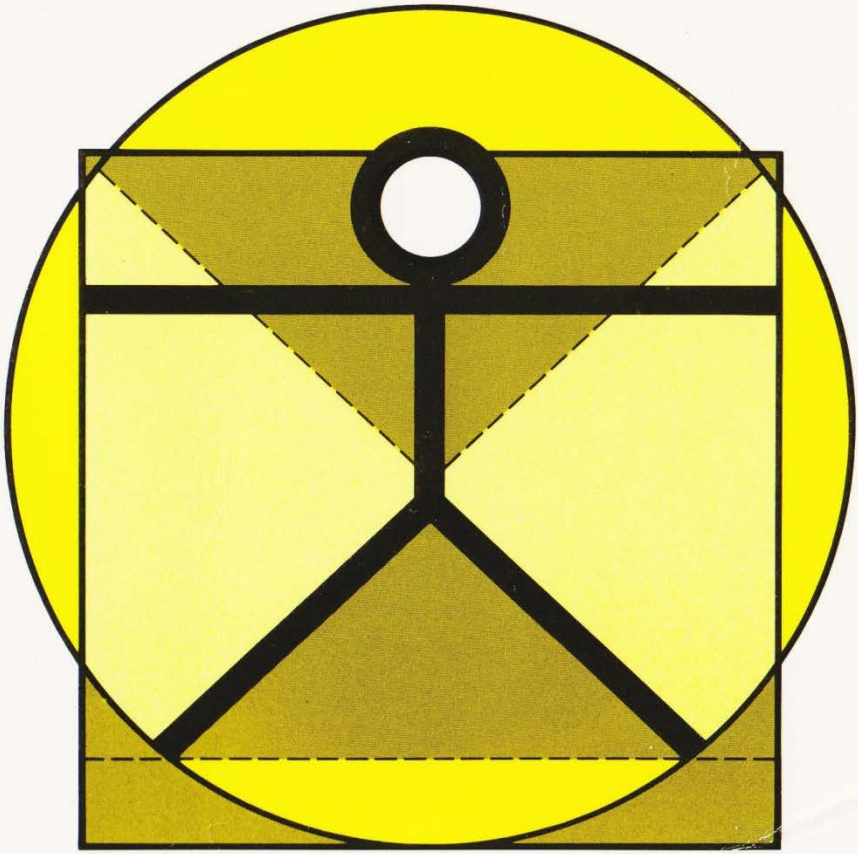
PICTURE CRAFT+

PETER SMITH



BROADCASTING BRITISH BROADCASTING SOFT CORPORATION

PICTURE CRAFT

PETER SMITH
WITH
GODFREY HALL

BBC PUBLICATIONS

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Introduction

Author's note

Picture Craft has shown itself to be a fascinating and versatile resource. Designed for children from about six to fourteen years of age, it allows them to create designs and pictures, which may then be saved and used later in a number of games and puzzles. They can print out their pictures too.

One of the main strengths of this integrated software suite is its flexibility. It can be set up so that only those activities and features are available which the adult decides are suitable for the children in their charge. The 'set-up' procedures are very simple to use, but are 'invisible' to the child.

The software has undergone extensive trials in both junior and secondary schools, and has also been used successfully in an adult computer literacy course. The feedback fromtwo separate sets of schools trials gave rise to a great many refinements and modifications, many of which have been included. I am most indebted to all those who helped.

There are four 'help' cards provided with the pack, one each for the DESIGN and PAINTING units, and two for the GAMES unit. These are designed to have one edge slid beneath the perspex strip above the red function keys of the computer, or just laid over the strip. They give information on the use of the function keys as well as giving a summary of the other keys used in each unit.

The software has been tested on all versions of the BBC Micro, including the new Master series. It is not designed to work with a second processor.

Some features of the software

- Designs are built up by manipulating a set of basic shapes. Each individual shape can be stretched, squashed, turned and flipped, to create new shapes. Lines can also be added, and full editing of any picture is possible.
- This basic set of shapes can be changed and saved for future use.
- Pictures are painted using a fast and flexible 'flood fill' facility. Plain colour fills, as well as four types of patterned fills, are possible.
- Pictures are saved in a highly compacted format, so that a full thirty-one pictures can be saved to a separate disc.

- Users of single-disc drives may save their pictures (and new shape-sets) to either a separate disc or to the Picture Play disc itself.
- Pictures can be 'dumped' to any Epson-compatible printer. These may be fully shaded prints, or outline-only prints which children can colour with felts or crayons.
- Any picture can be turned into a puzzle! There are four different picture puzzles to choose from. Further, each puzzle has several levels of difficulty to choose from.
- There is a 'magic painting' game which is particularly suitable for the younger child. Children may also design their own 'magic' pictures (which appear to be quite blank) for their friends to play with.
- A large number of example pictures and shape-sets are supplied. These are held in a special program on the Picture Play disc, ready for easy transfer to a disc of your own.
- The ability to design and use your own shape-sets, within the DESIGN unit, makes *Picture Craft* particularly valuable in the exploration of the fascinating mathematical world of 'tessellations' or tiling patterns.
- The manual includes two important sections to help you get the most out of *Picture Craft*. The author has compiled a number of activities and suggestions to help you get the most out of the software and you will find these in the section 'Getting the most from *Picture Craft*'. There is a further section, written by Godfrey Hall, which gives teachers a wealth of ideas on how they may use *Picture Craft* as a springboard for activities and projects away from the computer.

Using the *Picture Craft* manual

The second section of the manual is called 'Before you start'. It is most important that you follow this section carefully. It shows you how to create a backup disc. You should always work with this backup and *never* with the master disc.

There is so much that you can do with this software that, if you were to be presented with all of the possible activities at once, you might well feel that you did not know where to start! To get around this, the software has been set up so that, at first, you are offered only a limited range of options.

The third section, called 'Getting started', carefully guides you through these limited options. You will learn how to design and paint a simple picture, and then use it to play a game. You will find it helpful to work through this section carefully, before experimenting further with the *Picture Craft* software.

It is useful to think of the software as being made up of a number of integrated units. These are:

1 The SET UP unit.
2 The DESIGN unit.
3 The PAINTING unit.
4 The DISPLAY unit.
5 The GAMES unit.
6 The SHAPE unit.

These units are linked together through the main menu.

'How to use the *Picture Craft* software' describes all the features of each unit, and shows you how to select which units and features are to be 'currently' available. This section also explains how to transfer the sample pictures and shape-set files to a separate disc. Many units also have a 'troubleshooting' section, which is the place to look when something seems to have gone wrong.

The sample pictures and shape-sets are designed to give you some ideas about the wide range of activities which are possible with the *Picture Craft* software. The section titled 'Getting the most of your *Picture Craft*' software, gives you many ideas; often referring you to these sample pictures and shape-sets.

This software has been developed to work on an ECONET network of linked BBC Microcomputers. The section 'Technical notes' explains how to use this software on such a system. You will also find notes on how to use the pictures created with *Picture Craft* in your own programs, and other notes of a technical nature.

There are many interesting areas of study connected with shape, colour and design apart from those which can be best explored with the aid of the *Picture Craft* software. Godfrey Hall, a teacher of great experience with primary school children, has contributed his ideas to this 'Clasroom and home activities' section of the manual. You will also find many useful references to other resources.

Although this section will obviously be of great assistance to the practising teacher, parents will also find it of great interest. Many of the ideas can be followed up by the interested parent, just as easily as they may be in the classroom. It will generally be obvious when activities are more suited to the school than the home.

Note 1. A set of worksheets is provided with the *Picture Craft* Software.

NOTE: If you have a Master 128, please run the Master 'convert' utility before using **Picture Craft.**

Before you start

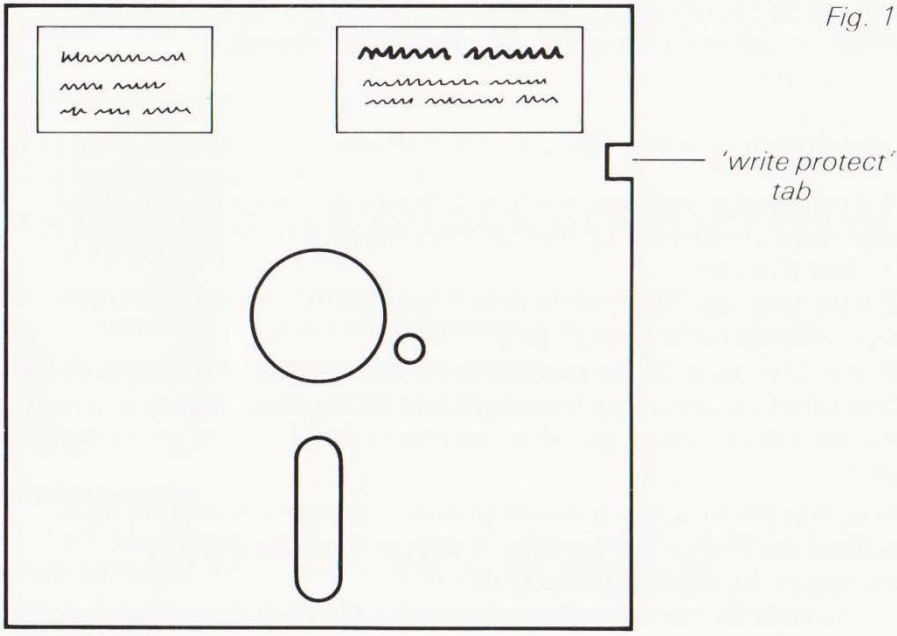
The disc which you find in your *Picture Craft* pack is referred to as the *Picture Craft* master disc. Treat it with great respect. With it, you will be able to create up to five working copies of ***Picture Craft.*** You should not use the master disc itself *except* for creating backup copies. If you have access to an 80-track disc drive *only,* then please refer to the section below titled 'The CONVERT utility', otherwise proceed as follows to create a working backup copy of *Picture Craft.*

Creating a working backup of *Picture Craft*

1 Make sure you have a formatted disc ready. This should be a 40-track disc *unless* you have used the CONVERT utility (described on page 13) on your master disc.

2 Make sure that there is no 'write protect' tab on your *Picture Craft* master disc. This is the sticky tab which is sometimes fixed over the disc's 'write protect' notch (see the diagram below).

Fig. 1



3 Double-disc drive users:

Place the *Picture Craft* master disc in drive 0, and the blank formatted

disc in drive 1. Make sure that each drive is compatible with the number of tracks on each disc. That is, if the drive is an 80-track unit, the disc in the drive should also be 80-track; and correspondingly for a 40-track drive.

Now type:

*DISCOPY 1

and press the RETURN key.

You will first see a message telling you how many remaining backup copies can be made. Copying will then take place automatically. When you see the prompt appear, copying is complete.

Single-disc drive users:

Insert the master disc in your disc drive and type:

*DISCOPY 0

and press the RETURN key.

You will first see a message telling you how many remaining backup copies are available. Copying will then commence.

Swap between the master disc and the newly formatted disc when you are told to do so. The *Picture Craft* master disc is the 'source disc' and the disc to which you are making a copy is the 'destination disc'. When you see the prompt appear, copying is complete.

Possible errors

1 If you see the message 'Remove protect tab', take your disc out of your drive, remove the protect tab from the write protect notch (see *Fig. 1*), and try again.
2 If the message 'Destination drive?' appears, you have forgotten to type a number after typing *DISCOPY.
3 If a 'Disc error 18' (or perhaps some other number) message occurs, check that you are using the correct type of disc drive, that is, a 40-track drive, *unless* you have used the CONVERT utility on the master disc.

Note that if the backup fails with an error message, you will *not* have wasted one of your five backups. If you get repeated disc error messages, try a different disc drive.

Remember that the backup copies which *Picture Craft* allows you to make are for the purchaser's use only. If you give copies to other people, even as a favour, you are both depriving the author of his living and breaking the law on copyright.

Schools and other institutions requiring a multi-user licencer should contact BBC Publications at the address given on the pack.

The CONVERT utility

The *Picture Craft* disc is supplied in 40-track format. However, in common with most BBC Publications disc software, a conversion utility is included to allow the disc to be run on an 80-track drive.

If you only have access to an 80-track drive, you will need to convert the *Picture Craft* master disc to run on it. If you have access to both 40- and 80-track drives, take a 40-track backup first (as described on page 11) and then convert your working copy. The conversion is a 'once-and-for-all' operation, and it is for this reason that it is better, where possible, only to convert the working backup copy.

To convert a disc to 80-track format, proceed as follows:

(IMPORTANT NOTE: If you have a BBC B + or Master 128 computer, and 80-track drives, you should not use the CONVERT utility. Instead, you should type *DRIVE 0 40, then press RETURN, then press SHIFT and BREAK.)

1 Ensure that the disc you wish to convert has no write protect tab present.

2 Place the disc in an 80-track drive.

3 Type *CONVERT and press RETURN. You will now see the message 'Converting please wait . . .'

4 The converter will now be active and the conversion process will take a minute or two to complete.

5 When the process is complete, the prompt will return.
VERY IMPORTANT: *Under no circumstances should you press the BREAK key while the conversion is running.*

The disc will now run on an 80-track system.

Possible errors

1 If you see the message 'Disc error 18', this means that the disc has been corrupted. Make another backup copy and try again.

2 If you see the message '40T disc', this means that an 80-track drive is required. In effect, this means that you are trying to CONVERT a disc already CONVERTed, or you are trying to CONVERT using a 40-track drive.

Getting started

This section is designed to help you to become familiar with some of the core units of *Picture Craft*. You would do well to work through it carefully. When you have done so, you will have begun to get a feel for the way in which *Picture Craft* works. You will then be able to explore the software further with the help of the detailed descriptions of each unit given in Section 4, 'How to use the *Picture Craft* Software'.

Before you start, make sure you have the DESIGN help card placed above the function keys, with the leftmost symbol aligned above the red function key f0.

WARNING: It is not possible to disable the BREAK key, and children should be warned that pressing it may well lose their work. It is, however, usually possible to recover a design. This is explained fully in 'How to use the *Picture Craft* software'.

There is, though, a simple protection that can be made for the BREAK key. Cut out a strip of stiff card measuring about 90 mm (3½ in) by 13 mm (½ in). Bend it in three, in the shape of a 'U'. The two legs of the 'U' should be of equal size, and the centre part, connecting the legs, should be of the same width as the BREAK key. Poke the two legs in, on either side of the BREAK key, to form a protective bridge.

NOTE: Throughout this manual, your working copy of the *Picture Craft* disc is referred to as the 'program' disc.

Insert your program disc into your disc drive. (If you have twin drives, use drive 0. You can use your second drive to simplify the handling of picture files and shape-sets. This is explained fully in the Section 'How to use the *Picture Craft* software', 5.)

Hold down the SHIFT key, and while keeping it depressed, tap the BREAK key. Now release the SHIFT key. You will see a title page, followed after a few moments by a short menu like the one below.

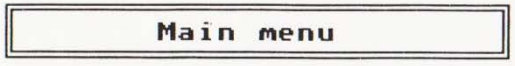


Fig. 2

Design a new picture.
Display a picture.
Choose a game.

This is the main menu. There are only three options for you to choose

from, though later you will learn how to add further choices.

You will come across a number of different menus in *Picture Craft*. They are very simple to use, and all work in exactly the same way. Simply press the space-bar to highlight the next item on the menu, and press the RETURN key to make your selection.

As an alternative to the space-bar, you may also use the 'A' and 'Z' keys to move backwards and forwards through a menu. This is particularly useful when the menu has a large number of options.

The first thing you are going to do is to create a picture. Select the option 'Design a new picture', and press the RETURN key. After a few moments, the screen will look like the picture below.

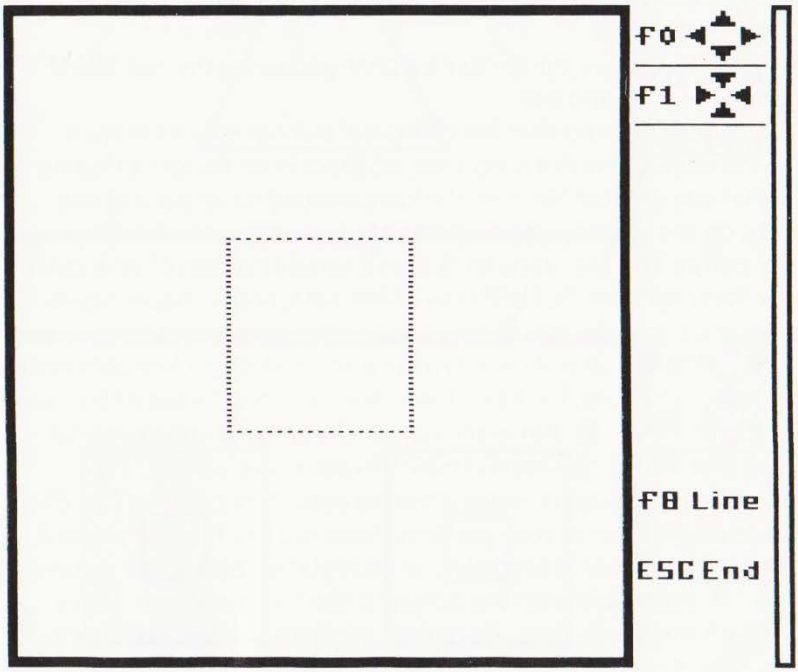


Fig. 3

The information at the right-hand side of the screen tells you that only three of the red function keys are currently active: f0, f1 and f8. The tall bar to the far right of the screen indicates how much 'picture memory' has been used up. As you add shapes and lines to your picture, you will see its level start to rise.

In the centre of the picture screen, you will see a dotted red cursor in the shape of a square. This is called the 'shape-cursor'. The square is one of the basic shapes which you use to build your picture.

Each time you press the space-bar you will see the cursor change.

There are six different polygons (straight-sided shapes) and a circle as shown below. Try this for yourself.

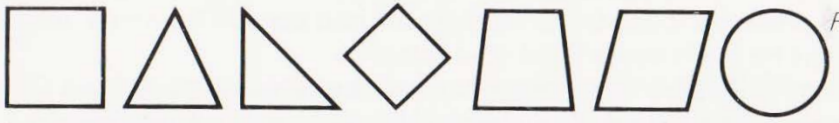


Fig. 4

It is easy to move the shape-cursor around the screen: just use the four arrow keys on the right of the keyboard. The shape moves in quite small steps. If you want to shift more quickly around the screen, hold down the SHIFT key at the same time as you hold down a cursor key. To move more slowly, and with greater control, hold down the CONTROL key (labelled CTRL above the left-hand SHIFT key) at the same time as pressing the arrow keys.

The size of the shape-cursor can be changed using the red 'SHAPE' keys f0 and f1 – try it and see.

You may have noticed that the computer will not let you move a shape off the edge of the drawing area, so there is no danger of losing it!

Now that you are familiar with the keys needed to select a shape and move it on the screen, you only need to know how to fix a shape on the screen before you are ready to design a simple pattern of your own.

This is done with the RETURN key. After selecting a shape, move the shape-cursor to the position you want it fixed, and press the RETURN key. The shape will be drawn as a solid white outline although, if you look closely, you will still be able to see the dotted lines of the red cursor on top of it (*Fig. 5*). Move the cursor using the arrow keys and you will see that the white shape remains fixed on the screen. Try adding a few more shapes to make a simple pattern or picture (*Fig. 6*). You can add single lines to your pattern. Press red key f8, and you will see that the shape cursor disappears, to be replaced by a small square cursor (*Fig. 7*). Fixing a line on the screen is like fixing a shape. Move the cursor with the arrow keys. As before, you can use the SHIFT and CTRL keys also, if you want to. Press the RETURN key to mark the beginning of your line. As you now move the cursor, you will see that a dotted line stretches out from the position where you first pressed the RETURN key. When you press the RETURN key a second time, the line is fixed on the screen.

You can carry on adding more lines in this way if you want to (*Fig. 8*).

To get the shape cursor back, press any of the red 'SHAPE' keys from f0 to f7.

If your first attempt is anything like mine was, your picture may by now look rather less than perfect! Do not worry at this stage as our purpose at the moment is really to get used to the key presses.

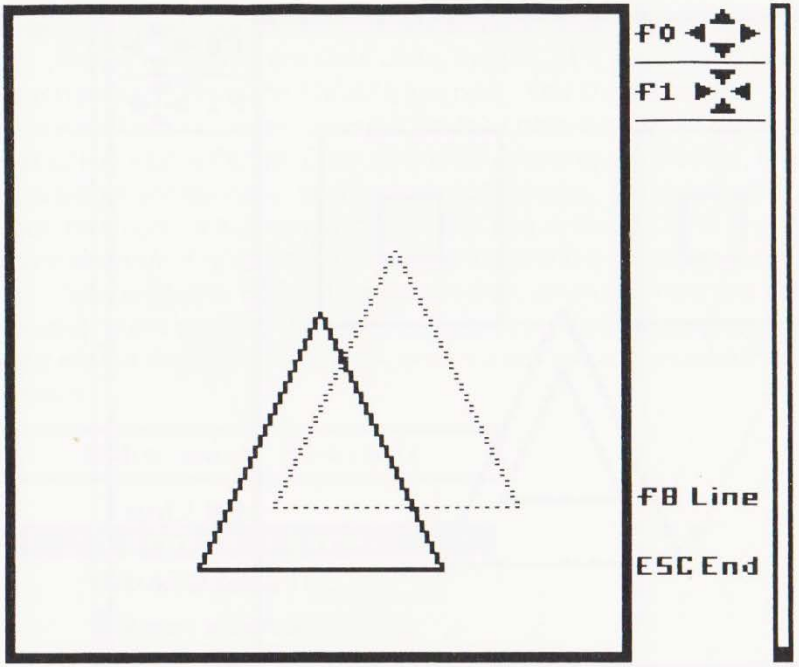


Fig. 5

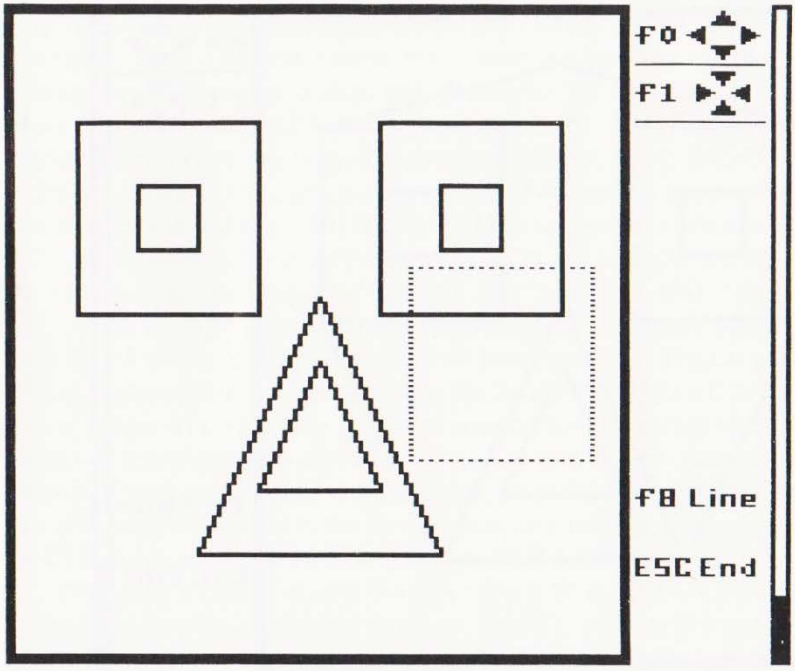


Fig. 6

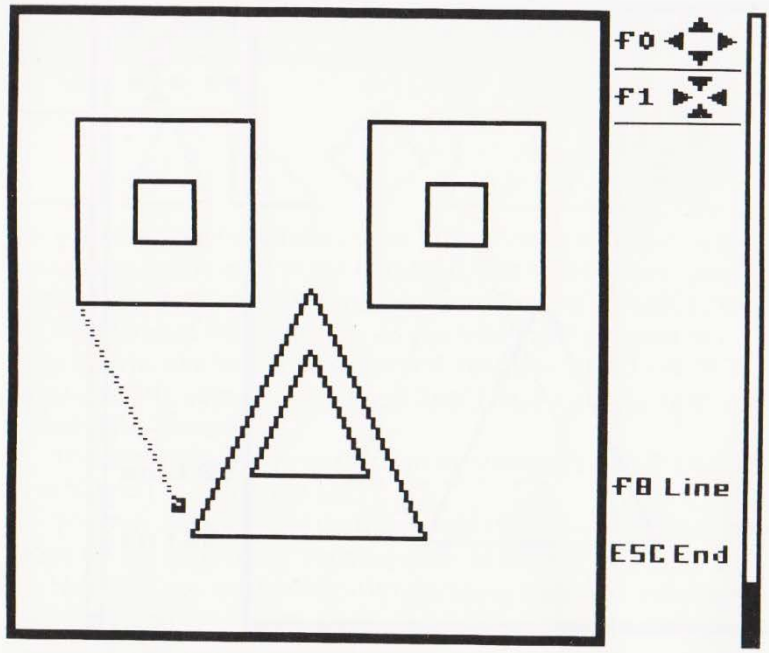


Fig. 7

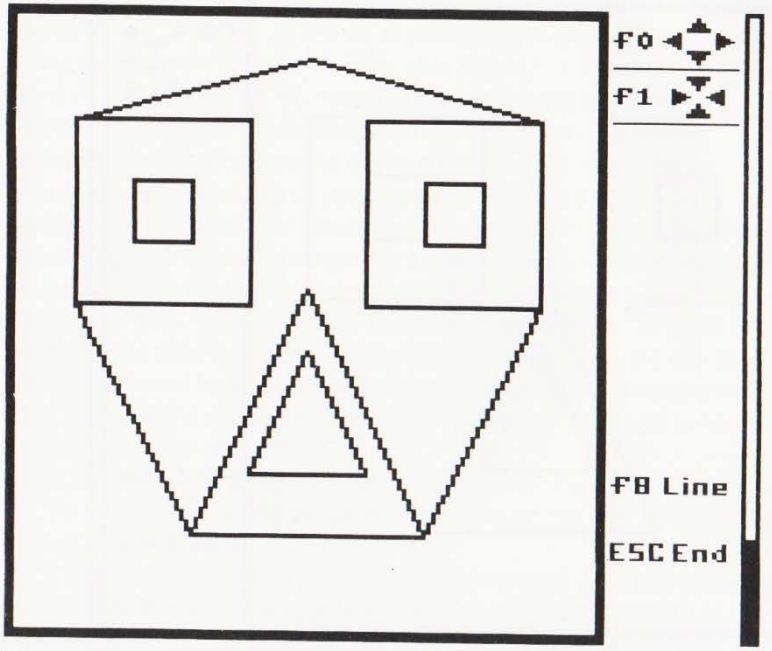


Fig. 8

Let us say that your design is now complete, and it is time to paint it.

As with most *Picture Craft* units, the ESCAPE key is used to end each activity. Press the ESCAPE key now. You should be able to hear an insistent beeping noise coming from the computer. This is a warning which is used in *Picture Craft* whenever pressing a key could, if you had pressed it accidentally, have unfortunate results. Try tapping the space-bar (or any other key except the BREAK key or the ESCAPE key): this cancels your attempt to end the program and the beeping noise stops.

Now press the ESCAPE key again and, when you hear the beeping sound, press the ESCAPE key a second time. Your picture now disappears (although it is not lost), and you will see a menu like the one below:

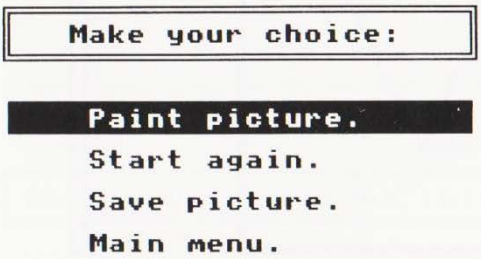


Fig. 9

You will see that there are four possible options to choose from. For the moment, just press the RETURN key to select the 'Paint picture' option.

You will see your design re-drawn in front of you, and the screen will turn blue. After a few moments, the screen will look like the picture below except that your design will, of course, be different from mine! Now remove the DESIGN help card and place the PAINTING help card above the red keys. As before, make sure that the word BREAK on the right-hand side of the card is above the BREAK key on the computer, to the right of the red keys. On the right of the screen you will see seven coloured boxes, with two arrows pointing to the red box at the top. Lower down is the message 'f4 Clear' and 'ESC End' (*Fig. 10*).

