TANGERINE USERS GROUP

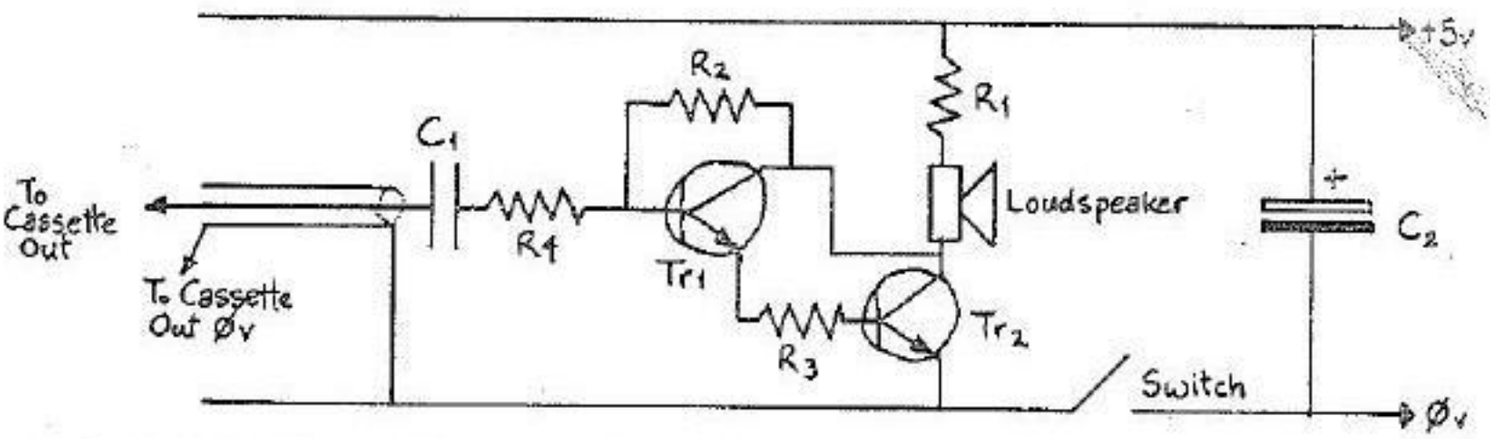
TUG

NEWSLETTER

ISSUE 13

David Cawthorne, 40, Westbourne Road, West Kirby, Wirral, Merseyside L48 4DH.

Dear Sirs,
A long time ago I sent you a circuit and a program for a sound generator which used PB7 and Timer 1 to produce square waves. No doubt you you still have the programs, but the circuit diagram I sent you of an amplifier was not a very good one; I have realised my fault and enclose a better circuit:



Screened cable must be used between cassette out and the circuit, the screening going to 0 volts.

Resistors: R1 – 100Ω, ¼ watt; R2 – 1.5MΩ, ⅛ watt; R3 – 1kΩ, ⅛ watt; R4 – 1kΩ, ⅛ watt.
Loudspeaker – 16 or 8Ω
Capacitors: C1 – 0.1 μF; C2 – 450 μF electrolytic, 16 volt.
Transistors: Tr1 – BC109; Tr2 – BD131
One switch.

To reduce the volume of sound produced, increase the value of resistor R3; to increase the volume, decrease the value of the same resistor.

```
ROUTINE:  0050   A9 00      }   disable interrupts
                 8D CE BF   }
                 A9 80      }   make PB7 into output
                 8D CB BF   }
                 A9 C0      }   set T1 = square wave on PB7
                 8D CB BF   }
                 A5 40      }   load T1 L – high
                 8D C6 BF   }
                 A5 41      }   load T1 L – low
                 8D C7 BF   }
                 8D C5 BF   }   initiate sound
                 A0 38      }
                 A2 00      }
                 CA         }   delay
                 D0 FD      }
          0073   88         }   delay
                 D0 F8      }
                 A9 00      }
                 8D C7 BF   }   stop sound
          007B   8D C6 BF   }
```

* *

Here is a helpful hint to people looking into interrupts for the first time:
If you have been fiddling about with interrupts and find that afterwards you cannot use your 20-way keypad after you have re-entered the monitor via a jump instruction in your program, do not reset in frustration, but try the following:

i) reset interrupt link
ii) clear interrupt enable flags
(ii) re-enter monitor or 00 BRK can be executed.

i.e.

```
                 A9 C3      }
                 85 05      }
                 A9 FE      }   (i)    Do not forget to
                 85 06      }          re-adjust the stack
                 A9 7F      }
                 8D CE BF   }   (ii)
                 00 or      }
                 4C 4B FC   }   (iii)
```

If you do the above to re-enter the monitor, the keypad will be useable without a reset.
The following is a routine to be used with the cassette load and dump program provided with the Tanex User Manual. It displays on the screen the addresses of the memory locations which are being loaded or saved to or from tape to computer. Apart from illustrating interrupts, this routine does away with the boring wait for your programs to be loaded or saved, and instead of printing up a blob at the end when all is done, it indicates that all is running well.
This program can be used with Tanex min. config. and should be put at end of available memory. This should be easily done, as to relocate the program only a few addresses have to be changed.

Step 1: Load the save program from tape to computer after typing in the load program manually. You should now have ØØ5Ø to Ø1E8 having the load and dump routines in these addresses.

Step 2: alter the following memory locations:

address	from	to
ØØ6Ø - 62	8D, CE, BF	EA, EA, EA
ØØA6 - A8	4C, 4B, FC	4C, C3, Ø7
Ø12Ø - 26	AD, CD, BF, 29, Ø, FØ, F9	58, 4C, D3, Ø7, EA, EA, 78
Ø14C - 4E	8D, CE, BF	EA, EA, EA
Ø18D - 8F	4C, 4B, FC	4C, C3, Ø7
Ø1DF - E3	2C, CD, BF, 5Ø, FB	58, 4C, D3, Ø7, 78

Step 3: type in the following program from address Ø78Ø to Ø7FF (or load it in if you put it on tape).

Step 4: to load a program (it must not be any longer than Ø4ØØ to Ø7FF or wherever you have placed this program), position the tape on the tape leader and type go from 78Ø i.e. LOAD => GØ78Ø (CR)

Step 5: to save data, alter memory locations 4Ø/41/42/43 as mentioned in the Tanex Users manual. position the tape where you want the program stored and type go from Ø785 i.e SAVE => GØ785 (CR) making sure the lead from tape recorder to computer is plugged in.

Step 6: if you want to relocate this program to end of memory the you have to alter the following addresses:

ØØA6 – ØØA8
Ø121 – Ø123
Ø18D – Ø18F
Ø1EØ – Ø1E2
Ø78C
Ø79Ø
Ø7FD – Ø7FF

```
0060  EA EA EA
00A6  4C C3 07
0120  58 4C D3 07 EA EA 78
014C  EA EA EA
018D  4C C3 07
01DF  58 4C D3 07 78
0780  78          SEI          LOAD
0781  A9 88       LDA#088      Set CB2 INTERRUPTS
0783  D0 03       BNE wt
0785  78          SEI          SAVE
0786  A9 C0       LDA#C0       Set T1 INTERRUPTS
0788  8D CE BF wt STA£BFCE
078B  A2 9D       LDX#9D   }
078D  86 05       STX£0005 }   INTERRUPT JUMP LINK 079D
078F  A2 07       LDX#07   }
0791  86 06       STX£0006 }
0793  C9 C0       CMP#C0
0795  F0 03       BEQ tmp
0797  4C 50 00    JMP£0050     JMP LOAD
079A  4C 46 01 tmp JMP£0146    JMP SAVE
079D  48          PHA
079E  AD CD BF    LDA£BFCD     INTERRUPT => INVESTIGATE
```

```
07A1  2D CE EF      ANDAEFCE
07A4  D0 02         BNE
07A6  68            PLA
07A7  40            RTI
07A8  85 45         STA£0045
07AA  68            PLA
07AB  68            PLA
07AC  09 04         ORA#04      } SET INTERRUPT DISABLE & RETAIN PSW
07AE  48            PHA         }
07AF  28            PLP
07B0  68            PLA         ADJUST STACK
07B1  68            PLA
07B2  A5 45         LDA£0045
07B4  A6 46         LDX£0046
07B6  2A            ROLA        ---> T1 INTERRUPTED ?
07B7  10 03         BPL
07B9  4C E3 01      JMP£01E3
07BC  29 10         AND#10      ---> CB2 INTERRUPTED ?
07BE  F0 03         BEQ
07C0  4C 26 01      JMP£0126
07C3  A9 03         LDA#03      }
07C5  85 05         STA£0005    }   RESET INTERRUPT LINK.
07C7  A9 FE         LDA#FE      }
07C9  85 06         STA£0006    }
07CB  A9 7F         LDA#7F      }   DISABLE INTERRUPTS
07CD  8D CE EF      STA£EFCE    }
07D0  4C 4B FC      JMP£FC4B    ---- RETURN TO MONITOR.
07D3  86 46         STX£0046        PRINT ON SCREEN ADDRESS BEING LOADED/SAVED.
07D5  A2 03         LDX#03
07D7  A7 40         LDA£0040        CONVERT A HEXADECIMAL NUMBER TO 2
07D9  29 0F         AND#0F          ASCII CODED CHARACTERS "HEXPNT"
07DB  10 04         BPL
07DD  4A            LSRA
07DE  4A            LSRA
07DF  4A            LSRA
07E0  4A            LSRA
07E1  C9 0A         CMP#0A
07E3  B0 04         BCS
07E5  69 30         ADC#30
07E7  10 02         BPL
07E9  69 36         ADC#36
07EB  9D F0 03      STA£03F0,X      DISPLAY ADDRESS
07EE  A5 41         LDA£0041
07F0  CA            DEX
07F1  F0 EA         BEQ
07F3  E0 01         CPX#01
07F5  F0 E2         BEQ
07F7  A5 40         LDA£0040
07F9  E0 02         CPX#02
07FB  F0 E0         BEQ
07FD  4C FD 07      JMP£07FD        WAIT FOR NEXT INTERRUPT.
```

You will notice that when executing the load program, the program continuously looks at CB2 interrupt flag to see when it is set – what a waste of time – instead set up CB2 interrupts, print the screen information, and when next interrupt occurs, go back to the original program. The same applies to when saving data, and other interrupts could occur.

Of particular interest is my version of HEXPNT, memory location Ø7D5 to Ø7FC in load/save routine.

The final program listed here is a routine for those of us who have Tanex & 20-way keypad, but no ASCII keyboard. When this program is loaded from 40 to 99, and memory location 5C to 5E is altered so that it reads JMP USER PROGRAM (i.e. one's own program), then after G50, by pressing the escape key (shift & 9 at the same time) an escape is executed and the registers are printed up.

There are 3 restrictions:
i) T_1 cannot be used.
ii) Bits 6 & 7 of memory location BFCB must be kept to a 1 & 0 respectively.
iii) Bit 6 of memory location BFCE must be kept to a 1 i.e. after G40, the above mentioned bits must not be altered:

The above restrictions refer to the controlling of Timer ONE.

```
0040  78           SEI              START
0041  A9 5F        LDA#5F           SET UP INTERRUPT JUMP LINK.
0043  85 05        STA£0005
0045  A9 00        LDA#00
0047  85 06        STA£0006
0049  A9 40        LDA#40           SET TIMER ONE
004B  8D CB BF     STA£BFCB
004E  A9 C0        LDA#C0           ENABLE TIMER ONE INTERRUPTS
0050  8D CE BF     STA£BFCE
0053  A9 FF        LDA#FF           INITIATE TIMER ONE COUNTDOWN FFFF
0055  8D C4 BF     STA£BFC4
0058  8D C5 BF     STA£BFC5
005B  58           CLI
005C  4C __ __     JMP USER PROGRAM
005F  48           PHA
0060  8A           TXA
0061  48           PHA
0062  AD CD BF     LDA£BFCD
0065  2D CE BF     AND£BFCE
0068  2A           ROLA
0069  2A           ROLA
006A  B0 04        BCS T1ENT.       DID TIMER 1 INTERRUPT?
006C  68     NO ESC. PLA
006D  AA           TAX
006E  68           PLA
006F  40           RTI
0070  A9 01  T1ENT. LDA#01          NO
0072  8D F2 BF     STA£BFF2
0075  AD F3 BF     LDA£BFF3
0078  0A 0A 0A     ASLA,ASLA,ASLA   SCAN 20-WAY KEYPAD
007B  A2 02        LDX#02           FOR ESCAPE KEY.
007D  8E F2 BF     STX£BFF2
0080  18           CLC
0081  6D F3 BF     ADC£BFF3
0084  AE C4 BF     LDX£BFC4         - CLEAR T1 INTERRUPT FLAG.
0087  C9 84        CMP#84
0089  D0 E1        BNE NO ESC.      - WAS ESCAPE KEY PRESSED ?
008B  A9 C3        LDA#C3           YES, RESET INTERRUPT JUMP LINK
008D  85 05        STA£0005
008F  A9 FB        LDA#FB
0091  85 06        STA£0006
0093  A9 7F        LDA#7F           DISABLE INTERRUPTS
0095  8D CE BF     STA£BFCE
0098  68           PLA              SAVE ALL REGISTERS AND DO A 'BREAK
0099  AA           TAX              COMMAND INDICATING THE CONDITION
009A  68           PLA              OF ALL THE REGISTERS AT TIME OF ESCAPE
009B  85 1B        STA£001B         AND WHERE PROGRAM WAS AT INTERRUPT/ESCAPE
009D  4C 80 FF     JMP£FF80
```

What is printed indicates the condition of all the registers at the time of escape key being pressed.

P.S. If there are any Midrotan Users near to where I live : i.e. West Kirby, Calday, Hoylake, Meols, Morton, Newton or Greasby maybe they would like to contact me.

MASTER MIND D.P.Heeley

BASIC Instructions on screen

```
 10 FOR CL= 1 TO 16:?:NEXT CL
 22 ?TAB(10)"MASTERMIND"
 42 ?"THE GAME IS PLAYED BY ASKING ME TO PICK
    3,4 OR 5 NUMBERS"
 50 ?"RANGING FROM 0 TO 9, THE NUMBERS I PICK MAY
      BE DUPLICATED."
 60 ?"WHEN I HAVE PICKED MY NUMBERS YOU WILL BE PROMPTED
      TO INPUT"
 70 ?"YOUR GUESS AS TO WHAT NUMBERS I HAVE PICKED."
 80 ?"WHEN YOUR NUMBERS HAVE BEEN CHECKED I WILL PRINT
      HOW MANY"
 90 ?"RIGHT NUMBERS YOU HAVE IN THE RIGHT PLACE AND
      HOW MANY RIGHT"
100 ?"NUMBERS YOU HAVE IN THE WRONG PLACE. IF YOU MUST
      CHEAT TYPE X."
110 FOR DL=1 TO 12000:NEXT DL
120 FOR CL = 1 TO 16:?:NEXT CL
125 DIM M(100)
126 DIM L(100)
127 DIM C(100)
128 DIM P(100)
129 DIM K(100)
130 ?:?:?"HOW MANY NUMBERS SHALL I PICK ?":?:?
135 Z=0
136 G=0
137 S=0
140 GET A$:O=ASC(A$):IF O<51 OR O>53 THEN PRINT CHR$(127);
    :GOTO 140
160 A = O-48
170 FOR X = 1 TO A
174 LET L(X) = INT(RND(1)*10)
176 NEXT X
240 ?:?:?"PLEASE INPUT YOUR NUMBERS"
250 B = 0
254 FOR B = 1 TO A
258 GET B$:O=ASC(B$):IF O=88 THEN PRINT CHR$(127);:GOTO?15
259 IF O = 127 THEN Z = Z-B+1:G = G-B+1:PRINT CHR$(127);
    CHR$(127);CHR$(127);:GOTO 250
260 IF O<48 OR O>57 THEN PRINT CHR$(127);:GOTO258
261 C(B) = O-48
262 Z = Z+1
264 M(Z) = C(B)
266 G = G+1
270 NEXT B
280 D = 0
290 E = 0
300 I = 10:Q = -1
302 FOR X = 1 TO A
304 H(X) = L(X):N(X) = C(X)
306 NEXT  X
```

THE P.G.M. STORY

With increasing interest being generated in the P.G.M. as users get to grips with the concept of high definition graphics, this month brings a few more details of the general principal of use.

