

VACS Dual Screen Installation

Early WPC

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Thanks for taking the leap and purchasing this Video Apron Card System.

We think it is a truly different type of modification for pinball machines.

Please read these instructions thoroughly before installing.

It is an easy kit to install and is fully reversible.

If you have any questions or suggestions, please contact us.

Video Apron Assembly
Distribution PCB Assembly
Warped Vector Interface (Optional)
Raspberry Pi 27-watt power supply brick
Ball Trough Deflector
Game Interface Cable
Vector to RPi Interface Cable
Apron Power to Distribution PCB Cable
(2 quantity) HDMI splice connectors
Left Screen to RPi Cable (red wire ties)
Right screen to RPi Cable
RPi to Coin Door area USB Extension Cable
Distribution PCB mounting screws
Micro SD Card – Game Specific



In our haste to make this manual, we forgot to include the power brick or SD card in this photo, and the HDMI connectors are already on the cables.

Good catch, Eagle Eye!

BASIC INSTRUCTIONS

Installing this kit is easy and straightforward.

We are going to assume that you, the installer, have all the basic knowledge to perform simple maintenance and repairs on pinball machines. Turn off the power, take off the glass, open the backbox, etc.

If you are not comfortable with this level of work, please stop now and find a local technician to help you.

You will need a Phillips screwdriver, wire cutters to trim wire ties and possibly a small flat blade screwdriver.

INSTALLING THE WARPED VECTOR INTERFACE

While the Vector is an integral part of the VACS experience, we do not manufacture that component.

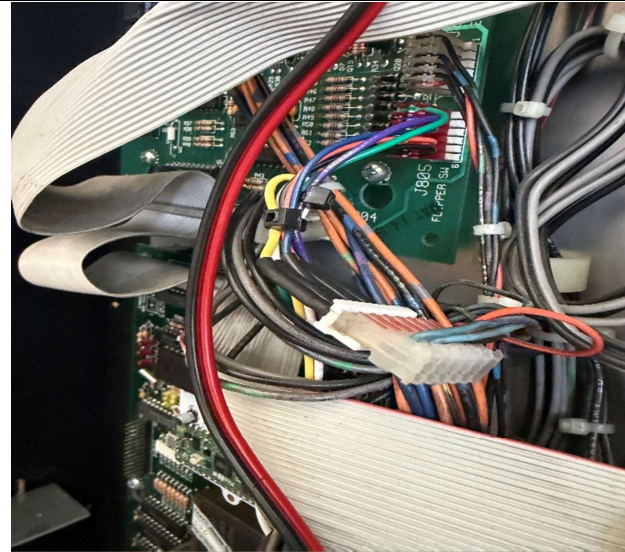
You will find their instructions both in the box and on the Warped Pinball website, so there is no need to duplicate it here.

We do provide instruction and basic support for Vector, so if you need any help with getting it installed, please contact us or Warped Pinball.

CABLING IN THE BACKBOX

Find the bag labeled "Game Interface Cable". It's the only multiwire colored cable in the pile, about 7 feet long.

