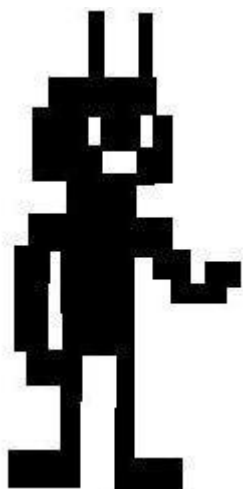# TRS8BIT

HELLO EVERYONE.

IT'S MARCH, SPRING IS JUST AROUND THE CORNER, SO I OFFER A VERY WARM WELCOME TO YOU ALL WITH THIS EDITION, WHICH STARTS OFF OUR 11TH YEAR OF PUBLICATION AND OFFER BIG THANK YOU TO EVERYONE WHO HAS SENT IN ARTICLES.

I'D JUST LIKE TO SAY 'HI' TO THE RECENT WEBSITE VISITORS FROM TAICHUNG IN TAIWAN AND LVIV IN THE UKRAINE.

THERE HAS BEEN QUITE A BIT OF INTERESTING ACTIVITY ON THE UK EBAY JUST RECENTLY. A M4P FETCHED £157 AND A VIDEO GENIE COMPLETE WITH A DOUBLE DISK DRIVE REACHED £206. IF THE LUCKY BUYERS ARE READING THIS, HOW ARE YOU GETTING ON WITH THEM? WE'D ALL LOVE TO HEAR ABOUT IT.

:: STOP PRESS ::
I'VE JUST BEEN NOTIFIED THAT

In this issue of
TRS8BIT
WITH 60 PAGES IN THIS ISSUE

PLEASE CHECK OUT FULL DETAILS ON

PAGE 2

EPISODE 13 OF TRASHTALK IS NOW AVAILABLE.

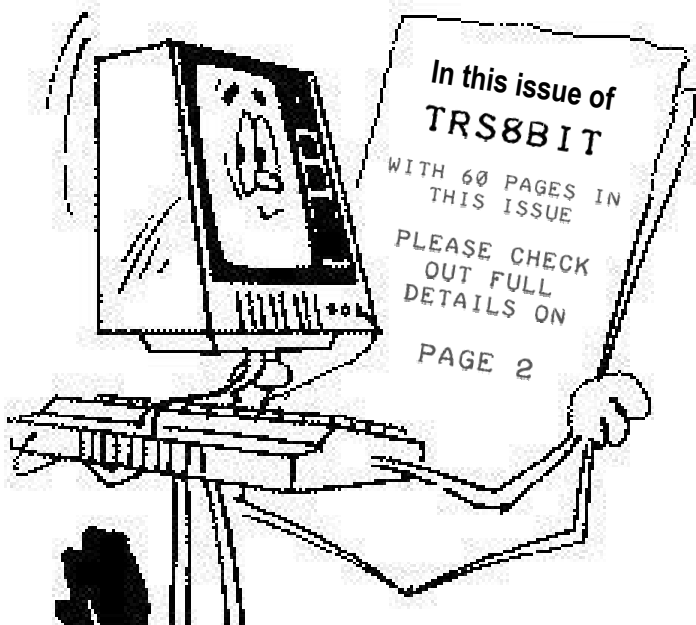MY THANKS GO TO STEPHEN WALTERS FOR THE TIP ABOUT THE EXATRON WAFERS ON EBAY.

UNFORTUNATELY, THEY WERE THE 'BLUE WHEEL' TYPE WHICH, IN THE UK, WERE RENOWN FOR SHEDDING THEIR COATING! IS ANYONE OUT THERE WORKING ON AN SD CARD-TYPE INTERFACE FOR THE EXATRON?
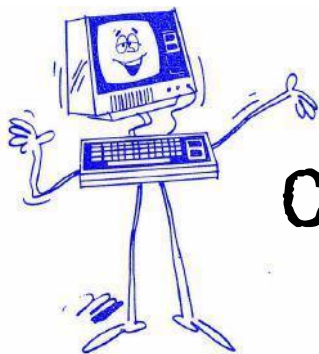
SO, DOWN TO THIS ISSUE. I HOPE I'VE FOUND AND RECEIVED ARTICLES WHICH GRAB YOUR INTEREST OR INSPIRE YOU TO 'NEW THINGS TANDY'. IF THERE IS SOMETHING SPECIFIC YOU WOULD LIKE TO SEE, PLEASE CONTACT ME AND I'LL TRY MY BEST FOR YOU.

PRINTERS SEEM TO FEATURE IN THIS ISSUE WITH MAV DETAILING THE ORIGINAL LP1. THERE'S A REVIEW OF THE CGP-115, FROM THE DAY AND DETAILS OF PRODUCING A PRINTER CABLE TO A CENTRONICS INTERFACE. GEORGE PHILLIPS HAS ASSISTED ET FONEHUME WITH HIS ONE LINE PROGRAM MUSIKEY TOGETHER WITH A COUPLE OF ADDITIONAL IDEAS FROM ET. ANDREW QUINN RE-CASES AND EI, PASCAL HOLDRY CLEANS-UP OLD KEYBOARD KEYS AND MARK MCDOUGALL SHOW US A 'TANDY ON A CHIP'.

SO, UNTIL JUNE TAKE CARE EVERYONE

DUSTY

CONTENTS

IN MAV'S WORKSHOP

by Ian Mavric

MAKE A PRINTER CABLE FOR YOUR MODEL I,III,4,4P,4D AND TANDY 1000

Little defence has been made of Radio Shack's printers sold for the TRS-80 line of computers. Most were decent printers which got the job done, some were exceptional in terms of printed output quality and speed, and a few were downright terrible for exactly the opposite reasons.

Radio Shack's marketing view was, much like the computers they sold, if you wanted to print something then Tandy had the printer no matter how little or much you wanted to spend. One thing which was never included, and always sold at an extra cost was the printer cable. I would say that 99% of printers were sold with this additional $50 cable, which connected from a 34-way parallel printer bus on the TRS-80 to the 36-way Centronics parallel port on the printer.

Not too many people have asked me about TRS-80 printers because it would appear that the uses people have for their TRS-80s in the modern era don't require much or any printing. I even rarely use one myself, mainly only to print diskette labels, which gives them that nice period dot -matrix look.

Other than that I don't need to print from a TRS-80. However people have been asking me about printer cables as they are finding printers on eBay or Gumtree and need a way of connecting them. Amusing that will possibly 99% of printers were sold with the cable, very few printers that come up for sale include the cable. Fortunately building one is easy.

PARTS REQUIRED
The cable itself comprises of three parts:

A 34-way card-edge connector:
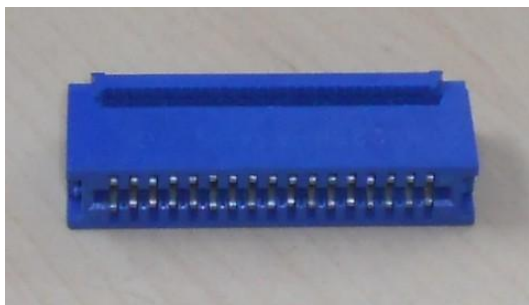
(Make sure the one you buy has no polarity keyway between teeth 3/4 and 5/6 - those are for disk drives and will not fit onto the TRS-80 printer port.)

A 36-way Centronics connector:

And some 34-wire ribbon cable:

(I have found these cables work well up to about 1.8m long but if you sit your printer right next to your TRS-80 you can make the cable as short as you like.)

CONSTRUCTION

Building the cable is fairly straightforward. Start by crimping the 34-way card-edge connector on one end of the cable. The cable has a red stripe which indicates pin 1, and the card-edge connector will be either numbered, or have a small triangle indicating which is pin 1. Line the cable with pin one and crimp.

At the printer end you will have already noticed that the Centronics connector is 36-way, so two of the pin connections will not be used and it's important that the cable is connected to the correct 34 pins.

Looking at the Centronics connector you will see they are numbered. **Just make sure that pin 1 (red stripe) is connected to pin 1 on the Centronics connector.**
For those who care, this will mean that pins 18 and 36 will not be connected to anything.

Your cable should look like this:
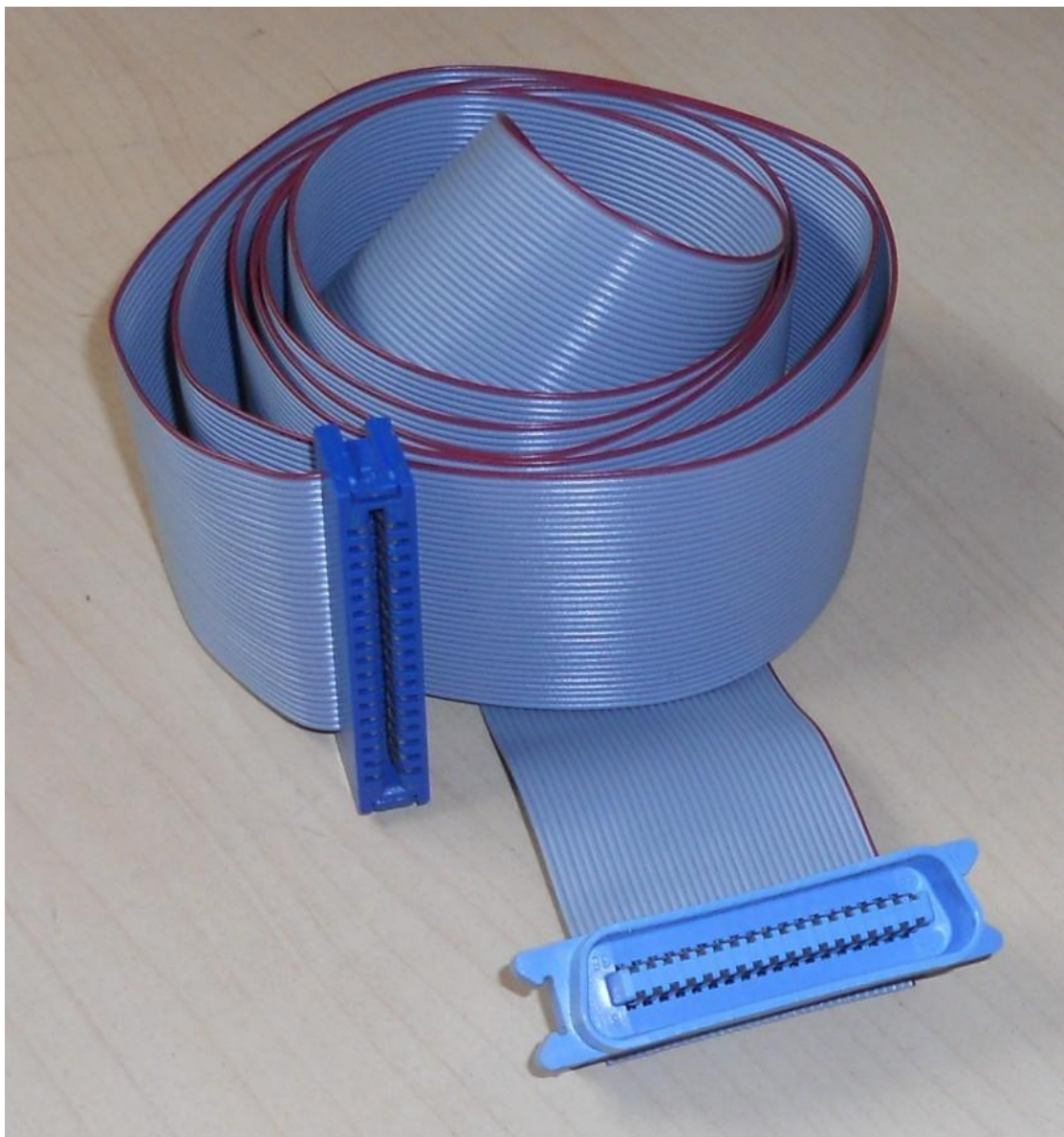
Picture: Completed TRS-80 printer cable

INTERESTING NOTES FOR CURIOUS PEOPLE

PIN NUMBERING ANOMALY: The pin numbering on the card-edge connector is different than on the Centronics connector. Card edge connectors number the pins 1 on the top row then 2 below it, then 3 on the top row and 4 below it, and so on. A Centronic connector numbers the pins across the connector, so on the top row is pins 1 to 18, and on the bottom row 19 to 36. This means that on the ribbon cable wire 1 (red stripe) connects to pin 1 on both the card-edge and Centronics, but that's the only one. Wire 2 on the ribbon cable connects to pin 2 on the card-edge but pin 19 on the Centronic. Card-edge pin 3 connects to Centronics pin 2 and card-edge pin 4 connects to Centronics pin 20 and so on. This is why when you apply that numbering scheme to a 34-wire ribbon cable you end up with pins 18 & 36 on the Centronics unused.

TANDY 1000 INCLUSION: Readers will have noticed from the title of the article that the Tandy 1000 series of computers is included in those that can use this printer cable. Including a TRS-80 compatible printer port was no flippant move on Radio Shack's part, because at the time of the Tandy 1000s release they saw the machine as the next logical upgrade path for Model I/III/4 users who might have large investments in expensive TRS-80 printers and their consumables. A selling point at the time would have been that you can retire your old TRS-80 and plug your shiny new Tandy 1000 series PC into your faithful old Daisy Wheel II, DMP-2100 or CGP-220 and keep working.

CONCLUSION

For people versed in making their own ribbon cables one of these can be made in about 15 minutes once you have obtained the parts. For those who prefer to buy a completed assembled and tested cable, drop me a line as I make and sell them as needed to individual's required length.

Ian Mavric

ianm@trs-80.com

Ian Mavric is an IT Specialist who also restores and collects TRS-80's and classic cars. He live with his wife and kids in Melbourne, Australia.

TRS-80 Emulators . com

TRS32: A Model I/III/4/4P Emulator For Windows

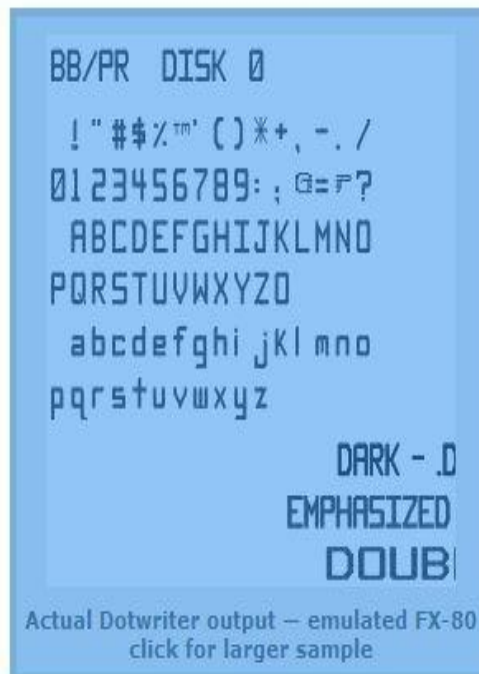written by Matthew Reed

Unregistered Shareware Version:

- Works under all current versions of Windows
- Full Windows application — no low-level hardware conflicts!
- Model I, Model III, Model 4, and Model 4P emulation
- Four floppy disk drives (with optional realistic disk drive sound)
- Cassette tape drive with graphical on-screen controls
- Exatron Stringy Floppy emulation
- Printer support
- Serial port for RS-232 communications
- Joystick support (using a Windows joystick — TRISSTICK and Alpha Products joysticks are emulated)

Registered Version:

- All features included in the shareware version
- Built-in emulation of an Epson FX-80 dot matrix printer (including graphics and control codes)
- High resolution graphics (Radio Shack and Micro-Labs)
- Up to 1 megabyte of additional memory in Model 4 and 4P modes
- Hard disk support
- Orchestra 85/90 music generation

Interested?

- Read the TRS32 emulator documentation
- Download the shareware version
- Register online


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Actual Dotwriter output — emulated FX-80
click for larger sample

MATTHEW'S EMULATOR IS QUITE ASTOUNDING.
IT'S MY FIRST CHOICE WHEN DEVELOPING IDEAS FOR TRS8BIT.
HE OFFERS FULL SUPPORT AND IT IS STILL UNDERGOING ENHANCEMENT.
IF YOU HAVEN'T REGISTERED YOUR SHAREWARE VERSION YET, PLEASE DO SO AND ENCOURAGE
AND SUPPORT MATTHEW'S ENTHUSIASM TO CONTINUE WITH HIS WORK.

ED.

I MAKE NO APOLOGIES FOR STARTING OFF WITH THE NEXT COUPLE OF ITEMS, WHICH ARE NOT, IN ITS PUREST SENSE, TANDY RELATED. THE FIRST ARTICLE, BELOW, BY BOB RICHARDSON, JUMPED OUT AT ME WHEN I OPENED MY COPY OF "SMALL PRINTER". (THE OFFICIAL, PUBLICATION OF THE BRITISH PRINTING SOCIETY, BPSNET.ORG.UK). AS THERE HAS BEEN MUCH TALK ON THE TRS-80 FORUM REGARDING HI-RES GRAPHICS, FOR THE MODELS 1, 3 AND 4 AND EVEN FOR THE M2, I HOPE YOU WILL FIND THEM OF INTEREST. PERHAPS EVEN WORTHY OF A PROJECT.

Out of the Archives

St BRIDE FOUNDATION

St Bride Library holds around 60,000 books, 3,600 periodical titles and several hundred thousand artefacts related to printing, publishing, paper-making and the book arts. Many of the artefacts in particular are not listed in the catalogue, but simply stored in boxes and packages on some 4km of shelving that fills the many storerooms used by the library and dotted around the red brick building on Bride Lane. Located close to Ludgate Circus and Fleet Street, the building was constructed between 1891 and 1894. It was designed by Robert Cunningham

artefacts, but some of the more quirky and unusual pieces filed away in the 2,500+ archival boxes which line the shelves.

Tisley's Harmonograph Print

We start with a small piece of printed ephemera (actual size 3" x 3") produced using a piece of technology that captured the Victorian imagination. Alongside you will find an example of a harmonic print, produced on Tisley's Harmonograph.

$$x(t) = A_1 \sin(tf_1 + p_1)e^{-d_1 t} + A_2 \sin(tf_2 + p_2)e^{-d_2 t},$$
$$y(t) = A_3 \sin(tf_3 + p_3)e^{-d_3 t} + A_4 \sin(tf_4 + p_4)e^{-d_4 t}.$$

Harmonograph Formula

Murray, and this rambling old Victorian pile is a maze of corridors and staircases, with some 50 or so rooms. Many are filled with library stock, and such is the breadth of the collections that some of the more obscure holdings have not seen the light of day in many decades. These are not always 'treasures' in the sense that they have a high monetary value, but they are often items which are unique or rare because they were meant to be disposable and should not have survived. The type specimen collection (over 10,000 catalogued items, and many more unrecorded) is a good example of the latter.

Out of the Archives will feature an item from the St Bride Collections each month. These may not always be important historical documents or

Tisley & Spiller were opticians, with commercial premises in London's Brompton Road, but their workshops also produced a wide range of scientific and optical instruments. Barometers, dog whistles, microscopes, apparatus relating to 'telephonic electricity' and even a patented phoneidoscope (for visualising sound waves with the aid of pollen) were manufactured at their works.

Tisley's Harmonograph produced eleborate 'Spirograph'-style designs using a pair of damped pendulums. A pen travelling in an elliptical pattern, governed by the movement of a simple pendulum, follows a gradually decaying orbit on a platform which is also moving according to a different direction of swing generated by another

AS USUAL IN CASES LIKE THIS, THE SECOND ARTICLE, ON THE NEXT
TWO PAGES, SIMILARLY JUST SEEMED TO PRESENT ITSELF FROM
NOWHERE, AND AS A LIFE-LONG FAN OF MECCANO, I JUST COULDN'T
BELIEVE MY LUCK IN FINDING TWO SIMILAR ARTICLES ON SUCH A
UNUSUAL SUBJECT. IT'S ACTUALLY FROM THE DECEMBER 1958
EDITION OF MECCANO MAGAZINE, (I'VE JUST REALISED, I WOULD
HAVE BEEN 12 AT THE TIME IT WAS FIRST PRINTED!).

E.T. ANY CHANCE YOU COULD MAKE A ONE-LINER HARMONOGRAPH PROGRAM?

pendulum. Got it? The patterns are not entirely random, but can be dictated by modifying the various control elements. Tisley's Harmonograph operates according to a rational parametric equation, thus:
(See the image opposite for the

Machine—which helpfully included details of the precise settings required for Tisley's Harmonograph to produce each pattern shown in the book. (These settings would have been recorded in the space between the brackets on the St Bride example).
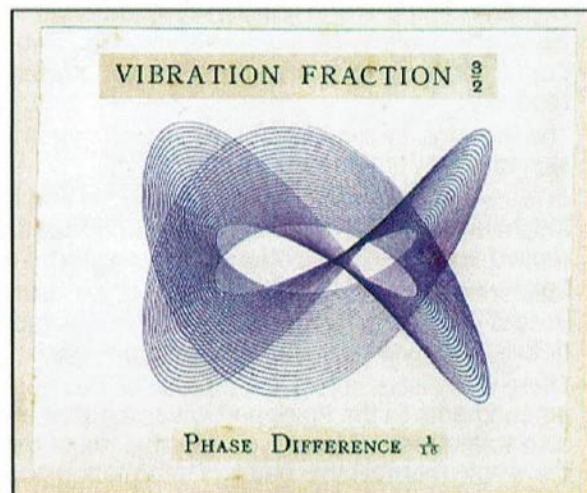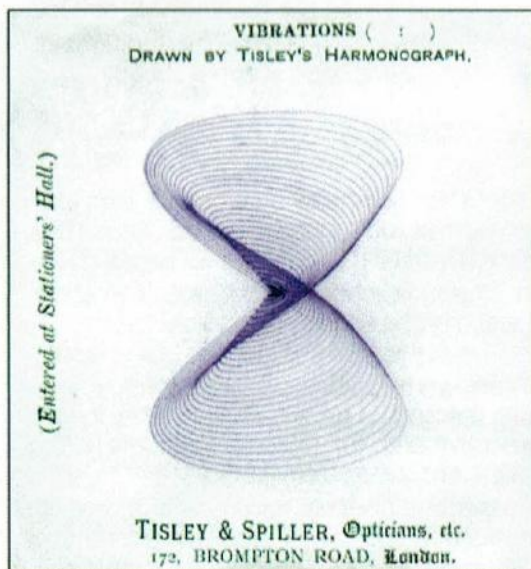
Left: Harmonograph example from St Bride Library.
Right: Illustration from Whitty's book, showing machine settings.

Harmonograph examples

mathematical formula)

The Harmonograph serves no practical purpose: it was simply a Victorian novelty based upon scientific principles. It was invented by Hugh Blackburn, Professor of Mathematics at Glasgow University, during the 1840s, although it was Samuel Tisley, in collaboration with his business partner George Spiller, who perfected a machine to draw these attractive curves according to programmable parameters in the late 1870s. It was possible to reproduce the same pattern again and again by making precise adjustments to the mechanisms. In 1893 author H. Irwine Whitty demonstrated this in his book—*The Harmonograph: Illustrated by Designs Actually Drawn by the*

The purple ink used on this scrap of paper also showcases a major Victorian invention. The Harmonograph pattern is drawn in ink pigmented with the world's first synthetic dye—aniline purple—probably manufactured in the 1880s just a few hundred yards from my current home. Invented by William Perkins in 1856, it was produced in large quantities at a factory in Greenford, Middlesex, close to the Grand Union Canal. Greenford now has a William Perkins High School, named after the great man. The uniform is, perhaps unsurprisingly, a fetching shade of mauve.

Bob Richardson (9718)

A Model Harmonograph

Build this fine Designing Machine

THE complete Harmonograph is seen in Fig. 1. It consists of a pendulum that carries a table at its upper end and is mounted pivotally in such a manner that it is free to swing in any direction. When the pendulum is set in motion a ball pen suspended above the table traces out a design on a piece of paper attached to the table. The addition of a second pendulum, flexibly attached to the lower end of the first one, makes the designs produced by the machine more intricate.

The base of the Harmonograph is a box-shaped structure built by joining the ends of two 12½″ Angle Girders by 5½″ Strips. Four 2½″ Strips are bolted vertically to the ends of the Angle Girders; the upper ends of the forward pair are connected by a 5½″ × 2½″ Flanged Plate 1 and those of the rear pair by Angle Brackets and a 5½″ Strip. Two 12½″ Strips are also bolted between the shorter flanges of Plate 1 and the rear 2½″ Strips.

Each side of the base consists of two 4½″ × 2½″ Flexible Plates and one 2½″ × 2½″ Flexible Plate, which are bolted between the 12½″ Strips and the Angle Girders. The top of the base consists of a 4½″ × 2½″, a 2½″ × 2½″ Flexible Plate and a 2½″ × 1½″ Flexible Plate, together with one 5½″ × 1½″ Flexible Plate 2. A 5½″ Angle Girder is bolted to Angle Brackets that are fixed in the 6th from end holes in the 12½″ Strips of the base. The Flexible Plates are arranged as shown in the illustration and are supported at the sides of the base by Angle Brackets. A 9½″ Strip 3, bolted down the centre of the base, strengthens the structure

Two 12½″ Angle Girders are bolted at one end to a 5½″ Strip 4 fixed to the base in the position shown. They are bolted also to the Flanged Plate 1, and to them two Flat Trunnions 6 and 7 are fastened, each

Fig. 1. The Harmonograph, a machine that produces fascinating designs by means of a swinging pendulum.

bolt carrying two Washers on its shank between the Flat Trunnion and Angle Girder. Reversed Angle Brackets, one of which is shown at 8, are then bolted to the inner sides of the Flat Trunnions, and through the free end hole of each Bracket a bolt is fastened to form the supports for the swivel frame 9, which is constructed by joining two 2½″ × ½″ Double Angle Strips with 1½″ Strips. Two 3″ Screwed Rods passed through the centre holes of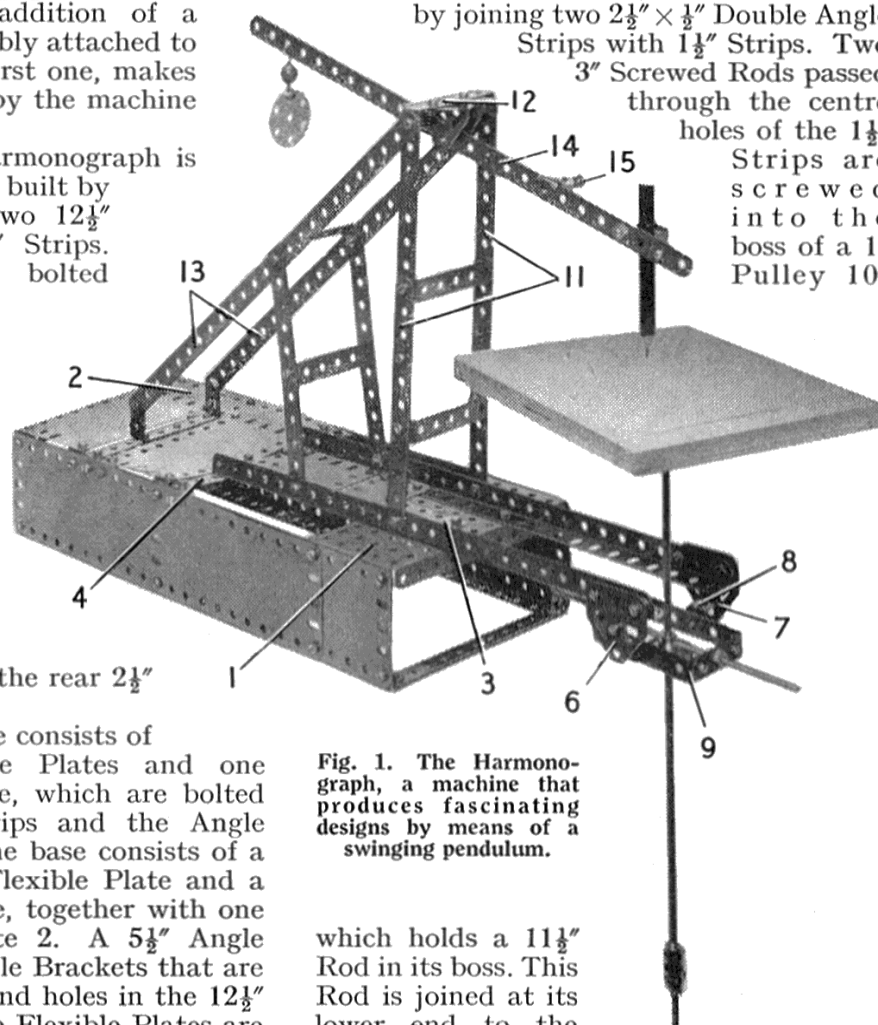 the 1½″ Strips are screwed into the boss of a 1″ Pulley 10, which holds a 11½″ Rod in its boss. This Rod is joined at its lower end to the pendulum by a Coupling.

The pendulum consists of three or four 11½″ Rods coupled end to end, and carries a bob weight, which can be made up from any convenient parts or pieces of metal available. The weight should be about 1 lb.

The designs are drawn on sheets of paper pinned to the table, which is of wood and is approx. 6 in. square. A Bush Wheel is

screwed to its underside and this is fixed on the end of the 11½″ Rod held in Pulley 10. If desired a Hinged Flat Plate can be used as a table by fastening it to the Bush Wheel by two Double Brackets. The paper used should be of good quality and have an even surface. Rough paper, and also paper with a highly finished surface, should not be used. Ordinary writing paper will do.

The support for the pen arm consists of two compound strips 11, each comprising two 5½″ Strips overlapping four holes, which are secured to the 12½″ Girders on the top of the base. The Strips 11 are joined at their upper ends by a Double Angle Strip 12, the bolts holding also two 12½″ Strips 13. The lower ends of the 12½″ Strips are fastened to Fishplates bolted to the lugs of a further 2½″×½″ Double Angle Strip that is fixed to the base of the model. The pen arm 14 is a 12½″ Strip and is pivotally mounted on a lock-nutted ¾″ Bolt to Trunnions bolted underneath the Double Angle Strip 12. Washers and nuts are used to space the arm centrally on the Bolt. It is best to use a ball pen and this can be held in a Double Bent Strip fixed to the pen arm as shown. A lock-nutted Bolt can be used to grip the pen lightly and hold it in place.

The pressure of the pen on the paper can be regulated by adjusting a balance weight 15, which is moved along the arm until the pen just rests
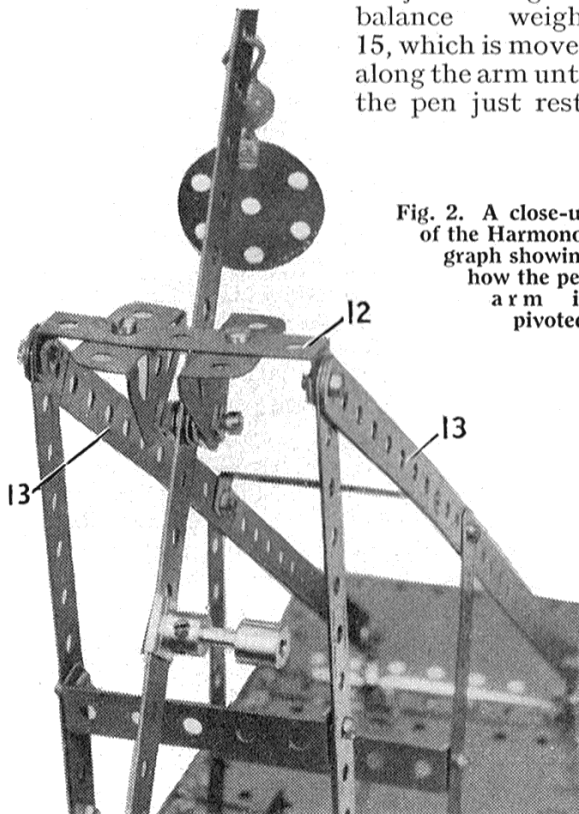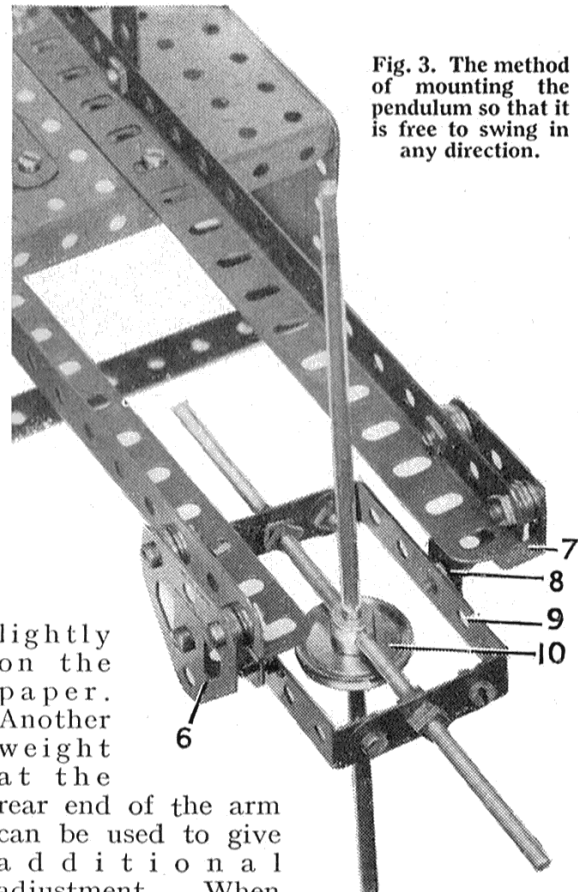

Fig. 3. The method of mounting the pendulum so that it is free to swing in any direction.

lightly on the paper. Another weight at the rear end of the arm can be used to give additional adjustment. When the model is completed some very interesting effects can be obtained by superimposing one design on another, and by using a compound pendulum designs of a more intricate type can be produced. A compound pendulum is made simply by making up a weight, such as a quantity of nuts and bolts enclosed in two Boiler Ends and then connecting the extra weight to the end of the main pendulum by a piece of string about 6″ in length. Also by adding extra weights to the pendulum the latter will continue to swing for a longer period. Another way of introducing variety into the designs is to vary the weights on the two pendulums, increasing the load on one and slightly decreasing that on the other.

Parts required to build the Harmonograph: 5 of No. 1; 1 of No. 1a; 10 of No. 2; 4 of No. 5; 2 of No. 6a; 4 of No. 8; 3 of No. 10; 9 of No. 12; 4 of No. 13; 1 of No. 22; 1 of No. 24; 1 of No. 24c; 95 of No. 37a; 89 of No. 37b; 14 of No. 38; 1 of No. 45; 8 of No. 48a; 1 of No. 50; 1 of No. 52; 1 of No. 57c; 1 of No. 63; 2 of No. 80; 1 of No. 111a; 6 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 126a; 1 of No. 173a; 1 of No. 188; 1 of No. 189; 4 of No. 190; 2 of No. 191; 4 of No. 192.

Fig. 2. A close-up of the Harmonograph showing how the pen arm is pivoted.

TANDY'S NEW four-pen Colour Graphic Printer could have the same dramatic effect on printing as the change from black and white to colour screen displays has had on computing. It is a direct descendent of the CE-150 2.25in. colour printer produced by Sharp for the PC-1500.

The printer, complete with RS-232 and Centronics interfaces, costs £149 including VAT but not including any connecting cables. It comes with a power supply, operation manual, three black pens, one each of blue, green and red, and a roll of plain paper 4.5in. wide and 180ft. long. The machine is a healthy 8.5in. square by 3in. high and weighs 1.75lb. It is coloured silver-grey, with a black top cover which is raised to gain access to the pens and their holders.

The printer can print either 80 or 40 characters per line. The ASCII character set from code 32 to code 127 is implemented, although unfortunately there is no pound sign. A switch marked special characters provides for Japanese script.

The characters are not produced by a dot matrix or burnt into aluminised paper. In either case, present technology would not permit 80 characters within a space of a little over 3.75in. The characters are formed in the machine's internal ROM and written on to the paper using ink pens. The effect is similar to high-quality type-written text. Except for the lack of proportional spacing of characters, and paper width, the performance is as good as many professional printers.

The printer has two modes of operation, text and graphics. The Graphics mode permits character size to be varied from 80 characters per line to one character per line, in 63 steps retained on return to text mode. Characters can also be rotated in 90° steps. Also available is the facility to draw 15 different types of dashed line. Colour can be changed and a return to text initiated with very simple commands.

Axes are specified in terms of X or Y with a defined step and interval. The step is a multiple of 0.008in. between 1 and 999, positive and negative, and the interval, the number of repetitions of the step, is between 1 and 255.

The effective X-axis resolution of 480 steps and equivalent vertical resolution draws convincing circles, without annoying steps on the edge.
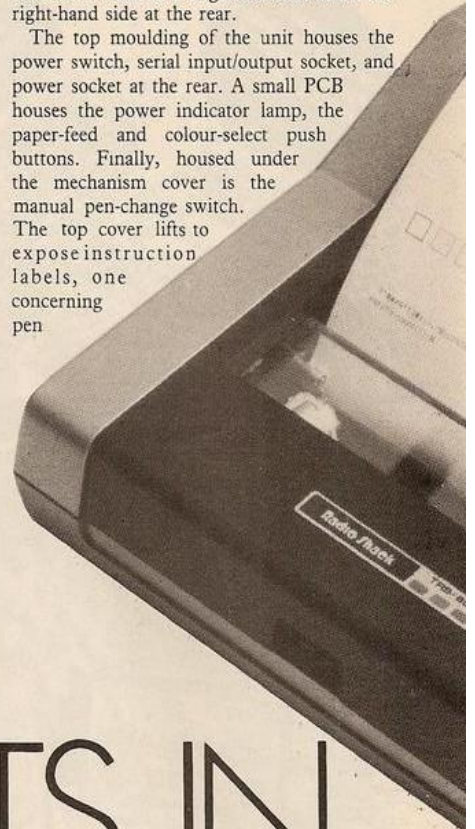
The printing speed is a slow 12 characters per second. At present screen dumps of graphics are not possible.

The machine is opened by undoing five screws in the base and releasing four locking tabs to release the top moulding. The base holds the print and feed mechanism at the front. The paper drive is friction-fed by a full-length rubber compound roller and side pressure rollers which also prick the edge of the paper at 0.156in. steps. This gives the effect of tractor drive and has the advantage of providing the Y axis with a quoted accuracy of one percent coupled, with a repetition accuracy of 0.008in.
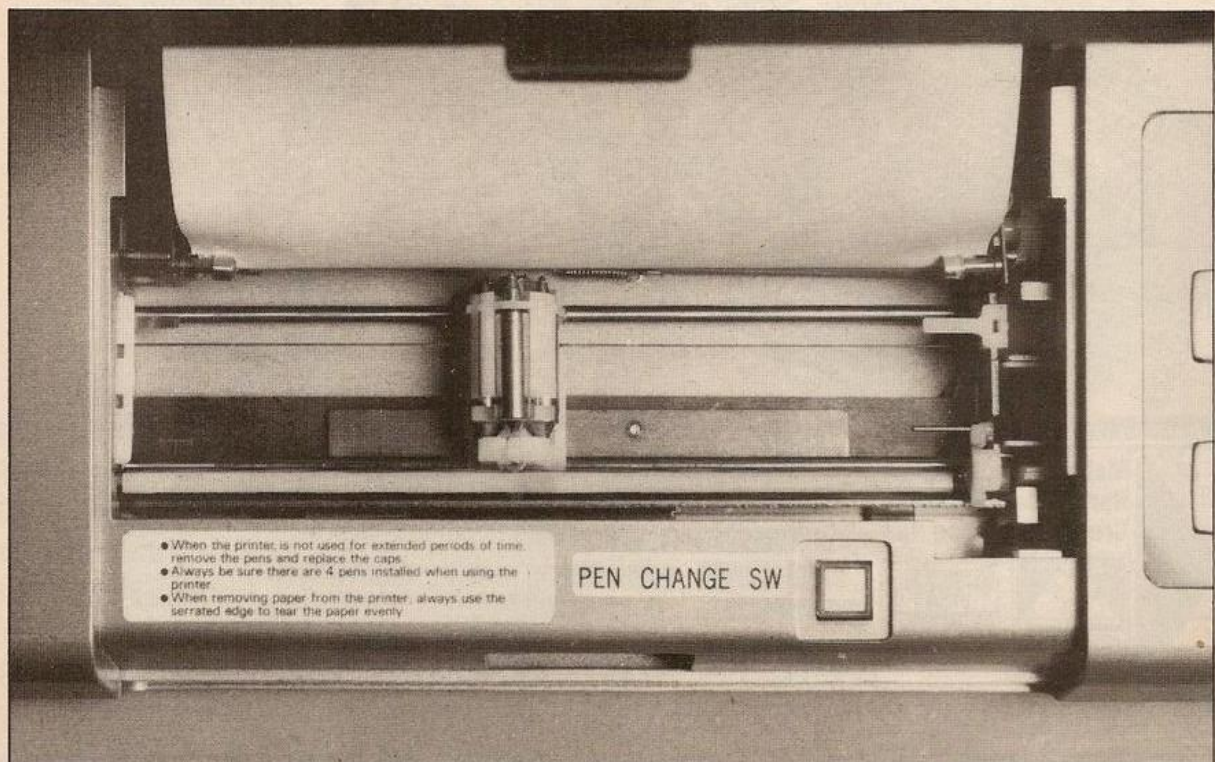
The PCB is screened from interference and the major integrated circuit components are encased in a screened box shaped around the parallel input/output socket — very professional. There is a large heat sink down the right-hand side at the rear.

The top moulding of the unit houses the power switch, serial input/output socket, and power socket at the rear. A small PCB houses the power indicator lamp, the paper-feed and colour-select push buttons. Finally, housed under the mechanism cover is the manual pen-change switch. The top cover lifts to expose instruction labels, one concerning pen

CGP-115 LISTS IN

- When the printer is not used for extended periods of time, remove the pens and replace the caps.
- Always be sure there are 4 pens installed when using the printer
- When removing paper from the printer, always use the serrated edge to tear the paper evenly

PEN CHANGE SW

REVIEW

If your listings are listless and your printouts are plain, the CGP-115 could be what you are looking for. Kathleen Peel checks it out.

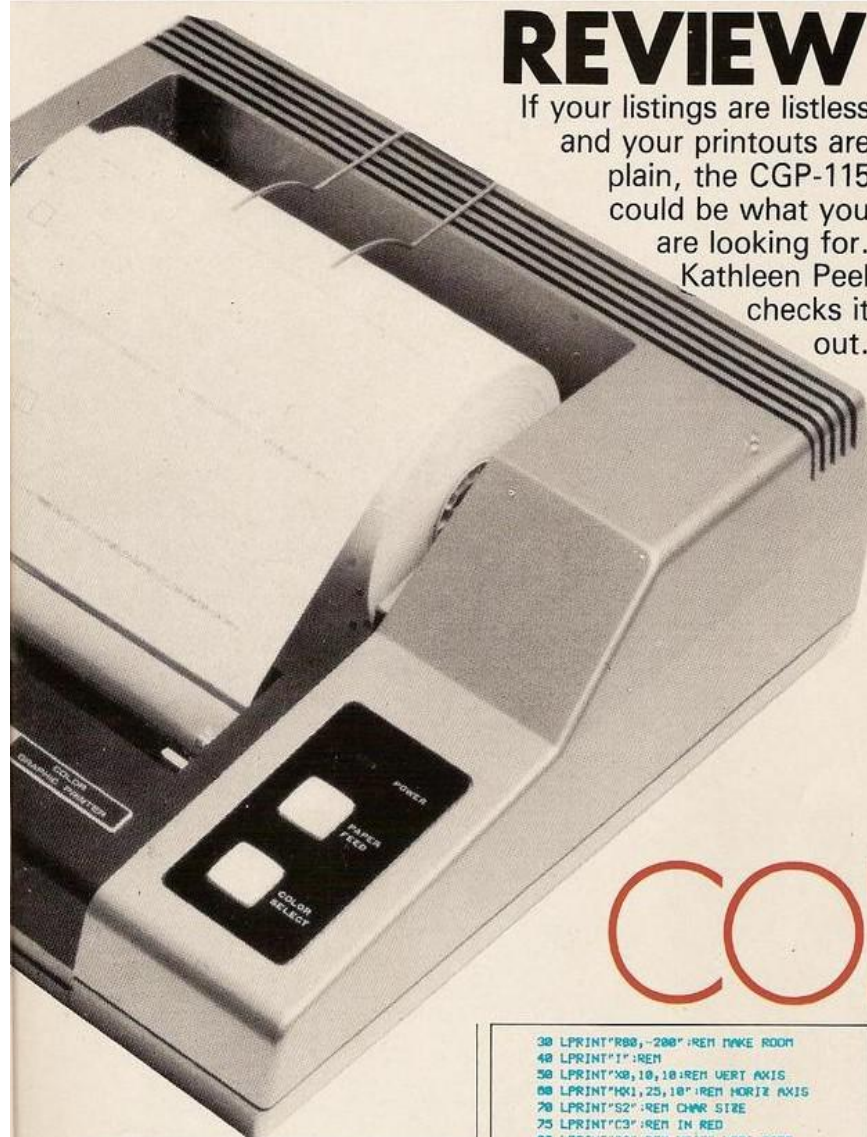replacement and the other noting how to look after your printer.

The 50-page manual is well laid out and clear, but there are some omissions. The appendices provide some Basic programs which produce pie charts, sine and cosine curves.

It is surprising that there is no indication of the connections on the four-way DIN socket masquerading as an RS-232 interface. Only pins 2, 3 and 4 are wired. Table 1 gives the connections. The serial interface operates at 600 baud with no parity and two stop bits.
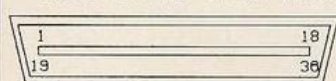
The parallel interface is via a Centronics-type plug but the only connections used are busy — Pin 11, strobe — Pin 1 acknowledge — Pin 10 and the data lines.

Loading the paper was initially a bit of a problem. A protrusion in the centre prevented the paper from being entered into its loading slot completely, and so take up, by pressing the paper-feed button, could not take place. The answer was to cut a strip of paper 6in. long by 1in. wide and load this into the slot close to one edge, such that it could be fed through by hand. The strip was then slid across into a central position and the full paper width loaded over the top of the strip. As soon as take up was established the strip was removed. I only used this procedure twice as, whatever the obstruction was, it disappeared. Loading the pens was straightforward if a little fiddly. Neither operation is likely to be required very often.

COLOUR

```
30 LPRINT"R80,-200":REM MAKE ROOM
40 LPRINT"I":REM
50 LPRINT"X0,10,10:REM VERT AXIS
60 LPRINT"HX1,25,10":REM HORIZ AXIS
70 LPRINT"S2":REM CHAR SIZE
75 LPRINT"C3":REM IN RED
80 LPRINT"Q3":REM WRITE LEFT SIDE
90 LPRINT"M-10,10":REM POS PEN
92 LPRINT"PSALE":REM WRITE VERT
94 LPRINT"M10,-40":REM POS PEN
96 LPRINT"Q0":REM WRITE RIGHT WAY
97 LPRINT"C2":REM IN GREEN
98 LPRINT"P    1983":REM TITLE
150 LPRINT"C1"
170 LPRINT"M0,0"
190 LPRINT"D20,75"
200 LPRINT"D50,50"
210 LPRINT"D100,100"
250 LPRINT"C0"
259 LPRINT"S0"
260 LPRINTT4,C0
261 FORX=1T06:LPRINTL0:NEXTX
262 LLIST
264 END
```

Above: typical 80-character printout.

ORIC--TANDY CGP-115
Centronics Interface

SPEEDBLOC CABLE   RS 462-289
MOUNTING SOCKET   20-WAY
Above: sample Oric/CGP-115 printout.

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pqrstuvwxyz{|}~
```
Auto-test character set.

Pin	Function
1	Not connected
2	Busy
3	Earth
4	Data

Table 1. Four-pin socket terminations.

	Printout	
	Length/£	Sq. ft./£
Sinclair	27.2	9.1
Amber	129.4	24.3
CGP-115	112.8	42.3

Table 3. Paper usage running costs.

```
10 REM LINE SAMPLE PROGRAM
20 PRINT,CHR$(18)
30PRINT,"L3"
40PRINT,"J480,0"
50PRINT,"A"
60 END
```
Sample BBC/CGP-115 printout.

When the printer is switched on, the pen carrier traverses to the left-hand edge and rotates the pens to ensure that holder number one is in the top working position. The printer then draws four boxes produced sequentially by the pens in holders 1, 2, 3 and 4. This is to ensure that the user is aware of any dried-up pens.

Pressing the paper-feed button at switch on sets in motion a self-test procedure that also prints the character set in the four loaded pen colours.

CONCLUSIONS

■ Tandy's new printer will transform data presentation and allow the computer to interpret results fully, for ease of reading, varying colour, indentation, and print size as necessary.

■ The graphics capability provides for considerably better resolution that available to the majority of micros. The lack of a screen-dump facility is likely to be temporary as users will soon develop software to produce screen dumps in colour.

■ This high-quality printer can only be faulted on paper width, and slow speed which may make it unsuitable for word processing. ■
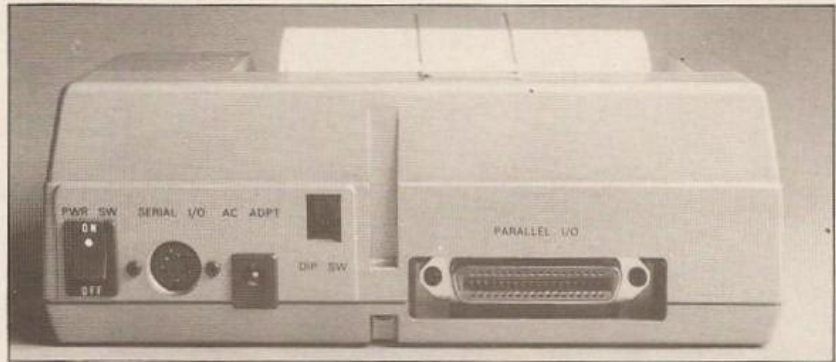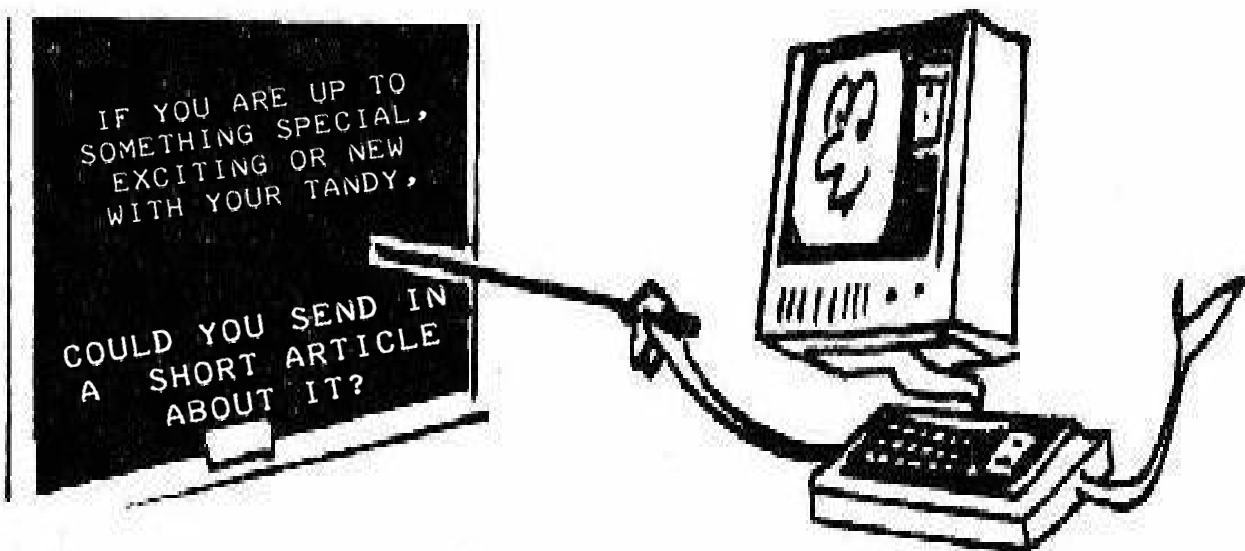
Table 2. Comparison of machines.

	Colours	Characters		Paper			Printer Size in.	Basic Cost £	Accessories		
		line	sec	Type	Width in.	Length ft.			Paper	Ribbons	life
Sinclair Printer	1	32	50	Metal-ised	4	65	5.5 × 2.9 × 1.9	59.95	11.95 for 5		
Amber 2400	1	24	17	Plain	2.25	88	6.3 × 6.3 × 3.1	89.70	3.40 for 5	2.00 Ribbon	3 × 88ft. rolls
Tandy CGP-115	4	80 to 1in. 63 steps	12	Plain	4.5	150	8.4 × 8.6 × 3	149	3.99 for 3	1.69 for 3 pens	825ft. each pen

A GREAT LITTLE PRINTER WITH BOTH PARALLEL AND SERIAL
INTERFACES. HAS ANYONE SUCCESSFULLY MANAGED SORT OUT HOW TO
'REFILL' THE PENS WITH INK?

PAPER ROLLS, OF THE CORRECT SIZE (TANDY CAT. NO. 26-1428),
ARE STILL AVAILABLE IN THE U.K. FROM EBAY, MRPAPER.CO.UK
ETC., BUT IF YOU'RE DESPERATE I CAN FIND YOU A SPARE ROLL.
PLEASE EMAIL ME.

IF YOU ARE UP TO SOMETHING SPECIAL, EXCITING OR NEW WITH YOUR TANDY,

COULD YOU SEND IN A SHORT ARTICLE ABOUT IT?

TANDY

TRS-80

MICRO-ORDINATEUR

Pourquoi un micro-ordinateur personnel ?

Parce qu'il vous fera gagner un temps précieux, que vous soyez chef d'entreprise ou homme de science, ingénieur ou enseignant, étudiant ou simplement père de famille! Le TRS-80 offre en effet une souplesse d'emploi telle qu'il peut être utilisé avec succès dans l'entreprise (comptabilité, facturation, calcul des salaires, inventaire,...), au laboratoire (calcul scientifique, classification de produits...), dans l'enseignement (apprentissage de l'informatique, des mathématiques, des langues...) et même à la maison (gestion du budget familial, classement des factures,... ou pour le jeu!). En fait les possibilités du TRS-80 ne sont limitées que par la créativité de son utilisateur, ses besoins et son imagination. Pourquoi ne bénéficieriez-vous pas, vous aussi, des bienfaits de l'informatique !

DANS L'ENTREPRISE

DANS L'ENSEIGNEMENT

A LA MAISON

SYSTEME DE BASE (26-1001)

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TVA incluse

LE PREMIER MICRO-ORDINATEUR ACCESSIBLE... ET EFFICACE !

Conçu et réalisé aux Etats-Unis par Tandy, le TRS-80 est complètement monté et testé: il suffit de le brancher pour qu'il fonctionne. Nous vous présentons ci-dessus notre **système de base expansible.** La conception modulaire de notre TRS-80 vous permet en effet de transformer le système de base en un système très élaboré capable de résoudre la plupart des problèmes des petites et moyennes entreprises. La gamme très complète de périphériques et de logiciels dont vous trouverez la description dans cette brochure vous prouvera que notre TRS-80 n'est pas un gadget extravagant mais bien un outil précieux qui mérite votre confiance !

TRS-80

I HAD A VERY GENEROUS (AND ANONYMOUS) DONATIONS TO THE SITE RECENTLY. AMONG THE BITS, WAS AN 8 PAGE TANDY CATALOGUE FROM BELGIUM. LATE 1970'S OR EARLY 80'S I WOULD GUESS.
IF THERE'S ANYONE IN BELGIUM WHO WOULD LIKE THE ORIGINAL FOR THEIR OWN COLLECTION, (I.E. NOT TO SELL ON EBAY), PLEASE CONTACT ME AND I'LL HAPPILY POST IT OFF TO YOU. (1ST COME, 1ST SERVED!)

MUSIKEY MK2

GEORGE PHILLIPS
&
E.T. FONEHUME

HI DUSTY
IF YOU REMEMBER, IN THE LAST ISSUE, I SUBMITTED A 2-LINE 1-LINER CALLED MUSIKEY. AS, I'M SURE YOU'LL AGREE, A 2-LINE PROGRAM RATHER DEFEATS THE OBJECT OF A 1-LINER COMPETITION, BUT I WAS UNABLE TO FIT ALL THE CODE INTO 1 LINE. EVEN SO, YOU DID PUBLISH IT IN THE NEWSLETTER WHICH WAS VERY SPORTING OF YOU.

ANYWAY, HERE'S THE GOOD (ACTUALLY IT'S FANTASTIC) NEWS. I HAD A SUPER EMAIL FROM GEORGE PHILLIPS WHO'S CRACKED THE PROBLEM FOR ME. MANY THANKS GEORGE.

HOWEVER, IT IS FAIR TO SAY THAT EVEN WHEN IT FITS WITHIN ONE LINE, THE SOUND IS NOT MUCH BETTER :)
HERE'S THE MK2. 1-LINER FOR YOU TO TRY.

