

DATAPEN

*A Quality Lightpen
For The Color Computer*

Speech Systems

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Moving Tape to Disk

All programs supplied with the DATAPEN are written in BASIC. Therefore, transferring these programs to disk is very simple. Merely:

1. Insert the tape and press PLAY on the tape player.
2. Type CLOAD followed by ENTER and the first program will load.
3. Type SAVE "PROGRAM" and the program will be saved to disk.
4. Repeat until all programs are saved.

***** Important Disk Controller Note *****

When the programs begin, you are asked if you are going to store and retrieve your data from TAPE or DISK. If you answer TAPE, you must not have a disk controller plugged in the computer.

General Rules To Remember

The switch on the DATAPEN should be thought of as a request by the user to the program that the DATAPEN is in a location on the screen that the user wants interrogated.

After hitting the switch, keep the DATAPEN still while the program "looks" for the DATAPEN.

Watch the LED (light) at the end of the DATAPEN to insure that it lights when placed to a bright spot on the screen. If not, turn up the brightness.

Getting Started

Getting started is really quite easy, you merely install the DATAPEN in the RIGHT JOYSTICK connector on the back of the Color Computer. Next place the DATAPEN on the screen and make sure that the light (LED) located at the end of the DATAPEN lights. If it does not, adjust the brightness control on your monitor or TV so that the LED lights when you put the DATAPEN on the face of the screen and goes off when you remove the DATAPEN from the screen.

There are three programs that come with the DATAPEN. They are: INTRO, SKETCH, and SHAPE. Using the DATAPEN will require some getting used to and we think the best way to accustom yourself to the pen is to (C)LOAD and RUN "INTRO".

INTRO

When the program first begins, you are given a menu with 3 options.

```
# HOW THE PEN WORKS
# POS'N TEST FLOW CHART
# FINDING X & Y POSITION
```

Place the DATAPEN over the # (pound sign) of option "HOW THE PEN WORKS" and press the switch on the side of the DATAPEN. It is very important that the DATAPEN be placed exactly on the option you wish to select otherwise the wrong selection will be made. If you are having difficulty, most likely the TV or Monitor is not bright enough, merely turn up the brightness control until the DATAPEN functions correctly. You will notice that in the absence of light the value from the joystick is typically 61 and decreases to approximately 31 when brought to a light area of the screen. An examination of the routine at 1500 to 1540 will show how the decision is made as to whether the switch is depressed or if light is triggering the DATAPEN. The routine shows that if the JOYSTICK values is less than 50 the DATAPEN assumes light is on the screen.

You will also notice that as the switch is depressed, the status displays ON and OFF. Once again, an examination of lines 1500 to 1540 will indicate how the decision is made.

The next option "POS'N TEST FLOW CHART" is also intended as a demonstration to indicate how one might write a BASIC program that includes a menu in which the option is selected by the DATAPEN.

The last option "FINDING X & Y POSITION" also intended to show you how you might write your own BASIC program in which you must know exactly where on the screen the DATAPEN is located. Merely place the DATAPEN anywhere on the screen and hit the switch. Keep the DATAPEN in the same position on the screen and you will find a grid moves across the screen. This process takes a few moments. The software is in the process of finding out where you have placed the pen. Remember, the DATAPEN only knows the difference between light and no light. So it blanks the screen and then places bars across the screen until the DATAPEN informs the computer that it has seen light. This method of finding the position of the pen is a little more time consuming because the DATAPEN can be anywhere on the screen. If your program has only a few valid points where the DATAPEN can be then the flashing cursor method just discussed would be best. Use it as a "nucleus" for your own BASIC program.

SKETCH

As the name indicates, this program allows one to sketch on the screen. When it begins, you are asked if you are using a tape or disk system. Thereafter, when you are going to store or retrieve a sketch, the program will access the correct media (i.e. Tape or Disk). If you reply with "TAPE" then you must not have a disk controller plugged into your computer.

