# EVOLUTION II

INK JET PRINTERS
INSTALLATION AND OPERATION MANUAL

## digital design inc.

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This manual is for use in operating and maintaining the EVOLUTION II Ink Jet Printer. This 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.

Digital Design Inc. has a policy of continual product improvement. The Company therefore reserves the right to modify the information contained in this manual without prior notice.
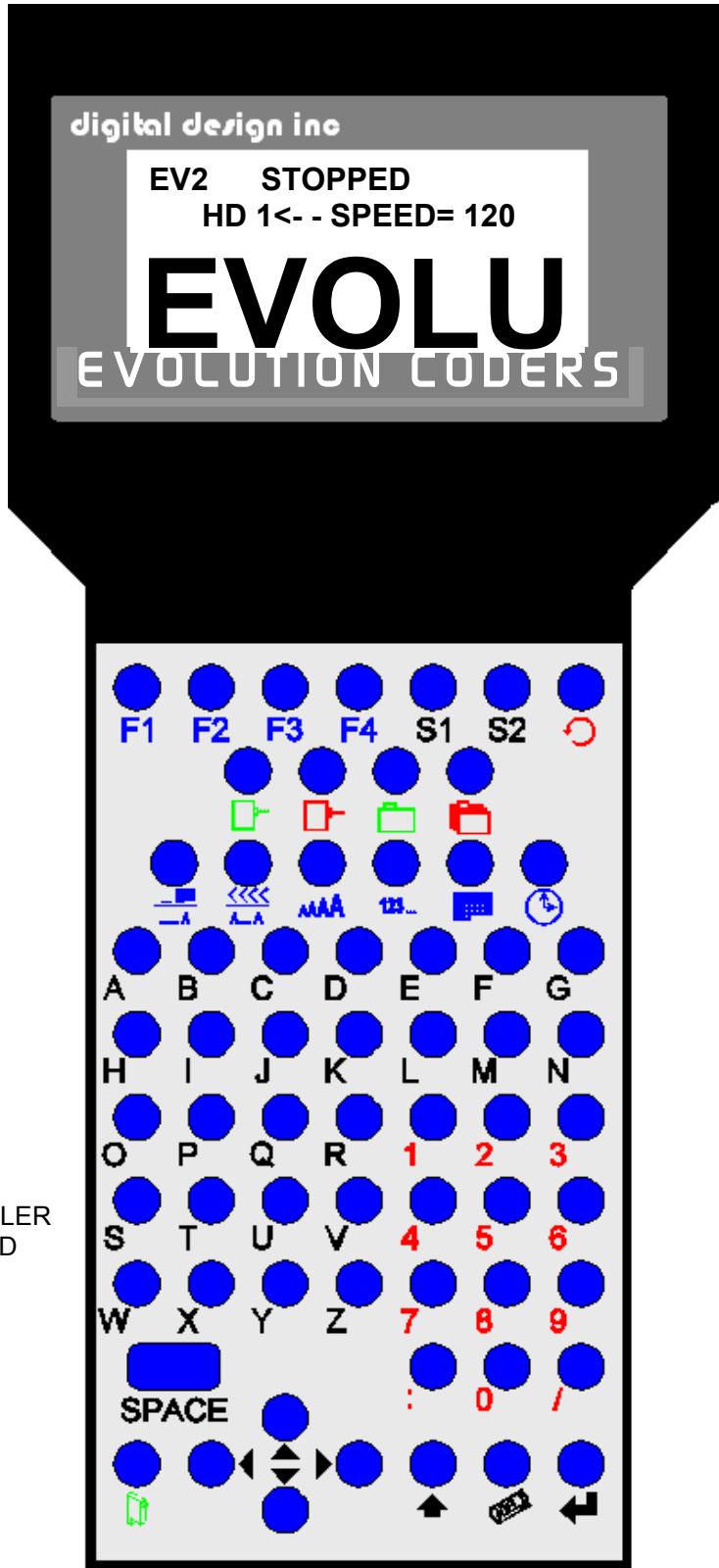
**ALL PRINT CARTRIDGES SUPPLIED BY DIGITAL DESIGN INC. ARE FACTORY TESTED AND PROFILED TO PRODUCE AN OPTIMUM AND CONSISTANT CODE. USING OTHER THAN AUTHORIZED CARTRIDGES WILL CAUSE UNDESIRABLE RESULTS.**
**EACH FLASH DATA CARD IS PROFILED EXPLICITELY FOR ITS' INTENDED PRINTER, AND IS SECURITY LOCKED PROHIBITING USE IN OTHER THAN THE ORIGINAL PRINTER FOR WHICH IT WAS PURCHASED. KEEP ALL UPGRADE CARDS IN A SECURE PLACE.**
**EVOLUTION II IS A FULLY FEATURED MODEL WITH VARIABLE FIELD PROGRAMMING AND BARCODE CAPABILITIES.**

# EVOLUTION CONTROLLER

PRINT HEAD
CABLE PLUG

digital design inc

**EV2    STOPPED**
**HD 1<- - SPEED= 120**

# EVOLU

EVOLUTION CODERS

GRAPHIC
(WSYWIG)
LCD DISPLAY

F1  F2  F3  F4  S1  S2

A  B  C  D  E  F  G

H  I  J  K  L  M  N

O  P  Q  R  1  2  3

S  T  U  V  4  5  6

W  X  Y  Z  7  8  9

SPACE  :  0  /

EVOLUTION
CONTROLLER
KEYBOARD

**NOTE:**
**THE EVOLUTION**
**GRAPHIC CONTROLLER**
**WILL CONTROL THE**
EVOLUTION 1        (EV1)
EVOLUTION 2        (EV2)
EVOLUTION SC      (EVSC)
**THE UPPER LEFT**
**CORNER OF THE DISPLAY**
**INDICATES THE SPECIFIC**
**PRINTER CONNECTED TO**
**THE HAND HELD**
**CONTROLLER**

# INSTALLATION AND OPERATION MANUAL
## PART 1:  INSTALLATION PROCEDURES
### INSTALLING THE EVOLUTION II PRINTING SYSTEM

Caution should be taken while installing the EVOLUTION 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.


**VERIFY THAT YOUR EQUIPMENT IS IN PROPER OPERATING CONDITION.**

**LOCATE A CONVENIENT POSITION ON YOUR EQUIPMENT. EVOLUTION II 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 THEN THAT SUPPLIED IN THE INSTALLATION KIT.**

**MOUNTING ON PRODUCTION LINE**

```
MOUNTING BRACKET TEMPLATE
      PLACE ADHESIVE TEMPLATE
        ON PRODUCTION LINE


   ⊕       MARK CENTER SPOTS     ⊕


  DRILL AND TAP 5/16-18 (0.250 DRILL)
                  OR
    CLEAR DRILL 11/32 (0.343 DRILL)
```
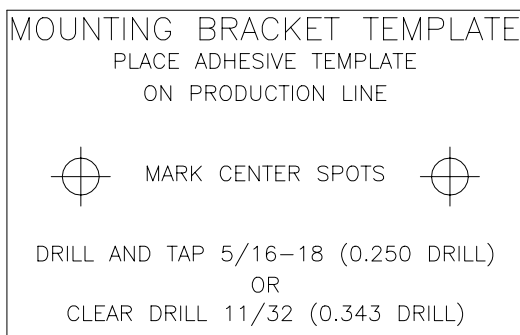
Locate the supplied mounting template and affix in a convenient location on the production line. Spot and drill both mounting holes for a 5/16" bolt. NOTE: the user may also thread the side of the conveyer using a 5/16" tap.

Fasten the mounting bracket to the conveyer using the supplied mounting hardware and ensuring 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 II MOUNTING OPTIONS**

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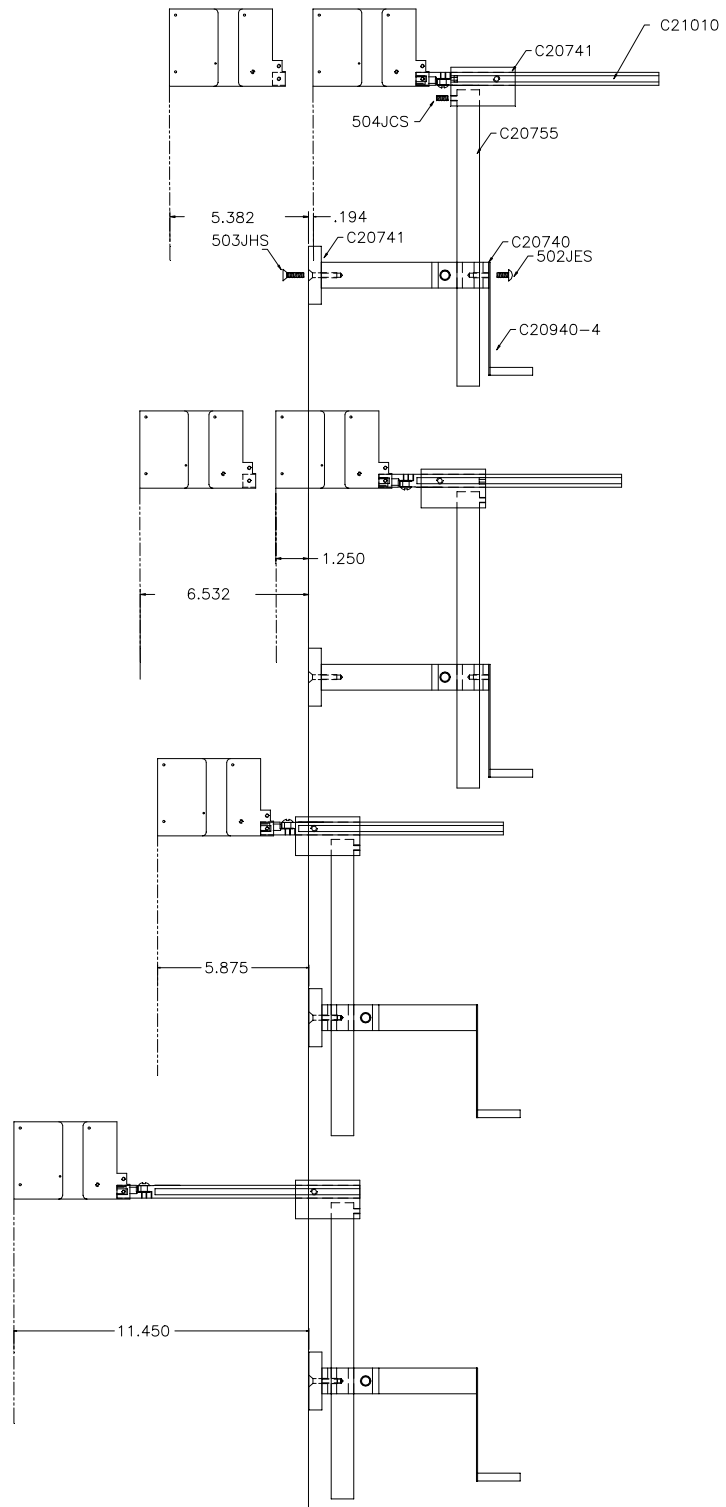
Vertical height adjustment for the EVOLUTION II print head is accomplished by loosening the included hand knob 5993K41.

