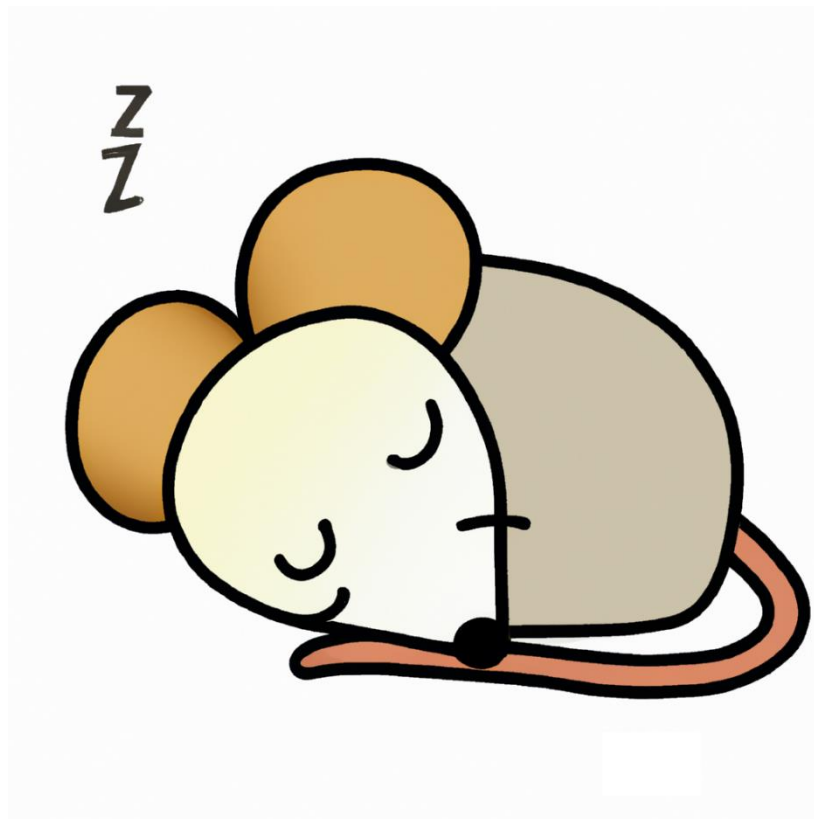


# **PROM Programmer and Editor**

## **Instruction Manual & Functional Description**



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## 1 Introduction

This card has been designed to allow the programming and editing of 32 x 8 PROM's.

<b>Manufacturer</b>	<b>Part Number</b>
National	74S188
Fujitsu	7111
Signetics	82S23
AMD	827S1
MMI	6330
TI	18SA30
Harris	7602

## 2 Components

Reference	Value	Qty	Notes
C1	600pF	1	
C2	330uF	1	
C3	100uF	1	
C4	10nf	1	
C5	100nF	1	
C11	10nF	1	
C12	1nF	1	
C13	1uF	1	
C14	8n2	1	
D1, D2, D3, D4, D5, D6, D7, D8	LED	8	
D10	1N5819	1	
D13	10V	1	
D14	1N4148	1	
J1	Control / Program Select Switch	1	PBH4UEENAGX
J2	USB_C_Receptacle_PowerOnly_6P	1	
J3	Conn_01x02	1	
J4	USB_A	1	
J5	Barrel Jack	1	
L1	50uH	1	
Q2, Q3, Q5, Q6	BC108	4	
Q4	BD139	1	
R1	1K1	1	
R2	13K	1	
R3	0.25	1	
R4	180	1	
R5	5K6	1	

# PROM Programmer 32 x 8

R6, R7	5.1K	2	
R8	220	1	
R12	4K7	1	
R21	470K	1	
R22	560K	1	
R23, R24, R25, R26, R28, R30	10K	6	
R29	680	1	Must be 1W minimum
R32	6K	1	
R33	47	1	
RN1	1.5K	1	
RV1	25K	1	
SW1, SW2, SW3, SW4, SW5, SW6	SW SPDT	7	GW12LCP
SW8	SW SPDT	7	2MS1T2B3M2QES
SW11, SW12, SW13, SW14, SW15, SW16, SW17, SW18	SW Push SPDT	8	800USP8P1A1M2RE
TP1	10KHz	1	Insert test pin if required
TP2	+16V	1	Insert test pin if required
TP3	+5V	1	Insert test pin if required
TP4	PULSE	1	Insert test pin if required
TP5	PRG_PWR 10V	1	Insert test pin if required
TP6	PROM_ENABLE	1	Insert test pin if required
TP8	X1	1	Insert test pin if required
TP9	X2	1	Insert test pin if required
TP10	X3	1	Insert test pin if required
TP11	X4	1	Insert test pin if required
U1	74S188	1	Use socket / ZIF socket
U2	MC34063AP	1	
U6	4043	1	
U7	4017	1	
U8	HEF4093B	1	
U9	TL431LP	1	



