Service Reference Manual

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Series

High Resolution Printing Systems

7100
7200
7400

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Suite #409
Arlington, Texas 76011

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Chapter 1

Introduction

The FoxJet FXJet series of Ink Jet Printers are capable of printing barcodes, custom logos, and alphanumeric characters on porous and semi-porous products as they pass in front of the printhead. The FXJet series is particularly effective for printing on corrugated cartons. Nothing touches the product other than the ink itself. There are no rollers or rubber typefaces to change. Simply entering a new message on the keyboard can change the print. The printer will usually display options available with each command and show prompts and status information to assist the user. SystemMaster™, a Windows™ based program (optional), can be used to program printers from a remote PC. The Model 7100 will drive one printhead. The Model 7200 and 7400 systems can drive up to two or four printheads respectively and operate in a multi-tasking environment. Tiny individual drops of ink, fired by the printhead at precise times form alphanumeric characters and special graphic characters as the product passes in front of printhead. The printhead ejects ink by microprocessor controlled piezoelectric crystals that force the ink through tiny orifices, creating very precise drops of ink. The printhead firing signals are synchronized to the movement of the conveyor belt or driven by an internal oscillator. In either case, a product detect circuit ensures that the desired message will be printed on the correct location on the package or carton.

Basic Operation

Single phase 110 VAC or 220 VAC, 50 or 60 Hz powers the FXJet series products. When product detect occurs (usually via photocell sensor), system will print characters in a dot matrix format. A system clock or encoder pulses synchronize printhead-firing pulses with product motion, insuring that printed message is positioned properly on product. The frequency of the firing pulses combined with the speed of travel determines the horizontal print resolution of the messages printed.

Using This Manual

This manual is designed to provide the distributor service representative with a service reference that will assist in providing a high level of support to end-users. The manual is not a substitute for factory training nor is it a replacement for the Operator's Manual. It is assumed that the user is familiar with general mechanical & electrical safety procedures. A section is provided for the insertion of Technical Bulletins, which are distributed regularly. Technical Bulletins augment the Service Reference Manual as equipment or software evolves.

Safety Precautions

Operating and servicing the FXJet Series system requires that certain safety precautions be followed in order to prevent equipment damage and/or personal injury.

When operating the system, observe the following precautions:

- Do not touch the face of the printhead while it is powered on. The printhead is heated to temperatures as high as 60º C .
- Avoid handling the ink system and ink hose while in operation.
- Keep system clean and free from dust, particularly when performing any maintenance procedures.
- Do not allow product to come in contact with the face of the printhead. Damage to the printhead is likely.

During servicing, ensure that:

- You always wear a grounded static wrist strap to avoid electro-static discharge when working inside the controller. The controller's electronics are susceptible to damage from electro-static discharge.
- Take care not to allow ink to come in contact with any electronic components or circuit boards. The ink is conductive and damage to circuitry will result.
- Service procedures are followed precisely.

Caution

A danger of explosion exists if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warning

Fire, explosion and severe burn hazard exists. **DO NOT** recharge, disassemble, heat above 100° C, incinerate or expose battery to water.

Application Design

Chapter 2

Design Factors

The FXJet Series Printing System is a simple, yet sophisticated product coding system. It can be used to print on a number of different porous and non-porous substrates, particularly corrugated cartons. The FXJet Series was designed to produce large and small characters as well as barcodes with almost instantaneous dry times. The ink system is gravity feed; ink flow relies on proper printhead position in relation to the ink reservoir. FXJet Series systems can be mounted in various manners and to print at virtually any angle. FXJet Series Printing Systems are comprised of three models: the Model 7400 for multiple printhead control (up to 4) with multi-tasking operation, the Model 7200 dual head control with multi-tasking operation and the Model 7100, a more compact single printhead system. Printheads can be configured in a modular housing for maximum flexibility in printhead angles or in integrated housings for optimum convenience and stability. Four maximum image area heights are available: 5", .75", 1.0", 1.8" and 1.9". FoxJet mounting hardware (or bracketry) consists of various combinations of stainless steel rods and brackets. Bracketry is available in kits and individual components.
Many factors must be considered when designing an application using FoxJet Printing Systems. In order of importance, they are:

Substrate type

FXJet Series inks adhere extremely well to porous and semi-porous substrates. Products must be clean, dry and residue-free. Printing on non-porous products with FXJet Series systems is not very effective because the ink cannot absorb into the substrate.

Speed

Line speed (speed of conveyor belt travel) is the most critical factor in determining the capability of the printheads to print reliably in a given application. When using the internal clock, line speed combined with firing frequency determines the print resolution. When using an encoder, the line speed combined with the encoder pulse train determines firing frequency that the printhead will fire. Shaft encoder assemblies are actually rated in terms of DPI.

The following page shows some simple mathematical formulas that can be used to calculate the feasibility of any print application. The maximum rate at which a FXJet Series 224/32 or 352/32 printhead can reliably print is 9 kHz. The frequency limit is slightly higher, 11 KHz for the 96/32 and 192/32 FXJet Series printheads.

Firing frequency, as it applies to a given application, is determined with the following two formulas.

- **Using Shaft Encoder:**

$$\frac{DPI}{W} \times LS = Freq.$$

Where:

DPI= Encoder base DPI rating
W= Width setting of FoxJet Controller
LS= Line Speed (in inches/second; IPS)
Freq.= Firing pulse train (in cycles/second; Hz) to printhead (9 kHz

Maximum for 224/32 & 352/32), (11KHz maximum for 96/32 & 192/32)

- **Using Internal Oscillator**

$$35000 \div W = Freq.$$

Print DPI's are determined with the following formulas.

- **Using internal oscillator (35kHz):**

$$\left(\frac{35000 \div W}{LS}\right) = DPI$$

Where:

DPI= Horizontal print resolution
W= Width setting of FoxJet Controller
LS= Line Speed (in inches/second; IPS)

- **Using encoder assembly:**

$$\left(\frac{P \div C}{W}\right) = DPI$$

Where:

DPI= Encoder base DPI rating
W= Width setting of FoxJet Controller
C= Encoder wheel circumference in inches (dS=C)
P= Pulses Per Revolution output of encoder

Product pitch

Product detection starts the print process for each product. It is important that the previous print cycle is complete before a new print cycle can start. Product spacing and photocell mounting must be such that print cycle is complete before next product is detected by photocell.

Environmental factors

FXJet Series systems will operate in ambient air temperatures ranging from 50º – 95º Fahrenheit. Humidity (non-condensing) can range between 20 % and 80 %.
Standard equipment cabinets are not water resistant, however, NEMA-4 cabinets are available as an option for locations using water wash-down procedures.

Equipment mounting

Equipment can be mounted directly onto conveyor line or in stand-alone assemblies. However, conveyor mounting is not highly recommended for systems using modular printheads because of the propensity for excessive conveyor line vibration that can cause the printhead to de-prime. A typical installation is pictured below. (See Specifications for equipment dimensions.)

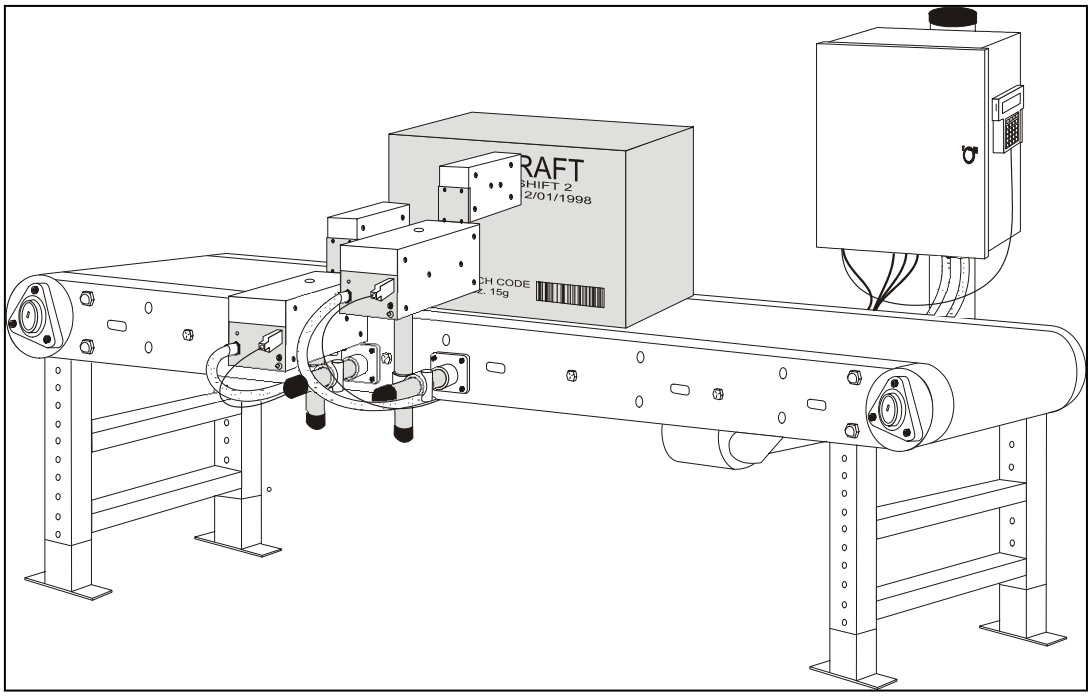


Fig. 2-1 Typical Conveyor Mounting

Product Detection (Photocell)

Product detection devices are used to initiate print cycles and properly locate printing on package. Photocells are more suitable than mechanical devices because they are less likely to produce " double pulses" per product. Photocells are usually mounted directly onto the printhead housing; however, they can be mounted directly to the conveyor with its own bracketry. Photocells must be mounted up-line from the printhead for accurate product detection. Most photocell assemblies have gain adjustments to tune the sensitivity of the sensor.

Proximity

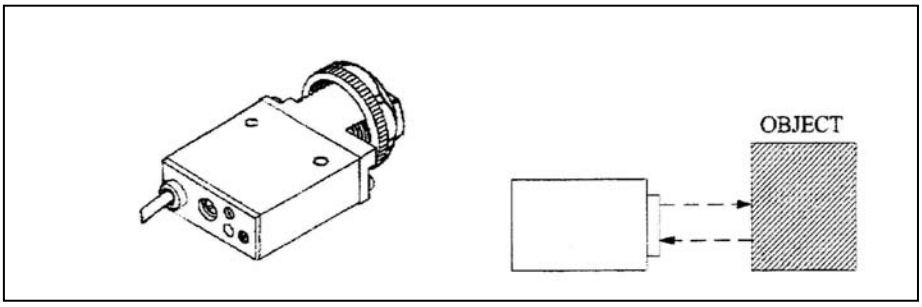
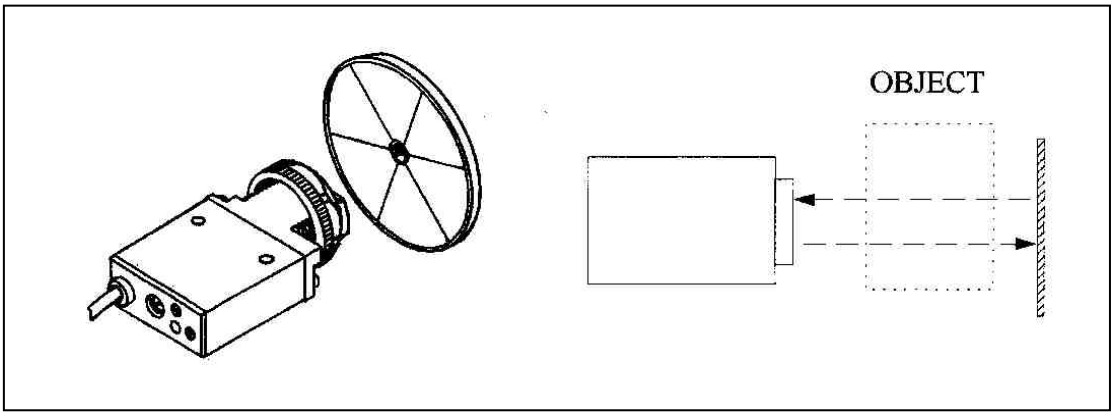


Fig. 2-2: Proximity Photocell

The proximity photocell senses its own emitted light reflected back as an object passes by. The proximity photocell is supplied with all systems and is effective for most applications.

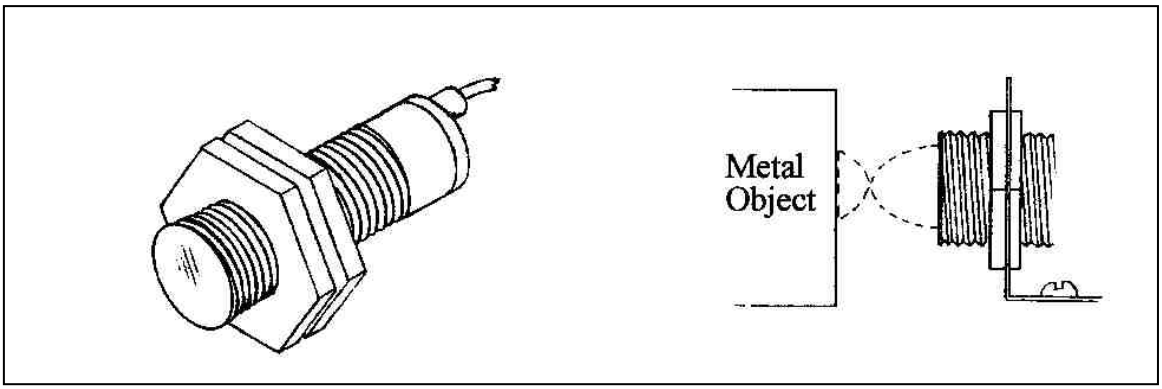


Reflective

Fig. 2-3 Reflective Photocell

The Retro-Reflective Photocell consists of a sensor and a reflector with the reflector mounted directly in front of the sensor on the opposite side of the conveyor so that product passes between the two. When the beam is broken, the photocell sends the product detect signal to the Controller.

(Product Detection Cont.)



Inductive

Fig. 2-4 Inductive Photocell

The Inductive Proximity Sensor uses a coil to radiate an electromagnetic field. When a metallic object approaches the sensor's surface, the magnetic field will distort. The distortion in the lines of flux induces a change in the current driving the coil and, consequently, send a product detect signal.

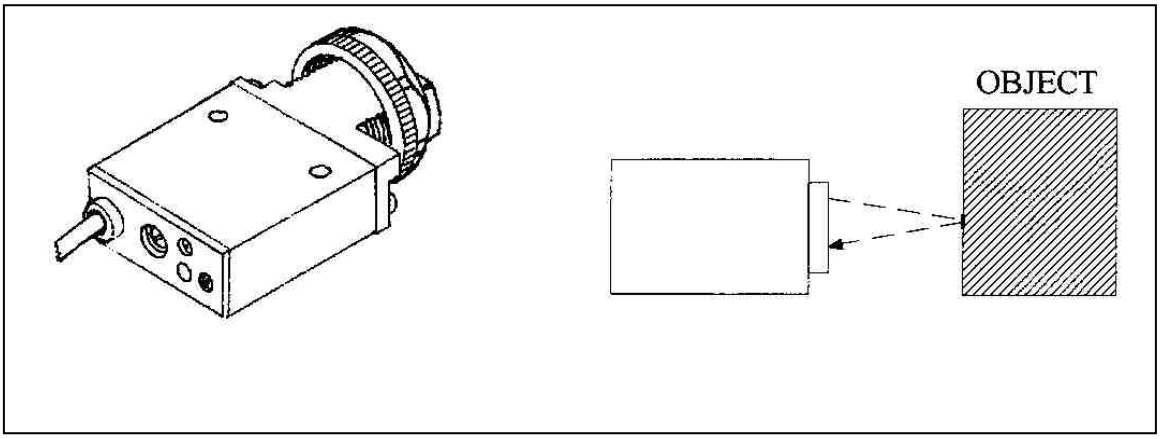


Fig. 2-5 Print Registration Photocell

Print Registration Photocell

The Print Registration Photocell detects a print registration mark on an object by sensing its own emitted light reflected from the mark. The sensing area can be as small as 0.04" (1 mm) in diameter at the focus point.

External Alarm

The External Alarm Beacon is used to indicate system ready and ink low situations. The beacon is comprised of a green light and a red light. When the CPU detects an ink low condition, it will cause the red light to flash. When the green light is lit, the system is ready for printing. The lenses on the lights are made of heat and shock resistant polycarbonate resin. The alarm beacon can be mounted onto a floor stand or integrated into a conveyor system.

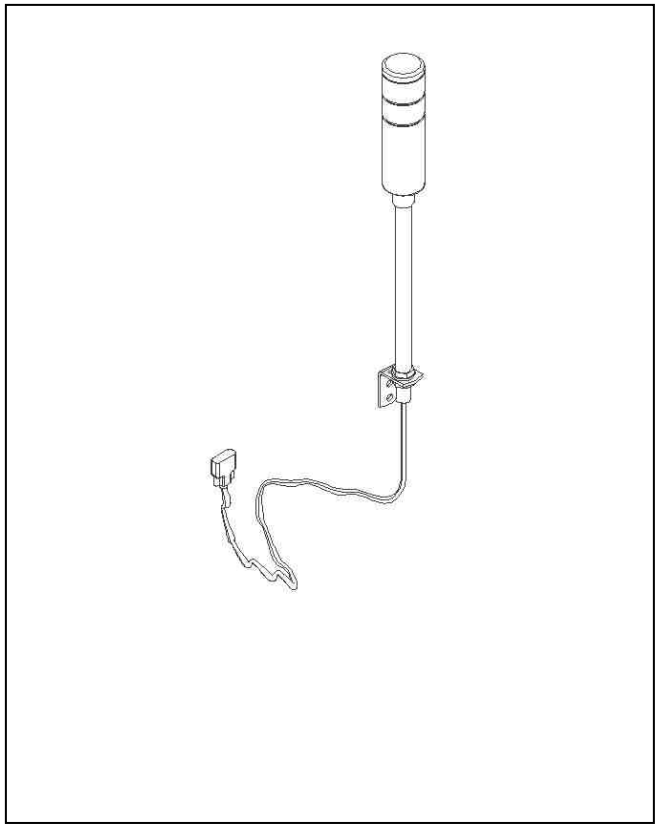


Fig. 2-6 Alarm Beacon

Line Speed Monitoring
(Shaft Encoder)

Shaft encoders are timing instruments necessary for applications with varying conveyor line speed and/or for printing bar codes.
The shaft encoder synchronizes printhead firing to the speed of the production line. Shaft encoders generate a pulse train whose frequency relates to the speed of conveyor line travel. Typically, shaft encoders are comprised of a wheel attached to the shaft of an encoder module. The size of the wheel and the number of pulse per revolution that the encoder outputs, will determine the print resolution. The rate of rotation will determine the frequency at which the printhead will fire. FoxJets' Shaft Encoder Kit is comprised of 1 wheel and a 5000 PPR shaft encoder mounted in a spring loaded pivot bracket that can be used to generate a pulse train that provides 142, 213 and 426 base DPI. Base DPI's can be further adjusted during programming. (See WIDTH command in the Command Definitions.)

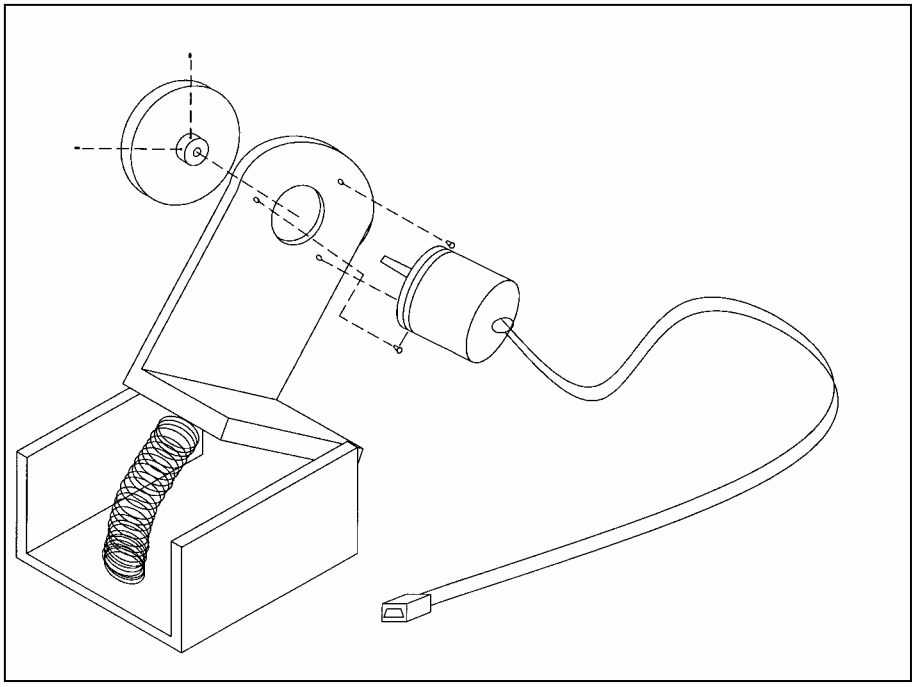


Fig. 2-7 Shaft Encoder

AutoPrint Module

The AutoPrint Module was designed to be used with the 7400 controller. It allows printing at specified intervals without photocell triggers. Popular applications for AutoPrint Module use are web printing applications such as tickets or wrapping materials. Any product where photocell triggers would be difficult to generate might be printed on using the AutoPrint Module.
The AutoPrint Module's dimensions are 3" x 2" x 3". It has three DB-9 cables mounted to the outside of the box. The system shaft encoder and photocell are connected to the AutoPrint Module instead of the Controller. LED's indicating presence of shaft encoder pulses and photocell signals (" product detection").
Product detection signals can be actual photocell triggers or AutoPrint Module generated photocell triggers. The AutoPrint Module has three modes of operation, selectable by a three-position toggle switch.

They are:

- **PT** - Pass Through. PT mode passes the Photocell and Shaft Encoder signals directly to the FoxJet controller and system operates as normal.
- **AP** - AutoPrint. AP mode generates " product detection" signals to the controller by counting shaft encoder pulses and comparing the count to operator input (thumb wheel switches). Photocell triggers are not necessary as in nor-mal printing modes.
- **PC** - Photocell. PC mode operates the same as AP mode, except that the photocell must be blocked continuously. In this mode, the photocell would act as an " AutoPrint Enable" signal.

This feature is built into the 7100 and 7200 controllers.

Theory of Operation

Chapter 3

The FoxJet printing system is comprised of a few standard parts that are used for all models. The difference between models will be the printhead used and the electronics that drive the printhead. The block diagram below is for the 7400 controller.

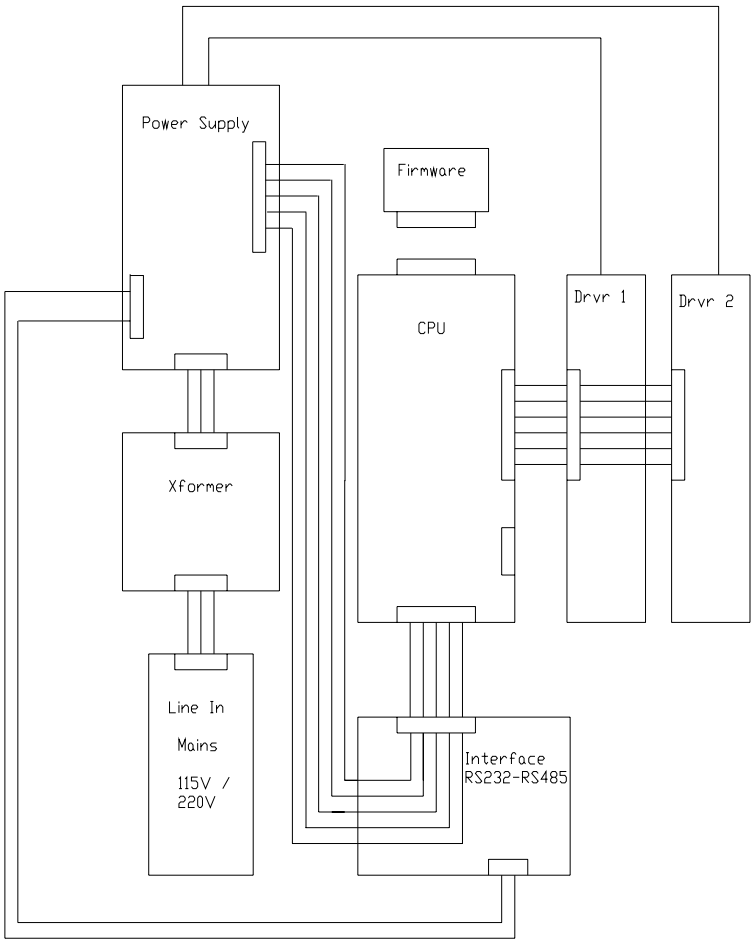


Fig. 3-1 7400 Controller Block Diagram

Power Supply - 7400 Controller

The power supply (or PSU) is a linear supply that provides all of the voltages used in the system. The input line voltage is selected by the orientation of the fuse module, allowing the user to match the environment line voltage for proper operation.

Input Voltages:

110V-120VAC 3A 50/60 Hz
220V-240VAC 1.5A 50/60 Hz

Output Voltages:

+5VDC 3 A used for logic circuits
+12VDC 2 A used for powering external peripherals
150VDC 0.25 A used for printhead drive voltages
36VAC 9 A used to heat printheads

Power supply voltage checks should be made with supply loaded and unloaded.
Sometimes failures of other circuits can give impression that power supply voltage is incorrect. And sometimes supplies can give good voltages in unloaded condition, yet not when circuits are connected to it.
All potentiometers on power supply are set at the factory and should NOT be adjusted in the field. If voltages are incorrect, there is a fault that cannot be remedied by adjusting a potentiometer.

CPU Board – 7400 Controller

The CPU board contains a 32-bit CMOS microprocessor for high performance data manipulation. 1 megabyte of RAM that is backed up by a Lithium battery is used to store printing parameters and messages. The RAM will also receive the operating instructions from the firmware module at power up.
The CPU will convert messages into bitmap images that it will pass to the driver board to be held in a FIFO (first in, first out buffer). The CPU will calculate the firing sequence based on parameters and when the photocell trigger occurs, send timing pulse train to fire printhead nozzles to driver board.
Timing pulses can be a function of shaft encoder input or an internal oscillator. Photocell inputs as well as shaft encoder inputs are received from the Interface card via Opto isolators.
Using an integrated keypad that uses RS232 communication through the Front Port connection sets messages and print parameters. The Controller can also be programmed with a PC via the Rear Port connection. The user can download ASCII command strings or use SystemMaster software to remotely control the FoxJet printing systems.

Firmware module – 7400 Controller

The Firmware Module connects directly to the CPU board. The Module will contain the system operating software. The current production standard is xxxx418xxx, but there are many custom versions and older versions in use. Always check the firmware version when working on systems and especially when replacing the firmware module.

Driver Board – 7400 Controller

The driver board is connected to the CPU by a 60-pin ribbon cable. This bi-directional cable provides printhead and ink system status to the CPU for fault detection and display. The LED's on the board show visual indication of the status that is being sent to the CPU. The CPU sends image data and timing pulse train to the driver board on this cable as well.
Switch SW1 on the driver board selects the voltage applied to each of the printheads that the driver will control. This selection is based on the printhead type and ink used.
The printhead heating circuit is controlled on the drive board. Two " pico" fuses are used to provide overload protection for the 36 VAC heating circuit on the board. If either of these fuses open, the HEATING LED will not light.
Image bitmaps containing message structure are brought into the FIFO when SE command is set. When the photocell trigger occurs and DELAY value is counted out, the CPU will send pulse train to slant circuit. The slant circuit will electronically delay the pulses to the nozzles so that the printed image will be vertical. These electronic delay values will vary based on the printhead being used and the SLANT command values. When using the 256/32 or the 352/32 printhead, OFFSET is used instead of SLANT.

Interface Board - 7400 Controller

Connected to the CPU by a 34-pin ribbon cable, the Interface board connects system to all peripherals and supplies 12VDC for those peripherals. The Front Port connection will supply the hand held terminal with 5 volts from the CPU circuits as well. The 12VDC is fused with poly switches and green LED's indicate when voltage is present. Early versions of this board used miniature circuit breakers instead of fuses.

Power Supply – 7100 & 7200 Controllers

The power supply (or PSU) is a linear supply (similar to the 7400) that provides all of the voltages used in the system with the exception of the 150 VDC. A high voltage module on the Controller circuit board produces this voltage. The input line voltage is selected by the orientation of the fuse module, allowing the user to match the environment line voltage for proper 0peration.

Input Voltages:

110V-120VAC 3A 50/60 Hz
220V-240VAC 1.5A 50/60 Hz

Output Voltages:

+5VDC 3 A used for logic circuits
+12VDC 2 A used for powering external peripherals
36VAC 9 A used to heat printheads

Power supply voltage measurements should be made with the power supply loaded and unloaded. Sometimes failures of other circuits can give the impression that the power supply voltage is incorrect. And sometimes power supplies can give good voltages in an unloaded condition, yet not when circuits are connected to it.
All potentiometers on the power supply are set at the factory and should **NOT** be adjusted in the field. If voltages are incorrect, there is a fault that cannot be remedied by adjusting a potentiometer.

7100 Controller

7100 single head controllers use basically the same circuits as a 7400, but they are integrated on one board. It uses the same Motorola 20 Mhz CPU. It has 1 MB of Ram and 1 MB of ROM. It will support 1 printhead. The keyboard interface is connected directly to the CPU via the front port (com 1). This allows the 7100 Controller to be networked easily. The Rear Port and Aux Port are serial connections, so networking doesn't require special connectors. The driver board(s) have been replaced by a Driver section on the single board. The RS-232/RS-485 interface board has been incorporated also.

7200 Controller

The 7200 Dual Head Controller uses FoxJet's newest designed board. All of the features of the 7100 board are present with increased memory capacity of 2 MB of SRAM and flash ram. Multitasking has been added with inputs for two photocells and two shaft encoders. All options on the board are controlled with software commands eliminating the need for jumpers and switches. The board has two additional communication ports. They are both software selectable between RS232 or RS485. A PS2 port has been added which may be used to interface to hand-held scanners. The Dual Head Controller supports connection of FoxJet's large character keyboard.

Ink Delivery System

The standard Ink System consists of a prime bulb, ink reservoir, check valves, and a control board to perform ink low sensing. There are two systems in use now: a Modular Ink System (also called Manual Prime) used with modular printheads and the Integrated Printhead/Ink System. The prime bulb is only used to pump ink throughout the tubing and printhead to purge air out of system. Thereafter, ink flows from tank to printhead by gravity feed capillary action. The advantage to this type of ink delivery is that no thinning solvents are necessary and there are no moving parts during print operation. The gravity feed ink delivery system requires that the printhead be positioned properly in relation to the ink system. If the printhead orifice plate is too high in relation to the ink level, the printhead will de-prime after a few prints. Since the head pressure of the ink level in the tank can't overcome the force of gravity, the printhead eventually can't refill itself. If the printhead orifice plate is lower than the ink level in the tank, the printhead will constantly leak (weep) ink. When printing while in this condition, the printhead's piezo crystals will not be able to generate enough velocity to overcome the surface tension of the ink covering the array and, consequently, message will not be printed on product.

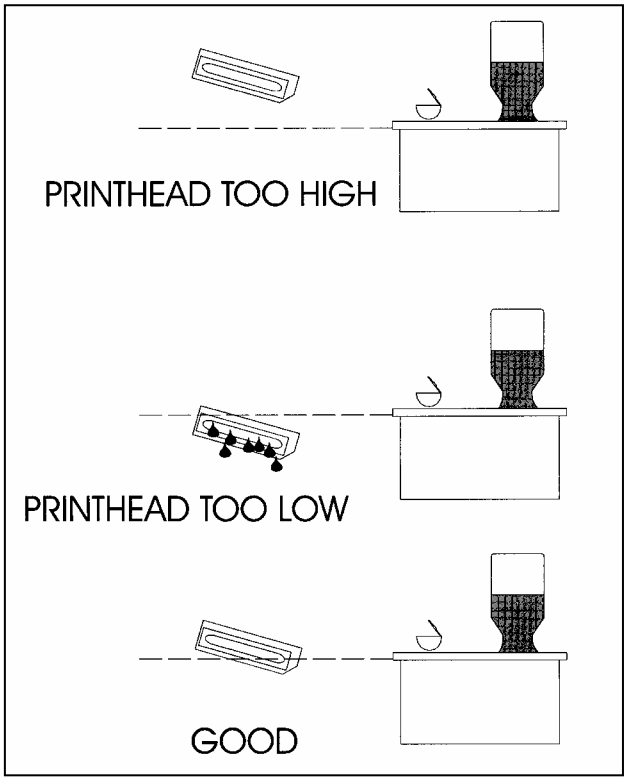


Fig. 3-2 Ink Level

Printheads

The printhead is comprised of 32 identical channels or nozzles sharing common ink supply manifold. Each channel contains a piezo electrical ceramic transducer with a foot bonded to it, in contact with the ink in the chamber. The other end of each channel has several extremely small orifices where the ink is ejected (3, 6, 8 or 11). When a drive pulse is applied, the length of the transducer decreases, creating a void, which fills with ink. The drive voltage is then rapidly removed and the transducer returns to its original length, creating pressure in the chamber. This causes ink to be ejected through the extremely small orifices at the end of each channel. Surface tension turns the ejected ink into small droplets. This fill-before-fire process is the same for all the 32 equally spaced channels.

