

COMPUTERS LYNX USER

The magazine for LYNX micro owners.

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OCTOBER 1983

THE 128K LYNX—MIXING BUSINESS AND PLEASURE

The 128K Lynx Professional micro made its first public appearance at the Personal Computer World Show in London. Priced very competitively at £445 including VAT, the 128K has been designed with the business and educational markets in mind.

The primary attraction of the 128K machine to the small businessman is its ability to run CP/M software, which demands 64K of user RAM. CP/M has now become the industry standard for business software, and a wide range of programs can be bought.

The 128K's memory is essentially arranged in a similar fashion to that of the successful 96K Lynx. 37.5K of the RAM is directly accessible in Basic, while an additional 24K can be accessed via machine code, or used as a data store for Basic programs. The remaining 64K is allocated to video RAM—twice the amount of video RAM found in the 96K machine. The size of the ROM rises to 24K, which includes some enhancements to the Basic.

The reason for the size of the video RAM is simply that CP/M requires an 80-column text display. The increased video RAM doubles the Lynx's horizontal resolution, which permits the increased display width.

Another refinement to be found on the 128K Lynx is the 6MHz Z80B chip. This is a faster version of the renowned Z80A, and will allow Basic programs to run approximately 35 per cent faster as far as logic and arithmetical functions are concerned.

The 128K will be equipped with a new serial port that includes a full 'handshake'. The idea behind this innovation is that it allows the Lynx to be used as an intelligent terminal to a mainframe

96K IN DIXONS

The range of dealers from whom Lynx equipment is available is growing all the time. Dixons, the major High Street consumer electronics chain, are to stock the 96K Lynx during the autumn.

The 96K, which has been described as '90 per cent of a BBC-B for a £100 discount', will be on sale at 50 selected Dixons outlets. This model is also being sold by the other two High Street chains, Laskys and Spectrum dealers.

computer. Business users in particular will find that this is a major advantage.

The new port will also serve to widen the range of printers that can be used with the Lynx.

Other modifications to the Lynx's circuitry will improve the machine's capability of saving and loading from cassette.

It will be possible for owners of 48K or 96K Lynxes to upgrade their machines to full 128K specification, but, at the time of going to press, no firm price for the upgrade had been fixed.

Prince faces tough training on Lynx

The Times

This headline had us leaping through the files to see whether a guarantee card had been received from Buckingham Palace. But we should have known better—nobody could describe training on the Lynx micro as 'tough'. In fact, the headline refers to Prince Andrew's impending training course on Lynx helicopters.

DISK DRIVES

Lynx owners will soon be able to abandon the Heath Robinson approach of loading and saving software via a cassette recorder. Dedicated disk drives will shortly make their appearance in the shops.

The basic unit will run single-sided, double-density, 40-track, 5¼" 'floppies', each of which will hold 250K of unformatted storage space. The price tag will be £343.85 inclusive of VAT. That price includes the disk controller.

Up to three additional units can be run from the same master unit. They simply plug into one another. The add-on units will retail at £228.85.

A FRIEND IN NEED...

It looks as though the high technology explosion will finally bring some relief to the disabled—thanks to the Lynx.

A device called Helpmate has been developed that allows the deaf and dumb to 'talk' to another person anywhere in the country. The Helpmate is housed in a small unit with a typewriter keyboard and a display capable of carrying 36 characters. The user types out his message which can then be relayed to the recipient, either in visual form or via a voice synthesiser. The message travels through a telephone connection, to a Lynx, installed in a central control point which would be used to switch lines and activate systems.

A REMOTE CONNECTION

Although the 128K Lynx is being billed as Computers' business machine, even the 48K version is finding applications outside the home.

Fidelity PLC, a London-based electronics firm, is using a 48K Lynx in the manufacture of its new Wanderer cordless telephone. The Wanderer is the only cordless telephone approved for connection to British Telecom's network.

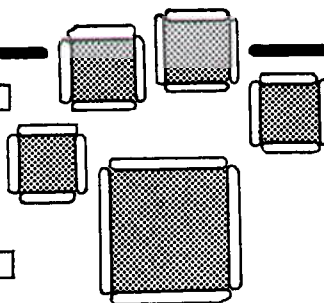
The Lynx has been used as an intelligent controller to supervise part of the manufacturing process. Its use was necessitated by the stringent operating characteristics demanded by British Telecom.

JOYSTICK CONTROL

The arrival of Power Blaster, the very fast machine code game written by Romik's programmers, has emphasised the need for joystick control on the Lynx.

In fact, this is already available through your local Lynx stockist. It comes in the form of an interface pack which slots into the expansion bus at the back of the computer. Once this is in position, any Atari-compatible joystick can be used, although Computers recommend the DiscWasher Pointmaster unit. The retail price of the joystick interface is £14.95.

LYNX



The list of software for your Lynx is expanding all the time. All 48K titles will run on the 96K Lynx, so you can upgrade your machine and take your software with you.

- CONNECT 4** £4.95
Friendly and fun!
- DAM BUSTER** £6.95
For flying aces
- GOBBLE DE SPOOK** £9.90
The amazing chase
- HANGMAN** £7.95
Spell right and hold tight
- LYNX INVADERS** £9.90
Defeat them if you can!!
- MOONFALL** £7.95
A test of astronautic skills
- MONSTER MINE** £7.95
Outwit the hungry monsters of the mine!!
- NUMERONS** £9.90
Educational and fun!!
- POWER BLASTER** £9.90
The Universe is at war—your chance to save it
- SULTAN'S MAZE** £7.95
Find the rubies in the maze
- 3D MONSTER CRAZE** £9.90
Find the keys to success along the treacherous corridors

COMING SOON—**LYNX MUSIC MASTER**, learn to compose your own melodies!!

ALL TITLES ARE AVAILABLE FROM YOUR LOCAL LYNX DEALER—INCLUDING LASKYS AND SPECTRUM SHOPS—OR DIRECT FROM US

ORDER FORM

GAME	QUANTITY	PRICE

Please send order to:

CAMSOFT, 33a Bridge Street, Cambridge, CB2 1UW

Total cheque/PO. enclosed (cheque payable to Camsoft Ltd)

WARNING: These programs are sold according to CAMSOFT Ltd's terms of trade and conditions of sale.

NAME
ADDRESS

MOONFALL

Camssoft
£7.95

You have to land a lunar module on the surface of the Moon, using your thrusters to brake your descent and to position the module so that it lands on flat ground rather than rocks.

The variable factors are your altitude, your speed of descent, your fuel load, your engine temperature and your position relative to the ground.

The Lynx's excellent graphics are used to good effect in this game. As you near the lunar surface the screen jumps to a 'close-up' so that you can pick your landing site among the rocks. The displays of the variables have an authentic look, and allow you close control of the module. But unless your co-ordination is very good, you will undoubtedly find it difficult to make a safe landing.

NUMERONS

Camssoft
£9.90

This is an educational game that doubles perfectly happily as pure entertainment.

Using a Space Invaders scenario, the player must shoot down 'invaders' which are each marked with a number. They can only be destroyed by firing the correct number, and the skill comes in the speed with which the player can mentally work out which is the correct fire button.

The graphics are very pretty, and there are options of either Night or Day, and also single- or double-height images. The sound effects are a little thin, but no doubt some would argue that the last thing you need when you are feverishly trying to perform enormous feats of mental arithmetic is a whole lot of noise.

Unless you have a mind like a computer, the higher skill levels of Numerons are extremely difficult. No doubt, after years of play you will become adept enough to reach these distant realms. Your reviewer, who needs pencil and paper for all but the smallest sums, found it rather embarrassing to play Numerons while there were children present. The children, on the other hand, found it very absorbing.

GEMPACK IV

Gemsoft
£7.95

Two games for the price of one, both written in machine code.

In Sea Harrier, you are the pilot of a plane attempting to land on an aircraft carrier. The problem is to avoid going through clouds which damage your plane. You have chemical bombs which will disperse the clouds, but then you risk 'dispersing' the aircraft carrier, too.

It's a very simple game, but the speed of

the plane makes it extremely difficult to land. A high degree of manual dexterity is called for even at the lowest skill level. The higher the skill level the less bombs you are given, and the less likely you are to make it to the carrier.

Sub Chase goes to the opposite extreme. You are the captain of a destroyer, and you have to fire depth charges at submarines which are equipped with missiles. The subs travel at a snail's pace, as do the depth charges and the missiles. The destroyer wouldn't win any prizes for speed either. If the sub is cruising along the ocean bed, you've got time to put the cat out before the depth charge is likely to make contact.

The skill factor is your ability to judge the relative speeds of the depth charge and the sub, and, curiously, it is quite difficult. The game is not so much slow as inexorable.

MONSTER MINE

Gemsoft/Camssoft
£7.95

You have to escape from a maze-like mine inhabited by hungry monsters, and collect as much money as possible on your way. You cannot afford to take too long because there is a time limit on your escape. If you exceed it, you will be trapped in the mine, and become 'Dish of the Day' for the monsters.

A simple concept, but one that requires a considerable degree of manual dexterity if you are to avoid the clutches of the monsters for any length of time. Each time you manage to escape from the maze you are offered the chance to 'chicken out' and keep your money, or have another go and risk getting eaten next time around. If you get out more than three times, the monsters triple their speed which makes life rather more exciting. There is a facility for 'saving' your high score on tape, if you really think you've done well.

This machine code game is probably the simplest and most addictive of the Gem software for the Lynx.

POWER BLASTER

Romik/Camssoft
£9.90

Far and away the fastest of the games under review here, Power Blaster has been written by Romik, one of the most professional software houses in the business.

Your task is to clear away bombs that are constantly being laid by Martians. You can only move inside the 'maze' when your path is free from bombs. You score points for the number of bombs you clear, and your score decreases as soon as you stop shooting or remain stationary. You must also avoid contact with the Martians themselves.

There are nine skill levels, the highest of which seems to be the domain of the genuinely addicted games player—who else could possibly wish to be comprehensively destroyed every two seconds? Mere mortals who have over-reached themselves can resort to using the Hyper-space facility which removes the threat of certain destruction—temporarily.

This game has been written for joystick control, but the player can just as simply employ the arrow keys.

SULTAN'S MAZE

Gemsoft/Camssoft
£7.95

The Sultan of Baghdad—no less—has dropped his jewels in Hampton Court Maze. Your task is to find them, while avoiding the Ghost who also inhabits the Maze.

You have access to a map of the Maze, but whenever you use it you lose energy. On the lower skill levels you are allowed to jump through hedges—an activity that would bring dire consequences, were you to do it in the real Hampton Court Maze.

The Gemsoft writer has coped pretty well with the graphics and introduced some clever perspectives, and the whole thing hangs together well. The response time is fast, too.

SPACETREK

Quazar
£4.75

The Star Ship Enterprise roams the sectors of the known universe, seeking and destroying Klingons, and refuelling from Star Bases which are dotted at random in Space.

Aided by long and short range scanners, a battery of phasers and photon torpedoes, you are required to boldly roam . . . and roam . . . and roam. In fact you have to roam for what sometimes seems like light years before you come upon a Klingon. Naturally this makes you all the more keen to blast the thing out of the heavens.

But sometimes even a photon torpedo won't have any effect on the Klingon. If this occurred in the TV series, Kirk would simply instruct Mr Spock to warp into hyperspace and the little local difficulty would be overcome. True to form, the writer of this game gives you the same option.

There are various points in this game where unexpected things happen, but the instructions warn you about this. It would be uncharitable to suggest that random occurrences are anything other than intentional.

More software news
on page 20 . . .

LOADING AND SAVING ON LYNX MICROS

One very common enquiry at the Camssoft office is 'How do I get my Lynx to LOAD and SAVE?' Well, here are a few tips and hints to help you.

One common error is plugging in the leads the wrong way round. In order to check that your leads are plugged in correctly you should make sure that the tape recorder is outputting to the Lynx and then press escape. If the cursor returns, the leads are correct; if not, swap the plugs around and try again. This routine should work because you can only escape while the computer is loading information from the tape recorder.

There is no catch-all answer to the problem of finding the correct volume setting. In our experience the Lynx will accept from half to maximum volume from most cassette players, with the tone on high.