## 3 Construction

Read everything here before starting

### 3.1 Before you start construction

Inspect the PCB for any visible signs of damage

Select your components:

- Turned pin sockets are recommended due to robustness and reliability
- The 680-ohm resistor is rated at 1W

The IC's are static sensitive. Handling precautions need to be observed.

### 3.2 Order of construction

The recommended order of construction is:

- Resistors
- Sockets
- Disc capacitors
- Electrolytic capacitors
- Switches
- LED
- Insert IC's
- Other items, test pins etc.

Also, to consider is constructing the board by functional area to aid in diagnostics. Each area can be implemented then tested

- Power delivery / connectors
- 16V power supply
- Timing logic
- Remaining parts

### 3.3 Things to Note Before Starting

Be very careful when inserting switches to get their polarity correct

The capacitor at C5 is optional. Its purpose is to smooth out poor *wall wart* PSU's

The on/off switch is optional and may be bypassed with a wire link between the OUT and IN positions

The 680-ohm resistor (R29) and the BD139 transistor (Q4) can get quite warm in operation

The 680-ohm resistor (R29) must be at least 1W

The inductor (L1) is rated at 50uH. The easier to source inductors rated at 47uH is an acceptable substitute

Numerous test points have been included to allow for ease of diagnostics

Add a spacing socket to the socket for the PROM if a ZIF socket is being used to allow sufficient space for the lever

The through-plated-holes for the PROM socket are wide enough to accept a ZIF socket but I **strongly** recommend not soldering one in as they are easy to damage and expensive. Use a normal socket and a sacrificial spacer socket before the ZIF socket

If mounting ZIF socket directly onto the board, the level may have clearance issues with IC U8 – 4093.



## 4 Functionality

The high level design is based on an article for a PROM programmer from 1980

[Link](#)

The design has been reworked with:

- Only requires a 5V supply
- New design for 16V generation
- Full LED display for address and data
- Improved switch selection

The original design also had a bug where it would sequence the steps but not stop at the required step. I presume the original designer did not have access sufficient test equipment to see the issue ?

### 4.1 Timing

The core to the design is the decade counter (4017) which generates a sequence of outputs spaced at 100uS. These are then used to sequence various activities, such as enabling/disabled the CS. The state of these activities is held by the four latches in the 4043.

The latches control:

Latch 0: Program sequence start – See TP X1

Latch 1: 5V / 10V power for Vcc – See TP X2

Latch 3: 16V Programming pulse – See TP X3

Latch 2: CE – See TP X4

### 4.2 Timing Visualization

**Cyan** – CE

**Pink** – Programming pulse

**Yellow** – Vcc

Note: Each signal has been offset slightly so the zero values do not overlap



## 5 Usage of the Programmer

The programmer can be used in two modes. Read (Control) and Program.

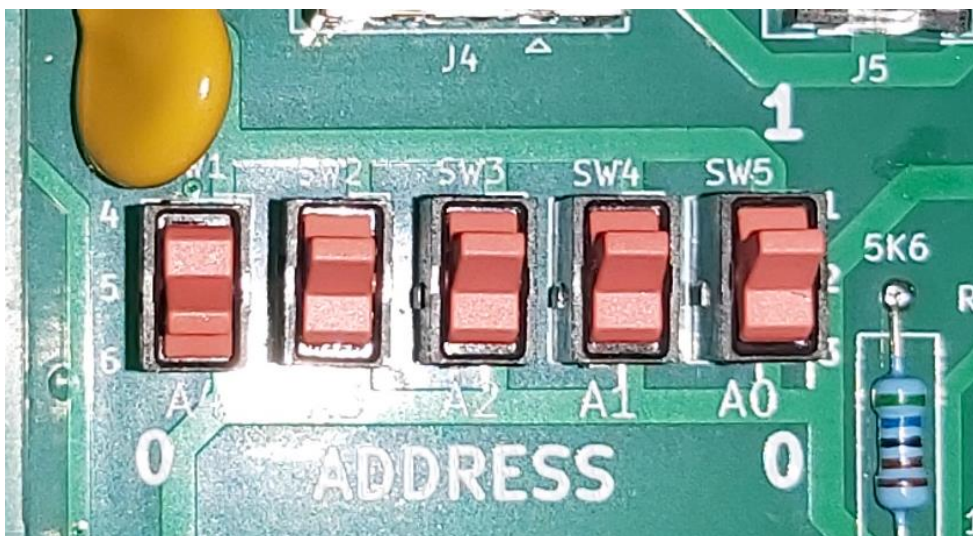
The modes are controlled by the 4PDT push switch in location J1