```
1 B=32000:DEFUSR=B:FORC=BTOB+21:READE:POKEC,E:NEXT:FORZ=1TO8:REA
DT(Z):NEXT:FORY=0TO1STEP0:N=VAL(INKEY$):IFN=0NEXTELSEN=USR(T(N))
:NEXT:DATA205,127,10,76,69,62,1,211,255,16,254,69,62,16,211,255,
16,254,13,32,239,201,142,128,114,106,96,84,74,70
```

THE MONTY HALL PROBLEM
E.T. FONEHUME

THE MONTY HALL TELEVISION PROGRAM "LET'S MAKE A DEAL" GAME SHOW
WAS VERY POPULAR IN THE USA FOR A NUMBER OF YEARS.

THE MONTY HALL PROBLEM (WHICH I CAME ACROSS QUITE BY ACCIDENT THIS
XMAS WHILE TRYING TO AVOID THE SWEET SOUNDS OF CAROLS PLAYED BY
MUSIKEY) SEEMS A COUNTER-INTUITIVE PUZZLE.
THERE ARE 3 DOORS, BEHIND WHICH ARE TWO GOATS AND A CAR.
YOU PICK A DOOR (FOR EXAMPLE, DOOR 1), WHICH YOU HOPE HAS THE CAR
BEHIND IT.
MONTY HALL, THE GAME SHOW HOST, EXAMINES THE OTHER DOORS (2 & 3)
AND ALWAYS OPENS ONE OF THEM WITH A GOAT. (IF BOTH DOORS HAVE
GOATS, HE'LL RANDOMLY PICK ONE TO OPEN). HE THEN ASKS IF YOU WISH
TO SWAP 'YOUR' DOOR FOR THE OTHER REMAINING UNOPENED DOOR.

NOW HERE'S THE PROBLEM. DO YOU STICK WITH DOOR 1 (YOUR ORIGINAL
GUESS) OR SWITCH TO THE OTHER UNOPENED DOOR? AND DOES IT ALTER
YOUR CHANCES OF WINNING?

SURPRISINGLY, THE ODDS AREN'T 50-50. IF YOU SWITCH DOORS, THE
CHANCES ARE YOU'LL WIN 2/3 OF THE TIME! HERE'S A 1-LINER TO GIVE
YOU ALL SOME STATISTICS!

```
1 RANDOM:CLS:FORG=0TO1STEP0:R=R+1:PRINT@192,R;") ";:W=RND(3):PRI
NT"CAR IN";W;:F=RND(3):PRINT"PICK";F;:IFF=WTHENK=K+1:NEXT:ELSEC=
C+1:FORX=0TO1STEP0:S=RND(3)::IFS=W OR S=FTHENNEXTXELSEPRINT"OPEN
";S;"KEEP WINS";K;"CHANGE WINS"C:NEXTG
```

7427) CAR IN 1 PICK 3 OPEN 2 KEEP WINS 2444 CHANGE WINS 4982

THE MATRIX - ET FONEHUME

HI DUSTY.
THE OTHER DAY I CAME ACROSS THIS SUPER WEBSITE :-

https://www.screensaversplanet.com/screensavers/matrix-code-emulator-390/#reviews

IT HAD A SMASHING 'MATRIX' TYPE SCREEN SAVER WHICH HAD ME THINKING,
COULD I PRODUCE SOMETHING SIMILAR FOR MY M1 L2?
I HAD A GO AND TO MY SURPRISE, IT DIDN'T WORK OUT TOO BAD. IF YOU'RE
RUNNING MATTHEW'S EMULATOR, IT'S BETTER IF YOU INCREASE THE RUNNING
SPEED JUST A LITTLE :)

```
10 DATA 8448,15360,4352,15424,256,64,-20243,201:CLS:DEFINTA-Z:RA
NDOM:FORQ=0TO7:READW:U(Q)=W:NEXT
20 FORG=0TO1STEP0
30    FORZ=1TO9:A(Z)=RND(58)+2:PRINT@A(Z),"↓";:NEXTZ
40        FORV=1TORND(7)
50            FORH=16256TO15360STEP-64:U(1)=H:U(3)=H+64
60            DEFUSR=VARPTR(U(0)):J=USR(0)
70            NEXTH
80        NEXTV
90    PRINT@0,CHR$(30);
100 NEXTG
```

THAT'S CERTAINLY A GREAT WEBSITE ET - I'VE DOWNLOADED MY OWN COPY :)

Repairing keys - TRS-80 M1 L2 / M3

Pascal Holdry

This tutorial is intended for the repair of the keys 2 pins for keyboard TRS-80 M1 level2 and M3

Over time the keys no longer work! Removing the key

Top view
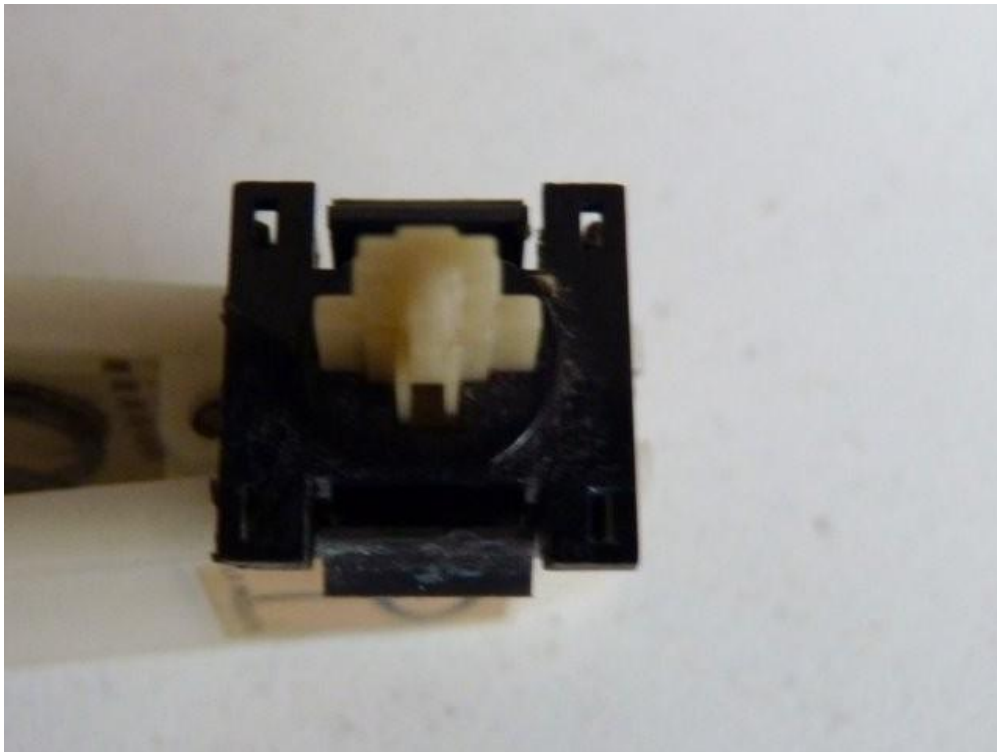
View from below
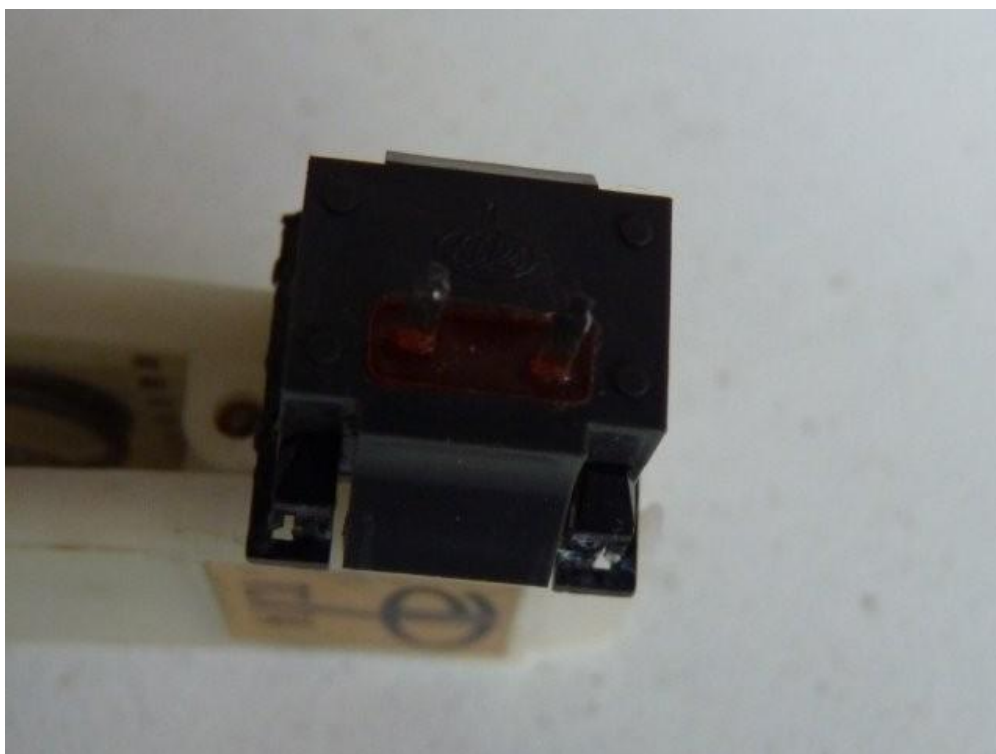
Profile view
You can see the 2 clips (right and left) that hold the button closed
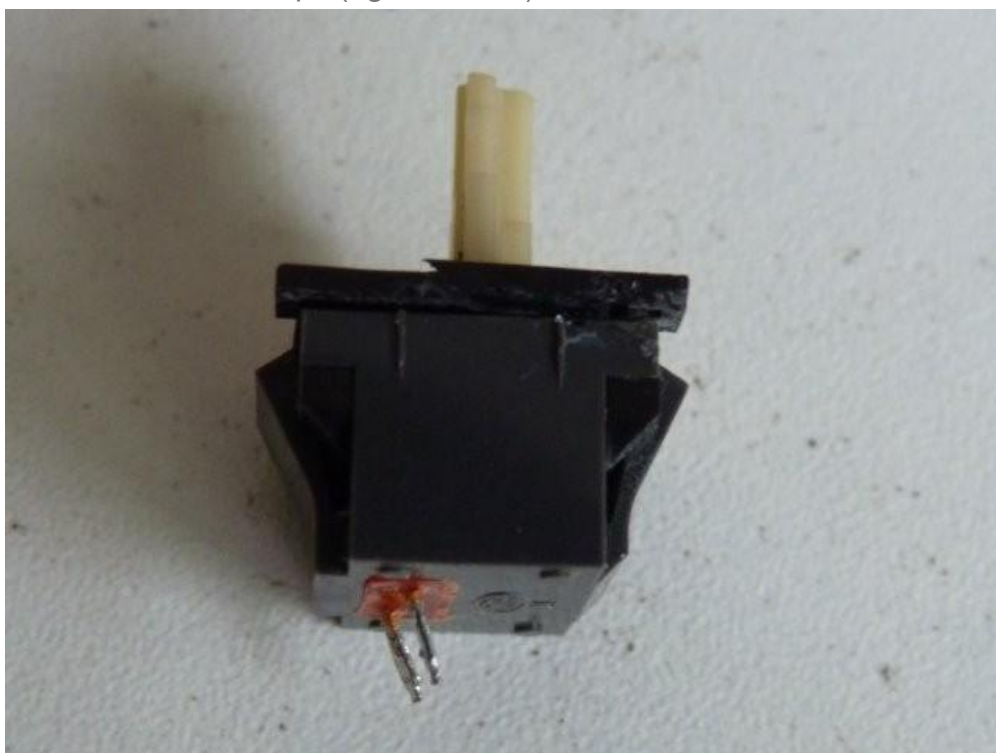
Opening the key
To open the key, simply disengage 2 clips on both sides of the button with a thin blade (see below) (or 4 clips)
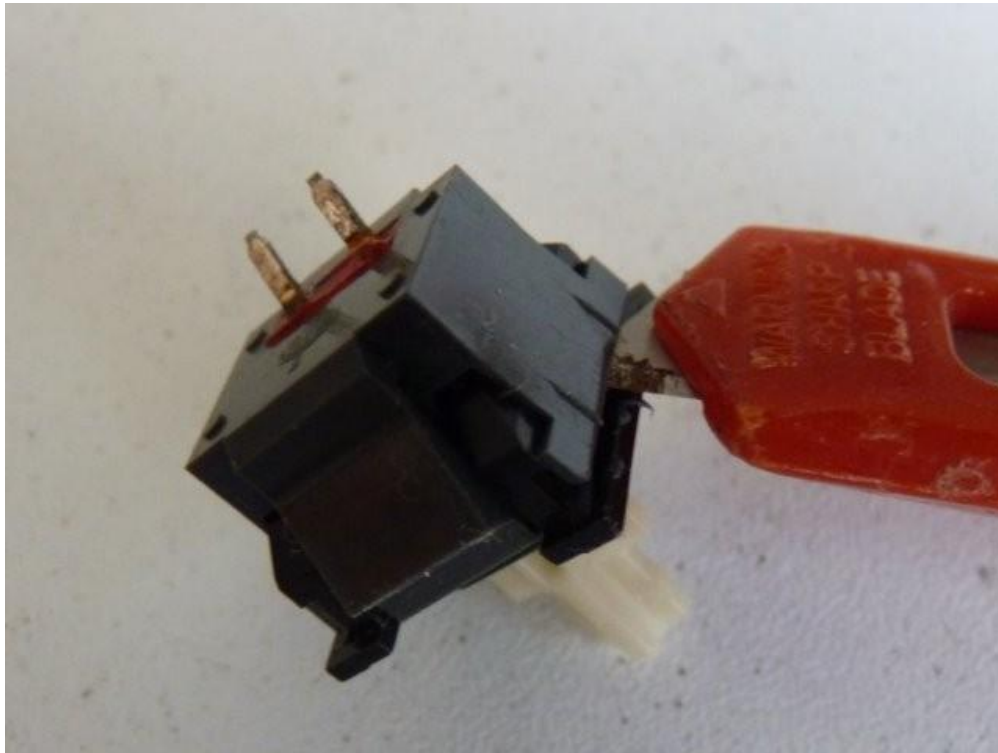
Switch output
To remove the switch, you have to heat with a soldering iron, the 2 pins simultaneously by making a slight push to release the switch

All of the removed key parts .
The red piece is only the "brake" varnish installed by Tandy in order to keep the switch in place during handling
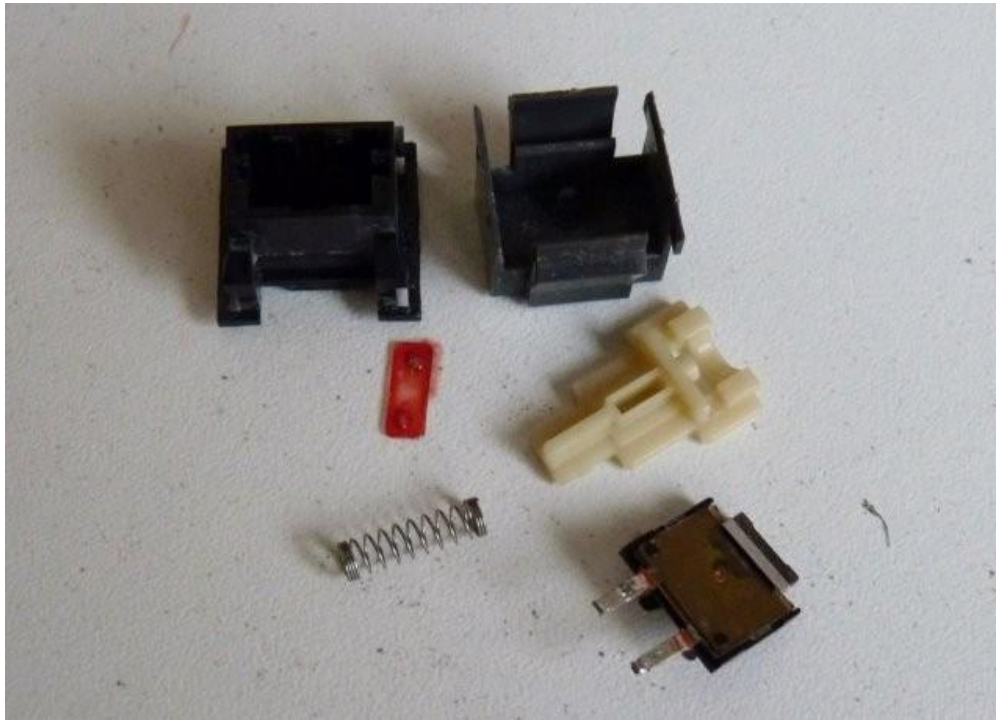
The complete switch on the outside of the case
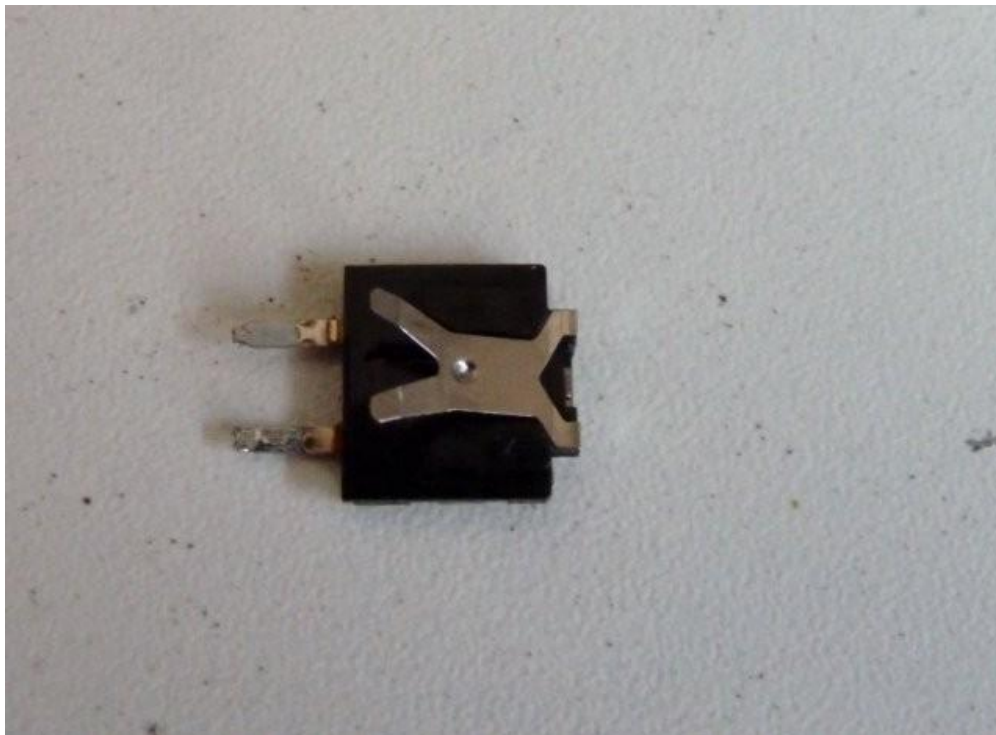
Removing the Switch Pushbutton
To disassemble the switch's metal push-button, I suggest you use a needle and insert it in the switch this way
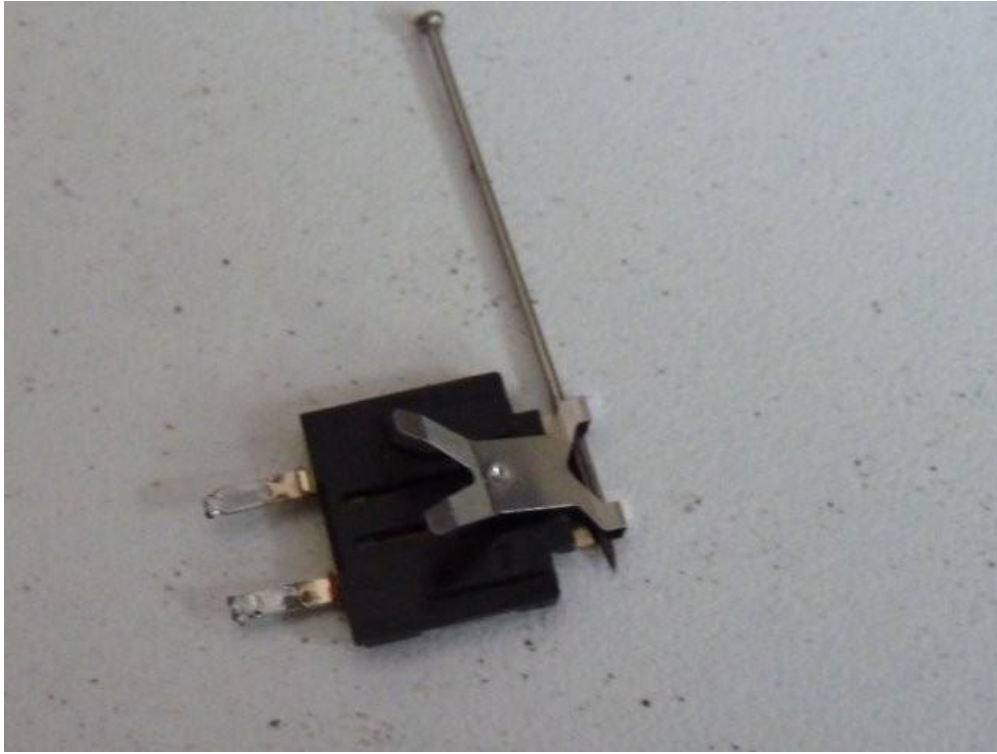
Then to position it thus, in order to pull the metal pusher well in its axis
As you can see, although the mechanical parts of the switch are golden, the parts are covered with dirt
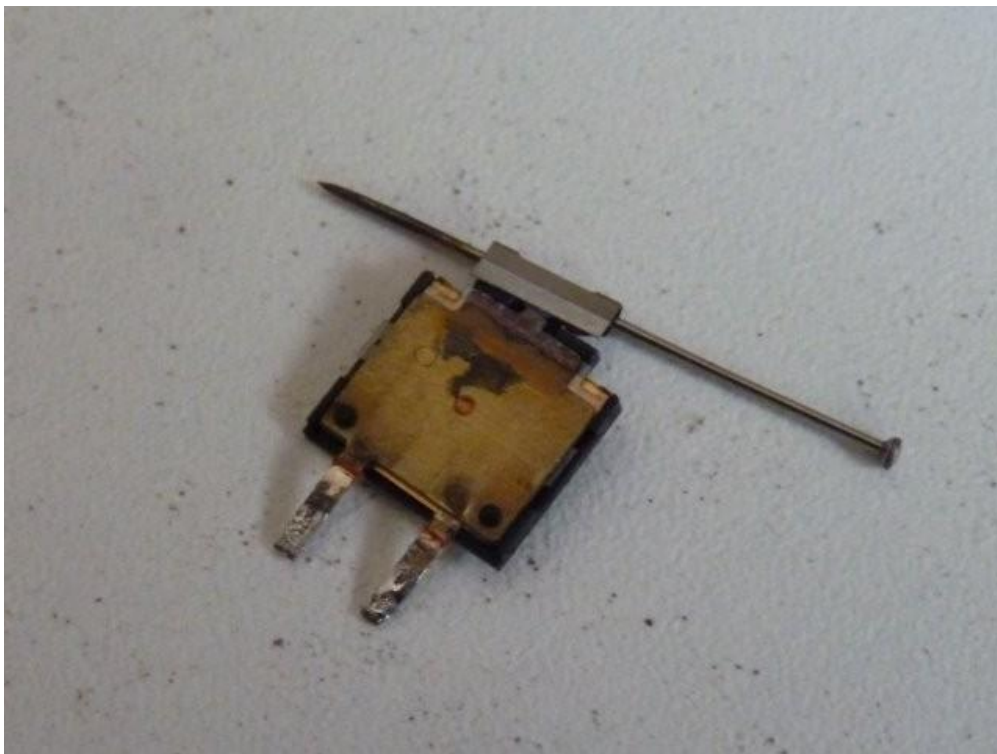
Internal view of the Switch (careful not to break the 2 plastic rivets)
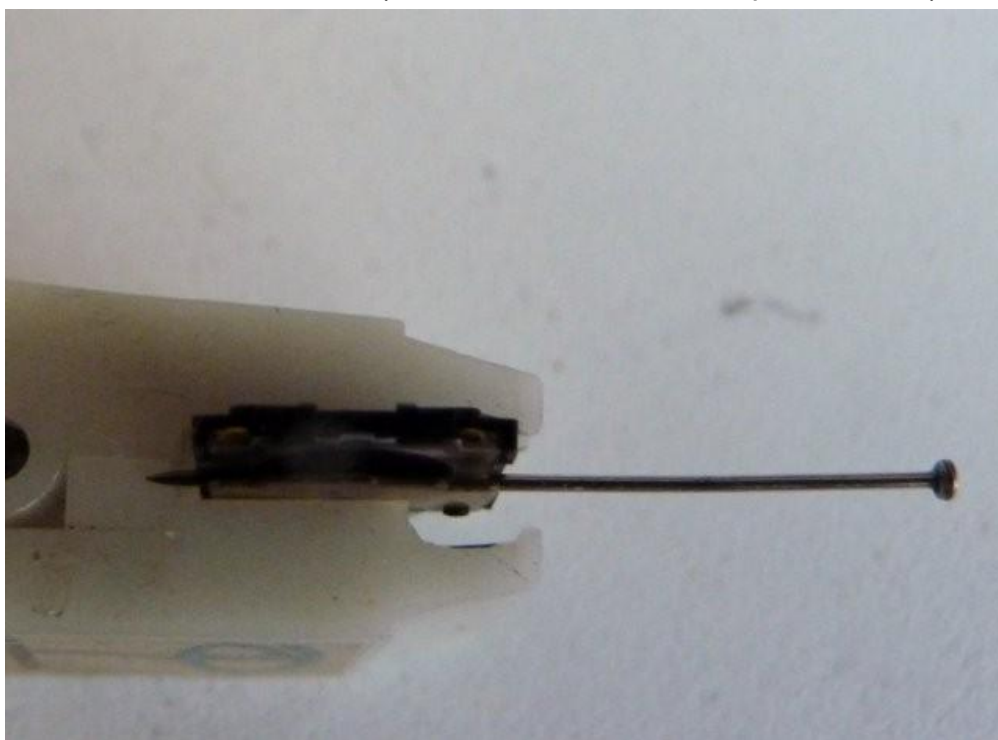
Cleaning the key

To clean the switch, I use an ultrasonic tank containing gasoline F

The switch in petrol and ultrasound
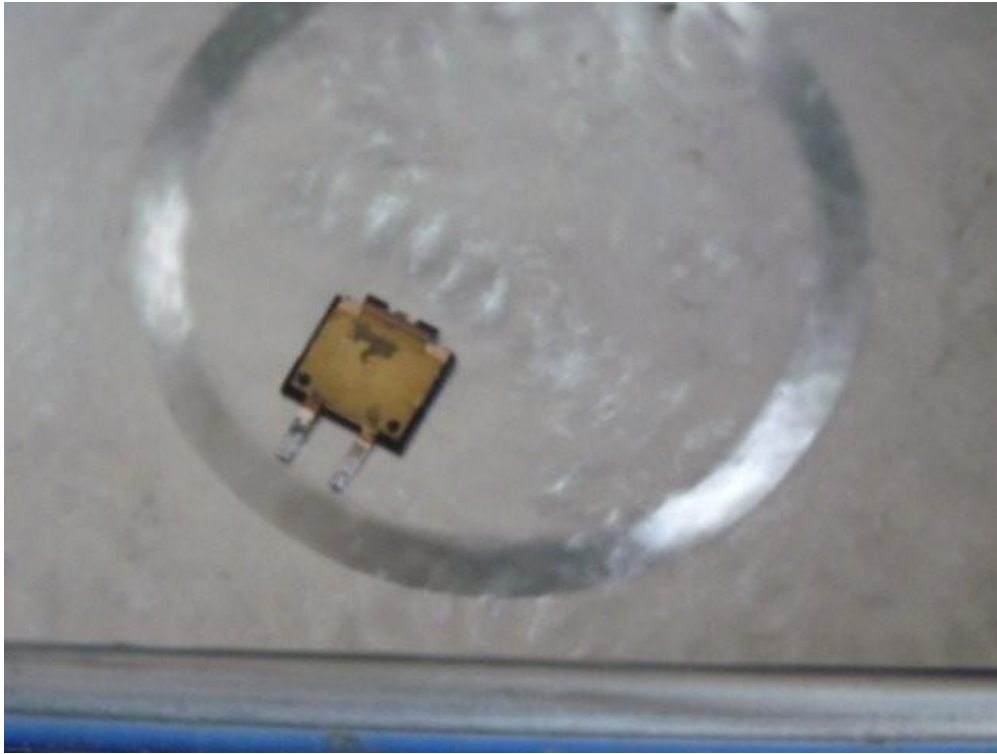
Mechanical cleaning
To finish the cleaning, I insert a office paper between the 2 golden poles of the switch and I make a reciprocating movement, in order to remove the impurities

I take this opportunity to straighten the 2 pins

Reassembly of the key

1. Check and rectify the metal pushbutton of the switch

2. Insert the switch into the lower slot of the button and let the 2 pins

3. Fit the finger and its spring into the upper slot of the key

4. Bringing housing "top and bottom" of the key checking on the switch and the

"finger touch" fit well into their guides

5. Wait for the closing noise of the 4 clips
Check with an ohmmeter the correct function of the key

FOR FURTHER DETAILS OF THIS AND MANY OTHER HARDWARE
DEVELOPMENTS WHICH PASCAL IS CURRENTLY WORKING ON

PLEASE VISIT HIS WEBSITE :- HTTP://WWW.PROF-80.FR/
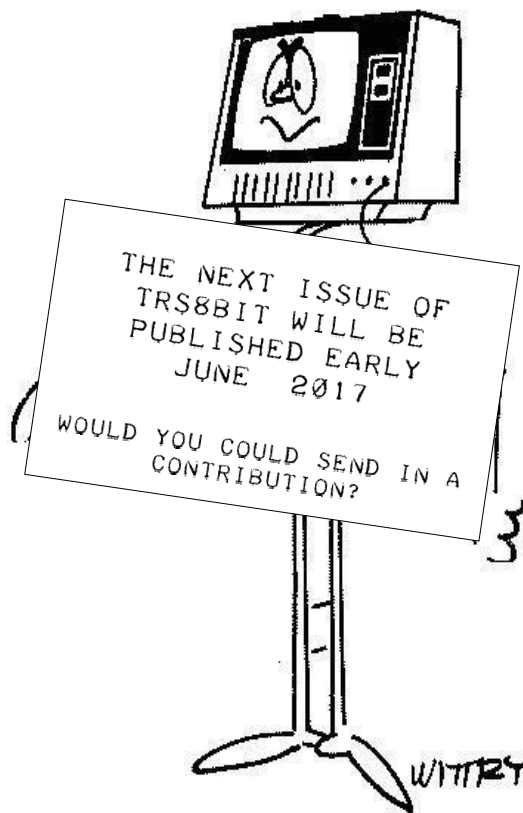
THE NEXT ISSUE OF
TRS8BIT WILL BE
PUBLISHED EARLY
JUNE 2017

WOULD YOU COULD SEND IN A
CONTRIBUTION?

WITTRY

Re-casing an Expansion Interface

Andrew Quinn

Included in Ian's box of "things from the junk box" for FreHD testing was a Model 1 Expansion Interface PCB.

Ian tells me that a common problem is people shipping Expansion Interfaces with the power transformer still inside. Add an enthusiastic courier driver and you are almost guaranteed to have a broken case. This Expansion Interface had such treatment so had ended up a junk box parts donor.

Apart from the missing case, WD-1771 floppy disk controller and connection cable to the keyboard, the Expansion Interface board looked complete and in good condition.

For anyone who finds a parts donor Expansion Interface board and wants to get it going, as of 2013 the WD-1771 floppy controllers are still available on eBay as are the 4116 dynamic RAM chips. Best to search around because the prices vary a lot. Unless you are hung up on period authenticity then the vintage style packaging with the really high prices are not required!

With the chips replaced and a cable made up the initial indications where that the Expansion Interface worked fine.

At this point I realized why they put these in cases... where to put the monitor when you just have a PCB? Things get very spread out.

Taking inspiration from the current trend in acrylic project cases for things like the Raspberry Pi I went looking for a source of acrylic sheet and discovered CTS Plastics in Tauranga.

Here is my solution to the no-case problem.

    2 sheets of 6mm grey perspex plastic
    5 x 50mm bolts, assorted nuts and washers.

Total cost about NZ$25.

 Much safer than having the EI board floating around on the table, looks smart and with 6mm perspex it is very strong so the monitor can sit on top.

The dimensions and drilling information is in the attached pdf for anyone wanting to build their own.
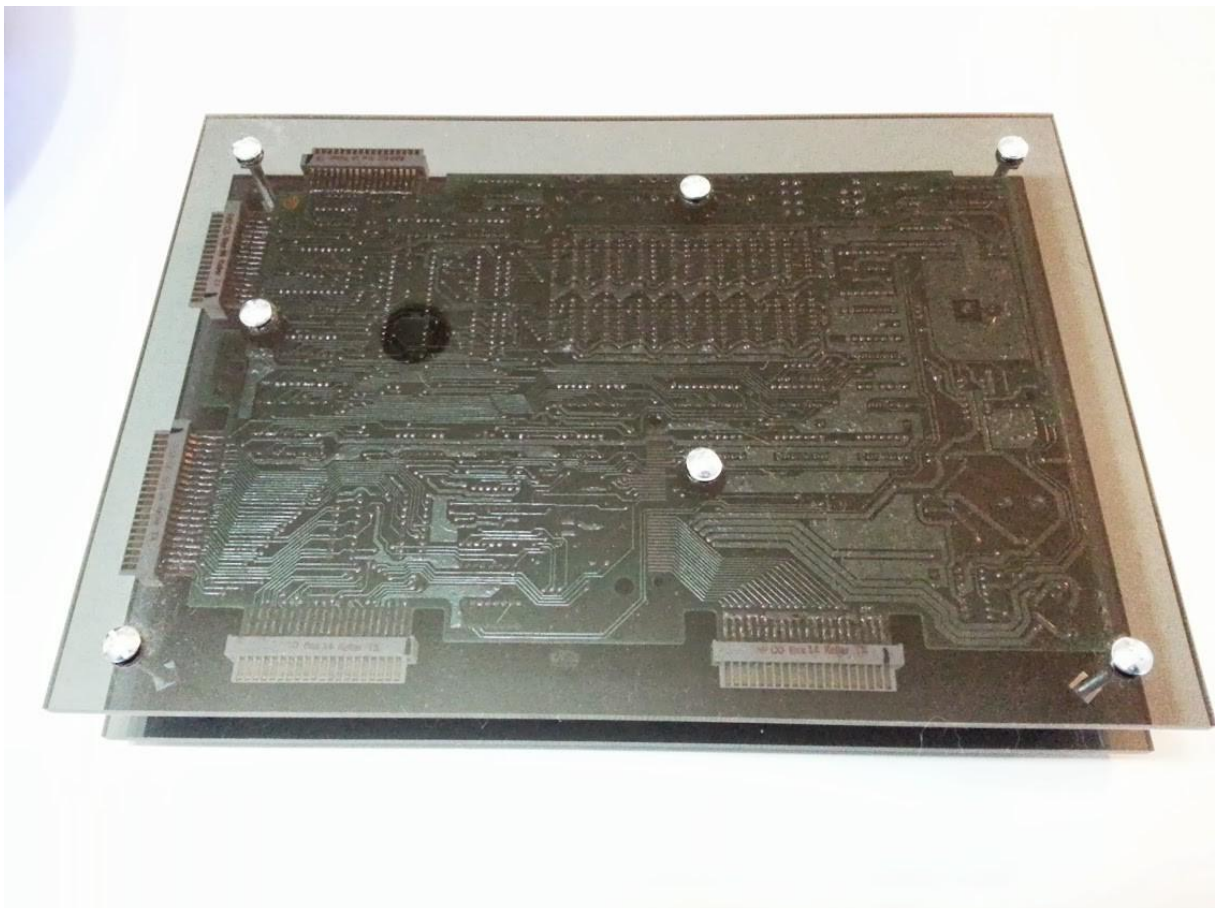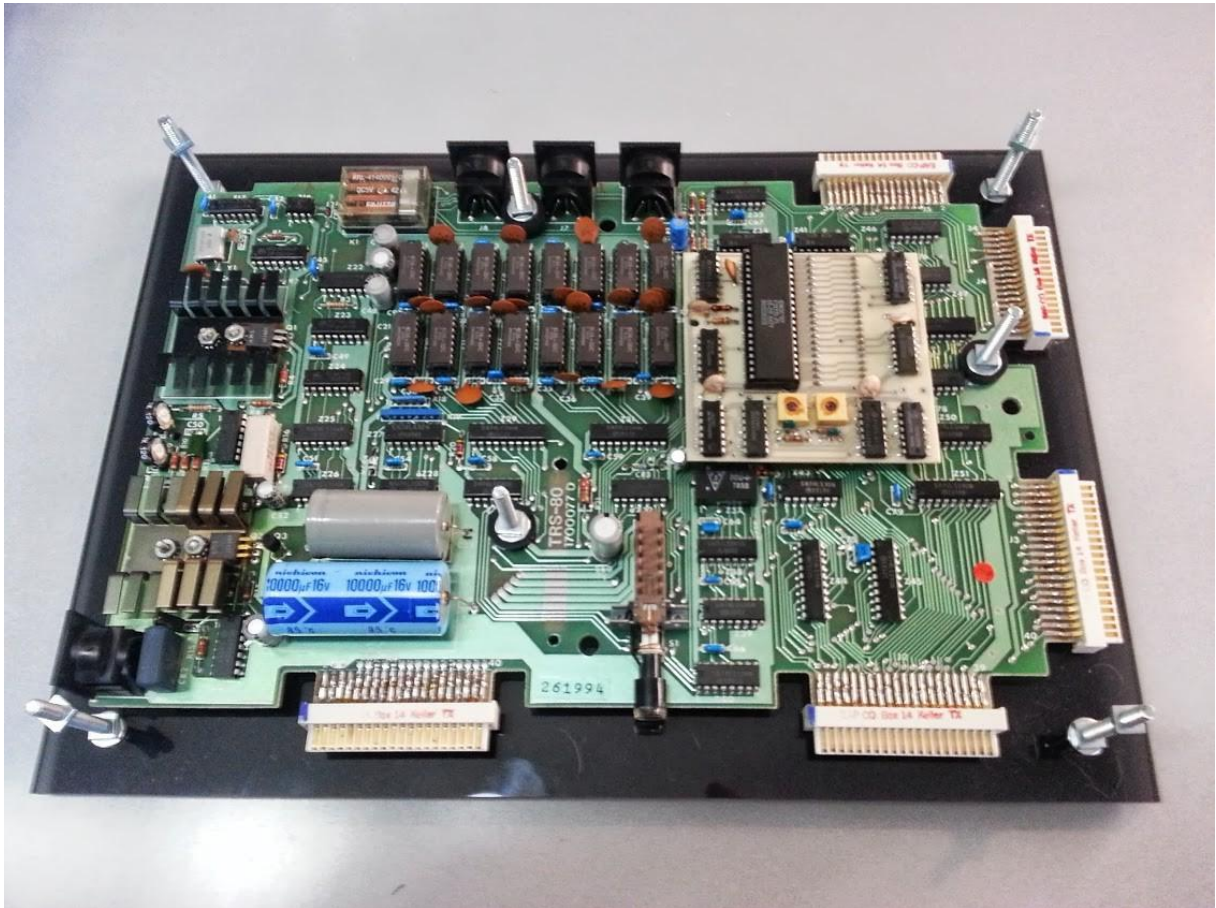
The drill details are:

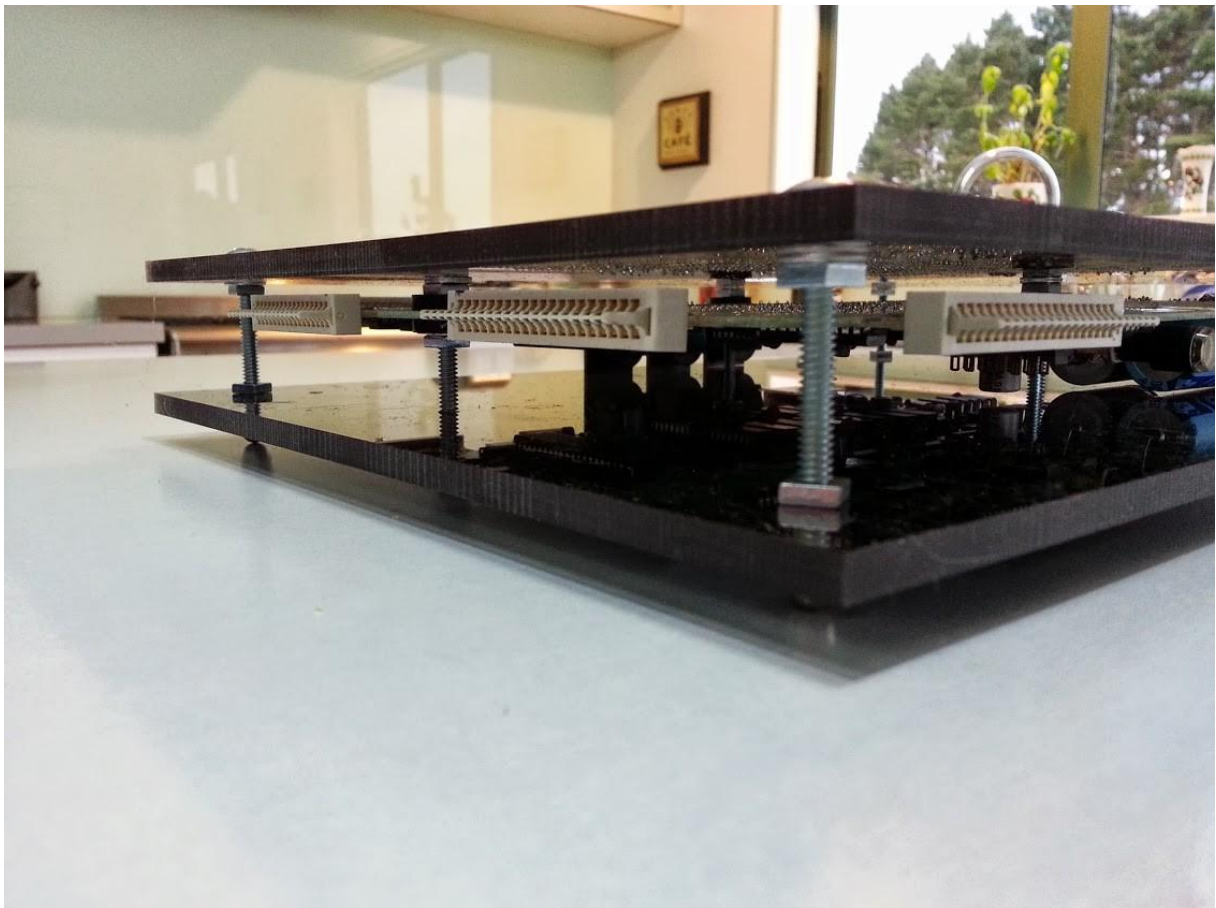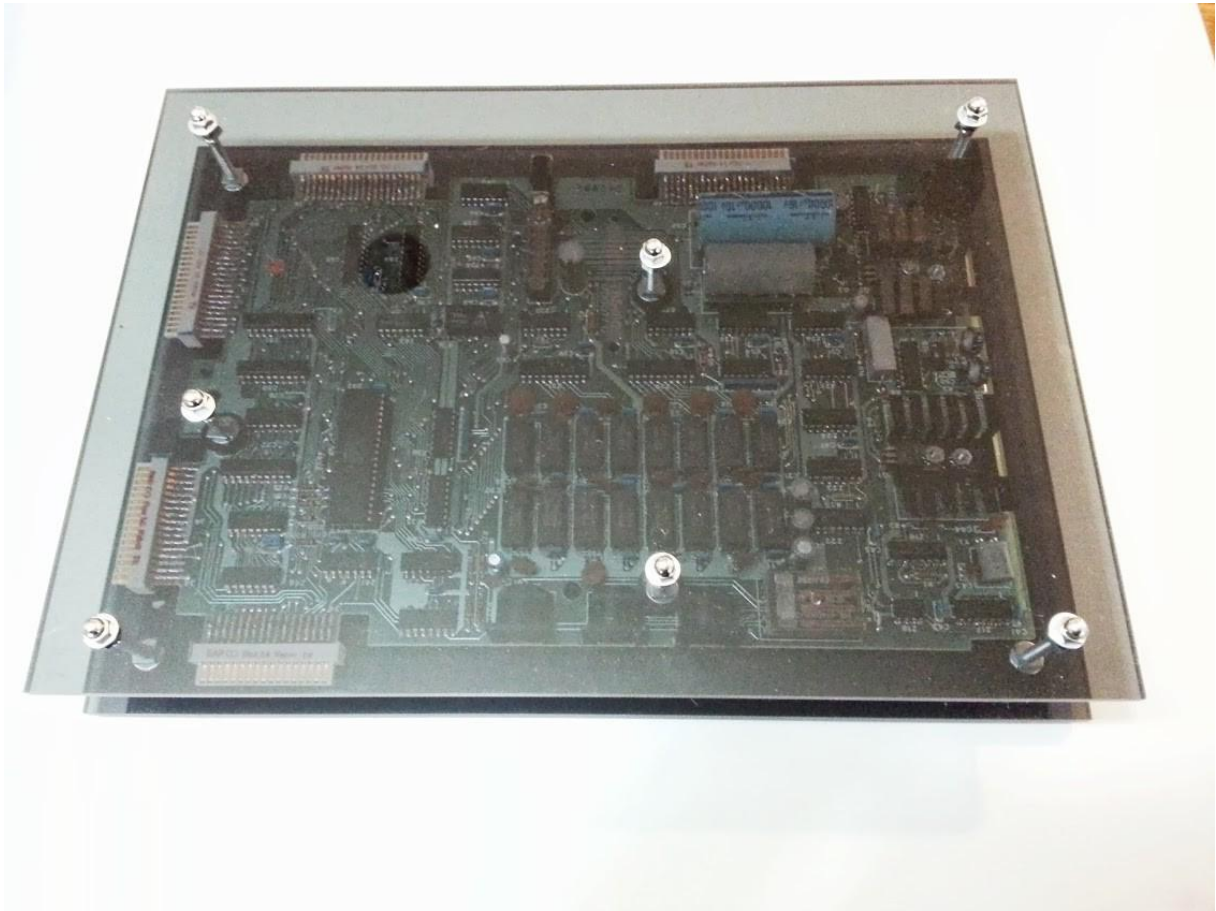   4 holes (1 at each corner) 20mm from the edges.

    2 holes 143mm from the left edge. One is 82mm from the bottom and the other 202mm.

    1 hole 38mm from the right edge. This is 142mm from the bottom.

The two pieces will be mounted together with spacers so the holes need to be accurately drilled on both sheets.
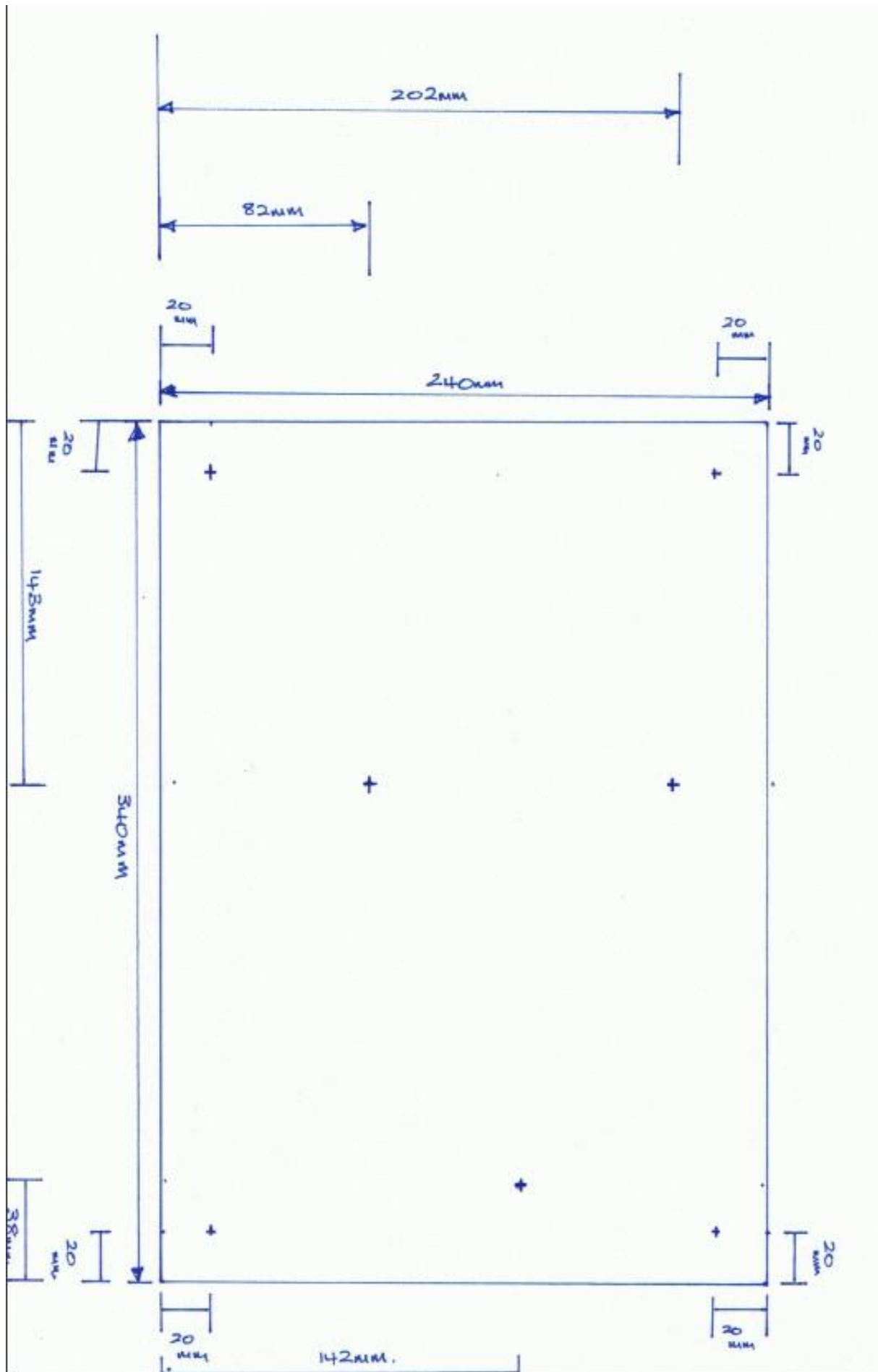
202mm

82mm

20 mm

20 mm

240mm

20 mm

20 mm

142mm

340mm

20 mm

38mm

20 mm

20 mm

20 mm

142mm.

IN MAV'S WORKSHOP

by Rick Ragnini / Ian Mavric

MAPPA-1 UPDATE: RADIO SHACK DDA

Mappa-1, the CP/M adapter for the TRS-80 Model I has been on sale for a year now and people have been happily using the product exploring what CP/M had to offer within the limitations of the Model I hardware.

While most people found that the Mappa-1 just plugged in and work, a few people were discovering that their systems wouldn't boot. It was eventually traced down to the Mappa-1 being unhappy to live in the same system as a Radio Shack Double Density Adapter (DDA) catalog number 26-1143.

RADIO SHACK DDA

I didn't pick up on this problem because my test system uses a New_Perc DDA which is compatible with the Percom DDA, and not affected by having the Mappa-1 installed. A Google search on the Omikron Mapper-I, which the Mappa-1 is based on, didn't turn up any clues so I put the solution on my "to do" list which seems to grow more quickly than it gets whittled away.

Then one day I received an email from Rick Ragnini, one of my regulars, who said he'd examined the problem and arrived at a solution:

Ian,
I have come up with a solution to use the MAPPA-1 with the RS Doubler. Using a scope I could see that for whatever reason the Omikron CPM was turning on the DD FDC after the initial boot. On the RS DD board, the switching of the SD and DD FDC's is done using the 74LS74 flip-flop at U1, if the input to pin 2 is high then the SD FDC is used, if pin 2 is low then the DD FDC is used.

If you cut the trace from pin 2 to pin 8 of U1 and add a SPDT switch to connect pin2 to pin 8 (normal mode) or pin 4 (pin 4 is always HIGH forcing SD mode only) you can effectively turn off the RS DD board without removing it.

Works perfect.   Now with a flip of the switch I can remove the doubler to run CP/M without taking anything apart. As a side benefit, the RS DD board is still doing data-separation for SD FDC operations.

Let me know if you want more info on this.

Thanks,
Rick Ragnini

THE MODIFICATION

On the DDA cut the trace which runs between pins 2 and 8 on U1 and solder three wires:
a Black wire to pin 8
a White wire to pin 4
and a Grey wire to pin 2

Get a small SPDT switch and connect the Grey wire to the centre post, and the Black and White wire to the outer posts.

Mount the switch somewhere on the EI. Out the back is good or if you don't like to drill holes in your EI run it out next to one of the cassette ports and just leave it dangling.

Since a picture tells a thousand words, what Rick is talking about is explained on the next page.
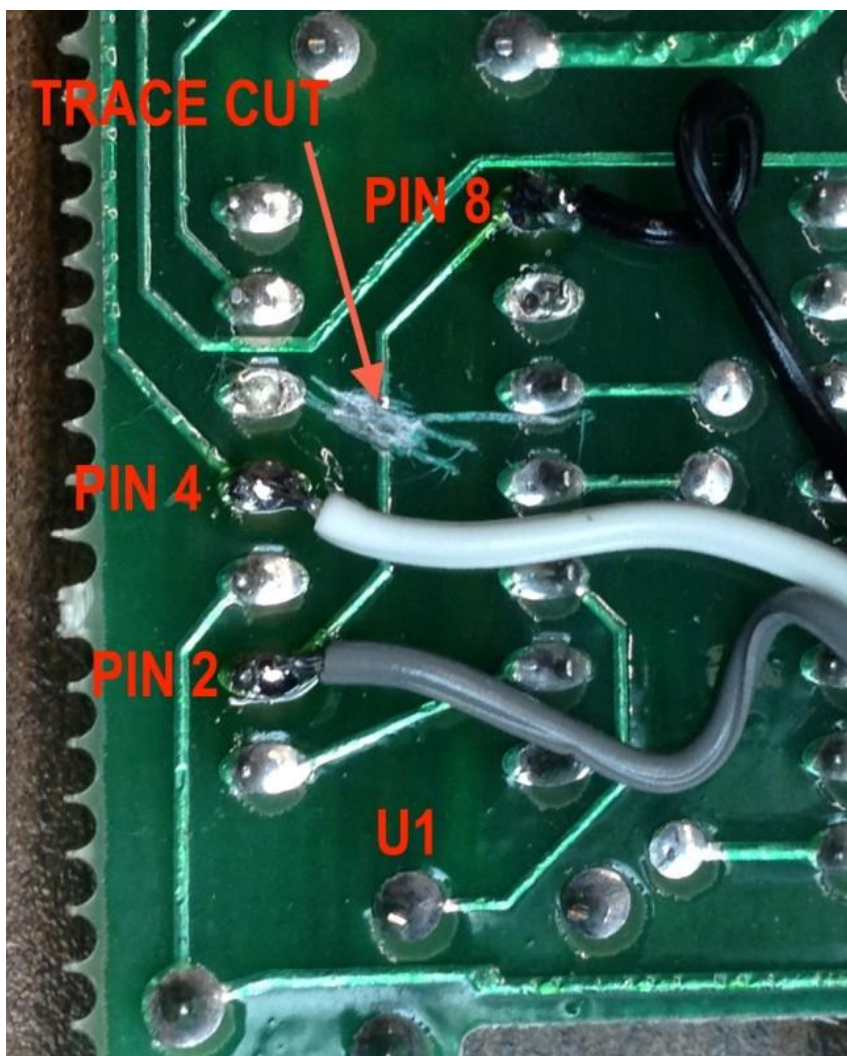
Picture: shows trace cut and where the three wires go on DDA (photo courtesy of R.Ragnini)
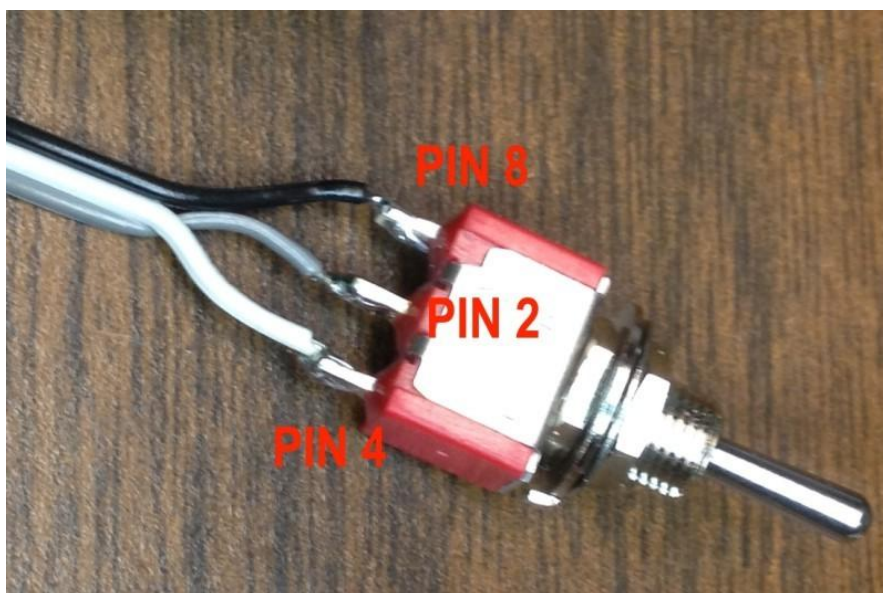
Picture: shows where the three wires go on the switch (photo courtesy of R.Ragnini)

Picture: one possible place to mount the switch (photo courtesy of R.Ragnini)

CONCLUSION: DID THIS CAUSE A PROBLEM BACK IN THE DAY?

At the time Omikron designed the Mapper-I (1979-80) they could not have been aware that their product would cause problems with future hardware developments, like Radio Shack's DDA which didn't appear until mid-1982. The Eprom with boot options which came with the Mapper-I is marked simply "A", which I presume means first or early release version. I have seen at least one photo of someone selling one of these on eBay with "B" on the Eprom, which makes me think this is an updated version of the firmware that may well fix the above problem, but so far I've been unsuccessful at obtaining a copy of that firmware to try out. Needless to say if anyone has a copy of the B version or any other version of the firmware for the Omikron Mapper-I then I'd like a copy :-)

Ian Mavric
ianm@trs-80.com

Construction

Lower case ROM patch

Lower case on power-up with no software driver...

Figure 1

William R Bell, El Granada, California

For Model I Level II

This modification adds two integrated circuits to the TRS-80 Model I Level II to give lower case on power up without needing to load a software driver. It works in conjunction with the Radio Shack or Electric Pencil type lower case modifications.

