Instructions for using the EPROM Programmer Universal Adapter – Updated 2/20/16

Introduction

This device allows a standard EPROM programmer to read many obsolete EPROMs, PROMs, and ROMs that it is not designed to read. If a Willem EPROM programmer is used this includes the 6540 type ROMs used in the Commodore PET 2001. Rev. 2 was the first version released. Rev. 3 introduces two auxiliary connectors for easier use of external power supplies.

Background

Most all early ROM chips, be they ROMs, PROMs, EPROMs, and (some) EEPROMs work on the same principle. To read a byte of data at a given address the address lines of the ROM chip set to that address and then, after some delay (or sometimes a clock edge) the data at the specified appears on the data lines. Thus, if we want to read a 2 Kb ROM of some odd type we can do so on an EPROM programmer that is setup to read a standard 2Kb chip. All we have to do is connect the data lines, address lines, power, and chip select lines to make the odd ROM look like a standard chip to the programmer. There are always exceptions of course, such as the MPS6540 chip used in the Commodore PET 2001 series computers which requires a clock edge between when the address lines are set and the data can be read. This is a problem because most EPROM programmers don't have an easily available clock line. However, the commonly available and inexpensive Willem programmers do! Thus, if you plan to read a lot of old ROMs using this product I strongly recommend that you buy an inexpensive Willem programmer. I have only tested it with a PCB3 type programmer but it should work with any of the bare-PCB type Willem programmer so long as you are willing to do some poking and find which pin has the clock on it. For some ROMS it will also be necessary to obtain a power supply capable of supplying -5V and +/-12V. An old ATX power supply works nicely for this purpose.

Instructions for use

Using the universal adapter is easy. If your ROM is listed on the following pages simply connect the programmer pins (marked P1 to P32) to the socket pins (marked S1 to S32) as described in the table. If your ROM is not listed, you will need to get a pinout for it, either from a datasheet, the service manual for the device it is used in, or by reverse engineering. Then, choose a standard 27-series EPROM which is at least as large as the ROM you want to read (see the table below) and connect the data lines, address lines, power lines, and chip select lines to make your ROM 'look like' the standard ROM. If your ROM is smaller then any of the standard ones, read it as a 2716 and then throw away the extra data. When you get it working, please send me your configuration so I can add it to this table.

Operation Notes

If you need to connect multiple lines to +Vcc or Gnd, or if you need to use the built-in inverter chip, connect Vcc and Gnd for the device and programmer to the pins on the adapter labeled as such. If your ROM needs a clock signal and you have a Willem programmer connect the clock line to pin1 of J4 on the Willem board (this may be different on newer Willem programmers). If you have trouble with a chip that requires a clock, try inverting the clock with one of the supplied inverters. Finally, use with modern high-speed 'universal' programmers such as the Xeltek SuperPro series is not recommended because, due to their high speed operation, these programmers may not read all older ROMs correctly.

Standard EPROM Type	Size (Kilo-Bytes)	Size (Kilo-Bits)
2716 or 27C16	2	16
2732 or 27C32	4	32
2764 or 27C64	8	64
27128 or 27C128	16	128
27256 or 27C256	32	512
27512 or 27C512	64	1024
27C010	128	2048