### 5.1 Read Mode

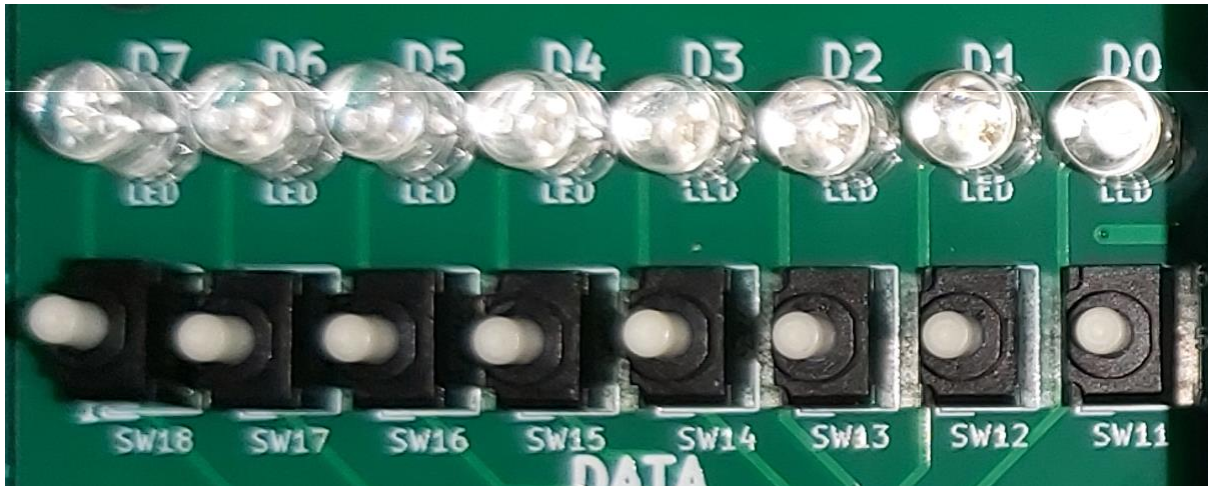
The switch at J1 is in the out position.



This mode allows any address to be examined in the PROM. The address is select using the five address switches labelled A0 through A4. Down is zero, Up is one.



The values at the address selected is displayed on the LED's D0 through D1



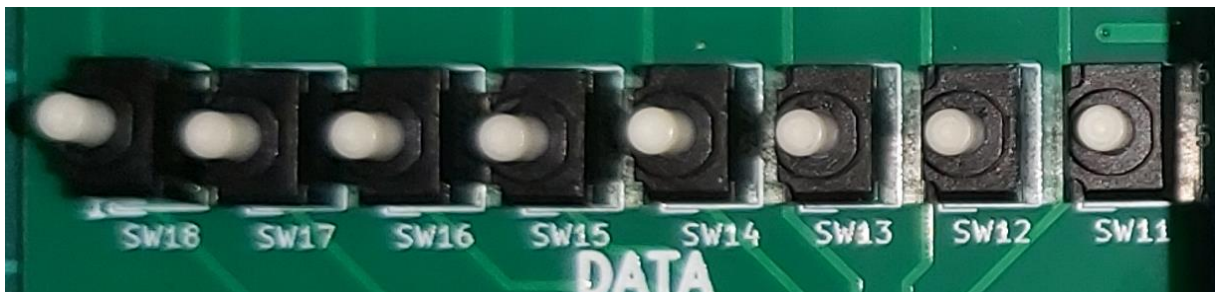
## 5.2 Program Mode

The sequence to program a bit is as follows:

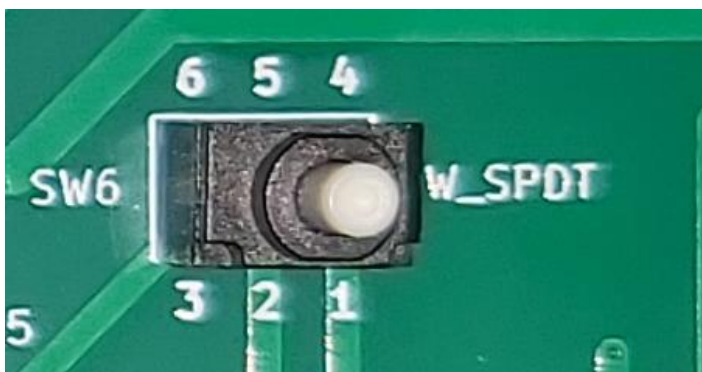
Use Read Mode to select the required address and identify which bit you want to program

Push the switch at J1 in to select Program Mode

Hold down the Data switch under the bit (LED) you want to program



Press the Program switch to program the required bit



Switch J1 back to Read Mode to verify that the required bit has been programmed

### 5.3 Warning

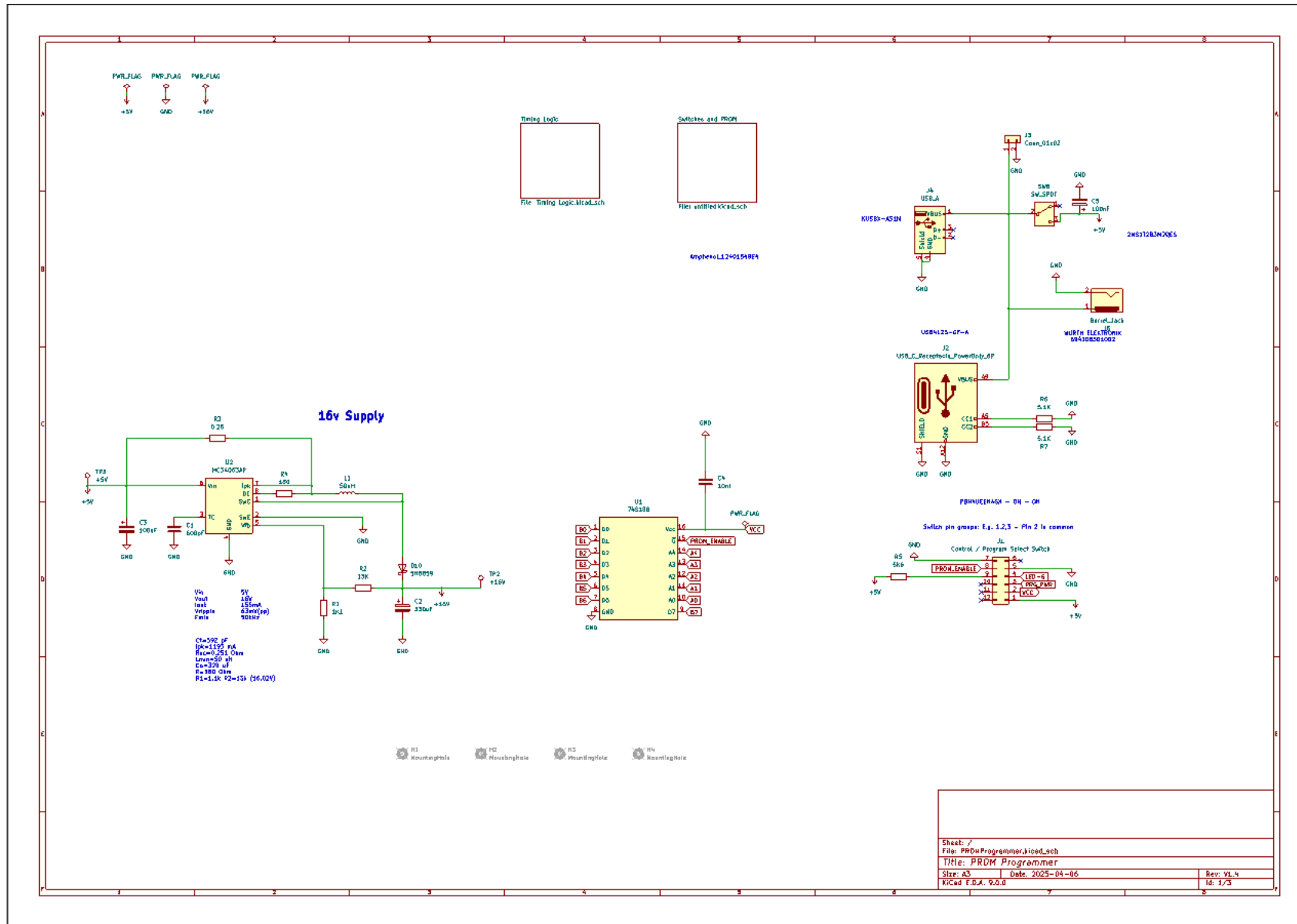
Note that once a fuse has been programmed, it is an irreversible process. Make sure that the bit to be programmed is the one you want to program!

