

SYDTRUG NEWS

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DRIVE MODIFICATIONS

by Gary K. Bryce

Before starting any discussion on the modification of Disk Drives, I will cover the basics of the hardware involved in the selection of drives.

In the standard system an individual drive is selected when the Disk Operating System (DOS) sends the appropriate drive select signal to memory address 37E0H, one of the four drive select lines on the drive bus is forced to a logic "0" or 0 volts. (see table 1 below)

DRIVE SELECTED	SELECT LINE STATUS			
	DS0	DS1	DS2	DS3
None	1	1	1	1
0	0	1	1	1
1	1	0	1	1
2	1	1	0	1
3	1	1	1	0

Table .1.

(NOTE: When Double sided drives are used DS3 becomes)
(the Side Select signal, reducing the number of)
(drives in a standard system to three.)

Two of the modifications that I will discuss in this article involve the switching or re-specifying of these signals to enable the more versatile operation of your system.

MODIFICATION .1

Switch selectable Drive Select

The purpose of this modification is to allow the redirection of the Drive Select lines to each drive in the system. This will enable those of us with systems using two or more Drives with differing Track counts or Side counts to select any drive in any position (ie BOOT on any drive). This modification does not involve any changes to the Disk Drives or Drive Cable in your system.

By intercepting the Select signals before they reach the Drive circuitry, they can be re-routed by means of a switch. In a two Drive system this can be accomplished by a simple Double Pole Double Throw switch (see Figure .1), to allow any drive to be selected as drive "0" in a three drive system, a three pole three position switch is required (see Figure .1).

The method used to intercept the drive select signals applies to all drives which use a fourteen pin DIL socket to route the signals (HS, DS0, DS1, DS2, MUX, DS3 & HM) to the drive. i.e. SHUGART, TEAC, MPI, TANDON etc. For those drives which use other methods, i.e. PERTEC, TEAC (half height), another method would need to be developed.

To modify a four drive system, all that is involved is the replacement of the switch by a four pole four position switch and the inclusion of the fourth drive select signal.

DRIVE .A.

Note:- All fourteen wires need not be brought out to the switch, only those drive select signals to be used need be brought out via the header. Shorting bars may be inserted in the header for HS, MUX or HM signals.

