



Multicode Data Formatting and Preferred Symbol

User Guide

MULTICODE DATA FORMATTING AND PREFERRED SYMBOL USER GUIDE

MN-002895-02

Rev A

March 2018

Revision History

Changes to the original guide are listed below:

Change	Date	Description
Rev A	8/2016	Initial release
Rev A	3/2018	Deleted 'MDF Actions' heading from top of page A-26. Aligned 'MDF Action' with 'Output' (below it). Changed 'Option' to 'Case' (Multiple Bar Codes Satisfy One Bar Code Criteria).

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ABOUT THIS GUIDE

Introduction

The Multicode Data Formatting and Preferred Symbol User Guide provides programming instruction for using MDF and Preferred Symbol on select Zebra 2D imaging scanners.

✓ **NOTE** Screens and windows pictured in this guide are samples and can differ from actual screens.

Chapter Descriptions

Topics covered in this guide are as follows:

- [Chapter 1, Multicode Data Formatting \(MDF\) Overview](#), provides a basic description of MDF functionality.
- [Chapter 2, Preferred Symbol](#), provides a basic description of Preferred Symbol functionality.
- [Chapter 3, Multicode Data Formatting](#), describes MDF scanning session parameters, MDF programming limits and pattern match criteria.
- [Chapter 4, Data Formatting Within an MDF Rule](#), describes MDF data formatting options within a MDF rule.
- [Chapter 5, User Feedback Controls \(LEDs, Beeper, and Vibrate\)](#), describes user feedback settings applied across all MDF rules and Preferred Symbol modes.
- [Chapter 6, Multicode Configuration and Deployment](#), describes MDF programming and remote management options.
- [Chapter 7, MDF Non-Supported Capabilities](#), describes functionality not supported in Multicode Data Formatting.
- [Appendix A, Examples](#), includes simple to advanced programming examples.

Notational Conventions

The following conventions are used in this document:

- *Italics* are used to highlight the following:
 - Chapters and sections in this guide
 - Related documents
- **Bold** text is used to highlight the following:
 - Dialog box, window and screen names
 - Drop-down list and list box names
 - Check box and radio button names
 - Icons on a screen
 - Key names on a keypad
 - Button names on a screen.
- Bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents and Software

To program MDF and Preferred Symbol download the 123Scan configuration utility at:
<http://www.zebra.com/scannersoftware>

For the latest version of this guide and all guides, go to: <http://www.zebra.com/support>.

Service Information

If you have a problem with your equipment, contact Zebra Global Customer Support for your region. Contact information is available at: <http://www.zebra.com/support>.

When contacting support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number.

Zebra responds to calls by email, telephone or fax within the time limits set forth in support agreements.

If your problem cannot be solved by Zebra Customer Support, you may need to return your equipment for servicing and will be given specific directions. Zebra is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your Zebra business product from a Zebra business partner, contact that business partner for support.

CHAPTER 1 MULTICODE DATA FORMATTING (MDF) OVERVIEW

Introduction

This User Guide documents two new user programming options:

- Multicode Data Formatting (MDF)
- Preferred Symbol.

MDF

MDF enables a 2D imaging scanner to scan all the bar codes within a label, with one trigger pull, and then modify and transmit some or all of them to a host application. For working MDF examples that can be programmed to a scanner, see [Appendix A, Examples](#).



Figure 1-1 Sample Scanned Label

Programming options include:

- Outputting all or specific bar codes
- Controlling bar code output sequence
- Applying unique MDF to each output bar code

- Discarding scanned data if all required bar codes are not present.

MDF is easy to program using 123Scan. Programming an MDF rule follows the same paradigm and user interface as Advanced Data Formatting (ADF). MDF programming is saved within the 123Scan configuration file.

MDF can be deployed to a fleet of 2D imaging scanners using the Scanner Management Service (SMS) through a traditional SMS Package, just like ADF.

Preferred Symbol

Preferred Symbol is a bar code prioritization technique. When scanning a label with multiple bar codes, one or more bar code(s) can be singled out for decoding while excluding the others. The Preferred Symbol is the only bar code that is decoded and output within a preset time (called the Preferred Symbol Timeout). During this time, the scanner attempts to decode the prioritized bar code and reports only this bar code. With Preferred Symbol only one bar code is output per trigger pull.

CHAPTER 2 PREFERRED SYMBOL

Introduction

Preferred Symbol is a bar code prioritization technique that enables favored decoding of a user designated high priority bar code(s). Basically, if scanning a label with multiple bar codes, one bar code can be singled out to be decoded instead of the others. See [Example 1: Preferred Symbol - UPC for Retail on page A-1](#) for a real world example. The Preferred Symbol is the only bar code that is decoded and output within a preset time called the Preferred Symbol Timeout. During this time, the scanner attempts to decode the prioritized bar code and reports only this bar code. With Preferred Symbol only one bar code is output per trigger pull. For more details including a working Preferred Symbol example see [Appendix A, Examples](#).

Change your bar code settings

Your scanner is already set up to recognize the most common types of bar codes. To modify your **decoding options**, select a symbology (bar code type) from the drop-down below.

Select symbology (bar code type) to modify

Select symbology (bar code type) to modify

Chinese 2 of 5

Codabar

Code 11

Code 128

Code 39

Code93

Composite

Discrete 2 of 5

GS1 Databar

Interleaved 2 of 5

Korean 3 of 5

Matrix 2 of 5

MSI

Other 2D Symbologies

Other Options

PDF-417

Postal

Preferred Symbol

UPC EAN

Change your bar code settings

Your scanner is already set up to recognize the most common types of bar codes. To modify your **decoding options**, select a symbology (bar code type) from the drop-down below.

Preferred Symbol ^

☒ Preferred Symbol^ [What is this?](#)

Options

Prioritized symbologies

Preferred Symbol Options

Select codes

Edit

Identify exact bar code

Preferred symbol criteria

[View / Edit](#)

Prioritization time

200

ms

[What is this?](#)

☐ Multicode override of preferred symbol

[What is this?](#)

Figure 2-1 123Scan > Configuration Wizard > Symbologies Screen

Consistent Prioritization Across Multicode Rules

The decoding of a Preferred Symbol is prioritized above all other scanning.

Preferred Symbol Timeout

When Preferred Symbol is enabled within the scanner, the Preferred Symbol Timeout specifies how long the scanner attempts to decode a prioritized bar code before reporting the other bar codes in the field of view.

Parameter Range

The parameter range is 200 ms to 5000 ms and the default is 200 ms.

If No Preferred Symbol is Present During the Allotted Time

When no Preferred Symbol is found during the Preferred Symbol Timeout (allotted time) then any symbol in the field of view may be decoded.

Specifying a Preferred Symbol

A preferred symbol can be specified in one of the following ways.

Option 1 - A Single Symbol

A single high priority bar code can be defined according to the bar code criteria used with traditional ADF.

Code Type

This is a required field when specifying a preferred symbol.

Code Length

This is an optional field when specifying a preferred symbol.

String

This is an optional field when specifying a preferred symbol.

String Starting Position

This is an optional field only active when specifying a string.

A string can be defined at a particular position:

= which means the strings starts at a particular location.

Option 2 - A Group Of High Priority Symbols

A group of up to five high priority bar codes can be defined by symbology. This list of symbologies can be selected from the total list of 123Scan supported symbologies.

Scanning Priority Within a Group Of High Priority Symbols

If a group of high priority preferred symbols was set, whichever bar code within this list is scanned first is output first.

Multicode Override Of Preferred Symbol

The user has the option to override the preferred symbol prioritization when the scanner encounters a set of bar codes that satisfy an MDF pattern match by clicking Multicode override of preferred symbol.

Change your bar code settings

Your scanner is already set up to recognize the most common types of bar codes. To modify your **decoding options**, select a symbology (bar code type) from the drop-down below.

Preferred Symbol ^

☒ Preferred Symbol^ [What is this?](#)

☐ Options

Prioritized symbologies

Preferred Symbol Options [Edit](#)

Identify exact bar code

Preferred symbol criteria [View / Edit](#)

Prioritization time [What is this?](#)
ms

☒ Multicode override of preferred symbol [What is this?](#)

Figure 2-2 Multicode Override Of Preferred Symbol

When No MDF Pattern Match Occurs

If a pattern match does not occur, the scanner outputs a preferred symbol, if one was scanned.

CHAPTER 3 MULTICODE DATA FORMATTING

Exiting an MDF Scanning Session

While in an MDF scanning session, decode only previously non-scanned (unique) symbols.

Criteria to Exit an MDF Session

Upon meeting one of the criteria below, end the acquisition mode of the Multicode session.

1. Trigger is Released

The scanner exits a Multicode session if the trigger was released.

2. MDF Group is Satisfied

The scanner exits a Multicode session if an MDF rule criteria is satisfied and actions were initiated.

