

Toshiba Global Commerce Solutions
POS Virtual Serial Drivers



Toshiba POS Virtual Serial Drivers User's Guide

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About this guide

The guide describes how to install and configure Toshiba POS Virtual Serial Drivers 1.11 on Linux systems.

Who should read this guide?

This guide is intended for personnel who are connecting Toshiba Point of Sale (POS) USB devices to RS232 POS applications through Toshiba Virtual Serial Drivers, from now on and through all this document known as VSP.

Summary of changes

April 2020

- Initial release.

November 2021

This release is including software deployment support on the following POS Systems:

- Toshiba TCx® 810 6102-2xx/Exx
- Toshiba TCx® 810E 4828-T2x/E2x

May 2022

- Added support for retrieved codepages from TCx® printers.

June 2022

- GB18030 character encoding initial support added.

March 2023

- Support for APA Line Displays.
- Support for GB18030 character encoding for APA line displays.

August 2023

- Added support for: Toshiba TCx® 900 4901-91x/E1x/C1x.

Chapter 1. Introduction

System Requirements

This section lists the hardware that VSP supports as well as the software requirements that VSP needs to run without problems.

Supported Hardware

The following are the supported devices on various POS Terminals:

POS Systems Devices	TCx® 900	TCx® 810/ TCx® 810E	TCx® 800	TCx® Wave	TCx® 300/SurePOS 300 (4810- 360/370/380 & 4810-35x)	Other Toshiba POS Systems
Integrated MSR	✓	✓	✓	✓		
Integrated 2x20 Line Display	✓	✓	✓	✓		
Cash Drawer (USB)	✓	✓	✓	✓		
Cash Drawer (RJ11/SDL) ¹	✓	✓	✓			
TCx® Printer 6145	✓	✓	✓	✓	✓	✓
TCx® Double Side Display ²	✓	✓	✓	✓	✓	✓
TCx® Single Side Display	✓	✓	✓	✓	✓	✓

Software Requirements

The Virtual Serial Drivers requires the following software environment:

Operating System	• Linux x64 (Kernel 4.4+) ³
-------------------------	--

¹ For Cash Drawer (RJ11/SDL) the support is available only for TCx® 800 Head/Base – USB.

² The support for the TCx® Double Side display exists on Toshiba Virtual Serial Port version 1.6 and above, yet only one side of the display can be configured.

³ Best effort will be provided for no default version.

	Packages tested on GNU/Linux distributions: Ubuntu 20.04, CentOS 7, SLE 12 SP4, SLE 15 SP2, SLE 15 SP4 ⁴
Library Dependence	<ul style="list-style-type: none"> • libusb 1.0 • libudev • librt
Desktop Environment	<ul style="list-style-type: none"> • Gnome 3.22+⁵

⁴ Best effort will be provided for no tested GNU/Linux distributions.

⁵ KDE desktop environment is not yet supported.

Chapter 2. Installing the Virtual Serial Drivers

This chapter describes the Toshiba POS Virtual Serial Drivers in Linux using either the ``rpm`` or ``dpkg`` package handlers depending on the Linux distro is being used.

Installation Procedure

Installation of RPM Package

To install the Toshiba Virtual Serial Drivers ``rpm`` package, follow the next steps:

1. It is assumed that you have downloaded the `.rpm` package from Toshiba site
2. Open a terminal
3. Once the terminal is opened please type:

```
$ sudo rpm -ivh toshiba-vsp-linux-1.11.x-r.r.sle.x86_64.rpm
```

- a. password may be required
- b. type user password and hit enter

Once after these steps are followed the Virtual Serial Drivers service will be running, you can check this by opening a terminal and type the following command:

```
$ sudo systemctl status vsd
```

Removal of RPM Package

To **remove** the Toshiba Virtual Serial Drivers from your system please follow the next steps:

1. Open a terminal
2. Once the terminal is open type

```
$ sudo rpm -e toshiba-vsp-linux
```

- a. password may be required
- b. enter user password and hit enter

Once these steps are completed the Toshiba Virtual Serial Drivers will be removed from your system.

Installation of DEB Package

To install the Toshiba Virtual Serial Drivers deb package, follow the next steps:

1. It is assumed that you have downloaded the `.deb`` package from Toshiba site
2. Open a terminal
3. Once the terminal is opened please type:

```
$ sudo dpkg -i toshiba-vsp-linux-1.11.x-r.r.amd64.deb
```

- a. password may be required
- b. enter the user password and hit enter

Once after these steps are followed the Virtual Serial Drivers service will be running, you can check this by opening a terminal and type the following command:

```
$ sudo systemctl status vsd
```

Removal of DEB Package

To **remove** the Toshiba Virtual Serial Drivers from your system, follow the next steps:

1. Open a terminal
2. Once the terminal is open type the following command:

```
$ sudo dpkg remove --purge toshiba-vsp-linux
```

- a. password may be required
- b. Insert user password and hit enter

Once you follow the steps the Toshiba Virtual Serial Port will be removed from your system.

Chapter 3. Configuring the Virtual Serial Drivers

VSP Configuration Tool

The Toshiba Virtual Serial Drivers has configuration utility which binary (``vsd``) is located at the directory ``/opt/tgcs/vsp/``. But for user commodity it can be found on the dash menu to look up for it please hit the ``Super key`` to open the search bar of the dash and type “toshiba”, an icon like the shown in **Figure 1** will appear.



