DMD Extender

Application Note 3
Stern SAM LCD Replacement

V0.1 November 2013

Important

This document is a guide to installing an LCD panel to replace an LED display in Stern SAM system pinball machines.

The user installs the DMD Extender and LCD Panel Kit entirely at their own risk – Dr Pinball cannot accept responsibility for damage or other problems caused by this system or its use.

The installation instructions are given purely as a guide. The user must exercise caution when performing the installation.

Introduction

This Application Note is a guide to replacing the 128 X 32 dot DMD LED panels in all Stern SAM system DMD games.

What's Needed

This section details what is needed to complete the installation.

Tools
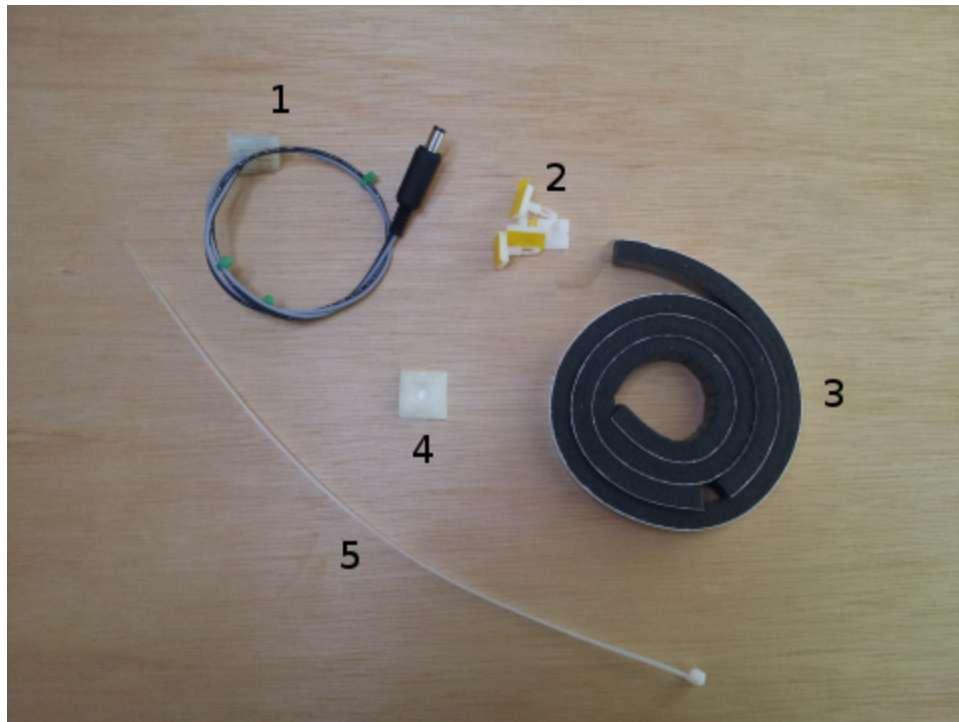
Set of Imperial sized sockets – small

Saw

Components

Components available from Dr Pinball

DMD Extender comprising:

- DMD Extender Board
- 14 Way Ribbon Cable – Not needed for this installation
- Power cable
- Power splice
- SD Card with Raspberry Pi software
- Cable tie

LCD Interface Kit comprising:

1. LCD Controller power cable
2. 4 X adhesive PCB mounts
3. 2 X Extra thick foam weather strip, suitable for 4mm to 7mm gap
4. Cable tie adhesive mount
5. Cable ties

Components available from other sources

Raspberry Pi – Model A or Model B

LCD Panel – 15.6" 16:9 1920 X 1080. Model used in this guide is LG LP156WF1

LCD Controller – DVI to LVDS to drive the panel above

DVI to HDMI Cable 1m

Plywood, 6 mm thickness

See Appendix A for retailers of these items.

Method

Step 1 - Preparation

Switch off the pinball machine and remove the plug from the wall outlet.

