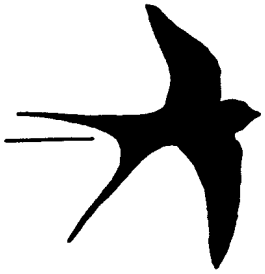


SWALLOW SYSTEMS

Application Notes for PIP

This set of notes gives some ideas for the use of **PIP**. If you have any application ideas, send them in and we will try to include them in our next series. We always credit the authors, so if you want to get famous, here is an opportunity!

Children should always be given every chance to experiment with minimum adult input. When they need help they will usually ask for it. If they become frustrated or bored then an adult should step in only enough to overcome the immediate problem.

It is not advisable to let children plug in the charger! If it is forced in wrongly it is possible to destroy both **PIP** and the charger.

Please feel free to make any copies you wish of these application notes. We release them into the public domain for educational use.

You can integrate **PIP** into many different projects and reading schemes. Part of the fun is "dressing up" **PIP** to suit, using building systems, paper or cardboard. We cannot give details of particular reading schemes but we hope you will find ways to use the resources of your particular school.

PIP is dependant on the operating surface. Carpets can give unpredictable results. If you use **PIP** on hard smooth surfaces you will get the best possible accuracy. If you run **PIP** on paper, make sure it is held down and cannot be rucked up during turns.

PIP is moderately accurate. Try to design maps and puzzles to allow for errors of 10 degrees in angles. Distances will be accurate to a few percent on a good surface.

PIP is fairly slow. It seems to move quickly over small distances, up to 100cm. Beyond this, the time taken for long **forwards** and **backwards** commands can make things a little boring.

Remember that during the execution of a program, pressing any key will abort the program with a **grumble**, so pressing **Test** will give a **grumble** if **PIP** is running and execute the test routine otherwise. You can use this to check if **PIP** is **pause**ing, turned off, or merely waiting for the next instruction.

With a little practise you will be able to get a rough idea of how the children are getting on by listening to the beeps, grumbles and songs of **PIP**. Too many grumbles, or worse still, no sounds at all, should make you investigate the situation.

Hints for junk modelling with PIP

When dressing **PIP** up it is a good idea to make things that just drop over the top. There are small cereal packets and some makes of shoe boxes that fit exactly but you may have to stick together two halves of tissue boxes or something of the sort. The whole process can be converted into an exercise in estimation and measurement.

If your boxes are too big you can stick matchboxes inside to fit on the sides and front of **PIP**. This means you can make large models that still fit snugly over **PIP**.

It helps to have a hole in the model for access to the **Go** button. Programs can be entered and tested before fitting the model and then **Go** is all that is needed.

Some dressing up ideas that have come from schools:-

A school with special needs children found it very useful to draw an amusing face on a piece of paper to paste to the front of **PIP**. This not only helped to make **PIP** a person rather than a thing but also clarified which end was the front.

During a topic on water, one school created an entertainment for the parents. It was "The Sorceror's Apprentice". They dressed **PIP** up with a raffia broom head and programmed it to travel backwards and forwards.

During a topic on Dinosaurs, **PIP** was made into various types of dinosaur by the children sticking two cut-outs to the sides using Blu-Tack.

If you can get an old electrical cable reel, it can be turned into an excellent carousel by hanging paper horses from the inside and fitting blocks underneath for location.

After you have used **PIP** you may like to ask the children to make a **PIP** out of boxes etc. (or possibly a girl/boy friend for **PIP**!)

A nursery school used Lego to make a crane on top of **PIP**. They used this to tow away badly parked model cars. A country school might like to adopt this idea for "harvesting" paper crops.

Battery Charging

Remember that **PIP** can be charged up whenever you like for as long as you like. It is best to get into the habit of charging **PIP** every night to avoid the problem of a suddenly flat battery. Make sure that the charger is correctly plugged into **PIP** before you switch on the mains.

Have Fun!

PIP application note 1

These are some preliminary ideas for children to find out about **PIP**. Our thanks to Mrs. G. Hart.

Example 1

Place **PIP** on the floor and switch on.

Press **CM** , ↑ , 1 , 0 , **Go** . Watch what happens.