```
0473  3808    JR C,$+0AH    ;if not letter jump
0475  D640    SUB 40H       ;convert to ASCII 0-31
0477  FE20    CP 20H        ;test for UC or LC
0479  3802    JR C,$+04H    ;if upper case jump
047B  D620    SUB 20H       ;change LC to ASCII 0-31
047D  CD4105  CALL 0541H    ;continue on
```

Program listing 1

_____ *Construction*

The TRS-80 has lower case in everything but video. The video driver routine in ROM converts upper and lower case letters to control codes. The video controller hardware converts the control codes to upper case letters. The Radio Shack and Electric Pencil modifications take care of the video controller. However, a RAM resident video driver routine must be loaded to replace the routine in ROM. This modification patches the ROM so the software driver is not needed.

The patch converts the JR C instruction to JR. This causes the jump to always execute and bypass the code that converts letters to control codes. The code is shown in Listing 1. Memory location 0473 hex is changed from 38 hex, JR C, to 18 hex, JR, by changing bit 5 from a 1 to a 0. This is done by decoding that memory location and pulling data line D5 low. Figure 1 shows the circuit for the patch. S1 and R1 are optional. They allow the patch to be switched out. The output must connect to D5 at the ROM pin 15, not the data bus. This is so D5 is pulled low at the input of the data line tri-state buffer. The 74LS12 is an open collector device. This is necessary whenever more than one device drives the same line.

The patch can get all but one of its signals from the empty ROM socket. The ACS*, ROM A chip select, is available at pin 1 of the 74LS42 on the Level II board. I built my patch into a small module that plugs into the empty socket with a wire to the ROM board for ACS*. It can also be built on a small board and connected to the socket with a DIP cable like the one the Level II board has. If you have the two-ROM Level II, you don't have an empty socket, so you will have to hard wire the modification. ∎

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IN MAV'S WORKSHOP
by Ian Mavric

TRS-80 PRINTERS FROM THE BEGINNING SERIES
PART 1: LINE PRINTER I (26-1150, 1152)

At the introduction of the TRS-80 in 1977 Radio Shack knew that for their new little computer to be taken seriously it would need to be able to produce hard copy. Level I Basic didn't lend itself to easily be able to send information to a printer, but it was decided very early on that the yet-to-be designed Expansion Interface had to have a printer port and the Level II Basic being written by Microsoft had to have commands to print data to said printer port.

A printer or series of printers was then required to be announced at the same time as the items needed to expand the usability of the TRS-80. It's no co-incidence then that at the same time Level II Basic, the Expansion Interface, Disk Drives and DOS, that a printer became available which rivalled other printers in price and performance in 1978.

Never one to shy away from naming things the bleeding obvious, their first printer was called the Line Printer. Just as the Model I was not so named when it was released, the Line Printer was not named the Line Printer I, however after its successors were released it was retroactively named the Line Printer I, and hereafter referred to as the LP1 in this article.

ONE PRINTER : TWO VERSIONS

Being busy designing computers and interfaces, Tandy decided to leave printers to companies specialised in that, as was the normal practice at the time with small microcomputer companies.

Centronics was a big name in dot matrix printers at the time and they had a successful product called the "779" which was marketed as an inexpensive printer for minicomputer users.
Spray painted in matching TRS-80 silver-and-black paint and the requisite "Radio Shack TRS-80 Line Printer" emblem on the front and the LP1 was born.

TRS-80 Line Printers

TRS-80 Line Printers are medium-speed, 5x7 dot matrix impact printers suitable for business, education and home use. Both use the standard 64-character upper case ASCII character set, but do not support TRS-80 graphics.

The 26-1150 friction feed printer uses roll or "fanfold" paper, one or two copies. The 26-1152 with tractor feed uses only fanfold paper with feed holes in the margins and will produce up to 5 carbon copies. A continuous-loop cloth ribbon lasts approximately as long as a standard typewriter ribbon. Replacements are available through Radio Shack.

The width of the letters, or "print density," is continuously variable from 10 to 16.5 characters per inch. Print density affects print speed. At maximum density, the printers will produce 132-character lines at a speed of 21 lines per minute.

The 26-1150 friction-feed model (like a typewriter) includes a holder for roll paper up to 9.8" wide. The tractor-feed version is required for multiple copies and exact placement of type on preprinted invoices, payroll checks, and so on. Tractor width is adjustable from 3 to 12.1 inches. Top of forms control is available through software.

Both printers require Level-II (or Disk BASIC), a connecting cable, and the Expansion Interface. All Level-II PRINT commands except PRINT@ can be used (preceded by an "L"). Operating and service manuals are included. Tractor Feed model, 26-1152. Friction Feed model, 26-1150. Printer-to-Expansion Interface Connecting Cable (one required), 26-1401.

TRS-80 Line Printer Specifications

Print Density: 10-16.5 characters per inch (80-132 characters per line). *Print Width:* Up to 8". *Print Speed:* 60-100 characters per second. *Vertical Line Spacing:* 6 lines per inch. *Dimensions:* 9.5 x 19.8 x 19.5". *Weight:* 45 lbs. *Power:* 120VAC, 50/60 Hz, 3 Amps. 360 Watts. U.L. listed.

Left, Friction Feed model 26-1150. Below, Tractor Feed model 26-1152.

It was available in two versions. A professional tractor-feed version carried the catalog number 26-1152 and a price tag in 1978 of $A2299.00 and there was a friction feed version with catalog number 26-1150 for those on a budget for $A1899.00   The friction feed version used a roll of paper which sat on a holder behind the printer. It was not popular and did not look professional like the tractor-feed version, and was dropped by mid-1979. Another factor would have been that shortly after the EI, Disk Drives and Printer were released Tandy sold a series of small business accounting and management packages "General Ledger"

"Accounts Payable" "Inventory Control I" and "Disk Payroll" to name a few, these worked with pre-printed tractor feed forms on the tractor-feed LP1, no doubt magnifying the tractor feed LP1's use as a business tool.

SPECIFICATIONS - 1978 STYLE

LP1 was a dot matrix printer, but if you were a dot matrix printer user in the mid-to-late 80s then you used a dream-machine in comparison to the LP1. 5x7 dots was the was the printing matrix and it was uppercase only. This suited the TRS-80 well as it was uppercase only at this time. The LP1 was interesting in that it was neither an 80 column nor a 132 column printer, but both. A control on the back meant you could vary the width of the text continuously. The print head only moved at one speed so this printer was faster at printing 132 columns than 80 columns. Paper size was generally US Letter or A4 in Australia on tractor (sprocket) feed "computer paper". The tractor width could be adjusted so you can run 1-wide or 2-wide mailing labels. Print speed was a respectable 60-100cps depending on the print density used. This was not bad for a budget printer designed around 1976.

THE DOWN SIDE - SIZE, WEIGHT and EXECUTION

The specifications above would be quite decent except that the printer is enormous! LP1 measures 19.5in wide x 19.8in long x 9.5in tall and weighs in at a hefty 45lb. Designed for long run time connected to mini-computers it's over engineered with heavy duty motors and power supply. Unheard-of today, this printer was shipped in a wooden box and held down with metal straps.

It's also very loud when running due to it's oversized print head capable of printing the original plus up to five carbon copies (most dot matrix printers are only good for 2-3 carbons).

Unlike an 80s dot matrix, the LP1 idles with the motor constantly moving a fibre belt which the head rides on. When it needs to print it grabs the belt, prints, lets go of the belt, then grabs the underside of the belt for the return trip back to the start point.

UNPACKING/REPACKING INSTRUCTIONS

NOTE: FAILURE TO ADHERE TO THE FOLLOWING INSTRUCTIONS COULD RESULT IN VOIDING THE WARRANTY.

RECOMMENDED TOOLS

Flat Blade Screwdriver
Tinsnips

UNPACKING

1. Using tinsnips cut the three bands (1) around the outer sleeve (2) and remove the outer sleeve.

2. Remove the top cover (3) and two sleeves (4, 5).

   NOTE: ATTACHED TO THE FRONT OF THE INNER SLEEVE IS THE CLEAR PLASTIC COVER (6) AND TO THE BACK OF THE INNER SLEEVE ARE OPERATOR'S AND SERVICE MANUALS (7). REMOVE THESE ITEMS FROM THE INNER SLEEVE.

3. Remove the printer (8) and pallet (9) from the bottom cover (10).

4. Remove the hardware (11, 12, 13) mounting the printer to the pallet.

   NOTE: RETAIN MOUNTING HARDWARE FOR RE-PACKING.

5. Unwrap clear plastic cover (6) and install onto printer.

REPACKING

6. To repackage printer, reverse steps 1 through 6 and add new strapping around the outer sleeve.
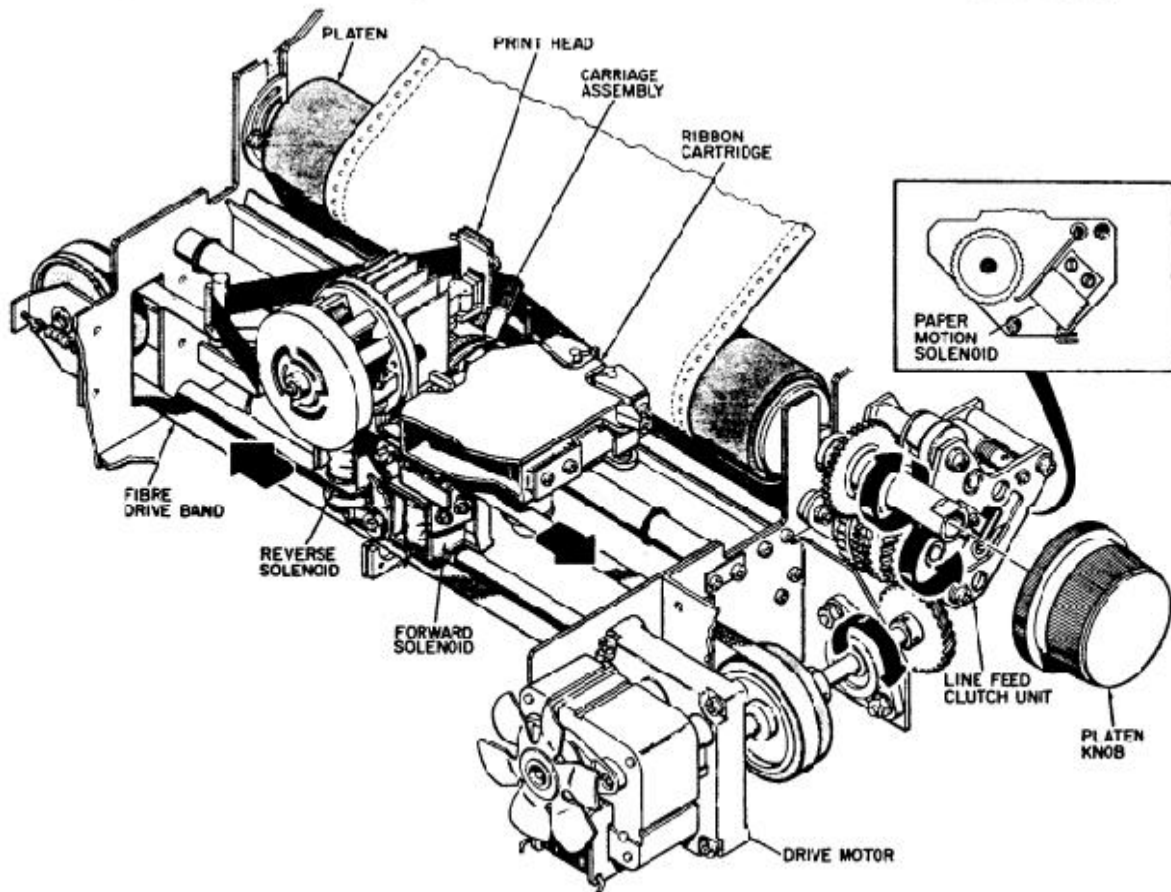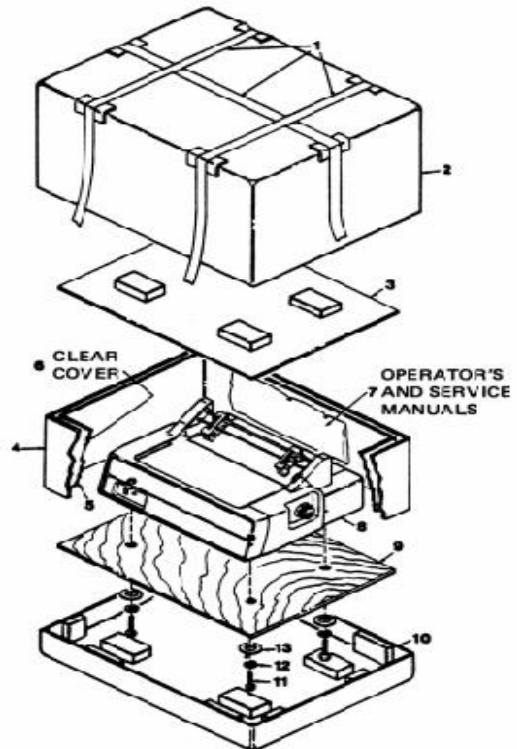
Figure 1-3. CHARACTER PRINTING/PAPER MOTION

To make matters worse for operating this printer, the heavy duty power supply meant that turning it on or off would either crash your Model I, power spike zap your disks if the drive doors were closed, or cause a re-boot.

The effect was that if you wanted to print something, you needed to either have this noisy printer running constantly OR save your work, power the TRS-80 down, power up the printer and the TRS-80, load your program and your work, print it, then reverse the process in order to turn off the noisy printer.

I owned one of these printers for a while (not my first printer, I acquired it from a business throwing it out in the late 80s) and quickly grew sick of its size, weight, and noise. I had planned to have it a spare printer on a 2nd TRS-80 at home (my main printers being a DW2 university and a DMP-200 at home) but quickly found it unusable.

The way the LP1 used its ribbon was also interesting and worth mentioning. When we think of a modern dot matrix printer you have a plastic cartridge with the ribbon inside. On the LP1 the ribbon was loose and sits inside a plastic ribbon holder, basically scrunched up. Two rubber rollers pull the ribbon past the print head and back into the holder, where it is re-scrunched up.

Messing up the ribbon installing procedure meant you could easily make a mess if the ribbon did not fit properly inside the holder and attempted to un-scrunch itself.

This happened once to me and while I did manage to get it back into to the holder, since it was a new ribbon the process made my hands very black, which again diminished my opinion of the printer even further.

The diagram below shows the ribbon in a circular spool inside the ribbon holder but that is deceptive because it was anything but.
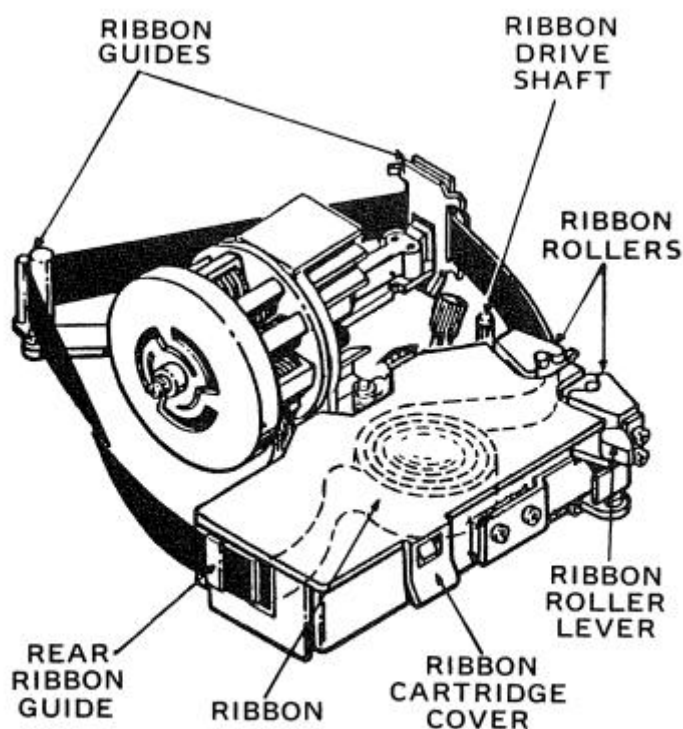
FIGURE 3. SPOOL RIBBON REPLACEMENT

PRINT SAMPLE

```
THE PACKER PROGRAM IS NAMED AFTER ITS MOST USEFUL FUNCTION-
PACKING BASIC PROGRAMS INTO MULTILINE STATEMENTS SO THAT THEY
TAKE UP LESS ROOM IN MEMORY, TAPE OR DISK. HOWEVER, THE
PROGRAM HAS OTHER FUNCTIONS AS WELL- UNPACKING, ELIMINATING
UNNECESSARY SPACES, RENUMBERING, AND MOVING BASIC PROGRAM
LINES.

WE HAVE TWO VERSIONS OF PACKER : 32K AND 48K
THEY ARE USED AS FOLLOWS:
1) FROM DOS TYPE 'LOAD PACKER/CMD'
2) GO TO BASIC SETTING MEMORY SIZE AT 44443 (32K) OR 60827
(48K)
3) LOAD A BASIC PROGRAM AS USUAL
4) CALL PACKER FROM BASIC AS FOLLOWS:
      SYSTEM
      *?/44444 OR 60828
5) YOU SHOULD SEE:
   PACKER: COPYRIGHT 1979 BY COTTAGE SOFTWARE
   *-
```


APPARAT INC.
6000 E. EVANS AVE. BLDG #2
DENVER, COLORADO 80222
(303) 758-7275
SER # 8101   35 TRACK NEWDOS

From a 5x7 matrix you wouldn't expect anything earth shattering but the LP1 did print clearly defined dots making up the uppercase character set. Since lowercase was not supported, lowercase descenders would only be a problem in future printers. The previous page is a typical print sample from the LP1:

The darkness would be more consistent when the ribbon was new, obviously. If this print looks strangely familiar, especially to early adopters of the TRS-80, its because many small software companies who marketed their programs from home had one of these printers and used them for printing the manuals as well as disk labels. Most notably, Apparat Inc. and their early releases of Newdos.

MANUALS SUPPLIED
Also interesting and worth mentioning was that this printer came with both the Operation manual and Service Manual. No other Radio Shack hardware product that I can think of included the Service Manual, it was always an extra cost item which needed to specifically ordered from an RSCC.
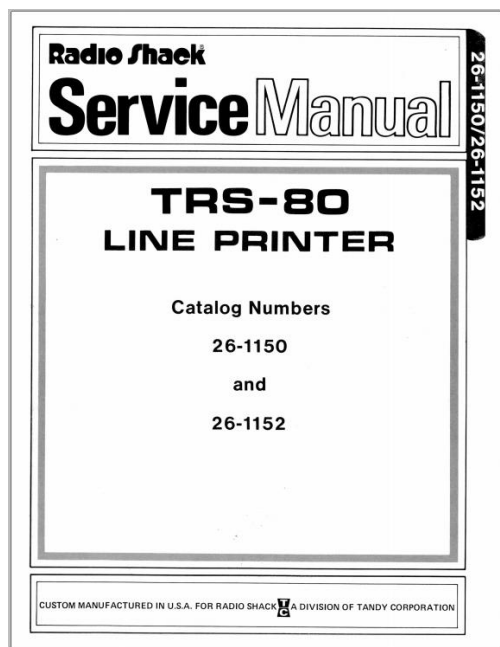
CONTROLS, CABLES and STAND

The LP1 has only one button on the front, which is the Online/Offline button. It's only marked "PRINT" and as such so unless you read the manual its possible the printer could be inadvertently left Offline while its

owner scratches his or her head wondering why it's not printing anything. Curiously Centronics decided a power-on LED was a good idea but to be honest, a bit pointless because when the printer is idling the noisy belt motor is whirring so you could never be mistaken that the printer was running.

Coming from the Centronics company, the printer naturally comes with a parallel printer interface that was Centronics compatible, and needed a Radio Shack printer cable catalog number 26-1401 to hook it up to your TRS-80. (BTW if you need to make one of these cables check my other article in this issue "Make A Printer Cable...".) If you didn't have an Expansion Interface, Radio Shack had a solution in the form of a Printer Interface Adapter catalog number 26 -1411 which allowed you to connect LP1 directly to your Model I keyboard unit.

The back-and-forth motion of the heavy print head changing directions meant the LP1 tended to rock the table it was sitting on, and if your Model I was also on that table it had the habit of crashing the system due to amplifying the microphonics problem afflicting most Expansion Interfaces.

Tandy's solution was to make a printer stand specifically for the LP1 which was catalog number 26-1302 which looked a little top-heavy to me.

I never saw one so can't really comment on how sturdy it is... I suspect it would be sturdy because Tandy wasn't in the habit of selling products which didn't do the job required of it.

PRICING and CONSUMABLES

Deciding to kit out your Model I with a LP1 was not a decision to be taken lightly. That probably explains why so few LP1s still exist and Radio Shack didn't released sales figures back in the 70s so one can only speculate on how many were sold. I'm guessing less than 20,000 units. Listed below are prices and catalog numbers related to the LP1, remembering the prices are listed in 1978 US dollars: (Source: Tim Mann's Radio Shack Catalog Number compilation)

26-1152 Line Printer 1, Tractor feed $1559
26-1302 Line Printer 1 Stand $99

CONCLUSION

Reviews at the time of introduction gave the LP1 a good score in terms of price and performance but the technology and improvements in dot matrix printers made great leaps forward in only a few years so by 1980 or 81 the LP1 was seen as slow, limited, heavy and expensive. Most were condemned to the scrap heap of history. Today they make an interesting conversation piece but little more. Even the most ardent TRS-80 enthusiast would be at pains to live with the machine in daily usage. While I have no scoring system in mind, if I had to I'd give this printer score of 1 out of 5 (in comparison to all Tandy/TRS-80 branded printers). While this may sound needlessly harsh, it should be mentioned that all family trees need to start somewhere and so while the LP1 was limited, things could only get better from here.

CONCLUSION redux

Keen enthusiasts will notice I overlooked the TRS-80 Screen Printer (catalog number 26-1151) as Radio Shack's first printer released for the Model I, and the only printer which would work with a 4K Level I Model I. As a screen-dump only printer it's not, to me, in the same definition scope of the proper printers which came after it, which allowed listing a program, or printing individual lines or filling out a pre-printed form under program control.   These basic functions are what we expected as the minimum requirements for a printer connected to our TRS-80, and the LP1 was the first to fill that role.

NEXT TIME: Line Printer II (catalog number 26-1154)
Ian Mavric
ianm@trs-80.com

TRS-80 On-A-Chip – Part 1

by Mark McDougall
Virtual Logic Pty Ltd

Model I in an FPGA   CoCo in same FPGA

It should surprise no-one, that in the 40-odd years since the design of our beloved TRS-80, that technology has advanced to the point where today one can – quite easily - fit the entire Model I and all its peripheral hardware - into a single integrated circuit.

What is an FPGA?

Programmable logic has been around for many years, but it is only relatively recently that both the capacities of these devices have become sufficiently large, and also become sufficiently cheap, that retro computer enthusiasts have taken to emulating their favourite platforms in hardware. Field Programmable Gate Arrays (FPGAs) are the penultimate programmable logic devices available today and come in sizes ranging from a few thousand gates, to hundreds of thousands of gates capable of emulating more than a few Amigas at once - and then some. Correspondingly, these devices cost anywhere from a few dollars at the low end, to tens of thousands of dollars at the top end. Fortunately for TRS-80 enthusiasts, the required silicon is much closer to the former than the latter.

Although the exact architecture of FPGA devices differs between manufacturers, suffice it to say that they are essentially very large arrays of logic gates and memory elements whose interconnections are programmable and hence can be configured to mimic the behaviour of any and all manner of digital circuits, including CPUs, random-access memories, video display circuits, storage media controllers and the interconnect logic required to make them all work together as a computer. What's more, the programming of these devices is only temporary in nature, and the entire contents may be re-configured completely at reset or at subsequent power-up. The upshot of this being, your single chip can be used to emulate all manner of retro computer hardware at whim by simply downloading a new configuration file, a process that typically takes no more than a few seconds.

Key to the workings of programmable logic are the clocks, and FPGAs provide various mechanisms to generate multiple clocks from a single external source. Like legacy digital logic, the clocks determine how fast circuits are switched and usually designs are limited primarily by the number and accuracy of the clocks that can be generated in a single design, and the maximum frequency at which those clocks can be driven and still achieve a working design.

Programming an FPGA

There are actually several ways to program (develop for) an FPGA.

Perhaps more intuitive to old school digital hardware engineers, most FPGA vendors provide a schematic entry mechanism that allows the design to be entered as a graphical representation of interconnected gates and memories. These tools come with libraries akin to 74-series logic devices for example, as well as larger components such as legacy memory blocks and even entire CPUs. Such a schematic would look quite similar to that for an equivalent physical circuit board. Schematic entry, however, has a few disadvantages and tends not to be used much except perhaps for the very top level of a hierarchical design. Rather, most designs are described in textual hardware descriptions languages (HDLs) such as VHDL or Verilog. Whilst describing a hardware design, these languages offer all the advantages of software programming languages such as ease of maintenance, vendor-agnostic design, easier sharing of common libraries and lastly but certainly not least of all in a commercial environment, use with version control systems.

And like software programming, all but the most trivial hardware designs are hierarchical; top-level designs consisting of large blocks of functionality which is then broken down into smaller blocks, and so-on as required. Ultimately the top level ties the entire design together. It should be obvious that any of those logic blocks at any level may consist of custom-written hardware descriptions (hereafter referred to as 'code') or 3rd-party libraries providing common functionality.

How to start?

Like most things in life, there's more than one way to skin the proverbial cat. And each approach has its own limitations, disadvantages, advantages and challenges

At one extreme, the approach is to effectively clone the original schematic down to the gate level, or near enough as the technology allows. Each 74-series IC on the original circuit would, therefore, have its own symbol (schematic) or module (HDL) in the code, whose ports parallel those of the pins on the physical chip. Further up the hierarchy, groups of these would be wired together to perhaps describe a particular function, such as video generation or expansion interface. The advantage to this approach is, arguably, a more accurate emulation and, also arguably, it's less prone to inadvertent design errors as you're cloning an existing design. However, not only is it sometimes technically impossible to use this approach, it's sometimes not even desirable. Examples of where it may not be possible include clocking limitations of the FPGA, analogue aspects of the original design, or custom logic whose gate-level implementation is not known.

Examples of where it may not be desirable include the ability to drive different video displays, use different peripherals such as modern keyboard, mouse or SD card, or even over-clocking portions of the design (CPU). At the other end of the spectrum, one may choose to implement rather a design that merely behaves the same as the emulated system (like software emulations necessarily do). A good example is the video generation circuit, which need not resemble the original at all – it may drive a VGA or even HDMI signal at a much higher frequency and completely asynchronously to the rest of the system – without perceptible loss in emulation accuracy. Or rather than program and instantiate an array of legacy 74-series functional blocks, one may implement system address decoding succinctly in a single, easy-to-read and self-documenting HDL case statement.

It should surprise no-one that most emulations sit somewhere between these two extremes, cherrypicking the mechanism that is most suited to each module on a case-by-case basis, and that is most compatible with the goals of the overall design, whether that be accuracy, over-clocking, interfacing to legacy or modern peripherals, or a combination of the above.

Why Hardware Emulation?

So why are we bothering to emulate these systems in hardware, when software emulators have been around for many years? What are the advantages of doing so?

To a degree, it's a personal preference. But those who are interested in hardware emulation generally have similar reasons for being so. The tangibility of the emulation is a major factor; you have a physical piece of self-contained hardware sitting on your desk, blinking LEDs, dedicated (at that particular time) to running your chosen emulation. Closer to the metal, as they say. Accuracy is another, albeit somewhat debatable, claim. Rather than a very fast CPU executing thousands of software instructions in sequence to emulate parallel hardware operations and approximate discrete time events, your emulation is actually executing parallel (albeit somewhat different) hardware operations at frequencies near to, or exactly those, of the original design. I'll leave this here, as it would be possible to write a whole article just examining the arguments on both sides of this claim.

Another big reason is the capability to interface both legacy and modern peripherals to the emulation. Most common are PS2 keyboards/mice, VGA output and SD cards for secondary storage, but the possibilities lie beyond those. Firstly, legacy hardware such as joysticks, disk drives (and other storage media) and cartridges may be interfaced directly, something that is difficult to do for software emulations running on modern PC hardware. Some people, for example, simply like the idea of plugging in an original game cartridge to their emulations. Secondly, more interesting modern peripherals may also be connected, such as your favourite wireless console gamepad or alternate USB input device, or Ethernet or Wifi modules.

Finally, having a stand-alone, untethered and physically small emulator sitting on the desk – something that is not a PC – is what appeals to some.

Availability

There are several examples of purpose-built circuit boards for FPGA emulation of classic microcomputers. Examples include the C-One (Commodore 64), Minimig (Commodore Amiga), MiST (Atari ST), Suska (Atari ST), One-Chip MSX (MSX), Turbo Chameleon 64 (Commodore 64) and the more generic MMC and Replay boards. Of course, any of these boards are capable of emulating most of these systems, and many more.

Another, and usually cheaper, option is to buy one of the many so-called FPGA evaluation or development boards sold by a number of vendors. One of the most popular is the now-discontinued - but reportedly still available - TerASIC DE1 board. This board has a decent number of emulations ported to it, and comes with PS2 keyboard input, VGA output, on-board SRAM & FLASH memories, and an SD card slot.
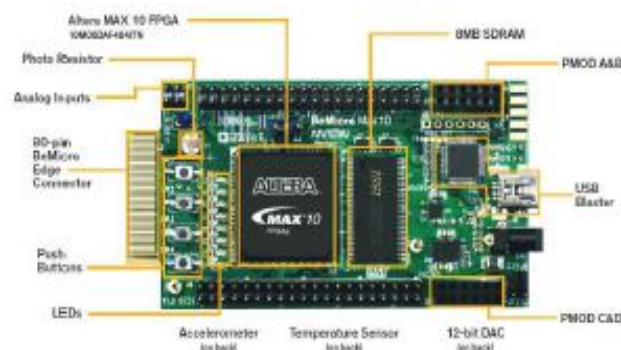
Additionally, there have been a few custom circuit boards designed to enhance the emulation of specific systems on specific development boards, notably the Coco3FPGA Analogue Board for the aforementioned TerASIC DE1 that provides analogue joystick input, additional memory, RTC and Wifi module for use by the Coco3FPGA emulation.

Next issue

Next time I'll discuss the TerASIC DE1 board and the TRS-80 Model I and Color Computer FPGA emulations in more detail.

Links to similar projects

C-One	http://c64upgra.de/c-one/
MiST	http://lotharek.pl/product.php?pid=96
Suska	http://experiment-s.de/en/boards/suska-iii-c/
Replay	http://www.fpgaarcade.com/replay/
Turbo Chameleon 64	http://wiki.icomp.de/wiki/Chameleon
MCC	http://www.mcchome.arcaderetrogaming.com/

Learning FPGA And Verilog A Beginner's Guide https://docs.numato.com/kb/learning-fpga-verilog-beginners-guide-part-1-introduction/
TerASIC DE1 https://www.terasic.com.tw/cgi-bin/page/archive.pl?No=83
Coco3FPGA Add-on for DE1 https://sites.google.com/site/thezippsterzone/coco-3-fpga
Minimig http://amigakit.leamancomputing.com/catalog/product_info.php?products_id=777

Altera FPGA MAX 10 Bemicro Evaluation Board

THERE WAS GREAT EXCITEMENT AT THE MILLER'S HOUSEHOLD THE
OTHER DAY WHEN, TO MY GREAT DELIGHT, AN 'EBAY WIN'
ARRIVED :)
FOR JUST £5, I ACQUIRED A LITTLE TANDY TP-10 PRINTER IN
SUPER CONDITION. I WAS PLEASANTLY SURPRISED JUST HOW CLEAR
THE PRINT QUALITY WAS WHEN I RAN A TEST-PRINT AND IT EVEN
CAME COMPLETE WITH THE ORIGINAL MANUAL.

THE PRINTER HAS ONLY A SERIAL INTERFACE, (I THINK IT WAS
ORIGINALLY DESIGNED TO ACCOMPANY THE MC-10 COMPUTER WHICH
HAS A 'DIN' SOCKET S/I BUILT IN), SO I DECIDED TO SET ABOUT
TRYING TO ATTACH THE TP-10 TO MY 16K LEVEL 2 KEYBOARD.
THE 'SIMPLE' SERIAL INTERFACE THAT LEON HELLER DEVISED,
NEARLY 40 YEARS AGO, USING THE TRS-80'S POWER SUPPLY AND
OUTPUTTING THROUGH THE CASSETTE PORT WOULD DO JUST FINE. SO
I SET ABOUT HUNTING AROUND FOR THE SCHEMATIC.

I FELT THAT A GERBER TYPE PCB DESIGN WAS REQUIRED, SO I HAD
A YOUNG CHAP FROM INDIA DESIGN ONE FOR ME. I FOUND HIM
THROUGH USING WWW.FIVERR.COM. I WAS MOST IMPRESSED WITH
SPEED OF HIS WORK, WITH A SET OF GERBER FILES DULY ARRIVING
IN A COUPLE OF DAYS. I THEN ASKED BAS TO CHECK TO SEE IF IT
LOOKED OK TO HIM AND HE GAVE IT THE ALL CLEAR.

I SHALL NOW TRY AND GET A BOARD MADE UP AND HOPEFULLY REPORT
BACK IN THE NEXT ISSUE JUST HOW THINGS ARE PROGRESSING.
I'VE PUT SOME IMAGES ON THE NEXT PAGES, JUST FOR INTEREST.

JUST A THOUGHT THOUGH, BEFORE I GO ANY FURTHER, IS IT
POSSIBLE TO SIMPLIFY THE DESIGN EVEN FURTHER WITH 21ST
CENTURY I.C.'S? - ANY IDEAS FROM ANYONE WOULD BE APPRECIATED

