

# M I C R O -

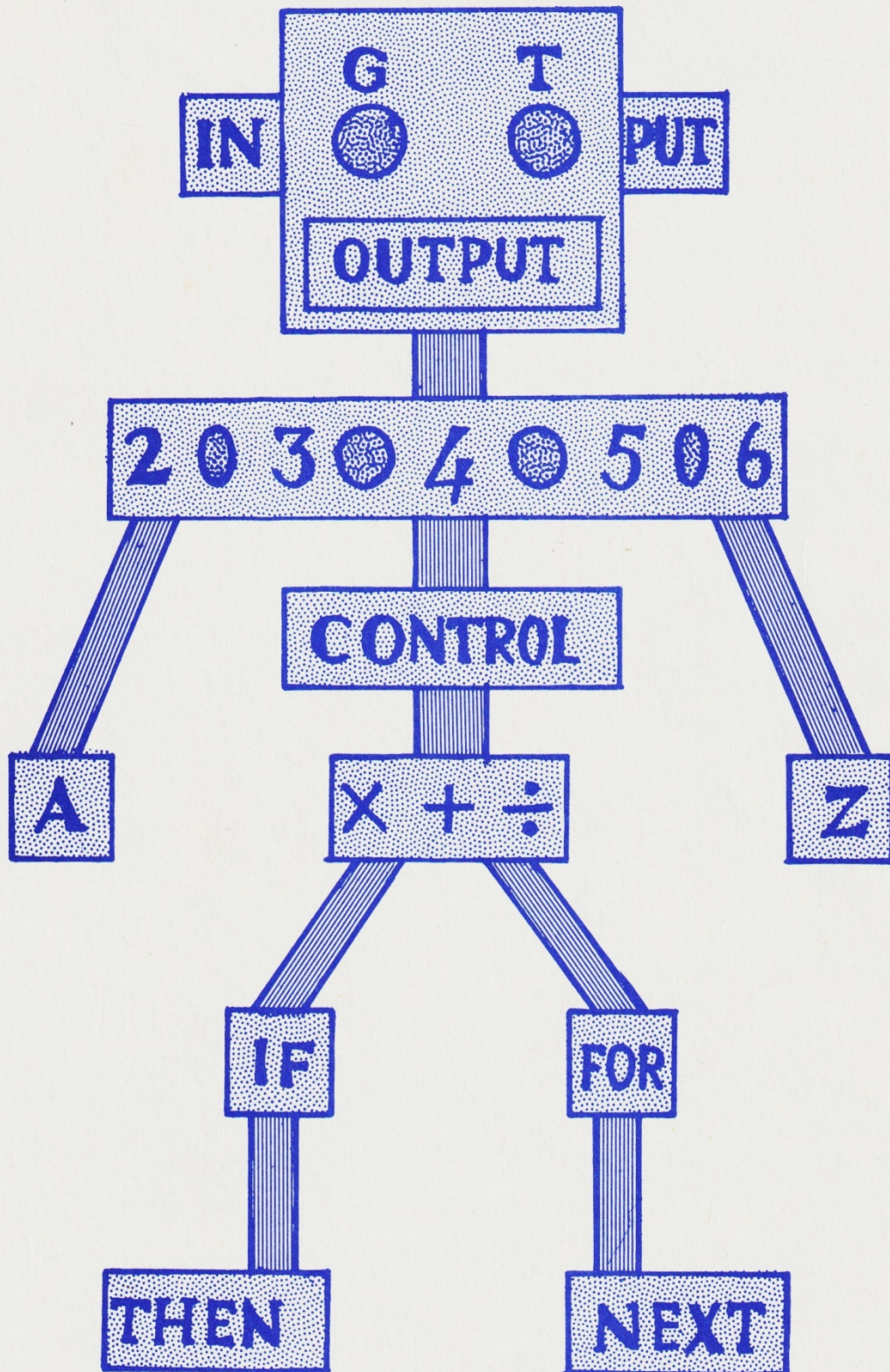
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# MICRO-SCOPE

The letters stand for "Microcomputer Software Co-operation for Primary Education." The title also signifies the unlimited opportunities and challenges awaiting us.

Newman College has become deeply involved in the development of applications of the microcomputer in primary schools in the Birmingham area. It is a two-way exchange of ideas: teachers meet us and each other in college; and lecturers visit schools (and even teach children!) We are not out to sell machines, but to accept and control them for wide-ranging educational purposes, across the whole curriculum.

Staff of Newman College have formed an Editorial Board to launch the newsletter. We intend to co-opt teachers from primary schools as soon as possible.

EDITOR: John Lane;

BOARD: John Fair, Alan James, Roger Keeling;

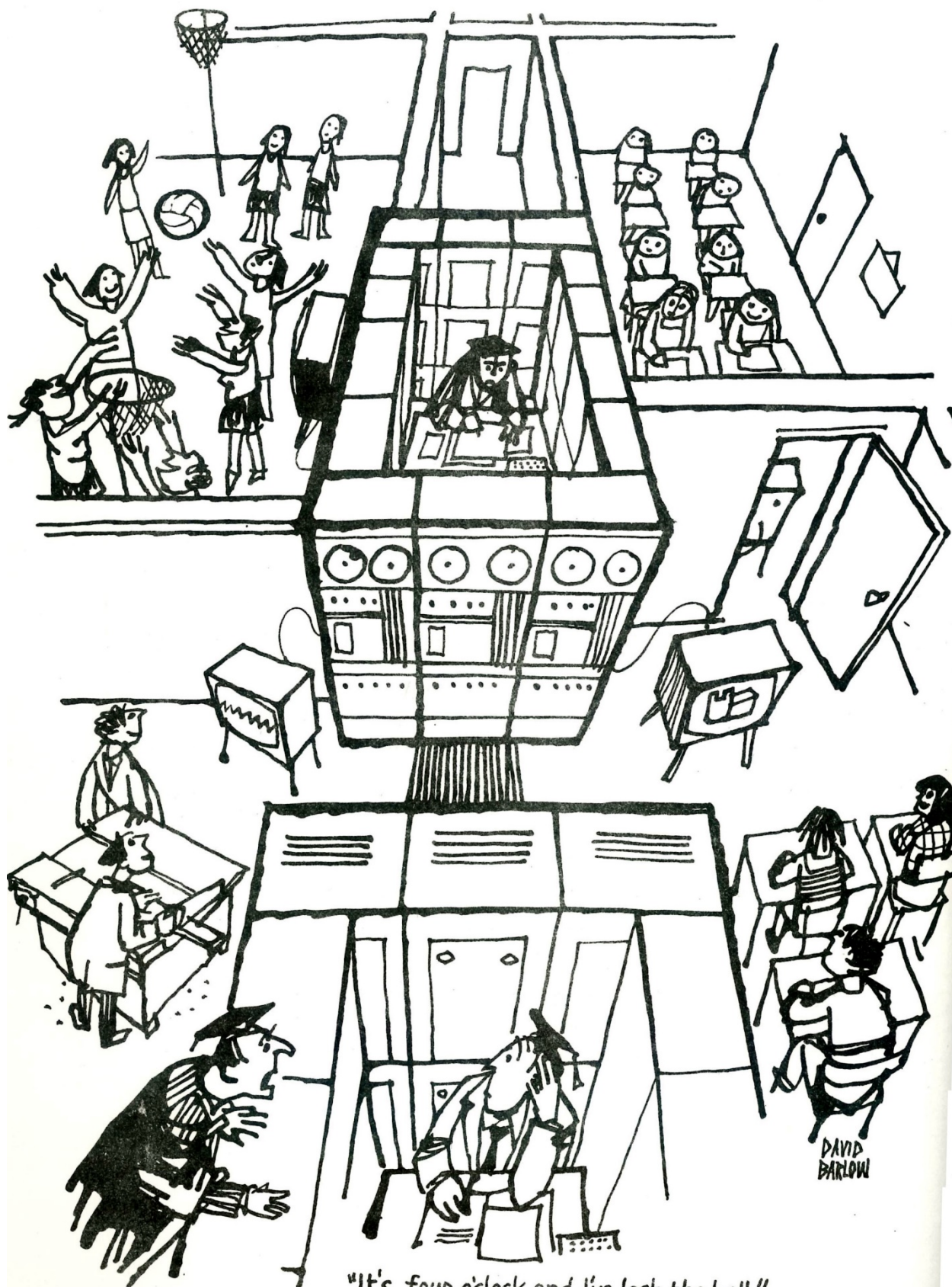
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"It's four o'clock and I've lost the bell."

