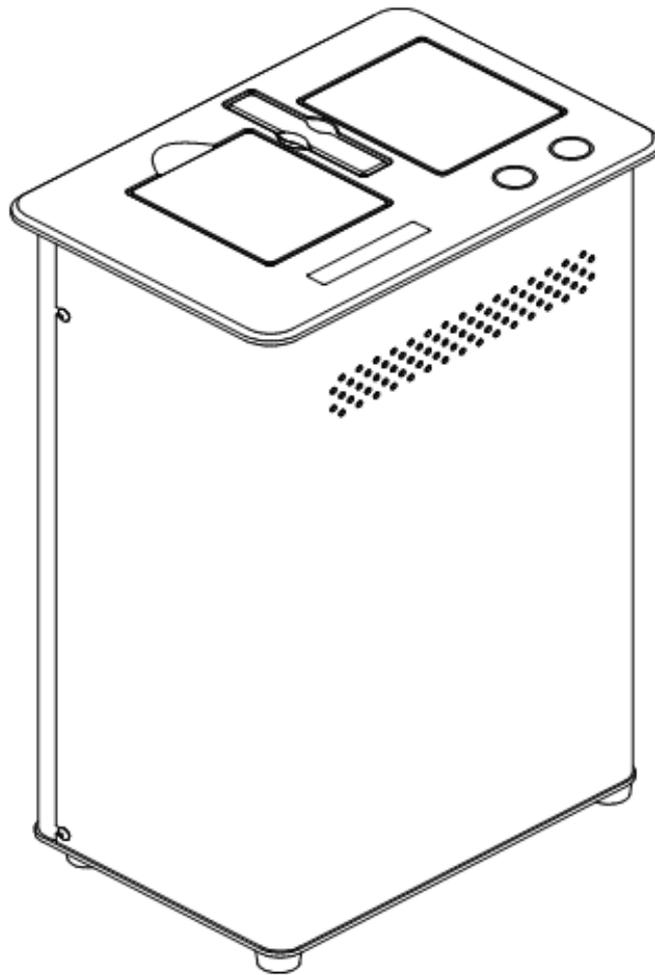


# MD2<sup>®</sup> CR Multi-Deck Card Shuffler



## Service Manual



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**SHFL entertainment, Inc.  
1106 Palms Airport Drive  
Las Vegas, Nevada 89119**

## Revision History

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## General Safety Guidelines

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The *MD2® CR* Shuffler with Card Recognition has ventilation slots that allow air to circulate through the shuffler to prevent overheating. These ventilation slots must always be kept open and free of any debris or blockage.

The shuffler is equipped with a power cord appropriate for use in North America. If the shuffler is being utilized outside North America, please check the requirements of that country to ensure that the power cord meets its requirements. As a minimum, the power cord used with the shuffler must meet the following requirements: 0.5 amps, 100-240 volts.

Be certain that the shuffler is connected to a grounded outlet when in use. Additionally, when working on the shuffler the technician should use a properly grounded anti-static device, such as a wrist strap.

To ensure proper operation of the shuffler, avoid any liquid spills or the introduction of any foreign objects into the shuffler. Such an introduction could cause fire, electrical shocks or other significant malfunctions.

When operating the shuffler, be sure all covers are properly in place and only operate the shuffler in accordance with these operating instructions. Do not make any adjustments to the controls on the shuffler except in accordance with the procedures set forth in this manual. Do not turn the shuffler on and off in rapid succession - turn it 'ON' or 'OFF' in a deliberate manner.

## 1.0 Machine Characteristics

---

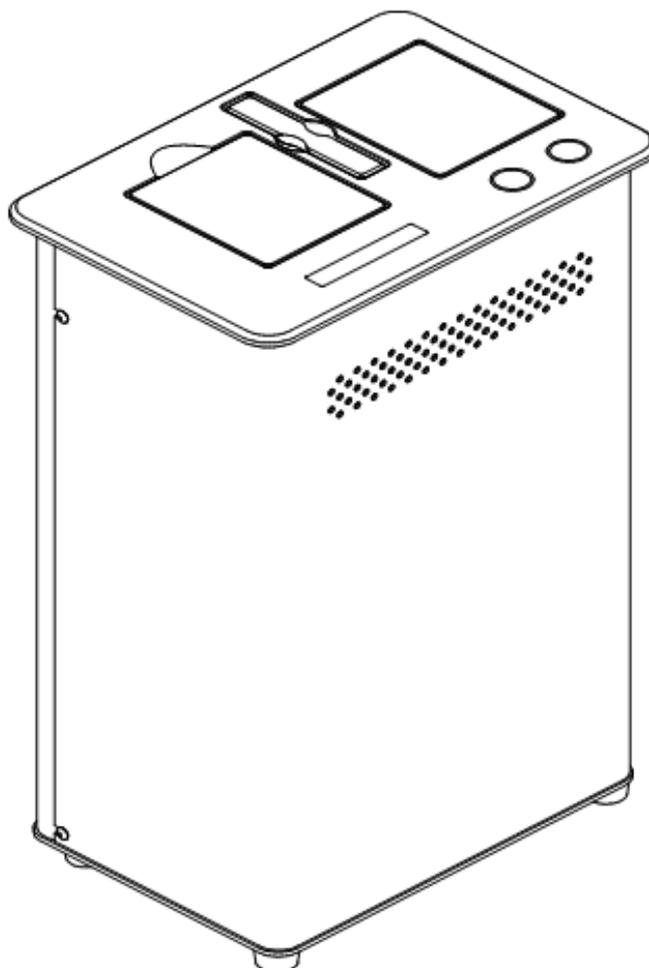


Figure 1-1. *MD2® CR Shuffler with Card Recognition*

Power Requirements: 100-240 VAC 50-60 HZ  
1.10/0.5 A

Dimensions: 11.5" x 8.0" x 18.5"  
(292 mm x 203 mm x 470 mm)

Weights: 28 lb (12.7 kg)

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## 2.0 Principles of Operation

---

### Principles of Operation

The *MD2® CR* multi-deck card shuffler shuffles four, six or eight decks of cards. Two sets of cards are required (usually different color decks) to utilize the shuffler more effectively for game play: while one set of cards is in play, the other set is being shuffled. The card recognition function can be set in the Setup menu of the *MD2® CR* to read cards during the shuffle. The *MD2® CR* shuffler can be configured for a number of standard games or any number of cards from 208 to 424, depending on the user setting.

In non-Card Recognition mode the cards are counted as they are shuffled in. The shuffle is aborted if the number of cards counted is different from the number of cards selected.

In Card Recognition mode the card decks are identified by optical means as they are shuffled. The shuffle is aborted if the cards identified during the shuffle are different from the expected cards for the selected game. (Missing, Extra or Unknown).

At the beginning of each cycle, the random number generator (RNG) assigns a location within a virtual rack for each card of the un-shuffled deck. The cards are loaded into a Feeder. As the cards are feeding in (from the bottom of the deck), the program executes the outcome determined by the RNG. A moveable Platform positions the cards in the shuffling compartment to the correct location. A set of grippers will grip the cards at that location and the Platform will move down creating a gap for the next card to be inserted.

When all the cards are inserted, the Platform raises the shuffled deck to be used by the dealer.

### Card Learning

Card learning is the method by which the *MD2® CR* shuffler reads all individual cards in a deck of cards and stores images and parameters for the geometry of the cards (location and size of the suit and rank symbols) for future optical character recognition.

### Card Tuning

Card tuning is the method by which the optical character recognition parameters are “fine-tuned” after card learning. The camera and geometric parameters are adjusted based upon manual administrator inputs. Card tuning is necessary for accurate operation of the *MD2® CR* shuffler.

---

### **Game Application**

The *MD2® CR* shuffler is used on card games requiring up to eight decks of 52 cards dealt from a shoe.

Application examples:

- Blackjack
- Baccarat
- Specialty Games

### 3.0 Operating Procedures

---

#### Start Up and Dealing Procedures

##### Passwords

There are two primary password levels used in the *MD2® CR* – the General password and the Administrator password. The General password is used in the Section 4 Setup Procedures and Adjustments and in the web pages of Section 5. The Administrator password is used in the web pages, as well, and allows access to all web page functionality. Contact SHFL entertainment, Inc. Engineering to obtain these passwords.

##### ! CAUTION !

The Feeder drops quickly when power is restored. Make certain no objects will block its path as it falls.

Plug the power cord into a 110V/60Hz or 220V/50Hz outlet. Turn the shuffler power switch to the ON position. The shuffler will perform system initialization. If there are cards left in the machine, it will display a message on the *Message Panel* to remove the cards.

After all cards are removed, the message panel will display:

Initializing MD2...

MD2 Initialized.

The message panel will then alternate two displays which allow the card deck type to be verified and accepted or changed:

RED: Scroll GREEN: Select  
1 102 Bee 92 Jumbo Tech Art

and

Card Type Selection  
1 102 Bee 92 Jumbo Tech Art

Press the GREEN button to accept the currently selected card type.  
Press the RED button to scroll through the available card deck types.  
Press the GREEN button to accept the new card deck type.

---

The shuffler will default to the last setup prior to power down. A typical message panel display might read:

BJ/War/Bac 8 Deck Green:Select Red:Change
--

If no change is required, pushing the GREEN button will raise the Feeder Elevator. A message will be displayed for loading:

Load 416 Cards Push GREEN button
-------------------------------------

The number of cards is based on the number of decks entered previously. Load the correct number of cards and push the GREEN button again. The Feeder Elevator moves down and the shuffle starts.

When the shuffle is complete, the GREEN button lights up. Push the GREEN button and the Feeder Elevator comes up. Load the second deck and push the GREEN button again. The shuffled deck will be raised and the un-shuffled deck lowered. Remove the shuffled deck from the Platform and proceed with the game. The Platform will automatically go down and the shuffle will start.

If a change is required, push the RED button after power up. Change the game and number of decks with the RED button. Select the game and number of decks with the GREEN button.

Spanish 21 8 Deck Green: Select Red:Change
---

### Count Mismatch

If Card Recognition is set ON (see Section 4.0), including an extra card in the deck results in an error message. The (M)issing, (U)nknown or e(X)tra card is identified. This is a typical display:

417 Cards M: 0 U: 0 X: 2D Push RED Button
--

Turn power 'OFF' to the shuffler. Turn power 'ON' again and remove the deck. Find and remove the extra card and look for additional invalid cards (such as Jokers or company logo cards) before restarting the shuffling procedure.

---

### Card Jam Recovery Procedures

The *MD2® CR* Shuffler with Card Recognition has built in automatic jam recovery features to deal with certain types of card jams.

If manual intervention is required to clear the problem, follow the messages on the message panel. Typical examples might be:

Check For Bent Cards

or

Clear Jam. Push RED

## 4.0 Setup Procedures and Adjustments

---

### General

To enter the **Setup Menu**, hold down the RED button and turn the shuffler power 'ON'. Continue to hold down the RED button until the message panel displays "Setup Menu". Release the RED button at that time. In general, to move through the menu items, press the GREEN button. To change the menu item or to execute commands, press the RED button.

#### Total Cycles

This message panel displays the current total of cycles on the machine since the last reset. A cycle is defined as the number of completed multi-deck shuffles.

Total Cycles 000012
------------------------

#### Time

The message panel displays the time and allows a new time to be entered. The time displayed is based on a 24-hour clock.

Press the RED button to move the cursor to the left, one character at a time.

Press the GREEN button to change the character.

Set Time: 05:35:39_
------------------------

Return the cursor to the far right after the changes have been made and push the GREEN button to save the setting.

#### Date

To change the date, press the RED button to advance the cursor to the desired character.

Press the GREEN button to change the character.

Set Date: 01-08-07_
------------------------

Return the cursor to the far right after the changes have been made and push the GREEN button to save the setting.

---

### Verifying Changes

Always check the values after entry to verify that the changes have been made and saved.

### Card Recognition Function

The message panel item allows the Card Recognition feature to be set to either ON or OFF. The message panel will display:

Card Recognition? Yes/No?

Press the RED button to toggle between YES and NO. Press the GREEN button to select and advance to the next menu selection.

A password is not required to change the Card Recognition option.

### Password

The password must be entered to inspect or change most shuffler data.

The message panel will display:

Enter Password  
00000\_

To enter the password, press the RED button to advance the cursor to the desired character, and press the GREEN button to change the value of the character. After entering the correct password, return the cursor to the far right, and press the GREEN button.

### Passwords

There are two primary levels of passwords, the Administrator password and a General password. Some of the web pages and associated functions are not available when using the General password.

### Automatic Setup

This menu item allows calibration of the machine for the type of cards to be used. One 52 card deck is used. The password must have been previously entered.

---

The message panel will display:

Automatic Setup  
To Start Push RED

To begin calibration, push the RED button. The machine will display:

Auto Setup in Progress  
Push GREEN Button

Load the 52 cards and push the GREEN button to start the Automatic Setup process. When finished, the message panel will display:

Setup Complete  
Push GREEN to Continue

Setup Complete  
Grip: 277, Plat: 294

Both elevators will rise. Remove the cards from the Platform. The new gripper and Platform values will now be saved. Push the GREEN button to continue.

### Resetting Shuffle Cycles

This menu item displays the total number of shuffling cycles since the last reset- and allows resetting the cycles to 0. Press the RED button to reset.

Reset Cycles                      005714

### Resetting History Log

Press the GREEN button to advance to Reset History Logs.

Reset History Logs

To reset all available data in the history log, press the RED button.

#### **Note**

Resetting this log will permanently erase the data currently in the log.

---

## Selecting Card Type

The factory-set Card Recognition values are different for every card type. In order for the *MD2® CR* shuffler to accurately recognize the rank and suit, it must be set to the card type that is currently in use. The password is not required.

The message panel will display the first card type. The card type displayed will vary, depending upon what has been initially loaded or what decks have been selected. This is a typical display:

Select Card Type Bee E 1566 – Standard Index
---

Use the RED button to cycle through the pre-loaded card types. A maximum of ten card types can be displayed and selected. There may be many more card types recorded in the shuffler's memory. Ten card types are selectable from the Deck Library web page (see Section 5.0). The design philosophy is that standard card types should be easily available, but that a user would probably not employ more than ten deck types at one time.

Press the GREEN button to select the card type and advance to the next menu selection.

## Set Unloading Delay

This setting adjusts the delay time in seconds before the Platform lowers after the shuffled cards are removed from the machine. The selectable range is 5 seconds to 20 seconds.

Set Unloading Delay      15
-----------------------------

To change the number, press the RED button until the desired delay is displayed.

Press the GREEN button to select and advance to the next menu selection.

---

### Set Platform Delay

This setting adjusts the delay time in milliseconds (msec) between the time the Platform is lowered and the gap is created to when the next card is inserted.

The message panel will display:

Delay After Plat. Drop 100
-------------------------------

Press the RED button to select a time from 100 to 500 msec. The Delay After Drop for the *MD2® CR* shuffler should be set to 100 msec.

Press the GREEN button to select and advance to the next menu option.

### Seed RNG

This item allows manual reseeding of the random number generator. Push the RED button to access the function.

Seed RNG
----------

Next:

Push GREEN Button 4 Times
------------------------------

After pushing the button, the message panel will display:

RNG Seeded. Push GREEN to Continue
---------------------------------------

---

## Resetting Serial Number

### Important

The serial number should only be changed to match the serial number stamped into the base plate of the shuffler.

Serial Number:  
200620\_

Press the GREEN button to advance to the Serial Number Menu. The message panel will display the serial number of the machine. To change the number, press the RED button to advance the cursor to the desired character, and press the GREEN button to change the character.

Return the cursor to the far right after the changes have been made, and push the GREEN button to save the setting.

## Tuning Card Types

This option will allow a service technician to fine tune a card deck type that was previously downloaded into the *MD2® CR*. This process is called Tune Cards here, but it is really the second step of a process to align the camera optics to read and recognize cards with accuracy. In order for the shuffler to learn cards, a computer must be connected and configured to connect to the shuffler. Typically this will be a laptop in the field. See Section 6.0 of this manual for instructions on how to “tune” a deck for card recognition.

Tune Cards

or

Tune Cards + Joker

## Network Options

Use the GREEN button to page through the menu until ‘Network Options’ is displayed.

Use the RED button to page through the network sub-menu options.

Network Options  
MAC Addr: 00603505dff9

---

Press the RED button. 'Enable Network Yes/No?' will appear. Press the RED button to toggle from 'Enabled' to Disabled'. Verify that 'Network Enabled' is selected.

Enable Network Yes/No?  
Network Enabled

Press the GREEN button. The following IP addresses and the subnet mask can be individually modified when the shuffler is connected to a dynamic server network. Press the RED button to move the cursor. Press the GREEN button to change the digits.

Enter CardRec IP Address  
IP: 169.254.0.1 \_

Press the GREEN button.

Enter Server IP Address  
IP: 0.0.0.0 \_

Press the GREEN button.

Enter Subnet Mask  
SNM: 255.255.0.00 \_

Press the GREEN button. Press the RED button to toggle from 'Enabled' to Disabled'. Verify that 'DHCP Disabled' is displayed (for a static, stand-alone network configuration).

DHCP YES/NO?  
DHCP Disabled

Press the GREEN button to continue.

### **Exiting Setup Menu**

To exit the Setup Menu, turn the shuffler OFF.

---

## Board DIP Switches and EPROM

There are three printed circuit boards mounted onto the shuffler's Main Board (Figure 4-1). These boards contain DIP switches and an EPROM containing firmware. The DIP switches may be used for additional setup options. The EPROM can be reinstalled for upgrades or special configurations.

The functionality of each DIP switch is controlled by the EPROM software and may vary from version to version.

Please refer to the "Shuffler DIP Switch Settings" reference sheet available in the Product Information section of Shuffler Engineering department web page in Radar to determine the recommended DIP switch settings for a specific EPROM version, or call SHFL entertainment, Inc.

**Replacing the EPROM:** To replace the EPROM, turn power 'OFF' to the shuffler. Remove the old EPROM from the socket by pressing the left and right tabs of the socket at the same time. Insert the new EPROM, noting the location of pin 1. Push in until the left and right tabs click into place.

