

EVOLUTION LX

INK JET PRINTERS INSTALLATION AND OPERATION MANUAL

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This manual is for use in operating and maintaining the EVOLUTION LX 1 (LX 1) and EVOLUTION LX 2 (LX 2) Ink Jet Printer. This manual includes various optional features, which may not be included in your basic model printer.

For basic start-up instructions, please refer to PART 1 Installation Procedures.

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ALL PRINT CARTRIDGES SUPPLIED BY DIGITAL DESIGN INC. ARE FACTORY TESTED AND PROFILED TO PRODUCE AN OPTIMUM AND CONSISTANT CODE. USING OTHER THAN AUTHORIZED CARTRIDGES WILL CAUSE UNDESIRABLE RESULTS.

EACH FLASH DATA CARD IS PROFILED EXPLICITELY FOR ITS' INTENDED PRINTER, AND IS SECURITY LOCKED PROHIBITING USE IN OTHER THAN THE ORIGINAL PRINTER FOR WHICH IT WAS PURCHASED. KEEP ALL UPGRADE CARDS IN A SECURE PLACE.

EVOLUTION LX 1 IS A BASIC MODEL WITH NO VARIABLE FIELD PROGRAMMING CAPABILITIES. OPTIONAL SOFTWARE MAY BE ADDED TO A BASIC UNIT AND IS COVERED IN THIS MANUAL.

EVOLUTION LX 2 IS A FULL FEATURED MODEL WITH THE CAPABILITY OF ADDING OPTIONAL BARCODES OTHER THAN THE STANDARD 8 INCLUDED SYMBOLOGIES.

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INSTALLATION AND OPERATION MANUAL

PART 1: INSTALLATION PROCEDURES

INSTALLING THE EVOLUTION LX PRINTING SYSTEM

Caution should be taken while installing the EVOLUTION LX printing system on your equipment. Digital Design Inc. has taken every precaution to ensure a safe and accurate instruction set to guide the installer through the installation process. Follow the operational guidelines in the installation procedures. Various OPTION PACKAGES (OP) are available and are referenced throughout this manual.

VERIFY THAT YOUR EQUIPMENT IS IN PROPER OPERATING CONDITION.

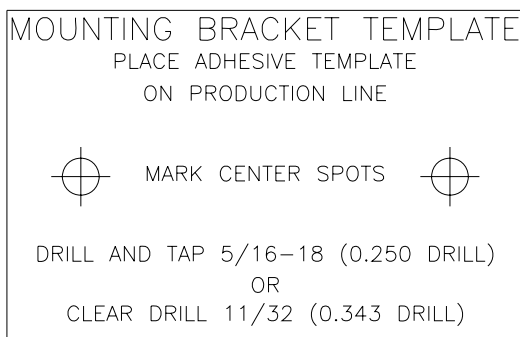
LOCATE A CONVENIENT POSITION ON YOUR EQUIPMENT. EVOLUTION LX REQUIRES 4-1/2" OF SPACE ON THE PRODUCTION LINE.

FOLLOW THE INSTALLATION PROCEDURES.

READ CAREFULLY ALL INSTALLATION PROCEDURES BEFORE PROCEEDING.

INSTALL THE PRINTING SYSTEM ON YOUR EQUIPMENT. THERE IS NO EXTRA HARDWARE REQUIRED OTHER THAN THAT SUPPLIED IN THE INSTALLATION KIT.

MOUNTING ON PRODUCTION LINE



Locate the supplied mounting template and affix in a convenient location on the production line. Spot and drill both mounting holes for a 5/16" bolt. NOTE: the user may also thread the side of the conveyor using a 5/16" tap.

Fasten the mounting bracket to the conveyor using the supplied mounting hardware and ensure that the supplied ground strap is located securely beneath either of the two mounting bolts, and that

conductivity to earth ground is less than 1 ohm. This ensures a proper path for static discharge, should the need arise.

EVOLUTION LX MOUNTING OPTIONS

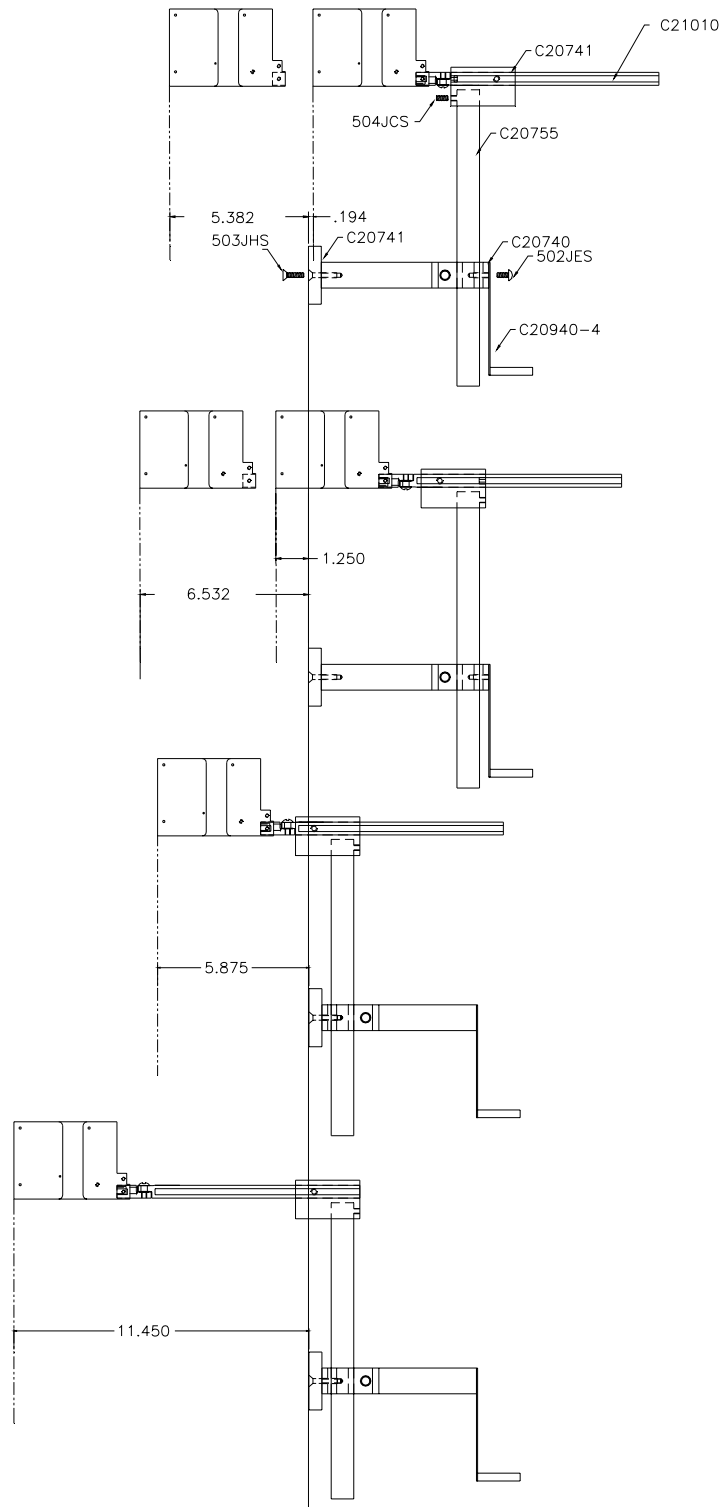
The EVOLUTION LX mounting bracket assembly C21010 has a number of possible mounting configurations, which allows adaptability to a variety of production equipment.

The top cross slide bracket C20741 may be rotated 180 deg by loosening the included setscrew 504JCS and rotating the bracket. This allows the print head to be extended by just over 1". Although this is not a significant amount it might be helpful.

Refer to the first two pictorials to identify the various components of the mounting bracket system C21005.

Rotating the horizontal mounting bracket C20740 may further increase extension into the production line. The mounting centers for both the base block C20741 and controller holder C20940-4 are identical. Remove the two 502JHS flat head screws from the base block and the two 502JES button head screws, rotate the bracket and replace both the base block and controller holder.

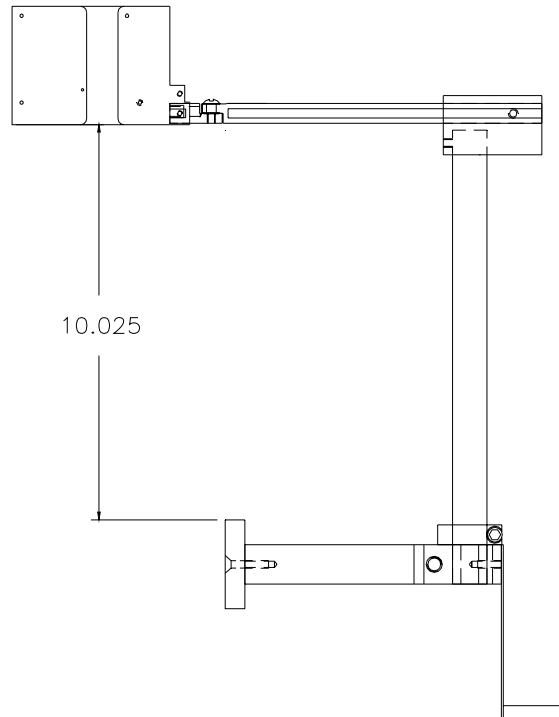
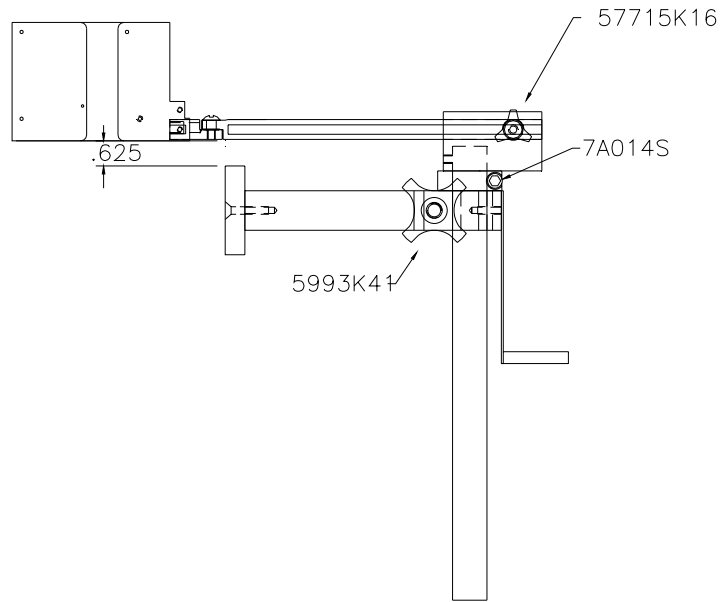
The above procedure allows for a print head displacement from .625" before the production line to 11.450" into the production line.



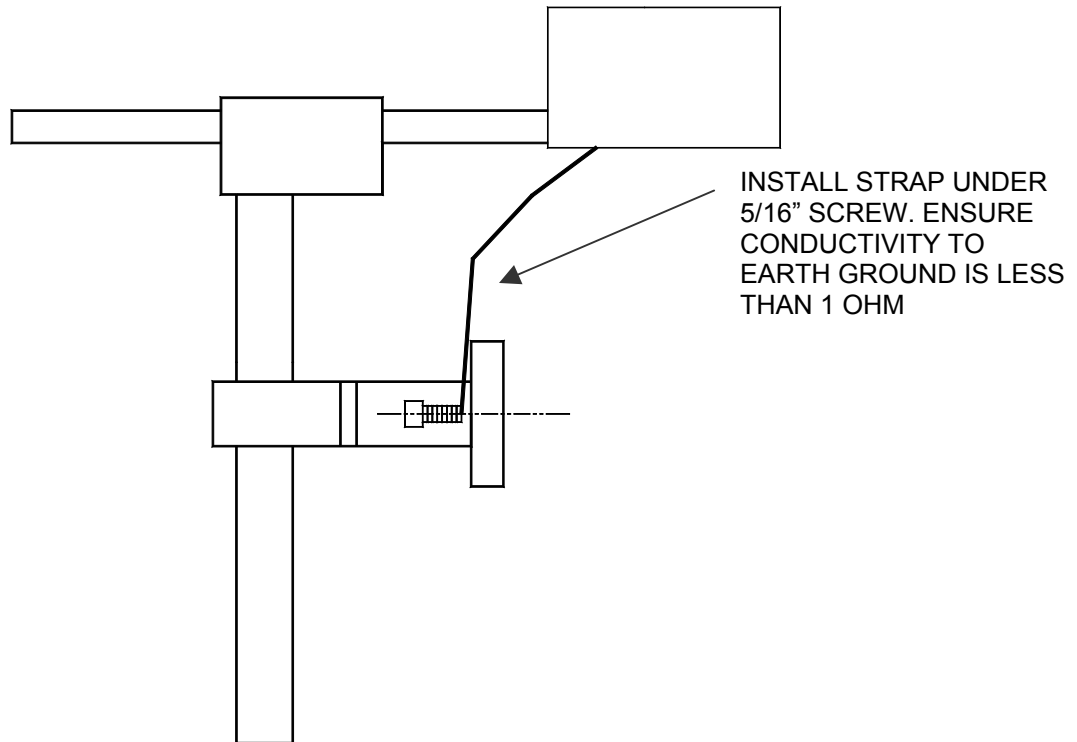
Vertical height adjustment for the EVOLUTION LX print head is accomplished by loosening the included hand knob 5993K41.

Note that the hand knob may be mounted on either side of the horizontal mounting bracket depending on the orientation of the bracket. It should also be noted when rotating the cross slide assembly it is necessary to move the smaller hand knob 57715K16 to the other side of the bracket so it aligns with the flat on the horizontal extension rod.

After the mounting bracket is configured loosen the locking collar 7A014S and re-locate it against the horizontal extension bracket and tighten. This allows the user to loosen the horizontal mounting bracket-locking knob and rotate the assembly without losing the height adjustment.



GROUNDING STRAP INSTALLATION



INPUT POWER CONNECTION

Insert the power plug to the available power source. The supplied power supply is universal and will auto detect 100/240 VAC 50-60Hz.

No other adjustments are necessary.

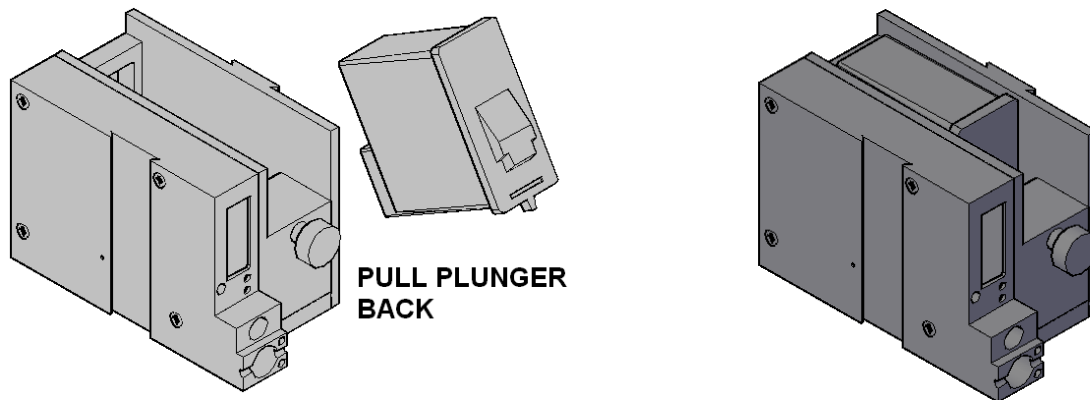
INSTALLING THE PRINT CARTRIDGE

Remove the protective film from the face of the print head and **DISCARD**. This protective film should not be re-applied. If it is necessary to remove the print head and store for a long period of time, it is best to place the cartridge in a seal able plastic bag.

Proper insertion of the cartridge is necessary to avoid damage to either the cartridge or printer.

Pull back on the rear plunger, insert the cartridge at approximately a 30 deg angle and press downward until the cartridge is in place, and then release the plunger. A light snap will be felt as the locking mechanism presses the cartridge into the correct position.

NOTE: EACH PRINT CARTRIDGE HAS BEEN PROFILED AT THE FACTORY. THIS PROCEDURE DETERMINES THE OPTIMAL OPERATING CHARACTERISTICS FOR EACH INDIVIDUAL CARTRIDGE. USING ANY OTHER PRINT CARTRIDGE WILL HAVE UNDESIRABLE RESULTS.



NOTE: WHEN A NEW CARTRIDGE IS INSTALLED, BOTH THE RED AND GREEN LIGHT WILL FLASH TWICE INDICATING A CORRECT INSTALLATION. THE APPROPRIATE CARTRIDGE SETTINGS AND CORRECT INK LEVEL WILL AUTOMATICALLY BE CONFIGURED.

CONNECTING THE CONTROLLER TO THE PRINTER

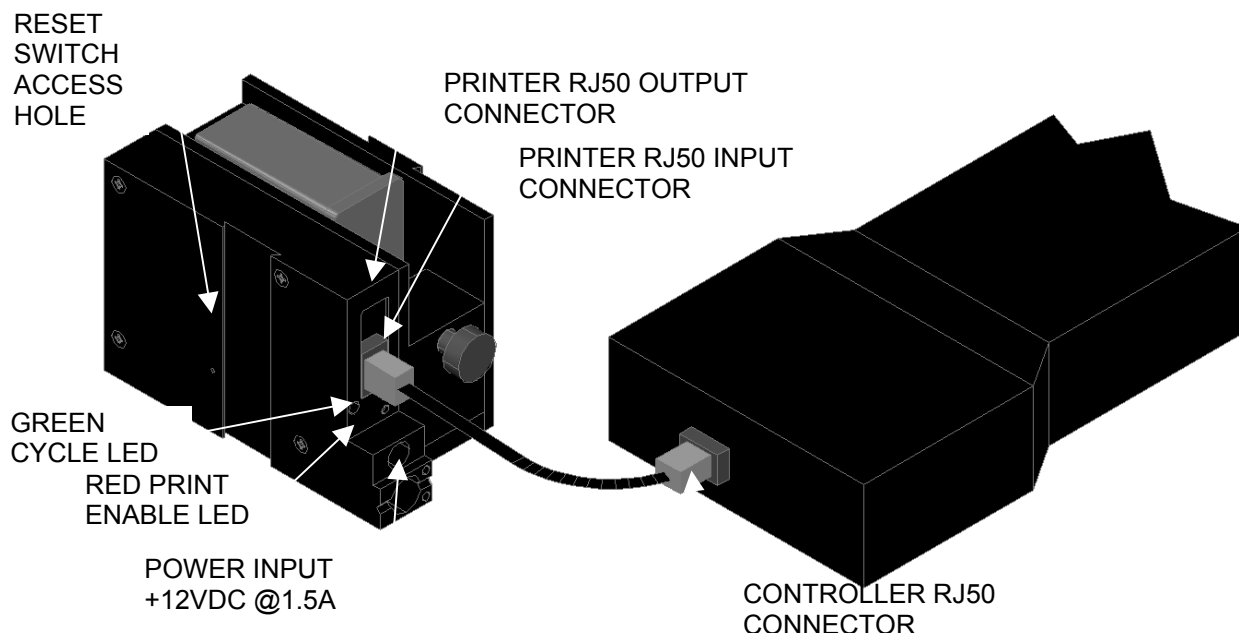
Connect the Controller to the printer using the supplied 3 FT (.9 m) interconnect cable C21008-3 supplied with the Printing System. The cable is a standard RJ50 (10 conductor). Longer cables are available as required.

Connect either end of the cable to the Printer Assembly and securely lock in place. **NOTE: THE CONNECTOR MUST BE PLUGGED INTO THE INPUT RJ50 CONNECTOR LOCATED ADJACENT TO THE LED'S AND MARKED WITH AN ARROW POINTING TOWARDS THE CONNECTOR.** A click will be felt when the connector is in the appropriate position. Connect the free end to the Controller Assembly and ensure the connector is securely seated.

CAUTION: NOTE ORIENTATION OF THE CONNECTORS. DO NOT FORCE CONNECTORS INTO POSITION SECURELY LATCH (CLICK) INTO POSITION.

CONTROLLER MUST PLUG INTO THE PRINTER RJ50 INPUT CONNECTOR OR DER INPUT.

THE POWER INPUT CONNECTOR MUST BE SECURELY INSERTED INTO THE PRINTER. UPON PROPER INSERTION BOTH THE RED AND GREEN LED'S WILL FLASH INDICATING PROPER CONNECTION.



VERIFYING THE PRINTER SOFTWARE VERSION

To verify the current operating software press the V key.

```
CONTROLLER 2.0
PRINTER 3.06A _ _ _ _
PRINTER SN XXXXXX
EXIT ANY KEY
```

The first line indicates the version of the controller software

The second line numeric indicates printer software version and the letter is the firmware version of the printer. The '+' (s) following indicate options installed: The dashes shown in the pictorial above and in the explanation below the _ _ _ _ characters represent the space character and are not actually displayed.

```
+ _ _ _ = Option 1
_ + _ _ = Option 1.5
+ + _ _ = Option 1 and Option 1.5
+++ _ _ = Option 2
++++ _ _ = Option 3
```

NOTE: the EV 2 LX will display all (++++) signs as all features are enabled.

The third line indicates the serial number of the printer

SYSTEM RESET

Soft Reset

There are two types of resets available in the Evolution printing system. The first type of reset is a SOFT RESET.

**ERASE STORED
MESSAGES**
YES OR NO Y/N

Remove the cable between the controller and print station.

Pressing the R key while reconnecting the cable to the controller will display the reset screen.

RESET PRINT HEAD
YES OR NO Y/N

CAUTION: A response of Y will delete all stored messages from the controller.

The next screen to appear prompts the user to determine if a print head is to be restored to its default value.

**ALL HEADS
WILL BE RESET**
CONTINUE = X KEY
ANY OTHER EXITS

CAUTION: ALL PRINT HEADS CONNECTED TO THE CONTROLLER WILL BE RESET TO FACTORY DEFAULT CONDITIONS. THIS INCLUDES RESETTING EACH UNIT ADDRESS TO 1. TO PREVENT THIS REMOVE ALL INTERCONNECTED PRINT HEADS EXCEPT FOR THE UNIT TO BE RESET FROM THE DATA LINK.

The specific unit address must be reset to the correct value after a reset.

Hard Reset

The second reset is a hard reset. Disconnect the power cable. Insert a standard paper clip into the hole on the female dovetail side of the cabinet, and while holding the paper clip in place (a light click will be felt) re-apply the power connector. Keep the reset switch depressed for at least 5 seconds.

This operation will reset the printer to the factory default settings and clear any current message.

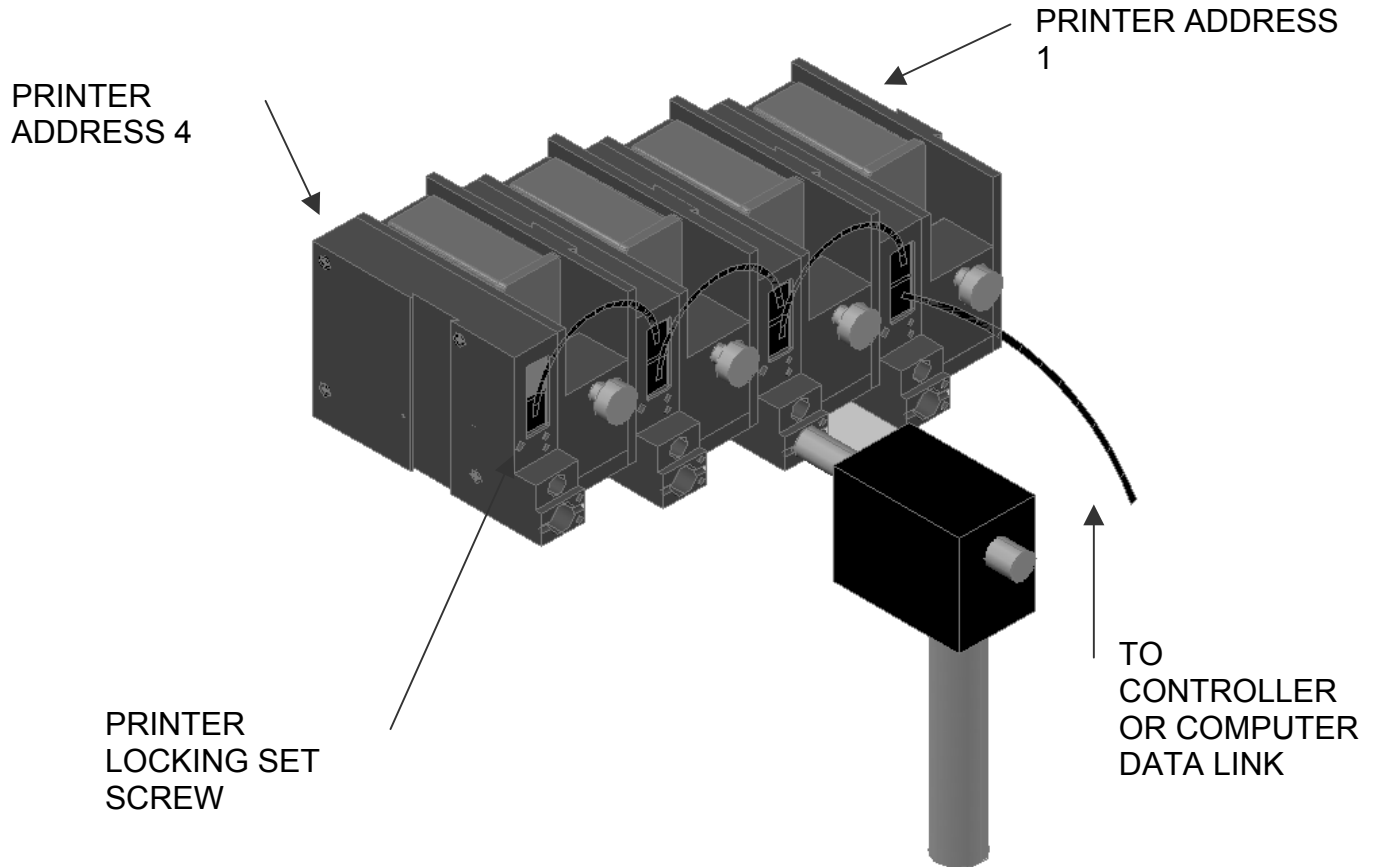
NOTE: FOR BOTH A SOFT AND HARD RESET THE DISPLAY WILL SHOW THE DEFAULT MESSAGE: "EVOLUTION"

MULTIPLE PRINT HEADS

EVOLUTION LX printing systems have the ability to reside on a network. The network may contain from 1 to 32 printers connected via RJ50 cables. These cables are available in varying lengths depending on the application. Each mounting bracket can support up to 4 printers and would typically interconnect with a 7" RJ50 data cable.

