similar to the Gutter Clipping fault.

PRINT SAMPLE(Gutter clipping)

EJ95
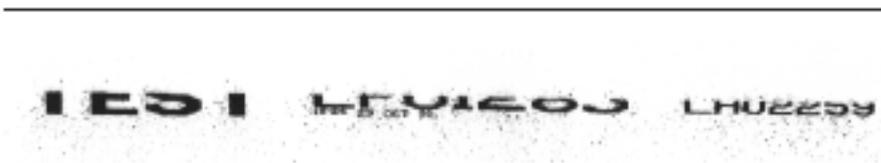
Most commonly, the drops are lost at the bottom of the print, as in the above print sample. Whether the top or the bottom of the print is missing, a typical result of printhead cover catch is a fine diffuse spray of drops.

Cause and Cure

Check the EHT settings and connections. Check the printhead cover slot for an obstruction, which may be a build up of ink. If the printhead cover is badly out of place on the printhead, the drops to be printed may miss the cover slot altogether. Ensure that the conduit is not pulling the printhead out of line with the cover slot.

Print Samples

EJ98
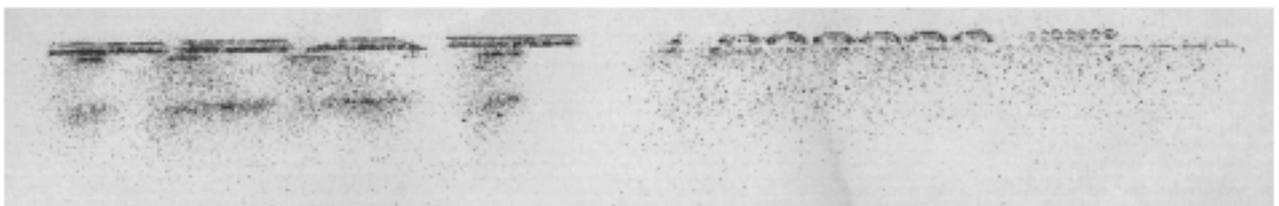
The above print sample shows what can happen if the printhead cover slot is obstructed by dried ink, dust or some other contaminant, such as a hair.

User Manual

Cause and Cure

Clean the exit slot using the appropriate solvent for the type of ink being used in the printer. Make sure that the printhead cover is correctly positioned and securely fitted on the printhead.

NOTE: Some of the Printhead Cover Catch print samples may show similarities with Phasing Errors problems. The fundamental difference to note is that phasing errors still print ALL the drops, although not in the correct positions, while printhead cover catch (or clipping) problems show a considerable loss in the number of drops printed.

Problem Solving - Ink System Mechanical Faults

FC12 Pressure Loss

There are several ways in which a pressure loss can manifest itself:

- a Low Pressure warning on start-up (error 3.12);
- a No VOD Adjustments warning (error 3.00);
- a significant discrepancy between Set Pressure and Read Pressure when the pressure is set to 255 by the service engineer in Diagnostics;
- an obvious leak of ink from around the pump, the tubing or the manifold.

The following identifies how each of the ink system components can contribute to a loss of pressure in the system:

Ink Tank Reservoir

- debris in the ink tank can cause either a partial or a total pressure loss. The debris can be pieces of foil seals from ink bottles, or other extraneous material that has fallen into the reservoir.

Pre-Pump Filter

- debris from the ink tank reservoir that has been drawn into the body of the filter can cause a total, or more usually a partial, pressure loss;
- over tightening of the connectors onto the threaded stud of the filter body can cause a partial pressure loss by constricting the olive and reducing the size of the flow aperture;
- the actual filter membrane may have become blocked; it has done its job of protecting the pump.

Pump Assembly

The pump assembly is an electromagnetically-coupled gear pump.

- the pump motor has failed, resulting in loss of drive and hence total pressure loss;
- the motor has decoupled from the pump, so that the motor is spinning wildly but not turning the gears in the pump head, again resulting in a total pressure loss;
- the gears in the pump are worn, resulting in less than totally efficient drive and a partial pressure loss;
- a leak has developed on the output side of the pump.

NOTE: If the pump motor is turning but the pump itself is not, there will be a normal reading for Set Pressure, but a zero reading for Read Pressure.

Main Ink Filter

- the filter has fulfilled its task and has eventually collected an excess of debris and become blocked;
- the PTFE tubing has been incorrectly fitted to the filter. If the tubing is pushed too far into the elbow assembly, a pressure loss can result due to reduced flow;
- the stainless steel inserts, when pushed into the PTFE tubing, have pared off a little of the inner wall of the tubing causing a blockage which reduces flow, and hence pressure;
- a leak has developed at an assembled or welded joint.

Manifold Assembly

- the pressure transducer is faulty. Check the transducer and its associated wiring before suspecting a fault in the pressure circuit hybrid of the IPM PCB;
- the vacuum venturi has either become blocked, or the stainless steel insert has been lost through incorrect assembly;

- a leak has developed at an assembly joint or crack. The manifold has simply become worn-out after years of ink flow.

Problem Solving - Printhead Mechanical Faults

FC32 Jet Alignment Problems

There are several ways in which a jet alignment problem can occur:

- the jet has been shut down incorrectly;

- ink has been leaking from the nozzle during a period of non-use;

- the ink is contaminated causing quantities of salt deposits to build up around the nozzle;

- a nozzle blockage has been only partially cleared;

- the nozzle cap has become loose;

- the jewel in which the nozzle orifice is machined has become cracked or deformed causing jet instability;

- the nozzle assembly has been knocked out of alignment.

Before attempting to rectify a jet alignment problem, it is advisable to investigate which of these possible causes is most likely to have occurred, and to take the appropriate steps to ensure it does not reoccur.

The first thing to do is to clear the nozzle, which will most often cure the problem. Clearing the nozzle should remove any deposits of ink or debris which could be causing an obstruction in the nozzle orifice, resulting in jet misalignment.

If clearing the nozzle does not solve the problem, it will be necessary to call your local Distributor for a EC-JET approved engineer.

Clearing the Printhead Nozzle

The nozzle has a very small orifice and it is possible for this orifice to become blocked in a number of ways, for instance: dried ink, foreign debris introduced into the ink supply, or contamination of ink types.

The most common occurrence is when ink has dried within the nozzle and caused a restriction. In this situation, the first course of action is to perform a series of nozzle clear routines. In normal operation, ink is supplied to the nozzle under pressure and is emitted from the orifice as a jet. When a nozzle clear is performed, vacuum is applied to the nozzle, and air and solvent can be drawn the reverse way into the nozzle to clear any restrictions.

To perform a series of nozzle clears, call up the Setup menu from the CURRENT MESSAGE screen, by pressing the F4 (Setup) key:

EJ99

CURRENT MESSAGE   1

TEST PRINT

F1：Edit Message   F2：Check Status
F3：New Message

VOD   00000

Jet Off

PASSWORD

●   Enter Password

VOD   00000   PRESSURE   000   PHASE

Jet Off   2006-03-24   14:01:38
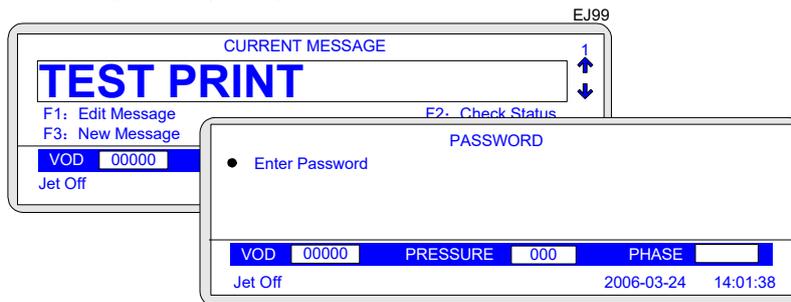
If password protection is switched on (see "Changing the System Setup"), the PASSWORD menu will appear at this stage, as shown above.

