TRS8BIT

WELCOME TO THIS, THE FIRST EDITION OF 2008. THANKS FOR TAKING THE TIME TO DOWNLOAD AND READ IT! DON'T FORGET THAT THE NEWSLETTER FORMAT IS DESIGNED TO PRODUCE AN 'A4' BOOKLET WHEN PRINTED. I FIND THAT AN 'A5' SIZED BOOKLET IS MUCH EASIER TO HOLD AND READ.
I HOPE THAT, ONCE AGAIN, I'VE MANAGED TO FIND INTERESTING ITEMS TO CATER FOR A SELECTION OF TASTES AND INTERESTS.
THE MODEL 1 DOES SEEM TO DOMINATE BUT NEVER HAVING OWNED ANY OTHER TRS-80 I'M A BIT IN THE DARK WITH THE LATER MODEL 3'S AND 4'S.
IF THERE IS ANY SUBJECT YOU WISH TO BE FEATURED, PLEASE EMAIL ME WITH SUGGESTIONS AND I'LL DO MY BEST TO OBLIGE.

I'VE NOTICED, ON EBAY, OVER THE LAST 6 TO 8 WEEKS, 2 VIDEO GENIES, 3 MODEL 100/2'S AND VARIOUS MODEL 4 COME UP FOR SALE. I WAS SURPRISED AT HOW LITTLE THEY FETCHED. ONE OF THE GENIES (A MODEL 3003) WENT FOR JUST UNDER £40. ONE OF THE MODEL 100 ONLY FETCHED 99P AND A MODEL 4P ONLY MANAGED JUST OVER £15.

WHILST RUMMAGING THROUGH MY BIT AND PIECES, I CAME ACROSS ITEMS FOR BOTH THE MODEL 100 AND THE VIDEO GENIE. THIS LEAD ME TO DISCOVER ANOTHER INTERESTING WEB SITE IN NEW ZEALAND. I'VE PUT A LINK TO THIS ON TRS-80.ORG.UK

THIS EDITION INCLUDES AN ARTICLE BY KEN ROBINSON WHICH LISTS DETAILS OF THE GENIE'S 50 WAY BUS AS MATCHED TO THE MODEL 1'S 40 WAY BUS. (KNUTT HAS VARIOUS PIECES OF GENIE INFORMATION ON HIS WEB SITE. IT'S WELL WORTH A VISIT IF YOU'RE INTERESTED).

THERE'S A CLEAR AND COMPREHENSIVE WALK-THROUGH INSTRUCTION SET FOR DOWNLOADING MODELS 1 AND 100 USING ST-80 III AND DETAILS OF HOW TO BUILD A NULL MODEM. BOTH OF THESE ARTICLES WERE ORIGINALLY WRITTEN BY LEON HELLER AND PUBLISHED IN NATGUG NEWS.

TALKING OF LEON, HE WAS THE FIRST PERSON I CAME ACROSS WHO SPARKED MY INTEREST IN THE LANGUAGE 'C'. IF I REMEMBER CORRECTLY, THERE WAS A VERSION OF 'SMALL C' AVAILABLE FOR THE MODEL 1, BUT IT WAS ONLY PRODUCED FOR DISK SYSTEMS.
ON EARLY PC'S I BECAME INVOLVED WITH THE AMERICAN 'MIX' 'C' LANGUAGE. IT HAD A BIG USER BASE IN THE STATES WITH MASSIVE AMOUNTS OF FREEWARE FUNCTIONS. BUT AS THE YEARS PROGRESSED, I FOUND THE CURLY, CURVED AND STRAIGHT BRACKETS MORE AND MORE DIFFICULT TO SEE (NO PUN INTENDED!!). SO I MOVED BACK TO COBOL, PICK AND AS A CONSEQUENCE BASIC.
I STILL THINK THAT 'C' IS A NEAT, POWERFUL AND COMPACT LANGUAGE, HOWEVER, AT TIMES, IT CAN BE A BIT ON THE OBTUSE SIDE!

ON THE SUBJECT OF 'C' I'VE FOUND (ON ONE OF THE MANY SHAREWARE CD'S I HAVE) A NICE LITTLE 'C' SOURCE PROGRAM FOR USE ON COMPUTERS WITH ONLY UPPER CASE.

AND WHILE I'M MENTIONING THE LACK OF LOWER CASE, I'VE ALSO INCLUDED ONE OF THE MOST USEFUL LOWER CASE DRIVERS I'VE EVER USED. (IT WORKS GREAT WITH MATTHEW REED'S MODEL 1 EMULATOR, WHICH, BY THE WAY, HAS HAD ANOTHER UPDATE. SEE TRS-80.ORG FOR DETAILS).
ALL OF THE ONE-LINERS AND PROGRAMS FOR TRS8BIT ARE EITHER WRITTEN, DEVISED OR TESTED USING THE EMULATOR. I'M QUITE HOOKED ON THE WINDOWS VIRTUAL CASSETTE!

THAT'S ABOUT IT FOR NOW, KEEP IN TOUCH.

DUSTY

--== o0o ==--

AT THE
READY>
PROMPT

WITHIN LEVEL II BASIC THERE ISN'T AN XOR INSTRUCTION (ONLY AND, OR, NOT). HOWEVER IT IS POSSIBLE, ACCORDING TO JOHN PHELAN, TO USE THE FOLLOWING :-

A XOR B = (A OR B)-(A AND B)

AND OBTAIN THE CORRECT RESULT.

IN THE LAST EDITION I MENTIONED THE PRINT USING "!" SIGN SO IT SEEMS ONLY FAIR TO 'FEATURE' THE OTHER STRING OUTPUT CODE WHICH IS THE PERCENT "%" SIGN.
THE PERCENT SIGN MARKS THE BEGINNING AND THE END OF A PRINT LOCATION TO BE FILLED WITH STRING DATA. BETWEEN THE 2 PERCENT SIGNS IS A GIVEN NUMBER OF SPACES. THESE SPACES DEFINE THE WIDTH OF THE STRING FIELD. FOR EXAMPLE, THE EXPRESSION
"% %" DEFINES A STRING FIELD OF 4 POSITIONS. (THE BEGINNING AND END PERCENT SIGNS COUNT AS ONE SPACE EACH.) WHEN YOU USE THIS PRINT MODE, THE COMPUTER TAKES THE OPERAND STRING SUPPLIED BY YOU AND TRIES TO PUT IT INTO THE 'PRINT USING' FIELD.
FOR EXAMPLE -

```
10 PRINT USING "%    %";
"DUSTY"
```

WILL PRINT - DUST.
ALL CHARACTERS THAT DON'T FIT INTO THE 'PRINT USING' STATEMENT ARE TRUNCATED.
ANY PERCENT SIGN THAT IS NOT BEGINNING OR ENDING A STRING FIELD IS REGARDED AS JUST ANOTHER CHARACTER.

YOU CAN, OF COURSE, PRE-DEFINE YOUR PRINT USING STRING TO SAVE MEMORY (AND EFFORT), FOR EXAMPLE -

```
10 A$="%          %"
20 B$="27 LETSBIE AVENUE"
20 PRINT USING A$;B$
```

WILL PRINT - 27 LETSBIE.
THIS IS A NEAT LITTLE DEVICE FOR LIMITING THE WIDTH USED BY FIELDS WITHIN PRINT OUTS OR SCREEN DISPLAYS.

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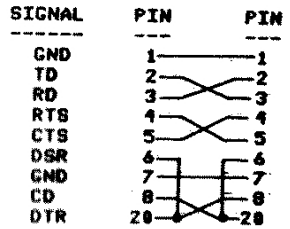
HERE'S A GREAT ONE-LINER FOR DISPLAYING CHARACTERS RAPIDLY TO THE SCREEN BY PATRICK BOYLE

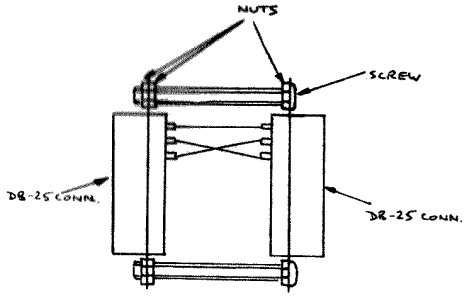
```
0 CLEAR22:A$=STRING$(22,32):J=VARPTR(A$):I=PEEK(J+1)+256*PEEK(J+
2):FORK=ITOI+21:READZ:POKEK,Z:NEXT:POKE16526,PEEK(J+1):POKE16527
,PEEK(J+2):FORX=1TO2:POKEI+10,RND(255):L=USR(0):X=1:NEXT:DATA33,
0,60,17,1,60,1,255,3,54,0,237,176,6,5,33,0,0,43,124,181,201
```

IF YOU ARE CONNECTING A COMPUTER TO ANOTHER VIA THEIR RS-232 SERIAL PORTS, YOU NEED A DEVICE CALL A 'NULL MODEM'. THIS IS JUST A CABLE WITH APPROPRIATE CONNECTORS, WIRED IN SUCH A WAY THAT EACH COMPUTER APPEARS AS A MODEM TO THE OTHER. WITH A COUPLE OF DB-25 CONNECTORS AND A FEW PIECES OF WIRE, TWO SCREWS AND A FEW NUTS, YOU CAN EASILY BUILD A NULL MODEM FOR A FEW POUNDS IN ABOUT 20 MINUTES.

ALL YOU DO IS PLACE THE CONNECTORS BACK TO BACK, AND LINK THE PINS BETWEEN THE CONNECTORS ACCORDING TO THE TABLE BELOW.



THEN YOU FIX THE TWO CONNECTORS TOGETHER USING THE SCREWS AND NUTS AS SHOWN BELOW.



IF YOU WANT TO BE REALLY POSH, YOU COULD USE STUDDING, SPACERS AND A SMALL BOX OF COURSE.

I USED A MALE AND FEMALE CONNECTOR, AS THIS ENABLES ME TO CONNECT MY MODEL 1 OR MODEL II TO MOST OTHER SYSTEMS.

BY WIRING THE PINS ON A ONE TO ONE BASIS, WITH CONNECTORS OF THE APPROPRIATE GENDER, YOU CAN EASILY MAKE WHAT IS TERMED AS A GENDER-CHANGER.

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TRS-80 MODEL 1/GENIE EDGE CONNECTOR CROSS-REFERENCE FROM AN ORIGINAL ARTICLE BY KEN ROBINSON

THE FOLLOWING TABLE SHOWS THE PIN INTER-CONNECTIONS TO OBTAIN THE TRS-80 BUS FROM THE VIDEO GENIE. IN THE TABLE THE SYMBOLS USED EITHER SIDE OF THE GENIE PIN NUMBER HAVE THE FOLLOWING MEANING.
NN INDICATES AN ADDITION TO THE GENIE BUS
#NN# INDICATES A SIMILARITY BETWEEN THE GENIE AND THE TRS-80 BUT NOT AN IDENTITY.

AN ACULAB FLOPPY TAPE AND AN LNW EXPANSION BOARD CONTROLLING DISKS CAN BE RUN OFF AN EXPANSION BUS USING THE FOLLOWING SUBSTITUTIONS-
PIN 12 OUT* CAN BE OBTAINED BY OR'ING GENIE PINS 40 AND 38
PIN 13 VR* CAN BE OBTAINED BY OR'ING GENIE PINS 40 AND 43
PIN 14 INTAK* CAN BE OBTAINED BY OR'ING GENIE PINS 38 AND 45
PIN 15 RD* CAN BE OBTAINED BY OR'ING GENIE PINS 41 AND 43
PIN 19 IN* CAN BE OBTAINED BY OR'ING GENIE PINS 38 AND 41

SUITABLE OR GATES CAN BE FOUND ON THE 74LS32, WHICH IS A QUAD ARRAY. UNLESS INTAK* IS DEFINITELY REQUIRED IR CAN BE LEFT CUT FOR MOST APPLICATIONS. IT IS WORTH NOTING THAT RD* AND WR* ON THE TRS-80 ARE IN FACT □NENRD□ AND □MEMWR□ AND

TRS-80			VIDEO GENIE		
1	RAS*	43	1	GND	8,37,29
2	SYSRES*	#48#	2	GND	8,37,29
3	CAS*	*13*	3	A7	36
4	A10	26	4	A6	38
5	A12	29	5	A5	35
6	A13	27	6	A4	31
7	A15	21	7	A1	27
8	GND	1,2,49,50	8	A3	34
9	A11	28	9	A2	40
10	A14	23	10	A0	25
11	A8	22	11	D5	28
12	OUT*	*32*	12	D2	32
13	WR*	#40#	*13*	□CAS□	3
14	INTAK*	--	14	D1	22
15	RD*	#41#	15	D0	30
16	MUX	*25*	16	D3	26
17	A9	24	17	D7	20
18	D4	20	18	D6	24
19	IN*	*33*	19	VCC	--
20	D7	17	20	D4	18
21	INT*	31	21	A15	7
22	D1	14	22	A8	11
23	TEST*	#39#	23	A14	10
24	D6	16	24	A9	17
25	A0	10	*25*	MUX	16
26	D3	16	26	A10	4
27	A1	7	27	A13	6
28	D5	11	28	A11	9
29	GND	1,2,49,50	29	A12	5
30	D0	15	30	PHI	--
31	A4	6	31	PINT	21
32	D2	12	*32*	□OUT□	12
33	WAIT*	37	*33*	□IN□	15
34	A3	6	34	□PHLDA□	--
35	A5	5	35	□PHAN□	--
36	A7	3	36	□HALT□	--
37	GND	1,2,49,50	37	□PWAIT□	--
38	A6	4	38	□ILRQ□	--
39	GND (LEV 2 ONLY)		#39#	□PHOLD□	23
40	A2	9	#40#	□WR□	13
			#41#	□RD□	15
			42	□CCDBS□	--
			43	□MREQ□	1
			44	□D0DBS□	--
			45	□MI□	--
			46	□RESET□	--
			47	RFSH	--
			#48#	□NNI□	2
			49	GND	8,37,29
			50	GND	8,37,29

NOT □RD□ AND □WR□, HENCE THE * AS OPPOSED TO THE BAR □CAS□ CAN BE OBTAINED FROM THE CPU BOARD INSIDE THE GENIE ON PIN 6 OF Z39. MUX CAN BE OBTAINED ON PIN 5 OF Z37. ALSO IF YOU WISH □OUT□ IS AVAILABLE ON PIN 8 OF Z15 WHILST □IN□ IS AVAILABLE ON PIN 6 OF Z15.

(THE ORIGINAL ARTICLE WAS IN VERY POOR CONDITION AND CONSEQUENTIALLY VERY DIFFICULT TO READ. I HOPE I'VE MANAGED TO COPY ALL THE DETAILS CORRECTLY).

HERE'S A NICE LITTLE MOD TO THE CASSETTE VERSION OF ELECTRIC PENCIL FROM AN ORIGINAL ARTICLE WRITTEN BY RODNEY SCHREINER.

FOR SEVERAL MONTHS I'VE BEEN USING THE CASSETTE VERSION OF PENCIL TO PREPARE MANUSCRIPTS AND LETTERS USING SINGLE SHEETS OF 8.5 X 11 INCH PAPER. SINCE PENCIL DOES NOT AUTOMATICALLY PAUSE AT THE END OF A PAGE, I HAVE TO WATCH THE PRINTER AND STOP THE PROGRAM MANUALLY SO I CAN INSERT A NEW SHEET OF PAPER.
THE TEDIOUSNESS OF THIS TASK FINALLY GOT TO ME, AND I DECIDED TO INVESTIGATE THE PROGRAM TO SEE IF I COULD MODIFY IT SO THAT IT WOULD STOP AT THE END OF EACH PAGE. AFTER A LENGTHY SEARCH THROUGH THE CODE, I LOCATED THE SPOT AT WHICH THE PROGRAM TESTS FOR THE FINAL LINE OF A PAGE. AT THIS POINT THE PROGRAM JUMPS TO THE PAGE SPACING ROUTINE. BY CHANGING ONLY 2 BYTES I ALTERED THIS JUMP TO A RETURN TO THE MAIN SYSTEM. NOW, WHEN THE PRINTER REACHES THE END OF PAGE, IT STOPS AND I CAN LOAD A FRESH SHEET OF PAPER AT MY LEISURE. ALL THAT IS NECESSARY TO CONTINUE PRINTING IS TO MOVE THE CURSOR TO THE START OF THE NEXT PAGE I REQUIRE PRINTING AND OFF I GO.

THE CHANGES I'VE MADE ARE DETAILED BELOW:

CHANGE

4F3FH FROM 28 TO C8
4F40H FROM 06 TO 00

ONLY BYTES 4F3F AND 4F40 ARE CHANGED. THIS CAN BE ACCOMPLISHED BY USING T-BUG, RELOCATED TO HIGH MEMORY. AFTER THE 2 CHANGES ARE COMPLETED, A NEW SYSTEM TAPE CAN BE WRITTEN FROM T-BUG. THE STARTING ADDRESS IS 4350H, THE ENDING ADDRESS IS 5374H AND THE ENTRY POINT IS 4350H.
THIS NEW VERSION OF PENCIL CANNOT PRINT CONTINUOUSLY, SINCE THE ALTERATIONS ABOVE FORCE IT TO STOP AT THE END OF EACH PAGE. HOWEVER, IF I NEED CONTINUOUS PRINTING I CAN USE MY ORIGINAL PENCIL CASSETTE.

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FILE TRANSFERS ON THE MODELS 1 AND 100 BY LEON HELLER

IF YOU ARE USING THE TANDY RS-232 BOARD, IT IS NOT ADVISABLE TO JUST PLUG THE CABLE FROM THE MODEL 1 INTO THE BACK OF THE MODEL 100. BOTH MACHINES ARE CONFIGURED AS 'DATA TERMINAL EQUIPMENTS' (DTE) AND ALTHOUGH YOU CAN REVERSE PINS 2 AND 3 ON THE RS-232 BOARD IN THE MODEL 1, THE OTHER SIGNALS WILL BE TRYING TO OUTPUT TO ONE ANOTHER. THIS SHOULD NOT RESULT IN ANY DAMAGE, BUT WILL PREVENT PROPER HAND-SHAKING BETWEEN THE SYSTEMS. YOU WILL NEED WHAT IS TERMED A NULL MODEM CONNECTOR, WITH ALL THE SIGNAL CROSSED OVER. THESE CAN BE OBTAINED AT MANY LOCAL COMPUTER SUPPLY SHOPS OR YOU CAN EASILY MAKE ONE FOR YOURSELF. (SEE THE ARTICLE ON PAGE 3 ED.)

