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AUSTRALIAN

RAINBOW

INCORPORATING

GOCO

October, 1984

No.40

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AUSTRALIAN RAINBOW INCORPORATING GOCO

AUSTRALIAN EDITOR AND PUBLISHER
Graham Morphett

CO-EDITOR
Kevin Mischewski

EDITOR'S ASSISTANT
Christine Lucas

AND GRATEFUL ASSISTANCE FROM
Brian Dougan
Peggy Annabel
Richard and Judy
Rod Hoskinson
Helga Wilson
Patric Simonis
Annette Morphett
Glen Mischewski
Jim & Sheryl Bentick

COVER DESIGN
Jim Bentick

All Programs in this issue of RAINBOW are available on cassette tape

SEE CENTRE PAGE FOR DETAILS

OS-9

Kevin HOLMES is the man to contact for information on OS-9. All Rainbow OS-9 content is sent to him and in turn to those interested, along with a monthly newsletter. Kevin has joined the US Users' Group, and wants to form a local branch of that group here to give you access to all their public domain software, and to keep you abreast of the latest news. Kevin appreciates any assistance you can provide in the form of software or hints.

His address is:—

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The major issue facing the computer world is the problem of software piracy.

In particular, it seems that IBM's PC with its attendant software is the victim of blatant attempts at piracy. (Before this, APPLE had to fight 'em off too.)

Currently it is possible, the story goes, to obtain $15 copies of some of the major software packages for the PC from Taiwan - with other software to follow.

Apart from the moral issues (remember morals?), there are reasons why these things cost what they cost over and above the physical cost of producing them. Our visit to Tandy's Headquarters in Mt. Druitt N.S.W. (reported upon elsewhere) underlined some of these reasons, and incidently, left us feeling that we do get good value for money from our Tandy shop.

You may not realize it, but up until recently, every computer Tandy sold was individually bench tested at Mt. Druitt. Tandy is now only testing one in ten Color Computers, because the rejection rate over the past three years has been virtually non existant. They continue to test 100% of all other computers in their line. Tandy also hold parts for all their products for six years after they stop selling the product and spend considerable sums developing new products; the Model II Mark II CoCo, soon to be released, the result of one such project.

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From the other side, one of the reasons that people have turned to stealing programs, particularly those that belong to computers other than CoCo, is that their programs cost so much.

In fact when you look at the price of, say "Wordstar", and compare it to the price of, say "VIP Writer" (not that I'm equating the two), there does seem to be a wildly disproportionate factor ruling. How come you get for no apparent additional price, "Wordstar", "Spellstar", and whatever else when you buy say, an Osbourne, when the same programs off the shelf cost the best part of $1200.

Something, as they say, is fishy, because Osbourne and Co are unlikely candidates for the piracy courts. They obviously buy their software from the owner at considerably reduced rates.

The result of continued dishonesty in regard to computer software is truncation of software and hardware production. If I know you're going to copy disk after disk of any new program I create, where's the incentive to produce further programs?

The answer to the problems of the industry may yet lie with our very own CoCo. We have not been as affected by the massive theft of programs from which other systems have suffered.

Sure in most clubs there are the thoughtless ones who attempt to copy every new program that comes to a meet (- and we must one day address ourselves to that problem), but at least we do not see large quantities of familiar software under someone else's banner for half the price! Why? - because the price of software is reasonable in the first place. If you feel it's a bit stiff to pay $59.95 for a Scriptsit ROM PACK, you would really be winging if you had to pay $300+ for "Wordstar". $29.95 for Donkey King isn't bad - betcha can't get it for an IBM PC near that price!

So maybe if the software suppliers priced the product realistically then the motivation to cheat would be reduced.

On a lighter note, but briefly, this is our education issue. There is currently an explosion of interest in CoCo from educational authorities around Australia.

In Sydney, the first Users' Group for people interested in the educational application of CoCo was recently inaugurated.

In Queensland, CoCo is in daily use in many schools. Education is what CoCo is all about, and CoCo is especially at home when interfaced to a school environment.

Our special thanks must go to the Queensland Education Dept and to the Tandy Education Reps from the Fortitude Valley Computer Centre in Brisbane, for their assistance in the preparation of this issue.

MT. DRUITT

Kevin and Myself took advantage of a recent ten second lull in telephone calls to get out of the office and off in the car to Sydney. The aim being to meet the folk at Tandy's Head Office and to do some other chores along the way. Needless to say, we got done about 20% of what we set out to do.

But see Tandy we did.

Tandy's new premises in Mt. Druitt are located in a new industrial estate. The buildings are modern and there is room for expansion.

We met with Mal Williams first. He is currently Australian Computer Marketing Manager. Mal is a quiet guy who thinks before he speaks. He was more co-operative than we expected. We discussed many issues including new products, joint promotions, and even joint ventures.

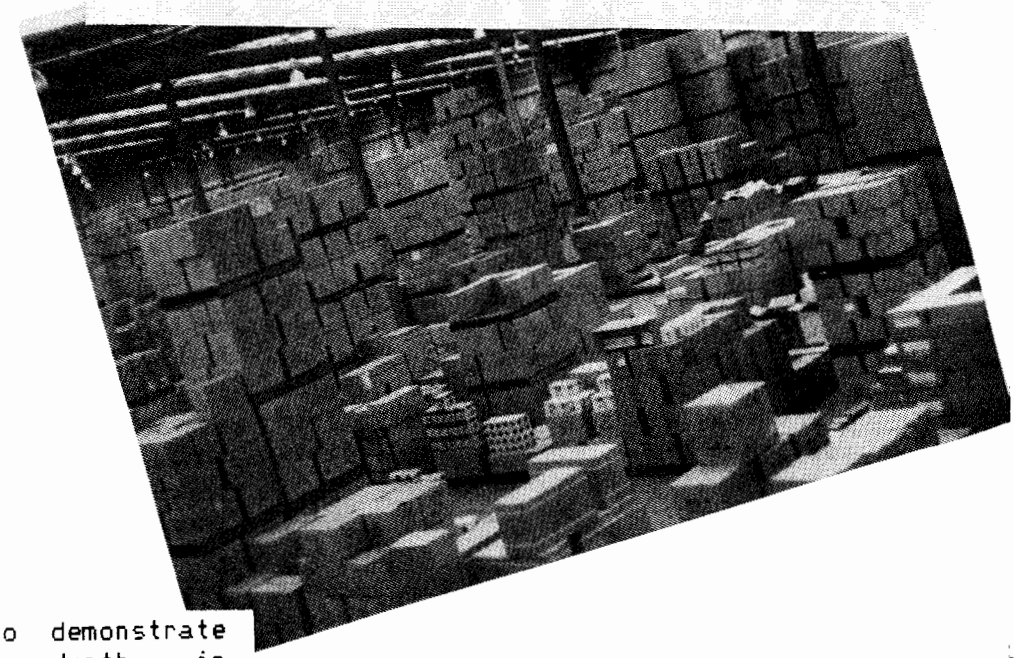
Then it was time for the grand tour. It was during the tour that we came to realize just what an investment Tandy must have in Australia.

But it was the people and their attitude that continued to impress. Like Jeff Beaumont in the Service Centre, Steve De Calb, Adrian and various others who demonstrated a care for their customers and a caring knowledge of Rainbow and what we are about.

In this day and age when no other store carries more stock than what they can turn over in a Month, Tandy has a very full, very large warehouse.

As mentioned elsewhere, Tandy holds $2.5 million worth of spare parts. They keep parts for up to six years after they delete a line. Tandy also retains a service manual for every piece of equipment it sells.

We saw a number of new items, and after we left, we started to think about what it all meant. Crystal Ball gazing can be fun and this is what we think we can see in the not too distant future.



1. The possibility of a CoCo with more R.A.M. which is unlikely to be accessable to basic. The rumors from America have been flying thick and fast about such a computer and it may yet not eventuate - still.....

2. The growth in OS-9 as an operating system par excellance with a large number of programs to run from it.

3. If more RAM is to be made available, then it would be utilised by OS-9.

4. A growth in the popularity of the Model 2000. The current shipment of this excellent machine is sold out.

5. A strong move to demonstrate strength as well as depth in Educationally based software.

6. We doubt that Tandy will allow themselves to be kept out of the schools in NSW and VIC (or any other State for that matter!) for any longer than they can help!

7. Some tentative involvements in periferal areas such as speech synthesis, bulletin board programs etc., - just to check the water temperature!

These are all guesses - we were asked not to reveal for another month the details of several exciting things - so look for more news next month!

EDUCATION AND TANDY

Ross Eldrich and Gaylene Brown work for the Queensland Education Dept., as Project Officers with the South East Queensland Division's Computer Evaluation Project.

Both are long serving teachers who have been taken out of the system and given the job of leading this project.

The Project has been active for about one year, sufficient time to prove it's worth.

Ross and Gaylene take their computer classroom to previously arranged venues, usually schools. (The computers are all 64K ECB TANDY COLOR COMPUTERS). In stage 1, they stay for about a week - long enough to run a "first timers" course for a good cross section of the school's community.

Usually this means that teachers are taken from their classes and given training in the mornings, the kids get to use the computers in the afternoons, and the parents come along for evening meetings.

By the end of the week, most people have reached the stage where they can certainly interact with a computer, and many gain the rudiments of programming skills.

The work that Ross and Gaylene do does not stop when they leave the school at the end of the week. Follow up lessons are then provided for selected people - in particular, for the teachers. These tutorials are run from 'home base' at the Logan City Education Centre in Woodridge, Qld.

Ross and Gaylene are averaging 12-15 schools per year with this program at present and the results have been most encouraging.

Never the less, the very way in which the Project is attacking the subject, underlines the great need to do much more to bring the computer into the lives of the school population.

Over a most pleasant lunch, Ross recently outlined the current status of the computer in the school and some of the initiatives that have been taken to encourage teachers, authorities, kids and parents to get involved. (The kids don't usually need much motivating!)

The benefits of involving children with computers seem to be the same ones that we have been finding in our own user groups. It appears that concepts, when skillfully integrated with the computer often can be passed on far more efficiently when there is a computer to assist. The kids love to use the commputer. Reading skills improve, math skills improve and improvements in deductive reasoning can also be noted.

Ross has had a lot of contact with Greg Trigger and Leo Wilson from the Tandy Computer Centre. In fact Tandy is justifiably proud of their part in the Project. Many Queensland Primary Schools now use the Tandy Color Computer as a result of Greg and Leo's work. As Ross Eldrich says, "The Tandy Color Computer is underrated by many people because it doesn't look as smart as other computers. In fact it has a BASIC which is most forgiving and is therefore particularly suited to the school environment. In addition, the support given by these guys is second to none."

It is in the area of support, that Leo Wilson feels he can be of greatest use to Educationalists. In fact he has initiated an Educational Software source book. This book, which will be similar to Tandy's Agricultural Software source book, will provide listings on just about every program of an educational nature for a Tandy computer.

Leo also does all the usual things that one would expect of a Salesman working in the field of education - school demos, teacher training, software demonstration - that type of thing.

Leo sees five levels of usage for computers in classrooms. They are:

1. For use as an Electronic Blackboard
2. For Drill and Practice
3. Simulation
4. Computer Assisted Instruction
5. To teach programming itself.

Teachers, he feels, need software packages which are easy to use, work well in the classroom and compliment the syllabus. Whilst there are many software packages around for a great many computers, it is often difficult to see just what purpose some of the packages serve. As he says - a number of the opposition claim to have great quantities of educational software available for their computers - but what is the percentage of available syllabus relevant software?

Leo is a member of the Qeensland Software Developmet Council which has been specifically set up to foster the development of software for Queensland Schools. Through this association he is able to foster software projects that meet a real need.

In the School's Administration, computers can and are being used to maintain student records, provide budgeting and accounts control, and the various other special files that are required.

Computers are of particular assistance to Librarians.

Tandy in Queensland has achieved much. They are on the Dept. of Education's contracts list, they provide a worthwhile product, they provide or encourage a wealth of support services and, with the introduction of the Model 2000, they are in the forefront of those who would provide total School management tools.

****

So far this year, the Fortitude Valley Computer Centre in Qld has had over 450 Teachers and Principals through their Educator Training Workshop. The three hour introductory course on classroom computers is run four days a week at the Computer Centre.

This Education column is a new feature which will appear as long as the articles keep coming!

Education is something that CoCo does very well and it is most appropriate that Rainbow addresses itself to this area, particularly as there are the beginnings of several Teachers' User Groups.

We of the general public can also be of assistance to those of you who teach.

It was quite evident during the discussions that we had with various ones during the preparation of the article on Tandy and Education, that one of the real problems that a teacher faces is the problem of finding enough time to program!

It occured to me that if you have a genuine need for a program to undertake a specific job, then we could probably suck some poor .... into working with you. (How about it Koala? You've got nothing better to do with your time!)

Conversely, if you drop us a line occasionally, or dictate an article over the phone, we'll tell the rest of the country what you're up to!

****

The Holy Spirit School, Pine Rivers, Qld, is a recent purchaser of CoCos.

This year the Catholic Education office introduced a funding scheme for Parish Schools. After comparing a number of computers, the Holy Spirit School chose the 16K CoCo.

All years, 2 to 7 will be timetabled for visits to the Computer Room for one hour per week.

Their program covers four areas:

1. Computer Awareness.
2. Computer Literacy.
3. Computer Programing.
4. Computer Assisted Instruction.

In addition the School sees a need for year 1's to have access to the computers for games. This enhances their eye-hand co-ordination and fine motor development.

GAME

32K ECB

the RAINBOW

GEO GRAPHICS

by Joseph S. Paravati

Learning the 50 states and their capitals was always a challenging part of geography class. Memorizing the names of all those cities was not any easy task. Here is a program that can be used to help you put those cities with the right state. *MAP*, which requires 32K ECB, is a game as well as a learning tool. After *CLOADing* and *RUNing*, you are given instructions and then presented with a blue map of the United States.

Each state will be randomly highlighted in red. You must type in the name of that state (spelling counts!) and push ENTER. For each correct answer you score 10 points. If you make a mistake, you will be given the correct answer. Next, a tiny white flashing dot will appear where the capital of that state is located. Again, type in the correct name and your score will be given. So, get out your Atlas or your old geography book and study those states. I could've sworn that Miami was the capital of Florida.

```
110..... 217    1580 ..... 1
170..... 16     1920 .... 229
280..... 97     2170 .... 194
630..... 242    5160 .... 121
960..... 85     5360 .... 204
1280 .... 226   END .... 182
```

The listing:

```
10 ' ***GEOGRAPHY LESSON*** 3/83
     BY J.S.PARAVATI
20 R=RND(-TIMER):NU=0
30 CLS0:PRINT@234,"GEOGRAPHY GAM
E";:PRINT @480,"BY J.S.PARAVATI
 3/83";
40 DIM X(50),Y(50),S$(50),P$(50)
50 FOR N=1 TO 50
60 READ X(N),Y(N):NEXT N
70 DATA 16,63,16,39,20,27,38,39,
28,60,48,57,44,87,68,81,76,60,72
,51,60,24,96,27,96,40,124,51,124
,66,116,81,124,100,140,36,140,48
,148,66,148,84,156,108,160,36,16
4,57,188,69
80 DATA 212,69,208,81,172,81,168
,99,184,99,200,93,192,108,216,90
,184,54,196,54,206,62,216,60,222
,62,224,54,216,51,188,33,224,33,
232,45,242,42,236,38,232,30,238,
30,240,18,44,156,88,144
90 FOR N=1 TO 50:READ S$(N),P$(N
):NEXT N
100 DATA CALIFORNIA,SACRAMENTO,O
REGON,SALEM,WASHINGTON,OLYMPIA,I
DAHO,BOISE,NEVADA,CARSON CITY,UT
AH,SALT LAKE CITY,ARIZONA,PHOENI
X,NEW MEXICO,SANTA FE,COLORADO,D
ENVER,WYOMING,CHEYENNE
110 DATA MONTANA,HELENA,NORTH DA
KOTA,BISMARCK,SOUTH DAKOTA,PIERR
E,NEBRASKA,LINCOLN,KANSAS,TOPEKA
,OKLAHOMA,OKLAHOMA CITY,TEXAS,AU
STIN,MINNESOTA,SAINT PAUL,IOWA,D
ES MOINES,MISSOURI,JEFFERSON CIT
Y,ARKANSAS,LITTLE ROCK,LOUISIANA
,BATON ROUGE
120 DATA WISCONSIN,MADISON,ILLIN
OIS,SPRINGFIELD,KENTUCKY,FRANKFO
RT,VIRGINIA,RICHMOND,NORTH CAROL
INA,RALEIGH,TENNESSEE,NASHVILLE,
MISSISSIPPI,JACKSON,ALABAMA,MONT
GOMERY,GEORGIA,ATLANTA,FLORIDA,T
ALLAHASSEE,SOUTH CAROLINA,COLUMB
IA
130 DATA INDIANA,INDIANAPOLIS,OH
IO,COLUMBUS,WEST VIRGINIA,CHARLE
STON,MARYLAND,ANNAPOLIS,DELAWARE
,DOVER,NEW JERSEY,TRENTON,PENNSY
```

```
LVANIA,HARRISBURG,MICHIGAN,LANSI
NG,NEW YORK,ALBANY,CONNECTICUT,H
ARTFORD
140 DATA RHODE ISLAND,PROVIDENCE
,MASSACHUSETTS,BOSTON,VERMONT,MO
NTPELIER,NEW HAMPSHIRE,CONCORD,M
AINE,AUGUSTA,ALASKA,JUNEAU,HAWAI
I,HONOLULU
150 GOSUB 5000
160 CLS:PRINT @4,"***STATES AND
CAPITALS***":PRINT STRING$(32,"*
")
170 PRINT "TYPE IN AND <ENTER> C
ORRECT      STATE WHICH IS SHOWN
ON MAP.     10 POINTS FOR CORRECT
 ANSWER -10FOR WRONG ANSWER. THE
N TYPE AND <ENTER> CORRECT CAPIT
AL FOR SAMESTATE. CAPITAL FLASHE
S ON AND    OFF WHEN IT IS TIME T
O TYPE IN   CAPITAL."
180 PRINT "20 POINTS FOR CORRECT
 ANSWER,    -20 FOR WRONG ONE."
190 PRINT @482,"<PRESS ANY KEY T
O CONTINUE>";
200 K$=INKEY$:IF K$="" THEN 200
210 S=1
220 CLS:PRINT "MAP SHOULD BE BLU
E. IF NOT THEN USE <RESET BUTTON
> AND RE-RUN.  DO THIS AS MANY T
IMES AS NEEDED UNTIL MAP IS BLUE
."
230 PRINT:PRINT "DURING GAME YOU
 MAY PRESS <DOWN ARROW> KEY TO G
ET A BLACK ON     GREEN COLOR SET
.":PRINT:PRINT "IF YOU TYPE IN W
RONG ANSWER OR  SPELLING IS WRON
G THE COMPUTER  WILL GIVE RIGHT
ANSWER."
240 PRINT @485,"<PRESS ANY KEY T
O START>";
250 K$=INKEY$:IF K$="" THEN 250
260 PMODE4,1:PCLS0:SCREEN1,0
270 PMODE3
280 COLOR 8
290 ' UNITED STATES MAP
300 CIRCLE(90,15),72,,.08,0,.5
310 CIRCLE(18,52),12,,3,.25,.75
320 LINE(18,88)-(30,88),PSET
330 LINE-(48,98),PSET
340 LINE-(64,98),PSET
350 LINE-(64,94),PSET
360 LINE-(76,94),PSET
370 LINE-(84,99),PSET
380 LINE-(84,108),PSET
390 LINE-(96,117),PSET
400 LINE-(98,117),PSET
410 LINE-(104,108),PSET
420 LINE-(112,108),PSET
430 LINE-(132,132),PSET
440 LINE-(140,134),PSET
450 LINE-(138,123),PSET
460 LINE-(144,114),PSET
470 LINE-(156,114),PSET
480 LINE-(160,111),PSET
490 LINE-(172,109),PSET
500 LINE-(188,111),PSET
510 LINE-(200,120),PSET
520 LINE-(208,141),PSET
530 LINE-(212,143),PSET
540 LINE-(216,138),PSET
550 LINE-(212,108),PSET
560 LINE-(230,76),PSET
570 LINE-(224,74),PSET
580 LINE-(228,48),PSET
590 LINE-(244,44),PSET
600 LINE-(240,30),PSET
610 LINE-(252,15),PSET
620 LINE-(248,12),PSET
630 LINE-(244,3),PSET
640 LINE-(242,3),PSET
650 LINE-(232,18),PSET
660 LINE-(216,20),PSET
670 LINE-(206,43),PSET
680 LINE-(196,45),PSET
690 LINE-(195,45),PSET
700 LINE-(196,24),PSET
710 LINE-(192,12),PSET
720 LINE-(184,14),PSET
730 LINE-(180,21),PSET
740 LINE-(184,45),PSET
750 LINE(172,45)-(168,24),PSET
760 LINE-(164,15),PSET
770 LINE(172,45)-(184,45),PSET
780 PAINT(128,96),6,8
790 ' **********************
800 ' STATES
810 LINE(30,88)-(34,84),PSET
820 LINE-(20,60),PSET
830 LINE-(20,48),PSET
840 LINE-(8,48),PSET
850 LINE(58,98)-(58,74),PSET
860 LINE-(38,74),PSET
870 LINE-(38,78),PSET
880 LINE-(35,78),PSET
890 LINE-(33,80),PSET
900 LINE(38,74)-(38,48),PSET
910 LINE-(20,48),PSET
920 LINE(58,74)-(58,54),PSET
930 LINE-(52,54),PSET
940 LINE-(52,48),PSET
950 LINE-(38,48),PSET
960 LINE(52,54)-(78,37),PSET,B
970 LINE-(78,20),PSET
980 LINE(10,32)-(32,32),PSET
990 LINE-(32,48),PSET
1000 LINE(32,18)-(32,48),PSET
1010 LINE(40,18)-(52,39),PSET
1020 LINE(58,54)-(92,75),PSET,B
1030 LINE(86,75)-(86,92),PSET
1040 LINE-(74,92),PSET
1050 LINE-(76,93),PSET
```

```
1060 LINE(88,75)-(140,75),PSET
1070 LINE-(140,88),PSET
1080 LINE-(105,86),PSET
1090 LINE-(105,80),PSET
1100 LINE-(88,80),PSET
1110 LINE(140,88)-(146,90),PSET
1120 LINE-(146,96),PSET
1130 LINE-(150,102),PSET
1140 LINE-(148,114),PSET
1150 LINE(92,58)-(138,75),PSET,B
1160 LINE(78,20)-(114,33),PSET,B
1170 LINE(78,45)-(114,33),PSET,B
1180 LINE(150,42)-(115,42),PSET
1190 LINE-(126,45),PSET
1200 LINE-(132,51),PSET
1210 LINE-(138,57),PSET
1220 LINE(150,30)-(152,17),PSET
1230 LINE-(148,36),PSET
1240 LINE-(152,42),PSET
1250 LINE-(152,45),PSET
1260 LINE-(156,48),PSET:LINE-(15
6,51),PSET
1270 LINE-(152,54),PSET
1280 LINE-(136,54),PSET
1290 LINE(140,76)-(160,76),PSET
1300 LINE-(156,93),PSET
1310 LINE-(148,93),PSET
1320 LINE(160,86)-(176,86),PSET
1330 LINE-(176,108),PSET
1340 LINE(156,93)-(160,96),PSET
1350 LINE-(160,105),PSET
1360 LINE-(168,105),PSET
1370 LINE-(168,110),PSET
1380 LINE(176,86)-(192,86),PSET
1390 LINE-(196,102),PSET
1400 LINE-(196,106),PSET
1410 LINE-(180,106),PSET
1420 LINE-(180,110),PSET
1430 LINE(196,106)-(212,106),PSE
T
1440 LINE(192,86)-(208,86),PSET
1450 LINE-(216,102),PSET
1460 LINE(208,86)-(216,84),PSET
1470 LINE-(224,87),PSET
1480 LINE(160,76)-(228,76),PSET
1490 LINE(192,86)-(196,77),PSET
1500 LINE(152,54)-(160,75),PSET
1510 LINE-(180,63),PSET
1520 LINE-(184,66),PSET
1530 LINE-(190,66),PSET
1540 LINE-(198,68),PSET
1550 LINE-(192,75),PSET
1560 LINE(190,65)-(190,45),PSET
1570 LINE-(176,45),PSET
1580 LINE-(176,51),PSET
1590 LINE-(171,67),PSET
1600 LINE(152,45)-(176,45),PSET
1610 LINE(192,45)-(204,45),PSET
1620 LINE-(204,57),PSET
1630 LINE-(198,68),PSET
1640 LINE-(208,66),PSET
1650 LINE-(216,63),PSET
1660 LINE-(224,69),PSET
1670 LINE(204,57)-(216,63),PSET
1680 LINE(204,45)-(220,45),PSET
1690 LINE-(222,51),PSET
1700 LINE-(220,54),PSET
1710 LINE-(222,57),PSET
1720 LINE-(204,57),PSET
1730 LINE(220,57)-(220,66),PSET
1740 LINE(226,60)-(220,57),PSET
1750 LINE(222,45)-(228,51),PSET
1760 LINE-(228,20),PSET
1770 LINE(228,42)-(238,40),PSET
1780 LINE-(240,45),PSET
1790 LINE(238,40)-(242,38),PSET
1800 LINE(228,36)-(240,34),PSET
1810 LINE(232,18)-(234,34),PSET
1820 LINE(236,15)-(240,30),PSET
1830 LINE(2,130)-(124,176),PSET,
B
1840 PAINT(92,156),6,8
1850 LINE(48,134)-(52,165),PSET
1860 LINE-(44,162),PSET
1870 LINE-(36,168),PSET
1880 LINE-(12,174),PSET
1890 LINE-(28,165),PSET
1900 LINE-(20,162),PSET
1910 LINE-(16,153),PSET
1920 LINE-(20,144),PSET
1930 LINE-(16,138),PSET
1940 LINE-(24,132),PSET
1950 LINE-(48,134),PSET
1960 LINE(64,130)-(64,176),PSET
1970 CIRCLE(72,138),5,,.5
1980 CIRCLE(88,144),4,,.8
1990 CIRCLE(100,150),4,,.4
2000 CIRCLE(104,156),4,,.5
2010 CIRCLE(108,168),6,,1.3
2020 LINE(128,150)-(250,170),PSE
T,BF
2030 A$="SCORE":DRAW"S8C6BM130,1
68":GOSUB 5080
2040 NU=NU+1:IF NU=1 THEN R=RND(
50) ELSE NU=0
2050 C$="":DRAW"BM50,190"
2060 PAINT(X(R),Y(R)),7,8
2070 IF R=50 THEN PAINT(108,168)
,7,8
2080 IF NU=1 THEN 2110
2090 CIRCLE(X(R),Y(R)),1,8,.9
2100 CIRCLE(X(R),Y(R)),1,7,.9
2110 Z$=INKEY$:IF Z$="" THEN 206
0
2120 A$=Z$:DRAW"S8C7BM+0,0":GOSU
B 5080:IF A$=>" " AND A$=<"Z" TH
EN C$=C$+A$:SOUND 5*R,2
2130 IF Z$=CHR$(13) THEN A$=C$:G
OSUB 2230:GOTO 2040
2150 IF Z$=CHR$(10) THEN 2160 EL
```

```
SE 2060
2160 S=NOT S AND 1 OR 0
2170 PMODE4,1:SCREEN 1,S:PMODE3
2180 GOTO 2110
2220 '************************
2230 IF NU=1 THEN IF C$=S$(R) TH
EN SC=SC+10:SOUND 130,3:SOUND 19
0,3 ELSE SC=SC-10:SOUND 10,5
2240 IF NU<>1 THEN IF C$=P$(R) T
HEN SC=SC+20:SOUND 130,3:SOUND 1
90,3 ELSE SC=SC-20:SOUND 5,5
2245 IF SC=>1000 THEN SC=SC-1000
2250 A$=STR$(SC):COLOR 8:LINE(19
7,170)-(250,150),PSET,BF:DRAW"C7
BM194,168":GOSUB 5080
2260 IF NU=1 THEN IF C$<>S$(R) T
HEN PAINT(10,188),5,8:DRAW"S8C7B
M50,190":A$=S$(R):GOSUB 5080:FOR
 T=1 TO 400:NEXT T
2270 IF NU<>1 THEN IF C$<>P$(R)
THEN PAINT(10,188),5,8:DRAW"S8C7
BM50,190":A$=P$(R):GOSUB 5080:FO
R T=1 TO 400:NEXT T
2280 PAINT(10,188),5,8
2290 IF NU<>1 THEN PAINT(X(R),Y(
R)),6,8:IF R=50 THEN PAINT(108,1
68),6,8
2300 RETURN
5000 ' ***CHRACTER GEN.<2>***
       ***SUB-ROUTINE***
5010 '
5020 'SUBROUTINE MAIN PROGRAM BY
 J.S.PARAVATI  DATA FROM TRS-80
NEWS 4/82--R. VAN DYKE
5030 '
5040 DIM X$(38),Y$(38)
5050 FOR N=1 TO 38
5060 READ X$(N),Y$(N)
5070 NEXT N
5080 '
5090 DRAW B$
5100 FOR J=1 TO LEN(A$)
5110 FOR L=1 TO 38
5120 IF MID$(A$,J,1)=X$(L) THEN
DRAW Y$(L):GOTO5140
5130 NEXT L
5140 NEXT J
5150 RETURN
5160 DATA " ","BM+7,0"
5170 DATA "A","U4E2F2D2NL4D2;BM+
3,0"
5180 DATA "B","U6R3F1D1G1NL3F1D1
G1L3;BM+7,0"
5190 DATA "C","BM+1,-0;H1U4E1R2F
1;BM+0,+4;G1L2;BM+6,0"
5200 DATA "D","U6R3F1D4G1L3;BM+7
,0"
5210 DATA "E","NR4U3NR2U3R4;BM+3
,+6"
5220 DATA "F","U3NR2U3R4;BM+3,+6
"
5230 DATA "G","BM+1,-0;H1U4E1R2F
1;BM+0,+2;NL1D2G1L2;BM+6,0"
5240 DATA "H","U3NU3R4NU3D3;BM+3
,0"
5250 DATA "I","BM+1,0;R1NR1U6NL1
R1;BM+4,+6"
5260 DATA "J","BM+0,-1;F1R1E1U5N
L1R1;BM+3,6"
5270 DATA "K","U3NU3R1NE3F3;BM+3
,0"
5280 DATA "L","NU6R4U1;BM+3,+1"
5290 DATA "M","U6F2ND1E2D6;BM+3,
0"
5300 DATA "N","U6F1D1F2D1F1NU6;B
M+3,0"
5310 DATA "O","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5320 DATA "P","U6R3F1D1G1L3;BM+7
,3"
5330 DATA "Q","BM+1,0;H1U4E1R2F1
D3G1NH1NF1G1L1;BM+6,0"
5340 DATA "R","U6R3F1D1G1L2NL1F3
;BM+3,0"
5350 DATA "S","BM+0,-1;F1R2E1U1H
1L2H1U1E1R2F1;BM+3,+5"
5360 DATA "T","BM+2,+0;U6NL2R2;B
M+3,+6"
5370 DATA "U","BM+0,-1;NU5F1R2E1
U5;BM+3,6"
5380 DATA "V","BM+0,-6;D2F1D1F1N
D1E1U1E1U2;BM+3,+6"
5390 DATA "W","NU6E2NU1F2U6;BM+3
,6"
5400 DATA "X","U1E4U1;BM-4,0;D1F
4D1;BM+3,0"
5410 DATA "Y","BM+0,-6;D2F2ND2E2
U2;BM+3,6"
5420 DATA "Z","NR4U1E4U1L4;BM+7,
6"
5430 DATA "1","BM+1,0;R1NR1U6G1;
BM+6,+5"
5440 DATA "2","NR4U1E1R1E2U1H1L2
G1;BM+7,+5"
5450 DATA "3","BM+0,-1;F1R2E1H2E
2H1L3;BM+7,6"
5460 DATA "4","BM+3,0;U2NR1L3U1E
3D3;BM+4,3"
5470 DATA "5","BM+0,-1;F1R2E1U2H
1L3U2R4;BM+3,+6"
5480 DATA "6","BM+4,-5;H1L2G1D4F
1R2E1U1H1L3;BM+7,+3"
5490 DATA "7","U1E4U1L4;BM+7,+6"
5500 DATA "8","BM+1,-0;H1U1E1H1U
1E1R2F1D1G1NL2F1D1G1L2;BM+6,0"
5510 DATA "9","BM+0,-1;F1R2E1U4H
1L2G1D1F1R2;BM+4,+3"
5520 DATA "0","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5530 DATA "-","BM+2,-3;R2;BM+3,+
3"
```

EDUCATION OVERVIEW

The Computer As Teacher

By Michael Plog, Ph.D.