Remove the backbox translite glass. Remove the speaker panel and place onto the pinball machine – use magnets or blutac on the side rails to stop the speaker panel from slipping.

You may also need to open the backbox light door to gain access to the cabling inside.

Step 2 – Remove the DMD display

Figure 1 shows the DMD screen. Remove the data ribbon cable and power connector from the screen. These cables are marked in the figure.
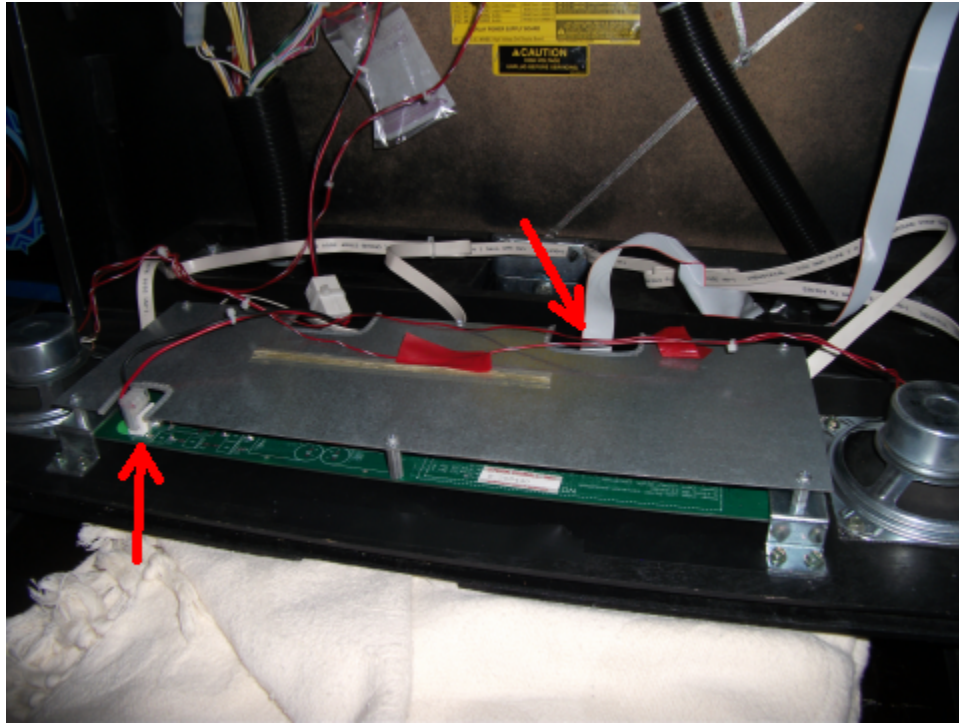

Figure 1 – DMD screen, remove marked cables

The removed power cable is not needed by the LCD replacement and can be pushed safely out of the way.

