

LYNX USER GROUP



MAGAZINE
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LYNX COPY CAT

This is a collection of programs for serious and non-serious programmers alike.

COPY CAT which will Load/Save/Verify, with or without auto-run, machine code, basic, and multipart programs.

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FLYTE

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LCS

21 Manitoba Close
Blackburn, Lancs. BB2 7DR.

EDITORIAL

This will be an introduction and an explanation of the intentions and aims of the LYNX USERS GROUP. It is to be hoped that as the membership and interest increases that the standard and quality of the magazine will also be improved.

A general outline was given in the first issue of the newsheet and since its publication further suggestions and requirements have already been made by members. Many of these will be adopted in the forthcoming issues, however certain ideas do need careful thought, for example, the idea of operating a subscribed software library. This of course does raise the question of possible piracy of commercial material, though it would be feasible to possibly operate some form of user software library e.g. long machine code programs which do require accuracy of entry to be successful. Perhaps members would get in touch with the editor on this subject.

From the questionnaire it is quite evident that most LYNX owners are only using BASIC as a programming language and although there is some intention of getting to grips with machine code at a later date, initially help is certainly needed to program. So articles on designing and structuring programs from more experienced members would be certainly appreciated.

Another feature which would be of benefit and interest to all members is to compile a series of POKES into the pointer table and elsewhere into RAM, to assist in getting more from their LYNX.

As has been observed by the editor over the last year, even with BASIC, programs have been getting more sophisticated as owners are discovering the incredible flexibility of LYNX BASIC, this is why there is an important need (long overdue) for an advanced book on LYNX BASIC. If any individual feels that to write such a tome is too daunting a task, then an alternative approach would be for each interested member to write in detail on one subject for perhaps one chapter and then to collate all contributions together and to produce a joint effort. Typical headings might be :-

- 1) STRING SLICING
- 2) STRING MANIPULATING
- 3) STRING ARRAYS
- 4) NUMERICAL FUNCTIONS
- 5) NUMERICAL ARRAYS
- 6) USEFUL FORMULAE AND FUNCTIONS
- 7) PROGRAMMING TECHNIQUES
- 8) DESIGNING A PROGRAM
- 9) USER DEFINED GRAPHICS
- 10) MEMORY SAVING METHODS : 48K OWNERS
- 11) A BLOCK ANALYSIS OF ROMs : NO BYTES!
- 12) ASSEMBLER / BASIC ANALOGIES
- 13) SCREEN PRINTING TECHNIQUES : CHR\$ and VDU
- 14) PEEKS and POKES : A BIG TOPIC
- 15) APPENDICES

I am sure that other subjects could be thought of in place of or in addition to the above. However the above is only a guide to what could be covered in such a manual, one thing I am sure of, that it would become a BEST SELLER!!! Publication and

printing can easily be arranged, on a guarantee from members that they would certainly purchase the book if it was produced. Another possible approach could take the form of a ring binder manual so additional chapters could be added at a later date with of course an amended index each time. This method is used in industry by certain component manufacturers to update their catalogues at low cost. Of course all contributors would share in the royalties from the sales and be acknowledged in the preface. Please write to the editor on this subject so a reaction can be obtained from LUG members.

There are at present local branches of LUG in existence, the first is based in TYNE and WEAR, called the NORTH EAST LYNX USER GROUP; a second one has been formed in MANCHESTER, under Jim Sellek; a third in READING, details of these will be supplied on request. Hopefully further local groups will be formed and their existence will be mentioned in this magazine. Certainly at least two are required in Scotland and maybe Wales, and they are also required in other regions of the country, e.g. the South West.

LUG is now advertised on PRESTEL, pages :- 8008124a and b, and is affiliated to the Association of Computer Clubs (ACC). LUG will also be at the PERSONAL COMPUTING WORLD exhibition at Olympia No 2, LONDON, from 19th to 23rd Sept. If there are any other shows elsewhere in the country, perhaps volunteers could be found to 'man' these events and so promote LUG! Please send your replies to the editor.

One version of the LYNX is neglected and that is the Laureate or 128K model, so any material at all would be greatly appreciated by these owners, and I am sure that other owners would find 128K program material interesting as well! I have been asked whether it is possible to extend the CIRCLE command on the 96K to produce ellipses as per the 128K, see the article by Guy Hindle in this issue. On the subject of circles, due to the asymmetry of the LYNX pixel it is not possible to directly obtain a good circle on the screen, however if the SIN / COS routine is used, by introducing a 'fiddle factor' of 1.25:1 to the horizontal and vertical plotting routines, it is possible to obtain quite a good symmetrical circle.

One topic I regard as a maximum priority, and that is, getting the Serial Port up and working. If this could be modified by adding the necessary handshake line and adjusting the signal levels to convert into a RS232 port, then with appropriate software the LYNX will be able to not only operate a modem but will be capable of communicating to other makes of microcomputer. This would also open up the possibility of the LYNX being able to easily interface to other peripherals which use the RS232 port as a standard method of communication. Perhaps someone could suggest ideas on this subject. In the case of the 128K machine this already has a handshake line but it still is not a true RS232 port and some form of software is still required.

An attempt will be made in all issues of the LUG magazine to achieve a reasonable balance of all material supplied for publication. The suggested topics are :-

- 1) Hints and Tips on programming.
- 2) Program structuring.
- 3) BASIC programs e.g. games, utilities..
- 4) Constructional projects with appropriate software.
- 5) Machine code routines and utilities.
- 6) Reviews of any form of software.
- 7) Reviews of any form of hardware.
- 8) Letters to the Editor.

To this can be added any other topic which members feel appropriate.

As mentioned in the first newsheet, there will be provision for members to advertise their equipment (1) or any software they may be tired of. This could include items which although not directly related to the LYNX, maybe could be of interest to other members, BUT don't advertise unwanted objects like furniture or cars, because they won't appear...., so don't abuse the facility ! Do keep the advert short otherwise it may be edited ! Adverts of this form will be inserted free, however there has been an amendment, any advert from a non-LUG member will be charged a nominal £1.00 for each insertion.

Commercial advertisers or owners who would like to advertise software for example, can do so at the rate of £80.00 per A4 page or pro-rata in 1/8 page increments. Copy may either be supplied or if required, can be set by the editor for a small nominal charge. This advertising rate is being kept intentionally low to encourage suppliers to advertise and also to offer to members a chance to offer their 'wares' and who are not sure of the market.

At the time when this editorial was being written certain items of information had come to hand. One of the Spectrum chain of shops in Tottenham Court Road, were selling the LYNX 48K for £79.95 and the 96K LYNX for £149.95! These are ridiculously low figures and if any owner feels like a second machine or is thinking of parting with his LYNX, perhaps some thought is needed. Originally, the only acceptable price for LYNX peripherals was for the Joy-stick Interface @ £14.90. As a printer is possibly the next item of hardware obtained, the price for the interface should have been no more than £30.00, otherwise to the purchase price of any form of printer must be added another £50.00 for the interface. Why was the printer output routine set for a now outmoded printer ? Most printers use a standard ASCII code for carriage return and line feed, namely 0Dh (CHR\$ 13) and not 0Ah as the LYNX routine seems to do. This has resulted in printer 'patches' being required, my patch is in this issue for anybody who would like to interface to the Tandy CGP 115 or the MCP40 which is now at a reduced price of £120.00, or less. If anybody has a 'patch' for their printer, earn some money and have it published in the LUG magazine!

Another subject which should be mentioned is the question of 'BUGS', it would be a useful exercise to

generate a listing of faulty routines which still exist in the ROMs, these could then be possibly corrected. Some of which were previously mentioned in NILUG Issue 4. by Colin Clayman. To mention an example, try LOG (1), this gives 1.6E-7 and which should of course be 0!

Would all those members who have not received a copy of the June issue of the newsheet with their first issue of the magazine, please get in touch either by 'phone or letter to the editor. The reason is, because many new members have not directly transferred from NILUG and have obtained their copy either from the exhibitions or from direct enquiry about the user group.