3. Time Since Last Scanned Bar Code Exceeds Limit

Multiple bar codes, each on a different side of a package, can be scanned within an MDF session as long as the trigger remains depressed, and the **Time between MDF codes** is not exceeded. With the factory default of 10 seconds, after decoding label A , there are 10 seconds to decode label B.

The scanner exits an MDF session without completing a pattern match if the time since the last decoded bar code exceeded the time limit. The programmable time limit defaults to 10 seconds and can range from 5 to 25 seconds in 1 second increments.

The highlighted option is a global setting implemented across all MDF groups and rules.

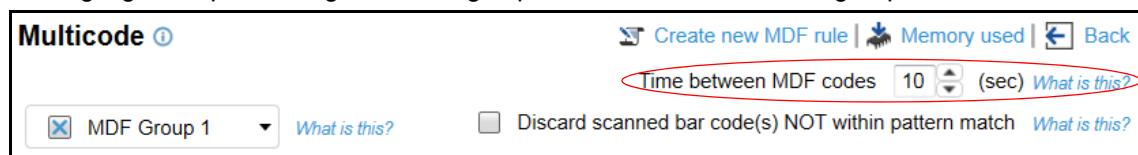


Figure 3-1 Time Between MDF Codes

4. Second Similar Bar Code That Also Meets Pattern Match Scanned

The scanner exits an MDF session if a second bar code is scanned that satisfies an already fulfilled bar code criteria within this MDF session's pattern match.

MDF Programming Capabilities

MDF Rules Within an MDF Group

The scanner can hold up to 20 MDF rules per MDF group. Each rule can specify criteria to identify a unique bar code such as any 1D, stacked 1D (such as GS1 DataBar), 2D, and postal code.

MDF Groups Within a Configuration File

The scanner can hold up to 9 MDF groups within a configuration file.

Order of Execution

MDF Group 1 executes before MDF Group 2.

Within an MDF group, MDF Rule 1 (left most rule in 123Scan UI) executes before Rule 2.

MDF Memory Within the Scanner

The available MDF memory within the scanner is shown within 123Scan.

MDF Pattern Match

A pattern match is the criteria used to determine if a set of scanned bar codes generally on one label qualify for manipulation based on an MDF rule. A pattern match is determined through analysis of the criteria used within the programmed MDF rules.

Identifying Bar Codes Within the Pattern Match (Bar Code Criteria)

Each bar code within the pattern match is defined according to the bar code criteria identified below.

Code Type

This is a required field when specifying a bar code within the pattern match.

Code Length

This is an optional field when specifying a bar code within the pattern match.

String

This is an optional field when specifying a bar code within the pattern match.

String Starting Position

Specific location: This is an optional field when specifying a bar code within the pattern match.

Pattern Match Met

Output Sequencing

If a pattern match is met, the bar codes within the matched MDF group are output in order from left to right (Rule 1, then Rule 2, then Rule 3, etc.).

Optional Output Of Bar Code Data

The user has the option to specify a bar code within the MDF rule criteria - requiring the bar code for a pattern match, but not output the bar code's data.

Data Formatting

If a pattern match is met, the bar codes within the matched MDF group have the option for unique data formatting to be applied per bar code. For example, the first output bar code could have a carriage return appended to its data, the second bar code could have D appended to its data, etc.

Pattern Match Not Met

If all bar codes required for the pattern match are not scanned within the MDF session, the user determines what action occurs with the decoded, non-pattern match bar codes.

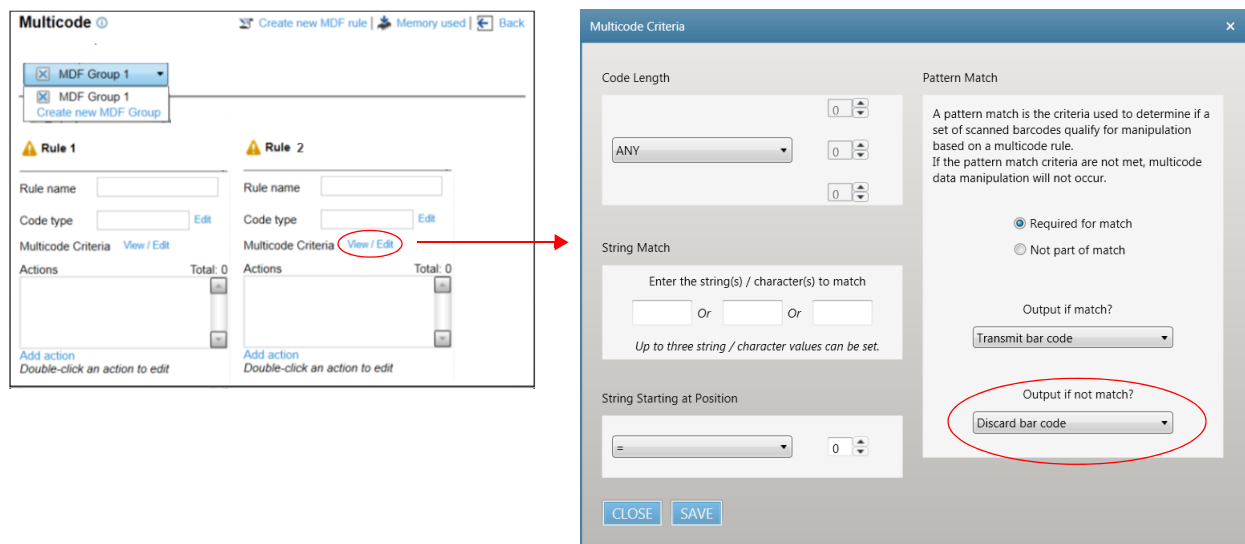


Figure 3-2 Setup MDF Criteria

This scanner behavior is configurable per MDF rule.

Option 1 - Discard Bar Code

If the pattern match is not met, the scanner can discard the decoded bar code. This is the factory default setting. This setting is programmed for each bar code individually within the MDF rule Multicode Criteria.

Option 2 - Transmit Partial Set of Pattern Match Bar Codes

If the pattern match is not met, the scanner can transmit the partial set of bar codes, which satisfy the pattern match requirements. This setting is programmed for each bar code individually within the MDF rule Multicode Criteria.

If multiple MDF groups exist and no pattern match occurs, output the data for the highest priority MDF group (MDF Group 1 has the highest priority) with a partial pattern match.

Bar Code(s) Scanned Not Within Pattern Match

If bar code(s) outside the pattern match are scanned within an MDF session and a pattern match does not occur, the user can select whether or not to transmit the last scanned bar code. The highlighted option is a global setting implemented across all MDF groups and rules.

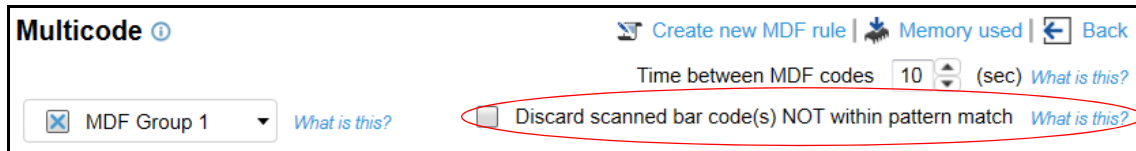


Figure 3-3 *Discard Scanned Bar Codes Not Within Pattern Match*

Option 1 - Transmit Bar Code Not Within Pattern Match

If the MDF session ends without a pattern match, the scanner transmits the last scanned bar code outside the pattern match. This is the factory default.

✓ **NOTE** Outside the pattern match means the bar code does not satisfy any MDF rule.

The outside-pattern match bar code transmits to the host upon a trigger release, or the **Time between MDF codes** time limit was exceeded (see [3. Time Since Last Scanned Bar Code Exceeds Limit on page 3-1](#)).

✓ **NOTE** If the MDF criteria for ANY rule is **Output if NO pattern match = Transmit bar code** AND a partial pattern match exists, the **Output if NO pattern match** parameter takes precedence over the unchecked **Discard scanned bar code(s) NOT within the pattern match** parameter.

For a real world use case, see [Example 2: Simple MDF Example on page A-5](#).

Option 2 - Discard All Bar Codes Not Within Pattern Match

The scanner discards all bar codes outside of the pattern match and continues attempting to find a pattern match.

Multiple Bar Codes Satisfy One Bar Code Criteria

Case 1 - Different Data in Each Bar Code (Two Unique Bar Codes)

If multiple bar codes with different data satisfy one MDF rule criteria, the scanner exits the decode session without generating an MDF output.

For example, if scanning two Code 128 bar codes, each with 14 digits but with different data in each bar code, the scanner does not output an MDF result.

Case 2 - Same Data in Each Bar Code (Duplicate Bar Codes)

If multiple bar codes with the same data satisfy one MDF rule criteria, the scanner generates an MDF output.

For example, if scanning two Code 128 bar codes, each with 14 digits and each with the same data, the scanner outputs an MDF result.

Scanning a UPC Outside of an MDF Group

If an individual UPC is scanned with no other bar codes within the field of view, it can be output; even if an MDF group exists that includes a UPC.

