

TANGERINE USERS GROUP

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EPROM PROGRAMMER

A910854F0014ADF3BF2902F0
0F20E88218A82E83E7A17

D0E3A201A552D03FADF3
18052A8E1050180UAV

A558D043203E09A9
427A9E6A4031

A56F29FB856FA
70792A2801

203008A6F
A92012

DF2BFA90
203008A6F



ESTEN '82

TUG'S EPROM PROGRAMMER

This Eprom Programmer project has been designed to be a cheap alternative method of construction for the average user. It brings within reach of the individual the opportunity to programme the 2716 eprom. Use 5 volt SINGLE RAIL eproms ONLY!

This project has been designed and created on the Microtan System by a user of that system, a hardware and software enthusiast.

We are providing all the software you will need to enable you to automatically programme the 2716 from memory contents and locations.

Comprehensive constructional details are included as a guide. However, specific constructional requirements are left to the user who may require alternative modifications.

Of the few components required, the user may be able to select some of the items from their own spares boxes; alternatively, what components that are not readily available, can be sought from those suppliers offering TUG members discounts. (See newsletters)

We have selected the three 9 volt (PP3) supply method as being an ideal format without the user being restricted by the use of defined power supply requirements. Simply, the PP3 is the most cost effective method considering the limited amount of use the programmer unit is expected to have at any one time.

A simple, single sided pcb has been provided as a cheap effective stage of development for our future expansion plans. The pcb has been manufactured to a high standard of quality.

The constructor should have no difficulty in assembling the project. If any problems do develop, we shall be only too pleased to assist where possible.

Now go eprom yourselves.....

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The software for automatic programming is contained on the tape supplied and has been recorded at 300 baud for security of data;

Filename 'TUGPRO'

It will occupy memory between 0400 - 08FF (hex)

Data requiring copying should therefore not occupy this memory space.

NOTES:

Firstly, let us consider the data which you wish to 'Burn' into your eprom (Erasable Programmable Read Only Memory). Once you have developed a program which you would like to use on a regular basis, it makes sense to store it in this cheap reliable form, free from the worries of bad tape loads etc.

There are two basic methods of the use of eproms to store data. The first method although simple, does require the use of Microtans 'Copy' command.

The eprom can be programmed from any area of memory with all the addresses and pointers unaltered. After being burnt into the eprom, the data can be copied out of eprom into the original addresses in the area in which it was created.

If you require the data to be used from an eprom positional address, then the data must be altered to contain the correct addresses for all JMP and JSR instructions and ZERO page pointers. Whichever method you choose, thoroughly check the validity of the data before 'Burning' takes place, as mistakes cannot be rectified later.

In order to avoid missing one or two of the more tricky changes, try moving the program into a different area of Ram for trial.

Once you have thoroughly de-bugged your program, copy the data into an area above 0900 hex, and dump to tape.

WARNING - VERIFY CONTENTS AGAINST RAM - RECORD AT 300 BAUD.

After storing your programme onto tape.

Switch off the computer and install the eprom programmer unit into the parallel sockets on Tanex, sockets A1 - B1 - C1 as indicated in the circuit diagram. Install a 2716 single supply eprom (5volt) (Texas equivalent 2516) into the zero force insertion socket orientated to the correct pointers i.e. Pin number 1 located over the white spot indicator on the pcb.

DO NOT AT THIS STAGE CONNECT THE POWER SUPPLY TO THE UNIT

Check all connections thoroughly - then switch on the computer.

Load in your EPROM data and verify using the E command.

Load in the programmer software supplied on tape.

Activate the programme by 'G400'. If all is well you will be asked to connect the 27v supply (connect the 3 batteries), then hit any key. Providing the supply has been switched on, the unit will print the sign on message on the screen, followed by a prompt '*'.
.

You now have six commands at your disposal

B (Blank) This checks to see if the eprom has been completely erased to 'FF's'

This will either confirm with the message (Prom is blank) or tell you the first non 'FF' address found.

