Trane Technologies RFID Compliance Program

Zebra ZT411R

RFID Printer Staging

Created by: Lowry Managed Services & Support

Create Date: November 9, 2020

Modified Date: 11/9/2020

Approved by: Dave Dooling

Approved Date: 11/9/2020

Current Version: Final

Project Management

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Revision Tracking

Revision #	Firmware Version	Approved By	Modified By	Date Modified	Comments
Draft	V92.21.05Z Link OS 6.3 released 8/31/20		Dave Dooling	11/9/2020	Draft Version. All configuration accomplished via USB Mirror on USB Host Port. No external connection necessary. 1) Left Position set to -20 to compensate for print image shift due to improper media guide setting adjustment. 2) Following feature switches set from customer feedback: Backlight timeout disabled, Batch Counter enabled, RFID Logging enabled.

Zebra ZT411R Current Configuration

Firmware Version	V92.21.05Z
Wireless Version	N/A
Link-OS Version	V6.3
Hardware Configuration ID / SKU	ZT41143-T0100A0Z
OEM Information	Zebra Technologies ZT411R Series
Manufacture Date	12/2019

ZT411R Configuration Details Screenshot (MASTER) with variable values highlighted in ==yellow==

```
+13.0               DARKNESS
6.0 IPS             PRINT SPEED
+000                TEAR OFF ADJUST
TEAR OFF            PRINT MODE
GAP/NOTCH           MEDIA TYPE
TRANSMISSIVE        SENSOR SELECT
THERMAL-TRANS.      PRINT METHOD
1248                PRINT WIDTH
1801                LABEL LENGTH
41001-97/1910-04416 PRINT HEAD ID
39.0IN   988MM      MAXIMUM LENGTH
MAINT. OFF          EARLY WARNING
NOT CONNECTED       USB COMM.
BIDIRECTIONAL       PARALLEL COMM.
RS232               SERIAL COMM.
9600                BAUD
8 BITS              DATA BITS
NONE                PARITY
XON/XOFF            HOST HANDSHAKE
NONE                PROTOCOL
NORMAL MODE         COMMUNICATIONS
<~>  7EH            CONTROL PREFIX
<^>  5EH            FORMAT PREFIX
<,>  2CH            DELIMITER CHAR
ZPL II              ZPL MODE
INACTIVE            COMMAND OVERRIDE
FEED                MEDIA POWER UP
FEED                HEAD CLOSE
DEFAULT             BACKFEED
+000                LABEL TOP
-0020               LEFT POSITION
 OFF                APPLICATOR PORT
ENABLED             ERROR ON PAUSE
PULSE MODE          START PRINT SIG
DISABLED            REPRINT MODE
052                 WEB SENSOR
```

080	MEDIA SENSOR
058	RIBBON SENSOR
255	TAKE LABEL
027	MARK SENSOR
027	MARK MED SENSOR
002	TRANS GAIN
016	TRANS BASE
041	TRANS LED
185	RIBBON GAIN
002	MARK GAIN
061	MARK LED
DPCSWFXM	MODES ENABLED
....	MODES DISABLED
1248 12/MM FULL	RESOLUTION
6.3	LINK-OS VERSION
V92.21.05Z <-	FIRMWARE
1.3	XML SCHEMA
7.0.1 23.24	HARDWARE ID
8176k............	R: RAM
65536k...........	E: ONBOARD FLASH
NONE	FORMAT CONVERT
FW VERSION	IDLE DISPLAY
11/09/20	RTC DATE
23.22	RTC TIME
DISABLED	ZBI
2.1	ZBI VERSION
READY	ZBI STATUS
TM:M6E MICRO	RFID READER
20.00.00.01	RFID HW VERSION
01.0B.02.05	RFID FW VERSION
USA/CANADA	RFID REGION CODE
USA/CANADA	RFID COUNTRY CODE
RFID OK	RFID ERR STATUS
20	RFID READ PWR
20	RFID WRITE PWR
F2	PROG. POSITION
96	RFID VALID CTR
6	RFID VOID CTR
NONE	ADAPTIVE ANTENNA
A4	RFID ANTENNA
108 LABELS	NONRESET CNTR
108 LABELS	RESET CNTR1
108 LABELS	RESET CNTR2
1,059 IN	NONRESET CNTR
1,059 IN	RESET CNTR1
1,059 IN	RESET CNTR2
2,689 CM	NONRESET CNTR
2,689 CM	RESET CNTR1
2,689 CM	RESET CNTR2
*** EMPTY	SLOT 1

*** EMPTY	SLOT 2
0	MASS STORAGE COUNT
0	HID COUNT
OFF	USB HOST LOCK OUT

Configuring Zebra ZT411R Series Label printers

|	
Step 1 – Unpack printer from shipping container and record printer Part Number, Serial Number and MAC Address for the Lowry Sales Order in the Excel Spreadsheet on the Imaging drive. G:\Imaging\	
Step 2 – Open printhead and remove the spacer label leaving printhead open. Connect AC power cable and power up the printer.	
Step 3 -- Adjust the Transmissive Sensor 0.75" to the right of the printer's platen driver roller left hand edge. **NOTE**: This is critical for proper Label and RFID Calibration processes. The factory default position shown here with the red X is not the correct position for the sensor.	
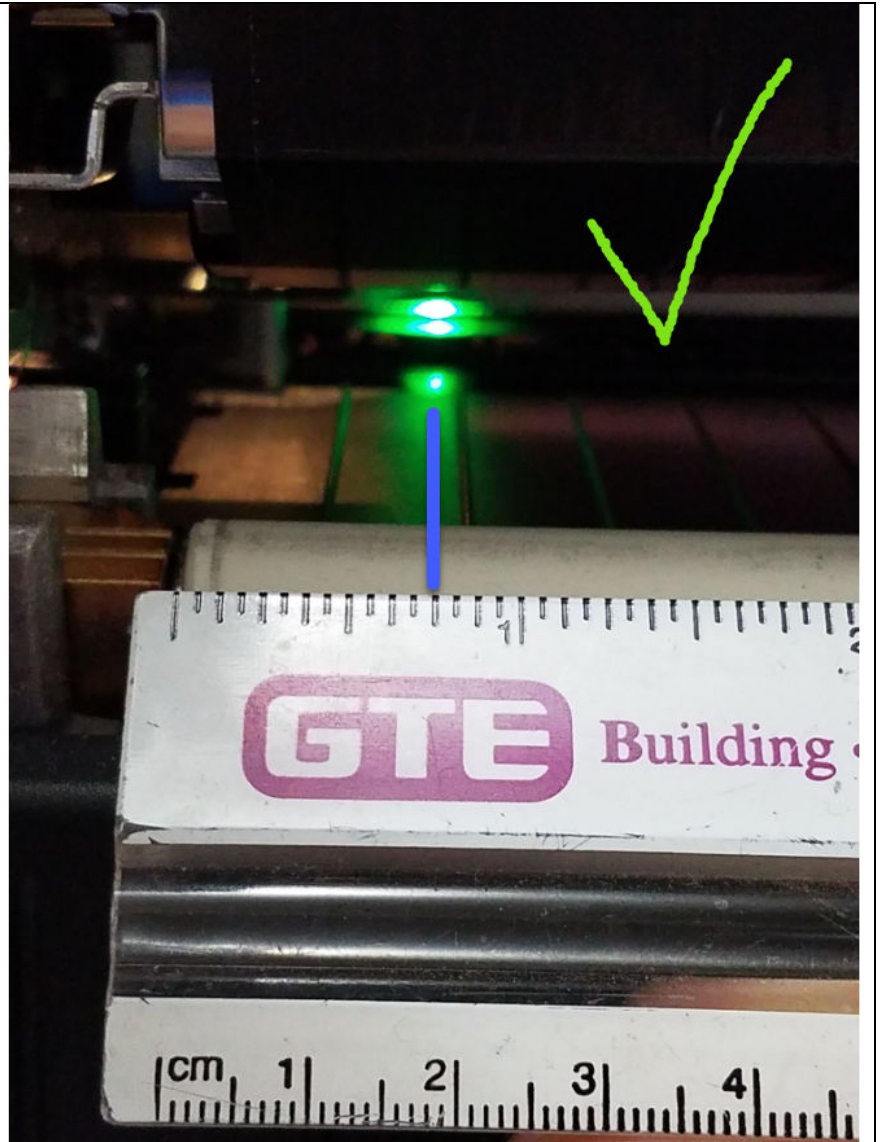
|	
Step 4 – Load PINK 4X6 RFID test labels and ribbon into the printer. See following link: https://www.zebra.com/us/en/support-downloads/printers/passive-rfid/zt411.html "HOW-TO-VIDEOS" Media and Ribbon Loading for step-by-step procedure on how to do this correctly.	1) 4X6 Fluorescent Pink RFID Labels, Roll OD 7.5", 3" Core 1000 labels per roll Part # 305-00260 2) 110mm x 450M, premium wax/resin formulated for Zebra RF ID Printing Systems. Part # ZEB110450PVW