Rom Type: 6540	**Rom Type:** 2513	**Rom Type:** 1601, 1602, 1702, 1702A	**Rom Type:** 2704, 2708
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2716 or 27C16
S3 <-> Gnd S4 <-> Gnd S5 <-> P24 S6 <-> P22 S7 <-> P12 S8 <-> P11 S9 <-> P10 S10 <-> P9 S11 <-> P8 S12 <-> P7 S13 <-> P26 S14 <-> Vcc S15 <-> P27 S16 <-> P5 S17 <-> P6 S18 <-> Inverter Output 1 S19 <-> Vcc S20 <-> P23 S21 <-> P21 S22 <-> P20 S23 <-> P19 S24 <-> P18 S25 <-> P17 S26 <-> P15 S27 <-> P14 S28 <-> P13 S29 <-> Vcc Gnd <-> P16 Vcc <-> P28 Willem J4 Pin 1 <-> Inverter Input 1	S5 <-> Aux 1 S6 <-> N.C. S7 <-> N.C. S8 <-> P13 S9 <-> P14 S10 <-> P15 S11 <-> P17 S12 <-> P18 S13 <-> N.C S14 <-> N.C S15 <-> Gnd S16 <-> Aux 2 S17 <-> N.C. S18 <-> P12 S19 <-> P11 S20 <-> P10 S21 <-> P9 S22 <-> P8 S23 <-> P7 S24 <-> P6 S25 <-> P5 S26 <-> P27 S27 <-> N.C. S28 <-> Vcc Vcc <-> P28 Gnd <-> P16 P20 <-> Gnd P21 <-> Gnd Aux 1 <-> External -12V Supply Aux 2 <-> External -5 Supply Gnd <-> External Supply Common	**Address Lines:** S7 <-> P12 S6 <-> P11 S5 <-> P10 S25 <-> P9 S24 <-> P8 S23 <-> P7 S22 <-> P6 S21 <-> P5 **Data Lines:** S8 <-> P13 S9 <-> P14 S10 <-> P15 S11 <-> P17 S12 <-> P18 S13 <-> P19 S14 <-> P20 S15 <-> P21 **Select:** S18 <-> P24 **Power:** S28 <-> Aux 1 (Vdd) S20 <-> Aux 1 (Vgg) P16 <-> Aux 2 (Vss) Vcc <-> Gnd Vcc <-> S16 (Vcc) Vcc <-> S17 (Prog) Gnd <-> S19 (Vbb) Gnd <-> S26 (Vcc) Gnd <-> S27 (Vcc) Vcc <-> External +5V Supply Aux 1 <-> External -9V Supply Aux 2 <-> Ext. Supplies Common	S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 **S16 <-> Gnd** S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 S22 <-> P22 **S23 <-> Aux 1** S24 <-> P24 **S25 <-> Aux 2** S26 <-> P26 S27 <-> P27 S28 <-> P28 **P16 <-> Gnd** **Aux 1 <-> External +12V Supply** **Aux 2 <-> External -5 Supply** **Gnd <-> Ext. Supply Common**
Note: 6540 ROM chips require a clock. On most Willem Programmers this is J4 Pin 1 but it may differ on your model	**Note:** Only the first five bits of each byte and only the first 512 bytes of data read should be saved.	**Note:** Only the first 256 bytes of data read should be saved. Part requires > 100 mA supply.	**Note:** Only the first 512 bytes of data read should be saved for 2704 or first 1024 bytes for 2708
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Rom Type: TMS-2716	**Rom Type:** TMS-2532	**Rom Type:** TMS-2564
Read as Type: 2716 or 27C16	**Read as Type:** 2732 or 27C32	**Read as Type:** 2764 or 27C64
S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 **S16 <-> Gnd** S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 S22 <-> P22 **S23 <-> Aux 1** **S24 <-> P23** **S25 <-> Aux 2** S26 <-> P26 S27 <-> P27 S28 <-> P28 **P16 <-> Gnd** **Aux 1 <-> External +12V Supply** **Aux 2 <-> External -5 Supply** **Gnd <-> Ext. Supply Common**	S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 S16 <-> P16 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 **S22 <-> P25** S23 <-> P23 S24 <-> P24 S26 <-> P26 S27 <-> P27 **P28 <-> Vcc** **Vcc <-> S28** **Vcc <-> S25**	S3 <-> P3 **S4 <-> P24** S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 S16 <-> P16 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 **S22 <-> P25** S23 <-> P23 **S24 <-> P29** **S25 <-> P4** S26 <-> P26 S27 <-> P27 S28 <-> P28 **S29 <-> P22** S30 <-> P30