This ability is user programmable through setting UPC as a Preferred Symbol. See [Example 1: Preferred Symbol - UPC for Retail on page A-1](#) for details.

Terms and Definitions

Table 3-1 *Terms and Definitions*

Term	Value
Multicode	Industry wide name for the ability to scan multiple bar codes with one trigger pull.
MDF	Multicode Data Formatting (MDF) is Zebra's name for Multicode.
MDF Session	An MDF session is the act of decoding a label from trigger pull to either transmission of data or termination of decode session.
MDF Group	The complete set of commands for processing a single label, which contains multiple bar codes. 123Scan can program from 1 to 9 MDF Groups.
MDF Rule	The programming specifics for processing a single bar code. The MDF Rule, similar to an ADF Rule, contains both criteria and actions. One MDF Rule identifies a single bar code and how to format its data; more bar codes require more MDF Rules.
Pattern Match	A pattern match is the criteria used to determine if a set of scanned bar codes qualify for manipulation with MDF. If the pattern match criteria are not met, the MDF will not be applied.

For example, if an MDF implementation is written for just one label which has two bar codes, it would be programmed into MDF Group 1 and MDF Group 1 would contain two MDF rules (Rule 1 and Rule 2), as shown below in [Figure 3-4](#).

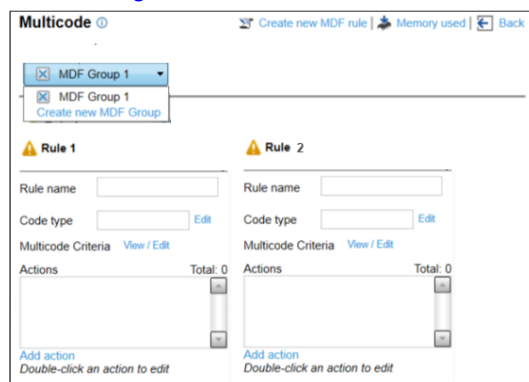


Figure 3-4 *MDF Group 1 With Two MDF Rules*

CHAPTER 4 DATA FORMATTING WITHIN AN MDF RULE

Data Formatting Actions: MDF Versus ADF

MDF Supported Communication Protocols

MDF is applied to all scanner protocols including SNAPi.

Combining MDF and ADF

MDF output from the scanner may include additional post processing with ADF. For example, an MDF rule can output scanned data for post processing to an ADF rule, which is written with the **Code type** set to **Multicode**.

Actions Supported in MDF

The following Data Formatting actions are supported in MDF.

- Most commonly used
- Skip
- Send
 - All that remains
 - Next
 - Up to
 - Host tag (see [Host Tag Details on page 4-2](#) for details)
- Send value like ASCII key (MDF does not support sending non ASCII values).

Actions Supported in ADF but Not MDF

The following Data Formatting actions are supported in ADF, but not MDF.

- Send Pause
- Rule Set
- Send value like Function Keys
- Beep.

Host Tag Details

An action in an MDF rule can send a host tag which inserts a unique identifier to each output bar code as a marker for a host application. The host tag can be from one to four printable alphanumeric characters. The host tag can be a prefix, suffix, or sent within the data. This host tag MDF action can be used in unison with **Send all that remains**, **Send next** and **Send up to** to customize where the host tag appears before, within, or after the scanned data.

Raw Unscanned Bar Code Data	123456
Output = Host Tag + Bar Code Data	app123456

New MDF Functionality

MDF and ADF support the following new capabilities.

Code Length Criteria - MDF

MDF can support the ability to specify a code length of =, <, >, "range" and "or".

- Code length $\neq$ x (for example, not equal to x = 5)
- Code length $>$ x (for example, greater than x = 5)
- Code length $<$ x (for example, less than x = 5)
- Code length $\geq$ x and $\leq$ y (for example, a range between x = 5 to y = 10, inclusive)
- Code length = value 1 or value 2 or value 3 (up to 3 'or' values).

String Criteria - MDF

String = value 1 or value 2 or value 3 (Up to 3 'or' values).

MDF can support the ability to specify up to three alphanumeric string values through the use of an 'or' statement.

Example 1: String = 3 or 7 or Z

Example 2: String = 420 or 421

Example 3: String = 8 or 92c

Example 4: String = 12

CHAPTER 5 USER FEEDBACK CONTROLS (LEDS, BEEPER, AND VIBRATE)

Consistent Feedback Across MDF Rules

User feedback settings are uniformly applied across all MDF rules and Preferred Symbol modes. Feedback settings do not vary from MDF Group 1 to Group 2, etc.

LED, Beeper, and Vibrate Behavior

Good Decode Indication (Scan Last Bar Code of Pattern Match)

Within an MDF session, upon decoding the last bar code within the pattern match, the LED, beeper, and vibrator can be used to provide good decode feedback - an indication that the pattern match was satisfied. This good decode indication is a programmable feature with these options:

- LED only
- LED, beeper (factory default)
- LED, vibrate
- LED, beeper, and vibrate.

CHAPTER 6 MULTICODE CONFIGURATION AND DEPLOYMENT

Programming Through 123Scan

123Scan is used to program MDF and Preferred Symbol to a scanner.



NOTE Once MDF is programmed to a scanner using 123Scan, you cannot use 123Scan to retrieve MDF from the scanner for viewing and editing. However, you can use 123Scan to clone MDF from one (already programmed) scanner A to another (unprogrammed) scanner B.

MDF Group Name

Each Multicode group has a name up to 32 characters in length.

Programming an MDF Rule With 123Scan

MDF is programmed to a scanner, along with other settings, the following ways:

- Programming bar code(s)
- Electronic download.

Deployment Through SMS

The Scanner Management Service (SMS) can be used to remotely deploy MDF to a scanner.

Application Control

Enabling/Disabling MDF Groups

An application can enable and disable MDF group(s) using an RSM command. For example, an application can disable MDF Group 1 and enable MDF Group 2, and vice versa.

- MDF Group 1 is RSM attribute number 882
- MDF Group 2 is RSM attribute number 883
- MDF Group 3 is RSM attribute number 884
- MDF Group 4 is RSM attribute number 885
- MDF Group 5 is RSM attribute number 886
- MDF Group 6 is RSM attribute number 887
- MDF Group 7 is RSM attribute number 888
- MDF Group 8 is RSM attribute number 889
- MDF Group 9 is RSM attribute number 890.

Enabling / Disabling Preferred Symbol

An application can enable and disable Preferred Symbol using RSM attribute number 881.

CHAPTER 7 MDF NON-SUPPORTED CAPABILITIES

Introduction

The functionality listed below is not supported in Multicode Data Formatting.

Customer Specific Check Digit Calculations

MDF does not support non-standard, customer specific check digit calculations.

Location Based Pattern Match Requirements

MDF does not support pattern match requirements based on bar code positional dependencies (i.e., Code 128 is left of a UPC).

Time Delays

MDF does not support the interjection of a time delay between transmitted bar code data. A time delay may be inserted through post MDF data process using an ADF rule. See section [Data Formatting Actions: MDF Versus ADF on page 4-1](#) for details.

Non-ASCII Values

MDF does not support the transmission of non-ASCII values.

APPENDIX A EXAMPLES

Example 1: Preferred Symbol - UPC for Retail



Figure A-1 Preferred Symbol Prioritization - UPC for Retail

Customer Use Case

The customer wants UPC to be decoded and other symbologies to be ignored initially when looking at a label with multiple types of symbologies present.

Preferred Symbol Approach

Using Preferred Symbol enables UPC-A to be decoded and output before any other symbology. Upon pulling the trigger, UPC (the Preferred Symbol) is the only symbology output. No other symbology is output for 300 ms.

Programming Details: Criteria & Actions

Preferred Symbol

Preferred Code(s) = UPC-A

Prioritization time period = 300 ms

ADF Action = Append an <Enter> key

Output:

Output if match = 885909459858<Enter>

Output if no match = Any other bar code

Preferred Symbol in 123Scan

To create a configuration file within 123Scan:

1. From the **Symbologies** screen, select **Preferred Symbol**.

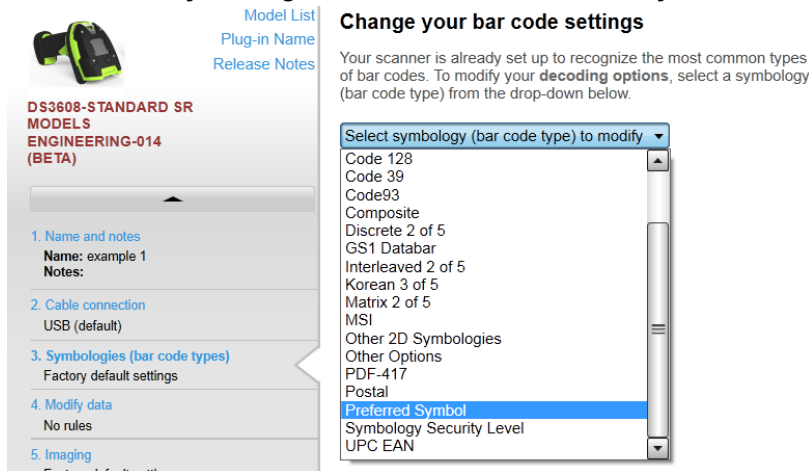


Figure A-2 Enabling Preferred Symbol in 123Scan

2. Select the **Preferred Symbol** check box to enable (circled in [Figure A-3](#)).
3. Select **UPC-A** from the drop-down list in Preferred Symbol Options (see [Figure A-3](#)).
4. Set the **Prioritization time** to 300 ms.