Test

Make sure that you use the correct baud rate; use the command TAPE n where 'n' is a number between 0 and 5 given on the tape or cassette box.

If you still have no luck, then you should play with the volume and tone controls. One way to test these controls is to listen to a saved program from the start. A high pitched squeal will be the first sound emitted, then there will be a short gap and then the 'squeal' will continue. This is called the program 'header', and it should produce a name on the screen when loaded properly. It is a good idea to set the tape counter to zero just before the header and then play the tape to the computer. If no name appears and the counter has passed the header, start again trying a different volume and/or tone setting.

The header is the only part of the recording by which the computer can indicate to you whether or not it is reading the program.

The last, but extremely important point, is that there are two different types of cassette player available. The first type will save information on tape and read it back, giving the same wave form. The second type will save a program but on playback will give an *inverse wave form* which might not work on other tape players. This is why some tapes will load on some tape recorders and not on others. To avoid this problem all Camssoft tapes have been recorded on both sides of the cassette at different recording levels. So

if one side does not load on your tape recorder, try loading the other.

Saving

To SAVE a program, check the leads are correct; it is better to use the MIC socket rather than the AUX.

Place the tape in the player, and wind it on past the red leader tape. Save the program in the computer by typing SAVE "PROGRAM NAME" and then press PLAY and RECORD on the cassette player, and then press RETURN on the computer.

When the SAVE has finished—i.e. when the cursor returns to the screen—listen to the tape to make sure a good signal has been saved. VERIFY the saving, before dismantling the computer/recorder set-up.

Do not store tapes in a place where magnetic fields might effect them; areas especially to watch are around a T.V. or monitor, power transformers and loud speakers.

CASSETTE RECORDERS

The following is a list of cassette tape recorders that have performed well when harnessed to the Lynx:

Elftone EL 8019 (Compucorder)
EL 8025

Dixons TR 30
TR 12

Bush 3150
Sharp RD 610X
RD 620E

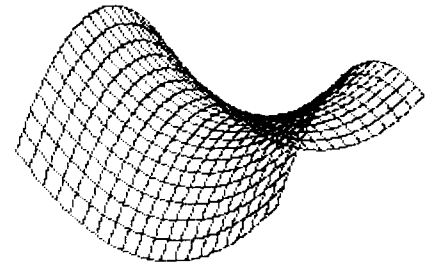
Ferguson 3T27
Panasonic RQ 8200
C 2120
Slimline

Sony TCM 121
TCM 3

Binatone Piper (Mini Cassette)
W H Smith CCR 800
Tensai CR106
Radio Shack CCR 81

In particular we recommend the **Elftone EL8019** Compucorder. The **Dixons TR30** comes a close second.

Our thanks to all those users who responded to our call for recommendations.



WANTED—PROGRAMMERS

Camssoft, the software offshoot of Computers, is looking for writers to produce programs for the Lynx series of micro-computers.

Games software for the Lynx is now on the market, and Camssoft are now trying to encourage programmers to come up with educational and business software.

On the educational side, they would be happy to hear from anyone who has written, or is thinking of writing, any of the following: Spelling, Mathematics, General Knowledge, Astronomy, Car Mechanics, Household Accounts, Geography, History, Language Learning.

For the business list, they are looking for the following types of software: Bank Account, Office Accounts, Address Book, Telephone Directory, Stock Control, Invoicing.

The Lynx user base is growing all the time, and the expected Christmas hardware boom will inevitably be followed by increased demand for software. Another advantage of writing for the Lynx lies in the machine's 'expandability'. Owners of 48K Lynxes can upgrade their machines without having to scrap the software they

have already bought. This will increase the likely sales figures by a significant amount.

Initially there was some criticism of the slow screen handling on the Lynx. However, as people become better acquainted with the micro, it has become apparent that there are all sorts of ways of improving the speed, while still maintaining the very attractive high resolution graphics.

The Lynx is a subtle animal. Those who take the trouble to understand its fairly unusual modes of operation generally conclude that it is capable of much more than they first realised.

First step

If you are interested in writing software for the Lynx, your first step is to send details of your plans to Camssoft at 33A Bridge Street, Cambridge CB2 1UW. If they think you are barking up the right tree they will do all they can to help you. And, what's more, they will take all the hassle of distribution off your plate while still paying you a fair royalty on tape sales.

SNOWBALL

at £9.90 is the ultimate adventure for:

BBC 32K COMMODORE 64 SPECTRUM 48K

LYNX 48K NASCOM 32K ORIC 48K ATARI 400/800 32K

Snowball is a massive adventure with over 7000 locations. it took nine months to perfect and marks a new leap forward in adventure games - it has a detailed, planned background and is set aboard a huge starship that would really work. Snowball could be a glimpse of the future!

You play Kim Kimberley, security agent. Your mission is to guard the colony ship Snowball 9 from sabotage.

Thus when your freezer-coffin wakes you with the Snowball still in flight, you know that something must be very wrong. You're weakened and disorientated by lengthy hibernation, but the fate of the 5 mile long space-ship is in your hands!

Snowball is our new fourth adventure. Here's what the reviewers said about the first three:

"The descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine... The booklet supplied with each program is very helpful. Extensive information is supplied about the game scenario... The Level 9 programs are great fun to play, and plenty happens to keep you bemused and amused for hours on end"

- *Which Micro & Software Review, August*

"A minor miracle of programming" & "An impressive suite of adventures. They are always a pleasure to play"

- *Popular Computing Weekly, 12 May & 23 June*

MIDDLE EARTH ADVENTURES

for the same micros as Snowball.

Each of these games has over 200 locations and a host of puzzles. They can be played singly or together as an impressive trilogy. Each game could well take months to solve!

1) Colossal Adventure

The classic mainframe game "Adventure" with all the original puzzles plus 70 extra rooms.

2) Adventure Quest

An epic puzzle journey.

3) Dungeon Adventure

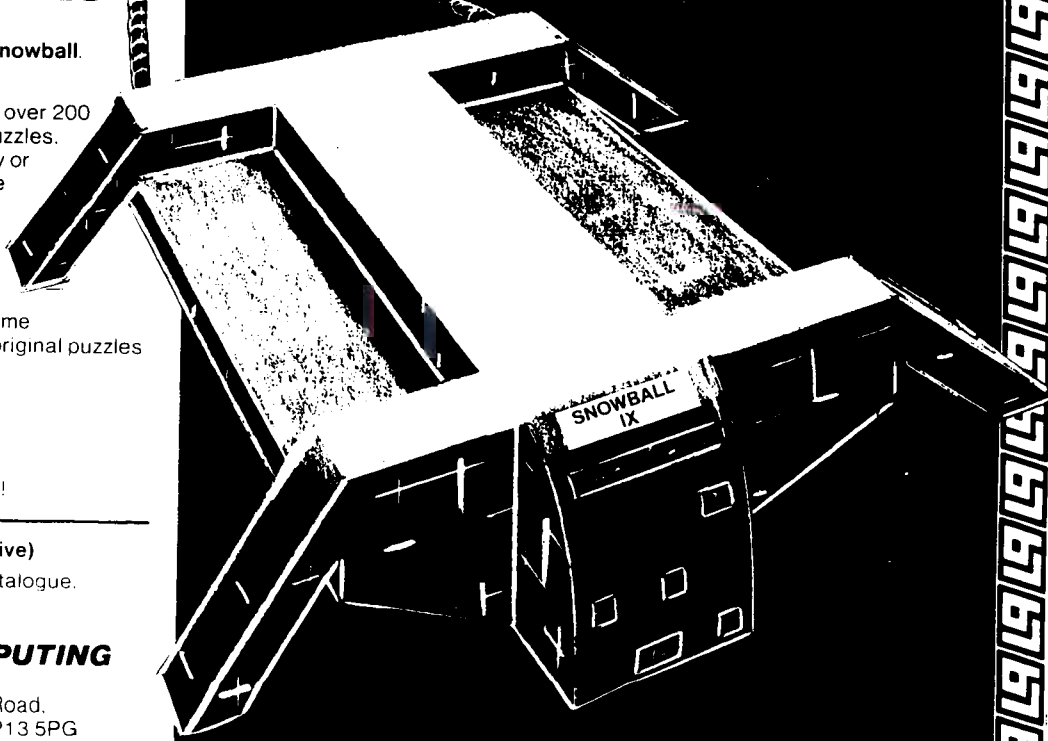
Over 100 puzzles to solve!

Price: £9.90 each (inclusive)

Send order, or SAE for catalogue, describing your micro, to:

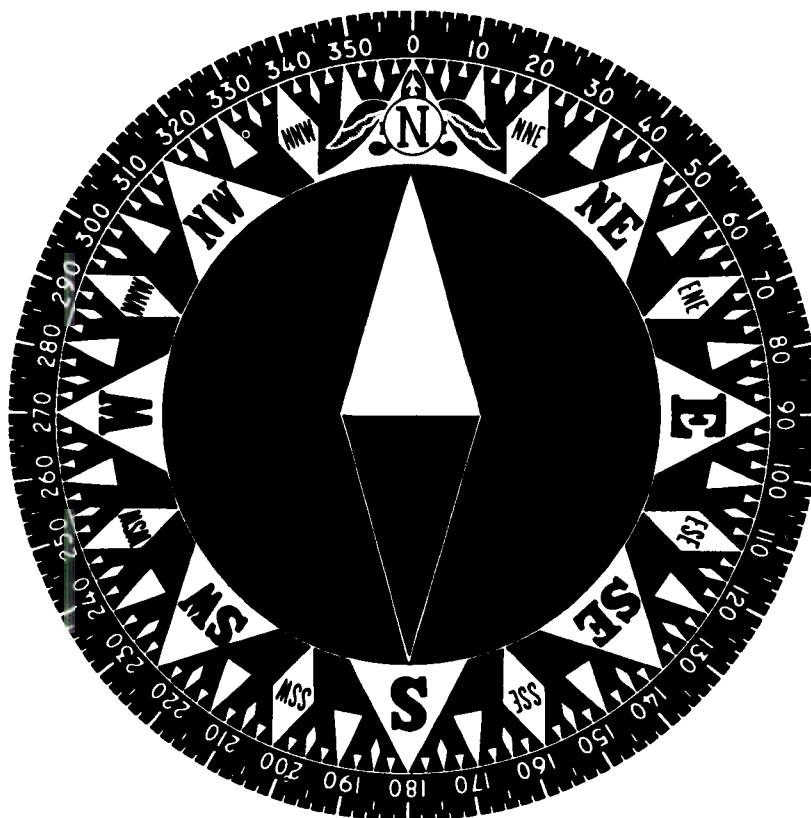
LEVEL 9 COMPUTING

Dept X, 229 Hughenden Road,
High Wycombe, Bucks HP13 5PG



COMPASS

Points the RIGHT way to machine code



At £15 inclusive, COMPASS (short for Compression Assembler) is simply the best assembler that you can buy for the Lynx. Here's why:

- ★ COMPASS is a full Z80 assembler, providing all the opcodes, plus the standard "pseudo-ops" (DEFB, DEFM, DEFS, DEFW, EQU and ORG), plus extra ones for conditional assembly, turning listing on/off within the program, and defining an address for the G command.
- ★ COMPASS provides source compression. With other assemblers you would soon run out of memory, but COMPASS holds the source text in a compacted form that only uses half as much space. Your program can be twice as big with no problems, and loading/saving is twice as fast!
- ★ And source compression is just the beginning. . . The cassette contains a copy of standard COMPASS, running in normal memory, and using about 8K of memory space. But it also contains a special version that runs mainly in the alternate green bank – Lynx memory that is otherwise unused. **This version only uses 256 bytes of your valuable memory space!** Both COMPASS versions use the same source format so you can switch to the special one as your program grows, and carry on working. You really are getting something for nothing!
- ★ Standard COMPASS is super-fast, assembling about 3000 lines per minute. The special banked version is not quite as speedy, but manages a respectable 500 lines per minute.
- ★ COMPASS also provides: find/find-and-replace commands; hex/decimal/character data types, label names up to 80 characters long, full descriptive error messages and checksums to protect you against rogue programs.
- ★ COMPASS comes with a comprehensive 25 page manual and a concise summary card.
- ★ COMPASS costs £15, runs on the 48K or 96K Lynx, and is available mail-order from Level 9 Computing, and from good Lynx dealers (please pester your Lynx dealer until he contacts us if he doesn't have a copy!)