Laaaa,bbbb (List) Where(aaaa) is the start address and (bbbb) is the end address of the required listing. Similar to Tanbugs List command, only the contents are listed from address aaaa to bbbb (hex) inclusive. You may halt the printout by typing CNTL/C at any time.

Paaaa,bbbb,cccc (Programme) Copies the data currently in Ram from address aaaa to bbbb inclusive and programmes this into eprom starting at address cccc (taken as zero if not specified).

Programme verifies each byte as it is programmed and stops on error.

A printout of the number of bytes left to be programmed is given on the screen during programming.

Programming may be ABORTED by typing CNTL/C at any time.

S (Stop) returns control to Tanbug. Always use this method of exiting from the program rather than hitting RESET, this method will remind you to disconnect the 27v power supply, and all the I/O ports can be reset.

Taaaa,bbbb,cccc (Test) same as programme, but verification is not made after each byte.

Vaaaa,bbbb,cccc (Verify) Verifies Eprom contents against RAM, prints error message if different, else no action.

The ESCape mode key is disabled during operations. The CNTRL/C key may be used to halt any funtions.

FINISHED

Always stop using the STOP command, this ensures that you disconnect the 27v supply. Completed, switch off the computer, remove the Eprom and programmer unit, insert the eprom into you eprom board.

Test Eprom contents under real control to ensure that your programme now in eprom runs correctly.

Due to the fact that the Eprom Programmer has been made available to the majority of members. Perhaps this is a good place in these notes to remind that that we are now setting up an eprom erasing service! Please ring for more details.

EPROM ERROR MESSAGES

**Eprom start address) 7FF

The eprom address range is only from 0 to 7FF hex. The address specified was outside this range.

**Program .) 2Kbytes long

The size of the 2716 eprom is 2Kbytes (2048 locations). The

addresses specified give a size of program larger than 2Kbytes.

**** Program too large for eeprom start address**

Although the conditions above have both been satisfied, if the length of the program is added to the eeprom start address, this would give a final eeprom address greater than 7FF hex - the program would overflow the top of available eeprom.

**** Verification error at aaaa**

Found bb

when expecting cc

A verification error occurred during programming, verification or a blank check.

**** Programmer not plugged in!**

Although the programmer may appear to be connected, there is a fault in either the power supply or on the sense pins connected to Port B.

----- HAPPY PROGRAMMING -----

Erasing.

Eeproms can be programmed a byte at a time if required, however, if a mistake has been made or a new version of the program produced, they must be erased completely. This involves exposing the eeprom to a special frequency of UV light for about 20 mins.

Contact T.U.G.

WARNING!!!

EPROM'S DO NOT LIKE STATIC ELECTRICITY!!!!!!

COMPONENTS REQUIRED

P.C.B. as enclosed.

- 1) 3 off 14 Pin DIL Plugs or Headers.
(preferred with attached ribbon cable)
- 2) Aproximately 1 m of ribbon cable, or longer if required or not obtained as above.
- 3) 1 Zero Insertion Force Socket for 2716
- 4) 1 74LS04 HEX INVERTER
This number may appear as part of a larger spec number, i.e. SN74LS04N or DM74LS04. Part of the manufactures code.
- 5) 1 BC107 Transistor or equivalent. Any NPN Transistor with Vceo 30v should be suitable.
- 6) 1 27v Zener Diode (400 mw). The positive side has a blue or black band.
- 7) RESISTORS $\frac{1}{4}$ W or larger rating.
1 off each.
470R (yellow-violet-brown)
1K (brown-black-red)
3K9 (orange-white-red)
These values are no critical but recommended.
- 8) 3 off PP3's with battery connectors. A switch may be incorporated if required.

The largest expense will be the zero force insertion socket, it is a matter of choice what type is used. See MAPLIN ELECTRONIC SUPPLIES.

WIRING DIAGRAM ENCLOSED
COMPONENT OVERLAY ENCLOSED

* NOTE. SOLDERCON TERMINALS may be used instead of IC sockets, less expensive than sockets they are available in strips of a hundred and may be used to hold the EPROM (2716). SEE MAPLIN ELECTRONIC SUPPLIES.