A list of options is displayed on the screen.

Pen Commands

DW - Draw
EL - Erase Line
BM - Blank Move
PT - Paint

Keyboard Commands

@ - Save Drawing
C - Draw Circle
1-9 - Accuracy Factor
S - Slow Measurement Bars
F - Fast Measurement Bars DEFAULT ϕ

You are then given the opportunity to retrieve a sketch. If you decide to load in a previous sketch give the name of the sketch file you wish to get. Assuming you are starting from the beginning, you will reply to the load query with "N".

You now have two options of resolution, PMODE1 or PMODE4. In PMODE1 you have 4 colors to use. In PMODE4 you have only 2 colors but the resolution is much superior to the PMODE1 option.

Next you are allowed to select from one of two color sets.

You are then asked for an accuracy factor which is typically a value from 1 to 9. The accuracy factor is provided to enable you to determine an invisible accurate drawing grid while maintaining the resolution of the particular mode you have selected. The value entered is the point size of the grid and may be any value up to 100 but in practice will be between 1 and 10. The accuracy factor may also be changed during a drawing session by selecting keys from 1 to 9, but remember the invisible grid will be altered accordingly. The main use for higher accuracy factors is to allow you to join lines together more accurately, even with sloppy pen usage or a poor TV display.

Now let's assume you wish to draw a line. Point the DATAPEN at the "BM" or "MOVE" box and hit the switch. Allow the grid to find the pen and now place the pen on the screen where you want the line to start. Once again hit the switch on the DATAPEN and allow time for the grid to find the DATAPEN. You will notice a dot will appear at this point. This operation is like picking up a pen in preparation of placing it down. Next select "DW" or "DRAW" by placing the DATAPEN in the box. Hit the switch to request a selection. Now place the DATAPEN at the other end of the line you wish to draw and hit the switch. After the grid finds the DATAPEN, a line will appear.

In addition to drawing lines you have an option from the keyboard of "C" to draw a circle. The center of the circle is the last point visited and the radius is the next pen position after pressing "C" on the keyboard. If you wish to place the center of the circle at a different point, merely select the "BM" or "BLANK" option. The "ER" or "ERASE" option will remove the center dot from the circle.

You may also use this program to PAINT. When painting you must select a particular color by placing your DATAPEN over the appropriate colored box and hitting the switch. When painting it is important to note that you can only paint area's that are completely enclosed such as a box or a circle. You must watch out for holes where the paint can "escape". Holes can often arise when a line has been erased. You can best fill these holes with a "Blank Move". In addition, remember that the foreground color cannot be repainted and very small areas cannot be painted because the computer does not paint diagonally.

It is important to note that when loading back a drawing that you have previously saved, you must be careful to use the same resolution parameters (i.e. PMODE 1 or 4).

The drawing files produced by both this program "SKETCH" and the following program "SHAPE" occupy graphic page 2 in PMODE 1 and pages 2, 3, 4, and 5 in PMODE 4. Therefore, you may load these files in independent of all other software. If you are display a drawing that was produced in PMODE 4 you must first type PCLEAR 5. If you are going to display a drawing that was produced in PMODE 1 you need not type anything but you may if you wish type PCLEAR 2 if you wish to save memory. Then (C)LOADM "DRAWING" and then run the following programs.

PMODE 1 Drawing

```
10 PMODE 2,2
20 SCREEN 1,1
30 GOTO 30
```

PMODE 4 Drawing

```
PMODE 4,2
SCREEN 1,1
GOTO 30
```


SHAPE

This program has similar commands as SKETCH with the exception that PAINT and CIRCLE are not available. In addition, two different "save" commands are available.

Because of the way the screen pixels are arranged a small drawing sometimes does not have the same proportioning as a large drawing so keep your eyes on the library shape while you are drawing with the DATAPEN.

The program begins by asking if you are using a tape or disk system. All I/O will be stored and retrieved from the device you choose. If you reply with "TAPE" you must not have a disk controller plugged into the computer.