Step 5 – Adjust the Media Beam Hanger Guide Post. Leaving it loose will cause label wandering problems.

Step 6 – Adjust the Outer Media Guide to the outer edge of the label stock until its just touching. Too loose and the label will walk to the right and the printed image will be clipped on the left-hand side. Too tight and the label liner will roll up over the guide and jam labels.
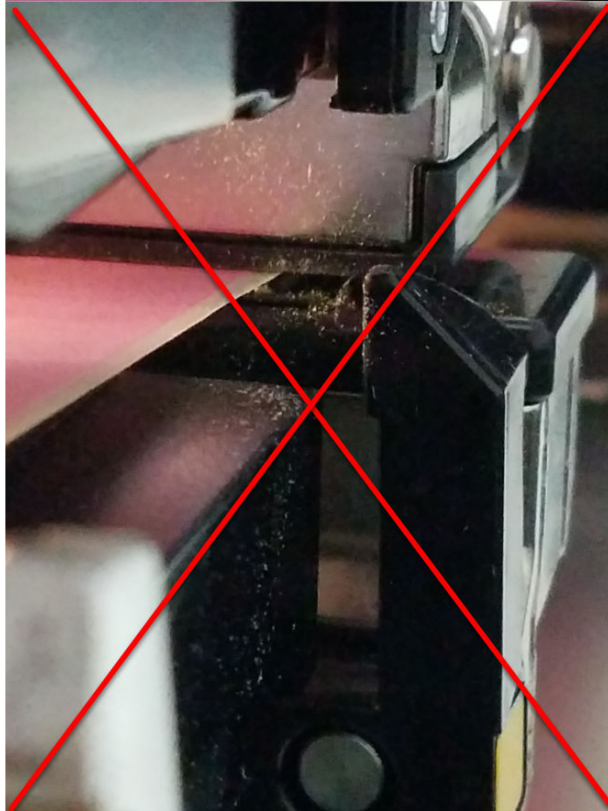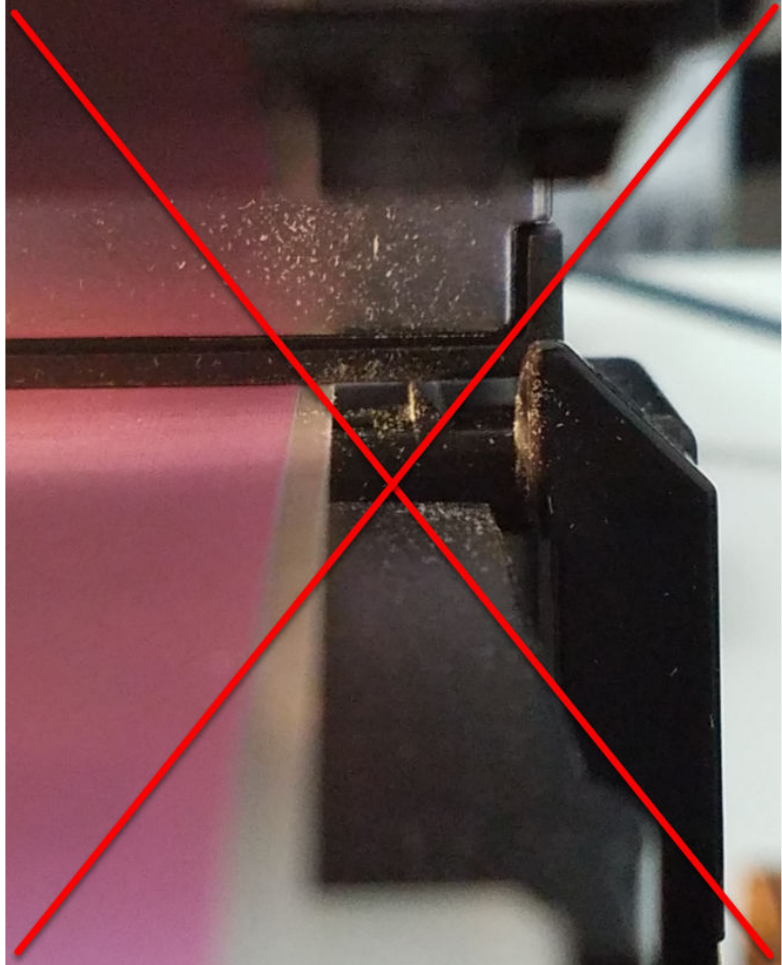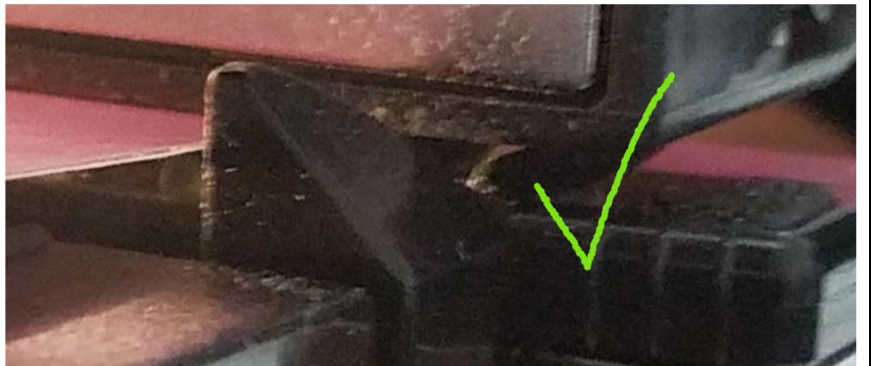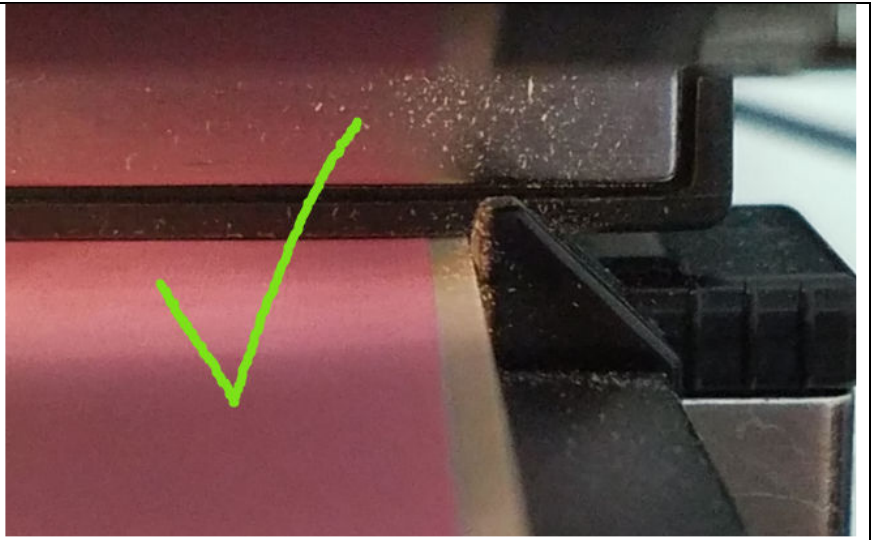
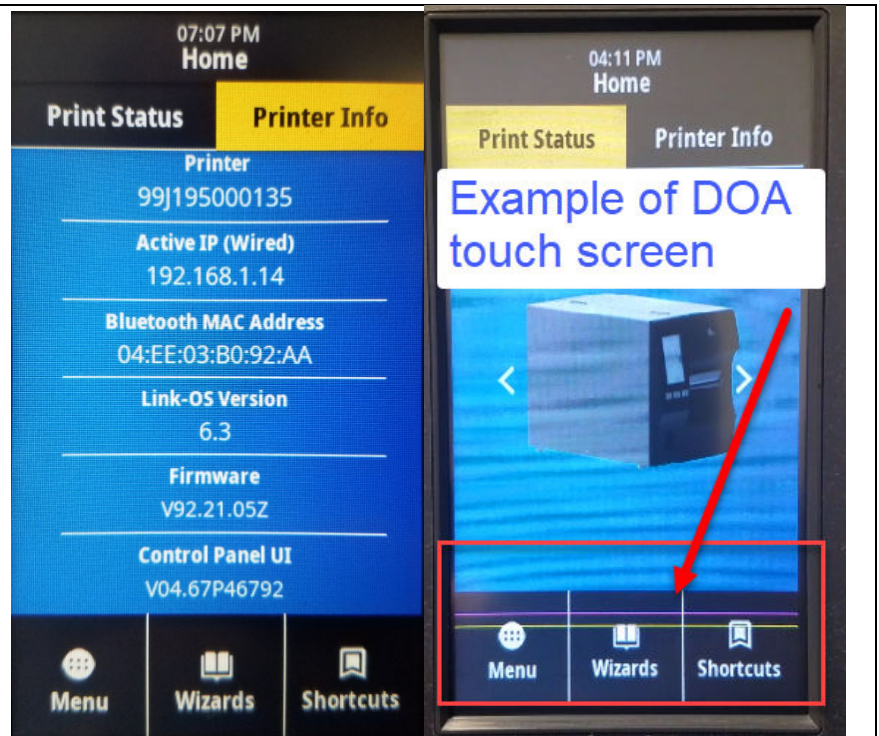|	
Step 7 – Adjust Pressure Dial barrels to 3 1/2 to ensure that Media/Ribbon calibration is accurate. Media slippage may occur below 2 1/2. **NOTE: Do NOT leave at factory setting of 2. This will cause RFID Voiding problems, label mis-registrations and skipping labels.**	