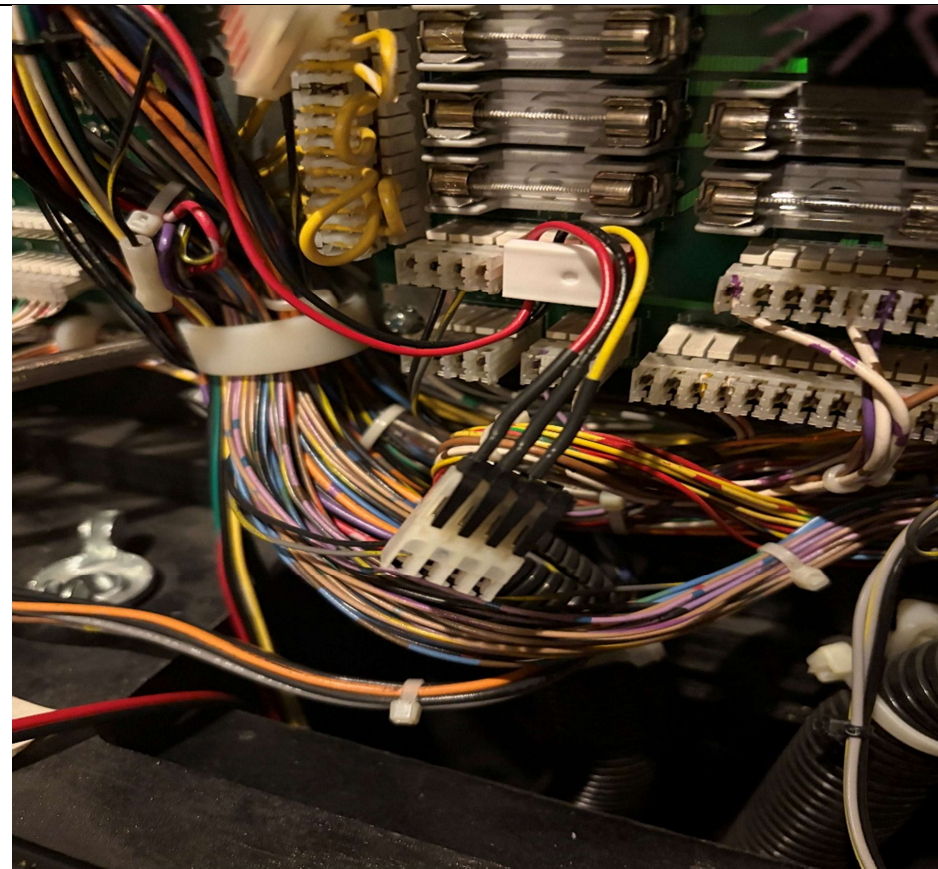
The end with a single connector goes down the backbox hole and eventually toward the front of the game. The backbox end connects in two places.



First - J805 on The Addams Family flipper PCB and J905 on the Fliptronic II PCB (all others). Remove that 6 pin connector and replace it with the red 6 pin connector at the end of the Game Interface Cable. Install the game connector you removed to the white male 6 pin connector attached near the red connector.

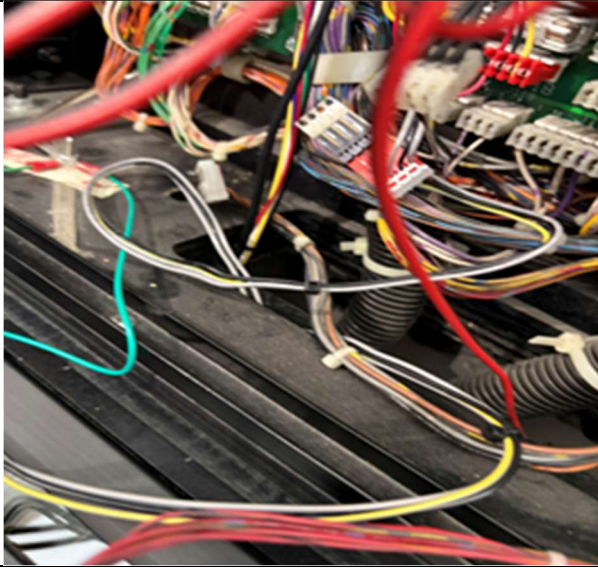
The game in this photo is The Addams Family.

In all other early WPC games, you will find J905 on the bottom edge of the Fliptronic II PCB. Same wiring and connector though.

