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EDITORIAL

First of all, let me apologize for another late issue. I held this issue late as long as I could in hopes of being able to run a review of the AERCO drive system for the 206B. They are about one week off at the time of this writing, so I should be running them by the time you read this. The system is operational, except for some cable problems. Bill Stoeker has a unit running at 21st Century Electronics, and he described the system to me.

First of all, it's a dual drive system running Qume drives. The drives are double sided, double density, but the interface has the capability to run anything from 3 1/2" disks to 8" disks. It comes in a case, and has an RGB port available for a monitor. The DDS uses the keyboard commands on the 206B, so there is no need for awkward USSR calls. The interface utilizes the 64K cartridge bank, which can be accessed by the user. It will later be used for an implementation of CP/M 2.2. This means that the 206B will be able to run three operating systems: its own system, the Spectrum operating system, and CP/M. The disks, by the way, use a Kaypro format, so a whole new realm of software will become available.

Also, for all of you folks running the ZX80/81 or 1000 out there, let me remind you that a disk system is still available for them. It's a dual drive setup, and is very fast - I've seen this one in action running Fro/File. It's really a nice system.

By the way, Timex has turned all of its service facilities over to TS Connections (3832 Watterson, Cincinnati, Ohio 45227). Repairs usually run \$35 to \$40. I have had experience with these people, and am happy with how they handled my problem.

Also, 206B's are still available. I know of one place who sells them for \$179.00, and that includes the 2040 thermal printer. Feel free to call or write to me if you'd like more info about this.

Last time I mentioned Sinclair's decision not to market the Spectrum+ in the U.S. Well, it seems that they are selling the QL here. Rumor has it that they are being sold through American Express just as the first ZX80/81's were. I haven't seen anything to substantiate this rumor, though. If anyone out there has heard, let me know.

In this issue we have reviews of the Ramex disk drives, and reviews of three pieces of software: Fighter Pilot, Timegate, and Multi-Draw for the 2068. In hardware, we've got plans for a digital thermometer, and news from England in the JB Corner. (Let's all thank John for buying a new printer! The JB Corner is much easier to read now!!) That's all for this time. Next issue will feature a full review of the AERCO disk system (keep your fingers crossed!). Until then, keep on ZX'in!

# 21st CENTURY ELECTRONICS

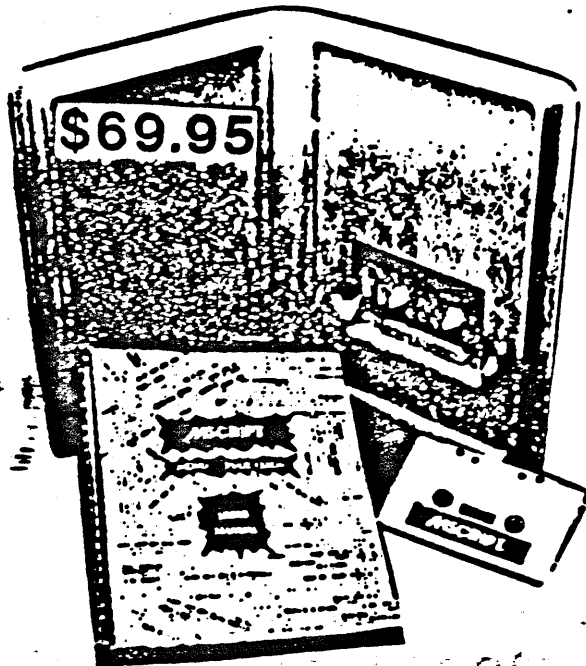
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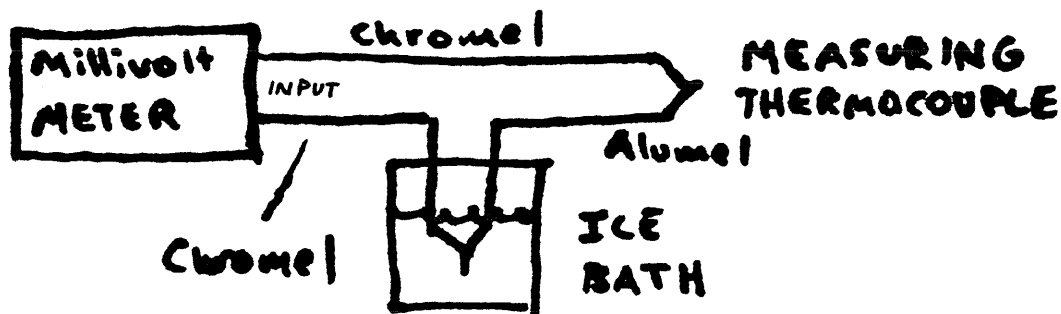
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## THE SOLDER JOINT