Change your bar code settings

Your scanner is already set up to recognize the most common types of bar codes. To modify your **decoding options**, select a symbology (bar code type) from the drop-down below.

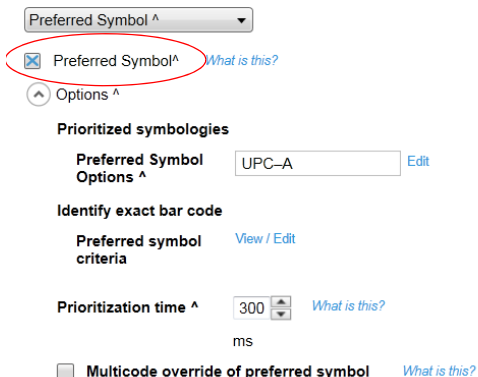


Figure A-3 Enabling Preferred Symbol

To append an enter to only the UPC-A data:

1. From the **Modify data** screen, create an ADF Rule as shown in [Figure A-4](#) below.



**DS3608-STANDARD SR
MODELS
ENGINEERING-014
(BETA)**

[Model List](#)
[Plug-in Name](#)
[Release Notes](#)

1. Name and notes
Name: Untitled1
Notes:

2. Cable connection
USB (default)

3. Symbolologies (bar code types) ^
Custom settings

4. Modify data ^
Custom settings

5. Imaging
Factory default settings

6. General
Factory default settings

Advanced Data Formatting

Rule list: 1 ▾

Rule 1 + - ◀ ▶

Criteria ▾ 3% Total: 96b

Rule set: Default ▾

Rule name: Unknown Rule 1

Code type: UPC-A [Select codes](#)

Code Length: Any ▾ 1

String: Trigger bar code

String at position: ANY ▾ 1

Actions: 1. Send All that remains 2. Send Extended Key <Enter>

Total: 2

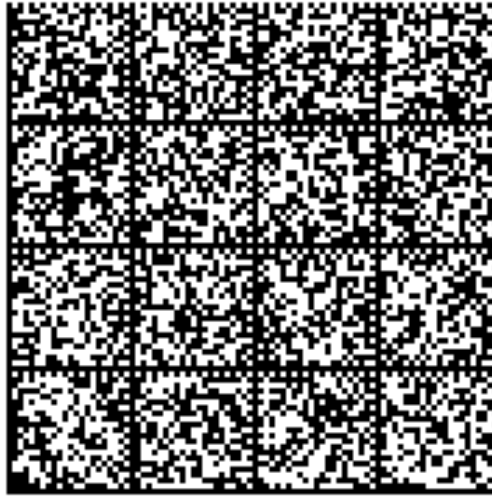
Figure A-4 Creating an ADF Rule to Append an Enter

Validate Output: Programming Bar Code for This Example

This programming bar code configures an MDF enabled scanner to output the data to meet this example's requirement when scanning the sample bar codes at the beginning of the example.

This bar code can be used to demonstrate the desired data output.

Scan the following programming bar codes in order, starting with 1 of 2.



Programming Bar Codes: 1 of 2



Programming Bar Codes: 2 of 2

Example 2: Simple MDF Example

Figure A-5 includes one label with two bar codes:

- Code 39: 6 digits
- Code 128: 8 digits

Bar codes for scanning - Use Case 1

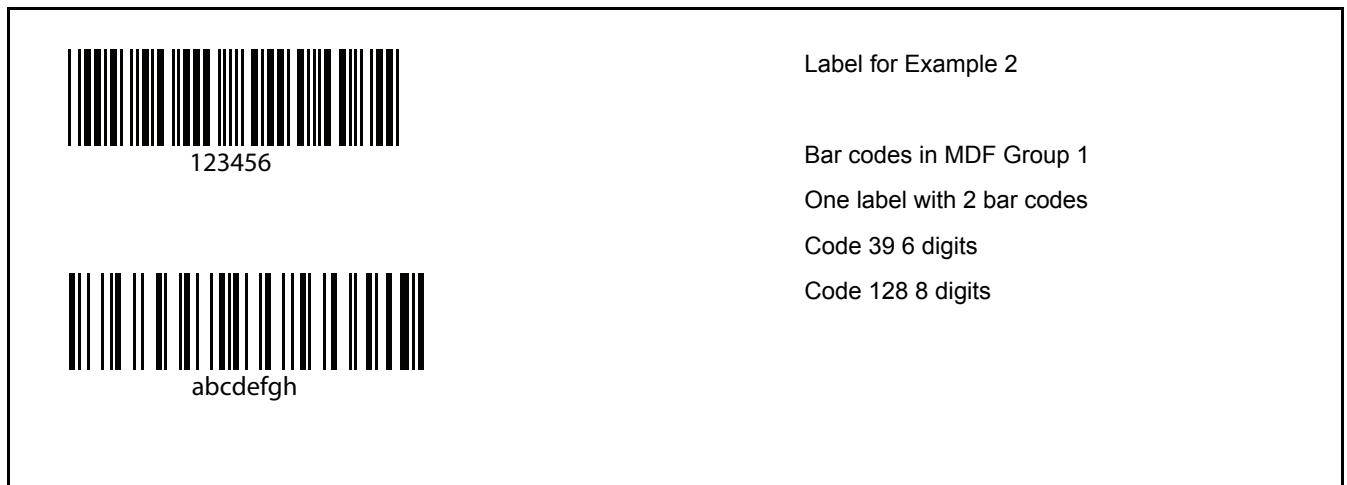


Figure A-5 Bar Codes in MDF Group 1

PDF for scanning - Use Case 2

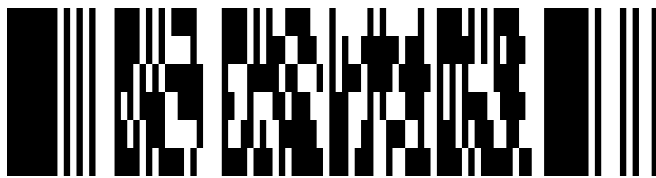


Figure A-6 PDF for Scanning

Customer Use Case

- Use Case 1: The customer wants to decode all bar codes on a label in one trigger pull.
- Use Case 2: If only a bar code outside the label is scanned, this bar code should be transmitted to the host. For example, a PDF bar code is scanned without scanning the label.

MDF Approach

- Use Case 1: If a pattern match exists (all required bar codes present), the MDF Rule is executed.
- Use Case 2: If a pattern match does not occur and a bar code outside the label is scanned, this bar code should be transmitted to the host upon the trigger being released.

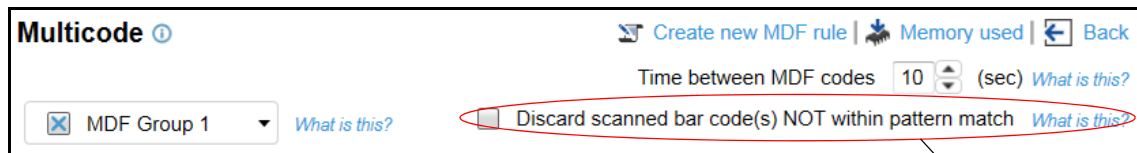
Programming Details: Criteria & Actions

Global Setting

With the **Discard scanned bar code(s) NOT within pattern match** setting unchecked, if a pattern match does not occur, the last decoded bar code outside the pattern match¹ is sent to the host, upon the trigger being released. For additional information on this feature see [Option 1 - Transmit Bar Code Not Within Pattern Match on page 3-4](#).

✓ **NOTE** ¹Outside the pattern match means the bar code does not satisfy any MDF Rule.

✓ **NOTE** If the MDF criteria for ANY rule is **Output if NO pattern match = Transmit bar code** AND a partial pattern match exists, the **Output if NO pattern match** parameter takes precedence over the unchecked **Discard scanned bar code(s) NOT within the pattern match** parameter.



Use Case 2 is satisfied by this global setting.

