

MAKRÖ Marking Products



MAKRÖ M5 Printer Operator Manual



Part Number: M5-001-02
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Safety

Cautions and Warnings



IMPORTANT:

Where appropriate in this manual additional safety statements will be displayed. These statements are designed to call attention to potential hazards and to assist in allowing the user to utilize the equipment safely and efficiently.



Safety glasses and solvent resistant gloves should be used when contact with the ink or solvent liquids is possible.



Store all inks and solvents in their original containers, in a properly grounded, flammable liquid storage cabinet and away from heat sources. Promptly clean up any spilled ink using the correct solvent.

Lifting



This equipment has a shipping weight of 80 pounds (36.3 kg). To avoid injury to personnel or damage to equipment, always use proper lifting and/or carrying techniques with the unit.



Lethal Voltages



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



CAUTION - Lethal voltages are present inside the print head when the unit is printing. **DO NOT** insert **ANY** object into the opening in the print head cover!



Warning: This Equipment Must Be Earthed / Grounded.



IMPORTANT:

CAUTION – Disconnect all power before servicing.



IMPORTANT:

CAUTION - There are no user serviceable parts for this system. Only a properly qualified and trained technician should do any required service.



IMPORTANT:

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Specifications



IMPORTANT:

CAUTION – Do **NOT** place the unit in any position where the power cord is not accessible. There must be access to the power cord to enable disconnecting power in the event of an emergency.



IMPORTANT:

Do not permanently hard wire to power unless a breaker is accessible to disconnect power.



IMPORTANT:

ALWAYS check to be sure that all covers are correctly fitted to the unit before operation. Contact a supervisor for guidance if you are not sure. In addition to providing electro-magnetic shielding to the components, the covers provide a safety barrier to protect the user.



During operation, surfaces of the equipment may be hot to the touch.



IMPORTANT:

IMPORTANT: Never ship, transport or store the unit with Ink or Makeup Solution in the tanks. See [“Appendix E - Draining the System”](#) on page 71. for information on draining the fluids from the system.



DO NOT smoke or have open flames near the printer. The Ink and Makeup Solutions are flammable.

Power Requirements

Voltage:

115 Volts AC, 60 Hz	T3.15A slow-blow rated fuse
230 Volts AC, 50 Hz	T1.6A slow-blow rated fuse



IMPORTANT:

A European approved cord set rated 300 Volts AC, 18 AWG, 75°C must be used.

Current Draw

The maximum current draw of the power supply is 2.5 amps.

Typical measured amperage draw:

Jet running - 100 mA

Starting system - 200 mA

Environmental Ratings

Operating Temperature: 41-104°F, 5-40°C

Humidity range: 10-95% relative humidity, non-condensing

Altitude: up to 2000 meters

Enclosure classification: IP55 rated

MAKRÖ Marking Products

Welcome

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Product Overview

Available Models

There are two Makro Marking Products printers:

Model	
M5	CIJ printer with large color touch panel GUI designed for more demanding applications and up to 4 lines of print. Font heights available: 5, 7, 9, 16, 24, 32 high.
M5P	A variant of the M5 designed specifically to print using pigmented inks. Offers special routines for starting, stopping and viscosity control for pigmented inks. Font heights available: 5, 7, 9, 16, 24, 32 high.

In addition the -P or pigmented model is specifically designed to use a white pigmented ink. In terms of options, each model is available with print head conduit lengths that are either 2 meters or 4 meters.

Package	Features
Standard	Two lines (up to 16 dot high) with High Quality Fonts
Upgrade	Two lines (up to 16 dot high) with High Quality Fonts, High Speed Fonts, Barcode Printing, Graphic Printing
Upgrade +	Four lines (up to 32 dot high) with High Quality Fonts
Upgrade ++	Four lines (up to 32 dot high) with High Quality Fonts, High Speed Fonts, Barcode Printing, Graphic Printing

Feature Specifications

Lines of print: Up to five (5)

Character height range:

- Minimum character height: 0.05" (1.25 mm)
- Maximum character height: 0.61" (15.6 mm)

Maximum speed (raster height dependant): Up to 1050 FPM (6 m/s)

Comprehensive range of print features including:

- Static and dynamic field types
- Fonts from 5 to 32 dots high
- Versatile print mode selections
- Clock / calendar fields
- Shift Codes
- Bar Codes
- Counters

Continuous print mode

Self-cleaning, sealed print head with no manual adjustments and auto head / conduit flush routines

Single button jet control

Full on-screen diagnostics

Trouble-free fluid refilling

2 meter or 4 meter print head conduits

10.4" color touch panel GUI

Multi-level password protection

Positive air purge to print head (optional)

IP55 rated enclosure

Choice of solvent base for printing fluids

Print Performance Selections

General Purpose Rasters

High Quality

A general purpose raster designed for slow to mid-speed printing, in which achieving high print quality is top priority.

High Speed

A general purpose raster designed for high speed printing, in which achieving higher print speeds is top priority.

Turbo

A special purpose raster designed for single line printing at the fastest possible speed.

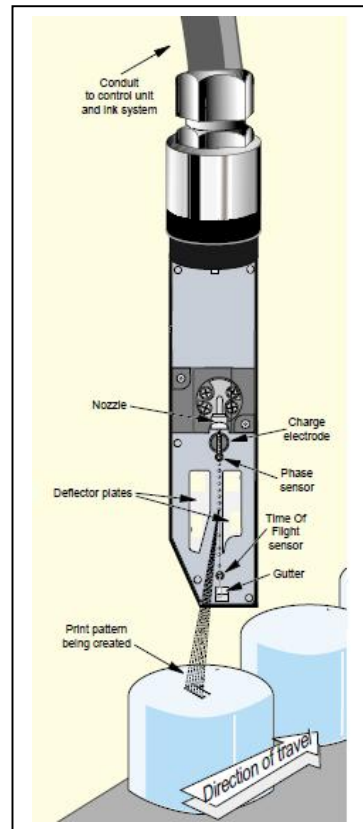
Typical System

Product Overview

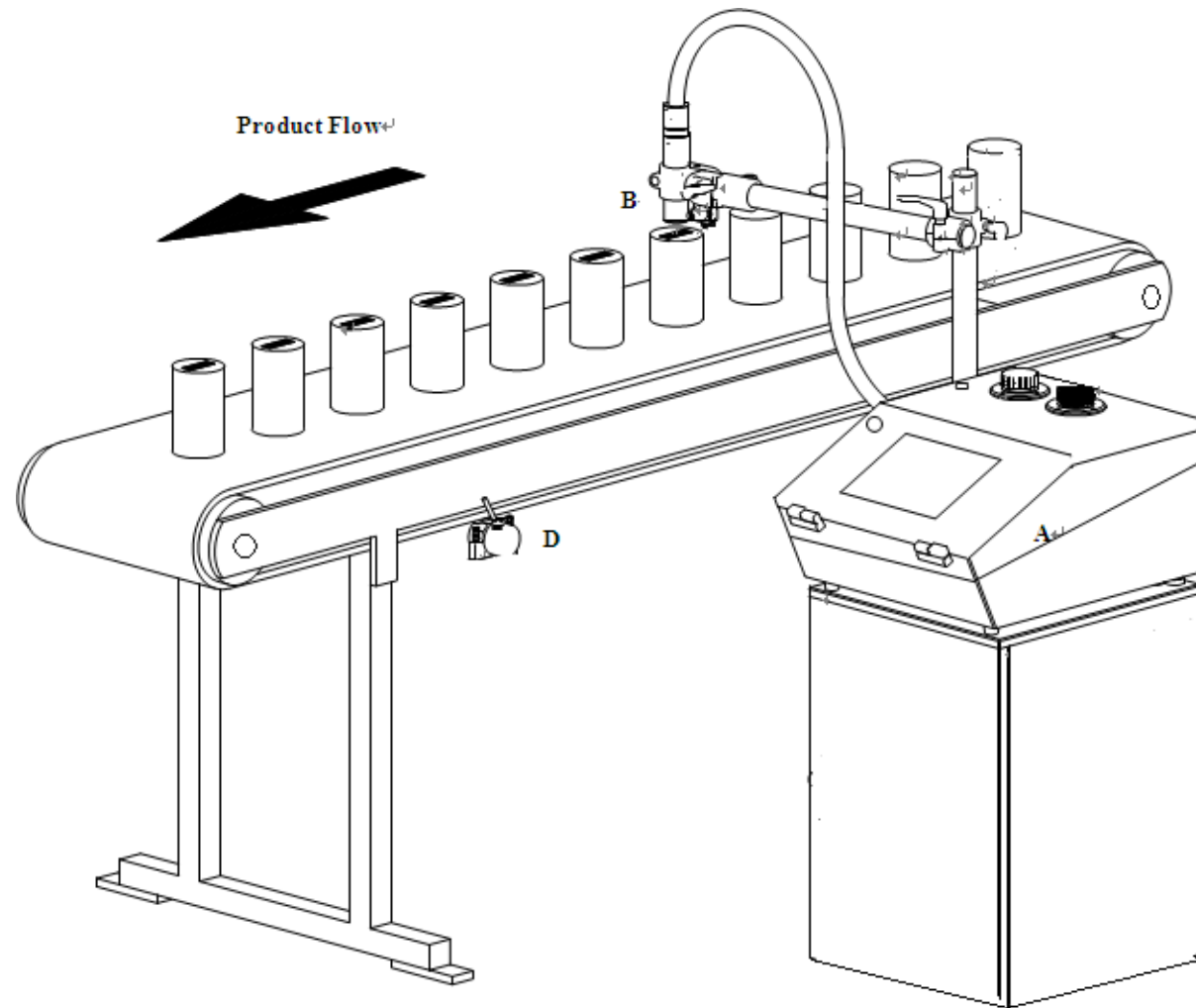
Typical installation

A = System Enclosure
B = Print Head
C = Photocell (Sensor)
D = Speed Encoder (optional)
E = Throw Distance

Optional items shown



Head



System Description

A complete system normally consists of several components: the system enclosure or controller with the umbilical attached print head, a trigger device and an encoder (optional). See Figure 1.

The System Enclosure/Controller houses the electronics and the ink/makeup solution supply system for the unit. The touch screen is an integrated part of the controller. Connected to the controller is the print head, the trigger device, and the speed encoder (if used).

The print head contains the jet and deflector plates that control the printing. The substrate (or print head) must be moving for printing to occur. The distance between the print head and the substrate is referred to as the “Throw Distance”. The optimum throw distance for proper print height is 10 mm.

A print trigger tells the controller when to print. Typically, a photocell is used to detect the target as it passes the print station. The controller reacts to the trigger signal and initiates a print cycle. A trigger signal may also be provided by some other device such as a PLC.

If a conveyor belt does not move at a constant line speed, an encoder should be used to automatically compensate for any variations in line speed. The encoder wheel mounts in contact with the conveyor. It turns at a rate proportional to the conveyor speed. While the wheel turns, an electrical pulse train is sent to the controller. These pulses allow the controller to compensate for variations in the line speed and results in good quality print.

An Encoder should be mounted as close as possible to the print station.

Product Overview

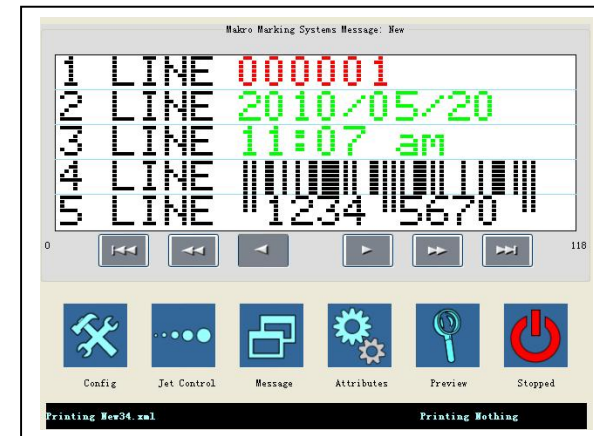
Terminology

Before using the M5 printer for the first time, it is a good idea to become familiar with the equipment and gain an understanding of how to use the printer. See “[System Description](#)” on page 7 for information on the equipment used with the printer.

Before learning the details of the M5, it is necessary to outline some of the basics of using an ink jet printer. Several key terms and concepts are defined in this section.

Print Targets / Substrates	The materials to be printed on
Message	Any combination of fields used to create what is being printed onto the substrate
Fields	Any text, graphic, barcode, counter, date code or time code created
Functions	Tasks that can be performed using the printer software

See the sample of the Main Screen below for an example of a message with several types of fields.



Navigating the M5 software requires the use of several functions controlled by the icons on the Main Screen.

Functions are tasks that can be performed using the printer software. Examples include:

- Configuring the printer
- Jet Control
- Message management
- Setting message Attributes
- Previewing messages
- Stop/Start/Suspend printing

Additionally, fields such as date codes or text are created using the appropriate Message Functions in the software.

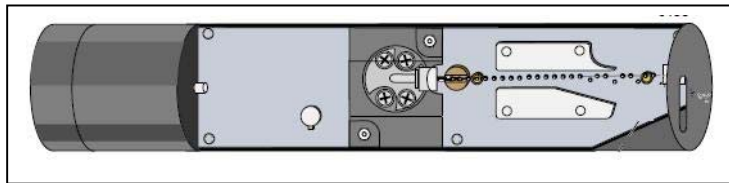
Once messages are created, they can be printed.

Terminology

Continuous Ink Jet Printing

Theory of Operation

Electrically conductive ink is pressure delivered to a nozzle (typically 62 microns in diameter). As the ink passes through the nozzle the liquid is pulse modulated. This breaks the stream of ink into uniformly spaced and sized droplets.



