DMD Extender

Application Note 1
Sega Large Screen LCD Replacement

V0.1 October 2013

Important

This document is a guide to installing an LCD panel to replace a plasma display in Sega Large Screen pinball machines (192 X 64 screens).

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.

Please note that the 12V supply in DE / Sega games is normally acceptable to drive a display panel and display controller. However for other manufacturers e.g. Stern / Bally / Williams etc, the 12V supply may not be suitable and may damage your system – a 12V regulator is required in these situations, which can be supplied by Dr Pinball.

Introduction

This Application Note is a guide to replacing the 192 X 64 DMD plasma panels in the following Sega games:

Maverick

Mary Shelley's Frankenstein

Baywatch

Batman Forever

What's Needed

This section details what is needed to complete the installation.

Tools

Set of Imperial sized sockets – small

Flat bladed screwdriver – small

Saw

50mm hole cutter

Components

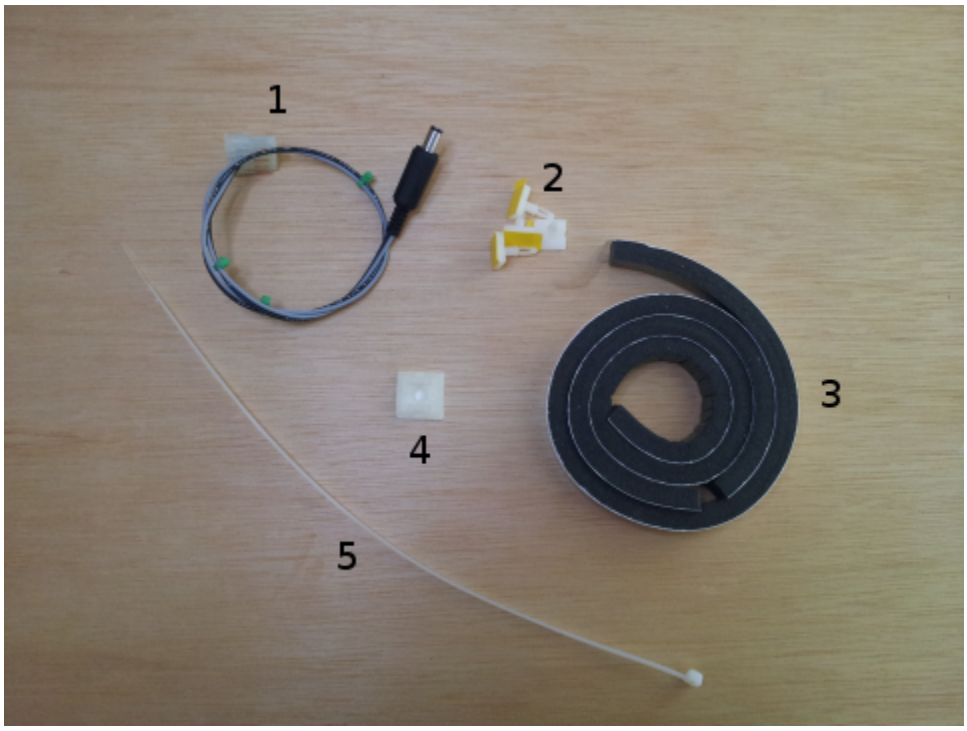
Components available from Dr Pinball

DMD Extender comprising:

- DMD Extender Board
- 14 Way Ribbon Cable
- 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 tie