## EDITORIAL

This newsletter is planned as a service to teachers in primary schools in a time of change.

We intend to be reassuring. You won't need to be a specialist to read "MICRO-SCOPE." We do not assume a maths degree, nor programming experience, nor hardware already installed in your school. After all, you don't have to be a motor mechanic to drive a car, nor an engineer to trust your life in a lift. Telephones, spectacles and levers are just familiar extensions of human capacities. The microcomputer certainly can and will be used by many as a totally mysterious "black box". In the primary school it must sensibly be seen as a staff resource, not an expensive toy for the enthusiast. (Careful - it is addictive!)

Another keynote for us is opportunity - the optimist's word for self-defence. The revolution has begun. The machines are occupying the primary schools, and will spread. We predict that they will transform many aspects of teaching within a decade. If classroom teachers are closely involved early enough, they can channel the energy and specify the developments they want from the programmers. Some will want to go a step further and learn how to make their own local and topical references through adjustments to a program.

Our purpose is to help to oil the wheels (and to update our metaphors!) We shall give examples of teachers getting involved in software development. The newsletter will be a vehicle for sharing experiences and apprehensions, flops and successes. A forum is also needed for airing the issues and choices to be faced.

Our commentary will keep a broad perspective. Certain aspects and applications will require more depth, and we shall run series on selected themes. Each article is intended to be self-sufficient, but the effect will be cumulative. Occasionally we may devote a whole issue (or a special supplement) to a single theme.

PLEASE WRITE TO US. Articles, letters, criticism and ideas will be welcome. Our aims for 'MICRO-SCOPE' outlined here need your participation.

## Classroom Uses of the Microcomputer

With the advent of low-cost microcomputers we must begin to assess the potential of this technology in the field of primary education. This article looks at areas of possible application and will hopefully serve as a stimulus to the production of many more ideas.

I must emphasise at the outset that the micromputer is not going to dominate or replace the teacher. We must learn to use it as an aid. Different teachers will have their own approaches and will exploit different characteristics of the machine. Each will aim to identify those characteristics that will add to his own existing resources. It is equally important to recognise that inappropriate use of the machine might cause a lack of thinking or attention, and so stifle the learning process.

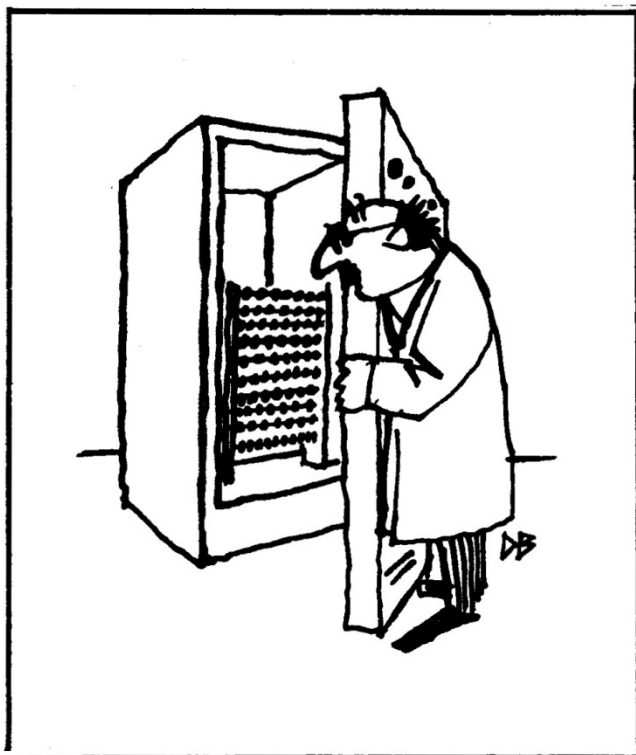
A few promising applications are given below.

### 1. AS AN ELECTRONIC BLACKBOARD.

The graphics facility can be in colour or black and white. It can draw graphs, diagrams and maps more quickly and accurately than a teacher at the blackboard. Williams<sup>(1)</sup> cites two disadvantages of the blackboard:

"The difficulties usually fall into one of two categories: a) an accurate graph or diagram is needed which I cannot produce quickly enough, with the accuracy required, without losing the pace of the lesson; b) the situation has a dynamic aspect to it which I cannot cope with fast enough."

We can investigate changes caused by varying the data and produce a revised graph for comparison almost immediately. The momentum of the lesson is maintained and it allows investigations to be deeper and more extensive than may have been possible previously. With animated graphics we can move a cursor around the screen to indicate a particular flow or route, or move a shape around the screen by translation, rotation, reflection or enlargement.



## 2. AS A TEACHING AID.

It can be used with a whole class, a group or an individual. In particular the machine can provide a tailor-made teaching environment for children requiring remedial help, while it is equally capable of challenging the brightest pupils. In fact it partly answers the criticism made in "Primary Education in England"<sup>(2)</sup>

... for the children who showed most marked mathematical ability the work was often too easy and it is a matter for concern that these children's abilities were not fully extended in their work in this subject."

The machine has certain advantages over the human teacher. The microcomputer is the epitome of patience and it provides instant feedback personalised where appropriate. It also has an amazing capacity to motivate. This leads in turn to the third point.

## 3. TO GIVE PRACTICE IN SKILLS.

This could be simple drill work in maths or language. The micro can, for example, generate simple arithmetic problems: but envelope this work within a games situation and add a graphics display and you have a recipe for total pupil involvement that even the best motivators would be hard pressed to match.

"Primary Education in England" states :

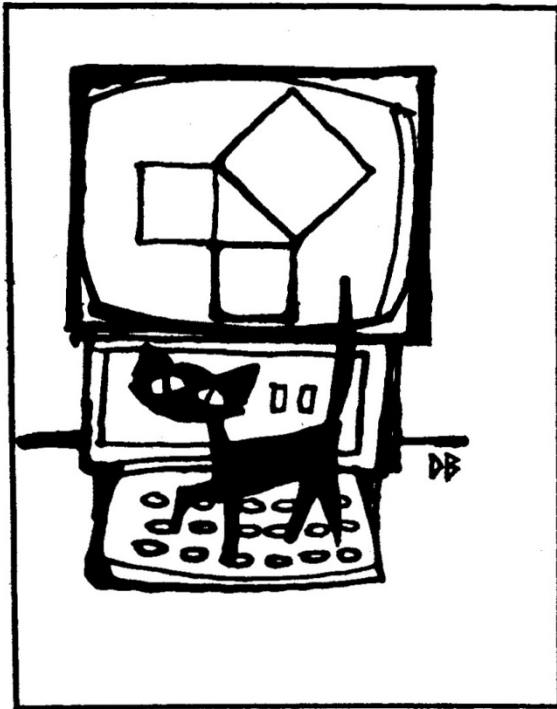
"In describing what their schools set out to achieve in mathematics, heads' comments indicated clearly that they attached considerable importance to children achieving competence in the basic skills of arithmetic and understanding mathematical processes..... Many heads also referred to the importance of children gaining confidence, enjoyment and satisfaction from their work in mathematics."

Here the microcomputer can provide the skill practice and certainly provide enjoyment, satisfaction and a growth in confidence.

## 4. FOR TESTING AND DIAGNOSIS.

The more information we have about each pupil, the greater our accuracy when assessing strengths and weaknesses. The micro can be used to test individuals across the curriculum for certain concept formations, skill acquisitions and understanding and then to store the results for future reference.





The teacher can then interrogate the file at any time and find out, at varying levels of detail, the performance of each pupil. The micro could then be used to generate work cards or question sheets, for any individual child, using the information it has stored to assess the standard. This is potentially a very powerful application but requires the very best software to make it effective. To quote "Primary Education in England" again:-

In about a third of the classes, at all ages, children are spending too much time undertaking somewhat repetitive practice of processes which they had already mastered. In these circumstances there was often a - failure to make increasing demands on the children's speed or accuracy, or to introduce new and more demanding work."

The microcomputer could go a considerable way to answering this criticism.

##### 5. AS A COMPUTER!!

In the previous discussion I have looked at applications involving the micro as a teaching aid, in situations where it can add a dimension to the teaching environment. Yet naturally we can also use it as a very fast and powerful calculator. It is ideal for handling problems of chance and strategy - that is, by the use of the (pseudo) random number generator for fast simulations - dice throwing in mathematics, population growth in biology, or location problems in geography.