On the far right of the screen is another tall bar; again, this shows how much of the 'colour memory' has been used up. The purpose of this is explained fully in Section 4 'How to use the *Picture Craft* Software' (page 41). Near the centre of your picture is a small light-blue cursor in the shape of a cross (+). You use this cursor to show which region of your picture you wish to paint. As in the DESIGN unit, the cursor is moved around with the arrow keys, and holding down the SHIFT or CTRL keys at the same time has the effect explained before.

Choosing a colour is very like selecting a shape in the DESIGN program. You use the space-bar to select a new colour, and press the return key to paint the region beneath the cursor with that colour.

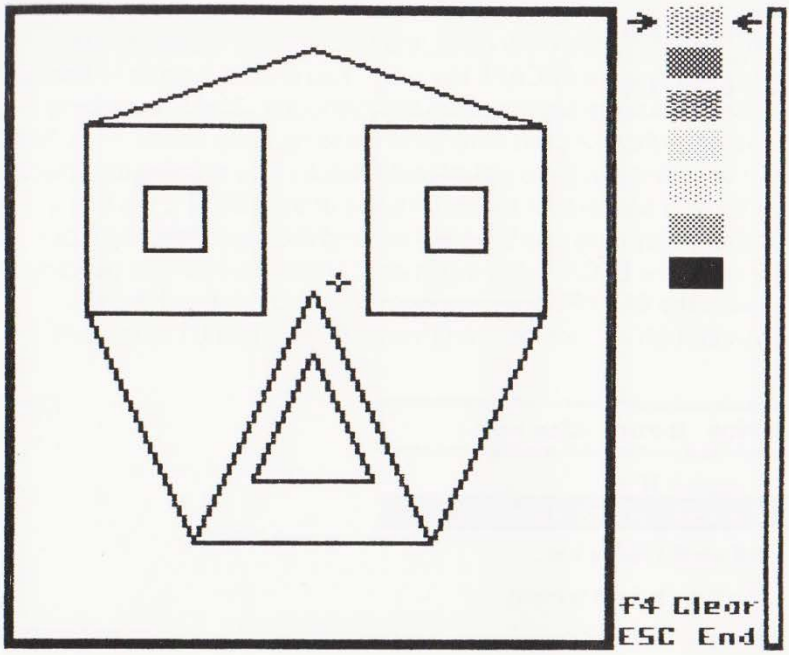


Fig. 10

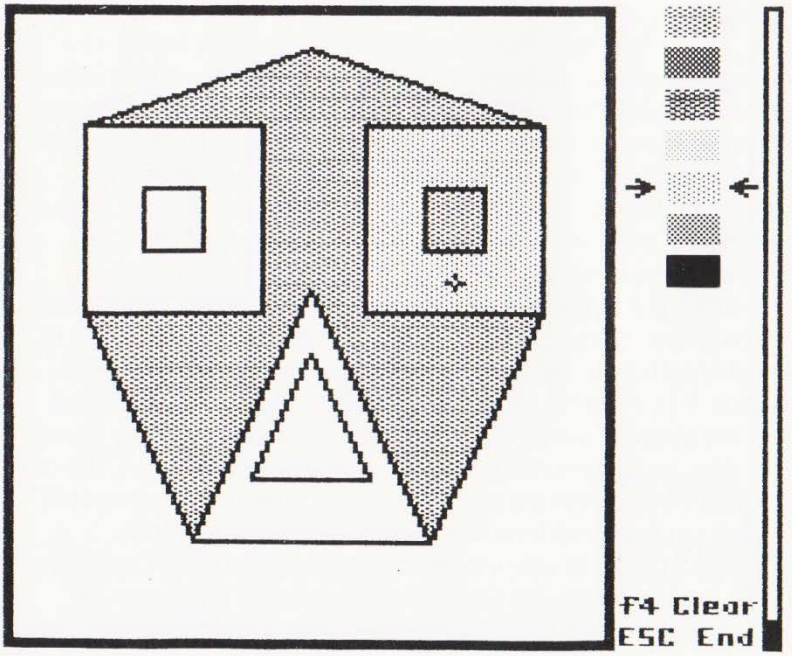


Fig. 11

These are all the keys you need at the moment; so, using the arrow keys to move the cursor, the space-bar to select a colour and the RETURN key to fill an area, you can now paint your picture (*Fig. 11*).
If you change your mind about the colour of any region, just paint over the top of it with a new colour.

If you decide you want to start again, you can clear all the paint from your picture by pressing the red key f4. As it would be annoying to lose your painting by accidentally pressing f4, you will hear the warning beep when you press this key, and must press it a second time to confirm that you really do wish to clear all the paint from your picture. If you have pressed it by mistake, remember that you can cancel it with the space-bar, or any other key except the BREAK key.
When you have finished painting your picture, press the ESCAPE key (twice, remember) and the painting will disappear, to be replaced by the simple menu screen as shown below:

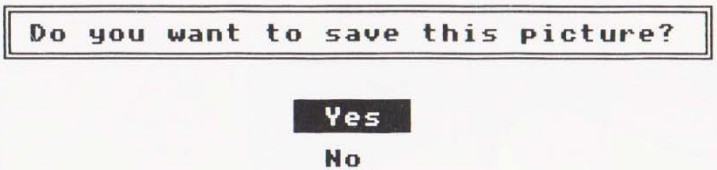


Fig. 12

Select 'Yes', and press the RETURN key.

You will be asked to enter a name for your picture. Your title can be up to seven characters long, and you can use a mixture of letters and/or numbers for its name. When you have typed in your picture name, press the RETURN key to carry on.

The picture has now been saved, and you are returned to the main menu, which is where we started! To reassure yourself that the computer has correctly saved your picture, use the space-bar to select 'Display a picture' and press the RETURN key. Shortly, you will see a menu screen with names on it. One of these is your own picture which you have just saved, and the other is a sample picture provided for you, called HOUSE. Select your picture name, using the space-bar to swap between the names, and then press the RETURN key.

You will see your picture re-drawn and re-painted in front of you. When it is complete you will see the message 'ESC End' appear beside it. Now press the ESCAPE key twice, and you will be returned to the main menu again. This time select the 'Choose a game' option and you will see a further menu like this (*Fig. 13*):

Fig. 13

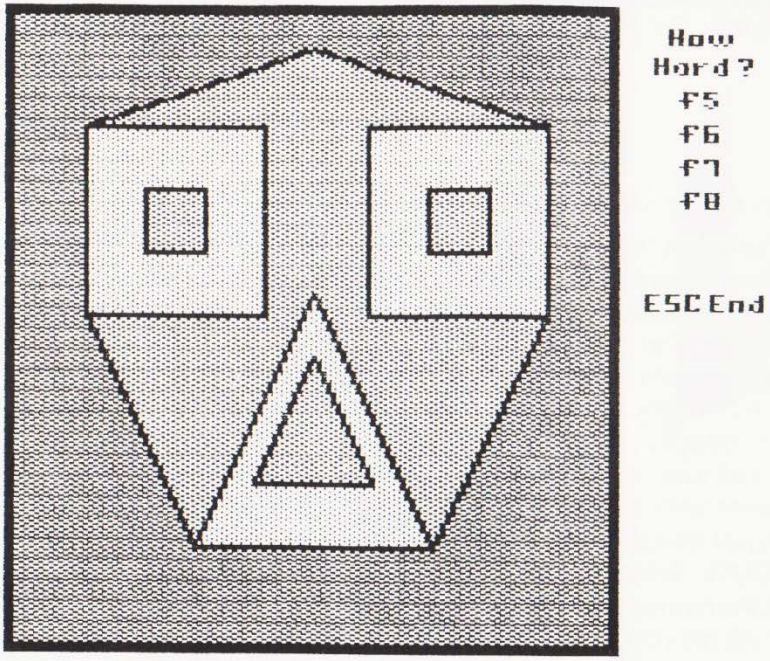
```
Games menu:

Swaps
Twister
Swaps and Twists
Block Slide
Magic Painting
```

There are five games to choose from: four picture puzzles and a magic painting game. Select the puzzle 'Swaps' and press the RETURN key.

You will now see the same menu that you saw when you chose the option to 'Display a picture', as the computer wants you to select a picture for your game. It is up to you whether you use your picture or mine. The picture you selected will be re-drawn and painted. When I did this with my picture, it looked like this:

Fig. 14



The four picture puzzles each have a help card. Find the help card for 'Swaps' and place it above the function keys in the usual way.

Swaps is a jigsaw puzzle game, in which the computer divides your picture into squares and mixes up the pieces. It is your task to sort them out again. There are four levels of difficulty to choose from. The help card shows you how may pieces there will be in your puzzle. Try selecting one of the easier levels to start with. I decided to try a three-by-three puzzle by pressing the red key f6. My picture was jumbled up into nine pieces by the computer and looked like this:

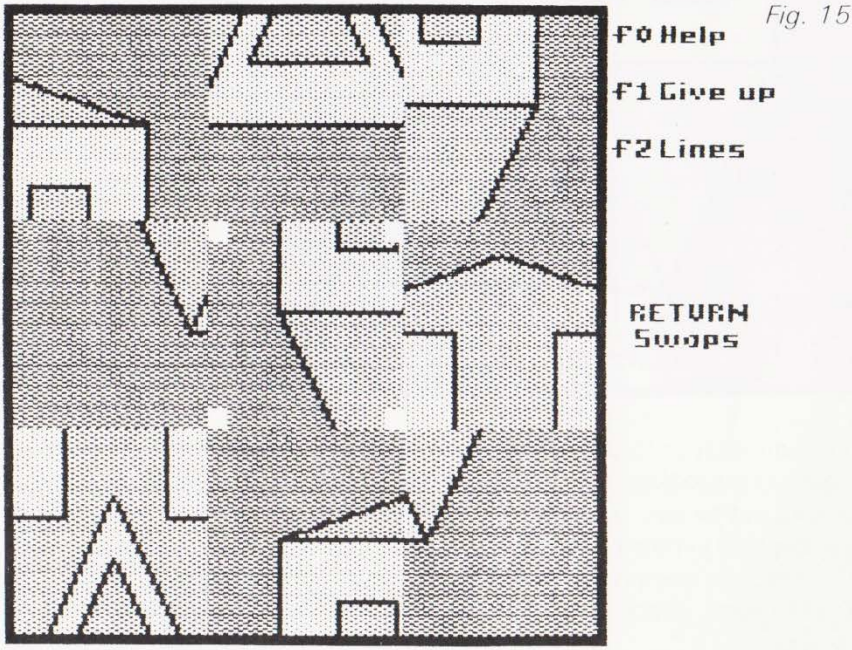


Fig. 15

To solve the puzzle, you have to swap pairs of squares until your original picture has been restored.

You will see that one of the squares of your jumbled puzzle is marked at its four corners by small black squares. You can use the cursor keys to move from one square to another. Try it and see. Now decide on which two squares you want to swap, to start sorting out your picture. Have you done that? Right, now move the cursor to the first of the squares you have chosen and press the RETURN key. This square is now marked with a black outline. Move to the second square and press RETURN again. The two squares of your puzzle are now swapped by the computer. You continue this process until your puzzle is solved.

The picture below shows my picture with some of the pieces restored.

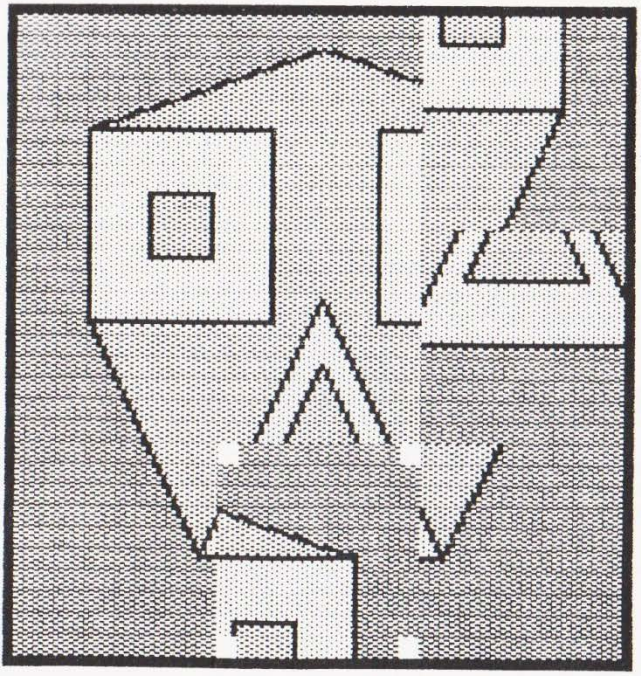


Fig. 16

It is quite easy to forget what your original pattern looked like. You can have a quick look at it by pressing the red help key f0. This will sort the picture out for you, but only for a moment, before replacing each square back into its jumbled position

If you get completely stuck, you can give up by pressing the red key f1 (twice, of course!). The computer will then sort out your puzzle for you.

When you have completed the puzzle (or have given up!), you can try the puzzle again, perhaps choosing a different level this time. Alternatively, you can use the ESCAPE key to end, and you will be returned to the main menu again.

You have now learned something about the use of the DESIGN, PAINTING and GAMES units. You might now like to go through this section once more. However, if you feel ready to find out what else you can do, then you will need to move on to the next chapter, which describes how to include and use the many extra exciting features that are possible in *Picture Craft*

How to use the *Picture Craft* software

1 The main menu

How the main menu works

The main menu is the menu which first appears when you run the *Picture Craft* software. This menu shows you the activities which are currently available for you to choose from.

When you first get your *Picture Craft* disc, the main menu looks like this:

Fig. 17

Design a new picture.
Display a picture.
Choose a game.

It is possible to add extra options to the main menu (see page 28). The full range of choices is shown below:

Fig. 18

Design a new picture.
Edit an old drawing.
Edit an old painting.
Display a picture.
Choose a game.
Design a new shape set.
Edit an old shape set.

You use the main menu to select the activity you want to work with. Whatever selection you make, you will find that you are usually returned to this main menu screen (or at least have the option to do so) after each activity.

There is one option which is always available from the main menu, but which does not appear on the menu screen. This is the option to select the SET UP menu.

To select this, you have to press the control key (labelled CTRL) and the 'S' key at the same time. It is from the SET UP menu that the adult o older child can control the selection of many features within the rest of the program. You will find out all about this in Part 2 of this section.

To make a selection from this (or any other) menu, use the space-bar to highlight the selection required, then press the RETURN key. If in doing so you find that you are presented with another menu screen, the games menu for example, pressing the ESCAPE key will return you to the main menu.

As an alternative to the space-bar, you can use the 'A' and 'Z' keys to move in either direction through a menu. This is particularly useful when making a selection from a long list of choices.

The main menu options

a Design a new picture
This selects the DESIGN unit allowing a new design to begin. You are offered the chance to load a different shape-set, if this option has been turned on from the SET UP unit (see 'Picture design options', page 30). A description of how to use the DESIGN unit is given in Part 3.

b Edit an old drawing
You will be offered a menu of all the picture names currently available, and you select one of the names in the usual way. The DESIGN unit is then selected and you will see the drawing appear in front of you. When the drawing is complete, you can add more shapes to it. If the line and edit options have been set, you will also be able to add lines to your drawing or to remove shapes or lines from it. If the picture has not been drawn using the standard shape-set, then the appropriate shape- set is automatically provided instead. If there are no pictures on the disc, you will see the message 'No pictures available', and you will be returned to the main menu.

c Edit an old painting
You will be given a menu of all the picture names on disc currently selected for pictures. The one you select will be drawn and, if it had been painted when you saved it, the picture will be painted again in the colours previously used. You can then change the colours of any regions you choose, or, if the 'clear' option is turned on, you could clear all the paint from your picture and start again. The painting unit is fully described later in this chapter. NOTE: *Picture Craft* allows you to save a picture as a drawing or as a fully or partly painted picture.

d Display a picture
Selecting this option gives you a menu of all the picture names currently available. The one you select is re-drawn and re-painted. If you have a suitable printer connected to your BBC Microcomputer (and you have turned on the option to print a picture from the SET UP unit), then you can print out your picture.

e Choose a game
If you 'Choose a game', you will be presented with the games menu. Part 6 of this section on page 48 describes this option in detail.

f Design a new shape-set
The SHAPE unit, which is fully described in Part 7, is selected. This allows you to build your own shape-sets.

g Edit an old shape-set
The SHAPE unit is selected, but you are first offered a list of all the currently available shape-sets. If none is available, you will see the message 'No shape-sets available' and you are returned to the main menu.

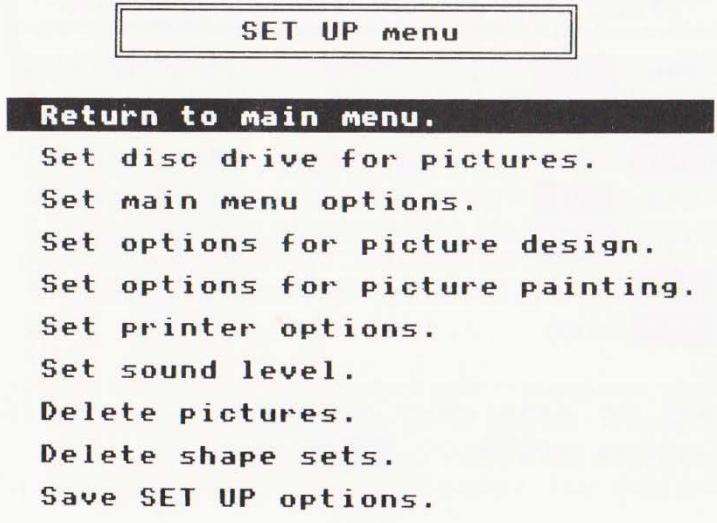
2 The SET UP unit

How the SET UP unit works

This important unit is intended for use by adults rather than by younger children. However, experienced older children will not find it difficult to use. It is always available from the MAIN MENU by pressing the control key (labelled CTRL) and the 'S' key at the same time.

The SET UP menu is shown below

Fig. 19



From the SET UP unit you can select which options are to be available from the main menu and which features are to be available in the DESIGN and PAINTING units. You can also tell *Picture Craft* where you want to save your pictures and shape-sets, and you can delete pictures and shape-sets too. Further options are to set the sound level and configure the printer.

Any changes you make using the SET UP unit will happen immediately and survive until the BREAK key is pressed. You can, however, make any changes more permanent by selecting the option to 'Save the SET-UP options'. This is the last option on the SET UP menu. These options are then saved to the disc, and will remain active, even after the end of your current session with *Picture Craft,* until you return to the SET UP menu again.

Do not be afraid to experiment with the SET UP unit, but for the moment it would be a good idea not to 'Save the SET UP options'. Instead, try selecting 'Select options for picture design', make some changes and then return to the main menu. Now choose to 'Design a new picture' and see how the DESIGN unit has changed. If you get in a muddle, you can always just press the BREAK key and start again. As you did not choose to 'Save the SET UP options', the changes you made will now have been cancelled.

NOTE: Children should *not* be encouraged to press the BREAK key, except in conjunction with the SHIFT key to start up the software.

Disc drive options

When you receive your *Picture Craft* disc, it is set up so that any pictures you decide to keep are saved on your working copy of the *Picture Craft* program disc. However, when you want to investigate the many sample pictures supplied, you will need to tell *Picture Craft* to expect to find the pictures on a separate disc; and, if you are fortunate enough to have double-disc drives, on a different drive.

If you have double-disc drives, the ideal solution is to have the program disc in drive 0 and your picture disc in drive 1. You can, in fact, choose to save your pictures (and new shape-sets) on any of the logical drive numbers (0 to 3) supported by the BBC Microcomputer. Choosing the option to 'Select disc drive for pictures' from the SET UP menu will display the message below:

```
Do you want to save your pictures
on the program disc? ... Yes  No
```

Fig. 20

All sections from the SET UP unit are made with the normal menu keys. So press the space-bar to select 'Yes' if you do want pictures to be saved to the *Picture Craft* program disc.

If you want to save your pictures to a separate disc, select 'No'. You will now see the following selecting menu:

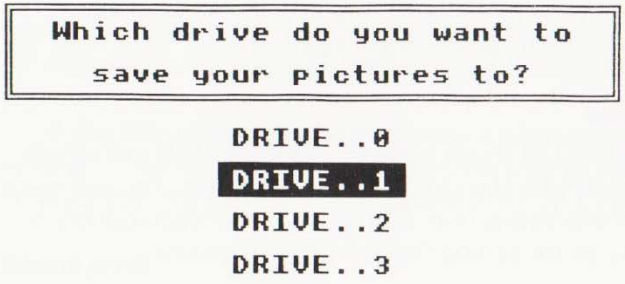


Fig. 21

Use the space-bar (or the 'A' and 'Z' keys) to make your choice, then press the RETURN key.

NOTE: If you have a single disc drive, but want *Picture Craft* to expect to find its pictures and shape-sets on a separate disc, answer 'No' to the question 'Do you want to save your pictures on the program disc?' and then select drive 0. *Picture Craft* will then tell you whenever you need to swap the discs around.

Main menu options

This controls which choices appear on the main menu. You will see a screen appear like the one below:

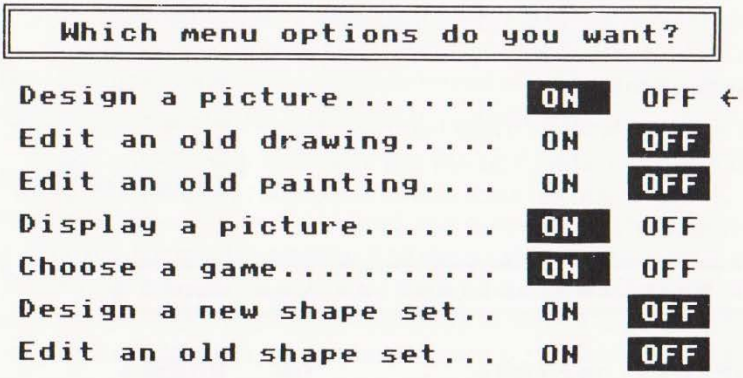


Fig. 22

You can now see at a glance which menu options are currently selected.

Notice that there is an arrow pointing to the top line.

Each selection is 'toggled' by pressing the space-bar and confirmed by pressing the RETURN key. Try it and see. Each time you press the

RETURN key, the arrow moves to the next line until all the options have been offered. You will then see the message

Are these settings OK? Yes No

If you use the space-bar to select 'No', you can go through each choice again making any amendments you want to, until you answer 'Yes' confirming that you have the choices you want. The choices which are now turned on will appear in the main menu.

Picture design options

This allows you to select just those features of the DESIGN unit which you feel are most suitable for the children in your charge. You will see a menu screen like the one below (*Fig. 23*), and you set each option in exactly the same way as for setting the main menu options.

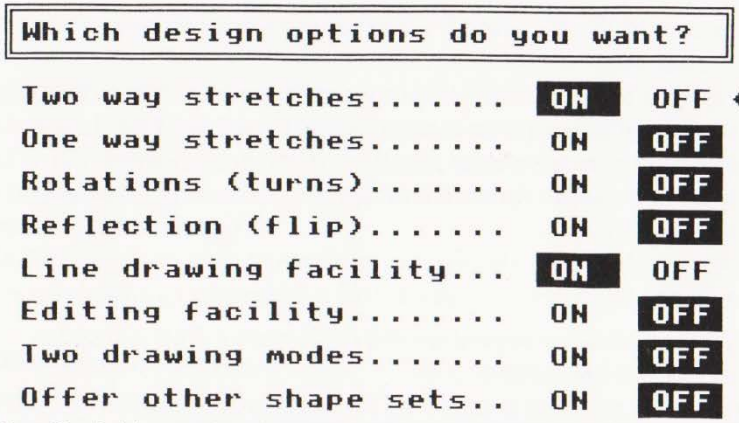


Fig. 23

Part 3 of this section (page 33)describes each of these features.

Picture painting options

This allows you to select just those features of the PAINTING unit which you want to make available. You will see a menu screen like the one below (*Fig. 24*), and you set each option in exactly the same way as for setting the main menu options.

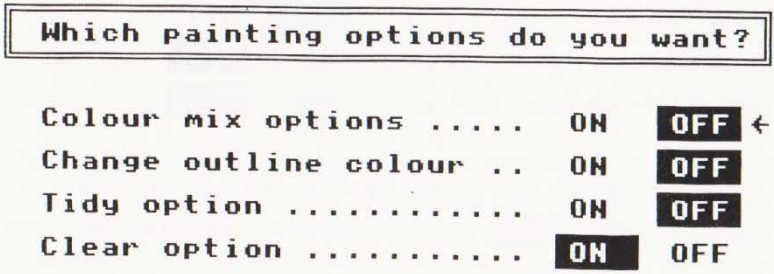


Fig. 24

Part 4 of this section on page 41 describes each of these features in detail.

Printer options

It is possible to print your pictures using any printer which is 'Epson compatible', which most modern printers for microcomputers are. This feature is initially set to be 'off'. Selecting 'Printer options' from the SET UP menu allows you to turn this feature on. Part 5 of this section gives you further details on this.

If you are using a serial printer, you will be used to having to enter several '*' commands before your printer can be used. These can be entered from the SET UP menu as described on page 27.

Sound level

Select this option from the SET UP menu, you will see the instruction

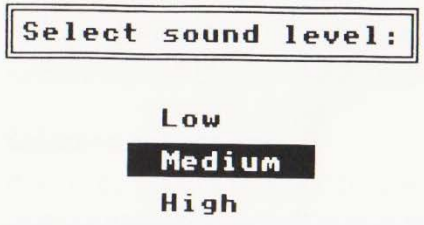


Fig. 25

You will hear a tone each time you alter the setting by pressing the space-bar. This gives you an indication of the loudness of the sound you will hear throughout all units of the *Picture Craft* software. Press the RETURN key when the sound is at the level you require.

Sound is used very sparingly in *Picture Craft*. The sounds you do hear are mainly there to give you information. This is why you are not given the option to turn the sound off completely.

Deleting pictures

Normally, when a picture is saved, the name you choose to give it is checked against the names of all the existing pictures on the disc you are currently saving pictures to. If you enter a name which has already been used, *Picture Craft* asks you to enter a different name. If this check were not made, a previously saved picture might accidentally be destroyed. Pictures can be removed, however, from the SET UP unit by selecting the option to 'Delete pictures'.

If no pictures are found, you will see the message

'No pictures available'

and you will be returned to the SET UP menu screen.

Assuming there are some pictures present, you will see a screen like the one below

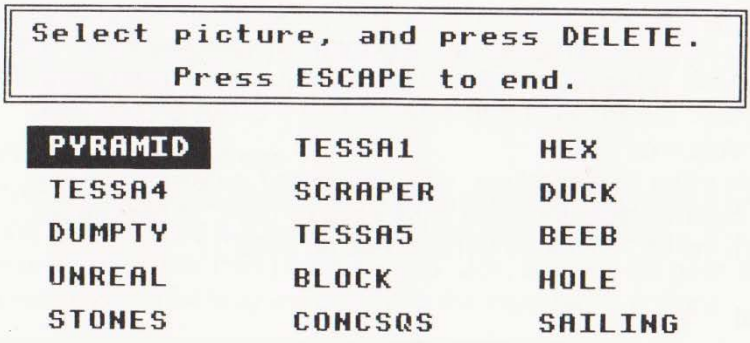


Fig. 26

Use either the space-bar or the 'A' and 'Z' keys to select the picture you wish to delete, then press the DELETE key. You can repeat this to remove further pictures. When there are no more pictures you wish to delete, press the ESCAPE key.

Deleting shape-sets

Saving and deleting shape-sets is done in exactly the same way as saving and deleting pictures. When you select this option from the SET UP menu, if any shape-sets are available you will see a screen like this:

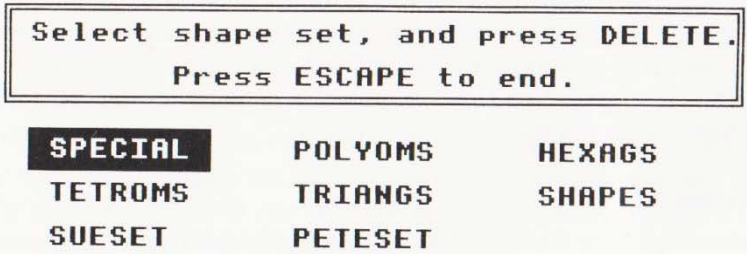


Fig. 27

Shape-sets are deleted by selecting the required name, and pressing the DELETE key. Press the ESCAPE key to return to the SET UP menu.

Entering * commands

You are permitted to enter operating system commands from the SET UP menu.

