

Maine Revenue Services

Software Developer’s Guide

For PDF-417 Formatted 2D Barcoded Tax Returns

2024 - 2025

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Section 1: Maine Revenue Services includes 2-D Bar Coding of Tax Returns

After testing the use of PDF-417 barcodes on Maine's Individual Income Tax Return (1040ME) it was decided that this technology would be incorporated with several of Maine's substitute tax forms. In 2012 MRS' Administrative Rule 104 was changed to require the placement of 2D barcodes on all tax software developed substitute forms designated to contain the 2D barcode. Waivers may be requested and will be granted on a case-by-case basis. Forms received without the 2-D bar code will be delayed in processing and may result in reduced accuracy of the data captured with resulting delays in processing or un-necessary contact with taxpayers. For the 2023-2024 tax processing season the following forms will be mandated to contain the 2-D barcodes: 1040, 1120, FORMCR, MEUC1 (including MEUC1SCH2), 1040ES, 1040PV, 941P (including the 941P Schedules 2 and 3 forms) & 1040C.

Information on 2-D bar coding of tax forms is available on the Federation of Tax Administrators' web site at www.taxadmin.org.

Section 2: 2D Barcode Content

The 2-D barcode will include all variable data fields contained on the primary form as well as all other supporting forms from which data is captured. All alphabetic characters must be capital letters only.

All data formats follow the criteria published in the "Tax Forms Processing 2-D Barcoding Standards Guidance" issued by the Federation of Tax Administrators (FTA). Note: hyphens and separators should not be used in dates, social security numbers, telephone numbers, etc. However, a leading hyphen ("-") is to be used for negative dollar amounts.

The name field on the return should be broken down by field as described in the tax form layout specifications. Check box fields should return the number "1" if checked and "0" if blank.

Dollar amounts, on non-payroll related forms, are required to be rounded to the nearest dollar and the bar code field must contain whole dollars only with no special characters except for the "-" in front of a negative dollar amount. On payroll reporting forms (currently the 941P and its schedules) all payroll values will contain cents except in the Sales and/or Income fields as stipulated in the 2D specifications for these forms.

Section 3: Quality Assurance

The software must ensure that Name, Address and Entity ID (Social Security, Federal Entity Identification Number, Account Number, etc.) information is present prior to printing the return.

Also, the software must contain a brief explanation of what a 2-D barcode is and inform taxpayers that any changes made to a return after printing will not be reflected in the 2-D barcode unless they print a new return. Handwritten changes on computer-generated returns are not acceptable and may not be detected during processing resulting in original data being applied to the account. Failure to print a new return after making changes will severely impact MRS processing and introduce errors.

The software must ensure that printed data and encoded data in the 2-D barcode are an exact match with the exception to rounding of dollar amounts. Any updates to data must be reflected in the 2D barcode prior to a return being printed. This becomes especially important when a return is updated after its initial creation. Changes to any document within a return must flow to every other area of the return, as appropriate.

For their own internal purposes, the vendor may choose to print company name, an identification number, control number, version number, etc. on the form or schedule. Row 64 of the paper form may be used for this purpose. When trying to research a problem, some vendors have found this information to be helpful.

Section 4: PDF-417 Formatting Specifications

Developers are encouraged to also refer to Tax Forms Processing - 2D Barcoding Standards: Section 3 as found at www.nactp.org.

Normal PDF-417	
Encode type	300 dpi
DPI	ON
Pixel shaving	Variable
Code word count	N/A
Mils Encryption Error Correction Level	104
Data Columns	Variable
Module Aspect Ration	2.00:1
Data Rows	Variable
X Dimension	3
Location	Reserved area on page one of primary form.
Reserved space	3.75" x 1.65" (may vary depending on amount of data)
Max Characters	1300
Field Delimiter	Carriage Return [<CR>]
End of File Delimiter	*EOD*