```
VWXYZ[\]^_`abcdef9hijklmnoP9rstu
UVWXYZ[\]^_`abcdef9hijklmnoP9rst
TUVWXYZ[\]^_`abcdef9hijklmnoP9rs
STUVWXYZ[\]^_`abcdef9hijklmnoP9r
RSTUVWXYZ[\]^_`abcdef9hijklmnoP9
QRSTUVWXYZ[\]^_`abcdef9hijklmnoP
PQRSTUVWXYZ[\]^_`abcdef9hijklmno
OPQRSTUVWXYZ[\]^_`abcdef9hijklmn
NOPQRSTUVWXYZ[\]^_`abcdef9hijklm
MNOPQRSTUVWXYZ[\]^_`abcdef9hijkl
LMNOPQRSTUVWXYZ[\]^_`abcdef9hijk
KLMNOPQRSTUVWXYZ[\]^_`abcdef9hij
JKLMNOPQRSTUVWXYZ[\]^_`abcdef9hi
IJKLMNOPQRSTUVWXYZ[\]^_`abcdef9h
HIJKLMNOPQRSTUVWXYZ[\]^_`abcdef9
GHIJKLMNOPQRSTUVWXYZ[\]^_`abcdef
FGHIJKLMNOPQRSTUVWXYZ[\]^_`abcde
EFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcd
DEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abc
CDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`ab
```
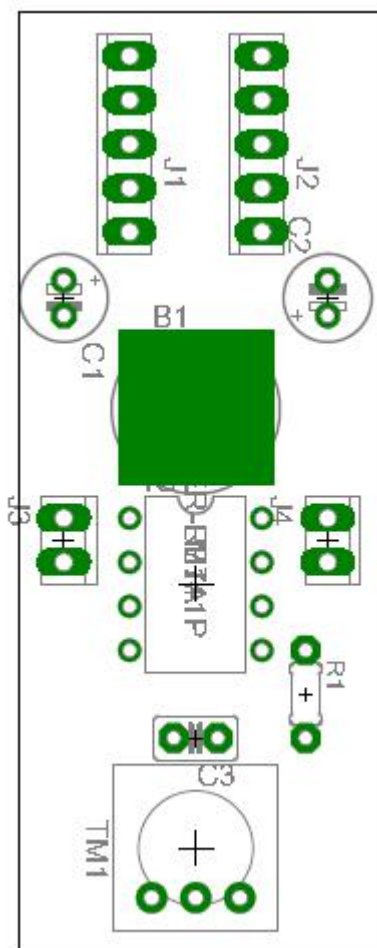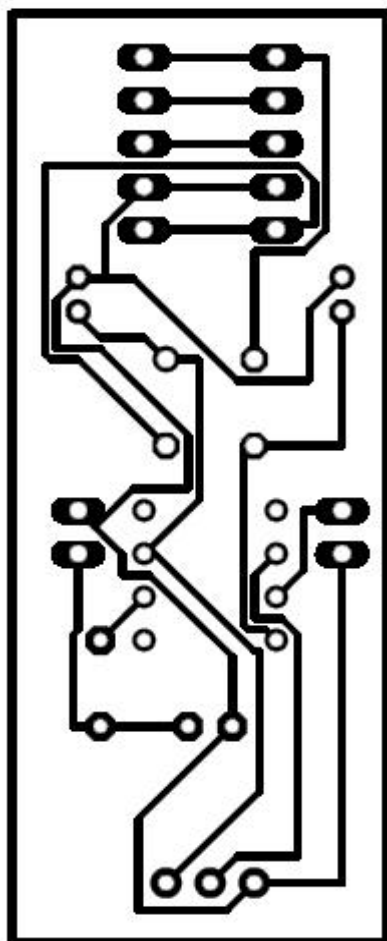
Ultra-simple serial printer interface

If you wish to use RSM-2 or the Electric Pencil with a serial, RS232 printer, and do not want to spend £30 or so on the Small Systems Hardware interface, here is a very simple, low-cost circuit that does essentially the same thing. It derives its power from the TRS-80 power supply via a bridge rectifier and capacitor combination delivering about +9 and -9 volts. The actual interface consists of a 741 operational amplifier connected as a comparator with the 100K pot. providing the threshold adjustment. It would be advisable to use a 10-turn cermet trimpot for this function as the adjustment is a little tricky. To set the circuit up merely connect in line with the power supply and keyboard and plug in the cassette output lead from the keyboard unit. Do not connect the printer at this stage. Use the appropriate command to activate the printer and monitor the output from the interface with a voltmeter or a 'scope. Adjust the 100K trimpot until you get the output swinging between + and - nine volts, ensuring that when the output is between characters (a mark condition) and idling, -9V is on the output from the interface. Connect up the printer and there you are!

Construction is non-critical and any convenient construction technique can be employed. Mine is built upon a small printed circuit board and mounted in   a small box. I cannot guarantee that the RS232 specification is met 100%, but it drives my Tandy RS232C interface from my other computer (a Motorola 6800 based system) quite happily.

FROM
SKI POWER SUPPLY

J1 TO KEYBOARD

VM08

+9V

470µF 12V

-9V

470µF 12V

FIG. 1 - Power supply

OFFSET NULL 1   8 STROBE
IN - 2 741 7 SUPPLY+
IN + 3   6 OUTPUT
SUPPLY - 4   5 OFFSET NULL

CASSETTE
O/P FROM
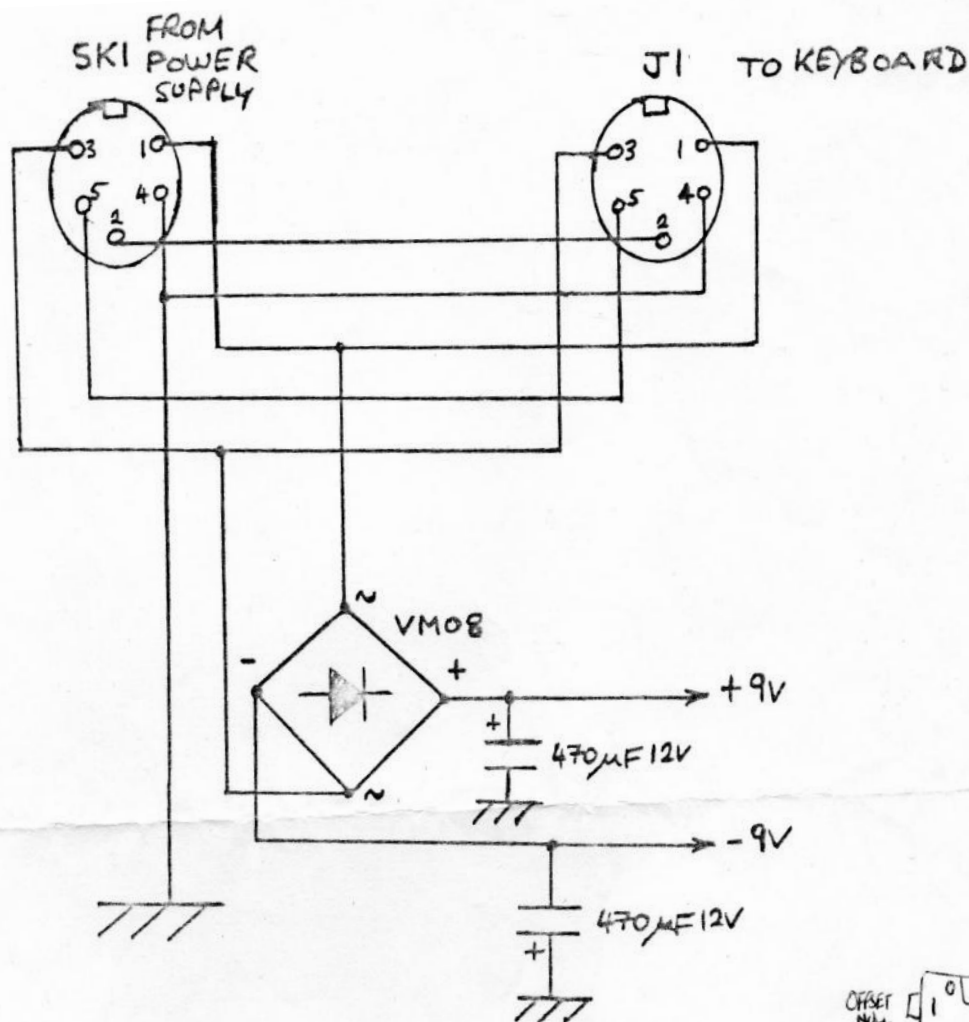KEYBOARD

+9V   +9V
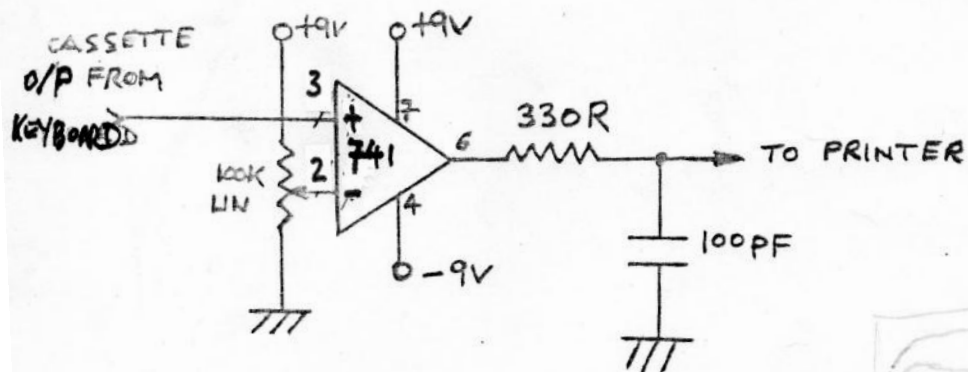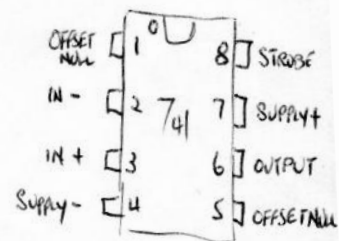
3
7
741
6
330R
TO PRINTER

100K LIN
2
4

-9V

100PF

FIG. 2 - Interface circuit

GET YOUR START IN COLOR COMPUTING

Compact Color Computer— Ideal for Beginners!

NEW FOR '84 119⁹⁵

- Eight Colors ■ Attaches to Any TV
- 255 Tones for Great Sound Effects
- 4K Memory—Expandable to 20K
- Easy-to-Use Micro BASIC Commands
- Measures 2 × 7 × 8¹/₂"

TRS-80 Micro Color Computer Model MC-10. The easy and affordable way to join the "computer revolution"! Just attach the MC-10 to any television and you're all set. Learn to write your own programs with color and sound using our excellent tutorial manual (included). Or use programs from our growing library of ready-to-run MC-10 cassette software for entertainment or education. Produce graphics characters with just two keystrokes. Enter BASIC commands using multi-purpose keys. The MC-10 features a standard typewriter-style keyboard—not a flat, plastic overlay. Displays 16 lines of 32 upper case characters with reverse video capability. The MC-10 has a cassette port that lets you use an optional cassette recorder to save and load programs and data, and an RS-232C serial interface to connect a printer or modem. U.L. listed. 26-3011 . . . . 119.95

16K RAM Module
Write larger, more complex programs on your MC-10. Slip the 16K RAM Module into the slot located on the back of the computer for an additional 16,000 characters of program and data space— 20,000 characters total.
26-3013 . . . . 49.95

MC-10 Specifications
Microprocessor: 6803 8-bit. Keyboard: 47-key typewriter-style, with Break, Control and 16 graphics keys. Multifunction keys for BASIC commands. Video Display: 16 lines of 32 upper case characters. Output connects to any standard TV set (300 ohms) and includes video and sound. Memory: 4K RAM, expandable to 20K. Input/Output: 1500-baud cassette (recorder optional). RS-232C serial I/O port. Dimensions: 2 × 7 × 8¹/₂". Weight: 29¹/₂ ounces. Power: 120 VAC, 60 Hz, 16W.

New! Ready-to-Run Cassette Software for the TRS-80 Micro Color Computer

Micro Color Checkers. Try your skill against the computer's in this all-time favorite! 26-3360 . . . . 8.95

Micro Color Games Pak. Play Lunar Lander, Breakout, Hangman and Pong! Fun for the whole family. 26-3361 . . . . 9.95

Micro Color Math/Design Package. Perform math functions and plot graphics. A great learning aid. 26-3362 . . . . 9.95

Micro Color Pinball. Great arcade-style action and excitement! Requires 16K RAM Module. 26-3363 . . . . 9.95

Micro Compac. Configure your MC-10's serial port for communications. Access major news and financial data bases, such as CompuServe® and Dow Jones News/Retrieval® for the most up-to-date information (requires optional modem and cable). 26-3350 . . . . 29.95

Low-Cost, Thermal Matrix Printer With Graphics

NEW FOR '84 99⁹⁵

- Ideal for Use With the MC-10
- Prints Graphics and Alphanumerics
- Whisper Quiet ■ Measures 3 × 8 × 5"

TP-10 Thermal Printer. Prints 32 characters per line at 30 characters per second on 4¹/₈"-wide thermal paper. Features include elongation mode for expanded print and a special repeat function to make graphics programming easier. Color Computer-compatible serial interface only (600 baud). U.L. listed.
26-1261 . . . . 99.95
Paper. 4¹/₈"-wide thermal.
26-1332 . . . . Pkg. of 2/3.95

SPECIFICATIONS. Character Set: 94 ASCII, 16 graphics. Pitch: 10, 5 cpi. Line Spacing: ¹/₆ inch. Dimensions: 3 × 8 × 5". Weight: 3¹/₄ lbs. Power: 120VAC, 60 Hz.

55

"Quinnterface" Mini Expansion Interface for 16K Model 1 FreHD users.

- COMPLETLY ASSEMBLED AND TESTED -

This is THE perfect device for all Model 1 users who own a 16K Level II unit, (which is most of us!), but no Expansion Interface or disk drives, especially if you don't want to modify your M1 with upgraded boot ROM or memory upgrade.

The 'Quinnterface', developed by J. Andrew Quinn from New Zealand, adds 32K RAM and auto-boot functionality to you FreHD.

U.K. And Europe, contact Bas. at BetaGamma Computing.
U.S.A. And rest of the world, contact Mav. At "The Right Stuff"

LOOKING FOR FAST, INEXPENSIVE, UNLIMITED MASS STORAGE FOR YOUR TRS-80 MODEL I/III/4/4P/4D?

The amazing

"FreHD"

-Emulates a TRS-80 hard drive, but faster than any hard drive!
-Works with your favourite DOS (LS-DOS, LDOS, CP/M, Newdos/80 2.5)
-Uses SD card for storage medium
-Bonus free Real Time Clock function!
-Designed in Belgium and proudly built and shipped from Australia
-Kit form or fully assembled

Order yours today:
http://ianmav.customer.netspace.net.au/trs80/emulator

TRS8BIT

HI EVERYONE AND
WELCOME TO THIS,
OUR 5ØTH EDITION!

THE MAIN FEATURE
OF THIS ISSUE IS
THE M1 CLONES THAT
WERE AVAILABLE IN
THE DAY. MAINLY,
IN THE UK, THE
VIDEO GENIE, THE
SYSTEM-8Ø IN
AUSTRALIA AND NEW
ZEALAND AND THE PMC-8Ø IN
THE USA.
I'VE TRIED TO FIND A NUMBER
OF ARTICLES FROM THE DAY,
AND MAV HAS A REVIEW OF
PASCAL HOLDRY'S RECENT RE-
ENGINEERED EXPANSION BOARD
CONNECTOR.

THERE HAS BEEN QUITE A FEW
TANDY'S SOLD ON EBAY, OVER
THE LAST FEW MONTHS. SO MANY
IN FACT, I'VE PUT IN A
DEDICATED COUPLE OF PAGES
WITH PHOTOS AND PRICES.
IT'S SURPRISING TO KNOW,
JUST HOW MUCH PRICES HAVE
RISEN OVER THE LAST COUPLE
OF YEARS.

DON'T FORGET THAT THE
TRAVELLING FREHD IS STILL
AVAILABLE ON TOUR, IN
AUSTRALIA & NEW ZEALAND,
EUROPE, AND THE UK AND ALSO
THE USA, FOR A 3Ø DAY TRIAL
PERIOD. CONTACT MAV FOR
FURTHER DETAILS.

PETER CETINSKI HAS JUST
RELEASED EPISODE 15 OF
TRASHTALK. THERE ARE FURTHER
DETAILS OF THE 'TANDY
ASSEMBLY' DUE TO BE HELD IN
OCTOBER AND AN INTERESTING
FEATURE REGARDING WRITING
MODERN DAY PROGRAMS.
PLEASE CHECK OUT PETER'S
WEBSITE FOR FURTHER DETAILS.

PASCAL HOLDRY'S WEBSITE IS
ALWAYS FULL OF NEW AND
INTERESTING DEVELOPMENTS. THE
LATEST HARDWARE IS A DOM FOR
THE M2.
I UNDERSTAND THAT MAV IS
HOPING TO MARKET THE DEVICE
IF THERE IS ENOUGH INTEREST
TO MAKE THE PROJECT
WORTHWHILE.

PETER BARTLETT HAS A VERY
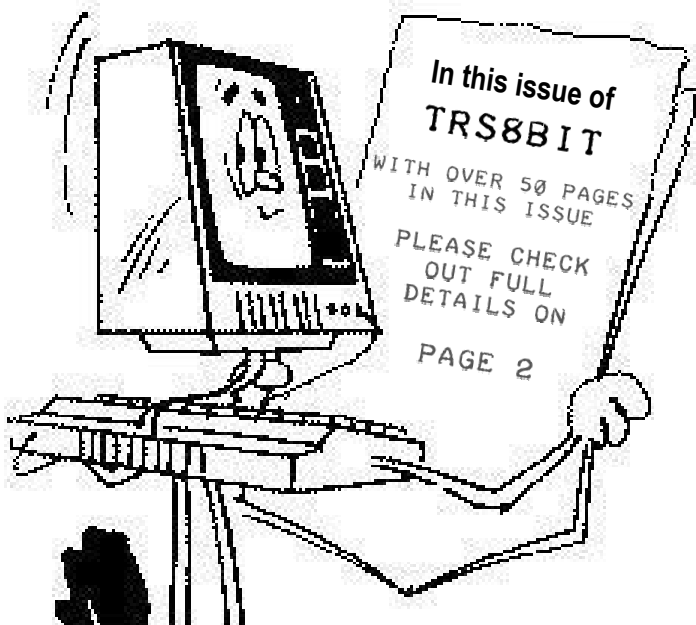LIMITED NUMBER OF 'MIRE'
UNITS FOR SALE.
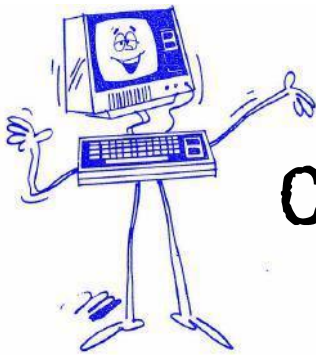ONCE AGAIN, PLEASE SEE HIS
WEBSITE FOR FURTHER DETAILS.

HAS ANYONE INSTALLED MATTHEW
HAMILTON'S M3 EMULATOR?

WELL, THAT ABOUT WRAPS UP
THIS ISSUE. I HOPE YOU FIND
SOMETHING TO INTEREST OR
INSPIRE YOU.
SO UNTIL SEPTEMBER

TAKE CARE

DUSTY

In this issue of
TRS8BIT
WITH OVER 5Ø PAGES
IN THIS ISSUE
PLEASE CHECK
OUT FULL
DETAILS ON
PAGE 2

CONTENTS

LEVEL 3 BASIC

Level 3 is written by the authors of levels 1 and 2 and provides three broad functions:

1. Use of commands that are otherwise available only on disc : (USRs, FN, TIME$, &H, LINEINPUT,MID$ etc)

2. new instructions and commands for graphics and for Basic renumbering, RS232 output etc.

3. improved operating system with reduced LOAD problems, single key word entry, keyboard debounce, long error messages and reset via BREAK.

To the user, especially with expansion interface, the additional commands mean that some of the facilities otherwise restricted to disc only are available at a fraction of the cost. These commands are as listed on page 10/4 of the reference manual. This is particularly true in the case of TIME$ which is physically present in the expansion interface byt unattainable to the non-disc-owner. The graphic commands that are new to Basic do not fundamentally do anything that could not be laboriously contrived in Basic. Nowever, after watching Level 3 cover the screen with X's or flash past of it in milliseconds instead of 'maxi'seconds, you soon appreciate the difference !

The operating system changes are a certain improvement especially the shift key entries of which 26 are set by the programme (shift A to shift Z). These can all be changed by the user so that for example:

LSET C= "CONT" + CHR$(13) will mean that every time shift C is pressed, the word CONT will appear and the computer will continue. Interestingly, one can make up graphic words in this way. For example:

LSET A= CHR$(191)+ CHR$(140)+CHR$(191)

will display and assign: whenever shift A is pressed. Reset through BREAK means that tapes can be stopped during load and save operations. Thus, an incorrect tape can be stopped loading with the interface, the use of BREAK does not lose the BASIC programme - a thoroughly useful piece of software.

To look on the other side, there are naturally some disadvantages:
the first is that Level 3 resides from 4300 to 57E0 so cannot be
used with 4k (1.) and leaves the 16k user with only 10k of store.
Even the economies in Level 3 can never recoup the lost 6k. Extra
memory is therefore desirable. Secondly, while Level 2 programmes
run in Level 3, programmes with Level 3 functions in them will not
run in Level 2 (or, I believe TRS DOS BASIC). There is however
no problem in using Level 3 to write, edit and save a programme
without special functions and then running it in Level 2. Thirdly
ther is a disc Level 3 supplied on the cassette but this is still
supplemental to Level 2 and not to DOS BASIC. Lastly, a personal
point, renumbering lines will not economise on space in programme
text as every line number is assigned 5 bytes of which the blanks
would have to be editted out; also, print statements containing
ENTER bytes (ie: ASC II '13') are messed up by the renumber
routine. Beware!!

In summary, whilst there are disadvantages, there are by far
outweighed by the advantages and, in no small degree, by a good
reference booklet and quick reference card covering all level
2 and Level 3 commands, instructions, error codes, control
characters etc. If you are expanding slowly, you will particularly
appreciate spending about 1/10th of the cost of a disc unit for
at least ½ the advantages.

Nigel Dibben

IN EPISODES 14 AND 15 OF TRASHTALK, LEVEL 3 BASIC IS MENTIONED, SO
I THOUGHT YOU MIGHT FIND THIS REVIEW OF INTEREST.

THIS ARTICLE, WHICH IS A RE-PRINT FROM THE JULY 1979 EDITION OF
THE 'TRS-80 NEWSLETTER' (BEFORE IT WAS CALLED 'NATUG NEWS' WAS BY
NIGEL DIBBEN AND LIKE MYSELF, HE SEEMED TO THINK THAT BILL GATES
WROTE, AND MICROSOFT PUBLISHED THE SOFTWARE.

I REMEMBER THAT QUITE A NUMBER OF MEMBERS PURCHASED THE SOFTWARE,
BUT AT THE TIME, I ONLY HAD 4K OF RAM IN MY MODEL 1, SO IT WASN'T
A LOT OF USE TO ME! THERE WAS EVEN A 'MOD' TO ENABLE THE SOFTWARE
TO RUN WITH THE ACULAB FLOPPY TAPE.

I MANAGED TO CONTACT NIGEL ASKING FOR PERMISSION TO USE THE ABOVE
ARTICLE AND HE INFORMS ME THAT HE STILL HAS HIS ORIGINAL MODEL 1
AND MODEL 3.

TRS-80 Emulators . com

TRS32: A Model I/III/4/4P Emulator For Windows

written by Matthew Reed

Unregistered Shareware Version:

- Works under all current versions of Windows
- Full Windows application — no low-level hardware conflicts!
- Model I, Model III, Model 4, and Model 4P emulation
- Four floppy disk drives (with optional realistic disk drive sound)
- Cassette tape drive with graphical on-screen controls
- Exatron Stringy Floppy emulation
- Printer support
- Serial port for RS-232 communications
- Joystick support (using a Windows joystick — TRISSTICK and Alpha Products joysticks are emulated)

Registered Version:

- All features included in the shareware version
- Built-in emulation of an Epson FX-80 dot matrix printer (including graphics and control codes)
- High resolution graphics (Radio Shack and Micro-Labs)
- Up to 1 megabyte of additional memory in Model 4 and 4P modes
- Hard disk support
- Orchestra 85/90 music generation

Interested?

- Read the TRS32 emulator documentation
- Download the shareware version
- Register online

Actual Dotwriter output — emulated FX-80
click for larger sample

MATTHEW'S EMULATOR IS QUITE ASTOUNDING.
IT'S MY FIRST CHOICE WHEN DEVELOPING IDEAS FOR TRS8BIT.
HE OFFERS FULL SUPPORT AND IT IS STILL UNDERGOING ENHANCEMENT.
IF YOU HAVEN'T REGISTERED YOUR SHAREWARE VERSION YET, PLEASE DO SO AND ENCOURAGE
AND SUPPORT MATTHEW'S ENTHUSIASM TO CONTINUE WITH HIS WORK.

ED.

THE VIDEO GENIE
SYSTEM-80
AND
PMC-80

TWO EVENTS OCCURRED WHICH MADE ME DECIDE TO RUN A FEATURE ON
THE ABOVE MACHINES.
THE FIRST WAS THE DEVELOPMENT BY **PASCAL HOLDRY**, IN FRANCE, OF A
BOARD TO ENABLE VG OWNERS TO CONNECT THEIR MACHINES TO A TANDY
M1 EXPANSION INTERFACE.

THE SECOND, WHICH CAUSED GREAT EXCITEMENT AT THE MILLER
HOUSEHOLD, WAS THE ARRIVAL OF MY REPAIRED VG FROM **BETAGAMMA
COMPUTING**. BAS MUST HAVE PULLED OUT ALL OF THE STOP TO GET THIS
'LITTLE WONDER' UP AND RUNNING AND TRULY REFLECTS THE GUYS
ABILITY WHEN IT COMES TO GETTING OLD MACHINES BACK IN THE LAND
OF THE LIVING. I THOUGHT IT HAD BEEN LONG-PAST IT'S USE-BY
DATE, HAVING FOUND IT, IN A BUCKET, AT A CAR BOOT SALE. BUT AS
YOU CAN SEE FROM THE PHOTO BELOW, IT IS JUST 16K OF PURE MAGIC
AND DELIGHT.

THANKS BAS, GREAT SERVICE, AS ALWAYS :)

SO, TO KICK OFF THIS FEATURE, MAV'S SENT AN EXCELLENT REVIEW
OF THE PMC 50/40 INTERFACE.

IN MAV'S WORKSHOP

by Ian Mavric

PMC 50/40 INTERFACE FOR THE RADIO SHACK EXPANSION INTERFACE

HISTORY

By 1979 a little company in Asia called EACA decided that Radio Shack had sold enough Model Is that they could make their own improved and cost-reduced version to compete with it. Enter what was known, in 1980, as the PMC-80 in the USA, the Video Genie 3003 in Europe, and the System 80 in Australia. EACA licensed Level II Basic from Microsoft, and Tandy hated the idea of a clone of their system so they sued EACA. And lost. The machine went through a few upgrades in its life and sold reasonably well but was pretty much finished up sometime in 1983. All models can be easily identified by their fake wooden sides. I'm just going to call it an EACA for the remainder of this article, and you can just substitute in the local name it goes by in your part of the world.

Being a Model I clone, to expand past the standard 16K Level II system you needed to add an expansion box, and so EACA brought these to the market in two versions, one was S-100 compatible (X-4010) and the other (X-4020) not. Neither were popular so are very rare to find these days. Committed collectors often have to wait years and then pay a premium for these rare expansion boxes.

WHY NOT JUST PLUG IN A RADIO SHACK EXPANSION INTERFACE?

This is one of the areas of differentiation that distanced the EACA from the TRS-80. Firstly the expansion bus on the EACA was 50-pin, whereas the TRS-80 was 40-pin. This meant you could not directly plug a Radio Shack Expansion Interface into the EACA. Over the years ways were devised to connect a Radio Shack Expansion Interface to the EACA and most consisted of manually wiring an adapter between the two units and adding some gates. It was not elegant but it worked. What was needed was someone to make a proper plug-in adaptor that just worked. Late in the life of the EACA, the US division, PMC, came up with an adaptor which did just that. No real explanation was given why they did this, it just appeared sometime in late 1982 or early 1983.

I speculate that the unpopular expensive EACA expansion box was no longer being produced and this might have been PMC's way to offer expansion capability for their PMC-81 until the remaining inventory of computers sold out. Want to expand your PMC-81? Buy one of these adaptors and use a Radio Shack Expansion Interface. As that TV meerkat says, "Simples!".

PMC 50/40 INTERFACE

It took me a little while to find one of these elusive devices but with a little help from J. Andrew Quinn one was located in New Zealand and subsequently bought and sent to me in Australia.
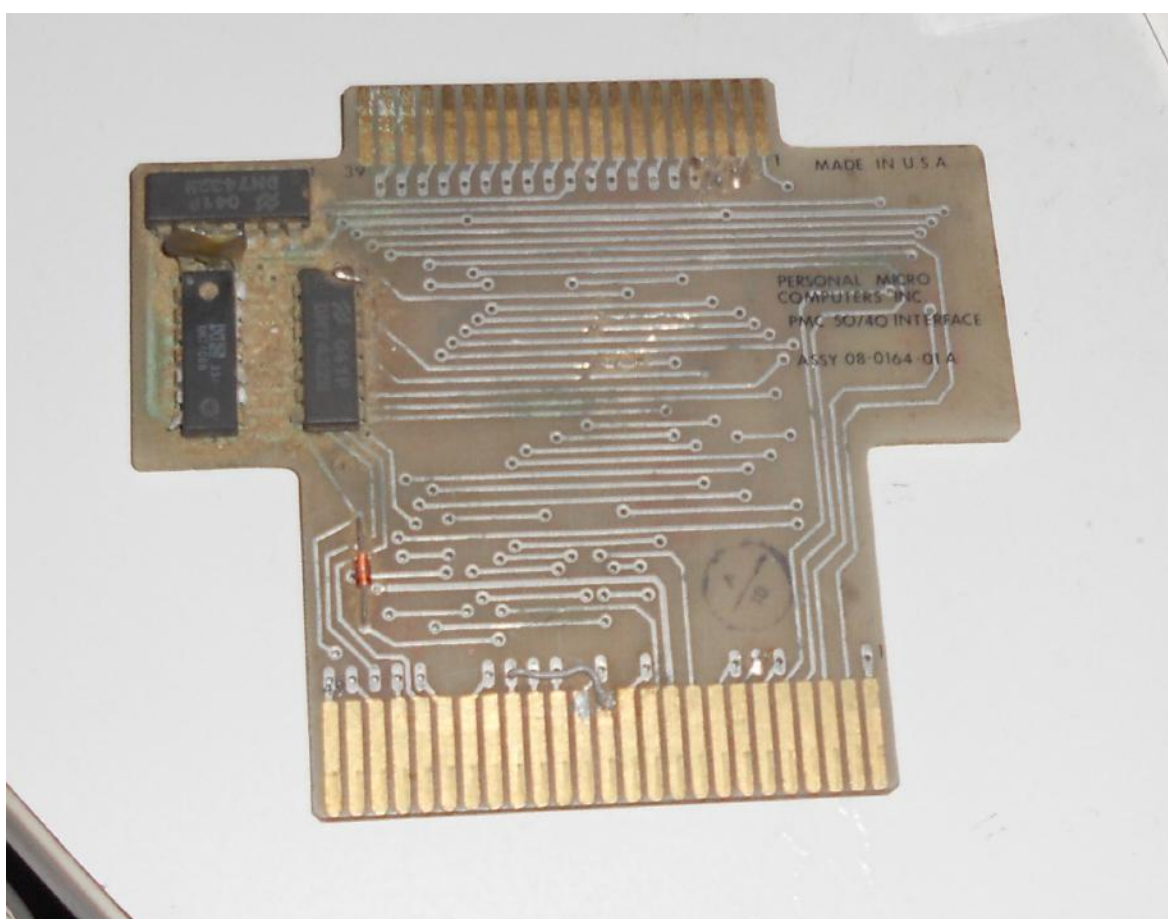
Picture: PMC Micro Computers Inc. PMC 50/40 Interface

It was in pretty awful condition as you can see but it was sent to reverse-engineering genius Pascal from www.prof-80.fr for examination and after some effort a working reproduction was completed and tested on his Video Genie 3003.

Picture: PMC 50/40 Interface reproduction (photo courtesy Pascal Holdry)

It connects between the EACA and Radio Shack Expansion Interface as you would expect:

Picture: Video Genie 3003 (lid removed) connected to Radio Shack's EI (photo courtesy of Pascal Holdry)

And as you can see it boots a floppy disk (in this case Newdos/80) which is the most common reason people wish to expand their Model I or EACA: add disk drives to the system.

Picture: Video Genie booted to Newdos/80 (photo courtesy of Pascal Holdry)

FURTHER TESTING

A prototype PCB was send to me and built up but unfortunately at this moment in time I had no System 80s to test it on! I called in well-known collector of all things TRS-80, John Benson, to act as beta tester for me and at the time of writing the good news is that the adaptor does appear to work. I'll be making a few of these available for purchase soon and depending on how the uptake is I may decide to make them available as an ongoing product.

So far John has found that the adaptor works with the System-80 "Blue Label" and the Radio Shack Expansion Interface (later version). This is a good start and handy to know because in Australia at least, the Blue Label and the later EI are the most commonly found versions of these two devices.

Tests will continue with the Black Label, Business and Educator versions of the System 80, as well as the early buffered-cable version of the Expansion Interface, as time permits. During testing with his Blue Label, John discovered a handy little bonus definitely worth spruiking about...

FreHD NOW WORKS ON THE EACA

With a Radio Shack Expansion Interface connected to your EACA, you can now easily add mass storage in the form of the very popular and reliable FreHD hard drive emulator. It's always been a difficulty for EACA owners because the official expansion boxes never had a bus extension connector. The Radio Shack EIs have them which allowed owners to connect devices such as the Screen Printer, Voxbox, Voice Synthesizer, and hard drive. Now you can just plug a FreHD into the EI, boot a hard disk start-up floppy and you are up and running a device the engineers at EACA would never have thought possible.

THIS SOUND GREAT! IS THERE ANYTHING ELSE I SHOULD KNOW?

While the PMC 50/40 interface is a great start, there are a few things worth mentioning for those contemplating using the device.

Printing does not work. The Model I and EACA printer ports use different, incompatible "smarts" and so as far as Pascal and others have found, you can't use the printer port on the Radio Shack EI without modification to the EI.

To my mind, this may have been a problem back in the 1980s when then the systems were used for actual work and needed to print people's word processing, inventory manifests, accounts receivable, mailing labels, program listings etc., but these days in all seriousness, who still needs one of these systems to print?
I therefore have made the decision to continue testing the PMC 50/40 Interface but will advise all potential buyers that printing will not work.

In testing, Pascal discovered that two wires needed to be soldered to the processor board in the EACA, to bring the CAS/ and MUX signals from the EACA to the EI to recognise the extra 32K RAM inside the RS EI.
Installed they look like this:
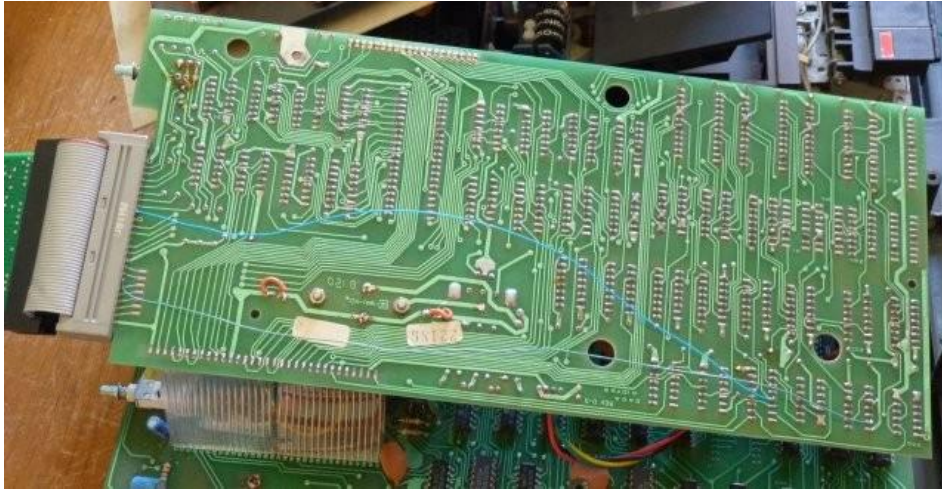
Picture: long blue wires add CAS/ and MUX signals to expansion connector (photo courtesy of Pascal Holdry)

However in beta test with his Blue Label, John Benson found no need to open his computer and add these two wires for the system to operate. More investigation is needed but I suspect it might be due to the DDU unit in the later RS Expansion Interfaces which only uses RAS memory signal and generates CAS/ and MUX internally. If this is the case then life is certainly easier and the PMC 50/40 Interface becomes a simple plug in and use affair.

FURTHER INVESTIGATION CONTINUES

Since beta testing has only really begun, an update will be published in the next issue of TRS8Bit, hopefully with some good news for owners with System 80 Black Label (early EACA with no up/down arrow keys) and System 80 Business and Educator (later EACAs with tape deck removed and replaced with numerical keypads) on how to get those machines working. Testing with the early Expansion Interface will continue, and interestingly the PMC 50/40 Interface may in fact lend itself to connecting a Quinnterface to an EACA without even needing a expansion box of any description.

CONCLUSION

Simply because these were cheap alternatives to Tandy's (relatively speaking) expensive TRS-80 Model I, the EACA was the first system purchased by many people, many of which are still devoted fans. For those who love the EACA computer, and there are many out there, this adaptor shows the potential to add interesting upgrades to the focus of their retro computing hobby.
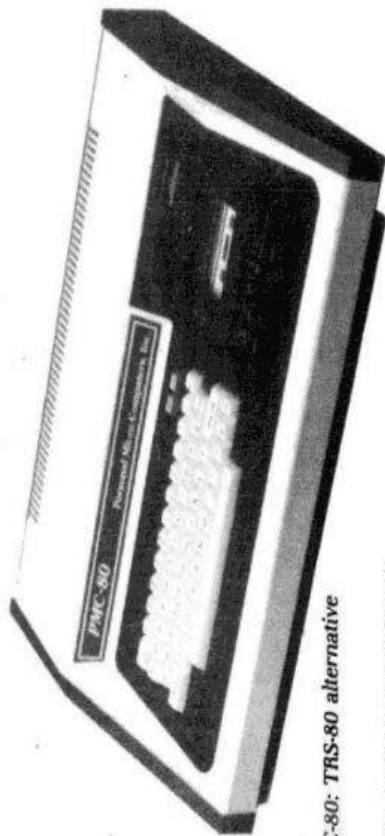
Ian Mavric   (ianm@trs-80.com)

Ian Mavric is an IT Specialist who also restores and collects TRS-80's and classic cars. He live with his wife and kids in Melbourne, Australia.

InfoWorld Hardware Review

PMC-80: TRS-80 'Workalike' Computer

PMC-80: TRS-80 alternative

By Thom Hogan, IW Staff

Reportedly there are more TRS-80s in the world than any other computer system. With the international introduction of the Video Genie, TRS-80-compatible systems will solidify their market dominance.

Manufactured in Hong Kong, the Video Genie has been available for almost a year in Europe and the Far East. Personal Micro Computers, a subsidiary of broadcast-equipment maker Recortec, is sole distributor of the computer in this country.

Personal Micro Computers has renamed the Video Genie PMC-80, and uses the phrase "TRS-80 workalike" in some of its advertising. The model reviewed here is actually a second-generation machine, with the keyboard revised to include all the key functions available on the TRS-80.

Setup

With the exception of the video monitor, the PMC-80 is a completely integrated machine. Setup is therefore simple: unbox the machine and monitor, plug in the power cords for each and then plug in the cable (optional; $25) supplied with the monitor to each unit.

Each end of the monitor cable has different connector types. The only possible mistake a beginner could make would be to plug the monitor in to the second cassette recorder connector; but since everything is clearly labeled on the back of the machine, anyone should be able to hook up the PMC-80 quickly and correctly.

In connecting the expansion interface, we managed to snap a small plastic strain relief on the back of the PMC-80. Likewise, the decorative bezel, on the front of the interface unit, that keeps the connections out of sight should be treated gingerly. If you exercise reasonable care, you should not have any problems—certainly none that affect the computer's performance.

Ease of Use

The most negative comment about the PMC-80 comes under this category. We immediately became aware that the new model has no right-hand shift key! If you are a touch typist contemplating using the PMC-80 for word processing, you may wish to reconsider. If you use prepackaged programs, do your own programming or don't need to distinguish between uppercase and lowercase, the absence of that extra shift key is a slight nuisance.

At the same time, the other features of the PMC-80 make it easy to operate. Although the reset button is on the back of the machine, you can find and operate it without looking. A special video cut switch, which changes the display to one of 32 characters on 16 lines as opposed to the normal 64, is also easy to reach and use.

Probably the most impressive feature of the PMC-80 is its integrated cassette drive. When you wish to prepare a cassette for use, you press a conveniently located button labeled "F1," with which you can manually control the cassette recorder. Insert the cassette, close the lid and press "play"—or any other button to manipulate the tape to the location you desire.

When the meter indicates that the computer has found something on the cassette, press the "F1" button again to return cassette control to the computer. Type CLOAD, or other appropriate instruction, and the computer does the rest. Other than user errors resulting from not following the above procedure, we did not ex-

perience a single problem in loading and saving tapes on the PMC-80.

Cassettes from different manufacturers are often recorded at different levels, making adjustment of the volume control necessary on some computer/recorder combinations. We tried tapes from various suppliers and found that almost all loaded on the first try, even those whose level fell outside the marks on the volume meter that indicated the range the PMC-80 could tolerate. For the few tapes, recorded at oddball levels, that did not immediately load, a simple volume adjustment yielded a correct load.

As with the TRS-80, a flashing asterisk in the upper right-hand corner of the screen tells you if a tape is loading correctly.

Performance

The primary question about the PMC-80's performance is, does it really function exactly like a TRS-80 Model I computer? The answer, at least in our tests, is an unequivocal "yes."

All software we tried, including assembly-language cassettes, BASIC program tapes, program instructions entered by hand and disk programs worked on the PMC-80 exactly as they would on the TRS-80.

The BASIC supplied in ROM with PMC-80 is a Microsoft BASIC that incorporates the same command structure and syntax as TRS-80 Level II BASIC. The graphic functions (SET, RESET, PRINT AT, etc.) are all included in the PMC-80. We tried programs and special command sequences we knew had unique TRS-80 instructions; all worked on PMC-80.

PMC-80 Personal Micro Computers, Inc.
475 Ellis Street
Mountain View, CA 94043

- Z80 CPU
- 16K RAM memory
- 16 × 64 display
- Integrated cassette recorder
  $645

Expander:
- Centronics parallel interface
- RS-232 serial interface
- Disk controller
- 32K RAM memory (optional—$295)
  $410

Video Display
- Green-tint display
- 12-inch diagonal screen size
  $159

The expansion interface (nicknamed the Expander) is also a TRS-80 "workalike." LPRINT and LLIST commands work through the parallel interface connector on PMC's Expander box.

Looking inside the expansion interface to see how PMC managed to "reverse-design" Radio Shack's interface, we were surprised to find that the Expander is a three-slot S-100 bus with power supply. The topmost slot contains an oversize S-100 board with disk controller, and serial and Centronics parallel interfaces. Also included in our test machine was a 32K S-100 bus memory board.

One slot was left free in the expansion box. We tried an S-100 bus clock board and several memory boards in place of the one supplied. All seemed to work correctly. Personal Micro Computers does not claim that the interface board is IEEE bus compatible, although it does make that claim for the memory board. The signal definitions used on the bus meet the proposed IEEE standards. A "phantom" signal is used on pin 67 to enable the disk bootstrap, a common method used in standard S-100 bus systems.

You should expect some boards to function incorrectly in the Expander. First, you cannot address memory between 0000 and 07FFF because of overlap with memory in the PMC-80. Second, the I/O ports from 0F8 to 0FF are not available. Therefore, any S-100 board that uses either of these two

areas will not work with the PMC-80.

When left on for long periods of time, the PMC-80 was warm to the touch on the top cover, but not excessively so. The expansion interface also became warm, but again, not enough to impair performance. Adding another board to an interface that has a large power consumption may require installation of a fan in the interface box, especially since the boards are laid out horizontally and obstruct the flow of hot air trying to rise.

The green-tint monitor supplied with our unit performed well. The characters appeared well formed and sharp on the display. A wide range of contrast and brightness settings should make this unit suitable to any user. We also tried the monitor on an Apple II and were pleased with the way it reproduced high-resolution graphics.

Documentation

The documentation supplied with the PMC-80 is spartan, yet accurate and clear. No important information is left out of the three manuals that accompany the system, but neither is there any extra tutorial material.

The BASIC manual includes a handy index and, in some ways, provides a much more concise description of the language than does Radio Shack's Level II BASIC manual. PMC's 88-page manual may not be overly useful to a complete computer novice, but for experienced BASIC programmers it contains the necessary information in an easy-to-use format.

Especially helpful is appendix D, a list of the program limitations, memory overhead and run-time memory allocations. It is nice to find that the limits of line numbers allowed, the number of characters allowed in a string variable, the number of bytes required by each

PMC-80

FOR-NEXT loop and other such information is all in one place and clearly defined.

A 22-page manual, *Programming for Beginners*, also comes with the PMC-80. It will help a newcomer adjust to the concept of programming, and an hour will suffice to digest its entire contents.

The optional *Service Manual* should prove helpful to anyone experienced in electronics and desiring a better understanding of how the PMC-80 works. Troubleshooting flowcharts and complete schematics and parts lists are included in the *Service Manual*.

Serviceability

The PMC-80 has a 90-day warranty. Repairs should be available at any computer store that carries the machine.

Internally, the PMC-80 is relatively modular. There are two electronic boards (one for the CPU and one for the interface electronics), the keyboard, the cassette recorder module and the power supply. You can replace any of these modules individually.

The PMC-80 is a well-built alternative to the TRS-80 Model I and III computers. Aside from the missing shift key, we could find no other shortcomings in the PMC-80 to suggest not purchasing it.

If you are considering buying a cassette-based computer, the PMC-80 excels in ease of use and should be among the first machines you look at. If you are considering buying a TRS-80 Model III, the PMC-80—though not one integrated unit like the Model III—costs less and has essentially the same performance and the bonus of S-100 expansion possibilities. ∎

Increase Capacity

Lobo Controller.

GOLETA, CA—Apple owners can now increase their disk-storage capacity with an eight-inch disk controller that supports double-density, double-sided drives.

The Lobo LCA-22 controller is completely compatible with Apple DOS and can control up to four drives. Total storage capacity per drive is a maximum of 1.1 megabytes. The board is not slot dependent. Price is $699, and deliveries are from stock.

Lobo Drives International, 354 South Fairview Ave., Goleta, CA 93117.

∎

Vendor Book

NYACK, NY—Micro-Serve, Inc., has published the fourth edition of the *Software Vendor Directory*, a directory of microcomputer software companies.

This edition contains lists of 1001 software vendors and 4195 products. Each is indexed by 80 hardware categories and 200 software categories.

Since March 1980, the *Software Vendor Directory* has been available throughout the United States and in 11 foreign countries. A disk version is also available (under CP/M).

Micro-Serve, Inc., 250 Cedar Hill Avenue, Nyack, NY 10960.

∎

THE MICROSOFT ADVERT CAUGHT MY EYE. I DIDN'T REALISE THEY
WERE INTO HARDWARE SALES/DEVELOPMENT TOO.
(EVEN IF IT IS FOR AN APPLE!)

VIDEO GENIE MEMORY EXPANSION

Addition of 16K Memory to EG3003 16K

1. Remove top cover and keyboard

2. Piggyback 8 4116 IC's on top of existing memory leaving pin 15 on each IC open. ($\overline{CAS}$)

3. Join together all open $\overline{CAS}$ pins and connect to 5V (Z20 pin 16) via a 330 ohm pull up resistor

4. Break the track between pins 4 & 5 of Z21, break track to pin 5 of Z21

5. Connect pin 4 of Z21 to Z25 pin 11

6. Connect pin 5 of Z21 to Z25 pin 10

7. Connect Z25 pin 10 to Z8 pin 15

8. Join pins 13 and 12 of Z8

9. Connect Z8 pin 11 to $\overline{CAS}$ line of extra RAMs

10. Join Z37 pin 14 to Z8 pin 14

Components required   8 x 4116 (better than 450nS)
                                        1 x 330 ohm ¼ resistor
                                        50cm connecting wire

From an engineering point of view, this method of memory expansion is quite diabolical. Piggybacking static RAMs isn't too bad, but dynamic RAMs are another matter. It seems to work, however! I would not advise anyone to try this with the TRS-80.

Leon Heller

THIS REPRINT IS FROM TRS-80 NEWS FROM MARCH 1981

IF YOU ARE UP TO SOMETHING SPECIAL OR NEW WITH YOUR TANDY, HOW ABOUT LETTING US ALL KNOW ABOUT IT?
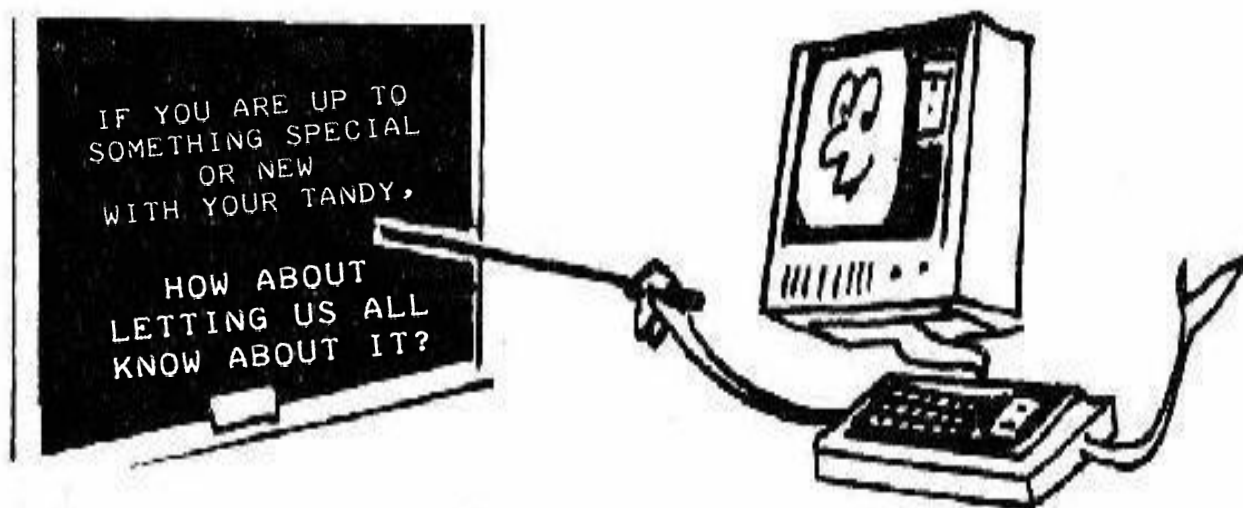
EXTRA MEMORY FOR YOUR VIDEO GENIE

You can fit 64k RAM chips to your Video Genie,and provide a
full memory bank from 0000H to FFFFH free of any Prom based
operating system.This is done by replacing the 16k RAM chips
located at the top of memory,in addresses C000H to FFFFH,by 64k
chips,and making some address selection changes to give the
necessary bank switching.Obviously this should not be attempted
unless you are fairly confident of your hardware design
abilities.The mods are relatively straightforward,quick,and
cheap.In my case,I am using the extra memory to run CP/M,but
there are many other possible uses for the extra bank of memory.

The key to the modification is in the design of the 64k RAM
chips.The pinout of these devices is almost identical to that of
the 16k RAM chips used on the expansion unit board.In addition
the refresh requirements are the same,and the power supply
arrangements can be changed to allow for the single rail
requirements of the 64k chips.The data that you will need to
understand and take into account,is available in the following:

Hitachi Data sheet for HM4864 Dynamic RAM Video Genie Service
Manual Video Genie EG3014 Expansion Technical Manual

If you are still interested in carrying out this modification,I
suggest that you aim to produce the software interface described
below:

MODES-two modes of operation;TRS and RAM.There must be an
external switch such that the system can be powered up in the TRS
mode,or switched into this mode if all else fails. The TRS mode
is identical to the standard Video Genie with a full set of
memory chips.The RAM mode switch allows software switching via an
input/output port between the two modes.When in RAM mode the
memory map is replaced by 64k of RAM,with the top 16k common to
the TRS mode.This enables communication between the two modes,and
is particularly suited to CP/M operation.

MODE SWITCHING-this is accomplished using bit 6 of port FFH.Logic
0 for RAM mode,and logic 1 for TRS mode.

The first step in the modification must be to change the
operation of Z9 on EG3014 sheet 2,in order to multiplex the top
two address bits (A14 and A15) from Z9.The standard circuit uses
pin 9 on Z9 as an inverter for Z10 pin 6 output (presumably to
save gates).Tack in an extra quad two input nand gate,cutting the
necessary tracks in order to do this.This change can be tested
now since it hasn't altered the basic operation at all.The next
stage is to set up the mechanism for providing a bank switch
signal from port FFH into the expansion interface.I used the
spare gates and flip flops on the VG interface board (sheet 2 in
the Service Manual).See Figure 1 at the end of this note.The link
to the Expansion Interface can be made using the Phantom line and
Memdis if you link pins 4 and 36 of the 50 pin S100
connector.This stage can also be tested independently.The next
stage is to carry out some surgery on the EG3014 Expander

board.Refer to sheet 1 of the Technical Manual,and Figure 2 at
the end of this note.The objective is to ensure that when MEMDIS
is pulled low and all memory is switched out,the 48k signal into
Z37 pin 9,Z32 pin 2,and Z22 pin 13,goes low and enables the RAM
chips Z1 to Z8.The final step is to remove decoupling capacitors
and unwanted supplies from the RAM and connect up the extra
address line to Z9 pin 9.Buy the 64k RAM chips and plug them
in.By pure luck and step by step testing,my modification worked
first time!

The instructions I have given have been aimed as guidelines
only,and it is recommended that you spend a couple of weeks
thinking about the modification before starting.Don't start
unless you feel confident, since it is possible to do a great
deal of damage.However,if you do succeed,you can have a
remarkably cheap CP/M system.

Malcolm Kennerley.
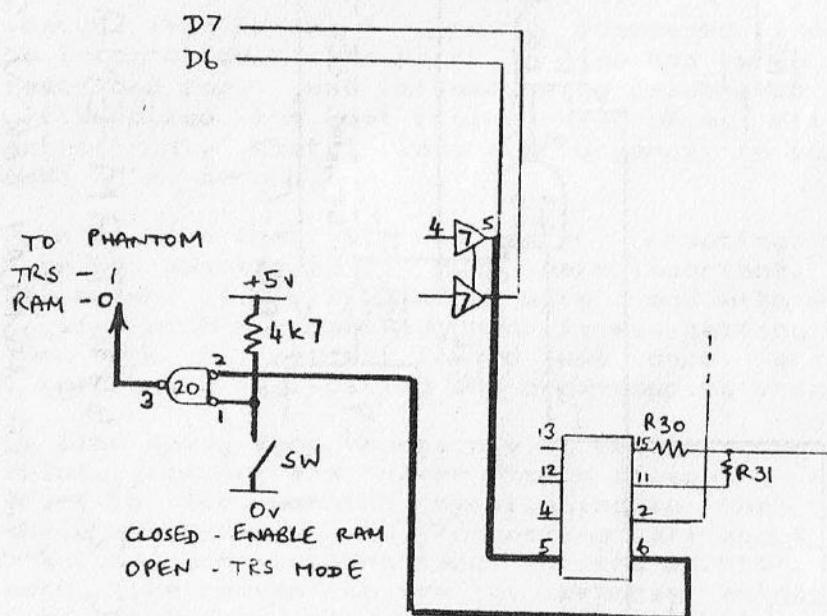
FIG 1 BANK SWITCH

(EXTRA MEMORY FOR V-G)

WMK 8/8/83

FIG 2 64k RAM ENABLE

(EXTRA MEMORY FOR V-G)

WMK 8/8/83

MALCOLM'S ARTICLE IS FROM NATGUG NEWS, AUGUST 1983

Comments on the Genie III.

I've had my Genie III for 7 months now and in spite of some problems with one of the boards I'm very impressed and pleased with it. The ability to run CPM programs has been invaluable for some of my applications - dBASE II and Cardbox being rather superior to any database that you can get under Model 1 & 3 operating systems. The Z80A running at 4 Mz makes a considerable difference to the execution speed of most programs and has stopped me playing some of the arcade games - they're too damned fast.

Two of the major reasons as far as I was concerned that made me buy the Genie III as opposed to the Model 4, were the fact that the Genie had a detached keyboard and ran under NEWDOS-80v2, letting me run the majority of my Model 1 software. I've had no reasons to regret that decision, and routinely transport data disks between the Genie and my old Model 1, to which I still have access. The 80 track, double-density disk system means that with a little care, I can read and write disks for any of the Model 1/3 variations.

The keyboard is much superior to the Model 1/3 and with the aid of Caxton softwares 'Touch-n-Type' both Jill and I have taught ourselves to touch type at about 45 wpm. It took about 10 days with about 30mins each evening to reach that standard, and is well worth doing if you have significant amounts of text to process.

Newdos-80v2 works just fine - there appears to be no halfway house as far as operating systems are concerned, you either hate or love particular ones. I love Newdos-80v2 and hate LDOS so I'm not going to express my biased thoughts on operating systems, however it must be born in mind though that it is very difficult to use any other operating system on the Genie when emulating a Model 1. The one function that I miss in Newdos is the ability to ROUTE to disc. If any one has figured out how to route what would normally go to the printer, to the disc as a file instead, I would be extremely grateful for the information.

Eaca have made a reasonable job of transporting NEWDOS and 'Model 1 ROM' to the Genie environment. For those who don't know, the Genie has no proper ROM as such. There are 5 memory banks, one of which contains 64K RAM. The video display, keyboard, disk drive memory etc. is contained in the other banks, and then switched into operation as required, when of course the corresponding area from the 64K RAM is switched out. The system also has an EPROM which contains the bootstrap loader. When reset is pressed, the bootstrap looks to see if you have a CPM or a Newdos disc. If its a Newdos disc, it loads both Newdos and a copy of the 'Model 1 ROM' into memory. This makes the sytem very versatile in that you can muck around with the operating environment in a way just not possible with a ROM based system. However it also means that the system is a little more fragile and when machine code programming, crashes seem to occur more often and are usually quite spectacular.

The Genie III has a number of extra keys. This means that although the main entry points are at the same addresses, the keboard decoding and subsequent character display routines are in a slightly different area of memory. Therefore, programs which have their own partial keyboard drivers may not work properly when they return to the ROM routines. This is the reason that TASMON does not work properly. It can be patched as follows:

For a version starting at D000H, the routine at E9D2H has to be changed-

```
E9D2H          JR Z,E9D5H
               LD (HL),A
               LD A,C
               CP 20H
               JP C,0506H  =>  JP C,04E9H
               CP 80H
               JP NC,04A6H =>  JP NC,04B3H
               LD (HL),A
               CP (HL)
               JP NZ,047BH =>  JP NZ,046AH
               JP 047DH    =>  JP 046AH
```

Similar problems occur with Southern Software's ENB, which I haven't had either the time or inclination to fix as yet.

One of the big attractions of the Genie III is the 80x24 screen which is available under NEWDOS-80. Unfortunately there are very few programs that can take advantage of this facility. In addition, the BASIC editor available in the large screen format is indescribably awful. However, you can get a version of Southern Software's EDIT for the 80x24 screen and I've re-written Scripsit to use the larger format (see advert elsewhere in this issue). I can also let anyone interested have the patches to TASMON, Superzap and a sorting DIR utility, all of which use the big screen. So programs are slowly becoming available.

For those of you willing and able to tackle your own program conversions, there are two main ways to tackle the problem of using the 80x24 screen. If for instance the program uses the standard DOS print a character to the screen at 0033H then there is no real problem, you just have to find the variable controlling the number of lines allowed to be printed on or scrolled up the screen at any one time. This will work OK for ZEN and EDAS for example which use standard DOS routines.

However, many programs use direct screen addressing for their displays and that causes problems. This is because the extra screen memory is mapped to the area normally taken up by the system RAM ie. from 4000H-437FH. The total screen is addressed as a continuous block from 3C00H-437FH, but the second half of the screen has to be switched in before you start writing to it. If you don't do this you will start to write all over the system routines with disastrous results.

Bank switching is carried out by writing specific bit patterns to port 0FAH. You can do this directly but you have to be very careful about what happens to the stack. It is very easy to leave it in the bit of memory that you've switched out and any subroutines will get hopelessly lost. It is far easier to use the routines already built into the operating system in order to carry out system functions that need to write to the extra screen memory. There are 8 special call points that carry out various operations on the screen, normally with HL pointing to the screen address. These are:

Address	Function
3643H	LD A,(HL)
3649H	LD (HL),A
364FH	LD (HL),20H
3656H	LDIR
365DH	LDDR
3664H	INC (HL)
366AH	CPIR
3761H	CPDR

To use these functions, simply load your registers with the appropriate addresses or values and CALL ADDRESS. The bank switching is all carried out for you. If you want to do something that is not covered by one of these instructions, there is are two general purpose CALLS to switch in and out the banks. To use these:

```
        CALL 3605H      ;Switch in extra video ram
        Do your OP
        CALL 3629H      ;Switch out extra video ram
```

Using these combinations you can carry out just about all the operations that you want.

One final tip concerns that blinking cursor. As you have probably discovered by now, it is a hardware cursor and it is not at all easy to get rid of it. The chip controlling the display is in fact very versatile and the actual format of the display is all under software control. It is somewhat complicated to use so that if you want to muck around with your display then I suggest you get hold of the technical information sheet on the chip - the Motorola MC6845. This is very informative and actually gives a small sample program in machine code to demonstrate how to set up the screen and cursor parameters. For simple purposes however, you can just alter the operating system. Putting a NOP (00H) at 048CH will make the cursor disappear, putting E6H at 048CH will restore it. You can do this from within BASIC with a simple poke statement.

I hope this has been of some use to any of you Genie III owners. I would welcome any comments from fellow owners and you are most welcome to phone me on

Geoff Smith

GEOFF'S ARTICLE IS FROM NATGUG NEWS, MAY, 1984

MODIFICATIONS TO SCRIPSIT FOR THE VIDEO GENIE

The following modifications to Scripsit are to make the program
suitable for use with the Video Genie. Using Prozap or Superzap.
the printer in / out addresses are modified from the TRS80 37E8H
address to the Genie port FDH.

```
                    Relative file sector 0000H
                    Bytes           48H,49H,4AH
                    Current         32H,E8H,37H
                    Change to       D3H,FDH,00H

                    Relative file sector 000DH
                    Bytes           9BH,9CH,9DH
                    Current         3AH,E8H,37H
                    Change to       DBH,FDH,00H

                    Relative file sector 0014H
                    Bytes           93H,94H,95H
                    Current         3AH,E8H,37H
                    Change to       DBH,FDH,00H
                    Bytes           A4H,A5H,A6H
                    Current         3AH,E8H,37H
                    Change to       DBH,FDH,00H
                    Bytes           B2H,B3H,B4H
                    Current         32H,E8H,37H
                    Change to       D3H,FDH,00H

                    Relative file sector 0015H
                    Bytes           7AH,7BH,7CH
                    Current         32H,E8H,37H
                    Change to       D3H,FDH,00H

