OPTICON

Fixed Position 2D Imager Scanner

NLV3101

This document provides instructions for installing the NLV3101 fixed position 2D imager scanner.

Integration Guide

All information subject to change without notice.

Document History

Model Number:	NLV3101	**Specification Number:**	
Edition:	1.0	**Original Spec Number:**	
Date:	10-xx-2012		

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Limited Warranty and Disclaimers

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Packaging

The packing materials are recyclable. We recommend that you save all packing material to use should you need to transport your scanner or send it for service. Damage caused by improper packaging during shipment is not covered by the warranty.

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Revision History

Edition	Date	Description of Changes	Content	Compatible Firmware Version
1.0	10-xx-2012	-	New document	After DA01J08

Contents

1. Abstract

The NLV3101 is a fixed-position HD 2D image scanner, capable of reading high resolution linear (1D) & 2D symbologies at close range and at high speeds.

1.1. Scanner Characteristics

The NLV3101 is outfitted with the following characteristics:

・High Performance Scan Rate
This device displays a scan rate far outclassing its predecessors, able to easily read targets even in dark areas.

・Compact Body
An incredibly compact 2D scanner “33.0 (W): 41.1 (D):24.0 (H) m”. With its tight design the NLV3101 is an amazing space saver, providing easy installation.

・Reading Moving Targets, Auto Trigger
This device comes equipped with an on board auto trigger, bringing high speed 2m/s barcode scanning to enable reading of moving targets. The scanner senses these targets automatically to capture labels instantaneously.

・Focus Model
Choose between both standard (125mm) and high resolution (65mm) models, with varying scan ranges and resolution levels.

・Environmentally Resistant
IP65-rated and able to operate under temperatures of -20~50℃, the NLV3101 is usable in a wide variety of environments.

・Read-Editing
Utilizing “Data Edit Programming”, this device is capable of scanning multiple image batches with up to a maximum of 16 different code types. Also comes with easily implemented GS1 format for output edit processing.

・Sharp Aiming
Safe, long lasting, and high readability thanks to the sharp green aiming LED. Also, thanks to the aiming functionality the NLV3101 is capable of detecting a target’s readable width, and can easily confirm reading positions of wide-area barcodes such as GS1-128.

・Setting Tool
The NLV3101 may be equipped with a downloadable “Universal Menu Tool 2D” setting tool with simple installation.

・RoHS
The device is RoHS compatible.

1.2. Installation Process

This section contains details regarding the install process for the NLV3101.

1. Check and Select the Scanner

A technical check is performed prior to installation.

- Scanner Explanation (ref. 2.)
- NLV3101 Spec. Overview (ref. 13.2.)

Transmitting

S Supported Symbologies

2. Installation Check

The scanner will perform an install check in the actual install environment.

- Installation (3. ref.)
- 3D_CAD download

3. Download the Universal Menu Tool

Tools Necessary for operation may be downloaded from the Opticon homepage.

- For Settings, Image Capture, Transmit Confirmation ⇒ “Universal Menu Tool”
- For USB-COM ⇒ “USB Driver”
- For capturing images ⇒ “SDK”

4. Perform Setting Tests

Tests are performed for settings that are deemed most optimal for operating the scanner.

- Function Settings/Storing Procedure (ref. 4.)
- Interface (ref. 5.)
- Supported Symbologies (ref. 6.)
- String Options (ref. 7.)
- Timing Variance (ref. 8.)
- Indicators (ref. 9.)
- Read Activation (ref. 10.)
- Data Edit Programming (ref. 11.)

*** 10/10 ***
TEST

5. Create Settings

Create optimal setting commands/2D menu codes.

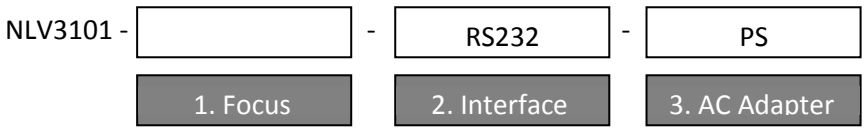
6. Installation Complete

2. Scanner Explanation

This chapter contains:

2.1. Scanner Model

Details regarding the available scanner models are explained within this section.



・Scanner Focusing Distance

Item	Description
Blank	Standard Reading Focus (Distance: 125mm, ref. 11.2.2.)
High Density (HD)	High Resolution Reading Focus (Distance: 65mm, ref. 11.2.3.)

・Interface

Choose the interface for the device from among the below four available options:

Item	Description
RS-232C	RS-232C Interface (Loose Wire or D-Sub 9 pin)
USB-COM	USB-COM Interface
USB	USB-HID Interface
Wedge PS/2	Wedge PS/2 Interface

・AC Adapter

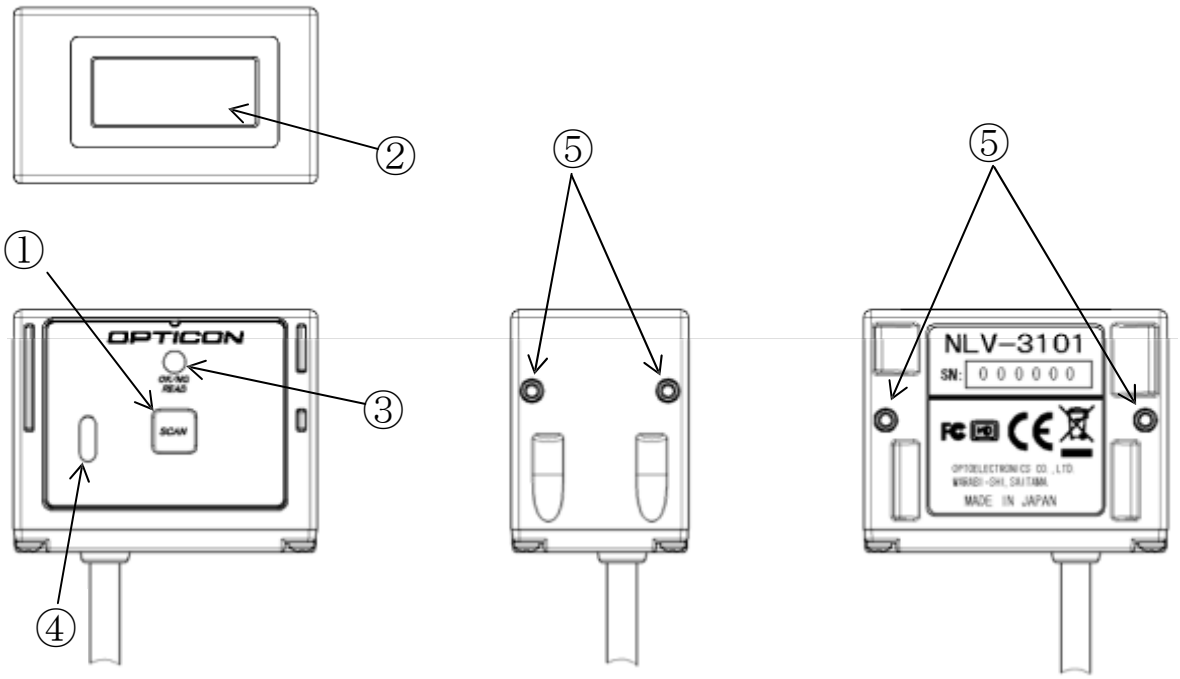
AC Adapter included. 'No Entry' is not included.

Item	Description
Blank	AC Adapter not included
Power Supply (PS)	AC Adapter included

**** Models with adapters included: RS-232C (D-Sub9pin spec.) and Wedge PS/2.***

**** Device support may vary depending on the model type and number of units. Contact an Opticon representative for further inquiries.***
Support for the device is dependent on the model type & volume. Contact customer support for further inquiries.

2.2. Detailed View



① Trigger
Press the trigger to release LED light from the scan window in order to perform a barcode scan.

② Scan Window
The scan window enables the light path for the scan imaging range, LED light, and aiming reticle. Also, be sure to perform scans with a clean lens.

③ Status LED
The NLV3101's state is displayed via the colors shown below. (ref. 7.2.)

Color	Description
Green	Upon a successful read
Red	Upon an unsuccessful read or transmit error

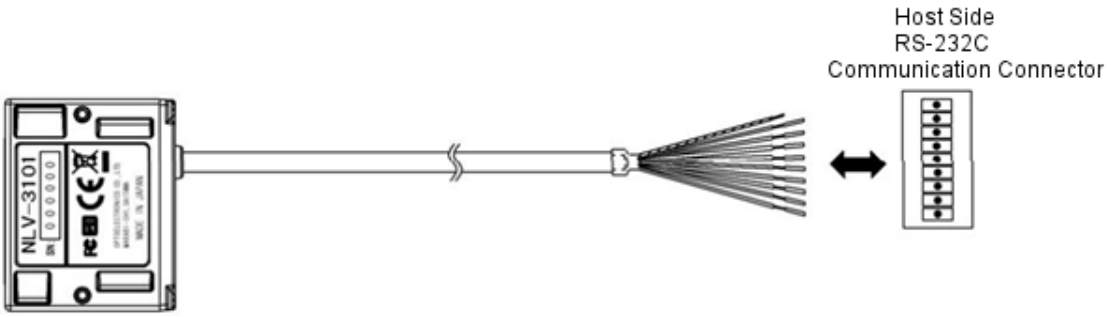
④ Buzzer Outlet
This is the buzzer's speaker. Please note that if plugged, the buzzer may become muted and difficult to hear. The type of noise that the buzzer emits may change depending on the device state.
Various buzzer settings such as mute, volume level, buzzer length, and tone are fully customizable. (ref. 7.1.)

⑤ Installation Holes
These are screw holes designed for installing the NLV3101. Two more holes are located underneath the scan button install plate. Refer to the dimensional drawing for how to install correctly. Dimensions: M2 x 0.4, with an effective depth of 3 mm.

2.3. Connecting To The Host

This section describes in detail the process of installing and connecting to the host computer.

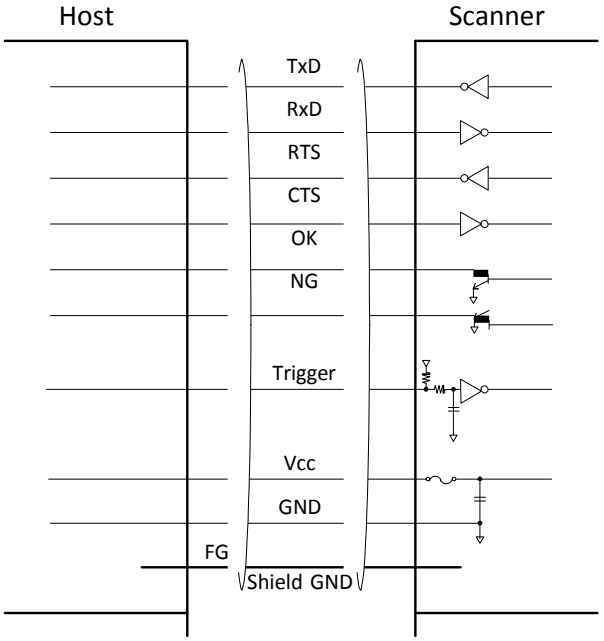
・RS-232C Loose-Wire Interface Cable Connector



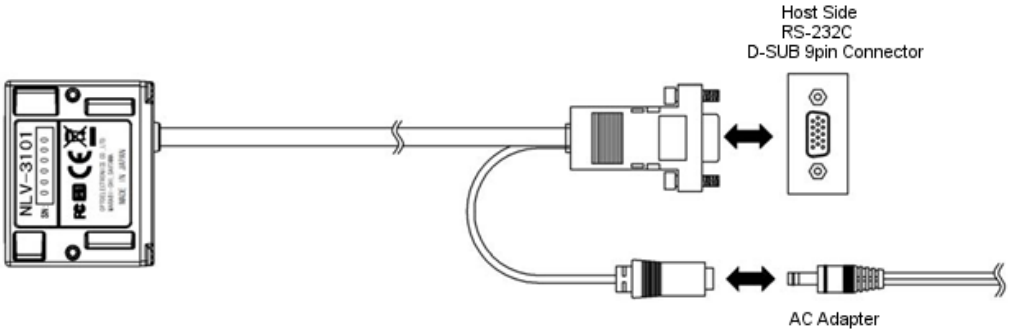
Assigned Loose-Wire Pins:

Cable Color	Signal Name	Notes
Red	VCC	Power Voltage 4.5-5.5V
Burgundy	Trigger	External Trigger Input Terminal
Yellow	OK	External OK Output Terminal
Orange	NG	External NG Output Terminal
Black	S-GND	
Gray	RTS	
Blue	CTS	
Green	TxD	
White	RxD	
(Black)	Shield GND	Thermal Shrink Tube Processing

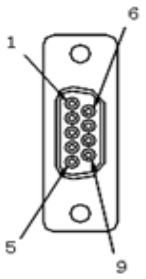
Loose-Wire Circuit:



・D-Sub 9Pin RS-232C Interface Connector

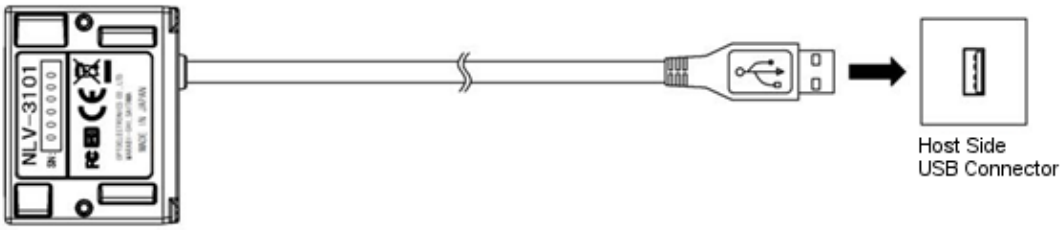


D-Sub 9pin Specifications:

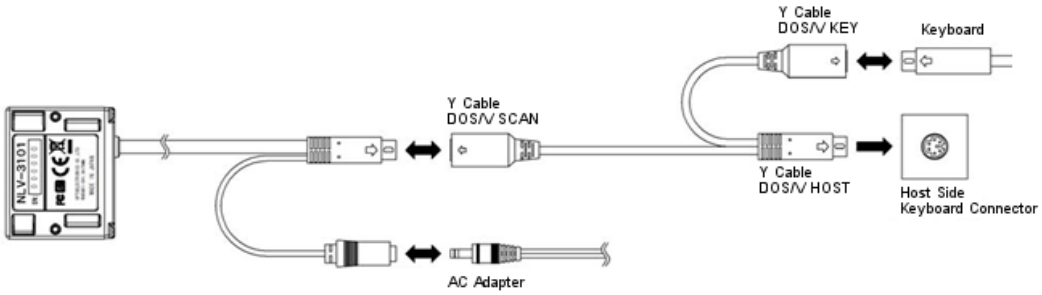
Pin Number	Signal Name	Notes	Pin Configuration Drawing
1	Shield		
2	TxD		
3	RxD		
4	(NC)	6 pins + connector	
5	GND		
6	(NC)	4 pins + connector	
7	CTS		
8	RTS		
9	(NC)	No Connection	

*** AC adapter is included when using the RS-232C interface (ref. 2.5.).**

・USB-HID/USB-COM Interface Connector



・Wedge PS/2 Interface Connector



*** AC Adapter is included when using the Wedge PS/2 interface (ref. 2.5.).**

2.4. Scanning Method

The NLV3101 reads the target barcode via capturing images, the method of which is explained below:

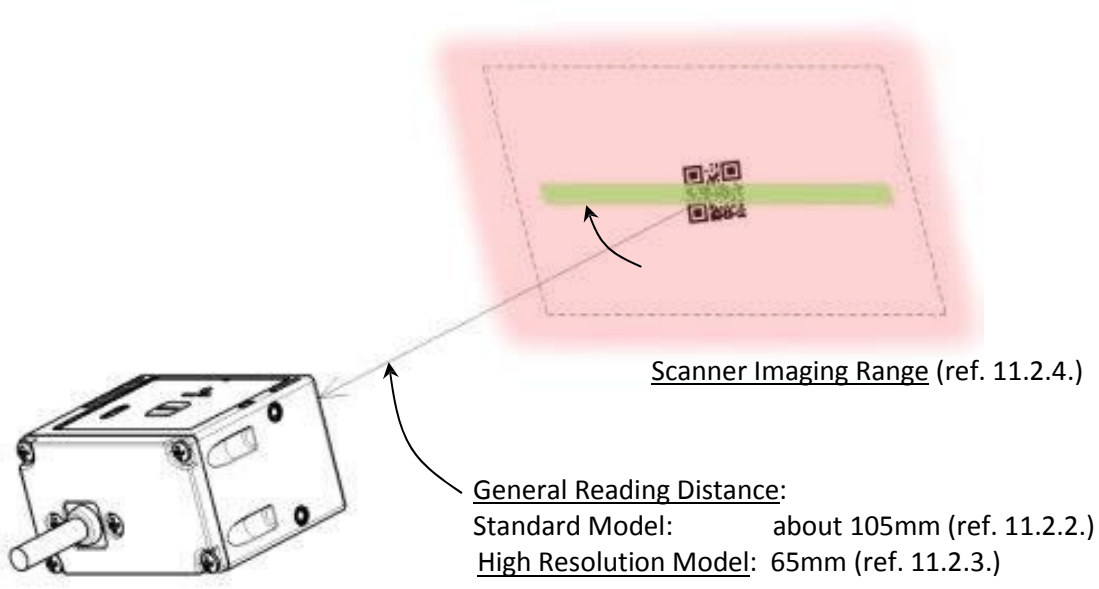
1. Transmit the command trigger “Z” via serial transmission (RS-232C, USB-COM).

2. Switch “External Trigger” to “ON” (per RS-232C loose-wire plug specifications).

3. Detect the read target via “Auto Trigger Mode”.

4. Press the trigger.

**** Under normal conditions, read the barcode from a distance of 80mm/45mm from the front of the device using the green aiming light as a guide.***



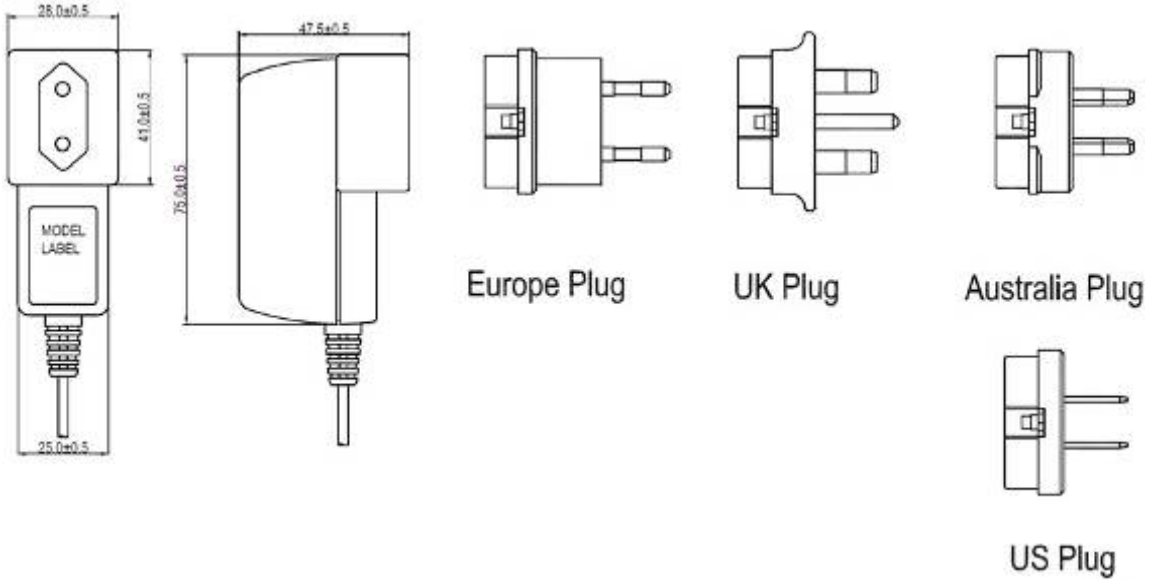
**** An error buzzer occurs if the scan is activated when the USB-COM/USB-HID interface is not connected to the host computer.***

2.5. Accessories

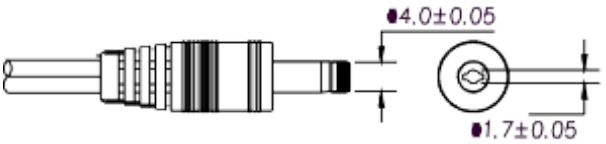
Both the RS-232C (D-Sub9Pin Spec) /Wedge PS/2 interfaces come with an AC adapter included, equipped with an interchangeable plug and usable within a wide variety of regions.

Item		Specifications
Model Name		SFP0602000P-PSE
Dimensions		47.5 (W) x 28.0 (D) x 75.0 (H) mm
DC Output Cable Length		1.8m
Input Specifications	Voltage Range	AC 90 - 265V
	Supply Current	0.5A
Output Specifications	Voltage Range	5.7 - 6.3V
	Maximum Current	2A Max
Temperature	In Operation	0-40°C

AC Adapter Dimensions:



**** Note: the polarity of the DC jack becomes "hot".***



3. Installation

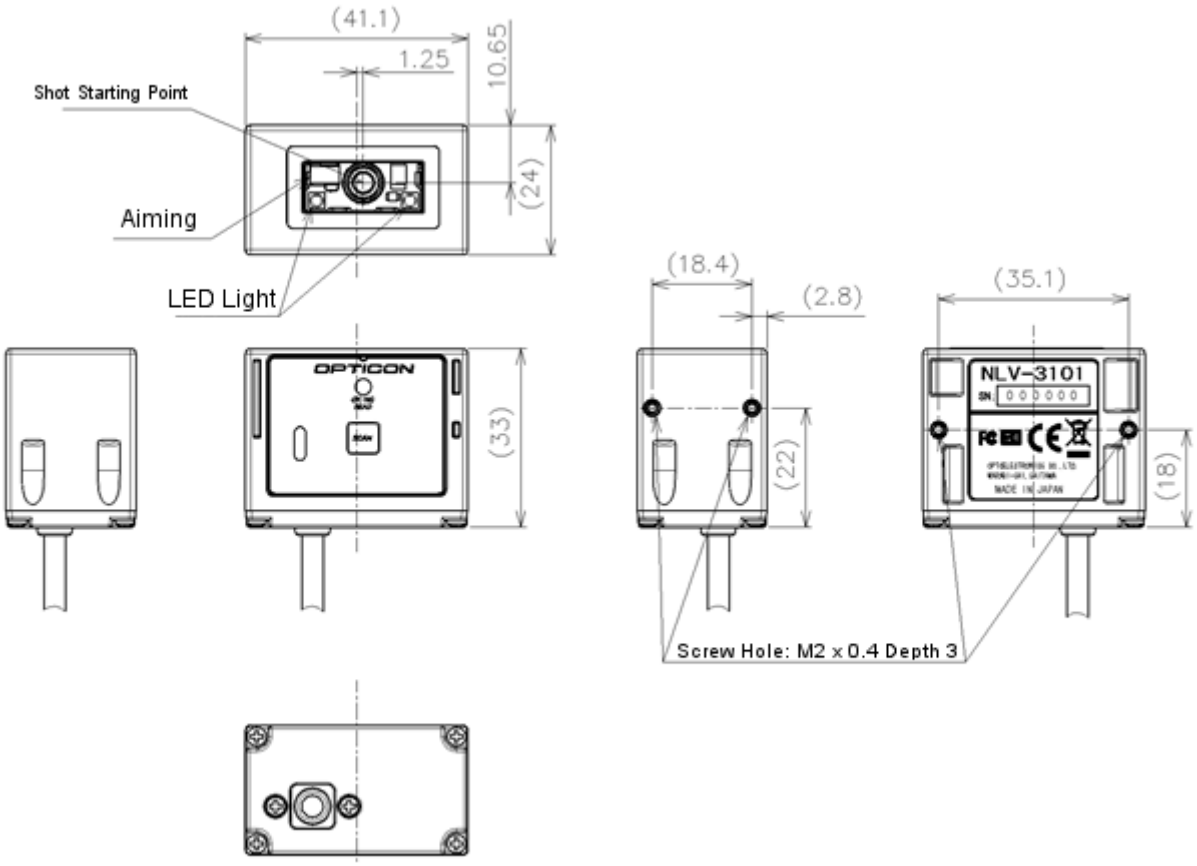
This chapter contains:

3.1. Scanner Installation

The Scanner Installation process is described in detail below:

・When installing, use the screw holes located on the back or side of the device.
・Be sure to not drive screws past the recommended insertion depth.
・The device's mounting surface comes with built-in impact resistance, however due to the NLV3101's particular optical system and body, a direct blow may cause the system to malfunction.

Installing via Back or Side:
Recommended Screw Type: M2
Pressure Torque- less than 20cN・m
Screw Depth- 3.0mm on the installation-side



・External Dimensions:
33.0 (W) x 41.1 (D) x 24.0 (H) mm
・Total Weight:
30 grams (cables not included)
・Cable Length:
1.5m

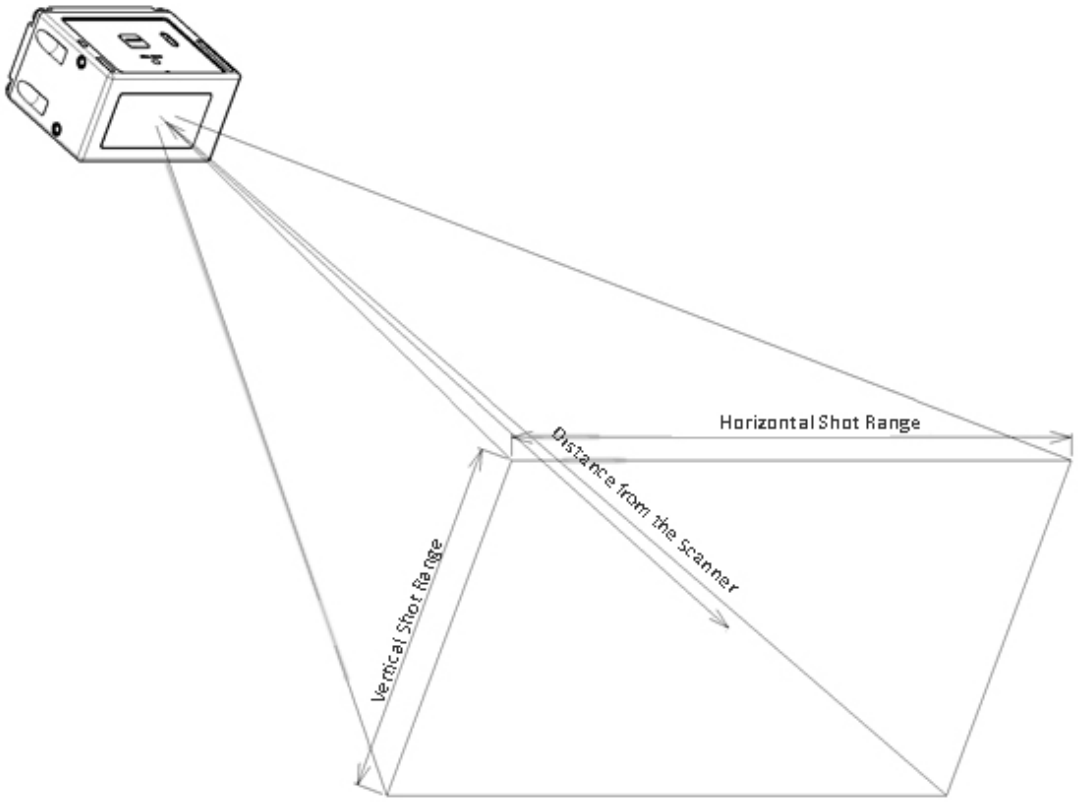
**** Download 3D CAD data from the Opticon homepage:***
http://www.opticonusa.com

3.2. Scan Imaging Range

This section explains in detail the scan imaging range and light path.

3.2.1. Imaging Range

The NLV3101's imaging range is explained in the figure below. When installing the frame, make sure to prepare a large open space.