Figure 1 – Toshiba VSP Configuration Tool on Dash Search

Click on it and the “Toshiba Virtual Serial Port Configuration Utility” will open displaying as shown in **Figure 2**

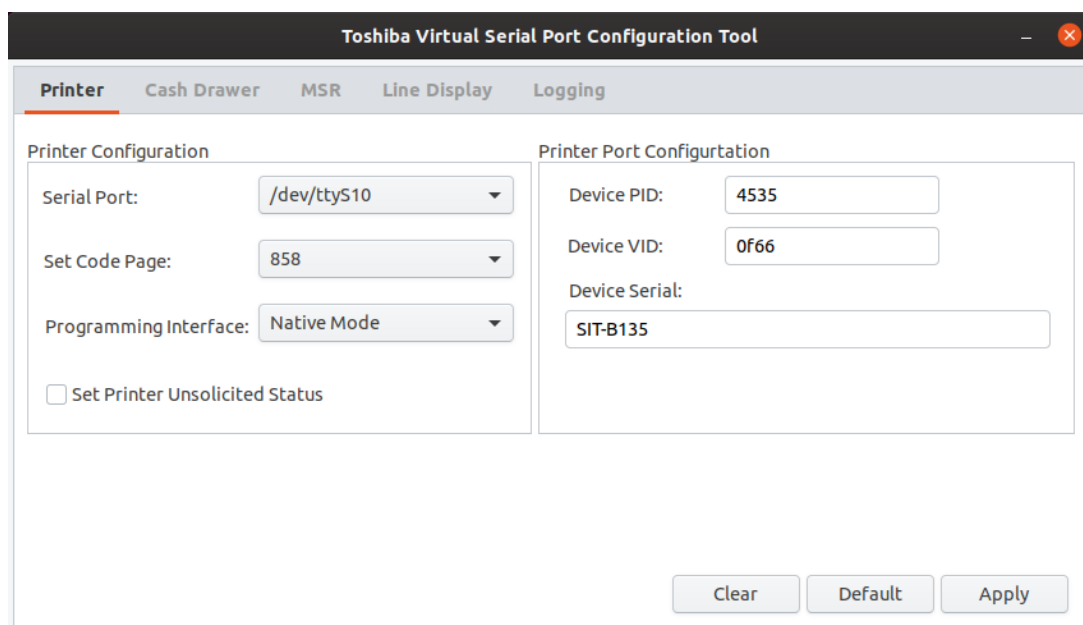
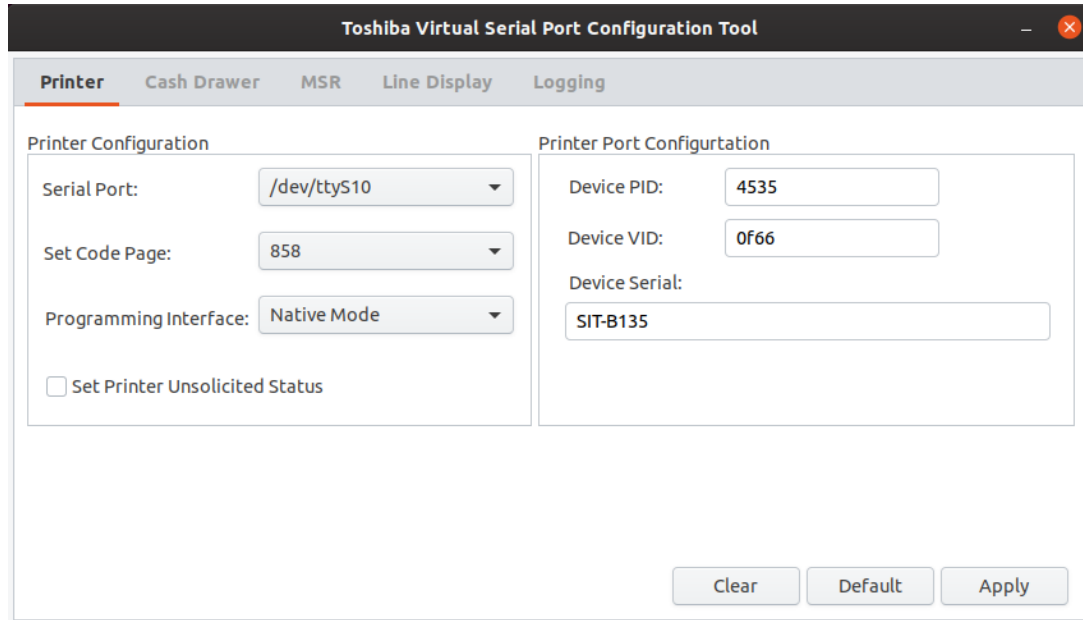


Figure 2 - Toshiba Virtual Serial Port Configuration Tool

To enable the settings, click the ``Apply`` button on the individual tabs where the change has been made. The Virtual Serial Drivers service will be restarted by the tool, when the tool is closed, prompting

for the user password, *please insert the correct password to restart the `vsp` service, otherwise the changes won't take effect on device/log configuration.*

Printer Configuration



The screenshot shows the 'Toshiba Virtual Serial Port Configuration Tool' window with the 'Printer' tab selected. The window has a dark title bar and a light gray background. The 'Printer' tab is highlighted with a red underline. The 'Printer Configuration' section on the left contains three dropdown menus: 'Serial Port' set to '/dev/ttyS10', 'Set Code Page' set to '858', and 'Programming Interface' set to 'Native Mode'. Below these is an unchecked checkbox labeled 'Set Printer Unsolicited Status'. The 'Printer Port Configuration' section on the right contains three text input fields: 'Device PID' with '4535', 'Device VID' with '0f66', and 'Device Serial' with 'SIT-B135'. At the bottom right are three buttons: 'Clear', 'Default', and 'Apply'.

Figure 3 – Serial Port and Printer Configuration Tab

The Printer Configuration tab allows users to configure the printer settings as well as assigning a serial port to connect the printer to.

The settings are:

- Serial Port
- Set Code Page
- Programming Interface: The modes available are “TCx® Printer (Native)”, TCx® Printer (Compatibility)” and “Epson Emulation”.⁶
- Unsolicited Status check box is to enable the RS232 signals reporting for TCx® Printers

Support for DBCS Code Pages

The Virtual Serial Port supports DBCS font usage, this is achieved by selecting the item “Printer Default” listed in the dropdown list of the “Set Code Page” control for “TCx® Printer (Compatibility)”, “TCx® Printer (Native)” and “Epson Emulation” modes. In the case of “TCx® Printer (Native)” the dropdown list of the “Set Code Page” control will display the codepage of the DBCS font and the option “Printer Default” as the last two items (Both options are equal). By doing this if a DBCS font is loaded

⁶ If the user sets the Programming Interface as “Epson Emulation” to return to a Native or Compatibility mode a printer reset must be done manually

in printer DBCS1 position, it will use the uploaded font as the default, otherwise the printer will use the shipment default code page 858.

It is important to know that if a code page was set prior to selecting the “Printer Default” code page option, a manual reset must be done by the user, to avoid using the previously selected code page.