In outlining these possibilities, which are very much interrelated, it seems evident that the future is bright and exciting but is very much dependent on the rapid development of suitable software. Primary teachers cannot all be expected to acquire technical expertise or learn to write their own programs, although no doubt some will and hence provide a valuable contribution. Other teachers will only be required to use 'packages', and these need not be long and complex. Simple, short programs illustrating a particular point or concept are likely to be equally successful.

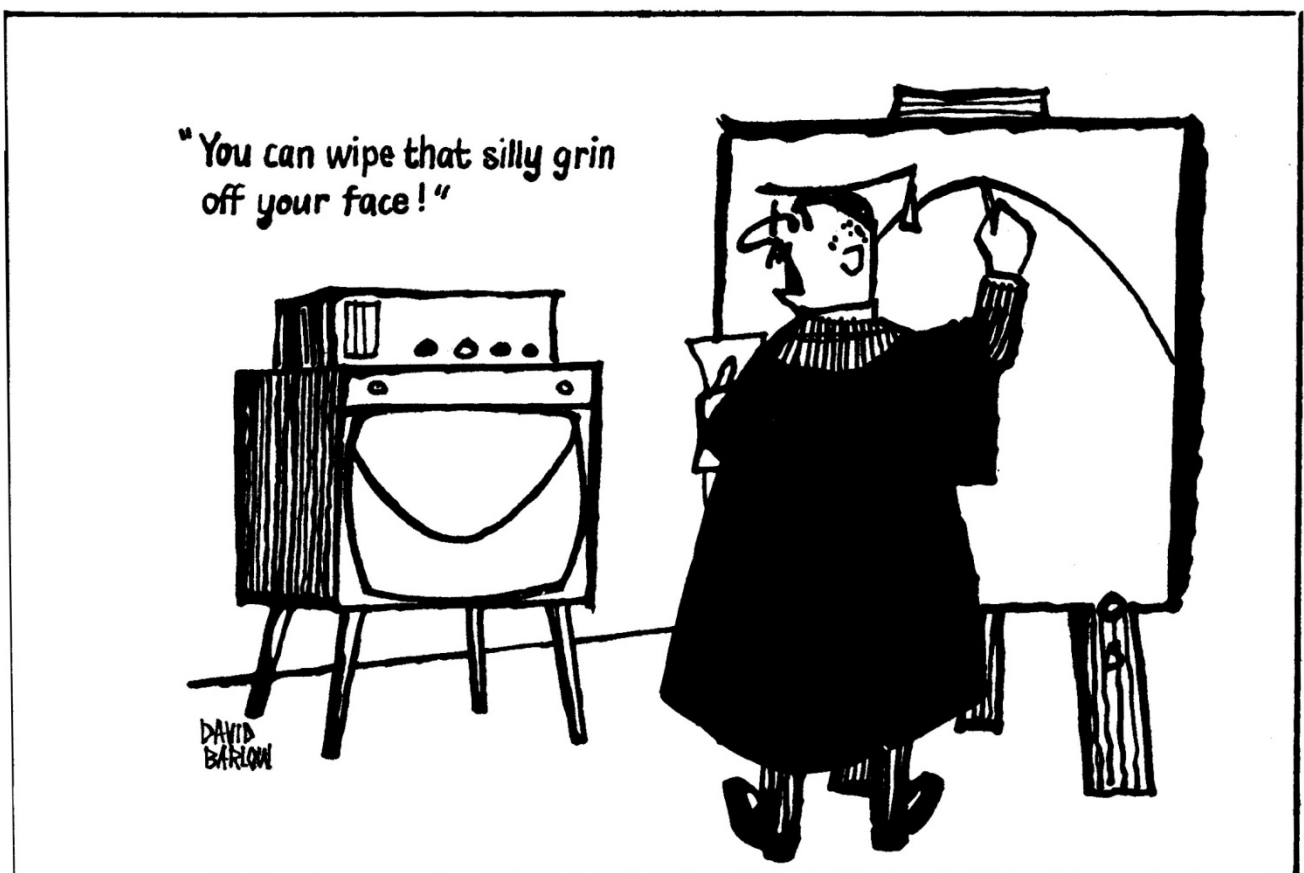


Computer awareness itself is an important bonus. Young people will need to learn to accept and control the technology with which they will grow up. Classroom trials have shown they are far more adaptable to the new technology than are their parents or teachers.

Perhaps we are only at the beginning, but expansion will be swift. The microcomputer will become an aid to learning and understanding but will not replace it. Teachers must become aware of the possibilities so that they can guide progress in the direction they think will be most useful. No doubt there will be many false trails but hopefully many real advances as well. These advances must be developed, tested and evaluated by primary teachers and not dictated by computer boffins.

R.K.

- 1). Williams, "The Computer as a Visual Aid", Computers in Schools September 1979, page 16.
- 2) "Primary Education in England," H.M.S.O, 1978, Chapter 5.



FIRST IMPRESSIONS FROM A FIRST SCHOOL

For some time programs written, adapted or borrowed by Newman college Primary Software Development ("NECOPS") have been tried out in schools. These notes make up the first in a series of reports from whatever we now call the "chalk-face."

Initially, the uses of a micro in a first school classroom would appear to be extremely limited. This certainly was my first reaction on being offered the use of a RML 380Z for a week in my class of 8 and 9 year olds. The computer arrived complete with a disc containing five maths teaching programs and documentation.

The first pleasant surprise was finding that four of the programs were directly relevant to maths work in progress in the classroom. I found that the programs divided themselves into two distinct categories—those which were valuable tools for group or class teaching and those which provided opportunities for individual practice at an appropriate level.

The first category embraced the "COIN" and "JANE"\* programs: whilst "TRAIN", "GRID" and "DIAGRAM" proved ideal for individual work and practice.

(1) "JANE" - This "function machine" program stimulated more discussion and provided more opportunities for group work than any other. The children really thought about the problems presented and were aware that in some instances there were alternative answers. A very useful program providing a different slant on an important area of early mathematical experience.

(2) "TRAIN" - I'm sure that many harrassed teachers will regard this program as a godsend, providing, as it does, opportunities for graded practice in addition, subtraction and multiplication. I found it very popular with the children but feel that one modification would help the teacher. This is:

to provide a store of the problems presented and answers given (right or wrong), which could be called up by the teacher at the end of each session. This would help in diagnosing particular weaknesses.

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\* "JANE" comes from "ITMA" project, College of St. Mark & St. John, Plymouth.

(3) "GRID" - Very helpful for supplementing "Addresses and Regions" work in Fletcher Level 2

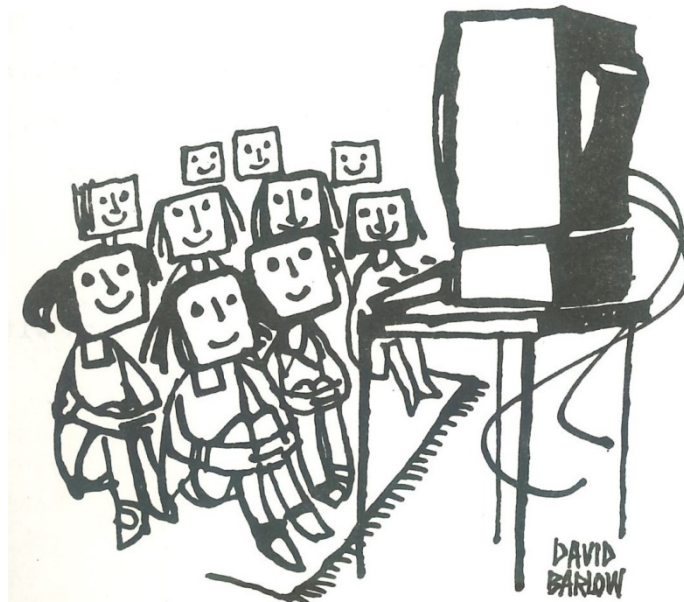
(4) 'DIAGRAM" - Fine for teaching rotations and clockwise/anticlockwise. Really made the children think. The idea of turning from the previous direction of travel rather than from a fixed direction is one which taxed many of my class to the limit of their ability. A very useful programme.

(5) 'COIN" - Not very relevant to work in progress, but enjoyed by the class.

I think that the greatest problem posed by a micro in the classroom is one of organisation. If this can be satisfactorily overcome, then one has a valuable new tool at one's service. If you can write your own programs, so much the better!

STEVE MOSS

(Deputy Head, Hundred Acre Wood First School, Streetly.)