Well, it has finally happened. I heard a rumor that the first college credit course is going to be offered via microcomputer and modem. I cannot give you any more details, except that the course is being offered through some college in New York, and the student also lives in New York.

This is an exciting event, and if any of you have any more information about it, please contact me. Send any information you have to my address below.

This type of instruction can be considered "remote." The student and teacher are separated by distance (possibly time as well). Actually, remote education has been around for a while. The first major attempts at remote education were done using television broadcasts. The teacher was in a studio (sometimes with a class present) and the remote students were in another classroom, or even at home. Lectures were taped and played several times to different sets of students. Of course, if you missed something important, you could always watch the tape again.

Most television instruction died out in the early 1970s. It seems the interest was not powerful enough. There are still a few cases of remote television instruction around. Mostly, this type of instruction is used with adults, not elementary or secondary students. I know of one example, being conducted even as you read this, of adult learners watching a television tape, and then completing laboratory exercises. The subject matter of the remote teaching is microcomputers.

The lack of immediate feedback is one major feature tending to make this form of instruction less powerful for younger learners. Also, motivation is generally accepted as higher in adult learners than in younger ones. It takes a high degree of motivation to struggle through a lecture without being able to have questions answered.

There is an example of remote education being used with high school students, which attempts to avoid the problem of lack of immediate feedback. The teacher is in one location, with a television camera. Students are in other locations, but also with a television camera. Students can see the teacher, and the teacher can see the students. When a student raises a question, the teacher can see a hand in the air and hear the question. Four small high schools have formed a consortium to offer courses which would otherwise not be available to students. The success of this experimental program is not known at this time. It may be a flop; it may be the best thing since sliced bread.

Now, how can microcomputers fit with this concept of remote education? Just redefine remote a little bit, to mean a student working on something without a teacher present or helping. Students are working with a machine, following instructions given by the machine. Correct answers are rewarded; incorrect answers are caught immediately. When finished, the student turns off the computer and puts the diskette away.

Why should the student be in a classroom for this? Why couldn't the student work at home? The answer is that the student could work at home very easily, and has no need to be in a school building. With a modem attached to a home computer, lessons could be delivered each day and student work returned to the school. A single teacher could deal with many more students, since the time for each student would be reduced dramatically. In fact, the same instructions could be delivered to all students. Teachers would only have to spend time on the instructions for the day and problem students.

This exact situation has been predicted for education in the future. Students will be working at home, with only occasional visits to a school building. Many science fiction stories have been written using this theme. Serious futurists have discussed such a possibility as tomorrow's educational reality.

If applied to an entire school, the possibilities can stagger the imagination. Instead of one teacher for less than 30 students, a single teacher can "process" possibly a hundred students. There will be no need for principals at all. Teachers can work at home also — they have no real need to be in a school building any more than students. Teachers can attend a curriculum conference at the same time they are collecting test results from students.

On the other hand, the future may not look like this at all. My personal belief is that future schools will not be conducted entirely via modems and computers. Some people disregard all uses of computers for education; they are wrong. Wrong also are those that think the computer can replace teachers and school buildings.

So far, all past attempts at remote education on a large scale (classroom or building) have failed. The failure has not been the fault of technology. It is simply that such a view of schooling disregards two things — human behavior and an understanding of education. Let's take the easiest one first, an understanding of education.

There are different types of learning. Some learning is simple knowledge acquisition. An example of this type of learning is the date the Constitution was written, or how to save a program on tape using commands on the Color Computer. Much of the "drill and practice" programs sold for educational use represent simple acquisition of knowledge. Here, the use of a computer for education really shines. Students learn facts from a computer as well (or maybe even better) as from a human teacher.

There are other types of learning, however. In addition to learning that Jefferson was the major author of the Constitution, we also want students to learn the use of the concept of democracy. This is a "higher level" of learning; one that involves a synthesis (or putting together) of many facts and applying them within a framework of a philosophy.

The computer is not a good tool for learning the principles of how things operate. The computer is an extremely useful educational tool for learning how things operate, but not very good for learning why things operate as they do. A human needs to monitor higher level learning and explain the "why" of things — from social systems to electronic components of the computer.

Consider for a moment what psychologists term the "Ah response." You have experienced this, but perhaps forgotten the last time. Maybe you have seen it work in others, especially children. The "Ah" response is a simple way of expressing a mental click that happens when understanding is achieved. The eyes open larger, the mouth typically opens, eyebrows go up, there is an intake of breath, and posture changes. The typical verbal response is "Ah" or "Ooooh." The learner has "got it."

Teachers see this response often. A computer cannot determine if the student has conquered (there is no better term) a concept.

Earlier, the term human behavior was used as a reason why computers will never totally replace teachers. The major part of the complexity of human behavior that safeguards the teaching profession is that humans are gregarious; we need the social contact of other humans. Part of schooling is learning social skills — which can only be practiced with other humans around.

Humans take different routes to get to the same learning. At present, no one knows enough to account for the different questions students ask about a single topic. A human teacher can use reason to determine the best way to take a student from one point to another. A computer can only use logic, which is often inadequate. (That seems to be the major difference between organic intelligence and metallic intelligence — computers are logical, but not reasonable.)

Lest you get the wrong impression from my words, let me state that computers have many roles to play in schooling of the future. Computers now play a limited role, which should be expanded. Still, the computer will never replace the need for a human teacher in classrooms.

Computers should be used differently at different levels of learning. For simple acquisition of factual knowledge, computers can be used in a direct manner. For more complicated learnings (i.e., synthesis or analysis), computers should be used to create simulations and more fully cement the concepts.

The thoughts expressed here are mine, and I have no copyright on truth. If you want to comment on anything I have said, please write me at 829 Evergreen, Chatham, Ill., 62629. I would enjoy hearing from you. Also, I will be part of a forum coordinated by Dr. Charles Santee at the Chicago RAINBOWfest. I hope to see you there, to discuss these and other ideas.

We have just begun with computer applications in education. There is a long way to go. As a humanist, I believe we have the capability to get there, but also believe the journey is as important as the destination. Keep going.

EDUCATION

16K

Multiple Choice Test Generator

Gary Kinney

The multiple choice test generator is not new, but this one allows the easy use of subscripts and superscripts. Science and math require the extensive use of these. The printing program for the LP VII will print subscripts and superscripts of the numerals zero to nine, + and -. The printing program for the Gemini 10 will print any character as a subscript or superscript.

The test generator consists of two programs. The first program generates a file, allows loading or saving the file (tape or disk), adding to the file, editing the file, or deleting from the file. The second program formats the file for printing and prints the tests.

To create a file, load the program *MCQUIZ*. If you have Extended BASIC, the first time a program is run, you will have to type *PMODE 0:PCLEAR 1* before running or run the program twice. When the menu appears choose option two to create a new file. The screen will clear and you may begin typing in the questions. The computer will not allow input when executing the garbage routine, so you have to wait during this period. This will occur more often as the buffer becomes full so check the screen for loss of the cursor. If an error occurs, you can usually recover the file, if you immediately *GOTO 40*. Save the file before proceeding and then go ahead with option two. The maximum number of questions is set by the value of NQ in Line 25, the clear in Line 20, and RAM size. The questions may

be up to 256 characters long including formatting. Therefore, you should limit questions to seven screen lines (224 characters). To get a subscript, press the down arrow key then the first character of the subscript. When the down arrow key is pressed, an arrow pointing to the left will be printed on the screen to indicate a subscript. For multiple subscripts you must do this for each character of the subscript. For superscripts the same procedure is used except you use the up-arrow key and an arrow pointing up is printed on the screen. When you finish the question, press the ENTER key and type in the answers to the question. The answers should not be more than two screen lines long to avoid problems during printing or editing. At the end of each answer press ENTER. If you have fewer than four answers just press ENTER for a blank answer. When all answers are completed you then press the number of the correct answer. A prompt will appear on the screen; to continue entering questions press any key except 'M' or 'E'. 'M' will return you to the main menu and 'E' will place you into the edit mode.

Once in the edit mode, the cursor can be moved by using the arrow keys. Holding the key down will move the cursor repeatedly. The character under the cursor may be changed by typing the new character. The character to the left of the cursor may be deleted by using the SHIFT left arrow combination. A character may be added to the left of the cursor by pressing CLEAR, then pressing the character to be added. Changes in superscripts and subscripts can be made in the above manner except for the arrow characters. The arrow characters can only be added by using the insert mode. Once all changes have been made press ENTER. The answers will appear one at a time for editing in the same manner as the questions. When finished with each answer, press the ENTER key. After the last answer you will be returned to the main menu.

When the question file is complete, return to the main menu and *SAVE* using option four. You will be given the choice of saving the file to either tape or disk. The saved file can be loaded back in using option one and edited(option six), added to (option two) or deleted from (option five). The delete routine uses the high speed *POKE*, if this does not work on your computer, delete Lines 1450 and 1490.

The second program will print the multiple choice tests. Load the program *PRTGEM* or *PRTVII* and run. If you have the 1.0 BASIC ROM, you must load

Line Description

LPVII

10-130	SET UP
140	HIGH SPEED POKE
150	READ SUPERSCRIPTS
160	READ SUBSCRIPTS
170	SLOW SPEED POKE
180-310	READ FILE
320	HIGH SPEED POKE
330-410	FORMAT FILE
420-490	RANDOMIZE QUESTIONS
500	SLOW SPEED POKE
510-720	PRINT QUESTIONS
730-820	CHOICE OF CONTINUING
830-890	RANDOMIZE ANSWERS
900-970	PRINT CORRECT ANSWERS
980-1030	SKIP TO NEXT PAGE
1040-1060	SAVE CORRECT RANDOM ANSWER
1070-1150	CODE SUPERSCRIPTS
1160-1220	CODE SUBSCRIPTS
1230-1330	FORMAT QUESTION LINE LENGTH
1340-1380	ANSWER PRINTING FORMAT
1390-1460	DATA FOR SUPERSCRIPTS AND SUBSCRIPTS
1470-1480	NAME PRINTING ROUTINE

PRTGEM

10-160	SET UP
180-310	INPUT FILE
320	HIGH SPEED POKE
330-410	FORMAT FILE
420-490	RANDOMIZE THE QUESTIONS
500	SLOW SPEED POKE
510-720	PRINTING TESTS
730-820	CHOICES OF CONTINUING
830-890	RANDOMIZE ANSWERS
900-970	PRINT CORRECT ANSWERS
1040-1060	SAVE CORRECT RANDOM ANSWER
1070-1150	CODE SUPERSCRIPTS
1160-1220	CODE SUBSCRIPTS
1230-1330	FORMAT LINE LENGTH
1340-1380	ANSWER PRINTING FORMAT

MCQUIZ

1-40	SET UP
50-140	MAIN MENU
160-430	INPUT ROUTINE
440-750	EDITOR
760-970	FILE INPUT
980-1290	FILE OUTPUT
1300-1370	INPUT THE CORRECT ANSWERS
1380-1495	DELETE ROUTINE
1450	HIGH SPEED POKE
1490	SLOW SPEED POKE
1500-1840	REPEATING CURSOR ROUTINES

Variables List

PRTGEM

Q$	Questions
AN$	Answers
RN	Random question
RA	Random answer
A	Answer printing format
CA	Correct answer
CB	Correct answer of random question
HT$	Horizontal tab
UL$	Start underline
UO$	Stop underline
DW$	Double width print on
DO$	Double width print off
NA$	Prints name and line
NQ	Maximum number of questions in file
TQ	Maximum number of questions on test
M	Number of questions in file

PRTVII

Q$	Questions
AN$	Answers
RN	Random question
RA	Random answer
A	Answer printing format

the eight-bit driver program before running *PRTVII*. To load from tape, change the *OPEN"I",#1,N$* in Line 230 to *OPEN"I",#-1,N$*, all *INPUT#1* in Line 240 to 290 to *INPUT#-1* and *CLOSE#1* in Line 310 to *CLOSE#-1*. The program uses the high speed *POKE* during formatting. If this does not work on your computer, remove the following lines: *PRTGEM 320,500;PRTVII 140,170, 320,500*. You will be asked to enter the name of the question file. The computer will then load the file, format the questions to prevent word splitting and insert the codes for the superscripts and subscripts. When formatting is complete you will enter the number of questions on the test. The computer will then randomly select the questions, randomize its answers and print the questions 10 to a page. When printing is complete, you are given the option of printing another test. If you choose to print another test, you may print another test from the same file or add questions from another file to the questions already printed. Because of this last option, you may print a test of any length (maximum is value of TQ in Line 120) from several different files. The answers to the test will be printed on the next page at the end of each test.

These programs will work without Extended BASIC with the following changes:

MCQUIZ: for 16K change CLEAR (Line 20) to 6000 and NQ (Line 25) to 30.
Delete Lines 10, 780-810, 900-970, 990-1020, 1160-1290.
Change *LINEINPUT* to *INPUT* in Line 770 and 980.

PRTGEM or PRTVII: Make changes for tape input, for 16K
RAM adjust NQ (Line 120) to 30 and CLEAR (Line 110) to 6000.
Delete Line 100.
Add 120 XX=RND(0):NQ=60: TQ=99
1080 FOR SS=B TO LEN(QQ$)
1085 IF MID$(QQ$,SS,1)= CHR$(94)THEN1100
1090 NEXT SS:RETURN
1170 FOR SS=B TO LEN (QQ$)
1175 IF MID$(QQ&,SS,1) =CHR$ (95)THEN1190
1180 NEXT SS:RETURN

I have question files for high school chemistry and physics. Each file contains 25 questions and there are 20 files for each subject. If you would like either of these question files with these programs, send $15, type of printer(Gemini 10 or LPVII), type of medium(tape or disk), whether you have Extended BASIC, and RAM size.

CA	Correct answer	MCQUIZ	
CB	Correct random answer		
SU$	Codes for superscript	NQ	Number of questions in file
SD$	Codes for subscripts	B$	Questions
NQ	Maximum number of questions in file	AN$	Answers
TQ	Maximum number of questions on test	CA	Correct answers
M	Number of questions in file	N	Number of questions

160.....	231	990.....	19
390.....	165	1240	71
590.....	167	1470	179
760.....	183	end	215

Listing 1:

```
1 '*********************************
2 '* MULTIPLE CHOICE TEST          *
3 '* OCTOBER 1983                  *
4 '* GARY KINNEY                   *
5 '* 10 WHITFORD AVENUE            *
6 '* WHITESBORO, NEW YORK 13492    *
7 '*********************************
10 PMODE0:PCLEAR1
20 CLEAR 19500
25 NQ=60
30 DIM AN$(NQ,4),B$(NQ),CA(NQ)
40 SL=1055
50 CLS:PRINT@64,"     (1) LOAD FI
LE"
60 PRINT:PRINT"     (2) ADD TO FI
LE"
70 PRINT:PRINT"     (3) END"
80 PRINT:PRINT"     (4) SAVE FILE
"
90 PRINT:PRINT"     (5) DELETE FR
OM FILE"
100 PRINT:PRINT"     (6) EDIT FIL
E"
110 Z$=INKEY$:IF Z$="" THEN 110
120 Z=VAL(Z$):IF Z<1 OR Z>6 THEN
 110
130 IF N=0 AND Z>3 THEN 110
140 ON Z GOTO 760,160,150,980,13
80,440
150 CLS:END
160 CLS:N=N+1:B$(N)="":PRINT"QUE
STION";N
165 N=N+1:B$(N)="":PRINT"QUESTIO
N";N
170 PRINT CHR$(142);
180 A$=INKEY$:IF A$=""THEN 180
190 IF A$=CHR$(13) THEN 260
210 IF A$=CHR$(8) THEN B$(N)=LEF
T$(B$(N),LEN(B$(N))-1):GOTO240
220 IF A$=CHR$(10) THEN A$=CHR$(
95)
230 B$(N)=B$(N)+A$
240 PRINTCHR$(8);A$;CHR$(142);
250 GOTO 180
260 CLS
270 FOR I=1 TO 4
275 AN$(N,I)=""
280 PRINT:PRINT"ANSWER";I
290 PRINTCHR$(141);
300 A$=INKEY$:IF A$=""THEN300
310 IF A$=CHR$(13) THEN PRINTCHR
$(8):GOTO380
```

```
320 IF A$=CHR$(8) THEN AN$(N,I)=
LEFT$(AN$(N,I),LEN(AN$(N,I))-1):
GOTO 360
340 IF A$=CHR$(10) THEN A$=CHR$(
95)
350 AN$(N,I)=AN$(N,I) +A$
360 PRINTCHR$(8);A$;CHR$(141);
370 GOTO 300
380 NEXT I
390 GOSUB 1300
400 CLS:PRINT@128,"PRESS    M TO
RETURN TO MENU              E TO
EDIT                        ANY K
EY TO CONTINUE"
410 Z$=INKEY$:IF Z$=""THEN 410
420 IF Z$="M" OR Z$="m" THEN 50
425 IF Z$="E" OR Z$="e"  THEN M=
N:GOTO 460
430 GOTO160
440 CLS:PRINT@64,"QUESTION TO ED
IT FROM 1 TO";N
450 INPUT M:IF M<1 OR M>N THEN 4
40
460 CLS:LB$="QUESTION":PRINTLB$;
M
470 PRINTB$(M):B$=B$(M):LN=0:GOS
UB 550:B$(M)=B$
480 CLS:LB$="ANSWER":X=0:LN=0
490 FOR I=1 TO 4
500 PRINT@LN,LB$;I
510 PRINTAN$(M,I):B$=AN$(M,I):GO
SUB550:AN$(M,I)=B$
520 LN=LN+128:SL=SL+128:X=0
530 NEXT I
540 SL=1055:GOTO 50
550 IF X<1 THEN X=1:P=PEEK(SL+X)
560 Z$=INKEY$:POKE(SL+X),P
570 IF Z$=CHR$(9) AND X<LEN(B$)+
1 THEN GOSUB 1500:GOTO560
580 IF Z$=CHR$(94) AND X>32 THEN
 GOSUB1600:GOTO560
590 IF Z$=CHR$(12) THEN GOSUB680
:X=X+1:GOTO550
600 IF Z$=CHR$(10) AND X<LEN(B$)
-32 THEN GOSUB1800:GOTO560
610 IF Z$=CHR$(13) THEN RETURN
620 IF Z$=CHR$(8) AND X>1THEN GO
SUB1700:GOTO560
630 IF Z$=CHR$(21) AND X>1THEN B
$=LEFT$(B$,X-2)+RIGHT$(B$,LEN(B$
)-X+1):PRINT@LN+32,B$:X=X-1:GOTO
550
640 IF Z$<>"" AND LEN(B$)=>X AND
 Z$<>CHR$(12) AND Z$<>CHR$(8) AN
D Z$<>CHR$(21) AND Z$<>CHR$(10)A
NDZ$<>CHR$(94)  THEN GOSUB 720:X
=X+1:P=PEEK(SL+X):GOTO550
650 POKESL+X,207
660 FOR TD=1TO15:NEXT
670 GOTO 560
680 I$=INKEY$:POKESL+X,P:FORTD=1
TO15:NEXT:POKESL+X,207:IFI$=""TH
EN680
700 IF I$=CHR$(10) THEN I$=CHR$(
95)
710 B$=LEFT$(B$,X-1)+I$+RIGHT$(B
$,LEN(B$)-X+1):PRINT@LN+32,B$:RE
TURN
720 B$=LEFT$(B$,X-1)+Z$+RIGHT$(B
$,LEN(B$)-X):SC=ASC(Z$)
730 IF PEEK(282)<>255 THEN 750
740 IF SC>63 AND SC<97 THEN POKE
SL+X,SC:RETURN ELSE POKESL+X,SC+
64:RETURN
750 IF SC>63 AND SC<97 THEN POKE
SL+X,SC:RETURN ELSE IF SC>31 AND
 SC<64 THEN POKESL+X,(SC+64):RET
URN ELSE POKESL+X,(SC-96):RETURN
760 CLS:PRINT:PRINT
770 LINEINPUT"NAME OF FILE  ";N$
780 PRINT:PRINT:PRINT"  (1) DISK
 OR (2) TAPE"
790 Z$=INKEY$:IFZ$=""THEN790
800 Z=VAL(Z$):IF Z<1 OR Z>2 THEN
 790
810 IF Z=1 THEN 900
820 CLS:PRINT@228," READING TAPE
"
830 OPEN"I",#-1,N$:INPUT#-1,N
840 FOR I=1TON
850 INPUT#-1,B$(I),CA(I)
860 FORJ=1TO4:INPUT#-1,AN$(I,J):
NEXTJ
870 NEXT I
880 CLOSE#-1
890 GOTO40
900 CLS:PRINT@228," READING DISK
"
910 M$=LEFT$(N$,8)
920 OPEN"I",#1,M$:INPUT#1,N
930 FORI=1TO N
940 INPUT#1,B$(I),CA(I)
950 FOR J=1TO 4:INPUT#1,AN$(I,J)
:NEXT J
960 NEXT I
970 CLOSE#1:GOTO40
980 CLS:LINEINPUT"NAME OF FILE "
;N$
990 PRINT@128,"  (1) DISK OR (2)
 TAPE"
1000 Z$=INKEY$:IFZ$=""THEN1000
1010 Z=VAL(Z$):IF Z<1 ORZ>2 THEN
 1000
1020 IF Z=1 THEN 1160
1030 CLS:PRINT@128,"INSERT TAPE,
 PRESS PLAY AND     RECORD"
1040 PRINT:PRINT"PRESS ENTER WHE
N READY"
1050 Z$=INKEY$:IFZ$=""THEN 1050
1060 IF Z$<>CHR$(13) THEN 1050
```

```
107Ø CLS:PRINT@224,"  LOADING TO
 TAPE"
108Ø OPEN"O",#-1,N$
109Ø PRINT#-1,N
11ØØ FORI=1TON
1110 PRINT#-1,B$(I),CA(I)
1120 FOR  J=1TO4:PRINT#-1,AN$(I,
J):NEXTJ
1130 NEXT I
1140 CLOSE#-1
115Ø GOTO4Ø
1160 CLS:PRINT@128,"INSERT DISK,
PRESS ENTER WHEN    READY"
1170 Z$=INKEY$:IFZ$=""THEN1170
1180 IF Z$<>CHR$(13) THEN 1170
1190 CLS:PRINT@223,"  SAVING DAT
A TO DISK"
12ØØ VERIFY ON
1210 M$=LEFT$(N$,8)
122Ø OPEN"O",#1,M$
123Ø WRITE#1,N
124Ø FOR I=1TON
125Ø WRITE#1,B$(I),CA(I)
1260 FORJ=1TO4:WRITE#1,AN$(I,J):
NEXTJ
127Ø NEXT I
128Ø CLOSE#1
129Ø GOTO 4Ø
13ØØ CLS
1310 FORI=1TO4
1320 PRINT"(";I") ";AN$(N,I)
1330 NEXT I
1340 PRINT:PRINT"TYPE NUMBER OF
CORRECT ANSWER"
135Ø Z$=INKEY$:IF Z$=""THEN 135Ø
1360 Z=VAL(Z$):IF Z<1 OR Z>4 THE
N 135Ø
137Ø CA(N)=Z:RETURN
1380 CLS:PRINT@64,"QUESTION TO D
ELETE FROM 1 TO";N
1390 INPUT M:IFM<Ø OR M>N THEN 1
38Ø
14ØØ CLS:PRINT"QUESTION";M
1410 PRINTB$(M)
1420 PRINT@448,"IS THIS THE CORR
ECT QUESTION?"
1430 Y$=INKEY$:IF Y$=""THEN 143Ø
1440 IF Y$<>"Y" AND Y$<>"y" THEN
 4Ø
1445 IF M=NQ THEN 149Ø
145Ø POKE65495,Ø
1455 FOR D=M TO N-1
1460 B$(D)=B$(D+1):CA(D)=CA(D+1)
1470 FOR E=1 TO 4:AN$(D,E)=AN$(D
+1,E):NEXT E
1480 NEXT D
149Ø POKE65494,Ø
1495 N=N-1:GOTO4Ø
15ØØ FORTD=1TO25:NEXTTD:X=X+1:P=
PEEK(SL+X):POKESL+X,2Ø7
1510 IF PEEK(344)<>247 OR X>LEN(
B$) THEN RETURN
1520 POKESL+X,P:X=X+1:P=PEEK(SL+
X):POKESL+X,2Ø7
1530 FORTD=1TO1Ø:NEXT TD
1540 POKESL+X,P:GOTO1510
16ØØ FORTD=1TO25:NEXTTD:X=X-32:P
=PEEK(SL+X):POKESL+X,2Ø7
1610 IF PEEK(341)<>247 OR X<32 T
HEN RETURN
1620 POKESL+X,P:X=X-32:P=PEEK(SL
+X):POKESL+X,2Ø7
1630 FORTD=1TO1Ø:NEXT TD
1640 POKESL+X,P:GOTO1610
17ØØ FORTD=1TO25:NEXTTD:X=X-1:P=
PEEK(SL+X):POKESL+X,2Ø7
1710 IF PEEK(343)<>247 OR X<2 TH
EN RETURN
1720 POKESL+X,P:X=X-1:P=PEEK(SL+
X):POKESL+X,2Ø7
1730 FORTD=1TO1Ø:NEXT TD
1740 POKESL+X,P:GOTO1710
18ØØ FORTD=1TO25:NEXTTD:X=X+32:P
=PEEK(SL+X):POKESL+X,2Ø7
1810 IF PEEK(342)<>247 OR X>LEN(
B$)-32 THEN RETURN
1820 POKESL+X,P:X=X+32:P=PEEK(SL
+X):POKESL+X,2Ø7
1830 FORTD=1TO1Ø:NEXT TD
1840 POKESL+X,P:GOTO1810
```

```
200..... 175
460..... 60
700..... 1
950..... 89
1210 .... 163
END .... 201
```