Note: The TI brand 2716 (designated TMS-2716) is NOT compatible with standard 2716 chips.	**Note:** 2532 and 2732 EPROMs are NOT pin compatible. The adapter must be used.	**Note:** 2564 and 2764 EPROMs are NOT pin compatible. The adapter must be used.
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Rom Type: MK31000, 2316A, 8316A, MCM68316A, AM9217	**Rom Type:** MK34000, 2316, 2316B, 8316, 9316, 2616, MCM68316E, and AM9218	**Rom Type:** 2332, 8332, 9332	**Rom Type:** 2364, MK36000, MCM68766, MC68766, MC68764, MCM68764, 27HC641
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2732 or 27C32	**Read as Type:** 2764 or 27C64
S5 <-> P5 S6 <-> P27 S7 <-> P26 S8 <-> P23 S9 <-> P12 S10 <-> P11 S11 <-> P10 S12 <-> P9 S13 <-> P8 S14 <-> P7 S15 <-> P6 S16 <-> Aux1 S17 <-> Gnd (CS3) S18 <-> Gnd (CS2) S19 <-> Gnd (CS1) S20 <-> P21 S21 <-> P20 S22 <-> P19 S23 <-> P18 S24 <-> P17 S25 <-> P15 S26 <-> P14 S27 <-> P13 S28 <-> Aux2 P16 <-> Aux1 P28 <-> Aux2 Gnd <-> Aux1 Vcc <-> Aux2	S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 S16 <-> Aux1 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 S22 <-> Gnd (CS2) S23 <-> P23 S24 <-> Gnd (CS1) S25 <-> Gnd (CS3) S26 <-> P26 S27 <-> P27 S28 <-> Aux2 P16 <-> Aux1 P28 <-> Aux2 Gnd <-> Aux1 Vcc <-> Aux2	S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 S16 <-> P16 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 **S22 <-> P25** S23 <-> P23 S24 <-> P24 (CS1) **S25 <-> Vcc** (CS2) S26 <-> P26 S27 <-> P27 **S28 <-> Vcc** **P28 <-> Vcc** *Changes for alternate pinout:* *S25 <-> P25* *S22 <-> Vcc (CS2)*	S5 <-> P5 S6 <-> P6 S7 <-> P7 S8 <-> P8 S9 <-> P9 S10 <-> P10 S11 <-> P11 S12 <-> P12 S13 <-> P13 S14 <-> P14 S15 <-> P15 S16 <-> P16 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21 **S22 <-> P25** S23 <-> P23 S24 <-> P24 (CS1) **S25 <-> P4** S26 <-> P26 S27 <-> P27 **S28 <-> P30**
Note: This chip uses mask-programmable chip select lines. If the chip will not read, you may need to move one of more of the CS lines from Gnd to Vcc	**Note:** This chip uses mask-programmable chip select lines. If CS1 and CS2 are active low, but CS3 is active high, it can be read without an adapter. Else, use the settings above but move of the CS lines from Gnd to Vcc as needed.	**Note 1:** This chip uses mask-programmable chip select lines. If the chip will not read, you may need to move one of more of the CS lines to Gnd or Vcc as needed. **Note 2:** Use alternate pinout changes if last 2K reads as 0xFF.	**Note:** This chip uses mask-programmable chip select lines. If the chip will not read, you may need to move one of more of the CS lines to Gnd or Vcc as needed.
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Rom Type: 1818-2270 and similar	**Rom Type:** 1818-2269, 1818-2271, 1818-2272, 1818-2244, and 1818-2245 (data lines 0-7)	**Rom Type:** 1818-2269, 1818-2271, 1818-2272, 1818-2244, and 1818-2245 (data lines 8-15)
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2716 or 27C16