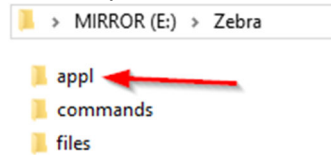|	
Step 8 – Once labels and ribbons are loaded, close the printhead. Press the Printer Info tab on the LCD Display. If display shows LINK-OS 6.2 and Firmware shows V92.21.04Z or lower. IF the Firmware shows SPnn-nnnnn, the firmware must be upgraded. **If Link OS 6.3 and V92.21.05Z is displayed, skip to Step 12.** **Observe Touch screen for any vertical or horizontal raster lines indicating a faulty touch screen. This would be a DOA printer.**	07:07 PM **Home** **Print Status** — **Printer Info** **Printer** 99J195000135 **Active IP (Wired)** 192.168.1.14 **Bluetooth MAC Address** 04:EE:03:B0:92:AA **Link-OS Version** 6.3 **Firmware** V92.21.05Z **Control Panel UI** V04.67P46792 Menu Wizards Shortcuts 04:11 PM **Home** **Print Status** — **Printer Info** **Example of DOA touch screen** Menu Wizards Shortcuts
Step 9 – **Firmware update required:** Obtain USB Flash Drive that has a USB Mirror Drive configured. Directory structure looks like this: MIRROR (E:) > Zebra appl ← commands files Firmware and Config files go into Zebra\appl directory. Only one file at a time.	Confirm that Firmware V92.21.05Z is loaded in the Zebra\appl directory with the file name extension .ZPL