NOTE: When connecting multiple print heads place no more than 4 stations on a mounting bracket as shown.

NOTE: Please address each unit individually as per page 2-20 (SET UNIT ID) prior to daisy chaining the printers. Special care must be taken to connect the output of the first printer to the input of the next printer.



EVOLUTION LX QUICK START

LX x STOPPED
HD 1- - >SPEED=100
EVOLU






Connect the printer to the appropriate power source.
Connect the controller to the printer. The controller
derives power from the printer.

On startup the LCD will display as pictured.

WHERE THE LX x IS EITHER LX 1 OR LX 2

CHANGING LANGUAGE PROMPTS

< - - SELECT - - >
ENGLISH

Press the F4 key  and select  for
LANGUAGE. Use the   keys to select the
desired language and press the  to select the
language.

ENABLING PRINTING MODE





LX x PRINTING
HD 1- - >SPEED=100
EVOLU



Press the GREEN PRINT key  to start printing

HEAD SELECT MODE

LX x STOPPED
HD 1- - >SPEED=100
EVOLU

The hand held controller can program up to 32
printers on an RS485 data link. The factory default
sets each printer to **ADDRESS 1**. Selection of
another print head other than ADDRESS 1, press

the  key. Use the   keys to select the
alternate printer number and press the  key. The
printer whose address was selected will respond
with the current message and appropriate
parameters.

As an added convenience using the   will auto
scan to find the next available head connected to
the network.

**NOTE: If more than 1 printer has the same
address either a NO RESPONSE message or
erroneous results may be displayed.**


< - - SELECT - - >
WHICH HEAD = 1

NO RESPONSE
ANY KEY TO EXIT

ENTERING A MESSAGE


LX x STOPPED
HD 1- ->SPEED=100

EVOLU

If the printer is in the PRINTING mode press the GREEN PRINT key 
The LCD display will change from PRINTING to STOPPED.

MESSAGE ENTRY
- - - - FONT-1 LINE

EVOLU


Press the GREEN EDIT key 
The LCD will display the MESSAGE ENTRY mode.

MESSAGE ENTRY
- - - - FONT-1 LINE

Press the BLUE F3 key  to delete the entire message.


MESSAGE ENTRY
- - - - FONT-1 LINE

EXP 12/

Press the BLUE FONT  key to select the desired font size and enter the text EXP 12/10/04. Notice that as characters are typed the message will automatically (if necessary) scroll to the left.


MESSAGE ENTRY
- - - - FONT-1 LINE

2/10/04

Pressing the ENTER key  will end the MESSAGE ENTRY mode, re-display the message and enter the STOPPED Mode.

LX x PRINTING
HD 1- ->SPEED=100

EXP 12/

Press the GREEN print enable key  to enter the PRINTING Mode

STORING A MESSAGE (LX 1 WITH OP 1, 1.5, 2, 3 OR LX 2)

LX x STOPPED
HD 1- ->SPEED=100

EXP 12/

MESSAGE # 1 LX x
PLEASE WAIT

Press the GREEN STOP PRINT KEY 

Note: There are up to 100 messages stored in the hand held controller (option dependent). This allows the user to move the controller to another printer and enter the same or other saved message.



The upper right top line of the display indicates the unit type the message was prepared for.

MESSAGE # 1 LX x
MESSAGE STORED

EXP 12/


Press the RED MESSAGE STORE key 

The LCD display will display the message storage screen

Use the  or  to select the desired storage location

LX x STOPPED
HD 1- ->SPEED=100

EXP 12/

Press the RED MESSAGE STORE KEY  a second time and the current message appears in the selected location and is stored.

Press the ENTER key  to return to the STOPPED prompt.

LOADING A MESSAGE (LX 1 WITH OP 1, 1.5, 2, 3 OR LX 2)

LX x STOPPED
HD 1- ->SPEED=100

EVOLU

Press the GREEN STOP PRINT KEY 

Note: In option pack 1 there is a maximum of 50 messages stored. Option pack 1.5 or above, increases message storage to 100 messages.

MESSAGE # 1 LX x
PLEASE WAIT

Press the RED MESSAGE STORE key  and use the  or  keys to select the desired message


MESSAGE # 1 LX x

EXP 12

The top line of the display also indicates the printer style that the current stored message was created for. Attempting to load a stored message into a different printer style will result in an "SYSTEMS INCOMPATIBLE" message


LX x STOPPED
HD 1- ->SPEED=100

EXP 12

Press the ENTER  key to load the selected message and return to the STOPPED Mode. The selected message will be displayed on the LCD.

LX x PRINTING
HD 1- ->SPEED=100

EXP 12

Press the GREEN print enable key  to enter the PRINTING Mode

EVOLUTION LX QUICK SETUP

Each time a new print cartridge is installed the system automatically profiles the correct operating parameters and current remaining ink level for the newly installed cartridge. These parameters set the required voltage and firing parameters to produce consistent results without user intervention.

NOTE: USING OTHER THAN AUTHORIZED CARTRIDGES MAY CAUSE UNDESIRABLE RESULTS.

To view the current ink level press the following keys in order:



<< -- INK -- >>
100 %
OTHER KEY EXIT

This screen indicates the ink level remaining. This value is approximate as it does not take into account any service wipes or external priming/cleaning functions.

Press any key to return to the STOPPED mode.

The LINE SPEED may be set in either the PRINTING or STOPPED mode.
Set the line speed by:



The PRINT DELAY may be set in either the PRINTING or STOPPED mode.
Set the print delay by:



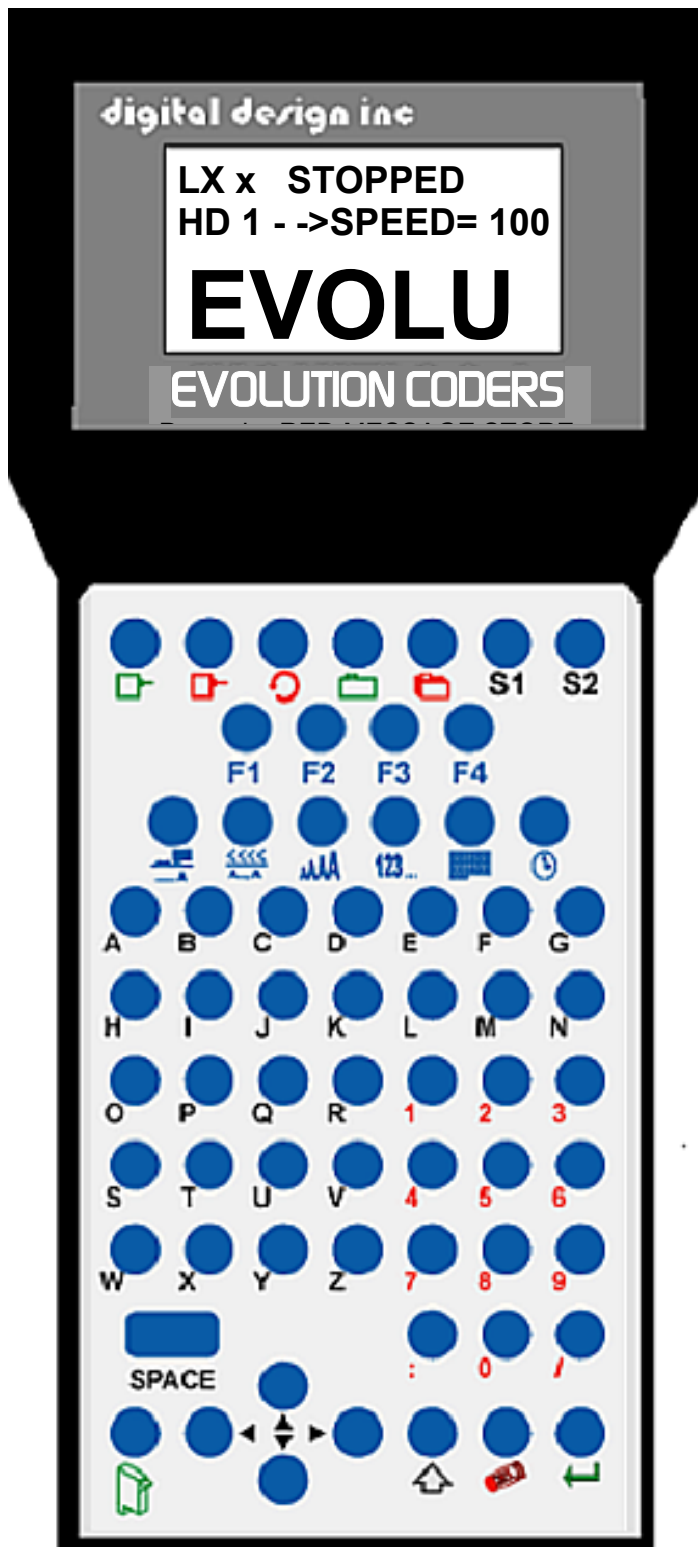
NOTE: Each increment or decrement changes the delay by the pre-defined amount. Each count increases or decreases the print delay by approximately 0.050" (1.27mm)

You may continue to experiment with line speed and print delay until the desired code registration on the product is achieved.

PART 2: OPERATION PROCEDURES

OVERVIEW

CONTROLLER AND LCD



The keypad on the print station, pictured here, contains 64 keys. The LCD will display various messages to assist in programming on the upper half of the display. The lower half of the display will show the actual message in a WYSIWYG (What You See Is What You Get) format.

The system operates in 3 basic modes. They are: PRINTING, STOPPED, and MESSAGE ENTRY Mode. In PRINTING Mode the majority of the keys on the keypad are disabled to avoid inadvertent changes. When in PRINTING Mode the Top line of the LCD will display **PRINTING**.


















The STOPPED Mode is used to change the functions of the printer. When in the STOPPED Mode the display will show **STOPPED** on the top line.

The Message Entry Mode is used to create or modify printable codes, when in this mode the top line of the display will show **MESSAGE ENTRY**.

The 4 keys on the second row are the function keys F1 through F4. They each consist of submenus for modifying various printer functions. Their specific menus are detailed later in this section.

The next two rows of keys with icon legends directly control specific parameters of the printer as follows.

KEYPAD KEY DESCRIPTIONS

	This is the manual cycle key. When in the STOPPED Mode, pressing this key causes the printer to print one code.
	This is the Print key. Use it to place the unit in the PRINTING or STOPPED Mode
	This is the Purge key. Use it to purge ink for maintenance purposes. The unit must be in the STOPPED Mode to use this key.
	This is the Head Select key. Use it to select the address of the head to be communicated with. Or day of week in MESSAGE ENTRY mode.
	Use this arrow to decrease values, and use it to move the cursor in the message line while editing the message.
	Use this arrow to increase values and use it to move the cursor in the message line while editing the message.
	Use this arrow to move the cursor between the message lines while in Edit mode and building a message. Increment LCD contrast
	Use this arrow to move the cursor between the message lines while in Edit mode and building a message. Decrement LCD contrast
	This key is the Message Storage key. Use it to store and to recall individual messages. Enters prefix in MESSAGE ENTRY mode.
	This is the Delete key. Use it to backspace to delete a character when mistyped as well as to exit from certain menus.
	This is the Message Entry key. Use this key to enter the MESSAGE ENTRY mode, to input a code or to edit a message.
	The Date key. Use this key to enter the Date in MESSAGE ENTRY Mode. (LX1 WITH OP 2 or above or LX 2). Change Date in STOPPED Mode.
	The Time key. Use this key to enter the Time in MESSAGE ENTRY Mode. (LX1 WITH OP 2 or above or LX 2). Change Time in STOPPED Mode.
123...	This is the Sequence Number or Lot Counter key. Use this key to enter the Sequence Number in MESSAGE ENTRY Mode. (LX1 WITH OP 2 or above or LX 2). Sets SEQ/LOT operating parameters in STOPPED mode.
	This is the Enter or Return key. When pressed, the unit will accept input and exit certain menus.
	This key selects the Print Delay and Offset Dates (1 or 2) in MESSAGE ENTRY mode (LX1 WITH OP 3 or LX 2)
	This key selects the Line Speed and the shift code in the MESSAGE ENTRY mode (LX1 WITH OP 3 or LX 2)
	This key selects the Font size in the MESSAGE ENTRY mode. In the STOPPED Mode pressing this key displays the current fonts loaded
S1	Pressing this key while in the MESSAGE ENTRY mode enters special characters. In STOPPED mode enter the Prefix for Mixed Raster in the LX2.
S2	This key enters special customer Logos in MESSAGE ENTRY mode. In STOPPED or PRINTING the S2 key reverses LCD colors.

TURNING ON THE PRINT STATION FOR THE FIRST TIME

LX x STOPPED
HD1- ->SPEED=100

EVOLU

To turn the print station on insert the power jack into the DC power connector.

There is no on/off switch or power indicator. When the power is first applied both red and green LED's will flash several times indicating a power up sequence. The LCD on the hand held

controller will be illuminated indicating a power on condition.

The first time the print station is turned on, as received from the factory, the LCD will look like the illustration above. Each line gives important information regarding the system:

The Top line indicates the operating mode of the unit: "STOPPED" when in STOPPED Mode, " PRINTING" when in PRINTING Mode (DEFAULT), and "MESSAGE ENTRY" when in message entry mode. The first several characters on the top line indicated the system type.

The 2nd line shows the print head currently selected, the direction of travel for the product and the programmed SPEED, or encoder divider when using an external encoder, which only can be viewed in the PRINTING mode.

The lower half of the display shows the message available for printing.

CHECKING SYSTEM INFORMATION

CONTROLLER 2.0
PRINTER 3.06A
PRINTER SN284955
ANY KEY TO EXIT

Verify system information by pressing the V key on the hand held controller keyboard. The LCD screen will display the software, firmware, serial number and options enabled. Enabled options are indicated on the second line as a series of + characters where the first + indicates option pack 1, the second + indicates option pack 1.5

the next+ indicates option pack 2 and the last + indicates option pack 3. All four + signs indicate option pack 3 or the LX 2 system.

CHECKING LOADED FONTS

LX 1 ACTIVE FONTS
2 LINE fontname
1 LINE fontname
ANY KEY TO EXIT

LX 1 Press the FONT ^{AAA} key in the STOPPED Mode to check what 2 fonts are currently loaded in the print head.


LX 2 ACTIVE FONTS
4 LINE font name
3 LINE font name
2 LINE font name
1 LINE font name
ANY KEY TO EXIT

LX 2 Press the FONT ^{AAA} key in the STOPPED Mode to check what 4 fonts are currently loaded in the print head.

CHANGING SYSTEM DATE AND DAY OF WEEK CODES

(LX1 WITH OP 2,3 or LX 2)

PRESENT SETTING
ANY CHANGES Y/N
01/04/00

When the unit is in the STOPPED Mode pressing the DATE  key allows the user to change the system date. If there are no changes press the N key to return to the STOPPED Mode.

PRESENT SETTING
ANY CHANGES Y/N
01/04/00
ENTER MONTH-

Press the Y key to change the date.

The system will prompt the user first for the Month (enter 2 digits), then the Day (2 digits) and finally the year (2 digits).


PRESENT SETTING
ANY CHANGES Y/N
01/04/00
ENTER DAY-

PRESENT SETTING
ANY CHANGES Y/N
01/04/00
ENTER YEAR-

< - - SELECT - - >
DAY OF WEEK- 1

After the date is entered the system requests the actual date day of week. This parameter is usually set to 1 for Sunday, 2 for Monday etc.

DAY FORMAT
1= NUMERIC
2= LETTERS


The day of the week can be entered into a message as either a number 1-7 or as a letter A-G. The day of the week is entered into a message by pressing the  key while in the MESSAGE ENTRY mode.

PRESENT SETTING
ANY CHANGES Y/N
04/23/05

After the data is entered the system displays the currently entered date and pressing the N key returns the user to the STOPPED Mode, or press Y to the correct the date.

CHANGING SYSTEM TIME AND DATE ROLL OVER TIME (LX1 WITH OP 2,3 or LX 2)

TIME SETTINGS
1= SET TIME
2= DATE CHANGE TIME

When the unit is in the STOPPED Mode pressing the TIME  key allows the user to change the system time or date change time. Press the 1 key to display the current time

PRESENT SETTING
ANY CHANGES Y/N
23:05

Select the N key if the time is correct and return to the STOPPED Mode.

PRESENT SETTING
ANY CHANGES Y/N
23:05
ENTER HOURS -

Press the Y key to change to the correct time. Enter the correct hours (2 digits) followed by the correct minutes (2 digits). The screen displays the corrected time. Press the Y key to make further changes or N key to return to the STOPPED Mode.

PRESENT SETTING
ANY CHANGES Y/N
23:05
ENTER MINUTES -

Notice the time is in 24-hour format.

PRESENT SETTING
ANY CHANGES Y/N
13:50

TIME SETTINGS
1= SET TIME
2= DATE CHANGE TIME

The Date Change option is enabled by selecting option 2. This feature allows the date to roll over at a specified time other than 00:00 (12:00am midnight). For example if the start of a new shift day occurs at 06:00 the date will be changed each day at 6:00AM.

DATE TIME CHANGE
ANY CHANGES Y/N
00:00

Selecting Y allows changing of the roll over time. Setting this parameter to 00:00 sets the default rollover time to midnight.

DATE TIME CHANGE
ANY CHANGES Y/N
00:00
ENTER HOURS -

Similar to entering the time, first enter the hours then at the next prompt enter the minutes. Remember the time is entered in military time.

DATE TIME CHANGE
ANY CHANGES Y/N
00:00
ENTER MINUTES -

Entering 06:00 sets the date change time at 6:00AM.

RESET CLOCK

ENTER HOURS -

Enabling this function requires resetting the current correct time.



RESET CLOCK

ENTER MINUTES -

Enter both the current time in hours and minutes.
This resets the correct time and establishes a new Date Rollover Time.

LCD BACKLIGHT AND CONTRAST CONTROL

The LCD backlight and contrast may be set from the hand held controller keyboard and is applicable in both the PRINTING and STOPPED mode. The **S2** key causes the LCD to display as either white letters on a blue background or blue letters on a white background. This key is an alternate action key.

Backlight contrast may be controlled using the  or  keys on the keyboard. The user may set these parameters to best suit the application.

SETTING PRINTING PARAMETERS

DEFINITIONS

There are two parts to programming the EVOLUTION LX ink jet printer,

- Configuring the operations parameters, (character width, delay, etc.) and
- Creating the message.

MODES OF OPERATION

The system operates in 3 basic modes. They are: PRINTING, STOPPED, and MESSAGE ENTRY Mode.

In PRINTING Mode the majority of the keys on the keypad are disabled to avoid inadvertent changes. When in PRINTING Mode the Top line of the LCD will display **PRINTING**.


The STOPPED Mode is used to change the functions of the printer. When in the STOPPED Mode the display will show **STOPPED** on the top line.

The Message Entry Mode is used to create or modify printable codes, when in this mode the top line of the display will show **MESSAGE ENTRY**.

PRINTING AND STOPPED MODE



LX x PRINTING
HD1- - >SPEED=100
EVOLU

When in the PRINTING Mode the screen will look like the screen on the left. When PRINTING is seen on the LCD, the unit will print as product passes in front of the printer. To enter PRINTING Mode, press .



LX x STOPPED
HD1- - >SPEED=100
EVOLU

When in the STOPPED Mode the screen looks like the illustration at left. When STOPPED the printer will not print when product is moved past the printer.

In STOPPED Mode, access can be made to the menus under the function keys, **F1** through **F4** icon control keys plus access to Message Entry

Mode. To enter STOPPED Mode, press .

MENU STRUCTURE

In the STOPPED Mode, access is allowed to the menu structure for basic parameters. The menus reside within the function keys, **F1** through **F4**. In order to select one of the parameters, press the number key that corresponds to the desired parameter.

F1

The **F1** key, when pressed, brings up the menu as shown below.

1=CHAR. SPACING
2=EXT. ENCODER
3=DATE OFFSET
4=BARCODE

#3 VALID IN LX1 WITH OP 3 or LX 2
#4 VALID IN LX 2 MODEL

F2

The **F2** key, when pressed, brings up the menu as shown below.

1=DIRECTION
2=PRINT INVERSE
3=PRODUCT DETECT
4=AUTO REPEAT

#4 VALID WITH ANY OP1, 2,3 OR LX 2

F3

The **F3** key, when pressed, brings up the menu as shown below.

1=PRODUCT COUNT
2=SHIFT CODE
3=DATE FORMAT
4=TIME FORMAT

#1 VALID IN LX1 WITH OP 3 OR LX 2
#2 VALID IN LX1 WITH OP 3 OR LX 2
#3 VALID IN LX1 WITH OP 2, 3 OR LX 2
#4 VALID IN LX1 WITH OP 2, 3 OR LX 2

F4

The **F4** key, when pressed, brings up the menu as shown below.

1=LANGUAGE
2=INK SUPPLY
3=SET UNIT I.D.
4=LOAD CARD

Selecting an option that is not available will display the screen as pictured on the left indicating that the option is not available.

NOT AVAILABLE

ANY KEY TO EXIT

F1 MENU

1=CHAR. SPACING
2=EXT. ENCODER
3=DATE OFFSET
4=BARCODE

future system expansion.

Place the unit in the STOPPED Mode and press **F1**. The screen shown to the left is produced. Press the correct number to make changes to that parameter. Those selections not available will display NOT AVAILABLE. They are reserved for

1 = CHARACTER SPACING

< - - SELECT - - >
OF SPACES- 1

This parameter controls the amount of space between characters in the code. Spacing can be varied from 1 to 25 columns. Use this control to make printed codes more legible when code is compressed. Press the **1** then press **▶** or **◀** to change the value. Press **↵** once the desired value is displayed.

2 = EXT. ENCODER

ENCODER
1=INTERNAL
2=EXTERNAL

Press **1** to select internal time base. This parameter controls the source of the time base used for printing. Each vertical column printed requires a signal necessary to produce a character representative of the line speed of the production line. The printer can be set to produce a perfect

aspect ratio character (300 dpi vertical and horizontal) or compressed by setting the print head line speed faster than the actual line speed, or expanded by changing the internal speed slower than the actual line speed.

In the event there is an acceleration or deceleration to the production line, or there is a requirement to guarantee accurate aspect ratio, such in the case of barcodes, an external encoder is necessary. Press **2** to select external encoder. While external encoder is selected the LINE SPEED key **⏮** will adjust the expansion and compression of the printed message. NOTE: WHEN PRODUCING BARCODES IT IS NECESSARY TO PRODUCE A PERFECT ASPECT RATIO CHARACTER.

Swath height is $0.500 (1/2") / 150 \text{ vertical dots} = 0.0033"$ between vertical dots

Therefore to print a perfect aspect ratio character requires an encoder pulse every $0.0033"$. The encoder range adjustment is from 0 to 7 and assuming the mean is a count of 4 then by connecting an encoder that produces a pulse for each $0.000825"$ the correct character aspect ratio can be achieved. This allows either compression or expansion of the printed text.

In STOPPED mode the external encoder is ignored and the internal time base is used to print a message.

3 = DATE OFFSET (LX1 WITH OP 3 ONLY OR LX 2)

DATE OFFSET
1 DATE OFFSET 1
2 DATE OFFSET 2

This selection allows the user to preset the number of days used in the date offset calculation to a maximum of 9999 days. The format of the date offset can be different than a normal date and may be set with the F3 #3 option DATE FORMAT.

There are two date offset functions, and each may be set independently.

DATE OFFSET
USE KEYS 0->9
OF DAYS = 0100




Select option 1 or 2 to enter the desired offset days.

4 = BARCODE TYPE (LX 2 MODEL ONLY)

< - - SELECT - - >
CODE 39

This parameter determines the barcode type to be entered into a message. As standard the EVOLUTION LX 2 contains 8 barcode symbologies, which are: UPC-A, UPC-E, EAN-8, EAN-13, CODE 39, CODE 128B, CODE 128C AND INTERLEAVED 2 OF 5.

< - - SELECT - - >
UPC A

Press  or  to change the barcode type and press  once the desired type is displayed.

< - - SELECT - - >
MIN. BAR WIDTH= 5

The default system parameter establishes that the normal size of a narrow bar is equal to 5 vertical columns. This value, which is variable from 3 to 15, is selectable depending on the overall length of the barcode to be printed and the bleed factor of the ink on the surface. This value sets both the light and dark bars nominal width.

< - - SELECT - - >
ADDED SPACE = 0

The added space parameter allows the user to insert extra columns to a normal light bar width to allow for the bleed factors associated with various substrates. Valid entries are from 0 to 3 extra spaces.

< - - SELECT - - >
QUIETZONE WIDTH
75

The quiet zone is the space before and after a barcode that must be kept blank. Each count is equal to one vertical column. In proper aspect ratio each column is 0.0033" thus a count of 75 would leave 0.247" before and after the barcode.