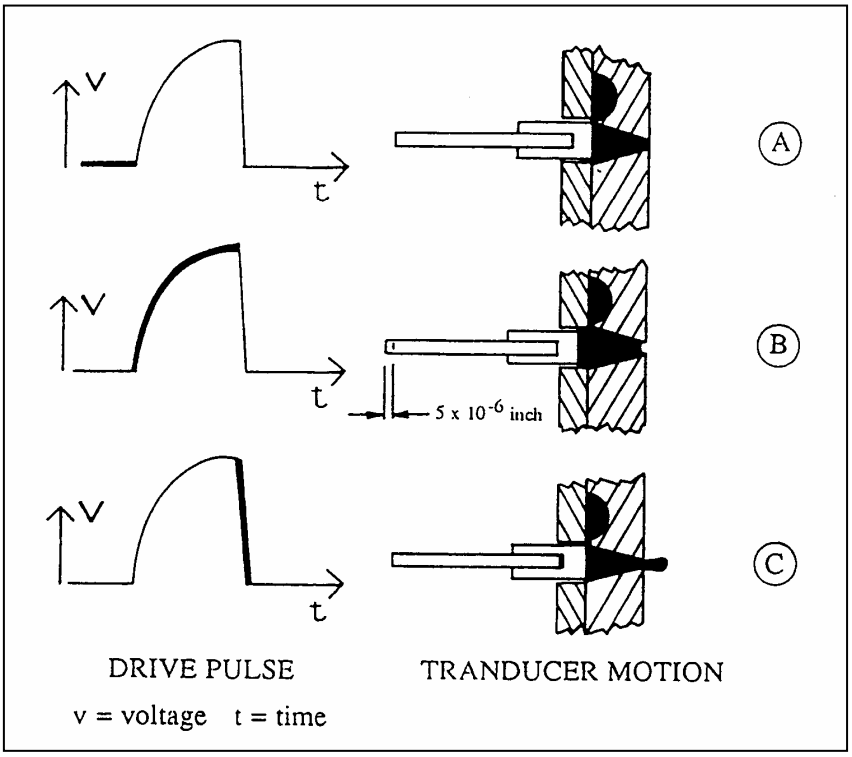


Fig. 3-3 Firing Pulse

By varying the printhead angle of the 96/32 printhead, different print heights can be obtained. However, the more you rotate the printhead away from the recommended angle, the lower the vertical print resolution will be.

The 96/32 printhead can come with either a 27º or 16º-orifice plate (CP/OP), which allows two different print heights (0.75” or 0.5” respectively).

The 192/32 printhead is mounted at 32º and will print 1”.

The 1.8”Printhead (224/32) can be mounted at various angles between 32º-90º.

The 1.9" Printhead (352/32) is always mounted at 90º angle.

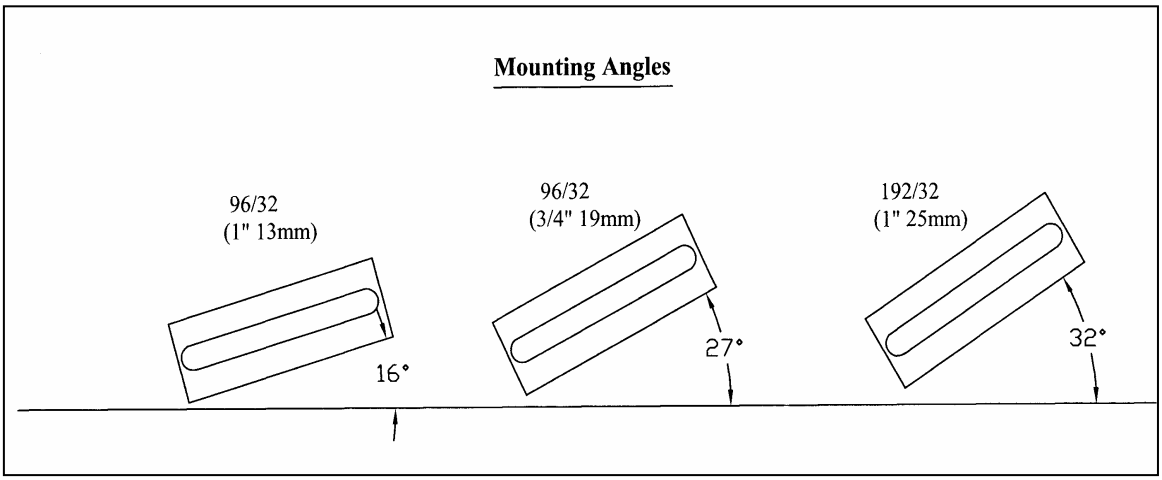


Fig. 3-4 Mounting Angles

The slant circuit on the Drive Board controls the timing of ink droplet ejection, allowing the user to input the font as if the printhead was completely vertical.

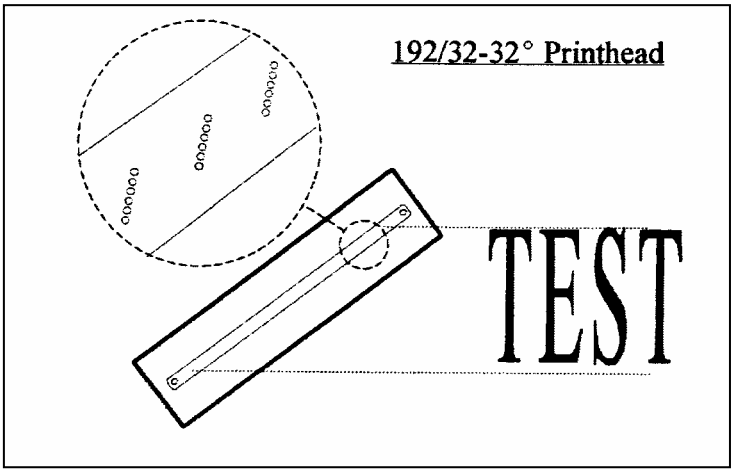


Fig. 3-5 Slant View 1

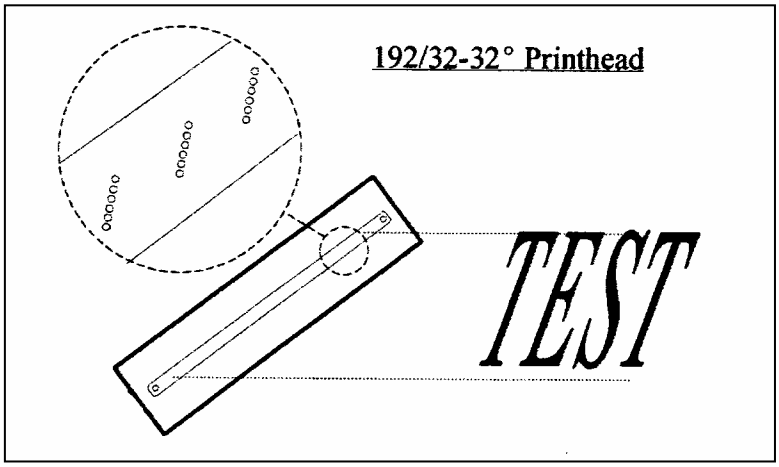


Fig. 3-6 Slant View 2

The 1.9” image area is achieved by the different configuration of the orifices. The OFFSET command is used instead of the SLANT command to help control the printhead timing pulses.

352/32-90º

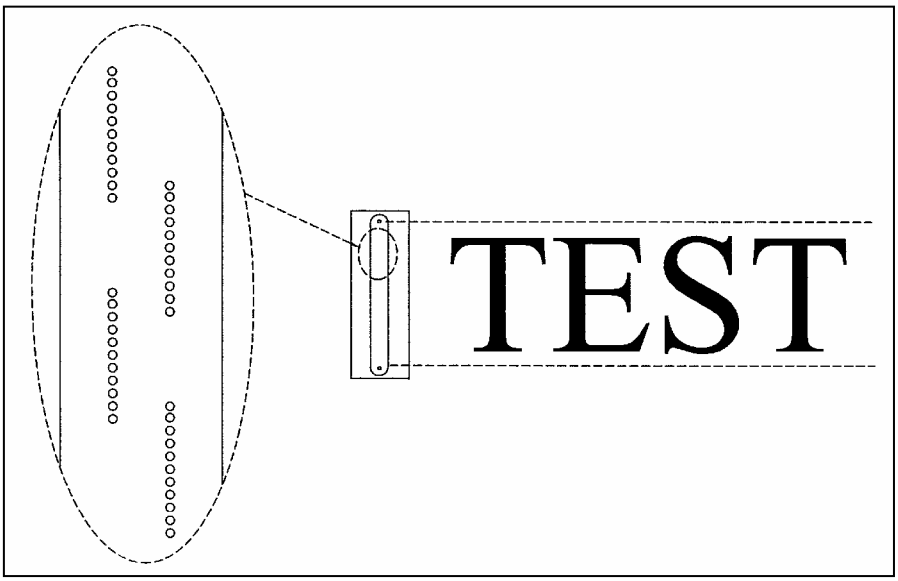


Fig. 3-7 Offset View

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Programming

Chapter 4

Programming the FoxJet Printing System can be accomplished in three different manners; through the Printer's keyboard, SystemMaster or through user-defined ASCII command strings. The Command Definitions found later in this manual will help to explain the function of each command. Some commands interact with others and affect the operation of the FoxJet printer. For instance, changing the WIDTH command will require changing the DELAY command. As the value of the WIDTH command increases, the print resolution will decrease. Refer to Formulas in Design Application for more information concerning print resolution. The DELAY value determines how long after product detect that a print cycle will occur. The DELAY value is in rasters, and the print resolution determines how many rasters there are in a given length of conveyor travel. If print resolution is 300 DPI, then a DELAY value of 300 would represent an inch of belt travel. Another important relationship is the WIDTH and OFFSET/SLANT values. Offset is used with the 1.9" printhead and Slant is used with all others. Chapter Five has more detail concerning the relationship between the OFFSET/SLANT and WIDTH commands.
Fonts or Font Codes as they are used in the FoxJet Printer refer to codes that select a particular dot matrix size, a low-resolution logo (graphic), or one of several bar code symbologies.

Keyboard Programming

Programming the FoxJet printer with the hand-held keyboard (older 7400) or the integrated keyboard is accomplished by entering the two letter code for the command, entering the desired data or condition and pressing the 'ENTER" key. The command will be saved until next change. Refer to the Chapter Five for definitions of the commands and directions in how to use. Most commands are only valid for current head selected by the HEAD command, particularly editing commands. Those commands will require programming for each printhead. A few relate to two printheads (7100 systems have only one printhead). Most configuration commands will impact all heads connected to the controller.
The FoxJet display will also display system status, such as the Main Screen shown below.

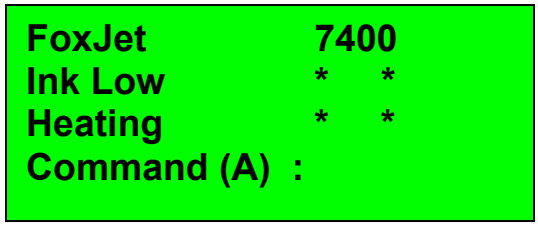


Fig. 4-1 Main Screen

The fourth line in any of the command screens will indicate which printhead the command will affect. In the example below, the OFFSET command would only apply to Printhead A.

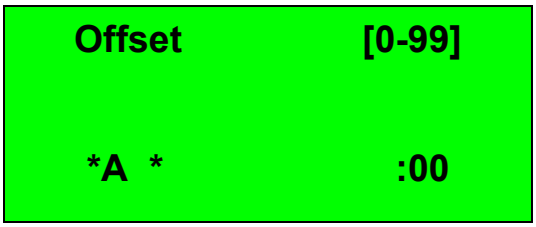


Fig. 4-2 Printhead Selected

There a few status screens that appear on the display to indicate a condition that requires immediate attention (one shown below will be in xxxx415xxx firmware).

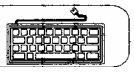
Fig. 4-3 Low Battery Screen

Keyboard Specialty Keys

The following symbols show methods for navigating through the edit screens on the handheld terminal (older 7400 only).

Alt ←	Moves the cursor left one character
Alt →	Moves the cursor right one character
Alt ↑	Moves the cursor one line up
Alt ↓	Moves the cursor one line down
Enter ↵	Saves all changes
Alt Esc	Aborts all changes
Alt Clr	Deletes the character behind the cursor (destructive backspace)
Shift	Toggles between upper and lower case characters
Alt Shift C	Clears the entire message

The following symbols show methods for navigating the built in Keypad. (7X00 series)

◁	Moves the cursor left one character
▷	Moves the cursor right one character
△	Moves the cursor one line up
▽	Moves the cursor one line down
ENTER	Saves all changes
ESC	Aborts all changes
BACK	Deletes the character behind the cursor (destructive backspace)
SHIFT	Toggles between upper and lower case characters
ALT 1  CLEAR	Clears the entire message

Adjusting LCD contrast

To increase the LCD screen contrast:
Press and release the ALT1 key and then press and release the UP arrow key. Repeat the sequence until the desired contrast level has been set.

To decrease the LCD screen contrast:
Press and release the ALT1 key and then press and release the DOWN arrow key. Repeat the sequence until the desired contrast level has been set.

SystemMaster™ Programming

FoxJet has developed a Windows-based program that will control up to 32 FoxJet Printers or controllers through the external port (Rear Port). SystemMaster use and programming is fully discussed in the SystemMaster User's Guide.

External Programming

The Rear Port provides for external communication via RS-232 or RS-485 protocol, using 8 data bits, no parity bit, and 1 stop bit. External programming requires a thorough understanding of the command structure and definitions of the FoxJet printer. This information can be found in Chapter Five.
External Programming (or Rear Port Programming) is accomplished with ASCII command strings.
Some ASCII characters have special functions such as Carriage Return (designated as <CR>, hex value 0D), Line Feed (<LF>, 0A), Form Feed (<FF>, 0C), and Control F (CTRL-F, 06).
Many of the two letter commands detailed in Command Descriptions pertain to individual heads. When these commands are received, the printer applies those changes to the Current Head. The Current Head defaults to head A and may be changed with the HEAD command (see Command Descriptions). Please refer to the Command Definitions for a more complete description of which commands apply to single heads, dual heads, and all heads.
Download times are 1 millisecond per ASCII character when using 9600 baud. The FoxJet printer will take an average of 30 to 45 milliseconds to decode and compile print jobs. If more specific information concerning decode and compile times are needed, contact your Support Representative.

Special Techniques

Some time saving techniques are explained in the following sections.

Embedded Codes

When creating messages, embedded codes can be inserted into the printed message that will automatically update as time passes. These codes are detailed below. Inserting {DT} into a message will print the date as determined by system date set with the DATE command every time that message is printed.

Table 4-1 Embedded Codes

Date		Time	
{DT}	*Inserts MM:DD:YY	{TI}	Inserts Hour:Minute:Second
{YE}	*Inserts Year	{HO}	Inserts Hour
{MO}	Inserts Month	{MI}	Inserts Minute
{DA}	Inserts Day	{SE}	Inserts Second
{JD}	Inserts Julian date	**Expiration**	
{YL}	Inserts last digit of year	{EC}	*Inserts Exp. MM:DD:YY
{AD}	Inserts DDD (alphabetic)	{EY}	*Inserts Exp. Year
{DW}	Single digit day of the week, where Monday is 1	{EA}	Inserts Exp. MMM (alphabetic) JAN, FEB, …
{YW}	2-digit week of the year, where Jan 1 is 1st week	{EH}	2 Char. Exp. Month JA,FE,MR,…
{AM}	Inserts MMM (alphabetic)	{EJ}	Inserts Exp. Julian date
{CD}	4-digit number derived from the system date	{EL}	Inserts last digit of Exp. year
Rollover Date		{EW}	Inserts Exp. DDD (alphabetic)
{RM}	Inserts Rollover Month	{EM}	Inserts Exp. Month
{RD}	Inserts Rollover Day	{ED}	Inserts Exp. Day
{RC}	*Inserts Rollover Date	**4 Digit Year Commands**	
{RY}	*Inserts Rollover Year	{E2}	Inserts Exp. MM:DD:YYYY
{JR}	Inserts Rollover Julian date	{E4}	Inserts Exp. Year YYYY
{RA}	3 Char. Alpha Rollover Month	{D2}	Inserts date MM:DD:YYYY
{RB}	3 Char. Alpha Rollover Day of the week	{D4}	Inserts Year YYYY
{RL}	Inserts last digit of Rollover year	{C2}	Complete Exp. Rollover Date MM-DD-YYYY
Expiration (Based on Rollover Date)		{C4}	Exp. Year based on Rollover Clock YYYY
{DR}	2-Digit Day Exp.	{R2}	Inserts Rollover Date
{XR}	2 Digit Exp. Month	{R4}	Inserts Rollover Year
{YR}	*Last 2-Digits of Exp. Year	**Misc. Embedded Codes**	
{CR}	*Complete Rollover Date MM-DD-YY	{SH}	Inserts the Shift Code (A, B, C)
{MR}	2 Character Exp. Month JA,FE,MR,AR,MA,JN,…	{BB}	Prints reversed (white on black)
{ZR}	3 Character Alpha Month		

*** If FD command is set to Y (yes) the year will print 4 digits**

Embedded Numbers Codes

Embedded codes for Numbers will print desired numbers value for batch counting or product counting per shift. When the NUMBERS command was set up, an upper and lower value was set, was well as an incremental value. Embedded codes are used to print the result of the counting operation as part of a message, updating as photocell triggers occur. Embedded codes for numbers format is detailed below.

d = variable, for that digit of the counter that is to printed.

Example of entering an embedded message for Numbers:
{V3V2U1}.

This embedded code will print lowest three digits of the numbers counter, leaving out leading zeros and counting up from LOWER value. The initial value and incremental value is set with the Numbers command.

Table 4-2 Numbers

Numbers	
{ NL}	To print the counter as a down counter, all 8 digits
{ Ld}	To print a specified digit of the counter as a down counter.
{ Wd}	To print a specified digit of the counter as a down counter, unless it is a leading zero
{ NU}	To print the counter as an up counter, all 8 digits
{ Ud}	To print a specified digit of the counter as an up counter
{ Vd}	To print a specified digit of the counter as an up counter, unless it is a leading zero

Alternative Input Devices

Input devices other than the handheld terminal can be connected to the Front Port connection on the FoxJet controllers (Rear Port (comm. 3) or Aux Port on 7100 systems).
Any device that can output ASCII in RS-232 format can be used. One such device is a barcode scanner. A barcode scanner can be programmed to generate a Call Group or Label Save based on the information read from the barcode. A hand scanner can also be used to do a Label Request from SystemMaster. Another is a programmable scale. Products can be weighed and the EDIT function can be used to input the data into a message. The device connections must match those of the Hand-held terminal supplied with standard FoxJet controllers.

One-for-One Printing vs. Batch Mode

When using external programming and a printed message needs to be changed on every print cycle (one-for-one printing), the editing session for that message should be terminated with a form feed <FF>. This causes the controller to build up the image of that message only once for each edit session. Consequently, in one-for-one printing, there will be an edit session for every print cycle. Image build times will limit the effectiveness of One-for-One printing. Typical image builds range from 30-50 milliseconds for 50 characters. Barcode image builds are in the 10-20 millisecond range for 15 characters. However, in cases where a message doesn't change from print cycle to print cycle, it isn't necessary to edit that message more than once. Any embedded commands such as counters or system date will automatically be updated on each print cycle. One-for-one printing and batch mode printing may be mixed. For instance, if message #1 prints a counter using the embedded code, {U2U1} , and message #2 prints a product code that may change on every print cycle, and both messages are to print on each cycle, the following procedure should be followed:

1. Edit message #1 one time and terminate the session with a <CR>.
2. Before every print cycle edit message #2 with the correct product code and terminate the session with a <FF>.

Barcode Programming

Barcodes are a series of printed bars whose patterns of bars and spaces can contain much information in a short message. Bar code readers can read these barcodes very quickly and usually from great distances. There are two width and four width bar codes. The most commonly commercially used codes are SCC-14 (Shipping Container Code) and UPC-A (United Product Code). These codes are two width codes; i.e. they are comprised of two different widths of printed bars and non-printing spaces. The wide bar is typically 2.5 x the width of the narrow bar. The same ratio applies for the non-printing spaces.
The FoxJet FXJet Series is capable of producing high quality barcodes on cartons. Versa Print ink is very effective for printing on corrugated cartons. The ink absorbs into the carton very fast. As ink absorbs, however, the print can spread (or " bleed"). Barcode bar widths and spaces need to be very precise so FoxJet has provided the user the ability to adjust the bar and space widths as needed to generate quality barcodes on any type of porous and semi-porous substrates. It is highly recommended that systems being used in applications printing barcodes have an encoder installed with 245 DPI wheel.

All barcode fonts can be set up using the following procedure. The quality of the code is dependent upon print resolution and the absorption characteristics of the substrate.

1. Use the EDIT command to set up your message. Select the desired font and bold level. The BOLD value will automatically set the barcode widths of all barcodes except those using I 2 of 5 (Interleaved 2 of 5).

2. Enter in the desired data on the first line. The raster widths can be adjusted at this point (see picture below).

3. Set the LONG BAR command to desired height. The height of the long bar is set in channels, so with LONG BAR at 16, the bars would be printed at .5" high on a 1" printhead.

4. Select the message to be printed with the SELECT command.

5. Set up all other printing parameters.

6. Adjust the bar widths and spaces if necessary using the EDIT command to view your message again. This time the display will show the bar widths and spaces (in rasters) as programmed by the BOLD level used. Each width can be adjusted individually to achieve the proper widths and ratios. The example below shows the bar and space widths for Font Code 92 (I 2 of 5). The largest number represents the wide space width in terms of rasters. Notice that it is wider than the wide bar width. This is because the printed bar will " bleed" and spread.

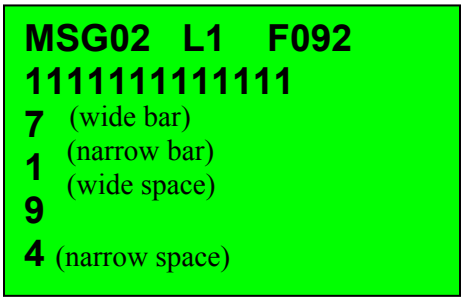
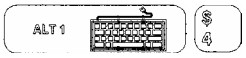


Fig 4-4 Barcode Parameters

Barcode Parameter Menu

Firmware version 415 and above has a font (#47) that contains a menu for programming several variables for an Interleaved 2 of 5 barcode. It is activated from the message edit screen. You will need to select a font 47 and input barcode data in the message first. The keystroke sequence to activate the parameter menu is 

for (7400) and 

for the (7100 & 7200).

The following menu options are available.

Fig. 4-5 Barcode Parameters

Currently, the barcode dimensions are based on the **MAG** and the **T**ype **H**ead command settings. The **T**ype **H**ead command tells the system which printhead is installed. 352/32 **T**ype **H**ead setting will assume a 245 DPI print resolution and 192/32 selection will assume 142 DPI print resolution. The **MAG** value combined with **T**ype **H**ead selection will load pre defined bar/space widths.

- To disable horizontal bearer bars, set **HBD** to zero.
- Check Digit (**CD**) selects automatic check digit generation.
- Interleaved 2 of 5 barcode requires an even number of digits, including check digit. If barcode message contains an odd number, a leading zero will be automatically added.

SCC-14 (I 2 of 5)

1. EDit a message and select font #47.

2. Enter the desired data to be coded on line one. Even though the Check Digit is not automatically generated, it will be printed. The user must input the check digit as part of the message.

3. Use the following key sequence to enter the bar code menu.

-- 7400

-- 7100, 7200

4. Make the following selections:

Fig. 4-6 Barcode Parameters

Command	Description	Option
M	Message#	1-200
CD	Automatic Check Digit	N
HR	Human Readable Character	Y
HBD	Horiz. Bearer Bar Height	2
CR	Check Digit Part of HR	Y
VB	Vertical Bearer Bars	N
HT	Height of Barcode	32
MAG	Barcode Magnification	100%

5. Setting the bar widths and spaces can be done manually using the table below or have the controller set it automatically.

Variable Bar/Space Widths (All Printheads - 245 DPI)				
	70% Mag	80% Mag	90% Mag	100% Mag
Wide Bar	15	17	19	21
Narrow Bar	3	4	5	6
Wide Space	18	21	23	26
Narrow Space	8	9	11	12

6. Enter the barcode data on line one. For automatic setting, save message and then SElect it. After you have selected it, the Controller will put the width and space data in automatically for the printhead and DPI you are using.

7. Set all other necessary printing parameters. See Command Definitions for detailed information on all commands.

UPC-A

1. EDit a message and select font #98.

2. Enter the desired data on the first line.

3. Setting the bar widths and spaces can be done manually using the table below or have the controller set it automatically.

4. For automatic setting, save message and then SElect it. After you have selected it, the Controller will put the width and space data in automatically for the printhead and DPI you are using.

Variable Bar/Space Widths (All Printheads – 245 DPI)		
Line 2	Widest Bar – Widest Space	28 31
Line 3	3rd Width Bar – 3rd Width Space	21 14
Line 4	2nd Width Bar – 2nd Width Space	13 17
Line 5	Narrow Bar – Narrow Space	05 10

128

1. EDit a message and select font #46.

2. Enter the desired data on the first line.

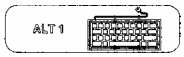
3. Setting the bar widths and spaces can be done manually using the table below orhave the controller set it automatically.

4. For automatic setting, save message and then SElect it. After you have selected it, the Controller will put the width and space data in automatically for the printhead and DPI you are using.

Variable Bar/Space Widths (All Printheads – 245 DPI)		
Line 2	Widest Bar – Widest Space	28 31
Line 3	3rd Width Bar – 3rd Width Space	21 14
Line 4	2nd Width Bar – 2nd Width Space	13 17
Line 5	Narrow Bar – Narrow Space	05 10

Font Selection Codes

The font code table below will assist in determining which font code to use for specific applications.

Once in the EDIT screen, the user can select the font by pressing the 

key then 

key. The cursor will jump to upper right of display and the font can be selected there. The BOLD value can also be set with the font selection.

For example, to set the font to 7 with a BOLD of 3, enter 307 after reaching the font selection field. Pressing the 

key will save the font in the message and move the cursor back to line 1 of the message content section. If a font is entered that is not part of the firmware for that system, the font code will revert back to the previous font selected.

Font Chart
Table 4-3

Font	Description	Output	Series
1	Micro-Spacing. Only allows spaces (no characters)	Spaces	FXJet WaxJet
2	UPC Shipping Container Barcode 100% Top half (For Twin Printheads) (Not for 7100)	½ Barcode	FXJet
3	UPC Shipping Container Barcode 100% Bottom half (For Twin Printheads) (Not for 7100)	½ Barcode	FXJet
4	UPC Shipping Container Barcode with Wide Bearer Bars 1-30 Characters	Barcode	FXJet
5	5hx6w Dot Matrix, 5 dots high Character	5 Lines	FXJet WaxJet
7	7hx6w Dot Matrix, 7 dots high Character	4 Lines	FXJet WaxJet
8	8hx8w Dot Matrix, 7 dots high Character (Not for 7100)	4 Lines	FXJet
9	10hx10w Dot Matrix, 9 dots high Character	3 Lines	FXJet WaxJet
10	UPC Shipping Container, with HR and Check Digit 2–30 Characters	Barcode	FXJet
11	UPC Shipping Container, with HR and NO Check Digit 2–30 Characters	Barcode	FXJet
14	16hx16w Dot Matrix, 12 dots high character **(Code Page)** (Not for 7100)	2 Lines	FXJet WaxJet
15	16hx8w Dot Matrix, 12 dots high Character (Not for 7100)	2 Lines	FXJet WaxJet
16	16hx10w Dot Matrix, 14 dots high Character (Not for 7100)	2 Lines	FXJet WaxJet
16	16hx16w Dot Matrix, 12 dots high Character **(Code Page)**	2 Lines	FXJet*
17	16hx12w Dot Matrix, 16 dots high Character	2 Lines	FXJet
30	32hx32w Dot Matrix, 28 dots high Character **(Code Page)**	1 Line	FXJet WaxJet
31	32hx24w Dot Matrix, FXJet; 32 dots high Character WaxJet; 31 dots high Character (**Code Page** for 7100)	1 Line	FXJet WaxJet
32	32hx24w Dot Matrix, 28 dots high Character (**Code Page** for 7100)	1 Line	FXJet WaxJet

Font Chart – Table 4-3 Cont.

Font	Description	Output	Series
33	32hx15w Dot Matrix, 24 dots high OCR-B Characters (Numeric Only, Not for 7100)	1 Line	FXJet
34	32hx21w Dot Matrix, 32 dots high OCR-B Characters (Numeric Only, Not for 7100)	1 Line	FXJet
35	32hx13w Dot Matrix, 23 dots high OCR-B Characters (Numeric Only, Not for 7100)	1 Line	FXJet
36	32hx22w Dot Matrix, 24 dots high OCR-B Characters (Numeric Only, Not for 7100)	1 Line	FXJet
37	32hx22w Dot Matrix, 24 dots high (Not for 7100)	1 Line	FXJet
40	EAN 13 Barcode	Barcode	FXJet WaxJet
41	EAN 8 Barcode	Barcode	FXJet WaxJet
42	Code 39 Barcode (w/HR)	Barcode	FXJet WaxJet
43	Code 128 Barcode (w/HR)	Barcode	FXJet WaxJet
44	UCC/EAN Code 128 Barcode (w/HR)	Barcode	FXJet WaxJet
46	UCC/EAN 128 Barcode Application Identifiers (w/HR)	Barcode	FXJet WaxJet
47	Universal I2 of 5	Barcode	FXJet WaxJet
50	® Registered Trade Mark	Graphic	FXJet WaxJet
51	Solid Recycle Logo	Graphic	FXJet WaxJet
52	Outlined Recycle Logo	Graphic	FXJet WaxJet
53-58	Custom Programmed EPROM logo space	Graphic	FXJet WaxJet
59	“Test Pattern” Logo	Graphic	FXJet WaxJet
60-74	User Downloadable Logos (Not for 7100)**	Graphic	FXJet WaxJet
60-61	User Downloadable Logos	Graphic	FXJet* WaxJet
90	Postnet Barcode	Barcode	FXJet
91	Alphanumeric Mixed Font	Up to 4 lines	FXJet WaxJet
92	Interleaved 2 of 5 Barcode 1-30 Characters	Barcode	FXJet
93	Code 39 Barcode	Barcode	FXJet
94	UPC Shipping Container Barcode 62.5% (w.HR)	Barcode	FXJet
95	6 Line PostNet Barcode	Text/Barcode	FXJet
96	UPC Shipping Container Barcode 70% 1-30 Characters	Barcode	FXJet
97	Code 128 Barcode	Barcode	FXJet
98	UPC A Barcode	Barcode	FXJet
99	UPC E Barcode	Barcode	FXJet

** 7100 Only ** 7200 & 7400*

When a font is selected that is not available, the font number will go back to last font used.

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Command Definitions

Chapter 5

Each command definition details function, data entry options and ASCII string for use in external programming. FoxJet input terminal operation is discussed fully in the Operator's Manual and in the Programming chapter of this manual. The following commands apply to 418 firmware released in fall 2000. Not all commands will apply to every system. Custom firmware may have additional command sets and some of the commands may operate differently than the standard configuration.

Configuration Commands

Configuration commands are used during the initial setup of the system. Commands that are associated with the whole system operation or the configuration of the printhead will be in this section.

BAud rate [Y/N]

- Models – 7100 systems only

Accessed through keyboard, sets baud rate for Rear Port communication for Quantum systems. Must be set to match control device. The arrow keys select the desired baud rate. **Default is 9600.**

C2

- Models – 7200 systems only

Sets baud rate for comm. Port 2. Use arrow keys to adjust baud rate from 9600 to 38.4K.

C3

- Models – 7200 systems only

Sets baud rate for comm. Port 3. Use arrow keys to adjust baud rate from 9600 to 38.4K.

C4

- Models – 7200 systems only

Sets baud rate for comm. Port 4. Use arrow keys to adjust baud rate from 9600 to 38.4K.

Curve

- Models – All FXJet Series.
- Affects selected head only.

