

JCM[®] TRAINING OVERVIEW

DBV[®] Series
DBV-500 Banknote Validator

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Phone (800) 683-7248
(702) 651-0000
Fax (702) 651-0214

E-mail support@jcmglobal.com
www.jcmglobal.com



DBV-500 Banknote Validator

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OVERVIEW

This training course addresses the following JCM DBV-500 device versions:

Table 1 DBV-500 Banknote Validator Versions

Device	Version Difference
DBV-500 SU	Upstack Unit
DBV-500 SD	Downstack Unit

DBV-500 SD UNIT

Figure 1 illustrates the DBV-500 SD Banknote Validator Unit.



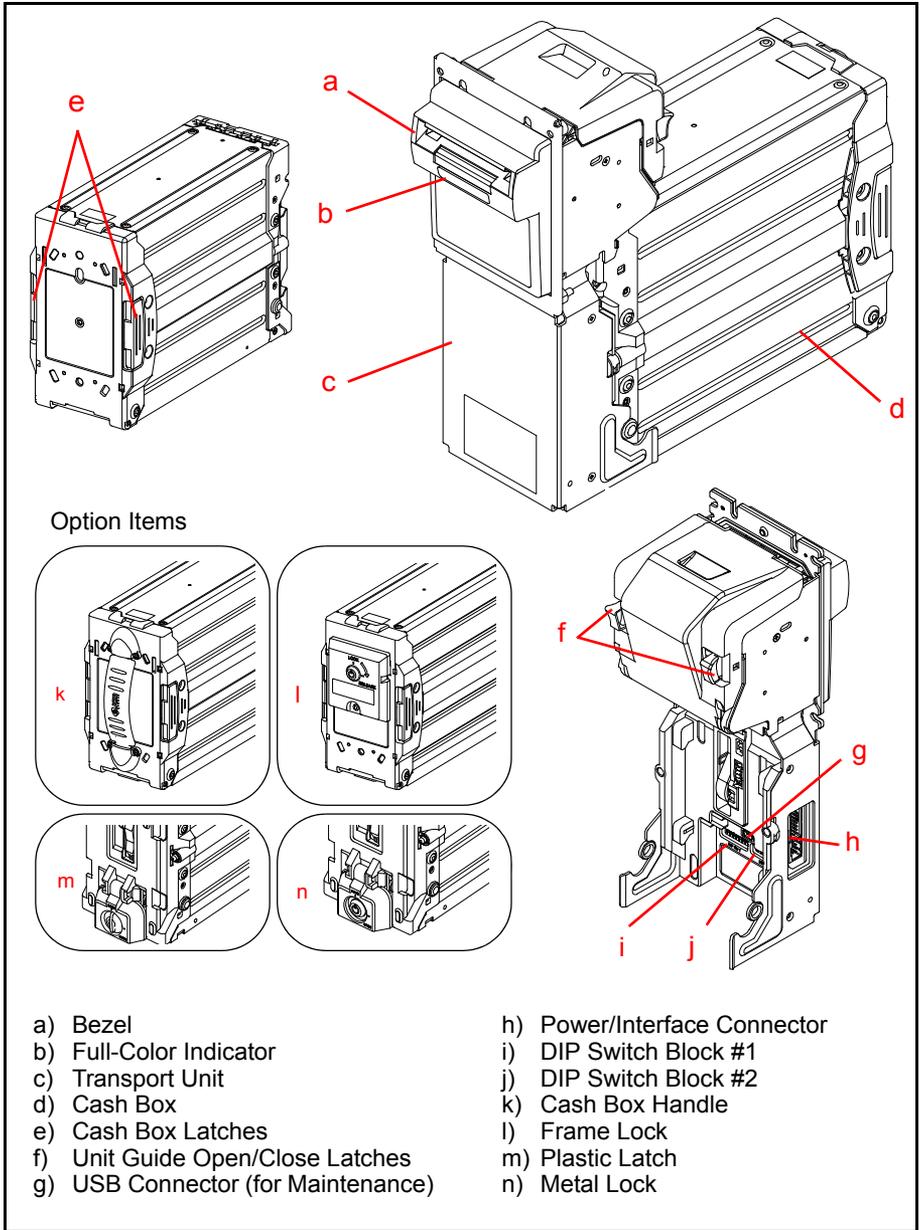
Figure 1 Typical DBV-500 SD Unit

Lecture Notes

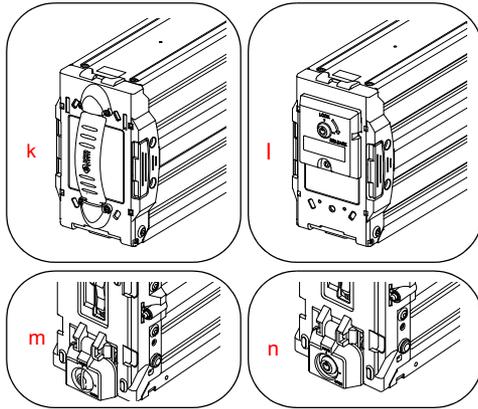
COMPONENT LOCATIONS

COMPONENT NAMES

Figure 2 illustrates the DBV-500 Component Names and Locations.