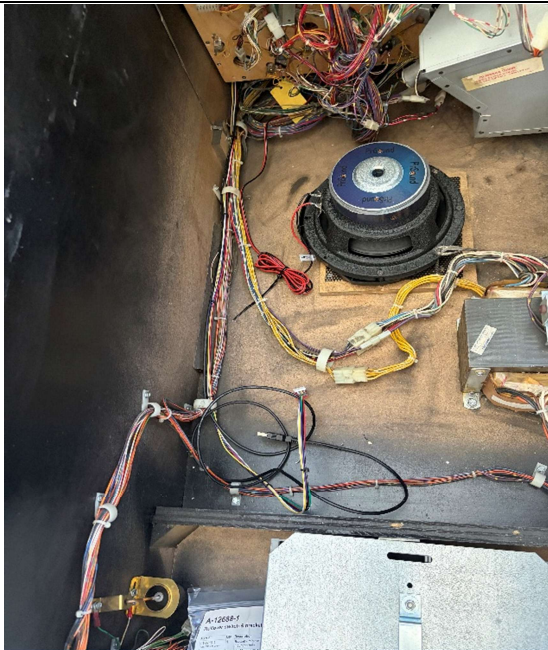


Partway down the Game Interface Cable is another 4-pin red connector. Attach it to J118 at the lower left corner of the Power Driver PCB. Attach the game cable you removed to the black male connector also near the red connector.

CABLING IN THE BACKBOX (Cont.)



Stuff the other cable ends down the backbox hole on the left side.



Remove the balls (almost forgot, didn't you?) and lift the playfield. Retrieve the two backbox cable ends and work them toward the front of the game. Try to leave the excess near the back so there is enough to fold the backbox down when moving the game.

INSTALLING THE APRON

Remove the two screws holding the original apron to the rear playfield supports, slide the apron forward about 1 inch and remove the original apron.



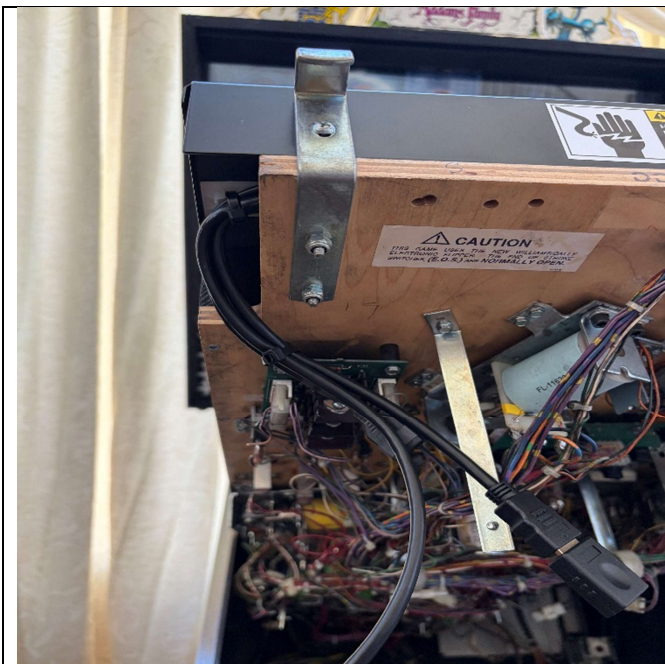
You will need to transfer the chrome apron guard from your original apron to the new apron. Your new apron is about 10mm taller than the original one, so adjust it down a little bit.



(IMPORTANT!)