ADD CHECK DIGIT**1 = YES****2 = NO**

Check digits may be added to any of the imbedded symbologies by selecting option 1.

ADD MAN READABLE**1 = YES****2 = NO**

This parameter adds a man readable set of characters directly beneath the barcode being printed, and is valid for all barcode types.

ADD GUARD BARS**1 = YES****2 = NO**

If man readable characters are enabled the user has the option of enabling or disabling guard bars.

Barcode reliability is directly related to the substrate and linearity of the production line. Care should be taken to ensure that the production environment is conducive to printing barcodes. For example barcodes are susceptible to vibration (bounce) found on roller style conveyers where flat belt types are preferable. Acceleration and deceleration components will add a skew factor to the barcode as will slippage between the product and production line. Refer to Appendix A for further details on "Producing a Reliable Barcode".

F2 MENU

1=DIRECTION
2=PRINT INVERSE
3=PRODUCT DETECT
4=AUTO REPEAT

Place the unit in the STOPPED Mode and press **F2**. The screen shown to the left is produced. Press the correct number to make changes to that parameter

NOTE: OPTION 4 ONLY APPEARS IF LX 1 WITH OP 1,2,3 OR LX 2

1 - DIRECTION

< - - SELECT - - >
LINE DIRECTION

< - - - -

The arrow shown on the LCD's third line should agree with the direction of product travel. Press **▶** or **◀** to change direction. Press **↩** for the printer to accept the change.

2 - PRINT INVERSE

CODE ORIENTATION
1 = NORMAL PRINT
2 = UPSIDE DOWN

This parameter allows the code to print right side up or upside down. Press **1** for normal print or **2** for upside down codes. Save the choice by pressing **↩**. Upside down printing will normally require a change in direction.

3 - PRODUCT DETECT




PRODUCT DETECT
1 = INTERNAL
2 = EXTERNAL

This menu selection allows the user to select the source of the product detect feature. Press **1** and then **↩** to use the internal product detect sensor located at the front of the printer just below the print head. If it becomes

necessary to sense a portion of the product not directly in front of the print head then an external product detect sensor must be used. This setting also allows the EVOLUTION LX to be controlled from other sources, like a PLC.

4 - AUTO REPEAT (LX1 WITH OP 1, 2 OR 3 OR LX 2) *****

< - - SELECT - - >
REPEAT TIME= 0

This option enables the unit to continuously print repeated codes at specified time intervals along the entire length of the product. A time of 0 disables the Auto Repeat option. Use  or  to change the repeat time. Each number in the time delay adds or subtracts a distance equivalent to the pre-defined setting. Save your choice by pressing . The maximum repeat spacing is 255 counts where each count is equal to 80 character columns or 0.250". This allows for a total displacement of **63.75"**. Setting a print delay that uses the same mathematical equation can increase this number. Thus a total displacement of 26.92" can be realized.

< - - SELECT - - >
1=UPDATE CODE
2=SAME CODE

If a repeat time is greater than zero then the auto repeat function is enabled. After entering a repeat time the user is prompted to update the printed data variable field contents or use the same information for all printed messages.

When the UPDATE CODE option is enabled then variable field data; for example a sequence number is updated on each printed message. Selecting the SAME CODE feature will, in the above example, print the same sequence number on all subsequent prints on the same product. Variable data will only be updated when the next product passes in front of the printer.

An example of this is printing on a piece of plasterboard. With the count disabled a sequence number, for example, will print the same serial number N times across the length of the plasterboard. When the next board passes in front of the print head the sequence number will be updated.

F3 MENU

1= PRODUCT COUNT
2= SHIFT CODE
3=DATE FORMAT
4=TIME FORMAT

1 – PRODUCT COUNT (LX1 WITH OP 3, OR LX 2)

PRODUCT COUNT
CHANGES Y / N OR C
08:00 - - > 17:00
COUNT = 000000

The product counter is a non-printable entity, and must be read after the end of the set time period. The counter indicates each print cycle sensed by the product detect circuitry, whether internal or external. Depressing the **C key** will clear the counter.

If there are no changes press the **N key**.

PRODUCT COUNT
START TIME
08:00 - - > 17:00
ENTER HOURS-

To change the settings depress the **Y key**.
All times are in Military Time 00:00 to 23:59 hours.

PRODUCT COUNT
START TIME
08:00 - - > 16:00
ENTER MINUTES-

Enter the start time HOURS.
At the next screen prompt enter the start time MINUTES

PRODUCT COUNT
STOP TIME
08:00 - - > 16:00
ENTER HOURS-

The system then prompts the user for the STOP TIME.

PRODUCT COUNT
STOP TIME
08:00 - - > 16:00
ENTER MINUTES-

Enter both the stop time HOURS and then the MINUTES.

PRODUCT COUNT
CHANGES Y / N OR C
08:00 - - > 17:00
COUNT = 000000



The newly entered data is re-displayed for verification or correction if necessary Press the **Y key** to change the data or the **N key** to finish and return to the **STOPPED MODE**

2 – SHIFT CODE (LX1 WITH OP 3, OR LX 2)

**1= PRODUCT COUNT
2= SHIFT CODE
3=DATE FORMAT
4=TIME FORMAT**

Shift codes may be encoded directly in the printable message. The printer can print 6 individual shift codes. Each shift code contains a unique start time and alpha/numeric code to be printed.

**ADJUST SHIFTS
< - - SELECT - - >
SHIFT 1 07:00 A
ANY CHANGES Y/N**

Press  or  to change the desired shift to view or change.

The shift code option allows the user to enter 6 different shift times per day. Use the arrow keys to select a shift and enter a Y to change a shifts start time.

All times are in Military Time 00:00 to 23:59 hours.

**ADJUST SHIFTS
SHIFT 1
START TIME
ENTER HOURS -**

**ADJUST SHIFTS
SHIFT 1
START TIME
ENTER HOURS -**

Enter the correct start time HOURS for the shift selected.

**ADJUST SHIFTS
SHIFT 1
START TIME
ENTER MINUTES -**

Enter the correct start time MINUTES for the shift selected.

**ADJUST SHIFTS
SHIFT 1
PRINT CODE -**

Finally, enter the desired code to be printed in the message. Legal characters are the letters A to Z and the numbers 0 to 9.

**ADJUST SHIFTS
< - - SELECT - - >
SHIFT 1 07:00 A
ANY CHANGES Y/N**

The printer re-displays the data for the selected shift for verification.

NOTE: THIS PROCEDURE MAY BE REPEATED FOR ALL DESIRED SHIFTS

NOTE: TO DISABLE A SHIFT ENTER A SPACE CHARACTER IN THE PRINT CODE FIELD. THE SHIFT TIMES WILL BE DISPLAYED AS --:-- FOR ALL DISABLED SHIFT TIMES.

3 – DATE FORMAT (LX1 WITH OP 2, 3 OR LX 2)

1= PRODUCT COUNT
2= SHIFT CODE
3=DATE FORMAT
4=TIME FORMAT

CHANGE FORMAT
1=CALENDAR DATE
2=WEEKLY DATE
3=DATE OFFSET 1
4= DATE OFFSET 2

MONTH FORMAT
1=NUMERIC
2=LETTERS

DATE FORMAT
D=DAY M=MONTH
Y=YEAR J=JULIAN
dm/dd/dy

DATE FORMAT
D=DAY M=MONTH
Y=YEAR J=JULIAN
jjj

DATE FORMAT
D=DAY M=MONTH
Y=YEAR J=JULIAN
jjjyy

Press **F3** to change the date formatting. Each of the following screens prompts the user to enter the desired format for printing.

NOTE: THE USER MAY INDIVIDUALLY CHANGE THE FORMAT OF BOTH THE CALENDAR FORMAT AND THE DATE OFFSET

NOTE: THE FOLOWING PROCEDURE APPLYS TO BOTH CALENDAR AND OFFSET DATE FORMATS.

Selecting the standard numeric format will prompt the user to enter the format of the date in standard number format.

The default as shipped from the factory is dm/dd/dy, and may be modified as required.

If the offset format was selected the word **DATE** is replaced with the word **OFFSET x, where x is either 1 or 2.**

To change the format press the delete key and the last line on the display will be erased. The entire format will be erased and must be re-entered.

Press either of the designator keys (i.e. M for month) and the display will display the correct code for the item selected. As an example enter the Julian date and year. Press the J key followed by the Y key. The code entered will print the Julian date followed by the 2-digit year. Notice no delimiters were selected, but may have been entered by selecting the appropriate key on the keyboard. Legal delimiters are the colon (:), the forward slash (/) or the period (.) or SPACE.

MONTH FORMAT**1=NUMERIC****2=LETTERS**

Alpha characters may be selected by pressing option 2.

DATE FORMAT**D=DAY M=MONTH****Y=YEAR****jjjyy**

Delete the current formatting by pressing the Delete key.

DATE FORMAT**D=DAY M=MONTH****Y=YEAR****ddmmmyy**

Enter the desired Date Format and notice when the M (month) is selected the display shows mmm. Select the appropriate key on the keyboard by entering in the desired code. Press the Enter key to return to the STOPPED Mode.

WEEKLY DATE**1=ENABLE****2=DISABLE**

The software performs a special function allowing the user to set the current date to change only at a certain day of the week. This function is typically used in batch processing, where a batch may be prepared on Sunday and packaged from Monday through Friday of the following week.

Entering either the current date or offset date in a message will result in the initial date being printed for either function throughout the following week. Selecting option 2 disables the function and returns the user to the STOPPED Mode.

4 – TIME FORMAT (LX1 WITH OP 2, 3 OR LX 2)

1= NOT AVAILABLE
2= NOT AVAILABLE
3=DATE FORMAT
4=TIME FORMAT

Change the Time Format by selecting option 4.

NOTE: Delimiter characters like a : / SPACE OR PERIOD code may be entered to separate fields

TIME FORMAT
H=HOURS S=SECOND
M=MINUTES
hh:mm

The factory default for time formatting is hh:mm and may be changed as required. Press the Delete key and the last line on the display is erased.

TIME FORMAT
H=HOURS S=SECOND
M=MINUTES
hh

Enter the desired format by pressing the H, M or S keys, and select delimiters as required. Select H if only hours are required. Press the Enter key to return to the STOPPED Mode.

F4 MENU

1 = LANGUAGE
2 = INK SUPPLY
3 = SET UNIT I.D.
4 = LOAD CARD

Place the unit in the STOPPED Mode and press **F4**. The screen shown at left is produced. Press the number that corresponds to the parameter you wish to change.

1 - LANGUAGE

< - - SELECT - - >

ENGLISH

Press **1** and the screen will change like the one on the left. The default language is English; the other choices are Spanish, French or German. Scroll through the choices using either **◀** or **▶**. Once the desired language is shown on the screen, press **↵**. This will return the unit

to the STOPPED Mode. Whenever language is chosen, all prompts and commands shown on the screen will be in that language.

2 - INK SUPPLY

REMAINING INK
100%

ANY KEY TO EXIT

The second line of the display shows the percentage of ink remaining in the print cartridge.

Each time a new cartridge is installed the system automatically reads the cartridges remaining ink supply.

Each cartridge is tested and profiled at the factory eliminating the burden of personalizing each cartridge by the user. There are a number of tasks associated with print cartridge profiling, as each print cartridge differs from another. The correct drive voltage, pulse width timing, etc. must be calculated for optimum operation.

NOTE: USING NON-AUTHORIZED CARTRIDGES MAY PRODUCE UNDESIRABLE RESULTS

3 – SET UNIT I.D.

**< - - SELECT - - >
SET HEAD # = 1**

Each printer can contain a unique address to distinguish multiple printers when controlled by a single hand held controller or computer data link using an RS485 data link. The default for each new printer is ADDRESS 1. Addresses can range from 1 to 32. It is advisable when adding multiple

printers to affix a label indicating the unique ADDRESS number of the individual printer.

Note: To program a printer it must be connected directly to the hand held controller, with no other printers connected.

Note: If several printers have the same address a NO RESPONSE message or unreliable results may be displayed.

4 – LOAD CARD

LOADING FONTS (MENU SELECT 1)

EXECUTE LOADER

1=LOAD FONTS

2=LOAD LOGOS

3=LOAD OPTIONS

The user can replace the existing FONT, add up to six logos, or load optional software from a Data Flash card, which is plugged into the top of the printer. Select 1 to load a different font to replace the current system font.

LOAD FONT

1= LOAD DEFAULTS

2= LOAD ALTERNATE

LOAD RESULTS

PLEASE WAIT

The screen to the left will appear and after a few seconds a result will be displayed to indicate NOTHING LOADED or the name of the newly loaded font, logos or software upgrades.

LOAD RESULTS

2 LINE fontname

1 LINE fontname

ANY KEY TO EXIT

This screen will be displayed if the data flash card is either not present or cannot be read.

MEMORY ERROR

NO FLASH CARD

CHECK THAT THE DATA FLASH CARD IS PROPERLY INSTALLED

ANY KEY TO EXIT

A successful load will display the current font names loaded into the print head. This screen will be displayed when the default fonts are loaded.

LOAD RESULTS

2 AF fontname

1 AF fontname

ANY KEY TO EXIT

NOTE: LX 2 units display all 4 loaded fonts.

When loading alternate fonts the AF will replace LINE for the alternate font or fonts loaded.

NOTE: LX 2 units display all 4 loaded fonts.

NOTE: when optional fonts are loaded into the system the Data Flash Card is encoded with the serial number of the unit and is valid only for the unit in which the fonts were loaded.

LOADING LOGOS (MENU SELECT 2)

EXECUTE LOADER
1=LOAD FONTS
2=LOAD LOGOS
3=LOAD OPTIONS

The user can replace the existing FONT, add up to six logos, or load optional software from a Data Flash card, which is plugged into the top of the printer. Select **2** to load logos into the print head.

EXECUTE LOADER
PLEASE WAIT

MEMORY ERROR
NO FLASH CARD

ANY KEY TO EXIT

This screen will be displayed if the data flash card is either not present or cannot be read.

CHECK THAT THE DATA FLASH CARD IS PROPERLY INSTALLED

LOAD RESULTS
2 LINE 1 2 3
1 LINE 1 2 3
ANY KEY TO EXIT

Displaying the number of logos as indicated in the pictorial indicates successful loading.

The display indicates the number of logos loaded for the 1 line or 2 line mode.

Loading logos overwrites the logos currently existing.

LOADING OPTIONS (menu select 3)

EXECUTE LOADER
1=LOAD FONTS
2=LOAD LOGOS
3=LOAD OPTIONS

Optional software may be added via Data Flash Card to the basic unit to add features.

NOTE: when optional software is loaded into the system the Data Flash Card is encoded with the serial number of the unit and is valid only for the unit in which the software was loaded.

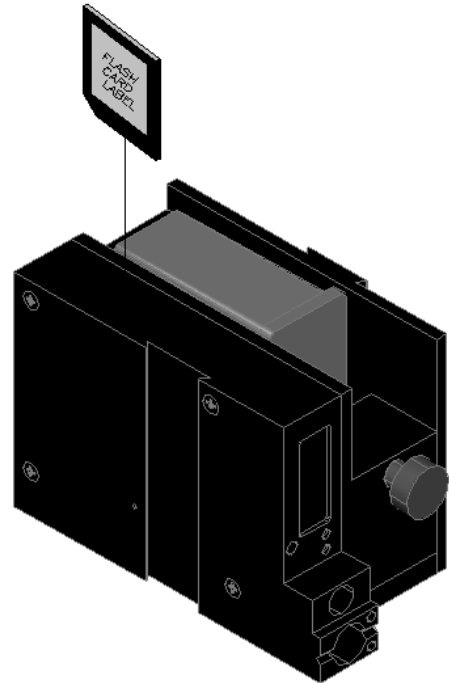
CONTROLLER 2.0
PRINTER 3.06A++++
PRINTER SN284955
ANY KEY TO EXIT

Verify system information by pressing the V key on the hand held controller keyboard. The LCD screen will display the software, firmware, serial number and options enabled. Enabled options are indicated on the second line as a series of + characters where the first + indicates option pack

1, the second + indicates option pack 1.5 the third is option pack 2 and the last + indicates option pack 3. NOTE: LX 2 systems display ++++ signs indicating a full featured unit with 8 barcode symbologies.

NOTE: THE FIGURE BELOW SHOWS THE CORRECT ORIENTATION FOR INSERTING THE DATA FLASH CARD.

INSERT THE DATA FLASH CARD INTO THE SLOT PROVIDED AT THE TOP OF THE PRINTER AS SHOWN. NOTE THE ORIENTATION OF THE LABEL ON THE CARD. PRESS THE CARD COMPLETELY INTO THE SLOT. THE CARD SHOULD BE REMOVED AFTER USE AND STORED IN A SAFE PLACE. ONCE LOADED (FONTS & OPTIONS) THE CARD IS SECURITY LOCKED WITH THE SERIAL NUMBER OF THE PRINTER AND WILL NOT OPERATE IN ANOTHER PRINTER.



NOTE:

There are two fonts loaded into the EVOLUTION LX1 printer at any one time, and four fonts loaded into the LX 2 printer. Loading a new font will overwrite the existing font or fonts. The LX 1 printer is shipped with a 1/2" font for a single line of print and a 7/32" font for two lines of print. Alternate fonts that are loaded replace the existing fonts. The LX 2 system also includes a 1/8" and a 3/32" character font for 3 and 4 line messages, respectively.





SETTING PRINT DELAY AND LINE SPEED

LINE SPEED – This setting adjusts the width of the printed message on the product. This setting should be adjusted to produce the desired print on the product. Line speed can be increased or decreased to stretch or compress the message to fit the desired print area.




SETTING LINE SPEED

< - - SELECT - - >
LINE SPEED = 100

Normally, the system will be set to use the internal time base for line speed control. The default value is 100, which creates a normal width character on a line moving at 100 ft per min. The print can be narrowed by increasing the number and widened by

decreasing the number. Pressing  accesses this parameter. Once pressed, a new screen appears, as shown to the left. Changes can now be made by using  or . The range of values for character width is 10 to 200. Once the desired number is chosen, press  to save your entry.


< - - SELECT - - >
ENCODER DIV = 1

If external encoder is enabled and the unit is in the PRINTING mode the user has the option of adjusting the compression ratio of the printed message. Changes may be made by using  or . Once the desired number is chosen, press  to save your entry.

SETTING PRINT DELAY

LX x STOPPED
HD1- - >SPEED=100




EVOLU

Print delay is used to position a message on the product at a location other than at the leading edge. Access this parameter by pressing  on the keypad.

NOTE: This parameter may be set when the unit is either in the PRINTING or STOPPED Mode

LX x PRINTING
HD1- - >SPEED=100

EVOLU

To change the value use either  or . The range of values for this parameter is 1 to 255. Each increment represents 16 columns, approximately .050" (1.5mm). Therefore, a delay of 255 would approximate 12.75" (323.85mm). Once a number is chosen, press  to save the entry.

< - - SELECT - - >
PRINT DELAY= 100

NOTE: THE DIMENSION INDICATED IS WHILE PRINTING A PERFECT ASPECT RATIO CHARACTER. WHEN PRINTING A COMPRESSED OR EXPANDED CHARACTER THE ACTUAL DIMENSIONAL NUMBER WILL BE


DIFFERENT BUT CAN BE ESTIMATED BASED ON THE 16 COLUMNS PER COUNT.

NOTE: Setting the line speed first, then adjusting the print delay may prove to be the best starting point

INPUT, EDIT OR DELETE MESSAGES


LX x STOPPED
HD1- - >SPEED=120

EVOLU

To input, delete or edit a message, the unit must be in the STOPPED Mode. If the LCD reads PRINTING, press . The screen should be similar to the one shown at the left.

MESSAGE ENTRY
FONT 1 LINE

EVOLU


Enter the Message Entry mode by pressing . The top portion of the screen will change as shown on the left.

QUICK KEYS F1 beginning of line

F2 end of line



F3 delete entire message

MESSAGE ENTRY
FONT 1 LINE






The user has two options to edit or change a message. If a new message is to be entered press the  key to delete the entire existing message.

MESSAGE ENTRY
FONT 1 LINE

DM.DD.

For example, to produce a 1/2" tall 1 LINE message, press the font key  until the 1/2" font size is shown, and enter EXP followed by the  key. This enters the DATE OFFSET (select 1 or 2 for correct offset date) as defined in the F1 menu.

MESSAGE ENTRY
FONT 2 LINE
BEST BY
EXP 12/01/2004

To place two lines use the  to select 2 LINE mode. Press the  key to delete the entire message. Press the  or  to select which line the data will be entered on. Enter BEST BY. The pictorial at the left shows two lines of 2 LINE character size. To enter and print only 1 line of 2 LINE select the line and enter data to that line only. Once the message line(s) is complete, save the change by pressing .

LX x STOPPED
HD1- - >SPEED=120
BEST BY
EXP 12/01/2004

NOTE: USE THE DATE OFFSET KEY  TO ENTER AN EXPIRATION DATE.

MESSAGE ENTRY
FONT 1 LINE
BEST BY
EXP 12/01/2004




MESSAGE ENTRY
FONT 1 LINE
BEST BY
EXP

MESSAGE ENTRY
FONT 1 LINE
BEST BY
EXP 12/31/2004

MESSAGE ENTRY
FONT 1 LINE
BEST BY
EXP 12/01/2014

< -- SELECT -- >
!#\$%& () * + = ¢ ■ Ñ É Ö

LX x STOPPED
HD1- - >SPEED=120
BEST BY
EXP 12/01/2014



The second option is to replace characters by using the  key or moving the cursor over a character to be replaced. When the MESSAGE ENTRY mode is entered the cursor is placed at the end of the line. Pressing the  key will delete the last character on the line. Successive 's will continue to delete the last character on a line.






At the left the characters 12/01/2004 were deleted..


NOTE: THERE IS NO INSERT FUNCTION


Enter the correct data, in this case 12/31/2004.

NOTE: in this case since the alpha/numeric characters for the date were entered the field will not automatically adjust for the next data rollover. The user must use the DATE key for proper operation.

The alternative approach if just a few characters are to change is to use the  or  to place the cursor just to the left of the character to be changed and retype the correct character. In this example the 12/31/2004 WAS CHANGED TO 12/01/2014.

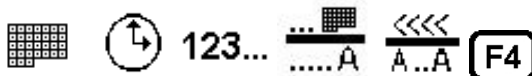
Symbols are inserted by pressing . When in Message Entry mode, position the cursor where a symbol is needed and press . The screen will show a line of symbols as presented on the left. Position the cursor by pressing  or  immediately to the left the special character to be inserted and press .

Continue to build the message or press  to save the message and return to the STOPPED Mode.


LX 1 messages may contain up to 2 lines of text, while LX 2 may contain up to 4 lines of text. Selecting different message lines is accomplished by pressing the font key  until the appropriate line designation is displayed.

MESSAGE ENTRY
---- FONT- 1 LINE


Enabling variable field programming requires the use of the special function keys.



MESSAGE ENTRY
---- FONT- 1 LINE
DM/DD/

To enter a date that automatically changes use the  key. The current date format as set in the F3 menu is entered into the message.

MESSAGE ENTRY
---- FONT- 1 LINE
HH:MM

To enter a time that automatically changes use the  key. The current time format as set in the F3 menu is entered into the message.

MESSAGE ENTRY
FONT- 1 LINE
0000

Sequence numbers may be added to a message with the **123...** key. Note when the key is depressed the four ---- are changed to #### indicating a sequence number field. After entering

the correct sequence number press the **123...** key to terminate the sequence field. The maximum number of digits allowable is 9 numeric characters.

Refer to the following page for Sequence or Lot counter setup and selection.

MESSAGE ENTRY
---- FONT- 1 LINE
0000

MESSAGE ENTRY
<<<< FONT- 1 LINE
DM.DD.

Date offset codes are entered by using the key. The user may select offset 1 or 2 at data entry time.

The correct date offset format as defined in the F3 menu is entered into the message.

MESSAGE ENTRY
---- FONT- 1 LINE
S

Use the key to enter a shift code.

Shift codes are defined in the F3 menu and will automatically change at the appropriate shift times. The shift designator S is displayed to indicate the data entry.

SEQUENCE NUMBER LOT COUNTER SETUP AND SELECTION

SEQ. NUMBER
1= COUNT UP
2= COUNT DOWN

Sequence number format is programmable in the STOPPED Mode by pressing the ^{123...}key. The counter may be set to count either up or down by selecting number 1 or 2. Pressing enter advances the user to the next menu prompt.

CLEAR SEQ# FIELD

YES OR NO Y/N

Clearing the sequence field resets the counter to their initial settings.

COUNTER LIMIT
00000000
ANY CHANGES Y/N

The next prompt allows for changes in the sequence limit field. Selecting Y allows the user to enter the desired maximum (minimum for down count) count. Digits are entered via the keyboard right justified. As an example to set a maximum count of 5000 enter 5000. Pressing the DEL key allows for re-entry while pressing the ENTER key returns the user to the LOT COUNTER menu.

COUNTER LIMIT

ANY CHANGES Y/N
ENTER #00000000

COUNTER LIMIT

ANY CHANGES Y/N
ENTER #000005000

LOT COUNTER
1=ENABLE
2=DISABLE

If a LOT style counter is desired then enable the lot counter by selecting option 1.

CLEAR LOT# FIELD

YES OR NO Y/N

Selecting ENABLE prompts the user to clear the lot counter to a reset condition.

UPPER LIMIT

ANY CHANGES Y/N

The user now has the option of setting the upper limit of the lot counter by entering Y.

UPPER LIMIT**ENTER #0000**

Enter the upper limit count using the keyboard. Up to 4 digits are allowed. This value determines how many products are printed before the sequence number in the message is updated. For example entering a 50, as the upper limit will print the same

serial number on the next 50 products before the sequence number is incremented/decremented by 1.