By Brian Bauer

### Build A Digital Thermometer

The latest in the series of projects is a digital thermometer. A high temperature thermometer was needed for checking temperatures inside of a large gas fired furnace. This was built with a digital panel meter kit plus a few wires (thermocouple wires), some ice water, and a ceramic tube. The ceramic tube and thermocouple wires are available from Omega Engineering (203)-322-1666, One Omega Drive, Box 4047, Stamford, Ct 06907. The digital panel meter kit is available from Circuit Specialists, PO Box 3047, Scottsdale Ariz. 85257. The main chip however is widely available from Jameco, Active, etc. At any rate the basic set up is shown below.



The ceramic tube serves to keep the thermocouple from oxidizing or corroding. It probably isn't necessary if the device is used only occasionally for experimental use. The ice bath provides a zero reference for the thermocouple. This is the so called "compensation" part of the circuit, and with this reference the millivolts from the circuit can be directly compared to NBS tables to get temperature. This assumes that a matched pair of thermocouple wires is used for the electrode. (Omega can provide matched pairs) So theoretically anyway, the device can be used to obtain temperature readings without any need for direct temperature calibration providing: (1) The panel meter is correctly calibrated to yield millivolts, (2) The thermocouple wires are matched by Omega, (3) The reference junction is held at zero degrees centigrade. The panel meter can be constructed from the kit or may be put together from spare components if the main IC is purchased separately. The schematic is shown on the next page. The pin designations for the leads leading to the LEDs are in the order: segment, numeral, with the right most digit as numeral number 1. For example pin #2 is designated D1 which means it lights segment D of the right most (least significant) digit. Clearly the display is not multiplexed! All of the commons for the LED digits are connected together and lead to the +5 volt supply line. Pin number 19 controls the 4th (most significant digit), which has only two possible states, a one or a zero. Pin number 20 is designated POL is the line leading to the minus symbol, POL means polarity. All of this is fairly

