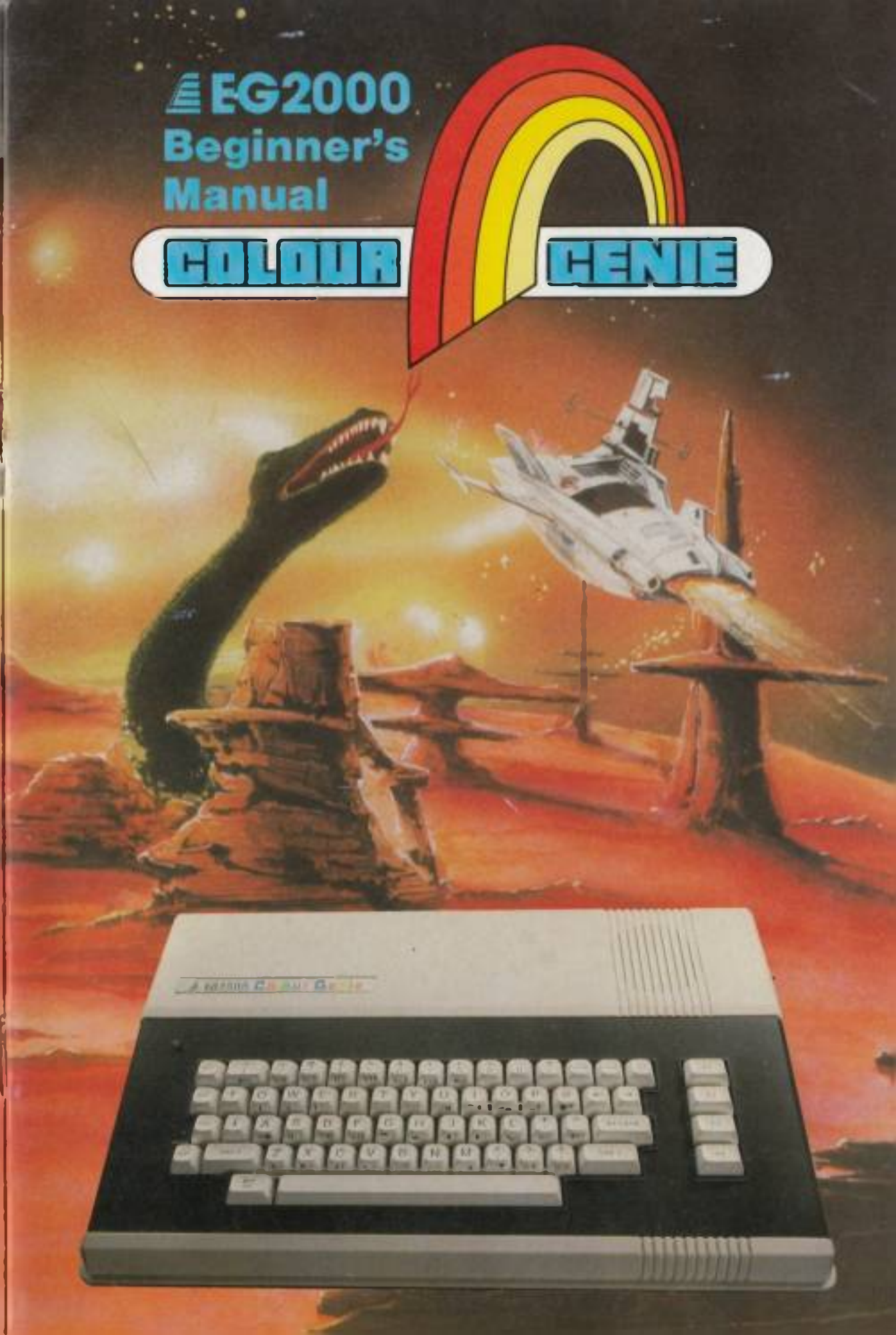
EG2000 Beginner's Manual

COLOUR GENIE



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INTRODUCTION

Congratulations on purchasing the Colour Genie micro-computer! You are now the proud owner of one of the most sophisticated personal computers available. This manual is designed to tell you how to get the system up and going without going too deeply into how the computer works or how to program it.

Before we turn on the power to the Colour Genie, let's begin by taking a quick look at the unit:

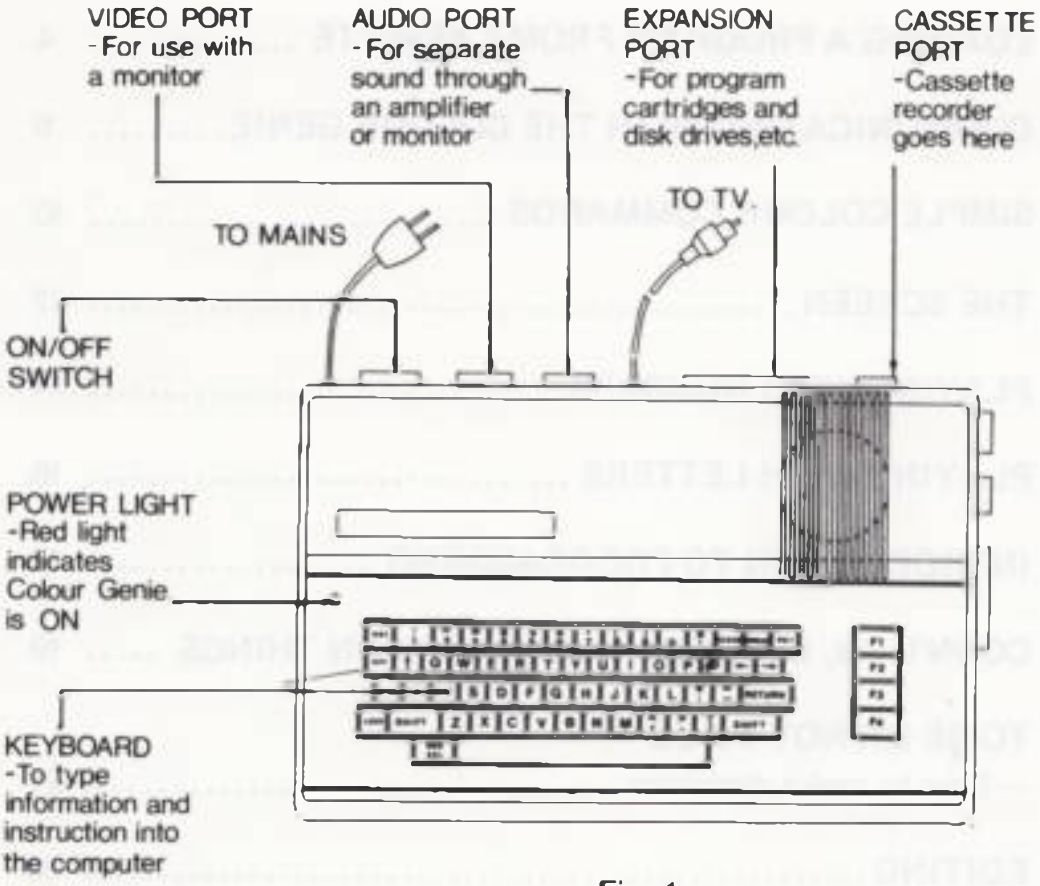


Fig. 1

UNPACKING AND CONNECTING THE COLOUR GENIE

On opening the box you should find the following:

1. The computer.
2. A lead to connect a tape recorder.
3. Two manuals to help you get the most enjoyment out of the Colour Genie.
4. A cassette tape with some sample programs on.

Take the computer out of the box carefully. When the computer has been plugged into the mains connect the television set to the computer as shown in diagram 1.

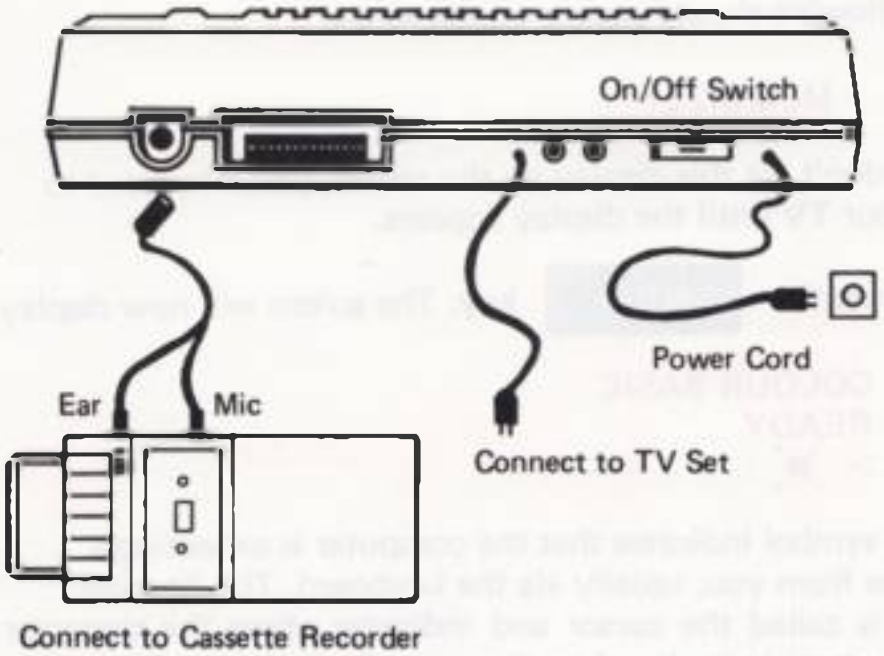


Fig. 2 Rear View Of Colour Genie

Should you choose to use a monitor instead of a TV set, you can do so by plugging a coaxial cable with an RCA phone jack into the socket marked "VIDEO PORT" at the rear of the Colour Genie, and the other end to the colour monitor which accepts composite video input signals. If the monitor has an

inbuilt speaker, you can get dramatic sound effects from the Colour Genie by using another lead with an RCA phone plug to connect to the audio input of the monitor via the rear socket of the Colour Genie marked "AUDIO PORT". Alternatively you can use the audio input of any amplifier for sound effects.

Turn on the TV and select the channel as indicated on the bottom plate of the computer. As the Colour Genie is a colour computer it is clearly desirable to use a colour TV to look at the output from the computer. However the system will still work with a black and white set.