NOTE: To use the lot count feature the LOT counter in the above setup must be enabled. The message should contain the SEQUENCE NUMBER option 1.

Moving the cursor back over the various characters contained in the message may be used to validate the message. Note that the field designator will normally appear as - - - indicating an alpha/numeric code as would be seen by moving the cursor adjacent to the M F G or the E X P on the second line. The same designator will be seen when the cursor is placed adjacent to any non-changeable field including the space character.

Moving the cursor under a variable programmable field will display the correct field designator in place of the - - - alpha/numeric designator.

<p>MESSAGE ENTRY <<<< FONT- 2 LINE MFG DM/DD/DY HH:MM EXP DM.DD.DY <u>S</u> 0009</p>
--

For example, moving the cursor adjacent to the S (shift code) on the second line would display the field designator as < < <

NOTE for clarification the underscore character is used in the example to indicate

the character position.

The various field designators displayed are:

- - - - Alpha/Numeric non-changeable data

Sequence number field

< < < < Shift code field

OM Offset date month field

OD Offset date day field

OY Offset date year field

DM Current date month field

DD Current date day field

DY Current date year field

TH Current time hour field

TM Current time minute field

NOTE: ONLY 15 OBJECTS ARE PERMITTED IN A PARTICULAR MESSAGE TOTAL. IN THE ABOVE EXAMPLE THE FIRST LINE OF DATA MFG DM/DD/DY HH:MM CONTAINS 10 OBJECT FIELDS. FOR PURPOSES OF CLARITY THE SPACE CHARACTER IS SHOWN AS THE UNDERLINE _ CHARACTER WHERE:

MFG_ = ALPHA/NUMERIC FIELD

DM = DATE MONTH FIELD

/ = ALPHA/NUMERIC FIELD

DD = DATE DAY FIELD

/ = ALPHA/NUMERIC FIELD

DY = DATE YEAR FIELD

_ = ALPHA/NUMERIC FIELD

HH = TIME HOURS FIELD

: = ALPHA/NUMERIC FIELD

MM = TIME MINUTES FIELD

The above constitutes 10 object fields. Even though there are up to 48 characters permitted per line (depending on options), data entry will be inhibited when the 15th object is entered, although the last field, if it is an alphanumeric object, may contain enough characters to meet the remaining character limit.

Barcodes are also an object field and must be considered when entering a message. Thus a barcode with an imbedded sequence number is counted as two or more objects.

Barcode fields may be entered by pressing the **F4** key while in the MESSAGE ENTRY mode.



NOTE: THIS FEATURE IS ONLY AVAILABLE IN EV LX 2

The barcode insignia is indicated following the font style and the code type is displayed on the third line of the display. When the barcode entry is completed press the **F4** key to end the

barcode field entry. The software checks that the data entered is valid according to the barcode type selected. If the barcode entered is valid the system re-displays the barcode with a series of lines overlaying the barcode field. Barcode fields may contain ANY VARIABLE FIELDS if the specified code permits such a function. Codes therefore may contain Alpha and Numeric characters, code dependent.

The barcode types are selected from the STOPPED screen and press the **F4** key, and select menu option 4.

Entering a sequence number within a barcode requires a specific sequence of operations that must be adhered to:

1. ENTER THE BARCODE FIELD BY PRESSING THE **F4** key.
2. ENTER ANY CHARACTERS REQUIRED PRIOR TO SEQUENCE NUMBER
3. PRESS THE SEQUENCE NUMBER KEY ^{123...} TO BEGIN THE FIELD
4. ENTER THE APPROPRIATE SEQUENCE NUMBER
5. PRESS THE SEQUENCE NUMBER KEY ^{123...} TO END THE FIELD
6. ENTER ANY CHARACTERS REQUIRED FOLLOWING THE SEQUENCE NUMBER
7. EXIT THE BARCODE FIELD BY PRESSING THE **F4** key.

The above sequence will allow the user to imbed a sequence number into the barcode type selected.

The system contains 8 barcode types:

CODE 39

INTERLEAVED 2of5

CODE 128B and CODE 128C

UPC A and UPC E

EAN 8 and EAN 13

Each barcode type may contain man readable characters, guard bars, and check characters. All barcode characteristics are programmable and are controlled in the F1 menu option select #4.

NOTE: REFER TO APPENDIX A – PRODUCING RELIABLE BARCODES

NOTE: BARCODES ARE A FEATURE OF THE LX 2 SYSTEM ONLY

VARIABLE FIELD FORMAT PRINTING (LX1 WITH OP 2, 3 OR LX 2)

The EVOLUTION LX printer provides the operator the capability of adding variable fields to a message with optional software. This includes DATE, TIME SEQUENCE, DATE OFFSET, SHIFT CODE and BARCODES. Entering any of

MESSAGE ENTRY
FONT 1 LINE

EVOLU

MESSAGE ENTRY
FONT 1 LINE

MESSAGE ENTRY
FONT 1 LINE

MM/DD/

MESSAGE ENTRY
FONT 1 LINE






HH:MM


MESSAGE ENTRY
####FONT 1 LINE


0000


LX X STOPPED
HD1- - >SPEED=120

DD/DM/


these special fields is accomplished with the   123...  A...A  A...A  F4 keys.

To input, delete or edit a message, the unit must be in the STOPPED Mode. If the LCD reads PRINTING, press .


Enter the Message Entry mode by pressing . The top portion of the screen will change as shown on the left.

The user has two options to edit or change a message. If a new message is to be entered press the  F3 key to delete the entire existing message.

The following applies to either a 1, 2, 3 OR 4 line message.

To enter a DATE CODE depress the  key. The currently formatted date code as preset under the F3 menu, is inserted into the message.

Note: the current format is displayed as mm for month, dd for day and yy for year


To enter a TIME CODE depress the  key. The currently formatted time as preset under the F3 menu, is inserted into the message.

Note: the current format is displayed as hh for hours, and mm for minutes

To enter a SEQUENCE NUMBER (if the Lot


Counter is disabled) depress the ^{123...} key. Enter the correct number of digits required the depress the

123... again to end the sequence number field. Note during this operation the #### displayed next to the FONT 1 LINE indicating a sequence number field.

Press the  key to end MESSAGE EDIT and return to the STOPPED MODE.

MESSAGE ENTRY
FONT 1 LINE


DD.DY

To enter a DATE OFFSET CODE press the  key. The currently formatted date offset code as preset under the F3 menu, is inserted into the message. The correct number of days to offset are set under the F1 menu.

MESSAGE ENTRY
FONT 1 LINE


mm.dd.yys

Entering a SHIFT CODE is accomplished by

pressing the  key. Shift codes are set under the F3 key. The correct alpha/numeric character preset is added to the message

STOPPED
HD1- - >SPEED=120

mm.dd.yys

Press the  key to end MESSAGE ENTRY and return to the STOPPED MODE.

NOTE: Variable field data can be entered anywhere within the message and will be automatically updated at the beginning of each new print cycle



MESSAGE ENTRY
FONT 1 LINE

mm.dd.yys

Pressing the **S1** or **S2** keys and selecting the appropriate special symbol or stored logo accomplish adding a special character or LOGO.

MESSAGE ENTRY
FONT 1 LINE

mm.dd.yys#L'

Press the S1 key and position the cursor just prior to the desired character and press the  key. In this case the # character was selected. To add a stored LOGO press the S2 key and scroll through the list of stored logos and press the  key. The logos are displayed by the L character. Each logo will have an L and 1,2 or 3 imbedded ' to indicate the logo selected.

NOTE: FOR CLARITY MESSAGES ARE COMPRESSED

PASSWORD PROTECTION (LX1 WITH OP 1,2,3 OR LX 2)

PASSWORD XXXXX

**ENABLE
PASSWORD
YES OR NO Y/N**

PASSWORD XXXXX

The LX x contains a password function designed to limit access to the MESSAGE ENTRY mode and prevent unauthorized changing of message lines. To activate this function, switch the unit off, then press and hold **P** while switching the unit on. The display changes and requests the default password (which is 12345). Enter the 12345.

The screen to the left appears and prompts the operator to ENABLE PASSWORD
A response of N maintains the current password and disables password protection.

If the response Y is selected the screen at the left appears to prompt the user to enter a new password. Enter the new 5-character password any combination of letters and numbers may be used. Once this has been completed, the unit

will not allow message editing without the entry of the password.

NOTE: If the new password is misplaced or forgotten, contact the factory.

MIXED RASTER MESSAGE ENTRY

NOTE: Mixed raster printing is a new function available only in the LX system. This feature allows the operator to combine larger text followed by a small text size.

The LX 2 system has two modes, a single line and a two-line mode. This allows for a message to contain (using the default fonts) a 1/2" tall character followed by 2, 3, or 4 lines of text using a 7/32", 1/8" or 3/32" font size. The second mode is a two-line mode. This option allows a half height message of one line of 7/32" (or alternate font followed by up to 4 lines of a smaller text size.

Remember that the default resident fonts may be replaced by an alternate set of font sizes or styles.

The prefix, when selected, is automatically inserted at the beginning of the message and may not be moved to any other part of the message. The prefix is created in a unique manner that is not in the normal MESSAGE ENTRY mode.

The prefix data may be any legal alpha/numeric text, variable field data such as date/time, barcodes (LX 2 only) or logo.

NOTE: Only 1 prefix may be resident in a message regardless of the configuration. When a message is stored, the stored message will contain all the parameters as well as the prefix. Each stored message may contain a different prefix that was created prior to saving the message. Reloading the message from storage will also contain the appropriate prefix.

The following procedure is shown using an LX preparing a full height prefix followed by a 2-line code, but remember that there are other combinatorial depending on the system type LX 1 or LX 2.

ENTERING A MIXED RASTER PREFIX

LX x STOPPED
HD1- - >SPEED=100

EVOLU

PREFIX ENTRY
---- FONT- 1 LINE

EXP ON

PREFIX ENTRY
---- FONT- 1 LINE

PREFIX ENTRY
---- FONT- 1 LINE

\$12

LX x STOPPED
HD1- - >SPEED=100

EVOLU


MESSAGE ENTRY
---- FONT- 1 LINE

EVOLU


MESSAGE ENTRY
---- FONT- 2 LINE


**.95
BEST BY**

Entering a mixed raster message requires a two-step process. The simplest approach is to first create the prefix.


If the printer is in the PRINTING mode press the stop print key . The LCD should be as pictured on the left.

Press the **S1** key on the keyboard, which enters the PREFIX ENTRY mode. At this point message entry is identical to the normal MESSAGE ENTRY mode.


The lower half of the LCD may or may not contain data. If data is present press the **F3** key or use the delete key  to clear the current data.



Press the font key  to select either a 1-line or 2-line prefix and enter the desired data. Remember that the data may be any legal data entry as available in the normal MESSAGE ENTRY mode.

Following font size selection enter the desired message. In the pictorial at the left the message prefix \$12 was entered. Remember the special symbols are found by pressing the **S1** key.

Press the enter key  to return to the STOPPED mode.

The next step in mixed raster messages is to enter the remainder of the message.

Press the message entry key  to enter the MESSAGE ENTRY mode.

Press the **F3** key or use the delete key  to clear the current data. And use the font key  to select the font size required for the rest of the message.

Enter the 2 lines of data required for the message.

The example below shows a 2-line message. The top line of the message is the balance of the price .95 and the second line of the message are the words BEST BY followed by the

MESSAGE ENTRY
---- FONT-2 LINE

BY 19 MAY


MESSAGE ENTRY
---- FONT-2 LINE

.95
BEST BY 19


MESSAGE ENTRY
---- FONT-2 LINE

BY 19 MAY


MESSAGE ENTRY
---- FONT-2 LINE


 **.95**
BEST BY

LX x STOPPED
HD1- - >SPEED=100

 **.95**
BEST BY

LX x PRINTING
HD1- - >SPEED=100


 **.95**
BEST BY

expiration date  key. Remember that variable field data must be entered using the appropriate special function key.

NOTE: That the beginning of the message is not shown because as data is entered on the second line the actual message caused the message area to scroll left out of view.


Press the **F1** key to redisplay the message from the beginning.


The prefix data may now be entered into the message. **DO NOT EXIT MESSAGE ENTRY MODE.**

Press the message storage key . While in the MESSAGE ENTRY mode. The message storage key has a different function in this mode and does not save the message to storage, but rather enters the prefix message previously created.

The prefix message is entered but because the message was longer than the display area the display scrolled to the left.

Press the **F1** key to display the message from the beginning.

The prefix message is now displayed at the beginning of the message shown as the  symbol.

Press the enter key  to return to the STOPPED mode.

The message is ready for printing.

Press the print key  to place the printer in the PRINTING mode.

The message may be stored by selecting the message storage option.

NOTE: changing a prefix after a message is created will automatically update the current message with the new prefix.





MESSAGE STORAGE (LX1 WITH OP 1, 1.5,2,3 OR LX 2) STORING A MESSAGE


MESSAGE # 1

MESSAGE # 1
PLEASE WAIT


MESSAGE # 1
MESSAGE STORED

EVOLU

All LX printers are able to store up to 100 (depending on options and or model types) system wide programmed messages and their associated parameters. Follow these steps to store a message. Create the message and press . Press . Using  or , scroll to the desired message location number.

Press  a second time. This places the message into that numeric location for recall at a later time. Use the same procedure to overwrite an existing stored message as well.

Stored messages are system dependent and can not be loaded into other system types. For example a message created for an LX 2 can not be sent to an LX 1.

The LCD display will indicate that the message is stored. Press  to exit.

NOTE: Message storage should be used after the product has been coded satisfactorily. When a message is stored all operating parameters of the printed code are saved. Once recalled, codes will be printed the same as they had been before.




Option pack 1 enables the user to store up to 50 messages in the hand held controller. With option pack 1.5, 2, 3 or LX 2 the controller is capable of storing up to 100 messages.

RECALLING A STORED MESSAGE

MESSAGE # 1

EVOLU

Place the unit in "Stopped" mode and press .

Use the  or  to scroll through the stored messages. Find the desired message and press . That message is now displayed on the screen ready for printing.

LX x STOPPED
HD1- - >SPEED=120

EVOLU

PART 3: MAINTENANCE PROCEDURES


PERIODS OF SHUT DOWN


SHORT PERIODS OF SHUT DOWN

When the printer has been shut down overnight, the system might require a purge to clear out dust particles that have settled on the nozzle area during non-use. This is only necessary if there are missing dots in the printed code on product. **NOTE: IT IS BEST TO REMOVE CARTRIDGES WHEN NOT IN USE, AND STORED IN THE APPROVED CARTRIDGE CLIP.**

LX x STOPPED
HD1- - >SPEED=100

EVOLU


To purge be sure that the unit is in the STOPPED Mode by pressing green  key. The screen changes to STOPPED as shown to left.

Place a piece of lint free wipe in front of the print head and press the red . Allow the unit to purge for several seconds. There is an automatic shut down after 1,000 printed columns to ensure that the print head will not be damaged. If ink residue has solidified on the nozzle area a small drop of ink may be applied to the lint free wipe.

When purging is complete the LCD will be returned to the STOPPED Mode.

LX x STOPPED
HD1- - >SPEED=100

EVOLU

Press the green  and the screen changes to PRINTING, as shown at the left. The unit is ready to begin coding.

LX x PRINTING
HD1- - >SPEED=100

EVOLU

LONG PERIODS OF SHUT-DOWN

When the printer is to be shut down for extended periods, or the ink cartridge needs to be changed to insert a different color cartridge, the ink cartridge should be removed.

Clean the print head nozzle area with a soft, lint free wipe and insure there is no ink residue remaining on the nozzle area. The print cartridge should be stored in the approved cartridge clip (4X50-CLIP).

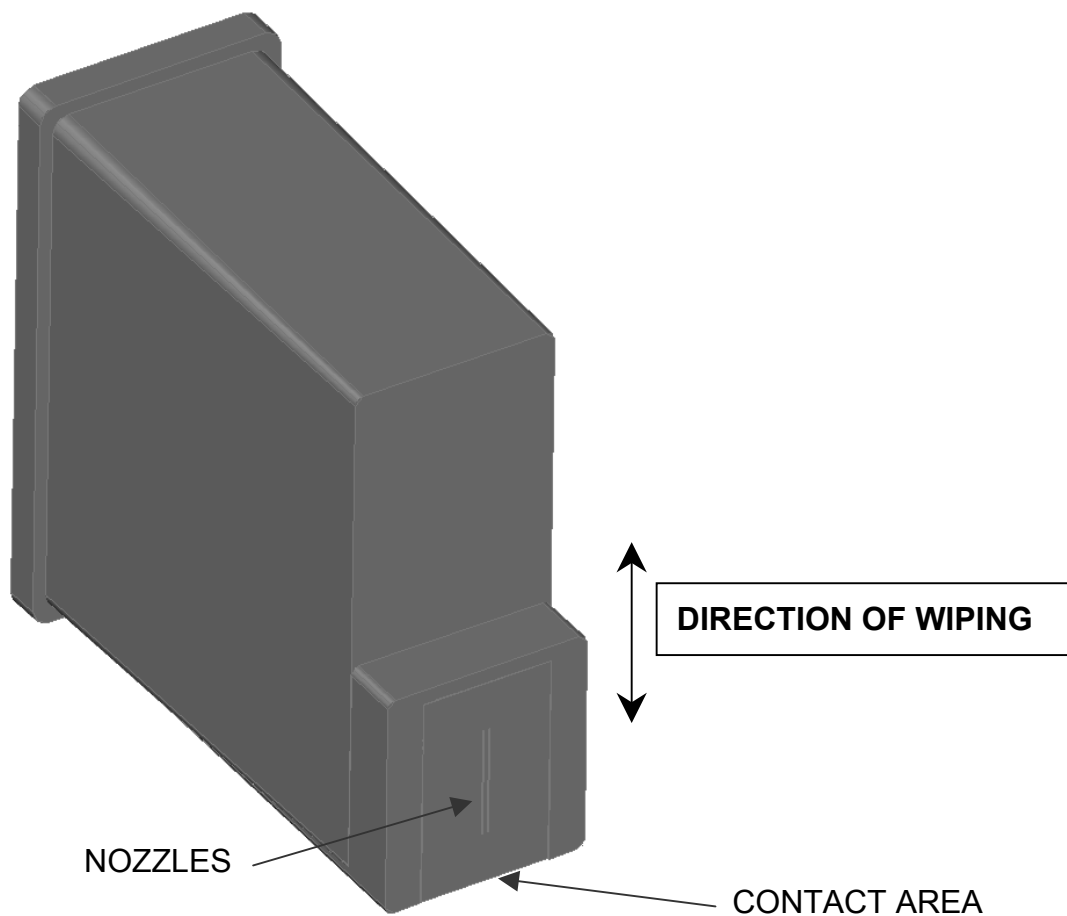
CAUTION: DO NOT USE THE ORIGINAL SEALING TAPE SUPPLIED WITH THE EVOLUTION LX INK CARTRIDGE AS IT MAY HAVE BEEN CONTAMINATED. DO NOT USE ANY OTHER MATERIAL OR ANY ADHESIVE BACKED PRODUCT, AS THIS WILL DAMAGE THE NOZZLE AREA.



PRINT CARTRIDGE MAINTENANCE

It is necessary to maintain the **EVOLUTION** print cartridge free from accumulated dust and debris. Periodically the cartridge should be removed and cleaned. This is totally dependent on the operating environment and the average printable life of the ink cartridge. In extremely dusty environments, this maintenance procedure may be required regularly.


To clean the cartridge, carefully clean the face of the cartridge with a soft, lint free wipe. Use caution in wiping the **NOZZLE** area so as not to scratch the face. Always wipe in the **ARRAY PLATE** vertically as indicated. Clean the **CONTACT** area in a similar fashion.



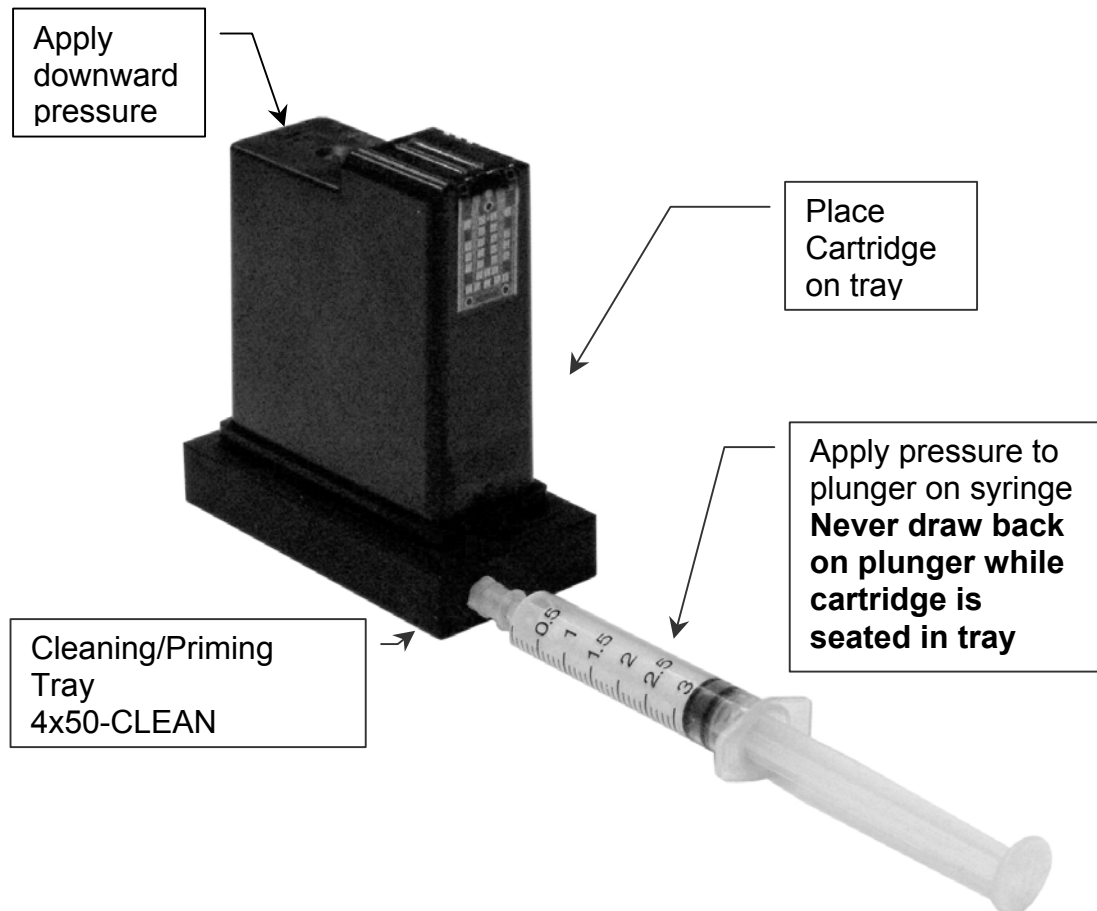
CLEANING TRAY 4X50-CLEAN (ORDERED SEPARATELY)

NOTE:

Ingested air or severe nozzle clogs may be eliminated with the use of the cleaning syringe/tray ordered optionally.

The photo below shows the correct procedure in using the syringe and cleaning tray. Place the tip of the syringe (optional pump) into the front of the tray's luer lock connector. Place the ink cartridge onto the tray and apply a downward pressure ensuring that the cartridge is securely pressed against the rubber gasket in the tray. While holding the cartridge securely in place gently apply pressure to the syringe plunger until ink flows from the nozzle area. NOTE: Never draw back on the syringe, as this will ingest air into the cartridge causing a loss of prime. Repeat this procedure several times while watching the ink flow. Between each cycle gently remove the standing ink on the nozzle area with a lint free wipe. Following ink evacuation remove the cartridge from the tray. Remove any remaining ink from the nozzle face with a lint free wipe. Replace the cartridge into the printer. Place a piece of clean white paper directly in front of the print head and perform a purge function by pressing and releasing the purge key . The key is activated on the release of the key. Swipe the paper quickly past the print head to expand the purge pattern so the individual droplets may be viewed. Perform a test print and verify that all nozzles are firing correctly.


NOTE: An optional air pump 4x50-PUMP may be purchased separately for easier operation.