LUG is now INTERNATIONAL, members exist in NORWAY, FRANCE, DENMARK, BELGIUM, LUXEMBOURG, SAUDI ARABIA, and S.AFRICA! I must compliment them on their command of English and thank them for their support of LUG.

I am quite sure that many members would be interested in short articles on some of the other computer languages, at least in a simple form, these could be, FORTRAN, COBOL, C BASIC, LOGO, LISP, etc. So how about submitting articles and recovering your membership fee! Remember an A4 page will pay you £10! All programs will be most welcome and will be published, any material no matter how brief will be of interest.

This has been a massive editorial, in future I will keep it a lot shorter because it is YOUR group and YOU must support it.

It has also been proposed that it may be a good idea to hold a symposium/exhibition some time in the future, where members could meet and possibly get support from some of the software houses. Perhaps you would get in touch with the EDITOR on this idea. The entrance would be free to LUG members and anyone else would of course have to pay an entrance fee.

At the time of writing, I can inform you that an INCREDIBLE deal is being set up by my company (PERIPHERAL PRODUCTS) with a very well known hardware firm. If it is successful, then the LYNX will virtually 'erupt' overnight !!! Currently they are supplying expansions to the BBC micro, and have provisionally indicated that modifications for the LYNX would be relatively straight forward. It is hoped that at least a prototype system will be up and running for the PCW show in September, so keep your fingers crossed !!!

As a final point, would all radio hams please get in touch with the EDITOR, as two facilities are now available, a) a MORSE trainer and b) a RTTY system.

R B JONES EDITOR

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The SANYO DR 202 DATA RECORDER

This is a review on a new dedicated cassette recorder from SANYO. Unlike the very popular DR101, which had the facility of still being used as a mono music recorder, the DR202 has been produced specifically for home or even industrial use with computers.

The author first spotted it at the WHICH MICRO exhibition at the NEC at Birmingham in January '84, but at that time very little information was available. Now however it is just beginning to appear in ones and twos in the occasional computer store, on enquiry, the price it is being offered at, is about £50.00, the author has had one in his possession now for about 3 months and has been putting it through its paces.

The appearance of this new cassette machine is radically different to any machine that has yet appeared, as the styling is a case which is angled at approximately 30°. This complements the general shape of any micro, and is in a grey and pale cream, which goes well in styling with the LYNX colour scheme.

To give a few basic facts; dimensions are, 200 mm wide, 150 mm deep, 50 mm at the front sloping to 90 mm at the back, weight 950 grams, the angled design makes for very easy reading of cassette labels through the clear window. The deck controls are from left to right; SAVE (RECORD), LOAD (PLAY), REW, FFWD, STOP/EJECT. The absence of a pause key was thought originally to be a disadvantage but using ADSS, (explained later), really made this function rather redundant. Also provided in the SAVE and LOAD keys are red and green LED indicators respectively. Connections on the back are SAVE, LOAD, and REMOTE which are LYNX compatible, but the colour code is different! The machine is for mains use only, and on checking the signal out from the LOAD socket, it was found to have only a small AC ripple on the signal, about 3% of the total level, indicating that quite adequate smoothing was employed in its power supply, so this should not present a problem on any version of the LYNX.

On the righthand side are the electrical controls consisting of 4 push-buttons, labelled left to right as PHASE (NOR / REV), MONITOR (OFF/ON), SAVE MUTE, and the ADSS switch with three LEDs above. Below these is of course a VOLUME control which is of the slider type. No tone control is fitted as it is generally accepted that most computer recordings are best with a 'bright' sound on play-back.

The PHASE switch was found to be very useful, as many programs I have tried from other sources are often reversed phase and would explain why owners often have trouble loading software from other sources.

The MONITOR switch allows you to hear the signal in both SAVE and LOAD modes, and frankly I leave this switched on all the time as the volume of sound



is at a very acceptable level. It doesn't hurt the eardrums!!! I have found this particularly useful at the beginning of the header signal, for many headers are corrupted at the start. This presumably is the point when the recorder in question is just switched on, and the motor just starts up. Being able to hear the signal in the LOAD mode also tells you whether the LYNX has seen the program title so it can quickly be returned to the start if it fails to do so.

As yet I have not found the SAVE MUTE facility to be of great use. The idea is to wipe the tape for a certain length to provide isolation between programs. I will interject at this point with an experience I have had with 'cheapo' tapes, and that is the problem of PRINT-THROUGH. Some tapes I recorded a year or so ago are now un-LOADable, and on investigation found that on what should have been blank tape between programs, there were trace recordings re-recorded from the adjoining tape layers. Of course this would have also happened anywhere within a program and thereby corrupted the program. So I have learnt a bitter lesson from this, so BEWARE!!!

The final switch and I have left this till last is the ADSS facility and in a word 'WOW'.

The principal is similar to the facility provided now on HI-FI cassette machines which is a programmable search for a particular program. ADSS or to give it its full title AUTOMATIC DATA SEARCH SYSTEM is a means of fast search in either forward or reverse rewind for your program choice, e.g. on a C60 or C90 cassette. It effectively turns the cassette recorder into an equivalent of a DISC system, because you are able to rapidly find your program and then to drop into normal LOADING speed.

Basically the ADSS looks for gaps between programs and it allows you to program up to 3 gaps, which in effect covers 4 programs. If the program you require is further on then it will allow you to re-program during the fast wind or rewind, but keep a check on the gaps!!!

To summarize this :-

PROGRAM 1	Use normally.
PROGRAM 2	ADSS on.....1 GAP
PROGRAM 3	ADSS on.....2 GAPS
PROGRAM 4	ADSS on.....3 GAPS
PROGRAM 5	ADSS on.....3 x 1 GAPS

and so on.

This also operates in REW, if you are at the end of the tape or if you know where you are in the middle, you can easily trace your program.

Another useful aspect of this system, is if you have unsuccessfully tried to load a program, then just set the ADSS for 1 GAP and it will rapidly rewind (using the REW key), to the beginning of the recording and start to LOAD the program again. Really the digit counter nearly becomes redundant!!!

To use the ADSS, the sequence of operation for LOADING, for example, the second program on a tape is as follows :-

Put the tape into the cassette machine and press LOAD. It's at this stage that you set the ADSS to 1 (1st GAP), if you over set don't worry, you'll find that it will cycle around the three LEDs. Type in your program name, but don't press RETURN yet. Then press the FFWD key down, which will latch on. The motor will start and begin fast winding the tape, then press the RETURN key on the LYNX. As soon as the gap is found, the FFWD key will cancel and the cassette will LOAD in the normal way. The same procedure is used to re-LOAD a program which has failed to enter first time only this time, you use the REW key to get back to the beginning of the program.

Supplied with the DR 202 is a very clear booklet which also explains the techniques I have covered above. Certain little niggles, one is if you try to use the FFWD or REW keys with the LOAD key pressed and no ADSS selected, a rather nasty groaning sound emanates, so if you get one be careful !!! The cassette keys also appear to be a little sloppy but I cured this with tiny wedges in the levers inside. Another curious effect occurred when I was LOADING an old program, as I didn't know what level to start with, I set the VOLUME control to maximum and while it was entering I noticed the ADSS LEDs were flickering !, when it finished and tried the program, it was CORRUPTED !!! So... another bonus at least with the LYNX, is it even tells you on occasion that you are wasting time !!!

So summing up, in the time I have had this machine, I have been more than satisfied in spite of the points I mentioned above. Again I am in a position to obtain the DR 202 for any LUG member at a price cheaper than the shops, that is if they can get one !!! My impression is that, at least initially, the machine is being aimed more at the industrial user than at the home owner. I know it seems expensive at even this price, but if you are having trouble LOADING etc then you won't go wrong in obtaining one. I now quite happily use it at ALL TAPE modes from 0 to 5 with virtually no trouble. The nominal VOLUME setting seems to be about 3/4 level. Rating 8 / 10.

R B JONES

THE BOWTHORPE MAINS PLUG

A short while back the editor received some rather interesting literature about a new type of mains plug from a company called BOWTHORPE EMP Ltd. They are already offering this product to BBC owners and via the ACC are now sending information to all computer user groups. The editor then arranged a meeting with them to discuss further details. The outcome of which is that via my company PERIPHERAL PRODUCTS it is now available to all LUG members at a group discount. They are only interested in quantity orders so individuals will be unable to obtain them directly.