The TS command (7200 only) must be entered in order to access the CUrve command. This is a protected command. The TS code of the day must be obtained from FoxJet Technical Service. It will rarely be used since the firmware does an excellent job of setting the firing pulses. To change the fire pulse settings, send 6 digits*, which represent the three 2-digit fields. The firing pulse settings vary with the ink type and printhead type. This command is designed for precise control of the piezoelectric crystal's pulse width. The following table shows recommended settings (default for 418 firmware).

Table 5-1 Curve Command Settings

Printhead	7100 Controller	7200 Controller	7400 Controller
96/32	17:00:00	17:00:00	43:00:00
192/32	13.5:05:06	13.5:05:06	35:13:15
352/32	13.5:05:06	13.5:05:06	35:13:15
224/32	17:00:00	17:00:00	43:00:00

Example: To change the curve to 43:10:06, enter:
CU431006<CR>
Using a 192/32 or 352/32 printhead with a 7100 or 7200 controller, you must send 7 digits.
Example: **CU1350505<CR>**

Date [mm-dd-yyyy]

- Models – All

Sending 6 digits in MMDDYY format sets the system date. Set at installation and kept current by backup battery.
Example: To change the date to Jan. 2, 1998, enter:
DA010298<CR>

Display [1-4]

- Models – All

The front port display may be set to one of the following options:
1 -- VT-100 Emulation Terminal
2 -- Wyse Terminal
3 -- FoxJet Terminal
4 -- Reserved for future use
Example: To change the display to VT-100, enter:
DI1<CR>

ENcoder [Y/N]

- Models – All

If there is an external shaft encoder, this should be set to Y. When set to N, the controller generates an internal shaft encoder. Switch 4 of SW2 on standard CPU (7400 only) must match (Installation – System Configuration). 7200 and 7400 can have two encoder inputs; encoder command will affect Heads A & B or C & D on 7400. 7200 can have encoder command for each head.
To set the encoder to internal, enter:
ENN<CR>

Encoder Frequency[200=35000]

- 7100 & 7200 only

This command is head specific and allows the operator to specify the frequency of the internal oscillator. The default is 35000.
EF200<CR>

ID # [1-99]

- All models

Identifies printer to network PC. Accessed only through the FoxJet input terminal. 1st PC in each system must use odd number (1,3,5,7,9 etc.)

IDx<CR>

NETWORK [Y/N]

- All models

Sets FoxJet system to operate under SystemMaster network and accept commands from external source via the Rear Port. Avoid input conflicts by returning display screen to main menu. When using software other than SystemMaster, set the NEtwork to N.
NEY<CR>

OFfset [0-99]

- Models – FXJet Series only
- Selected head

This command is specifically for the 256 and 352 printheads. It is used to adjust the printhead channel firing timing. OFFSET is used synchronize all channels of the printhead so that all channels print in the same vertical raster. Value will must be matched to DPI in multiples of 25. For example, if using a 300 DPI encoder with width of 2 (print resolution of 150 dpi), the OFFSET should be 6 (150/25). See Theory of Operation for more details on using the OFFSET.
To make the offset 12, enter: **OF12<CR>**

PassWord [PW]

- All models

The password function allows three levels of user access using two specific passwords.

Level 1- Highest level, allows access to all commands currently supported by the controller.

Level 2- Mid level, allows only the following commands to be accessed:

Baud Rate	Bold	Call/Save	Clear Map
Counters	Delay	Encoder	Gap
ID	Invert	Label Request	Label Save
Long Bar	Network	Numbers	Offset
Position	Reverse	Select	Sign In
Sign out	Slant	Small Bar	Status
Test Print	Trigger Edge	Verify	Width

Level 3- Lowest level, only allows the following commands to be accessed.

Clear map	Counters	Delay	Status
Test print	Verify		

To enable password protection, enter **PW** from the keyboard or press the hotkey and select "**Y**". Once enabled, the user is automatically signed in at level three (the lowest access level). In order to access level 2 or 1, the user has to sign in. To sign in, enter **SI** on the keyboard and enter one of the two passwords. To sign out, enter **SO** and select "**Y"**. No password is required to sign out. When you sign out, the controller is set to level 3 unless you change the password enable to "**N**" before you sign out.

When a user is signed in at level 1, the Change Password "**CP"** command can be accessed. This command will allow the user to change one or both of the default passwords that allow access to level 1 and 2. Entering **CP** on the keyboard will display both passwords on the screen. The top line shows the level 1 password and the second line will show the level 2 password. By default, the level 1 password is "inkjet". The level 2 default is "111111111111111" (fifteen ones). Passwords cannot exceed 15 charters in length.

Notes:

1. Powering OFF/ON the controller will not sign out the current user.
2. An emergency password has been installed. Call FoxJet technical support for details.
3. All commands are always available through the rear port (serial port).
4. When password is disabled, Sign In, Sign Out and Change Password are not accessible.

TIme [hh:mm:ss]

- All models

The system time is changed using **TI**me command by sending 6 digits in HHMMSS format.
To change the time to 11:20:21PM enter:
TI232021<CR>

Type Head [TH]

The Type Head must be selected upon initial startup or printhead exchange for proper operation of the printhead ink system. The firmware will automatically set the proper drive voltage and curve once selected. If you have a multi-head controller and wish to leave a printhead empty, you will need to set **TH** to selection "0".
TH, then scroll down through the menu of printheads and select your high-lighted choice by pressing **Enter.**

TRigger Edge [R/F]

A product detect event can be set to occur on either the Rising or Falling edge of the photocell input to the printer.
Example: To set the trigger edge to Rising, enter:
TRR<CR>

SLant [0-31]

- All models
- Selected head

The command sequence is SLxx, where xx is the 1 or 2-digit slant value. See Theory of Operation for details on the Slant value. FXJet Series systems using 256/32 or 352/32 printheads must have SLANT set to 0. AlphaCoder 224/32 heads must be set to 0 when mounted at 90 degrees. Tables showing approximate SLANT values for each of the angled printheads can be found on the next 3 pages.
To change the slant to 7, enter:
SL7<CR>

Slant Value Tables

Slant values will help the controller make vertically aligned messages. The value is dependent on printhead type and print resolution. The tables on the following pages will assist in determining the appropriate value for **SL**ant command.

Table 5-2 Slant Table for .5 " Printhead (96/32)

Slant Value	DPI	Slant Value	DPI
1	18	17 300	302
2	36	18	319
3	53	19	337
4	71	20	355
5	89	21	373
6	106	22	390
7 122	124	23	408
8 150	142	24 426	426
9	160	25	444
10	177	26	461
11	195	27	479
12 212	213	28	499
13	231	29	515
14 244	248	30	532
15	266	31	550
16	282	32	568

Shaded blocks represent basic settings for encoder wheels supplied with the FoxJet encoder.

Table 5-3 Slant Table for .75" Printhead(96/32)

Slant Value	DPI	Slant Value	DPI
1	18	17	318
2	37	18	337
3	56	19	356
4	75	20	374
5	94	21	393
6	112	22	412
7 122	131	23 426	430
8	150	24	449
9	168	25	468
10	187	26	487
11 212	206	27	505
12	225	28	524
13 244	243	29	543
14	262	30	561
15	281	31	580
16 300	299	32	599

Table 5-4 Slant Table for 1.0" Printhead(192/32)

Slant Value	DPI	Slant Value	DPI
1	20	17	347
2	41	18	367
3	61	19	387
4	82	20	408
5	102	21 426	428
6 122	122	22	448
7 150	143	23	469
8	163	24	489
9	183	25	510
10 212	204	26	530
11	224	27	550
12 244	246	28	571
13	265	29	591
14	285	30	611
15 300	306	31	632
16	326	32	652

Table 5-5 Slant Table for 1.8" Printhead (AlphaCoder)

Slant Value	DPI	Slant Value	DPI
1	30	17	508
2	60	18	538
3	90	19	568
4 122	120	20	598
5 150	149	21	628
6	179	22	658
7 212	209	23	687
8 244	239	24	717
9	269	25	747
10 300	299	26	777
11	329	27	807
12	359	28	837
13	389	29	867
14 426	418	30	897
15	448	31	927
16	478	32	957

Editing Commands

Editing commands are specifically for preparing a message for printing. Most editing commands will only affect the selected head on multi-head systems.

BOld [0-9]

- All models
- Selected head

Entering a nonzero number causes each raster to be repeated that many times, resulting in denser characters & graphics.
To set bold to power of 2, enter:
BO2<CR>

D1 [0-99.99]

- 7200 only
- Selected head

This is a delay setting that can be set in inches.
Width and DPI must be set first.
D1dddd<,CR>

D2[0-2500]

- 7200 only
- Selected head

This is a delay setting that can be set in millimeters.
Width and DPI must be set first.
D2dddd<CR>

DElay [0-9999]

- All models
- Selected head

This setting varies the number of raster pulses that must occur after the photocell signal before printing cycle starts. Value is in rasters and the number of rasters per inch of travel is determined by print resolution.
Formulas for calculating DElay value can be found in the Setup/Installation chapter.
To set delay to 432, enter:
DE0432<CR>

DPi [50-600]

- 7200 Only
- Selected head

This setting tells the controller what is the base DPI of your encoder.
Default is 245.
To set DPi to 300, enter:
DP300<CR>

EDit Message
[0-25]7100, **[0-99]**7400. **[0-199]**7200

- All models

Edit command is used to create and change messages that are stored in the FoxJet Printer. When editing through the rear port, keep in mind that there is only 1 cursor control command (<LF>) to advance to the next line. The edit session may be terminated with <CR> or <FF>.
<CR> indicates that the message will print more than once (batch mode), and <FF> causes the message to print only once (one-for-one printing).
Example: To place "ABC" on line #3 of message #9 using batch print mode, enter:
ED09<LF><LF>ABC<CR>

Changing Fonts

As with Current Head, there is a Current Message, which is the last message that was edited with the ED command. Before changing fonts in a message make sure that the current message is correct. If not, perform a null edit session by: EDxx <CR>, where xx is the desired message number. The sequence for changing fonts is **<CTRL-F>fff <CR>**, where fff is the font number and may be from 1 to 3 digits.
See the Operator's Manual for more information on editing messages.
Example: To change to font #16, enter:
<CTRL-F>16<CR>

EXpiration Date [0-9999]

- All models

Adding this number to the current date forms the expiration date. To print the expiration date, an embedded command must be part of the message. The system date must be set first (See DATE command).
To create an expiration date of 3 days in advance, enter:
EX0003<CR>

GAp [0-99]

- All models
- Selected head

This number determines the number of rasters between characters.
To set the gap to 6, enter:
GA6<CR>

HEad [A-D]

- All models except 7100 systems

Selects printhead for editing and message selection.
To switch to head C, enter:
HEC<CR>

INvert [Y/N]

- All models
- Selected head

Setting this command to **Y** inverts the image. Default setting is inverted.
To set the image to inverted, enter:
INY<CR>

LOng Bar [1-32]

- FXJet Series only
- Selected head

Sets height of barcode in dots. Sets height of long bar in PostNet barcode.
To set long bar to 16, enter:
LO16<CR>

Numbers (Also see Table 4-2)

- All models
- Selected head

Numbers sets up a counter that counts photocell triggers. Four fields are used to set up the counter parameters. The counter can be used as a down or up counter. The Numbers counter resets at the start of a new shift or by invoking the NU command. Printing the output of the counter is accomplished with embedded commands.
A). UPPER : 99999999
B). LOWER : 00000000
C). REP : 000
D). INC : 001

The sequence for rear port access is:

NUuuuuuuuu<LF>llllllll<LF>rrr<LF>iii<CR>

Skipping over fields is possible by entering **<LF>** without a preceding string of digits. For example, to change the LOWER field without changing the UPPER field, enter:

NU<LF>llllllll<CR>,
where 11llllll consists of the desired 8 digits for the lower field.
Example: To make UPPER=99999999, LOWER=00000000, REP=000, and INC=001, enter:
NU99999999<LF>00000000<LF>000<LF>001<CR>

POsition [0-32]

- All models
- Selected head

Selects the position of print baseline according to printhead channel position.
To position the image up 1 nozzle, enter:
PO1<CR>

REverse [Y/N]

- All models
- Selected head

To compensate for a product moving on a transport from the opposite direction, set this to "Y".
To allow for reversed transport direction, enter:
REY<CR>

SElect
[0-25]7100, **[0-99]**7400. **[0-199]**7200

- All models
- Selected head

The SELECT command chooses the message(s) to be printed. Up to 8 messages may be selected for printing. To clear the select string and thereby disable printing, enter **SE<CTL-C><CR>.** Each of the 8 fields is a 2 or 3 digit field of **[0-25]**7100, **[0-99]**7400. **[0-199]**7200,designating messages.
To select messages 3,45,99, enter:
SE034599<CR>

Small Bar [1-32]

- FXJet Series only
- Selected head

This designates the number of dots that will constitute the small bar in PostNet barcode. The sequence is **SMss<CR**>, where ss is the 1 or 2-digit small bar value.
To set small bar to 3, enter:
SM3<CR>

WIdth [1-255]

- All models
- Selected head

Printhead timing pulse train is divided by the WIdth value. WIdth value is single most determining factor in establishing the print resolution. Width command changes affect the DElay and SLant function because the Width will affect print resolution (DPI).
To change the width to 5, enter:
WI5<CR>

Utility Commands

Utility commands are used for special functions, diagnostics and some other printing features.

BackUp [Y/N]

- All models

When enabled, BACKUP outputs all messages and command values as ASCII strings to the Rear Port for capture by programs similar to ProComm or Hyperterminal. The DATE & TIME settings are not affected by the BACKUP command. To restore, just send text file from PC to controller.
To initiate backup:
NE command must be set to N
BUY<CR>

CAll Group
[0-31]7100, 7400 **[0-99]**7200

- All models

One of 32 parameter groups (groups must be saved with SAVE command prior to using CALL) may be called from storage and applied. Each group consists of the following command settings:
BOLD, DELAY, EXP. DATE, GAP, INVERT, NUMBERS, POSITION, REVERSE, SELECT, and WIDTH.
To call parameter group #1, enter:
CA01<CR>

CLear Map [Y/N]

- All models
- Selected head

This command clears the print buffer.
CLY<CR>

Counters [CO]

- All models
- Selected head

This command will cause the upper and lower counter values to be sent out through the rear port, each preceded with a "U" or "L" respectively.
Example: **CO<CR>**
Result: U00000000L99999999

Product Counter [PC]

- All models
- Selected head

There are two programmable product counter. Each counter is associated with photocell input. Each counter sets up a counter that counts photocell triggers. Four fields are used to set up the counter parameters. The counter can be used as a down or up counter. Counter will increment any time that a product detect occurs, including test pattern prints or photocell triggers during setup or warmup. Product counters can only be reset by accessing the PC command.

A). UPPER : 99999999
B). LOWER : 00000000
C). REP : 000
D). INC : 001

The sequence for rear port access is:

PCuuuuuuuu<LF>1111111l<LF>rrr<LF>iii<CR>

Skipping over fields is possible by entering <LF> without a preceding string of digits. For example, to change the LOWER field without changing the UPPER field, enter:
PC<LF>1111111l<CR>, ,
where llllllll consists of the desired 8 digits for the lower field.
Example: To make UPPER=99999999, LOWER=00000000, REP=000, and INC=001, enter:
PC99999999<LF>00000000<LF>000<LF>001<CR>

Product Log [PL]

- All models
- Selected head

This command will cause the upper and lower counter values of each Product Counter to be sent out through the rear port.
Example: **PC<CR>**
Result: P1xxxxxxxxP2xxxxxxxx

ROllover Time [hh:mm:ss]

- All models

This sets the time of day when the system date is advanced. If set to before 1200, the date change will lag the real date. If set to after 1200, the date change will lead the real date. There are three 2-digit fields concatenated as Hours, Minutes, Secs.
To cause the date to advance at 11:05:20PM, enter:
RO230520<CR>

SAve Group
[0-31] 7100 7400 **[0-99]** 7200

- All models

Certain settings may be saved into 1 of 32 parameter group storage locations. This is useful for later recalling a known correct set of parameters. The parameters saved are:

BOLD, DELAY, EXP. DATE, GAP, INVERT, NUMBERS, POSITION, REVERSE, SELECT, and WIDTH.
Example: To save the current settings to group #4, enter:

SA4<CR>

Associated command - Call command.

Shift Set [1-3]

- All models

This command uses four fields to set work shift parameters for coding with an embedded command.

A). SHIFT # : 1 (shifts 1-3 allowed)
B). BEGIN : 00:00:00 (shift start time)
C). END : 08:00:00 (shift end time)
D). CODE : A (shift code)

The sequence for rear port access is:

SHnbbbbbb<LF>eeeeee<LF>c<CR>
where:

n = SHIFT number
bbbbbb = BEGIN time in HHMMSS format
eeeeee = END time in HHMMSS format
c = SHIFT CODE for shift #.

It is necessary for the first field (shift #) to be entered. The printer then automatically advances to the 2nd field. To skip over a field, enter <LF> without any preceding digits.
.
Example #1: To change SHIFT END to 094000 for shift #2 enter:
SH2<LF>094000<CR>

Example #2: To set BEGIN=08:00:00, END=16:00:00, CODE=A for shift #3, enter:
SH3080000<LF>160000A<CR>

STatus [ST]

- 7100 & 7400

This command will display the system status.
It will show if a Password has been enabled, if a head is in a heating condition or if there is an ink low condition.

- 7200

This command will display the system status as described above plus:

PC Photocell, either head
SE Shaft Encoder, either head
DI Data In – Rear Port
DO Data Out – Rear Port

An asterisk will appear next to the indicator for approximately 2 seconds after the last event.

TEst Print [TE]

- All models
- Selected head

This command causes the printer to print a special test pattern that fires all nozzles to assist in verifying that all channels are printing. Photocell triggers are necessary to initiate print cycle. BOLD, WIDTH & DELAY parameters apply: Encoder pulses are necessary if encoder is enabled.
1). Send **TE<CR>** to the rear port.
2). Conduct test prints.
3). Send <CR> to terminate the test print session.

VErify Logos [VE]

- All models

The logo downloading procedure may be verified with this command.
Downloadable logos are in the range of Logo #60 to Logo #74 (6100 & 7400). When VE<CR> is sent to the rear port, the printer responds by sending a series of downloaded logo numbers, terminated with ’00’.

For example, if logos #60 and 62 had been downloaded and the rear port received VE<CR> the printer would send "606200" out the rear port, indicating that logos #60 and #62 were received. If no logos had been received, the printer would send "00" indicating that no downloadable logos were received.
See Download Logo command.

ZAp [Y/N]

- All models

When executed in conjunction with a power off-power on sequence, this command clears all messages and downloaded logos and returns all parameters to factory settings. The purpose is to return the printer to a known state.
When ZAY<CR>is entered, a zap will occur on the next power up. However, if after entering ZAY<CR>, there is any front or rear port communication to the printer, the zap condition will be removed and the printer will not zap at the next power up.
Example: To zap the printer, perform the following sequence:

1). Send **ZAY<CR**>.
2). Cease all communications to the printer.
3). Power off and power on the printer.

Rear Port Programming

Rear Port commands relate directly to Host PC to FoxJet Printer communications. The Rear Port provides for external communication via RS-232 or RS-485. Whether using RS232/RS485 communications, the protocol is a selectable baud rate with 8 data bits, 1 stop bit and no parity. Any terminal communications software package will normally work. Rear Port programming has been successfully tested with HyperTerminal® and ProComm Plus®.
Most of the communications are done with ASCII command strings except for characters such as Carriage Return (designated as <CR>, hex value 0D), Line Feed (<LF>or <CTL-J>0A), Form Feed (<FF> or <CTL-L>0C), End of Text-Control C (<CTL-C>,03), and Change Font-Control F (<CTL-F>, 06). The following ***Rear Port command descriptions*** details a listing of commands, including their function and download data procedures.

Rear Port Command Descriptions

ACknowledge [Y/N]

When this function is enabled, the printer will send an "A","B","C", or "D" out the rear port to the host when the print image for a given head has been sent to the print buffer.
This feature is useful in one-for-one printing because it signals the host computer that it is safe to download the next message.
Send **ACY<CR>** to enable; **ACN<CR>** to disable.

DOwnload Logo [DO]

A range of font selection codes is reserved for downloading logos to the FoxJet controller. Logos can be downloaded into the memory locations identified by the font selection codes by either ASCII command strings through the Rear Port or the Logo option on SystemMaster.
The Download command (via the rear port) allows downloading logos with ASCII command strings. Essentially, you would be loading individual dot values (print or no print) in the memory locations identified by the font selection code. First, you must draw the logo onto a dot matrix background that is 32 dots high and no more than 256 rasters wide. (See drawing next page). Then you encode the logo information into hexadecimal code so that the FoxJet printer can decode it properly. Now you're ready to write an ASCII command string. The command string has many components (listed below).

<CR>	Resets the serial input data stream.
DO	Download following command string.
FF04	Identifies string as logo.
003C	Tags string to font selection code number in hexadecimal (3Chex is 60dec).
0011	Number of vertical rasters to downloaded in hexadecimal. (11hex is17dec)
X	raster of encoded logo information (HEX), each digit (X) represents 4
X	vertical dots, starting with #8at the top to #1 on the bottom (8,4,2,1).
X	
X	
X	
X	
X	
X	
<CR>	Ends the download string.

The download string for the logo on following page would be as follows:

<CR>DOFFO4003C0011F0000000103F000010FFC00001FFF000F3FFF8009
3FFFC00F7FFFF0007FFFFCCF7FFFFCE97FFFFCEB7FFFF8C27FFFF0003FFFC00F
3FFF80091FFF000F0FFE000003F8000<CR>

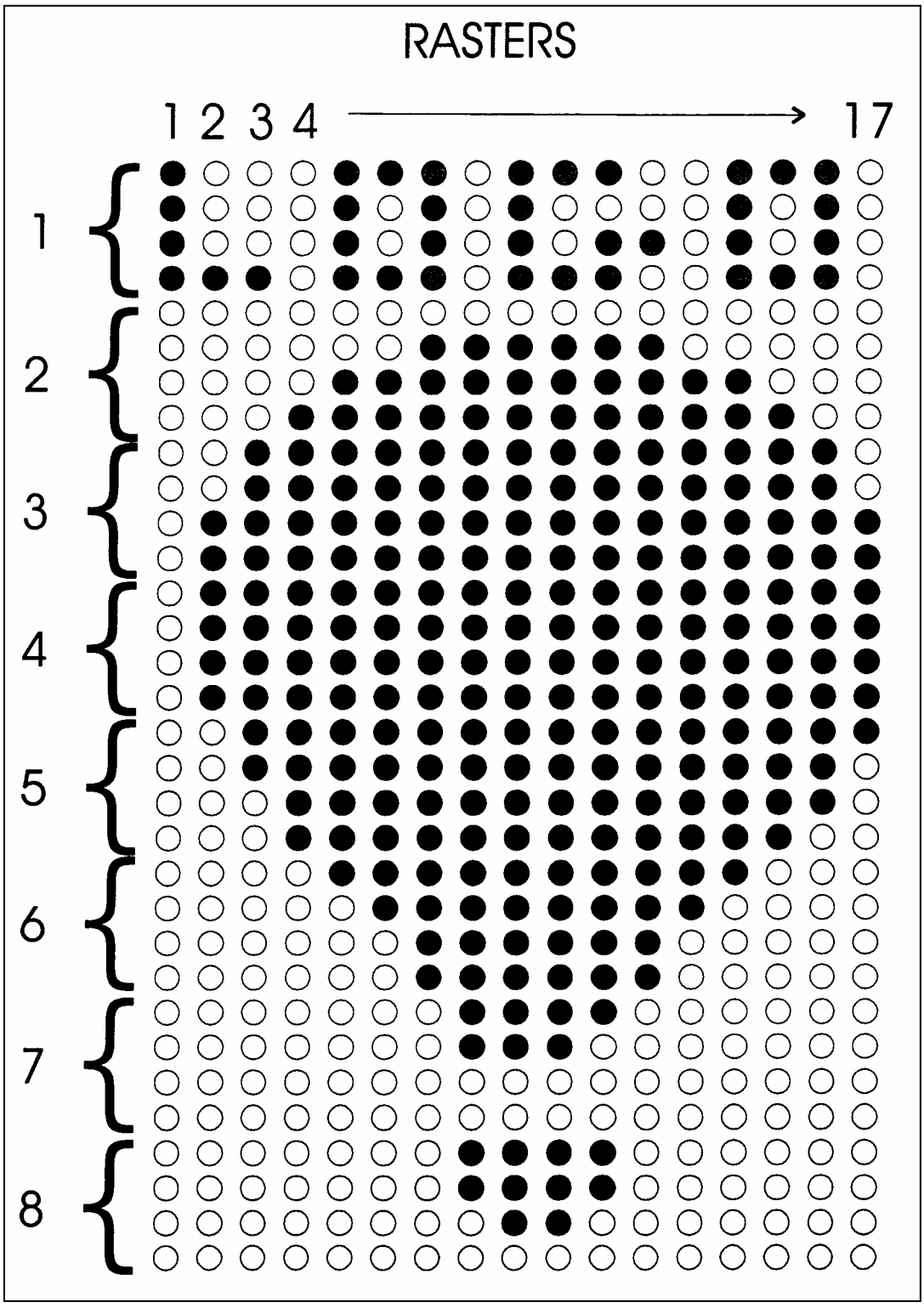

Fig. 5-1 Bitmap Raster Example

Label Request [LR]

- Models – All systems using SystemMaster

Label Request is programmed through the Front Port and when SystemMaster receives a Label Request, a search and download process is initiated in SystemMaster to find a stored label and download it the Printer. Typically, Label Request is programmed with a scanner for automatic loading.
*NEtwork must be set to “Y”.
LR(filename)<CR>

Label Save [LS]

- Models – all systems using SystemMaster

Label Save is accessed from the FoxJet controller input device. It allows the user to edit an active Label at the controller and save those changes to SystemMaster. This command can be used to create a new label. If an existing label is changed at the controller, it must me saved with a new name.
*NEtwork must be set to “Y”.
LS(filename)<CR>

QUery Status [QU]

- All models
- Selected heads

The **QU<CR>** sequence causes four status bytes to be sent, one for each printhead in the order A, B, C, and D. For each 8-bit return byte, the 1st three bits are fixed at "010". The remaining bits have the following meanings:

BIT #4	BIT #3	BIT #2	BIT #1	BIT #0
Printhead Status	High Voltage Status	Ink Level	Printhead Temperature Status	Printhead Heater Status
0 = AVAILABLE 1 = UNAVAILABLE	0 = HV OK 1 = HV NOT OK	0 = INK LOW 1 = INK OK	0 = AT TEMP. 1 = BELOW TEMP.	0 = NOT HEATING 1 = HEATING

For example, a printhead with everything OK and HEATING would have a status byte of 01000101 (Hex 45 = character ’E’).
To obtain status from each printhead, the following string should be used:
HEA<CR>QU<CR>HEB<CR>QU<CR>HEC<CR>QU<CR>HED<CR>QU<CR>

Backing up Printer Data using HyperTerminal®
(All Models)

Ensure that communication protocol configurations are correct and the **NE**twork Command is set to '**N'**. (If using a 7400, set SW2-6 on CPU to OFF) Connect a DB9 cable from the controller Rear Port connector to the Host Serial Port connector.

1. From Windows® **Start Menu**-**Accessories**-select **HyperTerminal**.
2. Create a new connection if not already established, by double clicking on Hypertem.exe. You will be asked to select an icon and name for the connection. Or double click on a previously created terminal connection.

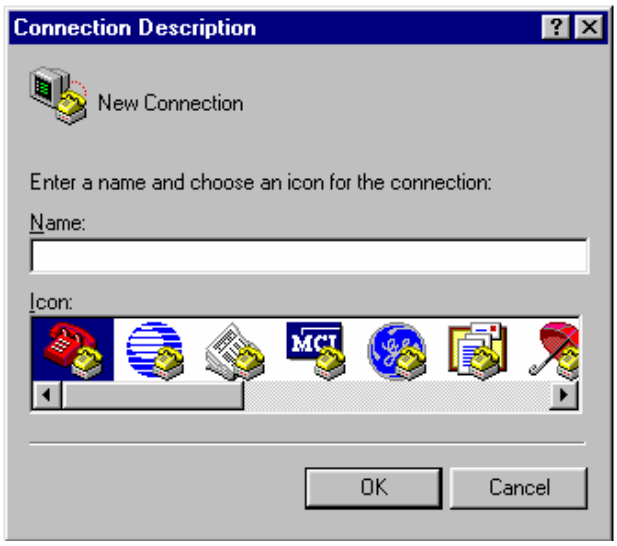

Fig. 5-2 Screen 1

3. You will be asked to input a phone number. No need to input a phone number. The connection should be "Direct to Com 1" or whatever comm. Port is being used on the Host. Click "**OK**" and move on to Com Port properties.

Fig. 5-3 Screen 2

4. Properties should be set to:

    9600 Baud

    8 data bits

    No parity

    1 Stop bit

    Flow Control to “**None**”

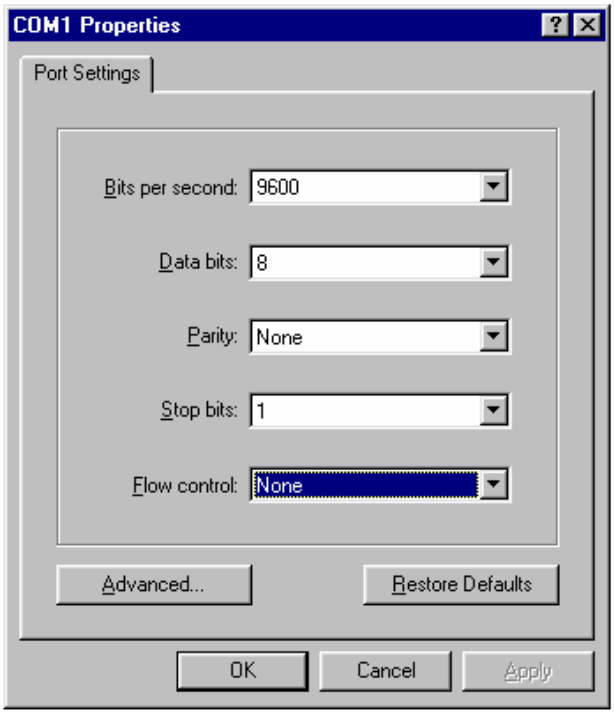

Fig. 5-4 Screen 3

5. Click “**OK**” when finished. You have completed the basic configuration of HyperTerminal.

To BackUp the printer data to your computer, proceed as follows;
*****. Insure that 'NE' is set to 'N' on the controller.****

1. Select "**Transfer**" and "**Capture Text**".

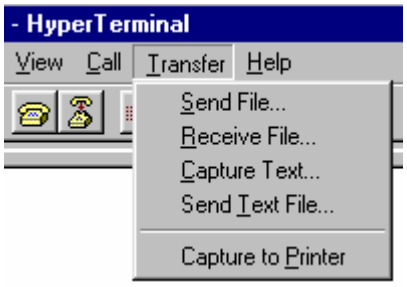

Fig. 5-5 Pull Down Menu

2. You can name the file being saved here or leave the default file name of "Capture. Text"

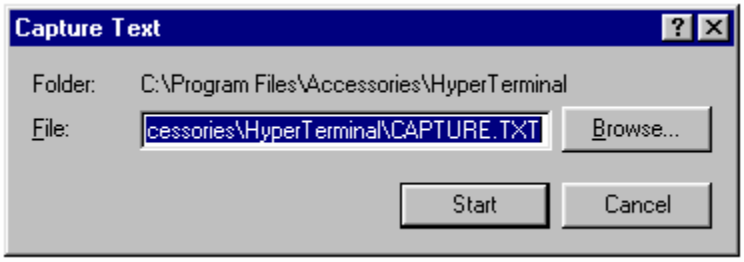

Fig. 5-6 Screen 4

The host system is now ready to accept the text string from the printer.

3. Issue the **B**ack**U**p command on the printer and the memory contents will be sent to the host computer and saved with the file name specified is step 2. above.

4. Select "**Transfer**", "**Capture Text**" and "**Stop**" to complete the **B**ack**U**p procedure.

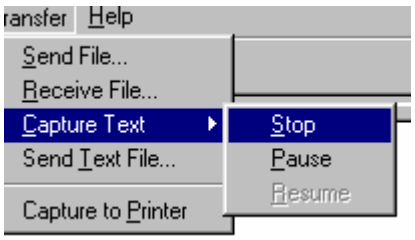

Fig. 5-7 Pull Down Menu 2

5. BackUp operation is now complete. All messages, Parameters, Font selections, Head specifics have been backed up to the file name you specified above.