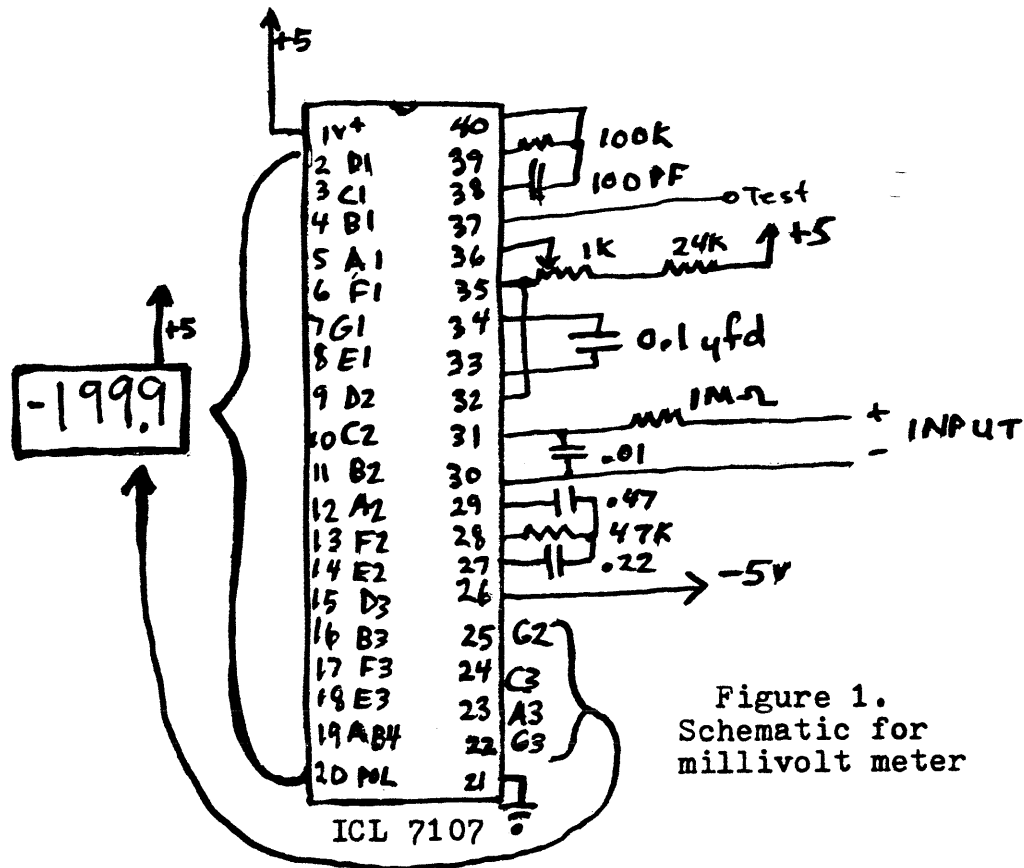


Figure 1.  
Schematic for  
millivolt meter

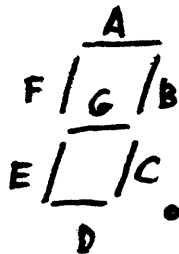


Figure 2.  
This shows which  
segment is called  
by what letter.

clear if the chip data sheet is available. The displays are common anode type

To use the full resolution of the display I chose to adjust the 1K pot on pin 35 to read 199.9 when 60 millivolts was applied to the meter inputs. To convert readings to millivolts the readings were multiplied by 60/200, that is 0.3. This was done because the chromel - alumel pair used generates a maximum of about 57 millivolts before it burns up around 1700 degrees C.

The construction of the thermocouples was a simple matter. The chromel and alumel alloys were purchased from Omega and for around \$10 each they are available in rolls of 50 ft. The ends of the wires were twisted together and mashed in a vise to make the junctions. To insulate them ceramic braid was used to cover one wire and the sensor was shoved down an 18 inch ceramic tube with a closed end. (All this junk is sold by Omega.) The reference junction was insulated with heat shrink tubing. The

reference junction was made by putting common insulation around one of the wires, twisting and mashing the junction, and then putting it in small diameter heat shrink tubing. Some silicone sealant was crammed in the end and allowed to set overnight. Then the heat shrink tubing was shrunk around it to make a water-tight seal. (hopefully).

One key point is that the display is not multiplexed. This means that it would be fairly easy to interface this IC to an input port. Or more specifically to three input ports, or if possible 23 bits. This is a cheap way to get a high resolution A/D conversion. The ADC0804 circuit described in a previous article is only 8 bits wide, which means that it can count up to 128, this chip can count to 1999. The interpretation of the various patterns presented to the ports could be done in software.

Another project that I've been fooling around with is converting a TTL monitor to accept composite video. After amplifying the video composite it was fed to a couple of comparators to pick off the horizontal sync, vertical sync, and video. Unfortunately the video did not come out very well. The horizontal and vertical sync were fine but the actual video signal was smeared out. I think inadequate frequency response was the problem. At any rate if anyone has a simple circuit for doing this job I would like to see it.

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## HARDWARE REVIEW

By Narti Kitiyakara

Review - Ramex disk drive and interface.

Price - \$450 + \$5 s/h.

Available from - Ramex International Ltd.  
48945 Van Dyke Road  
Utica, Michigan 48087

The Ramex disk system comes with a double sided, QUAD density disk drive, interface, and system disk. The interface is made by Abbeydale Designers, Ltd. an English firm. There isn't much to say about the drive itself. It comes with power supply case (measuring about 12.5 x 3.5 x 6.5 inches) and has its own power switch and fuse. The interface is a small black box which attaches to the edge connector, leaving just enough space for a jack to the monitor. It also has its own edge connector for a printer or other device. However, it changes the signals going out from it, so other interfaces need to be modified (instructions for modifying the Tasman interface are included, but for others you are told to contact the interface manufacturer). Ramex says that the first disk must be double sided, QUAD density, I don't know if this is true or not, as the Abbeydale instructions say it has to be double density. But really there is no way to save any money there, because Ramex has a stranglehold on the system disks (all in QUAD density).