Components available from other sources

Raspberry Pi – Model A or Model B

LCD Panel – 17.3” 16:9 1920 X 1080. Model used in this guide is LG LP173WF1

LCD Controller – DVI to LVDS to drive the panel above

DVI to HDMI Cable 1m

Plywood, 6 mm thickness

Roll of black insulation tape

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 plasma display

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

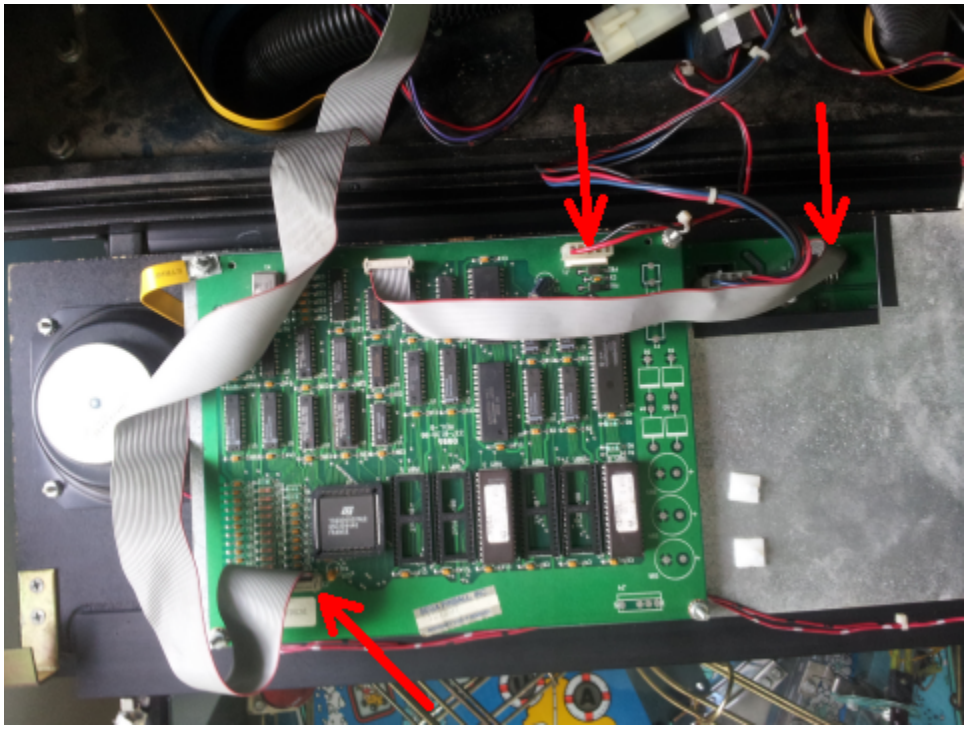


Figure 1 – DMD Controller, remove marked cables

Figure 2 shows the 6 nuts that must now be removed. After removing the nuts lift the 2 yellow earthing wires.

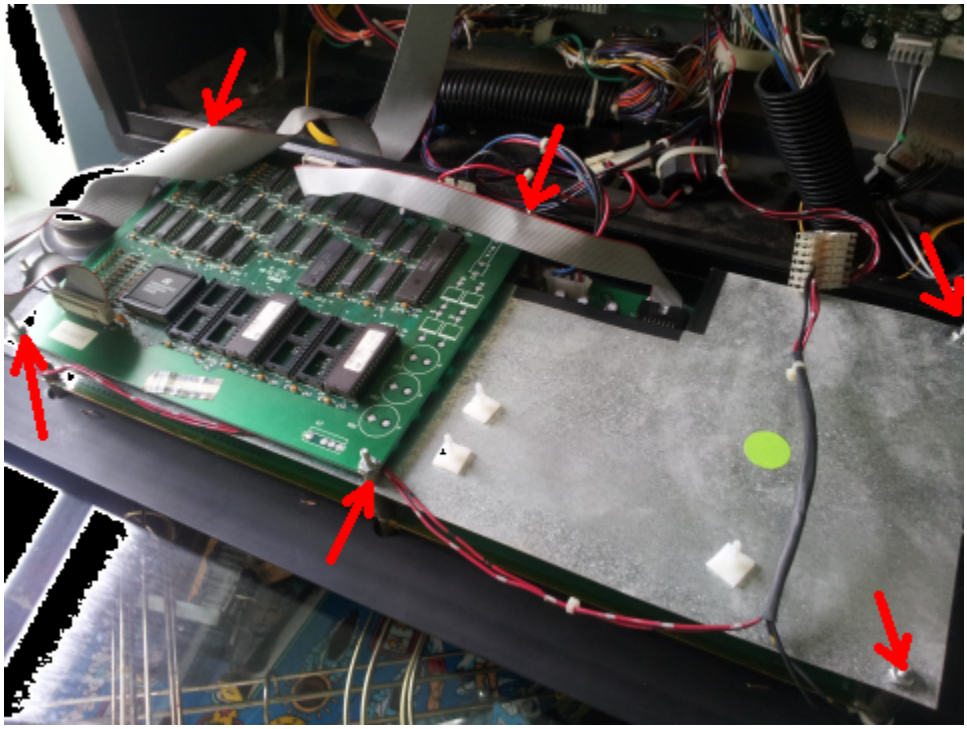


Figure 2 – Remove marked nuts

Remove the 4 small spacers as shown in figure 3, then remove the metal plate to expose the DMD screen.