Type in "XXXX" for the password, press the [enter] key and the SETUP menu will be displayed:

EJ100

SET UP

\> Password
⮂ Print Height
● Scale Height
⮌ Print Width

VOD   00000   PRESSURE   000   PHASE

Jet Off   2006-03-24   14:01:38
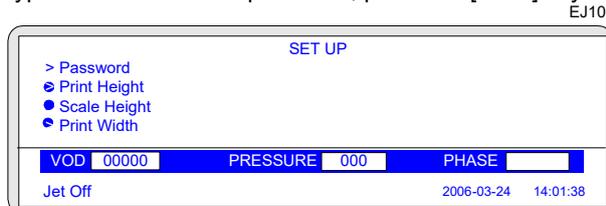
Scroll through the menu options using the up/down cursor keys until the Diagnostics option is selected, then press the [enter] key to call up the DIAGNOSTICS menu. Alternatively you can simply press the

"D" key which will call up the DIAGNOSTICS menu directly.

EJ101

```
                              DIAGNOSTICS
        • Stop Print
        • Test Print
        > Clean Nozzle
        • Nozzle Flush

        VOD      00000      PRESSURE    000      PHASE

        Jet off                          2006-03-24   14 : 01 : 38
```
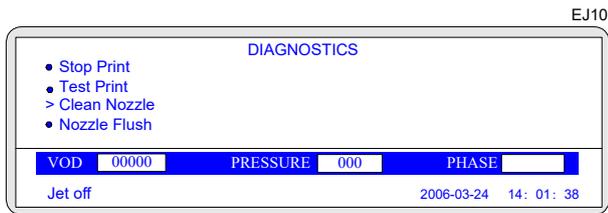
Use the up/down cursor keys to locate the Clear Nozzle option. Press [enter] and type in the number of Clear Nozzle sequences you wish to run. **DO NOT** press the [enter] key to start the nozzle clear sequence yet - the following procedure

must be carried out first:

NOTE: A minimum of three Clear Nozzle sequences is recommended in an attempt to clear a nozzle blockage. This can be performed as a continuous routine by entering "3" in the Clear Nozzle option and pressing [enter]. While wearing disposable gloves:

1.   Remove the printhead cover.

2.   Wash the printhead as described in "Cleaning the Printhead" ensuring the nozzle area is clean.

3.   Invert the printhead, with some absorbent material wrapped around it where it connects to the conduit, and hold it in a vertical position.

4.   Activate the Clear Nozzle routine by pressing the [enter] key.

5.   The status line will indicate that the printer is clearing the nozzle.

6.   Apply small amounts of solvent to the inverted nozzle face as illustrated below. It should be observed that when a small drip of solvent is applied to the nozzle face, it will be drawn in through the nozzle orifice and back into the assembly.

7.   Apply drops of solvent repeatedly until no more solvent is drawn in.

8.   The routine of three Clear Nozzle sequences should be carried out a maximum of 10 times, with an attempt to start the jet at the end of each routine. If the nozzle is still blocked after the 10 routines have been completed, the printhead should be replaced.

EJ102

Take care to build Up a good coating of solvent on the nozzle as shown here
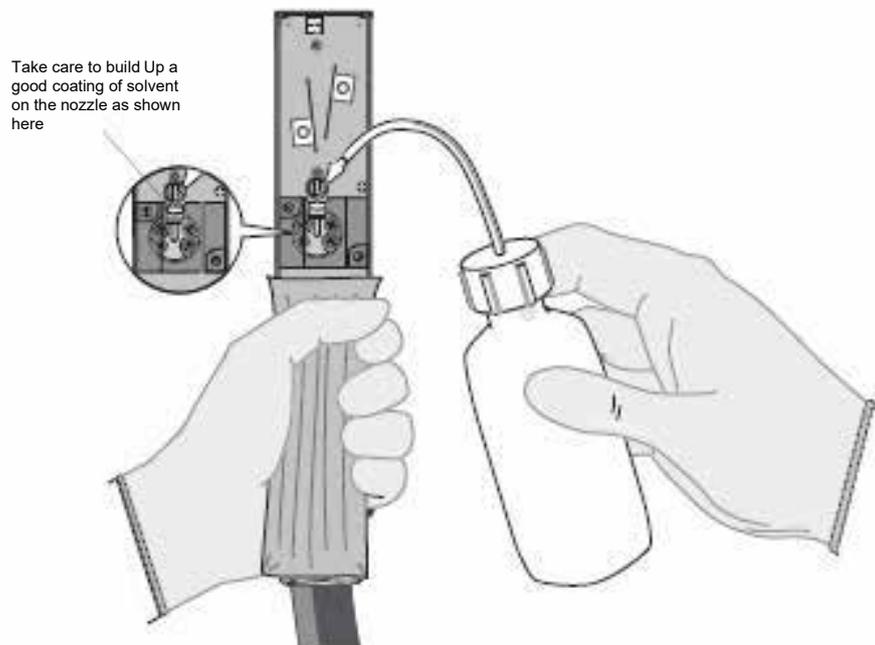
CAUTION: Be certain to use the correct solvent that corresponds to the ink type being used in the printer.

FC35 Gutter Problems

The faults which can occur in the gutter line are as follows:

- blocked gutter which can be due to:

  incorrect shutdown not purging the gutter;

  printhead mounted lower than the printer (causing siphoning effect);

- ink leaking from the gutter during a period of non-use:

  printhead mounted lower than the printer (causing siphoning effect).

- poor gutter action (inadequate suction):

  very thick ink, e.g. pressure is 40 points above the reference pressure value.

If you suspect a gutter blockage, do not attempt to clear it yourself; contact EC-JET or your local distributor.

FC36 Vibration Problems

Vibration can cause a number of problems, the most prominent of which are described here.

Diagnosis

Poor print quality is the most common indicator of vibration problems. This is because the print drops are relatively stable while in flight, so vibration in either the product being marked or the printhead itself, will result in the drops being misplaced or obstructed.

The various types of vibration and their effects are described in the following:

Product Vibration/Tilting

The product can tilt from one side to the other, either along the axis of the conveyor travel or at 90 degrees to it (i.e. across the conveyor width).

When the product tilts along the axis of the conveyor travel, the width of some characters will be contracted and some expanded, as the product tilts first one way then the other.

Similarly, when the product tilts at 90 degrees to the axis of the conveyor travel, the height of some characters will be contracted and some expanded, as the product tilts first one way then the other.

This is shown in the following illustrations:

Product tilting from side to
side along the axis of
conveyor travel

Notice how characters
are distorted in width
as the product tilts
under the printhead