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.
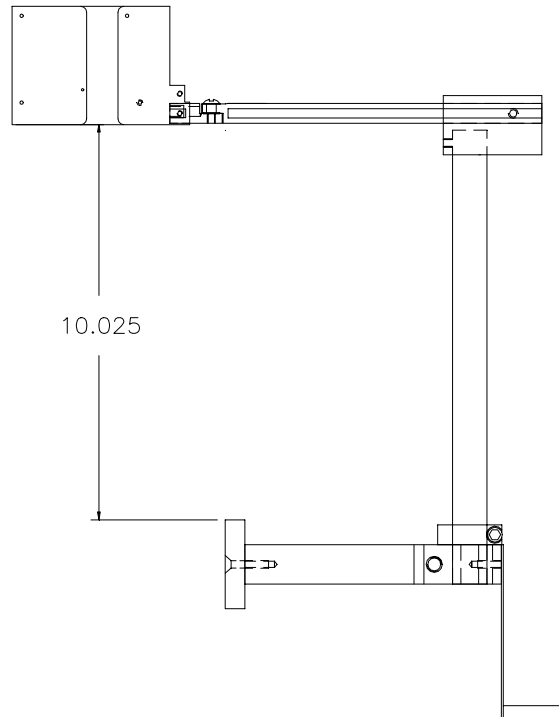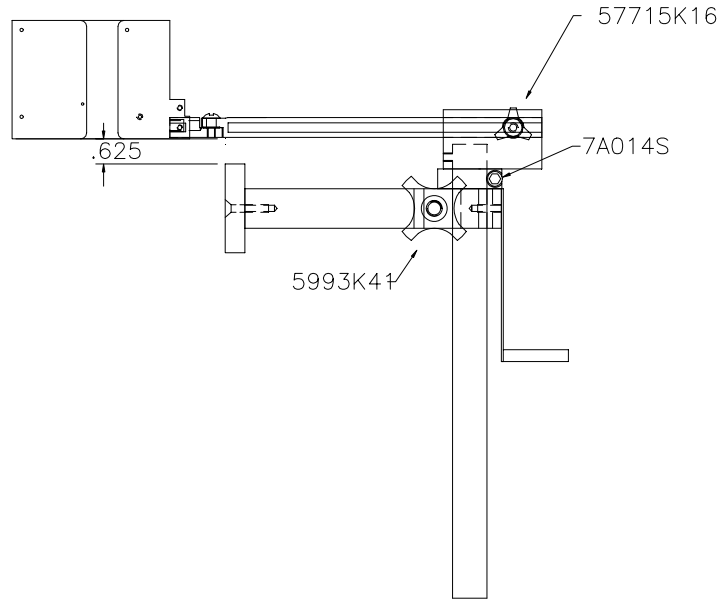
# GROUNDING STRAP INSTALLATION

**INSTALL STRAP UNDER 5/16"
SCREW. ENSURE
CONDUCTIVITY TO
EARTH GROUND IS
LESS THAN 1 OHM**
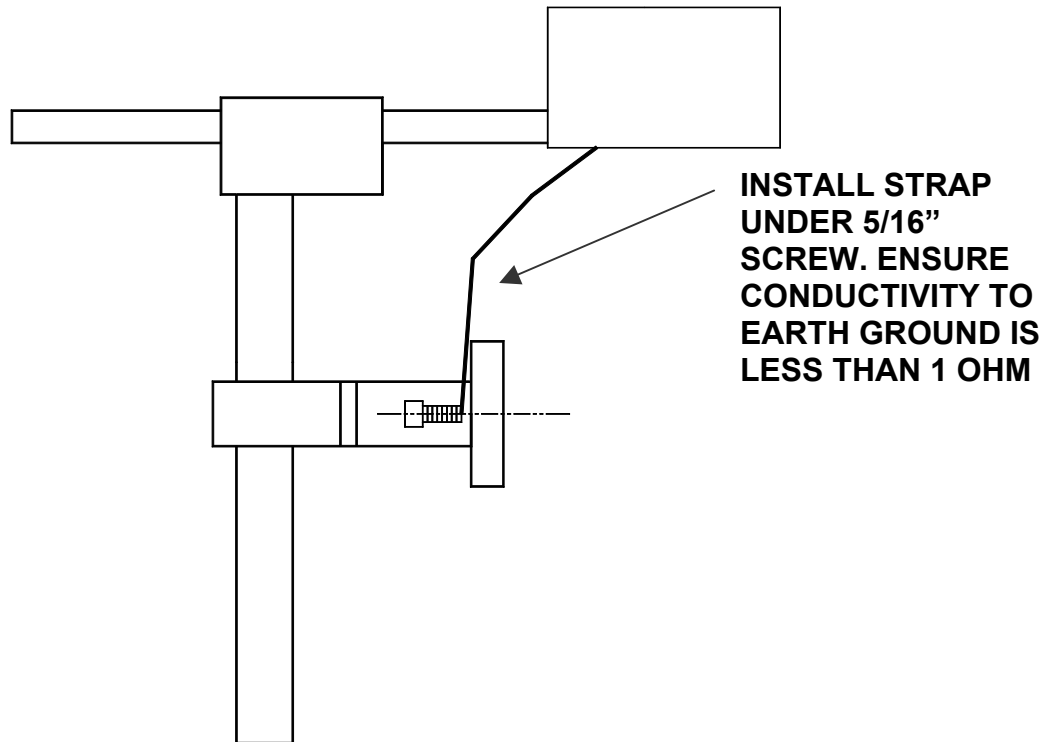
## INPUT POWER CONNECTION AND MODIFICATION

Insert the power plug to the available power source. The supplied power supply will 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 retain the film. This protective film may be re-applied to store partially used cartridges. If it is necessary to remove the print head and store for a long period of time, it is best to re-apply the plastic film, and place the cartridge in a closeable plastic bag. Rotate the Print Head Release mechanism to the rear of the print head so that it is free for insertion of the print cartridge. Push the print cartridge in and down to insert it into the print carriage. Gently lift the locking arm and press forward against the print cartridge. A 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 CHARACTERISTECS FOR EACH INDIVIDUAL CARTRIDGE. USING ANY OTHER PRINT CARTRIDGE WILL HAVE UNDESIRABLE RESULTS.**
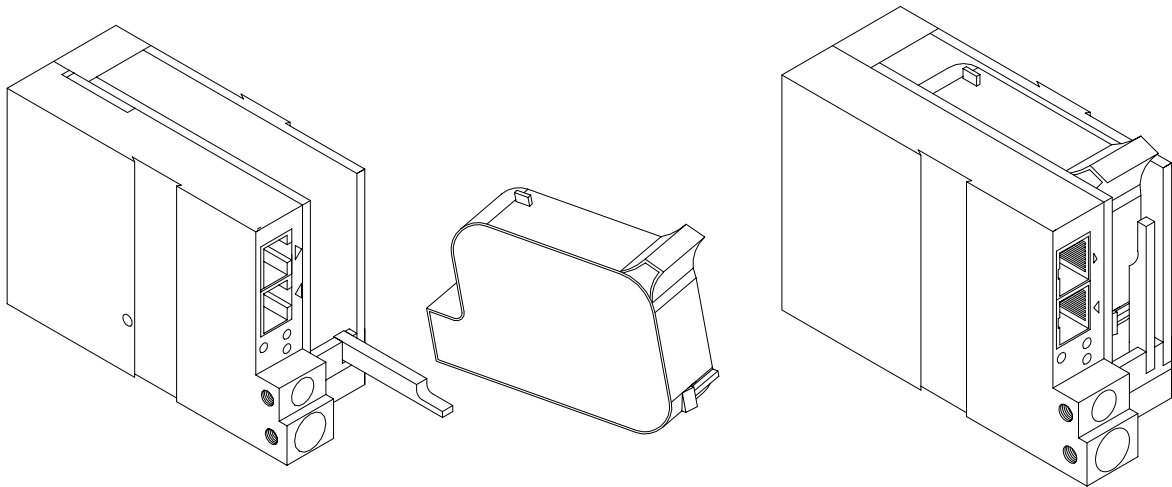
**NOTE: WHEN A NEW CARTRIDGE IS INSTALLED, BOTH THE RED AND GREEN LIGHT WILL FLASH TWICE INDICATING A CORRECT INSTALLATION. THE USER MUST REMEMBER TO RESET THE INK LEVEL UNDER THE F4 FUNCTION KEY MENU.**

## CONNECTING THE CONTROLLER TO THE CARRIAGE

Connect the Controller to the print carriage using the supplied 3 FT (.9 mm) 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 Carriage 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 TO THE CONNECTOR**. A click will be heard when the connector is in the appropriate position. Connect the free end to the Controller Assembly and ensure connector is securely seated.



RESET SWITCH ACCESS HOLE

PRINT CARRIAGE RJ50 OUTPUT CONNECTOR

PRINT CARRIAGE RJ50 INPUT CONNECTOR

GREEN CYCLE LED

RED PRINT ENABLE LED

POWER INPUT +12VDC @1.5A

CONTROLLER RJ50 CONNECTOR
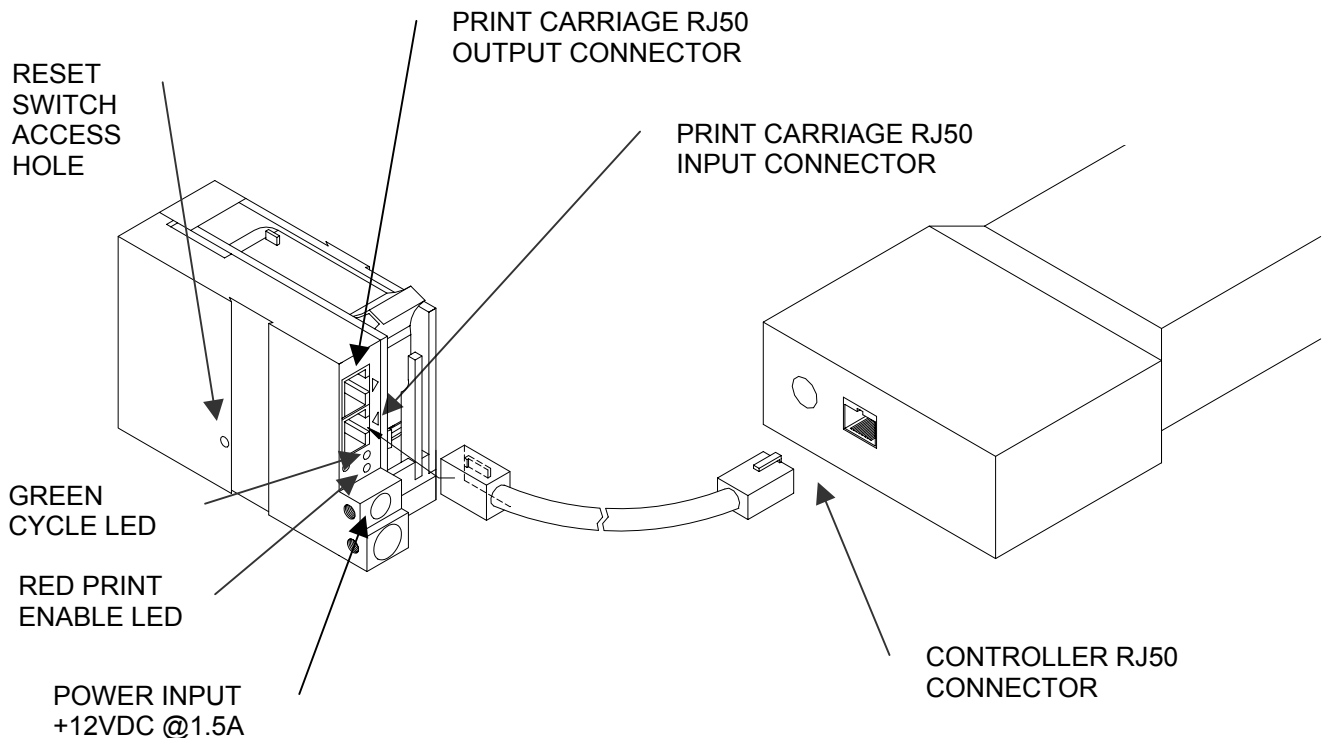
**CAUTION:**
**NOTE ORIENTATION OF THE CONNECTORS. DO NOT FORCE CONNECTORS INTO POSITION SECURELY LATCH (CLICK) INTO POSITION.**
**CONTROLLER MUST PLUG INTO THE PRINT CARRIAGE RJ50 INPUT CONNECTOR FOR PROPER OPERATION. THE PRINT CARRIAGE RJ50 OUTPUT CONNECTOR IS USED EITHER FOR CONNECTION TO THE NEXT PRINTER ON A NETWORK OR FOR EXTERNAL PRODUCT OR EXTERNAL ENCODER INPUT.**
**THE POWER INPUT CONNECTOR MUST BE SECURELY INSERTED INTO THE PRINT CARRIAGE. UPON PROPER INSERTION BOTH THE RED AND GREEN LED'S WILL FLASH INDICATING PROPER CONNECTION.**

## CONFIGURING THE PRINTER

**To verify the current operating software press the STOP PRINT** ⊡ **key.**
**Press the V key**

```
CONTROLLER 7.08
PRINTER 2.08K++++
PRINTER SN XXXXXX
EXIT ANY KEY
```

The first line indicates the version of the controller software
The second line numerics indicate printer software version and the letter is the firmware version of the printer.  The '+' (s) following indicate options installed:
        ++++      = Fully Optioned
The third line indicates the serial number of the printer

## SYSTEM RESET

## Soft Reset:

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

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

Pressing the R key while applying power to the unit will display the reset command mode
**CAUTION:** A response of Y will delete all stored messages.

```
RESET PRINT HEAD

 YES OR NO  Y/N
```

The next screen to appear prompts the user to determine if a print head is to be restored to its default value.
**CAUTION: ALL PRINT HEADS CONNECTED TO THE CONTROLLER WILL BE RESET TO FACTORY DEFAULT CONDITIONS.  THIS INCLUDES RESETING EACH UNIT ADDRESS TO 1.  TO PREVENT THIS REMOVE ALL INTERCONNECTED PRINT HEADS EXCEPT FOR THE UNIT TO BE RESET FROM THE DATA LINK.**

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

## 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.

This operation will reset the print carriage assembly to the factory default settings and clear any current message.

## MULTIPLE PRINT HEADS

EVOLUTION II printing systems have the ability to reside on a network. The network may contain from 1 to 32 print carriages connected via RJ50 cables. These cables are available in varying lengths depending on the application.
Each mounting bracket can support up to 4 print carriages and would typically interconnect with a 6" RJ50 data cable.

