Thanks for buying one of the first VirtualBoy TV-out kits ! I called it Virtualtap but you can call it whatever you want, I'm not the kind to make trademarks out of everything.

Please read all of this before doing anything !
Not reading instructions and messing stuff up will make you sad (and me too) :(

If the board or the ribbon cable shows signs of damage caused by transport, please tell me as soon as possible at furrtek@gmail.com ! You can also use that address for assistance if I don't reply on Twitter (@furrtek).

What's needed

- A 4.5mm game bit screwdriver, or a filed flathead screwdriver.
- Insulated, flexible wire. Mutli-core preferred.
- A socket to plug in the cable you want :
  - VGA is female DE-15 with straight pins. Don't forget the screws.
  - RGB NTSC can be anything you want, DIN, Nintendo AV, Coax...
  - You can also hardwire a cable to the VirtualBoy if you find that more practical.
- A push button or momentary SPST switch for palette selection.
- A reasonable quality soldering iron. A simple 30~40W one with a 1mm tip is enough.
- A tool able to make holes in plastic. Drill, Dremel...
- Solder (leaded if still available in your country).
- Liquid or gel flux (optional) and IPA (for cleaning, optional).
- A bit of patience and a steady hand.

Caution : The board may whistand a few static electricity zaps but please avoid manipulating it while wearing static-accumulating clothes (wool, Nylon, fur...) and shoes with thick soles. Best practice is to use a grounding wrist strap but it isn't an absolute necessity.

Solder pads reference

- S: Composite sync (only for RGB NTSC)
- R, G, B: Color components
- V: V-Sync (only for VGA)
- H: H-Sync (only for VGA)
- GN: Ground
- M: Buffering mode jumper
- P: Palette switch

Selecting the desired buffer mode
Since the VirtualBoy outputs video at 50fps, you can chose between having tearing but low lag, or having a clean picture with higher lag.

	Fast buffer mode	Quad buffer mode
Tearing	Yes	No
Introduced lag	Max. 20ms	Between 20 and 36.6ms
Solder jumper	Set	Not set

To set the jumper, just add some solder over it to join the two pads. By default, they aren't connected (quad buffer mode).

The mode is read continuously, so you may solder or desolder the jumper as you wish. You can also wire a switch to it but be aware that the pads are quite small and fragile.

Wiring the board

If you have a board programmed for VGA:
You need 6 wires connected to : Red (R), Green (G), Blue (B), H-Sync (H), V-Sync (V), Ground (GN). Make sure you don't mix up H-Sync and V-Sync.
Pinout: http://pinouts.ru/Video/Vga15_pinout.shtml

If you have a board programmed for RGB NTSC:
You need 5 wires connected to : Red (R), Green (G), Blue (B), C-Sync (C), Ground (GN).
Pinout : http://pinouts.ru/Home/Scart_pinout.shtml
Most Tvs require a voltage over 1V on SCART pin 16 to switch to RGB mode. Wire the 100ohm resistor in series from the VirtualBoy's 5V supply to this pin.

Palette switch: Wire it between Palette (P) and Ground (GN). You can omit the palette switch if you only want the default red palette.

The ribbon cable should already be correctly fitted but if you find the blue tab to be crooked, you might want to lift the connector flap, adjust it so that the blue tab becomes aligned, and close back the flap.

Open up your VirtualBoy and disconnect one of the displays from the main board by gently pulling on the ribbon cable. Insert the board's ribbon cable instead, metal contacts facing down (blue tab visible). If you want to keep the disconnected display working, you can put its own ribbon cable in the board's second connector.

Make sure the board isn't touching any metal part or circuit board in the VirtualBoy. Once the wiring is done and checked, you can power up your VirtualBoy. The video output should start working after a few seconds. If everything works correctly, cover the exposed side of the board with thick tape to avoid any shorts and find a place in the VirtualBoy's shell to tuck the board in. Be careful not to fold the ribbon cables too much.

Output type

VGA boards can't be made into NTSC ones, and NTSC boards can't be made into VGA ones. They need to be reprogrammed. You can send me back your board for free reprogramming if you wish to change the output type, as long as you pay for back-and-forth shipping.

Outputs specs

VGA: 800*600 pixels 60fps, 2x nearest neighbor upscale. Color outputs are 75 ohms. Sync outputs are 3.3V.
NTSC : 262 lines progressive 30fps. Color outputs are 75 ohms.
Palettes : Cycle between Red, Yellow, Green, Cyan, Blue, Magenta, White, White inverted.

Guarantee

Your board was fully tested with a real VirtualBoy playing Teleroboxer on a cheap LCD TV and a consumer grade CRT TV. It is guaranteed working before shipping.

I can't be held responsible if you damage the board yourself. Damage may not be visible, shorts or miswiring in general won't necessary produce smoke or flames.
If you believe that your board was dead on arrival, you'll have to send it back to me so I can check for defects. If there's indeed a manufacturing problem, I'll replace it free of charge. If there are electrically or visibly damaged components, you'll have to buy a new board.