PRINTER MAINTENANCE

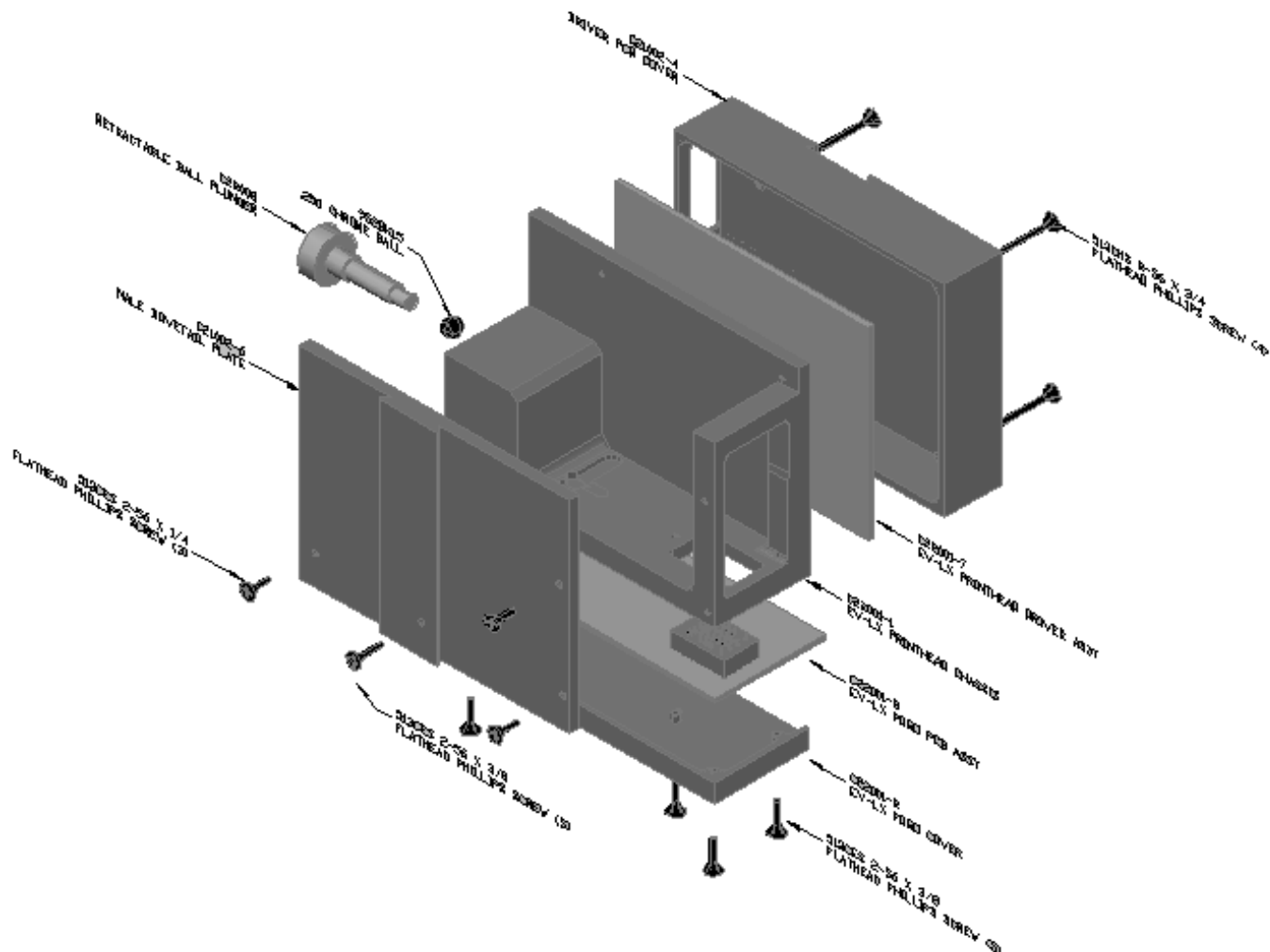
It is necessary to maintain the printer free from accumulated dust and debris. Periodically the printer should be inspected and cleaned. This is totally dependent on the operating environment. In extremely dusty environments, this maintenance procedure may be required occasionally but on average every week should be sufficient.

Remove the print cartridge and carefully inspect the printer for ink, dust and debris.

Re-insert the print cartridge and place the unit into the PRINTING mode by pressing .

CLEANING/PRIMING
TRAY
4X50-CLEAN

EXPLODED VIEW OF THE PRINT HEAD CHASSIS



PRINTER ADDED FEATURES

The LX series of printers have an added feature not found in the normal HP based Evolution products. To understand these features a brief description is required.



The HP style print head contains two columns, each containing 150 nozzles in the vertical direction. The spacing between the two columns is approximately 0.140" (3.56mm). The EV products use only one column, and inks have been developed to provide an optical density at 300 DPI comparable to lesser quality inks requiring printing at 600 DPI. Printing at 600 DPI also requires an encoder to accurately overlay both columns.

The LX style print head has the unique feature of containing 4 columns that are selectable under software control. The columns are arranged such that columns 1 and 2 and columns 3 and 4 are separated by 0.00083" (0.021mm). There is a gap between the first 2 columns and the second set of two columns. This gap is approximately 0.040" (1mm).

Since the cartridge is software controllable, the user has the option of selecting which column or columns are to be used. It is therefore possible to fire columns 1 & 2 or columns 3 & 4. The result is a 600 DPI print without an encoder.

While in the STOPPED Mode pressing the **F1** function key followed by the **C** key, the user may select the column or columns to print with as follows:

< -- SELECT -- >
HEAD COLUMN= 1

The system default is column 1 and may be changed by using the   arrow keys. Notice that the numbers 1 to 8 are selectable. Each number represents a different column or combinatorial.

1 = column 1 300 DPI

2 = column 2 300 DPI

3 = column 3 300 DPI

4 = column 4 300 DPI

5 = columns 1 & 2 BOLD PRINT 600 DPI

6 = columns 3 & 4 BOLD PRINT 600 DPI

7 = column 1, 2, 3, 4 automatically changing each print cycle at 300 DPI

8 = column 1&2, 3&4 automatically changing each print cycle at 600 DPI





Features 7 and 8 are special functions that are intended to circumvent inherent problems encountered with the HP style cartridges. For example, when printing a small character with the HP cartridge, individual firing resistors may become ineffective before the ink in the cartridge is exhausted. Using option 7 automatically prints the message sequencing the 4 columns in the LX cartridge. This ensures the ink in the LX cartridge is fully used without the necessity of altering the message location to a different line as in HP units.

Those applications requiring a bolder print can use either option 5 or 6, or use option 8 for auto sequencing.

In either 7 or 8 there will be a small gap between the start of each message.

PART 4: TROUBLESHOOTING AND REPAIRS

This chart was created to assist the user in troubleshooting the unit. Find the problem in the first column; apply the remedy(s) suggested in the third column.

Condition	Probable Cause	Remedy
LCD remains blank.	No power.	Ensure the controller is securely connected to the correct port on the printer assembly
Unit does not print, although LCD shows information.	No message in unit	Input your message (see pages 2-26).
	Unit in "STOPPED" mode.	Press  .
	No ink.	Replace ink cartridge; reset ink volume parameter (press  and follow the sequence.
Unit does not purge.	Out of ink.	Replace with new ink cartridge.
	Unit in "PRINTING" mode	Press Stop Print.  .
	Ink cartridge clogged	Clean Ink Cartridge Nozzle area with lint free wipe
Missing one or more dots from code.	No ink.	Clean or Replace cartridge and purge system (press  .
	Long down-time.	Follow daily start-up procedure if your line experienced a long down time.
Unit loses data while printing	Static electricity	Eliminate source of static. Attach ground strap between print head and low impedance earth ground.
	High levels of radio frequency.	Move unit to an alternate location or attach ground strap as above.
	Spikes in electrical line.	Use AC line filter
Cartridge Invalid	Non DDI cartridge	Replace with approved cartridge
	Improper installation	Re install cartridge
No Response	Improperly seated connection	Reseat connectors or corroded pins
	Multiple heads with the same address	Readdress the heads correctly
	Spikes in electrical line.	Use AC line filter

PART 5: PARTS LIST AND OPTIONS

Part No.	Description
----------	-------------

SPARE PARTS

C21001-1	EVOLUTION Controller Cabinet
C21030-2	EVOLUTION Controller LCD Assembly
C21030-1	EVOLUTION Controller PCB Assembly
C30238	EVOLUTION Controller Keypad
C22001	EVOLUTION LX 1 Printer Assembly
C22007	EVOLUTION LX 2 Printer Assembly
C22001-7	EVOLUTION LX Printer CPU Assembly
C22001-8	EVOLUTION LX Head POGO Assembly
C21005	EVOLUTION LX Mounting Bracket Assembly
C21000-2	EVOLUTION Power supply

OPTIONS

96280-01	Floor stand
EV1-BOX	Spring Loaded Carton Follower
EV1-TMT	Top Coding Mounting Bracket
C21050	Low Ink Warning Beacon
C21010-5	Articulating Flex Mount Bracket
C21006	External Product Detect
C21007	External Encoder
C21012	Optional Junction Box
EV1-SW1	Option Pack 1 Password, 50 - Message Store, Auto Repeat
EV1-SW1.5	Option Pack 1.5 Expanded Message Length, 100 - Message storage
EV1-SW2	Option Pack 2 (Option Pack 1 & 1.5) & Time, Date, Sequential Number
EV1-SW3	Option Pack 3 (Option Pack 2) & Date Offset, Shift Code, Product Count
EV1-FONT	Alternate Font (Specify when ordering)
EV1-LOGO	Logo Option (Specify when ordering)
4X50-CLIP	Lexmark Cartridge Clip
4x50-CLEAN	Lexmark Cleaning/Priming Tray With Syringe
4x50-PUMP	Lexmark Cleaning/Priming Tray Pump

CABLES

C21008-1	EVOLUTION LX RJ50 Cable 7 INCH
C21008-3	EVOLUTION LX RJ50 Cable 3 Feet
C21008-10	EVOLUTION LX RJ50 Cable 10 Feet
C21008-25	EVOLUTION LX RJ50 Cable 25 Feet
C21008-50	EVOLUTION LX RJ50 Cable 50 Feet
C21008-100	EVOLUTION LX RJ50 Cable 100 Feet

INKS

4550BK6	6 Pack of Black Ink Cartridges
4550RD6	6 Pack of Red Ink Cartridges
4550GR6	6 Pack of Green Ink Cartridges
4550BL6	6 Pack of Blue Ink Cartridges
4550YW6	6 Pack of Yellow Ink Cartridges
4550CY6	6 Pack of Cyan Ink Cartridges
4550UV6	6 Pack of Ultra Violet Ink Cartridges
4650BK	Black Ink Cartridges (SEMI-POROUS)
4650BL	Blue Ink Cartridges (SEMI-POROUS)
4650RD	Red Ink Cartridges (SEMI-POROUS)
4750BK	Black Ink Cartridges (NON-POROUS)

NOTE: Digital Design is constantly developing new ink formulation to suit the needs of our customers. The above list is a sampling of the ink portfolio for the EVOLUTION printing systems.

PART 6: COMMUNICATIONS PROTOCOL

Introduction – Using The EVOLUTION Printer Control Language

To ensure that all features of EVOLUTION printers are used to their fullest, this section has been written as an aid in creating applications.

This section has been written with both the professional and advanced programmer in mind. It is assumed the reader understands concepts such as: ASCII codes, typical printer control languages, command structures, objects and various parametric programming. It is also assumed the reader can use a programming language like C, C/C++, Basic, or any other programming language capable of sending and receiving commands to and from the EVOLUTION printer via a serial communications port.

This communication protocol covers all EVOLUTION products. Some commands are not applicable to certain units, and care must be taken in determining what valid commands are for each specific printer. Commands that reference specific units are so noted.

Communications between a printer and the hand held controller, a host computer, or PLC are identical. The hand held controller limits the available features of the printer to simplify operation and minimize user data entry mistakes.

The communications protocol is via an RS485 data link operating in a master/slave environment where the printers are the slaves. There can only be one master such that both the hand held controller and a host device cannot coexist.

RS485 communications can be used effectively over long distances (up to 1000 feet) and in electrically noise environments as result of electromagnetic interference from motors and welding equipment. Also, multiple receivers (EVOLUTION Printers) -up to 32- may be connected to such a network in a linear multi-drop configuration in a master-slave topology.

If we are interested in writing a customized Windows software application to drive the EVOLUTION LX printer from a personal computer the standard RS232 serial port has to be used to control and drive the RS485 EVOLUTION LX Printer. So, the addition of a converter from RS232 to RS485 is necessary with its corresponding driver.

Since today the RS232 is being gradually replaced by USB for communications in personal computers as result of which most of the new computers desktops and laptops no longer have built-in standard serial (COM) ports, a USB to RS232 converter also is necessary, therefore a **“virtual serial port”** which is an emulation of the standard serial port has to be installed. This port is created by software which enables extra serial ports in an operating system without additional hardware installation.

The converter its driver and the virtual serial port along with the cables are provided by Digital Design. Note that it assigns COM3 to the virtual serial port.

Also, in writing Windows Applications is necessary to consider the following:

Since, we are using the RS485 the biggest difference **related to programming** the RS232 is that we can have up to 32 EVOLUTION Printers and since communication is initiated by a master computer some form of arbitration is necessary therefore, the EVOLUTION COMMUNICATIONS PROTOCOL which is described next must be used accordingly. Here we must make sure **the first data byte to be sent** to the EVOLUTION Printer is the address of the recipient printer, further complicating this, is the fact that for compatibility with our legacy systems we are using 7 bits for transmitting data(which allow us to transmit 127 ASCII characters), so the byte that identify the printer address has to be split up into two nibbles(4 bits long) which means that the original printer's address byte has to be masked and shifted in order to have the Upper/Lower Address nibbles which are sent separately.

The same has to be done when a parameter (like printer speed) is being transmitted.

Finally, if we are planning to use MS Visual Basic as development tool for building applications we should use the MSComm serial communications control which allows direct control access to the standard or virtual serial port in a PC, which of course has to be initialized before being used, in this case also a timer has to be used to continually poll the serial port in order to receive data from the EVOLUTION Printer. (a full example of it you can find in the folder:\Printer Communications\EVCOMMTESTRELEASE\Setup.exe).

If, we are planning to use MS Visual C++ or MS Visual C#, the Serial Port class included in Microsoft's .NET Framework is the best tool to be used (a full example of it you can find in the folder: \Printer Communications\EVComunications\WindowsApplication14.exe).

There is also, another application to test communications between a PC and the EV Printer, which is located in the folder:

\Printer Communications\Physical Connection Test\EV_TEST.exe).

ASCII CHARACTER CHART

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2	SP	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	`		`	~	DEL

DESCRIPTION

This communication protocol is based on Version 1.4, which was initially released NOV 2005 and is used with all EVOLUTION products. The communications option converses with a host computer via an RS485 data link.

NOTE: EACH REQUEST OR COMMAND SENT TO A PRINT STATION RECEIVES A RESPONSE FROM THAT PRINT STATION. COMMUNICATIONS SOFTWARE MUST WAIT FOR A RESPONSE TO DETERMINE IF THE PRINT STATION WAS READY TO ACCEPT THE COMMAND, AND THE DATA WAS VALID AND PROCESSED. NO RESPONSE COULD INDICATE THE DATA WAS LOST. IF AN ERROR WAS DETECTED IN PROCESSING A NAK WITH AN ERROR CODE IS RETURNED.

DATA WORD DEFINITION

Full Duplex
7 Data Bits
1 Even Parity Bit
1 Start Bit
1 Stop Bit

BAUD RATE

115,200 Bits per second

DEFINITIONS

Q=QUERY TO HEAD

R=RESPONSE FROM HEAD

D=DATA UPDATE TO HEAD

X=ACK FROM HEAD

'!'=ASCII CHARACTER OR CHARACTERS

0x21 HEX DATA EQUIVELENT

ADDRESS= TWO ASCII REPRESENTATIONS OF HEX CHARACTERS

`x`|`y` TWO ASCII CHARACTERS REPRESENTING THE UPPER AND LOWER

NIBBLE OF A HEXADECIMAL BYTE WHERE X IS THE UPPER NIBBLE AND

Y IS THE LOWER NIBBLE

FOR EXAMPLE:

TO SEND A SPEED OF 105 FEET PER MINUTE SEND

ASCII : (0x3a) AND ASCII 5 (0x35)

TO SEND A DELAY OF 30 SEND

ASCII 3 (0x33) AND ASCII 0 (0x30)

NOTE: THE ` CHARACTER AND | CHARACTER ARE NOT PART OF THE DATA STREAM AND ARE THERE FOR SEPARATION OF FIELDS ONLY.

CABLING FOR EVLINK ENVIRONMENT

C20552 RS232C to RS485 converter module
C20551 Cable from PC to RS485 converter module
C21008-xxxx Cable (define length) from **EVOLUTION** units to RS485 data link
C21009 Termination plug for RS485 data link

HARDWARE INTERFACE

When connecting multiple printers via an RS485 link, input and output connectors are provided on the print station, which allows the cabling to be daisy chained. NOTE: It is important to remember to set each of the print stations to a unique address.

PHYSICAL CONNECTIONS RS485 PRINTER

Pin # 4	= Receive +
Pin # 5	= Receive -
Pin # 6	= Transmit +
Pin # 7	= Transmit -
Pin # 9	= Ground

Note: At the end of the data link a termination plug is installed to balance the RS485 data link-connecting pin 4 to pin 5 and pin 6 to pin 7 with 120-ohm.

PROTOCOL FORMAT:

Host request for information;

ESC|Command|SOH|EOT (Single End Host to 1 printer)

Or

ESC|STX|Address|Command|SOH|EOT (Multiple printers)

Host sending new information;

ESC|Command|Data|EOT (Single End Host to 1 printer)

Or

ESC|STX|Address|Command|Data|EOT (Multiple printers)

EVOLUTION PRINTABLE CHARACTER SET

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
0 1 2 3 4 5 6 7 8 9

Special Symbols:

<u>ASCII Character</u>	<u>Hexadecimal</u>	<u>Prints As</u>
Space	(0x20)	Space
!	(0x21)	Hour Glass
#	(0x23)	#
\$	(0x24)	\$
&	(0x26)	&
((0x28)	(
)	(0x29))
*	(0x2a)	*
+	(0x2b)	+
-	(0x2d)	-
.	(0x2e)	Period
=	(0x3d)	=
:	(0x3a)	:
/	(0x2f)	/
"	(0x22)	Cents
%	(0x25)	Solid block
;	(0x3b)	Ñ
?	(0x3f)	Ë
@	(0x40)	Ó

Special Function Characters

`	(0x7b`	Large Logo 1
	(0x7c)	Large Logo 2
`	(0x7d`	Large Logo 3
·	(0x7b`	Small Logo 1
	(0x7c)	Small Logo 2
·	(0x7d`	Small Logo 3

NOTE: The same characters are used for a 2-line logo as is used for a 1-line logo. When the message is a 1-line it accesses the logo from the font table memory map for a single line font, which is, where the large logos are stored. Conversely when the message is a 2-line then the logo is accessed from the memory map imbedded within the 2-line font table.

SOFTWARE PROTOCOL

In the following pages, all references to characters or digits pertain to the standard ASCII character set. The bar (|) character is used as a field separator and it is not part of the transferred data. When data is shown in hexadecimal, it will consist of the hex number preceded by a 0x, for example (0x1B). Generally, all packets to and from a print station begin with an ESC (0x1B) and terminate with an EOT (0x04).

There are two types of commands:

Downloading information to the print station

Requesting information from the print station.

To distinguish the two types of commands, a SOH (0x01) is placed after the command byte in a request command string. The following illustrates this concept:

To download data to print station

ESC/GROUP ADDRESS/UNITADDRESS/COMMAND/DATA/EOT

To request data from the Print Station

ESC/GROUP ADDRESS/UNITADDRESS/COMMAND/SOH/EOT

NOTE: EACH REQUEST OR COMMAND SENT TO A PRINT STATION RECEIVES A RESPONSE FROM THAT PRINT STATION. COMMUNICATIONS SOFTWARE MUST WAIT FOR A RESPONSE TO DETERMINE IF THE PRINT STATION WAS READY TO ACCEPT THE COMMAND, AND THE DATA WAS VALID AND PROCESSED. NO RESPONSE COULD INDICATE THE DATA WAS LOST OR THE PRINTER WAS OCCUPIED PERFORMING A NON-INTERRUPTABLE TASK. IF AN ERROR WAS DETECTED DURING COMMUNICATIONS A NAK WITH AN ERROR CODE IS RETURNED. IN THE EVENT OF A NAK RESPONSE IT IS THE RESPONSIBILITY OF THE PROGRAMMER TO DETERMINE THE NATURE OF THE ERROR, CORRECT THE PROBLEM IF NECESSARY, AND RESEND THE COMMAND TO THE APPROPRIATE PRINTER. IT SHOULD NEVER BE ASSUMED THAT THE PRINTER RECEIVED THE DATA. VERIFICATION FROM THE PRINTER SHOULD ALWAYS BE TAKEN INTO CONSIDERATION.

There is often confusion concerning how data is represented when transmitted within strings of text. As a general rule each character imbedded within a string is an ASCII character. Take for example the command for setting the printer address, which is the ASCII character B. The imbedded data requires two bytes of data they are 'X' and 'Y'. When received by the printer these two bytes are concocted into an 8-bit byte. Therefore to set a printers address to 15 it is necessary to send two ASCII characters a HEX 31 (the number 1) and a HEX 35 (the number 5)

i.e. $x = 0x31$ & $y = 0x35$ yields unit address 15

ERROR CODES

Commands to a print station, if completed successfully, return a single byte response of an ASCII ACK (0x06). If the command was not successful, a two-byte response of an ASCII NAK (0x15) is returned, followed by an error code.

Below is a list of the returned error codes.

Both responses will be preceded with the printers address for further verification.

ACK command

ESC/GROUP ADDRESS/UNITADDRESS/ACK/EOT

NAK command

ESC/GROUP ADDRESS/UNITADDRESS/NAK/'ERROR CODE'/EOT

Where error code is a single byte ASCII 31 to 39

NAK 1	= PHYSICAL DATA ERROR
NAK 2	= ILLEGAL COMMAND BYTE
NAK 3	= MANUAL PRINT ATTEMPTED WHILE IN PRINTING MODE
NAK 4	= TRYING TO READ A WRITE ONLY FIELD
NAK 5	= TRYING TO WRITE A READ ONLY REGISTER
NAK 6	= PRINT STATION INPUT BUFFER FULL MUST PRINT BEFORE NEXT DOWNLOAD TO CLEAR INPUT BUFFER.
NAK 7	= SYSTEM BUSY – USER HAS SYSTEM THRU KEYBOARD
NAK 8	= SYSTEM BUSY – PRINTING FUNCTION
NAK 9	= BARCODE DOES NOT VERIFY

NOTE THE FOLLOWING COMMAND SET IS APPLICABLE TO ALL EVOLUTION MODELS EXCEPT WHERE NOTED. WHERE EV 1 OR EV 2 IS STATED IT REFERS TO BOTH EV 1 OR EV 2 AND LX 1 OR LX 2.

COMMANDS:

'!' 0x21 Software Version (read only) (EV 1, EV 2, EV SC)

Q. ESC|STX|Address|'|SOH|EOT

R. ESC|STX|Address|`PRINTER ffffssss`|CR|EOT

Where:

PRINTER= ASCII string PRINTER for EVOLUTION I LX
 EV2 for EVOLUTION I LX
 EVSC for EVOLUTION SC

ffff = Software and Firmware versions

(eg. 2.02H indicates version 2.02 with Firmware version H)

ssss = Optional Software loaded

Where: (for EV 1 only)

The first y indicates option pack 1 – OP1

The second y indicates option pack 2 – OP2

The third y indicates option pack 1.5 – OP1.5

The last y is reserved for option pack 3- OP 3

Where: (for EV 2 and EV SC)

Both units are standard with all options thus a ++++ will be returned

'#' 0x23 Printer Configuration (Read only) (EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`#`|SOH|EOT

R. ESC|STX|Address|`#`|x`|y`|EOT

Where Byte x Bits 3,2,1,0

Bit 3 = if 1 Cartridge Not Valid

Bit 2 = Not Used

Bits 1,0 = System Type

11 = EVOLUTION I LX

10 = Evolution 2

01 = Evolution 3

00 = Evolution Small Character

Where Byte y Bits 3,2,1,0

0000 = no options available

0001 = option1 enabled

0010 = option2 enabled

0100 = option1.5 enabled

1000 = option3 enabled

'\' 0x5c Unit Serial Number (Read only 6 digits) (EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`\'`|SOH|EOT

R. ESC|STX|Address|`\'`|serial number`|CR|EOT

**'I' 0x6c Special Field Flags
(EV 2, EV SC AND EV 1 WITH OP1 AND ABOVE)**

Q. ESC|STX|Address|'I'|SOH|EOT

R. ESC|STX|Address|'I'|'x'|'y'|EOT

Where: x defines bits 7,6,5,4

Bit 7 = don't care

Bit 6 = don't care

Bit 5 = 1 = No guard bars

Bit 4 = 1 = Man read added to barcode

Where: y defines bits 3,2,1,0

Bit 3 = 1 = Bar checksum added to barcode

Bit 2 = 0 = Calendar will only change on 1st day of week

Bit 1 = 1 = Day of the week is alpha

Bit 0 = 1 = counting down

D. ESC|STX|Address|'I'|'x'|'y'|EOT

X. ESC|STX|Address|'I'|ACK|EOT

**'8' 0x38 Control Flags
(EV 1, EV 2, EV SC)**

Q. ESC|STX|Address|'8'|SOH|EOT

R. ESC|STX|Address|'8'|'x'|'y'|EOT

Where: x defines bits 7,6,5,4

Bit 7 1 = Head busy printing message

Bit 6 1 = Print image inverted

Bit 5 1 = Head busy manual cycle

Bit 4 1 = Head busy purging

Where: y defines bits 3,2,1,0

Bit 3 1 = External Encoder

Bit 2 1 = External Product Detect

Bit 1 1 = Direction forward

Bit 0 1 = Enable PRINTING Mode

D. ESC|STX|Address|'8'|'x'|'y'|EOT

X. ESC|STX|Address|'8'|ACK|EOT

Where: x defines bits 7,6,5,4

Bit 7 Don't Care

Bit 6 1 = Print image inverted

Bit 5 Don't Care

Bit 4 Don't Care

Where: y defines bits 3,2,1,0

Bit 3 1 = External Encoder

Bit 2 1 = External Product Detect

Bit 1 1 = Direction forward

Bit 0 1 = Enable PRINTING Mode

'G' 0x47 Errors (note: error codes must be reset)
(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`G`|SOH|EOT

R. ESC|STX|Address|`G`|`x`|`y`|EOT

Where: x defines bits 7,6,5,4

Bit 7 = UART Overrun Error

Bit 6 = Communication Overrun Error

Bit 5 = UART Framing Error

Bit 4 = UART Parity Error

Where: y defines bits 3,2,1,0

Bit 3 = Font checksum error loading from card to chip

Bit 2 = Font 1 checksum error in Ram

Bit 1 = Font 0 checksum error in Ram

Bit 0 = Real Time Clock Memory error

TO RESET ERROR CODES

D. ESC|STX|Address|`G`|`x`|`y`|EOT

same bit positions as above

use only as a mask to clear error bits.

i.e. x = 0001 and y = 0001 clears real time clock memory

error and UART parity error.