To adjust other printer settings, please download and use the TCx® Printer Configuration Utility from <https://commerce.toshiba.com/>. The utility provides a rich set of features including firmware download, font download, bitmap download, paper saving options and paper sensing settings.

Controls Behaviour

The “Clear” Button allows to set the port to “None” in the drop-down list that enunciates the ports, with this, if the button “Apply” is clicked, the configuration will be saved and upon `vsd` service restart, the printer won’t be managed by VSP Drivers.

The information displayed on the boxes for Device PID, Device VID and Device Serial will only autofill if the application detects a supported device; with this, when button “Apply” is clicked this value will be stored on VSP configuration file.

The “Default” button sets the “Code Page” drop-down list to the default code page 858 and the “Programming Interface” to Native Mode.

Cash Drawer Configuration

The screenshot shows the 'Toshiba Virtual Serial Port Configuration Tool' window with the 'Cash Drawer' tab selected. At the top, there are tabs for 'Printer', 'Cash Drawer', 'MSR', 'Line Display', and 'Logging'. Below the tabs, a 'Serial Port' dropdown menu is set to '/dev/ttyS17'. The main area is divided into two columns: 'Cash Drawer 1' and 'Cash Drawer 2'. 'Cash Drawer 1' has fields for 'Vendor ID' (04b3), 'Product ID' (4557), and 'Serial Number' (11S3AA01190900YK23RW8C801S). 'Cash Drawer 2' has fields for 'Vendor ID' (0f66), 'Product ID' (4559), and an empty 'Serial Number' field. At the bottom right, there are 'Clear' and 'Apply' buttons.

Figure 4 - Serial Port Configuration Tab for Cash Drawer

For assigning a virtual serial port to the attached `Cash Drawers`, user needs to use the drop-down list of the ports.

As you can see there are two boxes that display the information provided by the `USB` interface of the cash drawers, this will only be populated if the utility detects supported `USB` cash drawers attached to the POS system.

At this point how the Cash Drawers are being indexed is managed by how the system identifies this device, this is, **the first cash drawer to be detected will take the Index 1** populating its info in the box of the `Cash Drawer 1`, and the second cash drawer detected will populate its info on `Cash Drawer 2` box.

Note: “It is important to address that VSP 1.11 for Linux doesn’t support two devices with the same PID and VID, if by any chance user connect two cash drawers that have the same VID and PID, only the first one detected by the system will be managed by VSP”

Controls Behavior

The “Clear” button will clear the information populated in the boxes for `Cash Drawer 1` and `Cash Drawer 2` as well as setting the serial port to `None`, if button “Apply” is clicked and `vsd` service is restarted, the VSP drivers will stop managing the port and the interaction with the cash drawer.

If a USB Cash Drawer was configured and then it is replaced it with a different one, it is recommended to run again the VSP Configuration Tool.

MSR Configuration

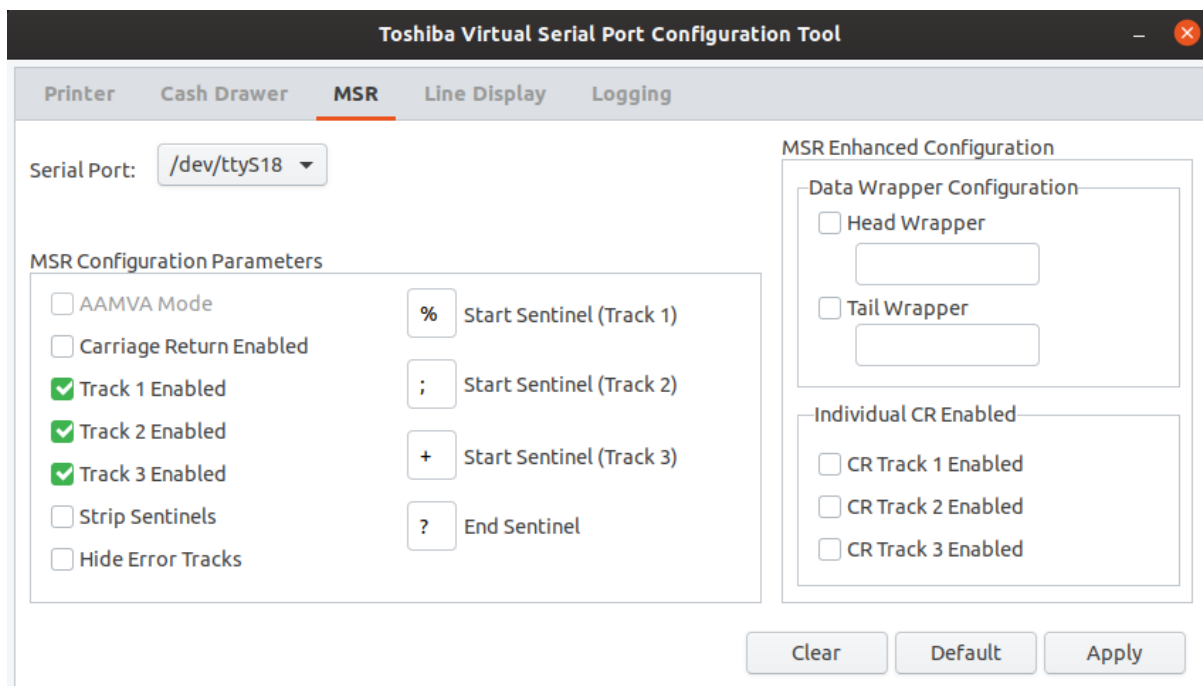


Figure 5 – Serial Port Configuration and MSR Configuration

The MSR Configuration provides a mechanism by which the MSR can be configured. Configuration must be done before using the MSR.

Figure 5 - Serial Port Configuration and MSR Configuration and **Table 1 – MSR Configuration Options** explains the MSR Configuration Options and **Table 2 MSR Enhanced Configuration Options** the enhanced options in the next page.