Step 10 – Power printer down and insert USB Mirror Drive into the USB Host Port of the printer.	
Step 11 – Power the printer back on and **o**bserve the Mirror process reflash the printer. This takes approximately 3 minutes to complete. "MIRROR PROCESS COMPLETE" is the LCD display sequence that indicates the firmware update Mirror process was completed. The new firmware version should display on the LCD menu. **NOTE:** The printer may try and print a configuration once the firmware update is complete. The printer is not fully calibrated yet so the configuration printout out may fail with a Ribbon Out or Media Out error condition. This is normal and should be ignored since MEDIA POWER UP and HEAD CLOSED setting for RFID printers is defaulted to FEED and not calibrate. The printer MUST be manually calibrated to clear the ribbon and or media error.	
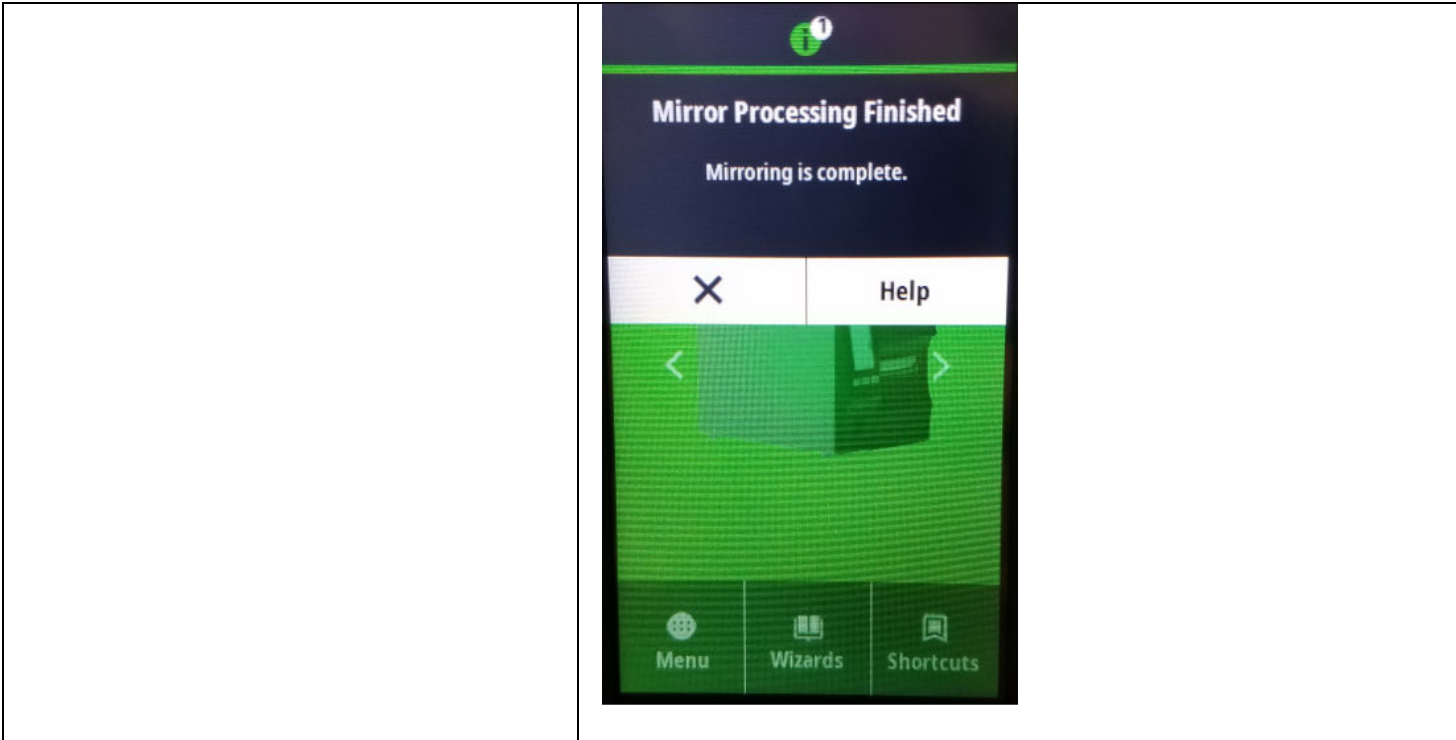
	Mirror Processing Finished Mirroring is complete.
Step 12 – Repeat steps 9, 10 & 11 to configure the printer settings. Substitute the .ZPL firmware file with the ZT411R.ZPL file in Zebra\appl directory. This file has the following ZPL configuration commands and settings to the right. **Note:** The values in the ZPL commands to the right are default settings for the customer to get the printer up and running rapidly out of the box. Do NOT modify these settings or ANY LCD settings beyond this step. The printer configuration is good.	ZT411R.ZPL file contents: ~SD13 ~TA000 ^XA^MMT^PR6,6,2^MNY^JST^MTT^PW1248^ML11775^MFF,F^LT000 ^LS-20^RS8,,,3,N^XZ ^XA^JUS^XZ ! U1 setvar "display.backlight_on_time" "0" ! U1 setvar "display.batch_counter" "enabled" ! U1 setvar "rfid.log.enabled" "yes" ***\<enter key CR must be here for command to be acted upon by the printer\>***

Step 13 – Perform Screen Calibration to ensure the touch screen is properly calibrated. The protective film over the touch screen must be removed to accomplish this step.
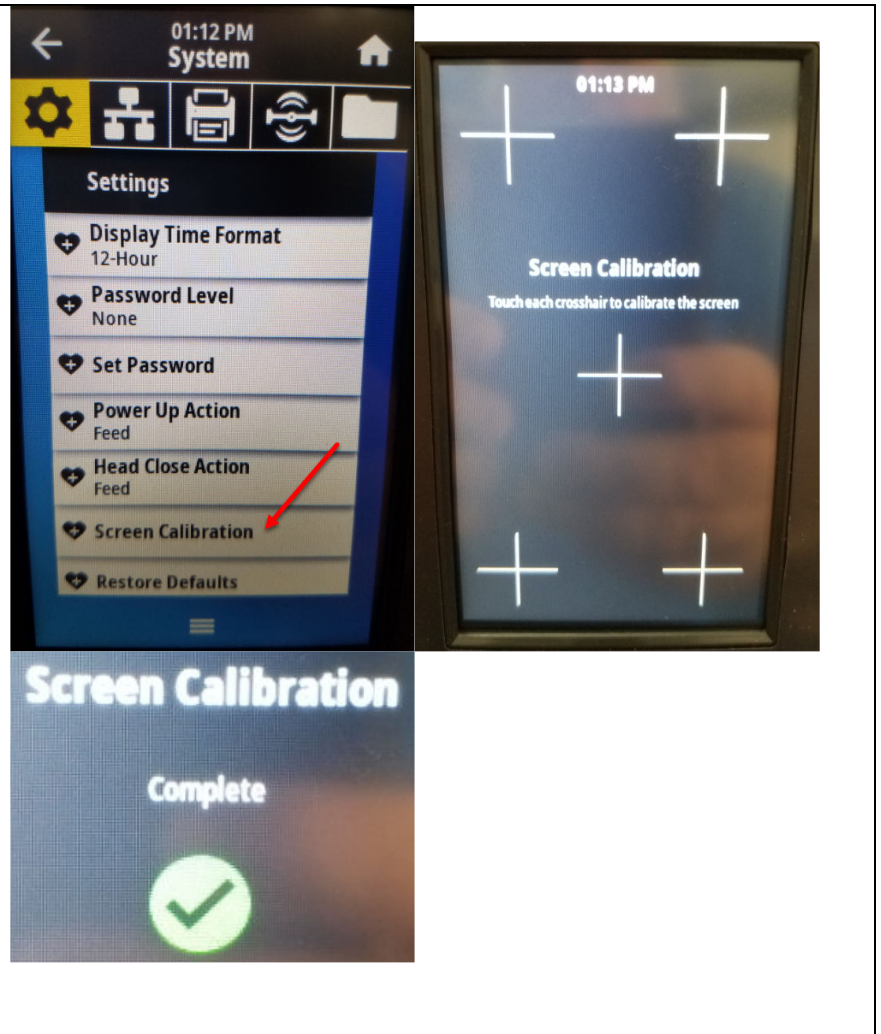
Step 14 – Perform a Media/Ribbon Calibration sequence (Manual Calibrate) by pressing the control panel PAUSE and CANCEL keys in for 3 seconds and releasing to start the sequence. Follow the LCD screen instructions step by step. See the following link for details: https://supportcommunity.zebra.com/s/article/ZT411-ZT421-Ribbon-Media-Sensor-Manual-Calibration?language=en_US

Upon completion, press the FEED key several times and labels should move to the exact same stopping point every time.