Next turn on the Colour Genie (the ON/OFF switch is at the rear) and the red power light on the keyboard panel should glow. If it does not, check that the Colour Genie is properly plugged in at the mains.

The following should appear on the screen:

```
> MEMSIZE?
```

If you don't get this display on the screen, you may need to tune your TV until the display appears.

Now press the RETURN key. The screen will now display

```
COLOUR BASIC
READY
>
```

(The > symbol indicates that the computer is expecting a response from you, usually via the keyboard. The flashing square is called the cursor and indicates where the character that you type in is placed on the screen).

The easiest thing to do now is to load a program from the sample cassette tape and see what the Colour Genie can do.

Any high quality cassette recorder can be used with the Colour Genie. It must have miniature jack sockets for earphone and microphone though. These sockets are usually labeled EAR and MIC respectively. The lead that is supplied with the system should fit most cassette recorders. Fig 2 shows how these connections are made.

LOADING A PROGRAM FROM CASSETTE

Put the demonstration cassette into the cassette recorder and rewind the tape so that the tape is at the beginning. Adjust the playback volume control to about half way to its maximum and then type

```
> CLOAD
```

Now press the PLAY key on the cassette recorder and then the RETURN key on the computer keyboard.

Two stars will appear in the top right hand corner of the screen to indicate that the program is loading correctly. The right hand star will flash as the tape is running whilst the left hand one will stay steady. Any deviation from this means that the program is not going in correctly. Refer to the BASIC manual if things start to go wrong.

When the program has loaded the READY prompt will appear again. STOP the cassette recorder and type RUN on the computer keyboard. When the RETURN key is pressed the program that has been loaded from the cassette will now run in your computer.

As a number of programs are provided on the sample cassette some method must exist for loading the one that you want. It is possible to tell the computer to load a particular program. In this case type

```
> CLOAD "name"
```

where *name* is the name of the program required. If *name* is not included after CLOAD then the first program encountered on the tape is loaded. It is useful to use a cassette recorder that has a digital tape counter on it as this makes for ease of use if more than one program is stored on the cassette.

LOAD and RUN the programs on the sample tape to get an idea of what the Colour Genie can do. By this time you are probably itching to get the computer to obey you and not the person who wrote the demonstration tape!

COMMUNICATIONS WITH THE COLOUR GENIE
A TOUR AROUND THE KEYBOARD

The keyboard on the Colour Genie is just like a normal typewriter except for the addition of a few extra control keys. These are quite important as they give the computer instructions that cannot be entered any other way.

The BREAK key stops a program whilst it is running. So if you put some data into a program when requested, for example, and the computer doesn't like it and starts doing strange things, the BREAK key will override the program and get you back to the beginning. After the BREAK key has been pressed the computer tells you whereabouts in the program the BREAK occured.

The two RESET keys are located at the top left and right hand corners of the keyboard. When both of these keys are pressed together they reset the whole system and is used to get the system out of a "crash" which can be caused if the computer is told to do something that ties its processor up in knots. Programs and other contents of the memory are not affected by using RESET.

Holding down the REPEAT key causes the previous key entry to repeat.

CTRL

This key is used with the colour keys to select colours from the Colour Genie. The colour keys are indicated on the front of the numeric Keys 1 to 8. Hitting the CTRL key followed by any of the 1 to 8 keys will change the colours as indicated by colour keys.

Combination	*Colour Displayed*
CTRL 1	White – WHT
CTRL 2	Green – GRN
CTRL 3	Red – RED
CTRL 4	Yellow – YEL
CTRL 5	Orange – ORG
CTRL 6	Blue – BLU
CTRL 7	Cyan – CYN
CTRL 8	Magenta – MAG

The CTRL key, followed by the MOD/SEL key will change the display from characters to full graphics. The full range of these effects is discussed in the BASIC Manual.

SHIFT

Unlike most typewriters the Colour Genie keyboard SHIFTs to lower case. It is normally in upper case. The SHIFT LOCK key performs in the normal way but for the peculiarity already mentioned.

RETURN

The RETURN key enters commands and text into the computer.

The MOD/SELect key allows the user to select the graphics mode required for a particular application. There is a high resolution and a low resolution screen available for use. For the moment we will look at the low resolution, text screen only.

The CLEAR key clears the screen and homes the cursor to the top left hand corner of the screen.

The → key moves the cursor to the next TAB position on the screen. These are fixed at 8 character intervals starting from column 1.

The ↓ key moves the cursor down one line and moves it to the first column, i.e. carriage return and line feed.

The ↑ key acts as the exponentiation sign key. When printed on the screen or on paper it appears as [.

The ← key moves the cursor back one position and deletes any character moved over.

These four keys allow the user to program functions so that the function is carried out when the appropriate key is pressed.

By using these keys with and without SHIFT, you get a total of 8 assigned functions. On power up, the Colour Genie has already been assigned 8 functions as shown below:

	WITH SHIFT	*WITHOUT SHIFT*
F1	RENUM	LIST
F2	DELETE	RUN
F3	CLOAD	AUTO
F4	CSAVE	EDIT

These function keys can also be programmed to suit your own needs. Details on how to program the functions keys are discussed in the BASIC Manual.