Press **CM** , ↑ , 5 , 0 , **Go** . Look how far **PIP** goes.

Press **CM** , ↑ , 6 , 0 , **Go** .

Now send **PIP** to a friend.

SHOW ME!

Example 2

Place **PIP** on the floor and switch on.

Press **CM** , ↑ , 2 , 0 , ↱ , 9 , 0 , ↑ , 2 , 0 , **Go** . Look how far **PIP** turns.

Press **CM** , ↑ , 2 , 0 , ↱ , 1 , 8 , 0 , ↑ , 2 , 0 , **Go** .Watch again.

Press **CM** , ↑ , 2 , 0 , ↱ , 2 , 7 , 0 , ↑ , 2 , 0 , **Go** .

Send **PIP** round a corner to a friend.

What must you press to get **PIP** to turn all the way round?

Example 3

Place **PIP** on the floor and switch on. Find out all the things **PIP** can do.

How many things are there? Can you get **PIP** to do them?

Example 4

Place **PIP** on the floor and switch on.

Put a small book on **PIP**. Send it to a friend.

Write down what you pressed to get exactly to your friend.

Tell your friend not to move but to send **PIP** back to you with the book.

Tell your friend to write down what they pressed to do it.

Look and see if they are both the same. If they are not the same, why not?

Example 5

You need three children or marked points.Spread out in the shape of a triangle. Number the points or children 1, 2 and 3.

Start by sending **PIP** from 1 to 2 and then writing down what you pressed.

Then send **PIP** from 2 to 3 and write down what you pressed.

Now send **PIP** from 3 to 1 and write down what you pressed.

Now try and send **PIP** all the way round without stopping. Use what you have written down.

Try again but make **PIP** pause at each person/point.

Example 6

Press **PIP**'s Test key and watch what happens.Can you write down and check the commands necessary to make **PIP** do this program?

SHOW ME!

Example 7

Use a metronome, stopwatch, tocker or another **PIP** flashing to give a time reference.

How many ticks does it take for **PIP** to move 100 forwards?

How many ticks does it take for **PIP** to move 100 backwards?

How many ticks does it take for **PIP** to turn 360 degrees left?

How many ticks does it take for **PIP** to turn 360 degrees right?

How many ticks does it take for **PIP** to move 200 forwards?

How many ticks does it take for **PIP** to move 50 forwards 4 times?

Does it make any difference if the 50 forwards are done using **Repeat** structures instead of using the same instruction 4 times?

How many ticks does it take to draw a square with sides 10 cm. long?

How many ticks does it take to draw a square with sides 20 cm. long?

Example 8

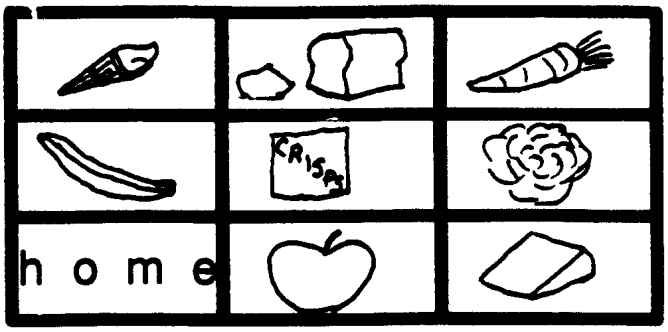
Attach a piece of string to **PIP** using adhesive tape.

Can **PIP** pull a toy train? How many carriages? Can **PIP** pull a chair? Can **PIP** push a pile of bricks over?

PIP application note 2

These are more ideas for children using **PIP**. They are to do with coordinates.

Example 1



Draw out a large grid on paper on the floor, (3 by 3, or 3 by 4) each block about the size of this piece of paper. Attach a pointer to **PIP**. Draw food items or fit pictures of food items in the grid, mark the bottom left corner **home**. See figure.

PIP can taste the food (pointer points to the picture) in turn going **home** after each one.

What is **PIP**'s menu today? Write down the menu and the program to make **PIP** taste the food in the correct order.