There have already been several devices on the market to suppress mains interference, all of which seem to be only partially successful for they are generally based on the usual inductive/capacitive type of filter, and are also rather bulky in appearance. This is where this new product is different ; (1) it does not rely on the filter mentioned above and (2) it is only slightly taller than a conventional plug top, (see advert). This latter aspect lends itself ideally to those owners who use a multi-way distribution block.

In simple terms the principal on which it works is that any signal or spike which is present on the mains supply above the normal level is simply 'chopped' off. The device does not operate and therefore consumes no power unless the interference exceeds a certain level. It provides complete coverage on the incoming supply as it is connected across all three lines. The base is completely standard, fitted with a 5A fuse instead of the more usual 13A, and will present no problem in fitting to the computer's cable. The packaging is also rather unique, for it is literally printed on every surface with an abundance of technical data, which makes for very interesting reading. It has full BS approval and has been produced by a company whose business is very high voltage, 1 Mega-volt or thereabouts!!!

About a year ago I purchased one of OPUS SUPPLIES 22" colour monitor chassis, which I fitted into an old TV cabinet. Now because of having a large tube, the designers RAMTEK Ltd had built in several spark-gaps within the circuitry to release any overvoltage which may be generated by the LINE generator, fine, BUT on occasion these discharge with a loud CRACK and the result on any program within the LYNX is a total CRASH !!!

Over a period of approximately a month, I have found the plug to be reasonably effective, for I believe that a lot of interference appears on the RGB cable between the LYNX and the monitor and of course this plug will only be effective on the incoming mains supply. Certainly I don't appear to get quite so much trouble with interference as I used to. The cost would seem to be rather high but if valuable data is not to be lost then any product to prevent this happening must be essential. The retail price when it is generally released will be £12.00 inclusive of VAT, but to LUG members it is offered at a discounted price of £10.00 inclusive of postage/pack-ng and VAT Recommended. 8/10.
R B JONES

FLYTE by LCS software

FLYTE is a night flight simulator for the 48K or 96k LYNX. Also included is a six page manual describing flight briefing, main controls, flying characteristics, instrument panel layout, hints for the novice, and a map of three runways and fifteen beacons. The flight brief tells you that your mission is to pilot a 747 Jumbo between two airports, e.g. LONDON HEATHROW, GATWICK, and MANCHESTER with the use of fifteen beacons on longer flights. (Ed. Using a Jumbo for a few miles ?).

The program took approximately four minutes to MLOAD on TAPE 0 and autoruns. Once loaded you are shown the logo for a few seconds then the screen clears to show the control keys. Left and right keys controls banking, up and down keys control the elevators, flaps on the 'F' key, beacon direction on the 'N' key. Joysticks with the interface can also be used. After pressing a key, you are asked whether you want the added difficulty of wind speed and direction. Pressing a key again, you are presented with a view from the cockpit with the stars at the top of the screen, the horizon, and runway lights. The bottom half of the screen shows the aircraft dials and control display consisting of compass, clock, airspeed, engine thrust (controlled by the '+' and '-' keys), altimeter, fuel, artificial horizon, heading, bearing, distance from bearing, flaps and undercarriage. (Ed. Phew !!)

Increasing thrust to 2/3 and using the cursor keys to keep the aircraft on the runway, you should take off between 120 - 145 knots. Below 120 and you don't get enough lift, above 145 the screen shakes and you are given a message that a pilot error has occurred trying to take off at too high an airspeed.

It took me a few goes to get airborne, but finding the airport and landing was a lot harder than I thought. The aircraft seems to bank to the left all the time, is this normal on a real aircraft? (Ed. Perhaps it needs some maintenance !!).

I have made six successful landings so far but have only been given a zero rating, so am I really that bad ?

To sum up I would give this game 8/10 for entertainment and presentation. (Ed. I want it !!).
T GAWLIK.

CENTIPEDE by PLAY IT software

CENTIPEDE is a very popular arcade game found in many Pubs and amusement centres. This is the second version the reviewer has seen for the LYNX, the first being SPEEDPEDE from Camsoft. Both are very good implementations of the game, but after playing SPEEDPEDE and CENTIPEDE, I feel I must give the edge to CENTIPEDE as the graphics are much clearer, certainly on my 22" monitor, which tends to show up all kinds of faults with graphics. However I will say this, a TV will not do justice to the displays on either, as in both versions, there is an incredible amount of very fine detail on the characters and it is unlikely that a TV will be able to resolve this detail.

It was some time ago that I played SPEEDPEDE, at the ALCC exhibition at Easter, so I am unable to give a definitive report on SPEEDPEDE, so I will confine my comments to CENTIPEDE.

From a personal point of view, I am not much of a games player although about two years ago I bought an ATARI console and tried my hand at some of the cartridges but after about three months, I soon became quite bored and shortly after sold it and decided to buy a LYNX instead !!! Only one of the games I had, ever caught my interest and that was ADVENTURE and as yet I have not seen it implemented on any micro let alone the LYNX. So as regards games software, I tend to be a little wary. However I must say that generally I was very impressed with the quality of CENTIPEDE, which really illustrates what can be done with the video RAM if one tries hard enough. As has been said before, the LYNX is a very subtle "cat" and needs skilled programmers to demonstrate what can be done with all that memory.

The copy of CENTIPEDE I received, was MLOADed at TAPE 0, took approximately 3 minutes to load, and then autoran. You are then presented with the first of two highly colourful screens, which shows details of how to play the game e.g. "Q" for up, "A" down, "L" left, "R" for right, and the space bar for fire. There is also a joystick option, this operates via the right joystick port. However as I don't possess the JOYSTICK INTERFACE, I was unable to assess the game from this. But after trying the designated keys I would say that a joystick was essential to get maximum enjoyment from the game, for the game is fast and reads the keyboard at an incredible speed so making high scoring a bit of a problem !!! All text characters are redefined on what appears to be an 8x8 pixel format, this technique was first seen by the writer in a game from ABERSOFT called PACMAN I, and using this method any software writer doesn't have to worry about byte boundaries etc., with the result that the software does run faster. It would have been a good thing if there was an inbuilt routine to switch to an 8x8 format in the ROMS, perhaps called GCHAR, so that faster games could have been written even in BASIC, for all that is required is capital letters for any form of text. All text in CENTIPEDE is redefined on this basis and is also highly coloured as well ! The top of the screen shows a highly colourful logo of PLAY IT software and shows what can be done in this direction. The bottom is evidently WINDOWed as it shows the SCORE reached and the number of lives left, a maximum of 5. The second screen simply shows a "HALL OF FAME" with the writer supposedly reached a score of 50000, I crept in at the bottom of this with a score of 8400, but I am certain that with a joystick I could have done better. To start the game the spacebar is pressed, whereupon the bulk of the screen "wipes" the display leaving the windowed section at the bottom showing the score and number of lives left, the screen then fills with a random array of "mushrooms" and the dreaded "centipede". Also there appears the occasional "snail", a flying "bug" and one or two other "nasties". Various jingles are used for sound as well as fire noises

etc, and it is a pity (or not) that the LYNX volume is so low as some of these tunes are quite musical in nature and could be a lot louder.

The game is the classical CENTIPEDE, and wouldn't go amiss in any arcade, so if you know the game then you would thoroughly enjoy this version, it is fast, graphically excellent, and is only let down by the sound volume which is really the fault of the LYNX and not the game. I was really impressed and hope that this standard can be maintained for any games software, as the LYNX is quite starved for any good material. Keep up the good work, PLAY IT, and I look forward to further software from them. Highly recommended, 9/10.

R B JONES.