1 2 3 4 5 6

Product tilting from side to side
at 90 degrees to the axis of
conveyor travel

Notice how characters
are distorted in height
in a sinusoidal form

1 2 3 4 5 6
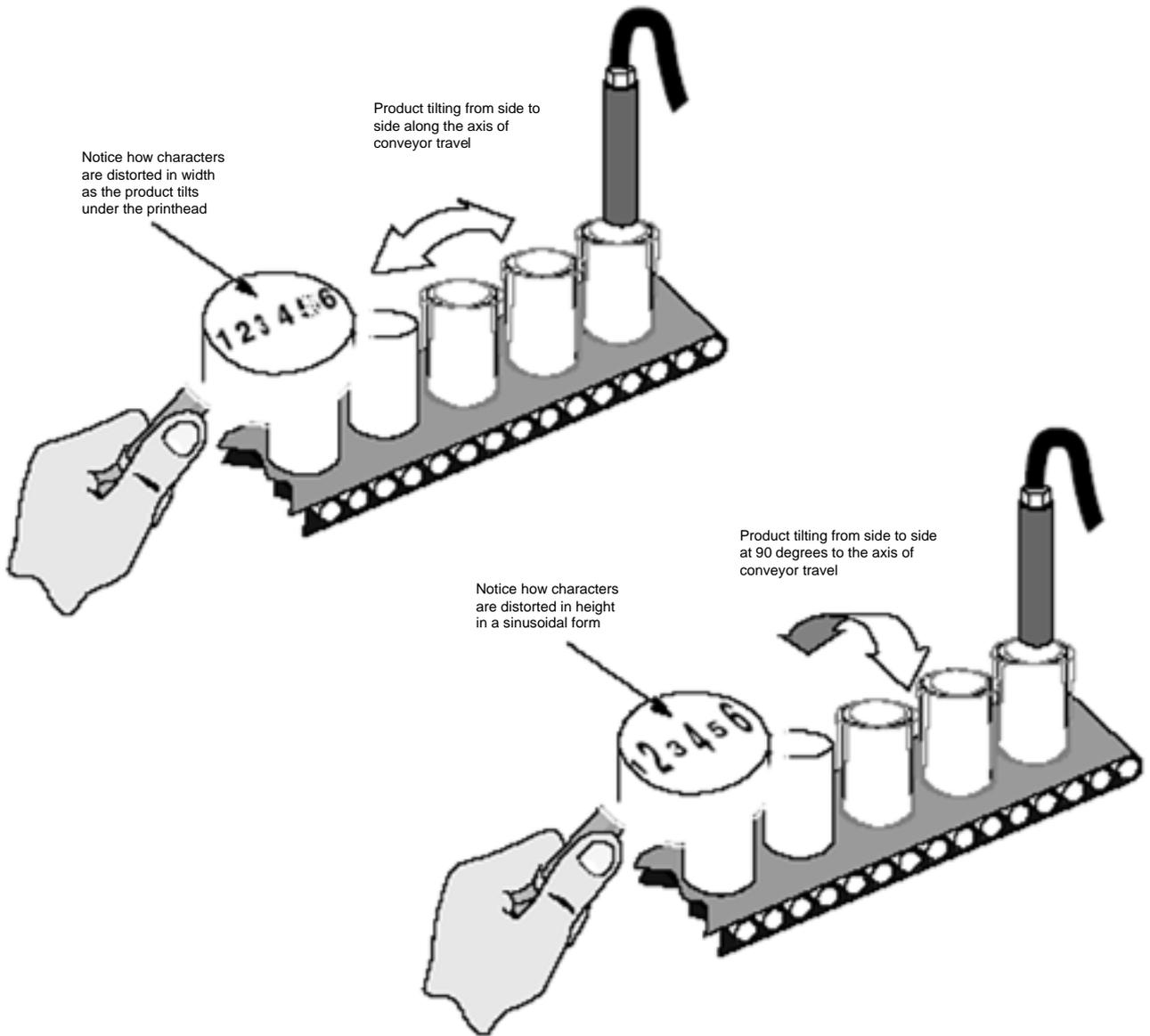
High Frequency Vibration

High frequency vibration will show as a regular displacement of drops, without necessarily distorting character height or width. The illustration below shows the displacement of rasters in response to high frequency vibration:

EJ104

Character without high frequency vibration

Character with high frequency vibration across the conveyor

Character with high frequency vibration in direction of conveyor travel
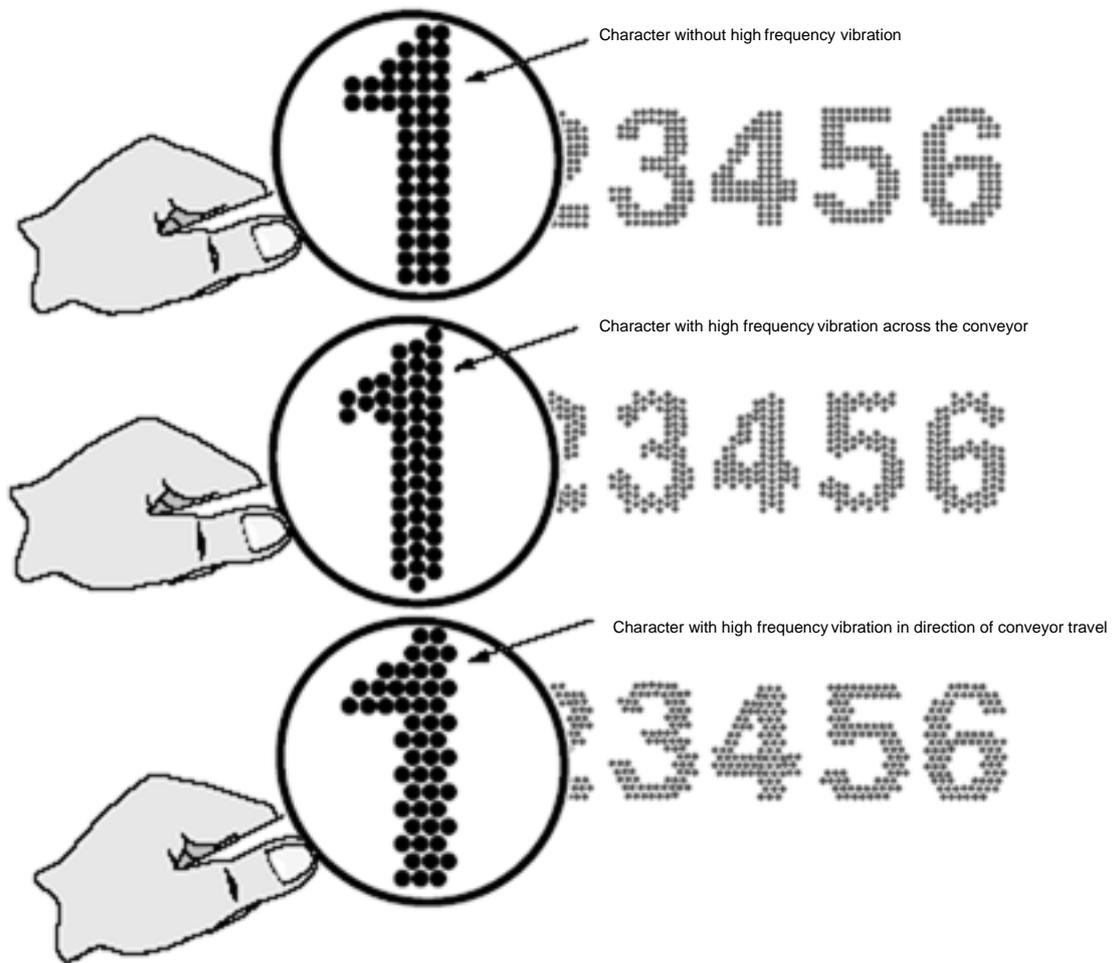
To determine whether high frequency vibration is affecting the product or the printhead, simply pass a piece of paper under the printhead and trigger the print. Take care to move the paper at a steady speed.

If it is the product which is vibrating, then the print quality will be good. If the print quality is poor, the vibration is likely to be coming from the printhead.

To test for printhead vibration, pass a piece of paper under the printhead in the same way as described above, but this time hold the printhead with your other hand to dampen any vibration in it. If print quality improves as a result, then the printhead is suffering from the effects of vibration.

The following illustrates these tests:

EJ105
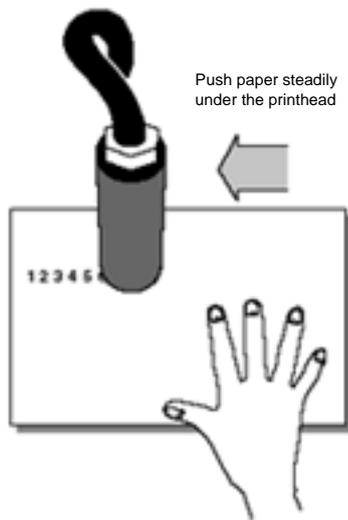
Testing for product vibration   Testing for printhead vibration
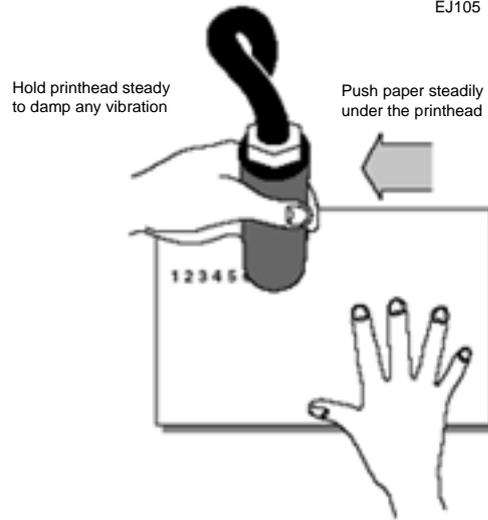
Strong vibration and knocking to the printhead is the most serious vibration problem likely to occur, since this will affect operation of the printer itself. Severe vibration or knocking will lead to the printer shutting itself down and displaying one or both of the following fault messages:

" 2.01 Deflector Voltage "

" 2.03 Velocity of Drop "

It will also be found necessary to clean the printhead more often than would be expected.