                    Relative file sector 0029H
                    Bytes           3BH,3CH,3DH
                    Current         32H,E8H,37H
                    Change to       D3H,FDH,00H
                    Bytes           42H,43H,44H
                    Current         32H,E8H,37H
                    Change to       D3H,FDH,00H
```

Ken Gray

KEN'S ARTICLE IS FROM NATGUG NEWS, JUNE 1982

THE DICK SMITH SYSTEM-80

MARY PAGE
WITH THANKS TO TERRY STEWART'S WEBSITE FOR ALL THE INFORMATION.

HTTP://WWW.CLASSIC-COMPUTERS.ORG.NZ/

THE SYSTEM-80 IS THE DICK SMITH TRADE MARK NAME GIVEN TO THE EACA "VIDEO GENIE I AND II" MACHINES. THE "SYSTEM-80" IS THE WAY THIS MACHINE IS GENERALLY KNOWN IN AUSTRALIA AND NEW ZEALAND.

EACA SOLD THESE MACHINES TO ALL COMERS; SUBSEQUENTLY THEY SHOWED UP ALL THROUGH THE WORLD UNDER AN ASSORTMENT OF BRAND NAMES. THESE INCORPORATED THE VIDEO GENIE IN EUROPE, THE PMC-80 AND PMC 81 IN NORTH AMERICA, THE HT-1080Z (IN HUNGARY) AND THE TRZ-80 IN SOUTH AFRICA.

THE INTRIGUING THING ABOUT THESE NAMES (ASIDE FROM THE MARK II) WAS THAT THEY WERE NEVER ANNOUNCED. THE NAMES FOR THE MARK I VARIATIONS WERE ONES THAT WERE GIVEN BY CLIENTS THEMSELVES TO RECOGNIZE THE DISTINCTIVE VARIATIONS OF THE MARK I. UNDER THE HOOD, THE SYSTEM-80'S DETAILS WERE FUNDAMENTALLY THE SAME AS THE TRS-80 MODEL 1, BUT WITH JUST ENOUGH DIFFERENCES TO MAKE IT UNIQUE AND, I SUPPOSE, CREATE A FEW COMPATIBILITY PROBLEMS!

THE UNIT WAS POWERED WITH A ZILOG Z80 CHIP RUNNING AT 1.79 MHZ AND 'BRAGGED' 16K OF MEMORY ON-BOARD. IT RAN A VARIANT OF MICROSOFT BASIC WHICH WAS THE SAME AS THAT IN THE TANDY RADIO SHACK TRS-80 MODEL 1 MACHINE. THE CHARACTERS WERE DISPLAYED ON CRT SCREEN, (USUALLY A DOMESTIC TV), 64 CHARACTERS WIDE BY 16 LINES. THE GRAPHICS MATRIX WAS ALSO IDENTICAL TO THE TRS-80 M1.

PROGRAMS WERE LOADED OR SAVED TO THE BUILT IN CASSETTE TAPE DESK. A 50-WAY BUSS COULD INTERFACE WITH A DISCRETIONARY SYSTEM-80 EXTENSION UNIT, OFFERING 32K OF ADDITIONAL MEMORY, DISK DRIVES, A CENTRONICS PARALLEL PRINTER PORT AND A RS-232. EARLY SYSTEM 80S HAD ONLY UPPER CASE, THOUGH LATER MODELS INCLUDED LOWER CASE.

LIKE THE TRS-80 MODEL 1, EARLY MODELS EXPERIENCED KEYBOARD
BOUNCE. THE CONTRASTS BETWEEN EARLY SYSTEM 80'S AND THE TRS
-80 MODEL 1 KEYBOARDS WAS THE 'TWO MISSING KEYS'. THE CLEAR
AND THE RIGHT ARROW KEYS.

THE LAST SYSTEM-80'S CEASED PRODUCTION AT SOME POINT IN MID-
1983. BY THEN MORE THAN 13,000 UNITS HAD BEEN SOLD IN
AUSTRALIA AND HAD, REPUTEDLY, MADE "A FORTUNE" FOR DSE.

DICK SMITH HARDWARE HELD THE RESTRICTIVE AUSTRALASIAN
CIRCULATION RIGHTS, UNTIL 1982.

THE SYSTEM 80, WAS RENOWN IN AUSTRALIA AND NEW ZEALAND IN
THE MID 1980'S. IT WAS SUPPORTED IN EUROPE AND THE UK AND
WAS SOLD (LESS EFFECTIVELY) AS THE PMC-80 IN NORTH AMERICA.

IN MAV'S WORKSHOP

by Ian Mavric

TRS-80 DISASTER RECOVERY: MODEL III, 4, 4D KEYBOARD DAMAGED IN TRANSIT

The TRS-80 keyboard, its one of the most important parts of the computer and basically the only way we the humans, can communicate with the digital brains of the TRS-80. When your keyboard stops, your TRS-80 stops, and your retro-computing hobby grinds to a halt. Back in the day, when your keyboard failed, Radio Shack carried spare keyboards so oftentimes if a key failed a complete replacement keyboard was installed. Then by the early 90s Radio Shack ran out of keyboards. So clever people looked at how to fix individual key switches. This has carried the TRS-80 community to the present day but another problem has shown up with alarming regularity in the eBay era. I call it keyboard transit puncture.

BUT IT WORKED PERFECTLY BEFORE I SHIPPED IT?

On your Model III, 4 or 4D, next time it's open, look under the keyboard, and you'll see a plastic post in the middle of the case under the keyboard. It's purpose is to prevent the keyboard from flexing as you type on it... essentially giving the computer the solid feel we know typing on it.

Picture 1: post which punctures the keyboard

However, in certain situations where heavy items are placed on top of the keyboard when the computer is packed, can push enough force down on the keyboard that the post breaks the keyboard PCB between the J and K keys. It's a hole, in effect a puncture. Oftentimes the keyboard looks perfectly normal, but in severe cases the J and K keys are damaged too much they sit on funny angles. You also find that while most of the keys work well, certain other keys - up to 10 of them - not just J and K, won't work. The reason for this is because some of the connecting PCB traces to other keys have been damaged, not just J and K.

THAT LOOKS BAD, WHAT CAN I DO?

If this was 1987 then this would be an instant throw away and replace the keyboard, but since it's 2017 we need to treat it with the mindset that while there is damage, with a bit of detective work you can once again have a working keyboard. The first thing to know is that while the hole is small (less than 1cm diameter) it most likely has damaged up to six traces and impacted four solder pads on two key switches (two on J and two on K). First, unsolder the J and K key switches and remove them. Test them with a multimeter for less than 200 ohms resistance; if satisfactory then the key will most likely work one re-installed. (Seldom do I see a key switch which has been hit so hard it's physically damaged, but if that is the case you'll need to source a replacement key switch.)

Below are two photos of Model 4D keyboards, the top one shows an undamaged one and the lower photo shows the puncture hole made in transit. (Don't mind the other wires you see, they will be explained in due course.)

Picture 2: undamaged Model 4D keyboard
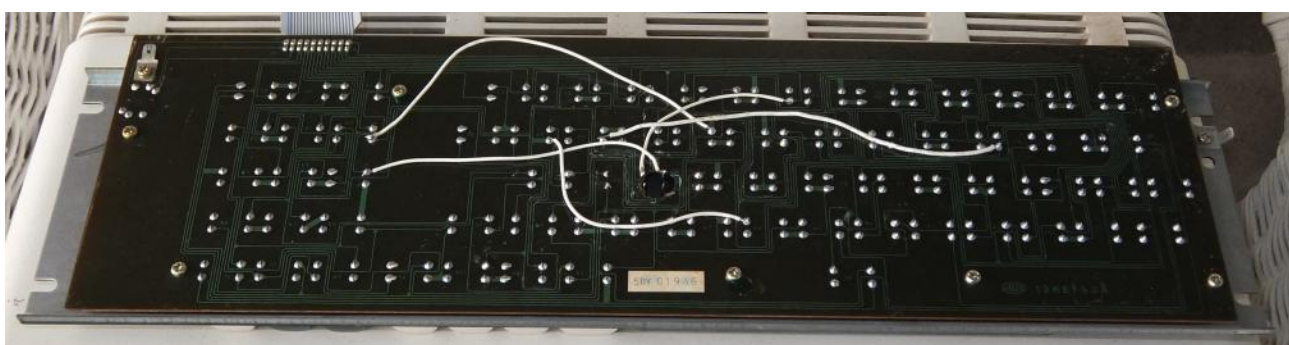
Picture 3: damaged and repaired Model 4D keyboard

Close up examination of the keyboard shows quite a lot was going on around the area where the puncture has occurred. Compare the two photos below. Again, the top one shows an undamaged keyboard and the lower one shows the damage.
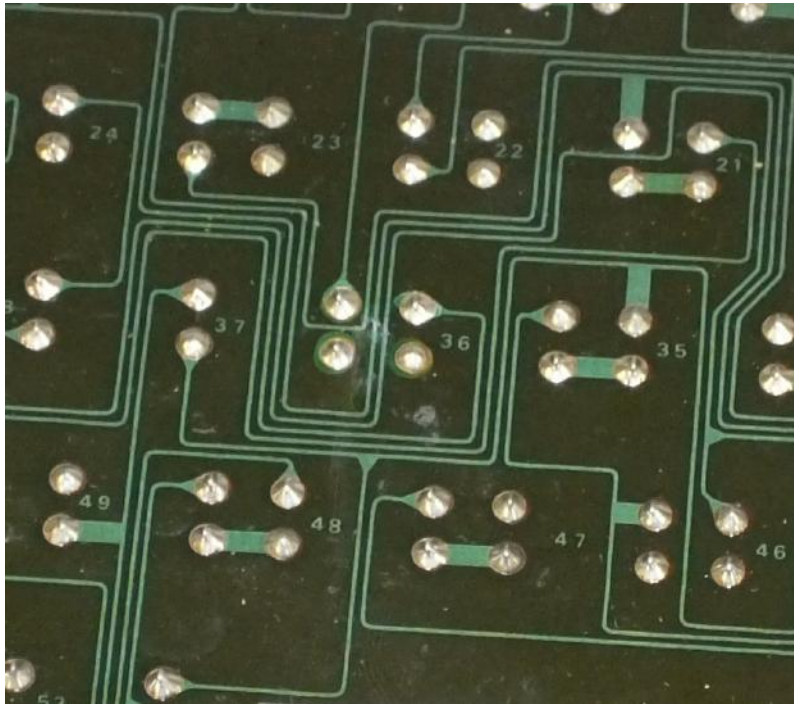
Picture 4: undamaged 4D keyboard

The main damage occurs to the three traces and 4 solder pads to the left of the keyswitch 36.
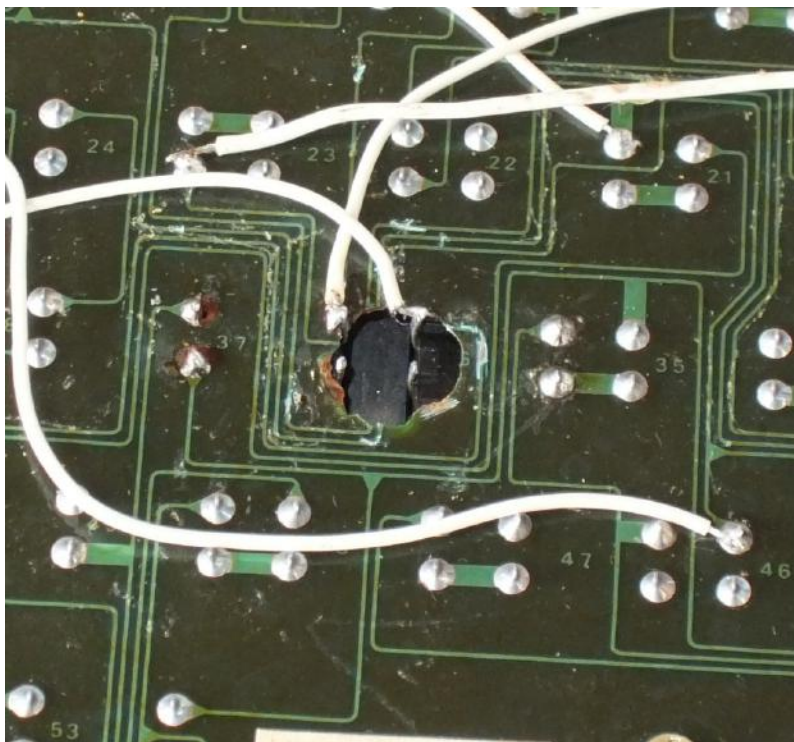
Picture 5: close up of the puncture and one method to repair it

REPAIR THEORY AND PRACTICE

Although it looks pretty bad, all that is needed to repair this particular
keyboard (a Model 4D ALPS keyboard) is to restore reconnect those three
broken traces, and connect to the solder lugs on the J and K key which
now hang in free space. I should point out that they don't hang
precariously in free space, at the metal upper keyswitch holder is still
doing its job. Also notice from picture 4 (above) that only two of those
four solder lugs adjacent to the number 36 are connected. So all up we
need to restore 5 connections. Reduced to only 5 wires makes the repair
look much less daunting than it did when you first saw that hole in your
keyboard.

Take another look at picture 3 (above) and notice I have soldered in 5
wires. As mentioned, 3 of them reconnect the broken PCB traces and the
other two connect to the key switches. You'll have to excuse me for
using the same colour wire for all 5, but you get the idea of what I am
doing. Using a multimeter or any continuity tester you can follow where
the PCB traces start and finish, and simply connect them to solder pads
bypassing those disconnected by the puncture. I use this method
because if you try to repair with wires across the puncture, any time you
put pressure on the keyboard you will stress the wires.   While there are
multiple places you can put the wires, it will look similar to picture 3
when finished. Below is a closer look:
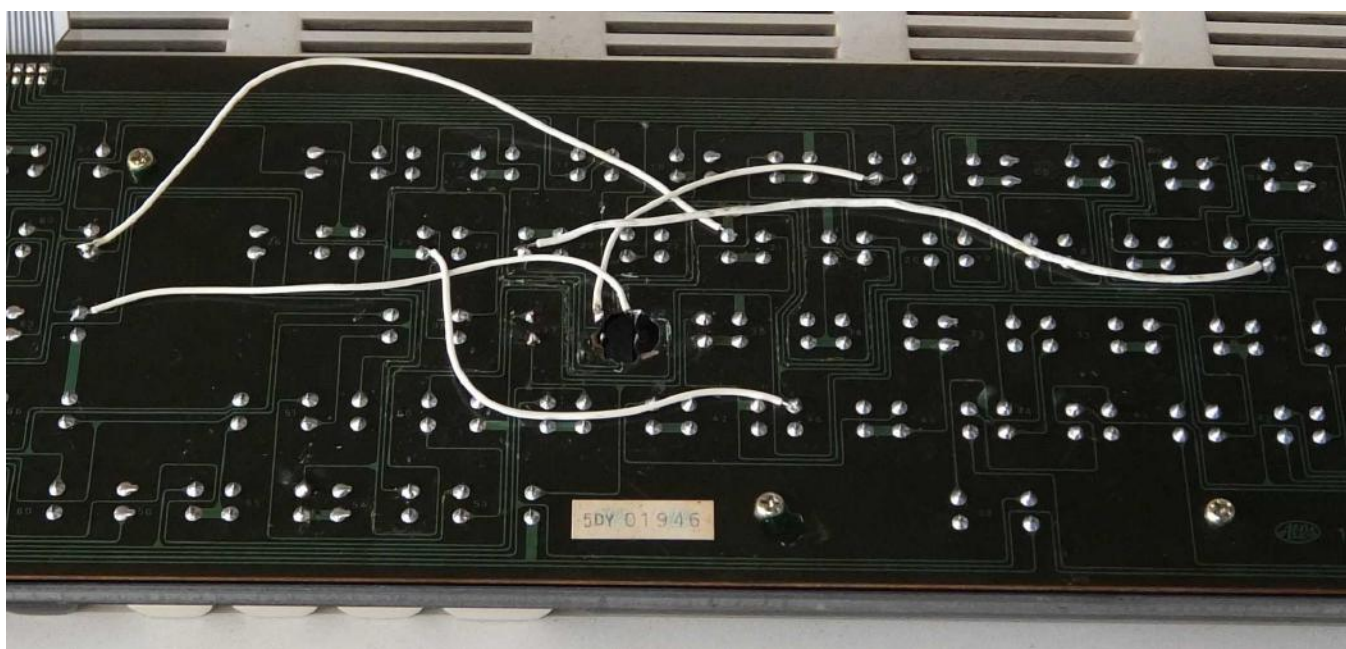
Picture 6: five wires, in appropriate places, and you are finished

Once completed, you can test your keyboard by just plugging it in. If the wrong keys respond that indicates one or more of the 5 wires are soldered to the wrong places, re-check with a multimeter, and you will find the mistake.

FINISHING OFF

With the keyboard working again re-assembly can commence. That post in the case now has nothing under the keyboard to support it and for most people they will be happy with that, it hardly changes the feel of the keyboard. My preference is to put some blocks of appropriately sized foam rubber on either side of the post so the keyboard is supported on either side of the post.

For the future bear in mind that you have this repaired keyboard so be mindful when transporting the machine not to put too much force on the keyboard lest you cause more problems.

CONCLUSION

For most people this will be a permanent solution and the keyboard will not have any more problems and give a good service life consistent with any other Model III or 4 keyboard.

This above technique can be used to repair Model III ALPS keyboards which have the 2- or 4-lug keyswitch design, or the Model 4 and 4D ALPS keyboards. Unfortunately the technique won't work with the Model 4 gate-array and 4D membrane type keyboards.

At this point on time if they are damaged in this manner there is no way that I can see to repair those. They only way would be to procure a replacement keyboard from one of the usual sources like eBay or TRS-80 parts specialists, though they can be hard to find.

Ian Mavric

ianm@trs-80.com

THE NEXT ISSUE OF TRS8BIT WILL BE PUBLISHED EARLY SEPTEMBER 2017

WOULD YOU CARE TO SEND IN A CONTRIBUTION?

EBAY ITEMS THAT CAUGHT MY EYE

THERE HAS BEEN A LARGER THAN USUAL
NUMBER OF ITEMS ON THE UK'S EBAY
OVER THE LAST 3 MONTHS.

FOR AN EVEN BIGGER SELECTION, USE
EBAY.COM (IT'S JUST THE POSTAGE
COSTS THAT WILL SPOIL IT)

HERE'S A M2 SETUP, WITH A DISK EX-
PANSION UNIT AND A DAISY WHEEL
PRINTER, REQUIRING SOME TLC

BILL DEGNAN HAS ONLY A FEW OF THESE
AEROCOMP M3 DISK DRIVE CONTROLLERS.
I WOULD HAVE THOUGHT THESE MUST BE
GETTING QUITE RARE NOWADAYS AND AT
$29.95 MUST BE GOOD VALUE. THESE
ARE NEW, OLD STOCK, WITH ONLY A FEW
LEFT.

THIS EXPANSION INTERFACE
SOLD FOR £133.72

THIS VIDEO GENIE, SOLD AS SEEN,
REACHED £65.00

THIS COLLECTION MADE THE GRAND SUM
OF £53.00

    (DEE READ ME THE RIOT ACT ABOUT EVEN
THINKING OF PUTTING IN A BID! AH WELL ...)

80 Microcomputing 75 Issues PDF format on 2 DVDs

HOW ABOUT A COMPLETE SET OF 80
-MICRO IN .PDF FORMAT ON DVD?

I LIKE THE IDEA BUT I WONDER
ABOUT COPYRIGHT!

A GREAT LITTLE CGP-115
PRINTER. FINDING THE INK TUBES
IS A BIT OF A PROBLEM THOUGH.

WHEN THE PLASTIC COGS INSIDE
BECOME WORN, THEY CAN BE
REPLACED WITH METAL ONES, SO
I'M LEAD TO BELIEVE.

HERE'S THE CP/M MAPPER BOARD
FROM MAV'S WORKSHOP.

IF YOU NEED TO RUN CP/M ON
YOUR M1, THIS IS THE MODERN
WAY TO GO.
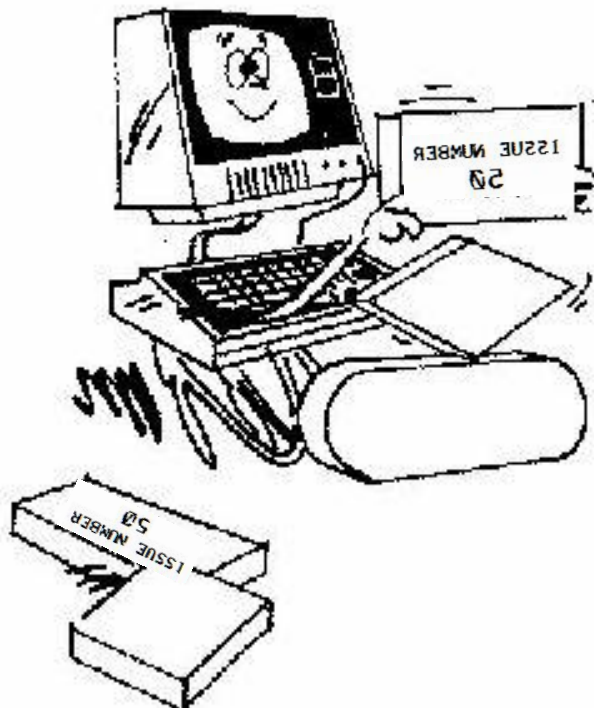
DOM Interface Card for TRS-80 M2

A realization by Hans Rietveld, Regis Munoz and Pascal Holdry

This card with a simplified 8-bit IDE output will allow you to install a DOM to simulate a hard drive.

Specifications:

1. Slot and format of a TRS-80 M2 card
2. Minimum of components
3. Possibility to position a compatible 5.5 "HDD
4. Simple use
5. No external power supply for the DOM
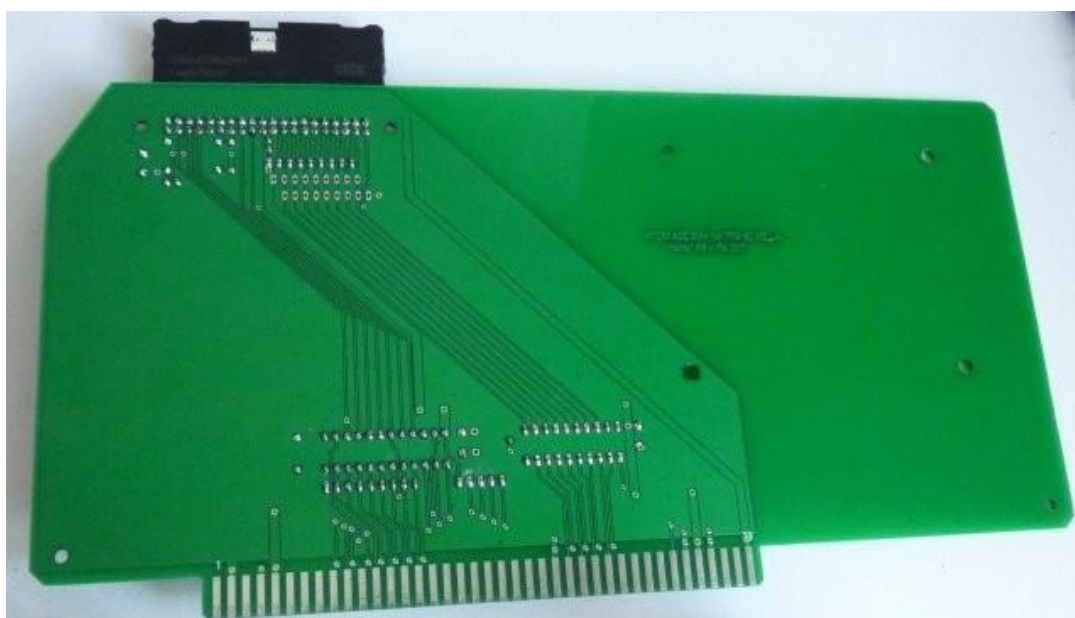
Top view

View from below

It will be possible to fix a 2.5 "compatible hard disk on the card. The card working with a fake IDE interface (8 bits) some hard drives and adapters" SD .... "refuse to operate with an interface 8-bit and non-16-bit IDE

HERE'S A M2 MODERN DAY ENHANCEMENT FROM PASCAL HOLDRY'S WEBSITE. I UNDERSTAND THAT MAV IS HOPING TO PRODUCE THIS UPGRADE.

IN MAV'S WORKSHOP

by Ian Mavric

TRS-80 PRINTERS FROM THE BEGINNING SERIES
PART 2: LINE PRINTER II (26-1154)

Last time I talked about the Line Printer I, Tandy's first attempt at a full sized printer for the Model I, using the best in printing technology available at the time (1978) in for form of the Centronics 779.

It was large, expensive, noisy, and best appreciated by business users. It was a bit too large and noisy for home use, and so Tandy sold some small printers aimed at home users called the Screen Printer and Quick Printer I. It became clear pretty quickly that home users needed a printer with more capability than the Screen and Quick printers, but without the behemoth size and expense of the LP1.

Enter the Line Printer II in 1979. Smaller, cheaper, with some improvements and some annoying deficiencies, it was a move in the right direction and a sign of the future of dot-matrix printers.
I'll refer to it as the LP2 for the rest of this article.

Line Printer II
799⁰⁰

Line Printer II   New L:
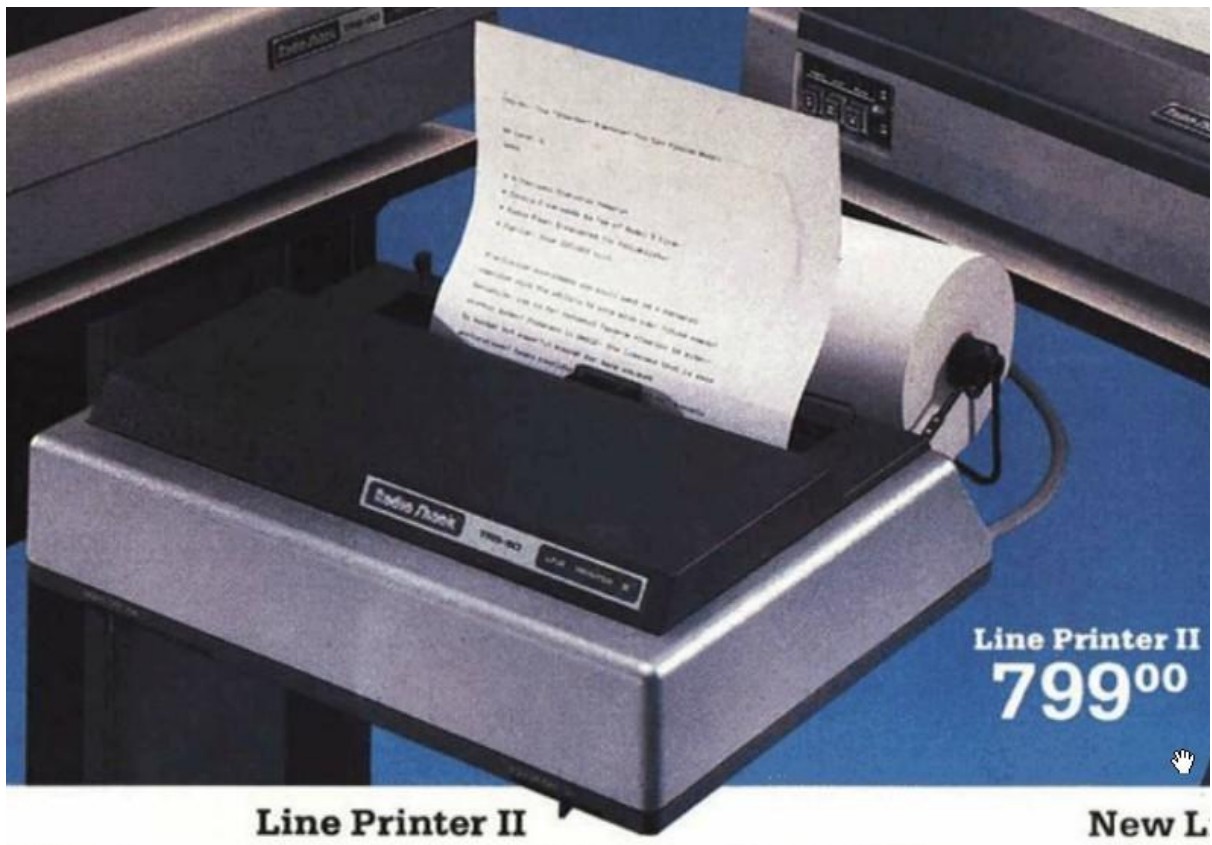
SMALLER BUT SLOWER

The advertisement on the next page, from Radio Shack Catalogue -3, shows a LP2 sitting next to a LP1 and a QP2.
The size of the LP2 approximates the size of 1980s Epson dot matrix printers, that being bigger than an A4 paper (or US Letter, if you prefer) but not ostentatious like the LP1 was.

Paper handling was the same as the LP1, which meant that it could use a roll of paper (as pictured in the adverts) or tractor feed which was becoming more and more popular at the time, especially as quality tractor feed paper with perforated removable edges was becoming more affordable.

Print speed of the LP2 was 50 characters per second, which was a reduction compared to that of the LP1 which was capable of around 80cps. It was also slower than Tandy's other printers of the time, the Screen Printer, and Quick Printers I and II.

TRS-80 Line Printers for Every Application

1598⁰⁰
Including Cable

NEW
999⁰⁰
Including Cable

NEW
219⁰⁰

SPECIFICATIONS - 1979 STYLE

LP2 was a dot matrix printer, more suited to home use than business use but no doubt many LP2s found their way into small business.

7x7 dots was the was the printing matrix in upper and lowercase which was a marked improvement on the LP1 with it's uppercase only. This was also timed with the introduction of the lowercase modification kit for the Model I so naturally people who installed this kit also wanted to be able to print in lowercase.

It's no surprise that sales of the LP1 took a nose-drive after the LP2 was released. Also a sign of the future of dot matrix, the LP2 could print in either standard 80 column mode or condensed 132 column mode. This was a departure from the continuously variable print width adjustment capability of the LP1.

Another departure from the LP1 was that the LP2 could only print 2 carbons instead of 5, though this certainly would not be on many home computer user's mind.

Line Printer II

Here's 80/132-column printing at low cost! The dot-matrix head prints 7x7 upper and lower case characters. Also prints expanded (wide) letters under software control. Non-adjustable platen pins keep forms in perfect alignment. Uses 9¼" fanfold, roll or single sheet paper. Pin or pressure feed, 2 carbons. Inexpensive roll paper fits in a detachable rear bail. U.L. listed. 26-1154 . . . 799.00

Ribbon 3-Pack. 26-1413 . . . . 18.95
LP II Dust Cover. 26-504 . . . . 4.95

NEAT, COMPACT, LIGHT

At 10lb the LP2 was around one quarter the weight of the LP1, and at 15in x 11in x 5in it was much smaller. It looked natural sitting next to a Model I but came across as being tiny when sitting next to a Model II as the photos from RSC-3 below show:
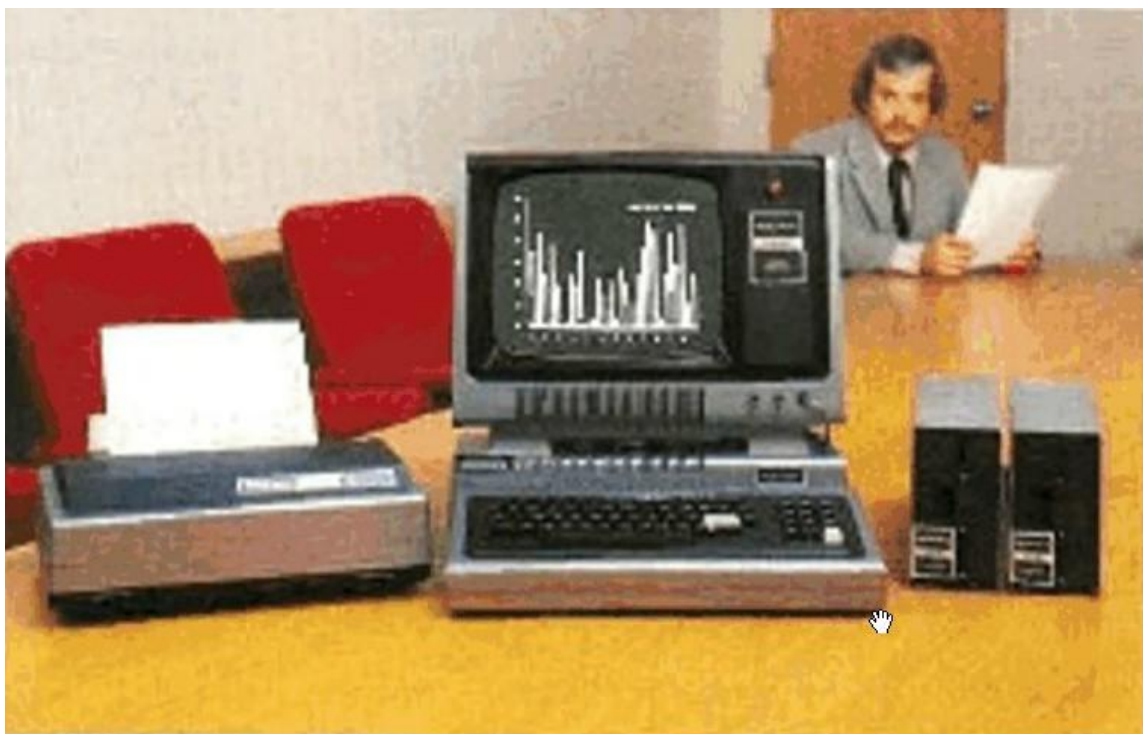
PRINT SAMPLE

The 7x7 matrix was an improvement on the LP1s 5x7 matrix and being a print head designed by Centronics the print was sharp and easy to read.

It still left a little to be desired in the clarity stakes especially for word processing. Yes, lowercase characters are supported but unfortunately there are no lowercase descenders and certain lowercase characters are not properly represented, merely being smaller versions of their uppercase equivalent, have a close look at G and Q and it's lowercase versions, on the following page.

Printable Characters

The Line Printer II can produce all ASCII characters from hex 20 through hex 7F (decimal 32 through 127). Here's what they look like:

Normal Size

Double Size

Note that the following four codes are different from the usual ASCII character set.

Character		Code		
Usual ASCII	Line Printer II	Decimal	Hex	Octal
∧	↑	94	5E	136
—	←	95	5F	137
⟨	↓	96	6O	140
~	→	126	7E	176

The arrows are more useful since they correspond to the TRS-80's Video Display character set.

MANUALS SUPPLIED

The typical manual was included so the end user could get their printer up and running quickly. For those with a more technical side to them there was also a Service Manual available at a extra cost.
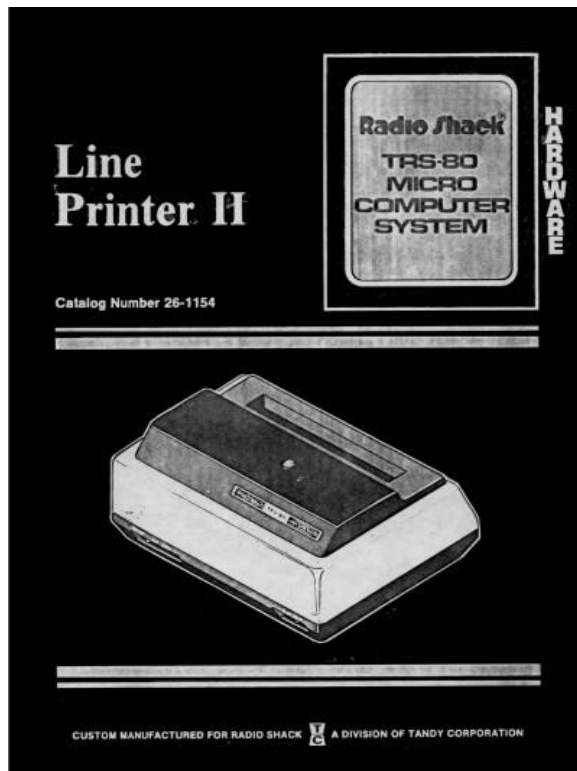
WHATS GOING ON WITH THE INTERFACE?

The LP1 had a proper Centronics interface but the LP2 had a strange card
-edge which was different to anything that came before or since. It's a
40-pin interface with a split between pins 3/4 and 5/6 which is 4 pins on
one side and 36 pins on the other.

In order to connect this to the Expansion Interface, you need printer cable 26-1415 which has as 34 pin card edge on the Expansion Interface end and a 40 pin card edge on the LP2 end:

You can also use the Printer Interface cable, Catalog Number 26-1411, to connect direct to the TRS-80. See Figure 6 and 7.

LINE PRINTER II

EXPANSION INTERFACE

PRINTER CARD EDGE

TO TRS-80

6 CABLE
(NOT SUPPLIED)
CATALOG NO
26 1415)

NOTE:
Be sure cable exits from the bottom
of connector on both ends.

£24.95 inc VAT
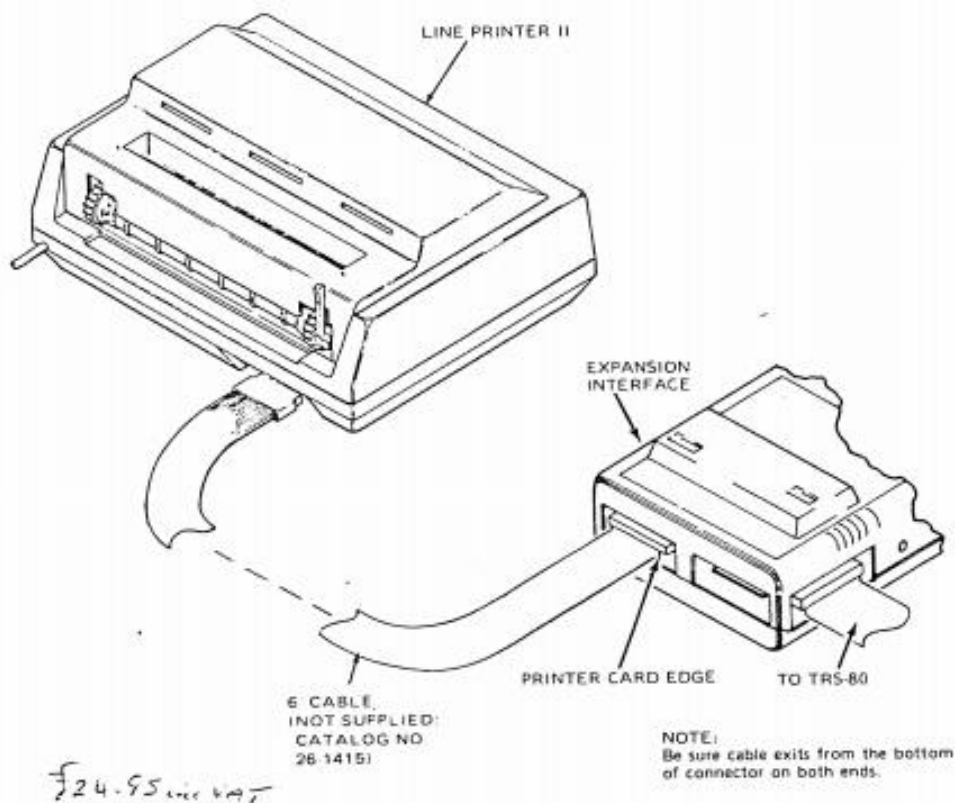
Figure 6. Line Printer II cabling (to TRS-80 Expansion Interface)

You could also connect the LP2 directly to the Model I Level II keyboard unit and Tandy was happy to sell you another adapter, which was different to the 26-1411 adapter used to connect the LP1 to the M1. The new adapter carried the catalog number 26-1416 and had different electronics inside it to talk to the LP2.
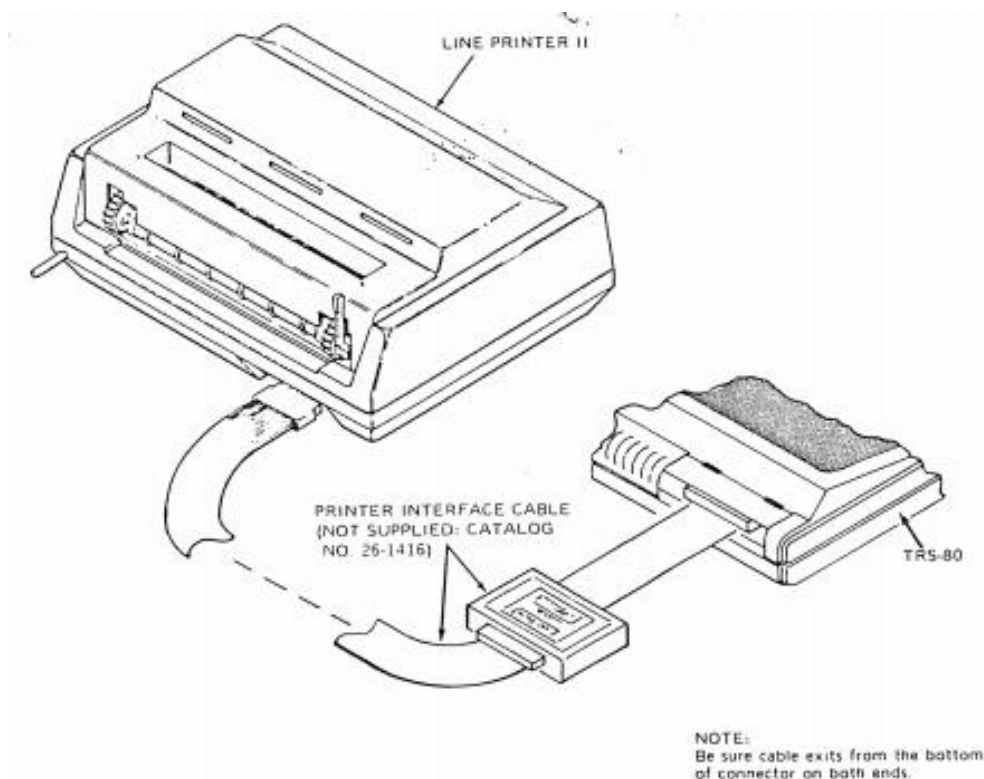
Figure 7.   Line Printer II cabling (to TRS-80)

PRICING and CONSUMABLES

Kitting out your Model I with a LP2 was less of a financial hardship than with the LP1. At least this printer came with the necessary cable to connect to the Expansion Interface.

The printer hit the market it 1979 at a price of $999 which was reduced to $799 around 18 months later. Listed overleaf are prices and catalog numbers related to the LP2, remembering the prices are listed in 1978 US dollars: (Source: Tim Mann's Radio Shack Catalog Number compilation)

26-1154 Line Printer II, $999
26-0504 Line Printer II Cover $5.95
26-1413 LP 1 3x ribbons/$18.95
26-1416 Model 1/LP2 adapter cable $69
26-1402 Paper (2 rolls) $19.95
26-1403 Fanfold Paper 9.5x11 3100 sheets $37.95

CONCLUSION

As Tandy's first attempt at a plain paper printer for home users selling for under a thousand bucks, the LP2 was a good start. I have two of them in my collection and neither of them work, so I can't comment on what they are like to live with. That fact that you see them from time to time on eBay (approximately one a year) compared to the LP1 (approximately one every three-to-five years) seems to imply the LP2 sold in respectable numbers. Last time I came up with a simple rating system comparing Tandy printers. Since the LP2 still fits in that category of being more of a curiosity than something useful, I rate it 1 out of 5.

WHAT ABOUT THE LINE PRINTER IV?

So similar in appearance that it's obviously an update, in 1981 Tandy released the Line Printer IV (catalog number 26-1159) for $999. I've never seen one and have only read about the updated specifications. Print speed was still around 50cps, but the 7-pin dot matrix head was now replaced with a 9-pin version, and an updated ROM to match. This would not be last time that Tandy sold printers under new names which were just the same old printer with minor upgrades, but the practice seemed to serve them well. A good example will be discussed next time, when I look at the Line Printer III, which then became the Line Printer V, and then finally became the DMP-500.

NEXT TIME: Line Printer III (catalog number 26-1156)

Ian Mavric

ianm@trs-80.com

LOOKING FOR HIGH-RESOLUTION GRAPHICS FOR YOUR TRS-80 MODEL 4/4D?

Then you simply must have the

"Improved Grafyx Resolution Solution!"

-Improved version of the established Grafyx Solution GX 4.2 board
-640x240 resolution for a total of 153,600 pixels, High Bandwidth
-Easy install in minutes inside your Model 4, Gate-Array Model 4, or 4D
-4P version is just around the corner - stay tuned!
-Compatible with most M3 and M4 Hi-Res software for Radio Shack HRG
-Designed in Belgium and proudly built and shipped from Australia or UK

Order yours today exclusively from:

UK and EU: BetaGamma Computing: bgialopsos@aol.com

Rest of the world: http://ianmav.customer.netspace.net.au/hires/hires.htm

"Quinnterface" Mini Expansion Interface for 16K Model 1 FreHD users.

- COMPLETLY ASSEMBLED AND TESTED -

This is THE perfect device for all Model 1 users who own a 16K Level II unit, (which is most of us!), but no Expansion Interface or disk drives, especially if you don't want to modify your M1 with upgraded boot ROM or memory upgrade.

The 'Quinnterface', developed by J. Andrew Quinn from New Zealand, adds 32K RAM and auto-boot functionality to you FreHD.

U.K. And Europe, contact Bas. at BetaGamma Computing.
U.S.A. And rest of the world, contact Mav. At "The Right Stuff"

LOOKING FOR FAST, INEXPENSIVE, UNLIMITED MASS STORAGE FOR YOUR TRS-80 MODEL I/III/4/4P/4D?

The amazing

"FreHD"

-Emulates a TRS-80 hard drive, but faster than any hard drive!
-Works with your favourite DOS (LS-DOS, LDOS, CP/M, Newdos/80 2.5)
-Uses SD card for storage medium
-Bonus free Real Time Clock function!
-Designed in Belgium and proudly built and shipped from Australia
-Kit form or fully assembled

Order yours today:
http://ianmav.customer.netspace.net.au/trs80/emulator

TRS8BIT

HI EVERYONE AND WELCOME TO THE SEPTEMBER 2017 EDITION OF THE NEWSLETTER.

AS I'M SAT HERE TYPING THIS NOTES, IT'S JUST 6 WEEKS UNTIL THE TANDY ASSEMBLY IN CHILLICOTHE, OHIO. THERE MUST BE, CURRENTLY, GREAT EXCITEMENT AT THE CETINSKI HOUSEHOLD. I JUST WISH I'D BEEN ABLE TO COME AND SEE YOU ALL. I'M SURE PETE WILL BE SUPPLYING VIDEO'S AND PICTURES FOR US ALL TO ENJOY, SOMETHING WHICH I'M REALLY LOOKING FORWARD TO.

MAV APOLOGISES FOR HOLDING OVER HIS REVIEW OF THE TANDY LINE PRINTER 3 WHICH HE PROMISED IN THE LAST ISSUE. HE'S VERY BUSY AT THE MOMENT, PREPARING FOR THE 'TANDY ASSEMBLY' IN OCTOBER. ALL BEING WELL, THE ARTICLE WILL APPEAR IN THE DECEMBER ISSUE.

In this issue of
TRS8BIT

SEE
PAGE 2
FOR
DETAILS

A VIDEO GENIE SOLD ON EBAY FOR JUST £59, SO THAT WAS A BARGAIN. ALSO ON EBAY, THERE IS A VERY SPECIAL M1. FULL DETAILS ON PAGE 29!

I'VE PUT IN A PLEA FOR A MODEL 2 KEYBOARD. (EVEN A GENERIC SUBSTITUTE WOULD BE OK). IF YOU HAVE ONE FOR SALE, PLEASE CONTACT ME AT THE USUAL EMAIL ADDRESS.

THERE'S AN INTERESTING SELECTION OF ITEMS IN THIS, SLIGHTLY SMALLER THEN USUAL EDITION.
THERE IS A GOOD SELECTION OF MICRO-80 MAGAZINES AVAILABLE, FREE OF CHARGE, THANKS TO THE GENEROSITY OF KEITH HAND.

IAN MAVRIC HAS CONTRIBUTED TWO ARTICLES, ONE FOR ANYONE BUILDING A FREHD AND THE OTHER SHOWING ALL OF US WHAT TO EXPECT FROM THE M1 LOWER CASE CHARACTERS IN 2017.

ET FONEHUME HAS SENT IN ANOTHER OF HIS ONE-LINERS WHICH HAS BEEN AMUSING THE GRANDKIDS, USING A LITTLE 'SECRET' THAT I HAD LONG FORGOTTEN ABOUT.

AND FINALLY, THERE IS A REVIEW OF THE SNAPP INC. UTILITIES SOFTWARE, FOR THE MODEL 2.

THAT'S ABOUT IT FOR THIS ISSUE. DON'T FORGET, THE NEXT ONE WILL BE THE XMAS EDITION, SO IF YOU FANCY SENDING IN AN ARTICLE, IT WOULD BE GREAT TO HEAR FROM YOU

TAKE CARE EVERYONE

DUSTY
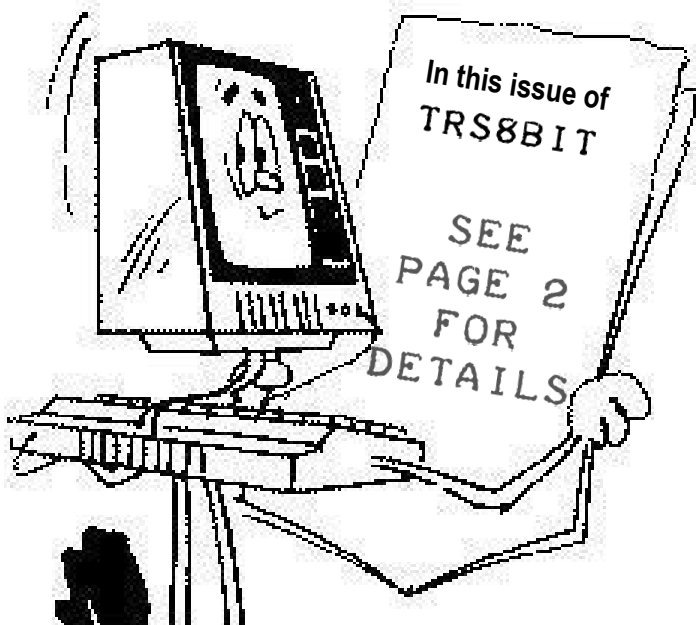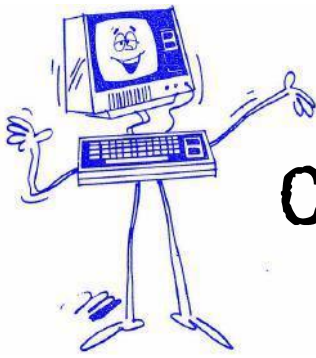
CONTENTS

DONATIONS TO
THE SITE

THANKS TO THE
GENEROSITY OF KEITH
HAND THE FOLLOWING
EDITIONS OF MICRO-80
AND A 'TRACKDOWN
MICROSIMULATOR Z80'
ARE STILL AVAILABLE TO
GO TO GOOD HOMES :)

MICRO-80 EDITION NUMBERS AVAILABLE :-

17,18,19,20,21,22,23,24,24

VOL 3
1,1,2,3,3,4,4,5,5,6,6,7,8

VOL 4
2,4,6

REPEATED NUMBERS INDICATES ADDITIONAL COPIES AVAILABLE.
PLEASE CONTACT ME, AT MY USUAL EMAIL ADDRESS

DUSTYM AT FABSITESUK DOT COM

AS USUAL, THESE ITEM ARE FREE OF CHARGE, ON A FIRST
COME, FIRST SAVED BASIS, HOWEVER, HELP WITH POSTAGE
COSTS WOULD BE APPRECIATED.

AND FINALLY, HERE'S A COUPLE OF PHOTO OF A MUCH-MODDED M1
MAIN BOARD. I'VE SENT IF OFF THE BAS AT BETAGAMMA COMPUTING,
TO SEE IF HE CAN FATHOM OUT JUST WHAT HAS BEEN GOING ON.

THERE COULD WELL BE SOMETHING OF INTEREST TO US ALL 40 YEARS
ON. EVEN A FORGOTTEN GRAPHICS MOD PERHAPS?

ONCE AGAIN KEITH, MANY THANKS.

IN MAV'S WORKSHOP:

FreHD Update
U3 74LS245 for Kit Builders
- WARNING WARNING WARNING -

by Ian Mavric

The ever popular Kit B version of FreHD has been a strong seller for me since it's introduction in 2013. While not quite up there with the sales of Kit C and the Clearly Superior read-to-run versions of FreHD, Kit B appeals to the home hobbyist who likes to solder and can follow simple instructions to get a working device for the least financial input.

For those who have been living under a rock, Kit B comprises of the FreHD PCB, SD card socket, the battery holder for the CR-2032 RTC battery, and pre-programmed PIC and GAL chips.
Also included is a CD with the files you need to get up and running. The files are vast... operating systems for Model I, III, and 4 computers in all configurations, parts list (BOM) to complete FreHD, and even Eprom bin files for those who wish to go the whole nine years and install an Auto Boot feature to their computer.
(Kit A, for those who are interested to know, it just the CD and PCB.)

U3 74LS245: This particular component has been interesting over the years because to selection of it can cause troubles depending on the application intended for the FreHD.
Back when Fred Vecoven was designing the FreHD U3 started out as a 74HCT245 and this worked well with the Model 4, which was the only TRS-80 Fred had at the time. As a beta tested I confirmed that the 74HCT245 also worked with the Model III and 4P, but early on it didn't work with the Model I via the 26-1132 Hard Disk Adapter.
Interest in using FreHD with the Model I was starting to gain momentum so a few people looked at the problem (Brett, Dean, Andrew, Ray, et. al... you know who you all are, sorry if I forgot anyone) but the simplest and most elegant solution was to replace U3 with a 74LS245.
A positive of this change was that it also continued to work just as well with the Model III, 4 and 4P so officially the part was changed on the BOM.

NOT ALL 74LS245s ARE CREATED EQUAL: My preferred part has been (and still is) the Texas Instruments SN74LS245N and have been using these with no problems since mid 2013.

However recently I ordered some more of them and users were noticing strange behaviour with their Model Is. I noticed a small change to the production codes on the latest batch of SN74LS245Ns and found that those with the prod. code 32MBJ<u>10</u> do not like the Model I.

The SN74LS245Ns which have worked well since 2013 have the prod. code 56CFX5K<u>E4</u>. I use a lot of 74LS245s... they are used on FreHD, as well as the Quinnterface, and Hi-Res graphics boards.
The J<u>10</u> coded chips work fine on the FreHD when connected to a Model III, 4, or 4P, but not happy when the FreHD is connected to the Model I via the M1 HD adapter.

I've tried to research what has changed but information has been scant on the subject.
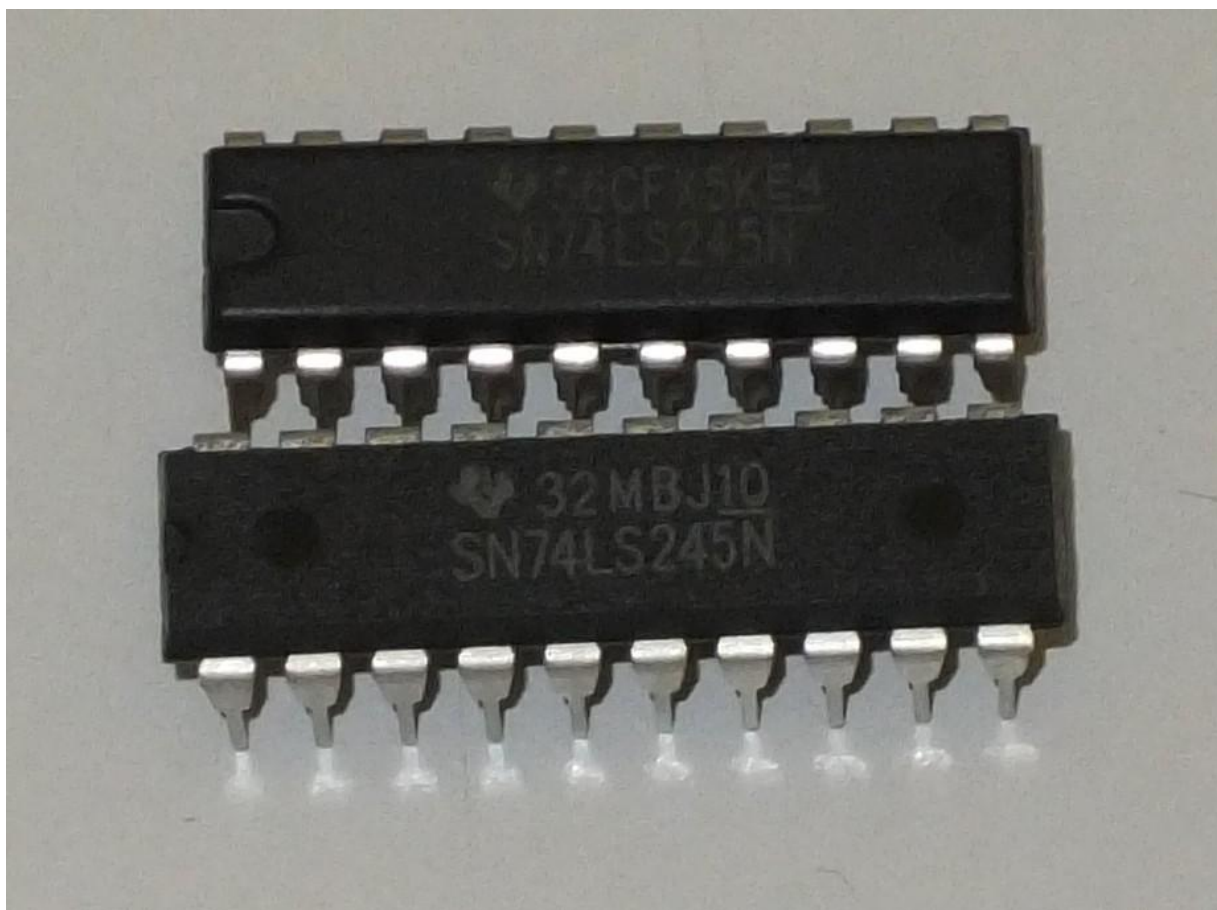
Picture: two different SN74LS245Ns, both from Texas Instruments

So in the picture above, the one you want is on the top, easily identified by the underlined <u>E4</u>. The one to avoid is the lower one, with the under-lined J<u>10</u>.

   This is a public service announcement, you have been warned :-)

ANY OTHER WARNINGS? While I am here I should point out that I have also tested the National Semiconductor DM74LS245N and it works great.

I also tested a Goldstar GD74LS245 and I would avoid these on the Model I as they gave mixed results. Some would work great others gave spontaneous reboots so due to the varying quality of these it's best to give them a miss.

Ian Mavric

ianm@trs-80.com

Ian Mavric is an IT Specialist who also restores and collects TRS-80's and classic cars. He live with his wife and kids in Melbourne, Australia.

DRACO 64

THE NEXT ISSUE OF TRS8BIT WILL BE PUBLISHED EARLY DECEMBER 2017

WOULD YOU CARE TO SEND IN A CONTRIBUTION?

WITTY

Sharp 80:
TRS-80 Model III Emulator for Windows


```
                              -Z-H-V--   33C3  A3           AND E
                       PC   33C6  33C4  20 32       JR NZ, 33F8
                       SP   408D >33C6  CD 20 31    CALL 3120
                                  33C9  F2 BF 33    JP P, 33BF
                       AF   0054  33CC  CD 3D 31    CALL 313D
                       BC   3810  33CF  A6          AND (HL)
                       DE   0400  33D0  20 08       JR NZ, 33DA
                       HL   403A  33D2  ED 62       SBC HL, HL
                                  33D4  22 01 42    LD (4201), HL
                       IX   4015  33D7  C3 7D 30    JP 307D
                       IY   FFFF  33DA  E5          PUSH HL
                                  33DB  2A 01 42    LD HL, (4201)
                       AF'  0000  33DE  23          INC HL
                       BC'  0000  33DF  22 01 42    LD (4201), HL
                       DE'  0000  33E2  ED 5B FF 41 LD DE, (41FF)
                       HL'  0000  33E6  ED 52       SBC HL, DE
                                  33E8  D1          POP DE
                       IR   005A  33E9  DA A1 30    JP C, 30A1
                       WZ   33BF  33EC  AF          XOR A
                                  33ED  12          LD (DE), A
                       (HL) 00    33EE  22 01 42    LD (4201), HL
                       (SP) 0694  33F1  2E 96       LD L, 96

                       0.00 MHz T: 000,000,016,262,774
                       Dsk: 0:S0:T16:S05
```

This is a full-featured emulator of a TRS-80 Model III micro-computer. It is free of charge and all source code is publically available. It includes:

Complete and self contained with ROM and DOS built in
Faithful Z-80 CPU emulation (including undocumented op-codes -- passes all ZEXALL opcode tests)
Runs at standard 2.03MHz (or run up to 100MHz on a modern PC)
Bundled disk and tape library includes applications, utilities, operating systems, and games
Supports up to four virtual floppy drives, and all major virtual floppy formats (DMK, JV3, JV1)
Tape drive emulation supports high and low speed reading and writing (CAS format)
Windowed and full-screen modes with zoom
Authentic sound support
Built-in Z-80 assembler and disassembler
Real-time monitor of Z-80 CPU internals and IO device status
Printer to file support
Save the entire state of the computer with snapshots
Support for all video modes, including wide characters and Kanji mode

What makes a number

E.T. FONEHUME

HI DUSTY, HERE'S A LITTLE ONE-LINER WHICH I DEVELOPED FROM
(YET ANOTHER) PROGRAM I DEVISED JUST TO AMUSE THE GRANDKIDS.

WE WERE JUST TALKING ABOUT HOW A NUMBER CAN BE MADE BY
ADDING TOGETHER OTHER NUMBERS. FOR EXAMPLE, 9 CAN BY MADE BY
ADDING TOGETHER 2 AND 7 ETC. AND I GOT TO THINKING.

DO YOU REMEMBER AT SCHOOL, IN MR BORTHWICK'S MATHS CLASS,
THE 'TRICK' OF FINDING THE TWO NUMBERS, WHICH, WHEN ADDED
TOGETHER, MAKE UP ANOTHER NUMBER, GIVEN YOU ONLY KNOW THE
DIFFERENCE BETWEEN THE TWO? WELL THIS IS WHAT MY PROGRAM WAS
BASED ON. THE ONE-LINER, BELOW, HAS NO FRILLS, BUT, AS
USUAL, I JUST HAD TO CREATE IT!

DON'T FORGET, WHEN TYPING IT IN, THE 'NEW LINES' ARE CREATED
BY THE DOWN ARROW AND NOT THE SPACE-BAR. ALSO, WHEN ENTERING
THE ANSWERS AT THE INPUT PROMPT, THE USUAL RULES APPLY, I.E.
A COMMA IS REQUIRED BETWEEN THE 2 NUMBERS IF ENTERED
TOGETHER. THE '??' WILL SHOW IF THEY ARE ENTERED SINGULARLY.

WHAT A SUPER LITTLE PROGRAM E.T. I'D FORGOTTEN ALL ABOUT THAT. JUST IN CASE THE
TRICK HAS SLIPPED YOUR MINDS TOO AND YOU WANT TO PLAY ALONG, ET'S PROVIDED THE
ED.