S5 <-> Aux 1 S6 <-> Vcc S7 <-> P8 S8 <-> P10 S9 <-> P12 S10 <-> P14 (D1) S11 <-> P17 (D3) S12 <-> P19 (D6) S13 <-> P21 (D7) S14 <-> Gnd S15 <-> P5 S16 <-> Inverter Output 1 S17 <-> Aux 2 S18 <-> P6 S19 <-> Gnd S20 <-> P20 S21 <-> P18 (D4) S22 <-> P15 (D2) S23 <-> P13 (D0) S24 <-> P11 S25 <-> P9 S26 <-> P7 S27 <-> External +15.0V Supply S28 <-> Aux 1 Aux 1 <-> External -2.0V Supply P27 <-> Aux2 Aux 2 <-> Inverter Input 1 P28 <-> Vcc P16 <-> Gnd	**Power Supply:** S3 <-> Aux 1 Aux1 <-> External -12V supply through 100K resistor Aux1<-> Gnd through 2.2k resistor S30 <-> Aux2 Aux2 <-> External +12V supply S4 <-> Vcc S18 <-> Gnd P28 <-> Vcc P16 <-> Gnd **Address Lines:** S7 <-> P12 S27 <-> P11 S6 <-> P10 S28 <-> P9 S5 <-> P8 S29 <-> P7 S17 <-> P6 S16 <-> P5 **Data Lines 0-7:** S26 <-> P13 S8 <-> P14 S25 <-> P15 S9 <-> P17 S24 <-> P18 S10 <-> P19 S23 <-> P20 S11 <-> P21	**Power Supply:** S3 <-> Aux 1 Aux1 <-> External -12V supply through 100K resistor Aux1<-> Gnd through 2.2k resistor S30 <-> Aux2 Aux2 <-> External +12V supply S4 <-> Vcc S18 <-> Gnd P28 <-> Vcc P16 <-> Gnd **Address Lines:** S7 <-> P12 S27 <-> P11 S6 <-> P10 S28 <-> P9 S5 <-> P8 S29 <-> P7 S17 <-> P6 S16 <-> P5 **Data Lines 8-15:** S22 <-> P13 S12 <-> P14 S21 <-> P15 S13 <-> P17 S20 <-> P18 S14 <-> P19 S19 <-> P20 S15 <-> P21
Note 1: Only the first 512 bytes of data should be saved **Note 2:** This is an HP custom part used in the 3455A multimeter and maybe others. **Note 3:** Outputs are open collector. Use pullup resistors between Vcc and D0-D7 when using programmers like the Willem.	**Note 1:** Only the first 256 bytes of data should be saved **Note 2:** These ROMs are HP custom parts used in the 8620C Sweep Oscillator, the 4261A LCR meter, the HP 436A power meter, and maybe others. **Note 3:** These ROMs have 16 data lines and thus must be read twice, once for each set.	**Note 1:** Only the first 256 bytes of data should be saved **Note 2:** These ROMs are HP custom parts used in the 8620C Sweep Oscillator, the 4261A LCR meter, the HP 436A power meter, and maybe others. **Note 3:** These ROMs have 16 data lines and thus must be read twice, once for each set.
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Rom Type: TBP24S10, TBP24SA10	**Rom Type:** TBP28L22, TBP28LA22	**Rom Type:** TBP28S42, TBP28SA42, TBP28L42, DM74S473
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2716 or 27C16
Power Supply: P28 <-> Vcc P16 <-> Gnd S24 <-> Vcc S16 <-> Gnd **Enable:** S21 <-> P22 S22 <-> P24 **Address Lines:** S13 <-> P12 S14 <-> P11 S15 <-> P10 S12 <-> P9 S11 <-> P8 S10 <-> P7 S9 <-> P6 S23 <-> P5 **Data Lines:** S20 <-> P13 S19 <-> P14 S18 <-> P15 S17 <-> P17	**Power Supply:** **Power Supply:** P28 <-> Vcc P16 <-> Gnd S26 <-> Vcc S16 <-> Gnd **Enable:** S21 <-> P22 S22 <-> P24 **Address Lines:** S7 <-> P12 S8 <-> P11 S9 <-> P10 S10 <-> P9 S11 <-> P8 S23 <-> P7 S24 <-> P6 S25 <-> P5 **Data Lines:** S12 <-> P13 S13 <-> P14 S14 <-> P15 S15 <-> P17 S17 <-> P18 S18 <-> P19 S19 <-> P20 S20 <-> P21	**Power Supply:** P28 <-> Vcc P16 <-> Gnd S26 <-> Vcc S16 <-> Gnd **Enable:** S21 <-> P22 **Address Lines:** S7 <-> P12 S8 <-> P11 S9 <-> P10 S10 <-> P9 S11 <-> P8 S22 <-> P7 S23 <-> P6 S24 <-> P5 S25 <-> P27 **Data Lines:** S12 <-> P13 S13 <-> P14 S14 <-> P15 S15 <-> P17 S17 <-> P18 S18 <-> P19 S19 <-> P20 S20 <-> P21