Typing a '*' will cause a star prompt to appear on the screen.

Now just enter the command you want, and press the RETURN key. If possible, *Picture Craft* will execute your command and then return you to the SET UP menu.

3 The DESIGN unit

Introducing the DESIGN unit

The DESIGN unit is at the heart of the *Picture Craft* software. It is very simple to use, although it will take a little time to learn to use all of its features to their maximum advantage.

When you first use the *Picture Craft* software, many of its features are turned off.

Important note The instructions for using the DESIGN unit assume that *all* of the facilities of the DESIGN unit have been turned *on* using the SET UP unit. You will find details of how to do this in Part 2 of this section on page 27.

You will need to have the DESIGN help card placed above the red function keys when using the DESIGN unit.

Selecting a shape-set

When you select the option to 'Design a new picture' from the main

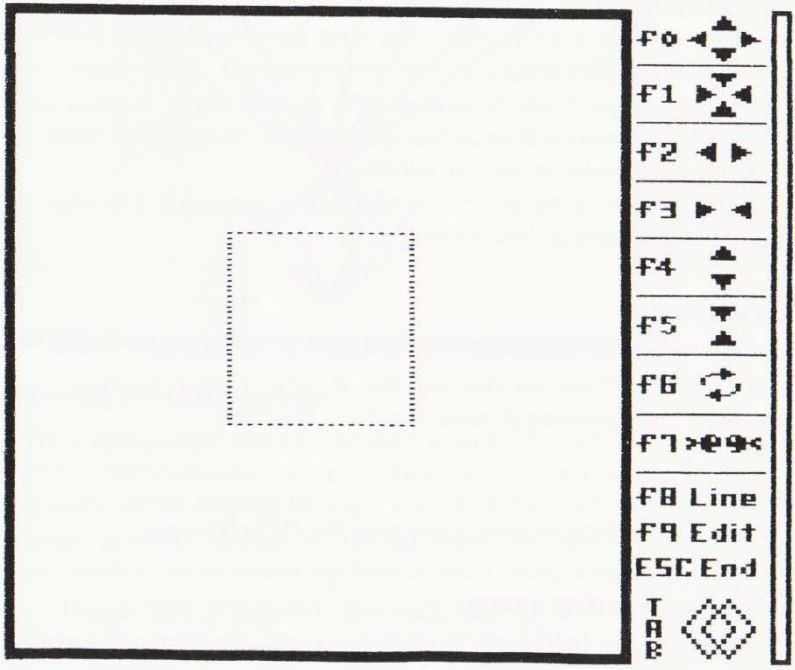


Fig. 28

menu, you will be asked if you want to use the standard shape-set. If you answer 'No', then you will be offered a list of all the currently available shape-sets, and you can choose which one you want to use for your design. As usual, step through the list with the space-bar (or use the 'A' and 'Z' keys) and press RETURN to make your selection.

When all the options are set 'on' and the DESIGN unit is first selected, the screen will appear like *Fig 28*.

The three design modes

You will see from the DESIGN help card that the red function keys are in three groups. There are seven SHAPE keys, one LINE key, and one EDIT key. These correspond to the three 'modes' of operation of the DESIGN unit. The key presses which are applicable to each mode are summarised on the help card.

THE SHAPE MODE

When you select the DESIGN unit from the main menu, you always begin in shape mode. This is the mode which allows you to place shapes on the picture screen.

Moving the shape-cursor

The selected shape-cursor is moved around the picture area with the four arrow keys. If, at the same time, you hold down one of the SHIFT keys,you will find that the shape-cursor moves quickly, in big steps, around the picture area. If you hold down the control key at the same time (labelled CTRL), you will have fine control over the shape-cursor which now moves slowly, in very small steps.

Picture Craft does not let you move the shape-cursor off the edge o the picture area, so there is little danger of losing it!

Selecting a shape

Each time you press the space-bar, the shape-cursor changes to the next shape available. You can also use the 'A' and 'Z' keys to step quickly through the available shapes in either direction.

Fixing a shape

To fix a shape on the picture area just press the RETURN key.

Stretching and squashing shapes

There are eight function keys which work in the shape drawing mode.

The first six of these (f0 to f5) are used to stretch or squash the currently selected shape-cursor.

Red keys f0 and f1 stretch or squash the shape-cursor both horizontally and vertically.

Red keys f2, f3, f4 and f5 allow the shape-cursor to be stretched or squashed in one direction only.

There is a limit to how far you can stretch or squash any shape, so if you are pressing one of these keys and the appearance of the shape-cursor does not change, it is because you have reached this limit.

The next design was drawn simply by squashing and stretching the rhombus shape.

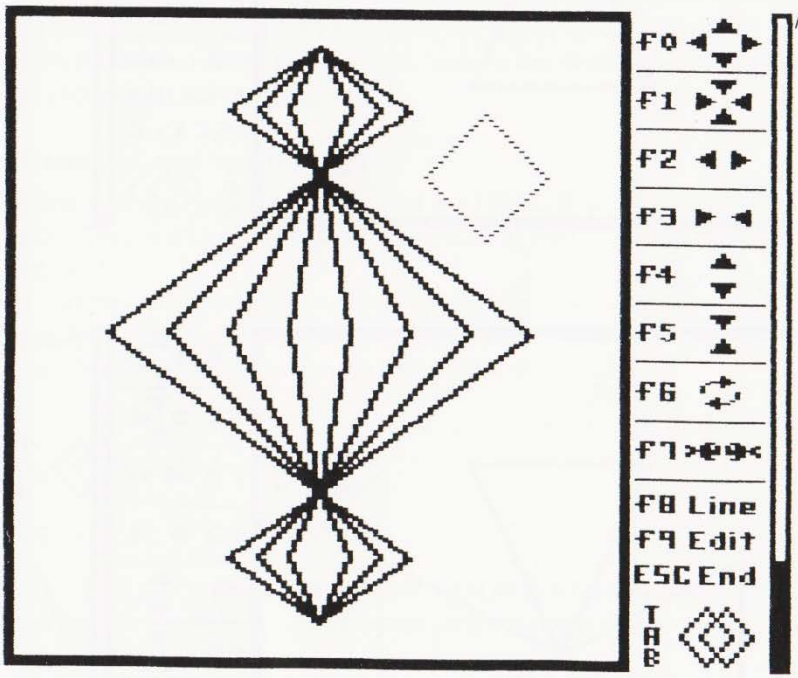


Fig. 29

Turning the shape-cursor

The shape-cursor can be turned a quarter-turn at a time by pressing red key f6. Some shapes, a square or a circle for example, do not look any different when rotated through a quarter-turn, so sometimes the shape-cursor does not appear to change when the 'turn' key is pressed. For this reason, you will always hear a short beep when this key is pressed.

The second of the next two pictures, *Fig. 31*, shows a simple pattern which was made by turning the triangle that you can see in *Fig. 30*.

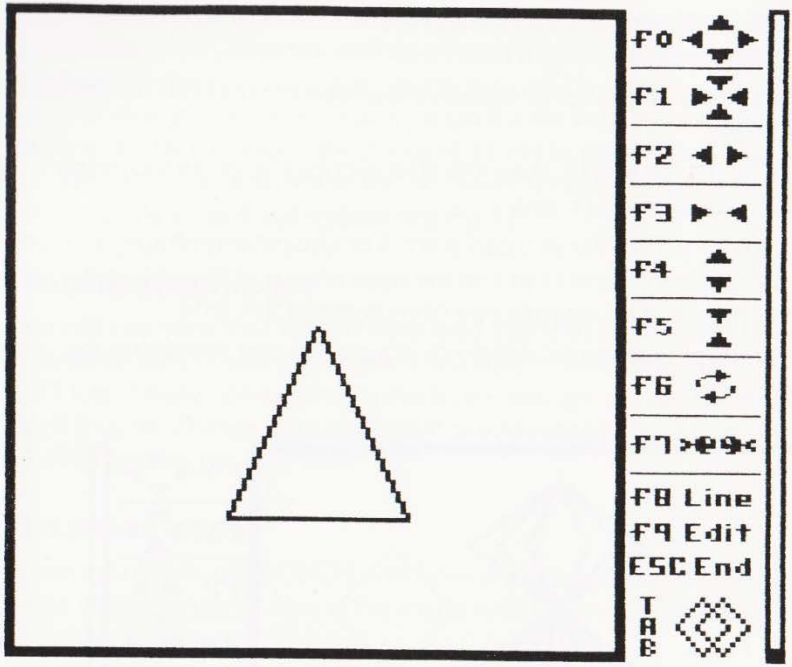

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 30

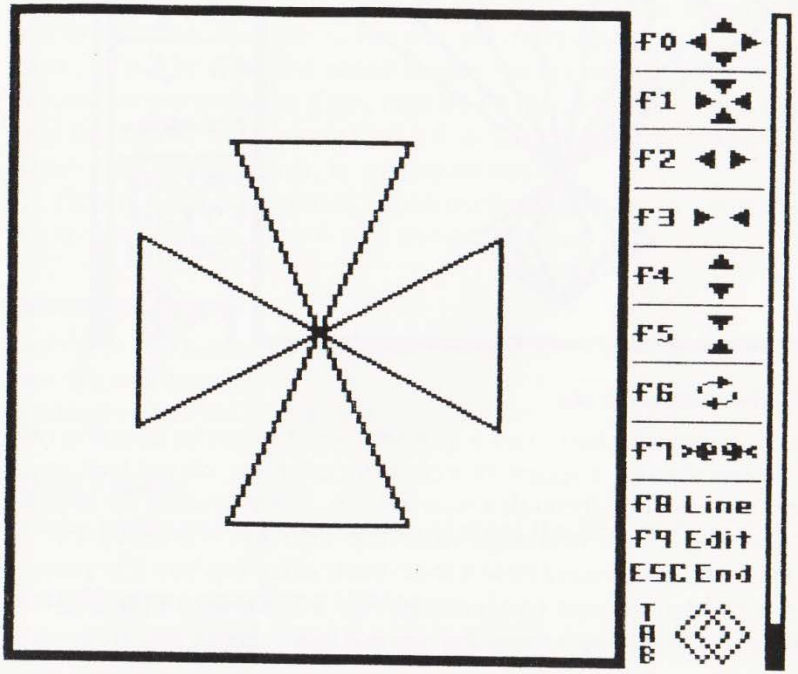

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 31

Flipping the shape-cursor

Pressing red key f7 flips the shape-cursor. The mathematical way of describing this would be a reflection in a vertical mirror line. As with the turn feature, some shapes do not look any different after they have been 'flipped'; so again you hear a confirming 'beep' when you press this key.

This is not an easy idea to explain in words, but if you select the DRAWING unit from the main menu and experiment with each of the shapes available, you will quickly learn how to use these keys.

Centring the shape-cursor

While in shape mode, pressing 'C' at any time will return the shape-cursor to the centre of the picture area. The shape-cursor will also be returned to its 'normal' size. This is the size it would appear as when the DRAWING unit was first selected, before the shape-cursor had been stretched, squashed or turned.

'Cover up' and 'see through'

In the bottom right-hand corner of the DESIGN screen, you will see the word TAB with a small window containing two overlapping squares inside it.

When the symbol looks like *Fig. a* in the diagram below, you are in 'see through' shape mode. Any shape added to your design will not affect lines or shapes already fixed on the screen.

Fig. 32

Fig. a

Fig. b

If the TAB key is now pressed, the symbol will now look like *Fig. b*. You are now in 'cover up' shape mode, and any new shape will cover up any lines underneath it.

You can see this difference by comparing *Figures 33 and 34*. or, better still, by trying it out for yourself.

THE LINE MODE

To enter the line drawing mode, just press key f8. The shape-cursor disappears to be replaced by a small square cursor. This line-cursor is moved around the picture area in the same way as the shape-cursor, using the four arrow keys, with the SHIFT key for quick movement and the CTRL key for fine control.

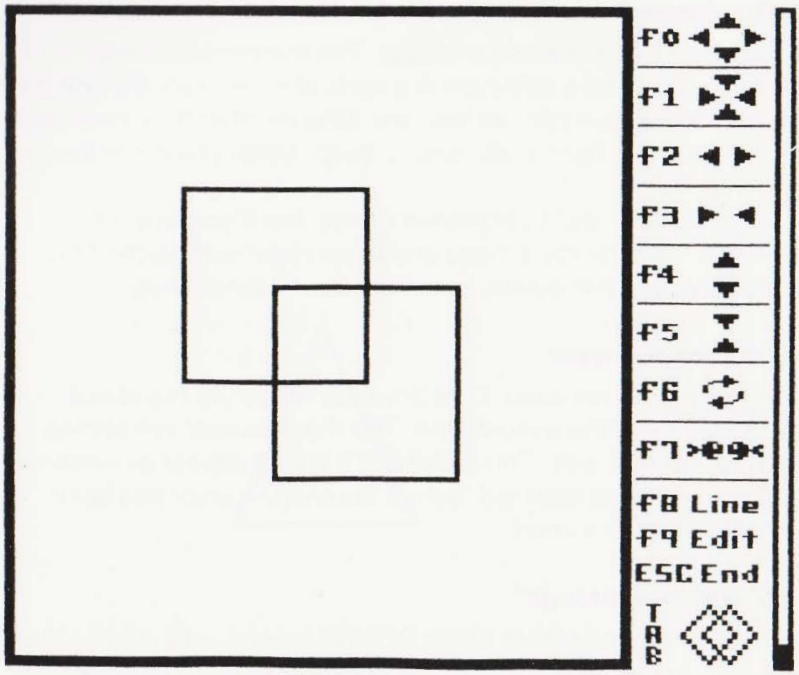

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 33

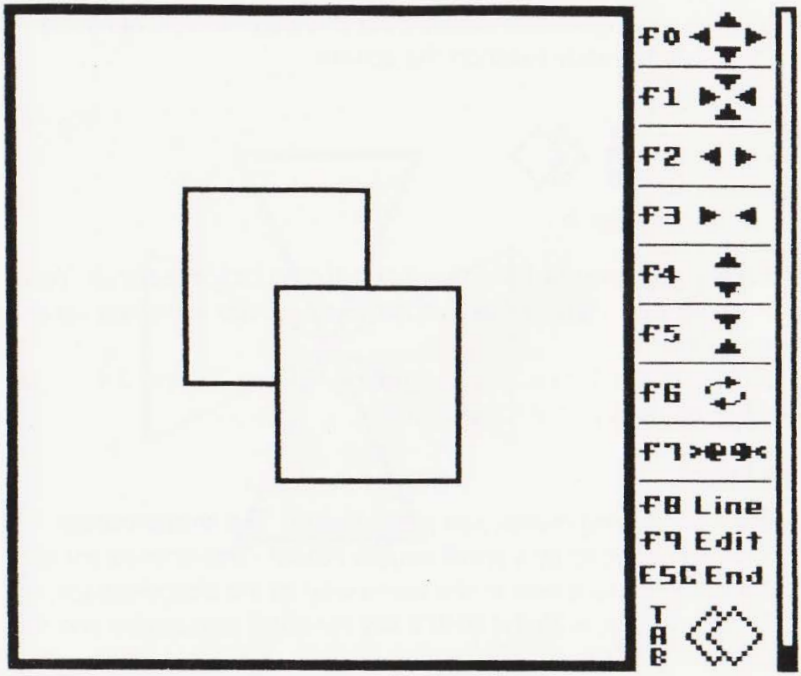

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 34

Move the line-cursor to the position at which you want to start your line and press the RETURN key once. Now move the line-cursor with the arrow keys. You will see a dotted red line stretch out from the point where you fixed the start of the line. Press the RETURN key a second time to fix the line on the picture area.

Pressing 'C', returns the line-cursor to the centre of the screen.

THE EDIT MODE

Each line or shape in your design can be individually selected and removed. To enter the edit mode, press key f9. (Obviously you need to have drawn some shapes on the screen before pressing this key or you will have nothing to edit!)

The last shape or line drawn is highlighted in magenta (or purple). To remove this shape, just press the DELETE key. The whole picture screen is cleared and then completely re-drawn except for the highlighted shape or line.

You can easily remove any shape from your picture. Just press the space-bar repeatedly, until the shape you wish to get rid of is highlighted. Now press DELETE.

As an alternative to the space-bar, you can use the 'A' and 'Z' keys to move backwards and forwards through all the shapes of your picture.

When you want to finish editing, press the line key to draw a line, or any of the shape keys (f0 to f7) to return to the shape drawing mode.

Notice that all the lines of a shape are highlighted, even if a part of the shape has been overdrawn by a later shape using the 'cover up' shape drawing mode. These 'covered' lines appear in green. If a shape appears to be entirely green, you know that it must have been covered up completely, so it might as well be removed from the picture.

The replay facility

When in shape mode, it is possible to watch your whole design slowly re-drawn from the beginning, by pressing the letter key 'R'. When drawing is complete, the shape-cursor reappears and you can continue with your design. If, however, you press the edit key (f9) in the middle of the replay, you will hear a beep, and the rest of the picture is completed at high speed. You will then find that you are put into edit mode. The first highlighted shape will not, however, be the last shape drawn but the shape which was being drawn at the moment you pressed the edit key.

This procedure is very useful when you want to edit a shape within a very complex drawing.

The picture memory indicator

As you add shapes and lines to your picture, you will notice a green bar rise on the far right of the screen. This is the picture memory indicator. When it is full you will not be able to add any more shapes or lines to your picture, unless you first delete a shape or line. *Picture Craft* allows your picture to contain over 60 shapes and lines.

Moving on

When your design is complete and you are ready to move on, press the ESCAPE key. You will hear a repeated warning beep. To confirm that you really want to move on, press the ESCAPE key a second time. If you have pressed the ESCAPE key by accident, press any other key (except the BREAK key, of course) to cancel it.

The DESIGN menu options

When you have ended your design by pressing the ESCAPE key, you will see the menu shown below:

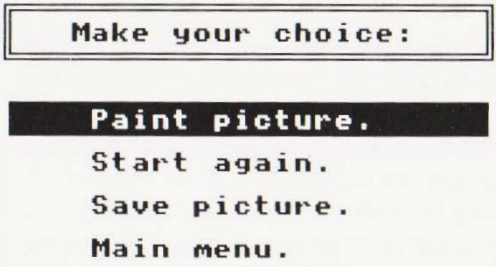


Fig. 35

If you choose to paint your picture, the screen will clear, your design will be re-drawn and *Picture Craft* will move on to the PAINTING unit described next in Part 4.

There are, however, three other possibilities.

- You can 'Start again'. This will take you back to the DESIGN unit and your previous picture will be lost.
- You can choose to 'Save picture'. You will be asked to enter a name for your picture before returning to the main menu.
- You could choose to return straight to the main menu. Your current design will be lost.

Troubleshooting

I've pressed the BREAK key by mistake!

It is most unfortunate that the BREAK key on the BBC Microcomputer is

situated so close to the right-most function key (f9). In all the other *Picture Craft* units, this key has not been used, but in the DESIGN unit all the red keys are necessary.

It is unfortunately therefore possible that the BREAK key will be accidentally pressed by a child attempting to select the edit mode with function key f9. It is not possible to disable the BREAK key (at least without physically altering the internal wiring, which seems a bit drastic). However, if the BREAK key is pressed while in the DESIGN unit, recovery of the picture is usually possible in the following way:

First, insert the disc on which you are currently saving your pictures into drive 0. (If you have chosen to save your pictures to the *Picture Craft* program disc itself, this will not be necessary.)

Secondly, press the red function key f0. Now restore the program disc to drive 0 if necessary, and restart the *Picture Craft* disc. Select the option to 'Edit an old drawing' from the main menu, and load in the picture which appears as HELP from the list of available pictures. The picture will be re-drawn and you can carry on from where you were interrupted when the BREAK key was pressed.

Please note that you should select 'Edit an old drawing' and *not* 'Edit and old painting', as this latter course of action may give unpredictable results.

Cover-up drawing doesn't seem to work properly

It is possible to design a shape of your own, which, when drawn in the 'cover-up' shape mode, will rub out more than just the region inside the shape.

See the paragraph on 'The check key' on page 59 to find out how to avoid this problem.

I want to make some changes to a drawing I have saved

Simply select the option to 'Edit an old drawing' from the main menu and carry on from there.

4 The PAINTING unit

Introducing the PAINTING unit

The PAINTING unit of *Picture Craft* allows you to paint your designs and pictures using either plain colours or a range of two-colour striped and 'dotty' patterns. Several other useful facilities are provided and these are described in detail below.

Important note The instructions for using the PAINTING unit which

follow assume that *all* of the facilities of the PAINTING unit have been turned *'on'* using the SET UP unit (see Picture painting options, page 30).

In the picture below, the PAINTING unit has been SET UP with all the options switched 'on'.

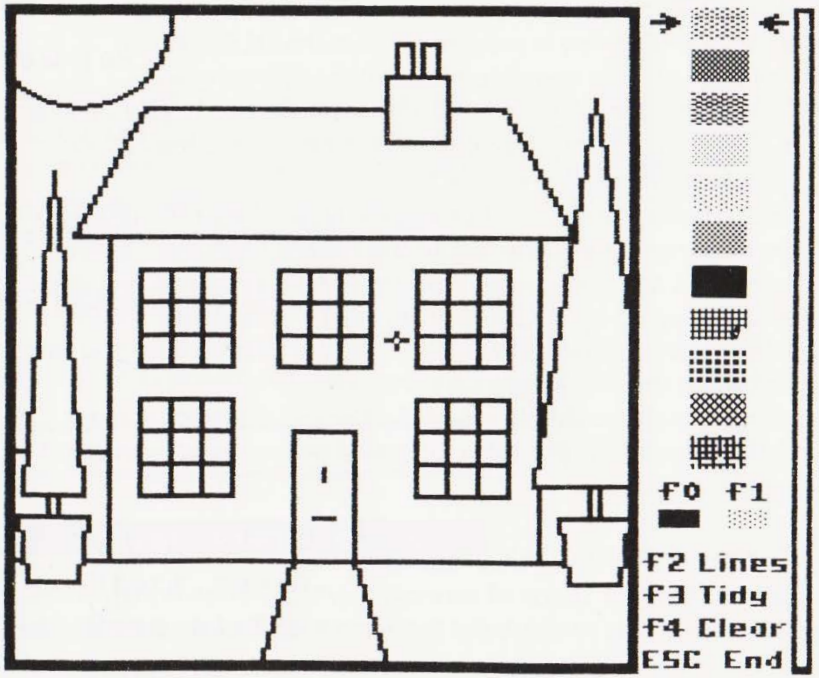


Fig. 36

Moving the cursor

The painting cursor appears initially as a small light blue cross (+) near the centre of the screen. You use this cursor to tell *Picture Craft* which region of your design you want to paint. The painting cursor is moved around the picture screen with the four arrow keys in the same way as you moved the shape- and line-cursors in the DESIGN unit.

If, at the same time, you hold down one of the SHIFT keys, the painting cursor moves rapidly around the picture area.

If you hold down the control key (labelled CTRL), you will have fine control over the painting cursor, which now moves slowly, in very small steps. This is useful when trying to paint very small regions.

Selecting a colour

When you first enter the PAINTING unit you will see eleven coloured boxes to the right of the picture area. The top seven boxes are the plain

colours, and the lower four show the striped and dotty patterns which are available. Two arrows point to the top red box, showing that red is the colour currently selected for painting.

To select a different colour, either press the space-bar until the arrows point to the colour or 'mix' that you want, or use the 'A' and 'Z' keys to move up and down the colours instead.

When you have selected your colour or mix, press the RETURN key to fill the region under the painting cursor. If you hear a beep, you are on a line, and the shape cannot be painted. Move the cursor so that its centre is *inside* the shape you want to paint. To change the colour of any region, just paint over the top of the old colour.

Deleting a colour

You can change the colour of any region of your picture, just by painting over the top of it with a new colour. However, you may sometimes want to just remove the paint completely from a region.

To do this, move the cursor inside the region you want to clear and press the DELETE key.

Mixing colours

Beneath the lowest dotty pattern, you will see two smaller boxes, labelled 'f0' and 'f1'. These two boxes are initially red and yellow, which are the 'mixing' colours used for the four striped and dotty painting options.

Pressing the red function keys f0 and f1 changes the mixing colours used for the striped and dotty patterns. Try it and see. Any two of the seven plain colours may be selected for each of the mixing colours. This allows a total of 112 different colour selections for painting your picture!

Changing the outline colour

The red function key f2 changes the colour of the lines of your design.

This is always set initially to white, but all seven plain colours or black can be selected. The line colour selected when you save your picture is remembered, so that when you display your picture, or use your picture in one of the picture puzzles, the picture appears with your chosen colour for its outline. You may also choose to have your picture drawn with black lines! This might, at first, seem a strange thing to do, especially before you start painting, as you will appear then to have a completely blank picture area! However, there are several good reasons why you will sometimes want to do this.

Firstly, it enables you to turn your pictures into 'magic' pictures. You will find out more about these in Part 6 of this Section, which describes

the *Picture Craft* games (page 48), and also see 'Creating ''magic'' pictures', (page 51).

A second reason for this option is that many designs, when completely painted, look particularly striking with a black outline. Try it and see what you think.

Tidying your picture

The 'tidy' key fills *all* unpainted areas of the screen in whatever LINE colour is currently selected. Pressing the tidy key (red key f3) causes the repeated warning beep to sound. As usual, you must press the key a second time to confirm your desired action, or press any other key (except BREAK) to cancel it.

The tidy option is most frequently used at the end of a painting, and is specially useful when you have drawn a complicated design which includes a number of very tiny regions in it. The tidy option allows you to fill all these tiny areas in one go. Simply select the line colour which you think looks best for your picture, using key f2. Now press f3 (twice) and all the remaining spaces are filled in in the same colour as the picture lines.

There are other situations in which the tidy option is useful. Suppose you choose to paint a design using just the two colours red and blue (this can often look very striking). Select the colour red and paint in all the areas which you want to be painted in this colour. Now use f2 to change the line colour to blue and press the tidy key. All the remaining regions are filled in blue. This can be much quicker than painting all the regions separately. You may then want to choose a different line colour before saving your picture.

Although you will usually choose this option as one of the last things you do to your picture, you *may* tidy your picture at any time. The tidy option can only be used once in each painting, so the message 'f3 Tidy' is removed after the tidy option has been used. It is reinstated, however, if the picture is cleared of paint using the clear option (key f4).

It would not make sense to tidy a picture in black; so, when the line colour is set to black, the tidy feature is disabled.

NOTE: A region which you have painted but then cleared using the DELETE key will remain unaffected when you select the tidy option. This allows you to choose to keep particular areas black.

Clearing your picture

You can clear all the paint from your painting at any time by pressing the red function key f4. As it would be unfortunate if this key were pressed

by accident, you will hear the repeated warning sound and must press f4 a second time to confirm that you really want to clear the screen.

The 'colour memory' indicator

As you paint areas of your picture, you will notice the green bar rise on the far right of the screen. This is the colour memory indicator. If you change the colour of a previously painted area, *Picture Craft* detects this and no extra colour memory is used. (The one exception to this is explained in the note below.)

When the memory indicator is full you will not be able to paint any new regions, although you may change the colour of previously painted regions. You may use the tidy feature at this point to fill any remaining regions with a chosen colour. *Picture Craft* allows you to paint over 80 regions in total.

NOTE: Suppose that you have run out of colour memory and there are still some regions you wish to paint. To do this, use the tidy feature to paint all the remaining areas in yellow. Now, although there is no picture memory left, *Picture Craft* allows you to re-paint (or clear with the DELETE key) any previously painted regions. It does *not*, however, allow you to paint over any *tidied* regions.

Fortunately, *Picture Craft* makes it easy to tell which regions have been tidied – the picture cursor flashes when it is over any tidied area.

Moving on

When you have finished painting your design, and you are ready to move on, press the ESCAPE key. You will hear a repeated warning beep. To confirm that you really want to move on, press the ESCAPE key a second time. If you have pressed the ESCAPE key by accident, press any other key (except the BREAK key) to cancel it.

The PAINTING menu options

When you have ended your design by pressing the ESCAPE key, you will see the menu shown below:

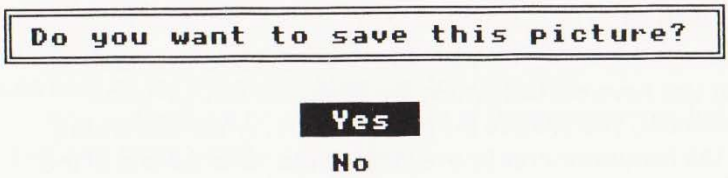


Fig. 37

If you choose to save your picture, you will be asked to enter a name for your picture, before returning to the main menu. If you choose not to

save it, *Picture Craft* returns you directly to the main menu.