LEVEL 9 COMPUTING

Dept X, 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

GETTING DOWN TO BUSINESS

Having recently purchased one of your excellent Lynx 48K computers, I would like to congratulate you on achieving exceptional quality, low price and a machine that is simple to use, all in one go.

I find Lynx User irons out many difficulties of the sort that inevitably occur when you produce a manual for a sophisticated piece of hardware such as the Lynx.

The magazine not only appeals to the computer-ignorant, such as myself, but also to the more informed and experienced user.

I run a small business and I have bought the computer because I feel it will be able to help me with the myriad tasks that the business entails. In particular, I eagerly await the production of software that will enable me to run graphics through the computer. I am a graphic designer, and I need to be able to produce pie-charts, graphs, 3D cutaways and the like. As far as I can see, the Lynx offers very real competition to the well-known 'fruit' computer that has found so much favour in my sector of industry.

R Bell
Sheffield

REGISTER TWEAK FOR STABLE DISPLAY

Lynx users who have experienced difficulties in obtaining a stable TV picture may benefit from my solution to the problem.

I have a Grundig 1644 colour unit with an automatic self-seeking tuner. On power-up of the Lynx, the TV picture would cycle vertically. With no access to a manual vertical hold or tuner knob, it wasn't long before the situation became very frustrating.

However, by judicious use of two of the registers (R4 and R5) of the 6845 Cathode Ray Tube Controller, I managed to resolve the problem.

I simply modified the Vertical Total register (R4) until a reasonable picture was obtained. Then, keeping the value in R4 I altered R5 (the Vertical Total Adjust register) until the picture stabilised again. I devised a simple program to increment the contents of the register, with a suitable delay (in seconds) between each increment. The program was halted when a good picture had been obtained. I then examined the contents of the register and noted them down.

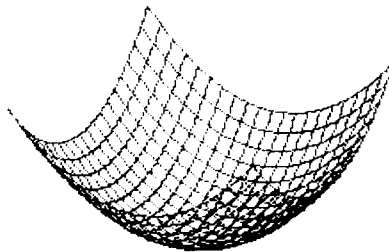
For my own TV, the following values produced an excellent picture: R4=77, R5=18.

B Markland
Bramhall
Cheshire

```

100 CLS
110 LET X=1.5
120 LET Y=7.5
130 LET C=COS(RAD(60))
140 LET S=SIN(RAD(60))
150 FOR J=-10 TO 10
160   PROC TPT(J*Y,-50*X)
170   MOVE P+125,-0+200
180   FOR K=-49 TO 50
190     PROC TPT(J*Y,K*X)
200     DRAW P+125,-0+200
210   NEXT K
220 NEXT J
230 FOR J=-10 TO 10
240   PROC TPT(-50*X,J*Y)
250   MOVE P+125,-0+200
260   FOR K=-49 TO 50
270     PROC TPT(K*X,J*Y)
280     DRAW P+125,-0+200
290   NEXT K
300 NEXT J
310 PROTECT GREEN
320 END
330 DEFPROC TPT(X,Y)
340 LET Z=-((100**2-X**2-Y**2)/
100-500)
350 LET P=X*C-Y*S
360 LET A=Y*C+X*S
370 LET Q=A*C+Z*S
380 ENDFPROC

```



Screen dump by R Penrose

MORE BATTERIES— LESS SPAGHETTI

Thank you for the Lynx User newsletter. I found it absorbing although I must confess that some of the topics were well beyond my understanding. Time, hopefully, will change that.

I am using a Tandy Realistic CTR58 tape recorder with my Lynx. The SAVE and LOAD operations work perfectly, even at TAPE 5 (2100 baud), when the recorder is powered by four AA penlight batteries. I am perfectly happy with this arrangement because the batteries last quite a long time. Also, it cuts down the number of mains leads that clutter up the place.

I tried two different mains adaptors from Tandy, one of which was specifically recommended for the CTR 58. Neither of them would work with my computer, even at the slowest baud rate, whatever the volume setting. I can only assume that there is an AC ripple playing havoc with the signals to and from the computer.

The remote control failed to work initially, but once I had transposed the wires in the jackplug, as recommended in Lynx User, there were no further problems.

Despite not having found a suitable AC adaptor, I am perfectly satisfied with the CTR 58. The volume setting is not particularly critical, and I tend to keep

it at the half-way mark all the time.

I am very pleased with my Lynx. My chief reasons for buying were the features of Lynx Basic, the machine code monitor, the size of the memory, the graphics, and finally the fact that it is British.

My knowledge of machine code is not as extensive as it might be. However I'd like to learn more about it. Are there any plans to produce a beginner's guide to machine code/assembly language on the Lynx?

A Rendall
Middlesbrough
Cleveland

A technical manual for the Lynx, dealing with assembly language and machine code, is being prepared.

EFFICIENT USE OF CASSETTE SPACE

I have been using a cassette tape recorder that does not have a counter, which makes it very difficult to distinguish where a saved program finishes on the tape, particularly when I have rewound the cassette and removed it from the machine. The only safe way to SAVE another program is to use another tape, which can lead to exorbitant and essentially unnecessary expenditure on cassettes.

To get round this problem, I now SAVE a dummy program (consisting of, say, 10 REM and called PROG-END) after the end of the program proper. Then I can enter a VERIFY PROG-END command. When the BAD TAPE message comes up I know that I have passed the end of the program I want to keep, and I can safely save my new program.

E Eve
Westcott
Surrey

MYSTERIES OF M/C MONITOR

I am particularly interested in the Lynx's built-in machine code monitor. Can you tell me what its function is?

I would also like to know how best to assemble machine code on the Lynx.

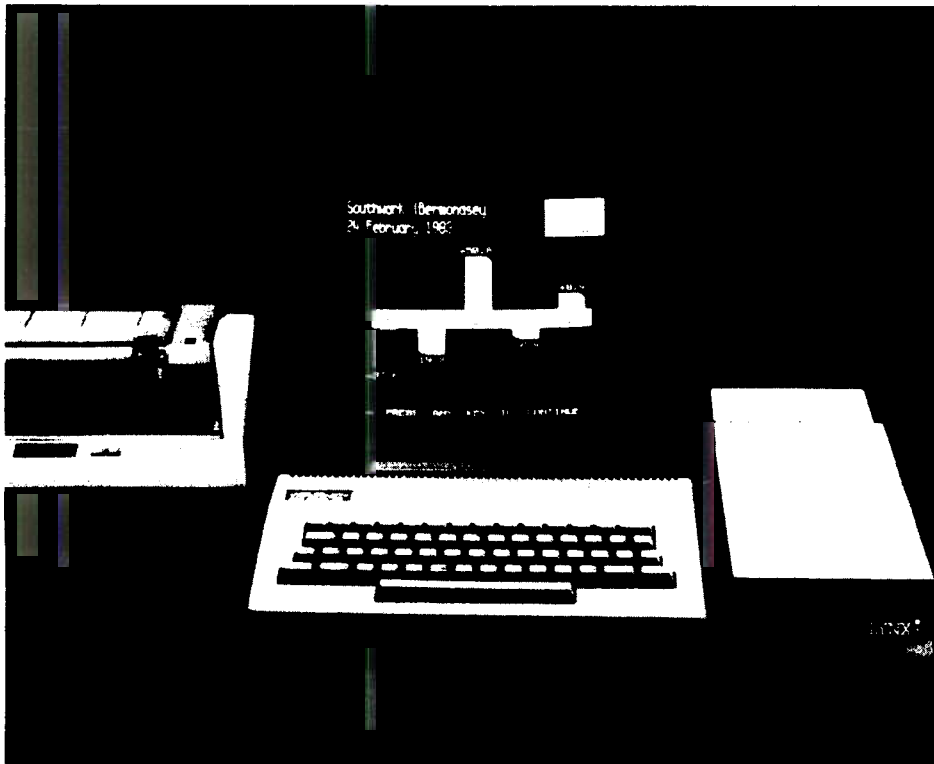
M Horton
Bath

The monitor provided with the Lynx is particularly useful as a tool for machine code programmers. It gives extensive facilities for editing and debugging code, among many other things.

It is not, however, an internal assembler. For example it will not convert mnemonics such as LD A, (HL), into the relevant op-code (in this case, 7E). You can either do this manually yourself, using a Z80 programming book and the monitor command M (for MODIFY), or you can buy a copy of the Zen assembler, available shortly from Camssoft.

96K LYNX

ONE STEP BEYOND



STEVE JEDOWSKI
reviews the 96K Lynx

OUTWARDLY the 96K Lynx looks almost identical to the 48K, apart from a different badge, and an extra beep on power-up. So what are you getting for £299.00 or £89.95 for an upgrade? Well, quite simply you are getting a lot more RAM and a little extra ROM.

On the 48K Lynx, 32K was used for the screen (2.5K was used by the operating system), leaving 13.5K available to basic. With the 96K Lynx, 32K is again used by the screen with the screen resolution remaining at 256 x 248, but the RAM available to basic rises to 37.5K. Quick mental arithmetic or even working it out on your Lynx in the intermediate calculator mode will tell you that 32K + 37.5K does not equal 96K! So what has happened to the other 26.5K? Well, as with the 48K Lynx, 2.5K is used by the machine's operating system leaving 24K. This remaining RAM (23K actually as the data store needs 1K for internal book-

LYNX SOFTWARE BY QUAZAR COMPUTING

LABYRINTH (G11)

This is a top quality 3D maze game made possible by the superb graphic capabilities of the Lynx. You have to think spatially to find your way through the many complex mazes in the shortest route. Do not despair, help is at hand if needed.

Features: -- Fast moves, help option, sound effects, great graphics, replay of route.

CHANCELLOR (G21)

This program provides a realistic simulation of the U.K. economy, working from either one or two economic theories (which are fully explained). Dare you unleash your ideas upon the unsuspecting population? Can your policies work? Try to remain in office for the full term of ten years.

Features: -- Full graphical output of your progress (or otherwise!), Chancellor rating at the end of your term of office, based on your overall achievements. A thinking person's game.

REVERSALS (G31)

Our version of the traditional popular board game. An exciting, fast and highly addictive game of skill and logic, easy to learn yet hard to master. The program is written in machine code, so no more long waits between moves.

Features: -- Three levels of play, full rules and instructions given demonstration game, option to set up pieces to any position, replay of the last game, optional sound effects, stunning graphics.

SPACE TREK (G41)

Space—the final frontier. You are in command of the Star Ship Enterprise, and the Federation of Planets is in grave danger from invading forces. Your mission—to save the Universe by seeking out and destroying the evil Klingons.

Features: -- Three levels of play, long and short range scans, phasers, photon torpedoes, constant display of your status report, colour graphics and sound effects, including signature tune.

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DISASSEMBLER (U11)

A basic utility program which enables you to examine machine code programs in ROM or RAM in standard Z-80 mnemonics.

Features: -- Full disassembler of relative and absolute jumps, option of disassembly in decimal or hexadecimal notation.

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keeping) can be used as a basic data store or for storing machine code. So now we have 60.5K available to the user. A whole set of new commands allows you to use the data store in basic programs. Each command is prefixed by the word 'EXT' (which has been assigned a single key entry: 'ESC' + 'E' in place of 'DATA' as on the 48K machine). There are 48 Data Store identities and any number of these can be used within the memory available. Data can be added to any store at any time and there are pointers for each store, each independently resettable. The manipulation of data is similar to the READ... DATA... RESTORE commands available for use in basic.

```
EXT FETCH N = READ
EXT STORE N = DATA
EXT BACK N = RESTORE
```

(where N = store identity)

EXT WIPE N erases all the data from store N. Two very useful commands are EXT S LOAD N and EXT S SAVE N. These allow you to load and save data to and from tape. This opens up a whole new area of programming for the Lynx, hopefully with the promise of home financial packages and databases.