Note 1: Only 256 bytes of data should be saved and only the first 4 bits are valid. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.	**Note 1:** Only 256 bytes of data should be saved. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.	**Note 1:** Only 512 bytes of data should be saved. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.
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Rom Type: TBP28S46, TBP28SA46, TBP28L46	**Rom Type:** TBP24S41, TBP24SA41	**Rom Type:** TBP24S81, TBP24SA81
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	**Read as Type:** 2716 or 27C16
Power Supply: P28 <-> Vcc P16 <-> Gnd S28 <-> Vcc S16 <-> Gnd **Enable:** S22 <-> Vcc S23 <-> Vcc S24 <-> P24 S25 <-> P22 **Address Lines:** S12 <-> P12 S11 <-> P11 S10 <-> P10 S9 <-> P9 S8 <-> P8 S7 <-> P7 S6 <-> P6 S5 <-> P5 S27 <-> P27 **Data Lines:** S13 <-> P13 S14 <-> P14 S15 <-> P15 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21	**Power Supply:** P28 <-> Vcc P16 <-> Gnd S25 <-> Vcc S16 <-> Gnd **Enable:** S15 <-> P22 S17 <-> P24 **Address Lines:** S12 <-> P12 S13 <-> P11 S14 <-> P10 S11 <-> P9 S10 <-> P8 S9 <-> P7 S8 <-> P6 S24 <-> P5 S23 <-> P27 S22 <-> P26 **Data Lines:** S21 <-> P13 S20 <-> P14 S19 <-> P15 S18 <-> P17	**Power Supply:** P28 <-> Vcc P16 <-> Gnd S25 <-> Vcc S16 <-> Gnd **Enable:** S17 <-> P22 **Address Lines:** S12 <-> P12 S13 <-> P11 S14 <-> P10 S11 <-> P9 S10 <-> P8 S9 <-> P7 S8 <-> P6 S24 <-> P5 S23 <-> P27 S22 <-> P26 S15 <-> P23 **Data Lines:** S21 <-> P13 S20 <-> P14 S19 <-> P15 S18 <-> P17
Note 1: Only 512 bytes of data should be saved. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.	**Note 1:** Only 1024 bytes of data should be saved and only the first 4 bits are valid. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.	**Note 1:** Only the first 4 bits of the data are valid. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 if necessary.
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Rom Type: TBP28S86A, TBP28SA86A, TBP28L86A, TBP28S2708A	**Rom Type:** TBP28S166	
Read as Type: 2716 or 27C16	**Read as Type:** 2716 or 27C16	
Power Supply: P28 <-> Vcc P16 <-> Gnd S28 <-> Vcc S16 <-> Gnd **Enable:** S22 <-> Vcc S23 <-> Vcc S24 <-> P24 S25 <-> P22 **Address Lines:** S12 <-> P12 S11 <-> P11 S10 <-> P10 S9 <-> P9 S8 <-> P8 S7 <-> P7 S6 <-> P6 S5 <-> P5 S27 <-> P27 S26 <-> P26 **Data Lines:** S13 <-> P13 S14 <-> P14 S15 <-> P15 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21	**Power Supply:** P28 <-> Vcc P16 <-> Gnd S28 <-> Vcc S16 <-> Gnd **Enable:** S22 <-> Vcc S23 <-> Vcc S24 <-> P24 **Address Lines:** S12 <-> P12 S11 <-> P11 S10 <-> P10 S9 <-> P9 S8 <-> P8 S7 <-> P7 S6 <-> P6 S5 <-> P5 S27 <-> P27 S26 <-> P26 S25 <-> P23 **Data Lines:** S13 <-> P13 S14 <-> P14 S15 <-> P15 S17 <-> P17 S18 <-> P18 S19 <-> P19 S20 <-> P20 S21 <-> P21	
Note 1: Only 1024 bytes of data should be saved. **Note 2:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 3:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 when using programmers like the Willem if necessary.	**Note 1:** This part draws high current. Use an external +5V power supply on Vcc if needed. **Note 2:** Outputs of some parts are open collector. Use pullup resistors between Vcc and D0-D7 when using programmers like the Willem if necessary.	
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