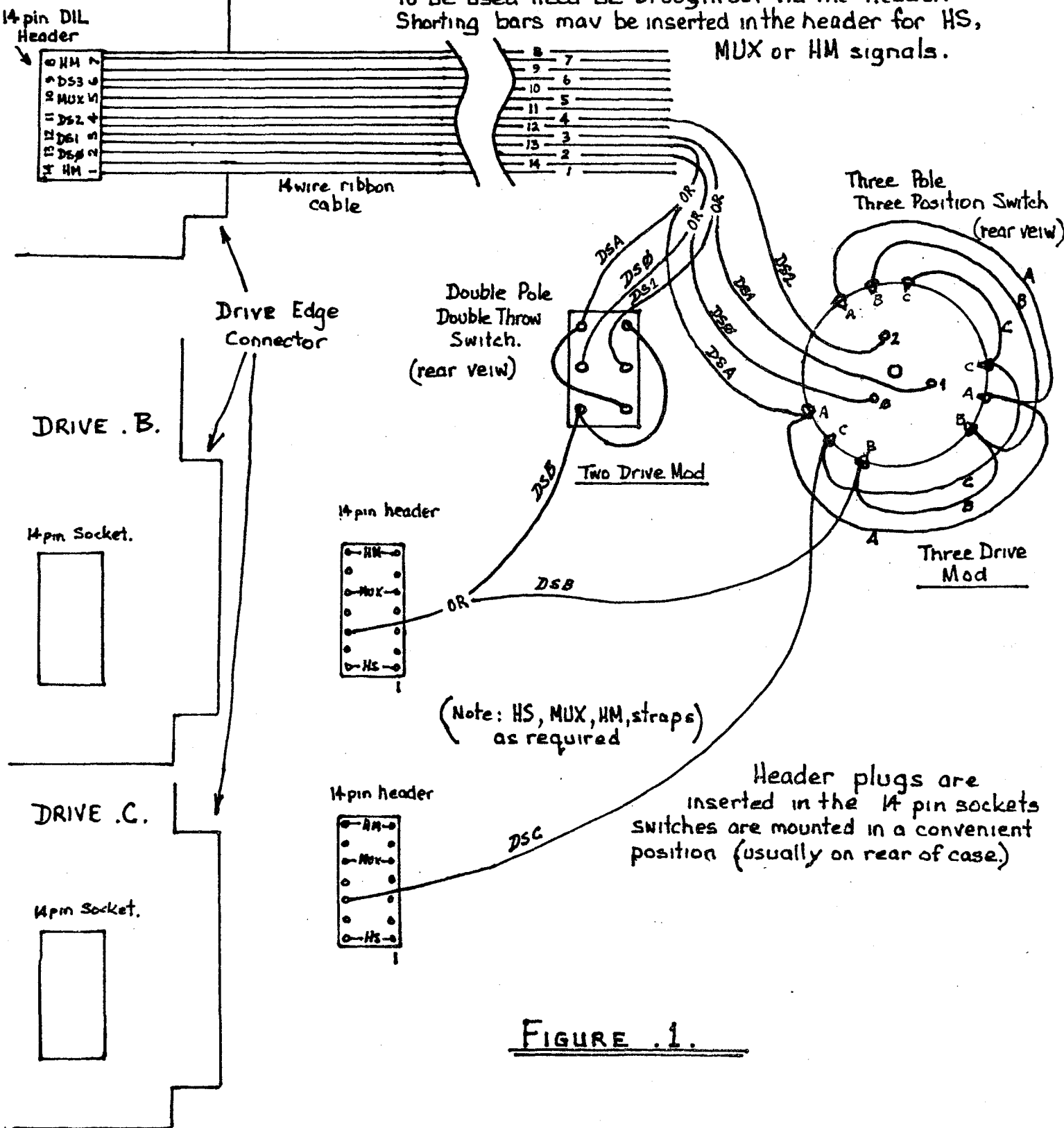
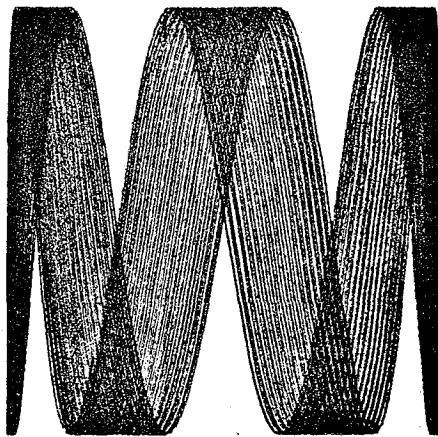
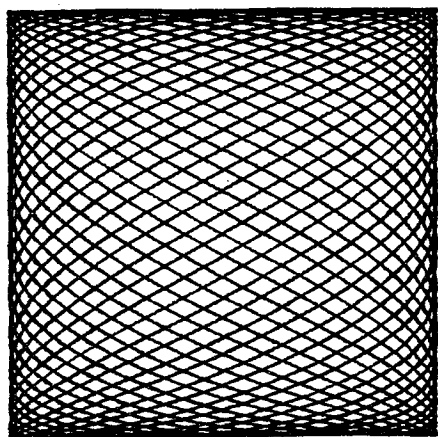


FIGURE .1.



GENERAL

5 MB ON LINE

This mod is only really useful to those of us with one or more spare Drives sitting on the shelf, it allows the use of up to seven double sided drives in the system, although the extra drives will only be available when a DOS which supports this hardware is used (ie Alan Johnstones' Newdos/80 ver.2.0). This mod does not preclude the use of an unmodified DOS, but the extra drives will not be accessible under the unmodified DOS. This modification does not involve any changes to the Disk Drives.