# A\_PRIMARY\_B.A.S.I.C.

## Programming for teachers of young children.

Many teachers in primary schools will be aware of the coming social and industrial revolution made possible by computers. Some resist it; many fear it; others will wish to mould this giant and channel its strength into educational benefit. Some will feel the need to understand, modify or write programs.

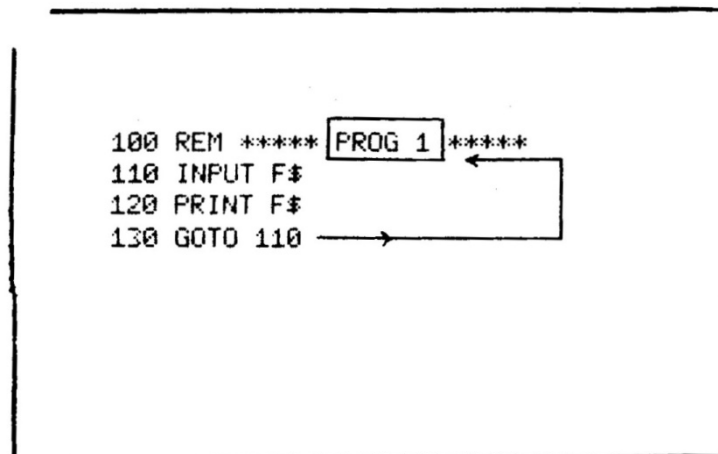
Of course, programs will be available ready-made, but good teachers do not like to rely blindly on textbooks or teaching packages. Adaptations are often desirable. Also, things do go wrong, and a little expertise can often, in seconds, save a whole lesson.

This is the first in a series of articles designed to introduce a simple computer language - the well-known Beginners All-purpose Symbolic Instruction code. There are more sophisticated alternatives, but B.A.S.I.C. is the language used now in this educational context.

As an illustration, I shall discuss how to make the computer print out verses of the action song "One finger keep moving". There are many ways to write this program. My first approach is trivial, but later refinements will introduce useful principles of wide application, and indicate the power of the computer to handle repetition economically.

### STATEMENTS.

Look at Program 1. There are four lines of program, each with a number: each line will be read and obeyed in sequence.



Line 100 is a REMARK, used here as a label only as the computer reads any REM statement but takes no action. REM statements are helpful to the programmer or user in reading a program.

Line 110 is an INPUT Statement which stores whatever is typed on the keyboard in the computer memory. Here the words "One finger keep moving" can be typed in and stored under the reference code F\$ (say it as "F dollar or h F stringy" ). F\$ is a string variable - a series of symbols denoted by the variable name.

Line 120 is an OUTPUT Statement which PRINTS the string stored as F\$ (A Printer or a V.D.U. screen may be used.)

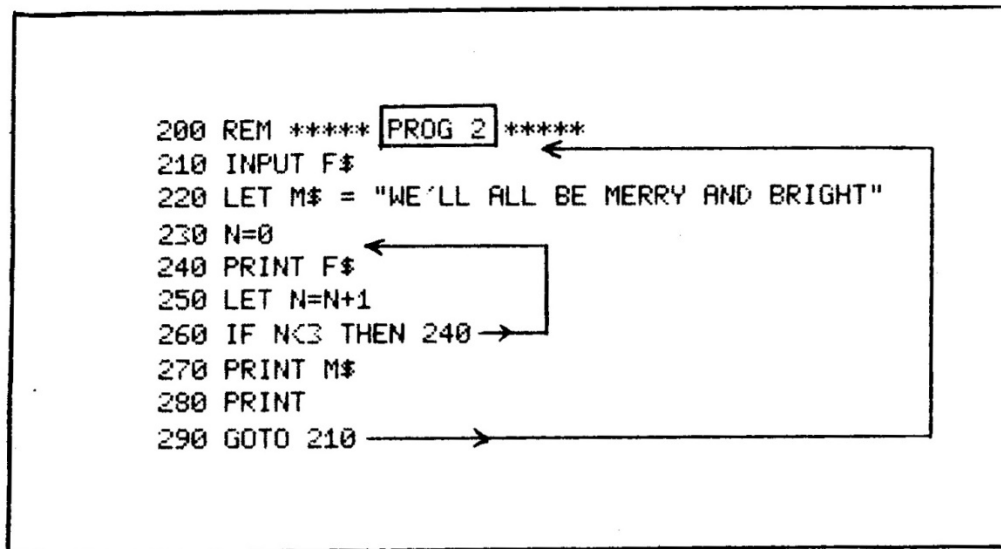
Line 130 is an Unconditional Jump Statement which returns the control to line 110 again.

This program merely prints out one line of the song at a time, as it is typed in. As yet it is neither faster nor more economical than an ordinary typewriter! But we have now met some useful principles:-

1. BASIC programs consist of a sequence of instructions called Statements.
2. Each statement has a line number. Statements are read and obeyed in numerical order.
3. We have met
  - (a) Input/Output Statements (INPUT -, PRINT -);
  - (b) Unconditional Jump Statements. (GO TO - );
  - (c) REM Statements.

LOOPS.

Now we begin to refine the program, and note that in each verse a line is repeated. We want to construct a "loop" to print the line three times exactly (when input once only!). For this we can use a Conditional Jump. Look at Program 2.



Lines 230 to 260 give us a loop using the "IF - THEN -" Conditional Jump. The control will twice jump back to 240 and so read line 240 three times. The next time it reaches line 260, the condition  $N < 3$  will not be satisfied, so the program continues to line 270. The "IF a THEN -" Conditional Jump gives us a way of making decisions and "branching". In the program above we use it for counting in a loop.

Program 2 also illustrates some new points. Lines 220, 230 and 250 are all examples of Assignment Statements. In line 220, M\$ denotes the string variable which locates the storage of the sentence "We'll all be merry and bright".

In line 230, N is a numerical variable (No \$ - it is not a string variable). The number 0 (zero) is assigned to a store with reference code N.

In line 250, the variable denoted by N is increased by one and re-stored, still under the label N. (Remember that line 250 is an assignment statement - don't try to read it as algebra!). The ordinary operations of arithmetic: +, -, \* (multiply), / (divide by), ^ (raise to the power of) may be used with numerical variables. In assignment statements the word LET is optional (see lines 220, 230,



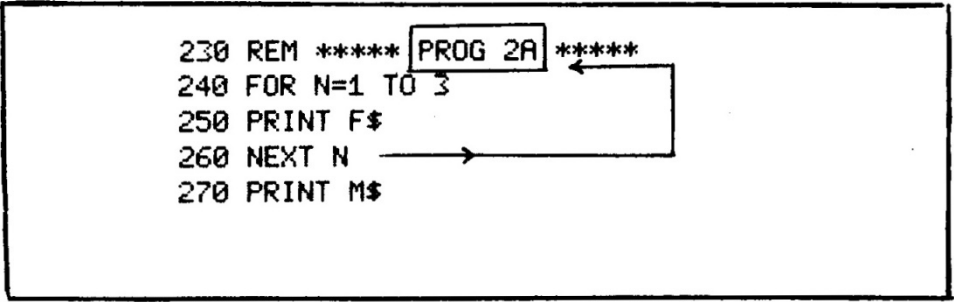
Any sequence of line numbers will do. I have started at 200, to avoid confusion with Program 1, and have left gaps of ten between line numbers. Later I can modify the program by inserting a new instruction into any gap (as say 225 or 242). I just type the addition at the end - sorting into numerical order is automatic!

Line 280 prints a blank line, for double spacing. I can also change any line by overwriting it. If I type 220 INPUT M\$ at the end, I replace the old line, which was an assignment statement, by a new input statement. (The program would still work!)

#### COUNTING.

The "IF - THEN -" conditional jump has many applications. When, as here, it is used for counting only, an alternative formulation may be simpler.

