RK05 Emulator/Tester & Accessories

The RK05 Emulator/Tester system consists of a main unit, various cables, a terminator, and a power supply. These sub-components are available in kit form or parts can be purchased directly from the sources in the bill of materials.

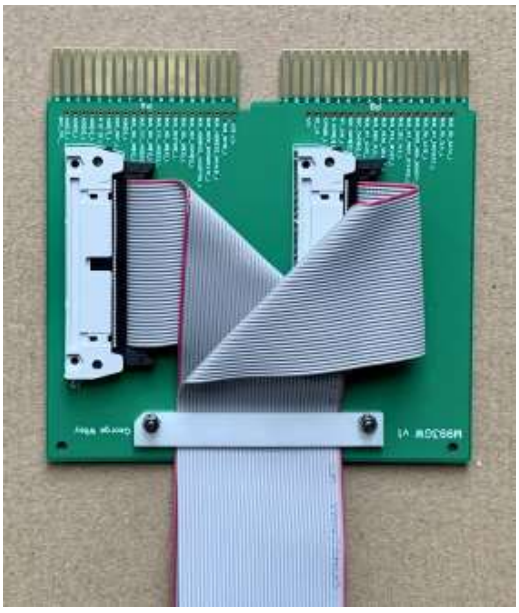
The RK05 Emulator/Tester main unit can be configured to function either as an RK05 disk drive emulator or as an RK05 disk drive tester. The specific function is determined by the software in the Raspberry Pi Pico and the FPGA firmware. Currently, the RK05 disk emulator functions have been rigorously tested. The RK05 disk drive tester functions have been used to test the emulator but full tester functionality is not yet complete.

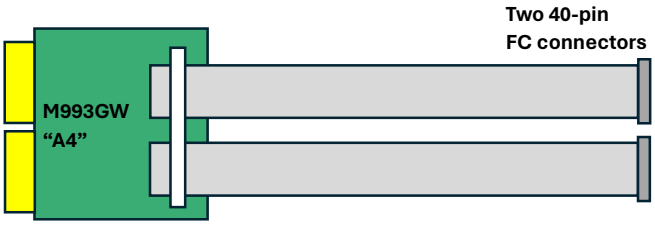
The emulator/tester and accessory kits have been designed to use commonly available tools for the assembly process, such as: soldering components to circuit boards and the use of fasteners to hold parts together.

Assembled versions of the RK05 Emulator/Tester & Accessories sub-components are shown below:

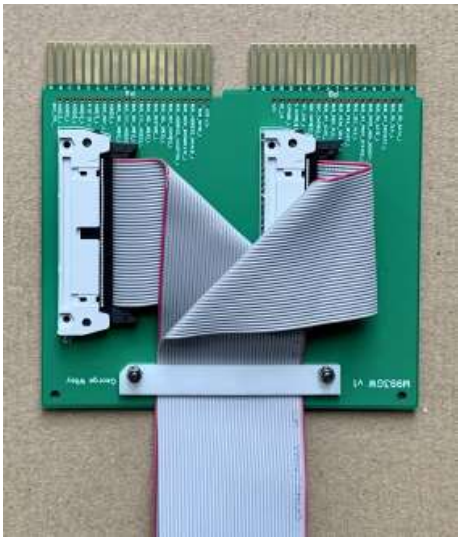
- **E1, RK05 Emulator/Tester main unit** – This main unit emulates an RK05 drive. It can also be configured as an RK05 tester by loading different software and FPGA code. The emulator is powered from a +5V DC source. A power cable is included in the kit but a power supply is not. The power cable connects the emulator to the RK05 Emulator Power Supply, accessories A7 or A8.