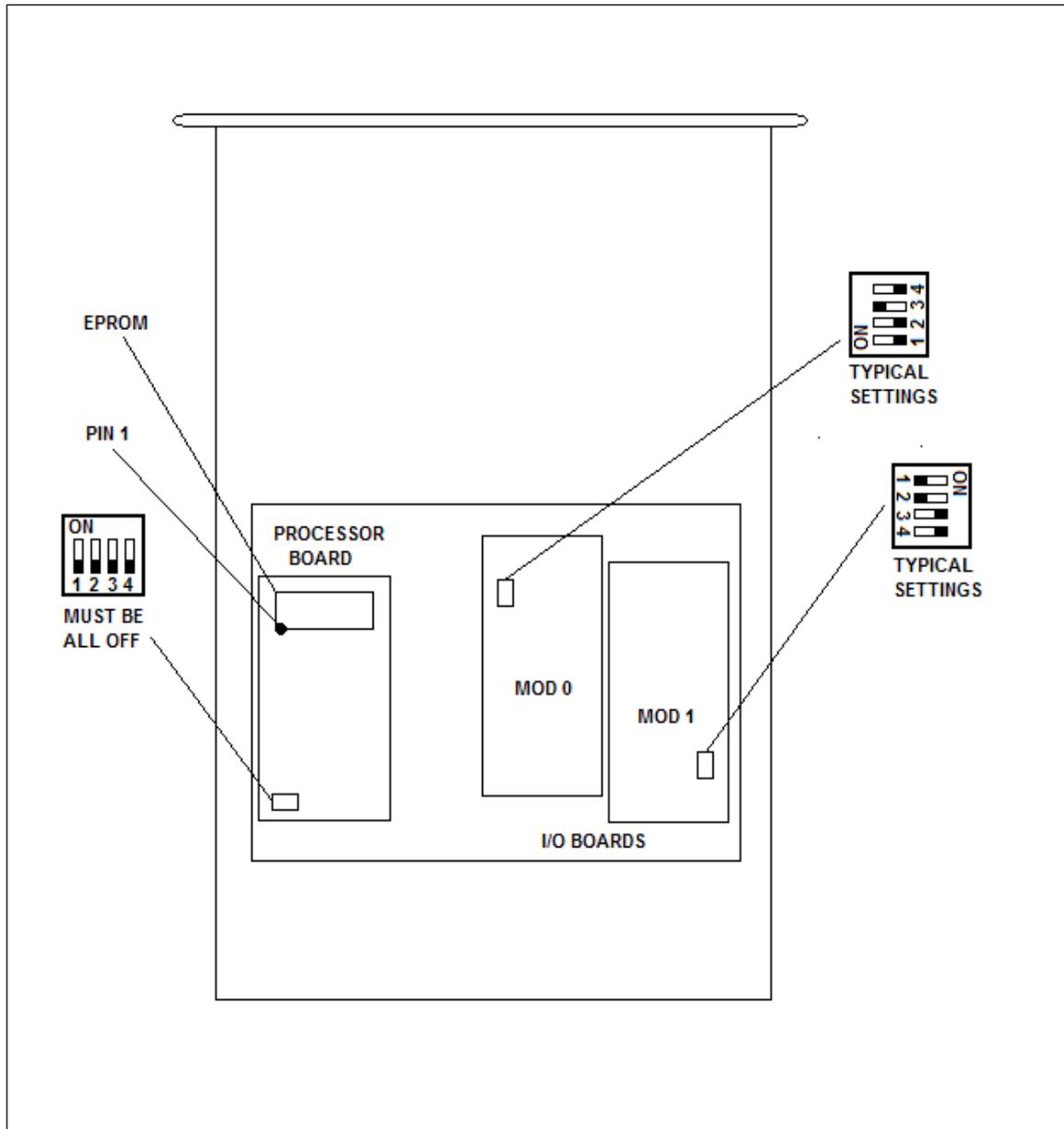


Figure 4-1. DIP Switches and EPROM

## 5.0 Shuffler Web Pages

---

### Integrated Web Pages

The *MD2® CR* with Card Recognition is a network device with integrated web pages; a user can connect to the shuffler and access these web pages to change shuffler settings, add new or delete old deck types, review card images, view card recognition errors, and perform other configuration actions using the browser.

Card Learning is another procedure that is facilitated by using the web pages in conjunction with displayed message panel procedures.

#### Connecting to the *MD2® CR* Shuffler

Although the web pages can be accessed over a network from any browser (such as Microsoft Internet Explorer), typically the shuffler will be connected to a laptop used for technical service. In this case, the shuffler acts as a server and the laptop (or desktop) computer is connected, possibly using a crossover network cable if required. The “network” here consists of the laptop and the *MD2® CR* Shuffler. This section generally describes how to connect the laptop to the shuffler, since there may be some subtle differences.

### *MD2® CR* Shuffler and Laptop/PC Configuration

#### Shuffler Setup

1. Enter the Setup Menu on the shuffler by cycling power ‘ON’ while holding down the RED button.
2. Use the GREEN button to page through the setup options until you see “Enter Password”.
3. Enter the General password.
4. Use the GREEN button to page through the menu until ‘Network Options’ is displayed.
5. Use the RED button to page through the network options until ‘Enable Network Yes/No?’ appears. Verify that ‘Network Enabled’ is selected.
6. Use the GREEN button to page through the network options until ‘DHCP Yes/No?’ is displayed. Verify that ‘DHCP Disabled’ is selected.

#### Computer Setup

The Proxy Server on the computer must be disabled before attempting to access the web pages. If it is not disabled, the computer cannot access the shuffler. Follow these steps to disable the Proxy Server:

1. Power down the shuffler, if it is currently in use.
2. Connect the crossover cable (if needed) to the computer and shuffler via the Ethernet ports.
3. Power up the computer and allow it to initialize.
4. Using the mouse or touchpad, right-click on the appropriate web browser icon on the PC desktop.
5. Select “Properties”. The Internet Properties window should appear.

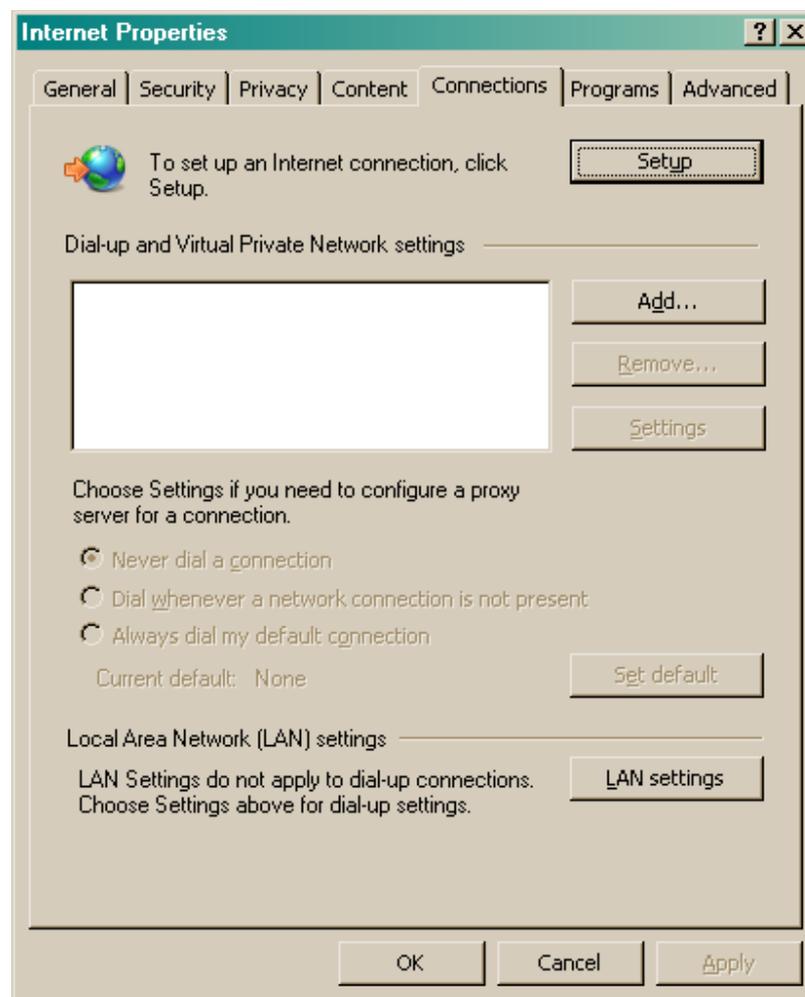


Figure 5-1. Microsoft Internet Properties

6. Click on the “Connections” tab. The window in Figure 5-1 should appear.
7. Click on the “LAN Settings...” button. The window in Figure 5-2 should appear.

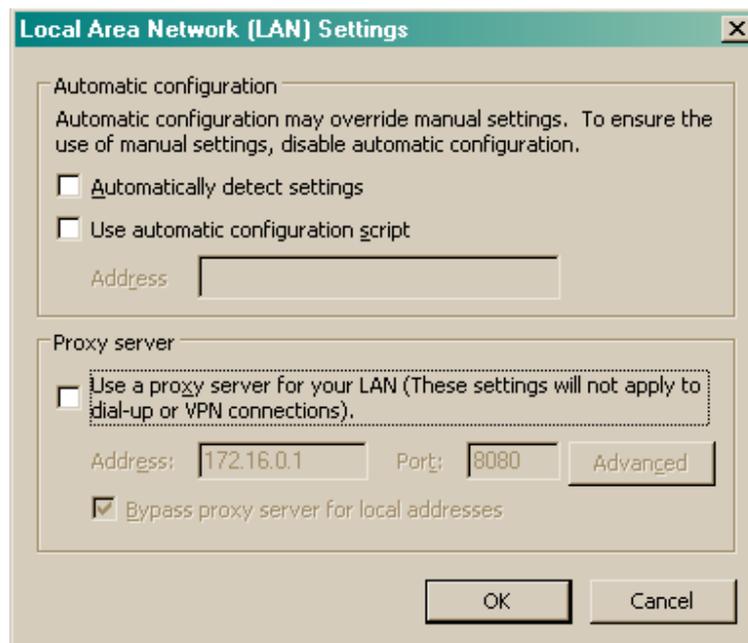


Figure 5-2. LAN Settings

8. Uncheck (deselect) “Use a proxy server for your LAN” in the “Proxy Server” section.
9. Click “OK”.
10. Click “OK” again on the “Internet Properties” window.

### Restore Settings

If your PC is used in both networked and non-networked environments, it is recommended that you restore these settings to their original configuration after the connection to the shuffler is no longer needed.

11. It may be necessary to restart the computer.
  - a. Once the computer has rebooted, run Microsoft Internet Explorer or alternate web browser. Type “http://169.254.0.1” as the web address. Press ‘Enter’. You should see the Login web page in Figure 5-3.

## Web Browser Login

Follow the procedures described above to access the shuffler web pages. When successful, you will see the Login web page in Figure 5-3.

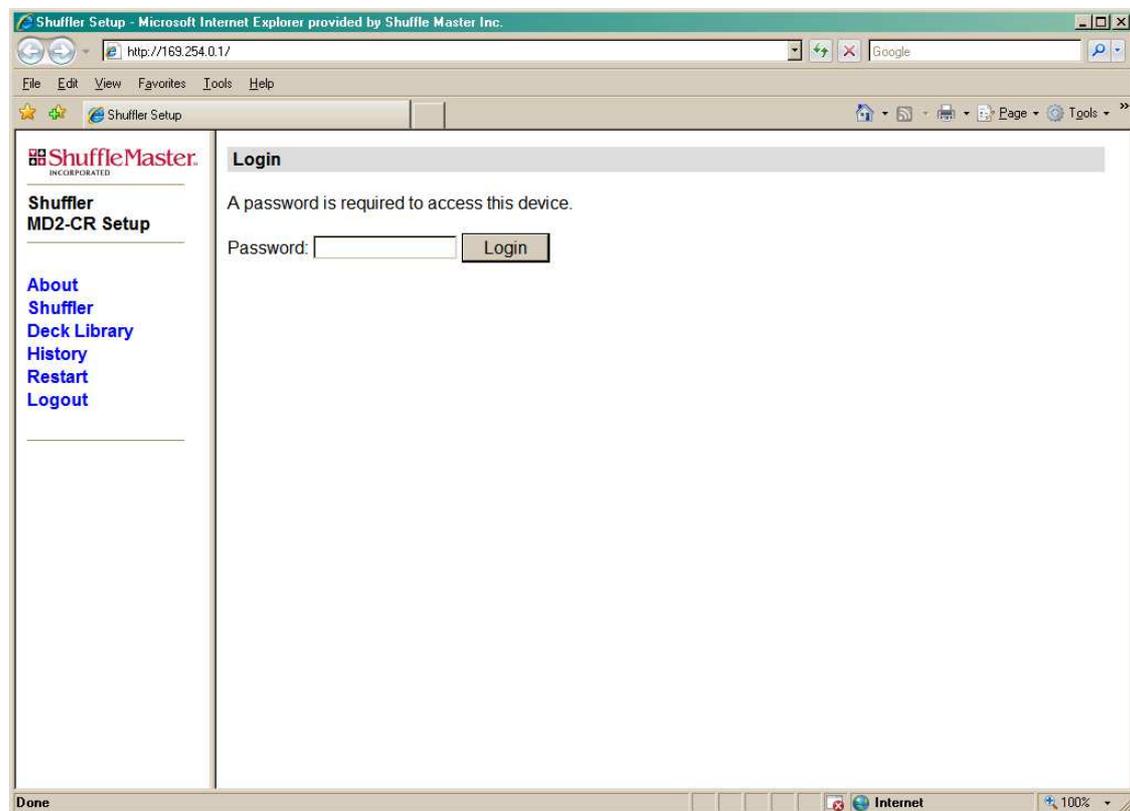


Figure 5-3. Login Web Page

### Passwords

There are two levels of password, the Administrator password and a General password. Some of the web pages and associated functions are not available when using the General password.

Normally, the Administrator password would be used by technical personnel, however, the General password is available as circumstances require. The functions described below are Administrative functions; the General function differences are described later.

Enter the Administrator password and you will see the “after Login” web page in Figure 5-4.

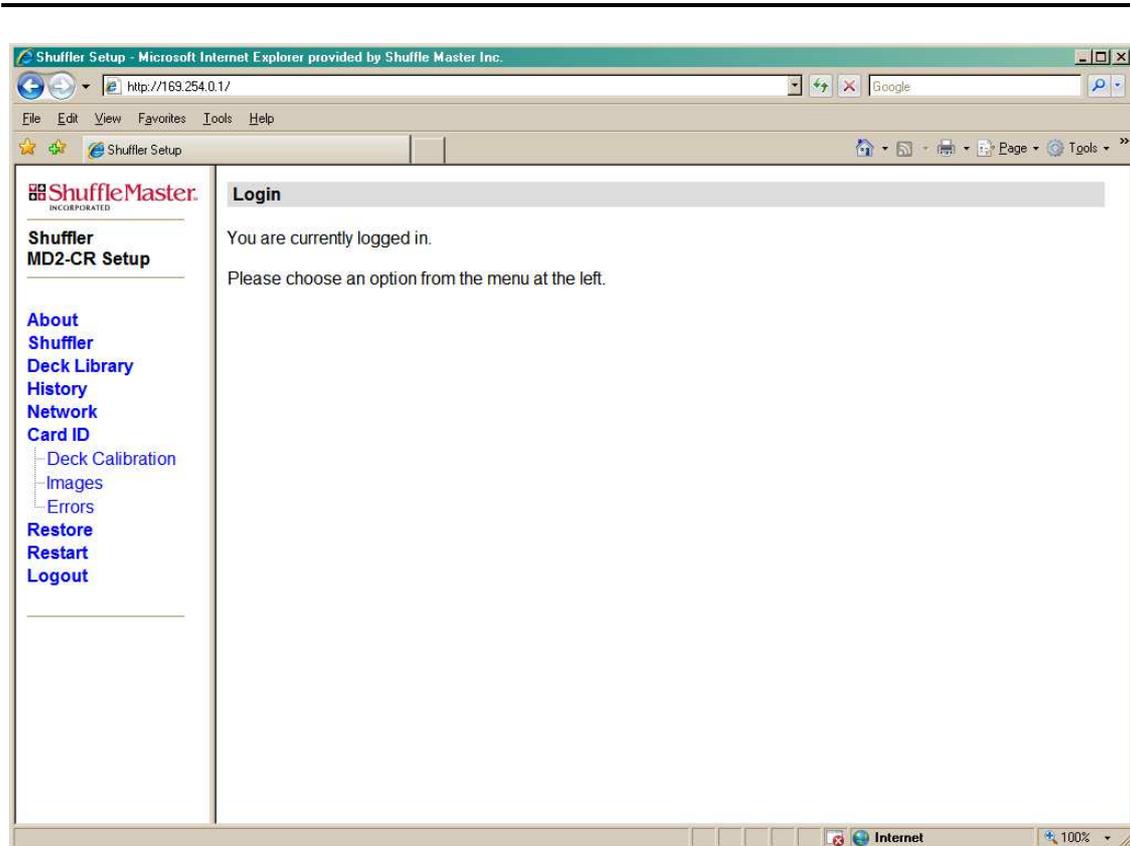


Figure 5-4. Web Page after Login

Click on the About menu option on the left side of the web page.

### About Web Page

This web page shows the software version installed in the Shuffler, the currently entered Serial Number and the Shuffler Label. Changes cannot be made here to the information shown on the About web page (Figure 5-5).