Listing 2:

```
1Ø '*****************************
2Ø '* PRINTING TEST LPVII       *
3Ø '* OCTOBER 1983             *
4Ø '* GARY KINNEY              *
5Ø '* 1Ø WHITFORD AVENUE       *
6Ø '* WHITESBORO,NEW YORK 13492*
7Ø '*****************************
1ØØ PMODEØ:PCLEAR1
11Ø CLEAR 19500
12Ø XX=RND(TIMER):NQ=6Ø:TQ=99:CL
S
13Ø DIM Q$(NQ),AN$(NQ,4),RA(NQ),
RN(NQ),A(NQ),CA(NQ),CB(TQ),SU$(1
1),SD$(1Ø)
14Ø POKE65495,Ø
15Ø FOR I=ØTO11:SU$(I)=CHR$(18):
FORJ=1TO5:READS:SU$(I)=SU$(I)+CH
R$(S):NEXTJ:SU$(I)=SU$(I)+CHR$(1
28)+CHR$(3Ø):NEXTI
16Ø FOR I=Ø TO 9:SD$(I)=CHR$(18)
:FORJ=1TO5:READS:SD$(I)=SD$(I)+C
HR$(S):NEXTJ:SD$(I)=SD$(I)+CHR$(
```

```
128)+CHR$(30):NEXTI
170 POKE65494,0
180 CLS:PRINT"READ DATA DISK":PR
INT
190 PRINT"INSERT DISK":PRINT
200 PRINT"PRESS ENTER WHEN READY
 ":PRINT
210 A$=INKEY$:IF A$<>CHR$(13) TH
EN 210
220 PRINT:INPUT"NAME OF DATA FIL
E";N$:PRINT
230 CLS:PRINT@226,"DATA FILE BEI
NG READ":OPEN"I",#1,N$
240 INPUT#1,M
250 FOR I=1 TO M
260 INPUT#1,Q$(I)
270 INPUT#1,CA(I)
280 FOR J=1 TO 4
290 INPUT#1,AN$(I,J)
300 NEXT J,I
310 CLOSE#1
320 POKE65495,0
330 CLS:PRINT@137,"FORMATING DAT
A"
340 PRINT@262,"QUESTION NUMBER"
350 FOR I=1 TO M
360 GOSUB 1230
370 QQ$=Q$(I):GOSUB 1070:GOSUB 1
160:Q$(I)=QQ$
380 GOSUB 1340
390 FOR F=1 TO 4:QQ$=AN$(I,F):GO
SUB1070:GOSUB1160:AN$(I,F)=QQ$
400 NEXT F
410 NEXT I
420 CLS:PRINT@226,"NUMBER OF QUE
STIONS UP TO";M;
430 INPUT N
440 FOR I=1 TO N
450 RN(I)=RND(M)
460 FOR J=1 TO (I-1)
470 IF I=1 THEN 490
480 IF RN(I)=RN(J) THEN 450
490 NEXTJ,I
500 POKE65494,0
510 CLS:PRINT@229,"PLEASE WAIT P
RINTING"
520 IF SF=0 THEN GOSUB 1470
530 FOR I=1 TO N
540 PRINT#-2:PL=PL+1
550 PRINT#-2,CHR$(18);CHR$(28);C
HR$(30);CHR$(192);
560 PRINT#-2,CHR$(31);I+SF;CHR$(
30);CHR$(16);"14";Q$(RN(I))
570 PL=PL+INT(LEN(Q$(RN(I)))/66)
+1
580 CB(I+SF)=CA(RN(I))
590 GOSUB 830
600 GOSUB 1040
610 IF A(RN(I))=2 THEN 650
620 PRINT#-2,"       (1)";AN$(RN(
I),RA(1));CHR$(16);"45";"(2)";AN
$(RN(I),RA(2)):PL=PL+1
630 PRINT#-2,"       (3)";AN$(RN(
I),RA(3));CHR$(16);"45";"(4)";AN
$(RN(I),RA(4)):PL=PL+1
640 GOTO 680
650 FOR J=1 TO 4
660 PRINT#-2,"       (";J;")";AN$
(RN(I),RA(J)):PL=PL+1
670 NEXT J
680 TEN=(I+SF)/10-INT((I+SF)/10)
690 IF TEN=0 THEN GOSUB 980
700 IF TEN=0 AND INT((I+SF)/10)=
(N+SF)/10 THEN G=1 ELSE G=2
710 NEXT I
720 CLOSE#-2
730 CLS:PRINT@226,"WOULD YOU LIK
E ANOTHER RUN"
740 PRINT"TYPE Y(YES) OR N(NO)"
750 Z$=INKEY$:IF Z$="" THEN 750
760 IF Z$<>"Y" THEN 810
770 PRINT:PRINT"(S) SAME FILE OR
 (N) NEW FILE"
780 F$=INKEY$:IF F$="" THEN 780
790 IF F$="S" THEN GOSUB 900:SF=
0:GOTO 420
800 IF F$="N" THEN SF=SF+N:GOTO2
20 ELSE 780
810 IF Z$<>"N" THEN 750
820 CLS:GOSUB900:PRINT@230,"PRIN
TING COMPLETE";:END
830 FOR K=1 TO 4
840 RA(K)=RND(4)
850 FOR L=1 TO (K-1)
860 IF K=1 THEN 880
870 IF RA(K)=RA(L) THEN 840
880 NEXT L,K
890 RETURN
900 IF G=2 THEN GOSUB 980
910 FOR K=1 TO 5:PRINT#-2:NEXT K
:PL=PL+5
920 PRINT#-2,CHR$(31);"ANSWERS T
O QUESTIONS";CHR$(30):PL=PL+1
930 FOR I=1 TO N+SF
940 PRINT#-2,I;")"CB(I):PL=PL+1
950 NEXT I
960 PRINT#-2:PL=PL+1:GOSUB 980
970 RETURN
980 IF PL>=66 THEN 1030
990 PN=71-PL
1000 FOR K=1 TO PN
1010 PRINT#-2
1020 NEXT K
1030 PL=5:RETURN
1040 FOR J=1 TO 4
1050 IF AN$(RN(I),CB(I+SF))=AN$(
RN(I),RA(J)) THEN CB(I+SF)=J:RET
URN
1060 NEXT J
1070 B=1:PRINT@279,I
```

```
1080 SS=INSTR(B,QQ$,CHR$(94))
1090 IF SS=0 THEN RETURN
1100 SS$=MID$(QQ$,SS+1,1)
1110 IF SS$="+" THEN C$=SU$(10):
GOTO1140
1120 IF SS$="-" THEN C$=SU$(11):
GOTO1140
1130 SV=VAL(SS$):C$=SU$(SV)
1140 QQ$=LEFT$(QQ$,SS-1)+C$+MID$
(QQ$,SS+2)
1150 B=SS+2:GOTO 1080
1160 B=1
1170 SS=INSTR(B,QQ$,CHR$(95))
1180 IF SS=0 THEN RETURN
1190 SS$=MID$(QQ$,SS+1,1)
1200 SV=VAL(SS$):C$=SD$(SV)
1210 QQ$=LEFT$(QQ$,SS-1)+C$+MID$
(QQ$,SS+2)
1220 B=SS+2:GOTO1170
1230 Q$=Q$(I):E$="":LN=0
1240 IF LEN(Q$)<(67+LN) THEN Q$(
I)=E$+Q$:RETURN
1250 A$=LEFT$(Q$,(66+LN))
1260 FOR L=(66+LN)TO 1 STEP -1
1270 C$=MID$(A$,L,1)
1280 IF C$=" " THEN 1300
1290 NEXT L
1300 D$=LEFT$(A$,L)+CHR$(13)+CHR
$(16)+"06"
1310 Q$=RIGHT$(Q$,LEN(Q$)-L):IF
LN=0 THEN LN=3
1320 E$=E$+D$
1330 GOTO 1240
1340 FOR K=1 TO 4
1350 AL=LEN(AN$(I,K))
1360 IF AL >30 THEN A(I)=2
1370 NEXT K
1380 RETURN
1390 DATA 128,142,145,145,142,12
8,128,146,159,144,128,146,153,15
1,144
1400 DATA 128,145,149,149,155,12
8,135,132,159,132,128,151,149,14
9,137
1410 DATA 128,142,149,149,136,12
8,131,129,157,131,128,138,149,14
9,138
1420 DATA 128,130,149,149,142,12
8,128,132,142,132,128,128,132,13
2,132
1430 DATA 128,184,196,196,184,12
8,128,200,252,192,128,200,228,22
0,192
1440 DATA 128,196,212,212,236,12
8,156,144,252,144,128,220,212,21
2,164
1450 DATA 128,184,212,212,160,12
8,140,132,244,140,128,168,212,21
2,168
1460 DATA 128,136,212,212,184
1470 FOR K=1 TO 4:PRINT#-2:NEXTK
1480 PRINT#-2,CHR$(31);"NAME ";C
HR$(18);CHR$(28);CHR$(255);CHR$(
192);CHR$(30):RETURN
```

```
230..... 221
480..... 151
710..... 189
1050 .... 136
END .... 201
```

Listing 3:

```
10 '*****************************
20 '* PRINTING TEST GEMINI 10   *
30 '* OCTOBER 1983              *
40 '* GARY KINNEY               *
50 '* 10 WHITFORD AVENUE        *
60 '* WHITESBORO,NEW YORK 13492*
70 '*****************************
100 PMODE0:PCLEAR1
110 CLEAR 20000:POKE150,1:PRINT#
-2,CHR$(27);"@";
120 XX=RND(TIMER):NQ=60:TQ=99
130 DIM Q$(NQ),AN$(NQ,4),RA(NQ),
RN(NQ),A(NQ),CA(NQ),CB(TQ)
140 HT$=CHR$(9):UL$=CHR$(27)+"-"
+CHR$(1):UO$=CHR$(27)+"-"+CHR$(0
):DW$=CHR$(14):DO$=CHR$(20)
150 NA$=DW$+"NAME "+DO$+UL$+"

      "+UO$
160 PRINT#-2,CHR$(27);"D";CHR$(6
);CHR$(45);CHR$(0);CHR$(27);CHR$
(82);CHR$(3);
180 CLS:PRINT"READ DATA DISK":PR
INT
190 PRINT"INSERT DISK":PRINT
200 PRINT"PRESS ENTER WHEN READY
":PRINT
210 A$=INKEY$:IF A$<>CHR$(13) TH
EN 210
220 PRINT:INPUT"NAME OF DATA FIL
E";N$:PRINT
230 CLS:PRINT@226,"DATA FILE BEI
NG READ":OPEN"I",#1,N$
240 INPUT#1,M
250 FOR I=1 TO M
260 INPUT#1,Q$(I)
270 INPUT#1,CA(I)
280 FOR J=1 TO 4
290 INPUT#1,AN$(I,J)
300 NEXT J,I
310 CLOSE#1
320 POKE65495,0
330 CLS:PRINT@137,"FORMATING DAT
A"
340 PRINT@262,"QUESTION NUMBER"
350 FOR I=1 TO M
```

```
360 GOSUB 1230
370 QQ$=Q$(I):GOSUB 1070:GOSUB11
60:Q$(I)=QQ$
380 GOSUB1340
390 FORF=1TO4:QQ$=AN$(I,F):GOSUB
1070:GOSUB1160:AN$(I,F)=QQ$
400 NEXT F
410 NEXT I
420 CLS:PRINT@226,"NUMBER OF QUE
STIONS UP TO ";M;
430 INPUT N
440 FOR I=1 TO N
450 RN(I)=RND(M)
460 FOR J=1 TO (I-1)
470 IF I=1 THEN 490
480 IF RN(I)=RN(J) THEN 450
490 NEXT J,I
500 POKE65494,0
510 CLS:PRINT@229,"PLEASE WAIT P
RINTING"
520 IF SF=0 THEN PRINT#-2,NA$:PR
INT#-2
530 FOR I=1 TO N
540 PRINT#-2
550 PRINT#-2,UL$;"      ";UO$;
560 PRINT#-2,DW$;I+SF;DO$;Q$(RN(
I))
580 CB(I+SF)=CA(RN(I))
590 GOSUB 830
600 GOSUB 1040
610 IF A(RN(I))=2 THEN 650
620 PRINT#-2,"       (1)";AN$(RN(
I),RA(1));HT$;"(2)";AN$(RN(I),RA
(2))
630 PRINT#-2,"       (3)";AN$(RN(
I),RA(3));HT$;"(4)";AN$(RN(I),RA
(4))
640 GOTO 680
650 FOR J=1 TO 4
660 PRINT#-2,"       (";J;")";AN$
(RN(I),RA(J))
670 NEXT J
680 TEN=(I+SF)/10-INT((I+SF)/10)
690 IF TEN=0 THEN PRINT#-2,CHR$(
12);
700 IF TEN=0 AND (I+SF)/10=INT(N
+SF)/10 THEN G=1 ELSE G=2
710 NEXT I
720 CLOSE#-2
730 CLS:PRINT@226,"WOULD YOU LIK
E ANOTHER RUN"
740 PRINT"TYPE Y(YES) OR N(NO)"
750 Z$=INKEY$:IF Z$=""THEN 750
760 IF Z$<>"Y" THEN 810
770 PRINT:PRINT"(S)AME FILE OR
(N)NEW FILE"
780 F$=INKEY$:IFF$=""THEN 780
790 IF F$="S" THEN GOSUB900:SF=0
:GOTO420
800 IF F$="N" THEN SF=SF+N:GOTO
220 ELSE 780
810 IF Z$<>"N" THEN 750
820 CLS:GOSUB900:PRINT@230,"PRIN
TING COMPLETE";:END
830 FOR K=1 TO 4
840 RA(K)=RND(4)
850 FOR L=1 TO (K-1)
860 IF K=1 THEN 880
870 IF RA(K)=RA(L) THEN 840
880 NEXT L,K
890 RETURN
900 IF G=2 THEN PRINT#-2,CHR$(12
);
920 PRINT#-2,DW$;"ANSWERS TO QUE
STIONS"
930 FOR I=1 TO N+SF
940 PRINT#-2,I;")"CB(I)
950 NEXT I
960 PRINT#-2,CHR$(12);
970 RETURN
1040 FOR J=1 TO 4
1050 IF AN$(RN(I),CB(I+SF))=AN$(
RN(I),RA(J)) THEN CB(I+SF)=J:RET
URN
1060 NEXT J
1070 B=1:PRINT@279,I
1080 SS=INSTR(B,QQ$,CHR$(94))
1090 IF SS=0 THEN RETURN
1100 C$=MID$(QQ$,SS+1,1)
1140 QQ$=LEFT$(QQ$,SS-1)+CHR$(27
)+"S"+CHR$(0)+C$+CHR$(27)+"T"+CH
R$(27)+"H"+MID$(QQ$,SS+2)
1150 B=SS+2:GOTO1080
1160 B=1
1170 SS=INSTR(B,QQ$,CHR$(95))
1180 IF SS=0 THEN RETURN
1190 C$=MID$(QQ$,SS+1,1)
1210 QQ$=LEFT$(QQ$,SS-1)+CHR$(27
)+"S"+"1"+C$+CHR$(27)+"T"+CHR$(2
7)+"H"+MID$(QQ$,SS+2)
1220 B=SS+2:GOTO1170
1230 Q$=Q$(I):E$="":LN=0
1240 IF LEN(Q$)<(67+LN) THEN Q$(
I)=E$+Q$:RETURN
1250 A$=LEFT$(Q$,(66+LN))
1260 FOR L=(66+LN)TO 1 STEP -1
1270 C$=MID$(A$,L,1)
1280 IF C$=" " THEN 1300
1290 NEXT L
1300 D$=LEFT$(A$,L)+CHR$(13)+CHR
$(9)
1310 Q$=MID$(Q$,L+1):IF LN=0 THE
N LN=3
1320 E$=E$+D$
1330 GOTO 1240
1340 FOR K=1 TO 4
1350 AL=LEN(AN$(I,K))
1360 IF AL >30 THEN A(I)=2
1370 NEXT K
1380 RETURN
```

EDUCATION

4K

WORD SCRAMBLER FOR SPELLING LISTS

John F. Wilfore

As a somewhat novice programmer, I've found that *Word Scrambler for Spelling Lists* has not only been a fun exercise in some Color BASIC programming, but also a very interesting application of the *RND* (random number function). The result is a very useful and entertaining educational program that provides drill and practice of assigned spelling words in a challenging "scrambled word" format. In addition to providing me with a chance to practice and improve my own programming skills and use the TRS-80C, *Word Scrambler* has given my third-grade son a chance to use the computer for more than just games. He is actually building language arts, logic and computer skills all at the same time.

The programming task was to use the *RND* function to select words from a weekly assignment list of 15 words contained in *DATA* statements, making sure that each word in that list is chosen only once. When the word is selected from the appropriate list, the letters are then scrambled and displayed on the screen in random order. The child is then asked to unscramble the letters and type in the correct spelling of that word.

Sound provides either positive or negative reinforcement, and if the answer is incorrect, the correct spelling is given. A running score is displayed, which includes the child's name. To insure self-pacing, the student is asked to "press any key" to continue. At the conclusion of the lesson, a grade score is also given.

Interacting with the keyboard, selection of various weekly assignments and a personal touch by using an individual's name, provide for an entertaining and meaningful experience for younger students just being introduced to computers.

Now that we know all of the wonderful things that the program can do for the student, let's take a look at how the program works — basically with the *RND* function. The first task at Line 320 was *FOR K=1 to 15* to select 15 different words from a given list. Setting variable *X=RND(15)* gave a random number, and if X was unique (hadn't been used before), it was sequentially inserted into array R1. If not, a new X would be generated until it was unique. Each time a new X was generated, R1 was tested to determine if X had been generated previously.

Once a unique word was selected — *A$(X)* — the next task was to scramble its letters. First, the length of the word was determined at Line 440 using *L=LEN (A$(X))*. Next, variable *Y= RND(L)* generated another random number, and if Y was unique, it was inserted into R2 array. Each time a new Y was generated, R2 array was tested to determine if that Y had been generated previously.

In Line 570, using *FOR I=1 TO L*, for L number of letters and using *MID$* of *A$(X)*, one letter at a time, the scrambled set of letters from *A$(X)* could easily be generated and displayed to the student. A comparison between the original word, *A$(X)*, and the answer input by the student, *D$*, is then done, confirmation given, and the next random word is selected, till done. While the looping portion of the program is a little complex, the remainder of the coding is rather straightforward.

In summary, the program itself was an excellent programming exercise in the use of loops, arrays, input and output and text screen formatting. A subroutine at Line 1020 is even accessed using the variable AT to indicate the desired *PRINT* @ location of a set of graphics characters, used to enhance the text screen. Written exclusively in Color BASIC, the program should run in 4K by simply removing the *REM* statements.

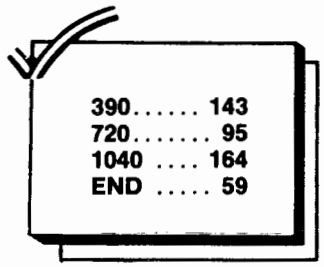
The unique combination of being very useful and an interesting programming exercise might stimulate others to modify the program. I'm sure that extra graphics and perhaps even a "hint" function would further enhance the program. The following list of variables will be useful:

STRING VARIABLES

A$(15) — array for selected word list
C$ — single random letter, from *MID$*
D$ — student word, compared to *A$(X)*
N$ — student name

NUMERIC VARIABLES

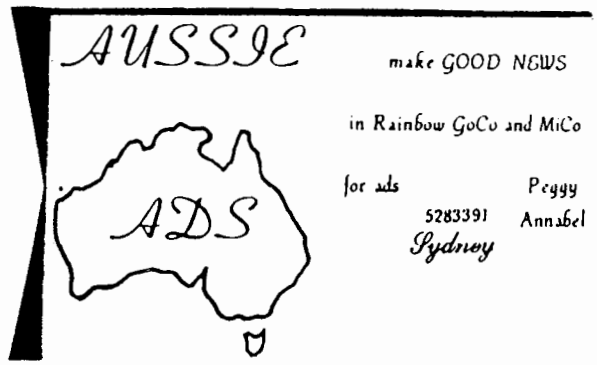
R1(15) — array for word pointers, init. to 0
R2(10) — array for letter pointers, init. to 0
AT — variable for *PRINT* @ subroutine
C — counter for correct responses
I — index for loop
J — index for loop
K — index for loop to select 15 random words
L — length of random word
N — random numbers for letters in R2
W — week of spelling list assignments
X — random number for word index
Y — random number for letter index



The listing:

```
10 '*******************************
20 '*      WORD SCRAMBLER         *
30 '*           FOR               *
40 '*      SPELLING LISTS         *
50 '*                             *
60 '*    COPYRIGHT 1983 BY        *
70 '*     JOHN F. WILFORE         *
80 '*   ALL RIGHTS RESERVED       *
90 '*******************************
100 DIM A$(15), R1(15), R2(10)
110 RESTORE
120 C=0
130 CLS(3)
140 AT=96:GOSUB 1020
150 PRINT @ 128,"WELCOME TO YOUR
 SPELLING LESSON"
160 AT=160:GOSUB 1020
170 PRINT @ 260, "WHAT'S YOUR NA
ME";
180 INPUT N$
190 PRINT @ 356,"WEEK 1 THRU 5";
200 INPUT W
210 '*** READ IN PROPER WORD LIS
T ***
220 FOR I=1 TO W
230 FOR J=1 TO 15
240 READ A$(J)
250 NEXT J
260 NEXT I
270 '*** INITIALIZE WORD ARRAY T
O ZEROS ***
280 FOR I=1 TO 15
290 R1(I)=0
300 NEXT
310 '*** GENERATE RANDOM WORDS *
**
320 FOR K=1 TO 15
330 X=RND(15)
340 '*** CHECK TO SEE IF WORD US
ED PREVIOUSLY ***
350 FOR I=1 TO 15
360 IF R1(I)=X THEN GO TO 330
370 NEXT
380 R1(K)=X
390 '*** INITIAL LETTER ARRAY TO
 ZEROS ***
400 FOR I=1 TO 10
410 R2(I)=0
420 NEXT
430 '*** RANDOMIZE LETTERS ***
440 L=LEN(A$(X))
450 FOR I=1 TO L
460 Y=RND(L)
470 '*** CHECK IF LETTER USED PR
EVIOUSLY ***
480 FOR J=1 TO 10
490 IF R2(J)=Y THEN GO TO 460
500 NEXT J
510 R2(I)=Y
520 NEXT
530 '*** SCRAMBLE & TEST ***
540 CLS(3)
550 PRINT @ 68, "UNSCRAMBLE THES
E LETTERS";
560 PRINT @ 128," ";
570 FOR I=1 TO L
580 N=R2(I)
590 B$=A$(X)
600 C$=MID$(B$,N,1)
610 PRINT C$;
620 NEXT
630 INPUT D$
640 '*** CONFIRMATION SECTION **
*
650 IF D$=A$(X) THEN C=C+1 ELSE
GO TO 750
660 SOUND 130,3:SOUND 199,5
670 AT=224:GOSUB 1020
680 PRINT@256, "CORRECT! YOU NOW
 HAVE ";
690 PRINT C;
700 PRINT "RIGHT"
710 PRINT @ 288, "       NICE GOI
NG ";
720 PRINT N$
730 AT=320:GOSUB 1020
740 GO TO 810
750 SOUND 20,3:SOUND 5,3
760 AT=224:GOSUB 1020
770 PRINT @ 256, " ";
780 PRINT A$(X)
790 PRINT @ 288,  " WAS THE CORR
ECT WORD"
800 AT=320:GOSUB 1020
810 PRINT@419, "PRESS ANY KEY TO
 CONTINUE";
820 K$=INKEY$:IF K$=""THEN GO TO
 820
830 NEXT K
840 '*** TEST IS DONE. LAST SCRE
EN ***
850 CLS(3)
860 AT=0:GOSUB 1020
870 PRINT @ 64, "CONGRATULATIONS
 ";
880 PRINT N$
890 SC=INT(C/15*100 + .5)
900 PRINT @ 128, "YOUR GRADE WAS
 ";
910 PRINT SC;
```

```
920 PRINT " %"
930 PRINT @192, "FOR WEEK NO. ";
940 PRINT W
950 AT=256:GOSUB 1020
960 PRINT @ 320, "DO YOU WANT AN
OTHER TEST Y OR N";
970 INPUT T$
980 IF T$="Y" THEN GO TO 110
990 PRINT @ 416, "COME BACK AND
SEE ME AGAIN SOON,";
1000 END
1010 '*** PRINT @ SUBROUTINE ***
1020 FOR I= AT TO AT+31:PRINT @
I, CHR$(182);
1030 NEXT
1040 RETURN
1050 '*** WEEK 1 - CONSONANTS
1060 DATA FLAG,FED,HID,DOT,HUNT,
APPLE,BRING
1070 DATA CLUB,ELSE,HAPPY,PEN,RI
VER,ROCK,SHALL,SUNNY
1080 '*** WEEK 2 - DOUBLE LETTER
S
1090 DATA ADD,CLIFF,DRILL,ILL,KI
SS,LESS,MESS
1100 DATA ODD,ROLL,SHELL,SMELL,S
PELL,SPILL,STUFF,UNLESS
1110 '*** WEEK 3 - USING VERBS
1120 DATA BAT,CHOP,CLAP,DROP,NAP
,PIN,STEP,SKINNED,STOPPED
1130 DATA TRAPPED,TRIPPED,TAGGIN
G,PLANNING,WAGGING,TAPPING
1140 '*** WEEK 4 - CONSONANT CLU
STERS
1150 DATA SNOW,STAR,STATE,STICK,
TRICK,STRING,SPRAY,SPRING
1160 DATA CLEAR,CLOSE,DRAWER,DRI
VE, FLAT,FLOOR,PRINT
1170 '*** WEEK 5 - MORE CONSONAN
T CLUSTERS
1180 DATA ACT,DUST,EAST,TEST,WES
T,LIFT,BEND,GRAND
1190 DATA GROUND,WIND,BUILD,CHIL
D,WILD,MILK,BUMP
```



GAMEMASTER'S APPRENTICE

Role Playing Games Are *Not* Computer Games

By George Firedrake and Art Canfil

Role playing games are *not* computer games. A role playing game is an interaction between players, who operate characters, and a game master, who runs the world in which the adventures occur. Most of the play is verbal exchange. The players tell the game master what their characters want or intend to do. The game master then tells them if they can or may do it or, if not, why not and what might happen instead. Much time is spent consulting rule books. A game player may come equipped with a suitcase full of books to be consulted regularly during game play.

The game master creates the game world and stocks it with challenges, puzzles, traps, hazards, adversaries, and surprises. She or he runs the game world fairly and with imagination, making it interesting, challenging, and fun for the players. The game master has, and frequently consults, many rule books.

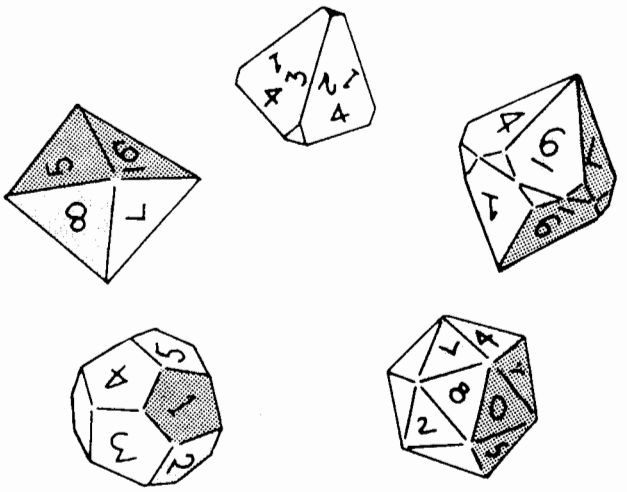
The players play their characters *as the characters are.* That's the idea: role playing. Get into the role. Play the character as if the character has a life of her, his, or its own. If your character is a barbarian warrior of average intelligence, act like a barbarian warrior of average intelligence. If your character is a rogue, play the part. If your character is a hobbit, be a hobbit. You might even be a wizard, an elf, a dwarf — play the role!

At its best, a role playing game is interactive storytelling in which everyone contributes to the telling, or improvisational theater, spontaneously created by the interplay of game master and game players. Players and game master control and play characters within the rules of the game system.

Most rule systems use dice to determine the outcome of events. A character has many skills. For each skill, a character has a success percentage that determines the probability of success or failure under normal conditions. The game master may increase or decrease this probability if conditions are unusual.

Dice might be used to find out whether something happened or didn't happen. Did a character successfully open a door, or find a hidden object, or hear a monster sneaking up behind her or him? Roll dice to find out.

Dice are used to determine success or failure in using weapons. If a weapon attack is successful, dice are used to determine how much damage is inflicted. If a character can use magic, dice are used to determine whether a spell is cast successfully and what its effects are. In playing a game, you will spend much time rolling dice and interpreting the results of a roll.



The Game World

Role playing games are usually played by people sitting around a large table. To help players visualize the game world, the game master may use a *game board.* A game board might be simply a large sheet of paper on which the game master reveals portions of the game world as the characters, run by the players, make their successful explorations. As the game progresses, more and more of the game master's world becomes visible on the game board.

And what might that be?

A dungeon — a network or labyrinth of rooms, or caves, or whatever fiendish structure the game master contrives. Enter at your own risk — you might find

monsters to flee or overcome, treasures to acquire (if you can defeat the monsters), problems to solve (solve problem, get treasure), or cleverly contrived traps to ensnare the unwary.

A map of a wilderness area in which an outdoor adventure occurs. Of course, many areas are marked as "unknown," "perilous," "No one has ever returned from here," or "Beware! Dragons be here."

A map of a village, town, or city. An adventure might begin in such a place or occur there. Adventurers need provisions, equipment, weapons, knowledge, training, and other things that can be obtained in the places where people cluster.

The floor plan of an inn or tavern, showing all things visible to a character who enters such a place. Where would your character like to sit in the tavern (perhaps away from those trolls over there)? Would your character like to stay at the inn tonight? If so, he or she can go upstairs — the game master draws (or shows a previously drawn) floor plan of the second story, except for that mysterious room in the northeast corner.

The game master knows everything about the game world. Your character can learn about the game world only by exploring, asking questions, taking risks, guessing correctly.

As you walk into the game room, you see several people sitting around a large table. They are obviously having a good time. Curious, you approach. On the table you see a map. You look more closely. Yes, there on the map are several tiny figures. Each figure represents a character run by one of the players. Other figures represent NPCs, non-player characters, controlled by the game master.

It seems that a fight (called a *melee*) is in progress. The adventurers, figures controlled by the players, have been attacked by a bunch of nasties (NPCs) controlled by the game master. The battle rages as you watch. Players reach out and move their figures, roll dice, yell instructions, mutter to themselves. The game master, likewise, manipulates the NPCs. Who will win? Stay, watch, and find out.

The game board is usually populated by lead, plastic, or paper figures that represent the characters controlled by the players and the game master. Hundreds of figures are possible: humans, hobbits, elves, dwarfs, orcs, trolls, intelligent ducks, dragons (or course!), and dozens of other mundane or fantastic creatures.

