

WALKER'S WAY

By Martin Walker

Flushed with the success of Hunter's Moon, Martin Walker has launched into his latest 64 project. Over the next few months, he'll be revealing all the trials and tribulations of creative programming in this, his diary . . .

Sunday 24th January 1988

The first major breakthrough. My projects always seem to start with the main character of the 'story', unlike Andrew Braybrook's, whose first step always seems to be the background character set. I find that if there's a hero to work with, more things suggest themselves. Anyway, less of this waffle, let's hear about the breakthrough!

Well, I've designed a new craft that looks almost as if it escaped from an Atari ST. Using only two sprites (the Hunter of *Hunter's Moon* fame used four hi-res sprites superimposed) I've managed to get a four colour craft that looks as if it has been designed in 320x200 mode. Most of the realism comes from all the time I put in on Hunter's playing with the light. No, not swinging from the ceiling, but gently playing across the harsh metallic hull of the Hunter, as she swung to meet the renewed onslaught from the crystalline forces. With lasers hurling twin blinding beams of destruction through the starkness of space, spinning showers of debris spun out into the void . . . Now, where was I?

Monday 25th January

Must make a note not to get carried away today, otherwise I will get carried away forcibly, kicking and screaming! You've probably already noticed that Sunday still counts as a working day in my book, but my weekends tend to be in convenient gaps towards the middle of the week – you can't take a day off if there's an idea struggling to get out, can you?

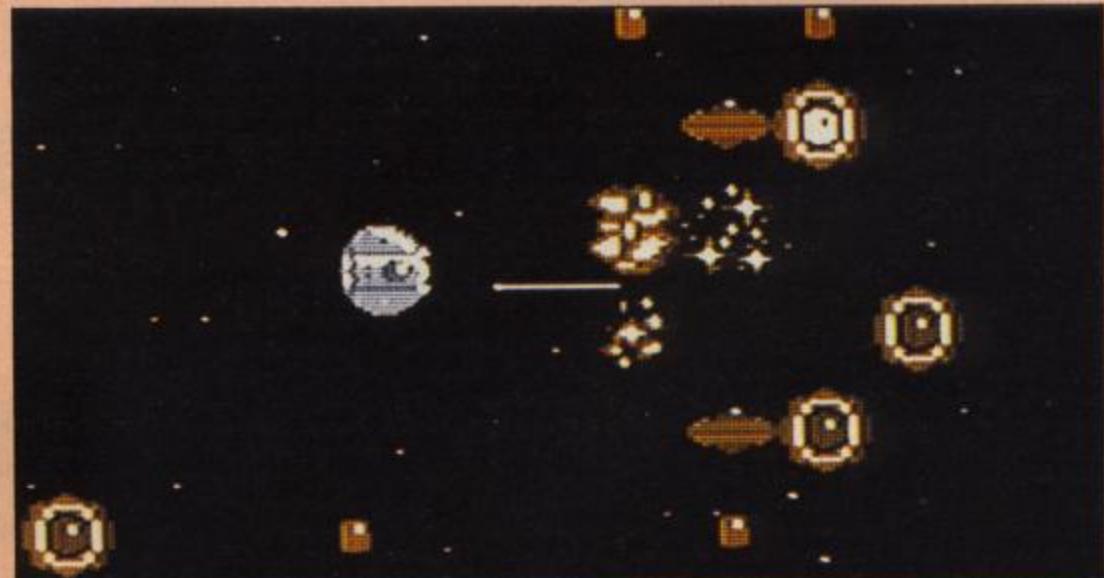
Back to the light and shade. If you look at the majority of games that used highlights and shadows to add depth and realism, they all tend to place the imagined light source at top left. The highlights are all top left on each object, and the darkest parts are bottom right. It was a long time before I realised why, but Hunter's Moon is lit from the top right. Hmm! The answer is that I'm left handed! If you are right handed, to draw easily you normally position the light at the top left to avoid shadows of your arm falling across the picture. Subconsciously I always place the 'sun' at the other side for the same reason! Pretty heavy huh?

Wednesday January 27th

Hmm! What to write about today? Got up. Went shopping. Re-read the current issue of ZZAP! I know it must be a Walker 'weekend'. What can I reveal to the world (at least a select selection of ZZAP! readers) that would grab them before they skip ahead to infinitely poke their way into another Galactic Mega-Score table? What is it anyway that drags us back to a game even when we've got infinite lives and

can start at any level? Is it the atmosphere generated in *Paradroid*, the feeling after completing a wave of licker ships in *Iridis Alpha*, or the swirling beauty of the alien formations in *Delta*? Can I think of any more sentences to end with a question mark?

Some games seem to always merit 'just one more blast' before the 64 has its juice cut. I'm pleased with the way Hunter's turned out in this respect – I still enjoy playing it after sitting in front of it for nearly 8 months. I suspect it's something to do with getting the difficulty set right. Some games feel as if nobody ever wanted you to get very far! I set my games to be tricky for me. This should mean that king-zappers find it a challenge and the rest of us can still get there. My best so far at *Hunter's Moon* is



system 14.

It's always tricky to set the difficulty of any game after a few months of your own playtesting. You're an experienced player (and often the only one at first), and there's nothing worse than a starting level that seems too difficult for a beginner, or too easy for that matter. Ideally it must be tried out on unsuspecting friends and colleagues – here, grab a joystick and give me a gut reaction. It could be messy, couldn't it?

Everyone likes different sorts of control – that's why there are three engines to choose from in Hunter's. Take your bog standard progressive shoot 'em up. You start like a snail and always have to get through at least two screens worth of mayhem before collecting enough tokens to get what in any 'normal' game is standard equipment! I like the approach of *Delta* – at least when you've got it you keep it for a bit, or in *Morpheus* where there's a real feeling of having earned your new bolt-on goodie (even if it gets blown off 10 seconds later).

Thursday 28th January

Spent some time thinking about a new control method for the next game. Scribble. Eight way scrolling again, I think. Although it commits me to animating my craft through 16 directions as it rotates, it seems worth it. I've already done a flick screen and parallax horizontal scroller now, but prefer the freedom of being able to go anywhere at all (backgrounds permitting). Scribbled furiously for some time – all these pieces of paper will be condensed later to become the 'New Gameplan'!

Friday 29th January

Though it might be a useful chance in this diary to publish a complete star system guide to *Hunter's Moon* for all those players who might find it helpful. A couple of exclusive tips for ZZAP! readers – to start the game at any one of the first four systems, simply hold down keys 1, 2, 3, or 4 as you press the fire button to begin. And for all those who need a little encouragement – there's a graphic sequence at the end of the game for anyone who gets as far as the Ludo system (starmap 11) or further before running out of craft. 'The Hunter returns to *Hunter's Moon*' after the high score table disappears.

Saturday 30th January

Went into town today. Thought it would be interesting to see what was on the software shelves of the high street shops. Boots as always had a good selection and seem to get most things fairly quickly once released. They also have a nice clearout occasionally and a few bargains. Not today I fear. I think one software house must have overdone the hype, as the bargains seemed to be composed mostly of one

huge heap of the same game reduced to £2.99. Whoops!

WH Smith seem to have their software delivered by the local museum. I spotted titles that have since become collectors items sitting on the shelves next to the 'Top 20 Chart Games'. It's great for a quick delve and reminisce. You can spot the trends in cassette covers, and even find the full price games next to their budget reincarnations. Not much of a contest, really, is it?

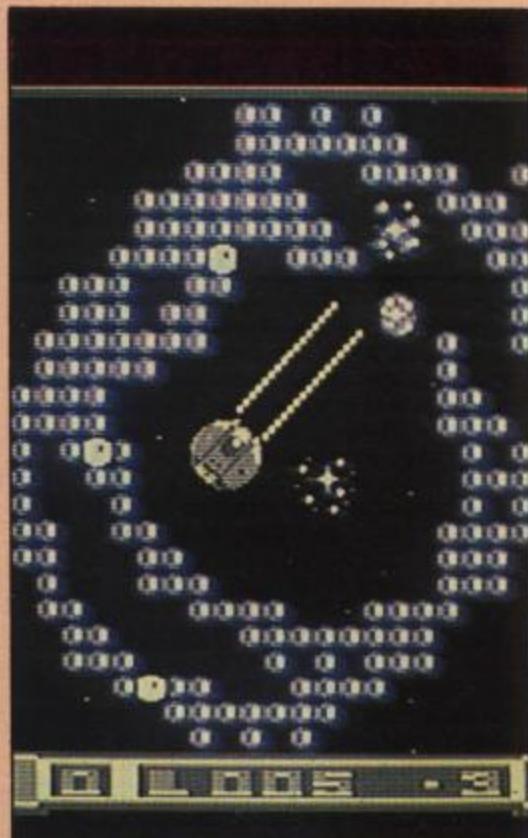
Sunday 31st January

Played a few games today. It's all research really! Vertically scrolling shoot 'em ups never seem to give you enough warning of what's coming, because the TV screen is tilted on its side compared to the arcade equivalents. In *Salamander* the scrolling alternates between horizontal and vertical, but you do have to change the gameplay to suit when your ship changes direction. I recently watched in adm-

ration as a friend of mine played through the entire game on one coin and then grumbled because he'd lost a ship. I think I'll ask him to playtest my next project!

Wednesday 3rd February

The last few days have been spent rewriting my sound effects editor. So many games seem to have the sound effects 'hung on' at the last moment, just before release, but I like to live with mine for a while first. It's rather like watching a silent film at early stages in the design of a game. Sometimes you get a shock when your aliens first open their mouths! I'm lucky in that I can produce my own, so much tweaking will go on as I finish the other parts of the game.



I tried to make the cells in Hunter's have pseudo-speech; not actually talking but making voice-like sounds. Really, the only way to perfect these is by continually changing different aspects of the sound in real time as you perfect the effect you're after. Most commercial editors have to be designed to be easy to learn by anyone, and often you spend more time looking at the keyboard than at the screen. Mine is approached more as a games player who wants to 'play' with the sound as I edit. It becomes another game to play when you want a change from coding – but the best sounds you store to be used in the game later!

A new front end has now been completed. Nearly all joystick controlled for the busy bits, and a few keys to leap on for switching channels and sounds. Sometimes it seems to work in games to use the odd key press during the action, but I can never cope with anything other than the space bar or RUN/STOP to pause. There seems to be a mini convention for shoot 'em up about which keys to use: Fire button to start, RUN/STOP to pause, 'Q' to quit. Hands up all those who load up an old favourite, and then panic when RUN/STOP doesn't pause the game when the 'phone rings!

Thursday 4th February

Visited ZZAP! offices to be serious, spread jollity and discuss life, the universe and everything. Julian and Steve gave me a great welcome (and a black coffee to bring me back to life after setting the alarm clock excruciatingly early – we programmers normally keep quite odd hours). Much talk about the industry ensued – if anyone's ears were burning during



the afternoon they now know why! I also got a great chance to scrutinise the latest software offerings, shortly before they appear in the shops. I certainly know what I'll be buying next for my Atari ST (Oh, whoops what a giveaway!). I also had a long chat with Lloyd about ROM cartridges – apparently he thought the initials stood for Rip Off Merchants; probably due to their price. Thanks for an enjoyable day, guys!

Saturday 6th February

I'm still investigating the possibility of using a cross assembler on my ST (I can't afford to buy an OPUS). My last project on the 64 (I won't mention its name again!) ended up in six chunks of source code, and even with a turbo loading disk system it took over five minutes to assemble. This doesn't sound very long until you get a 'branch out of range' error after 4 minutes and 50 seconds and have to start all over again! If you read through your old issues you'll find that both previous 'diarists' have decided to go down the same road, and many software houses are now joining them. Ocean have installed an ST-based cross development system for their in-house team which even allows graphics and music to be produced for a range of machines on the ST – if they would consider selling it to outside parties I'd be very interested to hear from them!

The biggest advantage of a well-written system is that you can debug your 64 program while it's running – normally you either see the graphics screen or the debugger, but not both at once. By using the ST with a second monitor you can examine what is going on in your 64 on one screen whilst continuing to run the game graphics on the 64. Invaluable! I'll let you know how I get on.

Sunday 7th February

Knocked my piles of scribbles into one great heap today. Sorted through all the ideas and started a 'master' sheet to include all the compatible and best ideas for the next project. I now have a gameplan, a craft designed and plenty of ideas which may evolve or be discarded as everything progresses. I don't want to give everything away yet, but expect another shoot 'em up with smarter-than-average 'baddies'. I intend to give them the same fire power as the player, so you'll have to think a bit more before you go in, guns blazing. I've also come up with a new level design system that allows a level of 16 screens in size to be defined in 32 bytes. Imagine the possibilities!

Monday 8th February

Mulled over tactics for new aliens. I like the feel of using the multiplexer but simply having 32 sprites whizzing about does not a game make. Intelligence is the order of the day, and teamwork will also figure in their attacks and tactics. It sounds a bit hazy, but I'd like to try out some ideas that seem very promising. More about them another time. Played a certain vertically scrolling shoot 'em up this afternoon, with an infinite lives poke. It didn't seem to have been playtested at all. The graphics were great, and it had all the ingredients of a classic but was almost impossible to play! If the bog standard ship speed had been slightly faster it would have played oh-so-much better. And in the furious action I more often than not shot my own approaching super weapons; if only they had been invulnerable I swear I could enjoy it a lot. But the most evil of all crimes happened – unfair collision detection. Is there anything worse than losing a ship when you're convinced that the approaching alien missed you by at least 2 pixels? Answers on a postcard please.

Tuesday 9th February

This will be the final entry for this month, as tomorrow I'm off to Exeter to visit Cyberdyne Systems, who helped with the mastering of HM. They want me to design the sound effects for their forthcoming game *Armalite*. So far it looks extremely polished and impressive, and if they can cram in all the features they intend to, it will certainly be on my list of essential purchases.

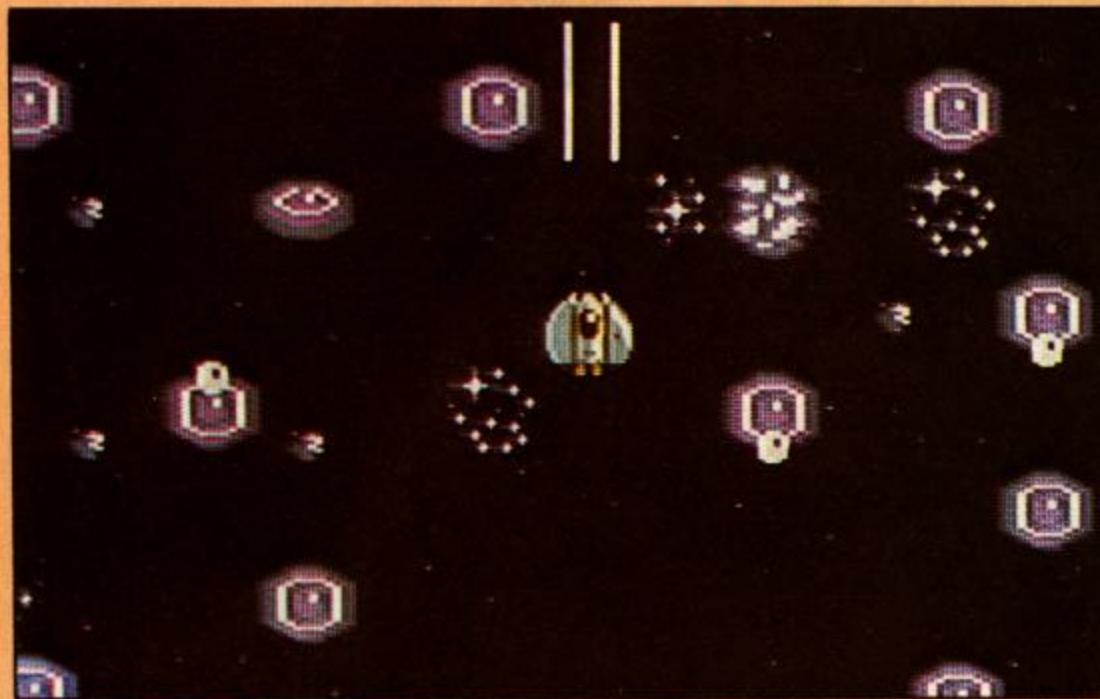
I've been stretching the SID chip in different ways today, in anticipation, and have now amassed a bank of percussive effects like metal blocks, milk bottles and elastic band twangs. These all help to refine the constant search for new and refined in-game sounds. It's fun, rewarding and doesn't damage your health. All in all a harmless pastime suitable for all the family and friends.

How many games are there in your collection that have the same old 'boing' and 'splats' that we've all heard so many times before. The first time I heard *Paradroid* I was sucked in. I was down there in the corridors with them – and due in no small part to the intelligent use of sound effects. Where would karate games be without the digitised grunt! And that Floyd-like backing track for *Delta* by Jabba the Hubbard was awesome, as a colleague of mine might say. Funny that. Last week I wandered into a shop and bought a woolly jumper with sheep on it. Just liked it I suppose.

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The second instalment of Martin Walker's programme of a diary – or diary of a program.



Thursday 1 February

Produced some more sound effects this morning: some new weapons that have real oomph! They incorporate dull thud, whine and recoil elements, and make a good start to my 'weapons' library. Some will no doubt be used in *Armalite* and others will be more appropriate to my new project.

One intention in the new game is to allow the player to have a shield energy which drops every time you are hit, or collide with the background, and my 'knock' library will allow me to simulate crashing into different materials (metal, glass, wood etc.) The big advantage with this style of play is that it allows the aliens to be more trigger happy without making the game frustratingly difficult, and also allows you to take a few chances in a tight situation without necessarily losing a ship.

Friday 12 February

A Walker weekend again! I find that if you relax twice as much as normal you can cram a whole weekend into one day, thus allowing more time for work the rest of the week. Seriously though folks, I sometimes have to force myself to stop and lead a normal existence for an odd day or two, otherwise I get stale and ideas start to dry up. Incidentally, aren't milkmen amazing! Ours arrives whistling fit to bust at about 5 am every morning – I wondered what was going on the first time I had a super-late programming session.

Saturday 13 February

Watched *Moonraker* last night (again!). I like the laser sounds used, so this morning saw a

new addition to the Weapons file. Producing a copy of an existing sound is perfectly possible with SID, but lasers are fairly easy to get anyway. More problems come with 'natural' sounds, but running water, raging fires and ticking clocks are all feasible (just listen to *Chameleon!*).

The rest of the day produced the start of a new graphic style for backgrounds. As my games evolve, the 'story' also takes shape around the proposed gameplay. This time the action takes place in claustrophobic metal cities where death may be only a corridor away. It's nice to be down on the ground once more!

Sunday 14 February

The 'city' look gradually took more shape today. The feel is hi-tech, but with an oppressive feel like that used in *Alien* and *Blade Runner*. Although I intend to evolve 'plasteel', 'glasteel' and other colour-based building materials later (the 'Chris Foss look'), so far I've come up with pleasing looks in Steel, Chrome, Bronze, Copper and that means black anodised sheen. What a shame the 64 only easily gives four colours at one time – all these on screen at once would look stunning. Instead I'll have to rely on the enemy lasers to stun you!

Monday 15 February

A novel start to the day. The postman delivered a package of ten blank disks from Trilogic in Bradford. The novel part is that I didn't order them! I wouldn't have minded but my Access card had been charged for at least three months! One phone call sorted it all out, along with a refund and a trip to the post office to

return the package to them, and then hopefully to the correct purchaser.

I've also found Trilogic helpful and informative. I know that most people buy products like the Expert Cartridge to back up (hack up?) games, but mine has proved invaluable during development. Being able to break into a game at any stage and examine things saves as much time when trying things out or tracing bugs. I only wish that more people used them constructively, but then perhaps if more games were 'fine-tuned' during playtesting people wouldn't need to hack a game about to get beyond level two!

Tuesday 16 February

A couple of explosions started the day today, but only from the safety of the sound effects editor. I gave up after the first two – some days inspiration goes and you spend more time making cups of coffee than coding. Finally got started again mid-afternoon, down in the bowels of the city.

Started rationalising the layout of corridors and walls – I don't want to store each entire level separately as then I'd need a multiload (and we all know what we think of multiloading!) Had a novel idea later to design a random level generator for some parts of the game, so that you never quite know what to expect. It might work well, but would never compete with its tweaked and cunningly thought out companions for gameplay.

Wednesday 17 February

Continued with city design. I now have six floor gratings and many variations in feel and colour, from squeaky-clean brilliantly polished metallic areas to dark, oppressive corridors, lost for all eternity within the forgotten reach of the basement. Extra colours can be added in selected areas for special features, and I'm pleased with the overall look (not designer overalls but overall design!).

Thursday 18 February

I studied the software charts today. Groan. Groan again. Why do people buy the rushed, undernourished licensed games that appear with depressing frequency? Some are really well done, but when 'a certain software house' admits in print that it wasn't happy with its own product, what are we to think? Licenses can be extremely expensive, but at the moment guarantee sales, almost in spite of the product itself. Many of the smaller software houses have 'gone under' despite having good product, and the saddest thing to me personally is that it is possible to make more money doing conversions than writing original games, especially if you can write them faster than anyone else. Enough said.

Friday 19 February

Booted up the Sprites Editor today, for a session of enemy designing. By the afternoon I decided I must be suffering from 'Braybrook's disease' – some days alien designs can be decidedly elusive, and you can spend all day waiting and none appear! Although I have 10 sprites to save, none are up to scratch. Perhaps I should sell them as a job lot for use in a licensed game. Meow! Oh for more horizontal resolution on 64 sprites! Perhaps if I put my fat pixels on low voltage for a few days they would oblige and thin out a bit, or maybe if I put 'ST' at the top of the editor they might take the hint.

Monday 22 February

A great new idea for the game arrived in my head late last night, whilst eating a slice of toast. It involves a new way of viewing an overhead scrolling universe, using reflection and



parallel worlds. Heavy huh? I should be able to design a single level of the game using two different city layouts simultaneously, but allowing the player to move fairly freely between both. It needs some refining before I start coding, but it feels good already. I've jotted down some possible ways to permit inter-landscape travel, and intend to let the 'baddies' pursue you between levels. What a profitable day!

Tuesday 23 February

Spent some time today with good ol' *Electrosound*. Probably the reason is the 'run-time' module that Orpheus subsequently released – at long last the programmer could include self-written music in a game without taking several months off to write a music utility. It may have a memory overhead of 10K and take as much raster time as an average game, but I still like it!

It must be admitted though that trying to write music using a computer keyboard seems to me like trying to eat spaghetti with a spoon! When I can afford it, the ST sitting forlornly in the corner will have a MIDI keyboard attached for realtime music making, and then perhaps the 64 can receive its music down a suitable cable.

Thursday 25 February

The latest few days have been spent doing what I term a 'mental bellyflop'. If you work within a development team or have a working partner then it does have the advantage of instant feedback. Any idea that comes to you can be bounced off another mind to get an instant reaction, and false trails, dead ends and diversions can be minimised.

The 'mental bellyflop' is the way I sell my ideas – in the absence of feedback from elsewhere it is best to collate all the ideas hastily scribbled down as they pop into your head, hurl them all into the air and then do something completely different for several days. After this time away from the mundane business of designing another piece of background or tweaking the odd sound effect (and some of them are!), you can return refreshed and be far more objective about your own ideas. The bellyflop leaves the important ideas still 'in the pool' but discards the 'splashes' which tend to dilute the main idea. I now have a definitive gameplan.

Saturday 27 February

I fully intended to get in a good day's work on my sprites today, but that was before the postman arrived with the latest demo of *Armalite*. At last the 'super-weapons' are in, and I can now see (hear?) how my weapon sound effects fit into the game. The graphics look excellent, and I'm looking forward to helping gametest when everything else is finished – it's very playable already and the aliens don't even shoot back yet!

Most of the day was eventually spent on more sound effects. The number of super-weapons has dramatically increased, so I had great fun honing mean and moody audibles to suit, and was well pleased with all the results.

Sunday 28 February

Worked with the dreaded sprite editor again today, but surprised myself by coming up with a new weapon look. By using software sprites (ie mapping objects across the character screen and replacing the 'underneath' characters afterwards) you can also at the same time add in spot colour. The new weapons can therefore have their own colours, as long as I'm careful how I design them. It's even possible to throb the colours (wow!) as they move.