One of the most important features of the P.G.M. is the ability of the user to select a Cursor of suitable design, maybe for a specific task, or just a flight of fancy. With the ability of now being able to programme the 2716 Eprom easily, its now just a matter of a usefull design being programmed into monitor routines to meet the users needs.

For a word processing package for example, the cursor can take the form of a '_' allowing easily read characters to be controlled during editing, very usefull.

The P.G.M. allows this type of concept simply due to the Microtan only partially decoding the character generators and therefore transmitting the value 'FF' instead of the true Ascii character of '7F'. Maybe it's not so important as you think, that is untill you actually have one of this type to use, and only then do you know what your missing, it is important during editing to see where your going, and quickly.

The normal Ascii character set ends at 7F (Hex), untill now they have been allowed to repeat themselves continuing to FF (Hex) repeating without interruption. Maybe that's o.k. if you can't find anything else to do with the wasted space, but by simply interrupting that cycle we have access to graphics. By decoding the character generators we have access from '80' (Hex) to '9F' (Hex) and from 'E0' (Hex) to 'FF' (Hex) 64 programmable graphic characters in all, very nice, just decode all that flexibility into 1K of user RAM and you have the P.G.M. at work.

Turning to a more graphical view of things!, the graphic cell you've always known as the 'Chunky' 4x2 has now been changed by the aid of the P.G.M. to give you a cell structure of 8 bits x 16 bytes, a 128 addressable locations within the character cell as you know it, thats a lot different than Eight! and a lot more powerfull. Just draw an 8x16 grid and see what it looks like, the applications for this type power are enourmous, sets of user defined characters, graphics, symbols, ALPHABETS even, can be programmed, stored and used time and again, its all in the software as they say. (What do you think of a set of chess pieces, each piece occupying two cells ajacent to each other allowing a grid size of 16x16 for definition, all mapped out on the screen, why not think big and go for 32x16! 4 cells wide by 2 deep, Boy! thats some binary at work) its all in the software.

Deviating from our fancies for a moment, the P.G.M. uses all standard TTL devices and has on board buffering and requires only the normal 5v supply, the 1K of user Ram required is held onboard the module and is page selectable. Thankfully at last, the graphics don't have to be switched on and off any longer, no more of that corruption by Basic, no more of watching those little white squares disapearing off the top of the screen or watching the screen blank out when your programme crashes with the old graphic mode set.

The P.G.M. will slide into the system rack and connect to the bus with the normal 64 way plug or rest on top of Tanex in the Micron case and tie into the rear of the mini mother board, fly lead the P.G.M. to the Microtan 65 and its activated.

Animations are a cinch because the CPU has access to the ram only when the onboard circuitry is not using it. Take a roll of film for instance, a few frames for exposures, a few slight alterations and displayed again.

Eric's never going to be the same again.. Sporting a TUG cursor!!

Next Month - more information on the P.G.M.

EPROM MONITOR CONVERSION

With the modification to Microtan '65 to carry the new 2716 Eprom Monitor comes a few problems with those who already own the MK 1 version Microtan with the Monitor in ROM. The object here is to convert the Microtan 65 board to carry the new 2716 eprom as cheaply as possible thus bringing on stream those poor unfortunates still left out in the cold. The new monitor in 2716 (MK 2) format is basic to the old Roms in content with the addition of a couple of printer routines so there should be no difficulty in running any of your present programs. At this time of writing the proposed manual for the MK 2 monitor is not available and therefore the advantages of converting to the new Monitor are not yet apparent. A 'WARM' start does exist for users of Basic however this has proved sometimes unreliable due to corruption that can take place in Zero page ram. It will prove better therefore to await the arrival of the manual to gain some insight into the full potential of the new monitor.

\- - - -

CONVERSION by Steve Buxton. 52 Robey Drive. Eastwood. Notts.

SOCKET	PIN	DATA	2716 PINS	
G2	17	A7	1	
G2	1	A6	2	
G2	2	A5	3	
G2	3	A4	4	
G2	4	A3	5	
G2	7	A2	6	
G2	6	A1	7	
G2	5	AØ	8	
G2	14	DO Ø	9	
G2	13	DO 1	10	
G2	12	DO 2	11	
H2	9	Vss ØV	12	
G2	11	DO 3	13	
H2	14	DO 4	14	
H2	13	DO 5	15	
H2	12	DO 6	16	
H2	11	DO 7	17	
H2	8	$\overline{CE}$	18	
G2	15	A10	19	..... Modification to circuit board required
H2	10	$\overline{OE}$	20	to allow address line 10 to be fitted.
G2	18	+5v	21	
H2	15	A9	22	
H2	16	A8	23	
G2	18	+5v	24	

A 24 pin socket was mounted on a small piece of Vero board aprox 1½"" x 1⅞"" to carry the 2716 allowing enough room each side of the socket to take the ribbon cable links. Two very short ribbon cables with plugs attached (I have used 16 pin dil plugs as 18 pin were not available) were used to used to connect the jumper board to sockets G2 & H2 (old Rom sockets)

STOP PRESS! BREADBOARD '81.

Diaries ready Please! November Wed 11th - Sun 15th.

TANGERINE USERS GROUP STAND No: 91. VISIT US FIRST!