Option Items



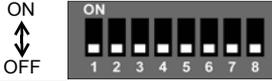
- | | |
|------------------------------------|------------------------------|
| a) Bezel | h) Power/Interface Connector |
| b) Full-Color Indicator | i) DIP Switch Block #1 |
| c) Transport Unit | j) DIP Switch Block #2 |
| d) Cash Box | k) Cash Box Handle |
| e) Cash Box Latches | l) Frame Lock |
| f) Unit Guide Open/Close Latches | m) Plastic Latch |
| g) USB Connector (for Maintenance) | n) Metal Lock |

Figure 2 DBV-500 Component Names

DIP SWITCH SETTINGS

Table 2 lists the default Configuration Settings for the DBV-500 DIP Switch Block #1.

Table 2 DIP Switch Block #1 Configuration Settings*



Switch No.	Switch ON	Switch OFF
1	VEND 1 INHIBIT	VEND 1 ACCEPT
2	VEND 2 INHIBIT	VEND 2 ACCEPT
3	VEND 3 INHIBIT	VEND 3 ACCEPT
4	VEND 4 INHIBIT	VEND 4 ACCEPT
5	VEND 5 INHIBIT	VEND 5 ACCEPT
6	VEND 6 INHIBIT	VEND 6 ACCEPT
7	OFF	OFF
8	TEST MODE	OFF (OPERATING MODE)

* See the Software Information Sheet (SIS) for proper Switch Settings.

Lecture Notes

COMMUNICATION SETTINGS

The DBV-500 Banknote Validator supports the following communication interface types:

- Photo-Coupler (9600 bps)
- TTL (38400 bps)
- RS-232C (38400 bps)
- Pulse
- USB 2.0*

* USB Communications requires an external harness for USB connection.

Table 3 lists the default Configuration Settings for DIP Switch Block #2.

Table 3 DIP Switch Block #2 Configuration Settings (Default)

Switch No.	DIP Switch #2*								
	ID-003			ID-0E4					
	Photo Coupler	TTL	RS-232C	TTL	RS-232C	Baud Rate 9600 bps	Baud Rate 19200 bps	Baud Rate 38400 bps	Baud Rate 115200 bps
1	OFF	ON	OFF	OFF	ON				
2	OFF	OFF	ON			OFF	ON	OFF	ON
3	OFF = Standard ID-003					OFF	OFF	ON	ON
	ON = Send Enable or Disable Status before Stacker Full								
4	OFF			OFF		OFF			
5	OFF			OFF		OFF			
6	OFF			OFF		OFF			
7	OFF = Standard Current Mode [Peak Current: 3.0A]								
	ON = Maximum Current Limitation Mode [Peak Current: 2.0A]								
8	OFF = ID-003 Mode								
	ON = ID-0E4 Mode								

* For correct DIP Switch Block #2 Settings for other protocols, check the Software Information Sheet (SIS) for the specific protocol.

Lecture Notes

SETTING THE LED BEZEL DEFAULT COLOR SETTING

To set or change the LED Bezel default color setting, proceed as follows:



NOTE: Before changing settings, record the current settings of DIP Switches #1 through #8 in DIP Switch Block #2. These settings will need to be restored in order to complete this procedure.

1. Remove power from the DBV-500 Banknote Validator Unit.
2. Set the DBV-500 DIP Switch Block #1 (Switches #1, #4, #5, #6, #7 and #8) settings to ON.
3. Restore power to the DBV-500 Banknote Validator Unit.
4. Select the desired Bezel LED Color SOLID ON by setting DIP Switch Block #2 as indicated in Table 4 below.



NOTE: To change the Bezel LED Color from a SOLID ON to a Flashing (ON/OFF) display, set the DIP Switch Block #2 Switches (Table 4) ON for the desired LED Color, then set Switch #8 ON to enable the Flashing function for the selected LED Color.

Table 4 LED Bezel Color Settings [Enable (Idling) State]

Bezel LED Color	DIP Switch Block #2 Settings							
	1	2	3	4	5	6	7	8
GREEN	ON							
CYAN		ON						
BLUE			ON					
MAGENTA				ON				
WHITE					ON			
YELLOW						ON		
RED							ON	
GRADIENT (FADING)	ON	ON	ON	ON	ON	ON	ON	
LED OFF	ON	ON	ON	ON	ON	ON	ON	ON

5. Set DIP Switch Block #1 Switch #8 to OFF to save the Bezel LED color configuration.
6. Remove power from the DBV-500 Banknote Validator Unit.
7. Reset all DIP Switch settings on DIP Switch Block #1 and Block #2 to the original settings.

Lecture Notes

SENSOR AND ROLLER CLEANING PROCEDURE

To clean the DBV-500 Unit, gently wipe the Sensors and Rollers using a clean (slightly damp) lint-free Microfiber cloth.



