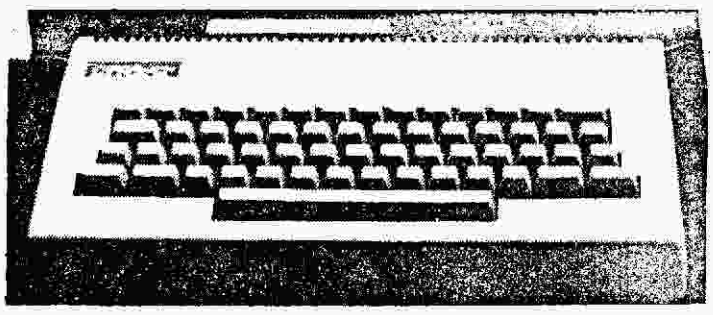
LYNX USER GROUP



MAGAZINE

Vol. 1 Issue 3.

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On the 16th March, the first LYNX USER SHOW was put on for members of the LYNX USER GROUP in a church hall in BIRMINGHAM, mention of this was in issue 103 of PERSONAL COMPUTER NEWS in the PCN DATELINES section of the magazine. In spite of unexpected bad weather, the show was a resounding success. Attendance by LYNX owners was high and those members who had "worked" on their machines had many new features and "addons" to demonstrate. Although still at an early stage of development, most of these were fully operational and certainly excited the otherwise "starved" owner.

One of the critisms of the LYNX was that the now accepted standard feature of screen scrolling was absent in its design, however thanks to a member of the READING sub-group, scrolling was now implemented in ROM as an optional command. This was called up by EXT SCROLL ON, it was cancelled by EXT SCROLL OFF. As an extension to this, by assigning a variable or value to SCROLL, it was possible to manipulate the scroll by either a default value of 1, (conventional scrolling), or to move the screen display in "chunks", i.e. scroll by 10 lines for example.

On the software front, PHOENIXX SOFTWARE had a large display demonstrating the latest in games and cassette based utilities, amongst these being JETSET WILLY and DIGGERMAN. Demonstrations by individual members on CP/M software were given, amongst these was the implementation of the integrated business package produced by SAGE SOFTWARE. Although not shown, some of the well known business packages are available for the "LAUREATE" LYNX, these being facilities like WORDSTAR, DATA BASE II etc, as well as the PERFECT suite of software. There are plans for further software to be configured, but mention of this will have to wait until a later date!

Probably the most exciting aspect of the show, was the range of hardware improvements which were shown and working. Taking a "clockwise tour", the first new "addon" was a fully working speech synthesiser reciting Shakespeare's HAMLET, "To be or not to be...", LYNX?. The clarity was excellent, although only at a low volume. Continuing round, the visitor was shown full implementation of the RS423 facility, with all required handshaking for its operation. Also demonstrated, was multiple duplex working at many different BAUD rate combinations. On the next stand, was possibly the biggest expansion yet for the LYNX, namely sideways ROM expansion, enabling the owner to access a further 56K of ROM with a very simple BASIC instruction for selection. Plans are afoot for GRAPHIC packages, a WORD PROCESSOR etc. in ROM. Although slightly "bugged" at the show, the author can now report that the "bugs" are now "zapped" and this facility will soon become available to both 48K and 96K owners. On the opposite side of the hall, PERIPHERAL PRODUCTS had on display, an interfaced SILVER REID typewriter "talking" to a 96K LYNX via a special interface, producing daisy-wheel printing. The final plan is to provide a complete package for the LYNX incorporating a customised word processor to take advantage of the typewriter's special features.

Various other items of both software and hardware were to be had, namely educational games, a very powerful character generator, ZEN assembler, a very useful tape utility and a new cassette based word processing package.

EDITORIAL
****

Well here at last is Issue 3 of the LUG magazine, again I must apologise for its late arrival, based on the timing of Issue 2, it should have appeared 2 months ago! There have been several events since the last Issue in January, possibly the most important that most people will know about, was of course the very first LYNX USER SHOW. Rather than expound too much on this, I am including a report which I put together for the Deputy Editor of Personal Computer News, who promised to pay us a visit, but someone parked a skip on his car! However he did as promised and provided a mention (a whole column!) in the following issue! Another item of activity by myself, was to pay a visit to THAMES TV studios in Tottenham Court Road, with the intention of getting a mention on CHANNEL 4's program; FOR COMPUTER BUFFS. Although nothing was said on the program, it has resulted in mention of the LYNX USER GROUP on DATABASE within ORACLE. This has been circulating around the different networks about the country. Has it reached your area yet?

My sincere thanks go to ALAN BUIK for offering his church hall and for the assistance and catering he provided. Also I must thank all those who demonstrated new projects and software and who therefore provided items of great interest for other members. Although I arrived 2 hours late, I felt that for those of you who managed to make it, in spite of the weather, that generally the show was a resounding success. It is now the feeling that a second show should be arranged, most likely in LONDON, so that it proves to the cynics that the LYNX is not dead yet! On the subject of TV, I must update the fact that our PRESTEL pages are changed to:- 8102147a,b, and c, yes, we now have three screens! Try to access them! As a final point, Guy Kewney, who produces the CHANNEL FOUR program, also writes for PERSONAL COMPUTER WORLD and again we have a column insert in the latest issue.

I must also apologise for the very late delivery of DISK DRIVES and other peripherals, but there have been technical hitches, which will now be soon resolved.

As an outcome of Birmingham's show (and previous discussions), a group of members are closely collaborating to try to develop the latent power within the 96K version of the LYNX. Verbal agreement has been secured from ANSTON TECHNOLOGY that we have the design to develop further, their efforts will be directed towards expanding the potential in the newer 128K.To wet your appetites,these are some (not all,it would spoil the surprise!) of the proposals:-

1) Unique to the LYNX --- programmable scrolling, up and down.
2) Full serial operation - 4 handshake lines and 4 DUPLEX modes.
3) Sideways "ROMing" ---- expanding the ROM memory to an incredible 152K!
4) Adding 40 commands --- to the BASIC, due to the increased ROM size, most will support the screen.

The outcome of this, will be:-

SUPER LYNX

As you will appreciate a lot of dedicated work is necessary by both software and hardware engineers within the group,so please be patient,it is coming!

One of the reasons why this magazine is late, is that the ALPHATRONIC is being "naughty" lately, like losing a felt pressure pad from the "A" drive. The outcome of this, is that I've had to use the "DISKED" utility on the LYNX to recover the magazine articles. Of 33 files on the disk only one was totally lost, this surely proves the power of this utility. The original program was set to read only LYNX disks, i.e. 40 tracks and 10 sectors, I now have an enhanced version to read 80 tracks and 16 sectors. From my rather heavy use of this utility, I am now fully conversant with it, and will be adding. to the supplied booklet, some of its finer points. One point I will make (also mentioned in the booklet), it is VERY POWERFUL, so if you are nervous, use a duff disk to practise on!

Please note, as I'm sure some of you have already discovered, that the FILL routine in Issue 2, was "bugged"! Ignore the mnemonics completely and only take note of the code, the other item which caused problems, was distinguishing between an "8" (eight) and a "B" (as in "bad"). As far as I can tell the code is correct, although there may be the odd error.

We now have two chapters for our own advanced book, the first covering all details on the keyboard with a number of tables and charts etc. The second one is a very comprehensive study of the DATA STORE and how to get more from this area of RAM, but it is only two thirds finished as yet! I have been promised chapters on the LYNX DOS and on variable arrays, so if you've felt like writing a chapter on some topic but felt that you would be the only subscriber, I can assure you that it has already started. Please refer to Issue 1 of the magazine for ideas.

I feel that I must make some comment about material produced for the LYNX, whether it be hardware or software. It was the "moan" right from the start that there was little or no addons or software available for the LYNX. This is slowly changing BUT if you don't support the suppliers, then it will be considered that it is a waste of time to do anymore and the LYNX WILL fizzle out!

I have carried out an intensive study of the LYNX's cassette routine, and how it relates to SAVEing and LOADing on cassette. The LYNX is unconventional is that it uses a "sinusoid" as a recording signal (most other micros use a square wave) and like HI-FI any distortion which might creep in, will definitely cause corruption of the data. So the problem is primarily one of compatibility, NOT every recorder is suitable, this is why the SANYO DR202 is now "customised".

REVIEW OF CAMSOFT's WORD PROCESSOR
****

I acquired my copy of Camsoft's WORD PROCESSOR when I upgraded my 48K to 96K at LASKY'S with a number of other free goodies. These were FORTH, MODER 80, NUMERONS and the parallel printer interface. The freebie box has done nothing to change the fact that whichever branch of LASKY'S I have visited, they never have any software running on a LYNX nor is there anybody who knows the least bit about it. With the moan out of the way, here is the review.

Inside the impressive looking box, there is the usual cassette tape together with a 15 page instruction booklet. After LOADing, the screen greets us with the information that WORD PROCESSOR was written by a company called LIONSOFT. The program is only 3K in length and will run on a 48K machine, which is welcome news for those owners. The price of £24.95 for this is however, ridiculous. After the title you are presented with 3 prompts, regarding lines per page, characters per line and tab length. These can be set to your own or your printers requirements, or by pressing RETURN, it defaults to 11" paper, 6 lines per inch, 80 character width and a tabulation of 8 spaces. After this the main menu screen appears, which details all the possible functions. All functions are accessed using the CONTROL key and a corresponding letter key. CONTROL T puts you in TEXT mode, where you just type away, not bothering about justification etc. Because the LYNX's screen is 40 columns wide and most printers are more than this, there is no direct match of what your printout will look like. The program wordwraps on printing, so that words which are not fully completed on one line are then carried over to the next line and printed in full.

The WORD PROCESSOR allows you to insert, delete, amend and move text by words or blocks of text. After any function which modifies your text, prints it or saves it to tape, you are asked "Are you sure?". This is a general purpose message, helping to keep the program small as well as giving you an option if the wrong key is pressed.