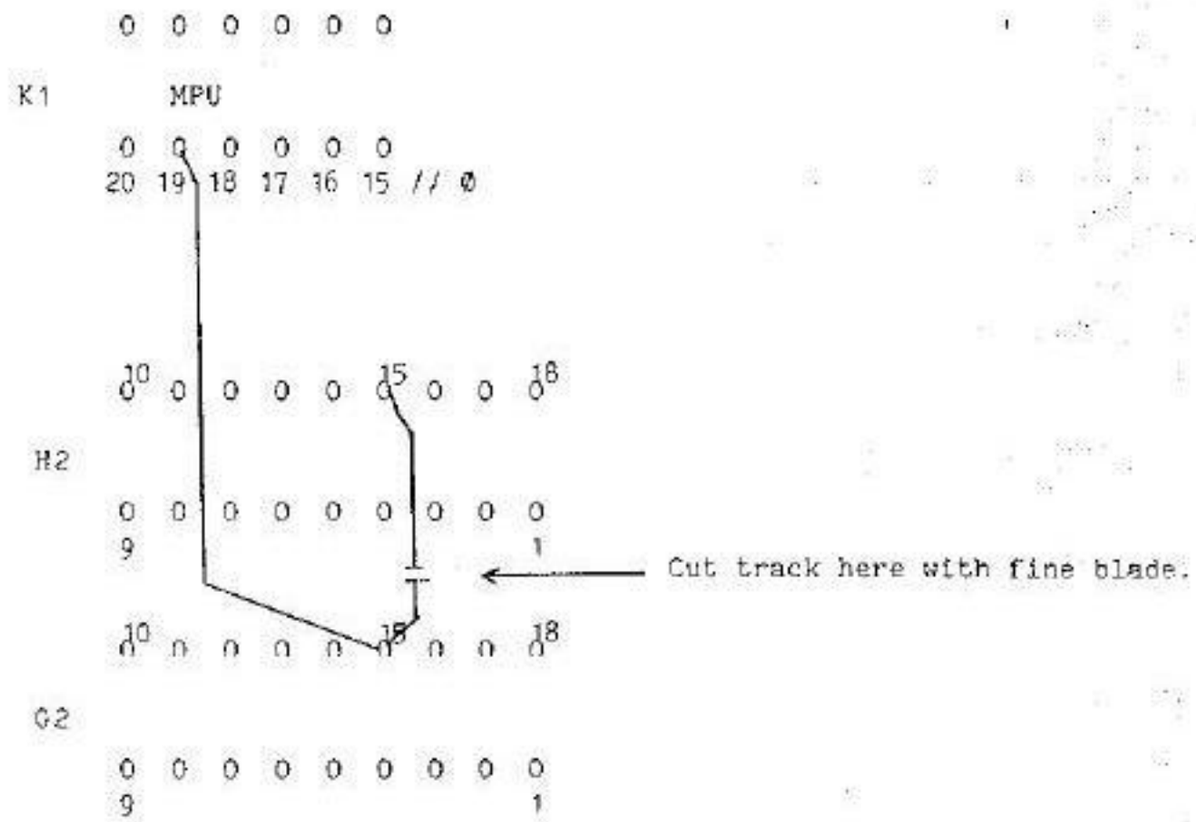
We will be exhibiting more packages for your systems.

Cont:

The underside of the board shows the tracks and terminals of K1, H2, G2.

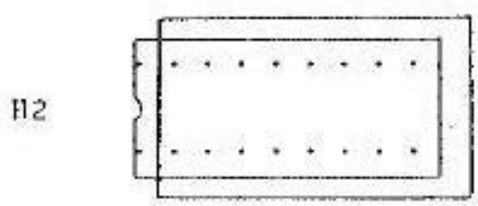
Note the orientation of pins 1. on all I.C's. The track from pin 15 on G2 & H2 can clearly be seen and should be CUT midway between the I.C's, (this will enable the track to joined back together at any time in the future allowing plenty of room to work with the soldering iron.). The cut should be made with a small knife or razor, and if the cut is kept clean, rejoining will be easy.

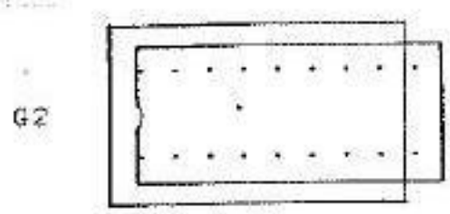
Using an insulated fine wire, connect pins 15 (G2) to pin 19 (K1)



With the module assembly completed, the header plugs can be inserted into the old Rom sockets. Being that 16 pin header plugs are used note clearly the correct placement of the plugs. The orientation can be seen in fig 2.
Note: H2. Insert header plug into pins 2-9 & 10-17. fig 3.
Note: G2. Insert header plug into pins 1-8 & 11-18. fig 3.

The old Roms can be saved for any future use and should be kept on anti static foam.





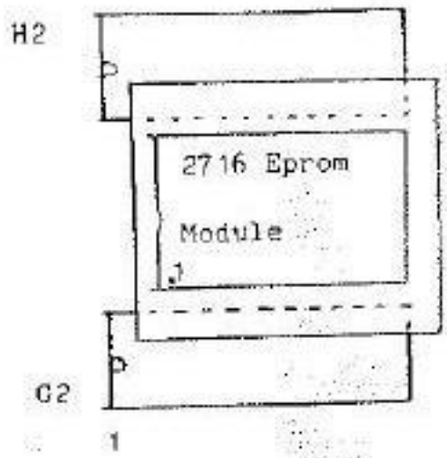
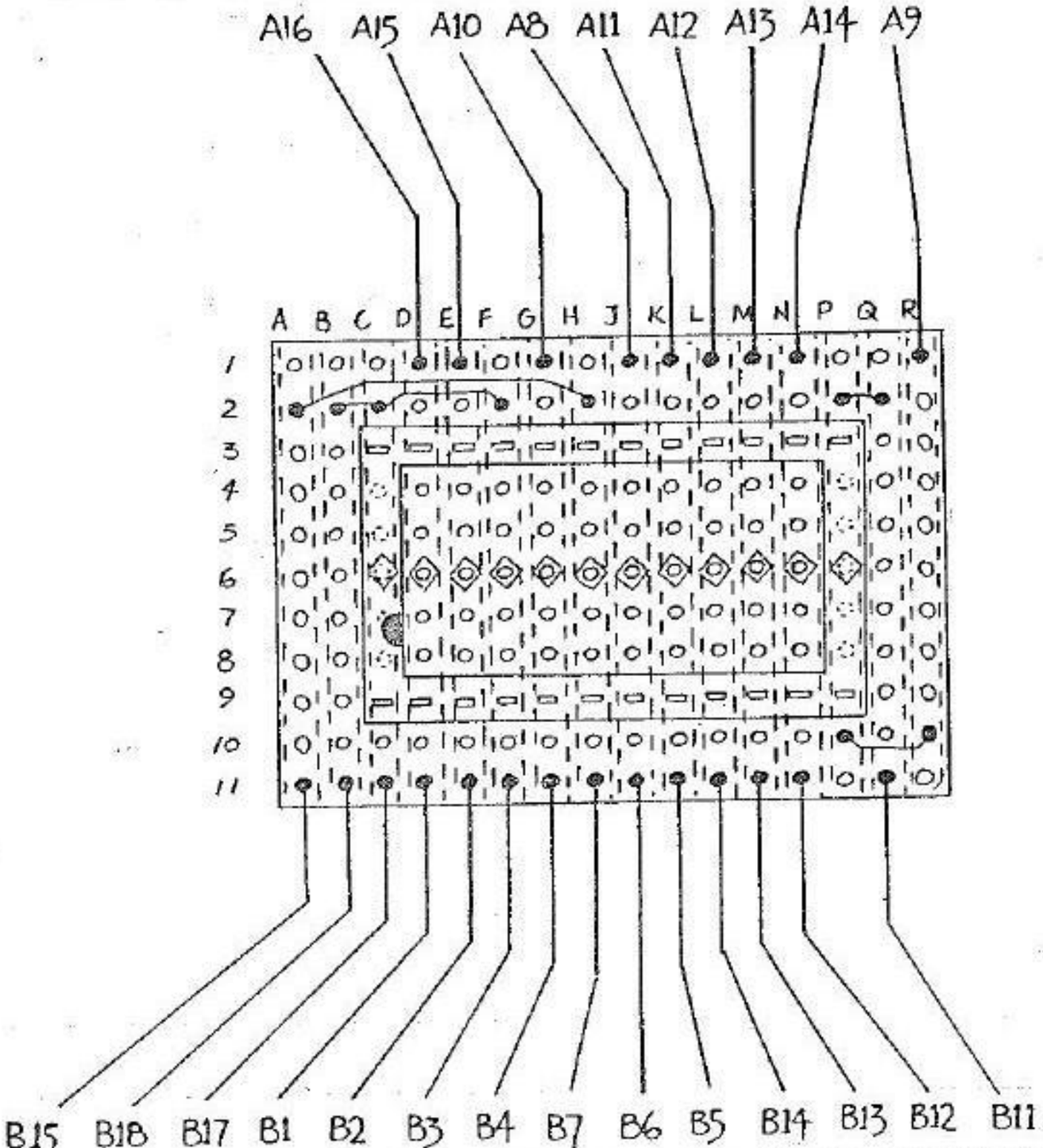


DIAGRAM SHOWS BOARD COMPONENTS SIDE UP
COPPER TRACKS SHOWN AS HIDDEN DETAIL

D.I.L. PLUG A OCCUPIES SOCKET H2
PINS 2-9 & PINS 10 - 17

NOTE COPPER TRACK MUST BE CUT AS
INDICATED BY DIAMONDS - ◇
GRID LOCATIONS : C6, D6, E6, F6, G6, H6, J6, K6, L6, M6, N6, P6



CONNECT WIRE LINKS AS FOLLOWS - 5 OFF
A2-H2, B2-C2, C2-F2, P2-Q2, P10-R10.