Remove the 4 corner screws from the metal plate and lift the plate away from the screen. Figure 2 shows the 4 screws.
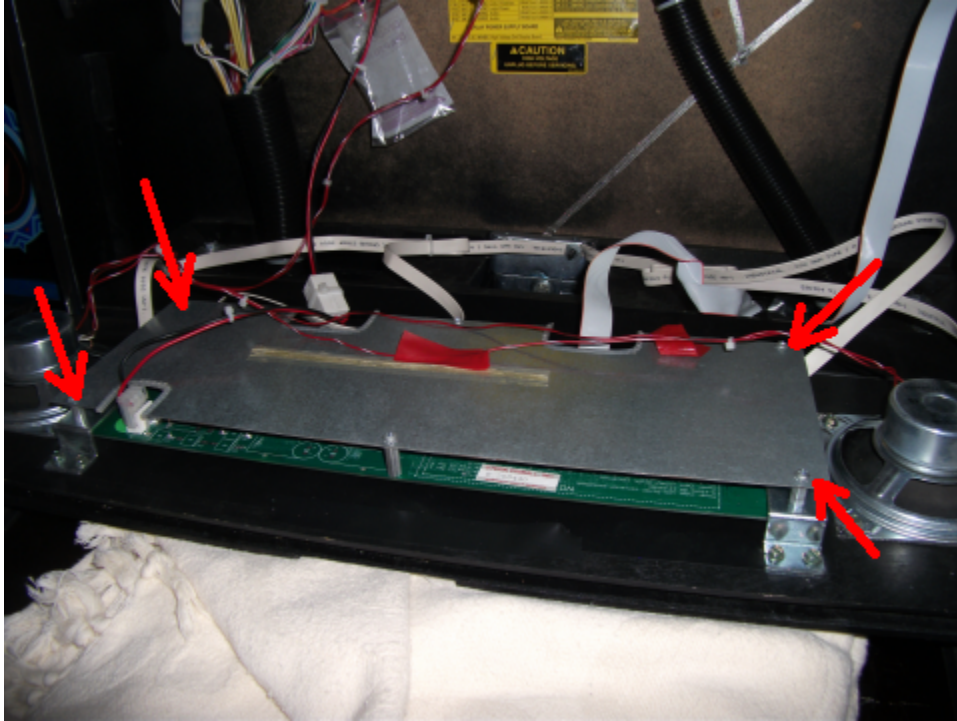

Figure 2 – Metal plate screws

Remove the 8 screws that hold the DMD screen onto the speaker panel. These screws hold the 2 mounting brackets. The screen and mounting brackets can then be removed. Figure 3 shows the screw locations – only 4 screws are visible in the figure.
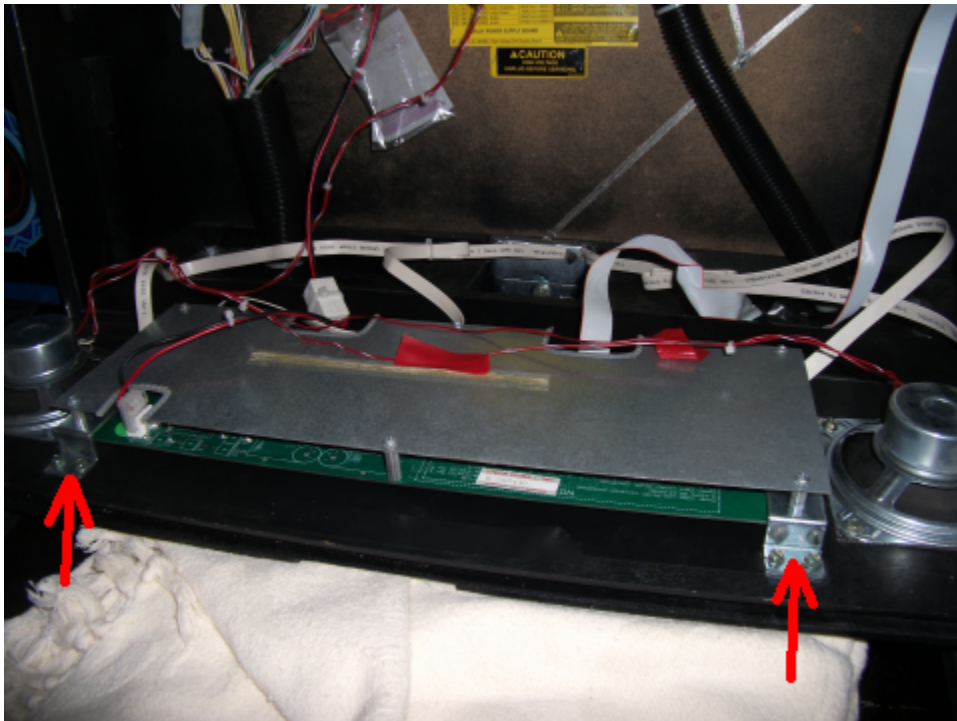

Figure 3 – 4 of the 8 bracket screws

There are also 2 earth cables that should be disconnected.