Install the ball trough deflector

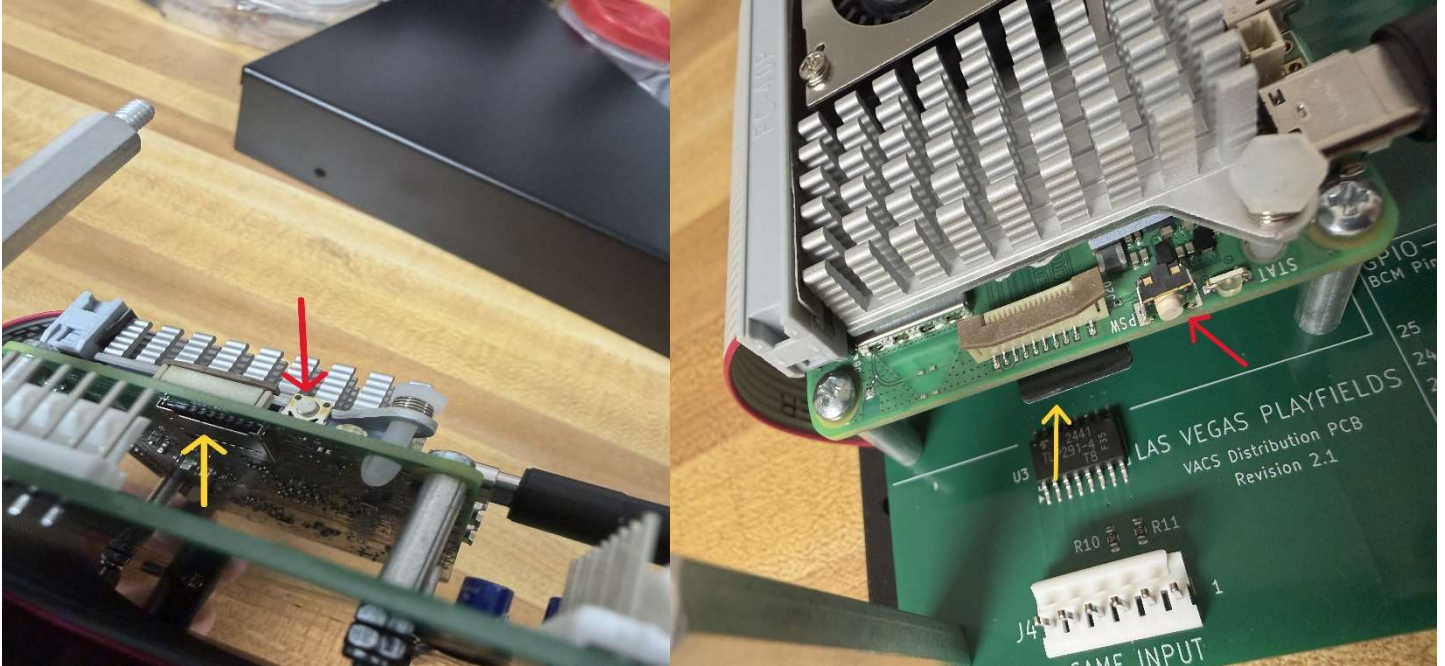
There is a little wire gate in the ball trough area that needs to be kept away from the screen electronics. You will find a small black part in the parts bag that has tape on one side to attach this to the ball trough walls. Install it as you see in the photos.



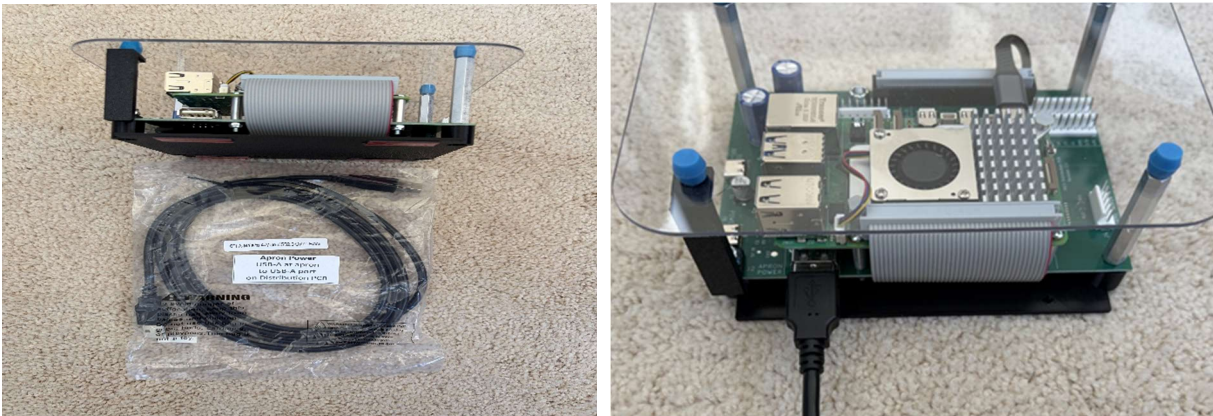
Inspect all the wiring and connectors under your new apron; make sure nothing came unplugged. Install the new apron just like you would the old one, keeping the 3 large cables forward and off to the left side.