D.I.L. PLUG B OCCUPIES SOCKET G2
PINS 1 - 8 & PINS 11 - 18

*TRIED & TESTED...B.G.

SWITCHING MAINS POWERED EQUIPMENT USING SOLID STATE RELAYS.... by WIREMAN

To switch mains powered equipment using the Ports on Tanex, one must first convert the small amount of current available from the ports outputs to switch greater mains load current. A relay device must be used for good reasons. Firstly, the load is isolated from the control circuit, secondly as already stated, the control circuit has only a small amount of current available, certainly not sufficient for our purpose.

With modern electronics at work for us we are able to use a Solid State Relay. These devices have no moving parts and are therefore silent in operation adding the fact that they cause no Arching and virtually no spurious radio frequency noise, together with the benefit that they are encapsulated in a plastic block.

The electrical isolation in solid state relays is achieved by making the control input optically isolated from the rest of the circuit, creating an acceptable safety factor for connection to a microcomputer circuit.

The solid state relay used in these experiments was obtained from Radio Spares at cost aprox £6.84+VAT. There are several types available which vary in physical appearance and current switching ability. In this case a simple in line package switching 2.5 amps. All types feature Zero Voltage Switching triac control circuitry, which means that the mains load is turned on or off only at the zero crossing of the mains. This in turn has the advantage that interference pulses are reduced to a minimum, this is known as Synchronous Switching. When a change in state occurs at the Control input, the switching circuit waits for the next mains Zero crossing before the mains output is changed.

Since zero crossing occurs every 10m/seconds (100 times a second) this does not matter.

As can be seen from the circuit, it is very simple to wire up, however, for safety sake the mains circuit must be fused.

Any of the VIA ports is capable of driving the SSR and any of the outputs from the selected ports can be used, (PA0-PA7 ~ PB0-PB7).

OUTPUT CURRENT	PACKAGE	R.S. STOCK NO:	CATALOGUE PRICE
2.5 amps	Single in line	348-431	£6.84+VAT
2.5 amps	Printed Circuit Mount	349-692	£8.04+VAT
7 amp	Octal Plug-in	348-598	£11-10+VAT

When using the device the selected port must of course be selected to be outputs using the DATA DIRECTION REGISTER. With the circuit shown writing a 0 to the port output being used will turn the mains device on, writing 1 will turn it off.

see over.....

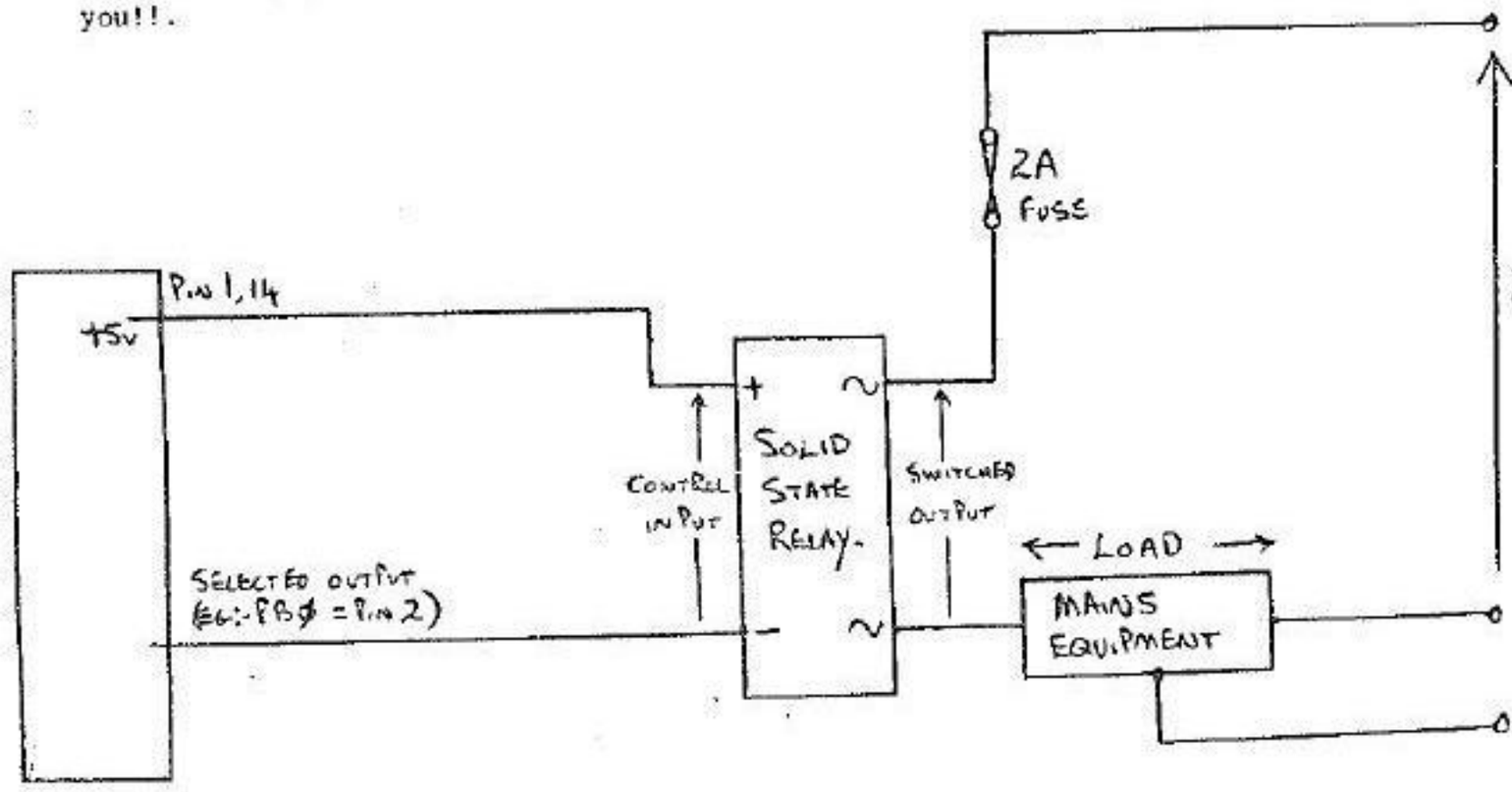
**** WARNING

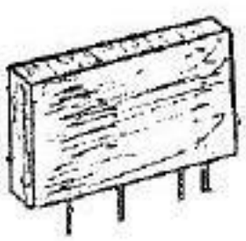
Although the above article represents a tried and tested circuit I must remind members that these circuits connected to the mains can be dangerous in unskilled hands. We do not have the time to construct every project that may be used in the newsletter and therefore they may go untried and tested from our point of view. The object is to bring to you circuits and projects that are constructed and used by individual members which they have found satisfactory for their purpose. (If you are

in any doubt, contact the author of the article, he or she will be only too pleased to help a fellow member on that particular article. We do ask our members to refrain from taking computer problems to these authors as the responsibility for your Microtan system faults etc is with the manufactures and not with us, although we will as a group be only too pleased to help where ever possible with the odd fault finding, we are not a substitute for their responsibility to their customers.