**** Imaging range specifications are ±5% the below values.***

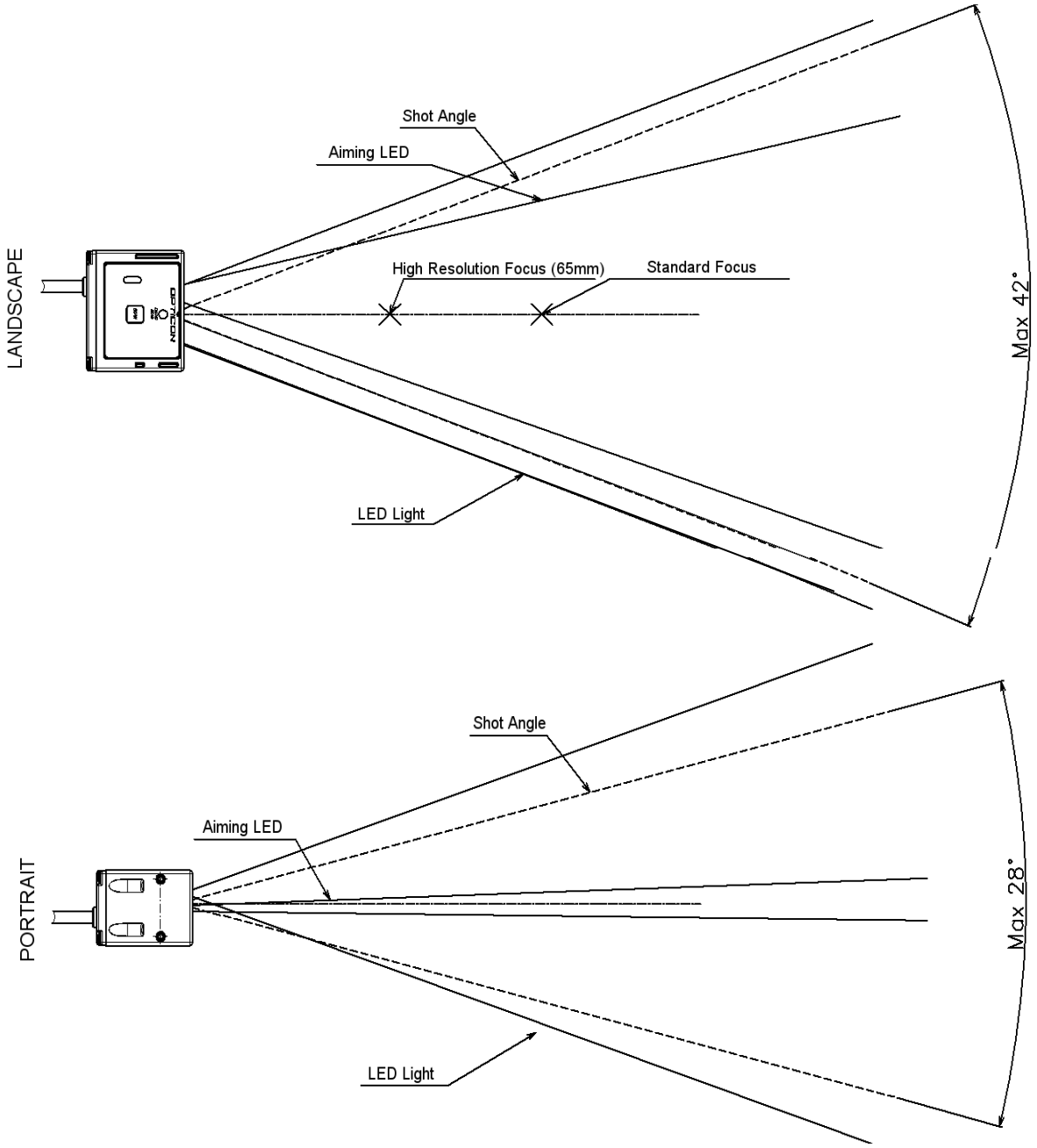
Imaging Range:

Distance from Scanner	[mm]	40	60	80	100	125	140	160	180
Horizontal Shot Range	[mm]	30	37	59	74	93	104	118	133
Vertical Shot Range	[mm]	19	24	38	47	59	66	75	85

**** Confirm an adequate amount of clearance when setting up the frame.***
**** The above refers to the "Scan Imaging Range", not the "Read Range".***
**** Be sure to also confirm an adequate amount of clearance when setting up objects to be scanned.***

3.2.2. Light Path

When installing the NLV3101, make sure to procure a space large enough to account for the imaging range, LED light area, and LED aiming functions. When installing the scan window, confirm that there is a large enough opening range as described in light path in the below figures:



**** Be sure to capture images in the actual environment that they are taken in. Images may be confirmed via the "Universal Menu Tool 2D".***

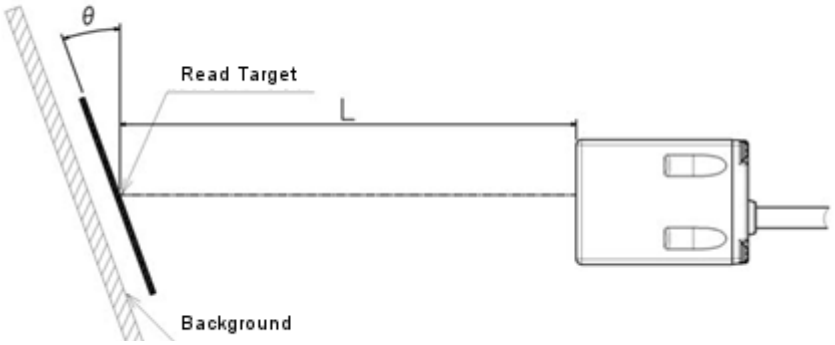
3.3. Placement and Reading Media

Placing the scan target in a fixed position creates a condition in which specularity will more likely occur from the LED and external light sources.

3.3.1. LED Reflected Light

Using Reflective Labels:
Specularity may occur when using highly reflective labels.

Counter-Measure:
Attaching an angle to the target label may help to avoid reflected light (per the figure below). The condition for specular light being released is dependent on Distance L and Angle θ. Tilt θ set to 15 degrees is recommended; however scanning will become more difficult as the tilt increases.



**** Please do not set up in an environment with reflective surfaces in the background.***

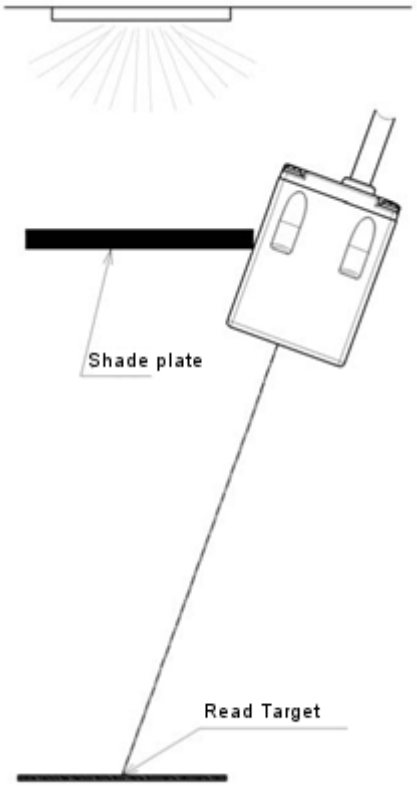
**** Be sure to capture and check pixels within the actual environment. Pixels can be confirmed via the "Universal Menu Tool 2D".***

3.3.2. External Specularity

When using codes displayed on metal labels or liquid crystal displays, take note that strong light sources such as fluorescent or direct sunlight can cause specularity to occur in glass or metallic surfaces.

Counter-Measure:

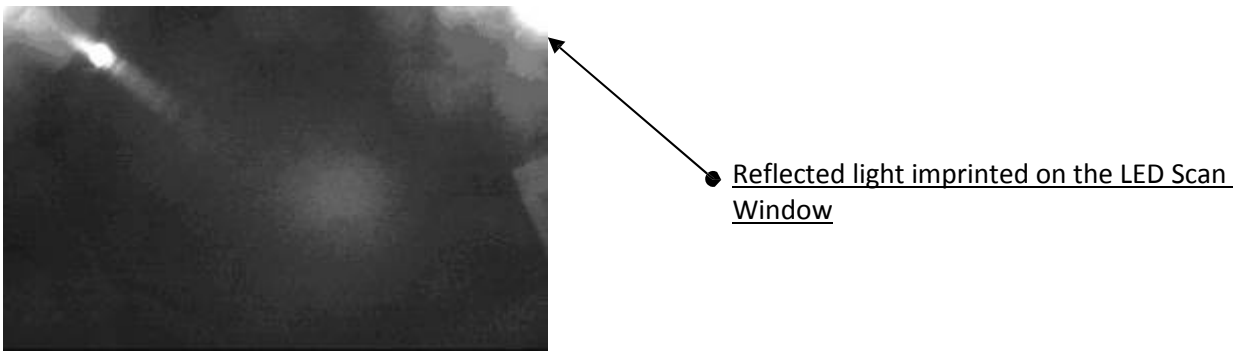
It is highly recommended to set up the read range in a shaded area in order to protect against strong external light sources.



• Be sure to capture and check pixels within the actual environment they are taken in. Pixels can be confirmed via the "Universal Menu Tool 2D".

3.4 Setting the Scan Window

Reflected light or specularity may occur on the LED scan window depending on the type of materials used, or the window's placement. The recommended settings, distance, and angle limitation to prevent occurrences are specified below:



3.4.1. Scan Window Selection

The following items are recommended to prevent lowered pixel contrast due to specularity, dirt, or damage:

・Acrylic cast plate, glass, or extruded plate.

・Choose materials that are transparent/colorless, and that the surface used is flat, smooth and with as little scratches and damage as possible.

・Apply AR Coating (anti-specularity coating) to both sides of the scan window.

・Hard Coat-processed acrylic plate to prevent scratching from field-use on the scan window.

The above acrylic plate is produced by the following manufacturers, produced with enhanced anti-scratch technology with no harmful side effects to the NLV3101's optics:

Nitto Jushi Kogyo
Cralex Precision Plate
Mitsubishi Rayon Co., Ltd.
Aqualite, etc.

3.4.2. External Specularity

The distance and angle when installing the scan window have limitations placed on them in order to help prevent specularity. Be sure to perform installation according to specifications of the below figure:

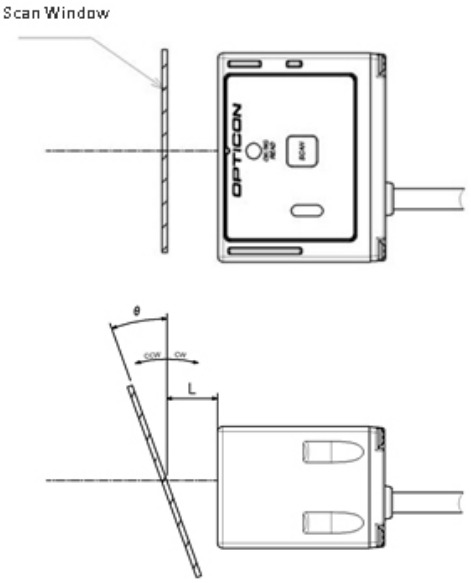


Figure 1: Scan Window Distance and Angle

The recommended install positions for both “Double-Sided AR Coating” and “NO AR Coating” are described below:

Measurement Conditions:
Scan Window: 1mm acrylic panel
Conditions: In a darkly lit room with no light sources or reflective materials, visually confirm reflections that appear when taking images.

Double-Sided AR Coating:

L	[mm]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0
θ_{CW}	[deg]	0°	≧0°	≧0°	≧25° ≦5°	≧30°	-	-	-	-	-	-	-	-	-
θ_{CCW}	[deg]	0°	≧0°	≧0°	≧0°	≧5°	≧10°	≧10°	≧20°	≧20°	≧20°	≧20°	≧20°	≧20°	≧20°

NO AR Coating:

L	[mm]	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	6.0	7.0	8.0	9.0	10.0
θ_{CW}	[deg]	0°	0°	-	-	-	-	-	-	-	-	-	-	-	-
θ_{CCW}	[deg]	0°	≧0°	≧10°	≧15°	≧20°	≧20°	-	-	-	-	-	-	-	-

**** Recommended: L=1mm, ϑ=0°***
**** Due to the size intolerance of the installation hole for the gap between the device and the scan window, more than 1mm clearance is recommended.***
**** Because the above does not take into consideration external light sources, AR coating is also highly recommended.***
**** Please confirm the above via device-captured pixel data.***

4. Function Settings/Storing Procedure

This chapter contains:

4.1. Menu Barcodes

The various functions of the NLV3101 are fully customizable, and may be set by reading menu barcodes. These are displayed by installing Opticon's specified font, and allow for scanning without depending upon settings.

The general flow is described below:

1. Read the Start Menu Label "ZZ".

The device changes to Menu Mode.

↓

2. Select the item you would like to change the settings for, and read the menu label for that item.

When choosing multiple items it is possible to successively read menu labels.

↓

3. Lastly, read the Finish Menu Label "ZZ".

Settings for labels read in Menu Mode are stored as non-volatile memory.

・Menu barcodes are distinguished by a 5-character ID code.

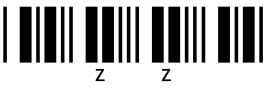
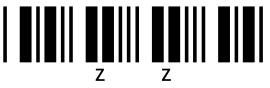
・Menu barcodes are encoded according to specifications set by Opticon. There is no confusion between scanned labels during operation.

Example: Returning to default settings and disabling the AC Adapter plug-in buzzer (ref. 7.1.3.)

Menu Code	Description	1D Menu Code
ZZ	Menu Mode Start/Finish	
BAP	Return to Default Settings	
GD	Disable the AC Adapter Plug In Buzzer	
ZZ	Menu Mode Start/Finish	

Settings are also configurable via inputting numerical values, as is shown in the table below:

Example: Setting the Good Read buzzer frequency to 3500 Hz (ref. 7.1.2.)

Menu Code	Description	1D Menu Code
ZZ	Menu Mode Start/Finish	
DF0	Buzzer Tone (Frequency)	
Q3	Press 3	
Q5	Press 5	
Q0	Press 0	
Q0	Press 0	
ZZ	Menu Mode Start/Finish	

4.2. 2D Menu Codes

With 2D Menu Codes, it is possible to perform multiple settings within a single code. These settings may be changed via the same code by inputting the following data format into the 2D code directly:

Data Format:

@MENU_OPTO@ZZ@SettingCommand1@SettingCommand2@ZZ@OPTO_UNEM@

"@MENU_POTO" (Start Key)	
"@" (Separator)	
"ZZ" (Start Key)	
"@" (Separator) "Non-specified Command 1" (ex. U2)	← Multiple settings possible.
"@" (Separator)	
"ZZ" (Finish Key)	
"@" (Separator)	
"OTPO_UNEM@" (Stop Key)	

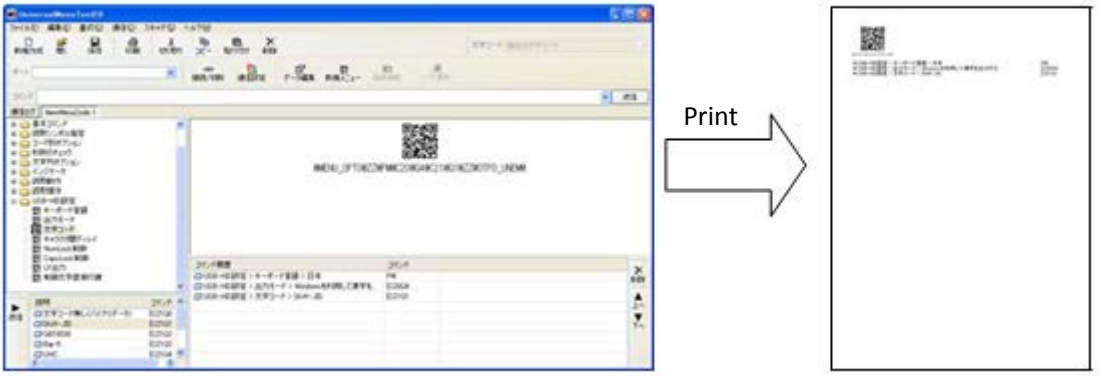
・The Fixed String Option (ref. 5.3) is unable to change settings via 2D menu codes, due to the necessity of reading barcodes of suitable length after first scanning the Fixed String Menu.

**** For other special-case menus such as the above, please use menu barcodes instead.***

・The format is different for “Data Edit Programing” 2D menu codes. For details see section 9.3.2.

・Traditionally-used 2D codes (PDF417, QR Code, etc.) may be utilized “as-is” with 2D menu codes.

2D menu codes may be created via the “Universal Menu Tool 2D”.



Download and install the Universal Menu Tool 2D from the Opticon homepage:

http://www.opticonusa.com

**** For questions regarding product use, please consult the tool’s Help menu.***

2D Menu Code Examples:

・Returning to Default Settings (BAP)

Menu Code	Menu Contents	2D Menu Code
BAP	Return to Default Settings	@MENU_OPTO@ZZ@BAP@ZZ@OTPO_UNEM@

・Returning to Default Settings and disabling the AC Adapter Plug-in Buzzer (BAP) (GD)

Menu Code	Menu Contents	2D Menu Code
BAP	Return to Default Settings	@MENU_OPTO@ZZ@BAP@GD@ZZ@OPTO_UNEM@
GD	Disable the AC Adapter Plug-In Buzzer	

・Setting the Good Read Buzzer Frequency to 3500 Hz (ref. 7.1.2.)

Menu Code	Menu Contents	2D Menu Code
DF0	Buzzer Tone (Frequency)	@MENU_OPTO@ZZ@DF0@Q3@Q5@Q0@Q0@ZZ@OTPO_UNEM@
Q3	# 3	
Q5	# 5	
Q0	# 0	
Q0	# 0	

Disable/Enable 2D Menu Codes:
2D menu codes may be enabled or disabled via commands detailed in the below tables:
**** Caution: It is highly recommended to disable 2D menu codes when not in use.***

Item	Command	Command Description	Default Setting
Enable/Disable2D Multi-Menu Barcode	D1Y	This Enables 2D Multi Menu	o
	D1Z	This Disables 2D Multi Menu Barcodes	

Menu Code	Description	Menu 1D Code
ZZ	Menu Mode Start/Finish	
D1Y	Enables 2D Menu Codes	
D1Z	Disables 2D Menu Codes	
ZZ	Menu Mode Start/Finish	

4.3. Commands

RS-232C and USB-COM interfaces utilize a serial connection in order to perform settings for functions. The command formats are described in detail below:

4.3.1. Command Formats

Commands are executed by way of packet units, ranging from a command format-defined Header to Terminator.

Command Header *2	Command ID *1		Command Terminator *2
<ESC> (0x0B)	N/A	1-2 char. Command (ASCII)	<CR> (0x0D)
	[(0x5B)]	3 char. Command (ASCII)	
	[(0x5D)]	4 char. Command (ASCII)	

* 1. Command IDs outside of single commands (1 character) are able to transmit a sequence of multiple IDs.
* 2. It is possible to create command header/terminator combinations with <STX> (0x02) and <ETX> (0x03), respectively.

Input Examples:

1 Character Command: <Esc> Δ <CR>
2 Character Command: <Esc> ΔΔ <CR>
3 Character Command: <Esc> [ΔΔΔ <CR>
4 Character Command: <Esc>] ΔΔΔΔ <CR>
2 and 3 Character Commands in Sequence: <Esc>ΔΔ [ΔΔΔ <CR>

4.3.2. Using Commands: Precautionary Items

This section describes several points to keep in mind when using the NLV3101's commands.

・It is not possible to transmit more than one multiple-command packet sequence at a time.

・If handshaking is set to either "BUSY/READ" or "MODEM", the RTS output becomes "BUSY". Because of this, it is recommended to refer to this signal and watch for the correct timing.

・If the "Save" command is not transmitted, functions that are set via commands will not be stored as non-volatile memory. Non-volatile memory is stored by turning off, and then restarting the device. Use the "Z2" command to record items set by other commands as non-volatile memory.

・The maximum size of the command packet buffer is 1000 characters. Note that due to missing sections of the command, functions will not operate properly if more than the former is transmitted.

・Due to the possibility of controls becoming disabled, the below interface-related command settings will not be immediately reflected after transmission; only after the non-volatile memory has been inputted via "Z2".

-Baud Rate Settings

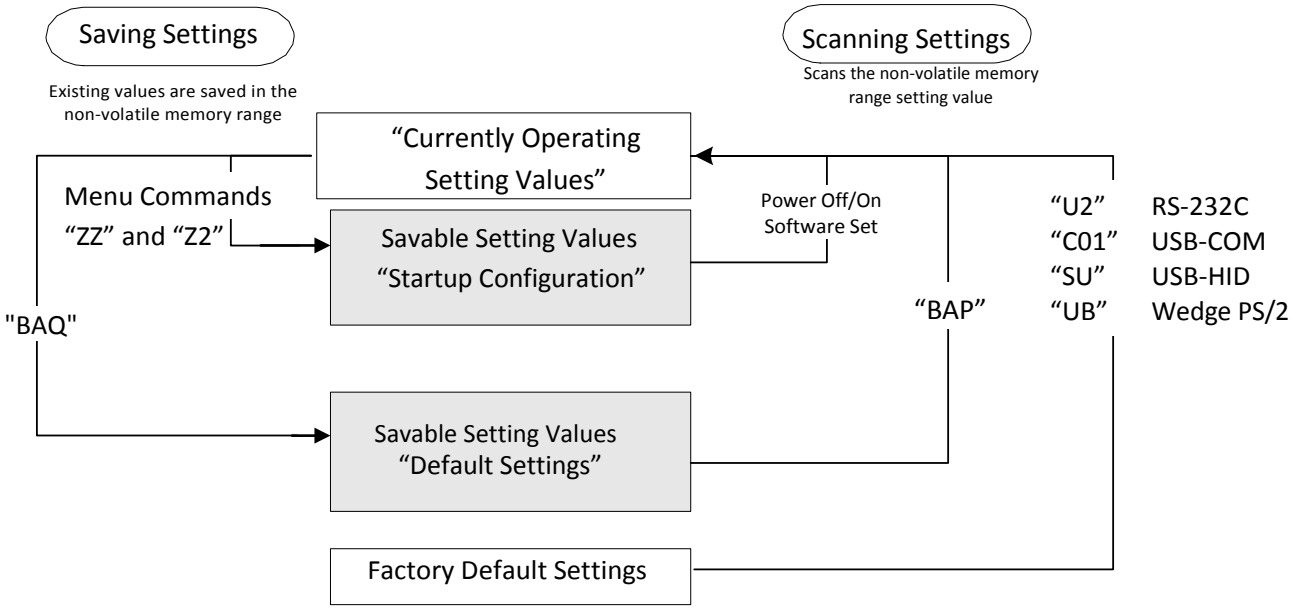
-Data/Parity/Stop Bits, etc.

・After completion, items set via command settings are stored as non-volatile memory when performing setting functions via 2D or menu barcodes (ref. 3.1, 3.2).

4.4. Default Settings & Saving Settings

The flow of setting the NLV3101 is explained in the figure below:

The Input/Read Transition for Setting Values:



**** Settings via Menu Barcodes or 2D Menu Codes will always be saved via the "Startup Settings".***

Currently Operating Setting Values:
These are the current valid setting values.
(This includes settings that are added when the device is turned on)

Startup Settings:
These are setting values read when the device is booting up.

Custom Default Settings:
These user-customizable settings are available during the initial system startup
**** CAUTION: By setting "BAQ", the default settings will overwrite any current setting values.***

Factory Default Settings:
The factory default settings are the same as those specified in this integration guide.

4.4.1. Default Settings

The user may switch the device to its default settings by utilizing the methods below.

Item	Command	Interface	Description	Notes
Factory Default Settings	U2	RS-232C	Returns RS-232C to its default setting	
	C01	USB-COM	Returns the USB-COM to its default setting	
	SU	USB-HID	Returns USB-HID to its default setting	
	UB	Wedge PS/2	Returns Wedge PS/2 to its default setting	
Custom Default Settings	BAP	Shared Interfaces	Returns to its default setting	

4.4.2. Saving Settings

Current Active Parameters may be written into both the startup and default settings.

Item	Command	Description	Notes
Saving Settings	Z2	Writes currently active setting values into the startup settings	Commands Only
	BAQ	Writes currently active setting values into the default settings	

**** When updating the firmware, both the default and startup settings will be reset to their original state.***

**** Options similar to setting the Data Transmit Rate (Baud Rate) are available after saved settings are transmitted.***

4.5. General Commands

This section explains in detail the general commands available for the NLV3101.

4.5.1. Command Trigger

It is possible to Start/Finish scanning operations via command inputs.

Item	Command	Description	Notes
Command Trigger	Z	This activates scanning	Commands Only
	Y	This completes scanning	

**** When the valid read time is set to 0 seconds (Default Settings), the Z command's valid read time extends indefinitely until the Y command finishes receiving.***

4.5.2. Scan Rate Test Mode

Once the below commands are received, the Scan Rate Test Mode will perform a series of scans, outputting data in the following format in ten-second intervals:

***** 7/10 *****

01242231317011350891

"01242231317011350891" is scanned data, and represents 7 successful scans for every 10 attempts.

Receive the below command to complete the Scan Rate Test Mode:

Item	Command	Description	Notes
Scan Rate Test Mode	XU8	Start/Finish Scan Rate Test Mode	Disables Save Command "Z2"

4.5.3. External Trigger

The High/Low activity of the External Trigger signal is selectable.

Item	Command	Description	Notes
External Trigger	YA	External Trigger Signal High (Active)	o
	YB	External Trigger Signal Low (Active)	

**** Please refer to the Loose Wire RS-232C Interface section for details regarding the External Trigger Signal Circuit.***

4.5.4. Diagnostics

The primary function of the below commands is to diagnose the state of the current device settings.

Item	Command	Description	Notes
Diagnostics	Z1	Transmits the software version	
	Z3	Transmits setting contents	
	EAR	Transmits changes to the default settings	
	ZA	Transmits ASCII-printable strings	
	YV	Transmits ASCII-controlled strings	

**** The "Z3" command, which transmits setting data, may change its content when updating firmware.***

4.5.5. ACK/NAK Post-Serial Commands

It is possible to transmit both <ACK> (0x06) after an enabled serial command, and <NAK> (0x15) after a disabled serial command. With this, it becomes possible to whether a command is enabled or disabled.

Item	Command	Description	Default Setting
Command's ACK/NAK	WC	Enables receiving of ACK/NAK after Serial Commands	
	WD	Disables receiving of ACK/NAK after Serial Commands	o

4.5.6. Indicators

The settings of the following commands are specified below (ref. 9.1.1. Buzzer Volume), (ref. 9.2.1. Status LED Blinking Period), and (ref. 9.3.2. Menu Barcode Setting Indicator).

Item	Command	Description	Notes
Buzzer	B	Activates the confirmation buzzer	Commands only
	E	Activates the error buzzer	
Status LED	L	Activates “Confirm” Status LED	
	N	Activates “Error” Status LED	

4.5.7. Numpad Input Commands

Following numpad-settable commands, the below commands are inputted via user-specified formats.

Item	Command	Description	Notes
Direct Numpad Input	Q0	# 0	Inputted following user-specified formats
	Q1	# 1	
	Q2	# 2	
	Q3	# 3	
	Q4	# 4	
	Q5	# 5	
	Q6	# 6	
	Q7	# 7	
	Q8	# 8	
	Q9	# 9	

5. Interface

This chapter contains:

5.1. RS-232C

This section describes in detail the RS-232C interface.

5.1.1. Overview (RS-232C)

The table below displays a general overview of the RS-232C interface.

Item	Description	Default Setting
Transfer Rate	300-115200 bps	9600bps
Data	7/8 bit	8bit
Parity Bit	None/Even/Odd	None
Stop Bit	1/2 bit	1 bit
Handshaking	None, Busy/Ready, Modem, ACK/NAK	N/A
Other Options	Flow Control Intercharacter Delay (RS-232C)	

5.1.2. Transfer Rate

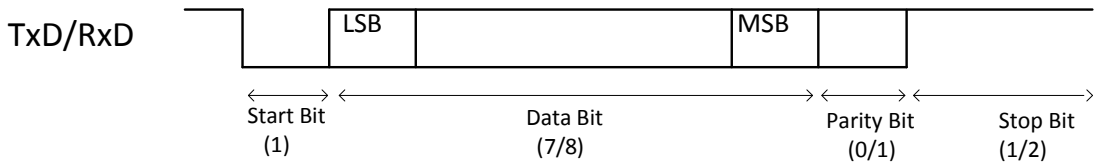
The Transfer Rate (Baud Rate) refers to the rate at which bits travel between both the device and host computer. The scanner and host must be set at the same baud rate.

The baud rate may be set via the below menus/commands:
The below command-based settings are used in conjunction with "Z2" (the command which writes non-volatile memory).

Item	Command	Description	Default Setting	Notes
Baud Rate Settings	K1	300 bps		"Z2" enabled after transmit
	K2	600 bps		"Z2" enabled after transmit
	K3	1200 bps		"Z2" enabled after transmit
	K4	2400 bps		"Z2" enabled after transmit
	K5	4800 bps		"Z2" enabled after transmit
	K6	9600 bps	o	"Z2" enabled after transmit
	K7	19200 bps		"Z2" enabled after transmit
	K8	38400 bps		"Z2" enabled after transmit
	K9	57600 bps		"Z2" enabled after transmit
	SZ	115200 bps		"Z2" enabled after transmit

5.1.3. Character Format

Data characters are transmitted via the formats contained in the table below. Parity bits are added to each character, with odd parity being “ODD”, and even parity being “EVEN”.



