Add a 7-inch touchscreen to your Raspberry Pi

By Greg Swain

If you want to turn your Raspberry Pi (RPi) into a completely self-contained unit, then this 7-inch (18cm) Touchscreen Display is the answer. It's a cinch to hook-up and get going, has a bright 800 x 480 pixel display and includes a mounting kit so that you can attach the RPi module to the display's metal back-plate.

YOU MIGHT think that adding a touchscreen display to your Raspberry Pi (RPi) would be complicated but it's not. Basically, it's just a matter of plugging two captive flat-ribbon cables from the display into the supplied adaptor board, connecting a separate flat ribbon cable between the adaptor board and the RPi's DSI (digital serial interface) socket, adding a couple of power supply leads and that's it.

There's no software (apart from operating system updates) to add and it

should all start working the moment you apply power to boot the RPi. You can add a virtual keyboard if you wish but more on that later.

What's in the kit

As well as the 7-inch Touchscreen Display and the aforementioned adaptor (or driver) board, the kit includes the DSI ribbon cable, four M2 x 12mm spacers, four M2 screws and four jumper wires. Only two jumper wires (for the power supply) are required

for later RPi models (Model A+, B+, RPi2 & RP3) but the early Model A and Model B boards require the remaining two jumpers to be added (see below).

No instructions are supplied with the kit but there's lots of assembly information online, including on the element14 website – see www.element14.com/community/docs/DOC-78156/l/raspberry-pi-7-touchscreen-display

There's also an excellent video of the assembly process here: https://www.

The first step in the assembly is to lay the adaptor PCB and the display panel upside down and connect the wide ribbon cable from the panel to the Panel 2 socket. The narrow ribbon cable is then connected to the Panel 1 socket on the other side and the adaptor PCB attached to the back of the display.

raspberrypi.org/blog/the-eagerly-awaited-raspberry-pi-display/

Update the software

The latest versions of Raspbian include all the software and drivers necessary to operate the Touchscreen Display. For this reason, it's a good idea to update your RPi's operating system before attaching the unit.

To do this, make sure your RPi is connected to the internet, then SSH or VNC into your RPi (or connect it to a keyboard, mouse and monitor), open a command window and type:

sudo apt-get update

Once the updates have downloaded, do the following:

sudo apt-get upgrade
sudo reboot

This will install all the latest drivers and software necessary to support the 7-Inch Touchscreen Display.

While you are at it, you may as well install the virtual keyboard, as follows:

sudo apt-get install matchbox-keyboard
sudo reboot

Hardware assembly

The first step in the assembly is to lay both the adaptor board and the display upside down and plug the wide ribbon cable from the display into the Panel 2 socket. For the uninitiated, it's not just a matter of pushing the cable into the socket though. Instead, you first have to release the little plastic locking bar

and that's done by gently pulling on it to slide it out. The cable is then pushed into the socket and secured by sliding the locking bar back in.

Once that's done, the adaptor board is flipped over, laid on the back of the display and the narrow ribbon cable plugged into the Panel 1 socket. As before, it's secured using a locking bar after making sure that the cable has been pushed all the way into the socket.

By the way, the touchscreen LCD is supplied with a protective plastic film. This should be left in place during the assembly to prevent scratches.

The next step is to attach the adaptor board to the back of the display using the four M2 x 12mm spacers. The DSI cable is then plugged into its socket (silver contacts facing up) and the red and black jumper cables plugged into the +5V and GND pins on the adjacent connector (see photo).

After that, it's just a matter of securing the RPi module to the spacers using the four M2 screws, connecting the DSI cable (silver contacts facing inwards) to its DSI socket and plugging in the red & black supply cables into pin 2 (+5V) and pin 6 (GND) on the RPi's GPIO port.

RPi Models A & B

RPi Model A/B modules don't have the required I²C outputs on the DSI bus to communicate with the driver board. The way around this is to use the two extra jumper wires provided to connect the SDA and SCL pins on the adaptor board's GPIO header to SDA (pin 3) and SCL (pin 5) respectively on the RPi's GPIO header.