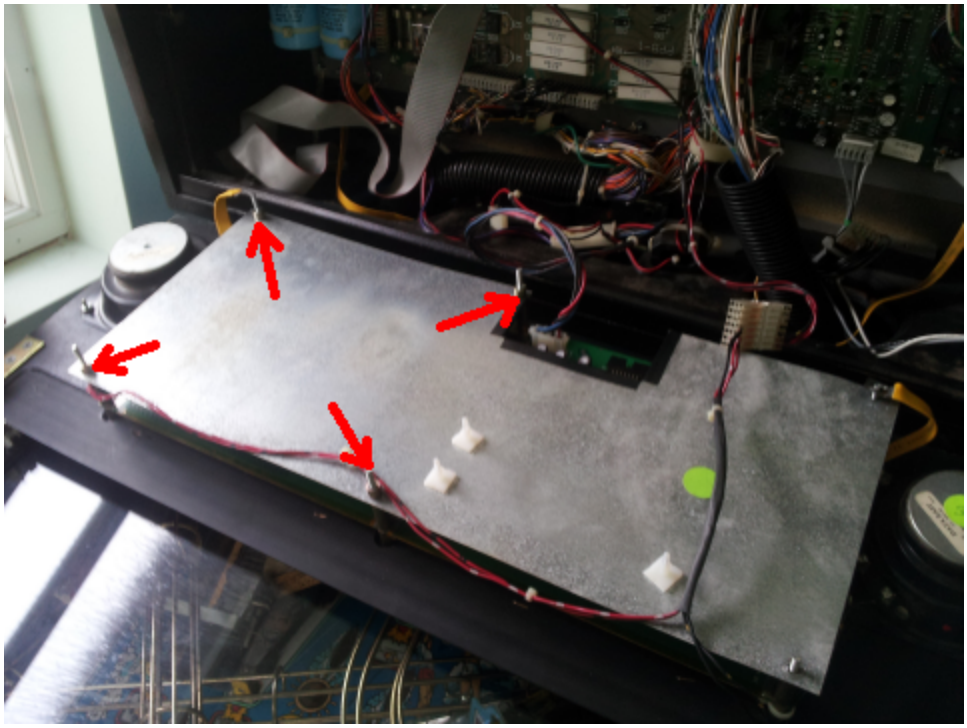


Figure 3 – Small spacers

Remove the power cable from the DMD Screen, followed by the 6 large spacers as shown in figure 4.

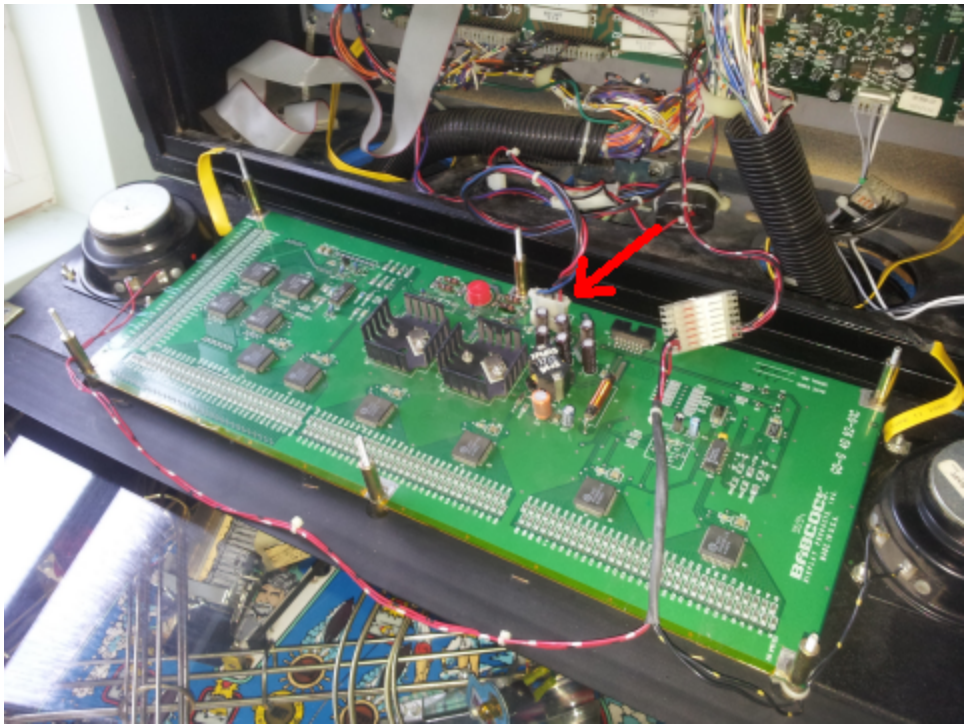


Figure 4 – Power cable and large spacers

Now carefully lift the DMD Screen away from the speaker panel.

Step 3 – Prepare the speaker panel

It is necessary to remove the centre top mounting post as shown in figure 5.