NOTE: DO NOT use Alcohol, solvents, citrus-based products or scouring agents. These items may cause damage to the Validation Section Sensors and Rollers.

1. Turn the DBV-500 Unit Power OFF.
2. Open the Validation Guide.
3. Clean the Lens of each Sensor (yellow) and the Rollers (green). (See Figure 3 for Locations and Table 5 for Cleaning Methods.)
4. Calibrate the DBV-500 Unit after cleaning.

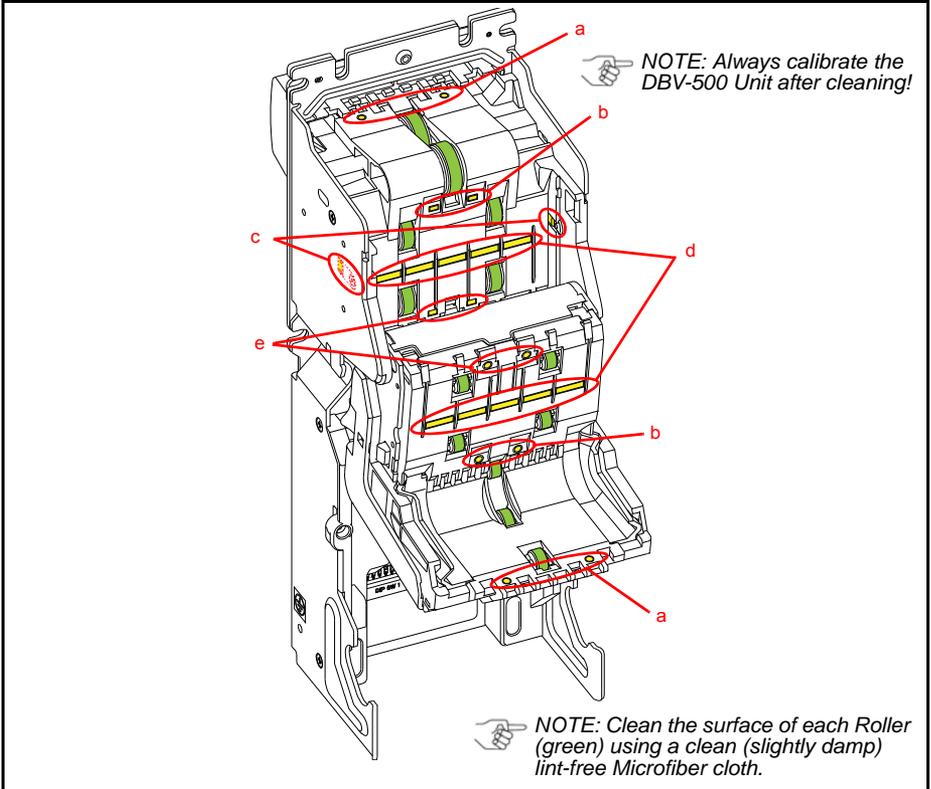


Figure 3 DBV-500 Sensor and Roller Locations

Table 5 DBV-500 Sensor and Roller Cleaning Methods

Label	Sensor Description	Cleaning Method
a	Entrance Sensor	Wipe Sensors (yellow areas) clean using a clean (slightly damp) lint-free Micro-fiber cloth.
b	Centering Start Sensor	
c	Side Sensor	Wipe Rollers (green areas) clean using a clean (slightly damp) lint-free Microfiber cloth.
d	COB Sensor	
e	Exit Sensor	

JCM TOOL SUITE STANDARD EDITION

Figure 4 illustrates the JCM Tool Suite Standard Edition's Main Screen.



NOTE: For DBV-500, JCM Tool Suite Version 1.29 or higher is required.

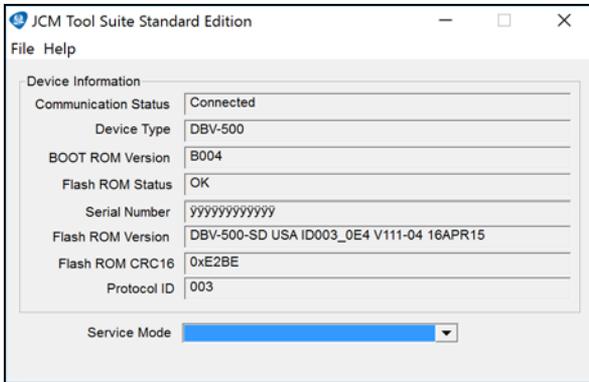


Figure 4 JCM Tool Suite Main Screen

The JCM Tool Suite Standard Edition supports the following operational modes and User-selectable Functions, under the “Service Mode” drop-down Menu:

The available Service Mode Functions include:

- Normal Mode or Operational Mode (All DIP Switch Block #1 Switches = OFF):
 - Download
 - Statistics
 - Event Log View
- Test Mode (DIP Switch Block #1 Switch #8 = ON):
 - Download
 - Statistics
 - Sensor Adjustment
 - Performance Test
 - Event Log View



NOTE: All Diagnostics Tests can also be performed by setting various DIP Switch settings. For more information on setting the DIP Switches for testing, refer to Section 6 in the DBV® Series DBV-500 Operation and Maintenance Manual (P/N 960-100933R {EDP #233449}).