How does the program perform? The most obvious aspect of usage is when you want to change a mis-spelt word, I seem to spend most of my time doing just that! The letters H and P seem particularly prone to not being picked up, maybe that's something to do with the way WORD PROCESSOR scans the keyboard. So off you go with the Left arrow key to move up the text, you have to move up the text because, when listing, the cursor always finishes at a carriage return (the RETURN key gives a CR, this is used to end a paragraph or give a blank line). You can correct spelling mistakes by using the AMEND function. This used by typing in the mis-spelt word and then, again this time correctly. The program then searches for all occurrences and stops at each one in turn, displaying a "?". If you want to correct, press Y, or N if not. This is an excellent command that has two unfortunate drawbacks; the first is that it will stop at any occurrence of the mis-spelt word. What always happens to me, is that I have spelt "the" without the "h", i.e. "te". The AMEND function goes off to amend "te" to "the" and stops at every "te", this means it stops at "cassette"! The first screenful is alright but because the LYNX doesn't scroll, the next screen is laid on the first, and so on until the end of the text is reached. (Ed. What about a CLS function !). You just cannot find out where you are. This also happens when you insert or delete a character. After each keypress the entire text lists itself, which means, if you are working near the beginning of your text or have a few screenfuls, it takes ages ! When WORD PROCESSOR finishes listing, you are left with a screenful of text, which bears no relation to where you started, and a flashing cursor in the previous position. To find out where you are, the cursor can be moved left and right; magically your previous text re-appears. Weird!

When just typing the text, it carries on at the top of the screen after the previous one is full. This was most disconcerting until I discovered that CONTROL S clears the screen. The instruction booklet says that WORD PROCESSOR is a "simple" program and because of the design of the LYNX, it doesn't have full screen editing. It goes on to say these disadvantages should not outweigh the benefits, this would be very true if the price was significantly lower.

The tape handling works fine except for two points, the first comes about by entering the wrong name. The program locks in the cassette reading routine and the only way out is to press ESCape which will crash the program, this also happens if you try to read or verify a program that was saved without quotes. Normally the ESCape key returns you to the main menu from wherever you are, but not in this case. The second point is that the tape writing routine manages to push out a far higher volume than my LYNX normally does, so check your LOAD and SAVE levels when using this program. When printing, the program inserts, seemingly at random, a large number of spaces in the middle of the text for no apparent reason.

On a EPSON FX80, the £ on the keyboard is not printed, they should have put a routine in to enable you to change things like this. While I don't expect to be able to configure for every possible make and type of printer, there should be some choice, and I do have a "£" on my keyboard!

The WORD PROCESSOR takes quite a while to learn properly, and can be laborious and annoying to use even then. At £10.00 this would be acceptable but not at £24.95.

Ed. Please note that this price was before PHOENIXX SOFTWARE offered it at £14.95.

D A HOLDING.

PERIPHERAL PRODUCTS The following new products are coming:-
****

1) The "LARYNX".....A speech synthesisor.
2) "SUPER LYNX".....Enhance your 96K LYNX.
3) "SILVER LYNX".....Word proc.+TYPEWRITER.
4) "MYNX".....MIDI interface.

JETSETWILLY
****

Many popular home computer magazines voted JETSET WILLY the Spectrum game of the year in 1983, which shows how far behind the LYNX lags behind in the software stakes. Still, it's a 'classic' game, and none the worse for its age a year in home computing is a long time! JETSET is actually the 'sequel' to MANIC MINER, but many people rate it a better game. The object of the game is to guide the hero, Willy, around his mansion after a party, collecting all the glasses, and having done so, Willy will be allowed to go to bed. This sounds simple, but little could be farther from the truth! The game has umpteen screens, each of which roughly corresponds to a "room" in Willy's mansion, and allowing for walls and stairs you can move between them quite freely, you don't have to complete one room before moving on to the next (as in MANIC MINER). The rooms are full of moving objects and characters, touching any of which will lose one life. Sometimes things you think are objects, turn out to be fatal. Using the arrow keys for left and right and RETURN to jump to manouvre around, leap between platforms and over moving objects. Timing successive leaps to avoid numerous objects moving at differing speeds and judging exactly where to jump from, to land on very narrow platforms becomes more and more complex the further you go in the mansion. Sometimes rooms seem impossible at first and require careful thought, timing and dexterity!

If you are completely stuck, ask a Spectrum owner, but beware! There are subtle differences between the LYNX and Spectrum versions, generally that the LYNX is less forgiving and stricter. Some rooms which are absurdly easy on the Spectrum version, require care on the LYNX, personally I think this is a bit of an improvement. There are, however, annoying situations where the LYNX just won't let you survive some things you can get away with on the Spectrum.

A final note is the inlay card, it is the Spectrum version. The software protection scheme includes a little card which talks of the Spectrum colour keys-ignore it and use the LYNX colours, they of course work.

Oh, and there is at least one bug in the LYNX version, in the wine cellar....This bug is not in the Spectrum version, although the Spectrum bugs seem to be absent from the LYNX.

A first clue, you have to jump THROUGH staircases, and you have to be in precisely the right place to do so....numerous other problems are up to you!!

VERDICT: Absolutely recomended. Easily a year ahead of any other LYNX game. After a month I still haven't explored the whole mansion and I haven't even considered starting to collect any objects yet! Rating 10/10, this should have happened more than a year ago!!

PS: When will we see Knight Lore/ Attic Attac/ Sabrewulf....not to mention graphics design and other utility software???

A.Bolton

The ENTERPRINT "2400"
****

If like me, you still have a ZX Printer left over from your early computing days, there is still an interesting device available to enable you to connect it to the LYNX.

The ENTERPRINT 1200 Printer Interface is available to special order in 2400 baud format at the price of £28.75 including post & packing.

In addition to specifying the baud rate, it is necessary to ask that the DIN plug on the flying lead be changed to 3 pin type, rather than the 5 pin normally supplied. The printer can then be used as normal with the added advantage that it will now produce capitals, and lower case with true descenders,as well as block graphics.The characters conform to the PRESTEL/TELETEXT specifications.

To use the printer is simply a matter of sending the appropriate ASCII code. When 32 characters or less, plus carriage return or a line feed have been received, the BUSY line is asserted, then the contents of the BUFFER are printed. Although printing is only 32 characters to the line, the ENTERPRINT accepts listings from a 40 character line computer using the LLIST command.

The DATA FORMAT is 7-bit ASCII plus parity (ignored), 1 start bit and 1 stop bit. The ENTERPRINT is uncased, on a printed circuit board which is 134mm x 83mm wih an input socket for a 9 volt supply. The printer power supply should be used. A flying lead connects the interface to the SERIAL socket on the LYNX. The board contains a ZILOG Z80A CPU, 5 other chips and various other items, so you you get quite a lot for your money. The board has rubber feet, so it can be used "raw", although it would be better in a case.

To use the Interface with the LYNX it is also necessary to reset some of the LYNX printer driver parameters. The best setting I have achieved is by using two pokes:-

POKE &61C1,32
POKE &61C3,130

There is a slight bug in the system which I have been unable to eliminate, i.e. where the line length in the listing exceeds 32 characters in length, it insists in omitting that 33rd character. One could get over this by inserting a space as the 33rd character in most lines.

The ENTERPRINT 2400 is available from:-

ENTERPRISE TECHNOLOGY Ltd,
P.O. BOX 140,
WIGAN, LANCS.

Jim Blakeley, N.U.T.L.U.G.

A QUART FROM A PINT?

This article is a combined one, concerning getting twice the usage from a floppy disk. Which ever method is adopted, it results in a storage capacity of 400K (before formatting) from a single sided, double density disk. The idea is to record on both sides of a disk, however it must be said that extreme care must be taken, especially on a disk which is already recorded on.

METHOD 1 by John Doerr

All that prevents recording on both sides, is the write protect notch on one side, and the index hole near the centre of the disk, also on one side.

Put two disks back to back after first having lined up the hole in the disk itself with the index hole in the sleeve. Carefully mark the position of this hole on the sleeve of each disk using the disks as templates for each other. Also mark the position of the write protect notch on each disk. Now slip a piece of paper between the disk & sleeve (to avoid damaging the disk surface) & using a single hole punch slid in under the sleeve, punch a hole over the mark you made for the index hole. Now turn the disk over to repeat the process & punch a hole in the other side of the disk. If you spin the disk yourself in the sleeve, you should see the index hole line up with your newly punched holes. Don't worry if the alignment is not perfect as the drive is very tolerant of hole positioning. Lastly using the punch, a write protect notch where you marked the sleeve earlier. If all has gone well, then you should have created mirror images of the existing holes found on a disk. Your own holes may be a bit "whiskery" as the sleeve is lined with a "fibrous matting. Be careful with the disk surface, the job is slightly tricky but could be worth doing as you could save about £3 per disk. The price you could pay is if you bend the disk, you will lose twice the data!

METHOD 2 by R B JONES

Having considered John's technique above, I decided to look at an alternative method. The materials you require are a sharp scalpel and some large Blick labels.

First make sure the "operating theatre" is clean and dry with no dust around. Using the scalpel, slide the blade under the closed down front flap and carefully break the welded seals on the sleeve. Gently, without bending the disk, bend backwards the released flap. With the flap clear, very carefully slide the disk out of the sleeve noting which way round it is, (it has a reinforcing ring at the centre) relative to the sleeve and very carefully place the disk on a piece of dust free paper. Now the sleeve can be worked on with no risk to the disk!

Using fairly firm pressure, cut a small square hole (easier than a round one!) directly opposite the index hole on the other side of the main drive hole. Try to cut through both sides of the sleeve at one go as this will minimise any ragged edges near to the disk when it is re-inserted. Finally cut the corresponding write protect slot on the opposite side of the sleeve. The size of the square index hole should be about 4mm square.

Without too much handling of the disk surface slide the disk back into the sleeve, gently bend back the flap and remake the seal by using pieces of the large Blick label. With luck, success should result and the second side can now be formatted and used immediately. Just to emphasise certain points, treat the disk with extreme care, avoiding too much handling of the surface, finger grease will corrode the oxide and to make sure the Blick label sticks, avoid handling the tacky side too much. I have done this on several disks now, both under LYNX DOS and under CP/M with 100% success, so it is perfectly feasible.

The choice is yours, both methods work and it can make for very cheap storage. One last point,.by cutting a second notch on the sleeve edge, this does make the floppy disk even more floppy!