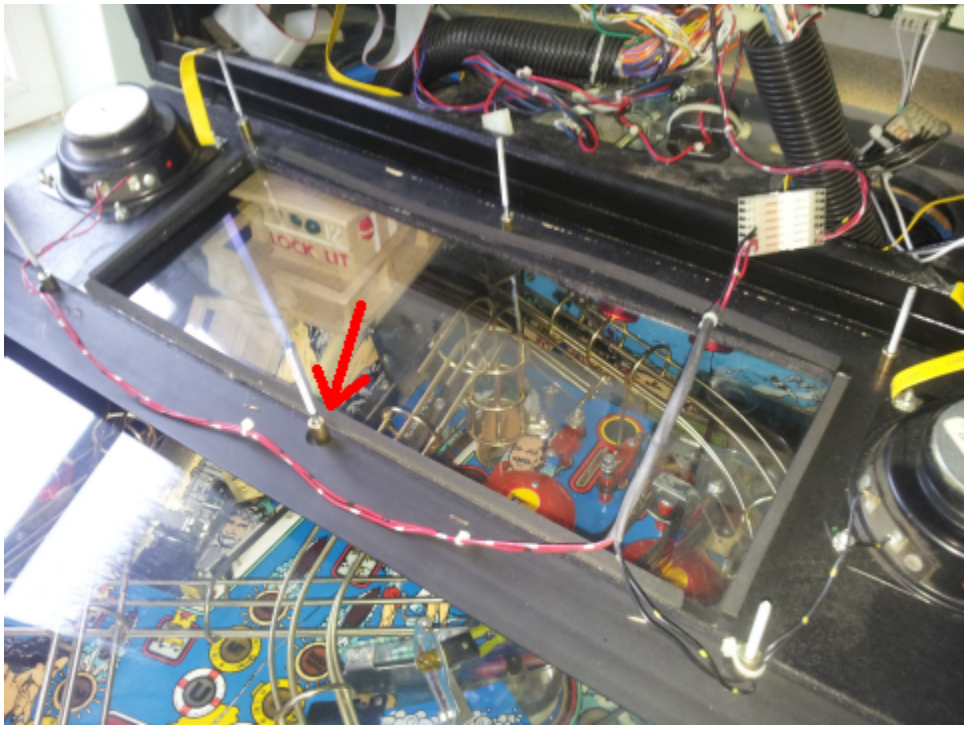


Figure 5 – Centre top mounting post

First, remove the translite mounting strip from the speaker panel. Start by removing the staples that hold the mounting strip in place, as shown in figure 6. Use a small flat bladed screw driver to pries the

staples out. Keep the staples for remounting later.

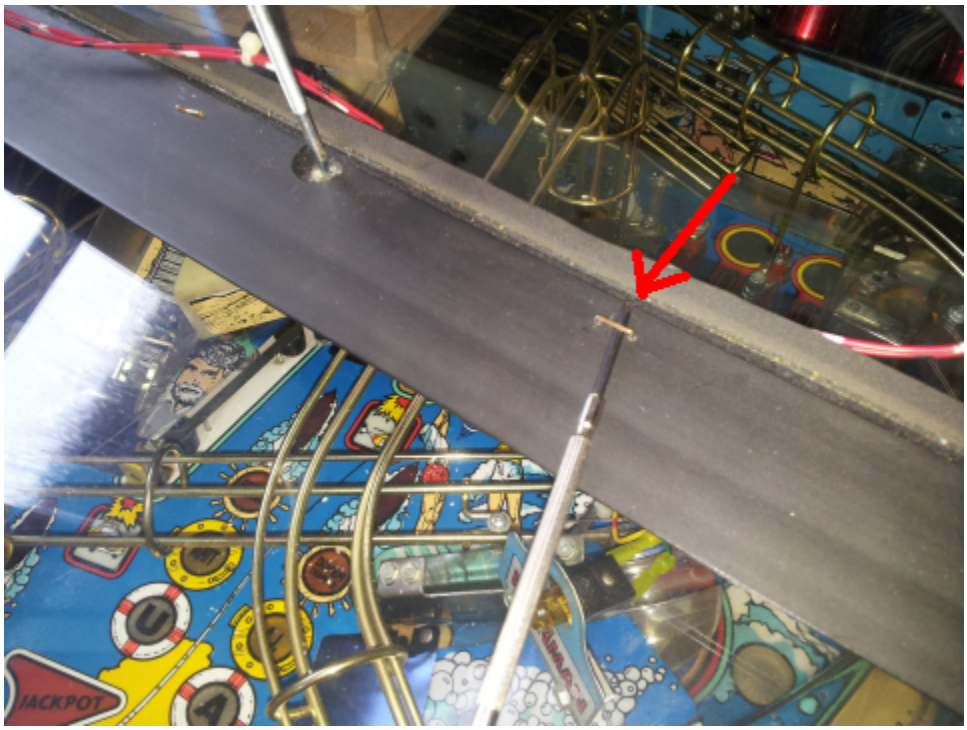


Figure 6 – Remove all translite mounting strip staples

Now carefully pries the plastic front of the speaker panel away from the wooden back.