B.C.

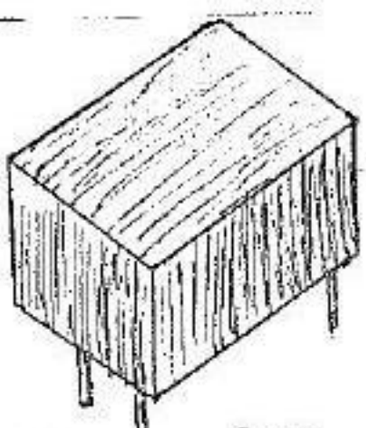
..... This switching circuit was originally connected to a mains lighting circuit with the result that the lighting could be turned on or off under simple computer control. We did in fact go further by connecting the device to enable a cassette data dump to control the switch as reasonable speeds as a simple demonstration, needless to say, the ordinary domestic light bulb does not like this sort of handling, with the predictable result, I will leave to your imagination. It does leave us however with further thoughts on the management of the ordinary household equipment. No doubt you have a few ideas on the subject. Lets hear from you!!.





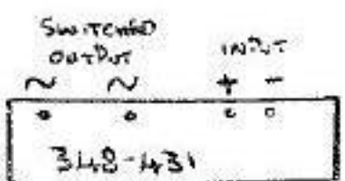
SINGLE IN LINE

L. 43mm
W. 10·2mm
H. 25mm

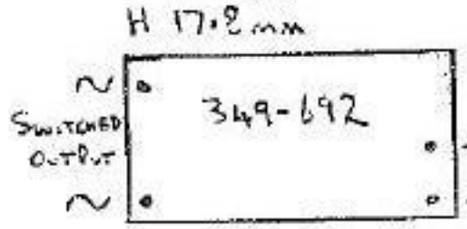


L. 38·1mm
W 25·4mm
H 17·8mm

P.C.B MOUNTING



PIN VIEW



PIN VIEW

FOR SALE ***FOR SALE*** ***FOR SALE*** ***FOR SALE*** ***FOR SALE***

Full Micron system - £200.00. ono. (Will split). New keyboard (cased)...£45.00.
Mini Rack + M/m/b....£40.00. Microtan 65 + Options...£60.00 Tanex + 7K...£45.00
Also Xbug..Basic..Keypad..Toolkit... Phone REDCAR 485516.

Microtan 65 + Options, manual etc...£90.00. 20 Way Keypad...£9.00 Keyboard...£50.0
Invaders Sound Box...£9.00. Port Control Keypad...£5.00. Some 2114's (70p) 4116's (
2716 (£1.00). Xbug (£10.00). Space Invaders Rom (£5.00). Frank Vella 01 567 1092
7 Kerrison Road, Ealing, London. W55NW

WANTED: TANRAM. Min con or populated. Write Box 34C at T.U.G. H.Q.

MICRON factory built Feb 1981. Complete with all Options, Manuals etc.. OFFERS PLEA
J. Woad. 71 Castle Crescent Thornhill, Dewsbury, West Yorkshire. WF12 0BH.

High Resolution Board. recent purchase, now selling: £60.00. Box 35C T.U.G. H.Q.

Microtan 65 single board + L/Case + Graphics Option. Only £90.00.
G. Francis. 4 Aston House Wandsworth Road London S.W.8.

APPLE KEYBOARD. Second Hand £20.00. Ring Bill Floyd (0252) 871731

Unwanted Gift. A New MicroTantel Unused/Sealed £140.00. Write Box 36C T.U.G. H.Q

Micron Case with P.S.U. £20.00. M.P.S. 1 + 12v Option. £15.00. BASIC (Piggy Back)
C.Davis. 01 399 2865 Any evening. £25.00.

INFORMATION PLEASE

As I am considering purchasing a CREED printer for cheap hard copy, can any member help out with the Interfacing Connections required please.

David Moysen. Walton on Thames 42692

INFORMATION RELEASE

Due to increasing requests for our Reverse Character Firmware Data Eprom. Please Note This Data may be used with all high resolution boards. The eprom can be stored in any eprom location as it does not contain any adverse addressing. The information required for Reverse characters are stored in DATA format. The package contains the full Ascii and Numerical set in reverse graphics. (Black characters on a White background). Ideal for all types of programmes especially where the users attention must be drawn to certain information on the screen. NO hardware mods are required!

Give us a TUGring for more information!

MICRO-TANTEL PROJECT

If you run a Micro-Tantel and would like to join us on a special project, please give us a ring at T.U.G. H.Q..

IS YOUR LITTLE REPEATER WITHIN EASY REACH OR ARE YOU PUTTING ON TOO MUCH WEIGHT ?

WATCH US GET TO GRIPS WITH IT NEXT MONTH

ACCESS FACILITIES — SOFTWARE/HARDWARE

MEMBERS PRICES

ASTEROIDS!!!	7K	MACHINE CODE-FULL GRAPHICS	£9.37 inc
SHUTTLE LANDER!!!	7K	MACHINE CODE-FULL GRAPHICS	£9.37 inc
DIVE BOMBER!!!	7K	MACHINE CODE-FULL GRAPHICS	£9.37 inc
SPACE INVASION!!!	2K	MACHINE CODE-FULL GRAPHICS	£3.75 inc
KIM!!!		MACHINE CODE-FULL GRAPHICS	£3.00 inc
SPACE FIGHTER!!!		M/CODE & BASIC-FULL GRAPHICS	£4.50 inc
DEMOLITION!!!		MACHINE CODE-FULL GRAPHICS	£4.50 inc
HI-LO!!!	6K	MACHINE CODE-FULL GRAPHICS	£9.00 inc
REVERSE CHARACTERS		DATA IN EPROM(NO HARDWARE MODS)	£15.00 inc

BLACK CHARACTERS ON WHITE BACKGROUND!!!!

UTILITY & GAME PACKS

PACK I	M/C.	MOTOR CROSS/HANGMAN	£4.12 inc
PACK II	M/C.	MAZE/DRAW	£4.50 inc
PACK III	M/C.	TEXT EDITOR/BASIC TRACE	£3.75 inc
PACK IIII	M/C.	ALIEN/PUZZEL	£4.50 inc
SCRIBBLE!!!		BASIC	£6.75 inc
HOME FINANCE!!!		MACHINE CODE-ACCOUNTS PACKAGE	£12.75 inc
TANTYPE!!!		BASIC-TYPING TUTOR	£7.50 inc

HARWARE-SOFTWEAR

EPROM PROGRAMMER!!!

P.C.B. & COMPREHENSIVE MANUAL & POWERFULL SOFTWARE £16.12 inc

PROGRAMMABLE GRAPHIC MODULE

P.C.B. & COMPREHENSIVE MANUAL & DEMO PROGRAM	£19.50 + vat
AVAILABLE IN KIT FORM SOON	P.O.A.
AVAILABLE ASSEMBLED SOON	P.O.A.
TUG SWEAT SHIRTS HIGH QUALITY	£6.50 inc
BLANK DATA CASSETTES. MP15's PACKS OF 10	£6.90 inc
TUGRAM..... 2114's.... 4116's.... 2716's....	P.O.A.