X. ESC|STX|Address|`G`|ACK|EOT

'R' 0x52 Head Status (read only)
(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`R`|SOH|EOT

R. ESC|STX|Address|`R`|`x`|`y`|EOT

Where: x defines bits 7,6,5,4

Bit 7 = Not Used

Bit 6 = Latched eye active

Bit 5 = Unfiltered eye active

Bit 4 = Product being printed

Where y defines bits 3,2,1,0

Bit 3 = auto repeat print gap active

Bit 2 = Not Used

Bit 1 = Input buffer Line 2 full

Bit 0 = Input buffer Line 1 full

'U' 0x55 General purpose flags (read only)
(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`U`|SOH|EOT

R. ESC|STX|Address|`U`|`y`|EOT

Where y defines bits 3,2,1,0

Bit 3 = Not Used

Bit 2 = Not Used

Bit 1 = Ink Cartridge Empty

Bit 0 = Mixed Raster Enabled

'B' 0x42 Set Unit Address (Write Only)
(EV 1, EV 2, EV SC)

D. ESC|STX|Address|`B`|`x`|`y`|EOT

X. ESC|STX|Address|`B`|ACK|EOT

Where x y = 8 bit unit address

i.e. x = 0x31 & y = 0x35 yields unit address 15

'1' 0x31 Auto Repeat Inter-print delay (Range 0 - 255)
(EV 2, EV SC AND EV 1 with any option pack)

Q. ESC|STX|Address|`1`|SOH|EOT

R. ESC|STX|Address|`1`|`x`|`y`|EOT

D. ESC|STX|Address|`1`|`x`|`y`|EOT

X. ESC|STX|Address|`1`|ACK|EOT

0 = Auto Repeat Disabled

Each count provides a delay equal to 16 columns for EV 1 and EV 2.

Each count provides a delay equal to 2 columns for EV SC.

'&' 0x26 Line Speed (RANGE 10-200)
(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`&`|SOH|EOT

R. ESC|STX|Address|`&`|`x`|`y`|EOT

D. ESC|STX|Address|`&`|`x`|`y`|EOT

X. ESC|STX|Address|`&`|ACK|EOT

**'d' 0x64 Encoder Divider (Range 0-7)
(EV 1, EV 2, EV SC)**

- Q. ESC|STX|Address|`d`|SOH|EOT
- R. ESC|STX|Address|`d`|`x`|`y`|EOT
- D. ESC|STX|Address|`d`|`x`|`y`|EOT
- X. ESC|STX|Address|`d`|ACK|EOT

**"" 0x27 Product Delay (RANGE 1-255)
(EV 1, EV 2, EV SC)**

- Q. ESC|STX|Address|`0x27`|SOH|EOT
- R. ESC|STX|Address|`0x27`|`x`|`y`|EOT
- D. ESC|STX|Address|`0x27`|`x`|`y`|EOT
- X. ESC|STX|Address|`0x27`|ACK|EOT

**')' 0x29 Inter-Character spaces (RANGE 1-25)
(EV 1, EV 2, EV SC)**

- Q. ESC|STX|Address|`)`|SOH|EOT
- R. ESC|STX|Address|`)`|`x`|`y`|EOT
- D. ESC|STX|Address|`)`|`x`|`y`|EOT
- X. ESC|STX|Address|`)`|ACK|EOT

**'>' 0x3E Head Align (Range 0 - 16) 'O' on keyboard
(EV 2 only)**

- Q. ESC|STX|Address|`>`|SOH|EOT
- R. ESC|STX|Address|`>`|`x`|`y`|EOT
- D. ESC|STX|Address|`>`|`x`|`y`|EOT
- X. ESC|STX|Address|`>`|ACK|EOT

**'4' 0x34 Sequence Number Rollover Value
(EV 2, EV SC AND EV 1 with version 2.09 and OP2 or 3)**

- Q. ESC|STX|Address|`4`|SOH|EOT
- R. ESC|STX|Address|`4`|`#####`|CR|EOT
where `#####` = rollover value in ascii (max 9 digits)
- D. ESC|STX|Address|`4`|`#####`|CR|EOT
- X. ESC|STX|Address|`4`|ACK|EOT

**'^' 0x5E Lot Counter Limit Count
(EV 2, EV SC AND EV 1 with version 2.09 and OP2 or 3)**

- Q. ESC|STX|Address|`^`|SOH|EOT
- R. ESC|STX|Address|`^`|`###`|CR|EOT
where `###` = rollover value in ascii (max 4 digits)
- D. ESC|STX|Address|`^`|`###`|CR|EOT
- X. ESC|STX|Address|`^`|ACK|EOT

**'_' 0x5F Lot Counter Value (read only)
(EV 2, EV SC AND EV 1 with version 2.09 and OP2 or 3)**

- Q. ESC|STX|Address|`_`|SOH|EOT
- R. ESC|STX|Address|`_`|`###`|CR|EOT
where `###` = current count value in ascii (max 4 digits)
- D. ESC|STX|Address|`_`|`###`|CR|EOT
- X. ESC|STX|Address|`_`|ACK|EOT

**'[' 0x5b DATE_ROLLOVER
(EV 2, EV SC AND EV 1 with version 2.09 and OP2 or 3)**

- Q. ESC|STX|Address|`[`|SOH|EOT
- R. ESC|STX|Address|`[`|`x`|`y`|`x1`|`y1`|EOT
Where:
 |`x`|`y`| = Time of Day Hours
 |`x1`|`y1`| = Time of Day Minutes
- D. ESC|STX|Address|`[`|`x`|`y`|`x1`|`y1`|EOT
- X. ESC|STX|Address|`[`|ACK|EOT

'3' 0X31 Expiration Days 1 (max 999)

or

'@' 0X31 Expiration Days 2 (max 999)

(EV 2, EV SC AND EV 1 WITH OP3)

Q. ESC|STX|Address|`3`|SOH|EOT

R. ESC|STX|Address|`3`|`aaaa`|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte

D. ESC|STX|Address|`3`|aaaa`|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte

X. ESC|STX|Address|`3`|ACK|EOT

'r' 0x72 Remaining Ink (0 to 99%)

(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`r`|SOH|EOT

R. ESC|STX|Address|`r`|`x`|`y`|EOT

'0' 0x30 Shift Code (max 6 shift codes)

(EV 2, EV SC AND EV 1 WITH OP3)

Q. ESC|STX|Address|`0`|SOH||EOT

R. ESC|STX|Address|`0`|`hh mm`|`zz`|.....|CR|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte

..... = pattern repeat for each shift code programmed

hh = shift start hours

mm = shift start minutes

zz = shift code to print

D. ESC|STX|Address|`0`|`hhmm`|`z`|CR|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte

hh = shift start hours

mm = shift start minutes

zz = shift code to print

X. ESC|STX|Address|`0`|ACK|EOT

**'/' 0x2f Product Counter (6 Digits Max)
(EV 2, EV SC AND EV 1 WITH OP3)**

Q. ESC|STX|Address|`/`|SOH|EOT

R. ESC|STX|Address|`/`|HH MM hh mm`|`cccccc`|CR|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte
HH = Product counter start hours
MM = Product counter start minutes
hh = Product counter stop hours
mm = Product counter stop minutes
cccccc = counter (6 Digits Max)

D. ESC|STX|Address|`/`|`ww xx yy zz`|`cccccc`|CR|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte
HH = Product counter start hours
MM = Product counter start minutes
hh = Product counter stop hours
mm = Product counter stop minutes
cccccc = counter

X. ESC|STX|Address|`/`|ACK|EOT

'6' 0x36 Cycle Head (Write Only)

(EV 1, EV 2, EV SC)

D. ESC|STX|Address|`6`|SOH|EOT

R. ESC|STX|Address|`6`|ACK|EOT

**`` 0x60 Print Column Configuration
(All Lexmark Models)**

Q. ESC|STX|Address|``|SOH|EOT

R. ESC|STX|Address|``|`#`|CR|EOT

where 1 = Column 1
where 2 = Column 2
where 3 = Column 3
where 4 = Column 4
where 5 = Columns 1&2 (600 DPI)
where 6 = Columns 3&4 (600 DPI)
where 7 = Columns 1,2 ,3 ,4 sequencing each print cycle
where 7 = Column 1&2, 3&4 sequencing each print cycle (600 DPI)

D. ESC|STX|Address|``|`#`|CR|EOT

X. ESC|STX|Address|``|ACK|EOT

SPECIAL FIELD OBJECTS

Message Objects define special characteristics about the messages contained in line 1 or line 2. These may define for example font size, sequence number, date code, etc. There may be up to 15 Objects (special fields) for each line in a message with the limitation that there can only be 1 sequence number imbedded in a message.

'P' 0x50 Message Objects

(EV 1, EV 2, EV SC)

Q. ESC|STX|Address|`P`|SOH|aabb|EOT

R. ESC|STX|Address|`P`|`aa bb cc dd ee ff gggg hhhh`|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a byte

aa = objects for which line 0 or 1

bb = number of objects transmitted. (Max 15)

Each object as defined by bb: (repeat the for each object)

cc = Position within message string

dd = Number of characters in object

ee = Attribute of the object

Where:

ee= 00 Normal Alpha/Numeric character

ee= 01 Time Hours

ee= 02 Time Minutes

ee= 03 Time Seconds

ee= 04 Date Month

ee= 05 Date Day

ee= 06 Date Year

ee= 07 Date Julian

ee= 08 Sequence Number (1 per message)

ee= 09 Barcode

ee= 0A Shift Code

ee= 0B Expiration Date Month

ee= 0C Alpha Date Code

conflict shows lot code ee= 0D Expiration Date Year

ee= 0E Expiration Date Julian

ee= 0F Expiration Date Day

ee= 10 Day of Week (1-7)

ee= 12 Expiration 2 Date Month in Alpha

ee= 13 Expiration 2 Date Year

ee= 14 Expiration 2 Date Month

ee= 15 Expiration 2 Date Julian

ee= 16 Expiration 2 Date Day

ee= 40 Valid Bar Code (EV 2 only) OR'd with other Attributes

ee= 80 Bar Code Attribute (EV 2 only) OR'd with other Attributes

'P' 0x50 Message Objects (continued)

ff = font of object

Where: for EV 1 AND EV 2

ff= 00 for 2 Line Font

ff= 01 for 1 Line Font

ff= 02 for 3 Line Font (EV 2 only)

ff= 03 for 4 Line Font (EV 2 only)

Where: for EVSC ONLY

ff= 00 for S5 Font

ff= 01 for S7 Font

ff= 02 for B7 Font

ff= 03 for S12 Font

ff= 04 for B12 Font

gggg = starting column of object in printed image (reserved)

hhhh = starting row of object in printed image (reserved)

D. ESC|STX|Address|`P`|`aa bb cc dd ee ff gggg hhhh`|EOT

X. ESC|STX|Address|`P`|ACK|EOT

Even though there up to 24 characters (48 characters for LX1 with OP 1.5 and above or LX 2) permitted per line data entry will be inhibited when the 15th object is entered, although the last field, if it is an alpha/numeric object, may contain enough characters to meet the max character limit.

Barcodes are also an object field and must be considered when entering a message. Thus a barcode with imbedded variable field data would be counted as two or more objects.

NOTE: PRINTER MAX CHARACTERS PER LINE

(EV 1 max 24 characters – 48 characters OP1.5, 2 or 3)

(EV 2 max 48 characters)

(EV SC max 96 characters)

'\$' 0x24 Line 1 Message

Q. ESC|STX|Address|`\$`|SOH|EOT

R. ESC|STX|Address|`\$`|`message`|CR|EOT

D. ESC|STX|Address|`\$`|`message`|CR|EOT

X. ESC|STX|Address|`\$`|ACK|EOT

'%' 0x25 Line 2 Message

Q. ESC|STX|Address|`%`|SOH|EOT

R. ESC|STX|Address|`%`|`message`|CR|EOT

D. ESC|STX|Address|`%`|`message`|CR|EOT

X. ESC|STX|Address|`%`|ACK|EOT

'w' 0x77 Line 3 Message (EV 2 only max 48 characters)

Q. ESC|STX|Address|`\$`|SOH|EOT

R. ESC|STX|Address|`\$`|`message`|CR|EOT

D. ESC|STX|Address|`\$`|`message`|CR|EOT

X. ESC|STX|Address|`\$`|ACK|EOT

'z' 0x7a Line 4 Message (EV 2 only max 48 characters)

Q. ESC|STX|Address|`\$`|SOH|EOT

R. ESC|STX|Address|`\$`|`message`|CR|EOT

D. ESC|STX|Address|`\$`|`message`|CR|EOT

X. ESC|STX|Address|`\$`|ACK|EOT

'E' 0x45 Line 5 Message (Prefix line)

Q. ESC|STX|Address|`\$`|SOH|EOT

R. ESC|STX|Address|`\$`|`message`|CR|EOT

D. ESC|STX|Address|`\$`|`message`|CR|EOT

X. ESC|STX|Address|`\$`|ACK|EOT

NOTE: TO ENTER A LOGO CALLOUT INTO A MESSAGE USE THE ACSII CHARACTERS 0x7B FOR LOGO1 0x7C FOR LOGO 2 AND 0x7D FOR LOGO 3

**':' 0x3A Logo1 Name (read only - max 9 characters)
(EV 1, EV 2)**

Q. ESC|STX|Address|`:`|SOH|`x`|`y`|EOT

R. ESC|STX|Address|`:`|`logo name`|CR|EOT

Where: x = don't care

y = Bit 0 = 0 = Logo Name in Font 0

1 = Logo Name in Font 1

Bit 1 = 0 = Get Name from on board data flash chip

1 = Get Name fro Data Flash card

**';' 0x3B Logo2 Name (read only - max 9 characters)
(EV 1, EV 2)**

Q. ESC|STX|Address|`;`|SOH|`x`|`y`|EOT

R. ESC|STX|Address|`;`|`logo name`|CR|EOT

Where: x = don't care

y = Bit 0 = 0 = Logo Name in Font 0

1 = Logo Name in Font 1

Bit 1 = 0 = Get Name from on board data flash chip

1 = Get Name fro Data Flash card

**'<' 0x3C Logo3 Name (read only - max 9 characters)
(EV 1, EV 2)**

Q. ESC|STX|Address|`<`|SOH|`x`|`y`|EOT

R. ESC|STX|Address|`<`|`logo name`|CR|EOT

Where: x = don't care

y = Bit 0 = 0 = Logo Name in Font 0

1 = Logo Name in Font 1

Bit 1 = 0 = Get Name from on board data flash chip

1 = Get Name fro Data Flash card

**'Q' 0x51 Starting Sequence Number (max. length 9 digits)
(EV 2, EV SC AND EV1 with version 2.09 and after)**

Q. ESC|STX|Address|`Q`|SOH|EOT

R. ESC|STX|Address|`Q`|`zzzzzzzzz`|CR|EOT

Where:

zzzzzzzzz = ASCII string which is the starting sequence number to print.

D. ESC|STX|Address|`Q`|`zzzzzzzzz`|CR|EOT

X. ESC|STX|Address|`Q`|ACK|EOT

**'2' 0x32 Date and Time Setting / Reading
(EV 1, EV 2, EV SC)**

Q. ESC|STX|Address|`2`|SOH|EOT

R. ESC|STX|Address|`2`|`aa bb cc dd ee ff gg`|EOT

Where: each set of 2 ASCII characters represent the upper and lower nibble of a packed BCD byte
aa= Time of Day Seconds (not used)
bb= Time of Day Minutes
cc= Time of Day Hours
dd= Day of Week
ee= Date Day
ff = Date Month
gg= Date Year

D. ESC|STX|Address|`2`|`aa bb cc dd ee ff gg`|CR|EOT

X. ESC|STX|Address|`2`|ACK|EOT

**'u' 0x75 Store message in non-volatile memory (Write only)
(EV 1, EV 2, and EV SC)**

D. ESC|STX|Address|`u`| EOT

X. ESC|STX|Address|`u`|ACK|EOT

NOTE: THE FOLLOWING CODES ARE SPECIFIC TO EV 2

' "' 0x22 Minimum Bar Width (Range 3-15 Data matrix 2-15)
Default 5

Q. ESC|STX|Address|`"|SOH|EOT
R. ESC|STX|Address|`"|`x`|`y`|EOT

D. ESC|STX|Address|`"|`x`|`y`|EOT
X. ESC|STX|Address|`"|ACK|EOT

' .' 0x2e Bleed Compensation (Range 0 - 3) Default 0

Q. ESC|STX|Address|`.`|SOH|EOT
R. ESC|STX|Address|`.`|`x`|`y`|EOT

D. ESC|STX|Address|`.`|`x`|`y`|EOT
X. ESC|STX|Address|`.`|ACK|EOT

' * ' 0x28 Quiet Zone (Range 0 - 150) Default 75

Q. ESC|STX|Address|`*`|SOH|EOT
R. ESC|STX|Address|`*`|`x`|`y`|EOT

D. ESC|STX|Address|`*`|`x`|`y`|EOT
X. ESC|STX|Address|`*`|ACK|EOT

'n' 0x6e Type of Barcode (read only)

Q. ESC|STX|Address|`n`|SOH|EOT
R. ESC|STX|Address|`n`|`x`|`y`|EOT

where

x = number of available barcodes

y = type of barcode

0= CODE39

1= TWO OF FIVE

2= CODE 128B

3= CODE 128C

4= UPCA

5= UPCE

6= EAN8

7= EAN13

8= DATAMATRIX

'?' 0x3F Barcode Name(read only)

Q. ESC|STX|Address|`?`|SOH|`x`|`y`|`x1`|`y1`|EOT

Where:

`x` `y` = Barcode type as in 'n' command

`x1` `y1` = don't care

R. ESC|STX|Address|`?`|`BARCODENAME`|CR|EOT

where BARCODENAME = Ascii name of type of barcode

'=' 0x3d Barcode Verify

D. ESC|STX|Address|`= `|`x`|`y`|`BARCODESTRING`|CR|EOT

x = don't care

y = type of barcode (same as 'n' command)

BARCODESTRING = Barcode Ascii data

X. ESC|STX|Address|`= `|`xy`|EOT

where

if barcode verifies

ESC|STX|Address|`= `|ACK|EOT

if barcode doesn't verify

ESC|STX|Address|`= `|NAK|`9`|EOT

EXAMPLE WRITTEN IN C

to query a print station to determine the line speed.

INITIALIZE AND OPEN A SERIAL CHANNEL

EXECUTE THE FOLLOWING CODE

```
// Query Print Station Address 7 for Line Speed
putchar(0x1b);      // Send out ESC
putchar(0x02);      // Send out STX
putchar(0x30);      // Send out upper nibble of address 07
putchar(0x37);      // Send out lower nibble of address 07
putchar(0x26);      // Send out a '&' command
putchar(0x01);      // Send out SOH
putchar(0x04);      // Send out EOT

// Get results from print station
`
unsigned char dummy,speed;

    dummy = getchar();      // Get ESC
    dummy = getchar();      // Get STX
    dummy = getchar() << 4;  // Get upper nibble of address
    dummy |= getchar() & 0x0f; // Get lower nibble of address
    if(dummy == our_address)
    `
        dummy = getchar();      // Get command
        speed = getchar() << 4;  // Get upper nibble of speed
        speed |= getchar() & 0x0f; // Get lower nibble of speed
        dummy = getchar();      // Get EOT
    ` else `
        // error handler (not our address)
    `
`
```


Example written in C to send a line speed to a print station

INITIALIZE AND OPEN A SERIAL CHANNEL

EXECUTE THE FOLLOWING CODE

// Send Print Head Address 2 Line Speed of 100 feet per minute.

```
putchar(0x1b);    // Send out ESC
putchar(0x02);    // Send out STX
putchar(0x30);    // Send out upper nibble of address
putchar(0x32);    // Send out lower nibble of address
putchar(0x26);    // Send out '&' command
putchar(0x36);    // Send out upper nibble for Line Speed 100
putchar(0x34);    // Send out lower nibble for Line Speed 100
putchar(0x04);    // Send out EOT
```

// Get results from print station

`

unsigned char dummy;

```
dummy = getchar();    // Get ESC
dummy = getchar();    // Get STX
dummy = getchar() << 4;    // Get upper nibble of address
dummy |= getchar() & 0x0f;    // Get lower nibble of address
if(dummy == our_address)
```

`

```
dummy = getchar();    // Get command
dummy = getchar();    // Get ACK for print station
if(!dummy == ACK)
```

`

// error handler (didn't get acknowledgement from printer)

` else `

```
dummy = getchar();    // Get EOT
```

`

` else `

// error handler (not our address)

`

EXAMPLE WRITTEN IN VB

to send a new message to a print station.

INITIALIZE AND OPEN A SERIAL CHANNEL

EXECUTE THE FOLLOWING CODE

```
Public Sub DoMessage()
```

```
DATA$ = "800": GETINFODATA: Rem DISABLE PRINTING MODE
```

```
DATA$ = "&32": GETINFODATA: Rem SET LINE SPEED TO 50
```

```
DATA$ = "P01010010000100000000" & Chr$(&HD): GETINFODATA: Rem SET OBJECTs
```

```
DATA$ = "%ABCDEFGHJIJ" & Chr$(&HD): GETINFODATA: Rem SEND MESSAGE
```

```
End Sub
```

```
Public Sub GETINFODATA() : : Rem SENDS A COMMAND AND GETS A RESPONSE
```

```
RESPONSE$ = "": COMM.InBufferCount = 0
```

```
COMM.Output = ESC & STX & "01" & DATA$ & EOT
```

```
Timer.Enabled = True: TIMERFLAG = False
```

```
GETINFO:
```

```
Do
```

```
DoEvents
```

```
If TIMERFLAG = True Then GoTo TCOMMERROR
```

```
Loop Until COMM.InBufferCount >= 1
```

```
RESPONSE$ = RESPONSE$ & COMM.Input
```

```
If InStr(RESPONSE$, Chr$(&H15)) > 0 Then GoTo GETDATAERROR:
```

```
Rem A NAK WAS RECEIVED
```

```
If InStr(RESPONSE$, Chr$(&H4)) = 0 Then GoTo GETINFO
```

```
Rem AN EOT WAS RECEIVED
```

```
RESPONSE$ = Mid$(RESPONSE$, 6, Len(RESPONSE$))
```

```
Rem DELETE ADDRESS HEADER
```

```
Timer.Enabled = False
```

```
Rem WE NOW HAVE A VALID RESPONSE
```

```
Exit Sub
```

```
GETDATAERROR:
```

```
Timer.Enabled = False: TIMERFLAG = False
```

```
GoTo PROCESSERROR
```

```
Exit Sub
```

```
TCOMMERROR:
```

```
Timer.Enabled = False: TIMERFLAG = False
```

```
PROCESSERROR:
```

```
If RESPONSE$ = "" Then RESPONSE$ = "0" Else RESPONSE$ = Right$(RESPONSE$, 1):
```

```
Rem GET THE ERROR CODE
```

```
Select Case (RESPONSE$)
```

```
Case 0
```

```
MSG$ = "NO RESPONSE FROM UNIT"
```

```
Case 1
```

```
MSG$ = "TRANSMISSION ERROR"
```

```
Case 2
```

```
MSG$ = "ILLEGAL COMMAND"
```

```
Case 3
```

```
MSG$ = "TRYING TO PRINT WHILE IN COMMAND MODE"
```

```
Case 4
```

```
MSG$ = "TRYING TO READ A WRITE ONLY REGISTER"
```

```
Case 5
```

```
MSG$ = "TRYING TO WRITE A READ ONLY REGISTER"
```

```
Case 6
```

```
MSG$ = "UNIT INPUT BUFFER FULL"
```



```
Case 7
  MSG$ = "UNIT IN EDIT MODE"
Case 8
  MSG$ = "PRINT STATION BUSY TRY AGAIN"
End Select
MsgBox MSG$
COMM.InBufferCount = 0: Rem FLUSHES THE INPUT BUFFER
End Sub
```

THE ABOVE VB ROUTINES DEMONSTRATE THE ENTIRE SEQUENCE OF:
PREPARING DATA TO SEND TO THE HEAD
SENDING THE DATA TO THE HEAD
WAIT FOR A RESPONSE
DETERMINE IF THE DATA WAS ACCEPTED OR REJECTED

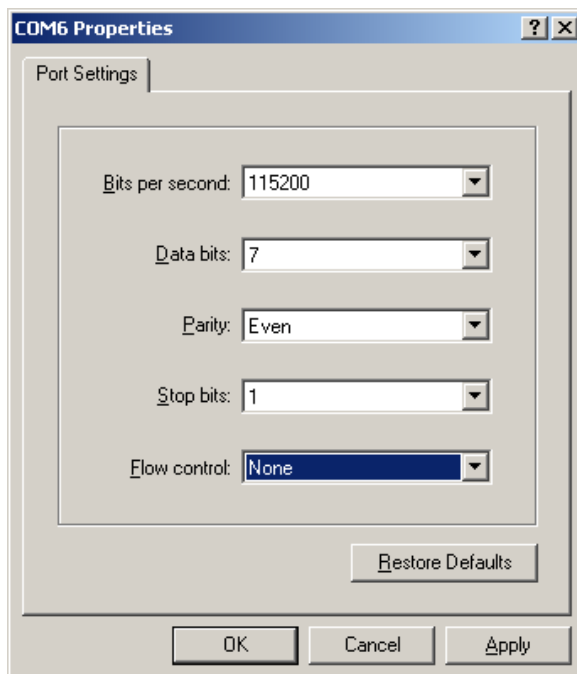
EXAMPLE USING HYPER TERMINAL

Preliminary test of the device data link can be performed using the standard HYPER TERMINAL supplied with windows.