NOTE: Please address each unit individually as per page 2-17 prior to daisy chaining the printers.  Special care must be taken to connect the output of the first print carriage to the input of the next print carriage.

When connecting multiple print carriages place no more than 2 stations on a side of the mounting bracket as shown.

PRINT CARRIAGE
ADDRESS 1

PRINT CARRIAGE
ADDRESS 4

PRINT CARRIAGE
LOCKING SET
SCREW

TO
CONTROLLER
OR COMPUTER
DATA LINK
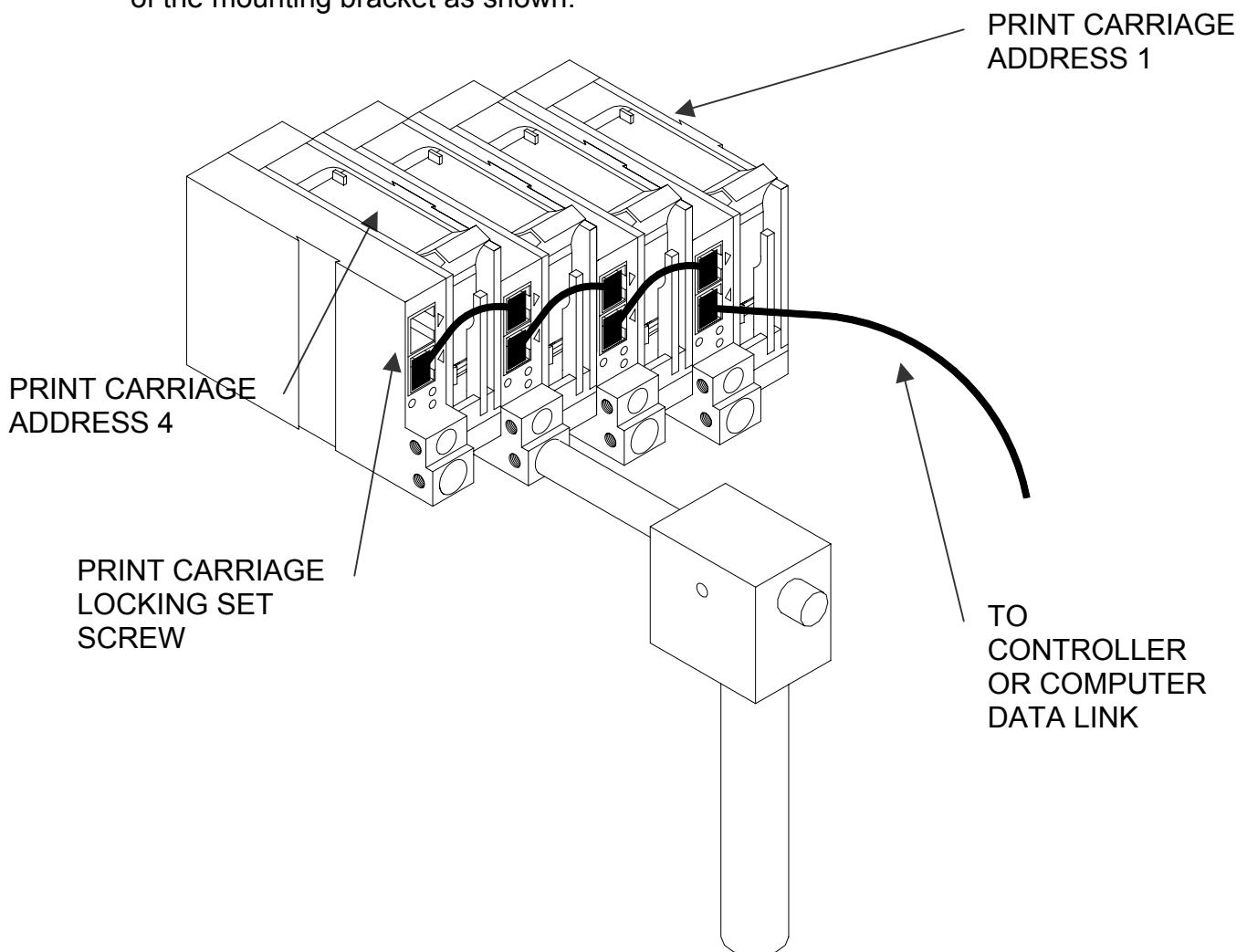
## EVOLUTION II QUICK START

```
EV2   STOPPED
HD 1- - >SPEED=100
EVOLU
```

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

On startup the LCD will display as pictured.

### CHANGING LANGUAGE PROMPTS

```
< - -  SELECT   - - >

ENGLISH
```

Press the F4 key [F4] and select [1] for LANGUAGE. Use the [◄] [►] keys to select the desired language and press the [↵] to select the language.

### ENABLING PRINT MODE

```
EV2   PRINTING
HD 1- - >SPEED=100
EVOLU
```

Press the GREEN PRINT key [▢⋯] to start printing

### HEAD SELECT MODE

```
EV2   STOPPED
HD 1- - >SPEED=100
EVOLU
```

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

```
< - -  SELECT   - - >
WHICH HEAD =   1
EVOLU
```

the [▨] key. Use the [◄] [►] keys to select the alternate print carriage number and press the [↵] key. The print carriage 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 environment

```
  NO RESPONSE


ANY KEY TO EXIT
```

Accessing an address not associated with any print carriage will result in a no response message.

## ENTERING A MESSAGE

```
EV2   STOPPED
HD 1- - >SPEED=100


EVOLU
```

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 🗀

```
MESSAGE ENTRY
- - - - FONT-1 LINE
```

Press the BLUE F3 key [F3] to delete the entire message

```
MESSAGE ENTRY
- - - - FONT-1 LINE


EXP 12/
```

Press the BLUE [ᴀA] FONT key to select the desired font size and enter the text EXP 12/10/04

Press the ENTER key ⏎ to end the MESSAGE EDIT mode

```
MESSAGE ENTRY
- - - - FONT-1 LINE


2/10/04
```

Notice as data is entered the display scrolls to the left as new characters are entered.

Press the ENTER key ⏎ will end the MESSAGE EDIT mode, re-display the message end enter the STOPPED mode.

```
EV2   PRINTING
HD 1- - >SPEED=100


EXP 12/
```

Press the GREEN print enable key ⌨ to enter the print mode

## STORING A MESSAGE

```
EV2   STOPPED
HD 1- - >SPEED=100

EXP 12/
```

Press the GREEN STOP PRINT KEY 🖳

**Note: There are a total of 100 messages stored in the hand held controller. This allows the user to move the controller to another print station 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  EV2
PLEASE WAIT
```

```
MESSAGE #    1  EV2
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

```
EV2   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 command prompt.

## LOADING A MESSAGE

```
EV2   STOPPED
HD 1- - >SPEED=120

EVOLU
```

Press the GREEN STOP PRINT KEY ⬚

```
MESSAGE #    1  EV2


EXP 12/
```

Press the RED MESSAGE STORE key 🗀 and use the ◀ or ▶ keys to select the desired message and press the ENTER ⏎ key

```
EV2   STOPPED
HD 1- - >SPEED=120

EXP 12/
```

```
EV2   PRINTING
HD 1- - >SPEED=120

EXP 12/
```

Press the GREEN print enable key ⬚ to enter the print mode

## EVOLUTION II QUICK SETUP

Install a new cartridge.  Press the following keys in order:

[F4]  [2]

To reset the ink level detector press [C]

```
REMAINING INK
     100 %
C NEW CARTRIDGE
OTHER KEY EXIT
```

Each time a new print cartridge is installed the system automatically profiles the correct operating parameters for the new cartridge. These parameters set the required voltage and on time to produce consistent results without user intervention.
**NOTE: USING OTHER THAN AUTHORIZED CARTRIDGES MAY CAUSE UNDESIRABLE RESULTS.**

Press the GREEN print enable key [⊡] to enter the print mode

To set the LINE SPEED, press [⊡] to put the system in the Printing mode. Set character width by

[A..A]  [◄]  [►]  [←]

To set the PRINT DELAY press: [⊡] to put the system in the Printing mode. Set print delay by

[.....A]  [◄]  [►]  [←]

. NOTE: Each increment or decrement changes the delay by the pre-defined amount.

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
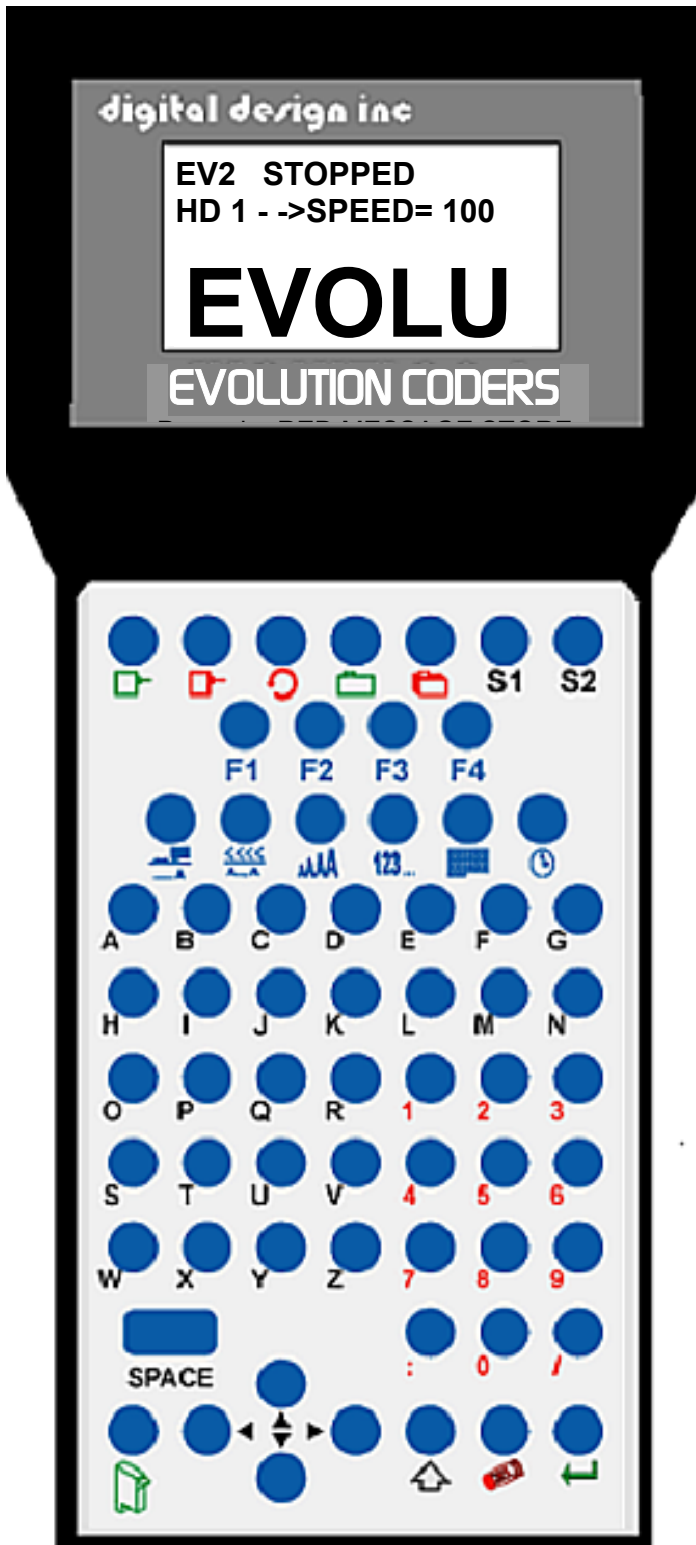


The keypad on the print station, pictured here, contains 64 keys. The LCD will display various messages to assist in programming on the upper half of the display. The lower half of the display will show up to two lines of the entered print message.

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

The Command Mode is used to change the functions of the printer. When in the Command 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 top 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 Print mode |
| | This is the Purge key. Use it to purge ink for maintenance purposes. The unit must be in the Command mode to use this key. |
| | This is the Head Select key. Use it to select the address of the head to be communicated with. In edit mode it enters the DAY of WEEK |
| ◄ | 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. |
| ▼ | Use this arrow to move the cursor between the message lines while in Edit mode and building a message. |
| | This key is the Message Storage key. Use it to store and to recall individual codes. |
| | 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 code. |
| | This is the Date key. Use this key to enter the Date in Message Entry Mode. (OPTION PACK 2). Change Date in STOPPED mode. |
| | This is the Time key. Use this key to enter the Time in Message Entry Mode. (OPTION PACK 2). Change Time in STOPPED mode. |
| 123... | This is the Sequence Number key. Use this key to enter the Sequence Number in Message Entry Mode. (OPTION PACK 2) |
| | This is the Enter or Return key. When pressed, the unit will accept input and exit certain menus. |
| | This key selects the Print Delay in COMMAND mode and Offset Date in EDIT mode (OPTION PACK 3) |
| | This key selects the Line Speed in COMMAND mode and the shift code in the EDIT mode (OPTION PACK 3) |
| AAA | This key selects the Font size in the EDIT mode. In the COMMAND mode pressing this key displays the current fonts loaded in the print head. |
| **S1** | Pressing this key while in the Message Entry mode accesses special characters |
| **S2** | This key is reserved for special customer Logos |

# TURNING ON THE PRINT STATION FOR THE FIRST TIME

```
EV2   STOPPED
HD1- - >SPEED=120


EVOLU
```

To turn the print station on insert the power jack into the DC power connector.
**There is no on/off switch.**
The first time the print station is turned on, as received from the factory, the LCD will look like the illustration on the left. Each line gives important information regarding the system:

The Top line indicates the operating mode of the unit: STOPPED when in Command mode, PRINTING when in Print mode, and MESSAGE ENTRY when in message entry.

The 2nd line shows the print head currently selected, the direction of travel for the product and the programmed SPEED.

The lower half of the display shows the message entered for printing. This may represent one, two, three or four lines of code.

**NOTE: THE DISPLAY IS A WYSWIG GRAPHIC TYPE AND MAY ONLY DISPLAY A PORTION OF THE ACTUAL MESSAGE.**

## CHECKING SYSTEM INFORMATION

```
CONTROLLER  1.06
PRINTER  2.08K++++
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. The EVOLUTION II printer is fully configured thus a ++++ will be displayed.