The droplet stream's flight passes between two deflection electrodes that a constant charge applied (normally plus and minus 3000 volts). While in the field a drop that is charged is deflected towards one of the electrodes by an amount proportional to the charge carried. Droplets that do not have a charge applied are not deflected. They continue in flight until they are collected in the gutter and then recycled into the ink tank.

This stream of ink from the nozzle to the Gutter is called a Jet.

A very basic consideration is that there must be movement. Either the substrate that is to be printed on moves past the print head or the print head moves over the substrate. If there were no movement, all of the drops of ink would pile on top of each other and not show any recognizable output (see Figure 3).

printing is a non-contact form of printing used in high speed coding operations for consistently printing on any surface. have

The quality of the print is not seriously affected by irregular surfaces such as molding ridges on the bottoms of bottles, and it can print on almost any type of surface that can accept ink.

These systems use fast drying inks.

Codes can be automatically updated and changes in the messages can be made rapidly by touch pad keyboard entry.

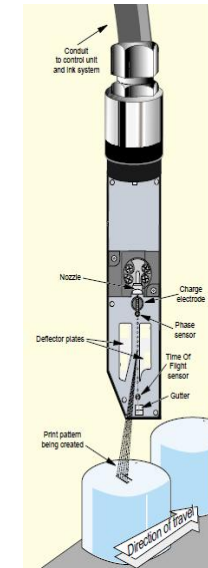
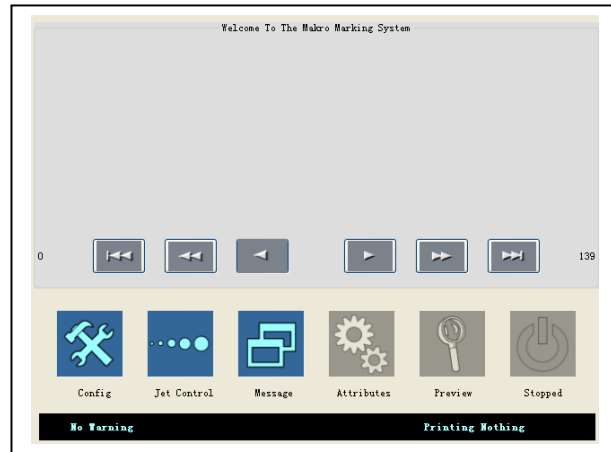


Figure 3

Main Screen



Introduction

The Welcome screen is displayed after the M5 Controller has completed the boot process for the first time. The above screen only appears if a “Full” software upgrade has been performed. Consult the M5Technical Manual for complete details.

The icons can have different background colors depending on the password level.

Blue	A Blue * icon is “Active” and can be selected.
Gray	A gray icon is “Inactive” and can’t be selected unless the user level is reset.
Red	A red icon is “Restricted” and requires a password to access.

Once the printer is configured and a message is created the Attribute s, Preview and Traffic Light icons will become active.

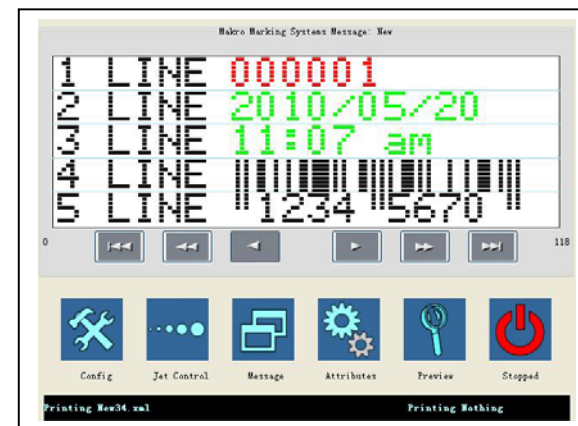


IMPORTANT:

* Since this manual is designed to be printed using a black and white laser printer the blue background has been stripped from the icons. If the blue was left in the icon, the printed image could not be distinguished from a gray icon. If viewing the manual in PDF format, any icon with a white background will function as if it were blue.

For details on Password Levels and accessibility, see the Password Section of the Configure Screen. Configure is covered in the M5 Technical manual.

If the printer was powered off with a saved message in the Main Screen, the software will open displaying that message in the message editing window.



The Main Screen is the navigation hub to access the various functions for the printer.

Main Screen

Functions

Six (6) active icons appear on this screen.

Configure Printer (Config)



This icon is used to designate the hardware that is attached to the printer. For safety and proper operation the M5 must be configured prior to use. Make all connections of external equipment with the POWER OFF.

Jet Control



This icon is used to access Jet Control functions that will maximize printer performance. See [“Jet Control” on page 51.](#)

Message



The Message icon is used to create a new message with a choice of field types. Once a message is created, any of the fields can be edited for content or font size, erased or moved. Messages can be printed, deleted or saved in printer memory for later recall. The menu displayed when the Message icon is tapped will show New, Open, Open Template, Save, Delete, and Cancel

Attributes



Attributes are printer message properties that relate to print delay, print width, print height and target length (if applicable). These values are saved for each message stored in the M5 Controller.

Preview



The Preview function slowly scrolls across only the utilized message area. Once the last field is shown, the display reverts back to the view that was displayed before the icon was tapped. A second tap of the Preview icon while scrolling will cancel the function and revert the view back to the view that was displayed before the icon was tapped.

Stopped/Suspended/Printing



These Traffic Light icons are used to Stop or Start Printing. If the red traffic light is tapped and the Jet is not running, a Jet start sequence will be initiated. If the green traffic light is tapped, a screen will open that allows the choice of either suspending printing, shutting down the Jet, or performing an extended shutdown sequence. If printing is suspended, the traffic light will be yellow



Message

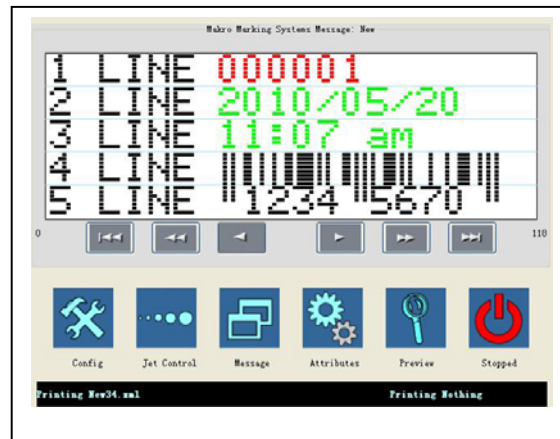


Creating or editing a message is easy with the Makro M5 Controller software. From the Main Screen, tap the Message Icon. The software will lead the user through the steps needed to enter the message fields into the Editor workspace. A Message is composed of one or more fields that contain the data to be printed. Messages have a maximum length of 6000 dot columns (a dot column is one vertical row of dots that compose a vertical line [also referred to as a Raster] in any character or symbol). Individual fields have a limit of 999 characters.

Typical fields include:

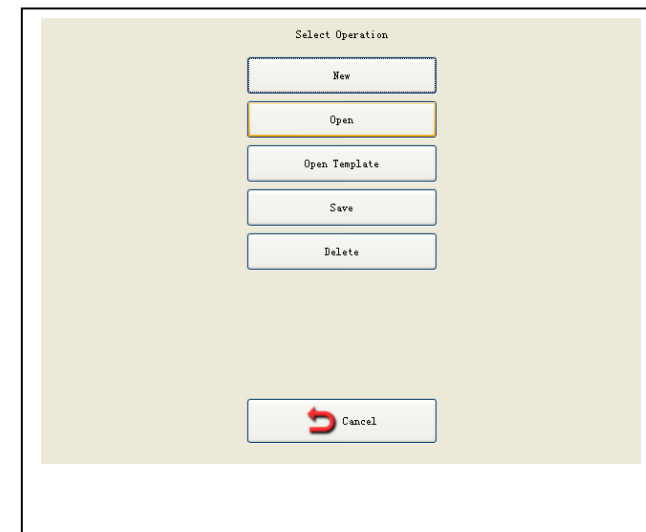
Text	Date	Time
Counter	Import Text	Remote Text
Graphics	Barcode	Shift Code

After messages are created, a Backup should be done. This function is accessed through the Configure Screen. Instructions for this process is covered in the M5 Technical Manual.



As shown above, the Message editing window shows how the print output will appear. The visible horizontal lines displayed on this screen represent the “lines” available for printing in the message. The area between each line represents a possible eight (8) dots of printing. The number of “lines” displayed is dependent on the print height chosen for the message. The bottom Title Bar displays the name of the currently printing message (or NONE if not printing).

When the Message icon is tapped, a Select Operation screen will open giving the user the choice of:



New	Create a New Message
Open	Load an Existing Message
Open Template	Opens any Existing Message to use as a basis for a new message. The file name is stripped so that a new name must be assigned to the resulting message file.
Save	Save the contents of the Current Message
Delete	Delete an Existing Message
Cancel	Cancel the operation and return to the Main Screen

Main Screen

New

When New is selected, the Print Performance Screen will open and provide the user with the choices available for the new message.

The screenshot shows a 'Print Performance Selection' dialog box. It is divided into three main sections: 'Font Library Choose' with 'Normal Font' and 'Simple Font' options; 'Performance' with 'High Quality', 'High Speed', 'Multiline High Speed', and 'Turbo' options; and 'Message Height' with options for 8, 16, 24, 32, and 40 high lines. The 'Turbo' performance option and '32 High (4 Line)' message height option are selected. At the bottom are 'OK' and 'Cancel' buttons.

There are six Message Height choices and four Performance choices that can be combined to determine the message limitations. Not all Message Heights can be combined with every Performance choice. The different combinations all have an Optimum Line Speed limitation.

The Optimum speed limit is the maximum speed where the pitch between rasters is at the defined spacing. At higher speeds, the printer will still print all the information in the message, but the horizontal spacing between rasters* will increase.

* A raster is one vertical column of dots that become part of a character or graphic. A raster can also be referred to as a dot column.

See the Table below for the Message Height and Speed Limit combinations:

Raster Height vs. Speed Limit				
Message Height	High Quality	High Speed	Multiline High Speed	Turbo
5	504 FPM 2.56 m/s	1050 FPM 5.334 m/s	-	-
7	370 FPM 1.8796 m/s	961 FPM 4.88 m/s	-	-
9	291 FPM 1.478 m/s	524 FPM 2.66 m/s	-	-
16	104 FPM 0.528 m/s	370 FPM 1.880 m/s	264 FPM 1.34 m/s	355 FPM 1.80 m/s
24	79 FPM 0.40 m/s	-	163 FPM 0.828 m/s	287 FPM 1.458 m/s
32	39 FPM 0.198 m/s	-	98 FPM 0.498 m/s	178 FPM 0.90 m/s

As the choices are made on the screen, the Optimum Line Speed tab will update to show the combination limitations.

Multiline High Speed is a special series of rasters designed to print multiple lines. For instance, the 16-high version is made for two lines of 7-high font content. If a 16-high font is used there will be a gap through the printout. For an example of this output see [“Appendix D - Print Samples” on page 69](#) .

As a user, the actual line speed must be taken into consideration when selecting the Message Height. If the line speed is 100 FPM and the user selects a 32-High, High Quality message, the resulting print quality will suffer due to the extreme spacing between rasters.

If the system doesn't have upgrade keys the Print Performance Selection screen will show the restrictions with grayed out selections.

The 'Print Performance Selection' screen is divided into four quadrants. The top-left quadrant, 'Font Library Choose', has 'Normal Font' selected with a green circle and 'Simple Font' grayed out. The top-right quadrant, 'Performance', has 'High Quality', 'High Speed', and 'Multiline High Speed' grayed out, while 'Turbo' is selected with a green circle. The bottom-left quadrant, 'Message Height', has '8 High (1 Line)', '16 High (2 Line)', and '24 High (3 Line)' grayed out, while '32 High (4 Line)' is selected with a green circle and '40 High (4 Line)' is grayed out. At the bottom are 'OK' and 'Cancel' buttons.

Select Location

After the Print Performance Selection is made, the user must decide the location of the field(s). The Select Location Screen will open. The screen displayed will depend on the Message Height chosen and will reflect the maximum choices available for that height.

Two versions of the 'Select Location' screen are shown. The left version, for a 4-line message height, has two input fields labeled 'Line One' and 'Line Two'. The right version, for an 8-line message height, has three input fields labeled 'Line One', 'Line Two', and 'Line Three'. Both screens have a 'Cancel' button at the bottom.

Field Type Selection

Several Data or Field types may be entered into a message by selecting the appropriate icon. This screen is accessed by either tapping an empty area of the editing window or through the Enter Another Field prompt.

The 'Field Type Selection' screen displays a grid of icons for different data types: 'Text' (characters A, B, C), 'Date' (calendar icon), 'Time' (pm/am), 'Chinese' (character 汉), 'Counter' (numbers 1, 2, 3, 4), 'Import Text' (arrow icon), 'Remote Text' (barcode icon), 'Graphics' (color palette), 'Barcode' (barcode), 'Shift Code' (printer icon), and a 'Cancel' button.

If the system doesn't have upgrade keys the screen will show the restrictions with grayed out icons.