Restore data

To Restore the BackUp data to your printer, proceed as follows;

Prior to restoring, it is advisable to do a hardware Zap on the controller. Follow directions elsewhere in this manual on this procedure.
*****. Insure that 'NE' is set to 'N' on the controller.****

1. Connect using HyperTerminal and select "**Transfer**" and then "**Send Text File**".

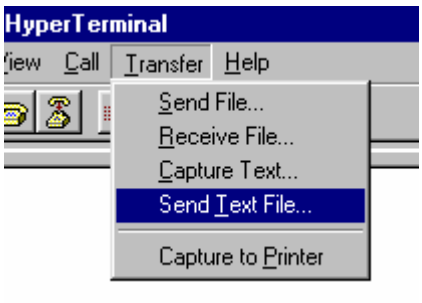

Fig. 5-7 Pull Down Menu 3

2. Select the desired file in the dialog box.

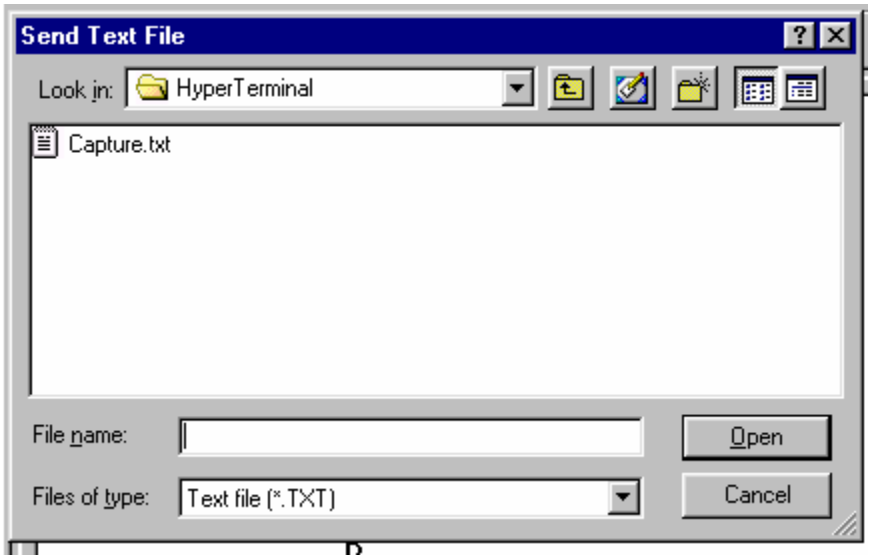

Fig. 5-9 Screen 5

3. Click "**Open**" and the file will be sent to the printer.

4. All data has been restored to Printer. Restore operation is complete.

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FXJet Series Installation & Setup

Chapter 6

System Configuration

Prior to powering up the system, it is a good idea to perform a visual inspection on the printed circuit boards in the controller.

1. Check for damaged components and loose connections.

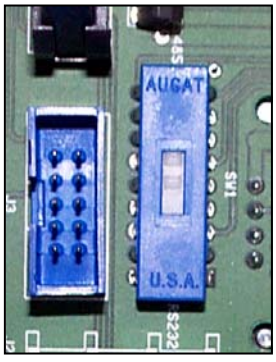
2. Make sure that all socketed IC's are seated securely.
   (Insure all circuitry is handled properly in accordance with local ESD procedures).

3. Measure the Backup Battery voltage on the CPU PCB. Reconnect the battery if disconnected. Configuring the system to operate consists of setting a few switches on the boards in the controller.

Interface PCB (7400)

The Interface PCB is located at the bottom of the 7400 Controller. Switch SW1, located on the right side of the board, determines the communication protocol for use with a computer (Rear Port connection). If connecting a computer to the FoxJet controller using the Rear Port, this switch should be set to match the communication protocol of the serial port for which the computer is configured. The controller is shipped with the switch in the RS232 position.

The switch is located on the top left side of the 7100 controller PCB. The 7200 controller does not have the hardware switch. It is accessed through a software command (R4).



7400 Controller

7100 Controller

Fig. 6-1 RS232/485 Switches

CPU (7400)

The CPU PCB contains two switches that are used for configuration. SW1, located on the left side of the CPU PCB, sets the baud rate for both the Front Port and Rear Port. The Front and Rear Port connections on the Connector Panel are used for input devices. The Front Port is used for the keyboard, which uses 9600-baud rate communication.

This default setting for SW1 is 9600-baud for both Front and Rear Port.
See Table 1-1 for other settings.

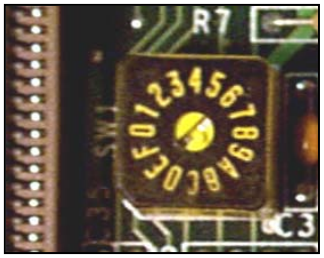


Fig. 6-2 SW1

Table 6-1 Switch SW1 (CPU)

Switch Position	Front Port Baud Rate	Rear Port Baud Rate
0	38.4K	9600
1	38.4K	9600
2	38.4K	9600
3	38.4K	9600
4	38.4K	38.4K
5	38.4K	38.4K
6	38.4K	38.4K
7	38.4K	38.4K
8	9600	38.4K
9	9600	38.4K
A	9600	9600
B	9600	19200
C	19200	9600
D	19200	19200
E	19200	19200
F	19200	19200

Position A is the factory default.

SW2 is a bank of six individual switches that are use to configure peripherals connected to the Connector Panel.
See Table 6-2 for configuration.

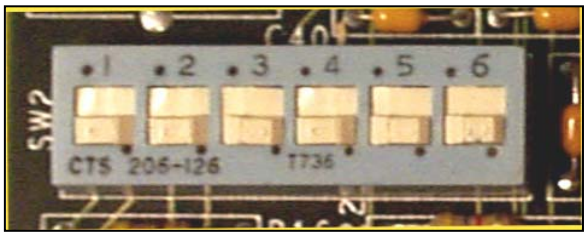


Fig. 6-3 SW2

Re-connect backup battery if it has been disconnected.

Table 6-2 Switch SW2 (CPU)

Switch Number	Switch DOWN	Switch UP
1 ENCODER #1 TYPE	OPEN COLLECTOR	TTL
2 ENCODER #2 TYPE	OPEN COLLECTOR	TTL
3 PHOTOCELL	MULTI-TASK PHOTOCELL #1 TRIGGERS HEADS A & B PHOTOCELL #2 TRIGGERS HEADS C & D	NON-MULTI-TASK PHOTOCELL #1 TRIGGERS ALL PRINTHEADS
4 FIRING PULSE TIMING SOURCE	INTERNAL OSCILLATOR	EXTERNAL SHAFT ENCODER
5 SHAFT ENCODER	MULTI-TASK, ENCODER #1 DRIVES HEADS A & B ENCODER #2 DRIVES HEADS C & D	NON-MULTI-TASK ENCODER #1 DRIVES ALL PRINTHEADS
6 REAR PORT COMMUNICATIONS	SERIAL RS485	SERIAL-RS232

Note: Switch 4 must match Encoder command setting for print operations. Switch 6 must match the setting of SW1 of the Interface PCB

Dual Head Driver PCB (7400)

The Driver Board must be configured for the specific printhead type(s) that are being used. The printhead type(s) are selected using SW1 on the Driver Board. The location of this switch is shown below.
See table 1-3 for proper settings.

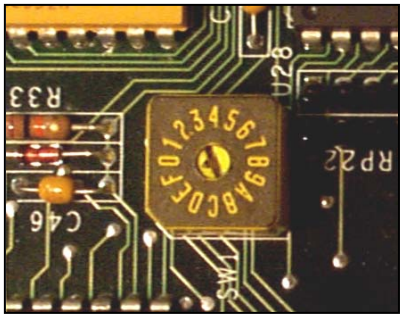


Fig. 6-4 Type Head Adjustment

There are three different categories of printhead types, based on power required, ink used and printhead nozzle array plate configuration.

Table 6-3 Head Types

Type	Voltage	Ink	Orifices/Channel
Type 1	70V	JetWrite	96/32
Type 2	90V	PostBrite	96/32
		AllWrite	96/32
		VersaPrint	96/32
Type 3	150V	VersaPrint	192/32
		VersaPrint	352/32
		AlphaMark	224/32

The chart below will assist in determining the switch setting for SW1 on each Driver Board.

Table 6-4 DRIVER BOARD 1 / 2

SWITCH SETTING	HEAD A/C	HEAD B/D
0	OFF	OFF
1	OFF	TYPE 1
2	OFF	TYPE 2
3	OFF	TYPE 3
4	TYPE 1	OFF
5	TYPE 1	TYPE 1
6	TYPE 1	TYPE 2
7	TYPE 1	TYPE 3
8	TYPE 2	OFF
9	TYPE 2	TYPE 1
A	TYPE 2	TYPE 2
B	TYPE 2	TYPE 3
C	TYPE 3	OFF
D	TYPE 3	TYPE 1
E	TYPE 3	TYPE 2
F	TYPE 3	TYPE 3

CPU/Driver PCB (7100)

The 7100 Controller consists of only one board, the CPU/Driver board and the Power Supply. SW1 sets the communication protocol for the Rear Port: up is RS232 & down is RS485. This switch is set to RS232 in the factory. The Rear Port connection is used for external control of the 7100 Controller. JP3 selects the drive voltage based on printhead type. JP4 & JP5 are used in SystemMaster network configuration as terminators.

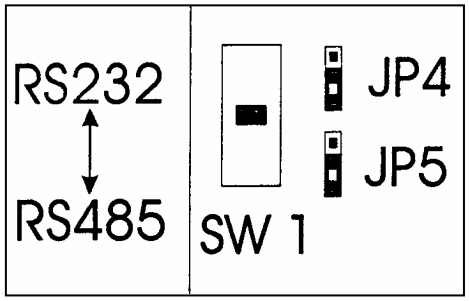


Fig 6-5 7100 Communications Settings

Type 1- jumper pins 1 & 6

Type 2 - jumper pins 2 &5

Type 3 - jumper pins 3 &4

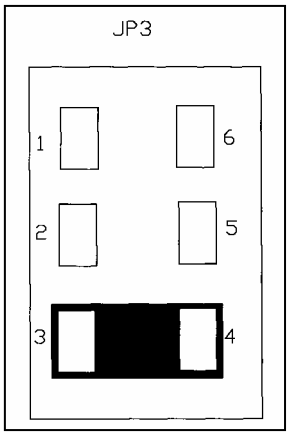


Fig. 6-6 7100 Type Head Jumpers

JP3 is set to **Type 3** in this example.

CPU/Driver PCB (7200)

The 7200 Controller consists of only one board, the CPU/Driver board and the Power Supply. Software commands set the communication protocol for the Rear Port: **R4** will allow you to choose between RS232 and RS485. The Rear Port connection is used for external control of the 7200 Controller. Printhead high voltage is selected automatically when the printhead is identified using the **TH** command. J14 & J15 connect the battery. A termination is installed on the Rear Port Out DB9 connector in a SystemMaster network configuration to identify the last controller in the network.

Power Entry Module (7X00 Series)

The Power Entry Module can be set to operate on 220 VAC or 110 VAC. Insert the fuse module so that the correct voltage can be read when latch is shut.

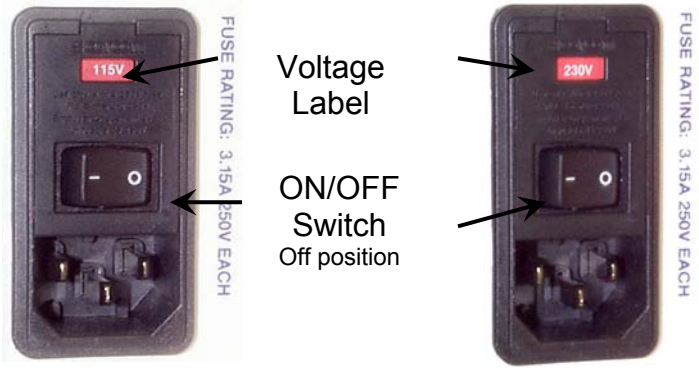


Fig. 6-7 Power Entry Module

Equipment Installation

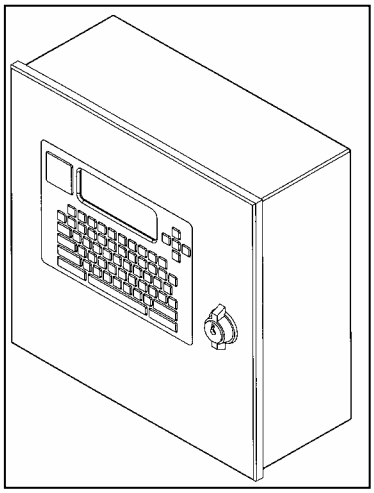
Mounting the system directly on the conveyor line is usually the most convenient and aesthetically pleasing installation. However, the operational characteristics of the conveyor will dictate the feasibility of mounting the printing system to it. Systems can be mounted to a sturdy portable frame (Floor Stand). A floor mounted system is available to completely isolate printing equipment from the vibration of a conveyor line. There are several bracketry kits available, as well as individual pieces. Special bracketry has been designed for more complicated application situations. For more detailed information concerning the different bracketry kits, contact Customer Service.

Production Line

The following procedure is the recommended method for installation of the Model 7400 Controller. Other Controllers will install in a similar manner. Read each step carefully to avoid later problems.

1. Assemble 2” bracketry as designed during site survey.
2. Position Controller to desired height on 2” post and tighten clamp.

Ensure that controller door has room to open. A minimum of 16” is required for door swing path.



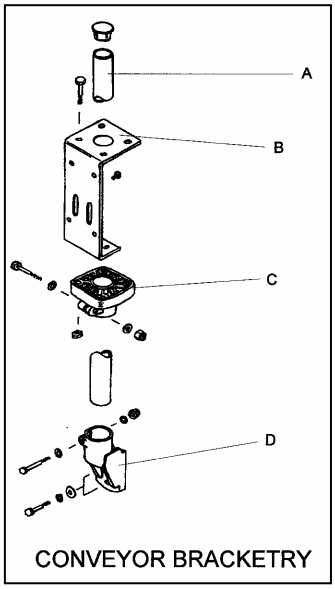


Fig. 6-8 7400 Controller Mounting

Modular

The 7400 modular printhead comes with a 3/4” mounting spud attached to it. The mounting spud can be fastened to either side of the printhead housing. The Ink Housing Assembly has a 1” mounting ring attached and it can also be fastened to either side of the housing. Integrated printhead assemblies will come with a 1" mounting ring as well.

3. Assemble Printhead/Ink System bracketry as planned during site survey.
4. Fasten Printhead/Ink System to its mounting. Factors to consider when installing printheads and ink systems are listed below.

- Ink throw distance is a maximum of 1/4” . Faster production lines will require that the nozzle array be mounted closer to the product.
- The ink hose on modular systems must be routed so that a minimum of movement will occur.
- The printhead and the ink hose must be mounted so that nothing strikes them in order to avoid de-priming situations and possible damage.
- The 7400 Modular Printhead must be installed so that the bottom nozzle in the Nozzle array is level with the ink level in the Ink tank or reservoir.

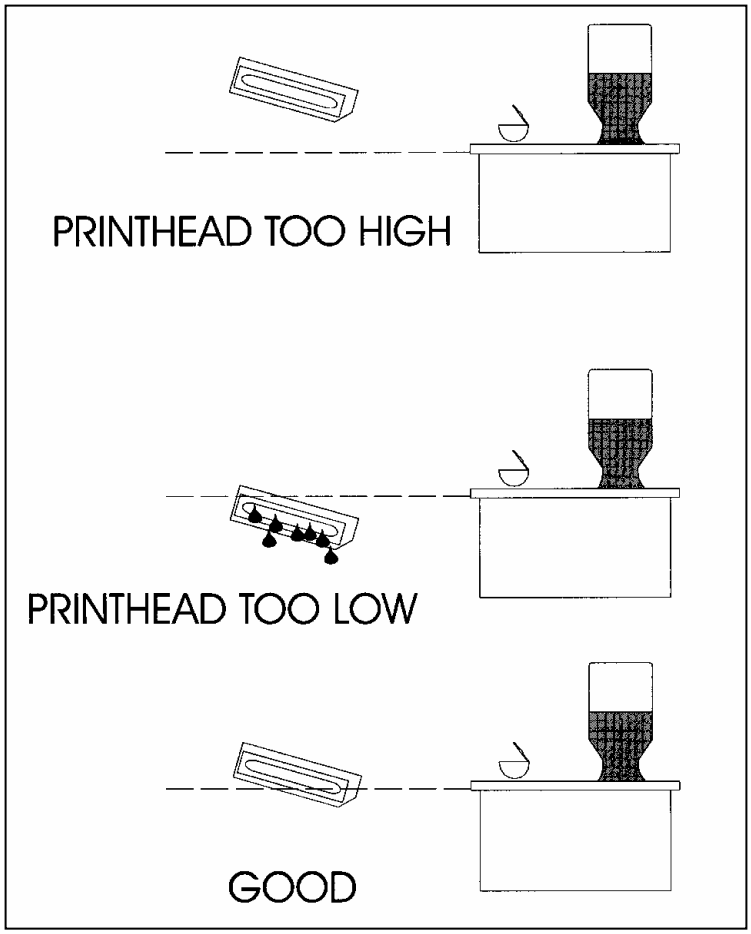


Fig 6-9 Ink Level to Printhead

5. Printheads must be mounted so that nothing comes in contact with the print-head nozzle array. Damage will occur.
6. Gently remove the strain relief clamp from the pin and socket connector.
7. Unthread the strain relief nut on sheath and gently slide over the connector.
8. Route the connector through the hole in the Connector Panel and slide the strain relief nut over the connector.
9. Thread the strain relief nut onto the sheath and tighten snugly.
10. Plug connector to J1 of the Drive PCB.
11. Connect the edge connector to printhead PCB. Make sure that the red wire is positioned toward the vent cap of the printhead. Connect the ink low wire to J4 of printhead PCB. Install strain relief on printhead tray.

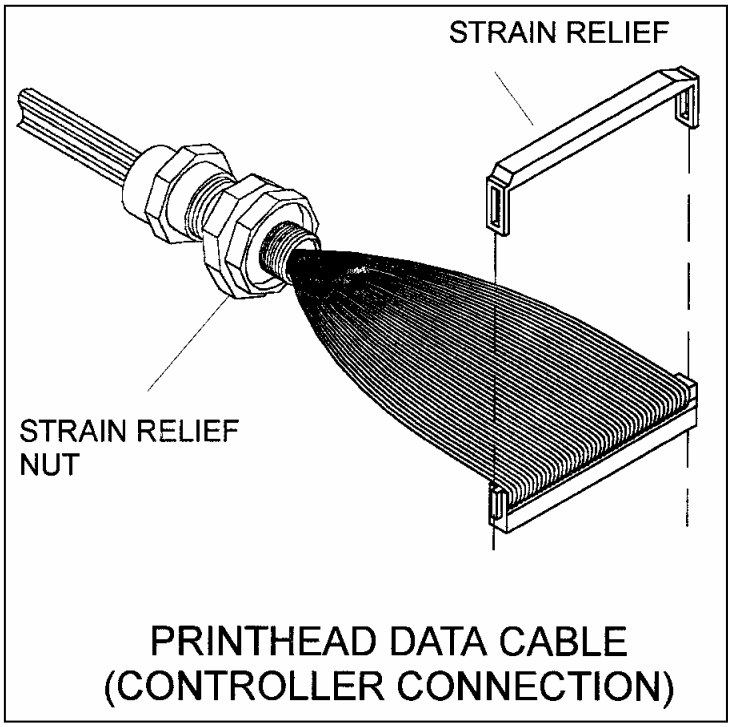


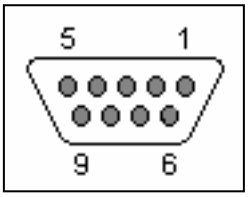
Fig 6-10 PrintHead Data Cable

12. Install Photocell as designed during site survey and connect cable to desired Photocell jack on Connector Panel. Photocell 1 can trigger prints on all four heads or on printheads A & B. Photocell 2 will trigger printheads C & D.

Table 6-5 Photocell Pinout

PIN	SIGNAL NAME	TYPE
3	Photocell Signal	Input
5	DC Ground	Ground
6	+ 12 VDC	Supply

Female DB-9

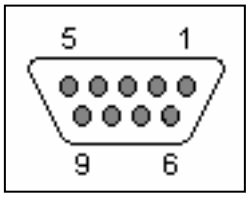


13. Install Encoder Assembly (if used) and connect the cable to desired Encoder jack on Connector Panel. Encoder 1 will provide timing signals for all four printheads or printheads A & B. Encoder 2 will provide timing signals for printheads C & D.

Table 6-6 Encoder Pinout

PIN	SIGNAL NAME	TYPE
7	Shaft Encoder Signal	Input
5	DC Ground	Ground
6	+ 12 VDC	Supply

Female DB-9

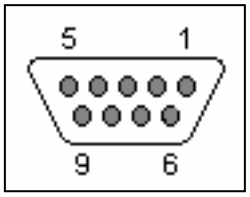


14. Connect straight through DB-9 cable to jack on ink system and jack on Connector Panel marked Autoprime. This cable will supply +12 VDC to the prime pump

Table 6-7 AutoPrime Pinout

PIN	SIGNAL NAME	TYPE
5	DC Ground	Ground
6	+ 12 VDC	Supply

Female DB-9

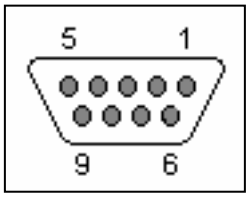


15. Install External Alarm Beacon (if used) as designed during site survey and connect cable to jack on Connector Panel marked Ext. Alarm. Alarm1 indicates that Printheads are at temperature and that system is ready to print (green light). Alarm 2 indicates that there is an ink low sensed at one of the ink systems (red light).

Table 6-8 External Alarm Beacon

Female DB-9

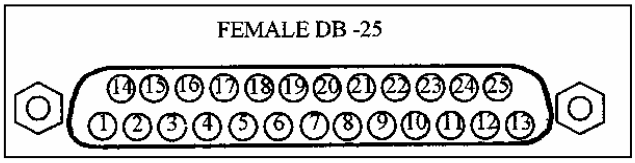
PIN	SIGNAL NAME	TYPE
4	Alarm 2	Output
5	DC Ground	Ground
6	+ 12 VDC	Supply
8	+ 12 VDC	Supply
9	Alarm 1	Output



16. Connect Hand-held Terminal cable to jack on Connector Panel marked Front Port. Other serial devices can be connected to the Front Port and can operate at either RS232 or RS485, however, of inputs from Front Port and Rear Port, only one can be RS485. See page 6-22 for more information about connecting to the Rear Port.

Table 6-9 Handheld Terminal Pinout

PIN	SIGNAL NAME	TYPE
2	RS232 RX	Input
3	RS232 TX	Output
7	Ground	Ground
9	+ 5 VDC	Supply
12	RS485 TX+	Output
13	RS485 TX-	Output
14	+ 12 VDC	Supply
24	RS485 RX+	Input
25	RS485 RX-	Input



Demonstration (Table Top)

Tabletop demonstration systems are a vital tool for performing print samples and equipment checkouts.

1. The controller can be mounted to a stand (with 1/4" machine screws no more than 1/2" in length) that can be used on a tabletop. Tabletop controller stands are recommended when using printing system with the hand transport for demonstrating print operations.
2. The hand transport contains an encoder for print timing and a micro switch for "product detect". Both devices are wired to the DB-9 connector of the transport.

Fig. 6-11 Demo Table Top

Connect a DB-9 cable between the hand transport and Photocell 1 of the Connector Panel.

3. Printhead is mounted to transport with 3/4" rods and cross blocks. The Ink/System is typically not mounted to the transport.

Auto-Print Module (optional for 7400)

1. Connect AutoPrint Module DB-9 cable marked **"PC**" to photocell cable.

2. Connect AutoPrint Module DB-9 cable marked **"SE**" to shaft encoder cable.

3. Connect AutoPrint Module DB-9 cable marked **"FJ**" to Photocell 1 jack on controller.

Encoders

1. Open Shaft Encoder Kit and inventory contents. Detailed instructions will be included in kit.

2. Determine the proper wheel using the formula below. FXJet Series Printheads have a maximum firing frequency of 9 kHz. FoxJet Encoder wheels are rated at 300, 284 and 245 DPI when used with FoxJet Shaft Encoder.

$$\frac{DPI}{W} \times LS = Freq.$$

Where:

DPI=	DPI rating of encoder assembly
W=	Width setting of FoxJet Controller
LS=	Line Speed (in inches per second)
Freq.=	Firing pulse train (in cycles per second; Hz) to printhead

3. Mount the appropriate wheel to the shaft of the encoder. Tighten setscrews.

4. Mount the encoder pivot mount assembly to the conveyor line. To make sure that the rotation of the wheel will accurately reflect the speed of the conveyor belt, mount the wheel so that direct contact to the belt roller is made.

5. Route the encoder cable back to the Controller, ensuring that the cable will not be damaged by conveyor line motion.

Initial Startup

Prior to power up, ensure the printhead is mounted and properly connected.
After the power switch is engaged, the system will boot up and the printhead(s) will begin to heat. The printhead CP/OP will heat up to 60º C .
The controller screen will display the following.

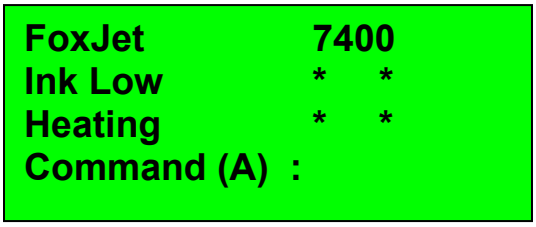


Fig 6-12 Main Screen

The “HEATING” status line will indicate “A” (through D) until all printheads reach operating temperature. This usually takes 1 to 5 minutes.
Check LED’s on the board(s) to ensure all circuits are operating properly. See table below.

Table 6-10 Model 7400 Dual Head Driver Board Indicators

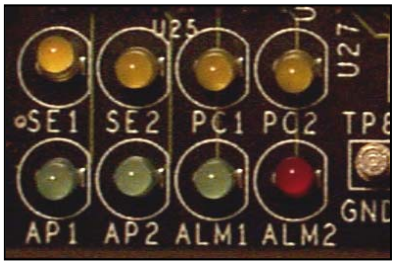
LED	FUNCTION	TYPICAL STATUS
HDA HDB	Indicate when printhead is connected	Lit if printhead is sensed
HVA HVB	Indicate High Voltage on driver board	Lit when High Voltage is ok for each printhead
INKA INKB	INK LOW indicator	Lit when INK LOW condition exists
HTRA HTRB	Indicate when printhead heating elements are active	Lit while printhead is heating. Cycles on/off to maintain temp.

Fig 6-13 Driver Board LEDs

Table 6-11 Model 7400 CPU Board Indicators

LED	FUNCTION	TYPICAL STATE
DS1 DS2	Flash during XMIT & REC when downloading info from host computer	Will only flash during communication process; indicates rear port communications
DS3	On some systems, lights to indicate that encoder is selected in firmware; doesn't affect operation	Most systems this will be off
DS4	Indicates that system has passed power up tests	Will be lit when system is running; older systems will not use this indicator
PC1 PC2	Photocell Trigger indicator	Flashes when photocell trigger; with no photocell plugged in, light will not be lit
SE1 SE2	Shaft Encoder rotation indicator	Flashes to indicate a pulse from shaft encoder. appears to be steady, but is actually flashing at encoder speed
ALM1	Indicates all printheads are at temperature	On when ALL printheads are at temp
ALM2	Red LED that indicates an INK LOW condition	Off until INK LOW happens
AP1 AP2	Autoprime pulse indicators; used with high speed document printing only	Will not be lit for general application

LED's 1-4

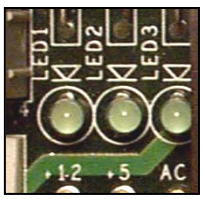


CPU LED's

Fig 6-14 7400 CPU Board LEDs

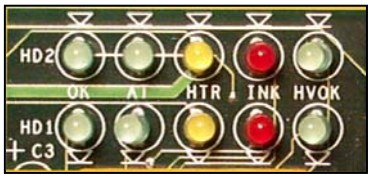
Table 6-12 Model 7200 Indicators

LED	FUNCTION	TYPICAL STATE
LED1	Indicates +12 VDC Present	Will be lit when system is turned on
LED2	Indicates + 5 VDC Present	Will be lit when system is turned on
LED3	Indicates 36 VAC Present	Will be lit when system is turned on
DS1 DS2	Flash during XMIT & REC when downloading info from host	Will ***only*** flash during rear port communications
DS3	On ***some*** systems, will be lit to indicate an encoder is selected in firmware.	Most systems, this will be off
DS4	Indicates system has passed power up tests	Will be lit when system is on: Older systems did not use this indicator
HD1/2 OK	Indicates HD 1 and/or 2 is ready	Will be lit when system is ready to print
HD1/2 AT	Indicates HD 1 and/or 2 is at operating temperature	Will be lit when heads are at temperature
HD1/2 HTR	Indicates HD 1 and/or 2 is being heated	Will be lit periodically while print head is being heated
HD1/2 INK	Indicates HD 1 and/or 2 has an ink low condition	Will be off unless Ink Low is detected
HD1/2 HVOK	Indicates HD 1 and/or 2 high voltage is OK	Will be lit when system is turned on



LED's 1-3

LED's DS1-4



Indicator LED's

Fig 6-15 7200 Board LEDs

Table 6-13 Model 7100 Indicators

LED	FUNCTION	TYPICAL STATE
LED1	Indicates + 5 VDC Present	Will be lit when system is turned on
LED2	Indicates +12 VDC Present	Will be lit when system is turned on
DS10	Indicates 36 VAC Present	Will be lit when system is turned on
DS6 DS7	Flash during XMIT & REC when downloading info from host	Will ***only*** flash during rear port communications
DS8	On ***some*** systems, will be lit to indicate an encoder is selected in firmware.	Most systems, this will be off
DS9	Indicates system has passed power up tests	Will be lit when system is on: Older systems did not use this indicator
HD OK	Indicates head is ready	Will be lit when system is ready to print
HV OK	Indicates head high voltage is OK	Will be lit when system is turned on
AT TEMP	Indicates head is at operating temperature	Will be lit when head is at temperature
HEAT ON	Indicates head is being heated	Will be lit periodically while print head is being heated
INK LOW	Indicates head has an ink low condition	Will be off unless Ink Low is detected

Power LED's LED's DS6-9 Indicator LED's

Fig 6-16 7100 Board LEDs

Priming / Purge Procedure

Priming Procedure

1. Place a lint-free wipe over the nozzle array plate to absorb ink.

2. Press, Do Not Squeeze, the prime button until ink is seen coming from the nozzles.

3. Gently wipe nozzle array plate to remove ink. Use clean wipe for each cleaning pass.

4. If ink is visible on array plate, Printhead will not print.

5. Perform a test print.

If some channels are still out, leave system on and retry test print at 15-minute intervals until all nozzles are printing properly. Usually all channels will print properly within 30 minutes.

Purge Procedure

Purge must be done whenever the Printhead has been changed or if the ink system has been allowed to run dry of ink. Sometimes a purge may be necessary if the Printhead/ink system has been struck with excessive force.

1. Place shipping cap on the Printhead.
2. Press the prime button 5 to 6 times.
3. Remove shipping cap.
4. Follow Priming Procedure.

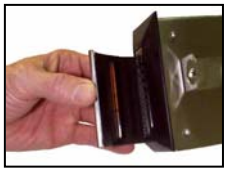


Fig. 6-17 Prime/Purge

Filling the Ink Supply

➢***NEVER mix different types of inks. The printhead can be damaged. Use only FoxJet approved inks.***

1. Clean any dust or debris from around the receptacle.
2. Unscrew the empty bottle and remove.
3. Remove the foil seal from the new bottle. Ensure orange seal is in place at receptacle.
4. Screw in new bottle.

➢***Ink bottles can be replaced while system is printing, as long as ink remains in reservoir.***

Fig. 6-18 Replace Ink Bottle

Auto Maintenance System

The Auto Maintenance System has been designed to automatically perform a priming sequence at a pre-programmed time interval. The priming sequence will restore channels that have dropped out and help maintain quality print while increasing the time between printhead cleaning.

The Auto Maintenance System consists of the following components:

- Trident UJII Printhead with integrated maintenance plate and vacuum port
- Ink collection bottle
- Purge pump
- Vacuum pump
- Auto Maintenance System Controller PCB

The Maintenance Plate is coated with a non-stick material (Teflon) before it is bonded to the CP/OP. The Teflon prevents debris from sticking to the Maintenance Plate. The debris can be easily wiped away.

The procedure used previously for priming the printhead calls for use of a lint free cloth wiped across the printhead while performing a prime. This wiping action can force dust or other foreign material into the orifices.

The Auto Maintenance System will routinely prime the printhead and collect the ink which will alleviate the need to periodically wipe the printhead face. This is accomplished by a programmed timing interval set by the user. It can be set as often as once every 2 hours if installed in a extremely dirty environment. Or it can be set to up to every 30 hours if installed in a clean environment. The interval can be adjusted in 2 hour increments by means of a rotary switch mounted on the Auto Maintenance System Controller PCB.