..... COMPARISON OF TWO SPACE INVADER PROGRAMS:-

LYNX INVADERS BY CAMSOFT

YNXVADERS BY BUS-TECH

The Camsoft game comes in the usual attractive packaging complete with instruction leaflet detailing loading and playing instructions. Bus-Tech's offering is in their usual packaging of a black cassette inlay with only a few lines of typed loading instructions. Both programs loaded first time and each presents a title page showing controls and scoring possibilities. Camsoft's titles are excellent while Bus-Tech's are merely good. Neither program, annoyingly, gives an option to use a joystick or for two people to play.

The most noticeable difference between the two comes when the screen fills with Invaders. Bus-Tech ones are tiny compared to the Camsoft versions. YNXVADERS as a whole is very much slower and the bullets which do not hit anything corrupt the top of the screen display. Colour, graphics, movement and response are far superior in LYNX INVADERS. Camsoft's game also features a hold game facility, enabling you to answer the door etc, and return to the game at exactly the spot you left it.

In conclusion, if you want a space invader program, out of the two offerings, Camsoft's LYNX INVADERS is by far the better program. This is also a very good implementation of the type in its own right. Two features stop me from giving it full marks, the lack of a joystick option, and the price at £9.90.

D HOLDING.

..... CHANCELLOR from QUAZAR COMPUTING

Chancellor gives you the opportunity to show how much more of a grasp of the national economy you have than either the present, past or future governments. Having played this game an enormous number of times I know now how wrong my friends and I are. The game comes with detailed, though poorly presented instructions, briefly explaining the way the program arrives at decisions and the difference between Keynesian and Monetarist theories. After loading you make the choice between the two theories and the game is then based on those parameters.

Chancellor presents you with a screenful of questions, the answers to which should be given some thought as you can get thrown out of office pretty quickly. The questions range from what you want the exchange rate against the dollar to be, your annual expenditure and a whole range of economic topics. The unions sometimes reject your pay proposals and you can only vary some parameters by a maximum of 10%. When the questions have finished, Chancellor asks if you want to display your performance on its two graphs. This is the point where the shock sets in. Unemployment doubled, balance of payments miles out and who knows what else. Having recovered, you go on to a financial summary of your first year, then you start again on the next year's figures. 10 years is the period to survive, this is difficult as the graphs get worse and messages start to appear, warning you about excessive unemployment etc. Chancellor makes you wonder if the Treasury uses a similar program for their economic model of the country or do they use an inferior version.

Chancellor is a good, thinking game with which you can spend many an exasperating hour. At the reasonable price of £4.75 I can highly recommend it.
D Holding

..... MOONFALL

This is Camsoft's version of the old Lunar Lander game albeit with colour and sound. The object of the game is to land your lunar module without crashing into the ground or blowing up the engine. The game first asks which level you require (1 easy, 9 difficult), then displays the main screen. This is a nice piece of graphics, with the Earth at the top right and the landing surface, complete with rocks and mountains, in outline at the bottom. Detailed along the top of the screen are the various parameters you need to control or take note of. These are altitude, vertical speed, engine temperature (it blows up at 2200 degrees K), weight of fuel and horizontal movement indicator. The nicely represented lunar module appears at top centre. Reverse thrust is controlled by the number keys and horizontal movement by the arrow keys. Horizontal and vertical control naturally increases in sensitivity as the fuel load lightens, this particularly affects the horizontal movement.

As the module gets nearer to the surface the display switches to a close-up view for an accurate landing (or crash!). It is possible to go up as well as down and to go off the screen sideways. The display does not scroll across, it just switches to the next horizontal view. Higher levels start you off with a higher downward speed, and what to me, definitely feels like more rocks to obstruct a clean landing.

MOONFALL is a nice game, though doing nothing spectacular, it is enjoyable, demanding and graphically good.

D. HOLDING.

It has been said that the 48K LYNX does not have enough memory left to store BASIC programs since most of its RAM is used for display. In fact it has approximately 14K RAM left for programs and whilst this does not seem much compared with other similar (overall) sized micros like the SPECTRUM, it is often more than sufficient if some care is taken to write the program efficiently and compactly, yet still retaining its superb graphics not available on most other micros. Writing programs in this way can also produce more readable and understandable programs as a beneficial side-effect. Also smaller programs take less time to LOAD.

I am sure the majority of home programs can be written for the 48K LYNX, except possibly those requiring reams of text, such as adventure games.

I first used some of the techniques I give below when I had a 1K ZX81, when it was essential to write compact programs in order to get it to do anything useful. Now I find that this experience is equally valid to the 48K LYNX as well as for programs I do at work on a 64K ICL business micro.

Using these techniques I can often save at least a third of the original size of programs published in magazines, which also saves the amount I have to type. I think a 20% saving can be achieved as a matter of course, without sacrificing readability; indeed improving it. Most of the following hints will not only reduce the size but will also make programs more understandable.

Much of this is based on the fact that:
1)...every constant number takes 5 bytes to store
2)...every extra line adds at least 8 bytes whereas every BASIC "word" e.g. PRINT & RED needs only 1 byte to store as a token.

In each strategy described below I assume the others have been taken into account, especially hint 1, in order to identify the individual savings of that strategy alone.

1) CONSTANT NUMBERS

Often a program contains many repeated constants such as 10 (character height in pixels) and particularly 1. Replace each of these by a reserved variable which is given the value once at the start, e.g. :-

```
LET I=1,N=10
.....
FOR I=I TO N
.....
```

This saves 5 bytes for every constant provided you had at least 4 of the same constant.

This also enables you to change the size of something in one go without going through the whole program. You will also save a bit if for the less frequent constants you can replace them by a simple expression in the other reserved variables, e.g. :-
2 replaced by I + I saves 2 bytes.

Never worry about using extra variables, as on the LYNX the storage space of all the variables is fixed. The only problem is the fact that there is just 52 of them, but this is not usually a limitation, provided you don't waste unnecessary ones.

2) COLOURS

The useful and unique LYNX feature of having the functions BLUE, RED, etc. for the colours means that these should always be used rather than numbers when the colours are needed, e.g. always use :-
INK RED; never INK 2.

This saves 4 bytes every time a colour is used.

The same goes for giving "logical" variables the value TRUE or FALSE rather than 1 or 0. If you want to initialise an array to 0, set its elements to FALSE.

If you are really pushed for space, you can replace every constant less than 8 by its colour regardless of use, but this will make the program far less understandable, e.g. :-

All 2s could be replaced by RED.

3) GOTO

Most programs or parts of programs have the logical structure:-

```
Set up
100 action
IF NOT finished THEN GOTO 100 ..[END]
```

It is far clearer of what is happening and, because of the indentation of the LYNX's LIST routine, easier to see the structure if you replace this by:-

```
Set up
REPEAT
action
UNTIL finished .....[END]
```

This saves 3 bytes for every GOTO removed.

Similarly IF...THEN GOTO is often used to jump round a block, e.g. :-

```
IF x <> N THEN GOTO 40
PRINT .....
LET .....
40 .....
```

You can replace this by:-

```
IF x = N THEN PRINT .....
IF x = N THEN LET .....
```

provided there are no more than 3 lines jumped over. Also never use :-

```
IF x <> N THEN GOTO 100
LET a = 5
GOTO 110
100 LET b = 7
110 .....
```

when you can use :-

```
IF x = N THEN LET b = 7
ELSE LET a = 5
```

It is now very rare for any of my programs to have any GOTOs, which makes them far easier to debug as I can see immediately how it got to any path; thanks to the LYNX's superb programming structures.

4) IF...THEN...ELSE

Often one of two mutually exclusive simple actions is taken as a result of a test, e.g. :-

```
IF w THEN PRINT "YOU WON!"
IF NOT w THEN PRINT "YOU LOST!"
```

If this is replaced by :-

```
IF w THEN PRINT "YOU WON!"
ELSE PRINT "YOU LOST!"
```

this will save 6 bytes.

5) IF...THEN...LET

Often a variable is increased as a result of a test, e.g. :-

```
IF K$ = "1" THEN x = x + 1
```

If this is replaced by :-

```
LET x = x + (K$ = "1")
```

it will save 4 bytes. Even more can be saved if it can be merged with an adjacent LET.