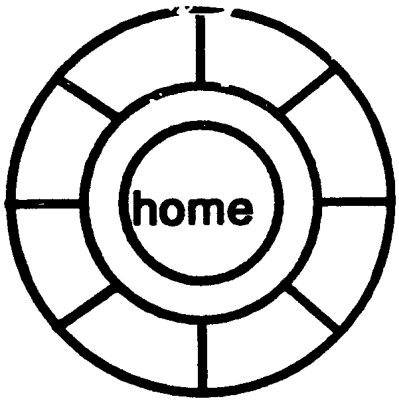
How many pieces of food can **PIP** taste within one program?

Discussion ideas:-

Is the food good for you?

Is the menu for **PIP** a good one? No oil? No electricity? No nuts and bolts?

Is there a reason for going **home** after each item?



Example 2

Repeat exercise 1 with the food pictures in a large circle and **home** in the middle. See figure.

Example 3

Replace the food items in either of the above exercises with characters from the current reading book.Can you program **PIP** to bring some of the characters to his **home** for a party and return them to their homes afterwards.

Write down the program.

PIP application note 3

These are more ideas for children using PIP. Out thanks to Mrs. G.Hart.

Example 1

Make a cat mask for **PIP** and 6 mouse skittles with numbers on. Use figure 3 and photocopy it for the children to cut out and colour in. Add numbers to the front of each mouse for scoring.

Put the skittles at least 2 metres away and 25 cm. apart. Knock down the skittles with the cat and add up the score.

How many skittles can you knock down in one program?

(A party version of this was suggested by Pete Dailhou of JPR software in Australia. He uses balloons instead of skittles and bursts them with pins attached to **PIP**.)

Example 2

Make a course for **PIP** using cones or skittles. The cones can be made from cut out and rolled paper. See figure 4 for an example. The start can be marked out with masking tape on the floor and **PIP**'s house could be a modified cardboard box.

Program **PIP** to go round the course without touching the cones and park in his house.

Program **PIP** to return from his house to the start.

Who can program **PIP** to do these with the least number of program steps?

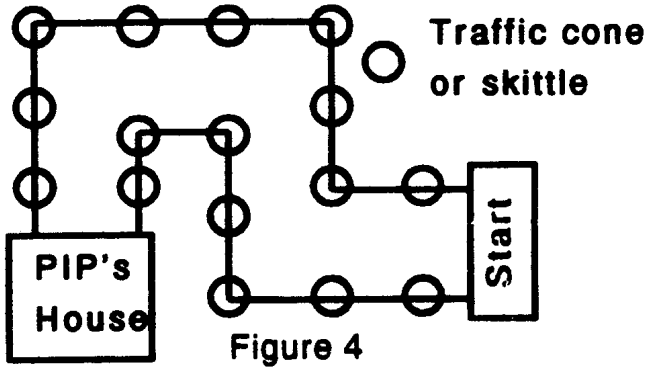


Figure 4

If you change the shape of the course first, can you write down the program for **PIP** to follow before programming **PIP**. Did you get it right? Can you write down the correct program?

Example 3

This needs a large hall or corridor with classrooms off it.

Program **PIP** to be a postman. He carries the letters on his back in the correct order and visits each classroom in turn. At each door he must stop and play some music to announce his arrival. He must wait for a little time for the letter to be collected.

Can you program **PIP** to take the register to the school secretary?