Enough of the boring details of the interface (I'm not a hardware person), and on to the operating system. SF-DOS (Disk Operating System, don't ask me where they got the SF) resides in the high portion of the memory, leaving you with about 31K for programs, etc. However, since it does reside in memory, you must be careful about large machine code programs (mostly the games) which could overwrite it. This, so far, has made it impossible to copy them onto disk, but I'll beat it yet (I've written to Ramex for help with this). The DOS allows you to do anything you could with a normal cassette, only much faster (as an example, HOT Z, which is listed as 24K, takes about 4 seconds to load). There are two DOSs, one when you start with the system disk, the other if you start with any other disk (called MiniDOS). MiniDOS gives you most of the basic needs of a DOS, SAVE, LOAD, CATalog, and MERGE. The full DOS gives you all of these, and some other commands which I'll point out as I get to them. All commands must be preceded by 'PRINT #4:' to serve as a flag for the DOS.

Both DOSs have standard cataloging (give you a directory of what's on the disk), including disk name, capacity, and free space, although with SF-DOS you can catalog things with a certain string in them. Both DOSs also allow you to SAVE, or LOAD anything you would in BASIC, verifying it automatically (this makes SAVE commands take longer than LOAD commands), you can ERASE anything from the disk, or MERGE anything (incidentally, if you MERGE an auto-run program, it is actually

merged, but it still auto-runs, so there is no breaking into programs there). And speaking of auto-run programs, any program with the name 'AUTO' will be run whenever you reboot the system (NEW or turn the computer off and on again). This includes machine code programs which start with the first memory location they were SAVED from. Those are all the commands available to MiniDOS.

Full SF-DOS also has commands to FORMAT disks, rename files, copy disks, and use sequential files. The FORMAT command simply prepares a new disk for writing and reading, by marking off the sectors and tracks, erasing everything that's on the disk. The MOVE command can be used to rename files, copies files from one disk to another, or copies everything which the system allows (you cannot copy some parts of the system disk). A sequential file allows you to read from or write to a file of either strings or numerical variables in a sequential manner. You start by OPENING the file, with a certain stream number attached, by using the command 'PRINT #4:OPEN #n,"filename"'. If "filename" already exists it is OPENED for reading, otherwise it is OPENED for writing. You can then use 'PRINT #n;' to send information out to the disk, or either 'INKEY# #n' or 'INPUT #n;' to get information from the disk. You must then tell it you are done with that stream with the command 'CLOSE #n'. You can't both read and write to the same file. This doesn't sound like any improvement over the old saving of arrays, but it means you lose only 512 bytes, instead of the entire memory required for the array. The 512 bytes pushes the program into higher memory, so be careful if you like machine code in REM statements or things like that. An interesting quirk of the sequential files is that it insists on giving the keyboard click when reading from the disk, so if there are long files it's a good idea to shorten the length of the click, because it can slow things down (another unrelated quirk is that if you leave a printer on when saving something it does a few line feeds, but no characters). The system disk comes with a program, 'MAIL/BAS', to demonstrate sequential files, and a file, 'MAIL/DAT', of many English companies supporting the Sinclairs.

Some of the old errors have been re-used by SF-DOS, mostly those dealing with either stream or parameters (like giving a non-existing drive number will tell you Integer out of Range). Twelve new errors have been added, dealing with disk related problems (ie. disk full, file not found). The system manual is easy to read and understand, but the writers need some lessons in editing, and margins. It goes through each command step by step, and gives an appendix of all the errors, and commands. The Ramex disk system has its pros and cons. On the pro side is the speed, reliability, and memory size. On the con side is cost, and the fact that it keeps the DOS in memory. If you need it, the Ramex disk is certainly a good investment, but I would be cautious because of the price.