IF YOU REQUIRE MORE COMPREHENSIVE DETAILS ON ALL OUR PRODUCTS
SEND S.A.E. 9x4 OR GIVE US A TANRING ON (0202) 294393

YOU GET MUCH MORE WITH TUG!!!!

```
310 FOR X = 1 TO A
320 I = I+1:Q = Q-1
330 IF H(X) = N(X) THEN D = D+1:H(X) = I:N(X) = Q
340 NEXT X
350 FOR X = 1 TO A
360 FOR V = 1 TO A
370 I = I+1:Q = Q-1
380 IF H(X) = N(V) THEN E = E+1:H(X) = I:N(V) = Q
390 NEXT V
400 NEXT X
620 F = F+1
630 IF D = A THEN 705
662 S = S+1
664 P(S) = D
666 K(S) = E
670 GOSUB 800
700 GOTO 254
705 PRINT
710 ?"WELL DONE, IT TOOK YOU "F" ATTEMPTS TO GET IT RIGHT."
711 ?"MY NUMBERS WERE:-"
715 F = 0
720 FOR X = 1 TO A
730 PRINT L(X);
740 NEXT X
745 IF D<>A THEN ?"  CHEAT!":?
748 ?:?:?"PLAY AGAIN ? Y FOR YES, N FOR NO"
750 ?: GET A$:?CHR$(127)
751 IF A$ = "Y" THEN 130: IF A$ = "N" THEN END
752 END
755 GOTO 130
800 R = 0
805 FOR CL = 1 TO 16:?:NEXT CL
806 IF A = 3 THEN PRINT TAB(A*4+1)CHR$(6); CHR$(32); CHR$(32);
    CHR$(120)
807 IF A = 4 THEN PRINT TAB(A*4) CHR$(6); CHR$(32); CHR$(32);
    CHR$(120)
808 IF A = 5 THEN PRINT TAB(A*4-1) CHR$(6); CHR$(32); CHR$(32);
    CHR$(120)
810 FOR H = 1 TO G
820 J = J + 1
830 Y = Y + 1
840 PRINT M(H);
850 IF J = A THEN 865
860 NEXT H
865 R = R + 1
867 PRINT CHR$(32);
868 PRINT CHR$(32);
869 PRINT CHR$(32);
870 PRINT P(R);
880 PRINT K(R)
890 J = 0
900 IF Y = G THEN 915
910 GOTO 860
915 Y = 0
930 RETURN
```

Please note that we have included the variables in this listing as they were originally given as we feel that newcomers to Basic will benefit from a little study while the more experienced will know what to look out for.

Dear Sir,

Having recently received my TANRAM I am just discovering the lack of information supplied by T.C.S. Ltd for this product and for its installation in a system that does not have the latest Microtan 65 and Tanex boards. There is no circuit diagram, or any instructions on how to derive certain control signals from Tanex or the Microtan 65 board that TANRAM needs.

I have now discovered that the – 5v rail should be connected to pin 29. Now I require to know what pins the signals $\overline{\text{INHRAM}}$ & BE should be connected to, and where do they come from? My Microtan 65 or my Tanex do not have these signals available, and they are not included in the Tanbus specification in my Microtan 65 manual. I am assuming the other connections are the same as in my Tanbus specification. It would appear that Tanbus has been updated and I have not got the latest information on it; also, later versions of the Microtan 65 and Tanex boards may have these signals but mine does not.

Could anybody send me any information on the latest Tanbus specification and how to derive the $\overline{\text{INHRAM}}$ & BE signals from the '65 and Tanex boards. If someone could provide me with a circuit diagram for TANRAM I would be most grateful. It would be a good idea if you could publish this information in the next newsletter, as I am sure there must be other members experiencing the same problems.

Brian Stephens. 6 Pine Place, Banstead, Surrey. SM7 1LY.

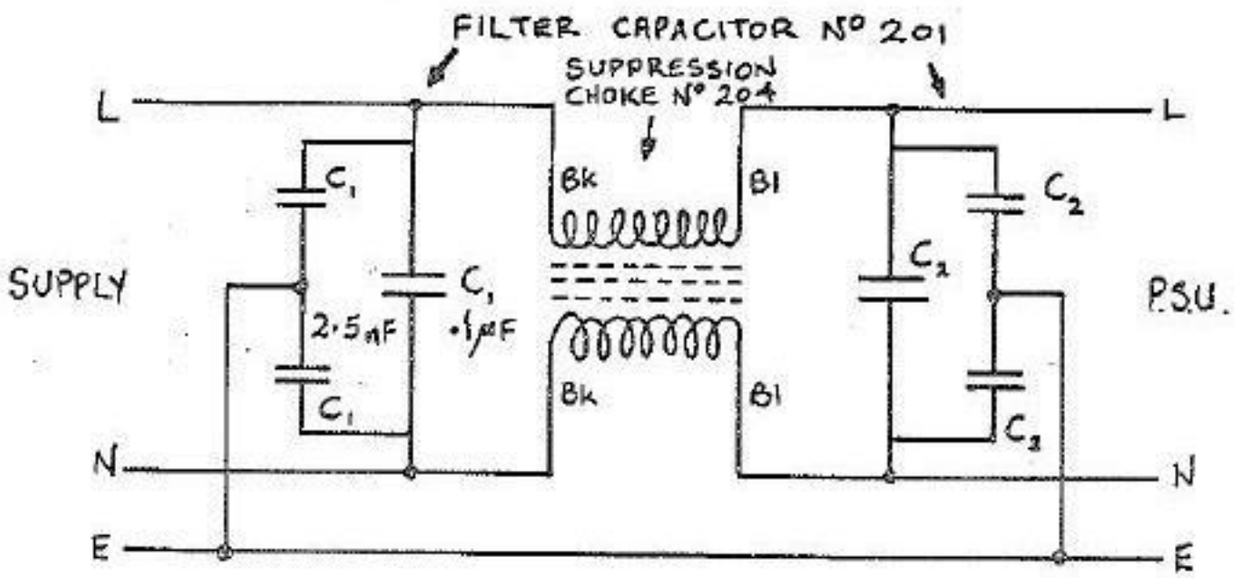
Dear Bob,

I notice that gremlins still seem to be appearing down some mains supplies. Having suffered a bad spate of this some time ago I knocked up a filter as per the diagram below. Since then I have had no problems – in fact my system can survive a quick flick of the power switch, although the 33,000mfd filter possibly accounts for that. The mains filter parts were purchased from MS Components Ltd., Zephyr House, Waring Street, West Norwood, London. Total cost is under £3.00.

I am currently having trouble with the serial interface, which appears to be reluctant to take or give data from the data bus. Has anyone out there any ideas?

Keep up the good work.

Ian Brockbank 23 Monks Close, Bircham Newton, Kings Lynn, Norfolk.



DATA STRINGS

This is a routine for stringing data strings together before saving on tape.

There must not be a NULL string untill the end of the string, since inputing a null string drops you out of the program, lines 2020 to 2050 check for array length (A$).

DATA OUTPUT

```
2000 ?"DO YOU WISH TO SAVE DATA ?";: GET F$:?:IF F$="N" THEN END
2005 IF F$="Y" THEN 2020
2010 GOTO 2000
2020 L=0
2025 IF A$(L)="" THEN 2040
2030 L=L+1 : GOTO 2025
2040 ? " SET CASSETTE ON RECORD AND":?"PRESS ANY KEY"
2050 POKE1,0
2055 IF PEEK(1)=0 GOTO 2055
2060 ?:L=L-1:POKE22,255:? L
2065 ?" SAVING " L+1 " RECORDS "
2070 T$=" ": FOR N= 0 TO L
2080 IF LEN(T$)+LEN(A$(N))<78 THEN T$=T$+A$(N)+"*":? N+1;:POKE48,0
2085 POKE3,0
2090 POKE22,25:? T$:T$= "": IF N<L THEN 2080
2100 ?" DATA SAVED "
```

We can assume that the above routine will be used to output data before the following input routine will be used. Line numbers are not important and can therefore be changed to meet individual requirements.
During the routine testing we experienced that if no data was available to load, the input routine would remain locked and required a Reset, in this particular case, the Warm start in the NK 2 Monitor was inoperative.