Remove the 4 screws that hold the brackets to the DMD screen – the brackets will be used to mount the LCD screen and plywood panel.

Step 3 – Make the LCD panel mount

It is necessary to make a mounting panel from plywood. Use 6mm (1/4") ply and cut to the size 131mm X 425mm.

There is no need to drill any mounting holes.

Stick weather strip foam to the back of the panel to help retain the LCD screen, as shown in figure 4.

Figure 4 – Foam weather strip on the back of the plywood mounting plate

You should also stick 2 short pieces of weather strip along the short edge on the opposite side of the board to the longer strips of foam i.e. 2 long pieces of foam on one side and 2 short pieces of foam on the other side.

Step 3 – Install the LCD panel

Prepare the plywood mounting panel by fixing the DMD Extender, Raspberry Pi and LCD Controller as shown in figure 5.
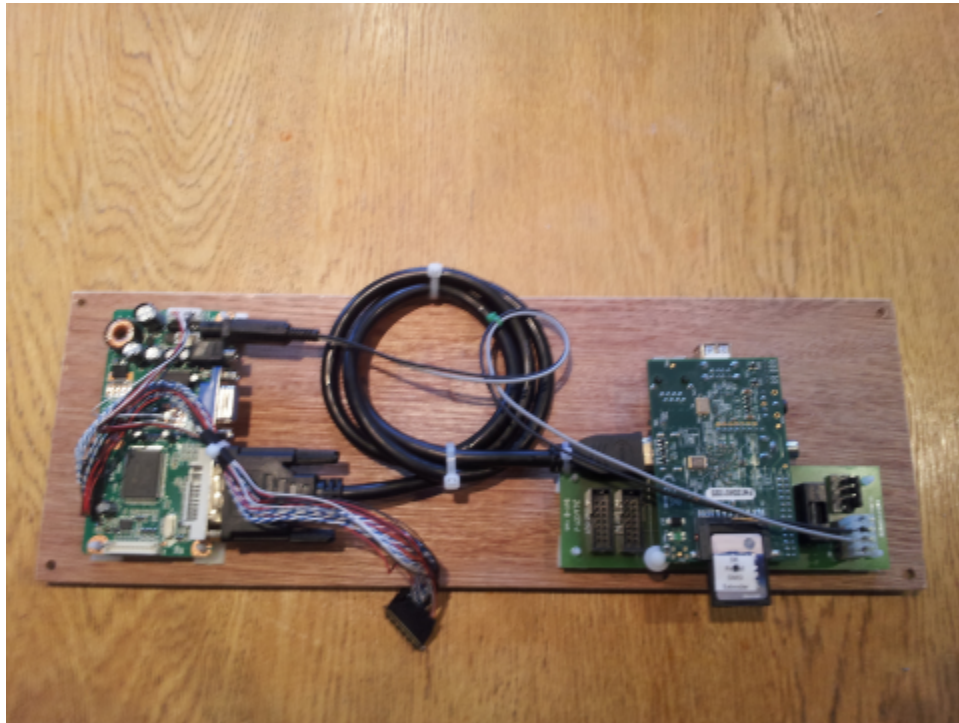

Figure 5 – Components mounted on the plywood panel

Figure 5 shows the DMD Extender mounted with the adhesive stand-offs as supplied with the Extender.

The LCD Controller is mounted with the adhesive stand-offs as supplied with the LCD Installation kit.

The LCD Controller is powered by the supplied cable connected to POWER OUT on the Extender.

The DVI / HDMI cable is kept secure using the cable ties supplied.

N.B. The short foam strips are not shown in figure 5.

Place the LCD screen onto the speaker panel and ensure it sits squarely and centrally. The bottom of the screen should be level with the rebate in the speaker panel. If the screen sits too low the speaker panel will not fit into the backbox.

Place the plywood mounting panel over the LCD screen and connect the LVDS cable to the LCD screen.