## SOFTWARE REVIEW

By Narti Kityakara

Review - Timegate

Price - \$24.95 + s/h

Available from - Knighted Computers  
707 Highland St.  
Fulton, NY 13069

According to the advertisements Timegate is "a level two 4-D Space-Time Sci-Fi Arcade Adventure," well, it is a sci-fi arcade game. Whether it's "level two" or not I don't know, it is, however, only in the vaguest sense of the words, four dimensional. Yes, it does involve time, but only in a very inactive way. Yes, it does give some amount of perspective to simulate three dimensional flight, but this only involves finding your enemy, once you've found him distance matters very little.

The ship's instruments include a map showing where the enemy is, and where planets are; damage indicators; and a view of the surrounding space. In the game you start out in the far future (how far depends on what skill level you choose), and try to fight your way back to the year zero in which the enemy base is located. To change time zones you must pass through time gates, however, you don't know where these will be. If there are any aliens in the area you must destroy them before you can use the time gate. If you are damaged in battle you can completely regenerate your ship by landing on a planet, again you have to wait until all enemies are destroyed before you can do this. There are six damage indicators, covering weapons, shields, engines, and another three that I didn't think were very important.

Timegate can be a fun game, within two dimensions the aliens are good fighters, taking evasive actions until ready to fire at you. For just relaxing it can be satisfying to destroy scores of aliens after being shot down in Fighter Pilot. There are a few things which could be improved, I would have liked a way to turn of the sounds it makes, and while having the instructions on cassette is novel, it takes to long to find any one point of the instructions.

## SOFTWARE REVIEW

By Narti Kityakara

Review - Fighter Pilot

Price - \$21.95 + s/h

Available from - Knighted Computers  
707 Highland St.  
Fulton, NY 13069

Fighter Pilot is a simulation of the F-15 Eagle fighter. It offers both simple flights, and dog fighting, with four skill levels for each simulation. The F-15 is an extremely maneuverable aircraft, with a 65,000 ft. ceiling, and a maximum speed of about 1,440 knots, which I must say is very fun to fly in a dog fight, although it is easy to over react with the joystick.

The instruments include an artificial horizon (with roll and pitch), which I found much preferable to the Rate of Climb indicator of the Psion simulation, compass or radar (for flying or fighting respectively), and all the other instrument found on the Psion plane. Unlike the Psion simulation your instruments are shown at all times so that you can safely fly with the map on. Also unlike Psion, if you leave one side of the map, you come back on the other side, instead of just flying on to run out of fuel. The plane can be controled from the keyboard alone, but it is extremely difficult to dog fight like that, or with the joystick and keyboard. The TS-2068 version (this is another converted Spectrum program) has different functions for the two joystick ports, the right is used for fighting, the left for landing and take-off.

There are two modes for non-combat flying: landing practice, which puts you in a good starting position 6 miles from the end of a runway; and flying training, in which you are in position for take-off and can just fly around to your heart's content. Both of the non-combat modes are rather dull, more interesting however are air-to-air combat, and combat practice (where the other planes don't shoot back). The other aircraft fight very well, always attempting to get in position behind you, and often preforming complex maneuvers, such as barrel rolls and loops (although I've yet to see one Immelmann, half a loop and half a roll to turn around quickly). All modes have one of four skill levels, and optionally: crosswinds, and fog (which makes you lose sight of the horizon, and is very difficult to fly in).

Fighter Pilot is a fast paced, and exciting game, well worth the \$22 if you like either dog fighting, or just flying around.

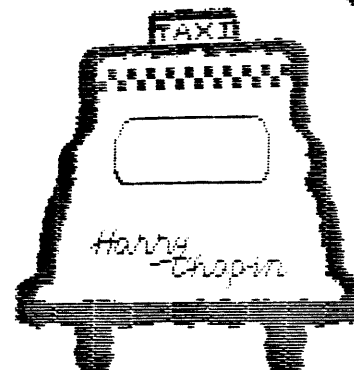
## SOFTWARE REVIEW

By Joseph Dell'Orfano

Review - Multi-Draw 2068

Price - \$24.95

Available from - 21st Century Electronics  
6813 Folk St.  
Guttenberg, N.J. 07093



Multi-Draw is a far cry from MacPaint. However, it does offer some handy graphics support for the 2068. All functions are available through the joystick (except string entry). This is both a help and a hinderance. Anybody who's had the chance to work with Atari joysticks knows that they're not the best method of data entry. However, they do make it easier to access the various functions of the program - no need to memorize a lot of coded commands. These are just remarks about the hardware, though. Now onto some remarks about the software itself.