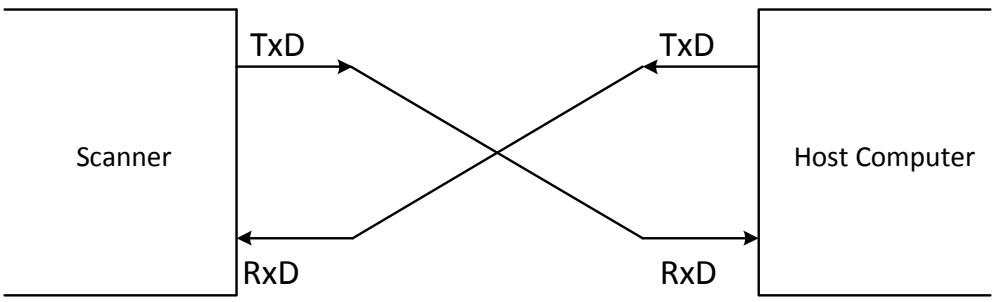
The data, parity, and stop bit settings may be edited by entering the below commands/menus.
The below command-based settings are used in conjunction with "Z2".

Item	Command	Description	Default Setting	Notes
Data Bit	L0	7 Data Bits		"Z2" enabled after transmission
	L1	8 Data Bits	○	"Z2" enabled after transmission
Parity Bit	L2	No Parity Bits	○	"Z2" enabled after transmission
	L3	EVEN Parity		"Z2" enabled after transmission
	L4	ODD Parity		"Z2" enabled after transmission
Stop Bit	L5	1 Stop Bit	○	"Z2" enabled after transmission
	L6	2 Stop Bits		"Z2" enabled after transmission

5.1.4. Handshaking
The Baud Rate control type is set via the below commands/menus.
The below command-based settings are used in conjunction with "Z2".

Item	Command	Description	Default Setting	Notes
Handshaking	P0	No Controls (No Handshaking)	○	"Z2" enabled after transmission
	P1	BUSY/READY Controls		"Z2" enabled after transmission
	P2	MODEM Controls		"Z2" enabled after transmission
	P3	ACK/NAK Controls		"Z2" enabled after transmission
	P4	ACK/NAK NO RESPONSE		"Z2" enabled after transmission

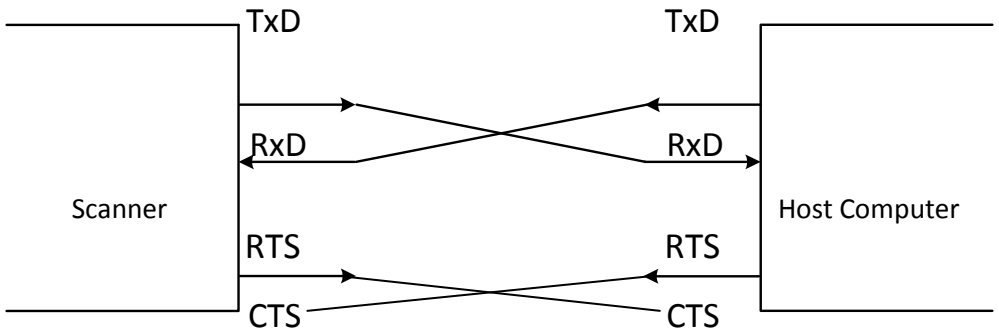
A) No Controls (No Handshaking)
With this setting, the scanner may transmit without connecting to the host.
**** There are times with this setting where commands from the host may not be properly received.***



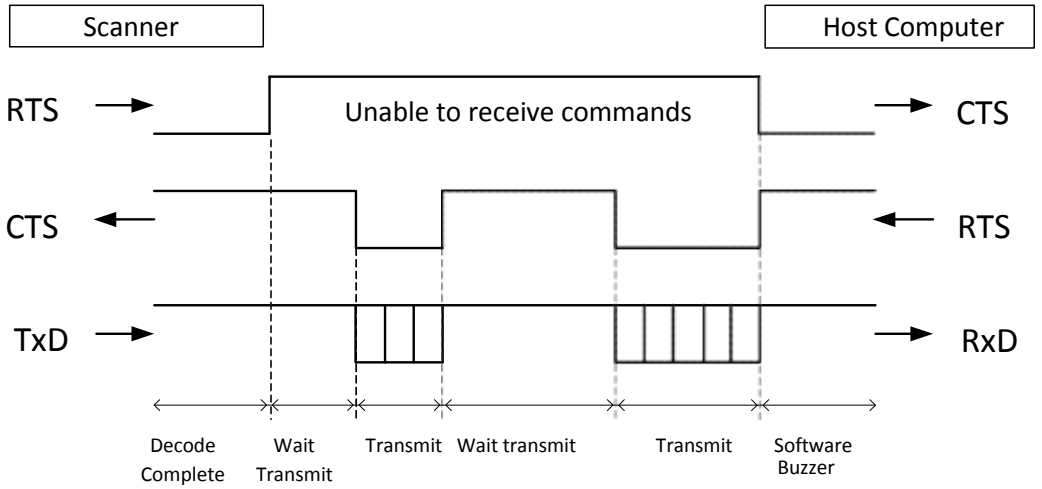
B) BUSY/READY Controls

With this setting, both the host computer and the NLV3101 may utilize the RTS line to relay to each other their “BUSY/READY” state.

By connecting the device and host computer as shown in the below figure, both devices may catch the others' state via the CTS line.

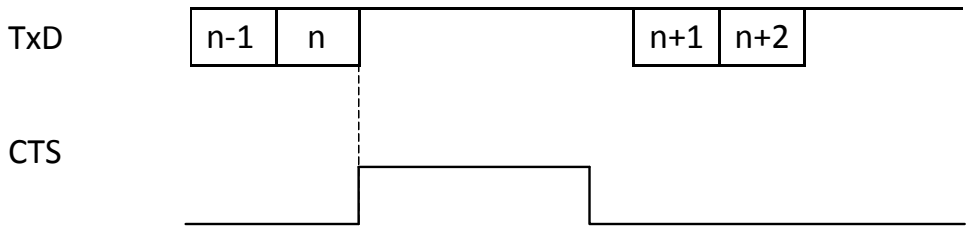


During transmission, receiving, and any other action outside of menu processing, the device will constantly have the RTS line set to “ON” (receiving possible). The NLV3101 checks the CTS line before transmitting data: if the device is set to ON, transmitting commences; if OFF it waits until a specified time, wherein it then returns to the ON state. If the CTS line is still set to OFF at the specified time, the action will end automatically due to abnormal status.



CTS, TxD Signal Timing:

If the CTS line (Host-side RTS signal) is set to OFF while the TxD signal is still in transmission, 1-2 will be transmitted before resetting to Standby. Also, characters are transmitted once they’ve been caught by the CTS signal.

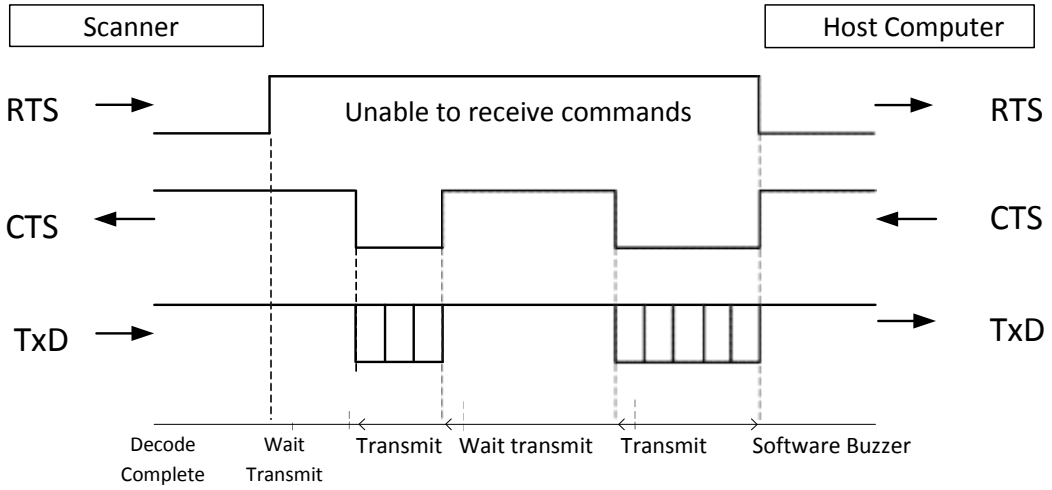


The CTS Wait Time is set via the below menu/commands. These command-based settings are used in conjunction with "Z2".

Item	Command	Description	Default Setting	Notes
CTS Wait Time	I0	Unlimited flow control time out	o	"Z2" enabled after transmission
	I1	Flow control time out 100 ms		"Z2" enabled after transmission
	I2	Flow control time out 200 ms		"Z2" enabled after transmission
	I3	Flow control time out 400 ms		"Z2" enabled after transmission

C) Modem Controls

RTS immediately sets to OFF when voltage is fed into the device, and RTS switches to ON when the device wants to send data to the host. When the host becomes able to receive data, CTS switches to ON automatically. The device is able to transmit data as long as CTS is ON. However, RTS switches to OFF when all data is finished transmitting (the host will then switch the device CTS to OFF in response). When the RTS is ON, if the CTS line does not switch to ON during the fixed setting period, an error buzzer will activate and the transmission will end abruptly.



D) ACK/NAK Controls

The device waits for a response from the host computer after transmitting data, and the system responds with the following actions:

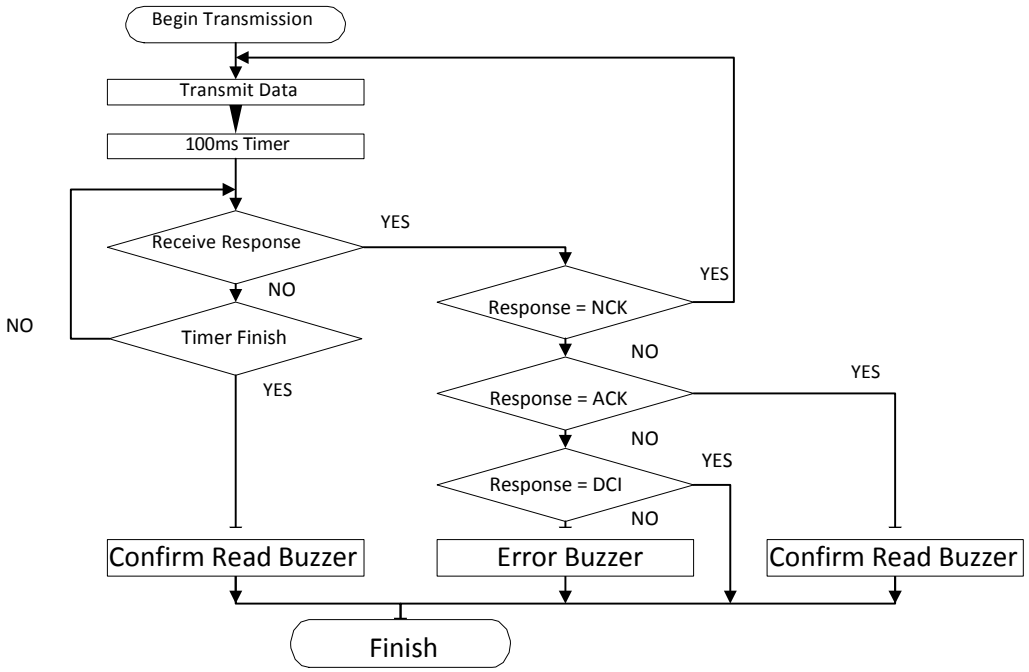
ACK Response/Receive (ASCII: 0x06) ⇒	A scan confirmation buzzer will activate and the device will finish transmitting.
NAK Response/Receive (ASCII: 0x15) ⇒	The device will retransmit data.
DC1 Response/Receive (ASCII: 0x11) ⇒	The device will finish transmitting without either a confirmation or error Buzzer.
Time Out ⇒	If there is no response within 1 second from the host, the device will activate an error buzzer and stop transmitting.

E) ACK/NAK No Response

If there is no response from the host within 100ms, the device will determine that the data has been properly received.

ACK Response/Receive (ASCII: 0x06) ⇒	The device will finish the transmission by activating a confirmation buzzer.
NAK Response/Receive (ASCII: 0x15) ⇒	The device will retransmit data.
DC1 Response/Receive (ASCII: 0x11) ⇒	The device will finish the transmission without either a confirmation or error buzzer.
Time Out ⇒	If there is no response within 100 second from the host, the device will activate a confirmation buzzer and end the transmission.

[ACK/NAK No Response Flowchart]



5.1.5. Intercharacter Delay (RS-232C)
The intercharacter delay refers to the establishment of a setting-enabled time delay after each transmitted character. This may be utilized when the host is not supporting the flow control, and not processing received data. The intercharacter delay is configured via the below commands:

Item	Command	Description	Default Setting	Notes
Intercharacter Delay	KA	No delay	o	"Z2" enabled after transmission
	KB	20ms delay		"Z2" enabled after transmission
	KC	50ms delay		"Z2" enabled after transmission
	KD	100ms delay		"Z2" enabled after transmission

5.1.6. Troubleshooting (RS-232C)
Troubleshooting information for problems occurring with the RS-232C is shown below:

Case	Solution
Cannot Connect: No response from transmitted commands	・Check the Communication settings (transfer rate, character format, etc.) ・After making setting changes, transmit Z2. A majority of functions will not respond unless the Z2 Command is transmitted ・Check the Handshaking settings
Characters are garbled	・Check the Communication settings (transfer rate, character format, etc.) ・Set the host computer’s processing rate and intercharacter delay settings ・Check if the Scan Code and Communication Tool's character code is matching
The line is doubled	・Check the communication tool line feed settings

5.2. USB-COM

This section describes in detail the USB-COM interface.

5.2.1. Overview (USB-COM)

The table below displays general information regarding the USB-COM interface.

Item	Description	Notes
Transfer Rate	Full Speed USB 2.0 (FS Mode)	
Required Voltage	500mA	Actual consumption may vary
Vendor ID	065A	
Product ID	A002	
Available OS Platforms	Microsoft™ Windows 2000 / XP/ Vista / 7/ 8	32/64 bit
Other	CDC-ACM	

5.2.2. Plug-In Process (USB driver)

The USB driver is necessary when connecting to the host computer via USB-COM interface.
Download the USB driver from Opticon's homepage http://www.opticonusa.com.

5.2.3. Confirm Connection

Confirm the USB-COM connection via the following list:

**** Note: this example utilizes Windows XP***

1) Install the USB driver
2) Connect the scanner to the PC
3) Right-click on "My Computer", then select "Properties"
4) From the "Hardware" tab, click the "Device Manager" button
5) Open "Port" to confirm the scanner COM number

5.2.4. Connection Process

The process for connecting to the host computer is explained below:

1) Activate the Emulator (serial communication tool)
2) Connect via the confirmed COM port from step 5 from section 5.2.3

**** The above figure displays the Universal Menu Tool 2D***

5.2.5. Troubleshooting (USB-COM)
Troubleshooting information for problems which occur with the USB-COM interface is show below:

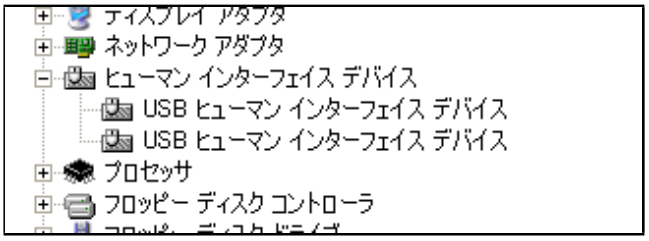
Case	Solution
Not recognized by the PC: (The device manager does not appear in the scanner)	・Check whether the USB is connected correctly ・Check whether the USB is activating normally ・If using such wireless connections such as Bluetooth, attempt a reconnection ・Check the USB port. If using a laptop or hub the voltage may be insufficient ・Unplug device from the USB port, and wait a short while before plugging again ・Try plugging into a different port
Even if the scan is successful, an error buzzer activates and the device does not output	In addition to the above, ・Open the COM port with a communication tool
Unable to connect (not able to open the COM port)	・Check the COM port number via the device manager (See section 5.2.3 for details on activation) ・Close the tool once, and then reopen. Solution may vary depending on the tool being used (Refer to the Help tool or User's Manual) ・Restart your computer.
Characters are garbled	・Check if the scan code and communication tool's character codes are matching
The line is doubled	・Check the communication tool line feed settings

5.2.6. Overview (USB-HID, Wedge PS/2)
The table below displays a general overview of the USB-HID, Wedge PS/2 Interfaces:

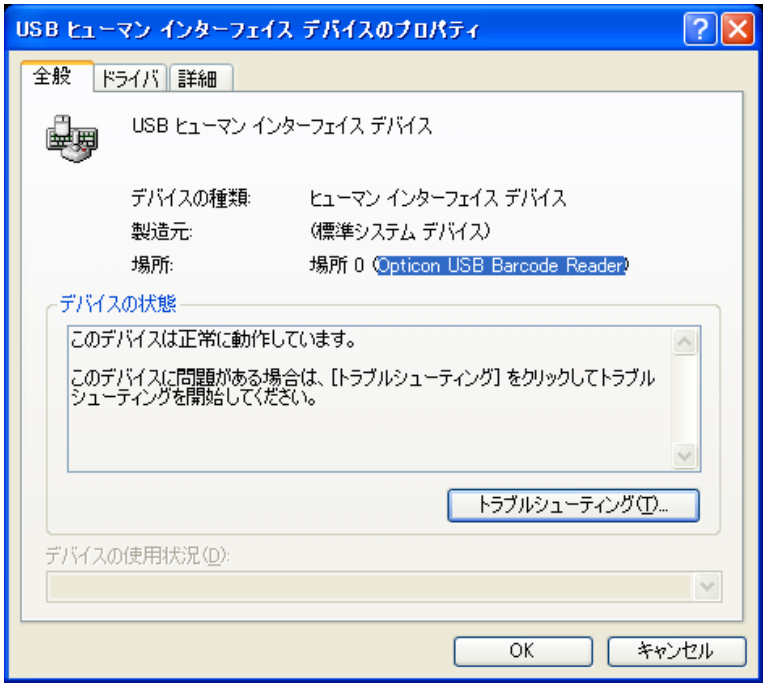
Interface	Item	Description	Notes
USB-HID	Voltage Requirements	500mA	Varies from actual voltage consumption
	Vendor ID	065A	
	Product ID	A002	
	Control Data Transmit Interval	4ms (minimum value)	The intercharacter delay is changeable via the menu. However, it cannot be lowered than the minimum value.
Wedge PS/2	Control Data Transmit Interval	10ms	The intercharacter delay is changeable via the menu
	Keyboard Use	Use or don't use the keyboard (only PC/AT Wedge supported)	
Shared Interfaces	Keyboard Languages	US, UK, German, French, French Macintosh, Italian, Spanish, Portuguese, Swiss (French), Swiss (German), Dutch, Belgian, Swedish, Finnish, Danish, Norwegian, Japanese, Czech	
	Output Mode	Output All, ASCII Output, Character Output Mode 1, Character Output Mode 2	
	Character Codes	None, Shift JIS, GB18030 (Chinese), Big-5 (Taiwanese), UHC (Korean), UTF-8, UTF-16	
	Other Options	NumLock, CapsLock Controls Intercharacter Delay LF Output Controls, Direct Character Input Controls	

5.2.7. Confirming Connection (USB-HID)
Confirm the connection of the USB-HID interface following the steps below:
(Details regarding the Wedge PS/2 interface are explained in a subsequent section)
**** This example utilizes Windows XP***

1) Connect the device to the host computer
2) Right-click on “My Computer”, then select “Properties”
3) From the “Hardware” tab, click the “Device Manager” button
4) Open “Human Interface Device”, then double-click “USB Human Interface Device”
(When using a USB mouse or keyboard several devices will be displayed as in the below figure. Choose from any on the list)



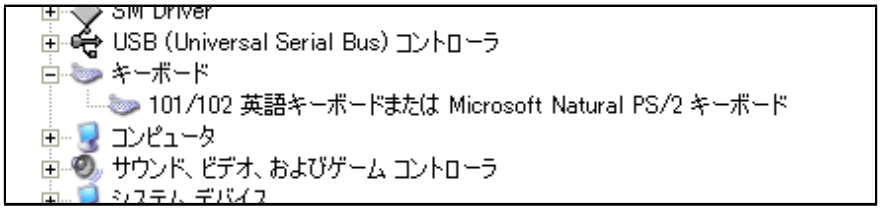
5) Confirm in the “Location” tab that “Opticon USB Barcode Reader” is highlighted.



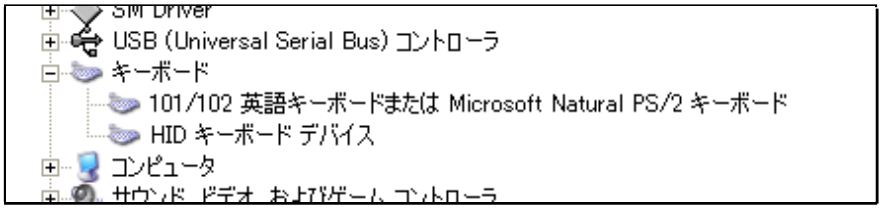
It is possible to check whether a connection is possible or not with any type aside from Wedge PS/2.

**** This example utilizes Windows XP.***

1) Connect the device to the host computer
2) Right click on “My Computer” and then select “Properties”
3) From the “Hardware” tab, click the “Device Manager” button
4) Open the “Keyboard” tab. Connection should be possible if the PS/2 keyboard is confirmed according to the below figure



The above is also possible when using a USB-HID keyboard.



5.2.8. Settings Tutorial

Settings must be properly implemented in order to produce the desired output result. Within this section, main setting items will be explained in list-order with representative examples.

1) Keyboard Language

The layout of the keyboard may change depending on your country/region. Because of this, it is important to set the keyboard language properly. Unwanted values will be outputted if incompatible settings are entered.

Keyboard Languages	2D Menu Code
USA Default Settings	 @MENU_OPTO@ZZ@KE@ZZ@OTPO_UNEM@

2) Setting Character Codes

This sets which character code will read the scan label. This setting is needed for using characters containing multiple bytes (such as Chinese). When not including the above characters, no character code is needed. Following these settings, the scanner processes special byte strings as multiple byte lines when they are received/captured.

Character Code	2D Menu Code
Default Setting	 @MENU_OPTO@ZZ@C21@Q0@ZZ@OTPO_UNEM@
UTF-8	 @MENU_OPTO@ZZ@C21@Q5@ZZ@OTPO_UNEM@

3) Other Settings

Check the keyboard settings, particularly when using the Wedge PS/2 interface.

5.2.9. Keyboard Languages

The Keyboard Languages can be set from the host computer while connected to the scanner. Keyboard alignment will vary depending on the country/language set. Improper output results if the necessary corresponding settings are not in place.

Item	Command	Description	Default Setting
Keyboard Languages	PM	Japanese	
	KE	US	o
	KV	UK	
	KG	German	
	KI	French	
	BAO	French Macintosh	
	OW	Italian	
	KJ	Spanish	
	PH	Portuguese	
	PL	Swiss (French)	
	PK	Swiss (German)	
	PI	Dutch	
	PJ	Belgian	
	PD	Swedish	
	PG	Finish	
	KK	Danish	
	PE	Norwegian	
	WF	Czech	
	E76	Chinese	
	E77	Korean	
	E78	Taiwanese	

5.2.10. Character Codes

This mode sets the character codes used by the NLV3101. When a code is read, it is cross-checked with the resulting character code range, and then determines the kanji character (or notation) in a matching bind row. Also, it is very important that the chosen settings and readable codes, as well as codes used by the host computer's application are all matching.

Item	Command		Description	Default Setting
Character Code	C21	NO	No Character Code is used (handled as binary data)	o
		Q0		
		Q1	Shift JIS	
		Q2	GB18030	
		Q3	Big-5	
		Q4	UHC	
		Q5	UTF-8	
		Q6	UTF-16	
		Q7	UTF-16LE	
		Q8	UTF-16BE	

5.2.11. Output Mode

This mode sets the handling of output values greater than 0 x 80.

Item	Command		Description	Default Setting
Output Mode	C20	Nothing	The full value is outputted	o
		Q0		
		Q1	Outputs ASCII codes only	
		Q2	No kanji is outputted	
		Q3	Kanji Output Mode (1)	
		Q4	Kanji Output Mode (2)	

5.2.12. Intercharacter Delay

The Intercharacter delay is used to adjust the system's data transfer. If the rate is too fast, the system will become unable to handle and receive any character data. Be sure to adjust the delay to match with that of the system.

Item	Command	Description	USB-HID Default Setting	Wedge PS/2 Default Setting
Intercharacter Delay	LA	No Delay	o	
	LB	Delay = 1		
	LC	Delay = 2		o
	LD	Delay = 3		
	LE	Delay = 4		
	LF	Delay = 5		
	LG	Delay = 6		
	LH	Delay = 7		
	LI	Delay = 8		
	LJ	Delay = 9		
	LK	Delay = 10		
	E80	Delay = 11		
	E81	Delay = 12		
	E82	Delay = 13		
	E83	Delay = 14		
	E84	Delay = 15		
	E85	Delay = 16		
	E86	Delay = 17		
	E87	Delay = 18		
	E88	Delay = 19		
	E89	Delay = 20		

**** Defers from similarly-named items on the RS-232C Interface.***

5.2.13. NumLock/CapsLock Controls
Sets the control processes for NumLock and CapsLock during data transfers.

Item	Command	Description	Default Setting	Notes
NumLock Controls	RN	Does not use the Numpad pad	o	
	RM	Uses the Numpad		
	/A	Adheres to the current settings		* 1
CapsLock Controls	5Q	No controls	o	
	8A	Inverts the current settings		* 2
	2U	CapsLock controls automatically		* 3

1 The Numpad is usable only when NumLock is ON
2 When beginning a transmission, the CapsLock is transmitted and inverts its setting. Utilized when the CapsLock function is currently set to ON. When finished transmitting, returns to its original setting.
3 CapsLock is controlled so that the original character string is correctly displayed. When finished transmitting, returns to its original CapsLock setting.

5.2.14. Line Feed (LF) Output Controls
This section describes setting the line feed output for character controls. CR (Carriage Return), LF, or both (CR + LF) are commonly utilized to display line breaks. When setting the "LF Output", the device will convert both the CR and LF line break code when outputting. Thus, when dealing with CR + LF it is necessary to break twice. When setting "No LF Output", break the CR once in order to ignore the LF. However, it will only break when the LF is also breaking.

Item	Command	Description	Default Setting	Notes
LF Output Controls	X14	Outputs the LF		
	X15	No LF output	o	

5.2.15. Direct Input Control Characters
When transmitting control characters, it is possible to set whether or not to allow direct input. If enabled, direct input is possible as long as both the HT (Horizontal Tab) and ESC (Escape) keys are available on the keyboard.

Item	Command		Description	Default Setting
Direct Input Control Characters	C22	Q0	NO direct input	
		Q1	YES direct input	o

Customizable direct-input control characters are indicated when the below settings are enabled:

Control Character	Value	Corresponding Key	Notes
BS	0x08	Backspace	When not enabled, Ctrl + H
HT	0x09	Tab	When not enabled, Ctrl + I
LF	0x0A	Enter	When not enabled, Ctrl + J
CR	0x0D	Enter	When not enabled, Ctrl + M
ESC	0x1B	Escape	When not enabled, Ctrl + [
DEL	0x7F	Delete	When not enabled, Ctrl + Backspace

5.2.16. Keyboard Usage (Wedge PS/2)

The table below explains the steps utilizing the Wedge PS/2 interface only. When the keyboard is not connected directly to computer Wedge “Y”, please set “No keyboard use”. This option is only supported by the PC/AT Wedge.

Item	Command	Description	Default Setting	Notes
Using the Keyboard	KM	YES keyboard use	o	
	KL	NO keyboard use		

5.2.17. Troubleshooting

Troubleshooting information for problems occurring with both the USB-HID and Wedge PS/2 are shown below.

Case	Problem/Solution
Characters are garbled	・Check to see if the Keyboard Language and Output Destination application settings are set correctly ・Check whether Output Mode is set correctly. ・Check whether the keyboard is set to half-em space input. If using a Chinese keyboard, etc. utilize “Alphabet Input” ・If the host's processing rate is not sufficient, input the intercharacter delay ・If control characters are included, check if Ctrl + a is “batting” with the host's shortcut key
The line is doubled	・Customize settings in accordance with systems utilizing LF output controls
Unable to output images	・Images are not outputting correctly

Troubleshooting information for problems occurring with the USB-HID is shown below (details for the Wedge PS/2 will be explained in a later section).

Case	Problem/Solution
・The device manager does not appear in the scanner ・Error buzzer activates even with restarting the device	・Check whether the USB is connected correctly ・Check whether the USB port is running normally ・Check the USB port voltage. If using a laptop or hub, the voltage may be insufficient ・Unplug the device from the USB port, and wait a short while before re- plugging ・Plug into a different port

Troubleshooting information for problems occurring with the Wedge PS/2 is shown below.

Case	Solution
・Nothing is being outputted ・Data is outputted incorrectly	・Plug in the scanner correctly before turning on the host computer ・Check if the host computer is capable of utilizing a PS/2 Keyboard ・Do not use the keyboard when transmitting data to the host
Unable to output via laptop	・Check if the keyboard settings are properly implemented

5.2.18. Precautionary Items

This section describes in detail the precautionary items when using a USB-COM interface.