IF an error occurs or labels are stopping inconsistently. Review the following:

Outer Media Guide position
Media Sensor position
Review the weblink instructions again and repeat the manual calibration process.
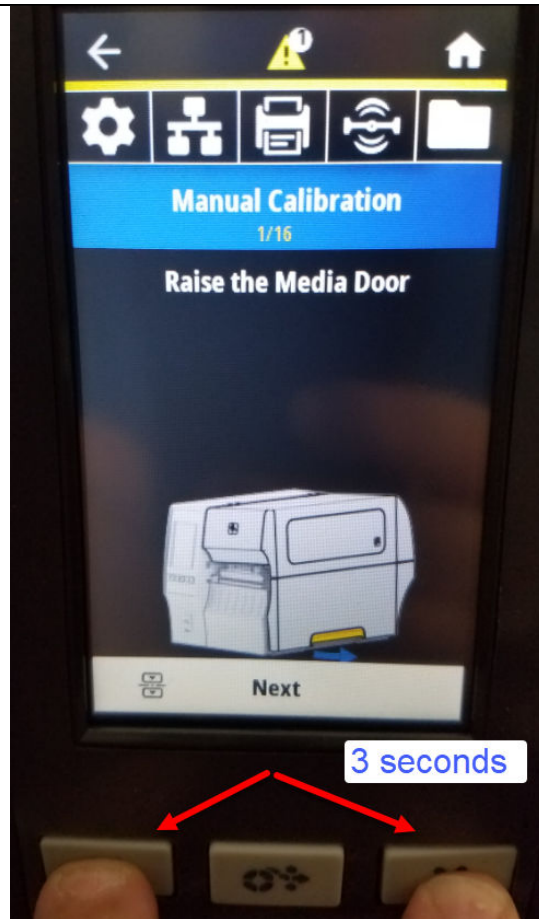
Step 15 – Perform an RFID Calibration sequence. This will take approximately 6:15. See: https://supportcommunity.zebra.com/s/article/ZT411-ZT421-RFID-Calibration?language=en_US

ZT411 & ZT421 RFID CALIBRATION. Upon completion, confirm the following settings match a combination shown in the table to the right. If the settings vary drastically, repeat the RFID Calibration sequence.

    RFID READ POWER
    RFID WRITE POWER
    RFID PROG. POSITION
    RFID ANTENNA

RAW DATA	PROG POS.	ANTENNA	READ PWR	WRITE PWR
position=F2 MM,A4,20,20	F2	A4	20	20
position=F2 MM,A4,19,19	F2	A4	19	19
position=F2 MM,A4,20,20	F2	A4	20	20
position=F2 MM,A4,21,21	F2	A4	21	21

```
20                    RFID READ PWR
20                    RFID WRITE PWR
F2                    PROG. POSITION
96                    RFID VALID CTR
6                     RFID VOID CTR
NONE                  ADAPTIVE ANTENNA
A4                    RFID ANTENNA
```

Step 16 – Review ZT411/ZT421 User Guide p/n: P1106464-02EN page 176 "Using a USB Host Port and the Print Touch Feature Exercise 2: Print a Label Format from a USB Flash Drive" by pressing Menu> Folder Icon> USB >Print: From USB to Print Test and configuration files from USB Flash Drive.

It is very similar to the ZT410, however the ZT411 uses the Folder Icon to access the menu.

Review Step 17 below and select check mark to begin printing the Test4X6.ZPL labels.

NOTES:
1) This test format has 15 Label labels formatted for RFID in it. Both Ultriva and Oracle RFID Test label formats are present in the test files to ensure print imaging, RFID Encoding and label tracking are confirmed good.

2) USB file naming conventions MUST follow the DOS 8.3 conventions or it will not display in the Print: From USB submenu.
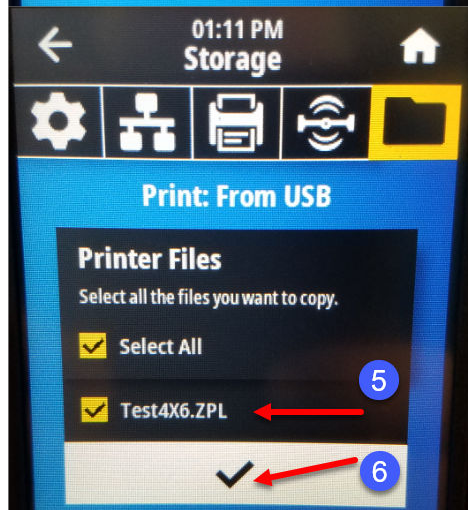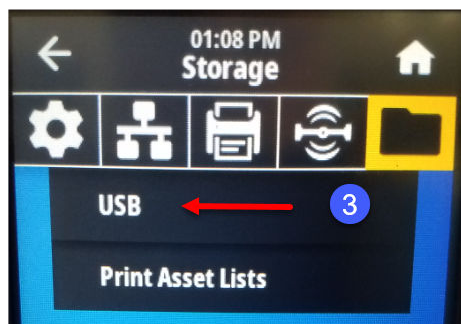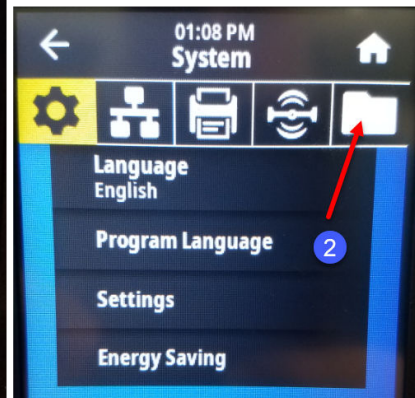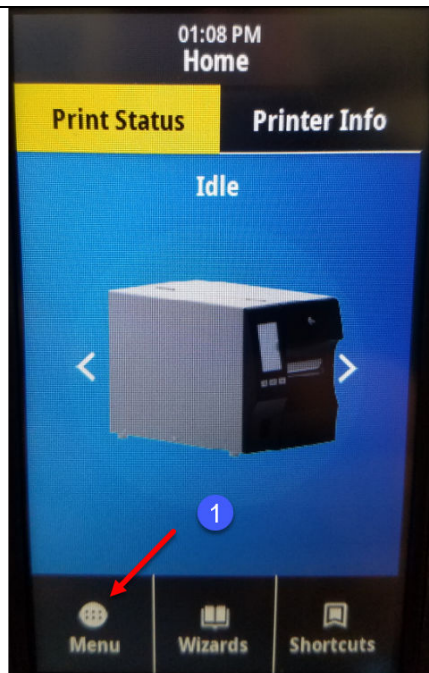
Step 17 – While printing the Test4X6.ZPL print operations -- observe the following conditions:

1) **Label tracking against the Outer Media Guide appears good. IF the label is skewing (tracking to the right) and crunching up against the Outer Media Guide, adjusting the Pressure Dial barrels will be necessary. This is a critical step as any label skewing will cause ribbon wrinkle, RFID VOIDS and Media Calibration problems. If the Label is skewing to the right, test adjusting the LH inboard pressure dial barrel tighter until to > 3.5 or 4 tics are showing.**

2) Continue pressing the PRINT soft key while making the Pressure Dial adjustments to correct any label skewing problems detected. Each PRINT will yield 5 test labels.

3) Once the label tracking is acceptable, observe that no RFID VOIDs are occurring. During Staging/Testing, a less than 5% VOID rate should be seen.
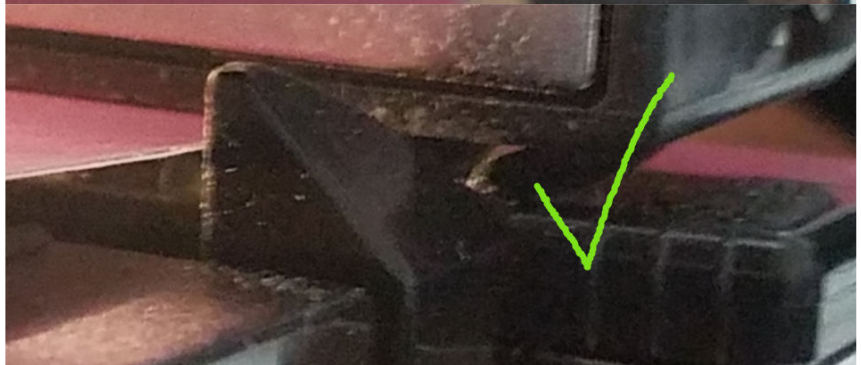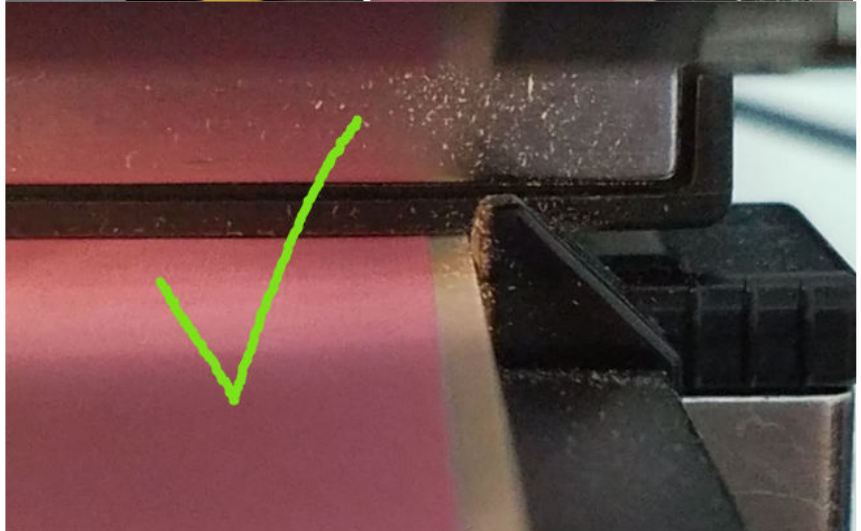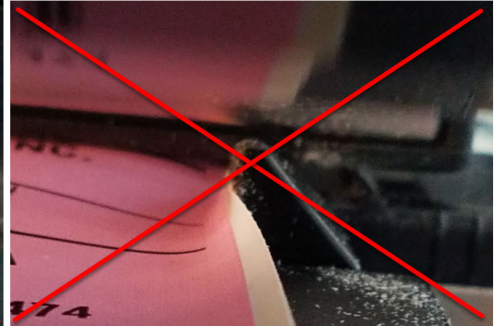
4) **Tear off several labels and ensure the label separation is good. The TEAR OFF value should never place the perforation in front of the Tear Bar. This will cause the adhesive to be exposed. Adjust TEAR OFF value accordingly.**