Troubleshooting

I tried to tidy my picture, but it didn't seem to work properly

Any region which has been painted is not affected by the tidy facility. This is true even if a painted region has been cleared using the DELETE key. This is useful as it allows you to keep certain areas black if you want to.

I've accidentally pressed the BREAK key and lost my picture

On page 40 you will find an explanation of how to recover a picture after the BREAK key has been pressed when you are using the DESIGN unit.

This method of recovery usually works equally well if BREAK is pressed when using the PAINTING unit. The only difference is that, in this case, you *may* then select the option to 'Edit an old painting'.

Your painting should be re-drawn and you should be returned to exactly the same position you were in before pressing the BREAK key.

I've pressed the tidy key and my picture seems to have disappeared.

Suppose the first thing you did with your picture was to select the tidy option. Now, if the lines are white, the unpainted regions (which would be the whole picture) will be filled in white. The picture hasn't really disappeared. Press key f2 to change the line colour and you will see it reappear.

I'm pressing the tidy key, but I just hear a beep

Your line colour is currently set to black. It does not make sense to fill the black regions in black, so *Picture Craft* does not let you use the tidy option. Change the line colour to the colour you wish to use for tidying and try again.

5 The DISPLAY unit

Displaying a picture

You select the option to 'Display a picture' from the main menu. (It is assumed that you have set this option 'on' from the SET UP unit.)

After a moment, you will see the picture menu, which shows the names of all the pictures currently available to you. Choose one of the picture names in the usual way, using the space-bar (or the 'A' and 'Z' keys) to select a picture name and pressing the RETURN key to complete the action. You will see your picture re-drawn with the line colour

set to white. The line colour is then set to black (so that the picture appears to have vanished), and the picture is re-painted.

Finally, the line colour is re-set to the colour you chose when the picture was first saved. Beside the picture you will see the message 'ESC end'. Pressing the ESCAPE key (twice) returns you to the main menu.

Printing a picture

If you have an Epson-compatible printer attached to your computer, and the printer option has been set 'on' from the SET UP menu, you will also see the messages 'f0 Shaded print' and 'f1 Outline print'.

Pressing f0 will print your picture to the printer, showing each colour as a different shade. Selecting an outline print will print only the outline of you picture, that is, the drawing your created with the DESIGN unit.

Printing a complete picture takes a few minutes. When the printing has finished, you will see the messages reappear beside the picture and a beep will sound.

Saving a picture for use outside *Picture Craft*

Picture Craft saves its pictures in a highly compacted format, allowing you to save many pictures on a single picture disc. To use a picture outside of *Picture Craft,* you need to save the screen in an uncompacted form, and this is achieved as follows.

Remove the program disc from drive 0 and replace it with the disc which you want to save the picture to.

Now press these *three* keys: CTRL, 'S' and 'P' (SP stands for 'save pictures). The messages beside the picture will disappear, and you will hear the disc whirr. When it stops and you hear a beep, replace the program disc in drive 0 and press the two keys CTRL and C (for 'continue'). You can now continue using *Picture Craft.*

The picture will have been saved using the file-name PICTURE.

Picture Craft makes no checks before saving, and the disc you are saving the picture to will require a lot of disc space (20 480 bytes, in fact). If you are not sure whether the disc you are intending to use has enough space left on it, it might be safer to use a formatted, and blank, disc for this purpose. Assuming that there are no other files present, a 40-track disc can hold four pictures saved in this way. An 80-track disc can hold up to nine such uncompacted pictures.

You will find out how to make use of these uncompacted pictures in your own programs on page 84.

6 The GAMES unit

How to select a game

From the main menu, select the option to 'Choose a game'. You will then be given the games menu shown below:

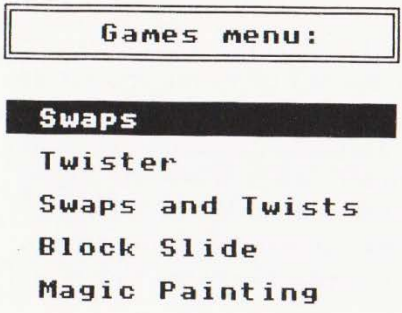


Fig. 38

There are four puzzles and one painting game.

The four picture puzzles have many features in common. These common features are described first and are followed by a description of the differences for each puzzle.

The games range from very easy to very hard! 'Magic Painting' is by far the easiest activity and is suitable for children from four years upwards.

'Twister' will be managed by many children from five years upwards, at the easier levels.

'Swaps' comes next in order of difficulty, followed by 'Swaps and Twists' and finally the 'Block Slide' game, which many adults find difficult, particularly at its hardest level!

Common features of the picture puzzles

The picture puzzles all need a picture to work with. This could be a picture you have created entirely yourself with the DESIGN and PAINTING units, and then saved, or a picture saved from the Magic Painting game (which is described below), or one of the sample pictures provided.

Some pictures make better puzzles than others. Irregular designs or pictures often make the most interesting puzzles, whilst very symmetrical designs often result in extremely difficult puzzles.

When you select a picture puzzle, you are offered a list of all the pictures currently available, and you select one of these in the usual way. You will then see the picture re-drawn, in the same way as if you had

chosen to DISPLAY the picture and, when it is complete, you will see the messages

How
Hard?
f5
f6
f7
f8
ESC end

displayed to the right of the picture.

All the picture puzzles mix up your picture into a number of squares, and your task is to rearrange the pieces.

Each puzzle has a help card, and if you place one of these cards above the red function keys you will see a row of larger squares, each divided into a number of smaller squares above the keys f5 to f8. (The Block Slide puzzle has only three possible levels.) This shows you how many pieces there will be in your puzzle, and this varies from a four-piece puzzle to a 25-piece puzzle. (The easiest option in the Block Slide puzzle is a nine-piece puzzle.)

On selecting a level, by pressing one of the red keys f5, f6, f7 or f8, you will see the picture become jumbled up. The 'How hard?' messages are now removed and are replaced with a summary of the keys needed to solve the particular puzzle chosen. All the keys are also summarised on the appropriate help card.

Each puzzle has a help key. If you press key f0 the picture is reconstructed, and remains sorted as long as you keep key f0 depressed. When you let go, the picture returns to its jumbled state. You can use this key as often as you like.

Each puzzle also has a 'Give up' key. If you press f1, the repeated warning beep sounds. A second press sorts the picture out for you, and you are then offered the chance to repeat the puzzle.

Every picture puzzle allows you to change the picture's line colour. Pressing the red key 'f2' cycles through all the line colours available.

All the picture puzzles except Block Slide use a cursor, which consists of four small black squares which mark the corners of the currently selected puzzle square. These cursor squares would not show up against a black background. If, therefore, you have slected a picture which has unpainted areas left in it (which you are quite entitled to do), *Picture Craft* paints these areas for you. (How exactly it does this is described in the 'Troubleshooting' section.)

This process does not affect your picture in any permanent way. For example, if you later chose to DISPLAY the picture, the unpainted areas would still appear black.

Picture Craft always detects when a picture puzzle has been successfully completed: it then plays a simple tune.

The policy of keeping the sound used to a minimum is followed even with the *Picture Craft* games. The trials have shown that most children get great satisfaction from the success of completing a picture puzzle, and none has yet complained about the lack of continual noises or long tunes while they are playing!

Whether a picture has been successfully completed or the option to 'Give up' has been taken, the current messages are removed from the screen, and are replaced by the 'How hard?' messages again. Children may choose to repeat the puzzle, perhaps trying a harder or easier one. At this stage it is also possible to press the ESCAPE key twice, to return to the main menu.

Many children enjoy the challenge of repeating a puzzle at the same level, but this time trying to reduce the number of times they press the help key.

The differences between the individual games are now described.

Swaps

In Swaps, the computer divides the picture into a number of smaller squares (how many depends on which level you have chosen) and mixes up the positions of all these smaller squares. Your task is to sort out the picture. You do this by swapping pairs of squares until the picture is restored.

Decide which two puzzle squares you wish to swap and use the arrow keys to select the first of these. Now press the RETURN key and the chosen square will be highlighted with a black outline around it. (If you change your mind, you can cancel your first selection by immediately pressing the RETURN key a second time.) Now move the cursor to the puzzle square you wish to exchange it with, and press the RETURN key again. You will see the two puzzle squares swap positions.

You continue this until the picture is completely restored.

Twister

Twister is, for most children, the easiest of the picture puzzles. In this puzzle, the computer twists each puzzle square around, through one, two or three quarter-turns.

To restore the picture, select a puzzle square with the cursor keys and use the red function keys f3 and f4 to turn the square. Key f3 turns

the puzzle square through a quarter-turn in an anti-clockwise direction and f4 turns the puzzle square in a clockwise direction.

NOTE: Some children find it easier to use just one of the 'turn' keys, which is quite adequate for solving the puzzle.

Swaps and Twists

As you might guess from its name, this challenging game is a mixture of the first two games, Swaps and Twister, since you have to swap *and* turn the pieces of the puzzle to restore the picture.

NOTE: In 'Twister' and 'Swaps' and 'Twists', you may notice a slight loss of resolution in your picture. This is for technical reasons.

Block Slide

This is the hardest of all the puzzles, and provides a stimulating challenge for people of all ages. The bottom right-hand puzzle square is removed and the computer then mixes up the picture by sliding an adjacent square into this empty space. This is repeated until the picture is well mixed. When the computer has finished its mixing, there will, of course, be one empty puzzle square. You use the arrow keys to move one of the adjacent puzzle squares into this space.

You have solved the puzzle when the entire picture is restored except for the bottom right-hand square. The computer then restores this final piece for you. Children will be well advised to stick to the easiest level at first, before moving on to the harder levels.

The reaction of many people on first meeting this puzzle is that it is impossible! This is never true, but the puzzle is not easy. You need to develop some strategies or plans; and, with perseverance, older children will often manage to develop their own successful strategies.

Those who would like some hints, however, may find the following notes useful.

1 There is often an initial tendency to get one piece in the right position and then be reluctant to move it. This is not a good strategy!

2 One useful strategy I have found (though there may well be better ones) is to try to get one side of the puzzle completed at a time. This should be either the top row or the left-hand edge, away from the bottom right-hand corner.

Magic Painting

When you select this game, you will see a screen which looks just like the PAINTING unit, with all the colour-mix and other features turned off. The only difference is that there does not appear to be any picture to

paint. You will hear a series of tones. When these have ended, you will see the familiar painting cursor in the middle of the picture area (*Fig. 39*).

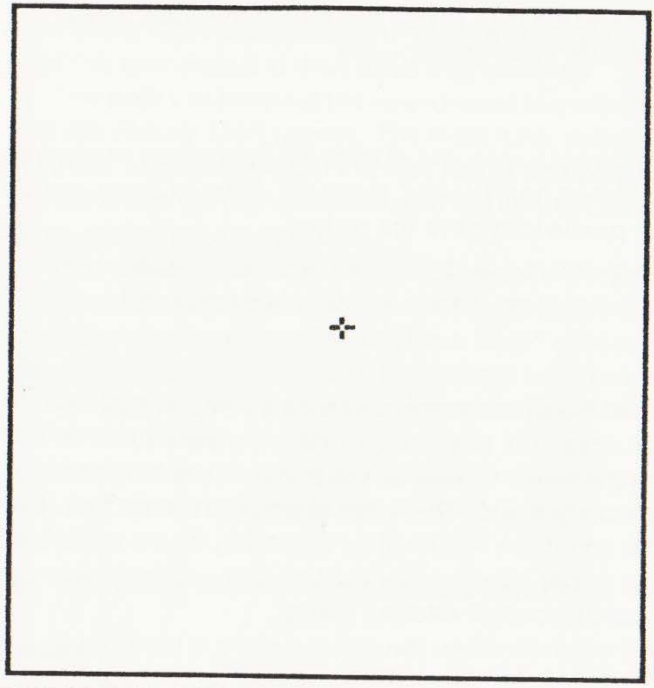


Fig. 39

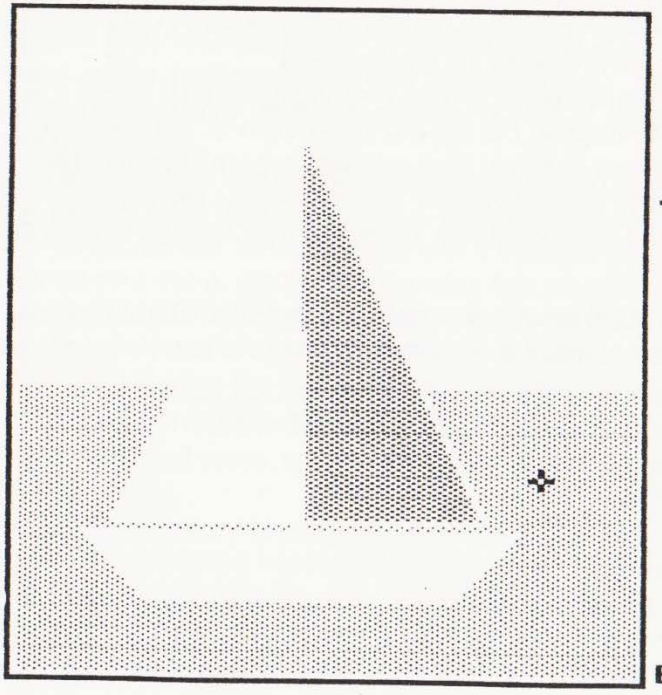


Fig. 40

While you have been listening to the tones, a picture has, in fact, been drawn, but its lines are invisible. To discover what the picture is, you just paint the picture, using the same keys you would use in the PAINTING unit. (Refer to Part 4 of this section if you have forgotten which keys to use.) The picture will gradually grow in front of you as you paint more areas of it. Children love to try and guess what the picture is going to be.

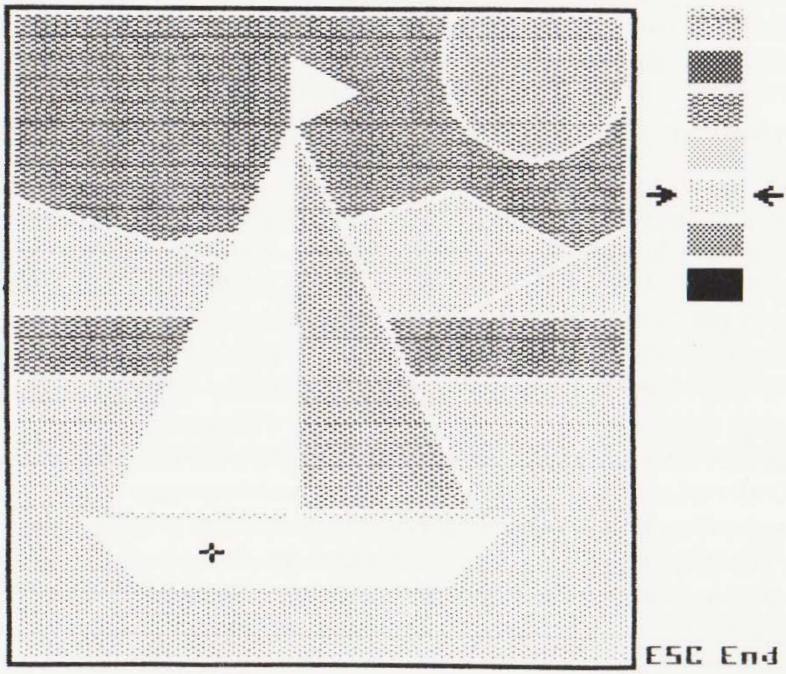


Fig. 41

When you have revealed the picture, you can go back and change the colours of any areas if you want to.

When you have completed the picture, press the ESCAPE key twice to end.

You will then see the following menu:

Fig. 42

You can save the last picture, in which case you will be prompted for a name for the picture. As with *all Picture Craft* pictures, you could then

use the picture for a picture puzzle, or you could edit it using the DESIGN or PAINTING units. After the picture has been saved, you are returned to the main menu.

Selecting the 'Main menu' returns you straight to the main menu. Selecting 'Another magic picture' will give you the chance to paint a new magic picture.

There are fifteen different magic pictures, and *Picture Craft* makes sure that no picture is repeated until you have worked through all these fifteen different pictures.

Troubleshooting

Those are not the colours I used for the picture!

All the picture puzzles use a black cursor of various sorts. If you choose a picture which you have not completely painted, these black cursors might be impossible to see. Fortunately, *Picture Craft* takes care of this and notices any black regions in your picture. Regions which you have painted, but later cleared with the DELETE key, are filled in dark blue, and any other areas are 'tidied' in the line colour of your picture.

Picture Craft doesn't think I've completed my picture puzzle, but I do!

Picture Craft makes a very careful check to find out when your puzzle is complete. It will notice if even a single dot of your picture is wrong! Try pressing the 'help' key f0, and watch for any slight changes.

If you have designed an abstract but very symmetrical pattern and are playing Twister or Swaps and Twists, it is possible that you might have rebuilt the picture upside-down. If all else fails, press f1 to give up, then press ESCAPE to get back to the main menu and select a different picture for your puzzle.

I can usually do sliding block puzzles but this one is impossible!

No it's not; but if you find that you can get all except one piece in the right place, then a crafty thing may have happened!

Look at your picture carefully and you will probably find that two of the puzzle squares are exactly the same.

Before you can solve the puzzle, you will need to exchange the positions of these two identical pieces. You will find that you can now solve the puzzle. If more than two pieces are the same, or there are several pairs the same, you will still only need to exchange one similar pair.

7 The SHAPE unit

Introducing the SHAPE unit

The *Picture Craft* DESIGN unit allows you to design pictures using seven different shapes and also straight lines. The shapes comprise six polygons (straight-sided shapes) and a circle.

The SHAPE unit, selected from the main menu, allows you to re-design each of the six polygons and save them as a new shape-set (with or without the circle). You can then use these new shape-sets to design new pictures. You can also use the SHAPE unit to edit a shape-set which you previously designed and saved.

Although it is easy to re-design the shapes using *Picture Craft* alone, you will often find that you want to plan your new shape-set on paper first. A special shape design worksheet is supplied for this purpose. If you have access to a photocopier, take copies of this worksheet and plan your new shape-set on this. Alternatively, you can lay tracing paper over the top of the worksheet and design your shapes on this. It is also possible to use squared or dotted paper as well. This advice applies to the other worksheets as well.

It is not envisaged that the youngest children will design their own shape-sets, but they will, of course, be able to experiment with new sets created by others, or one of the sample sets provided.

The SHAPE unit works in a slightly different way from the rest of *Picture Craft*. You respond to the computer by pressing appropriate letter and number keys, instead of making all your selections with the space-bar.

Picture Craft always tells you which keys you should press. If you need to press the RETURN key at any time, this will be made clear to you. The only exception to this is where a yes/no answer is required. In this case just press the letter key 'Y' or 'N'.

There are two options from the main menu which use the SHAPE unit. These are the options to 'Design a new shape-set' or to 'Edit an old shape-set'.

Creating a new shape-set

When you select this option from the main menu, you will see the screen overleaf, *Fig. 43*:

The six shapes which appear in the six windows on the left of the screen are the shapes of the usual set. Press a number from 1 to 6 to choose which shape you wish to change. You are then asked if you want to edit the existing shape.

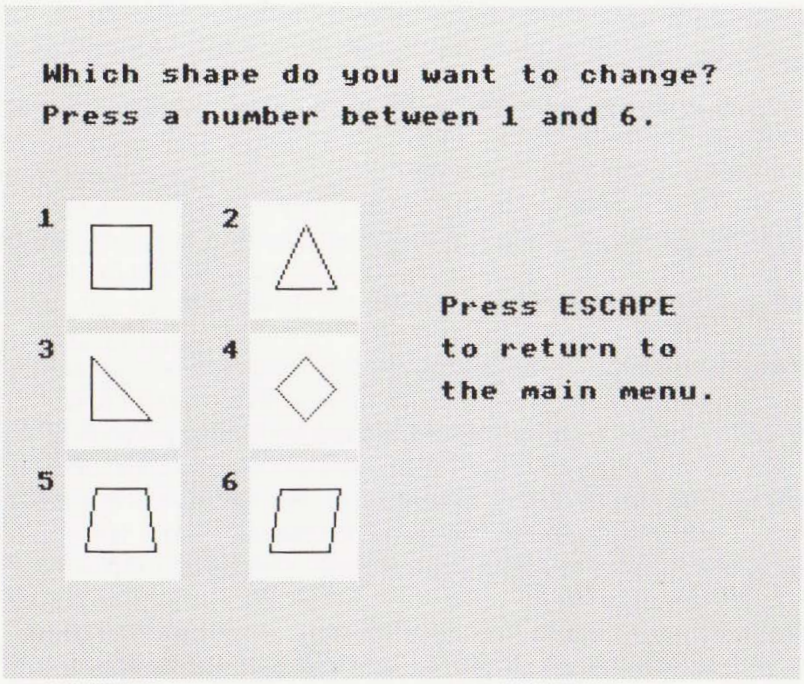

Which shape do you want to change?
Press a number between 1 and 6.
1
2
3
4
5
6
Press ESCAPE
to return to
the main menu.

Fig. 43

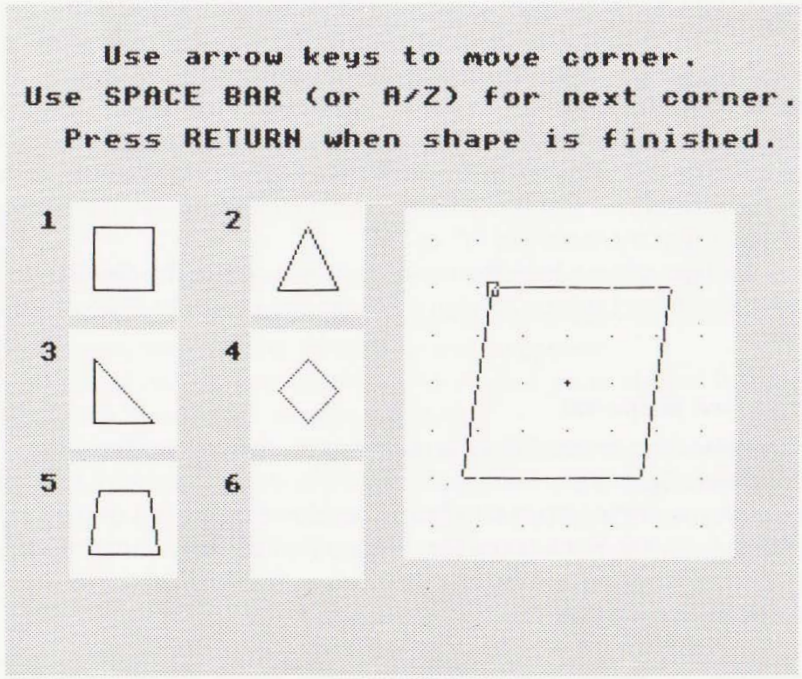

Use arrow keys to move corner.
Use SPACE BAR (or A/Z) for next corner.
Press RETURN when shape is finished.
1
2
3
4
5
6

Fig. 44

When I selected shape number 6, and then answered 'Yes' to the question 'Do you want to edit the existing shape?', my computer screen looked like *Fig. 44*.

The shape which I chose has been copied to the large shape design grid where it can now be changed.

You will see that one of the corners of the shape is marked by a small square cursor. This corner can be moved with the four arrow keys. To move on to the next corner, press the space-bar (or use the 'A' and 'Z' keys which allow you to move around the corners of the shape in either direction).

When the shape is as you want it, press the RETURN key. The new shape is copied to the empty window. You are then offered the chance to change another shape. I chose to change shape 3 and the right-angled triangle in window 3 disappeared.

This time, when I saw the question, 'Do you want to edit the existing shape?', I pressed the letter 'N' to answer 'No'.

You are now aksed to say how many sides you want your new shape to have, and you can choose any number up to 12.

I entered the number 8 and pressed the RETURN key. Now the screen looked like *Fig. 45* and I was able to invent a new shape with 8 sides:

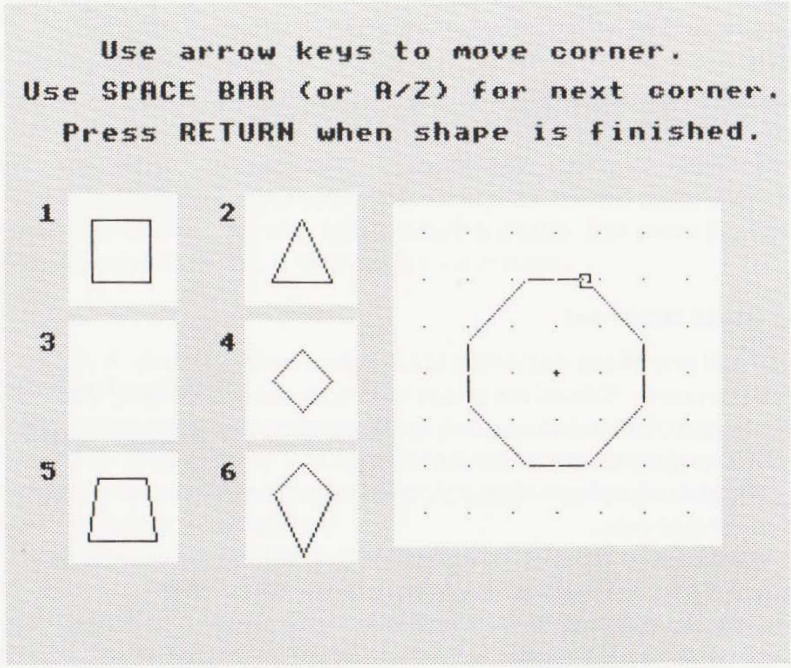


Fig. 45

You can carry on changing shapes until you tell *Picture Craft* that you don't want to change any more. You will then be asked, 'Do you want to save this shape-set?' If you answer 'No', you will simply return to the main menu. If, however, you answer 'Yes', then you are asked one further question. This is, 'Do you want to add the circle to your shape-set?' Usually you will want to include it, so answer 'Yes' by pressing the 'Y' key, and you will see the message 'Circle: ON' appear beneath the six shape windows.

If you choose not to include the circle, you will see the message 'Circle: OFF'. In either event, the screen will clear after a few moments and you will be prompted for a name for your shape-set.

NOTE: You will probably have noticed that some of the dots in the shape editing window are crosses, and that you hear a beep every time you move a corner to one of these crosses. *Picture Craft* has been carefully designed so that if you limit the corners of your shapes to the crosses, you will find that the different shapes tend to fit together very easily when used in the DESIGN unit. They also fit together with themselves or rotations and reflections (flips) of themselves very neatly. This can be very useful if you are investigating tiling patterns (tessellations).

You do not have to limit your shapes to these crosses; but, if you don't, you will find that when you try to fit shapes together in the DESIGN unit, you have to make greater use of the fine-cursor-control facility (obtained by holding down the CTRL key while pressing the arrow keys).

It is particularly useful to keep this in mind when planning shapes for tiling patterns. The example shape-sets TESSET1 and TESSET2 were designed using only the white dots.

Editing an old shape-set

You may edit any shape-set which you have saved previously. If you select the option to 'Edit an old shape-set' from the main menu, you will be offered a list of all the shape-sets currently available. Select the name of the set you want to edit in the usual way.

Fig. 46 shows what my screen looked like when I selected to edit one of my shape-sets.
Notice that because I previously chose to save it without the circle, the message beneath the six shape windows reads 'Circle: OFF'.

Individual shapes can now be edited in the usual way, and then the whole set can be saved again.