INSTALL THE DISTRIBUTION PCB

The Distribution PCB is the heart of this system, take a good look to find all the connectors and other components.

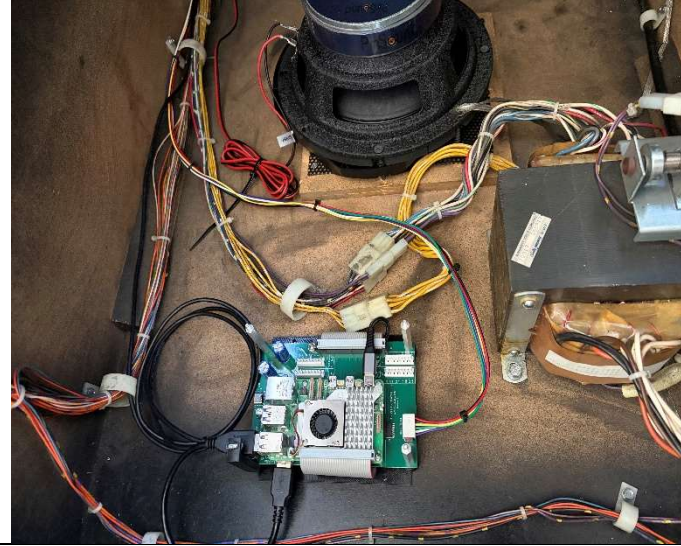


You will find an SD card in a plastic bag, taped to the plexiglass top. Install that SD card in the RPi slot as shown in the photos. It is installed with the LABEL SIDE FACING DOWN. Don't force it. Do make sure it is fully seated. The yellow arrow points to the SD card slot, the red arrow points to the exceedingly large white RPi power button.



Grab the USB-A cable labeled "Apron Power to Distribution PCB Cable", then find the USB-A connector that resides on the large, bottom PCB and is labeled 'Screen Power'. Plug one end of the cable in there before mounting the Distribution assembly in the game.

INSTALL THE DISTRIBUTION PCB (Cont.)

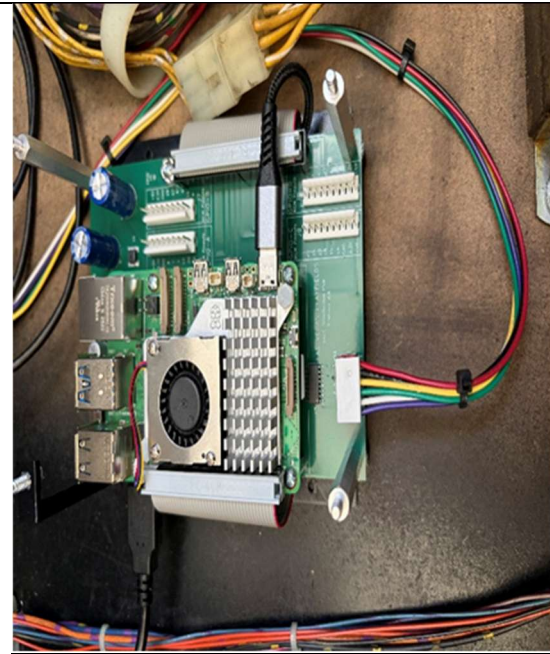


The Distribution assembly can be mounted with double stick tape that is already applied to the bottom or with 4 small screws. If you use the tape, be sure to clean the dust off the bottom of the cabinet or it won't stick. You can mount it in any direction, but it fits best and you can reach the RPi power switch easiest if you mount it as shown.