CASSETTE REMOTE CONTROL.

A simple modification to any cassette recorder that has remote control and one that will enhance its convenience of operation, is a REMOTE CONTROL BY-PASS SWITCH. It is very easy to fit, being wired across the remote control socket as shown in (Fig.2b). The switch required is a miniature "PUSH-TO-MAKE, RELEASE-TO-BREAK" switch, preferably red to match the colour coding of the remote lead.

After SAVING or LOADING data, the cassette motor is stopped by the LYNX and the need to rewind the tape will often occur, especially for VERIFY. Instead of having to remove the remote plug from the recorder, just press the new remote BY-PASS BUTTON to gain control of the motor, saving wear on the remote socket and lead. It is also far more convenient.

Remote control of a cassette recorder can vey easily be achieved with another simple modification if it is not already included in your recorder. (Fig.2a) shows a typical cassette motor circuit without remote control. A 2.5mm jack is fitted and wired as shown in (Fig.2b) below. The centre contact of the socket must be connected to the negative wire from the motor, this having first been removed from the negative return or chassis. The outer contact of the jack is made to the negative return or chassis and also to the switch contact on the jack, in order to complete the circuit.

It is very important once again to recognise and maintain correct polarity as the LYNX cassette motor control is polarity concious owing to the use of transistors in the circuit. Due care must also be used to ensure that the placing of additional switches, sockets and wiring does not foul other components on reassembly.

M.GEORGE.

GRAPHIC SAVE UTILITY
****

The program provides the user with the facility to save to tape, full screen images of the RED, BLUE, or GREEN screens and then to reload them back as required.

The program consists of some machine code (in CODE lines), and a short BASIC section. It is written as two PROCEDUREs, GSAVE (C) which will save the colour given by "C", and GLOAD (C) which will load the colour given by "C". "C" must be 1 (BLUE), 2 (RED), and 4 (GREEN). The screens are saved as files given by A$.

You can save one colour and load it back into another so that colours are transposed (PROTECT values have no effect on these routines). You can also save or load ALT.GREEN by POKE &6292,&80.

The following short program checks that the four CODE lines have been entered correctly and then deletes itself.

```
50 FOR I=4038 TO 4044 STEP 2
51   LET A=LCTN(I),T=0
52   FOR J=0 TO PEEK(A-2)-8
53     LET T=T+PEEK(A+J)
54   NEXT J
55   READ N
56   IF T=N THEN NEXT I
57   ELSE PRINT "ERROR IN LINE ";I
58   IF T<>N THEN STOP
59   DEL 50,60
60   DATA 3518,7864,7400,3549
90   REM PROCEDURE DEMO.
99   CLS
100   FOR I=1 TO 40 STEP 0.1
101     LET X=I*SIN(I),Y=I*COS(I)
102     FOR J=1 TO 5
103       FOR K=1 TO 5
104         DOT X*SGN(((J+K) MOD 2)-0.5)
+40*J,40*K+Y
105       NEXT K
106     NEXT J
107   NEXT I
109   LET A$="PATTERN"
110   PROC GSAVE(4)
111   CLS
112   PRINT "NOW PRESS A KEY THEN REWIND
TAPE AND PLAY BACK"
113   LET G=GETN
114   CLS
115   PROC GLOAD(2)
116   STOP
4000   DEFPROC GSAVE(C)
4002   LET A=LCTN(4042)
4004   IF C=1 THEN DPOKE A+6,&628E
4006   ELSE DPOKE A+6,&628E+C
4008   IF C=4 THEN POKE A+22,&0070
4010   ELSE POKE A+22,&0069
4012   CALL LCTN(4044)
4014   CALL A
4016   ENDPROC
4018   DEFPROC GLOAD(C)
4020   LET A=LCTN(4040)
4022   IF C=1 THEN DPOKE A+1,&628E
4024   ELSE DPOKE A+1,&628E+C
4026   IF C=4THEN POKE A+35,5
4028   ELSE POKE A+35,3
4030   CALL LCTN(4038)
4032   CALL A
4034   ENDPROC
4037   REM CODE LINE 4038 FINDS ON TAPE
THE NAME GIVEN BY THE BASIC VARIABLE A$
4038   CODE  CD 65 08 CD 85 08 FE 22 20
F9 2A E4 68 23 CD 85 0B FE 22 28 05 BE 2
0 E8 18 F3 C3 FB 0C 00
4039   REM CODE LINE 4040 LOADS A GRAPHI
C FROM TAPE INTO ONE COLOUR BANK
4039.5   REM THIS CODE WORKS AS FOLLOWS:
1 - READ 256 BYTES FROM TAPE INTO INPUT
BUFFER AT &6000
2 - WRITE THESE BYTES TO THE SCREEN
3 - REPEAT 1 AND 2 32 TIMES
4040   CODE  2A 90 62 06 20 C5 E5 21 00
60 CD 65 08 06 00 E5 C5 CD 85 0B C1 E1 7
7 23 10 F5 CD FB 0C 00 01 21 00 60 3E 03
 D9 01 7F FF ED 79 D9 3E 20 D3 80 01 00
01 ED B0 AF D9 ED 79 D9 D3 80 EB C1 10 C
6 C9 00
4041   REM CODE LINE 4042 SAVES A GRAPHI
C FROM ONE COLOUR BANK TO TAPE
4041.5   REM THIS CODE WORKS AS FOLLOWS
1 - READ 256 BYTES FROM SCREEN INTO
INPUT BUFFER AT &6000
2 - SAVE THESE BYTES TO TAPE
3 - REPEAT 1 AND 2 32 TIMES
4042   CODE  3E 01 32 9F 62 2A 92 62 06
20 C5 E5 00 06 00 11 00 60 D5 E5 C5 CD 7
0 00 7D C1 E1 12 23 13 10 F3 CD 93 0B E1
 01 00 01 7E E5 C5 CD A6 62 C1 E1 23 0B
78 81 20 F2 CD FB 0C E1 24 C1 10 CD 3E 0
7 32 9F 62 C9 00
4043   REM CODE LINE 4044 TO SAVE ON TAP
E THE NAM,E GIVEN BY THE BASIC VARIABLE
A$
4044   CODE  CD 93 0B 3E 22 CD A6 62 2A
E4 68 23 7E FE 0D 28 05 CD A6 62 18 F5 3
E 22 CD A6 62 C3 FB 0C 00
```

Ed. Lines starting with the REM function are no necessary for the program to run and can be deleted
Francis Lovering

SMALL ADs.
****

LYNX LOGICHESS. For 96K only.....£6.00 only.
Contact:-
Mr D ETHERINGTON,
1 KELSO MEWS, CAVERSHAM, READING. RG4 0RJ.

+ - - - - - - + - - - - - - + - - - - - - + - - - - - - +

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Mr J NEWTON,
"TRESILIAN", CROSS STREET, BOW STREET,
DYFED. SY24 5BB

PRINTER PATCH No 2 for the NEC-PC8023BE-N

With hindsight, I have been lucky. I bought this fully-featured, 80-column printer a year ago because I had used the model at work and liked it, and because in my price range (under £500) it was the best available. I connected it up to my 48K LYNX via the interface box, loaded the parallel printer software, I tried LPRINT "HELLO!" and saw HELLO! printed.

Then I found that LLIST produced completely continuous text which was barely legible, and I had to perform the simplest of printer patches: setting the DIP switches on the printer chassis. The NEC printer manual is very clear and after experimenting I chose the following settings (X= OPEN (OFF), O= ON):

SW1-6 to SW1-8 are the most important switches for this patch. SW1-6 and SW1-7 closed mean respectively that line feed (LF) is set at full characters print in one line and that standard ASCII characters CR,LF,VT,US and FF are all recognised as triggers to print data from the printer's buffer. SW1-8 open means that the carriage return (CR) character (ASCII 13) causes only carriage return and not line feed also.

With these settings, this printer now works perfectly with my 48K,96K and 128K Lynxes. In particular LINK works effectively on the 128K machine, reproducing exactly what appears on the screen, without the block cursor (on my 48K and 96K machines, even with CFR set to 0 to suppress the cursor flashing, cursor characters are printed). I have used almost all of the control and graphics commands in the NEC manual, using the N-BASIC it describes as though it was LYNX BASIC, and it works. I have written a simple BASIC routine to take graphic screen dumps (6 minutes per whole screen on a 48K or 96K Lynx), printing or ignoring any combination of the colours displayed. Great fun, and useful for producing clear reports and diagrams. Recently I have seen this printer advertised at around £200, which is a snip for this excellently engineered device (considerably less than I paid for it!), and wholly recommended for the Lynx.

Chris Mathews.

PERIPHERAL PRODUCTS

Due to lack of sales the following items will be discontinued when stocks are exhausted:-

KEYBOARD AID PACKAGE	Stock level - 4
DATA STAND	As above

But the DATA CARDS sets are still available @ £3.00

BOWTHORPE SUPPRESSOR PLUGS	Stock level - 6

The SANYO DR 202 DATA RECORDER is now "customised", hence the price increase to £47.95. It will now successfully SAVE/LOAD from TAPE0 to TAPE5 on either BASIC, AUTOSTART BASIC or MACHINE CODE programs. Existing owners can have the "customising" carried out for £5.00 inclusive.

R B JONES.

Reading the LYNX keyboard from machine code

There is already a routine in the ROM of the LYNX that reads the keyboard. Using this is very simple. The routine is called and returns the ASCII code of the key pressed in the accumulator, similar to "KEYN" in BASIC. The following example routine will wait until the "RETURN" key is pressed:-

```
Addr Code       Label Mnemonics
               LOOP
xx00 DD 21 04 62      LD IX,6204H ;Pointer to KEYB
                                  ;routine
xx04 DD 6E 00         LD L,(IX+0) ;Get low byte of
                                  ;address
xx07 DD 66 01         LD H,(IX+1) ;Get high byte of
                                  ;address
xx0A 5B 0F xx         LD DE,RETADD;Return address for
                                  ;simulated call
xx0D D5               PUSH DE     ;Save it for the
                                  ;RET later
xx0E E9               JP (HL)     ;Go for KEYB routine
            RETADD
xx0F FE               CP 0DH      ;Is it a carriage
                                  ;return?
xx10 C8               RET Z       ;If so then finish
xx11 18 F6            JR LOOP     ;Otherwise repeat.
xx14 00               END
```

The program jumps to a routine in ROM which returns the ASCII value of the pressed key in the accumulator. This is then compared with 0D hex., (carriage return) and if the comparison succeeds, then control is returned to the main program otherwise the program loops around again.