If all this extra RAM has whetted your appetite then read on to see what extra commands have been crammed into the extra 4K of ROM. To start with, the 96K Lynx can drive both serial and parallel printers—that is, if the software exists in ROM to drive them. For serial printers you will need a special lead and, for parallel printers, the parallel interface which is connected via the 40-way expansion bus on the rear of the machine. The routines are configured for Epson series printers via the parallel interface and the Seikosha GP250X via the serial port. I have successfully used the Seikosha GP250X via the serial port and with greater printing speed, via the optional parallel interface.

The 96K Lynx has both CIRCLE and TRIANGLE commands. The syntax for the circle command is:

```
EXT CIRCLE M,X,Y,R
```

where M must be either 0 or 1, 1 for a filled circle (in the current ink colour) or 0 for a line circle. X and Y are the co-ordinates of the centre of the circle and R is the radius. The TRIANGLE command requires three sets of co-ordinates;

```
EXT TRIANGLE X1,Y1,X2,Y2,X3,Y3
```

where each co-ordinate represents one corner of the triangle. This command gives a filled triangle in the current ink colour.

The WINDOW facility on the 48K Lynx was somewhat limited in that you could not clear the Window independently of

the whole screen. This has now been rectified and

```
EXT CLW
```

clears the Window in the current paper colour and homes the cursor to the top of the Window. This command has a further use in that it can also be used as a rectangle-fill, by defining the Window as the area of the rectangle, choosing the desired (paper) colour and then using the clear window command. These three extra commands; CIRCLE, TRIANGLE and CLW (clear window), make any request for a PAINT command somewhat redundant as you are now able to fill an area of any shape using these commands in combination or in isolation.

If you have ever ESCaped in the middle of a program which redefined the window or was working in double-height multi-coloured characters and wanted easily to list the program in normal Lynx screen format then 'EXT VRESET' will be a welcome command. This resets the video display to the normal power-up status (minus the Lynx logo), i.e. white on black with standard height characters and the full screen window, clearing the screen at the same time.

Explode!!

ZAP!!!!, LASER!!!!, EXPLODE!!!! and KLAXON!!!! are four preformatted sound effects provided as part of the 96K version 2.0 basic. These are all programmed by prefacing each effect by EXT (ESC + 'E') as with the other new commands on the 96K machine, e.g. EXT EXPLODE. This fortunately does not have any adverse effect on the machine itself. Obviously these will have little use in business-orientated software but will doubtless be welcome additions to the avid games player and programmer alike. As will the use of joysticks with the (Atari-compatible) Lynx Joystick interface which gives the keyboard a rest from pounding fingers fighting off yet another invasion from space! A light pen is also provided for but as yet has no release date. An error-trapping facility has also been included.

One major criticism is that the 96K Lynx still doesn't scroll, not even in the TEXT mode. For this we will have to wait until the 128K machine arrives.

The extra memory and the extensions to basic in this version 2.0 Basic are proof that the Lynx is the machine that can grow with your programming ability and needs. At £299 for a 96K machine (or £315 for an upgraded machine) the Lynx stands in a class of its own.

How have I coped with my 96K Lynx? Well I've got used to the extra beep on power-up, and the computer isn't short on memory although my memory is fading fast. I now take circles and triangles in my stride and I've become quite blasé about sound effects. However there is one thing I am glad about and that is that my Lynx can't answer back! Well, not yet anyway.

THE FOREST

by

Brian Rumbelow

This program is for the 96K Lynx; it shows how circle and triangle routines can be used to draw pictures on the screen.

Everything on the screen (apart from the red 'Dot Pebbles') is either a circle or a triangle. Lines 120-160 show a loop reading in different values for the circle command.

Three triangles are drawn, one large yellow one (Line 300), and two green ones (Lines 320,330). The large yellow triangle represents the path, and the two green ones, the valley.

Another loop (Lines 340-380), reads in the values for the 'Tree triangles'. The last loop draws the 'Pebble' dots.

```

100 PAPER BLUEP
110 CLS P
120 FOR A=1 TO 12P
130 READ C,X,Y,RP
140 INK CP
150 EXT CIRCLE 1,X,(Y-40),RP
160 NEXT AP
170 DATA 2,127,350,300P
180 DATA 6,127,350,290P
190 DATA 3,127,350,280P
200 DATA 1,127,350,270P
210 DATA 4,127,350,260P
220 DATA 5,127,350,250P
230 DATA 1,127,350,240P
240 DATA 7,170,110,12P
250 DATA 7,185,102,8P
260 DATA 7,205,100,15P
270 DATA 7,181,120,10P
280 DATA 7,195,115,13P
290 INK YELLOWP
300 EXT TRIANGLE 127,175,0,251,255,
    251P
310 INK GP
320 EXT TRIANGLE 255,251,127,175,255,
    150P
330 EXT TRIANGLE 0,150,127,175,0,251P
340 FOR T=1 TO 21P
350 READ X,Y,A,B,C,DP
360 EXT TRIANGLE X,Y,A,B,C,DP
370 NEXT TP
380 INK REDP
390 FOR B=0 TO 200 STEP 2P
400 LET Q=RAND(76)P
410 LET W=127+SGN(RND-0.5)*RAND
    (8*32 DIV 19)P
420 DOT W,Q+175P
430 NEXT BP
440 DATA 0,170,13,115,26,170P
450 DATA 24,170,34,117,44,170P
460 DATA 37,170,46,123,55,170P
470 DATA 50,170,60,125,70,170P
480 DATA 69,170,77,129,86,170P
490 DATA 84,170,90,132,96,170P
500 DATA 90,170,95,137,100,170P
510 DATA 99,170,105,142,109,170P
520 DATA 107,172,112,148,115,172P
530 DATA 115,174,118,152,122,174P
540 DATA 131,174,134,151,138,174P
550 DATA 136,174,140,146,144,172P
560 DATA 140,172,145,147,150,172P
570 DATA 150,172,156,149,162,172P
580 DATA 160,172,167,144,174,172P
590 DATA 170,172,178,142,186,172P
600 DATA 186,170,194,140,202,170P
610 DATA 199,170,208,135,217,170P
620 DATA 210,170,219,132,228,170P
630 DATA 219,170,229,129,239,170P
640 DATA 238,170,255,125,255,170P
650 GOTO 650P

```

FAST is a machine code routine designed to increase greatly the speed with which characters are printed on the screen. It is also adaptable, in that a POKE or a DPOKE can:

- Change the height of the characters.
- Alter the ink colour to any of five colours (with no loss of speed)
- Spread out the character onto alternate lines.
- Print to and display Alternative Green.

Unfortunately, getting the increased speed involves sacrificing some very useful features of the present screen driver. The commands PROTECT, INK and PAPER have no effect on FAST, the colour blocks written to being alterable only by DPOKE and POKE. And while that effectively gives you limited control over PROTECT and INK, PAPER is always black.

The characters in FAST are eight pixels (one byte) wide and follow byte boundaries down the screen; that is to say the pixel position of the left hand side of the character is always a factor of eight. This means that there is a maximum of 32 characters per line, and that PRINT@ will always round down to the byte boundaries.

FAST does not read the video memory it is writing to so the command VDU 21 (overwrite) will not work.

For complex reasons characters in FAST may have variable heights but only with a factor of 4. So that in the case of the listing given all characters are 8 pixels high. This cuts off descenders from lower case letters, but leaves block capitals completely intact.

For more details on the working of the routine see the section on using FAST from machine code (right) but if you simply want to use it in your Basic program the following information should be enough.

To copy the routine into RAM, go into MONITOR and use the M (modify) command to type it in; then D (DUMP to cassette) command, to save it; and finally return to BASIC via J (JUMP).

```

9600 F5 E5 D5 C5 D9 E5 D5 C5 ueUEYeUE
9608 06 02 CD CE 00 D9 2A 54 ..MN.Y*T
9610 62 7D 6C 26 00 44 29 29 b)I&.D))
9618 29 29 29 0E FF 0C D6 03 )))..V.
9620 30 FB 09 01 00 C0 09 D9 0C...e.Y
9628 C5 46 23 4E 23 56 23 5E EFENEVE^
9630 23 E5 D5 D9 01 20 00 E5 EeUY. .e
9638 09 E5 09 54 5D 09 EB D9 .e.TJ.kY
9640 E1 D1 D9 3E 17 01 FF FF aQY>
9648 ED 79 C1 3E 40 D3 80 D6 myA>eS.V
9650 20 D3 80 70 EB 71 D9 71 S.pkqYq
9658 EB 70 D6 20 D3 80 AF 01 kpV S./
9660 FF FF ED 79 E1 D9 11 20myaY.
9668 00 19 D9 C1 10 BA C1 D1 ..YA.:AQ
9670 E1 D9 C1 D1 E1 F1 C9 00 aYA@aqI.
9678 00 00 00 00 00 00 00 .....
    
```

To use FAST in Basic, type in this program

FAST WO

Now type in the command:

DPOKE &62B9, (start address (&9600 in example))

If you enter the code correctly the ink should have turned yellow. If you haven't, then MLOAD it back and correct it.

Once you have the program working the following commands will allow you to alter it:

POKE (start address) +&9, (height/4)

This will determine the height of the characters, in fours.

POKE (start address) + &44, value to send to PORT &FFFF

This will determine the banks to be written to:

&13 will write to the RED/BLUE BANK

&15 will write to the GREEN/ALTERNATIVE GREEN BANK

&17 will write to BOTH THE ABOVE BANKS.

DPOKE (start address) +&24, colour block address

&A000 will write to BLUE AND/OR ALTERNATIVE GREEN.

&C000 will write to RED AND/OR GREEN

POKE (start address) +&4C, &40 will display GREEN &4C, &50 will display ALTERNATIVE GREEN.

When you use FAST you will find that it wipes out about a quarter of itself by wrapping around the same line. This should be corrected by resetting the Window to:

WINDOW 0,93,1,251

allowing you 31 x 25 characters per screen.

Unfortunately FAST is not 100% compatible with the Basic and if you use commas in your PRINT statements that go over the end of the line you will crash the machine. But if you avoid these you should be quite safe.

At present the spacing between text lines on the screen is 10 pixels. However, the FAST routine would benefit by having 8-pixel spacing on the screen. This 3-byte routine is an easy way of achieving this:

*M9700

9700 <00> D6 02 C9

9703 <FF>.

Using MONITOR as above, type in the routine and then:

DPOKE &628C,&9700

POKE &628B, &C3

To return to 10-pixel spacing, type:

POKE &628B, &C9

To rearrange the WINDOW so that the screen displays 31 columns x 31 rows, type:

WINDOW 0,93,0,248

You don't need a Lynx gallop. Get come up with a machine that will make you a cheetah rather than

Although FAST is a routine to be used from Basic, it contains a section of code that may be of use to machine code programmers. But like all general purpose routines it may be substantially improved for specific operations.

The ROM routines given in the last issue of *Lynx User* are slowed down by two main factors: the complications of testing for the various INK, PAPER, and PROTECT values, and the limitation of outputting only one byte per interline blanking period.

The former problem can be circumvented by disassembling OUTBYTE and CALLING the routine it CALLS for putting a byte on the screen.

To overcome the second factor, a new routine is required. The routine used in FAST (see left) was written to this end.

The major advantage of this routine is that it allows you to put four individual bytes in four individual locations in either or both colour banks in one interline blanking period. In theory this should quadruple the speed of your screen accesses, but that depends largely on how long you spend setting up the registers between the interline blanking periods, as there are only around 42 micro-seconds to spare.

Because it is obtaining its data by indirect addressing, and because it uses the stack extensively, FAST requires two interline blanking periods for every four bytes in the screen.

Using the interline period

The interline blanking period—the time taken by the electron beam in the television tube to move from the end of one line to the start of the next—is only about 21 micro-seconds—or 85 T-states (1 T-state = ¼ micro-second on the 48K and 96K Lynxes). This allows very little time,

WORK

Whip to make your
George Kendall has
machine code routine
think you've bought
an a Lynx.

sufficient to put four bytes on the screen using all the alternate and normal registers, but not quite sufficient for five.