Only the top needs to be released, you do not need to remove the whole plastic piece.

The plastic is held on with double-sided tape – using a small flat bladed screwdriver ease the plastic away from the wood. Be very careful not to damage the plastic – be patient and work slowly.

Eventually you will be able to access the centre post and push it out, as shown in figures 7 and 8.

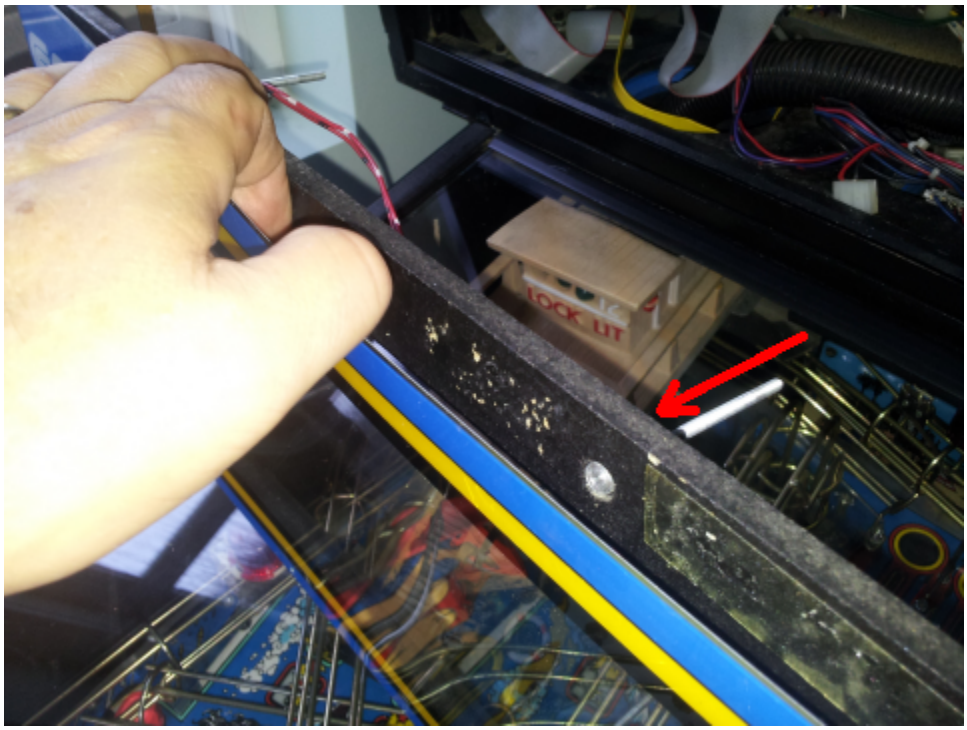


Figure 7 – Push out the centre post in the direction shown

Figure 8 – Centre post removed

Now replace the translite mounting strip and secure using the original stables. You can use a hammer to fix the staples into the original holes. Move the panel so that the staple being fixed sits over the side rail – this will stop the glass being damaged.

Do not apply too much pressure with the hammer or you will damage your pinball machine.

Figure 9 – Locate the staple over the side rail when using the hammer

At this point you may wish to clean the plastic window before installing the LCD 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 183mm X 446mm. A 50mm hole needs to be cut into the panel. If using an LG LP173WF1 panel then follow the drawing in figure 10.