Use a Standard USB Type-A to Mini-B Cable between the PC and DBV-500.

1. Remove the Cash Box.
2. Connect the Mini-B cable to the USB Port by the DIP Switches.
3. Connect the Type-A connector to the USB Port on the PC.
4. Apply power to the DBV-500 Unit.
5. Open the JCM Tool Suite Application. When connected, the Device Information Fields will be filled in, as shown in Figure 4.

SOFTWARE DOWNLOAD PROCEDURE

To update the Software Version in the DBV-500 Unit:

1. Click the “Service Mode” drop-down menu (Figure 5 a), then click “Download.”

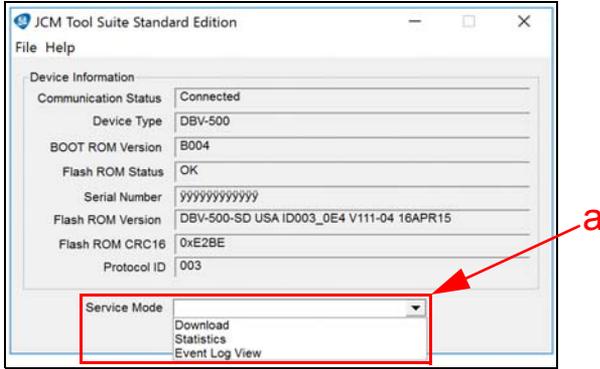


Figure 5 JCM Service Mode Drop-Down Menu

The JCM Downloader Suite Edition display appears (Figure 6).

2. To select the file to download, click “Browse” (Figure 6 a).
 3. From the folder that contains the DBV-500 download file, click the DBV-500 Download file name, then click the “Open” screen button.
- The JCM Downloader Suite Edition Version x.xx display reappears.
4. Click “Download” to start the file transfer (Figure 6 b).



NOTE: A Blue Barograph will display the download progression. When downloading is complete, the DBV-500 Unit will automatically reset, and the Online message will be displayed (Figure 6 c).

Lecture Notes

PERFORMANCE TESTING PROCEDURES

PERFORMANCE TESTING

Available Tests Using the JCM Tool Suite Application

 *NOTE: Additional tests are available using DIP Switch Performance Testing Procedures.*

- Transport Motor Normal Rotation
- Transport Motor Reverse Rotation
- Stacking
- Sensor Test
- DIP Switch 1 Test
- DIP Switch 2 Test
- LED Test
- Centering Test

To run Performance Tests, proceed as follows:

1. Disconnect the DBV-500 Unit from its power source.
2. Remove the DBV-500 Unit's Cash Box to access the Maintenance USB Port.
3. Set DIP Switch Block #1, Switch #8 ON.
4. Reconnect the DBV-500 Unit to its power source.
5. Connect a USB Type-A to Mini-B cable between the PC's USB Port and the DBV-500 Maintenance USB Port.
6. Launch the "JCM Tool Suite Standard Edition" software application.
7. Click the Service Mode drop-down menu (Figure 5), then select Performance Test (refer to Figure 7 on the following page).
8. Click on the desired Performance Test in the left column (e.g., STACK TEST).
9. Click the "Start"  Screen Button to begin the Performance Test.
Test Results are displayed in the Performance Test window (right column).
10. Click the "Stop" Screen Button to end the selected Performance Test.

 *NOTE: Repeat Steps 8 through 10 above to run additional Performance Tests.*

Lecture Notes

The Performance Test window appears as shown below.