I intend to use software sprites for player and enemy bullets, leaving as many sprites as possible for aliens. Perhaps the multiplexor will be used as well, but I may not need that many baddies on screen at once. This should make for a much more colourful overall screen look.

Monday 29 February

This should be an excellent day, as it only happens once every four years! A giant leap for mankind! Groan, waffle, waffle etc. Down to business. Being suitably cryptic so as not to give everything away before release date, the new game could be described as a shoot 'em up incorporating a board game (a what?), and mazes. I intend at the moment to have a new form of control that is a cross between horizontal/vertical/eight-way scrolling, and plenty of mayhem (blasting to you). As with all projects, things may change subtly as time passes.

Today saw the start of rationalising the backgrounds. Although I've got a disk with about 15 different screen designs, to get as many

levels as possible into a single load needs much planning from this point on. *Hunter's* needed only 64 bytes for each eight-screen level, the trick being that each of the eight worker cells produced the backgrounds as they moved about, effectively plotting the level as you played. Only the type of movement and starting positions were needed for each new level.

The layout of this game should occupy about 32 screens for each level in two different parts, but I've come up with a method to define all 32 screens in the magic 64 bytes again, along with a few bytes to decide the colours, type of scenery and aliens. This is where the concept of the board game comes in. Stay tuned to this diary for more information as it develops!

Tuesday 1 March

The postman arrived this morning with yet another diversion, namely my official production disk copy of *Morpheus*. Since everything I play must affect me to some extent (if I'm honest!), it must all be relevant to the diary n'est pas? The finished game (as opposed to the version I played at PCW last year) has a few tweaks in the graphics dept. (the docking station is more 'rugged') and I really like the restart facility.

So far I've got to level ten, but still can't get to grips with the control weapons systems – by the time I've switched from the main engines great damage to the ship has normally been sustained, and I currently find it easier to run away. What an admission! The booklet helps a great deal in choosing systems (let's hope the lack of it proves a useful deterrent to the pirates' understanding of the game!) Overall I really enjoyed it. Nice one, Andrew. It will be interesting to see how people respond to the price tag though, especially if they didn't follow the diary and know what to expect before they decide to buy.

Wednesday 2 March

My ears hurt! I've spent all day on the sound effects for *Armalite* and knocked them into shape ready for another visit to Cyberdyne Systems sometime in the next week or two for 'tweaking'. Since so many super-weapons have been designed there are now eight two-channel weapons sounds which can be intermixed – I got a total of 50 different variations which should be enough for anyone! The alien mothership and player's craft explosions have been designed as megablasts using all three sound channels simultaneously. This created a colossal sound (sad if it's your ship, but satisfying if it's the mothership!).

The only tricky bit of brainwork came in deciding priorities for the sounds so that I can ignore the odd alien going boom if I won't know if all the sounds 'fit' until I hear them in the game itself. Sometimes certain things don't sound right when you hear them 'on-screen' so to speak. This is a tricky part of writing sound effects, and the reason I like to gametest as well. The right atmosphere is so important, and is greatly helped if you can 'believe' that the sounds are actually being created by the objects on screen. So many games are let down in this area!

Thursday 3 March

Another visit to the shops today, and a chance to peruse a different branch of my least-favourite high street software stockist (see last month's diary). This one was a real chortle! The stock was so disorganised that I gave up looking for one particular game, and decided to ask for it at the nearby counter. Considering the fact that 'We only stock the top 20 games', it seems that the only way to get a best-selling game is to make sure that it's best-selling first! Still, this probably explains why the stock is so out of date – they wait to see if everyone is buying it before they decide whether they'll sell it! And on that note I'll bid you adieu for this month.

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By Martin Walker

Month three: and the binary embryo begins to take shape



Friday 8 March

After spending the last few days in the wilds of Lincolnshire, I was raring to go with some fresh ideas – but there was a power cut all day! I had to resort to washing the car instead – I couldn't tell what colour it was anyway! Still, it's a chance to explain what the new game will be about before I get coding again.

The dwellers of the metallic cities live in two vast interlinked square complexes – in fact each level is designed like two chessboards one above the other, a sort of 3D maze. To explore each complex you can travel freely through its corridors, but some areas of one half can only be reached by travelling through link tunnels from the other side – the problem being that the tunnel doors may be locked, and the keys are mobile and roaming somewhere in the city!

Wednesday 9 March

Back with a vengeance. The rationalisation of level plotting is now complete – each part of the maze is designed like a piece of Scalextric; bends, straights and crossroads so that all I have to specify is the relevant piece of 'track' for each linking section of the 16 screen layout.

WARNING. Technical bit follows for enthusiasts only. All normal(?) readers please skip to next section. *Hi, coding freaks everywhere. Here's the diary equivalent of the scroll message in the border! Each of the mazes is formed on a 'board' of 8x8 squares, so only 64 bytes are needed to store each layout, and by packing two squares of information into each byte, both 'sides' of each city can be stored in the same 64 bytes, a total of 32 screens worth! Wow! Hi to John, Dan, Robin and John.*

The decision has now been taken to avoid spending excessive time tweaking until later – I want to finish this before next Christmas! Anyway, did anyone notice that the engine

exhaust of the Hunter was animated in all 16 directions of travel? Did I really spend a total of 4 days on the main ship explosion? Who spotted that the infobars dimmed just like cinema lights as you entered the Relaxation Mode? Perhaps if someone would pay me by the hour . . .

Friday 11 March

Having finally decided on the design for each 'track' I have to produce some dummy screens by hand to make sure that the universal system looks good in all styles. By the end of the day it has to be said that the universal system works well for a single piece of track, but by the time a complete screen full is put together it's very blocky. Back to the drawing board.

Although my disk of dummy screens has many pleasing 'looks', more thought is now required to design one that can be used in a more versatile way. It's rather like trying to build a housing estate with a set of standard bolt-together rooms. All I've got so far is a wimpy Wimpy!

Saturday 12 March

Produced a definitive set of track designs which work well in quantity. It took yesterday's large scale practice to show what would work well – and now to surgically remove the scrolling routines from Hunter's (pass me those rusty scissors someone).

This is the hard way to start a project – nothing but mock-ups for weeks. Once it's done, though, the game is well under way in one fell swoop. At the end of several hours of surgery, I was left with what I hope are all the relevant sections of code, except for declaring the zero page variables – I will do that later when the first section of new code has been written. Complex, eh?

Sunday 13 March

Wrote most of the routine to plot the maze. The master program will take the magic 64 bytes and convert it to 16384 bytes of screen design.

TECHNICAL BIT – Each maze has 64 squares; each square has 16 'chunks' each chunk has 16 characters; there are 16 chunks in each style library. Yes, I know it sounds like a nightmare. Where do you start? In this case on the inside – once you can successfully plot one chunk it's time to try for a whole square, and so on. At least that's the way I should do it – the logical way, but I'm going to be naughty and try to do the whole lot at once. Then if the dreaded blank screen appears when I fire it up I can be at least bypass each routine in turn to isolate the offending one. Hope this makes sense; when I'm in programming mode words tend to come out strangely, to say the least!

Monday 14 March

The big day. Another few hours finishing off the new routines and then debugging starts. I'm keeping my fingers crossed (what an unprofessional attitude – of course it will all work with no problems)!

Later, a warm feeling fills my being. No, I haven't messed myself – the whole caboodle worked first time! As I jumped into the game the first entire 16 screen steel city met my gaze. It really felt like exploring as my little craft roared about the empty corridors, and I'm very pleased with the overall effect.

Now that I can see 64 of the squares all together it is relieving to note that you can't see the joins, and unless you have been reading this diary most people probably won't realise what has been done. I spent the rest of the day trying out the different designs of craft and fiddling with the city colour scheme.

Tuesday 15 March

Time to press on with different designs of city to check the last few days of work really are universal. The second 'look' to hit the streets (groan) is a satin corrugated metal, and the third is my original brass look. Both came out nicely, but I'll be glad to get more spot features in like the tunnel entrances and static defence systems, as these will add even more colour and variety.

Thursday 17 March

Changed my mind about the brass look, and spent several hours changing chunks around to improve things (what did I say about not tweaking). In the end it was back to the character editor to redesign the corners of my brass pipes, and then rekeying the data into the chunk table. Let's hope that settles it – I'm spending more time plumbing than coding!

The dreaded read error appeared from my disk drive in the afternoon – I sent it for repair earlier this year and hoped it would last a bit longer before throwing a wobbly. Let's hope it can hang on for a bit before I have to lose it again. To cheer myself up a bit I had a quick game of *Xenon* on the Atari ST. I've lost more working hours to this than anything else in the last month or so. I know that it's got nothing revolutionary in the gameplay area, but it just plays so well! My current best is the end of level three, but the difficulty is set to be challenging all the way through. For my money the name of the programming team – The Bitmap Brothers – is more memorable than the title of the game. That's fame for them!

Friday 18 March

Started thinking about the special pieces of cityscape, like the tunnel entrances and static defences. Designed a recoiling gun emplacement and a tunnel entrance but they still need more work yet. As the tunnel entrances are all normally locked, my intention is to animate the doors sliding open as they key passes over them. An ideal opportunity to use one of the

new metallic sound effects!

Opening the tunnel entrances will simply be a matter of getting one of the mobile keys to pass the relevant spot. Controlling them will be similar to a sheepdog trial – simply nudge one or fire at it to drive it in the desired direction. The problem will come if you get ambushed by a gang of city dwellers, as the key will wander off in the confusion. There'll be a radar of sorts to help spot where the action is!

Saturday 19 March

The day started in ping-pong mode, as I flitted from one thought to another. I tried improving a pipe fitting and ended up designing a whole new city look that fits well into the overall scheme of things. Colours were then inspected and changed to add maximum variety.

In my quest for the finer details of gameplay (even when I have hardly started the action) copious notes were made about possible adversary types and weapon systems. Since your craft has an energy 'bar' which falls with damage sustained, it'll be possible to have indestructible enemy bullets to dodge (not fair if they can destroy you at first go). I fancy the idea of 'bouncing strobombs' (©MW 1988) in addition to the normal fireballs. These will give you the power to fire around corners and ricochet into particularly nasty adversaries, without getting yourself in the line of fire.

Monday 22 March

I had a phone call from Robin at Cyberdine Systems on Saturday. *Armalite* will be ready to playtest and add sound effects on Tuesday, so I've arranged to drive down to Exeter to install them myself. Many additions to it have been made in the coding department since my previous demo, and every time I think the graphics can't get any better Robin improves them yet again.

A couple of new sound effects are needed, so this afternoon saw the monitor shaking with a new pneumatic hammer and a sizzling electric field. The latter caused my wife Belinda to clap her hands over her ears and run out of the room, so it must be quite realistic! The poor old loudspeaker will soon need a re-coning.

Wednesday 24 March

Yesterday was spent in Exeter. The 250 mile round trip was well worth it, as not only did we get the sound effects in and working for rough 'cartesting' but I got my first feedback on this project as well. I'm glad to report a favourable response to the cities. Various suggestions were made for future additions to gameplay (they are a generous lot with their thoughts!), and I returned with my brain full of the further ideas that occurred to me while driving back up the motorway.

Today was spent working through various ideas with the sprite editor. The original craft design that I was so pleased with may need rethinking. Although it's very detailed, using hi-resolution sprite overlays, the backgrounds cannot achieve the same crispness using multicolour mode. The city has a soft focus look that is pleasing, but the craft, being more sharply defined, appears to be closer and thus flying above the corridors rather than along them. Against the background of 'space' this is not a problem, but unless I give an option to fly the present design is off to the archives for the present. I now fancy a spider-like design with animated legs!

Friday 26 March

More problems with the 1541 disk drive today. It's definitely got to go back again for repair, with the most difficult of all faults to trace – the intermittent one! There are now three of my work disks that contain at least one file that refuses to load; today a file refused to be saved at all, and the stage has now been reached where I don't trust the drive one little bit. Shouting at it didn't appear to help! Working with it any more is really like sitting on a time

bomb – sooner or later something really important will get corrupted or I'll explode! Unfortunately, the previous time it was sent for repair at the beginning of February no obvious fault could be found. Let's hope luck is with me this time, and the fault shows up while the engineer is watching!

At least things looked up later on – I got a novel idea for a new weapon. As your craft has an 'energy bar' a method is needed to recharge after collisions or attacks. The obvious way to do this would be to give a full charge at the end of each completed level, or to allow the player to discover energy banks in the city. Try this method for size. You have a charger that can be launched from your craft to home in on the aliens. On contact it drains energy from them on each pass until they are destroyed (unless it is destroyed first by a direct hit), and when fully charged you can command it to return and transfer its load to you. I intend to give it a main colour of white (when in trouble send out the white charger, get it?).

Saturday 26 March

I started the day like a demon possessed, and completely redesigned my steel pipes. No tweaking – who am I trying to kid? If any possible improvements are spotted I 'go for it'. On a production line you'd be able to spot me right next to the huge bottleneck, but my bits would be neater! Anyway, as you progress with any graphic design, experience grows and your more practised eye begins to notice the little deficiencies in the initial work. That's my excuse anyway!

After getting sidetracked, out came my book on Airbrushing. I don't possess an airbrush but the techniques of rendering different materials are just as useful for computer graphics, dealing as they do with reflections and textures. After much study, and not a little fiddling with the character editor, I amazed myself and produced a chrome pipe!

Sunday 27 March

Another big session with the sprite editor today, with no finished results. Groan! My main problem with sprite design in this project is not having the black background of 'space'. Any colour shows up against a black surround and realistic metallic shading can be achieved by using three other shades (like my metal cities for instance), relying on the background colour being black for definition.

Sprites on the 64 can only have three colours. In space you can rely on black all round to add a fourth colour for crisp sprite designs. However, against a complex backdrop, only two methods work. You can either surround them with a black border (as in Slapfight for instance) or use a predominance of white (as in Alleykat). Both methods ensure that no part of the sprite will merge into the background as it moves around the landscape. The black border approach can however look very 'blocky' and the all-white version simply does not look right with my metal cities. I'm getting there, albeit slowly, but it's certainly tough going. Perhaps tomorrow?

Monday 28 March

Yippee! If only all working days could be like this. Today it seemed that nothing could go wrong at all. One of the many nice things about dealing with Thalamus is the help and support they give the programmer during a project. I now have a disk drive on loan while mine is returned for further scrutiny by Trilogic – no further corruption in the Walker household (on my disks anyway)!

Also, by lunchtime I had my first crispy sprite (and no, it wasn't a takeaway!) and during the afternoon I got about four more, including some animated ones. They use black and white for the common colours, and a variety of middling hues for the third, but still retain the colour shading which adds so much depth and roundness. I'm very pleased, and the city now has its first inhabitants.

Tuesday 29 March

A good solid day of work. You can always tell when the project has some momentum, as you never even think of playing a game – you're too busy working! This was just one of those sort of days. The Sprite Editor, having been reinstated after yesterday's performance, produced a further selection of inhabitants (with just a little help from me).

Wednesday 30 March

Ho-hum! Another day out in the big wide world. Once again I trekked into another set of software outlets, in search of paradise and the game of my dreams. Not even *IO* (Firebird) seems to be out yet. Nothing but row after row of budget software, and just a few unknowns (no reviews yet).

If only you could have games demonstrators (the good old days!) we would all have fewer disappointments when we get home with a new piece of software. You know the feeling – shall I make a cup of coffee first or load it up straight away? The mounting anticipation as the loading music strikes up (or buzzes into action as the case may be). The impressive loading screen. And then, when your excitement reaches a peak, and you press the fire button to start . . . your mouth hangs open in shock as you realise you have just wasted your money. Yes, I've got a few of those in my collection. Nowadays I wait for the ZZAP! review – keep up the good work guys!

Thursday 31 March

I've just emerged unscathed after completing a wonderful game of *Delta*. After all this time I still come back to it, and thanks to an unmentionable rival magazine (hi, Gary) my backup version now has infinite weapons as well as infinite lives. Even loading the cassette to install the new 'POKE' routine gave me a chance to play with the amazing mix-e-loader once again. I still rate the *Delta* title music and in-game soundtrack as the best thing ever done by Rob Hubbard. Come back to England all is forgiven!

Monday 4 April

What a weekend too. On Friday my friend Chris Paynes from Manchester arrived to stay for a few days. Amongst many other enjoyable diversions we had a marathon 11 hour session of playing games and looking at software in general on the 64, Atari ST and the old Atari 800, as well as Chris's new Apple Macintosh. It was very revealing, to say the least!

He brought some borrowed ST software, which we looked at first of all. What a let down! *Rolling Thunder* on the ST has a playing area of 1/4 screen but looked as if it were being scrolled from Basic! And how about this for realism – if you are shot while jumping you lay down and die in mid air!!! I couldn't believe it! Then we attempted to play *Dark Castle* on the ST (a great medieval platform game on the Macintosh). After loading and swapping between three different disks before we could start at all, I went left on the first screen instead of right and we had to swap disks two more times before we could start again! And, during all this time, because I have a 1 mb ST there was 512K of empty memory sitting there unused! Surely someone must soon realise that it is easy to check for extra memory and use it as a Ramdisk!

Honestly, we had more fun playing simultaneous two-player games on the old Atari 800 – *Basketball* and *Dandy* (NOT the Electric Dreams version but the original – copyright 1983). It just shows that gameplay is far more important than advanced graphics and megabytes of memory. As Julian said in last month's editorial – with a few honourable exceptions there's little on the 16-bit machines at present that is that much better than what is already available on 8-bit machines. Long live the 64!

WALKER'S W • A • Y

By Martin Walker

Month four: the story so far – Harold has met Daphne while on a fishing trip in the country. They've sworn their unrequited love for each other and plan to get married and live a life of bliss. However, Pablo (the half caste) has traced them to the small hotel in which they're renting rooms. Unbeknown to our hero he has taken an adjoining room and plans to surprise them when they return. Little does he realise that Harold has returned to London unexpectedly after receiving a mysterious call in the night. Daphne has fallen from her horse while out riding, and is being tended in a crofters cottage by the local doctor who happened to be passing at the time. Meanwhile we join Harold at an address in Knightsbridge ... Wake up ... Wake up Martin ... WAKE UP MARTIN! It's time to write your diary!

Monday April 18

Well, it's been a funny month. After yet another compliment to Rob Hubbard in last

months diary I got to thinking that writing a music player might be a sensible idea, now that he has moved to sunnier climes. So, to cut a long story short, this month has been spent mostly away from the game and into aural territory (ears to you).

Since this entailed many days of brow beating monotony as I grappled with the idiosyncrasies of variable depth vibrato and pulse width modulation, I've decided for this month only to adopt a free form approach to the diary, and only write when something more interesting happens. Don't worry coders, the game will be back with its bit-twisting and byte-shifting next month. So, pull up a comfy chair, fluff up the cushions and relax. Off we go!

Tuesday April 19

Have you ever attempted to order software over the telephone? Not with a modem I hasten to add, but simply using a credit card to get a new title that either hasn't arrived in the local shops yet (and maybe never will!) or to take advantage of an unmissable discount price. Well it's not always quite as easy as it sounds. I tried it this month. One morning I decided that I just had to get *Oids* for my Atari ST. My 64 software is always obtainable locally, but finding ST titles is tricky to say the least. Anyway, I ordered said title and sat back.

Three days later I telephoned again to find out why it hadn't arrived, and discovered the sneaky bit. The number for enquiries is different, and it takes an hour to get through. 'No, the person who told you it was in stock could not possibly have known – the warehouse is at another address. No, it wouldn't be sent out

next day – it takes that long for the warehouse to have your order passed on'.

After five days of patient waiting I thought of sleeping on the front doormat – but I didn't want to wake up and find a letter in my mouth. Anyway, the package finally arrived seven days later, addressed to Carlentham in Gloucestershire. No, I haven't heard of it either. To make the story even sillier, two days later my credit card receipt arrived separately! The moral of this tale is that once you find a speedy and reliable mail-order supplier, don't be tempted to go to somewhere else just because they're 50p cheaper – it would cost me more than 50p to replace all the hair I tore out waiting!

Thursday April 28

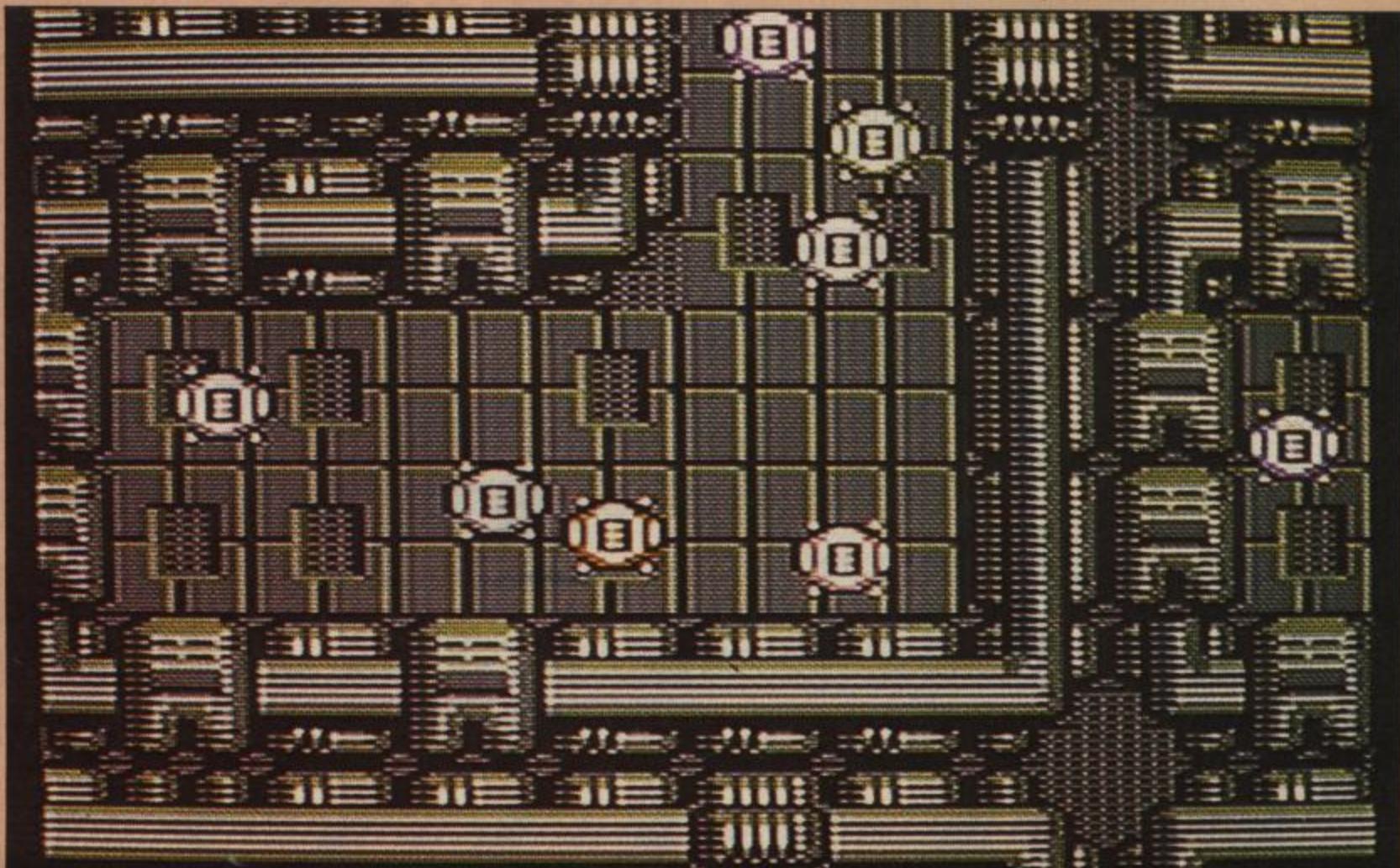
A chance to restart the normal diary format – after three weeks of aching ears and twitching eyeballs the music player is finally complete, or at least in a suitable state to start writing music. Using it is by far the best way to find where improvements may be needed.