SIMPLE COLOUR COMMANDS

Let's play with changing the colour of the text on the screen to introduce some of the colour capabilities of the Colour Genie. The Colour Genie has eight colours at its command. These are given codes from 1 to 8, and have the relationship shown below:

Code	Code Number
White	1
Green	2
Red	3
Yellow	4
Orange	5
Blue	6
Cyan	7
Magenta	8

There are two ways of changing the colour of the text. The simple command

```
COLOUR n
```

will change the colour depending on the value of n used. For example typing

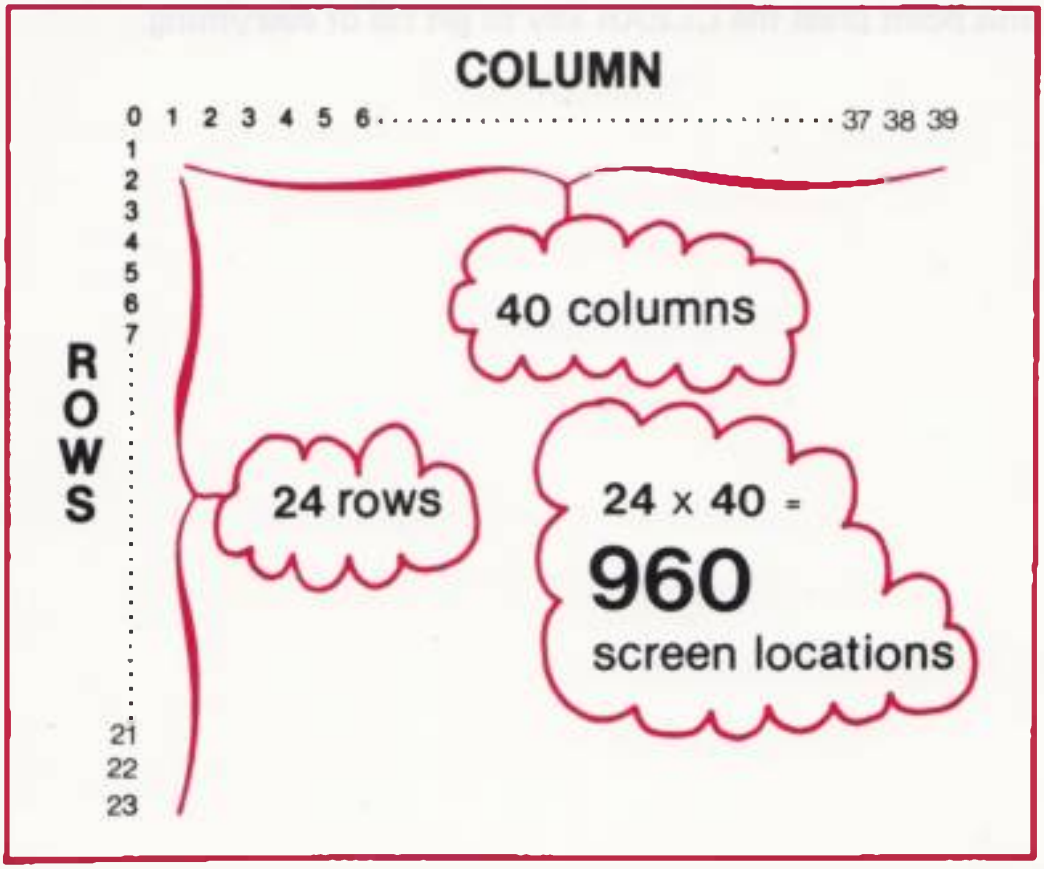
```
COLOUR 4
```

will change the text colour to yellow. It is also possible to get the same effect directly from the keyboard. This will be one of the first uses of the CTRL key that we have come across. If the CTRL key is pressed followed by a number key any following text will be in the appropriate colour. Thus keying

will change any following text to orange. Text colour can be changed during a line, it does not need to be used only at the beginning.

THE SCREEN

The screen has 960 positions on which it can display characters when in the low resolution mode. These are arranged as 24 rows by 40 columns. The positions are numbered as shown on the chart below.



It is easy to place a character on the screen at any one of the 960 positions. This is done by using the

```
PRINT @ n, "x"
```

command. The value of n is the number of the position required and x the character required. Notice that at this stage of familiarity with the machine we put the character in quotation marks. Play around with this command for a bit to get used to where thing appear on the screen. Whole words, or strings of characters, can be used as well. Try typing

```
PRINT @ 100, "Hello"
```

for example. If the @ *n*, part is left off then the character or string of characters is printed on the line below the present cursor position. For example, type

```
PRINT "FRED"
```

and see what happens. As the screen is getting a bit mucky at this point press the CLEAR key to get rid of everything.