5) **TEAR OFF too far back will work, but perforation will not be clean.**

6) **TEAR OFF position just behind Tear Bar is optimal. This will prevent exposing adhesive and minimize label wrap jam problems.**
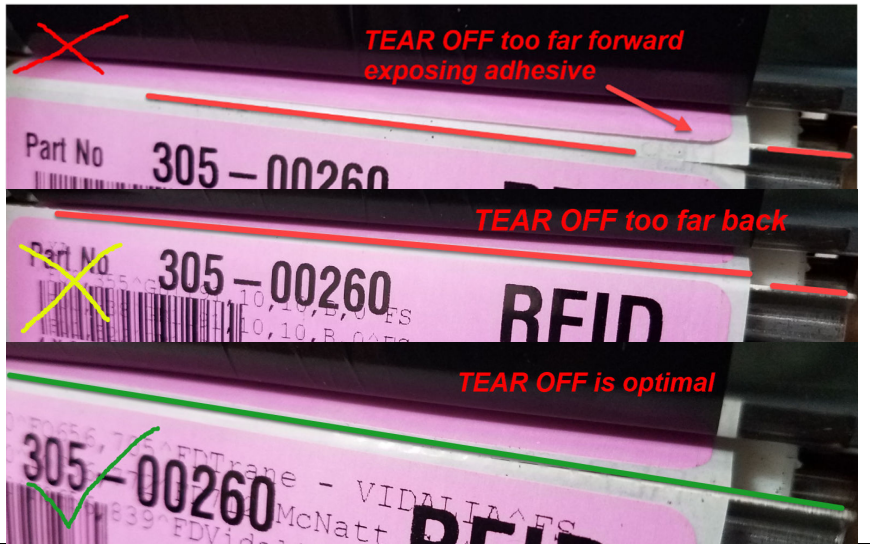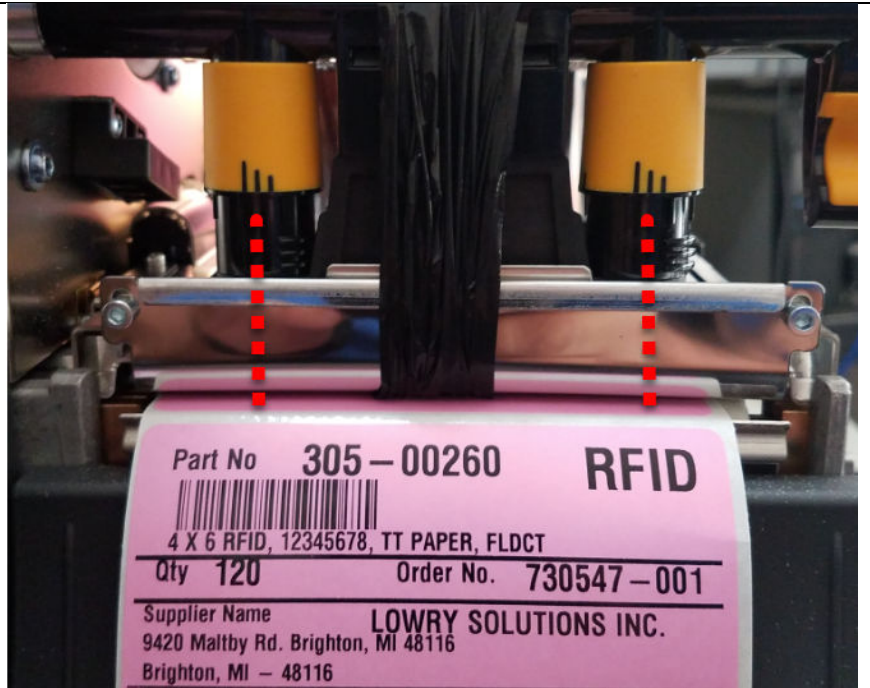
Step 18 – Position a printed TEST4X6 label as shown to the right and press the Menu icon and select the RFID icon and scroll down to select READ RFID DATA to perform an RFID READ DATA operation on the inlays encoded during the printing of the TEST4X6.ZPL label files.
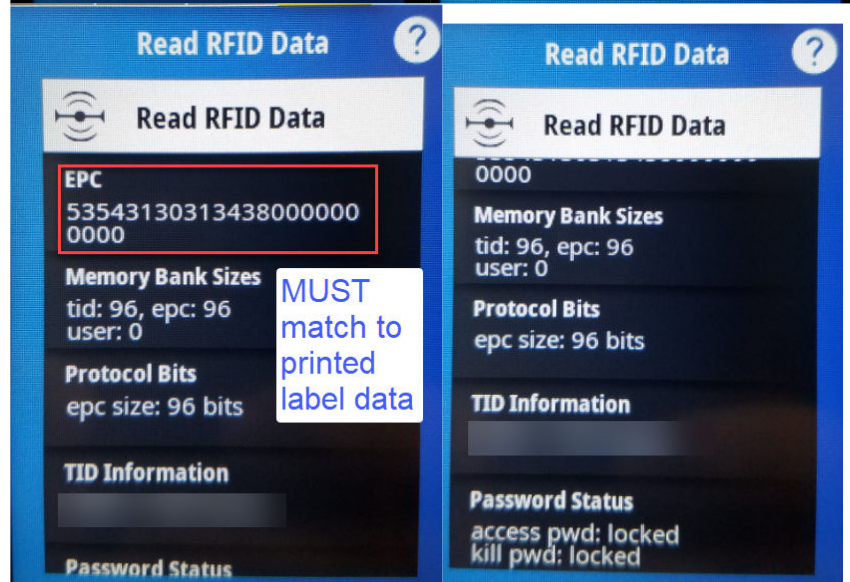
1) Open the printhead and back up the printed label so it's positioned like the image on the right.

2) Close the printhead, but DO NOT press the PAUSE key or it will advance one label and prevent the RFID READ functions.

3) Navigate to the RFID Menu and scroll down to READ RFID DATA and press it. You should see a sequence as shown to the right which shows the encoding. If NO TAG FOUND is displayed, open the printhead and re-position the label over the encoder slightly, close the printhead and press READ again. Keep trying until you find the correct position and make a note of it.

4 X 6 RFID, , TT PAPER, FLDCT
Qty 120   Order No. 730547—001
Supplier Name   LOWRY SOLUTIONS INC.
9420 Maltby Rd. Brighton, MI 48116
Brighton, MI — 48116
Tracking #   Packing Slip #
453854712146   1146552
Ship Date   8/22/2018   Ship To
Req Recv Date   8/28/2018   Trane — VIDALIA
Stock Location   712 McNatt St
10072   Vidalia, GA — 30474
Rel #   EYT

RFID

4) Repeat the process by scrolling up or down in READ RFID DATA menu to confirm the following screens can be seen and match what you see to the right. Remember – each encoded inlay (label) will have unique EPC data. The rest of the data should be the same.

Scroll Up on screen
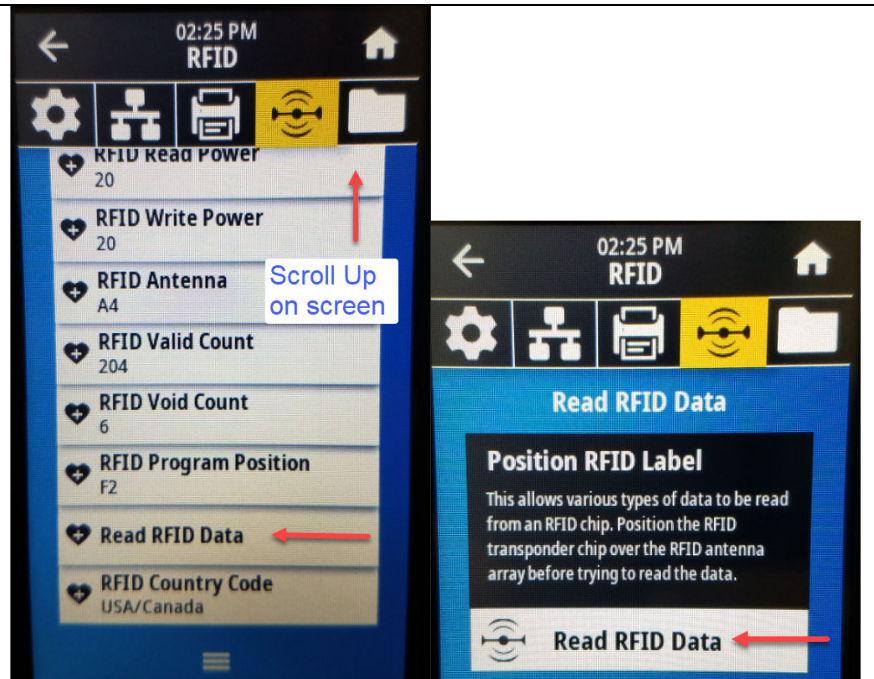
5) Verify the EPC data matches the printed EPC data. *The data MUST match.*

    EPC Data
    MEMORY BANK SIZES
    PROTOCOL BITS
    TID INFORMATION
    PASSWORD STATUS

MUST match to printed label data

RFID EPC : 535431303134340000000000000

MUST match RFID Read Data

Step 19 – Setup Printer "Shortcuts" menu items for quick access to common settings that will routinely need to be accessed by customer and remote technical support. Press the "Heart" icon with the "+" sign in it to add to the Favorites menu. This is limited to 5 items.