There are two things that always appear at the top of the list if you hope to produce music for other people's games – the size of the code ('I've only got 2K of spare memory left and I must have a 20 minute in-game soundtrack') and how little processor time it takes up ('I'm running 100 enemy bullets on the interrupt – but there's only 8 scan lines left to run sound effects and music'). Spending four hours and managing to trim 18 bytes off the length of the code and 1 scan line off the interrupt time is rewarding in the end, but not much fun to read about. I've now finally returned calmly from my ordeal, but the household is much noisier!

Friday April 29

A great start for the music player – heavy metal guitar, with whistling harmonics and bending strings. I'm pleased with the snare drum sound as well, as this is the backbone of most game music. The first piece is well under way, and small refinements can now be made to the code to make it easier to work with. The first one came today when it was discovered that 64 bytes for a sequence is sometimes not enough, so the entire memory map had to be reorganised and all table references revised (There, I told you it would have been boring to hear a blow by blow account of the everyday

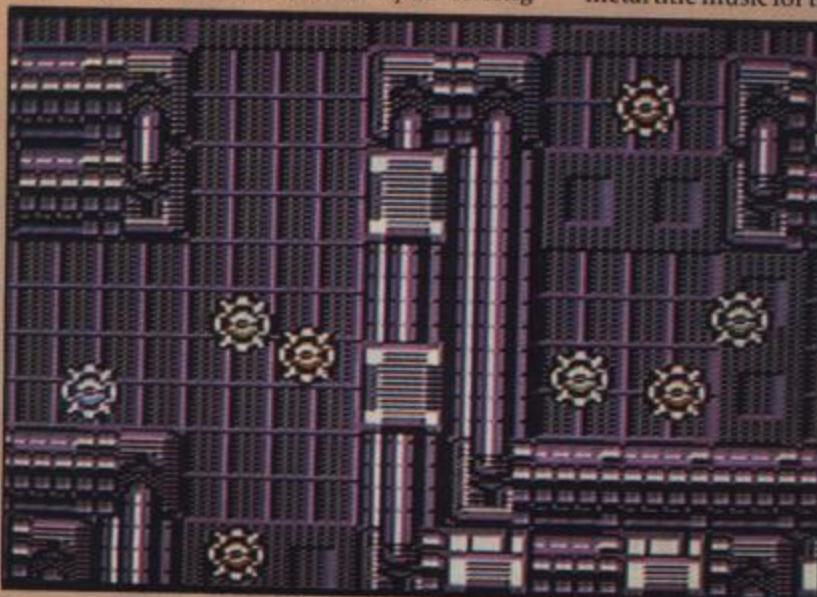
► As yet unnamed ...



activities!). When all the pieces of music for a game are complete the code can be compacted, so not a byte will be wasted.

Saturday April 30

A slow start – the volume control on my amplifier finally needed sorting out before music writing could commence at all today. You know how it goes. First the control crackles a bit when you turn it, then if you leave it for long enough it will eventually develop one or two spots where the sound cuts out altogether. Well, has anybody ever had one like mine that has been left crackly for so long



that it refuses to work anywhere on its rotation? It's a good job I used to be in electronics – I unearthed a suitable replacement from my bits box and soldered it in and for the first time in months I could have music at any volume – not just where the crackle free spots were. Bliss!

The solo section of the piece took shape quite quickly. With two lead guitars it sounded a little like the old Wishbone Ash – anyone remember them? Incidentally, talking of guitars, did you know that the Sensible Software crew are also musicians? The music for *Wizball* (by Martin Galway I believe) also has some rather tasty riffs hidden in the game (and I don't mean scratch 'n' sniff packaging for computer games – now there's an idea! Hang on a while I fill out this copyright application).

Sunday May 1

I wish I could use the filter a bit more. Commodore in their infinite wisdom decided to fit components which give a 20% variation in filter frequency between different 64's. This means that a filtered sound that sounds wonderful on one machine may be inaudible on another. Try listening to a well known game on a friend's machine – you may get a surprise! Archer Maclean tells me that *International Karate* on my machine misses out many of the bass notes because of this. Anyone would think it was my fault! Many computer musicians refuse to use the filter at all because of this, as it can wreck the sound balance.

The alternative is to come up with ways of modulating the sound using different waveforms with time, or changing the note itself as it progresses. My 'heavy metal guitar' sounds a higher harmonic for a fraction of a second as the note starts, to simulate the attack that you get using a guitar plectrum at high volume with overdrive (on the guitar you fool). Using the plectrum at different points along the string encourages different harmonics to sound. When you know what you're doing you can consistently get those amazing high pitched feedback notes like Van Halen (not me – I only play keyboards and the fool). The great thing about computer music is that I can hit them every time while playing a frenzied solo. I work it all out on paper first. I suppose that's cheating really, but who cares as long as the

end result is good. It's only like using a sequencer or a drum machine – the musical part is knowing what to type in!

Monday May 2

Today is a bank holiday, and also Belinda's birthday, so I've promised not to switch on the computer all day.

Tuesday May 3

The first piece of music got finished today – I'm well pleased with it. Anybody fancy heavy metal title music for their next game? I resisted

► Martin's game begins to take shape ...

the temptation to add those predictable synth drum patterns. You know the sort of thing I mean. Dibby-dibby-dobby-dobby-dubby-dubby-blat! I spent my time on getting a good snare sound, as in most cases this is all you need to add punch. The characteristic sound of the snare drum comes from the rattle of the snares against the bottom head. If memory serves well, most drummers seem to tune the two heads something like a third apart, so overall there are three sounds to simulate. The best sound I got rapidly swaps the waveform between a triangle and noise, to get the head sound and rattle going together.

Mostly it's down to experimenting, unless you want to go the whole hog and use a sampled sound, and these eat memory and processor time. This is all right for a title screen but more rarely used during a game. *Mega Apocalypse* is a worthy exception, and very nicely done too! A typical in-game sample, for example a digital grunt in *IK+*, might need to have its sample updated 5000 times a second (that's 100 times every TV frame!). Although the actual code to do it each time is very short, it's unlikely to leave enough time to scroll the screen as well, so don't expect many sampled sounds in shoot 'em ups, not on the 64 anyway!

Wednesday May 4

Another day spent updating the sound effects in *Armalite*. I suspect that by the time it's released it will render most other progressive shoot 'em ups totally obsolete. Never before have I seen so many moving sprites on the screen at once! It makes you wince when a new alien formation comes on screen – and that's even before they start firing back!

Out came the sound effects editor. It's strange that since so much time has been spent with music this month that even the effects are ending up more musical. Eight more alien firing sounds blasted their way from the speakers before I retired exhausted for another cup of coffee, and a re-bore for my ears.

Thursday May 5

Back to the music player. The second piece is off to a flying start with a haunting main theme and some strange backing 'instruments'.

Because the sounds can be changed in pitch during their duration it's possible to produce multiplexed chords by swapping between several notes every 50th of a second (although this produces disturbing low frequency rumbles unless you're very careful). Another new breed of sounds (as far as I know!) are 'two-tiered' sounds which start on one note and continue on another. Both techniques produce the effect of more than the usual three channels playing, and fill out the sound very effectively.

It's great to be using my old keyboards for work again – they may not be MIDI (it wasn't even thought of when they were purchased) but they've been well played-in during the ten years or so I was involved with bands before my computing bug struck. After blowing away the dust and cobwebs I'm blasting forth in earnest, and with the 64 music roaring out of my 'stack' as well I'm having to think about complaints from the neighbours about noise for the first time in ages. Great stuff!

Friday May 6

A hearty thank you to all those readers who voted *Hunter's Moon* into the ZZAP! Readers Charts recently, especially so for the mammoth leap of 13 places up the ratings in May's issue. It's nice to know that you enjoy playing it. If the interest is there, then there's always the possibility of another 128 levels or a construction kit in the future.

Back to work, and a new instrument for 'piece two', again using the two-tiered system. It really sounds like several people playing at the same time. The nicest thing about all these discoveries is that they don't only apply to the SID chip – all could be used in music players designed for other machines too. Who knows what machine I might end up working with and writing for in the future?

Saturday May 7

A whittling operation took place this afternoon. After a sudden insight into a different way of producing vibrato (frequency wobble) I set to and managed to trim about 20% off the maximum processor time taken by the music player when all three voices are 'wobbling'. I suppose the technical boffins would call it an optimised algorithm. The longest time ever taken now is about 26 scan lines (just over 3 characters deep) on the interrupt. Even if I put the music player on a starvation diet I doubt that much more could be tweaked off, but looking at the time taken by some other people's routines I don't somehow think I need worry about it!

Another voice and theme for piece two evolved in the evening. This one definitely sounds as if it escaped from a Peter Gabriel album – unison wood chimes in a repeating rhythm. It's amazing just how many new and different sounds are possible on the 64. Why didn't I do this last year?

Sunday May 8

Yet more sounds! A multiplexed chord using one channel, and a new smooth bass sound (at least it was designed with that in mind, but it will probably be used at higher frequencies for other things). The piece two continued, and grew into something I wasn't expecting.

At first, when the multiplexed chords were added to the unison wood blocks, it sounded really big. Then the masterstroke – a riff that sounded like four instruments at once. It sounded bigger and bigger as the piece went on, and when I introduced double speed bass with hi-hat as well it suddenly dawned on me – Tubular Bells! Not a ripoff of the riff, but that lovely section where Viv Stanshell introduces each instrument in turn, and it grows and grows. Although there are still only three channels on the 64, towards the end it really does give the impression of about eight instruments all playing at once! And with that rewarding thought this month's diary must fade into the sunset.

WALKER'S W A Y

By Martin Walker

Month five: And in that dark place a silence grew; a silence that threatened to engulf all in its encompassing reaches. It hung in palpable folds about the fabric of the forgotten corridors, its dusty films smothering the former majestic glory. Indeed, it was no longer a place for wonder. Now only caution prevailed; for only caution could be advisable in a disused city that held untold secrets and horrors.

Each defence had been cunningly contrived, and no outward sign of danger was apparent, even on close inspection. There was one consolation only to be savoured – for even as the traps could close their grinning jaws on the unwary, so also they held no loyalty to their designers, and could be turned against them.

everything chimed in again, but I suppose it is surprising that it hasn't happened before now.

After that bad start, things picked up when a new technique was found to produce large four note chords on one channel. Crossing my fingers, the next step was an obvious one – use it on all three channels! Suffice it to say that 12 note chords are now possible. Anyone who wants vast multi-layered soundtracks please bear me in mind – I'll be opening for business in about a week's time (mind you, by the time you read this I could be retired to Hawaii on the profits or living in a tent in Scotland to hide from the bailiffs – who knows?)

Sunday 15th May

That screaming rock guitar has crept in again. Mind you, with a thundering bass line, drums and four note backing chords it sounds just right. Belinda caught me today playing an air guitar under headphones: head nodding, tortured expression on face, wringing imaginary notes from a nonexistent axe in total silence. Great fun – and it gets me in the mood for more music making!

Monday 16th May

A day of tidying up. Several things needed sorting out with the player, like adding a control to quickly clear any section of sequence or track memory and resetting step pointers to return the operator to the beginning of the section (when I've allowed 128 steps in a sequence it can take a long time to get back to step one by hand!).

The tempo controls needed to be simplified – the byte values actually used don't really mean much, so the editor now uses a table of these peculiar numbers, which then allows tempo values from one to eight to be shown on the editor screen. These are much easier to understand – I've never been able to understand how anyone can work well when they constantly have to perform mental manipulations to understand what they are seeing and doing. An editor should be designed to act as a buffer between the actual data and the designer, so one can concentrate on the creative side – after all, if 20% of your brain is juggling with numbers, that's 20% not being used effectively!

Friday 13th May

So reads the start of the storyboard for *Citadel* – yes, the new game has finally got a name and will enjoy a return this month to assembler territory. In the meantime the music demo disk must be finished, duplicated and dispatched to interested parties!

A clove of garlic hangs from my monitor today, to ward off evil spirits. I shouldn't worry really, as 13 is supposed to be Walker's lucky number. Anyway, the primeval thoughts seem to have a positive result, as a new voice enters the music library – ethnic pan pipes. And no, I've not sampled them either! They fit perfectly into the start of piece three for the demo disk, which sounds dark and mysterious.

Saturday 14th May

One channel of the SID chip went totally silent today, which caused a panic I can tell you! At first I thought the chip itself had gone faulty (Oh, calamity!) but on scanning the *Programmers Reference Guide* it turned out that I was a victim of the dreaded noise lockup. If the noise waveform is set and another waveform is switched on then noise may disappear altogether. The cure is to set and reset the Test bit of the relevant channel – the editor had now been modified accordingly. Quite a relief when



Tuesday 17th May

Back to the *Armalite* sound effects for some revisions. I've been told that there definitely won't be any more changes after this (!?), but as I enjoy the days at Exeter, and have been partly using this first SFX project as a means of honing my editor and adding features in the field, I don't really mind. One thing it has shown very clearly is that the only effective way to add sound effects to a game is to have a playable version to work from. Only by playing the game and hearing everything *in situ* can the effects be balanced and the 'feel' refined.

The most important sound of all in any shoot 'em up is that of the player's main weapon, since you're likely to hear this almost non-stop during the game. There are a few games in my collection that have the monitor volume turned down during play, simply because this sound, although good by itself, gives you a headache when you trigger it eight times a second! The new one for *Armalite* has a kick like a machine gun, but is well enough down in the mix not to overpower everything else, and when you stop firing it leaves the whine of a ricochet to add atmosphere.

Wednesday 18th May

The sounds for *Armalite* are complete and installed! Everyone was well pleased with the remix and new main weapons – it just shows how important the final mix can be. We played a subtly 'tweaked' version of the game that lets you begin with a fully-equipped armoury on board. Much devastation followed! The final version of the super-weapon sounds really give you the feeling of power, as a five beam laser cuts a swathe through an entire wave of aliens with one searing blast! We celebrated by cracking open a new bottle of Nescafe, and I returned at midnight tired but exhilarated – my first freelance SFX project has satisfied customers!

Thursday 19th May

Paul Cooper is arriving this afternoon to hear the new music demos. Apparently, word has already spread from Exeter yesterday about them (thanks guys!), so this morning I really must put together all the relevant files on one disk, and design a screen display and menu system, so that he can have a 'take-away'.

There's nothing worse than someone giving you a demo that needs a programmer to run it. I've received demos that require you to load two separate files by hand, and then type a SYS call before a single note can be heard. Most software houses won't have time to persevere further than the first piece in that format. First impressions are so important – just like reviews of a game in fact!

Paul finally arrived at 8pm. He really enjoyed the music – mind you, being able to play it back through a large speaker system does aid the presentation! I think I may have my first customer for game music shortly.

Monday 23rd May

Time to get started with the duplication of the demo disks. About a dozen have now gone out to different places, and now the only thing to do is to wait for feedback. Back to the game!

During the lulls in musical inspiration the sprite editor has appeared on the screen several times, and now various new 'creations' have emerged, along with more of the gameplay elements. From the original city style and design to the present storyboard has been two and half months (not including all the time off to write the music player). I've been asked to prepare a proper storyboard for this project to explain everything that happens in the gameplay. As I'm used to letting the fine details evolve naturally, this requires some careful thought. The emphasis is on exploration and surprise, since a single 'step' may trigger a trap as easily as reveal a needed weapon or device.

Tuesday 24th May

Just how many levels to include in a game is sometimes a more tricky decision than you might imagine. The careful design for my cities will allow me to store the graphics in a far more compacted fashion, allowing much more depth and variety for each level, but it has been decided to design 32 levels or less, which will allow many more features to be added to each, to provide greater depth to each level.

I suspect that many people took quite a time before they realised just how much was really crammed into *Hunter's Moon – Citadel* will have a free-running demo showing random sample levels, just to show the many features in action. I certainly know how disappointing it can be in a game to experience the opposite side of the coin, and find that there isn't as much as you expected. After having *Mutants* for a few days I couldn't wait to finally complete the first 16 levels so that I could see what new features came next. After playing for six hours non-stop my goal was finally achieved only to find – the same 16 levels with more difficult settings! A rather miserable evening followed!

Thursday 26th May

Yesterday was spent at Ludlow, after a kind invitation by Julian for a mega game-playing session chez Rignall. We popped in to the ZZAP! offices around lunchtime to see Gordon and Paul in action and tempted all the workers out to the *Dog and Disk Drive* (they didn't take much persuading!) After a round of orange juices (honest – they serve freshly squeezed ones that are amazing!), a bite and a chat (we put the software industry to rights as usual), Jaz and I got our joysticks out for a big session (our case comes up on Monday next!). Do you realise that more of this diary appears in brackets than out of them? Perhaps my word processor should be modified to insert them automatically at the beginning and end of each sentence.

During the afternoon my peepers also got to view some of the many CompuNet Demos that filter their way into the ZZAP! offices. There's one hell of a lot of talent out there, and I was suitably amazed. Some of the venetian blind raster effects on show were breathtaking, with imaginative character sets and effects, and suitably hacked music (I was glad to see that the composer was nearly always credited!). Incidentally, both Julian and Steve are also graphic artists (they showed me some of their impressive work), so look out for their names in some rather different situations in the future!

Friday 27th May

Today saw the scribble factor in action again, with a little session of algorithmic design to determine how the sprites will detect walls and other solid objects, to negotiate their way around the city. This simply entails looking at the next character in the current sprite direction to decide whether to force a stop or explode (the sprite!). As my character set has always borne this in mind, all the 'safe' characters like floors are at the beginning. If you've ever used *SEUCK* you'll know what I mean!

In the evening some time was spent starting a new and more aggressive musical piece. This has a bass line that growls! It seems that it will be possible to 'multitask' the music writing and game programming successfully – when the game is in need of further inspiration the writing of some music seems to rejuvenate the grey cells very nicely!

Monday 30th May

After a long diversion into different territory, today saw the first major advance into the Sprite Editor. Some time ago, you may remember, it was decided to redesign the main sprite. The definitive version is now complete – a mobile monitor (looking rather like a gold-clad turbo-driven TV) which performs many different functions. Powered by floatation

engines it can move freely around the cities, launch many varieties of weapons, probes and other devices, show information on its own screen, and even indicate the answers to certain questions by nodding or shaking its 'head'. All the animation for this is now complete, and I'm well pleased, since it will allow me to involve the player in much more interaction with the surroundings.

Tuesday 31st May

Several telephone calls during the last few days showing interest in the music demo also resulted in a few tweaks to its presentation today. Firstly, the current piece being played is now highlighted (people can forget which one they are listening to, you know!) and instead of stopping dead when you press RUN/STOP the music now fades gracefully away. Also, since seeing the CompuNet demos last week some time was spent incorporating some rainbow scrolling effects for maximum visual impact. After only one day, the overall 'oomph' factor is greatly increased for version two of the demo disk, available on demand shortly!

Wednesday 1st June

Monday's sprites are now all set to be put into context in the game, with relevant animation. This proves fairly easy, but a bit more time is taken to think through animation routines for the 'aliens', since each will require different animation speeds and number of frames. There are four types of aliens so far – a couple of menacing metal insect species with waving antennae, and an unfolding 'eye' which throbs rather nicely. Each type will have its own character. Some will attempt to home in on the player whilst others will protect vital installations in the city (unfortunately they will also prove vital for the player!).

Thursday 2nd June

Today saw some much needed thought into ways of introducing more colour into the cities. If you saw the rough screen shots in last month's diary you will know the look I'm after, but with much more colour and variety. Colour scrolling on the 64 is always a problem, as the processor is so slow that a large proportion of available time can be used up simply moving the screen about. All sorts of tricks can be employed, but the answer for many people is the *Blue Peter* method. This involves preparing a second screen of information already suitably scrolled in the required direction, so that when the fine scroll limit is reached, you simply whip out the one you prepared earlier (remember all those programmers on TV?).

Friday 3rd June

Start of the big scroll routine, including colour. Yes, I've decided to go the whole hog and shift the lot! This will mean less processor time for other things, but won't produce any noticeable limitations as long as things are carefully done. Most of the work will have to be done on paper first, since the algorithm requires optimising for minimum time (this one will take more time than any other routine!).

After an exhausting day on paper, the evening brought a welcome return to musical piece four, and following a fruitful session resulting in a good intro, a bit more coding concluded the day. A complete reshuffle of the music editor memory map allowed me to save all of the music files (voices, notables, sequences and tracks) in one large chunk, to avoid having four separate operations every time an addition or modification is made. Every simplified operation releases more brain cells to produce more fresh ideas! So, with a numb brain and throbbing ears, but a more varied outlook, I'll wish you adieu till next time.

WALKER'S WAY

By Martin Walker

Martin opened his eyes. As he focused on the ceiling, he noticed the grey haze that filled the room. Damn, he thought. Another shakedown for the opposition. The smell of smoke awoke in him a feeling of hunger. He had not eaten since Thursday and now it was... hell! What day was it? He tried to work out how long he had been in the room but drew only a flicker of recognition from his normally alert mind. His senses, out of force of habit, quickly rallied in an attempt to make something out of this predicament. He got up and walked to the door which had been locked from the other side. Someone didn't want him to leave. Picking the lock with a paperclip, he opened the door a crack and glanced outside. 'GET BACK IN THERE UNTIL YOU'VE FINISHED THIS MONTH'S DIARY!'

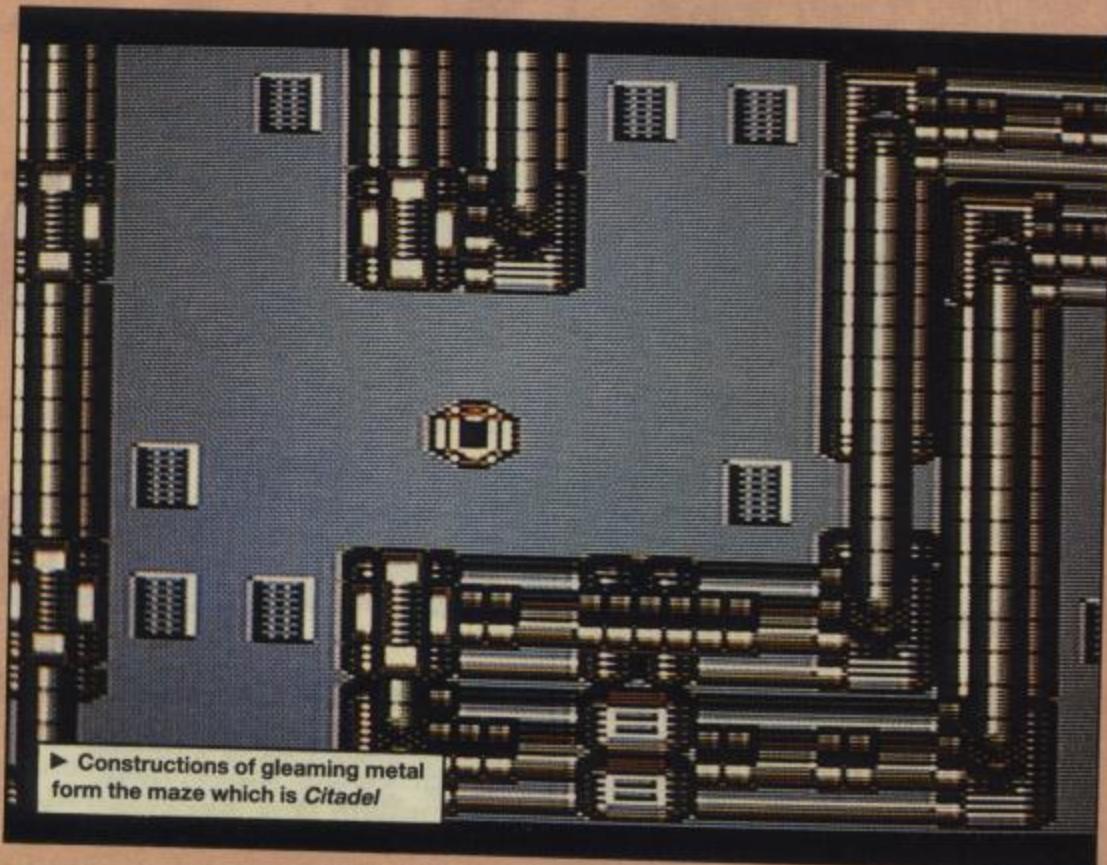
Sunday 12th June

Another novel day. My joystick has needed some attention for some time now, and this afternoon saw the soldering iron out once again. Some years ago, when I worked in electronics, I was lucky enough to have the facilities of a machine shop to make a joystick to my own design. It uses microswitches for reliability, but is unusual in that it is small enough to fit neatly into the palm of one hand and allow single-handed thumb operation of the stick itself if I need to access the keyboard with the other hand (it was originally designed for playing *Star Raiders* on the old Atari 400!). It still functions perfectly, but the lead needed replacing after being pushed and pulled for over 5 years, especially after coping with the ridiculous positioning of the joystick ports on the Atari 1040ST – plugging in the joystick involves tipping the machine upside down!