In order to take full advantage of the 21.3 micro-seconds available we recommended that you take the following steps: Set up PORT &FFFF with the values appropriate to the banks you wish to write to—with 1 as the left hand hexadecimal digit so that the bank 0 (the ROM) is switched out. (This action speeds up the Z80 by around 13%. If it is switched in, the Z80 takes an extra T-state for every OP CODE. See left for the various recommended PORT FFFFH values. **NB**—Do not read-enable more than one bank.) Then send 40H (or 50H for Alternative Green to be displayed) to PORT 80H. This will freeze up the Z80 until it is almost safe for the Z80 to take over the screen memory without degrading the display.

No interference

The time taken up in outputting a second value to PORT 80H is sufficient to ensure no interference with the screen. This value should be 20H (for CPU access) or 30H (for Alternative Green).

Now that CPU access is enabled the data can be sent to the screen freely. Before the 22 micro seconds are up, CPU access must be disabled so that the video memory can be displayed from the beginning of the new line. This involves giving register A a value of 0 (or 10H for Alternative Green) and then outputting A to PORT 80H.

Once outside the blanking period PORT FFFFH should be reset to allow writing to Workspace (eg using the Stack) and reading from ROM.

For further explanation see, chapters 15 and 16 of the Manual and pages 12-15 of Lynx User 1.

1	ORG	9600H	
2	LOAD	9600H	
3	FONT:	ED0	0CEH
4	9600	FS	PUSH AF
5	9601	ES	PUSH HL
6	9602	DS	PUSH DE
7	9603	CS	PUSH BC
8	9604	D9	EXX
9	9605	ES	PUSH HL
10	9606	DS	PUSH DE
11	9607	CS	PUSH BC
12	9608	0602	LD B,2 ;Height of character in 4 pixel used b
13	960A	CDCE00	CALL FONT ;Initialises HL pointing char table
14	960D	D9	EXX
15	960E	2A5462	LD HL,(5254H) ;Fetch Cursorx & Cursory
16	9611	7D	LD A,L
17	9612	8C	LD L,H
18	9613	2600	LD H,0H
19	9615	44	LD B,H
20	9616	29	ADD HL,HL
21	9617	29	ADD HL,HL
22	9618	29	ADD HL,HL
23	9619	29	ADD HL,HL
24	961A	29	ADD HL,HL
25	961B	0EFF	LD C,0FFH
26			
27	961D	0C	LL1: INC C ;C:=A DIV 3
28	961E	D803	SUB 3
29	9620	30FB	JR NC,LL1
30	9622	09	ADD HL,BC
31	9623	010000	LD BC,00000H ;Start address for Colour block
32	9626	09	ADD HL,BC
33	9627	D9	EXX
34			
35	9628	05	LL2: PUSH BC
36	9629	46	LD B,(HL) ;HL - char table
37	962A	23	INC HL
38	962B	4E	LD C,(HL)
39	962C	23	INC HL
40	962D	56	LD D,(HL)
41	962E	23	INC HL
42	962F	5E	LD E,(HL)
43	9630	23	INC HL
44	9631	E5	PUSH HL
45	9632	D5	PUSH DE
46	9633	D9	EXX
47	9634	012000	LD BC,20H ;No. of bytes per line
48	9637	E5	PUSH HL
49	9638	09	ADD HL,BC
50	9639	E5	PUSH HL
51	963A	09	ADD HL,BC
52	963B	54	LD D,H
53	963C	5D	LD E,L
54	963D	09	ADD HL,BC
55	963E	EB	EX DE,HL
56	963F	D9	EXX
57	9640	E1	POP HL
58	9641	D1	POP DE
59	9642	D9	EXX
60	9643	3E17	LD A,17H ;13H RED or BLUE
61	9645	01FFFF	LD BC,0FFFFH ;15H GREEN or nothing (or A/GREEN)
62	9648	ED79	OUT (C),A ;17H YELLOW or BLUE (or CYAN)
63	964A	C1	POP BC
64	964B	3E40	LD A,40H ;50H if A/GREEN is to be displayed
65	964D	D380	OUT (80H),A ;Freezes up the Z80 until interline bl
66	964F	D620	blanking SUB 20H
67	9651	D380	OUT (80H),A ;Enables CPU access
68	9653	70	LD (HL),B
69	9654	EB	EX DE,HL
70	9655	71	LD (HL),C
71	9656	D9	EXX
72	9657	71	LD (HL),C
73	9658	EB	EX DE,HL
74	9659	70	LD (HL),B
75	965A	D620	SUB 20H
76	965C	D380	OUT (80H),A ;Disables CPU access
77	965E	AF	XOR A
78	965F	01FFFF	LD BC,0FFFFH
79	9662	ED79	OUT (C),A ;Resets banks to normal
80	9664	E1	POP HL
81	9665	D9	EXX
82	9666	112000	LD DE,20H ;No. of bytes per line
83	9669	19	ADD HL,DE
84	966A	D9	EXX
85	966B	C1	POP BC
86	966C	10BA	DJNZ LL2
87	966E	C1	POP BC
88	966F	D1	POP DE
89	9670	E1	POP HL
90	9671	D9	EXX
91	9672	C1	POP BC
92	9673	D1	POP DE
93	9674	C1	POP HL
94	9675	F1	POP AF
95	9676	C9	RET
96			END

READING THE SCREEN FROM LYNX BASIC

You may want your programs to check what is on the screen before you write to it. If you are devising a game, for example, it may be useful to know whether a collision is about to take place. With some micros you can simply employ the Basic command PEEK to perform this function. But the Lynx does not work like that.

However a similar effect can be achieved by a different procedure, and the program shown here allows us to demonstrate how. Here's how it works:

The aim of the program is to keep a record of what is about to be overwritten, so that it can be replaced afterwards. PROC READ DOT is used by the program to find out if the dot specified by X and Y is green or not.

CALL &0070 in line 2210 calls a machine code routine in the computer's ROM. It uses the expression &C000 + Y * 32 + XDIV8 as a memory address from which it reads a byte into the read-only variable HL. &C000 (or C000H)

is the beginning of the green memory block.

Y * 32 + XDIV8 uses the screen coordinates X and Y to find the byte within that block.

2*(7-X MOD8) is used in lines 2220 and 2230 to pick out the individual bit from HL. And the result, either 1 or 0, is put in variable V.

Sketch Pad

If you run the program, a dot will appear on the screen. This can be moved slowly or quickly around the screen, and used to draw a picture. The cursor keys, when pressed either individually or in combination, move the dot in any of eight directions. If they are held down simul-

taneously with the space bar, the dot will move faster. If you hold down the RETURN key, the dot will trace out a line in its wake. If you press C, the screen will clear.

```

100 LET Y=100,X=100,V=0
120 TEXT
130 REPEAT
140   PROC KEYREAD
150 UNTIL 0
160 END
170 REM *****
2000 DEFPROC KEYREAD
2005 IF KEY#="C" OR KEY#="c"
    THEN CLS
2010 IF NOT(INF(%0480) BNAND 8)
    THEN LET D=D*1.2
2015 ELSE LET D=1
2020 IF NOT(INF(%0080) BNAND 16)
    THEN PROC MOVE(0,-1)
2030 IF NOT(INF(%0080) BNAND 32)
    THEN PROC MOVE(0,1)
2040 IF NOT(INF(%0980) BNAND 32)
    THEN PROC MOVE(1,0)
2050 IF NOT(INF(%0980) BNAND 4)
    THEN PROC MOVE(-1,0)
2060 IF INF(%0980) BNAND 8 THEN
    ENDPROC
2070 INK GREEN
2080 DOT X,Y
2090 LET V=1
2095 ENDPROC
2099 REM *****
2100 DEFPROC MOVE(B,C)
2110 INK GREEN*V
2120 DOT X,Y
2130 LET X=(X+B*D) MOD 256
2140 LET Y=(Y+C*D) MOD 256
2150 PROC READDOT
2160 INK GREEN*V+4
2170 DOT X,Y
2180 ENDPROC
2199 REM *****
2200 DEFPROC READDOT
2210 CALL &0070,&C000+Y*32+X DIV 8
2220 LET A=2*(7-X MOD 8)
2230 LET V=SGN(HL BNAND A)
2240 ENDPROC
2250 REM :

```

V = Contents of pixel under cursor

ALTERNATIVE GREEN

The Lynx has four colour blocks, three of the standard kind: Green, Red, and Blue (which in combination can produce eight different colours) and one which is called Alternative Green. Alternative Green can be used as a separate screen to store a page of green text, a graph, or perhaps for fast animation.

While there is no BASIC command to print in Alternative Green this can be done quite simply by changing the position in memory that the BASIC uses to send data to the Green block, so that it sends data to the Alternative Green block instead. This is done by the following command:

DPOKE &6292,&8000

and returned to Green by:

DPOKE &6292,&C000

NOTE: this will not display Alternative Green. For that, the following command should be used:

OUT &80,16

EXPLOSION, shown below, demonstrates how these can be used. It prints

up a Green explosion in each colour block, and then, in the REPEAT-UNTIL loop, switches them to give the effect of a flashing explosion.

```

100 REM *****EXPLOSION****
110 TEXT
120 DPOKE &6292,&A000
130 CLS
140 PROTECT BLACK
150 PROC LINES(100,RED)
160 PROC LINES(160,YELLOW)
170 DPOKE &6292,&C000
180 PROC LINES(00,WHITE)
190 REPEAT
200   FAUSE 200
210   OUT %0080,4
220   FAUSE 250
230   BEEP 1,5,63
240   FAUSE 100
250   OUT %0080,16
260 UNTIL FEYN
270 END
280 REM *****
1000 DEFPROC LINES(X,I)
1010 INK I
1020 PROTECT WHITE-INK
1030 FOR Y=0 TO X
1040   MOVE 127,126
1050   PLOT 3,RAND(X)-X DIV 2,
    RAND(X)-X DIV 2
1060 NEXT Y
1070 ENDPROC

```

SCREEN SPEED

If you give your Lynx unnecessary work to do, the speed of handling will be reduced. So it's a good idea to take a few precautions when you are writing to the screen. Here are a few tips that will help to speed up the Lynx's work rate:

PROTECT all colours except those that you are using. Follow any PRINT statements with ","—otherwise the computer will have to go through the whole procedure of clearing the next line. CHR\$(31) is a useful substitute. Use the TAB command to position text. If that is not possible, use CHR\$(12) to speed up the movement.

Memory efficiency

The following program uses unnecessary lines:

```

100 LET X = 100
110 LET Y = 200
120 VDU 24
130 VDU 7
140 PRINT A;
150 PRINT "=CASHFLOW";

```

They could be rewritten as follows to save 8 bytes for every line number no longer used:

```

100 LET X = 100, Y = 200
120 VDU 24,7
130 PRINT A; "=CASHFLOW";

```

When you use a long series of commands, the following structure is sometimes useful:

```

100 FOR X = 0 TO 11
110 READ A
120 A$ = A$ + CHR$(A)
130 NEXT X
140 DATA 1,2,24,2,1,128,129,10,22,22,
    130,131

```

Where similar blocks of instructions appear in your program, avoid repetition by using a PROC or GOSUB

Sometimes a series of IF - THEN statements can be cut down to a single line, e.g.:

```
IF X >= 32 OR X <= 128 THEN X = X + 96
```

Always use BLACK to WHITE to define your colours, as they are 'tokenised' down to one byte each, and more memory-efficient than numbers. They also make a program more readable. The same principle applies frequently to TRUE and FALSE (0 to 1).

When you are seriously short of memory, a considerable amount of space can be saved by replacing 0 to 7 with BLACK to WHITE. The price you pay is program readability. This principle also applies if you use a number very frequently. You can give an unused variable that number and repeat it throughout the program. Often a series of INK, PAPER, CLS and VDU commands can be compacted into a single line, e.g.:

```
VDU 1,2,2,0,4,7
```


CHARACTER DEFINITION

To define characters, use the method shown on the intro tape (and the Star Rover program in the last issue). This involves putting ten hexadecimal numbers for each character on code lines. The command DPOKE GRAPHIC, LCTN (line number) then points the graphic character set to the beginning of the line number with the first code statement in it. From then on CHR\$(128) to CHR\$(255) will be generated from the memory contents of the location of that line number onwards.

As the memory used to store the beginning of a code line is exactly 8 bytes long, an extra two zeros should be added so that there are exactly 10 bytes between the first character of a new line and the last character of the old one. Remember the intervening CODE lines cause a loss of one character.