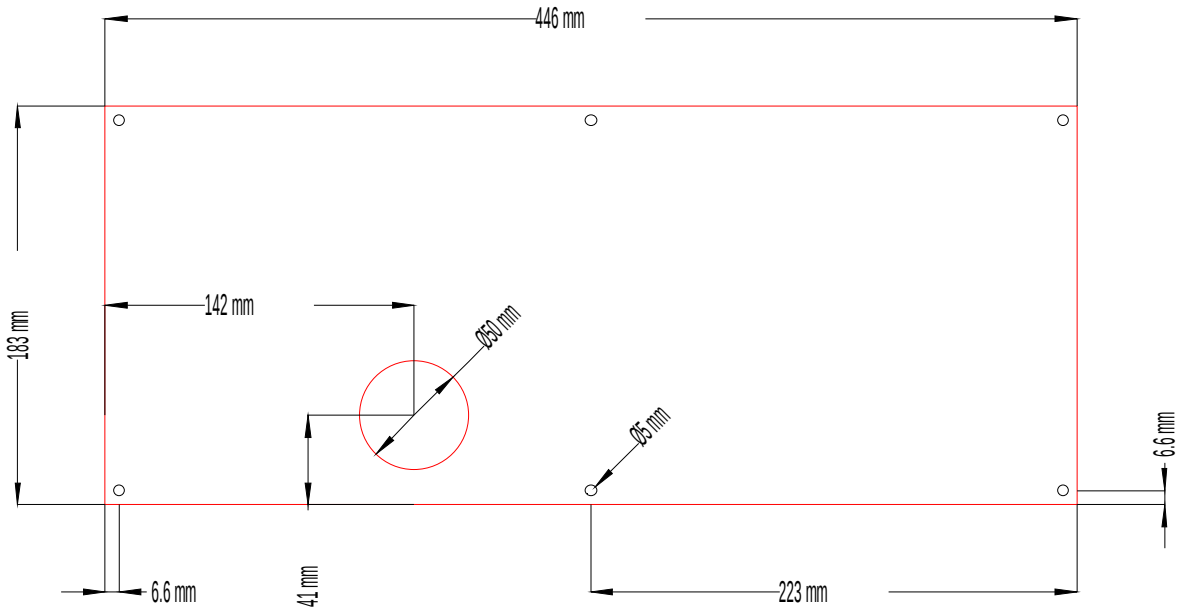


Figure 10 – LCD mounting panel diagram

It is possible to use the metal plate as a template for the mounting panel, especially when deciding on the 6 X 5mm holes. Be careful as the metal plate is too wide to be used as a complete template – the plywood panel should be 446mm wide.

If using a different lcd panel ensure the 50mm hole is correctly placed over the LCD connector to allow the plug to be inserted.

Stick weather strip foam to the back of the panel to help retain the LCD screen, as shown in figure 11.

Figure 11 – Foam weather strip on the back of the plywood mounting plate

Ensure the foam strip is placed on the correct side of the mounting panel.

Take the centre top mounting post that was removed in Step 2 and push through the centre top hole in the plywood mounting plate. You may need to use a pair of pliers to force the post fully into the plywood. Figures 12 and 13 show the post in position.

Figure 12 – Centre top mounting post

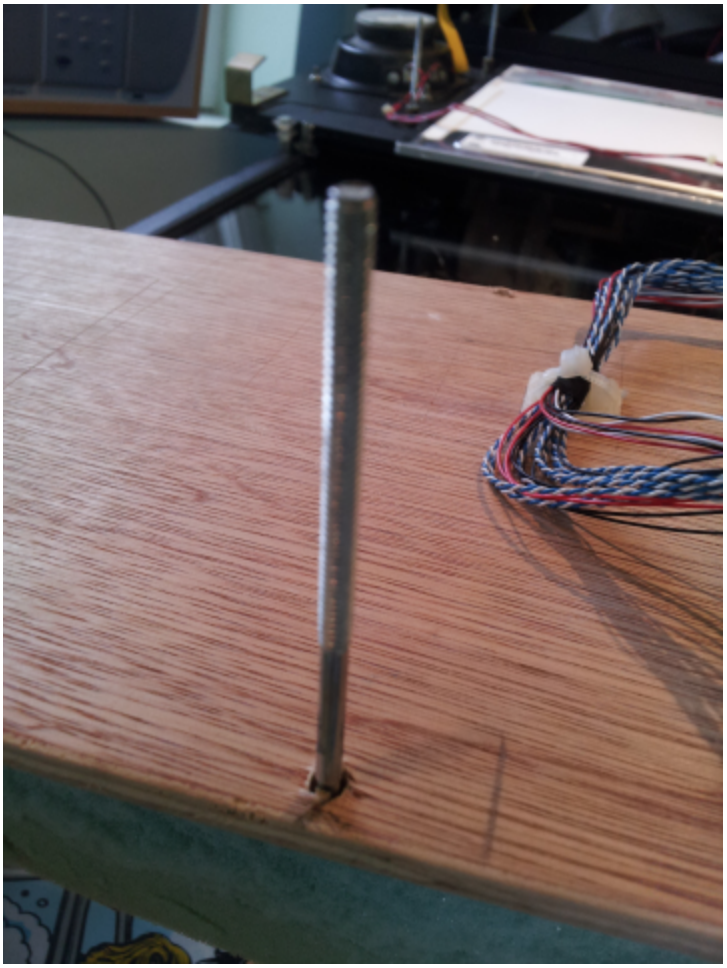


Figure 13 – Centre top mounting post

Step 3 – Install the LCD panel

Take the LCD panel and place black insulation tape along the left and right of the screen to cover the metal bezel. This will stop the metal frame being visible when mounted in the speaker panel.