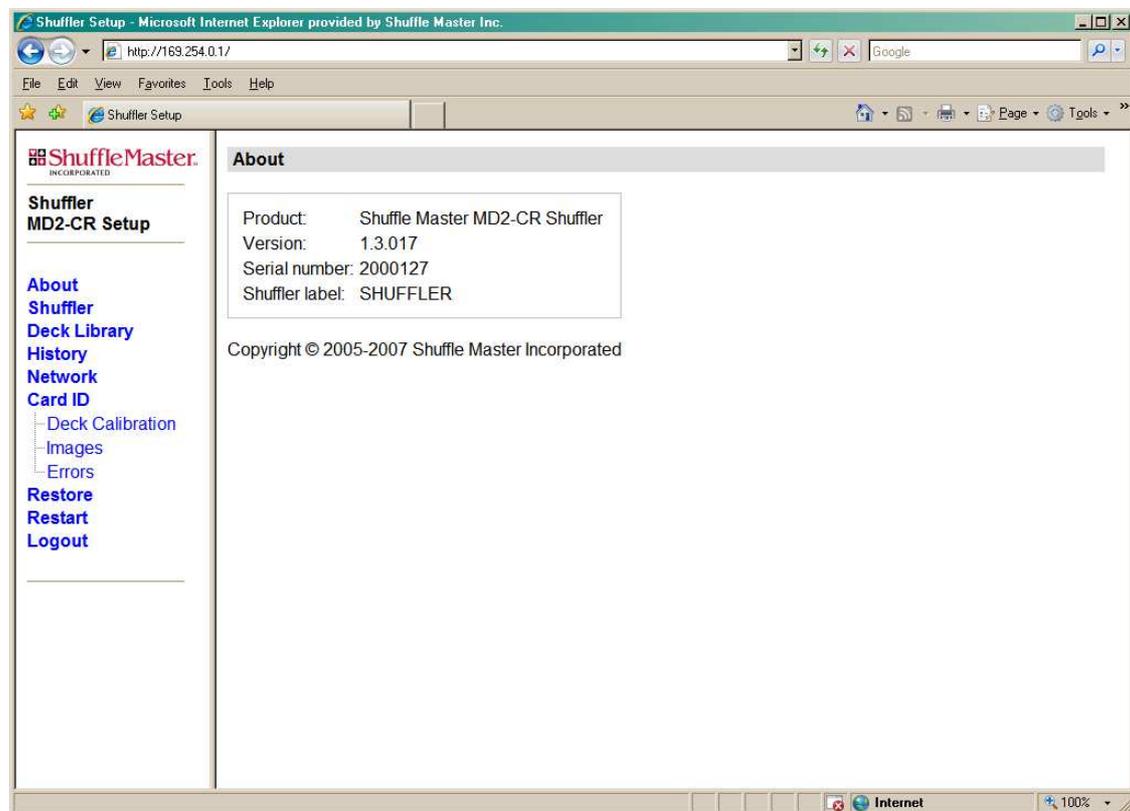


Figure 5-5. About Web Page

## Shuffler Configuration Web Page

Shown in Figure 5-6. This web page will allow a technician to set or change the Shuffler Label.

### **Serial Number Change - IMPORTANT**

The serial number should only be changed to match the serial number stamped on the base plate of the shuffler.

The Serial Number can be modified only from the Setup Menu using the VFD display. Refer to “Resetting the Serial Number” on page 14.

The Date/Time option box can be checked to synchronize the date and time to the current date and time set on the computer used to access the web page. Click “Save Changes” to record changes made on this web page.

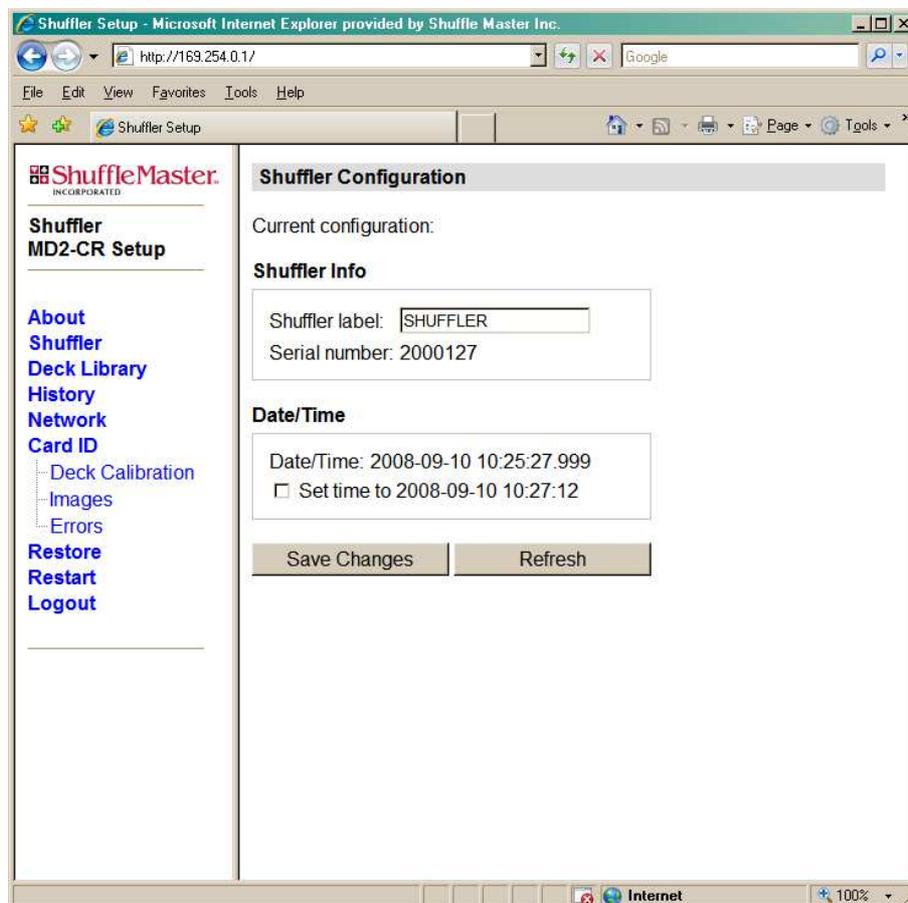


Figure 5-6. Shuffler Configuration Web Page

## Deck Library Web Page

This web page (Figure 5-7) displays all of the decks that currently exist in the shuffler's card recognition system, including their Learned and Tuned status and the version library from which each came. In Administrator mode, a new deck can also be installed or an old deck uninstalled.

Note that the number of card type files installed in the shuffler at any one time is limited to 20. If additional decks to be installed will cause the number to exceed 20, a number of current deck files should be uninstalled prior to installation of the new files.

---

A maximum of ten card decks can be selected in the Menu column check boxes, making them available through the Deck Selection option in the shuffler's Setup Menu. The one to ten card decks represent the decks that a customer would normally use for game play. Different sets of one to ten decks can be selected from those available in the Deck List.

Card decks are listed as *Learned* or *Tuned*. When card deck information is downloaded, it is considered to be *Learned*, since the process loads parameters that enable the shuffler to recognize the cards as they are shuffled. When the decks go through the Tuning process defined in the shuffler message screens, they are fine-*tuned* and enhanced in accuracy. Read Section 6.0, Page 46, for a discussion of the card tuning process.

A new deck can be defined in the card recognition system. The first step in the process is to use this screen to name the deck. Normally the card deck types are downloaded from existing libraries at SHFL entertainment, Inc. using the Deck Manager, a program that connects to the shuffler and rapidly downloads any number of library decks.

Uninstall Deck uninstalls selected decks from the web page and the shuffler.

Remember to press Save Changes if any are made on this web page.

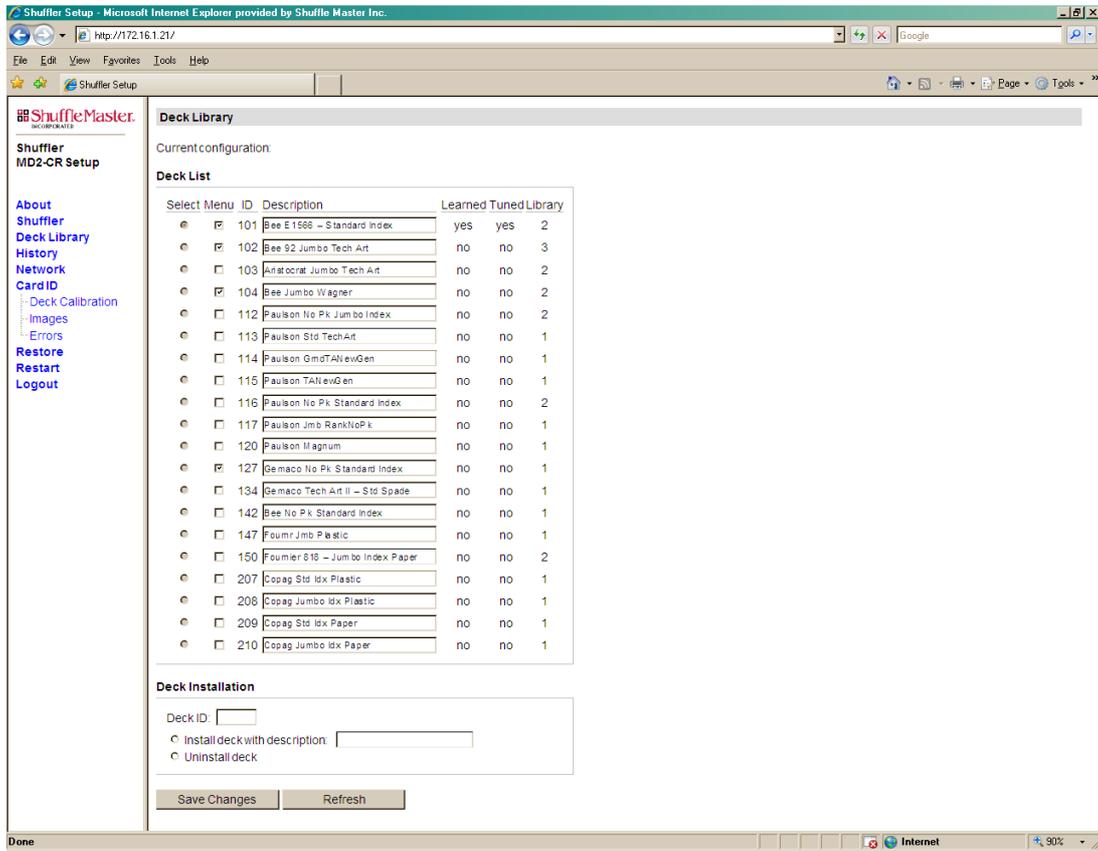


Figure 5-7 Deck Library Web Page

## History Web Page

This web page (Figure 5-8) allows a technician to review unknown card errors, shuffler status information and diagnostic conditions that may have occurred within the shuffler.

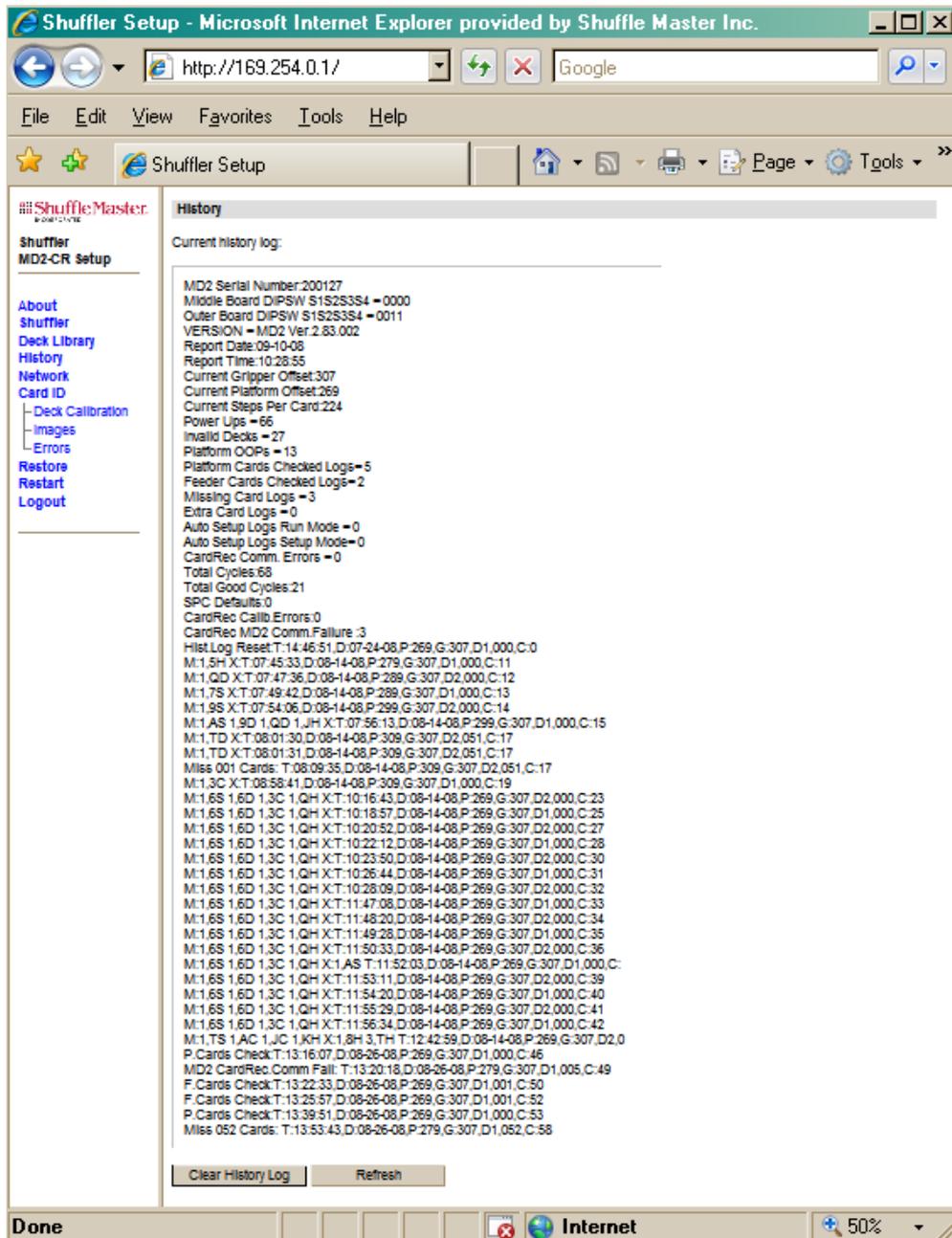


Figure 5-8. History Web Page

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## Network Configuration Web Page

The network web page shown in Figure 5-9 allows a technician to set certain network parameters by which the shuffler will interface with the casino network.

Typical installation of the shuffler would require that the shoe is networked into an established computer with DHCP capability; the ability to automatically assign dynamic IP addresses for the shuffler. Multiple shufflers are connected to a hub that is connected to a server computer.

If a DHCP network is not available, a unique static IP address must be assigned to each shuffler. These unique IP numbers must be determined by the Casino's IT department and each number will need to be individually programmed into each shuffler via the Network Configuration web page.

### Default IP Address

The *MD2® CR* shuffler defaults to an IP address of 169.254.0.1. If two or more shufflers are connected on the same network, unique IP addresses must be programmed into each shuffler to avoid network conflicts.

### Current Network

The MAC address is a number that is guaranteed to be unique to each device. It is set automatically by the microprocessor in each shuffler.

The IP address is the default IP address for every shuffler. It is the IP address used to interface with the shuffler when it is networked with a single computer (for setup).

## Options for use on a DHCP Network:

### Startup Network

**Enable Network** must be checked for the shuffler to send and receive messages via a network.

**Try DHCP first:** This option box must be checked so that the shuffler will request an IP address with which to communicate on the casino network.

**Static IP address, Static subnet mask and Static DNS server:** These areas are not used on a DHCP network.

---

**Broadcast target IP:** Any changes to this number would have to be defined by the casino's IT Department.

**Common pre-sets:** These radio buttons allow the casino to set up certain preset options. Once a preset option has been defined, the technician can select that option while accessing additional shufflers to save typing time.

Remember to press "Save Changes" if any are made on this web page.

### **Options for use on a Static Network:**

#### **Startup Network**

**Enable Network** must be checked for the shuffler to send and receive messages via a network.

**Try DHCP first:** This option box must be unchecked.

**Static IP address, Static subnet mask and Static DNS server:** The casino's IT department will need to provide the technician with the Static IP numbers for each shuffler. The numbers must be manually entered into this web page.

**Broadcast target IP:** Any changes to this number would have to be defined by the casino's IT Department.

**Common pre-sets:** These radio buttons allows the casino to set up certain preset options. Once a preset option has been defined, the technician can select that option while accessing additional shufflers to save typing time.

Remember to press "Save Changes" if any are made on this web page.

#### **Network Integration**

**Shuffler Label:** Allows the casino to assign a unique label to each shuffler for reporting purposes.

**Server Name:** Allows the casino to label a specific server to which a shuffler is sending information.

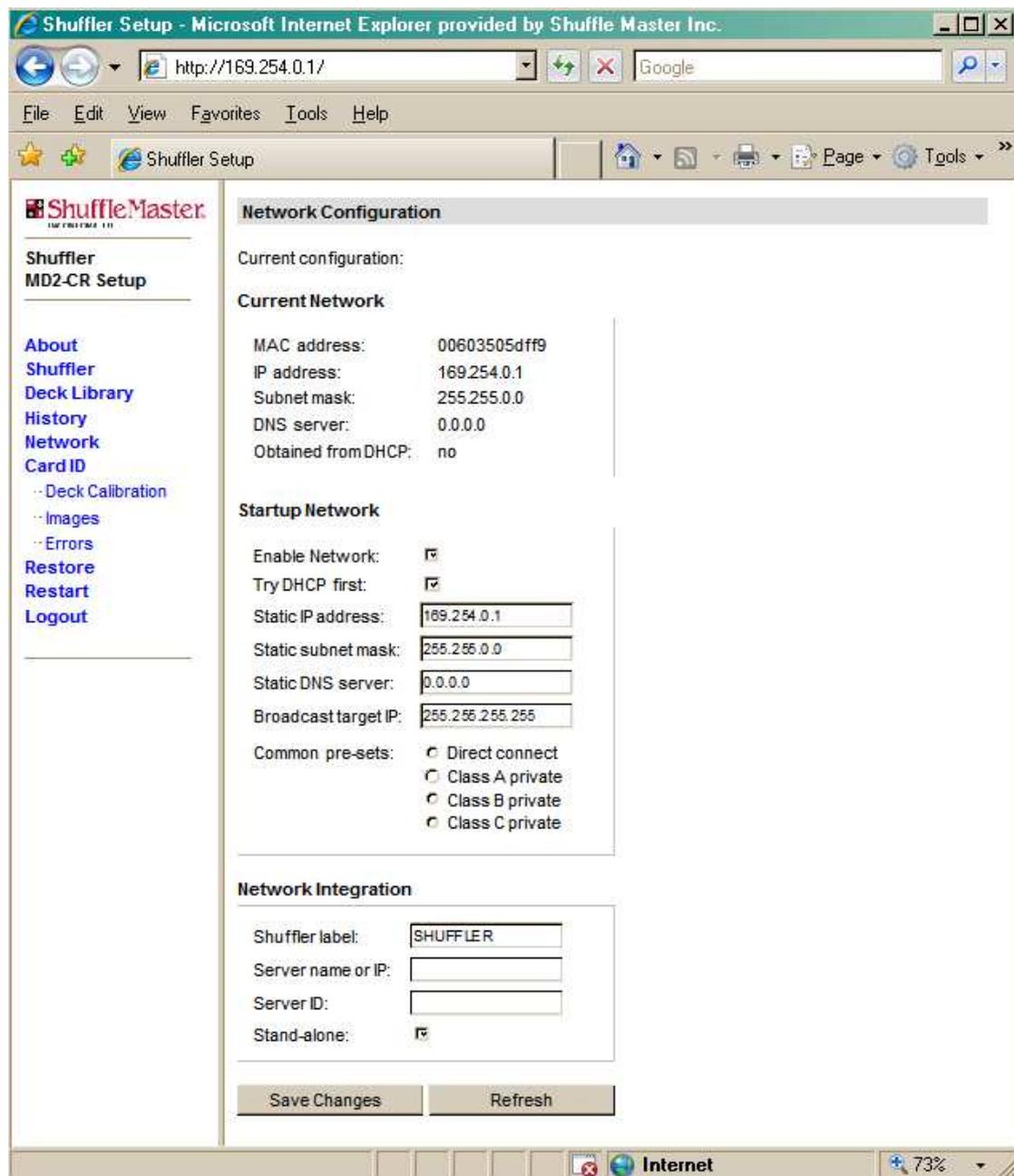


Figure 5-9. Network Configuration Web Page

## Card ID Web Page

Selecting Card ID displays the web page shown in Figure 5-10. The submenu items are Deck Calibration, Images, and Errors.