Try replacing lines 230 to 270 by:-

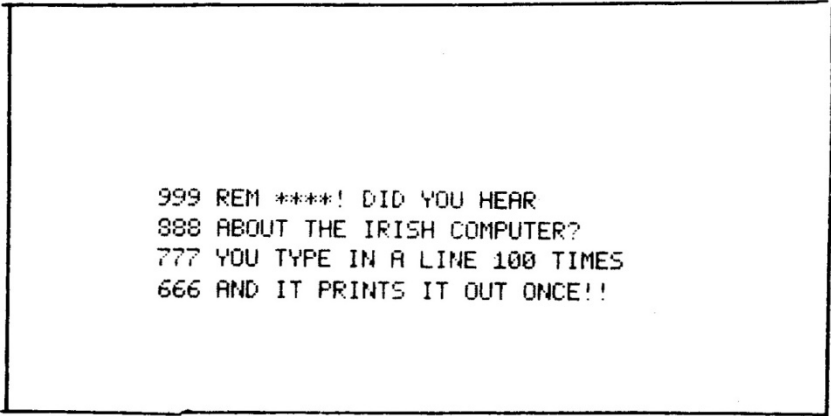


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230 REM ***** PROG 2A *****
240 FOR N=1 TO 3
250 PRINT F$
260 NEXT N
270 PRINT M$

```

The control keeps returning from line 260 to line 240 until the counter N has moved through its range of values (1 to 3). This gives three readings of line 250. This is called a "FOR - NEXT" LOOP. (Note that the instructions replaced have been over-written: we could just type the line number 230 and leave it blank.)



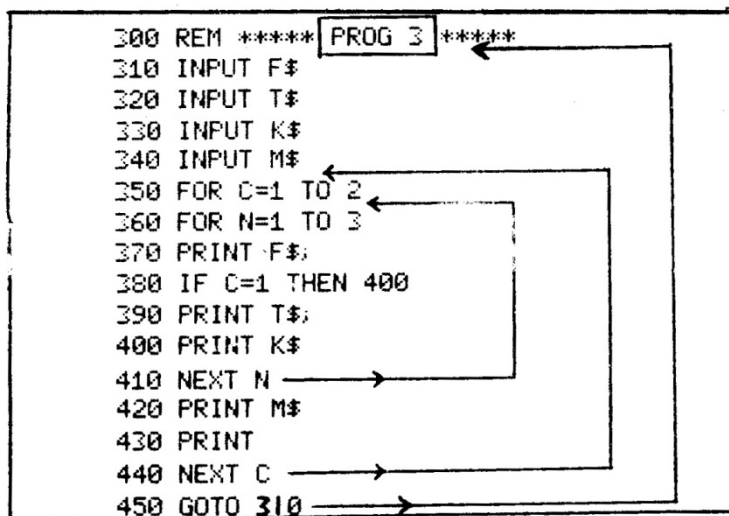
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999 REM ***** DID YOU HEAR
888 ABOUT THE IRISH COMPUTER?
777 YOU TYPE IN A LINE 100 TIMES
666 AND IT PRINTS IT OUT ONCE!!

```

## NESTING.

So far we have used a single loop to print repetitions of a line. Program 3 will print two verses, and shows how any phrase can be recalled repeatedly:-



The strings F\$, T\$, K\$, M\$ are input respectively as "One finger" "one thumb" "Keep moving" and "We'll all be merry and bright".

The C loop gives the verses (1 to 2). In verse 1, C = 1 at line 380, so line 390 is omitted: in verse 2 it is included.

Note that the C loop completely encloses the N loop, which repeats a line three times within a verse. Loops must be properly "nested" and must not cross each other.

We want the strings located by F\$, T\$, and K\$ on the same print line and M\$ on a new line. Semi-colons in lines 370 and 390 keep the print line open, but line 400 closes it.

To summarise further principles we have met:-

4. BASIC programs contain assignment statements for string variables (A\$) and for numerical variables (A). The latter use the usual rules of arithmetic.
5. Jump Statements allow us to loop, to branch or to count:-
  - (a) GO TO - is an Unconditional Jump;
  - (b) IF - THEN - and FOR - NEXT are Conditional Jumps.

As an exercise you could extend this program to further verses. Also, try "Polly put the kettle on", or "She'll be coming round the mountain."

In later articles we shall develop further the ideas of loops, strings and print format.

"Out of the Mouths....."

How do children take to having a computer come to visit their \* classroom? One class of 10-year olds recently wrote down their impressions. They covered a wide range, but some attitudes seem to be characteristic.

Perhaps the most striking note is that of confidence, in marked contrast to common adult inhibitions! "These past few days we have been using it....", "It is easy to work....", "I like the way that they've made the keyboard like a typewriter which makes it easier to use."

It is a superb toy. "I had a lot of joy out of it." "I enjoy it very much so does all the class."

Many typical responses are positive, challenging, thoughtful and constructive: "I personly think that the computer which was borrowed was great! It can do a variety of things. My favrite is the diagram. I stayed over on Monday and had a go at master mind. It was very hard but I got it on the fourth time."

"Also I like the train programme because you are playing a game and learning at the same time which would be good for younger children." "I think the drawrings could be improved a bit." (Back to the drawring board!)

It whets the appetite: "We do not want the computer to go back. We wish we could keep it in the class. It can work things out very fast...." "The only thing about having one is that they are expensive...." "I think our school must have one."

Of course, it will never replace teachers - or will it? "I hope that in the future every desk at home will have a computer in. And just come to school to play games." Help - call the union!

\* From Sledmere Primary School, Dudley.

R.K., J.L.



## Some hints on Hardware

Which hardware? It is an intimidating decision for any school to make. In the secondary sector the most popular machines are Research Machines 380Z, Apple, PET and Tandy TRS-80. However, it does not follow automatically that these are the best micros for the primary sector. So what should you look for?

I advise three preliminary steps. First, consult other primary schools in your area, and try to agree on one make of equipment. This will facilitate exchange of software (compatibility) and expertise. You will have moral support, you may be able to share the cost of the more expensive peripherals such as a printer, and you may even be able to help each other to diagnose simple faults. Second, seek the advice and support of your LEA adviser/inspector for primary computing. An adviser for computer studies is likely to be orientated to secondary schools. Invite him down to the school and show him how you hope the micro will be integrated into the school curriculum. Emphasise that you want a micro as a teaching aid, whereas many secondary schools use it for teaching computer studies. Third, visit local secondary schools and find out what expertise exists there, what hardware they have, and what support they can give. Are there any sixth formers who could write programs for you?

When you are ready to buy the hardware, be ambitious! Aim high. I am not convinced that, after the initial outlay, money is always available for expansion. Don't be tempted by £100 price tag adverts - once you start adding on all the bits you need you rapidly approach the price of other more robust machines. Make sure your machine offers at least the following :-

1) 10K of available user memory. This largely depends upon where the BASIC interpreter is stored. If it is in ROM (Read Only Memory - i.e., physically contained on a chip) then it takes up none of user memory. If, however, it has to be read in off a cassette or disc then it may use as much as 9K or more of the memory. Hence a 10K machine of one make may be equivalent to a 20K + machine of another make.

2) Low resolution graphics (about 80 x 60 - usually available as part of the BASIC interpreter) and the ability to update at a reasonable price to high resolution colour graphics (about 300 x 200).

3) A big screen, easily visible by a whole class. The school TV set will serve adequately, but then can't be used simultaneously for broadcasts. You may decide to buy a TV set to go alongside the microcomputer. Make sure the interface exists (and check the price), and that you get a sharp image on the TV screen.

4) A backing store to retain information with the machine switched off.

A cassette recorder plus interface will suffice, but a disc drive is much better. It is faster and more convenient, but is about 10 times the price. Discs themselves are about £3 each, and can usually store at least 72K of information (i.e. 72000 characters approximately).

Programs can be erased and rewritten and the life span can be several years, depending on the frequency of reading and writing.

5) Printer interface. If at some time you may wish to buy a printer, ask the cost of the interface to connect it to the micro.

Other questions to ask are:-

- a) do I have to pay for the BASIC interpreter?
- b) what software is available (free) to start me off?
- c) what is your guarantee?
- d) what about maintenance? (Most important - a maintenance contract may be for 10% p.a. of the purchase price.) What are the call out charges?
- e) are the manuals (one for BASIC and one for the hardware) clear and concise?
- f) can you give the address of a school to whom you have already made a sale? - (Go and talk to them about the equipment and the company.)
- g) can I add extra memory at a later date - at what cost, and to what maximum?
- h) can I convert a cassette system to a disc system (at what cost)?

To summarise - be thorough, be patient, be sceptical. We hope to hear from you how you make out, and what problems you meet.

RK

This article shows how much can be achieved when one teacher with enthusiasm and initiative marshals the support of colleagues and parents.

#### AN "APPLE" FOR THE TEACHER

##### Background

Blanford Mere Primary School has some 300 children aged 5 to 12 and 11 teachers. We draw from the Charterfield and Blanford Mere Estates, which could be labelled "Middle Class". All our basic needs are fulfilled. We are fortunate to have a very active P.T.A. and it raises £600 to £1000 p.a. When I arrived in September 1979 from a Middle School in Halesowen the P.T.A. had over £1000 in the fund.