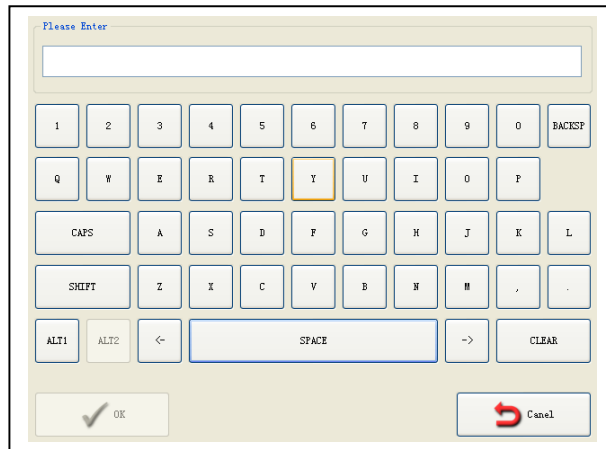
Main Screen



Text



Text fields are static information that can convey a name, description, or any alphanumeric data. Text fields are displayed on the editing window using a black font. A Text field has a maximum length of 250 characters. If a longer message is needed, additional Text fields may be strung together in a message.



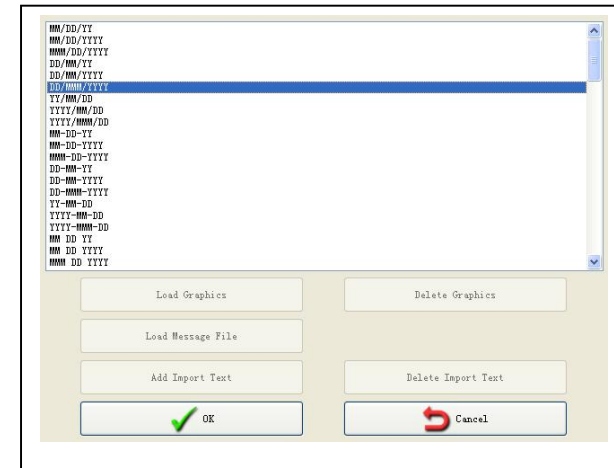
When the Text field icon is selected a keyboard will be displayed to allow data entry. Additional characters are available when the SHIFT, CAPS, ALT1 key are used. If a character is needed that is not on the keyboard, the UNICODE key allows entry of the code used to display and print the character.

Until data is entered, the “OK” button will remain grayed out.

Date



Date fields are dynamic and controlled by the real-time clock in the M5 printer touch screen interface. Date fields display using a green font. There are numerous predefined formats for a Date field. Below is a sample screen that shows some of the available formats.



Select the desired format from the pages of options.

Time



Time fields are dynamic and controlled by the real-time clock in the M5 Controller touch screen interface. Time fields display using a green font. There are several predefined formats for a Time field including:

A screenshot of a dialog box titled 'hh:mm (AM/PM)'. The dialog box has a large white area for displaying the selected time format. Below this area are six buttons arranged in two columns. The left column contains 'Load Graphics', 'Load Message File', 'Add Import Text', and 'OK' (with a green checkmark icon). The right column contains 'Delete Graphics', 'Delete Import Text', and 'Cancel' (with a red 'X' icon).

Select the desired format from the page of options.

Main Screen

Counter



Counters are dynamic and controlled by the M5 Controller touch screen interface. In the printout and in the editing window counters fill in leading unused digits with zeros.

These fields are displayed on the editing window using a red font. Counters increment using print triggers.

There are five (5) Tabs on the Counter screen:

Digits

Digits sets the number of characters that are in the counter.

(10) characters. The “Plus” button increases the number of digits Counter fields can be constructed to contain from one (1) to ten digits.

for the Counter and the “Minus” button decreases the number of

Start Value

keypad that allows a specific Start Value to be entered.

The default Start Value is zero. Tapping inside the box opens a

End Value

The End Value box automatically fills in with nines (9) equal to the number of digits designated for the counter. Tapping inside the box opens a keypad that allows any number to be entered as the

End Value. When the End Value is achieved the counter rolls over and resumes at the Start Value.

Increment By

The Increment By box is where the user sets the amount of increase per print trigger. The default is one, but the allowable range is from one to 255.

Repeat Value

The Repeat Value box is where the user sets the number of times a number is repeated before incrementing. The default is one, but the allowable range is from one to 255.

Global Counter

The software allows for special Global Counters that link counters in different messages. To make a Global Counter, the

starting with four "Z's", i.e.: ZZZZ1. For the next message that is file containing the counter must be saved with a file name

name, such as: ZZZZ2. After the message is saved, it can then be to be linked, save the original message with a variation of the file Naturally, re-save using the same name after making these opened to modify the other content to reflect the differences. are to be linked. As each linked message is selected for printing, changes. Continue with this procedure for all of the messages that to print with the previous message.

the counter will start with the next increment value that was due

**IMPORTANT:**

If any Global Counter is edited, it will no longer be linked. If a counter is later added to a message that contains a Global Counter, the new counter will not be linked.

Import Text

The Import Text function is a user definable list of often used words or phrases that can be put into a message without having to type the entire word or phrase. These fields are displayed on the editing window using a black font

Remote Text

Remote Text fields are special Text Fields that print data sent from an external source. Until data is received, the editing window will display as either asterisks as place holders or the last remote data string sent to the printer. Remote Text fields are displayed in the interface..

There are three Tabs on the Remote Text screen.

Number of Characters

Once a file length is set, the data string must be exactly that number of characters. If either more or less characters are transmitted, printer will ignore the data string. Tapping the **Add** button opens a keyboard that allows entry of data that will be added to the list.





Main Screen



Graphics



Graphics can be installed and stored in the memory of the M5 Controller touch screen interface. Graphic size limitations: The maximum size for a graphic is 16 X 1000 and 32 X 500. When the Graphic icon is chosen, three pages are available to select from. There are 33 pre-loaded graphics in the M5. See [“Appendix B - Graphics” on page 63](#) for a complete list.

Barcodes



The C84 Controller supports five types of barcodes. Barcode fields display using a black font. Barcodes always display the human readable interpretation as a 7-high font under the bars. When the Barcode icon is selected, a screen opens to allow choosing the height and type of barcode.

The image shows a screenshot of a barcode configuration screen. It has a light gray background with a white border. At the top, there are two sections: 'Size' and 'Type'. The 'Size' section has two radio buttons: '16 High' (selected) and '32 High'. The 'Type' section has five radio buttons: 'Code 39', 'Interleaved 2/5', 'UPC-A', 'EAN-8' (selected), and 'EAN-13'. Below these sections is a 'Data' field, which is a white text box. At the bottom, there are two buttons: 'OK' (with a green checkmark icon) and 'Cancel' (with a red X icon).

Size

Selects the total height of the barcode and the human readable text. The two sizes are either 16-High or 32-High. The choice can be limited by the Head Configuration and/or placement of the field in the message area.

Type

There are five (5) supported types of barcodes: Code 39, Interleaved 2 of 5, UPC A, EAN-8 and EAN-13. See below for an explanation and example of each type.

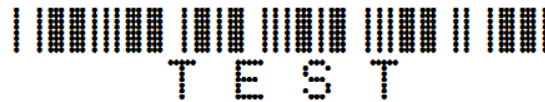
Data

Tapping inside the Data box will open a keyboard/keypad to enter the content of the barcode. The Data will be displayed for checking accuracy until the “OK” button is tapped.

Barcode Types

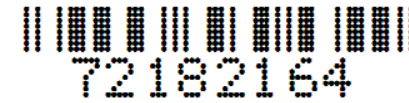
Features and examples are shown below:

Code 39



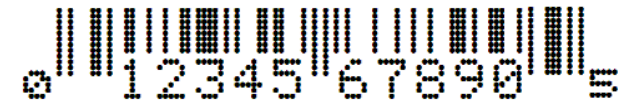
- Allows alphanumeric data entry from special keyboard
- Automatically adds start/stop characters at the beginning/end

Interleaved 2 of 5



- Numeric data entry (0-9)
- Must have an even number of digits
- If an odd number of digits is entered, the program will add a leading zero and inform the user that it was added

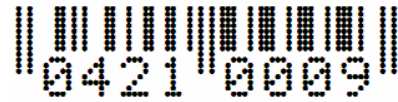
UPC-A



- Numeric data entry (0-9)
- Total of 12 digits long
- The user must enter 11 digits
- The 12th digit is the check digit and is automatically calculated and added to the barcode

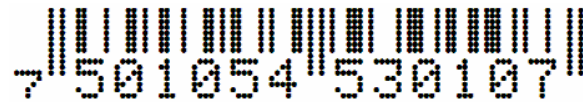
Main Screen

EAN-8



- Numeric data entry (0-9)
- Total of 8 digits long
- The user must enter 7 digits
- The 8th digit is the check digit and is automatically calculated and added to the barcode

EAN-13



- Numeric data entry (0-9)
- Total of 13 digits long
- The user must enter 12 digits
- The 13th digit is the check digit and is automatically calculated and added to the barcode

Barcode Error Messages

The software has built in error checking. If input data quantity is incorrect an error message box will open and explain the change needed.

An Interleaved 2 of 5 barcode requires an even number of digits. If an odd number of digits are entered, a leading zero will be added to the barcode and a message will be displayed informing the user of the action.

UPC-A, EAN-8 and EAN-13 have a specific number of characters that must be entered in the keypad to create the barcode. If an incorrect number of digits are entered for any of these barcode types, a warning message similar to the above will be displayed, but with the appropriate content:

UPC-A UPC-A requires 11 digits
EAN-8 EAN-8 requires 7 digits
EAN-13 EAN-13 requires 12 digits



IMPORTANT:

Barcodes have an empty area adjacent to the bars that is referred to as a Quiet Zone. It is imperative that this area be kept clear and that nothing else overlaps the zone.

If there is any overlap, the characters that are overlapped will be displayed as light red (pink) on the Touch Screen.

If there is an attempt by the user to insert a barcode where there is physically no room to fit (such as trying to put one on Line Two of a 16-High message), an error message will open to inform that it can't be inserted in that location.

Shift Code



Shift Codes are a dynamic field consisting of a programmed code that updates based on the real-time clock value. Up to three shift times can be entered.

Three Shift Time boxes appear on the left of the screen. These are considered start times of the shifts; the end time of a shift is the start time of the next shift, if used. The shift three start time can be set or it can be left the same as shift two so no changeover takes place. This is useful when a day has just two shifts and not three.

The Shift Codes, displayed on the right of the screen, can be programmed to hold a maximum of three alphanumeric characters. Shift Codes are displayed as a green font.

Shift 1 Time 0800	Shift 1 Code 1
Shift 2 Time 1600	Shift 2 Code 2
Shift 3 Time 2359	Shift 3 Code 3
✓ OK	✗ Cancel

Main Screen

Select Font Size

After any icon (except Barcode and Graphic) is selected on the Field Type Screen, the user will have to select the desired height for the font used in that field.



Depending on the message height chosen and line location selected, certain fonts will not be available. For example, a message height of 16-High would not allow choosing a 21-High or 32-High font since the raster could not print a character that large. In a similar fashion, with a 16-High message and Line Two selected, only 5-High and 7-High would be displayed as choices.

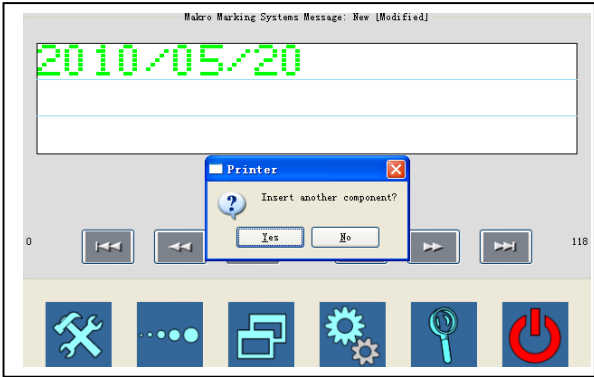
Font Aspect Ratios

Font Name	Font Aspect Ratio	Character Separation
5-High	5 Dots H x 5 Dots W	1 dot column separator
7-High	7 Dots H x 5 Dots W	1 dot column separator
9-High	9 Dots H x 7 Dots W	1 dot column separator
14-High	14 Dots H x 10 Dots W	2 dot column separator
16-High	15 Dots H x 10 Dots W	2 dot column separator
21-High	21 Dots H x 15 Dots W	3 dot column separator
32-High	32 Dots H x 20 Dots W	4 dot column separator

After selecting a font size, an appropriate data entry screen opens.

Enter Another Field

After creating a new field, the "Enter Another Field?" prompt will appear to help build the message. It will continue prompting until "No" is selected.



If "Yes" is tapped, the "Select Location" screen will reopen. Any new field added on the same line will be placed immediately adjacent to the existing field. This works fine for stitching together logos but may be an issue for text fields. If additional spacing is desired, place a "space" at the beginning and/or end of the text field.

If "No" is selected, the prompt stops, but additional fields can still be entered. See Manual Field Entry below.

Manual Field Entry

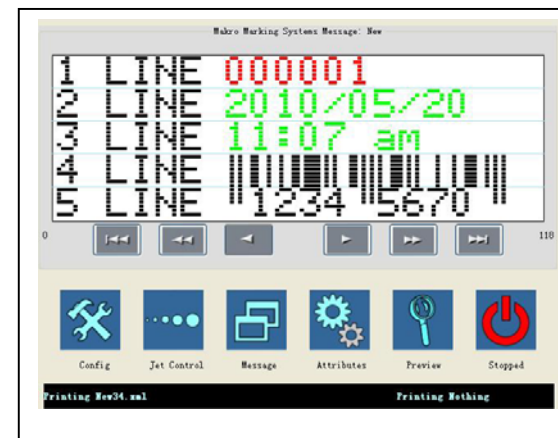
There is a second method of entering fields without using the "Enter Another Field" prompt. Simply tap the screen at the position where the field is to start. Once a starting position is established, the prompts will appear in the same sequence:

Field Type
Select Font
Data Entry

The advantage to using Manual Field Entry versus the Enter Another Field prompt is the ability to place fields where desired and avoiding the fields abutting each other.