PLAYING WITH NUMBERS

The Colour Genie not only handles words and graphics characters. Like most other computers using the BASIC programming language it also acts as a sort of programmable calculator. Like a programmable calculator it can be used without having to write a program. Normally this is referred to as operating in the IMMEDIATE mode. For example, if two numbers had to be added together we could type

```
> PRINT 2 + 3
```

When the RETURN key is pressed the computer replies with

```
5

READY

>
```

Because the video display needs to have everything on one line it will not recognise the usual symbols for multiply and divide. So we have to use * for the multiply sign (not confusing it with x) and / for divide. To do a simple arithmetic exercise, say adding two numbers and then multiplying the result, also needs brackets. This is because the computer has to be told the order in which to do things. Normally this is multiplication and division before addition and subtraction. If you want to alter this order then you have to use brackets. So let's add 2 and 3 and multiply the answer by 4. The following entries are required:

```
> (2 + 3) *4
```

On pressing RETURN (which we will assume you will do automatically from now on when entering things from the keyboard) the computer replies:

```
20

READY

>
```

From now on we'll also drop the READY and prompt (>) bits.

We have seen that it is possible to use the computer like a normal calculator. It is also possible to use letters instead of numbers. In fact this ability makes the computer extremely useful as most of our communication is done with letters not numbers.

Let us assume that we want to add two numbers together but we are not quite sure what value they have! We will call the first number *A* and the second one *B*. If we now tell the computer the value of *A* and *B* then all we have to do is tell the machine to add *A* and *B* together.

So let's make *A* equal to *3* and *B* equal to 4:

```
LET A = 3

LET B = 4
```

Now if we tell the computer to

```
PRINT A + B
```

we should get the number 7 appearing on the screen. What has happened is that a part of the computer's memory has been given the name *A* and another part has been given the name *B*.

PLAYING WITH LETTERS

The next step is to let *A* and *B* represent strings of characters and then "add" these together. For example type

```
LET A$ = "FRED"
```

and

```
LET B$ = "  BLOGGS"
```

(note the space before the B)

We have to use the *$* sign after the *A* and *B* to tell the computer that it is going to save a string in its memory. At the same time the string itself has to be in quotes to let the computer know where it starts and ends. Unfortunately the computer treats spaces as characters so leaving a space will be meaningless in this situation.

Now type

```
PRINT A$ + B$
```

and see FRED BLOGGS appear on the screen!

Fig.3

It is really only possible to add strings or compare them. It is rather meaningless to both us and the computer to try and subtract, divide or multiply strings of characters! The computer handles strings in exactly the same way as numbers, assigning a portion of its memory to store them.

However it is a bit silly to junk up the rather limited memory of any computer with things it doesn't need to know. We therefore need a way of getting the Colour Genie to ask us what information we want to enter.

INTRODUCTION TO PROGRAMMING

One way of overcoming the problem defined at the end of the last chapter is to use the INPUT command. When this command is executed the computer comes back with a ? on the screen and we have to enter some information at this point. As we are now about to tell the computer in which order to do something we will have to write a simple program to do so. There is nothing particularly magical in programming. It is simply a method of telling the computer how to do something and in what order. Because computers are basically dumb, the first thing to learn, especially with the BASIC computer language in the Colour Genie, is how to enter line numbers. Computers follow line numbers religiously so we have to be very careful in making sure that things are in the right order. The Colour Genie is very good here as it does it for you. To get rid of anything that is left in memory type CLEAR and then type

```
AUTO 10, 10
```

and when you've hit RETURN notice that a number, 10, comes up on the left hand side of the screen. In this case we've chosen 10 as the starting point for our program so that we can insert things later. The second number tells the computer the steps that we require. So the second line will be numbered 20, and the third 30 etc. Going up in steps of 10 is a very common practice and makes things very flexible. Enter the following text

```
10 PRINT "WHAT IS YOUR NAME?"

20 INPUT A$

30 PRINT "YOUR NAME IS"; A$
```

After A$ press BREAK to stop the line numbers from going on, and on and on . . . . . .

To see what happens now we have to RUN the program.

Simply type in RUN and then press RETURN . The computer should print

```
WHAT IS YOUR NAME?
?
```

Enter your name after the question mark and press RETURN

If you've put the program in correctly you should see

```
YOUR NAME IS GENIE (for example)
```

The READY and cursor prompt tells you that your program has finished.

We can also play around with numbers in the same way. For example type in the following program:

```
10 PRINT "ENTER THE FIRST NUMBER, A";
20 INPUT A
30 PRINT "ENTER THE SECOND NUMBER, B";
40 INPUT B
50 PRINT "A + B = "; A + B
```

This program introduces a few new ideas. The semi colon after a PRINT statement makes the next item printed, a ? in case of lines 20 and 40, appear directly after the previous statement. So in line 50 the character "A + B = " are immediately followed by the answer A + B. The more aware reader may have noticed this in the previous program for printing your name as well.

COUNTING, LOOPING AND OTHER FUN THINGS

The next thing we can get the computer to do is count. This may seem a rather simple thing for a computer to do, and may seem at first rather a waste of time. However this facility is probably one of the most important functions available in BASIC or any other programming language.

Let's say that we want to print out a name ten times over. We could just write ten PRINT statements starting at line 10, for example, and going on to line 100. This would be rather tedious though and the writers of BASIC include the command FOR . . . TO . . . STEP . . . NEXT, or FOR/NEXT for short.