In many cases such tests are used when the arrows change the position of something, e.g. :-

```
IF KEYN = 12 THEN x = x + 1
```

```
IF KEYN = 22 THEN x = x - 1
```

can be replaced by :-

```
LET x = x + (KEYN = 12) - (KEYN = 22)
```

this will save 21 bytes.

6) ADJACENT LINES

Often a block of successive lines of the same command, i.e. :-

```
LET, PRINT (particularly @) and IF
```

can be merged into one line, saving 8 bytes per line.

7) GOSUB/PROC

A commonly used SUBroutine can be replaced by a PROCEDURE, and the name of the PROCEDURE, even 1 letter, will be more memorable than the GOSUB line number. However the longer you make the name, the less likely you will save space but it will be more understandable. For example you will save with :-

1 character name, provided it's called at least twice.

5 character names, provided it's called at least 5 times.

8 or more character names will never save.

You could use the LYNX's LABELS in a similar way, but there is no real advantage over PROCEDURES. In fact one big advantage of PROCEDURES is that they can pass parameters unlike GOSUB, so you will also save lots of preliminary LETs as well.

8) ARRAYS

A large array which takes small values, less than 256, such as is used to keep track of objects and positions in the display, can usefully be replaced by a 1 character string array, e.g. :-

```
DIM A$(1) (N)
```

saving 4 bytes for every element.

However it will take more program to access its elements, i.e. :-

A(i) = x becomes A\$(i) = CHR\$(i), using 3 more bytes.

x = A(i) becomes x = ASC(A\$(i)), using 8 more bytes.

But if the values are codes for characters in the display, they can be replaced by the actual characters directly without needing a coding scheme.

9) DATA

When there are a lot of unrelated values to be given to an array, it is wasteful to LET each element separately; rather put the values in DATA, and READ them into the array in a loop, e.g. :-

```
FOR i = 1 to N
```

```
READ A(i)
```

```
NEXT i
```

```
DATA 12,23,45,67,89,.....
```

You will save about 20 bytes for each value in excess of 3 of them.

10) USER DEFINED GRAPHICS

When user defined graphic characters are used they are often put in DATA as binary numbers (BIN), READ and then POKED to store or a REM in a loop. All this can be saved by putting them directly in a CODE line in hexadecimal. It is very little work to convert the binary values to hex. e.g. :-

```
FOR i = 1 to N
```

```
READ g
```

```
POKE G + i, g
```

```
NEXT i
```

```
DATA BIN(101010), BIN(111111), BIN(001100),.....
```

can simply be replaced by :-

```
CODE 2A 3F 0C .. .. .
```

saving 52 bytes plus 11 bytes for each number.

11) VDU and CHR\$

Never use VDU in preference to CHR\$ unless you have more than 7 codes that can be put in 1 VDU line or you cannot include the CHR\$ in an existing PRINT line.

Particularly never use VDU for changing colour as PAPER BLUE and INK YELLOW is even more compact than VDU I, YELLOW, I + I, BLUE, let alone using numbers in the VDU.

(c) Colin Clayman 1984.

***** PRINTER PATCH No 1 for CGP 115 / MCP 40 *****

As has been mentioned before in NILUG issue No. 6, there are few standards as regards printer command codes. However under the ASCII "banner", there are some codes which tend to be universal. Some of these are:-

- 1) 07h or CHR\$(7), generally used for BELL or BEEP.
- 2) 08h or CHR\$(8), used for BACKSPACE.
- 3) 0Ah or CHR\$(10), used for LINE FEED.
- 4) 0Dh or CHR\$(13), for CARRIAGE RETURN and LINE FEED.

The LYNX however was configured for the SEIKOSHA range of printers which require an 0Ah for carriage return and line feed. Thus to run any printer which uses the ASCII standard for the above, certain printer "patches" are required. In addition, there are other printers which don't seem to conform to any standard, so "patches" are needed for these as well.

The purpose of this short article is to provide a "patch" for the very popular printer by TANDY, namely the CGP 115. This printer has now become almost a home standard, being available in several forms for the ORIC ATMOS, ATARI 600, and BBC under the label of the MCP 40. Although slow, approx. 12 char. per sec, it has many advantages for LYNX owners i.e. cheap (£100), 1 to 40 or 80 characters/line, graphic capabilities (4 colours), standard CENTRONICS connection (the TANDY has also serial) and because of being a near standard, pens and roll paper is therefore readily available from nearly every computer store. Unlike daisy wheel or dot matrix printers, this printer actually draws every character using tiny ball point pens and an x,y

action on the pen mechanism and paper drive. However this isn't supposed to be a review on the printer, so here are two versions of the "patch", the first was supplied by Simon Roberts of Computers when he was there, and the second is my version to lose it into HIMEM. Either version works equally well, DO NOT leave out the DEL lines, because if they are left out the LYNX will hang up !!!

PATCH 1a :-

```
1 CODE FE 1E C2 CB 4B 3E 0D C3 CB 4B
2 DPOKE LCTN (1) + 3,DPEEK (&6202)
3 DPOKE LCTN (1) + 8,DPEEK (&6202)
4 DPOKE &6202,LCTN (1)
5 POKE &61BD,4
6 POKE &61BF,0
7 DEL 2,7
```

PATCH 1b :-

```
1 RESERVE HIMEM-10
2 FOR P = 0 TO 9
3   READ D
4   POKE HIMEM + P,D
5 NEXT P
6 DATA &FE,&1E,&C2,&CB,&4B,&3E,&0D,&C3,&
CB,&4B
7 DPOKE HIMEM + 3,DPEEK (&6202)
8 DPOKE HIMEM + 8,DPEEK (&6202)
9 DPOKE &6202,(HIMEM)
10 POKE &6202,4
11 POKE &6202,0
12 DEL 1,12
```

Both programs can be inserted either before or after another program and then run once. In the case of PATCH 1a only line 1 will be left and this must NOT be removed for LLISTing etc. PATCH 1b is ideal for any program from tape as long as there are no user defined graphics above HIMEM, when corruption may occur. These patches may also work for other printers.

The EDITOR would like to see whether these routines could be improved upon and will publish any mods in the next issue of the LUG magazine, also if anyone else has a "patch" or pokes to the printer table, these will also be published under the PRINTER PATCH heading.

R B JONES

CIRCLE FILL

This is a useful utility for those who don't have either a 96K (circles only) or a 128K LYNX. The routine is in fairly simple BASIC and should be readily understood by most owners. It is also very effective when used with Chris Cytera's XOR plotting routine in a previous issue of NILUG.

To produce ellipses, set the variable 's' not equal to 1 in the PROC circle(a,b,c,s) call, where a=Xpos., b=Ypos., and c=radius, these being in pixel dimensions. N.B. Line 1 must only be used once in the running of the program.

```
1 DIM a(2),f(0)
10000 DEFPROC circplt
10010 IF a(0)=b-x THEN LET f(0)=TRUE
10020 IF f(0)=TRUE THEN ENDPROC
10030 IF a(0)=b-y THEN GOTO 10070
10040 MOVE (a+x)*w,b-y
10050 DRAW (a-x)*w,b-y
10060 LET a(0)=b-y
10070 IF a(0)=b-x THEN GOTO 10150
10080 MOVE (a+y)*w,b-x
10090 DRAW (a-y)*w,b-x
10100 IF a(2) THEN GOTO 10130
10110 MOVE (a+y)*w,b+x
10120 DRAW (a-y)*w,b+x
10130 LET a(2)=FALSE
10140 IF a(1)=b+y THEN GOTO 10180
10150 MOVE (a+x)*w,b+y
10160 DRAW (a-x)*w,b+y
10170 LET a(1)=b+y
10180 ENDPROC
10190 DEFPROC circle(a,b,c,s)
10200 LET x=0,y=c,a(2)=TRUE,f(0)=FALSE,w
=s
10210 LET a=a/s,z=3-2*c,a(0)=b-c,a(1)=b+
c
10220 WHILE x<y
10230   PROC circplt
10240   IF z<0 THEN LET z=z+4*x+b
10250   ELSE LET z=z+4*(x-y)+10,y=y-1
10260   LET x=x+1
10270 WEND
10280 IF f(0)=TRUE THEN ENDPROC
10290 PROC circplt
10300 ENDPROC
```

I would also like to know whether anyone has reached my score of 500,000 on PLAY IT'S CENTIPEDE ?
GUY HINDLE

BOOKSHELF

This series will appear from time to time as information and space permits. Any book or magazine which may be relevant to the LYNX and its programming will be included. The following are a selection from the Editor's library, those which are strongly recommended are asterisked (*).