ASSUMING YOU HAVE A SMART TERMINAL PROGRAM LIKE ST80-III ON THE MODEL 1, YOU SET THE SYSTEM UP FOR 300 BAUD, 7 DATA BITS, EVEN PARITY, 1 STOP BIT, TRANSMIT AUTO LINE FEED ON, AND RECEIVE

AUTO LINE FEED ON.
ON THE MODEL 100, SELECT 'TELECOM' FROM THE MAIN MENU, THEN SET THE RS-232 PARAMETERS USING F3 (STAT: 37E1E). NOW USE F4 TO GET INTO TERMINAL MODE. KEYS PRESSED ON THE MODEL 1 SHOULD BE ECHOED ON THE MODEL 100, AND VICE-VERSA, SHOWING THAT ALL CONNECTIONS ON BOTH SYSTEMS ARE FUNCTIONING.

IF YOU ARE TRANSFERRING A FILE FROM THE MODEL 1 TO THE MODEL 100, YOU NOW GET THE FILE INTO THE MODEL 1 BUFFER, USING (SHIFT) G. RESPOND TO THE TRANSMISSION SPEED QUESTION WITH 1, TO BE ON THE SAFE SIDE. ON THE MODEL 100, USE F2 TO SELECT THE DOWNLOAD MODE. THE SYSTEM WILL REQUEST A FILENAME. AFTER INPUTTING THE FILENAME, F2 WILL BE DISPLAYED IN REVERSE VIDEO. NOW PRESS (SHIFT) O ON THE MODEL 1 KEYBOARD, AND THE FILE WILL BE TRANSFERRED FROM THE MODEL 1 TO THE MODEL 100, BEING SIMULTANEOUSLY DISPLAYED ON THE MODEL 1 AND MODEL 100 SCREENS. WHEN THE FILE HAS BEEN TRANSFERRED ST80-III 'READY' WILL BE DISPLAYED ON THE MODEL 1. IF YOU PRESS F2 ON THE MODEL 100, THE FILE WILL BE CLOSED, AND YOU CAN EXIT FROM 'TELECOM' BY PRESSING F8 TWICE.

TO UPLOAD FROM THE MODEL 100 TO THE MODEL 1, FIRST SET THE MODEL1 UP FOR RECEIVE AUTO LINE FEED ON (SHIFT B), AND OPEN THE MEMORY BUFFER (SHIFT) C. KEYING F3 ON THE MODEL 100 WILL RESULT IN THE REQUEST FOR THE FILE NAME. INPUT THE FILE NAME, AND RESPOND TO THE WIDTH QUESTION WITH (ENTER). 'UP' WILL BE DISPLAYED IN REVERSE VIDEO, AND THE FILE WILL BE TRANSFERRED TO THE MODEL 1, BEING DISPLAYED ON THE MODEL 1 SCREEN AS TRANSFER OCCURS.

WHEN THE FILE HAS BEEN TRANSFERRED, 'UP' ON THE MODEL 100 SCREEN WILL CHANGE FROM REVERSE VIDEO TO NORMAL. KEYING (SHIFT) X ON THE MODEL 1 WILL CLOSE THE MEMORY BUFFER, AND THE FILE CAN BE TRANSFERRED TO DISK USING (SHIFT) F.

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THIS PROGRAM IS ONE OF THE MOST USEFUL ONES I'VE EVER HAD FOR A 16K MODEL 1! (IT WILL ACTUALLY FIT DOWN TO A ONE-LINER). IT'S A SUPER LITTLE LOWER-CASE DRIVER. IT WORKED WELL (SUBJECT TO ANY NECESSARY HARDWARE MOD BEING COMPLETED) WITH ORDINARY LEVEL II BASIC, ACULAB XBAS, DISK BASIC AND MORE RECENTLY, MATTHEW REEDS EMULATOR.
THE REALLY NICE THING ABOUT IT WAS THAT IT WORKS IN REVERSE! I.E. WITH THE SHIFT HELD DOWN, LOWER-CASE LETTERS ARE PRODUCED. THIS AVOIDED ACCIDENTAL LOWER-CASE ENTRIES. A REAL BOON FOR PROGRAM DEVELOPMENT AND DE-BUGGING!

```
10 REM FOR 16K MACHINES SET MEM SIZE TO 32737
20 POKE 16553,255:FORI=32738TO32767:READJ:POKEI,J:NEXT
30 POKE 16414,226:POKE16415,127
40 DATA 221,110,3,221,102,4,218,154,4,221,126,5,183,40,1
50 DATA 119,121,254,32,218,6,5,254,128,210,166,4,195,125,4
```

"CONVERT"
WRITTEN BY LEOR ZOLMAN

THIS PROGRAM CONVERTS REGULAR C SOURCE FILES INTO A FORMAT SUITABLE FOR EDITING ON THE TRS-80 (OR ANY UPPER-CASE-ONLY SYSTEM.) SINCE THERE ARE QUITE A FEW ASCII CHARACTERS THAT NEED TO BE REPRESENTED EVEN THOUGH THEY DON'T SHOW UP ON UPPER-CASE-ONLY SYSTEMS, A SPECIAL NOTATION HAS BEEN CREATED FOR REPRESENTING THESE CHARACTERS. THE POUND SIGN IS USED AS A SORT OF 'SHIFT' KEY, WITH THE LETTER FOLLOWING THE POUND SIGN DENOTING THE SPECIAL CHARACTER NEEDED. NOTE THAT THE C COMPILER DOES NOT RECOGNIZE THIS SPECIAL SCHEME, AND BEFORE YOU CAN COMPILE A SOURCE FILE CONTAINING THE SPECIAL CODES YOU MUST PREPROCESS THE FILE USING THE "CCØT" COMMAND.

THE SPECIAL CODES AND THE CHARACTERS THEY REPRESENT ARE:

```
#L   LEFT BRACKET (FOR SUBSCRIPTING) (5B HEX)
#R   RIGHT BRACKET           (5D HEX)
#C   CIRCUMFLEX (BITWISE "NOT")  (7E HEX)
#H   UP-ARROW (EXCLUSIVE "OR" OPERATOR)
                             (5E HEX)
#V   VERTICAL VAR (LOGICAL AND BITWISE "OR")
                             (7C HEX)
#B   BACKSLASH (FOR ESCAPE SEQUENCES)(5C HEX)
#U   UNDERSCORE                   (5F HEX)
```

FOR EXAMPLE, THE COMMAND

```
A>CONVERT FOO.C BAR.CT
```

WILL EXPECT FOO.C TO BE A NORMAL C SOURCE FILE ON DISK, AND WILL CONVERT IT INTO A FILE NAMED BAR.CT. THE FILE BAR.CT MAY THEN BE EDITED TO YOUR TASTE, BUT REMEMBER TO PREPROCESS IT WITH "CCØT" BEFORE APPLYING THE C COMPILER.

AS YOU MAY HAVE GATHERED FROM ALL THIS, THE LANGUAGE "C" WAS NEVER INTENDED TO BE IMPLEMENTED ON A SYSTEM HAVING UPPER-CASE ONLY; NEVERTHELESS, HERE IS A WAY FOR IT TO BE DONE.

THIS PROGRAM IS RATHER SIMPLE, AND THUS IT WILL NOT RECOGNIZE THAT SPECIAL CHARACTERS IN QUOTES ARE NOT SUPPOSED TO BE CONVERTED.

```
#DEFINE LEFTCURLY ØX7B
#DEFINE RIGHTCURLY ØX7D
#DEFINE LEFTBRACK ØX5B
#DEFINE RIGHTBRACK ØX5D
#DEFINE CIRCUM ØX7E
#DEFINE UPARROW ØX5E
#DEFINE VERTIBAR ØX7C
#DEFINE BACKSLASH ØX5C
#DEFINE UNDERSCORE ØX5F

CHAR IBUF[134], OBUF[134];

MAIN(ARGC,ARGV)
INT ARGC;
CHAR *ARGV[];
BEGIN
     INT FD1, FD2;
     CHAR C;
     IF (ARGC != 3) BEGIN
          PRINTF("USAGE: CONVERT OLD NEW <CR>\N");
          EXIT();
     END
```

```
     FD1 = FOPEN(ARGV[1],IBUF);
     IF (FD1 == -1) BEGIN
          PRINTF("NO SOURCE FILE.\N");
          EXIT();
     END
     FD2 = FCREAT(ARGV[2],OBUF);
     IF (FD2 == -1) BEGIN
          PRINTF("CAN'T OPEN OUTPUT FILE.\N");
          EXIT();
     END

     WHILE ((( C = GETC(IBUF)) != ØX1A) && C != 255) BEGIN
          SWITCH (C) BEGIN
           CASE LEFTCURLY: PUTST(" BEGIN ");
                BREAK;
           CASE RIGHTCURLY: PUTST(" END ");
                 BREAK;
           CASE LEFTBRACK: PUTSPEC('L');
                BREAK;
           CASE RIGHTBRACK: PUTSPEC('R');
                BREAK;
           CASE CIRCUM: PUTSPEC('C');
                BREAK;
           CASE UPARROW: PUTSPEC('U');
                BREAK;
           CASE VERTIBAR: PUTSPEC('V');
                BREAK;
           CASE BACKSLASH: PUTSPEC('B');
                BREAK;
           CASE UNDERSCORE: PUTSPEC('U');
                BREAK;
           DEFAULT: PUTC(TOUPPER(C),OBUF);
          END
     END

     IF (C==255) C = ØX1A;  /* DIGITAL RESEARCH....WOW. */
     PUTC(C,OBUF);
     FFLUSH(OBUF);
END

PUTST(STRING)
CHAR *STRING;
BEGIN
     WHILE (*STRING) PUTC(*STRING++,OBUF);
END

PUTSPEC(C)
CHAR C;
BEGIN
     PUTC('#',OBUF);
     PUTC(C,OBUF);
END
```

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I HOPE YOU'VE ENJOYED THIS ISSUE. IF YOU HAVE, WHY NOT DROP ME A LINE AND TELL EVERYONE WHAT YOU'RE UP TO WITH YOUR TANDY? IF NOT. LET ME KNOW AND I'LL TRY AND IMPROVE THE NEXT ISSUE, WHICH BY THE WAY, SHOULD BE OUT EARLY JUNE Ø8.

AND FINALLY, HAS ANYONE A PDF COPY OF 'PATHWAYS THROUGH THE ROM' FROM IRA'S SITE? IF YOU HAVE, WOULD YOU EMAIL ME A COPY? IT'S THE SAME ADDRESS FOR ALL CORRESPONDENCE - TIA

DUSTYM@BEEB.NET

TRS8BIT

I CAN'T BELIEVE THAT THIS IS OUR 6TH EDITION OF TRS8BIT! TIME DEFINITELY GOES FASTER AS MY AGE INCREASES.

I HOPE YOU ENJOY THIS EDITION AS I FEEL THERE ARE SOME FASCINATING ARTICLE TO KEEP YOU AMUSED.

STAR BILLING IN THIS ISSUE MUST GO TO AN ARTICLE ROY T BECK HAS UPDATED WHICH WAS ORIGINALLY WRITTEN FOR TRSTIMES. IT'S FOR ANY BRAVE SOUL WHO WOULD LIKE TO ATTACH A HARD DRIVE TO A MODEL 1, 3 OR 4. IF ANYONE HAS (OR HAS HAD!) A GO I'D LOVE TO HEAR HOW YOU GOT ON. THIS MUST BE ONE OF THE MOST EXCITING AND WELL RESEARCHED ARTICLE I'VE EVER COME ACROSS FOR THE TRS-80 COMMUNITY.

THERE'S A SMASHING ONE-LINER TO CALCULATE PRIME NUMBERS.
JUST AS A MATTER OF INTEREST, I CAN LOAD-UP MATTHEW REED'S EMULATOR, RUN THE PROGRAM, PRINT OUT THE ANSWERS AND CLOSE DOWN, IN LESS TIME THAT DEE'S LAPTOP COMPUTER (UNDER WINDOWS XP) TAKES TO POWER ON!

THERE'S THE USUAL 'AT THE READY PROMPT' AND VARIOUS OTHER LITTLE SNIPPETS I'VE BEEN PLAYING AROUND WITH OVER THE LAST FEW WEEKS.

AT LONG LAST, I FELT I HAD TO BUCK-UP COURAGE AND HAVE A GO AT RUNNING MATHEW REED'S EMULATOR WITH DISKS! (A GIANT LEAP FOR MANKIND YOU MIGHT THINK). THE ONLY DOS I OWN IS NEWDOS80 V2 AND I'M ON A STEEP RE-LEARNING CURVE! (SEE, AT THE READY PROMPT, FOR WHAT I MEAN).
DURING THE 80'S I NEVER MANAGED TO AFFORD AN E.I. AND DISK DRIVES OF MY OWN, BUT I WAS LUCKY ENOUGH TO BE ABLE TO USE ONES OWNED BY FRIENDS. (I HAS HALF A DOZEN DISKS OF MY OWN AND A GENUINE COPY OF NEWDOS80).
AS YOU CAN IMAGINE, I'M REALLY ENJOYING MYSELF!
AS AN ASIDE, I'VE JUST BEEN 'ELECTED' TREASURER OF THE LOCAL BRANCH OF THE BRITISH PRINTING SOCIETY AND HAVE DECIDED TO DO ALL THE ACCOUNTANCY WORK ON MY M1 EMULATOR BY USING ELECTRIC PENCIL AND VISICALC. I'LL LET YOU KNOW HOW I GET ON!

THANKS TO EVERYONE WHO OFFERED ME COPIES OF PATHWAYS THROUGH THE ROM. IT WAS GREATLY APPRECIATED. THANKS MUST GO TO DAVID COOPER FOR BEING THE FIRST TO OFFER AND LETTING ME HAVE MANY OTHER BITS AND PIECES, SOME OF WHICH I HAVEN'T SEEN FOR YEARS.

KNUTT HAS RELEASED HIS LATEST PROGRAM 'PLAYCASS'. IT'S AVAILABLE AS A DOWNLOAD FROM HIS WEBSITE. THERE IS A LINK TO HIS SITE ON TRS-80.ORG.UK
HAVE A LOOK, IT'S, YET AGAIN, ANOTHER REMARKABLE PIECE OF SOFTWARE, JUST RELEASED FOR A 30 YEAR-OLD PIECE OF HARDWARE!!

THERE HAS BEEN A REDUCTION IN THE AMOUNT OF TRAFFIC ON THE UK'S EBAY FOR TRS-80 RELATED ITEMS FOR QUITE A WHILE. VARIOUS BOOKS SEEM TO FETCH A FEW POUNDS EACH

AND A COUPLE OF MODEL 4P'S RANGING FROM £12-£40 EACH. SOMEONE HAD BEEN ADVERTISING 270 ISSUES OF BYTE FOR SALE. WITH A STARTING BID OF £200 IT WAS TOO MUCH MONEY FOR ME, BUT THEY WOULD MAKE VERY INTERESTING READING.
EBAY.COM STILL MANAGES TO AMAZE ME WITH THE QUANTITY AND DIVERSITY OF ITEMS STILL BEING OFFERED FOR SALE. IF ONLY THE POSTAGE COSTS FROM THE STATES WERE NOT SO HIGH.

JUST BY WAY OF ADVANCE NOTICE, MY ISP, BEEB.NET, IS CLOSING DOWN AT THE END OF JUNE08. THIS MEANS A NEW HOME FOR TRS-80.ORG.UK HAS HAD TO BE FOUND PRETTY SHARPISH. I HOPE TO ACCOMPLISH THE CHANGE-OVER AS SEAMLESSLY AS POSSIBLE, BUT JUST IN CASE, I'LL ASK FOR YOU FORBEARANCE! IT ALSO MEANS, OF COURSE, MY EMAIL ADDRESS WILL CHANGE TO:-

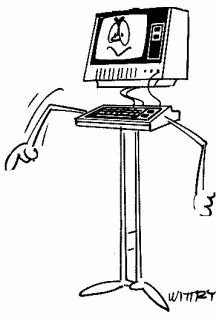
DUSTYM@FABSITESUK.COM

PLEASE USE THIS ADDRESS WITH IMMEDIATE EFFECT. I SHALL BE SENDING AN EMAIL TO EVERYONE WHO HAS CONTACTED ME OVER THE LAST TWO YEARS, SO HOPEFULLY NO CONTRIBUTION TO TRS8BIT WILL GO AMISS.

(CONTINUED ON PAGE 10)

AT THE
READY>
PROMPT

HAVING BITTEN THE BULLET AND STARTED USING MATTHEW REED'S EMULATOR RUNNING NEWDOS80 V2, HERE'S A TIMELY REMINDER OF SOMETHING (ELSE) I'D COMPLETELY FORGOTTEN. IN ORDER FOR THE CASSETTE PROGRAMS TO LOAD AND SAVE, A CMD"T" MUST BE ISSUED IMMEDIATELY BEFORE ANY BASIC TAPE INPUT/OUTPUT OPERATION. THESE OPERATIONS ARE TIMING SENSITIVE AND ARE AFFECTED BY INTERRUPT-DRIVEN TASKS SUCH AS TRACE & CLOCK.
JUST TO REMIND YOU, THE COMMANDS AFFECTED ARE :- CLOAD, CLOAD?, CSAVE, INPUT#-1,INPUT#-2, SYSTEM, PRINT#-1, AND PRINT#-2,. DON'T FORGET TO ENABLE INTERRUPTS WHEN YOU HAVE FINISHED, WITH THE CMD"R" COMMAND. (AND YES, BEFORE YOU ASK, I DID!)