A year ago I obtained a part-time job at a Tandy Store on Saturdays and was pleasantly surprised to find a TRS80 gathering dust in one corner. I soon noticed the masses of children (8 - 14years) who constantly used it. I began to write a few programs and test them on the children. The interest was astonishing, so before long I was writing more and more programs.

This got me thinking about its uses in school, so I approached the Headmistress at the end of November and asked her about the prospects of getting a micro. After she'd picked herself up from the floor, she was understandably dubious but nevertheless willing to give it a chance.

##### Acquisition.

I then drafted a letter to all likely suppliers and manufacturers of micros up and down the country. I offered a choice from three proposals. First, they could supply us with free hardware and acquire any software written by us. Second, for a 50% discount we could provide them with useful prestige through reports in local papers and national computer magazines. Third, we could pay 10% of the purchase price in advance and the rest on satisfactory completion of a year's trial. I was very optimistic: but 30 letters only produced 10 replies, all negative.

Back I went to the Head, who said we should mull over the idea until the A.G.M. of the P.T.A. at the end of January.



Now came our first stroke of luck. At the Christmas play a parent offered me the use of his PET in school during the week, as long as he could have it back by 5.30 p.m. and at the weekends.

So at the beginning of the Spring term we had a PET in school. Unfortunately there was only a maths program available at that time, plus a multitude of games. During the ensuing month I taught my class of 10 - 11 yr. olds how to use it. Before long they became very competent and I could safely leave them alone with it. At that time the rest of the staff were aware of its existence but not of its implications.

The time came for the A.G.M. of the P.T.A. After long consultations with the Head it was decided to find the reaction of the parents before proposing the purchase of a micro in a staff meeting.

I put a case forward to the P.T.A. The ensuing discussion was very fruitful and the outcome was a staggering 10-1 vote in favour of the purchase. The first hurdle was overcome - the parents asked for financial details. I narrowed it down to the following:

Microcomputer	Approximate cost
Sinclair ZX80	£100
TRS 80	£500
PET	c800
Apple II	£1250

At the staff meeting on the following day, I proposed the purchase of a computer, which caused a great deal of unrest, guffaws etc. We eventually decided that a term should be set aside for all the teachers and the highest possible proportion of children to assess its effectiveness as a teaching aid. Understandably all the staff were extremely reluctant to use the PET. I attacked the problem by giving individual sessions at dinner times to the staff, showing them how to use and load the computer, over a fortnightly period.

By consistent badgering from me, it became fairly effectively used during the school week. Even my most sceptical colleagues could use it and see the children using it.

By the end of the term the computer had become an accepted part of the scene. We then had another meeting and there was a 6-4 vote in favour of the micro.

So the second hurdle had now been overcome and the third one was to be my hardest - choosing the right computer for the job. After some careful deliberations the Sinclair ZX80 and Tandy were dismissed for various reasons. This narrowed it down to PET and the Apple.

Before I made the final decision, I arranged for the staff to see demonstrations of both machines and invited the Maths Inspector in for his opinion. It seemed there was little or no policy in the authority on the purchase of micros.

The second stroke of luck arrived next day in the post. Apple were offering a 25% discount for schools, which brought the price down to an acceptable limit of just over £900. So the Apple was purchased and we have recently taken delivery.

#### Comments from the Staff Meeting

Many misgivings were expressed, such as:-

- (a) Little or no understanding of what the computer can do, or what it looks like.
- (b) Thought it was size of an IBM mainframe - therefore movement from class to class posed difficulties.
- (c) Doubted its effectiveness in school
  - with children;
  - with their own abilities to operate it.
- (d) Envisaged computer only with 10-12 yr. group.
- (e) Saw no applications for it in infants.
- (f) Thought we were jumping on the bandwagon.
- (g) Doubted that there would be any in-service training for teachers to justify its inclusion.
- (h) (h) Fear of children dropping it (0
- (i) (i) Breakdown during lessons.
- (j) If I left, who would program it? - might have to sell it.
- (k) Who would train new teachers?

We have overcome many problems and the fears have faded.

Now the computer is in use every minute of every day, including dinner times and after school. One of the most pleasing aspects of having a micro is that children, having inbuilt inquisitive minds, are demanding to know how it works and what the programs do. So I have selected a group of children (2 from each class in the middle school) and begun to show them the rudiments of low resolution graphics and simple programming - with some very pleasing results so far.

Simon Webb.



STOP PRESS: We have just received a copy of a new booklet by R. Jones - "MICROCOMPUTERS: Their Use in Primary Schools", published by the Council for Educational Technology at £6





2. BASIC programming for primary teachers.

This course will run for 10 consecutive Wednesdays 3.00 - 5.00, commencing January 28th. It will be a course for beginners, and will provide ample 'hands on' experience. The College has microcomputer systems and 2 terminals on-line to a minicomputer.

3. Commencing Thursday February 12th an informal monthly meeting of primary teachers interested in assessing and developing software (3.30 - 5.30)

Applications for these courses should be made in writing to  
R. Keeling.

Please give your name, school and telephone number, and  
state whether lunch is required.

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MICROCOMPUTERS IN PRIMARY EDUCATION

A report of a one-day conference at Newman College, 5th  
November 1980.

Most of the eighty teachers present were from Junior Schools, including many heads. Infant, Middle and Special Schools and Teachers' Centres were also represented.

Roger Keeling opened the conference with an overview of the opportunities and issues. He was followed by Colin Watkins, the only Primary teacher out of fifteen seconded to the M.A.C.E. Project (Micro-electronics And Computers in Education). His views on the selection of hardware and on standardisation led to lively discussion later. Colin also outlined aspects of administration and information retrieval. Ian Glenn, head of Brays School, showed how a versatile keyboard could be designed to input selected words or colours at a touch.

Roger Keeling went on to demonstrate some of the programs he and others have been using in local schools. At the same time Colin Watkins led a separate group for "program specification". Ideas discussed included "ladybird" graphics, movement in display, timed responses and the need for defined objectives. Practice in spelling and grammar, as well as mathematics, was suggested. Creative Writing was developed in two ways. The computer could offer a selection from basic elements as starting-point for an open-ended story, or it could provide variations of vocabulary and description within a fixed framework.

Pam Fiddy, an infant teacher from Cornwall, contributed some ideas on matching words to pictures. She noted the danger of increasing the amount of repetitive work children do, just because computers handle this so well. Simon Webb reported how his Kingswinford school had obtained a computer with the help of the P.T.A., and discussed its current usage and timetabling. The pupils have fewer inhibitions than the teachers:\*

Other contributions came from Dr. Negus (on applications in Primary science), John Tolley and from Chris Lyon of B.E.C.C. (Birmingham Educational Computer Centre.)

Participants were invited to complete questionnaires and to comment on the course. More than half of the respondents envisaged acquiring a micro within two years - some, within six months. Most were willing to share in the design and evaluation of software, and called for courses in programming techniques. Many useful suggestions were made for applications across the curriculum - in language development, mathematical topics, logic, science and geography. There was a plea for programs which teach rather than test.

J.F., A.J.

\* See article on Page 18.

## Programs in Current Use

A full listing of "TRAINS", and notes on eleven more programs.

When space permits we will list whole programs with full documentation. I have selected "TRAINS" for the first issue. It has proved very popular, and it motivates children to practise arithmetic better than many teachers can.

It is also a straightforward program to adapt for different makes of microcomputer, and REM statements have been added for this purpose. The awkward part to re-write is the graphics routine to draw the trains. There are eight trains per line, starting in the top left corner. The program converts a parameter C (1 to 56) to a co-ordinate system (A, B) to position the train.

### User Documentation.

This is a program designed to provide practice in addition, subtraction or multiplication. It is for use by individual pupils, or by small groups.

To use the program type RUN, and return.

The first decision is whether you are going to practice addition, subtraction or multiplication, in response to which you type the appropriate key (+, -, or \*).

For each question that follows you have to specify the magnitude of the problem by choosing the number of digits in the two operands: a maximum of 4 in each is allowed. The resultant question is randomly generated. For example:

"How many digits in the problem?"

"Left hand side" 3

"Right hand side" 2

263+47=310 <|

In the example the user input is underlined, and the arrow indicates that the input must be followed by the return key. The

answer to the problem must be provided as quickly as possible. In fact the program incorporates single key input and therefore the

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answer to each problem is the only number that needs to be followed by the return key.