```
0 CLS:RANDOM:A=RND(20):B=RND(20):PRINT"I'M THINKING OF 2 NUMBERS

THEIR SUM IS";A+B;"
THEIR DIFFERENCE IS";
ABS(A-B):INPUT"
CAN YOU ENTER THE 2 NUMBERS";Y,Z:IF (Y=AORY=B)AND(Z=AORZ=B)THENP
RINT"WELL DONE!"ELSEPRINT"SORRY,THEY WERE";A;"AND";B
```

TRS-80 Emulators . com

TRS32: A Model I/III/4/4P Emulator For Windows

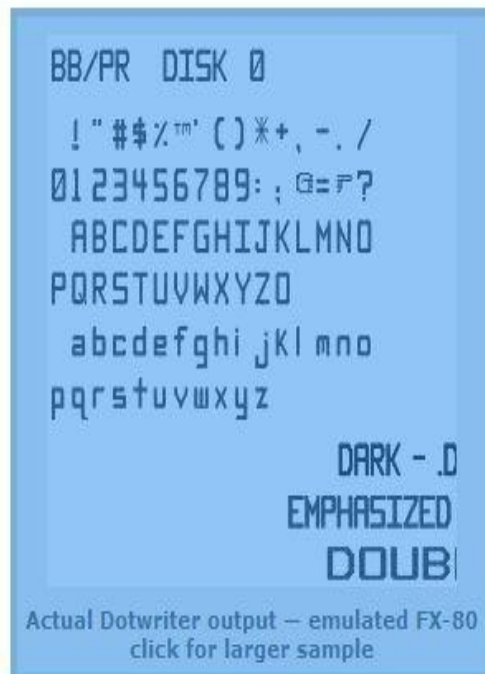written by Matthew Reed

Unregistered Shareware Version:

- Works under all current versions of Windows
- Full Windows application — no low-level hardware conflicts!
- Model I, Model III, Model 4, and Model 4P emulation
- Four floppy disk drives (with optional realistic disk drive sound)
- Cassette tape drive with graphical on-screen controls
- Exatron Stringy Floppy emulation
- Printer support
- Serial port for RS-232 communications
- Joystick support (using a Windows joystick — TRISSTICK and Alpha Products joysticks are emulated)

Registered Version:

- All features included in the shareware version
- Built-in emulation of an Epson FX-80 dot matrix printer (including graphics and control codes)
- High resolution graphics (Radio Shack and Micro-Labs)
- Up to 1 megabyte of additional memory in Model 4 and 4P modes
- Hard disk support
- Orchestra 85/90 music generation

Interested?

- Read the TRS32 emulator documentation
- Download the shareware version
- Register online

```
BB/PR  DISK 0

!"#$%™'()*+,-./
0123456789:;⌐=⌐?
 ABCDEFGHIJKLMNO
PQRSTUVWXYZ0
 abcdefghijkl mno
pqrstuvwxyz


  DARK - .D
 EMPHASIZED
  DOUB
```

Actual Dotwriter output — emulated FX-80
click for larger sample

MATTHEW'S EMULATOR IS QUITE ASTOUNDING.
IT'S MY FIRST CHOICE WHEN DEVELOPING IDEAS FOR TRS8BIT.
HE OFFERS FULL SUPPORT AND IT IS STILL UNDERGOING ENHANCEMENT.
IF YOU HAVEN'T REGISTERED YOUR SHAREWARE VERSION YET, PLEASE DO SO AND ENCOURAGE
AND SUPPORT MATTHEW'S ENTHUSIASM TO CONTINUE WITH HIS WORK.

ED.

Dusty - There's always been a great deal of interest in the M2 and, coming across this review of the Snapp Inc. Utilities, I thought it might be of interest to your readers.

MODEL 2 DOS FIX

The following 6 programs are written by Snapp Inc. who have also written a patch program for applying a large number of patches to TRSDOS. Some of them correct errors and some are convenience features.
An example of the latter is to move the Break key from its present position where it can easily be hit by inexperienced operators in place of the backspace key, to Control 6. In other words, after this patch has been installed, it is necessary to hit the Control key and the 6 key in order to break the program.
A number of the error fixes are Tandy "official" patches.

Any purchaser of Snapp Inc. programs is provided with **DOSFIX** free of charge, on the distribution disk.

Snapp Inc. UTILITIES

ECHO
The purpose of this program is to allow the Model II user to produce a hard copy of all output to the video screen. The program attaches itself to the operating system, requires no user memory and intercepts each character as it is displayed on the screen, sending it also to the printer. Both serial and parallel printers are fully supported, as is the Spooler. The program may not, however, be used with the HOST program mentioned elsewhere in this list. The ECHO function may be turned off by running the program ECHOOFF, which is, of course, also supplied on the disk.

SAVE
The purpose of this program is to retrieve a resident BASIC program following some kind of catastrophe, such as an accidental reboot or an unintended System command. Such disasters, of course, reboot the machine back to DOS, When this occurs, it is only necessary to type SAVE and the resident BASIC program will be copied into a special file from which it may be recalled. Needless to say, if the disaster caused pointers or other vectors to be destroyed, then garbage will generally be copied to the file.

SCREEN
This program allows the programmer to create hard copy of the video display on the printer.   It is intended to be used as a subroutine for BASIC programs and is loaded in DOS, but accessed from BASIC. It changes from line printer into a screen printer in effect.

SKRUNCH
The purpose of this program is to reduce to an absolute minimum size a
BASIC program for optimal execution in the Model II.   Programs which
have been SKRUNCHed typically occupy 30% to 40% less memory space
and run up to 10% faster.
As Model II users will know, the machine frequently finishes up with a
slightly less core memory space than the Model 1. This program is of
particular application, therefore, with the Model II.

Optimising the program consists of five phases, all of which are optional,
as follows:-
1. Removal of all REM statements.
2. Removal of irrelevant blank spaces.
3. Removal of explicit type characters for integers.
4. Merging multiple statements into single lines.
5. Removal where possible of trailing quote marks.

It should be noted that feature no. 3 above will require the user to define
his integers at the start of the program, and that all non integer variables
should be explicitly defined. This is the only feature which is non
transparent to the programmer, in other words requires some action on
his part.

As mentioned above, all of these features are optional so if the
programmer decides there is little to be gained by using no. 3 it need not
be called.

Operation is from DOS, the command being SKRUNCHfilespec1 to
filespec2 followed by the options required. The program to be
SKRUNCHed may either be in ASCII or in compressed format. SKRUNCH
will automatically make this determination.
If SKRUNCH decides that the file is not a BASIC program the user is
advised. The output file, that is to say, the one that has been
SKRUNCHed will be in ASCII and most users will wish to resave it so as
to automatically put it in compressed form.

SPOOLER   -   INCREASE YOUR THROUGHPUT
Normally when a program has print routines in it, the CPU has to hang
around waiting whilst the printer does its thing. The result of this is that
programs which have a fairly heavy print content can take a considerable
time to run simply because the printer is a slow peripheral.

Obviously some printers are slower than others, but with almost all (with
the possible exception of the Line Printer 3, which seems to have a type
of spooler built in) considerable delay is inserted into the run time.

The Spooler utility enables the machine to go about its business whilst the printer is delivering output. In this way, maximum utilisation is made of both the machine and the printer and some programs will run up to twice as fast as they would if they did not have the Spooler installed. Essentially, therefore, the effect is that the processor does not have to wait for the printer to finish printing before it processes its next step and likewise, the printer does not have to wait whilst the processor thinks about what is to be printed next.

The Spooler comes in the form of a program which is loaded either automatically or manually from DOS. Once loaded it is transparent to the user, in other words, he can forget that it is there. The advantages will be automatic.
This Model II Spooler comes on the same disk in a large number of versions from which the user can choose one most applicable to his needs. The reason for the different versions is so that the operator may, if he wishes, load other machine language programs, which will run concurrently with the Spooler.
Furthermore, the Spooler is provided in several versions which give varying sizes of buffer, that is to say, take up different amounts of space in the computer. The larger the buffer that can be used, the greater the advantage will be.

In addition in this particular Spooler program there is a program called TOPSPOOL, which does not occupy any user memory space at all.

As touched on above, the advantage derived from the use of the Spooler can be very great, but we should point out that it is impossible to give any concrete figure representing the advantage to be gained, because it will depend on a number of different parameters, chiefly how much printing is being done and the speed of the printer being used.

Using the Tandy Line Printer 2 with a mailing list, for instance, we found that without the Spooler a given number of names would take six minutes to printout, but with the Spooler installed, control was returned to the keyboard in just under four minutes. There was, therefore, a gain of just over one-third.
On the other hand, with the Line Printer 3, which is a dual direction printer and therefore has a much higher throughput anyway, the advantage was only about thirty seconds. The Spooler is available for either parallel or serial printers.

Further versions are available both in parallel and serial form as disk Spoolers. These store their buffer on disk rather than in memory.

EXTENDED   BASIC
A REAL BOON TO THE BUSY PROGRAMMER

The only real disappointment that we experienced when we started to
use the Model II was the absence of the various little aids to which we
had grown accustomed using NEWDOS on the Model I.
This Extended BASIC program enables most of these aids to be used on
the Model II. Before we describe the features, we should emphasize that
this is a patch program, that is to say, the present BASIC on the
operating disk is itself altered, hence, once the patches have been made,
they need not be made again on that disk and (as with NEWDOS) it is
exactly as if the features are permanently installed in the interpreter, as
in fact they are.
A further advantage of not having to load the program each time that it
is to be used is that no user memory nor user disk space is taken up.

Extended BASIC is divided into 5 sections as follows:-

XBASIC
This module enables the use of six single key stroke commands and ten
abbreviations as follows:-

Left arrow   - Will list first line of a program.
Right arrow   - Will list last line of a program.
Up arrow   - List previous line of a program.
Down arrow   - List the next line of a program.
Full stop   - List the current line.
Comma   - Edit the current line.

The ten abbreviations are:
A - Auto
C - CLS
D - Delete
E - Edit
K - Kill
L - List
M - Merge
N - New
P - Line printer list
S - System

It will be seen from the above that a number of convenience features are
similar to those in NEWDOS, particularly the use of the comma and the
four arrows.

The advantages from using these single key stroke inputs are obvious. The S to take one back to DOS is particularly useful and it can be followed, of course, by a DOS command in quotes. Thus, S"DIR" will automatically list the directory drive 0.

XREF
This is similar to the cross reference utility already introduced for the Model II. The purpose, of course, is to produce a list, either on the VDU or the printer, of any, or all, variables or line numbers used within the resident BASIC program, with information about each location within the program whether the variable or line number is used. XREF is called merely by typing the letter X whilst in BASIC, followed by various parameters as follows:-
X.   - List all references to the screen.
X,   - List all references to the printer.
X.vv   - List all references starting with vv to the screen.
          - (vv can be any variable)
X.nnnnn - List all references starting with nnnnn to the screen
X,vv   - List all references starting with vv to the printer
X,nnnnn - List all references starting with nnnnn to the printer
Xvv   - List only references to the variable vv to the screen
Xnnnnn - List only references to the nnnnn to the screen
X   - List the next program line containing a reference to the last
          - Xvv or Xnnnnn command.

In the above formations, the vv represents any variable name and may consist of either one or two characters. The symbol nnnnn represents any (line) number and may consist of from one to five characters. The format of the listings is normally for cross reference programs, that is to say, the variable requested will be shown on the left side of the screen followed by one or more reference entries. XREF does not attempt to distinguish between line numbers and integer constants so both will be listed together.

XDUMP
It is hard to select one of these modules which is the most useful, but certainly this one must be close to the top. The purpose of the routine is to allow the programmer to list to the VDU or the printer all variables used in the program together with their current values. The command is invoked by typing the letter Z in a similar way to XREF with the letter X, as follows:-
Z - List all variables to the VDU.
Z. - List all variables to the printer.
Zvv - List only the named variable to the VDU.
Z.vv - List beginning with the named variable to the VDU.
Z,vv - List beginning with the named variable to the printer.

Array variables will have each number listed separately. The program
supports arrays of up to ten dimensions.
Each variable is listed on a new line followed by its type character (% for
integer, '. for single floating point, etc.)
followed by its current value.

XFIND
I very much regret that on the sample disk which received, this
command had not yet been implemented and are, therefore, unable to
describe it in any detail.   Essentially, it is a utility to enable the
programmer to find any given string or keyword in a BASIC program.   It
will, therefore, be similar (in function only because, like the other BASIC
XBASIC modules, it is essentially in the interpreter once loaded) to the
NAME LOF and LOC in Plus BASIC for the Model 1. We assume that entry
to the command will be with the letter F and we imagine that the
parameters will follow the general format of the remainder of XBASIC.

XRENUM
This is an enhanced renumbering utility to the one supplied with the
Model II.   Its big advantage is that it will not only renumber BASIC
program lines, but it will also move them. In a similar way to NEWDOS it
will also search the text for undefined sequence numbers and for some
errors associated with BASIC statements. Whenever any of the
commands in XRENUM are used, the user is informed of the total number
of program lines, together with the total number of bytes in the old
program text and if changed, the total number in the new text. The
operator is also informed of whether or not the text has been changed.
The commands are as follows:-

R - Searches all the text for undefined sequence numbers and some
errors.

R sssss,iiiii,ppppp,qqqqq - This will cause all text lines whose sequence
numbers are less than or equal to ppppp and less than or equal to qqqqq
to be assigned new line numbers, sssss is the first new line number and
subsequent numbers will be generated by adding iiiii to the line number
of the previous text line.

When all four parameters are used, a move will be made. Assume, for
instance, that a program is numbered consecutively in increments of 10
from 10 to 1000 and the line R 2000,100,860,870 Is entered, then the
new program will no longer have lines numbered 860 and 870, but these
lines will have been added at the end of the program as lines 2000 and
2100.

As can be seen from the above descriptions, this is an extremely
comprehensive and useful utility for anyone programming in BASIC on
the Model II computer.

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THE NEW TRS-80™ SURPRISE

Meet Model II —
not an update but a
whole new ballgame!

Designed and built by
Radio Shack

While the legendary, best selling TRS-80 (Model I) continues, we've added a bigger, more powerful brother—the TRS-80 Model II —to answer your needs for more data storage, greater versatility, and higher computing speed, all at the lower cost you've learned to expect from Radio Shack.

There are fine business computers from Digital, Hewlett-Packard, IBM and others priced in the low five figures, but TRS-80 Model II— without sacrificing quality—brings you five-figure computing power at a four-figure price!

Manage a five to ten-thousand item inventory, prepare a payroll for hundreds, get timely and accurate management reports, and perform countless other tasks at twice the speed of TRS-80 Model I. Yet Model II won't fence you in or become obsolete. Like its little brother, it expands easily to meet growing needs.

TRS-80 Model II highlights

• **Fast and powerful**
• **Systems grow with your needs**
• **Easy to operate**
• **Affordable**

News from PASCAL

AS USUAL, PASCAL HOLDRY HAS BEEN APPLYING HIS MIND TO
VARIOUS NEW ENHANCEMENT TO THE TANDY RANGE. THIS LAD IS A
REAL GENIUS WHEN IN COME TO RE-ENGINEERING.

CHECK OUT HIS WEBSITE FOR FURTHER DETAILS - HTTP://WWW.PROF-80.FR/

GENDON3

Improved character generator

TRS-80 M1

This card enhances the display of video characters.
It replaces the original "MCM6670" video character generator of the
TRS-80 model 1
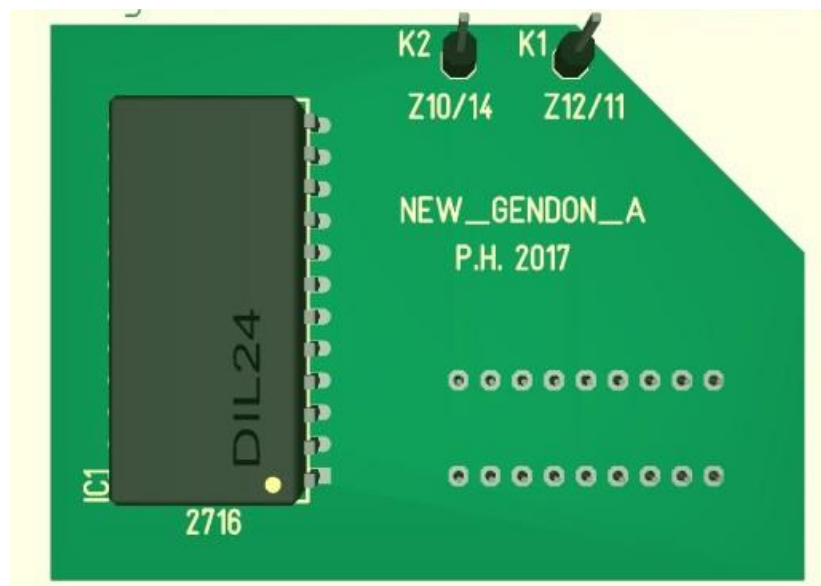
Card Tray for TRS-80 M12,16B, 6000

In the TRS-80 M2, all cards are in a "card slot".

1. CPU board
2. Video card
3. Floppy Map
4. Memory card

This left only 4 free slots for only 4 expansion cards

By creating the TRS-80 M12 Tandy has gathered the maximum of these essential cards on a motherboard.

1. CPU Z80
2. Floppy
3. Memory
4. ... etc.
5.

Then Tandy created a "card cart" that connects to the motherboard (instead of the video card) leaving 6 free slots for 6 expansion cards (The slots are compatible with the cards of the TRS-80 M2)

The "Card Cart" was an option that was placed instead of the Video Card

An example with the "cart":

1. Video Card (previously on the motherboard)
2. HI-Res card
3. CPU card 68000
4. 1st Memory Card 258KB
5. 2nd Memory Card 256KB
6. ......?
7. ...?

View Cart

Back view of basket
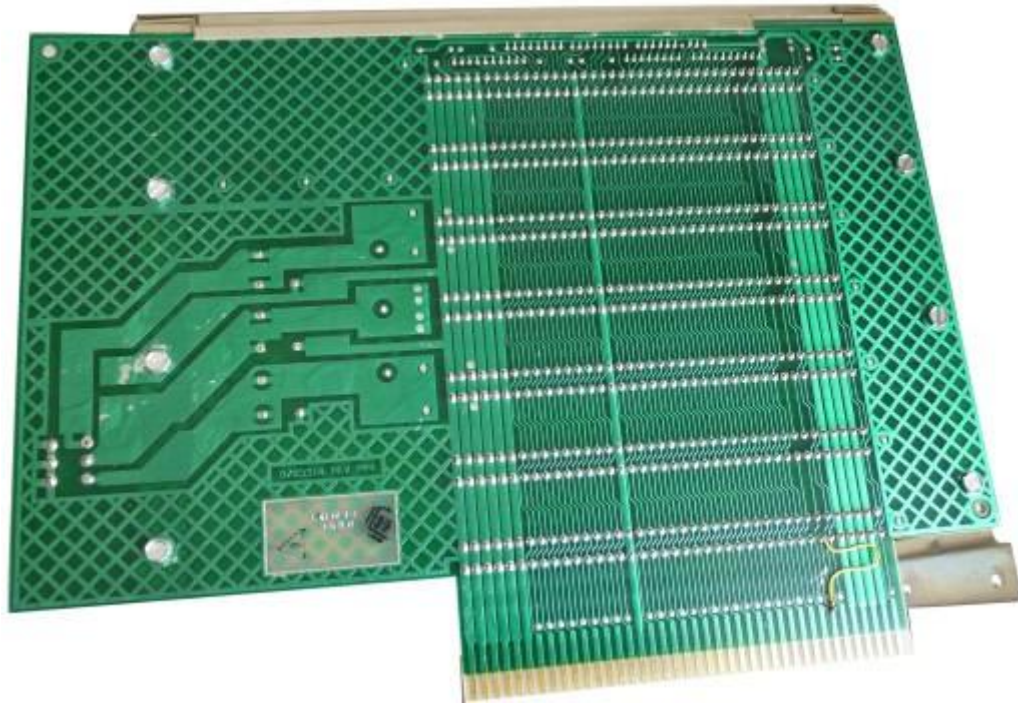
As you can see a yellow shunt sits on the "PCB"

This yellow shunt (to be confirmed) would only be present on the first copies to correct a manufacturing error.

The motherboard with its central slot for the video card or the "Cart"

This card was sent to me from the USA by Nels which I thank very strongly

DOM Interface Card for TRS-80 M2

A realization by Hans, RM and PH

This card with a simplified 8-bit IDE output will allow you to install a DOM to simulate a hard drive.

Specifications:

1. Slot and format of a TRS-80 M2 card
2. Minimum of components
3. Possibility to position a compatible 5.5 "HDD
4. Simple operation
5. No external power supply for the DOM

Top view

View from below

It will be possible to fix a 2.5 "compatible hard disk on the card. The card working with a fake IDE interface (8 bits) some hard drives and adapters" SD .... "refuse to operate with an interface 8-bit and non-16-bit IDE

Newsletter of Sydtrug Inc.

Sydney TRS-80/MS-DOS Users' Group

C/- Peter Wignell PO Box 95 NARWEE NSW 2209
AUSTRALIA
Website : www.sydtrug.org

WHAT'S IN A NUMBER - THE 'SECRET'

TALK ABOUT TEACHING GRANDPARENTS TO SUCK EGGS, BUT JUST IN CASE YOU HAVE FORGOTTEN THE 'SECRET', IT'S QUITE SIMPLE

DEDUCT THE DIFFERENCE FROM THE SUM AND DIVIDE BY 2. THAT'S ONE OF THE NUMBER. TAKE THAT NUMBER FROM THE SUM AND YOU HAVE THE SECOND NUMBER.

IN MAV'S WORKSHOP

LOWERCASE CHARACTERS ON THE MODEL I: EVERYTHING YOU NEED TO KNOW IN 2017 Part 1

by

Ian Mavric

HISTORY

In 1977 Radio Shack released the TRS-80 Model I and it has been well documented and also ridiculed that it displayed only capital letters. This was at a time when all small computers coming onto the marketplace (Apple II and C= Pet) had the same limitation and so this criticism needs to be put into proper context. Also at the time typing in all-caps wasn't considered yelling at the operator as it is now in the internet age.

For while the caps only limitation was not really seen as one until the push for word processing software started to gain momentum at the end of the 70s. WP was going to be a BIG thing in the 80s so it's not surprising that all computers after 1980 have lowercase characters. In order for WP to be a reality, computers needed a decent keyboard and a good display. The Model I with its 64 column display was therefore a natural. The Apple II had a 40 column display and the Pet had a terrible keyboard at the time.

Model I - As Introduced

To save $1 per computer the video display circuit of the Model I has only 6-bits, whereas 7 bits are needed for displaying the full ASCII character set, which includes capitals and lowercase. Also, legend has it, incorrectly programmed character generator ROM (CGR) chips were installed in the earliest Model Is.

The CGR did indeed have lowercase characters inside it, but an error resulted in the 'a' character being two rows too high. Also, this CGR had no lowercase descenders. The legend is that Radio Shack cut a deal to buy these reject CGRs from Motorola at a cheap price because the computer wasn't designed to display lowercase anyway. You can identify the systems which have this CGR, check Z29 on the motherboard and if it's got a 8001 that's the early CGR.

MCM6670 – An Improvement

The 8001 was used in early Model Is from the introduction in 1977 to mid -1978 when I guess the supply of reject chips from Motorola ran out at about the 50,000 mark. After that Radio Shack started using the MCM6670 which is basically the 8001 with the flying 'a' problem fixed. It still had no descenders and like the 8001, it was soldered to the mother-board, at least initially. These were sold from mid-1978 until early in 1979 when RS decided a lowercase modification kit was needed. Most of the time spent by the RSCC technicians doing the upgrade was de-soldering the old 8001 or MCM6670 so this time period saw the introduc-tion of socketed CGR in Z29.

MCM6673 – Finally a Solution

1979 was the year Radio Shack had no choice but to take a long hard look at the lack of lowercase characters on the Model I, add them but also make them look attractive. The 8001 and MCM6670 have no lower-case descenders and are just plain not pleasing to work with, so an up-grade kit utilising the existing CGR would likely have been met with criti-cism. What RS opted to do was get Motorola to custom program a new CGR with all the characters moved up one pixel row so that one line of the lowercase characters were descended below the base line. The result looked pleasing and required only adding a 6th 2102 video ram chip pig-gybacked to Z45. The conversion could be done in under 5 min in cases where Z29 was socketed and in 1 minute where both Z29 and Z45 were socketed. In fact it took longer for the soldering iron to warm up than to perform the modification. It's what we came to know as the 26-1104 lowercase modification kit.

Model I Expansion Options

Bring your Keyboard Unit and we'll do the rest!
Parts prices only. Required installation is extra.

Lower Case Kit. Quality lower case for your Model I display and compatible printer. "Driver" tape in-cluded. NOTE: Some non-Tandy Electronics software will not work with this kit installed. Not intended for use with programs written in upper case form it.
269-1104 . . . . 99.95

It's the reason why all Model I computers produced from the middle of 1979 until the end of production have Z29 and Z45 socketed. In fact around this time RS stopped putting the MCM6670 into the Model I and shipped them with the MCM6673 already installed. (You know you have a very late Model I if it has socketed Z29,45, MCM6673 CGR, 2-chip "MEM SIZE?" ROM set and ALPS keyboard.)
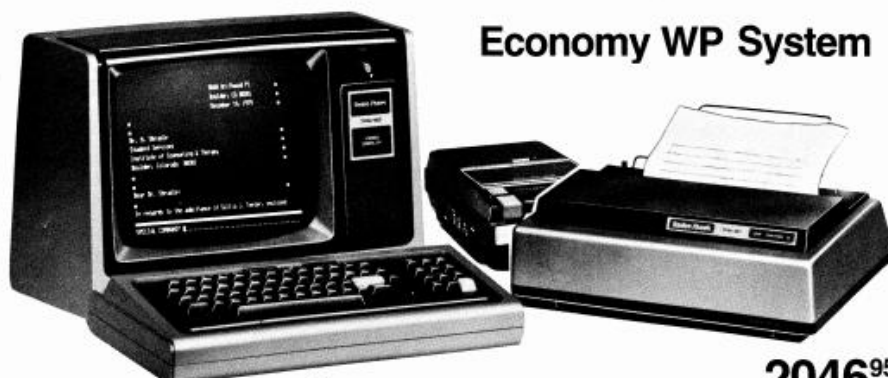
There were a few good reasons RS might have gone to the trouble of getting the MCM6673 made. At around the same time they were just about to release the first Daisy Wheel printer, and first versions of Scripsit WP software for cassette and disk systems. WP without lowercase makes no sense, but with lowercase in the computer, powerful (for the time) software and a Daisy Wheel printer, WP becomes a reality. Remember that at this time, around 1979-80, dedicated WP machines from Xerox, Canon and IBM cost $10K or more. A TRS-80 could be outfitted for the job for around ½ that, and, being a computer, it could be used for accounts, payroll, etc., so there was good reason to get it right.

As the full-page advert shows, they wanted to push the Model I as a serious WP system:

Offered in three configurations:

Next time: 3rd party lowercase modifications and ways to get access to the lowercase characters already present inside the 8001 and MCM6670

Ian Mavric   ianm@trs-80.com

YET ANOTHER EBAY SURPRISE

IF YOU JUST FANCY SOMETHING EXCEPTIONALLY UNIQUE AND HAVE A
FAIR AMOUNT OF MONEY TO SPARE HOW ABOUT THIS LITTLE 'GEM' I
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UP FOR SALE IS A VERY HISTORICAL TRS-80 16K LEVEL-II MODEL I
(26-1006) COMPUTER. SERIAL # 100,000

TANDY, PARENT COMPANY TO RADIO SHACK, INTRODUCED TO THE
PUBLIC ON AUGUST 3, 1977 (40 YEARS AGO) THE TRS-80 MODEL I
COMPUTER. PRODUCTION OF THE COMPUTER BEGAN IN TANDY'S
FACTORY IN FORT WORTH, TEXAS IN EARLY SEPTEMBER 1977. BY
THE END OF DECEMBER 1977 5,000 COMPUTERS HAD BEEN DELIVERED
WITH OVER 5,000 ON BACK ORDER. IN 1978 RADIO SHACK HAD SOLD
OVER 100,000 COMPUTERS.

TO CELEBRATE THIS MILESTONE TANDY ADVANCED PRODUCTS, THE
PLANT THAT MANUFACTURED A TRS-80, CREATED A SPECIAL
COMPUTER, SERIAL # 100,000. THIS COMPUTER WAS A **CHROME
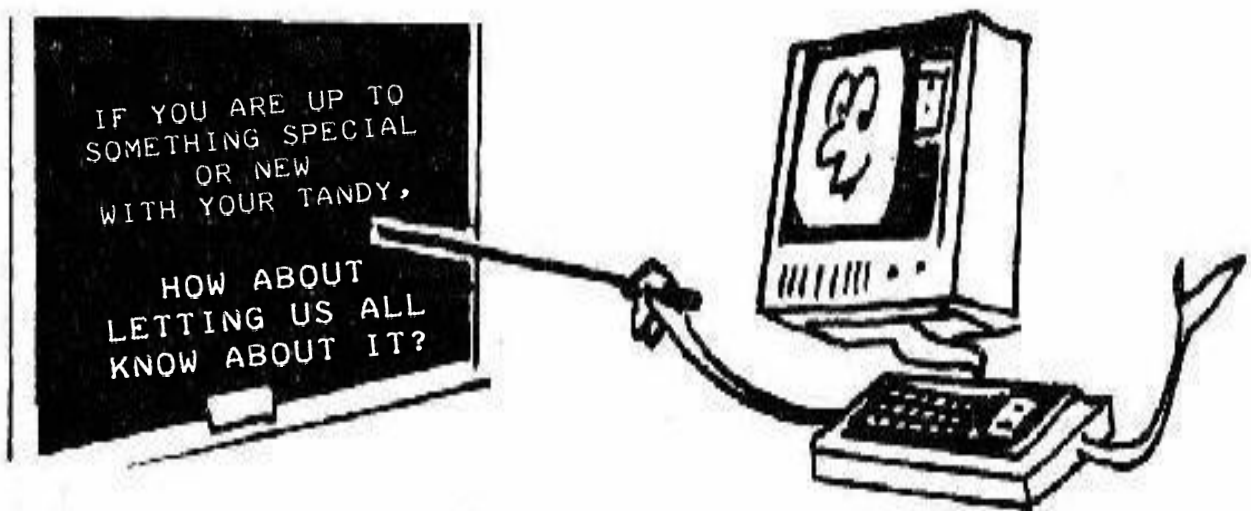PLATED** TRS-80 MODEL I WITH 16K RAM AND LEVEL II ROM MODEL #
26-1006.

I ACQUIRED THIS COMPUTER AROUND 20-25 YEARS AGO AT A TENT
SALE BY THE RADIO SHACK OUTLET STORE. I COULD NOT BELIEVE
MY EYES WHEN I SAW THE COMPUTER IN THE TENT FOR SALE! I
GRABBED IT UP, PAID FOR IT AND LOCKED IN IN THE TRUNK OF MY
CAR BEFORE I WENT BACK IN THE TENT LOOKING FOR OTHER
TREASURES. I HAVE NO IDEA HOW THE COMPUTER ENDED UP IN A
TENT SALE BUT I WAS THRILLED TO FIND IT AS I HAD HEARD ABOUT
IT WHEN IT WAS MADE AND PRESENTED. I HAD ONLY SEEN THE
COMPUTER ONE TIME PRIOR TO THE TENT SALE.

THE COMPUTER HAS BEEN A PRIZE ITEM IN MY COMPUTER COLLECTION
BUT IT IS THAT TIME IN MY LIFE TO DOWNSIZE SO IT IS NOW
BEING OFFERED FOR SOMEONE ELSE TO OWN AND TREASURE. THE
COMPUTER IS STILL SEALED WITH THE ORANGE SEALER THAT WE USED
AT THE RADIO SHACK REPAIR CENTERS. THE COMPUTER DOES HAVE A
FEW MARKS, BUT IT IS IN EXCELLENT CONDITION TO BE ALMOST 40
YEARS OLD! THE PHOTOS DO NOT DO THE COMPUTER JUSTICE, BUT
IT IS HARD TO PHOTOGRAPH ANYTHING CHROME PLATED AS
EVERYTHING REFLECTS INCLUDING THE LIGHTS!!

I HAVE NO IDEA WERE TO START THE PRICE ON THIS HISTORICAL
COMPUTER, BUT YOU GOT TO START SOMEWHERE SO THE BUY-IT-NOW
PRICE IS HIGH. DO NOT BE AFRAID TO MAKE AN OFFER, ALL I CAN
DO IS ACCEPT IT, COUNTER OFFER OR DECLINE.

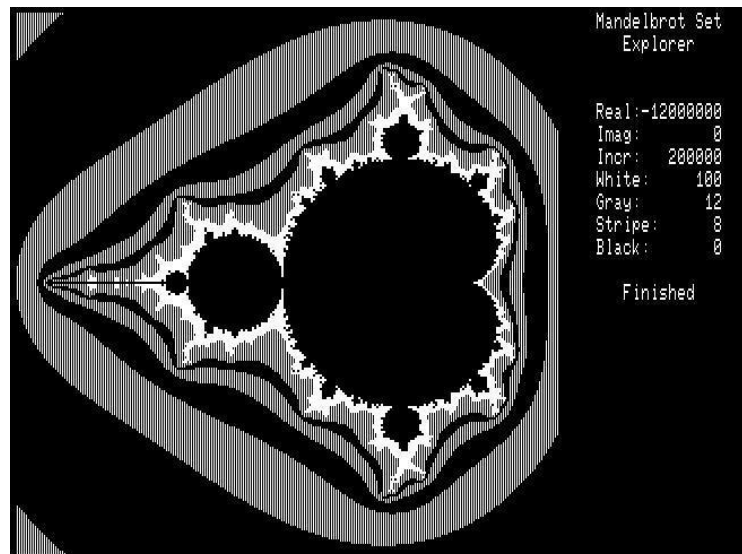I ALSO HAVE A NEW IN THE BOX MODEL 1 MONITOR UP FOR AUCTION:

HTTP://WWW.EBAY.COM/ITM/172851961441?
SSPAGENAME=STRK:MESELX:IT&_TRKSID=P3984.M1558.L2649

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GENERAL DESCRIPTION OF *MMSFORTH*

For Radio Shack TRS-80 Models I and III
and the IBM Personal Computer

For a decade, the Forth language and system have been the computer environment of choice at many of the world's foremost radio telescope observatories. Now that the investment for a professional version is reduced from many thousands of dollars to the low hundreds, Forth is proving equally revolutionary and practical for microcomputer business programs, games and I/O device controls.

Forth is a structured language somewhat similar to PASCAL except that, in Forth, the programmer defines additional commands as they are needed. The commands can be immediately compiled into the language, and deleted when no longer needed. This makes Forth expandable and contractible so you can tailor it to your own needs. Assembler code can be inserted directly into a Forth program using a function of the language itself. This eliminates the need to pre-load or POKE in Assembler subroutines as one normally does in BASIC.

enables the user to precompile modified versions of MMSFORTH for specific applications or simply to examine it. Your complete professional application systems also can be precompiled with each final user's individual serial-numbered MMSFORTH System. You may choose to deliver to the final user precompiled without your source code; such programs will load rapidly and run efficiently, while effectively preventing user review and modification. MMS encourages professional programmers to modify and extend its system in this manner, provided that the necessary MMSFORTH System and any utilized accessory modules are properly sold to each final user.

Like Hewlett-Packard calculators, Forth uses Reverse Polish Notation. Unlike H-P's, Forth has **multiple stacks** of "infinite" depth limited only by the size of available memory. Forth programs tend to be so **compact** that a 16K disk system becomes practical.

mmsFORTH

Since early 1979 over 3,000 persons and organizations have licensed MMSFORTH, making it the **most popular** professional Forth system. MMSFORTH offers **significant advantages** over any other Forth currently available for the TRS-80 or IBM Personal Computer, and many features supplied by MMS are not available in other versions of Forth for any microcomputer. The MMSFORTH System Diskette supplies user-callable disk (and TRS-80 tape) I/O, virtual memory with multiple block buffers, double-precision integer math (to +/-21,000,000.00), auto repeat keyboard with complete ASCII set, variable-character blinking cursor, a complete Assembler (8080 for the TRS-80, 8088 for the IBM), sophisticated full-screen editing, Extended-BASIC-like string-handling and arrays, even a function to "screenprint" text and graphics to your compatible line printer.

Because MMSFORTH runs in **its own software environment** without DOS, it can achieve an unusual degree of flexibility. Its disk format frees 1.5 tracks more data space than most DOS diskettes (plus an optional 20 Kbytes additional data per "M.3" disk on the IBM), runs faster, adjusts for up to 8 35-track to 255-track drives, and permits MMSFORTH program and data diskettes to be read, changed, and run **interchangeably** between Model I and Model III, or between Model III and IBM Personal Computer hardware. Just put the diskette in the other type of computer, change disk format on any drive, and keep running!

MMSFORTH's inclusion of **79-STANDARD Forth** words enhances compatibility with versions from Forth, Inc. and others. MMS includes **source code** for the upper portion of MMSFORTH which is written in Forth. This unusual feature

Persons accustomed to BASIC interpreters will gasp at the **execution speed** of Forth programs. A demonstration program supplied on the MMSFORTH package sorts 1,000 items in 3 seconds. Routines in MMSFORTH run significantly faster than most other Forths, and approximately 20 times faster than equivalent BASIC programming (faster still when using Forth's Assembler). Forth's **modular, structured code** makes development time exceptionally brief and bug-free. Functions including those using Forth's internal Assembler can be tested interpretively during development of a package. Machine code dump routines are also provided. Thus the MMSFORTH system supports programming in high-level Forth, Assembler, and machine code as well as functioning as **interpreter and compiler!**

The MMSFORTH System Diskette includes additional routines and **demonstration programs.** Among these are a number guessing game, a name sorting program, a remarkable demonstration of five common sorting routines, a graphics package and the Game of Life, a menu-driven checkbook balancing program, the famous BREAKFORTH arcade game with sound, and THE NOTEPAD letter writing program. An optional directory block has been implemented for these demonstrations and is available for user applications.

MMSFORTH is the hottest new software environment for the IBM Personal Computer and the TRS-80 Model I and III, and our MMSFORTH USERS MANUAL of over 200 pages makes learning it easier than ever before. This manual is available separately (without Appendices, but with a fine introduction and even a detailed analysis of our checkbook balancing program), for those who wish to evaluate Forth further or to use it with a version other than MMSFORTH.

MMS continuously adds refinements, additional modules, and application programs to its MMSFORTH system.

The MMSFORTH **UTILITIES** Diskette includes a very full FLOATING POINT MATH utility with complex numbers, radian and degree trigonometry, rectangular and polar coordinate conversions, etc. It also includes XREF, a powerful cross-referencing utility which quickly lists the anatomy of any Forth program's source code. The TRS-80 version of the UTILITIES Disk includes a full Z80 ASSEMBLER utilizing most of MMSFORTH's capabilities for conditional control structures, interpretive and compiled operating modes, etc. The IBM version of the UTILITIES Disk includes TGRAPH, a color graphics wordset including a full Turtle Graphics implementation.

The MMSFORTH **GAMES** Diskette includes a handy copy of the BREAKFORTH arcade game from the System Diskette, plus new arcade games (CRASHFORTH and FREEWAY), board games (OTHELLO and TIC-TAC-FORTH), and an excellent creation and solution aid for CRYPTOQUOTE puzzles. It's top-notch for fun and for learning interactive Forth techniques!

The **FORTHCOM** communications program in MMSFORTH permits a wide variety of RS-232 and **telephone communication** activities. Run as a terminal on other computers, and spool the input to your printer. Between two FORTHCOM systems, transfer ranges of Forth blocks (with space compression and error checking) or even let one computer take over **remote operation** of the other. These capabilities are available to the user from FORTHCOM's on-screen menu at up to 1200 baud, or to the programmer by modifying its Forth source code to special tasks at up to 9600 baud!

THE DATAHANDLER application program for MMSFORTH is a fast, flexible, and easily used data base management system based on SCELBI's PIMS Manual but with dramatically increased capabilities, storage capacity, and operating speed. (In accounting, mail-list, inventory or other files of hundreds of records, records are selected conditionally on any field or fragment thereof with delay time less than a half-second; the same files are sorted on multiple fields in 5 to 10 seconds.) Like other MMSFORTH software, THE DATAHANDLER comes with demonstration programs, data files, documentation, and full source code for further modification. (See next column.)

FORTHWRITE is a fast, full-performance word-processor with easy-to-learn simple operations and surprisingly powerful advanced features. Among its more unusual abilities are ability to imbed additional **printer control characters** individually or in groups, text indents and **outdents**, **relative** margin settings, block and document linkage anywhere in text or only upon print-out (permitting insertion of data into forms, keyboard entry of custom items during print-out, and full-disk print-out!), **print-to-disk** option, a keyboard control for the playback of transcription tapes, and **full-proportional** support of appropriate printers WITH tabbing! The release version of FORTHWRITE will accept record data from THE DATAHANDLER. (Using FORTHWRITE, this actual copy was converted from a SCRIPSIT/TRSDOS file, then modified and printed on an NEC Spinwriter printer.)

The MMSFORTH **GENERAL LEDGER** provides fast, smooth-operating accounting support including subsidiary ledgers and journals. It has an unusually **large capacity** of 500 accounts with unlimited subsidiary ledgers and over 2,500 line items per session (one group of journal entries). Its many built-in **information safeguards** include error checking, a complete audit trail, 60-character transaction descriptions, and prompting for additional data on unbalanced entries. An **optimized user interface** speeds professional data entry by minimizing switching back and forth from numeric keypad to other keys. Journal detail is always retained, so detailed journal and ledger listings may

be made of any account or group of accounts (determined by any part of account number). Income statements include percentage information for present period and for year-to-date.

TRADESHOW is a specialized high-speed intelligent-terminal program for the selective remote monitoring and recording of up to 100 types of **Commodities Exchange transactions** from the COMEX or similar data lines (separately leased services) at up to **1200 baud** without modification. TRADESHOW is designed for easy and effective use by sophisticated commodities traders who value its selectivity and 15-minutes or greater leadtime on other data services. (TRADESHOW is not supported on the TRS-80 Model I.)

MMS **supports** its powerful MMSFORTH software system with on-board examples, manuals, a user newsletter, workshops, and custom consultation. MMS also encourages the formation of MMSFORTH User Groups; dozens presently exist around the world. Upgrades to each MMSFORTH System are made available to its licensed user at minimal cost.

THE DATAHANDLER
(Data Base Management System in MMSFORTH)

THE DATAHANDLER is a favorite and inexpensive first application for most new users. It is an interactive data base management system in MMSFORTH for the TRS-80 Model I or III or IBM Personal Computer system with at least 32K RAM and one minidisk drive. Its user can specify up to 10 data fields appropriate to each particular job (more with a minor change), of variable length up to 255 characters each! Standard and special report formats can be output to screen and printer. It is an outstanding solution to a wide variety of personal and professional tasks such as management of alphabetic and numeric data files, including accounting and inventory. The DATAHANDLER diskette includes mail list, checking account and bibliography applications with custom report commands and sample data files, both as useful products and as informative examples of other practical applications.
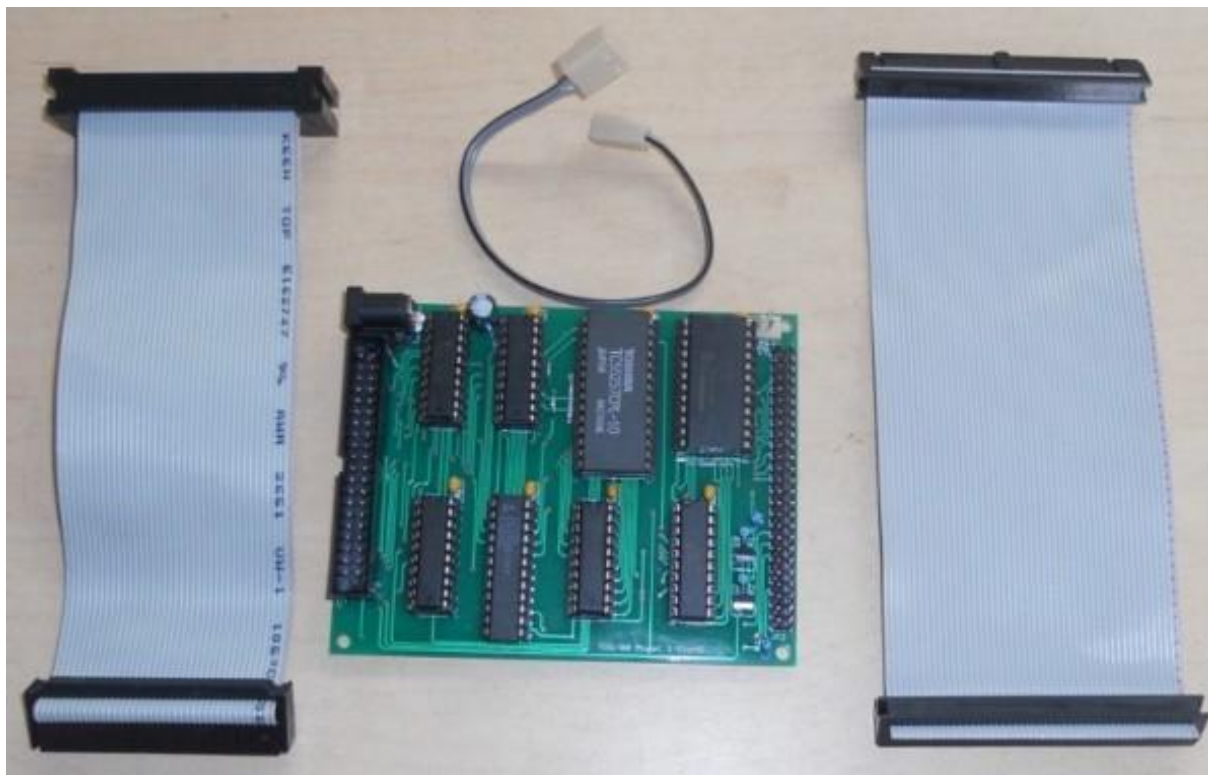
THE DATAHANDLER's program approach follows the excellent introductory documentation of SCELBI's PIMS Manual. However, unlike PIMS and other TRS-80 data base packages written in BASIC, THE DATAHANDLER is **extremely fast**: typical multiple-field sorts on a 100-record file take five seconds, while look-ups take less than a half-second! The system and its sequential data files are **remarkably compact** as well. An indexed key structure incorporates sophisticated string and value selection mechanisms including normal compares and values inside or outside a range. THE DATAHANDLER is **the best professional solution** for those data files which can reside in RAM: typically at one time, 24K fewer data characters than the computer's RAM capacity. Often, larger files can be divided into a series of subfiles for effective use.

Most computer data files for personal use will fit into THE DATAHANDER easily, as will many professional tasks. The flexibility of its interactive program makes it the logical choice for non-programmers. For the professional programmer, it and MMSFORTH offer far greater execution speed than BASIC programs, while its complete source code and Forth's structured and modular language provide the tools for rapid and accurate modification to a wide variety of custom applications.

Several MMSFORTH features make THE DATAHANDLER unusually well suited to single disk drive use: the program area of the DATAHANDLER diskette is **software write-protected** while the data file area is left open; alternatively, after loading the program its diskette may be replaced by one or more diskettes containing data only. Regularly used system configurations may be precompiled for five-second loading time.

"Quinnterface" Mini Expansion Interface for 16K Model 1 FreHD users.

- COMPLETLY ASSEMBLED AND TESTED -

This is THE perfect device for all Model 1 users who own a 16K Level II unit, (which is most of us!), but no Expansion Interface or disk drives, especially if you don't want to modify your M1 with upgraded boot ROM or memory upgrade.

The 'Quinnterface', developed by J. Andrew Quinn from New Zealand, adds 32K RAM and auto-boot functionality to you FreHD.

U.K. And Europe, contact Bas. at BetaGamma Computing.
U.S.A. And rest of the world, contact Mav. At "The Right Stuff"

LOOKING FOR FAST, INEXPENSIVE, UNLIMITED MASS STORAGE FOR YOUR TRS-80 MODEL I/III/4/4P/4D?

The amazing

"FreHD"

-Emulates a TRS-80 hard drive, but faster than any hard drive!
-Works with your favourite DOS (LS-DOS, LDOS, CP/M, Newdos/80 2.5)
-Uses SD card for storage medium
-Bonus free Real Time Clock function!
-Designed in Belgium and proudly built and shipped from Australia
-Kit form or fully assembled

Order yours today:
http://ianmav.customer.netspace.net.au/trs80/emulator

A PLEA FOR HELP!

DUSTY

I'VE BEEN LUCKY ENOUGH TO WIN A M2 ON EBAY RECENTLY, BUT
UNFORTUNATELY, IT'S MISSING THE KEYBOARD.

HAS ANYONE OUT THERE A M2 KEYBOARD FOR SALE, OR CAN YOU
OFFER INFORMATION TO USE AN ALTERNATIVE MODEL?

ANY HELP WOULD BE APPRECIATED.

BAS, AT BETAGAMMA COMPUTING IS GIVING THE MACHINE A COMPLETE
OVERHAUL. CHANGING PAPER CAPS., DISK DRIVE BELT ETC. SO I
SHALL BE LOOKING FORWARD TO HEARING FROM HIM ONCE HE HAS THE
TIME TO TAKE A LOOK.
I DON'T THINK I'M GOING TO HAVE ENOUGH ROOM TO KEEP THE 3 8"
DRIVE DISKS THOUGH.

JUST IMAGE A FREHD RUNNING ON IT! CP/M TOO. OH BOY!

HERE'S SOME PHOTOS, FROM THE EBAY ADVERT, JUST FOR INTEREST.

Radio Shack
TRS-80
MODEL II
DISK
SYSTEM

POWER

Tandy Corporation TRS-80 MODEL II MICRO COMPUTER

CATALOG NO. 267-4002

SERIAL NO. 64009811

VOLTAGE — 240V
FREQUENCY — 50Hz
VOLT AMPS — 185VA
NOTE: REPLACE FUSE WITH
SAME TYPE 1 AMP SLO-BLO

CUSTOM MANUFACTURED IN THE U. S. A. BY THE TANDY
CORPORATION ∎ FORT WORTH, TEXAS, 76102

WARNING: NO USER SERVICABLE PARTS INSIDE THIS UNIT.
UNIT SHOULD BE TAKEN TO A TANDY STORE OR Tandy
COMPUTER CENTER FOR SERVICE.

EXPANSION   PARALLEL PRINTER CHANNEL   SERIAL CHANNELS A B   DISK FUSE

Tandy Corporation TRS-80 MODEL II DISK SYSTEM

CATALOG NO. 267-4162

SERIAL NO. 301111

VOLTAGE — 240V
FREQUENCY — 50Hz
VOLT AMPS — 302VA
NOTE: REPLACE FUSE WITH
SAME TYPE 1 AMP SLO-BLO

CUSTOM MANUFACTURED IN THE U. S. A. BY THE TANDY
CORPORATION ∎ FORT WORTH, TEXAS, 76102

WARNING: NO USER SERVICABLE PARTS INSIDE THIS UNIT.
UNIT SHOULD BE TAKEN TO A TANDY STORE OR Tandy
COMPUTER CENTER FOR SERVICE.

TRS8BIT

HI EVERYONE AND WELCOME TO THE 2017 CHRISTMAS EDITION. DEE AND I WISH YOU ALL A VERY MERRY XMAS AND A HAPPY NEW YEAR.

2017 HAS BEEN A FANTASTIC YEAR FOR ALL TANDY FANS. THE HIGHLIGHT IN THE USA MUST HAVE BEEN THE TANDY ASSEMBLY, HELD IN CHILLICOTHE, OHIO. I UNDERSTAND, THERE ARE ALREADY PLANS FOR THE 2018 EVENT! - ROLL ON!
THERE ARE TWO REVIEWS OF THE EVENT IN THIS ISSUE FOR THOSE WHO WERE UNLUCKY ENOUGH NOT TO BE ABLE TO ATTEND.

THERE'S BEEN QUITE A LOT OF INTEREST ON THE TRS-80 FORUM RECENTLY, REGARDING RUNNING A FREHD ON A MODEL 2. THIS CAUGHT MY INTEREST IMMEDIATELY, AS YOU CAN

In this issue of TRS8BIT WITH OVER 60 PAGES SEE PAGE 2 FOR DETAILS

PERHAPS IMAGINE, AFTER MY RECENT M2 PURCHASE. (EVEN THOUGH I'M STILL LOOKING FOR A KEYBOARD).

MAV, AMONGST HIS MANY OTHER COMMITMENTS, HAS STARTED A M2000 ARCHIVE. IF YOU THINK YOU MIGHT HAVE ANYTHING OF INTEREST, PLEASE CONTACT HIM VIA HIS WEBSITE. (DETAILS ON PAGE 67).

PETER CETINSKI HAS BEEN VERY BUSY WITH NOT ONLY THE TA, BUT HE'S MANAGED TO SETUP A TRS-BOX SYSTEM ON HIS M6000, TOGETHER WITH STARTING A XENIX ARCHIVE. DOES THIS LAD EVER GET ANY SLEEP I WONDER:)

FINALLY, THERE IS TALK OF USING A 3D PRINTER TO PRODUCE ALL THOSE MISSING 'LITTLE BITS' WHICH SEEM TO SNAP OFF AT THE MOST INCONVENIENT TIME. I'VE NEVER SEEN A 3D PRINTER IN THE FLESH, AND WOULD LOVE TO HEAR ABOUT ANY PROGRESS ANYONE HAS MADE. A COUPLE OF HUNDRED LINES, OR SO, AND A FEW PHOTOS, WOULD BE MUCH APPRECIATED FOR THE MARCH EDITION OF THE NEWSLETTER.

IN THE MEAN TIME, BEFORE I CLOSE THIS, OUR 12TH YEAR, I WOULD JUST LIKE TO THANK ALL THOSE OF YOU WHO HAVE CONTRIBUTED ARTICLES OVER THE LAST DECADE OR SO. A SPECIAL MENTION MUST GO TO MAV FOR ALL HIS EXCELLENT ARTICLES AND HIS INFECTIOUS ENTHUSIASM HE'S ALWAYS SHOWN TO BOTH MYSELF AND TRS8BIT.
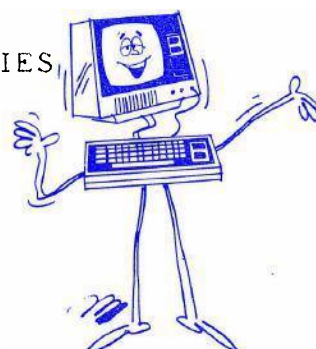THANKS MATE :)

SO, UNTIL MARCH

TAKE CARE,
DUSTY

# CONTENTS

Super Card Pro

http://www.cbmstuff.com/proddetail.php?prod=scp

The ultimate disk archiving hardware! The SuperCard Pro hardware and software gives you the most advanced flux level copier/imager/converter system available today!
Make backup copies of your old 5.25" or 3.5" floppy disks directly to another disk, or store the data as a flux image file (.scp) for later use, including converting to a format that can be used by various computer emulators.
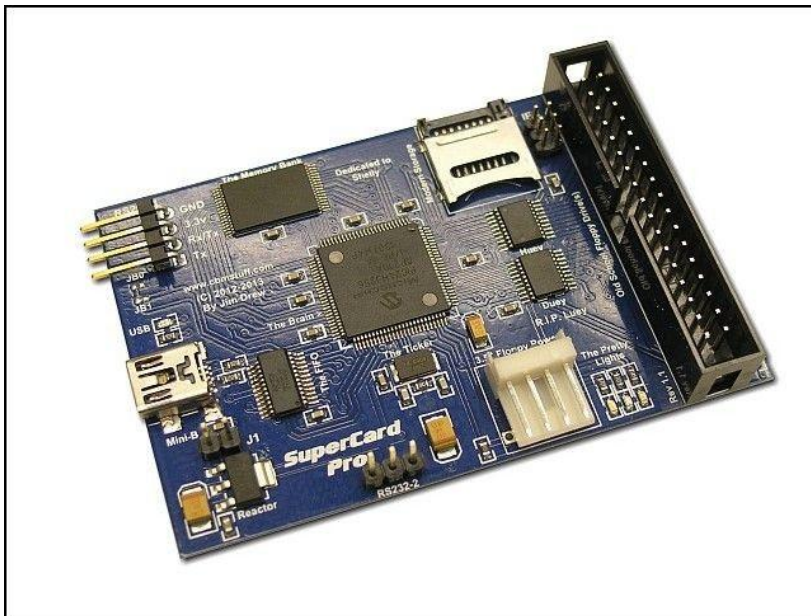
The SuperCard Pro can be driven from a USB port or be a stand alone device, driven by one of its two serial ports. Currently only PC driver software is available.

The SuperCard Pro software will always be a work in progress, updated as we find different disk formats to support. Software updates will always be free. The SuperCard Pro board's CPU can be reflashed through the USB interface, so hardware capabilities can be changed as needed.

Current status:

At this time SuperCard Pro can automatically duplicate any disk that was written with the data starting and ending at the index pulse. The majority of all commercial programs were created this way. 99% of Atari ST, Amiga, Atari 400/800, and a few other lesser known systems had their commercial disks created this way. So far, it appears that TRS-80, Roland, TI-99/4A, CP/M, and a few other systems were always done this way. There is also support for non-index copied disks, focusing currently on the Commodore 64/128 software and we are working towards 100% for all systems automatically through the copier.
Using the Analyzer program, it is possible to duplicate 100% of everything written on standard circular tracks, regardless of their relation to the index pulse. There are some protection schemes that look for data as the head steps and those can not be duplicated reliably using a PC drive, but we can duplicate those programs on the native system.

SuperCard Pro supports writing to the backside of a disk, even without an index pulse available, by simply flipping the disk over. We will be adding support for the No-Flip ("flippy") mod.

Future features:

The SuperCard Pro hardware uses a bi-directional floppy bus. This means that it can become a floppy drive emulator. This firmware update is not available to the public yet, but that is being worked on and will be made available at no charge.
The emulator will use flux level files, meaning that copy protected disk images will work just like you were using a real floppy drive. Both read and write support will be available.
Note: the price of SuperCard Pro will increase once this firmware is available, so early adopters will benefit with this free upgrade!

Another planned feature is a low-level, cycle exact 1541 disk drive emulator. There is a 6 pin expansion port on the SuperCard Pro that is for an adapter (available separately) to use a standard Commodore IEC connector. You would use a standard Commodore serial cable between the IEC adapter and your Commodore 64/128, and the SuperCard Pro becomes a 1541 disk drive! Again, using flux level images, copy protected disks will load just like the original.

Requirements (items not included):

PC floppy drive - 5.25" or 3.5".
34 pin floppy interface cable (available in the online store).
Power supply for the drive.
Note: 3.5" disk drives can be powered directly from the SuperCard Pro when connected via USB to a PC.

Specifications:

CPU: PIC24HJ256GP210A @160MHz (40 MIPs)
RAM: 512K of static RAM for local storage
USB: FTDI FIFO, full speed
Serial: dual ports, 110-1M baud
Storage: micro-SD card slot
Interface: bi-directional 34 pin floppy drive

IN MAV'S WORKSHOP:

Tandy's Commitment to Agriculture
Part 1: My Leeton Model II

by Ian Mavric

History: Those of us who grew up in large cities generally don't have much understanding or appreciation of what it is or was like working a farm and living quite remotely from even your neighbours. Big countries like Australia and the United States are well known for their large number of sometimes enormous farms, which are important to the economic and nutritional wellbeing of their countries. We don't give much thought to the grains, meat, milk, eggs, fruit and vegetables we consume and export, much less the management of those farms to be profitable well run organisations. It doesn't take a genius to work out that if the farms all go bust the country starts to starve. In Australia, for example, droughts and cyclones play havoc with farmers. Personally I want well paid professional farmers doing what they do best. Up until the 1980s the economics of running a farm was a numbers process based on pencil and paper, slide-rule and later, calculators. Enter the microcomputer.

TRS-80 Model II and III: Tandy realised early that while it was easy to sell computers in a city, it was rather more difficult to sell computers to farmers. Reluctance to embrace new technology or learn something new was the chief deal-breaker here. Farms are typically an intergenerational affair with younger people interested in new technologies and older farmers unwilling to learn something new or shell out a not inconsiderable amount of hard-earned money. Texans are known for their tenacity and so it was no surprise that Tandy took on the challenge to try to make inroads into the farming sector, much more so than big city based competitors Apple, C= and IBM. By 1981 two systems showed promise as being good workhorses well suited to life on the farm: the 64K Model II with external drive unit, and the 48K dual-drive Model III. Radio Shack started to look into what software was being written for the agricultural sector, and how they could get the message to farmers. They started with ads in relevant agriculture magazines, and in their own Radio Shack computer catalogues.

What Will You Need to Run Your Farm With the TRS-80 System?

HARDWARE

You will need a TRS-80 Model III, 48K with 2 disk drives.

A Line Printer, either Model V, VI, VII, VIII or a Daisy Wheel printer.

SOFTWARE

1. Scripsit A superb word processor which is easy to manage and learn due to the audio and visual lessons supplied.

This is a good one to learn first when starting out. A dictionary program is available giving 60,000 commonly used words for proof reading.

This is invaluable for writing professional looking letters which are printed out in seconds and filed away for future reference on disk.

2. General Ledger For your complete farm accounting system plus a budget guide. General Ledger enables you to print out a Profit & Loss statement, a trial balance, an income statement together with posting summaries and document list. All this at the press of a button is printed out in seconds.

In consultation with your accountant you will be able to present him with the necessary monthly print-outs thereby reducing accountants fees and freeing your accountant to render his services as your financial adviser.

3. VisiCalc A professional planning and management tool that lets you perform those "what if" calculations quickly and easily. The farming applications of VisiCalc are enormous, for example you could workout a "cash flow" on a particular operation such as an irrigation scheme, or a proposed piggery expansion and look at a series of "variables" or "what if" situations to help you decide the viability of the project in a matter of minutes which would normally take days with the pencil and calculator method.

You can use VisiCalc to help decide which machinery to buy or what crop to grow, crop spraying calculations, ration formulations, etc., whether it is an intensive or extensive operation. VisiCalc is an invaluable aid in farm management.

4. Profile Allows you to store and retrieve data your farming operation from paddock management to intensive livestock operations.

This can be used for "family listing" in studs for potential buyers or for culling and selection criteria etc. Profile will sort the records into whatever criteria categories you wish.

The new Profile Plus includes a maths package which enables you to include any equation you may wish to apply to your records, analysing and storing the computer results.

See your nearest Tandy store Manager for further details on the TRS-80 Farm Management Programs. Ask for a demonstration of the TRS-80 Programs that can be readily adapted to meet your particular farming requirements.

Agricultural Software Sourcebook: Most people are aware of the Applications Software Sourcebook which Tandy made available each year starting in 1983 with catalog number 26-2114 which contained information about thousands of programs for Tandy computers. Tandy made it clear they had not tested any of the programs in the book, so buyer beware, but it was interesting how they figured that even if there were a few dud programs in the book, making people aware that there were programs available from places other than Radio Shack did indeed help sell more systems.   A smaller and much harder to obtain book is called the Agricultural Software Sourcebook and carries the catalog number 26-7990. The book is divided into 5 sections called Financial Management, Livestock, Cropping and Irrigation, Horticulture, and Misc. Being specialist software some carry interesting and funny names for programs with serious uses and equally serious price tags. Eg. Sheep Manager ($500.00) and Total Analysis Piggery System ($700.00). Many of these programs would have sold in such low numbers (perhaps 10 copies or less) as to be virtually impossible to find these days. It's a shame as this is one area which these computers really excelled but went pretty much unnoticed apart from communications between farmers.

SHEEP MANAGER   48K 2D MODEL III
                                          64K 1D MODEL II
_____
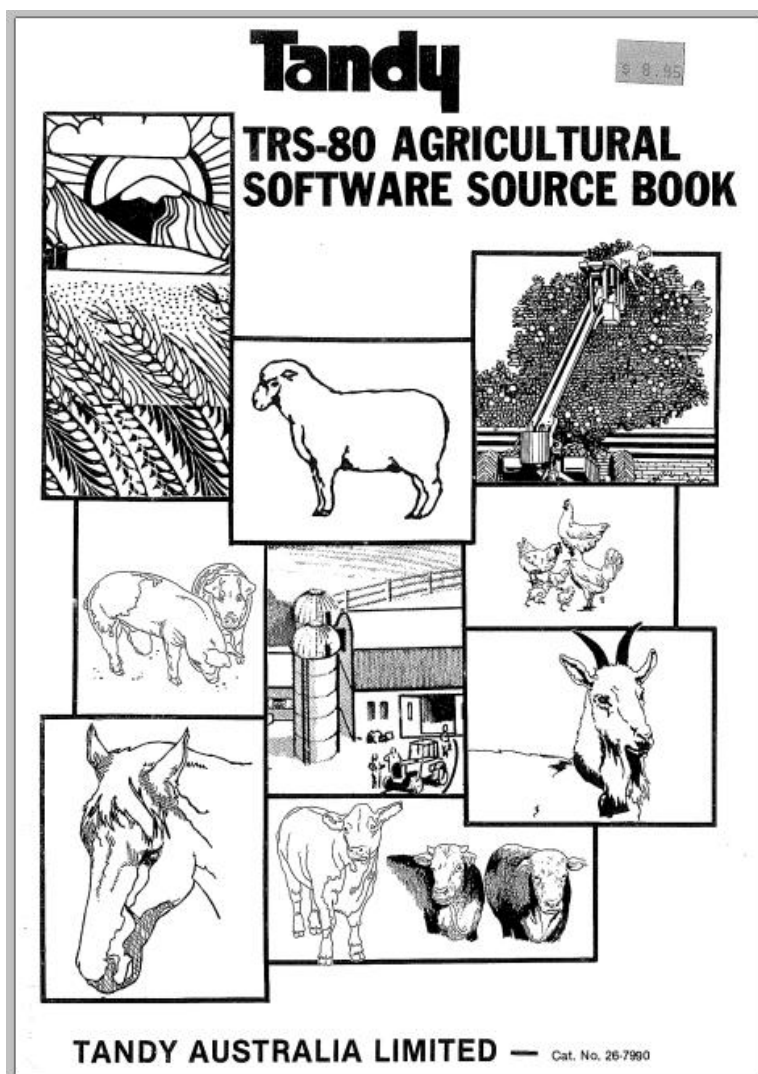
OVERVIEW

Sheep Manager is designed to aid in the objective selection of
breeding stock from a flock. The selection process gives weighting for
selection of both wool and meat production. The program also adjusts
meat and wool weight figures for multiple birth sheep. Having ranked
the flock by micron diameter size, body weight, index score 1 and 2,
printouts can be obtained showing ewes or rams according to any
pre-determined criteria e.g a sorted listing in order of micron
diameter size, for all sheep of a given sire and of twin birth.

FEATURES

Information recorded-

1. Tag number.
2. Sire code.
3. Birth status.
4. Greasy fleece weight.
5. Fleece type.
6. Fibre diameter.
7. Yield.
8. Body weight.
9. Condition score.
10. Wool price.
11. Meat value.

Calculations performed-

12. Clean fleece.
13. Index score 1 (wool production).
14. Index score 2 (meat production).
15. Average body weight.
16. Average greasy fleece weight.
17. Body weight correction factor.
18. Greasy fleece weight correction factor.

CAPACITY

- Using a twin disk drive system, 3500 sheep can be maintained.

REQUIREMENTS

- Model III or 4 with twin disk drive.
- 132 column printer.

FOR FURTHER INFORMATION CONTACT   PRICE
                                                   $500.00
Kyabram Computer Services
174 Allan Street,
KYABRAM. VIC. 3620
(058) 522-186

27

Leeton Model II: Leeton is a smallish rural town in country New South Wales with a population around 7000 and geographical placement 550 km west of Sydney and 450 km north of Melbourne.

Leeton is situated in one of the most productive farming regions in the state, with citrus, rice, grapes and wheat farms found throughout the Leeton Shire. Leeton is Australia's Rice Capital as it is home to the Sun-Rice headquarters. Other industry includes Freedom Foods, Berri Juices, Riverina Beef and Murrumbidgee Irrigation. I was contacted by a retired electronics store owner who was the local agent for Tandy Electronics, and he had some equipment he wanted to offload. Included was a Model II with external drive expansion box, a DWP-410 printer, and some software.

Keen to expand my TRS-80 support to include 8in systems, a deal was cut and a week later I owned the Model II system:

The Model II survived the journey intact and overall looked in good condition. Consistent with one used in an office.
The daisy wheel printer was even boxed and what you can't see in the picture above is the 30+ disks which came with it and complete set of manuals.

It's a late production machine. I opened it up and found inside a build date of 9th March, 1982 which considering these were made since 1979 and sold up until the Model 12 came along in late 1983, this might have been one of the last batches sent to Australia. It's serial number is in the 54000 range and it was nice to see it has the later model Astec AA11082 power supply as used in the Model 12, 16, 16B and 6000. The floppy controller is also the later design which doesn't need an external terminator plugged in to use the system as a single-drive. The inside of the system had some dust but nothing like the amount of accumulated muck like dead insects, rodent droppings or sawdust (yes, you read that correctly, I collect a Model II from a sawmill office once and it has been poorly stored and had a large amount of sawdust inside - lucky I checked before powering that bad boy up!).

Keen to get this machine up and running I decided the standard re-cap of the PSU was in order, since it still had those terrible old Rifa mains filtering caps. Once completed I'd attempt to power the system and see for any signs of life.

Removing the PSU from a Model II or 16:

Over the years many people have complained about the rubbish placement of the PSU and video board inside the Model II and 16, making maintenance of the power supply rather irksome and something best avoided. While I am mostly in agreement with this, it is possible to remove the PSU with the least amount of effort if you follow these steps. Tools required: long screwdriver with 25-30cm shaft and a magnetised head.

1. The PSU is mounted on a metal carrier which is screwed to the base of the computer with three screws. The metal carrier also holds the video board for the CRT, and is generally very cramped with lots of wires making it look harder to remove than it actually is. After unplugging the computer, remove the back cover off the Model II and find the three screws I am talking about. Use a flashlight if needed. Two are up the front of the metal carrier and one is down the back. Undo all three screws and take them out.

2. If you give the assembly a wiggle you can see that it needs to come upwards and lean over, PSU facing up, so you can remove the PSU from the carrier. across the top of this will be a bunch of wires, held in place by at least two cable ties. Clip the cable ties, and unplug the black video connector from the video board. (These cable tied wires, for anyone interested, connect to the brightness and contrast controls on the front of the computer.) There is enough slack in these wires to move them out of the way without unplugging them.

3. Unplug the two pin mains connector from the PSU (the connector with black and white wires). On the back of the CRT neck is a round connector for the heater and electron gun - its wire is too short with you lift the PSU/video board assembly up so it too needs to be unplugged from the CRT. There are no high voltages on it, just carefully unplug it. Enough should be undone so the PSU/video board assembly can be lifted 5-10cm to get to the lower connection on the PSU which is a large white one, and the green GND lead, undo them both.

4. Going slowly you should now be able to get the whole carrier up to about a 45 degree angle where you can undo the PSU from the carrier. There are 5 screws on the PCB and 4 underneath on the heat-sink. At this point the PSU should just lift out. Since the PSU is a derivative of Astec's design they've adapted for many microcomputers, the three mains filter caps are 0.22uF, 0.1uF and 0.01uF. I prefer to use those yellow Suntan ones, but any which are rated at more than 265V and X2 compliance will do.

5. Putting it all back together is just a reversal of removing it, making sure no wires are hooked or otherwise damaged in the process. Don't forget to reconnect the round plug into the back of the CRT. The three screws are flat blade however I take the opportunity to replace them with Philips type screw to make it easier to remove them next time.
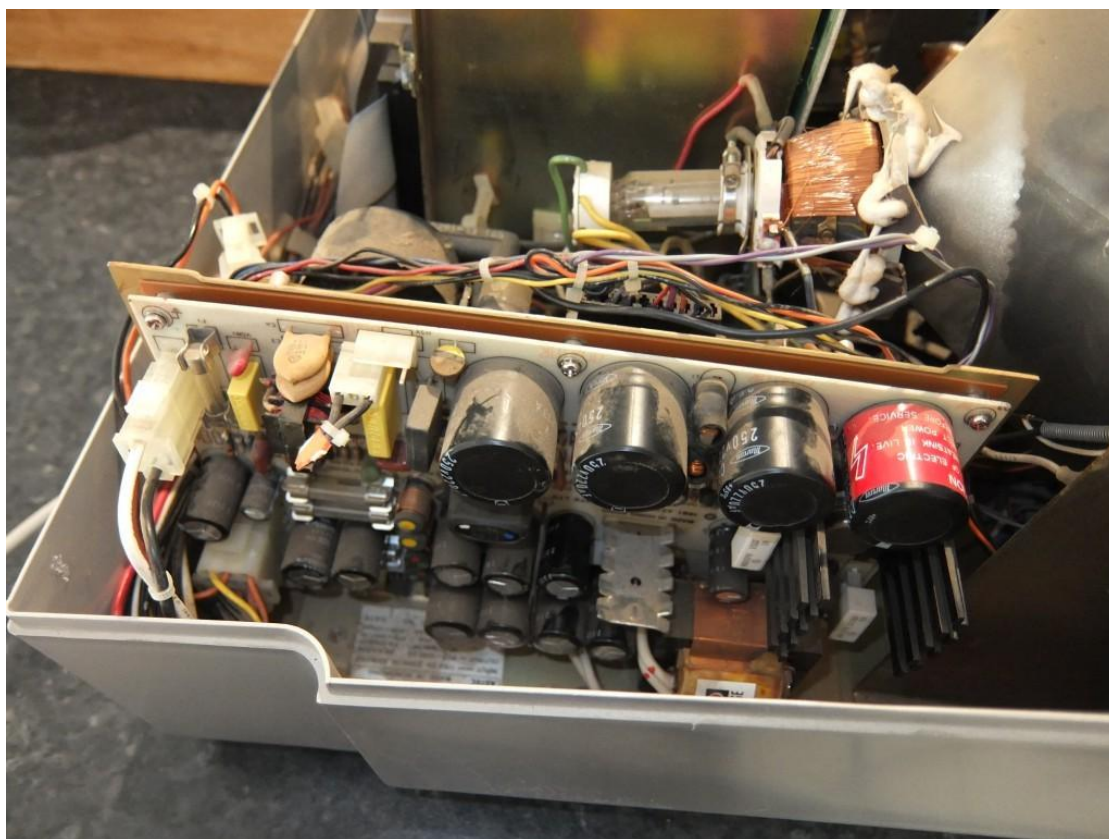
IT'S ALIVE! While the lid was off the Model II I inspected the disk drive head and it was remarkably clean, but I still gave it a bit of a clean with isopropyl alcohol. The drive motor seemed to spin freely so I left it alone. Everything else looked in order so I plugged it in and hoping for the best but fearing the worst, switched it on. The cooling fan spun up, as did the floppy drive motor. The neck of the CRT started to glow a re-assuring orange.... and there was nothing on the screen.

For some reason the brightness and contrast were turned down to the lowest settings and so I soon had the informational request "INSERT DISKETTE", making me think this can't be true... fully working, no re-moving the cards and reseating all the chips... or dead 4116 Ram chips, or rodent damage cables. This was turning out the be the best buy of a Model II I'd ever had. Not believing my luck I grabbed a boot disk and hit reset. TRSDOS 2.0A booted straight up, waiting for the date and time:

Time to re-foam the keyboard: My experience with other 8in TRS-80s is that while they have a very nice keyboard with excellent action well designed for long periods of time at the computer, they all suffer from degraded foams which render some or all of the keys inoperable. I was fully expecting that with this keyboard as well. So far though, most of the keys work, or work well enough for me to use the computer. It will need to be re-foamed soon but for the moment I can continue my work with it.

Software: As stated earlier, it did come with some 30 floppy disks and on them were usual staples of the 8in line including TRSDOS 2.0A, VisiCalc, Scripsit 2.0, Profile II, and P&T CP/M. The only agriculture-related title is called Stock Control and the other interesting one is Store Demo (cat. no. 700-1003) which I would imagine is what they run when a sceptic business owner dressed in a suit and tie walks into a Radio Shack Computer Centre and says "You call this a computer? Show me why I'd drop five grand on one of these?"
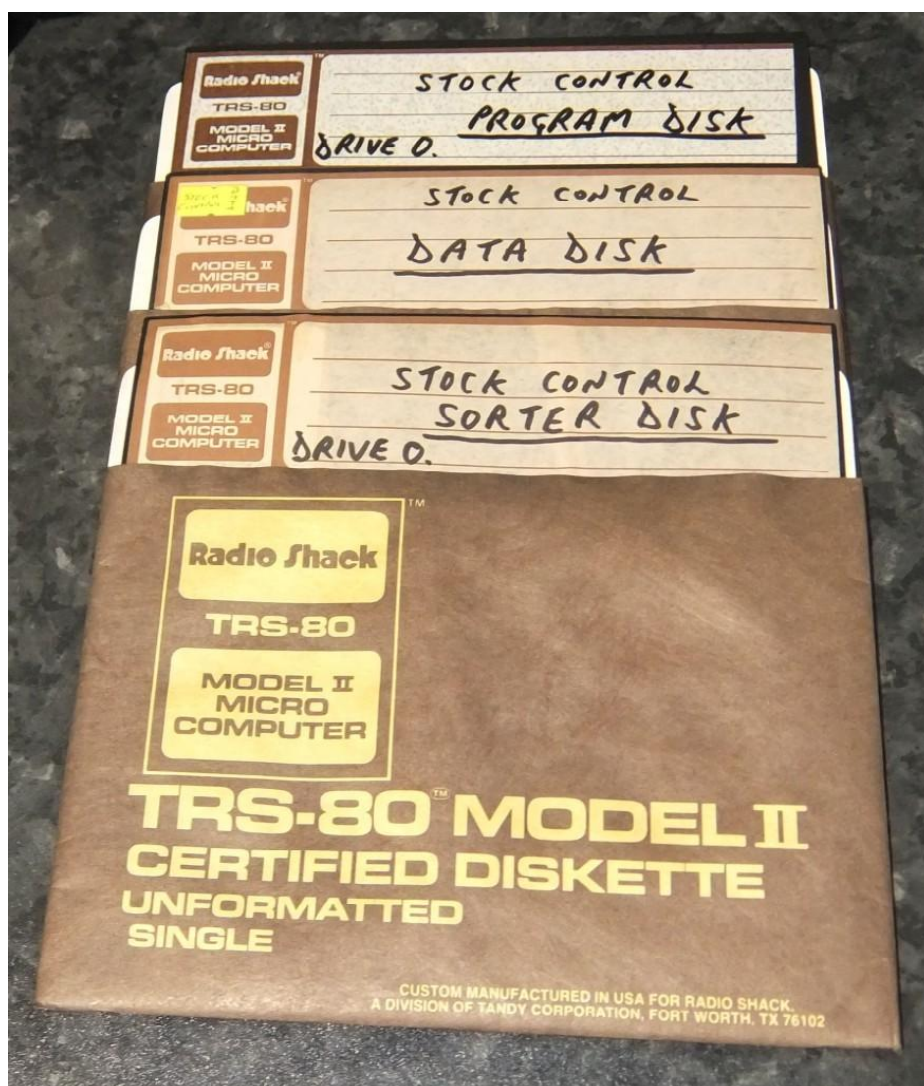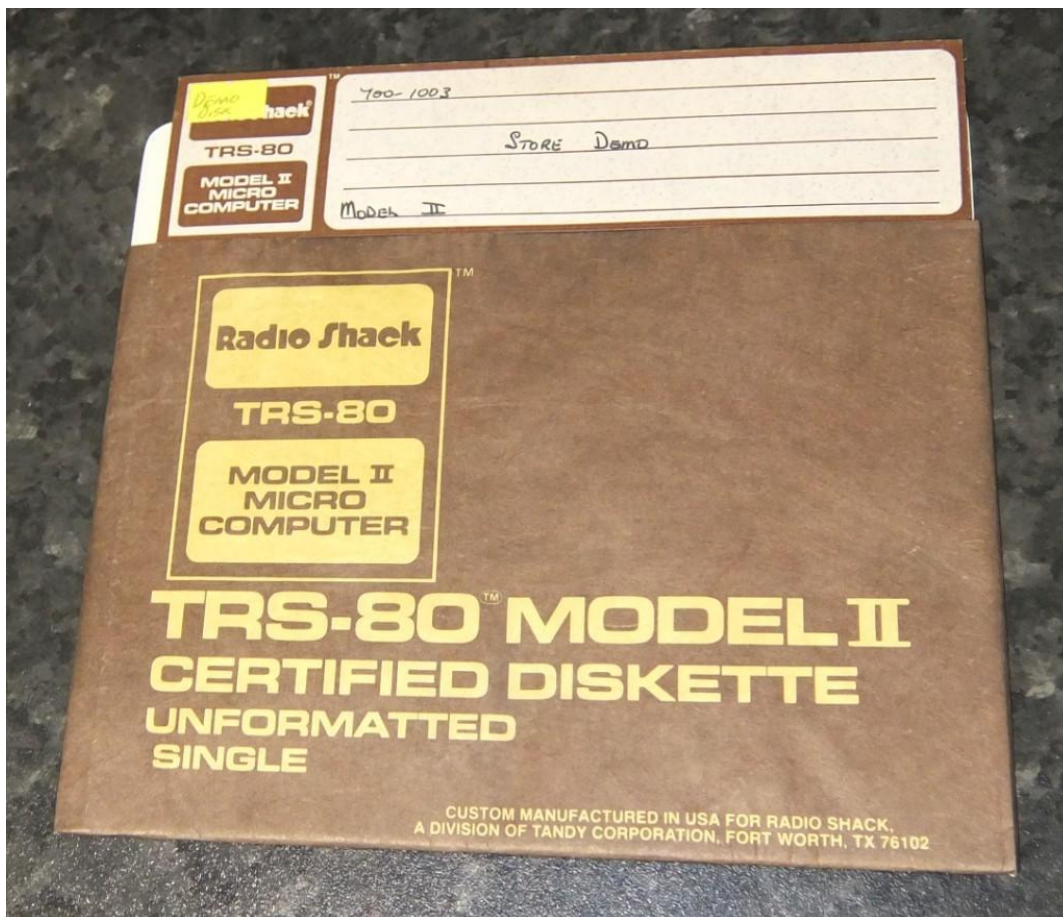
The Future of the Leeton Model II: This one will become my in-house test system for experimenting with the Hans-0x products to connect IDE and DOM hard drives to the 8in TRS-80s. My plan to is have by 2018 a product people can buy which plugs in and runs an emulated hard drive without the need to solder things together or set up special boot disks. Something analogous to my FreHD Clearly Superior product for the Model III and 4, where you just install it, and boot it up and you're up and working. Based around a DOM module, it will be fast. Currently it support LS-DOS and CP/M. More announcements in the next issue of TRS8Bit.

Next time: Tandy's Commitment to Agriculture on the TRS-80 Model III and 4.

Ian Mavric

ianm@trs-80.com

 Ian Mavric is an IT Specialist who also restores and collects TRS-80's and classic cars. He live with his wife and kids in Melbourne, Australia.

HERE IS A REVIEW OF DOSPLUS BY PETER TOOTILL
THIS REVIEW FIRST APPEARED IN NATGUG NEWS, JULY 1982

DOSPLUS - TRS-80 Disk Operating System

There is a multiplicity of operating systems available for the
TRS-80 and it's relatives, I know of TRSDOS, LDOS, NEWDOS+ (still
available!), NEWDOS/80, DOSPLUS, MULTIDOS, VTOS (no longer
available?), TURBODOS (Model II only), ULTRADOS, OS80, and of course
CP/M, and that little list may not be exhaustive! Most of these have
passed through several versions in their history, with numerous
patches to deal with bugs and deficiencies. The ones that have
become generally more established in the U.K. are the NEWDOS family,
LDOS, and to a lesser extent VTOS, not forgetting Tandy's own
TRSDOS. DOSPLUS (why do they always have to spelled with capital
letters?), has recently become available in the U.K., and I have
been using it for several months, ever since installing a double
density controller in my expansion interface. My original 3.3D ('D'
is for double density) version came with my LNDoubler board), and
was upgraded to 3.4D, for the princely sum of $25 (dollars, not
pounds) in January. To follow on from the articles by Ken Grey in
recent newsletters, I would like to add a few comments of my own.

I have found DOSPLUS to be fast, flexible, and easy to use. It
has powerful features, and although lacking some of the 'bells and
whistles' of NEWDOS or LDOS, it has it's own advantages, especially
in the area of double density operation. The double density format
is also reasonably compatible with LDOS and at least one d/d version
of Model I TRSDOS that has somehow escaped from Fort Worth, or so I
am informed. NEWDOS/80 v.2.0 uses a different d/d format, and can't
read a d/d disk formatted by DOSPLUS or LDOS. The BASIC has all the,
by now, usual facilities, and a few extras of its own, such as
'INPUT@', a substitute for those slow 'INKEY$' routines that are
usually required when constructing forms on the screen. Automatic
lower case driver and repeating keyboard are also included. I have
listed most of the features that are provided in addition to the
normal TRSDOS facilities.

The things that have impressed me have been the speed of
operation, the ease of handling different disk formats, (there's no
need to set up complicated 'PDRIVE' parameters), the all round ease
of use, and the speed and reasonableness of price of the upgrade. I
had the last in about three weeks, by airmail, and $25 is a bit
different from the $45 plus $8 for every month of ownership for the
recent LDOS upgrade. The main thing I don't like about DOSPLUS is
the manual, 3.3 was best left undescribed, all 52 pages of it
(sic!), 3.4 is much better, but still not up to the standard of
LDOS, or NEWDOS/80. The fact that the system lacks some of the more
esoteric NEWDOS/80-LDOS features doesn't mean that its not
versatile. Indeed if it had come out before those two, it would be
thought to be pretty remarkable. The list of features should help to
show what I mean.

Lib. commands:

BUILD)   Set up and execute a list of DOS commands (sim. to
& DO)   CHAIN in other DOS')
BREAK   Enable/disable break key.
CAT   Short form directory (sim. to DIR in most DOS's-can
           also handle Model III TRSDOS disks on a d/d system)£
DIR   Extended directory (as in Mod.III TRSDOS, or DIR (A)
           on Mod I. Output from CAT & DIR can be sent to printer
CLEAR   Empty a file, or clear RAM.£
CONFIG   Set up system params e.g. drive step rate, 5"/8" drives
           double sided drives, speed up mod etc£.
COPY   Devices can be copied as well as files. (e.g. keyboard
           can be copied to a disk file)£.
CREATE   Opens a file of specified no. of records and LRL on disk
FREE   Disk free info. Gives map of free and used granules.
FORCE)   Device routeing commands, e.g. screen output can be sent
to
JOIN   )   printer, or disk file.
FORMS   Sets printer page width, length, etc. (even for BASIC
           programme listings), also supports serial printers.
RS232   Set RS232 parameters (baud rate etc.)
(all lib commands can be used from BASIC via "CMD" function)

Utilities:-

COPY1   Single drive file copy.
CONVERT *+ Copy files from Model III to Model I (d/d system only)£
CRUNCH +   Compress BASIC programme.
DISKDUMP+) Disk file and sector editing programmes (sim. to
SUPERZAP)
DISKZAP)
MAP *+   Maps out location of files on the disk
PURGE *+   Displays disk file names and asks if file to be killed.
           Defaults to visible files only (inv. and sys files can be

           selected by parameter).
RESTORE + Brings back a file from the dead! Restores accidentally
           killed files, a VERY useful feature!.
SPOOL +   Printer spooler.
TAPE   Tape to disk & vice versa for m/c code programmes (sim.
           to LMOFFSET).
TRANSFER*+ Copies all user files from one disk to another (useful if

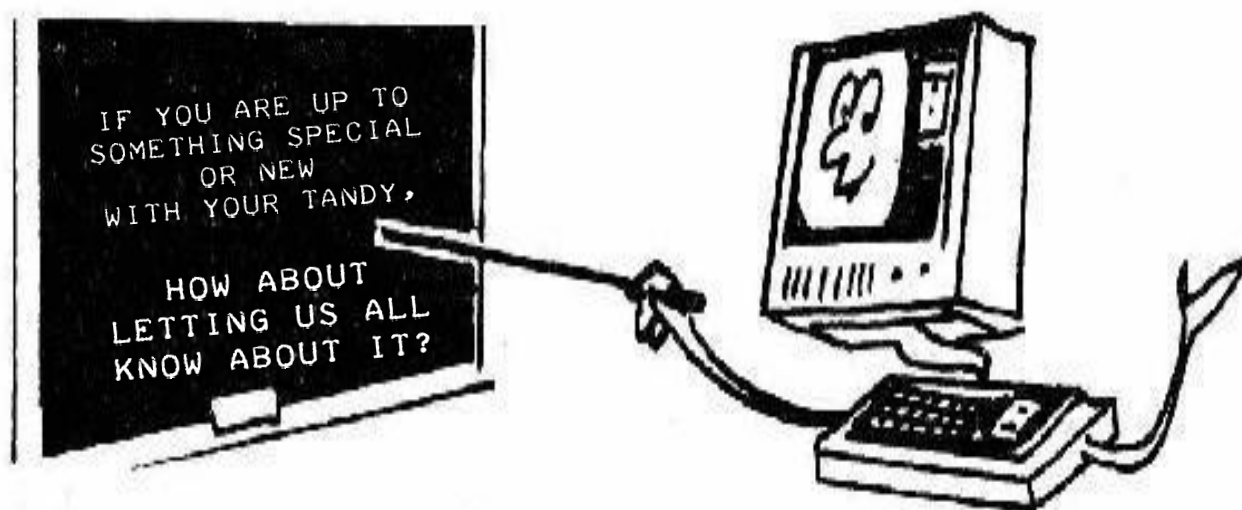   changing DOS's, saves a lot of typing!)

NOTES:-
*   These commands can have a mask to specify the file or files you
wish to operate on e.g. B/CMD will specify all files starting with a
letter B and having a /CMD extension.£
+   Can be used from BASIC via "CMD" function.
£   Substantially different, or new in version 3.4.

BASIC utilities & extensions:-

DU	Duplicate and insert line
DI	Delete and insert line.
RENUM	Renumber BASIC programme.
REF	Lists references to variables, to selected parameters, e.g. line no's, keywords, variable(s) etc.
TRON	Single step through BASIC programme.
CMD"M"	Displays values of variables on screen or printer (not arrays).
CMD"O"	Built in machine code sort routine£.
SR	Search for (and replace if desired), occurences of expressions in the BASIC text. (sim. to facility found in word processors).
INPUT@	Controlled screen input. You specify screen position, prompt string, and length of field, which is then displayed as a series of dashes. Replaces the usual slow INKEY$ routines used in setting out forms on screen£.

(Many BASIC commands, such as list, load, save, edit, run, kill, auto, delete, can be abbreviated to the first letter:- e.g. L'TESTPROG/BAS".)

TBASIC   A tiny BASIC, lacking the extended facilities set out above, but
         providing about 4.5K more RAM than standard disk BASIC

IF YOU ARE UP TO SOMETHING SPECIAL OR NEW WITH YOUR TANDY,

HOW ABOUT LETTING US ALL KNOW ABOUT IT?

Sharp 80:
TRS-80 Model III Emulator for Windows