The nature of active keyboard functions is such that the environment of the output destination possibly can have a negative impact on control character output. It is common with (Ctrl + α key) and Kanji Output Mode (1) (Alt +α key) to be set to the output destination's shortcut key. When this occurs batting characters will not correctly output. Thoroughly checking both the code being utilized as well as the output destination environment before outputting is highly recommended. Do not activate the keyboard or preform scans before the OS is fully booted up when using the Wedge PS/2 interface. In addition, when not using Wedge PS/2 it is possible to utilize the keyboard without connecting the AC adapter. However, when doing so be sure to not turn the adapter power ON or OFF (A malfunction may occur).

5.3. Common Settings

The commonly shared settings between available interfaces for the NLV3101 are explained in this section.

5.3.1. Data Buffer Mode

When outputting data, it is possible to set whether or not a scan may be performed. If buffer mode is enabled, the device is able to perform other actions during output (scanning, etc.). However, reading functionality may drop during this action. If buffer mode is disabled, scanned data will cease activation during output. Once output is completed, other actions will then become available again. Also, buffer mode is forcibly disabled when setting handshaking via the RS-232C (ref. 5.2.4).

Item	Command	Description	Default Setting
Data Buffer Mode	D80	Disable	
	D81	Enable	o

6. Supported Symbologies

This chapter contains:

6.1. Symbology Settings

This section explains in detail readable symbologies and setting command ID for the NLV3101.

Enable (Single): Sets the selected code as the only readable code

Enable (Add): Adds the selected code to the list of other readable codes

Disable: Sets the selected code to “Unreadable”

6.1.1. 1D Codes

Symbology	Enable Single Command	Enable Add Command	Disable Command	Default Setting	Minimum Char Number	Transfer CD	Calculate CD	Notes
UPC	J1	R1	X4B	o	-	o	o	
UPC Add on 2 UPC Add on 5	J2 J3	R2 R3	X4C X4D		-	o		
EAN (JAN)	J4	R4	X4E	o	-	o	o	
EAN Add on 2 EAN Add on 5	J5 J6	R5 R6	X4F X4G		-	o		
EAN-13	JG	JU	DDM	o	-	o		
EAN-13 Add on 2 EAN-13 Add on 5	JH JI	JV JW	X4N X4P		-	o		
EAN-8	JA	JO	DDN	o	-	o		
EAN-8 Add on 2 EAN-8 Add on 5	JB JC	JP JQ	X4M X40		-	o		
Code 39	A2	B2	VB	o	1	o	×	
Tri-Optic	JD	JZ	DDJ	o	-	-		
Codabar (NW7)	A3	B3	VC	o	1	o	×	
Industrial 2of 5	J7	R7	X4K	o	5	o	×	
Interleaved 2of 5	J8	R8	X4L	o	6	o	×	
S-Code	RA	R9	DDK		5	×		
Code 128	A6	B6	VE	o	1	-	o	GS1 Conversion (ref.6.2.1)
Code 93	A5	B5	VD	o	1	-	o	
IATA	A4	B4	VH	o	5	×	×	
MSI/Plessey	A7	B7	VF		3	o	o	
UK/Plessey	A1	B1	VA		2	o	o	
Telepen	A9	B9	VG		1	-	o	
Code 11	BLB	BLC	BLA		1	×	o	
Matrix 2 of 5	AB	BB	DDL		5	o	×	
Chinese Post Matrix 2 of 5	JE	JS	JT		-	o	×	
Korean Postal Authority	JL	WH	WI		-	×	o	
Intelligent Mail Barcode	D5H	D5F	D5G		-	-	o	
POSTNET	D6C	D6A	D6B		-	-	o	
JPN (Customer Barcode)	D5R	D5P	D5Q		-	-	o	

6.1.2. GS1 Databar

Symbology	Enable (Single)		Enable (Add)		Disable		Default Setting	Notes
GS1 DataBar ・GS1 DataBar Omnidirectional ・GS1 DataBar Truncated ・GS1 DataBar Stacked ・GS1 DataBar Stacked Omnidirectional	J9	BC6	JX	BCI	SJ	BCU	o	GS1 Conversion (ref. 6.2.1.)
GS1 DataBar Limited	JJ		JY		SK		o	
GS1 DataBar Expanded ・GS1 DataBar Expanded ・GS1 DataBar Expanded Stacked	JK		DR		SL		o	

6.1.3. Composite Codes

Symbology	Enable (Add)	Disable	Default Setting	Notes
Composite GS1 DataBar ・CC-A ・CC-B ・Limited CC-A ・Limited CC-B ・Expanded CC-A ・Expanded CC-B	BHE	BHF		GS1 Conversion (ref. 6.2.1.) (*1.)
Composite GS1-128 ・CC-A ・CC-B ・CC-C				
Composite EAN ・EAN-13 CC-A ・EAN-13 CC-B ・EAN-8 CC-A ・EAN-8 CC-B	D1V	D1W		
Composite UPC ・UPC-A CC-A ・UPC-A CC-B ・UPC-E CC-A ・UPC-E CC-B				

1. Because Link Flag is set when all 2D codes are enabled, UPC/EAN becomes unreadable

6.1.4. 2D Codes

Symbology	Enable (Single)	Enable (Add)	Disable	Default Setting	Notes
PDF417	BC3	BCF	BCR	○	
Micro PDF417	BC4	BCG	BCS		
Codablock F	D4R	D4P	D4Q		
QR Code	BC1	BCD	BCP	○	GS1 Conversion (ref. 6.2.1)
Micro QR Code	D38	D2U	D2V	○	
Data Matrix (ECC 200)	BC0	BCC	BCO	○	GS1 Conversion (ref. 6.2.1)
Data Matrix (ECC 000-140)	BG2	BG0	BG1		
Aztec Code	BC5	BCH	BCT	○	
Aztec Runes	BF4	BF2	BF3		
Chinese Sensible Code	D4K	D4L	D4M		
Maxi Code	BC2	BCE	BCQ		

6.1.5. Other Options

Symbology	Enable (Single)	Enable (Add)	Disable	Default Setting	Notes
All Codes	A0		B0		Not including Add On
All 1D Codes	BCA	BCM	BCY		Includes Add On
All 2D Codes	BCB	BCN	BCZ		(*1.)

* 1. PDF417, QR Code, Data Matrix (ECC 200, 000-140), Maxi Code, Micro PDF417, Aztec Code, GS1-128 Composite, Aztec Runes, Micro QR, Chinese Sensible Code, Codablock F
* 1. Because Link Flag is set when all 2D codes are enabled, UPC/EAN becomes unreadable
For sample codes, please see section 11.3

6.2. Alternative Symbology Options

This section explains in detail alternative symbology options for the device.

1) Specifying the Output Format
This option specifies the output format of the read data for each code.
* Convert to HS1 Data (GS1-128, GS1 Databar, Composite GS1 Databar, GS1 Data Matrix, GS1 QR Code)
* Transmit Start/Stop (Code 39, Codabar)
* Transmit Check Digit (Code 39, Codabar, WPC, 2 of 5, IATA)
* Convert to Full ASCII (Code 39)

2) Calculating Check Digit (CD)
This specifies the enable/disable of the Check Digit function.
(Code 39, Codabar, 2 of 5, IATA)

6.2.1. GS1 Conversion

When reading a GS1 label in default settings, FNC1, which indicates the terminus of the variable length data, does not transmit (This is due to FNC1 not being included in ASCII). When converting GS1, FNC1 is converted as GS (0x1D) and outputted in order to enable GS1 data to be analyzed by the host computer. However, when the variable length data contains the final AI data, FNC1 is not created and thus GS is not outputted.

Default Settings State:

FNC1 (Do not Transmit)	AI	Data (Fixed Length)	AI Data (Variable Length)	FNC1 (Do not Output)	・・・	AI	AI Data (Variable Length)

↓

GS1 after Conversion:

FNC1 (Do not Transmit)	AI	Data (Fixed Length)	AI Data (Variable Length)	GS(0x1D) (Output)	・・・	AI	AI Data (Variable Length)

GS1 conversion may be set with the below menu/commands:

GS1 Conversion Support Code	Item	Command	Description	Default Setting
GS1-128 GS1 DataBar GS1 DataBar Composite GS1-128 Composite GS1 Data Matrix GS1 QR Code	Convert to GS1	X/0	Disables Convert GS1	o
		X/4	Enables Convert GS1	

**** All conversions besides the above can be edited via section 11. "Data Edit Programming"***

6.2.2. UPC-A, UPC-E

Code	Item	Command	Description	Default Setting
UPC-A	UPC-A Transmit CD, Leading Zero	E3	UPC-A, No Leading Zero and Transmit CD	o
		E5	UPC-A, No Leading Zero and Do Not Transmit CD	
		E2	UPC-A, Leading Zero and Transmit CD	
		E4	UPC-A, Leading Zero and Do Not Transmit CD	
UPC-E	UPC-E Transmit CD, Leading Zero	E7	UPC-E, No Leading Zero and Transmit CD	o
		E9	UPC-E, No Leading Zero and Do Not Transmit	
		E6	UPC-E, Leading Zero and Transmit CD	
		E8	UPC-E, Leading Zero and Do not Transmit CD	
	UPC-A, Convert E	6Q	Transmit UPC-E as-is	o
		6P	Transmit UPC-E as UPC-A	
	Convert to UPC-E1	KP	Disable UPC-E1	o
		KQ	Enable UPC-E1	

6.2.3. EAN-13, EAN-8

Code	Item	Command	Description	Default Setting
EAN-13 and EAN-8	Transmit CD	6J	EAN-13, Do Not Transmit CD	
		6K	EAN-13, Transmit CD	o
	Transmit CD	6H	EAN-8 Do Not Transmit CD	
		6I	EAN-8 Transmit CD	o
	Convert to ISBN	IB	Disable Convert ISBN	o
		IA	Enable Convert ISBN	
		IK	Enable ISBN when possible	
	Convert to ISSN	HN	Disable Convert ISSN	o
		HO	Enable Convert ISSN	
		4V	Enable ISSN when possible	
	Convert to ISMN	IO	Disable Convert ISMN	o
		IP	Enable Convert ISMN	
		IQ	Enable ISMN when possible	
	EAN13 Mandatory Add on 1	-G	If EAN13 begins at 378/379/ or 529 EAN Mandatory Add On is Enabled	
		-H	If EAN13 begins at 378/379/ or 529 EAN Mandatory Add On is Disabled	o
	EAN13 Mandatory Add on 2	-C	If EAN13 begins at 434/439/414/419/977/ or 978 EAN Mandatory Add On is enabled	
		-D	If EAN13 begins at 439/414/419/977/ or 978 EAN Mandatory Add On is Disabled	o

6.2.4. Code 39

Code	Item	Command	Description	Default Setting
Code 39	Switch to Full ASCII	D5	Standard Code 39	o
		D4	Full ASCII Code 39	
		+K	Convert to Full ASCII Code 39 when possible	
	Switch to It. Pharm.	D6	Only Convert It. Pharm.	
		D7	Convert to It. Pharm. when possible	
	Calculate CD	C1	Do Not Calculate CD	o
		C0	Calculate CD	
	Transmit CD	D8	Do Not Transmit CD	
		D9	Transmit CD	o
	Transmit ST/SP	D1	Do Not Transmit ST/SP	o
		D0	Transmit ST/SP	
	Transmit Leading A	DA	Do Not Transmit It. Pharm. Leading A	o
		DB	Transmit It. Pharm. Leading A	
	Attachments	+M	Disable Attachments	o
		+L	Enable Attachments	

6.2.5. Codabar (NW-7)

Code	Item	Command	Description	Default Setting
Codabar (NW-7)	Convert ABC, CX	HA	Enable Codabar Standard Mode Only	o
		H4	Enable ABC Code Only	
		H5	Enable CX Code Only	
		H3	Enable Codabar/ABC and CX	
	Calculate CD	H7	Do Not Calculate CD	o
		H6	Calculate CD	
	Transmit CD	H9	Do Not Transmit CD	
		H8	Transmit CD	o
	Insert Space	HE	Disable Insert Space	o
		HD	Enable Insert Space	
	Transmit ST/SP	F0	Not Transmit ST/SP	o
		F3	ST/SP: ABCD/ABCD	
		F4	ST/SP: abcd/abcd	
		F1	ST/SP: ABCD/TN*E	
		F2	ST/SP: abcd/tn*e	
		HJ	ST/SP: <DC1><DC2><DC3><DC4> /<DC1><DC2><DC3><DC4>	

6.2.6. 2 of 5, S-Code

Code	Item	Command	Description	Default Setting
2 of 5 and S-Code	Transmit CD	E1	Do Not Transmit CD	
		E0	Transmit CD	o
	Calculate CD	G0	Do Not Calculate CD	o
		G1	Calculate CD	
	Space Check	GK	Disable Industrial 2 of 5 Space Check	
		GJ	Enable Industrial 2 of 5 Space Check	o
	Convert S-Code	GH	Do Not Transmit Interleaved 2 of 5 as S-Code	o
		GG	Transmit Interleaved 2 of 5 as S-Code	

6.2.7. Code 128

Code	Item	Command	Description	Default Setting
Code 128	Attachments	MP	Disable Attachments (Add FNC2 Message)	o
		MO	Enable Attachments (Add FNC2 Message)	

6.2.8. IATA

Code	Item	Command	Description	Default Setting
IATA	Calculate CD	4H	Do Not Calculate CD	o
		4I	Calculate FC/SN Only	
		4J	Calculate FC/CPN/SN	
		4K	Calculate FC/CPN/AC/SN	
	Transmit CD	4M	Do Not Transmit CD	
		4L	Transmit CD	o

6.2.9. MSI/Plessey

Code	Item	Command	Description	Default Setting
MSI Plessey	Calculate CD	4A	Do Not Calculate CD	
		4B	Calculate 1 CD = MOD 10	o
		4C	Calculate 2 CD = MOD 10/MOD 10	
		4D	Calculate 2 CD = MOD 10/MOD 11	
		4R	Calculate 2 CD = MOD 11/MOD 10	
		4S	Calculate 2 CD = MOD 11/MOD 11	
	Transmit CD	4G	Do Not Transmit CD	
		4E	Transmit CD 1	o
		4F	Transmit CD 1 and CD 2	

6.2.10. UK/Plessey

Code	Item	Command	Description	Default Setting
UK Plessey	Transmit CD	4O	Do Not Transmit CD	
		4N	Transmit CD	o
	Insert Space	DO	Disable Insert Space	o
		DN	Enable Insert Space	
	Convert X	DP	Do Not Convert A to X	o
		DQ	Convert A to X	

6.2.11. Telepen

Code	Item	Command	Description	Default Setting
Telepen	Convert Output Mode	D2	Numeric Mode	o
		D3	ASCII Mode	

6.2.12. Code 11

Code	Item	Command	Description	Default Setting
Code 11	Calculate CD	BLF	Do Not Calculate CD	
		BLG	Calculate CD 1	
		BLH	Calculate CD 2	
		BLI	Automatically Calculate CD 1 or CD 2	o
	Transmit CD	BLJ	Do Not Transmit CD	o
		BLK	Transmit CD	

6.2.13. Korean Postal Authority Code

Code	Item	Command	Description	Default Setting
Korean Postal Authority code	Transmit CD	*+	Transmit CD	
		*-	Do Not Transmit CD	o
	Transmit Dash	*.	Transmit Dash	o
		*/	Do Not Transmit Dash	
	Reverse Read	*9	Enable Reverse Read	
		*8	Disable Reverse Read	o

6.3. Setting the Number of Characters

Within this section, setting the fixed character length of compatible symbologies is explained in detail.

It is recommended set a fixed length of characters for the NLV3101 when reading barcodes of a known length. By fixing the character lengths, the device determines whether read labels are of correct length, refusing all labels that does not meet the specified requirements. One of the primary benefits of fixing the number of characters is that it enables the protection of short-scan labels such as Interleaved 2 of 5 (which is not outfitted with proper security when performing a partial reading). The checking of fixed length is preformed according to the label data; however options such as “Transmit ST/SP”, “Do Not Transmit ST/SP”, “Transmit CD”, “Do Not Transmit CD” are not affected. Also, character settings have no effect on codes of fixed length such as EAN-13.

The following customizable options are available:

6.3.1. Selected Code's Fixed Length, Minimum/Maximum Number of Characters

This option will enable the checking of fixed lengths, as well as the minimum/maximum number of characters for different barcode types. Only specifically set barcode types will be affected.

Setting via Commands:
<Esc> [XYZQaQbQcQd<CR>

XYZ (ref. 6.3.2.): Inputs the command ID for differing codes.
a, b, c d: 0-9. The value (1000a +100b +10c +d) is 10 decimal places, to a maximum of 8000

Example:

<Esc> [DC1Q6<CR> ⇒	Fixes Code 39 length at 6
<Esc> [DC1Q6 [DC1Q1Q2<CR> ⇒	Fixes Code 39 length at 6 and 12
<Esc> [DC1Q6 [DC4Q1Q2<CR> ⇒	Fixes Code 39 length at 6, and Interleaved 2 of 5 at 12
<Esc> [DC1<CR> ⇒	Clears fixed length for Code 39
<Esc> [DB4Q4<CR> ⇒	Sets the minimum length for Interleaved 2 of 5 at 4
<Esc> [DB4<CR> ⇒	Clears the minimum length for Interleaved 2 of 5
<Esc> [DA1Q1Q2<CR> ⇒	Sets the maximum length for Code 39 at 12
<Esc> [DA 1 <CR> ⇒	Clears the maximum length for Code 39
<Esc> [DALQ2Q0 [DAJQ1Q2Q5<CR> ⇒	Sets the maximum length for PDF417 at 20, and 125 for QR Code

Setting via Menu Barcodes:
<SET (START)>
<Reads the fixed length (HK), minimum length (HL), and maximum length (HM) (ref. 5.3.3) of the selected codes>
<Reads barcodes of the necessary type and length>
<Finish (END)>

Caution:

・Both minimum (HL, DB1-DB0) and maximum (HM, DA1-DA0) lengths are able to set one length value for each barcode type

・Fixed digits (HK, DC1-DC0) are able to set two types of lengths for each barcode type (When setting two types of digits, be sure to set them in between one setting time frame)

・Due to the fact that “Setting Character Length” has a higher priority than both “Min/Max Length”, when checking the length of a label the minimum/maximum lengths will not be checked. Be sure to clear the settings when attempting to set the minimum/maximum length while set in “Fixed Digits”

・Specified settings will be cleared if lengths were not implemented after finishing DA1-DA0, DB1-DB0, or DC1-DC0

6.3.2. Selection Code Character Length, Min/Max Length Setting Commands List

Types of Code	Fixed Number of Characters	Minimum Character	Maximum Character
Return to Default Settings	DC0	XQG	XNG
Code 39	DC1	DB1	DA1
Codabar	DC2	DB2	DA2
Industrial 2 of 5	DC3	DB3	DA3
Interleaved 2 of 5	DC4	DB4	DA4
Code 93	DCD	DBD	DAD
Code 128	DCB	DBB	DAB
MSI/Plessey	DC8	DB8	DA8
IATA	DC7	DB7	DA7
PDF417	DCL	DBL	DAL
QR Code	DCJ	DBJ	DAJ
Data Matrix	DCH	DBH	DAH
Maxi Code	DCK	DBK	DAK
Aztec Code	DCI	DBI	DAI
Micro PDF417	DCM	DBM	DAM
RSS-Expanded (GS1 Databar)	DCF	DBF	DAF
Composite	DCG	DBG	DAG
GS1-128	DCC	DBC	DAC
S-Code	DC5	DB5	DA5
UK/Plessey	DCA	DBA	DAA
Matrix 2 of 5/Chinese Post	DC6	DB6	DA6
Telepen	DC9	DB9	DA9
Codablock-F	DCO	DBO	DAO
Code 11	DCE	DBE	DAE
Chinese Sensible Code	DCN	DBN	DAN

6.3.3. Selection Code's Fixed Character Length and Min/Max Length Menu Setting Command List

Item	Command	Description	Notes
Set the Character Number via Menu Barcodes	HK	Fixed length selection code	Menu barcodes only
	HL	Minimum length selection code	Menu barcodes only
	HM	Maximum length selection code	Menu barcodes only

7. String Options

This chapter contains:

7.1. Converting Upper/Lower Case Characters

This section describes the process of switching upper/lower case characters and may be used when the host computer requests only one character size type.

Converting Upper/Lower Case:

Test Character String	AbCd	Default Setting
Do Not Convert Upper/Lower Case	AbCd	o
Convert to Upper Case	ABCD	
Convert to Lower Case	abcd	
Convert to Upper/Lower Case	aBcD	

Upper/lower case conversion setting is customizable via the below menu/commands:

Item	Command	Description	Default Setting
Convert Upper/Lower Case	YZ	Not Convert Upper/Lower case letters	o
	YW	Convert to Upper case letters	
	YX	Convert to Lower case letters	
	YY	Convert to Upper/Lower case letters	

7.2. Prefix/Suffix

The scanned data for each code may set the following additional characters.

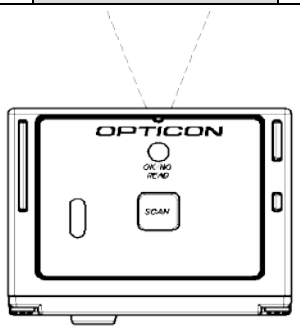
Output Format:

1) Common Prefix/Common Suffix (max length 8 characters)
   Each code may add a prefix and suffix to the front and back ends of its string. This however, is set to OFF in the default settings.

2) Alternate Codes Prefix/Suffix (max length 4 characters)
   Each code may add a prefix and suffix to the front and back ends of its string.
   Within default settings, the prefix is set to OFF, and under suffix, <CR> is added.

3) Code Identification/Code Length (ref. 7.3)
   Within the prefix/suffix, it is possible to add a code identifier and/or the number of data digits (In this case, “digits” refers to those that are set after output formatting such as those seen in section 6.2. “Alternate Symbology Options”).

Common Prefix 8 digits max.	Alternate Code Prefix 4 digits max.	Scanned Data	Alternate Code Suffix 4 digits max. (*1.)	Common Suffix 8 digits max.



*1. <CR> is added to “Alternate Code Suffix” in the default settings.

7.2.1. Prefix/Suffix Settings
Within this section, the process of customizing the prefix and suffix settings are explained in detail.

Set via Commands:
<Esc>aa11223344bb11223344<CR>

*aa: This sets the code that adds the prefix
*bb: This sets the code that adds the suffix (ref. 7.2.2.)
*11: 1st prefix/suffix value
*22: 2nd prefix/suffix value (ref. 7.2.3.)

Example:
With Code 39, when attaching "C39" to the prefix, and "<CR>" "<LF>" to the suffix:
<Esc>M40CQ3Q96AO41M1J<CR>

Setting via Menu Barcodes:
1) Read the START “(ZZ)” code
↓
2) Read the menu barcode that supports “7.2.2. Prefix/Suffix Setting” codes.
↓
3) Read the menu barcode that attaches “7.2.3. Prefix/Suffix Value” to the string.
↓
4) Read the END “(ZZ)” code

Example:
With Code 39, when attaching "C39" to the prefix, and "<CR>" "<LF>" to the suffix
<Menu (ZZ) read START code>
<Menu (M4) read [Set the Prefix for Code 39]>
<Menu (0C) read "C" code>
<Menu (Q3) read “3” code>
<Menu (Q9) read “9” code>
<Menu (6A) read “:” code>
<Menu (O4) read “Set the Suffix for Code 39”>
<Menu (1M) read "<CR>" code>
<Menu (1J) read “<LF>” code>
<Menu (ZZ) read END code>

Note:
**** The prefix/suffix setting commands will clear the currently added value before performing any new settings. When this happens, the default setting suffix "<CR>" will be cleared as well.***
**** When clearing all codes for default setting suffix "<CR>", set either “All Suffix Settings (RZ)” or “Clear Suffix (PR)”.***
**** If the prefix/suffix exceeds the maximum character length (4 digits), the settings will be ignored. Be sure to delete any unnecessary characters.***

7.2.2. Prefix/Suffix Setting Commands

Code	Prefix Command	Suffix Command
All Codes	RY	RZ
UPC-A	N1	N6
UPC-A Add on	M0	O0
UPC-E	N2	N7
UPC-E Add on	M1	O1
EAN-13	N3	N8
EAN-13 Add on	M2	O2
EAN-8	N4	N9
EAN-8 Add-n	M3	O3
Code 39	M4	O4
Tri-Optic	MC	PN
Codabar	M5	O5
Industrial 2 of 5	M6	O6
Interleaved 2 of 5	M7	O7
S-Code	MB	OB
Matrix 2 of 5	GL	GM
IATA	I8	I9
MSI/Plessey	N0	N5
Telepen	L8	L9
UK/Plessey	MA	OA
Code 128	M9	O9
GS1-128	XMX	XOX
Code 11	BLD	BLE
Intelligent Mail Barcode	D5I	D5J
POSTNET	D6D	D6E
GS1 DataBar	OE	PQ
Composite Code	RR	RS
Codablock-F	D4S	D4T
Data Matrix	MD	PO
Aztec	BF0	BF1
Chinese Sensible Code	D4N	D4O
QR Code	MK	PW
Maxicode	ML	PX
PDF417	OC	PY
Micro PDF417	OD	PZ
Clear Prefix/Suffix	MG	PR
Common Prefix/Suffix	MZ	PS

7.2.3. Prefix/Suffix Value

ASCII	Command	ASCII	Command	ASCII	Command	ASCII	Command
<SPACE>	5A	A	0A	a	$A	^@ (NULL)	9G
!	5B	B	0B	b	$B	^A (SOH)	1A
"	5C	C	0C	c	$C	^B (STX)	1B
#	5D	D	0D	d	$D	^C (ETX)	1C
$	5E	E	0E	e	$E	^D (EOT)	1D
%	5F	F	0F	f	$F	^E (ENQ)	1E
&	5G	G	0G	g	$G	^F (ACK)	1F
'	5H	H	0H	h	$H	^G (BEL)	1G
(	5I	I	0I	i	$I	^H (BS)	1H
)	5J	J	0J	j	$J	^I (HT)	1I
*	5K	K	0K	k	$K	^J (LF)	1J
+	5L	L	0L	l	$L	^K (VT)	1K
,	5M	M	0M	m	$M	^L (FF)	1L
-	5N	N	0N	n	$N	^M (CR)	1M
.	5O	O	0O	o	$O	^N (SO)	1N
/	5P	P	0P	p	$P	^O (SI)	1O
:	6A	Q	0Q	q	$Q	^P (DLE)	1P
;	6B	R	0R	r	$R	^Q (DC1)	1Q
<	6C	S	0S	s	$S	^R (DC2)	1R
=	6D	T	0T	t	$T	^S (DC3)	1S
>	6E	U	0U	u	$U	^T (DC4)	1T
?	6F	V	0V	v	$V	^U (NAK)	1U
@	6G	W	0W	w	$W	^V (SYN)	1V
[	7A	X	0X	x	$X	^W (ETB)	1W
\	7B	Y	0Y	y	$Y	^X (CAN)	1X
]	7C	Z	0Z	z	$Z	^Y (EM)	1Y
^	7D	0	Q0			^Z (SUB)	1Z
_	7E	1	Q1			^[(ESC)	9A
`	7F	2	Q2			^\ (FS)	9B
{	9T	3	Q3			^] (GS)	9C
|	9U	4	Q4			^^ (RS)	9D
}	9V	5	Q5			^_ (US)	9E
~	9W	6	Q6			DEL (ASCII127)	9F
		7	Q7				
		8	Q8				
		9	Q9				

7.3. Code ID/Code Length Identification

It is possible to set the code identification/code length instead of additional characters by following the same general process as the prefix/suffix setup.

7.3.1. Code Identification

Code ID Opticon: Appendix ref. 13.1.1
Direct “Code Identifier” input delivers rapid-process programming for the prefix/suffix of each barcode type.

Code ID AIM/ISO: Appendix ref. 13.1.2
The Code identifier is transmitted via ISO 15424 format.] cm

- “]” is ASCII value 10, with a base of 93
- “c” is a code character
- “m” is a character modifier

Code identification is outputted by setting the prefix/suffix value for the below commands:

Item	Command	Description	Default Setting
Code ID	$2	Enables code identification for the Opticon ID currently in use	
	$1	Enables code identification for the AIM ID currently in use	

7.3.2. Code Length

Removing the prefix/suffix characters, a code length is transmitted in double digits. With 2D bar codes, the transmitted code length is 6 digits. Also, it is possible to transmit both 1D and 2D codes at a 6-digit length. For these direct-input characters, a 4-digit length prefix/suffix will be considered as 1-digit.