Editing Fields

Whether in the process of creating a new message or editing an existing one, the user can edit specific fields in the message. From the editing window, simply tap the field in the message to be edited.



Once any existing field is tapped, a screen appears showing the functions: Font, Edit, Erase, Move and Field Attributes.

Main Screen

Font



Selecting the Font icon allows the user to change the size of the font that is used in the existing field. The selection list will only display font sizes that will fit in the message area from the current position to the bottom of the message area.

Tapping "Cancel" retains the current font setting. For Barcode and Graphic fields, the Font function does not apply and, therefore, is not displayed.

If the field content is edited, be sure to check that the change does not result in any overlaps. Overlapped fields are designated with light red (pink) in the effected area of the character/graphic. Any overlaps can be corrected using the Move icon.

Edit

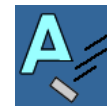


Selecting the Edit icon will open the data input option for the field type selected (keyboard, keypad, etc.).

Tapping "Yes" will set the message so that the next print trigger will use the "Start Value" for the Counter. If "No" is tapped, the Counter configuration screen will open to allow changing of any parameter of the counter.

If the field content is edited in a manner that modifies the field length, be sure to check that the change does not result in any overlaps. Overlapped fields are designated with light red (pink) in the effected area of the character/graphic. Any overlaps can be corrected using the Move icon.

Erase



Selecting Erase icon will delete the complete field selected.

There will be a confirmation prompt that must be acknowledged before the field is actually deleted. There is no "Undo" for this action, once a field is deleted, it is permanently deleted.

Move



If the user is not satisfied with the positioning of any specific field in the message area, the field may be moved. Tapping any existing field opens the option screen. Once a field is selected and Move is chosen, the next position tapped in the message area will be the left edge of the insert point for the field. This method allows changing the line that the field is positioned on (providing the field size will fit at that position, i.e.: a 16-high field cannot be moved to Line 4).

If any field is moved to a position where it is overlapping another field, the part of the field in the overlap will appear as a pale red (pink) color. The field should be moved so that no overlap occurs.

If a smaller adjustment (this must be on the same line of the message) is required, use the "Left" and "Right" horizontal "fine" positioning arrows. Each tap of an arrow moves the field one dot column in the

arrow's direction. When the desired position is reached, tap the "OK" button to lock the field in its new position.

Field Attributes



Each Field in a message can be assigned specific individual attributes such as:

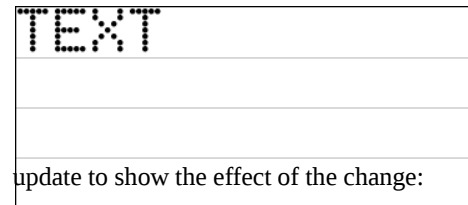
Bold

If the Field Attributes icon is selected, a screen will open that allows the user to make changes that will effect the appearance of that specific field.

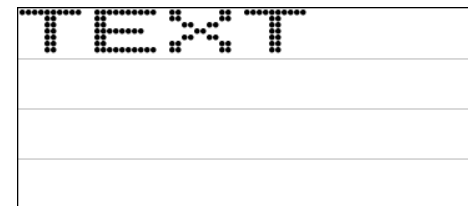
Bold

At the top of the screen is the section where a Bold Factor can be applied to a field.

The Default setting is "0" as a bold factor (each dot column of the message is printed once). This is a sample of a Bold setting of "0":



If the setting is changed to a Bold setting of "1", the display will



Main Screen

Note that each dot column is shown twice (and will print twice).
If a Bold setting of “2” is selected, the display will update to show the effect of the change:



Note that each dot column is shown three times (and will print three times). The Bold function increases the width of all characters by repeating printed dot columns. The default value is "0" which prints each dot column once. The allowable range is "0" to "9" with the width resulting in the Bold value plus one; i.e.: a Bold of "1" will result in a print with each dot column printing twice.

Bold Print fields are shown as WYSIWYG (What You See Is What You Get).



IMPORTANT:

If the Bold function is applied to a field you must check that there is no overlap with adjacent fields (any overlap is indicated by pale red [pink] characters in the display).

For a sample of Bold Print, see [“Appendix D - Print Samples” on page 69](#).

There are four check boxes below the Bold setting tab. The examples below are made with a Bold setting of “0”.

The effects of selecting each check box will be illustrated.

Main Screen

Preview



The Preview icon initiates a scroll of the complete message area. Once the end of the message is reached, the screen will automatically return to the view that was displayed before the icon was tapped. If the Preview icon is tapped during a scroll of the message, it will immediately cancel the action and return to the view that was displayed before the icon was tapped.

Traffic Light



The Traffic Light is used to control printing. It has three phases:

- Red Printing Stopped
- Yellow Printing Suspended
- Green Printing Enabled

Printing Suspended only shows if the unit had been printing and the Traffic Light is tapped. A screen will open offering three options:



Suspend Printing will halt printing, return to the Main Screen and display the Yellow Traffic Light.

Shutdown Jet will stop printing, initiate a shutdown of the Jet, and if programmed, will turn off power to the unit after the Jet is stopped.

Extended Shutdown is available to use when it is known that the unit this will not be used for a longer period of time. It is recommended to use option for the following circumstances: This cycle will also turn off the power to the unit after the Jet is stopped, if programmed for the option.

- For Dye based ink systems where the shutdown exceeds seven days.
- For Pigmented ink systems where the shutdown exceeds four days.

Makro M5 Printer

The Makro M5 Printer utilizes a color touch screen interface and a Continuous Ink Jet print engine. The color touch screen allows programming of the printer by fingertip. Continuous Ink Jet printing allows a very high-resolution output without any physical contact with the substrate.

Turning on the Unit

With the unit connected to the proper power source (115V or 230V AC), flip the rocker switch and hold in the push button for a moment. A relay will latch itself in the "on" position.



Rocker Switch



Push Button

With power applied, the controller will "boot up" and load the operation software for the Makro M5 Printer. If this is the first time the unit has been turned on, a Warning Screen will open notifying the user that fluid levels are low (units are never shipped with any fluids in the tanks).

Getting Started

Before the unit can print you must Commission the unit.



Items required:

Installed printer with all external components connected

Two bottles of Ink

Two bottles of the appropriate Makeup Solution (this must be the solution recommended for use with the chosen Ink type)

Safety glasses/goggles

Solvent resistant gloves

1. The unit will show all existing Alarms (Ink Low, Makeup Solution Low).

Getting Started

2. Install **TWO BOTTLES** of Makeup Solution * and **TWO BOTTLES** of Ink into the appropriate tanks. Never add more than **TWO BOTTLES** of either fluid when commissioning a system. Any excess may cause the system to be **OVERFILLED**. This will cause a failure and will **VOID the WARRANTY**.

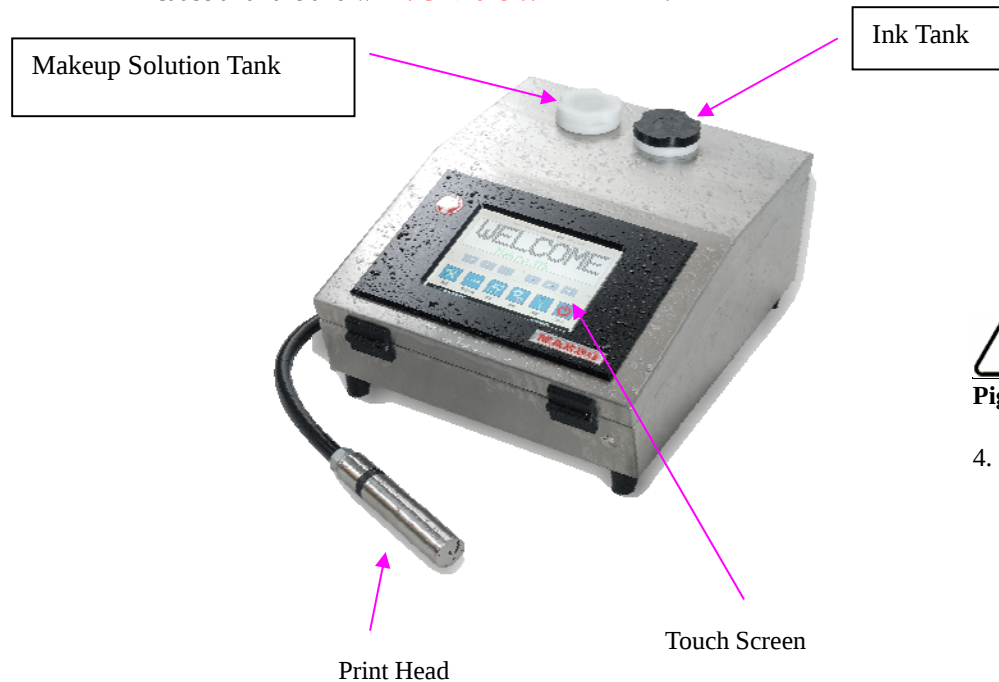


Figure 5

The black Filler Tube is on the Ink Tank and white Filler Tube is on the Makeup Solution Tank (see Figure 5).

* Makeup Solution is the solvent used by the system to control the viscosity of the Ink.

3. To add Ink, first remove the cap on the black Filler Tube to the ink tank on the M5. Invert the new bottle of Ink and shake briefly (see Figure 6).



Figure 6



IMPORTANT:

Pigmented inks require at least one minute of agitation.

4. Turn the bottle back to right side up, unscrew the bottle cap and verify that the foil seal is in place. If the foil is secure, invert the

bottle and insert into the opening of the ink tank.

If the foil seal is damaged, analyze the circumstances to determine the chances the fluid was contaminated. If stored with the cap on the bottle, the probability is great that there had been no contamination and the fluid is usable. Use a clean funnel to pour the contents of the bottle into the tank.

Inside the opening of the tank filler tube is a piece of metal designed to pierce the foil seal and allow the ink to drain into the tank.

The Makeup Solution Filler Tube and tank function in an identical manner. The only difference is the diameter and color of the Filler Tube: The Makeup Solution Filler Tube is 38mm in diameter and is White while the Ink Filler Tube is 45mm in diameter and is Black.

The Makeup Solution and Ink Bottles have different diameter necks (the sizes match the different size Filler Tubes) that help to prevent the incorrect fluid being dispensed into the wrong tank.



IMPORTANT:

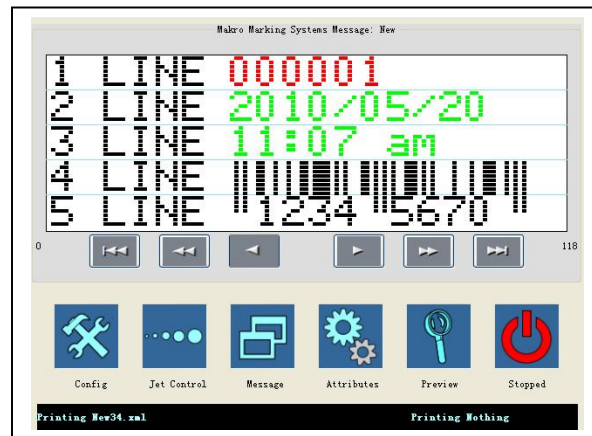
Never add Ink or Makeup Solution unless the system indicates that some is needed.



IMPORTANT:

The Ink and Makeup Solution used in the M5 printer have a defined shelf life. Before adding either fluid to the system, determine that the bottle has not passed the expiration date.

- The Alarms should go away and the Main Screen should be displayed.

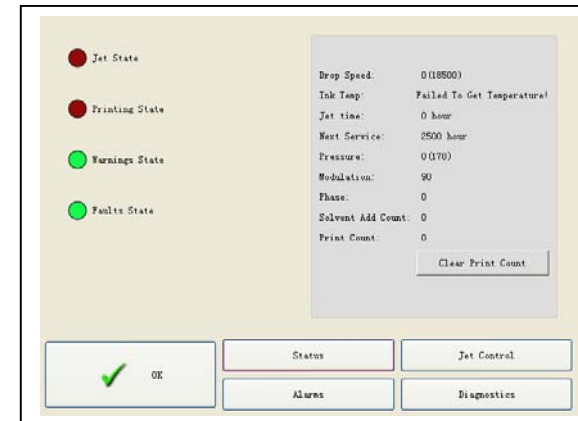


- The Ink and Makeup Solution tanks are now filled, but the internal components such as the Damper, Filters etc. are empty (since units are never shipped with fluids in the system). To prime the system so that it is ready to print, perform the following steps:

- Tap the Jet Control button.

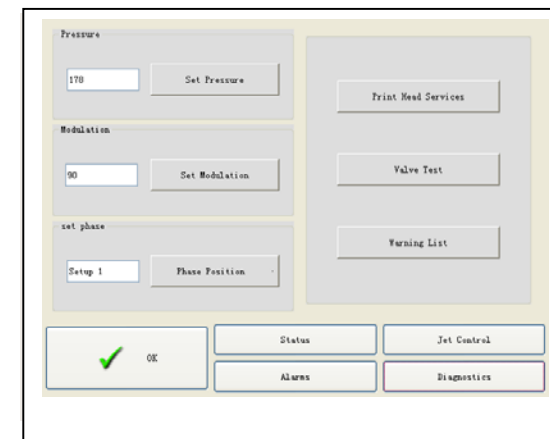


- The Jet Control Screen will open.



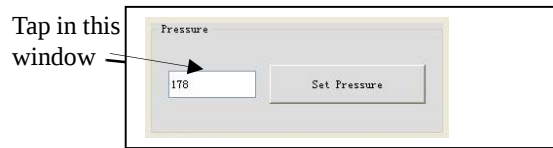
- Tap the Diagnostics Button.