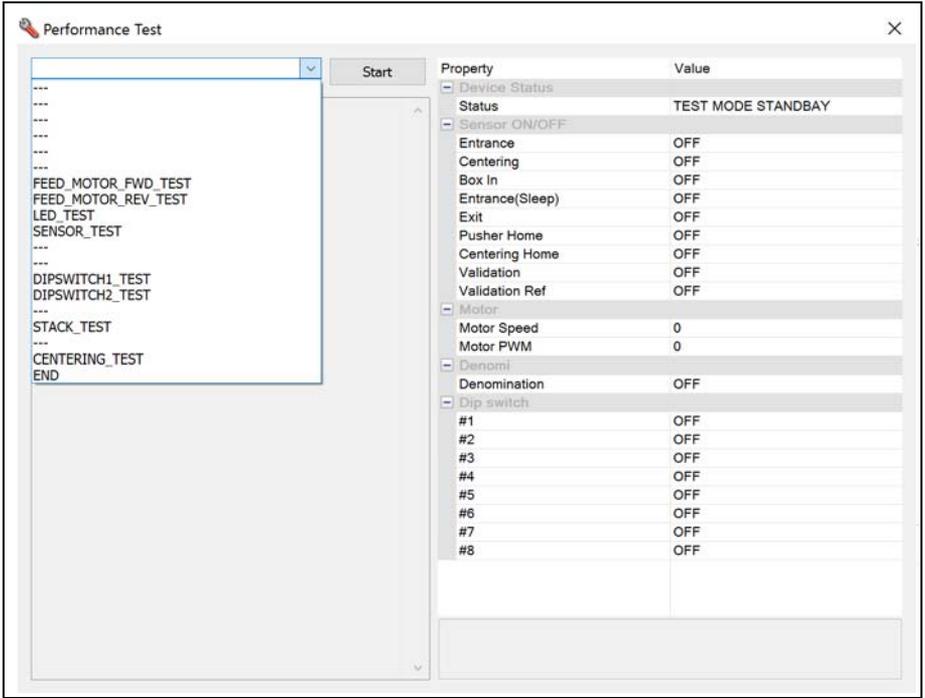


Figure 7 JCM Tool Suite Performance Test Window

Lecture Notes

PERFORMANCE TESTING

Available Tests Using DIP Switch Block #1

Table 6 below lists the available Performance Tests using DIP Switch Block #1, and the settings required for each test.

To run Performance Tests using DIP Switch Settings, proceed as follows:

1. Disconnect the DBV-500 Unit from its power source.
2. Remove the DBV-500 Unit's Cash Box.
3. Set DIP Switch Block #1, Switch #8 ON.
4. Reconnect the the DBV-500 Unit to its power source.
5. Set the appropriate DIP Switch(es) to ON as shown in Table 6.
6. Set DIP Switch Block #1, Switch #8 OFF to begin the Performance Test.
7. Confirm correct operation.
8. Set DIP Switch Block #1, Switch #8 ON to end the selected Performance Test.



NOTE: To perform the Acceptance Test:
 1. Turn DIP Switch Block #1 Switch 8 OFF.
 2. Set the Cash Box onto the DBV-500 Unit.
 The Acceptance Test will begin automatically.

Table 6 Performance Tests Using DIP Switch Settings

Test Item	DIP Switch Block #1 Settings								Test Description
	1	2	3	4	5	6	7	8*	
Transport Motor Normal Rotation	ON							ON/OFF	Normal Rotation Speed Test
Transport Motor Reverse Rotation		ON						ON/OFF	Reverse Rotation Speed Test
Stacking Test			ON					ON/OFF	Stacking Mechanism Movement (check @ 3 second intervals)
Aging Test				ON				ON/OFF	Aging Movement (check @ intervals set by DIP SW1 #6 & #7)
Centering Mechanism	ON				ON			ON/OFF	Centering Mechanism Movement (check @ 3 second intervals)
Sensor Test							ON	ON/OFF	Each Sensor Performance Check†
Acceptance Test (with Validation)	ON	ON	ON	ON				ON/OFF	Acceptance Check with Validation
Acceptance Test (No Validation)	ON	ON	ON	ON		ON		ON/OFF	Acceptance Check without Validation
Reject Test (No Validation)	ON	ON	ON	ON	ON		ON	ON/OFF	Reject Check without Validation
DIP Switch #1 Test	ON	ON	ON	ON	ON	ON	ON	ON/OFF	DIP Switch #1 Performance Check
DIP Switch #2 Test		ON	ON	ON	ON	ON	ON	ON/OFF	DIP Switch #2 Performance Check
LED Test				ON	ON	ON	ON	ON/OFF	LED Performance Check

* DIP Switch Block #1 Switch 8 Setting: OFF to start Test, ON to stop Test.

† Refer to Sensor Test and Table 7 on page 15 for Sensor and LED Conditions for the Sensor being tested.

SENSOR TEST

To test each sensor, block each Sensor, then consult Table 7 and confirm the Bezel LED color changes to the correct color for the Sensor being tested.

Table 7 Sensor and LED Condition*

Sensor Name	Condition	LED
Entrance Sensor	Shielded	RED
Centering Sensor	Shielded	GREEN
Validation Sensor	Shielded	BLUE
Exit Sensor	Shielded	YELLOW
Stacker Home Position Sensor	When the Pusher Plate is NOT at Home Position	MAGENTA
Centering Home Position Sensor	When the Centering Mechanism is NOT at Home Position	CYAN
Box Detection Sensor	When the Cash Box is installed	WHITE

* If multiple sensors are active, the status of the sensor with lowest priority is shown.

Lecture Notes

CALIBRATION

Calibration of the DBV-500 Unit needs to be performed when any of the following conditions occur:

- When removing and replacing the CPU Circuit Board
- When removing or replacing any Sensors or Sensor Boards
- After cleaning the DBV-500 Unit
- If the Banknote Acceptance rate has decreased.



NOTE: KS-091 Reference Paper is specified for use when calibrating the DBV-500.