1. PDF 417 has error detection and correction capabilities. The more error correction is used, the less data can be communicated in the barcode. Complete barcode read failures are very uncommon. The tax Application Programming Interface (tax API) sets parameters for correction/detection. These parameters should be observed and not altered.
2. Based on the experience of other taxing authorities' 2-D barcode use, the error correction level in the current market-provided DLL will be set to level 4.
3. A general rule that can be used to determine if a printer can produce a 2-D barcode is if the printer can produce a graphic such as a tax agency seal or business logo, then the printer should be capable of producing a 2-D barcode that can be scanned.
4. Pixel shaving is a technique that produces higher-quality barcodes when printed on lower-quality equipment like inkjet printers. Pixel shaving will result in improved read rates. In the DLL, pixel shaving will always be turned on.
5. Increasing the x (horizontal) dimension of the barcode elements from the minimum of 7.5 mils to the maximum of 25 mils will produce the most readable barcodes, especially on low quality ink/bubble jet printers. Whenever possible, software vendors will create a barcode that uses the largest possible x element value for the given space.
6. Users are advised that stretching or scaling the barcode (via copying the paper media or the like) changes its integrity and worsens readability; it should not be employed.
7. 2-D barcodes should never be rotated. Rotating a 2-D barcode increases processing difficulty and introduces the risk of errors. Since PDF-417 barcodes are read in both the x (horizontal) and y (vertical) directions on a portrait page, rotating them from their natural position can render the barcode unusable.
8. Unless otherwise noted in Part 2, any line item left unanswered or having a value of zero (blank, no data, null or 0) should not have a value on the printed page or in the 2D barcode. An inspection of the 2D barcode (raw data) should look something like this, which represents 2 consecutive line items having no data values, [<CR><CR><CR>].

Section 5: Portable Document Format - PDF Files

IMPORTANT! When saving a form in PDF format, the ADOBE reader defaults to fit or shrink to printable area. There is a setting in the PDF specifications that can be set in each file that will force the document to print without being shrunk. When using PDF files to save and/or print tax returns, the following PDF Viewer **Preferences or properties must be set by the vendor application:**

Print Scaling = None

Duplex = Simplex

The standard Adobe Reader when installed, defaults to Page Scaling set to “shrink to printable area” causing all documents to be scaled. This causes two problems: 1.) 2D barcodes become unreadable and 2.) Fixed location printing is shifted and becomes unreadable.

Setting the Print Scaling property to none will override the local setting and force the document to print without scaling.

Setting the Duplex property to Simplex will override local settings and force the documents to be printed single sided. Simplex printing is a requirement for 2D bar coded returns.

These settings are explained in section 8.1, Viewer Preferences, page 577 of the following manual:

PDF Reference sixth edition Adobe®
Portable Document Format Version 1.7
November 2006
Adobe Systems Incorporated

The following are excerpts from that manual:

Print Scaling - The page scaling option to be selected when a print dialog is displayed for this document. Valid values are **none**, which indicates that the print dialog should reflect no page scaling, and **App Default**, which indicates that applications should use the current print scaling. If this entry has an unrecognized value, applications should use the current print scaling. Default value: App Default. Note: If the print dialog is suppressed and its parameters are provided directly by the application, the value of this entry should still be used.

Duplex - The paper handling option to use when printer the file form the print dialog. The following values are valid:

- **Simplex** - Print single-sided.
- **Duplex Flip Short Edge** - Duplex and flip on the short edge of the sheet.
- **Duplex Flip Long Edge** - Duplex and flip on the long edge of the sheet.

Section 6: Maine Testing Procedures

The Maine 2-D test package will be available online at <https://taxadmin.kiteworks.com/> as soon as is practical. You will need an account to log in to the site and permissions to get access to the Maine PDF files. If you do not have access and need it contact Michelle.M.Andrews@maine.gov for assistance. The same scenarios used for OCR readability testing will be used for 2-D barcode testing whenever possible.

Vendor registration requirements, forms approval guidelines and MRS contact information is published in our “Guidelines for Developing Substitute Tax Forms” located on the SES. MRS has a email address for vendors to use to contact members of the Forms Management Team and should be used for submission of all test forms and approval requests. This email address is: VendorForms.MRS@maine.gov

While all tax software vendors have been assigned a four-digit identification number by FTA, Maine has been assigning two-digit vendor identification numbers for several years and will continue to use these. Therefore all 2-D bar codes will contain both the FTA assigned identification as well as the Maine assigned identification numbers. These locations are identified within the respective specifications.