Manual Calibration
    (Menu >Printer >Sensors)
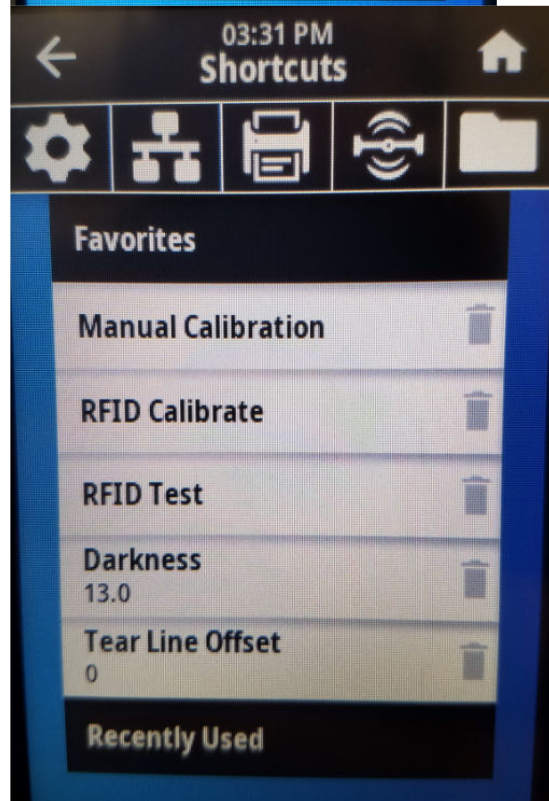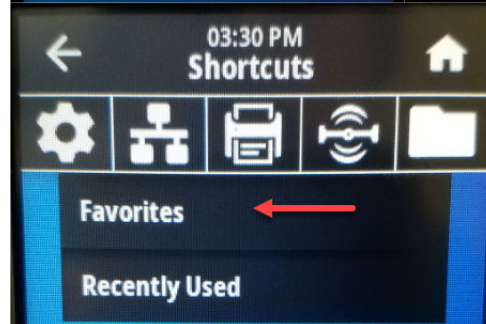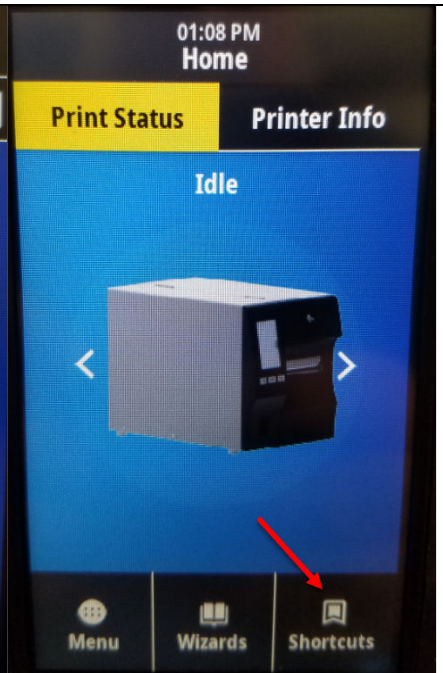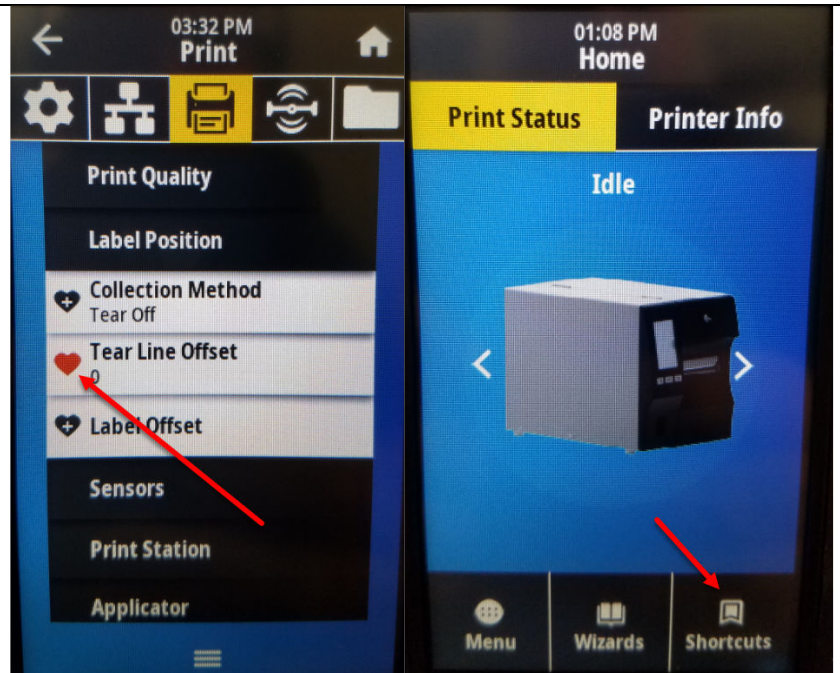**RFID Calibrate**
    (Menu >RFID >RFID)
RFID Test
    (Menu >RFID >RFID)
Darkness
    (Menu >Printer >Sensors)
Tear Line Offset
(Menu >Printer >Label Position)

Step 20– Once print testing is competed successfully, press and hold the FEED and CANCEL keys at the same time for greater that 3 seconds and a printer configuration will print. Compare the printer settings to the MASTER configuration shown at the beginning of this document. The items highlighted in yellow are variable and may vary somewhat printer to printer.	The USB Mirror Dive may be removed at this time.
Step 21 – Power printer down and connect USB A to B Cable to the printer and a Live CAT5 Network cable to the printer on a network segment that is known to have DHCP enabled. Power the printer up and verify the Ports are behaving correctly. **NOTE: DO NOT PRINT TEST PAGE during this step or the configuration settings will be overridden.**	**The purpose of this step is to verify that:** 1) The printer will successfully prompt a Windows PC to discover the printer via the Plug-N-Play process and load the ZDesigner ZT411R 300 dpi Printer Driver. 2) The printer will successfully acquire a DHCP IP Address. That address will display on the printers LCD screen and will ping and the printer's built in Web Pages will now load. **NOTE: DO NOT PRINT TEST PAGE during this step or the configuration settings will be overridden.**
Step 22 – Power printer down. Remove all external cables and USB Mirror Drives at this time. Remove Labels and Ribbon and place a blank label underneath printhead and close it down and lock it.	
Step 23 -- Verify ALL printers have correct Configuration ZT41143-T0100A0Z	300 DPI Printhead with RFID Module installed.
Step 24 – Affix Lowry Asset Management Tags in the approved locations by customer IF they are being used.	
Step 25 – Update Imaging/Staging records and/or spreadsheets.	
Step 26 – Repackage the printer in the correct shipping box.	
Step 27 – Ensure the Shipping Box is marked appropriately as the printer is now unique to the Customer site.	