```
                                    -Z-H-V--    33C3  A3           AND E
                            PC   33C6  33C4  20 32       JR NZ, 33F8
                            SP   408D >33C6  CD 20 31    CALL 3120
                                       33C9  F2 BF 33    JP P, 33BF
                            AF   0054  33CC  CD 3D 31    CALL 313D
                            BC   3810  33CF  A6          AND (HL)
                            DE   0400  33D0  20 08       JR NZ, 33DA
                            HL   403A  33D2  ED 62       SBC HL, HL
                                       33D4  22 01 42    LD (4201), HL
                            IX   4015  33D7  C3 7D 30    JP 307D
                            IY   FFFF  33DA  E5          PUSH HL
                                       33DB  2A 01 42    LD HL, (4201)
                            AF'  0000  33DE  23          INC HL
                            BC'  0000  33DF  22 01 42    LD (4201), HL
                            DE'  0000  33E2  ED 5B FF 41 LD DE, (41FF)
                            HL'  0000  33E6  ED 52       SBC HL, DE
                                       33E8  D1          POP DE
                            IR   005A  33E9  DA A1 30    JP C, 30A1
                            WZ   33BF  33EC  AF          XOR A
                                       33ED  12          LD (DE), A
                            (HL) 00    33EE  22 01 42    LD (4201), HL
                            (SP) 0694  33F1  2E 96       LD L, 96

                            0.00 MHz T: 000,000,016,262,774
                            Dsk: 0:S0:T16:S05
```

This is a full-featured emulator of a TRS-80 Model III microcomputer. It is free of charge and all source code is publically available. It includes:

Complete and self contained with ROM and DOS built in
Faithful Z-80 CPU emulation (including undocumented opcodes -- passes all ZEXALL opcode tests)
Runs at standard 2.03MHz (or run up to 100MHz on a modern PC)
Bundled disk and tape library includes applications, utilities, operating systems, and games
Supports up to four virtual floppy drives, and all major virtual floppy formats (DMK, JV3, JV1)
Tape drive emulation supports high and low speed reading and writing (CAS format)
Windowed and full-screen modes with zoom
Authentic sound support
Built-in Z-80 assembler and disassembler
Real-time monitor of Z-80 CPU internals and IO device status
Printer to file support
Save the entire state of the computer with snapshots
Support for all video modes, including wide characters and Kanji mode

```
        R
      E R                                                    A
    MERR                                          MERRYXM SM
    MERRYXM                                     XMASMERRYXMA M
    MERRYXMASM                                MERRYXMASMERRYXMASMER
     RRYXMASMERR                            MASMERRYXMASMERRYXMAS
      RYXMASMERRYXM                        YXMASMERRYXMASMERRYXMAS
       YXMASMERRYXMAS                     RYXMASMERRYXMASMERRYX
         ASMERRYXMAS                     RYXMASMERRYXMASMER
            RYXMASMER                   RRYXMASMERRYXMA
             MASMERR              ERRYXMASMERRY
              SMERRY          MERRYXMASMERR
             ASMERRYXMASMERRYXMASMERR
           YXMASMERRYXMASMERRYXMASMERR
          RYXMASMERRYXMASMERRYXMASM
              RRYXMASMERRYX
              RRYXMASMERRY
              ERRYXMASMERRYX
              MERRYXMASMERRYXM
          XM SMERRYXM  MERRYXMASM
            SM RRY  ASMERRYXMASMERRY
           ASMERR          RRYXMASME
```

LAST YEAR, THE XMAS CARD WAS A KOALA BEAR SO DEE SUGGESTED THAT AN
AMERICAN EAGLE SHOULD BE FEATURED THIS YEAR.

SO, TO EVERYONE, EVERYWHERE, WHO HAS ENJOYED AND SUPPORTED US IN 2017
DEE & I WISH YOU ALL
A VERY MERRY CHRISTMAS