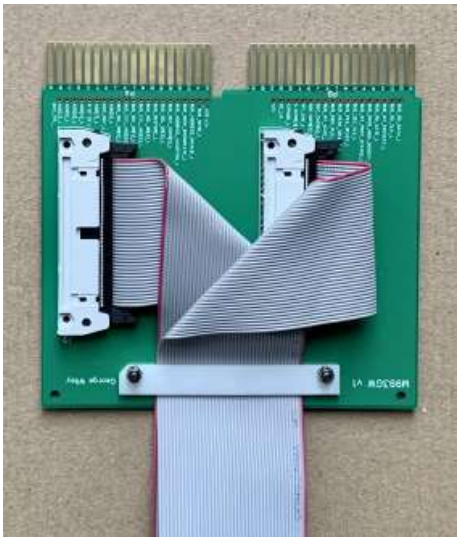
- **A1, RK05-to-RK8-E Cable, 1 meter length** – Cable to connect an RK05 Emulator/Tester main unit to a DEC RK8-E or Plessey PM-DC/8 disk controller for a PDP-8 Omnibus system. The A1 kit consists of an A4 "paddle board" plus two 1 meter 40-pin flat cables.

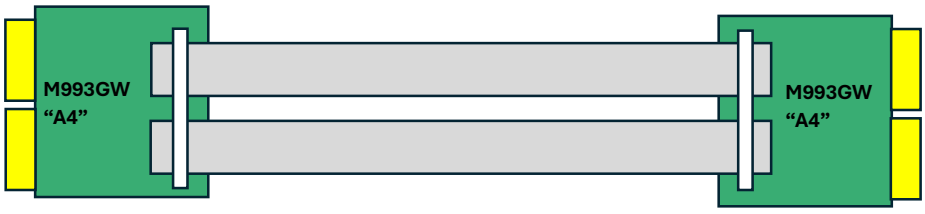




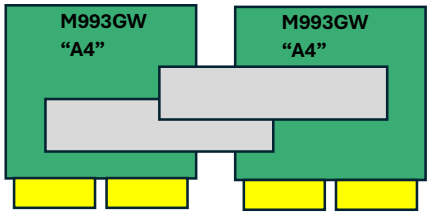
- **A2, RK05-to-RK05 Cable, 1 meter length** – Cable to connect two RK05 Emulators or two RK05 drives or RK05 Emulator to RK05 drive on an RK05 bus. The A2 kit consists of two A4 "paddle boards" plus two 1 meter 40-pin flat cables. This cable is intended to work with a DEC RK-11D/E but has not yet been tested with the RK-11D/E. The function of this cable is similar to a DEC BC-11 cable but it connects only the RK05 disk interface signals, not the full Unibus signal set.