The idea behind the FOR/NEXT command is to tell the computer to start counting at one number and in discrete steps count up to another. The computer needs somewhere in its memory to store the present value of the number and this means that we have to give this varying quantity an identity. Usually we choose a single character, say x. So if we want X to start at 1 and go up to 10 in steps of 1 the command would be:

```
FOR X = 1 TO 10 STEP 1
```

This is not much good on its own as the computer has not been told to do anything with X, or even to actually start counting! So let's print our name out ten times as an exercise.

```
10 FOR X = 1 TO 10 STEP 1

20 PRINT "MY NAME IS GENIE"

30 NEXT X

40 END
```

The END statement just tells the computer that the program has stopped. After a while various things get left off programs like this. For example, the STEP 1 bit goes if the STEP value is 1. Similarly the END is not always required and experienced programmers, as well as sloppy ones, leave bits out!

The whole process of counting with FOR . . . NEXT is called looping. What the program does is to loop from line 30 back to line 10 until X is equal to its highest value. When it reaches this, i.e. 10, then the program continues with the line following the NEXT X statement i.e. line 40.

Let's do something a bit more mathematical, like printing out the squares of numbers between 1 and 20. The easiest way of getting the square of a number is to multiply that number by itself. So if the number is *N* then its square is *N*N*. The program could look like this.

```
10 FOR N = 1 TO 10

20 PRINT N, N*N

30 NEXT N
```

The comma between N and N*N will cause the numbers to be printed out 10 screen positions apart. Let's make this a bit more sophisticated with the columns labelled and each line printing out in a different colour! Try this and see if you can figure out how it works. The colons allow more than one statement on a line.

```
10 PRINT "N", "N*N"

20 FOR N = 1 TO 8

30 COLOR N: PRINT A, N*N

40 NEXT N
```

TO BE OR NOT TO BE

The other thing that computers do quite well is make decisions. Unfortunately, like most things to do with computers we have to tell them very precisely what the decision is going to be. The construction for making decisions on the Colour Genie is of the form IF . . . THEN . . . ELSE. This is in fact very simple and just like normal English. In other words IF something is true THEN do something, IF it is not THEN do something ELSE.

A short program will illustrate the idea. Type in the following.

```
10 PRINT "ENTER A NAME": INPUT A$

20 IF A$ = "GENIE" THEN PRINT "THAT'S MY
   NAME!" ELSE PRINT "THE NAME IS"; A$

30 GOTO 10
```

We can combine some of the ideas looked at so far into a quite complicated program. See if you can work out what this one does and how it does it!

```
10 CLS

20 PRINT "PRESS 'RETURN' TO START"

30 INPUT A$

40 CLS

50 PRINT "PRESS 'BREAK' TO STOP"

60 PRINT @ 334, "DIGITAL STOPWATCH"

70 LET T = 1000

80 LET X = 0: LET Y = 0: LET Z = 0

90 PRINT @ 450, "HRS"; Z

100 PRINT @458 , "MIN"; Y
```

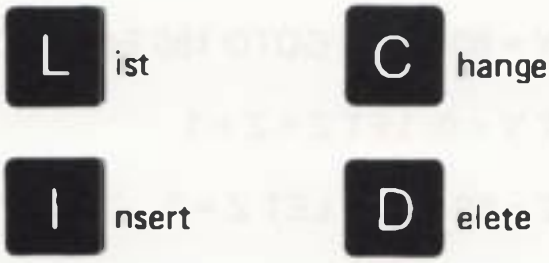
```
110 PRINT @ 467, "SEC"; X

120 FOR A = 1 TO 330

130 NEXT A

140 LET X = X + 1

150 IF X = 60 THEN GOTO 160 ELSE GOTO 90

160 LET X = 0: LET Y = Y + 1

170 IF Y = 60 THEN GOTO 180 ELSE GOTO 90

180 LET Y = 0: LET Z = Z + 1

190 IF Z = 60 THEN LET Z = 0
```

If this program has been keyed in correctly, you should have a stopwatch on the screen.

EDITING

Sometimes, in fact very often, mistakes are made in entering programs or other entries from the keyboard. The Colour Genie has a very sophisticated editing system for correcting these errors. In this chapter we will look at some of the simplest commands only. They will be covered fully in the BASIC Manual.

Let's just look at the more common commands. These are



Consider the program that we looked at earlier, namely the one for printing out squares. It looked like this

```
10 FOR N = 1 TO 10

20 PRINT N, N*N

30 NEXT N
```

Say we want to change the actual function of N to be printed to 2*N instead of N*N. We have to change line 20 only. We could type out the whole line again and thus replace the one that's in the computer. However if you type out

```
EDIT 20
```

the Colour Genie will respond with

```
20
```

and wait for you to do something. Hit the *L* key and you will see the whole line displayed on the screen

```
20 PRINT N, N*N

20
```

If you now hit the space bar once the cursor will move a space to the right. Now let us move the cursor to the 12th position. The line will look like this

```
20 PRINT N, N*
```

Pressing the *C* key will now change the following character, so as we want the second N to become 2 press the 2 directly after the C. Now hit RETURN and the new line will be entered into the computer. Just to make sure that it is in correctly type LIST and the computer will list all the program lines in its memory at this point. If you did not use the NEW command before re-entering this program you may find a lot of unwanted junk in there as well.

The other two commands mentioned were D elete and I nsert. These work in a similar way to C hange and delete the character following or insert a new character at, the cursor position See the BASIC manual for all the other things that can be done whilst editing.