CONSTRUCTIONAL NOTES

The constructor is left to decide on the quality of the finished article. For instance, the Hex Inverter can be mounted in a socket rather than soldered directly to the board, making easy replacement at any time in the future. Likewise the quality of the Zero Force Insertion socket is a matter of choice as some of the sockets can be found with quick release levers. Alternatively, the IC's can be mounted in SOLDERCON TERMINALS, these inexpensive terminals are available in strips of a hundred. Overall, a considerable saving on the project.

If three DIL plugs can be obtained with ribbon cable attached then this would be preferable. The length of the ribbon cable is a matter of choice, however, a nine inch run is preferred.

A switch may be incorporated in the power supply circuit if required to isolate the supply when not used.

COMPONENT LAYOUT

A component layout is enclosed showing the position of the components to be installed.

There are two wire links required and are shown on the layout as the two points indicated by (-----). These links should be inserted first.

Install R1, R2, R3 as indicated.

Install D1 with the BAND on the component orientated as shown on the layout.

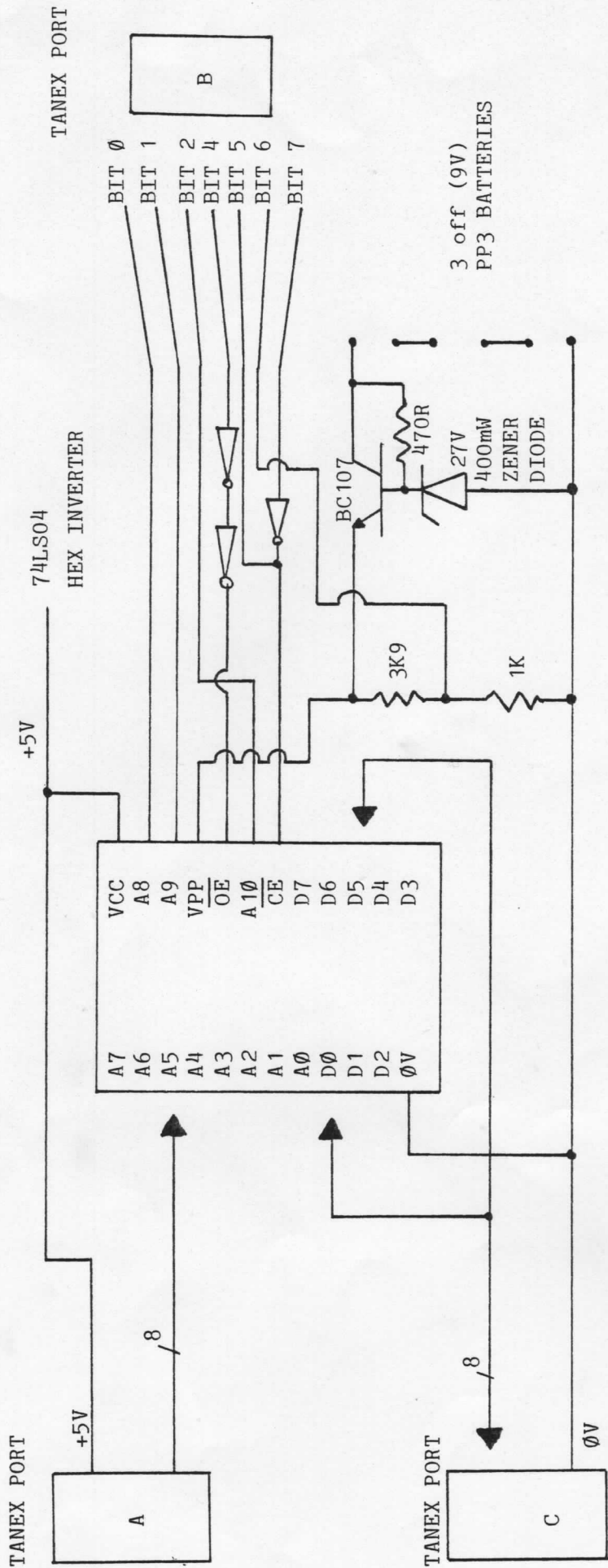
The ribbon cable and power supply leads can be connected next leaving Tr 1 and the IC sockets until last.