Sometimes it may be necessary to detect more than one key at the same time. The LYNX allows this to be done since each key affects one bit of a Z80 I/O port independantly. Therefore the Z80 IN and OUT instructions should be used for this purpose. A full list of which keys affect which bits of which ports is given on page 22 of LYNX USER mag.1 (JUNE '83). The following example program performs similarly to the previous one but waits for both the UP and RIGHT keys to be pressed before it leaves the loop:-

```
            LOOP
yy00 01 B0 00         LD BC,0080  ;Location of port
yy03 70               IN A,(C)    ;Get value from port
yy04 CB 67            BIT 4,A     ;Test the relevant
                                  ;bit
yy06 20 FB            JR NZ,LOOP  ;If set then try
                                  ;again
yy08 01 B0 09         LD BC,0980  ;Second port
                                  ;location
yy0B 70               IN A,(C)    ;Get next value
                                  ;from port
yy0C CB 6F            BIT 5,A     ;Test bit again
yy0E 20 F7            JR NZ,LOOP  ;If set then try
                                  ;again
yy10 C9               RET         ;Otherwise we have
                                  ;the keys pressed
                                  ;so finish
```

Note that the keys are reset active or "negative logic".

Simon Roberts.

HI-LO by GORDON CLAY

An addictive card game which will provide you with hours of entertainment.

```
10 IF HIMEM>&0552 THEN RESERVE HIMEM-400
20 CLS
30 LET s=0,K=0
40 PROC INSTRUCTIONS
50 PROTECT 0
60 VDU 2,4,4
70 RANDOM
80 PAPER GREEN
90 DIM B(6)
100 LET S=0,W=1
110 PROC CARDS
120 LET K=K+1
130 PAPER GREEN
140 PRINT  @ 29,150;"
 "; @ 18,200;"                          ";
150 PROC VAL CARDS
160 PROC SUIT
170 VDU 1,0
180 MOVE 5,110
190 DRAW 240,110
200 DRAW 240,240
210 DRAW 5,240
220 DRAW 5,110
230 MOVE 200,110
240 DRAW 200,240
250 LET U=5
260 PRINT @ 103,56;CHR$(24);CHR$(1)(7);C
HR$(2)(RED);"SCORE"; @ 103,80;"GAMES"; @
 107,68;s; @ 107,92;K-1;CHR$(25);
270 PROC CHOICE
280 PRINT  @ 33,220;" ACES ARE LOW ";;
290 PRINT  @ 18,130;" HIGHER (H) OR LOWE
R (L) ";
300 IF INP(&0480)=251 THEN PROC HIGH
310 IF W=6 THEN PROC BEEP
320 IF W=6THEN PRINT  @ 29,150;"** YOU W
IN **";
330 IF W=6 THEN LET s=s+1
340 IF W=6 THEN PROC END
350 IF INP(&0780)=251 THEN PROC LOW
360 GOTO 300
370 DEFPROC WIPE
380 PAPER GREEN
390 FOR q=5 TO 120 STEP 20
400   FOR w=20 TO 80 STEP 10
410     PRINT  @ q,w;"      ";
420   NEXT w
430 NEXT q
440 LET W=1
450 IF K>20 THEN  GOTO 2800
460 GOTO 110
470 DEFPROC CHOICE
480 PROC SUIT
490 IF B(U)=1 THEN  PROC ACE
500 IF B(W)=2 THEN  PROC TWO
510 IF B(W)=3 THEN  PROC THREE
520 IF B(W)=4 THEN  PROC FOUR
530 IF B(W)=5 THEN  PROC FIVE
540 IF B(W)=6 THEN  PROC SIX
1130 PRINT  @ U,20;"Q"; @ U+12,20;A$;CHR
$(24); @ U+6,15;CHR$(139);CHR$(140);CHR$
(25); @ U+30,50;CHR$(2)(6);"    ";CHR$(2
)(7); @ U,80;A$; @ U+15,80;"Q";
1140 PRINT CHR$(24); @ U+4,30;CHR$(141);
CHR$(142);
1150 VDU 25
1160 ENDPROC
1170 DEFPROC JACK
1180 PAPER 7
1190 FOR R=20 TO 80 STEP 10
1200   PRINT  @ U,R;"      "
1210 NEXT R
1220 PRINT  @ U,20;"J"; @ U+12,20;A$; @
U+15,80;"J"; @ U+4,15;CHR$(24);CHR$(144)
;CHR$(145);CHR$(146);CHR$(25);
1230 PRINT  @ U,80;A$; @ U+4,30;CHR$(24)
;CHR$(147);CHR$(148);CHR$(149);CHR$(25);
 @ U+3,50;CHR$(1)(0);CHR$(137);CHR$(137)
;CHR$(137);CHR$(137);
1240 ENDPROC
1250 DEFPROC TEN
1260 PAPER 7
1270 FOR R=20 TO 80 STEP 10
1280   PRINT  @ U,R;"      ";
1290 NEXT R
1300 PRINT  @ U+1,20;CHR$(136); @ U+14,8
0;CHR$(136); @ U,31;A$;"  ";A$; @ U,44;A
$;"  ";A$; @ U,57;A$;"  ";A$; @ U,70;A$;
"  ";A$; @ U+6,38;A$; @ U+6,65;A$;
1310 ENDPROC
1320 DEFPROC NINE
1330 PAPER 7
1340 FOR R=20 TO 80 STEP 10
1350   PRINT  @ U,R;"      ";
1360 NEXT R
1370 PRINT  @ U,20;"9"; @ U+14,80;"9"; @
 U+1,30;A$;" ";A$; @ U+1,41;A$;" ";A$; @
 U+1,59;A$;" ";A$; @ U+1,70;A$;" ";A$; @
 U+5,50;A$;
1380 ENDPROC
1390 DEFPROC SEVEN
1400 PAPER 7
1410 FOR R=20 TO 80 STEP 10
1420   PRINT  @ U,R;"      ";
1430 NEXT R
1440 PRINT  @ U,20;"7"; @ U+14,80;"7"; @
 U+1,30;A$;" ";A$; @ U+5,40;A$; @ U+1,50
;A$;" ";A$; @ U+1,70;A$;" ";A$;
1450 ENDPROC
1460 DEFPROC EIGHT
1470 PAPER 7
1480 FOR R=20 TO 80 STEP 10
1490   PRINT  @ U,R;"      ";
1500 NEXT R
1510 PRINT  @ U,20;"8"; @ U+14,80;"8"; @
 U+1,30;A$;" ";A$; @ U+5,40;A$; @ U+1,50
;A$;" ";A$; @ U+1,70;A$;" ";A$; @ U+5,60
;A$;
2070   IF z=1 THEN  GOTO 2000
2080   LET B(S)=T
2090 NEXT S
2100 ENDPROC
2110 DEFPROC CARDS
2120 VDU 1,WHITE,2,RED
2130 FOR U=5 TO 120 STEP 20
2140   FOR I=20 TO 80 STEP 10
2150     PRINT  @ U,I;CHR$(137);CHR$(137
);CHR$(137);CHR$(137);CHR$(137);CHR$(137
);
2160   NEXT I
2170 NEXT U
2180 ENDPROC
2190 DEFPROC SUIT
2200 LET Q=RAND(4)+1
2210 IF Q=1 THEN  LET A$=CHR$(128)+CHR$(
129)
2220 IF Q=1 THEN  VDU 1,BLACK,2,WHITE
2230 IF Q=1 THEN  ENDPROC
2240 IF Q=2 THEN  LET A$=CHR$(130)+CHR$(
131)
2250 IF Q=2 THEN  VDU 1,RED,2,WHITE
2260 IF Q=2 THEN  ENDPROC
2270 IF Q=3 THEN  LET A$=CHR$(132)+CHR$(
133)
2280 IF Q=3 THEN  VDU 1,RED,2,WHITE
2290 IF Q=3 THEN  ENDPROC
2300 IF Q=4 THEN  LET A$=CHR$(134)+CHR$(
135)
2310 IF Q=4 THEN  VDU 1,BLACK,2,WHITE
2320 IF Q=4 THEN  ENDPROC
2330 DEFPROC GRAPHICS
2340 DPOKE GRAPHIC HIMEM
2350 RESTORE 2430
2360 LET R=1
2370 INK GREEN
2380 PROTECT MAGENTA
2390 FOR A=0 TO 219
2400   READ B
2410   POKE LETTER(128)+A,B
2420 NEXT A
2430 DATA &0,&01,&03,&07,&15,&31,&63,&61
,&25,&03
2440 DATA &0,&32,&48,&56,&60,&62,&63,&47
,&38,&48
2450 DATA &0,&12,&30,&63,&63,&31,&15,&7,
&03,&01
2460 DATA &0,&12,&30,&63,&63,&62,&60,&56
,&48,&32
2470 DATA &0,&01,&03,&07,&15,&15,&07,&03
,&01,&0
2480 DATA &32,&48,&56,&60,&62,&62,&60,&5
6,&48,&32
2490 DATA &01,&03,&03,&05,&15,&15,&05,&0
1,&01,&07
2500 DATA &32,&48,&48,&40,&60,&60,&40,&3
2,&32,&56
2510 DATA &0,&46,&42,&42,&42,&42,&42,&42
```

```
550 IF B(W)=7 THEN  PROC SEVEN
560 IF B(W)=8 THEN  PROC EIGHT
570 IF B(W)=9 THEN  PROC NINE
580 IF B(W)=10 THEN  PROC TEN
590 IF B(W)=11 THEN  PROC JACK
600 IF B(W)=12 THEN  PROC QUEEN
610 IF B(W)=13 THEN  PROC KING
620 ENDPROC
630 DEFPROC BEEP
640 FOR Q=100 TO 180 STEP 10
650   BEEP 100,100,63
660   PAUSE 100
670 NEXT Q
680 ENDPROC
690 DEFPROC END
700 PRINT  @ 18,200;" PRESS SPACE FOR A
GAME ";
710 IF INP(&0480)=247 THEN  PROC WIPE
720 IF INP(&0480)=239 THEN  END
730 GOTO 710
740 ENDPROC
750 DEFPROC LOW
760 LET W=W+1
770 LET U=U+20
780 PROC CHOICE
790 IF B(W-1))B(W) THEN  ENDPROC
800 PRINT  @ 43,150;" WRONG ";
810 FOR q=1 TO 10
820   BEEP 600,q,63
830 NEXT q
840 PROC END
850 ENDPROC
860 DEFPROC HIGH
870 LET W=W+1
880 LET U=U+20
890 PROC CHOICE
900 IF B(W-1)(B(W) THEN  ENDPROC
910 PRINT  @ 43,150;" WRONG ";
920 FOR q=0 TO 10
930   BEEP 500,q,63
940 NEXT q
950 PROC END
960 ENDPROC
970 DEFPROC KING
980 PAPER 7
990 FOR R=20 TO 80 STEP 10
1000   PRINT  @ U,R;"      ";
1010 NEXT R
1020 PRINT  @ U,20;"K"; @ U+12,20;A$;CHR
$(24); @ U+4,15;CHR$(138);CHR$(139);CHR$
(140)CHR$(24); @ U+4,30;CHR$(141);CHR$(1
42);CHR$(143);
1030 VDU 25
1040 PRINT  @ U,80;CHR$(2)(7);A$; @ U+15
,80;"K";
1050 PRINT  @ U+3,50;CHR$(2)(1);"    ";
1060 VDU 2,7,1,RED
1070 ENDPROC
1080 DEFPROC QUEEN
1090 PAPER 7
1100 FOR R=20 TO 80 STEP 10
1110   PRINT  @ U,R;"      ";
1120 NEXT R
1520 ENDPROC
1530 DEFPROC SIX
1540 PAPER 7
1550 FOR R=20 TO 80 STEP 10
1560   PRINT  @ U,R;"      ";
1570 NEXT R
1580 PRINT  @ U,20;"6"; @ U+14,80;"6"; @
 U+2,30;A$;" ";A$; @ U+2,50;A$;" ";A$; @
 U+2,70;A$;" ";A$;