Players move figures on the game board as a chess player moves chess pieces on the chess board. Your character's position on the game board shows her or his relationship to other characters and what might be possible or impossible in the next few seconds of game time.

Game time is the time experienced by your character in the game world. How long (in game time) will it take for your character to reach the end of the hallway, about 30 feet away? How will other characters move while this is happening? Can your character fire an arrow at that nasty down the hall, or is the line of fire blocked by fellow adventurers?

A fantasy role playing game might last a few hours or a few years. Players might meet once to play one game of three or four hours duration. Players might meet once a week for years. Each week, play continues from where it left off the previous week.

Most players have several characters to play in games, just as an actor might play several roles on stage or screen, or an operatic performer might sing different roles at different times.

However, there is one essential difference. In fantasy role playing, each character has his, her, or its own life which changes according to what happens to the character during a game. Characters become older during game play. A character can even die during a game, sometimes a sad experience for the real life person who is playing that character. Characters change during game play. So, for each character, a character sheet is maintained and updated after each game. As a character learns and grows, so does the character's record. Aha! An obvious application for our friendly CoCo.

Computer-Based Adventure Games

Fantasy role playing games have a great influence on computer games, but computers have had little impact on fantasy role playing games. There are two kinds of computer Adventure games: one deterministic, the other probabilistic.

A deterministic Adventure game is the same each time you play it. Each game is a complex logical puzzle for the player to solve. If you succeed in decoding a game, you move on to another game, perhaps more difficult. A game may take a few hours to solve, or much longer.

A probabilistic game is probably different each time you play. Events are determined partially by choices made by the player and partially by random choices made by the computer. Outcomes are determined partially by the player's skill and partially by luck. You create a character who explores a dungeon or other computer-contrived universe. You make decisions for your character who enjoys, or suffers, the consequences of your decisions. Play and see what happens. Play again. Your character, or another character of your design, will probably experience a different sequence of events, even if you make the same decisions as before.

We have received several adventures from Owls Nest and Prickly-Pear. We'll playtest them and tell you about them. We invite you to play along, especially if you haven't played before!

GameMaster's Apprentice — The Books

Computer Adventure games are perhaps the most sophisticated of computer games. However, they fall far short of the richness and complexity of a role playing game conducted by a human GameMaster. It is puzzling that software designers and publishers have not developed software for home computers to assist role playing game players in managing fantasy worlds. Ten to 15 million people (our estimate) play role playing games. The number of players is increasing rapidly. This may be a software market as large as the market for computer Adventure games.

GameMaster's Apprentice software might include:

— GameMaster's Dice. Role playing games use several types of dice: four-sided, six-sided, eight-sided, 10-sided, 12-sided and 20-sided. A rich world of probability, important to kids.

— Simple worksheet programs to help optimize the design of characters or other artifacts used in role playing games. For example, starship design in the science fiction game *Traveler*.

— Storing, retrieving, and managing information otherwise found in rulebooks, scenario packs, and other literature of role playing games. For example: Character records, prices and specifications of weapons, wages and prices in the city of Myboro in Wundervale, descriptions of magic spells, hard to remember rules and anything else that must be looked up during game play.

— Programs to generate pronounceable random names for characters, according to a user selected consonant vowel structure.
— Programs to automate time-consuming game mechanics. For example, a conflict between two characters or a melee involving several characters.
— Names, addresses, and phone numbers of players, game masters, game publishers, game and hobby stores, and so on.

Fantasy game worlds can include everything known about real life, plus anything a player or game master can imagine.

We are writing books and software, first for the CoCo, then for other computers. Our progress will be chronicled on these pages. Although written for children, these books will not be too difficult for adults.

Taipan: A Game In Context

If you have read *Tai-pan* by James Clavell, or *Dynasty* by Robert S. Elegant, you know something about the exotic "China Trade" of the 19th century.

European and American military power had opened trade doors to China and Japan. Immense fortunes could be made by daring, adventurous men without ethical principles to hinder them. The China Traders were such men. They called themselves tai-pan.

Tai is Chinese for great or big or even supreme. Pan means leader or boss. Thus, a tai-pan is a big boss or great leader or perhaps supreme leader. Even today, the term is used for the heads of trading firms from Hong Kong to Singapore (read Clavell's *Noble House*, the sequel to *Tai-pan*).

In the China Trade, the greater the risks, the greater the profits. The risks were more awesome than mere financial gain or loss — there was always a strong possibility of sudden unnatural death.

The China Trader had to contend with pirates, the triads (Chinese secret societies), and the vagaries of Mother Nature. But they dared to do so, and great fortunes were made and lost.

This is the context in which we will build a computer game. No Simulation game can take everything in a setting or environment into account. Think of the problems in creating a game in the China Trade context: the attitudes, behavior, economic and political power of thousands of people, the distribution of wharf rats throughout Asia, tides, weather conditions, what's happening elsewhere in the world, and so on.

Obviously, we can't put every factor into a single Simulation game. Instead, we design a game that, when you play it, it *feels as though* these factors are part of your experience. In a well-done game, you will get caught up in the mystique. You will find yourself playing the role.

How? First, we can include a number of *common* events, such as bad weather, problems with pests, and pirate attacks, as fairly regular situations. Second, we can create a number of rare events, such as random robberies, confiscation of cargo by port authorities, dramatic rises or falls in prices of goods, etc., as representative of the vast number of things which could actually happen in the "real world."

Using the built-in "random number generator" of your CoCo, we can make some events happen quite regularly, while some other situations may not occur more than once in a blue moon, if at all, during any particular game. And we can set the probability of any event anywhere within a broad spectrum of likelihood.

We also need to make the context of the game interactively "realistic." In other words, the player should have a feeling that the "world" of the game reacts like the real world does. For example, the real world constantly seems to present "trade-offs" — situations where we have choices between two or more alternatives, each of which has advantages and disadvantages.

If you are on foot and need to cross a road against heavy traffic, you might have two choices: One choice might be to jaywalk across the road. The other option might be to go down two blocks to a pedestrian overpass and cross there. With the first choice, you might cross the road much more quickly, thus saving some of your precious time — but you risk not only getting a citation from a police officer, but getting killed as well. With the second choice, you cross the road legally and safely — but use up more time.

Now, add another factor: urgency. Suppose you have just been bitten by a poisonous snake, and the nearest hospital was across the road. Would you jaywalk or take the overpass? Or what if you had all the time in the world that day. Which route then?

In a Contextual Computer Game, we can vary this factor of urgency. We can also vary the danger of the traffic, the pedestrian's ability to dodge cars, and even the safety of the overpass! Trade-offs — they're vital factors in Contextual Computer Games, and we'll use them in *Taipan*.

Motivating the player is the key to any good game. You don't have to possess a degree in psychology to know some of the things which motivate people. The desire for power, a lust for money, the drive for gaining respect, the pleasure of accomplishing something difficult — all these are common motivations. In *Taipan*, we are going to motivate the player with a combination of greed and pride.

Greed is vital, because only with this can the player fit into the role of a taipan. That's what the player will be, a taipan. You may wonder how real greed could be generated in a mere game — after all, there's no real money involved. If you're thinking this, then just try to remember the last time you played Monopoly. After playing for a few minutes, didn't you get just a *little* greedy? If not, you're the exception, and maybe you didn't have much fun!

But there's a vital factor here that can't be overlooked by any game designer: in a game (and maybe in life?), wealth, power, or any other reward, doesn't taste so sweet unless there was a struggle to gain it. What would be the purpose of playing Solitaire with all the cards in the deck face up? There has to be uncertainty, conflict, and obstacles to overcome for any reward to actually feel like a reward.

So, in our game, we've got to make the player struggle to satisfy greed. That struggle, if successfully carried out, will result in pride of accomplishment.

Difficulty

The degree of difficulty is perhaps the most troublesome factor of all. A game designer has to get it just right. Too hard to play, and everyone hates the game. Too easy, and people despise it for being trivial. And everyone has different standards! It looks as though any game, at best, would appeal only to a certain segment, doesn't it? Not necessarily; by using the principle of trade-offs properly, a single game can be a sort of "one-size-fits-all" proposition.

Tai-pan is a game anyone who can read and understand words and numbers, and can poke keys on a CoCo, has a good chance to win. It is also a game in which a Ph.D. with degrees in Asian studies, computer science, and accounting — will stand a chance of losing.

GAME

32K ECB

the RAINBOW

The *Mad Adder*

By Larry K. Gage

The *Mad Adder* is a mathematical logic-type game. The object of the game is to figure out the proper number replacements for each symbol so that the problem is a mathematically correct addition problem. An addition problem will be shown with the numerals replaced by graphics symbols. Each symbol shown represents one (and only one) number and likewise a number is represented by only one symbol.

To play *Mad Adder*, insert the cassette and type *CLOAD"MADADDER"* and ENTER. The program uses the highest resolution graphics (*PMODE4*) and four colors, and requires 32K memory to run. Type *RUN* and program execution will begin. A simple explanation of the game's object will be given and then followed after an interval by an example problem. The time interval is used by CoCo for drawing, coloring, and getting the symbols into arrays.

After the example problem is completed you continue program execution by pressing any key. CoCo will then respond by asking you to enter the difficulty level (one, two or three) that you wish to try. Level one is the easiest (numbers between one and 199) and level three, the most difficult (numbers between one and 19,999).

The graphics addition problem will be drawn and you will be asked your guess for the numeric value of the upper-right symbol. Respond by pressing a number key from zero through nine. Your entry will be inserted into the appropriate spots in the numeric solution area of the screen and you will be asked for your guess for the next symbol. The program does not allow you to enter the same number for two different symbols.

After you have made a guess for each symbol, CoCo will inform you if your guesses result in a mathematically correct addition problem or not. If it is correct, the screen will show "good solution" and then tell you the length of time you required to solve the problem, as well as the number of clues given. It then re-initializes as necessary and asks you to enter the difficulty level for another problem. If your guesses did not result in a mathematically correct addition problem, your incorrect solution will be erased and the number of tries you have attempted will be shown. If you want a clue, press 'C' when asked for a guess. If CoCo responds "you already guessed that" when you press 'C', then you have already made an erroneous guess. (At that point you may want to start over on the same problem — which can be done by pressing 'S'.)

1) You are only allowed nine tries to solve any problem.
2) If a problem appears too difficult, simply press 'Q' when you are asked to guess the value of a symbol, enter the difficulty level you desire, and a new problem will be generated.
3) If you discover you have "messed up" and want to start over on the same problem simply press 'S'.

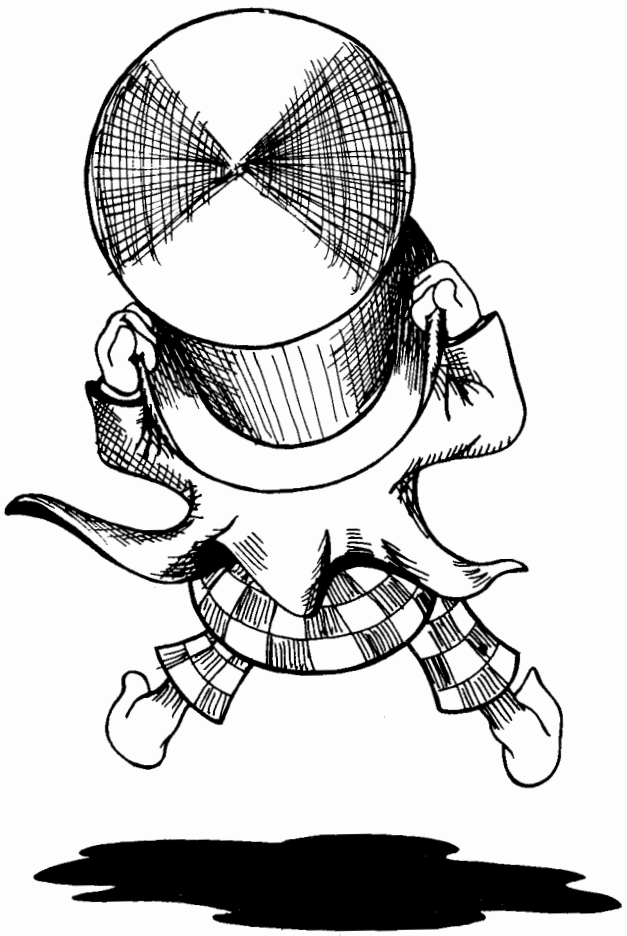
46..... 80	1000 146
225..... 70	1150 179
350..... 192	1300 65
600..... 190	1550 17
790..... 225	END 193

The listing:

```
5 'MADADDER V1.9 11/08/83
10 CLS0:PRINT@42,"the";:PRINT@46
,"mad";:PRINT@50,"adder";:PRINT@
64,"1";:PRINT@66,"k";:PRINT@68,"
gage";:PRINT@83,"copyright";:POK
E1116,49:POKE1117,57:POKE1118,56
:POKE1119,51:X=RND(TIMER):'V 1.1
15 FORI=1024 TO 1055:POKEI,182:N
EXTI
16 FORI=1504TO1535:POKEI,246:NEX
T
20 PRINT@160," THE OBJECT OF THI
S GAME IS TO  SOLVE A MATHEMATIC
AL PROBLEM IN WHICH THE NUMBERS
0 THRU 9 HAVE BEEN REPLACED BY U
NIQUE SYMBOLS.";
25 POKE178,0:GOSUB1570
30 PCLEAR4:PMODE4,1:COLOR0,1:PCL
S
40 DIM N1(15),N3(15),N4(15),N8(1
5),N9(15),N0(15),AN(3),AR(13),AA
(13),Z$(10),J(10),M1(15),M2(15),
M3(15),M4(15)
45 PRINT@420,"BE PATIENT--I'M DR
AWING";
46 GOSUB1590
50 FORI=1TO10:J(I)=I:NEXTI
55 GOSUB1580:PCLS
60 SA=0:GOSUB1330:LX=24:LY=24
70 XX=10:YY=10:LINE(9,9)-(35,35)
,PSET,B:DRAW"BM22,33E10UEU6HUH2L
5G3H3L5G2DGD6FDF10":POKE178,13:P
```

```
AINT(11,11),,Ø
8Ø GET(1Ø,1Ø)-(34,34),N1,G
85 POKE178,Ø
12Ø X=72:Z=Ø:CL=Ø:NT=1:GOSUB157Ø
125 GOSUB158Ø
13Ø POKE178,1:FORY=28TO34:FORQ=X
-Z TO X+Z STEP2:LINE(Q,Y)-(Q,Y),
PSET:NEXTQ:Z=Z+2:NEXTY:LINE(72,1
8)-(72,28),PSET:FORY=1ØTO18:FORX
=62TO82STEP2:LINE(X,Y)-(X,Y),PSE
T:NEXTX,Y:POKE178,157
14Ø GET(6Ø,1Ø)-(84,34),N4,G
145 POKE178,Ø
191 CIRCLE(22,52),12,,.7:CIRCLE(
22,52),1Ø,,.8:CIRCLE(22,52),8,,.
7:POKE178,13Ø:PAINT(22,52),,Ø:PO
KE178,Ø:PAINT(31,52),,Ø
192 GET(1Ø,4Ø)-(34,64),N3,G
195 GOSUB158Ø
21Ø PRINT@416,"A SAMPLE PROBLEM
IS COMING UP.. PRESS ANY KEY AFT
ER SAMPLE PROB ";
22Ø DRAW"BM197,1ØM+4,+8M2Ø9,22M-
8,+4M197,34M-4,-8M185,22M+8,-4M1
97,1Ø":CIRCLE(197,22),6,,.9:PAIN
T(2ØØ,2Ø),4 'STAR
225 GOSUB157Ø
23Ø GET(185,1Ø)-(2Ø9,34),N8,G
24Ø YY=1ØØ:XX=1ØØ:LX=8:LY=24:GOS
UB32Ø:XX=116:GOSUB32Ø:XX=1Ø1:YY=
1ØØ:LY=8:LX=24:GOSUB32Ø:YY=116:G
OSUB32Ø:GET(1ØØ,1ØØ)-(124,124),N
9,G:LY=24
25Ø XX=219:YY=1Ø:GOSUB32Ø
255 POKE178,31:PRINT@326,"G O O
D   L U C K";
26Ø LINE(219,22)-(237,34),PSET,B
F:LINE(224,1Ø)-(241,22),PSET,BF
265 POKE178,Ø:LINE(216,36)-(244,
9),PSET
27Ø GET(218,1Ø)-(242,34),NØ,G:PO
KE178,Ø
28Ø GOSUB146Ø
285 GOSUB158Ø
29Ø IFSA=ØTHENDL=1:NT=9:GOTO31Ø
3ØØ GOSUB146Ø:GOSUB148Ø
31Ø PCLS:CLS0:GOTO34Ø
315 GOSUB158Ø
32Ø FORM=YY TOYY+LY:FORN=XX TO X
X+LX STEP2:LINE(N,M)-(N,M),PSET:
NEXTN,M:RETURN
33Ø '---SET UP VALID PROBLEM--
34Ø X=RND(9899):AN(1)=RND(X)+1ØØ
:AN(2)=RND(9899)+1ØØ
35Ø Z=-1*(DL=3)-1Ø*(DL=2)-1ØØ*(D
L=1)
36Ø FORI=1TO2:AN(I)=INT(AN(I)/Z)
:IFAN(I)<1THENAN(I)=1
37Ø NEXTI
38Ø AN(3)=AN(1)+AN(2)
385 GOSUB158Ø
39Ø '  --- SHUFFLE SYMBOLS---
4ØØ FORI=1TO2Ø:X=RND(1Ø):Y=RND(1
Ø):IFX=Y THEN42Ø
41Ø Z=J(X):J(X)=J(Y):J(Y)=Z
42Ø NEXTI
43Ø '-- SET PROB ARRAY LOCS NEG
44Ø FORI=1TO13:AR(I)=-1:NEXTI:NM
=Ø
45Ø FORI=1TO3:NM=NM+1:Z(I)=INT(A
N(I)/1Ø):AR(NM)=AN(I)-1Ø*Z(I)
46Ø NEXTI:GOSUB158Ø
47Ø FORI=1TO 3:FORJ=1TO3
48Ø NM=NM+1:IFZ(J)=ØTHEN49ØELSEA
R(NM)=Z(J)-INT(Z(J)/1Ø)*1Ø:Z(J)=
INT(Z(J)/1Ø)
49Ø NEXTJ
5ØØ NEXTI
51Ø IFAN(3)>9999THENAR(13)=1
52Ø LY=132
53Ø FORI=1TO13:Z=AR(I):LX=118
54Ø IFI>3THENLX=9Ø:IFI>6THENLX=6
2:IFI>9THENLX=34:IFI=13THENLX=6
:LY=132:GOTO58Ø
55Ø IFLY=132THENLY=7Ø:GOTO58Ø
56Ø IFLY=1ØØTHENLY=132
57Ø IFLY=7ØTHENLY=1ØØ
58Ø GOSUB63Ø:NEXTI
59Ø LINE(Ø,95)-(12,95),PSET:LINE
(Ø,94)-(12,94),PSET:LINE(6,89)-(
6,1Ø1),PSET:LINE(7,89)-(7,1Ø1),P
SET ' + SIGN
6ØØ LINE(12,127)-(144,128),PSET,
B
62Ø GOTO8ØØ
63Ø Y=Z:IFZ=ØTHENY=1Ø
64Ø IFY<ØTHEN RETURN
65Ø FORM=1TO1Ø:IFY=J(M)THEN66ØEL
SENEXTM
66Ø XL=LX+24:YL=LY+24
67Ø ON M GOTO 69Ø,7ØØ,71Ø,72Ø,73
Ø,74Ø,75Ø,76Ø,77Ø,68Ø
68Ø PUT(LX,LY)-(XL,YL),NØ,PSET:R
ETURN
69Ø PUT(LX,LY)-(XL,YL),N1,PSET:R
ETURN
7ØØ PUT(LX,LY)-(XL,YL),M1,PSET:R
ETURN
71Ø PUT(LX,LY)-(XL,YL),M2,PSET:R
ETURN
72Ø PUT(LX,LY)-(XL,YL),M3,PSET:R
ETURN
73Ø PUT(LX,LY)-(XL,YL),M4,PSET:R
ETURN
74Ø PUT(LX,LY)-(XL,YL),N3,PSET:R
ETURN
75Ø PUT(LX,LY)-(XL,YL),N4,PSET:R
ETURN
76Ø PUT(LX,LY)-(XL,YL),N8,PSET:R
ETURN
77Ø PUT(LX,LY)-(XL,YL),N9,PSET:R
ETURN
```

```
780 RETURN
790 GN=AR(I):CL=CL+1:GOTO960
800 DRAW"S4BM10,10D5R3U2D2R3U5BM
+3,+5U10D5R3D5BR3U4ER3D5UGLLBR6U
10D5L2R3BM+6,+5R4L4U5R4U5D10BR3U
5R4D5L4BR10U5D5R4U5D9LBM+5,-4U5R
4D5L4BR7U5D5R4U5"
810 DRAW"BM+6,+5R4L4U5R4D9LBM+4,
-4U5D5R4U5BR3R3FDL4U2D4FRREBR3FR
REUHLLHUERRFBM+3,+4FRREUHLLHUERR
FBR10D5BM+3,-1FRREUHLLHUERRFBM+8
,+4U8D3L2R4BM+3,+5U8D4R3FD3BM+3,
-3ERRFDL4U2D4FRRE"
820 DRAW"BM10,30D3F2RE2U3BM+3,+5
U4ER3D5UFL3BR7U8BR3BD3D4FRRRU5BM
+3,+2UERRFDL4U2D4FRREBR7U3ERRFD3
GLLHBM+7,+1U7FERLGDDL2R4"
830 DRAW"BM+9,+4U8D3L3R4BM+3,+5U
8D3R3FD4BM+3,+0U5BM+0,-2UBM+7,+3
HLLGDFRRFDGLLHBM+10,+0FRREUHLLHU
ERRFBM+3,-1D4FR3U5D8GBM+4,-4U5DE
RFD4U4ERFD4BM+3,+0U8D3R3FDDGL3BM
+8,+0HUUERRFDDGLLBM+8,+0LU8"
840 DRAW"BM+6,+1ERRFDDLGDBD2D"
850 TIMER=0
860 NM=1:NE=0:LINE(158,130)-(256
,131),PSET,B
870 SCREEN1,1:FORI=1TO13:IFAR(I)
<0THEN1020
880 IFI=1 THEN910
890 FORJ=1 TO I-1:IFAR(I)=AR(J)T
HEN 1020
900 NEXTJ:NE=NE+1
910 Z=AR(I):LX=152:LY=21:LINE(18
0,20)-(240,45),PRESET,BF:GOSUB63
0
920 GOSUB1450:IFSA=0 THENGN=AR(I
):Q$=STR$(GN):GOTO960
930 GOSUB1520:FORW=1TO9:IFVAL(Q$
)=W THEN950ELSENEXTW
940 IFQ$="Q"THEN1540ELSEIFQ$="S"
THEN1132
945 IFQ$="C"THEN790ELSEIFQ$<>"0"
THEN920
950 GN=VAL(Q$):N=GN+1:Q$="V30;04
;L20;"+STR$(N):PLAY"XQ$;"
960 DRAW"S3BM200,45"+Z$(GN)
970 IFI=1THEN1000
980 FORIA=1 TO I-1:IFGN=AA(IA)TH
ENGOSUB1280:GOTO920
990 NEXTIA
1000 FORIA=I TO 13:IFAR(IA)=AR(I
)THENGOSUB1210
1010 NEXTIA
1020 NEXTI
1030 FORZ=1TO13:IFAA(Z)<0THENAA(
Z)=0
1040 NEXTZ
1050 A1=AA(1)+AA(4)*10+AA(7)*100
+AA(10)*1000
1060 A2=AA(2)+AA(5)*10+AA(8)*100
+AA(11)*1000
1070 A3=AA(3)+AA(6)*10+AA(9)*100
+AA(12)*1000+AA(13)*10000
1080 GOSUB1470:IF A1+A2<>A3 THEN
1140
1090 DRAW"S7BM150,186U3R3D3L3R3D
3LBM+3,-3U3R3D3L3BR5U3R3D3L3BR8L
3U3R3U3D6BR6R3U3L3U3R3BD6BR2U3R3
D3L3BR6U6D6BR3U3D3R3U3D3BR3U6D3L
2R4BD3BR2U3D3BR2U3R3D3L3BR5U3DER
```



```
2FD3"
1100 SCREEN1,1:GOSUB1460
1110 IFSA=0THENSA=1:GOSUB1520:GO
TO1130
1120 GOSUB1560:CLS3:T=TIMER:PRIN
T@133,"YOUR SOLUTION TIME WAS";:
PRINT@170,INT(T/3600);"MIN";INT(
INT(T/6-INT(T/3600)*600+.5)/10);
"SEC";:PRINT@229,"AT DIFFICULTY
LEVEL ";DL;:PRINT@295,"WITH ONLY
 ";CL;" CLUES";:GOSUB1460:SCREEN
1,1
1130 GOSUB1480:PCLS:TIMER=0:NM=1
:NT=0:CL=0:GOTO340
1132 SOUND8,1:DRAW"S8BM165,183L3
DR3D2L3BR5U4DLR2BR2BDGDREDU2LBRB
D2RBR2U3DEGDDU2BR3RRLU2D4BR8EUHL
GDFRBR4HU2BR3DGGBR5HUEFDL2FREBR2
BDU3DE":GOSUB1460:GOTO1160
```

```
1140 'BAD SOLUTION
1150 SOUND2,4:DRAW"S8BM180,183D3
RU2D2RU3BR2D3U3R2FGL2R2FBR2BU3R3
D3L3U3BR5D3U3F3U3BR5L3D3R3UL":GO
SUB1460
1160 SCREEN1,1
1170 NT=NT+1:NM=1:IFNT>9THENGOSU
B1550:GOTO1130
1180 SCREEN1,1:IA=NT:GN=AR(IA):D
RAW"BM14,64S6DU4L2R4BR2R3FDGF2H2
L3U3D4BR6U4BR6L4D2R3L3D2R4BR2R3E
UHL2HER3BR3R4BD2L4"
1190 LINE(65,50)-(88,66),PRESET,
BF:DRAW"S2BM66,65"+Z$(NT)
1200 GOSUB1530:GOTO860
1210 X$="236":Y$="96":IFIA>3THEN
X$="216":IFIA>6THENX$="196":IFIA
>9THENX$="176"
1220 IFIA=13THENX$="156":Y$="154
"
1230 IFIA-3*INT(IA/3)=0 THENY$="
154"
1240 IF(IA+1)-3*INT((IA+1)/3)=0
THENY$="126"
1250 Q$="BM"+X$+","+Y$
1260 DRAW Q$+Z$(GN)
1270 AA(IA)=GN:RETURN
1280 DRAW"S8BM10,180D3R3U3D6U3BR
2U3F3D3L3BR5U3D3R3U3BR5BDD2U2ER3
D3UGL2BR6U6D6BR3U3DERBD3BR5LHUER
FL3FREBR3BD2U2ER2D3UGL2BR8L3U3R3
U3D6BR2U3D3R3U3D6"
1290 DRAW"BR7U6L3D3R3BR2U3D3R3U3
BR3BURFDL3EGDFREBR2BDR3U2L3UR3BR
5L3DR3D2L3BR7EGLHUR3HLGDBR8BU2L3
D3R3U6BR7D6U3L2R4BR2R3D3BL2U6D6B
R4U2ER2D3UGL2BR6U6D3L2R4"
1300 GOSUB1460:LINE(10,170)-(256
,191),PRESET,BF
1310 RETURN
1320 SCREEN1,1:GOTO1320
1330 'NOS DEFINED
1340 Z$(0)="S3BR2H4U14E4R8F4D14G
4L8"
1350 Z$(1)="BR9R6L3U21G6"
1360 Z$(2)="BR18L14U4E4R6E4U4H4L
8G6"
1370 Z$(3)="BE4F4R6E4U4H3L4R4E3U
4H3L6G4"
1380 Z$(4)="BR10U24BL2D2M-8,+14R
16"
1390 Z$(5)="BR2R4E10U2H3L9U8R14"
1400 Z$(6)="BR3BE3F3R6E4U6H4L8D8
U16E3R6"
1410 Z$(7)="BR7M+11,-23L14"
1420 Z$(8)="BR6H2U8E2R14F2D8G2L1
4BU12R2H2U8E2R10F2D8G2"
1430 Z$(9)="BR10M+8,-12U9H3L9G3D
9F3R12"
1440 RETURN
1450 LINE(179,25)-(220,45),PRESE
T,BF:RETURN
1460 FORMM=1TO1000:NEXTMM:RETURN
1470 FORMM=1TO13:AA(MM)=-1:NEXTM
M:RETURN
1480 PRINT@352," ENTER DIFFICULT
Y LEVEL (1,2,3) ";:SA=1
1490 Q$=INKEY$:IFQ$=""THEN1490EL
SEDL=VAL(Q$)
1500 IFDL<1 OR DL>3THEN1490
1510 PRINT@432,DL;:RETURN
1520 Q$=INKEY$:IFQ$=""THEN1520EL
SERETURN
1530 LINE(154,70)-(256,191),PRES
ET,BF:RETURN
1540 CLS4:GOSUB1580:PRINT@128,"
   MAYBE THAT WAS TOO HARD,     *
******LET'S  TRY AGAIN.********"
:GOTO1130
1550 CLS7:GOSUB1570:PRINT@133,"I
 ONLY ALLOW 9 TRIES.";:PRINT@197
,"BETTER LUCK NEXT TIME.";:RETUR
N
1560 FORMM=1TO3:PLAY"O4;L255;V31
;1;2;3;4;5;6;7;8;9;10;11;12;11;9
;7;5;3;1":NEXTMM:RETURN
1570 PLAY"L255;O5;V31;12;11;10;9
;8;7;6;5;4;3;2;1;O2;12;11;10;9;8
;7;6;5;4;3;2;1":RETURN
1580 FORMM=1TO3:MK=RND(255):SOUN
DMK,1:NEXTMM:RETURN
1590 PCLS
1600 CIRCLE(12,12),11:CIRCLE(12,
12),6,0,.9,.1,.35:DRAW"BM9,8D2LU
2RBR6D2RU2L"
1610 GET(0,0)-(24,24),M1,G
1620 PUT (100,100)-(124,124),M1,
PSET
1630 DRAW"BM25,23M32,9M40,16M25,
23BM28,22U7R12L4D3U7L6BM32,9D11L
6BM30,12HUUEUERRERRFRRF4D5GDDGDU
3":POKE178,13:PAINT(32,8),,0:POK
E178,0
1635 GET(25,1)-(49,25),M2,G
1640 DRAW"BM57,25E2U2H3U2HU2EU2E
U4F2EURER5FRF2D4R4ERFG5L7E5U3HL2
GD6U5HL2GD7GDHFR10E4UBM66,25H3U2
E3BL5BGH2U2E2BR6UBR4U"
1642 POKE178,154:PAINT(73,12),,0
:POKE178,0
1645 GET(53,1)-(77,25),M3,G
1646 PUT(140,101)-(163,124),M3,P
SET
1650 DRAW"BM113,8RE2R3F3DF2D4GDG
2DGL4HGL4HUH2UHU4EUE3R3F2RM-3,-6
L2M+5,+6BH3HL3G3LHDF4RE3U":POKE1
78,17:PAINT(113,18),,0:POKE178,0
1655 GET(101,1)-(125,25),M4,G
2000 RETURN
```

EDUCATION OVERVIEW

Opposing Views On Computers In Education

Michael Plog, Ph.D.