Options	Default Settings	Description
AAMVA Mode⁷	Disabled	The AAMVA Mode control button is greyed out by default since the Toshiba Virtual Serial Drivers does not support this data mode. By having this mode disabled, the default data mode for VSP is the “RAW Data Mode.”
Carriage Return Enabled⁸	Disabled	A carriage return is appended to each track of data.
Track 1 Enabled	Enabled	Returns Track 1 (if present) from a swiped card.
Track 2 Enabled	Enabled	Returns Track 2 (if present) from a swiped card.
Track 3 Enabled	Enabled	Returns Track 3 (if present) from a swiped card.
Strip Sentinels	Disabled	Strips start and stop sentinels from data returned after a card swipe.
Hide Error Tracks	Disabled	When an error occurs while reading a track from a card, an "E" is returned for that track. Enabling this option prevents the "E" from being sent in response to an error.
Start Sentinel (Track 1)	%	Character which is pre-pended to the start of the returned Track 1 data (if present).
Start Sentinel (Track 2)	;	Character which is pre-pended to the start of the returned Track 2 data (if present).
Start Sentinel (Track 3)	+	Character which is pre-pended to the start of the returned Track 3 data (if present).
End Sentinel	?	Data which is appended to the end of each returned track of data.

Table 1 - MSR Configuration Options

Options	Default Settings	Description
Data Wrapper	Empty	Configuring the head data wrapper or/and tail data wrapper for each data track. Able to configure supported ASCII code from 032 to 127, including non-text characters. Total data wrapper length is 14-characters for configured head, tail or both data wrapper.

⁷ Virtual Serial Drivers [VSP] does not support the AAMVA mode, the default data mode that VSP uses is the **RAW Data Mode**

⁸ Only a single carriage return per track will be appended even if both the **Carriage Return Enabled** and **Individual CR Enabled** are enabled.

Individual CR Enabled	Disabled	A carriage return is appended to each track of data, individually.
------------------------------	----------	--

Table 2 - MSR Enhanced Configuration Options

Line Display Configuration

The screenshot shows the 'Toshiba Virtual Serial Port Configuration Tool' window with the 'Line Display' tab selected. The 'Line Display Configuration' section contains the following fields:

- Serial Port:** A drop-down menu showing '/dev/ttyS20'.
- Vendor ID:** A text box containing '0f66'.
- Product ID:** A text box containing '452b'.
- Serial Number:** An empty text box.

At the bottom right of the configuration area, there are two buttons: 'Clear' and 'Apply'.

Figure 6 – Line Display Tab Configuration

To configure the serial port for the Line Display attached to the POS system, the user needs to select a port from the drop-down list for the serial port.

The information for Vendor ID, Product ID will only autofill if the utility detects a supported device, otherwise this controls will be empty.

Controls Behaviour

The button “Clear” when clicked will clear the information from the boxes for the device information, and set the serial port to “None”, if the button “Apply” is clicked and the utility closed, the utility will attempt to restart the service, if user agrees to restart the service by typing the user’s password, **VSP** will stop managing the serial port and the communication to the device will be stopped.

Logging Configuration

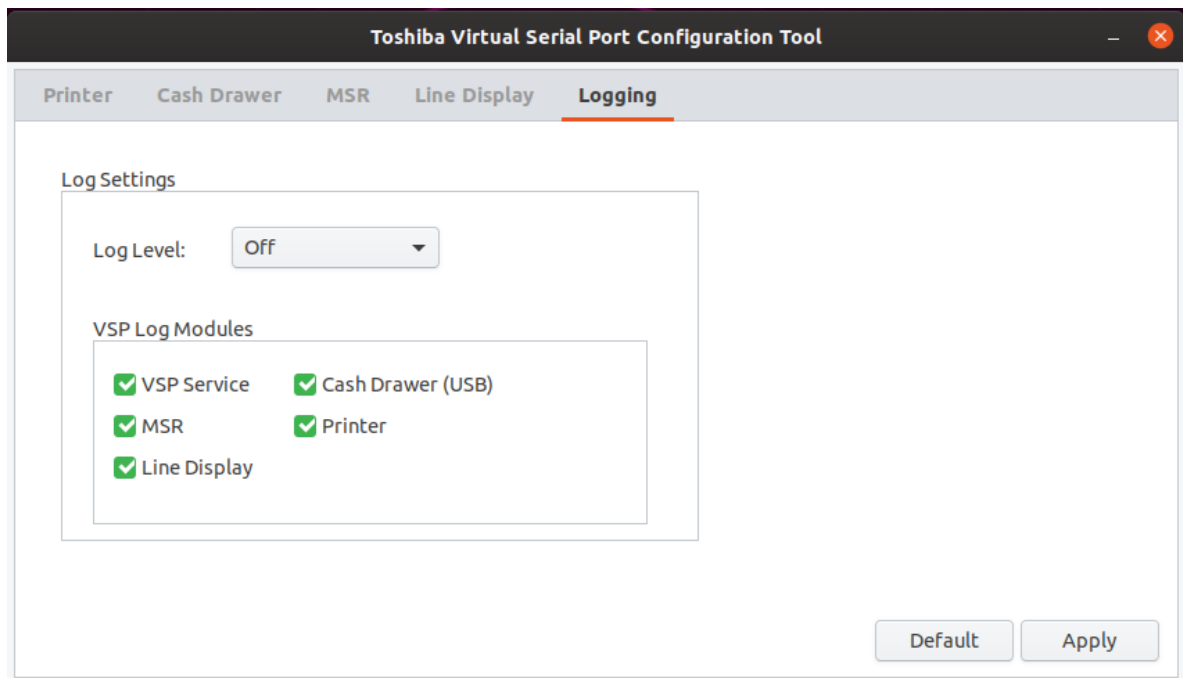


Figure 7 – Logging Configuration Tab

The Logging Configuration tab changes the configuration for which information should be written in the log as well as which module's process should be logged. This with the finality of having information to debug if some problem with the driver happens during normal operation

The various settings are:

- Log Level.

6 levels are supported. They are:

- "Off",
- "Error",
- "Warning",
- "Info",
- "Verbose",
- "Trace".

- Modules.

The various modules (device behaviour) that will be logged:

- VSP Service
- MSR
- Cash Drawer (USB)
- Line Display
- Printer

Collect Script

The Toshiba Virtual Serial Drivers for Linux contains a mechanism to retrieve the information regarding the `VSP` operation and configuration if by somehow the `VSP` driver alongside the supported devices stop working for an unknown reason.