1590 ENDPROC
1600 DEFPROC FIVE
1610 PAPER 7
1620 FOR R=20 TO 80 STEP 10
1630   PRINT  @ U,R;"      ";
1640 NEXT R
1650 PRINT  @ U,20;"5"; @ U+14,80;"5"; @
 U+1,30;A$;" ";A$; @ U+5,50;A$; @ U+1,70
;A$;" ";A$;
1660 ENDPROC
1670 DEFPROC FOUR
1680 PAPER 7
1690 FOR R=20 TO 80 STEP 10
1700   PRINT  @ U,R;"      ";
1710 NEXT R
1720 PRINT  @ U,20;"4"; @ U+14,80;"4"; @
 U+1,30;A$;" ";A$; @ U+1,70;" ";A$;
1730 ENDPROC
1740 DEFPROC THREE
1750 PAPER 7
1760 FOR R=20 TO 80 STEP 10
1770   PRINT  @ U,R;"      ";
1780 NEXT R
1790 PRINT  @ U,20;"3"; @ U+14,80;"3"; @
 U+6,30;A$; @ U+6,50;A$; @ U+6,70;A$;
1800 ENDPROC
1810 DEFPROC TWO
1820 PAPER 7
1830 FOR R=20 TO 80 STEP 10
1840   PRINT  @ U,R;"      ";
1850 NEXT R
1860 PRINT  @ U,20;"2"; @ U+14,80;"2"; @
 U+6,30;A$; @ U+6,70;A$;
1870 ENDPROC
1880 DEFPROC ACE
1890 PAPER 7
1900 FOR R=20 TO 80 STEP 10
1910   PRINT  @ U,R;"      ";
1920 NEXT R
1930 PRINT  @ U,20;"A"; @ U+14,80;"A"; @
 U+6,50;A$;
1940 ENDPROC
1950 DEFPROC VAL CARDS
1960 FOR z=1 TO 6
1970   LET B(z)=0
1980 NEXT z
1990 FOR S=1 TO 6
2000   LET z=0
2010   RANDOM
2020   LET o=RAND(8)
2030   LET T=RAND(13)+1
2040   FOR F=1 TO 6
2050     IF T=B(F) THEN  LET z=1
2060   NEXT F
,&46,&0
2520 DATA &42,&0,&42,&0,&42,&0,&42,&0,&4
2,&0
2530 DATA &15,&07,&0,&0,&0,&0,&0,&0,&0,&
0
2540 DATA &63,&63,&63,&47,&63,&63,&31,&1
5,&63,&63
2550 DATA &62,&60,&56,&48,&32,&32,&32,&3
2,&48,&48
2560 DATA &03,&03,&03,&01,&01,&01,&03,&0
7,&15,&31
2570 DATA &63,&63,&60,&62,&63,&63,&61,&6
3,&63,&63
2580 DATA &0,&0,&0,&0,&0,&0,&0,&0,&56,&6
0
2590 DATA &03,&0,&0,&0,&0,&01,&01,&01,&0
,&01
2600 DATA &63,&63,&62,&63,&63,&63,&63,&6
3,&63,&63
2610 DATA &60,&48,&48,&48,&48,&0,&48,&48
,&32,&48
2620 DATA &03,&01,&03,&03,&0,&03,&03,&03
,&03,&15
2630 DATA &63,&63,&63,&63,&63,&63,&63,&3
1,&63,&63
2640 DATA &32,&0,&32,&32,&32,&0,&0,&0,&0
,&48
2650 ENDPROC
2660 DEFPROC INSTRUCTIONS
2670 PROTECT 0
2680 VDU 2,0,4,1,YELLOW,24
2690 PRINT  @ 30,10;;"PLAY YOUR CARDS RI
GHT"; @ 30,15;CHR$(21);"----------------
-----";
2700 VDU 25,1,CYAN,20
2710 PRINT  @ 0,70;" The object of the g
ame is to guess      if the second card
is higher or lower   than the first. If
you guess all six    cards correctly the
n you win."
2720 PROC GRAPHICS
2730 PROTECT 0
2740 VDU 24,1,GREEN
2750 PRINT  @ 40,100;"GOOD LUCK";
2760 VDU 25,1,7
2770 PRINT  @ 30,230;"PRESS SPACE BAR";
2780 IF INP(&0480)=247 THEN  ENDPROC
2790 GOTO 2780
2800 VDU 24
2810 PROTECT 0
2820 PAPER 0
2830 CLS
2840 INK 6
2850 PRINT  @ 40,50;CHR$(18)" AGAIN - Y
 or N "CHR$(18)
2860 PRINT
2870 LET A$=GET$
2880 IF A$="Y" THEN  RUN
2890 IF NOTA$="N" THEN  GOTO 2870
2900 VDU 25,4
2910 END
```

```
SHUTTLE PILOT by FRANK DI MAMBRO
********************************
10 PROTECT 0
20 WINDOW 3,125,5,245
30 VDU 1,4,2,0,4,7
40 PRINT  @ 40,60;CHR$(24)"STOP THE TAPE
";CHR$(25)
50 PROC DEF GRAPHIC
60 PROC DEF SOUND
70 PROC TITLE
80 LET H=8100,F=9500,V=7000,Z=
90 VDU 1,7,2,0,4,7
100 LET a=5,b=27,c=6,d=27,e=7,f=26,g=8,h
=26,i=9,j=26,k=9,l=30,q=10,r=27
110 FOR s=1 TO 70
120   LET x=INT(RND*256),y=INT(RND*248)
130   DOT x,y
140 NEXT s
150 LET m=10,n=25,o=10,p=30
160 PRINT  @ b*3,a*10:CHR$(1);CHR$(7);B$
;
170 PRINT  @ d*3,c*10:CHR$(1);CHR$(7);E$
;
180 PRINT  @ f*3,e*10:CHR$(1);CHR$(7);C$
;
190 PRINT  @ h*3,g*10:CHR$(1);CHR$(7);D$
;
200 PRINT  @ j*3,i*10;CHR$(1);CHR$(7);F$
; @ l*3,k*10;CHR$(1);CHR$(7);G$;
210 PRINT  @ n*3,m*10;CHR$(1);CHR$(7);H$
; @ p*3,o*10;CHR$(1);CHR$(7);H$;
220 PRINT  @ 12*3,0;CHR$(1);CHR$(6);CHR$
(18);"SATURN SHUTTLE"; @ 2*3,2*10;CHR$(1
);CHR$(3);"INSTRUMENTS"; @ 25*3,2*10;"MO
DULE";CHR$(18);
230 MOVE 0,32
240 PLOT 3,95,0
250 PLOT 3,0,75
260 PLOT 3,-95,0
270 PLOT 3,0,-75
280 PRINT  @ 1*3,6*10;"ON STAND BY"; @ 8
*3,21*10;CHR$(1);CHR$(5);"PRESS A NUMBER
 TO START";
290 PAPER BLACK
300 LET I$=GET$
310 PRINT  @ 1*3,9*10;CHR$(1);CHR$(4);"A
LL SYSTEMS GO"; @ 5*3,21*10;"
              ";
320 PRINT  @ 1*3,4*10;CHR$(1);CHR$(4);"H
EIGHT="; @ 1*3,6*10;CHR$(1);CHR$(6);"VEL
OCITY="; @ 1*3,8*10;CHR$(1),CHR$(5);"FUE
L=";
330 LET I$=KEY$
340 IF I$="" THEN  GOTO 360
350 LET Z=VAL(I$)
360 FOR x=1 TO Z
370   PRINT  @ 8*3,4*10;H;" "; @ 10*3,6*
10;V;" "; @ 7*3,8*10;F;" ";
380   LET q=q+1
390   PRINT  @ r*3,q*10;CHR$(1);CHR$(6);
A$;
400 NEXT x
410 LET q=10,r=27
420 FOR x=1 TO Z
430   LET q=q+1
440   PRINT  @ r*3,q*10;"  ";
450 NEXT x
460 LET V=V-(Z*Z),H=H-(Z*7),F=F-(Z*Z)
470 IF Z<5 THEN  LET V=V+(Z*5)*E
480 IF Z=9 THEN  LET F=F-(Z*2)
490 IF H<5 AND V<0 THEN  GOTO 5505
500 IF V<5 AND H<>0 THEN  GOTO 550
510 IF V>50 AND H<4 THEN  GOTO 550
520 IF F<5 THEN  GOTO 5500
530 LET q=10,r=27
540 GOTO 330
550 DOT 0,210
560 PLOT 3,248,0
570 FOR v=1 TO 11
580   LET a=a+1,c=c+1,e=e+1,g=g+1,i=i+1,
k=k+1,m=m+1,o=o+1
590   PRINT  @ b*3,(a-1)*10;"  "; @ f*3
,(e-1)*10;" "; @ (f+4)*3,(e-1)*10;" "; @
 n*3,(m-1)*10;" "; @ (n+6)*3,(m-1)*10;"
";
600   PRINT  @ b*3,a*10;B$;
610   PRINT  @ d*3,c*10;E$;
620   PRINT  @ f*3,e*10;C$;
630   PRINT  @ h*3,g*10;D$;
640   PRINT  @ j*3,i*10;F$; @ l*3,k*10;G
$;
650   PRINT  @ n*3,m*10;H$; @ p*3,o*10;H
$;
660 NEXT v
670 IF H<5 AND V<0 THEN  GOTO 880
680 PRINT  @ (b-4)*3,(a+4)*10;B$; @ b*3,
a*10;"  "; @ (d+2)*3,(c+2)*10;E$; @ d*3
,c*10;"  ";
690 PRINT  @ (f-3)*3,(e+1)*10;C$; @ F*3,
e*10;"    ";
700 OUT &0086,13
710 FOR I=1 TO 100
720   OUT &87,RAND(I)
730   SOUND HIMEM,RAND(I)
740 NEXT I
750 OUT &0087,0
760 PRINT  @ 1*3,11*10;CHR$(1),CHR$(2);"
SSHUTTLE CRASHED";
770 PAPER BLACK
780 LET X$=GET$
790 CLS
800 PRINT ,,,,,"BAD LUCK YOU CRASHED",,,
,,,,"THE SHUTTLE AND",,,,,,,,,"THERE AR
E NO SURVIVORS!!"
810 PRINT ,,,,,"ANOTHER GAME (Y/N)"
820 LET T$=GET$
830 IF T$="Y" THEN  RESTORE
840 CLS
850 GOTO 70
860 IF NOTT$="Y" THEN  VDU 1,0,2,7,4
870 GOTO 880
880 PRINT  @ 11*3,1*10;CHR$(1);CHR$(6);"
 SHUTTLE LANDED";
890 FOR E=1 TO 20
900   BEEP 180,E*5,63
910   PAUSE 1000
920 NEXT E
930 LET S$=GET$
940 VDU 1,7,2,1,4
950 PRINT ,,,,,"CONGRATULATIONS YOU HAVE
 ",,,,,,,"LANDED THE SHUTTLE",,,,,,,,"AN
D THERE ARE NO INJURIES!!"
960 GOTO 810
970 DEFPROC DEF GRAPHICS
980 DPOKE GRAPHIC,LCTN(990)
990 CODE  01 03 03 07 07 0F 0F 1F 1F 3F
00 00
1000 CODE  3F 3F 3F 3F 3F 3F 3F 3F 3F 3F
 00 00
1010 CODE  20 30 30 38 38 3C 3C 3E 3E 3F
 00 00
1020 CODE  3F 00 00 00 00 00 00 00 00 00
 00 00
1030 CODE  03 02 04 04 08 08 10 10 20 20
 00 00
1040 CODE  0F 0F 00 00 00 00 00 00 00 00
 00 00
1050 CODE  3C 3C 00 00 00 00 00 00 00 00
 00 00
1060 CODE  30 10 08 08 04 04 02 02 01 01
 00 00
1070 LET B$=CHR$(128)+CHR$(130)+CHR$(132
)
1080 LET C$=CHR$(128)+"USA"+CHR$(132)
1090 LET E$=CHR$(130)+CHR$(130)+CHR$(132
)
1100 LET D$=CHR$(130)+CHR$(130)+CHR$(132
)
1110 LET F$=CHR$(136)+CHR$(128)+CHR$(132
)
1120 LET G$=CHR$(142)
1130 LET H$=CHR$(138)+CHR$(140)
1140 LET A$=CHR$(136)+CHR$(134)+CHR$(132
)
1150 ENDPROC
1160 DEFPROC DEF SOUND
1170 LET A=HIMEM
1180 FOR I=64 TO 2 STEP -1
1190   FOR J=1 TO 4
1200     POKE A,1+RAND(I-1)
1210     LET A=A+1
1220   NEXT J
1230 NEXT I
1240 ENDPROC
1250 DEFPROC TITLE
1260 VDU 1,5,2,0,4,24,18
1270 PRINT  @ 40,40;"S";CHR$(29);"A";CHR
$(28);"T";CHR$(29);"U";CHR$(28);"R";CHR$
(29);"N";CHR$(28);CHR$(18);" ";CHR$(18);
"";
1280 PRINT  @ 62,40;"S";CHR$(29);"H";CHR
$(28);"U";CHR$(29);"T";CHR$(28);"T";CHR$
(29);"L";CHR$(28);"E";CHR$(18);" ";
1290 PRINT  @ 19*3,115;CHR$(1);CHR$(6);C
HR$(25)"By";
1300 PRINT  @ 45,130;CHR$(1);CHR$(6);"F.
890 FOR E=1 TO 200! Mambro";
1310 PRINT  @ 30,220;CHR$(18);"PRESS ANY
 KEY TO START";CHR$(18);
1320 LET I$=GET$
1330 ENDPROC
```