Remember the old physics class, where they explained action and reaction? Well, reaction applies to social situations also. For those of us old enough to remember the 1960s, we lived through the reaction to the Vietnam War. Most politicians are elected as a result of a reaction against some policy or image of policy. There are reactions against computers also.

I should make the standard editorial disclaimer right now. THE RAINBOW allows me to write what I want. My comments are my own, and do not necessarily reflect the views of the magazine. On a more personal note, let me emphasize that no one on THE RAINBOW staff has ever tried to control what I write, or even make changes in my copy beyond normal proofing and editing. So, as you read the rest of this article, remember that the thoughts are mine; not necessarily THE RAINBOW's.

A particular reaction against computers in education has come to my attention lately. There is an organization called the "National Anti-Drug Coalition." This group says computers are turning students into "zombies." They also claim computerization in schools will result in teacher layoffs, depersonalization of schools, and a teaching style of "drill and grill."

A few years ago, this group reportedly tried to stop the Baltimore city schools from instituting a computer plan in the city's 140 elementary schools, 27 junior high schools, and 20 high schools. The Anti-Drug Coalition said computers would dehumanize teaching and turn the children of Baltimore into robots. The thwarting efforts were unsuccessful; Baltimore now has 400 microcomputers for its 120,000 students.

There may be other cities and school districts where the Anti-Drug Coalition is working. If so, I can only sympathize with the school officials. It is not easy to put up with people who use emotion instead of reason; prefer witch hunts to quests for enlightenment.

Now just who is this coalition? The organization was founded in 1976 by Lyndon LaRouche. I have had the opportunity to see Mr. LaRouche on television. Late one night, a strange advertisement came on. This was LaRouche, running for president. In the past, he has run for president on the U.S. Labor Party ticket, and this year is running as a Democrat. At the time I first saw the advertisement, I considered his view of the Soviet Union to be childish and his interpretation of factual material to be distorted. Thus, even before I ever heard of this coalition, I knew I had a philosophical difference with the coalition founder.

I am sure Mr. LaRouche feels himself to be sincere. He probably is a kind husband and parent, and maybe owns a loyal pet. But his perception of reality differs greatly from mine. And even though he may be extreme in his views, and just wild enough to get into controversy with his lack of information, there are other people who also question the use of computers in schools. Well, let's consider some of the arguments *against* the use of computers in education.

The concept of turning students into zombies and robots is difficult to argue against. The statement has metaphysical tones, not factual. The concept of turning students into mindless actors in a play, written by evil scientists, is like telling a Christian that Judas was the only good disciple. Some statements are simply outside the mental framework we use to filter information about the world. There may be more here than meets the eye, however.

I have heard of (but not examined) some research that shows a drop in creativity when students are working on computers. Assume for a moment that a competent research study actually determined that. There are a host of questions, such as how creativity was measured, etc. Even beyond that, let's accept the finding as legitimate. Given the state of the art of educational software, I can easily accept that drill and practice programs lessen creativity. Drill and practice in any form will not inspire students. Such activities are necessary in schooling, but are not sufficient as the total outcome of education.

If, instead of drill and practice, students are assigned a problem to solve, and given a computer as one of the tools available to them, I would be surprised if a measure of creativity did not increase. For example, students can learn how to use a spreadsheet package, and then be given a problem to solve. Part of the solution will involve calculations on the spreadsheet. This is a type of activity that can stimulate creativity on the part of the student. (And possibly on the part of the teacher as well.)

Next, consider that computerization will eliminate the need for teachers. Past articles have mentioned this position, so there will not be much time spent on it here. Education (of anyone, not just children) requires judgments by someone. A computer cannot make judgments. The act of forming a judgment involves a value position. Computers are logical, they are not reasonable. Training for a specific skill, such as typing, disk repair, or using a band saw, can be accomplished with a computer. Education is more than training. The lower level thought processes are necessary to education, but are not sufficient. Higher level mental activities, such as analysis, synthesis, and evaluation, are also necessary for education.

It is true that the role of the teacher may change in the future. That should not be surprising; the role of the teacher has changed significantly in the past 50 years. The next 50 years will see even greater changes. The technology of microcomputers will see even greater changes. The technology of microcomputers will contribute only a small amount of that change.

What about depersonalization of schools? There are many people — including educators — that claim schools are already depersonalized. Arguments are made every day that schools do not meet the needs of students or society. The computer is an easy scapegoat for this argument. Frankly, I find it hard to believe that a student working on a microcomputer will be less involved with humans. First, students have to share time on computers. Beyond that, computer use in schools causes questions for students. The first question is naturally, "How do I turn on this thing?" The questions get more complicated. By peer interaction, as well as teacher interaction, students will be dealing with

humans to solve problems. (That sounds like education to me.)

The term "drill and grill" is cute. Stupid, but cute. It is true that much of educational software is drill and practice. It is unfortunate, but some people believe that such software is the maximum capability of computers. Such a view is extremely shortsighted. Everything evolves, including curriculum and skills of programs. During the early phases of educational computing, it is expected that software be crude and elementary. With the growth of the field, the sophistication of programs will increase. This sophistication means more than flashy software. Other skills (such as explanation) can be taught with the help of a computer. We have already seen a tremendous growth in educational software; future growth is almost certain.

The crux of the whole matter is that computers should be used as one tool available to teachers. The microcomputer cannot become the only tool; indeed it is not the most important tool. The computer is only one of many tools teachers should use to educate children.

Let us back up for a moment, and consider why we should even talk about the arguments of Mr. LaRouche. After all, it is easy to shoot holes in positions of people who have failed to consider all the important elements of a position. Is it not a cheap shot and waste of time to deal with the coalition? Not entirely. If we are capable of responding to the extreme fringe, we will be capable of responding to intelligent, real arguments. These concerns are shared by well-meaning, reasonable people, who can express their views in more realistic terms. It is understood that anyone reading this magazine is already "sold" on computers. Other people, however, do not share our enthusiasm. They are not all vicious or stupid; they simply have not experienced the benefits of computers in the educational process. Their questions are legitimate and deserve responses.

There is not time to go into all the arguments against computers and questions about their use, but one position deserves mention. There is a concept of "readiness" in education. In essence, this means that children will learn more efficiently if they are ready for the material. This involves two components. The first is enough background knowledge. (We should not expect children to read, for example, until they know the letters of the alphabet.) The second component is a state of mind. Learning will be more efficient once the need for knowledge is experienced. The concept of readiness can also apply to institutions and societies. Schools and school people may lack some of the background knowledge and mental attitudes to efficiently use computers in education. Allow me to give you a personal example of readiness. I came home from work recently, and my wife jokingly informed me she was mad at me. She wanted to know why I had not taught her to use the word processor on our Color Computer. She has achieved readiness! Well, school people will need to achieve readiness about computers also. By having the machines available, readiness will not have to wait on purchase orders and delays of bureaucratic decisions.

That is all for this month.

EDUCATION

16K ECB

THE A B C GAME

James F Taylor

When I purchased my Color Computer, one of the major uses I envisioned was as a learning tool for my pre-school son. So, as soon as I learned the rudiments of graphics programming on the CoCo, I set out to teach it to my child. This program is a result of that effort.

The general idea behind the program is an interactive early reader. A picture of an object is displayed with it's name written beneath. At the bottom of the screen is a pair of spectacles, and in the left lens of the spectacles appears the first letter of the name of the object. The child simply has to match the letter in the left lens. A correct response is rewarded with two measures of the "ABC Song". An inmcorrect response gets "the raspberries."

Program execution is relatively straightforward. Variables are initialized, and the controlling array is loaded from data. The array is two dimensional. It represents a table which is 26 rows long, the alphabet, and four columns wide. The four parts are: The string, which is used by the BASIC DRAW cpommand to draw the letter; the string used by the DRAW command to draw the corresponding picture; a string of numbers which represents the letters in the word; and a one character flag, which denotes whether the particular letter has previously been used.

The title screen is then displayed with the entire alphabet for an ABC Song sing-a-long, and the program then moves directly into the main interactive routines. The letter to be displayed is chosen in Lines 145 to 153. To prevent the game from getting repetitive, all letters must be used once before any are repeated. A random number is generated to point to the subscript with the appropriate data. If the fourth data element indicates that the letter is free (F), it is marked used (U) and control is returned to the display. If the letter is found to have been used, the list is scanned from the top for the first available letter. If none are found free, the list is re-initialized to free (F) and the random number generated is returned to the display routine.

The display routine uses the data elements to determine the length and letters in the word, and centers and draws the word on the screen. It then draws the picture and the letter in the spectacles. The display is erased by simply redrawing everything in the background color.

If your child tires of the content of the program, you can replace the picture and word elements of the data statements with your own. Each letter of the word is represented as a two digit number. For example, "FROG" would be represented as "06181507" with "06" representing the sixth letter of the alphabet, F.

Well, I hope this program helps your kid(s) as much as it has mine. Not only can my son quickly identify (and write) all the letters, but he has also learned to spell most of the words in the program. Also, he has learned how to run the program, and he is now a pre-school touch-typist. I think I might be exaggerating just a little.

180..... 48	1000 169
410..... 209	1060 200
530..... 234	1130 128
681..... 250	1200 198
820..... 103	END 136

```
1 '*********************************
2 '*      A B C   G A M E          *
3 '*        (C)   1983             *
4 '*            BY                 *
5 '*      JAMES F. TAYLOR          *
6 '*       P. O. BOX 208           *
7 '*     MERIDEN, KS  66512        *
8 '*     PH: (913) 484-2778        *
9 '*********************************
10 '
90 CLEAR 500
100 Q1$="70":Q2$="125"
110 A1$="166":A2$="125"
```

```
120 P1$="60":P2$="40"
130 RN=RND(-TIMER)
140 DIM D$(26,4)
145 '
150 '****************************
160 '* Load controlling array  *
170 '* from data statements    *
180 '****************************
185 '
190 CLS3
200 FOR I=1 TO 26
210 FOR J=1 TO 4
220 READ D$(I,J)
230 PRINT@RND(500),"ABCGAME";
240 NEXT J
250 NEXT I
260 GOSUB 690' Draw title screen
270 GOSUB 850' Play ABC Song
275 '
280 '****************************
290 '* Draw Playing Screen     *
300 '****************************
305 '
310 PMODE4,1:COLOR5,0:PCLS:SCREE
N1,1
320 FOR I=30 TO 40 STEP 10
330 CIRCLE(80,140),I
340 CIRCLE(176,140),I
350 NEXT I
360 PAINT(115,140),5,5
370 PAINT(211,140),5,5
380 DRAW"BM120,140E5R7F5"
390 DRAW"BM120,145E5R7F5"
400 PAINT(128,138),5,5
410 GOSUB 920' Get letter
411 '****************************
412 '* Determine draw position *
413 '* of current word in play *
414 '* and draw on screen      *
415 '****************************
420 WL=LEN(D$(RN,3))/2:PW=WL*14:
PS$=STR$(154-PW)
430 DRAW"C5S6BM"+PS$+",70"
440 FOR I=1 TO WL*2 STEP 2
450 L=VAL(MID$(D$(RN,3),I,2)):DR
AW D$(L,1)
460 NEXT I
461 '****************************
462 '* Draw picture & first    *
463 '* Letter of word          *
464 '****************************
470 DRAW"S8BM"+Q1$+","+Q2$+D$(RN
,1)
480 DRAW"BM"+P1$+","+P2$+D$(RN,2
)
481 '****************************
482 '* Get response and verify *
483 '****************************
490 IN=0
500 A$=INKEY$:IFA$=""THEN500
510 IN=INSTR(1,"ABCDEFGHIJKLMNOP
QRSTUVWXYZ",A$)
520 IF IN THEN DRAW "C5S8BM"+A1$
+","+A2$+D$(IN,1):GOTO 560
530 IN=INSTR(1,"abcdefghijklmnop
qrstuvwxyz",A$)
540 IF IN THEN DRAW "C5S8BM"+A1$
+","+A2$+D$(IN,1):GOTO 560
550 GOTO 500
560 IF IN=RN THEN 600
561 '****************************
562 '* Process incorrect re-   *
563 '* with 'Raspberrys & erase*
564 '****************************
565 '
570 PLAY "O2L100FFFFFFFO1AAAAAAA
O2FFFFFFF"
580 DRAW "C0BM"+A1$+","+A2$+D$(I
N,1)
590 GOTO 490
591 '
592 '****************************
593 '* Process correct response*
594 '* & erase all             *
595 '****************************
596 '
600 PLAY "O3L4CCGGAAL2G"
610 DRAW"S8C0BM"+Q1$+","+Q2$+D$(
RN,1)
620 DRAW"C0BM"+P1$+","+P2$+D$(RN
,2)
630 DRAW"C0S8BM"+A1$+","+A2$+D$(
IN,1)
640 DRAW"S6C0BM"+PS$+",70"
650 FOR I=1 TO WL*2 STEP 2
660 L=VAL(MID$(D$(RN,3),I,2)):DR
AW D$(L,1)
670 NEXT I
680 GOTO 410
681 '
682 '****************************
683 '* Draw title screen       *
684 '****************************
685 '
690 PMODE3,1:COLOR2,3:PCLS:SCREE
N1,0
700 DRAW"BM10,10;ND172R234D172L2
34BG10U191R255D191L255"
710 PAINT(115,5),4,2
720 DRAW"C1S10BM44,30"+D$(1,1)+D
$(2,1)+D$(3,1)
730 DRAW"BM78,75"+D$(7,1)+D$(1,1
)+D$(13,1)+D$(5,1)
732 DRAW"BM82,115"+"S4"+"BR4G4D6
F4BR5BU14"+D$(3,1)+"F4D6G4BR9BU1
4"
733 DRAW"S4BR5NG3D14NL2R2BR3BU4;
F4R2E4U6H4L2G4F4R2E4;BR5F3NR2G3F
4R2E4H3E3H4L2G4BR15BD10BU7NU7R8N
R2NU7D7"
```

```
740 DRAW"C2S4BM37,145"
750 FOR I=1TO26
760 DRAW D$(I,1)
770 IF I=13 THEN DRAW"BM37,165"
780 NEXT I
790 FOR I=43TO208 STEP 15
800 CIRCLE (I,135),15,1,.3:PAINT
(I+10,135),2,1
810 NEXT I
820 CIRCLE (190,40),15,2:PAINT(1
90,40),2,2
830 DRAW "BM190,40;NU21NE25NR21N
F25ND21NG25NL21NH25"
840 RETURN
841 '
842 '****************************
843 '* Play opening ABC song    *
844 '****************************
845 '
850 PLAY"L4CCGGO3AAL2GP255"
860 PLAY"L4O3FFEEL8DDDDL2CP255"
870 PLAY"L4O3GGFFEEL2DP255"
880 PLAY"L8O3GGL3GP255L2FL4EEL2D
P255"
890 PLAY"P255L4O3CCGGO3AAL2GP255
"
900 PLAY"P255L4O3FFEEL2DDC"
910 RETURN
911 '****************************
912 '* Generate next letter &   *
913 '* prevent repeats          *
914 '****************************
915 '
920 RN=RND(26)
930 IF D$(RN,4)="U" THEN 950
940 GOTO 990
950 FOR I=1 TO 26
960 IFD$(I,4)="F"THENRN=I:GOTO99
0
970 NEXT I
980 FOR I=1 TO 26:D$(I,4)="F":NE
XT
990 D$(RN,4)="U"
1000 RETURN
1001 '
1002 '****************************
1003 '*      D  A  T  A          *
1004 '* Elements are:            *
1005 '*  LETTER DRAW STRING      *
1006 '*  PICTURE DRAW STRING     *
1007 '*  LETTERS IN WORD(1-26)   *
      *  INITIAL 'FREE' FLAG     *
1008 '****************************
1009 '
1010 DATA "BD14U8NR10U2E4R2F4ND1
0BU4BR4","S5R20E10R70D10E12H12D1
0L70H10L20F12G12","0118181523","
F"
1020 DATA "ND14R8F2D2G2NL8F2D4G2
NL8BU14BR6","S3BR55BD20R50U50L50
ND50E20R50NG20D50G20","021215031
1","F"
1030 DATA "BR10BD4U2H2L6G2D10F2R
6E2U2BU10BR4","S4R50E15R40D15R20
F5D15L10H5L10G5F7R5E7BL20L68H5L1
0G5F7R5E7BL20L3H5U10H5BR55E12R32
D12L42","030118","F"
1040 DATA "D14R6E4U6H4L6BR14","S
3BR35R50E5R30F5R15D2L15G5L30H5L5
0U2BR5U20R20F20BD2G20L20U20","04
011820","F"
1050 DATA "NR10D7NR6D7R10BU14BR4
","S4BR60BU30ND50R30D50NR10L40BR
6U54R38D54BL14BU35U10L10D10R10BD
10E2F2G2H2","05240920","F"
1060 DATA "NR10D7NR6D7BU14BR14",
"S4BR50BU25U2R3U7L7D7R3D50R2U50R
20D15L20BD15R50U5NL5OU5NL5OU5NL3
0U5NL30U5NL30U5NL50","06120107",
"F"
1070 DATA "BR10BD2H2L6G2D10F2R6E
2U2NL4BU10BR4","S6BR10BD10E20U3E
3H5E3F5NG3R5E3R20F3R20E5F5NL10D5
L30D4G4D4G5L10H5U4NR20BR3D3F4R6E
4U3L20BR10D4R2U4L12D16L27","07211
4","F"
1080 DATA "D8ND6R10ND6U8BR4","S4
BR55BU30ND50R30D50R10D4L50U4R40B
U5L30","08012O","F"
1090 DATA "BR2R6L3D14L3R6BU14BR6
","S2BR120BU50D10F5D15F5D30F5ND5
E5U15E5U10E5U30R30D90L80U90R70BU
10R20D110L105U110R85","0903090312
05","F"
1100 DATA "BD10D2F2R6E2U12BR4","
S3BR70BU20R30H30R20F30R20F7NR15B
L70U2L15D4R15U2BR40D4R20U8L20D4B
R30G7L20G30L20E30L30G15L13E15NL2
0U3NL30U3NL35U3NL30U3NL20U3H15R1
3F15","100520","F"
1110 DATA "D14U8R4E6G6F6D2BU14BR
4","S3BR50BU10E40ND80F40NL80G40H
40L10E5L10F10L10E5L20E5L10F10L10
E5L20E5L10F10L10E5L20","11092005
","F"
1120 DATA "D14R10BU14BR4","S4BR5
9BU25D50R5U10R10BU3L10U10R10BU3L
10U10R10BU3L10U10R10BU3L10U10L5N
D20BR15D10BD3D10BD3D10BD3D10BD3D
10R5U62L5","120104040518","F"
1130 DATA "ND14F5E5ND14BR4","S3B
R80BU30NR40D60R40U60BD10R20D40L2
0BU7R13U26L10","132107","F"
1140 DATA "ND14D2F10D2U14BR4","S
3BR70BU40D10F50D7G5L20H5L10G5NR2
0L5H5U10E5","14151905","F"
1150 DATA "BD2D10F2R6E2U10H2L6G2
BU2BR14","S4BR60BU30D5L5D40R40U4
0L5NL30U5L30BD10D20R29U20L29BR5B
D5D10R19U10L19BU15D3BR5U3BR5D3BR
```

```
5U3BR5D3BD1ØBL5L1Ø","1522Ø514","
F"
1160 DATA "ND14R8F2D4G2L8BU8BR14
","S3BD3ØBR1ØØL41H1ØU3ØE1ØH5G5H3
E5R55G8F8D3ØG1ØBE1ØR17U3ØL17BD4R
11D22L11","16Ø92ØØ3Ø8Ø518","F"
117Ø DATA "BR2NR6G2D1ØF2R6E1NF1N
H2E1U1ØH2BR6","S4BR3ØBD2ØR2ØE2ØN
U5E3NU7E3NU9E3NU1ØE3NU1ØE3NU1ØE3
NU8E3NU6E3NU3E3F2G3NR3G3NR6G3NR8
G3NR1ØG3NR1ØG3NR1ØG3NR9G3NR7G3NR
5G1ØD5L7G3","1721Ø91212","F"
118Ø DATA "D14BR1ØU6H2NL8E2U2H2N
L8BR6","S2BR2ØNR15ØU5R15ØBE3ØND1
5G7ND15G1ØND15G7ND15G1ØND15G7ND1
5G1ØND15G7ND15","18Ø111Ø5","F"
119Ø DATA "BD12F2R6E2U3H2L6H2U3E
2R6F2BU2BR4","S2BR12ØBU55R4ØF3ØD
3ØG3ØL4ØH3ØU3ØE3ØBF5R35F26D27G27
L35H27U27E26BD35BD12BL15S3F2R6E2
U3H2L6H2U3E2R6F2BU2BR4R5ND12R5BR
4BD2D1ØF2R6E2U1ØH2L6G2BU2BR12ND1
2R8F2D4G2L8","19Ø9Ø714","F"
12ØØ DATA "R5ND14R5BR4","S3BR5ØB
D2ØR6ØU2ØH1ØL5U5L5D5L25U5L5D5L5G
1ØD2ØBU2ØBL5NL2ØU12R17BR7R22BR7R
18D12R2ØU1ØH1ØL93G1ØD1Ø","2ØØ512
Ø516Ø8151405","F"
121Ø DATA "D12F2R6E2U12BR4","S4B
R8ØBU2ØD4ØL4ØU1ØNH1ØR1ØNH1ØU1ØNH
1ØR1ØNH1ØU1ØNH1ØR1ØNH1ØU1ØNH1ØR1
ØH1ØL1ØD1ØL1ØD1ØL1ØD1ØL1ØD1ØF1ØB
H25E2ØNL1ØND1Ø","2116","F"
122Ø DATA "D9F5E5U9BR4","S4BR11Ø
BU2ØNF15D5F1ØR5D2ØL1ØH5L1ØG5L4ØH
5L1ØG5L1ØU3ØE5R8ØBG5F1ØL25U1ØR15
BL25D1ØL2ØU1ØR2ØBL25D1ØL2ØU1ØR2Ø
BD3ØBL2ØF5R1ØE5BR4ØF5R1ØE5","22Ø
114","F"
123Ø DATA "D14E5F5U14BR4","S5BR4
ØBD15U15NR1ØBU3NR1ØU15R1ØND15BR4
ND15R1ØD15NL1ØBD3NL1ØD15L1ØNU15B
L4NU15L1ØBG5U4ØR33D4ØL33","23Ø91
4Ø41523","F"
124Ø DATA "D2F1ØD2BL1ØU2E1ØU2BR4
","S4BR6ØBU3ØND5ØR3ØD5ØNR1ØL4ØBR
6U54R38D54BL14BU35U1ØL1ØD1ØR1ØBD
1ØE2F2G2H2","Ø524Ø92Ø","F"
125Ø DATA "F5ND9E5BR4","S4BR11ØD
2ØL7ØH2ØR9ØBL2ØH1ØL3ØG1ØBR8BU3NE
5R3ØU5L25BU2E5NE5R15F5BD12BL4ØS3
F5NE3NG3F1ØE5H3BF3G8H3","25Ø1Ø3Ø
82Ø","F"
126Ø DATA "BD14NR1ØU2E1ØU2NL1ØBR
4","S3BR65BU4ØF5NG5F5NG5F5NG5F5N
G5F5NG5F5;L5D15R1ØU15L5BD12BL3U5
R6D5L6BR3BD3;NL5NR5D5NL5NR5D5NL5
NR5D5NR5NL5D5NL5NR5D5NL5NR5D5NL5
NR5D5NL5NR5;BU45E5NF5E5NF5E5NF5E
5NF5E5NF5E5NF5","26Ø916162Ø518","
F"
```

TUTORIAL

Teachers Need Spirit Masters

By Valerie Rhead

There was a time when teachers could be distinguished by the patina of chalk dust that clung to their clothing. Nowadays, they are most easily identified by their purple fingertips. Educators of students in all subject areas and at all grade levels have an insatiable need for printed classroom materials, such as tests and worksheets. Usually the most convenient and economical means of providing these is with spirit masters (which often come in a highly visible shade of purple). I routinely use my Color Computer for creating these stencils.

The computer's editing features and memory make it a superb tool for this purpose. Gone forever are the double-edged razor blades that threatened mortal injury as you laboriously scraped off errors sculpted in carbon. Also a relic of the past is the necessity of typing each test or assignment from scratch.

I store all the things that I use repeatedly on disk. For example, a standard exam cover page can be loaded into the computer. I don't have to recalculate all the spacing each time so that it is attractively centered. Standard test questions also can be saved and retrieved as needed. Not only does this save time, but it is more accurate. It's very easy to omit an essential instruction when you're rushing to make up a test. You can save yourself the aggravation of little hands popping up asking you something that should have been clearly stated.

If the original "ditto" becomes exhausted, it's easy to print another one from the disk. If I had used a typewriter, I'd be faced with the futile task of trying to make an acceptable photostat of the 112th, very faded copy of a spirit master. If that didn't work, I'd be stuck with the boring job of retyping the whole thing. How did I ever manage to get along before I had a computer?

Know Your Printer

The key to producing a good spirit master is the printer. When we first got our Radio Shack LP VIII, I was disappointed that it didn't print a good ditto. I quickly found though, that it did a very acceptable job when the ribbon was removed. As the ribbon is in a cartridge, it's quite simple to remove and reinsert it.

When you type without a ribbon, proofreading your work is more difficult. It can be accomplished (with only a slight bit of eyestrain) by reading the imprint on the carbon. I did notice,

however, that I allowed more errors to slip by doing it this way. This is particularly embarrassing for a typing teacher.

Another problem I encountered with the LP VIII was that the paper-out switch would activate and stop printing about two-thirds of the way down the sheet. This was unacceptable. I solved the problem by feeding in a small piece of paper at the left-hand end of the platen, and taping it in place so it wouldn't advance. This temporarily depressed the switch and I was then able to print to the end of the page. It is important that, when the switch is deactivated, you make sure that you don't print off the end of the sheet. Particularly when printing without a ribbon, this could damage the platen, and they're expensive to replace.

Awhile ago, we acquired a Gemini 10X printer. The LP VIII has graduated and gone to college with our daughter. I am happy to report that the Gemini 10X allows you to physically turn off the paper-out switch. This can also be done, according to the manual, under software control.

I was delighted to discover that the new printer will produce a very good spirit master with the ribbon in place, which is achieved by using the emphasized print mode. This has cut down on my proofreading errors substantially, and I can once again look my students in the eye.

Making "Dittos" More Interesting

I often decorate my spirit masters with computer generated pictures and designs. As a kid, I was committed to outlining my artistic creations in black and then filling in the interior with color. Unfortunately, my teacher belonged to a different school, so my masterpieces were routinely returned with a grade of 'D.'

When we got our first computer, I was thrilled to discover that even I was now capable of true artistry. Sometimes I draw pictures of realistic scenes, such as a rocket ship taking off through a star-laden sky. I also like to create the kind of abstract patterns that use lots of *FOR . . .NEXT* loops. I usually invent my own designs, but sometimes I'll use a graphics program from a magazine.

I use a screen print program and print my creations at the top of a spirit master. Sometimes I attain interesting effects by running the same spirit master through the printer more than once with different colored carbons. The remaining space on the stencil is then used for test questions, or worksheet problems for my students to complete.

I sometimes use *Telewriter 64* to create artistic borders for the stencils. I define some of the graphics codes, and then combine them into attractive designs. The possibilities are endless.

Recently, I've started to use Michael Himowitz's *Big Print* program that was in the December 1983 RAINBOW. I can print a message or title in large letters of up to nine characters per line. Right after I got this program, my first message at the top of a short exercise I had prepared for my class was appropriately "Merry Xmas."

Although producing these designs is time consuming, I usually decorate a large number of sheets at a time, whenever I feel in a creative mood. I then have a stockpile of attractive spirit masters on hand for later use, when I'm rushing to produce a test for tomorrow's class.

The graphics make life a little more interesting for my students, because they don't get the same boring looking sheets to work from every day. It also provides my data processing class with a practical demonstration of one of a computer's capabilities.

They're sometimes useful, too, as a classroom management device. "Class, you should have three sheets: one that says 'Computers are Fun' at the top; one that has a picture of a rocket ship; and another with a border made up of circles."