AND FINALLY, JUST A LITTLE BIT OF HISTORY TURNED UP THE OTHER DAY. TUCKED AWAY INSIDE A BOOK WAS A LITTLE CLOTH BADGE THAT SOMEONE HAD MADE FOR NATUG MEMBERS WHEN THE GROUP FIRST STARTED. (BEFORE THE NAME WAS CHANGED TO NATGUG!).
IT'S STRANGE, I CAN QUITE CLEARLY REMEMBER BRIAN ISSUING THEM BUT I CAN'T REMEMBER WHO IT WAS WHO HAD THEM MADE. IS THERE'S ANYONE OUT THERE WITH A BETTER MEMORY THAN ME WHO CAN REMEMBER WHO IT WAS?

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LOUIS PELLETIER HAS WRITTEN A CRACKING ONE LINER TO CALCULATE PRIME NUMBERS. IT'S SURPRISINGLY FAST FOR JUST LEVEL 2 BASIC. IT CALCULATES ALL THE PRIMES UP TO 1000 IN UNDER 10 SECONDS ON A 16K LEVEL II MACHINE. DON'T BELIEVE ME? JUST TRY IT!

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1 DEFINTA-Z:CLS:L=1000:DIMA(L):V=INT(SQR(L)):FORB=3TOLSTEP2:IFA(
B)NEXT:ELSEIFB>VPRINTB,:NEXT:ELSEFORC=B*BTOLSTEP2*B:A(C)=1:NEXT:
PRINTB,:NEXT
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SUMMARY OF RADIO SHACK HARD DRIVE PARAMETERS

AN UPDATED ARTICLE BY
ROY T BECK
WHICH FIRST APPEARED IN
TRSTIMES

INTRODUCTION

RECENTLY I RECEIVED A CALL FROM A MAN WHO NEEDED TO KNOW HOW MANY TRACKS AND HEADS WERE ON A RADIO SHACK 70 MEG HARD DRIVE. SUCH A SIMPLE REQUEST, AND COMPLETELY NECESSARY IN ORDER TO PARTITION AND FORMAT A HARD DRIVE. BUT WHERE DO YOU FIND THE INFORMATION WHEN YOU NEED IT AT 1 AM? THE ANSWER SHOULD BE IN THE RADIO SHACK HARD DRIVE MANUALS, BUT IT IS ONLY PRESENTED IN A FRAGMENTARY AND INCOMPLETE FASHION, UNLESS YOU HAVE THE SERVICE MANUAL FOR THAT PARTICULAR DRIVE. IF YOU ARE DOING A DRIVE SWAP, LIKE HOT-RODDERS USED TO SWAP ENGINES, FORGET IT. RADIO SHACK DOESN'T EVEN WANT TO TALK TO YOU!
THIS ARTICLE WILL PROVIDE A QUICK SUMMARY OF THE PERTINENT FACTORS FOR THE VARIOUS DRIVES RADIO SHACK HAS USED IN OUR TRS HARD DRIVE PACKAGES. I WILL EXCLUDE THE 8.4 MEG DRIVE, AS THAT DRIVE IS NOT SUITABLE FOR THE MODEL 1, 111 AND 4 FAMILY.

MODEL 1, 3 AND 4 DRIVES

I WILL INCLUDE A FEW OTHER DRIVES WHICH YOU MAY RUN INTO. TO BEGIN WITH, ALL DRIVES SUITABLE FOR USE WITH RADIO SHACK CONTROLLERS ARE CATEGORISED AS MFM, (MEANING MODIFIED FREQUENCY MODULATION), AND HAVE THE SAME INTERFACE AS THE SEAGATE ST-412 OR SEAGATE ST-506 DRIVES. THIS INTERFACE PHYSICALLY CONSISTS OF TWO CARD-EDGE CONNECTORS, ONE WITH 20 CONDUCTORS, THE OTHER WITH 34, PLUS A 4 WIRE MALE POWER CABLE CONNECTOR. USABLE DRIVES IN THIS CATEGORY RANGE FROM 5 TO 70 MEGS. THE MAXIMUM HEAD COUNT AND CYLINDER COUNT WHICH CAN BE USE BY THE RADIO SHACK HARD DRIVE CONTROLLERS (HDC) IS 8 AND 1024, RESPECTIVELY. ALL OF THESE DRIVES ARE FULL HEIGHT UNLESS NOTED TO THE CONTRARY. INCIDENTALLY, THE BARE HARD DRIVE IS ALSO COMMONLY REFERRED TO AS THE 'BUBBLE', AND OCCASIONALLY I USE THAT TERM TO DISTINGUISH THE HARD DRIVE FROM THE OVERALL PACKAGE, WHICH INCLUDES THE HDC AND THE POWER SUPPLY, ALL IN A CASE. THE BUBBLE IS CALLED THAT BECAUSE THE HEADS AND PLATTERS ARE LOCATED INSIDE A SEALED DUST-TIGHT CHAMBER IN THE DRIVE. DON'T EVER OPEN THE SEALED CHAMBER, THAT SHOULD ONLY BE DONE IN A CLEAN ROOM.

Table 1

Hard Drive (Bubble) Characteristics

Mfg.	Model	Size	Hds	Cyls	Step Rate	Notes	Access
Tandon	TM-602S	5	4	153	10 usec	1	99 ms
Tandon	TM-501	5	2	306	10 usec	2	85
Tandon	TM-502	10	4	306	10 usec	3	85
Tandon	TM-503	15	6	306	10 usec	4	85
Tandon	TM-603S	12	6	230	10 usec	5	99
Seagate	ST-225	20	4	615	10 usec	6	65
Seagate	ST-412	10	4	306	10 usec	7	99
Seagate	ST-506	5	4	153	10 usec	8	
Quantum	Q-540	35	8	512	10 usec	9	45
Micropolis	1325T	70	8	1024	10 usec	10	28

NOTES FOR TABLE 1

1. THIS DRIVE WAS USED IN MOST RADIO SHACK 5 MEG BOXES, CAT NO 26-1130. SOME OF THESE DRIVES REQUIRE THE STEP RATE TO BE SET AT 6 OR EVEN MORE. THIS CORRESPONDS TO 3 MILLISECONDS. TRY THE DEFAULT VALUE OF 10 MICROSECONDS. IF THE STEP RATE IS TOO FAST, VERIFICATION WILL REPORT NUMEROUS BAD TRACKS. LF THIS OCCURS, REPEAT THE PARTITIONING WITH 6, WHICH SHOULD WORK.
2. APPARENTLY SOME RADIO SHACK 5 MEG BOXES HAD THIS DRIVE.
3. THIS DRIVE WAS NOT USED BY RADIO SHACK, BUT IS MENTIONED IN SOME OF THEIR SERVICE MANUALS.
4. THIS DRIVE WAS USED IN ALL THE RADIO SHACK 15 MEG BOXES, CAT NO 26-4155.
5. THIS DRIVE WAS USED IN ALL THE RADIO SHACK 12 MEG BOXES, CAT NO 26-4152.
6. THIS DRIVE IS WIDELY AVAILABLE AND WORKS WELL IN RADIO SHACK BOXES. IT IS A HALF-HEIGHT DRIVE, BUT IS A DROP-IN FIT IN PLACE OF A FULL HEIGHT DRIVE.
7. THIS DRIVE WAS NOT USED BY RADIO SHACK, BUT IS LISTED HERE BECAUSE IT IS ONE OF THE ''GENERIC'' MFM DRIVES FREQUENTLY MENTIONED.
8. THIS DRIVE WAS NOT USED BY RADIO SHACK, BUT IS LISTED HERE BECAUSE IT IS THE OTHER ''GENERIC'' MFM DRIVE FREQUENTLY MENTIONED.
9. THIS DRIVE WAS USED IN THE RADIO SHACK 35 MEG BOXES, CAT NO 26-4171. IT HAS AUTO-PARKING BUILT IN; IT PARKS ITSELF AT THE HIGHEST CYLINDER ON LOSS OF POWER.
10. THIS DRIVE WAS USED IN THE RADIO SHACK 70 MEG BOXES, CAT NO 26-4173.

THE INFAMOUS 'THREE WIRES'

THE 'THREE WIRES' L AM REFERRING TO ARE THREE WIRES WHICH RUN FROM A HARNESS IN THE HARD DRIVE CASE TO SPECIFIC POINTS ON THE BUBBLE, VARYING WITH THE ACTUAL BUBBLE USED IN THE SYSTEM. RADIO SHACK SOLDERED THESE THREE WIRES DIRECTLY TO THE PC BOARD OF THE BUBBLE, WHICH COULD EASILY BE DONE ON THE PRODUCTION LINE. IT DOES POSE A PROBLEM TO US USERS, ESPECIALLY WHEN WE WISH TO SWAP BUBBLES.

IT MAY BE USEFUL TO EXPLAIN THE PURPOSE OF THE THREE WIRES. THE WIRE COLOURS ARE AS FOUND IN A MASTER DRIVE; THE COLOURS ARE DIFFERENT IN A SLAVE DRIVE.

THE YELLOW WIRE RESPONDS TO THE DRIVE SELECT SIGNAL. THE SYSTEM CAN ELECTRICALLY ACCOMMODATE UP TO 4 DRIVES, ONE MASTER AND THREE SLAVES. THERE IS A DRIVE SELECT LINE FOR EACH OF THEM. THE SELECTED DRIVE HAS 0 VOLTS ON ITS SELECT LINE, AND THE OTHER THREE STAND AT + 5 VOLTS. WHEN THE MASTER DRIVE IS SELECTED, THE YELLOW WIRE WILL BE AT 0 VOLTS, AND THE GREEN LIGHT MAY BE ON. THE REASON FOR SAYING ''MAY'' IS THAT THE WHITE WIRE ALSO ENTERS INTO THE PICTURE.

THE WHITE WIRE SENSES 'SEEK COMPLETED', WHICH IS A SIGNAL RETURNED BY THE DRIVE TO THE HDC. WHILE THE DRIVE IS ACTIVELY STEPPING, THIS LINE WILL BE AT + 5 VOLTS, SIGNIFYING SEEK IS NOT COMPLETE. WHEN SEEK IS COMPLETE, THE LINE GOES LOW, AND THE WHITE WIRE WILL BE AT 0 VOLTS. THE WHITE AND YELLOW WIRES ARE NORED TO TURN ON THE GREEN LIGHT WHEN

BOTH ARE LOW. IF THE DRIVE IS STEPPING OR NOT SELECTED, THE GREEN LIGHT GOES DARK. THUS THE STEADY GREEN LIGHT MEANS THE DRIVE IS SELECTED AND IS NOT STEPPING, AND A FLICKERING GREEN LIGHT MEANS EITHER THE DRIVE IS STEPPING OR IS MOMENTARILY NOT SELECTED AS THE DOS CHECKS ON A FLOPPY DRIVE, OR DOES SOMETHING ELSE. NORMALLY THE GREEN LIGHT IS LIT ON THE MASTER DRIVE. IF YOU HAVE A SLAVE CONNECTED, ITS GREEN LIGHT WILL NORMALLY BE DARK.

THE ORANGE WIRE IS PART OF THE WRITE PROTECT CIRCUIT, AND SENDS + 5 OR Ø VOLTS TO THE HDC, THEREBY INFORMING THE LOGIC WHETHER THE WP SWITCH ON THE FRONT OF THE CASE IS DEPRESSED. WHEN THE SWITCH IS DEPRESSED AND THE RED LIGHT IS ON, THE ORANGE WIRE IS AT Ø VOLTS. WHEN THE WP LIGHT IS OFF, THE ORANGE WIRE IS AT +5 VOLTS.

A CAUTIONARY NOTE ON A QUIRK OF THE WRITE PROTECT CIRCUIT IS APPROPRIATE, THE RED LAMP IS ACTIVE, IN A SENSE, EVEN WHEN IT IS DARK. WHEN THE LAMP IS DARK, +5 VOLTS IS PASSED THROUGH IT TO THE REMAINING LOGIC IN THE HDC. THE QUIRK IS THAT IF THE LAMP BURNS OUT, OR FAILS TO MAKE GOOD CONTACT IN ITS SOCKET, THEN THE +5 VOLTS DOES NOT GET TO THE LOGIC, AND THE HDC SEES Ø VOLTS, WHICH IT INTERPRETS AS A WRITE PROTECTED CONDITION. THE RESULT IS THE DOS CANNOT WRITE ON A DRIVE EVEN THOUGH THE WRITE PROTECT WAS NOT DELIBERATELY ENGAGED. WITH A BURNED-OUT LAMP, THE DRIVE IS CONTINUOUSLY WRITE PROTECTED! THE LAMP, BY THE WAY, IS RATED 5 VOLTS, 55 MILLIAMP. THE CURRENT DRAW IS NOT CRITICAL, ANYTHING FROM ONE MILLIAMP TO 1ØØ MILLIAMP WILL WORK. THE PROBLEM IS AVAILABILITY OF THIS SPECIAL LAMP. AN EMERGENCY SOLUTION IS TO REPLACE THE BURNED OUT LAMP WITH THE ONE FROM THE GREEN ACTIVE SOCKET. THE LAMPS ARE THE SAME, AND THE SYSTEM DOESN'T CARE IF THE GREEN LAMP WORKS OR NOT.

I HAVE CHASED OUT THE ORIGINAL WIRING OF ALL THE RADIO SHACK DRIVES, EITHER PERSONALLY OR THROUGH OTHER HELPFUL PERSONS. I ESPECIALLY WANT TO THANK ART MCANINCH OF BORGER, TX AND FRED OBERDING OF SAUSALITO, CA FOR THEIR KIND EFFORTS AND COMMUNICATIONS.

Table 2

"Three Wires" Connections

Early Masters with large HDC's, 8X300 chip type

Wire	Orange	Yellow	White
Function	Write Protect	Drive Select	Seek Complete
ORIGINAL CONNECTIONS			
5/12/15 Meg	TP-18	U21-8	U7-5
GENERIC (SIMPLIFIED) CONNECTIONS			
All MFM Drives	HDC resistor pack R27 pin 6 Note 1	HDC J6 pin 26 Note 3	HDC J6 pin 6 Note 3

Late Masters with small HDC's, WD1010 chip type

Wire	Orange	Yellow	White
Function	Write Protect	Drive Select	Seek Complete
ORIGINAL CONNECTIONS			
12/15 Meg	TP-18	U21-8	TP-8
35 Meg	J2-5	U1-5	U15-16
70 Meg	Pad R97 Note 4	Outboard pin, J11	TP-1
GENERIC (SIMPLIFIED) CONNECTIONS			
All MFM Drives	HDC R54, end nearest J10 Note 2	HDC R23, end nearest U23	HDC U31 pin 8

TABLE 2 SHOWS THE ORIGINAL HOOK-UP PLUS AN ALTERNATE (AND SIMPLER) GENERIC ARRANGEMENT FOR MASTER DRIVES, ESPECIALLY WHERE SOME OTHER BUBBLE IS BEING INSTALLED. SEE THE SECTIONS HEADED 'GENERIC' FOR THE SIMPLER CONNECTIONS.
THE ADVANTAGE OF THE GENERIC CONNECTION IS THAT YOU CAN THEREAFTER REMOVE OR EXCHANGE DRIVES WITHOUT HAVING TO UNSOLDER THE THREE WIRES AS THEY ARE NOW ATTACHED TO THE HDC INSTEAD OF THE BUBBLE.

NOTES FOR TABLE 2

1. SOLDER WIRE TO FEED THROUGH NEAR PIN 6. CUT TRACE TO PIN 5 OF J1 TO PREVENT FEEDING 5V INTO THE 20/C CABLE.
2. CUT TRACE TO PIN 5 OF J6 TO PREVENT FEEDING 5V INTO THE 20/C CABLE.
3. USE EMPTY PIN HOLE OF J6 INSTEAD OF J5.
4. THE PAD IS MARKED R97, BUT NO RESISTOR IS ACTUALLY INSTALLED THERE,

ALL OF THE DRIVES I DELIVER TO CUSTOMERS ARE CONNECTED IN THE GENERIC FASHION DESCRIBED ABOVE. THIS SIMPLIFIES MATTERS FOR BOTH ME AND THE CUSTOMER, AND OF COURSE THE LOGIC WORKS THE SAME AS ALWAYS, AS THE GENERIC CONNECTION CONNECTS THE THREE WIRES AT THE DESTINATION (THE HDC) INSTEAD OF AT THE SOURCE (THE BUBBLE).

OVER THE LAST COUPLE OF YEARS, I HAVE CONNECTED MANY DIFFERENT DRIVES INTO OUR RADIO SHACK BOXES, UP TO AND INCLUDING THE 70 MEG DRIVE, AND ALL WORK WELL. BE AWARE THAT THE 12 MEG, 35 MEG AND 70 MEG DRIVES ALL SUFFER FROM A BIT OF PUFFERY. THEY WERE ADVERTISED AND SOLD BY RADIO SHACK WITH THOSE LABELS, BUT THE LABELS ARE ONLY STRICTLY TRUE WHEN INSTALLED ON MACHINES OF THE MODEL 11 FAMILY BECAUSE THOSE MACHINES FORMATTED MORE BYTES PER TRACK THAN LS-DOS AND LDOS CAN DO. THE REAL LIMITS ON THOSE DRIVES WHEN USED IN A MODEL 1, 111 OR 4 SYSTEM ARE 11,304,960 BYTES, 33,554,432 BYTES AND 67,108,864 BYTES RESPECTIVELY, BASED UPON 8 HEADS AND 230, 512 OR 1024 CYLINDERS.
FOLLOWING THE USUAL ADVERTISING PRACTICE, YOU COULD MORE PROPERLY CALL THESE 11, 34 AND 67 MEG DRIVES. IT IS NOT POSSIBLE TO USE ANY DRIVE LARGER THAN 67/70 MEGS BECAUSE THE HDC CANNOT DEAL WITH MORE THAN 8 HEADS AND 1024 CYLINDERS, AND THE DOS CANNOT HANDLE OTHER THAN 32 SECTORS OF 256 BYTES EACH. NO MATTER, THE 67 MEG IS A LARGE DRIVE, AND YOU ARE UNLIKELY TO FILL IT.

SLAVE DRIVES

I HAVE OMITTED DISCUSSING SLAVE DRIVES IN THIS ARTICLE; THE WHOLE POINT OF SWAPPING DRIVES IS TO GET MORE CAPACITY, AND MY FEELING IS THAT YOU ARE BETTER OFF TO PUT A BIG DRIVE IN THE MASTER AND FILE THE SLAVE IN THE CLOSET. YOU CAN GO AS LARGE AS 70 MEG IN YOUR MASTER, SO WHY FOOL AROUND WITH THE SLAVE DRIVE?