To generate this information, follow the next steps:

1. Open a terminal
2. Once the terminal is opened type the next command:

```
$ sudo bash /opt/tgcs/vsp/collect.sh
```

- a. user password may be required
 - b. type user password and hit enter
3. This will generate a **`collect.tar.gz`** file located at `/opt/tgcs/collect`

If you have an issue, please run this script, and keep the ``collect.tar.gz`` file to share it with the support representative.

Chapter 4. Configuration for Multiple Systems

To deploy the Virtual Serial Drivers on multiple systems without reconfiguring all settings, you can extract and load the configuration file to systems across the enterprise.

The configuration file "`VSDConfig.xml`" is found inside the `/opt/tgcs/vsp` directory. Use the file in the configured system to replace the configuration file in the other systems.

Nevertheless, for device information update, user needs to run the utility to update the `USB` device information in the `XML` file by clicking "Apply" button on each tab for each device tab as well as logging tab, but the port and device specific configurations will be preserved.

Chapter 5. MSR Data Format

These sections describes the incoming data for the 3-track MSR.

Table 3 – MSR Data Format shows the default MSR data format of the track data sent to the application. The expected output can be different if the configuration parameters are modified by the Configuration Tool.

Mode	Data	Format
Successful Read (Serial)	SS Card Data ES	Start Sentinel (SS) character = ASCII % for track 1 Start Sentinel (SS) character = ASCII ; for track 2 Start Sentinel (SS) character = ASCII + for track 3 End Sentinel (ES) character = ASCII ? for all tracks
Unsuccessful Read (Serial)	Error	ASCII E

Table 3 – MSR Data Format

Chapter 6. Line Display Command Set

Line Display Command Set Summary

This section describes the `RS232` Command Set that is used to communicate with the Line Displays.

Table 4 – Line Display Command Summary contains the summary of the commands.

No	Command (Hexadecimal)	Command Description	VFD Support	APA Support
1	00 nn	Emulation Mode Select	YES	YES
2	02 nn	Character Set Select	YES	YES
3	03 <Character #> <Character Data>	User Character Definition	YES	NO
4	04 nn	Brightness Control (Not Supported by Virtual Serial Drivers)	NO	NO
5	05 <Data>	Alphanumeric Message Scroll	YES	YES
6	08	Backspace	YES	YES
7	09	Horizontal Tab	YES	YES
8	0A	Line Feed	YES	YES
9	0D	Carriage Return	YES	YES
10	0F	Test	YES	
11	10 nn	Display	YES	YES
12	11	Normal Display Control Mode	YES	YES
13	12	Vertical Scroll Display Control Mode	YES	YES
14	13	Cursor On (Not Supported by Virtual Serial Drivers)	NO	NO
15	14	Cursor Off (Not Supported by Virtual Serial Drivers)	NO	NO
16	1F	Reset	YES	YES
17	Undefined values between 00 and 1F	Null Characters		

Table 4 – Line Display Command Summary

Since the APA line display can use double byte character set (DBCS) for the Simplified Chinese GB18030 code page, it has two operation modes.

The first operation mode is when no DBCS font is active, in such case the display is used as a 2x20 VFD line display and the command set is the same for both displays, for example, to select the emulation mode the command sequence **00 01** will set the IBM emulation mode regardless the type of line display connected.

The second operation mode is when the supported DBCS is active (a double byte character is active when it is set using the character select command). In such case every supported command sequence must start with the byte **06H**, for example, to select the emulation mode the command sequence **06 00 01** will set the IBM emulation mode if an APA line display is connected and the supported DBCS is active.

The following sections describe the command set for both VFD and APA line displays.

Line Display Command Set Description

Emulation Mode Select (00H)

Command Sequence: 00 nn

Purpose: Sets the specified emulation mode as defined below.

00H Logic Controls Mode (default)

01H IBM Mode

Example: 00 00

This example sets the Logic Controls Mode.

Character Select (02H)

Command Sequence: 02 nn

Purpose: Selects the specified character set as defined below.

00H Code Page 437 (Original PC Character Set)

01H Code Page 897 (Katakana)

02H Code Page 858 (Multilingual International)

03H Code Page 852 (Central Europe)

04H Code Page 855 (Cyrillic)

05H Code Page 857 (Turkey)

06H Code Page 862 (Israel)

07H Code Page 863 (Canadian French)

08H Code Page 864 (Arabic)

09H Code Page 865 (Nordic)

0AH Code Page 808 (Cyrillic – Russia)

0BH Code Page 869 (Greece)

Example: 02 00

This example selects Code Page 437

Note: This command is effective only in IBM Mode.

User Character Definition (03H)

Command Sequence: 03 <Character #> <Character Data>

Purpose: Defines a custom character as specified below. The character definition is different for each emulation mode.

Logic Controls Emulation Mode: The byte following the command byte contains the ASCII character (20h - 7Fh) of a keyboard key to be redefined. This byte is followed by 5 bytes that define the bit patterns of the user defined character. Logic Controls only allows one keyboard key to be redefined. This means there is only one user definable character in this mode. Once a key is redefined, any occurrence of that character on the display will change to the user defined character. If a new key is redefined the previously redefined key is restored to the original character on all places on the display and the newly redefined key will be changed to the user definable character. The format of this data stream is shown in **Table 5 – User Character Definition – Logic Controls Mode**. The hyphen character indicates a do-not-care bit.

Byte #	Bit 0 (LSB)	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7 (MSB)
1	P1	P2	P3	P4	P5	P6	P7	P8
2	P9	P10	P11	P12	P13	P14	P15	P16
3	P17	P18	P19	P20	P21	P22	P23	P24
4	P25	P26	P27	P28	P29	P30	P31	P32
5	P33	P34	P35	-	-	-	-	-

Table 5 - User Character Definition – Logic Controls Mode

Px below represents a character pixel position in the character, a 1 indicating the pixel is ON, and 0 indicating the pixel is OFF.

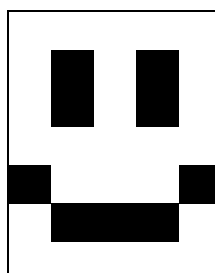
<----- 5 pixels wide ----->

P1	P2	P3	P4	P5
P6	P7	P8	P9	P10
P11	P12	P13	P14	P15
P16	P17	P18	P19	P20
P21	P22	P23	P24	P25
P26	P27	P28	P29	P30
P31	P32	P33	P34	P35

<--- 7 pixels tall --->

Example: 03 20 40 29 10 1D 00

This example replaces the blank space (20H) by the following symbol (black pixel on):



IBM Mode: The byte following the command byte represents an address between 15H and 1AH or between 1CH and 1DH⁹. The address byte is followed by 8 bytes that define the actual bit patterns of the user defined character. The format of this data stream is shown in **Table 6 – User Character Definition: IBM Mode**. The hyphen character indicates a do-not-care bit.