## CHECKING LOADED FONTS

```
EVSC   ACTIVE FONTS
   4 LINE ARIALA332
   3 LINE ARIALA1_8
   2 LINE ARIALA732
   1 LINE ARIALA1_2

 ANY KEY TO EXIT
```

Press the FONT ᴬᴬ**A** key in the COMMAND mode to check what fonts are currently loaded in the print head.

# CHANGING SYSTEM DATE AND DAY OF WEEK CODES

```
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.
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 MONTH-
```

```
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

**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 date. If there are no changes press the N key to return to the STOPPED mode.

**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 12:00AM (midnight). For example if the start of a new shift day occurs at 6:00AM 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 disables the function.

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

Similar to entering the time enter first 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.

# PROGRAMMING

## DEFINITIONS

There are two parts to programming the EVOLUTION II ink jet printer,
- Setting the operations parameters, (character width, delay, etc.) and
- Building the message.

## MODES OF OPERATION

The system operates is 3 basic modes. They are: PRINTING Mode, STOPPED (command) Mode, 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 Command 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**.

## PRINT MODE AND STOPPED "COMMAND" MODE

```
EV2   PRINTING
HD1- - >SPEED=100


EVOLU
```

When in the Print 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 carriage assembly. To enter Print mode, press ⬚⋯.

```
EV2   STOPPED
HD1- - >SPEED=100


EVOLU
```

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

In Command 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 Command mode, press ⬚⋯.

**MENU STRUCTURE**

In the Command 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 TYPE
```

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

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

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

```
1= PRODOCT COUNT
2= SHIFT CODE
3=DATE FORMAT
4=TIME FORMAT
```

**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
```

## F1 MENU

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

Place the unit in the Command mode and press [F1]. The screen shown to the left is produced. Press the correct number to make changes to that parameter. Those selections designated as NOT AVAILABLE will not respond to selection. They are reserved for future system expansion.

## 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 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.

## 3 = DATE OFFSET:

```
DATE OFFSET
USE KEYS 0->9
# OF DAYS = 100
```

To enter a date offset (expiration date) change the value equal to the number of days until expiration. Legal entries are 0 to 999 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.

## 4 = BARCODE TYPE:

```
< - - SELECT - - >
   CODE 39
```

This parameter determines the barcode type to be entered into a message. As standard the EVOLUTION II 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. 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 Command mode and press [ F2 ]. The screen shown to the left is produced. Press the correct number to make changes to that parameter

## 1 - DIRECTION:

```
< - - SELECT - - >
LINE DIRECTION


        < - - - -
```

The arrow shown on the LCD's third line screen should agree with the direction of product travel. Press ▶ or ◀ to change the direction of print. Press ⏎ for the unit 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. Pressing 2 will produce the following screen. Press 1 for normal print or 2 for upside down codes. Save the choice by pressing ⏎. Look for the change of direction on the imprint.

## 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 to use the internal product detect sensor located at the front of the print carriage just below the print cartridge. 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 printer to be controlled from other sources, like a PLC. When external product detect is selected the user must also change the jumper option within the print head. Refer to the OPTION SELECT section for proper use.

## 4 - AUTO REPEAT:

```
< - -  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 16 character columns or 0.053". This allows for a total displacement of 13.46". Setting a print delay that uses the same mathematical equation can increase this number. Thus a total displacement of 26.92" can be realized.

## F3 MENU

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

## 1 – PRODUCT COUNT:

```
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 external photo eye. Depressing the **C key** may clear the counter.

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

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

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:

```
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:

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

```
CHANGE FORMAT
1=CALENDAR DATE
2=OFFSET DATE
```

```
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 CALANDER FORMAT AND THE DATE OFFSET FORMAT**
**NOTE: THE FOLOWING PROCEDURE APPLYS TO BOTH CALANDER 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.**

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 (.).

<table>
<tr>
<td>

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

</td>
<td>

Alpha characters may have bee selected by pressing option 2.

</td>
</tr>
<tr>
<td>

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

</td>
<td>

Delete the current formatting by pressing the Delete key.

</td>
</tr>
<tr>
<td>

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

</td>
<td>

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.

</td>
</tr>
<tr>
<td>

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

</td>
<td>

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.

</td>
</tr>
</table>

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

## 4 – TIME FORMAT:

Change the Time Format by selecting option 4.

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

**NOTE: Delimiter characters like a : code may be entered to separate fields**

```
TIME FORMAT
H=HOURS
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
M=MINUTES
hh
```

Enter the desired format by pressing the H and or M 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 Command 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 choice is Spanish. Scroll through the choices using either ◄ or ►. Once the desired language is shown on the screen, press ⏎. This will return the unit to the Command mode. Whenever language is chosen, all prompts and commands shown on the screen will be in that language.

## 2 - INK SUPPLY:

**REMAINING INK**
**100**
**C NEW CARTRIDGE**
**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 user must reset the system ink gauge by pressing the **C** key.

When a C is entered the system automatically profiles the operating conditions for the new cartridge.

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 and pre-fire pulse warming 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 print carriage can contain a unique address to distinguish multiple carriages when controlled by a single hand held controller or computer data link using an RS485 data link. The default for each new print carriage module is ADDRESS 1. Addresses can range from 1 to 32. It is advisable when adding multiple print carriages to affix a label indicating the unique ADDRESS number of the individual carriage.

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

## 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 print carriage.  Select 1 to load a different font to replace the current system font.

```
LOAD FONT
1= LOAD DEFAULTS
2= LOAD ALTERNATE
```

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
PLEASE WAIT
```

To load or replace the current LOGOS in the system press the **2** key. Similar to loading FONTS the screen at the left will appear indicating the load results.

```
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 fontname
1 LINE fontname
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
```

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

**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 print carriage.  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 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  1.06
PRINTER  2.08K ++++
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: 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 PRINT CARRIAGE 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 CARRIAGE AND WILL NOT OPERATE IN ANOTHER PRINT CARRIAGE.**
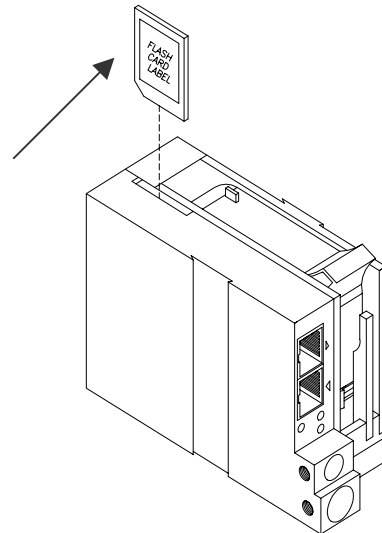
**NOTE:**
**There are four fonts loaded into the EVOLUTION II printer at any one time. Loading a new font will overwrite the existing font or fonts. Print starts at the bottom nozzle of the print head (dot 150 for line 2) and at the middle of the print head (dot 75 line 1). The printer is shipped with a 1/2" font, a 7/32" font, a 1/8" font and a 3/32" font. The 1/2" font may be replaced with other than a 1/2" tall character. Alternate fonts that are loaded replace the existing fonts. Inserting a data flash card containing alternate fonts and cycling the power will temporarily use the alternate fonts on the data flash card until the card is removed and either the power is cycled or the print station is set to the STOPPED mode. This eliminates the need to load the alternate font using the LOAD CARD option.**

## SETTING PRINT DELAY AND LINE SPEED

**LINE SPEED** – This setting adjusts the width of the printer 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.

**PRINT DELAY** – This setting adjusts the location of the printed message on the product.

```
EV2   STOPPED
HD1- - >SPEED=100

EVOLU
```

Access to these parameters is possible when the unit is in either the STOPPED or PRINTING mode as shown to the left.

Pressing the ⌐A delay key allows the user to determine the amount of print delay. Each count at a normal aspect ratio is approximately 0.060". This will vary according the amount of compression or expansion used.

```
EV2   PRINTING
HD1- - >SPEED=100

EVOLU
```

## 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 $\overline{\overset{<<<}{\text{A..A}}}$ 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 1 to 200. Once the desired number is chosen, press ⏎ to save your entry.

```
< - -   SELECT   - - >
ENCODER DIV = 4
```

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 printer message. Changes may be made by using ◄ or ►. Once the desired number is chosen, press ⏎ to save your entry.

## SETTING PRINT DELAY

```
EV2   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**

```
EV2   PRINTING
HD1- - >SPEED=100


EVOLU
```

```
< - -   SELECT   - - >
PRINT DELAY= 100
```

To change the value use either [◄] or [►]. The range of values for this parameter is 1 to 255. Each increment represents 18 columns, approximately .053" (1.35mm). Therefore, a delay of 255 would approximate 13.46" (342mm). Once a number is chosen, press [↵] to save the entry.

**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 18 COLUMNS PER COUNT.**

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

## SETTING HEAD ALIGNMENT

```
< - -   SELECT   - - >
HEAD ALIGN = 0
```

Aligning the vertical print for messages in multiple print heads is fine-tuned with an additional feature found in either the PRINTING or STOPPED mode. Pressing the letter O on the keyboard accesses this feature.
A count of 0 disables this feature while using the arrow keys allows the user to fine-tune the print head alignment. Valid selections are from 0-16.

## INPUT, EDIT OR DELETE MESSAGES

EV2   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.

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  F3  key to delete the entire existing message.

MESSAGE ENTRY
    FONT  1 LINE

**.DD.DY**

For example, to produce a single line of 1 LINE. Press the font key  [AA]  until the 1/2 " font size is shown, and enter        EXP    followed by the

⬚  key. This enters the DATE OFFSET 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 size. Press the  F3  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.

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

Once the message line(s) is complete, save the change by pressing ⬚.

**NOTE: USE THE DATE OFFSET KEY TO ENTER**

**AN EXPIRATION DATE.**

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

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..

```
  MESSAGE ENTRY
      FONT  1 LINE
BEST BY
EXP
```

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

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

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

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

```
< - -   SELECT   - - >
 !#$&( )*+=¢■ŇÉÕ
```

Symbols are inserted by pressing S1. When in Message Entry mode, position the cursor where a symbol is needed and press S1. The screen will show a line of symbols as presented on the left. Position the cursor by pressing ◀ or ▶ on the special character to be inserted and press ⏎.

```
 EV2   STOPPED
 HD1- - >SPEED=120
 BEST BY
 EXP 12/01/2014
```

Continue to build the message or press ⏎ to return to the Command mode.

**EVOLUTION II messages may contain up to 4 lines of text. Selecting multiple message lines is accomplished by pressing the font key until the appropriate line designation is displayed. NOTE: barcodes may only be used in the 1 or 2 line mode. Smaller barcodes are generally un-useable under 7/32".**

```
  MESSAGE ENTRY
- - - - FONT- 1   LINE
```

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

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

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 date 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

```
  MESSAGE ENTRY
- - - - FONT- 1   LINE

0000
```

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

```
  MESSAGE ENTRY
< < < < FONT- 1   LINE

DM.DD.
```

Date offset codes are entered by using the key.
The correct date offset format as defined in the F3 menu is entered into the message with the key to enter a shift code.

```
  MESSAGE ENTRY
- - - - FONT- 1   LINE
S
```

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.