Figure 14 – Black insulation tape on left and right sides of the LCD panel

Place the Lcd panel onto the speaker panel ensuring it sits square and central to the window.

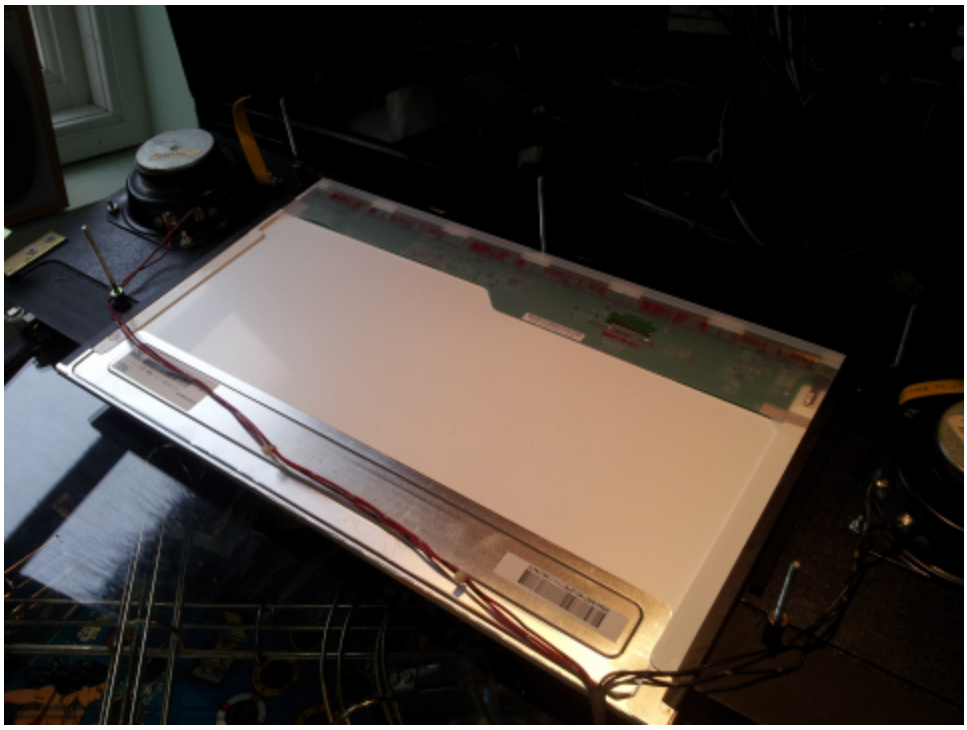


Figure 15 – LCD panel in position

Place the plywood mounting panel over the LCD panel locating it on the 5 posts as shown in figure 16.

Figure 16 – Plywood mounting panel in place

Now mount the LCD controller onto the plywood using the 4 self adhesive PCB mounts. Gently connect the LCD Controller LVDS connector to the LCD panel. Place the 6 large spacers onto the posts.

Use the cable tie and adhesive cable tie mount to secure the Lcd LVDS cable.

Figure 17 shows the video and power connectors in place.

Figure 17 – Video and power connectors

Replace the metal plate, and the 4 small spacers to support the DMD driver board.

Mount the DMD driver board and replace the 6 nuts – do not over tighten the nuts, but ensure the LCD panel is held sufficiently.

Install the DMD Extender into the pinball machine, please follow the DMD Extender instructions for details on how to mount in the pinball machine – http://www.drpinball.co.uk/documentation.htm