As I discussed at the beginning of this article, each drive is selected by enabling one only of the drive select lines. To enable more drives the software must be able to output the drive select signals in binary code (modified for normal operation on unmodified DOS'es), meaning that more than one select line can be enabled at one time. These coded signals are intercepted in the same manner as Mod .1, but instead of being routed to a switch, they are routed to a decoder board, using a 74LS138 one of eight decoder. The decoding table follows.

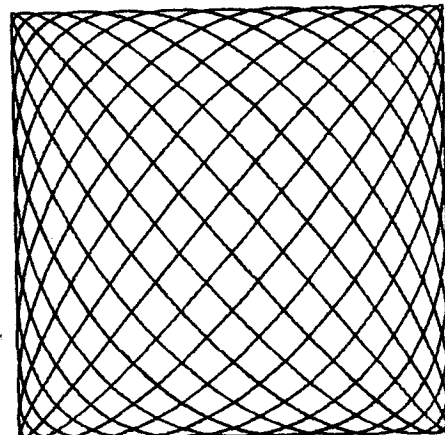
DECODING TABLE.

DRIVE SELECTED	PDRIVE Ds	SELECT LINES IN				SELECT LINE OUTPUTS							
		DS0	DS1	DS2	DS3	0	1	2	3	4	5	6	
NONE		1	1	1	1	1	1	1	1	1	1	1	
0	1	0	1	1	1	0	1	1	1	1	1	1	
1	2	1	0	1	1	1	0	1	1	1	1	1	
2	4	1	1	0	1	1	1	0	1	1	1	1	
3	3	0	0	1	1	1	1	1	0	1	1	1	
4	5	0	1	0	1	1	1	1	1	0	1	1	
5	6	1	0	0	1	1	1	1	1	1	0	1	
6	7	0	0	0	1	1	1	1	1	1	1	0	
74LS138 pin No.		1	2	3	-	9	10	12	11	13	14	15	