- The Diagnostics Screen will open.

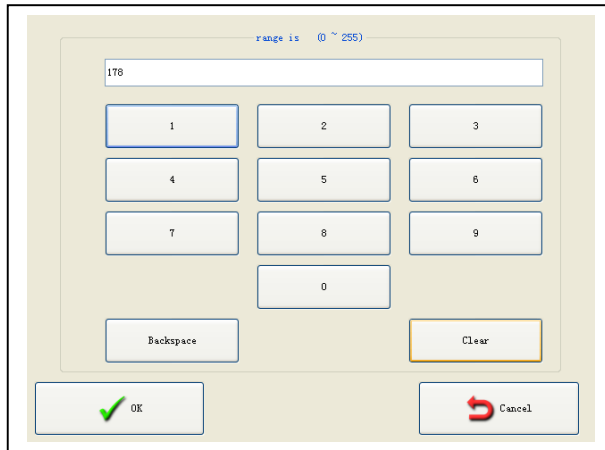


Getting Started

11. Tap the Set Pressure value window.



12. A Set Pressure Keypad will appear.



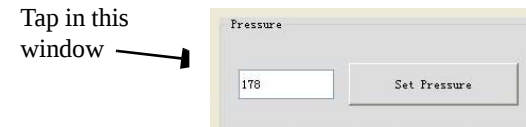
13. Enter the value (178) (the value displayed is the Head Code reference pressure. With that value highlighted just enter the desired value. The new value will replace the highlighted value. If the value is not highlighted, Tap the Clear button first). Tap OK; tap the Set Pressure button once.



Tap this button

14. The pump should start running at this time, filling the filters and damper with ink. Let the system run for about 1 minute.

15. Tap the Set Pressure value window again.



16. After the Set Pressure Keypad appears (see above), enter 0, tap OK, and tap the Set Pressure button once. The pump should stop running.
17. The unit is now ready to start the jet. Refer to the Jet Control section for the procedure on Starting the Jet. See [“Starting the Jet” on page 54](#).



IMPORTANT:

18. It is possible that very shortly after starting the Jet that the system may display another Ink Low Warning. This can occur due to the amount of fluid necessary to fill all of the internal filters and tubing lines. If the Warning does appear, add **ONE** additional ½ liter bottle of Ink.



IMPORTANT:

19. After the initial filling, never add Ink or Makeup Solution unless the system provides an Alarm requesting the fluid.



IMPORTANT:

20. Never transport or store the unit with fluids in the tanks. If either of these circumstances occur, see [“Appendix E - Draining the System” on page 71](#) or complete instructions in Technical Manual.



M5 Message Tutorial

The following exercises will guide you through the process of creating and printing a simple message. At the same time, they will provide insight into the printer's menu structure. It is recommended that all exercises be carried out on the same occasion.

These exercises take you through the following procedures:

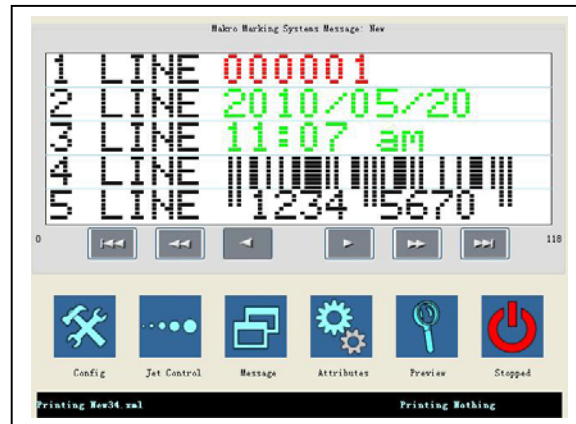
- Exercise 1 - Creating a Message
- Exercise 2 - Adding a Date Field
- Exercise 3 - Adding a Time Field
- Exercise 4 - Moving a Text Field
- Exercise 5 - Setting the Attributes
- Exercise 6 - Saving a Message
- Exercise 7 - Printing a Message

Before starting exercise 1, please make sure that the printer has been properly installed and is ready to print.

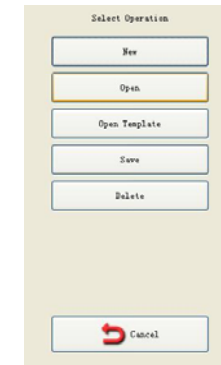
Exercise 1 - Creating a Message



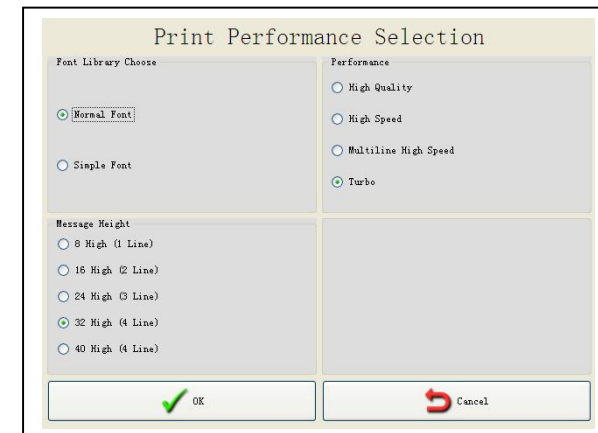
- a. After the unit is powered up, the Main Screen appears displaying the last message loaded . Tap the "Message" icon.



- b. A "Select Operation" screen appears. If the unit has just had a full update to the software, the left Select Operation screen will appear. Otherwise the right screen will appear. Tap "New" to create a new message.



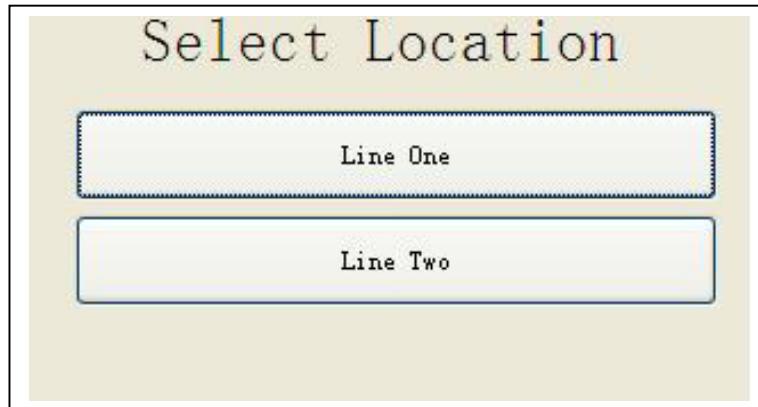
- c. The Print Performance Selection Screen will open, select 16-High (Two Line), High Quality and Tap OK.



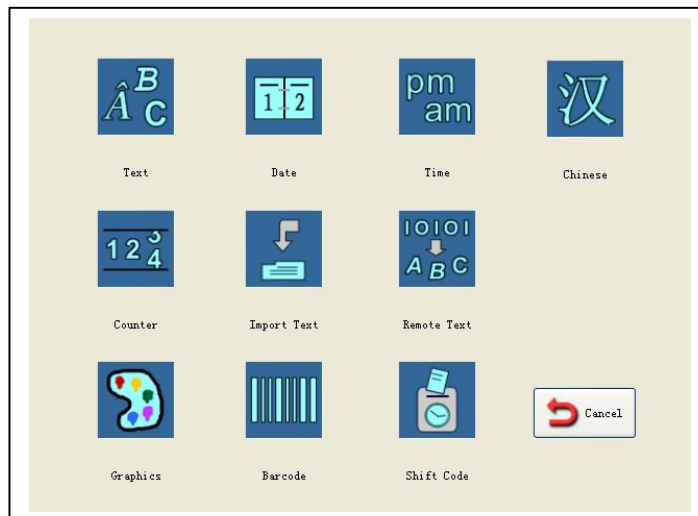


Tutorial

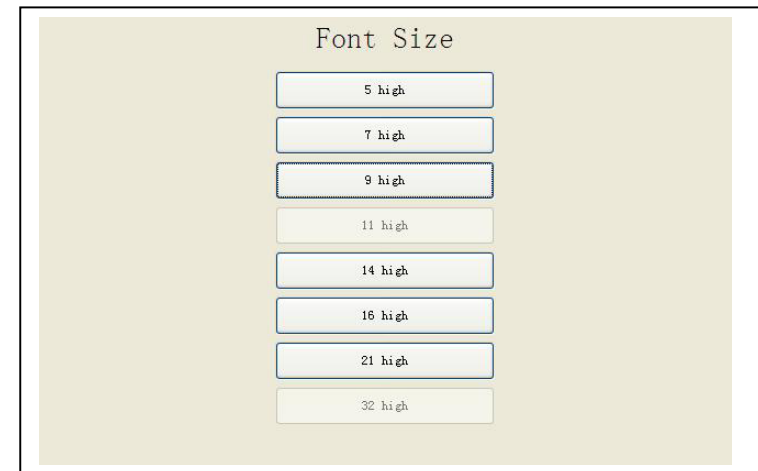
- d. A "Select Location" screen appears prompting to select which line of the message the first Field will be located. Please note that if some other Message Height is selected, a different Select Location Screens will appear. Select the first line by tapping on "Line One".



- e. The Field Selection screen will appear. Tap the "Text" field icon.



- f. The "Font Size" screen will appear (the list displayed will depend on the Message Height selected). Tap the "7 high" font size.

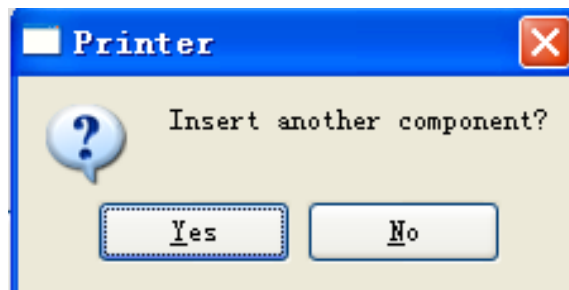


- g. A keyboard screen will appear. By tapping on the appropriate letters, enter the text "TEST MESSAGE ", leaving a space after the word MESSAGE. Do not enter the quotation marks. Tap the "OK" button to proceed to the next exercise.

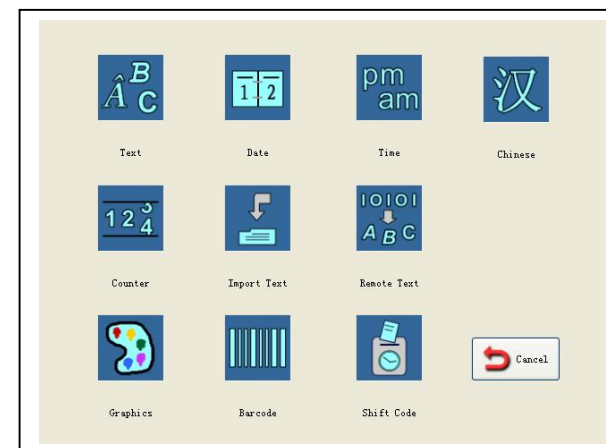


Exercise 2 - Adding a Date Field

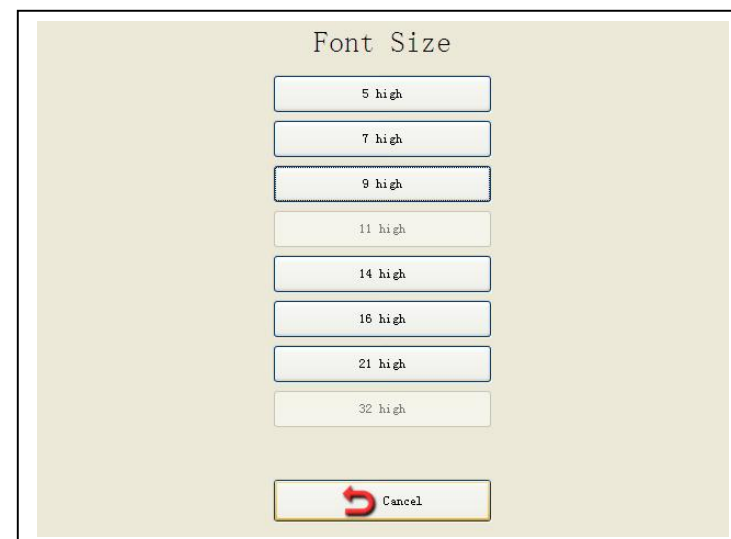
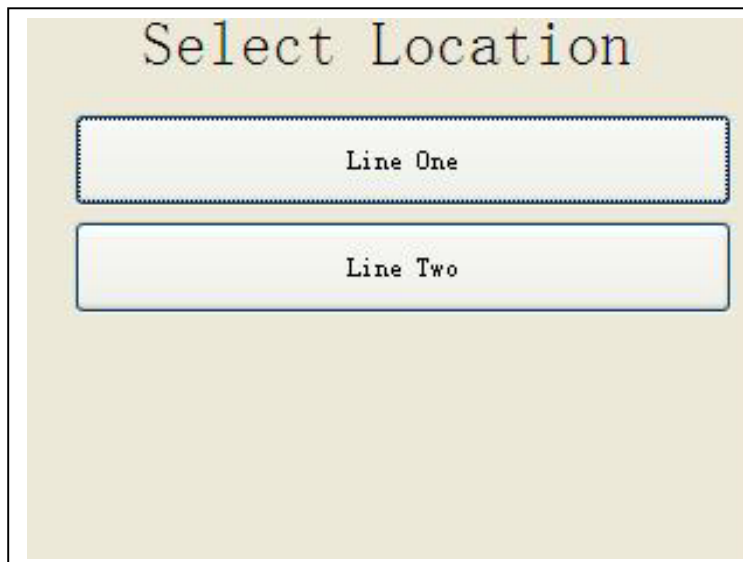
- A screen appears asking if you want to "Enter Another Field?". Tap "Yes". {Note that if "No" is selected, it is still possible to enter the date. In this case simply tap in a blank space next to the words "TEST MESSAGE " in the message editing window.} If "Yes" is selected..