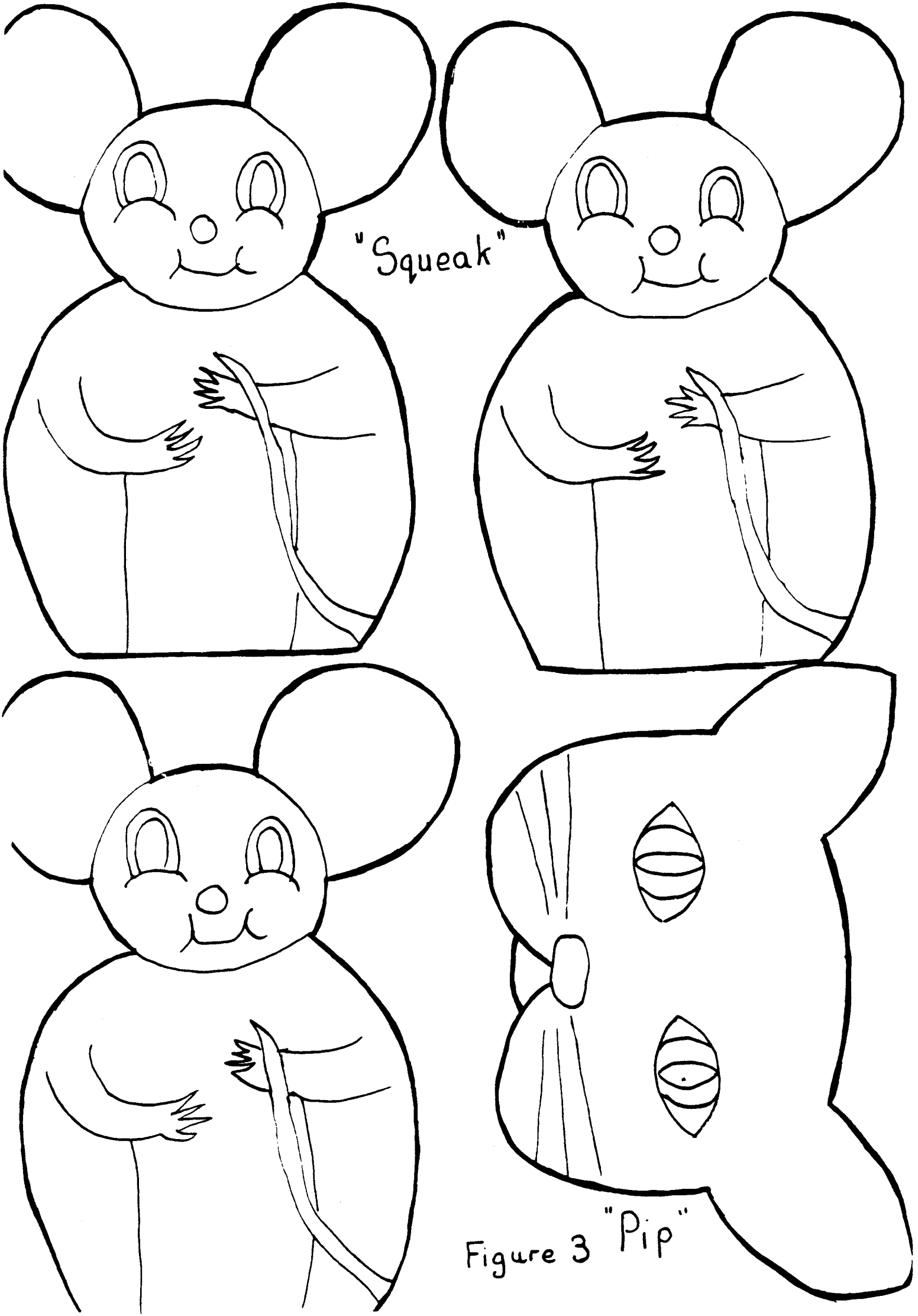


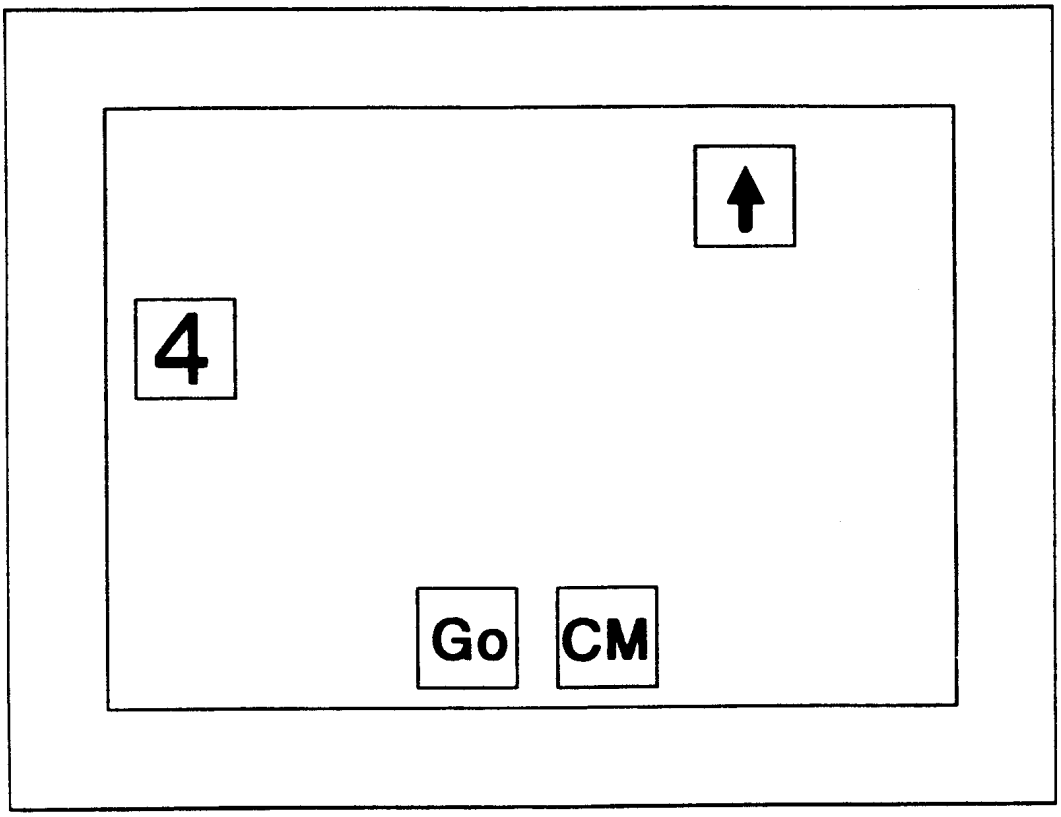
Figure 3

Ideas for younger children

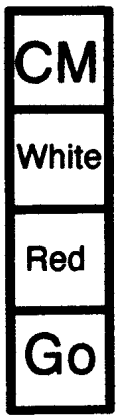
The problem is to ensure that the children can manage enough correct keypresses to make **PIP** do something interesting. If they get too many grumbles because they have got out of step with what **PIP** is expecting, they can start to get disheartened.

It is easy to explain that **Test** does something interesting but the problem is getting from that to programming **PIP**. The difficulty is that **PIP** will need at least 3 correct keypresses before it will do anything, even with the X10 plug fitted.

The first idea is from Mrs. Pratt of Glevum school where it was used for special needs children. It will also work well for younger children.