```
  SEQ. NUMBER
1= COUNT UP
2= COUNT DOWN
```

Sequence number format is programmable in the STOPPED mode. 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

ANY CHANGES Y/N
ENTER #000000000
```

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 enter 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 STOPPED mode.

```
COUNTER LIMIT

ANY CHANGES Y/N
ENTER #000005000
```

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 under the M F G or the E X P on the second line. The same designator will be seen when the cursor is placed under 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.

```
 MESSAGE ENTRY
- - - - FONT- 3   LINE
BATCH 3FT4E
MFG DM/DD/DY HH:MM
EXP DM.DD.DY S 0009
```

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

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 ON A PARTICULAR LINE. 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 48 characters permitted per line data entry will be inhibited when the 15$^{th}$ object is entered, although the last field, if it is an alphanumeric object, may contain enough characters to meet the 48-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 objects.

```
  MESSAGE ENTRY    ▐▐▐▐
- - - - FONT- 1   LINE
                 CODE 128C

 12345
```

```
  MESSAGE ENTRY
- - - - FONT- 1   LINE
                 CODE 128C
   12345
```

Barcode fields may be entered by pressing the [F4] key while in the MESSAGE ENTRY mode. 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 lined overlaying the barcode field. Barcode fields may contain a sequence number 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**

## VARIABLE FIELD FORMAT PRINTING

The EVOLUTION II printer provides the operator the capability of adding variable fields to a message. This includes TIME, DATE, SEQUENCE, DATE OFFSET and SHIFT CODE PRODUCT COUNT and BARCODES. Entering any of these special fields is accomplished with the ▦ ⏱ 123... ▀▄ᴀ ⫷ᴀ..ᴀ [F4] keys.
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.

```
   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 F3 key to delete the entire existing message.

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

```
   MESSAGE ENTRY
      FONT  1 LINE

DD/DY
```

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

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

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

```
   MESSAGE ENTRY
####FONT  1 LINE
0000
```

To enter a SEQUENCE NUMBER 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.

```
EV2   STOPPED
HD1- - >SPEED=120
DD/DM/
```

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

```
   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.

```
   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 ⬚F3⬚ key to delete the entire existing message.

To enter a DATE OFFSET CODE depress the

```
   MESSAGE ENTRY
        FONT  1 LINE
DD.DY
```

⬚ 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
```

Endering a SHIFT CODE is accomplished by pressing the ⬚A..A⬚ 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 EDIT 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.mm.yys
```

Adding a special character or LOGO is accomplished by pressing the S! or S2 keys and selecting the appropriate special symbol or stored logo.

```
   MESSAGE ENTRY
        FONT  1 LINE

mm.mm.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.

## PASSWORD PROTECTION

```
┌─────────────────────────────┐
│                             │
│   PASSWORD XXXXX            │
│                             │
│                             │
└─────────────────────────────┘
```

The printer contains a password function designed to limit access to the edit menu and prevent unauthorized changing of message lines. To activate this function, switch the unit off, then press and hold $\boxed{P}$ while switching the unit on. The display changes and requests the default password (which is 12345). Enter the 12345.

```
┌─────────────────────────────┐
│                             │
│   ENABLE PASSWORD          │
│   YES OR NO Y/N            │
│                             │
└─────────────────────────────┘
```

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

```
┌─────────────────────────────┐
│                             │
│   PASSWORD XXXXX            │
│                             │
│                             │
└─────────────────────────────┘
```

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, reset the unit.**

## MESSAGE STORAGE
## STORING A MESSAGE

| MESSAGE # 1 EV2 |
| --- |

The controller is able to store up to 100 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.

| MESSAGE # 1 EV2 |
| --- |
| PLEASE WAIT |

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.

| MESSAGE # 1 EV2 |
| --- |
| MESSAGE STORED |
| |
| EVOLUTION 1 |

The LCD display will indicate that the message is stored. The display also defines what system type the message has been created for.

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.**
**The controller is capable of storing up to 99 messages, and it should be noted that all stored messages are contained in the hand held controller.**

## RECALLING A STORED MESSAGE

| MESSAGE # 1 EV2 |
| --- |
| |
| EVOLUTION 1 |

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.

| EV2  STOPPED |
| --- |
| HD1- - >SPEED=120 |
| |
| EVOLUTION 1 |

# PART 3:  MAINTENANCE PROCEDURES
## 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.

| |
|---|
| **STOPPED**<br>**HD1- - >SPEED=120**<br><br>**EVOLUTION 1** |

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.

| |
|---|
| **PURGING**<br>**HD1- - >SPEED=120**<br><br>**EVOLUTION 1** |

Place a piece of lint free wipe (or absorbant paper) 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 water may be applied to the lint free wipe.
When purging is complete the LCD will be returned to the STOPPED mode.

| |
|---|
| **STOPPED**<br>**HD1- - >SPEED=120**<br><br>**EVOLUTION 1** |

| |
|---|
| **PRINTING**<br>**HD1- - >SPEED=120**<br><br>**EVOLUTION 1** |

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

## 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 wipes and insure there is no ink residue remaining on the nozzle area. Re-apply the sealing tape. The print cartridge may be stored in a sealable plastic bag.
**CAUTION: USE THE ORIGINAL SEALING TAPE SUPPLIED WITH THE EVOLUTION II INK CARTRIDGE. DO NOT USE ANY OTHER MATERIAL OR ANY ADHESIVE BACKED PRODUCT, AS THIS WILL DAMAGE THE NOZZLE AREA.**
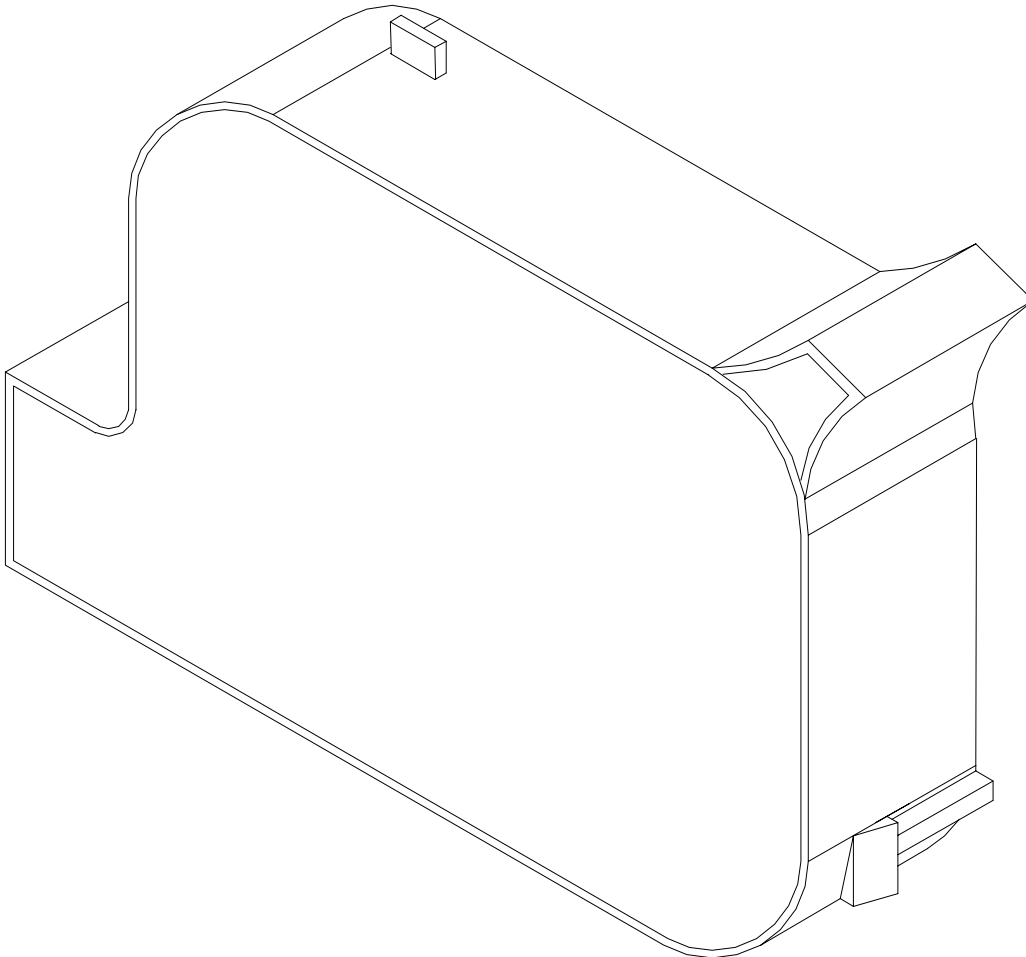
# PRINT CARTRIDGE MAINTENANCE

It is necessary to maintain the 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.

**DIRECTION OF WIPING**

NOZZLES

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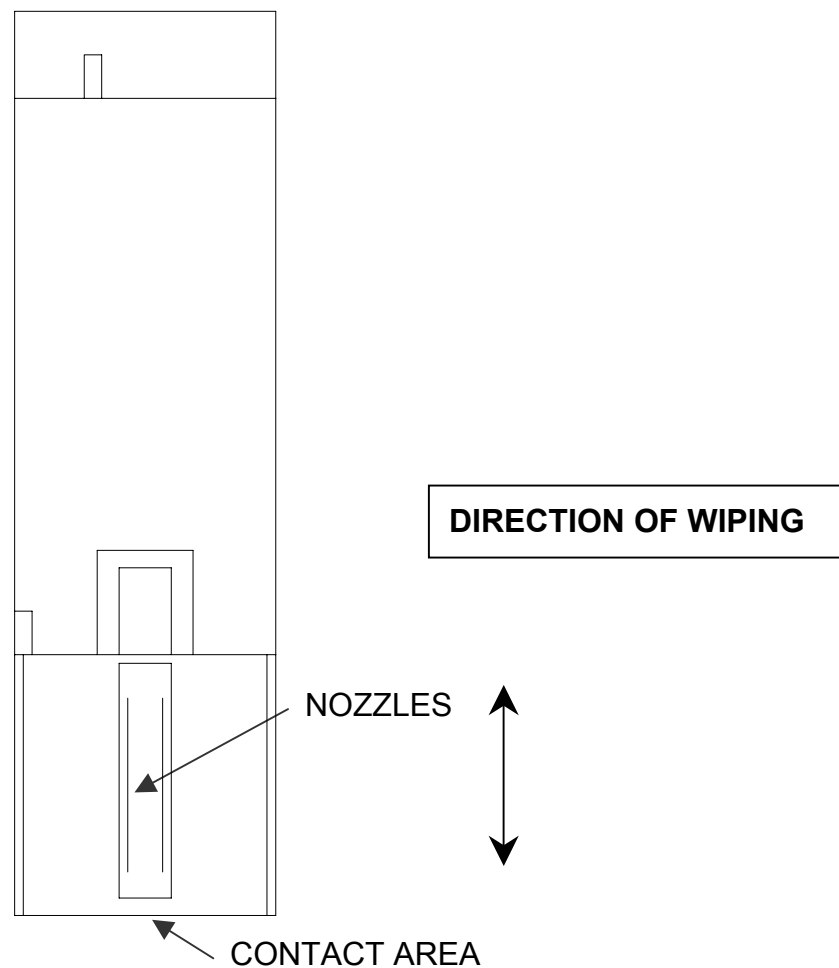
**NOTE:**
**Ingested air or severe nozzle clogs may be eliminated with the use of the cleaning syringe/tray ordered optionally.**

The photo below shows the correct procedure in using the syringe and cleaning tray. Insert the ink cartridge into the tray and securely snap into place. Place the tip of the syringe into the front of the tray. While holding the syringe securely in place gently draw back on the syringe plunger until ink flows into the syringe. Normally, it is not necessary to evacuate more than 0.1 cc of ink at a time as indicated below. Following ink withdrawal remove the syringe carefully. Remove the ink cartridge from the tray. Remove any remaining ink from the nozzle face with a lint free wipe. 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.