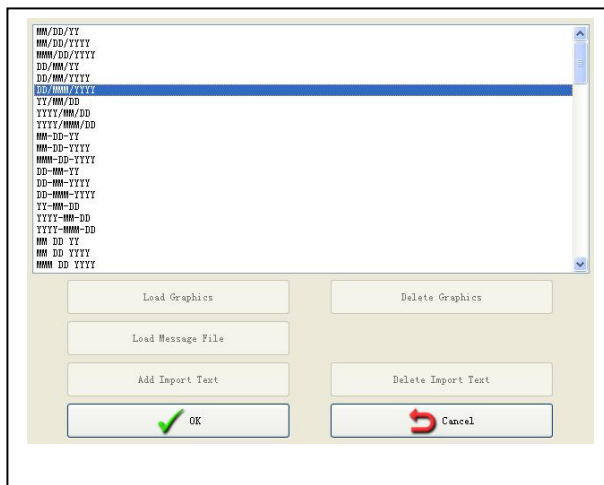
- Tap the "Date" icon.



- Tap the "7 high" font size.



- d. Tap the "MM/DD/YY" date format in the "Insert Date" screen. The screen will open with the last used date format highlighted. Simply select the desired format (it may be necessary to browse through the different pages to find the correct format). Once a selection is made, proceed to the next exercise.

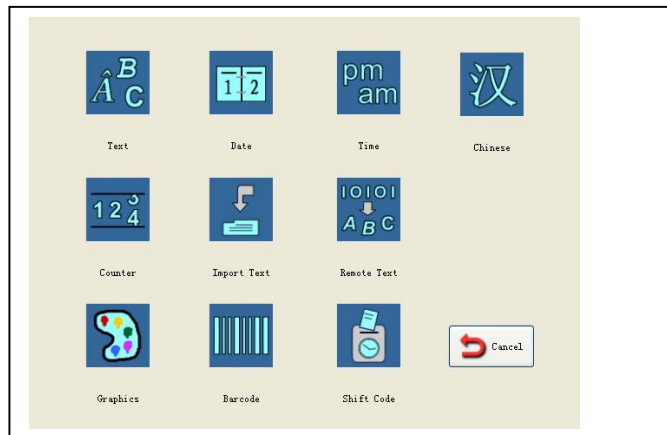


Exercise 3 - Adding a Time Field

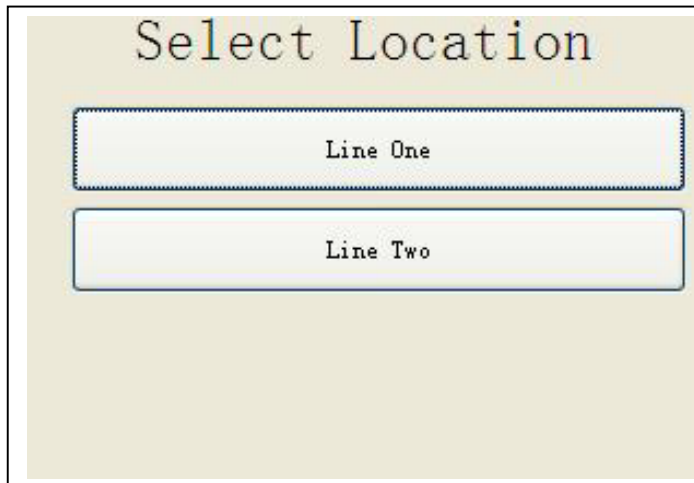
- a. The "Enter Another Field?" screen appears. Tap "Yes". {Note that if "No" is selected, it is still possible to enter the time. In this case simply tap in a blank space next to the date in the message editing window.} If "Yes" is selected, tap "Line One" in the "Select Location" screen.



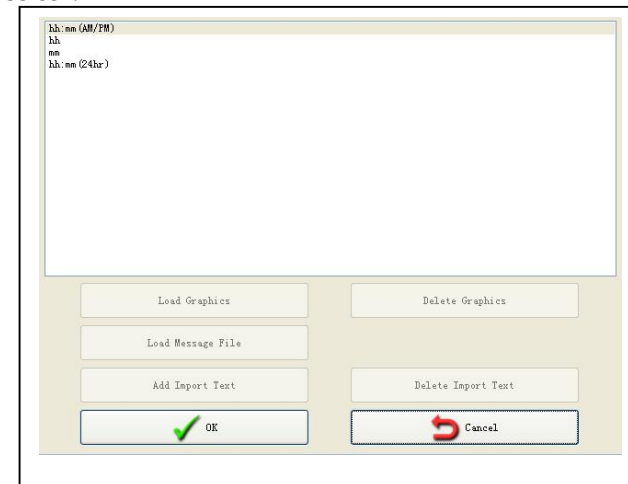
- b. Tap the "Time" icon.



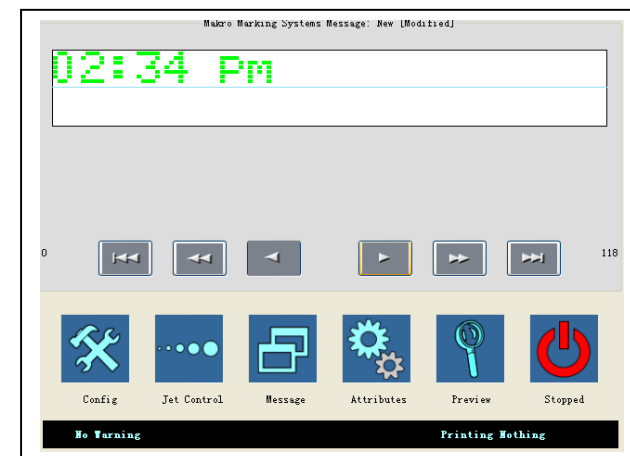
- c. Tap the "7 high" font size.



- d. Tap the "hh:mm [AM/PM]" time format from the "Insert Time" screen.



- e. At the "Enter Another Field?" screen, select "No". At this point, the message editing window should be displayed.

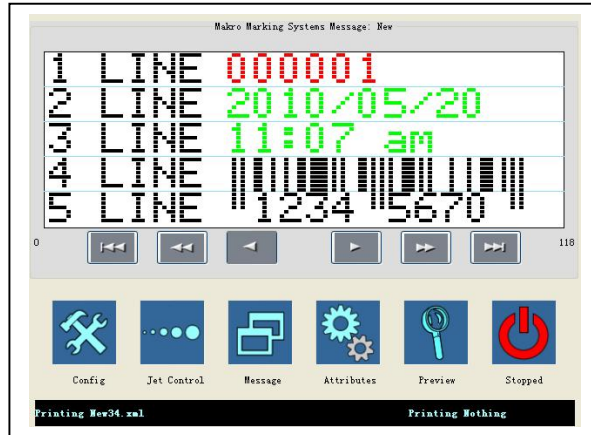




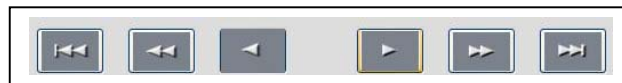
Tutorial

Exercise 4 - Moving a Field

- a. Tapping the "Preview" icon in the message editing window scrolls through the message just created. Notice that the date and time fields are close together with no spaces between them.



- b. Use the arrow keys to scroll to the part of the message where the date and time are visible.



Moves to the Home position

Moves 100 dot columns Left

Moves 50 dot columns Left

Moves 50 dot columns Right

Moves 100 dot columns Right

Moves to the end of the message area

- c. Tap on any part of the time field. A screen appears showing editing options for the time field just selected.

- d. Tap the "Move" icon

- e. The message editing window appears with a "Move Object" tab at the bottom of the screen. The time field may be moved in one of two ways. Tap the arrow keys in the "Move Object" tab to move the time field one pixel or dot space at a time. Tap "OK". Or, simply tap in the message to where the time field should be moved.



- f. Using one of these methods, move the time field six spaces to the right.
- g. Select “OK” when the Time field is moved to the desired position.
The editing window will update to show the new positioning



Exercise 5 - Setting Attributes

Once a message is created, the Attributes for the message should be defined.

- a. Tap the Attributes icon on the Main Screen. The Message Attributes Screen will open.

- b. Tap inside the Print Width window.

Tap inside this window

Tutorial

- c. A keypad will open to set the Print Width.

- d. Using the appropriate keys, enter the value 3000

- e. When the proper value is displayed, tap the “OK” button on the keypad.

- f. Tap inside the window for Print Delay.

- g. A keypad will open to set the Print Delay.

- h. Using the appropriate keys, enter the value 50 mm.



- i. When the proper value is displayed, tap the “OK” button on the keyboard.

Message Attributes

Print Width(CP/ROW): 3000

Print Height: 170

The Room Printing Defers(ROW): 300

Print Direction: ☒ Left ☐ Right

Print Inverse: ☐ Inverse

Meter Adjust(X 10 CP/M): 250

Length: [reset]

☒ Timer ☒ Level ☒ High Level ☒ By Pass Meter
☐ Encoder ☐ Light Eye ☐ Low Level ☐ By Meter

OK Print Mode Cancel

- j. When the Message Attributes Screen displays the value shown above, tap the “OK” button.

Before a message can be printed, it must be saved.

Exercise 6 - Saving a Message



- a. Tap the "Message" icon near the bottom of the Main Screen.
- b. A "Select Operation" screen will appear. Tap "Save".

Select Operation

New

Open

Open Template

Save

Delete

Cancel

- c. The Keyboard Screen will appear. Enter "TEST" as the file name (without quotation marks).

Please Enter

TEST

1 2 3 4 5 6 7 8 9 0 BACKSP

Q W E R T Y U I O P

CAPS A S D F G H J K L

SHIFT Z X C V B N M , .

ALT1 ALT2 <- SPACE -> CLEAR

OK Cancel

- d.



Tutorial

Exercise 7 - Printing a Message



- a. The "Select Message for Printout" screen appears. Tap "Yes". If "No" is selected, the message may still be selected for printing by tapping on the traffic light icon in the message Main Screen.

If the Jet is not running, the controller will initiate a Starting Jet Sequence (see the Jet Control Section). Once the Jet is started, the unit will be ready to print.

If the characters are present, but have excessive space between the rasters, the substrate line speed is possibly excessive or the print width setting is too large. Refer to the chart: ["Raster Height vs. Speed Limit" on page 14.](#)

- b. The message should print following a print trigger.



- c. If completed correctly, the printed message will look like the following with the current date and time:

TEST MESSAGE MM/DD/YY HH:MMpm

Configure



Config

The parameters for the basic setup of the printer are located in the Configure section of the software. Here the user may set the system language, access levels as well as program the software to match the hardware attached to the unit. Selection of an encoder, and print direction are a couple of the settings. The system clock may also be set in this section. Please see the M5 Technical Manual for more details on the Configure section.



Configure



Attributes



Every message created for the M5 has specific Attributes such as: Print Delay, Target Length, Print Width, and Print Height. Once a message is created, the Attributes for the message should be defined. Separate Attributes can be set and saved with each message. A change in the value of each Attribute is made by tapping inside the display box to access a number pad or by tapping on the "+" or "-" button to increase or decrease respectively.

Print Delay

Print Delay is the interval between the print trigger and actual start of printing. This allows positioning of the message on the target where desired. Tapping in the number box opens a keypad that displays the range limits. In metric units of measurement the increments or decrements are 1.0 mm intervals. When working in Imperial units of

measurement the increments or decrements are made in 0.1 inch intervals.

Print Width

Each increment in Print Width represents 1/1000 of a millimeter (1 μ m) between Rasters (Dot Columns) set for Metric or in increments of 0.001 inches for Imperial measurements. The allowable range for Print Width is 30 to 12000 μ m or 0.001 to 0.472 inches.

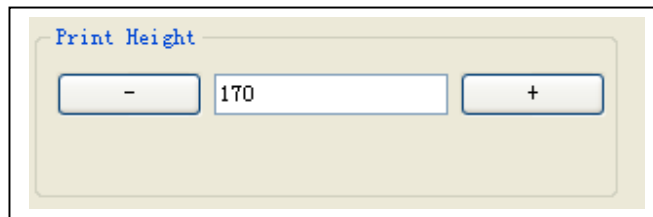
A typical Print Width is in the range of 342 to 500 μ m. This range normally results in printed rasters that have a slight overlap. This output has the appearance of a solid font (not characters with individual dots).

If Message Height speed limitations are exceeded, the resulting print will be spread out.

Attributes

Print Height

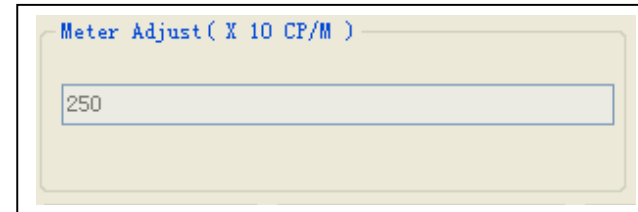
Print Height allows a specific height setting to be saved as a message parameter. The zero center position prints at the exact setting of the Configuration Height. Tapping the “Plus” Button increases the height one increment per tap. Each segment moved will result in a proportionally larger message height. Tapping the “Minus” Button decreases the height one increment per tap. Each segment moved will result in a proportionally smaller message height. Zero is the Nominal height for the Message Height. The Print Height adjustment range is plus or minus three (3) increments from the Nominal Height. This adjustment allows the fine adjustment of the height.