## 6 Notes on Components

All the components used have been selected at time of design to be readily available via commercial component suppliers.

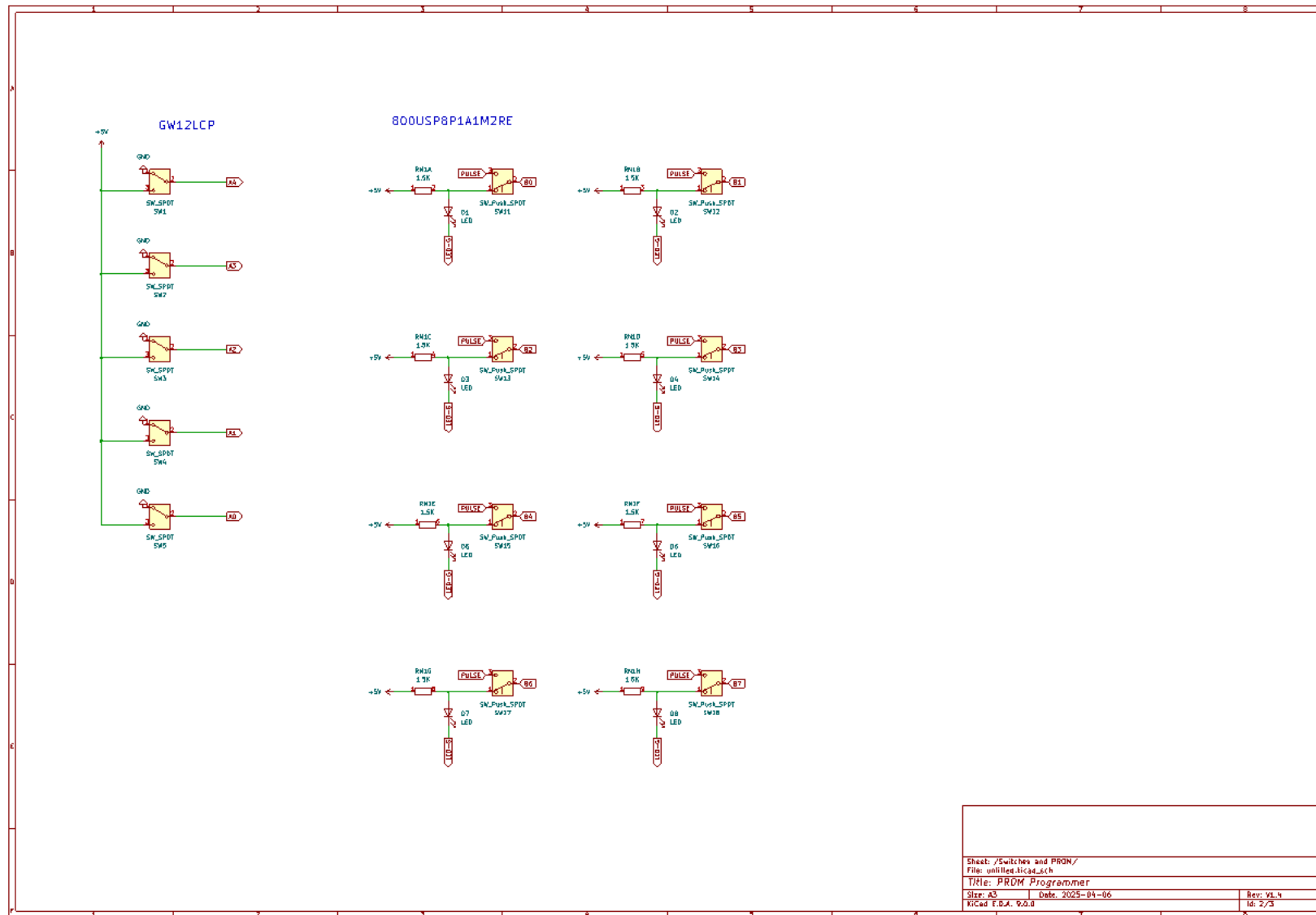
## 7 Circuit Diagrams

## PROM Programmer 32 x 8

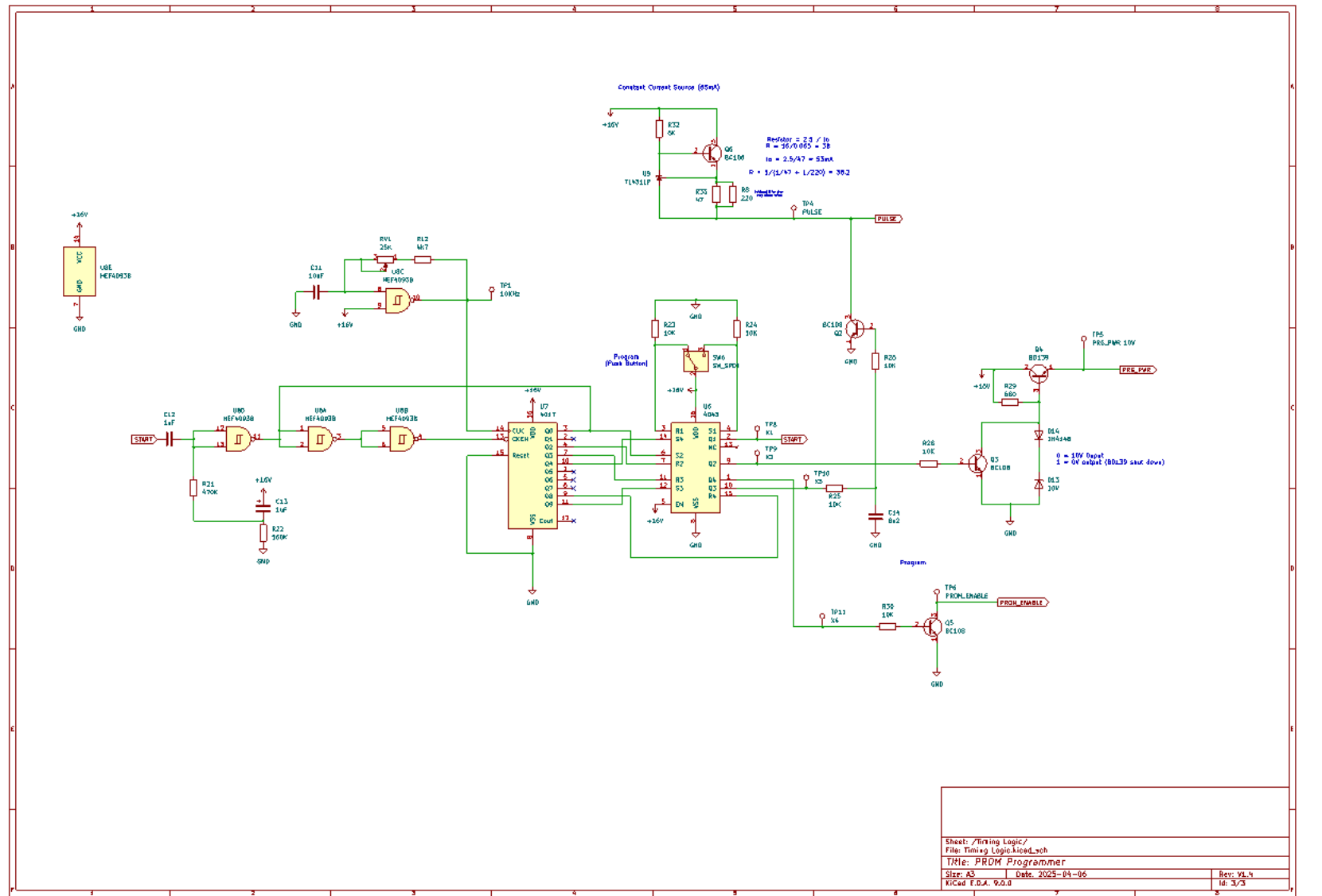




# PROM Programmer 32 x 8



## PROM Programmer 32 x 8





## 8 Errata – Fixed Items

### 8.1 Version 1.5

On / Off legend on power switch was inverted

Some component symbol changes (Kicad 9 update)

Minor silkscreen changes