Code length is outputted by setting the prefix/suffix value for the below commands:

Item	Command	Description	Default Setting
Code Length	$3	Enables the code ID for lengths of (1D/2D: 2/6 digits)	
	$6	Enables the code ID for lengths of (1D/2D: 6/6 digits)	

**** For details on the code ID value, please refer to the code ID table from section 11.1.***

Example: Adding "<Code ID> :< Code Length>" to all code prefixes

Setting via Commands:
<Esc>RY$26A$36A<CR>

Setting via Menu Barcodes:
<Menu (ZZ) read START code>
<Menu (RY) read “Set all code prefixes” (ref. 7.2.2)>
<Menu ($2) read “Code Identifier that utilizes the Opticon ID”>
<Menu (6A) read ":" code (ref. 7.2.3) >
<Menu ($3) read “Code length (1D/2D: 2/6 digits)”>
<Menu (6A) read ":" code (ref. 7.2.3) >
<Menu (ZZ) read END code>

7.3.3. Code Coordinates

Code coordinates are outputted by setting the prefix/suffix value for the commands displayed in the table below (These are displayed as “CMOS sensor pixel coordinates”). It is possible to output both coordinates for the vertex, and center of, scanned codes.

Item	Command	Description	Default Setting
Code Coordinates	DDX	Enables the output of the code’s 4 vertex coordinates	
	DDY	Enables the output of the code’s center coordinates	

* Vertex Coordinate Outputting Format

X_1, Y_1; X_2,Y_2;X_3,Y_3;X_3,Y_3;X_4,Y_4;

* Center Coordinate Outputting Format

X, Y;

*XY Format

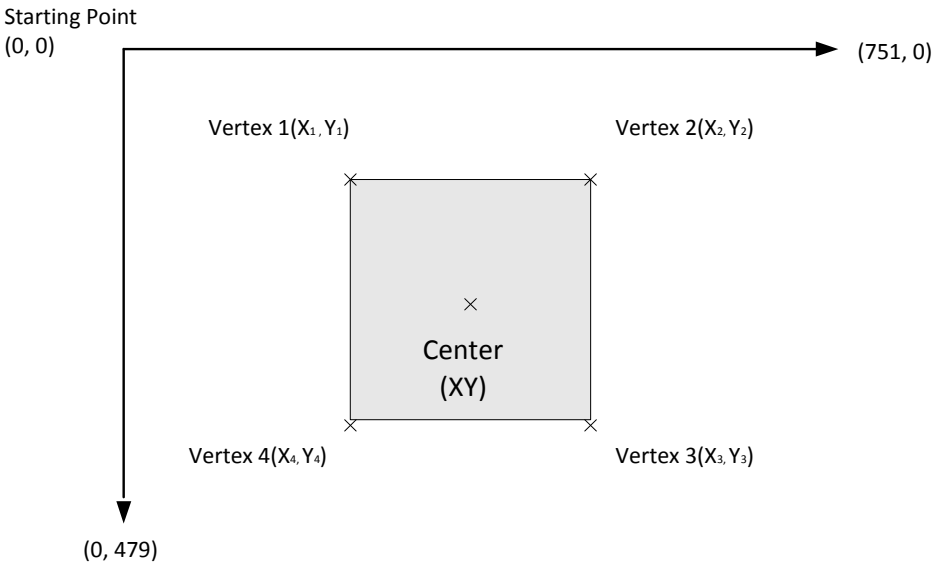
X: 4-digit number

Y: 4-digit number

Device Coordinate Range:

X: 0 ~ 751

Y: 0 ~ 479



7.4. Read Failure Error Message

It is possible to transmit the error messages that activate when read failure occurs. When there is no barcode label, decode failure may be determined.

Item	Command	Description	Default Setting
Read Failure Error Message	TH	Enables output of the code's 4 vertex coordinates	
	TH	Enables output of the code's center coordinates	

Character string commands of a maximum of 4 digits may be entered following the input of commands shown in the table below.

Item	Command/ Character String Command					Description	Default Setting
Read Failure Error Message	TH					No Barcode Label Error Message	
	TI					Decode Failure Error Message	
	TG					Do Not Transmit Error Message	o

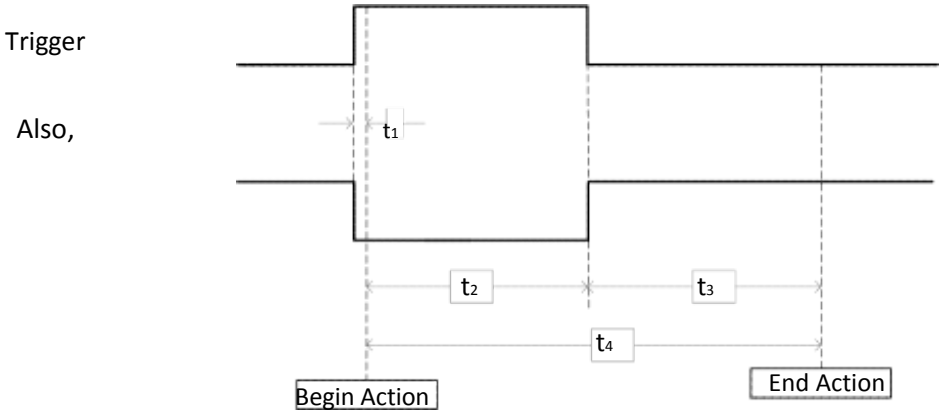
8. Timing Variance

This chapter contains:

8.1. Read Activation Timing

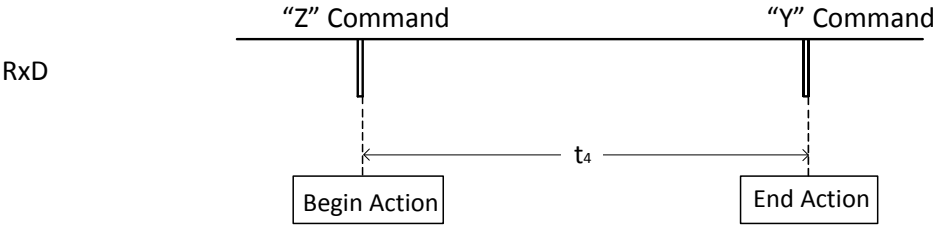
8.1.1. Activate Reading START/END

Trigger Key or Trigger Signal:
Press the trigger or switch it to “ON” to activate the device. By setting the extended read time, activation and setting periods are extended as soon as the signal switches to “OFF”.

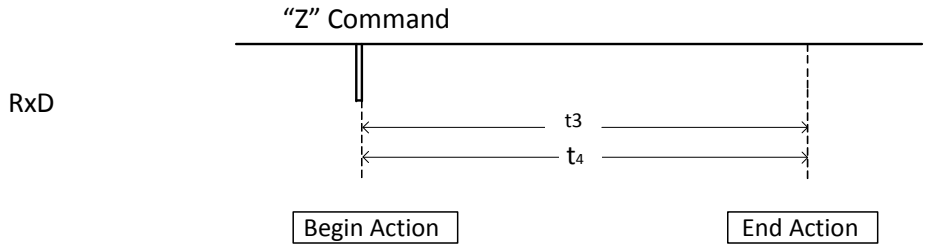


・The default setting for t_3 is “Extended Read Time = 0 sec”. For details on how to set the extended read time, refer to section 10.1.1.

・Command Controls:
Commands are activated by transmitting the “Z” command, and deactivated via the “Y” command.



・Command Controls (Extended Read Time):
Setting the extended read time will also allow the user to deactivate commands.

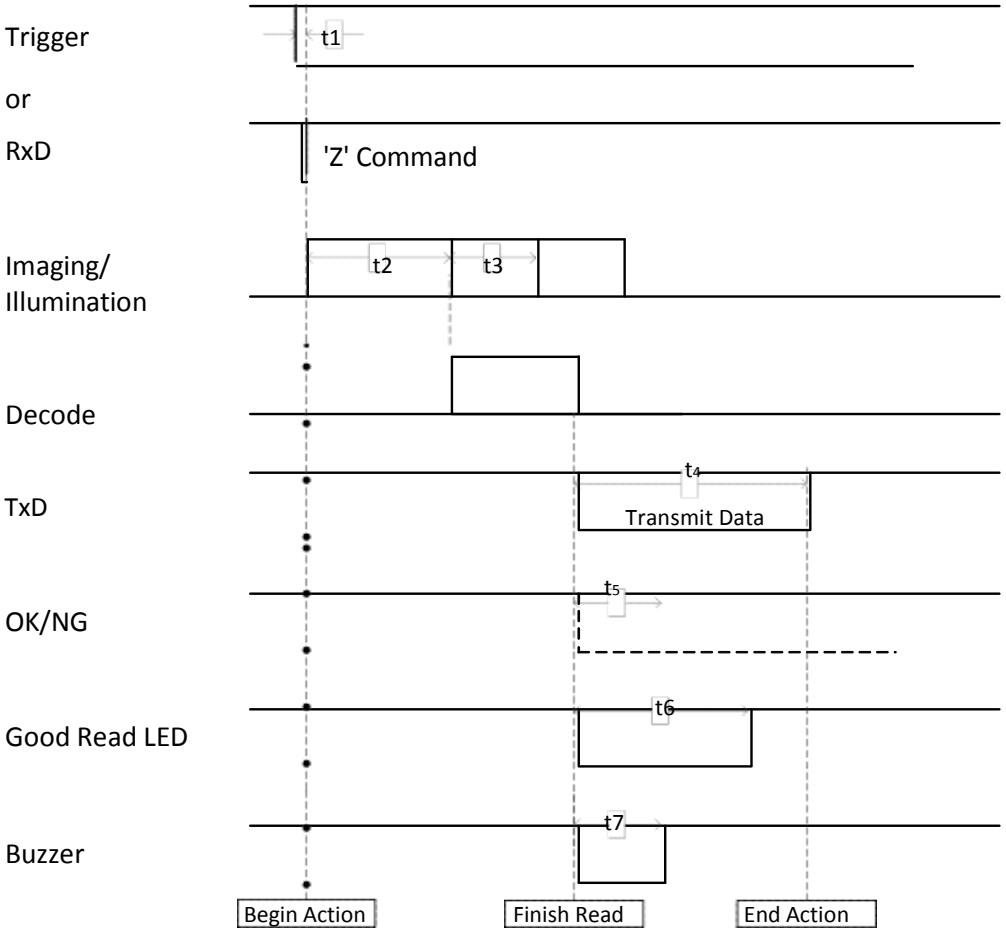


**** The extended read time may also use the “Y” command to end scanning functions when performing settings.***

Item	Description	Default Setting	Type	Unit
t_1	Anti-Chatting Time	-	2	ms
t_2	Trigger Time	-	-	s
t_3	Extended Read Time (Settings)	0	-	s
t_4	Active Read Time	-	-	s

8.1.2. Successful Reading

The below section explains the correct timing for performing a successful read.

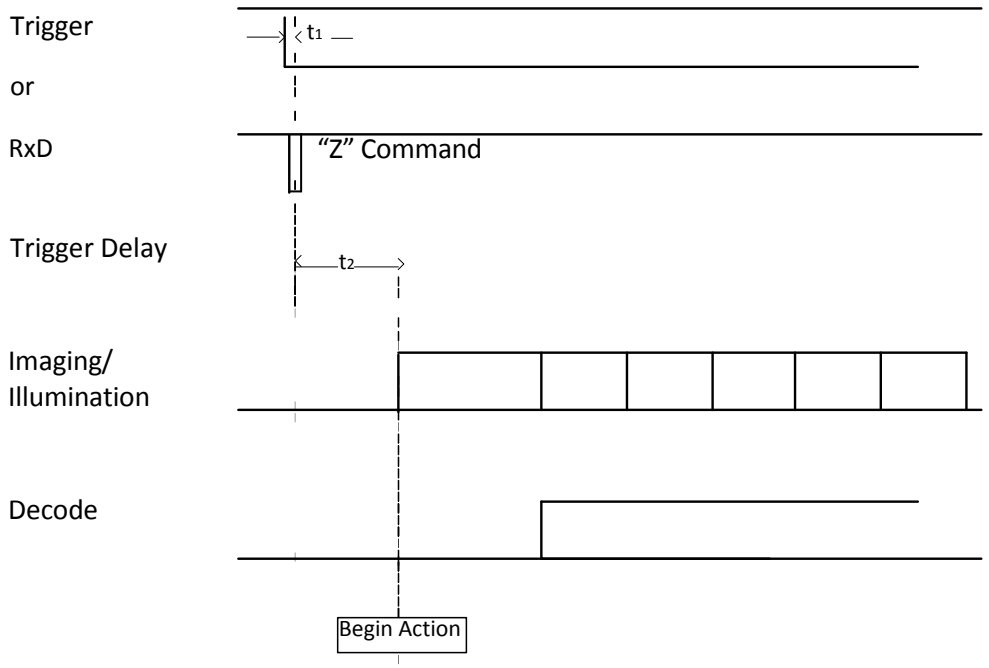


The timing for the above actions is explained below:

Item	Description	Default Setting	Type	Unit
t_1	Anti-Chatting Time	-	2	ms
t_2	1st Image Capture Time	-	36	ms
t_3	2nd Image Capture Time	-	18	ms
t_4	Transmit Data (Use Settings with RS-232C)	-	-	bps
t_5	OK/NG Signal (Use Settings)	Disable	-	ms
t_6	Good Read LED (Use Settings)	200	-	ms
t_7	Buzzer (Use Settings)	100	-	ms

8.2. Trigger Delay

The trigger delay may be activated either by manual trigger press/inputting the “Z” command, or after a customizable set period of time.



The timing for the above is explained in detail in the table below:

Item	Description	Default Setting	Type	Unit
t_1	Anti-Chatting Time	-		ms
t_2	Trigger Delay	Disable	-	10ms

With Trigger Delay, it is possible to set the extended period, from input to activation, of a trigger press or command. Numeric commands are entered via user-specified format, followed by the commands in the table below. These settings are implemented in units of 10ms.

Item	Command					Description	Default Setting (Effective Range)
Trigger Delay Time Numeric Setting	DEC	Qa	Qb	Qc	Qd	Numeric Settings for the Trigger Delay Time (10000a+1000b+100c+10d) [ms]	Disable (10-99990ms)

Example:
Set the trigger delay duration to 50ms

Execute Command:
<Esc>[DECQ0Q0Q0Q5<CR>
" <Esc>[DECQ5<CR" is also possible

8.3. OK/NG Timing

With the RS-232C loose-wire specifications, an "OK" signal will be outputted when a read is successful. A "NG" signal will only be outputted when a barcode label is registered. The commands in the table below allow the user to enable or disable these signals.

Item	Command	Description	Default Setting
Enable "OK" Signal	X*Q	Enables the OK/NG signal	o
	X*R	Disables the OK/NG signal	

9. Indicator

This chapter contains:

9.1. Buzzer

This section explains in detail the available setting options for activating the buzzer.

9.1.1. Buzzer Volume

This function controls the buzzer volume settings.

Item	Command	Description	Default Setting	Setting Value
Buzzer Volume (*)	T0	Buzzer Volume: Max	o	100%
	T1	Buzzer Volume: High		70%
	T2	Buzzer Volume: Med		40%
	T3	Buzzer Volume: Min		2%

**** The volume is also settable via numpad***

Enter the below 3-digit numeric command after inputting the above.

Item	Command				Description	Default Setting (Effective Range)
Buzzer Volume Numeric Setting	DF4	Qa	Qb	Qc	This sets the buzzer volume via numerical settings (100a+10b+c) [%]	100% (1-100)

9.1.2. Good Read Buzzer

A Good Read buzzer will activate upon a successful read. Additionally, it is possible to set both the buzzer's tone (frequency) and length. The NLV3101 also comes equipped with a customizable silence setting.

・Enable/Disable Buzzer

Item	Command	Description	Default Setting
Enabling/Disabling the Buzzer	W0	Disables the buzzer	
	W8	Enables the buzzer	o

・Buzzer Length

Item	Command	Description	Default Setting
Buzzer Length	W7	Buzzer Length: 50 ms	
	DF3	Buzzer Length: 75 ms	
	W4	Buzzer Length: 100 ms	o
	W5	Buzzer Length: 200 ms	
	W6	Buzzer Length: 400 ms	

・Buzzer Tone

Item	Command	Description	Default Setting
Buzzer Tone (*)	DF1	Low Volume Buzzer (2750Hz)	
	W1	Medium Volume Buzzer (3000Hz)	
	DF2	High Volume Buzzer (3250Hz)	
	W2	Level 2 Buzzer (Mid Vol. ⇒ Low Vol.)	
	W3	Level 2 Buzzer (Mid Vol. ⇒ High Vol.)	

**** The Buzzer Tone may be set numerically as well***

Enter the below 4-digit numeric command after inputting any of the above commands. The frequency range for regular use is 2000-4000Hz. Additionally, the optimal range for this device is about 2700Hz.

Item	Command					Description	Default Setting (Effective Range)
Buzzer Tone Numeric Setting	DH0	Qa	Qb	Qc	Qd	Sets the buzzer tone via numerical input (1000a+100b+10c+d) [Hz]	2700Hz (1-9999)

9.1.3. AC Adapter Plug-In Activation Buzzer

The commands below set the activation buzzer for when plugging in the AC adapter.

Item	Command	Description	Default Setting	Notes
Enable/Disable the Plug-In Buzzer	GD	Disables the power adapter plug-in buzzer		"Z2" is enabled after transmitting
	GC	Enables the power adapter plug-in buzzer	o	"Z2" is enabled after transmitting

9.1.4. Read Timeout Buzzer

An error buzzer will activate if a successful read is not completed before the scanning action finishes.

Item	Command	Description	Default Setting
Read Timeout Error Buzzer	EAP	Disables the read timeout buzzer	o
	EAQ	Enables the read timeout buzzer	

9.1.5. Buzzer In Between Multiple Reads

The “Mid-Buzzer” refers to the sound activated when, after reading a label; the appropriate conditions for outputting data are not met. For example, with 5 multiple read labels + Buffer Mode, a mid-buzzer will activate after the first four labels are scanned. Afterwards a good read buzzer will activate, signaling that the data result has been outputted successfully. Because this result cannot be outputted during the first four labels, the mid-buzzer helps to confirm each scan individually as it finishes.

However, this function setting will be ignored if the good read buzzer is disabled.

Item	Command		Description	Default Setting	Notes
Mid-Buzzer	EBY	Q0	Disables the mid-buzzer		
		Q1	Enables the mid-buzzer	o	

**** Mid-Buzzer Frequency: 5000Hz (5KHz), Length: 10ms***

9.2. Status LED

This section explains in detail the activation settings for the status LED upon a successful read.

9.2.1. Status LED Blinking Period

Whenever a successful read occurs, the status LED will begin blinking for a customizable predetermined period.

Item	Command	Description	Default Setting
Status LED	T4	Disables the LED light	
	T5	Blinking Period: 0.2s	o
	T6	Blinking Period: 0.4s	
	T7	Blinking Period: 0.8s	

9.2.2. Reversal of the Good Read Status LED

When the LED Good Read Status is set to 'Reverse', stand detection is enabled and the Status LED will blink when the device is left in the stand as well. When a scan is successful the Status LED stops blinking following the same period lengths as the above commands.

Item	Command	Description	Default Setting
Reverse Status LED	E6Y	Does not reverse the Status LED	o
	E6Z	Invert the Status LED	

9.3. Indicator Overview

This section outlines in detail all general settings for the indicator.

9.3.1. Indicator Timing

The timing for activating the Indicator is set whenever a scan is performed.

Item	Command	Description	Default Setting	Notes
Indicator Timing	VY	Pre-Data Transmit Indicator	o	Immediately after scanning
	VZ	Post-Data Transmit Indicator		

9.3.2. Menu Barcode Setting Indicator

This command selects the indicator which activates when setting menu barcodes or 2D codes.

Item	Command		Description	Default Setting	Notes
Menu Barcode Setting Indicator	EBT	Q0	Buzzer	o	
		Q1	Vibration		
		Q2	Buzzer, Vibration		

10. Read Activation

This chapter contains:

10.1. Manual Trigger

The manual trigger will begin a scan by either setting the trigger to 'ON' or by transmitting a command trigger (ref. 3.5.1). Manual Trigger has two types; “Single Read” and “Multiple Read”, and comes equipped with a fixed exposure function for when scanning from a single, fixed position.

10.1.1. Extended Read Time

This section explains the process of setting the period length of an extended read. This period extends and continues a scan from either the point in which the trigger signal ends, or when a read command is transmitted.

Item	Command	Description	Default Setting	Notes
Extended Read Time (Single Read)	Y0	0 sec	○	Synchronized with the trigger
	Y1	1 sec		
	Y2	2 sec		
	Y3	3 sec		
	Y4	4 sec		
	Y5	5 sec		
	Y6	6 sec		
	Y7	7 sec		
	Y8	8 sec		
	Y9	9 sec		
	YM	Infinity		
	YL	10x		

**** When the extended read period’s default setting is set to 0 seconds, the scan may be started via the “Z” command and finished with the “Y” command.***

10.1.2. Single Read

A complete scanning action begins by reads a single code, and upon a successful read will finish operation.

Item	Command	Description	Default Setting
Single Read	S0	Press the trigger once to begin scanning	○

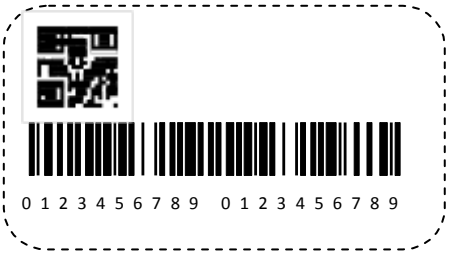
10.1.3. Multiple Read

With a multiple read, the scanning operation will continue after a successful barcode scan. As shown in the figure below, when there are multiple codes within the scan range of the NLV3101, in order to prevent a scanned code from being read multiple times, it will be saved within the device’s memory and not scanned again. However, if over 20 codes are read and recorded the memory will systematically reset itself.

Item	Command	Description	Default Setting
Multiple Read	D3P	Scanning will continue after the first code is completed	Single Read

**** In order to release from multiple read, set the single read as “S0”.***

Example)
Reading multiple codes with one trigger press:



Example)
Reading multiple codes with one trigger press, in sequence:
With the below example, reading the same code more than once will require resetting and starting the scan over (multiple read prevention will reset).

**** As long as the currently read code is not of a high density, the scanning speed will be enhanced by selecting "High Speed Search" (10.3.2) from "Code Search Priority Mode".***

10.1.4 Fixed Exposure Mode
This action is enabled by scanning mobile targets of the same media from a fixed position. Because the default setting's Automatic Exposure Adjustment Mode will also make adjustments to the background, etc., extra images may be captured during the process. However scanning is stabilized by fixating the exposure, and the first read image may be securely decoded.

Fixed exposure secures the below two parameters:
1) Shutter Speed
2) Image Sensor Amplification Rate (Gain)

Fixed exposure has the following two modes:
・Complete Exposure Fixed Mode
Within this mode both 1) and 2) above parameters are completely secured.

・Partial Exposure Fixed Mode
Within this mode the secured exposure of 1) and 2) are adjusted via the below ranges:
Upper End Exposure = 1) x 2) x 1.5
Lower End Exposure = 1) x 2) ÷1.5

Fixed exposure will activate automatically via the following list of commands:

Item	Command		Description	Default Setting	Notes
Complete Exposure Fixed Mode	DDU	Q0	Completely fixes pre-scanning exposure		Commands Only
		Q1	Completely fixes post-scanning exposure		
Partial Exposure Fixed Mode	DDV	Q0	Partially fixes pre-scanning exposure		Commands Only
		Q1	Partially fixes post-scanning exposure		
Cancel Fixed Exposure Mode	DDW		Switches to Automatic Exposure Adjustment Mode	o	

Pre-Scanning Exposure Auto Fixing Method:
Within this method, secured commands are fixed to the operating exposure before being transmitted. (Commands Only)
1. The NLV3101 is secured at a position where the target is readable.
↓
2. The target code is scanned.
↓
3. The secured command is transmitted to the pre-scanning exposure.
(When saving via commands transmit "Z2")

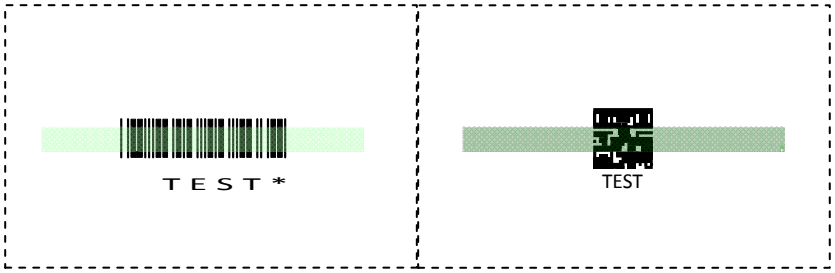
Post-Scanning Exposure Auto Fixing Method:
After transmitting a secured command, it is immediately fixed by performing a scan.
After being transmitted, a command is fixed by simply preforming a read. (Menu is also possible)

1. First, the NLV3101 is secured at a position where the target is readable.
↓
2. The device then transmits a secured command to the post-scanning exposure, or it may read the menu.
↓
3. The device may either transmit command trigger "Z", press the trigger key, or sets the trigger to ON.
↓
4. Upon a successful read, the exposure is then fixed at the current level.
(When saving, “Z2 is transmitted)

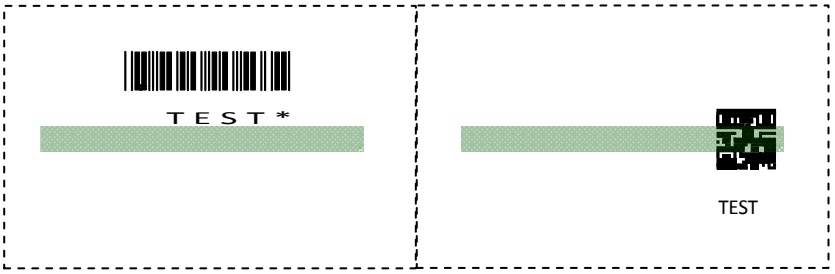
10.1.5. Central Reading
This section is necessary for reading a desired code when several are lined up adjacent to each other. As shown in the figure below, scanning will only occur when the center of the image is contained within the code.

Item	Command	Description	Default Setting
Central Reading	D00	Only reads codes within the aiming LED’s central range	
	D0Z	Reads the entire image	o

Example) Scanning when the central reading settings are enabled:



Example) Not scanning when the central reading settings are enabled:



• If multiple codes are closely packed together, it is highly recommended to utilize the Trigger Repeat function (ref. 10.1.2.). This allows for a more easily targeted scan.

10.2. Auto Trigger

The auto trigger will automatically detect the scan target, press the trigger and begin reading. This setting may be either enabled or disabled. Be sure to save your settings while using “Stand Detection” when the device is during on. If removed from the stand the device will switch to “Manual Trigger”.

Item	Command	Description	Default Setting
Auto Trigger	+F	Disables the auto trigger	o
	+I	Enables the auto trigger	

10.2.1. Detection Mode

This section explains in detail the 3 detection methods of the NLV3101. Please note that these are interchangeable depending on the intended use.

1) Green Aiming Detection
   While in the Green Aiming Irradiation state, the target will be detected immediately upon entering the aiming range. Due to room illumination intensity having a large effect on the target's detectability, it is recommended to use this function while indoors.
2) Red Illumination Detection
   While in the Red Illumination state, the target will be detected immediately upon entering the angle range. This may be used even under bright conditions.
3) No Illumination Detection
   This method allows for detection without use of illumination. However, if the voltage decreases the detection response will lower as well. Because a non-zero amount of light in the environment is needed to preform detection, this method is unusable in dark areas. On the other hand, it may be used in bright environments.

Item	Command	Description	Default Setting
Detection Mode	DDG	Green Aiming Detection	o
	DDH	Red Illumination Detection	
	DDI	No Illumination Detection	

10.2.2. Detection Sensitivity

Depending on the brightness level of the environment, it may be necessary to adjust the sensitivity settings of the auto trigger. The figure below describes the general detection distance from the device’s front.

Device Model	Unit	Sensitive	Normal	Insensitive
Average Model	mm	250	200	150
High Resolution Model	mm	200	150	100

• The above table is a general outline only. The detection distance is highly dependent on the scan media and level of surrounding illumination.

• The above does not apply when utilizing No Illumination Detection.

Item	Command	Description	Default Setting
Detection Sensitivity	XMF	Detection Sensitivity: Sensitive	
	XMH	Detection Sensitivity: Normal	o
	XMJ	Detection Sensitivity: Insensitive	

10.2.3. Multiple Read Reset Time

When using the auto trigger, it is possible to set a time interval where the same code is not read multiple times. However, when same-code-reading is not allowed the numerical value must be set at “0”. Multiple read reset time will reset if the data reads a different code.

Item	Command					Description	Default Setting (Effective Range)
Multiple Read Reset Time	D3R	Qa	Qb	Qc	Qd	Multiple Read Reset Time (1000a+100b+10c+d) [10millisecond]	700millisecond (0-9999)

10.2.4. Auto Trigger Sleep Mode

The auto trigger will switch to sleep mode if the target is unreadable for an extended period of time. Within this mode, detection will be conducted intermittently according to previously set time intervals. Sleep mode will cancel automatically if a barcode target is detected during the operation. Alternatively, it may be released via other methods, such as trigger events. Sleep mode may be disabled by entering "0".