Target Length

Just to the right of the Print Width setting there is an Attribute called Target Length. If the Target Length Attribute is not shown on the screen, it is because the Auto Length box in the Configure Printer screen is checked. When this box is checked, the M5 performs calculations for correct message length automatically. See the M5 Technical Manual for

more details concerning the Auto Length feature and the Configure screen.



When specifying Target Length, the range is a minimum of 6 to a variable upper limit that is dependant on the print width equal to 4000 dot columns of spacing. The length is changed in increments of 1 mm. In Imperial units the range is from 0.2 to a variable upper limit that is dependant on the print width equal to 4000 dot columns of spacing. The length is changed in increments of 0.1 inches. The Target Length is the maximum length of printout allowed. If the message data exceeds the value set for the Target Length, the message will be truncated in the printout. If the message data is less than the value set in Target Length, the next message cannot be printed until the Target Length distance has been reached. In the case that the substrate is a continuous roll or web instead of individual units, the Target Length is the interval between the starting points of the printouts .

Print Mode

When the Print Mode button on the Attributes Screen is tapped, the Print Performance Screen will open. This allows the selection of a different Message Height or Raster Performance selection (within the limitations of the features of the model purchased)

Updating Attributes in Printout

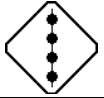
As soon as the “OK” button is tapped on the Attributes screen, the changes are sent to the print engine and a prompt will appear warning that the message must be saved for the changes to become permanent.

The Main Screen will display [Modified] in the Message Name Tab.



The changes will have to be saved to become permanent.

Attributes



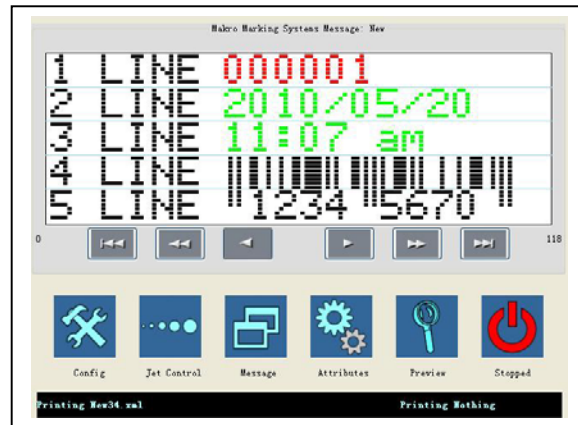
Jet Control

Introduction

Before printing can be accomplished, the "Jet" must be started (see ["Theory of Operation" on page 10](#) for a definition of a Jet). There are two methods that can be used for starting the Jet.

The first method would be to simply Touch the Traffic Light icon. This will initiate the starting Jet sequence and immediately load the current message for printing (a New Message must be saved before it can be printed).

The second method is to touch the Jet Control icon on the Main Screen to open the Jet Control Status screen.



If the Jet is started through the Jet Control Screen, printing does not begin immediately.



Tapping the Jet Control icon opens the Jet Control Screen which has three sections: Status (the default screen displayed), Alarms and Diagnostics.

The Status Screen has several important indicators that inform the user about functions of the printer.



The indicator circles along the left side of the screen change from green to red, and in one instance, yellow. In addition, the captions associated with the circle changes to further clarify the status.

The first indicator being red shows that the Jet is stopped (along with the label for the indicator). In addition, the second indicator, also red, shows that printing is stopped. For a CIJ printer to be able to print the jet must be running. It is impossible to print without a jet. The third indicator, showing green, implies that there are no warnings (of problems) reported by the processor. The fourth indicator, also green, indicates there are no reported faults.

“Warnings” are system notifications that require a response from the user.

“Faults” are system notifications of a problem that requires the Jet to be stopped, either immediately or through a normal shutdown procedure. Power to the unit is maintained so that the user is able to see the reason for the shutdown.

Jet Control

The list along the right side of the screen reports on information from the processor board.

Drop Speed	The elapsed time for a charged droplet to pass over the two sensors (the Phase Sensor and the Drop Speed Sensor). Since the jet is not running there is no Drop Speed reading.
Ink Temperature	The temperature is monitored to help determine the viscosity of the ink.
Jet Time	The number of hours that the jet has run since the last service.
Next Service	Indicates when the next service is due.
Fan Speed	Displays the cooling fan speed as a percentage of maximum.
Pump Pressure	The Pump Pressure varies to control the correct Drop Speed. Since the Jet is not running, the Pump Pressure is not displayed (the pump isn't running and there is no pressure).
Modulation	Displays the current Modulation Setting.
Phase	Displays the current Phase Position.
Solvent Add Count	Displays the number of Solvent Adds that have been done to maintain viscosity since the Jet was started.

Next Service is a countdown in hours. At zero hours, the caption will read "Service Now Due" as well as the warning screen appearing. This figure is only updated when the system boots.

Fan Speed is displayed as a percentage of the normal maximum. This allows the user to observe a loss of performance (normally due to the filter becoming clogged with particulates).

Touching the "Alarms" button opens the Alarms screen, which includes indicators that represent conditions of the printer.



Any Warning or Fault indicator will trigger the Alarm Attention screen. This screen will appear in front of any currently open screen. The reason for the Alarm will be shown in Red on the screen.

The first indicator on the left is Ink Low. When the ink level in the tank gets to a predetermined level, the indicator will change to Red. If this occurs the user should add a ½ liter bottle of Ink to the Ink Tank, see “Figure 5” on page 32.



IMPORTANT:

Never add Ink unless the system requires it. In normal operation, it will **NEVER** be necessary to add more than **ONE BOTTLE**.

The second indicator is to monitor the level of the Makeup Solution. Again, if the system requires more solution the indicator will change to Red and the Alarm Attention screen will appear. If this occurs the user should add a ½ liter bottle of Makeup Solution to the Makeup Solution Tank. Never add Makeup Solution unless the system requests it. In normal operation, it will **NEVER** be necessary to add more than **ONE BOTTLE**.

With either an Ink Low or Makeup Solution Low Warning the printer will continue to function and print. If the unit is powered down without adding the appropriate fluid, when re-powered the Jet will not start until the fluid levels are correct.

Head Temperature indicator circle changes to Red if the temperature inside the Print Head exceeds a safe level. This is a failure and the Jet will stop immediately.

The next indicator notifies the user of a Deflector Voltage failure. This can be caused by the Jet being deflected and touching the Deflector Plates. This normally results in the jet stopping automatically. If this should occur, remove the print head cover, wash down the internal parts with Cleaner in a wash bottle to clean any residual ink (catching the fluid in a container and then properly disposing of the waste). Allow the print head to dry, replace the cover and restart the jet (see “Wash Down of Print Head” on page 59).

The fifth indicator changes to Red if the Print Head Cover is removed or loose. Printing is suspended when this warning is activated (the indicator on the Status screen will change to yellow to signify the suspension).

When the Cover is secured in place the indicator will change back to Green and printing will resume.

The sixth indicator warns of an internal spill of either Ink or Makeup Solution. This is a failure and the Jet will stop immediately. This failure should be corrected by a properly trained technician.

The seventh indicator warns of a Charge Voltage problem. This normally results in the jet stopping automatically. This failure can be caused by the jet being deflected and touching the charge plates. If this should occur, remove the print head cover, wash down the internal parts with Cleaner in a wash bottle to clean any residual ink (catching the fluid in a container and then properly disposing of the waste). Allow the print head to dry, replace the cover and restart the jet (see “Wash Down of Print Head” on page 59).

The eighth indicator activates if the cooling fan is not functioning.

The list on the right half of the Alarms Screen is a duplicate of the information displayed on the Status screen (see page 51 for an explanation).

The Attention screen will appear for 6 different "Warnings": The

Ink Low
Makeup Low
Head Cover Off
Invalid Drop Speed Reading (only functions after the Jet has started)
Low Pressure (only functions after the Jet has started)
No Print Head Connected

Jet Control

The screen will also appear for eight different "Faults":

Head Temp
High Voltage Fault
TOF Fault
Charge Volt Fault
Viscosity Fault
Phase Fault
Ink Leak
Unknown Software Fault

A Head Temp and Internal Spill Fault will result in the system immediately stopping the Jet. Any of the other Faults will initiate a normal shutdown of the Jet.

Troubleshooting for these Faults is covered in the M5 Technical Manual.

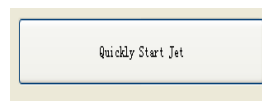
Starting the Jet

To actually print the jet must be running.



The jet can be started two ways.

1. If the Main Screen is open and the "Stopped" traffic light icon is tapped the start jet sequence will commence. The entire sequence takes approximately 90 seconds.
2. In the Jet Control screen, simply tapping the "START JET" button starts the jet.



For either sequence, a window with a countdown timer opens up and stays in front until jet has started.

If the Startup Sequence was started from the Editor/Viewer screen using the traffic light, the indicator will show green and the unit will print when given a trigger.

Notice that there is now a Drop Speed and Pressure reading and that the ink temperature is being monitored.

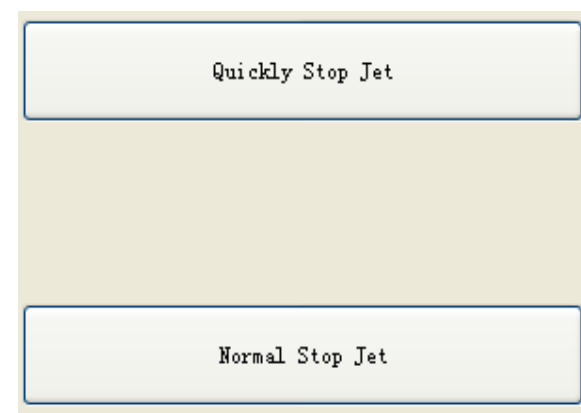
During normal operation the Drop Speed reading will vary somewhat. The Pressure will change to compensate and keep the value within range.

If the Jet was started from the Diagnostics Screen and the user navigates to the Main Screen, the Traffic Light will be displayed as Yellow, with a Suspended label.

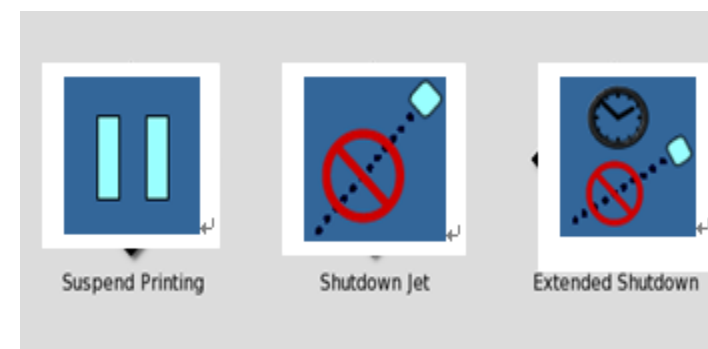
Stopping the Jet

There are two methods for Stopping the Jet:

1. From any of the Jet Control screens touch the Stop Jet button. If the Stop Jet button is tapped with Printing enabled (green Traffic Light), the Traffic Light will switch to red and printing will halt.



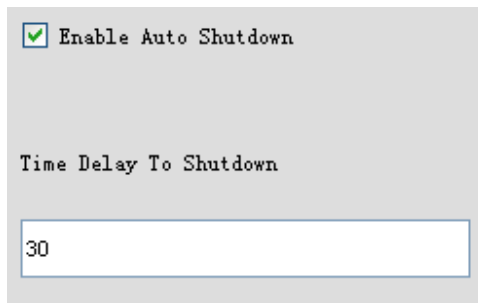
2. From the Main Screen touch the Traffic Light and select the Shutdown Jet or Extended Shutdown option.



Jet Control

A window with a countdown timer opens up and stays in front until jet has stopped.

After the screen shows that the Jet is stopped, power can be turned off (or if enabled, the unit will go into the auto-power down mode - see the M5 Technical Manual for instructions on enabling the auto-power down mode)



☒ Enable Auto Shutdown

Time Delay To Shutdown

30



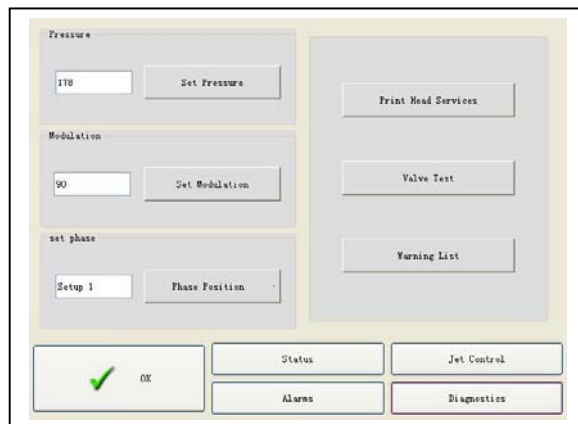
IMPORTANT:

Pigmented ink models have a special agitation function included in the software to prevent the pigments from settling and causing problems. For this feature to function, the power must be left on.

Diagnostics

Touching the Diagnostics button opens the Diagnostics Screen.

The Diagnostics screen has several sub-screens that can provide useful assistance when troubleshooting a problem with the Jet.



Touch the Print Head Services button.

Print Head Services

The Print Head Services options include:

Clear Nozzle
Nozzle Test
Clear Head
Calibration

These functions are only available if the Jet is **NOT** running.

Makro recommends the following steps to clear a blocked nozzle:

Step 1 - Clear Nozzle (perform this function three times), start jet and observe correct performance. If the problem persists, proceed to step 2.

Step 2 - Nozzle Test (perform this function three times), start jet and observe correct performance. If the problem persists, proceed to step 3.