Byte #	Bit 0 (LSB)	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7 (MSB)
1	-	-	-	P1	P2	P3	P4	P5
2	-	-	-	P6	P7	P8	P9	P10
3	-	-	-	P11	P12	P13	P14	P15
4	-	-	-	P16	P17	P18	P19	P20
5	-	-	-	P21	P22	P23	P24	P25
6	-	-	-	P26	P27	P28	P29	P30
7	-	-	-	P31	P32	P33	P34	P35
8 ¹⁰	-	-	-	-	-	-	-	-

Table 6 - User Character Definition: IBM Mode

Px below represents a character pixel position in the character, a 1 indicating the pixel is ON, and 0 indicating the pixel is OFF.

<----- 5 pixels wide ----->

P1	P2	P3	P4	P5	
P6	P7	P8	P9	P10	
P11	P12	P13	P14	P15	
P16	P17	P18	P19	P20	
P21	P22	P23	P24	P25	
P26	P27	P28	P29	P30	
P31	P32	P33	P34	P35	

<--- 7 pixels tall --->

Note: User defined characters will NOT remain on the display if the display control mode is switched (with the RS232 Line Displays, user defined characters remain on the display when the display control mode is switched).¹¹ This means that, when switching from IBM Mode to Logic Controls Mode, the IBM user defined characters will be replaced with the space (20H) character.

⁹ The RS232 2x20 Line Display supports 1EH as a user defined character. However, due to RS232 and USB Line Displays firmware differences, the Virtual Serial Drivers will not support 1EH as a user defined character.

¹⁰ This is maintained for application compatibility for displays with 5x8 character boxes.

¹¹ The implementation is different from the RS232 2x20 Line Display due to differences between the RS232 and USB Line Displays firmware.

Brightness Control (04H)

Command Sequence: 04 nn

Purpose: Specifies a brightness setting for the display as percentage of maximum brightness.

FFH	100%
60H	60%
40H	40%
20H	20%

Example: 04 60

Sets the brightness at 60% of maximum.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Alphanumeric Message Scroll (05H)

Command Sequence: 05 <Data>

Purpose: The bytes following the command compose a message of up to 45 characters in length that are continuously scrolled on the top line of the display. Any data received after the 45th are ignored except a carriage return (0Dh). The message will be displayed after the carriage return command is received. If the cursor position is on the top line when this command is received, it is moved to the first position on the bottom line. If the cursor position is on the bottom line, the cursor position is not changed. Any text on the bottom line is left unchanged when this command is issued. Data will continue scrolling on the top line until a valid character, *`Backspace`*, *`Horizontal Tab`*, *`Line Feed`*, *`Carriage Return`*, or *`Display Position`* command is written when the cursor position is on the top line. Test and Reset will stop the scrolling message regardless of the display position.

Example: 05 48 65 6C 6C 6F 0D

Sets "Hello" as the scrolling message.

Backspace (08H)

Command Sequence: 08

Purpose: Decrements the cursor position by one, and clears any character displayed in that position. If the write position is at the lower left position, the position is moved to the upper right, and if the write position is at the upper left, the write position is moved to the lower right. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Horizontal Tab (09H)

Command Sequence: 09

Purpose: Increments the cursor position by one. No character erasure takes place. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent. At the end of a line, the display behaviour is determined by the state of the DC1/DC2 mode as follows:

Normal Display Control (DC1) Mode: If the cursor is at the upper right position, it is moved to the lower left position. If the cursor is at the lower right position, it is moved to the upper left position.

Vertical Scroll Display Control (DC2) Mode: If the cursor position is at the upper right position, it is moved to the lower left. If the cursor is at the lower right position, the characters displayed on the bottom line are moved to the top line, the bottom line is cleared, and the cursor is moved to the lower left position.

Line Feed (0AH)

Command Sequence: 0A

Purpose: The display behaviour is determined by the state of the DC1/DC2 mode as follows:

Normal Display (DC1) Mode: The cursor is moved to the same position in the complementary line. In this mode, a line feed command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Vertical Scroll (DC2) Mode: If the cursor position is on the top line, it is moved to the complementary position on the bottom line. If the cursor position is on the bottom line, all characters on that line are moved to the top line, the bottom line is cleared, and the cursor position is unchanged. This command will always stop the scrolling alphanumeric message.

Carriage Return (0DH)

Command Sequence: 0D

Purpose: Causes the cursor to move to the left most position of the current line. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Test (0FH)

Command Sequence: 0F

Purpose: Causes the first 40 characters in the currently selected character set to be displayed one time. In addition, at the end of the test, a test pattern is written that turn all pixels ON. At the end of the test routine, the display is cleared, and the display is reset to the "reset" state defined below.

Display Position (10H)

Command Sequence: 10

Purpose: Changes the cursor position. The byte following the command byte indicates the character position where the next data string write will start. Address 00h is the top left, address 13h is the top right, address 14h is the bottom left and address 27h is the bottom right. Any values greater than 27h are ignored and the cursor position will remain unchanged. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Normal Display Control Mode (DC1) (11H)

Command Sequence: 11

Purpose: Data can be written into either line. After writing a character, the cursor moves one position to the right. When the display position is at the last position of the top line, the cursor moves to the first position of the bottom line. When the display position is at the last position of the bottom line, the cursor moves to the first position of the top line. The display remains in DC1 mode until a DC2 mode command is issued, a reset command is issued, or power is removed from the display.

Vertical Scroll Display Control Mode (DC2) (12H)

Command Sequence: 12

Purpose: Data may be written to either line. When the display position is at the last position of the top line, the cursor moves to the first position of the bottom line. When valid character data or a horizontal tab command is sent to the last position of the bottom line, the data on the bottom line will be transferred to the top line and the cursor will be moved to the lower left position. Note that a carriage return command does not cause the data on the bottom line to be transferred to the top line.