JUST IN PASSING, I WILL REMARK THAT THE ''THREE WIRES'' ARE ACTUALLY FOUR IN NUMBER IN A SLAVE BOX,

THE FOURTH WIRE BRINGING 12 VOLTS TO A POWER RELAY (WHICH OBVIATES THE NEED FOR A POWER SWITCH IN A SLAVE), AND THE WIRE COLOURS DIFFER FROM THOSE IN A MASTER BOX.

MISCELLANEOUS COMMENTS

A FEW OTHER FACTORS OF INTEREST ARE THE SECTOR INTERLEAVE, THE CYLINDER TO REDUCE WRITE CURRENT, THE CYLINDER TO BEGIN PRE-COMPENSATION, AND THE AVERAGE ACCESS TIME. THE SECTOR INTERLEAVE IS PREDETERMINED WITHIN THE FORMATTER, AND UNLESS YOU ARE GOOD AT MACHINE CODE, IS NOT ADJUSTABLE. THE GURUS WHO DESIGNED THE RADIO SHACK HARD DRIVE SYSTEM SET THIS FOR US. I HAVE NOT MADE ANY ATTEMPT TO 'TUNE' THE INTERLEAVE, HAVING NOT HAD THE TIME (NOR THE INTEREST) TO TACKLE THIS AREA.

THE CYLINDER AT WHICH WRITE CURRENT SHOULD BE REDUCED IS SPECIFICALLY STATED BY THE DRIVE MANUFACTURERS, BUT OUR FORMATTERS SIMPLY ASSUME A VALUE AND GO AHEAD WITHOUT ASKING US. IF YOU REVIEW THE DRIVE SPECS, THE RECOMMENDED VALUE IS TYPICALLY ABOUT HALF THE TOTAL NUMBER OF CYLINDERS, AND I BELIEVE THIS IS WHAT THE FORMATTER PROGRAMS ASSUME. FURTHERMORE, THE NEWER DRIVES TAKE CARE OF THIS FUNCTION IN HARDWARE, AND SO REGARDLESS OF WHAT THE SOFTWARE AND CONTROLLER SAY, THE LATER DRIVES DO THEIR OWN THING. DON'T WORRY ABOUT IT, IT IS NOT CRITICAL,

THE CYLINDER TO BEGIN WRITE PRE-COMPENSATION VARIES CONSIDERABLY. MOST OLDER DRIVES SET IT AT ABOUT 1/2 OF THE TOTAL CYLINDERS, BUT SOME OF THE LATER ONES DON'T WANT ANY PRE-COMPENSATION. AGAIN, THIS VALUE APPEARS NOT TO BE CRITICAL, AND IS TAKEN CARE OF IN THE DRIVER SOFTWARE. I HAVE RECEIVED ONE (ONLY) REPORT FROM A USER WHO SAID HE HAD TO PATCH HIS CODE TO SUPPRESS PRE-COMPENSATION IN ORDER TO MAKE HIS DRIVE WORK, BUT I LACK ANY FURTHER DETAILS. IT SEEMS TO BE A FACTOR OF CONCERN, GENERALLY.

FINALLY, THE AVERAGE ACCESS TIME IS A BRAGGING POINT AMONG IBM USERS, BUT FOR US TRS TYPES, HARD DRIVES ACCESS SO MUCH QUICKER THAN FLOPPIES THAT THE WHOLE PROCESS SEEMS LIKE MAGIC ANYWAY. FOR THE DRIVES WE ARE USING, THE ACCESS TIMES ARE AS SHOWN IN TABLE 1 , AND (EXCEPT FOR THE 70 MEG DRIVE), ARE SLOW BY IBM STANDARDS. EVEN SO, THE CHANGE FROM FLOPPIES IS DRAMATIC, AND YOU WILL ENJOY RADIO SHACK HARD DRIVES ANYWAY.

MOST DRIVES HAVE BUFFERED SEEK, WHICH ALLOWS THE CONTROLLER TO SEND STEPPING INSTRUCTIONS AT THE 10 MICROSECOND RATE. THE DRIVE ACTUALLY JUST HOLDS THE COUNT IN AN INTERNAL REGISTER UNTIL THE CONTROLLER STOPS SENDING. THE DRIVE THEN MOVES ITS HEADS AT ITS OWN BEST RATE, AND STOPS ON THE DESIRED CYLINDER. A FEW VERY OLD (MOSTLY 5 MEG) DRIVES LACKED THIS FEATURE, AND WITH THESE YOU MUST TELL THE CONTROLLER TO SEND THE STEPPING PULSES AT 3 MILLISECOND OR GREATER INTERVALS. ALWAYS TRY THE 10 MICROSECOND STEP RATE FIRST, AND IF THE FORMATTER CHOKES, (REPORTS MOST

CYLINDERS BAD) THEN TRY SLOWER STEPPING RATES UNTIL YOU FIND ONE THAT WORKS.

HERE IS A WARNING TO NEWDOS-80 V2.5 USERS, THE HARD DRIVE VERSION OF NEWDOS-80 IS V2.5, AND IT WORKS FINE ON THE OLD, LARGE HDC BOARDS. HOWEVER, THERE IS A BUG IN NEWDOS' FORMATTER WHICH PREVENTS OPERATION ON THE NEW, SMALLER HDC'S. FORTUNATELY, THIS BUG WAS SQUASHED BY AN AUSSIE, AND A FRIEND OF HIS SENT THE CURE ALONG TO ME.

THE PATCH TO HDFMTAPP, THE NEWDOS FORMATTER IS AS FOLLOWS. USING SUPERZAP:

```
DFS OF FILE HDFMTAPP/CMD
FRS1
MOD D1
FIND:       AF 32 CB 00
CHANGE TO: 3E 0F D3 CB
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ALL OF THE DRIVES IN TABLE 1 ARE PHYSICALLY AND ELECTRICALLY INTERCHANGEABLE. THERE ARE ACTUALLY MANY MORE FLOATING AROUND; THEY JUST HAVE TO BE MFM TYPES. THE MISOSYS RSHARD5/6 DRIVERS AND POWERSOFT SUPREME HD DRIVERS (SERIES RS) BOTH WILL WORK WITH ALL OF THEM. THE MISOSYS DRIVERS ARE EASIER TO INSTALL, BUT THE POWERBOAT SUPREME DRIVERS ALLOW GREATER FLEXIBILITY WHEN YOU WANT MAXIMUM CONTROL OVER PLACEMENT OF PARTITIONS.

(NOTE: THE DRIVER, RSHARD, THAT ROY REFERS TO, IS CURRENTLY AVAILABLE FOR DOWNLOADING AT WWW.TIM-MANN.ORG. A BIG THANKS GO TO TIM MANN & ROY SOLTOFF FOR THIS FACILITY.
IT IS STILL POSSIBLE TO BUY MFM DRIVES. I'VE SEEN THEM ADVERTISED ON EBAY ON A NUMBER OF OCCASIONS.
ED.)

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PACKING AND SUPER-GRAPHICS

BY PHILLIP CASE

BY NOW, MOST OF YOU HAVE SEEN THOSE FUNNY LISTINGS WHICH APPEARS TO BE GARBAGE. PROGRAMS LIKE 'ANDROID NIM' 'BEE WARY' AND 'STAR SCOUT' ALL LOOK LIKE BAD LOADS WHEN LISTED. THIS IS DUE THE USE OF A PROCESS KNOWN AS 'PACKING' THE GRAPHICS.

THE REASON THESE PROGRAMS HAVE THEIR GRAPHICS STRINGS PACKED THIS WAY IS TO SAVE MEMORY. BY PACKING YOUR STRINGS IN THIS MEMORY, YOU REDUCE THE AMOUNT OF OVERHEADS MEMORY NEEDED BY ABOUT TWO-THIRDS.

TO CREATE SUPER-GRAPHICS, ONE SIMPLY CHANGES THE VALUE OF THE CHARACTERS BETWEEN THE QUOTES IN A LINE TO READ AS GRAPHICS CODES. FOR EXAMPLE: 10 A$ = "*". TO CHANGE THIS LINE, ONE WOULD SIMPLY POKE THE MEMORY LOCATION THAT CONTAINS THE "*" WITH THE VALUE OF THE GRAPHICS CHARACTER NEEDED. IN THIS CASE LET'S USE A FULL GRAPHICS BLOCK OR CHR$(191). TO CHANGE LINE 10 TO PRINT A CHR$(191), WE FIND THE ADDRESS WHICH CONTAINS THE "*" AND POKE THE ADDRESS WITH 191.

MOST OF YOU ARE PROBABLY ALREADY FAMILIAR WITH THIS PROCESS, SO I WON'T SAY ANYTHING MORE ABOUT IT EXCEPT THAT DISK USERS HAVE

A REAL ADVANTAGE IN THE USE OF DEBUG.

THE INTERESTING THING ABOUT SUPER-GRAPHICS IS THE METHOD IN WHICH THEY WORK. THE S-80 CONVERTS ALL COMMANDS INTO ONE BYTE TOKENS TO SAVE MEMORY. IT JUST HAPPENS THAT THE COMMAND TOKENS ARE THE SAME ASCII VALUES AS THE GRAPHICS CHARACTERS. THAT'S WHY A SUPER-GRAPHICS LINE CONTAINS ONLY COMMAND WORDS.

NOW FOR THE HEAVY STUFF, STAY CLOSE. WE'VE ALL BEEN TOLD THAT SUPER-GRAPHICS LINES CANNOT BE EDITED. THIS IS BECAUSE THE COMPUTER READS ALL THE CONTENTS BETWEEN QUOTES AS REGULAR CHARACTER INFORMATION RATHER THAN TOKENS. IF YOU'RE LIKE ME, YOU FIND YOU NEED TO EDIT THE LINE THAT YOU'VE SLAVED SO HARD OVER TO CONVERT TO TOKENS.

THERE IS A LITTLE TRICK THAT WILL PERMIT YOU TO EDIT YOUR SUPER-GRAPHICS WITHOUT LOSING YOUR TOKENS. IF, WHILE YOU'RE EDITING THE LINE, YOU (C)HANGE THE FIRST QUOTE IN THE LINE TO AN ASTERISK, THE LINE WILL BE RETOKENIZED. THEN, WHEN DONE EDITING, POKE THE ASTERISK BACK TO A QUOTE AND VOILA! THE LINE IS CONVERTED BACK TO SUPER-GRAPHICS AFTER EDITING.

THIS LITTLE TRICK SHOULD PROVE USEFUL WHENEVER YOU FIND YOU NEED MORE CHARACTERS IN A LINE WHICH IS ALREADY PACKED. FOR THOSE OF YOU WITH A DISK SYSTEM, I SUGGEST DOING ALL THE AFOREMENTIONED WITH DEBUG, THE MONITOR WHICH IS A PART OF DOS.

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MORE MILEAGE FROM EPSON RIBBONS

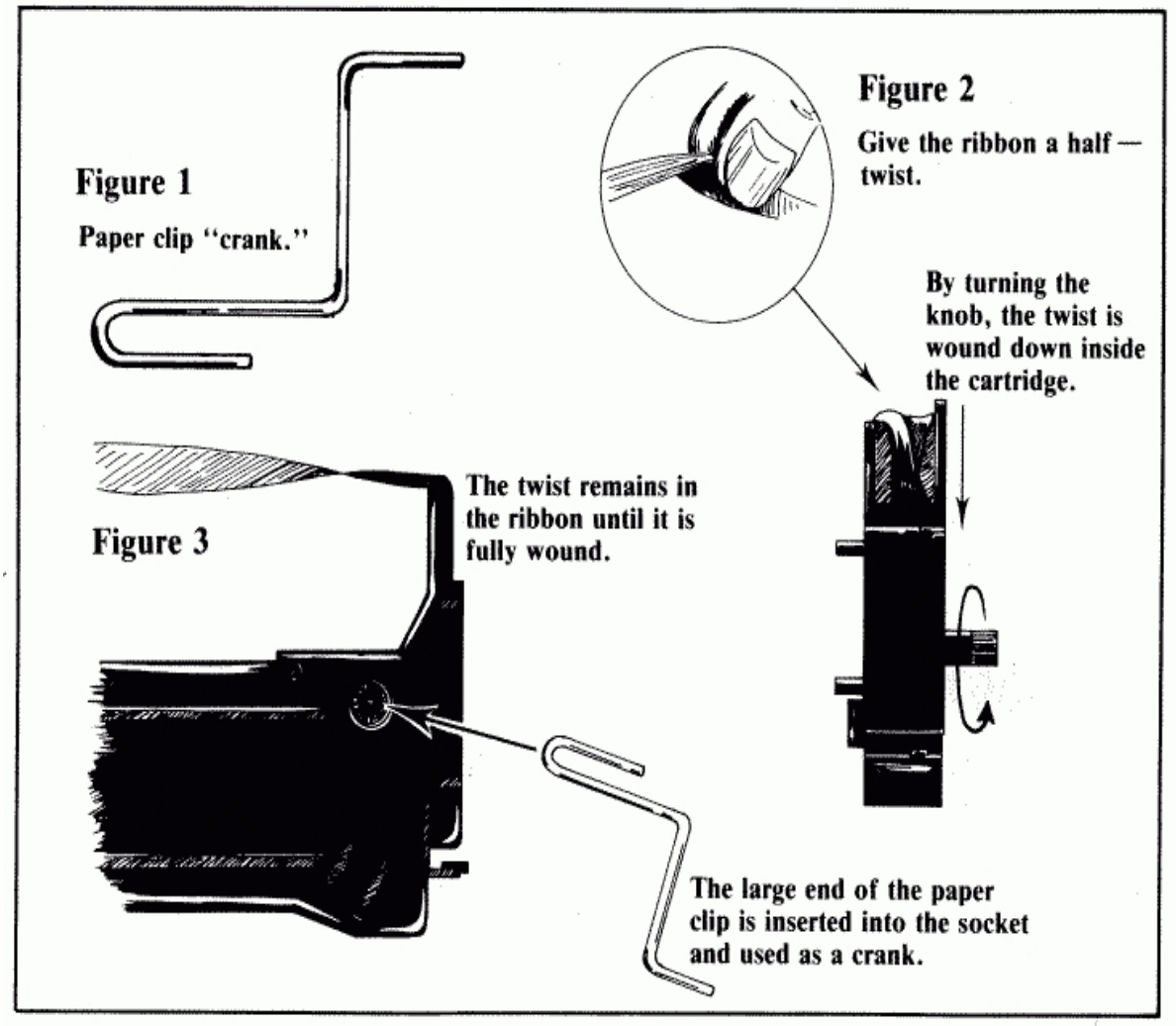
IT IS POSSIBLE TO EXTEND THE LIFE OF EPSON MX-70 AND MX-80 RIBBON CARTRIDGES BY FLIPPING THE RIBBON OVER IN THE CARTRIDGE. SINCE THE PRINT HEAD STRIKES OFF-CENTRE ON THE RIBBON, FLIPPING THE RIBBON EXPOSES A FRESH SURFACE. HERE'S A SIMPLE TECHNIQUE FOR DOING JUST THAT.

TAKE AN ORDINARY PAPER CLIP AND BEND IT AS SHOWN IN FIGURE 1. LAY THIS ASIDE, WITHIN EASY REACH. NOW TAKE THE RIBBON CARTRIDGE AND REFER TO FIGURE 2. LIFT THE RIBBON AT THE END NEAR THE RIBBON ADVANCE KNOB AND GIVE THE RIBBON HALF A TWIST. TURN THE ADVANCE KNOB A FEW TURNS TO FEED THE TWISTED RIBBON INTO THE CARTRIDGE THROUGH THE ADVANCE MECHANISM. AT THIS POINT, THE RIBBON CARTRIDGE SHOULD LOOK AS IT DID BEFORE, EXCEPT FOR A HALF-TWIST IN THE EXPOSED PORTION.

TAKE THE PAPER CLIP CRANK YOU MADE EARLIER AND INSERT THE LOOP END INTO THE RIBBON ADVANCE SOCKET ON THE CARTRIDGE. THIS IS ON THE BOTTOM OF THE CARTRIDGE, OPPOSITE THE ADVANCE KNOB AS IN FIGURE 3. NOW USE THE CRANK TO ADVANCE THE RIBBON UNTIL THE HALF-TWIST INSIDE THE CARTRIDGE COMES OUT THE OTHER END. THAT'S ALL THERE IS TO IT. THE RIBBON IS NOW FLIPPED OVER.

IT'S THE PAPER CLIP CRANK THAT MAKES THIS IDEA PRACTICAL. WITHOUT THIS, YOU WOULD HAVE TO ADVANCE THE RIBBON WITH THE KNOB. SINCE THERE ARE 20 YARDS OF RIBBON

IN THE CARTRIDGE, THIS COULD TAKE QUITE SOME TIME AND THE SHARP/HARD LITTLE KNOB WOULD PLAY HAVOC WITH YOUR FINGER(S)! WITH THE CRANK HOWEVER, IT TAKES NO MORE THAN 2 OR 3 MINUTES TO WIND THE ENTIRE RIBBON.



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(CONTINUED FROM PAGE 2.)

I'VE MANAGED TO DO A DEAL WITH 'FABSITESUK.COM' WHO ALLOW WEB HOSTING FOR VERY MODERATE FEES IF YOU'RE A NON-PROFIT MAKING ORGANIZATION.

TALKING OF NEWS-LETTER CONTRIBUTION, THEY ARE A BIT THIN ON THE GROUND. IF YOU'RE HAVING FUN WITH YOUR TRS-80, I'D LOVE TO KNOW WHAT YOU'RE UP TO. JUST AN UPDATE OF A FEW LINES WOULD BE APPRECIATED.

MY EMAIL ADDRESS ON THE WEB-SITE HAS BEEN CHANGED FROM THE DATE OF THIS ISSUE, SO, IN CASE YOU LOOSE THIS NOTE OF IT, JUST CLICK ON THE EMAIL BUTTON.

WELL, THAT ABOUT WRAPS UP THIS EDITION. I HOPE YOU FOUND SOMETHING OF INTEREST; SO UNTIL SEPTEMBER

BYE FOR NOW

DUSTY.

TRS8BIT

WELCOME TO THE SEPTEMBER EDITION OF TRS8BIT. JUST A QUICK THANK YOU FOR THE FEEDBACK, KIND COMMENTS IN GENERAL AND IN PARTICULAR ABOUT ROY'S HARD DISK ARTICLE IN THE LAST ISSUE. IT SEEMS AT LEAST TWO PEOPLE HAVE BEEN ASSISTED BY IT.
HOW ABOUT LETTING US ALL KNOW HOW YOU'RE GETTING ON?

CONTRIBUTIONS HAVE BEEN A BIT THIN ON THE GROUND, MOST PROBABLY DUE TO THE AUGUST HOLIDAY TIME, BUT I HOPE THAT I'VE MANAGED TO FIND ODD LITTLE BITS OF INTEREST FOR YOU!

THE USUAL ONE-LINER MAKES AN APPEARANCE AND A NUMBER OF SNIPPETS IN 'AT THE READY PROMPT' WHICH I'VE BEEN PLAYING AROUND WITH.
I'VE PRODUCED A CHART OF 'LOOK AT A GLANCE' PRINTER INFORMATION TO ASSIST IN CHECKING FOR COMPARABLE OPTIONS.
THERE'S AN ARTICLE BY ANON. WHO DOESN'T LIKE 'MOD'. PERHAPS, IN HIS YOUNGER LIFE, HE WAS A ROCKER EH?

STAR-BILLING GOES TO A CRACKING ARTICLE BY EC KILPATRICK FOR ALL YOU HARDWARE BUFFS OR ANYONE WANTING TO FIT 48K INSIDE THEIR KEYBOARD.

THIS ALL CAME ABOUT BECAUSE I 'WON' SOME 8 BIT, 64K RAM CHIPS WHICH WERE FOR SALE ON EBAY AND I WAS SURE THAT, IN THE BACK OF MY MIND, THERE WAS AN ARTICLE WHICH HAD A USE THEM. SURE ENOUGH, I FOUND IT.
IT WAS ORIGINALLY PUBLISHED IN NATGUG NEWS IN SEPTEMBER 1984 AND I'VE MANAGED TO INCORPORATE ALL THE LATER, ADDITIONAL AMENDMENTS THAT WENT WITH IT.
THE CHIPS ARE MARKED-
SHARP LH2164-15
** NOW IF ANYONE WOULD LIKE TO TRY IT OUT I'D BE MORE THAN HAPPY TO SEND THE RAM CHIPS FOR YOU TO USE **

IF YOU'RE INTERESTED, PLEASE EMAIL ME WITH YOUR DETAILS AND I'LL SEND THE CHIPS OFF TO YOU.
THIS LOOKS TO ME LIKE MAJOR SURGERY AND IS WAY PAST MY MEAGRE DIY ABILITIES.
I CAN'T EVEN GUARANTEE THAT THE CHIPS ARE SUITABLE OR EVEN STILL USABLE BUT IT WOULD BE REAL FUN TO TRY IT OUT. JUST THINK OF IT, HARDWARE MODS ON A 30 YEAR OLD MICRO-COMPUTER!
I DON'T RECOMMEND ATTACKING YOUR ONE AND ONLY REMAINING MODEL 1 THOUGH!

N.B. THIS OFFER IS, BY ITS VERY NATURE, ON A FIRST-COME FIRST-SERVED BASIS! THERE WOULD BE NO CHARGE, BUT A SHORT ARTICLE FOR TRS8BIT TELLING US HOW WELL (OR OTHERWISE) THE MODS WENT, WOULD BE MOST APPRECIATED.

ALSO, WHILE I'M THINKING ABOUT FREEBIES, I'VE, ONCE AGAIN THANKS TO EBAY, ACQUIRED A NUMBER OF 'NEW-OLD-STOCK' RIBBONS FOR AN EPSON LX80. IF YOU'RE HAVING TROUBLE SOURCING A REPLACEMENT JUST LET ME KNOW. THE REFERENCE NUMBERS QUOTED ARE 8MM X 6M F3570ZA.
AND...
WHILE HELPING ON A CLEARANCE, I CAME ACROSS A

PART-BOX OF NEW, 8" FLOPPY DISKS. SO IT YOU RUN A MODEL 2 OR ANY MACHINES WITH 8" DRIVES AND YOU'RE HAVING DIFFICULTIES GETTING MEDIA, AGAIN, PLEASE LET ME KNOW. THEY ARE MEMOREX, SINGLE SIDED, DOUBLE DENSITY, SOFT SECTORED WITH 77 TRACKS.

TALKING OF MODEL 2'S, ONE SOLD ON THE UK'S EBAY FOR £75. THERE HAS BEEN QUITE A FEW TANDYS SOLD OVER THE LAST FEW WEEKS, WITH MODEL 1'S FETCHING BETWEEN £18 AND £35 AND MODEL 4'S FETCHING BETWEEN £50 AND £90. THERE'S BEEN CONSIDERABLY MORE SALES OF ACCESSORIES, BOOKS AND SOFTWARE TOO, FOR ALL MODELS.
AS AT THE TIME OF WRITING, THERE IS A VIDEO GENIE FOR SALE IN AN EBAY 'SHOP'. THE PRICE IS £80
IT'S NICE TO KNOW THERE'S STILL A BIT OF INTEREST OUT THERE.

CONTINUED ON PAGE 7

AT THE
READY>
PROMPT

ONE REALLY NEAT FEATURE OF DISK BASIC IS THAT IT ALLOWS THE USE OF HEX AND OCTAL CONSTANTS.
I.E. IF YOU ISSUE THE COMMAND PRINT &H5BBB, IT RETURNS THE ANSWER 23483, THE DECIMAL EQUIVALENT. THIS SAVES ME HAVING TO GET OUT MY TANDY PC-6 COMPUTER ANY TIME I NEED A CONVERSION FIGURE!

HERE'S A FEW OLD CHESTNUTS, BUT JUST IN CASE YOU DON'T HAVE THEM TO HAND;
TO DISABLE THE MODEL 1'S BREAK KEY POKE 16396,23
AND, JUST AS HANDY, TO ENABLE THE BREAK KEY POKE 16396,201.

IF YOU CAN'T REMEMBER WHAT YOU'VE SET MEMORY SIZE TO WHEN STARTING LEVEL II BASIC, HERE'S AN EASY WAY TO HELP.
PRINTPEEK(16561)+PEEK (16562)*256+2.

IF PEEK(293) = 73, THE MACHINE YOU'RE ON IS A MODEL 3. ANY OTHER VALUE AND IT'S A MODEL 1.

THESE WORK FINE WITH MATTHEW REED'S M1 EMULATOR

IF YOU'RE ON A MODEL 1 -
POKE 15360,1
PRINT PEEK(15360) THIS WILL PRINT A 1 IF THE R/S LOWER-CASE MOD HAD BEEN FITTED. IF NOT, THE RESULT WILL BE 65

THERE'S A LITTLE 'BUGLETT' IN SOME EDITIONS OF TRS-DOS 2.3 WHICH I HAD FORGOTTEN ABOUT. THE PASSWORD PROTECTION GIVES UP AFTER ONE TRY. THE FIRST TIME YOU TRY TO COPY AN UNCOPYABLE FILE IT WILL GIVE THE ERROR MESSAGE "FILE ACCESS DENIED". TRY TO COPY IT AGAIN - THIS TIME YOU SHOULD SUCCEED!

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HERE'S A ONE-LINER FROM AN ORIGINAL IDEA BY MICHAEL LYON