VALIDATION SENSOR CALIBRATION

To perform the DBV-500 Validation Sensor Calibration procedure:

1. Disconnect power from the DBV-500 Unit.
2. Set DIP Switch Block #1, Switch # 8 to ON.
3. Restore power to the DBV-500 Unit.



NOTE: The DBV-500 Unit's Front Bezel LED will flash Green.

4. Connect the USB Type-A to Mini-B cable between your PC's USB port and the USB port located on the DBV-500 Unit.
5. Launch the "JCM Tool Suite Standard Edition" software application.
6. Click the Service Mode drop-down menu (Figure 5), then click Sensor Adjustment.
7. Confirm that the DBV-500 Calibration Tool is running, as shown in Figure 8.

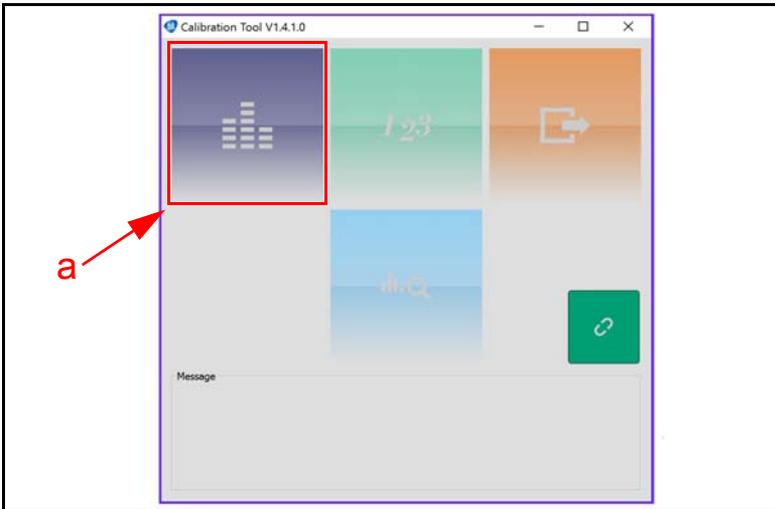


Figure 8 DBV-500 Calibration Tool

8. Click the Sensor Calibration function screen button (Figure 8 a).
The Sensor Calibration screen appears momentarily (refer to Figure 9).

9. Follow the onscreen prompts and click the Start button (Figure 9 a) to begin the DBV-500 Validation Sensor Calibration.



NOTE: KS-091 Reference Paper must be used for Calibration of the DBV-500.

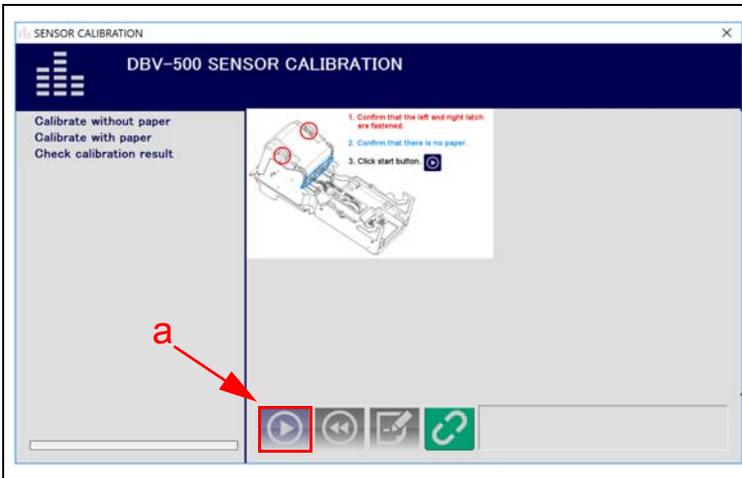


Figure 9 DBV-500 Sensor Calibration Function

10. When prompted to Change Serial Number?, click Yes if the Serial Number recorded on the CPU Circuit Board needs to be changed; otherwise, click No to complete Calibration.
11. When the Sensor Calibration Screen appears (Figure 10), click the Start button (Figure 10 a) to save the Calibration Settings to EEPROM.

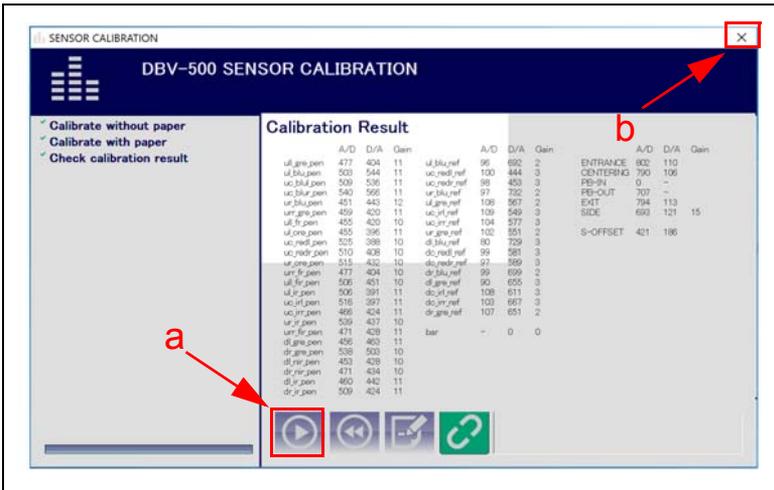


Figure 10 DBV-500 Sensor Calibration Results

12. When the “Write EEPROM Succeeded” prompt appears, click the “OK” screen button to close the screen. Then click the Close box × (Figure 10 b) to close the Sensor Calibration Screen and complete the Calibration process.