0.1 cc of ink drawn at any one time

Scale gradation is in 1.0 cc major increments
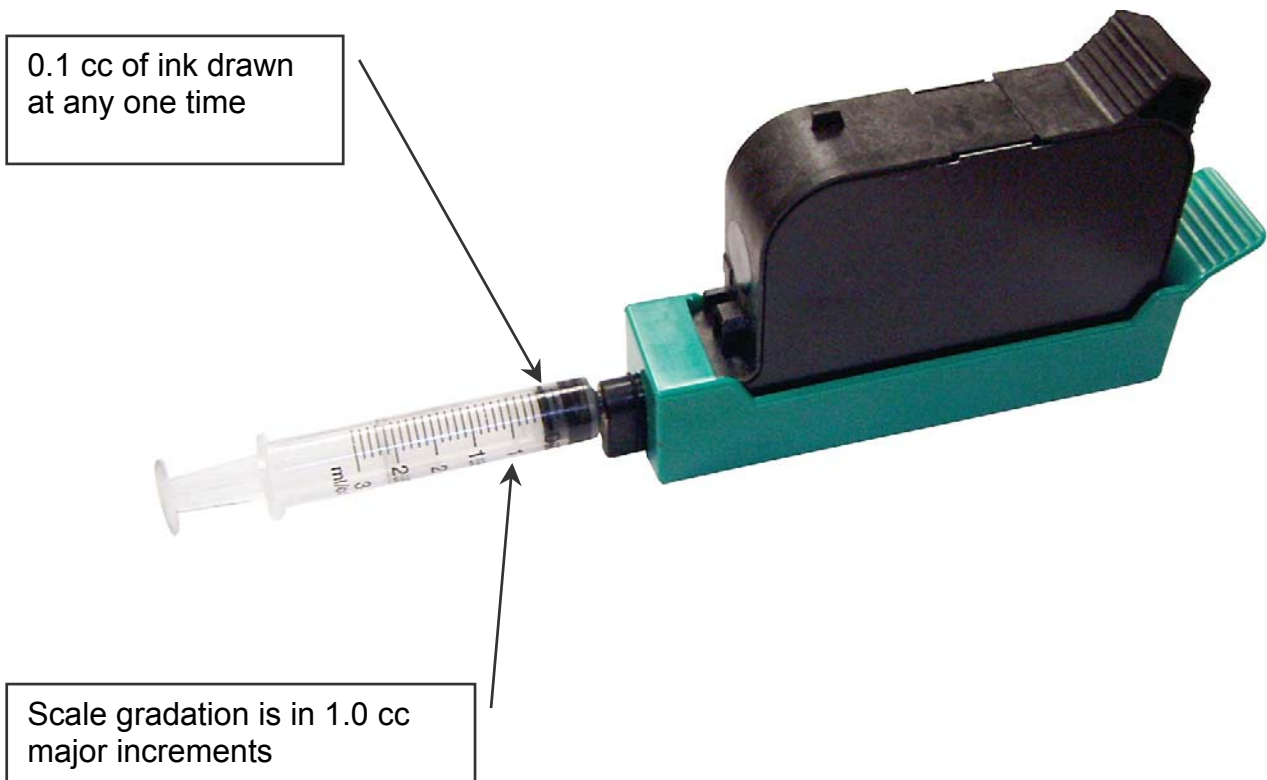
# PRINT CARRIAGE MAINTENANCE

It is necessary to maintain the print head carriage free from accumulated dust and debris. Periodically the print head carriage 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 print carriage C21001 for dust and debris.
Re-insert the print cartridge and place the unit into the PRINTING mode by pressing ⌷⋯.

# EXPLODED VIEW OF THE C21002 PRINT CARRIAGE
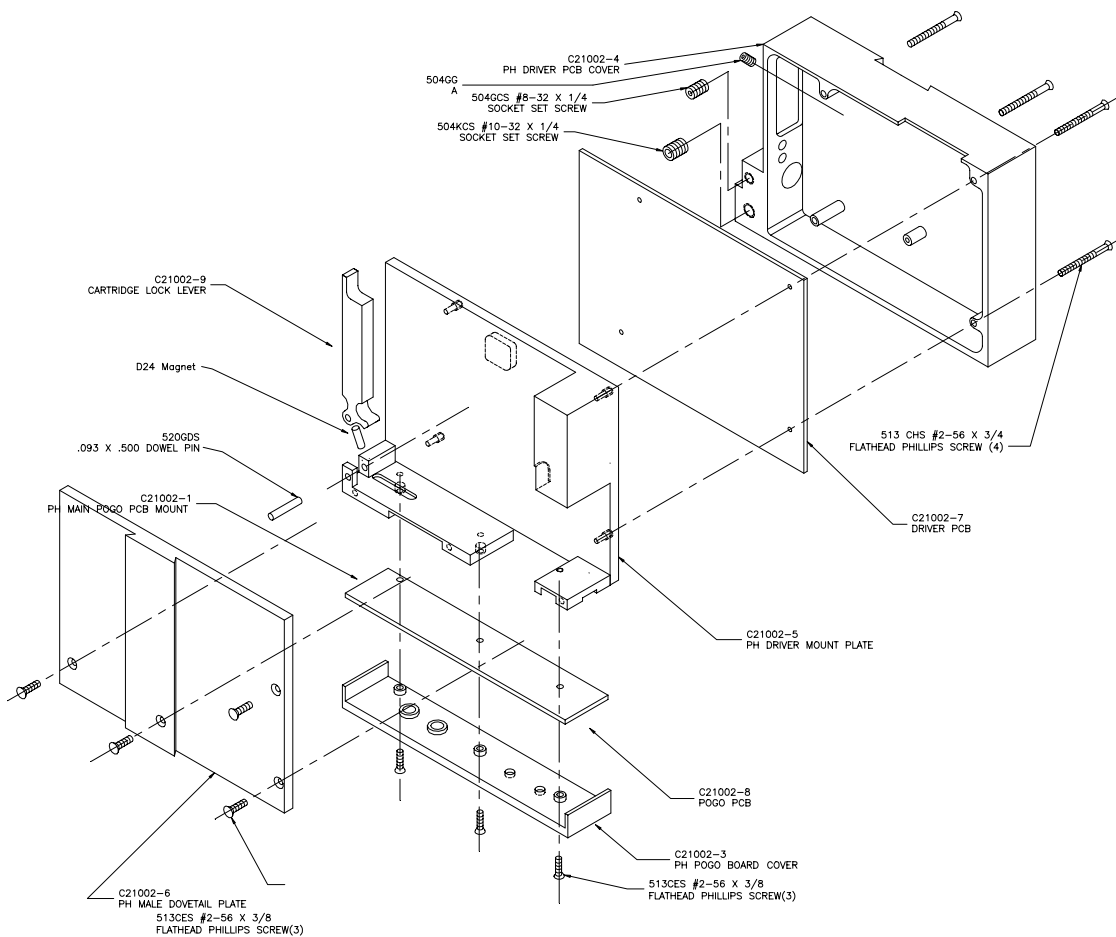
# PART 4: TROUBLESHOOTING AND REPAIRS
## FAULTS

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 print carriage assembly |
| Unit does not print, although LCD shows information. | No message in unit | Input your message (see pages 2-18). |
| | Unit in "COMMAND" mode. | Press [□⋯]. |
| | No ink. | Replace ink cartridge; reset ink volume parameter (press [ F4 ] and follow the sequence. |
| Low ink indicator on with full ink cartridge. | Did not reset ink volume parameter. | Press [ F4 ]. Continue key entry following menu prompts. |
| Unit does not purge. | Out of ink. | Replace with full ink cartridge. Reset ink volume parameter (press [ F4 ]). |
| | 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 |

# PART 5: PARTS LIST AND OPTIONS

Part No.        Description

## SPARE PARTS

| Part No. | Description |
|---|---|
| C21001-1 | EVOLUTION II Controller Cabinet |
| C21001-2 | EVOLUTION II Controller LCD Assembly |
| C21001-3 | EVOLUTION II Controller PCB Assembly |
| C30238 | EVOLUTION II Controller Keypad |
| | |
| C21002 | EVOLUTION II Print Head Carriage Assembly |
| C21002-7 | EVOLUTION II Print Head Carriage CPU Assembly |
| C21002-8 | EVOLUTION II Print Head Carriage POGO Assembly |
| C21005 | EVOLUTION II Mounting Bracket Assembly |
| C21000-2 | EVOLUTION II Power supply |

## OPTIONS

| Part No. | Description |
|---|---|
| 96280-01 | Floor stand |
| C21003 | Top Coding Mounting Bracket |
| C21006 | External Product Detect |
| C21007 | External Encoder |
| C21012 | Optional Junction Box |
| EV1-FONT | Alternate Font (Specify when ordering) |
| EV1-LOGO | Logo Option (Specify when ordering) |

## CABLES

| Part No. | Description |
|---|---|
| C21008-1 | EVOLUTION RJ50 Cable 6 INCH |
| C21008-3 | EVOLUTION RJ50 Cable 3 Feet |
| C21008-10 | EVOLUTION RJ50 Cable 10 Feet |
| C21008-25 | EVOLUTION RJ50 Cable 25 Feet |
| C21008-50 | EVOLUTION RJ50 Cable 50 Feet |
| C21008-100 | EVOLUTION RJ50 Cable 100 Feet |

## INKS

| Part No. | Description |
|---|---|
| 4500BK6 | 6 Pack of Black Ink Cartridges |
| 4500RD6 | 6 Pack of Red Ink Cartridges |
| 4500GR6 | 6 Pack of Green Ink Cartridges |
| 4500BL6 | 6 Pack of Blue Ink Cartridges |

4500YW6          6 Pack of Yellow Ink Cartridges
4500CY6          6 Pack of Cyan Ink Cartridges
4500UV6          6 Pack of Ultra Violet Ink Cartridges


4600BK6          6 Pack of Black Ink Cartridges (SEMI-POROUS)

## PART 6:  COMMUNICATIONS PROTOCOL

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 a specific unit. Commands that reference specific units are so noted.

## 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 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 165 FEET PER MINUTE SEND – ASCII : AND ASCII 5**
**WHICH WOULD BE 0x3A AND 0x35 HEXADECIMAL**
**TO SEND A DELAY OF 30 SEND – ASCII 3 AND ASCII 0**
**WHICH WOULD BE 0x33 AND 0x30 HEXADECIMAL**

## 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 print carriages 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 PRINT CARRIAGE

| 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 with120-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:

| ASCII Character | Hexadecimal | Prints As |
|-----------------|-------------|-----------|
| 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) | Ň |
| ? | (0x3f) | Ě |
| @ | (0x40) | Ó |
| { | (0x7b} | Logo 1 |
| \| | (0x7c) | Logo 2 |
| } | (0x7d} | Logo 3 |

## 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. IF AN ERROR WAS DETECTED IN PROCESSING A NAK WITH AN ERROR CODE IS RETURNED.**

## 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.

| | |
|---|---|
| NAK 1 | = NOT USED |
| NAK 2 | = Illegal Command Byte |
| NAK 3 | = NOT USED |
| NAK 4 | = NOT USED |
| NAK 5 | = Trying to write a read only register |

| | |
|---|---|
| NAK 6 | = Print station buffer full must print before next download to clear buffer. |
| NAK 7 | = NOT USED |
| NAK 8 | = NOT USED |

**COMMANDS:**
**'!'    0x21        Software Version (read only)**
**         (EV I, EV II, EV SC)**
  **Q.** ESC|STX|Address|`!`|SOH|EOT
  **R.** ESC|STX|Address|{PRINTER fffffssss}|CR|EOT
    Where:
    PRINTER= ASCII string    PRINTER for EVOLUTION I
                                  EV2      for EVOLUTION II
                                    EVSC     for EVOLUTION SC
         fffff = Software and Firmware versions
         (eg. 2.02H indicates version 2.02 with Firmware version H)
         ssss = Optional Software loaded
                 Where: (for EV I only)
                        The first y indicates option pack 1
                        The second y indicates option pack 2
                        The third y indicates option pack 1.5
                        The last y is reserved for future expansion
                 Where: (for EV II and EV SC)
                 Both units are standard with all options thus a ++++ will be returned

**'#'    0x23  Printer Configuration (Read only)**
**         (EV I, EV II, 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 1
                        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 = option3 enabled

**'\'    0x5c Unit Serial Number (Read only 6 digits)**
**         (EV I, EV II, EV SC)**
  **Q.** ESC|STX|Address|`\`|SOH|EOT
  **R.** ESC|STX|Address|`\`|`serial number`|CR|EOT

## 'l'   0x6c Special Field Flags
## (EV II, EV SC AND EVI WITH OP1 AND ABOVE)
Q. ESC|STX|Address|`l`|SOH|EOT
R. ESC|STX|Address|`l`|`x`|`y`|EOT
      Where: x defines bits 7,6,5,4
          Bit 7 = don't care
          Bit 6 = dont 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|`l`|`x`|`y`|EOT
X. ESC|STX|Address|`l`|ACK|EOT

## '8'   0x38 Control Flags
## (EV I, EV II, 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 print 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 print mode

## 'G'    0x47 Errors (note: error codes must be reset)
## (EV I, EV II, 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 I, EV II, 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

## 'B'    0x42 Set Unit Address (Write Only)
## (EV I, EV II, 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 II, EV SC AND EVI 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 I and EV II.
      Each count provides a delay equal to 2 columns for EV SC.