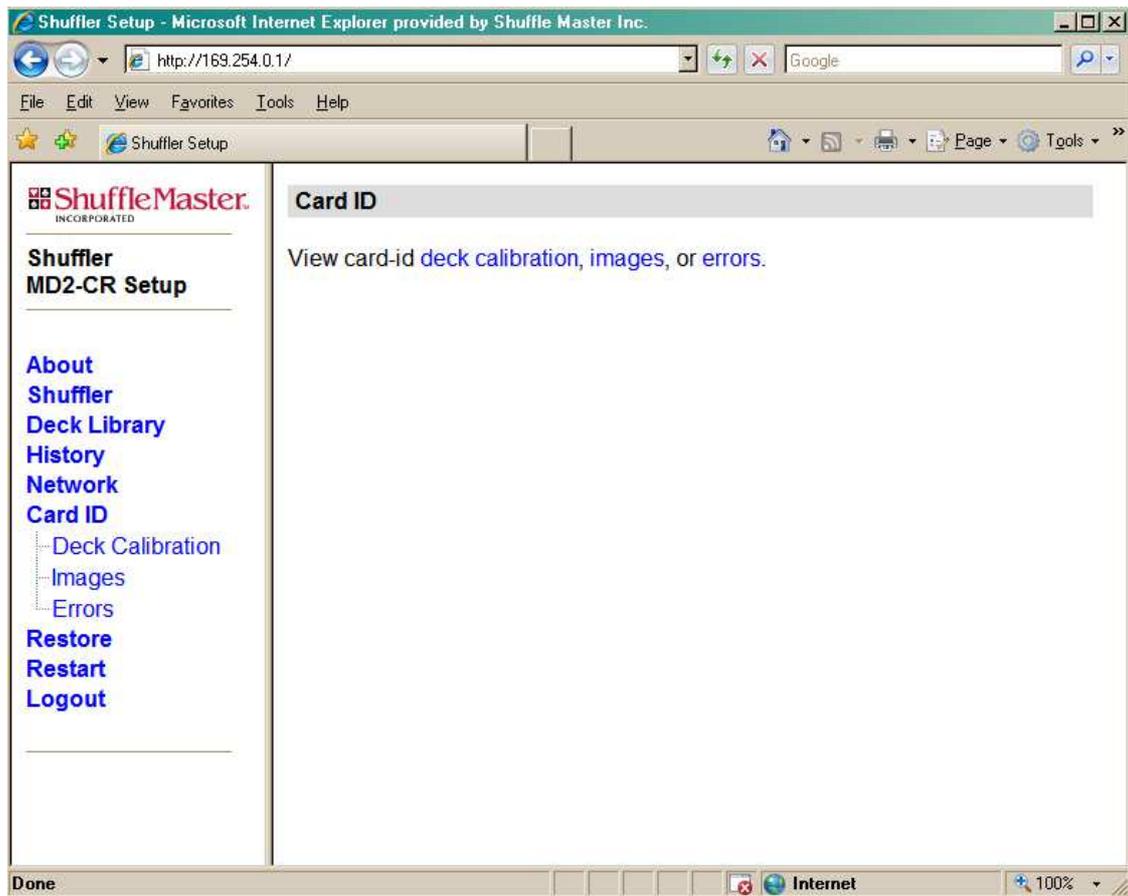


Figure 5-10. Card ID Web Page

## Card ID - Deck Calibration

Selecting the Deck Calibration submenu item displays the web page shown in Figure 5-11. This web page can be used to display and modify camera parameters, parameters related to the geometry of card images, to dump image data, and to perform file management of tuned images.

### Changing Deck Calibration Parameters

Under normal circumstances, these parameters should be changed only by SHFL entertainment's technical personnel.

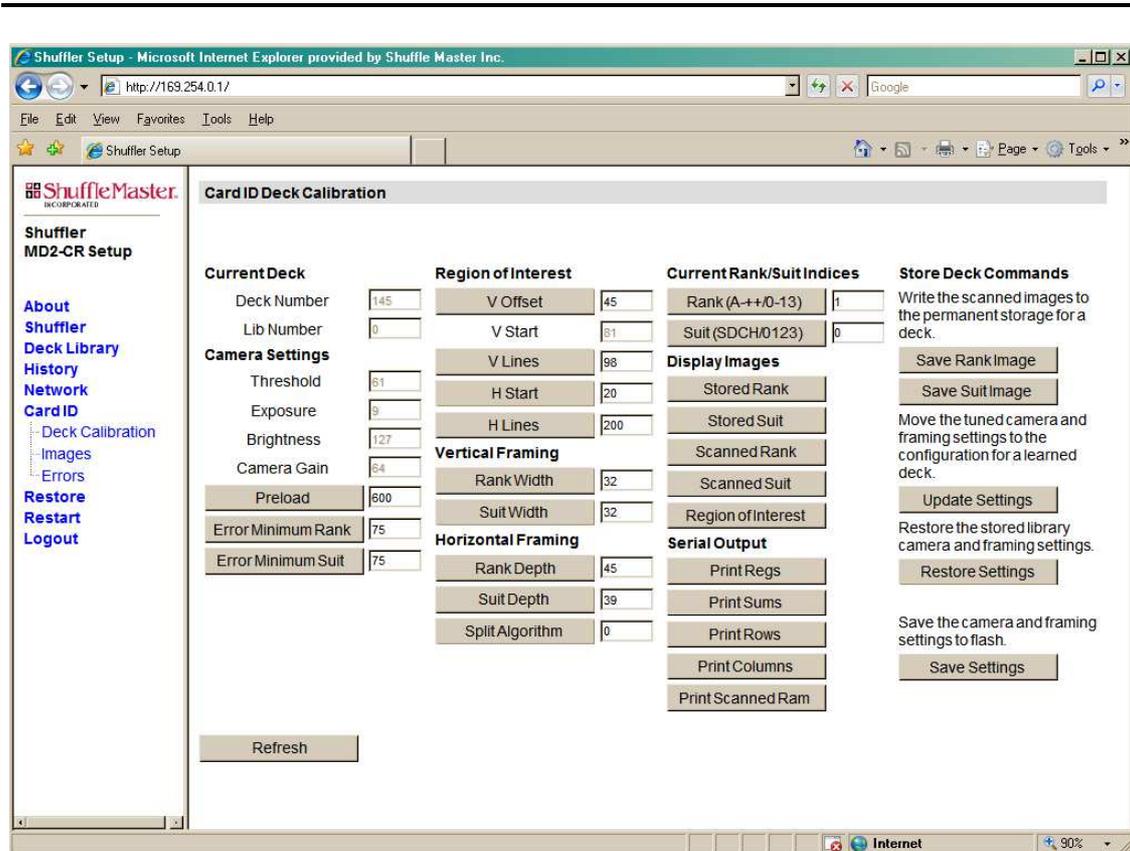


Figure 5-11. Card ID Deck Calibration Web Page

## Card ID – Images

Selecting the Images submenu item displays the web page shown in Figure 5-12. This is a comparison of the FPGA image compared to the flash image for the current deck. If no tuning has been done for the deck, they should match exactly. However, if tuning has been done, the FPGA image may differ from the Nflash image.

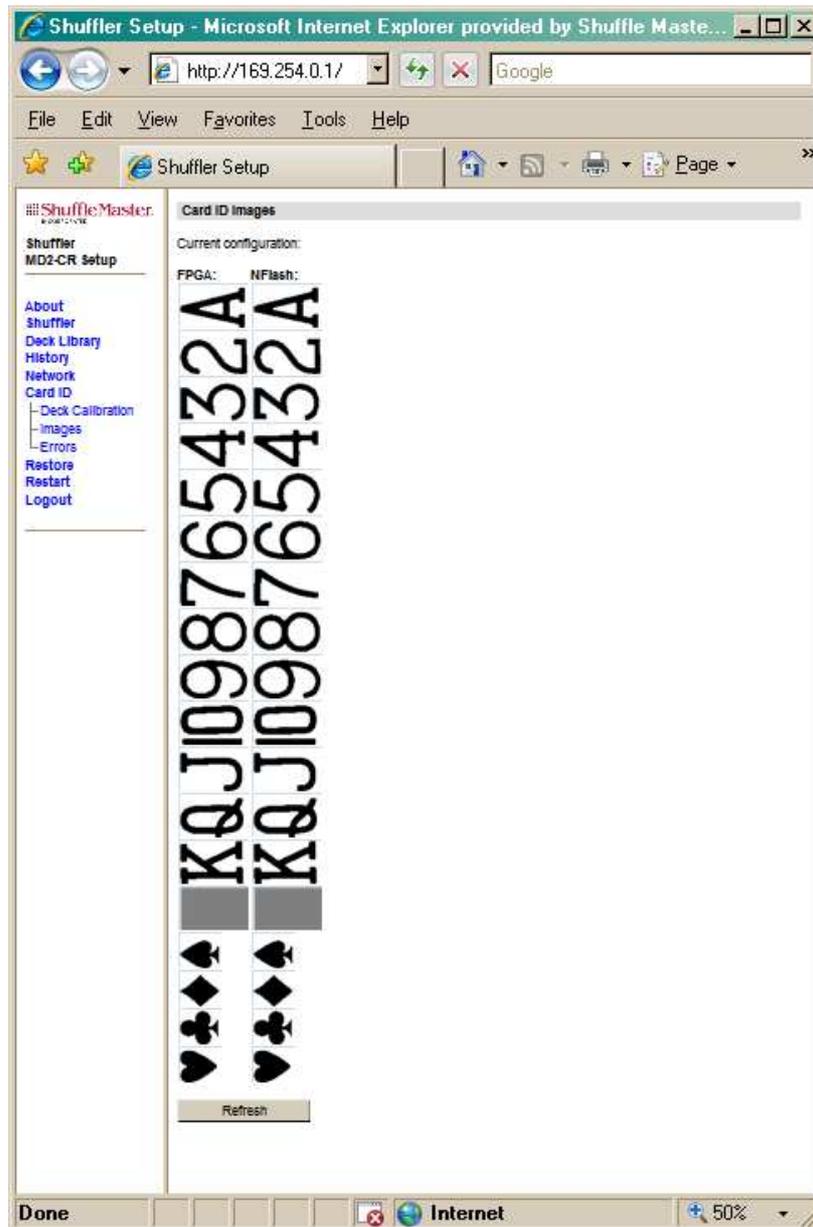


Figure 5-12. Card ID Images Web Page

## Card ID – Errors

Selecting the Errors submenu item displays the web page shown in Figure 5-13. This page displays the most recent instances of card read errors – cases in which the camera image could not be recognized. The unknown Region of Interest image is displayed along with the rank and suit images. The images can be used for failure analysis.

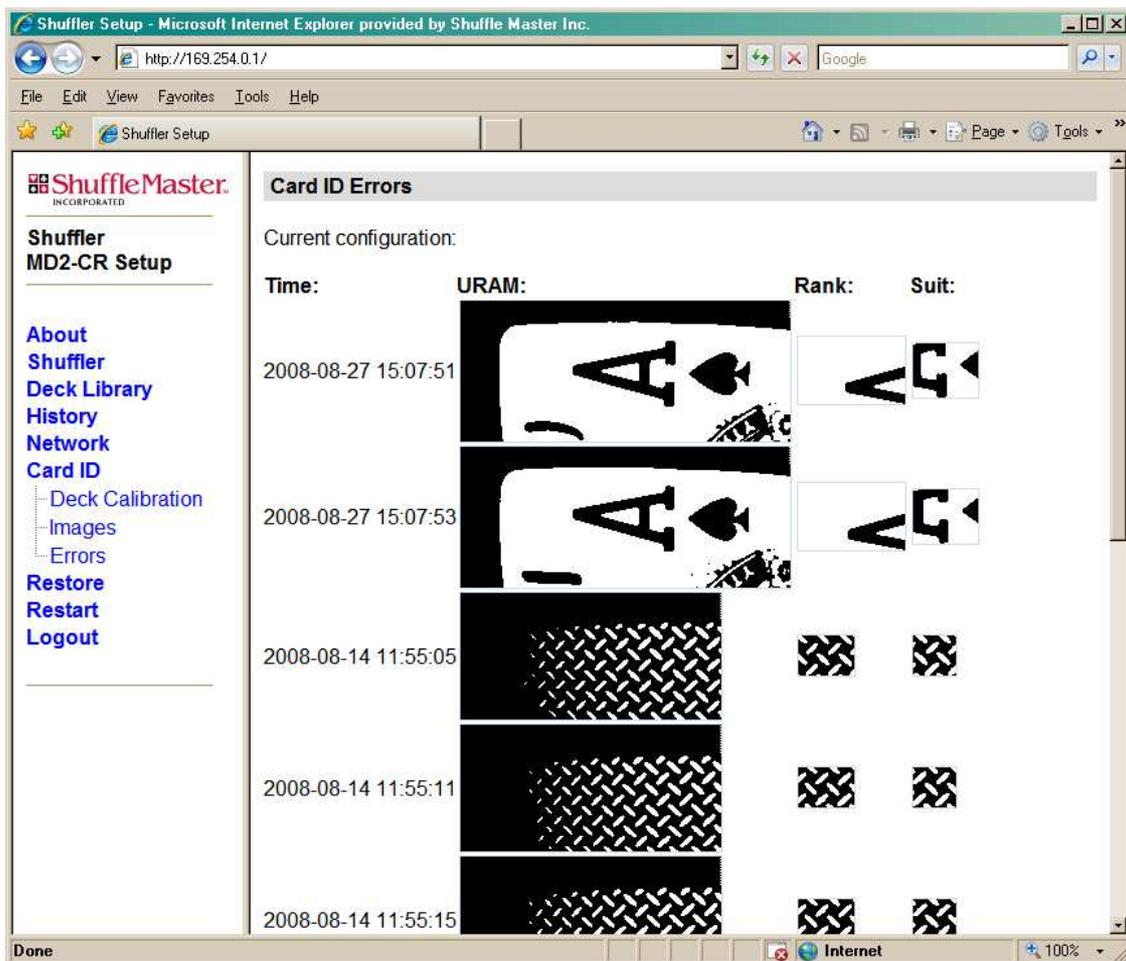


Figure 5-13 Card ID Errors Web Page

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## Restore Configuration Web Page

This web page (Figure 5-14) allows a technician to reset the network and other settings that can be configured in the web pages back to the factory presets. This button will NOT alter the Card ID Deck Calibration settings.

Click on 'Restore Defaults' to activate.

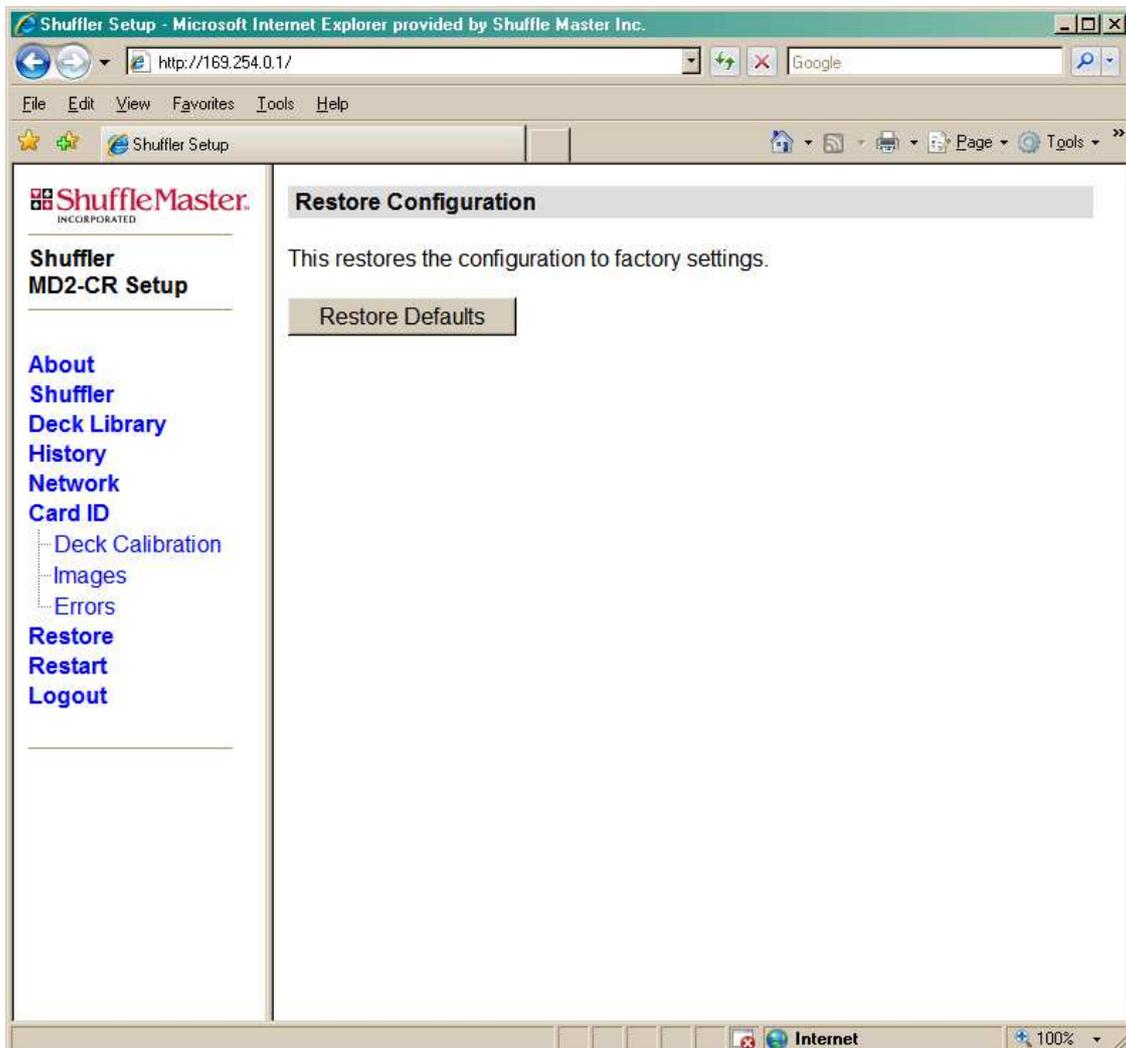


Figure 5-14. Restore Web Page

## Restart Device Web Page

A restart guarantees that most configuration changes made in the web pages are applied to the *MD2<sup>®</sup> CR* shuffler (Figure 5-15). (Calibration changes are not recorded.) Click on *Restart Device* to apply the changes.