Section 7: Address Formatting Guidelines

Maine has many taxpayers who live outside of Maine and the United States. For this reason, it is important that the taxpayer’s address be complete with State abbreviations, zip/postal codes, and country codes. MRS is reviewing its address format with respect to foreign addresses and how they will appear on the printed form but, there is no place, currently, on the paper return to enter a country code even though it is a required field and must appear within the 2-D barcode.

For addresses within the United States, its Territories, and U.S. Military addresses use United States Postal Service approved state abbreviations and the country code of “USA”. For addresses in Canada the below listed Canadian Province abbreviations are to be used in the State Code field, place the Postal Code in the Zip Code field and “CAN” in the Country Code field.

Canadian Provinces					
Alberta	AB	Newfoundland	NL	Prince Edward Islands	PE
British Columbia	BC	Northwest Territories	NT	Quebec	QC
Labrador	NL	Nova Scotia	NS	Saskatchewan	SK
Manitoba	MB	Ontario	ON	Yukon Territory	YT
New Brunswick	NB	Nunavut	NU		

For addresses, outside either the United States Place “XX” the State Code Field, place the Foreign Country code in its respective field, place the first two letters of the Foreign Province in the Foreign State field and the Foreign Zip Code placed in the foreign zip field needs to also be the same in the US Zip field.

Appropriate Country Codes can be found in the table below. The Codes found on the IRS website are no longer valid for our systems.

Country Code	Country Name	Country Code	Country Name	Country Code	Country Name
AFG	AFGHANISTAN	COC	COC	HA	HAITI
ALA	ÅLAND ISLAND	COG	CONGO	HMI	HMI
ALB	ALBANIA	COL	COLOMBIA	HOK	HONG KONG
ALG	ALGERIA	COM	COMOROS	HON	HONDURAS
AME	AM. SAMOA	COO	COOK ISLANDS	HOS	VATICAN CITY
ANA	ANGUILLA	CRA	COSTA RICA	HUN	HUNGARY
ANB	ANB	CRO	CROATIA	ICE	ICELAND
AND	ANDORRA	CUB	CUBA	INA	INDONESIA
ANG	ANGOLA	CUW	CURAÇAO	IND	INDIA
ANT	ANTARCTICA	CYO	CYPRUS	IRA	IRAN
ARG	ARGENTINA	CZE	CZE	IRE	IRELAND
ARM	ARMENIA	DEN	DENMARK	IRQ	IRAQ
ARU	ARUBA	DJI	DJIBOUTI	ISM	ISLE OF MAN
AUA	AUSTRIA	DOM	DOMINICA	ISR	ISRAEL
AUS	AUSTRALIA	DON	DOMINICAN	ITA	ITALY
AZE	AZERBAIJAN	ECU	ECUADOR	JAM	JAMAICA
BAG	BANGLADESH	EGY	EGYPT	JAP	JAPAN
BAH	BAHAMAS	ENG	ENGLAND	JER	JERSEY
BAN	BAHRAIN	EQU	EQU	JOR	JORDAN
BAR	BARBADOS	ERI	ERITREA	KAZ	KAZAKHSTAN
BEL	BELGIUM	ESR	EL SALVADOR	KEN	KENYA
BEN	BENIN	EST	ESTONIA	KIR	KIRIBATI
BER	BERMUDA	ETH	ETHIOPIA	KOR	NORTH KOREA
BES	BELARUS	FAL	FAL	KOS	KOSOVO
BEZ	BELIZE	FAR	FAROE ISLAND	KUW	KUWAIT
BHU	BHUTAN	FIJ	FIJI	KYR	KYRGYZSTAN
BLM	ST. BARTS	FIN	FINLAND	LAO	LAOS
BOL	BOLIVIA	FRA	FRANCE	LAT	LATVIA
BOS	BOSNIA	FRG	FRG	LEB	LEBANON
BOT	BOTSWANA	FRP	FRP	LES	LESOTHO
BOU	BOUVET ISLAN	FST	FST	LIA	LIBERIA
BQS	BONAIRE	GAB	GABON	LIB	LIBYA
BRA	BRAZIL	GAM	GAMBIA	LIE	LIECHTENSTEI
BRI	BIOT	GEO	GEORGIA	LIT	LITHUANIA
BRU	BRUNEI	GER	GERMANY	LUX	LUXEMBOURG
BUL	BULGARIA	GHA	GHANA	MAC	MACAU
BUP	BURKINA FASO	GIB	GIBRALTAR	MAD	MADAGASCAR
BUR	BURUNDI	GRA	GRENADA	MAE	MACEDONIA
CAA	CAMBODIA	GRD	GREENLAND	GRE	GREECE
CAI	CAI	CAV	CAPE VERDE	GUA	GUATEMALA
CAM	CAMEROON	CDR	CDR	GUB	GUB
CAN	CANADA	CHA	CHAD	MAR	MARTINIQUE
CAR	CAR	GUE	GUADELOUPE	MAS	MALDIVES
CHE	CHILE	GUI	GUINEA	MAU	MAURITANIA
CHI	CHINA	GUM	GUAM	MAW	MALAWI
CHR	CHR	GUS	GUERNSEY	MAY	MAYOTTE
CIV	IVORY COAST	GUY	GUYANA	MEX	MEXICO