**'&'    0x26 Line Speed  (RANGE 10-200)**
      **(EV I, EV II, 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 I, EV II, 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 I, EV II, 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 I, EV II, 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 II 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 II, EV SC AND EV1 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

  **D.**  ESC|STX|Address|`4`|{#########}|CR|EOT
  **X.**  ESC|STX|Address|`4`|ACK|EOT


**'['   0x5b DATE_ROLLOVER
         (EV II, EV CS AND EV1 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 Days until Expiration (max 999)
         (EV II, EV SC AND EVI 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'   0x52   Remaining Ink (0 to 99%)
         (EV I, EV II, 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 II, EV SC AND EVI 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 II, EV SC AND EVI 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

## 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 I, EV II, 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
ee= 0D Expiration Date Year
ee= 0E Expiration Date Julian
ee= 0F Expiration Date Day
ee= 10 Day of Week (1-7)
ee= 80 Bar Code Attribute (EV II only)

**The above constitutes 10 object fields. Even though there are 48 characters 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 48-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 objects.**

## 'P'   0x50   Message Objects (continued)

                    ff        = font of object
                    Where: for EV I AND EV II
                            ff= 00 for 2 Line Font
                            ff= 01 for 1 Line Font
                            ff= 02 for 3 Line Font (EV II only)
                            ff= 03 for 4 Line Font (EV II 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


## 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


## '$'    0x24 Line 1 Message
   **(EV I max 24 characters – 48 characters OP1.5, 2 or 3)**
   **(EV II max 48 characters)**
   **(EV SC max 96 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


## '%'    0x25 Line 2 Message
   **(EV I max 24 characters – 48 characters OP1.5, 2 or 3)**
   **(EV II max 48 characters)**
   **(EV SC max 96 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

**'w'    0x77 Line 3 Message (max 24 characters)**
        **(EV II 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 (max 24 characters)**
        **(EV II 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

**':'    0x3A Logo1 Name (read only - max 9 characters)**
        **(EV I, EV II)**
    **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 I, EV II)**
    **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 I, EV II)**
    **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 II, 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 I, EV II, 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 I, EV II, and EV SC)**

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

**NOTE: THE FOLLOWING CODES ARE SPECIFIC TO EVOLUTION II ONLY**

**' " '   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.**

```
// 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**

```
// 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.**

```
Public Sub DoMessage()
DATA$ = "800": GETINFODATA: Rem DISABLE PRINT MODE
DATA$ = "&32": GETINFODATA: Rem SET LINE SPEED TO 50
DATA$ = "P01010010000100000000" & Chr$(&HD): GETINFODATA: Rem SET OBJECTs
DATA$ = "%ABCDEFGHIJ" & 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 FLUSH 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**

# 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
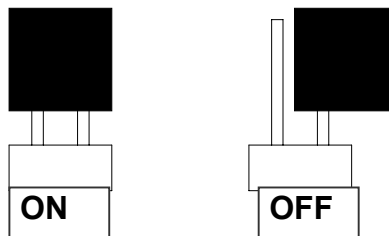


## VSEL J7

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.

## ENSEL J9

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

# JUMPER LOCATION

**EXTERNAL ENCODER
ENSEL J9
ON= PASS THRU
OFF= FLOAT OUTPUT**

**VOLTAGE SELECT
VSEL J7
ON= +12 OUTPUT
OFF= FLOAT OUTPUT**

ENSEL J9

PRSEL J10

VSEL J7

C2
100UF

DC IN J5

R30
10K
R2
10K
R3
10K
R4
10K

J1
PROG

J4
COMMOUT

J6
COMMIN

JTAG J3

R7
10K

R5
10K
R6
10K

R9
10K

C13
.1UF

C22
100U

U13
LM1117S

C12
.1UF

C6
.1UF
C5
2.2UF

FERRITE L1

C1
.1UF

C11
.1UF

C33XX

**EXTERNAL PRODUCT
DETECT
PRSEL J10
ON=PASS THRU
OFF=FLOAT OUTPUT**

R18
240.0
R24
54.9
C28
.1UF

C19
2.2UF

U19
DS1302

Y2
32.768KHZ

SW1
RESET

C17
.1UF

C16
.1UF

C23
100UF

U14
LM1117S

C20
.1UF
R25
124.0
R28
2.00

D2
MBRS340

L3
15UH

C15
.1UF

U12
LM2670S-ADJ

C4
.1UF

C26
.01UF

C24
100UF

C25
100UF

R17
R23
4.64

J8
PDEN

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## 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.
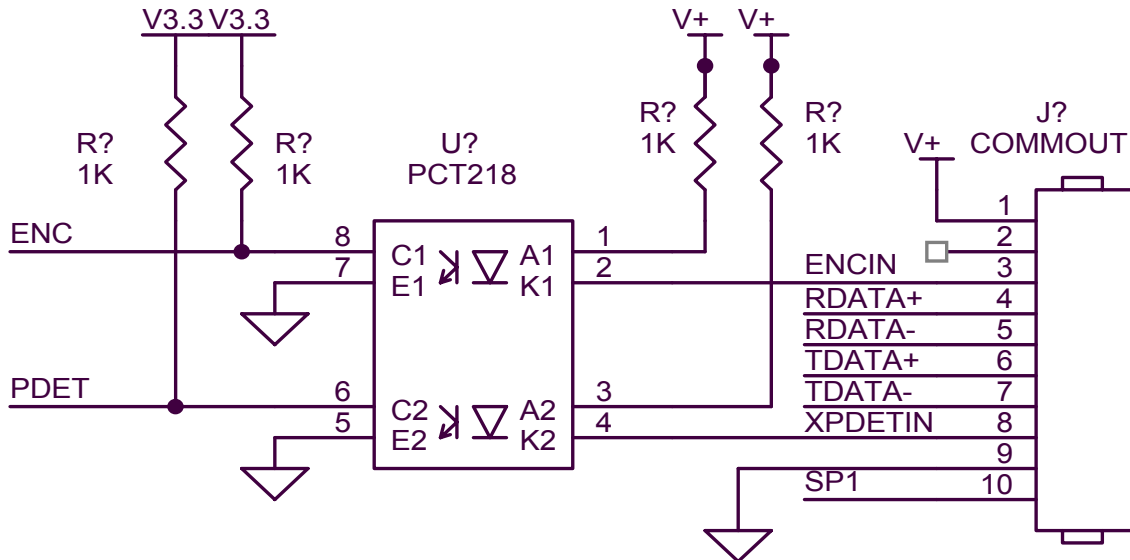


Each input requires the capability of sinking 12ma to ground as depicted in the above circuit. Connection to the optional control port requires an RJ50 connector.

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 ration 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.

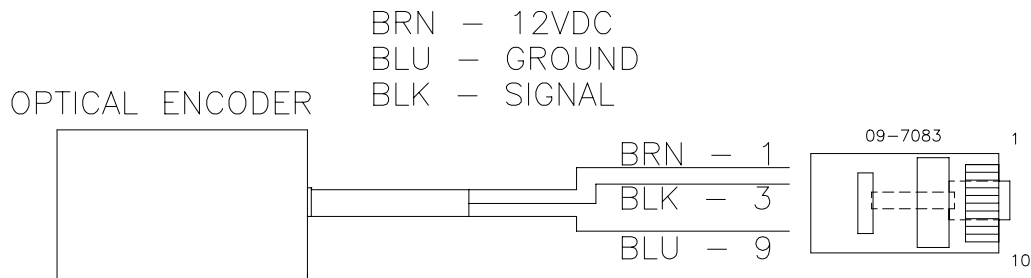Selecting the external encoder, the line speed calculation is replaced by a scalable encoder setting ranging from 0-7 allowing a printed message to be compressed or expanded. Ideally, the external encoder should be provided to use this feature to its maximum advantage.

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.

```
                             BRN — 12VDC
                             BLU — GROUND
                             BLK — SIGNAL
OPTICAL ENCODER