WHITE LEVEL TEST

To perform the DBV-500 White Level Test procedure:

1. Disconnect power from the DBV-500 Unit.
2. Set DIP Switch Block #1, Switch # 8 to ON.
3. Restore power to the DBV-500 Unit.



NOTE: The DBV-500 Unit's Front Bezel LED will flash Green.

4. Connect the USB Type-A to Mini-B cable between your PC's USB port and the USB port located on the DBV-500 Unit.
5. Launch the “JCM Tool Suite Standard Edition” software application.
6. Click the Service Mode drop-down menu, then click Sensor Adjustment.
7. Confirm that the DBV-500 Calibration Tool is running, as shown in Figure 11.

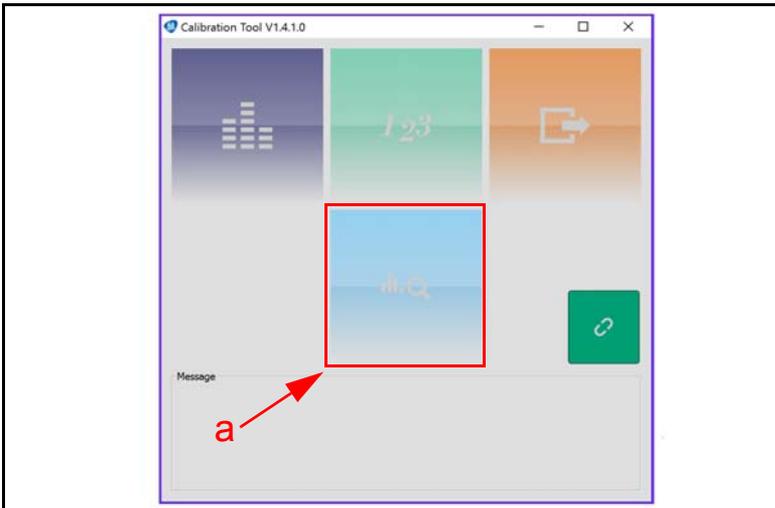


Figure 11 DBV-500 Calibration Tool

8. Click the White Level Test function screen button (Figure 11 a). The White Level Test screen appears momentarily (refer to Figure 12).

Lecture Notes

9. Follow the onscreen prompts and click the Start button (Figure 12 a) to begin the DBV-500 White Level Test.



NOTE: KS-091 Reference Paper must be used for Calibration of the DBV-500.

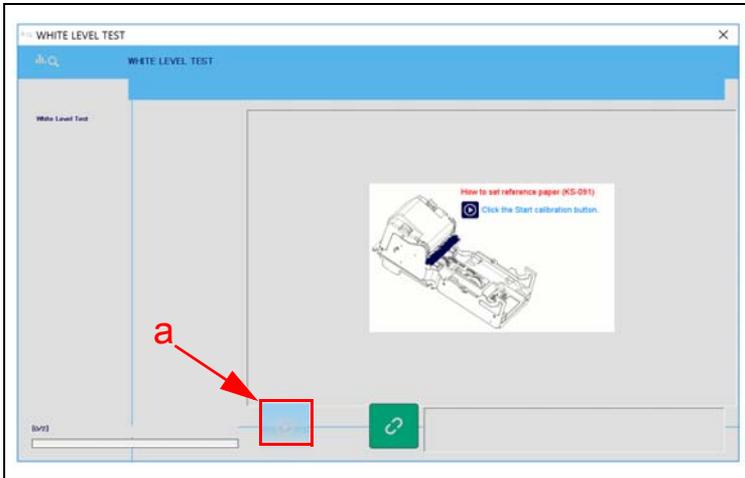


Figure 12 DBV-500 White Level Test Function

10. When the White Level Test is complete, click the Close box × (Figure 13 a) to close the White Level Test Screen and complete the process.



Figure 13 DBV-500 White Level Test Complete

LED ERROR CODES

STARTUP ERRORS

Startup Errors can occur during initial power up of the DBV-500 Unit. During Normal Operating Mode, the Bezel LED flashes white; in Performance Test Mode, however, the Bezel LED flashes white intervals. To identify the Startup Error, count the flashes between pauses, then consult Table 8 to determine the Error, Causes and Solutions.