To understand what is happening, consider that the stream of drops is relatively stable once in flight. Therefore, if the printhead suffers vibration or sudden movement, the drops will be obstructed either by the VOD sensor or the edge of the gutter. This will cause ink to be splashed on the VOD sensor and deflector plates, and to build up deposits on the gutter.

This is shown in the following illustration:

EC-JET

FORCE   FORCE   FORCE   FORCE

Gutter moves out
of drop stream
causing drops to
dirty the head by
colliding with either
side of the gutter

Impact or vibration
in this direction causes
drops to collide with
the VOD sensor and
gutter edge
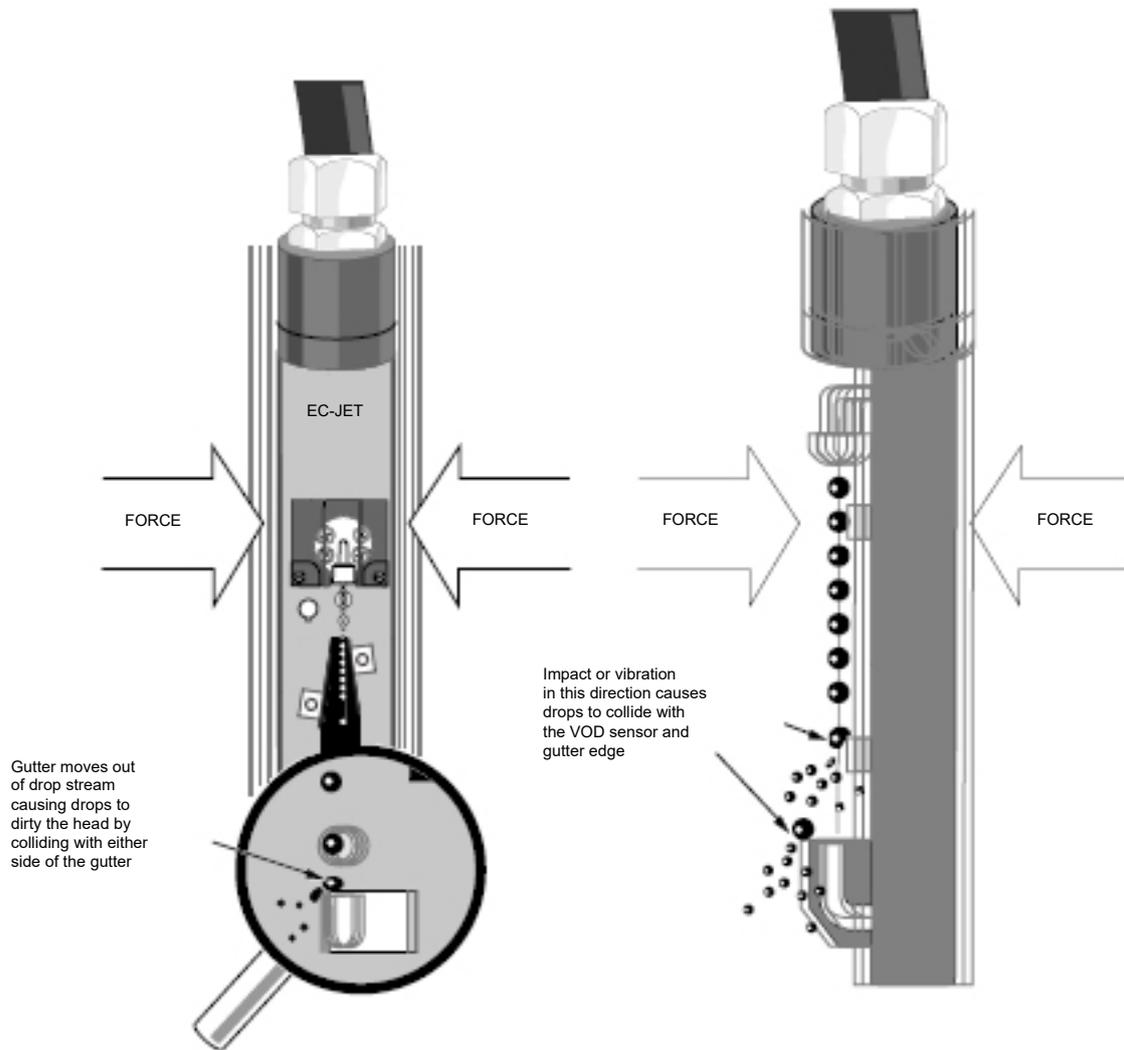
Jet obstruction due to high impact knock or excessive vibration.

FC39 No Print - Print Delay Problem

Normally, when the system detects a product passing the photocell, it will activate a "print go" signal which causes the current message to be printed immediately. The Print Delay option of the SETUP menu is used to delay printing to allow the product to travel further before printing, thus controlling exactly where the message is to be printed. For instance, if the product is a long one and the message is to be printed in the middle, it will be necessary to set the delay to a value appropriate to the speed of the conveyor and the length of the message, which will cause printing to occur at the desired place.

What actually happens is that when the system detects a product passing the photocell, it will delay printing by counting the number of rasters it would have printed, until that count becomes equal to the value of the Print Delay option.

However, if the Print Delay value is set to an inappropriate value, it is possible for the next product to arrive before the delay expires. This resets the delay to begin counting again, and since the conveyor is travelling at the same speed, the next product will once again arrive before printing has occurred and the delay will be reset; and so on. If this is allowed to continue, printing will never occur.

The following illustrates this problem:

1 The photocell informs the printer that a product is in position for printing

2 In response to this (if a Delay Has been set) the printer software Will begin to count rasters. It will not print until the number Of rasters counted is equal to the Delay value

PRINTHEAD

PHOTOCELL

3 However, if another product arrives before the count is completed, the Count is restarted and nothing will print. If this situation is allowed to continue, nothing will ever be printed

Conveyor direction

Delay would end here

Delay started here

Delay interrupted here by next product

Rasters are counted but NOT printed. They show here only for example

Conveyor direction

FC40 Part Of Message Missing - Overspeed Error

If the message to be printed is too long for the product or the conveyor is travelling faster than the system can print, the following warning message will be displayed in the status line of the display:

"3.02 Over Speed (Print Go)"

The following illustrates the problem:

EJ108

In this example, the message Is so long that the printer is unable to finish printing it Before the next product arrives. This causes the "Overspeed" warning message to be displayed

Message Would end here

Message started here

Photocell detects arrival of next Product before the current message has finished printing
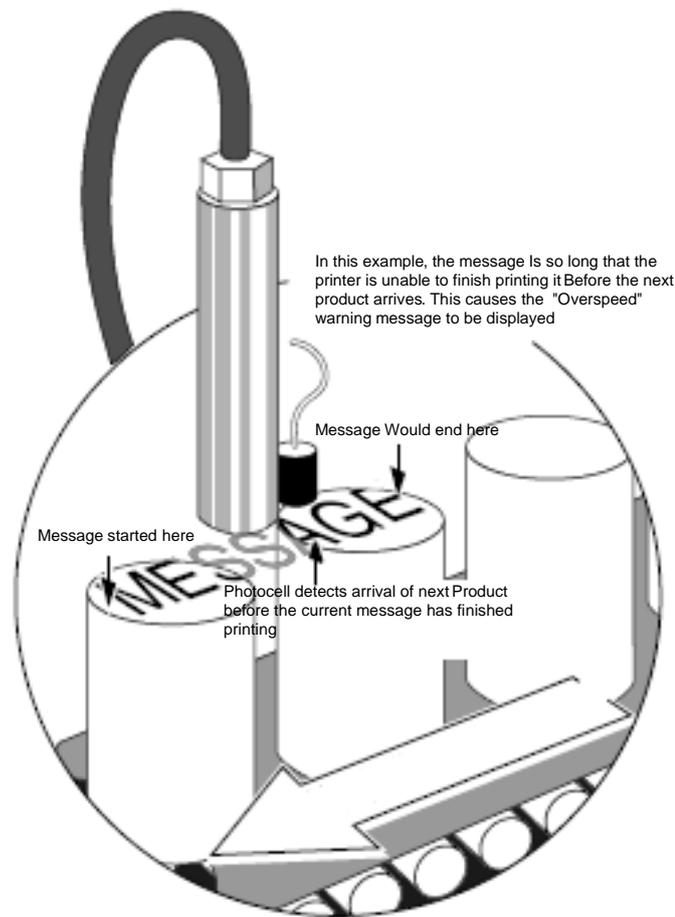
Technical Specification

Introduction

The EC-JET Continuous Ink Jet Printer is a fast, reliable, non-contact printer capable of applying sell-by dates, batch codes and other variable information to a wide range of substrates on the production line.