Figure 6 – LVDS cable connected to the LCD screen

To fix the mounting panel and screen, reattach the DMD mounting brackets onto the speaker panel – the bracket will clamp the mounting panel and screen to the speaker panel.

However, mount the brackets with one screw only on each side, and use the inside bracket holes positioned over the outside screw hole. This is shown in figure 7 and figure 8.
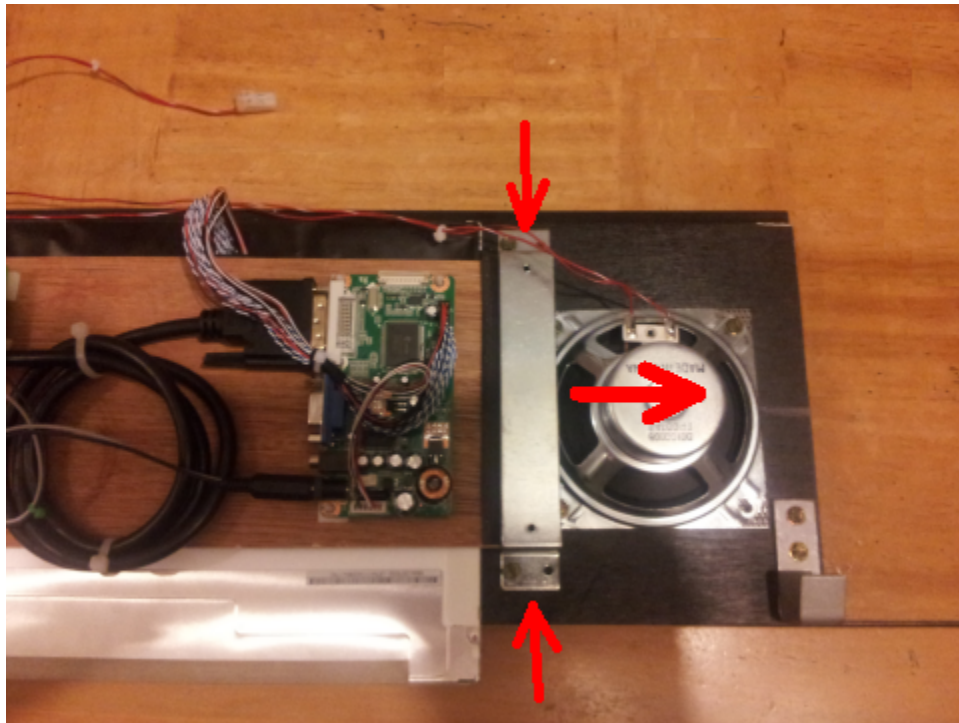

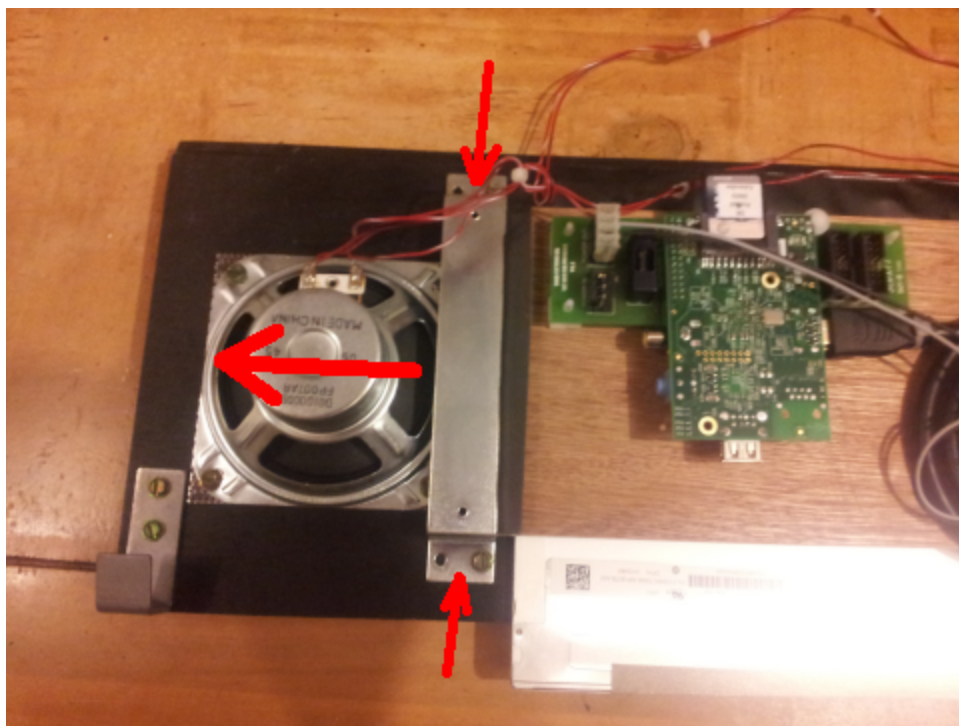*Figure 7 – Attach the bracket outwards with only 1 screw on each side.*