At the bottom of the screen is a cursor and a row of boxes which the cursor moves in. Below the boxes are various graphic characters. Also, at the lower left hand corner is the name of the command which is presently being accessed. All of these commands and characters are accessed with the joystick. The main display contains the drawing area, along with an 8x8 cursor, also joystick controlled. By pressing the fire button of the joystick, the selected graphic character is drawn on the screen. In this manner a crude drawing can be made.

The most powerful aspect of this program, however, is its ability to edit the drawing pixel by pixel. An area of the screen is blown up, and each individual pixel can be turned on or off. Also, by a similar process, the selectable graphic characters can be edited. This gives you great flexibility in designing graphics.

The program also supports color. You can set the color of what you're drawing, or paint over it later. This also allows for great flexibility. A hardcopy can be obtained with the 2040 printer, or an Epson compatible. (More on this later.)

Well, the first problem here is getting good results. It is a very tedious process. For example, the simple picture reproduced ~~above~~ took me about two hours to produce. Like I said, it's not MacPaint.

The second problem which I have discovered is in its screen save routine. The picture which was saved to tape consistently had the same mistake in it, which leads me to believe that there is a bug somewhere. Also, the program does not support my Gemini printer - funny, I thought that it was just about as 'Epson compatible' as you can get without an Epson! Unfortunately, I have not had a chance to try it out on an Epson. It would be interesting to see if it does indeed work.

Anyway, for the price of \$24.95, it is a pretty good deal. I would've like to have seen an option for keyboard entry, though, instead of relying solely on the joysticks. Also, the program makes no attempt to support any of the 2068's advanced graphic capabilities, although the program also includes a routine to copy a 64 column screen to the 2040. All in all, it is a good program - suffice it to say that I have not seen better.

**JB CORNER JB CORNER JB CORNER JB CORNER JB**

## Spectrum Update by John Bloxham

## NEWS

A couple of little snippets to start with:-

- 1) I no longer have a Sinclair Spectrum (?)
- 2) Sinclair Research have stopped making the Spectrum (!)

Before you go three no trumps in coronories I had better explain. Last Autumn (should I say Fall?) Uncle Clive introduced the Sinclair Spectrum Plus at £179. It sported a cut down QL style keyboard with more keys than the standard Spectrum but internally it was the same as the Speccy we all know and love. After Christmas there came a noticeable slowing of the home computer market so in an effort to stay ahead Clive cut the price of the Plus to £129 and discontinued the old rubber key model. Since then he has made the Plus keyboard available on its own and, like many others, I have "upgraded" my machine to a Spectrum Plus by buying the keyboard and transplanting the circuit board of my dear old Speccy. At £20 the keyboard is very good value and must, I think, have given the other add on keyboard manufacturers a nightmare as they were all retailing at about £50. The "feel" is quite good too and the separate punctuation and function keys are real handy. I have also recently taken the plunge and invested in a Microdrive now that the cartridges are cheaper and the reliability seems to be good. So far I am pleased with the speed and ease of use - it sure is a pain when I have to use the old cassette machine to load one of my old programs. Do any members in the U.S. have Microdrives yet? If so, how are yu getting on? Any hints or tips??

Generally the market is jittery over here with a number of well known manufacturers going bust and the much publicised arrival of Jack Trammil's new Atari machines giving everyone the willies. Even the unstoppable Sir Clive has had to put a cautious brake on Spectrum+ production even though the machine is selling as well as ever.