Item	Command					Description	Default Setting (Effective Range)
Auto Trigger Sleep Mode	EBW	Qa	Qb	Qc	Qd	Sleep Mode Time Settings (1000a + 100b + 10c + d)	300 sec (0-9999)

10.2.5. Detection Interval for Auto Trigger Sleep Mode

This section explains the setting method for the active detection interval while set to sleep mode.

Item	Command				Description	Default Setting (Effective Range)
Detection Interval	EBX	Qa	Qb	Qc	Detection Interval Time Settings (100a + 10b + c) [10 milliseconds]	500 milliseconds (1-999)

10.3. Decoding

10.3.1. 1D Code Decode Mode

This section explains in detail the method of setting 1D code when decoding. Within “Obfuscate Decode Mode”, the reading response will lower as complicated and difficult to read codes become more easily readable. In contrast “High Speed Decode Mode” will allow for a faster read response, but in exchange it becomes more difficult to read barcodes that are curved and/or dirty.

Item	Command	Description	Default Setting
1D Code Decode Mode	DM3	Obfuscate 1D Code Decode Mode	
	DM2	Standard 1D Code Decode Mode	o
	DM1	Medium Speed 1D Code Decode Mode	
	DM0	High Speed 1D Code Decode Mode	

10.3.2. Code Search Priority Mode

There are 3 types of search modes available to the NLV3101: High Speed, High Precision, and Central Code Priority High Precision. Be sure to select High Precision when reading codes with small or complex codes.

Item	Command	Description	Default Setting
Code Search Mode	DE9	High Speed Search	
	DEA	High Precision Search	
	DEB	Central Code Priority High Precision Search	o

10.3.3. Quiet Zone

Decoding is only possible when a barcode's left and right margins are specified as a narrow "Quiet Zone". However, due to the possibility of a partial or incomplete reading, do not set the quiet zone at too small a level.

Item	Command	Description	Default Setting
Quiet Zone	YN	No Quiet Zone	
	YO	1/7 Standard Quiet Zone	
	YP	2/7 Standard Quiet Zone	
	YQ	3/7 Standard Quiet Zone	
	YR	4/7 Standard Quiet Zone	
	YS	5/7 Standard Quiet Zone	
	YT	6/7 Standard Quiet Zone	
	YU	7/7 Standard Quiet Zone	o

10.3.4. Number of Read Checks

"Checking" refers to the confirming and comparing of multiple scans or decoding results. Increasing the number of checks allows for the rate of misreads to drop, however doing so also causes the output response to lower as well. To achieve the best result, please use high print quality labels.

Item	Command	Description	Default Setting
Number of Checks	X0	1 Scan, number of Checks = 0	
	X1	2 Scans, number of Checks = 1	o
	X2	3 Scans, number of Checks = 2	
	X3	4 Scans, number of Checks = 3	
	BS	5 Scans, number of Checks = 4	
	BT	6 Scans, number of Checks = 5	
	BU	7 Scans, number of Checks = 6	
	BV	8 Scans, number of Checks = 7	
	BW	9 Scans, number of Checks = 8	

10.4. Illumination, Aiming

This section describes in detail the read LED illumination and aiming for the NLV3101.

10.4.1. Read Illumination

It is possible to enable/disable, set the lighting method, as well as the brightness level of the red LED illumination. The following settings are available for use when scanning codes displayed on surfaces such liquid crystal screens.

・LED Illumination ⇒ Enable/Disable

If illumination is disabled, the quality of the read will noticeably drop. However, codes shown in liquid crystal displays will experience an improvement in readability.

・LED Illumination ⇒ Switch Automatically

Records and stores the scan projection status when alternating between Light ON/OFF, and preforms the read prioritizing that status. This function is recommended for situations when reading codes displayed on both paper and plasma displays.

・LED Illumination ⇒ Specular Reflection Prevention

When reflective light occurs from the LED, the illumination setting will switch to OFF and preform the scan. This function is recommended for situations when reading codes on liquid crystal displays.

Item	Command	Description	Default Setting
LED Illumination Mode	D39	LED Illumination ⇒ Enable	o
	D3A	LED Illumination ⇒ Disable	
	D3B	LED Illumination ⇒ Switch Automatically	
	D3Q	LED Illumination ⇒ Specular Reflection Prevention	
Adjust LED Illumination Brightness	DDB	LED Illumination Brightness ⇒ Standard	o
	DDC	LED Illumination Brightness ⇒ Low Level	

Flickering:

The anti-flickering function helps to prevent the flickering light that emits from the LED projector when there is no barcode target to scan, which may cause soreness and damage to the eyes. However, enabling this setting causes codes displayed on liquid crystal media to become more difficult to read.

Item	Command	Description	Default Setting
LED Illumination Anti-Flickering	D3I	LED Illumination ⇒ Prevents flickering LED light	
	D3J	LED Illumination ⇒ Prioritizes reading of liquid crystal display media	o

10.4.2. Aiming

This section explains the enabling/disabling of the green LED aiming light.

Item	Command	Description	Default Setting
Aiming ON/OFF	D3D	Aiming Light ⇒ Enable	o
	D3E	Aiming Light ⇒ Disable	
Adjust Aiming Brightness	DDD	Aiming Light Brightness ⇒ High	o
	DDE	Aiming Light Brightness ⇒ Standard	
	DDF	Aiming Light Brightness ⇒ Low	

10.5. Scan Media

Settings may need to be customized depending on the media-type of a particular symbology.

10.5.1. Concatenated Codes

A “concatenated code” refers to breaking up a single block of data via multiple codes, and reconnecting them for output when preforming a scan. The method of customizing these settings is described in detail below:

Item	Command	Description	Default Setting
Concatenated Codes	EBU	Enable	o
	EBV	Disable	

Example) Connecting 2 QR Codes:

Example) Connecting 3 QR Codes:

• When reading 2D concatenated codes, select “High Speed Search” from the “Code Search Priority Mode” tab (ref. 10.3.2.) to enhance the scanning speed.

10.5.2. White/Black Inverse Codes

Normally barcodes are printed in standard black ink onto white surfaces, however laser printing technology allows for imprinting white labels onto black metallic surfaces as well. Standard codes are printed in the traditional methods, while the latter are referred to as “Inverse Codes”. If “Inverse Codes Only” is selected, standard codes may not be used (This also applies to menu labels). ・・・

• Caution: The read will perform more slowly than normal when both standard and inverse codes are selected.

Item	Command	Description	Default Setting
Black/White Inverse Codes	V2	Standard Codes Only	o
	V3	Inverse Codes Only	
	V4	Both Standard and Inverse Codes	

Example) Standard and Inverse Data Matrix Codes:

Positive Data Matrix

Negative Data Matrix

Menu Barcodes:

Only standard barcodes are enabled.

Code	Contents	1D Menu Code
ZZ	Menu Mode Start/Finish	
V2	Standard Codes Only	
ZZ	Menu Mode Start/Finish	

10.5.3. Book Codes

This section explains in detail the different types of book code symbologies readable by the NLV3101.

Magazine Codes:

Magazine code scanning is only enabled with the below JAN-13 + Add On 5 barcodes.

・Leading “491” JAN-13

・Add On 5 (Price Code)

Data will only be outputted to the host computer after both JAN-13 and Add On 5 codes have been scanned.

Item	Command	Description	Default Setting	Notes
Enable/Disable Magazine Codes	XEM	Disable	o	
	XEN	Enable		

ISBN 2-Stage Labels:

ISBN 2-stage label reading is only enabled with the below barcodes.

・Leading “978” EAN-13 (Stage 1 Code)

・Leading “192” Instore-13 (Stage 2 Code)

Data will only be outputted to the host computer when both the EAN-13 and Instore-13 barcode stages have been scanned.

Output Method:

The following outputting methods are available.

・Enable/Disable ISBN 2-Stage Output Coupling

・Enable/Disable ISBN 2-Stage Character Output Coupling

The character gap in between the first and second stages is set as "," (comma).

(Only usable when ISBN 2-Stage Output Coupling is enabled)

Item	Command	Description	Default Setting	Notes
Enable/ Disable ISBN 2-Stage Label Reading	XSA	Disable	o	
	XSB	Enable		
Enable/Disable ISBN 2-Stage Output Coupling	D7W	No Output Coupling	o	
	D7X	Yes Output Coupling		
Enable/Disable ISBN 2-Stage Output Coupling Gap “,” Character	D7Y	Add Coupling Character “,”	o	
	D7Z	Do Not Add Coupling Character “,”		This is only enabled during the combining process

Example) ISBN 2-Stage Label

9 781 234 567 897

1 921 234 010 506

10.5.4. Batch Scan Settings

This section explains the method of how to set the minimum number of codes that must be read before outputting data. Take note that while using this setting option, any number of codes greater than the previously determined amount will not be scanned. In addition, the "Data Edit Programming" (ref. 11.) function is recommended for when the scan data format is pre-determined. Single barcodes may also be scanned when reading a batch of multiple codes.

Item	Command	Description	Default Setting
Multiple Read Label Number	D01	1 Code Multiple Read Label	○
	D02	2 Code Multiple Read Label	
	D03	3 Code Multiple Read Label	
	D04	4 Code Multiple Read Label	
	D05	5 Code Multiple Read Label	
	D06	6 Code Multiple Read Label	
	D07	7 Code Multiple Read Label	
	D08	8 Code Multiple Read Label	
	D09	9 Code Multiple Read Label	
	D0A	10 Code Multiple Read Label	
Multiple Read Label (Left/Right) *1	D0N	Reads from left to right	○
	D0O	Reads from right to left	
Multiple Read Label (Top/Bottom) *1	D0P	Reads from top to bottom	○
	D0Q	Reads from bottom to top	
Multiple Read Label (Output Priority) *1	D0R	Priority Horizontal Output	
	D0S	Priority Vertical Output	○
Enable/Disable Same Label Read	D0T	Disable	○
	D0U	Enable	
Enable/Disable Change Order	D0V	Enables order changing for the "Finish Decoding" label	○
	D0W	Disables order changing for the "Finish Decoding" label	
Buffer Mode	D0X	Buffer Mode (1 image)	
	D0L	Buffer Mode (n image)	○

1 If reading in the scanning order, Buffer Mode (1 image) is recommended to prevent incorrect outputting.

11. Data Edit Programing

This chapter explains in detail the processing/setting of data editing and batch reading. Within Data Edit Programming, by setting the “Cut” and “Paste” scripts, both large amounts of data may be edited without making changes to the host system, as well as preform batch scans based upon more detailed conditions.

・***Standard settings are easily utilized through the data edit function of the “Universal Menu Tool 2D”.***

11.1. Data Edit Programing Setting Overview

Within data edit programming, data substrings may be cut via the Cut Script function, which then may be pasted into the outputted data with the Paste Script to be edited.

・Cut Script:

The Cut Script allows for the cutting of any segment from scanned data substrings, which is then stored in the “Substring Database”.

The below actions are possible within the Cut Script:

1) Cut substrings
2) Cut application identifier strings
3) Remove specified strings when cutting
4) Add specified strings when cutting

・Substring Database:

The Substring Database manages data substrings cut via Cut Script such that afterwards it may be used in the Paste Script process.

・Paste Script:

The Paste Script refers to the method in which the data substrings cut via Cut Script and recorded in the Substring Database are pasted into outputted data.

The below actions are possible within the Paste Script:

1) Paste substrings
2) Paste application identifier strings
3) Insert specified strings

11.2. Data Edit Programing Practical Examples

In this section 4 explicit, practical examples of data edit programming are explained in detail.

11.2.1. Extracting Necessary Data from GS1 AI

This first example is when specific information such as the Lot No is included in the outputted settings. Though set with an output limit of 4 application identifiers, a grand total of 64 data blocks may be cut or pasted within Data Edit Programing. Outputting may only occur when application identifiers 01 (essential) and 17/30/10 (optional) are available.

Example Settings)
Cut Script:
¥Ax+$

Paste Script:
¥(GTIN¥)¥A01[0]¥Dx¥x0DLotNo:(¥A10[0]¥Dx|??)¥x0DExpirationDate:(¥A17[0]¥Dx|??)¥x0DQuantity:(¥A30[0]¥Dx|??)¥x0D

・Additional Settings: Enable GS1 Composition Code (ref. 5.1.3)
Setting Confirmation Number: 1 (ref. 9.3.3.)

・Setting Menu

 (Stores in Setting 1)	Setting Code Data: @MENU_OPTO@ZZ@ED0@'¥Ax+$'@ED1@'¥(GTIN¥)¥A01[0]¥Dx¥x0DLotNo:(¥A10[0]¥Dx|??)¥x0DExpirationDate:(¥A17[0]¥Dx|??)¥x0DQuantity:(¥A30[0]¥Dx|??)¥x0D'@ED2@Q1@BHE@ZZ@OTPO_UNEM@

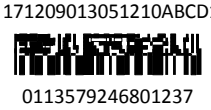
Symbology:
・GS1-Limited

Outputted Data:
(GTIN)04901234567894
Lot No:??
Expiration Date: ??
Quantity: ??

・GS1-128

(GTIN) 15012345678907
Lot No: EFGH5678
Expiration Date: 121103
Quantity: 256

・GS1-CompositeCode



(GTIN) 13579246801237
Lot No: ABCD1234
Expiration Date: 120901
Quantity: 512

・GS1-Data Matrix

(GTIN) 12345678901231
Lot No: IJKL8901
Expiration Date: 120401
Quantity: ??

11.2.2. GS1 2-Stage Label Batch Scanning

Necessary data may be set even when split among multiple labels. Within this example, outputting occurs when application identifiers 01/17/10 (essential) and 30 (optional) are available. When utilizing this setting, the single code for application identifier 01 becomes unreadable. However, it may still be scanned and outputted via the previously mentioned GS1-128 / GS1-Composite Code / GS1-Data Matrix.

Example Settings)
Cut Script:
¥Ax+$

Paste Script:
¥(GTIN¥)¥A01[0]¥Dx¥x0DLotNo:¥A10[0]¥Dx¥x0DExpirationDate:¥A17[0]¥Dx¥x0DQuantity:(¥A30[0]¥Dx|??)¥x0D
Setting Confirmation Number: 2

・Setting Menu

 (Stores in Setting 2)	Setting Code Data: @MENU_OPTO@ZZ@ED0@'¥Ax+$'@ED1@'¥(GTIN¥)¥A01[0]¥Dx¥x0DLotNo:¥A10[0]¥Dx¥x0DExpirationDate:¥A17[0]¥Dx¥x0DQuantity:(¥A30[0]¥Dx|??)¥x0D'@ED2@Q2@BHE@ZZ@OTPO_UNEM@

Symbology:
* GS1-128 2 stage label

Outputted Data:

(GTIN) 15012345678907
Lot No: IJKL8901
Expiration Date: 120901
Quantity: 512

・In order to completely read the above 2-stage label batch, disable the saved settings for Setting Number 1 (9.3.3.). If not disabled, though the first stage of the above barcodes will output correctly, if the second stage is read beforehand all items besides (GTIN) will be outputted as "??".

11.2.3. Outputting Necessary Information from Multiple Labels

Within this example the number of batch labels is set at 4. However, Data Edit Programing allows for a maximum of 16 labels and 8192 settable characters.

Example Settings)
Cut Script:
¥SB4[0-9]{12}$/¥ST[0-9]{6}“-“[0-9]{2}“-“[0-9]{6}“-“[0-9]$/¥ST<L>[0-9A-Z]+$/¥ST<S>[0-9A-Z]+$

Paste Script:
[0]¥x0DIMEI:[1]¥x0DLot No:[2]¥x0DSerial No:[3]¥x0D

Setting Confirmation Number: 3

・Setting Menu

(Stores in Setting 3)	Setting Code Data: @MENU_OPTO@ZZ@ED0@'¥SB4[0-9]{12}$/¥ST[0-9]{6}"-"[0-9]{2}"-"[0-9]{6}' -"[0-9]$/¥ST<L>[0-9A-Z]+$/¥ST<S>[0-9A-Z]+$'@ED1@'GTIN:0[0]¥x0DIMEI :[1]¥x0DLot No:[2]¥x0DSerial No:[3]¥x0D'@ED2@Q3@ZZ@OTPO_UNEM@

Symbology: [Outputted Data]

・4 Label Product Batch Scan

GTIN-13

4 123456 789018

Lot No.

L 0 1 2 3 A B C D

IMEI:

1 2 3 4 5 6 7 8 9 0 1 2 3 4 5

Serial No:

S E F G H I J K 4 5 6 7 8 9 0

GTIN: 04123456789018
IMEI: 123456-78-901234-5
Lot No: 0123ABCD
Serial No: EFGHIJK4567890

11.2.4. Outputting Necessary Information From Comma-Delimited Data
Though only four blocks of delimited data may be outputted within this example, Data Edit Programming allows for a maximum of 64 blocks to be cut and pasted.

Example Settings)
Cut Script:
(?:(.*?)(?:,|$)){4}

Paste Script:
〒[0,1,0]¥x0D[0,1,1]¥x0DTEL:[0,1,2]¥x0DFAX:[0,1,3]¥x0D

Setting Confirmation Number: 4

・Setting Menu

(Stores in Setting 4)	Setting Code Data: @MENU_OPTO@ZZ@ED0@'(?:(.*?)(?:,|$)){4}'@ED1@'POST:[0,1,0]¥x0D[0,1 ,1]¥x0DTEL:[0,1,2]¥x0DFAX:[0,1,3]¥x0D'@ED2@Q4@ZZ@OTPO_UNEM@

11.3. Setting Data Edit Programming

Within this section, the Data Edit Programing setting method is explained in detail.

11.3.1. Setting Commands

Within Data Edit Programing, the cut and paste settings may be utilized via the below commands:

Item	Command	Description	Notes
Cut Script Settings	ED0	Inputs the Cut Script followed by entering the command	
Paste Script Settings	ED1	Inputs the Paste Script followed by entering the command	
Confirm Setting Number Settings	ED2	Numerical value may be inputted via commands	Available Values: 1-4

Input Formats)

・Cut Setting Format: <ESC> [ED0'Cut Script' <CR>

The enclosed '…' within the Cut Script must be entered, followed by the finishing command.

・Paste Setting Format: <ESC> [ED1'Paste Script' <CR>

The enclosed '…' within the Paste Script must be entered, followed by the finishing command.

・Confirm Number Setting: <ESC> [ED2 Setting Number<CR>

This setting is utilized to enter the command numerical value (Settable numbers are Q1-Q4). When the Confirm Number Setting has been entered, the Cut/Paste Scripts will then store that number in their settings and thereby enable them.

**** When utilizing ['] with the Cut/Paste scripts, input as ["] instead.***

11.3.2. Setting 2D Menu Codes

Data Edit Programming makes use of the same format as standard 2D menu codes.

・Data Formats

@MENU_OPTO@ZZ@ED0@'Cut Script'@ED1@'Paste Script'@ED2@SettingNumber@ZZ@OTPO_UNEM@

"@MENU_POTO" (Start Key)	
"@" (Separator)	
"ZZ" (Start Key)	
"@" (Separator) "Any 1 Command " (ex. BHE)	←Multiple or no settings are also possible.
"@" (Separator) "ED0"	
"@" (Separator) "'Cut Script'"	
"@" (Separator) "ED1"	
"@" (Separator) "'Paste Script'"	
"@" (Separator) "ED2"	
"@" (Separator) "QN" (Setting Number N [N: 1-4])	
"@" (Separator) "Any 1 Command" (ex. BHE)	←Multiple or no settings are also possible.
"@" (Separator)	
"ZZ" (Finish Key)	
"@" (Separator)	
"OTPO_UNEM@" (Stop Key)	

11.3.3. Enable/Disable Data Edit Programing Settings

Within Data Edit Programming there are 4 available numbers that may store saved settings. Each of these may be enabled or disabled.

Item	Command	Description	Notes
Enable/Disable Setting Number	ED3	Enable	
	ED4	Disable	

・Enable Setting Number

<ESC> [ED3 Setting Number <CR>

In order to enable this setting, enter the Q1-Q4 setting number followed by the command.

・Disable Setting Number

<ESC> [ED4 Setting Number <CR>

In order to enable this setting, enter the Q1-Q4 setting number followed by the command.

Enable/Disable Setting Number Table:

Setting Number	Setting Method	Enable the Setting		Disable the Setting	
1	Command	REGE	Q1	REGD	Q1
	Menu	@MENU_OPTO@ZZ@ED3@Q1@ZZ@OTPO_UNEM@		@MENU_OPTO@ZZ@ED4@Q1@ZZ@OTPO_UNEM@	
2	Command	REGE	Q2	REGD	Q2
	Menu	@MENU_OPTO@ZZ@ED3@Q2@ZZ@OTPO_UNEM@		@MENU_OPTO@ZZ@ED4@Q2@ZZ@OTPO_UNEM@	
3	Command	REGE	Q3	REGD	Q3
	Menu	@MENU_OPTO@ZZ@ED3@Q3@ZZ@OTPO_UNEM@		@MENU_OPTO@ZZ@ED4@Q3@ZZ@OTPO_UNEM@	
4	Command	REGE	Q4	REGD	Q4
	Menu	@MENU_OPTO@ZZ@ED3@Q4@ZZ@OTPO_UNEM@		@MENU_OPTO@ZZ@ED4@Q4@ZZ@OTPO_UNEM@	

11.4. Outputting Data Edit Programing Script Settings

This section explains the outputting method for cut/paste script data stored within the setting number.

Item	Command		Description	Notes
Capture Script	ED5	Qn	Captures the setting number script	n :1-4

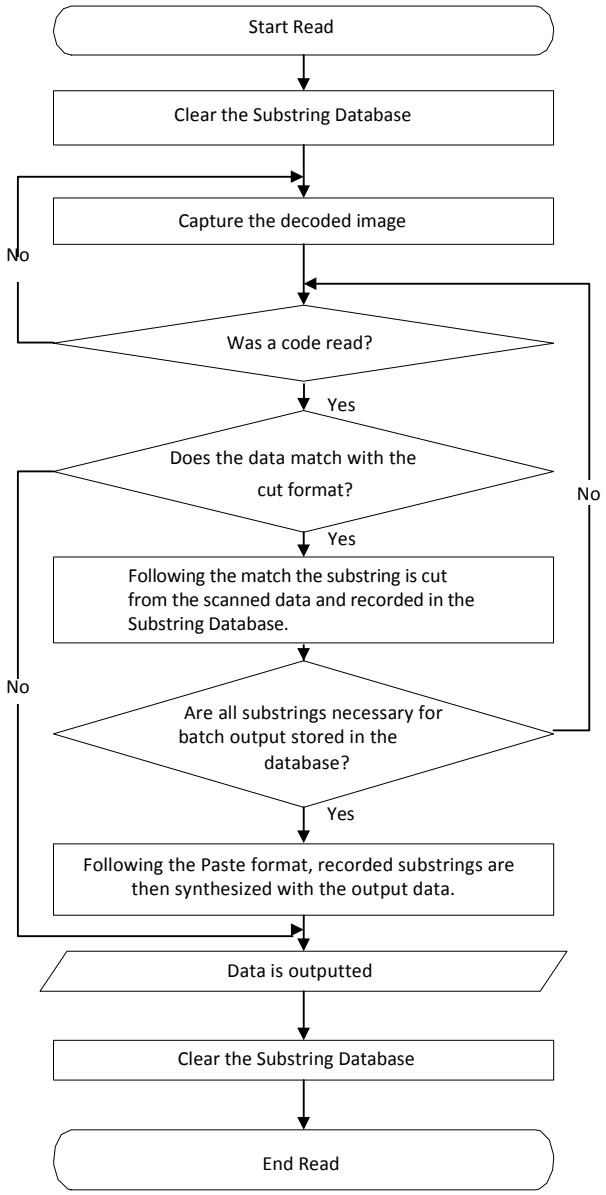
・Capture Setting Number Script
<ESC> [ED5 Setting Number<CR>
In order to capture the script, enter the Q1-Q4 setting number followed by the command.

Output setting strings via the below format:
Cut Script<CR>Paste Script<CR>

11.5. Data Edit Programing Specifications

The specification flow for Data Edit Programming is shown below:

Data Edit Programing Flowchart



・Cut Format:
This is the format for recording substrings cut from decoded data into the Substring Database.
**** It is also possible to record multiple cut scripts in order to better control batch readings.***
・Cut Script:
This is a setting script made up of several combined cut formats.
・Substring Database:
This is the database in which substrings cut from label data are stored.
・Paste Format:
Using substrings recorded in the Substring Database, this format works to create the structure of outputted data.
・Paste Script:
This is the setting script which represents the paste format.

11.5.1. Cut Format

The cut format compares and determines any matches found in the currently scanning decode data. If matches are found, substrings will then be extracted according to the cut format. When there are multiple cut scripts recorded, matching will be processed in the order of oldest-to-newest cut format ID. Substrings cut in this way are then recorded in the Substring Database. However, if no match is found data will be outputted via standard methods.

The two methods of pulling substrings via cut script are detailed below:
・”( )“ is inputted within the cut format, and any matches found in the data string are pulled
・”¥ACCCC” is inputted within the cut format, and the application identifier (AI) data string is pulled

**** The Application Identifier (AI) is GS1 compliant. (ref. 9.9. Application Identifier)***

**** Any AI or [x] is entered into CCCC. If AI, the [CCCC] positioned in ¥ACCCC's identifier + data string is pulled. If [x], it will pull from the AI placed in ¥Ax’s identifier and data string.***

The below table displays an example of label data, cut format, and cut data strings:

Label Data	Cut Format	Cut Data String
ABCDEF	AB(CDE)F	CDE
3910JPY1050	¥A3910	3910JPY1050
	¥A391D	
	¥Ax	

**** The character that displays the decimal position for AI data may be substituted with [D]. (3910-3919 is pulled.)***

11.5.2. Substring Database

The NLV3101's Substring Database stores strings that have been cut from label data. In addition, it is possible to configure substrings when output data is being constructed. These substrings are stored in 2 different methods: 1) stored via cut script ( ), or 2) via cut script ¥ACCCC or ¥Ax, and are explained in further detail below:

I. Control Method for Substrings Cut via Parenthesis:

Within the Substring Database, substrings that are cut via the "( )" inside of the cut script are controlled and managed with the 3 below IDs:

・Cut Format ID: L

This ID specifies which IDs within the cut format store which data strings.

・Cut Parenthesis ID: M

The Cut Parenthesis ID indicates whether a substring that is registered in the same ordinal position of cut format within "( )" matches or not.

・Cut Count ID: N

The Cut Count ID specifies the recording order of substrings stored in formats with identical cut script and cut parenthesis IDs.

**** Strings recorded in Cut Format ID = L, Cut Parenthesis ID = M, and Cut Count ID = N are notated as [L, M, N].***

The below table is an example of label data, cut format, and the Substring Database:

Label Data	Cut Format (Number = Cut Script ID)	Substring Database
ABCDEF	0. AB(CDE)F 1. GHI([A-Z])*	[0,0,0]=ABCDEF [0,1,0]=CDE
GHIJK	0. AB(CDE)F 1. GHI([A-Z])*	[1,0,0]=GHIJK [1,1,0]=J [1,1,1]=K

**** [A-Z] will match with any corresponding letter of the alphabet, "[*]" refers to the repetition of "( )".***

**** Data strings with a complete cut script match are recorded as Parenthesis ID = 0 and Cut Count ID = 0.***

II. Control Method for Substrings Cut via AI Specification:

Within the Substring Database, strings cut via ¥A0000 or ¥Ax in the cut script is managed with the 3 below IDs:

・Application Identifier: CCCC

This function specifies which substrings are cut by which identifier.

・Cut Format ID: L

Both the Cut Format and Cut Count IDs are identical to those within "( )". Cut Format ID will indicate, among the recorded "Cut Formats", which substring, recorded via which ID's "Cut Format", that it is.

・Cut Count ID: N

This ID specifies the recording order of substrings stored in formats with identical cut script IDs and application identifiers.

Within substrings recorded via Application Identifier = CCCC, Cut Script ID = L, or Cut Count ID = N, the application identifier portion is listed as “¥ACCCC[L,N]¥I” and the data field portion as “¥ACCCC[L,N]¥Dx”. In addition, regarding AI’s with multiple data fields such as Application Identifier 39 D, the “n’th” data field is listed as “ ¥ACCCC[L,N]¥Dn”, while strings connected to all data fields are shown as “¥ACCCC[L,N]¥Dx”.

The below table is an example of label data, cut format, and the Substring Database:

Label Data	Cut Format	Substring Database
1712040117120901	0. ¥A17¥A17	¥A17[0,0]¥I=17 ¥A17[0,0]¥D1=120401 ¥A17[0,0]¥Dx=120401 ¥A17[0,1]¥I=17 ¥A17[0,1]¥D1=120901 ¥A17[0,1]¥Dx=120901
	0. ¥A17*	
	0. ¥A17¥Ax	
	0. ¥Ax¥A17	
	0. ¥Ax¥Ax	
	0. ¥Ax*	
3910JPY1050	0. ¥A3910	¥A3910[0,0]¥I=3910 ¥A3910[0,0]¥D1=JPY ¥A3910[0,0]¥D2=1050 ¥A3910[0,0]¥Dx=JPY1050
	0. ¥A391D	
	0. ¥Ax	

**** The above “*” refers to the repetition of ¥A17 or ¥Ax.***

**** For every block of label data, the Substring Database will display the same recorded string regardless of the cut script utilized in Cut Script ID = 0.***

11.5.3. Paste Format

The paste format synthesizes output data based upon the substrings recorded in the Substring Database. This output data will only be synthesized if enough necessary data is accumulated, and once completed, will then be transmitted to the host computer. If there is a deficit of data, information will remain stored in the Substring Database and scanning will resume accordingly. Finally, it is possible to add substrings recorded in the Substring Database to output data by inputting the substring list from the previous “11.5.2 Substring Database” section into the paste format.