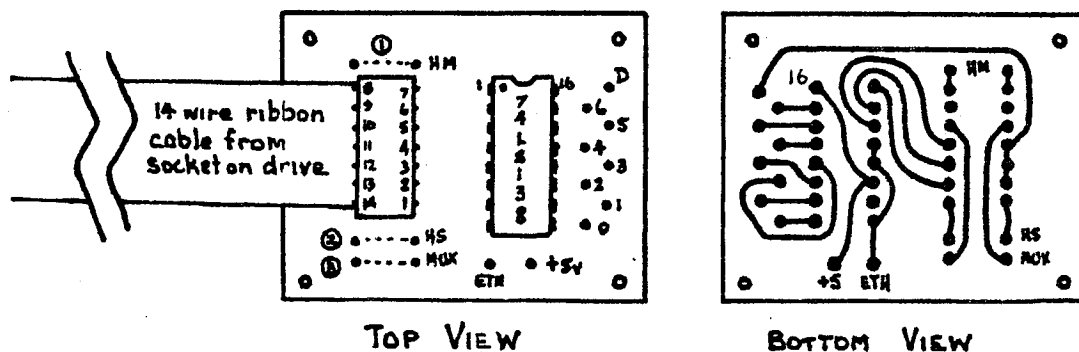
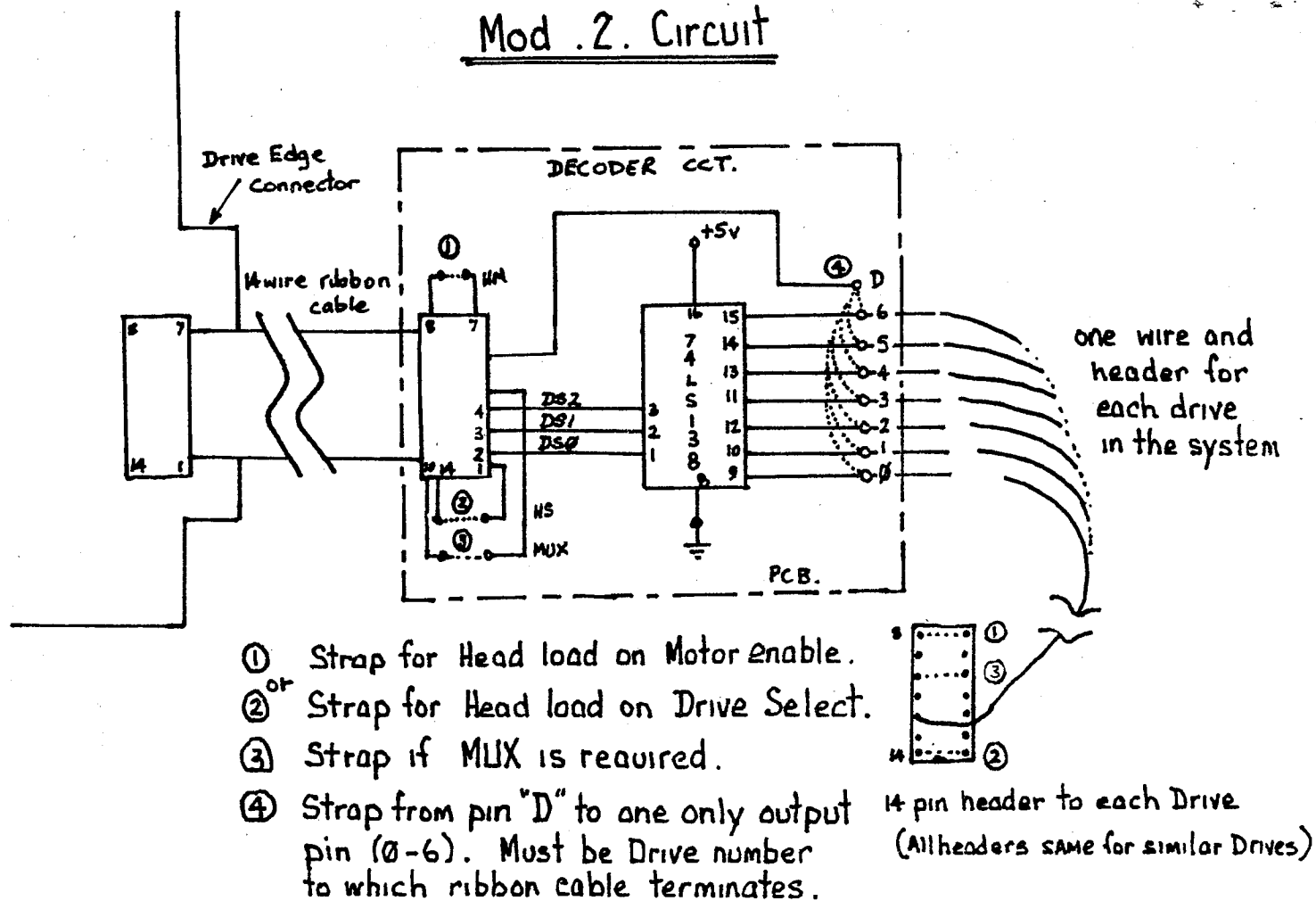
I have reserved drive select line four (DS3) as the side select signal, for use with double sided drives, and therefore anyone using only single sided drives will lose the use of drive three under unmodified DOS'es, it is possible to devise a circuit for this situation (using a one of sixteen decoder), but as the software mod to the DOS will only support a maximum of eight drives, I decided that seven double sided drives, giving a maximum of 5.16 Mega bytes of storage, using double density, would be sufficient.

PARTS LIST

1. 2 x 14 pin Dual in line headers
2. 1 length of ribbon cable
3. 1 x 74LS138
4. n-1 x 14 pin DIL shunts (or headers)
5. 1 x Printed circuit board
6. 16 x PCB stakes



Mod .2. Circuit



Mod .2. P.C.B. LAYOUT

ACTION REQUIRED

1. Etch a printed circuit board following the layout supplied.
2. Assemble the jumper cable using the ribbon cable and two DIL headers.
3. Mount components, PCB stakes, 74LS138 Decoder and one end of jumper cable to the PCB.
4. Insert straps (1), (2), (3) & (4) as required for your system.
5. Mount decoder board in a convenient position and wire the +5V and Eth connections of the PCB to the o/p of the power supply
6. Connect wires from decoder outputs to shunts (or headers) as per circuit.
7. Insert jumper plug in drive as per strap (4), insert shunts in all other drives.
8. Test operation before reassembling case.