A menu is then displayed.

```
φ CREATE NEW SPRITE TABLE
φ ADD MORE SPRITE TABLE
φ SAVE SPRITE TABLE
φ LOAD SPRITE TABLE
φ CREATE DRAWING
φ SAVE DRAWING
φ LOAD DRAWING
```

Use the "M" key on the keyboard to get back to the MENU at all times. Options available to the user listed in the menu are selected using the DATAPEN.

The program has two main phases:

1. Create shapes or "sprites".
2. Use sprites to create a drawing.

Creating Sprites

The program can create and store up to 24 sprites, which is referred to as a "sprite table", but if you need more you can save as many tables as you want to tape or disk. When creating shapes ("sprites") use the pen on the grid to draw your shape. Keep to the grid size, otherwise your shapes will be difficult to use later on.

Options available from the sprite development area are:

DRAW - Similar meaning as in the SKETCH program.

ERASE - Erase the last move or DRAW.

MOVE - Similar meaning as in the SKETCH program.

NEXT - Starts a new shape with the contents of the previous shape allowing you to build a similar pattern with little effort. If you want a new shape then use NEXT then WIPE.

WIPE - Clears both the screen pictures and also clears the stored shape in memory allowing you to start again.

Note that the shapes or "sprites" are stored in the array A2\$(1-24) which is obviously a string array. This array is saved each time you save a sprite and you may load it into your own BASIC program by using a similar array. The BASIC DRAW command must be used in your program to draw the sprite you have developed in you saved "sprite table".

If you fill up an array element before you have finished creating your shape, you will get a flashing NEXT box before the program automatically gives you a new sprite to work with. Just carry on drawing your shape and then use both shapes when drawing your picture.

The drawing grid is 8 points between elements, you can change this factor and also change the bars from fast to slow as in the SKETCH program.

Remember to always select "NEXT" after creating a new shape, even if you are going back to the menu. Failing to do so will erase your "sprite".

Using Sprites to Create a Drawing

The options for this portion of the program are:

GET - The shapes from a table which is displayed below your drawing (and moves off the screen while drawing.) If you want shapes from another set (on tape or disk), just return to the MENU using the "M" command and load the shape you desire. If you wish to add another shape to the table in the computers memory, save your drawing to tape or disk first.

PUT - The shapes into the screen in a 32 x 32 point grid. The pen retains the same shape until you GET another, or DRAW a line.

TURN - The shape to any of the 4 angles before drawing. The center of rotation is the center of the shape.

DRAW - A line by two stages, first place the start, then place the end. The line is drawn to 8 point resolution and this can be changed if desired by using the number keys as in SKETCH. Try to arrange your shapes to coincide with the 8 point entry and exit points (2 dots on the shape grid). The line stays in the pen for a subsequent PUT, but beware! there is a 16 x 16 point offset. It is best to use the DRAW command again for every line.

ERASE - Erases the last shape or line drawn. If you want to erase an even earlier shape, just redraw it then ERASE it. You can redraw broken lines caused by erase by redrawing the shape again.

The saved picture could be used in your own programs by (C)LOADM "filename" using an offset to move the destination if required. In PMODE2 mode the drawing occupies graphics page 2 and in PMODE4 it occupies graphics pages 2, 3, 4, and 5. See the section in the SKETCH program that outlines the details of loading and displaying a drawing in your own BASIC program.

Writing Your Own BASIC Program
Using the DATAPEN

In order to read the status of the switch, you may use:

```
10 CLS
20 SW = PEEK(&HFF00) AND 1
30 PRINT @ 0, SW
40 GOTO 20
```

In order to read the status of the LED, you may use:

```
10 CLS
20 LED = JOYSTK(0)
30 PRINT @ 0, LED
40 GOTO 20
```

To find the position of the DATAPEN in the X or Y position, we feel that this process is best explained by examining the program INTRO that comes with the program. This program should prove invaluable in helping you to write your own programs.