DC2 mode is the power up and reset default. The display remains in DC2 mode until a DC1 mode command is issued.

Cursor On (13H)

Command Sequence: 13

Purpose: Turns on the cursor. This is the power-up default.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Cursor Off (14H)

Command Sequence: 14

Purpose: Turns off the cursor.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Reset (1FH)

Command Sequence: 1F

Purpose: Causes the display to reset some programmable parameters back to the power-on state. This state is defined to be:

- Scrolling alphanumeric message OFF
- All pixels OFF (all character positions are filled with 20h)
- Write position for next write at position 00h (top left)
- Default code page (437) selected
- Vertical Scroll Display (DC2) mode enabled
- Default (Logic Controls) emulation mode selected
- IBM user defined characters are NOT erased. The Logic Controls user defined character key is RESET.

Null Commands

All other bytes between 00H and 1FH not defined above are completely ignored by the display in the Logic Controls mode. User defined characters in the IBM mode that have not been previously defined are spaces.

APA Line Display for GB18030 Command Set Description

Emulation Mode Select (06 00H)

Command Sequence: 06 00 nn

Purpose: Sets the specified emulation mode as defined below.

00H Logic Controls Mode (default)

01H IBM Mode

Example: 06 00 00

This example sets the Logic Controls Mode.

Character Select (06 02H)

Command Sequence: 06 02 nn

Purpose: Selects the specified character set as defined below.

00H Code Page 437 (Original PC Character Set)

01H Code Page 897 (Katakana)

02H Code Page 858 (Multilingual International)

03H Code Page 852 (Central Europe)

04H Code Page 855 (Cyrillic)

05H Code Page 857 (Turkey)

06H Code Page 862 (Israel)

07H Code Page 863 (Canadian French)

08H Code Page 864 (Arabic)

09H Code Page 865 (Nordic)

0AH Code Page 808 (Cyrillic – Russia)

0BH Code Page 869 (Greece)

0CH Code Page 54936 (Simplified Chinese)

Example: 06 02 00

This example selects Code Page 437

Note: This command is effective only in IBM Mode.

Brightness Control (06 04H)

Command Sequence: 06 04 nn

Purpose: Specifies a brightness setting for the display as percentage of maximum brightness.

FFH	100%
60H	60%
40H	40%
20H	20%

Example: 06 04 60

Sets the brightness at 60% of maximum.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Alphanumeric Message Scroll (06 05H)

Command Sequence: 06 05 <Data>

Purpose: The bytes following the command compose a message of up to 45 characters in length that are continuously scrolled on the top line of the display. Any data received after the 45th are ignored except a carriage return (0Dh). The message will be displayed after the carriage return command is received. If the cursor position is on the top line when this command is received, it is moved to the first position on the bottom line. If the cursor position is on the bottom line, the cursor position is not changed. Any text on the bottom line is left unchanged when this command is issued. Data will continue scrolling on the top line until a valid character, *`Backspace`*, *`Horizontal Tab`*, *`Line Feed`*, *`Carriage Return`*, or *`Display Position`* command is written when the cursor position is on the top line. Reset will stop the scrolling message regardless of the display position.

Example: 06 05 FF 28 FF 45 FF 4C FF 4C FF 4F 0D

Sets "Hello" as the scrolling message.

Backspace (06 08H)

Command Sequence: 06 08

Purpose: Decrements the cursor position by one, and clears any character displayed in that position. If the write position is at the lower left position, the position is moved to the upper right, and if the write position is at the upper left, the write position is moved to the lower right. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent. The command must be sent twice to erase one character in the line display.

Horizontal Tab (06 09H)

Command Sequence: 06 09

Purpose: Increments the cursor position by one. No character erasure takes place. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent. At the end of a line, the display behaviour is determined by the state of the DC1/DC2 mode as follows:

Normal Display Control (DC1) Mode: If the cursor is at the upper right position, it is moved to the lower left position. If the cursor is at the lower right position, it is moved to the upper left position.

Vertical Scroll Display Control (DC2) Mode: If the cursor position is at the upper right position, it is moved to the lower left. If the cursor is at the lower right position, the characters displayed on the bottom line are moved to the top line, the bottom line is cleared, and the cursor is moved to the lower left position.

Line Feed (06 0AH)

Command Sequence: 06 0A

Purpose: The display behaviour is determined by the state of the DC1/DC2 mode as follows:

Normal Display (DC1) Mode: The cursor is moved to the same position in the complementary line. In this mode, a line feed command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Vertical Scroll (DC2) Mode: If the cursor position is on the top line, it is moved to the complementary position on the bottom line. If the cursor position is on the bottom line, all characters on that line are moved to the top line, the bottom line is cleared, and the cursor position is unchanged. This command will always stop the scrolling alphanumeric message.

Carriage Return (06 0DH)

Command Sequence: 06 0D

Purpose: Causes the cursor to move to the left most position of the current line. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Display Position (06 10H)

Command Sequence: 06 10

Purpose: Changes the cursor position. The byte following the command byte indicates the character position where the next data string write will start. Address 00h is the top left, address 13h is the top right, address 14h is the bottom left and address 27h is the bottom right. Any values greater than 27h are ignored and the cursor position will remain unchanged. This command will stop the scrolling alphanumeric message if the cursor position is on the top line when this command is sent.

Normal Display Control Mode (DC1) (06 11H)

Command Sequence: 06 11

Purpose: Data can be written into either line. After writing a character, the cursor moves one position to the right. When the display position is at the last position of the top line, the cursor moves to the first position of the bottom line. When the display position is at the last position of the bottom line, the cursor moves to the first position of the top line. The display remains in DC1 mode until a DC2 mode command is issued, a reset command is issued, or power is removed from the display.

Vertical Scroll Display Control Mode (DC2) (06 12H)

Command Sequence: 06 12

Purpose: Data may be written to either line. When the display position is at the last position of the top line, the cursor moves to the first position of the bottom line. When valid character data or a horizontal tab command is sent to the last position of the bottom line, the data on the bottom line will be transferred to the top line and the cursor will be moved to the lower left position. Note that a carriage return command does not cause the data on the bottom line to be transferred to the top line.

DC2 mode is the power up and reset default. The display remains in DC2 mode until a DC1 mode command is issued.