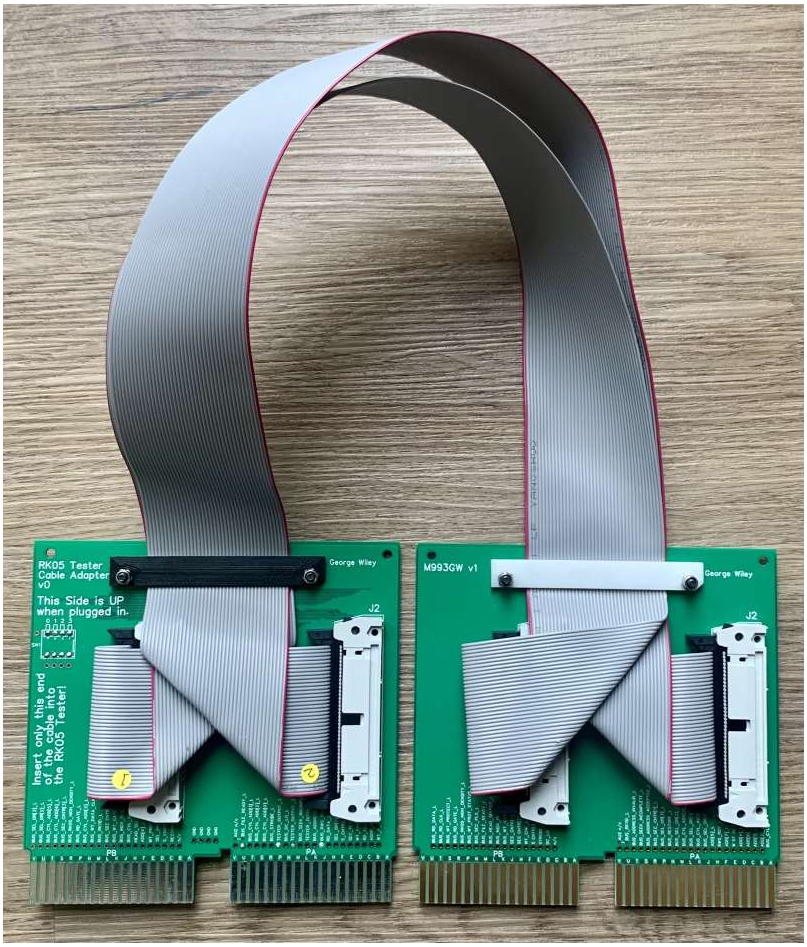


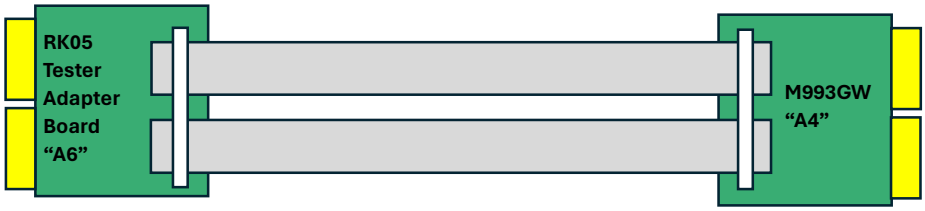
- **A3, RK05-to-RK05 Cable, Side-to-Side 30 cm length** – Similar to A2 but without cable clamps on the adapter board and short cables that route to the side. This cable is useful to connect two RK05 emulators that are mounted beside each other. The A3 kit consists of two A4 "paddle boards" plus one 30 cm 40-pin flat cable and one 20 cm 40-pin flat cable. One cable is 30 cm and the other is 20 cm so two boards can exist side-to-side without the clutter of excess cables. The method to fold the two cables of different lengths to have them be dressed nicely between the two boards is described in the assembly instructions.



- **A4, RK05 Adapter Board without Flat Cables** – An adapter board that plugs into the RK05 bus with two 40-pin flat cable connectors and a cable clamp with mounting hardware. The flat cable pinout is compatible with the DEC RK8-E and Plessey PM-DC/8. This adapter board is useful for users who already have their own flat cables or would like to make an RK8E cable or RK05-to-RK05 cable having a custom length. This board is the basic building block of other accessories:
  A1 = (1 × **A4**) + (2 × 1meter_flat_cable)
  A2 = (2 × **A4**) + (2 × 1meter_flat_cable)
  A3 = (2 × **A4**) + (1 × 30cm_flat_cable) + (1 × 20cm_flat_cable) – cable_clamps
  A5 = (1 × **A4**) + (1 × A6) + (2 × 1meter_flat_cable)

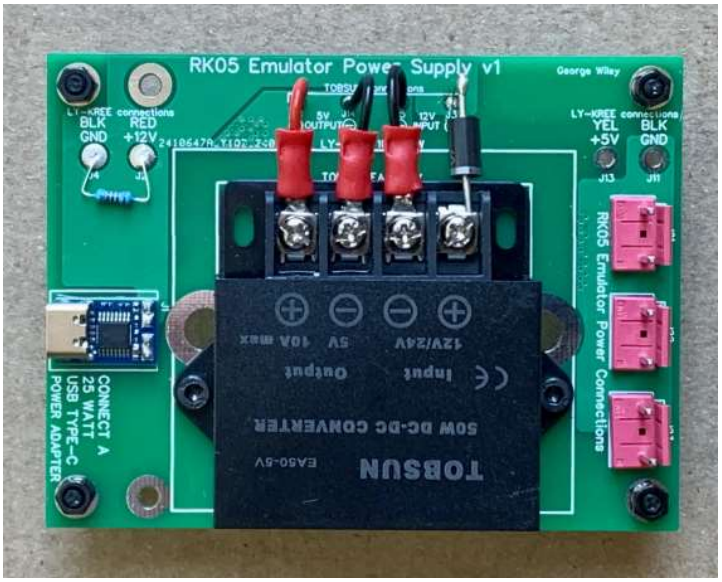
- **A5, RK05-to-Tester Cable, 1 meter length** – Cable to connect an RK05 Tester to an RK05 disk drive or to an RK05 Emulator. If the emulator/tester is configured as a tester then it is necessary to use either A5 or A6 to adapt the edge connector signals in the tester to the proper standard RK05 flat cable signal set. The "A5" cable consists of one A6, one A4, and two 1 meter 40-pin flat cables. This cable is directional, meaning that the end of the cable with the A6 adapter card must be plugged into the emulator/tester main unit that is operating as the tester. The A6 looks quite similar to the A4 but the connections on the PCB are completely different. The A6 board in the photo is a prototype version and the cables in the photo are shorter than 1 meter.