Thank You

We at SPEECH SYSTEMS sincerely hope that you get many hours of enjoyment from using the DATAPEN and that you consider it a useful tool making your Color Computer more powerful.


```

10 B=0:CLS:GOSUB1500:IF SWI$="ON"THEN10
20 PRINT@109,"MENU"
30 PRNT@133,"-----"
40 PRINT@165,"# HOW THE PEN WORKS";
50 PRINT@197,"# POS'N TEST FLOW CHART";
60 PRINT@229,"# FINDING X & Y POSITION";
70 PRINT@448,"USE THE PEN AND SWITCH TO CHOOSE";
80 GOSUB1500:IF SWI$="OFF" OR LED$="OFF" THEN 80
90 FOR Y=165 TO 229 STEP32
100 PRINT@Y,CHR$(128);
110 FOR DLAY=1 TO 60:NEXT
120 GOSUB1500:IF LED$="OFF" THEN B=(Y-133)/32
130 PRINT@Y,"#";
140 NEXT
150 IF B=0 THEN 90
160 CLS
170 ON B GOTO 180,390,2000
180 PRINT" THE DATAPEN HAS TWO OUTPUTSIGNALS, ONE WHICH TELLS YOU HOWBRIGHT
THE SCREEN IS AT THE TIP OF THE PEN AND ANOTHER WHICH TELLS YOU IF THE SWITCH
IS PRESSED OR NOT."
190 PRINT"THE ROUTINE AT LINES 1500-1540 CAN BE USED IN YOUR OWN PROGRAMS";
200 PRINT:PRINT"VARIABLES USED:-":PRINT"A .....INPUT FROM PEN. LED$ ....
..'ON' OR 'OFF'. SWI$ ..... 'ON' OR 'OFF'."
210 GOSUB1000
220 CLS:PRINT" THE JOYSTK(0) INPUT IS USED TO READ THE PEN'S OUTPUTAND VALUES ARE
RETURNED AS SHOWN"
230 PRINT@168,"JOYSTK(0) (A)=";A
240 PRINT@232,"SWITCH (SWI$)=";SWI$
250 PRINT@200,"LAMP (LED$)=";LED$
260 IF T=0 THEN PRINT@448,"PLACE THE PEN ON THE SCREEN IN A LIGHT AREA.";
270 GOSUB1500:IF LED$="OFF" AND T=0 THEN 260
280 T=T+1:IF T<50 THEN 230
290 IF T=50 THEN PRINT@448,"TRY LIGHT AND DARK AREAS, NOTICETHE RANGE OF JOYSTK(0
) 'A' ";
300 IF T<100 THEN 230
310 PRINT@448,"TO RETURN TO MENU PUSH SWITCH WHILE ON THIS SQUARE ";
320 IFX<128THENX=128ELSEX=32
330 PRINT@506,CHR$(X);
340 FOD=0TO60:NEXT:GOSUB1500
350 IF SWI$="ON"AND X=128 AND LED$="OFF"THEN X=32:PRINT@506,CHR$(32);:GOTO370
360 GOTO230
370 FORD=0TO60:NEXT:GOSUB1500
380 IFLED$="ON"THEN10ELSE230
390 PRINT@15,CHR$(133):PRINT@36,"PRINT FLASHING SYMBOL":PRINT@79,CHR$(133):PRINT@
99,"DELAY FOR PEN TO RESPOND":PRINT@143,CHR$(133)
400 PRINT@160,"CHECK LED AGAINST SPOT ON & OFF":PRINT@207,CHR$(133):PRINT@224,"IF
CHECK OK, CLOCK COUNTER UP":PRINT@271,CHR$(133):PRINT"IF CHECK BAD, CLOCK COUNTE
R DOWN"
410 PRINT@335,CHR$(133):PRINT"IF COUNTER IS MORE THAN 3 THEN PEN IS ON TARGET EL
SE TRY AGAIN"
420 GOSUB1000
430 GOTO10
999 REM*
*TEST FOR PEN ON POSITION SUBROUTINE***
1000 T=0:PRINT@480,"PEN HERE TO CONTINUE >";
1010 IF X<128 THEN X=128 ELSE X=32
1020 PRINT@506,CHR$(X);
1030 FOR DLAY=0 TO 60:NEXT
1040 GOSUB1500:IF LED$="ON" AND X=32 THEN T=T+1
1050 IF LED$="ON" AND X=128 THEN T=T-1