CONCLUSION.

When the decoder board has been installed, the Pdrive Ds specifications must be set to those listed in the decoding table and the extra drives must be enabled using the DOS command :-
SYSTEM dn AL=n, where dn is the drive which contains the diskette to be modified and n is the number of drives to be enabled (maximum of seven).

This mod could be combined with Mod .1 by routing some of the decoder outputs to a switch instead of directly to the drives.

If anyone has any questions or suggestions about these or other modifications, I would be glad to give any help that I can, I can be reached at the number appearing at the of this article.

by Gary K. Bryce,
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The Australian Beginning

If you have a modem or an acoustic coupler, and are interested in joining the T.A.B. (The Australian Beginning) through the Users Club, for the low cost of \$40.00, then please complete the application form hereunder, and return to the club with the fee.

SYDTRUG.

Computer. Brand _____

Model _____

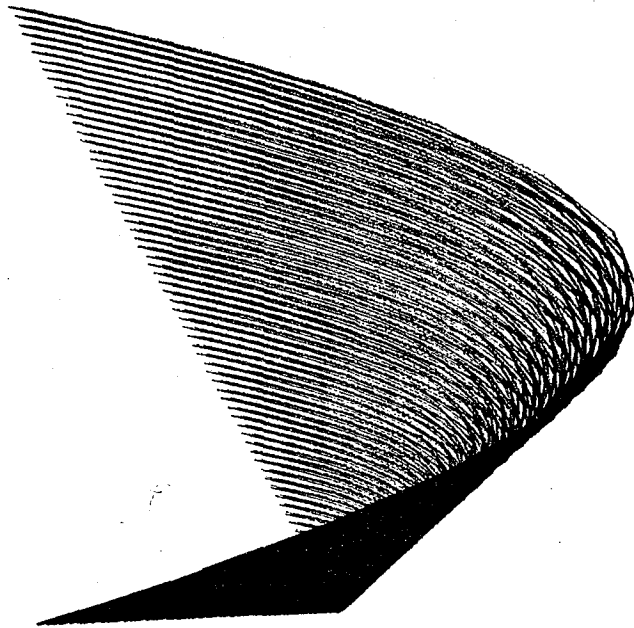
Name. _____

Address. _____

Telephone _____

Fee of \$40.00 herewith.

Signed _____



The plots scattered around this issue were plotted on the Tandy Printer/Plotter that was on sale last month for \$599 (down from \$1299). Each was formed by use of parametric equations such as $x = 300 \sin(3t)$

$$y = 300 \cos(7t)$$

The value of t was increased by a small amount at each step and a straight line drawn from the current pen position to the new coordinate position. By making the changes in t small enough the tracks appear curved.

I saw a demonstration of the Basis MEDFLY on 8/6/83 and was impressed by it. It was more than an Apple-clone. The case was solid made from steel, a fan was provided even though after 2 hours the case was still COLD. 2 processors are included though only one can be in operation at a time. Software included on the 128k version included CP/M for a Z80 at about 2.5 mh, and 6 versions of Apple compatible DOS for the 6502 at about 1 mh. The screen format is either 40 characters wide or 80 characters depending on the DOS in use. The price was better than the Apple.

The release of the VZ200 by Dick Smith sets a new low in Australia for the price of colour computers. This should put a lot of pressure on the firms with the inflated prices to reduce theirs. It's a little silly to see TI colour computer flogged for \$499 here when the price in the US is well under \$200. Ditto for half a dozen other machines.

FOR SALE

De Forest Data Separator, not used, \$10. See Col Elphick.

If you have anything to sell that may be of use to other members, there is space in this newsletter. Contact Col Elphick 543-1643.