```
10 REM XMAS0804/BAS
20 CLEAR500
30 M$="MERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRY"
40 GOSUB 220
50 READ S
60 IF S=0 GOSUB 160
70 READ L
80 T$=MID$(M$,S,L)
90     X=PEEK(VARPTR(P$)+1)+PEEK(VARPTR(P$)+2)*256
100 REM THIS AND THE NEXT LINE ARE NOT NEEDED ON 4 OR 16K SYSTEMS
110     IF X>32767 THEN X=X-65536
120         FOR Y=1TOL
130         POKE X+S+Y,ASC(MID$(T$,Y,1))
140         NEXT Y
150 GOTO 50
160 LPRINT P$
170 GOSUB220
180 READ S
190 IFS=0THENLPRINTP$:READS
200 IF S=99 THEN END
210 RETURN
220 P$=STRING$(81,32)
230 RETURN
240 DATA 4,1,0,2,1,4,1,53,1,0,1,4,46,7,54,2,0
250 DATA 1,7,42,12,55,1,0,1,10,37,21,0,3,11,34,21,0,4,13,32,23,0
260 DATA 5,14,31,21,0,8,11,31,18,0,13,9,30,15,0,16,7,29,13,0
270 DATA 18,6,28,13,0,17,24,0,14,27,0,13,25,0,21,13,0,21,12,0
280 DATA 20,14,0,19,16,0,15,2,18,8,28,10,0
290 DATA 18,2,21,3,26,16,0,17,6,30,9,0
330 DATA 99
```

APL80 from The Software Exchange
****

APL is an important language. In many ways it is very different to more normal high level languages such as BASIC, FORTRAN, COBOL, PASCAL etc. APL originated from a need felt by mathematicians to have a more flexible and extended system of describing and manipulating their concepts. It became a computer language almost as an after-thought.

The initial appearance is therefore rather daunting with a very comprehensive range of maths functions. These are in fact very straight-forward and you also have the ability to define new ones in a very simple fashion.

At first sight its most impressive ability is the way it deals with not only single numbers, but vectors (arrays in BASIC) and arrays (multi-dimensional arrays). You can give a variable name to an array and add, subtract, multiply etc. that array using either single numbers, e.g by adding 10% or using another array, e.g. adding this months sales figures to last months.

APL works in a command mode just like BASIC. Typing :- 4+4 will actually produce the answer 8. Typing 1 2 + 3 4 will give the answer 4 6. The speed of complex computations is amazing. The interactive command mode means great flexibility of data manipulation with the minimum of programming.

In mainframe implementations there is a powerful concept called workspace. This is a sort of electronic blackboard where you can put data, user defined functions and programs and have them all immediately available with the minimum of fuss. In micro implementations this concept is somewhat reduced, but you still have this extraordinary power of defining something interactively sticking it away and then calling it back in a program. In this way you can keep together all the bits and pieces for a particular job and save them all together on disk or tape with one save command.

There are very few control structures as such. You have to define your own. In this respect it is rather like assembly programming in that you build up a library of useful things which you can load into the particular workspace of the moment. The concept of local variables helps enormously. By defining a variable as local to a function or a program you don't have to bother if it is used elsewhere in the workspace.

APL in its original form uses strange Greek notation for its control characters. You can get these implemented on micros but it is expensive. The TRS-80 version uses the unused lower case and flags them with a graphics dot. It makes programs look funny but it works.

For the most part APL uses string data in the same way as numeric. So you can do a lot more to text with much fewer instructions than in BASIC. It has other nice things, like built in sorts, data reversal, data rotation, max & min, exponentiation, factorials, logs etc.

The TRS-80 version comes in two forms, tape & disk. The tape takes up 5k and the disk rather more. They both make extensive use of ROM subroutines and so are good value for RAM. The whole thing is run in interpreter mode so programs are not particularly fast, but when you see programs written in APL you can see how it can pack so much into so little. I have seen a multiple regression written in one line of program!

APL is sold by Microcomputer Applications of Caversham @ £10.50 for the tape version and £30.00 for the disk. I can thoroughly recommend it as an antidote to PASCAL.

The documentation is very poor and expects you to know APL. Newbear Computing are selling off their book side and are offering 'Structured Programming in APL' by Geller & Friedman @5.77. This is a book written from University lecture notes and it shows. However the first section is a very good intro to APL and there is a comprehensive dictionary of APL operators at the back.

The examples they use are unimaginative, and worse still, too complex. It is bad enough sorting out the coding without having to puzzle out the algorithm first. However its saving grace is a program for NIM complete with a routine which allows the machine to learn how to play the game better. I again recommend the book highly, but can only dream what David Lien might have done with the same opportunity.

Joe Edwards

THIS REVIEW, BY **JOE EDWARDS** FIRST APPEARED IN NATGUG NEWS
FEBRUARY 1982

THE NEXT ISSUE OF TRS8BIT WILL BE PUBLISHED EARLY MARCH 2018

WOULD YOU CARE TO SEND IN A CONTRIBUTION?

TRS-80 Emulators . com

TRS32: A Model I/III/4/4P Emulator For Windows

written by Matthew Reed

Unregistered Shareware Version:

- Works under all current versions of Windows
- Full Windows application — no low-level hardware conflicts!
- Model I, Model III, Model 4, and Model 4P emulation
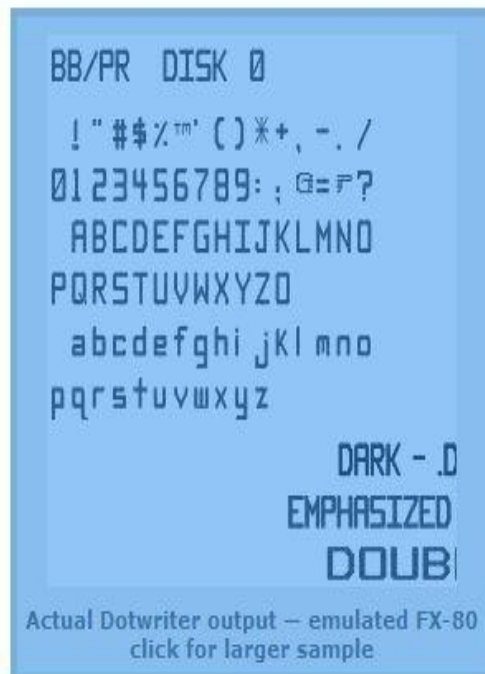- Four floppy disk drives (with optional realistic disk drive sound)
- Cassette tape drive with graphical on-screen controls
- Exatron Stringy Floppy emulation
- Printer support
- Serial port for RS-232 communications
- Joystick support (using a Windows joystick — TRISSTICK and Alpha Products joysticks are emulated)

Registered Version:

- All features included in the shareware version
- Built-in emulation of an Epson FX-80 dot matrix printer (including graphics and control codes)
- High resolution graphics (Radio Shack and Micro-Labs)
- Up to 1 megabyte of additional memory in Model 4 and 4P modes
- Hard disk support
- Orchestra 85/90 music generation

Interested?

- Read the TRS32 emulator documentation
- Download the shareware version
- Register online

Actual Dotwriter output — emulated FX-80
click for larger sample

MATTHEW'S EMULATOR IS QUITE ASTOUNDING.
IT'S MY FIRST CHOICE WHEN DEVELOPING IDEAS FOR TRS8BIT.
HE OFFERS FULL SUPPORT AND IT IS STILL UNDERGOING ENHANCEMENT.
IF YOU HAVEN'T REGISTERED YOUR SHAREWARE VERSION YET, PLEASE DO SO AND ENCOURAGE
AND SUPPORT MATTHEW'S ENTHUSIASM TO CONTINUE WITH HIS WORK.

ED.

Continuing our tradition of more computer for less money

THE NEW TRS-80™ SURPRISE

Meet Model II —
not an update but a
whole new ballgame!

Designed and built by
Radio Shack

While the legendary, best selling TRS-80 (Model I) continues, we've added a bigger, more powerful brother—the TRS-80 Model II —to answer your needs for more data storage, greater versatility, and higher computing speed, all at the lower cost you've learned to expect from Radio Shack.

There are fine business computers from Digital, Hewlett-Packard, IBM and others priced in the low five figures, but TRS-80 Model II— without sacrificing quality—brings you five-figure computing power at a four-figure price!

Manage a five to ten-thousand item inventory, prepare a payroll for hundreds, get timely and accurate management reports, and perform countless other tasks at twice the speed of TRS-80 Model I. Yet Model II won't fence you in or become obsolete. Like its little brother, it expands easily to meet growing needs.

TRS-80 Model II highlights

- **Fast and powerful**
- **Systems grow with your needs**
- **Easy to operate**
- **Affordable**

TRAVELLING MAV:

TA17: Tandy Assembly 2017

- My visit to Chillicothe, OH -

by Ian Mavric

IN THE BEGINNING there was no such thing as a system- or brand-specific computer festival. Looking back to the late 1970s the biggest ones were West Coast Computer Faire and COMDEX, where manufacturers big and small got together to show off their latest and greatest.

Tandy was no exception and regularly had exhibits of their machines. These were big corporate supported events which thousands of people attended, and had appropriate high cost to sign up and be an exhibitor. At the other end of the spectrum those in the Coco community set out to successfully run Rainbowfests throughout the 1980s which were smaller in scale, attracting a different demographic of user: the system-specific follower. The Coco community did an excellent job in this regard and there was never a TRS-80 Model I/III/4 equivalent festival which I always thought strange as in the 1980s the total number of Z80 systems in service outnumbered the Cocos. By the early 90s Rainbow had called it a day and the last Rainbowfest was in 1991. I should mention at this point that the Glenside Coco Club has been running their Last Chicago CocoFEST ever since.

VCF: Since the emerging hobby of retro computing moved into high gear in the 2000s, VCF has been running system-non-specific festivals for a number of years and they continue to grow in size and complexity. This is a good thing for people who are interested in retro computing for its own sake and are not system-specific fanatics.

I can appreciate a well restored or upgraded PDP-8, SOL-20, or Altair 8080 as much as a TRS-80 so I would be right at home there, however if someone was only interested in one platform only, a long travel to see one or two exhibits related to that platform might be a hard sell. Having said that, I hope to make it to some VCFs one day.

2016: By late 2016 the idea of a Tandy microcomputer specific festival was floated and was enthusiastically received by both the Z80 community as well as the Coco community.

Since there are Tandy enthusiasts for all their products, a decision was made to include them all. A grand name was needed and Tandy Assembly was born. As plans progressed it was decided that Chillicothe Ohio was a good central place for those prepared to organise the event and within reasonable distance from those who would be most likely to turn up. By August 2017 I decided to go so booked my tickets and accommodation.

October 2017: Australia to anywhere is a gruelling flight and it was going to take around 30 hours and three planes to get to Chillicothe. I went with United Airlines and was really impressed with them and would happily fly with them again. Just stepping into the plane and being greeted by the American air stewardesses made me feel like I'd walked straight into the USA. Being the new 787 Dreamliner it had an excellent entertainment system and the general buzz of the adventure ahead meant I hardly slept at all on the 13 hour flight to LA.
On the shorter flights from LA to Chicago and Chicago to Columbus I caught up on some sleep, finally.
CMH airport is just over an hour from Chillicothe so I was kindly offered a lift with George Phillips who was flying in from Canada. After picking up the rental car and driving to Quality Inn where we were staying, we finally arrived at about 1:30 in the morning on Friday.
With a whole day to kill George suggested we go check out the USAF Museum at Dayton Ohio and I was very please I decided to go.
It's free entry and enormous. It's not just war planes which is what comes to mind when I think of the USAF, but also presidential planes, rockets and space shuttle museums, as well as planes collected from enemies at the time like the Japanese, Germans and Russians.

Tandy Assembly: The Christopher Conference Centre was available from 5pm on Friday night to set up our exhibits for a 9am start Saturday morning when then general public were to be coming in.
I had previously sent my hardware exhibits by snail mail to Peter Cetinski, and also intended to display two running computers, a Model I and 4P. Since both are too large to bring on the plane I lined up with Peter to bring me examples of each and as a contingency for Randy Kindig to bring his non-working 4P and his Model I as well. As it turned out I only needed Pete's Model I and repaired Randy's 4P in front of a crowd so I had both machines up and running.

DAY 1: Jetlag finally caught up with me and I slept through my alarm. By the time I woke up it was 9:03am. Knowing I would start to feel ill if I missed out on breakfast and had a late lunch I went past the breakfast room at quality in and ate a bowl of cereal in about 30 seconds flat. At about 9:15 I walked in the door and tried not to look, or sound like a tool. I didn't stop talking to people all day, many had come long distances and were happy to finally meet me and just talk about TRS-80s.
I took time out to see the talks by Don French and Lance Micklus. In the afternoon we had the auction which generated funds for the next TA, and in the evening we had the Retro round-table discussion and finally the Tandy quiz which I won. I had stiff competition in the form of Boisey Pete (a computer historian) and a former Radio Shack Store Manager but it was obvious after about 10 questions I had this in the bag.

Randy's 4P: Back in 2015 Randy Kindig (of Floppy Days Podcast fame) decided he needed a Model 4 in his collection and not having much space or money figured the 4P was just the ticket. One was found locally for around $50 because it sort-of worked. I advised him that these are pretty easy for me to repair and we could probably do it over a Skype conference. We did succeed it making it work but it was never reliable and since we'd be catching up at TA17, I'd have another look at it.

It powered up and would display the three-language boot error, but could never boot. At TA17 I finally got my hands on it and found the usual problems.. the 80-column video sync capacitor was out and needed to be re-adjusted, and the floppy controller IC was blown. At the TA17 auction I bought a Coco floppy controller for $6 and used the WD1793 FDC to get the 4P reading again. As is usual with 4Ps (and IIIs and 4s as well), drive 0 was fairly worn out, so it would boot a floppy perhaps 1 out of 5 times, but I changed to cable to only have drive 1 connected which has much less wear and it was booting successfully 100% of the time.

While the system was open I also installed the Hi-Res graphics board, 64K memory upgrade (for a total of 128K) and a FreHD auto-boot Eprom. I put it back together and held my breath as I booted it up, with FreHD connected, and onlookers anxiously looked on as it worked first time, booting in the FreHD menu system. It worked perfectly for the rest of the show.

DAY 2: I had a better start to the day, having a proper breakfast and was in the conference room at 9am where I met more people and continued conversations from the previous day. People who had been interested in my items started to buy some of them and others placed orders to be filled once I returned home. I bought a few things from other vendors and took time to talk to just about everyone exhibiting. I took time out to see talks by Scott Adams, Peter Cetinski, and George Phillips. A few people had repair and tech questions which I hope was helpful and those who asked them got the answers they were looking for and now their computers are back up and running. I picked up one of the orange TA17 t-shirts and had Don French, Scott Adams and Lance Micklus sign some business cards for me. Around 3:30 it was time to call it a day so most of us started packing out exhibits up. Dinner with Phil Avery (New Zealand) and George Phillips (Canada) had the whole "An Australian, Canadian and Kiwi walk into a bar..." feel about it. We discussed how to encourage more international visitors to the next show. I discovered a new meaning for the word tired and settled my account at the motel and headed to my room for an early night. Tomorrow was to be an early morning.

Monday 9th October: Both George and I were flying out of CMH and our flights were within a half hour of each other, but still pretty early at around 9:30am, so to decision was to get up at 7am, have some breakfast and leave by 7:30, in order to drop off the car and be there by 8:30 or so. All went to plan and George's plane arrived first so we said goodbye as George, and his flight-cased 4P, headed back to Vancouver. For me it was to be the first of three flights back to Melbourne, another 30+ hour 3-leg journey in coach. I was treated with the same hospitality from United Airlines, the food adequate and the entertainment system fantastic. This time I even managed to get some sleep. Not a lot but more than on the trip to the USA. Flying on my own in coach I expect it to be a rather arduous and could be quite testing with my family with me, but for grown adults travelling on their own its very do-able. Cost wise my airfares was similar to my last visit to the USA in 2002 so while inflation has affected most things in our lives this last 15 years, the cost of air travel has pretty much stood still. Which is to say, it's now cheaper than ever to visit the USA and should not be the hindrance others think it is when coming to the next Tandy Assembly.

Notable mentions: I know I'm going to miss out on a few people here and I'm sorry if I forgot to mention you but where are some of the people who took time to talk with me, buy me lunch or dinner, drinks, and bought some of my items I was selling, which made my trip to the USA so successful:

Peter Cetinski - loaned me a Model I and 4P, bought me dinner Day 1
Randall Kindig - loaned me a Model I and 4P
Jay Newirth - came from Maryland and had many great stories about his restoration projects
Bill Bright - came from Kentucky and bought me lunch and we discussed his many projects
Paul Curtis - had a great time talking about his 4D project
Bob Boyd - came from Philadelphia to meet me
George Phillips - transit to and from CMH to Chillicothe saved me a small fortune
Phil Avery - visitor from New Zealand and bought one of my first restored Model IIIs in 2000
Ruud Broers - visitor from The Netherlands made the long journey from Europe
Martin Lucas - flew in from TX and has helped with FreHD/16B project
Rainer Effenhauser - flew up from TX with some 3D printed cases for my various products

Again, sorry if I missed anyone out.

Photo: me and Jay Newirth at TA17 (photo courtesy of J. Newirth)

Photo: Randall Kindig's at TA17 (photo courtesy of J. Newirth)

TA18: Working on the assumption that TA17 was a great success I'm preparing to do it all again next year, for the even bigger and better TA18. Keep your eyes on this publication for news on the Tandy Assembly 2018 as it comes to hand.

Ian Mavric

ianm@trs-80.com

Newsletter of Sydtrug Inc.

Sydney TRS-80/MS-DOS Users' Group

C/- Peter Wignell PO Box 95 NARWEE NSW 2209
AUSTRALIA
Website : www.sydtrug.org

I'VE BEEN KEEPING A WATCH ON THE TANDY ITEMS
APPEARING FOR SALE OVER THE LAST FEW MONTHS -
SO HERE ARE SOME

EBAY (.CO.UK) GEMS

LINE PRINTER III. NOT SOLD
(STARTING AT £35)

TANDY MODEL 1000. SOLD FOR THE
BARGAIN PRICE OF ONLY £46

VARIOUS EXATRON & ACULAB
WAFERS. NOT SOLD BUT BEING
RE-LISTED FOR THE 3RD TIME!

I DID MAKE A MUCH REDUCED
OFFER ON THESE, AS I CAN'T
IMAGINE THEY WILL BE USABLE,
BUT THE OFFER WAS DECLINED!

A COUPLE OF VIDEO GENIES.
NOT SOLD AT £400, BUT THEY
HAVE JUST BEEN RELISTED.

THIS VIDEO GENIE SOLD
FOR £232.90 - WOW!

A BOXED, MODEL 1 SETUP
FETCHED £181

THIS VIDEO GENIE REACHED
£208.90

THE EXATRON STRINGY FLOPPY,
ONLY MANAGED TO REACH £39.99

WHILE THE MANUAL WENT FOR
THE PRINCELY SUM OF £51

AND FINALLY, JUST FOR
INTEREST, THIS OSBORNE ONE
FETCHED £165

IN MAV'S WORKSHOP

LOWERCASE CHARACTERS ON THE MODEL I: EVERYTHING YOU NEED TO KNOW IN 2017 Part 2

by

Ian Mavric

LAST TIME

I discussed the different character generators fitted to the TRS-80 Model I during its production run from 1977 to 1980. Basically they got better and better and all of them had lowercase character set laying dormant inside them, and it was the design of the Model I which masked that.

Adding a missing memory bit-6 brings out those lowercase characters. This article explains where to go and why, to upgrade your system to lowercase depending on which CGR you have installed or are prepared to buy.

Lowercase modifications:

On systems with the 8001 and MCM6670 character generator chip there have been several modifications proposed to get access to the lowercase characters already present inside.
The Electric Pencil version is one of the most popular and included a switch. You will know if you have this modification because in one position the switch produces standard Uppercase only operation, and in the other position shows random symbols.
Once a driver program, or Electric Pencil software, you flip the switch and then the lowercase characters work. It's a protracted way of doing things but people at the time lived with it. If you find one of these machines and wondered what the switch was for and why, now you know.

Dennis B. Kitsz in his book The Custom TRS-80 and Other Mysteries outlines a lowercase modification which has gone on become the de-facto standard for those with the 8001 or MCM6670 character generator and I have installed it in many computers over the year.
It's great because it's completely self-contained (no switch) and software compatible with all the commonly used lowercase driver programs like Radio Shack's, as well as popular disk operating systems including LDOS, Newdos/80 and Multidos.

On the downside there are no lowercase descenders, and in the case of the 8001, the letter 'a' flies up in the air due to a manufacturing error at the Motorola plant. Having said that, my own personal Model I which dates back to early 1978 has the flying 'a' and no lowercase descenders and I used that for years with LeScript to do much of my high-school and university paper writing.

To perform the modification go to Custom TRS-80 book page 106 "Lower Case with Upper".

Tandy's Solution

As mentioned last time, when Tandy decided to release their own official lowercase modification, descenders and an otherwise pleasing looking character set was needed, so they had Motorola customise the MCM6670 especially for Tandy. This also has the effect of standardising the character set on all RS-upgraded machines. This new part was called the 6673 and makes the lowercase modification very simple indeed. 1 trace cut, two wires, and double stacked 2102 Srams are all that's needed. So much the better if you have a late Model I which already has the MCM6673 in Z29 and a socket in Z45. In the past, occasionally you could find the MCM6673 on eBay under its generic name SCM37530P but they have since become unobtainium.

To perform the modification, go to Custom TRS-80 book page 107 of the Revised edition (3rd printing) and read the section marked "Radio Shack Lower Case". It's important you find the revised edition because the first edition only has a picture of a chicken in the same place.

What about a 6674?

These are still kicking around on some vintage electronics surplus web sites but its best avoided due to having the same character set with no lowercase descenders as the MCM6670. Some of the symbol characters have changed but basically you need to hold out for a 6673 or employ one of the aftermarket solutions to get lowercase with descenders on your Model I.

Micro-80 Lowercase CGR EPROM

In the 80s Micro-80 in Adelaide produced a small adapter PCB with an EPROM which had a nice pleasing character set reminiscent of the MCM6673. I plugs into Z29 where the old character generator was, and if you have a particularly early system which has a soldered-in CGR then you need to unsolder it and install an IC socket. You then perform the rest of the lowercase modification as per the Radio Shack Lowercase listed above.

GenDon 3 Lowercase with three-line descenders

Genius TRS-80 hardware designer Don McKenzie thought about how it would be nice to have more attractive looking lowercase with three-row descenders instead of the standard single-row descenders.

He worked out with a specially programmed EPROM and a couple of modifications to the motherboard you could indeed get three line descenders. The work was more than the other modifications listed in this article but the result was really nice:
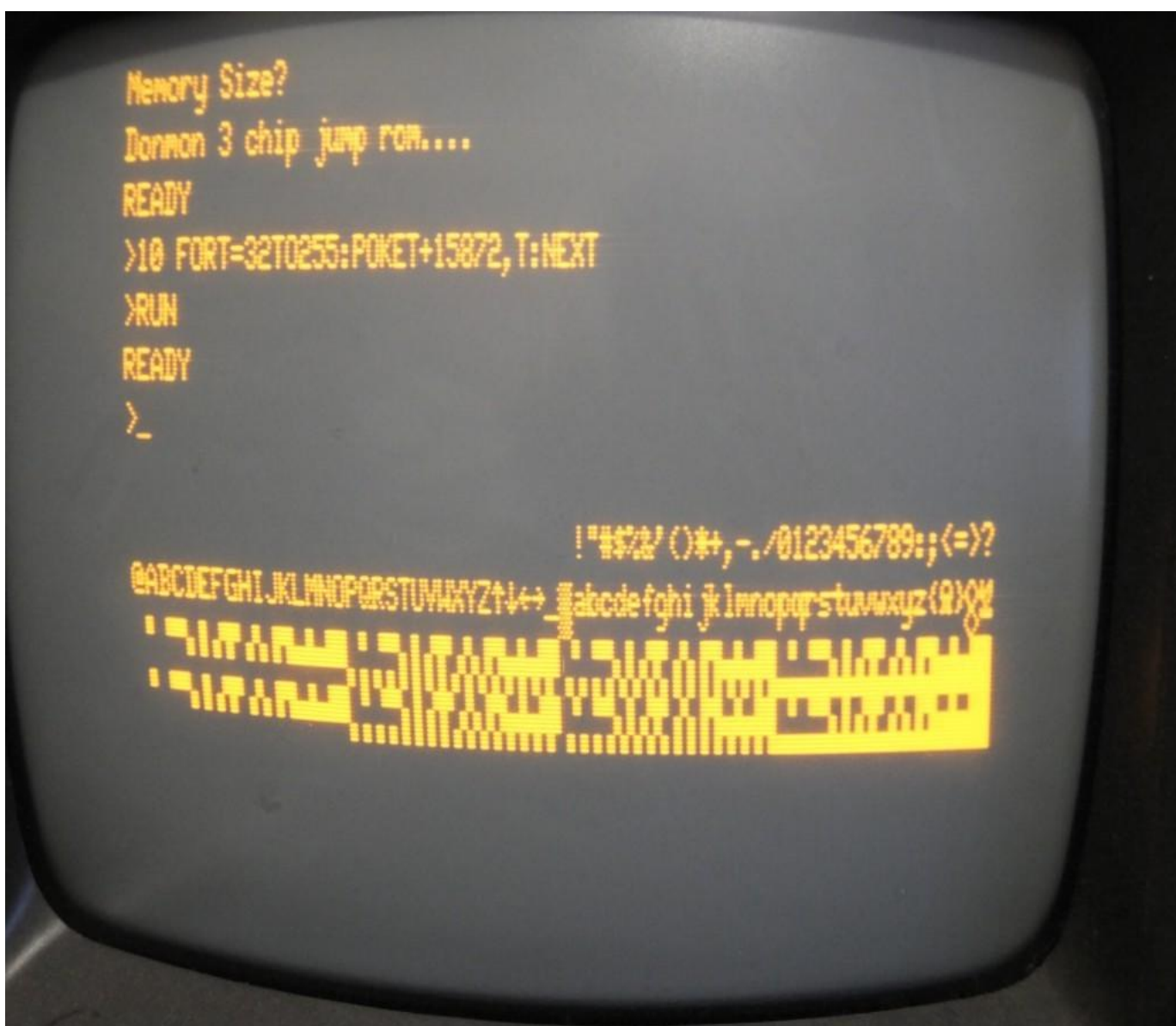
The board itself is small and compact:
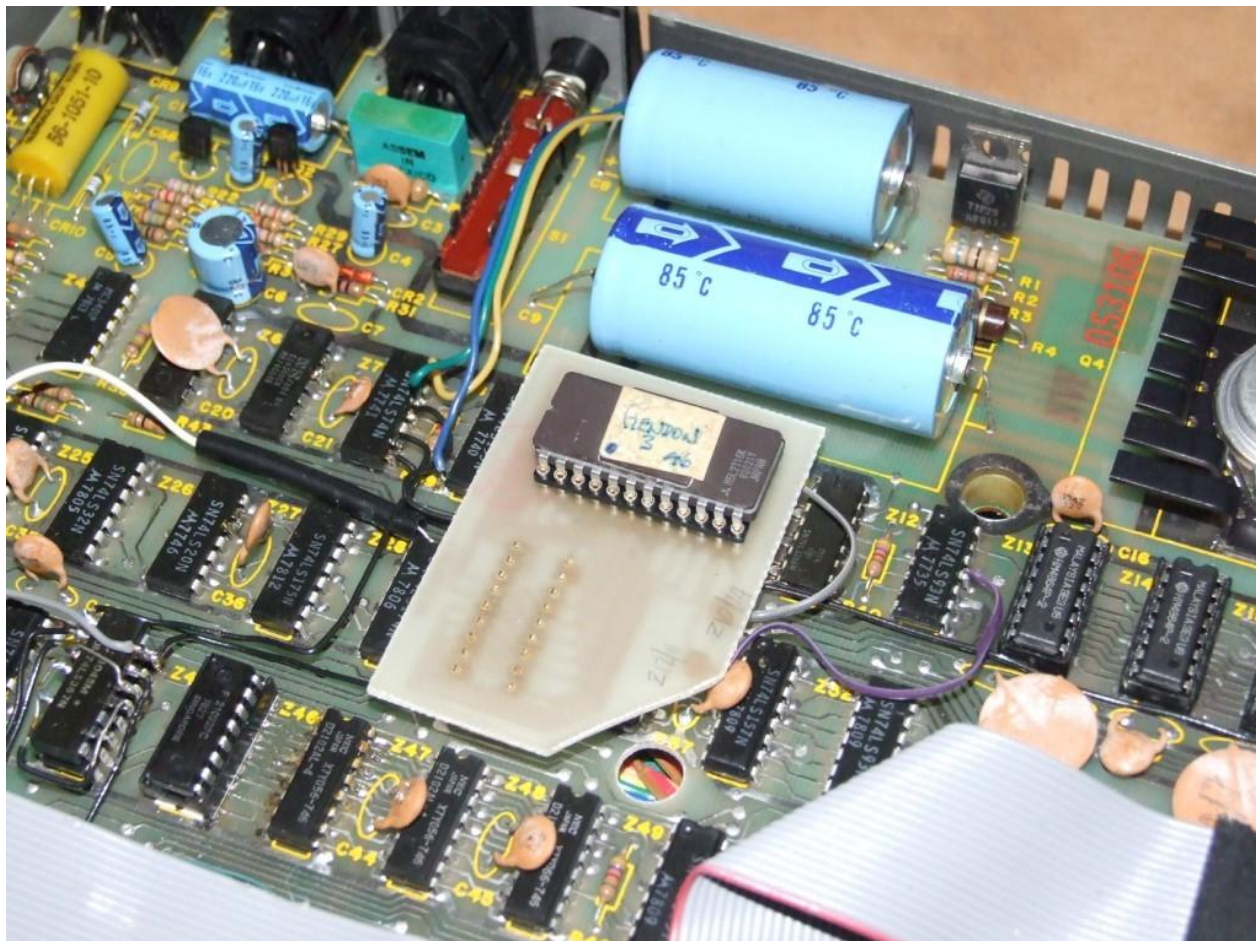
My plan is to bring back both the Micro-80 CGR and the GenDon3 back in 2018 for those who are still getting by with all-caps Model Is and want to get the most out of their systems.

Stay tuned for that announcement!

Ian Mavric

ianm@trs-80.com

Ian Mavric is an IT Specialist who also restores and collects TRS-80's and classic cars. He live with his wife and kids in Melbourne, Australia.

The BD Software C Compiler (*BDS C*)

An 8080/Z80 C Compiler:
Now Open Source and Public Domain!

Initial Commercial Release: August, 1979
Released into the Public Domain: September 20, 2002
This Distribution Last Updated: October 10, 2002

In 1979, I wrote a compiler for a subset of the pre-Standard ("K&R Classic") C Programming Language. The package was developed on, and targeted for, CP/M-80 floppy-based systems with as little as 32K of available system RAM. Originally intending to publish the source code in BYTE, I was eventually persuaded to turn the project into a retail product. Version 1.0 was released in August of 1979. The full package sold somewhere in the neighbourhood of 25,000 copies domestically, and a stripped-down version for Japanese-market MSX machines (distributed under the name *Alpha-C*) probably sold somewhere in the 50,000 copy range.
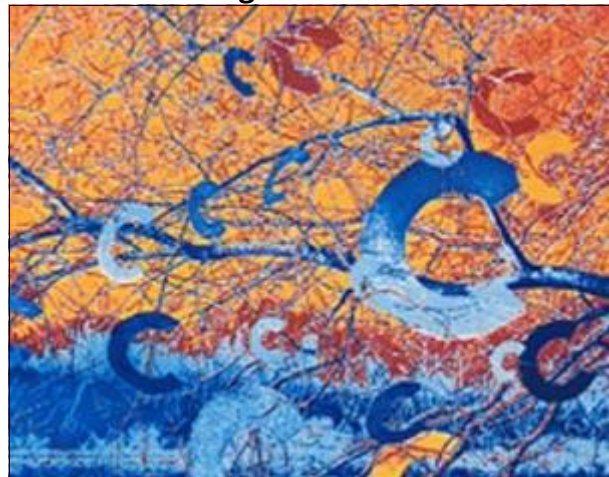
Now BDS C's commercial potential is well in the past. Until recently, I had not been aware of the continuing international interest in 8-bit CP/M (and derivative) systems... upon this discovery, I found no reason *not* to render BDS C, along with all of its source code (including the 8080 assembly language compiler/linker sources), free to the public. For the record:

I, Leor Zolman, hereby release all rights to BDS C (all binary and source code modules, including compiler, linker, library sources, utilities, and all documentation) into the Public Domain. Anyone is free to download, use, copy, modify, sell, fold, spindle or mutilate any part of this package forever more. If, however, anyone ever translates it to BASIC, FORTRAN or C#, *please* don't tell me.

Leor Zolman
9/20/2002

PLUS, AS AL STEVENS GRACIOUSLY POINTED OUT IN HIS DDJ ONLINE C NEWSLETTER, BDS C MAY BE USED TO PRODUCE 8080/8085/Z80 EMBEDDED SYSTEMS CODE (IT GENERATES CP/M-RESIDENT CODE BY DEFAULT, BUT THE RUNTIME PACKAGE CAN BE CONFIGURED EASILY ENOUGH TO RUN IN THE ABSENCE OF AN OPERATING SYSTEM.)

Tandy Assembly

I am a software engineer of modern systems who played with Atari's and Commodores as a boy and have a new found interest in retro computing and software development on the classic Tandy machines.
See more at http://pski.net/category/retro

Tandy Assembly 2017
By Peter Cetinski @pski

The world's first large gathering of Tandy Radio Shack computer enthusiasts since the 1980s took place this past October 7th and 8th in Chillicothe, Ohio, USA. The event was by most measures a huge success. We had over 80 participants from around the world, although most were from the US, as expected. The traveler with the longest trek to the show was none other than TRS8BIT's own Ian Mavric who flew in from Australia.

The show was conceived more than a year ago. It was formed from the convergence of several different efforts aimed at creating a Tandy focused retro computing event. John Linville, Neil Blanchard and Mike Rowen of the CoCo Crew Podcast were formulating the plan for creating an event. At the same time, I was in the early stages of planning on starting a TRS-80 focused event. We decided to join forces and create an all-encompassing Tandy focused computer event. The rationale being that by having a large umbrella that will cover many systems then that would increase the likelihood of significant participation.

Chillicothe, Ohio was chosen as the venue for the event due to its centralized location in the US and its affordable accommodations. We followed a tried and true formula for events of this type by creating exhibitor space as well as a speaking track. We eventually sold out on the available exhibitor space and had significant attendee ticket pre-sales which was an exciting indicator of interest in the event.

Peter Bartlett & Malcolm Ramey's exhibit (bottom) and my XENIX exhibit (top).

Mav's Working Live Repair Exhibit

We had great exhibits spanning all of the Tandy line of computers. From Model Is to pocket computers. From the Color Computer to the Tandy 1000. From Model 100 to Tandy 6000. And everything in between.

There was a Saturday night auction that went on for several hours. I scored a CM-8 monitor for my Coco 3 as well as a working Voice Synthesizer for my Model I!
The funds raised by auctioning off the donated items will help to pay for the event and will help to ensure successful future events.

CocoCrew podcaster John Linville hosting the Tandy Assembly auction

The speaker lineup was impressive. Don French, one of the fathers of the TRS-80, opened up the show with a well-received Saturday morning keynote address. Legendary adventure game programmer Scott Adams opened up the show on Sunday morning with his humble and inspirational keynote address.
Speaking luminaries also included the famous TRS-80 programmer Lance Micklus and Color Computer programmer Rick Adams. The speakers kept rolling on for most of the day Saturday and Sunday morning. I even gave a presentation on the Model II line of computers.

Don French speaking at the Saturday Keynote Address

I was pleased to meet so many people that I only knew from the online world. Enthusiasts such as George Phillips, Malcom Ramey, Martin Lucas, Peter Bartlett, Kevin Adams…the list goes on and on. Nothing beats meeting someone in person to establish a true friendship. I hope to keep those friendships alive for a long time. I'm disappointed that I did not get to meet many other attendees, especially those in the Coco community. I was so busy with my exhibit, speaking slot and event functions that it was difficult to mingle and just meet new people. I plan to rectify that in future years.

Getting to meet Scott Adams was a real thrill for me. He was a very nice fellow and was so grateful for the invitation to speak at the event. Scott's computer games got me through some tough times when I was a child. I will always remember playing them well into the night to help escape some of my life's challenges at the time. His games were a friend that was always there for me. Thank you, Scott!

Lance Micklus was another very gracious and generous person to meet. He gave me his Model III that was used to host his BBS back in the day. He even autographed it for me. I plan on including it in my future TRS-80 Museum.

Meeting Lance Micklus (left) and Scott Adams (right)

Since the event was such a success, we are already planning for Tandy Assembly 2018! Don't miss the next one. The first one was the highlight of my vintage computing career and I think the next one could feel the same for you as well.

SCOTT ADAMS

"That Was Then, This Is Now"

DON FRENCH

"The True Story of the Making of the TRS-80"

The Keynote Speakers
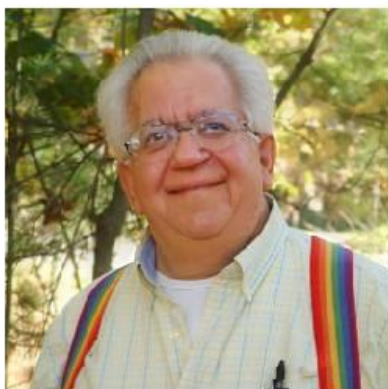
LANCE MICKLUS

"From Bank Robbers to Facebook"

RICK ADAMS

"The Resurrection of Bomb Threat"

Other Speakers

JOHN LINVILLE

"Keeping the CoCo in the Game"

PETER CETINSKI

"A History of the TRS-80 Model II Line"

STEVE STROWBRIDGE

"Gameplay Goodness, the Origin Story of ogStevieStrow"

BRENDAN DONAHE

"Hacking CoCo ECB for 64-Column Text with CoCoVGA"

GEORGE PHILLIPS

"The Making of TRS-VID"

ARNO PUDER & SASCHA HAEBERLING

"An Android-based Emulator and Retro App Store for the TRS-80 Model I/III"

The Exhibitors

Steve Strowbridge

Port St. Lucie, FL

Coco 3 and Retro SWAG

Mike Rowen

Cambridge City, IN

The Tandy Color Computer

Richard Lorbieski

San Antonio, TX

BoysonTech

Peter and Alex Cetinski

Chappaqua, NY

Tandy XENIX

Mark Marlette and Sandy Wiemer

Delano, MN

Cloud-9

Peter Bartlett and Malcolm Ramey

Colorado and Tennessee

Classic TRS-80s with Modern Upgrades

Randy Kindig

Lebanon, IN

Tandy's Portable Computers Through the Years

RETRO Innovations

Iowa

TANDY Color Computer and General System Products

Ian Mavric

Melbourne, Australia

Mav's Handmade TRS-80 Upgrades

Brendan Donahe

Lago Vista, TX

CoCoVGA

Alan Hightower

Austell, GA

Tandy 12345K PC Compatibles

Evan Wright

Chicago, IL

Cross Platform Text Adventures

Scott Adams

Chicago, IL

Adventure International

Michael Brant

Leesburg, FL

Mike's Miscellany

Brett Gordon

Lancaster, OH

Fuzix

George Philips

Vancouver, Canada

TRS-80 Video and Other Demos

Paul Fiscarelli

Various TRS-80 Projects

John W. Linville

Mebane, NC

Retro Tinker

Rick Adams

Burnsville, MN

Bomb Threat: The Game

Neil Blanchard

The Great White North

Tandy PC Games and Demos

The Sponsors

TRS8BIT

The World's Best TRS-80 Newsletter

RICHARD LORBIESKI

BoysonTech

BRENDAN DONAHE

CoCoVGA

CLOUD-9

Cool Stuff for Your Coco.
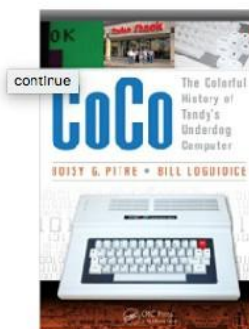
BOISY PITRE

The Colorful History of Tandy's Underdog Computer.
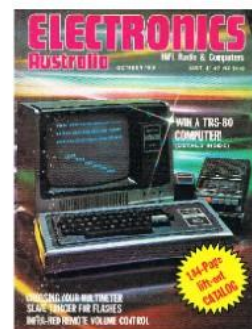
JOHN BENSON

"The World's Largest TRS-80 Collection"

THE RIGHT STUFF (TRS)

FreHD, Hi-Res graphics, Quinnterface, adapters, cables, memory upgrades, kits for the Model I/III/4/Coco

FLOPPY DAYS PODCAST

A podcast about vintage home computers and programmable calculators of the 70's and 80's.

COCO CREW PODCAST

A delicious adventure into the world of retro-computing news and information, featuring the Tandy Color Computer.

RETRO INNOVATIONS

TANDY Color Computer and General System Products

COCOTALK!

The nation's leading live talk show about the Tandy Color Computer

TRS-80 TRASH TALK PODCAST

TRS-80 Trash Talk is the show about all things TRS-80.

XT-CF Card for Tandy 1400 Series Laptops

Tandy helpfully included an expansion slot in their 1400 series of laptops, and in places there is reference to an expansion box, but it seems it never made it to market. The later 1400FD and 1400HD models retained the expansion slot and added a second (slightly different) slot for an MFM HDD controller, as implemented in the 1400HD.

The expansion slot is basically an 8-bit ISA slot, but with a different pinout and a few differences, in a custom card form factor to fit in the machine. Power budget is also limited to 200mA, according to the service manual. Fortunately, Tandy documentation provides everything needed to create a card – so here is what I believe to be the first ever expansion card for Tandy 1400 Series laptops (only about 20 years late):
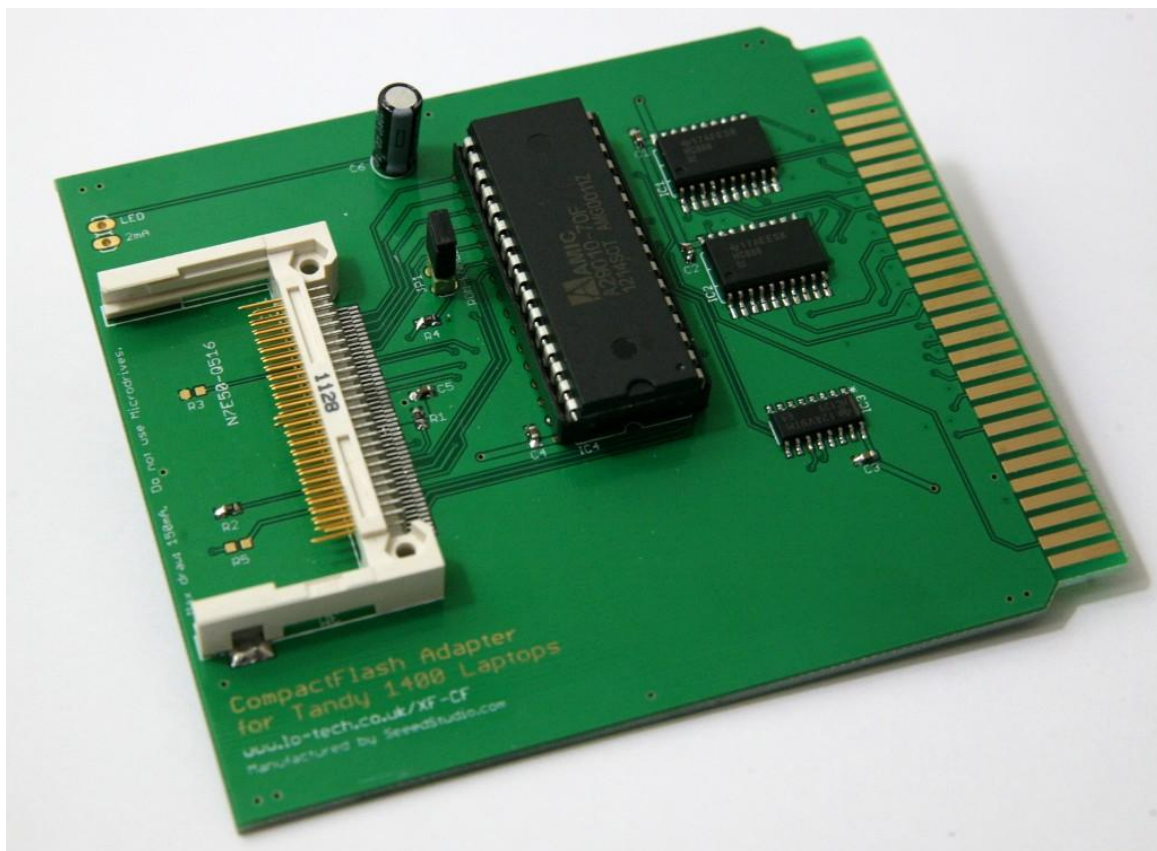
Expansion Card Design

Based on the information available in the Tandy technical reference, I've created a wiki page detailing everything about the expansion slots. Some of the Tandy documentation is contradictory, but my wiki is based on what is now a proven de-

sign. I've also included an Eagle layout for the PCB (restricted to a 100 x 100mm footprint, to enable low-cost manufacture by SeeedStudio).

XT-CF

My XT-CF cards provide hard disk functionality to PC/XT and PC/AT class machines based on Compact Flash (or microdrives), and for the Tandy 1400 the design needs just four ICs – a flash ROM, two 74688 address decoders and a 74139 decoder. Being XT-CF compatible, the design is fully supported by the XTIDE Universal BIOS (from build r554).

BIOS Initialisation

I built this board a while back, and although BIOS flashing went OK the machine didn't want to initialise the XTIDE Universal BIOS. The BIOS was clearly *detecting* the option ROM as the floppy seek test was performed on only the first floppy with it present (the BIOS assuming that an HDD would be installed in place of the second floppy, exactly as the 1400HD was shipped), but the BIOS initialisation messages never appeared.

This has had me stumped and the board simply sat on the side since. But recently XTIDE Universal BIOS project lead Tomi posted a code update (in r552):
XTIDE Universal BIOS can now be initialized if non-standard main BIOS does not call INT 19h or if INT 19h handler is replaced by some other BIOS.
And sure enough, the BIOS fired into life and the machine booted (and yes, the SuperTwist LCD screen really does look this bad):
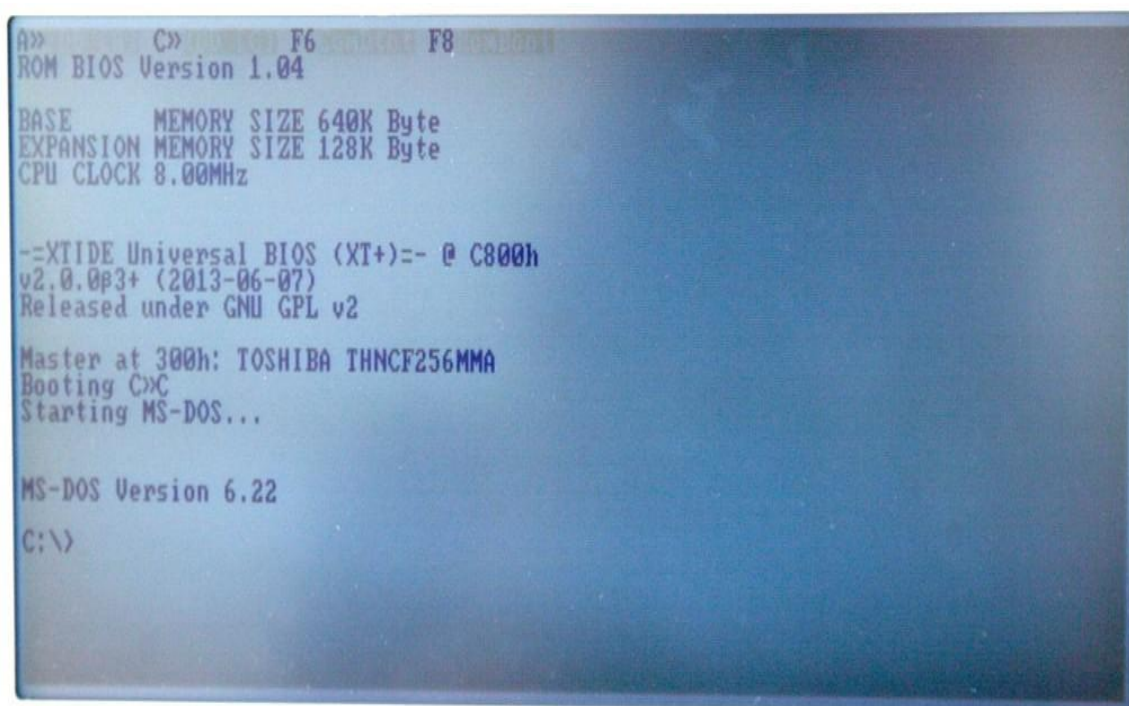
The solution isn't quite perfect – the fixed disk is inaccessible when restarted via CTRL-ALT-DELETE, but since boot time on this machine is identical for both soft boot and cold boot, this is just something that we need to live with for now.

1400LT, 1400FD and 1400HD

For 1400FD systems at least with BIOS 1.04, the system BIOS assumes the second floppy isn't installed when the XT-CF option ROM is present (this may also affect 1400LT systems). For now this is a limitation, but with 32KB of flash ROM available it should be possible to resolve it by adding a floppy BIOS to the card. For 1400HD machines, the MFM controller must be removed since both cards have their BIOS at C800h (upper memory space is somewhat limited in the 1400 series as Tandy included RAM in the upper memory area for use as a RAM disk).

Performance

Using the 'XTplus' XTIDE Universal BIOS build (thanks to the V20 CPU), DOS throughput (as measured with my own test utility) is at least 550KB/s. Due to the 8-bit data bus and V20 microcode optimisations, there is no performance difference between standard 8-bit PIO and BIU offload modes (as set with XTCFMODE), although both modes are supported.
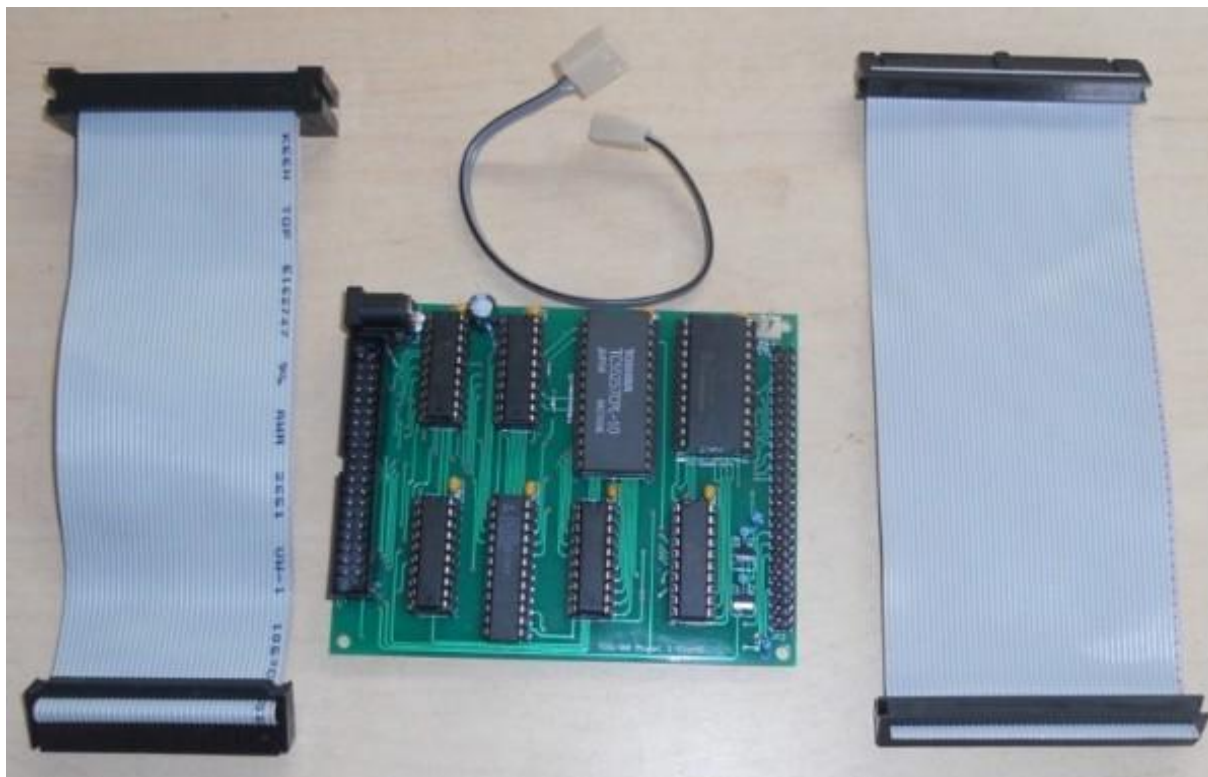
Availability

ENIG PCBs (gold plated) are available now through the shop page. Components will also be needed from your local electronics outlet such as Farnell, Mouser or Digikey – full Bill of Materials in the wiki. There is no bracket needed, since the card slides into the expansion slot guides within the system chassis, and the fit into the slot is tight enough not to need and further support.

"Quinnterface" Mini Expansion Interface for 16K Model 1 FreHD users.

- COMPLETLY ASSEMBLED AND TESTED -

This is THE perfect device for all Model 1 users who own a 16K Level II unit, (which is most of us!), but no Expansion Interface or disk drives, especially if you don't want to modify your M1 with upgraded boot ROM or memory upgrade.

The 'Quinnterface', developed by J. Andrew Quinn from New Zealand, adds 32K RAM and auto-boot functionality to you FreHD.

U.K. And Europe, contact Bas. at BetaGamma Computing.
U.S.A. And rest of the world, contact Mav. At "The Right Stuff"

LOOKING FOR FAST, INEXPENSIVE, UNLIMITED MASS STORAGE FOR YOUR TRS-80 MODEL I/III/4/4P/4D?

The amazing

"FreHD"

A PLEA FOR HELP!

DUSTY

I'VE BEEN LUCKY ENOUGH TO WIN A M2 ON EBAY RECENTLY, BUT
UNFORTUNATELY, IT'S MISSING THE KEYBOARD.

**HAS ANYONE OUT THERE A M2 KEYBOARD FOR SALE, OR CAN
YOU OFFER INFORMATION TO USE AN ALTERNATIVE KEYBOARD
UNTIL A 'REAL' ONE CAN BE SOURCED?**

ANY HELP WOULD BE APPRECIATED.

BAS, AT BETAGAMMA COMPUTING IS GIVING THE MACHINE A COMPLETE
OVERHAUL. CHANGING PAPER CAPS., DISK DRIVE BELT ETC. SO I
SHALL BE LOOKING FORWARD TO HEARING FROM HIM ONCE HE HAS THE
TIME TO TAKE A LOOK.
I DON'T THINK I'M GOING TO HAVE ENOUGH ROOM TO KEEP THE 3 8"
DISK DRIVE UNIT THAT CAME WITH IT THOUGH.

JUST IMAGE A FREHD RUNNING ON IT! OR CP/M, OR EVEN XENIX :)
OH BOY!

HERE'S A PHOTO, FROM THE EBAY ADVERT, JUST FOR INTEREST.

IN MAV'S WORKSHOP

by Ian Mavric

TRS-80 PRINTERS FROM THE BEGINNING SERIES
PART 3: LINE PRINTER III, V, DMP-500

Last time I talked about the Line Printer II, Tandy's first attempt at a full sized printer for the Model I which sold for under $1000. Alongside the Line Printer II they also sold the Line Printer I, a large noisy and not particularly fast business oriented printer retailing for over $2000. With the Line Printer III they had some new priorities which needed to be met, and this time they sure did deliver.

I'll be referring to it as the LP3 for the rest of this article. Unlike its two predecessors, the LP3 is a thoroughly modern printer released in 1980 and is the closest to what we come to think of as a modern dot-matrix printer. Bi-directional logic-seeking printing 9x7 dot matrix with lowercase descenders, and printing speed of 120 characters per second. At $1960 it also came in under the psychological $2K barrier.

Line Printer III
1960⁰⁰

DESIGNED FOR BUSINESS

The advertisement below from RSC-4 shows a LP3 sitting next to a LP2 and a LP6. Where the LP2 approximates the size of 1980s Epson 80-column dot matrix printers, the LP3 and (and LP6 for that matter) is a full 132-column business printer.

Paper handling was adjustable tractor feed which could be set to any paper width from 10cm (mailing labels) to 38cm (full 132 column "computer paper"). There was no cut sheet feeder or practical way to feed single sheets of A4 or Letter paper.

This didn't bother Tandy as they had plans to release a Daisy Wheel printer which lent itself better to single sheet applications due to its high quality output. Print speed of the LP3 was 120 characters per second, which left the previous two printers for dead. It was also bi-directional which was something we took for granted by the mid 1980s but was pretty novel at the time.

For those new to retro computing, bi-directional printing was when then print head can print in both directions, the first line with the head going right, then the next line with the head going right.

This saves an enormous amount of time compared to uni-directional printing where the head needs to return to column 1 before printing the next line commences. In business, where printing reports hundreds of pages long is the norm, this was one of the most welcome innovations in new printers.

SPECIFICATIONS - 1980 STYLE

LP3 was a dot matrix printer, aimed squarely at business though it's low price and good performance meant quite a few were bought and connected to mini and mainframe computers.

9x7 dots was the was the printing matrix in upper and lowercase which went on to be the standard for entry level high speed "draft quality" printers right through the 1980s.
The LP3 could print up to 5 carbons. It was speedy and heavy (42lb or around 23kg) and large at 62.5cm wide X 19.5cm deep x 16cm tall. It had a single parallel printer interface, and could connect to any computer with a Centronics compatible printer port.
The tractor feed paper could be fed from either behind the printer or more commonly from underneath.

Line Printer III

Our best dot-matrix printer, designed for heavy business use. The bidirectional, logic-seeking dot-matrix head prints quality 7x9 upper and lower case characters 132 columns wide. Adjustable fine-line increments for using preprinted forms, such as checks. The tractor mechanism will handle any fanfold computer paper up to 15" wide, up to 5 sheets. Indicators for on-line, power, and alert (paper out). Seven pushbutton controls, including self-test. U.L. listed. 26-1156 . . . 1960.00

Replacement Ribbon. 26-1414 . . . . 21.95
LP III Dust Cover. 26-505 . . . . 5.95

Specifications

Print Density: 10 or 5 characters per inch, software selectable.
Print Speed: 120 characters per second, 48 lines per minute.
Dimensions: 7-2/5x24-2/5x15-9/10". *Weight:* 42 lbs. *Power:* 120VAC, 60 Hz, 85W.

HOW BIG IS TOO BIG?

If you've just read the dimensions above and not done the mental spatial approximation, lets just face this is an enormous printer. Tandy only sold one printer which was physically larger, which is the DW-II, released around 18 months after the LP3. Whereas the LP1 was just a little on the overweight side to be installed in a home, a fair number of people used the LP1 at home, but the same could not be said of the LP3, or its derivatives, the LP5 and DMP-500. I'm sure some people used them at home but whenever I find one for sale it has always invariably come from an office. To give you some idea of the scale, here is a photo from my web site:

Photo: the Model III is a big computer but the LP3 is just insane

Photos: about the only system the LP3 looks right with is the fully expanded Model II

PRINT SAMPLE

The 9x7 matrix was an improvement on the LP1s 5x7 matrix and the LP2s 7x7 matrix. As mentioned, 9-pin dot matrix was to become the de-facto standard for high-speed draft quality dot-matrix printing for the next decade, and they all looked pretty much the same.

The fact is that the print sample from the LP3, LP5, LPVIII, DMP-200, DMP-400, DMP-500 all looks almost exactly the same. Over the page, is an old advert showing print samples:
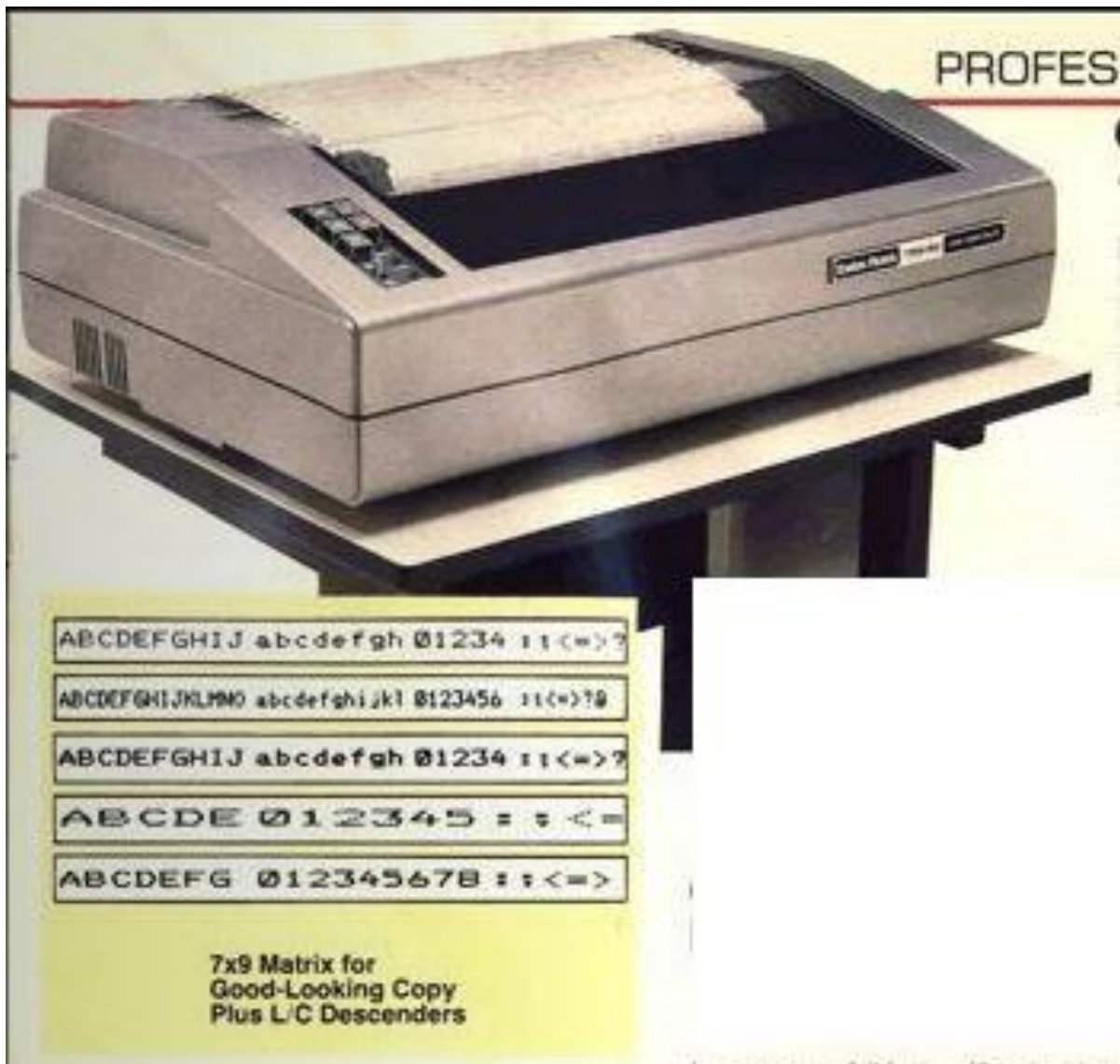
MANUALS SUPPLIED

The typical manual was included so the end user could get their printer up and running quickly. For those with a more technical side to them there was also a Service Manual available at a extra cost (not pictured).

Line Printer III

Radio Shack
TRS-80
MICRO
COMPUTER
SYSTEM

HARDWARE

Catalog Number 26-1156

CUSTOM MANUFACTURED FOR RADIO SHACK ᵀᶜ A DIVISION OF TANDY CORPORATION

WHAT IS BOTTOM PAPER FEED?

The LP3, true to its business-oriented data-processing pedigree had the ability to feed the tractor "computer paper" up from underneath the printer, and produced a special printer stand which facilitated this.
You would simply buy you box of 5000 sheet continuous tractor computer paper, open the top of the box and place it under the printer. Feed the paper up and onto the sprockets. It was really convenient instead of having a large box of paper sitting behind an already enormous printer.

Stand. Slotted top allows use with virtually all printers and permits bottom paper feed. 27 x 23½ x 19."
26-4302 . . . . 149.00
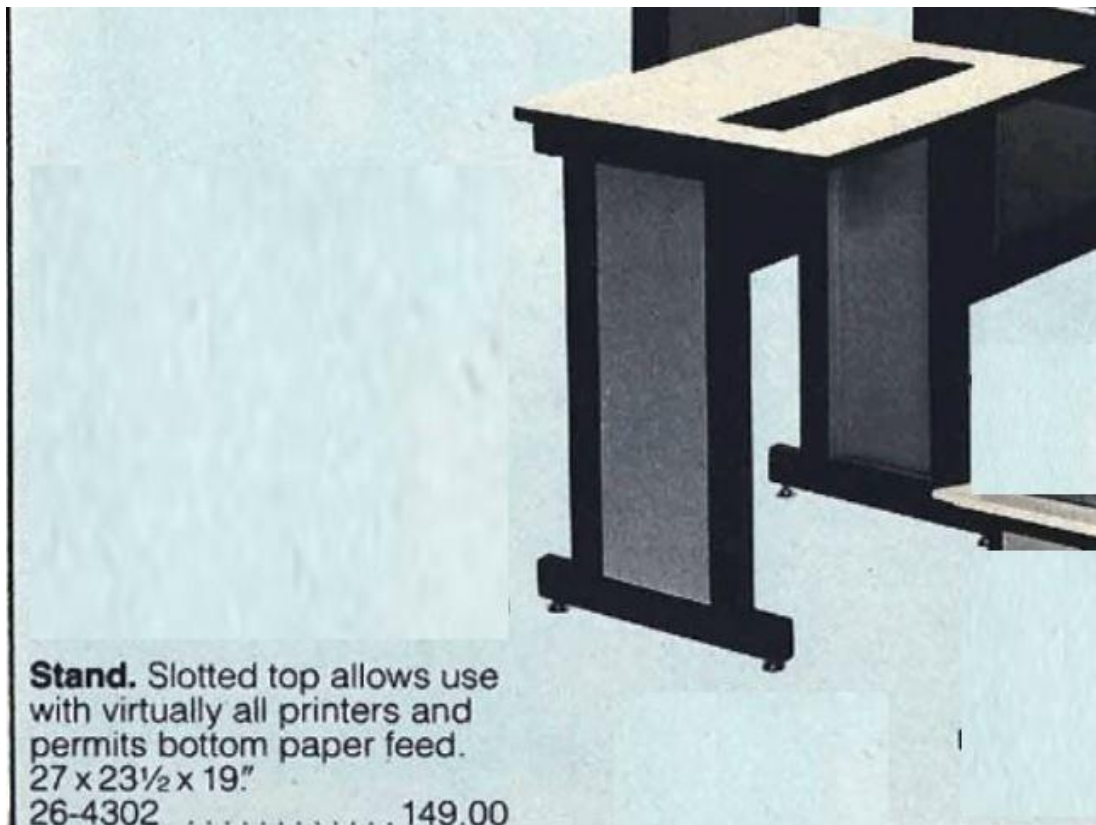
WAS IT PERFECT? IT NEARLY WAS...

On the print-head was a warning sticker not to touch the head after it had been printing for a while due to getting hot when printing. This was a very real possibility due to the nature of the continuous printing jobs the LP3 was often employed for.

Around 12 months after the LP3 was released a warning was sent out to owners alerting them that if the printer was used continuously printing full page output of more than 80% saturation (ie. 80% of the page has text on it) the print-head is liable to run so hot it overheats, necessitating a new print-head. Tandy's solution was to cease printing for 10 minutes every hour.

PRICING and CONSUMABLES

The usual accessories like vinyl cover and printer stand were released at the same time as the LP3.   The printer hit the market in 1980 at a price of $1960 which was reduced to $1860 around 18 months later in preparation for the release of the LP5. Listed below are prices and catalog numbers related to the LP3, remembering the prices are listed in 1980 US dollars: (Source: Tim Mann's Radio Shack Catalog Number compilation)

26-1156 Line Printer III $1960
26-0505 Line Printer III Cover $5.95
26-1414 LP 3/5 Ribbon 13.95
26-1401 Printer Cable (Model I/III/4) $39
26-4401 Printer Cable (Model II/16) $39
26-4302 Line Printer III Stand $149
26-1360 Wooden printer stand $149
26-1403 Fanfold Paper 9.5x11 3100 sheets $37.95

DERIVATIVES

When you're onto something good the logical thing to do is develop it
further. While the LP1 and the LP2/4 were acceptable for the jobs they
were designed to do, neither was popular enough to lend themselves to
further improvement. Not so with the LP3. Around 18 months after it
was released the first update to the LP3 was released at the Line Printer
V (cat. no. 26-1165). The case was unchanged, the control panel was
simplified, and in improvements to the print head increased to the speed
to an unprecedented (at the time) 160 characters per second, and
dropping the price to $1860. It also used the same printer ribbons as the
LP3:

Not to outdo themselves, again around 18 months later the last
incarnation of the printer which started out as the LP3 was released onto
the market as the DMP-500 (cat. no. 26-1252) with even more improved
print head design as well as higher speed carriage motors and smarter
electronics, 220 characters per second was obtained.
They even included a small price drop to $1795 and it was another
runaway success for Tandy.

TRS-80 DELUXE 15" 132-COLUMN DOT-MATRIX PRINTERS

New! All-Business Printer

1795⁰⁰

- Lowest Price Ever for High-Performance, Heavy Duty Design
- High-Speed—Prints 220 Characters per Second
- Prints 76 132-Column Lines per Minute ■ Bi-Directional

DMP-500. This hard worker is ideal for heavy business use. Logic-seeking head gives you fast speed and efficiency. Prints original, plus three copies. Adjustable tractor adjusts from 4" to 15". Line feed in $1/6$, $1/8$, $1/72$, $1/216$ increments. Paper advance in fine-line increments for aligning preprinted forms. Paper Feed and Form Feed controls. On-Line indicator. Parallel interface—use with TRS-80 Model I, II, III or 16. U.L. listed. 26-1252 Avail. 10/30/82 .... 1795.00

Finally, when everything else in the TRS-80 line-up was changing from silver to the new white paint scheme, the DMP-500 was one of the products which was selling too well to discontinue it so the last batch of DMP-500s came in the now-familiar white paint job. They have a revised catalog number of 26-1252A, and again a small price drop kept the printer earning profits for another few years before it was finally dropped from the marketplace in 1986.

CONCLUSION

You most often see LP3s sold alongside Model II computers when they come up for sale on eBay. It was their recommended printer for heavy duty datamation during the Model II and early on in the Model 16 era. If you are after one they come up from time to time, as do the ribbons. I rate this printer a 3 out of 5, mainly due to its huge size. Most people will find it too large to have happily set up full time in their retro-computing room.

NEXT TIME: Line Printer VI (catalog number 26-1166) and DMP-400 (catalog number 26-1251)

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WHERE 8 BITS AND 16K STILL RULE OK