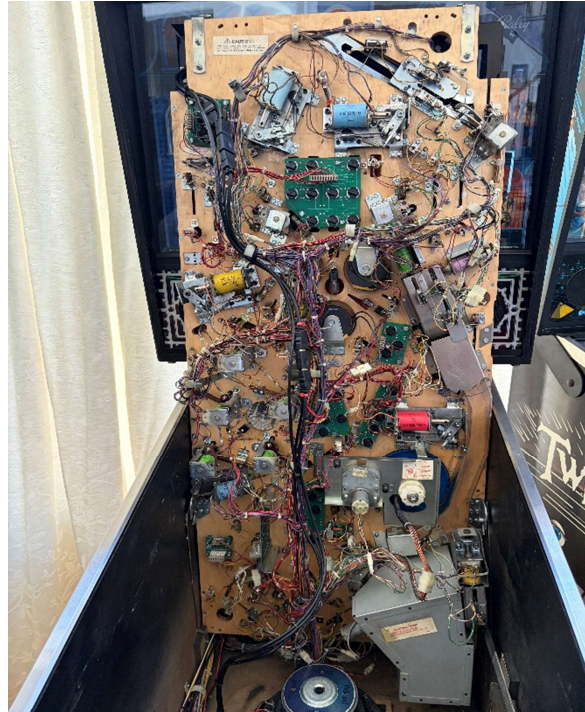
Information

The four 9 pin connectors are there to provide access to the RPi GPIO pins and system power for a few LEDs or whatever. You will find more information on our website.

CONNECT EVERYTHING

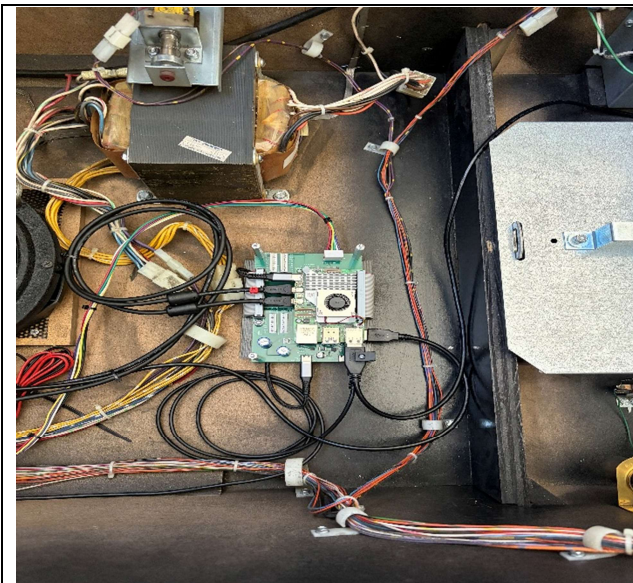


Find the Game interface cable you ran down from the backbox to the white 6-pin connector at the lonely end of the Distribution PCB. Plug the Vector to RPi Interface cable into any of the 4 USB-A inputs on the RPi.

CONNECT EVERYTHING (Cont.)