The table below displays an example of the Substring Database, paste format, and output data.

<table>
<tr><th>Substring Database</th><th>Paste Format</th><th>Output Data</th></tr>
<tr><td>[0,0,0]=ABCDEF
[0,1,0]=CDE [1,0,0]=GHIJK
[1,1,0]=J [1,1,1]=K</td><td>[0,1,0]_[1,1,0]_[1,1,1]</td><td>CDE_J_K</td></tr>
<tr><td rowspan="2">¥A3910[0,0]¥I=3910
¥A3910[0,0]¥D1=JPY
¥A3910[0,0]¥D2=1050
¥A3910[0,0]¥Dx=JPY1050</td><td>¥A3910[0,0]¥I_¥D1_¥D2</td><td rowspan="2">3910_JPY_1050</td></tr>
<tr><td>¥A391D[0,0]¥I_¥D1_¥D2</td></tr>
</table>

**** Thanks to ¥A3910[0,0], it is possible to temporarily continue outputting by designating either AI ID, cut script ID or cut count ID even if ¥I or ¥D1/¥D2 has been inputted.***

11.6. Cut Script Specifications

This section describes in detail the specifications for the cut script. First of all, the cut format is listed by using the cut script. These specifications use POSIX regular expressions as a base, and are an extension of functions used to edit label data.

**** Some POSIX functions are not supported. Also, multiple cut scripts may be listed by separating regular expressions via [/].***

11.6.1. Code Type Matching Syntax

This syntax is necessary to control code types which perform data cut processing. By listing OPTICON Code ID after ¥S (ref. 11.1.1.), only supported code types will be subject to cutting.

Item	Description
¥SX	Code Type: Designate OPTICON Code ID within X. Once completed, cutting will be performed only on specified code type. This item will remain active regardless of where it is listed inside the cut setting string. Enumerate this item when enabling multiple cutting code types. Example: ¥SC¥SF¥SG This example will enable cut processing for UPC-A, UPC-A + 2, and UPC-A + 5 data. Furthermore, cut processing may be performed will all code data if there is no listed code type within the regular expression.

11.6.2. Character Matching Syntax

This section explains Character Matching Syntax in detail. After comparing the target character and meeting necessary conditions, the target is switched to the next character and syntax. A cutting error will occur if conditions are not met.

Item	Description
x	Matching for X: First, write any character in "x". This is then compared against the target character, and if matching is cut and the target moves to the next character and syntax. A cutting error will occur if conditions are not met.
¥	Escape Sequence: Matching for the Immediately Following Meta Character: First, the immediately following meta character is compared against a standard character. If they are equal the character is cut, then the target moves to the next subject and syntax. If not, then a cutting error will occur. Within Data Edit Programming, in ASCII all characters aside from numbers and the space underscore are reserved as meta characters.
^	Matching for the Beginning of the String: The cutting target searches whether it is at the start of the string or not, and if so moves to the next available syntax. If not, then a cutting error will occur.
$	Matching for the End of the String: The cutting target searches whether it is at the end of the string or not, and if moves to the next available syntax. If not, then a cutting error will occur.
.	Wild Card: Matching for All Characters: The target character is cut and the target moves to the next available syntax.
[a-z0-9]	Matching for Any Character Inside "[ ]": The cutting target searches whether it is within [ ], and if so is cut and moves to the next available syntax. If not included, then a cutting error will occur. For example, characters grouped together such as [12345] (any one of 1/2/3/4/5 characters are matching) or [abcde] may be written as [1-5] and [a-e]. **** By writing "^" at the beginning of the string, the target will written as a character match not included within the contents of "[ ]". Because of this be sure to place "^" anywhere beside the start of the data string, or use the escape***
[^a-z0-9]	Matching for A Character Outside of "[ ]": The cutting target searches whether it is outside of [ ], and if so is cut and moves to the next available syntax. If included, then a cutting error will occur. **** Since placing "^" anywhere besides the head will be interpreted literally, be sure that it is always written there.***

11.6.3. Application Identifier Matching Syntax

This syntax explains in detail the Application Identifier Matching Syntax. Within this function, the target character searches for whether strings following the subject character match with the AI format. If it does, the matching substring is cut, the target proceeds an equal distance of characters forward and moves to the next available syntax. A cutting error will occur if there is no available match.

Item	Description
¥Ax	Matching for the Application Identifier and the Following Data: There is no limit to the number of available application identifier types. If data strings following the target character match with the application identifier, they are both then cut and the target moves to the next available syntax. A cutting error will occur if there is no match.
¥ACCCC	Matching for the Application Identifier CCCC and the Following Data: There is a limited syntax for ¥Ax's application identifier. For example, the target will match with AI 01 and its' data string if written as "¥A01". (Example: matches with [0112345678901234]) When written as "¥A310D" the target will match with AI 3100 through 3109 and the corresponding data strings. (Example: matches with [3101123456])

11.6.4. Repeat Syntax

The purpose of this function is to repeat the previously matching syntax. For example, "a*" will continue matching any string that has been repeated more than once by "a" for as long as possible. Or, "a*" will continue matching any string that has been repeated more than once by "a" for as **short** a time as possible (Matched strings will be cut via Character Match Syntax). Similarly to the above, for "¥Ax*", application identifiers and its data string will continue to match any string that has been repeated more than 0 times for as long as possible. The syntax "¥Ax*?" also follows the above, in that application identifiers and their data strings will continue to match any string that has been repeated for as **short** a time as possible.

Item	Description
*	Repeat Syntax (0~) (Longest Match) This syntax matches with previous characters/groups repeated more than 0 times. The syntax will attempt to match with the group with the greatest number of repetitions.
+	Repeat Syntax (1~) (Longest Match) This syntax matches with previous characters/groups repeated more than 1 time. The syntax will attempt to match with the group with the greatest number of repetitions.
?	Repeat Syntax (0~1) (Longest Match) This syntax matches with previous characters/groups repeated more than 0 and less than 1 time. The syntax will attempt to match with the group with the greatest number of repetitions.
{n}	Repeat Syntax (n) (Longest Match) This syntax matches with previous characters/groups repeated “n” times. The syntax will attempt to match with the group with the greatest number of repetitions.
{n,}	Repeat Syntax (n~) (Longest Match) This syntax matches with previous characters/groups repeated at a greater number of times than “n”. The syntax will attempt to match with the group with the greatest number of repetitions.
{n, m}	Repeat Syntax (n~m) (Longest Match) This syntax matches with previous characters/groups repeated more than “n” times and less than “m”. The syntax will attempt to match with the group with the greatest number of repetitions.
*?	Repeat Syntax (0~) (Shortest Match) This syntax matches with previous characters/groups repeated more than 0 times. The syntax will attempt to match with the group with the least number of repetitions.
+?	Repeat Syntax (1~) (Shortest Match) This syntax matches with previous characters/groups repeated more than 1 time. The syntax will attempt to match with the group with the least number of repetitions.
??	Repeat Syntax (0~1) (Shortest Match) This syntax matches with previous characters/groups repeated more than 0 times and less than 1. The syntax will attempt to match with the group with the least number of repetitions.
{n}?	Repeat Syntax (n) (Shortest Match) This syntax matches with previous characters/groups repeated “n” times. The syntax will attempt to match with the group with the least number of repetitions.
{n,}?	Repeat Syntax (n~) (Shortest Match) This syntax matches with previous characters/groups repeated at a greater number of times than “n”. The syntax will attempt to match with the group with the least number of repetitions.
{n, m}?	Repeat Syntax (n~m) (Shortest Match) This syntax matches with previous characters/groups repeated more than “n” times and less than “m”. The syntax will attempt to match with the group with the least number of repetitions.

11.6.5. Grouping Syntax

Grouping syntax is necessary to consolidate previously-mentioned multiple matching syntaxes, grouping together the scope of application for repeat syntaxes, and for extracting substrings.

Item	Description
( )	Grouping Strings: Regular expressions within "( )" are grouped together as a single matching syntax. In addition, strings matched with these expressions are cut as substrings and given a Cut Parenthesis ID in order of their appearance within "( )". Example) Regular expression "(([0-9]*)[a-z]*)*" matches with "123abc456def789ghi", and then substrings may be cut in the following ways: [L,1,0]=123abc, [L,1,1]=456def, [L,1,2]=789ghi, [L,2,0]=123, [L,2,1]=456, or [L,2,2]=789 ***Note: "L" is a cut script ID.***
(?:)	Grouping Strings: Regular expressions within "( )" are grouped together as a single match syntax. However, strings matched with expressions are **not** cut as substrings, and they are not given a Cut Parenthesis ID either. If regular expression "(abc(?:def)ghi)" is matched with "abcdefghi", only "abcdefghi" will be cut.
(!:)	Grouping Strings: Strings matched with regular expressions within "( )" are cut without any of the previously mentioned additions or removals. Example) With regular expressions "(abc<(!:def"jk")>ghi)" or "(abc (!:<def"jk">) ghi)", "[abcdefghi]" will be matched and "abcjkghi" and "def" will be cut.

11.6.6. Insert/Remove Syntax

Insert/Remove Syntax is not included in POSIX regular expressions; it is an expanded function created to conduct string replacement for label data. Insert syntax inputs new data strings into previously cut ones, while remove syntax will take the specified strings away.

<table>
<tr><th>Item</th><th colspan="2">Description</th></tr>
<tr><td rowspan="8">“ “</td><td colspan="2">Insert Syntax:
Insert syntax will cut the data string inside of “ “, and then inserts it into a second string. For example, “abcdefghi” will be cut if regular expression “(abc“def “ghi)” is matching with “abcghi”. In addition, it is also possible to insert pre-cut substrings via the below syntaxes.</td></tr>
<tr><td>[n]</td><td>This syntax will insert substrings cut via the “n’th” “( )” or “(!:)”. For example, regular expression “((abc)def”ghi[2]”jkl))”, matches with “abcdefjkl”, and “abcdefghiabckjl” will be cut via the first parenthesis. Also, when written as either “[]” or “[0]”, the most recently cut substring will be entered regardless of parenthetical order. As can be seen with the previous example, the result will be the same even with regular expression “((abc)def”ghi[]”jkl)”. However, an insert error will occur if the specified string does not exist.</td></tr>
<tr><td>¥ACCCC</td><td>With this syntax, among pre-cut application identifier data, only “CCCC” is considered to be an insert target. For example with ¥A01, pre-cut AI 01 data will be inserted. If there is multiple AI 01 data, the most recently cut will become the insert target.</td></tr>
<tr><td>¥Ax</td><td>With this syntax, the most recent application identifier data will become the insert target regardless of type.</td></tr>
<tr><td>¥I</td><td>With this syntax, the substring of the current insert target AI data is inserted. However, an insert error will occur if the specified string does not exist.</td></tr>
<tr><td>¥Dx</td><td>This syntax enters in all substrings for the current insert target. However, if the data does not exist then an insert error will occur.</td></tr>
<tr><td>¥Dn</td><td>With this syntax, the “n’th” data field string of the current insert target is entered. However, if the data does not exist then an insert error will occur. For example, when there are 2 data field types such as application identifier 319D (ISO currency codes and sum payments), both types may be separately inserted by inputting either “¥D1” or “¥D2”.</td></tr>
<tr><td>|</td><td>OR Operator:
This may be used if either the left or right side of the syntax is producing an insert error. If so, insert processing will be conducted on the side that is not producing the error. The left side will have priority if neither side is producing an error. If both sides produce an error, then another insert error will occur.</td></tr>
<tr><td>( )</td><td>With this syntax, though substrings within the parenthesis inside of " " are not cut, they are necessary for OR Operator Grouping.</td></tr>
<tr><td>< ></td><td colspan="2">Remove Syntax:
Remove syntax will take away data strings that match regular expressions within “< >”. For example, if regular expression “(abc<def>ghi)” matches with “abcdefghi”, only “abcghi” will be cut.</td></tr>
</table>

11.6.7. Selection Syntax

This section explains the Selection Syntax in detail. Among cut setting strings, aside from the POSIX regular expression standard OR operator, there also is an input OR operator "/", which distributes cut script IDs.

Item	Description
|	OR Operator: The OR operator will perform cut processing as long as either the left or right side of the syntax does not produce a cutting error. If both sides are not producing errors, then the left side will be prioritized. If both sides produce an error, then another cutting error will occur.
/	Input OR Operator: While the basic functions of this operator work similarly to the above, regular expressions broken by the input OR operator are assigned cut script ID based on a left-to-right ordering. Label numbers distributed in this way are used in the cut script IDs assigned during previously mentioned substring cutting. For example, when the regular expression "abcd/0123" matches with "abcd" and "0123", "abcd" would be processed with cut script ID = 0 and "0123" with ID =1.

11.7. Paste Script Specifications

With the NLV3101, paste formats are written via the paste script.

The [Paste Format] is written by making use of the Paste Script. Within the Paste Setting String Syntax there is the standard Paste Character Syntax, the Substring Paste Syntax, Application Identifier Paste Syntax, and the OR Operator with a grouping "( )".

The table below explains paste setting strings in detail:

Item	Description
x	Character Paste Syntax: Write any character in “x”. After pasting itself into output data, it then moves to the next available syntax.
¥	Escape Sequence: The immediately following meta character is pasted in the output data as a standard character, then moves to the next available syntax. Within Data Edit Programming and with ASCII, all characters aside from numbers and the space underscore are reserved as meta characters.
[L,M,N]	Substring Paste Syntax: The substrings for Cut Format ID = L, Cut Parenthesis ID = M, and Cut Count ID = N are pasted before moving to the next available syntax. A paste error occurs if the corresponding substrings do not exist. It is also possible to abbreviate N = 0 as “L, M”, and M = 0 or N = 0 as “L”. (it is not possible to abbreviate L)
¥ACCCC[L,N]	Application Identifier Selection Syntax: This syntax specifies the application identifier target for application data pasting. Cut Script ID = L, Application Identifier = CCCC, and Cut Count ID = N are all specified as paste targets before moving to the next available syntax. If N = 0, it is also possible to write an abbreviated notation such as “¥ACCCC[L]”. (It is not possible to abbreviate ¥ACCCC and L.)
¥I	Application Identifier String Pasting Syntax: The identifier string portion of the current paste target “application identifier data” is pasted before moving to the next available syntax. A paste error will occur if the corresponding data does not exist.
¥Dn	Application Data Field Paste Syntax: The Data Field String ‘N’ for the current paste subject “application identifier data” is formatted and pasted. A paste error will occur if the corresponding data does not exist.
¥Dx	Application Data Paste Syntax: All data strings for the current paste subject “application identifier data” are formatted and pasted. A paste error will occur if the corresponding data does not exist.
¥DfHH	Application Data Paste Options Syntax: This syntax specifies, within 16 decimals, the enable/disable flag inside the HH section. 00: Disable all formats 01: Do not output YYMMDD’s DD when is at “00” 02: Enable decimal points 03: Enable all formats
|	OR Operator: Paste processing will be conducted via either the left or right side of the syntax as long as there are no paste errors. If both sides are not producing an error, the left side is prioritized. If both sides are producing errors, then an additional paste error will occur.
( )	This syntax is used for grouping the OR operator.

11.8. Character Code Settings

Within these settings, you may select character codes that will be used in Data Edit Programming. The NLV3101 processes decode data in accordance to the selected character codes. In addition, if a value is present within a character code it will be processed as a kanji character. As a general rule, most applications are compatible with all country character codes. However, programs such as Microsoft ™ Word may also utilize UTF.

The character code settings are set via the below formats:

Item	Command		Description	Default Setting	Notes
Character Code Selection	C21	Qa	Character Code Settings: a: the below formats	-	
	a=0		No Code	o	This is processed as binary code
	a=1		Shift JIS		This is used in Japanese Notebook or MS Excel
	a=2		GB18030		This is used in Chinese Notebook or MS Excel
	a=3		Big 5		This is used in Taiwanese Notebook or MS Excel
	a=4		UHC		This is used in Korean Notebook or MS Excel
	a=5		UTF-8		This is used in European/American MS Word *
	a=6		UTF-16		This is used in Japanese/Chinese/ Korean/Taiwanese MS Word *
	a=7		UTF-16LE		
	a=8		UTF-16BE		

**** Within MS Word the kanji use zone standard is UTF-16, however the standard for other applications is UTF-8. Also, It is possible to open files using different UTF's.***

11.9. Application Identifier

Several common examples of application identifiers are listed in the table below:

AI	Item	Description	Format
01	GTIN *Global Trade Item Number*	This is a consumer identification code, which identifies a product or service in a global manner. Available code lengths are 8, 12, 13, and 14 characters respectively. When expressing GTINAI (01) under 14 characters, 0 is placed at the head of GTIN as padding.	n2+n14
10	Lot Number	This refers to the lot number, batch number, processing treatment number, etc.	(n2+an...20)
21	Serial Number	This is a manufacturer-set number sequence that lasts throughout the product lifespan.	(n2+an...20)
410-415	GLN *Global Location Number*	This displays the global location number (The location or business's functions, billing address, delivery address, etc.).	n3+n13
11	Production Date	ISO format YYMMDD	n2+n6
15	Shelf Life Date	The period in which optimal consumption quality is maintained. ISO format YYMMDD	n2+n6
17	Expiration Date	This refers to the expiration date, medicinal expiration date, etc. Warnings regarding use past the expiration date are also included.	n2+n6
7003	Expiration Date and Time	This displays the time and date for products being moved within the same time zone. Format YYMMDDHHMM	(n3+n10)
310*	Net Weight	This displays the net weight of the product (In kilograms). ** Displays digits lower than the decimal position*	(n2+n…8)
392*	Weighing Product Sales Price	This displays the sale price for weighing products. ** Displays digits lower than the decimal position*	(n4+…n15)
251	Raw Materials Reference Number	This is the number for products that are referenced. (The ID number for meat products, etc.)	(n3+n..20)
422	Country of Origin	This displays the country of origin. Also, utilizes the country code designated via ISO3166	n3+n3
91-99	Internal Use	This is for data determined to be internal use only.	(n2＋an..30)

(Documentation: ref. Distribution System Production Center)

12. Imaging Mode

This chapter explains in detail the Imaging Mode for the NLV3101. This function is responsible for shooting, processing, and transmitting images.

12.1. Function Overview

The processing settings for Imaging Mode refer to the trimming and sub-sampling of raw images, pixel depth changing, and other such functions. The following commands may be used in this mode:

**** Note: RS-232C and USB-COM interfaces supported only***

Command	Description	Notes
DE6	This displays the Image Processing Settings	
DE7	This changes the Image Processing Settings	
DE8	This takes an image	

12.1.1. Displaying the Imaging Process Settings

The NLV3101 utilizes the DE6 command to output current processing settings via the below formats:

Formats:

1	T	r	i	m	(	2	,	3	,	4	,	5	)		S	u	b	(	6	,	7	)
	B	p	8		J	q	9		F	f	10		T	r	11		rR	e	12	13		

Fields:

No.	Field	Size [byte]	Effective Range	Description
1	Start Character	1	0x3B	";"
2	Trimming Left	4	0–751	Image left-side absolute coordinates
3	Trimming Top	4	0-479	Image upper-end absolute coordinates
4	Trimming Right	4	0-751	Image right-side absolute coordinates
5	Trimming Bottom	4	0-479	Image lower-end absolute coordinates
6	Sub-Sampling Horizontal	1	1, 2, 4	sub-sampling settings: horizontal
7	Sub-Sampling Vertical	1	1, 2, 4	Sub-sampling settings: vertical
8	Bit per Pixel	2	1, 4, 8, 10	Number of bits-per-pixel (depth)
9	JPEG Quality	3	5-100	JPEG quality when compressed
10	File Format	4	1, 3	Output Format: 1: JPEG 3: BMP
11	Transfer Type	4		Transmit Type: PART: Separate ALL: Collective
12	Color Reverse	1	0, 1, 2	Black/White Inversion: 0: Do Not Invert 1: Invert 2: Maintain Status Quo
13	End Character	1	0x0D	CR

Example of Output:

; Trim (0, 0, 751, 479) Sub (1, 1) Bp 8 Jq 65 FfBMP TrPART Re2

12.1.2. Changing the Imaging Process Settings

The section explains changing the process settings via the “DE7” command. After entering DE7, input 6 of the following Q0 through Q9 commands to enable settings.

Command							Description	Default Setting
DE7	Qa	Qb	Qc	Qd	Qe	Qf	Image Process Settings	
	Q1	Q0	Qc	Qd	Qe	Qf	Trimming Left-Side Absolute Coordinate Settings: 1000c + 100d + 10e + f = 0 ~ 751	0
	Q1	Q1	Qc	Qd	Qe	Qf	Trimming Upper-End Absolute Coordinate Settings: 1000c + 100d + 10e + f = 0 ~ 479	0
	Q1	Q2	Qc	Qd	Qe	Qf	Trimming Right-Side Absolute Coordinate Settings: 1000c + 100d + 10e + f = 0 ~ 751	751
	Q1	Q3	Qc	Qd	Qe	Qf	Trimming Lower-End Absolute Coordinate Settings: 1000c + 100d + 10e + f = 0 ~ 479	479
	Q2	Q0	Q0	Q0	Q0	Qf	Sub-Sampling Settings: Horizontal f = 1, 2, 4	1
	Q2	Q1	Q0	Q0	Q0	Qf	Sub-Sampling Settings: Vertical f = 1, 2, 4	1
	Q3	Q0	Q0	Q0	Q0	Qf	Bit Depth (Bit per pixel) Settings: f = 0: 8bit (256) f = 1: 4bit (16) f = 2: 1bit (2) f = 3: 10 bit (1024, Raw Data)	0
	Q4	Q0	Q0	Qd	Qe	Qf	JPEG Quality Settings: 100d + 10e + f = 5 to 100	75
	Q5	Q0	Q0	Q0	Q0	Qf	Output Formatting Type: f = 1: JPEG f = 3: BMP	3
	Q6	Q0	Q0	Q0	Q0	Qf	Transmit Type: f = 0: Split PART f = 1: Collective ALL	0
	Q8	Q0	Q0	Q0	Q0	Qf	Black/White Inversion: f = 0: Do Not Invert f = 1: Invert f = 2: Maintain Status Quo	2

Transmit Command Example 1)

The image is trimmed at coordinates (left 100, up 100, right 500, down 300):

<ESC> [DE7Q1Q0Q0Q1Q0Q0[DE7Q1Q1Q0Q1Q0Q0[DE7Q1Q2Q0Q5Q0Q0[DE7Q1Q3Q0Q3Q0Q0<CR>

Transmit Command Example 2)

Sub-sampling is performed at a horizontal 1/2 and vertical 1/4:

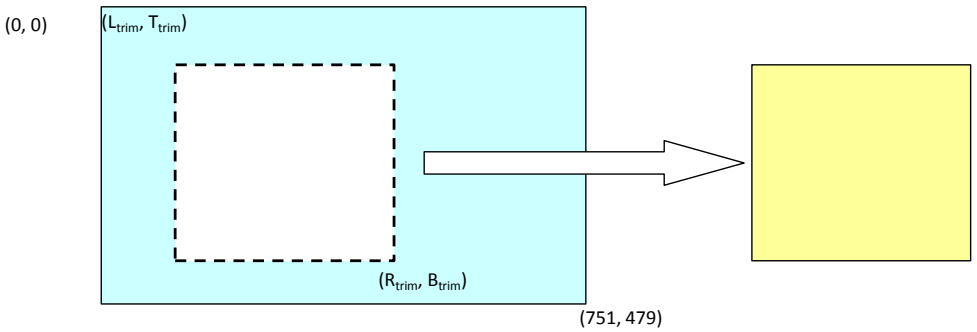
<ESC> [DE7Q2Q0Q0Q0Q0Q2[DE7Q2Q1Q0Q0Q0Q4<CR>

Transmit Command Example 3)

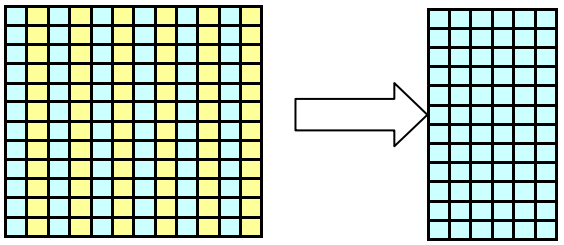
The transmit type is set as “Collective” and the Bit Depth at 4 bits:

<ESC> [DE7Q6Q0Q0Q0Q0Q1[DE7Q3Q0Q0Q0Q0Q1<CR>

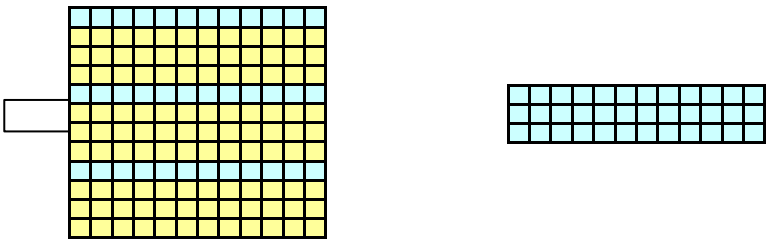
Trimming:
Trimming refers to cutting off a portion of the original image (specified in the blue figure below) into a rectangular shape. In addition, it is possible to extract only the necessary area of the image.



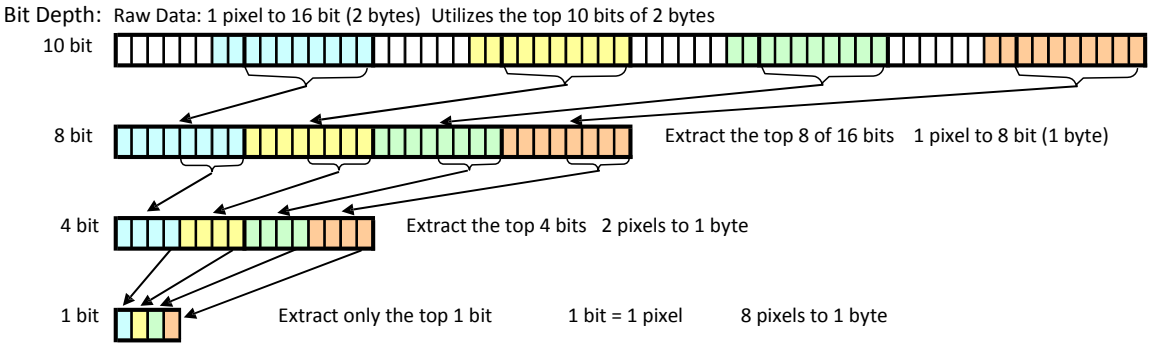
Sub-Sampling:
The data's size may be compressed by extracting data in row/column pixel units. This may be done in either horizontal or vertical directions. As shown in the figure below, when "2" is set horizontally, for every 2 rows 1 line of data will be extracted. When this occurs, the amount of information for 1 line will be at 1/2 the total.



As shown in the figure below, when "4" is set vertically, for every 4 lines 3 rows of data are removed and extracted. When this occurs, the height information for 1 row will be at 1/4 the amount.



Bit Depth:
This function controls the bit depth (number of bits per pixel) settings. When setting the volume of information for 10 bits (raw data) to "1", when at 8, 4, and 1 bits, the display will read as 1/2, 1/4, and 1/16.
**** Note: though the volume of information may decrease as the bit depth is lowered, the number of displayable colors will shrink as well.***



JPEG Quality:
This function controls the JPEG conversion quality settings.
**** Note: lowering the image quality will decrease the data size, however it will also cause the image to pixelate the more it is lowered.***

Output Format:
This controls the settings for outputting in either JPEG or BMP (Bitmap) formats. When using JPEG, the image will be compressed before being outputted as a ".JPG" file. BMP on the other hand will output images in an uncompressed format (no header attached).

12.1.3. Taking Images

The Imaging Mode is activated via the DE8 command, which then allows for taking and capturing images. Once the image has been taken or a specified time has lapsed, Imaging Mode is cancelled and the NLV3101 will return to its previous state. Any device receiving this command will begin to wait for a trigger press signal, and with the next press the device will begin reading only (no decoding). After successfully completing a scan, the recorded image data will be outputted immediately following "Output Protocols". The device will then wait for two additional parameters, "Select Imaging Mode" and "Timeout Settings" before transmitting via the below formats (each of these parameters are specified via Q0 ~ Q9). Additionally, depending on the imaging mode Timeout Settings are not required.