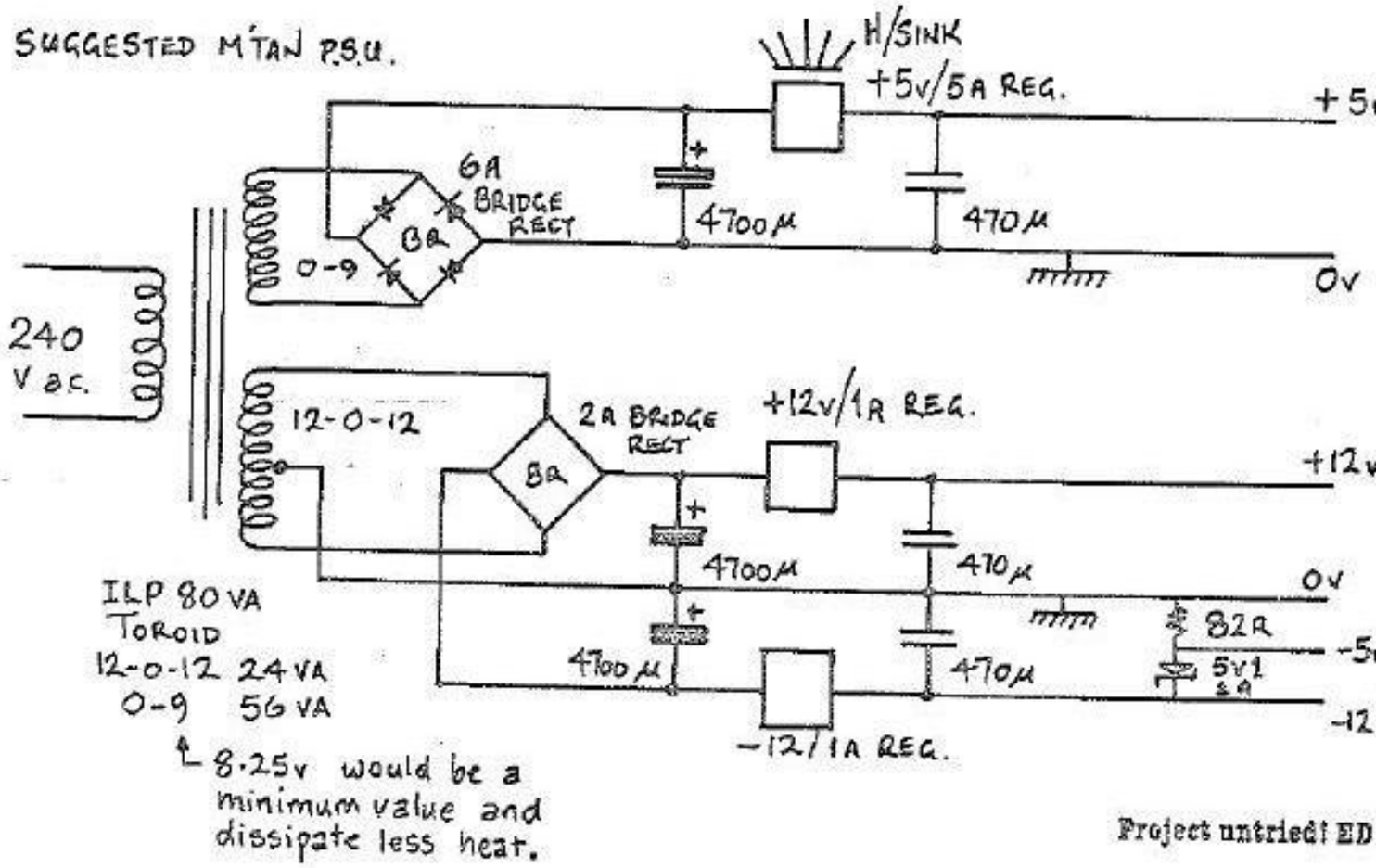
DATA INPUT

```
1000 ?" DO YOU WISH TO LOAD DATA ?";: GET F$:?: IF F$="N" THEN END
1010 IF F$="Y" THEN 1030
1020 GOTO 1000
1030 ?" PLEASE PUT CASSETTE ON PLAY"
1040 POKE22,,1: INPUT L
1045 ?" LOADING "L+1 " RECORDS "
1050 T=0
1060 POKE22,2: INPUT T$
1070 FOR N= 1 TO LEN(T$): IF MID$(T$,N,1)<> "*" THEN NEXT N
1075 ? T+1;: POKE48,0: POKE3,0
1080 L1=N
1090 A$(T)=MID$(T$,LO,L1-LO): IF T< L THEN T=T+1: LO=N+1: NEXT N
1100 IF T  L GOTO 1060
1200 ?" DATA LOADED "
```

* If the two routines are strung together together in one package, the instructions may be changed in lines 1000 & 2000 to read the appropriate destination address, e.g. THEN END changed to THEN 2000 or to whatever routine is used.

Bob,
Interesting to see the subject of power supplies coming up in the last issue of the newsletter, since the thought of replacing my twin (±12v and 5v) supplies with something a bit tidier has been at the top of my mind recently. Let me say, I've NOT got an Apple PSU, but I've been thinking of building my own. There are no more than a dozen components (see diag.). Everything is easily available and standard except for the transformer, which ILP will wind specially. The catch is that their price for a special is twice normal. All up it still comes out a lot cheaper than an MPS2 but maybe one of the members knows some manufacturer that winds a similar toroidal as standard, hence cheaper still.
Thoughts on construction ....
A Euroboard sized PCB will support everything inside the system rack and the PCB won't be a difficult one to etch. (Perhaps TUG might think of producing one for those who don't like messing about with ferric chloride). Presumably the MPS2 is built like this – I've never seen one. The only problem I can see is that all the regulator heat is dissipated inside the case.
My second thought is to mount the whole PSU on the back panel of the system rack. An ILP 80va transformer will fit **behind** the system motherboard and, best of all, the 5v regulator can go on a heatsink **outside** the case. OK, so you lose half the back panel for connectors but how much space do you need? Any comments from you, Bob, or from the rest of the membership?
I too would be interested in comment on the 'Cherry' keyboard; also on the RCA one offered by Display Electronics. Latest project: booking diary and address list for our Country Dance Band ! (PS always available Wales and the West – TUG discount).
Keep up the good work.
Ash White 11 Penderi Close, Oakdale, Gwent. NP2 0NJ.

P.S. I've given up using the BC109 buffer to my TV monitor. It works excellently directly connected with a well screened cable. A W.



Project untried! ED

TUG's XMAS BONANZA FOR IT'S MEMBERS

The Big Bumper Packs are coming 'till December 31st ONLY

Asteroid Attack) Save over £12.00 on our Xmas Bonus Jumbo Pack
Shuttle Lander)
Dive Bomber) Only **£25.00** R.R.P. £37.50

§§§

Space Invasion) Save £10.00 on this super Space Special
Space Fighter)
Scrabble)
Nim)
Demolition) Only **£20.00** R.R.P. £30.00

The Big Five Bonus Pack ! ! ! ! !

###

Pack I) Save over £6.00 on our Four-Pack
Pack II)
Pack III)
Pack IV) Only **£14.00** R.R.P. £20.50

##

Classified Ads

For Sale

Microtan as Micron & Mk 2 keyboard **less** RS232 chip, including keypad & software £290 o.n.o.

Also Mk 1 keyboard unused £42.00, 8912 sound I.C. & amp chip £6.00

Phone Blandworth (062 34) 6887 evenings