Tuesday 14th June

Some time has now been spent on rewriting the main scroll routine. Since this single routine is more often than not the longest and most 'processor consuming' of any in a game, ways of reducing the time taken are well worth looking for. Most eight-way scrolling games use a smaller part of the screen as the playing window to reduce this problem. The most used method of scrolling is to shift the entire playing window in the direction of the scroll byte by byte, and then plot a strip in the gap remaining after the rest of the screen has been moved along.

Hunter's scrolled the entire screen area in eight directions and this entailed devising some



tricky routines which again used the *Blue Peter* method of preparing a second screen while the first was being displayed. The only minor drawback in practice was the slight (4 frame) delay before moving off from rest (a twelfth of a second might not sound like very much, but you do notice it). I have devised a new method for *Citadel* that will allow proper control with no delays. Watch this space!

Wednesday 15th June

Sometimes modifying old routines can take longer than scrapping them and starting from scratch. The old scroll needs much hacking about before my new ideas can be implemented but I've started so I'll finish (pauses to mop brow). Incidentally, the single routine that took most time to write in *Hunter's* was the parallax star scroll – anyone who got *Quedex* on disk will have the early demo which had three layers of stars. In the end, by popular demand and for the greatest effect this was reduced to one layer scrolling at half speed and numerous additional 'twinkle' stars (and yes I know that stars wouldn't twinkle in space – there's artistic licence!).

Thursday 16th June

On with the scroll. This was a multi-tasking day, spent partly with the graphics editor (tweak tweak), partly in the realm of sprites (nothing startling) and back into coding territory. No earth-shattering achievements and no disasters. Just an ordinary day in an ordinary week. Yawn.

Monday 20th June

Well, the first stage of the new scrolling routines is complete. There is now a static zone in the centre of the playing window, where the player sprite itself moves, rather than the screen. When the edges of its zone are reached, the screen background starts to scroll. Unlike *Alien Syndrome* however, the static area is only small, and you still get plenty of advance notice when aliens arrive on the edges of the screen! The big advantage of this seemingly small cosmetic change is that underneath there is plenty of intelligent preparation going on, which allows me to retain a scrolling screen window as big as I need, rather than use a small cut down version like *Gauntlet*.

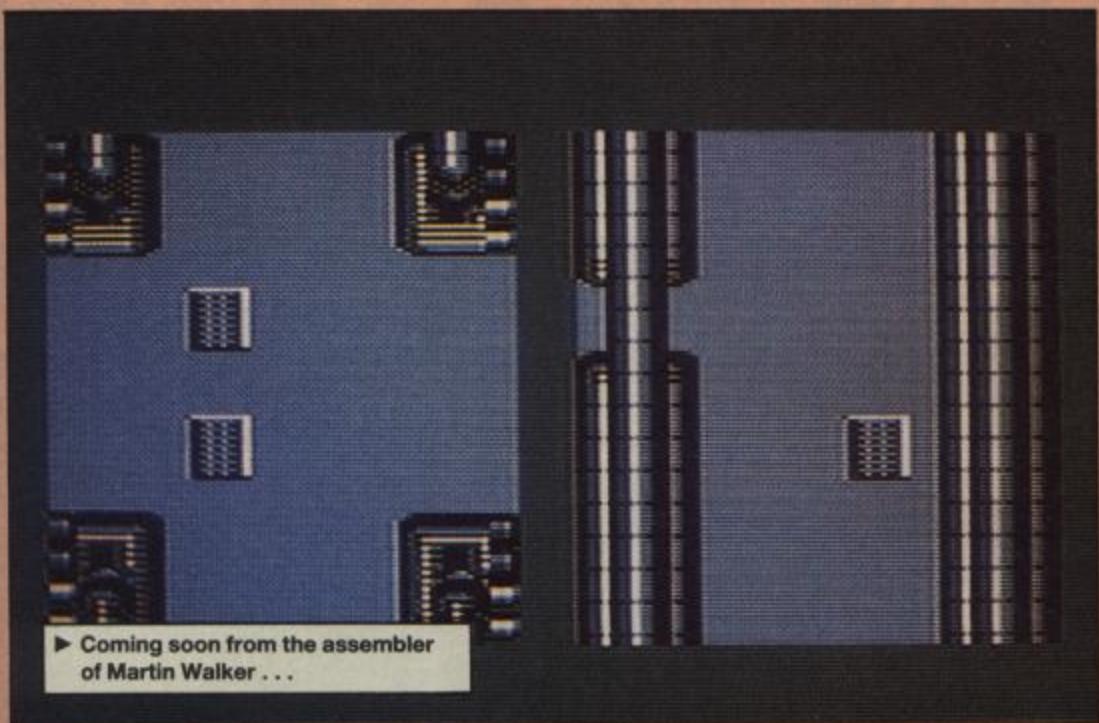
Tuesday 21st June

Because of the way the new routines are structured, it should be a comparatively simple procedure today to add extra code that allows the player to get right into the 'corners' of the city. I chose this in *Citadel* as it gives you more feeling of coming to a boundary wall, rather than the alternative which keeps the player in the centre of the screen but shows blank space beyond the boundaries (as used in *Paradroid*).

Wednesday 22nd June

I spoke too soon! It took all of today to track down and iron out the small multi-legged beasties (bugs to you) that inhabited the new 'corners' routines. It would certainly make things easier to have a square screen like *Quedex* which avoids any game sprites going beyond the dreaded 'seam' where the horizontal sprite positions cross from 255 to 256. However, to do this means only using sprites in the right hand information strip, as although you don't see it, the screen is still scrolling about under cover of blackness! As *Citadel* needs plenty of moving sprites in the cities, this method just isn't suitable.

The new 16 bit machines have a different problem with scrolling. As the high resolution multi-colour screens use so much more memory, moving it about takes up a lot of processor time, and since on the ST there is no fine scrolling every pixel of movement is separate and time consuming. This does allow any part of the screen to be fine scrolled in isolation, and the smaller the 'window' the less time it takes.



Result – lots of square windows! These really are ideal for eight-way scrolling games, as you get equal advance warning of aliens on the edge of the screen in any direction. Frustration soon sets in playing any game if you keep losing lives simply because you don't have time to react to something which hurtles into the screen window and sends you to your doom.

Thursday 23rd June

Another venture into graphics territory. The screen shots included in the July issue were actually from a disk left at ZZAP! Towers at the beginning of April, so you should notice a few changes and improvements by now! The traps still need designing, and since there will be quite a few dotted around they will need to be fairly simple in design to avoid the overall effect looking cluttered. The floor designs from the previous screen shots were soon rationalised to provide greater contrast. Now, the cluttered floors are replaced by the cleaner lines of simple pastels for pipe-laden cities, but don't fret all those who like the original sculptured floors – they will still appear in cities which have simpler lines in wall design. All this helps widen the design gap between walls and floors, and thus provide a stronger visual impact.

Monday 27th June

My main sprite, *Monitor*, has just emerged from the sprite editor looking rather more aggressive, and now sports newly designed flotation engines which lift him slightly off the floor level rather like a hovercraft when he moves. Since his own miniature 'screen' will be displaying 'charge remaining', as well as other more esoteric functions, it has been decided (by my imaginary committee) to leave directional animation out. This would confuse the 'screen' display when it rotated around corners!

Tuesday 28th June

I'm off to a meeting on Thursday; hopefully some music and sound effects work will emerge from it! To present the sound effects more easily a short demo was needed which allows a batch of effects to be named on screen and triggered from the keyboard selectively. This only took a couple of hours but the end result is far easier to demonstrate. After my meeting I'll know whether the company concerned wish to place an (X) in the no publicity box. If not, then watch out for a further entry in this instalment of the diary.

Wednesday 29th June

One thing to emerge from producing a storyboard is that once you have 'lived' with it for a bit it starts to take on a life of its own, and rather like boiling jam (?) all the choicest fruit bubbles rise to the surface. Many ideas have emerged that have since been refined or even discarded, and now a slimmed down version contains the essence of the gameplay.

One important thing with any game is to keep the challenge even when you have played it over and over – I'm sure this is the reason why some games are discarded shortly after purchase. This all boils down (don't worry! It's not going to be another jam analogy!) to the learning curve. Some games seem incredibly hard at first, and then you discover one 'trick' in the gameplay that lets you get a lot further. Others let you get a fair way in during the first few days, but then present a big stumbling block that stops you getting any further. I find that Motherships in progressive shoot 'em ups are often like this. Time and time again you get to the same level only to lose all your remaining lives trying to defeat the same obstacle. Frustration!

Both these examples would have a learning curve (progress against time) with a big step in it. A classic example of this is *Space Invaders* – once you realise that by picking off all the aliens at the extreme left or right it slows their descent and you suddenly find it possible to get much further. The ideal learning curve is smooth, or at least with so many small steps that in practice it amounts to the same thing. This produces a game that lets you progress a little further every time you play it, and keeps you coming back for more. My favourite game some weeks back was *Xenon* on the ST – unfortunately, although superb to play for several weeks, I never got beyond Level Three. Even arriving there with every weapon on board and a full complement of ships there were so many gun turrets half way through that I always lost a ship, and with it of course all my hard-earned weapons. At that point the game was well nigh impossible to restart! Groan. I do know one person who can complete it but he is rather exceptional!

Friday 1st July

The first music commission is now underway! Yesterday's meeting went well – old friends and new, and a new sideline firmly established. In this turbulent industry relying on one thing only can be fatal! Suffice it to say that I am now working for the 'SS' on a strategic simulation (mysterious eh?).

There are some strange 'quirks' in the 64. Although not everyone likes to use them, it is

possible to do some strange things which seem quite often to be discovered by accident. The 'infobars' used in *Hunter*'s employed the much used sprites in the border trick and I was well pleased with the result. The overall screen display became a lot bigger than normal, and allowed more on-screen action. Some time was lost, though, to a 'feature' in the SID chip, discovered when working on sound effects. The envelope controlling the attack, decay, sustain level and release time seems not to like being re-triggered if the sustain level is still maximum. This showed itself when occasionally a sound effect would go completely silent when triggered twice in quick succession, and took some tracking down. The solution turned out to be simple in the end. If you never use the sustain level at maximum (15) but always set it to 14 or lower the problem doesn't arise, and I don't think anyone is likely to hear the difference. I lost hours tracking that one down!

Monday 4th July

I have spent five hours trying to trace another weird effect in the SID chip – and with little success! Even studying the waveform on an oscilloscope sheds no more light on a solution – only providing more evidence of the problem. The result of this quirk is that the basic sound of an instrument changes slightly when the envelope settings are altered. I've checked my code thoroughly, but am now convinced that it must be the SID chip (at least that's my story!), since the effects only happen when the envelope settings have particular values. It seems that having any decay or release time other than zero throws out other timings – although I can tweak instruments to sound 'right', in practice it shouldn't happen. Some days you work like crazy and have nothing to show for it at the end. Such is the life of the programmer (at least that's what I say when I'm feeling philosophical).

Tuesday 5th July

This morning saw me finishing off the investigation started on Monday into the dreaded SID chip bug. According to my 'scope', unless the release value of the envelope is zero the 'gate on' command (to start the envelope and hear the sound) is not accepted for 30-40 milliseconds, which means that part of the attack is lost completely! I've found no way round it, and unless you study the waveform I doubt that anyone would notice. Without a circuit diagram of the SID chip itself I can do no more, but now at least know all the ways to minimise it.

After this untimely delay the new music project was continued in earnest during the afternoon and evening. Both the cassette loading music and the title tune are well under way, and I'm well pleased with them – very atmospheric! In fact I got so carried away playing synthesiser solos over the title track that I completely forgot that it was the humble 64 providing the backing!

Wednesday 6th July

Today is the final entry in this month's diary, and also heralds the triumphant arrival of my copy of *Bionic Commando* on disk, after a wait of some weeks! The bionic arm is great, and I must admit to losing a lot of work time today using it. The difficulty level seems to be set about right at the moment, although there are some very frustrating aspects – losing a life because someone drops on your head unexpectedly while you are hanging and waiting under a walkway is annoying and I would like to be able to shoot those dratted birds a bit more easily!

P.S. Thursday morning – Just before I send the diary off to ZZAP! Towers can I amend yesterday's entry . . . ? *Bionic Commando* is extremely frustrating, although still compulsive! (No! – Ed)

WALKER'S W A Y

By Martin Walker

The message needed much magic to travel such a great distance, and so the master of the wooden post was consulted. He thought long upon the problem (for it was well known that the post took great deliberation, and that people might wait until they had almost forgotten why they came) and then he produced a magic square. The man took it from the master with trembling hands, and as instructed, the magic square was attached to the message, and was placed within a box upon the green. Then he waited. Long he waited, until the shadows lengthened into evening, and then a strange craft came and removed it. The craft returned into the darkness as quickly as it had come, and at last the man heard it no more. Silence overcame the land, and he returned to his home. But a strange thing came to pass – the message soon appeared magically in another distant place, and great rejoicing was heard. 'GORDON, THE LATEST DIARY INSTALMENT HAS ARRIVED!'

Thursday 7th July

The first music commission thrashed through the speakers all today. I have set myself a realistic turnaround of about two weeks – in fact it's turning out to be far easier to pace a project of this duration than a game which can be very difficult to gauge.

Another piece of good news today. The second music commission was confirmed by telephone – none other than *Armalyte* for Thalamus! It's great to be back, guys, and it must give far greater continuity to a project when sound effects and music are produced by the same person.

Friday 8th July

More thrashing (of the musical variety) took place today. In fact, I suspect that this month

will be all thrashing, as there are now two musical commissions to be completed by the beginning of August. After all, I'm setting out to provide a speedy service so this instalment should provide a day-to-day insight into the life of a computer musician (all this variety at no extra cost to the reader!)

I think it does!) It's certainly the best piece I've written so far, but then every new piece seems to be turning out that way at the moment. Let's hope the trend continues.

Wednesday 13th July

I know that I said in last month's diary that I'd finished with this sound bug, but it's really 'bugging' me! Today, instead of having a complete day off I wrote an incredibly simple 10 line program to hang on the interrupt which just keeps triggering the same note rapidly. Sure enough, every few seconds after perfect 'pinging' the envelope failed to trigger properly leaving a click instead! I can't make the routine any simpler, so at the very least I've certainly proved once and for all that it's nothing to do with my music player. In addition, by using location \$D41C, the envelope output of channel three can be monitored, and once again this confirmed my findings. Armed with all this knowledge I can now make sure that the bug is avoided at all costs!

Today after completing the loading music I must return to the title tune, which is only about half finished. This was the intention, at any rate. In fact, whilst finishing off the loading sequence it was discovered (and not for the first time!) that since various groups of sequences were being repeated in each 'verse' it would be very useful (and time/memory saving in the long run) to be able to define the start and finish of a group and be able to repeat it a specific number of times. This involved writing a modified and extended routine for the music player when it reads track arrangements. At the same time various little improvements were made to the editor, based on the experience of using it every day for the last week – hands on experience is certainly the best way to find things.

Monday 11th July

First job of the day is to produce a dummy compacted routine of one of the demo pieces, to allow people to have a 'dry run' of installing the music into a game. All this means is that having been given the position in memory where the player and tune data is to sit, all the gaps at the end of short sequences of notes must be stripped out, and the remaining code squashed together leaving the smallest possible 'chunk'.

After three hours the first compacted set of code was complete, and also the decision to write an automated compactor. Moving 26 separate chunks of memory into different positions by hand is fraught with the possibility of errors, and I don't fancy doing it again. It feels rather like doing a Rubik's Cube blindfold!

Tuesday 12th July

A mammoth session today saw the loading music cassette virtually completed – all four minutes of it. It starts off in a mysterious way with menacing strings, then slowly evolves into full blown rip-roaring blockbuster (at least

Friday 15th July

The first job of the day was to re-allocate instrument sounds to different places in the voicing block. When the final code is produced for the game music, all the unused instrument sounds can be deleted to save memory, but only if the wanted ones are in one neat block at the beginning. Moving the voices themselves was only a small task, but the 'biggy' was then amending every byte that referred to the old values, which had to be done by hand. Again, another boring task that took two hours altogether but made a saving of 272 bytes to the end product. It will teach me to be more disciplined in future and define all instruments from number zero at the beginning of the block onwards, rather than where I feel like it! Another completely new section materialised for the title piece later on in the day.

Saturday 16th July

I've changed my mind about *Bionic Commando*, and award it the moan of the month! Periodically I load it up and can now guarantee that the first 7 or 8 games will be aborted during the first level, simply because I lose a life when something unexpectedly drops on my head, giving no warning or time to get clear. I'm not



the world's greatest game player, but I do expect to progress a little bit each time I play, and not be ruled largely by luck! I'll just have to wait for an infinite lives poke now, I suppose, to get much further than level three.

Monday 18th July

After a momentous start, I completed the 'mission over' music arrangement today (started over the weekend) and now all three pieces for the first commission are finished, waiting only for the relevant memory addresses to be supplied so that they can be inserted into the game.

The final couple of hours today were spent trying out sounds and ideas for the title music of *Armalyte*. In the end it went so well that the first 17 seconds of music were 'in the can' (or on the floppy as the case may be). This may not sound very much, but the first few seconds establish the mood and feel of a piece, and once that is established the rest follows much easier.

Tuesday 19th July

As all three pieces are complete for 'game one' I modified my demo routine to run these with details of each track added to the screen display. Now this module is completed I can use it to demonstrate the music for each new commission. As it happened, I had a call later on today from 'SS' to see how my first project was faring. Although I haven't yet got the run time addresses they were so eager to hear the music that I sent off the demo – it should arrive on Thursday (fingers crossed).

Wednesday 20th July

Most of the day was spent on the *Armalyte* title track, but I did take a couple of hours off in the morning to add two more features to the music editor (again after a need arose). Firstly, so much time has been spent tapping my fingers to keep time when adding new sections to a track that a metronome seemed like a good idea. The new design emits a single pulse of light periodically (synchronised to the music being played) and can be set to any tempo. It has already proved invaluable. The other improvement is to display the current sequences being played by each channel when the music is running – occasionally after three minutes of music the channels might get out of 'sync' due to a missing note somewhere, and it's very useful to be able to study the point each has reached to find the offending sequence.

Friday 22nd July

This morning I heard from 'SS' that the demo had arrived safely, and they are well impressed with it. When it arrived they turned off all the other noise-making machines, turned up the volume of their 64 and started the music. Within seconds (so I was told) every office in the vicinity was disgorging people who came to crowd round and listen. Apparently it ruined productivity for a while! Great stuff! (the reaction not the productivity). Modesty prevents me quoting some of the other kind comments that were made, but satisfied customers are the best advertisement for any business!!

Thursday 21st July

Part of the player was rewritten today to help with fast changes of voicing. Every time I use the system something suggests itself as an improvement! The only complication that arose was that gating notes on and off had been modified slightly, meaning that the 'SS' music could only benefit by my going through each sequence (all 63 of them) and modifying certain bytes by hand. The result was certainly worth it, and a few extra tweaks to the voices resulted in a cleaner mix.

Saturday 23rd July

I was supposed to have a day off today to rest my ears (poor soul), but decided instead to update the screen display for the editor. So many modifications and additions have been made recently that it was beginning to look a bit of a hotchpotch. Out came the screen editor and a complete redesign ensued. It only took a couple of hours altogether including the changes to the editor, but the result was well worth it. Finally, since I seem to spend so much time with a stopwatch timing different sections, a real time clock was added, which only took about three quarters of an hour to knock up. The whole package is now a real pleasure to work with, which is a good thing considering how many hours I spend with it!

Sunday 24th July

The title music progressed further today and at one point there are now five different instruments on the go, including a new design of swelling string chords that themselves contain eight notes! The only difficulty is that now the music sounds so full that it is beginning to slow down the composing, since each addition

needs to be made very carefully to avoid disturbing everything else. With a maximum limit of three notes at any instant it gets more like a jigsaw puzzle every moment trying to add yet another needed instrument without everything falling apart!

Wednesday 27th July

Two more connected features were added to the editor today – insert and delete. As the music gets more and more ambitious, so the sequences and track arrangements get longer and longer. Now it is possible to amend things in the middle without having to rewrite everything following the guilty bytes. Each of these additions should save a great deal of time eventually!

Tuesday 26th July

Well, the *Armalyte* title music was finally completed today, and I'm sure my most regular customers (Cyberdine Systems) will be pleased with it. It's my most 'expansive' piece to date, and at times sounds really vast! These multi-note chords seem to be turning into a speciality - sometimes there are 16 notes multiplexing at once. If you want to hear it, wait for the release of the game by Thalamus. As with all Thalamus releases, the disk version still includes the cassette loading screen and music on a separate file, so everyone gets everything!

Actually, this reminds me of another recent phenomenon – the enhanced disk version. Several times during the last few months I've bought disk version of games, either to speed up multiload epics (*Bionic Commando*) or to take advantage of extra features like the high score save on *Morpheus*. It would be nice to have the loading screen and music to complete the 'package', but do also bear in mind that some of the POKES published for cassette versions will not work on disk.

Friday 29th July

The loading music is now well under way. I decided to use the rhythm of the bolero – it sounds suitably military, and builds from a slow start getting bigger and bigger. The only problem might come if I build the music too quickly and find everything going at full blast before the end of the piece! Working with the SID chip is not like using an orchestra – but then again the classical composers had even more possibilities, like the firing of cannons at the climax in the 1812 overture. Perhaps if I could persuade Thalamus to provide a cap gun with each *Armalyte* cassette and instructions as to when to fire it for the best artistic effect?

Monday 1st August

Yesterday and today were spent on the final piece of coding for the editor – the compactor! After my dummy run mentioned earlier, I knew that automation was needed to squeeze together all of the sequences used for each piece, especially since these first two commissions each used 60-70 of them!

The compactor has to search through the selected music track to find which sequences it uses. If the particular sequence has been previously found and compacted then it is ignored, otherwise its data is located in memory. Then the compactor shunts this new sequence information onto the end of the other compacted data until it recognises the end of the sequence by the appropriate byte values. Finally it stores the new end location of the compacted data, and then continues through the track (I hope you all followed that – I may be asking questions later!) It took a lot of work to perfect a bug-free version, but it now takes a fraction of a second to do what took three hours by hand. Not a bad saving as long as I do it regularly!

WALKER'S W A Y

By Martin Walker

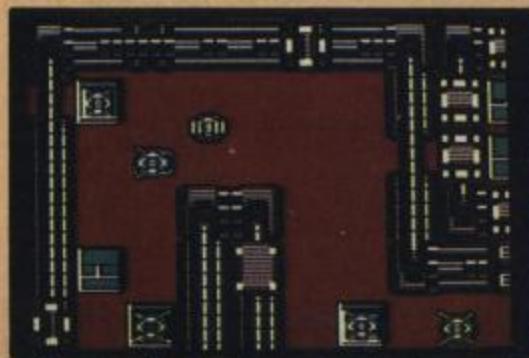
With a slow sweeping cut, he parted the mist, and then leapt upward, borne by invisible wings which protected his earthly form. Askaroth hurled bolts of lightning towards him, but they passed harmlessly to each side. As the blade rent the skies, the flames enveloped the usurper, and the mists closed once more about him. They spun faster and faster, tearing the figure ever higher. And then a great scream was heard; a long wailing cry that drew no pity. The usurper spun helplessly, his blade breaking into thousands of tiny fragments which were hurled into the void.