Figure 8 – Attach the bracket outwards with only 1 screw on each side.

If the bracket is mounted using 4 screws in the original position, the screen will not fit between the brackets.

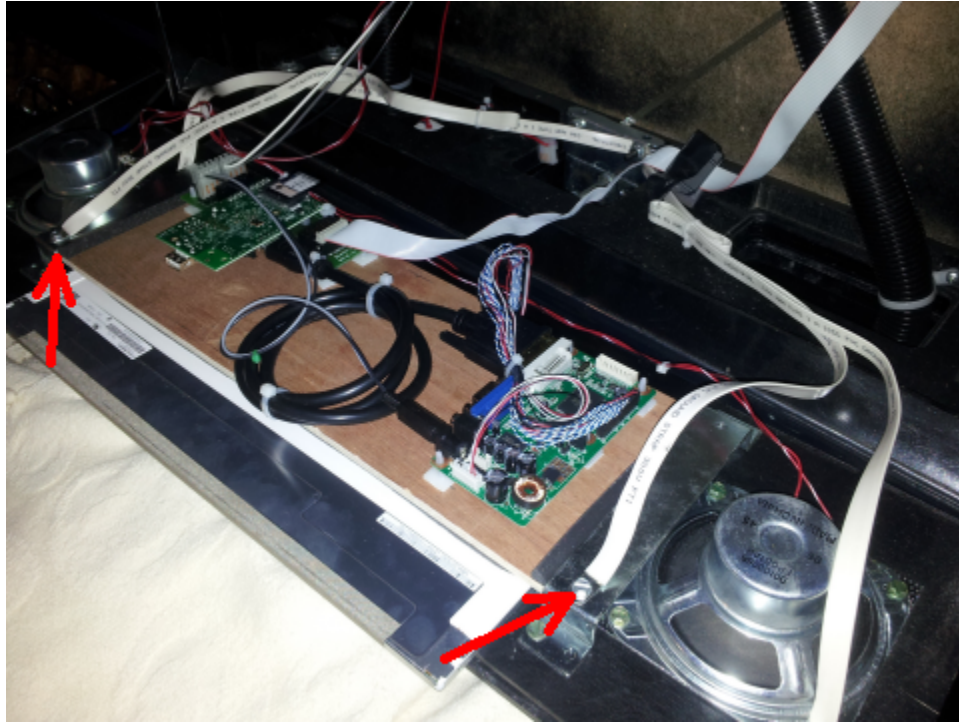Reattach the 2 earth leads to the DMD mounting brackets.

Figure 9 – Earth leads reattached

The 14 way ribbon cable that was removed from the original screen should be connected into the DMD Extender, socket marked DMD IN or DMD OUT.