SCREEN DUMP ROUTINE

****

This short BASIC program will dump the GREEN screen on to a printer in only a couple of minutes. It does require a 96K LYNX with the Parallel Printer Interface (or a 48K with the interface and tape software) and an EPSON RX80 or FX80 dot matrix printer. The program sets up the printer in graphics mode, and then reads directly from the screen and writes to the printer within a FOR-NEXT loop. Here is a brief description of the program:-

Line 110 Sets the printer line spacing to 24/216".

Line 120 Sets variable P to point to the beginning of the screen page. P=&C000 for GREEN or RED screen, or p=&A000 for BLUE or ALT. GREEN screen.

Line 130 FOR-NEXT loop to count each of the 32 screen columns.

Line 140 Sets printer normal density bit image mode.

Line 150 FOR-NEXT loop to count up the screen column.

Line 160 Calls ROM routine which reads byte from screen bank pointed to by variable J which is passed into register pair HL. This ROM routine returns with H=0 and L=byte from screen which is passed to variable HL. Use CALL &0070 for ALT. GREEN/GREEN, or CALL &0069 for BLUE/RED screen.

Line 170 Prints returned byte from screen.

Line 200 This pads out the end of the graphics line.

Line 220 Gives printer carriage return and line feed.

BASIC PROGRAM

```
100 REM ** SCREEN DUMP **
110 LPRINT CHR$(27);CHR$(51);CHR$(24)
120 LET P=&C000
130 FOR I=0 TO 31
140   LPRINT CHR$(27);CHR$(75);CHR$(225)
;CHR$(0);
150   FOR J=P+I+255*32 TO P+I STEP -32
160     CALL &0070,J
170     LPRINT CHR$(HL);
180   NEXT J
190   FOR K=1 TO 5
200     LPRINT CHR$(0);
210   NEXT K
220   LPRINT
230 NEXT I
```

Here is a listing of a BASIC program to give a demo of the above screen dump. It uses the EXT CIRCLE command (96K or 128K LYNX) to draw open circles, but a suitable procedure to draw circles could be substituted.

```
10 REM ** DEMO SCREEN **
20 LET R=5
30 FOR X=10 TO 172 STEP 6
40   EXT CIRCLE 0,X,100+100*SIN(X/60),R
50   EXT CIRCLE 0,X,140-100*SIN(X/60),R
60   LET R=R+2
70 NEXT X
```

Colin Tame.

An alternative to the "INPUT" command

****

The LYNX BASIC INPUT statement is useful in that it will except a text string of up to 240 characters, but this can be a disadvantage if you have just set up a screenfull of information. Another problem is that it will except a naked RETURN which causes the cursor to move down the screen obliterating everything which was previously printed.

Here is a simple solution to the problem. It consists of a procedure which uses GET$ to except characters and create a string (I$). The right most character of this string can be deleted by pressing the DELETE key. RETURN is used to terminate the input of characters.

To use the PROCedure you should first DIMension P$ and I$ at 127 characters, using DIM I$(127),P$(127), at the beginning of your BASIC program. Now, whenever you want to accept an input from within your BASIC program simply define P$ as the prompt you wish to appear on the screen. Then use PROC INPUT(x,y,c), where x and y are the co-ordinates of the cursor position where you want the prompt to appear and c is the maximum number of characters permitted.