Table 8 DBV-500 Startup Errors, Causes and Solutions

Normal Operation	Performance Test	Error	Causes and Solutions
White (1)	White (1)	Boot Check	Boot Program incorrectly written - CPU Board
White (3)	White (2)	Boot I/F	Boot interface incorrectly written/No Operating Program - Download the software, CPU Board
White (3)	White (3)	CPU Internal RAM	RAM Reading/Writing Error, CPU Board
White (3)	White (4)	External SD RAM	SD-RAM Reading/Writing Error, Download Software, CPU Board
White (3)	White (5)	EEPROM	EEPROM Reading/Writing Error, Calibrate, CPU Board
White (3)	White (6)	Downloading File	Check file for DBV-500, Download proper software
White (3)	White (8)	I2C Access	Sensors detected abnormal condition, Clean Sensors, check Stacker.

Lecture Notes

OPERATIONAL ERRORS

Operational Errors can occur when the DBV-500 Unit is available to accept Banknotes, and are indicated by the Bezel LED Flashing **Red** or **Magenta**. An Operational Error automatically takes the DBV-500 Unit Out of Service until the error is corrected. To identify the Operational Error, count the flashes between pauses, then consult Table 9 to determine the Error, Causes and Solutions.

Table 9 DBV-500 Operational Errors, Causes and Solutions

Normal Operation	Performance Test	Error	Causes and Solutions
Red (3)	Red (1)	Stacker Motor Lock	Stacker Motor Speed Error
Red (3)	Red (2)	Pusher Position	Pusher Mechanism is not at Home Position
Red (3)	Red (3)	Banknote Jam (Cash Box)	Jam at the Cash Box
Red (3)	Red (4)	Transport Motor Speed	Transport Motor Speed is Incorrect
Red (3)	Red (5)	Transport Motor Lock	Transport Motor is Inoperative
Red (3)	Red (6)	Centering Mechanism	Centering Guide has not moved
Red (3)	Red (7)	Reserved	Contact your local JCM Representative if this error occurs.
Red (3)	Red (8)	Fraud Detection	Sensors detected Banknote with Abnormal Timing
Magenta (3)	Magenta (1)	Cash Box Full	Empty Cash Box
Magenta (3)	Magenta (2)	Cash Box Removed	Re-seat the Cash Box
Magenta (3)	Magenta (3)	Banknote Jam (Transport)	Banknote Accepting/Rejecting Sensor Blocked

Lecture Notes

BANKNOTE REJECT ERRORS

Banknote Reject conditions are indicated by the Bezel LED Flashing Yellow or Green. To identify the Banknote Reject Error, count the flashes between pauses, then consult Table 10 to determine the Error, Causes and Solutions.

Table 10 DBV-500 Banknote Reject Errors, Causes and Solutions

Normal Operation	Performance Test	Error	Causes and Solutions
Yellow (3)	Yellow (2)	Magnification Error	Sensor detected improper levels; clean/calibrate
Yellow (3)	Yellow (3)	Denomination	Invalid denomination type
Yellow (3)	Yellow (4)	Pattern Error	Abnormal Banknote pattern detected; clean, calibrate
Yellow (3)	Yellow (5)	Photo Level	Sensor levels incorrect; clean, calibrate
Yellow (3)	Yellow (6)	Banknote Length	Banknote longer/shorter than specified; clean rollers
Yellow (3)	Yellow (7)	Pattern Error 1	Sensor readings do not compare; clean, calibrate
Yellow (3)	Yellow (8)	Invalid Banknote	Sensors detected the Banknote as invalid
Yellow (3)	Yellow (9)	Pattern Error 2	Sensor readings do not compare; clean, calibrate
Green (3)	Green (1)	Skewed insertion	Banknote inserted at an angle/crooked
Green (3)	Green (2)	Remaining Banknote	Banknote in Transport returned during initialization
Green (3)	Green (3)	Transport Time-out	Sensors detected improper Banknote movement
Green (3)	Green (4)	Banknote Detection	Sensors detected Banknote with abnormal timing
Green (3)	Green (5)	Inhibit Setting	Banknote acceptance disabled by switch or Host settings
Green (3)	Green (6)	Return Command	Banknote return commanded by Host

Lecture Notes

DBV-500 PARTS LIST

Table 11 DBV-500 Parts List

EDP No.	JAC No.	Description
Use JAC # →	501-100218R	UAC Module
G00286	← Use EDP #	Universal Power Supply for UAC
Use JAC # →	400-000158R	DBV-500 UAC Harness
Use JAC # →	302-100007RA	Power Cord, 2-prong USA
Use JAC # →	302-000001R	USB Male-A to Mini-B Cable
236939	← Use EDP #	Calibration Reference Paper (KS-091)



NOTE: Product EDP Numbers that begin with "G" designate products developed by JCM-E Germany.

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925 Pilot Road, Las Vegas, Nevada 89119

Office & Technical Support: (800) 683-7248 (option 1 after hours), FAX: (702) 651-0214

E-mail: support@jcmglobal.com

www.jcmglobal.com