Figure A-7 *Discard scanned bar code(s) NOT within pattern match*

Output 1 = Code 39

MDF Criteria

Code Type = Code 39

Code Length = 6

String =

Start at position =

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Discard bar code

MDF Action

= Send all that remains

= Send <Enter>

Output

Raw bar code data = 123456

Output if match = 123456<Enter>

Output if no match =

The screenshot shows a 'Multicode Criteria' dialog box with the following settings:

- Code Length:** Set to 6.
- String Match:** Set to '='.
- String Starting at Position:** Set to 1.
- Pattern Match:**
 - Radio button 'Required for match' is selected.
 - 'Output if match?' is set to 'Transmit bar code'.
 - 'Output if not match?' is set to 'Discard bar code'.

Buttons at the bottom: CLOSE, SAVE.

Figure A-8 *Pattern Match Settings for Output 1*

Output 2 = Code 128

MDF Criteria

Code Type = Code 128

Code Length = 8

String =

Start at position =

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Discard bar code

MDF Action

= Send all that remains

= Send <Enter>

Output

Raw bar code data = abcdefgh

Output if match = abcdefgh<Enter>

Output if no match =

The screenshot shows a 'Multicode Criteria' dialog box with the following sections:

- Code Length:** A dropdown menu set to '=', a numeric spinner set to 8, and another numeric spinner set to 1. Below these is a third numeric spinner set to 0.
- String Match:** A text input field with the placeholder 'Enter the string(s) / character(s) to match'. Below it are three small input fields separated by 'Or' characters. A note below states 'Up to three string / character values can be set.'
- String Starting at Position:** A dropdown menu set to '=', and a numeric spinner set to 1.
- Pattern Match:** A text area containing the explanation: 'A pattern match is the criteria used to determine if a set of scanned barcodes qualify for manipulation based on a multicode rule. If the pattern match criteria are not met, multicode data manipulation will not occur.' Below this are two radio buttons: 'Required for match' (selected) and 'Not part of match'. Further down are two dropdown menus: 'Output if match?' set to 'Transmit bar code' and 'Output if not match?' set to 'Discard bar code'.

At the bottom left are 'CLOSE' and 'SAVE' buttons.

Figure A-9 *Pattern Match Settings for Output 2*

MDF Output

If pattern match with label

123456<Enter> abcdefgh<Enter>

If no pattern match with label

No output

If scan only the PDF (data transmitted upon trigger release)

abcd

For details on the order of execution of MDF groups and MDF rules, see [Order of Execution on page 3-2](#).

MDF Rule in 123Scan

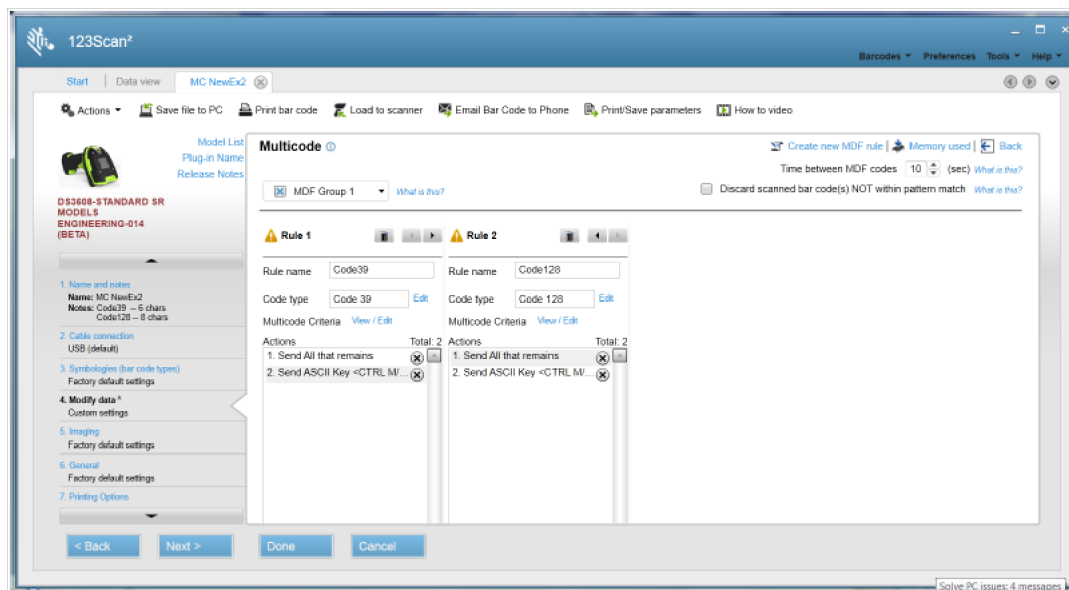


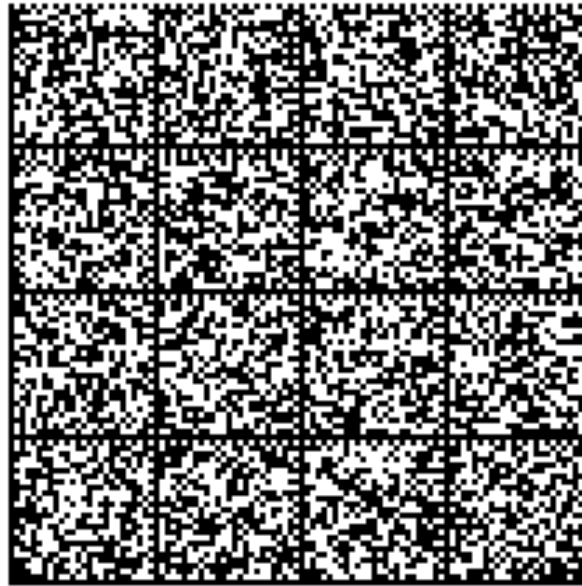
Figure A-10 MDF Rule - 123Scan

Validate Output: Programming Bar Code For This Example

This programming bar code configures an MDF enabled scanner to output the data to meet this example's requirement when scanning the sample bar codes at the beginning of the example.

This bar code can be used to demonstrate the desired data output.

Scan the following programming bar codes in order, starting with 1 of 2.



Programming Bar Codes: 1 of 2



Programming Bar Codes: 2 of 2

Example 3: Sending a Pause Using ADF

Customer Use Case

- Use Case 1: Building on [Example 2: Simple MDF Example on page A-5](#), the customer's host application is losing (dropping) data.

MDF Approach

- Use Case 1: Introduce a one second pause after transmitting the first bar code (Code 39) and a one second pause after transmitting the second bar code (Code 128).

Programming Details: Criteria & Actions

ADF Criteria

Code Type = Multicode

Code Length = 16*

*The data output by Example 2:

- 6 digits
- Enter =1 digit
- 8 digits
- Enter =1 digit
- Total =16 digits

String =

Start at position =

ADF Action

= Send Next 7*

*6 digits + Enter = 7 digits

= Send Pause 10

= Send Next 9*

*8 digits + Enter = 9 digits

= Send Pause 10

MDF Output

If pattern match

123456<Enter> <Pause 1 sec>abcdefgh<Enter><Pause 1 sec>

If no pattern match

No output



NOTE The <pause> is experienced within the 123Scan Dataview if from the initial **Select an operation mode** screen, the scanner's com protocol is set to **USB HID Keyboard Emulation**.

ADF Rule in 123Scan

Advanced Data Formatting

Rule list:

1

Rule 1

+

-

◀

▶

Criteria

7%

Total:
96b

Rule set:

Default

Rule name

Unknown Rule 1

Code type

Multicode

Select codes

Code Length

Enter ler

16

String

Trigger
bar code

String at position

ANY

1

Actions

Total: 4

1. Send Next <7>

×

2. Send Pause <10>

×

3. Send Next <9>

×

4. Send Pause <10>

×

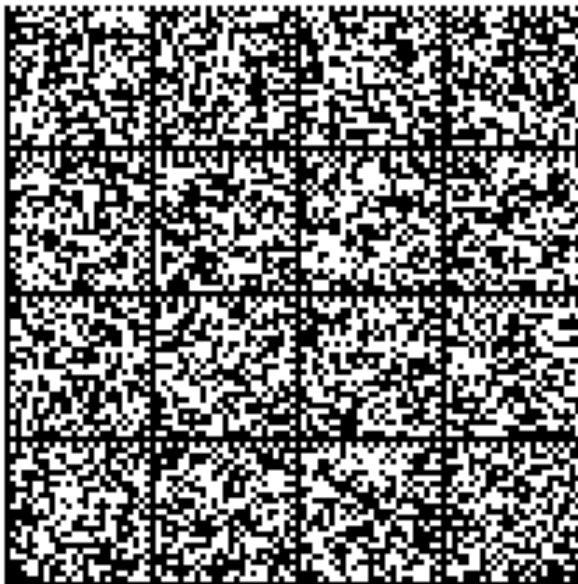
Figure A-11 ADF Rule - 123Scan

Validate Output: Programming Bar Code For This Example

This programming bar code configures an MDF enabled scanner to output the data to meet this example's requirement when scanning the sample bar codes at the beginning of the example.

This bar code can be used to demonstrate the desired data output.

Scan the following programming bar codes in order, starting with 1 of 2.