Use INP (&0080 to &0980) if you want the computer to read the keyboard without any delay (see example in Sketchpad, page 12). For details of the keyboard PORT, see *Lynx User 1*, page 22.

ALTERNATIVE USER-DEFINED GRAPHICS

An alternative to DPOKEing between the normal value of GRAPHIC and a user-chosen value of it for user-defined graphics (Read/Write, *Lynx User 1*) is to copy the Lynx's graphics characters to where they are expected under the user-chosen GRAPHIC value. For example, the start of the invader program on page 64 of the *Lynx User Manual* would become:

```
100 RESERVE HIMEM-30
101 LET G=LETTER(224)
110 DPOKE GRAPHIC, HIMEM
111 REM NOW RESTORE LYNX
    GRAPHICS
112 FOR J=0 TO 259
113 LET K=PEEK(G+J)
114 POKE LETTER(224)+J,K
115 NEXT J
120 ...
```

VDU(224) etc. will now yield Lynx's graphics, at the same time as VDU(128) etc, yields the user-defined invader's parts.

TUNING THE LYNX FOR A PERFECT PICTURE

Chris Mathews encountered a technical hitch when tuning his TV to his Lynx. His set uses sweep tuning, which would not lock onto the Lynx transmission but kept sweeping past it to the next TV transmission. The solution was simple once found: plug the Lynx in, start the tuning sweep

when Lynx beeps and then select another TV station the moment the Lynx pawprint appears on the screen. This should leave the Lynx station tuned correctly; if it doesn't 'capture' first time, try again. If the other TV station has detuned, reset it by tuning until the transmission you normally receive appears.

SPEEDING UP THE WRITING TIME

A common criticism is that rapid writing to the screen is not a strong point of the Lynx. This may be true but a notable improvement can be obtained in writing text (or graphics using the low-resolution graphics or user-defined characters) to an empty area of screen by terminating PRINT lines with CHR\$(31); (note the semi-colon) as the following short program demonstrates:

```
10 CLS
20 PRINT "PUTTING TEXT ON THE"
30 PRINT "SCREEN LIKE THIS"
40 PRINT "IS A FAIRLY SLOW METHOD"
50 PRINT "OF DOING IT."
60
70 PAUSE 20000
80 LET A$=CHR$(31)
90 PRINT "BUT PUTTING TEXT ON THE";A$;
100 PRINT "SCREEN THIS WAY";A$;
110 PRINT "IS RATHER QUICKER";A$;
120 PRINT "DON'T YOU AGREE?";A$;
130 PAUSE 20000
140 VDU 23,1,2
150 PRINT "IT IS ALSO",,A$;
160 PRINT "REASONABLY POSSIBLE",,A$;
170 PRINT "TO OVERWRITE TEXT",,A$;
180 PRINT "LIKE THIS",,A$;
190 PRINT@ 3,2,15;
200 END
```

In addition to its other uses, the WINDOW command sometimes forms a useful method of painting a given area of the screen a given colour. Another application might be in the production of bar charts.

LYNX BASIC

Lynx Basic lacks the ON...GOTO and ON...GOSUB commands found in some other Basics, but makes up for this by allowing variable expressions after GOTO or GOSUB. However, it may not always be convenient to program, say:

```
200 GOTO 2000*I
```

especially if there may be later a desire to use RENUM. An alternative is to use:

```
2000 GOTO L(I)
```

where the appropriate line numbers have been read to the array L().

NO PROBLEMS WITH RESERVE

We have seen it presented as a problem that putting a RESERVE command at the beginning of a program (e.g. to reserve space for an alternative character set) might eventually cause the computer to run out of memory if the program is run several times successively. This is

certainly the case if the program begins:

```
10 RESERVE HIMEM-100
```

But surely it would not be too difficult to make a note of the value of HIMEM before coding such a line, and then (e.g. to reserve 100 bytes) coding:

```
10 RESERVE 40852
```

If it is objected that the program might then crash if a lower HIMEM had previously been set by some other program, such coding could read:

```
10 IF HIMEM>40852 THEN RESERVE
40852
```

TIGHTEN UP YOUR PROGRAMS

For some reason we have seen a number of programs using coding like:

```
10 LET A$=GET$
```

```
20 LET A=VAL(A$)
```

```
30 IF A=0 THEN GOTO 10
```

where presumably two lines of coding would do, such as:

```
10 LET A=GETN-48
```

```
20 IF A<0 OR A>9 THEN GOTO 10
```

This also allows a valid numeric entry of 0.

HOW TO MSAVE FROM BASIC

Eric Eve writes: The machine code routine you give is useful, but how would I need to modify it to save an area of memory simply as data? I have in mind an area of memory reserved, for example, for user-defined characters or data stored in a compact format (poked into memory to be peeked by another part of the program, or another program). Such data can be read into a program using MLOAD, but the only way of saving it I have yet been able to discover is by going into the monitor. My attempts at modifying your routine have so far either caused the Lynx to hang up altogether, or else have saved a file which causes a "not yet implemented" error on loading (suggesting perhaps that I did not succeed in establishing a transfer address of 00). In other words, what do I do to achieve the same as a monitor SXXXX XXXX 0000 command from within a Basic program?

The following short routine enables users of the Lynx to MSAVE from Basic. It reserves an area of memory, defined by the first and second numbers in the REM statement. The third number denotes the point from which the program will auto-run after loading. If this third number is zero—as in the example shown—the program will not auto-run at all. The "NAME" after the third number is, of course, the program title.

This program performs an identical function to the monitor command D, as noted on page 97 of the manual.

```
100 REM 9600 9700 0 "TEST"
110 CODE EB CD FC 3E C9
120 CALL LCTN(100),LCTN(110)
```

REVEALED— LYNX USER FUNCTIONS

The Lynx supports a number of functions—ready-made sets of instructions for carrying out an operation, like finding the SINE of an angle. The USER functions work like other functions—like SIN and COS—but allow you to define the operations they perform. Definitions must be in machine code, and can call existing ROM routines. (A list of useful ROM routines was printed in the first edition of Lynx User).

There are 4 USER functions: USER0, USER1, USER2, USER3

They take a single argument, and have this format:

USER0 (VALUE)

This article will demonstrate how to define a USER function. All the examples have been kept short so that the definitions can fit into CODE lines.

Let's start by making USER0 act like PEEK. PEEK allows you to examine the contents of a particular place (address) in the computer's memory.

PEEK (A)

gives the value stored at address A; so the argument of the function specifies the address, and the function returns the value stored there.

When you use a function the computer stores the argument in an area of memory called WRA1. The letters stand for Working Register Area 1. The Lynx has several WRAs. These are areas in RAM which the Basic uses for calculation—rather like the memory on a pocket calculator.

The argument is stored in 'floating point'—the value is stored in two parts, the digits of the number and the power. When the function has been evaluated, the result is also stored in WRA1 in floating point.

There are two useful ROM routines you can use for constructing a PEEK.

FPINT (3497H)

converts the floating point number in WRA1 into an integer in the HL register pair. And

INTFP (34C4H)

which converts the integer in HL to floating point and stores it in WRA1.

Using these two routines, your PEEK equivalent will look like this:

```
USER0 CALL FPINT ;get argument as integer in HL
LD L,(HL) ;get byte in L
LD H,0 ;get H to 0
CALL INTFP ;store HL in WRA1
RET ;return
```

If you want to save a byte and make this run slightly faster you can replace CALL INTFP

```
RET
with
JP INTFP
```

To patch this into USER0, you can make the jump at FUSER0 (627CH)—which normally jumps to the NOT YET IMPLEMENTED error message—jump to your routine.

Independent

The code is position independent—it doesn't refer to specific addresses inside itself so it can be stored anywhere in the computer's memory—so you can put it in a CODE line like this:

```
10 CODE CD 97 34 6E 26 00 C3 C4 34
then implement it with line 20
20 DPOKE &627D,LCTN(10)
```

To make sure it does work like PEEK, try adding this:

```
30 FOR J=0 TO 15
40 PRINT J,USER0(J),PEEK(J)
50 NEXT J
```

(The values in the second and third columns should be the same).

USER functions can be defined to do things other than calculations. For example, you can define a USER function to print a character onto the screen.

Subroutine calls on the Z80 normally use up to 3 bytes storage. The exception is RESTARTS (RST) which take only one

byte. So where ROM space is very limited the most frequently called routines are changed to restarts. (There are other applications for restarts but they require hardware support).

The display drive is a frequently called routine which prints a character on the screen and performs carriage return, clear screen, and so on.

On the Lynx the display routine is RST 8, with the value you want to send to it in the A register. So to print a 'B' on the screen, you would

```
LD A,'B'
RST 8
```

or to make a beep (Control Code 7), you'd

```
LD A,7
RST 8
```

You can use the display routine to define a function to print a character—'X' in this example—to the screen, like this

```
LD A,'X' ;load A with character
RST 8 ;call display routine
RET ;return to Basic
```

You can put your print routine into a CODE line:

```
10 CODE 3E 58 CF C9
20 DPOKE &627D, LCTN(10)
30 FOR J=0 TO 9
40 P=USER0(J)
50 NEXT J
```

(A line of 10 Xs should appear across the screen.)

Reading the screen

You can, of course, employ USER functions to perform useful tasks, as the next example shows.

It would be very useful to be able to read a pixel on the screen—whether it's lit or unlit. The example defines a USER function which reads a pixel in the GREEN bank, but you can use the same principle to write a routine to read all the banks.

A USER function takes only one argument, but to specify a position on the screen you need an X co-ordinate and a Y co-ordinate. Because X can only be

The program below is an assembly listing of the machine code in line 100 of the program listing contained in the right-hand column of this article.

```
CD9734 RDSCR: CALL FPINT ;GET ARG AS INTEGER IN HL
7D LD A,L ;GET LOWEST 3 BITS
E607 AND 7 ;OF ARGUMENT TO DETERMINE
3C INC A ;BIT POSITION
0601 LD B,1
CB08 RDSCR1: RRC B
3D DEC A
20FE JR NZ,RDSCR1
C5 PUSH BC ;STORE BIT POSITION IN B ON STACK
CB3C SRL H ;DIVIDE ARGUMENT BY 8
CB1D RR L
CB3C SRL H
CB1D RR L
CB3C SRL H
CB1D RR L
ED5B9262 LD DE,(GRNBK) ;ADD ORIGIN OF GREEN BANK
19 ADD HL,DE
CD7000 CALL INGREEN ;READ BYTE
F1 POP AF ;GET BIT POSITION IN A
A5 AND L ;TEST IF A ZERO OR ONE
210000 LD HL,0 ;STORE ZERO IN HL
2B01 JR Z,RDSCR2 ;RETURN WITH ZERO IF BIT ZERO
23 INC HL ;SET HL TO ONE
C3C434 RDSCR2: JP INTFP ;CONVERT HL TO FP AND RETURN
```

tween 0 and 255, you can specify both co-ordinates in one argument using $X+256*Y$

So, for example, to specify the point (10,40) you would use the argument $10+256*40$

And for the value returned

0 lit

1 unlit

seems appropriate Here's the program listing:

```
100 CODE CD 97 34 7D E6 07 3C
    06 01 CB 08 3D 20 FB C5 CB
    3C CB 1D CB 3C CB 1D CB 3C
    CB 1D ED 5B 92 62 19 CD 70
    00 F1 A5 21 00 00 28 01 23
    C3 C4 34
```

```
110 DPOKE %627D,LCTN(100)
```

```
120 TEXT
```

```
130 PRINT @0,0;"B"
```

```
140 FOR Y=0 TO 9
```

```
150 PRINT
```

```
160 FOR X=0 TO 5
```

```
170 LET F=USER0*(X+256*Y)
```

```
180 LET A$=" "
```

```
190 IF F=I THEN LET A$="*"
```

```
200 PRINT A$:
```

```
210 NEXT X
```

```
220 NEXT Y
```

Since all the self references are relative, you can put this in a CODE line and add a few lines of Basic to test it.

NB: This is a long CODE line—double check it before you RUN the program. If you've made a mistake the machine may crash.

The program prints a 'B' at the top left of the screen. It then reads the 10x6 block of pixels, and depending on whether a pixel is lit or unlit it prints an asterisk or a space, building up a 'big' copy of the character below.