The body flapped limply as it began to fade and then return to its own dimension. The figure of Askaroth faded with it, and with a final roar of defiance, Askaroth returned to his own domain, leaving the dust king and his subjects once more in their great hall, where they hurried to relight the smoking brands and bring light once more into the kingdom. The king stood before his throne, and smiled. 'This month's diary is a bit fierce!'



Saturday 6th August

Well, the music to be played during the *Armalite* disk level loading sequence is complete – a floating and open ended sequence that should give a few well-earned peaceful moments during the lull between levels, allowing the player to relax the trigger finger



and prepare for further onslaughts to come. The only piece left to finish now is the 'game over' tune. This needs to have immediate impact, as most people will only be hearing it during the time it takes to enter their initials in the highscore table. It also needs to be suitably stirring to give a sense of achievement.

Sunday 7th August

During the afternoon the 'game over' music was finally completed, and it only remains to add my fadeout routine (written for the demo disk) to the actual music player, for use by the 'customer'. It quite often sounds better to fade the music before starting the game to give a smoother transition (more about that when the coding is started tomorrow).

Monday 8th August

The fade routine from the demo was streamlined for addition to the player today, and at the same time I decided to add the facility to trigger a fade at any speed from within a track. The most important thing for customers is to have an easy time with installation. During the mastering of *Hunter's Moon* we found it very tricky to time the loading music so that it faded out at the end. After all, you need to find the best time to start the fade, set a timer to do it, and then keep tweaking the fade speed until the track just fades to silence as the music finishes. The *Armalite* loading music triggers its own fade automatically and then switches the music player off as soon as the track dies away. I can even do a slow fade over 30 seconds if needed!

Tuesday 9th August

Another sound effects commission saw me in Southampton today, together with demo disks and notepad. It really does save a lot of time in the long run to discuss exactly what is needed before you start work – with sound effects.

particularly. It's strange that programmers can sometimes have little idea what they really need until you produce some sound effects – but it's amazing that they can soon find 32 modifications that must be made. This is why I like to discuss it fully first (and of course it's nothing to do with getting treated to a free lunch – thanks Neil!).

Wednesday 10th August

After a call from Robin in Exeter with information on some design changes to *Armalite*, today saw me extending the 'game over' music, and also making a few tweaks to the sound effects (Whoops! – don't read yesterday's entry guys). I've arranged to travel down to Exeter next Tuesday to see some surprise additions to gameplay, and let them see how a newcomer copes with the new features. This is a vital area of game testing – how many games have you seen that are just too hard or too easy? This one has been played over months and it shows. The big problem can be that programmers become too good at their own games, and so the feedback from an outsider can be invaluable – they all certainly gave me plenty of that with *Hunter's*!

Thursday 11th August

This morning the latest *Armalite* disk arrived, with various improvements and the dummy music installed. The final compilation of in-game music at the requested memory location took about an hour and a half, although I still made two mistakes which took a little tracing before the title tune burst forth at the start of the game. As the tracks themselves are only a small percentage of the total music file, I even managed to squeeze the cassette loading music into the game file, and this is going to be reused as an extra 3 minute piece during the in-game demo mode (a total of 10 minutes of music – what amazing value for money!).

During the afternoon, after several phone calls and a few hacks to install a couple of new sound effects, it became a race to get the final music and sound effect files on disk in time to catch the post back to Exeter. I made the final collection with five minutes to spare. Thinking about the expert audience watching my every move in Exeter next week, I then replaced the microswitch on my joystick fire button. It was beginning to feel a bit 'soft', and I'll need every possible advantage I can get!

Friday 12th August

The new sound effects commission was started,

and also a decision to update the sound effects module and editor to bring them up to the standard of the music editor. The sound effects produced are fine, but the editor seems so slow and lacking in refinements after working for a month with the supertweaked music editor. The coding was completed for the module itself during the afternoon, but as I'm away to the wilds of Lincolnshire again this weekend, the editor will have to wait until next week.

Tuesday 16th August

The big day. After limbering up my joystick trigger finger during the 120 mile journey down to Exeter, my big moment arrived at 11am. The latest version of *Armalyte* was ceremoniously loaded up, and with a breathless hush descending over the assembled throng, I plunged into test-pilot mode and entered the experience. And what an experience! I just couldn't stop playing all day – the new features are stunning.

Possibly my most favourite feature is that you can play in such a variety of ways, choosing different combinations of weapons each time you play, and even swapping super-weapons in real time to deal with particularly tricky elements as you play. Every time Cyberdyne see someone play, they see a different approach. I know I've produced the music and sound effects (which Cyberdyne Systems were well pleased with, I'm happy to report!) but this game is my favourite on any machine since *Delta*, and that's a BIG compliment. With any luck the review should be in this issue, so you won't have to take my word for it alone – BUT MISS IT AT YOUR PERIL! I've spent more time playing this than any other game this year!

Wednesday 17th August

Various readers from different parts of the country have been writing to me care of ZZAP! and Thalamus, and your letters make very interesting reading. Many thanks for taking the trouble, guys! I'm afraid that I can't reply to them all personally (I already work a 70 hour week and write the diary!) but would like to especially thank Chris Hester for his epics (the postman needs a barrow to wheel them up the path).

Andrew Roberts sent in many ideas for *Citadel* (some of your thought processes must run parallel to mine, or else you've seen my gameplan!) Rest assured that many of your ideas were already included, and the hidden doors will play an important part in the game. Your idea of collecting 'command credits' (although *Morpheus* used a similar scheme) is novel in that 20 will earn you an extra ship and 30 allow you to skip the present level. Hmmm. Possibilities!

A Farrell (hi, Al!) has paid me a handsome compliment in wanting to purchase my Music/SFX editors. As you've probably realised from recent diary instalments, the music and SFX editors are being used solely by me for commissions, so I'm afraid that they won't be available commercially. The demos that were sent out are sample musical pieces only, with no editor on board (for obvious reasons. Hack!).

Your query on how to achieve parallax star scrolling is really outside the scope of this diary to answer in 'depth' (unless ZZAP! want to avoid these awful puns and give me a separate technical bit!) but briefly, it's all done with characters. By defining a single star in successive positions across one character, and then filling a whole screen with it, you could have 1000 moving stars at once with very little effort! Different layers are achieved by using several characters, each having a single star which is plotted across the character 'square' at a different rate.

Finally, Keith McLeaman compliments me on my *Hunter's Moon* sound effects, and voices a topic which is mentioned by many people – the difficulty in achieving good sound effects in games.

There really is no substitute for fiddling! I probably learnt most about producing particular sounds by using one of the early keyboard synthesisers in a band – no presets, no memories, and only one note at a time. If you got a good sound you had to remember how to make it again! The latest keyboard sounds can be so complex that many musicians don't even attempt to program them themselves, but use commercially available disks to load new banks of voices. And if it's any consolation, looking at the game inlays will show you that many top programmers have their SFX produced by specialists – I'm very lucky to be able to do everything myself! Just to prove the point, today I rewrote the SFX editor and added some new features to help with the latest commission – no commercial package could ever be that flexible. Experiment with a music utility just making different sounds, and when you get to grips with how to get a particular effect, think of ways to improve it when you write your own AFX program!

Thursday 18th August

After producing some more sound effects (the art is knowing when a sound 'fits' and then leaving it alone!), it was back to *Citadel*. Since the essence of the game is triggering the traps to find equipment, keys, doors and nasty surprises (!) the graphics editor was booted up to try some designs for trapdoor opening. This sequence is important, since it provides most of the feeling of exploration. The timing will be crucial – if the doors open too quickly there's no nail-biting fight with your pursuers before being able to grab a vital piece of equipment; too slowly and you can escape too easily if there's something nasty being uncovered underneath!!



Sunday 21st August

A very interesting weekend, with a surprise guest – none other than Mr Riggers himself! As you might expect, most of the time was spent playing games, and once again out came the old Atari 800! For sheer playability, some of the old games take a lot of beating, and for the record the 'faves' were *A.E.* (Broderbund), *Outlaw/Howitzer* (APX) and *Bristles* (First Star). On the state of the art front, my trusty ST had a treat in the form of a first glimpse of *Starglider 2*. What an experience! Although I did little more than the tourist bit, wandering around having a peek at everything, there seems more than enough to keep most games players happy for weeks, if not months – it certainly makes up for the lack of depth in the original, and look how many people still enjoyed that (including me!). Finally, following a perusal of the complex *Trip-a-tron* (the new Minter megapackage) we ended up listening to the music from *Armalyte* whilst having a session with *Colourspace* on the ST.

Wednesday 24th August

Another few days spent in the comparative comfort of the sprite editor. It's very easy to get lost in this one, as you can not only design the little beasties but also join them together, overlay them for fancy work, and even prepare animated sequences to try out ideas! After settling in for a long session, a definitive trap opening sequence was generated.

Using the multiplexor will allow me to add

background details and colour to the landscapes, as well as produce the normal baddies, using sprites. In fact, since the main problem with any multiplexor is making sure that it is never possible for more than eight sprites to attempt to occupy the same horizontal 'strip', this will help a great deal by fixing sprites in position on the landscape. If all the sprites may be moving, the alternatives are a lot of effort to ensure that the wrong combination can never occur (*Armalyte*) or nasty flickers and lurchers (*Zynaps*, for one).

Thursday 25th August

The return of the cities! At long last a major advance for the *Citadel* code, namely the addition of the main collision routines to detect walls and other land-based obstacles. The coding proceeded smoothly, and by the end of the day I could move smoothly through the corridors with a real sense of solid matter beneath my feet (?). The only minor bug that still needs sorting out lets MONITOR get impaled on a pipe occasionally, but that shouldn't take too long to trace tomorrow.

Saturday 27th August

I have just experienced the weirdest set of coincidences! Yesterday I managed to trace the pipe impaling bug, and then spent some time 'gametesting' with Paul Beecher, my special visitor for the afternoon. In the evening, Belinda and I noticed a pool of water forming on the kitchen floor – a pipe had started leaking!! After attempting to stop the escaping water, we spent the night with the water turned off at the mains and listening to gurgling all over the house. Then the next morning, to cap it all, before the plumber arrived a circular dropped on the mat promising to 'Add a special magic of magic to your kitchen!' Perhaps it meant a swimming pool. Groan (and yawn). I shall have to be very cautious when I add the explosion routines to *Citadel*!

Tuesday 30th August

After a session which saw my latest sound effects commission nearly complete, *Citadel* returned to the monitor for various small improvements, in preparation for the next big addition over the rest of this week. In fact, after perfecting the wall detection, I spent the evening starting my very own sound effects file with a menacing clang.

Friday 2nd September

Over the last few days the traps have started to evolve. Since that elusive feeling of 'being there' is needed, I have decided to remember the state of all traps on a particular level, so that they are still the same when the player returns to the spot. This will allow strategies to develop, since some situations will call for indestructible baddies to be lured into ambushes, once the player has discovered suitable city defences to commandeer (and has not fallen into the traps in person!). To help with the feel, the initial sound effects have been installed, and can now be tweaked 'in action'.

Monday 5th September

The final day of this instalment, and the start of various new routines. The player's bullets, landscape sprite position updating and other vital areas all involve the multiplexor to some extent, so some study in this area is needed. A lot of things are beginning to come together, so I expect to have a playable demonstration completed by the end of the next instalment. Until then, keep your eyes twitching and your joystick fingers sharp (or perhaps that should be the other way round!).

WALKER'S •W•A•Y•

By Martin Walker

This month: Thrill to the full time return of program coding. Gasp as the *Citadel* begins to bristle with new developments. Whistle in amazement at the addition of go faster stripes. Wonder why there is so much waffle in the intros . . .

rather strange, since firing down a long corridor produced the effect of them all disappearing into another dimension at maximum range. Today the routine was revised to allow each to travel as far as the edges of the screen window – the only slight disadvantage of this method is that unless any bullet hits something there may be a tiny pause after loosing a full volley before the next bullet becomes available to fire again. This can

of the screen. Choosing which has occupied much thought.

When playing the game the eye finds it easier to glance down quickly to take in information – I suspect that this is why subtitles always appear at the bottom of the screen. However, if you are playing a vertically scrolling game the eye is always on the watch for ‘baddies’ arriving from the top of the screen. Also, just like reading a book, when first presented with the screen, the brain is conditioned to find it easier to react to a ‘title’ area at the top. After debating both options for some time, the top won, although it will probably prove more difficult to achieve a clean ‘split’ when 8 sprites appear under it!



Wednesday 8th September

Here we are on the first day of the latest diary, and already the player bullet firing routines are in – as I said at the end of last month, things are beginning to move quickly, especially now that all my music/sfx commissions have been completed for the time being. At long last there is more colour on screen as the bullets have separately mapped colour information.

produce, if taken to extremes, the classic super-fast firing in tight situations – but dodge ‘em while waiting for bullets so beloved of *Delta* fans everywhere; only if used very cleverly can it be turned into a strategy and not a grumble.

Friday 10th September

Somewhere on screen the score and needed in-game information must be displayed, and the time has come to decide once and for all where this is going to be, as many already existing routines may need to be modified slightly. I’m not using ‘sprites in the border’ tricks this time for various reasons, so it means losing several lines of characters either at the top or bottom

Saturday 11th September

Having decided where the information is to go, I suppose I ought to decide exactly what will be displayed. The current score is fairly obvious, but again there is a big controversy about the addition (or not) of Player 2 score and/or High score. Personally I rarely play with 2 players (perhaps I ought to rephrase that!), and anybody playing a one player game will find the second score completely redundant, so the high score seems more important overall, especially as a ‘1’ or ‘2’ can appear next to the score to indicate the current player. The other vital information needed in *Citadel* will be special equipment currently available for use, and the means of selecting it in the thick of the action. Suffice it to say that my screen editor saw a lot of action today.

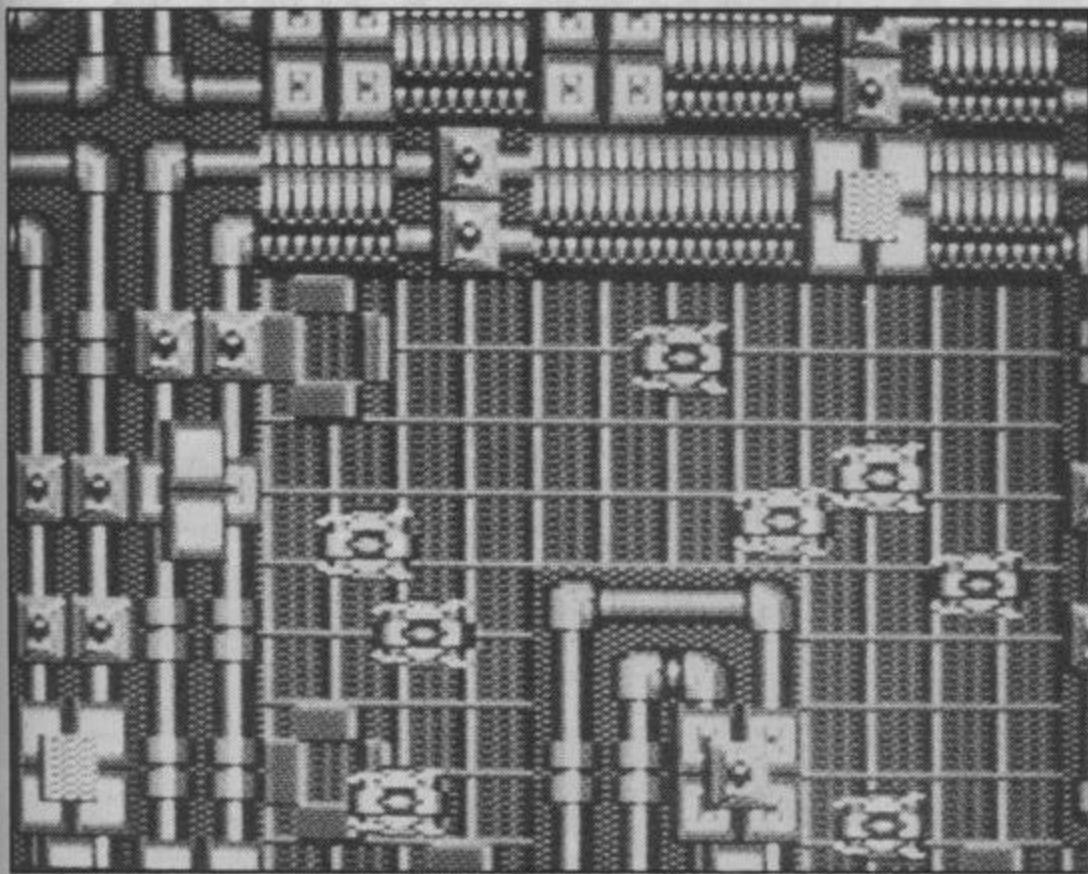
Monday 13th September

A tricky little routine to produce the screen splits was perfected today. Since an interrupt routine from the sprite multiplexor may strike anywhere down the screen, depending on the current position of the sprites, the screen splits will be produced using an NMI (dreaded by all backup cartridges, and tricky for me since I’m using my trusty Expert as a development aid!) A ‘Non-Maskable Interrupt’ is normally also generated when you tap the RESTORE key – for my purposes, this is ideal because it overrides any other interrupt, ensuring that the screen splits always occur at the correct position, whatever the other interrupts are doing.

Once the routine was in and working, it also allowed me to have different colours for the information bar at the top of the screen (and hopefully an end to the ZZAP! art department printing my screenshots upside down!).

Thursday 9th September

The first bullet routine gave a maximum range to each bullet, and in practice this looked



Tuesday 14th September

A day of preparation for the PCW show, which I shall be visiting tomorrow, plus some tidying up of routines to optimise their speed. The use of screen border colour changes at the start and finish of interrupt routines is a very useful development aid, showing exactly how much time is taken by each 'JSR', and helps to pinpoint bottlenecks and problem areas. I suppose that they are the equivalent of the 'go-faster stripes' so beloved of the car fraternity!

Wednesday 15th September

So this is what 7.30am feels like! Yawn. Stagger. Sip coffee. At least I'm going by train so I can catch up on sleep later. With my trusty joystick packed (just in case) it's off to Earls Court to see what everybody else has been doing.

Well, what a day! Many thanks to all of you who helped to make this my most entertaining PCW show so far. The prize for most interesting diary comment has to go to the reader who likes the bits in brackets best (this is just for you, and all bracket lovers everywhere!).

More and more companies seem to be setting up 'satellite' stands in nearby hotels. This certainly gives more variety to the day, but does tend to use up rather a lot of stand browsing time – at least the Mediagenic bash gave me a chance to take a ride in a chauffeur-driven limousine! And no, I shall not be procuring one if I ever get rich and famous. My trusty joystick did come in handy when I managed to try out a demo of the official *R-Type* on the 64. Later on, back at the show itself, the purchase of an ST joystick extender lead meant that I can now also plug it into the ST without performing any more upside down contortions (hooray!).

As the sun began to set, I found myself peering once again through a British Rail window, wending my weary way home again. All in all, a very rewarding day. Apologies to all those readers who asked for me in vain at the Newsfield stand on later days – next year I must go for several return visits.

Thursday 16th September

A day off to recover, and to mull over the products and trends seen at the show (and to

play my copy of *Hawkeye* – from those nice guys with deficiencies in the cerebral department).

Monday 19th September

Over the last few days the main structure of *Citadel* has been mapped out ready for the BIG routines. Since I need the real feeling of exploration, all of the things the player will meet on his/her travels must be positioned in advance – and this means storing the locations and status of up to 256 objects for each level! The reason for the ultra-compacted city generation system now becomes more apparent.

The function of an apparently useless object in the city may become obvious after another vital piece of equipment has been found or activated, so retracing your steps must show everything in its 'last visited' state (how many games have you played that just regenerate every meanie every time you re-enter a room? Bang goes any feeling of a real environment!). Also, an activated city defence may be used to set ambushes in a particular area for pursuing meanies – some of them may be indestructible using your own available weapons, and remembering the location of the switch that activates a force field may prove crucial! Learning to use the cities own defence systems to your advantage will get you much further into the game.

Wednesday 21st September

Movement of sprites is going to be on a predefined patrol basis. This will allow them to be designed in groups which will protect the more important installations. Just like in real life, there will be comparatively empty corridors followed by vital areas which will be very tricky to negotiate, with 'loadsasprites'. I did toy with the idea of invisible 'tramlines' allowing sprites to move freely about the cities and home in on the player, but if I were them I'd prefer to have safety in numbers!

Friday 23rd September

My brain hurts! There really is a lot of work to complete before my multiplexed sprites can react to their environment. First routine to be completed moves all sprites in 'sync' with the

background, depending on what my static zone 8-way scroller is doing. This sounded easy enough, but I finally traced 26 exceptions where a one or two pixel move was suddenly needed in the X or Y axes when stopping or suddenly changing direction! (It looks very smooth now but took two days to debug). The next two routines will be SPRITEOFF the screen at the edges, and SPRITEON if the edges correspond to the object's position in the city. Wish me luck!

Monday 26th September

SPRITEOFF proved to be a more typical routine – less than an hour to write, assemble and tweak. SPRITEON needs more thought before leaping into frenzied action at the keyboard. Since there will be up to 256 objects in a level, whenever the screen scrolls in a particular direction any new objects that should appear at any edge must be found and plotted from a massive table of X and Y values. The main problem with this sort of routine is that unless you are careful it will still be searching through the table long after the object is supposed to have appeared on screen – shortcuts must be found to minimise processor time.

Tuesday 27th September

This new routine turned out to be rather schizophrenic, and ended up as two routines – one running every frame on the interrupt and the other in mainline (any time remaining when the interrupts have finished!). Every piece of coding for *Citadel* is complicated by my insistence on scrolling in 8 directions. In a



vertically scrolling game, for instance, you only need to check how far the background has progressed to know when to 'launch' the next wave of aliens. *Citadel* checks each edge around the screen, depending on which direction the player is moving, to determine whether an object should appear or disappear.

Wednesday 28th September

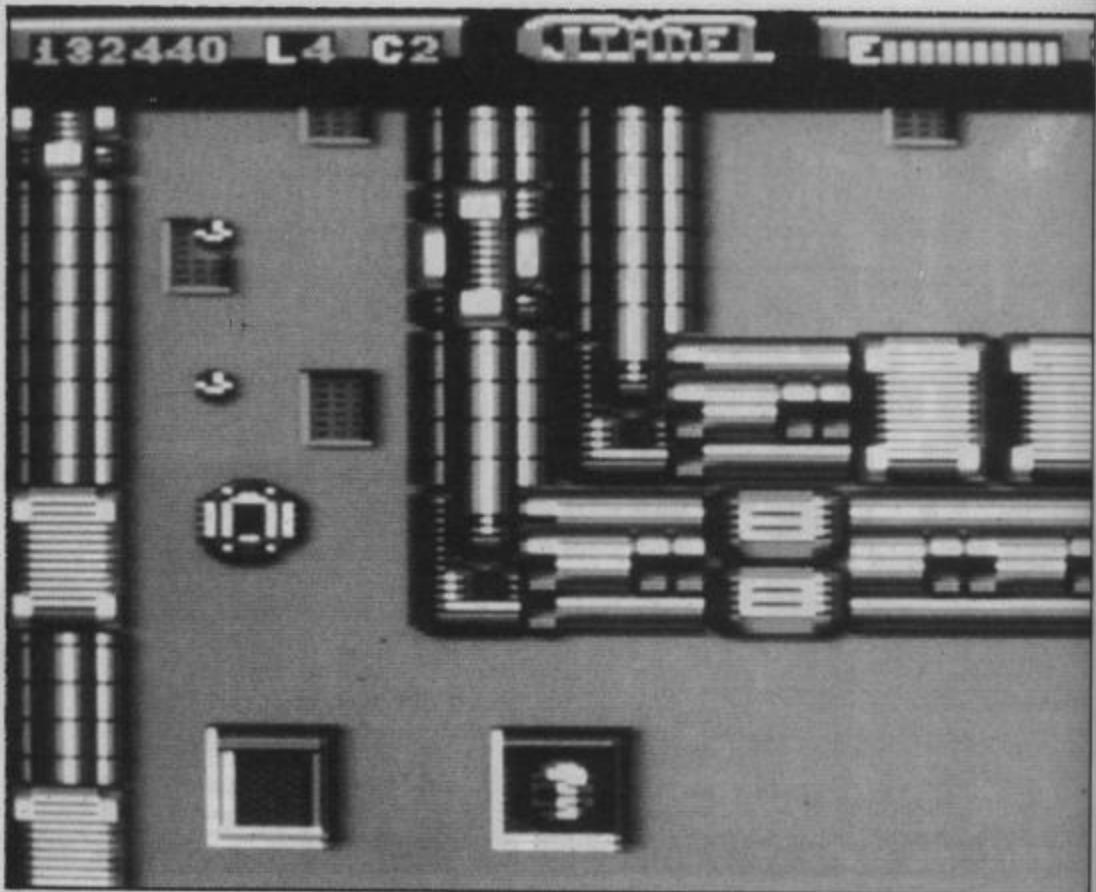
Well, the routines are now completely written, and debugging starts tomorrow. The trick of writing major routines seems to be to mull over different ways of producing the same effect. Although the principles of SPRITEON were fairly simple, most games have so little

processor time left (especially if of the scrolling variety) that it is the fastest routine that matters, and hitting on a way of streamlining it can be very important. This quite often revolves around a flash of inspiration – it is time saving to remember, for instance, that objects arrive on the left hand edge of the screen only when the player is moving left and so on.