GENERAL Z80 MANUALS

- * programming the Z80 (third edition)
by ROONAY ZAKS. Publ. by SYBEX. Approx. £12.00
- * Z80 ASSEMBLY LANGUAGE SUBROUTINES
by L A LEVANTHAL. Publ. by OSBORNE/McGRAWHILL
Approx. £13.00
- * MACHINE & ASSEMBLY PROGRAMMING
by D C ALEXANDER. Publ. by TAB. Approx. £7.00
- Z80 INSTRUCTION HANDBOOK
by NAT WADSWORTH. Publ. by HAYDEN. Approx. £5.00
- Z80 MACHINE CODE FOR HUMANS
by A TOOTILL & D BARROW. Publ. by GRANADA.
Approx. £7.95.
- Z80 MICROCOMPUTER HANDBOOK
by W BARDEN. Publ. by SAMS. Approx. £8.00

```

CINEMA
*****
10 REM :<<CINEMA>>
20 REM :Michael Cheetham 1983
30 REM :
40 REM :VARIABLES USED AS FOLLOWS:
50 REM : A & D = loop counters.
60 REM : L & R = left and right position co-ordinates for "tabs".
70 REM : d & e = local variables in "tabs" procedures.
80 REM : A$ = end routine flag.
90 REM : To change colours : "tabs" - lines 250 & 750; foreground - line 330
100 PROC SET
110 PROC SEATS
120 PROC TABS OPEN
130 PROC SCREEN
140 PROC TABS CLOSE
150 PAUSE 10000
160 VDU 23,1,6,2,2,7
170 PRINT "Do you want to see it again? Y/N";
180 LET A$=GET$
190 IF A$="Y" THEN GOTO 100
200 ELSE CLS
210 VDU 7,7,7
220 CLS
230 END
235 REM : #####
240 DEFPROC SET
250 PAPER RED
260 CLS
270 PAUSE 20000
280 PAPER BLACK
290 WINDOW 0,127,0,34
300 EXT CLW
310 WINDOW 0,127,166,252
320 EXT CLW
330 INK BLUE
340 MOVE 0,20
350 DRAW 254,20
360 MOVE 254,34
370 DRAW 0,34
380 MOVE 0,166
390 DRAW 254,166
400 EXT CIRCLE 1,127,600,400
410 EXT CIRCLE 0,127,1000,825
420 ENDPROC
425 REM : #####
430 DEFPROC SEATS
440 PAPER BLACK
450 WINDOW 0,23,226,252
460 EXT CLW
470 LET d=27,e=49
480 FOR A=1 TO 4
490 WINDOW d,e,226,252
500 EXT CLW
510 LET d=d+26,e=e+26
520 NEXT A
530 WINDOW 3,123,5,245
540 ENDPROC
545 REM : #####
550 DEFPROC TABS OPEN
560 INK BLACK
570 LET L=127,R=127
580 FOR A=1 TO 117
590 MOVE L,35
600 DRAW L,165
610 MOVE R,35
620 DRAW R,165
630 LET L=L-1,R=R+1
640 NEXT A
650 ENDPROC
655 REM : #####
660 DEFPROC SCREEN
670 PAPER WHITE
680 INK BLACK
690 WINDOW 15,112,45,155
700 EXT CLW
710 WINDOW 3,123,5,245
720 PROC DISPLAY
730 ENDPROC
735 REM : #####
740 DEFPROC TABS CLOSE
750 INK RED
760 LET L=10,R=244
770 FOR A=1 TO 118
780 MOVE L,35
790 DRAW L,165
800 MOVE R,35
810 DRAW R,165
820 LET L=L+1,R=R-1
830 NEXT A
840 ENDPROC
845 REM : #####
850 DEFPROC DISPLAY
855 REM : Your display here :
860 VDU 24,7,23
870 PRINT @ 54,40;"stuvvxy";
880 DPOKE @6273,-64
890 PRINT @ 54,29;"stuvvxy";
900 DPOKE @6273,32
910 VDU 25
920 MOVE 41,98
930 DRAW 214,98
940 ENDPROC

```

M CHEETHAM.

Ed. This program is written for the 96K LYNX but could be converted for 48K machines. The CLW command fills the area defined by the WINDOW co-ordinates in the current PAPER colour. A simple routine could easily achieve this but will of course be slower. In lines 870 and 890, "stuvvxy" is the printer's interpretation of the LYNX logo, characters 243 to 249 inclusive. Poking different values into @6273 has interesting effects i.e. double height and inverting the words.

MICRO-COMPUTER CRICKET

Micro-Computer Cricket or MCC for short is a simulation of running a small cricket club, and runs on a 48K LYNX. The object of the game is to have as many points as possible after your term in office. Running a sports club is something like running a business, to make money you must first satisfy the customer. As the secretary of the club, you must also ensure that the right amount of money is spent on every aspect of the club, and that an appropriate number of members of staff are employed doing the job. There is no use in having more coaches than there are players. From this we have to define the function of each member of staff and what it is worth paying him. Firstly the players, without enough players, you wouldn't be able to play any matches. You must have a strong squad, have as many players as you can afford. It's likely that if you've got a good team, some of them will be playing for ENGLAND, you need a few people standing by to step into Ian Botham's shoes. You've got to pay your players a fair bit too, if you don't, they'll start to leave, don't worry if only one or two leave, they are just retiring. But if you pay them too much you are in danger of being in the red. Start off paying them about £7000, but beware, they'll want annual pay rises. The ground staff are usually very few, their job is to look after the pitch, and maintain the ground. If they do a bad job, then other counties are likely to complain about the quality of your pitch, and you may even be sacked! Finally, other non-playing staff, this is a broad heading, and includes coaches, administrators and directors. If not enough of these staff are employed, coaching becomes poor, and administration falls to pieces. But possibly most importantly of all, the club may run short of directors, one of whose jobs is to encourage investment in the club. Points to watch:- beware of inflation, it does vary, costs rise, and staff need pay rises. It should be noted that the amount of prize money is somewhat exaggerated to enhance the importance of winning. This makes the game more fun!

LIST OF PROCEDURES

set-up	initialisation of variables	Instructions	
news	information on last year	budget	allows user to define the year's spending
update	brings budget into effect	post-mortem	tells you what went wrong !!


```

100 REM Micro-Computer Cricket
110 REM By Mark Cylera
120 REPEAT
130 PROC set-up
140 PROC instructions
150 REPEAT
160 IF Y>0 THEN PROC news
170 PROC budget
180 PROC update
190 UNTIL C<0 OR (e<K*0.3 AND G<4) OR
e<K/10 OR P<12
200 PROC post-mortem
210 UNTIL A$="N"
220 END
230 DEFPROC set-up
240 RANDOM
250 LET Y=0,C=250000,K=10000,W=0,B=25000
0,F=0,t=0
260 LET C$=CHR$(31)
270 ENDPROC
280 DEFPROC budget
290 CLS
300 PRINT TAB 7;"$$$ "CHR$(18)"BUDGET F
OR YEAR "Y+1;CHR$(18); " $$$";C$
310 REPEAT
320 INPUT "How many players in your st
aff this season";P
330 LET P=INT(P)
340 UNTIL P>0
350 REPEAT
360 INPUT "What will be their annual i
ncome";p
370 UNTIL p>0
380 REPEAT
390 INPUT "How many ground staff will
you employ this season";G
400 LET G=INT(G)
410 IF G=0 THEN PRINT "Who's going t
o prepare the pitch then?"
420 UNTIL G>0
430 REPEAT
440 INPUT "What will be their annual i
ncome";g
450 UNTIL g>0
460 REPEAT
470 INPUT "How many other members of s
taff will you employ this season";S
480 LET S=INT(S)
490 IF S=0 THEN PRINT "What? No coa
ches,no secretaries,no directors? You
must be joking!!!"
500 UNTIL S>0
510 REPEAT
520 INPUT "What will be their annual i
ncome";s
530 UNTIL s>0
540 REPEAT
550 INPUT "How much money will you spe
nd on playing equipment";E
560 IF E=0 THEN PRINT "What are you
going to play with? Tennisballs?"
570 UNTIL E>0
580 REPEAT
590 INPUT "How much will you spend on
the ground & ground equipment";e