```
0 IFW>0GOTOELSECLS:D=400:B=20:L=B:S=1:E=.4:C=.05:F=.5:FORW=1TO52
:FORX=-LTOLSTEPS:Y=SQR(ABS(D-X*X)):IFD<X↑2 Y=F:SET(Y*S+B,X+20):B
=B+C:D=D-E:NEXT:L=-L:S=-S:NEXT:ELSESET(Y*S+B,X+20):B=B+C:D=D-E:N
EXT:L=-L:S=-S:NEXT:GOTO
```

48K IN THE MODEL 1 KEYBOARD

EC KILPATRICK

NOW THAT GENERAL NORTHERN HAVE GONE OUT OF BUSINESS, WE THOUGHT IT WOULD BE A GOOD IDEA TO SEE IF IT WAS POSSIBLE TO MODIFY THE MODEL 1 KEYBOARD TO READ 48K WITHOUT HAVING TO ADD A DECODER BOARD.

WITH CONSIDERABLE HELP FROM MY GOOD FRIEND GUY GRANTHAM, WHO HAD ALREADY MODIFIED HIS VIDEO GENIE, WE HAVE SUCCEEDED. HERE IS HOW WE DID IT.

THE MEMORY SIGNALS COMBINED WITH RAS* AND CAS* TO READ:-
UP TO 16K RAM REQUIRE A15 LOW AND A14 HIGH
FROM 16K TO 32K REQUIRE A15 HIGH AND A14 LOW
FROM 32K TO 48K REQUIRE A15 HIGH AND A14 HIGH
THEREFORE, TO READ ALL 48K EITHER A14 OR A15 OR BOTH MUST BE HIGH AT THE RELEVANT TIME.

ORIGINALLY THE COMPUTER COULD ONLY RECOGNISE UP TO 16K OF RAM BECAUSE IT WAS ONLY DECODED TO READ MEMORY WHILE A15 WAS LOW, DUE TO Z73 (PINS 4,5,6 OR GATE) CONTROLLING Z21 (2 LINE TO 4 LINE DECODER) AT PINS 14 AND 2.

THESE SIGNALS WILL BE RETAINED FOR VIDEO, KEYBOARD AND ROM, BUT NO LONGER USED TO GENERATE THE MEM* AND RAM* SIGNALS BY OPENING LINKS 2,3,4,5 ON X3.

NEW CONNECTIONS ARE REQUIRED TO GENERATE THE MEM* SIGNAL WHICH COMES FROM PIN 6, Z74.

THIS SIGNAL NOW HAS TO BE ACTIVE LOW WHENEVER THERE IS A RD* ACTIVE, EXCLUDING CALLS TO RESERVED MEMORY 3000H TO 37FFH WHICH IS REQUIRED FOR DISK AND PRINTER I/O, OR TO THE KEYBOARD AT 3800H TO 3BFFH, OR AGAIN TO THE SEPARATE VIDEO RAM AT 3C00H TO 3FFFH. ALL THESE INVALIDATING CONDITIONS ARE MET WHEN A15 AND A14 ARE LOW AND A13 AND A12 ARE HIGH, AS PROVIDED BY THE OUTPUT FROM Z21 PIN 12 TO INPUT PIN 4 OF Z36. SO BY CUTTING THE TRACE TO PIN 5 OF Z74 AND LINKING PIN 4 OF Z36 TO THIS PIN, THE REQUIRED CONDITIONS OF MEM* ARE MET FOR 48K RAM.

Z73 PINS 8,9,10 ARE NOW SPARE BY VIRTUE OF CUTTING THE TRACE TO Z74 PIN 5. THIS GATE, TOGETHER WITH 2 OTHER ORIGINALLY 'SPARE' GATES, Z73 PINS 11,12,13 AND Z37 PINS 8,9,10 WILL BE USED TO DECODE THE ROW AND COLUMN ADDRESSES OF THE 64K RAM CHIPS.
PINS 9 AND 10 OF Z73 MUST HAVE THEIR INCOMING TRACES CUT AND REPLACED BY LINKS TO A14 AND A15 AT Z21 PIN 15 AND Z73 PIN 4 RESPECTIVELY.

Z73 PIN 8 OUTPUTS THE (A15 OR A14) CONDITION REQUIRED IN THE FIRST PARAGRAPH TO ADDRESS THE TOP 48K OF THE MEMORY MAP.
THIS SIGNAL IS INVERTED BY THE SPARE NOR GATE OF Z37 (8,9,10) AND COMBINED WITH RAS* IN THE SPARE OR GATE OF Z73 (12,13) WHICH, IN TURN FROM PIN 11 FEEDS THE EXISTING RAM* CONNECTION AT Z74 PIN 10.
NOTE :- PINS 8 AND 9 OF Z37 MUST BE SEPARATED AND ONLY ONE OF THEM MAY BE CONNECTED TO PIN 8 OF Z73, AS ALTHOUGH

PIN 9 APPEARS TO BE 'FLOATING' IT IS NOT POSSIBLE TO BE 100% CERTAIN ABOUT PIN 8, SO IT MUST BE TIED TO PIN 7 (EARTH).
A14 AND A15 MUST ALSO BE LINKED TO PINS 14 AND 13 OF THE DATA SELECTOR Z51, WHILE IT'S OUTPUT AT PIN 12 WILL BE LINKED TO THE NUMBER 9 PINS OF EACH OF THE 64K RAMS.

HERE ARE THE DETAILED CHANGES NECESSARY :-

OPEN UP THE KEYBOARD AND LOCATE THE FOLLOWING CHIPS ON THE 'TRACE' SIDE OF THE BOARD. Z21, Z36, Z37, Z51, Z73 AND Z74. (I STUCK A SMALL NUMBER LABEL ON EACH CHIP TO MAKE SURE I COULD ALWAYS READ THEM AND LOCATE PIN 1).

LAY THE KEYBOARD COMPONENT SIDE DOWN WITH THE KEYS AWAY FROM YOU.

CUT THE FOLLOWING TRACES, BETWEEN PINS 8 AND 9 OF Z37 (A SOLDER SUCKER IS NEED HERE), CLOSE TO PINS 9 AND 10 OF Z73, (PIN 10 ON THE COMPONENT SIDE) AND PIN 5 OF Z74.

***
NOTE:-
SOME LATE ISSUE BOARDS ALSO HAVE THE TRACES OF PINS 12, 13 AND 14 OF Z73 JOINED TOGETHER SO THE TRACE BOTH SIDES OF PIN 13 MUST ALSO BE CUT.
***

USING THIN INSULATED WIRE CONNECT THESE PINS IN THIS ORDER :-
FROM Z73 PIN 11 TO Z74 PIN 10
FROM Z73 PIN 12 TO Z73 PIN 5
FROM Z73 PIN 10 TO Z73 PIN 4 AND ON TO Z51 PIN 13
FROM Z73 PIN 13 TO Z37 PIN 10
FROM Z73 PIN 9 TO Z51 PIN 14 AND ON TO Z21 PIN 15
FROM Z73 PIN 8 TO Z37 PIN 9
FROM Z74 PIN 5 TO Z36 PIN 4
FROM Z37 PIN 8 TO Z37 PIN 7

NOW X3 HAS TO BE MODIFIED, AS MENTIONED EARLIER, STARTING FROM PIN 1, LEAVE THAT AS IS. PINS 2,3,4 AND 5 HAVE TO BE OPEN AND PINS 6,7 AND 8 CLOSED. A SMALL SCREWDRIVER CAN BE USED TO OPEN AND A BLOB OF SOLDER TO CLOSE AS NEEDED.

BEFORE THE 16K RAM CHIPS ARE REMOVED, THE SYSTEM CAN BE TESTED BY SWITCHING THE COMPUTER ON IN LEVEL 2 MODE AND ENTERING 'PRINT MEM', THE ANSWER SHOULD BE EITHER 48340 OR 48338 DEPENDING ON WHICH TYPE OF ROMS ARE FITTED. THE FIGURES ARE ONLY 2 REFLECTIONS OF THE EXISTING 16K AND AS SUCH, CANNOT BE USED.

PROVIDING THE SYSTEM WORKS THIS FAR, THEN FITTING THE 64K RAMS CAN BE CARRIED OUT. REMOVE THE 16K RAMS AND PUT THEM SAFELY AWAY. WITH THE KEYBOARD STILL LAID OUT WITH THE KEYS AWAY FROM YOU, CUT THE 12V TRACE AT PIN 8 OF Z19. CUT THE -5V TRACE AT THE CAPACITOR PIN BELOW PIN 1 OF Z13. FIT A THICK WIRE FROM THE +5V PIN ABOVE PIN 7 OF Z1 TO THE PIN ABOVE PIN 8 OF Z17.
FOLD THE KEYS OVER ON TOP OF THE BOARD AND TURN THE WHOLE ASSEMBLY OVER. VERY CAREFULLY BEND UP PIN 9 OF EACH OF THE 64K RAM CHIPS (NOT TOO FAR OR THEY MAY BREAK) AND INSERT THEM IN TO THE EMPTY RAM SOCKETS THE SAME WAY ROUND AS THE 16K CHIPS, MAKING SURE THAT EACH PIN 9 IS CLEAR OF THE TOP OF THE SOCKET, AS THAT MIGHT BE AT +5V. (CONTACTS MAY BE

SLIGHTLY PROUD ON SOME TYPES OF SOCKETS). WIRE ALL THE NUMBER 9 PINS TOGETHER AND CONNECT A WIRE FROM PIN 12 OF Z51 TO THE NEAREST PIN 9 OF THE RAMS.

CAREFULLY **RECHECK** THAT THE +12V TRACE IS DEFINITELY CUT AND THE SYSTEM IS READY TO GO.
IT IS NOT ESSENTIAL TO CUT THE -5V RAIL BUT IT SHOULD BE DONE AS A SAFETY MEASURE. CUTTING THE ORIGINAL +5V RAIL IS A VERY COMPLICATED JOB AND IS BEST LEFT ALONE, HENCE THE COMMENT ABOUT PINS 9 BEING WELL CLEAR OF THE SOCKET AS THAT IS STILL AT +5V.

***
NOTE:-
DO NOT USE TEXAS 64K RAMS AS THEY HAVE A DIFFERENT REFRESH SYSTEM AND CANNOT BE USED WITHOUT FURTHER MODIFICATIONS TO THE COMPUTER CIRCUITRY.
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I DON'T LIKE MODS

ANON.

MOD IS AN ARITHMETIC FUNCTION FOUND ON THE MODEL II. AS WITH SWAP, THIS FUNCTION IS USEFUL, BUT IT CAN VERY EASILY BE DUPLICATED ON A COMPUTER WITHOUT THIS FUNCTION, SUCH AS THE MODEL I OR MODEL III.
MOD SIGNIFIES THE INTEGER REMAINDER WHEN A DIVISION OPERATION IS PERFORMED. AN ELEMENTARY SCHOOL STUDENT LEARNING DIVISION WOULD LEARN THAT 5 DIVIDED BY 3 IS ONE REMAINDER 2. THUS, 5 MOD 3 EQUALS 2. IN A SIMILAR FASHION, ONE COULD DERIVE THAT 103 MOD 25 EQUALS 3.
THE MOD FUNCTION ON THE MODEL 2 TAKES THE FORM A MOD B. ITS EQUIVALENT ON THE MODEL I OR MODEL 3 WOULD BE A -
INT (A/B) * B. THUS, THE EQUIVALENT OF 103 MOD 25, AS IN OUR PREVIOUS EXAMPLE, WOULD BE 103 - (INT (103/25) * 25), WHICH, AS STATED ABOVE, SIMPLIFIES TO 3.
MOD DOES NOT SAVE A SIGNIFICANT PORTION OF EXECUTION TIME. IT DOES MAKE CODE USING THIS FUNCTION A BIT EASIER TO READ, BUT THIS, I BELIEVE, IS FAR OUTWEIGHED BY THE INCOMPATIBILITY IT CAUSES. SINCE IT IS EXTREMELY EASY TO "CONSTRUCT" A MOD FUNCTION WHICH WILL WORK ON VIRTUALLY ANY VERSION OF BASIC, I WOULD STRONGLY ADVISE AGAINST USING THIS FUNCTION.

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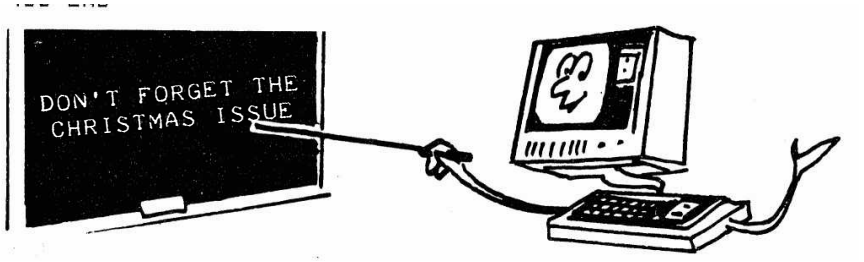

TRS8BIT "AT A GLANCE" TRS-80 PRINTER COMPARISON CHART (CIRA EARLY 1980'S)

	Centronics 737 LP II	Epson MX-80	Oki Microline 80	CGP-115	Quickprinter 2	DMP-100	Cannon BJ-10sx
WEIGHT (LBS)	12	12	14	1.8		8.6	3.7
SIZE	5 x 14.5 x 11	4.2 x 14.7 x 12	4.25 x 13.5 x 9.75	8.5 x 8.5 x 3	3.5 x 7 x 9.5	16 x 8.25 x 5.3	31 x 22 x 4.85
INTERFACE - PARALLEL/SERIAL	P	P	P	Both	Both	Both	P
SPEED	50 cps @ 10 cpi	80 cps @ 10 cpi	80 cps @ 10 cpi	12 cps	64 cps	50 cps @ 10 cpi	110 cps @ 10 cpi
BI-DIRECTIONAL	N	Y	N	N	N	N	Y
PRINT-HEAD LIFE - CHARS.	150 million	50 - 100 million	200 million	n/a	30 million	?	n/a
DESCENDERS	Y	Y	N	Y	N	N	Y
NO OF WIRES IN HEAD	9	9	9	n/a	n/a	7	n/a
DENSITIES CHARS/LINE	40, 66, 80, 132	40, 66, 80, 132	40, 80, 132	40, 80	9, 18 cpi	40,80	5, 8.5, 10, 12, 17
GRAPHICS	N	Y	Y	Y	Y	Y	Y
SLASH ZERO	N	N	Y	Y	Y	Y	N
LINE SPACING - LINES PER INCH	6	6 or 8	6 or 8	software selectable (fwd & rev)	6	6, 9	variable
MAX PAPER WIDTH	9.5 fanfold, 8.5 cut	10 fanfold	9.5 fanfold, 8.5 cut	4.5	2.38 ins - fixed	9.5 fanfold	8 ins
TRACTOR OR FRICTION FEED	F	T	Both	F	F	T	F
MAX COPIES	3	3	3	1	1	1	1
INK	ribbon, mobius loop	ribbon, cartridge	ribbon, .5 typewriter	4 colour pens	Aluminum coated	inked roller cassette	bubble jet cartridge

HIDE YOUR CODE!

BY PHILIP CASE

HERE'S A TIP ABOUT USING CONTROL CODE FUNCTIONS TO MAKE YOUR PROGRAMS HARDER FOR OTHER PEOPLE TO LIST, EXAMINE AND/OR AMEND. IF YOU REMEMBERS, CHR$(23) PUTS YOUR MODEL 1'S SCREEN INTO THE ENLARGED MODE (32 CHARACTERS PER LINE). CONSEQUENTLY, ANYTHING THAT'S ON THE SCREEN IN THE 62 CHARACTER MODE WILL LOSE EVERY OTHER LETTER WHEN YOU SWITCH INTO THE ENLARGED MODE. YOU CAN ILLUSTRATE THIS BY TYPING ANYTHING ON THE SCREEN, PRESSING SHIFT/ RIGHT ARROW, THEN PRINTING CHR$(23) (HOME CURSOR). BY DOING THIS YOU ARE ENTERING A CONTROL CHARACTER IN THE IMMEDIATE MODE.
YOU CAN PUT THESE CODES IN YOUR BASIC PROGRAM CODING BY ADDING A 'REM'ARK AT THE END OF AN IMPORTANT LINE, THEN AND ASTERISK (*).
HERE'S AN EXAMPLE -
10 FOR A=1TO10:NEXTA:REM* THIS LINE WILL STILL FUNCTION IN THE REGULAR WAY. AFTER EDITING THE LINE, GO BACK AND FIND THE LOCATION IN MEMORY WHERE THE ASTERISK ACTUALLY RESIDES. ONE FOUND, POKE THE ADDRESS WITH 23. THEN LIST THE LINE. THE LINE AUTOMATICALLY CAUSES THE COMPUTER TO CHANGE INTO THE ENLARGED FORMAT.
BY USING DIFFERENT COMBINATIONS OF THIS TECHNIQUE, YOU CAN MAKE IT A REAL PAIN FOR ANYONE TO ALTER OR ANALYSE YOUR BASIC CODE. AS AN IDEA, POKING 28 WILL HOME THE CURSOR, AND POKING 31 WILL ERASE TO THE END OF SCREEN!
NICE ONE EH?

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CONTINUED FROM PAGE 2

FOR THOSE OF YOU WHO VISIT THE WEB-SITE ON A REGULAR BASIS, YOU'LL ALREADY KNOW I'VE PUT OUT A REQUEST FOR HELP ON AN ARTICLE TO CONVERT A PROGRAM FROM APPLE II BASIC TO LEVEL II BASIC. IT IS SUPPOSED TO PRODUCE A SUDOKU PUZZLE, ON A 9 X 9 GRID.
I JUST THOUGHT THAT PRODUCING SUDOKUS ON A LEVEL 2, MODEL 1 WOULD BE JUST AMAZING AND MAKE A GREAT NOVELTY IDEA FOR THE CHRISTMAS EDITION. (WHICH, BY THE WAY, SHOULD BE AVAILABLE EARLY DECEMBER 2008.)

I ALSO 'WON', ON EBAY, A DPM-100 PRINTER BUT, SO FAR, I HAVEN'T BEEN ABLE TO GET IT RUNNING USING THE TANDY PRINTER TO KEYBOARD INTERFACE CONNECTOR AS YET. IT SEEMS TO POWER UP OK, BUT THEN JUST SITS THERE - LOOKING AMAZING, BUT DOING NOTHING!

I'M STILL LOOKING FOR MORE INFORMATION REGARDING THE 'ACULAB FLOPPY TAPE' PLEASE LET ME KNOW IF YOU COME ACROSS ANYTHING OF INTEREST. IT WOULD BE MOST APPRECIATED.

WELL, I THINK THAT JUST ABOUT WRAPS UP THIS ISSUE. IF YOU'VE ANY SPECIAL REQUESTS OR IDEAS FOR THE XMAS ISSUE PLEASE ASK AND I'LL DO MY BEST TO INCLUDE THEM.
IN THE MEAN TIME -

TAKE CARE

DUSTY

TRS8BIT

DEE AND I WISH

ALL OF OUR FRIENDS
OUT THERE IN TRS-80
LAND

A VERY
MERRY CHRISTMAS
AND A HAPPY
NEW YEAR

I HOPE, ONCE AGAIN, I'VE MANAGED TO PUT TOGETHER SOME INTERESTING ITEMS FOR THIS ISSUE.

'STAR BILLING' IN THIS ISSUE MUST GO TO PETER PHILLIPS WHO HAS GIVEN US ALL A CHRISTMAS PRESENT BY CONVERTING AN APPLE 2 SUDOKU CREATION PROGRAM TO RUN ON A LEVEL 2 16K MACHINE. (OF COURSE, IT WORKS JUST AS WELL WITH DISK BASIC!). ACCORDING TO PETER, THE PROGRAM WAS ORIGINALLY WRITTEN IN APPLE 'INTEGER' BASIC. I MUST ADMIT, IT SEEMED A BIT ODD TO ME. HOWEVER, PETER HAS DONE US PROUD; YET ANOTHER PROGRAM FOR A 30 YEAR OLD COMPUTER. IT WORKS SURPRISINGLY QUICKLY, MANAGING TO PRODUCE A PUZZLE IN APPROX. 10 SECONDS. BECAUSE OF THE PROGRAMS SIZE, I'VE PLACED A ZIP FILE FOR DOWNLOADING IT, ON THE WEB SITE WITH A COPY IN BOTH DISK AND CASSETTE FORMAT. (JUST TO SAVE THOSE RSI FINGERS!). I HOPE YOU ENJOY IT AS MUCH AS DEE AND I HAVE.

BY WAY OF A XMAS TRADITION, IF WE'VE BEEN ABOUT LONG ENOUGH TO HAVE A 'TRADITION', I'VE PRODUCED ANOTHER 'ASCII' PRINT WITH A SUITABLE XMAS FLAVOUR. THE PROGRAM IS NEARLY IDENTICAL TO THE ONE USED LAST XMAS, EXCEPT FOR AN ADDITIONAL LINE FOR YOU LUCKY PEOPLE WITH MORE THAN 16K OF RAM. OTHER THAN THAT, IT'S ONLY THE DATA LINES THAT HAVE CHANGED.

PERHAPS SOME OF YOU WILL REMEMBER THAT A COUPLE OF ISSUES AGO I MENTIONED THAT I WAS TAKING OVER THE JOB AS TREASURE OF MY LOCAL BRANCH OF THE BRITISH PRINTING SOCIETY. THERE ARE A VERY SMALL NUMBER OF TRANSACTIONS THROUGHOUT THE YEAR SO I THOUGHT IT WOULD BE NICE TO TRY AND RUN THE ACCOUNTS USING VISICALC AND ELECTRIC PENCIL. IT ACTUALLY WORKED OUT QUITE WELL. I'D FORGOTTEN JUST HOW GOOD VISICALC IS (WAS?). THE ONLY PROBLEM I ENCOUNTERED WAS WITH THE RESULTING PRINT-OUT. I WANTED TO USE THIS TYPE FACE (TELEPRINTER) AND, NOT HAVING A TELETYPE 33 ANYMORE, I HAD TO 'CHEAT' A LITTLE. I DOWNLOADED A COPY OF MY END OF YEAR STATEMENT TO WINDOWS, USING MATTHEW REED'S 'TRSREAD' PROGRAM AND USED WINDOWS NOTEPAD TO CHANGE TO THE REQUIRED FONT.
JUST TO REFRESH YOUR MEMORY, I'VE INCLUDED A MODEL 3 VISICALC 'CRIB' SHEET (JUST IN CASE YOU WANT TO PLAY TOO!). SORRY IF THE REPRODUCTION IS NOT TOO GOOD, BUT THE ORIGINAL IS ON THE 'WAXY' PAPER WE ALL KNEW AND LOVED SO MUCH!

DEE'S BEEN PLAYING WITH A NEW GAME ON HER NINTENDO DS WHICH HAS, YET AGAIN, INSPIRED ME TO HAVE A GO AT THE ONE LINERS IN THIS ISSUE. THEY ARE ALL ABOUT HAND AND EYE COORDINATION. THE IDEA BEING THAT YOU JUST TYPE IN THE RESPECTIVE SCREEN NUMBER WHEN BITS OF IT LIGHT-UP. THE FIRST ONE WAS QUITE SIMPLE, BUT THE OTHER ONE TOOK A BIT MORE

EFFORT TO GET IT DOWN TO JUST THE ONE LINE! IT WAS THOSE PESKY 'IF' STATEMENTS. THEY WILL KEEP DROPPING YOU THROUGH TO THE NEXT LINE WHEN THEIR CONDITIONS ARE MET!! DON'T FORGET, THE LARGE SPACES IN BOTH PROGRAMS ARE CREATED BY THE DOWN ARROW AND NOT THE SPACE BAR. FOR A LONGER GAME, JUST INCREASE THE 'F' LOOP.

I'VE REVAMPED AN ORIGINAL ARTICLE BY LAURIE SHIELDS WHICH GIVES SOME GREAT IDEAS FOR CHANGING LOWER CASE TO UPPER CASE. THE SMALL ASSEMBLER PROGRAM, WITH NOTATION, IS INCLUDED TOGETHER WITH A BASIC PROGRAM THAT USES A 'USR' ROUTINE TO CALL IT. I HOPE YOU FIND IT OF SOME INTEREST. ANYONE FANCY CHANGING IT TO CONVERT UPPER TO LOWER CASE?

WELL, THAT JUST ABOUT WRAPS UP THIS ISSUE. I'D LOVE TO HAVE YOUR FEEDBACK, THE NEXT ISSUE SHOULD BE OUT EARLY MARCH 2009, SO, IN THE MEANTIME, TAKE CARE

BYE FOR NOW
DUSTY

AT THE
READY>
PROMPT

I WAS BUSY (PLAYING)

WITH MY MODEL1 THE OTHER DAY, FILLING ARRAYS WITH GENERATED RANDOM NUMBERS AND I SUDDENLY THOUGHT IT WOULD BE A GOOD IDEA IF THE MACHINE GAVE ME AN INDICATION THAT IT WAS WORKING OK (OTHER THAN PRINTING ENDLESS RANDOM NUMBERS!). A SIMPLE FLASHING ASTERISK, AS USED FOR THE CASSETTE TAPE I/O WOULD BE JUST THE TICKET. IT CAN BE DONE QUITE EASILY IN BASIC AS:-

10 IF PEEK(15423)=42 THEN POKE 15423,32 ELSE POKE 15423,42

THE TOP RIGHT HAND CORNER OF THE SCREEN IS MEMORY ADDRESS 15423. IF IT CONTAINS AND ASTERISK (ASCII 42), THEN WRITE A SPACE (ASCII 32) ELSE WRITE AN ASTERISK. THIS WORKS FINE BUT IS NOT VERY ELEGANT WHEN COMPARED TO THE CODE IN ROM WHICH SIMPLY XOR'S THE CONTENTS OF 15423 WITH 10.
WRITING A SMALL MACHINE CODE ROUTINE SHOULD BE QUITE SIMPLE BUT THEN I THOUGHT, AS THE ROUTINE IS ALREADY IN ROM AT, 022CH, (ACCORDING TO JAMES LEE FARVOUR'S M/S BASIC DECODED) I COULD USE THAT! FOR LEVEL 2 USERS JUST

POKE16524,44:POKE16527,2

(FOR DISK BASIC USERS TYPE DEFUSR0=&H022C)

X=USR(0)

THIS LITTLE BIT OF CODE WILL DO THE EQUIVALENT OF A GOSUB AND PUT OR WIPE-OUT AN ASTERISK IN THE TOP R/H CORNER OF THE SCREEN AS PER THE EXAMPLE BELOW.