Before connecting the Eprom Programmer to the computer, check all circuits thoroughly.

Pin assignments are shown for the port address lines overleaf. Partial testing of the unit can be carried out without an eprom installed, this is simply achieved by installing the unit and running through the software program as far as possible.

NOTE:

The positions of Pin 1 of the IC's is indicated on the component layout, ensure that IC's are connected the correct way with the indentifying mark on the IC being adjacent to Pin 1 as shown. The Hex Inverter is shown as a " U " depression mark on the leading edge of the chip, this should be adjacent to Pin 1 as: 1 " U ".

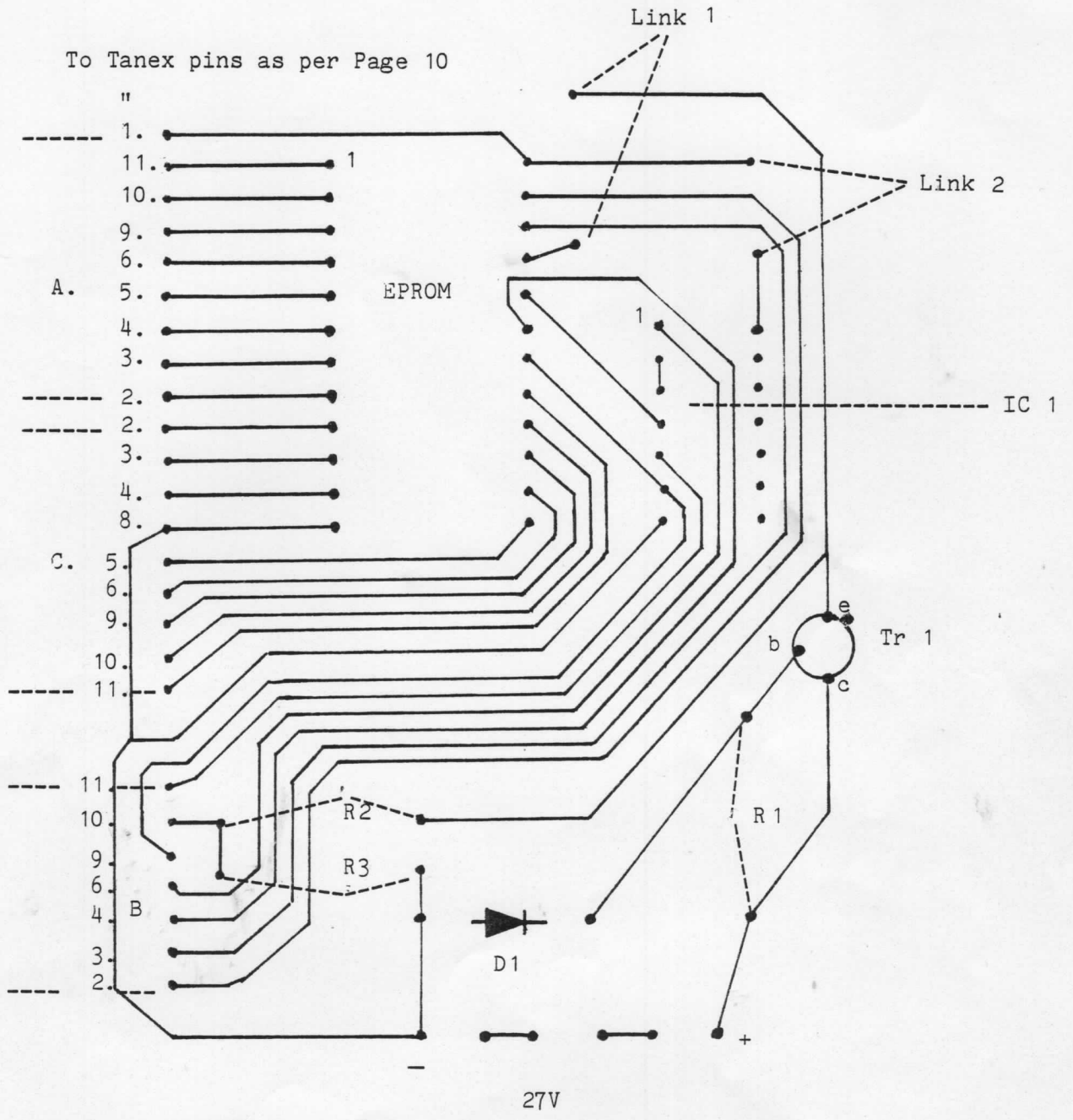


PORT A
 ADDRESS A0 - A7
 + 5V SUPPLY
 PORT C
 DATA I/0 D0 - 7
 + 0V SUPPLY

PORT B
 PIN ASSIGNMENT
 B0 ADDRESS A8
 B1 " A9
 B2 " A10
 B3 NOT USED
 B4 0E (NON INVERTED)
 B5 CE SENSE
 B6 27V SENSE
 B7 CE (INVERTED)

* NOTE: Not to scale....

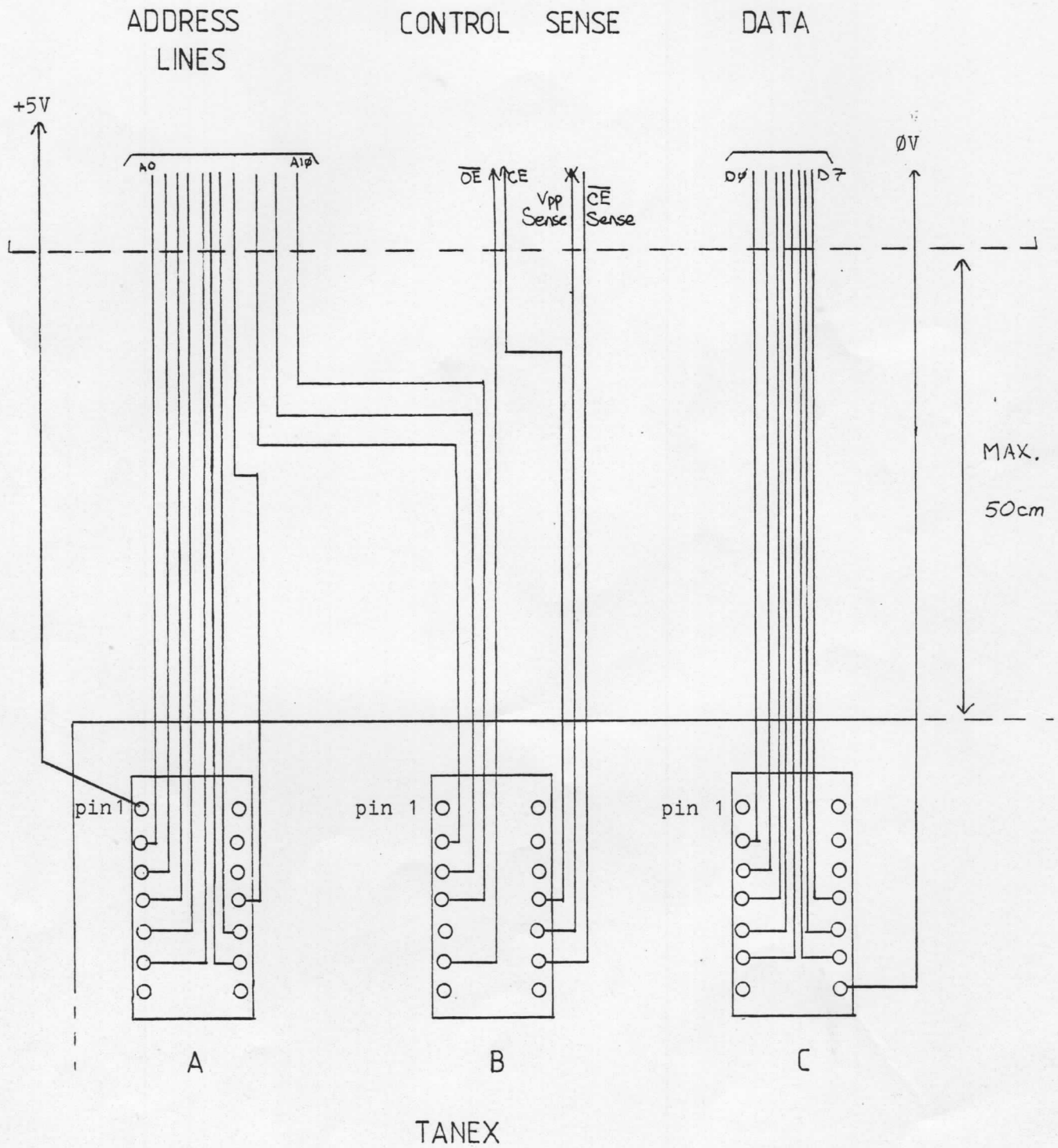
PCB Components Side.....