Technical Data

Cabinet

Construction

Base tray unit: Stainless steel grade 304

Top cover: Stainless steel grade 304

Dimensions

External height: 230 mm

External width: 450 mm

External depth: 550 mm

Weight

Printer weight: 23 kg (excluding ink, solvent and packaging)

Power Requirements

Voltage: 90 V (3 A) to 240 V (1.5 A) a.c., 50/60 Hz

Power rating: 200 VA

This equipment is a Class 1 earthed Electrical connections at the rear of the cabinet comply with the extra low voltage safety requirements.

WARNING: THIS PRINTER MUST BE EARTHED/GROUNDED.

Environmental

Operating temperature: +5 to +45 Celsius ambient

Humidity range: Up to 90% relative humidity, non-Ccondensing

Acoustic emission: Less than 70 db

Ink System

Construction

System enclosure: Stainless steel grade 304

Ink tank: MDPE natural

Solvent tank: MDPE natural

Capacity

Ink tank: 1800 ml approximately

Solvent tank: 1800 ml approximately

Pressure

Pressure range: Up to 4.48 bar (65 p.s.i.) normal operating pressure

Maximum pressure: 6.2 bar (90 p.s.i.) maximum under fault conditions

Level Control

Ink tank sense low: Warning reported at approximately 750 ml

Solvent tank sense low: Warning reported at approximately 750 ml

Performance

Solvent consumption: <8 ml/h at 20 Celsius ambient using EC1240 MEK black ink

Memory Capacity

Message storage capacity: Up to 46 messages

Logo storage capacity: Up to 120 logos

Chinese Character: 12000 inside

Printhead

Types

Micro: 40 micron

Midi: 60 micron and 70 micron

Macro: 100 micron

Construction

Printhead: Machined Acetal body

Cover tube: Stainless steel grade 304

Conduit adaptor: Stainless steel grade 303

Dimensions

Conduit length: 2 m

Throw Distance (recommended)

Micro: 3.5 mm

Midi: 10 mm

Macro: 20 mm

Printing Performance Data

Raster Information

Lines of print: Maximum two lines of 16 High characters, or up to four lines of 7 High characters

Rasters available: Paired raster set (printer model dependent) of 7 STD, 7 Min, 7 HS, 12 STD, 12 HS, 16 STD, 16 HS, 16 SHS, 24 STD, 32 STD, 34 STD

Character Height Range

Minimum character height: 1.2 mm (Micro printhead) using 7 Min raster

Maximum character height: 16.5 mm (Midi printhead) using 34 raster

Appendix 1: Installation & Setting Up

This appendix is to help you install and set up the printer. Normally this procedure will be carried out by EC-JET Service Engineers when commissioning a new printer.

These notes are provided as a guide to be used if the printer is relocated or changes are made to ancillary equipment. Guarding and safety interlocks should all be in place and working correctly. EC-JET can accept no liability for damage to either machine or personnel in the event of the printer being installed, moved or maintained by unauthorised and/or untrained personnel. If you are unsure of any procedure it is recommended that you contact your local EC-JET distributor.

Unpacking the System

Carefully remove the cardboard packaging and check for the following contents:

- EC-JET printer
- EC-JET User Manual
- Final test print sample sheet
- Total Quality Plan packing card
- Key for cabinet
- A Guide to Quick Use

Where to put the Printer

The EC-JET printer must be sited on a firm, solid base (preferably a EC-JET cabinet or mounting table) and with a clean power supply, i.e. free from electrical interference.

The printer physical dimensions, in millimetres, are as follows:

550 (wide) x 230 (high) x 450 (deep).

The printer weighs 23 kg (not including ink or packaging).

Accessories

The following accessories are available for purchase with the EC-JET printer:

- RS232 Communications Cable - allows multiple, remote printer control from Windows based PC system
- Shaft Encoder - enables even print width at uneven line speeds
- Photocell - detects presence of product
- Printhead Gantry
- Waterproof printer and printhead covers
- Positive Air Kit - to prevent dust interfering with print quality

For a full list of all available accessories, please contact EC-JET or your EC-JET distributor.

Power Connection

The EC-JET range of printers are designed to operate on a single phase, 50/60 Hz AC supply of 90 to 240 V at 50/60 Hz. This means that any AC voltage within this range will power the printer satisfactorily.

Please check that the details shown on the label at the rear of the printer match your power source before switching on.

Before connecting to the power supply, make sure the power-on switch is in the off position.

The power rating of the printer is 200 VA.

The wires in this electrical supply lead are coloured in accordance with the following code:

EJ16
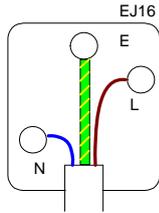
| GREEN-YELLOW | EARTH (E) |
| BLUE | NEUTRAL (N) |
| BROWN | LIVE (L) |

WARNING: THIS PRINTER MUST BE EARTHED. THIS PRINTER MUST ONLY BE WIRED BY A QUALIFIED ELECTRICIAN. EC-JET CAN ACCEPT NO RESPONSIBILITY FOR ANY DAMAGE CAUSED TO EITHER MACHINE OR PERSONNEL DUE TO INCORRECT OR FAULTY WIRING.

Attaching the Printhead to the Production Line

The printhead can operate from any angle if clamped in place with a EC-JET head bracket to ensure secure and vibration free operation.   EJ109