                                  BRN — 1        09-7083      1
                                  BLK — 3
                                  BLU — 9                     10
```

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)
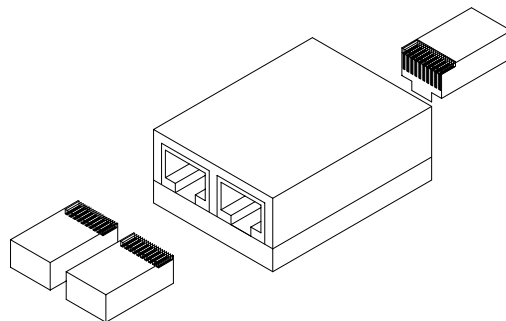
# PART 8: SPECIFICATIONS
## PRINTER SPECIFICATIONS

## PRINT CHARACTERISTICS

| | |
|---|---|
| Character Set: | Full alphanumeric and 20 special symbols |
| Standard Font: | Arial style |
| Logos: | up to 3 resident |
| 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: | |
| | 1/2" single line of print |
| | 7/32" two lines of print |
| Length: | 24 characters (1/2") 48 characters (7/32") |
| Message Storage | 50 Messages |
| Print Head to Product Distance: | Up to 1/4" (6.35 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 69 mm) |
| Weight: | 1 lbs.  (4.5 kg) |
| Control Panel: | Touch Switches and 4x16 Line LCD |

## PRINT CARRIAGE

| | |
|---|---|
| Standard Finish: | Aluminum Black Anodized |
| Dimensions: | 3.0"H x 1.8"W x 4.0"D   (76 mm x 46 mm x 102 mm) |
| Weight: | 1 lbs.  (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 | ARIEL STYLE | USER DEFINED |
| INTER-CHARACTER SPACING | 10 | 1 - 25 |
| LANGUAGE | ENGLISH | ENGLISH / SPANISH |
| LINE SPEED | 100 | 10 - 200 |
| LOGOS | 0 | 1 - 3 |
| PRINT INVERSE | NORMAL | NORMAL / INVERSE |
| PRODUCT DETECT | INTERNAL | INTERNAL / EXTERNAL |
| EXTERNAL ENCODER | INTERNAL | INTERNAL / EXTERNAL |
| PRINT DELAY | 1 | 1 - 255 |
| ENCODER RATIO | 4 | 0 - 7 |
| MESSAGE STORAGE | 1 | 1 - 50 |
| PASSWORD | 12345 | 5 CHARACTERS USER DEFINED |
| AUTO REPEAT | 0 | 0 - 255 |
| DATE | dd/dm/dy | USER DEFINED |
| TIME | hh:mm | USER DEFINED |
| SHIFT CODE | TIMES AND CODES SET TO ZERO | USER DEFINED |
| DATE OFFSET | OFFSET DAYS SET TO ZERO | USER DEFINED |
| PRODUCT COUNTER | TIMES AND CODES SET TO ZERO | USER DEFINED |
| BARCODE TYPE | | 8 SELECTABLE |
| MIN BAR WIDTH | 5 | 3 - 15 |
| ADDED SPACE | 0 | 0 - 3 |
| QUIET ZONE | 75 | 0 - 150 |
| CHECK DIGIT | NO | |
| MAN READABLE | NO | |
| | | |
| | | |
| | | |
| | | |

# APPENDIX A – PRODUCING RELIABLE BAR CODES

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.

## CONTRACT 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.

 EVOLUTION II 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 BAR CODES:

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 then 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.
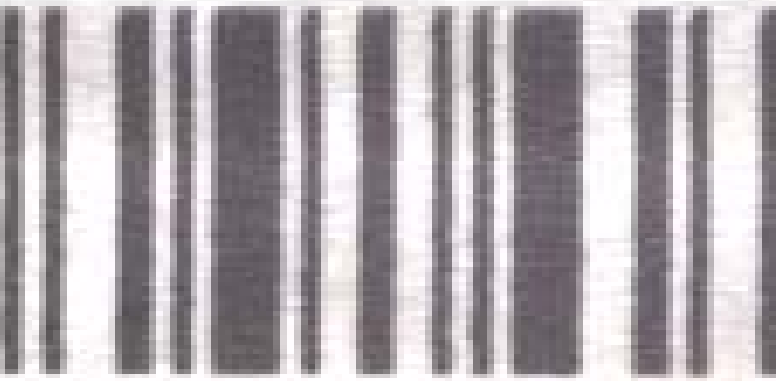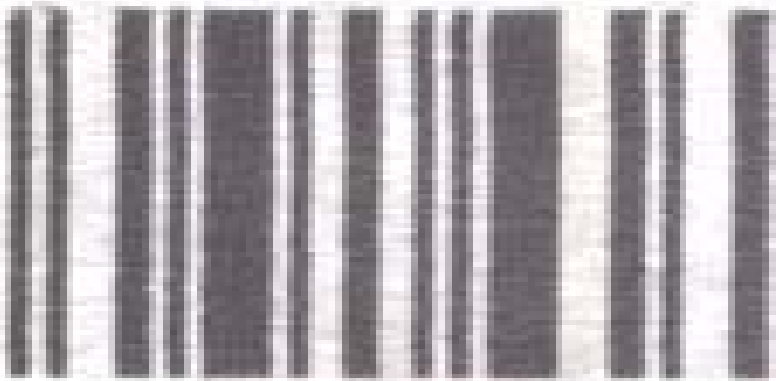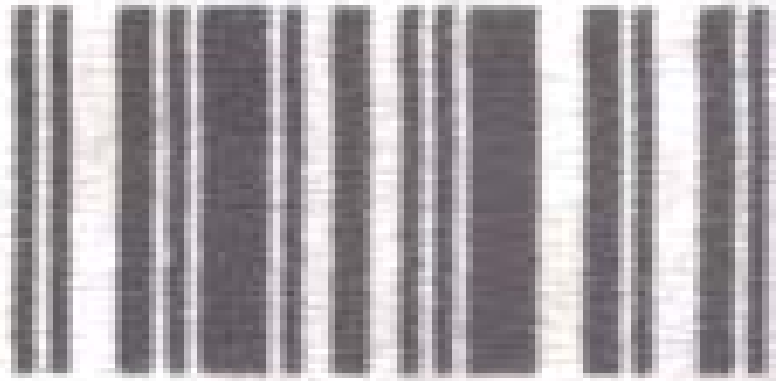
The image below is a scanned image of two sample prints. The upper section of code is produced at 60ft/min matching the line speed, while with the second sample, the line speed was increased to 100 ft/min. It should be immediately apparent at the difference in the optical density between both prints. 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.
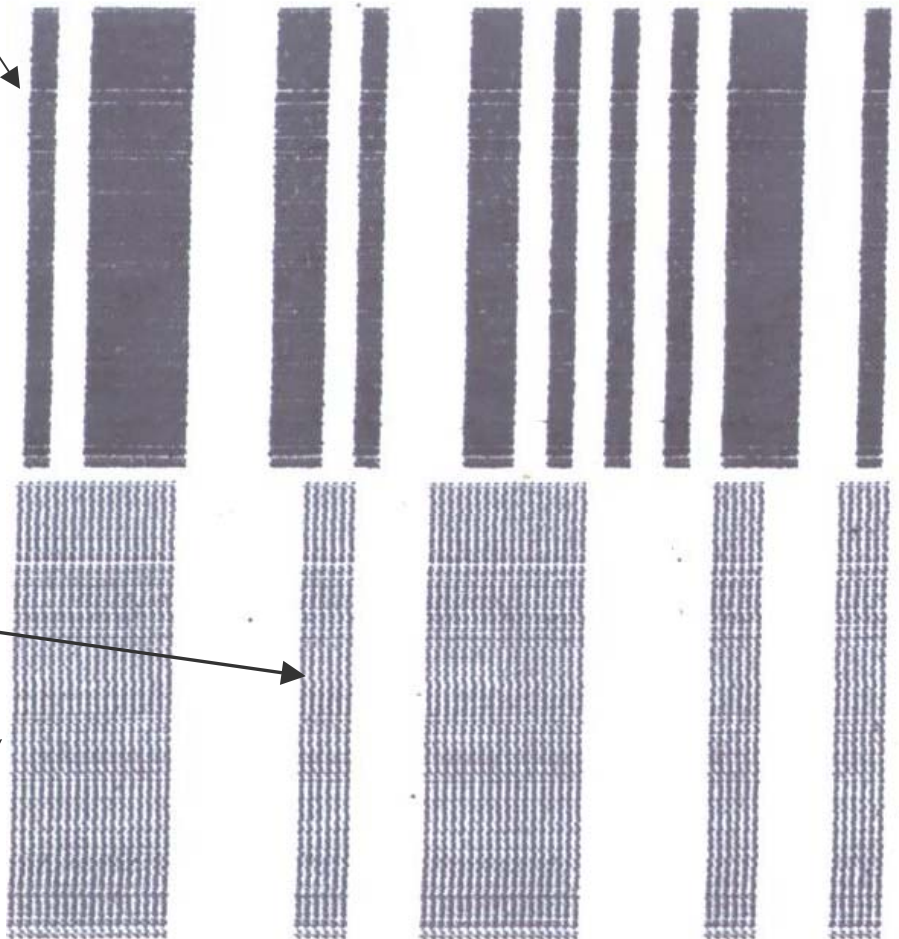
DIMINISHED OPTICAL DENSITY
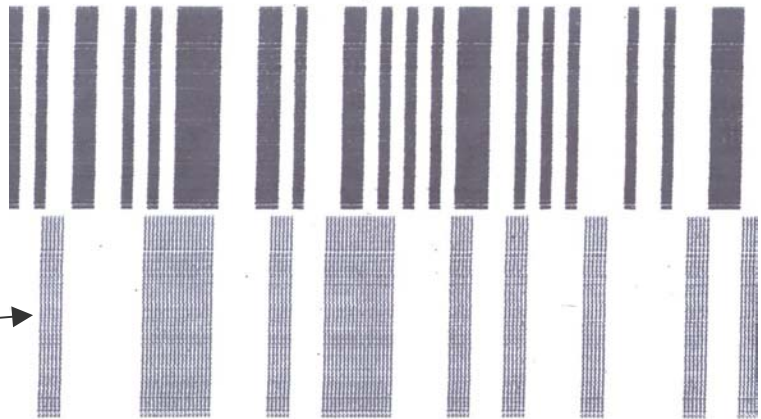
NORMAL ASPECT RATIO

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.

BAR WIDTHS BEGIN TO STRETCH

BAR WIDTHS BEGIN TO COMPRESS
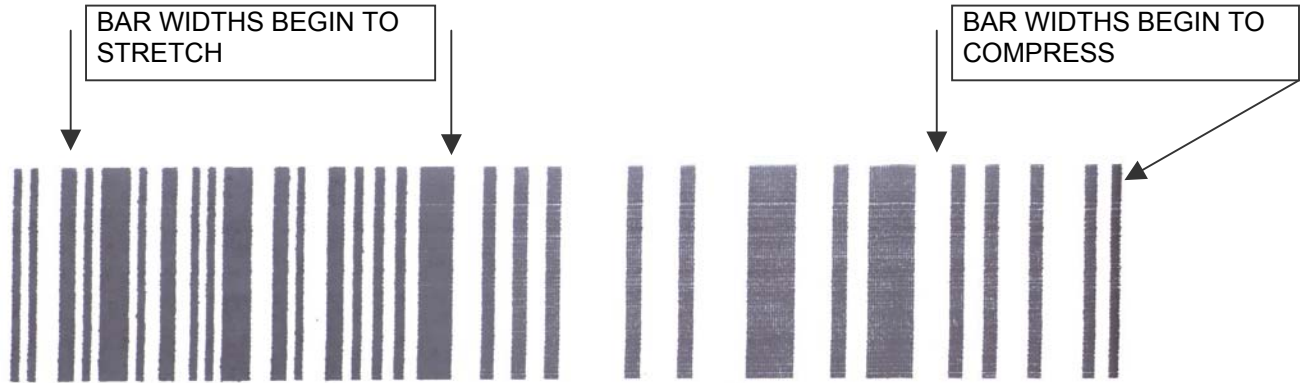


Finally, the image as it should look. This code was produced on white corrugated at 100ft/min and produced a verifiable class "A" with a decodability of 70%. The average bar growth from the reference standard was 0.03%.
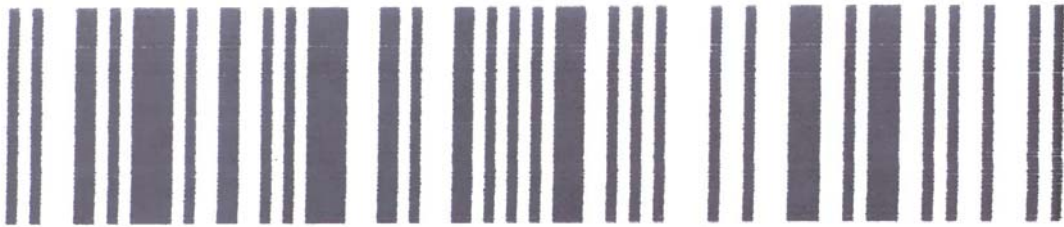
## BARCODE TYPES

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 or 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 to144x144 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.



CLOCKING PATTERNS
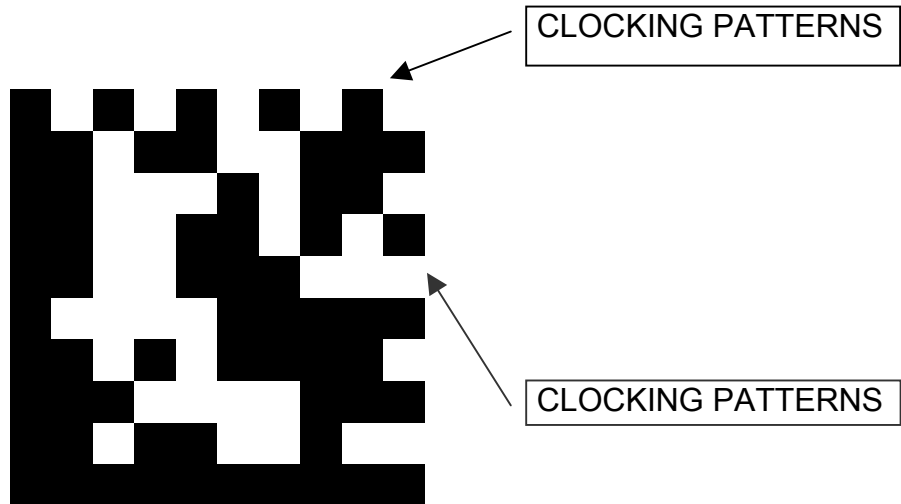
CLOCKING PATTERNS

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 EVOLUTION II 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.

| 7x7 | 6x6 | 5x5 | 4x4 | 3x3 | 2x2 | 1x1 |



| 3x3 | 2x2 | 1x1 |

IDEAL
1X1
ELEMENT
WITHOUT
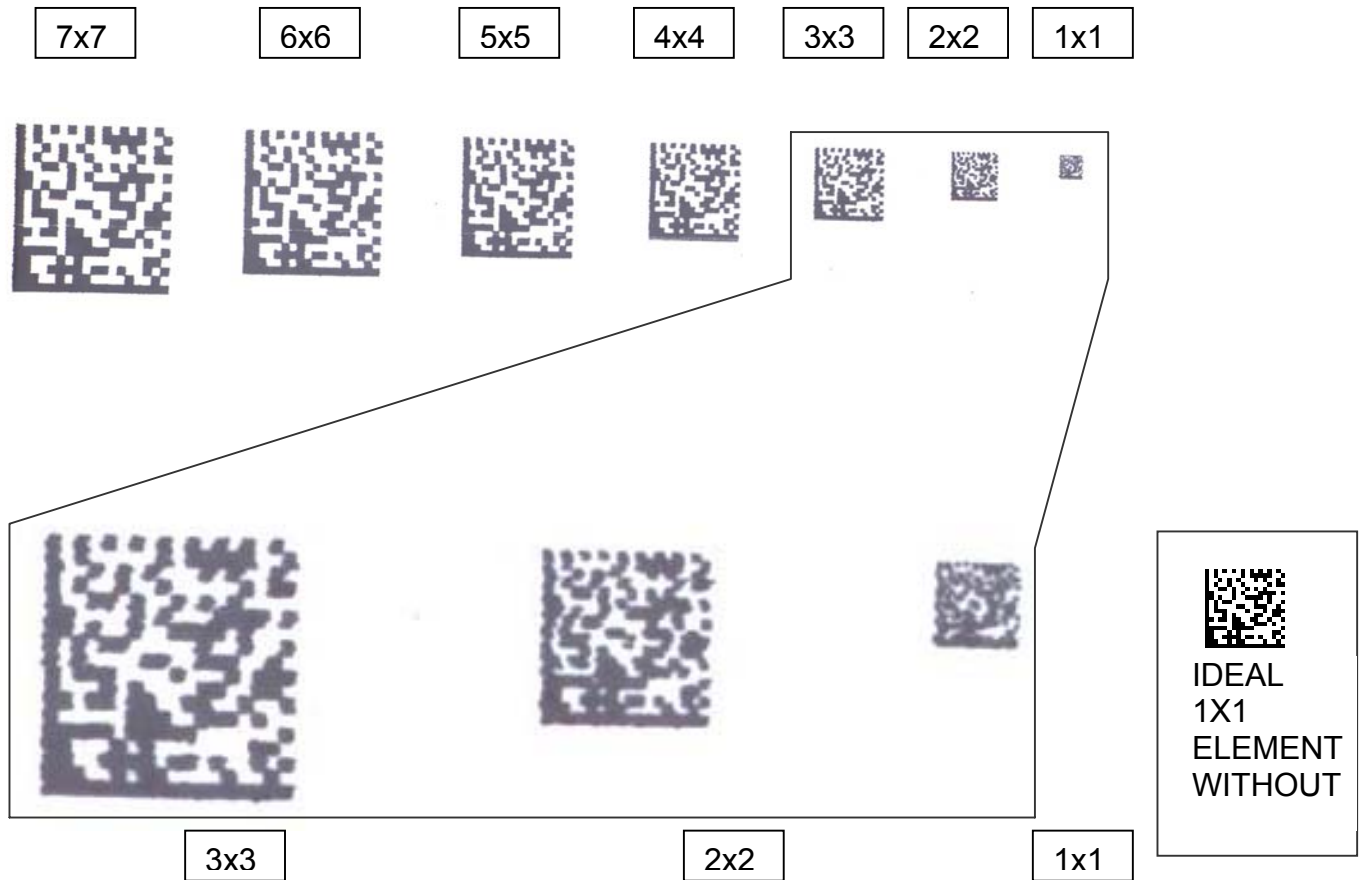
The above is an enlarged pictorial of the last 3 element resolutions. As may be seen the 2x2 element is extremely discernable, where the 1x1 array loses definition due to bleed patterns.

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 have 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.