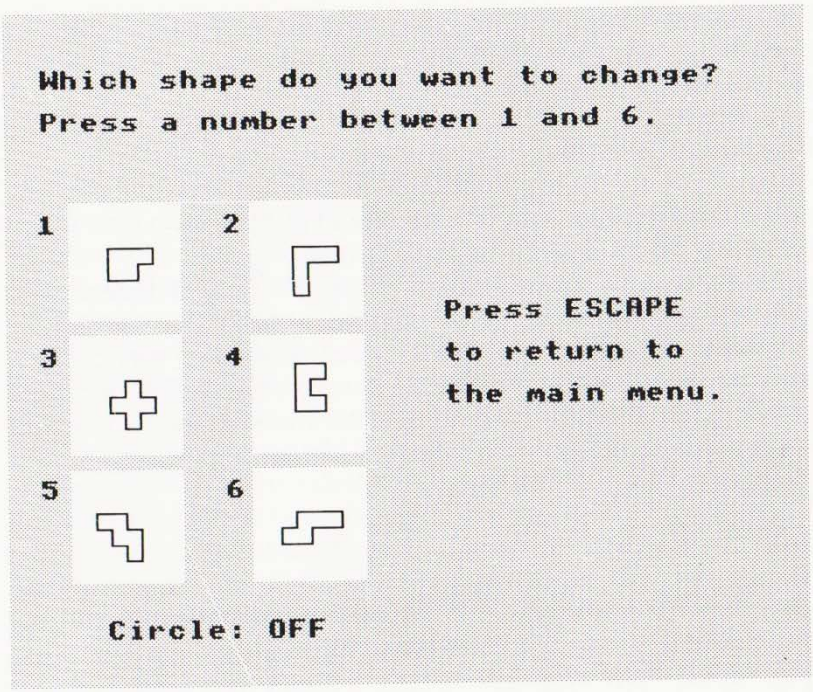


Fig. 46

Viewing a shape-set

If you don't want to change an old shape-set, but just want to take a look at it, select the option to 'Edit an old shape-set', and choose the set you want when you are given the list of shape-sets to choose from.

After a few moments you will see a screen like the one above. Instead of pressing a number key to select a shape, just press the ESCAPE key and you will return directly to the main menu.

Troubleshooting

It is possible to design a shape which, when used in the DESIGN unit in 'cover up' shape mode, will appear to rub out more than just the region inside the shape. There is a 'hidden' option in the design program to help overcome this problem.

Try this for yourself. Select the option to 'Design a new shape-set' from the main menu and select the square (shape 1) to be the shape you want to edit. When you see the shape transferred to the shape-editing screen, press the letter key 'C' (for 'check').

While you hold the key down, you will see dotted lines drawn from the centre of the edit screen (marked by a larger cross) to each of the four corners, as in the picture below (*Fig. 47*).

As long as none of the dotted lines pass outside the shape (in this case they do not), the 'cover up' drawing mode will work correctly.

If you find you are having problems with a particular shape, you will often find that the problem can be easily cured just by moving the shape to a more central position on the editing screen.

To move the whole shape, hold down the SHIFT key and press the arrow key to move the shape in the required direction.

In the next diagram, *Fig. 48*, can you see that some of the dotted lines pass outside the shape? This could cause problems when using the 'Cover up' mode in the DESIGN unit, but if the whole shape is moved up on the shape-editing screen, the problem is solved.

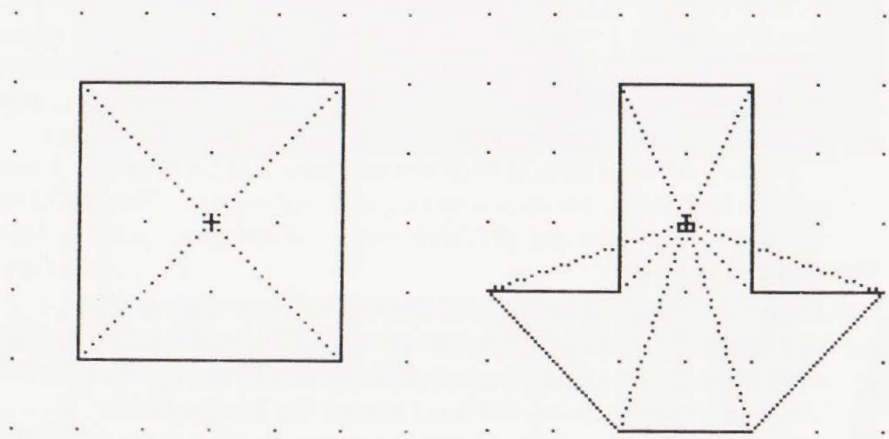


Fig. 47

Fig. 48

8 Transferring the sample pictures to a separate disc

Over twenty sample pictures and seven sample shape-sets are already provided for you to experiment with. They are stored in a specially compacted program on the master program disc. Providing them in this form, rather than on a separate disc, has helped to keep the price of this pack as low as possible. The following section on 'Getting the most from *Picture Craft*' refers you to a number of these pictures and shape-sets.

The pictures and shape-sets are kept on your master disc in a special program called FILES. These are easily transferred to a disc of

your own. To do this, you need to prepare a blank, formatted disc, ready to receive the pictures and shape-sets. Now place the master *Picture Craft* disc in your disc drive (drive 0 if you have double drives) and type:

MODE 7 <RETURN>

PAGE=&1900 <RETURN>

CHAIN "FILES" <RETURN>

Now just follow the simple instructions, inserting the blank disc in your disc drive when told to do so.

To make use of these pictures and shape-sets, you will need to use the SET UP unit to tell *Picture Craft* where to look for the picture disc. Place the *Picture Craft* disc in drive 0 and start up the disc with SHIFT + BREAK in the usual way. From the main menu, press the CTRL and 'S' keys to take you to the SET UP menu. Select 'Set disc drive for pictures' and answer 'NO' to the question 'Do you want to save pictures to the program disc?' If you have a single-disc drive, select drive 0, and if you have double drives, select drive 1. Users of single-disc drives can now use the pictures and shape-sets supplied. *Picture Craft* tells you when you need to swap the discs around.

If you have double drives, place the *Picture Craft* disc in drive 0 and then the picture disc you have just created in drive 1.

9 Disc tips

What to do when your disc is full

In Section 2 you discovered how to produce a working copy of the *Picture Craft* disc. You also found a list of the files which could be removed from your working copy to make more room for pictures and shape-sets.

If you are saving your pictures to the program disc and you have no more space to save new pictures and shape-sets, you can use the SET UP unit to delete some pictures and shape-sets. This is described on page 27.

If you don't want to lose your pictures, you can first copy them to another disc.

To do this, press CTRL and BREAK, then type:

*CAT <RETURN>

This will give you a catalogue of all the files on your disc.

Picture files are always preceded by a letter 'P', for example 'P.HOUSE'.

Shape-set files are always preceded by an 'A', for example 'A.NEWSET'.

To copy a file called P.HOUSE using single disc drives, type:

*COPY 0 0 P.HOUSE <RETURN>

and follow the instructions on the screen.

With dual-disc drives, place the source disc in drive 0, the disc you wish to copy to in drive 1, and type:

*COPY 0 1 P.HOUSE <RETURN>

More space for single-drive users

If you have a single-disc drive, you will often want to use it to save pictures to. This will save your having to swap between the program disc and the picture disc. You will therefore want as much space on your program disc as possible.

From the working copy of your program disc (*not* the master disc), there are a number of files which you can remove without affecting the performance of *Picture Craft*. To do this, type in the following commands. (Note that <RETURN> means 'press the return key'.)

*DELETE EMENU <RETURN>

*DELETE ECONFIG <RETURN>

*DELETE FILES <RETURN>

*DELETE DISCOPY <RETURN>

This will allow you to save extra pictures to the program disc before it fills up.

When there is no more room on the disc you are using for your pictures, *Picture Craft* usually warns you of this.

The only time when it does not do so is if you are using a single-disc drive and are saving your pictures to a different disc. This is to reduce the amount of disc swapping you have to do. It is useful, therefore, to have a spare formatted disc handy.

Many of the activities and suggestions in the next section refer you to the sample pictures and shape-sets included with *Picture Craft*.

Over twenty sample pictures and seven sample shape-sets are provided for you to experiment with. Before you study the activities in the next section, you should transfer these pictures and shape-sets to a separate disc, ready for use. This procedure is explained on page 60.

These suggestions are designed to introduce you to some of the many ways of using the *Picture Craft* software. You can either try the activities just as they are described or use them as starting points for further investigation.

Getting the most from *Picture Craft*

1 Designs and pictures

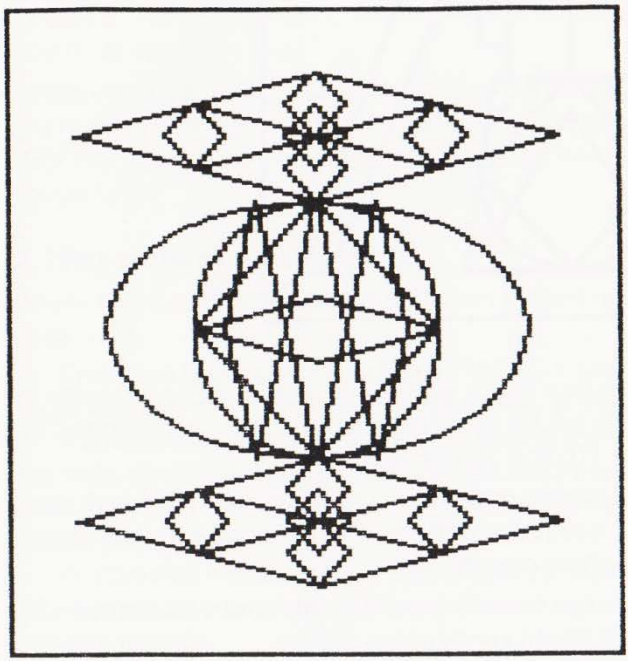
Picture Craft is well suited to creating both pictures and geometric or random designs. For a few examples of what is possible. have a look at the following sample pictures using the DISPLAY unit of *Picture Craft,* or use them to play a picture puzzle.

From the children of Curwen Junior School:

C4 HOUSE A joint effort by class four; the cloud effect is a Curwen School special effect!

SWEET (*Fig. 49*) A design from Cheryl Patrick and Simon Reed (both aged 11), built from just a few simple shapes, suitably stretched, turned and squashed!

Fig. 49



ROCKET A feeling of grand scale is suggested in the rocket picture by Harvinda Saidha (aged 10).

LOLLY Simple but tasty! From Freya Shepherd (aged 8).

SPACE Another from the popular theme of space, this one by Paul Eason (aged 9).

SEASIDE Nine-year-old Victoria Wiseman produced this interesting seaside view through a window. I particularly liked the shark!

From Brockley Junior School:

ROBOT (*Fig. 50*) A colourful robot picture by Jonathan White (aged 10).

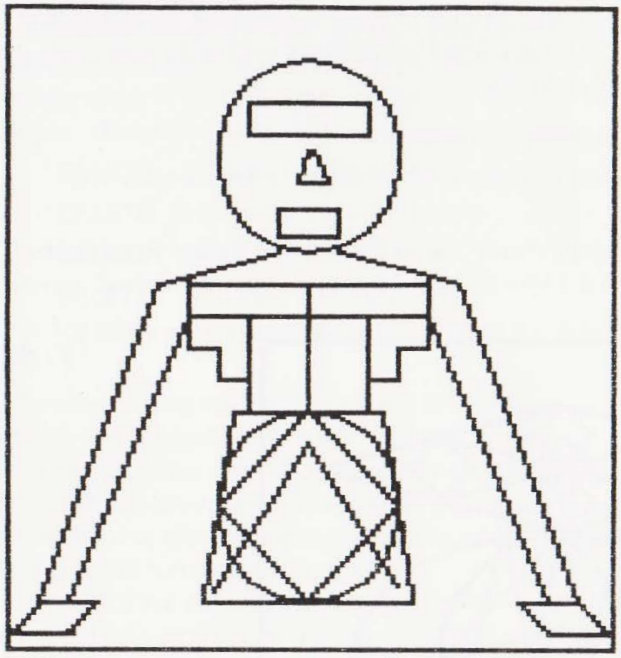


Fig. 50

COMET The popular space theme again, with Halley's Comet visible in the sky over a mountain backdrop. This striking image was designed by Amber Marshall (aged 10) and Tony Bird (aged 9).

The younger children seemed to prefer to create recognisable pictures rather than abstract or geometric designs. I've included a few pictures to show some of the pattern possibilities:

GEEPIC (*Fig. 51*) A design based around a single shape, stretched and flipped and then filled in bright contrasting colours.

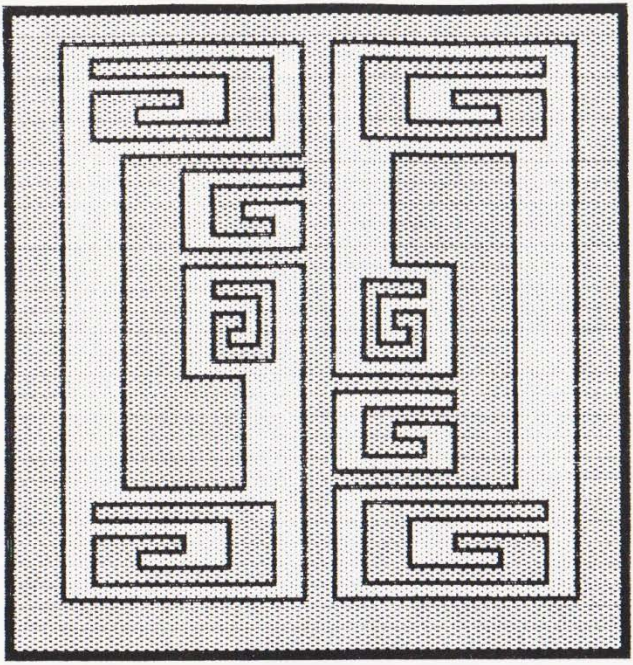


Fig. 51

TESPIC1, TESPIC2 and TESPIC3 Three tiling patterns (discussed on this page).

BLOCKS A three-dimensional image, which appears to 'turn upside-down' as you stare at it!

Some very effective designs can be created using only a single shape. Try making a design using only circles. The sample picture called 'GEEPIC' was designed using a single shape from one of the sample shape sets.

2 Tiling patterns (tessellations)

You will find useful notes on tessellation in Godfrey Hall's section on page 101.

There are two example pictures, TESPIC1 and TESPIC2, which show tessellations with a single shape. One of these, *Fig. 52,* is shown.

You can have a look at these by selecting the DISPLAY option from the main menu. Remember that you will first need to have set up *Picture Craft* to look for its pictures on a separate disc. You will find how to do this on page 84.

A 'complex mosaic', TESPIC3, is also included. This picture, *Fig. 53,* is made up from three different shapes: two different-sized squares and one triangle.

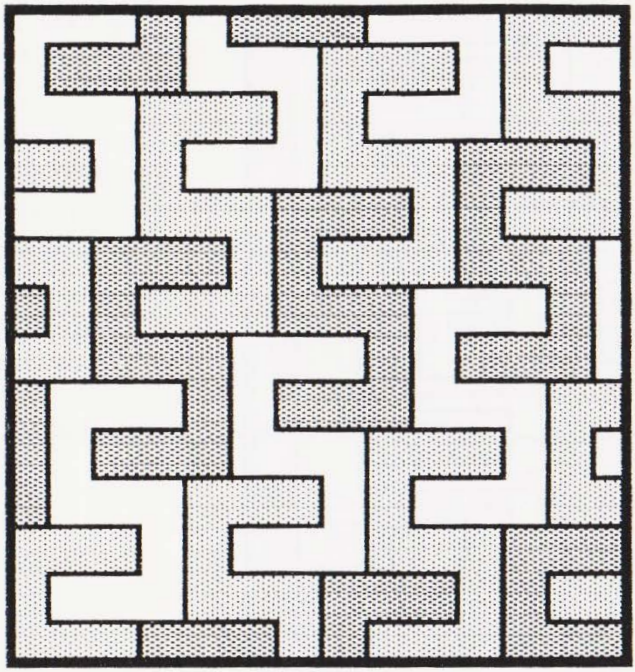


Fig. 52

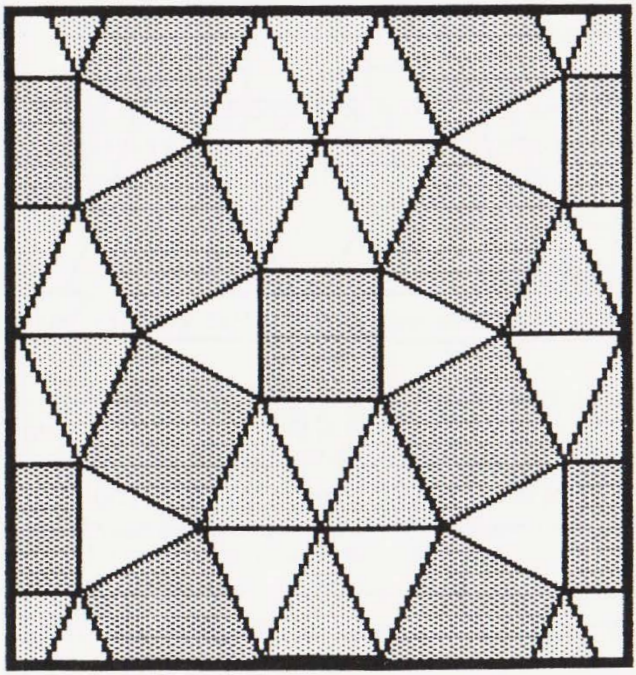


Fig. 53

Two purpose-made shape-sets in particular are included in the sample sets to give you some ideas for tiling patterns. In these, each shape can be made to tessellate, that is, they can be made into a tiling pattern. You might like to experiment with these. They are called TESSET1 and TESSET2. To use these sets, make sure the option to 'Offer other shape-sets' is turned 'On'. (See 'Picture design options' on page 30.)

From the main menu, choose to 'Design a new picture', and when you see the question 'Do you want the standard shape-set?', answer 'No', and you will be offered a choice of the sets available.

There are many investigations which children may like to try, and for which *Picture Craft* proves to be a valuable tool.
For example:

Do all triangles tessellate? What about quadrilaterals (shapes with four straight edges)?

Can all five- and six-sided shapes (pentagons and hexagons) tessellate, and if not, which ones do? What's the most interesting tile you can find which tessellates?

Picture Craft allows shapes to be quickly designed with the SHAPE unit and tested with the DESIGN unit. However, because *Picture Craft* limits you to quarter-turns only, you should be aware that because a particular shape cannot be made to tessellate using *Picture Craft*, it does not necessarily follow that the shape will not tessellate at all.

When investigating tiling patterns, you should ensure that the turn and flip options are set 'On' in the **DESIGN** unit.

3 Polyominoes

A domino is a shape made up of two squares joined by a common edge. A domino is one type of a 'polyomino'. Other types of polyomino are 'trominoes', which are made from three joined squares, and 'tetrominoes', which are the set of shapes made by joining four squares together. You will find a further discussion of polyominoes in Godfrey Hall's section on page 101.

Two sample sets of polyomino shapes are provided. These are TETRSET and PENTSET.

TETRSET gives the five tetrominoes (four connected squares), which are used in the sample picture POLPIC1, *Fig. 54*, which is in fact a 'complex mosaic' of the tetromino shapes.

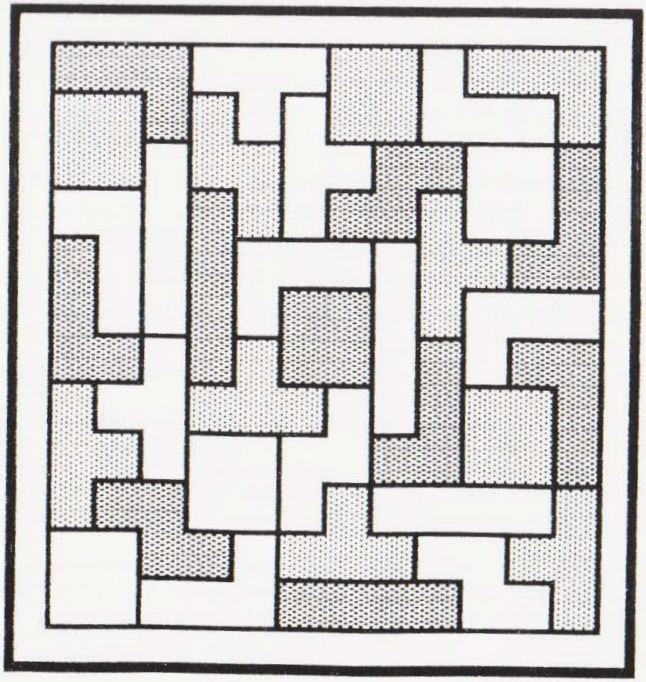


Fig. 54

Here are two tetromino puzzles which you can try with *Picture Craft*. (Select the option to 'Design a new picture' and select the shape set called TETRSET.)

a Can you take each tetromino in turn, and use four of the same type to build a square? The solution for the L-shaped tetromino is shown in *Fig. 55. Which of the other tetrominoes can you do this with?*

b Select the large rectangle included with the five tetromino tiles, and place it near the middle of the drawing area. This rectangle has the same area as the five different tetromino tiles put together. It would be mean to suggest that you try to use one of each of these tiles to exactly fill the large rectangle, as this turns out to be impossible, but see how many different tiles you can use to fill it exactly. (You are not allowed to 'stretch' any of the tiles, but you can 'turn' and 'flip' them.) One solution using three different tiles is shown in *Fig. 56*. Can you make use of four different tiles?

PENTSET contains six of the twelve possible 'pentominoes' which are the shapes made from joining five squares together. Interestingly, each of these can be used individually to make a tiling pattern, though some are quite difficult. You could try finding the other six pentominoes and making a shape-set of these. See if these can tessellate too.

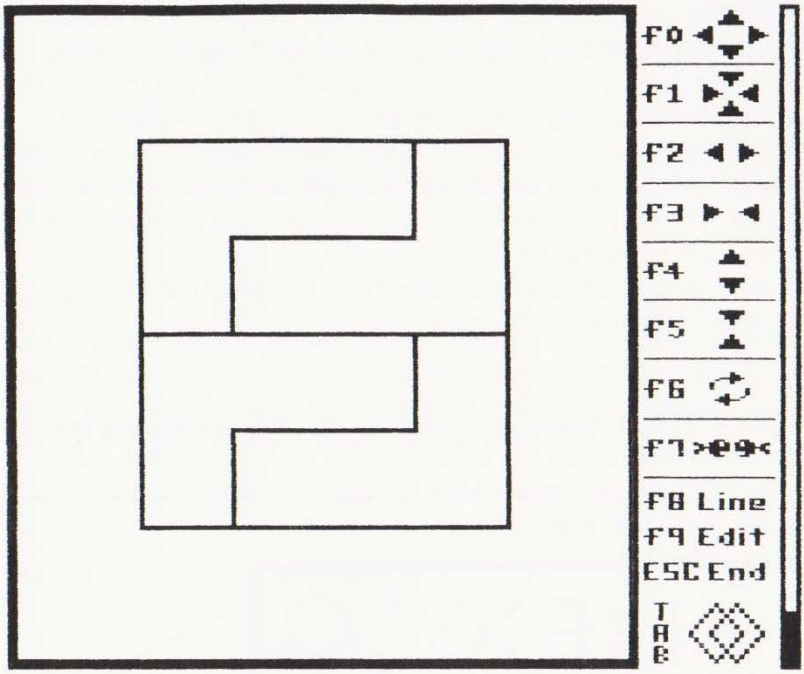

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 55

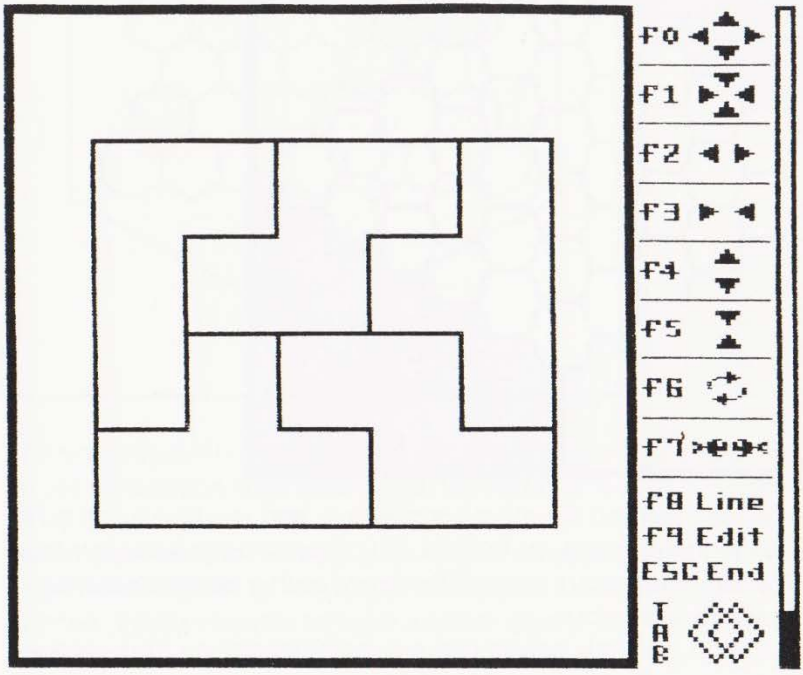

F0
F1
F2
F3
F4
F5
F6
F7
F8 Line
F9 Edit
ESC End
TAB

Fig. 56

4 Board games

Picture Craft is an excellent tool with which children may try to invent their own board games.

It is particularly valuable for games which require special boards which may not otherwise be available. Many games which are normally played with counters can be played too, with the added advantage that different-sized boards may be experimented with. 'Four in a row' and 'five in a row' are examples of these.

A few examples, some old and some new, are given below and sample pictures provided for most games.

Hex

Hex is a game for two players. It is simple to play but not so easy to win! From the main menu, select the option to 'Edit an old painting'. When you see the picture menu, select HEX. The picture will be re-drawn and partly coloured, so that it looks like the picture below:

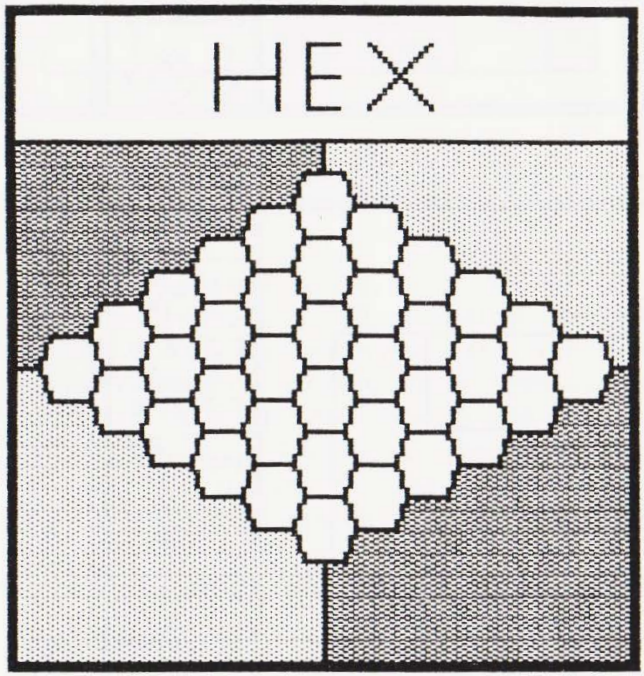


Fig. 57

One of you uses red and the other uses yellow, and you take turns to fill one of the hexagons using your colour. The idea is to connect your two coloured areas on opposite sides of the board with a continuous chain of hexagons of your colour.

Interestingly, the only way to prevent the other person from getting

a winning chain is to complete your own chain, so a draw is impossible.

When you have finished, you can clear the board by pressing red key f4, all ready for another game.

In the game provided, there are six hexagons across each side, but you could make your own board with more or less hexagons along each edge. (The shape-set called TESSET1 includes a hexagon for you to use for this purpose.)

Meander

This is another game for two players using a board made up of hexagons. From the main menu, select the option to 'Edit an old painting'. When you see the list of picture names, select MEANDER. The picture will be re-drawn so that it looks like the picture below:

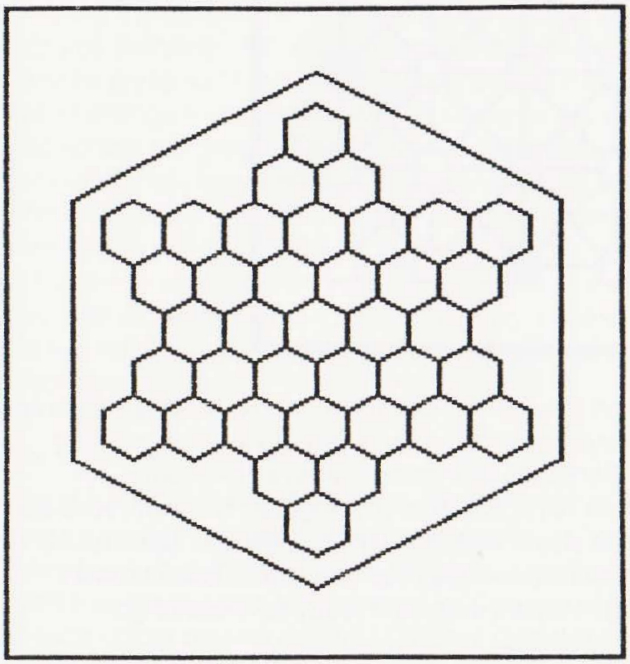


Fig. 58

The first player fills *any* hexagon with a colour of their choice. From now on, each hexagon filled must touch the hexagon which has just been filled by the opponent. The winner is the last player able to fill a hexagon. It doesn't matter what colours you use, but changing colour after each turn makes it easier to remember which was the last hexagon to be painted. When you are ready for another game, just clear the board with the red key f4.