Programming Bar Codes: 1 of 2



Programming Bar Codes: 2 of 2

Example 4

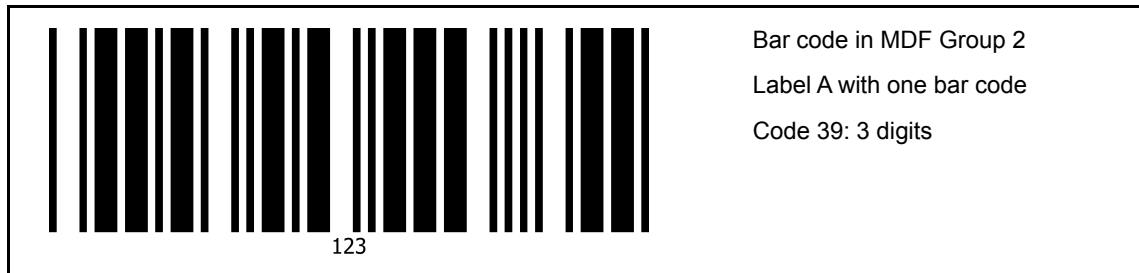


Figure A-12 Label A for Example 4

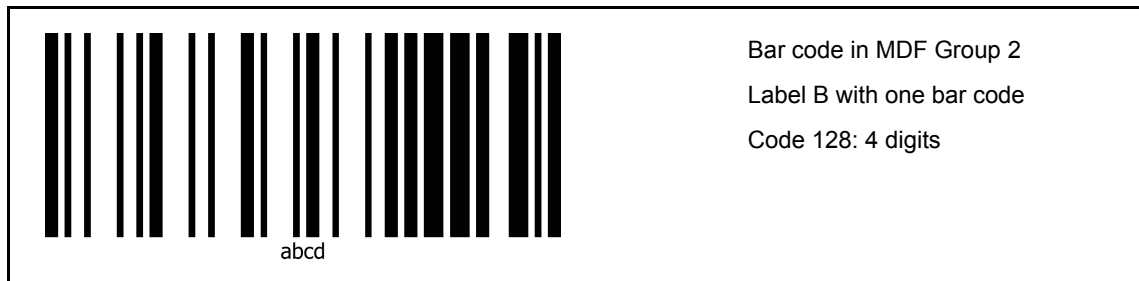


Figure A-13 Label B for Example 4

Customer Use Case

- Use Case 1: Building on [Example 2: Simple MDF Example on page A-5](#), the customer must scan another set of bar codes using the same scanner used in Example 2.
- Use Case 2: The new set of bar codes on Label A and Label B are on different sides of a box.

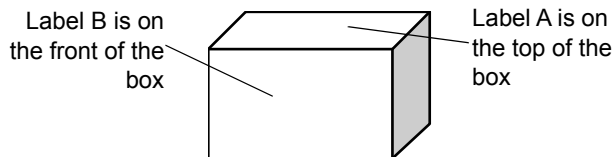


Figure A-14 Label A and Label B on Box

MDF Approach

- Use Case 1: A second set of MDF programming must be added to what was created for [Example 2: Simple MDF Example on page A-5](#). In Example 2, MDF programming is contained in MDF Group 1 (the default MDF group). In this example, programming is contained in MDF Group 2.
- Use Case 2: Scanning multiple labels on different sides of a box can be handle with an appropriately large **Time between MDF Codes** time.

Programming Details: Criteria & Actions

Global Setting

Multiple bar codes, each on a different side of a package can be scanned within an MDF session, as long as the trigger remains depressed and the **Time between MDF codes** is not exceeded.

The programmable time limit defaults to 10 seconds and can range from 5 to 25 seconds in 1 second increments. With the factory default of 10 seconds, after decoding Label A you have 10 seconds to decode Label B.

For addition information on this feature, see [3. Time Since Last Scanned Bar Code Exceeds Limit on page 3-1](#).

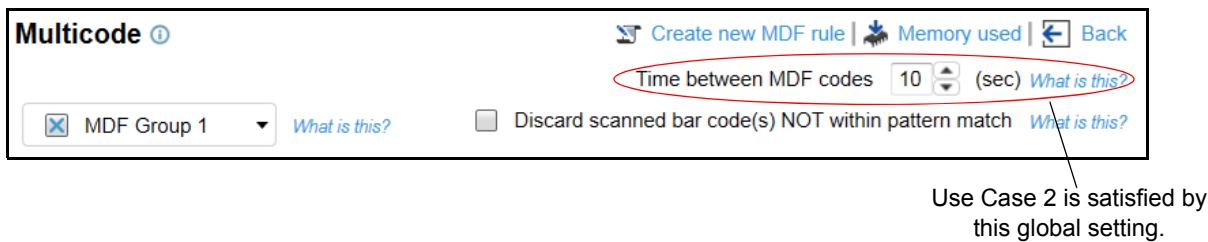


Figure A-15 Setup **Time between MDF codes** Timeout

Output 1

MDF Criteria

- Code Type = Code 39
- Code Length = 3
- String =
- Start at position =
- Pattern Match = Required for match
- Output if match = Transmit bar code
- Output if no match = Discard bar code

MDF Action

- = Send all that remains
- = Send <Enter>

Output

- Raw bar code data = 123
- Output if match = 123<Enter>
- Output if no match =

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The screenshot shows a dialog box titled "Multicode Criteria" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Code Length:** A dropdown menu showing "=", a numeric spinner set to 3, and another numeric spinner set to 1. Below these is a third numeric spinner set to 0.
- String Match:** A section with the text "Enter the string(s) / character(s) to match" and three input fields separated by "Or". Below the input fields is the text "Up to three string / character values can be set."
- String Starting at Position:** A dropdown menu showing "=" and a numeric spinner set to 1.
- Pattern Match:** A section with a text box explaining: "A pattern match is the criteria used to determine if a set of scanned barcodes qualify for manipulation based on a multicode rule. If the pattern match criteria are not met, multicode data manipulation will not occur." Below this text are two radio buttons: "Required for match" (which is selected) and "Not part of match". Below the radio buttons are two dropdown menus: "Output if match?" set to "Transmit bar code" and "Output if not match?" set to "Discard bar code".

At the bottom of the dialog are two buttons: "CLOSE" and "SAVE".

Figure A-16 *Pattern Match Settings for Output 1*

Output 2

MDF Criteria

Code Type = Code 128

Code Length = 4

String =

Start at position =

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Discard bar code

MDF Action

= Send all that remains

= Send <Enter>

Output

Raw bar code data = abcd

Output if match = abcd<Enter>

Output if no match =

The screenshot shows a 'Multicode Criteria' dialog box with the following settings:

- Code Length:** A dropdown menu set to '=', and a numeric spinner set to 4.
- String Match:** A section with the text 'Enter the string(s) / character(s) to match' and three input fields separated by 'Or'. Below it, a note says 'Up to three string / character values can be set.'
- String Starting at Position:** A dropdown menu set to '=', and a numeric spinner set to 1.
- Pattern Match:**
 - A text box explaining: 'A pattern match is the criteria used to determine if a set of scanned barcodes qualify for manipulation based on a multicode rule. If the pattern match criteria are not met, multicode data manipulation will not occur.'
 - Two radio buttons: 'Required for match' (selected) and 'Not part of match'.
 - 'Output if match?': A dropdown menu set to 'Transmit bar code'.
 - 'Output if not match?': A dropdown menu set to 'Discard bar code'.

At the bottom left are 'CLOSE' and 'SAVE' buttons.

Figure A-17 *Pattern Match Settings for Output 2*

MDF Output

If pattern match

123<Enter> abcd<Enter>

If no pattern match

No output

For details on the order of execution of MDF groups and MDF rules, see [Order of Execution on page 3-2](#).