COMPONENT LAYOUT

- R 1 470R
- R 2 3K9
- R 3 1K

TUG'S EPROM PROGRAMMER WIRING DIAGRAM



With TUG's news release in the last newsletter of the Eprom Storage Board, it is time now to consider programming the popular 2732 variety of eproms. This will now allow you to use the programmer to the full, giving a much greater value to the programmer, which must be one of the best valued on the market.

The 2732 eproms, although of twice the capacity of the 2716 fortunately are manufactured to nearly the same physical size of the 2716. This means that the same socket can be used for both.

However, there are several differences in the actual pin functions.

- (1) 2732 Eproms have an extra Address line (A11). This takes the place of the 2716 VPP pin.
- (2) VPP is now applied to the output enable pin \overline{OE} , during programming on the 2732.
- (3) The 50 ms programming pulse on the 2732 is an inverted version of the 2716 pulse.

I decided that the software control package must remain unaltered. This resulted in more switching than would have been needed with a special 2732 software routine, this does mean now, that the one package can do both jobs and is therefore a cheap solution.

For the conversion 3 switches are required:-

SW1 - Selects which type of eprom is to be programmed (2716 - 2732)
if 2716 eproms are selected, switches 2 & 3 are disabled, and all functions described in the manual remain the same.

SW2 - If 2732's are selected then this switch selects either Programming (T) mode or the commands L, V, B.

SW3 - If 2732's are selected, this switch selects either the 1st (low) 2K block or the 2nd (high) 2K block for all functions of SW2.

When programming the 2732 it is not possible to use the command P. This is now replaced with the command T and Verification can be made afterwards by switching over SW2.

2732 Programming Example.

Program to be blown resides in Ram from \$2000 to \$2FFF.

To program first half:- SW1=2732, SW2=Programme and SW3=LOW.

Now type T2000, 27FF, 0000. When this has been done, set SW3 to HIGH (ignore SW1 & SW2) and type T2800, 2FFF, 0000. After programming, the 4K program may be verified as follows:-

SW1=2732, SW2=B, L, V. & SW3=LOW

Type V2000, 27FF, 0000. This should take aprox one second and the prompt will reappear.

Now select SW3=HIGH. Now type V2800, 2FFF, 0000, this should also take aprox one second.

To List, the switch selections are the same as for Verify. Listing is done in two blocks SW3.

To test for Blank, the switches are also the same, but again must be applied for High & Low blocks (SW3).

NB! If TUGPRO program is loaded into memory from tape, ENSURE that NO eprom is resident in the Programmer socket....

MODIFICATION DETAILS

Refer to page NINE in the E.P. manual.

cont:

cont:-

- (1) Remove link 1.
- (2) Break track between points B & I.
- (3) Break track between points C & E.
- (4) Connect the wires lettered A to I on the switch diagram (fig 2) to the same letters found in fig 1.

A few points worth mentioning are, please don't use 'Cheap' eproms at least to test the conversion as there are quite a few duff jobs around to foul up the testing, use a decent eprom quality, these can quite easily be erased at a later date, and assuming of course that you don't blow them up!

Come to think of it, do the conversion after Xmas, at least the fairy lights will be safe.