Step 3 - Clear Head (perform this function **ONLY** once), start jet and observe correct performance. If the problem persists, proceed to step 1. If the problem cannot be resolved after attempting these steps the second time round, contact your Makro representative or local distributor for support.

Clear Nozzle

Suction at the nozzle will be applied for approximately 10 seconds to allow Makeup Solution to reverse the typical flow through the nozzle orifice. This can be used to clear a blocked nozzle. Remove the print head cover, hold the print head pointing up with a cloth wrapped around it to capture any excess fluid, see Figure 8. Tap the Clear Nozzle button. Using a wash bottle to gently stream Makeup Solution on the nozzle can help dissolve any ink residue that may have built up and is preventing the Jet from running.

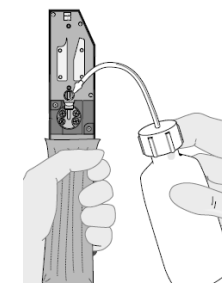


Figure 8

The cycle is completed automatically.

Jet Control

Nozzle Test

Tapping the Nozzle Test button will cause a high impact "fluid hammer" to force any blockages in the fluid path of the nozzle to become clear.

The cycle is completed automatically.

Clear Head

Clear Head button will force a Makeup Solution flush out of the nozzle assembly. This function will add Makeup Solution to the ink system. Excessive use can result in the ink's viscosity becoming too low for the system to function properly.



IMPORTANT:

The Clear Head function is to be used with caution and never tried more than once to attempt to clear a blocked nozzle.

The cycle is completed automatically.

Calibration

This function is reserved for technician use and is covered in the M5 Technical Manual.

When done testing any of the Print Head Services functions, touch the "OK" Button.

Valve Test

Instructions for performing this procedure are covered in the M5 Technical Manual.

Reset Hours

Instructions for using this function is covered in the M5 Technical Manual.

Events

The Event Log is a record of the most recent Tapping the warnings/events that the printer has experienced. A sample of the log follows:

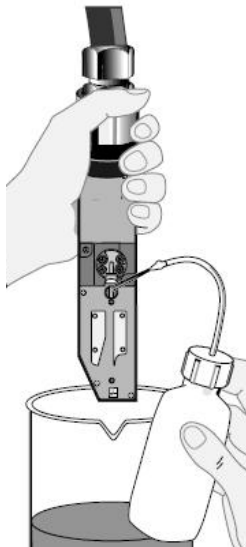
The log file is incorporated into a Backup. If Backups are performed often enough it is possible to have a complete record of the printer's operational status.

Maintenance

Wash Down of Print Head

maintenance for the system should include washing down the print head after the jet is **SHUT OFF**. If the wash down is attempted while the Jet is still running, the fluid will be collected by the Gutter vacuum and result in diluting the Ink.

Safety glasses and protective gloves should be worn when there is a possibility of coming in contact with Ink or Makeup Solution.



After the jet has been stopped, loosen the retaining screw on the print head and remove the cover.

Use a wash bottle filled with the correct Makeup Solution or Cleaner.

The wash bottle should be properly labeled to show the contents.

Over a collection container, Normal gently squeeze the bottle and direct the stream of Cleaner over the components of the print head that have any ink on the surface (Figure 10). (Be sure to properly dispose of the waste fluid.)

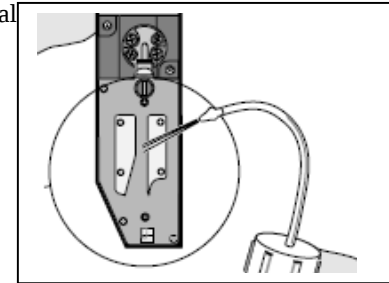


Figure 10

Pigmented Inks can be more difficult to remove. The recommended procedure is to use the a soft bristle brush to sweep over components of the print head that have any ink on the surface while directing the stream of Cleaner over them (Figure 11). (Be sure to properly dispose of the waste fluid.)

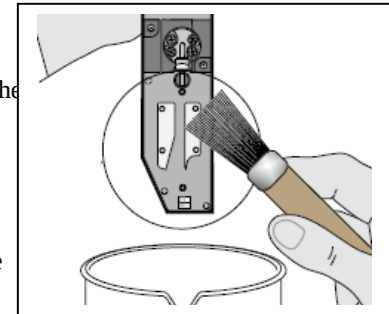


Figure 11

Once all of the ink has been removed, allow the print head to dry. The inside of the print head cover should also be inspected and cleaned. After all components are dry, reassemble the cover over the printhead and tighten the retaining screw.

IMPORTANT:

Do not ever mix chemicals without knowing compatibility. Makro accepts no responsibility for waste disposal or for any accidents that caused by discarded waste.

Please consult your own workplace safety practices on how to handle hazardous or non-hazardous waste.

Maintenance

Adding Ink or Makeup Solution

The Makro M5 Printer monitors the level of the Ink and Makeup Solution contained in the tank and will display a warning screen when additional fluid is required.

If the warning is triggered, the user needs to add **ONE** ½ liter bottle of Ink or Makeup Solution as required. It is critical that **ONLY** the Makeup Solution that matches the chosen Ink type is used.

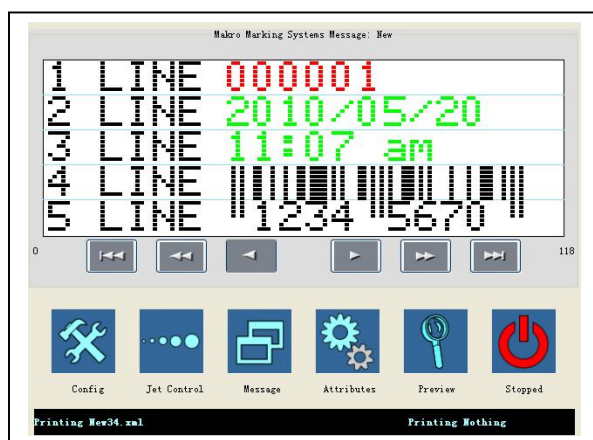


Appendix A - Setting the Clock

The M5 Printer touch screen interface contains a real time clock that has a battery backup. Normally the clock will only need set on the initial setup or when Daylight Savings takes effect/ends.

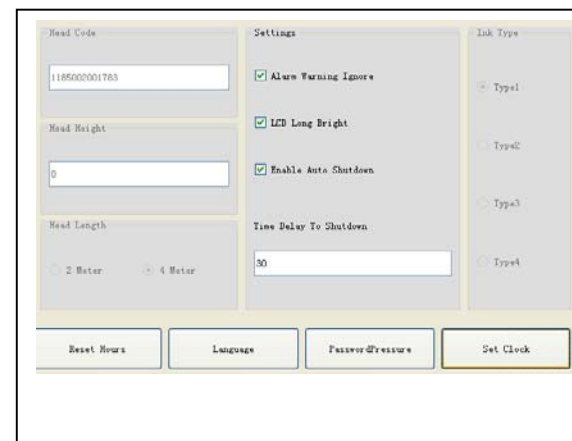


To access the Clock, the printer must be set for Password Level III. If you don't have access to this password level, contact your supervisor. On the Main Screen touch the Configure icon.

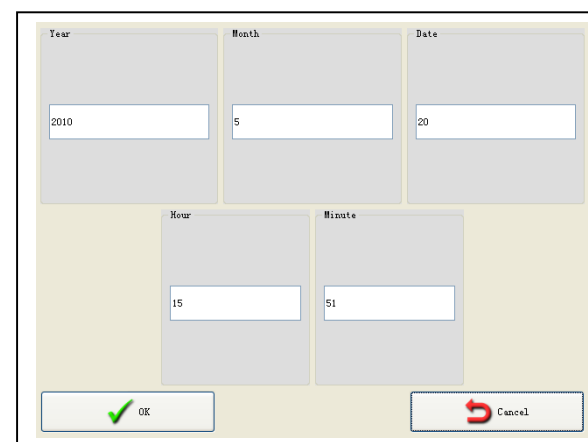


All other Configure Screen functions are covered in the M5 Technical Manual.

After the Configure Screen opens, touch the Set Clock button.



The Clock Screen will open displaying five (5) Tabs showing the current values stored.

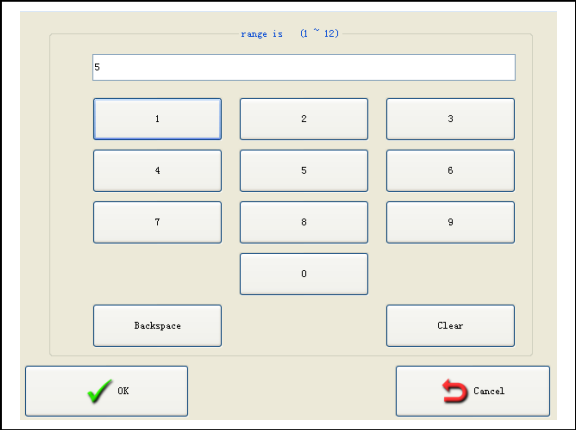


Setting the Clock

The Tabs include:

Year
Month
Date
Hour
Minute

Touch the window inside any of the Tabs to open a Keypad that allows the user to change a value.



The Tab at the top of the Keypad indicates the segment that is available to change. After the correct value is entered, touch the OK button. This will return the display to the Clock Setting screen so that any other segment can be changed.

After all changes are made, touch the OK button on the Clock Setting Screen to make the changes take effect.

The screen will change to the Configure Screen, touch the OK button to return to the Main Screen.



Appendix B - Graphics

Name	Dimensions in dots (width x height)	Appearance
ce-16	21 x 16	
ce-32	43 x 32	
crown-16	23 x 16	
crown-32	40 x 32	
CSTBAT-32	72 x 32	
DO-NOT-CUT-16	16 x 16	
eur-32	56 x 32	
FLAMMABLE-16	12 x 16	
FRAGILE-16	20 x 16	

Graphics

Name	Dimensions in dots (width x height)	Appearance
FRAGILE-16A	7 x 16	
FRAGILE-32	32 x 32	
GREEN-SPOT-16	16 x 16	
GREEN-SPOT-32	32 x 32	
KEEP-DRY-16	17 x 16	
KEEP-DRY-32	26 x 32	
KEEP-FROZEN-16	16 x 15	
M-LOGO-32	32 x 32	
nf-32	51 x 32	

Name	Dimensions in dots (width x height)	Appearance
NO-SUNLIGHT-32	32 x 32	
POISON-16	22 x 16	
POISON-32	44 x 32	
RECYCLE-16	24 x 16	
RECYCLE-32	35 x 32	
RECYCLE-32A	48 x 32	
RECYCLE-PE-LD-32	32 x 32	
reg-7	10 x 16	
reg-9	10 x 16	
reg-11	11 x 16	

Graphics

Name	Dimensions in dots (width x height)	Appearance
star-12	15 x 16	★
THIS-SIDE-UP-16	19 x 16	
THIS-SIDE-UP-16A	22 x 16	
THIS-SIDE-UP-32	32 x 32	

Appendix D - Print Samples

All Print Samples were printed with the Print Direction set for Right to Left.

Normal Print
Inverse Print
Reverse Print
Inverse and Reverse

123AB
1534B
1534B
1234B

Print Samples

Appendix E - Draining the System



IMPORTANT:

The M5 Printer should never be shipped or placed in storage with fluids in the tanks.

Instructions for performing this procedure are covered in the M5 Technical Manual.

This procedure should only be done by properly trained and qualified technicians.

Draining the System

Appendix F - Troubleshooting

Problem	Possible Cause	Remedy
No Printout	Message is not selected for printing	Tap the traffic light icon so that the lamp lights green instead of red or yellow.
	No message selected	Select a message in the Main Screen.
	Selected message is blank	Check message contents.
	Printout is not being triggered	Check print trigger (i.e. Photocell, etc.), position and activation. A trigger must be present for printout, even in Continuous print mode.
	Jet not running	Start the Jet.
	Print delay setting is too long or too short causing the print to miss the print target	Adjust print delay setting.
Poor Print Quality	Distance between print head and print target is too great	Move print head closer to target (10 mm is the recommended distance).
	Incorrect print attribute settings such as print width	Adjust print attribute settings.
	Obstruction across Jet exit opening in the print head cover	Remove the obstruction, clean the cover.
Partial Printout (truncated lengthwise)	Target length is not set correctly	Increase target length or select auto-length in Config screen.
Partial Printout (truncated vertically)	Obstruction across Jet exit opening in the print head cover may be “clipping” the printout	Remove the cover, clean the gutter area and the cover opening.
Printout is slanted	Print head is tilted relative to product flow	Adjust print head angle so that the print head cover screw is parallel to the direction of the approaching substrate

Troubleshooting

Problem	Possible Cause	Remedy
Low Ink Alarm appears on Screen	System has determined that the level in the Ink tank is low	Add one 1/2 liter bottle of Ink
Low Makeup Alarm appears on Screen	System has determined that the level in the Makeup Solution tank is low	Add one 1/2 liter bottle of Makeup Solution

Appendix G - Revision History

Revision History

Each Operator Manual has been written for a specific control unit software version or major hardware feature. The following table shows which manual should be used with a specific control unit.

Note that in no way does this table show compatibility between software versions.

Manual Version Number	Manual issue date (month/ year)	Software Version Number *	Major updates in manual
01	03/10	1.0-rc3	Note 1
02	03/10	2.0.0	Note 2

Note 1: Initial release

Note 2: Minor changes to prepare for translations

* Displayed on the System Screen, accessed through the Configure Screen. Password Level III is required to access this level.

Notes

For miscellaneous notes:

[illegible]

Notes

[illegible]

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