Direction of conveyor
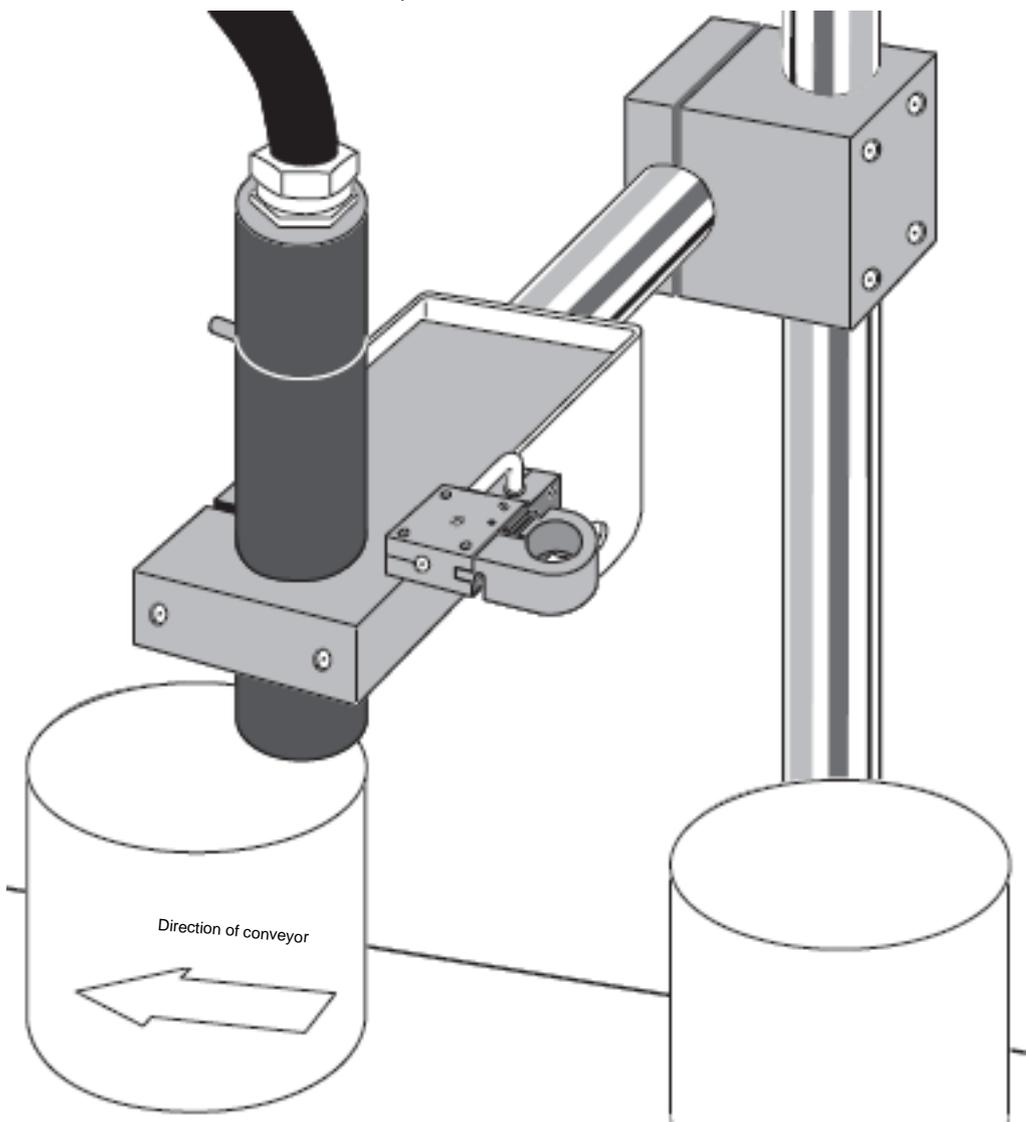
Print Height

If the printhead is moved nearer to the surface to be printed, height of the printed character will decrease - if moved further away, its height will increase.

However, adjustment of the print height should be controlled through the SETUP menu.

NOTE: Do not attempt to adjust the printed character height by changing the printhead-to-product distance. This may result in deterioration of print quality.

Setting up the Photocell

The photocell is used to detect the presence of a product to be printed on. There are variations in the way this "trigger" can be interpreted by the system, but usually a message is printed in response to a signal from the photocell.

The photocell should be mounted upstream of the printhead (so it detects the product before the product reaches the printhead), as close to the printhead as possible and at a distance from the product which gives consistently reliable triggering when a product passes it. A delay between the photocell being triggered and the print taking place can be set by a menu command, to aid fine adjustment of print positioning on the product.

EJ110

Photocell bracket swivels in both axes
To counteract light reflections thus
Improving product detection
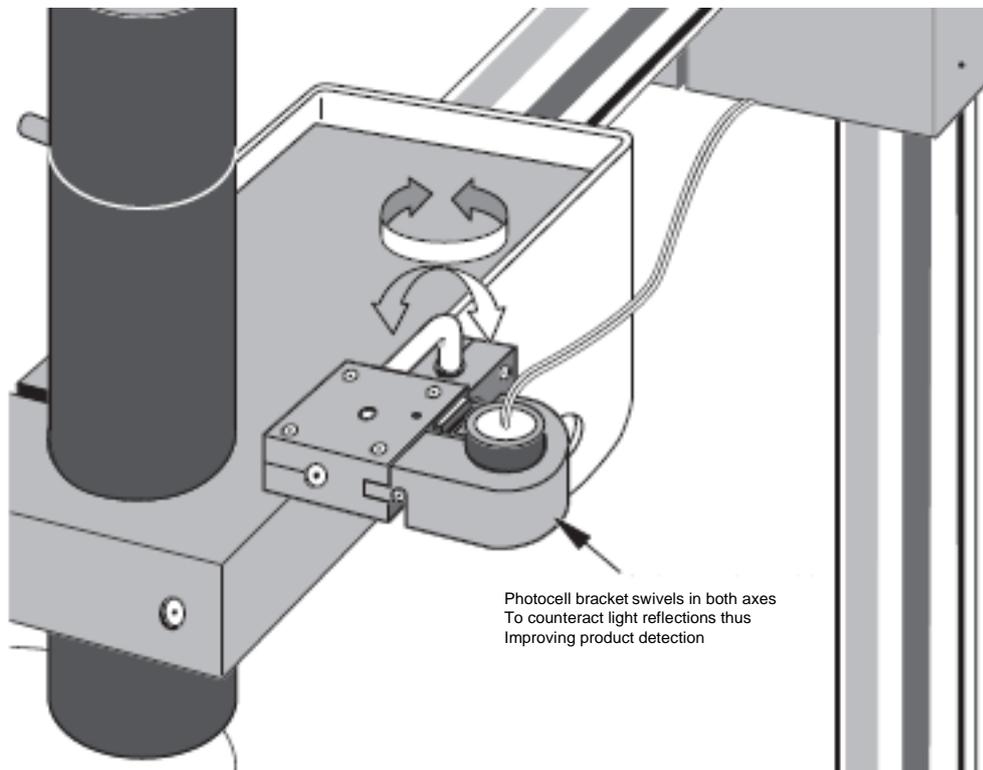
Photocell Connections

The photocell is connected to the system via a 9-pin D - Type connector. The function of each pin is described below:

Pin 1   +24 volts

Pin 2   0 volts

Pin 6   Next Object Signal

If the photocell has a screened conductor, it should be connected to the shell of the D - Type connector and to the printer chassis at the printer end of the cable (it must not be connected to 0 volts).

CAUTION: Electromagnetic Compatibility performance may be compromised by the use of unsuitable photocells. Use only EC-JET approved accessories.

On/Off Switch

Printhead Conduit

EJ111

Photocell / Shaft Encoder

RS-232

Mains Power Cables

Alarm Beacon

The above illustration shows the rear of the EC-JET with all available connections.

Setting up the Shaft Encoder

Shaft encoders are recommended for production lines where variable speed is likely. A shaft encoder generates a pulse for a fixed distance of product movement. This can be used to produce constant width print as the line speed increases or decreases.

If an encoder is to be fitted, it should be attached to a suitable production line drive shaft, with appropriate gearing if necessary. It must be installed and driven in a position where it best follows the movement of the product being printed on.

The calculations shown in the next few pages should be used to select the optimum arrangement for your application. EC-JET will be happy to advise on the best position and gearing for shaft encoder installation.

The selection of encoder and gearing will determine the printed pitch and the maximum possible line speed for the application. The printer allows some variation using the Print Width parameter, but the initial selection of the encoder and gearing is critical.

EC-JET offer a range of shaft encoders:

- 2500 pulses per revolution
- 5000 pulses per revolution

Each is available with either a 3 m or 5 m connecting cable.

For applications where the encoder needs to be driven from a conveyor belt or from the product, EC-JET has a selection of encoder wheels:

- 500 mm circumference
- 333 mm circumference
- 200 mm circumference

A given encoder and drive gearing will have a fixed encoder pitch - that is, the distance travelled by the product for each pulse cycle of the encoder output. The width control in the printer is used to generate rasters at integer multiples of the encoder pitch. This multiplier is the pitch factor and will always be a whole number. The calculations on the following pages show how this is used and explain the difference between pitch factor and print width.

Shaft Encoder Connections

The shaft encoder is connected to the system via a 9-pin D - Type connector. The function of each pin is described below:

Pin 3   +5 volts

Pin 2   0 volts

Pin 8   Single Ended Input

The screened conductor should be connected to the shell of the D - Type connector and to the printer chassis at the printer end of the cable (it must not be connected to 0 volts).

CAUTION: EMC performance may be compromised by the use of unsuitable shaft encoders. Use only EC-JET approved accessories.

Selecting the Encoder, Gearing, and Print Width

When using a shaft encoder it is vitally important that the calculations are followed and the print width is computed based on the geometry of the set up. If guessed at, messages will not be printed at the required size; rasters will be printed too close together or too far apart.

The calculations take you through a series of steps as shown below. There is also a worked example and a problem solving section afterwards.

Step 1   Define the required raster pitch for the application.

Step 2   Select the encoder, gearing and pitch factor that gives an actual raster pitch close to that required.

Step 3   Check that the calculated print performance (size and speed) is adequate.

Step 4   Calculate the print width from the pitch factor and enter it.

Step 5   Check print samples for performance.