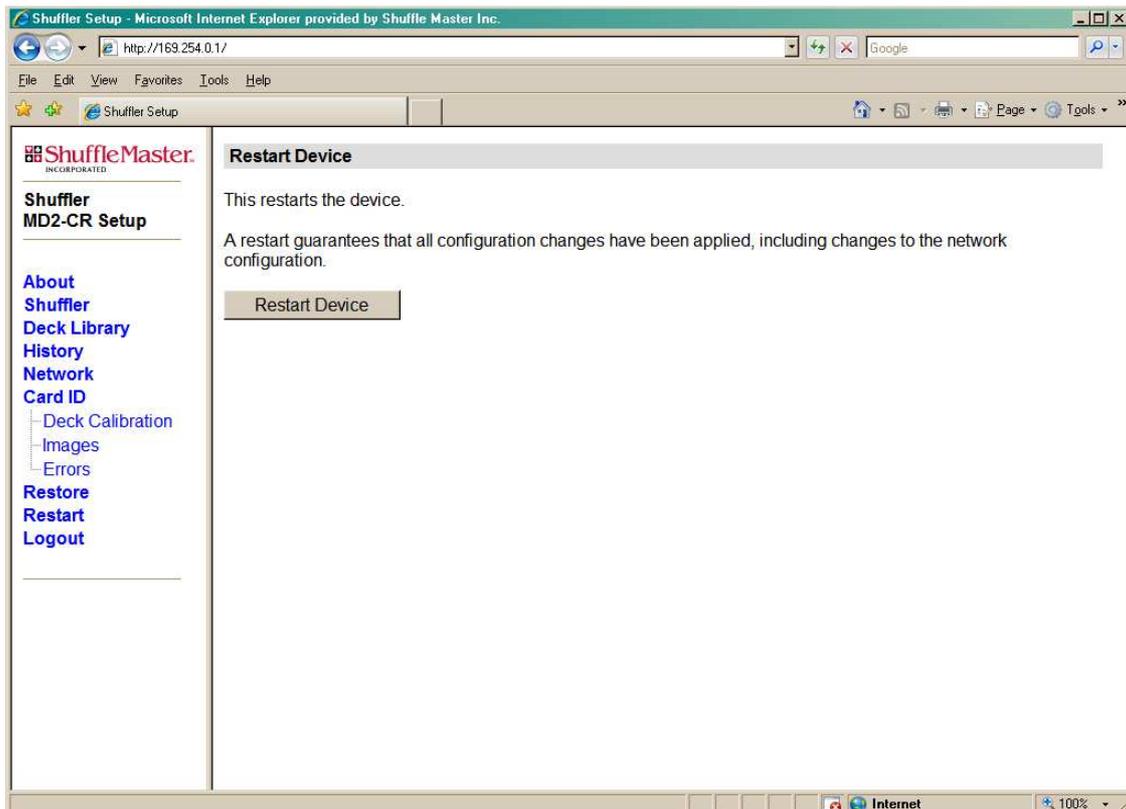


Figure 5-15. Restart Device Web Page

## Logout

To logout of the web browser, click on “Logout” on the left side of the web page. You will be returned to the Login web page (Figure 5-3).

## General v. Administrator Password - Functional Differences

When using the General Password mode, the Network, Card ID, and Restore options are not available.

The *About*, *History*, and *Restart* pages are identical.

Under the Deck Library web page, decks cannot be installed nor deleted. The Deck Installation section is not displayed). See Figure 5-16.

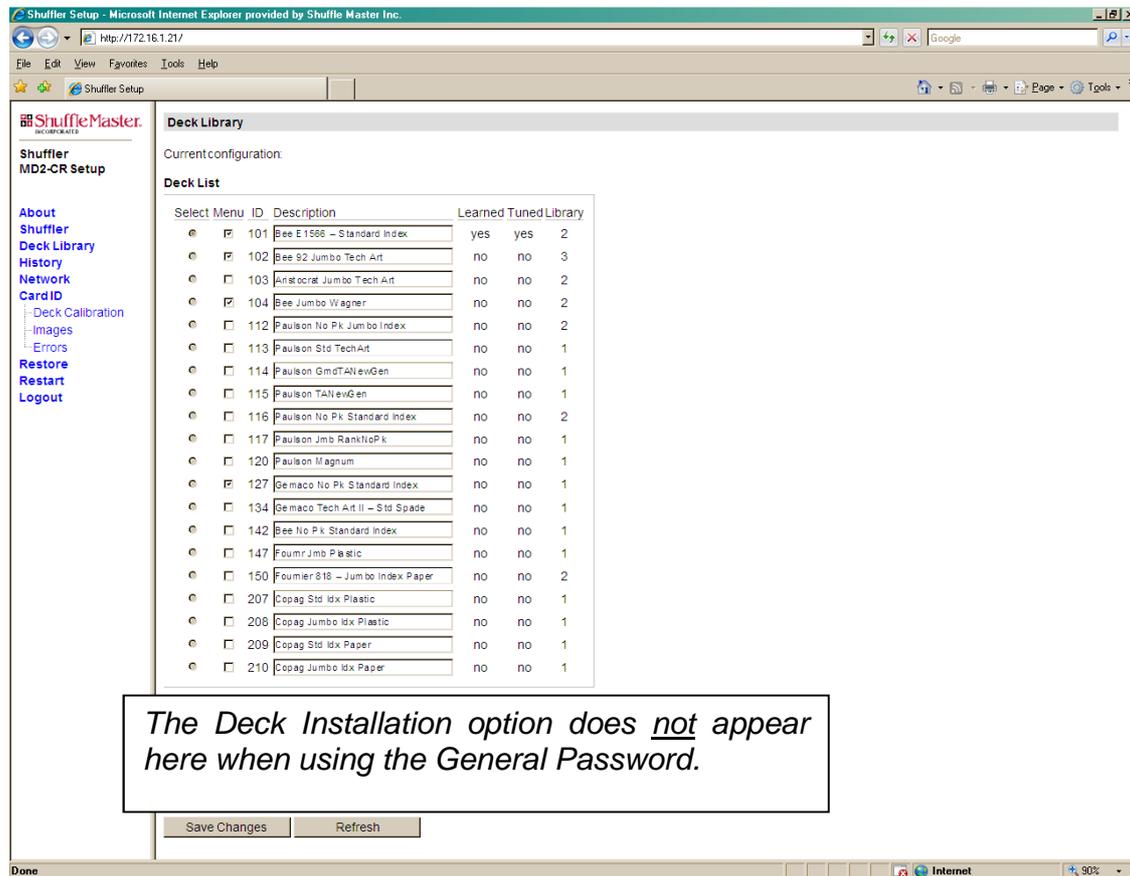


Figure 5-16. Deck Library Web Page in General Password Mode

## 6.0 Card Learning and Tuning Procedures

---

### Deck Library Calibration, Installation and Tuning

There are two types of optical character recognition procedures performed in the *MD2® CR* Shuffler- deck library *calibration* and *camera tuning of existing libraries*.

#### Deck Library Calibration

Deck library calibration is done at SHFL entertainment, Inc. At SHFL entertainment there are libraries of card types that consist of card rank and suit images in addition to parameters defining the location of the images on the cards, characteristics of the card stock, and other variables.

These images and parameters may not be optimized for specific cameras inside each individual shuffler because the parameters for these card types were generated by a different camera than the one installed in any other shuffler. They may have to be adjusted due to slight differences in the camera angle and position and slightly different focal lengths.

The shuffler can be preloaded with deck types that a customer may use, and up to ten of these decks can be selected as current decks. When card deck types are downloaded to the shuffler, these deck types are said to be Learned. Following the *Tuning* procedure the deck will be marked as Learned and Tuned in the Deck List of the Deck Library web page (Figure 5-7).

#### Deck Library Installation

The card learning procedure consists of downloading the appropriate library files using the Deck Manager application and a laptop or desktop PC. The deck libraries downloaded will be based upon the most likely customer requirements.

#### Deck Manager Application Software

The Deck Manager application can be used as a file manager to easily download the deck types from the SHFL entertainment libraries. Card images and parameters are present for each card deck type. The deck will be marked as Learned for each deck downloaded.

### Deck Manager

Deck Manager is a software application that is used to download card deck types from SHFL entertainment's libraries. The libraries contain the images and parameters for all cards in one or more decks. One or more decks can easily be downloaded to the shuffler.

---

The following discussion describes the basic operation of the Deck Manager as it relates to downloading deck types into the shuffler.

Figure 6-1 shows the basic Deck Manager window. The *Device* in this case is the shuffler on the same network as the computer running Deck Manager. Based on the Device Address, a specific shuffler is selected from the drop-down list of other possible devices connected on the network.

The *Library Folder* and *Receive Folder* are set to the locations of the decks to be downloaded and a folder to receive the decks, although the Receive parameter is not strictly necessary in this scenario. Set Trace Level to *Log* and check the *Install Using DeckList.txt* check box if ALL decks in the library are to be downloaded.

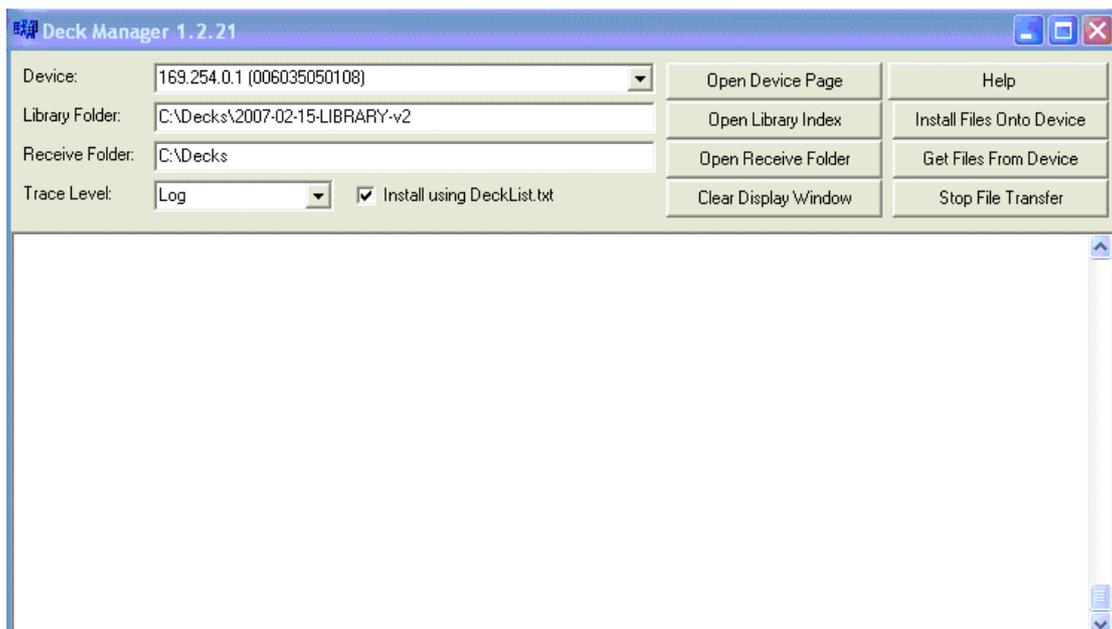


Figure 6-1. Deck Manager Main Screen

## New Library File Creation

To create a “new” card deck library:

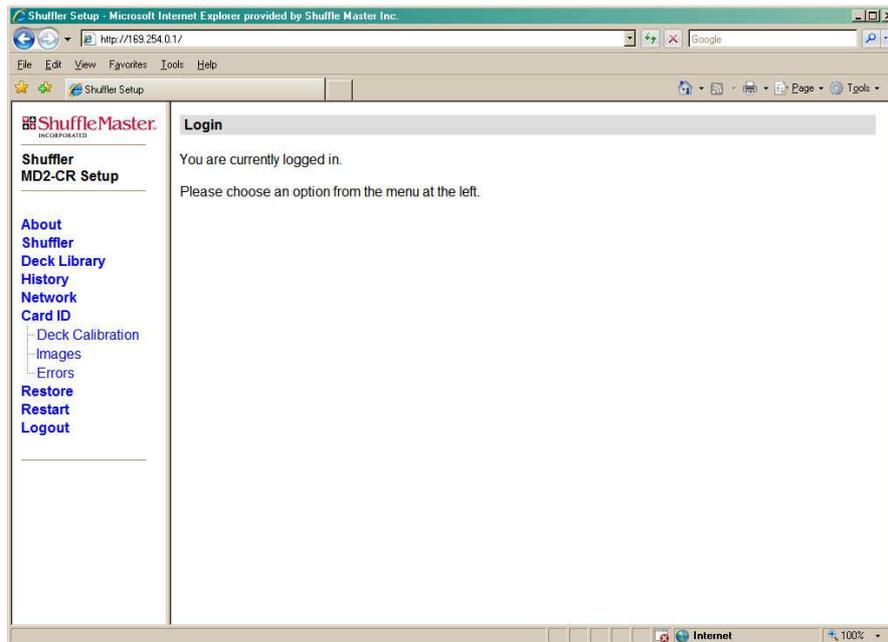


Figure 6-2. Web Page after Login

Click on **Deck Library** and the Deck Library page, with the Deck Installation section, will appear, as shown in Figure 6-3.

Type the SHFL entertainment **Deck ID** number (SID #) in the text box and **type the deck description** in the “Install deck with description” text box. Click **Save Changes** and allow the web page to refresh.

Confirm that the new deck and description appears in the Deck List. If not, repeat the previous step.

Depending on the software version, it may be necessary to verify that the Menu box for that deck is checked. If not, click the Menu box to select it and click on **Save Changes**.

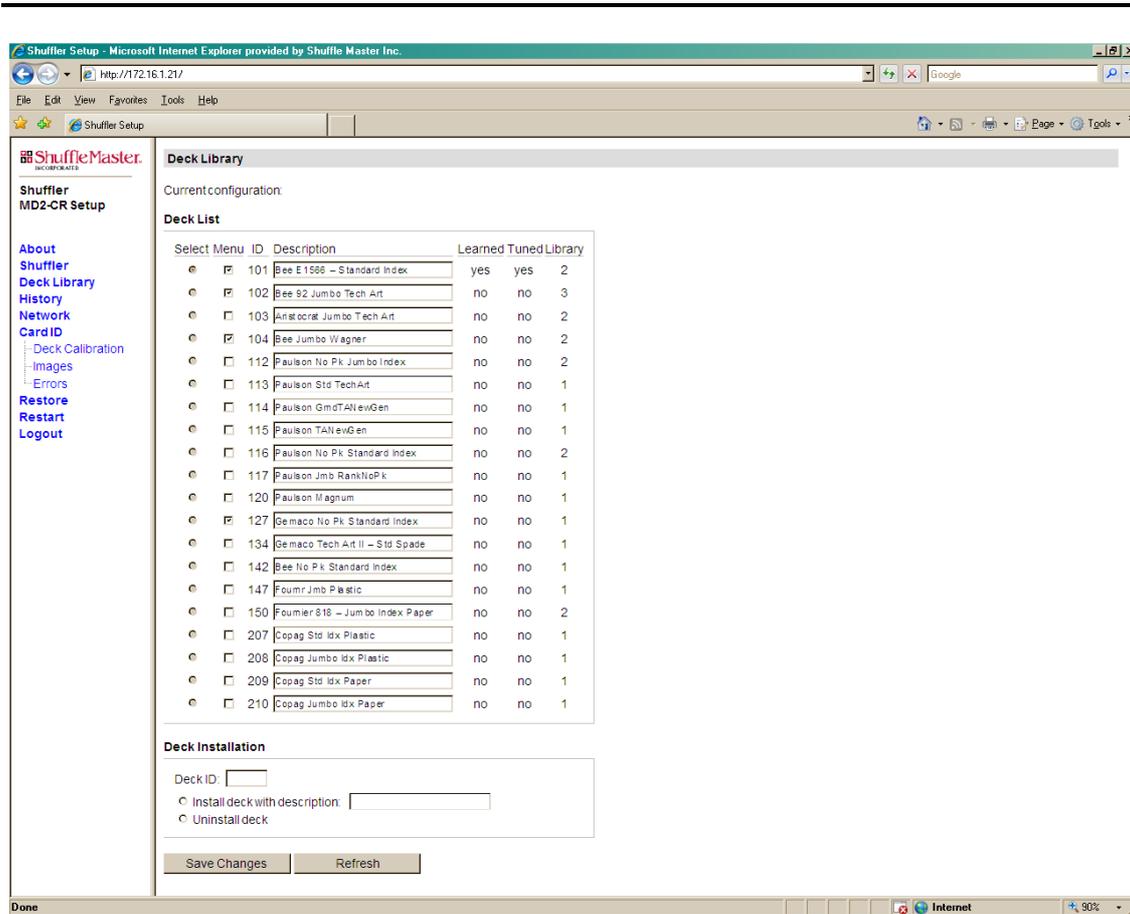


Figure 6-3. Deck Library Web Page

## Deck Calibration

Selecting the **Deck Calibration** menu item displays the page shown in Figure 6-4. This page is used to display, and allows modification of parameters related to the geometry of card images, to view image data, and to perform file management of the tuned images.