It simplifies life if the students are returning the sheets. You don't have 105 copies of three different sheets all mixed up together. Kids will try to put paper in the correct pile, if it's sufficiently obvious that they can do it without breaking stride as they head out the door for lunch.

I hope some of these suggestions will assist you in using your Color Computer to make spirit masters for your classes. I have access to dedicated word processors and more expensive brands of microcomputers at school. Now that I have mastered the idiosyncrasies of my TRS-80 system, I find that the Color Computer does everything I want. In some cases, it out-performs the school's more costly equipment. Having a computer at home offers one big advantage. When I arrive back at school with the tennis team at 5:30, I don't have to stay at school over the dinner hour to work on the word processor in order to prepare tomorrow's assignments.

Your imagination is the only limit when creating borders for spirit masters using *Telewriter 64*.

EDUCATION

16K ECB

THE CoCo SCHOOL MARM

Judy & David Dacus

The need for the series of programs we describe here and next month occurred to us when our youngest daughter was having difficulty with spelling in grade school and wanted something to help her study. We had a series of spelling practice programs from such sources as Chromosettee and other software sources, but these programs all took the "multiple guess" approach to practice - "One of the above words is spelled incorrectly? Can you guess which one and spell it correctly?" That technique provides practice in spelling, but is nothing like the way spelling tests are presented in school. It seemed that there were few ways to present words to the child without cueing as to the spelling. It then occurred to us that the best way of presentation of the spelling words is the one that has been used in the schools for well over a hundred years - pronounce the wod, use it in a sentence, and pronounce the word again. Since speech synthesis is expensive and somewhat difficult to use, we concentrated on an accessory we already had for the CoCo, the tape recorder. These programs use the tape recorder to produce the necessary pronunciation and use of the words in sentences.

The sound tape is controlled by the computer so that the tape pauses for student responses after each word. We have used block graphics to increase the ergonomic nature of the screen display. The instructions are presented in small digestible chunks, each delineated by a band of color. This will facilitate understanding, particularly for younger children.

The Spelling Practice System is designed to be used as a stand alone system for practice of the week's spelling words at home. When used in conjunction with the Spelling Test System, which we will present in next month's article, it becomes a comprehensive automated spelling practice and examination system for an elementary or secondary class. The spelling practice system consists of two programs, *Word Load* and *AudioSpell*. *Word Load* does double duty in that it produces data tapes that are interchangeable between the practice and testing programs. *AudioSpell* is the program that leads the child through spelling practice sessions step by step.

The Audio Spelling System is designed to operate on the 16K Extended Color BASIC Radio Shack Color Computer with nothing more than a tape recorder and color television. Routines are provided for the use of a line printer if it is available. Modifications for non-Extended BASIC are given later in this article.

AudioSpell

a) Materials

Program Tape or Disk — Program Name *"AUDIOSPL"*

Spelling Words Tape (to be made using *Word Load* program)

Color Computer, Television, and Tape Recorder

Line Printer or student-provided pencil and paper.

b) Instructions

AudioSpell is self instructing. The student should be familiar with the operation of the Color Computer, and with loading programs from cassette tape. Alternatively, the program can be loaded and run, and the *Spelling Words* tape inserted in the recorder before the student is given control of the computer. If your television has an earphone jack you may wish to provide a set of earphones so that the sound of the spelling words does not disturb other learning activities in the class. Do not attempt to plug earphones into the earphone jack of the tape recorder. The program will not function properly if all connections to the computer are not intact. Be sure that the volume of the sound on the television is adjusted to a comfortable level for the student. If you have a line printer, be sure that it is properly attached and turned on. The program will provide a list of words missed for further study. If you do not have a printer, the student will need a pencil and paper to copy the list of misspelled words for further study.

Word Load

a) Materials

Program Tape or Disk — Program Name "WORDLOAD"

Blank Cassette Tape, labeled "Spelling Words"

Color Computer, Television, and Tape Recorder

b) Instructions

The *Word Load* program is self instructing. You should have prepared a list of spelling words and a short sentence using each word before operating the program. *Word Load* allows five seconds to pronounce each word, use it in a sentence, and pronounce it again. After using the program, if you find that five seconds is too long or too short, you may modify the available time according to the modification instructions below. To preclude inadvertent erasure of the spelling words tape, you should break out the record-enable tab on the back of the tape after you have completed recording. The tape may be reused for the following week's words, if desired, by placing a piece of tape over the tab hole while recording. In order to prevent words from a longer list from spilling over into a shorter list, the pre-

vious spelling word list should be erased before recording a new list. Spelling words can be recorded for several levels of learning by using a separate cassette tape for each word list.

Modifications

Recording Time. Five seconds recording time was selected as optimum for the average user. To change recording time, it is necessary to change only one value in each of the programs. The Color Computer requires one second to count to 460 in a *FOR - NEXT* loop, such as the one found in Line 280 of the *Word Load* program. To change the length of time allowed to pronounce the word and use it in a sentence, you must multiply the number of seconds desired times 460 and place the resulting value in Line 280 of the *Word Load* program, and Line 290 of the *AudioSpell* program in place of the value 2300. Both programs must contain the same value in the timing loop for the tapes to be read correctly.

Praise Statements. The reinforcement expressions for correct answers in the *AudioSpell* program are located in Lines 610 to 700. If you wish to replace one of the praise statements with a statement of your own, you may do so by replacing the expression enclosed in quotation marks with your own expression. If you want to add more praise statements, you must modify Lines 580 and 590. To add more expressions, add lines after Line 700 using the same *PRINT" ":RETURN* format found in the original print statements. You must then increase the value 10 in the expression *B = RND(10)* in Line 580 by the number of lines you added, and add a comma and the line number of each line you added after number 700 in Line 590.

Using Programs With No Printer Available. If you do not have access to a printer, you may want to eliminate the student input regarding the printer. If you have a printer and always intend to have misspelled words printed rather than displayed on the TV screen, you may wish to eliminate the choice of TV display. To eliminate choice of the printer, change the expression "Do you have a printer (yes or no)" in Line 450 of *AudioSpell* to "Press ENTER to continue," and eliminate everything after the variable A$ in Line 450. Next, eliminate program Lines 520 through 560. To eliminate the choice of printing the list to the TV, modify Line 450 exactly as above, and eliminate program Lines 460 through 510.

Changing Printer Codes. The printing algorithms of these programs are written using ASCII codes for an Epson MX-80 printer. This printer uses *CHR$(14)* to print double-width characters and *CHR$(10)* as a line feed command. If your printer does not use these two codes you must substitute your printer code for *CHR$(14)* in Line 530 of *AudioSpell*, and substitute your printer's equivalent of *CHR$(10)* in Lines 530, 540, 550, and 560 of *AudioSpell.*

Modification To Run On A Non-Extended CoCo. As the programs are listed, they are for use on an Extended Color BASIC machine. To use these programs on a level I machine requires only removal or replacement of two reserved Extended words. The screens are formatted with the reserved word *STRING$.* This command prints a string of N copies of the ASCII character X as in *PRINT @ 0, STRING$ (N,X).* To substitute for the *STRING$* command using level I BASIC, you can substitute the algorithm:

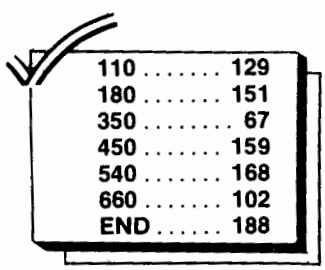
```
15 FOR I = 1 TO 32, : SC$ = SC$ +
CHR$(169): NEXT I
```

You will need one line and one variable for each different color band you wish to print. After you have inserted the variable at the front of the program, you may then substitute the command, *PRINT SC$* in place of each *PRINT STRING$* command in the program. The other Extended BASIC command, *B - RND(-TIMER),* occurs in Line 580 of *AudioSpell.* The purpose of this command is to randomize the selection of random numbers. This command can be deleted and the only result will be that the praise statements will be printed in the same pattern every time the machine is turned on.

THE ASCII SYMBOL. In Line 110 of *AudioSpell,* the listing shows an underscore character in parentheses in the instructions to be printed to the screen. This is shown as a back arrow on the computer screen, and is made by entering a shifted up arrow on the keyboard.

Coming Attractions

Next month we will present the programs designed to allow the student to be examined in precisely the same manner as he or she prepared for the test. For those who have disk systems, we have developed a version of all programs modified for the Disk Extended Color Computer. Using the system on disk will allow automated recording of grades in a grade file without teacher intervention. It will also expedite and facilitate student use of the spelling programs. The complete set of four programs for the disk version is available on cassette tape for $10. Our address is 206 Capri Road, Las Cruces, NM 88005. If you have problems with your entered version of these programs, be sure you have thoroughly proofread your code before writing or calling. Please send a self-addressed stamped envelope.



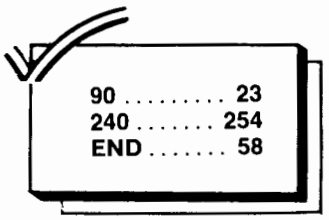
Listing 1:

```
10 ' SPELLING DRILL AND PRACTICE
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 2000:NW = 50:DIM WRD$(N
W)
40 CLS:PRINT@0,STRING$(32,169);:
PRINT@42,"AUDIO SPELL"
50 PRINT@64,STRING$(32,169);"HI!
  MY NAME IS COCO THE COLOR  COM
PUTER.  CALL ME COCO.  THAT'SWHA
T ALL MY FRIENDS CALL ME."
60 PRINT@192,STRING$(32,169);:IN
PUT "WHAT IS YOUR NAME";NAM$
70 PRINT@256,STRING$(32,169);"TH
AT'S A NICE NAME - "NAM$".":PRIN
T@320,STRING$(32,169);
80 PRINT@352,"DO YOU KNOW HOW I
WORK? (TYPE NOAND I WILL TELL YO
U WHAT TO DO) PLEASE TYPE YES OR
 NO AND        PUSH <ENTER>"
90 INPUT A$:IF LEFT$(A$,1) = "Y"
 THEN 140
```

```
100 CLS:PRINT@0,STRING$(32,169);
"I WILL SAY THE WORD, I WILL USE
 THE WORD IN A SENTENCE, AND THE
NSAY THE WORD AGAIN.  WHEN I
 FINISH THE WORD I WILL ASK YOU
 TO SPELL IT.":PRINT@192,STRING$
(32,169);
110 PRINT"IF YOU MAKE A MISTAKE
USE THE   BACK ARROW (_) TO ERAS
E.":PRINT@288,STRING$(32,169);:I
NPUT"PUSH <ENTER> TO CONTINUE";A
$
120 CLS:PRINT@0,STRING$(32,169);
"WHEN YOU THINK YOU HAVE SPELLED
 THE WORD CORRECTLY,PRESS <ENTER
>.  I WILL TELL YOU IF YOU HAVE
 SPELLED THE WORD CORRECTLY.  IF
 YOU DIDN'T, YOU  WILL HAVE
 ANOTHER CHANCE TO SPELL THE WOR
D.":PRINT@256,STRING$(32,169)
130 INPUT"PUSH <ENTER> TO CONTIN
UE";A$
140 CLS:PRINT@0,STRING$(32,169);
"NOW WE ARE READY TO START
 SPELLING THIS WEEK'S WORDS."
150 PRINT@96,STRING$(32,169);"PL
EASE CHECK TO SEE THAT THE     TA
PE MARKED - SPELLING WORDS -  IS
 IN THE TAPE RECORDER, THE     TA
PE IS REWOUND, AND THE        RE
CORDER IS ON PLAY."
160 PRINT@288,STRING$(32,169);
170 INPUT"WHEN YOU HAVE CHECKED
ALL THIS, PUSH MY <ENTER> BUTTON
 AND I'LL MOVE THE TAPE TO GET R
EADY.";A$:CLS:PRINT@328,"OOH!  T
HAT TICKLES!!":PRINTSTRING$(32,1
69);"I AM LOADING THE WORDS FROM
 TAPE"
180 I = 0:W = 0:W1 = 0:W2 = 0:W$
 = "":W1$ = "":W2$ = ""
190 OPEN"I", #-1,"WORDS"
200 IF EOF (-1) THEN 250
210 I = I + 1
220 INPUT #-1, W$
230 WRD$(I) = W$
240 GOTO 200
250 CLOSE #-1
260 NW = I
270 CLS:PRINT@0,STRING$(32,169);
:INPUT"WHEN YOU ARE READY FOR YO
UR      FIRST WORD PUSH MY <ENTER
>       BUTTON.";A$:CLS:PRINT@0,S
TRING$(224,169);"          LISTEN
CAREFULLY."
280 FOR I = 1 TO NW
290 AUDIO ON:MOTORON:FOR V = 1 T
O 2300:NEXT V:AUDIO OFF:MOTOROFF
300 SKIPF "MARKER":CLS:PRINT@0,S
TRING$(224,169);
310 INPUT"PLEASE SPELL THE WORD
YOU JUST  HEARD.";ANS$
320 IF ANS$ = WRD$(I) THEN R = R
 + 1:GOTO 580 ELSE W = W + 1:W$(
W) = WRD$(I)
330 CLS:PRINT@0,STRING$(224,246)
;:INPUT"I'M SORRY THAT IS NOT CO
RRECT.  PLEASE TRY AGAIN.";ANS$
340 IF ANS$ = WRD$(I) THEN 580 E
LSE W1 = W1 + 1:W1$(W1) = WRD$(I
)
350 CLS:PRINT@0,STRING$(224,246)
;"THE CORRECT SPELLING IS:",WRD$
(I)
360 PRINT@320,STRING$(32,169);:I
NPUT"PLEASE TRY AGAIN TO SPELL I
T  ";ANS$
370 IF ANS$ = WRD$(I) THEN 580 E
LSE W2 = W2 + 1:W2$(W2) = WRD$(I
)
380 CLS:PRINT@0,STRING$(224,246)
;"YOU MISSED THE WORD WITH IT
  WRITTEN ON THE SCREEN IN FRONT
  OF YOU.  PLEASE BE MORE CAREFU
L."
390 INPUT"READY FOR THE NEXT WOR
D";A$:CLS:PRINT@0,STRING$(224,16
9);"          LISTEN CAREFULLY"
400 NEXT I
410 CLS:AUDIO OFF:PRINT@0,STRING
$(32,175);"YOU ATTEMPTED TO SPEL
L          ";NW;" WORDS.":G = (R
/(W+R))*100
420 PRINT"YOU MISSPELLED ";W;" W
ORDS OUT OF ";W+R;" ATTEMPTS FOR
 A SCORE OF      ";G;"%."
430 IF W1 > 0 THEN PRINT"YOU ALS
O MISSPELLED";W1;"WORDS AT  LEAS
T TWICE";:IF W2 > 0 THEN PRINT",
 AND";W2;"WORDS THREE  TIMES." E
LSE PRINT "."
440 IF W = 0 THEN PRINT@ 192,STR
ING$(32,175);"WOW, YOU DID A TER
RIFIC JOB.    PRESS <ENTER> TO C
ONTINUE.":INPUT A$:GOTO 560
450 PRINT@288,STRING$(32,175);:I
NPUT"DO YOU HAVE A PRINTER(YES O
R NO)";A$:IF LEFT$(A$,1) = "Y" T
HEN 520
460 CLS:PRINT "THESE ARE THE WOR
DS MISSED AT  LEAST ONCE":FOR I
 = 1 TO W
470 PRINT W$(I),:NEXT I:PRINT:IN
PUT "WHEN YOU HAVE COPIED THESE
WORDSON A PIECE OF PAPER PUSH <E
NTER>";A$:CLS
480 IF W1 > 0 THEN PRINT"THESE A
RE THE WORDS MISSED AT  LEAST T
WICE":FOR I = 1 TO W1 ELSE GOTO
570
```

```
490 PRINT W1$(I),:NEXT I:PRINT:I
NPUT "PUT A CHECK MARK BY THESE
WORDS ON THE LIST YOU JUST MADE
THEN  PUSH ENTER";A$:CLS
500 IF W2 > 0 THEN PRINT "THESE
ARE THE WORDS MISSED THREE TIMES
":FOR I = 1 TO W2 ELSE GOTO 570
510 PRINT W2$(I),:NEXT I:PRINT:I
NPUT "YOU MISSPELLED THESE WORDS
 EVEN AFTER THEY WERE PRINTED ON
 THE  SCREEN.  PUSH <ENTER> TO
      CONTINUE.";A$:GOTO 570
520 CLS:PRINT@0,STRING$(224,175)
;"PRINTING ALL MISSPELLED WORDS"
530 PRINT#-2,CHR$(14);"SPELLING
STUDY LIST FOR ";NAM$;CHR$(10);C
HR$(10)
540 PRINT#-2,"LIST OF WORDS MISS
PELLED AT LEAST ONE TIME";CHR$(1
0);CHR$(10):FOR I = 1 TO W:PRINT
#-2, W$(I):NEXT I
550 IF W1 > 0 THEN PRINT#-2,CHR$
(10);CHR$(10);"LIST OF WORDS MIS
SED AT LEAST TWO TIMES";CHR$(10)
;CHR$(10):FOR I = 1 TO W1:PRINT#
-2, W1$(I):NEXT I
560 IF W2 > 0 THEN PRINT#-2,CHR$
(10);CHR$(10);"LIST OF WORDS MIS
SED THREE TIMES":FOR I = 1 TO W2
:PRINT#-2, W2$(I):NEXT I
570 CLS:PRINT@0,STRING$(224,169)
;"THANK YOU FOR PRACTICING YOUR
  SPELLING WORDS WITH ME.  LET'S
  WORK TOGETHER AGAIN SOON.":END
580 B = RND(-TIMER):B = RND(10):
CLS:PRINT@0,STRING$(224,175);
590 ON B GOSUB 610,620,630,640,6
50,660,670,680,690,700:PRINT@288
,STRING$(32,175);
600 GOTO 390
610 PRINT"YOU'RE A REGULAR SPELL
ING WHIZ! CONGRATULATIONS!":RETU
RN
620 PRINT"WOW!  THAT WAS GOOD.":
RETURN

630 PRINT"TERRIFIC! KEEP ON SPEL
LING.":RETURN
640 PRINT"OUTSTANDING!!  I'LL BE
T YOUR    MAMA WAS A DICTIONARY.
":RETURN
650 PRINT"WONDERFUL!  KEEP GOING
.":RETURN
660 PRINT"GREAT SPELLING!  WISH
I WERE    THAT GOOD.":RETURN
670 PRINT"GOOD JOB!  YOU'RE DOIN
G IT NOW.":RETURN
680 PRINT"SUPER! YOU'RE A GOOD S
PELLER.":RETURN
690 PRINT"THAT'S GREAT!  EVERYON
E WILL BE PROUD OF YOU.":RETURN
700 PRINT"BEAUTIFUL!  KEEP UP TH
E GOOD    WORK.":RETURN
```



Listing 2:

```
10 REM WORD LOADING PROGRAM
20 'COPYRIGHT 1982 BY JUDY M. AN
D DAVID M. DACUS, 206 CAPRI, LAS
 CRUCES, NM 88001
30 CLEAR 2000:Z$ = "MARKER":DIM
WRD$(50)
40 CLS:PRINT@0,STRING$(32,185);"
WE ARE NOW READY TO ENTER THE
SPELLING WORDS."
50 PRINT@96,STRING$(32,185);"FIR
ST, I WILL ASK YOU TO ENTER  THE
 CORRECT SPELLING OF EACH    WOR
D AT THE KEYBOARD.":PRINT@224,ST
RING$(32,185);
60 PRINT"AFTER WE HAVE RECORDED
THE       CORRECT SPELLING OF THE
 WORDS,  WE WILL RECORD YOU PRON
OUNCING  EACH WORD."
70 PRINT@384,STRING$(32,185);:IN
PUT "PRESS <ENTER> TO CONTINUE";
A$
80 CLS:PRINT@0,STRING$(64,185);"
PLACE YOUR TAPE IN THE RECORDER,
REWIND IT, AND push the play and
 record buttons."
90 PRINT@160,STRING$(32,185);:IN
PUT "HOW MANY WORDS ARE TO BE
     RECORDED";NW
100 I = 0:MOTORON:FOR Z = 1 TO 2
300:NEXT Z:MOTOROFF
110 OPEN "O",#-1,"WORDS"
120 I = I + 1
130 CLS:PRINT@128,STRING$(32,185
);:INPUT "PLEASE ENTER THE NEXT
SPELLING  WORD";W$
140 PRINT#-1,W$
150 WRD$(I) = W$
160 IF I = NW THEN 180
170 GOTO 120
180 CLOSE #-1
190 CLS:PRINT@0,STRING$(64,185);
"NOW WE ARE READY TO RECORD YOUR
 PRONUNCIATION OF EACH WORD."
200 PRINT@128,STRING$(32,185);"T
HE WORDS WILL APPEAR ONE AT A  T
IME. PRONOUNCE THE WORD, FOLLOWW
ITH A SHORT SENTENCE USING THE W
ORD, AND PRONOUNCE THE WORD    A
GAIN. YOU WILL HAVE 5 SECONDS  T
O SAY THE WORD AND SENTENCE    B
```

```
EFORE THE TONE SOUNDS.
210 PRINT@384,STRING$(32,185);:I
NPUT "PRESS <ENTER> TO CONTINUE"
;A$
220 CLS:PRINT@0,STRING$(64,185);
"YOU WILL HAVE TO UNPLUG AND PLU
GIN THE AUX PLUG FOR EACH WORD,
 BUT YOU WILL BE PROMPTED BY THE
 PROGRAM EACH TIME."
230 PRINT@192,STRING$(32,185);:I
NPUT "IF THE TAPE RECORDER IS ST
ILL ONRECORD AND YOU ARE READY P
RESS  <ENTER>";A$
240 FOR I = 1 TO NW
250 CLS:PRINT@0,STRING$(128,185)
;"*****UNPLUG THE AUX PLUG******
**";
260 PRINT@160,STRING$(32,185);"t
he word is "WRD$(I)
270 PRINT@256,STRING$(32,185);"P
RESS <ENTER> AND START TALKING A
FTER THE FIRST TONE SOUNDS.";:IN
PUT A$
280 MOTORON:SOUND 40,5:FOR V = 1
 TO 2300:NEXT V:MOTOROFF:SOUND 4
0,5
290 CLS:PRINT@0,STRING$(128,185)
;"******PLUG IN THE AUX PLUG****
**"
300 PRINT@192,STRING$(32,185);"P
RESS <ENTER> WHEN READY";:INPUT
A$
310 CLS:PRINT@192,"ADDING A SYNC
 MARKER"
320 OPEN "O", #-1, "MARKER":PRIN
T#-1, Z$:CLOSE #-1
330 NEXT I
340 CLS:PRINT@0,STRING$(224,169)
;"THE TAPE IS NOW COMPLETE.  IT
  MAY NOW BE REWOUND AND USED
  WITH EITHER THE AUDIO SPELLING
  PRACTICE OR SPELLING TEST
  PROGRAMS."
```

CORRECTIONS

Two figures were left out of the first installment of "Cooking With CoCo". Here they are:

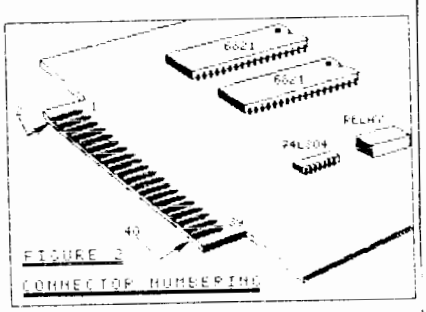


FIGURE 2
CONNECTOR NUMBERING

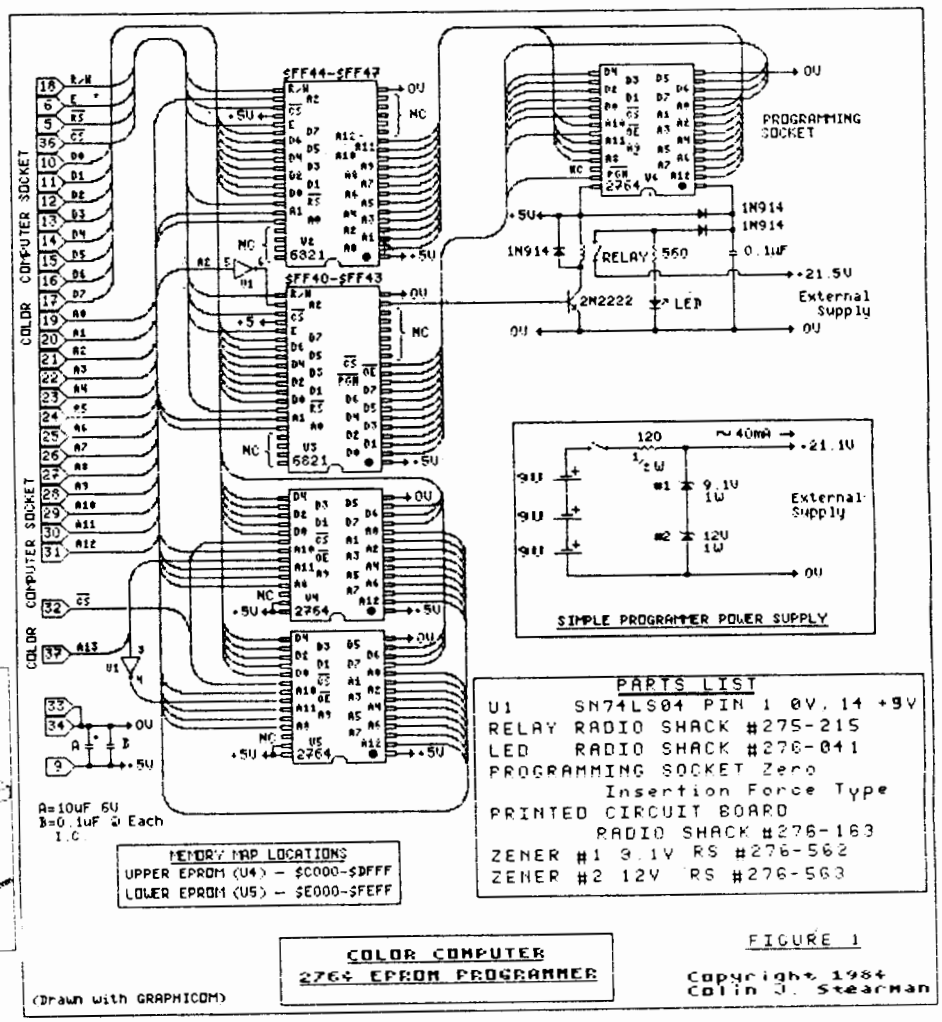


FIGURE 1

EDUCATION

32K ECB

the RAINBOW

The Old Fashioned Clock

By Joseph S. Paravati

Living in a digital world can have some disadvantages. For instance, some children can have trouble telling time on a good old-fashioned round clock. This was the case with my young daughter, and so the *Clock* was born.

Clock begins with a title page and after some instructions, the clock is drawn on the screen with a background of random colors. The time is shown and you must type in the correct time. For instance, if the time is five minutes after five, you type in 5:05 (do not forget the colon).

If you get the correct time, another time will be shown. If you type the wrong time, the computer will not show another time but will give you a chance to study your mistake. You then hit any key to continue. After 10 tries the computer displays your score and you can then continue.

Clock is very colorful and it is enjoyable to watch the computer draw the program. As it is written, the program needs 32K ECB memory. If the title page is removed and REM lines deleted I believe it will run on 16K ECB.

At first my daughter was only getting two or three out of 10 right. Now she usually gets eight to 10 right. I hope you find the *Clock* useful and enjoyable.