Step 1:   Define the Required Raster Pitch for the Application

For each raster type on each printhead type there is a drop pitch which gives the best quality print, i. e. 1:1 aspect ratio at the default printer settings. This value is known as the ideal pitch; a table later in the section lists them. For a particular application you may want to chose a different pitch, bearing in mind that the aspect ratio can be adjusted using the Print Height setting (see "Changing the System Setup").

The required raster pitch is calculated by:

Required raster pitch (mm)

$$= \frac{\text{Printed Length (mm)}}{\text{Number of Characters x Character Width (rasters)}}$$

$$= \frac{\text{Printed Length (mm)}}{\text{Number of Rasters in Message}}$$

Where:

Printed length = length of message on product. This must be less than the length of any area left clear
         for printing.

Number of characters = number of characters in the longest line of the message.

Character width = number of rasters in each character; see the following table.

(Alternatively, obtain the number of rasters in the message by creating the message on the printer and noting the x-position of the cursor just after the end of the message.)

The character width varies with the size of character chosen. The figures in the table include the gaps between characters; this will introduce a small error as the gap after the last character is not printed.

EJ112

Character Set	Character Width
5 HighCaps	6
7 HighFull	6
7 Chinese	-
9 HighCaps	-
12 HighCaps	10
12 Chinese	13
16 HighFull	11
16 HighCaps	11
16 Chinese	17
24 HighCaps	14
24 Chinese	25

For example:

Consider printing "Sell By 19 Nov 00" in 7 High Full using a Midi printhead and the 7 GEN STD raster onto a print area 38 mm long.

From the table above, the width of each character is 6 rasters. The message is 17 characters long including spaces. Therefore, the required raster pitch is given by:

$$\text{Required raster pitch (mm)} = \frac{38mm}{17 \text{ Character x 6 Raster}}$$

$$= 0.373mm$$

This will be the maximum pitch possible; any larger and the message will not fit in the print target area.

At this stage it is also worth considering if any other pitches will be required for other products to run on the line.

The following table shows the ideal pitch for each printhead and raster combination:

EJ113

Raster	PRINTHEAD TYPE / IDEAL PITCH (mm) Midi
7 GEN STD	0.4
7 MIN STD	0.4
7 HI SPEED	0.5
12 GEN STD	0.4
12 HI SPEED	0.7
16 GEN STD	0.4
16 HI SPEED	0.4
16 S HI SPEED	0.7
24 GEN STD	0.4
32 GEN STD	0.4
34 GEN STD	0.4

For our example, it can be seen that the required raster pitch (0.373 mm) is slightly small than the ideal pitch for the Midi 7 GEN STD (0.4 mm). This will fit the print area and may increase the potential maximum line speed, but there will be a small gap between the drops on most substrates.

Step 2:Select the Encoder, Gearing, and Pitch Factor

A particular combination of encoder and encoder drive (gearing or wheel) will give a particular encoder pitch; that is, the distance the product will travel for each cycle of the encoder output signal. The encoder pitch will be multiplied by the pitch factor (a whole number) to give the actual raster pitch. This should be as close as possible to the required raster pitch.

The table below gives the encoder pitches for standard EC-JET encoders and wheels. The encoder pitch for other gearing or drives can be calculated using:

$$\text{Encoder Pitch (mm)} = \frac{\text{Wheel Circumference (mm)}}{\text{Encoder Pulses Per Revolution}}$$

Where:

Wheel Circumference = Distance the product moves for one revolution of the encoder. This may be 3. 14 x roller diameter, or 3.14 x star-wheel diameter, etc., depending on the application.

EJ114

Encoder p.p.r.	Application	Wheel Circumference / Shafter Encoder Pitch (mm)		
		500mm	333mm	200mm
2500		0.200	0.133	0.080
5000		0.100	0.066	0.040

The encoder pitch will be multiplied by a whole number to give the actual raster pitch. By selecting a suitable encoder and gearing, the actual raster pitch can be made close to the required raster pitch.

Actual Raster Pitch (mm) = Encoder Pitch (mm) x Pitch Factor

Where:

Pitch Factor is a whole number.

This will probably require trial and error; first select an encoder/gear combination and then multiply it by whole numbers to get the actual pitch. This is then compared to the required pitch:

EJ115

	Encoder /Gearing	Encoder Pitch x Pitch Factor = Actual Raster Pitch		
Try 1				
Try 2				
Try 3				

For each encoder pitch you try, the starting point for the pitch factors can be:

$$\text{Pitch Factor} = \frac{\text{Required Pitch (mm)}}{\text{Encoder Pitch (mm)}}$$

rounded to the nearest whole number.

Using the example from Step 1, the required raster pitch is 0.373 mm. A standard EC-JET encoder and wheel will be used to try to achieve this.

EJ116

	Encoder/Gearing	Encoder Pitch x Pitch Factor = Actual Raster Pitch		
Try 1	2500ppr/200mm	0.080mm	4	0.400mm
				Too Low
Try 2	2500ppr/200mm	0.080mm	5	0.320mm
				Too Low
Try 3	5000ppr/200mm	0.040mm	9	0.360mm

The actual raster pitch from Try 3 is close enough to the required raster pitch to be used, particularly as the required raster pitch is the maximum. Therefore, a 5000 ppr encoder and a 200 mm wheel will be specified. The pitch factor will be 9.

It can be seen that the higher the encoder pulses per revolution, the closer the actual pitch will approach the required pitch. This also gives the possibility of accommodating changes in the required pitch. However, the cost of the encoder will be higher and there may be limitations in terms of speed (this is covered in later sections).

Step 3: Check the Expected Print Performance

Any difference between the required raster pitch and the actual raster pitch will influence the print performance. There is also a limitation due to the frequency of the encoder signals. In particular, the printed message length and the maximum line speed must be checked. If there are any problems with these then the selection process must be repeated.

Printed Message Length (mm) = Number of Rasters x Actual Raster Pitch (mm)

Where:

Number of Rasters = as calculated in Step 1

Actual Raster Pitch = as calculated in Step 2.

Max. Line Speed (m/s) = Actual Raster Pitch (mm) x Raster Rate (kHz)

Where:

Actual Raster Pitch = as calculated in Step 2

Raster Rate = Maximum Rate of Raster Production.

The raster rate varies with printhead type and raster:

EJ117

	PRINTHEAD TYPE / RASTER RATE (kHz)
Raster	Midi 60um
7 GEN STD	5.714
16 GEN STD	1.5
24 GEN STD	0.895

The maximum line speed calculated above should be compared with that expected for the production line - use the section "Line Speeds Per Product Frequency" later in this manual if necessary.

The line speed may also be limited by the encoder signal response:

Max. Encoder Speed (m/s) = Encoder Pitch (mm) x Specified Frequency (kHz)

Where:

Encoder Pitch = value from table in Step 2 for encoder/gearing

Specified Frequency = Limiting Signal Frequency (see the following table).

The specified frequency varies with encoder type:

EJ118

Encoder Type	Specified Frequency (kHz)
2500p.p.r.	20.0
5000p.p.r.	20.0

This gives the following maximum encoder speeds for standard EC-JET encoders and wheels:

EJ119

Encoder	500 mm circ.	333 mm circ.	200 mm circ.
2500p.p.r.	4.0m/s	2.66m/s	1.6m/s
5000p.p.r.	2.0m/s	1.33m/s	0.8m/s

The maximum encoder speed must also be higher than the production line maximum speed.

Referring back to the example, the actual raster pitch is 0.360 mm (Step 2) and the number of rasters is 102 (Step 1).

Printed Message Length (mm) = 102 x 0.360 (mm)

= 36.72 mm

This will fit in the target area of 38 mm.

The message is printed using the Midi 7 GEN STD raster with a raster rate of 5.33 kHz.

Max. Line Speed (m/s) = 0.360 mm x 5.33 kHz

= 1.918 m/s.

This is slightly higher than the quoted maximum line speed for the raster, achieved at the expense of a small gap between the printed drops.

The encoder/gearing chosen has an encoder pitch of 0.040 mm (Step 2), and a specified frequency of 80 kHz from the table above.

Max. Encoder Speed (m/s) = 0.040 mm x 80 kHz

= 3.200 m/s

This will not limit the expected printable maximum line speed.