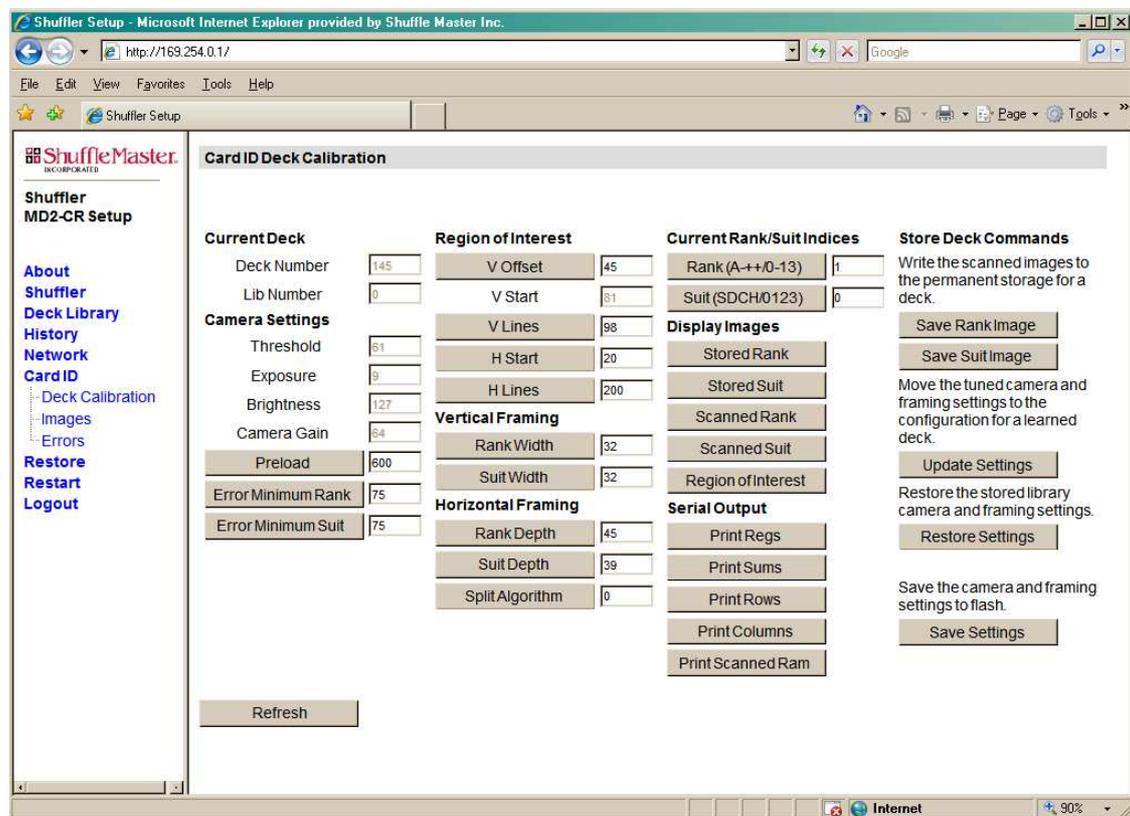


Figure 6-4. Card ID Deck Calibration Web Page

Under **Current Deck**, verify that the *Deck Number (SID #)* is correct before making any changes.

The **Region of Interest (ROI)** parameters define the target area for the camera. This image is viewed by clicking the **Region of Interest** button under the Display Images section. The combined rank and suit images should be positioned near the vertical center of the ROI, if possible. The position is adjustable by modifying the **V Offset** parameter. It may be necessary to adjust the size of the ROI by modifying the **V Lines** and/or **H Lines** to eliminate from the image any unwanted shadows or card-center art work, for example.

The **Vertical Framing** and **Horizontal Framing** parameters are used to isolate the rank and suit within the ROI. The **Rank Width** and **Suit Width** parameters are the vertical depth (as viewed on-screen) in pixels of the rank and suit images, respectively. See Figure 6-5.

**Rank Depth** and **Suit Depth** are the horizontal size in pixels of the rank and suit images. All rank and suit images should fit uniformly within the individual areas defined by these parameter settings, as viewed after clicking the **Scanned Rank** and **Scanned Suit** buttons in the Display Images section. Because of variances in the size and locations of these images, even within a single card deck, it is helpful to focus on those specific cards that may have a larger image or an image located slightly outside of the standard position. These are known as the “extremes”.

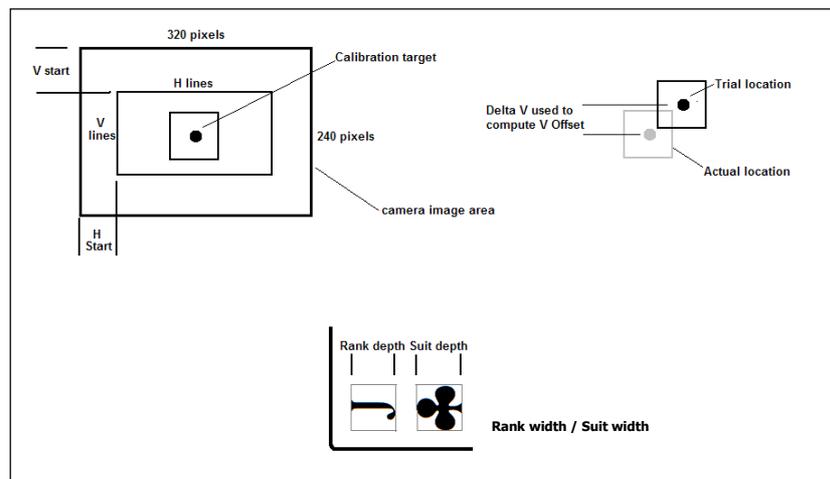


Figure 6-5. Card ID Deck Calibration Parameters

## To Modify Card Image Geometry

1. Turn power 'ON' to the shuffler. Allow it to initialize in Normal Mode.
2. Press the GREEN button to raise the Feeder Elevator.
3. Place a single “extreme” card in the Feeder compartment.
4. Press the GREEN button again. The Elevator will lower and the card will be passed over the camera onto the Platform. View its **Scanned Rank** and/or **Scanned Suit** images. The image should fit closely within the defined area. If not, adjust the size of the area smaller or larger by changing the **Rank Width**, **Suit Width**, **Rank Depth**, or **Suit Depth** parameters. You must click on the labeled button whenever a change is made.
5. Feed the card again. View the scanned images in the Images web page, Figure 5-12. Make further adjustments, if needed. This is a repetitive process and the parameters may have to be redefined several times.

---

When satisfied that the extreme and other non-extreme images all fit within the defined areas it is necessary to tune the entire deck.

You must click on **Update Settings** and **Save Settings** in the Store Deck Commands area before attempting the tuning process or the adjusted settings will not be saved.

---

## Downloading Card Deck Information to the Shuffler

1. Open "Internet Explorer" (or alternate browser).
2. Type <http://169.254.0.1/> (when using a stand-alone connection) into the address box in the web browser. Click on the "Go" or Enter button, if necessary.
3. Minimize the resulting 'Login' web page.
4. Open the Deck Manager. Cycle power 'ON' to the shuffler to obtain the device address automatically.
5. If needed, enter the path/location on the computer of the card deck files in the "Library Folder" text box.
  - If downloading **all** files in the library, click to select the "Install using Decklist.txt" check box and then click to activate the "Install Files onto Device" button.
  - If downloading only selected decks, click to activate the "Install Files onto Device" button.
6. Type the SID deck number(s) into the "Deck ID List" check box. Click on "OK". The download will begin.

Upon completion of the download, the last line appearing in the Deck Manager window will read "Finished installing files onto device 169.254.0.1". Close the Deck Manager.

1. Maximize the Login web page. Type the password to log in.
2. Open the Deck Library web page.
3. Click on either the 'Refresh' or 'Save Changes' buttons at the bottom of the Deck List
4. After the window refreshes, verify that the downloaded deck(s) appear in the Deck List.

Click the Menu column box to make the selected decks available for selection on the shuffler (Maximum 10). Click the 'Save Changes' button to save the selection(s).

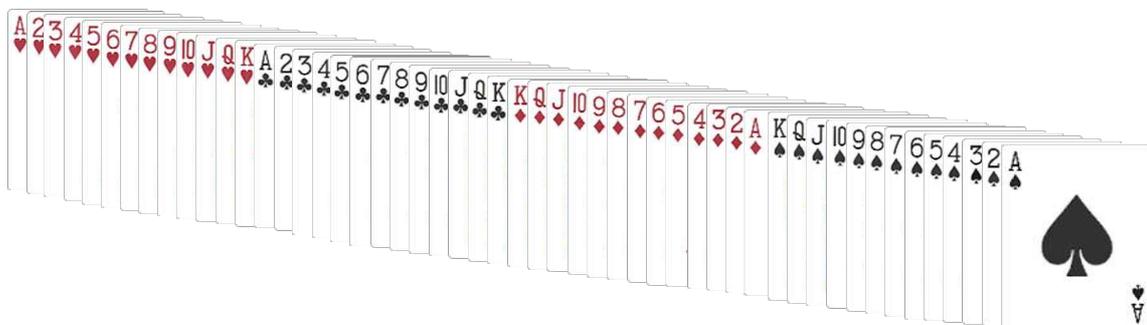
## Card Tuning

Card Tuning is the second step of the card learning process. In this step, card parameters are fine tuned. Based upon the Learned parameters, each of the 52 or 53 cards in the deck type is read in. The card images scanned replace any images already stored in the shuffler for that deck type. (The card images of any library deck type are not used for comparisons but are available to allow the technician to calibrate the image parameters.) Camera settings are automatically adjusted and stored.

### Deck Library Tuning Procedure

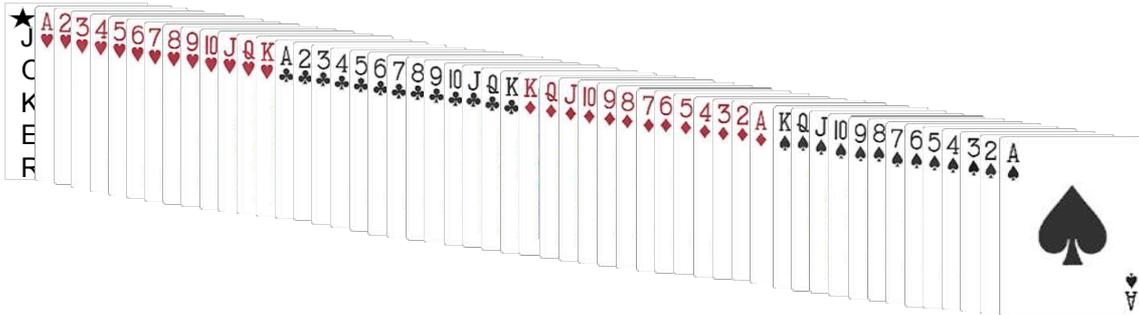
1. Plug the network cable from the computer into the shuffler.
2. Enter the Setup Menu on the shuffler by cycling power while holding down the RED button on the machine.
3. Use the GREEN button to cycle through the setup options until you see "Enter Password".
4. Enter the General password.
5. Continue to cycle through the options until "Select Card Type" appears.
6. Select the card type from the menu. If the card type is not available in the Setup menu on the shuffler, verify that the card type has been Learned and the "Menu" box is checked on the Deck Library web page, (Figure 5-7) and that not more than ten decks have been selected.
7. Cycle through the Setup menu options until "Tune Cards" or "Tune Cards + Joker" is displayed.
8. Press the RED button to select the desired option.
9. Arrange the decks (with or without the Joker), as shown:

Fifty two cards, without the Joker, stacked face down, in the following order:



OR

Fifty three cards, with the Joker, stacked face down, in the following order:



10. Press the GREEN button to raise the Platform.
11. Load the requested number of cards face down. The Ace of Spades is the first card on the bottom of the stack that is loaded into the shuffler.
12. Press the GREEN button to lower the Platform.
13. The shuffler display will list a series of events on the message panel while the card tuning process is performed.

Tuning..... xx% Done  
( 52 Cards )

14. When the process is complete, the message panel will display:

Tune Completed  
Push GREEN Button

15. Press the GREEN button to raise the Elevator
16. The message panel will display:

Remove Cards

17. then

Please Wait, or if Ready  
Push GREEN Button

- 
18. After the cards are removed, push the GREEN button four times to lower the Platform. If the button is not pushed, the Platform will lower after approximately 60 seconds.
  19. Turn power 'OFF' to the shuffler to exit the Service Mode.
  20. The new deck type and the shuffler are now ready for use in Normal mode.

## 7.0 Machine Switch Locations

<b>Switches and Sensors</b>				
Name	Description	LED Indicator Location		
		Module #1	Module #2	Plug #
PHS	Platform Home Switch	D7	-	2
ENC	Encoder	-	-	3
GCPS	Gripper Card Present Sensor	D21&D24	-	4
PCPS	Platform Card Present Sensor	-	D3	6
CDS	Card Drop Sensor	-	-	28
GS	Green Switch	D22	-	20
RS	Red Switch	-	D4	22
FCPS	Feeder Card Present Sensor	-	D2	23
FCOS	Feeder Card Out Sensor	-	D6&D9	24
GHS	Gripper Home Switch	-	D7	25
GWS	Gripper Working Switch	-	D24	26
LED BRD	Camera LED Source			27
TDS	Tower Down Switch	D4	-	31
FEUS	Feeder Elevator Up Switch	D3	-	33
FEHS	Feeder Elevator Home Switch	D23	-	34
FAN	Camera Fan Source			35
CTST	Camera Trigger Switch Transmitter			36
CIST	Card In Sensor Transmitter	-	-	37
COST	Card Out Sensor Transmitter	-	-	38
CISR	Card In Sensor Receiver	-	D22	39
COSR	Card Out Sensor Receiver	-	D5&D9	40
CTSR	Camera Trigger Switch Receiver			54
<b>Motors</b>				
Name	Description	Module #1	Module #2	Plug #
FEM	Feeder Elevator Motor	X		10
PM	Platform Motor	X		11
POM	Pick Off Motor		X	17
SUM	Speed Up Motor		X	18
GM	Gripper Motor		X	19

## 8.0 Service Menu

---

### Entering the Service Menu

To enter the **Service Menu**, turn the shuffler power switch ON while continually pressing the GREEN button until the message panel displays:

Service Menu

Press the GREEN button to step through each Service Menu item.

#### Software Version

This display will indicate the version of the software:

MD2 Ver. 2.80.01  
MD2 1.3.017

#### Cleaning Mode

Push the RED button to raise the elevators for easier access to the rollers. Push the RED button again to turn on the rollers forward and reverse. (Pressing the RED button will cycle from FWD to STOP to REV to STOP.) Push the GREEN button to lower the elevators.

Cleaning Mode

#### Run with 52 Cards

This function allows the Service Technician to test a complete cycle of the machine without waiting for the shuffler to cycle through four decks of cards. Push the RED button to enter this mode.

Run With 52 Cards  
To Start push RED

Push GREEN Button  
To Load Cards

---

Load 52 Cards  
 Push GREEN Button

Shuffling  
 (52 Cards)

### No Shuffle Mode

This menu item allows a one-time verification of the card deck(s) without shuffling the decks. Push the RED button to enter this mode.

No Shuffle Mode

The following two displays will appear and will alternate.

Card Type Selection  
 1 101 Bee E1566

RED:Scroll GREEN:Select  
 1 101 Bee E1566

Push the RED button to page through the selections. Push the GREEN button to select the correct deck type.

Next you will be asked to select the number of decks to be verified. This screen also displays the last game selected.

BJ/War/Bac 4 Deck  
 GREEN:Select RED:Change

Push the RED button to change the number of decks. Push the GREEN button to select. The Feeder Elevator will rise to allow insertion of the decks and the following display will appear. This screen also displays the last game selected.

BJ/War/Bac 4 Deck 208

---

Insert the decks and push the GREEN button to lower the Elevator and begin verification.

When verification is complete, the message panel will display:

Verification Complete Push GREEN Button
--

### Step By Step Mode

This menu item allows single stepping through the shuffle each time the GREEN button is pressed. Push the RED button to enter this mode. Pressing the RED button will single step the shuffle one card at a time.

Run Step By Step Mode
-----------------------

Shuffling Gripped: 2, Shuffled: 5
--------------------------------------

### Aborting the Shuffle

To abort the Step by Step mode, turn shuffler power off and restart.

### Sensors

This menu item identifies the state of the inputs (switches and sensors). Position 1 starts at the left.

Sensors: 000 000 001 010 10 *
----------------------------------

*\* In this example, positions 9, 11 and 13 are identified with a "1".*

<u>Position</u>	<u>Sensor/Switch</u>	<u>Description</u>
1	CIS	Card In Sensor
2	COS	Card Out Sensor
3	FCPS	Feeder Card Present Sensor
4	FCOS	Feeder Card Out Sensor
5	PCPS	Platform Card Present Sensor
6	PHS	Platform Home Switch
7	GHS	Gripper Home Switch

8	GCPS	Gripper Card Present Sensor
9	GWS	Gripper Working Switch
10	CDS	Card Drop Sensor
11	FEHS	Feeder Elevator Home Switch
12	FEUS	Feeder Elevator Up Switch
13	TDS	Tower Down Switch
14	PCPS	Duplicate of position 5

### Download to PC

Although the 'Download to PC' option appears in the Service Menu, support for the feature has never been available on the MD2 CR.

Misread card errors, shuffler status information and other diagnostic data are available through the 'History' web page, as described on Page 27.