MDF Rule in 123Scan

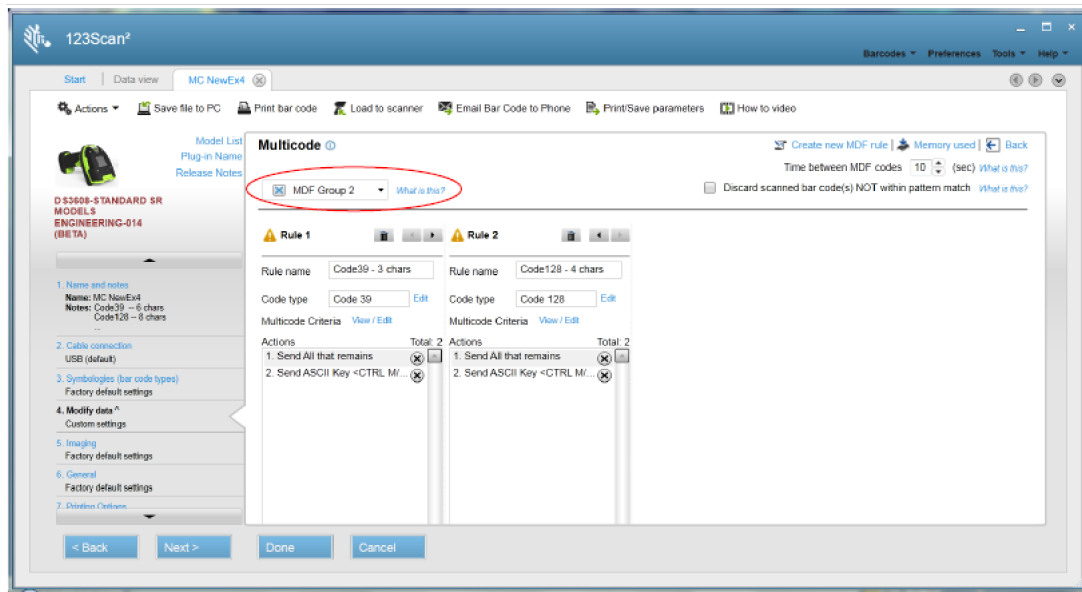


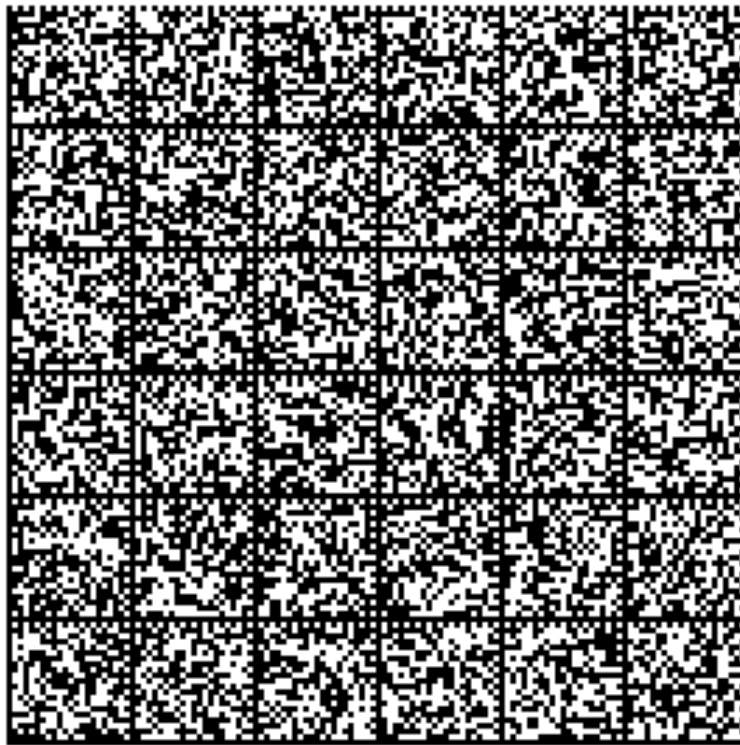
Figure A-18 *MDF Rule - 123Scan*

Validate Output: Programming Bar Code For This Example

This programming bar code configures an MDF enabled scanner to output the data to meet this example's requirement when scanning the sample bar codes at the beginning of the example.

This bar code can be used to demonstrate the desired data output.

Scan the following programming bar codes in order, starting with 1 of 3.



Programming Bar Codes: 1 of 3



Programming Bar Codes: 2 of 3



Programming Bar Codes: 3 of 3

Example 5: iPhone Box Label



Figure A-19 Preferred Symbol Prioritization - UPC for Retail

Customer Use Case

- Use Case 1: The customer wants to decode all bar codes on a label in one trigger pull.
- Use Case 2: If the label is not complete, the customer wants only the UPC on the label to be sent to the host.
- Use Case 3: The customer wants no other non-label bar code data to be sent to the host.
- Use Case 4: The customer wants a higher threshold for establishing a pattern match.

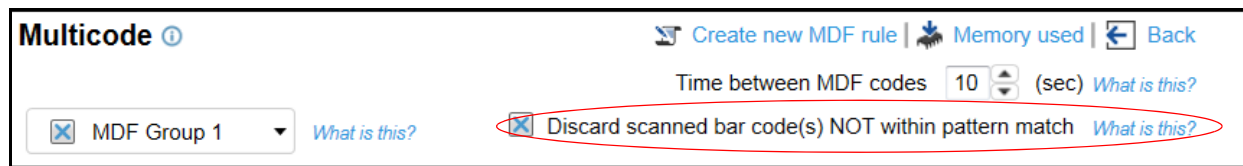
MDF Approach

- Use Case 1: If a pattern match exists (all required bar codes present), the MDF rules are executed.
- Use Case 2: If a pattern match does not exist but the UPC was decoded, the UPC is transmitted to the register.
- Use Case 3: If a bar code is scanned and it is not within the pattern match, it is not transmitted to the host.
- Use Case 4: One of the bar codes is not required by the host, but is present on all labels. It is used to set a higher pattern match threshold. But the data is not sent to the host.

Programming Details: Criteria & Actions

Global Setting

The check in the **Discard scanned bar code(s) NOT within pattern match** check box directs the scanner to discard all decoded bar codes not identified within an MDF Rule.



The screenshot shows the 'Multicode' configuration screen. At the top, there are links for 'Create new MDF rule', 'Memory used', and 'Back'. Below these, there is a 'Time between MDF codes' setting set to 10 seconds. The main configuration area includes a dropdown for 'MDF Group 1' and a checkbox for 'Discard scanned bar code(s) NOT within pattern match', which is checked and circled in red. There are also links for 'What is this?' next to the dropdown and the checkbox.

Figure A-20 Use Case 3 - Satisfied By Circled Global Setting

Output 1 = Universal Product Code

MDF Criteria

Code Type = UPC

Code Length = Any

String =

Start at position =

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Transmit bar code*

*Use Case 2: The factory default value for this setting is **Discard bar code**. By changing it to **Transmit bar code**, if one of the other bar codes on the label is missing/damaged causing the pattern match to fail, this UPC is still sent to the host.

MDF Action

= Send all that remains

= Send <Enter>

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Output

Raw bar code data = 885909459858

Output if match = 885909459858<Enter>

Output if no match = 885909459858<Enter>

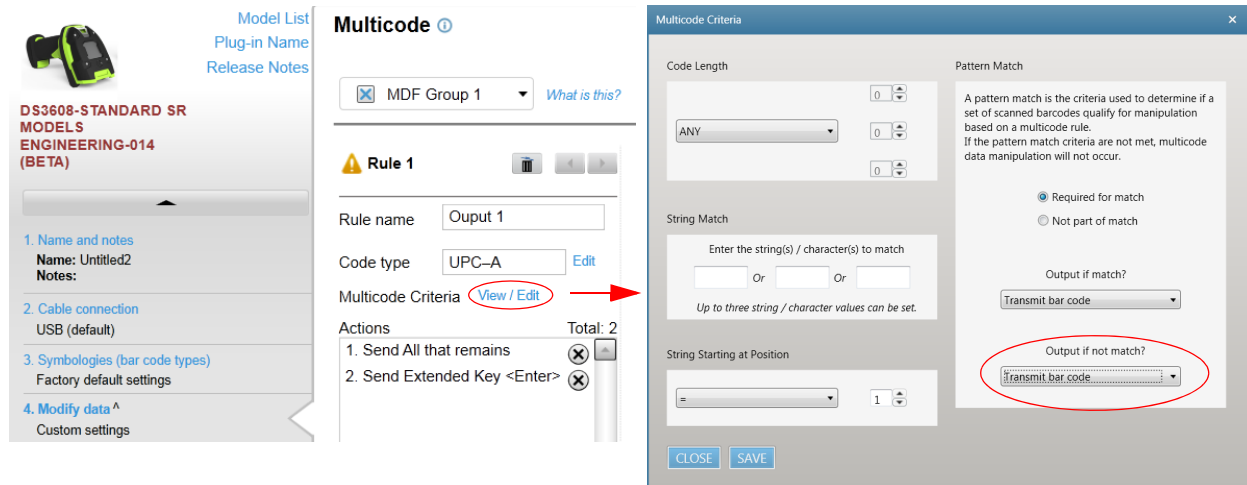


Figure A-21 Pattern Match Settings for Output 1

Output 2 = Part Number

MDF Criteria

Code Type = Code 128

Code Length = Any

String = 1P

Start at position = 1

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Discard bar code

MDF Action

= Skip ahead 2

= Send all that remains

= Send <Enter>

Output

Raw bar code data = 1PMC920LL/A

Output if match = MC920LL/A<Enter>

Output if no match =

The screenshot shows a 'Multicode Criteria' dialog box with the following settings:

- Code Length:** Three spinners, all set to 0. A dropdown menu is set to 'ANY'.
- String Match:** A text input field contains '1P'. Below it, a note says 'Up to three string / character values can be set.'
- String Starting at Position:** A dropdown menu is set to '=', and a spinner is set to 1.
- Pattern Match:**
 - Radio buttons: 'Required for match' is selected, 'Not part of match' is unselected.
 - Output if match?: 'Transmit bar code' (dropdown menu).
 - Output if not match?: 'Discard bar code' (dropdown menu).