Program Listing

```
5000 DEFPROC INPUT(x,y,c)
5010 PRINT CHR$(1);CHR$(WHITE); @ x,y;CH
R$(30);P$;" :- ";CHR$(1);CHR$(GREEN);
5020 LET I$="",F=0
5030 REPEAT
5040   LET G$=GET$
5050   IF ASC(G$)>31 AND F<c THEN  PRINT
 G$;
5060   IF ASC(G$)=8 AND F>0 THEN  PRINT
G$;
5070   IF ASC(G$)>31 AND F<c THEN  LET I
$=I$+G$
5080   IF ASC(G$)=8 AND F>0 THEN  LET I$
=LEFT$(I$,F-1)
5090   LET F=LEN(I$)
5100 UNTIL G$=""
5110 ENDPROC
```

S.French

PIE PROGRAM by E EVE

```
10 REM USING THE DATA STORE TO HOLD DATA
20 REM FOR DRAWING PIE-CHARTS
100 EXT VRESET
110 PROC INITIAL
120 REPEAT
130   PROC CHART
140 UNTIL Y$="N"
150 EXT VRESET
160 END
170 DEFPROC INITIAL
180 DIM I(7),V(6)
190 LET I(0)=RED,I(1)=GREEN,I(2)=YELLOW,
I(3)=BLUE,I(4)=WHITE,I(5)=MAGENTA,I(6)=C
YAN,R=50,I(7)=RED
200 EXT WIPE 1
210 PRINT "Please Wait";
220 FOR I=0 TO 360
230   EXT STORE 1,R*0.85*COS(RAD(I)),R*S
IN(RAD(I))
240   PRINT ".";
250 NEXT I
260 ENDPROC
270 DEFPROC CHART
280 PROC INDATA
290 PROC DRAW
300 PROC ASK
310 ENDPROC
320 DEFPROC INDATA
330 FOR J=1 TP 2
340   CLS
350   PRINT "INPUT DATA FOR PIE-CHART NO
.";J
360   LET T=0,V=0
370   FOR I=0 TO 6
380     PRINT "VALUE ";I;
390     INPUT V(I)
400     LET T=T+V(I)
410   NEXT I
420   EXT WIPE J+1
430   FOR I=0 TO 6
440     LET V=V+V(I)
450     EXT STORE J+1,V*360/T
460   NEXT I
470 NEXT J
480 ENDPROC
490 DEFPROC DRAW
500 CLS
510 FOR J=1 TO 2
520   PRINT  @ 75*J-40,55;J;
530   PROC PIE(150*J-101,120)
540 NEXT J
550 ENDPROC
560 DEFPROC PIE(x,y)
570 FOR I=0 TO 6
580   EXT FETCH J+1,V(I)
590 NEXT I
600 EXT BACK 1
610 EXT FETCH 1,X,Y
620 LET C=0
630 FOR I=1 TO 360
640   EXT FETCH 1,U,V
650   IF V(C)<=I THEN  LET C=C+1
660   IF I<360 THEN INK I(C)
670   PROTECT WHITE-INK
680   EXT TRIANGLE x,y,X+x,Y+y,U+x,V+y
690   LET X=U,Y=V
700 NEXT I
710 ENDPROC
720 DEFPROC ASK
730 PROTECT BLACK
740 INK WHITE
750 LET Y$=""
760 PRINT  @ 3,235;"Another pair of pi
? (Y/N)";
770 REPEAT
780   LET Y$=GET$,Y$=UPC$(Y$)
790 UNTIL Y$="Y" OR Y$="N"
800 ENDPROC
```

"SPLASH"

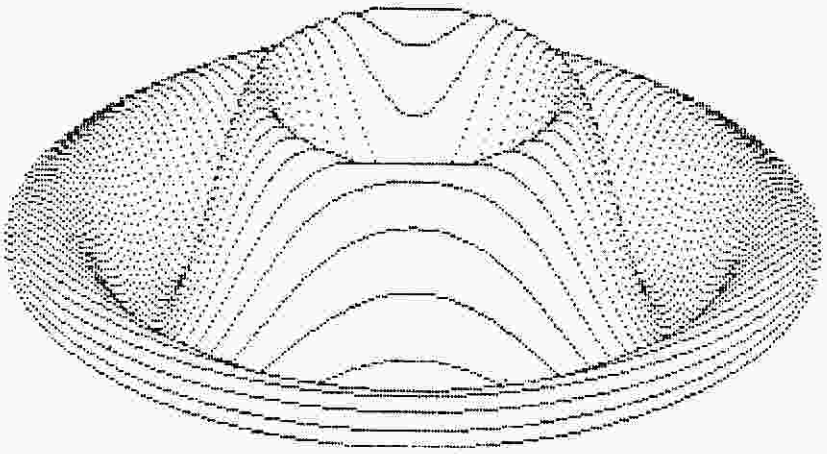
This is adapted from a program for the ZX81 in a magazine, it does however take about 10 minutes to draw.

```
5 TEXT
10 LET H=255
20 LET V=127
30 LET D=H/2,d=D*D,E=V/2,e=V/4
40 FOR B=0 TO D
50   LET b=B*B,M=-E
60   LET A=SQR(d-b)
70   FOR I=-A TO A STEP 5
80     LET S=SQR(b+I*I)/D
90     LET F=(S-1)*SIN(S*12)
100     LET f=I/5+F*e
110     IF f<=M THEN  GOTO 160
120     LET M=f,f=E+f,X=D-B,Y=(3*f)-75
130     DOT -X,-Y
140     LET X=D+B
150     DOT -X,-Y
160   NEXT I
170 NEXT B
180 END
```

Alternative formulae to try, for line 90:-

```
    F=EXP(COS(12*S)    or
    F=(S-1)*COS(S*12)
```

5 J SAWYER



RENAME FACILITY

When running a program containing variable values, it is best to retain the original as backup. This program autoruns when loaded ,and increments the serial number when saved, keeping the new variable etc., for use next time. Three characters are allowed for the name, but more may be used if the POKEs are increased accordingly.
When first used,or if the program is amended, enter the value of Z required, and GOTO 100 (this may form part of the program).
Please note:- Use MLOAD to recall , do NOT mix other lines before line 150.Acknowledgement to MILUG.
A. HANSON.

```
100 CODE EB 21 F6 61 E5 2A 1F 62 E5 21 0
0 00 C3 FF 3E 00
110 LET M=ASC(STR$(Z DIV 10))
120 LET N=ASC(STR$(Z MOD 10))
130 REM "XXX01"
140 POKE &69AA,M
150 POKE &69AB,N
160 VDU 4,24
170 PRINT  @ 20,50;"SAVED AS XXX";CHR$(M
);CHR$(N);
180 CALL LCTN(100),LCTN(130)
190 PRINT  @ 20,70;"XXX";Z DIV 10;Z MOD
10;" LOADED ";
200 LET Z=Z+1
210 PRINT  @ 20,90;"XXX";Z DIV 10;Z MOD
10;
220 PAUSE 50000
230 VDU 25,4
```

LYNX with CP/M 2.2

Suppose you had a games disk with a menu program called GAMESMEN.BAS which you wished to run from a cold BOOT. Normally after BOOTing, you would type in MBASIC GAMESMEN, for anyone used to CP/M, this is ok. But if it is a first time user, then it can get a bit confusing, so the trick I use, is to use DDT to patch in the commands into the CCP & therefore fool it into thinking they have been typed in.

STEP 1 USE SYSGEN to load a clone CBIOS
eg. A>SYSGEN <RETURN>
SYSGEN ver 2.2
Source Drive name (or RETURN to skip) A
Source on A, then type <RETURN>
Function completed
Destination Drive name (or <RETURN> to reBOOT)
then save the clone CBIOS:-
A> SAVE 34 AUTOSYS.COM <RETURN>

STEP 2 USE DDT to bring AUTOSYS.COM back into TPA & then find the DIGITAL RESEARCH copyright notice.
eg A>DDT AUTOSYS.COM <RETURN>
Then use the D command until you see the word "COPYRIGHT" on the right-hand side of the screen, this is around &0998

STEP 3 The start of the CCP is &0980, count 8 bytes from the start of the CCP, eg. &0987 & use the S command to set the zero byte there, to the number of characters in the command line. Eg. &0F for the command line MBASIC GAMESMEN.

STEP 4 Then starting at the next byte, set the next 15 bytes (for our command line) to the ASCII HEX codes for the desired command.
eg For MBASIC GAMESMENU
4D 42 41 53 49 43 20 47 41 4D 45 53 4D 45 4E
Then put &00 into the next byte, (to signify the end of command line).

STEP 5 Leave DDT with a CRTL-C

STEP 6 Now save patched code:-
eg Save 34 AUTOSYS.COM

STEP 7 Then use SYSGEN to move your patched code to the tracks 0 & 1 of your disk, answering <RETURN> for Source & A for Destination!

Auto loading menus is not the only use for this technique, I often use it to place passwords on disks for security with accounting programs under CP/M. (Ed. With the UTILITY DISK 1, the above is very easy!).
R K DAVIS

128K SERIAL PORT from BASIC

This program illustrates how to get serial data into the 128K, via BASIC. The most obvious method of sending serial data is by using "LPRINT". An explanation of the code held in line 50 then follows.

Line 10 sets the Baud rate to 9600.
Line 20 sets it for no parity.
Line 30 sets for 8 Data Bits.
Line 40 sets two Stop Bits.

```
10 SERIAL 4,9600
20 SERIAL 5,0
30 SERIAL 6,8
40 SERIAL 7,2
50 CODE FD 21 75 69 CD EC 5F 2F B7 67 CC
 72 69 6F D0 26 FF C9
60 CALL LCTN(50)
70 IF HL)=255 THEN PROC ERROR
80 ELSE PRINT HL,CHR$(HL)
90 GOTO 60
100 DEFPROC ERROR
110 IF HL=65535 THEN PRINT "NOT READY"
120 IF HL=65281 THEN PRINT "FRAME ERROR"
130 IF HL=65282 THEN PRINT "PARITY ERROR"
140 ENDPROC
```

The disassembly of line 50 follows:-

```
FD 21 75 69   LD IY,&6975   ;Serial I/O parameter
                            ;block
CD EC 5F      CALL &5FEC    ;Get serial I/P status
2F            CPL           ;Test ready
B7            OR A          ;status
67            LD H,A        ;Save status in H
                            ;(FF=Error)
CC 72 69      CALL Z,&6972  ;Ready so get data
6F            LD L,A        ;Return data in HL
D0            RET NC        ;Return, no data errors
C9            RET           ;Finished
```

I hope this will be of interest to 128K owners.
R Albone.

BOOKSHELF

Two new books to add to your collection, the first is one I recently acquired, which I found to be a very readable book on FORTH. This covers the subject from the beginning, and throughout compares FORTH with similar actions in BASIC and PASCAL. This does make for easy understanding of the language. The second book is really for those of you who require a definitive introduction to the topic of computer generated graphics, and offers algorithms for items like circle routines, pixel filling etc. Not really for the absolute beginner.