```



```

1060 IF T<3 THEN1010 ELSE RETURN
1499 REM***TEST PEN SUBROUTINE***
1500 A=JOYSTK(0)
1510 SW=PEEK(&HFF00)AND1
1520 IFA<50THEN LED$="ON" ELSE LED$="OFF"
1530 IFSW=0THEN SWI$="ON" ELSE SWI$="OFF"
1540 RETURN
1999 REM***X,Y POSITION FINDING***
2000 CLS
2010 PRINT@66,"THIS IS A DEMONSTRATION OF"
2020 PRINT@130,"FINDING A SCREEN POSITION "
2030 PRINT@194,"WITH THE LIGHT PEN."
2040 PRINT@258,"TRY THE PEN ON THE SCREEN"
2050 PRINT@393,"Y POS=";
2060 PRINT@425,"X POS=";
2070 FORI=1TO1000:SW=PEEK(&HFF00)AND1:IF SW=0THENI=1002
2080 NEXT:IFD=1001THENPRINT@322,"PUSH THE SWITCH TO START":GOTO2070
2090 PMODE0,1
2100 SCREEN1,1
2110 PCLS0
2120 FORI=1TO100:NEXT
2130 C=-1
2140 FORY=0TO191STEP4:LINE(0,Y)-(255,Y),PSET:A=JOYSTK(0):IFA<50THENC=Y:Y=191
2150 NEXT
2160 PRINT@399,C
2170 SCREEN1,1:PCLS0
2180 FORI=1TO100:NEXT
2190 B=-1
2200 FORX=0TO255STEP4:LINE(X,0)-(X,191),PSET:A=JOYSTK(0):IFA<50THENB=X:X=255
2210 NEXT
2220 PRINT@431,B
2230 IF C=-1 OR B=-1 THENPRINT@480,"BARS NOT SEEN BY PEN GIVES -1";ELSEPRINT@480
,"PEN HERE TO RETURN TO MENU <> ";
2240 IF C>180 AND B>220 THEN GOTO10
2250 GOTO2070
2260 REM ALTER THE STEPS IN 150 AND 210 GIVING HIGHER ACCURACY AND SLOWER SPEED
2270 REM USE THIS PROGRAM TO TEST YOUR SCREEN FOR EVEN ILLUMINATION.
2290 REM RESULT OF -1 MEANS THE PEN HAS NOT BEEN SEEN BEFORE THE SCREEN IS FULL

```


Point the Datapen Lightpen at your TV screen and it tells your computer what it sees! Now instead of pressing keys, just touch the screen with your lightpen and move pieces in games, select items from lists, create fascinating shapes and drawings.

Unlike other pens, the Datapen Lightpen is completely insensitive to local lighting conditions as it only operates on the high frequency light from the TV or monitor raster. This means that you won't have to fiddle with the brilliance control or work in the shade.

The pen has a red LED indicator which lights whenever valid video data is available and your program can have access to this signal allowing computer verification of target for high resolution drawing.

A further feature of this lightpen is a switch which allows the computer to ignore any signals that come from the pen before you are ready and on the desired place on the screen.

For those of you who want to write your own lightpen programs, the manual and introductory program provide a full description of how the pen works and how to use the pen.

The Datapen Lightpen contains compact electronic circuitry built into the pen body, providing a superior performance and a professional quality product.