```
300 POKE 16526,44:POKE16527,2
330 X=RND(1000)
350 IF X/10= INT(X/10) THENY=USR(0)
360 PRINT@300,X
400 GOTO330
```

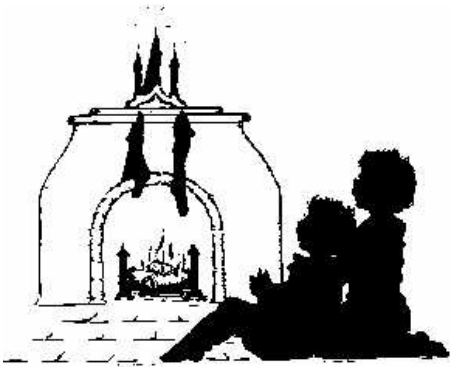
```
1 CLS:PRINT@30,"1 - 2";:FORB=6TO40:SET(65,B):NEXT:FORF=1TO10:X=R
ND(125):Y=RND(47):SET(X,Y):S=(X<64)+2:FORA=0TO1STEP0:CT=CT+1:A$=
INKEY$:IFVAL(A$)=STHENRESET(X,Y):NEXTF:CLS:PRINT"WELL DONE
YOUR SCORE WAS";CT:END:ELSENEXTA
```

TEXT CONVERSION

AND OTHER BITS.
FROM AN ORIGINAL IDEA OF
LAURIE SHIELDS

NONE OF MY MODEL 1

COLLECTIONS HAS THE LOWER-CASE MOD FITTED, BUT MATTHEW REED'S EMULATOR COME WITH L/C AS STANDARD. (ALL THAT'S NEEDED IS A DRIVER!). FOR THE BENEFIT OF ANYONE OUT THERE WITHOUT L/C, I THINK YOU'VE ONLY GOT HALF A COMPUTER! ALTHOUGH I LOVE MY TELETYPE FONT, ALL PROGRAM TITLES AND PROMPTS ON THE SCREEN LOOK INFINITELY BETTER WITH L/C, AS DOES ANY PRINTER OUTPUT. L/C IS TAKEN FOR GRANTED ON ALL MODERN COMPUTERS. I DOUBT WHETHER ANYONE EVER THINKS ABOUT IT THESE DAYS. HOWEVER, ONCE L/C IS FITTED (OR BEING USED) PROBLEMS CAN ARISE WHEN STRING COMPARISONS ARE REQUIRED. FOR EXAMPLE A STOCK NUMBER OF 123XYZ IS NOT THE SAME IN UPPERCASE AS IT IS IN LOWER CASE. THIS IS MOST ANNOYING AS A ROUTINE IN BASIC TO CHECK INPUT AND CONVERT ANY LOWER CASE TO UPPERCASE CAN BE RATHER SLOW AND WILL INVARIABLY INVOKE A STRING GARBAGE COLLECTION 'FREEZE UP'.



WELL, THAT WAS THE PROBLEM I CAME ACROSS AND AS A RESULT, THE FOLLOWING USR ROUTINE EMERGED. IN MACHINE CODE, IT IS EASY, ONCE WE KNOW WHERE ABOUTS IN MEMORY THE CHARACTER STRING IS LOCATED AND ALSO HOW MANY BYTES ARE INVOLVED. MICROSOFT MUST HAVE HAD JUST THIS SORT OF PROBLEM IN MIND WHEN THEY PUT TOGETHER LII BASIC, AS THE FUNCTION VARPTR TELLS US ALL THAT WE NEED TO KNOW BY SIMPLY INCLUDING IT WITHIN THE USR BRACKETS.

TO GET THE VALUE ENCLOSED IN THE USR BRACKETS, IN OUR CASE, THE VARPTR OF THE POSSIBLY LOWER CASE STRING, WE HAVE TO CALL A ROM ROUTINE AT ØA7FH AND THE INFORMATION RETURNS IN THE HL REGISTERS. THE INFORMATION IS IN FACT THE ADDRESS OF THE FIRST BYTE OF THREE THAT GIVE DETAILS ABOUT THE STRING VARIABLE AND THIS ONE IS SIMPLY THE LENGTH OF THE STRING. IF IT'S ZERO, THEN WE HAVE A NULL STRING. THE LARGEST WOULD BE 255, WHICH IS WHY THE LONGEST STRING WE ARE ALLOWED IS 255 BYTES, AS ANY MORE WOULD REQUIRE MORE THAN ONE BYTE FOR THE SIZE. THE NEXT TWO BYTES GIVE US THE ADDRESS OF SOMEWHERE DIFFERENT IN MEMORY WHERE THE STRING IS LOCATED. THIS ADDRESS IS STORED IN THE USUAL Z8Ø FORMAT OF LEAST SIGNIFICANT BYTE FIRST FOLLOWED BY THE MOST SIGNIFICANT BYTE.

IF WE WANTED TO BE BULLET PROOF THEN WE OUGHT TO INCLUDE A TEST ON WHETHER OR NOT THE VARPTR SUPPLIED FROM BASIC BELONGS TO A STRING OR SOME OTHER VARIABLE. THIS WE COULD DO BY LOOKING THREE BYTES BEFORE THE SIZE AND CHECKING THAT THE VALUE THERE IS THREE. IF NOT, THE VARPTR BELONGS TO SOMETHING OTHER THAN A STRING. ONCE WE HAVE CHECKED THAT THE SIZE ISN'T ZERO AND THE ACTUAL

ADDRESS HAS BEEN LOADED INTO THE 'D' AND 'E' REGISTERS, THEN WE GO ROUND A SIMPLE LOOP, LOOPING THE 'A' REGISTER WITH EACH CHARACTER IN TURN, CHECKING IF IT IS OUTSIDE THE RANGE 'A' TO 'Z', AND IF NOT, THEN RE-SETTING BIT 5 TO ZERO BY AND-ING WITH 5FH, PUTTING THE RESULT BACK WHERE WE FOUND IT. ON COMPLETION WE SIMPLY RET-URN TO BASIC.

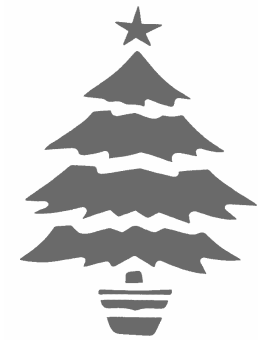
TO GET THIS ROUTINE WITHIN A BASIC PROGRAM, WE CONVERT ALL OF THE BYTES INTO DECIMAL NUMBERS. EG CD = 12*16 + 13, 7F = 7*16 + 15 ETC AND WRITING THEM INTO DATA STATEMENTS, BUT AS THIS SYSTEM OF PUTTING THEM BACK INTO MEMORY REQUIRES AN EVEN NUMBER OF BYTES WE MUST ADD A ZERO AT THE END GIVING 28 BYTES IN TOTAL. WE ARE GOING TO STORE THEM IN AN INTEGER ARRAY WHERE EACH VALUE IN THE ARRAY HOLDS 2 BYTES SO FOR 28 WE NEED TO DIMENSION 13 AS WE WILL USE THE ZERO ONE.

TO GET THE VALUES INTO THE ARRAY, WE MULTIPLY THE SECOND ONE OF THE PAIR BY 256 AND ADD IT TO THE FIRST BUT CHECKING THAT THE RESULT IS NOT GREATER THAN 32767 BEFORE ALLOCATING IT TO THE INTEGER ARRAY. IF THE RESULT IS GREATER THAN 32767 THEN SUBTRACT 65536 FIRST. HOWEVER, I DON'T LIKE THESE BIG NUMBERS AND AS THE ONLY WAY TO END UP GREATER THAN 32767 IS FOR THE SECOND NUMBER OF THE PAIR TO BE GREATER THAN 127 IN THE FIRST PLACE, THEN THIS IS SIMPLER TO SORT OUT,

IF YOU ARE FORTUNATE ENOUGH TO BE USING THE ZEN EDITOR/ ASSEMBLER, THEN INCLUDE A LOAD 8800H COMMAND JUST AFTER THE ORG STATEMENT AND THEN PEEK AT MEMORY ADDRESSES 8800H TO 881AH AND GET THE DECIMAL VALUES OF THE MACHINE CODE BYTES. CONVERT THESE INTO DATA STATEMENTS AND YOUR FINISH PROGRAM SHOULD LOOK SOMETHING LIKE THE ONE ON PAGE 5.

IT IS POSSIBLE TO GO EVEN FURTHER TO MAKE LIFE MUCH EASIER. IT'S AN INTERESTING AND CLEVER LITTLE 'TRICK' IF YOU'RE USING ZEN (OR ANY EDITOR ASSEMBLER THAT ALLOWS YOU TO LOAD CODE INTO MEMORY) AND NEWDOS80 V2. YOU CAN CREATE THE DATA LINES FOR YOUR PROGRAM AUTOMATICALLY VIZ:-