Table 6-14 AMS Switch settings

Switch setting	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Interval (hrs)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30

Manual Prime*

A manual prime can be accomplished by depressing the push-button switch on the rear of the print ink system housing. Pressing and holding the button for longer than 1 second will start the pump for a manual prime. It will continue to run as long as the push-button is depressed.

(Place a wipe in front of the maintenance plate to catch excessive ink.)

Pressing for less than 0.5 seconds will initiate a maintenance cycle. If the system has started a maintenance cycle and the button is pressed, the manual prime will not operate.

*** The system will not prime either manually or automatically if there is a Low Ink indication.**

Auxiliary Photocell Input

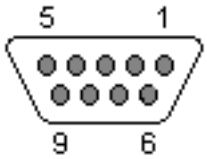
The system cannot print on the product while the printhead is in a prime sequence. During the automatic prime, ink is fed out the orifices and blocks any ink being forced out by the Piezos. Connecting the Auxiliary Photocell will alleviate this problem. The default delay setting is 3 seconds after the product passes the photocell. To change the default, perform the following:

1. Insure that the rotary switch is not in the “0” position.
2. Place a box in front of the photocell.
3. While the photocell is on, set the rotary switch to 0.
4. Once the LED stays illuminated continuously, set the rotary switch to a new number (1 through F *****) representing the number of seconds (1 through 15) you want to delay.

* **Note:** *“0” is not an available user setting*

5. Press and hold the prime button until the LED starts flashing.
6. Release the Prime button.
7. Remove box from in front of photocell.
8. Set the rotary switch back to the desired hour setting.

The **PHOTOCELL** DB9 (Female) is wired as follows:

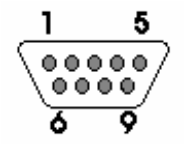


PIN	SIGNAL
1	NC
2	NC
3	PC IN
4	NC
5	GND
6	+12VDC
7	NC
8	NC
9	/PC OUT

Input Power

The Auto Maintenance System requires +12VDC for operation of pumps and Photocell. The +12VDC must be provided through a DB9 connector labeled “POWER” on the rear of the unit. This can be provided by the Controller connector labeled “AUX”. The Auto Maintenance System Controller PCB regulates the +12 VDC down to +5VDC for use on the PCB and it’s components.

The POWER DB9 (Male) is wired as follows:



PIN	SIGNAL
1	NC
2	NC
3	NC
4	NC
5	GND
6	+12VDC
7	NC
8	NC
9	NC

Shutdown Procedures

Previous printhead ink systems have had a suggested shutdown procedure for periods of inactivity of longer than 48 hours. With this new Auto Maintenance System, it is no longer necessary to power down and install shipping caps on the printheads. The purpose of shutting down power was to keep the ink from exposure to the heat for prolonged period of times without movement. With this system, you can program a prime every 8, 12, 24, or 30 hours while the machine is idle. This will reduce startup times and eliminate the need for regular shut down procedures. It will also reduce the printhead return rate for cleaning.

The following diagram can be used to troubleshoot flow problems.

AMS Fluidic Diagram

ITEM	DESCRIPTION
1	1-1/2 LG VITON
2	5" LG VITON W/4-1/2" INT SPRING
3	6-1/2" LG VITON W/5-3/4" INT SPRING
4	2-1/4" LG VITON W/1-1/2" INT SPRING
5	12" SMALL VITON
6	2" SMALL VITON
7	X40164-001 CHECK VALVE
8	X40173-001 FEMALE LUER FITTING
9	X40174-001 MALE LUER FITTING

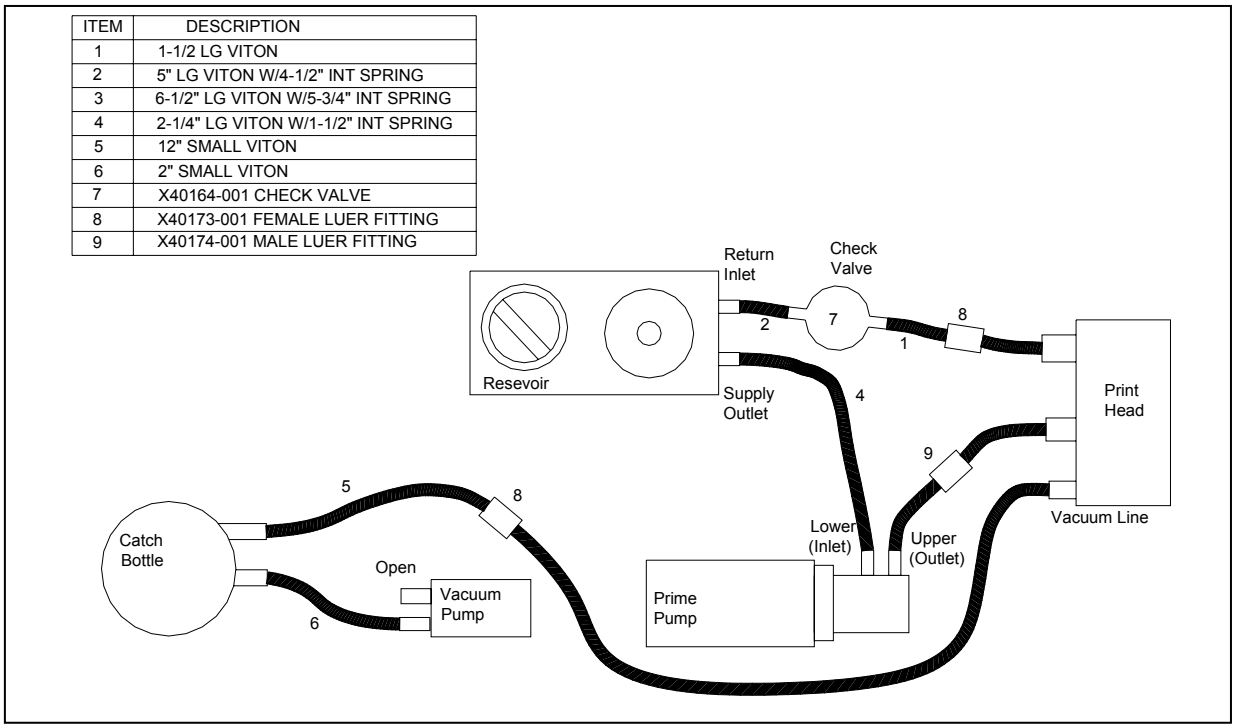


Fig 6-19 Fluidics

Fluidic path of ink:

1. Ink from the bottle fills the reservoir.
2. Ink travels from the Reservoir outlet to the Prime Pump Inlet port (Lower).
3. Ink then travels from the Prime Pump Outlet port (upper) to the printhead input.
4. Normal path of return is from the printhead outlet port to the Return inlet on the Reservoir.
5. When the prime is used, ink travels from the printhead maintenance plate, through the vacuum line to the catch bottle. Vacuum air pressure continues through the vacuum pump and is ported to the atmosphere.

Replenishing the Ink Supply(AMS)

The AMS system includes a Catch Bottle mounted on the rear of the Printhead/Ink system. This bottle must be changed each time a new bottle of ink is added to prevent improper operation of the system. To ensure this action, we have included a new Catch Bottle with each new bottle of ink supplied for AMS Printhead/Ink systems. See chart below:

Part Number	Description
S31112-002	INK, 500ML BTL VER300 BLK INK AMS
S31041-002	INK, 500ML BTL VERSA BLUE WF AMS
S31084-002	INK, 500ML BTL VERSA GREEN WF AMS
S31042-002	INK, 500ML BTL VERSA RED WF AMS
S31142-002	INK, 500ML BTL ALPHAMARK AMS

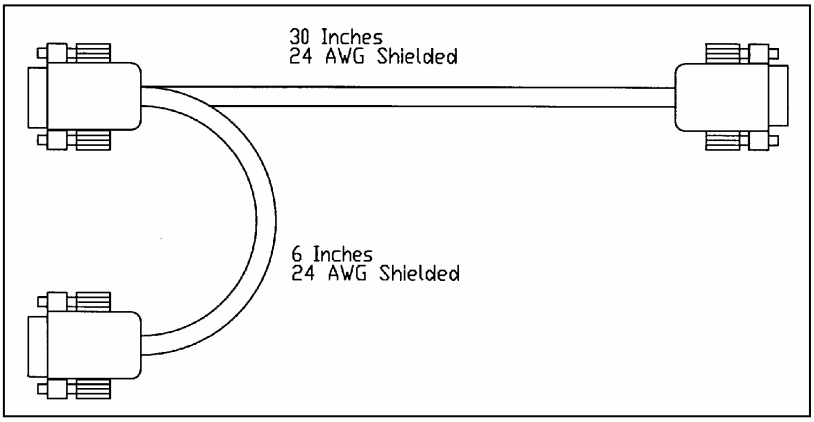
Optional Accessories

There are two optional accessories currently available for the AMS Printhead/Ink systems.

1. A photocell that is used with the Print Interrupt feature.
2. A 30-inch long cable that can be used to connect two AMS Printhead/Ink systems to one photocell. This cable can also be used to daisy chain any number of printhead/ink systems to one photo cell, depending on your system capabilities. See chart below:

Part Number	Description
S02038-002	Photocell
S01010-001	Photocell cable

Photocell Cable



Operation Tests (7400 typical)

1. Block nozzle array of printhead with lint free wipe.

2. Connect photocell to controller and configure with the user's guide for your photocell.

3. Block photocell with product sample and verify that the PC1 LED on the 7400 CPU board lights.

4. Turn the encoder wheel and verify the SE1 LED on the 7400 CPU board lights.

5. On the 7400 and all other systems, verify the Power LEDs are lit and the HD OK LEDs are lit.

Operational Setup

Prior to purchase of FoxJet Printing System, a site survey would have been accomplished. Use the data obtained in the survey to set parameters and messages.

Delay Value Calculation

The Delay value is in raster units. Determine the Delay value by adding the distance between photocell and the printhead nozzle to the distance from product edge to print location, then multiply the sum by the DPI (Dots Per Inch).

DPI X *(*d1+d2)*=DELAY*

where
d1 = distance between photocell and nozzle array (in inches)
d2 = distance from product edge to print location (in inches)

- If encoder installed, DPI is determined by dividing encoder DPI rating by the value set in the Width command.
- If encoder is not installed, DPI is determined by dividing 35000 (internal clock frequency) by value set in the Width command, then divide the result by the line speed in IPS (Inches Per Second).

Test Prints [TE]

Once a system is primed, it is recommended that some test printing be performed. A test pattern is embedded in the firmware that will fire all 32 nozzles. Product detect and printhead timing pulses are required to perform a test print.

1. Set following parameters to values indicated.

Width 20
Bold 2
Encoder N
Delay 500

2. Set Switch #4 of SW2 of the CPU board to the down position (EN = N on 7100 & 7200).
3. Select TE command on hand held terminal.
4. Pass a sample card past the printhead after triggering the photocell. Repeat process until you have a feel for the proper speed to pass the sample card. Once you have determined that all nozzles are firing properly, reset parameters and switches to proper application configuration.
5. Monitor print operations until LOW INK is detected and then follow Ink Refill procedures outlined in Chapter 7.

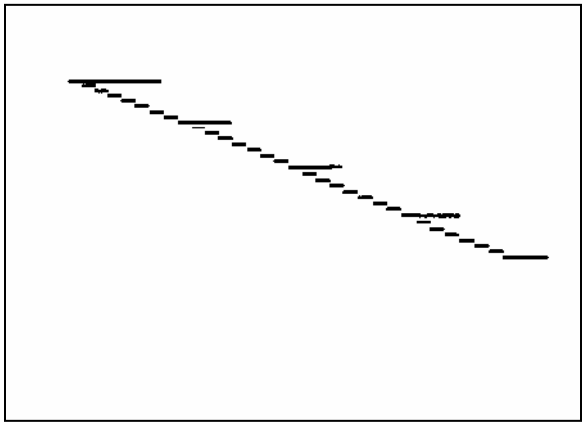


Fig. 6-20 Test Print

Network Setup

The FXJet Series controller can be configured in a network, controlled by a remote PC. The communication ports of the FXJet Series Controllers will allow RS-232 or RS-485 communication. The method of communications will be selected by dipswitch settings and jumpers mounted on the FoxJet Interface and CPU Boards. The RS-485 port allows point-to-point communications (RS-232 is a typical point to point system) or multi-drop network communications (one central computer communicating to several units across a single cable).

Network Diagram

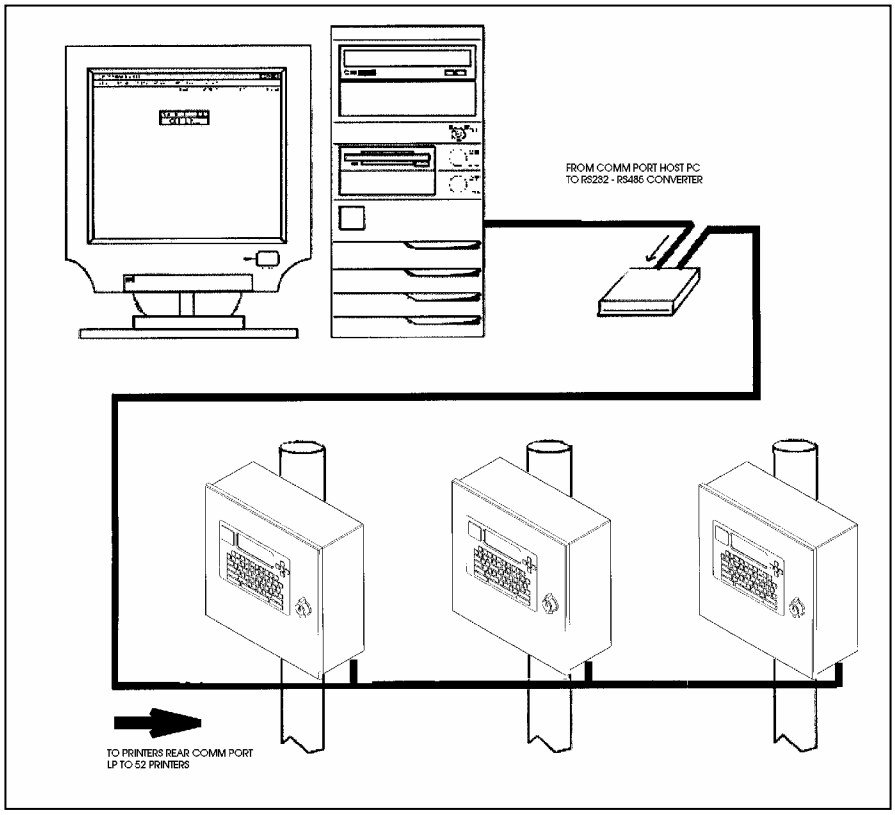


Fig. 6-21 Networking

Introduction to RS-485

The RS-485 standard communication uses two balanced signals referenced to each other, as compared to RS-232 signals, which are referenced to signal ground (in a four wire RS-485 system, two wires are used for transmit data, and two wires are used for receive data). Balanced signals allow greater distances between sending and receiving devices. Distances up to 4000 feet at high data transfer rates can be achieved. The RS-485 standard allows up to 32 drivers and 32 receivers on a 4-wire full duplex system.

The FXJet Series controller utilizes RS-485 serial asynchronous communication as a method of sending information between input and output ports of the controller and a computer (PC). Serial refers to binary digits, or bits, sent one after the other in sequence. Asynchronous means bits are transmitted on the line in a un-timed, random fashion (no central clocking device). Accordingly, you must program parity bits, data bits, stop bits, and the baud rate of the sending and receiving devices before communicating (like RS-232).

Connecting the RS232/RS485 Rear Communications Port

The RS232/RS485 Rear Communications Port is primarily used for applications which require host computer control for high speed down loading applications or using the FoxJet SystemMaster software interface program.
This port can be used for downloading from a host computer when an application calls for changing messages after each product or batches of products.
The Rear Port uses a female DB9 connector. The type of communication, RS232 or RS485 will dictate how the cabling is wired.

***Please note**: The pin out of this DB9 cable matches the conventional standard for RS232 and RS485. A straight through DB9 male/female cable is acceptable when wiring.*

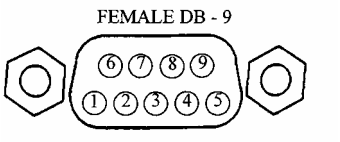
Running cable for Network application requires "Network level 5" cabling. A number of different types of cables are available. FoxJet recommends the DB style connector.

Table 6-15 RS232 connections:

PIN	SIGNAL NAME	TYPE
2	RS232 TX	OUTPUT
3	RS232 RX	INPUT
5	DC GROUND	GROUND

Table 6-16 RS485 connections:

PIN	SIGNAL NAME	TYPE
1	RS485 TX-	OUTPUT
2	RS485 RX+	INPUT
3	RS485 RX-	INPUT
4	DC GROUND	GROUND
9	RS485 TX+	OUTPUT



Application Note: *When networking, there is a Rear port IN and Out on the 7400 and 7200 controllers. There is a Rear Port and Aux port on the 7100. All of these can be used when running a cable into and out of the controller.*

PC Configuration

When setting up an RS-485 communication port or card on a PC, the interface card should be configured for the correct communication port and interrupt request line: COM1 is typically used for the mouse. COM3 should be used for the FoxJet network. Be sure that no IRQ conflicts exist. For further information, consult your IT/MIS department.

Table 6-17 PC Com Ports

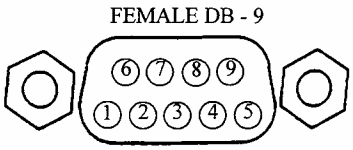
COM PORT	PORT ADDRESS	IRQ #
COM1	03F8	4
COM2	02F8	3
COM3	03E8	11
COM4	02E8	12

System Wiring For an RS-485 Network

When selecting the required cable, the length of the network lines should be considered. The greater the distance the more critical is the selection of the cable. A recommended standard would be a shielded 24 AWG, (solid or stranded) twisted pair cable.
The FoxJet controller is configured for RS-485 four-wire mode. In a four-wire network it is necessary that one node be a master node (PC) and all others be slave nodes (FoxJet controller). The network is connected so that the master node (SystemMaster PC) communicates to all slave nodes (all FoxJet printers connected).
The slave nodes only communicate with the master node (they do not communicate with each other). Attention should be paid to the polarity of the transmit and receive data lines during installation. The table below shows the connections for FoxJet controller networks.

Table 6-18 RS485 Pin out

PC PORT	REAR PORT	FRONT PORT
TX (-)	PIN 3- RX(-)	PIN 25-RX(-)
TX (+)	PIN 2- RX(+)	PIN 24-RX(+)
RX (-)	PIN 1-TX(-)	PIN 13-TX(-)
RX(+)	PIN 9-TX(+)	PIN 12-TX(+)



Connections are made by shielded cable into the Rear Port In jack on the Controller. You can run out of the Rear Port Out jack or the Aux Port (depending on your controller).

Controller Configuration

The FoxJet controller must have its Interface switches and jumpers set appropriately. The following pages show the controller board settings and jumpers for a typical installation. Besides the switches and jumpers, each controller must have an ID # selected and the Network mode of operation enabled when using SystemMaster.
The ID # is selected on the keyboard by entering "ID" and then selecting an identification number between 1-99.
The Network mode of operation is enabled by entering "NE" and selecting Y (SystemMaster use). When the network mode is enabled, the Rear port is capable of receiving commands, *but caution should be used*. The unit cannot determine between commands entered through the RS-485 port and the terminal port. Conflicting commands or commands entered while the network is communicating should be avoided.
NOTE: When LEDs DS1 & DS2 on the CPU board, 7200 board and DS6 & DS7 on the 7100 are illuminated, it indicates that network communications is taking place.

Switch Settings & Jumper Configurations (7400)
(Refer to Fig 6-19)

Set SW1 of Interface Board to 485 position for RS-485 communication. SW2 (#6) on CPU Board DOWN for RS485 communication. Ensure that termination jumpers are installed at JP4 & JP5 if controller is last in network sequence. If controller is not last, then remove jumpers from JP4 & JP5. (Figure below shows JP4 &JP5 as un-terminated)

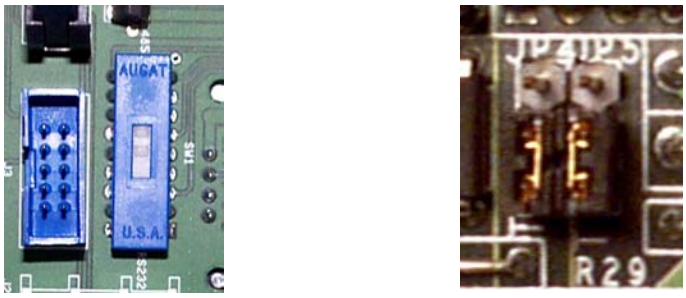


Fig 6-22 7400 Switch and Jumper Settings

Switch Settings & Jumper Configurations (7100)
(Refer to Fig 6-20)

Set SW1 on controller board to the down position to select RS485 operation. Ensure that termination jumpers are installed at JP4 & JP5 if controller is last in network sequence. If controller is not last, then remove jumpers from JP4 & JP5. (Figure below shows JP4 &JP5 as un-terminated)

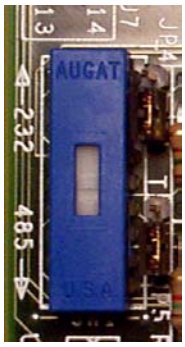


Fig. 6-23 7100 Switch and Jumper Settings

Switch Settings & Jumper Configurations (7200)

The 7200 board has no switches or jumpers to set up. You select RS-232 and RS-485 through software commands (R4). When you network more than one controller, you will need to put a terminator on the Rear Port Out connector.

7100 Board Layout

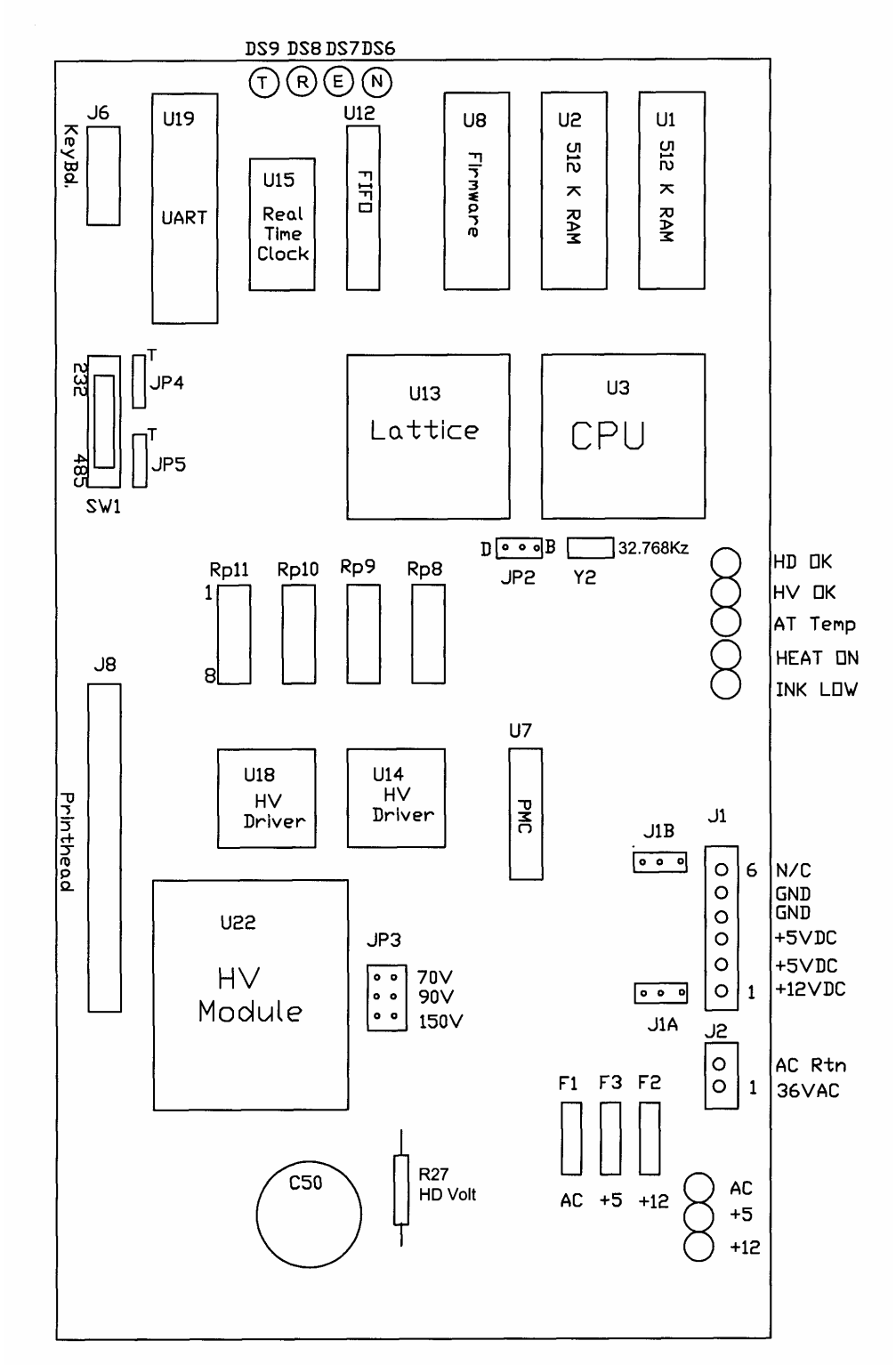


Fig. 6-24 7100 Board Layout

7200 Board Layout

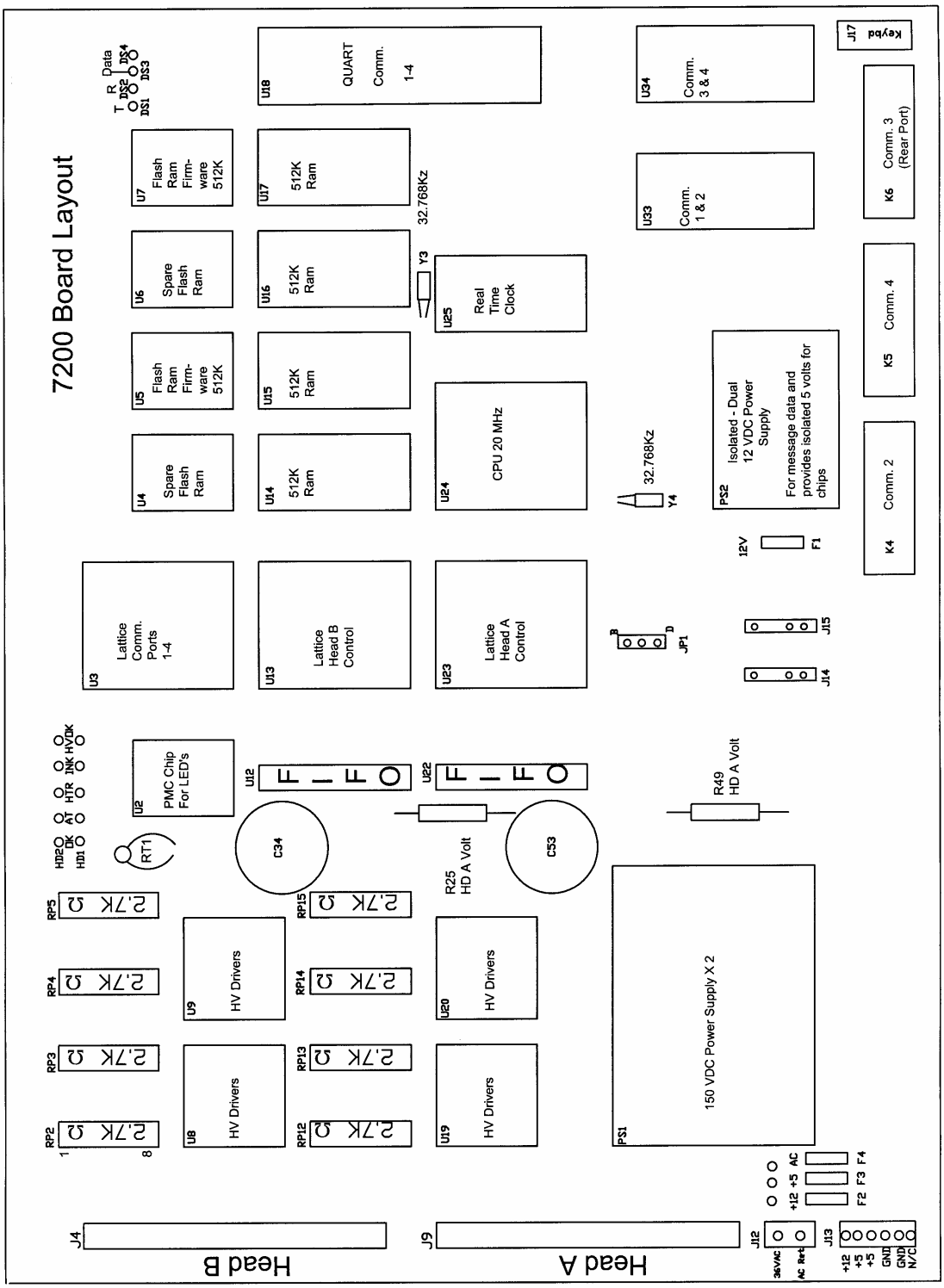


Fig. 6-25 7200 Board Layout

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Service

Chapter 7

Routine Maintenance

Routine maintenance on the FXJet Series Printing System is necessary for long term, reliable operation.

Maintenance Schedule

The following table will assist in setting up an effective routine maintenance program.

Table 7-1 Maintenance Schedule

Procedure	Page #	Daily	Weekly	Quarterly
Clean Array Plate and Prime Printhead		✓		
Clean printhead exterior			✓	
Clean ink system housing assembly			✓	
Clean photocell lens			✓	
Replace vent cap filter				✓
Clean interior of controller				✓
Ensure that mounting hardware is secure				✓

Array Plate Cleaning

Sometimes small particles of dust can partially or fully block one or more orifices. Cleaning the printhead array plate using Maintenance Spray is an effective, simple procedure that should be performed at least once per shift.

1. Spray small amount of Maintenance Spray on array plate.
2. Use a lint free wipe to remove excess by wiping at 90 degrees to the orifices.

- Use only approved inks and solvents on the FXJet Series Printheads.
- NEVER use any abrasive material or a scraper on the Printhead Array Plate. Damage to the printhead is likely and any warranties will be voided.

Printhead/Ink System Priming

Priming refers to eliminating air bubbles from printhead array plate.

1. Remove ship cap (if installed).
2. Hold lint-free absorbent cloth over printhead and push prime bulb several times.
2. Gently wipe off all ink. Some weeping will occur so wipe again as necessary.
3. Perform a test print, using a message that uses all nozzles or the test pattern (TE).
5. If all nozzles do not print, wait 10-20 minutes and perform a test print (TE). If all nozzles do not print, repeat steps 2-4.

Fig. 7-1 Priming

Cleaning Ink System (Modular & Integrated)

1. With system turned off, gently wipe housing with soft cloth to remove all dust and ink residue. Use only approved Maintenance Solutions as cleaning solvent. Excessive force may cause ink system to de-prime. If that occurs, it may be necessary to perform a Purge/Prime.
2. Turn system on and perform a test print. Purge/Prime as necessary.