Step 4:   Enter the Print Width Parameter

The "Print Width" parameter is used by the printer to generate the pitch factor and print rasters at the actual pitch calculated in Step 2. Print Width is a setting accessed from the SETUP menu. The way it can be changed is described in "Changing the System Setup".

The relationship between Print Width and Pitch Factor is:

Print Width = Pitch Factor - 1

The requirement to subtract 1 arises from the printer software operation.

Referring back to the worked example, the pitch factor calculated at Step 2 is 9.

Therefore, the Print Width parameter entered at the printer must be 9 - 1 = 8.

EJ120


```
                        SET UP
 ● Password
 > Print Height
 ● Scale Height
 ☞ Print Width

 VOD   00000        PRESSURE   000        PHASE

 Jet Off                              2006-03-24    14:01:38
```
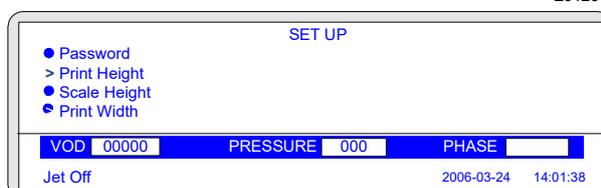
This will print one raster for every 9 encoder pulses.

Step 5:Check the Print Performance

Having entered the print width and created a message using the character size and raster from the calculation, prints must be taken at a variety of normal running speeds to confirm the settings. This must include the maximum running speed.

Troubleshooting Encoder and Print Width Problems

Important Notes:

1.   Never assume that the entered print width value is correct; always go back to the calculations.

2.   Never assume that the line speed is known accurately; try to measure it or estimate it as you see it on the day. (Refer to the "Line Speeds per Product Frequency" section later in the manual).

The encoder will only maintain a fixed print width up to the lower of the maximum line speed and the maximum encoder speed calculated in Step 3. When this speed is exceeded, the printed message length can increase dramatically and unpredictably. The same effect can be seen if the print width value is incorrectly calculated or entered. Very often a printer will be set up on line with a shaft encoder, the pitch factor poorly calculated (if at all) and print samples taken.

Troubleshooting must follow a logical sequence:

1.   If the message length measured on the print samples is larger than that calculated in Step 3, then it is possible that the line speed is too high. This can easily be checked:

    a)   From the SETUP menu, set Shaft Encoder to Off. Note down the original Print Width setting, then set Print Width to 0.

    b)   Note the original Print Delay setting. Multiply this by the original Print Width setting. Enter the new value.

    c)   Run the line at the same speed and take print samples.

The printer will now be generating rasters at its maximum rate.

        (i)   If the printed length of the message is still too long, then the line speed is too high for the printhead/raster being used. No adjustment of the encoder, gearing, or Print Width will influence this.

        (ii)   If the printed length of the message is now shorter than required, the original print width was wrong. It may need to be increased or decreased. Only going through the calculations will give the correct value to enter. Remember to check the maximum encoder speed.

Remember to enable the shaft encoder using the SETUP menu and adjust the Print Delay.

2.   If the message length measured on the original samples (i.e. with the shaft encoder enabled and the original Print Width setting) was shorter than that required, then the print width must be increased. The calculations will give the correct setting; if guessed at the results could still be unpredictable.

Using the Printer Alarm Output

When there is a print warning or failure, the printer activates a 24 volt external alarm, where fitted.

The Alarm Beacon available from EC-JET is as follows:

               Alarm Beacon Single Stage 24V.

The pin connections are as follows:

Pin 1   Alarm Signal

Filling with Ink and Solvent

Switch the printer on and check if the ink or solvent level warning messages are displayed. Fill the system with ink and solvent as necessary (see "Routine Maintenance").

Purging (or priming) the Filters

After a main ink filter change, the filter must be completely filled with ink before the system is run. For this purpose, a Filter Purge option is available from the DIAGNOSTICS menu.

This procedure should only be performed by an authorized service engineer following filter replacement.

Appendix 2: Printable Line Speeds

The following table shows the line speed at which good printing will be obtained for each raster type and printhead model at ideal pitch:

EJ121

	LINE SPEEDS PER PRODUCT FREQUENCY (m/s)		
Printhead Type	7 GEN STD	16 GEN STD	24 GEN STD
Midi	2.22	0.58	0.34

The line speeds shown above can be adjusted if printing at more than ideal pitch, i.e. double or treble pitch (see "Appendix 1: Installation and Setting Up").

NOTE: Print quality will be impaired if printing takes place at anything other than ideal pitch.

Ideal Pitch

Otherwise known as single pitch, this is dependent on the raster (i.e. printer type) being used. Printers with the faster rasters have an increased pitch capacity because the overall character height is larger. This helps to form "square" (more precise and uniform) characters.

Double Pitch

Twice the ideal pitch. Print height may need to be increased to maintain character proportion.

Treble Pitch

Three times the ideal pitch. Print height may need to be increased to maintain character proportion.

Appendix 3: Line Speeds per Product Frequency

This table shows a reference to line speeds according to the product pitch (gap between products) and the products per minute.

EJ122

| Product Pitch		LINE SPEED PER PRODUCT FREQUENCY (m/s)								
	mm	50	100	200	300	400	500	750	1000	1500
	inch	2	4	8	12	16	20	30	39	59
Products per Minute										
10		0.01	0.02	0.03	0.05	0.07	0.08	0.12	0.24	0.24
25		0.02	0.04	0.08	0.13	0.17	0.21	0.31	0.42	0.62
50		0.04	0.09	0.17	0.26	0.34	0.43	0.65	0.86	1.30
75		0.06	0.13	0.26	0.39	0.51	0.64	0.96	1.07	1.92
100		0.09	0.17	0.34	0.51	0.68	0.85	1.28	1.78	2.56
125		0.11	0.21	0.42	0.64	0.85	1.07	1.60	2.14	3.20
150		0.13	0.26	0.51	0.77	1.03	1.28	1.92	2.56	3.84
200		0.17	0.34	0.68	1.03	1.37	1.71	2.57	3.41	5.14
300		0.26	0.51	1.03	1.54	2.05	2.56	3.84	5.12	7.68
400		0.34	0.68	1.37	2.05	2.74	3.42	5.13	6.84	10.26
500		0.43	0.85	1.71	2.56	3.42	4.27	6.41	8.54	12.82
750		0.64	1.28	2.58	3.88	5.13	6.41	9.62	12.82	19.24

The formula used to calculate the line speed is defined, together with an example, below. The formula can be used to calculate the speed of specific product pitches and/or product frequencies not shown in the above table.

Line Speed (m/s) = No. of products per second / No. of products per metre

OR

Line Speed (m/s) = No. of products per second x Pitch between products (metres)

An Example:

EJ123
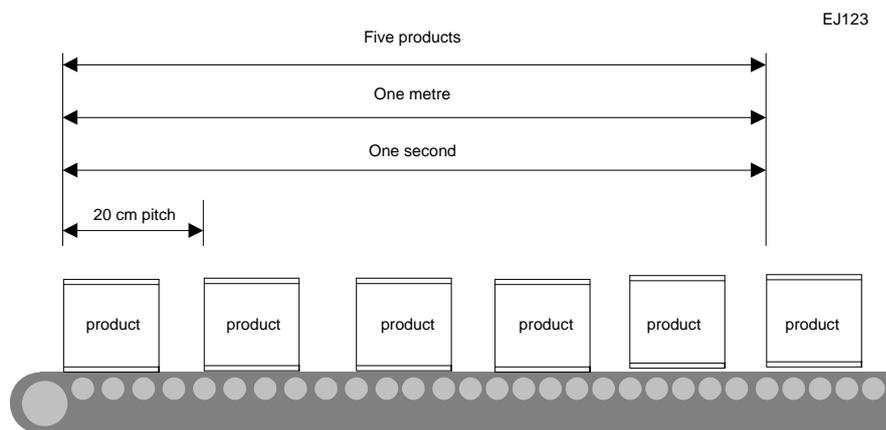
$$\frac{5 \text{ products / 1 second}}{5 \text{ products / 1 metre}} = \frac{5}{5} = 1 \text{ metre per second line speed}$$

5 products 1 second x 0.2 metre per second line speed

User Manual

EC-JET

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