Command					Description	Effective Value
DE8	Qa	Qb	Qc	Qd	This changes to Imaging Mode	
	m				This selects Imaging Mode m = a	0, 1, 2, 3
		n			Timeout Settings [seconds] n = 100b + 10c + d	0 ~ 999

Example 1) Interlocking Commands:
<ESC> [DE8Q0<CR>

Example 2) Trigger Imaging ② 15 Second Timeout:
<ESC> [DE8Q2Q0Q1Q5<CR>

m: Select Imaging Mode:

m	Imaging Mode	Description	Notes
0	Interlocking Commands	Takes an image upon receiving a command	n (Timeout Settings are unnecessary)
1	Trigger Imaging ①	After receiving a command the aimer is exposed and the image is taken with a trigger press	
2	Trigger Imaging ②	After receiving a command the aimer is exposed upon pressing the trigger, and will take the image once released	
3	Trigger Imaging ③	After receiving a command the aimer is exposed with the first trigger press, and with the second is cancelled and the image is taken	

The Time Chart for each available imaging mode is shown in the figure below:
Signals contained in the below figure are all “Active Low”. Additionally, output is also included in the imaging process.

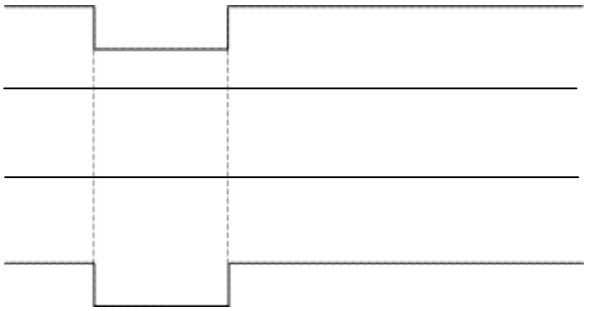
m = 0 Interlocking Commands

Imaging Mode

Trigger

Aiming

Imaging



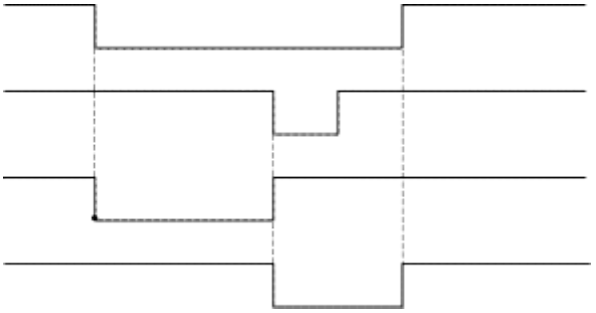
m = 1: Trigger Imaging ①

Imaging Mode

Trigger

Aiming

Imaging



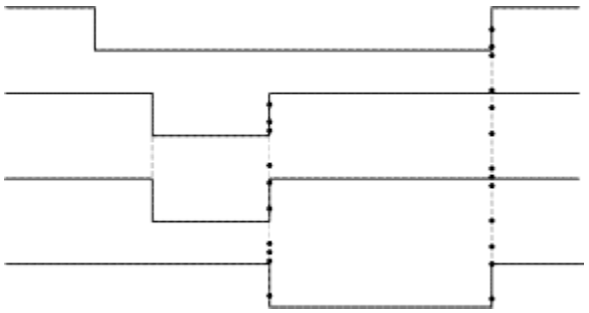
m = 2: Trigger Imaging ②

Imaging Mode

Trigger

Aiming

Imaging



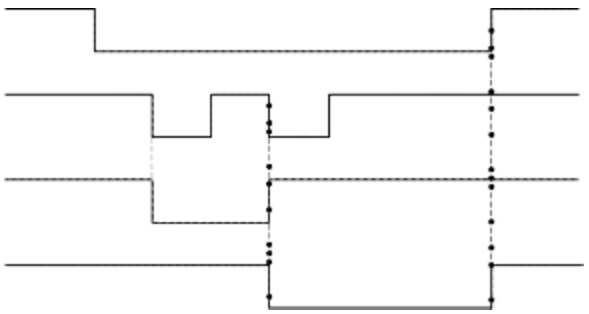
m = 3: Trigger Imaging ③

Imaging Mode

Trigger

Aiming

Imaging

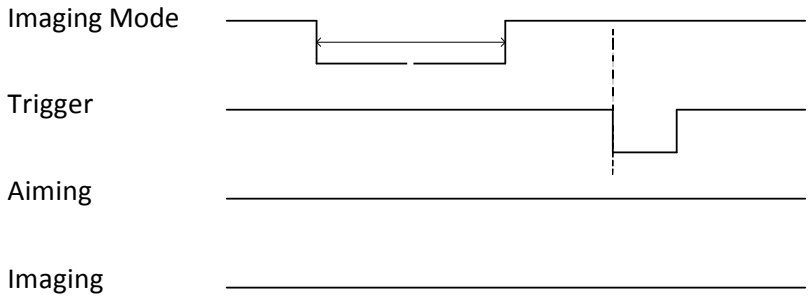


n: Timeout Settings:
The timeout settings for Imaging Mode are performed in “seconds”, ranging from (000) ~ 999. This value cannot be set when using Command Interlocking Mode (m = 0). The duration of the timeout period ranges from receiving a command to the point when an image is taken. When using “n = 0”, timeout does not occur and the device will wait for Infinite Time Trigger input. When using “n > 0”, the timeout period will be set to the specified amount of seconds.

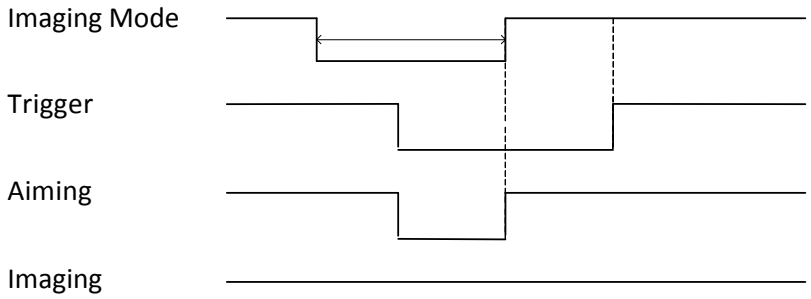
n	Timeout Period	Notes
0	No Timeout Period	Waits for Infinite Time Trigger
1 – 999	Specifies the timeout period (in seconds)	

If no trigger press signal is received during timeout period “t”, after the period lapses Imaging Mode will be cancelled and any future trigger input will produce normal decoding.

When utilizing Trigger Imaging ②, it is necessary to release the trigger during timeout period “t” for imaging to occur. If the former does not occur during “t”, after the period lapse the aimer will cease to function and Imaging Mode is cancelled. During this time releasing the trigger will not have any effect.

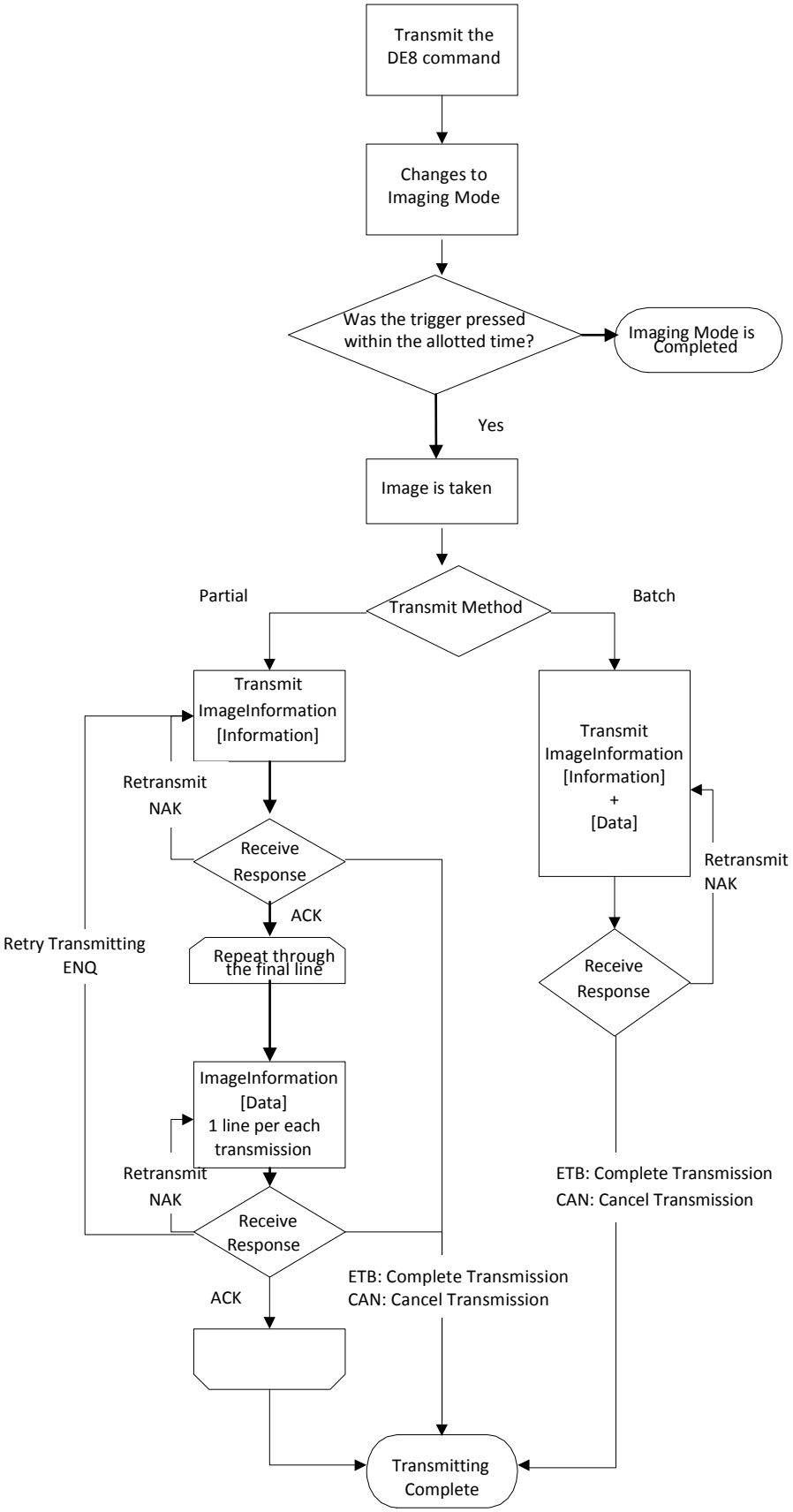


When utilizing Trigger Imaging ③, during timeout period “t” it is necessary to press the trigger twice, hold, then release for imaging to occur. With the first press the aimer is exposed, however it will cease to function after “t” elapses. The second trigger press will produce normal decoding.



12.2. Operation Flowchart

This section explains in detail the flow of operation for Imaging Mode.



12.3. Output Protocols

This section specifies the protocols utilized in the outputting process.

12.3.1. Image Information Formats

This function is utilized in outputting images, and is roughly divided into two categories: “Image Information” and “Image Data”.

Formats:

Start Char	Rec No	Length	(A) Information, Data (*)	Check Sum	End Char
0x21					0x0D

Fields:

Field		Size (bytes)	Description
Start Character		1	‘!’ (0x21)
Rec No		2	The default value for this field is set to “0”. Packets of the same type will be transmitted in a subsequent, incremental order.
Length		4	The size of “(A)”
(A)*	Information		This contains the image’s information (size, bit depth, etc.)
	Data		This contains the image data
Check Sum		2	The value of 2 bytes lower than the resulted sum of (A)'s element N multiplied by (n+1). (n =0, 1, 2, …)
End Character		1	<CR> (0x0D)

**** Refer to the next section for further information on each of the formats.***

**** Image data utilizes “Little Endian” and “Big Endian” for all others.***

・Information Field:

The Information Field is made up of the below sub-fields:

No.	Sub-Fields	Size (bytes)	Effective Range	Description
1	Identifier	1	OOh-FFh	This specifies the field's version
2	Image Size	4		This is the output image's size
3	Image Number	2	0~9	This is the image's Memory Identification Number
4	Image Width	2	1~752	This is the width (pixels) of the processed image
5	Image Height	2	1~480	This is the height (pixels) of the processed image
6	Trimmed Left	2	0~751	These are the left-side coordinates of the processed image
7	Trimmed Top	2	0~479	These are the upper-end coordinates of the processed image
8	Trimmed Right	2	0~751	These are the right-side coordinates of the processed image
9	Trimmed Bottom	2	0~479	These are the lower-end coordinates of the processed image
10	Sub-Sampling Horizontal (SW)	1	1, 2, 4	This is the sub-sampling value when outputting (Horizontal)
11	Sub-Sampling Vertical (SW)	1	1, 2, 4	This is the sub-sampling value when outputting (Vertical)
12	Maximum Brightness	2	0~1023	This is the maximum brightness value for the processed image (rate per 1024)
13	Bit Per Pixel(BPP)	1	1, 4, 8, 10	This is the bit depth for each pixel
14	File format	1	1, 3	Format Type 1: JPEG 3: BMP
15	Shot Left	2	0~751	These are the left-side coordinates of the raw image
16	Shot Top	2	0~479	These are the upper-end coordinates of the raw image
17	Shot Right	2	0~751	These are the right-end coordinates of the raw image
18	Shot Bottom	2	0~479	These are lower-end coordinates of the raw image
19	Binning Horizontal (HW)	1	1	This is the sub-sampling value when imaging (Horizontal)
20	Binning Vertical (HW)	1	1	This is the sub-sampling value when imaging (Vertical)
21	Amplification	2	0~1500	This is the rate of amplification
22	Exposure Time	4	50~500000	This is the exposure time
23	Brightness Index Value	2	0~1023	This is the brightness index value (rate per 1024)
24	Total Transfer Count	2	0~65535	This contains the total number of image information transfers inside the packet.
25	Reserved	211 *	0	(This is for expansion)

This number refers to 256 minus the sum of all sizes (other than "Reserved").

・Data Field:

The Data Field is made up of the below sub-fields:

No.	Sub-Fields	Size (bytes)	Effective Range	Description
1	Image Data	*	*	Outputted Image Data: Segmented Transmission- 1 line (width) each Batch Transmission- whole image

**** Differences occur depending on the format type, BPP settings, etc. When using JPEG format, transmission occurs in units of the width of the original image (Due to data compression, the volume of information differs from the actual per-line amount).***

12.3.2. Outputting Images

Images are outputted via image information formatting. Note that the method of outputting will change depending on the type of transmission. The image output for each transmitting type is specified below.

Segmented Transmission:

With segmented transmission, the image's information is transmitted in the first packet and the data in the second.

・Packet 0

Start Char	Rec No = 0	Length = 256	Information	Check Sum	End Char

・Packet 1

Start Char	Rec No = 1	Length	Data	Check Sum	End Char

・

・

・

・Packet n

Start Char	Rec No = n	Length	Data	Check Sum	End Char

Batch Transmission:

With batch transmission, both the image's information and data are transmitted within the first packet.

・Packet 0

Start Char	Rec No = 0	Length	Information	Data	Check Sum	End Char

12.4. SDK-Use Method

Capturing images becomes even easier by using the separately-distributed SDK tools or API. Refer to SDK documentation for more details.

12.5. Special Instructions

・Barcodes and other 2D codes cannot be read within this mode.

・Scanned images used in this reading cannot be outputted.

13. Appendix

This chapter contains:

13.1. Code ID Tables

13.1.1. OPTICON Code ID Prefix/Suffix Value

OPTICON Code ID			
Code	ID	Code	ID
UPC-A	C	MSI/Plessey	Z
UPC-A +2	F	Telepen	d
UPC-A +5	G	UK/Plessey	a
UPC-E	D	Code 128	T
UPC-E +2	H	GS1-128	T
UPC-E +5	I	Code 93	U
EAN-13	B	Code 11	b
EAN-13 +2	L	Korean Postal Authority	c
EAN-13 +5	M	Intelligent Mail Barcode	0
EAN-8	A	POSTNET	3
EAN-8 +2	J	GS1 Databar	y
EAN-8 +5	K	CC-A CC-B CC-C	m n l
Code 39	V		
Code 39 Full ASCII Italian	W		
Pharmaceutical	Y	Codablock F	E
Codabar	R	Data Matrix	t
Codabar ABC	S	Aztec	o
Codabar CX	f	Aztec Runes	o
Industrial 2of5	O	Chinese Sensible Code	e
Interleaved 2of5	N	QR Code	u
S-Code	g	Micro QR Code	j
Matrix 2of5	Q	Maxi Code	v
Chinese Post	w	PDF417	r
IATA	P	Micro PDF417	s

13.1.2. AIM/ISO15424 Code ID Prefix/Suffix Value

AIM/ISO15424 Code ID			
Code	]AIM-ID	Code	]AIM-ID
UPC-A	]E0	Telepen	]B*
UPC-A +2	]E3	UK/Plessey	]X0
UPC-A +5	]E3	Code 128	]C0
UPC-E	]E0	GS1-128	]C1
UPC-E +2	]E3	Code 93	]G0
UPC-E +5	]E3	Code 11	]H*
EAN-13	]E0		]X0
EAN-13 +2	]E3	Korean Postal Authority	]X0
EAN-13 +5	]E3	Intelligent Mail Barcode	]X0
EAN-8	]E4	POSTNET	]X0
EAN-8 +2	]E7	GS1 Databar	]e0
EAN-8 +5	]E7	CC-A	]e1
Code 39	]A*	CC-B CC-C	]e1
Code 39 Full ASCII Tri-Optic	]A*	GS1 Databar with CC-A GS1 Databar	]e0
Code 39 lt. Pharmaceutical	]X0	with CC-B GS1 Databar with CC-C	]e0
	]X0		]e0
Codabar	]F*	Codablock F	]0*
Codabar ABC Codabar CX	]F*	DataMatrix	]d*
	]X0	Aztec	]z*
Industrial 2of5	]S0		]X0
Interleaved 2of5	]I*	QR Code	]Q*
S-Code	]X0	Micro QR Code	]Q*
Matrix 2of5	]X0	Maxi Code	]U*
Chinese Post	]X0	PDF417	]L0
IATA	]R*	Micro PDF417	]L0
MSI/Plessey	]M*		
	]X0		

13.1.3. Code Option AIM/ISO15424 Code ID Prefix/Suffix Value

Code Options	]AIM-ID	Code Options	]AIM-ID
Code 39 Option AIM/ISO15424 Code ID: A*			
Normal Code 39 (D5) Do Not Check CD (C1) Transmit CD (D9)	]A0	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Do Not Check CD (C1) Transmit CD (D9)	]A4
Normal Code 39 (D5) Check CD (C0) Transmit CD (D9)	]A1	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Transmit CD (D9)	]A5
Normal Code 39 (D5) Do Not Check CD (C1) Do Not Transmit CD (D8)	]A2	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Do Not Check CD (C1) Do Not Transmit CD (D8)	]A6
Normal Code 39 (D5) Check CD (C0) Do Not Transmit CD (D8)	]A3	Full ASCII Code 39(D4) or Full ASCII Code 39 if pos. (+K) Check CD (C0) Do Not Transmit CD (D8)	]A7

Code Options	]AIM-ID	Code Options	]AIM-ID
Codabar Option AIM/ISO15424 Code ID: I*			
Codabar Normal Mode (HA) Do Not Check CD (H7) Transmit CD (H8)	]F0	Codabar Normal Mode(HA) Do Not Check CD (H7) Do Not Transmit CD (H9)	]F4
Codabar ABC (H4) or (H3) Do Not Check CD (H7) Transmit CD (H8)	]F1	Codabar ABC (H4) or (H3) Do Not Check CD (H7) Do Not Transmit CD (H9)	]F5
Codabar normal mode (HA) Check CD (H6) Transmit CD (H8)	]F2	Codabar normal mode (HA) Check CD (H6) Do Not Transmit CD (H9)	]F6
Codabar ABC (H4) or (H3) Check CD (H6) Transmit CD (H8)	]F3	Codabar ABC (H4) or (H3) Check CD (H6) Do Not Transmit CD (H9)	]F7
Interleaved 2of5 Option AIM/ISO15424 Code ID: F*			
Do Not Check CD (G0) Transmit CD (E0)	]I0	Do Not Check CD (G0) Transmit CD (E1)	]I3
Check CD (G1) Transmit CD (E0)	]I1	Check CD (G1) Transmit CD (E1)	]I4
IATA Option AIM/ISO15424 Code ID: R*			
Do Not Check CD (4H) Transmit CD (4L)	]R0	Do Not Check CD (4H) Do Not Transmit CD (4M)	]R3
Check FC and SN only (4I) or Check CPN, FC and SN (4J) or Check CPN, AC, FC and SN (4K) Transmit CD (4L)	]R1	Check FC and SN only (4I) or Check CPN,FC and SN (4J) or Check CPN,AC,FC and SN (4K) Do Not Transmit CD (4M)	]R4
MSI/Plessey Option AIM/ISO15424 Code ID: M*/X0			
Check 1CD = MOD 10 (4B): (4B) + Transmit CD1 (4E) or (4B) + Not transmit CD (4G) or (4B) + Transmit CD1 and CD2 (4F)	]M0]M1]X0	Check 2CD's = MOD 10/MOD 11 (4D): (4D) + Transmit CD1 (4E) or (4D) + Do Not Transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Check 2CD's = MOD 10/MOD 10 (4C): (4C) + Transmit CD1 (4E) or (4C) + Do Not Transmit CD (4G) or (4C) + Transmit CD1 and CD2 (4F)	]X0	Check 2CD's = MOD 11/MOD 10 (4R): (4D) + Transmit CD1 (4E) or (4D) + Do Not Transmit CD (4G) or (4D) + Transmit CD1 and CD2 (4F)	]X0
Telepen Option AIM/ISO15424 Code ID: B*			
Telepen (numeric or ASCII only): ASCII Mode (D3) Numeric Mode (D2)	]B0]B1	Telepen (numeric followed by ASCII): ASCII Mode (D3) Numeric Mode (D2)	]B0]B2
Telepen (ASCII followed by numeric) (not supported): ASCII Mode (D3) Numeric Mode (D2)	]B0]B2		

Code Option	]AIM-ID	Code Option	]AIM-ID
Code 11 Option AIM/ISO15424 Code ID: H*/X0			
Check 1CDs (BLG) or Check Auto 1 or 2CDs (BLI) (Length > 12) Transmit $CD_{(S)}$ (BLK)	]H0	Check 1CDs (BLG) or Check 2CDs (BLH) or Check Auto 1 or 2CDs (BLI) (Length > 12) Transmit $CD_{(S)}$ (BLK)	]X3
Check 2CDs (BLH) or Check auto 1 or 2CDs (BLI) (Length > 12) Transmit $CD_{(S)}$ (BLK)	]H1	Do Not Check CD (BLF) Do Not Transmit CD (BLJ)	]X0
Codablock F Option AIM/ISO15424 Code ID: O*			
FNC1 Not Used	]O4	FNC1 in 1st Position	]O5
Data Matrix Option AIM/ISO15424 Code ID: d*			
ECC000 - ECC140	]d0	ECC200, Supporting ECI Protocol	]d4
ECC200	]d1	ECC200,FNC1 in 1st or 5th Position and Supporting ECI Protocol	]d5
ECC200, FNC1 IN 1st or 5th Position	]d2	ECC200,FNC1 in 2nd or 6th Position and Supporting ECI Protocol	]d6
ECC200, FNC1 IN 2nd or 6th Position	]d3		
Aztec Option AIM/ISO15424 Code ID: z*			
No Structure/Other	]d0	Structured Append Header Included, FNC1 Following an Initial Letter or Pair of Digits	]d8
FNC1 Preceding 1st Message Character	]d1		
FNC1 Following an Initial Letter or Pair of Digits	]d2	Structured Append Header Included and ECI Protocol Implemented	]d9
ECI Protocol Implemented	]d3		
FNC1 Preceding 1st Message Character and ECI Protocol Implemented	]d4	Structured Append Header Included, FNC1 Preceding 1st Message Character, ECI Protocol Implemented	]dA
FNC1 Following an Initial Letter or Pair of Digits, ECI Protocol Implemented	]d5	Structured Append Header Included, FNC1 Following an Initial Letter or Pair of Digits, ECI Protocol Implemented	]dB
Structured Append Header Included	]d6		
Structured Append Header Included and FNC1 Preceding 1st Message Character	]d7	Aztec Runes	]dC
QR Code Option AIM/ISO15424 Code ID: Q*			
Model 1	]Q0	Model 2,ECI Protocol Implemented FNC1 in First Position	]Q4
Model 2,ECI Protocol Not Implemented	]Q1		
Model 2,ECI Protocol Implemented	]Q2	Model 2,ECI Protocol Not Implemented FNC1 in Second Position	]Q5
Model 2,ECI Protocol Not Implemented FNC1 in First Position	]Q3		
		Model 2,ECI Protocol Implemented FNC1 in Second Position	]Q6
Maxicode Option AIM/ISO15424 Code ID: U*			
Symbol in Mode 4 of 5	]U0	Symbol in Mode 4 of 5, ECI Protocol Implemented	]U2
Symbol in Mode 2 of 3	]U1	Symbol in Mode 2 of 3, ECI Protocol Implemented	]U3

13.2. Sample Codes

Example C.03.
EAN-13 and EAN-8

EAN-13
(ISBN)

ISBN data: 0131103628

EAN-8

EAN-13 +2

EAN-8 +2

EAN-13 +5

EAN-8 +5

Example C.04.
Code 39 and It.Pharm.

Code 39

Code 39 Italian Pharmaceutical
(Full Italian Pharmaceutical)

encoded data: *V2GZD9*

Full Italian Pharmaceutical data: A908557705

Code 39 Full ASCII

encoded data: *C+O+D+E 39*

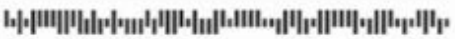
Tri-Optic

encoded data: $260R015


Example C.05.
Codabar
Codabar
01235
encoded data: C01235D
Codabar ABC
01234
encoded data:
C01234D
56789
encoded data:
D56789A
Codabar ABC data:
0123456789
Codabar CX
12344
encoded data:
A12344C
56784
encoded data:
B56784B
Codabar CX data:
1234456784
Example C.06.
2of5 and S-Code
Industrial 2of5
1234567895
Matrix 2of5
98765430
Interleaved 2of5
with bearer bars
0123456784
Chinese Post
0464 100050
encoded data: 04641000501
S-Code
98765432


Example C.07.
IATA
1234567890
Example C.08.
MSI/Plessey (with MOD 10 Checksum)
02468
encoded data: 024687
Example C.09.
Telepen
Telepen numeric
(Telepen ASCII)
5774817485748 3
Telepen ASCII data: Telepen
Example C.10.
UK/Plessey
02468
encoded data: 02468F8
Example C.11.
Code 128 and GS1-128
Code 128
0135792468
EAN-128
]C12143658709
encoded data: <FNC1>2143658709
Example C.12.
Code 93
Code 93
Example C.13.
Code 11
1234-5678
encoded data: 1234-56784
Example C.14.
Korean Postal Authority code
305-601

Example C.15.
Intelligent Mail Barcode



12 001 987654 321600500 21320 0035

Example C.16.
POSTNET

2132035356
encoded data: 21320-3535

Example C.17.
GS1 Databar

GS1 Databar

0165473728281919
encoded data: 65473728281919

GS1 Databar stacked

0198321456098768
encoded data: 98321456098768

GS1 Databar truncated

0100012345678905
encoded data: 00012345678905

GS1 Databar Limited

01179347834683 40
encoded data: 17834783468340

GS1 Databar Expanded

012345ABCDE
encoded data: 012345ABCDE

Example C.18.
Composite Codes

Composite
Component A

encoded RSS-14 data: 01234567891231
encoded CC-A data: CC-A : up to 56 characters

default data:
0101234567891231CC-A : up to 56 characters

Composite
Component B

encoded RSS-14 data: 56128923901255
encoded CC-B data: CC-B:encodes up
to 338 alphanumeric characters

default data:
01561289239012 55CC-B:encodes up
to 338 alphanumeric characters

Composite
Component C

encoded EAN-128 data: <FNC1>503012345678
encoded CC-C data: 02130123456789372 4<GS>
10123456 7ABCDEFG

default data:
503012345678021301234567893724<GS>
10123456 7ABCDEFG

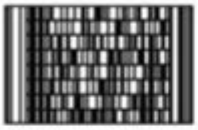
Example C.25.
PDF417

PDF417 sample bar code.

Example C.26.
MicroPDF417

MicroPDF417 sample bar code.

Example C.19.
Codablock F



Codablock F sample bar code

Example C.20.
DataMatrix (ECC200)

DataMatrix sample bar code.

Example C.21.
Aztec (Aztec)

Aztec sample bar code.

(Aztec Runes)

025

encoded data: 25

Example C.22.
Chinese Sensible code

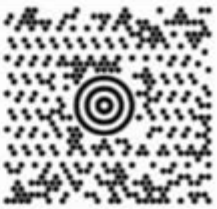
Example C.23.
QR Code (Model 2)

QR Code sample bar code.

Example C.24.
Micro QR Code (Model 4)

14159265358979

Example C.25.
Maxicode (Mode 4)



MaxiCode sample bar code.