```

```

600 UNTIL e>0
610 LET e=e-F
620 ENDPROC
630 DEFPROC update
640 LET e=e-F
650 LET Y=Y+1
660 LET t=1.04+RND/25
670 LET B=INT(B*t)
680 LET B=C-P*p-G*g-S*s-E-e
690 LET T=INT(K*4+RAND(K*2))
700 IF RND<0.16 THEN LET c=RAND(K*4)
710 ELSE LET c=0
720 LET R=INT(K*10+W/2+P*K/4-c)
730 IF S>3 THEN LET D=INT((W/3000+S-3)*
K/8)
740 ELSE LET D=0
750 IF B<-K AND RND<0.16 THEN LET w=-B
760 ELSE LET w=0
770 IF P>13 AND E>K/20 AND RND<0.1+P/75+
((p-K*0.7)/20000)+(15-G)/40 THEN LET W
=INT(P*2000+p+(R-K*10)/10+(5-G*1000)+e*t)
5+RAND(K/50)*5)
780 ELSE LET W=0
790 IF RND<0.06 THEN LET F=K/5
800 ELSE LET F=0
810 IF RND<0.1 THEN LET b=K+RAND(K)
820 ELSE LET b=0
830 LET P=P-1-RAND(2)
840 IF p<K*0.7 THEN LET P=INT(P*t/p/(K*0
.7)))
850 IF g<K*0.6 THEN LET G=INT(G*t/g/(K*0
.6)))
860 IF s<K*0.8 THEN LET S=INT(S*t/s/(K*0
.8)))
870 LET C=T+W+R+D+B-b+w
880 LET t=t+INT(W/K*2)+INT((R-K*5)/K*2+
INT(B/K))
890 LET K=K*1
900 ENDPROC
910 DEFPROC news
920 CLS
930 PRINT CHR$(18)" CAMPUSHIRE C.C.C. A
NNUAL ASSESSMENT:"CHR$(18);C$
940 IF c THEN PRINT "What a wash-out o
f a season!"
950 PRINT "Gate receipts in year "Y;" t
otalled"C$;"£"R; "."
960 IF W THEN PRINT "You have won a gr
and total of £"W;C$;"as prize money from
competitions."
970 ELSE PRINT "You have been awarded
no prize money from competitions."
980 PRINT "The Test & County Cricket Bo
ard have provided you with £"T;" of fu
nds."
990 PRINT "Campushire has £"B;" in the
bank."
1000 IF w=-B THEN PRINT "A wealthy bus
inessman has stepped in and cleared yo
ur overdraft."
1010 IF w=-B THEN LET w=0,B=0
1020 IF D THEN PRINT "The directors ha
ve invested £"D;" in"C$;"Campushire."
1030 ELSE PRINT "The directors have de
cided to make no contribution this year

```

```

1040 IF b THEN PRINT "Thieves have sto
len £"b;" from your"C$;"County's funds."
1050 PRINT "You therefore have £"C$;" ov
erall."
1060 IF F THEN PRINT "Thugs have dug u
p your pitch with knives and forks,
and have poured oil all over it. The
message 'George Davies is innocent' is s
prayed on the walls."
1070 IF G<4 OR e<K*0.3 THEN PRINT "Oth
er counties have complained about the
poor quality of your pitch."
1080 PRINT "P;" players have decided t
o stay on for the next year."
1090 PRINT "S;" members of non-playing
staff have"C$;"decided to stay on.";
1100 LET A$=GET$
1110 ENDPROC
1120 DEFPROC post-mortem
1130 CLS
1140 IF C<0 THEN PRINT "Your cash has
run dry."
1150 IF e<K*0.3 AND G<4 THEN PRINT "Th
e Den has deteriorated so much that you
have been blamed."
1160 IF e<K/10 THEN PRINT "You should
spend more on the ground than that!"
1170 IF P<12 THEN PRINT "Most of your
players have deserted Campushire."
1180 PRINT "You have been sacked!"C$
1190 PRINT "You lasted "Y;" years, and
you scored"
1200 PRINT t," points."C$
1210 PRINT "Do you want another game? (Y
/N)"
1220 LET A$=GET$
1230 ENDPROC
1240 DEFPROC instructions
1250 TEXT
1260 PRINT CHR$(24); " III Micro-comp
uter III "
1270 VDU 25
1280 PRINT @ 4,40;" You are the Secreta
ry of Campushire County Cricket Club,
and your job is to keep the club in a s
ound financial position, taking inf
lation into account."
1290 PRINT "At the start of the first ye
ar the club has a quarter of a million p
ounds to spend."
1300 PRINT "At the beginning of each ye
ar you must decide how many members of p
laying and non-playing staff you will e
mploy, and how much you will pay them."
1310 PRINT "You must also bear in mind
that you will have to spend money on
your ground,The Den, so as to attract pe
ople to watch Campushire\ and to kee
p the pitch in trim condition."
1320 PRINT C$; TAB 7;CHR$(18)"PRESS ANY
KEY TO CONTINUE"CHR$(18)
1330 LET A$=GET$
1340 ENDPROC

```

ADDITIONAL SOUND COMMANDS by COLIN TAME

.....

The 96K has an additional 4K ROM which contains some useful preformatted sound commands ; EXPLODE, KLAXON, LASER, and ZAP. I thought it would be useful to be able to use these commands, and for the 96K owners to see how the sounds are made up. Using a disassembler and the built in monitor, I was able to locate the routines in ROM and produce a listing. The two sound commands listed below are not the same as in the ROM as I wanted to be able to make them relocateable in memory so that they may be called using a CODE line from BASIC. They also sound slightly different.

Ed. If you are not familiar with placing data into memory directly, use the CODE method from BASIC.

ZAP ROUTINE ASSEMBLY LISTING

```
3E01 010 ZAP LD A,1
D380 020 OUT (80),A
0E14 030 LD C,14
0632 040 START LD B,32
AF 050 BEGIN XOR A
D384 060 OUT (84),A
ED5F 070 LD A,R
3D 080 LOOP1 DEC A
00 090 NOP
20FC 100 JR NZ,LOOP1
3E3F 110 LD A,3F
D384 120 OUT (84),A
ED5F 130 LD A,R
3D 140 LOOP2 DEC A
20FD 150 JR NZ,LOOP2
10EC 160 DJNZ BEGIN
0D 170 DEC C
20E7 180 JR NZ,START
AF 190 XOR A
D380 200 OUT (80),A
C9 210 RET
```

From BASIC :-

```
10 CODE 3E 01 03 80 0E 14 06 32 AF D3 84
ED 5F 3D 00 20 FC 3E 3F D3 84 ED 5F 3D 2
0 FD 10 EC 0D 20 E7 AF D3 80 C9
```

LASER ROUTINE ASSEMBLY LISTING

```
110101 010 LASER LD DE,0101
06B9 020 LD B,B9
3E01 030 LD A,1
D380 040 OUT (80),A
3E3F 050 LOOP LD A,3F
D384 060 OUT (84),A
CD7809 070 CALL 978
AF 080 XOR A
D384 090 OUT (84),A
CD7809 100 CALL 978
13 110 INC DE
13 120 INC DE
10EF 130 DJNZ LOOP
AF 140 XOR A
D380 150 OUT (80),A
C9 160 RET
```

From BASIC :-

```
20 CODE 11 01 01 06 B9 3E 01 D3 80 3E 3F
D3 84 CD 78 09 AF D3 84 CD 78 09 13 13 1
0 EF AF D3 80 C9
```

Ed. To use these sounds from BASIC use the CALL LCTN (Line number) method.