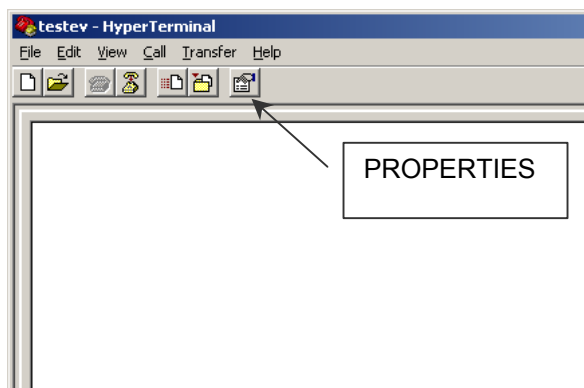
NOTE: it is assumed that the user has already installed a RS485 adapter and has verified the device address (COMM PORT) that device is attached to.

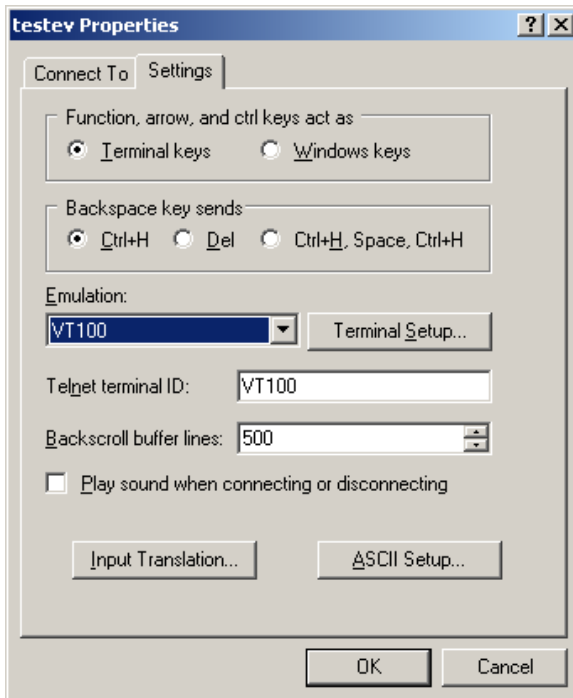
Select the appropriate COM port



Set the baud rate, data bits, parity, Stop bits and flow control.

Select properties and enter the following settings.





Set terminal keys checked. Select VT100 for the emulation mode as pictured on the left.

You can save your setup for future usage.

There are several keys that are required as control characters. They are as follows:

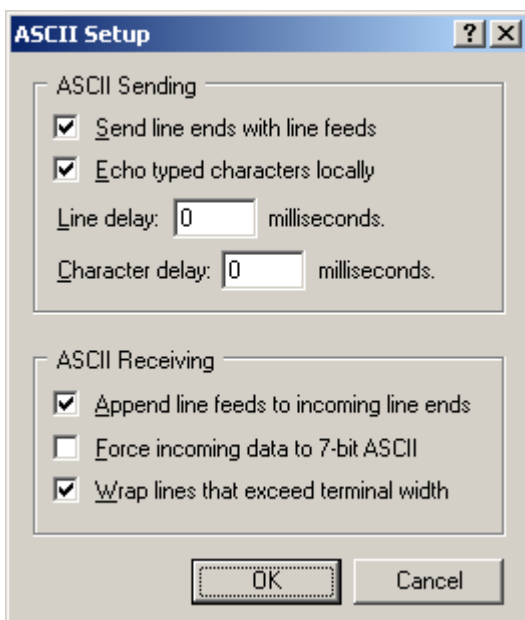
(The ^ character represents the control key in conjunction with the key shown)

^A THE SOH CHARACTER

^B THE STX CHARACTER

^D THE EOT CHARACTER

ESC the actual key on the keyboard



Select ASCII setup and set the appropriate check boxes.

Test the link by typing: spaces are shown for clarification and are not included.

ESC ^B 01 ! ^A ^D

The printer will respond with the printer's software/firmware information.

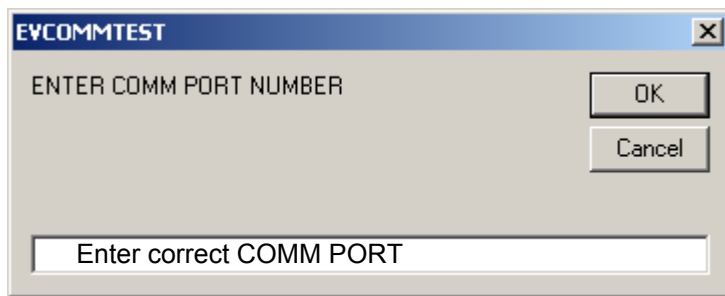
NOTE: NOT ALL CHARACTERS ARE DISPLAYED ON THE SCREEN.

EXAMPLE USING EVCOMMTEST

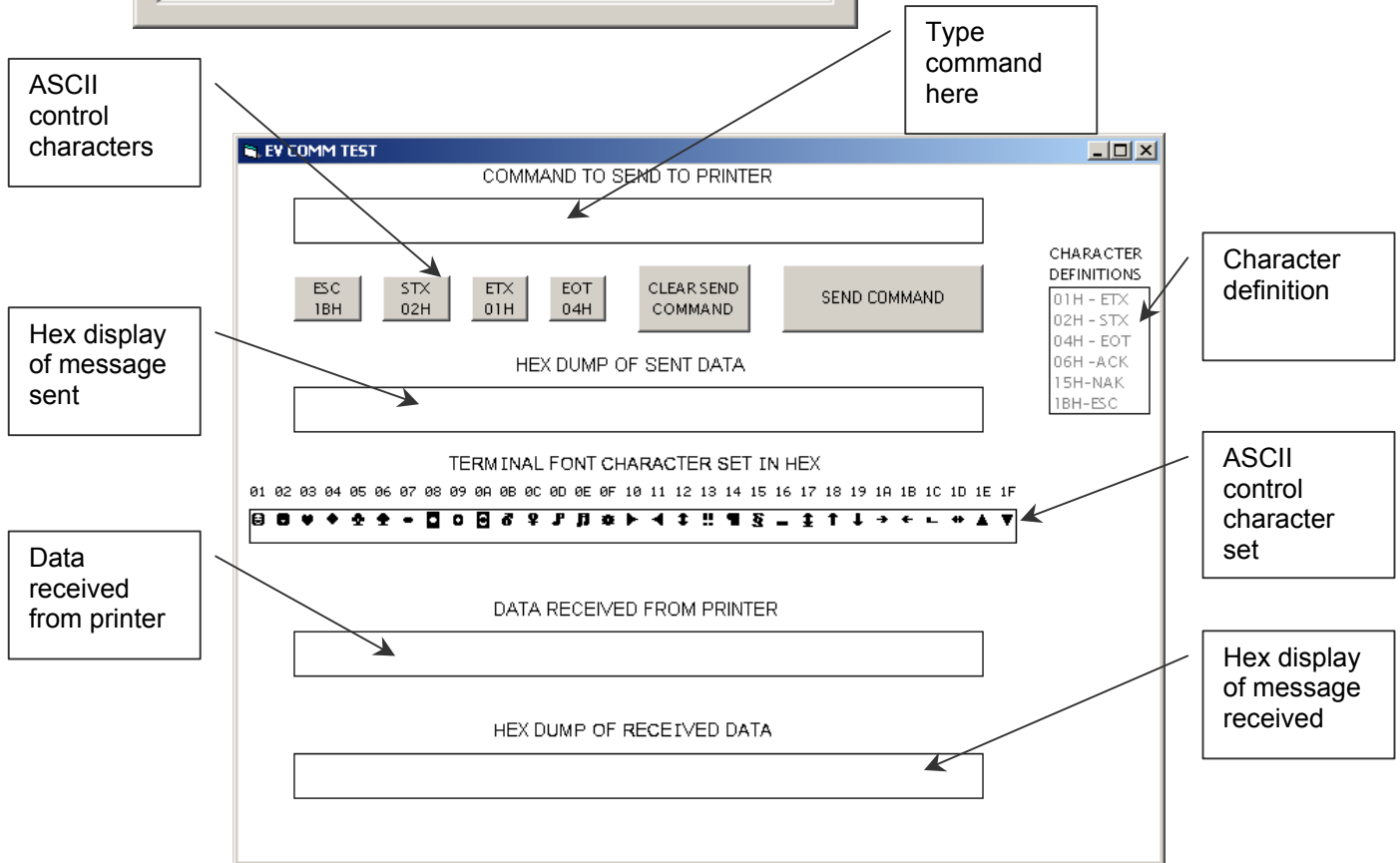
Hyper Terminal has a drawback in that it does not normally display the ASCII control character set, specifically those characters between a hex 01 through a hex 1F. The following describes a simple program written in visual basic (VB5) that provides the programmer with a clearer definition of the ASCII control character sequence. The program is included on this CD manual and may be found in the sub-directory "EVCOMMTEST".

The user should find the correct location and install the program by invoking "SETUP.EXE".

NOTE: it is assumed that the user has already installed a RS485 adapter and has verified the device address (COMM PORT) that device is attached to.



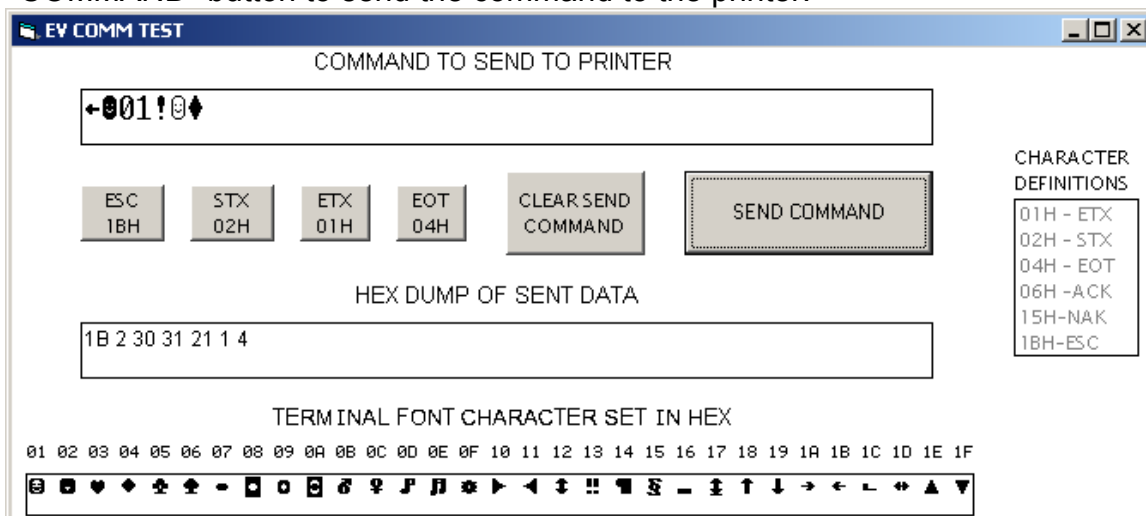
Program initiation displays the COMM PORT selection screen. The user should enter the correct COMM PORT and select "OK".



After a comm. Port is selected the above screen is displayed. This program allows for simple command entry and provides the programmer a detailed view of both the characters sent and the data received from the printer.

Commands to be sent to the printer are typed in first text box labeled "COMMAND TO BE SENT TO PRINTER". Since windows does not display ASCII control characters, and often interprets these control characters to have special meaning data entry for the special characters are in the form of icons on the screen. The second line of the display shows 6 gray-scaled boxes. The first 4 boxes represent the ESC, STX, ETX and EOT ASCII control characters. The "CLEAR SEND COMMAND" is intended to clear the first line text box. Of course any other windows erasing method will work. Finally the last box "SEND COMMAND" actually sends the command typed into the first line to the printer.

To enter a command string the user must follow the correct sequence. All command structures sent to a printer must start with the ESC character so select the ESC gray scaled box. Next select the STX box and then place the cursor in the command text box following the second character, which was the STX. After the cursor is placed in the command text box it is necessary to enter the unit ID (device address) of the printer. For initial test purposes use the factory default setting. This default address is 01 and should be typed in the command box following the STX. The required command follows the address. Selecting the ETX box followed by the EOT box ends the command string. Select the "SEND COMMAND" button to send the command to the printer.



When the "SEND COMMAND" button is selected the second text line displays the hex values of the message sent to the printer. In this case the ASCII character ! (Exclamation Point) was sent to the printer. This command requests the printer to respond with the software version of the system.

For convenience the third text line displays all the ASCII control codes with the hex values above them.

DATA RECEIVED FROM PRINTER
!001!LEXMARK3.13B++++J
HEX DUMP OF RECEIVED DATA
1B 2 30 31 21 4C 45 58 4D 41 52 4B 33 2E 31 33 42 2B 2B 2B 2B D 4

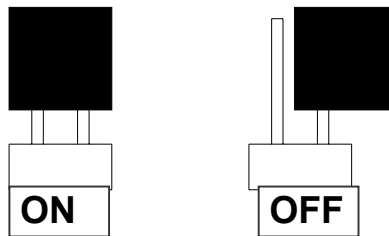
The bottom half of the display shows the ASCII data received from the printer and the hex values for the received data displayed in the last text box. The above response shows the printer is a LEXMARK with software version 3.13, a “B” firmware rev, and all options installed.

The programmer should try several commands to become familiar with the typical responses received from the printer. It should also be noted that the actual returned data might be in packed BCD format, or a hex value that needs to be translated.

PART 7: OPTION JUMPERS AND CABLING

OPTION JUMPER DESCRIPTIONS

Factory default for all jumper settings is in the ON position. To remove a jumper in the OFF position place the jumper on a single pin for future use



VSEL J7

This jumper when in the ON position supplies a +12vdc source on the RJ50 input connector. The hand held controller uses this source for power. Removing this jumper prevents the +12vdc source from exiting on pin 2 and possibly damaging other external control devices.

PDEN J8

This jumper when in the ON position the internal product detect is passed to the processor. Removing this jumper inhibits the internal product detect.

ENSEL J9

When this jumper is in the ON position the external encoder signal connected to the RJ50 output connector is passed through the printer to the RJ50 input connector. This allows the same encoder signal to drive several printers. If this is not desired remove the jumper

PRSEL J10

When this jumper is in the ON position the external product detect signal connected to the RJ50 output connector is passed through the printer to the RJ50 input connector. This allows the same product detect signal to drive several printers. If this is not desired remove the jumper

JUMPER LOCATION

EXTERNAL PRODUCT DETECT
EXTERNAL ENCODER
VOLTAGE SELECT (+5VDC OR +12VDC)

EXTERNAL ENCODER

ENSEL J9

ON= PASS THRU

OFF= FLOAT OUTPUT

EXTERNAL PRODUCT DETECT

VSEL J7

ON= +12 OUTPUT

OFF= FLOAT OUTPUT

VOLTAGE SELECT

VSEL J7

ON= +12 OUTPUT

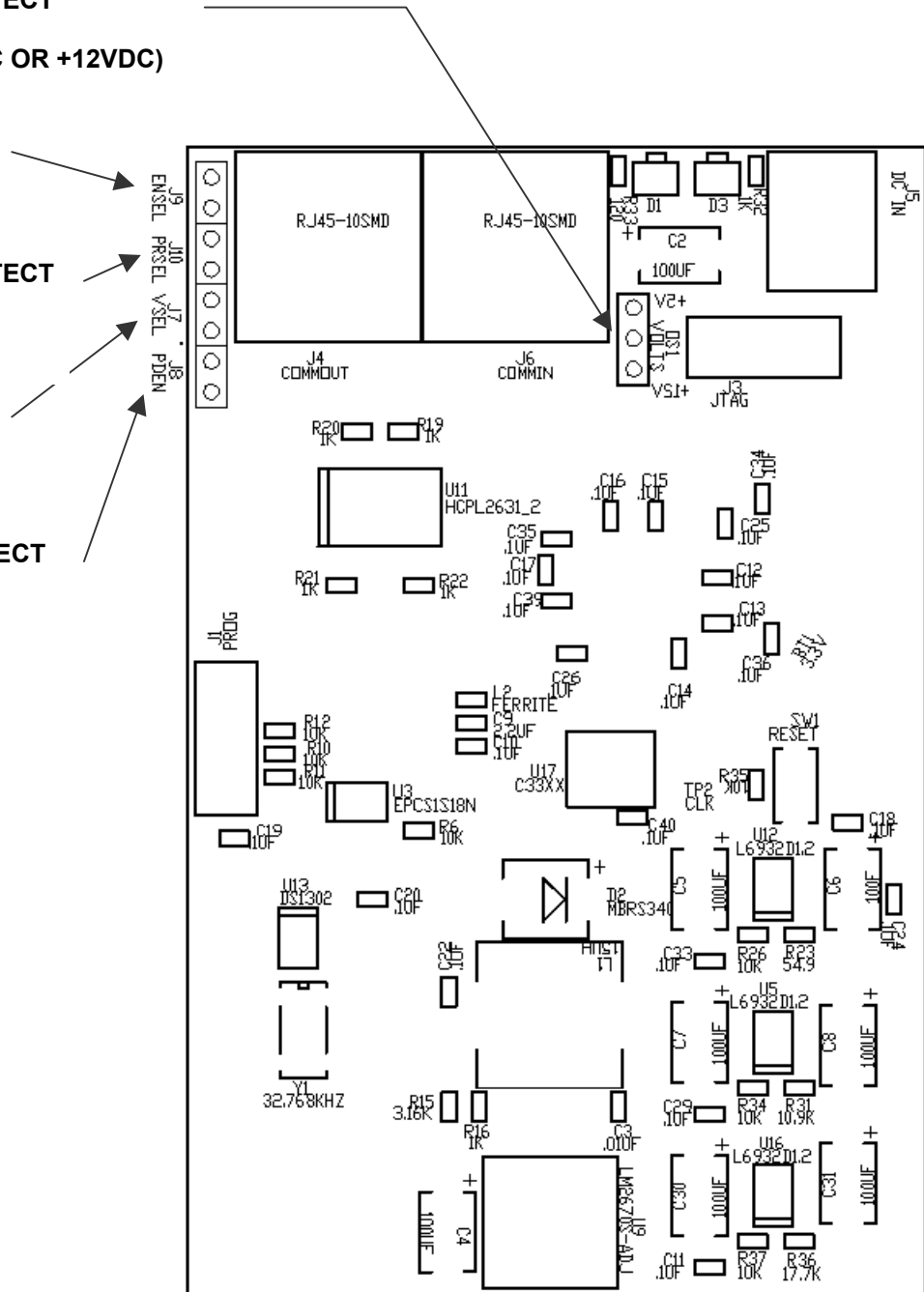
OFF= FLOAT OUTPUT

INTERNAL PRODUCT DETECT

PRSEL J10

ON=ENABLE

OFF=DISABLE

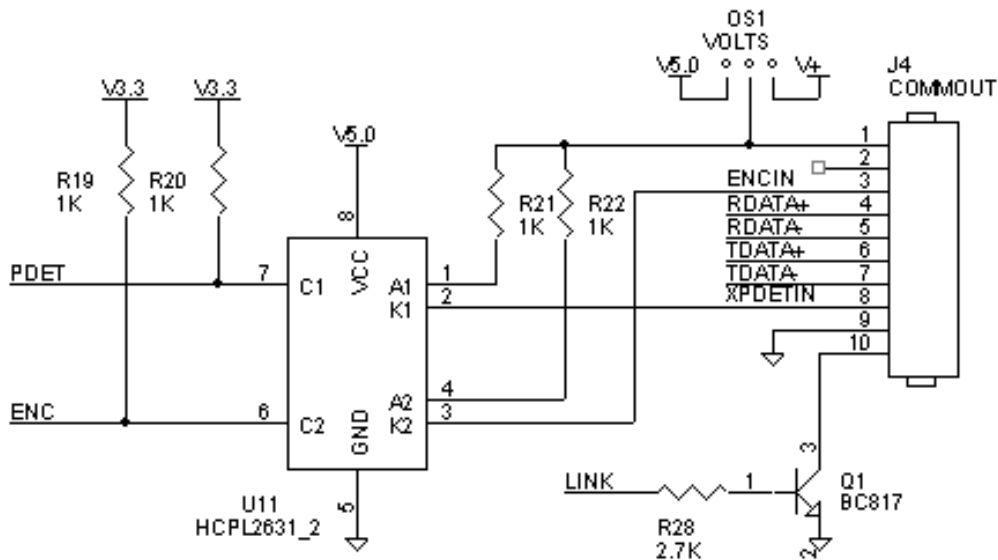


OPTION CABLING DESCRIPTIONS

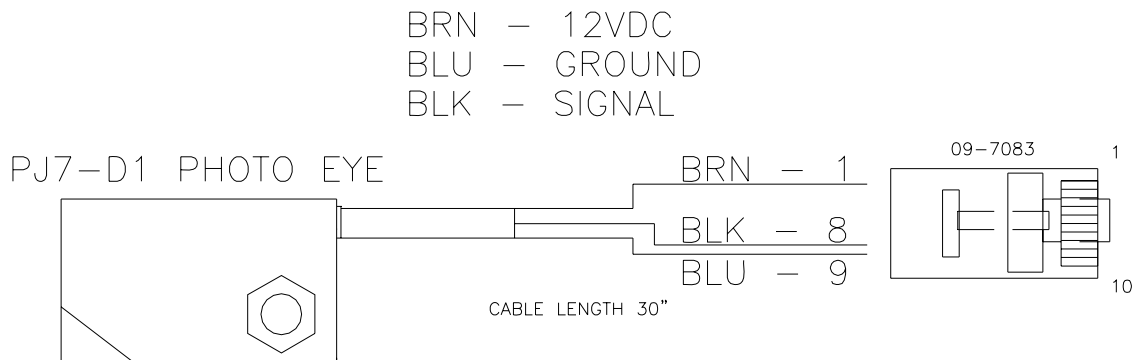
Evolution printers can accept inputs from external sources to control product detection and timing circuits to track product speed (Encoders). These device inputs are internally connected to pull-up resistors and drive optically isolated devices and may be driven by open collector or switch contacts.

Each input (ENCIN, XPDETIN) requires the capability of sinking 12ma to ground as depicted in the above circuit. Connection to the optional control port requires an RJ50 connector.

An external encoders signal is connected to the ENCIN (pin 3) and an external product detects signal is connected to the XPDETIN (pin 8).



Below is an example of the external product detect eye supplied by DIGITAL DESIGN INC part number C21006.



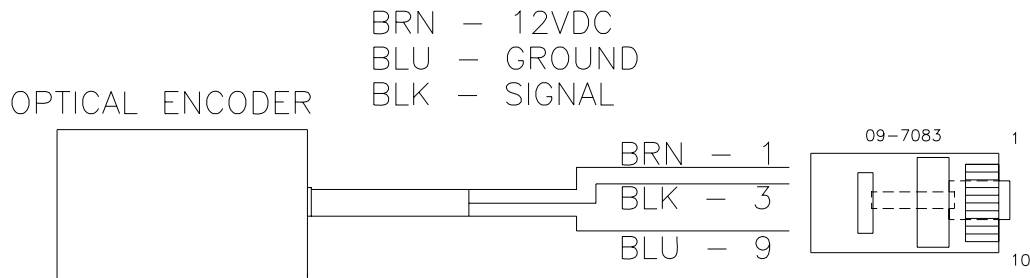
For those applications requiring accurate line speed detection an external encoder is needed.

The external encoder will provide accurate signals eliminating problems in those applications where moving product has an acceleration or deceleration component in its motion, and is often mandatory when trying to produce a reliable printed barcode. Selecting the external encoder should take into consideration a supply source that will yield the correct aspect ratio of printed height to width.

A vertical printed column contains 150 dots and spans 1/2". This equates to 0.00333 between each vertical dot placement, thusly each horizontal dot placement should be the same to maintain a perfect 300DPI ratio.

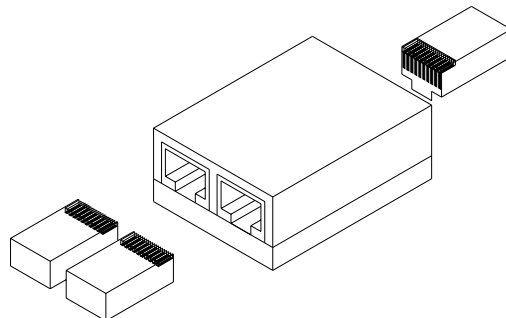
Selecting the external encoder, the line speed calculation is replaced by a scalable encoder setting ranging from 0-7 allowing a printed message to be compressed or expanded. Ideally, the external encoder should be provided to use this feature to its maximum advantage.

If the external encoder were selected to provide a resolution of 0.00333 then the external encoder set to 0 would produce the correct aspect ratio and the message can only be expanded in multiples of 0.00333 thousands of an inch. This may provide all that is required. Selecting an external encoder source that provided 0.00111 thousands of an inch would be a better choice.



The above pictorial is an example of the connections for an external encoder.