Use the green wire to connect from
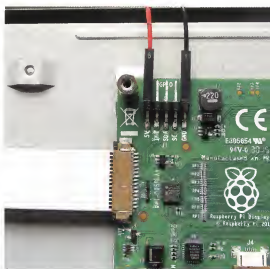
The 15-way DSI cable is plugged into its socket on the driver PCB with its contacts facing up. This close-up view also shows the 5V supply output leads which run to pins 2 & 6 on the RPi's GPIO header.

SDA on the adaptor board to pin 3 on the RPi's GPIO header. The yellow wire is then connected from SCL on the adaptor board to pin 5 on the RPi's GPIO header. Note that these connections are NOT required on later model RPi modules (A+, B+ Pi2 or Pi3).

There's one more step here: by default, DSI display detection is disabled on early A/B RPi boards, so it has to be enabled at boot time. To do this, SSH or VNC into your RPi and add the following line to /boot/config.txt:

ignore_lcd=0

Power supply

You need to use a 5V DC plugpack rated at 2A to power both the display
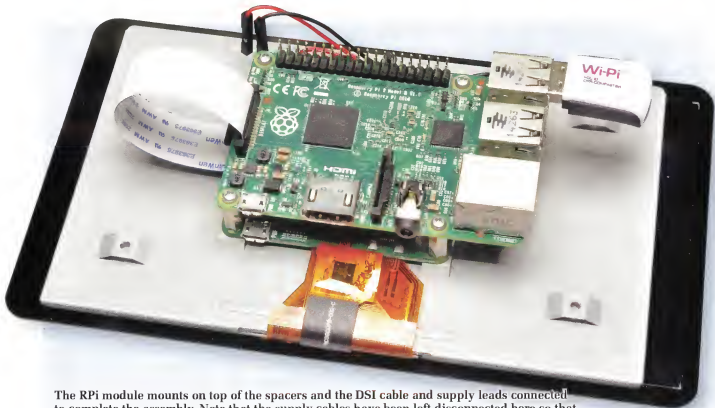
The RPi module mounts on top of the spacers and the DSI cable and supply leads connected to complete the assembly. Note that the supply cables have been left disconnected here so that the adaptor board and the RPi module could be powered from separate plugpacks – see text.

and the RPi. This should be plugged into the PWR IN micro-USB socket on the adaptor board. **DO NOT use the RPi's micro-USB port; the display consumes around 400mA and you could exceed the maximum current rating of the RPi's polyfuse if you do.**

The adaptor board supplies 5V power to the RPi via the jumper cables plugged into the latter's GPIO port (pins 2 & 6). Alternatively, you can de-lete these jumper wires and connect a USB-to-micro-USB cable between the adaptor board's PWR OUT socket and the RPi's PWR IN socket.

Yet another possibility is to power the display and the RPi from two separate plugpacks (ie, delete the jumper wires or USB cable).

Booting up

When you boot the RPi, it will au-tomatically detect the Touchscreen Display and use that as the default. The display should begin working as soon as power is applied and once the RPi has booted, you should have full touchscreen operation.

If it doesn't work, check that all the cables have been properly seated in their sockets. Check also that the power supply is rated at 2A if using it to power both the display and the RPi.

Default monitor

Because the Touchscreen Display is now the default, this his means that if a monitor is also plugged into the RPi's HDMI port, it will be ignored. If you want to keep an HDMI monitor as the default, just add

display_default_lcd=0

to the */boot/config.txt* file. It's also possible to use both display outputs at the same time – see https://www.raspberrypi.org/blog/the-eagerly-awaited-raspberry-pi-display/

Using the virtual keyboard

Touching **Menu –> Accessories –> Keyboard** brings up the virtual key-board as shown in the screen grab at left. You can elect to always have this keyboard above other open windows by clicking on the keyboard symbol at
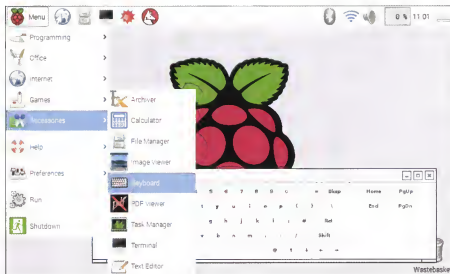
The virtual keyboard is easy to install (see text) and is accessed by tapping Menu –> Accessories –> Keyboard. It makes it easy to enter web addresses and to edit files, etc without having to connect an external keyboard or to access the RPi via VNC from another computer.