### Platform Position

This menu item allows the Platform to be moved to two different locations from home. Press the RED button to move the Platform. Monitor the encoder readout on the message panel to check if the Platform is working. Encoder value 0 = Platform in lowest position (down).

Typical encoder values are 3975 and 4350, indicating two positions with the first being physically lower than the other.

Platform Up/Middle/Dn:  
Encoder = XXXX

### Grippers

This menu item allows the motors, grippers and switches to be tested. Press the RED button to move the grippers. Successively pushing the RED button will move the *Gripper Forward to GWS*, *Gripper Close In*, *Gripper Retract to GWS*, and *Gripper Home Out*.

Gripper In/Out  
Gripper Forward to GWS

### Speed-Up Rollers

This menu item allows the Speed Up Motor and Rollers to be tested. Press the RED button to control the Speed Up Rollers forward – stop – reverse.

Speed Up:  
FWD – STOP – REV

---

### Pick-Off Rollers

This menu item allows the Pick Off Motor and Rollers to be tested. Press the RED button to control these Rollers forward - stop - reverse.

Pick Off:  
FWD – STOP – REV

### Feeder Elevator

This menu item allows the Feeder Motor and Elevator to be tested. Press the RED button to move the Feeder Elevator up or down.

Feeder Up/Down

### Gripper Test

The Gripper Test allows the technician to view the cards as they are repeatedly gripped and split, watching for a positive gripping action without dropped cards, for correct gripper arm travel and effectiveness of the Gripper Home and Gripper Working switches.

Push the RED button to access the gripper test. The Platform Elevator will rise and the message panel will display:

Load 104 Cards  
On The Platform

Placing the cards on the Platform will automatically cause the message panel to display:

Push RED Button.

Push the RED button to begin the test. The card stack will repeatedly be gripped, split and re-gripped until the test is terminated.

Grip Test In Progress  
Push GREEN TO End

Push the GREEN button to raise the Platform Elevator. Remove the cards. The Elevator will automatically lower.

---

### Exiting Service Menu

To exit the Service Menu, turn the shuffler OFF.

**! CAUTION !**

The Feeder drops quickly when power is restored. Make certain no objects will block its path as it falls.

*--- This Page Intentionally Left Blank ---*

## 9.0 Cleaning and Preventive Maintenance

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### 2 Week Maintenance

- Remove covers and blow out or vacuum out the machine
- Clean rollers with 99% isopropyl alcohol
- Brush or blow off all optical sensors
- Wipe all dirt and grime off of Camera LEDs
- Check for debris on the shaft between the Card In Sensors (CIS) and/or the Card Out Sensors (COS). Clean and remove, if necessary
- Check brake roller clearance
- Run auto setup with casino's cards
- Test run with casino's cards and check for proper operation
- Clean linear guide on the Platform between the two bearing blocks

### 1 Month Maintenance

- Perform 2 week maintenance
- Clean grooves in gripper blocks
- Check gripper blocks for free movement
- Check if Platform is level with grippers using fixture F1099

### 6 Month Maintenance

- Perform 2 week and 1 month maintenance
- If using plastic cards, replace the Brake Rollers and the 2 urethane rollers on each side of the lower brake roller
- Replace gripper pads if they show any visible wear.
- Check Tension of Platform Motor belt. Adjust if necessary
- Lubricate threads on gripper acme screw with white lithium grease

### 12 Month Maintenance

- Perform 2 week, 1 month and 6 month maintenance
- Clean and lubricate the inside diameter of Feeder idler pulley

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## 10.0 Mechanical Setup and Adjustments

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The gripper assembly and its related components are critical for proper operation of the MD2® shuffler. Therefore, the following adjustments must be made **EVERY TIME** the assembly mounting screws are loosened, the gripper arms are realigned or the gripper pads are replaced.

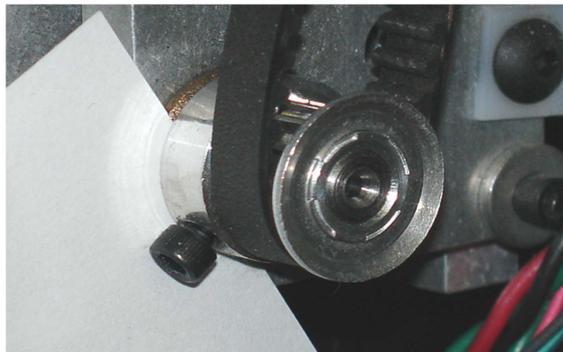
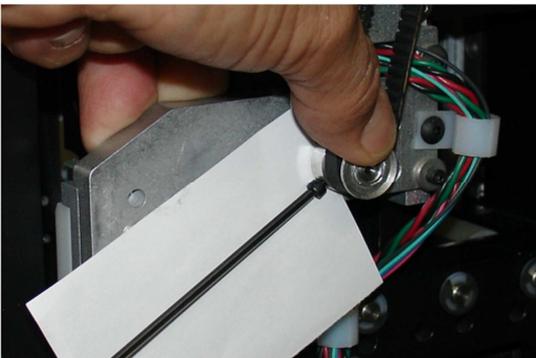
- ◆ Center the gripper assembly in the shuffler frame
- ◆ Level the gripper pads
- ◆ Adjust the brake roller assembly
- ◆ Run Auto Setup

### Gripper Shaft End Play Adjustment

Loosen the screw holding the pulley onto the gripper shaft. Place a .004" shim between the pulley and the Thrust Bearing.

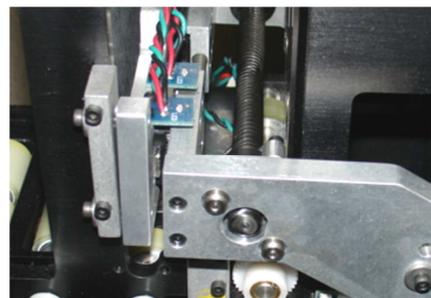
Note: If a .004" shim or "feeler gauge" is not available, the edge of a sheet of standard copy paper may be substituted.

Push the pulley in while pulling the gripper arm out and tighten the pulley screw.

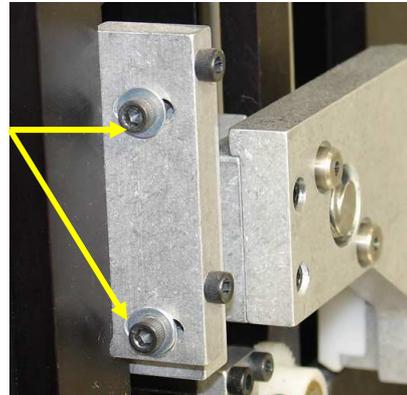


### Centering the Gripper Assembly in the Shuffler Frame

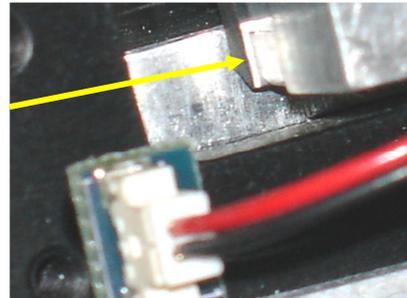
1. Turn the screw pulley by hand to fully open the grippers.



- Loosen the four mounting screws in the Gripper Adjusting Brackets. (Two screws on each side).

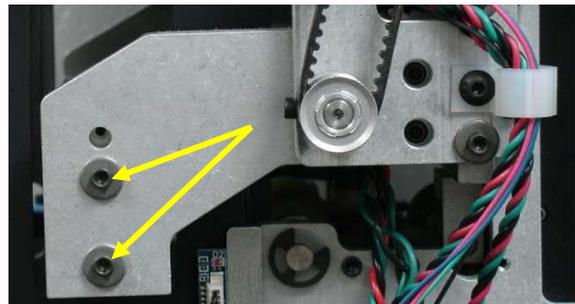


- Raise the Platform by hand and insert the Platform Leveling Gauge (F1099).
- Lower the Platform so that the top edge of the gauge is even with the lowest 1/16" of the gripping surface.
- Turn the screw pulley by hand until the grippers will hold up and support the gauge.
- Center the gauge in the Elevator space.
- Tighten the screws in the Gripper Adjusting Bracket.
- Open the Grippers and leave the leveling gauge on the Platform.
- Proceed to the next step of leveling the grippers to the Platform.



### Leveling the Grippers to the Platform

- Slightly loosen the screws on the adjustable side that secure the Gripper Pivot Blocks.
- Close the grippers by turning the pulley by hand.
- Raise the Platform and leveling gauge by moving the Platform belt until it contacts the bottom of the gripper pads.
- Tighten the Pivot Block screws.



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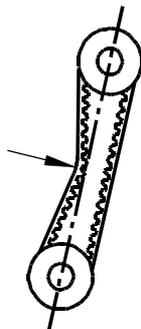
Note that only one side is adjustable and the holes in the Gripper Arm Plate are oval-shaped. The opposite-side Block should be pushed up tight against the overhanging edge of the Gripper Arm.

The Gripper Pads should NOT move freely from side to side when the leveling gauge is in contact with the bottom of the pads.

5. Open the grippers and remove the leveling gauge.

### **Gripper Belt Adjustment**

Move the Gripper arms all the way out. Adjust Gripper Belt Deflection so that the teeth of the belt meet in a line through the center of the pulleys. Do NOT bend the threaded shaft when checking the deflection.



### **Adjusting the Brake Roller Assembly**

When the Brake Roller Assembly in a specific shuffler requires frequent adjustment, it is possible that the roller gap is not level and even, or the Brake Roller or Lower Drive Roller may have developed a bulge or a flat spot and is no longer round. When either of these conditions exists, the gap between the rollers may fluctuate between “too small” and “too large”.

After verifying and eliminating the cause of the problem, adjust the Brake Roller Assembly.

Access to the Brake Roller Block is obtained through the access port in the Left Plate of the Feeder Elevator Assembly.

1. Raise and prop the Feeder Elevator up and out of the way.
2. Loosen the two Brake Roller Block mounting screws.
3. Insert and center two playing cards between the Lower Drive Roller and the Brake Roller.
4. Lightly apply pressure directly on the Brake Roller.



**NOTE:** Do not apply pressure to the top of the Brake Roller Block. The Assembly will tip to one side, allowing only one edge of the Brake Roller to contact the cards.

***THE BRAKE ROLLER MUST REMAIN LEVEL AND EVEN.***

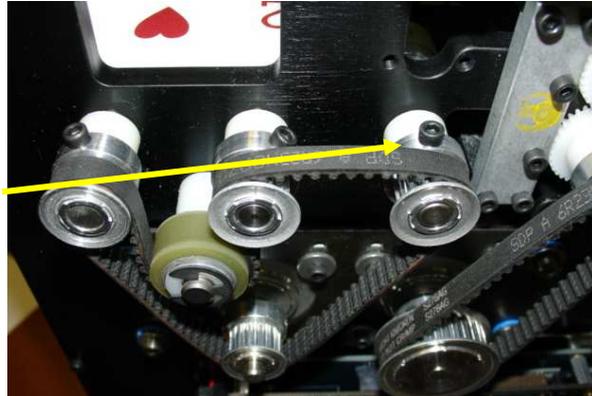
5. Lightly tighten one mounting screw. Tighten the second screw to the same degree of tightness. Securely tighten the first, and then the second screws.
6. Test the adjustment by passing two playing cards between the rollers:
  - One card will pass between the rollers easily.
  - Two cards will pass between the rollers with a definite level of resistance.
7. Lower the Feeder Elevator and perform the “One Revolution Test”.

**The “One Revolution Test”**

This test must be performed to assure that the cards will feed properly.

1. Move the Feeder Elevator into the down position.
2. Place two cards into the Feeder Elevator.

3. By hand, turn the pulley of the brake drive shaft assembly counter-clockwise until the pulley screw is straight up on top in the “12 o’clock position”.
4. By hand, turn the pulley clockwise, one revolution. The bottom card should touch the Speed Up Rollers as the pulley screw returns to the 12 o’clock position.



If the bottom card does not touch the Speed Up Rollers, the brake roller assembly is too tight and cards will not feed with one card remaining.

5. Re-adjust the brake roller assembly, if necessary.

### **Perform the Auto Setup Procedure**

Activate the Auto Setup procedure in the MD2® Setup menu and assure that the procedure completes successfully.

During Auto Setup, observe the cards as they are being gripped. The pressure exerted by the grippers should cause a card to “bow” slightly. If you do not see this bowing action in the gripped cards, run Auto Setup again. It may be necessary to run Auto Setup several times.

### **Test for Proper Operation**

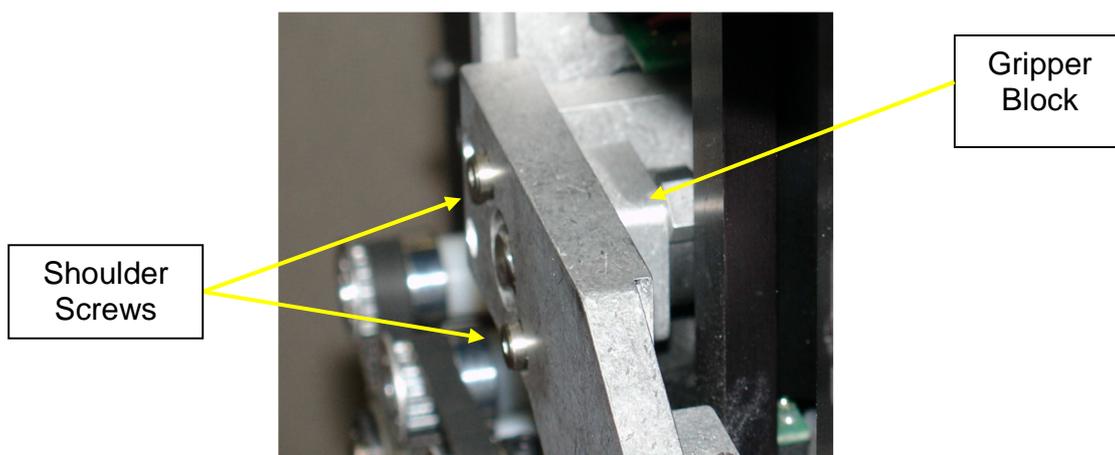
Place the machine into the Service Menu and “Run With 52 Cards” mode, or into Normal Operation. Run cards through the shuffler to assure a smooth shuffling operation, without card jams, crashes or dropped cards.

### **Perform the “Lean Test”**

The gripper pads must retract beyond the inside surface of the side plates. This can be checked by leaning the MD2® to allow cards on the Platform to rest against the side plate. Place 2 decks of cards beneath one side of the MD2®. In Service Menu, select “Run with 52 Cards”. Watch to see if the cards catch on the gripper pads as the Platform lowers and raises. Perform this test in both directions.



If the cards catch on the gripper pads during the lean test, mechanical travel of the gripper arms will need to be increased. Remove the two shoulder screws holding the Gripper Block with the plastic ACME threaded nut. Rotate the block  $\frac{1}{4}$  turn clockwise and re-install the shoulder screws. It is not necessary to loosen the clip that holds the ACME Nut into the block. Center the gripper assembly in the frame using Fixture F1099.



### Perform the Auto Setup Procedure

Activate the Auto Setup procedure in the MD2® Setup menu and assure that the procedure completes successfully.

During Auto Setup, observe the cards as they are being gripped. The pressure exerted by the grippers should cause a card to “bow” slightly. If you do not see this bowing action in the gripped cards, run Auto Setup again. It may be necessary to run Auto Setup several times.

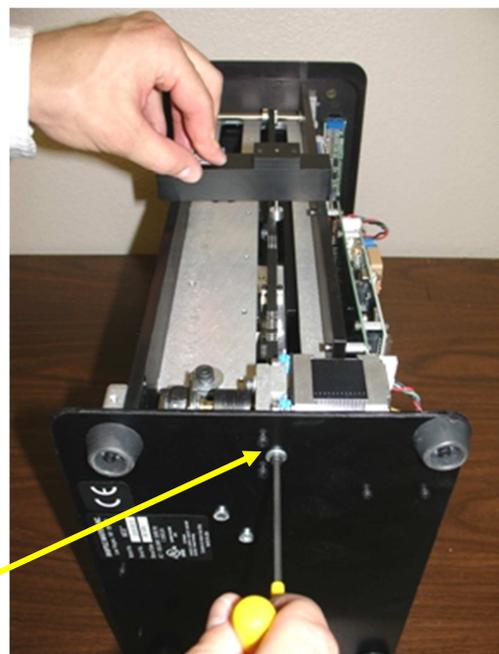
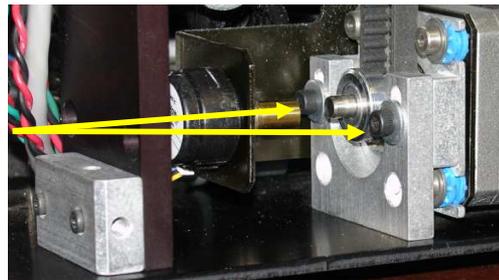
### Test for Proper Operation

Place the machine into the Service Menu and “Run With 52 Cards” mode, or into Normal Operation. Run cards through the shuffler to assure a smooth shuffling operation, without card jams, crashes or dropped cards.

### Adjusting Platform Motor Belt Tension

For proper operation and accurate positioning of the Platform, the tension of the Platform Motor Belt must be maintained at an optimum level.

1. Lower the Platform to the bottom position.
2. Loosen the two adjustable motor mount screws through the two access ports in the side plate.
3. Place the Belt Tension gauge (F1115) on the two main plates at the top standoff of the PC Board.
4. Place the Cap of the Belt Tension Gauge on the belt.
5. Adjust the motor height by tightening or loosening the screw at the bottom of the shuffler, as shown below, until the pin is flush with the top of the fixture. Tighten the two adjustable motor mount screws.
6. Snug the bottom adjusting screw to prevent it from falling out.