In these examples we have only looked at USER0. The other USER functions are defined in the same way. Details are listed below:

```
627C C3 32 3B FUSER0: JP NI
627F C3 32 3B FUSER1: JP NI
6282 C3 32 3B FUSER2: JP NI
6285 C3 32 3B FUSER3: JP NI
```

The C3 is a ready-made jump. Normally it jumps to the NOT YET IMPLEMENTED error message routine at 3B32H. By DPOKEing in the start address of your routine, you can make it jump to your definition.

FAST GRAPHICS

A short programme to demonstrate the fast resolution graphics of the Lynx.

```
100 TEXT
110 FOR A = 0 TO 50
120 DRAW RAND (240), RAND (240)
130 INK RAND (7) + 1
140 PROT 7 - INK
150 NEXT A
160 LET I = GETN
170 END
```

FOR A = 0 TO 50 in line 110 A can actually be written A = 0 TO N where N is any given number. This will increase or decrease the number of random lines that are drawn on the screen.

TRIANGLES

Brian Rumbelow

The object of this program is to show how triangles can be used to draw other shapes. A hexagon, for example, can consist of six triangles.

It has been written for the 96K Lynx, and Brian advises that you execute the following short routine to establish whether the program will work on your particular Lynx. Type the following line:

```
EXT TRIANGLE 0,0,250,0,0,250
```

If you get a large triangle the program will work; if not, a NOT YET IMPLEMENTED message will appear on the screen.

```
100 PROTECT 0
110 CLS
120 FOR D=1 TO 6
130 INK D
140 READ X,Y,A,B
150 EXT TRIANGLE 127,124,
    X,Y,A,B
160 NEXT D
170 GOTO 170
180 DATA 177,44,77,44
190 DATA 207,124,177,44
200 DATA 207,124,177,204
210 DATA 177,204,77,204
220 DATA 44,124,77,204
230 DATA 44,124,77,44
```

SOUND LOCATIONS

James Spring

This program can be used to produce different sounds. It can also be employed to find which memory locations are best for the sounds you want.

```
10 FOR B=1 TO 5000
20 FOR J=0 TO 100
30 SOUND B,J
40 NEXT J
50 NEXT B
```

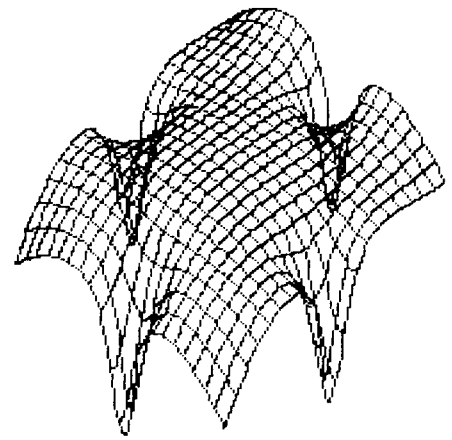
Line 10 can be altered to provide different sounds:

```
10 FOR B=5000 TO 10000
```

Line 20 can also be altered:

```
20 FOR J=0 TO 100
```

Lines 10 and 20 can also be transposed, giving a very strange sound.



SCREEN DUMP

R. Penrose

```
100 LET X=1
110 LET Y=5
120 LET C=COS(RAD(25))
130 LET S=SIN(RAD(60))
140 FOR J=-10 TO 10
150 PROC TPT(J*Y,-50*X)
160 MOVE P+125,-Q+350
170 FOR K=-49 TO 50
180 PROC TPT(J*Y,K*X)
190 DRAW P+125,-Q+350
200 NEXT K
210 NEXT J
220 FOR J=-10 TO 10
230 PROC TPT(-50*X,J*Y)
240 MOVE P+125,-Q+350
250 FOR K=-49 TO 50
260 PROC TPT(K*X,J*Y)
270 DRAW P+125,-Q+350
280 NEXT K
290 NEXT J
300 PROTECT GREEN
310 END
320 DEFPROC TPT(X,Y)
330 LET Z=200*((X/100)**3-
    3*(X/100)**2*(Y/100)**2)
340 LET Z=Z-10/(COS(X/15)
    *COS(Y/15)+1.1)
350 LET P=X*C-Y*S
360 LET A=Y*C+X*S
370 LET Q=A*C+Z*S
380 ENDFPROC
```

HYPERBOLA CONTOUR

Chris Cytera

This program calculates a colour number as a function of each pair of existing screen co-ordinates, and produces a point in that colour at those co-ordinates. The result is a beautiful contour map of a hyperbola, given by the expression $x*x+x*y-y*y$. This has been rearranged in the program to increase the speed. You may also like to try the expression $x*x+(x+y)*y$, which produces an ellipse.

```
100 PROTECT BLACK
110 CLS
120 FOR X=-128 TO 127
130 FOR Y=-124 TO 123
140 INK (X*X+(X-Y)*Y) DIV 100
150 DOT X+128, Y+124
160 NEXT Y
170 NEXT X
180 LET A$+GET$
190 RUN
```

GEM SOFTWARE



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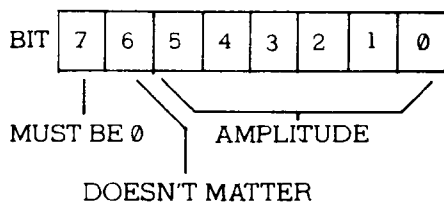
SOUND ON THE LYNX

How to call BEEP from machine code

The following procedure will produce a BEEP on your Lynx. First, the speaker is switched on by sending 1 to PORT 80H. Then PORT 84H is alternately OUTed with 0 and a non-zero number up to 63—controlling the amplitude (volume). Delay between the OUTing varies the frequency, and the 'number of cycles' parameter determines how many times it goes through this loop.

```
OUT (80H), 1 (switch on)
OUT (84H), (amplitude)
DELAY
OUT (84H), 0
DELAY
REPEAT (for number of cycles)
RETURN
```

PORT 84H



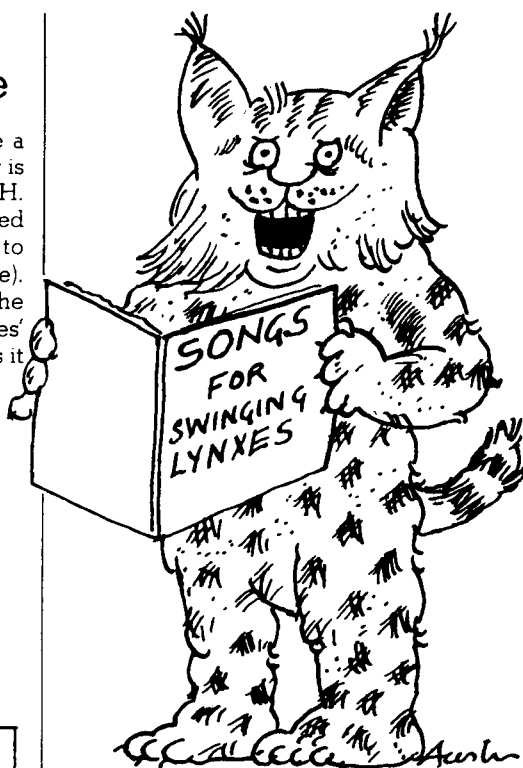
NB: Do not set bit 7 in your own routines

NB: The volume you will give will be ANDed with 3FH

To use the above, CALL it so that after completing the BEEP, it will return to your program once it encounters a RETurn.

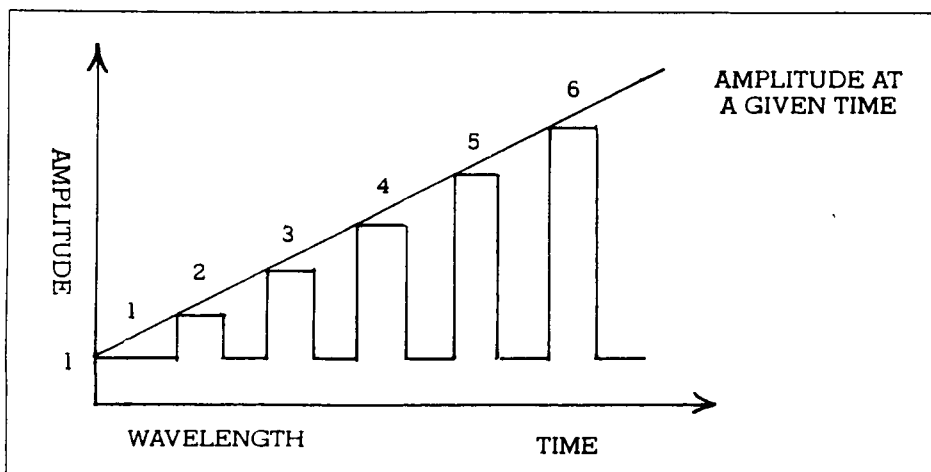
To call BEEP from machine code:

```
210000 BEEP 1: LD HL, number of
                cycles
110000          LD DE, wavelength
0600          LD B, volume
3E01          LD A, 1
D380          OUT (80H), A;
                switch on
                speaker
78           LD A, B
D5           PUSH DE
E5           PUSH HL
C34E09        JP 094EH; do
                not call
```



**David Noonan
coaxes some un-
likely noises out
of his unsuspecting
microcomputer. . .**

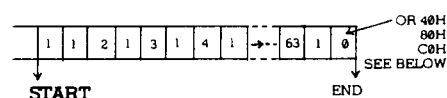
Fig 1.



Using sound in M/C programs

Sound uses a series of numbers starting with the address given and stopping when it first meets a value indicating 0 amplitude. The command goes through this table of amplitudes OUTing exactly what it finds there. For a sound steadily increasing in volume try this:

Table of Amplitudes in RAM



You have a waveform as shown below, in Fig 1 (almost over too quickly to hear!):

Because 0 will terminate the table we must use 1 as the lower value to provide the amplitude.

If your table includes numbers larger than 63 these will be ANDed with 63 to provide a number that the speaker can accept. Therefore if either 64 (40H), 128(80H), or 192(C0H) is in your table, they will all be treated as 0—and the table will be terminated.

TO USE SOUND IN A MACHINE CODE PROGRAM

```
210000 SOUND 1: LD HL, table
                of amplitudes
110000          LD DE, delay
3E01          LD A, 1
D380          OUT (80H), A
14           INC D
CD9009        CALL 0990H
C9           RET
```

LYNX PROGRAMMERS

Machine Code reaches the parts that Basic cannot.

For example you can:—

- Speed up the screen
- Make Basic programs smaller and faster with code line routines
- Use alternate green for programs or data
 - Add to the cassette handling
 - Add commands to the editor

It need not be difficult—the Lynx has excellent facilities for incorporating M.C. in Basic programs—and it may be that 30 or 50 bytes can make the world of difference. You may have already tried “hand” assembling using the monitor but this is painfully slow.

“CODER”—an instant assembler and disassembler for CODE lines. RAM and ROM makes it easy.

20 single key commands include insert and replace (in assembly mnemonics), delete, change an operand, save, test and many more. Operands can be entered in hex, decimal, binary or as expressions. Any M.C. in CODE lines can be relocated, and you can flip into the monitor and back to “CODER” at will. The 11 page manual includes simple routines for those just learning and plenty of information about the program. “CODER” is in Basic with Machine Code routines (in CODE lines) used extensively. It leaves room for over 4K of code on a 48K LYNX and concludes with notes;

AN ON GOTO ROUTINE (look up table)

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STARSHIP ORION by Paul Nixon £4.50
Save the Earth, challenge the aliens in Space with your main screen and target radar—but keep your eye on your oxygen supply. This program makes very good use of the graphics facilities.

DEATHBALL by A Miller £5.50
This game has two levels of play.
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NILUG

The National Independent Lynx User Group (NILUG) is run by Robert Poate. Robert's aim is to provide detailed information about the Lynx, through the NILUG Newsletter. At present he is compiling a beginner's guide to machine code, and simultaneously working on the production of software for the Lynx. NILUG's address is 53 Kingswood Avenue, Sanderstead, South Croydon, Surrey CR2 9DQ.