Connect the Power Cable Assembly in the DMD Extender POWER IN socket – see the DMD Extender installation instructions for locating and installing this cable.
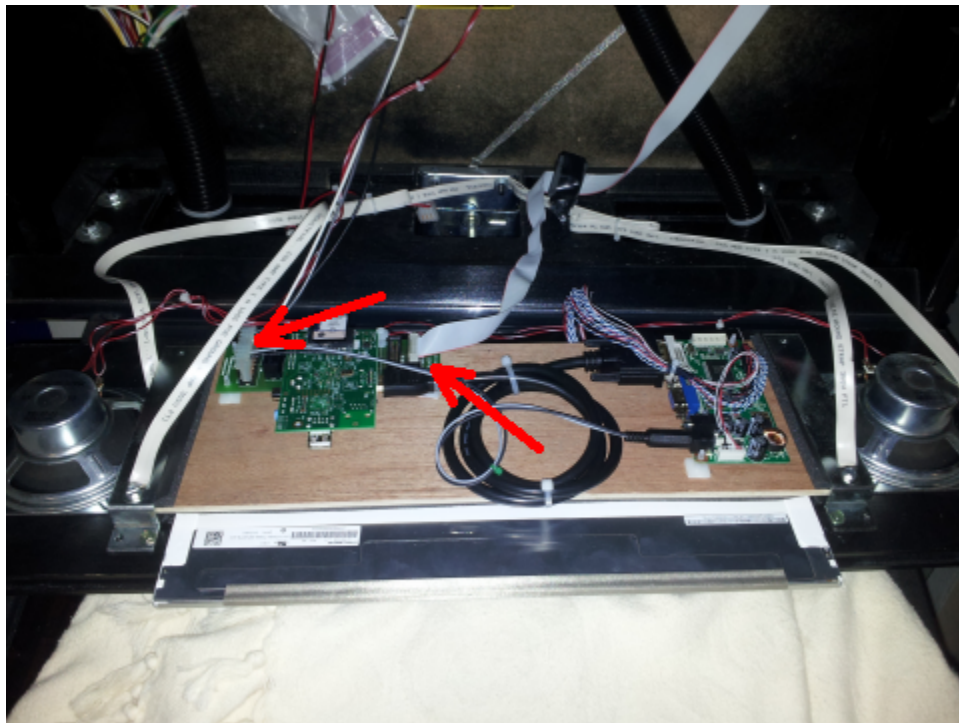

Figure 10 – Ribbon and power cables replaced

Replace the speaker panel into the back box and ensure the screen sits squarely.

Step 4 – Configuration

Follow the instructions for using the Configuration Utility supplied on the SD Card of the DMD Extender - http://www.drpinball.co.uk/documentation.htm

As a minimum you must select the following options:

Screen Type – HDMI/DVI

Screen Aspect Ratio – 16:9

Screen Resolution – Medium

Dot Matrix Type – Stern SAM

DMD Position – Adjust to move DMD portion into view

You may also want to change the dot colours and effects as required.

Step 5 – Finishing steps

Before completing the installation please check all connections made for correct insertion and orientation.

Remount the speaker panel and translite. The installation is now complete.

Appendix A

This section gives details of sources for items needed to complete the installation.

Raspberry Pi – Model A or Model B

This mini computer can be purchased from RS/Newark or Farnell/CPC – look online for more details.

LCD Panel
The following panel is recommended due to its superior viewing angles which are important in a pinball machine:

15.6" 16:9 1920 X 1080. Model used in this guide is LG LP156WF1.

This panel can be purchased from eBay or in the UK from Accupart – www.accupart.co.uk

LCD Controller

DVI to LVDS to drive the LCD panel, available from eBay:

http://www.ebay.co.uk/itm/B-NTA92C-VGA-DVI-LCD-controller-4-LG-PHILIPS-LP156WF4-SLB1-LED-Panel-2ch-6-bit-/370796210733?pt=US_Server_Boards&hash=item56552d2a2d

Please contact the vendor 'njytouch' to confirm compatibility.

DVI to HDMI Cable 1m

Available from eBay

Plywood, 6 mm thickness

Available from any DIY store