Squares

Select the 'Edit an old painting' option, as with the first two games, and choose the picture SQUARES. You will see a board like *Fig. 59* (except that at first none of the spares will be filled):

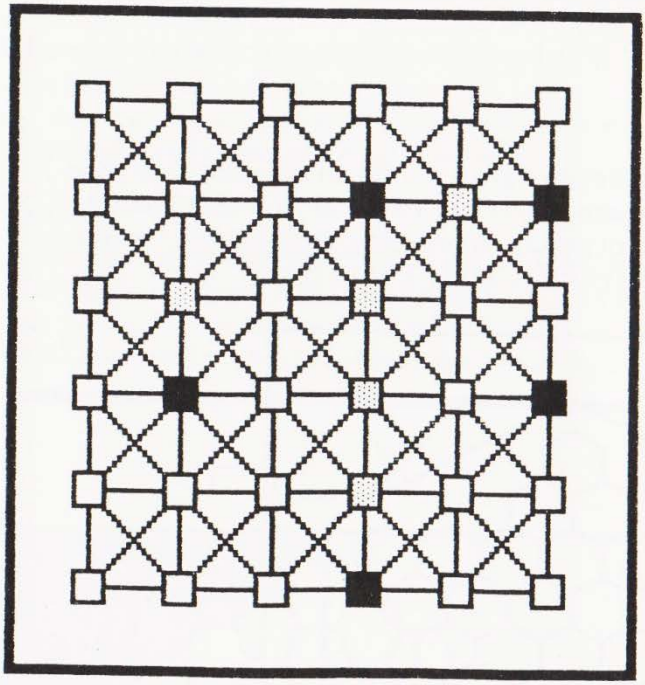


Fig. 59

Two or three people can play, and you start by each choosing a different colour. You take it in turns to paint any small square with your colour. The winner is the first person to fill the four corners of a square.

There are more ways to do this than you might at first think possible. In the picture above, the player with the dark squares has just won by filling the four corners of a square. Can you see where these corners are? As usual, pressing f4 clears the board ready for another go.

Reversi

Choose to 'Edit a painting' and select the picture called REVERSI. In this well-known two-player game, you each choose a colour, red and yellow, and take turns to fill an empty square on the board. You must 'sandwich' at least one square of your opponent's colour between the square you fill and another square of your colour already on the board. All of your opponent's squares which are 'sandwiched' in this way become yours and you re-paint them using your colour. If you make a

mistake, remember that you can always rub a square out again with the DELETE key. If you cannot find a square to fill which also sandwiches at least one of your opponent's squares, you have to miss a turn. When neither player can go, or the board is full, count up how many squares of each colour there are. The player with the most squares is the winner.

5 Colouring puzzles

The four-colour map puzzle

If you have the *Maths with a Story* software pack 1 (also written by Peter Smith and published by BBC Publications), you will already be familiar with this puzzle. This famous puzzle is fun for one person or for a group of people to work on together. You can play it with almost any of your pictures, but designs with small regions in them are not suitable.

Either draw a new picture and then move on to the PAINTING unit, or select the option to 'Edit an old painting', and choose from the list of pictures available. When it has been re-drawn and re-painted, clear the paint by pressing f4, so that you have just the outline of the drawing. The challenge is to paint the picture using as few colours as possible, so that no two touching regions have the same colour. It has recently been proved that any map on a plain surface can be painted using only four different colours, but some can be very tricky; others can be painted with fewer than three colours. If you choose the picture TESPIC1 shown in *Fig. 60*, you will see that the entire picture has been painted with only two colours, and the rule that touching regions should be of different colours has been followed. Notice that shapes of the same colour *may* touch at a corner.

The colour pattern game

This is a pattern recognition game for two or more players and is suitable for younger children. Choose the option to 'Edit an old painting' from the main menu and select the sample picture called PATGAME. Watch as the squares are coloured in. Can you see that all the squares of each colour make a pattern? Children take turns to clear the colour from a particular square or to paint it a different colour. While this is done, the other players must not look. The other players must then try to work out which square has been changed and what colour it should be.

Col and Snort

These two delightful games, devised by Colin Vout and Simon Norton respectively, are two-player games which both arise out of the colouring puzzle described earlier. As with the colouring puzzle, any picture which

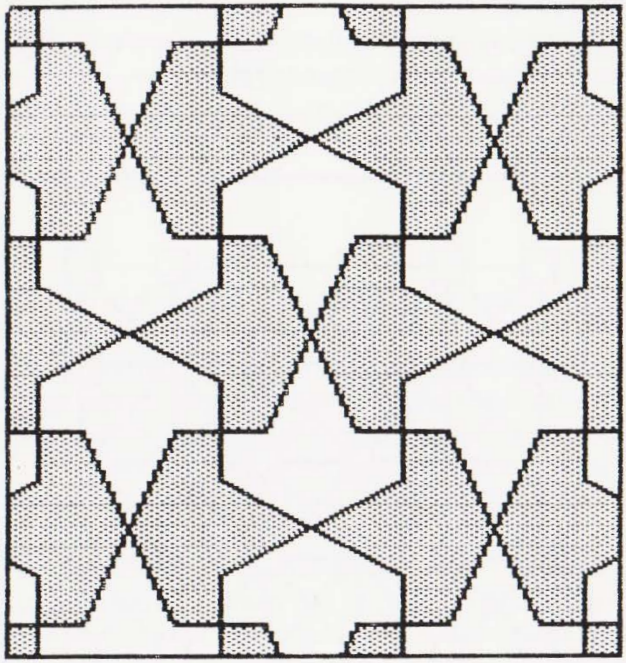


Fig. 60

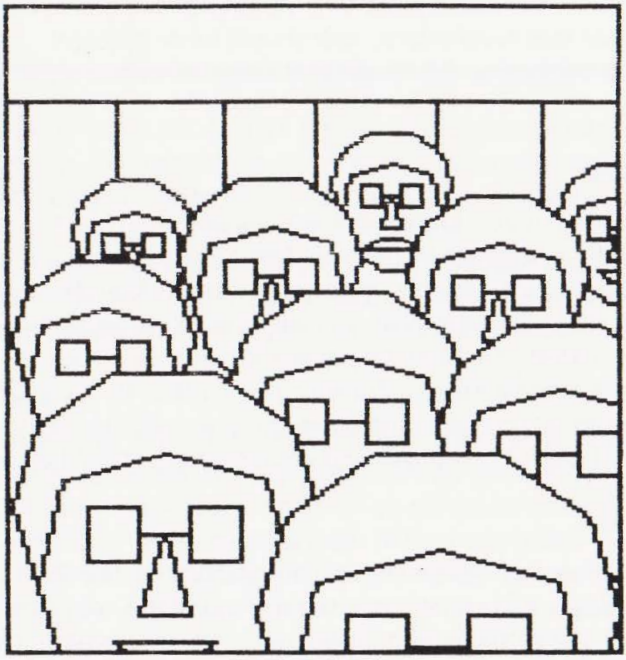


Fig. 61

is free of very small regions is suitable as a 'board'. In Col, each player chooses a colour. Players take turns to paint a region in their colour. No two touching regions can be the same colour. If you can't go, you lose. In Snort, each player chooses a colour. Players take turns to paint a region in their colour. This time, no two touching regions can be painted *different* colours. If you can't go, you lose.

Picture Craft is an excellent tool for playing these games as it is so easy to clear the colour from the picture at the end of each game, all ready for another go.

6 Three-dimensional pictures

There are a number of visual clues which we use to tell which objects in a picture are closer to us and which are further away.

Have a look at the CROWD picture, below left. (It is also supplied as one of the sample pictures.)

Notice that the faces which appear closest to us are larger. They also appear to be 'in front of' the faces further away. Yet another clue is that the faces which appear closest are lower down the picture. These effects are easy to achieve in *Picture Craft*. You can try a crowd scene like this for yourself if you like, by designing a picture using the sample shape-set called FACESET.

Start with smaller heads, higher up the screen, and as you draw heads further down the screen use key 'f0' to make the face larger. If the head you are about to draw is going to cover a head already drawn,press the TAB key to select 'cover up' drawing mode while you draw the hair and face, then press 'TAB' again to go back to 'see through' shape mode, to add the eyes, nose and mouth.

If you are using the FACESET shape-set, notice that the different elements of the face, eyes, nose etc. are each different shapes of the set. Once you have positioned one of the features and chosen a size with the stretch and squash keys, the whole face can be drawn just by selecting each shape in turn (with the space-bar) and pressing the RETURN key. There is no need to use the cursor keys or the stretch keys until the head is complete. Designing co-ordinated shape-sets like this is a useful skill and an explanation of how to do this is given in Part 7.

You can also enhance the three-dimensional effect by using strong colours in the foreground and softer colours in the background.

You will find quite a different approach to making a picture look 'solid' in the sample picture which I've called CACTUS, which is shown in *Fig. 62*.

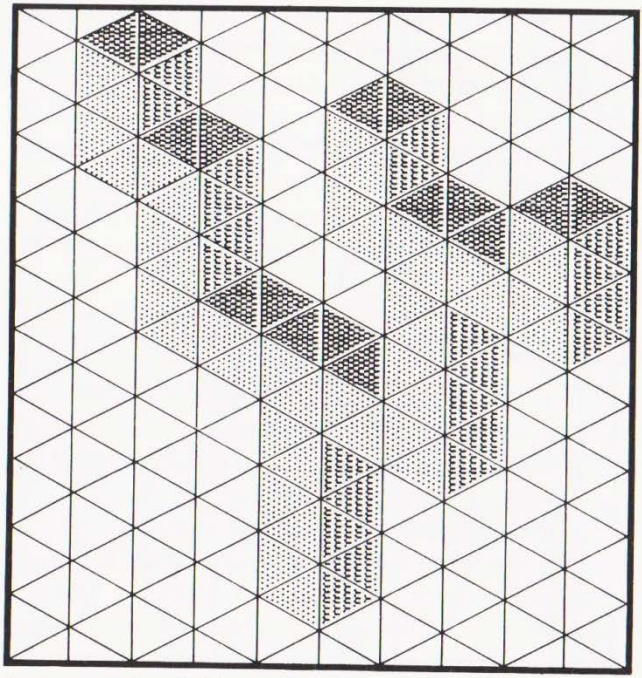


Fig. 62

An isometric grid (a grid made up of equal-sided triangles; a work-sheet has been provided) has been used and the different faces of the structure have been shaded so that the 'tops' of the cactus are all painted in one colour, the 'front' in a second colour and the 'sides' in a third colour.

You can experiment with this grid by selecting the option to 'Edit an old picture', selecting the picture name CACTUS and immediately clearing the paint from the picture with key f4.

7 Designing shape-sets

A full description of the use of the computer in designing your own shape-sets is given in Part 7 of the section 'How to use the *Picture Craft* Software'.

However, it can also be valuable to plan your shape-sets away from the computer, and a special shape-design worksheet has been provided for this purpose.

Generally, you will want to design your new shapes around the centre of the shape-design grid, which is marked by a larger cross. There are several advantages in doing this.

Firstly, this tends to reduce the possibility of the 'cover up' drawing mode's clearing regions outside the borders of the shape (see page 59 for full details of this).

Secondly, when you use the 'turn' feature in the DESIGN unit, the shape turns around this central point. Keeping the shape central on the shape design grid ensures that when the shape is 'turned' it does not move to an entirely different position on the picture screen.

Remember that you can easily adjust the position of your shape on the shape-design grid by using the arrow keys together with the SHIFT key (see page 60). Remember, too, that you can check whether the 'cover up' shape mode will work correctly by pressing the letter 'C' while your shape is on the shape design grid (see page 59).

There are times, however, as in the FACESET example discussed on page 75, when you will nevertheless wish to place shapes away from the centre of the shape-design screen. In this example, the shapes of the set were specially designed to fit together to make the whole face. Here you have to be very careful when you use the 'cover up' drawing mode, although, because you can always edit your picture, no mistakes are irreversible.

When planning a set where several shapes are to be fitted together to form a single larger shape, it is best to draw the entire shape using the shape-design worksheet first.

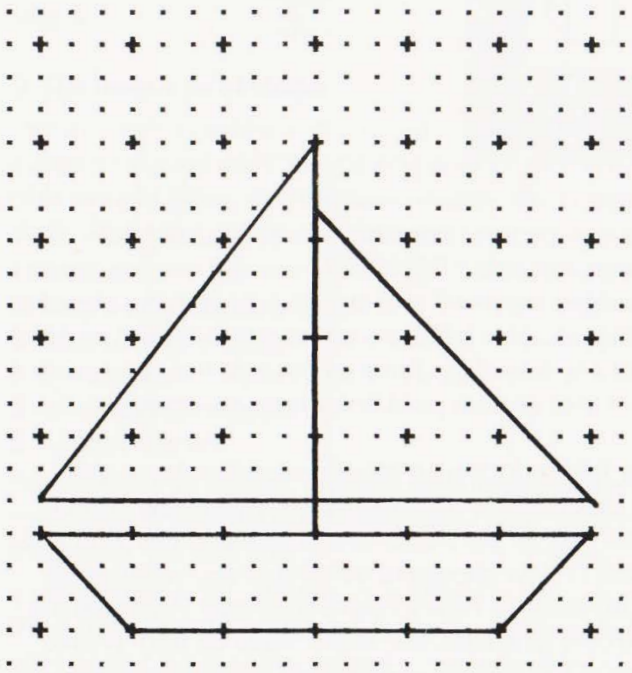
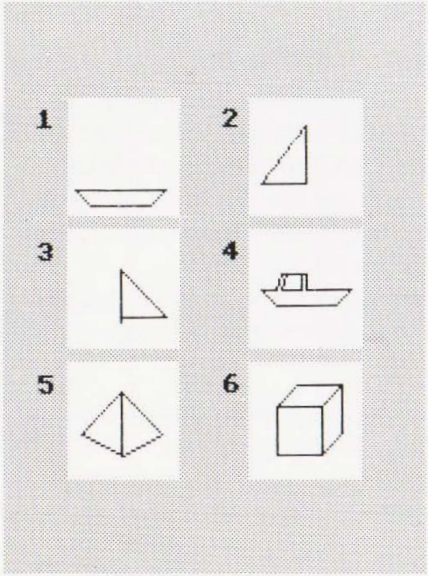


Fig. 63

In the diagram above, you can see a picture of a sailing boat which I

drew first using a grid on the worksheet. I decided to break the boat down into three simpler shapes. I then used the SHAPE unit and made these simpler shapes the first three shapes of the shape-set shown below (*Fig. 64*). Each part was placed in exactly the same position on the shape-design grid as it appeared in my original plan of the whole yacht.

Fig. 64



If you select 'Design a new picture' from the main menu, and then choose the sample shape-set called DEMOSET, you will see how these three shapes can be 'added together' to make the complete boat again.

Notice that to do this you only need to use the arrow keys to position the base of the boat (or any one of the three parts), and the other parts automatically appear in their correct positions when you press the space-bar.

Another technique for producing complex shapes has been used in the other shapes in DEMOSET – the motor boat, pyramid and cube.

Select the option to 'Edit an old shape-set' from the main menu and choose the set DEMOSET. Now choose to edit shape six, which is the cube, and see if you can discover how it has been drawn. Although the shape appears to have only nine lines, it is really made up from twelve lines! Try moving some of the corners and you will discover how it has been done. This technique of passing over the same line more than once allows quite complex shapes to be constructed.

As an interesting exercise, the three-part yacht can actually be condensed into a single shape made up from a ten-sided shape. You might like to try this for yourself.

8 Creating 'magic' pictures

You can find out what 'magic' pictures are by playing the game called Magic Painting. These are pictures which appear to be quite blank, but which you can reveal by painting. It is easy to make your own magic pictures, too, by following these steps:

a Draw a picture using the DESIGN unit.

b From the DESIGN menu, select the option to 'Paint a picture'.

c When you see the PAINTING screen appear (with the coloured boxes down the right-hand side), press key f2 once. This changes the line colour to black, and you now have a magic picture to paint yourself, or to give to a friend to paint.

Alternatively, you can also play Magic Painting with a picture which has been saved. Select the option to 'Edit an old drawing' and choose the picture you want. The picture will be re-drawn (without colour) and you find yourself in the DESIGN unit. Now carry on as described above from step b.

9 The language of shape

Picture Craft provides a rich environment both for examining the language of shapes and for exploring their properties. A polygon is a shape with straight sides, and the basic shape-set contains some simple polygons. These are initially as follows:

1 A square
2 A right-angled triangle
3 An isosceles triangle
4 A rhombus
5 An isosceles trapezium
6 A parallelogram

Picture Craft, of course, lets you transform these shapes through stretches, rotations (turns) and reflections (flips); and many interesting questions arise. For example:

a Using just key f2, stretch each shape in turn, in a horizontal direction. What happens to the square? Does the right-angled triangle keep its right-angle? What shape does the circle become?

b Some shapes are unaffected by being turned – a circle, for example. Using key f6 only, rotate each polygon in turn. Is the shape of each

polygon maintained? Try this experiment again, but first stretch the shape using f2 or f3. Does this make any difference to the shapes which are unchanged by being turned? Some shapes, like a rectangle or ellipse, are unaffected when rotated through a half-turn. Which other shapes have this property?

c If the flip key is used to reflect the square, it is not affected at all. Try this with the other shapes. What happens if you stretch the shapes before you flip them? Does this make a difference?

Technical notes

Picture Craft on ECONET

EXTRA FEATURES

Picture Craft can be used on an Acorn Level II/III Econet, or compatible system, and when installed as such will support several users with their own personal picture library and configuration settings, as well as with access to a common library. So, for example, several children in a class may like to store their own pictures that cannot be seen by others until they are finished. Further, you may wish to remove drawing options for younger children to avoid overwhelming them, but allow them for other, more advanced children.

SETTING UP

To set up the *Picture Craft* system on Econet you should do this:

With a fileserver disc in place, log-on as a system user into DIR $ and type:

```
*CDIR PICT   (Create a directory)
*DIR PICT    (Select it)
*CDIR A      (Create sub-directories)
*CDIR P
```

Now transfer all the files on the disc into directory PICT using a net-transfer utility (usually supplied with the Econet system). The file called P.HOUSE will transfer into sub-directory P, filename HOUSE. Some extra commands now have to be typed from a station. You should be logged-on as a system user, and within DIR PICT. Some files need deleting and some need renaming. Type this:

```
*DELETE CONVER
*DELETE !BOOT
*DELETE MENU
*DELETE CONFIG
*DELETE DISCOPY

*RENAME !B !BOOT
*RENAME ECONFIG CONFIG
*RENAME EMENU MENU
```

Now the sample files need to be created (see page 60) on the fileserver. The PAGE setting is vital. Type:

```
PAGE=&1900
CHAIN "FILES"
```

When the FILES program runs, ignore the messages about Drive 0 and press SPACE. A group of files will be created in sub-directories A and P. You can check this afterwards by typing: *CAT A or *CAT P. The file creator has done its job and can be deleted. Type:

```
*DELETE FILES
```

Now, the correct attributes must be set to allow access to other users (except the CONFIG program). Type:

```
*ACCESS * WR/R
*ACCESS A.* WR/R
*ACCESS P.* WR/R
*ACCESS CONFIG WR/
```

Finally, you should create a system user called PICT. As this user name will allow access to the configuration menu, it should be password protected. Also, the auto-boot option needs to be set up. So type:

```
*NEWUSER PICT
*I AM PICT
*PASS " " secret
*OPT 4,3
```

where 'secret' is your password (maximum six letters).

The set-up is now complete. To log-on as system manager, allows you to set the configurations for other users and to create users, type:

```
*I AM PICT secret
```

Please note that transferring files to the Network does not reduce the number of disc backups you are allowed to take.

Creating new users

If you do not mind other users of *Picture Craft* having access to the configuration menu, and you don't require each user to have their own libraries and attribute settings, then all users can log-on as *I AM PICT. Here there is no point in having a password, and it should be removed. This situation might obtain in a secondary school.

Otherwise, if you wish to have non-privileged users with their own picture libraries and configuration settings, and without access to the configuration menu, you should create them using the 'Create new user' option on the configuration menu (CTRL-S from the main menu).

You will be asked for you own 'ID'. You should type PICT followed

by a space and your password, if any. When asked for the new user's name, enter this, and that user will be created (directory and user-name) with a !BOOT file containing the configuration settings currently active. That user can immediately log-on by typing *I AM user-name, and will auto-boot into *Picture Craft*.

It is important that the name you give does not already exist as that of a user, nor is there a directory in the root directory of that name, otherwise a 'Dir not empty' or 'Already exists' error will occur.

There is no facility to remove a user in the program. To do this you should use the normal system commands *REMUSER and *DELETE.

Also, when you save configuration options from the configuration menu, you are asked to specify the user-name. This must be that of a user already created, otherwise a 'Not found' error will occur.

Printing

The *Picture Craft* screen dump does not support the use of the Econet printer server as the handling of graphics data to a printer server is not straightforward. Of course, a picture can be saved to the fileserver; and another station with printer attached can load it for dumping.

Recovering a shape-set from a picture

It may happen that you have saved a picture which you can see was not designed with the standard shape-set, and you have forgotten the name of the shape-set which was used to create the picture.

It is fairly simple to 'extract' the shape-set data from the picture in the following way:

a Insert the disc with the picture using the required shape-set in drive 0.

b Suppose the picture is called MYPIC. It will appear on the disc catalogue as P.MYPIC, so type:

```
*LOAD  P.MYPIC
```

and press the RETURN key.

c Now, suppose you want to recover the shape-set using the name 'MYSET'. Type:

```
*SAVE  A.MYSET  1260+A0
```

and press RETURN key.

The shape-set will now appear in the shape-set menu under the name MYSET, and you can use it to design a picture.

There is another way to get at the shape-set which is easier, but does not give you a separate shape-set on your disc. Just select 'Edit an old picture', and choose the picture which was built with the required

shape-set from the picture menu. The picture will be re-drawn. When it is complete, and you see a shape-cursor appear, press ESCAPE straightaway. From the DESIGN unit menu, choose the option to 'Start again'. You will be returned to the DESIGN unit with a clear picture screen, and the shapes available will be those of the picture you just selected. You can now design your new picture.

Using *Picture Craft* pictures in your own programs

If you want to use a picture created with *Picture Craft* outside of the *Picture Craft* software, you must first save it in an uncompacted format. You will find out how to do this on page 46.

All pictures are saved using the name PICTURE. To display this picture, try typing in the following short BASIC program:

```
10 MODE 2
20 VDU 19,8,7;0;
30 VDU 23,1,0;0;0;0;
40 *LOAD  PICTURE
50 VDU 23;12,15;0;0;0
60 VDU 23;13,248;0;0;0
70 REPEAT: UNTIL  GET=32
```

Insert the disc containing PICTURE, in drive 0, and RUN the program.

This is how the program works:

Line 10 sets the screen to the correct mode for *Picture Craft* pictures.

Line 20 sets the line colour to white.

Line 30 turns off the computer's flashing cursor.

Line 40 loads in the picture.

Lines 50 and 60 centre the picture on the screen.

Line 70 waits until the space-bar has been pressed before ending the program.

If this does not work correctly, go back and check that you have got all the commas (',') and semi-colons (';') in the right places.

In line 20, try changing the number 7 to smaller numbers and see what happens.

If you are writing a program of your own, you could include these lines at the beginning to give an attractive title page to your program.

To do this, change line 70 to:

```
70 TIME=0
```

and add the following lines:

```
80 REPEAT
```

```
90 UNTIL TIME > 500
100 MODE 7
```

and then add the rest of your program.

Lines 70 and 80 make the computer wait for five seconds before the picture disappears and the rest of your program takes over.

Creating a carousel of your pictures

Although *Picture Craft* always uses the name PICTURE to save your pictures for use outside *Picture Craft,* you can re-name them easily.

Suppose you wanted to change the name to LION. Insert the disc containing PICTURE in drive 0 and type:

```
*RENAME PICTURE LION
```

Easy, isn't it?

Now you could save another uncompacted picture to the same disc, without affecting the first picture.

Each time, re-name your picture to give it a sensible name, but note that you are not allowed to choose a name with more than seven letters.

Suppose you did this three times and ended up with three pictures which you have re-named LION, WITCH and WARDROB.

You could show these pictures, one after the other, automatically, using the following short program:

```
10 MODE 2
20 VDU 19,8,7;0;
30 VDU 23,1,0;0;0;0;
40 VDU 23;12,15;0;0;0
50 VDU 23;13,248;0;0;0
60
70 REPEAT
80 *LOAD LION
90 PROCwait
100 *LOAD WITCH
110 PROCwait
120 *LOAD WARDROB
130 PROCwait
140 UNTIL FALSE
150
160 DEF PROCwait
170 seconds = 5
180 TIME = 0
190 REPEAT
```

```
200 UNTIL  TIME > seconds * 100
210 ENDPROC
```

Perhaps you can see how to add more pictures to your carousel or change the colour of the lines in your drawings. Can you change the length of time the computer waits before moving on to the next picture?

Glossary

The following short glossary contains both words and expressions used to describe the *Picture Craft* software and also some of the 'mathematical' words which you will find in the manual.

'Cover up' shape mode In this mode, any shape added to your picture 'covers up' any lines which are underneath it.

Design mode When you are in the DESIGN unit, you will, at any one time, be either drawing shapes or lines or editing your picture. These three 'modes' are called the 'shape mode', the 'line mode' and the 'edit mode' respectively. Additionally, the shape mode may be set to either 'see through' shape mode or 'cover up' shape mode.

Equilateral Triangle A triangle with three equal sides and three equal angles.

Hexagon A hexagon is a polygon which has six sides.

Pentagon A pentagon is a polygon which has five sides.

Picture disc A disc used for storing both pictures and shape-sets on. A maximum of 31 may be stored on a single disc surface.

Picture menu Whenever you ask to edit a drawing or painting, or when you select one of the picture puzzles, a list of all the pictures currently available is shown to you. This is called the picture menu.

Picture screen The large square area in the DESIGN and PAINTING units, in which all drawing and painting take place.

Polygon A polygon is any shape with straight edges, so squares and triangles are both examples of polygons.

Polyomino A domino is a shape made from two squares joined along a common edge. It is one instance of a polyomino. Polyominoes made from three squares are called 'trominoes', those from four squares are 'tetrominoes' and five joined squares form a pentomino.

Program disc The disc on which you keep your working copy of the *Picture Craft* software.

Quadrilateral A quadrilateral is any shape with four straight sides, so a square or a rectangle are both examples of quadrilaterals.

Sample picture One of the pictures provided for you. These must be transferred from the master program disc to a separate picture disc.

Sample shape-set One of the shape-sets provided for you. These must be transferred from the master disc to a separate picture disc.

'See through' shape mode In this mode, any shape added to your design does not affect any shape or line previously drawn.

Shape design grid The grid used in the SHAPE unit of the software on which you can edit old shapes or design new ones. You can design your shapes on paper first, using the shape-design worksheet provided.

Shape-set A set of six shapes (plus the circle if required), which make up the basic design shapes for use in the DESIGN unit. These shapes may be re-designed using the SHAPE unit and saved for future use.

Shape-set menu Whenever you choose to design a new picture and choose not to use the standard shape-set, or when you select the option to 'Edit an old shape-set' from the main menu, a list of all the shape-sets currently available is shown to you. This is called the shape-set menu.

Tessellation Another name for a tiling pattern, where a single shape is used repeatedly to cover a surface, without any spaces being left between the tiles (shapes).

Unit A unit refers to a part of the *Picture Craft* software: for example, the DESIGN unit.

Classroom and home activities

Godfrey Hall

Things to do away from the computer

Introduction

In his section, Peter Smith has detailed the numerous activities that your child or children can enjoy through direct interaction with his *Picture Craft* programs. Because *Picture Craft* is such an open-ended pack, it also lends itself to inspiring other activities in the classroom or the home. This section of the book is devoted to suggesting some of these activities.