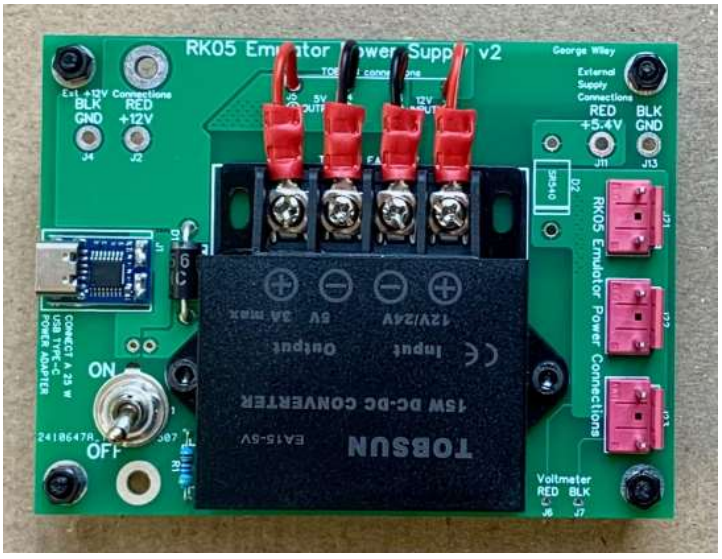


- **A6, RK05 Tester Adapter Board without flat cables** – When the main unit is configured as a Tester then the RK05 bus edge connector signals are not compatible with the RK05 bus. This is because the inputs and outputs of the main unit are now reversed. The Tester Adapter Board converts the flipped input-output signals to standard RK05 flat cable signal pinout. This board is the basic building block of the "A5" accessory:
  A5 = (1 × A4) + (1 × **A6**) + (2 × 1meter_flat_cable)

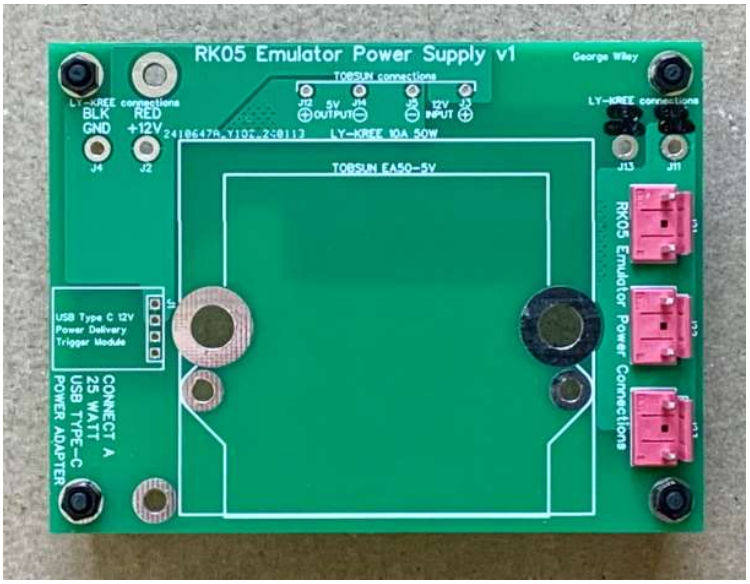
- **A7, RK05 Emulator Power Supply (version v1)** – A Power Supply that can provide power to three RK05 Emulators from a 25-watt USB Type C input. A 25-watt USB Type C power adapter and Type C cable is included in the A7 kit. The power cable that is built in the E1 main unit kit plugs directly into this board. Version v1 is no longer available. It is functionally the same as v2 except that it does not have a power switch.