Buttons at the bottom: 'CLOSE' and 'SAVE'.

Figure A-22 Pattern Match Settings for Output 2



NOTE See [Figure A-26 on page A-27](#) for a screen shot depicting all the programmed MDF rules and their actions.

Output 3 = Serial Number

MDF Criteria

Code Type = Code 128
 Code Length = Any
 String = S
 Start at position = 1
 Pattern Match = Required for match
 Output if match = Transmit bar code
 Output if no match = Discard bar code

MDF Action

= Skip ahead 1
 = Send all that remains
 = Send <Enter>

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Output

Raw bar code data = SC8PJMN9CDTD0

Output if match = C8PJMN9CDTD0<Enter>

Output if no match =

Multicode Criteria

Code Length

ANY

0 0 0

String Match

Enter the string(s) / character(s) to match

S Or Or

Up to three string / character values can be set.

String Starting at Position

= 1

Pattern Match

A pattern match is the criteria used to determine if a set of scanned barcodes qualify for manipulation based on a multicode rule. If the pattern match criteria are not met, multicode data manipulation will not occur.

☒ Required for match
☐ Not part of match

Output if match?
Transmit bar code

Output if not match?
Discard bar code

CLOSE SAVE

Figure A-23 Pattern Match Settings for Output 3



NOTE See [Figure A-26 on page A-27](#) for a screen shot depicting all the programmed MDF rules and their actions.

Output 4 = IMEI (International Mobile Station Equipment Identity)

MDF Criteria

Code Type = Code 128

Code Length = 15 or 16

String =

Start at position =

Pattern Match = Required for match

Output if match = Transmit bar code

Output if no match = Discard bar code

MDF Action

= Send all that remains

= Send <Enter>

Output

Raw bar code data = 013183004709357

Output if match = 013183004709357<Enter>

Output if no match =

Multicode Criteria

Code Length

Any one of: 15 Or 16 Or 0
Enter '0' if field not required

String Match

Enter the string(s) / character(s) to match
Up to three string / character values can be set.

String Starting at Position

= 1

Pattern Match

A pattern match is the criteria used to determine if a set of scanned barcodes qualify for manipulation based on a multicode rule. If the pattern match criteria are not met, multicode data manipulation will not occur.

☒ Required for match
☐ Not part of match

Output if match?
Transmit bar code

Output if not match?
Discard bar code

CLOSE SAVE

Figure A-24 Pattern Match Settings for Output 4



NOTE See [Figure A-26 on page A-27](#) for a screen shot depicting all the programmed MDF rules and their actions.

Output 5 = ICCID (Integrated Circuit Card Identifier)

MDF Criteria

Code Type = Code 128

Code Length = 19 or 20

String =

Start at position =

Pattern Match =Required for match*

Output if match = Discard bar code*

*Use Case 4: The customer wants a higher threshold for establishing a pattern match. This bar code is required to establish a pattern match, but is not transmitted to the host.

To satisfy this requirement two pattern match settings are used in unison.

1. The bar code is **Required for match** to be established.

2. **Output if match** is set to **Discard bar code**. The bar code is not sent to the host, if a match exists.

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Output if no match = Discard bar code

MDF Action = None

Output

Raw bar code data = 00010002000300040005

Output if match =

Output if no match =

The screenshot shows the 'Multicode Criteria' dialog box. On the left, there are sections for 'Code Length' (with a dropdown set to 'Any one of' and numeric inputs for 19, 20, and 0), 'String Match' (with a text input field and a note 'Up to three string / character values can be set.'), and 'String Starting at Position' (with a dropdown set to '=' and a numeric input set to 1). On the right, the 'Pattern Match' section contains a descriptive text block and two radio buttons: 'Required for match' (which is selected and circled in red) and 'Not part of match'. Below these are two dropdown menus: 'Output if match?' (set to 'Discard bar code' and circled in red) and 'Output if not match?' (set to 'Discard bar code'). At the bottom left are 'CLOSE' and 'SAVE' buttons.

Figure A-25 Pattern Match Settings for Output 5



NOTE See [Figure A-26 on page A-27](#) for a screen shot depicting all the programmed MDF rules and their actions.

MDF Output

If pattern match

885909459858<Enter>MC920LL/A<Enter>C8PJMN9CDTD0<Enter>013183004709357<Enter>

If no pattern match

885909459858<Enter>

For details on the order of execution of MDF groups and MDF rules, see [Order of Execution on page 3-2](#).

MDF Rule in 123Scan

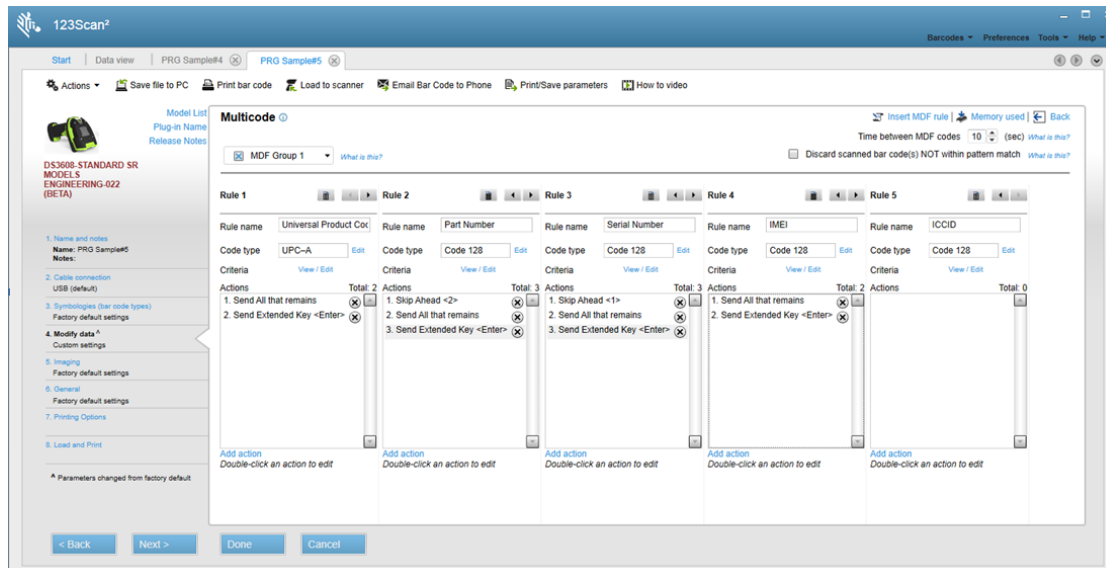


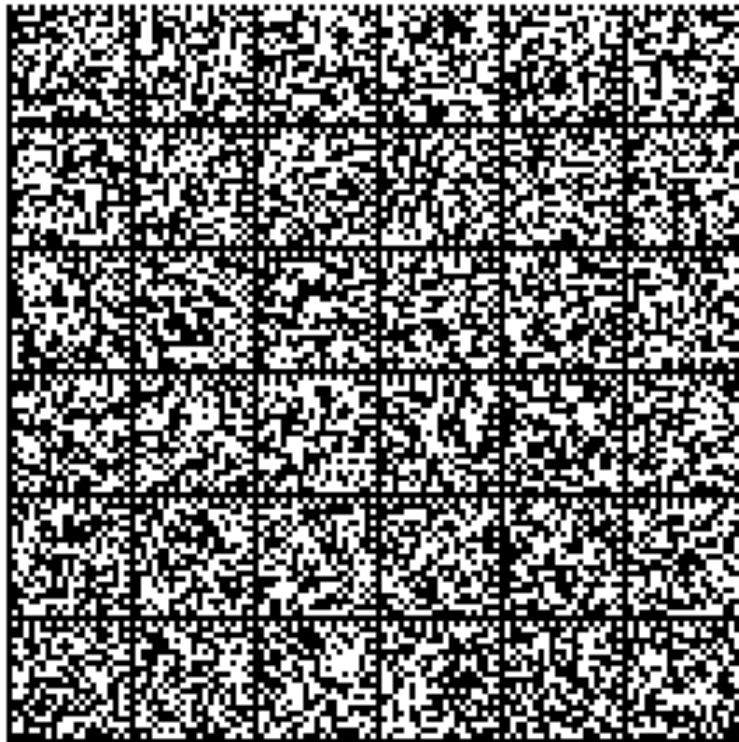
Figure A-26 All Programmed MDF Rules and Actions

Validate Output: Programming Bar Code For This Example

This programming bar code configures an MDF enabled scanner to output the data to meet this example's requirement when scanning the sample bar codes at the beginning of the example.

This bar code can be used to demonstrate the desired data output.

Scan the following programming bar codes in order, starting with 1 of 3.



Programming Bar Codes: 1 of 3



Programming Bar Codes: 2 of 3



Programming Bar Codes: 3 of 3



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