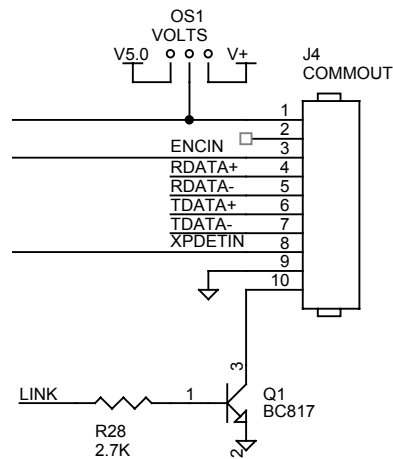
If it becomes necessary to supply both external product detect, and external encoder, both signals can be wired into the same connector, or DIGITAL DESIGN INC can supply an optional adaptor to allow connection of both cables (part number C21012)



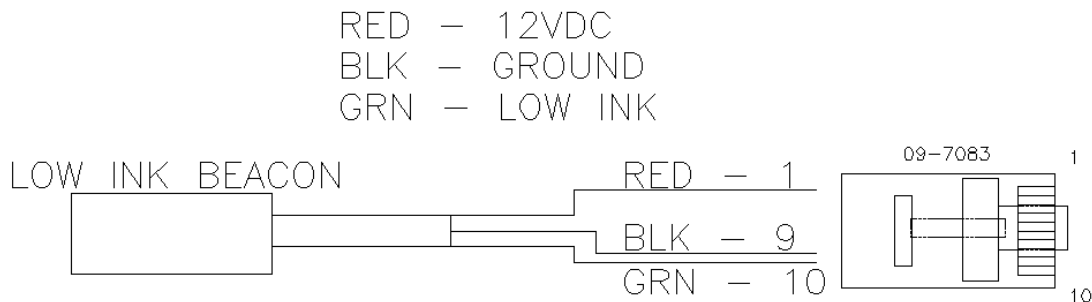
A LOW INK condition will cause the printer to output a signal available on the COMM OUT connector on pin 10. This signal is an “Open Collector” type and is capable of sinking up to 50ma at 24Vdc (REF Q1 in the following drawing). Also note that with OS1 the voltage on pin 1 may be selected as either 5VDC or V+ (12VDC).

When using the optional LOW INK BEACON (C21050) supplied by DDI as an option may be plugged directly into the printer on the COMM OUTPUT port.

The user may connect any other type of external device to act in lieu of the optional LOW INK BEACON.



The following drawing should be referenced to determine the correct pin assignment for an external device connection to the low ink alarm. Pin 1 of the connector can be used to supply power to an external device if required. The open collector output of Q1 is capable of sinking up to 50ma of current. The user must be careful not to exceed +24VDC if the LOW INK signal on pin 9 is connected to an external device that is sourced to another voltage. If the external device is a floating input then a pull-up is required and may be connected to the external devices power source or to pin 1 on the connector. Pin 9 is the signal path ground.



The colors indicated in the above drawing are currently used for the optional LOW INK BEACON.

When activated the signal will go to a logic ground indicating a low ink condition.

PART 8: SPECIFICATIONS

PRINTER SPECIFICATIONS

PRINT CHARACTERISTICS

Character Set:	Full alphanumeric and 20 special symbols
Standard Font:	Arial style
Logos:	up to 6 resident (3 FOR 1 LINE, 3 FOR 2 LINE)
Line Speeds:	From 10 to 200 fpm
Encoder Ratio:	0 to 7
Print Delay:	From 1 to 255 (approx .060 in to 15.0 in)
Character Heights:	Standard font sizes are: 1/2" single line of print (LX1 and LX2) 7/32" two lines of print (LX1 and LX2) 1/8" three lines of print (LX2 only) 3/32" four lines of print (LX2 only)
Bar Code Symbolologies	
LX2 only	Code 39, I 2 of 5, Code 128B, Code 128C UPC-A, UPC-E, EAN 8, EAN 13
Length:	UP TO 48 characters per line
Message Storage	UP TO 100 Messages
Print Head to Product Distance:	Up to 3/8" (9.525 mm)

CONTROLLER

Standard Finish:	Hi Impact ABS Black
Dimensions:	8.75"H x 4.25"W x 2.7"D (222 mm x 108 mm x 69mm)
Weight:	1 lb. (4.5 kg)
Control Panel:	Touch Switches and WYSIWYG LCD

PRINTER

Standard Finish:	Aluminum Black Anodized
Dimensions:	3.0"H x 2.5"W x 4.0"D (76 mm x 63.5 mm x 102 mm)
Weight:	1 lb. (4.5 kg)

ENVIRONMENTAL CONDITIONS

Temperature Range:	40°F - 104°F (5°C - 40°C)
Humidity:	up to 90% relative, non-condensing
Electrical Supply:	100-250 VAC; 50-60 Hz; 0.25Amp

GENERAL

Product Detector:	IR LED convergent
Communications link	RS485 (115KBAUD 7-BITS EVEN PARITY 1 STOP BIT)

DEFAULT SETTINGS

FUNCTION	DEFAULT SETTING	RANGE
DIRECTION	<	< >
FONTS	ARIAL STYLE	USER DEFINED
INTER-CHARACTER SPACING	10	1 - 25
LANGUAGE	ENGLISH	ENGLISH / SPANISH FRENCH / GERMAN
LINE SPEED	100	10 - 200
LOGOS	0	1 - 6
PRINT INVERSE	NORMAL	NORMAL / INVERSE
PRODUCT DETECT	INTERNAL	INTERNAL / EXTERNAL
EXTERNAL ENCODER	INTERNAL	INTERNAL / EXTERNAL
PRINT DELAY	1	1 - 255
ENCODER RATIO	1	0 - 7
MESSAGE STORAGE (OPTION PACK 1, 1.5, 2, 3)	1	1 - 100
PASSWORD (OPTION PACK 1, 1.5, 2, 3)	12345	5 CHARACTERS USER DEFINED
AUTO REPEAT (OPTION PACK 1, 2)	0	0 - 255
DATE (OPTION PACK 2, 3)	dm/dd/dy	User defined
TIME (OPTION PACK 2, 3)	hh:mm	User defined
SEQUENCE NUMBER	0	9 CHAR MAX
LOT COUNTER	0	4 CHAR MAX
SHIFT CODE (OPTION PACK 3)	TIMES AND CODES SET TO ZERO	User defined
DATE OFFSET (OPTION PACK 3) 2 COUNTERS	OFFSET DAYS SET TO ZERO	MAX 9999 DAYS
PRODUCT COUNTER (OPTION PACK 3)	TIMES AND CODES SET TO ZERO	User defined
BAR CODE BAR WIDTH	5	3 - 15
BAR CODE SPACE	0	0 - 3
BAR CODE QUIET ZONE	75	0 - 150
BAR CODE CHECK CHAR	NO	Y / N
BAR CODE MAN READABLE	NO	Y / N
BAR CODE GUARD BARS	NO	Y / N
FIRING COLUMNS	1	1 - 8

APPENDIX A—PRODUCING RELIABLE BARCODES

Printing reliable barcodes requires that several key issues be observed.

1. Barcode integrity
2. Contrast ratio
3. Bar separation
4. Quiet zone

BARCODE INTEGRITY

Barcode integrity is the validity of the data contained in the barcode. This includes valid characters and the correct ratio of dark to light bars.

CONTRAST RATIO

The contrast ratio is the optical density of the print against the background substrate. For example a black ink barcode against a white coated cardboard versus a black ink barcode on a brown cardboard.

BAR SEPARATION

Bar separation is the ratio of a dark bar to a light bar. This is one of the most critical parameters to be observed. Assuming that the aspect ratio of the printed barcode is correct, bleed factors can greatly diminish the readability of a barcode. Bleed factors vary greatly depending on substrates. For example printing on virgin versus recycled corrugated cases.

LX 2 printers have the capability to adjust various parameters of the printed barcode to circumvent the inherent problems in producing a reliable printed barcode. These include:

Dark Bar width
White Bar width

Even though the ratio of a dark bar to a light bar should not be changed it might be necessary to alter the printed barcode by adjusting the light bar size relative to a dark bar size allowing for bleed factors found on different substrates

QUIET ZONE

These are areas at the beginning and end of a barcode symbol that allow optical equipment to differentiate the barcode from other printed material.

The inks developed for the **EVOLUTION** printers will produce, at 300 dpi and 200ft/min, a class “A” barcode on brown corrugated, but care must be exercised in programming the various parameters that control how the printed image is produced. As with any fine resolution image the distance from the print head to

the product is of utmost importance. Trial and error is often required to produce the desired results.

PROGRAMMING BARCODES

BARCODE TYPE: This is the type of barcode to be used and only one type is valid per message.

Valid types are:

CODE 39

CODE128B

CODE 128C

INTERLEAVED 2of5

EAN13

EAN 8

UPC-A

UPC-E

DATA MATRIX (optional)

MINIMUM BAR WIDTH: This parameter controls the number of columns in a narrow bar. The legal limits are 3 to 15 printed columns for 1-D linear codes and 2 to 15 for 2-D codes.

ADDED SPACE: This controls the amount of added columns for 1-D codes only and is intended to overcome the nature of the bleed factor of the ink on different substrates. The legal values are 0, 1, 2 or 3 additional printed columns.

QUIET ZONE: These are areas at the beginning and end of a barcode symbol that allow optical equipment to differentiate the barcode from other printed material. The user may program a value from 0 to 150 printable columns where, with a correct aspect ratio, each column is 0.0033".

ADD CHECK CHARACTER: If selected the software will calculate the check character automatically.

ADD MAN READABLE TEXT: If selected the software will add man readable characters to the barcode.

GUARD BARS: If selected indicates that guard bars will be higher than other bars to allow for man readable characters located at the bottom of the code.

Man readable characters must be enabled for guard bars to take effect.

BARCODE TECHNIQUES

The following are actual scanned images of a UPC-A barcode (without man-readable or guard bars for clarity). These tests were produced on white coated corrugated. These are pictured here to help the user understand some of the important parameters in producing a reliable barcode. The faint background noise is a result of the scanning process and is not indicative of a typical printed sample.

Notice the diminished size ratio of the narrow light bar versus the narrow dark bar



Barcode with:
Bar width = 5
Added space = 0
Decodability = 39%
Average bar = 16X
Code class = C

The narrow light bar is still slightly less than the dark bar



Barcode with:
Bar width = 5
Added space = 1
Decodability = 50%
Average bar = .11X
Code class = B

Adding 2 spaces makes the narrow light bar equal to the narrow dark bar



Barcode with:
Bar width = 5
Added space = 2
Decodability = 62%
Average bar = .03X
Code class = A

Notice the diminished size ratio of the narrow light bar versus the narrow dark bar



Barcode with:
Bar width = 6
Added space = 0
Decodability = 47%
Average bar = .17 X
Code class = C

The narrow light bar is still slightly less than the dark bar



Barcode with:
Bar width = 6
Added space = 1
Decodability = 51%
Average bar = .10 X
Code class = B

Adding 2 spaces makes the narrow light bar equal to the narrow dark bar



Barcode with:
Bar width = 6
Added space = 2
Decodability = 64%
Average bar = .00 X
Code class = A

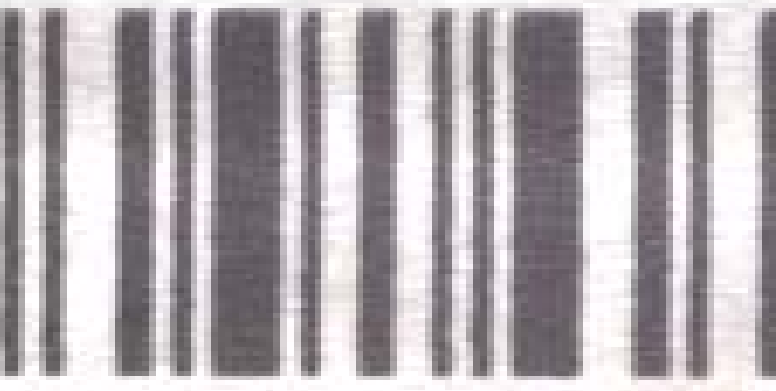
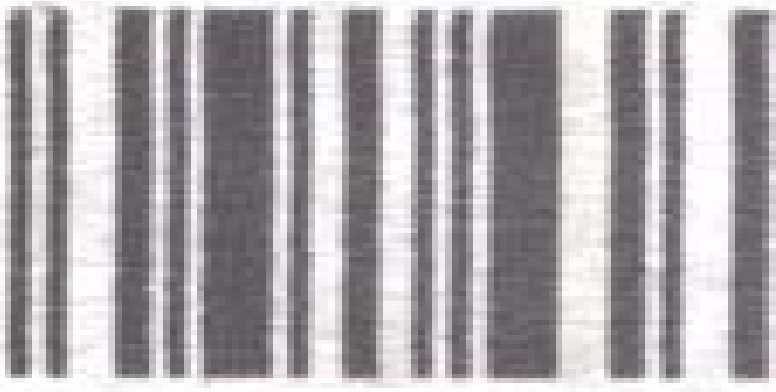
Barcode reader/verifier test equipment QUICK CHECK 800
All barcodes were readable and acceptable, some better than others
Decodability is the percentage as compared to the verifiers standard
Average bar is the size difference of a light bar to a dark bar
Code class is the overall acceptance of the code A B C D F

The picture at the right is an exploded view of the previous scanned image. Again notice the ink bleed and how it affects the ratio of the dark to the light bar widths. Using the ADD SPACE parameter gives the user the ability to minimize this effect.

Trial and error is necessary to find the correct settings to be used. The substrate material is the governing factor in deciding what the correct settings are.

The second concept that the pictures show is the overall consistency in bar width across the image. All scanners have the capability of accepting a certain amount of bar growth but must be kept to a minimum. Bar growth will be seen in non-linear production lines. Normally with a consistent running production line, there is no need for an external encoder. Where there is an acceleration or deceleration component in the production line, it is absolutely necessary to use an encoder. Even with an encoder a code can deviate from the proper aspect ratio. This deviation is caused by slippage of the product against the production line.

Bar growth will also lead to a less dense dark bar due to the fact the printed vertical columns will print further apart than previous dark bars. This may also be seen when not using an encoder and the line speed of the printer is set slower than the actual line speed of the production line.



The image below is a scanned image of two sample prints. The upper section of code is produced at 60ft/min matching the line speed, while with the second sample, the line speed was increased to 100 ft/min. It should be immediately apparent at the difference in the optical density between both prints. This variation will be more apparent on brown corrugated than on a white substrate.

NORMAL OPTICAL DENSITY

Displacing adjacent vertical columns farther than the correct aspect ratio caused this lack of optical density.

DIMINISHED OPTICAL DENSITY

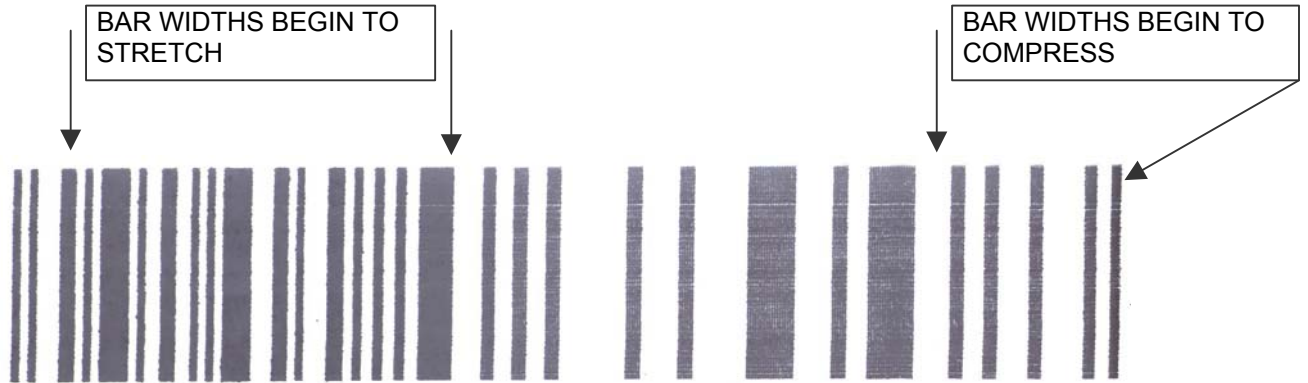
NORMAL ASPECT RATIO

The pictorial at the right is an expanded section of the above code and clearly defines the correct versus incorrect aspect ratio and should be avoided.

It should also be noted that the MINIMUM BAR WIDTH parameter was set to 6.

BAD ASPECT RATIO

Below is a scanned image of a typical application where there was an acceleration and deceleration component in the line movement. Notice how the bars grew from left to right then began to compress towards the normal at the right. Also apparent is the change in the optical density of the pattern. This was a totally unreadable code.



Finally, the image as it should look. This code was produced on white corrugated at 100ft/min and produced a verifiable class "A" barcode with a decodability of 70%. The average bar growth from the reference standard was 0.03%.



BARCODE TYPES

The following is a short description of the supported barcode types:
Each barcode type contains either 2 or 4 widths. This defines how many sizes of a light or dark bar exists in the code.

CODE39: Code 39 is an alphanumeric bar code that can encode (2 widths)

- Numbers**

- Upper case alphabet**

- Special symbols** _ . * \$ / % +

If the Check Character flag is set the software will calculate the optional check character (modulus 43).

CODE128: Code 128 is a 128-character ASCII code (4 widths)

If the Check Character flag is set the software will calculate the optional check character (modulus 103).

EAN-13: EAN-13 encodes 13 characters (4 widths)

- Numbers only**

- It includes a 2 or 3 digit country code**

- 9 or 10 data digits (depending on the length of the country code)**

- Checksum digit**

If the Check Character flag is set the software will calculate the optional check character (modulus 10).

EAN-8: EAN-8 is a shortened version of the EAN-13 code (4 widths)

- Numbers only**

- It includes a 2 or 3 digit country code**

- 4 or 5 data digits (depending on the length of the country code)**

- Checksum digit.**

If the Check Character flag is set the software will calculate the optional check character (modulus 10).

INTERLEAVED 2of5: Interleaved 2 of 5 is a numeric only bar code (2 widths)

- Numbers only**

If the Check Character flag is set the software will calculate the optional check character (modulus 10).

This code requires an even number of digits. If an odd number of digits are entered the software automatically inserts a leading 0. If a code contains an even number of digits and a check digit then the software adds a leading 0.

UPC-A: UPC-A encodes 12 characters (4 widths)

Numbers only

It includes a 1-digit system code (normally 0)

10 digits are the data characters

Checksum digit

If the Check Character flag is set the software will calculate the optional check character (modulus 10).

UPC-E: The UPC-E code is a compressed barcode (4 widths)

Numbers only (must include 0's)

Compression works by squeezing extra zeroes out of the barcode and then automatically re-inserting them at the scanner. Only barcodes containing zeroes are candidates for the UPC-E symbol.

DATAMATRIX: Is a 2-D full 256-character ASCII code

The code is made up of square modules (elements) arranged within a perimeter-clocking pattern.

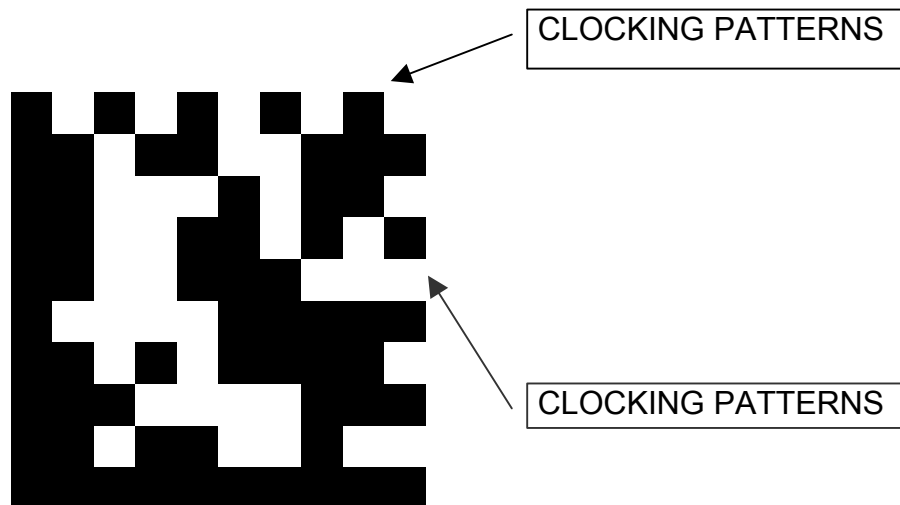
The symbol consists of data regions, which contain square modules set out in a regular array.

Most of the symbols are square ranging from 10x10 to 144x144 elements.

The correct array is automatic, dependent on the data entered.

The following are ideal data matrix codes.

The pictorial below is a 10x10 array encoding the numbers 1, 2, 3, 4 and 5 scaled for reference purposes.

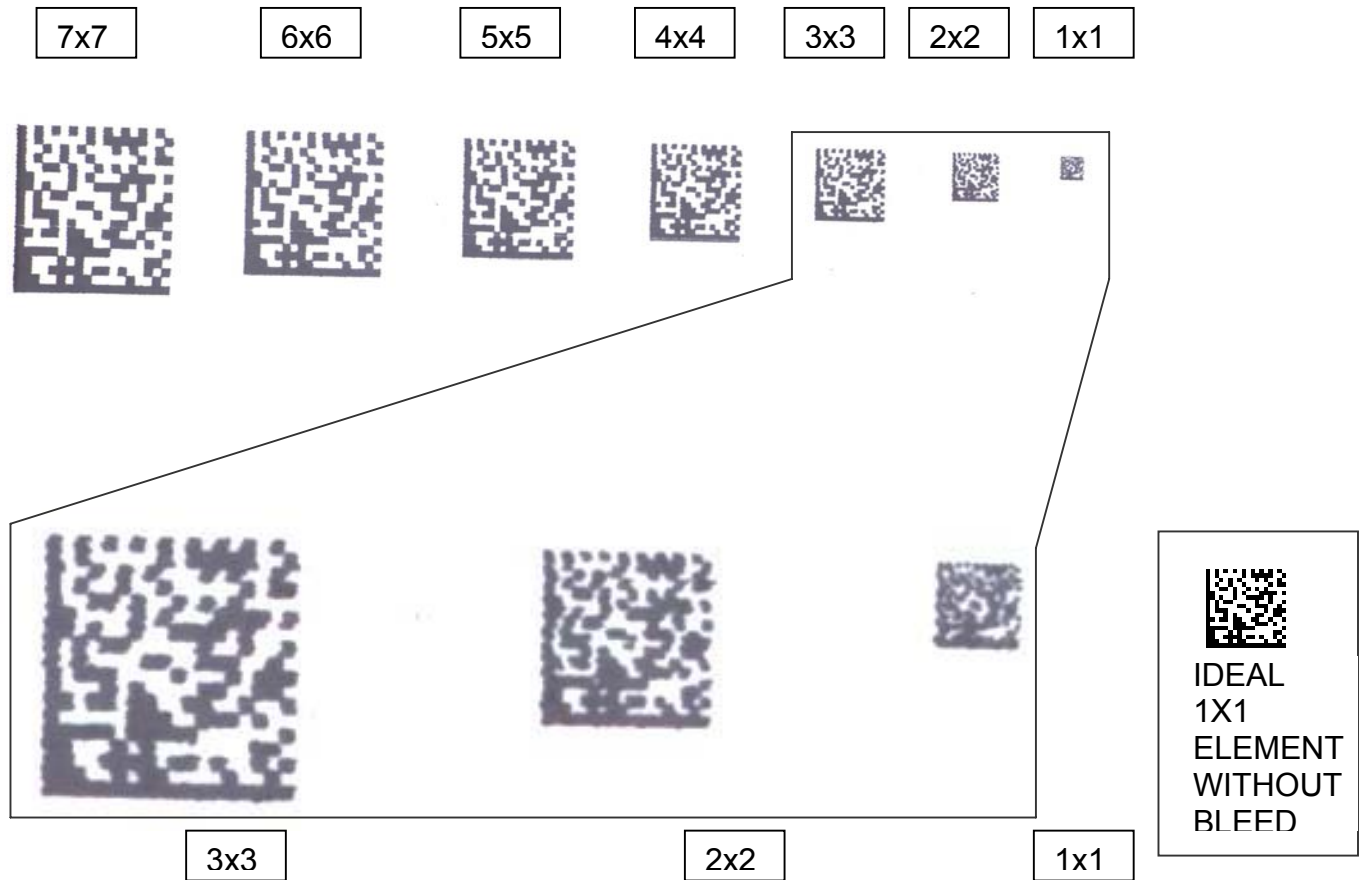


Data matrix codes are more tolerable to stretch and skew by the nature of their imbedded clocking patterns defining both columns and rows.

Below is an 18x18 array encoding DIGITAL DESIGN INC. The pattern is repeated 7 times with various resolutions ranging from a 7x7 element to a 1x1 element. Even though it is conceivable to produce a 1x1 element, the nature of ink bleed makes it unrealistic. The LX 2 with the optional DATAMATRIX symbologies installed limits the element size to a 2x2 array.



As a comparison the following is a scanned image of the actual printed sample.



The above is an enlarged pictorial of the last 3 element resolutions. As may be seen the 2x2 element is extremely discernable, where the 1x1 array loses definition due to bleed patterns.

As with linear barcodes the use of an encoder is not necessary for 2-D barcodes for any environment that does not contain an acceleration or deceleration component. Product handling should always be considered and care should be exercised in presenting the product relative to the print head in a consistent manner.

USING CHECK CHARACTER

If you are supplying the code with the check digit already calculated, you must deselect the ADD CHECK CHARACTER.

If you want the software to calculate the checksum for you, you must select ADD CHECK CHARACTER.

For example:

EAN and UPC have fixed length and therefore only the following possibilities exist.

EAN13: you supply a 13-digit code including the CHECK CHARACTER or you supply a 12-digit code and select the ADD CHECK CHARACTER.

EAN8: you supply an 8-digit code including the CHECK CHARACTER or you supply a 7-digit code and select ADD CHECK CHARACTER.

UPCA you supply a 12-digit code including the CHECK CHARACTER or you supply 11-digit code and select ADD CHECK CHARACTER.

UPCE: you supply an 8-digit code including the CHECK CHARACTER or you supply a 7 digit code and select ADD CHECK CHARACTER