If the answer is correct then you win 5 trains (the 3+2) or lose 5 if the answer is wrong. In the case of winning, the 5 trains are drawn in white on the screen, while in the case of losing they are changed to grey (so that you can still see how many have been deleted) only to be overwritten in white again if followed by a correct answer to a subsequent problem. This procedure is then repeated but may include either of two additional facilities. In response to "Left hand side" you can type S. This generates automatically a problem of the same magnitude as the previous one. Alternatively, if a particular answer is wrong you can type C. This generates the same problem for a second time and allows you one opportunity to correct it.

Targets may be set in two ways:-

- i) to fill the screen with white trains (56 in all) in the minimum number of moves. The number of moves taken is printed out on the screen when 56 trains have been achieved. This should encourage pupils to try for the harder problems (ie. 4,4)
- ii) Against the clock. The total time taken to answer all the questions is printed out. This should encourage pupils to try for speed and accuracy.

These two factors allow the teacher to build up a number of competitive situations in the classroom in order to encourage pupils to beat their own records. If at any time you wish to end the program then type F in response to "Left hand side."

One further facility is the ability to change the number of trains it needs to complete the game. For example if you wish to reduce the 56 trains to 40 trains then change line 820 in the program to:

```
820 IF C=40 THEN 910
```

This was not incorporated as a program option, so it remains outside the control of the person operating the program.



```

10 REM PROGRAM NAME-TRAINS
20 CLEAR100:RANDOMIZE
30 REM SET UP THE GRAPHICS AREA.
40 GRAPH 1
50 REM CHR$(12) CLEARS THE TEXT ON THE SCREEN
60 PRINT CHR$(12)
70 DIM A(56):TT=0
80 REM READ IN DIAGRAM DATA FOR DRAWING TRAIN.
90 FOR L=1 TO 10
100 READ A(L)
110 DATA 40,32,42,3,0,47,15,15,31,0
120 NEXT L
130 CM=0:SI=0
140 LV=1:TM=1
150 PRINT "DO YOU WISH TO ADD(+), MULTIPLY(*) OR SUBTRACT(-) ";
160 REM WAITS INDEFINITELY FOR A KEYBOARD CHARACTER
170 UU=GET(1):TV=GET(1)
180 IF TV=0 THEN 1260
190 REM OUTPUT CHARACTER TO SCREEN.
200 PRINT CHR$(TV)
210 IF TV=45 OR TV=43 OR TV=42 THEN 240
220 PRINT "SORRY, YOU CAN ONLY ADD, SUBTRACT OR MULTIPLY"
230 GOTO 150
240 A$=CHR$(TV)
250 PRINT"HOW MANY DIGITS IN THE PROBLEM"
260 PRINT"LEFT HAND SIDE      ":X=GET(1)
270 IF X=70 THEN 1180
280 GH=0
290 REM SAME DIMENSION PROBLEM
300 IF X=83 THEN X=PV:Y=PW:PRINT:GOTO 430
310 IF X=67 THEN 380
320 PRINT X-48
330 PRINT"RIGHT HAND SIDE      ":Y=GET(1):PRINT Y-48
340 X=X-48:Y=Y-48
350 IF X>0 AND X<5 AND Y>0 AND Y<5 THEN 430
360 PRINT "SORRY, THE NUMBER OF DIGITS MUST BE IN THE RANGE 1-4"
370 GOTO 250
380 GH=1:PRINT CHR$(67):X=PV:Y=PW:TM=TM*-1
390 IF TM=1 THEN 430
400 PRINT CHR$(12)
410 PRINT"SORRY, YOU ARE ONLY ALLOWED 1 CORRECTION"
420 TM=1:GOTO 250
430 CM=CM+1:B$="":CT=0:G=X+Y:PV=X:PW=Y
440 IF GH=1 THEN 550
450 REM W=RANDOM NO. IN RANGE 0-10^X
460 W=INT(RND(1)*10^X)
470 REM U=RANDOM NO. IN RANGE 0-10^Y
480 U=INT(RND(1)*10^Y)
490 IF A$ = "+" THEN V=U+W:GOTO 550
500 IF A$ = "*" THEN V=U*W:GOTO 550
510 IF W<U THEN 530
520 GOTO 540
530 Q=W:W=U:U=Q
540 IF A$="-" THEN V=W-U
550 ND=1:AN=0
560 PRINT W:A$:U: "=";
570 REM WAIT FOR 320 SECONDS FOR A CHARACTER FROM KEYBOARD.
580 XZ=GET(32000)
590 IF XZ=0 THEN TT=TT+32000:GOTO 580
600 IF XZ=127 THEN 1210
610 IF XZ=13 THEN 710
620 IF XZ>=48 AND XZ<=57 THEN 650
630 PRINT CHR$(7):GOTO 580
640 REM GET(-2)=TIME REMAINING FROM 32000.

```

# IRAINS

# IRAINS

```
650 TT=TT+32000-GET(-2)
660 PRINT CHR$(XZ);
670 REM +=CONCATENATION OPERATOR.
680 B$=B$+CHR$(XZ)
690 GOTO 580
700 PRINT
710 AN=VAL(B$):PRINT
720 IF AN=V THEN 790
730 D=128:TM=-1
740 FOR C=LV-1 TO LV+G STEP -1
750 IF C<1 THEN 880
760 GOSUB 950
770 NEXT C
780 GOTO 860
790 D=192:TM=1
800 FOR C=LV TO LV+G-1
810 GOSUB 950
820 IF C=56 THEN 910
830 NEXT C
840 LV=LV+G
850 GOTO 870
860 LV=LV-G
870 GOTO 240
880 PRINT:PRINT"YOU ARE NOW BACK TO ZERO"
890 LV=1
900 GOTO 240
910 GRAPH0:PRINT CHR$(12)
920 PRINT "YOU HAVE FINISHED THE GAME IN";CM;"MOVES"
930 PRINT "YOU HAVE TAKEN";TT/100;"SECONDS":??:??:?
940 GOTO 1260
950 IF C<=8 THEN 1020
960 IF C<=16 THEN 1030
970 IF C<=24 THEN 1040
980 IF C<=32 THEN 1050
990 IF C<=40 THEN 1060
1000 IF C<=48 THEN 1080
1010 A=10*(C-49):B=4:GOTO 1100
1020 A=10*(C-1):B=59:GOTO 1100
1030 A=10*(C-9):B=50:GOTO 1100
1040 A=10*(C-17):B=41:GOTO 1100
1050 A=10*(C-25):B=32:GOTO 1100
1060 A=10*(C-33):B=22:GOTO 1100
1070 GOTO 1100
1080 A=10*(C-41):B=13
1090 REM DRAW TRAIN WITH (A,B-3) AS BOTTOM LEFT HAND CORNER.
1100 L=1
1110 FOR J=B TO B-3 STEP -3
1120 FOR K=A TO A+8 STEP 2
1130 PLOT K,J,A(L)+D
1140 L=L+1
1150 NEXT K
1160 NEXT J
1170 RETURN
1180 PRINT CHR$(12):PRINT"SO FAR YOU HAVE WON ";LV-1;" TRAINS IN ";CM;" MOVES"
1190 PRINT"IT HAS TAKEN YOU";TT/100;"SECONDS"
1200 GRAPH 0:GOTO 1260
1210 PT=LEN(B$)
1220 IF PT=0 THEN 580
1230 B$=MID$(B$,1,PT-1)
1240 ?CHR$(127);
1250 GOTO 580
1260 GRAPH 0
1270 END
```

"NECOPS" Documentation Booklets

"TRAINS" is one of a series of programs described in the first edition of "Newman College Primary Software Development". This booklet contain the documentation for six programs written for primary schools.

- 1) GRID - a program associated with regions and addresses, as in Fletcher Maths, level II, book 1.
- 2) DIAGRAM - a program designed to draw pictures by directing a cursor using either compass directions or rotations in multiples of 45°.
- 3) COIN a an introduction to simple probability by spinning a coin n times. It also includes a study of the sequences generated.
- 4) TRAINS a see full notes above.
- 5) FSNAP fraction snap presented as a game. The fractions can either be in numeric or diagrammatic form.
- 6) MULTEST - a program which generates individual 'tables' tests based upon information from previous tests held upon a disc file.

The second edition will contain six more programs. They are:

- 7) DICE - a follow up to COIN. The user designs a die by specifying 4, 6 or 12 sides and numbering the faces as he likes. The program displays the build-up of a bar graph as the die is thrown n times.
- 8) GRIDREF a a geography program to help teach the basic ideas of 4 and 6 figure grid references.
- 9) SPELL a a program for early steps in reading. The pupil supplies the missing letter of a word. The output on the screen is in enlarged 'Ladybird' script.
- 10) SPELL 2 - a similar program in which the pupil has to retype a word after it has appeared on the screen for 5 seconds (N.B. both SPELL and SPELL 2 can cater for any vocabulary - in any language. French teachers take note!)