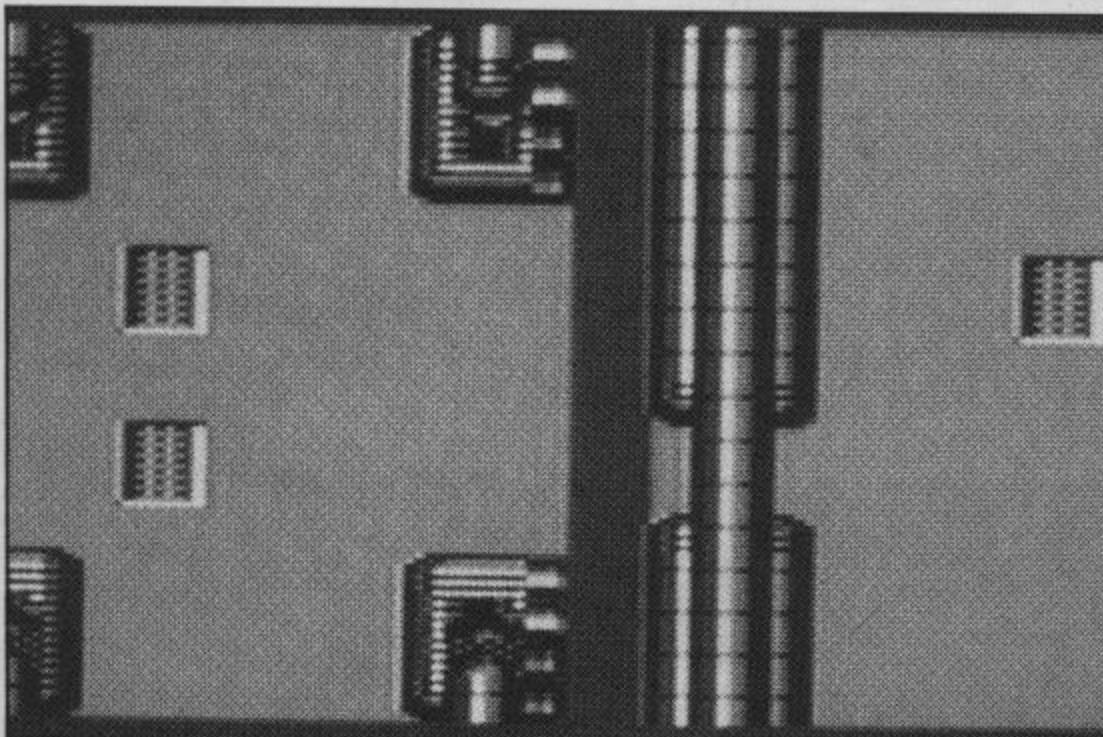
Thursday 29th September

A day off (what do you mean 'get on with the debugging!') and a perusal of life, the universe and chips with everything. I need to get my hair cut or else take up wearing a headband to keep it out of my eyes, and that would make me look like a jogger, and the only thing I like jogging is my elbow (how about that for a mammoth waffle (a shame it isn't an edible waffle) and the first instance of brackets within brackets!). Anyway, I'm suffering from 'advanced complimentitus' – another interesting letter forwarded to me by Thalamus from the left-handed Jimmy Strauburg of Future Factory (Sweden) no less. In fact I'm left-handed too (interesting fact number 42).

Following my trip to the local scalp hacker, I popped into Boots and Smiths but there was nothing much to capture the imagination – of course the shelves will be groaning under the weight of the Christmas releases in a little while, since such a big proportion of annual sales happen at this time.



▲ Yes, it's *Citadel* – and it's the right way up this time, too!



Friday 30th September

Well, all the debugging is now complete, and the traps appear and disappear at the screen edges as you move around the city – it's really starting to come to life. As I expected, there are difficulties where the sprites disappear at the top of the screen, since at the moment they can either move 'over' the score bar (eg. *Morpheus*) or suddenly 'blink' out before they get to it (*Hades Nebula*).

Saturday 1st October

A day of refinement (on the program, not my lifestyle!). After designing a new sound effect for the city itself to add more atmosphere, and a neater bullet character, it seemed about time to write the sprite animation routine so my inhabitants can stretch their legs (or wave their antennae as the case may be!). Again it is the fastest routine which counts, and one which also anticipates ways to save memory in the

animation movement tables.

When finished and installed into the game itself, another useful by-product was revealed – since objects can appear anywhere and then start animating, all of the onscreen sprites tend to end up moving 'out of sync', adding even more life (and certainly a lot more colour) to the screen!

Sunday 2nd October

It's time to return to genetics – the city needs more varieties of inhabitants. Approaching the sprite design from a different point of view, I ended up producing a shaded sphere according to basic artistic principles. It looked a bit crude, simply because with only black, mid grey and white you simply cannot produce smooth colour fading. Then by designing features onto the surface of the sphere where the colour transitions occurred, all of the 'glitches' disappeared, leaving me with a realistic metal sphere. I was well chuffed with the final result! A few more basic designs reared their ugly heads later (the designs were attractive but the

creatures ugly!).

Monday 3rd October

Main job of the day is to slightly revise the design for the trapdoor opening graphics – my little spheroid all but disappeared when he appeared in the game over the pure black gaping chasm of an open trap. Whoops! Taking advantage of the opportunity, various other small improvements were made to the city graphics.

Incidentally, according to my dictionary, *Citadel* does not use bas-relief graphics, since these are defined as 'low relief . . . in which figures project less than one half of their true proportions from the background'. The classic proponent of the 'embossed slab' look on the 64 must be Andrew Braybrook (and his creations have a beautifully clean sunlit look – there's crawling for you!), but I'm going for a more 'solid' look, more in keeping with my original need for a dark, oppressive feel to the cities (the first diary instalment described this as the *Blade Runner* look – perhaps this should now be updated to Cyberpunk!). And with that thought I had better prepare the screen shot file for this instalment, hopefully now printed nearby (the logo should be at the top!).



WALKER'S WAY

In this, the new and radically redesigned Walker's Way, Martin 'Axe Man' Walker continues on his long and perilous quest into the parallel universes of computer programming and magazine journalism. So, without further ado, heeeeere's Marty . . .



Thursday 6th October

These NMIs (see last month) are causing more problems than expected – although needed for extra screen splits, occasionally when re-entering my Expert cartridge things get corrupted in the game. I do use this device an awful lot for debugging, so the day was mostly spent coming up with a scheme to exit the program neatly. As this involved using special techniques normally more often seen as 'ripoff protection', then say n'more!



Friday 7th October

The cities, having security systems operational, now need more of a feeling of 'behind the scenes' activity – the sound effects have a hum of concealed power. TWINKLE is a routine which animates a small section of a particular city, depending on the current background design. It will be used in many different ways, but in designing the routine now I can incorporate the desired animation into the character set for future cities. There. Just thought you'd like to know that. Next!



Saturday 8th October

Now that the traps are operational, many more sprite designs are needed to fill them, and during the course of a day spent lounging about in the Sprite Editor, several new alien species evolved. It wasn't until later that I realised why I kept being reminded of Dan Dare (the original character created by the genius of Frank Hampson rather than the Virgin games) – my favourite newcomer

has a design rather like Dan's helmet as well as looking truly EVIL!



Sunday 9th October

A slight diversion today. Every time I produce a disk file for any screenshots it means hacking into the game. In fact, all that is needed is a stand alone file with screen, sprites and just the small amount of code needed to display them both. Once written it can be used again and again, but also means that no early copies of the game can ever fall into the wrong hands! (ZZAPI themselves are scrupulous in this respect – you can't even get through the front door if you don't know the combination!)



Monday 10th October

The next big code module should produce another big batch of additions to gameplay – at one fell swoop it will allow traps to be activated, objects to appear underneath and aliens to explode. In preparation, various trials were undertaken using yesterday's screenshot module to experiment with different ways of setting the traps.

In practice this module will probably turn into several smaller chunks which rely on each other, since there is limited time to 'hang' routines on each interrupt frame. This means that the things which absolutely MUST be checked every frame (high speed bullets for example) stay on the interrupt, but others may only happen once every four frames (score updates certainly don't need plotting more than 12 times a second!).



Tuesday 11th October

In preparation for the big routine I must cure a little bug-ette that causes your in-flight bullets to lurch alarmingly if you suddenly change direction. Otherwise aliens may well explode before the bullet gets to them – and that would be TOO easy, wouldn't it?

As usual it was the static zone scroller at the back of it. Once I'd traced the cause of the problem it only remained to think of the most universal way to cure it. It's very tempting, after finding a special case that causes problems, to simply check for the special case and add an extra piece of code to combat it; this has happened before – 26 exceptions to fine scroll bytes when suddenly changing direction – but often gets unwieldy. Since the bugs are caused by exceptions to certain rules it ends up being far better to think it through properly and treat the cause rather than the result – then if anything gets modified in the future you don't end up testing for exceptions to exceptions! Got that? Er . . .



Wednesday 12th October

The control mode has now changed slightly to accommodate being able to fire in any direction while moving in another. This now allows the player to whizz past the end of a side corridor and fire a quick burst of bullets down it or even to fire backwards while running away! It works by locking out the direction changes when the fire button is down, allowing you to fire by pushing the stick in any direction – and with built in autofire in the game it feels very powerful in action.



Thursday 13th October

As you may remember when the screen was first split at the top to allow my score 'bar', whenever sprites go beneath it the 64 tends

to lurch dramatically, sending the formerly neat split careering across the screen with annoyingly flickering colours. This is one of those problems that has most 64 programmers tearing their hair out, including me!

On the old Atari 8-bit computers there was an invaluable little bit of hardware built in which allowed you to program the colour and screen changes to wait until the electron beam had disappeared off the visible part of the screen before changing them 'invisibly'. On the 64 you just have to grit your teeth and produce little tables of delays for the split depending on what sprites are 'underneath', and then write tiny routines that act like a Grand Prix pitstop – get everything possible in advance and then when the split pulls into the 'pit' bolt it all on and bang it out again as quickly as possible, before anything else gets very far. I've had to resort to self modifying code (I agree with Andrew Braybrook's view that it's a bit naughty!) but it saves a few cycles, and in this case is necessity. And if it means the difference between a lurch and a rock solid split – go for it!



Friday 14th October

Well, you didn't expect me to debug these splits that quickly did you? As CITADEL is 8-way scrolling, the split is also complicated by having the screen moving up and down beneath it – this means a secondary set of tables. I'll say no more about it, but next time you see a game like IKARI WARRIOR on the 64 with 8 sprites appearing neatly from under the top screen split, spare a moment of admiration for the programmer (John Twiddy).



Saturday 15th October

Another visit to Exeter today, to see my friends, Cyberdyne Systems, and also get some 'instant consumer feedback' to all the improvements to CITADEL. The



feeling of exploring the city and my new 'glide and fire' control mode were well liked (what I really mean is that they love whizzing about blasting everything in sight!) Dan had some suggestions concerning the screen split, and I actually managed to get some work done, too. It's a great feeling working in a group - every time you groan at a bug somebody offers a suggestion (and some of them were really novel!).

black, white and one other colour – but has already surpassed himself with some new designs based partly on my latest renditions. Now he's venturing into the unknown and starting to produce creatures from the wilds of his imagination. Ooo-er!

Sunday 16th October

For the next few days I have a special quest – none other than Robin Levy, the graphics wizard from Cyberdyne Systems! Apart from playtesting (playing games, to you!) he has very nobly offered to play 'celebrity sprite designer' whilst taking a few days' holiday after the completion of ARMALYTE – so the next screenshots should look particularly inspired. Two gallons of midnight oil have been supplied, along with a spare monitor and my box of games for inspiration.

Tuesday 18th October

Since all the creatures in the city are defence systems, and therefore likely to be metallic in origin, our first major graphics discussion concerned what we termed 'kinetic reflections'. The amazing alien bullets in ARMALYTE are mostly tumbling metal shards, and the reason they work so well is the sudden glint they get when catching the moonlight as they revolve (well, I like to think that it's moonlight – that's the romantic in me).

I've always wanted to use this technique in CITADEL, but now with the expert himself in the graphics hotseat I can pick up some valuable tips from someone who has been doing it for a year already! The art is in using pure white on the animation frame that completely faces the light source momentarily (and, of course, regulars will know that mine is at the top right of the screen). Andrew Braybrook used this rather nicely in some of the ALLEYKAT creations, along with some rather fetching shadows, but as these ended up using a second sprite per alien it's out for this project.

Monday 17th October

Have you ever had that feeling of déjà vu? I was looking through a big batch of old CompuNet demos that Robin brought up (perhaps I'd better rephrase that) and was listening to the music from HYPER-SPORTS. Having never seen the game I couldn't work out why I knew the music so well, until it finally dawned on me that the same tune was used as the loading music in WIZBALL! I hope Martin Galway didn't manage to get paid twice!

Robin came across the same problem as I did with my sprite designing – the difficulty in producing smooth shading using only

object is mapped in underneath. Then, before the sprite door can start to open, the open version of the trap is replotted under cover of the sprites, so that by the time the door is opening, both the contents and the open character version are in position.

Once the sprite door is fully open it is removed, leaving the open character door and the object sprite in place. It sounds far more complicated than it looks, and in fact I doubt that many people would even realise just how much is going on, so just sit back and enjoy it!

rephrase that!). Once inserted into the game, it looked really nice, especially as we hit on the idea of having every animation frame of the explosion in a different colour for maximum impact (a touch of the Minter strobe!).



Tuesday 18th October

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Wednesday 19th October

Meanwhile, back in the coding department, the door opening sequence is well under way. When a closed trap is hit by a bullet, first the door sprite is plotted over the character version, and then the



Friday 21st October

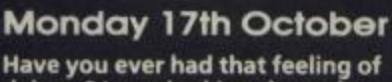
Robin has come up with some interesting variations on door designs – some even have teeth! In fact, we watched *The Return of the Jedi* on video last night, and several more inspirations resulted.

The door sequence has now been completely debugged, and now must be extended to accept multiple triggers, so that if you go around spraying bullets everywhere all the traps triggered will open singly in sequence one after the other. I decided to use a loop of eight triggers, so that the system must remember not only which traps you hit, but in which order. I doubt if the loop will need to be any bigger than this, as long as I remove references to the same trap being hit by many bullets, and it should be a daunting experience to see your hail of bullets turn into a choreographed sequence of unfolding doom!



A particularly frustrating day today, as all attempts to find a vicious bug failed. After modifying only two routines, as soon as the game restarted Monitor got hurled halfway across the city – and then as soon as the screen scrolled everything latched up. Groan. Having checked the source code for both, carefully, and finding nothing wrong I started bypassing each routine until the bug disappeared. When it does you have at least narrowed it down a bit.

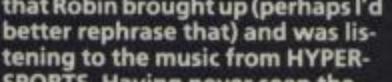
Since this happened to be in an enormous routine that was finished several months ago the dreadful truth dawned on me – in modifying the new code a line number had accidentally been inserted somewhere in the middle of everything else, and since I'd renumbered the entire program it was 'needle in a haystack' time! In situations like these the backup copy is vital – after adding the new code once again to yesterday's version of the source files everything worked perfectly. Phew!



Wednesday 26th October

A day off to drive to Exeter with Robin and return him to the land of cream teas. After a relaxing afternoon watching videos with the rest of Cyberdyne Systems, we ended the day with a championship session of International Karate. I was thrashed! (and me a black belt in pixel punishment!).

Since I normally work totally alone (aaah!) it's been a very worthwhile experiment. Certainly it's great to have someone close by to bounce ideas off, with the added boost of being able to write code as the graphics are being produced in tandem. It's also allowed me to study someone else's approach to sprites, and I'm already seeing some improvements in my own work using my newly honed artistic eyes.



Friday 28th October

Time to neaten up some points of presentation and remove a few little bug-ettes from the works. Monitor now triggers the traps on contact, as well as remotely using bullets, so you now have to be more careful when moving around, since racing about like a mad thing will ensue a speedy demise.

The next big chunk will see the baddies emerging from their traps and pursuing me around the corridors of the city. I'm glad that at least I can blow them up before they catch me!

WALKER'S WAY

To celebrate the new year 'Dangerous' Martin Walker jiggles about a bit more in the CITADEL



Thursday 3rd November

After a little while in most projects there are little things that need doing which start to mount up – this is one of those days when a whole batch of them gets sorted out! My top screen splits are now rock solid whatever the vertical scroll position and however many sprites are underneath the split (fingers crossed that it stays that way!) and the bullets now emerge accurately from the middle of Monitor. The pause and quit controls are properly in situ, so I can freeze everything to spot possible future bugs as they happen.

Other assorted tweaks have been installed and tested to streamline my interrupt routines – even at this stage catering for up to 18 sprites on screen soaks up interrupt time, and some routines may have to be rethought if this time simply runs out.



Friday 4th November

The next routine to be added will detect alien sprite collisions with Monitor (there's no fun at this stage unless there is some DANGER), so with streamlining in mind many sheets of paper were filled with thoughts. The initially obvious way to do it is to detect sprite to sprite collisions, and for all those out there who haven't written a game, NOBODY uses the inbuilt hardware collision detection, simply because it needs so many additional checks to tell you WHICH sprites were involved!

After thinking through various schemes, the merits of 'Look before you leap' programming were proved once again. Since my 'character bullets to alien sprite' collision routine looks for the

character beneath the sprite, by simply plotting a special group of characters beneath Monitor the same routine will detect alien sprite collisions with Monitor! A neat piece of timing ensures that these will never be visible, and by reshuffling the character set the routine will simultaneously detect aliens AND their own bullets hitting walls – all with no increase in detection time!



Sunday 6th November

Over the weekend much study and thought resulted in two old routines being restructured for greater speed while preparing for the new collision add-ons. This freed a little more interrupt time ready for multitudinous aliens. Incidentally, anyone who's marvelled at the number of moving objects in ARMALYTE may be interested to learn that some critical routines were completely rewritten three or even four times, each being faster than the previous – this dedication certainly shows in the final version with more aliens, more and faster bullets and bigger motherships!



Monday 7th November

Today was a dream come true – if only every day could be so productive! By lunchtime collisions with Monitor were written, tested and debugged, and then I made a start on the alien movement routines. By the end of the day there were not only moving aliens but moving bullets and aliens firing moving bullets, albeit always in the same direction!



Tuesday 8th November

While spending some time out in the big wide world (shopping to you!) I was horrified to notice that our local WH Smith's had apparently decimated its software stocks. It really did look as if they were winding down computer sales, so much so that I had a word with the manager, who was extremely helpful.



Wednesday 9th November

On with the baddies' weaponry. Now the bullets are in motion some thought needs to be given to the fastest routine to aim them accurately in the player's direction, as well as to give them 'personality' by adding different 'looks', speeds and possibly homing characteristics. All of the day was spent adding improvements to the firing routine – firstly a delay was added to prevent firing until a short time after the trap appears. This allows enough time to react to things arriving on screen, and avoids those dreadful situations in some games when you get obliterated before you've even noticed the newcomer!



Friday 11th November

Well, the first attempt at aiming enemy bullets was only partially successful. Certainly they came out in the correct direction, but with a speed dependent on how far away the player was. This meant that guns at the far edge of the screen hurled flak at you, but if you got too close to them the bullets just

sat on top of the guns. Whoops! Just to show how accidents can prove fruitful, this did give me the idea of aliens dropping stationary mines to avoid. Maybe, maybe not.



Saturday 12th November

The second attempt worked perfectly, so I now have accurately aimed bullets to avoid from all directions. Not a pretty sight! In fact quite a bit of time was spent simply travelling around the cities seeing how the opposition felt in action. Different speeds of both aliens and bullets were tried in order to gauge playability. Fast alien bullets rarely give the player a chance to react and avoid them, but may still work in conjunction with a depleting energy bar rather than instant death to the player, since once alerted you can take steps to remove the aggressor.



Monday 14th November

Now that the basics of gameplay are working it's time to add a bit more feedback to the system. Today the scoring and energy systems were installed, and seem to work well in practice. At the moment energy is on a percentage basis. Collisions with enemy bullets and the aliens themselves drain a part of your total shield energy, which will protect you from destruction until fully depleted.





Tuesday 15th November

Already interrupt time has run out in the worst possible case – ie, when the maximum number of sprites is on screen and moving and firing and all the player's bullets are moving as well as the player! Reorganisation of interrupt and mainline routines seems to be the order of the day, to allow more time for baddies on the interrupt. The key thought here is that some routines absolutely MUST occur every frame at an exact scan-line position (moving sprites will flicker unless moved during off screen time), but with a rethink some routines may be able to run during mainline time as long as they can occur at about once per frame to 'keep up'. Suffice it to say that after re-jigging two routines I've managed to regain enough time to stop the overrun – a rewarding day even though nothing new has appeared!



Wednesday 16th November

Presentation of the basic game is so important I thought it high time that a few more sound effects were incorporated, along with a priority system to ensure that some sounds are more important than others. This ensures that you never fail to hear the sound of yourself being destroyed. Aren't I considerate?



Thursday 17th November

Right. Time to start planning the patrol system for mobile aliens. Off you go. No, come back here when I'm talking to you. What me? Yes you! This is getting silly. Click. Engaging sensible brain module. Click. OK, while I'm thinking about that let's get out the sprite editor and see what we come up with.

(Later) Several new sprites have emerged – including a new gun turret that spits out high speed deadly dealers of doom (try saying that with a mouthful of toast!) along with a few more varieties of mobile alien. One thing that I always like to do is to add personality to different species of baddy, so each will have its own distinctive weaponry (memory and processor time permitting!).



Friday 18th November

This afternoon saw me with my jaw hanging open as the homing routines were first kicked into action on screen. Try to imagine an intelligent bullet that tracks its chosen target, following it round every corner in relentless pursuit (remember *Runaway* with Tom Selleck?) Every faltering joystick move brings the brutes slightly closer. After dodging and weaving for over a minute in my test level and triggering more trap guns in passing I ended up with six of the brutes following me in a swarm! The only tactic found so far to dispose of them is to take the corners so tightly that the pursuers crash into the walls whilst trying to cut corners.



Saturday 19th November

Well, after reorganising the interrupt and mainline routines my clever way of detecting collisions between the player and alien sprites has thrown a wobbly, so a different routine must be written to overcome this. All of this shuffling on the interrupt basically hinges on the fact that some routines must carry on regardless whilst others only need to be called occasionally – indeed it may be possible that a few may be missed altogether at times of desperate time shortage without anything being noticed (don't tell anybody!)



Sunday 20th November

Will wonders never cease? Another brief foray into the comfort of the sprite editor saw the creation of yet another static gun emplacement and then a further bout with this 'kinetic reflection' business (see last month's diary). After a session examining the methods and results – three more vicious looking mods to the code cleared up minor problems arising from yesterday's contribution. Finally, the revised piping system for an alien cityscape was entered in hex ready to appear on screen. And very nice it looks too, if I say so myself!