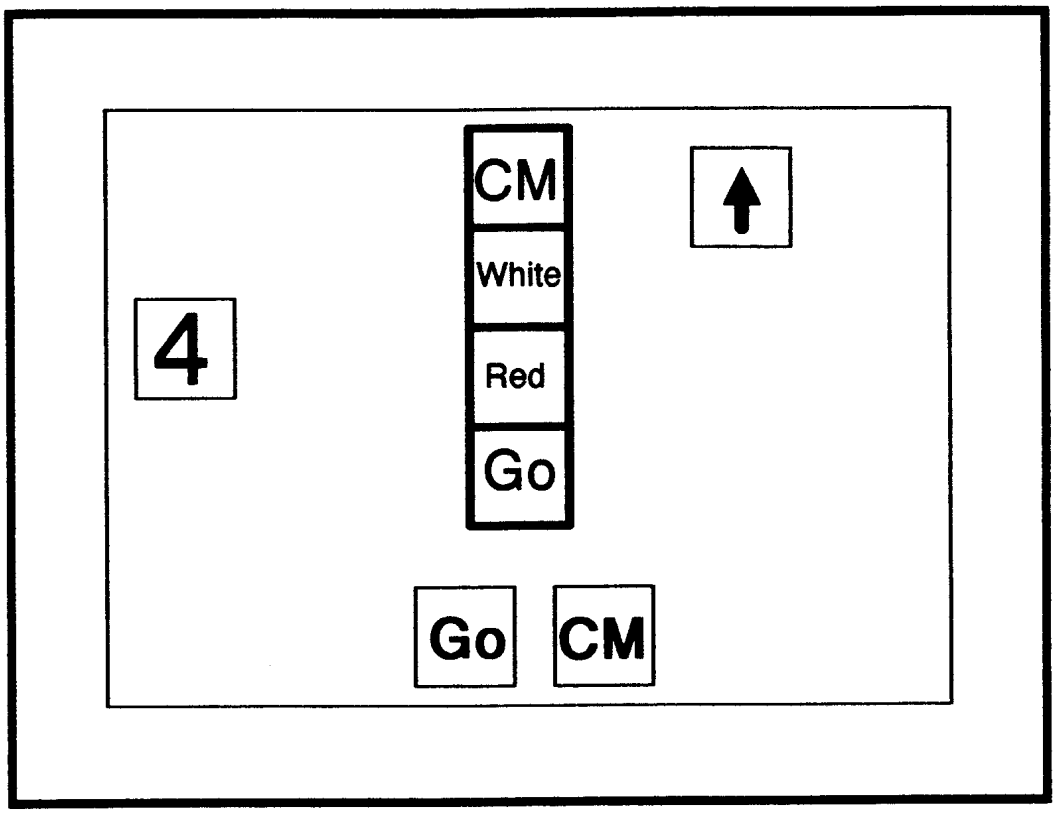


Prepare pieces of cardboard to fit over **PIP**'s keyboard. Each should have four cut-outs to allow access only to a command, a number, **CM** and **Go** keys. Then explain to the children which order they should press the keys. They will soon be able to make **PIP** do things. Use different templates to introduce new commands.



The second idea is from Gill Westbrook of Oak Farm Infant School.

Prepare work cards for the children which show four squares about the size of PIP keys. The first square has **CM** in it, the second is clear white the third is clear red and the last is green with **Go** in it. The children are shown that if they follow the sequence of the squares **PIP** will correctly do something.



It is probably best to combine both ideas by having a template with the work card contents shown on it. Several templates can be used to introduce the different cards. The final stage would be to just have a work card stuck to the top of **PIP**. Later on the X10 plug can be explained and may be left out all together when the children can manage without it.

If you need bigger unit movements for your children, we can supply a X22.5 plug to help. Please contact us on 0494 81 3471 for the latest details.

Many thanks to the staff of Glevum School for some of the ideas here

Worksheet 1

Name ..... Date .....

PIP Profile

Length .....cm. Width .....cm.

Height .....cm. Weight .....Kg

Description :-

PIP can:-

1 ..... 2 .....

3 ..... 4 .....

5 ..... 6 .....

7 ..... 8 .....

Worksheet 2

Attach a self-adhesive hook to the front or rear of **PIP**, make up a hook using Lego or use an elastic band around **PIP** to couple things to **PIP**.

How much weight can **PIP**

Pull? .....Kg. Push? .....Kg.

Carry? .....Kg.

If the weight is on a cart or trolley, how much can **PIP**

Pull? .....Kg. Push? .....Kg.

Using PIP in topic work.

Several teachers have come up with excellent ideas for using **PIP** in topic work. This note outlines some ideas and gives a flavour of the possibilities.The approach is to develop a scenario where **PIP** is a character operating within a relevant environment created by the class. **PIP**'s activities are made to fit logically with the character. In nearly all cases **PIP** will be customised. This can be as simple as a drop-over cardboard shape decorated to suit the character.

Pollution.

One school did a pollution project with 11 year old children. They made a cardboard map about 1 by 1.5 metres in size, with roads and buildings shown on it. The roads formed a loop with spurs going off the map. There was a sea front with quay and beach. The map showed a coal mine, factory, sewage works, dump, beauty spot and County Hall. A railway line used a level crossing and a bridge to cross the roads.

PIP became "**P**ollution **I**nvestigation **P**atrol" equipped with a drop-over coat made from a transparent vegetable packing box. This had various items made by the children fitted, including a "cigarette sucker upper", a "dog buckit (sic) and spade", a"poisonous gas collector" and various grabs, sensors and antennae made from cheese triangle boxes and cardboard.

They wrote a verse about **PIP** cleaning up the environment:-

Pollution Investigation Patrol.