Compatibility Issues Between Raspberry Pi Touchscreen & GPIO port

When testing this screen, we discovered that the Raspberry Pi has some problems accessing the GPIO pins while the touchscreen is plugged in. Pins 3 & 5 on the GPIO port are shared with pins 13 & 14 on the display connector. These pins form an I²C serial bus and are labelled SDA0 and SCL0.

Basically, this means that if you try to use pins 3 & 5 on the GPIO connector for any other purpose, the touchscreen will go blank and refuse to work. Unfortunately, the software that we used to set up outputs #1 and #2 for the "4-Input Temperature Sensor PCB For The Raspberry Pi" (May 2016) did just that.

In order to get the screen to work, we had to delete (or rename) the **dt-blob.bin** file that's installed in the RPi's **/boot** folder, as described in May 2016. In addition, we had to comment out the line that we had added to **/etc/rc.local** (ie, the line beginning with "python").

As a result, you will no longer be able to set outputs #1 and #2 at boot, although outputs #3 and #4 can still be used, as described in the May 2016 issue. The DS18B20 temperature sensors can also still be used as normal with the touchscreen connected, as described in Silicon Chip for March & May 2016.
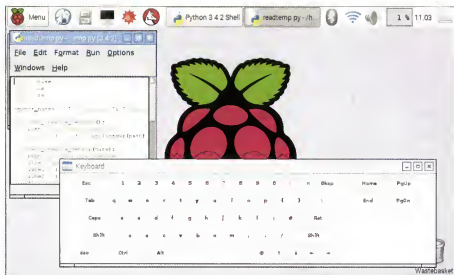
Updated software scripts archived in **RPiTempMonV2.zip** are available on the Silicon Chip website. Do not install **dt-blob.bin** but edit **/etc/rc.local** as before.

The virtual keyboard can be resized and can also be configured so that it always sits on top of other open windows (just click the keyboard symbol at top left of its window and select Layer –> Always On Top).

A variety of stands for the completed assembly are available from various sources on the internet.

top, left of the keyboard window, then selecting Layer –> Always On Top.
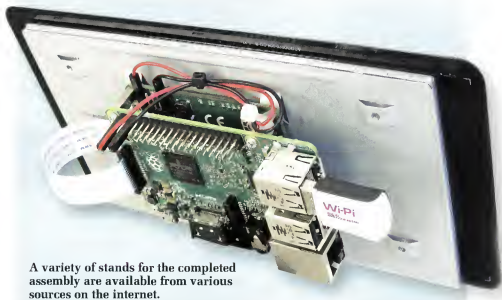
Display stand

To be of real use, the assembly needs some kind of case or stand and there are several that can be purchased online. For example, element14 have a full solution at http://au.element14.com/multicomp/cbrpp-ts-blk-wht/raspberry-pi-touchscreen-enclosure/dp/2494691 Another case and stand is at www.modmypi.com/raspberry-pi/cases/7-touchscreen-cases/raspberry-pi-7-touchscreen-case-plus-stand

Alternatively, take a look at the Pimoroni website at https://shop.pimoroni.com/products/raspberry-pi-7-touchscreen-display-with-frame They have a very attractive transparent acrylic stand which is available in six different shades: orange, red, green, blue, purple and black. A Pimoroni case is also available from Core Electronics – see http://core-electronics.com.au/pimoroni-raspberry-pi-7-touchscreen-display-case-noir.html

Yet another very attractive stand is at https://www.adafruit.com/product/2033 It's just $US14.95 (plus shipping).

Rotating the display

Depending on the stand or enclosure that's chosen, you might find that the display is upside-down when the panel is in position. If so, simply add

```
lcd_rotate=2
```

to **/boot/config.txt** then reboot the RPi and you won't have to stand on your head any longer.   **SC**