If you are using *Picture Craft* at home with your child or children, some of the activities suggested in this section cannot be undertaken. These are obvious from the context. Both teachers and parents can select those activities which best fit in with their resources of materials and time, and can easily extend and develop them if they wish.

Many of these ideas have been used and tested with classes and groups of children of various ages. It does not, however, follow that they will all be an instant success with your children. Some will be a great hit whilst others might be only marginally liked. I hope, however, that they will give you a starting point for helping your children experiment and make discoveries in the world of colour and shape.

You will be able to adapt many of the activities to different age groups. I have seen children from five to eleven use *Picture Craft* for the first time to create their own patterns and drawings easily. How you use the activities depends very much on the stage your children are at. I have tried keeping the suggestions straightforward and simple as well as suggesting basic materials to use. Wherever necessary, worksheets have been provided.

Children need the opportunity of becoming computer-literate in the ever-expanding world of computers and information technology, and need also to see the many links between computers and the other areas of the curriculum.

In conclusion, I would like to thank Peter Smith for editing the mathematical content of this section.

Shape

When working on the topic of shape, children should be given every chance to handle, sort, examine and create shapes, using many different materials. In this way, they can develop a recognition of shape and an awareness of some of the properties of the shapes they handle. The activities suggested and sketched here will reinforce the discoveries that the children make.

Basic equipment needed for the activities:

Coloured card or paper

Sticky paper and tissue paper

Scissors

Pencils

Rulers

Set of shapes (different sizes)

Glue

Colour magazines

Cardboard boxes

Template

1 *One-shape activities*

The children will need either a ready-made shape or one they make themselves. (Of course, they will need careful supervision and should not, if very young, be allowed to use sharp tools like scissors.)

They should place the shape on a piece of paper and draw around it, over and over, until no room is left on the paper. Children could be guided at first not to draw overlapping outlines, but can later, perhaps, cover the paper in any way they like. Children can then be encouraged to colour their work.

A good idea is to limit their choice of colours to start with and then extend the choice. I have seen some excellent designs by young children using only two or three colours. The pictures TESPIC1 and GEEPIC on the *Picture Craft* disc illustrate this.

2 *Shape search*

Ask the children to look round the classroom or home and make a list of all the different things they can see that are shaped like a square, or have a square as part of their design. They can then look for other shapes. Later, they can collect sets of shapes observable at home or in the school building and playground. They may like to go on a shape

search and see how many different shapes they can find. It would be interesting to divide their finds into those that are natural and those that are man-made. They may like to look through colour magazines for different shapes and make up a collage.

3 *Shape pictures*

Ask the children to create a picture using one particular shape. This can then be coloured in, using certain groups of colours – for example, warm and cold colours. One way of introducing this work is to read a short story such as *Angel Colours* or part of the *Half Men of O* by Maurice Gee. Groups of children can be asked to create certain types of pictures – vehicles, houses, people – using one specific shape. The picture SWEET on the *Picture Craft* disc has been designed using just one shape.

Children will be eager to write stories and poems about pictures they have drawn. As they progress and gain in confidence, more shapes can be introduced and two-shape pictures can be drawn. Alternatives the children can explore are to limit the colouring-in to dark colours or bright colours. A large frieze could be created, with squares or triangles as the theme.

4 *Shape areas*

An area can be set aside in the classroom or home to display items of a particular shape. Some ideas are: bicycle wheels for a circle table, or a wire mesh or grid for a square area.

5 *Shape people and creatures*

Use boxes and other materials to make shape figures, robots or strange-shape monsters and animals. There are some vivid examples of monsters and robots on the picture file supplied on the *Picture Craft* disc. These are always popular and I have found they often lead to children's creating their own story books and poems.

6 *Shape poems*

These are poems about shapes, written in the pattern of that particular shape; for example, triangle poems and circle poems. These can be put in a 'shape book' or hung as mobiles.

7 *Shape mobiles*

These can be either two- or three-dimensional shapes hung from the ceiling or from a string across the room.

One idea is to make a number of cubes and join them together into one larger shape. This can also be done with pyramids and other solids.

These can be very effective as mobiles, especially if they are colour-sprayed.

8 *Mobile people*

It is possible, as shown below, to make mobiles of faces or 'human' figures using one or more shapes. Multi-mobile monsters are another idea which always seems to go down well. Perhaps the children can make some Round Robots, Terrifying Triangles or Silly Squares.

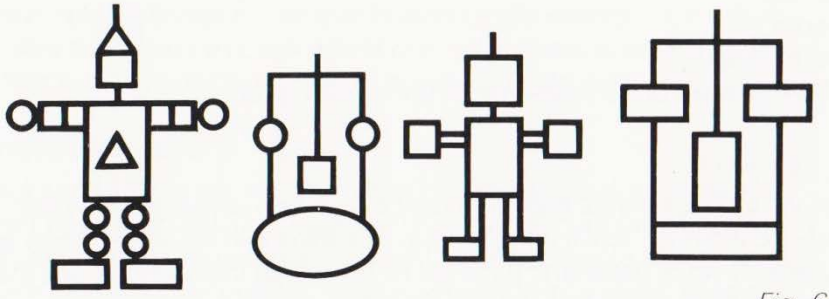


Fig. 65

9 *Shape/Computer link-ups*

A good idea is to get the children to draw their own picture or design and colour it in, using one or more shapes. If they deliberately draw on paper only the sorts of shapes that can be created using *Picture Craft*, they can then attempt to reproduce these using *Picture Craft* itself. I have tried this out with infant and junior children and found it very successful. They get a great feeling of achievement out of putting a design on the screen and then turning it into a game. One of the great advantages of *Picture Craft* is that they can store their picture or design and it can be used by other children in the group. I found that children of different abilities worked very well on this activity and enjoyed the challenge of the games offered by *Picture Craft*. They helped each other through the different stages and it was very encouraging to see children of different abilities working together.

All these activities can be carried out at home if there is more than one child in the family, or if you can press your neighbour's children into service! Perhaps even better, sit down together with your child and enjoy yourselves; and please resist the temptation to monopolise *Picture Craft*!

Colour

We are lucky to live in a world of colour. If we had been born a dog or a cat, ours would be a monochrome world. Some creatures such as bees and fish can see only certain colours.

Below are some ideas you might like to try out and a list of basic materials you will need.

Basic materials:

Glue
Coloured paper or card
Acetate
Pencils
Paints
Set of shapes
Different objects, as suggested in the following text.

1 *Rainbows*

Let the children create their own rainbow. Take a jam jar full of water outside and put it down wher the sun can shine into the water. Then get a piece of white paper and put it below the jar, so that they can see the colours of the rainbow shining on the white paper.

Another idea is to get a pot of liquid soap and blow bubbles. If the children look carefully, they should see the colours of the rainbow shining through the bubbles.

Perhaps they could make a pattern of circles and colour them in using the colours of the spectrum.

Drop a little oil on some water and look at the colours that form on the surface, then make a list of them.

2 *Colour cover-up*

Take a tray and put on it a number of different-coloured items, show it to the children, cover it up for about half a minute and get them to write down all the things they can remember seeing on the tray. See if any pattern emerges. What colours are the most remembered?

Get the children to go round and collect a list of their friends' favourite colours. Then produce a bar chart of the results – the height of each bar reflects the number of children voting its colour their favourite. They can repeat the experiment, this time asking their friends for the colours they really dislike and see if it is in striking contrast to the one they like.

Children can collect pictures containing their favourite colours (from magazines) and make a collage or frieze from them; or they can paint or

colour a picture in their favourite colours. You could ask them about their favourite colours in clothes, cars etc.

3 *Mixing colours*

Children always enjoy using paint to mix colours. They can experiment and record the results of using different mixes of colour. This could lead to drawing up a colour-mixing chart.

It might be interesting to talk about what they regard as unpleasant mixes of colours. Certain colours seem to clash – make a list of colour clashes.

Some children might be able to write poems or stories about particular colours or make their own folders or workbooks.

Another idea is a colour island which has plates such as Blue Point or Red Eye Cave. A colour map of the island could be drawn.

4 *Hot/cold colours*

It is a good idea to get the children to paint a picture or pattern using either hot or cold colours. Keep the choice of colours simple. Use only, say, red/yellow or blue/green. It might be interesting to look at ways in which cold colours could be made warmer and vice versa. How does adding white or black affect the picture?

I have found that children enjoy using just a few colours. This kind of work often leads to some good writing, using the idea of a warm or a cold scene as a starting point.

A spiral pattern starting with warm colours and ending with cold colours is another possibility, as is painting strips across a sheet of paper, changing the colours gradually from hot to cold.

5 *Shades of colour*

How about using shades of one colour in a picture?

A display could be mounted showing items of one colour but in different shades. I have been into schools where rooms have been divided into colour areas. This idea is easily implemented at home too.

There are all sorts of interesting items that can be collected. For example, taking a red theme, things that could be included are: tomatoes, apples, buttons, cotton, wool, radishes and red material. A new colour could be chosen each week.

6 *Colour spinners*

The children can cut out a circle of card, divide it into quarters and paint the circle alternately red, yellow, red, yellow. Make a hole in the centre

and put a matchstick through the hole, spin the card and note the new colour it seems to display as it spins. Make other spinners and try different colours. Try putting the colours of the rainbow on one card and see what happens when it is spun. Can the children suggest what is happening to the colours as a card spins?

7 *Colour masks*

Make some masks or visors and use coloured acetate or celluloid for the eye-pieces. Get the children to put them on and record what they see. Try out different colours on the masks. Get the children to draw and colour a picture in three colours – for example, green, red and blue. What happens to the picture when they look through red, green or blue?

The children could write a poem or a story about a world that is red or blue or some other colour.

Looking through coloured sweet papers is something else for them to try. Put two colours together and see what happens. Shine a torch through two colours of paper and record the new colour.

8 *Food dyes and colouring*

Ask the children to look at some of the foods and drinks that we consume every day and make a list of the colours. Find out from the packet, tin or bottle (if you can) any additives that have helped to create the colour – for example, cochineal. It might be interesting to write to the manufacturer to find out more about food colourings and additives.

Natural dyes are also used in other things such as clothes and it might be a good idea to try out some of these using tie-and-dye. If the children are making their own books they could make a material tie-and-die cover or they could experiment on an old T-shirt and produce their own exclusive design! There are manufacturers who could probably help with charts, videos and visits to their factories. I have taken children on some very successful visits to factories. This is, of course, best carried out as a school activity.

9 *Advertisements*

A study of the use of colour in advertisements is very interesting. One idea is to get the children to cut out a series of advertisements in strong colours, then collect another set that uses dull colours. Ask a second group to select the advertisements they like the best and to say why.

Another idea is to make a chart of colours used in advertisements and then see whether certain colours are used more frequently than others.

Advertising does use the power of colour a great deal and it is a fascinating topic to look at with older children. Perhaps the school might be able to get an advertising agency to come in and talk about the way they design pictures and how they try to use colour to influence people.

10 *The coloured sweets experiment*

Take a tube of coloured sweets and empty its contents on to a piece of paper, then make a list of the different colours and the number of sweets of each colour. Put a selection on a saucer and ask each child to select their favourites in order of preference. Record their findings as a table or bar graph. Compare the contents of several packets. Are they all exactly the same?

Another idea is to examine the tube and see which colours are used on it. (You could also weigh the contents and compare the weight with that given on the packet.)

Each colour of sweet can be allowed to melt on the tongue and timed to see whether some colours melt faster than others. I have found that one of the children's greatest treats is to be allowed to eat the results of all their hard work at the end!

11 *Colour poems and stories*

There are stories that have colour as their main theme. Examples are *Elmer the Elephant, The Day it Rained Colours* and *Little Red Riding Hood.* The children could make a collection of poems and stories and display them in the classroom or in the home. There are many resources that can be used, many of which will be found at the end of this book.

12 *Black and White*

Using just black and white can lead to striking pictures. Scraper board can be used, or black and white paper.

Symmetry

One of the areas which children find most fascinating to explore is that of symmetry. Children seem to fall quickly into the rhythm of the work and it can be very visually appealing.

The activities suggested below introduce children to mirror symmetry (also called line or reflection symmetry), and to turning symmetry (also known as rotational or radial symmetry).

You will be familiar with mirror symmetry if you have ever put a blob of ink on a piece of paper and then folded the paper in half. When the paper is unfolded you see two inky shapes which are alike, but as if they

had been reflected in a mirror. The fold line is known as the axis of symmetry or the mirror line. I have extended this idea of symmetry through folding in the activity called 'paint blots' described below.

To understand turning symmetry, look at the three-legged symbol of the Isle of Man shown below, *Fig. 66*. If you were to trace this shape and then turn the traced copy through a third of a whole turn, the traced copy would fit exactly over the original symbol. Shapes like this are said to have turning symmetry. Why not try it for yourself?

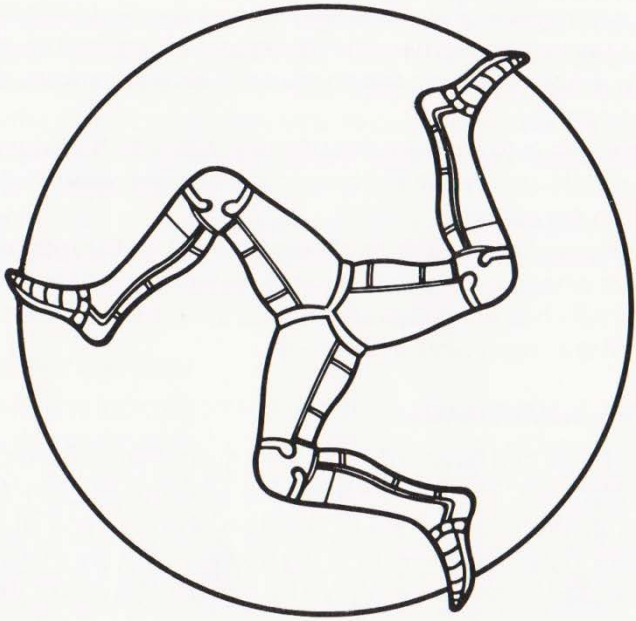


Fig. 66

Nature affords us many examples of symmetry, from the butterfly to the flower or leaf, and children seem to derive great pleasure from making detailed drawings of these.

Basic materials:

Safety mirror
Coloured and white paper
Thin card
Inks
Crayons
Paints
Letter shapes
String

1 *Paint blots*

In this simple activity, children just fold a piece of paper in two, then open it out and put a small drop of paint on the fold. The paper is then re-folded and carefully pressed down. When it is opened they will see that a symmetrical pattern has been created. The paint is left to dry and then the process is repeated using a different colour. In this way they can build up a colourful symmetrical pattern. Children will often 'see into' these blots and create their own fantasies from what they see. That these pictures are not consciously planned is an important factor, as haphazard blobs often produce the best results.

2 *Mirror images*

Get the children to write their name on a piece of paper, then hold a mirror so that they can see the reflection of their name. (Use a card or plastic 'safety' mirror, please!) They can then draw what they see in the mirror.

Instead of their names, children could draw shapes or patterns and then draw the shapes they see reflected in the mirror.

3 *Symmetrical letters*

There are many different capital letters which are symmetrical. Some letters, like 'A' or 'E', have mirror symmetry through a vertical or horizontal line; other letters, like 'S', have turning symmetry; and a few, like 'H',have both types of symmetry. Children usually enjoy trying to discover all the letters which have symmetrical properties. A worksheet is provided. There are some beautiful examples of Gothic script which can be shown to the children, and they can perhaps be encouraged to produce some decorated letters of their own using paints or felt-tip pens. A decorated letter could be used to begin a piece of writing. I have done this with children and found that it has led to a great deal of work on words and writing, and even a study of the history of letters.

4 *Everyday symmetry*

There are many everyday objects that are symmetrical. Some examples are: a fork, a record and a wine glass. It might be a good idea to make a collection of these for a 'symmetrical area' in the classroom or home.

Another interesting exercise is to look at vehicles from the front or rear, and then look at them side-on. The children will very quickly realise that vehicles can be seen to be symmetrical from the front or rear but not from the side.

5 *Natural symmetry*

Cut up fruit or flowers in different directions and show them to the children. They will often make exciting discoveries. Cut a tomato into two, in different ways, and you will discover a number of different sections which display radial or rotational symmetry.

6 *Paper folding*

Fold a piece of coloured paper or card and cut out a shape from the double-thickness. Open it out and look at the results. Folding the paper two or more times and then cutting shapes out can produce a whole string of figures or shapes which may have several lines of symmetry, depending on the way the paper is folded.

Children really enjoy paper-folding as they can get results so quickly. Your classroom or home can soon become a mass of paper snowflakes and symmetrical figures.

Be sure not to fold the paper too many times otherwise it will become too thick to cut.

7 *Bilateral butterflies*

Shapes which have just one line of symmetry, like the butterfly, are said to have 'bilateral' symmetry. Children can draw butterflies, making sure that these are bilaterally symmetrical or, as they say, 'the same on both sides', and then paint them using the same colours for corresponding areas on each side of the line of symmetry. I have seen some really beautiful work by children aged seven upwards.

8 *Pinhole pictures*

One way to reproduce a design which has bilateral symmetry is as follows. Take a piece of paper and fold it in half, then draw part of a face on one side of the paper, making sure that you draw right up to the fold. Take a pin and prick through the drawn lines of the shape. Open the paper and draw over the pin holes to complete the design.

9 *String printing*

This is another easy way of demonstrating bilateral symmetry. Fold a sheet of paper in half and then dip a piece of string in some paint. Open the paper and put the string on one half of the paper near the fold. Refold the paper, making sure that a loose end of string is hanging out. Take hold of that end and pull the string out, making sure that you keep a firm grip on the paper. Open the paper up and let it dry. When the paint has dried the process can be repeated to create a more complex

pattern. The pattern will have its axis of symmetry running down the fold. This method is suitable for use with very young children and can give some quite stunning results.

Tessellation or tiling

If a shape when used repeatedly can completely cover a plane surface, without any gaps between the shapes, then it is said to make a tiling pattern or tessellation. Everyday examples are tiles on a wall, a wood-block floor or bricks.

Some of the most amazing tessellations can be found in the work of the Dutch artist Escher. I have often sat with groups of children and looked in detail at his superb art; art that illustrates that tessellation work can be visually very attractive.

Children often produce intriguing patterns once they have grasped the initial concept. They find that some shapes more easily tessellate than others, so a good starting point would be squares or rectangles.

Some regular polygons can be used to form tessellating or tiling patterns – squares, for example. You could find out which other regular polygons tessellate, and perhaps encourage the children to use them.

1 *Nuts and bolts*

Ask the children to bring in a collection of hexagonal nuts. Have the children put the nuts together with their sides touching and then draw the pattern that they see. They can then colour the drawings, using different colours. Another idea might be to bring in a honeycomb and look at its pattern. I have found this to interest children greatly. A follow-up at school might be a visit from a beekeeper.

Polyominoes

What are polyominoes?

They are plane shapes made of a given number of squares the same size. Each square is connected to any one of the others by a common edge. There are many kinds of polyominoes. You can get dominoes (two squares joined up), trominoes (three squares joined up), tetrominoes (four squares) and pentominoes (five squares). Some examples are illustrated below:

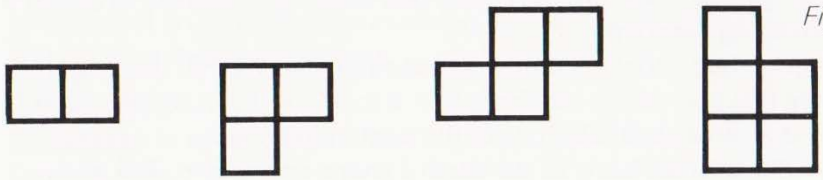


Fig. 67

Notice that there are only two different trominoes, the L-shaped tromino (shown in the illustration below) and the 'straight' tromino made up of three squares in a row. Any other apparently different trominoes are really only reflections or rotations of these two.

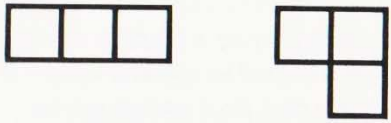


Fig. 68

The children can make some very interesting patterns and shapes from pentominoes. You or they can easily add the simpler shapes so created to the non-standard set of shapes in *Picture Craft*. (Some of these are already supplied on the *Picture Craft* disc.) There are also examples of patterns made using these shapes in the picture file on *Picture Craft* –for instance, POLYPIC.

Picture Craft is a powerful tool for this type of work and children seem really to enjoy using the program to create their own patterns.

Basic materials:

Card
Squared paper
Scissors
Glue

You could consider making a set of polyomino shapes so that the children can get used to handling them and become accustomed to the differences between them.

Dominoes are a good starting point and the children could begin their investigations by making their own sets. A certain way of focusing their curiosity and inventiveness is to give them a theme, like flowers or vehicles, and for them to decorate the dominoes accordingly.

1 *Playing with trominoes, tetrominoes and pentominoes*

Cut out some trominoes and fit them together on a squared piece of paper. Using these shapes it should be possible to create different patterns which can then be coloured in.

Once they have played with the different types of trominoes they can try tetrominoes and pentominoes. The children could be split up into small groups. Each group is given one shape and is asked to create a pattern using the shape.

A good game that children might like to try is one that uses a grid of squares that can vary in size from 6 × 6 to 10 × 10 or bigger. Each player is given a set of only one of the pentomino shapes of a certain shape. Players take turns to put down a shape on the grid. The game

finishes when one of the players is unable to take a turn – that is, unable to find a unoccupied space to fit her shape on. The other player is then declared the winner.

You might like to invent variations of the game where the choice is not limited to only a single pentomino shape. You will find a sample board and set of shapes in one of the worksheets with this pack. Copy the worksheet. Cut out the grid and pentomino shapes and stick them on a card if you want to stiffen them.

2 *Polyiamonds and Polyhexes*

A nice extension to work with polyominoes is to investigate the shapes which can be built up from equilateral triangles or regular hexagons.

If a number of equilateral triangles are joined together by a common edge, the resulting shapes are known as polyiamonds. A shape made from two such triangles, joined by an edge, is called a diamond; three form a triamond; four make a tetriamond; and so on.

When equal-sided hexagons are joined together, polyhexes are formed. Children might like to try to discover three different trihexes (three connected hexagons) or seven tetrahexes (each made from four connected hexagons).

This work does not lend itself to exploration with *Picture Craft* with the same ease as polyomino investigations, but you will find the worksheets of equilateral triangles and hexagons most helpful.

For further exploration into the world of polyominoes, polyiamonds and polyhexes, I would highly recommend Lorraine Mottershead's excellent book, *Sources of Mathematical Discovery* (Blackwell).

Plane shapes and areas

Children should be given every opportunity to experiment with the principles of conservation of area – that is, a plane shape of a given area can be translated, rotated and reflected, or cut up, without losing or gaining area. One way of helping them to do this is to give them some squared paper, get them to draw several shapes, cut them out and then construct other shapes from the pieces. Another idea is to try to reconstruct the original shapes. If you have geoboards, why not use these to show how different shapes can have the same area? The children will enjoy both experimenting with elastic bands on the boards and creating their own designs.

Basic materials:

Geoboards
Elastic bands

Centimetre-squared paper
Scissors
Card
Pencil
Ruler

1 *Tangrams*

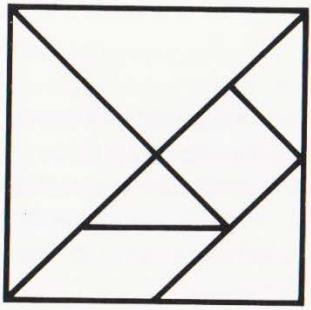


Fig. 69

An excellent way of demonstrating the conservation of area is to make a Chinese tangram. It was called a Wisdom Puzzle because it made people think really hard. The diagram above, *Fig. 69,* can be used to design many different figures and shapes. The actual area of the pictures created will always be the same as the square, so long as the individual shapes do not overlap. These pictures could then be coloured in

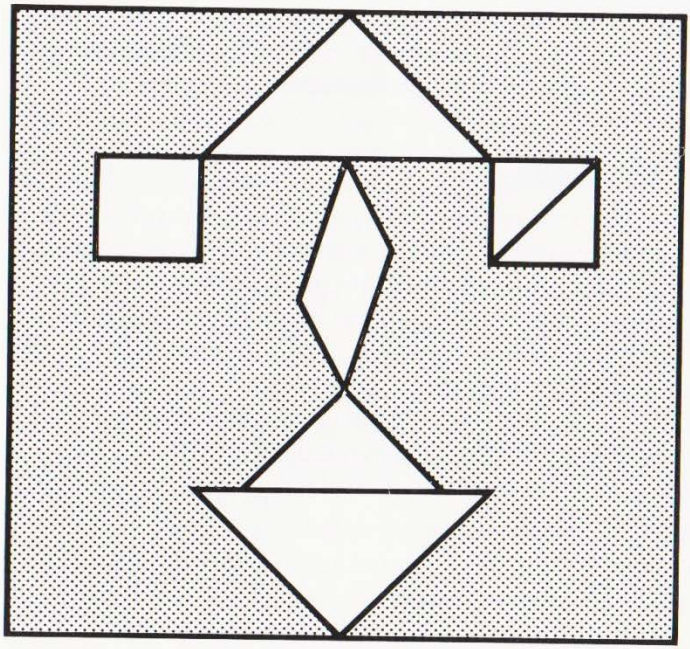


Fig. 70

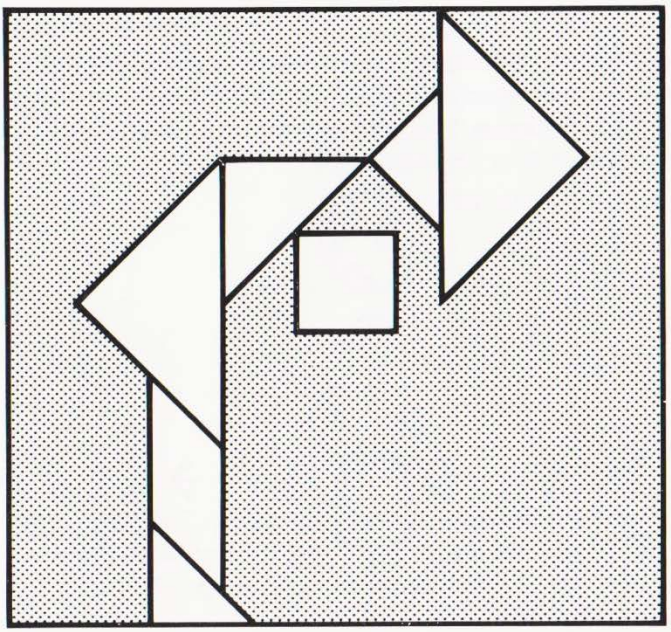


Fig. 71

and displayed. One interesting idea might be to put the shapes on a plain piece of paper and spray them. Some examples of possible designs are shown here in *Figs. 70, 71* and *72*.

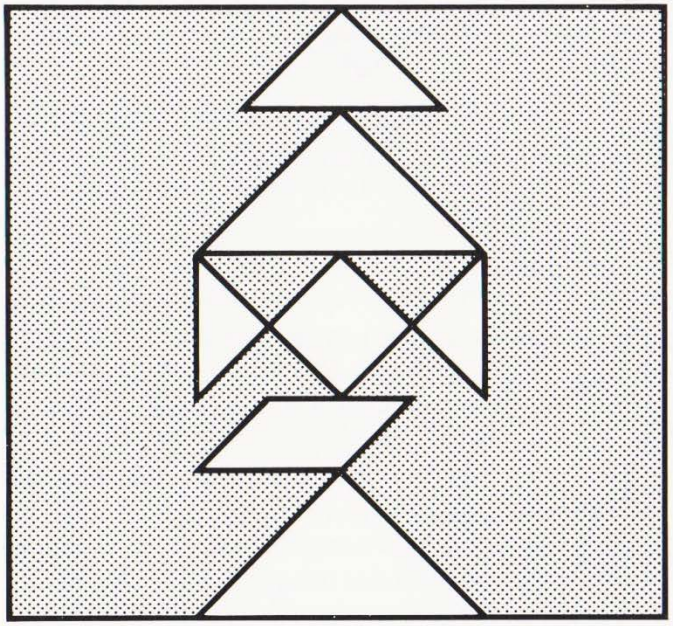


Fig. 72

Direction

Sherman the Space Pilot is a bit of a rascal – he always somehow contrives to lose his way in outer space. See if you can help him find his way back to base. Below are a number of games and exercises which will help children to learn about direction and angles.