**"YOU'VE GOTTA TRY THIS" DEPARTMENT**

Promise me that you will try this little routine:  
I don't know if you've ever heard of recursion but it's something I've never seen a genuine need for. Recursion is where a subroutine repeatedly calls itself, which might sound a little complicated but it can - so I've heard - produce short and elegant solutions to programming problems. Just remember then whenever a program comes across the word GOSUB it stores away the address of the next instruction on a special memory stack,

and whenever it meets the word RETURN it pops the top one off the stack and jumps to that address. Anyway, to get the idea, take a look at this little routine before you try it. The routine actually does something useful, and it would normally be fairly difficult to do it in BASIC. It is a FILL routine, that is it will ink in all the pixels inside an outline. The fill routine occupies only one line - line 100 - all right then, two lines if you count the RETURN instruction at line 110. The other lines simply draw some tricky shapes for the routine to fill. The variables x and y are set up to point to any pixel inside the outline then the routine is called and away it goes. The routine repeatedly calls itself as pixels are checked or inked in, even a small outline will cause hundreds of return addresses to be pushed onto the gosub stack, but as the computer is doing all the counting who cares? All this activity is fairly slow in BASIC but is very interesting to watch, notice how the line retraces its steps to check any pixels that may have been missed. The routine can be incorporated anywhere in your own programs of course but remember that if you want to fill an area out to the edge of the screen you must first draw a line around the edge.

```

10 REM BASIC fill
20 PLOT 50,50: DRAW 50,30,PI:
DRAW 20,0: DRAW 0,-48: DRAW -70,
0: DRAW 0,18
30 LET X=100: LET Y=75: GO SUB
100
40 PLOT 110,100: DRAW 0,50: DR
AW 40,0: DRAW 0,-50: DRAW -40,0:
CIRCLE 130,130,18
50 LET X=115: LET Y=105: GO SU
B 100: STOP
100 IF NOT POINT (X,Y) THEN PLO
T X,Y: LET Y=Y+1: GO SUB 100: LE
T Y=Y-2: GO SUB 100: LET Y=Y+1:
LET X=X+1: GO SUB 100: LET X=X-2
: GO SUB 100: LET X=X+1
110 RETURN

```



## QL support takes a quantum leap at last

A year after its launch the QL is just beginning to look as if it's getting there — and if it doesn't it won't be through lack of effort on the part of Sinclair Research. Last week saw Sir Clive and staff playing host to a number of journalists and, more important, a number of third party manufacturers who are producing software and add-ons for the machine.

The QL hasn't had the best of years, partly because of the unfamiliarity of its 68008 chip and partly because Microdrive cartridges have been expensive. But 68000 programming can be learned, and cartridges are now a more realistic price, so Sir Clive feels the time is ripe for a quantum leap in third party support.

At the end of QL year zero, the machine seems to have gravitated towards a sort of low-key, business machine status. It hasn't achieved anything like

QMOD, which is a 75/1200 or 1200/1200 modem. The assembled kit will put you in touch with Telecom Gold and Prestel, and, if you really have nothing better to do, Micronet 800.

As far as software is concerned, the poor old QL is currently being bombarded with languages, monitors and assemblers. Computer One has Pascal, Forth, a monitor and an assembler, Micro APL has APL, while Metacomco has an assembler, BCPL and Lisp. GST took the opportunity to announce a C compiler, available towards the end of this month.

As for the rest, CP Software had implemented Bridge Player 2 on the QL, while Eidersoft had QL Art, QL Archiver and a machine code screen dump routine.

On the hardware side Eidersoft also had a version of the Quickshot joystick with a QL plug on the end, a cheap (£9.50) printer lead, and QL to Atari joystick converters.

The QL's new ROM, the JS

dealing with questions on the expected competition in the low-cost, 16-bit micro arena from Commodore's Amiga and the ST range from Jack Tramiel's Atari.

'We're not impressed by the competition,' he said. 'I don't believe that Tramiel is in a position to compete. Realistically, he is at least a year behind us.'

● Expert Systems International will add another string to the QL's bow by implementing an interpreter for its Prolog-1 on the QL.

Prolog is an artificial intelligence language and its presence on the QL will make the machine appeal to a completely different type of user. The QL version of Prolog-1 will cost less than £100, Expert Systems says.