GRAPHICS

The Colour Genie has some quite interesting graphics symbols. These are printed on the keys and can be accessed from the keyboard very easily. Pressing the MOD/SEL key once, then one of the alphabetical keys will give you the character indicated on the left of the key, and pressing the SHIFT key will give the character on the right. There are some more on the function keys as well that do not appear on the key tops! These are the 8 assigned functions we discussed earlier on in page 8 and 9.
These characters can be used in exactly the same way as normal characters although some strange things can happen during editing. These are explained in the BASIC manual. If you want to look at the whole graphics set then enter the following program.

```
5 CHAR 4
10 FOR X = 0 TO 255
20 PRINT CHR$ (X); " ";
30 NEXT X
```

This will show you all that's in the computer. It is possible to load your own graphics characters but this is not recommended at the moment as it is not simple.

The use of the high resolution graphics page is rather complicated, but just to show what it can do type in the following program. It will be explained in the BASIC manual later.

```
10 FCLS
20 FCOLOUR 2
30 CIRCLE 50, 50, 10
```

Now, if RUN is keyed in all that happens after a few seconds is that the READY prompt appears on the screen. What's happened to the circle that we should have drawn? Well, it's not on the page that we've been using, this is reserved for text and the graphics characters on the keyboard. We have to call up the full graphics page and this is done by pressing CTRL and MOD/SEL at the same time. You should now see a blue circle drawn on a black background. To get back to the text page you will have to press the BREAK key.

It is possible to get the circle to be displayed by having a line in the program as follows:

```
15 FGR
```

This tells the computer to display the full graphics page. Unfortunately, as soon as the program has finished it switches back to the low graphics page. Add the following line to stay on the FGR page:

```
40 GOTO 40
```

This just puts the computer in an endless loop that can only be stopped by pressing BREAK

You may also be wondering how the circle came to be drawn where it was. The screen is divided up into a number of co-ordinates starting at 0,0 in the top left hand corner, and going to 159,95 in the bottom right as shown in Fig. 4

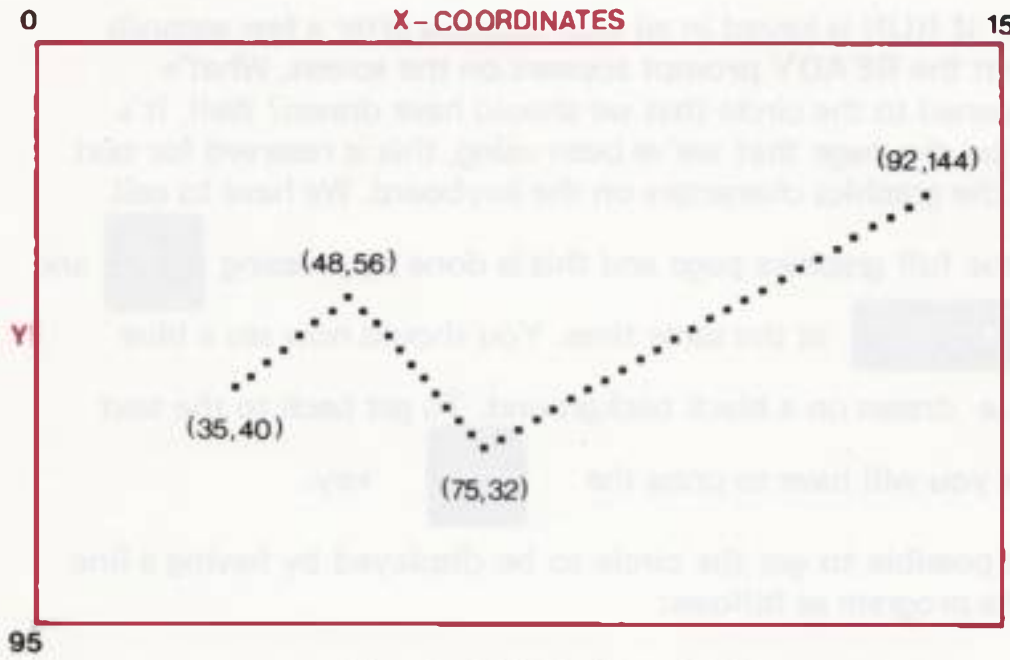


Fig. 4 Full Graphics Grid

There are some other graphics commands that are fairly easy to understand. The PLOT command lets straight lines be drawn between two co-ordinates: Try

```
FCOLOUR 4

PLOT 0,0 TO 10,10
```

The FCOLOUR command gives the colour of the circle, line or whatever, that has been drawn. The value of the number after the FCOLOUR command is related to the colour as follows:

FCOLOUR 1	Black
FCOLOUR 2	Cyan
FCOLOUR 3	Orange
FCOLOUR 4	Green

If you enter the two lines above you should see a straight line coming from the top left going down the page when you switch to FGR using 

and 

. Press break and enter the following:

```
FCLS: PLOT 0,0 TO 0,159 TO 95,159 TO 95,0 TO 0,0
```

You should get a square that outlines the whole graphics area. Now that most of the commands have been mentioned try a few experiments of your own to get familiar with them.