Basic materials:

Card
Crayons
Scissors
Glue
Pencil
Ruler

Lost in Space

Here the children must help Sherman face the right way. The spacecraft has just flown out of orbit and Sherman has confused himself brilliantly. The children have to rescue Sherman from himself and get the craft back to face the planet (*Fig. 73*).

If Sherman turns his spacecraft through a complete circle (a 'whole turn'), he will end up facing the same way. So, how much of a turn should he make to the right (that is to say, clockwise) to face the planet? Should he make a quarter-turn, a half-turn or a three-quarter turn?

How much of a turn should he make to the left (that is, anti-clockwise) to face the planet? Should he make a quarter-turn, a half-turn or a three-quarter turn?

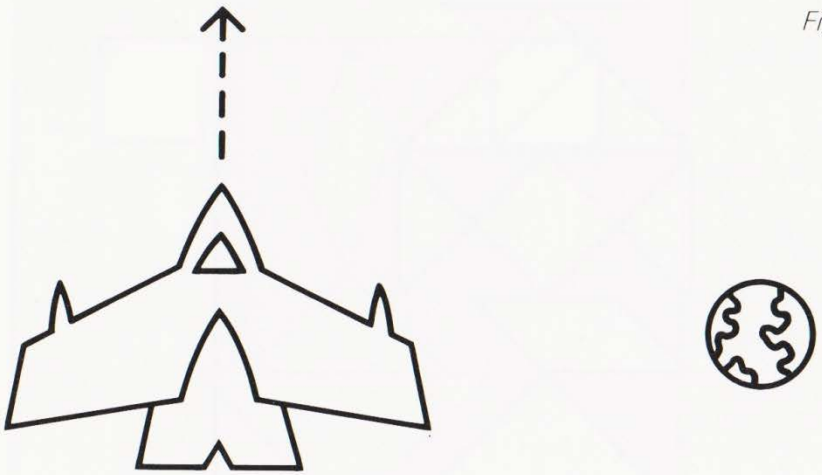


Fig. 73

Steady, Sherman!

Sherman, our valiant space pilot, is rather confused. The problem is that he doesn't know which way to go. Perhaps you can help. Use the figure below and see if you can point him in the right direction.

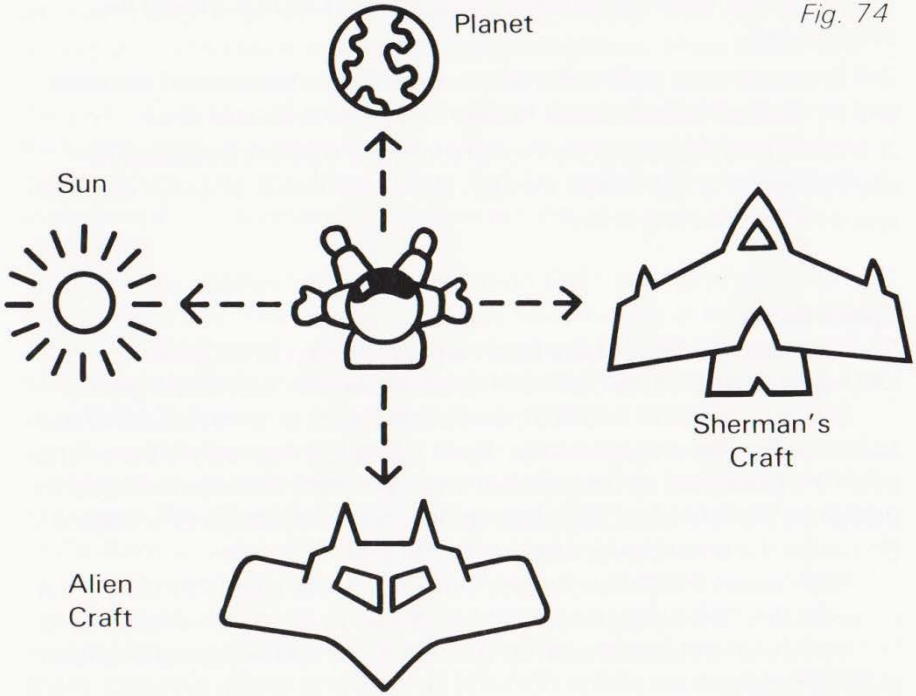


Fig. 74

The spacecraft is to Sherman's right (*Fig. 74*).

1 Sherman wants to face the Sun. If he turns to the right, how much of a turn should he make? If he turns to the left, how much of a turn should he make?

2 Sherman is now facing the Sun. Should he turn clockwise or anti-clockwise to face the alien craft? How much of a turn should this be?

3 Sherman is so confused that Shirley, the clever co-pilot of Sherman's spacecraft, has to rescue Sherman. How much of an anti-clockwise turn should Sherman's spacecraft make to face Sherman?

Manoeuvres

For the following activities you will need Sherman's worksheet. At school, it would be convenient to copy the worksheet. Cut out the spacecraft. You will need to place the cut-out in the centre of the worksheet and turn it. It might help to attach the copied sheet to a piece

of stiff card and put a drawing pin through the spacecraft to attach it to the sheet.

Place the spacecraft in the centre of the worksheet, facing Saturn.

Sherman's engines are faulty. His spacecraft is hard to control.

1 His spacecraft spins for five half-turns. Will he end up facing North, South, East or West? Now place the spacecraft so that it faces the asteroid belt.

2 If Sherman turns to face North, how much of a turn should he make, and in which direction should he turn? What is he facing now?

3 Sherman has successfully faced North, but then his troublesome engines spin the spacecraft through five whole turns. In which direction and what is he facing now?

Space Battle

The next activity has a space battle worksheet (a grid) to go with it. It can easily be copied, and you will need two copies to play the game.

Sherman controls one fleet, and another player, commander of the alien Ughogs, controls the other. Each player has four pods plus a super pod. The pods take up one square, the super pods two squares. Each player draws in all his pods, placing them on the squares of his choice. Do not let the other player see your battle grid.

Each player then has to locate the other player's pods by calling out co-ordinates. Success goes to the first player to locate the other's pods.

If you are not familiar with co-ordinates, the following explanation may be helpful.

Get a pencil and point it to a square on the worksheet battle grid. Now move the point of the pencil straight down until it points at a letter outside the grid. Let's say this is the letter D. Now point the pencil at the square in the grid again. Move the pencil point left until it points at a number outside the grid. Let's suppose this is the number 3. So the square you pointed to is the square D3.

Themes and project ideas

Pictures or designs children create using *Picture Craft* can be used to inspire themes for projects in the classroom or at home. Below are some starting points for a number of themes and ideas. These were the ones most popular with the children of my school. Interestingly, they were also popular with the children from the other trial schools. You will find a few of their creations (ROCKET, SPACE, ROBOT and COMET) on the *Picture Craft* disc. The discussion that follows suggests activities that

you might like to undertake for any topics that are inspired by pictures that children themselves create.

Robots

Make a collection of cardboard boxes and other empty containers and then get the children to make their own junk robots. They can be very imaginative and I have seen some superb creations. There could be a robot area in the classroom or at home. Another idea is to talk about the Green Cross Robot. There are a number of these around the country and I was fortunate enough to be able to borrow one from the local Road Safety Office. You should be able to find the address of your local office in the telephone directory. This last activity is, of course, really for school use.

Films are another source of inspiration and *Star Wars* has some excellent ideas in it. The children probably have models at home which they could bring in to school and draw or model in different mediums. Using *Picture Craft,* they can design robots that are triangular, circular or square. This activity is very suitable for children at home.

If you look through children's books, there are a number of robots or robot-type characters that come to mind. One of my favourites is the Tin Man from *The Wizard of Oz* and his counterpart Tik Tok from *The Return to Oz.* Another splendid book is *The Tin Man* by Ted Hughes.

After the children design their own sets of robots they could then create a world for them. They could write stories grounded in these worlds. They could then go on to explore the world of robotic movement, personal robots and the way in which robots are used in industry.

There are a number of educational robots on the market, such as the BBC Buggy and the Turtle, and by careful programming these can draw complex shapes and patterns. Of course, you may not be familiar with programming, but it is good to bear the possibility in mind. Before you or your school do acquire a robot, make sure you understand what having it entails, and also ensure that you have someone knowledgeable to help you with its use.

Perhaps a chart can be hung on the wall to show some of the developments in robotics over the past few years. There are some well written books (see the References section at the end of the book) which can be used in a project of this sort.

Space

This is a fascinating topic to cover with children and there is an enormous amount of back-up material available from a number of sources, including the Science Museum, Greenwich Observatory and most

libraries. Children love this topic and it was interesting to note how many children using *Picture Craft* for the first time opted to draw spacecraft, spaceships or space scenes.

One idea that I used was to convert the whole classroom into a 'space station'. Each area of the station contained a certain facility – for example, a scientific area and an astronomical area. The children were put into different groups and we even went as far as making our own identity cards. Putting an idea such as this into practice needs organising, but is very worthwhile in the end.

Why not look at the progress in the ideas about, and development of, space travel through the ages?

A large chart could be made showing the major events. A good idea with this work is to start with the Earth and work outwards to the stars, moving our planet to our neighbours in the solar system and then out into the Milky Way.

Satellites can enthral children. Charts and drawings can be made of the different types of satellites and their particular functions in outer space. We seem to be surrounded by an incredible number of satellites, many of which are now 'dead'. You could go on to look at the Voyager probes that will look at the outer planets and at the Giotto mission to study Halley's Comet. (The picture COMET on the program disc was drawn by a child.)

Designing spacecraft is a very exciting exercise and there are some excellent books available to help you on your way (see the References section). After the spacecraft have been designed the children can give details such as the payload, purpose, crew numbers and specifications. They could build some out of commonly available 'slot-together' kits, if available, and perhaps create their own miniature space station.

There are some excellent pieces of space music around that could be used for drama or creative writing. Examples are: *The Planets* by Holst, *Star Wars* and *ET* (soundtracks) by John Williams. The *War of the Worlds* record is always very popular and can be a good starting point for some creative writing or art work.

There are many exciting ways of developing this particular theme.

Travel

Children love to design everyday vehicles such as cars and trains, and also their own imagined forms of transport. The children could then study the different ways people travel around, looking at vehicles past, present and future.

One idea following on from a look at vehicles and transport is to set up a travel agency in the classroom or at home. The children can collect

brochures and pamphlets from the local travel agents. By writing to the tourist offices you can acquire a number of very attractive posters. Once these have been collected, construct a small agency in the corner of the room. Two or three children are usually enough to run this (at home, neighbours' children can sometimes come in handy!) and act as the agents.

After the children have looked at the brochures they can go away and select a holiday of their choice; priced, say, up to £250. After this they can go to the 'travel agents' and ask them to make the booking for them. When I did this I got the children running the agency to issue receipts and confirm the booking in writing. This work sets the children to writing cheques and working out balances and costs, and also timetables and flights.

Another possibility might be to set up an exchange in another part of the classroom. Children can then exchange some of their money before they leave. This could lead to a study of different currencies and a table could be set up with coins from different parts of the world. Local banks can often help with this and it would be possible to produce charts and graphs showing the changes in the exchange rate.

The children could also design their own brochures on strange and unusual destinations and produce maps showing some of the points of interest. The children could invent their own travel games and also look at the different costumes and customs of the countries featured in the brochures. They probably have photographs of their holidays at home and a display could be made. At school, it might be a good idea to set up a link with a school in one of the countries studies, something that can be organised through the British Council, 65 Davies Street, London W1Y 2AA.

Homes

Picture Craft lends itself very well to children's designing and creating their own houses. Using the shapes available and also by creating their own set of shapes children can produce houses of different shapes (see HOUSE on the *Picture Craft* disc).

A good way into this topic is through the children's own homes – the different types and ages of the buildings they live in. They could draw some of the different types of houses found in this country and then go on to draw the types of houses found in other countries. This work often leads on to plans and diagrams of the inside of buildings. A doll's house can allow the children to examine the different types of rooms of a house in greater detail.

The children could also design their ideas of homes of the future and

record some of the experiences of their relatives on tape and slides. School log books often can provide a look into the past.

You could lead the children in many directions: this is the kind of work which will be forever going off at tangents!

People and faces

Having used *Picture Craft* with a number of children during the pilot period, I was interested to notice that many children chose to draw faces on the screen. Also, they enjoyed creating their own people using the different shape-sets available in *Picture Craft*. This activity can easily and naturally lead to other activities with people as their subject.

People that help us

It might be a good idea to organise the children into small groups to design theme pictures such as 'the milkman with his float and milk bottles' or 'the police officer in the police car'. I have met several teachers who have used this theme and have asked the local 'lollipop lady' or nurse to come in and talk to the children. There may be a parent who is a fireman, or who works in a shop, who would be willing to talk to the children. The local fire officer is often very helpful and in certain parts of London it is possible to arrange a number of sessions on fire safety. The police can also provide a lot of back-up material in the form of booklets and possible visits, and it may be worth contacting the local home-beat officer. A visit to the local ambulance station always goes down well, and it may be possible to arrange a talk from the local dental hygiene unit.

Faces

Get the children to draw a circle on a piece of paper and then ask them to fill in one of the expressions in the drawings below, *Fig. 75*.

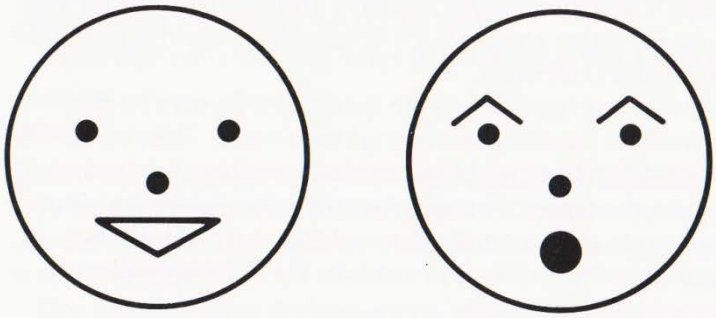
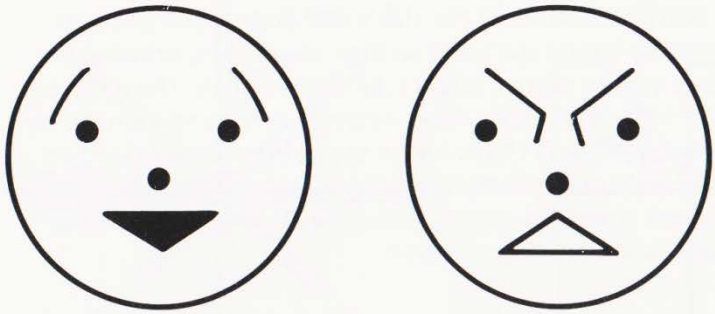


Fig. 75

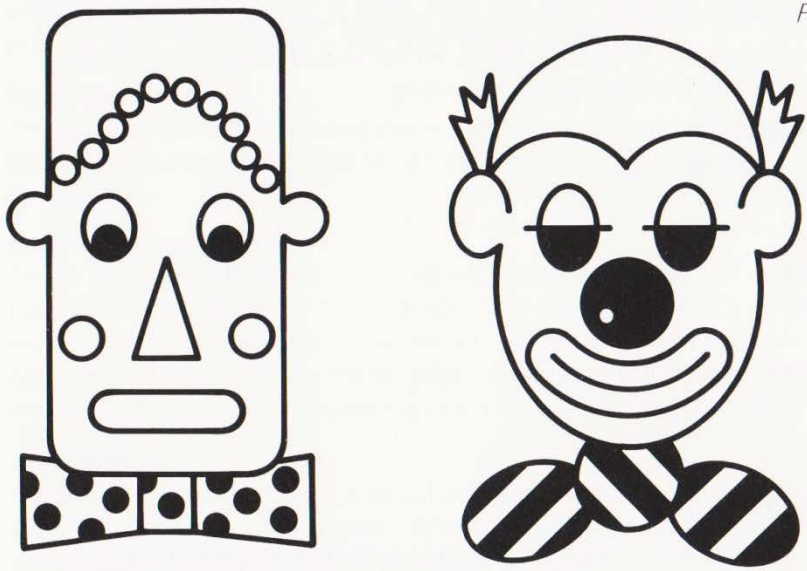
Fig. 75



They could then be asked to write a story about that person, explaining why they are cross or happy or sad.

Clowns' faces delight children and exaggerating their features can create some very colourful and appealing characters, as shown below.

Fig. 76



These can then be coloured, using chalks, pastels or bright paints. They can be incorporated into a circus or carnival scene on the wall or used as the basis for making masks.

A crowd scene could be another idea which could be implemented on *Picture Craft* (see CROWD on the *Picture Craft* disc). Another idea is for the children to look at the person next to them or opposite them. Get them to draw their neighbours and put their pictures up on the wall as a Rogues Gallery. I have seen some excellent drawings done by lower juniors of their impressions of their 'mums'.

There are many possibilities as far as the topics of people and faces are concerned and two ideal books to get hold of are *Paper Faces* and

Paper People, both by Michael Grater (Mills and Boon). The children could create a whole family and build up their characters, drawing pictures of them and writing stories about their experiences. The children decide on the family names, their ages, where they live, and what they do. Some of the suggestions I have had in the past have included pop stars in their mansions and milkmen in their cottages. Story lines can be thought up for each character and this could easily lead to work on a 'family storybook' about a village or town.

Stars

There are many ways in which the star motif can be tackled and I have seen some spectacular results from children of all ages. In nature there are many examples of star shapes – from the obvious, like the starfish, to the more subtle, like the complex snowflake crystal. Described below are some of those that can be created very easily and can form the grounding of a project on stars, which would cover decorations, astronomy and stars in the natural world.

Basic materials:

Straws (drinking or art)
Card
Foil
Scissors
Pencil
Ruler
Glue (PVA or similar)
Sticky coloured paper
Paint

Simple stars

One of the simplest of star shapes can be made using a few straws. Place these in a crisscross as shown in *Fig. 77*, and stick them together at the centre with some firm adhesive. They can then be painted or covered with wool in different colours. This can take some time but I have seen some pretty results. The stars can then be suspended from the ceiling.

Starmobiles

These can be made very easily and can be very effective. Take a piece of sticky paper and fold it twice, as shown in *Fig. 78*. Then unfold it. Cut into the middle as shown and then fold over the pieces and stick them down. Do this with about five or six pieces. It is a good idea to use

Fig. 77

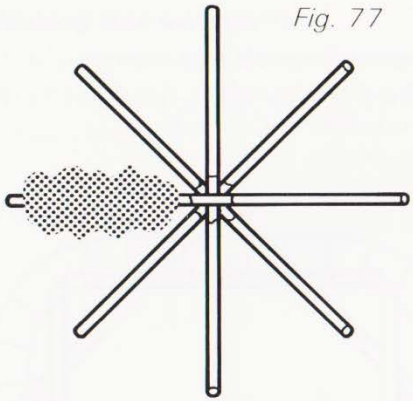
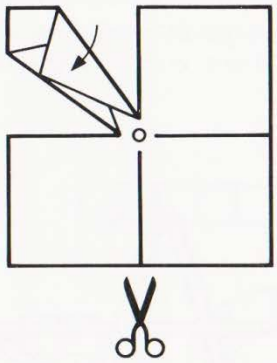


Fig. 78



different colours. Make a tiny hole in the centre of each of the pieces and thread them together. If plain, they can then perhaps be sprayed silver or gold, arranged in a star-type shape and hung up.

Box Stars

These can be created by using pyramids with square bases as shown in the box stars worksheet. These can then be stuck together and decorated.

Equilateral stars

These can be easily made up of two equilateral triangles, cut out and then stuck together to form the shape shown below, *Fig. 79*. They can look very effective against a dark background. Once the children have been shown how to make these, they seem reluctant to stop, and you may soon find the whole room cluttered with stars.

Stencil stars

Get the children to think up and cut out some simple star shapes and then draw or paint around them. Another idea is to create stars from parallelogram shapes, as shown below, *Fig. 80*.

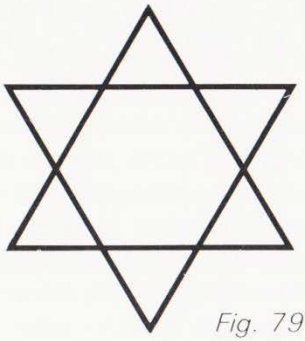


Fig. 79

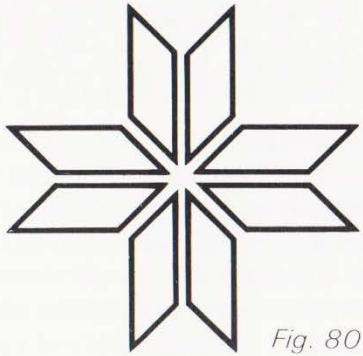
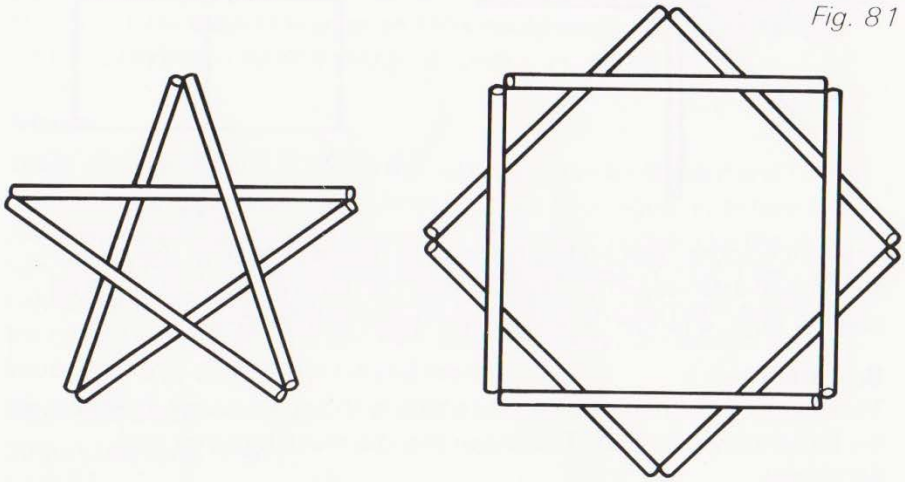


Fig. 80

Straw stars

These can be very simple or quite complex. A couple of the simpler shapes are shown below. After these have been created, it is possible to build them up in a number of different ways for 3-D effects.

Fig. 81



These are only a few suggestions. If you are interested in taking this further, I suggest that you obtain *Making Star Shapes* by Marion Hine and Roger Limbrick (Pine Tree Publications). They look at the subject in much greater detail and make some stimulating suggestions.

Games and puzzles

This section deals with a few games and puzzles you might like to create with the children.

The Board Games section in Peter Smith's section of this book (page 70) has a number of practical suggestions for board games using the program. This in turn could inspire children to invent their own board games on paper. Of course, small children will need guidance, perhaps along the lines discussed below.

Basic materials:

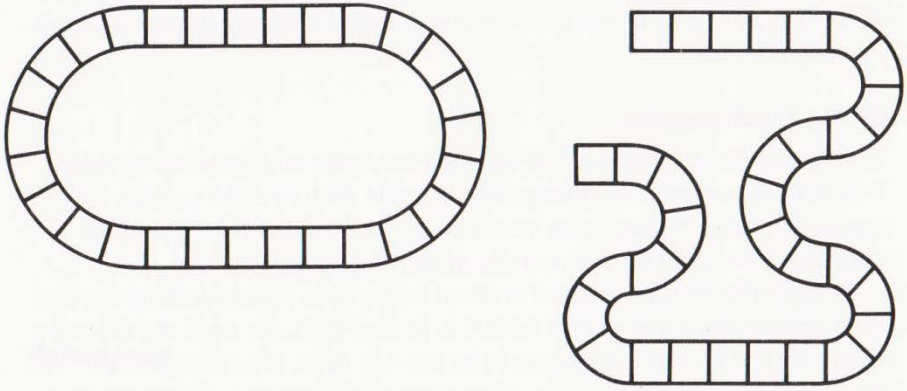
Card
Pencil
Dice
Ruler
Crayons
Felt tips

Making your own game

A dice game most children really enjoy can be made up like this:

Take a fairly large piece of card and draw on it one or both of the tracks shown below.

Fig. 82



Mark the squares on the track and mark which are the beginning and end squares. Write into several of the squares instructions such as 'go on 3', 'lose a turn' etc. These phrases can obviously be expanded if the game has a particular theme, for example, water. ('You fall in the pond and lose one turn.')

Older children will probably want to include the possibilities of short-cuts if they draw a more elaborate board that allows alternative paths. A short-cut must, of course, cut down the number of squares used, but could be more hazardous.

If they land on a particular square they could be sent to a square which could be a castle-prison or an island. They would then have to throw a six to get out. It is worth discussing what should happen if they land on their opponent's counter: should, for instance, that counter be knocked off the board and not be allowed back on again for one turn? If so, must that counter start at the very beginning or should it be allowed back to its last position?

Another feature of the game could be a set of cards. Certain squares can be marked, and if they land on these they then have to take a card which has instructions on it, such as 'keep this card and use it to get out of the castle' or 'go back to the start'. Children usually think up some very good instructions. There are obviously lots of other ideas that the children will come up with which can be incorporated into their game. It is advisable, at some stage before they have finished, to get them to

play the game with someone else; this will bring out any snags. For example, a child might think up a rule such as 'you must throw a six to start with', but the sixth square says 'go back to start'!

When they have finished they can decorate the boards and write out a set of instructions to go on the back, in case another group of children want to play the game. They could make a set of cards or perhaps a spinner instead of using a dice. The children can swap games with each other and perhaps come up with other ways of creating games instead of using a board.

Sliding-block puzzles

The *Picture Craft* program can be used to create sliding-block puzzles. This activity can also be undertaken outside *Picture Craft* using a picture drawn on paper, though one could be printed out from *Picture Craft* itself and then used for the activity described below.

Mount the picture on card and cut it into nine equal rectangles. You must now make a frame into which to fit your picture, as in the diagram below (*Fig. 83*). Put the picture in its correct form (this is important) into the frame. Remove one piece. Now slide the remaining pieces around until the picture is well jumbled. The game now proceeds like the sliding-block puzzle part of *Picture Craft*. That is, the pieces have to be slid around until only the piece that has been taken out is needed to complete the picture in its original form.

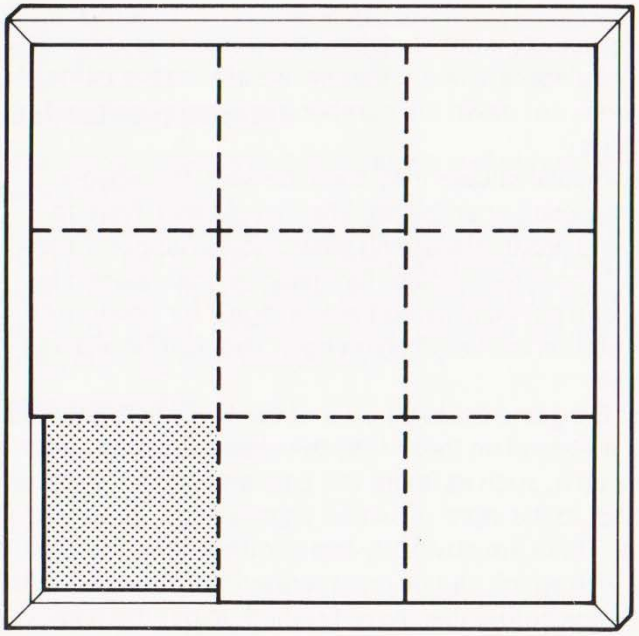


Fig. 83

Jigsaw puzzles

These are very popular and again easy to make. After sticking the paper on the card, cut it up into workable pieces. Unlike the pieces in the sliding-block activity, the jigsaw pieces need not be the same shape and size. A good idea might be to cover the puzzle with tacky-back to protect it.

The ideas above are meant as a starting point and should be modified as necessary.

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Software

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Best four maths	ASK.
Dragon's world	4Mation.
Facemaker	ASK.
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Pirate	Chalksoft.
Using your computer	BBC Publications, software cassette and audio cassette pack for BBC 'B', 1985.
Wordplay	BBC Publications, software cassette for BBC 'B', Electron and Commodore, 1985.

I should like to mention the following books which proved particularly good as sources of ideas for how the software could be used.

Sources of Mathematical Discovery Lorraine Mottershead (Blackwell).

Winning Ways John Horton Conway (Academic Press).

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