● Sinclair has now unveiled

new versions of its bundled software. Version 2.0 of Xchange (as Quill, Abacus, Easel and Archive are known collectively) will be supplied with QLs from March 4. Existing QL owners, provided they are paid-up members of QLUB (QL Users Bureau), may claim free upgrades from Sinclair.

The main criticisms of the original suite were that it was very slow to load into memory, spent far too long loading overlays and left little room for data.

Apparently, compression techniques and 'conversion to machine code' make version 2.0 of Xchange load twice as fast, run 20-30 per cent faster, occupy less RAM, and it will no longer be held up by overlays. The revised version of Xchange also supports floppy and hard disks.

## What the Sinclair future holds, by Sir Clive

More details have emerged of Sinclair's next major computer projects — the silicon disk drive and the Spectrum portable.

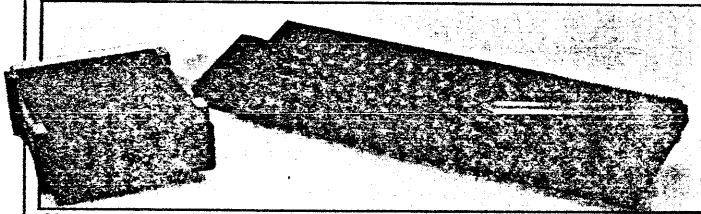
The wafer disk was dubbed by Sir Clive 'the most exciting development in computing this year.' He revealed that it will be launched later this year for the QL offering a ½Mb of storage for around £300.

The unit contains a single, large wafer of silicon and combines the functions of RAM memory and a disk drive. A battery ensures that data is retained when the QL is switched off, or when the drive is disconnected from the machine. It features a power indicator to warn of a low battery charge, and batteries can be changed while the unit is plugged into the QL. As a failsafe, data can be backed up on to Microdrives.

The silicon disk also features in Sinclair's plans for the portable Spectrum, probably in a year's time. Its specification begins to bear out our prediction (issue 42) that the Spectrum would become the Apple II of its time.

The only firm details so far are that it will be Z80-based and will be compatible with Spectrum software. Sir Clive told Wednesday's gathering that a change of interface would allow the silicon disk to be used as main storage on the portable although Microdrives are still an option.

The toughest part of the design is likely to be the display. Sir Clive has ruled out the use of liquid crystal technology, and is looking to further developments on his flat-screen TV.



QL and disk — first in a line of matching accessories.

the third party support the Spectrum had after its first year, but in hardware terms at least there's enough around for it to form the centrepiece of a credible business system.

There are disk drives available from Medic Datasystems, Micro Peripherals, Quest CST, and Sinclair itself intends to release a ½Mb RAM and disk later this year.

Disk drives now apparently being ten a penny, OEL's QCOM system was the star of the show. QCOM is a three part communications system, consisting of QCON, a communications interface switchable from 75-9600 baud, QCALL, an auto answer auto dial module, and

version, is one of a series of Sinclair. A number of new commands are included, but Sinclair's intention in launching JS at this point is to improve Microdrive handling. The new ROM itself is totally compatible with previous versions, but the new commands are partly experimental, and may not be documented until later versions of the ROM are produced. PCN will carry full details of them in the next few weeks.

If you're buying a QL in the next few weeks you should make sure you've got the JS version (type PRINT VER\$) and that it includes version 2 of the Psion applications.

## And in the beginning there was the QL

Last week's all-day seminar ended with what was billed as 'an informal press briefing' by Sir Clive himself. In the event, it was more of a religious rally, at least on the Sinclair side of the table — Sir Clive preaching the QL gospel.

He foresees a rosy future for his latest brainchild. The brightest spot on the horizon is Strathclyde University's commitment to take 7,000 QL systems — one on the desk of every student, and beyond that

Sinclair's intention to dominate the university and college computing field.

In addition, OEL's communications package could take the QL into the heavyweight business sphere.

To date, there are 50,000 QL users in Britain but Sinclair is talking of boosting that figure by 200,000 this year. Sir Clive wouldn't be drawn on his hopes for the US market other than to say that managing director Nigel Searle will return to America to head the mail order launch of the machine there.

Sir Clive was boisterous in