Series 7 Fluidic Diagram

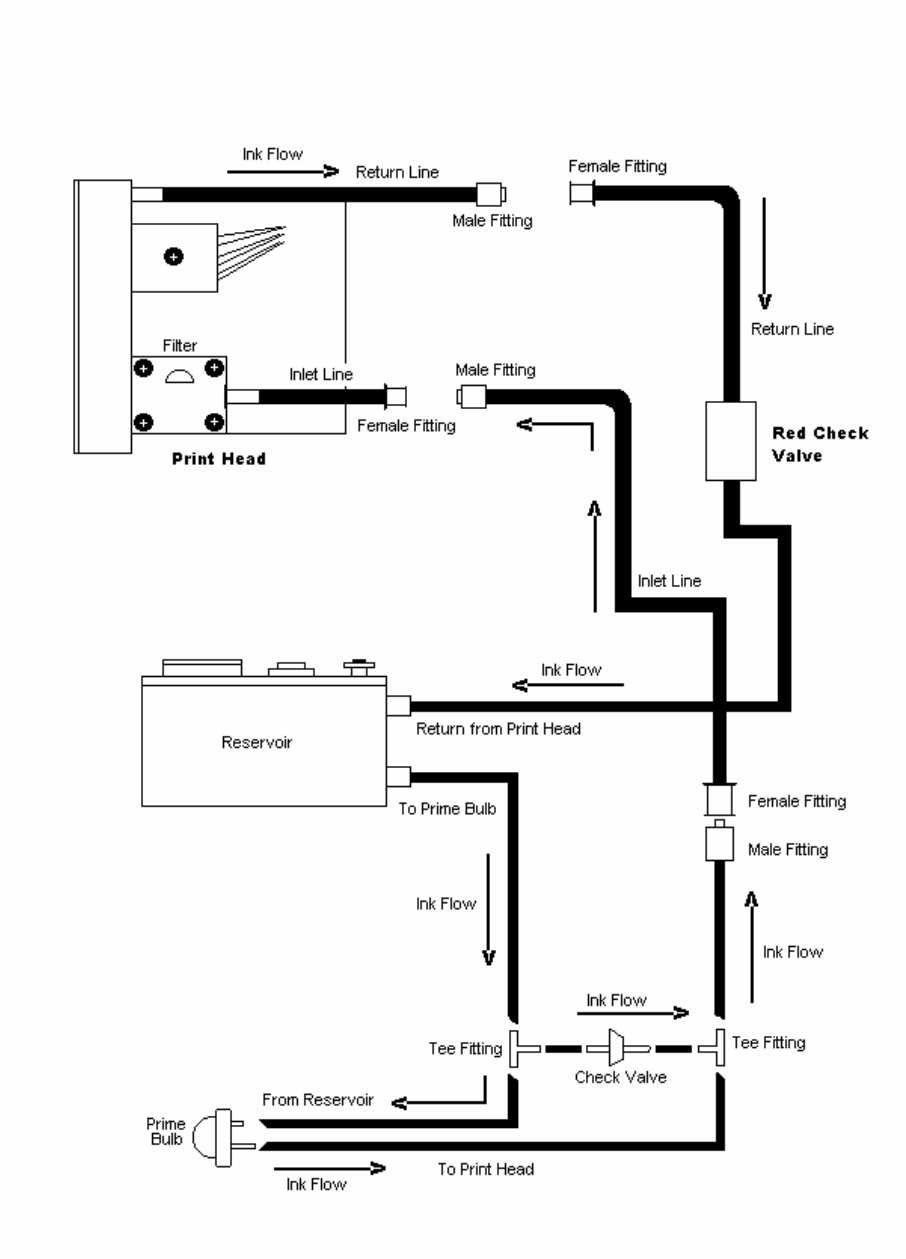


Fig. 7-2 Fluidics

Cleaning Photocell Lens

Photocell lenses can get dirty and cause system to not print on some products or print in the wrong location.

1. Gently wipe the lens of the photocell with a lint free cloth.
2. Clean area surrounding photocell of dust.

. Do not use any solvents on photocell lens. Damage to photocell is likely to occur.

Cleaning Interior of Controller

1. Turn system off.
2. Open controller door and ground self to chassis. Components on boards are static sensitive.
3. Dust interior with low-pressure, filtered air only.

Fault Diagnosis

Indicators and the following tables may assist in isolating printing and machine failures. FoxJet systems are designed with intent of assembly level repairs in field. Soldering on printed circuits is not recommended and FoxJet is unable to provide warranties on equipment serviced to this level.

Table 7-2 CPU Board Indicators (7400)

LED	FUNCTION	TYPICAL STATE
DS1 DS2	Flash during XMIT & REC when downloading info from host computer	Will only flash during communication process; indicates rear port communications
DS3	On some systems, lights to indicate that encoder is selected in firmware; doesn't affect operation	Most systems this will be off
DS4	Indicates that system has passed power up tests	Will be lit when system is running; older systems will not use this indicator
PC1 PC2	Photocell Trigger indicator	Flashes when photocell trigger; with no photocell plugged in, light will not be lit
SE1 SE2	Shaft Encoder rotation indicator	Flashes to indicate a pulse from shaft encoder. appears to be steady, but is actually flashing at encoder speed
ALM1	Indicates all printheads are at temperature	On when ALL printheads are at temp
ALM2	Red LED that indicates an INK LOW condition	Off until INK LOW happens
AP1 AP2	Auto prime pulse indicators; used with high speed document printing only	Will not be lit for general application

Table 7-3 Driver Board Indicators (7400)

LED	FUNCTION	TYPICAL STATUS
HDA HDB	Indicate when printhead is connected	Lit if printhead is sensed
HVA HVB	Indicate High Voltage on driver board	Lit when High Voltage is ok for each printhead
INKA INKB	INK LOW indicator	Lit when INK LOW condition exists
HTRA HTRB	Indicate when printhead heating elements are active	Lit while printhead is heating. Cycles on/off to maintain temp.

Table 7-4 Fuse List (ALL)

CIRCUIT	CKT DESIGNATOR	VOLT/CURRENT	PART NUMBER
7100 Controller	F1 (AC), F3 (5V)	125/2A	X12008-001
7100 Controller	F2 (12V)	125/2A Slow blow	X12009-001
7200 Controller	F1 (12V), F3(5V), F4 (AC)	125/2A	X12008-001
7200 Controller	F2 (12V)	125/2A Slow blow	X12009-001
7400 Driver	F1 (AC), F2 (AC)	125/2A	X12008-001
7400 I/O board	F1, F2	125/2A Slow blow	X12009-001
UPC II board	F1	5A	X12014-001
Power Entry Mod	F1, F2	250/3.15A	X12146-001
P/H 352,256,&96 Spec.	Thermal	250/2A-102°C	X12028-001
P/H – All others	Thermal	125/2A - 76°C	X12001-001

Table 7-5 Model 7200 Indicators

LED	FUNCTION	TYPICAL STATE
LED1	Indicates +12 VDC Present	Will be lit when system is turned on
LED2	Indicates + 5 VDC Present	Will be lit when system is turned on
LED3	Indicates 36 VAC Present	Will be lit when system is turned on
DS1 DS2	Flash during XMIT & REC when downloading info from host	Will ***only*** flash during rear port communications
DS3	On ***some*** systems, will be lit to indicate an encoder is selected in firmware.	Most systems, this will be off
DS4	Indicates system has passed power up tests	Will be lit when system is on: Older systems did not use this indicator
HD1/2 OK	Indicates HD 1 and/or 2 is ready	Will be lit when system is ready to print
HD1/2 AT	Indicates HD 1 and/or 2 is at operating temperature	Will be lit when heads are at temperature
HD1/2 HTR	Indicates HD 1 and/or 2 is being heated	Will be lit periodically while print head is being heated
HD1/2 INK	Indicates HD 1 and/or 2 has an ink low condition	Will be off unless Ink Low is detected
HD1/2 HVOK	Indicates HD 1 and/or 2 high voltage is OK	Will be lit when system is turned on

Table 7-6 Model 7100 Indicators

LED	FUNCTION	TYPICAL STATE
LED1	Indicates + 5 VDC Present	Will be lit when system is turned on
LED2	Indicates +12 VDC Present	Will be lit when system is turned on
DS10	Indicates 36 VAC Present	Will be lit when system is turned on
DS6 DS7	Flash during XMIT & REC when downloading info from host	Will ***only*** flash during rear port communications
DS8	On ***some*** systems, will be lit to indicate an encoder is selected in firmware.	Most systems, this will be off
DS9	Indicates system has passed power up tests	Will be lit when system is on: Older systems did not use this indicator
HD OK	Indicates head is ready	Will be lit when system is ready to print
HV OK	Indicates head high voltage is OK	Will be lit when system is turned on
AT TEMP	Indicates head is at operating temperature	Will be lit when head is at temperature
HEAT ON	Indicates head is being heated	Will be lit periodically while print head is being heated
INK LOW	Indicates head has an ink low condition	Will be off unless Ink Low is detected

Symptoms and Causes

The following pages list some known symptoms and typical causes. These lists are in no way complete and cannot replace systematic troubleshooting. The service representative must have a solid foundation of system knowledge and ink jet printing principles, as well as basic electronic troubleshooting abilities to progress beyond these lists.

No Print

- Printhead not heating
- Loss of power to printhead
- Encoder command and CPU SW2 mismatch
- No photocell trigger
- No message selected or empty message selected
- Delay set too long or too short
- Ink system de-primed
- No ink
- Clogged Printhead Array

Poor Print Quality

- Ink system de-priming
- Incorrect printhead to ink system positioning (modular system only)
- Printhead not heating
- Clogged or damaged Printhead Array
- Programming errors
- Ink lines restricted
- Gap between product and printhead too great
- Incorrect angle on printhead
- Incorrect drive voltage or CURVE settings
- Incorrect Type Head (TH) selected

Printhead Not Heating

- Thermal Fuse blown
- AC fuse on Driver Board or section blown
- Bad connection in Printhead Data Cable
- Power Supply failure
- Driver Board or section failure
- Bad Printhead Thermistor

Ink Low

- Ink supply empty
- Failed UPC board
- Failed Driver board or section
- Bad connection on Printhead Data Cable or in Ink Line Umbilical

Display Malfunction

- Keyboard faulty
- Bad CPU board
- Power Supply failure or blown fuse
- Bad Firmware Module

Boot failures

- Bad CPU board
- Loss of 5 VDC
- Low Battery voltage
- Bad Driver Board or section

Priming Failures

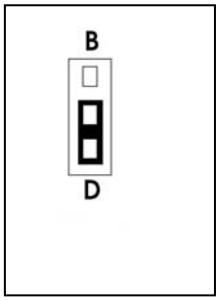
- Air leak in ink plumbing system
- Clogged printhead or array plate
- Clogged ink inlet filter
- Loss of 12 VDC

Service Procedures

Manual ZAP [ZA]

Manual ZAP is used to completely reset system to default values. Sometimes power fluctuations or other interference can lock up data busses in system. A manual ZAP can remedy a myriad of problems ranging from boot failures to garbled prints. Completely resetting will load all default values and clear all busses. All data being saved in RAM will be lost.

1. Turn system off.
2. Locate jumper JP3 on 7400 CPU Board (JP2 on 7100 system, JP1 on 7200 system). This jumper connects Backup Battery to memory circuits.
3. Move jumper from the “B” position to the “D” position for approximately 5 seconds. This action clears the memory contents.
4. Move jumper back to the “B” position and apply power to system.



Shown in the “D” drain position.

Fig. 7-3 Zap Jumper

Printhead Flush (VersaPrint)

VersaPrint flush solution can be used to flush a printhead for cleaning or when changing ink colors.

1. Turn system off.
2. Make sure that printhead area is clean.
3. Disconnect printhead ink supply at printhead. Cap off any exposed ink lines.
4. Connect syringe or squeeze bottle containing approved VersaPrint flush solution to printhead.
5. Run flush solution through printhead until ink is flushed out.

Changing Ink Supply

Ink supply can be changed while system is printing.

1. Thoroughly clean ink supply area.
2. Remove ink bottle. Sometimes rubber seal sticks to bottle. Remove seal from empty bottle. The seal must be re-used with new bottle to prevent leaking.
3. Clean seal with a lint free cloth as well as possible, but DO NOT use any solvent other than recommended solvents.
4. Place seal in reservoir fitting.
5. Screw in new bottle of ink, tightening hand tight only.

System Checks

Printhead Thermal Fuse

1. Turn system off.
2. Remove cover from printhead.
3. Disconnect Printhead Data Cable from Printhead PCB.
4. Measure for continuity across test points shown. If no continuity, replace fuse.

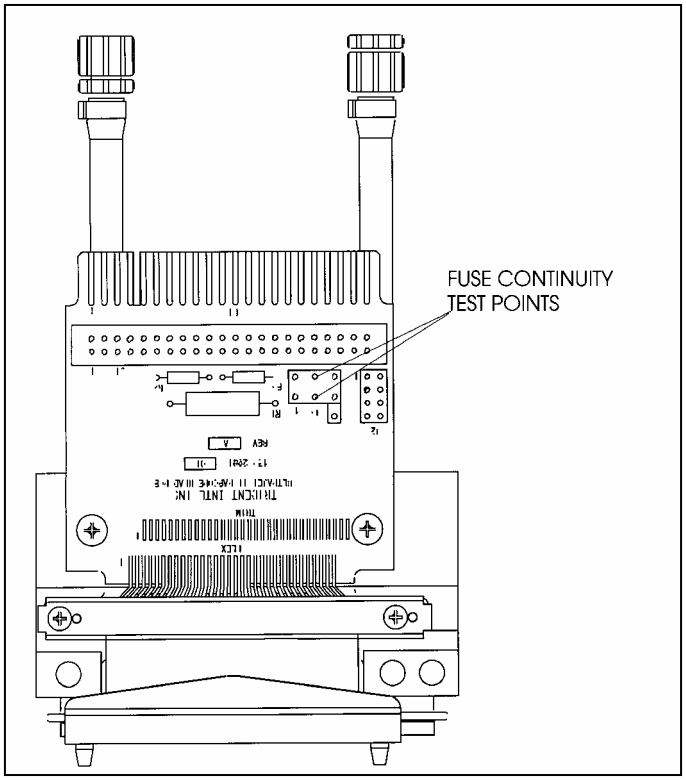


Fig. 7-4 UJII Continuity Test Points

Power Supply Check (7400)

Power supply voltages can be checked on the Power Supply board or on the power cable that goes to the Board(s). Always turn system off prior to disconnecting any internal cables.

- Measure +5 VDC & +12 VDC referenced to COM.
- Measure across both legs when measuring AC voltage.
- Measure between +150 and –150 for high voltage.

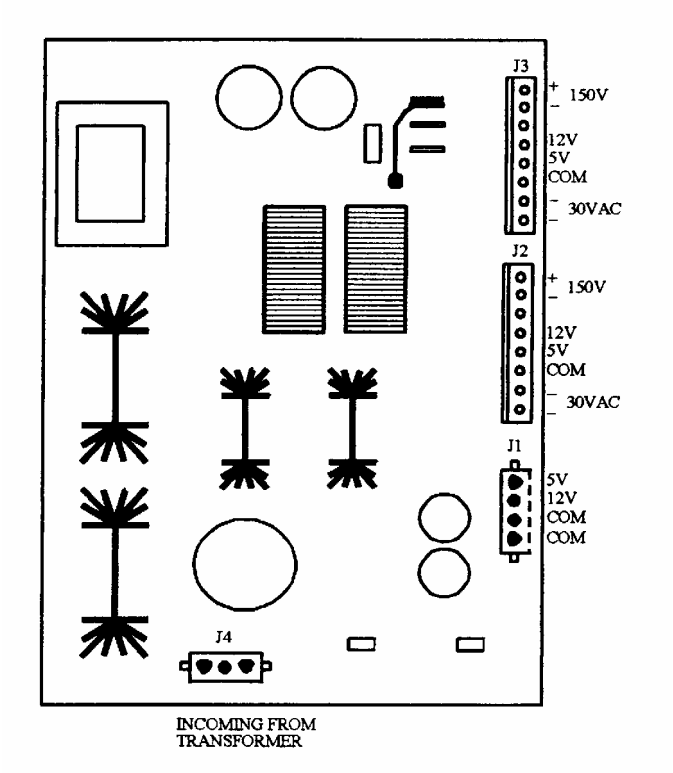


Fig. 7-5 7400 Power Supply

Typical power supply shown.

Power Supply Check (7200)

Power supply voltages can be checked on the controller board power connector. Always turn system power off prior to disconnecting any internal cables.

- Measure +5 VDC & +12 VDC referenced to COM.
- Measure across both legs when measuring AC voltage.

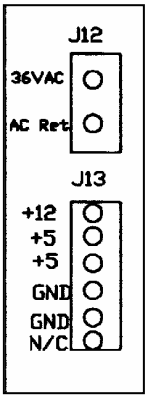


Fig. 7-6 7200 Power Connectors

Power Supply Check (7100)

Power supply voltages can be checked on the controller board power connector. Always turn system power off prior to disconnecting any internal cables.

- Measure +5 VDC & +12 VDC referenced to COM.
- Measure across both legs when measuring AC voltage.

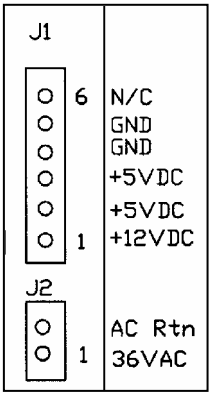


Fig. 7-7 7100 Power Connectors

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FXJet Series Assembly

Removal/Replacement Procedures

Chapter 8

Field Replaceable Units (FRUs) on FoxJet equipment are typically restricted to sub-assemblies and PCB assemblies. This chapter will detail the FRUs visually.
Figures 8-1 through 8-3 will assist in removing/replacing the major components of the 7100, 7200 and 7400 controllers.

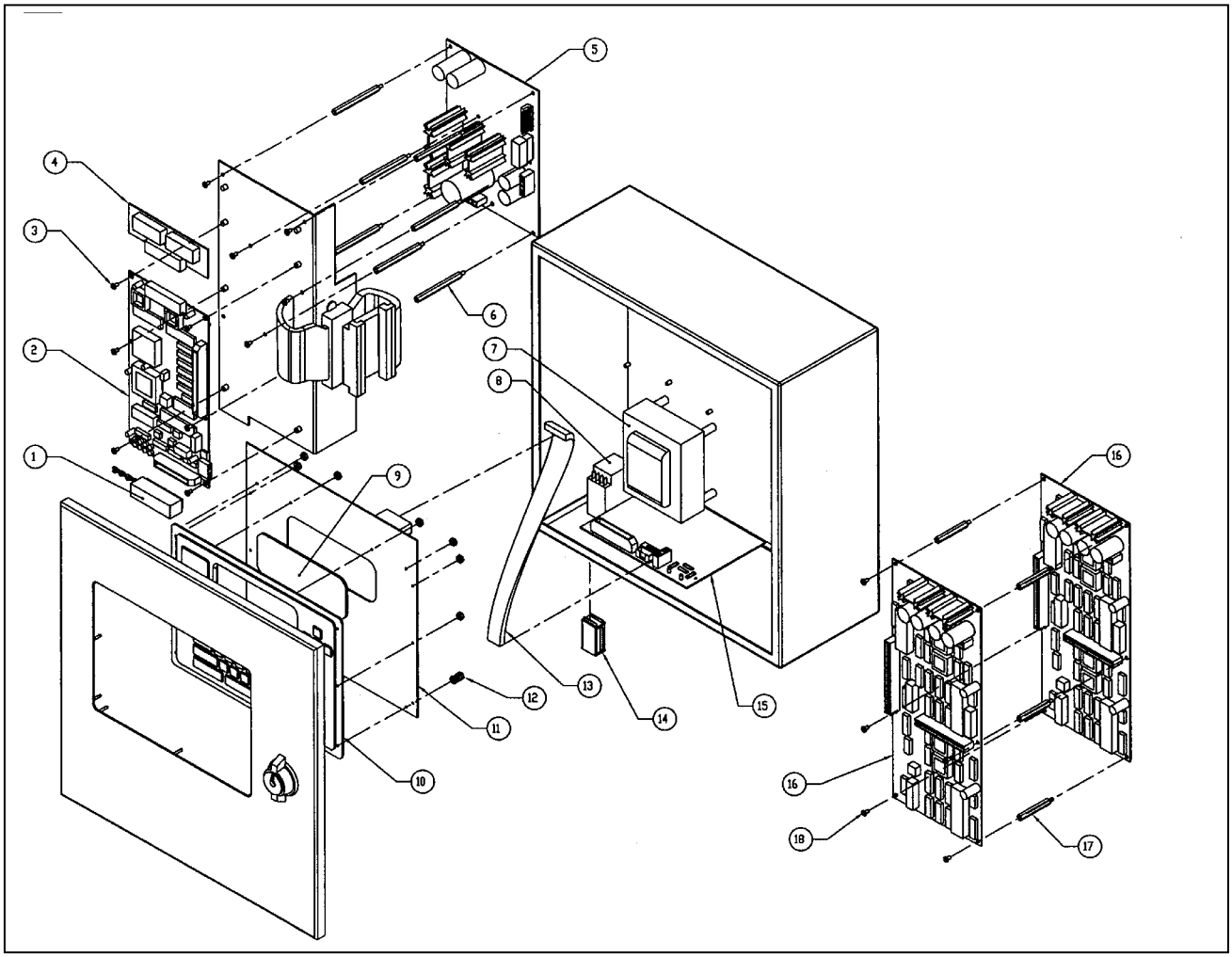


Figure 8-1 7400 Controller Exploded

Table 8-1 7400 Parts List

Item	Description	Part Number
1	Battery, 3.6 Volts, Lithium	X10105-001
2	CPU Plus PCB	X15080-003
3	6-32 X ¼" Screw (24)	
4	Firmware Module	X7400418OKO
5	Power Supply	X13006-004
6	Standoff	X20043-001
7	Transformer Assy	X13009-001
8	Switch, Mains Power	X01156-001
9	Display Cover, Large	X4182-001
10	Overlay, Keyboard, Large	X4180-001
11	Keyboard, Large Character	X15115-002
12	4-40 Hex nut w/nylon insert	
13	Cable, Ribbon Assy (keyboard)	X01113-005
14	Power input module	Part of item 8
15	Interface PCB	X15117-001
16	Driver PCB (2)*	X15010-011
17	Spacer, 6-32 X 1 ¾"	X20041-001
18	6-32 X 3/8" Screw (6)	

**Either one or two boards may be installed.*

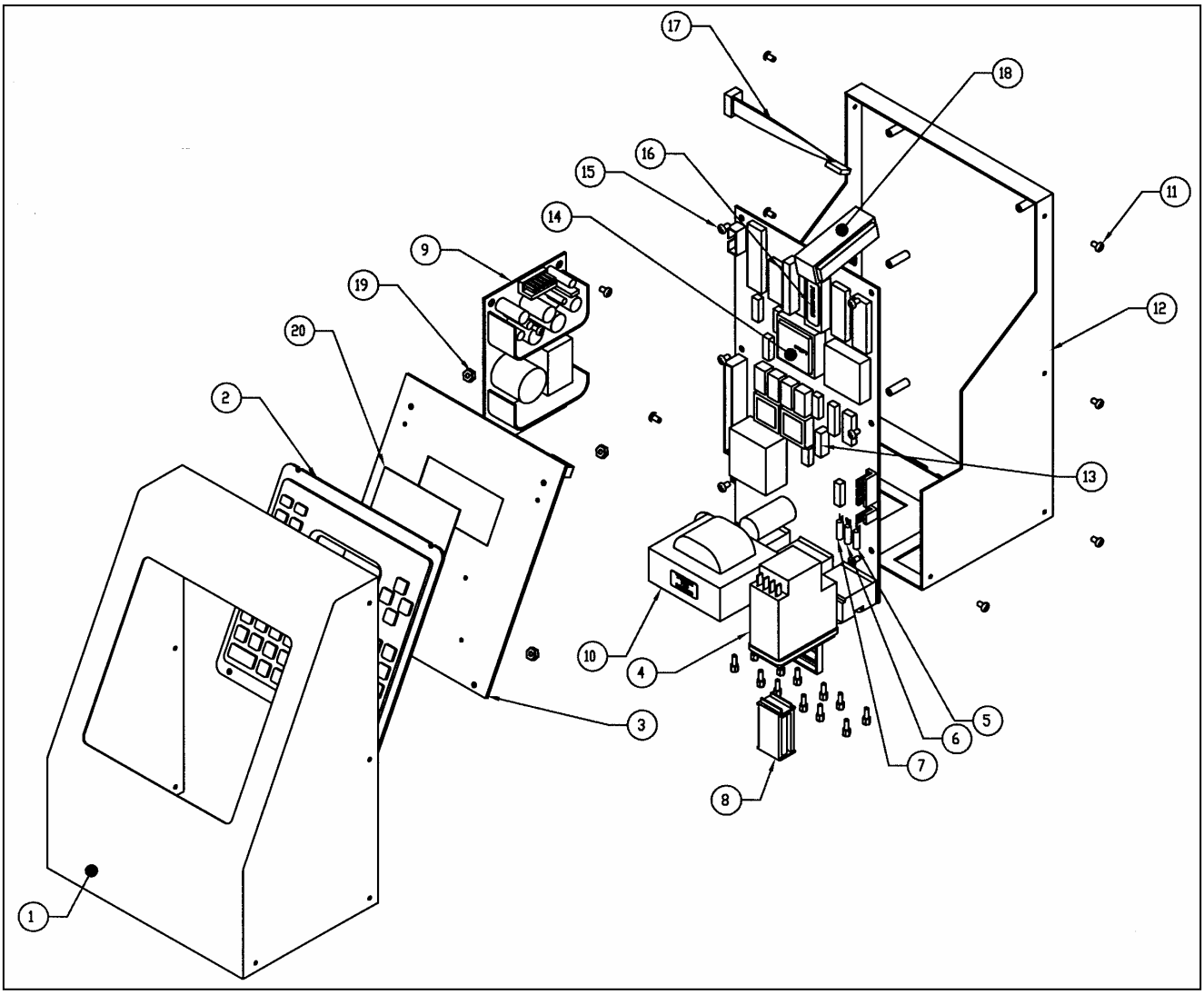


Fig 8-2 7100 Controller Exploded View

Table 8-2 7100 Parts List

Item	Description	Part Number
1	Enclosure, Quantum	X21123-001
2	Overlay, Keyboard Plus	X40176-001
3	PCB, STF, Keyboard Plus	X15105-002
4	Switch, Mains Power	X01156-001
5	F-2 Fuse, 12V, 2A	X12009-001
6	F-3 Fuse, 5V, 2A	X12008-001
7	F-1 Fuse, AC, 2A	X12008-001
8	Power Input Module	Part of Item 4
9	Power Supply	X13007-002
10	Transformer Assy	X13015-002
11	6-32 X ¼" Screw (11)	N/A
12	Enclosure, Base	X21124-001
13	PMC Chip	X7141200000
14	Lattice Chip	X7130200000
15	6-32 X ¼" Screw (6)	N/A
16	Firmware Chip	X7110418000
17	Cable, Ribbon Assy	X01113-002
18	Battery, 3.6V Lithium	X10105-001
19	4-40 Hex Nut w/nylon washer	N/A
20	Display Cover, Keyboard	X40177-001

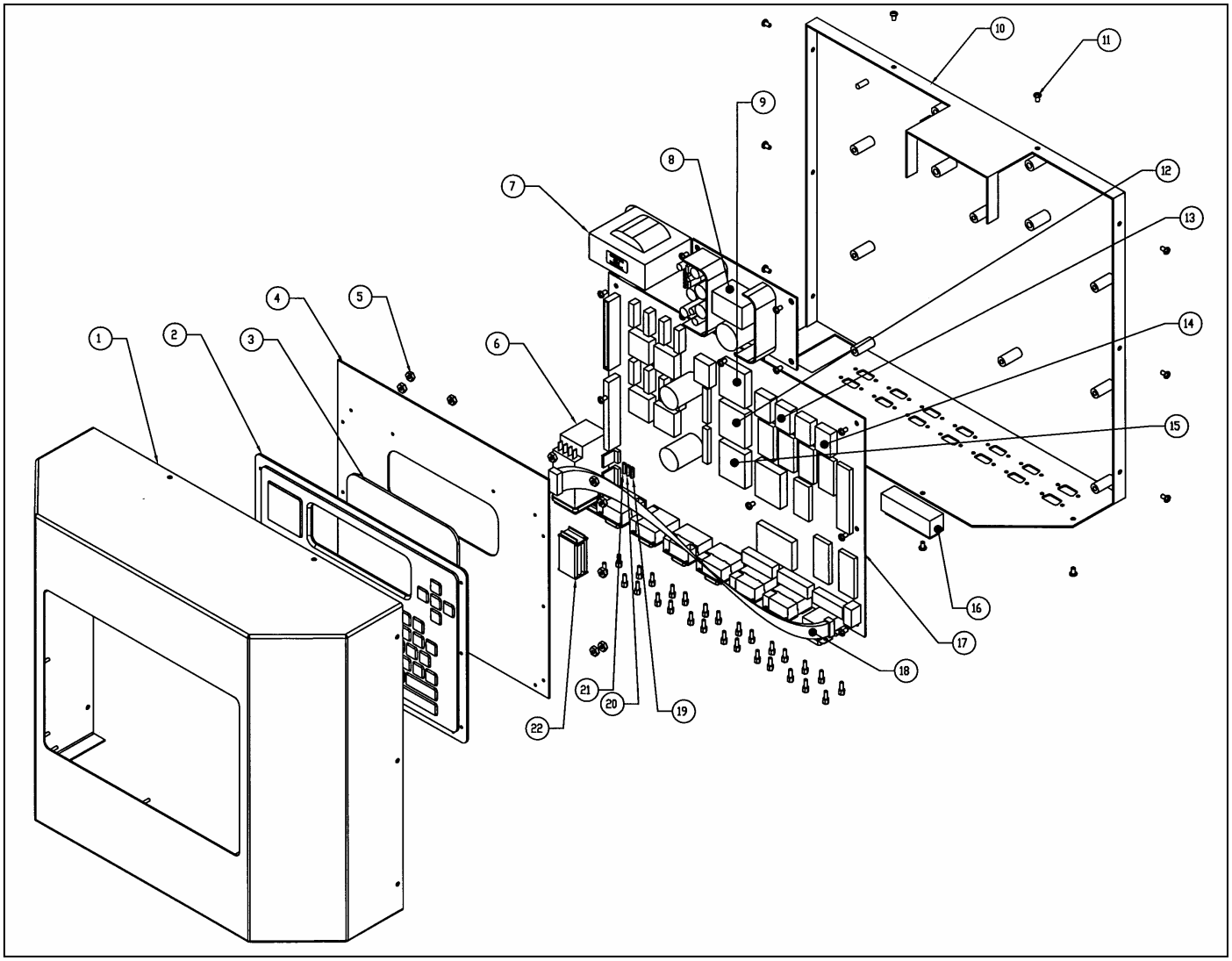


Fig. 8-3 7200 Controller Exploded View

Table 8-3 7200 Parts List

Item	Description	Part Number
1	Enclosure Cover, 7200	X21270-001
2	Overlay Keyboard, Large	X40180-001
3	Display Cover, Large	X40182-001
4	Keyboard, Large Character	X15115-002
5	4-40 Hex Nut W/nylon washer (13)	
6	Switch, Mains Power	X01156-001
7	Transformer Assy.	X13015-003
8	Power Supply	X13007-002
9	Lattice Chip	X7230201000
10	Enclosure, Base	X21269-001
11	6-32 X ¼" Screw (24)	
12	Lattice Chip	X7230101000
13	EVEN Flash Ram Chip	X7270419000
14	ODD Flash Ram Chip	X7270419000
15	Lattice Chip	X7230101000
16	Battery, 3.6V Lithium	X10105-001
17	PCB,STF, CPU 7200	X15101-003
18	Cable, Ribbon, Keyboard	X0113-004
19	Fuse 2A SB	X12009-001
20	Fuse 2A	X12008-001
21	Fuse 2A	X12008-001
22	Power Input Module	Part of item 6

Firmware Assembly Removal/Installation (7100)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards.

Removal

1. Turn system power off.
2. Remove controller cover.
3. Remove Firmware Assembly U8 (EPROM) using the proper removal tool.

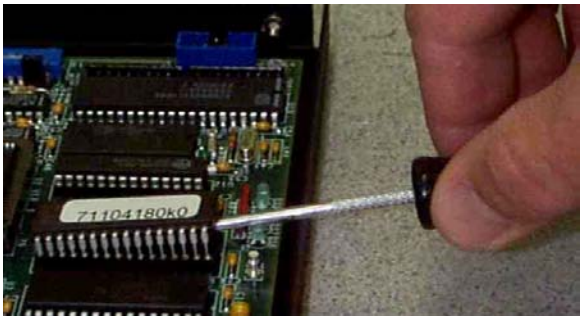


Fig 8-4 Remove 7100 Firmware

Installation

1. Inspect new Firmware Assembly U8 for damage that may have occurred during shipment.
2. Install Firmware Assembly U8 onto connector and press into place.
3. Perform a Manual Zap.
4. Reinstall cover.
5. Apply system power.
6. Verify operation with default settings.
7. Set system time & date.
8. Re-program system operational parameters.

Fig. 8-5 Install 7100 Firmware

Firmware Assembly Removal/Installation (7200)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards.

Removal

1. Turn system power off.
2. Remove cover.
3. Remove firmware assemblies U5 and U7 (FLASHRAM) using the proper removal tool.

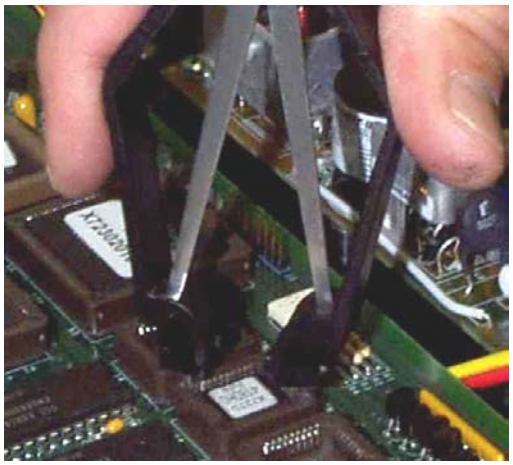


Fig. 8-6 Remove 7200 Firmware

Installation

4. Inspect new firmware assemblies U5 and U7 for damage that may have occurred during shipment.
5. Install firmware assemblies U5 and U7 into sockets and press into place.
6. Perform a Manual Zap.
7. Install cover.
8. Apply system power.
9. Verify operation with default settings.
10. Set system time & date.
11. Re-program system operational parameters.