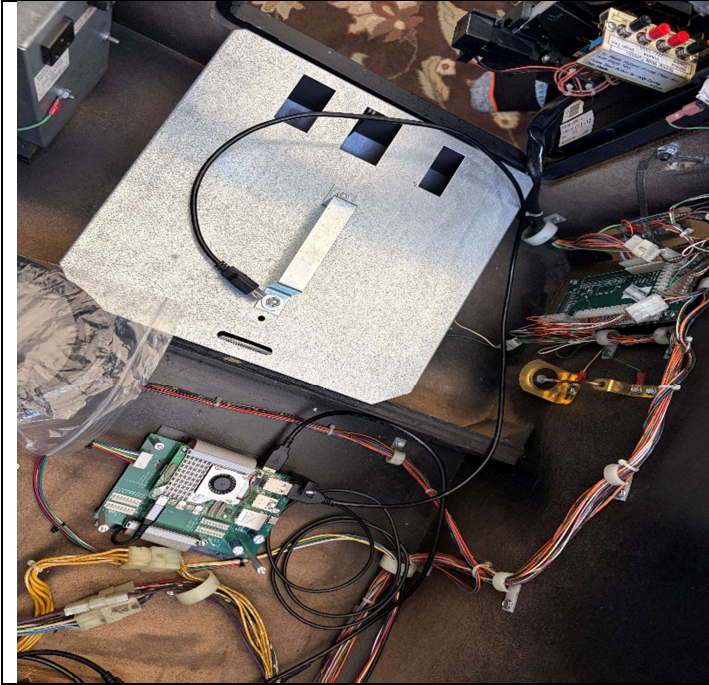
Find the Left Screen to RPi cable (red wire ties), the Right screen to RPi cable and the HDMI splice connectors. Attach them and the other end of the USB-A screen power cable to the three leads coming out of the Apron. Use a large wire tie to secure the wiring towards the front of the playfield notch, otherwise it can interfere with the flipper button switch.

I like to attach the cables to the playfield wiring harness near the metal standoffs, until about halfway down. Leaving them loose gives plenty of cable to allow the playfield to move freely up and down.

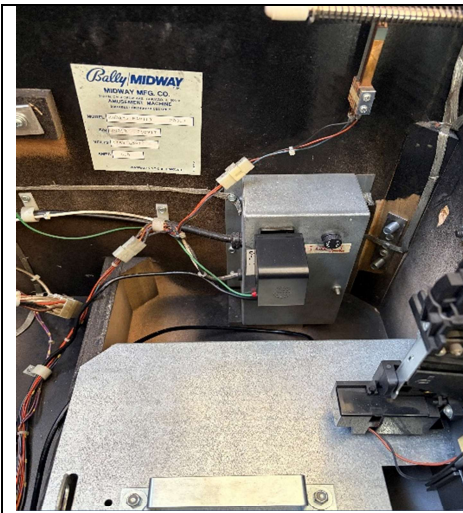


Attach the other ends of the HDMI cables to the RPi. The red wire ties indicate the left screen. The left RPi connector has a painted dot (but not in this picture).

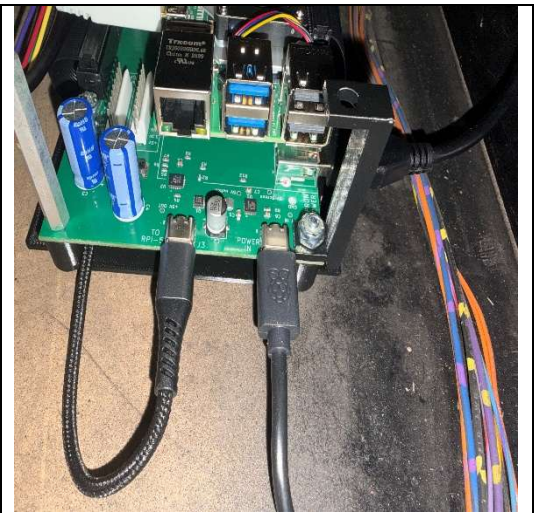
CONNECT EVERYTHING (Cont.)



Find the RPi to Coin Door area USB Extension Cable and plug it into any of the remaining RPi USB-A slots. Leave the other end up near the coin door so you can reach it with the playfield down.



Plug the Raspberry Pi power brick into the service outlet of your game. Plug the other end, **with the logo facing up,** into the remaining USB-C connector marked POWER IN on the Distribution PCB.



That's it. You should be out of cables now and all the ends should have homes, save the coin door one.

POWER UP

The VACS system should power up when you turn the game on and shut off when the game is turned off.