Monday 21st November

Before I send off disks to my test pilots I must add the routine to allow mobile aliens to change direction only at junctions in the corridors, to stop them trying to crash through walls in a vain effort to catch me. This proved easy enough, and by the end of the day it's much more difficult to escape from the baddies.



Wednesday 23rd November

The next chunk of code will have to make the mobile aliens slightly more intelligent. Although they now follow the corridor system, it is still too easy to lose them, so they will have to follow the player even while off screen. It's rather disconcerting to suddenly find a heavy concentration of traps ahead when you know that a squad of aliens are on your tail!



Friday 25th November

During a brief foray into the sound effects editor I came up with a new breed of metallic voices that are perfect for the alien firing sounds. They now have much more 'personality' as well as sounding far more 'alien' and menacing. I'm constantly amazed how players have 'translated' the pseudo voices in HUNTER'S MOON. Not only do the aliens apparently say 'Hiya' as they spit death at you but the starcells cry 'Meanwhile' as you collect them. Not a lot of people know that!



Monday 28th November

Back with a vengeance. At long last the special module has been designed that lets me design levels by scrolling round dropping traps wherever I like, rather than calculating it all by hand (or calculator as the case may be). Following a few minor mishaps in which dozens of traps appeared in the middle of walls came the serious business of a sample design session.

Planting traps in all sorts of interesting places and groupings proved great fun, but the big surprise came on leaving the game and checking the trap tables for bugs. The new level, bristling with defences and fairly bursting with baddies had (wait for it!) 55 traps! My previous top limit of 128 (or even the original 256) seems to have been VERY generous. That should free some memory for more features!



Wednesday 30th November

The level designer now has many additions – it allows pieces of city to be 'dropped' anywhere in the play area and different styles of cityscape to be perused in any colour scheme. Once again in testing it another design emerged, as well

as some ideas for extra 'city pieces' to add variety. Remember that as each city is constructed from standard pieces, like Scalextric, the full 16 screens of play area on each level can be specified in 64 bytes!



Thursday 1st December

Unanimous agreement from my test pilots – it's more fun trying to escape destruction with 'loads-traps' activated, so I've decided to trigger them by proximity with Monitor, rather than by actual contact. This will mean that racing about willy nilly will (those last three words sound weird!) result in furious activity in the city! After thinking it through, several routines can be restructured at the same time to save more time in the long run. This is what writing games is all about – idea/test/discard or improve. Who remember a certain Mr. Braybrook ripping out the player's sprite bullets a week before the end of the MORPHEUS diary?



Friday 2nd December

A real slog today to reorganise the alien movement, firing and homing routines ready to add the proximity coding. It took 6 hours of rewriting before all were ready (with more interrupt time freed. Hooray!) The proximity routine itself was written during the time it took to assemble the reorganised source code (Oh for a faster development system!), and kicking the whole thing into action showed that all the effort had been well worthwhile. Now you can no longer creep past the traps and get away with it. Just to prove it, I tried racing around the corridors avoiding everything. I didn't last very long!



Saturday 3rd December

As a follow up to my comments earlier about WH Smiths, you may be interested to learn that they have just made their main computer buyer redundant – due to falling hardware sales! And in the same issue of Computer Trade Weekly came the following quote from a spokesman at HMV Reading branch: "Next year our software stock will lessen – it just doesn't sell."

Perhaps this reflects the fact that if high street shops won't demonstrate games then real enthusiasts will buy mail order from the 'pile of boxes in the garage' supplier and save up to 30% on high street prices. After all, 30% IS a lot more to pay simply to see the empty packaging! Long live the good independent dealers! See you next month.

WALKER'S WAY

This man is so hot you could cook your breakfast on him. Who are we talking about? It's Martin 'Axe Man' Walker and his amazing technicolour Way. How far is he into the CITADEL? Read on and find out or we'll send da boys round...

Monday 12th December

My copy of ZZAP! (January issue) dropped onto the doormat this morning. The ROBOCOP demo gave me quite a bit of fun, partly because it seemed like a representative version of at least part of the final game – unlike the majority of freebies which can be such early versions that they completely put you off buying the finished product! How many tapes have you got that you carefully peeled from the front of magazines to avoid spoiling the cover, and then only loaded them up once? I've got a drawer full! It does take a little more effort on the part of the programmers and ZZAP! to organise and produce a stand alone single level demo, but when done well I certainly might buy something on the strength of it! Wouldn't you? What do you MEAN no?

hour, and then completed the revisions to the metal city that were waiting. Incidentally, remember that the graphics are evolving with the game – the early diary screenshots showed them, warts 'n' all (Perhaps I should show mockups produced with my ST in 512 colours. Hmmm. No. That would be cheating wouldn't it, Andrew? Tee hee!) I always remember what Paul Cooper (Thalamus supremo – sounds like a new snack to eat on toast!) said about screen shots. 'Until you see it move you don't know whether it's even part of the game, and not a specially prepared artist's impression.'

Mind you, I have actually met someone who has seen the new Konix joystick. And yes – some of the previews of the artist's impression WERE printed upside down in various magazines. Not very ergonomic when the handle sticks out of the top eh?

more aware of each local trap. Each different type of trap can have a different proximity trigger distance – and, of course, the most useful equipment will force you to get the closest before revealing its contents!

rassment in the originality department, today I looked out my copy of MROPHEUS – I've been meaning to get back and play this a bit more for some time (Too busy working to play games, eh?). Since reading AB's own tips in a certain rival magazine it seemed the time was ripe for another bash, especially to see if using disruptors really are the best way to get further into the game. Although having the disk version does allow me to save my all time high scores, it also lets everyone else see how low they are! However, after several hours of play, I only managed to progress as far as system 16 – not much of an improvement on my previous best of system 15. Back to the drawing board (any special hints for fellow diarists, AB?)

Tuesday 13th December

With some more additions to the all-singing all-dancing level designer the number of possible city 'pieces' has now risen from 16 to 32 (Of course when I say risen I really mean that I've designed some new ones!) This effectively allows the corridors and intersections to have much more variety, and more devious cities to be constructed (rather like getting a second set of Scalextric track pieces allows you to build more complex layouts).

Just to prove the merit of taking a total of three days to produce a 'construction set', I then produced a corker of a level in under one

Wednesday 14th December

The proximity traps work beautifully, in fact, with the larger format floor tiles the distances can be seen more easily in terms of 'squares'. As you approach an unopened device, at a certain number of 'squares' away it activates automatically (sensing your presence) so that by the time you get alongside, it's curtains (pull the other one!) So now it's time to add some more of my original ideas for a 'boardgame' strategy.

I want to replace mindless blasting with gameplay that uses a few more brain cells. First, all the proximities were made much smaller, and the remote triggering by hitting traps with your own bullets was temporarily removed (this could be provided by a more specialised weapon). This forces you to approach more cautiously, and be

Thursday 15th December

After yesterday's improvements, it was time to package up a demo to send off to my friends and colleagues, CYBERDYNE SYSTEMS, for a bit of feedback. If the postal system isn't too haywire at the moment, there will no doubt be an informative telephone call in a few days time. Off to the post office!

Have you noticed how games which get universally bad reviews in all the magazines have quite often been in the shops for a month or two already? In 'W.H.' today I spotted GAME OVER II high in the charts. What's this, I thought? A mystery product that everyone's buying but few have seen? Then I saw the packaging – big box/poster/high class artwork. It must be a Megagame!! And then I remembered the adverts – double page spread/available for 6 machines, and the dreadful truth dawned on me. HYPE! And then finally, after rooting through all the shelves, I came across one lone copy of INTENSITY. Its case was cracked and half missing, with the artwork bent at the corners... So this is what happens to people who bravely try to produce something new and original in the gameplay department. Merry Christmas, Andrew! (Mind you, by the time this appears in print it will be February, so perhaps that should be Happy Valentine's Day. Well, Happy February anyway!)

Saturday 17th December
Do you remember, back in the dim and distant past, that I sent out about a dozen of my music demo disks to different software companies looking for work? (ME, not the software houses, you fools!) Well, on 11th June I sent one to Ocean in Manchester. Today, six months later, I received a reply (and a cheeky one at that!) I think someone must be jesting! Perhaps they were clearing out their desks before Christmas. But at least they replied in the end.

As for the rest... Well, Virgin sent me a charming letter. A few other companies like Activision and Thalamus got in touch and are commissioning lots of musical work. The rest didn't reply at all, but I rather expected that. Don't be discouraged if your submission doesn't get an immediate response. I'm often lucky to get through on the telephone to some companies, even after four or five attempts (although others will chat for ages – while everyone else is trying four or five times to get through in vain!) And don't expect to get your demo disks back. After all, how do you think the frisbee was developed?

Friday 16th December

After yesterday's public embar-



Sunday 18th December
On with the 'boardgame'. In line with the new developments, MONITOR now moves a 'square' at a time, and only in four directions. This proved a much better form of control, as it also ensures that your bullets are always lined up with the enemy mobiles (Mind you, theirs always line up with you!) Another advantage is that less processor time is taken by the scrolling routines (Hooray!) Since the cities are formed from horizontal and vertical corridors the no-diagonal restriction is scarcely noticed, so it's a definite thumbs up all round – the control feels much more positive.



Monday 19th December
I suspect that this week will be somewhat chaotic, being so close to Christmas, but I'll keep up the diary as much as possible (what a noble gesture!) Just as an experiment I tried making the mobile aliens invulnerable and giving them instructions to stop when two 'squares' away from MONITOR. By doing this they are often perfectly positioned just out of range of the player's bullets, but ready to hit anything that moves into their line of fire.

With joystick in hand I fired up the new version of the game and prepared for action. Within the first two minutes I got hemmed into a dead end corridor and slowly battered into submission, so a new breed of alien has now evolved that employs its own shields to protect itself unless firing – definitely one to avoid at all costs!



Tuesday 20th December
Christmas shopping. The shelves of all the local software stockists are groaning under the weight of the festive releases. W.H. Smiths also have HOWARD THE DUCK and RAISE THE TITANIC in stock – I'm not sure if they've been there for ages or whether ACTIVISION have an incredibly persuasive sales force! As it's a time for peace and goodwill I'll suggest the latter. Certainly doing my Sherlock Holmes bit they all seemed to have the same amount of dust (I've never understood why this happens – it's a bit of a giveaway trying to sell something covered in dust, isn't it?)

ST and Amiga titles are now appearing more regularly in my high street, though I'm afraid that I still really have to be convinced that I'll be playing a game in three months time before forking out £25!! And once again this

means... You've guessed right again – READING REVIEWS IN MAGAZINES! (I believe the correct descriptive terms for this are fab, brill and triff).



Wednesday 21st December
More strategy has now evolved in the game. All mobile forces will now look 'ahead' by at least one 'square' to check for solid objects. They seem a lot more intelligent already! Given that so much action is happening on screen, I also suspect that mobiles going off screen need only have their 'going off position' stored. Although this means that they won't track you (reasonable for localised security systems) they may still be waiting if you return that way again, but with all the on screen action you'll not be worrying too much about that!

In fact, the new intelligence has to take quite a lot into account. After choosing a destination 'square', each mobile alien checks to see that it is unoccupied by MONITOR and other traps and aliens (it's safer to shoot at it than collide with it!), as well as more solid objects like walls. This prevents overlapping sprites (it's not much good having 16 sprites on screen if most are sitting on top of each other. Er, perhaps I'd better rephrase that!) This not only helps the multiplexor but also allows more enemy forces to surround the player, rather than ganging up on each other.



Thursday 22nd December
Continuing with alien movement patterns, things are really beginning to take shape. When travelling down a corridor, the player has to take into account the placement of any traps and mobiles to determine the best route. Avoiding destruction is becoming more thought provoking and less iconoclastic (There, I've wanted to use that word all year!) The feel is just as I wanted – a hybrid of shoot 'em up and board game. You can stop and consider the current positions of the enemy, or just plough in there with your fingers crossed! This can prove tricky with certain makes of joystick – it may be best to consult your doctor!



Friday 23rd December
What! Still working away? But it's nearly Christmas! And you must remember that programmers don't get paid holidays. Come to that, they don't get paid very often at all! With that sobering thought it's time to press on regardless. By the way, I'd love to know why the ZZAP! crew keep referring to me as the 'Axeman'. Perhaps it's because my remarks are so blunt. Then again perhaps not.

Since my 'baddies' are now more clever 'baddies', I can now prepare for some strategic merriment – alien bullets are going to be deadly to other aliens! This should allow some interesting gameplay to develop, as the security installations are gently persuaded to destroy each other in crossfire.



Saturday 24th December
I'll just... NO! Stop dragging me away from the computer. I MUST write my diary. Today I... AAAGH!! Please! NO!...

(Later) I have promised not to turn the computer on again until after Christmas, or risk not getting any presents at all. See you next year – unless I can sneak away while everyone else has fallen asleep on Christmas Day, I'll wait until the snoring starts and then ...



Monday 2nd January
Well, that was quick wasn't it? Another year has started since the last diary entry. Sorry, I'm afraid I was chained to the comfy chair on Christmas Day. How many of YOU were programming then?

The festive season seemed as usual to provide a pitched ratings battle between the four TV channels, with each side tweaking its scheduled programme starting times so that watching 'The Empire Strikes Back' would always mean missing the start of something else good on the other side. Even those lucky enough to have a video recorder are now foiled by the 'three good films at once' ploy. It must take months to organise mayhem on such a vast scale – and all so that in January the executives can see which channel ended up with biggest ratings in the lucky dip!

My prize for the 'turkey' of yuletide film viewing must be award to Walt Disney's 'Black Hole'. How many times did YOU spot the strings suspending that ridiculous robot? (And his battered chum!) As for the inter-robot aggression and rivalry, and their philosophical utterances – perhaps someone should have insisted that those involved read a little Isaac Asimov. He is, after all, the definitive author of INTELLIGENT robot stories, and the oft quoted Three Laws of Robotics. At least the spate of second rate Science Fiction films that poured out after the success of 'Star Wars' proved that it is only GOOD science fiction that makes real money at the box office. People vote with their wallets (and I don't mean bribing election officials!)



Tuesday 3rd January
Time to stock up with food after the holiday break, and examine the aftermath of Christmas on the software shelves. Following my earlier comments, I've definitely decided that Activision must have an INCREDIBLE sales force – W.H. Smiths are now sporting STAR RAIDERS II in a prominent position! (but with the usual amount of dust) Boots as usual have a range of special budget bargains, although their stock of RANARAMA at £2.99 does seem to be bottomless. How many copies have you bought? And after the festive furore has died down, how many of you are now the sad possessors of a duff arcade conversion?



Wednesday 4th January
Time to knock the bugs out of the new intelligence routines, and make the security systems just that little bit more DANGEROUS! After a week off, I'm just itching to get the next modules into place (or maybe I'm just itching?) Cheerio.

WALKER'S WAY



Thursday 5th January

After a surprise call from Kati asking if I'd like my music demo included in the next cover mounted cassette, today was spent collating a new version. After all, the existing one is now six months old! (I'm pleased to have a legitimate excuse to spend some time updating it). To be able to feature some of my latest commissioned work, I had to get permission from the companies concerned – after all, the pieces become their copyright once delivered. In fact everyone was keen for a bit of extra publicity, so I hope you enjoy listening to the demo on Issue 50 as much as I did creating it!



Friday 6th January

Right. Time to get rid of these bugs. The mobile alien guards still have a tendency to get 'angry' if they can't get to you because of an intervening object – I spotted several of them earlier today battering themselves against a wall in total frustration. Others kept insisting that they'd seen me somewhere else, and wandered off in the wrong direction. Whoops! I finally traced the problem to the routine which calculates the player's current position in the city – it still updated with each joystick move; even when a wall forced to a stop and overrode the joystick. Everytime I collided with a wall my apparent position was getting further and further away from reality! (I've got to keep taking the tablets).



Saturday 7th January

Clever blighters these aliens. Not only will they aim accurately at the spot that you are heading for (rather than where you are) but after today will only fire if the security hazard (you) is in the line of fire. Different directional

patterns for each category are now in and debugged; some guns for instance only fire horizontally or vertically – these are very useful for the protection of corridors! Others fire diagonally only (crossfire) which leaves others free to attack in eight directions. The upshot of all this is that you can now discern 'safe spots', out of the line of fire of static guns while you decide how best to proceed, and designing the placement of static gun emplacements can be more devious.

Improvements to the tracking system for mobiles now allows them to select the best direction, to allow them to get as close as possible to the player without colliding with each other's security systems (they've been going to evening classes to sort it all out!) This means that they can now surround you without getting in each other's way, although if one gets stuck at the back it will keep dodging backwards and forwards trying to get through the crowd!



Monday 9th January

A telephone call from Activision today – they are happy for me to use a musical piece from a Secret Project on the new music demo (Hooray!). Having added the final piece it's time to compile the lot, compact it and prepare the disk to send to ZZAP! Towers. The packaging of disks always seems to take longer than expected to do properly – and I'm a bit cautious since the time a certain postman bent one of my envelopes (and disk) in half to wrap round a pile of letters, even when it was encased in corrugated cardboard. There wasn't much chance of loading that! (What a crease. Groan!)



Tuesday 10th January

I had a big argument with two of my disks this morning. These two were brand new a short time ago, but they've caused me problems already, and this time I told them in no uncertain terms what I would do if they

refused to display the directory again (I reminded them of a certain Basil Fawlty). They didn't heed the final warning, so I tore their inner disks out through the little slot in the jacket and then jumped up and down on them, which made me feel a lot better. Let that be a lesson to them both!



Wednesday 11th January

Another bunch of little improvements leapt into action today, including a new batch of alien firing sounds. One of the most interesting effects from SFX editor sounded just like someone disgorging the contents of their stomach – and you should hear my exploding cat effect (strictly electronic – I'm very kind to animals). I hasten to add that these were not really suitable for the game, but no doubt somebody will disagree with me.



Thursday 12th January

Time to do the dreaded yearly accounts. All the receipts kept during the last year need to be entered into my computerised indexing system, which then produces all the totals spent in each category (such as telephone calls, stationery, etc.) BORING! At least I keep a running total of all my income – it needs to be a running total to stop the bailiffs catching up with me!



Friday 13th January

After hearing of the possibility that

CHAMELEON may be accepted for release in the United States, various modifications needed to be made to the code to ensure that it will run on the American NTSC television system, which has 20% less interrupt time. Since two years have since elapsed I'm very glad that I keep folders of such copious notes for each project – I wouldn't fancy trying to work out from scratch (although no doubt a lot of scratching of the head would be involved).



Monday 16th January

Remember the story intro to an earlier diary? ... Each defence had been cunningly contrived, and no outward sign of danger was apparent, even on close inspection. There was one consolation only to be savoured – for even as the traps could close their grinning jaws on the unwary, so also they held no loyalty to their designers, and could be turned against them. The time has come to start adding the big twist – overriding selected security installations (traps to you!) to aid you in your escape from the CITADEL.

Off to a flying start today (literally). The time has come to implement the capture probe. As well as onboard weaponry, MONITOR has the handy ability to launch a probe which can override a targeted trap (mobile or otherwise). How to do fancy:

- Reprogramming static defences to attack enemy units!
- Overriding moving aliens for use as remote assassins!
- Disabling moving aliens to provide strategic barriers!

At the end of a rewarding day continuous holding of the fire button now launches the capture probe, which can be freely moved anywhere on the screen. Releasing the fire button cancels this and returns control to normal weapons.





Tuesday 17th January

An annoying little bug took more tracking down than expected. Sometimes an active trap would self-destruct when going off the edge of the screen. Apparently it thought it had collided with a wall! These security systems are less intelligent than they seem. As quite often happens, although elusive, the bug was completely cured by a little check – only two lines of extra code!

Yesterday's way of entering capture mode proved confusingly unworkable in practice, since bullets are fired by holding the fire button and then pushing the joystick in the required direction. All too often simply waiting in ambush for approaching mobiles caused the player to enter capture mode accidentally. A new system has been added that waits for two quick jabs on the button, but aborts if the jabs are too far apart. Much safer!



Wednesday 18th January

Another tiny bug eradicated. The effect was occasional corruption in a particular part of the city floor – the prime suspect was overrun in the mainline routines (simple running out of time to plot the next screen display). After some detective work, narrowing down the problem by bypassing routines one by one (always the best way to start in these cases) the cause turned out to be a missing RTS instruction at the end of the alien firing routine! Funny things these computers.

Right. On with the capture probe. I want to get the effect of one of those controls on hi-fi's that 'click' into place giving a smooth 'grab' when the probe is close to a possible target. It is unfair to expect the player to position it exactly over a sprite – especially if the target is moving at the same time! After thinking it through carefully I opted for the probe being forced to match the position of a target closer than four pixels, and held for a short time. In practice this worked very well once 'tweaked' for feel – as you move the probe about it latches neatly onto each target it passes (when the probe will also flash to indicate a capture) and allows the player to target the probe quickly and reliably.



Thursday 19th January

Start of capture probe effects. Any captured trap is now immobilised and its

weaponry temporarily disabled. This allows you to concentrate on taking out other active traps when several are attacking simultaneously. It also proved useful for creating a temporary barrier to hide behind when a group of mobiles attacks. The main routines to follow will allow the player to use a captured mobile as a 'remote' device which mimics your firing and movement patterns, but also provide independent movement when needed. Since alien fire will be stopped by your new temporary ally it promises to be a valuable addition.



Friday 20th January

In keeping with the boardgame strategy elements I finally added more colour to the cities by producing a chequered floor tile pattern in alternate colours that also makes it even easier to think in terms of 'squares', since proximities have become so important in the triggering of traps and equipment. This change also proved to have several very useful side effects. All the sprites now look 'crisper' against the simpler background with no harsh black shadows (it suddenly dawned on me that this is one reason why the ELIMINATOR sprites look so good on the 16-bit machines). The other unexpected improvement was the explosions, which now look more colourful.



Saturday 21st January

A new design of sprites for an energy emplacement sprang out of the editor today, and a new modified system for the trapdoor sprites finally allowed all closed traps to use yet another colour in the background. After all this chopping and changing there are now five main colours on the screen at all times, and with the traps themselves in a selection of an extra five colours there are up to ten different hues displayed at once – without scrolling the colour RAM! It seems that in the past two days a whole new look has been refined – a product of lateral thinking (and just a bit of hard work!).



Monday 23rd January

Since the new elements all hinge on the storyline a bit of background history might prove useful. The CITADEL is a vast construction of many city levels built by a long dead race. For

centuries the forgotten corridors have lain thick with dust, totally unused and unoccupied – but for the still operational automatic security installations. These were programmed to detect any approaching alien intruder who strayed too close to their proximity zones.

The player controls the MONITOR – a Hoverdrone Mk IV remote module, which features flotation drive, quad peri-thrusters for directional control, and a built-in armoured display system that provide in-flight information. To escape from each city level involves not only defeating the many and varied alien defences, but also reprogramming the wall structures by means of switches which may completely change the layout of certain sections of the current city. Sending out the capture probe to examine different installations will provide information and collection of shield energy, extra usable weaponry, as well as the possibility of reprogramming the defences themselves to provide additional protection and an invaluable source of remotely controlled drones!



Tuesday 24th January

Right. Time to add some directional animation. Since MONITOR is powered by motors which provide lift similar to a hovercraft, when moving the joystick from rest the drive 'powers up', providing flotation just above floor level, and peripheral retros then provide thrust in the required direction. The thrusters now animate correctly depending on joystick direction, along with the rise/fall motion for take off and landing, with suitable sound effects added. The built-in miniscreen will show in-game information and stay 'right side up' (it wouldn't be very readable if MONITOR rotated!) – this is a job for tomorrow (sounds like a good slogan for an SF mag, doesn't it?)



Wednesday 25th January

The miniscreen burst into action at the end of a long bout of coding. Although only a single character in size, the screen has protective armoured doors which open when information is needed, but close to provide protection for the fragile display during combat. When the capture cursor is used it indicates the type of installation targeted, which is extremely useful for searching out energy pods or switches operating hidden doors.