Cursor On (06 13H)

Command Sequence: 06 13

Purpose: Turns on the cursor. This is the power-up default.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Cursor Off (06 14H)

Command Sequence: 06 14

Purpose: Turns off the cursor.

Note: This command is not supported by Virtual Serial Drivers. The command shall have no effect on the display.

Reset (06 1FH)

Command Sequence: 06 1F

Purpose: Causes the display to reset some programmable parameters back to the power-on state. This state is defined to be:

- Scrolling alphanumeric message OFF
- All pixels OFF (all character positions are filled with 20h)
- Write position for next write at position 00h (top left)
- Default code page (437) selected
- Vertical Scroll Display (DC2) mode enabled
- Default (Logic Controls) emulation mode selected
- IBM user defined characters are NOT erased. The Logic Controls user defined character key is RESET.

Null Commands

All other bytes between 00H and 1FH not defined above are completely ignored by the display in the Logic Controls mode. User defined characters in the IBM mode that have not been previously defined are spaces.

Character Set Supported by 2x20 VFD Line Display in Virtual Serial Drivers

Table 7 – Character sets supported by line display in Virtual Serial Drivers shows the country character sets supported by the line displays in Virtual Serial Drivers. The US/European character set contains at least the upper-case characters from many of the other code pages (excluding Cyrillic). These are duplicated in the code pages for those countries.

Code Page	TCx [®] Wave
437 (US/European)	✓
897 (Katakana)	
858 (Multilingual)	✓
852 (Central Europe)	✓
855 (Cyrillic)	✓
857 (Turkey)	✓
862 (Israel)	✓
863 (Canadian French)	✓
864 (Arabic)	✓
865 (Nordic)	✓
808 (Cyrillic – Russia)	✓
869 (Greece)	✓

Table 7 - Character sets supported by 2x20 VFD line display in Virtual Serial Drivers

Character Set Supported by APA Line Display in Virtual Serial Drivers

Table 8 – Character sets supported by APA line display in Virtual Serial Drivers shows the country character sets supported by the line displays in Virtual Serial Drivers. The US/European character set contains at least the upper-case characters from many of the other code pages (excluding Cyrillic). These are duplicated in the code pages for those countries.

Code Page	TCx® Wave
437 (US/European)	✓
897 (Katakana)	
858 (Multilingual)	✓
852 (Central Europe)	✓
855 (Cyrillic)	✓
857 (Turkey)	✓
862 (Israel)	✓
863 (Canadian French)	✓
864 (Arabic)	✓
865 (Nordic)	✓
808 (Cyrillic – Russia)	✓
869 (Greece)	✓
1115/54936 (Simplified Chinese)	✓

Table 8 - Character sets supported by 2x20 APA line display in Virtual Serial Driver

Chapter 7: Cash Drawer Command Set

Cash Drawer Command Set Summary

This section describes the RS232 Command Set that is used to communicate with the Cash Drawer.

Table 9 – Cash Drawer Command Summary contains the summary of the commands.

No	Command (Hexadecimal)	Command Description
1	06	Read Cash Drawer Status
2	1B 06	Enable/Disable Unsolicited Cash Drawer Status
3	07	Open Cash Drawer 1
4	1B 07	Open Cash Drawer 2
5	Undefined values	Null Characters

Table 9 - Cash Drawer Command Summary

Cash Drawer Command Set Description

Read Cash Drawer Status (06H)

Command Sequence: 06

Purpose: Obtains a 1-byte status information for the Cash Drawers.

Cash Drawer Status are defined as follows:

Bit	Status Description
7 (MSB)	Always 0; Reserved for compatibility
6	Cash Drawer 1 Sensor: '1' = Cash Drawer 1 Opened '0' = Cash Drawer 1 Closed
5	Cash Drawer 2 Sensor: '1' = Cash Drawer 2 Opened '0' = Cash Drawer 2 Closed
4	Cash Drawer 1 Present Indicator: '1' = Cash Drawer 1 is Present '0' = Cash Drawer 1 is Not Present
3	Cash Drawer 2 Present Indicator: '1' = Cash Drawer 2 is Present '0' = Cash Drawer 2 is Not Present
2	Unsolicited Status Function State: '1' = Unsolicited Status Function is ON '0' = Unsolicited Status Function is OFF
1	Always 0; Reserved for compatibility
0 (LSB)	Always 0; Reserved for compatibility

Table 10 - Cash Drawer Status

Enable/Disable Unsolicited Cash Drawer Status (1BH 06H)

Command Sequence: 1B 06

Purpose: Toggles the unsolicited Cash Drawer status function ON or OFF. The default setting is OFF, and this setting will be saved by the system. If the status is ON, the Cash Drawer status will be sent when there is a change in the status. Sending an open Cash Drawer command will also cause the Cash Drawer to return the status byte if the Cash Drawer was previously closed.

Open Cash Drawer 1 (07H)

Command Sequence: 1B 06

Purpose: Opens Cash Drawer 1.

Open Cash Drawer 2 (1BH 07H)

Command Sequence: 1B 06

Purpose: Opens Cash Drawer 2.

Null Commands

All other bytes not defined above are ignored by the Cash Drawer.

Chapter 8: Printer Command Set

Applications will communicate to the TCx® Printer using the RS232 command set.

To find out more about the printer command set, please refer to the TCx® Printer Programming Guide.

Support for DBCS Code Pages

The Virtual Serial Drivers supports DBCS font usage, this is achieved by selecting the item “**Printer Default**” listed in the dropdown list of the “Set Code Page” control in the **VSP Configuration Tool Printer Tab**. In the case of “Native Mode” the dropdown list of the “Set Code Page” control will display the codepage of the DBCS font and the option “Printer Default” as the last two items (Both options are equal). By doing this if a DBCS font is loaded in printer DBCS1 position, it will use the uploaded font as the default, otherwise the printer will use the shipment default code page 858.

It is important to know that if a code page was set prior to selecting the “Printer Default” code page option, a manual reset must be done by the user, to avoid using the previously selected code page.

To adjust other printer settings, please download and use the TCx® Printer Configuration Utility from <https://commerce.toshiba.com/>. The utility provides a rich set of features including firmware download, font download, bitmap download, paper saving options and paper sensing settings.

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