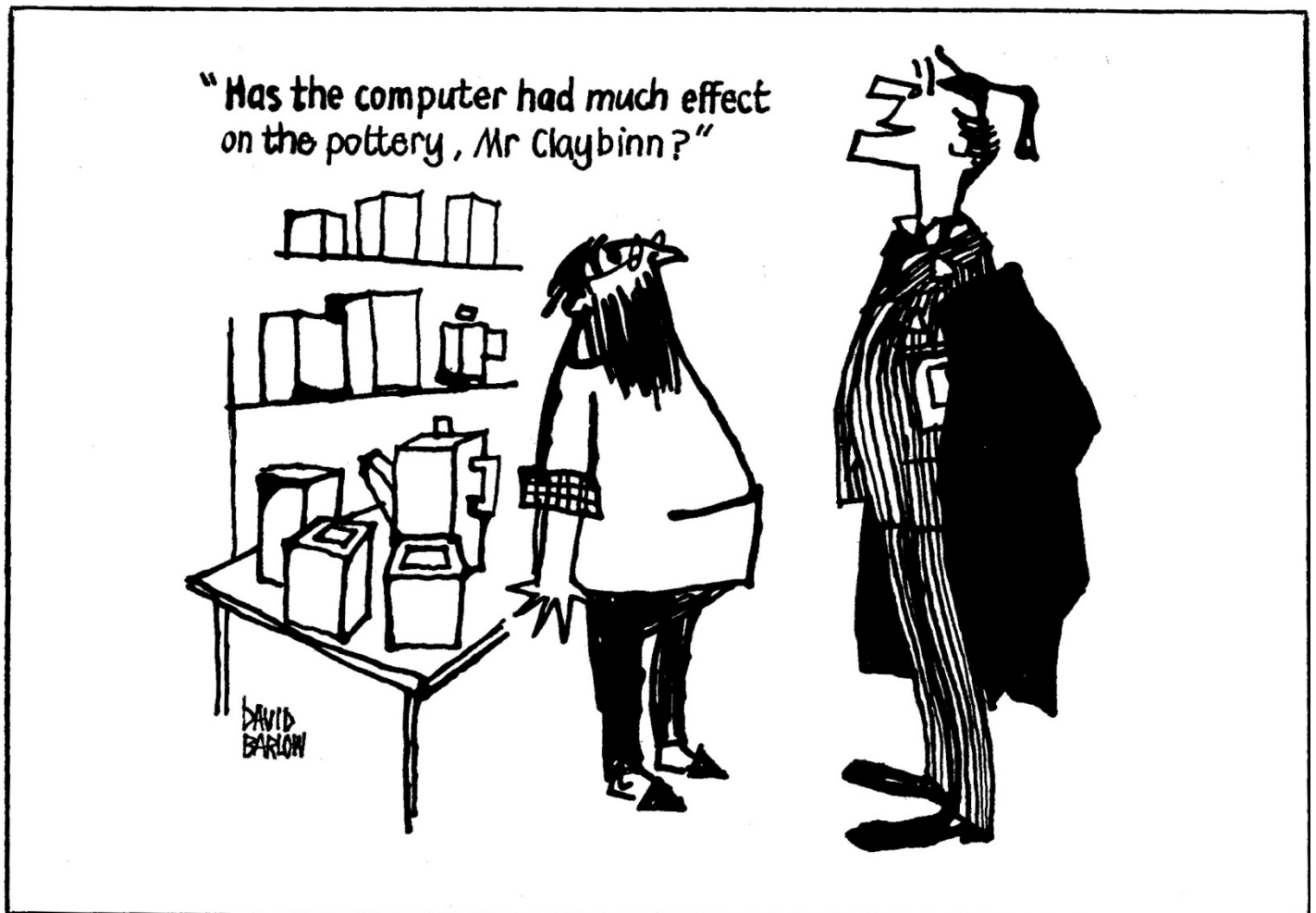
11) PHRASES - a jumbled sentence appears on the screen which the pupil has to re-arrange. It is the phrases (not the individual words) that are scrambled.

12) FTRAIN - a program similar to TRAINS, but providing practice in addition, subtraction and multiplication of fractions.

All these programs have been developed on Research Machines 380Z; FSNAPE and SPELL require the high resolution graphics board and MULTEST requires a disc system.

The programs themselves can be obtained free by sending us a 380Z disc or cassette. Remember to let us know which version you need - DBAS9, BASICSG or the new cassette BASICV5.

The two booklets containing full documentation can be obtained by sending us a postal order for 75p (50p for just one booklet). Write to R. Keeling, Newman College.





## NEWMAN COLLEGE

## COURSES AND RESOURCES FOR TEACHERS - SPRING 1981

D.E.S. COURSES

- 1) English at Transition from Primary to Secondary School. (M. Convey)
- 2) Science in Primary and Middle Schools. (Dr. M. Negus)

(Unfortunately both these courses are heavily overbooked but will be repeated next year.)

COLLEGE COURSES

- 1) European History for 'O' Level. (R. Mackenzie) Wednesdays 4 - 5 p.m.
- 2) Victorian and Modern Birmingham Information teaching materials, slides, documents. Dr. M. Rowlands January 20th - March 10th, Tuesdays 4 - 5 p.m. at Central Library.

DAY SCHOOLS IN R.E. (O. Cummings)

- 1) February. Prof. James P. Mackay (Edinburgh University) on "Jesus-Man and Myth".
- 2) March. Mr. Terence Copley (author of "A Bedside Book for R.E. teachers") on the problems of R.E. teaching in Sixth Forms.

LOCAL HISTORY RESOURCES. (Dr. M. Rowlands)

- 1) Publication - 70 to 80 pages of documents, maps and pictures, issued three times a year. Subscription (3 issues), £3.
- 2) Newspapers for consultation - "Birmingham Evening Mail" 1913-1950, "The Times" 1865- 1895.
- 3) Pictures, pamphlets, photographs for reproduction at cost as photographs or slides.
- 4) Bibliographies of local topics or places.

COMPUTERS IN SCIENCE EDUCATION. (Dr. M. Negus) - Software enquiries.GEOGRAPHY WORKSHOPS. (D. Flint or Mrs. A. Tapsfield)

11th March. Hydrology at advanced level.

1st April. Using Statistics in the analysis of Fieldwork Data.

For more information on the above courses, contact the relevant tutor at Newman College, Bartley Green, Birmingham B32 3NT, Tel. 021-476 1181. Dr. M. Rowlands will be pleased to discuss general questions.

IN-SERVICE B.ED.

The college continues to recruit for the above degree in the following subjects: Art & Design, English, Geography, Mathematics, Biological Science, French, History, Sociology and Theology. Education and Curriculum and Teaching Studies also form part of the course.

A handbook with details and application forms is available from the Registrar. General enquiries to Miss J. Sugg at Newman College.

"MICRO-SCOPE": Business and Plans.

This first issue of "MICRO-SCOPE" is sponsored by Newman College as a service to teachers. It is circulated, free, to all primary schools in the local area, and to L.E.A.'s nationally.

Ways of financing the newsletter in future are under active discussion. Sponsorship, advertising and subscriptions may all play a part. (Our computer has calculated subs of £10,000,003 p.a. -check that!) More details in "MICRO-SCOPE 2", which will again be circulated with the compliments of Newman College. We hope to produce at least 3 issues a year.

This material may be reproduced by educational institutions, with the usual acknowledgements.

For additional copies of Issue 1 or 2, write to the Editor enclosing 50p per copy + 30p (cheques to Newman College.)

Future Articles.

In our next issue we hope to have more reports from the classroom. A new series will show how simulations can give children some insight into the working of a computer, without any expensive hardware. Similarly, a "Puzzle Page" will stimulate children's ideas on associated topics like binary coding. The series on BASIC programming continues.

Please send us reactions to MICRO-SCOPE 1, suggestions for improvements, articles, reports, notice of events, news cuttings, quips and cartoons.

Micro Network

Are you already using a micro in your school? Do you wish to communicate with other users of the same machine or in the same locality? Are you in a position to welcome visitors or give advice? In our next edition we intend to publish a directory of active micro users. If you want to be included, drop us a line. If you have good software you are prepared to share, let us have a few lines of description.