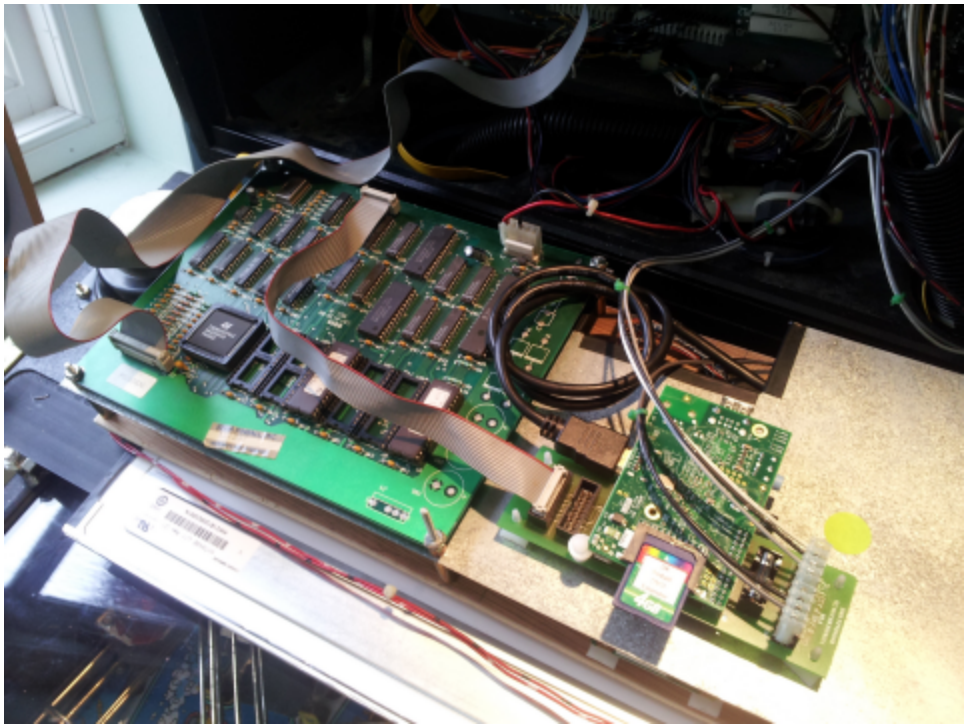


Figure 18 – All boards replaced

Ensure the cables are replaced in the correct orientation.

The small ribbon cable that was in the original DMD screen should now be connected into the DMD Extender.

The video cable should be plugged into the Raspberry Pi.

The LCD power cable should be connected to the DMD Extender 'POWER OUT' socket.

Figure 19 shows the correct orientation of the large ribbon cable.

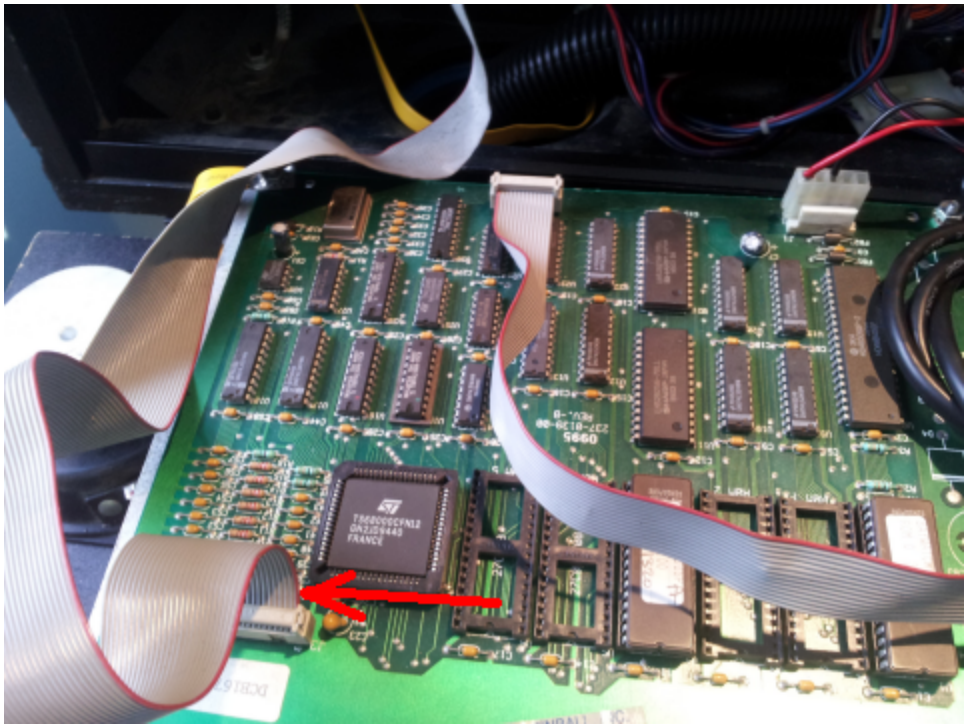


Figure 19 – Large ribbon cable orientation. Red wire marked with arrow.

The unused connector for the original DMD screen can be left free in the backbox.

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 – High

Dot Matrix Type – DE/Sega 192 X 64

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:

17.3” 16:9 1920 X 1080. Model used in this guide is LG LP173WF1.

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

This is a controller for a 15.6” screen but has been proved to also work in the 17.3” screen. Please contact the vendor 'njytouch' to confirm compatibility.

DVI to HDMI Cable 1m

Available from eBay

Plywood, 6 mm thickness

Roll of black insulation tape

Available from any DIY store