Robert Poate writes: One of the problems I have found with the Lynx is that the INPUT statement doesn't give me the facilities that I want.

Firstly I want to be able to accept a naked RETURN or to accept data. The Lynx allows you to take RETURN (using GET\$) or data (using INPUT) but not both. Secondly I want to be able to edit data. If a user enters data that fails a validation test I want to be able to give him the chance to edit the data and have another try. Thirdly I want to be able to restrict the amount of data that user may enter. The normal INPUT statement permits 240 characters even though the longest string you may have is only 127 characters long. A wayward user typing madly across the screen can ruin an artistic screen layout. Finally I want to be able to prevent single key entry during INPUT.

Solution

What follows is my solution to the problem. Basically it is a small machine code routine which is slipped between the line input routine and the code to process INPUT. It puts G\$ up onto the screen and allows a user to edit it. It fools INPUT if the user presses just RETURN. You can set the number of characters a user may type and it prevents single key entry.

The formal parameters look a little intimidating but they are all quite straight forward. First of all you define the prompt P\$. Then if you wish to edit text you define G\$, otherwise G\$=" ". Then you invoke the procedure which will set up G\$. The formal parameters are as follows: - PROC GEN.EDIT (n,i,P,p,W,w,b,d) where n is the number of characters permitted; i is a true/false flag to indicate if a naked RETURN is permitted; P,p are the co-ordinates for the prompt; W,w are the top left-hand co-ordinates for the input

window; b,d are the breadth and depth of the window in characters; G\$ is the output text.

I have found that it is a good idea to set the number of characters one larger than you need. This gives space for the cursor. Make the window size at least two characters bigger than the number of characters permitted. This allows for the INPUT prompt (?) and the following space.

The following program demonstrates the use of GEN.EDIT. It allows you to type in some text and then edit it.

BASIC DEMONSTRATION PROGRAM

```

100 CODE CD CC 10 06 F0 3E F0 90 47 F5 CD
    EF 10 E5 21 E2 10 22 BC 52 E1 F1 B8 CO
    ES 21 00 0D 22 00 50 E1 C9
110 PROTECT 0
120 DIM G$(40),P$(20)
130 VDU 1,BLACK,2,YELLOW,4,2,GREEN
140 LET G$=""
150 LET P$="ENTER SOMETHING "
160 PROC GEN.INPUT(20,0,3,55,70,55,12,2)
170 LET P$="NOW EDIT IT "
180 PROC GEN.INPUT(20,1,3,100,70,100,12,2)
190 PAPER YELLOW
200 PRINT @ 3,200;"G$ IS NOW "G$;" "
210 END
220 REM
230 REM chrs,CR,Prompt,Wind,Br,Depth
240 DEFPROC GEN.INPUT(n,i,P,p,W,w,b,d)
250 PRINT @ P,p;CHR$(19);P$;CHR$(18);
260 WINDOW W,b*3+W,w,w+10;d
270 VDU 23
280 FOR I=1 TO d
290 VDU 30,31
300 NEXT I
310 VDU 23
320 FOR I=1 TO LEN(G$)
330 POKE &5FFF+I,ASC(MID$(G$,I,1))
340 NEXT I
350 POKE &5FFF+1,3000D
360 POKE &2BC,LCFN(100)
370 POKE LCFN(100)+4,n
380 INPUT G$
390 POKE LCFN(100)+4,240
400 IF PEEN(&6000)=1 THEN GOTO 270
410 IF PEEN(&6000)=0 THEN LET G$=""
420 WINDOW 3,123,5,245
430 ENDPROC
    
```

U.K. membership of NILUG is £9.00 per year and overseas membership is £12.00 per year. Please let me know whether you want to start with issue 1 or 2. If you prefer send £1.50 for a sample issue.

SCOTTISH CLUB

The Edinburgh Home Computing Club meets at the Claremont Hotel, Claremont Crescent, Edinburgh at 7.30pm on the second, third and fourth Wednesday of each month. Lynx owners who would be interested in starting a user group within the EHCC should phone Neil Grubb on 031-667 6286 after 6pm.

Neil is sure that there are many Edinburgh Lynx users looking for an opportunity to share ideas and software.

Both Neil, who is the 80-member club's treasurer and assistant secretary, and John Palmer, the chairman, own Lynxes and are very pleased with their machines.

Routine to clear the screen

The ROM routine shown on page 13 of *Lynx User 1* is an example of how to clear the screen. The following routine is necessary to CALL it successfully:

```

3E 20 LD A, 20
D3 80 OUT (80H),A
3E 23 LD A, 23
21 00 C0 LD HL, 0C000H
16 00 LD D,0
CD CF 08 CALL 08CFH
D3 80 OUT (80H),A
C9 RET
    
```

Saving variables (continued)

In *Lynx User 1* (page 6, Saving Variables), we suggested that you RUN 1020 to save your program. We should have said GOTO 1020. Our original suggestion would delete all your variables before saving them.

Call 0—all is not lost

In the short item *Resetting after a Crash* (*Lynx User 1*, page 6) we stated that CALL 0 would cause Basic and machine code programs to be lost.

CALL 0 resets much of the machine's operating system, but does not erase memory. So Mr Walton's suggestion (*Is there Life after NEW?*, *Lynx User 1*, page 7) will also restore programs apparently lost through the use of CALL 0, and will keep machine code completely intact.

48K or 96K?

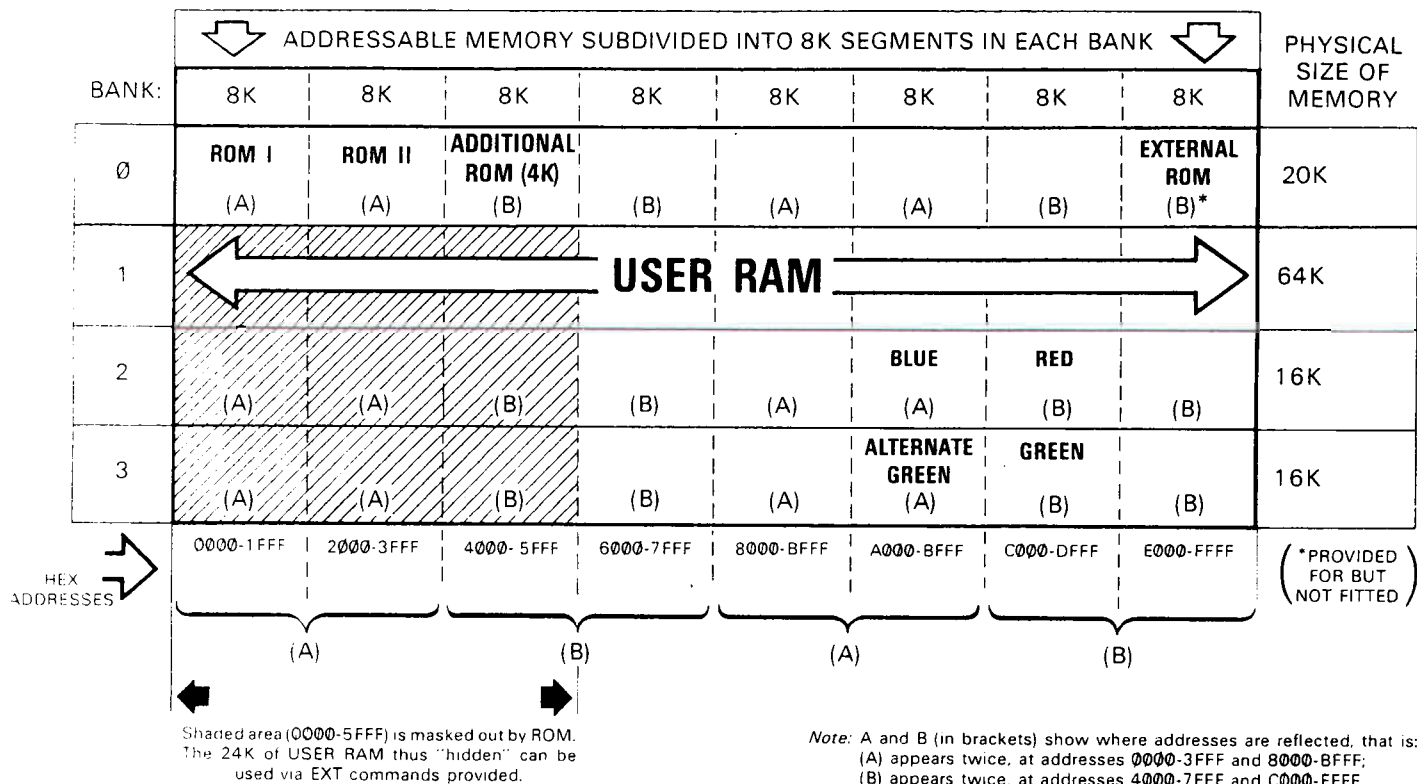
Information given in this issue of *Lynx User* refers to both 48K and 96K machines unless otherwise, stated.

LYNX USER

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Views expressed in this publication are not necessarily those of the publisher.

LYNX 96K memory map



Contrary to any previous documentation, the video memory map in Bank 2 shows the correct layout for 48K and 96K Lynxes.

SOFTWARE EXTRA...

Level 9 Computing are about to release a new adventure game called **Snowball**, to complement **Dungeon Adventure**, **Colossal Adventure** and **Adventure Quest**... **Maincomp** are advertising **Battle of Britain**, a textual game from which part of the proceeds are being put towards an RAF charity... **Camssoft** are soon to launch **Dambusters**, **Connect 4**, **Invaders**, **3D Monster Craze** and **Hangman** upon an unsuspecting world... also new from **Camssoft** is **Lynx Music Master**, which allows every **Lynx** owner to compose melodies without the need to understand musical theory... **Yupesoftware** are selling a **Sprite Graphics** package and a **Disassembler**, but the latter seems to be far from bug-free... **Quazar** are also advertising a **Disassembler** and their own version of **Othello**, entitled **Reversals**... **Laurie Shields Software** have compiled an **Editor/Assembler/Debugger**, yours for £22.50 including manual and cassette... **Harvestsoft** are selling a version of **King Solomon's Mines**... **Bambysoft**, based in the Shetlands, have sent us two games for children under 10—**Treasure Island** and **Rocketman**... **Lionsoft** are a new software house based in Somerset who have compiled a list of 12 games including **Poker**, **Patience**, **Hangman** and **Anagrams**—all of them should be on the market soon... Games from **Bus-Tech**, **Gemsoft**, **Willowsoft**, **Quazar** and **Level 9 Computing** are all described in detail in advertisements elsewhere in this issue... **Language-learning Courses** to be run on the **Lynx** will soon be available through **Camssoft**... did someone say there wasn't any software for the **Lynx**?

WIN 10 FREE GAMES

The popular press has convinced itself that all computer games are devised and written by a handful of nine-year-olds 'somewhere up North', and that each of them makes enough money to repay the National Debt overnight. It's arrant nonsense, of course, but, as the hacks say, 'why let the facts stand in the way of a good story?'

The truth is that computer games are written by all sorts of people, and that many programmers are amateurs who simply aim to cover the cost of their hobby by selling their output through the post.

To enter our competition, you don't even have to be a programmer, but you do need to have some kind of idea about the ways in which computer games work.

We are offering 10 FREE CAMSOFT GAMES to the entrant who comes up with the best idea or scenario for a computer game. Five free Camssoft games will be awarded to each of the two best runners-up.

Each entrant is allowed to submit three ideas. Each idea should be fully described on a single side of A4 paper, with details of scoring, levels and objectives. The games may be of the 'arcade', 'adventure' or educational variety.

What the judges are looking for is *originality*—there is no point in sending us versions of *Space Invaders* or *Pacman*, because we've seen all that before. Fresh, original ideas are what we are searching for.

If the ideas are strong enough, Camssoft will undertake to market the winning entries commercially. Your copyright on the game will not be infringed if you are a winner.

So, remember that we are not looking for programs, simply ideas. Each idea should be written on a single sheet of A4 paper. The maximum number of entries per person is three. The entries will not be valid unless they are accompanied by the coupon below.

Closing date for the competition is December 1, 1983.

Send your entries to 'Ideas', Camssoft, 33A Bridge Street, Cambridge CB2 1UW.

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