‡ FORTH for MICROS
by Steve Oakey. Publ. by NEWNES. Approx. £6.95
‡ Fundamentals of Interactive Computer Graphics.
by J D FOLEY & A Van DAM. Publ. by ADDISON WESLEY No. ISBN 0-201-14468-9. Price £22.95

FORTH FORUM No 3 by M LEIGH
****

For the experimenters.

For those who would like to try a hand at drawing/filling circles, here is SQR which I promised (adapted from Subset PCW Sept. 83.):-

```
CREATE SQR CODE D9 E1 11 40 00 7D 6C 62
                06 08 B7 ED 52 30 01 19
                3F CB 12 B7 ED 6A B7 ED
                6A 10 F0 17 6A 5C 57 60
                AF ED 52 19 30 01 23 E5
                D9 NEXT
```

HELPFULL HINTS

Random Numbers:- Computers Forth does not provide a random number generator, CBS-Forth provides two words, RND £ (£ = hash sign) which pushes the address of the 32 bit random number seed to the stack (may be used to seed the random number generator or fetch a 32 bit random number), and RND which calls the random number generator from the ROM and places random number in the range 0 - 65535 on the stack.

It may be useful to define RAND whose action will be to place a random number in the range 0 - n as follows :-

```
: RAND RND SWAP MOD  ;thus 8 RAND will give a
                       number in the range 0 - 7 for
                       setting random ink and paper
                       colours etc.
```

Crash recovery:- One of the major problems of programming in Forth is the ease with which a program can crash.

The usual causes are:-

a) Stack overflow (eg a missing DROP).
b) Return stack corruption (words >R and R> not paired).
c) Infinite loops.
d) Machine code routines which are "bug" ridden.

Depending on how much damage has been done a WARM restart may be possible. The folowing code will allow SHIFT ESC to halt a CBS-FORTH program in much the same way that ESC works in BASIC.

```
HERE CODE D9 01 80 00 ED 78 FE 3F D9 C2
          2C 63 01 37 73 C3 2C 63
CREATE ESCON CODE FD 21 , NEXT
CREATE ESCOFF CODE FD 21 2C 63 NEXT
```

ESCON will set the break facility (and slow down processing) and ESCOFF will reset to normal.

Backup Copies:- The following code may be used as an alternative to MLOAD or R in order to load and sucessfully run CBS-FORTH programs which have been saved with AUTOSTART without needing to pre-load FORTH from the master tape (use AUTOSTART <RETURN> to make a backup copy of the original tape or save a partially complete program). Enter the monitor and type:-

```
M 7000 21 07 63 FF 13 CD 78 3F <RETURN>
```

Then type:-

```
G 7000 "program name" <RETURN>
```

And set tape recorder to play.The program should load as if the you had first loaded the FORTH master tape and then used TAPE).

FORTH FILL
****

This is a program for providing a simple FORTH FILL routine and is written under CUB-FORTH, although it may be of use to other FORTH users. The routine makes heavy use of the stack for note making and so large shapes should be partitioned before filling. Failure to do this will crash the LYNX! However the routine will fill all shapes no matter how complex.

The routine is called PAINT, (see screen 4) and uses two variables, x and y which must hold the x and y co-ordinates of any point within the shape. It will FILL in any colour but only on a BLACK background, as this is only a general routine. I will leave it to other FORTH users to 'tailor' it to their own requirements, e.g. the paper colour could be passed as another variable and the routine told to ignore the colour bank or banks involved.

When the shape has been filled there is a short pause as the machine re-allocates the stack back to FORTH, because of this the routine is slow and cannot be used for fast action graphics. The value 42405 is only used as an end of stack marker and is purely arbitary, this is left on top of the stack when the routine finishes.

```
SCR   1
0       ( FORTH FILL ROUTINE)
1 0 VARIABLE x     ( x POSITION )
2 0 VARIABLE y     ( y POSITION )
3 : ONSTACK x C@ y C@ ;
4 : BELOW x C@ y C@ 1 - DUP y C!
5  POINT 0= ;
6       ( BELOW ROUTINE ) -->
7
SCR   2
0 : LEFT x C@ 1 - DUP x C! y C@
1 1 + DUP y C! POINT 0= ;
2     ( LEFT ROUTINE )
3 : ABOVE x C@ 1 + DUP x C! y C@
4 1 + DUP y C! POINT 0= ;
5     (ABOVE ROUTINE )
6 : RIGHT x C@ 1 + DUP x C! y C@
7  1 - DUP y C! POINT 0= ; -->
SCR   3
0     ( RIGHT ROUTINE )
1 : POSN x C@ 1 - DUP x C! y C@
2 DOT  DUP 42405 = NOT ;
3       ( DOT ROUTINE )
4 : FFILL BEGIN BELOW IF ONSTACK
5  THEN LEFT IF ONSTACK THEN ABO
6 VE IF ONSTACK THEN RIGHT IF ON
7 STACK THEN POSN WHILE y C! -->
SCR  4
0 x C!  REPEAT ;
1        ( MAIN FILL LOOP )
2  : PAINT 42405 FFILL ;
3         ( MAIN PROGRAM )
4
5         ( 42405 IS THE END OF
6 STACK MARKER FOR THE ROUTINE )
7
```

S.HAMBLETT.

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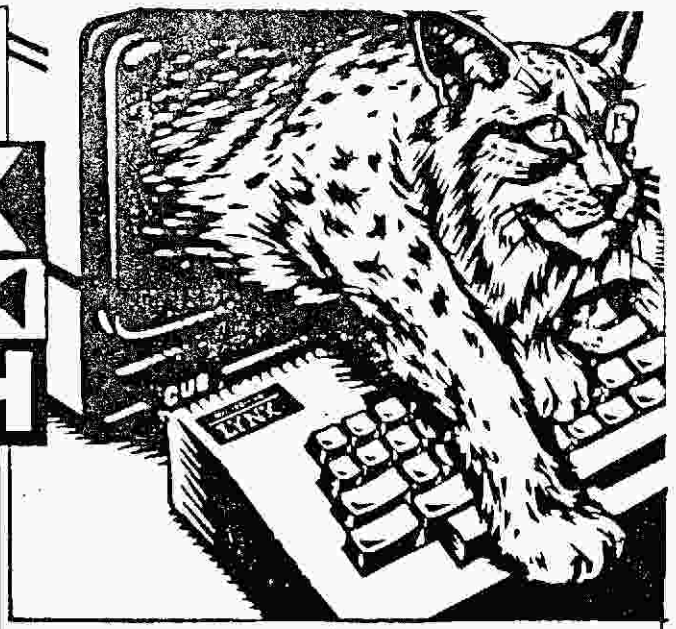
The Lynx, it seems, is set for a come-back and with it some new software.

LYNX GOES FORTH



Tony Eden looks at the latest version of FORTH from Cubsoft. .

For those of you who may not know, the Lynx will shortly be back in production (hopefully!), returning its name but backed by a new company. For the 12000+ owners of a Lynx this is good news as it means that software will continue to appear. This is borne out by a new implementation of FORTH produced by the Salford-based firm, Cubsoft.

And for those of you who are new to the word, FORTH is a programming language. It is advocated by its supporters as being superior to BASIC because it is much faster, easier to write, and uses less memory. It is particularly suited for applications which need speed, such as graphics and machine control (eg, robots).

Anyone who buys a home computer receives a manual which illustrates how to write simple programs and provides examples. The language used is always BASIC because it has become widely accepted. However if you only use this then you may become competent in BASIC but you will remain bereaved to the range of the computing world. Once you have mastered BASIC then FORTH is a good stepping stone to wider horizons because it works in an entirely different way.

Once you have mastered BASIC then FORTH is a good stepping stone

The essence of FORTH is the word. The word is either already defined such as PRINT, or you make it up yourself and instruct the machine what to do when the word is encountered. An example is VAT. If you wish to calculate the VAT then in FORTH you define the word VAT along the following lines:

```
: VAT 15 * 100 / . ;
```

':' shows that a word definition follows, '*' and '/' mean the same as BASIC except that they follow the numbers. '.' means print the result ';' means the end of the definition.

To find the VAT you just enter the number followed by the word (eg, 80 VAT displays 12, the result). You can add this word to the dictionary of defined words and it is always ready for use. In particular you can include this word in any other word definitions and build up a program that consists of such words. This is one of the great advantages of the FORTH language.

FORTH already exists on the Lynx under the Camsoft label. For the Cubsoft effort to be worthwhile it has to be a better job. Is this the case? The answer is an unqualified yes. It is obviously impractical to go through all the syntax and compare the two so a few examples must suffice.

EDIT Standard FORTH has 20 commands for editing the 11 "screens" of 16 by 64 characters and the keyboard buffer. On the Lynx implementation the keyboard buffer is 80 chars and only the backspace key has a function. If the line is altered its contents are wiped from the buffer and mistakes can only be rectified by retyping the line. As the display is 40 chars, each 64 char screen line occupies two display lines creating some awkwardness.

In this new version the keyboard buffer is arranged as 6 by 40 char lines with arrow keys useable. The screens now number 37, each with 8 lines of 30 chars. These screens are used as an extension of the keyboard buffer and, in effect, hold the whole program on RAM disk. There is even a master response situation to ensure that you only complete changes you wish to accept.

Cubsoft have produced a good implementation which offers several advantages

The Lynx has 128 user-definable graphics (UDG) chars stored from location FC00. Each character is bit-defined over a ten byte storage area. This is tedious to use. With Cubsoft the UDG are particularly easy to use. The desired bit representation of the character is given in hex, preceded by the name:

```
UDG DIAMOND 00 00 04 0E 1F
            0E 04 00 00 00
```

To call up the character simply enter the word Diamond.

Lynx FORTH has no random number generator whilst here we have two, a 32 bit number which can act as a seed or a number, and a function (RND) which places a number between 0 and 64K on the stack.

Cubsoft have produced a good implementation which offers several advantages over the Lynx version. Quibbles were minor with the exception of the documentation (where have we heard that before?). The 40-page booklet provided was well written and produced and was a complete reference to all the functions implemented, but not a single example of their use in sight. I accept that to include examples would have more than doubled the size and hence put up the cost but who minds paying an extra pound or two if it saves hours of trial and error?