FORTH CIRCLES (part 1)

.....

I use Camsoft's FORTH (ABERSOFT version) because it came free with my 96K LYNX, bought in March 84. This version includes most of the standard FORTH words (2ROT is a regrettable omission), as well as some useful extensions such as graphics routines, CASE statement, RAM-disc, KEYN + GETN. The editor is quite easy to use and an extended dictionary can be saved to tape without much bother following the instructions in the manual.

My principal difficulty was that the manual is obviously not designed for beginners. You need to understand FORTH to follow the manual, to understand FORTH you need to use it, yet to use it you need the manual. However with practice and perseverance all does become clear eventually.

Using FORTH forces you to structure your programs properly, there aren't any GOTOs to get you out of trouble. Also as you work through your textbook, and you won't get far without one!, the emphasis on technicalities like addresses, branching and so on leads you to a deeper understanding of the way in which your computer actually works. I found it all most stimulating and would recommend the experience to anyone.

I wanted a word which would draw filled circles on the screen given the x and y co-ordinates and the radius r. Here's the BASIC version :-

```
DEFPROC CIRCLE ( x,y,r )
FOR I = 0 TO 2*r
LET w = INT(SQR(I*ABS(2*r-I)))
MOVE x-w, y-r+I
DRAW x+w, y-r+I
NEXT I
ENDPROC
```

(Ed. You don't need FORTH to use this routine.)

Now unfortunately my FORTH doesn't have SQR so I had to define that first.

```
: ROOT ( w#w--w ) DUP 1 + BEGIN 2DUP / OVER
SWAP - 2 / DUP WHILE - REPEAT
DROP SWAP DROP
( positive integers only )
```

: SWAP

This can then be used in my FORTH CIRCLE drawing word :-

```
: CIRCLE ( x,y,r-- ) DUP 2 * 1 + 0 DO ROT DUP
2SWAP ROT OVER 2 * I - I *
SQR 2DUP + ROT ROT - 2OVER
I + DUP ROT ROT MOVE DRAW
LOOP DROP DROP DROP ;
```

(Ed. WATCH those spaces !!!).
For an open circle use DOT DOT instead of MOVE DRAW. This looks horribly long-winded but I couldn't think of a better way. If anyone has a more elegant method, I'd be interested to see it. Normally it is considered good FORTH style to have a lot of short words rather than a few long ones, the listing is more readable that way. Also short words that do a particular job are readily incorporated into higher level words, which means that programs can be developed very quickly, one of the big advantages of FORTH.

A L SHAW.

Welcome to FORTH FORUM. In this series I shall be investigating the use of FORTH on the LYNX micro. I shall in the course of time, hope to cover the following areas :-

- 1) General graphic capabilities of CBS-FORTH and Computers FORTH versus BASIC.
 - 2) Shape tables for drawing and filling arbitrary shapes.
 - 3) CIRCLE, ELLIPSE, and TRIANGLE draw and fill commands.
 - 4) Scaling in x and y directions.
 - 5) Efficient ways of moving shapes about the screen.
- In addition, I shall be running a Helpful Hints column and you are invited to send any queries to me c/o CUBSOFT, 6 OKEOVER ROAD, SALFORD, M7 0JX.

To kick off then, why use FORTH at all :-

- Advantages :-
- a) Fast.
 - b) Efficient use of memory.
 - c) Flexible.
 - d) You can define your own language to meet your own needs.
 - e) Easy to experiment with.

- Disadvantages :-
- a) Reverse Polish Notation.
 - b) Integer arithmetic only.
 - c) Easy to crash.

To illustrate, I have conducted the following bench tests :-

- 1) Compute primes in range 1-999 and list to screen (timings with/without display and in text mode).
- 2) Fill screen with horizontal lines.
- 3) Fill screen with vertical lines.
- 4) Draw a filled circle center (100,100) radius 75.

The results are summarised below :-

Language	Primes	Primes	Primes
Calculations	(calc.)	(text)	(normal)
48K BASIC	37	73	97
96K BASIC	37	73	97
Camsoft FORTH	8	46	71
48K CBS FORTH	6	27	69
96K CBS FORTH	6	27	69

And :-

Lang.Graphics	Horiz.	Vert.	Circle
48K BASIC	43	43	34
96K BASIC	43	43	2
Camsoft FORTH	42	42	20
48K CBS FORTH	42	42	18
96K CBS FORTH	8	35	3

In each case the FORTH program occupied less than half the memory than the BASIC equivalent, moreover in the case of CBS-FORTH each program could be fitted as source code into the basic keyboard input buffer and hence edited as a whole.

As part of a general discussion of FORTH, I would like to "home" in on the editing facilities available in FORTH.

Camsofts FORTH :- Comes with a fairly standard keyboard input buffer of 80 characters and FIG-FORTH editor (11 screens of 16 by

64 characters). The only editing facilities for the keyboard input buffer, are backspace to delete one character at a time to the beginning of the current line. As soon as a line is entered its contents are permanently lost, so if you make a mistake, you must retype the whole line.

The editor has over 20 commands available to manipulate lines, search for words etc, however the LYNX only supports 40 characters on a line, so each 64 character line then covers two lines on the screen, screens are therefore difficult to read and edit.

CBS-FORTH :- CUBSOFT have taken a novel approach to

both the keyboard input buffer and editor in order to make full use of the editing features normally available to BASIC (and save dictionary space). The keyboard input buffer consists of 240 characters arranged as 6 by 40 characters, both backspace and the arrow keys are available for editing purposes. The BASIC "CONTROL Q" has been replaced by "ESCAPE", which will recall the contents of the input buffer, should you wish to correct or alter a line after pressing RETURN.

CBS-FORTH :- The keyboard input buffer may be "programmed" to simulate the action of a loop etc. I will be shortly giving a machine code definition for SQR which will extract the square root of a number and round it to the nearest integer. Having written this routine I wished to test it and did so as follows :-

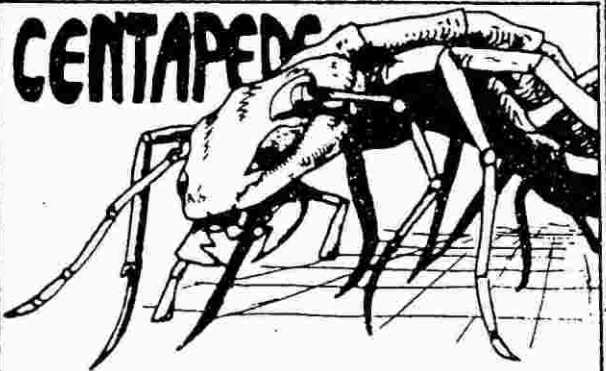
```
0 <RET.>          Put 0 on the stack.
1+ DUP DUP . SQR . <RET.> Increment, DUP to retain
                        copy for loop, DUP to get
                        copy for display, display,
                        extract root and display.
```

I then used <ESC> and <RET.> to step through a loop examining the square root generated until I was satisfied that SQR was working properly.

The CBS-FORTH editor is unique to this version of FORTH, there are 37 (117 in a 96K) screens, each consisting of 240 characters as 8 by 30 characters. These screens are held in compressed format in core (and on tape). The basic edit command is EDIT, which will call up a given screen for editing. The screen will appear blank, press <ESC> to recall the old contents of the screen or simply overtype. When you finish editing (backspace and arrows), press <RET.>, you are then prompted UPDATE ?, answer Y to update or N to leave the old screen unchanged (e.g. if you started to overtype when you meant to edit the old contents of the screen, or if you have made a bad mistake !). The philosophy behind the CBS-FORTH editor is that you should not need to learn a whole range of commands in order to use it, it is simply an extension of the keyboard input buffer, i.e. what you type is stored on RAM DISK rather than directly executed. Recognising the occasional need to move individual lines between screens, CBS-FORTH provides the following line editing commands :-

```
PAD !      accept 30 characters to PAD.
PAD @      display 30 characters at PAD.
GET        retrieve 30 char. line from screen
           and store at PAD.
PUT        move 30 chars. from PAD to given line
           and screen.
```


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