SOUND

The Colour Genie has a programmable sound generator with the ability to play at least three sounds at once. There are two commands to get the sound generator working. These are PLAY and SOUND. The SOUND command tells the generator what combination of notes to play, and the PLAY command contains all the information needed to get the sounds out.

To get the sound generator switched on the following command is used:

```
SOUND 7, 248
```

What this actually does is explained in the BASIC manual. The command to turn it off is

```
SOUND 7,255
```

To get some notes on the TV's loudspeaker we use the PLAY command. This has the following syntax:

```
PLAY (ch #, oct, note, vol)
```

where *ch #* is the number of the sound channel, and lies between 1 and 3; *oct* is the octave required and is between 1 and 8; *note* is the number between 0 and 12 relating to the note in that octave; and *vol* is the volume level, between 0 and 15.

Just to give you a reference level middle C (approx. 260hz) would have the following code

```
PLAY (1, 4, 1, 15)
```

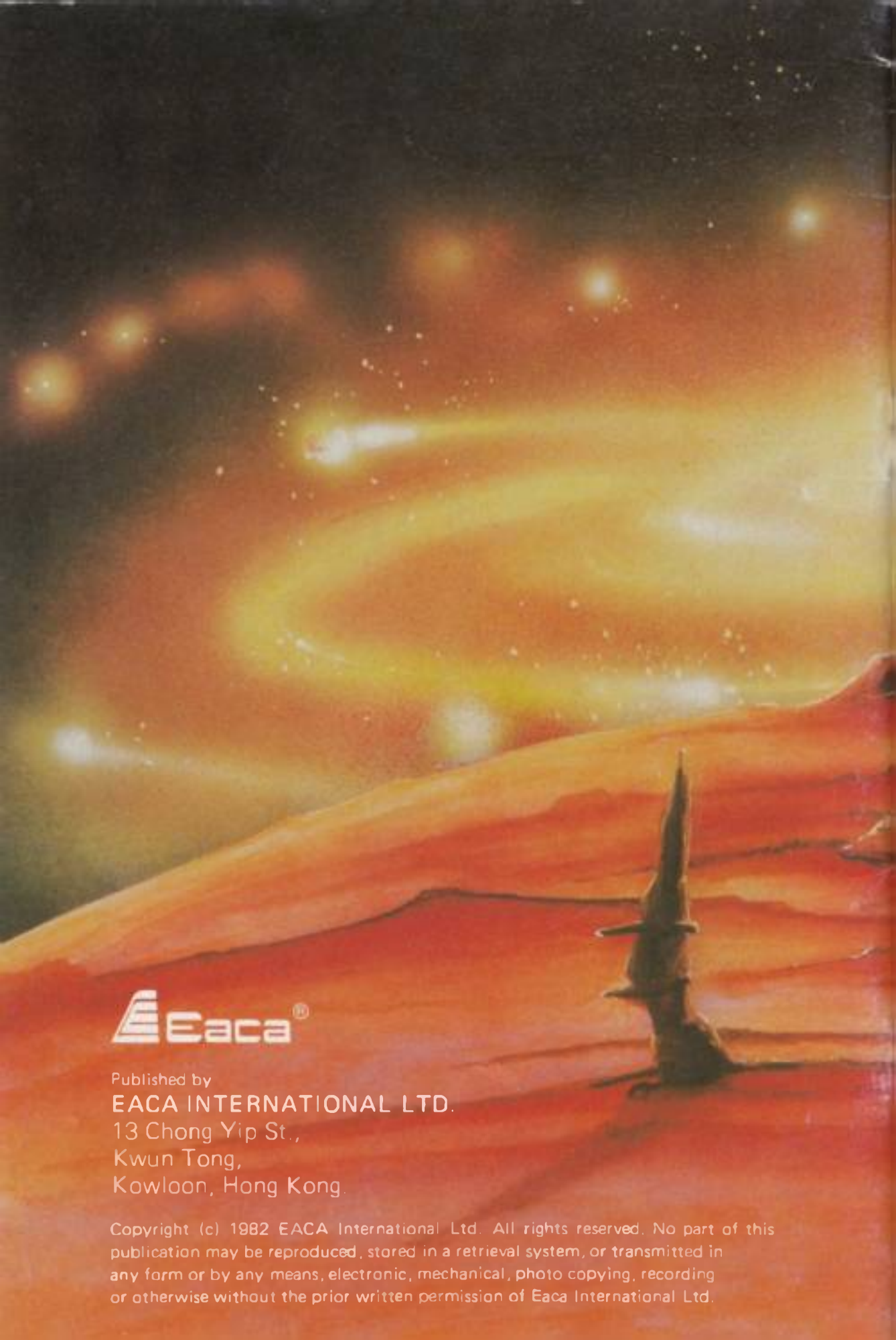
This would play the note at full volume. Just to help you play the following codes relate to each note

note number	*note*
0	rest
1	C
2	D
3	E
4	F
5	G
6	A
7	B
8	C #
9	D #
10	F #
11	G #
12	A #

Try playing three notes at once. This is possible by using three PLAY commands with channel numbers 1 to 3 being used.

GOING FURTHER

This booklet is very much in the nature of an introductory book and does not contain items or details that are needed for more complex programming. If you want to go further then read the thicker book on the Colour Genie BASIC Manual.



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