Country Code	Country Name	Country Code	Country Name	Country Code	Country Name
MIC	MICRONESIA	SIN	SINGAPORE	VIU	VIU
MOA	MONGOLIA	SJM	SJM	WAF	WAF
MOC	MONACO	SKN	SKN	WAL	WALES
MOL	MOLDOVA	SKO	SOUTH KOREA	WSA	WSA
MON	MONTSERRAT	SLA	SRI LANKA	YEM	YEMEN
MOO	MONTENEGRO	SLO	SLOVAKIA	ZAM	ZAMBIA
MOR	MOROCCO	SLV	SLOVENIA	ZIM	ZIMBABWE
MOZ	MOZAMBIQUE	SOI	SOI		
MRS	MAURITIUS	SOM	SOMALIA		
MTA	MALTA	SPA	SPAIN		
MYA	MYANMAR	SPM	SPM		
NAM	NAMIBIA	SSD	SOUTH SUDAN		
NAU	NAURU	STA	ST. LUCIA		
NEC	NEC	STH	ST. HELENA		
NEP	NEPAL	STP	STP		
NET	NETHERLANDS	SUD	SUDAN		
NEZ	NEW ZEALAND	SUR	SURINAME		
NIC	NICARAGUA	SVG	SVG		
NIG	NIGERIA	SWA	ESWATINI		
NIL	N IRELAND	SWE	SWEDEN		
NIR	NIGER	SWI	SWITZERLAND		
NIU	NIUE	SXM	SINT MAARTEN		
NMI	NMI	SYR	SYRIA		
NOI	NOI	TAC	TAC		
NOR	NORWAY	TAI	TAIWAN		
OMA	OMAN	TAJ	TAJIKISTAN		
PAK	PAKISTAN	QAT	QATAR		
PAL	PALAU	REU	RÉUNION		
PAN	PANAMA	ROM	ROMANIA		
PAR	PARAGUAY	TAN	TANZANIA		
PAT	PAT	TAT	TAT		
PER	PERU	THA	THAILAND		
PHI	PHILIPPINES	TIL	TIMOR-LESTE		
PIT	PITCAIRN	TOG	TOGO		
PNG	PNG	TOK	TOKELAU		
POL	POLAND	TON	TONGA		
POR	PORTUGAL	TUK	TURKMENISTAN		
MAH	MAH	TUN	TUNISIA		
MAI	MALI	TUR	TURKEY		
MAL	MALAYSIA	TUV	TUVALU		
RUS	RUSSIA	UAE	UAE		
RWA	RWANDA	UGA	UGANDA		
SAA	SAUDI ARABIA	UKR	UKRAINE		
SAF	SOUTH AFRICA	UNK	UK		
SAM	SAMOA	URU	URUGUAY		
SAO	SAN MARINO	USA	USA		
SCT	SCOTLAND	USM	USM		
SEN	SENEGAL	UZB	UZBEKISTAN		
SER	SERBIA	VAN	VANUATU		
SEY	SEYCHELLES	VEN	VENEZUELA		
SGS	SGS	VIB	VIB		
SIL	SIERRA LEONE	VIN	VIET NAM		