```
OPEN "0",1,"DATA/BAS": ?
£1,"110 DATA ";:FORX=&H8800
TO &H881A: ?£1,PEEK
(X)",":NEXT:£1,CHR$(13):
     CLOSE
```



AND THEN LOAD INTO BASIC "DATA/BAS". LIST THE PROGRAM AND YOU'LL SEE YOU'RE ALREADY HALF WAY TO WRITING YOUR PROGRAM AND NOT HAD TO GO THROUGH THE HASSLE OF CONVERTING A LOAD OF HEX VALUES TO DECIMAL.

I ASSUME THAT A SIMILAR STATEMENT IS ALLOWED IN LDOS. IF ANYONE WOULD CARE TO SEND IT IN, I'LL BE HAPPY TO PUBLISH IT IN THE NEXT EDITION OF TRS8BIT.

NOT WISHING TO 'TEACH MY GRANDMOTHER TO SUCK EGGS', BUT LINE 40 IS ALSO A NICE LITTLE 'WHEEZE' IF YOU HAVEN'T COME ACROSS IT BEFORE.
THE RESULT, IN BASIC, OF THE STATEMENT (M>127) WILL EVALUATE TO -1 IF TRUE OR 0 IF NOT TRUE, EVEN WITHOUT AN

'IF' COMMAND BEFORE IT. THE EXPRESSION 256*(M>127) WILL RESULT IN EITHER -256 OR Ø FOR EITHER TRUE OF FALSE. THEREFORE, M+256*(M>127) WILL, IN ONE STATEMENT, RESULT IN THE VALUE M-256 IF M IS GREATER THAN 127 AND JUST M OTHERWISE. SO BY READING FROM THE DATA STATEMENT PAIRS OF VALUES INTO VARIABLES L AND M (YOU GUESSED IT, LEAST AND MOST SIGNIFICANT) WE CALCULATE THE COMBINED VALUE AS :- 256*(M+256*(M>127))+L

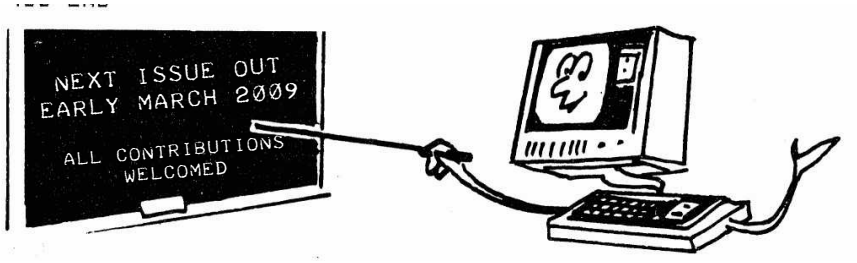
WITHOUT AN IF OR ELSE IN SIGHT!

N.B.
IT IS NECESSARY TO RE-DEFINE THE USR ROUTINE EACH TIME BEFORE USE SINCE INTRODUCING OTHER SIMPLE VARIABLES INTO THE RUNNING OF WHATEVER APPLICATION YOU PUT THIS ROUTINE TO, COULD CAUSE THE ACTUAL BYTES OF MEMORY ALLOCATED BY BASIC FOR THIS ARRAY TO BE CHANGED.

--== oØo ==--

```
 1                          ORG  8BØØH
                            LOAD 88ØØH
 2 8BØØ CD7FØA   START:     CALL ØA7FH       ;GET STRING POINTER
 3 8BØ3 7E                  LD   A,(HL)      ;GET LENGTH OF STRING
 4 8BØ4 B7                  OR   A           ;TEST IF NULL
 5 8BØ5 C8                  RET  Z           ;IF ZERO BYTES, RETURN
 6 8BØ6 47                  LD   B,A         ;PUT BYTE COUNT INTO REG B
 7 8BØ7 23                  INC  HL          ;POINT TO LSB IF STRING ADDR
 8 8BØ8 5E                  LD   E,(HL)      ;LOAD IN E REGISTER
 9 8BØ9 23                  INC  HL          ;POINT TO MSB OF STRING ADDR
10 8BØA 56                  LD   D,(HL)      ;DE NOW HAS ADDR OF STRING
11 8BØB 1A         LOOP:    LD   A,(DE)      ;GET BYTE FROM STRING
12 8BØC FE61                CP   "A"         ;IF < LOWERCASE A
13 8BØE 3807                JR   C,NEXT      ;IGNORE IT
14 8B1Ø FE7B                CP   "Z"+1       ;IF > LOWERCASE Z
15 8B12 3003                JR   NC,NEXT     ;IGNORE IT
16 8B14 E65F                AND  Ø1Ø111111B  ;MASK-OUT BIT 5
17 8B16 12                  LD   (DE),A      ;PUT BACK INTO STRING
18 8B17 13         NEXT:    INC  DE          ;POINT TO NEXT CHARACTER
19 8B18 1ØF1                DJNZ LOOP        ;GO ROUND LOOP
20 8B1A C9                  RET              ;ALL DONE - RETURN TO BASIC
21                          END
```

```
10 DEFINT J,L,M,N:DIMJL(13)
20 FORN=ØTO13
30 READ L,M
40 JL(N)=256*(M+256*(M>127))+L
50 NEXT
60 INPUT"TEXT STRING ";IN$
70 DEFUSR=VARPTR(JL(Ø))
80 M=USR(VARPTR(IN$))
90 PRINT IN$
100 GOTO60
110 DATA 205,127,10,126,183,200,71,35,94,35,86,26,254,97
120 DATA 56,7,254,123,48,3,230,95,18,19,16,241,201,0
```



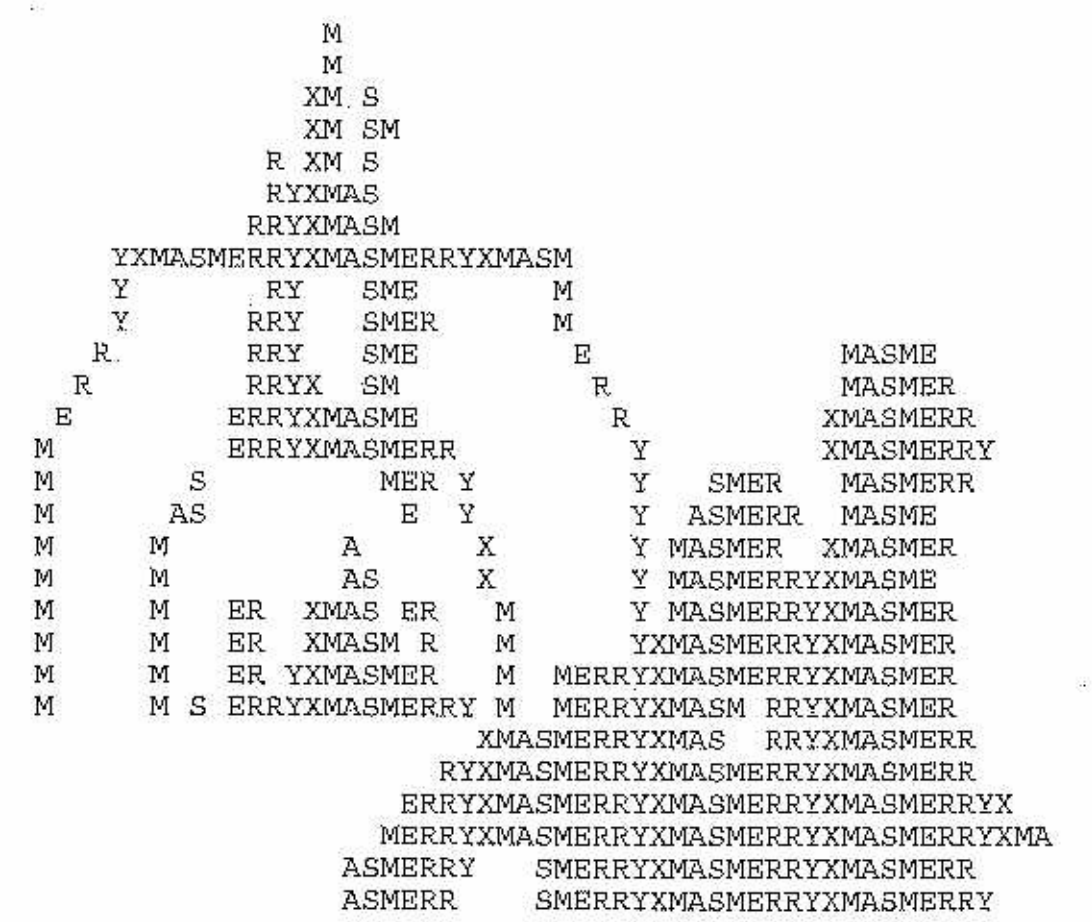
HERE'S THIS YEARS

XMAS PRINT. THE ORIGINAL CAN BE VIEWED ON PAGE 3.

I KNOW YOU NEED TO SQUINT A BIT AT IT BUT, HEY, GIVE ME A BREAK, IT IS CHRISTMAS AFTER ALL!

```
10 CLEAR500
20 M$="MERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRYXMASMERRYXM"
30 GOSUB 200
40 READ S
50 IF S=0 GOSUB 150
60 READ L
70 T$=MID$(M$,S,L)
80      X=PEEK(VARPTR(P$)+1)+PEEK(VARPTR(P$)+2)*256
90 REM - THE LINE BELOW IS FOR 16K+ MACHINES -
100      IF X>32767 X=X-65536
110          FOR Y=1TOL
120          POKE X+S+Y,ASC(MID$(T$,Y,1))
130          NEXT Y
140 GOTO 40
150 LPRINT P$
160 GOSUB200
170 READ S
180 IF S=99 THEN END
190 RETURN
200 P$=STRING$(63,32)
210 RETURN
220 DATA16,1,0,16,1,0,15,2,18,1,0,15,2,18,2,0,13,1,15,2,18,1,0
230 DATA 13,6,0,12,8,0,5,24,0,5,1,13,2,18,3,28,1,0
240 DATA 5,1,12,3,18,4,28,1,0,4,1,12,3,18,3,29,1,43,5,0
250 DATA 3,1,12,4,18,2,30,1,43,6,0,2,1,11,10,31,1,42,8,0
260 DATA 1,1,11,12,32,1,42,9,0
270 DATA 1,1,9,1,19,3,23,1,32,1,36,4,43,7,0
280 DATA 1,1,8,2,20,1,23,1,32,1,35,6,43,5,0
290 DATA 1,1,7,1,17,1,24,1,32,1,34,6,42,7,0
300 DATA 1,1,7,1,17,2,24,1,32,1,34,14,0
310 DATA 1,1,7,1,11,2,15,4,20,2,25,1,32,1,34,15,0
320 DATA 1,1,7,1,11,2,15,5,21,1,25,1,39,1,32,17,0
330 DATA 1,1,7,1,11,2,14,8,25,1,28,21,0
340 DATA 1,1,7,1,9,1,11,13,25,1,28,10,39,10,0
350 DATA 24,13,39,11,0,22,28,0,20,32,0,19,35,0
360 DATA 17,7,27,23,0,17,6,27,24,0,99
```

```
1 CLS:PRINT@30,"1 - 2";:PRINT@990,"3 - 4";:FORA=34TO96:SET(A,23)
:NEXT:FORB=6TO40:SET(65,B):NEXT:FORF=1TO10:X=RND(125):Y=RND(47):
SET(X,Y):S=(X(64)+2:S=S+(Y>23)*-2:FORA=0TO1STEP0:D=D+1:A$=INKEY$
:IFVAL(A$)=STHENRESET(X,Y):NEXTF:PRINT"
SCORE=";D:END:ELSENEXTA
```



MERRY CHRISTMAS EVERYONE AND A
HAPPY NEW YEAR

--== oØo ==--

WITH THANKS TO PETER PHILLIPS,

HERE'S YOUR CHRISTMAS PRESENT FROM TRS8BIT.

IT'S A LEVEL II, 16K RUNABLE, VERSION OF A SUDOKU CREATION PROGRAM.

THE MORE I RUN THIS PROGRAM, THE MORE IMPRESSED I BECOME WITH IT! ON A STANDARD LEVEL II MACHINE, OR WITHIN MATTHEW REED'S EMULATOR RUNNING AT 1.7 MHZ IT MANAGES TO PRODUCE A PUZZLE IN APPROX. 10 SECONDS. QUITE AN IMPRESSIVE ACHIEVEMENT FOR A 30 YEAR OLD PIECE OF HARDWARE. RAMP UP THE SPEED ON THE EMULATOR AND IT'S TRULY AMAZING!

ANYONE OUT THERE FANCY IMPROVING IT? HOW ABOUT AN ADDITIONAL OPTION TO ENTER THE NUMBERS FROM AN EXISTING PUZZLE AND CALCULATE THE ANSWER, INSTEAD OF USING ALL RANDOM NUMBERS?

DON'T FORGET, TO SAVE YOU TYPING THE PROGRAM IN, A DOWNLOAD IS AVAILABLE ON THE WEBSITE. JUST CLICK ON THE NAMED BOX.