70.....	21	5100	5
170.....	206	5290	67
380.....	182	5460	102
640.....	235	5640	25
840.....	104	5680	26
1040	53	END	98

The listing:

```
10 ' *TIME/OLD FASHIONED CLOCK*
BY JOSEPH S. PARAVATI JR.& SR.
                8/83
20 'GOSUB TO CHAR.GEN.SUBROUTINE
30 GOSUB 5000:GOSUB5640:R=RND(-T
IMER)
40 ' INITIAL SET UP
50 CLS:PRINT "*TIME ON AN OLD FA
SHIONED CLOCK*";:PRINT STRING$(3
2,"*");
60 PRINT "THIS PROGRAM WILL HELP
 YOU TO   LEARN TO TELL TIME ON
A REGULAR,ROUND TYPE CLOCK. WHEN
 YOU HEAR THE CLOCK'S 'TIC TOC'
YOU TYPE  IN THE TIME."
70 PRINT"TYPE IN AND <ENTER> YOU
R ANSWERSAS ON A NEW TYPE CLOCK.
 IF THE  TIME IS 12 O'CLOCK YOU
WOULD    TYPE 12:00. 5 AFTER 5 W
OULD BE  5:05. YOU CAN CHANGE YO
UR ANSWERBEFORE PRESSING <ENTER>
, JUST   PRESS THE '<-' (BACK-AR
ROW)."
80 PRINT @489,"<PRESS ANY KEY>";
90 IF INKEY$="" THEN 90
100 CLS:PRINT"AS YOU TYPE EACH N
UMBER (DON'T  FORGET THE ':') WA
IT FOR A TONE TELLING YOU THE CO
MPUTER HAS    RECEIVED YOUR NUMB
ER. IF YOU GETTHE TIME RIGHT THE
 COMPUTER WILLAUTOMATICALLY GIVE
 YOU ANOTHER  TIME TO FIGURE OUT
."
110 PRINT"IF YOU GIVE A WRONG AN
SWER YOU  WILL HAVE TIME TO STUD
Y THE     CLOCK TO SEE WHERE YOU
 WENT     WRONG. PRESS <ANY KEY>
 TO GET   ANOTHER TIME. AFTER EV
ERY TEN   TRIES A SCORE FOR THE
TEN TRIES WILL BE SHOWN.";
120 PRINT" TO END PROGRAM   PRES
S <SHIFT> AND <CLEAR>."
130 PRINT @489,"<PRESS ANY KEY>"
;
140 IF INKEY$="" THEN 140
150 CLS:PRINT @232,"WHAT'S YOUR
NAME?":PRINT"     (NO MORE THEN 7
 LETTERS)":INPUT NA$
160 IF LEN(NA$)>7 THEN 150
170 IF LEN(NA$)=0 THEN NA$="????
```

```
180 PMODE 3:PCLS5:SCREEN 1,1:COL
OR 6
190 ' MINUTE MARKS
200 X=128:Y=80:R=80
210 FOR D=0 TO 360 STEP 6
220 A=(270+D)/57.29577951
230 Q=INT(R*COS(A)+128.5)
240 W=INT(R*SIN(A)+80.5)
250 IF D/30=INT(D/30) THEN COLOR
 8 ELSE COLOR 6
260 LINE(X,Y)-(Q,W),PSET
270 NEXT D
280 ' CLOCK OUTLINE & BACKROUND
290 C$="R80F40D60G40L80H40U60E40
"
300 DRAW "C7BM88,10"+C$
310 CL=RND(7):IF CL<6 THEN 310
320 R=RND(100)
330 PAINT(128,188),CL,7:IF R>50
THEN PAINT(128,188),5,7:CL=5 ELS
E 340
340 CIRCLE(128,80),76,7,.9
350 PAINT(128,80),5,7
360 CIRCLE(128,80),76,5,.9
370 ' NUMBER SET UP
380 COLOR 7
390 A$="12":B$="BM118,26":GOSUB
5090
400 A$="1":B$="BM154,32":GOSUB 5
090
410 A$="2":B$="BM180,52":GOSUB 5
090
420 A$="3":B$="BM194,86":GOSUB 5
090
430 A$="4":B$="BM182,120":GOSUB
5090
440 A$="5":B$="BM154,138":GOSUB
5090
450 A$="6":B$="BM124,146":GOSUB
5090
460 A$="7":B$="BM96,136":GOSUB 5
090
470 A$="8":B$="BM68,118":GOSUB 5
090
480 A$="9":B$="BM54,86":GOSUB 50
90
490 A$="10":B$="BM66,52":GOSUB 5
090
500 A$="11":B$="BM86,32":GOSUB 5
090
510 ' CHANGE TO SPECIAL COLORS
520 PMODE4:SCREEN1,1
530 PMODE3
540 ' GRAPHIC PRINTING
550 A$="WHAT":B$="C8BM10,20":GOS
UB 5090
560 A$="TIME":B$="BM200,20":GOSU
B 5090
570 A$="IS":B$="BM14,140":GOSUB
 5090
580 A$="IT ?":B$="BM200,140":GOS
UB 5090:A$=""
590 IF CL=5 THEN COLOR5:LINE(0,1
56)-(255,191),PSET,BF
600 ' START OF HANDS ROUTINE
610 L=RND(360):IF L/6<>INT(L/6)
THEN 610
620 S=RND(360):IF S/15<>INT(S/15
) THEN 620
630 IF L=360 AND S/30<>INT(S/30)
 THEN S=S-15
640 IF L<>360 AND S=L THEN S=S-1
2:GOTO 680
650 IF L<>360 AND L>300 AND S/30
<>INT(S/30) THEN S=S+39 ELSE IF
L<>360 AND L>300 AND S/30=INT(S/
30) THEN S=S-6:GOTO 680
660 IF L<>360 AND L>174 AND S/30
=INT(S/30) THEN S=S-15
670 IF S/30<>INT(S/30) AND L<>36
0 AND L>0 AND L<96 THEN S=S-15
680 SOUND 30,2:SOUND 150,3
690 X=128:Y=80:R=50:R1=30
700 CIRCLE(X,Y),2,5,.9
710 A=(270+L)/57.29577951:B=(270
+S)/57.29577951
720 Q=INT(R*COS(A)+128.5)
730 Q1=INT(R1*COS(B)+128.5)
740 W=INT(R*SIN(A)+80.5)
750 W1=INT(R1*SIN(B)+80.5)
760 PMODE4:SCREEN1,1:LINE(X,Y)-(
Q,W),PSET
770 LINE(X,Y)-(Q1,W1),PSET
780 PMODE3
790 S1=INT(S/30):IF S1=0 THEN S1
=12
800 S$=MID$(STR$(S1),2)
810 L1=L/6:IF L1=60 THEN L1=0
820 L$=MID$(STR$(L1),2)
830 IF L1<10 THEN L$="0"+L$
840 COLOR5:LINE(90,190)-(166,174
),PSET,BF:COLOR8
850 U$=S$+":"+L$:B$="BM96,188":D
RAW B$
860 IF V$="" THEN SOUND90,1:FOR
T=1 TO 460:NEXT:SOUND 70,1:FOR T
=1 TO 460:NEXT
870 K$=INKEY$:IF K$="" THEN 860
880 IF K$=CHR$(92) THEN 1160
890 IF K$=CHR$(8) THEN V$="":COL
OR 5:LINE(90,190)-(166,174),PSET
,BF:COLOR8:GOTO 850
900 IF K$<>CHR$(13) THEN A$=K$:V
$=V$+K$:B$="BM+0,+0":SOUND200,2:
GOSUB 5090
910 IF K$=CHR$(13) THEN 920 ELSE
 870
920 IF V$=U$ THEN RT=RT+1 ELSE W
G=WG+1
930 IF V$=U$ THEN A$="GOOD WORK
"+NA$+"!":SOUND150,5:B$="BM8,170
```

```
":GOSUB 5090 ELSE A$="SORRY! THE
 TIME IS":SOUND1,4:B$="BM6,170":
GOSUB 5090:COLOR 5:LINE(90,190)-
(166,174),PSET,BF:COLOR8:A$=U$:B
$="BM96,188":GOSUB5090
940 IF U$<>V$ THEN K$=INKEY$:IF
K$="" THEN 940
950 IF K$=CHR$(92) THEN 1160
960 IF U$=V$ THEN FORT=1 TO 500:
NEXTT
970 COLOR CL:LINE(4,156)-(254,19
0),PSET,BF
980 PMODE4
990 COLOR0:LINE(X,Y)-(Q,W),PSET
1000 LINE(X,Y)-(Q1,W1),PSET
1010 COLOR5
1020 V$=""
1030 ZZ=ZZ+1
1040 IF ZZ=10 THEN GOSUB 1060:ZZ
=0:RT=0:WG=0
1050 GOTO 610
1060 'SCORE ROUTINE
1070 PMODE 3
1080 A$="YOUR SCORE IS:":B$="BM8
,170":GOSUB 5090
1090 A$=STR$(RT)+" RIGHT "+STR$(
WG)+" WRONG":B$="BM0,190":GOSUB
5090
1100 K$=INKEY$:IF K$="" THEN 110
0
1110 IF CL=5 THEN CL=6 ELSE IF C
L=6 THEN CL=7 ELSE IF CL=7 THEN
CL=5
1120 IF K$=CHR$(92) THEN 1160
1130 COLOR CL:LINE(0,156)-(255,1
91),PSET,BF
1140 RETURN
1150 ' END
1160 CLS:PRINT @230,"GOOD BYE "N
A$" !":PRINT:PRINT:PRINT:END
5000 ' ***CHRACTER GEN.<2>***
       **SUBROUTINE***
5010 '
5020 ' SUBROUTINE MAIN PROGRAM
BY J.S.PARAVATI        DATA FROM
TRS-80 NEWS  4/82
5030 '
5040 DIM X$(48),Y$(48)
5050 FOR N=1 TO 48
5060 READ X$(N),Y$(N)
5070 NEXT N
5080 RETURN
5090 DRAW "S8"+B$
5100 FOR J=1 TO LEN(A$)
5110 FOR Z=1 TO 48
5120 IF MID$(A$,J,1)=X$(Z) THEN
DRAW Y$(Z):GOTO 5140
5130 NEXT Z
5140 NEXT J
5150 RETURN
5160 DATA " ","BM+7,0"
5170 DATA "A","U4E2F2D2NL4D2;BM+
3,0"
5180 DATA "B","U6R3F1D1G1NL3F1D1
G1L3;BM+7,0"
5190 DATA "C","BM+1,-0;H1U4E1R2F
1;BM+0,+4;G1L2;BM+6,0"
5200 DATA "D","U6R3F1D4G1L3;BM+7
,0"
5210 DATA "E","NR4U3NR2U3R4;BM+3
,+6"
5220 DATA "F","U3NR2U3R4;BM+3,+6
"
5230 DATA "G","BM+1,-0;H1U4E1R2F
1;BM+0,+2;NL1D2G1L2;BM+6,0"
5240 DATA "H","U3NU3R4NU3D3;BM+3
,0"
5250 DATA "I","BM+1,0;R1NR1U6NL1
R1;BM+4,+6"
5260 DATA "J","BM+0,-1;F1R1E1U5N
L1R1;BM+3,6"
5270 DATA "K","U3NU3R1NE3F3;BM+3
,0"
5280 DATA "L","NU6R4U1;BM+3,+1"
5290 DATA "M","U6F2ND1E2D6;BM+3,
0"
5300 DATA "N","U6F1D1F2D1F1NU6;B
M+3,0"
5310 DATA "O","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5320 DATA "P","U6R3F1D1G1L3;BM+7
,3"
5330 DATA "Q","BM+1,0;H1U4E1R2F1
D3G1NH1NF1G1L1;BM+6,0"
5340 DATA "R","U6R3F1D1G1L2NL1F3
;BM+3,0"
5350 DATA "S","BM+0,-1;F1R2E1U1H
1L2H1U1E1R2F1;BM+3,+5"
5360 DATA "T","BM+2,+0;U6NL2R2;B
M+3,+6"
5370 DATA "U","BM+0,-1;NU5F1R2E1
U5;BM+3,6"
5380 DATA "V","BM+0,-6;D2F1D1F1N
D1E1U1E1U2;BM+3,+6"
5390 DATA "W","NU6E2NU1F2U6;BM+3
,6"
5400 DATA "X","U1E4U1;BM-4,0;D1F
4D1;BM+3,0"
5410 DATA "Y","BM+0,-6;D2F2ND2E2
U2;BM+3,6"
5420 DATA "Z","NR4U1E4U1L4;BM+7,
6"
5430 DATA "1","BM+1,0;R1NR1U6G1;
BM+6,+5"
5440 DATA "2","NR4U1E1R1E2U1H1L2
G1;BM+7,+5"
5450 DATA "3","BM+0,-1;F1R2E1H2E
2H1L3;BM+7,6"
5460 DATA "4","BM+3,0;U2NR1L3U1E
3D3;BM+4,3"
```

```
5470 DATA "5","BM+0,-1;F1R2E1U2H
1L3U2R4;BM+3,+6"
5480 DATA "6","BM+4,-5;H1L2G1D4F
1R2E1U1H1L3;BM+7,+3"
5490 DATA "7","U1E4U1L4;BM+7,+6"
5500 DATA "8","BM+1,-0;H1U1E1H1U
1E1R2F1D1G1NL2F1D1G1L2;BM+6,0"
5510 DATA "9","BM+0,-1;F1R2E1U4H
1L2G1D1F1R2;BM+4,+3"
5520 DATA "0","BM+1,0;H1U4E1R2F1
D4G1L2;BM+6,0"
5530 DATA "/","U1E4U1;BM+3,6"
5540 DATA "?","BM+0,-5;E1R2F1D1G
2;BM+0,+1;D1;BM+5,+0"
5550 DATA "!","BM+2,+1;U1;BM+0,-
2;U5;BM+5,7"
5560 DATA ".","BM+2,0;U1;BM+5,+1
"
5570 DATA ":","BM+2,-1;U1;BM+0,-
2;U1;BM+5,+5"
5580 DATA ";","BM+1,0;E1U1;BM+0,
-1;U1;BM+5,+4"
5590 DATA ",","BM+2,0;NU1G1;BM+6
,-1"
5600 DATA "'","BM+1,-5;E2;BM+4,+
7"
5610 DATA "-","BM+0,-3;R4;BM+3,+
3"
5620 DATA "+","BM+2,-1;U2NU2NL2R
2;BM+3,+3"
5630 DATA "=","BM+1,-2;R3;BM-3,-
2;R3;BM+4,+4"
5640 ' TITLE PAGE-DATA FROM
  DRAWING HELPER BY J.S.PARAVATI
5650 DATA 080,072,176,072,080,18
6,176,186,176,072,172,087,172,08
7,136,120,136,120,136,132,176,18
6,172,168,172,168,136,132,012,00
9,056,009
5660 DATA 068,009,108,009,120,00
9,128,009,120,009,120,048,128,00
9,148,036,148,036,168,009,168,00
9,176,009,188,009,228,009,188,00
9,188,048
5670 DATA 188,048,228,048,216,03
0,200,030,216,030,216,024,216,02
4,200,024,200,015,200,024,200,01
5,228,015,228,015,228,009,200,03
0,200,042
5680 DATA 200,042,228,042,228,04
2,228,048,176,009,176,048,176,04
8,168,048,168,048,168,021,168,02
1,148,045,148,045,128,021,128,02
1,128,048
5690 DATA 128,048,120,048,068,00
9,068,015,068,015,084,015,092,01
5,108,015,108,015,108,009,108,04
8,068,048,108,048,108,042,108,04
2,092,042
5700 DATA 084,042,068,042,068,04
2,068,048,084,042,084,015,092,01
5,092,042,056,009,056,015,012,00
9,012,015,012,015,029,015,056,01
5,040,015
5710 DATA 029,015,029,048,029,04
8,040,048,040,048,040,015,120,12
0,120,132,080,072,084,084,084,08
4,120,120,080,186,084,168,084,16
8,120,132
5720 DATA 084,084,172,084,084,17
1,172,171,120,120,124,123,136,12
0,132,123,120,132,124,129,136,13
2,132,129,132,129,132,123,124,12
3,124,129
5740 N=64
5750 PMODE4:PCLS :SCREEN1,1:PMOD
E 3:COLOR7
5760 FOR X=1 TO N:READ C,D,E,F:L
INE(C,D)-(E,F),PSET:NEXT X
5770 PAINT(32,42),7,7:PAINT(88,4
2),7,7:PAINT(148,39),7,7:PAINT(1
92,30),7,7
5780 LINE(124,123)-(132,123),PSE
T
5790 PAINT(124,87),6,7
5800 FOR T=1 TO 25:SOUND T*7,1:N
EXT T
5810 PAINT(128,126),6,7:PAINT(12
4,120),5,7
5820 FOR T=1 TO 1000:NEXT
5830 RETURN
```

GOCO

We were indeed fortunate, during the month to have Bob Delbourgo and family here. Bob was here to lecture at Queensland Uni and he and the family took time out from their busy schedule to have lunch with us, and to later join in at our own User's Group meeting.

Bob, Tino and Daniel have supplied a number of programs for GoCo, the first of which is included in ths issue. Good work Bob and Family - come on the rest of you - how about a few more local articles!

The Delbourgos were here for our monthly winge session. We usually get out of the office after the latest issue has been posted, into a park somewhere, have a Bar Be-Que lunch and then get stuck into the magazine and how to improve it! We discovered that we still have a way to go before we can say that we're satisfied, but we settled on some formulae to get the magazine close to where we want it.

A number of you missed the bar graphs. We are planning to send photo copies of full size bar graphs to those who have requested them.

I have had the opportunity to look in closer detail at the Model 2000 on several recent occassions.

My initial reaction is that one day we will have to get one for the office!

Ostensibly, Tandy has sold the current shipment, although I understand that a few remain around the shops. Not to fear - more are on their way.

The colors are well defined and have a slight pastel feel to them. It would be possible to do video titling and other forms of accurate screen graphics - perhaps even simple cartoons.

The keyboard is well laid out, has a nice positive feel to it and has quite an array of special purpose keys. Responses are quick, but many programs need to access the disc drives frequently thus slowing the overall response time.

We didn't like the way the 2000 remembers keyboard input whilst it is off accessing disk. If you are impatient and hit a key several times, you have to wait whilst the function that the key controls repeats itself. I wouldn't be surprised to learn that this feature can be turned off, its just that I haven't discovered quite how just yet!

There is a multitude of things to learn about this computer, and we will be writing more about the 2000 next month after we've had a chance to spend a day or two with one.

GoCo also features the work of Micheal Patkin this month. Micheal sent some very interesting material for us to peruse, hopefully it wont be very long before he is prepared to let you see it too.

COMPARISON

SHOPPING IN THE

ELECTRONIC MALLS

By Randy Graham

Randy Graham is a rehabilitation counselor working with the handicapped. Personal computing is his hobby; telecommunications one of his favorite activities. He has done freelance information retrieval and is an inveterate user of the major online systems.)

Last month, I described CompuServe Information Service, using the analogy of roaming around a shopping mall. How many of you tried it? Did you log on successfully? Did you find and join the M100 SIG? Have you been exploring their public access library? Have you downloaded a weather map? Did you find the program for the grandfather clock? (That's one of my favorite programs for the PoCo.) It takes up 3000 bytes of my precious RAM, but I love to show it to my friends and tell them that this is what high tech has been working toward all these years.

OK, time to visit another shopping mall -- The Source. Like all malls, it has some familiar services and some unique ones. I must admit that I am still just a tourist here myself. I have been hanging around CompuServe for years and had heard that The Source was similar. For the sake of completeness and fairness, I took some of my hard-earned bucks and joined The Source. Let me take you by the hand and show you what I have discovered so far, and then let's do a little comparison shopping.

Costs

The first thing I found out is that The Source is more expensive than CompuServe -- or is it? Remember I told you that CompuServe costs $20 to join if you did not get it free with a modem or cord? Well, the Source costs $100 to subscribe. They also give free signups with some modems; I considered buying one and selling the modem for half price. But when I called their toll-free number, the customer support person told me that they were having a sale and so it only cost me $60. Then, I received a notice that they are running a special until the end of May, that if I get a new subscriber, it only costs him $29.95 and I get $20 worth of connect time. Now, if you will all send me your names and addresses . . . Competition, or good management or something seems to be at work here. At CompuServe, you get a slim users guide and the invitation to buy more. I have invested in several because you need them. The source gave me a big thick manual and a couple of brief handy guides. My first conclusion from the comparison is that the costs of the two services are roughly comparable.

Once you have an account, you are billed for each minute you are connected to the service. CompuServe used to charge $5 an hour for evenings and weekends with no daytime access. Last year, they went up to $6 per hour. The Source charges $7.75. CompuServe adds a surcharge for some of their databases; I have found no surcharges yet on The Source. CompuServe charges $12.50 an hour for daytime use; The Source $20.75. Both charge about double for 1200 Baud, but you are sending and receiving about four times as fast. Again, depending on your use, costs are comparable enough not to be the biggest factor in choosing.

One distinct difference is that while CompuServe has no minimum, The Source charges a minimum of $10 -- $1 of which is for storage. They charge 50 cents per month per "record" of personal account storage -- your personal files. A record is 2K, so that you are charged for 4K. CompuServe gives you 128K with your account and then charges you $4 per week for each additional 64K.

Now, I consider this minimum charge a significant difference in the costs of the two services. If you do not use your CompuServe account, it costs you nothing; it will cost you on The Source.

Services

To get a handle on all the features in this "mall," let's group them into categories: information databases, computing and communicating.

Information Databases

The Source has a lot of databases on which you can read information on a great variety of topics for news and sports to home management to entertainment to stocks and bonds. What you do mostly is read. Reading these files is a lot like reading a newspaper or magazine -- there is a lot of information, searchable online and very current. If you would rather read a scrolling screen than a printed page, you may enjoy this section.

Computing

This section allows you to use the various languages to process data. There are a number of utilities for data handling and text editing. There are also utilities for manipulating stock market data available from the information databases. Using their utilities can make sense if you only need them occasionally. Why not have your files on The Source and work them over there instead of investing in a lot of software which will sit on the shelf most of the time?

Communications

The scope and variety of this part of The Source is what really fascinates me. You can send Email to other subscribers. You can also send Email to multiple subscribers on your customized mailing list. You can send open or blind copies to others. You can forward an Email letter to another subscriber with your appended comment.

A capability familiar to many old system users is "Chat" which allows you to talk "live" to other subscribers. You type "ONLINE" and get a list of others who are on the system now. You recognize my ID number and type "CHAT BCF042". A line flashes on my screen "SCA123 want to chat." By typing CHAT SCA123 and my comment, I can get a conversation going. If you are busy and do not want to be interupted, you can type "Chat -OFF."

There is also a bulletin board for wide-ranging, slower-motion communication. They only have one board, but it is divided into sections and you can search only the section you want. Messages are cleared off the board after seven days to keep the size of the board within reason.

Conferencing

And then there is conferencing. This is such an important activity, it deserves its own section.

When we get to conferencing, The Source shows its real power. Anybody can join the conference. This is not a realtime interchange, and there is more than one going at a time. This is more like a topical bulletin board. Someone starts a conference and leaves a startup message. Others add their comments. You may find a message addressed to you in your "In-Box" or you may want to read all of what is going on. Some of the members get off on a specialized area and decide to start their own subconference. Whenever you log on, check to see what is going on and add your two cents worth. Other members will read it when they log on. And so it goes.

I have not really had a chance yet to check out the conferences and see if there is one on PoCos. If not, let's start one. One of the things we can decide is whether to let anyone join or keep it private. We don't want any Apple people messing around in our conference, do we? But, let's let the NECies in -- they are close cousins to us PoCoers. You can make a conference private by giving the list of names or IDs who are allowed access or by establishing a password -- not your system password, one for the conference -- to restrict access.

That gets me into a fascinating aspect of The Source -- what they call their "Business Services." This is mostly a packaging of the various services with the added security of closed files and closed conferences. You can set up your own telecommunications system for your company within the structure of The Source. This would seem like a dandy idea for smaller companies who are not ready for their own nationwide systems or for departments who are having trouble getting time on the company's big machine. If you have been trying to persuade your company to let you use your PoCo when you travel, why not try it out with The Source's facilities to prove its value?

Publishing

A word must be said about The Source's publishing program. They have a public access library for subscribers' use. Now, you have your own file storage capability and you can decide whether to have them open to others or closed for private use. Or, you can submit programs to The Source for publication. If accepted, they are placed in the library. The library programs are still free to subscribers, but you do not have to donate them to the general public. The Source pays you a little royalty for them. Say you have a program which takes 5 minutes to download. And say 120 people access it. That is 600 minutes or 10 hours of connect time for which The Source made $77.50 in connect charges. They will pay you a little royalty (in free time) for getting people to use their service. Very neat.

Comparison Shopping

OK, let's get brave and try to compare these two similar information services, being fair to both.

1) We have already looked at costs. CompuServe is somewhat less expensive and has no minimum charge, but the difference is not as great as I once thought. You will have to look at your own budget and decide how important price is.

2) CompuServe is friendlier to your PoCo than The Source. CompuServe's new DEFAULT program allows you to tailor the output to your screen size. There is no such utility on The Source. You will have to learn to use the control characters to stop and start the display. CompuServe normally sends a 32-column by 24-line page; The Source uses 64 x 24. I have previously advised you to hook up your printer and "ECHO" hard copy but this cuts down on portability. Dumping to disk is another option, if you have gone this route -- but this is not an easy routine. When really computing portably, it looks like you are going to do a lot of repeating on The Source. Remember to use your DOWNLOAD judiciously; free memory is definitely a finite capacity.

3) The Source seems to have more information databases. If you like to read, you will enjoy the variety of their offerings. Both have computing power and utility programs at your fingertips.

4) Communications seems to be a standoff. CompuServe offers Special Interest Groups (SIGS) set up by the company in response to user demand. Each SIG is run by a SYSOP chosen by CompuServe. Each SIG has its own bulletin board, library of programs and files, and a conferencing capability. These conferences are in real time as a bunch of people get online at the same time and "talk" about a planned topic.

The Source's conferencing facility seems to include some of the above except that conferences are entirely user-run. Anyone can set up a conference at any time. As noted, the discussions do not run in real time. Another interesting aspect of The Source's conference is that the fellow who sets one up is responsible for the storage costs generated by the conference!

The Source's real-time communication is their "CHAT" program. This is one-to-one and a lot of friendships reportedly develop through CHATting. CompuServe has its unique "CB Simulator" which allows multiple-member conversations on trivial subjects in real time.

As noted, both have Email for personal private communication between members. The Source allows multiple copies and also allows you to leave read messages on the board. On CompuServe, you can only send to one recipient, although the message is still in the buffer if you want to address it to another user, etc. CompuServe does require you to file or delete a message when read. When you log on to CompuServe, a message line tells you that you have mail waiting; The Source does not. When you access a SIG on CompuServe, you are told that there is a message waiting; when you check into PARTICIPATE on The Source, you are told that there are "nn" messages in your "IN-BOX."

A strong point for The Source's conferences is that you can close them for private use of a designated group. CompuServe's SIGS are open to all users. Everyone can get into the realtime conferences, read your messages on the bulletin board and join in the CB discussions. Only personal files and Email are completely private.

5) Both systems have menu guidance for newcomers and command modes for the oldtimers. CompuServe arranges its files and programs by sections and "pages." The experienced user can take a shortcut at any system prompt ("!") by entering "GO PCS-154" or "GO 154" if you are in the PCS section, or "GO EMA" or "GO TRS" to read Radio Shack's newsletter, etc. In The Source, you type the program name "READ MAIL.CK" from the command prompt ("->"). On CompuServe, "T" at any system prompt will take you back to the main menu; on The Source, "Q" (or "QUIT") will get you out of whatever you are in and "M" (or "MENU") will give you the main menu.

OK, enough of this beating around the bush -- which is the best buy? I thought I knew until I checked them out side by side! I think any PoCo owner who got a free packet when he/she bought a modem cord is crazy not to subscribe to CompuServe; it costs you nothing unless you use it. I would have to stop and think about The Source -- will I use it enough to justify its cost? Now that I have subscribed, I am sure I will always use my minimum and get involved in some conferences, etc. How about you?

Meanwhile . . .

I haven't been hearing from you! Drop me an Email at 70015,434 on CompuServe or BCF042 (that's a zero, not the letter 'O') on The Source. Let's get something going here. PCM

Directly connecting your Model 100 to your multi-line office phone is no problem with Radio Shack's new Multi-Line Controller

Going Online At The Office With PoCo

By Carl Oppedahl

So you have your shiny new Model 100, and have dazzled your friends by calling up the Official Airline Guide (or some other computer) from home. Then you take it to the office, and there's no place to plug it in.

"The cable that runs from the switchboard to the phone is as big around as my little finger," you say to the Radio Shack salesperson. "The connector doesn't look anything like the modular plugs at home."

"No problem," is the reply. "Just pick up the Multi-Line Controller (43-233, $39.95) or the Single-Line Phone Tap (43-271, $14.95) and install it yourself between the phone and that big cable." So you pick one up and take it to the office.

Sure enough, it has male and female connectors that fit neatly between the phone and the cable, and the installation takes only five minutes. And there's a familiar looking modular jack for the beige Model 100 modem cable. You nervously try out the phone again, and it works fine.

The moment of truth arrives. Having edited your ADRS file to account for the fact that in the office you must dial '9' for an outside line, you try to autodial the OAG.

No good. The Model 100 makes scratchy noises, and never logs you in to the OAG. After 10 minutes and three more attempts, the admiring crowd around you becomes merely tolerant and disperses.

"Maybe the problem is just in the dialing," you think to yourself. So you dial 9 and the Tymnet number on the phone itself, then push the "Term" key on the Model 100.

Well, progress of a sort. You are able to log in and use the OAG, but all over the office the line is blinking as if a call were on hold. Naturally enough, others in the office pick up on that line to see why a call is on hold for so long. Each time they do it, they hear a load squeal, and you lose half a dozen characters.

What is to be done? The recently released Multi-Line Adapter from Radio Shack (Cat. No. 43-117, $4.95) may be the answer, and it is the purpose of this article to explain why.

Phone Signals

To understand the wiring in a typical office, it is instructive to review first the simpler wiring in the home.

Most residential phone jacks have four contacts, but only two are active, namely the red and green lines, often called "ring" and "tip." The other two wires, if present, are yellow and black, but serve no function except, perhaps, as a source of low voltage AC (alternating current) for phones that light up at night.

The phone instrument accomplishes everything, from ringing and dialing to voice communications through just the *tip* and *ring* signals. As a result the phone line cord often does not even contain a third and fourth conductor.

Not all phones that light up require an external power source on the yellow and black wires. The phones that light up in green use LEDs (light-emitting diodes) powered from the red and green wires.

Hold Button

In an office where the phones have hold buttons and other special features, there are often many wires other than tip and ring which must be handled by the phone instrument, and by any computer device that is to mimic a phone.

In the highly standardized "2500 key set" with five lines and a hold button these other wires include special circuits for ringing the bell, lighting up the five lights, and putting calls on hold. For each of the five lines there is a ring signal, a trip signal, a lamp signal, and a so-called "A-lead" signal. Although the office switchboads made by different companies vary somewhat, in general the lamp signal is for informational purposes only and there is no strict requirement that it be hooked up to anything.

When a device other than a conventional telephone is being hooked up, however, the "A-lead" signal, which has to do with putting calls on hold, usually cannot be left unaccounted for. When a Multi-Line Controller or Single-Line Phone Tap is connected, it brings the A-lead signals out on the yellow and black pins of the modular jack. The usual connections are shown in Table 1.

Many answering machines and other telephone devices have a relay inside to handle the yellow and black leads. Basically, whenever the phone is to be "off the hook" (in use) the usual connection is made to the red and green wires and, in addition, a relay shorts together the yellow and black wires. When the phone is to go back "on hook" (not in use) the connection at the red and green wires is broken before the connection between the yellow and black is broken.

The Radio Shack PHONE connector has provision for handling the tip and ring signals, but not for handling the A and A1 (yellow and black) signals. The reason, I'm sure, is that to squeeze in an A-lead-control relay, it would have been necessary to leave out something else.