PIP is our patrol man, he works both day and night,
To see if our environment is staying clean and bright.
He travels through the countryside, up and down the town.
He bleeps his friendly warning round "Be ***GREEN*** not dirty brown".
He rattles through the factories where smoke is pouring out.
"Acid rain is what you're causing. Clean up." you'll hear him shout.
On and on he travels to beaches black with oil.
Blaring out his message "Enjoy our world - Don't spoil."
He visits all the rivers, the salmon and the trout,
Making sure the oxygen has not been wasted out.
On to naked waste land, he plants new tiny trees.
Then back across the water to stop pollution dumped in seas.
Happy on his journey, Pollution **PIP** rolls on.
Tireless in his efforts 'til all pollution's gone.

The teacher produced work cards. These were to make **PIP** go from its parking place to a particular site, taking care to stop or sound **PIP**'s horn (music) to avoid hazardous level crossings, low bridges etc., then take a sample (flash the light). After identifying the pollution, **PIP** must go to the source to tell them of the damage caused before reporting to county hall and returning to base.

These ideas came from Di Pescod of St. Mary's RCVA School, Bodmin, Cornwall. Many thanks for permission to pass them on.

Cats

One teacher introduced **PIP** to her reception class (5 year olds) already in character. She fitted a fluffy pyjama case over a slightly modified ice cream tub and stuck the assembly over the top of **PIP** with sellotape. The pyjama case hung down to cover the sides and the keyboard was accessible through a cut-out.

This **PIP** was introduced as something she had found during the holidays. The children were asked to discuss what it was, whether it was a he or a she and what it could be called before exploring what it could do. After considerable discussion they named it Floss and decided it was neither male or female. (Other children using Floss later described it as a she, probably because of the soft fluffy covering.

This group of children spent time exploring for themselves what Floss could do. Once they had learned the basics, especially pressing **CM** in case Floss "had something on its mind", they were given specific tasks to carry out.

Floss operated on the classroom floor with three-dimensional props to add interest. The props included a garden made up of cardboard flowers, a fish pond, a mouse house with mouse and Floss's basket complete with "Do not disturb" sign.

The children were given simple tasks for Floss, such as "go and see if there are any fish in the pond". They were asked to write down the command sequence for this task and then program **PIP** to carry it out. The results were compared with their predictions and the errors corrected for a final perfect run. (It is a good idea to have a marked, repeatable, starting point for **PIP**. We use masking tape to make a "parking place" for **PIP**.

The teacher produced plans of how this work fitted into the curriculum. It is impossible to reproduce all of the details here but some of the less obvious comments included:-

Maths:- sets of cats, multiplication and division -1 cat has how many paws etc., estimation, measuring, angles.

Science:- eyes, feet, teeth, predators, herbivores and carnivores.

English:- speaking and listening in groups, reading cat poems and stories e.g. The Owl and The Pussycat, writing stories about Floss's previous experiences or their own cats.

P.E./Dance & Drama:- pretending to be robots, programming each other, moving like a cat, stealth, pounce, angry cat, happy cat.

These ideas were provided by Valerie Band of Alsager Excalibur C. P. School, Stoke on Trent. Many thanks for permission to pass on the information.

Dinosaurs

Another teacher used **PIP** in a dinosaur project. The children cut dinosaurs out of paper and coloured them in. The resulting pairs of coloured silhouettes were attached on either side of **PIP**. This was done with reception class children and "Pipmetrodon" was used in a similar way to Floss.They made places for the dinosaur to move between and explored aspects of dinosaur lifestyle.

This method of customising PIP with cut-out silhouettes is one of the simplest ways of dressing PIP up. Almost any character can be made in this way and if the shape is drawn by the teacher for cutting out and colouring in almost all children should be able to contribute.

Santa Claus

The same teacher used **PIP** as a towing device for Santa Claus' sleigh. The same approach could have been used to make the sleigh itself. These ideas have extra applications as science experiments to find out how much load **PIP** can pull. (One school found that **PIP** could pull 3Kg on a trolley)

These two ideas come from Gill Westbrook of Oak Farm School in Hillingdon. Many thanks for permission to pass on the information.

Vikings

As part of a viking project a class produced a large scale map of Norway and Britain. They customised **PIP** in a similar way to Pipmetrodon by sticking cut-out longboats on either side of it. Then starting from a fjord in Norway, **PIP** can be programmed to carry out raids on various parts of the British coast.