```
5 DEFINTA-Z
10 DIM A(81),B(81)
20 PRINT "LARRY NELSON'S SUDOKU FOR THE APPLE II"
25 PRINT " (CONVERTED FOR TRS-80 BY PETER PHILLIPS)"
30 PRINT: INPUT"WANT INSTRUCTIONS";D$:IF LEFT$(D$,1)="Y" THEN GOSUB 1000
40 PRINT"CREATING..";
50 GOSUB 4000
60 GOSUB 5000
70 GOSUB 3000
80 GOSUB 7000
90 GOSUB 6100
95 F=0
100 PRINT "  1=NEW PUZZLE": PRINT"  2=ANSWER TO PUZZLE":
105 IF F=0 THEN PRINT "  3=SHOW PUZZLE AGAIN"
107 PRINT "  4=QUIT"
110 INPUT A
120 IF A=1 THEN 40
130 IF A=2 THEN GOSUB 6000
135 IF A=3 AND F=0 THEN GOSUB 6100
140 IF A=4 THEN END
150 GOTO 100
1000 PRINT"SUDOKU IS A NUMBER PUZZLE IN A 9X9 GRID."
1010 PRINT"THE GRID IS SPLIT INTO 9 3X3 MINI-GRIDS."
1020 PRINT"SINGLE DIGITS FILL THE GRID. THE DIGITS"
1040 PRINT"MAY BE IN ANY ORDER. THERE ARE JUST"
1050 PRINT"THREE RULES FOR SOLVING THE GRID--"
1060 PRINT"-EACH ROW MUST HAVE ALL THE DIGITS 1-9."
1070 PRINT"-EACH COLUMN HAS ALL THE DIGITS 1-9."
1080 PRINT"-EACH MINI-GRID MUST ALSO HAVE ALL THE"
1090 PRINT"  DIGITS FROM 1-9."
1100 PRINT:INPUT"  HIT ENTER TO CONTINUE";D$
1110 RETURN
3000 PRINT ".";
3010 FORI=1TO81:A(I)=B(I):NEXT
3020 FOR I=1 TO 7 STEP 3
3030 X=RND(6)-1
3040 IF X=0 THEN 3160
3050 Y=0:Z=2
3060 IF X=1 THEN Y=1
3070 IF X=3 THEN Z=1
3080 GOSUB 3400
3090 IF X<4 THEN 3160
3100 IF X=5 THEN 3130
3110 Z=1:GOSUB 3400
3120 GOTO 3160
3130 Y=1:GOSUB 3400
3160 NEXT I
3170 FORI=1TO81:B(I)=A(I):NEXT
3180 RETURN
3400 FOR J=0 TO 8
3420 W=9*J+I+Y:V=9*J+I+Z
3425 P=A(W):Q=A(V)
3430 A(W)=Q:A(V)=P
3470 NEXT J
3480 RETURN
4000 PRINT ".";
4010 FORI=1TO9:A(I)=I:NEXT
4020 FOR I=1 TO 30
4030 X=RND(9):Y=RND(9)
```

```
4030 X=RND(9):Y=RND(9)
4035 IF X>=Y THEN 4030
4040 B=A(Y):C=A(X)
4050 A(X)=B:A(Y)=C
4110 NEXT I
4120 RETURN
5000 PRINT".";
5005 FORI=1TO81:B(I)=0:NEXT
5010 FORI=1TO9:A(I+9)=A(I):NEXT
5015 P=1
5020 FOR I=0 TO 2
5030 FOR J=1 TO 7 STEP 3
5040 FOR K=0 TO 8:B(P+K)=A(I+J+K):NEXT
5045 P=P+9
5050 NEXT J,I
5060 RETURN
6000 REM
6010 INPUT "ARE YOU SURE YOU WANT THE ANSWER (Y/N)";D$
6020 IF D$<>"Y" THEN RETURN
6030 F=1:FORI=1TO81:A(I)=B(I):NEXT
6100 F$=CHR$(191):L$=STRING$(11,140):T$=CHR$(188)
6105 PRINT : PRINT T$;L$;T$;L$;T$;L$;T$
6110 FOR J=0 TO 8
6120 PRINT F$;
6130 FOR I=1 TO 9:K=9*J+I
6140 IF A(K)<>0 PRINT A(K); ELSE PRINT "   ";
6150 IF I - 3*INT(I/3) =0 THEN PRINT F$;
6160 IF I - 3*INT(I/3) >0 THEN PRINT ":";
6170 NEXT I
6175 PRINT
6177 IF J > 7 THEN F$=CHR$(143)
6190 IF J+1 - 3*INT((J+1)/3) =0 THEN PRINT F$;L$;F$;L$;F$;L$;F$
6200 NEXT J
6210 PRINT
6220 INPUT "HIT ENTER TO CONTINUE";D$
6230 RETURN
7000 REM
7010 FORI=1TO81:A(I)=B(I):NEXT
7020 PRINT:PRINT "HOW DIFFICULT DO YOU WANT YOUR PUZZLE":PRINT "
1=EASY": PRINT "  2=MEDIUM": PRINT "  3=HARD"
7030 INPUT A
7040 IF A<1 OR A>3 THEN 7020
7050 W=2*A+20+RND(2)-1
7060 FOR I=1 TO W
7070 X= RND (81)
7080 IF A(X)=0 THEN 7070
7090 A(X)=0
7100 X=82-X
7110 A(X)=0
7120 NEXT I
7130 RETURN
8000 REM PORTING COMMENTS
8010 REM 4000 CREATES A RANDOM ORDERING OF 1-9
8020 REM 5000 FILLS PUZZLE WITH ROTATIONS OF THE RANDOM ORDERING
8030 REM 3000 MORE-OR-LESS PERMUTES THE COLUMNS
8040 REM 7000 HIDES SOME OF THE ELEMENTS.
8050 REM 6100 PRINTS THE PUZZLE ARRAY.
```

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TRS8BIT - VOL 02 NO 04 - CHRISTMAS 2008 - PAGE 10

VISICALC®

POCKET REFERENCE

FOR THE TRS-80® MODEL III

Manufactured for

Radio Shack®

A DIVISION OF TANDY CORPORATION

By

PERSONAL SOFTWARE INC.

Program by

Software Arts, Inc.

VisiCalc® is a Registered Trademark of Personal Software Inc.
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TRS-80® is a Trademark of Tandy Corporation

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KEY FUNCTIONS

MOVING THE CURSOR

→ ← ↑ ↓	Moves cursor in designated direction. Used in value entry and some commands to point to an entry position that will be selected when ENTER or a colon is pressed. Move edit cursor in Edit Command (see /E).
;	Moves cursor between windows (see /W).
>*coord*	Go To Command. Cursor moves to designated coordinate. ENTER completes command.

CALCULATING

+	Addition
−	Subtraction
*	Multiplication
/	Division
SHIFT @	Exponentiation character ∧.
#	If coordinate is immediately to left of edit cursor on edit line, replaces coordinate with that location's current value. Otherwise places current value of cursor location on edit line.
!	When the edit line is clear, forces recalculation of entire sheet. When formula is on the edit line, replaces formula on edit line with its current value.

EDITING

BREAK	Exits command.
CLEAR	Edit cursor deletes one position. If edit line is blank, exits command.
SHIFT-ENTER	Invokes Edit Command (see /E).

LABELS

Start with any letter or ". The initial quotation mark does not appear on the edit line. Defines the entry as a label with the numeric value of zero. Labels are left-aligned in the entry position. Correct typing errors while entering with the CLEAR key or SHIFT-ENTER (see /E).

VALUES

Start with a digit (0 through 9), plus (+), minus (−), open parenthesis, period (.), number sign (#), or at sign (@). Values are stored with 11 to 12 significant digits. In general format, program shifts between conventional and scientific notation as required to display the calculated value to the greatest precision. If column is too narrow to display the number in scientific notation, greater-than signs (>) fill the entry position.

VALUE REFERENCE

Entry position coordinate used as element in a formula. Value references are allowed wherever numbers are allowed. To start a value entry with a value reference, begin with +.

FILE NAMES

A file name is one to eight characters beginning with a letter, optionally followed by /VC for a worksheet, /PRF for a print file, or /DIF for worksheet in DIF™ format. The VisiCalc program adds the suffixes /VC, /PRF and /DIF. Disk drive specified by final suffix :0 or :1.

FUNCTIONS

Provide common formulas for use in values. Each function begins with @ followed by the name of the function; most functions also require an expression in parentheses (the argument). An argument includes the values (formulas and numbers) upon which the function calculates. The arguments shown as *v* may be any legal VisiCalc values. The arguments shown as *l* may be any logical values. The arguments shown as *list* may be any combination of values and ranges separated by commas. A *range* is a portion of a row or column specified by its beginning coordinate, a period (shown as an ellipsis), and its final coordinate.

@ABS(*v*)	Absolute value of *v*.
@AVERAGE(*list*)	Average of the non-blank entries in *list*. Maximum of 255 entries in *list*.
@COUNT(*list*)	Number of non-blank entries in list. Maximum of 255 entries in *list*.
@EXP(*v*)	Natural exponent of *v*.
@INT(*v*)	Integer portion of *v*.
@LN(*v*)	Natural logarithm of *v*.
@LOG10(*v*)	Base 10 logarithm of *v*.
@MAX(*list*)	Maximum value in *list*.
@MIN(*list*)	Minimum value in *list*.
@NPV(*dr,range*)	Net present value of the cash flow in *range*, discounted at the rate specified in the expression *dr* (discount rate).
@SQRT(*v*)	Square root of *v*.
@SUM(*list*)	Sum of the values in *list*.

TRIGONOMETRIC FUNCTIONS

All angles are calculated in radians.

@ACOS(*v*)	Arccosine of *v*.
@ASIN(*v*)	Arcsine of *v*.
@ATAN(*v*)	Arctangent of *v*.
@COS(*v*)	Cosine of *v*.
@SIN(*v*)	Sine of *v*.
@TAN(*v*)	Tangent of *v*.

SEARCH FUNCTIONS

@CHOOSE (*v,list*)	Returns the *v*th element of *list*. If *v* is greater than the number of elements in *list*, NA is returned.
@LOOKUP (*v,range*)	Compares *v* to the successive values in *range* and returns the corresponding value from the column or row immediately to the right or below the entries in *range*.

FUNCTIONS WITHOUT ARGUMENTS

@ERROR	Makes all expressions referencing the value display ERROR.
@FALSE	Logical value FALSE.
@NA	Makes all expressions referencing the value display NA.
@PI	3.1415926536.
@TRUE	Logical value TRUE.

LOGICAL FUNCTIONS

@AND(*list*)	TRUE if all values in *list* are TRUE, otherwise FALSE.
@IF(*l,v1,v2*)	*v1* if *l* is TRUE; *v2* if *l* is FALSE.
@ISERROR(*v*)	TRUE if *v* is ERROR; otherwise FALSE.
@ISNA(*v*)	TRUE if *v* is NA; otherwise FALSE.
@NOT(*l*)	TRUE if *l* is FALSE; FALSE if *l* is TRUE.
@OR(*list*)	TRUE if any value in *list* is TRUE, otherwise FALSE.

COMMANDS

/B Blank – Erases the highlighted entry position. ENTER or arrow key completes command.

/C Clear – Clears the worksheet, restores the General format and single window. Y completes command, any other key cancels.

/D Delete – Deletes all the entries in the row (/DR) or column (/DC) on which the cursor rests.

/E Edit – Allows editing of entry position contents. Places the contents of the highlighted entry position on the edit line. The left and right arrow keys (→ and ←) move the edit cue over the characters without changing them. The ↑ arrow key moves the edit cue to the beginning of the edit line; the ↓ arrow key moves the edit cue to the end of the edit line. Enter or delete to the left of the edit cue. SHIFT-ENTER invokes the Edit Command while entering values and labels.

/F Format – Sets local format for the highlighted entry position but does not affect contents in memory. Remains until changed or the worksheet is cleared.

- /FD Default – Resets to the global format.
- /FG General – Maximum precision.
- /FI Integer – Integer.
- /FL Left-aligned.
- /FR Right-aligned.
- /F$ Dollars-and-cents (two decimal places).
- /F* Graph – Replaces value with asterisks equal to its integer value.

/G Global – Affects entire window or sheet.

- /GC Column – Sets column width of all columns to specified number of characters. ENTER completes command.
- /GF Format – Sets display format for all entry positions not specifically formatted. See /F for format specifications.
- /GO Order of recalculation – Specifies whether the worksheet is to be recalculated down the columns (/GOC) or across the rows (/GOR).
- /GR Recalculation priority – Sets recalculation to automatic (/GRA) or manual (/GRM). Typing ! causes recalculation.

/I Insert – Inserts a new blank row (/IR) or column (/IC) at the cursor position.

/M Move – Moves an entire row or column to another position on the sheet. The first coordinate on the edit line is the row or column to be moved. The final coordinate specifies where the row or column is to be moved. ENTER completes command.

/P See "Printing."

/– Repeating Label – Fills the entry position with the designated character(s).

/R See "Replicating."

/S See "Storing."

/T Titles – Fixes rows and columns in place on the screen so they remain in view when the window is scrolled. The position of the cursor determines which column(s) and/or row(s) to be fixed. The Go To command (>) moves the cursor into a fixed area.

- /TH Horizontal – Fixes rows at and above the cursor.
- /TV Vertical – Fixes columns at and to the left of the cursor.
- /TB Both – Fixes columns and rows.
- /TN None – Unfixes all rows and columns.

/V Version – Displays the copyright notice and version number on the prompt line.

/W Windows – Splits the screen vertically or horizontally at the current cursor position. The semicolon (;) moves the cursor from one window to the other. Global commands affect only the window containing the cursor.

- /WH Horizontal – Splits the window just above the row with the cursor.
- /WV Vertical – Splits the window just to the left of the column with the cursor.
- /W1 One – Returns to one window.
- /WS Synchronized scrolling – Split windows scroll together.
- /WU Unsynchronized scrolling – Cancels synchronized scrolling.

PRINTING

The Print command sends a rectangular portion of the worksheet to a printer or to diskette. Formulas are not sent (to print formulas and formats, see /SS). To print all or part of a VisiCalc worksheet:

1. Place the cursor on the upper-left coordinate of the rectangular area to be printed and type /P.
2. Type F to send to diskette file.

   Type P to send to parallel interface printer.

   Type R to send to an RS-232 interface printer.
3. To send setup codes, type ", the setup string, then ENTER. The following special characters can be used:

∧C *char*	Sends control *char*acter.
∧E	Sends the Escape character.
∧Hnn	Sends the single ASCII character defined by the hexadecimal digits nn.
∧R	Sends a return character.
∧L	Sends a line feed character.
∧∧	Sends one carat character (∧).

   The setup codes must be reentered each time the Print command is used. Invalid codes are sent to the printer – no error indication is given.
4. The VisiCalc program automatically sends a line feed with each carriage return.

   – Turns off the line feed.
   & Restores line feed.
5. Enter lower-right coordinate of the rectangle to be printed, either by typing it or pointing the cursor to it, and type ENTER.

BREAK stops printing.

REPLICATING

The Replicate command copies the entry contents of the source range (the position(s) to be copied) into the target range (the position(s) to which it will be copied).

A range is a portion of a row or column specified by its beginning coordinate, a period (shown as an ellipsis), and its final coordinate.

A colon separates the source range from the target range and is entered by typing either colon or ENTER.

	Source	Target
To copy one entry once	coordinate	: coordinate
To copy one entry several times	coordinate	: range in same row or column
To copy a row or column once	row or column range	: starting coordinate
To copy a row several times	row range	: range in same column
To copy a column several times	column range	: range in same row

ENTER completes command.

If the source range includes reference to other locations, indicate how each reference is to be treated:

N No Change - Copies the reference as it appears in the source entry.

R Relative - Changes the reference so that it is relative to the target position.

STORING

The Storage command writes a file to diskette, reads a saved file from diskette, writes and reads files in the DIF™ format, deletes files from a diskette, and quits the VisiCalc program. File names can be displayed from the diskette by pressing the right arrow key when prompted for file name.

/SL Load - Loads a file previously saved with /SS. The file is loaded over the current sheet. New entries replace old ones. Any entries that are not replaced remain the same.

/SS Save - Saves the information on the worksheet to diskette under the specified file name. To print out formulas and formats type /SS:P.

/SD Delete file - Deletes the specified file from the diskette.

/SQ Quit - Quits the VisiCalc program, and returns to the operating system. Y completes command, any other key cancels.

/S#S Saves the specified area of the worksheet to diskette as a file in the DIF™ format. R or ENTER saves by rows, C saves by columns.

/S#L Loads a file in the DIF™ format. R or ENTER loads the information by rows, C loads by columns.

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