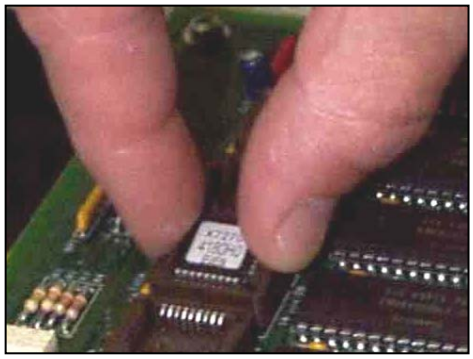


Fig. 8-7 Install 7200 Firmware

Firmware Assembly Removal/Installation (7400)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards.

Removal

1. Turn system power off.
2. Open cover.
3. Remove Firmware Assembly by gently squeezing plastic locks on standoffs.

Fig. 8-8 Remove 7400 Firmware

Installation

4. Inspect Firmware Assembly for damage that may have occurred during shipment.
5. Install Firmware Assembly onto connector and snap into place on plastic standoff posts.
6. Perform a Manual Zap.
7. Close cover.
8. Apply system power.
9. Verify operation with default settings.
10. Set system time & date.
11. Re-program system operational parameters.

Fig. 8.9 Install 7400 Firmware

CPU Board (7400)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards. (Refer to Figure 8-1)

Removal

1. Turn System off.
2. Open cover.
3. Disconnect all connectors.
4. Disconnect battery.
5. Remove Firmware Assembly by gently squeezing plastic locks on standoffs and lift firmware module up and out.
6. Remove CPU Board by gently squeezing plastic locks on standoffs.

Installation

7. Inspect CPU Board and ensure that all IC's are seated securely.
8. With system power turned off, gently slide board over plastic standoff posts until they snap into lock position.
9. Install Firmware Assembly onto connector and snap into place on plastic standoff posts.
10. Connect power cable to J4.
11. Connect Driver Data cable to J3.
12. Connect battery to J7 or J8.
13. Measure battery voltage. Battery voltage should be at least 3.0 VDC. System will not boot properly if battery voltage is too low.
14. Close cover.
15. Apply system power.
16. Verify operation with default settings.
17. Set system time & date.
18. Re-program system operational parameters.

Driver Board Removal/Installation (7400)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards. (Refer to Figure 8-1)

Removal

1. Turn off system power.
2. Open cover.
3. Disconnect all cables from Driver Board.
3. Remove standoff posts and remove board.

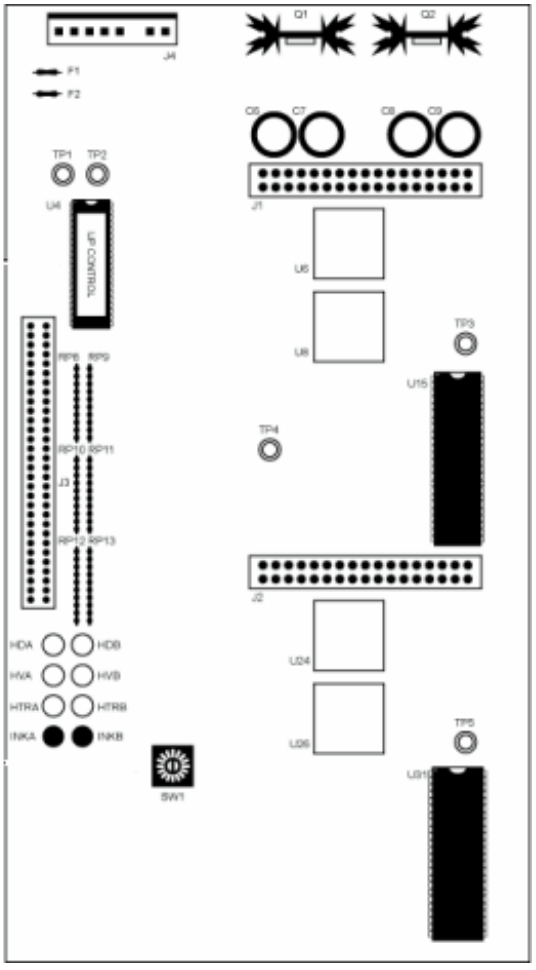
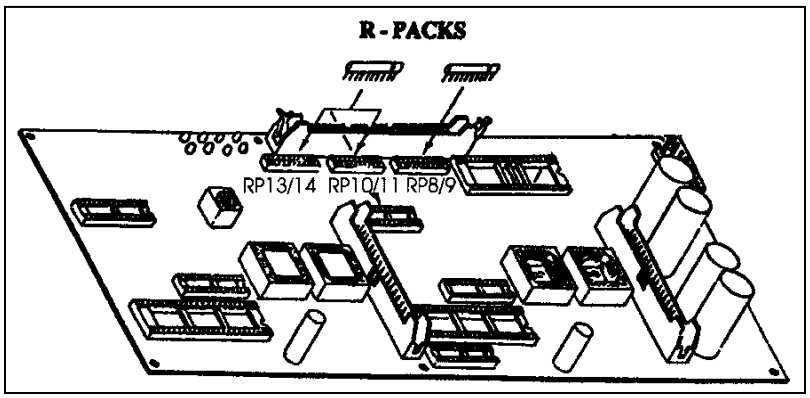


Fig. 8-10 Driver Board

Installation

1. Inspect new board to ensure that all IC's are seated securely.
2. With system power turned off, place board on standoffs and install standoff posts.
3. Connect Printhead Data cable(s) to J1 or J2.
4. Configure SW1 for type of printheads being used.
5. Connect Power Cable to J4.
6. Connect CPU Interface data cable to J3.
7. Close cover.
8. Apply system power. Monitor indicators for proper operation.
9. Print a test pattern to ensure that all channels are printing properly.
10. Return to normal operation.



Note: Make sure terminator resistors are installed on last board in multi-head system.

Fig. 8-11 R-Packs

Power Supply (7400)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards. (Refer to Figure 8-1)

Removal

1. Turn system power off.
2. Remove power cord from Power Entry Module.
3. Open cover.
4. Remove Firmware Assembly.
5. Remove CPU board.
6. Remove Power Supply Cover Plate.
7. Disconnect all cables from Power Supply unit.
8. Remove Power Supply.

Installation

1. Inspect Power Supply for damage that may have occurred during shipment.
2. Place Power Supply in controller and secure with screws.
3. Connect AC supply J4.
4. With system power switch in the off position, connect power cord to Power Entry Module.
5. Plug power cord into outlet and turn system power on.
6. With a DVM, measure power supply outputs.
7. If measurements are good, turn power to Off and proceed.
8. Connect power cable to Interface PCB.
9. Connect power cable to Driver board.
10. Install cover plate.
11. Install and secure the Firmware Assembly and the CPU board.
12. Connect power to the CPU board.
13. Close cover.
14. Turn system power on and check for proper boot up sequence.
15. Return system to normal operation.

Interface Board (7400 only)

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards. (Refer to Figure 8-1 and 8-12)

Removal

1. Turn system power off.
2. Disconnect all cables from the Controller End Plate.
3. Open cover.
4. Disconnect the cables at J1, J2 & J3 on the Interface Board.
5. Remove screws securing Interface board and remove Interface board.

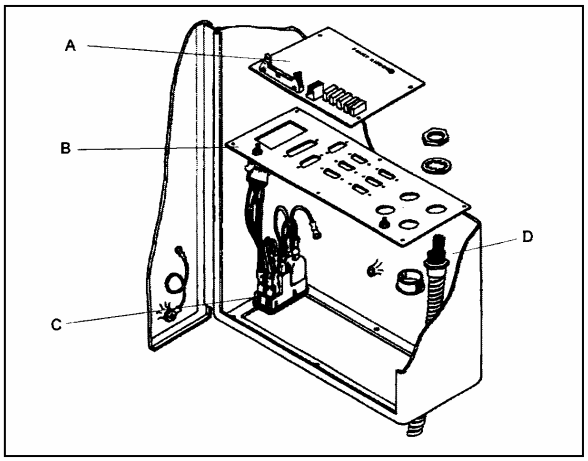


Fig. 8-12 Interface Board

Table 8-2 Power Entry Parts List

Item	Description	Part Number
A	Interface PCB	X15021-001
B	Controller End Plate	X21034
C	Power Entry Module	X01136
D	Printhead Data Cable	X01052-001, 3' X01048-001, 5' X01049-001, 10' X01067-001, 20'

Installation

6. Inspect Interface PCB for damage that may have occurred during shipment.
7. Place board in position and secure with screws.
8. Connect ribbon cable from CPU to J1.
9. Connect power cable from Power Supply to J2
10. Connect ribbon cable from keyboard to J3.
11. Re-connect peripheral cables to proper connectors on Controller End Plate.
12. Apply system power; ensure that the 5 green LED's light.
13. Close cover.
14. Test all aspects of operation, particularly those involving the peripherals connected to the Controller End Plate.
15. Return to normal operation.

Printhead (Modular Housing) UJI Typical

Removal

1. Turn off system power.
2. Remove Rotational Bracket.
3. Remove Front Plate from Housing.
4. Disconnect Ink Low Sensor line.
5. Disconnect and Luer connectors from printhead ink lines and cap.
6. Disconnect printhead umbilical data cable from printhead.
7. Remove printhead mounting screws.
8. Install Ship Cap on Array Plate.
9. Remove printhead from housing.

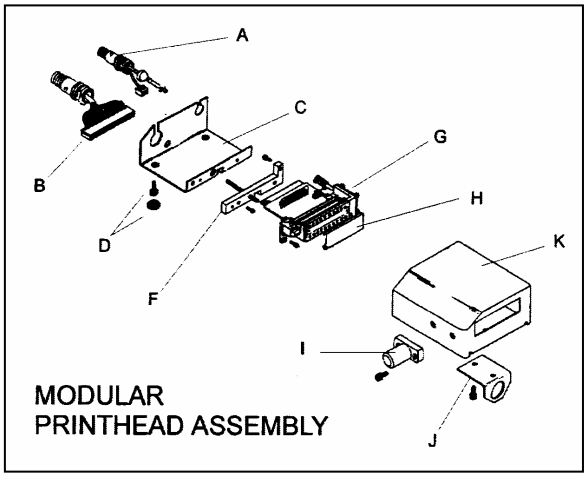


Fig. 8-13 Modular Printhead Assembly

Table 8-3 Modular P/H Parts List

Item	Description	Part Number
A	Ink Line	---------
B	Printhead Data Cable	X01100-006
C	Printhead Housing Tray	X21048-001
D	Thumbscrew	X22037-001
F	Insulating Plate	X21063-001
G	Printhead	Various
H	Shipping Cap	S40001-001
I	Mounting Spud	X20055-001
J	Photocell Bracket	X20021-001
K	Housing Cover	X21046-001

Installation

1. Secure printhead to mount with screws.
2. Remove Ship Cap.
3. Connect Printhead Data Cable to PCB. Ensure that red wire is positioned to same end of printhead as purge cap and away from ink inlet.
4. Uncap and connect ink line to printhead PCB.
5. Connect Ink Low sense line to printhead PCB.
6. Install Front Plate to Housing.
7. Install Enclosure Cover with screws.
8. Install Rotational Bracket using screws.
9. Apply power and ensure that printhead is heating.
10. Prime as necessary.

Printhead (Integrated Housing) UJ1

Removal

1. Turn off system power.
2. Remove Rotational Bracket.
3. Remove Front Plate from Housing.
4. Disconnect Ink Low Sensor line.
5. Disconnect and Luer connectors from printhead ink lines and cap.
6. Disconnect printhead umbilical data cable from printhead.
7. Remove printhead mounting screws.
8. Install Ship Cap on Array Plate.
9. Remove printhead from housing.

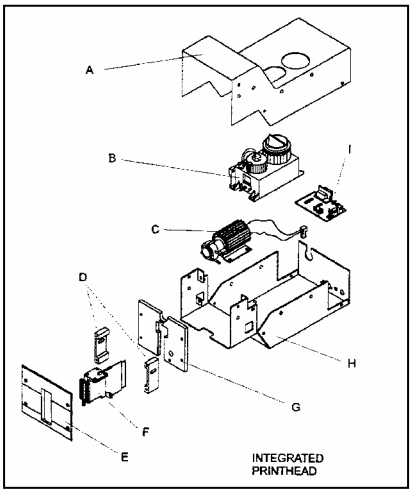


Fig. 8-14 Integrated UJI

Table 8-4 Integrated UJI Parts List

Item	Description	Part Number
A	Housing Cover	X21179-001
B	Ink Reservoir	X40022-001
C	Priming Pump	X01035-001
D	Faceplate Mtg. Spacer	X20098-001
E	Faceplate	Various
F	Printhead Assy	Various
G	Mounting Plate	Various
H	Housing Base	X21180-001
I	IPC Printed Circuit card	X15056-002

Installation

10. Secure printhead to mount with screws.
11. Remove Ship Cap.
12. Connect Printhead Data Cable to PCB. Ensure that red wire is positioned to same end of printhead as purge cap and away from ink inlet.
13. Uncap and connect ink line to printhead PCB.
14. Connect Ink Low sense line to printhead PCB.
15. Install Front Plate to Housing.
16. Install Enclosure Cover with screws.
17. Install Rotational Bracket using screws.
18. Apply power and ensure that printhead is heating.
19. Prime as necessary.

Printhead (Integrated Housing) UJII

(AMS system shown)

Removal (refer to fig. 8-15)

1. Turn system power off.
2. Remove cover screws and remove Printhead Cover.
3. Remove screws securing Printhead to Enclosure Base.
4. Disconnect and cap Luer fittings on Printhead Ink Lines.
5. Disconnect Ink Low Sensor connector and Printhead Umbilical from Printhead.
6. Pull Printhead assembly forward and out of Enclosure Base.
7. Remove screws securing Printhead to Insulation Mount.
8. Remove Insulation Mount.
9. Remove Printhead.
10. Remove O-ring from CP/OP

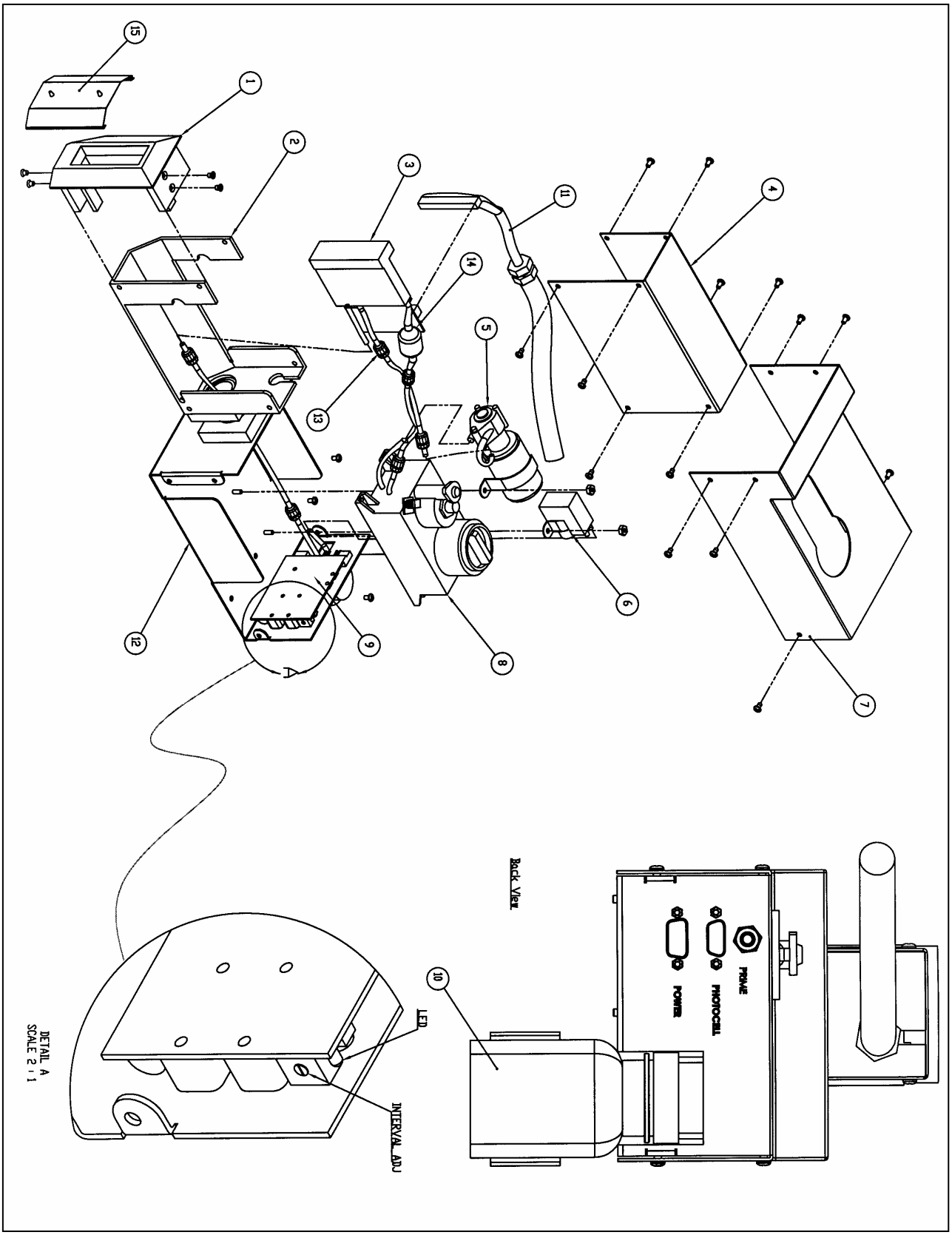


Fig. 8-15 Integrated UJII Printhead/Ink system (AMS)

Table 8-5 Integrated UJI AMS Parts List

Item	Description	Part Number
1.	Mount, Insulation P/H	X21241-001
2.	PH Base Assy	01237-001
3.	Printhead Assy	Various
4.	Encl Cover, FXJET UJII PH	X21245-001
5.	Prime Pump	X42009-002
6.	Vacuum Pump	X42013-001
7	Encl Cover, FXJET UJII Tank	X21282-001
8.	Reservoir, Ink	X40022-002
9.	PCB, Sol, Maintenance	X15135-002
10.	Catch Bottle	X40187-002
11.	Cable, PH Ext. DB25 10' Male	4011
12.	Encl Base, AMS, FoxJet	X21281-001
13.	Luer fittings	X40033-001 & X40173-001
14.	Check Valve	X40164-001
15.	Cap, Shipping PH-INK SYS UJII	S40012-001

Installation (Refer to Fig. 8-15)

1. Install O-ring on CP/OP
2. Install Insulation Mount on Print head and secure with screws.
3. Install Printhead in Enclosure Base and secure with screws.
4. Connect Printhead Umbilical and Ink Low Sensor line connectors to Printhead.
5. Uncap and connect Luer fittings to Printhead Ink lines.
6. Install Printhead Cover and secure with screws.
7. Apply power and ensure Printhead is heating.
8. Purge and prime as necessary.
9. Perform a test print **TE**, and if successful, resume normal operation.

Printhead Thermal Fuse (UJI or UJII)

Removal

1. Turn system power off and remove Printhead.
2. Unsolder thermal fuse leads and remove screw and fuse clamp.
3. Clean solder from PCB holes.

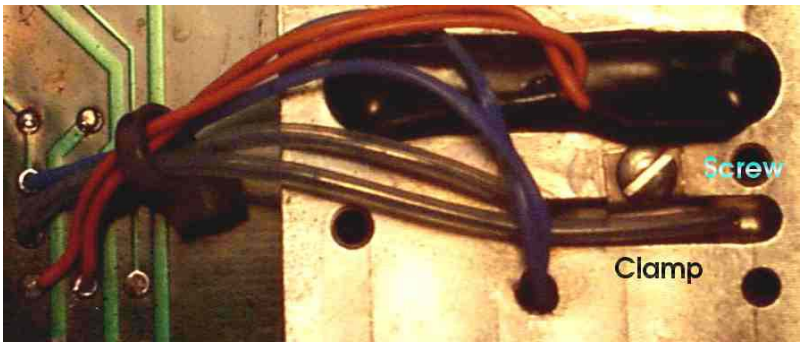


Fig 8-16 Thermal Fuse

Installation

1. Place fuse in position and secure with clamp and screw.
2. Insulate leads and solder leads into holes in PCB.
3. Ohm test for reading of less than 1 ohm.

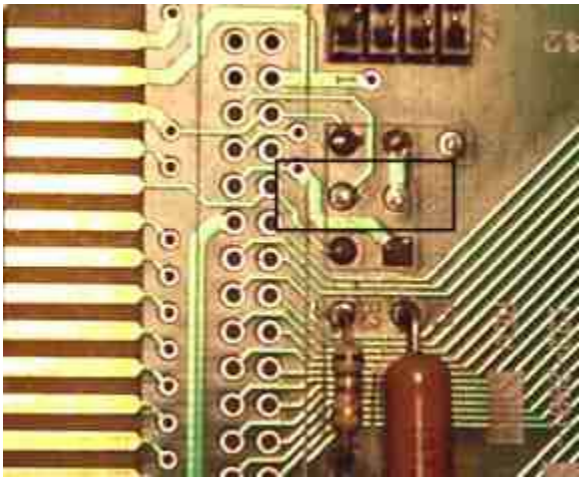


Fig. 8-17 Thermal Fuse Connection points.

Printhead Data Cable

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards.

Removal

1. Turn system power off.
2. Open controller door and disconnect printhead data cable from J1 on the Driver board.
3. Gently remove strain relief from connector.
4. Remove nut from plastic cable shield and gently thread the connector through the plastic nut.
5. Gently feed the cable through the opening in the Connector Panel.
6. Remove printhead from housing (modular) or remove housing (integrated).
7. Disconnect cable from printhead.
8. Remove nut from sheath and remove cable.

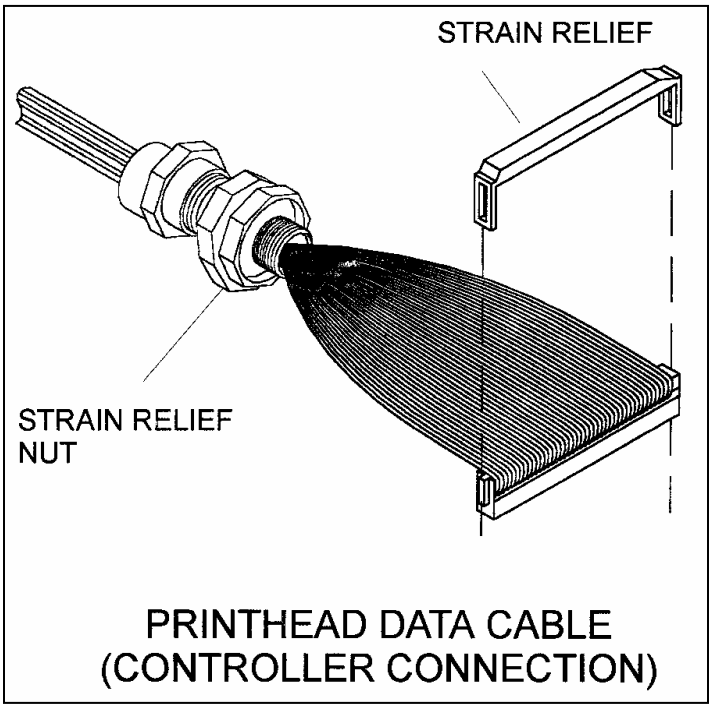


Fig. 8-18 Printhead Data Cable

Installation

1. Inspect cable for damage that may have occurred during shipment.
2. Remove strain relief from pin and socket connector. Then remove cable sheath nut.
3. Feed pin and socket connector through opening in Connector Panel.
4. Feed connector through cable sheath nut. Tighten nut on sheath, securing sheath to Connector Panel.
5. Plug connector to J1 (or J2) of the Driver PCB (7400) or to appropriate head connector on the controller board (7100, 7200).
6. Loosen sheath nut from other end of cable.
7. Feed cable to printhead PCB.
8. Secure sheath with sheath nut.
9. Connect edge connector to printhead PCB. Ensure that red wire is positioned at same end of printhead as purge cap and opposite from ink inlet.
10. Replace printhead in housing (reinstall housing cover).
11. Apply system power and ensure printhead heats.
12. Print a test pattern to ensure that all channels are printing properly.
13. Return to normal operation.

Backup Battery (Lithium)

Caution

A danger of explosion exists if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warning

Fire, explosion and severe burn hazard exists. **DO NOT** recharge, disassemble, heat above 100° C, incinerate or expose battery to water.

Some components on PCB's are static sensitive. It is recommended that static discharge precautions are observed when working in and around the FoxJet Controller and when handling FoxJet printed circuit boards.
New battery must be installed before old battery is disconnected or all saved data in RAM will be lost.

1. Measure new battery voltage. Should be at least 3.6 VDC.
2. Connect battery to unused battery connector on CPU board (J7 or J8 on 7400) or on controller board (J1-A, J1-B on 7100, J14 or J15 on 7200).
3. Remove old battery.
4. Secure new battery.

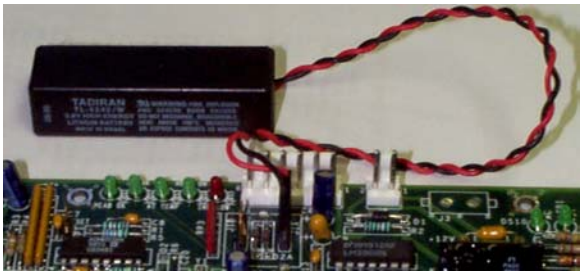


Fig. 8-19 Lithium Battery

Parts/Bracketry

Chapter 9

Bracketry for mounting equipment is available from FoxJet. FoxJet bracketry is comprised of tubular rods, flanges and crossblocks in diameters of 1/2”, 3/4”, 1” and 2”. The 2” poles are typically used to mount the controllers and 1” or 3/4” hardware for the printhead and ink systems. Modular printheads are usually mounted with ” rods, and the 1” rods are used with the heavier integrated systems. The 1/2" brackets are used for things like photocells and other miscellaneous lightweight parts.
Several kits are available with all pieces needed to mount controllers, printheads and ink systems.

Controller Conveyor Mounting Kit

The Controller Conveyor Mounting Kit (part # S02200-001) is used to mount the 7100, 7200 or 7400 controller to the side of a conveyor.

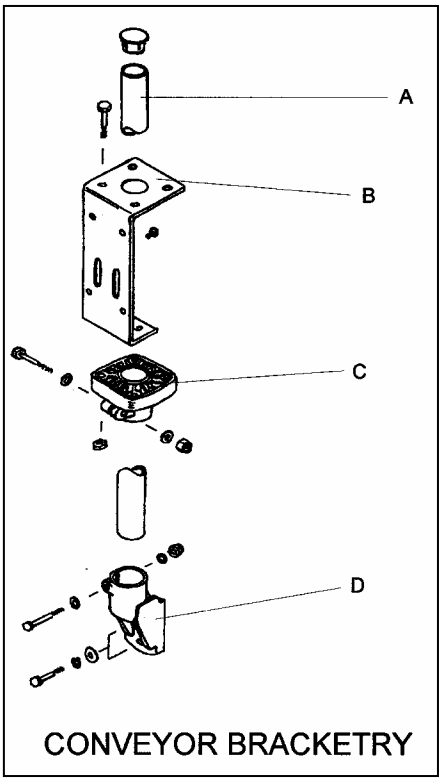


Fig. 9-1 Conveyor Bracketry

Table 9-1 Conveyor Mounting Bracketry

Item	Description	Part Number
A	Post 2” X 1’	X20018-002
A	Post 2” X 2’	X20018-003
B,C	Controller Bracket Assy	X22151-001
D	Conveyor Side Mount	X20105-001
Not Shown	2” Post Hinge	X22222-001

Controller Floor Stand Kit

The Controller Floor Stand Kit (part # S02014-001) is used to mount the 7100, 7200 or 7400 controller to the side of a conveyor.

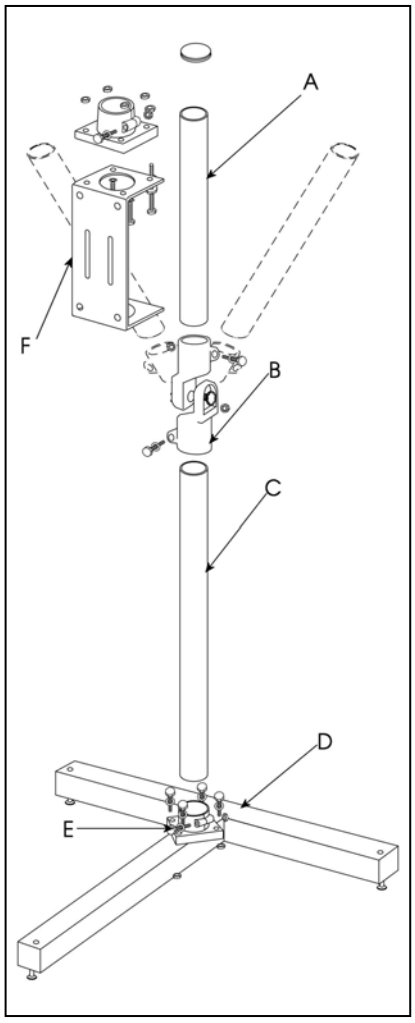


Fig. 9-2 Floor Stand

Table 9-2 Floor Stand Bracketry

Item	Description	Part Number
A	Post 2” X 2’	X20018-003
B	Post Hinge 2”	X22222-001
C	Post 2” X 3’	X20018-001
D	T-Base, Floor Stand	X21044-001
E	Brkt 2” Post Floor Stand Mtg	X20003-002
F	Controller Bracket Assy	X22151-001

Integrated Printhead/Ink System

The 1" kit can be used with a Floor Stand as well, using the 1" x 2" 90º Crossblock (not shown).

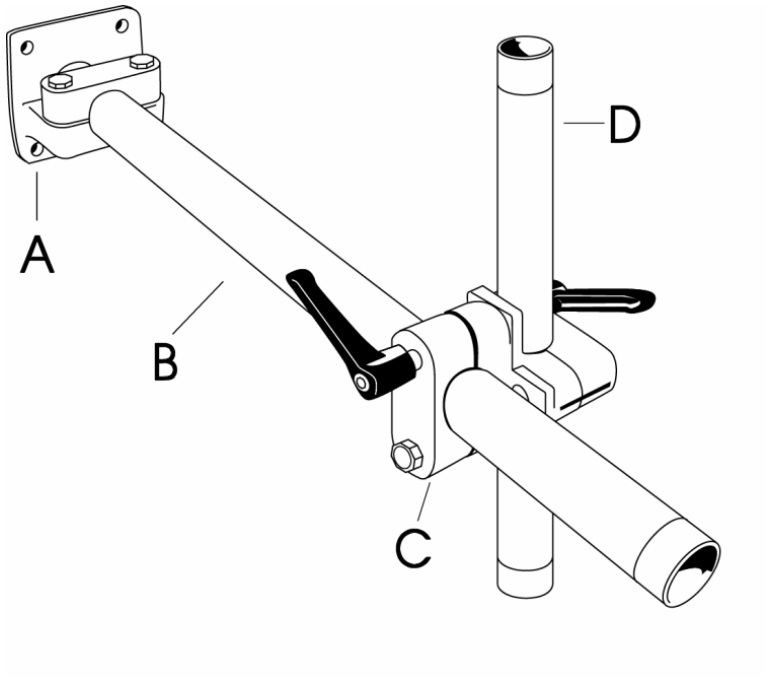


Fig. 9-3 Integrated Printhead Mounting

Table 9-3 Integrated Printhead Mounting

Item	Description	Part Number
A	Flange Base	X21094-001
B	1” X 18” Rod	X20081-001
C	90° Crossblock (1” - 1”)	X21093-001
D	1” X 12” Rod	X20100-001

Modular Printhead/Ink System Conveyor Kit

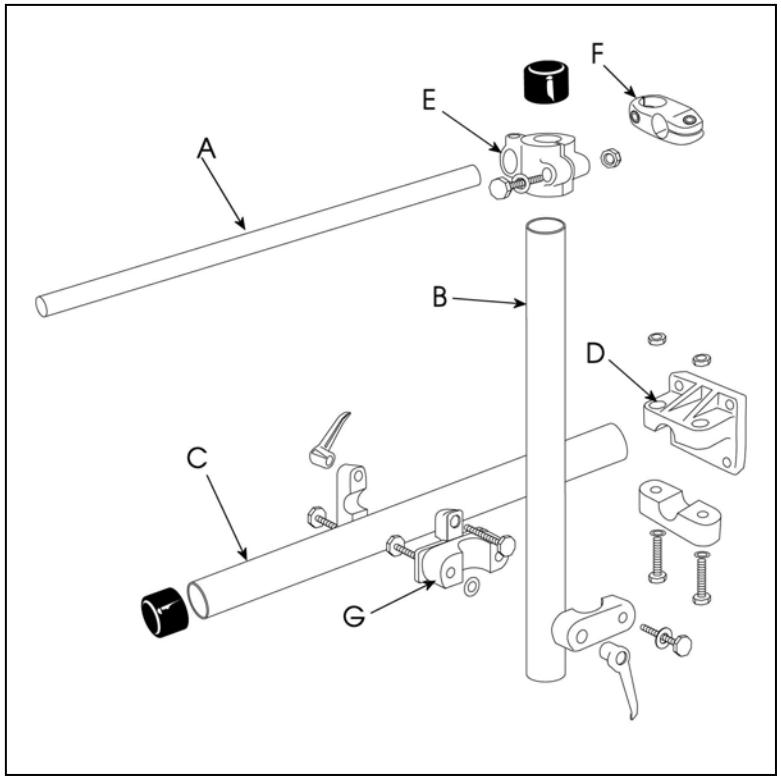


Fig. 9-4 Modular Printhead Mounting

Table 9-4 Modular Printhead Parts List

Item	Description	Part Number
A	¾" X 12" Rod	X20056-001
B	Tube, 1" X 12" Allum.	X20100-003
C	Tube 1" X 18" Allum.	X20081-003
D	Flange Base	X21094-003
E	Brkt. ¾" to 1" 90° Crossblock	X21082-001
F	Brkt. ¾" Crossblock Rod-Rod	X20058-001
G	Brkt. 1" Crossblock 90°	X21093-001

Specialty Bracketry

Integrated Spring Bracket

The Integrated Spring Bracket is the latest addition to the mounting options available for the FXJet Series Integrated Printhead/Ink Systems. Designed to enhance the capability of printing high quality barcodes, the Integrated Spring Bracket automatically adjusts the position of the integrated printhead to uneven print surfaces (up to .25"). Can only be used on integrated housings and designed strictly for use in horizontal print applications.