Besides, in those homes where the phones light up with the help of an AC adapter, an A-lead-control relay would

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(Carl Oppedahl is a lawyer specializing in technological litigation and author of the soon to be published book, Advanced Programming of The Model 100.*)*

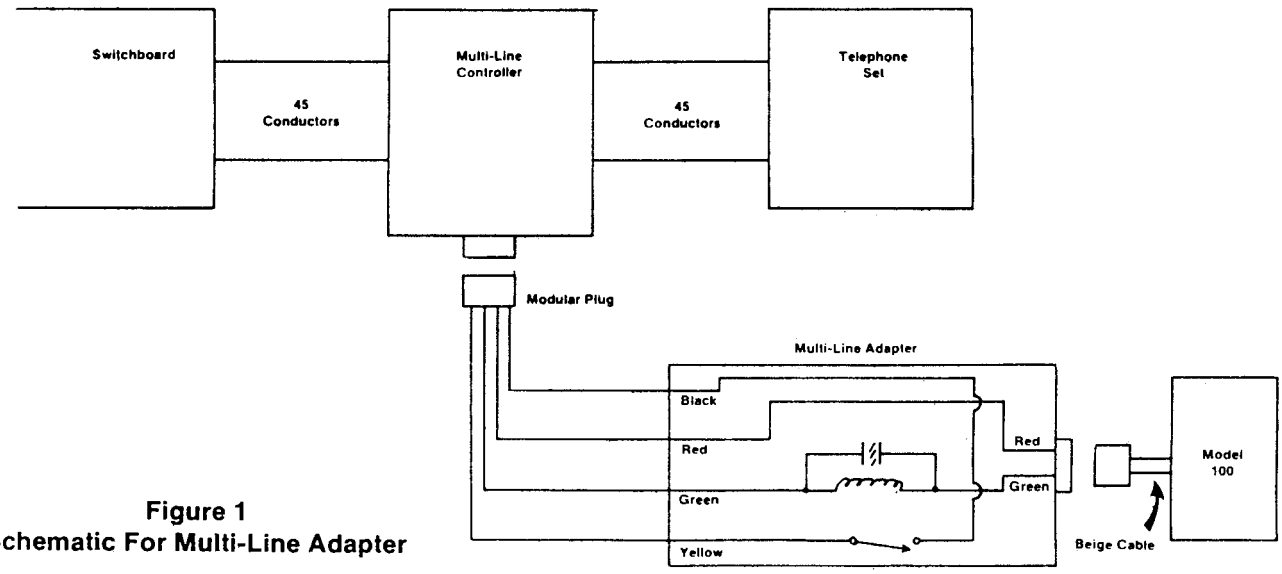


Figure 1
Schematic For Multi-Line Adapter

short out the AC adapter, sooner or later damaging either the adapter or the Model 100.

Some answering machines have an "A-lead" switch to disable the A-lead-control relay for use in the home. Imagine trying to find space for yet another switch around the edge of the Model 100!

The Multi-Line Adapter, though simple in concept and in design, took a long time to reach the market. Because it connects directly to phone lines, it must be FCC approved (under Part 68 of the FCC Rules), which takes lots of time and money. Keep in mind, however, that the Part 68 approval does not ensure that a telephone product does what it is supposed to — it simply indicates that the device will probably not electrocute phone workers even if it is dropped on the floor many times, and that if it fails, it will only screw up your phone service and not someone else's.

The FCC registration number for the Multi-Line Adapter, AA07HD-12138-AD-N, indicates that it is an adapter ("AD"), which is no surprise, and that it cannot dial phone numbers by itself ("N").

What It Does

What exactly does the Multi-Line Adapter do? It watches for current flow in the loop made up of the red and green (tip and ring) signals. Whenever current flows, the yellow and black wires (A and A1) are shorted. The Radio Shack catalog description incorrectly characterizes these signals as "1 and A1."

The schematic of the device is shown in Figure 1; typical Model 100 connection is shown. From the switchboard some 40 volts are available at the tip and ring conductors at the left. When the Model 100 is "on hook," it provides a

Table 1

Connections in Multi-Line Controller

Line	Rip	Ring	A	A1
1	26	1	27	2
2	29	4	30	2
3	32	7	33	2
4	35	10	36	2
5	38	13	39	2

very high resistance at the tip and ring conductors at the right, so that essentially no current flows through the relay coil. The voltage drop across the coil, which is proportional to the current, is quite small.

When the Model 100 goes "off hook," presumably to dial a call, its tip-ring resistance goes to perhaps 600 ohms. Several tens of milliamperes of current flow through the Model 100 (and thus through the relay coil), and the relay closes, shorting the yellow and black conductors.

An electrolytic capacitor is provided (100 microfarads at 10 volts) to keep the relay from chattering during dial pulses and the like. Note that the relay coil and contacts are each capable of handling direct current in either direction. In particular, the electrolytic capacitor is non-polar, so that it can handle either polarity. This is a good thing, since the polarities vary from office to office.

The ringer equivalence number (REN) indicates how much current a telephone device draws across the tip and ring signals when the phone is ringing. It is easy to see why the Multi-Line Adapter has a REN of 0.0. There is simply nothing connected between the red and green wires.

Not A Cure-all

The Model 100 dials numbers with dial pulses, just like a rotary phone dial. Some switchboards do not accept dial pulses, but instead require that dialing of numbers be done with DTMF (dual tone multifrequency, commonly called Touch-Tone, a registered trademark of AT&T). The Multi-Line Adapter will not help the dialing if this is the problem. But it will at least allow you to use the "Term" key without having "hold" lights flash on other phones.

Dialing 9

It bears repeating, at this point, that in some offices one must pause for a new dial tone after dialing 9. When setting up an autodial sequence in the ADRS file, the "equals" sign may be used within the phone number for a two-second pause. The Radio Shack Model 100 User's Manual is less than clear on this.

Conclusion

I do not recommend that you try to build it yourself; your work would not be FCC approved. Besides, at $4.95 it is cheaper than the parts purchased separately.

For some office installations, it is a must. And you can't beat the price.

PCM

PoCo DOMINOES

Bob Delbourgo

As you must have played DOMINOES since your childhod, I obviously won't explain the rules of this game, but I must tell you how to use the Model 100 keyboard to play against PoCo. In this version of dominoes the numbers range from 1 to 9 and you have the Privilege of starting. Because you have to begin with a double this is a doubtful advantage to you. The board is laid out in a zigzag up/down fashion and your additions to the board have to follow the 'tramlines', just like PoCo's additions. If you can play and thus do not wish to draw from the pile, position the cursor over the domino end (using arrow keys) and type H. If however you have no match and are obliged to draw from the pile, type Y. PoCo then responds and responds aggressively at that - it tries to force you to draw on your next move! But I do promise you that it has no knowledge of your hand or what is hidden in the pile. At the end of the game the totals in your hand and PoCo's are added to your previous totals to show the running scores.

Enough said. It only remains to add a few words about the variables in the Listing and the main routines for those of you who wish to follow the program in detail. I have found it most economical to store the dominoes as strings. P$ for your hand, Q$ for PoCo's, D$ for the hidden pile and R$ for the dominoes on the board. X( ) and Y( ) are the corridor locations and XL, YL, XR, YR correspond to the domino locations (left and right) of your own hand. DP and DQ act as markers indicating if you or PoCo can play. SP and SQ are your respective running totals. The subroutine 680-770 draws the domino once the number string B$ is read off. Shuffling of the dominoes is carried out in Lines 640-660. The computer's assessment of what domino to play occurs in subroutine 780-850. Basically it looks for the most frequently appearing number in it's hand and the board's and attempts to ensure that that number is exposed after it has played. Now see if you are more guileful than the Model 100!

The Listing:

```
10 FORI=1TOVAL(RIGHT$(TIME$,2)):R=RND(1):NEXTI:CLEAR500:GOSUB630
20 CLS:PRINT@91,CHR$(27);"p";" D O M I N O E S ";:FORI=6TO126STEP40:PRINT@I," ";
:PRINT@66+I," ";:NEXTI:PRINT@11,SPACE$(22);:PRINT@51,SPACE$(1);:PRINT@147,SPACE$
(1);:PRINT@166,"      by Bob Delbourgo ";CHR$(27);"q";:GOSUB670
30 GOSUB640
40 DIMXL(30),YL(30),XR(30),YR(30),N(9),X(180),Y(180)
50 FORI=1TO6:FORJ=0TO4:XL(I+6*J)=126+16*I:YL(I+6*J)=3+8*J:XR(I+6*J)=133+16*I:YR(
I+6*J)=3+8*J:NEXTJ,I
60 FORI=1TO10:FORJ=0TO8:X(18*I-17+J)=14*I-14:Y(18*I-17+J)=7*J:X(18*I-J)=14*I-7:Y
(18*I-J)=7*J:NEXTJ,I
70 CLS:R$="":RL=0:RR=0:RD=RD+1:LINE(0,0)-(139,63),1,B
80 FORI=6TO132STEP14:LINE(I,0)-(I,57):LINE(I+1,0)-(I+1,57):LINE(I+7,6)-(I+7,63):
LINE(I+8,6)-(I+8,63):NEXTI
90 LINE(140,6)-(140,63),0:LINE(139,0)-(239,44),1,B:PRINT@264,"Draw  POCO  PILE";
:PRINT@304,"Y/N?";:LINE(170,44)-(170,63):LINE(205,44)-(205,63):LINE(239,44)-(239
,63)
100 C=1:FORI=1TOLEN(P$)/2:A$=MID$(P$,2*I-1,2)
110 B$=LEFT$(A$,1):X=XL(I):Y=YL(I):GOSUB680:B$=RIGHT$(A$,1):X=XR(I):Y=YR(I):GOSU
B680:NEXTI
120 PRINT@315,LEN(D$)/2;:PRINT@309,LEN(Q$)/2;
130 I$=INKEY$:IFI$=CHR$(28)THENC=C+1:IFC>LEN(P$)THENC=LEN(P$)
140 IFI$=CHR$(31)THENC=C+12:IFC>LEN(P$)THENC=C-12
150 IFI$=CHR$(29)THENC=C-1:IFC<1THENC=1
160 IFI$=CHR$(30)THENC=C-12:IFC<1THENC=C+12
170 IFC=2*INT(C/2)THENX=XR(C/2):Y=YR(C/2)ELSEX=XL((C+1)/2):Y=YL((C+1)/2)
180 LINE(X,Y-1)-(X+6,Y-1),1:LINE(X,Y+7)-(X+6,Y+7),1:FORT=1TO20:NEXTT
190 LINE(X,Y-1)-(X+6,Y-1),0:LINE(X,Y+7)-(X+6,Y+7),0
200 IFI$="N"ORI$="n"THEN260
210 IFI$="Y"ORI$="y"THEN230
220 GOTO120
230 IFD$=""THENDP=1:IFDQ=1THEN530ELSE340
240 P$=P$+LEFT$(D$,2):P=LEN(P$):X=XL(P/2):Y=YL(P/2):B$=LEFT$(D$,1):GOSUB680:X=XR
```

```
(P/2):Y=YR(P/2):B$=MID$(D$,2,1):GOSUB680:D$=RIGHT$(D$,LEN(D$)-2)
250 GOTO120
260 C$=MID$(P$,C,1):C1=2*C-2*INT(C/2)-1:
270 IFC=C1 THENF$=MID$(P$,C+1,1)ELSEF$=MID$(P$,C1,1)
280 IFR$=""ANDC$<>F$THENBEEP:GOTO120
290 IFR$=""THENSOUND1000,10:R$=C$+F$:B$=C$:X=X(90):Y=Y(90):GOSUB680:X=X(91):Y=Y(
91):GOSUB680:GOTO330
300 IFLEFT$(R$,1)<>C$ ANDRIGHT$(R$,1)<>C$ THENBEEP:GOTO120
310 DP=0:IFC$=LEFT$(R$,1)THENSOUND1000,10:B$=C$:X=X(89-RL):Y=Y(89-RL):GOSUB680:B
$=F$:X=X(88-RL):Y=Y(88-RL):GOSUB680:RL=RL+2:R$=F$+C$+R$:GOTO330
320 IFC$=RIGHT$(R$,1)THENSOUND1000,10:B$=C$:X=X(92+RR):Y=Y(92+RR):GOSUB680:B$=F$
:X=X(93+RR):Y=Y(93+RR):GOSUB680:RR=RR+2:R$=R$+C$+F$
330 P$=LEFT$(P$,C1-1)+RIGHT$(P$,LEN(P$)-C1-1):LINE(140,1)-(239,43),0,BF:IFP$=""T
HEN530
340 FORC=1TOLEN(Q$):C$=MID$(Q$,C,1):IFC$=LEFT$(R$,1)ORC$=RIGHT$(R$,1)THEN390
350 NEXTC
360 IFD$<>""THENQ$=Q$+LEFT$(D$,2):D$=RIGHT$(D$,LEN(D$)-2):BEEP:PRINT@309,LEN(Q$)
/2;:PRINT@315,LEN(D$)/2;
370 IFD$=""THENDQ=1:IFDP=1THEN530ELSE100
380 GOTO340
390 PRINT@146,"Pondering..";:FL=0:FR=0:U$=LEFT$(R$,1):IFC$=U$THENGOSUB780:FL=F
400 U$=RIGHT$(R$,1):IFC$=U$THENGOSUB780:FR=F
410 IFFR>=FL THENF=FR ELSEF=FL
420 FORC=1TOLEN(Q$):C1=2*C-2*INT(C/2)-1:C$=MID$(Q$,C,1)
430 IFC1=C THENF$=MID$(Q$,C+1,1)ELSEF$=MID$(Q$,C1,1)
440 IFF=VAL(F$)ANDC$=LEFT$(R$,1)THEN470
450 IFF=VAL(F$)ANDC$=RIGHT$(R$,1)THEN480
460 NEXTC
470 SOUND10000,5:IFC$=LEFT$(R$,1)THENB$=C$:X=X(89-RL):Y=Y(89-RL):GOSUB680:B$=F$:
X=X(88-RL):Y=Y(88-RL):GOSUB680:RL=RL+2:R$=F$+C$+R$:GOTO490
480 SOUND10000,5:IFC$=RIGHT$(R$,1)THENB$=C$:X=X(92+RR):Y=Y(92+RR):GOSUB680:B$=F$
:X=X(93+RR):Y=Y(93+RR):GOSUB680:RR=RR+2:R$=R$+C$+F$
490 Q$=LEFT$(Q$,C1-1)+RIGHT$(Q$,LEN(Q$)-C1-1):PRINT@309,LEN(Q$)/2;
500 IFQ$=""THEN530
510 IFD$=""THENDQ=0
520 PRINT@146,SPACE$(12);:GOTO100
530 CLS:PRINT"ROUND ";RD
540 IFP$=""THENPRINT"You  win!":GOSUB610
550 IFQ$=""THENPRINT"POCO wins":GOSUB620
560 IFDP=1ANDDQ=1THENPRINT"Stalemate":GOSUB610:GOSUB620
570 PRINTCHR$(27);"p";"Your   TOTAL";SP:PRINT"POCO's TOTAL";SQ:PRINTCHR$(27);"q"
580 PRINT@250,"Another round (Y/N)?"
590 I$=INKEY$:IFI$="Y"ORI$="y"THENGOSUB670:GOSUB630:GOSUB640:GOTO70ELSEIFI$="n"O
RI$="N"THENEND
600 GOTO590
610 FORI=1TOLEN(Q$):SQ=SQ+VAL(MID$(Q$,I,1)):NEXTI:RETURN
620 FORJ=1TOLEN(P$):SP=SP+VAL(MID$(P$,J,1)):NEXTJ:RETURN
630 D$="1112131415161718192223242526272829333435363738394445464748495556575859666
768697778798889999":RETURN
640 FORI=1TO5*VAL(RIGHT$(TIME$,2))+10:J=2*INT(45*RND(1)+1)-1:K=2*INT(45*RND(1)+1
)-1:A$=MID$(D$,J,2):B$=MID$(D$,K,2):MID$(D$,J,2)=B$:MID$(D$,K,2)=A$:NEXTI
650 R=2*INT(35*RND(1)+1)+1:P$=MID$(D$,R,20):L$=LEFT$(D$,R-1):R$=RIGHT$(D$,71-R):
D$=L$+R$
660 R=2*INT(25*RND(1)+1)+1:Q$=MID$(D$,R,20):L$=LEFT$(D$,R-1):R$=RIGHT$(D$,51-R):
D$=L$+R$:RETURN
670 PRINT@240,"Shuffling the dominoes, please wait...";:RETURN
680 LINE(X,Y)-(X+6,Y+6),1,BF:IFB$="1"THENPRESET(X+3,Y+3)
690 IFB$="2"THENPRESET(X+1,Y+1):PRESET(X+5,Y+5)
700 IFB$="3"THENPRESET(X+1,Y+1):PRESET(X+3,Y+3):PRESET(X+5,Y+5)
710 IFB$="4"THENPRESET(X+1,Y+1):PRESET(X+5,Y+1):PRESET(X+1,Y+5):PRESET(X+5,Y+5)
720 IFB$="5"THENPRESET(X+1,Y+1):PRESET(X+5,Y+1):PRESET(X+1,Y+5):PRESET(X+5,Y+5):
PRESET(X+3,Y+3)
730 IFB$="6"THENFORK=1TO5STEP2:PRESET(X+1,Y+K):PRESET(X+5,Y+K):NEXTK
740 IFB$="7"THENFORK=1TO5STEP2:PRESET(X+1,Y+K):PRESET(X+5,Y+K):NEXTK:PRESET(X+3,
Y+3)
750 IFB$="8"THENFORK=1TO5STEP2:PRESET(X+1,Y+K):PRESET(X+5,Y+K):NEXTK:PRESET(X+3,
Y+1):PRESET(X+3,Y+5)
760 IFB$="9"THENFORJ=1TO5STEP2:FORK=1TO5STEP2:PRESET(X+J,Y+K):NEXTK,J
770 RETURN
780 FORI=1TO9:N(I)=0:NEXTI:FORC=1TOLEN(Q$):A$=MID$(Q$,C,1):IFA$<>U$THEN830
790 C1=2*C-2*INT(C/2)-1:IFC1=CTHENF$=MID$(Q$,C+1,1)ELSEF$=MID$(Q$,C1,1)
800 F=VAL(F$):FORI=1TOLEN(Q$+R$)
810 IFVAL(MID$(Q$+R$,I,1))=F THENN(F)=N(F)+1
820 NEXTI
830 NEXTC
840 N=N(1):FORG=2TO9:IFN(G)>=N THENN=N(G):F=G
850 NEXTG:RETURN
```

TALK$ = OSBOURNE$ + MODEL 100$

OR

APARTHEID OVERCOME

OR

HOW I GOT MY
TANDY 100 TO
TALK TO MY OSBORNE 1

Michael Patkin

For a computer muggins like me, the main purpose of a keyboard is to get text in. I do a lot of writing - nonsense, medical reports, correspondence, articles, attempts like this one you are reading right now to do something techinical and helpful, poetry when no-one else is looking, and so on.

I was the first boy on the block with a computer in about 1976, and it was a Wang 2200. Its a long expensive story since then, but one of the beauties of being 51 years old and having worked moderately hard is that one can indulge oneself a bit.

In short, now that a Wang 2200T has gone to the Geriatric Home at the C-mp-t-r W-r-h--s-, and we are a 2 Osborne family, I want to be able to write, keyboard in bed in the evening, without the complicated propping up of the Osborne on the end of the metal paper-bin.

Put in other words, the wish of my life is that I want to be able to write with the Tandy 100 propped up on my knees, resting on a thin 15 cm box to get it at the right height, and then download my masterpieces onto the Osborne where I can massage text with my lovely Wordstar (peace, Gareth and Sue!) and save it on the disk drives I am used to.

The problem is that you can't just stick a piece of wire into the Osborne and Tandy, make a spell (a witch's spell) and expect Magic to happen. (See Contagious Magic in "The Golden Bough" by Sir James Frazer. I know a dumb office manager who believes you can "hook up" a printer to a micro by leaving them alone on a desk overnight). Nothing happens.

The problem is getting the two to talk the electronic language, and IT CAN BE

DONE. Here is the receipe:

Take one Osborne 1, and one Tandy 100, and a connecting cable with an RS-232 plug at each end with a suitable configuration (See Appendix 1).

Write your masterpiece on the Tandy 100, using its text editor, which is built in and fairly straight forward. Finish your text with a few special characters you won't use for anything else,

for example: @@@

Make sure that you put in line feed (by pressing the ENTRY key) at the start of the document. At the end of the document, put in your special "marking" characters, in this case

@@@

Follow these charaters with a couple of line feeds.

Then put your document file into the "paste buffer". The instructions are all in the book, but to make it easy, here is one way of doing it again:

Go to the start of your document file with a CNTRL and then the "up" cursor control.

Mark the start of the file by pressing F7 (or by pressing CNTRL L, which is just another way, to make it confusing).

Mark the end of the text to paste by pressing CNTRL and then v (the down cursor control).

Then press F5, which puts the marked text (which is the whole document) into the paste buffer.

Now get back to the menu by pressing F8, and then into the "TELECOM" (communication) mode, by pressing the space bar or the right arrow twice and keying ENTER.

If it doesn't say 58NID in the top left hand corner, you will need to change the Status to this by pressing F3 and then putting in these characters. You only need to do this once, unless you have some other Status, for the Modem, for example, some other time, or unless you wipe the memory of the Tandy (and it takes more than the ordinary battery change to do this).

Don't do any more with your file to send.

Get the Osborne going with PIP. When the star comes on, type in a command like this:

b:filename= CRT(Q@@@oZ)

The @@@ are the three special characters you used to mark the end of the file with before.

Using them in this CP/M command means that PIP will recognise the end of the transmission and not get stuck without finishing).

The Osborne will do some huffing and puffing of its disk-drives and then stop and wait, like a VERY obedient doggie.

On the Tandy, now press the button labelled F4, to put it into "Terminal Mode", and then press F3, when it asks you the name of the file. Just press the PASTE button, and you will see the text running on the Tandy screen.

Magic! Your masterpiece now goes over, as you can tell by the display on the Tandy screen. And because the disk drive on the Osborne will cough a couple of times, before getting back to >A. This means you are all set up with your masterpiece on the diskette in drive B of the Osborne, all ready to revise. Bingo! Your text is now safely in place.

There is still some more tidying up to be done with Wordstar on the Osborne, as the text file is in a continuous stream, with no separate lines. (You could have specified a document and a line length earlier, instead of using the Paste Buffer, but each line would have ended with a Hard Return, and made editing a long-drawn-out business).

Reformat your text, using Wordstar, with the following commands:

oOR and then a couple of digits for the line length, usually 52, and press return

oOH to cut off hyphen help

oOJ to cut out right justification,

if that is what you prefer.

oQQB to give continuous re-format through the document, to the end. (If you hadn't put in oOH to inactivate hyphen help, the reformatting process would stop every time a hyphen seemed appropriate).

You've finished. Now follow a few explanatory notes.

LINE FEEDS AND CARRIAGE RETURNS.

If you try to send a text file across in the way recommended by Tandy, TELCOM strips all the line feeds. This is also a problem with non-Tandy printes as well. For some mysterious reason, the line feeds are not stripped if the Paste Buffer is uploaded, instead of a document.

THE FIRST LINE FEED

For other puzzling reasons, the Tandy aborts all the text as soon as it comes to the first ENTRY (line feed) and then sends across all the text cleanly. If you have a paragraph or a heading right at the start, with no line feed, it doesn't get sent across.

TABS

The system doesn't like these. You lose parts of lines. I don't use TAB in this situation.

ANOTHER WAY OF SIGNING OFF

Instead of having the @@@ (or whatever special string you choose) at the end of the file, you can have a dummy text-file with the same string, and send this over after the main file. This is useful if you forgot to put in the special string.

OTHER MYSTERIES

A couple of times the Tandy has gone berzerk, and beeped away uncontrollably. The knuckle test (running your finger-nails across the whole keyboard) doesn't help, nor does turning it off and on, or resetting. You can fix it, however. Just press SHIFT and BREAK/PAUSE. Sometimes there are beeps during transmission. I havn't checked out all the control codes, but somebody energetic will doubtless sort all this out.

Garbage on the Model 100 screen. This suddenly started appearing during uploading a couple of weeks ago. I think it may be because I have differently configured Wordstar diskette in the Osborne, maybe with the baud rate set for 1200 instead of 300, but life has been too busy to check it out. It is easier to write this.

APPENDIX 1. Cable connector for RS-232 sockets

The pins connected between the Osborne and the Tandy are 1, 2, 3, and 7.
At each end, the pins jumpered together are

1 and 7
4 and 5
6, 8, and 20.

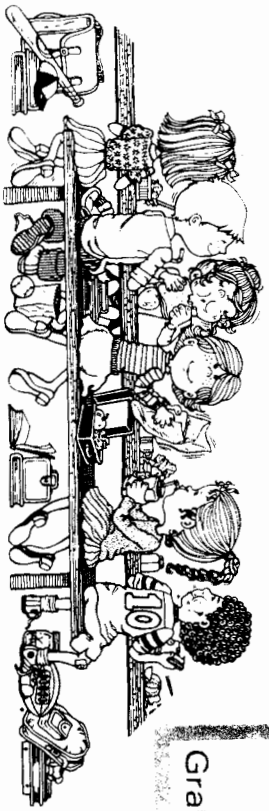
The only connections you need between the two machines are 2, 3, and 7. Because the Osborne 1 has 2 and 3 the wrong way round compared with other computers, you join 2 to 2 and 3 to 3, as well as 7 to 7. I don't understand all the explanations, but this has been working for a few weeks without bother, after the usual starting-up headaches.

Of course an RS-232 connector is expensive and a hassle. For a trial, you can simply put in individual wires between the two machines, with the metal bared of insulation the usual centimetre or so.

LATE ADDITIONS

I wrote off to a journalist in St. Louis who wrote an article in GoCo earlier this year mentioning a public domain program for adding line feeds to text. I haven't heard from him yet.

There is an article in Creative Computing for March 1984, by John J. Anderson (page 218). He goes on to describe connecting a Model 100 with an Apple, using some hardware changes. I thought he mentioned a public domain CP/M program to add line feeds, but my own short-term memory has gone phutt for the moment. It'll probably turn up somewhere from the cubic metre of computing magazines in the house!



user group CONTACTS

' (Stop between numbers = b.h. else
' a.h.; but, hyphen between = both.)

ADELAIDE	JOHN HAINES	08 278 3560
ADELAIDE NTH	STUN EISENBERG	08 250 6214
ALBURY	RON DUNCAN	060 43 1031
BAIRNSDALE	COLIN LEHMANN	051 57 1545
BALLARAT	MARK BEVELANDER	053 32 6733
BANKSTOWN	KEN HAYWARD	02 759 2227
BLACKTOWN	KEITH GALLAGHER	02-627-4627
BLAXLAND	BRUCE SULLIVAN	047 39 3983
BOWEN	TONY EVANS	077 86 2220
BOWRAL	MAX BETTRIDGE	048 83 9203
BRISBANE EAST	BOB THOMPSON	07 848 5512
BRISBANE NTH	JACK FRICKER	07 262 8869
BRISBANE STH	PATRIC SIMONIS	07 209 3177
BRISBANE SW	GRAHAM BUTCHER	07 376 3480
BRISBANE WEST	BRIAN DOUGAN	07 30 2072
BUNDABERG	JIM McPHERSON	071 72 8329
CAMBERWELL	TONY BALDWIN	03 728 3676
CAMPBELLTOWN	LEO GINLEY	02 605 4572
CANBERRA	SHAUN WILSON	062 51 2339
CAULFIELD	JEFF SHEEN	03 526 3724
CHATSWOOD	BILL O'DONNELL	02 411 3336
CHURCHILL	GEOFF SPOWART	051 22 1389
COLYTON TEENS	DWAYNE MANSON	02 623 5805
COOMA	SHEILA HAMMILL	064.82.3905
DANDENONG	BRETT CRUICKSHANK	03 798 5408
DARWIN	BRENTON PRIOR	089.81.7766
DENILIQUIN	WAYNE PATTERSON	058 81 3014
DONCASTER	JUSTIN LIPTON	03 857 5149
DUBBO	GRAEME CLARKE	068 89 2095
EMERALD	CAROL CATHCART	059 68 3026
FORSTER	GARY BAILEY	065 54 5029
FRANKSTON	BOB HAYTER	03.783.9748
GIPPSLAND STH	PAT KERMODE	056 74 4583
GOLD COAST	SHERYL BENTICK	075-39-2003
GOSFORD	PETER SEIFERT	043 32 7874
GRAFTON	DAVID HULME	066.42.0627
GREENACRES	BETTY LITTLE	08 261 4083
HOBART	BOB DELBOURGO	002 25 3896
IPSWICH	MILTON ROWE	07 281 4059
KENMORE	GRAHAM BUTCHER	07 376 3480
LITHGOW	STUART RAYNER	063 51 4214
LIVERPOOL	LEONIE DUGGAN	02-607-3791
MACKAY	LEN MALONEY	079511333x782
MACLEOD	ROBIN ZIUKELIS	03 450211x465
MacQUARIEFIELDS	KIETH ROACH	02 618 2858
MAFFRA	MAX HUCKERBY	051 45 4315
MAITLAND	LYN DAWSON	049 49 8144
MELBOURNE	JEFF SHEEN	03 528 3724
MELTON	MARIO GERADA	03 743 1323
MILDURA	DOUG MATTHEWS	050 23 5701
MOE	STEPHEN SEMPLE	051 27 6841
MORWELL	GEORGE FRANCIS	051 34 5175
MT ISA	PAUL BOUCKLEY-SIMONS	077 43 6280
MUDGEE	BRIAN STONE	063-72-1958
NAMBUCCA HDS	WENDY PETERSON	065 68 6723
NEWCASTLE	LYN DAWSON	049 49 8144
NOWRA	ROY LOPEZ	044 48 7031
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