- **A7, RK05 Emulator Power Supply (version v2)** – A Power Supply that can provide power to three RK05 Emulators from a 25-watt USB Type C input. A 25-watt USB Type C power adapter and Type C cable is included in the A7 kit. The power cable that is built in the E1 main unit kit plugs directly into this board. For users who do not need a power switch, the board can be built without the switch and have the power switch PCB pads shorted. The switch can either be a helpful function or it can be a liability because it is a control that can be unintentionally set in the wrong position. Some users may prefer to not have a switch and to plug the USB Type C power adapter into one of the switched outlets on the back of their PDP-8/e.

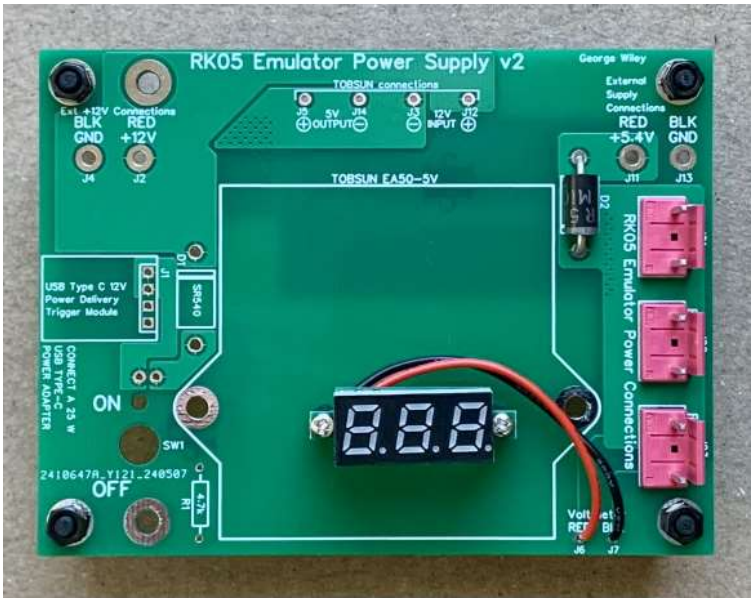


- **A8, RK05 Emulator Power Supply, without the DC-to-DC Converter (version v1)** – A bare-bones power distribution board that allows for the use of a user-provided 5 volt power supply. Note that use of A7 is recommended. “A8” version v1 is only a power supply PCB, three power headers and standoffs to support the board. The power cable built in the E1 RK05 Emulator/Tester main unit kit plugs directly into this board.



- **A8, RK05 Emulator Power Supply, without the DC-to-DC Converter (version v2)** – A bare-bones power distribution board that allows for the use of a user-provided 5.4 volt power supply. Note that use of A7 is recommended. “A8” version v2 is only a power supply PCB, three power headers and standoffs to support the board. It also features reverse voltage protection and a small voltmeter. The power cable built in the E1 RK05 Emulator/Tester main unit kit plugs directly into this board.

  The input voltage is +5.4 volts DC. For those who prefer to use a +5 volt supply instead, it is possible to build the board without the series reverse protection diode.



- **A9, RK05 Emulator Rack Mount Tray for 3 Emulators** – A rack mount tray that holds three E1 RK05 Emulators and an A7 or A8 power supply. Hardware to mount the E1 and A7 to the tray are included with those kits. The Rack Mount Tray can be purchased directly from amazon.com, https://www.amazon.com/gp/product/B01HTG4WHY. A photo of three E1 RK05 emulator main units mounted to the rack mount tray is shown in the photo.

- **T1, M930GW Terminator Board** – An RK05 bus terminator that's electrically the same as the DEC M930. The exception is the number of bypass capacitors on the +5V rail and their arrangement is different from the DEC M930 so the layout could be optimized for SMT components. The terminator board comes as an assembled unit because all SMT assembly has been performed by the manufacturer (JLCPCB). This board probably also functions as a Unibus terminator, like the DEC M930, but has not been tested that way.