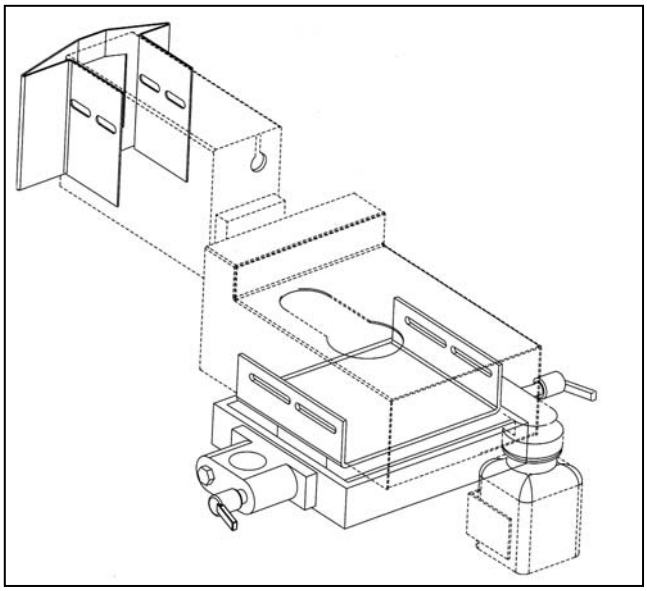


Fig. 9-6 Spring Bracket (UJII AMS shown)

Table 9-6 Integrated Spring Bracket Parts List

Description	Part Number
Integrated Spring Bracket - UJI	S02428-001
Integrated Spring Bracket - UJII	S02428-002
Integrated Spring Bracket - AMS	S02428-003
Additional Hardware (Not shown)	
Spring Bracket Mounting Kit	S02427-001

Appendix

This appendix includes all currently published equipment technical specifications. If further documentation such as schematics, drawings, etc. are required, contact FoxJet at 1.800.369.5384. The release of these documents will be contingent upon the acceptance of the confidentiality agreement.

FXJet Series Specifications

Hardware

Processor:
Motorola 68332
Speed:
20 MHz
Baud Rates:
9600,19.2k, 38.4K (Expandable to 115K)

Model 7100 Controller

Memory:
1 MB RAM 1 MB ROM
Maximum Printed Message Length:
At 142 DPI 26.5” (673 mm)
At 150 DPI 25.0” (636 mm)
At 300 DPI 12.5” (318 mm)
Communication:
1 Serial Port, RS232 or RS485
Single Printhead

Model 7200 Controller

Memory:
1MB RAM (expand to 2 MB)
1MB Flash ROM (expand to 2 MB)
Maximum Printed Message Length:
At 142 DPI 84” (2.13M)
At 150 DPI 80” (2.03M)
At 300 DPI 40” (1.06M)
Communication:
5 Serial Ports, RS232 or RS485
Multi-tasking(two separate printing tasks)
2-photocell inputs
2-shaft encoder inputs
Dual Printheads

Model 7400 Controller

Industrial Stainless Steel:
NEMA 12,IP51 Optional: NEMA 4,IP65
Multi-tasking (two separate printing tasks)
2 photocell inputs 2 shaft encoder inputs
Memory:
1 MB RAM (Expandable to 2M)
1 MB ROM
Communication:
2 Serial Ports, two RS232 or one RS232 & one RS485
Maximum Printed Message Length:
At 142 DPI 56.5” (1.44M)
At 150 DPI 53.5” (1.35M)
At 300 DPI 27” (0.67M)
Auxiliary Input/Output (Programmable)
Up to four printheads

Connections

Connector Type:
Standard DP9, DB25
Inputs (opto isolated, open collector to TTL type)
Photocell Shaft Encoder
Outputs (opto isolated)
Alarm (open collector) External Power (+12
VDC)
Printhead Electrical Cable Options
3’ Length 5’ Length
10’ Length 20’ Length

Diagnostics

Light Emitting Diode (LED) Indicators
Photocell Heaters
Ink Level High Voltage
Shaft Encoder Data Transmit/Receive

Electrical Requirements

Selectable
110-115 AC, 3 A Max
220/240 AC, 1.5 A Max
Frequency
50-60 Hz

Operating Environment

Operating
Temp 50º – 95º F (10º – 35º C)
Humidity 20-80%
Storage
Temp 5 º– 110º F (-15º – 43ºC)
Humidity 5-9%

Certification

FCC UL cUL TUV CE GS

FXJet Series Software

Firmware

Data Entry Keypad (standard)
Model 7100: 25 messages
Model 7200: 200 messages
Model 7400: 100 messages
100 characters per line
Delete/insert functions
Edit/Save functions
Product /batch counters
Programmable Counters
Automatic Time & Date
Programmable Shift Function
Standard fonts: 1 – 5 lines
Model 7100 stores 11 Graphic Images
Model 7200 stores 25 Graphic Images
Model 7400 stores 25 Graphic Images

SystemMaster 2000

Windows based (95&98)
Password protection (10 levels)
Extensive graphic/message storage
WYSIWYG capabilities
Message/Label management
Copy/Edit/Save Functions
Graphic Utilities
Backup/Restore functions
Network up to 32 controllers with bi-directional communication from Controller to host PC

FXJet Series Printheads

Imaging

96/32 *.5" (13mm) Printhead*
Number of channels: 32
Number of Orifices: 3
Mounting Angle: 16º
Image Area up to .5"
Vertical Resolutions
192 DPI
Horizontal Resolution
150 DPI
Character Height
.08" -.5"

96/32 *.75" (19mm) Printhead*
Number of channels: 32
Number of Orifices: 3
Mounting Angle: 27º
Image Area up to .75"
Vertical Resolutions
128 DPI
Horizontal Resolution
142 DPI
Character Height
.13" -.75"

192/32 *1.0" (25mm) Printhead*
Number of channels: 32
Number of Orifices: 6
Mounting Angle: 32º
Image Area up to 1.0"
Vertical Resolutions
192 DPI
Horizontal Resolution
142 DPI
Character Height
.2" –1.0"

224/32 *1.82"**AlphaCoder**(25-46mm) Printhead*
Number of Channels: 32.
Number of Orifices:7
Mounting Angle: 32-90º
Image Area: Up to 1.82'
Vertical resolution:123 DPI (1")
Horizontal resolution: up to 300 DPI
Character Height:
1"-1.82"

352/32 *1.9" (48mm) Printhead*
Number of Channels:32
Number of Orifices:11
Mounting Angle: 90º
Image area: up to1.9" (10mm-48mm)
Vertical resolution: 185 DPI
Horizontal resolution:213-300 DPI
Character Height: .38"-1.9"

Print Capabilities

Maximum Firing frequency: 9Khz(224 & 352) : 11 Khz (96 & 192)
Maximum line speed at 142 DPI is 317 ft/min (97M/min
Max line speed at 150 DPI is 300ft/min (91
m/min)
Max line speed at 300 DPI is 150ft/min (46
m/min)
Throw distance 1/16" (1.5mm) – 1/4" (6 mm)
Max line speed at 1/4" throw is 65 ft/min (20m/min)
Max line speed at 1/8" throw is 150ft/min (46m/min)
Max line speed at 1/16" throw is 350ft/min
(107m/min)
Printhead Orientation: Omnidirectional
Shock & Vibration Limits:
Vibration 10gs at all axis, .06" (2mm) Displacement, 10-350hz
Shock 30 b's .25" 6 mm displacement , 11
milliseconds duration

Dimensions

Controllers
Ht. Wd. Dep. Wt.
Model 7100 10.8" 7.5" 5.0" 8 lbs
Model 7200 15.2"13.2"5.15" 20 lbs
Model 7400 14" 1.2.5" 5.5" 25 lbs
Printhead/Ink Systems
Ht. Wd. Dep. Wt.
Mod. P/H 4.7" 2.0" 4.1" 1 lbs
Mod. Ink Sys. 3.3" 5.8" 8.5" 2 lbs
Int. Sys. 6.0" 5.0" 12.0" 2 lbs

FXJet Series Ink

Ink System

Reservoir Capacity: 25 ml (8.5 oz)
Ink Fill Method: Screw top ink bottle
Priming Mechanisms: Prime Bulb
Non-Pressurized Capillary Feed Technology
Low ink sensor

Ink Specifications

VersaPrint
Immediate dry times on corrugate
Specifically formulated for barcoding (X dimension 20 ml)
Substrates: Porous and Semi-porous
Ink volume : 500 ml (17 oz) or 125ml (4.25
oz)
Colors Black, Blue, Red and green
Non toxic/non hazardous
Ink Base: Glycol, Dye
USDA Compliant
JetWrite
Immediate dry times on corrugate
Substrates: Porous & Semi Porous
Ink volume: 500 ml (17 oz) or 125ml (4.25
oz)
Colors Black
Ink Base Oil, Dye
Ink Consumption
Char. Ht. Char./ML Font Code Char./ML
.25" 26000 .5" 13000
.30" 22000 1.0" 7000
.375" 18000 1.9" 4000
UPCSCS Barcode @ 62.5% Mag Level 520
UPC SCS Barcode @ 100% Mag Level 230
UCC/EAN Barcode w/20ml X Dimension 225

Dimensions:

7400 Controller

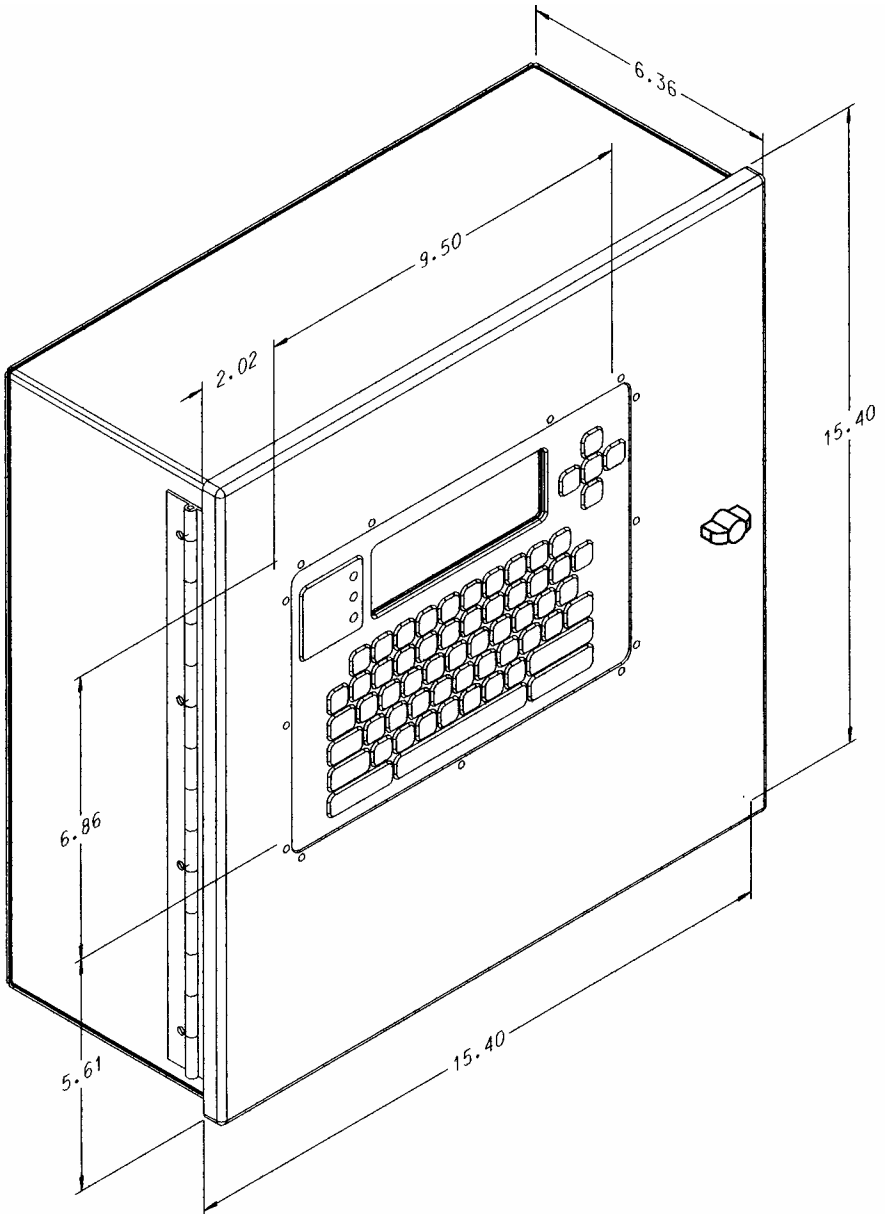


Fig. A-1

Dimensions:
7200 Controller

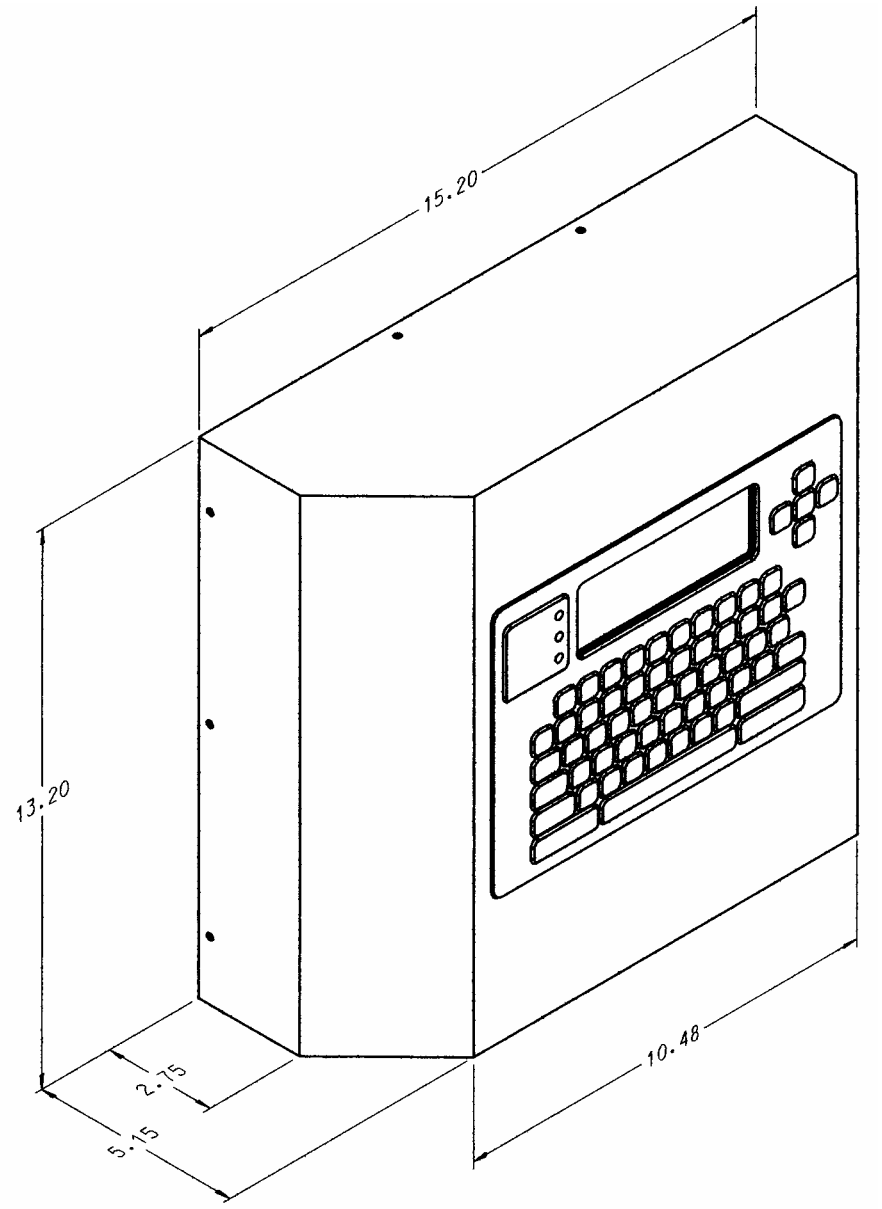


Fig. A-2

Dimensions:

7100 Controller

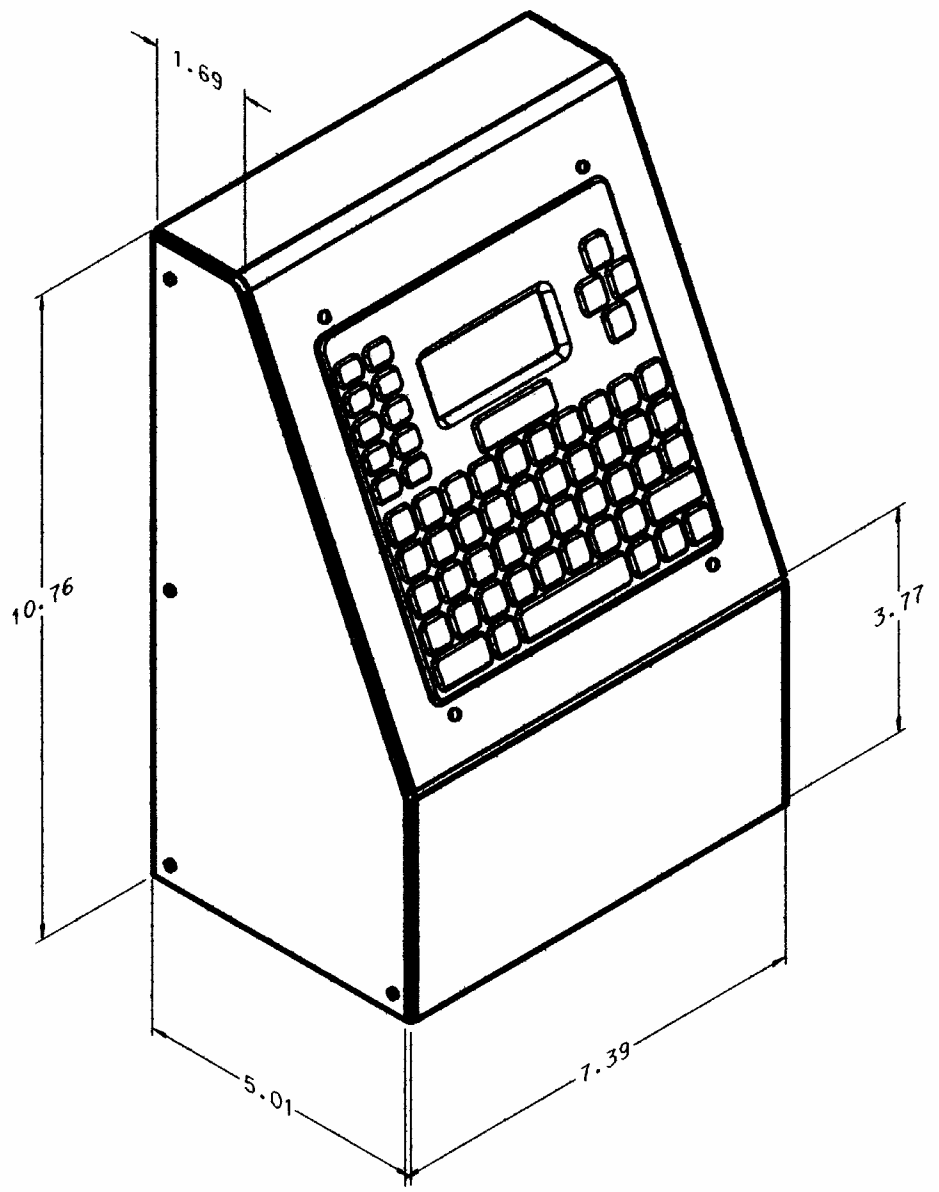


Fig. A-3

Dimensions:
Integrated Printhead

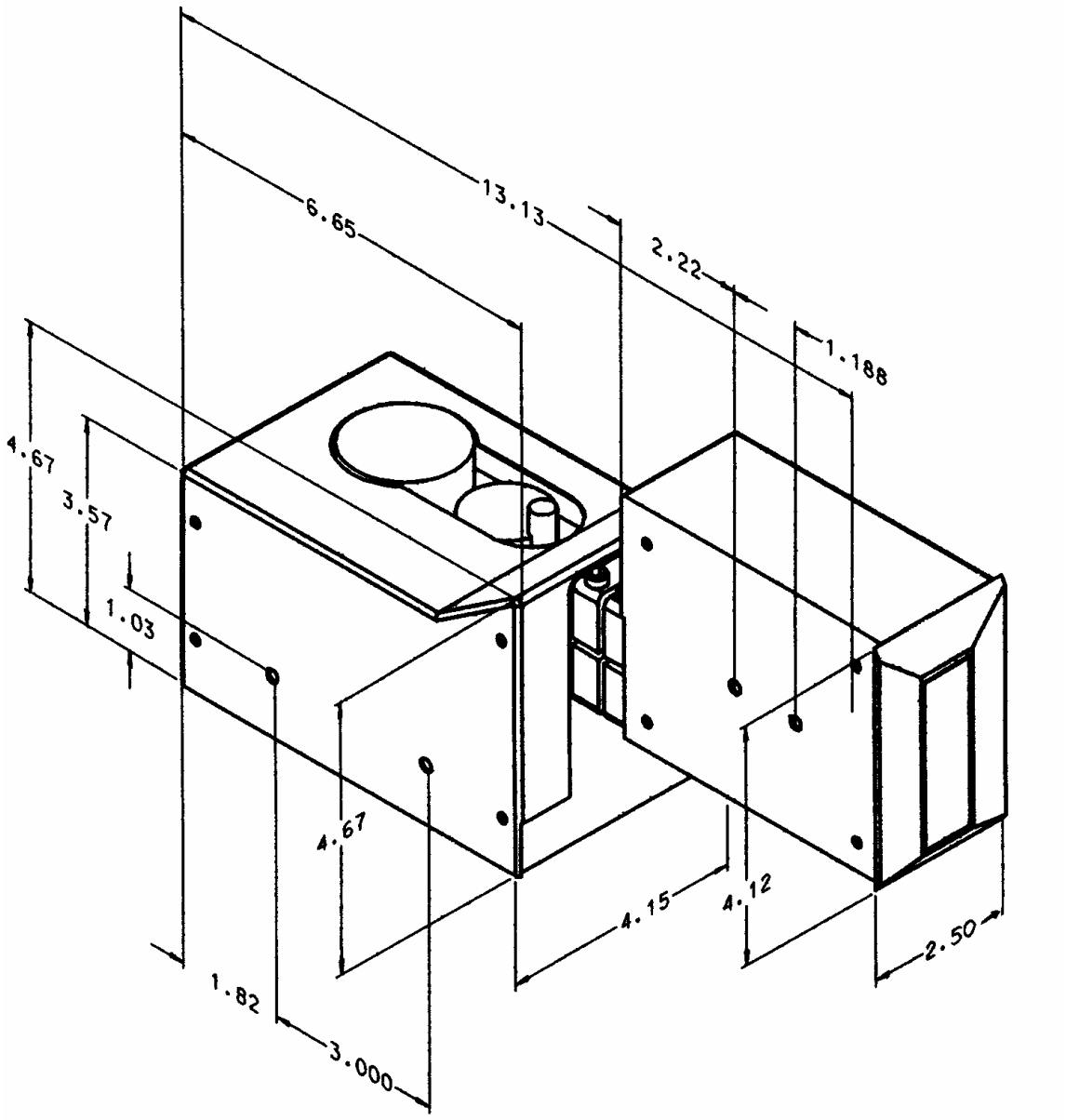


Fig. A-4

Dimensions:
Modular Printhead

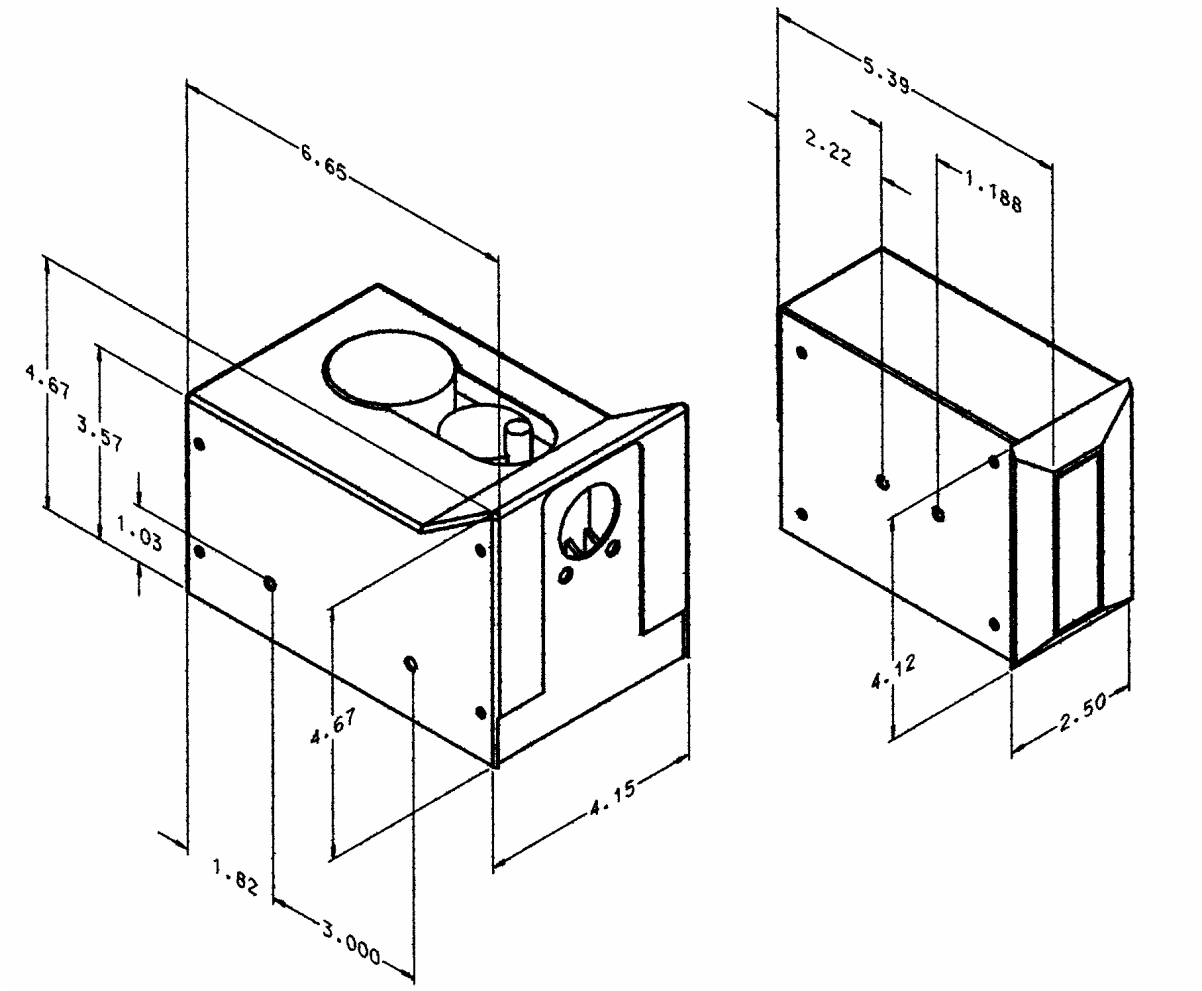


Fig. A-5

Dimensions:

UJII AMS Printhead

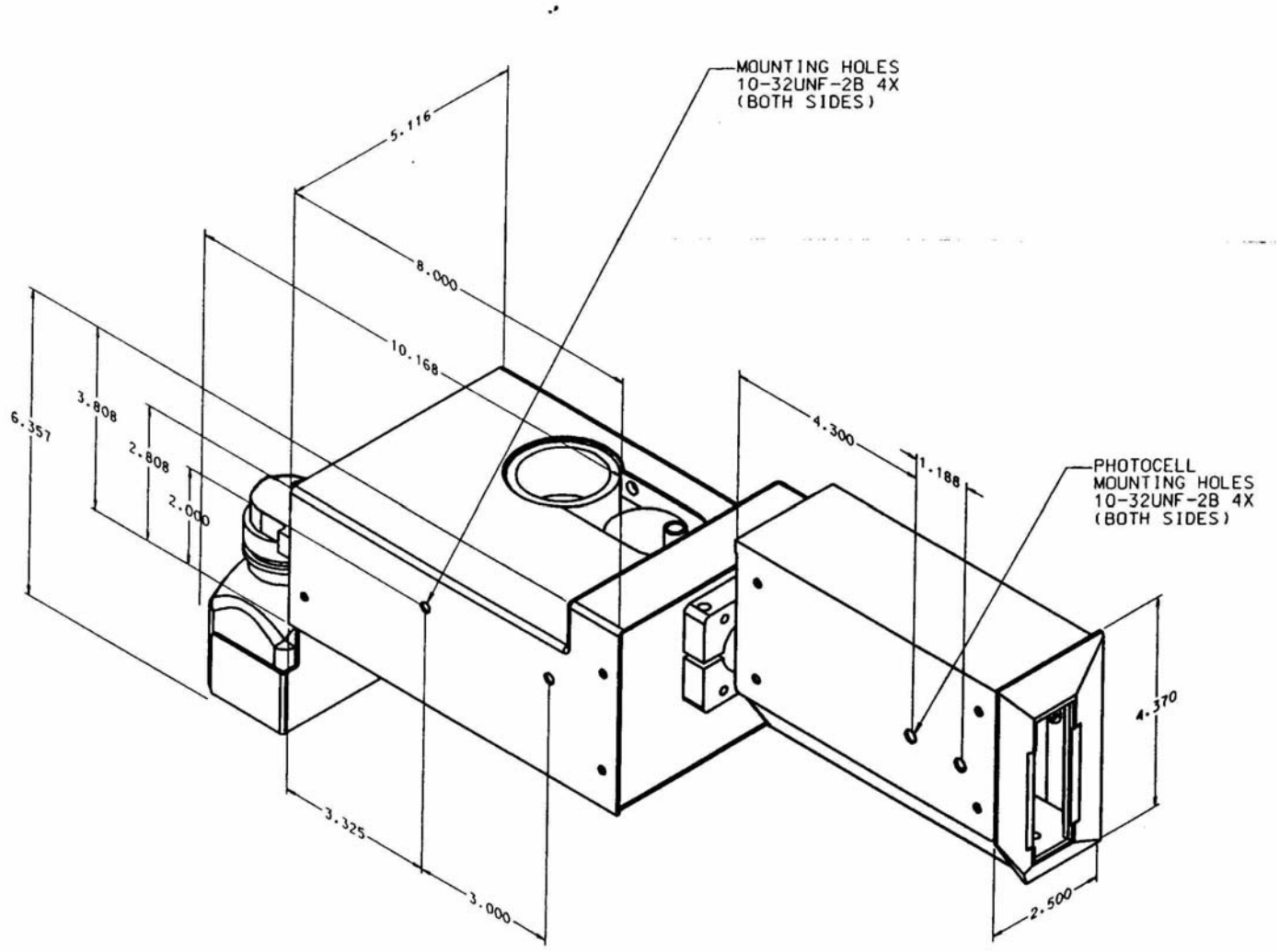


Fig. A-6

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