This project would allow the class to cover important areas of geography and history as well as the standard maths and English content of using **PIP**. Science can be introduced in terms of the payload **PIP** can carry and the benefits of trading versus raiding can be discussed. Given the limited payload of **PIP**, the benefit of larger military payload (number of Vikings) versus larger commercial payload (loot returned home) can be discussed.

This topic idea came from Ed Lloyd-Jones of Hereford and Worcester. Many thanks for permission to pass on this idea.

FIRE !

This idea is to make a map of the layout of the school in a scale suitable for **PIP**, with all the fire exits and doorways marked. **PIP** is placed in various places in the school and then a fire marker is placed on the map by the teacher. The children have to program **PIP** to escape safely from the fire.

We particularly like this idea as it allows the children to discuss fire escape procedures at one remove, so that they can spend considerable time on the topic with a low risk of causing distress. Also **PIP** sets a fine example of panic-free exit during a fire as its speed is unaltered by circumstances.

One way of obtaining the information to prepare the map is to use **PIP** as a surveyor. The programs to move **PIP** around the real school allow the children to find out the distances and angles to travel between schoolrooms and from this the map can be drawn.

This topic idea came from the staff of Wooton C. E. School,Oxford. The surveying idea came from Janet Baker of Frank Wise School, Banbury. Many thanks for permission to pass on this information.

Factories.

In its original form this idea used **PIP** in a topic about the industrial revolution. The class made a factory with ramps and workplaces and **PIP** moved materials and finished goods around the factory. This is the same as the use of some full-size industrial robots.

They found some problems with the basic idea. The bottom of ramps need to be designed to avoid **PIP** "bottoming" and lifting its drive wheels off the ground. Also it may help to counterbalance **PIP** so that it remains in the "tail-heavy" position.

The same programming, estimation and problem solving ideas apply to this application as the others. The special features are slopes and sound to indicate mood in an historical context. **PIP** carrying weights up slopes gives a direct measure of mechanical power. The weight **PIP** can carry is related to the steepness of the slope. For younger children the simple idea that **PIP** can carry more weight up shallower slopes is all that is needed. With older children accurate measurements can be made.

Using sound to indicate mood is already present in **PIP** with "grumble" and "sing". This school extended the idea with sombre music or Morse code (SOS) for misery and happy music (Whistle While You Work) for the opposite.

The use of an historical context is interesting , especially with the idea of **PIP**'s feelings. Since **PIP** is often considered a person rather than a thing, **PIP**'s reaction to its historical surroundings with happiness or misery gives the children a greater experience of working in a miserable environment.

This application covers a wide area of the curriculum. The direct application of maths, science and technology is combined with English, in terms of writing and reading and history is overlayed on this.

This topic idea came from Moira O'Hara of St. Angela's School, Glasgow. Many thanks for permission to pass on this information.

Since this idea was included in these notes other schools have adapted it to their needs. Parkhill Infants reception class in Croydon made a car factory and Brookhouse Primary in Blackburn used **PIP** in a functioning paint factory. They had a marked out track for **PIP** to move on and at 30 centimetre intervals they had circles marked at the side of the track. The first 5 circles had a pot of poster paint powder in red, yellow, blue, white and black and the last circle had a jug of water. **PIP** was equipped with a pot on its back and programmed to move along the track stopping as needed. Each child had to add some of its paint if **PIP** stopped opposite and at the end of the track the mixture was stirred and sent off for colour checking. The whole system was a very good demonstration of a roboticised factory with a real product.

Summary.

These topics give a small insight into teacher's ideas for encouraging their pupils to learn with **PIP**. The obvious areas of estimation and simple programming have been submerged in a more general cross-curriculum theme. Teachers have taken full advantage of **PIP**'s flat surfaces to use it as a load carrier dressed up with simple paper and cardboard designs.

A geographical approach in terms of a model of a larger reality is used rather than a mathematical approach in terms of co-ordinates. A formal map can be used with older children where **PIP**'s size and the use of small movement units means that only a comparatively small map is needed. Younger children may manage better on a normal floor customised with buildings and models, where the positions can be altered to give a variety of problems.

Highly motivated older children can make **PIP** sized three dimensional models such as a factory or garage. The technical problems are fairly formidable but the rewards in terms of the children's learning experiences probably justify it in schools with a strong technology capability.