A note about Powering a Raspberry Pi with USB-C in a pinball machine.

As it turns out, USB-C is not really designed for extension cables but the power on/off functions in a 30-year-old pinball machine don't really care. To get this to power on and off with the game, we had to resort to some extreme measures.

Do not switch or flip any of the USB-C connectors in this system. If you do, power will not reach the RPi properly and it probably won't run. They are marked with dots so you can get them back in the proper orientation, if one becomes disconnected.

Power goes into the Distribution PCB, which reads the game activity by monitoring the game 5-volt supply. If the game is on, the brick power is allowed to flow off the Distribution PCB and into the RPi. When the game is turned off, by the game switch or the wall outlet, brick power is disconnected and the RPi will shut down automatically. The shutdown power is supplied by a supercapacitor backup circuit.

One anomaly, which we are still trying to fix, is that an RPi will not automatically power up with input power unless the input voltage drops below 1 volt. The supercapacitors that provide shutdown power will not fall off, with the RPi shut off, for about 15-20 minutes.

This means that if you power down your game and turn it back on within 20 minutes, the VACS system won't restart.

You can manually restart it by pressing the power button on the RPi.

ADDING ATTRACT IMAGES and SYSTEM UPDATES

You can install new images by loading them onto a USB-A drive, top level, not in a folder, and plugging it into the coin door cable.

The system will recognize it and take you to a series of load screens that allow you to get the image(s) into the system.

If you want to change the order, delete images, store them or set up wide (dual screen) images, you'll need to plug in a keyboard and access the SETUP function. I like to use a wireless keyboard and plug the dongle directly into one of the RPi USB-A ports, but you can use the coin door cable as well.

To access SETUP, have the system running and press F5. That will take you to a series of screens that allow you to manipulate all the images in the system. It will display .jpg, .jpeg, .png and .mp4 video. You'll need to play around with it to fully understand its capabilities.

A note about WIDE videos

They are set up to run as a single file adjusted to a screen resolution of 1600x480. You can easily turn them on and off, change the order or adjust the timing for playback, but they are a little different and typical MP4 files won't play as wide files.

System Updates

When we have an update, you will need to download the file(s) from our website onto the top level of a USB drive, just like images. When you plug the drive into the system, it will automatically go to a series of screens to facilitate the changes.

We are working on a wireless image and update system and hope to have it set up soon.

POTENTIAL ISSUES

The Raspberry Pi-5 computer was not designed with this type of use in mind. Other than the power on/off issues, which we are working to further refine, there are a few warnings to be made aware of.

“This power supply is not capable of supplying 5A. Power to peripherals will be restricted.” You will possibly see this message on power up - This is not completely true and relates to the USB-C extension cable issue and filling supercapacitors with power. It will time out.

“Updates are available”

Like all other computers, Raspberry Pi thinks they need to update this thing about every other day.

If you see this message and want to plug in a keyboard to do it, just press ESC and VACS will shut down and take you to the Linux desktop. You can cause all sorts of trouble there, if you're so inclined.

You won't see this message until you connect the RPi to internet, but we are headed there with wireless updates. Either way, this message times out after power up and you don't ever need to install these updates if you don't want to.

“Low voltage warning. Please check your power supply”

I really don't like this one. The RPi-5 is very finicky about power. If the line voltage drops below 4.7 volts for even one clock cycle, it throws this warning and it will not go away until the system is powered down. We are trying to find a reliable solution. In the interim, this warning should not appear often.

Using VACS with an incorrect Vector ROM loaded

We are just starting to see this, but it appears if you have a Vector with a ROM loaded that does not match your game ROM, it could affect the VACS boot up.

Warped does not recommend using an incorrect ROM with Vector anyway, so if your ROM version is not listed, contact them and they will make it available.

CONTACT US

This is a new product, for both you and us.

We want your feedback and will do everything we can to answer your questions and concerns.

Using our website forum will be the best way to find information, or you can email us.

info @videoaprons.com