**Bottom  
Adjusting  
Screw**

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## 11.0 Troubleshooting

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### Will Not Power Up

Symptom	Cause	Remedy
Shuffler will not power up. No power to Main Control Board.	No A C power	Verify power cord is plugged in to main power source and is seated properly
	Failed Power Supply	Replace the Power Supply
	Loose Power Supply connections	Reseat the connections
Shuffler will not power up. Green LED at DS1 on Main Control Board is lighted.	Blown 2 5A, 250V fuse	Replace the Fuse
Blown Fuse	Shorted sensor, motor, RED or GREEN button switch	Replace the faulty part and the fuse

### After Initialization

Symptom	Cause	Remedy
Display shows "Card Rec Comm Failed" at power up.	Rabbit flash chip is not installed	Install the Rabbit flash chip
	CPU Board is not seated completely	Re-seat the CPU Board
	Faulty Rabbit Board	Replace the Rabbit Board
	Loose or faulty harness to card rec board (Pin #50, #51, #52)	Re-seat or replace the harness
	Faulty Rabbit Mounting Board (GM1079)	Replace PC Board
At power up, Platform "chatters" in down position.	Faulty Platform Home Switch	Replace the PHS Switch
Display shows "Remove Cards" when machine is empty.	Dirty or faulty FCPS, CIS, COS, PCPS	Clean or replace the faulty sensor element or Harness
	Faulty I/O Board	Replace I/O Board
Display shows "Feed Elevator Jammed".	Faulty Feeder Elevator Motor	Replace Feeder Elevator Motor, (#10)
Initializes with "Check CTS" message.	Faulty Camera Trigger Sensor	Clean or replace the CTS sensor element (#36)
Display shows "RNG Must Be Reseeded" each time power switch is turned 'ON'.	Missing or faulty RNG EPROM	Replace the EPROM
	Dead or weak Battery on the Main Controller PC Board	Replace the Battery

### After Initialization (Cont'd)

Symptom	Cause	Remedy
Camera LEDs do not light.	Gray Camera Ribbon Cable is loose or faulty	Reseat or replace the Cable
Initializes, Feeder rises, shuffles erratically and uneven.	Faulty Feeder Card Present Sensor	Clean or replace the sensor, or #23 Harness
	Faulty Feeder Card Out Sensor	Clean or replace the sensor, or #24 Harness
Display shows "Card Drop Sensor Failure".	Faulty Look Thru Card Drop Sensor	Replace the sensor element, or #28 Harness
RED light on, no display and fan running.	E-prom not installed or installed backwards	Check label on CPU Board for correct orientation of Pin 1
RED light, and blank screen. After pushing RED button display says card rec failure, also checking deck types shows no decks installed.	Main Board not seeing Rabbit Board	Replace Main Board
Both elevators rise. Display shows "Remove Cards Push GREEN Button".	Faulty Card In/Card Out/Camera Trigger Sensor	Replace the sensor element, or Harness

### Will Not Feed Cards

Symptom	Cause	Remedy
Will not feed cards.	Dirty Pick Off rollers	Clean the rollers with 90% isopropyl alcohol, or better
	Brake Roller gap is too small	Adjust the Brake Roller gap to be loose with one card and tight with 2 cards
	Faulty Camera Trigger Sensor	Clean or replace the CTS sensor element (#36)
	Faulty Platform Motor	Replace the Platform Motor (#11)
Will not feed cards. Display shows "Need To Check Cards" after cards placed in feeder.	Faulty Pickoff Motor	Replace the Pickoff Motor (#17)
Will not feed cards. Grippers do not move.	Faulty Gripper Working Switch	Replace the GWS Switch
	Faulty Platform Motor	Replace Platform Motor (#11)

## Pickoff / Feeder

Symptom	Cause	Remedy
Shuffle will not start.	Faulty Tower Down Switch or Gripper Working Switch	Replace the TDS Switch (#31)
	Faulty Gripper Working Switch	Replace the GWS Switch (#26)
	Faulty I/O Board	Replace the I/O Board
Shuffle will not begin. Display shows "Shuffling".	Faulty Pick Off Motor	Replace the Pick Off Motor (#17)
Shuffles 6 or fewer cards; shuffle stops. Display shows "Check CTS".	Faulty Camera Trigger Sensor	Clean or replace the CTS sensor element (#36)
Feeder Elevator rises frequently and display shows "Check For Bent Cards".	Dirty Pick Off Rollers	Clean Rollers with 90% alcohol or better
	Brake Roller gap is too small	Adjust the Brake Roller Assembly
	Pick Off Rollers are "slipping" under the Feeder cards	Update to new Pick Off Rollers; MD2248, MD2245, ST2059
	Feeder Elevator not lowered all the way	Adjust the Feeder Elevator Home Switch to lower the elevator (#34)
	Faulty Feeder Elevator Home Switch	Replace the Feeder Elevator Home Switch, or #34 Harness
Feeds cards fast and stops.	Faulty Camera Trigger Sensor	Clean or replace the CTS sensor element (#36)
Feeder Elevator does not rise when the GREEN button is pushed. Display shows "Feed Elevator Jammed".	Faulty Feeder Elevator Motor	Replace the Feeder Elevator Motor (#10)
Feed Elevator "chatters" continuously in the 'up' position.	Faulty Feeder Elevator Up Switch	Replace the FEU Switch (#33)
Feeder Elevator "chatters" in the 'down' position, then rises.	Faulty Feeder Elevator Home Switch	Replace the FEH Switch (#34)

## Speed Up

Symptom	Cause	Remedy
"COS Failed" message.	Faulty sensor transmitter or receiver	Replace the faulty CO sensor element (#38 - #40)
"COS Failed" message remains after swapping sensor elements.	Faulty Main Control Board	Replace the Main Control Board

### Speed Up (Cont'd)

Symptom	Cause	Remedy
Speed Up Rollers pause after each card is inserted, slow shuffle.	Debris around speed up shaft blocking CIS/COS	Remove debris from the shaft
	Faulty Card In/Card Out	Replace the faulty CI/CO sensor element (#37 & #39 or #38 & #40)
Speed Up Rollers pause after each card is inserted; slow shuffle.	Debris around speed up shaft blocking CIS/COS	Remove debris from the shaft
	Faulty Card In Sensor	Replace the faulty CI sensor element (#37 & #39)
Speed Up Motor stalls.	Speed Up Rollers are swollen	Replace the Speed Up Rollers

### Platform / Grippers

Symptom	Cause	Remedy
The Platform is continually re-homing. Cards do not move from Feeder.	Faulty or loose Encoder	Replace the Encoder, or #3 Harness
	Loose Encoder Coupling	Tighten the Coupling between the Platform Motor and the Encoder
	Broken Encoder Coupling	Replace broken Coupling
	Platform Belt is loose	Check and adjust the belt for proper tension
Platform tower popping up while shuffling.	Felt or debris buildup between bearing housings on Platform and Tower Linear Guides	Blow out / Clean out debris
Platform lowers before dealer can remove shuffled cards.	Unload Delay time set too short	Increase Unload Delay time in the Setup menu
Platform elevator rises. Display shows "Remove Cards".	Faulty Platform Card Present Sensor	Replace the PCPS, or Retractable Cord Assembly (#6)
Platform jams after 10 cards are shuffled.	Dirty or faulty Gripper Card Present Sensor	Clean or replace GCPS Sensor
Gripper cannot move to "Home" position.	Faulty Gripper Home Switch	Replace the Gripper Home Switch (#25)
Gripper Homing Jam.	Faulty Gripper Motor	Replace the Gripper Motor (#19)
Grippers fail. Display shows "Platform Jam Or Service Required".	Faulty Gripper Card Present Sensor	Replace the GCPS (#4)

### Platform / Grippers (Cont'd)

Symptom	Cause	Remedy
Machine frequently goes into Auto-Setup (cards falling out of Gripper).	Loose Gripper Belt	Adjust the Gripper Belt
	Gripper blocks are worn	Replace both Gripper Blocks
	Broken Compression Spring on Gripper Assembly	Replace the Spring
	Dirty or Faulty PCPS	Replace the PCPS (#6)

### Motor Faults

Symptom	Cause	Remedy
Fan Motor does not operate.	Faulty Fan Motor	Replace Fan Motor Assembly (#15)
Camera Blower Motor does not operate.	Faulty Camera Blower Motor	Replace Camera Blower Motor (#35)
Platform rises and falls Cards will not feed.	Faulty Speed Up Motor	Replace Speed Up Motor (#18)

### Sensor & Button Faults

Symptom	Cause	Remedy
Display shows "Remove Cards" when machine is empty.	Dirty or faulty FCPS, CIS, COS, PCPS	Clean or replace the faulty sensor element
	Faulty I/O Board	Replace I/O Board
Display shows "Remove Feeder Cards" when feeder is empty.	Dirty, faulty or misadjusted FCPS	Clean or replace the FCPS (#23)
Display shows "Card Jam" when all cards are removed.	Faulty CIS, COS or FCOS	Clean or replace the faulty sensor element
Display shows Push GREEN Button - "Load Cards".	Faulty GREEN Button	Replace the GREEN Button (#20)
	Faulty Platform Card Present Sensor	Clean or replace the PCPS, or #6 Harness
GREEN Button is inactive when requested.	Faulty GREEN Button	Replace the GREEN Button (#20)
RED Button is inactive when requested.	Faulty RED Button	Replace the RED Button (#22)
Auto-setup will not complete.	Gripper Card Present Sensor not sensing bottom card in Gripper	Adjust the GCPS to aim at bottom card when gripper separates the stack of cards
Platform jams after 10 cards are shuffled.	Faulty Gripper Card Present Sensor	Clean or replace the GCPS (#4)

### Sensor & Button Faults (Cont'd)

Symptom	Cause	Remedy
Display shows "Remove Cards" when machine is empty.	Faulty FCPS, CIS, COS, PCPS	Clean or replace the faulty sensor element or Harness
Shuffler stops but display shows "shuffling".	Faulty Card Out Sensor	Replace the faulty CO sensor element (#38 & #40)
Card Rec failure (intermittent partial card feed).	Camera Ribbon Cable is not seated properly	Re-seat or replace the Camera Ribbon Cable
	Loose or faulty Camera Trigger Sensor	Re-seat or replace the CTS switch element (#36)
Initializes. After cards are inserted, display shows "Check Tower Sensor".	Faulty Tower Down Switch	Replace the TDS switch (#34)

### Tuning

Symptom	Cause	Remedy
Display shows "Deck not Tuned".	Deck is not tuned	Tune deck 'Tune Cards' in Setup mode
Invalid deck message after successful tune.	Poorly tuned images	View Images web page Focus camera and retune card deck
	Incorrect deck selected for tuning	Assure that the correct deck type and description are selected in the shuffler
Images shifted.	Debris on calibration plate	Remove and clean underside of calibration plate. Replace plate
	Debris on or damage to the camera lens	Clean camera lens or replace the camera
	Incorrect deck selected for tuning	Assure that the correct deck type and description are selected in the shuffler and Deck Library web page

## Card Recognition

Symptom	Cause	Remedy
Display shows "Deck not installed". Web page shows deck is installed.	Faulty Rabbit flash chip	Replace Rabbit flash chip
	Deck not selected in Menu column of Deck Library web page	Go to Deck Library web page and click the Menu box to make deck available in the shuffler
Won't learn cards or feed them.	Card empty sensor needs to be replaced or adjusted	Replace or adjust sensor
Card Rec failure (intermittent partial card feed).	Camera Ribbon Cable is not seated properly	Re-seat or replace the camera ribbon cable
	Loose or faulty Camera Trigger harness (Pin #54)	Re-seat or replace the harness
Multiple missing and/or unknown cards messages.	Shuffler is set to an incorrect SHFL entertainment I D number (SID) for card type in use	Verify card type using Playing Card Reference book, or contact SMI
	Tuned using wrong card type	View Images web pages Retune
	Camera is out of focus	Re-focus the Camera Re-Tune the Deck
	Incorrect deck selected for tuning	Assure that the correct deck type and description are selected
	Brake Roller gap is too large	Adjust the brake roller assembly Refer to Section 10 for instructions
	Dirty or Faulty Card In Sensor	Clean or replace the CIS sensor

## Web Page and PC Connectivity Troubleshooting

Symptom	Cause	Remedy
The Shuffler and PC do not communicate.	Network is Disabled in the shuffler	Enable Network in Setup/Network Options
	DHCP is Enabled in the shuffler	Disable DHCP in Setup/Network Options (For stand-alone)
	The Proxy Server is 'On'	Turn off the Proxy Server in the PC
	A Crossover adapter is missing	Connect an adapter to one end of the network cable. (Only for desktop and older laptop PCs)
	If using IE7 as the browser, Microsoft NET Framework 3.0 is installed on the PC causing a network conflict	Uninstall the application from the PC
	A proper Network cable is not installed	Connect the PC and the shuffler with a standard CAT-5 patch cable
	The Wi-Fi application on the PC is not "Disabled"	Don't just turn the application "Off" It must be "Disabled"
IP Address will not broadcast to the Deck Manager from the Serial Viewer.	A proper Serial cable is not installed when using the Serial Viewer	Connect the serial cable from the PC to the connector on the Rabbit Board
	The PC security Firewall is preventing the connection	Disable the security firewall in the PC
No address broadcast to Deck Manager after cycling power to the shuffler.	The PC security Firewall is preventing the connection	Disable the security firewall in the PC
	A proper Network cable is not installed	Connect the PC and the shuffler with a standard CAT-5 cable (w/ adapter, if necessary)
Deck Manager won't "Install to" or "Get from" the device.	No network communication	Determine and correct the cause of the communication failure
Deck Manager will not "Get (All) files from the Device".	Not using Decklist.txt	Click to select "Install using Decklist.txt" in the Deck Manager
A specific deck file is not available.	The Device Library folder address is incorrect	Enter the correct library folder address in the Library Folder address box
Web pages will not open.	The Device IP address is incorrect	Check the dropdown Device Address list for the correct IP and MAC address
The Card ID menu does not appear in the web pages.	The General password was used to login	Use the Administrator password
The Deck Installation section does not appear on the Deck Library web page.	The General password was used to login	Use the Administrator password

## Miscellaneous

Symptom	Cause	Remedy
Card Type names are “missing” from the Deck Types List displayed on the shuffler.	Too many calibration files have been installed into the shuffler	Uninstall unneeded files from the Deck List to a maximum of 20
Shuffler “locks up”.	Unassigned deck number selected on shuffler	Access the Deck Library Web page; click menu boxes for maximum 10 decks Cycle power to shuffler; re-select correct deck
	Maximum allowable number of installed deck files was exceeded	If unable to access the Deck Library web page, reformatting of the card rec board is required

## 12.0 F1174 Camera Focusing Instructions

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The Focusing Fixture Assembly, Part Number F1174, provides a means to accurately focus the camera for the *MD2® CR* shuffler prior to installing, or re-installing the camera into the shuffler body.

This document provides instructions for use of the Fixture in the field.

### **Additional Equipment Required**

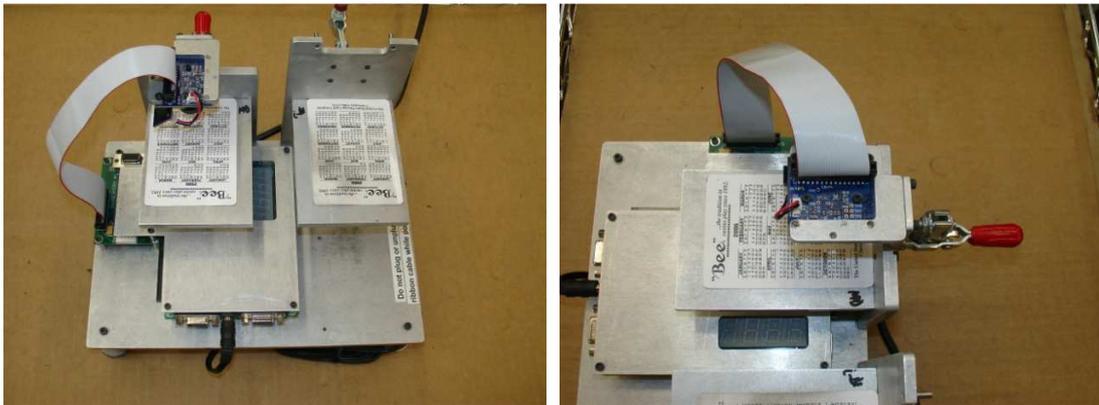
PC Monitor with VGA Cable and Power Cable  
P2081 Yellow Torque-Seal  
P2083 Lens Cleaning Cloth

Be certain that the Fixture is connected to a grounded outlet during use. Additionally, when working with a Camera PC Board, the technician should use a properly grounded anti-static device, such as a wrist strap.

### **Focusing Instructions**

1. Connect a PC Monitor to the F1174 Fixture using a standard VGA Cable.
2. Connect the Fixture (Power cord is included) and the Monitor to a main power source.
3. Remove the Camera Bracket Assembly from the shuffler.
4. Connect the Camera Ribbon Cable from the Fixture to the Camera PC Board.
5. Clamp the Camera Bracket Assembly into the correct position on the F1174 Fixture. See the photos, below. Apply downward pressure on the Assembly while clamping.
6. Remove the Camera Lens Cap, if present.
7. Turn power 'ON' to the Fixture and the Monitor.
8. View the live image on the Monitor. Turn the Camera Lens to focus the camera on the calendar text. The text should appear very clear and sharp.
9. Place a clean, white card or piece of paper on the Platform under the camera lens. Make sure that a clear, spot-free picture is present. If spots do appear, clean the camera lens and/or the internal CCD chip to remove all dirt or dust.
10. When the camera is focused, apply a small amount of the P2081 Yellow Torque-Seal adhesive between the threads and the camera housing to prevent the lens from rotating. See Figure 3.

11. Allow a few minutes for the adhesive to dry before re-installing the Camera and Bracket Assembly into the shuffler.
12. Complete the Tuning procedure for the desired deck(s). The newly scanned images will replace images previously stored for each deck type. Verify the quality of the new images through the “Images” page of the shuffler-integrated web pages.



Figures 1 & 2 *MD2<sup>®</sup> CR* Camera Mounted on Focusing Fixture

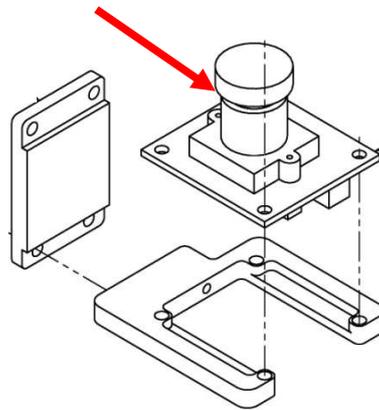


Figure 3 *MD2<sup>®</sup> CR* Torque-Seal Location