Thursday 26th January

Final touches to miniscreen included a flashing indication for the current target – E for energy, C for capture, S

for switches and F for additional fire-power. When the thrusters operate it displays an animated revolving symbol, and all should be completely readable even on 12" black and white TVs!



Friday 27th January

After a chance thought about the possible additional weapons that could be picked up from selected traps, I ended up producing and implementing four new weapons, complete with pod designs! Apart from the one supplied at the start of the game, during the course of your travels you may come across a RAPID FIRE, TWO-WAY FIRE (great for strafing both sides of a corridor when in 'glide and fire' mode), THREE-WAY FIRE (forwards and both diagonals either side of the current firing direction), and FOUR WAY FIRE (again with respect to the current firing direction). It really makes excursions into those little dead end corridors worthwhile if you emerge having a new weapon to play with!



Saturday 28th January

After such a rewarding Friday the productive hypersurge continued as alien fade-ups were designed and perfected. Now, after a mobile-launching trap has opened, each mobile alien device emerges from blackness, slowly rising out of the floor and into the harshly lit corridors of the CITADEL!

It took a bit of time before the most effective sequence of sprite definitions evolved for the fade, but once complete for one design of alien, the rest followed quite quickly in the same style. When the necessary additions had been made to the source code the new version appeared on screen – I was well pleased!



Monday 30th January

Only half a day today. The weapons pods needed some 'mods' to bring them into line with the other alien machinery and, since shield energy and weapons pods are collected by the capture probe, a design for an empty pod 'hangar' was also needed to appear when the contents have been used. This looks far better than the whole trap simply disappearing! And talking of that, I'd better run this diary through the spelling checker and then make it disappear into the post if it is to arrive on time. May the force be with you (and I don't mean the boys in blue!).

WALKER'S WAY

Want to learn about life, the universe and everything? Want to win friends and influence people? Well, we can't promise anything, but entry into the CITADEL will help you on your way...

Wednesday 1st February

First job this month is to update the on-screen CITADEL logo—I've been meaning to incorporate a smooth colour fade for some time now. To convert my design from theory into practice a mock-up program was produced which allowed three different colours to be altered on every scanline – a perfect test-bed for design! By the end of the day the in-game logo had emerged in its new form, with six colours fading through it in a classic 'airbrushed' look.

of characters to display, and it's this that causes the timing problems when you're trying to judge changes that ought to be happening off the edge of the screen where on-one can spot them. To add to the confusion, any game that scrolls vertically moves these 40 cycle 'stops' up and down the screen. Then to further complicate matters, any sprites displayed stop the processor in its tracks for another 2 cycles each. Get the picture? Well, the problem was cracked in the end, but it took plenty of brain cells!

Friday 3rd February

MONITOR's main armoury is a 'particle-beam' weapon which hurls out streams of energy globes. After an odd thought (and I do have quite a few!) I hit on a way to quickly detect which type of floor the globe currently occupies to allow the shading and shadow of the globe to change as it passes different colours in the cities. Just a small point but it only took half an hour in total.

The rest of the day was spent back in Sound Effects Editor, producing more new sounds and adjusting priorities to allow some sounds to be more important than others. After all, who wants to hear a wasted enemy missile impacting on a wall if your low energy alarm should be sounding? Answers on a postcard please. (Why does everyone keep saying that?)

Thursday 2nd February

Now to incorporate the new logo into the game, together with a short routine to produce the same effect as my test-bed. It looks much more solid than the original design, and the fade is really neat (although I say so myself!) The only knock-on effect is that my NMI splits now judder alarmingly when sprites disappear beneath them. Back to the think tank for a modified version of the split routine.

These splits are a major annoyance (Grrr!). Every 8 scanlines the processor gets switched off for 40 cycles to give the hardware time to read in the next row

Monday 6th February

A bit of reorganisation allowed more moving baddies on screen. Although I allowed for four mobile sprites to be active, originally this included enemy bullets, and when four baddies had emerged from their hangars they simply stopped firing (not particularly menacing, that!) By adding some simple checks to the movement routines there is now provision for four mobiles and two enemy bullets simultaneously (as well as up to ten sprite traps on screen). In total CITADEL is running up to 18 sprites – the absolute top limit is six aliens across any single horizontal strip, since MONITOR and the capture probe always use the two sprites not grabbed by the multiplexor. With total control over all alien movements at once (like for example the 'waves' of aliens in ARMA-LYTE) all 16 created by the multiplexor could be moving, and this will be used in some of the special 'secret rooms', such as storage hangars and laboratories. Wow!

Monday 13th February

Capturing enemy mobiles and controlling them needs a major think, as the joystick mechanics must be practical and foolproof (no disrespect intended to ZZAP! readers!) Two options are open at the moment: different control modes cycled through using the spacebar (OK, as the immediate danger from enemy bullets stops temporarily if you do – these security installations only attack if the player constitutes a threat), or a special sequence of joystick commands and obvious on-screen indication of your actions. Perhaps implementing both would be most useful, but with the option to deactivate the joystick method for those players who prefer using the spacebar (XENON really taxed my patience when it kept insisting that I wanted to fly when it was disaster to do so. Wiggling the stick is sometimes too easy to do by accident!)

Tuesday 14th February

First job of the day – make another backup! Until you've got the sum total of six or more months of work on two or three disks you won't realise just how valuable these become. Apart from making back up copies of them about every week and hiding them in a safe place, programmers can also get quite fanatical about the safety of their working disks (I know I do!) Normally the source files and object code/graphics are kept on a separate disk, and these two travel with me wherever I go in a little black disk box (like a pair of duelling pistols!) Let's face it – it would be bad enough to be burgled, but losing your disks as well... Aaargh!!

Wednesday 15th February

Visited my new accountant – and I really can't think of anything interesting to say about that! (with apologies to any accountants who may be reading this). Something struck me whilst looking round the software shelves later on (and it wasn't a passing ZZAP! reader!) Have you ever thought that looking at the boxes all lined up just isn't half as exciting as reading the reviews in magazines? I know I have! Even peering at the often microscopic screenshots is often no help at all in deciding whether to buy, especially if all inlays show the 16-bit versions (at least they now tend to declare which format is pictured – in the old days you could get a shock when you got home and saw what your version looked like!).



Thursday 16th February

Right. Hands up all those who thought that they would be able to pick whatever weaponry they could find lying about inside the equipment bays of this long dead civilisation without paying anything for it. Sorry! Every item will take energy to grab and bolt on – and the more powerful the weapon, the more energy needed to adapt MONITOR to the new environment.

Today the MINISCREEN was refined to display these energy requirements as well as the type of device captured by the probe. After two quick jabs at the fire button the capture probe will appear. While moving the probe anywhere on screen, any 'grabbable' item will pull the probe in to its exact position when close by, and then the MINISCREEN will indicate the type of item targeted (C=capture, E=energy, F=firepower, S=switch) alternating with the number of energy units required; all items so far need between 1 and 4 units.

The current energy remaining to the player is shown in the form of a bar graph contained in the info pods (positioned at the top of the screen). The complete line-up of info so far (from left to right) is: Score, MONITORs remaining, current city, CITADEL logo, energy bar and current type of firepower. Now, instead of wandering about adding everything you can find, it's more useful to destroy the nearby defences and save the more useful energy pods and extra weapons until really needed.

Some of the weapons have also been improved, and the basic particle-beam weapon made rather weaker (why do I keep mistyping that as bean? – perhaps a vegetarian Freudian slip!) The 'add-on' weaponry now has a life of about 20 seconds continuous use, so when the low firepower alarm

sounds you'd better start looking around for a new weapon – there's only two seconds of firing left in the one you've got. This encourages better use of resources and more interaction with the cities, and is also more like real life (yes I know it's only a game but that shouldn't stop some realism!).



Friday 17th February

All those budding 'Rambos' out there will no doubt be pleased to learn that today saw an addition to the destruction of any static guns. Not only does the gun itself explode in a glorious technicolour blast, but now it also leaves behind a large crater! This proves a telling reminder of where you have travelled, and also stops any possible confusion between destroyed guns and the cavernous black exits from the launching bays of mobile aliens.

Ideas have now crystallised for controlling mobiles captured by your probe (just thought you'd like to know that). Oh all right I'll tell you then. There will be three capture modes:

1. MONITOR static. Joystick moves and fires MOBILE unit (ideal for softening up the area ahead and rather like the independent control of the 'Catalite' in WIZ-BALL).

2. MOBILE static. Joystick moves MONITOR and fires MOBILE (by pre-positioning the MOBILE you can protect MONITOR from attack by nearby traps).

3. Joystick moves MONITOR and MOBILE together, and fires MOBILE (by pre-positioning the MOBILE this can provide protection in front, behind or any other position).

This probably sounds far more complex than it will feel in practice. Still, I'd prefer to offer plenty of variety – it's up to you whether you decide to use all the options! Every player will evolve their own preferred style of play – the bottom line is protecting MONITOR from destruction while searching the cities for the main exit, but this open ended approach allows many ways of achieving the same end.



Saturday 18th February

My old friend Chris Payne arrived for a relaxing weekend – I don't think he realised that he'd be tied to the chair until I'd finished writing down all his comments and feedback about CITADEL! The most useful thing was watching a beginner play for the first time after only a brief description and demo by an expert player (me, you fools!) Once he got the hang of the

capture probe the MINISCREEN display on MONITOR really helped in finding out what was what. The 'Glide and Fire' mode took a bit more getting used to, but once mastered does mean that you can dodge backwards and forwards whilst firing in a different direction. Practice makes perfect!

Overall response was very favourable, and first comment was 'This is great – and it feels really different to play from other shoot 'em ups' (which is what I wanted!) Specific thoughts concerned possible changes to the sprites. The energy pod got confused with the static guns, and MONITOR's subtle engines which animate in each direction of travel weren't noticed for some time in the heat of the action (Repeat after me: *I must be bolder with my pixels!*) Another helpful suggestion was the addition of a demo mode which shows gameplay in a 'feature by feature' way. After all, how else will a beginner even guess at the variety of ways to explore and play?



Monday 20th February

Start of the 'mods'. A new design of energy pod is now needed, but luckily the old one (which got confused with a static gun) can still be used after modification and different animation (as what else – a static gun!) MONITOR's engines were enhanced to boldly go where no engine had gone before, and a more stylised empty 'socket' produced to replace the original design (which remains in an equipment bay after a weapon or energy pod is collected).

A selection of small improvements were also made to the code as a result of my special guest's comments – the capture probe now grabs a bit more fiercely, and crashing into enemy units now drains more of your shield energy. After all, this isn't supposed to be dodgems!



Tuesday 21st February

I don't believe this! After sitting down this morning a whole host of alien designs for new floor tiles appeared within half an hour which look like Aztec mosaics (well at least I think so!) The screen designer (me!) is still suffering from shock – he normally likes to be warmed up thoroughly and have several cups of coffee before ideas commence. Still, if ideas want to come out when I'm not expecting them who's complaining? Not me!

After this great start to the day nothing seemed to be able to go

wrong, and a neat design popped up in the sprite processor for a switch which will operate some of the secret doors – it looks like two contacts banging together (Ooerr!) All doors will blend in with the surroundings perfectly (looking just like another section of wall), but once a switch has been found and operated the affected area will shimmer for some seconds allowing you to pass through it. Effectively the cities will be formed from sealed chambers, each with its own secret entrance and exit. What better way to discourage intruders from exploring?



Wednesday 22nd February

Another good suggestion for a subtle tweak gameplay has been the ability to change your mind after starting a move to an adjacent floor tile. In chess you can change your mind after moving a piece as long as you keep your hand on it (once you let go, that's it!) At the moment any move in CITADEL continues until the destination tile is reached. The next mod will allow free movement, but only allow stops in the middle of each tile. This way you can dart about, foxing the security installations who will always target their calculated destination, giving you more of a chance to dodge back out of the way. Sounds a bit complex, but I'm sure you'll notice the difference in practice!



Thursday 23rd February

The next few weeks will see the doors leaping into action (or should that be shimmering?), and the long awaited (by me at any rate) ability of MONITOR to use lift shafts to sink into the city floors and emerge on the other parallel side of a city. This will really expand the gameplay and allow frenzied bursts of action in my 'level' editor to produce three dimensional mazes. Effectively all the basic elements will then be finished and levels can be completed by getting to the main exit (this may sound easy but there will be plenty of wheeling and dealing needed to even get as far as the second city).

Next month will also see the return of the music editor and the start of the CITADEL soundtrack. I'm hoping to fit in an in-game soundtrack option (wish me luck). Never will I forget the feeling it gave to DELTA (Cue sunset and roll the final credits till next time).

WALKER'S WAY

After a brief absence last month (apart from his ace music demo!) Martin is coming near to completing the CITADEL.

Tuesday 28th February

Since it takes so much effort to get past the traps it's about time you got some reward for triggering them, so now 50 points are awarded for each (whoopee!). Other improvements today were the inclusion of a proper low energy alarm and a new sprite design for the next baddie - the STUNNER. It will fire energy bolts which temporarily stop MONITOR in his tracks for a few seconds. The other proposed baddie is the BEAMER. This doesn't move in the conventional sense - instead it 'beams' from one tile to another two further away. Should prove interesting to deal with, eh?

Wednesday 1st March

Some of the baddies have a different personality and actions, rather like the range of pieces in chess. The STEPPER will stop and wait when you do, giving you the chance to decide which way to proceed, whilst at the other end of the spectrum the KAMIKAZE will hurl itself straight at you - the only defence is to turn and run whilst firing backwards at it! Today some of these characteristics were enhanced. The AGGRESSOR now dashes in at high speed, then stops and fires when close. The CYLON moves slowly but takes many hits to dispose of.

Saturday 4th March

I've decided to implement the new security force beam generators next. These will provide the doorways with an extremely effective deterrent to intruders - one touch of the force beam will instantly fry all players who try to charge through without first finding and deactivating the associated switch! Tee Hee! The design has also been finished - a large industrial laser with style variations for each type of city.

Tuesday 7th March

The switches linked in beautifully and now the beams can be deactivated by using the capture probe on the associated switch once it has been discovered. Although MONITOR already detects the generators themselves as solid objects, he needs a small addition to be destroyed by the beam.

The switches are reversible, ie they can be both switched on and off at any time using the capture probe. In fact any of the trap objects can be 'used' at any time, even when on the other side of a solid wall, as long as they appear on screen and the trap has previously been triggered and its doors are therefore open. A novel tactic using the switches is to close the 'door' behind you after passing through it safely. It's rather amusing to see the mobile aliens clustered around the wrong side of the force beam, trying desperately to fire at you.

Wednesday 8th March

The final touches to the doors are now complete. MONITOR now gets 'fried' by the beam, but both the player and the baddies can fire through it. A particularly nasty tactic which gave me some evil delight is to wait just beyond the deactivated beam and switch it back on as a baddie comes through. Phut! Well they're MY pixels m'lud!

Friday 10th March

A fruitful session brought forth a new type of firepower - the BURST fire. This launches all the player's bullets in one huge salvo. It does take a little longer to reload, BUT this is amply compensated for by the fact that every type of alien can be taken out with one accurate shot.

Saturday 11th March

Right. A new bullet design for yesterday's BURST firepower, and then I got down to the lift shaft design. To connect the two parallel 'sides' of each city world, the lift shafts allow free access at any time, and in fact each level could be described as a three dimensional maze (albeit a small one!).

Monday 13th March

Multiple levels are now catered for! All of the data has been moved into position carefully, and there is

enough space for eight levels, each having two different 'halves' of 16 screens each - a total size of 256 screens' worth of strategic mayhem! There are different styles of graphics ranging from squeaky clean metallic to dark and dingy alien oppressive. The next thing is to code the routine which takes the player from one 'side' to the other within the double-sided cities, or to the next completely new city when the main exit has been accessed.

Friday 17th March

The sequence of events between levels and 'sides' of each city is now: MONITOR enters lift, sinks through floor level, city fades to blackness. New city fades up, MONITOR rises up through floor level lift shaft.

Now the level designer must be updated to include the new features, and then the levels themselves can be commenced, along with the dispatching of a test disk to Cyberdyne Systems in Exeter who have generously volunteered as test pilots (There! No more grumbling that I don't mention you in the diary any more - and I'll send you the bill shortly!).

Tuesday 28th March

The construction set now has a whole set of new commands - plot horizontal or vertical force beam generators, plot lift shaft and, most important of all - delete the item at the current position. This at last allows traps or any other object to be dropped or picked up anywhere in the city, so that many different tweaks can be carried out when designing new cities. The switches can be linked to any force beam, and the first sample city has been designed - a fetching crea-

tion in the alien design, complete with some nasty defensive spots.

Along with these fundamental changes, the cities themselves have been shrunk to slightly more manageable proportions. Each city now consists of two 'sides', each of eight screens total size, ie each level is 16 screens in total. This allows a much higher density of traps, much more action, and still feels vast in practice.

Thursday 30th March
A casual change to the code to allow entrances and exits for a city to be both on one 'side' of the city caused rather more problems than expected. After passing through the lift shaft MONITOR ended up in an unknown and strange part of the city (it was a bug you see, and quite an obscure one at that!). After happily leaping into a routine for several weeks it was discovered that the 'Y' register needed to be set to zero beforehand. Quite by accident this happened anyway. Such is life!

Saturday 1st April
The first report has come in from my erstwhile test pilots at Cyberdyne. The general consensus was excellent, and I'm much helped by all the feedback.

MONITOR's built-in MINISCREEN was much liked by all and the new graphics and sprites admired. Various small but extremely useful points emerged - as they kept falling down the lift shafts by mistake the fire button now needs to be pressed before entering. And since the player's bullets only have a limited range it seems fair that the alien bullets must have the same.

Monday 3rd April
My birthday, but don't think that I'm going to take a day off. No siree - this programming lark must press on! And very nicely it did too. The next city style is a dark and oppressive metal-armoured place with huge conduits and a riveted floor.

Tuesday 4th April
The terrifying armoured place had the final rivet hammered into it this afternoon, and the traps themselves have doors that open like a camera shutter. With the new sound effect it works beautifully.



Wednesday 5th April

The Ancient style has a novel twist, in that some of the pyramidal wall sections have small gaps allowing both parties to fire through. This might give you a bit of a shock when you first see them, but it creates great opportunities for knocking out installations from the safe side of walls. Just watch out for attacks down apparently empty corridors!



Thursday 6th April

At long last the Capture System for enemy alien types is under way. Captured mobiles now tag along behind MONITOR and provide an invaluable barrier to hide behind when being fired on. In fact any of the alien defences can be 'commandeered' for your own use.



Saturday 8th April

After feeling a bit aggressive today I decided to modify my PRISONER mode to allow the captured mobiles to ram the enemy. At last I can hide round a corner and knock out the enemy without getting in the line of fire! The PRISONERS themselves have a limited ability to take all this extra action, and will eventually explode in a shower of metal shards (oooh!).



Wednesday 12th April

With three levels playable, now seems a suitable time to install another batch of little touches - multiple lives and a lives indicator at the top of the playing area as well as an indication of the current city number.

Each level has its own different starting point (a horizontal scroller always starts on the leftmost point - CITADEL could start anywhere!) so all of the appropriate data needs to be stored. By popular demand (mine!) an extra MONITOR will be awarded every 10,000 points. Hooray!



Friday 14th April

At long last the music is under way - one of my full-blown film soundtracks. This one should sound even bigger than my music for ARMA-LYTE (cheque in the post please!)

after all, everyone improves as they go along. The title music sounds menacing and mysterious.



Saturday 15th April

Along with continued activity in the music department, today also saw the start of the title screen. I'm hoping to include a demo sequence, especially as the game now contains such a variety of gameplay - I'm sure that the casual player just won't realise what a variety of uses can be made of the captured mobiles. During the course of the last few days' play they have been used to: plug the top of security launchers to prevent other mobiles being launched; ram and destroy other mobiles around corners; sent ahead for use as a battering ram to destroy gun emplacements without firing a single shot; and even swung round and round like a mace to knock out hordes of WATCHERS swarming out of a nearby launchers!



Thursday 20th April

An excellent all-rounder. First the ancient city style was finished and then another style city which incorporates glass tubes with metal reinforcements. That's five styles completed already. A session with the level editor saw level four well under way, and pretty mean it is! Then to round off a comprehensive day the title music was lengthened.



Monday 24th April

The title track is now almost complete, and I'm very pleased with it. It really has a 'soundtrack from a film' feel to it. A few sound effects have also been tweaked. The low energy alarm was a bit too fierce; as long as you are aware of it when playing there's no need to deafen everyone!

Later on in the day the first playable outing into city number four took place. This contains glass and chrome flowpipes and one of the nicest city atmospheres sounds so far - rather like the Dalek city on Skaro in the first ever encounter with Doctor Who (anyone remember that far back?). One of the switches is situated in a mini-arena bristling with defences, and every move triggers yet another potential destroyer. Great stuff!



Tuesday 25th April

Well, I've entered the 'what so we do when we lose a life' debate. Countless reviews have bemoaned the fact that in many shoot-'em-ups a small mistake can send you back to the beginning of the level - and this can be quite a way with some games! CITADEL now has a small addition which remembers the last lift shaft visited, and your gleaming new MONITOR is delivered here if you run out of energy and receive a direct hit. All of the switches and traps are still in the same state too, so your efforts have not been in vain - at the very least you will have 'softened up' the security installations!

Learning curves for games (how much further you manage to progress each time you play) are tricky things to get right. Let's face it, the ubiquitous end-of-level guardian serves two functions - the 'ooh-aaah!' graphics thrill and a huge 'step' in the learning curve unless it's done properly. Most players will get to this point at least several times and then lose all their lives trying to defeat this one creature. Although ultimately very satisfying when you master it, it can be a source of terminal frustration for those of a more nervous disposition!



Wednesday 26th April

A rather hectic day had me going out in the car three times, and work had to fit into the gaps. Even so, it was a fruitful time - the title music is now complete (all four minutes of it - my musical pieces always grow don't they!) and it really suits the mood of the game. The CITADEL logo for the title screen is also basically complete in a fetching moulded metal look with Egyptian overtones (after all, the cities have been built by an ancient civilisation!), and tomorrow's main task will be to incorporate both of these elements into the rest of the game.



Thursday 27th April

The basic title screen is now in place. I've used the famous 4K cubby hole underneath the I/O chips to store it and the associated colour map and character set. All that needs to be done is to move the data when it is needed, and save the main game character set in the cubby hole until need later. Mind you, switching the ROMS in and out can cause problems if you get only a single value wrong (I know - I did the first time!).

With the addition of a demo mode and the final levels, there is a distinct possibility that next month's diary will see the completion of CITADEL. I've already got some healthy feedback from quite a few people, and all looks set for a triumphant finish. Wish me luck!

WALKER'S WAY

You've read the review of the superb CITADEL, now hear how Martin finally completed the game he's been working on for over a year, with some particularly nasty traps on the later levels.



Saturday 29th April

The main design of the new diagonal HAZARD cities continued this weekend. These look very different from those previously, and also bear in mind the twists that are now beginning to appear from one city to the next. One of the later cities will have no walls at all – instead there will be bottomless chasms between the pathways. This will have one huge consequence. You (and the enemy) will be able to shoot across the divide, providing a sudden increase in possible attack points.



Wednesday 3rd May

The main design work commenced this morning on level five – the ancient city of CHAMBERS. There are no switches to locate here, but all force beams are activated in timed pulses, hopefully giving you time to pass. This one is a real three-dimensional maze of narrow winding corridors and individual cells.

I've now had an opportunity to observe more people playing the game in different ways, and two clear types emerge – those who daren't stop and rely on their momentum to keep dodging the flak, and those who, like me, prefer to stop and think before the next move. CITADEL does seem to be successful at appealing to both those who like their shoot-'em-ups laced with strategy, and those who prefer strategy with a bit of action.



Thursday 4th May

Level five (the ancient city of chambers) needed a few tweaks before the timed force beams fired up correctly, but once in action provided a very different style of play. Although it is easy enough to time your dash through the beam generators (this isn't one of those pixel-perfect platform games!), waiting for a suitable moment allows your pursuers to catch up.



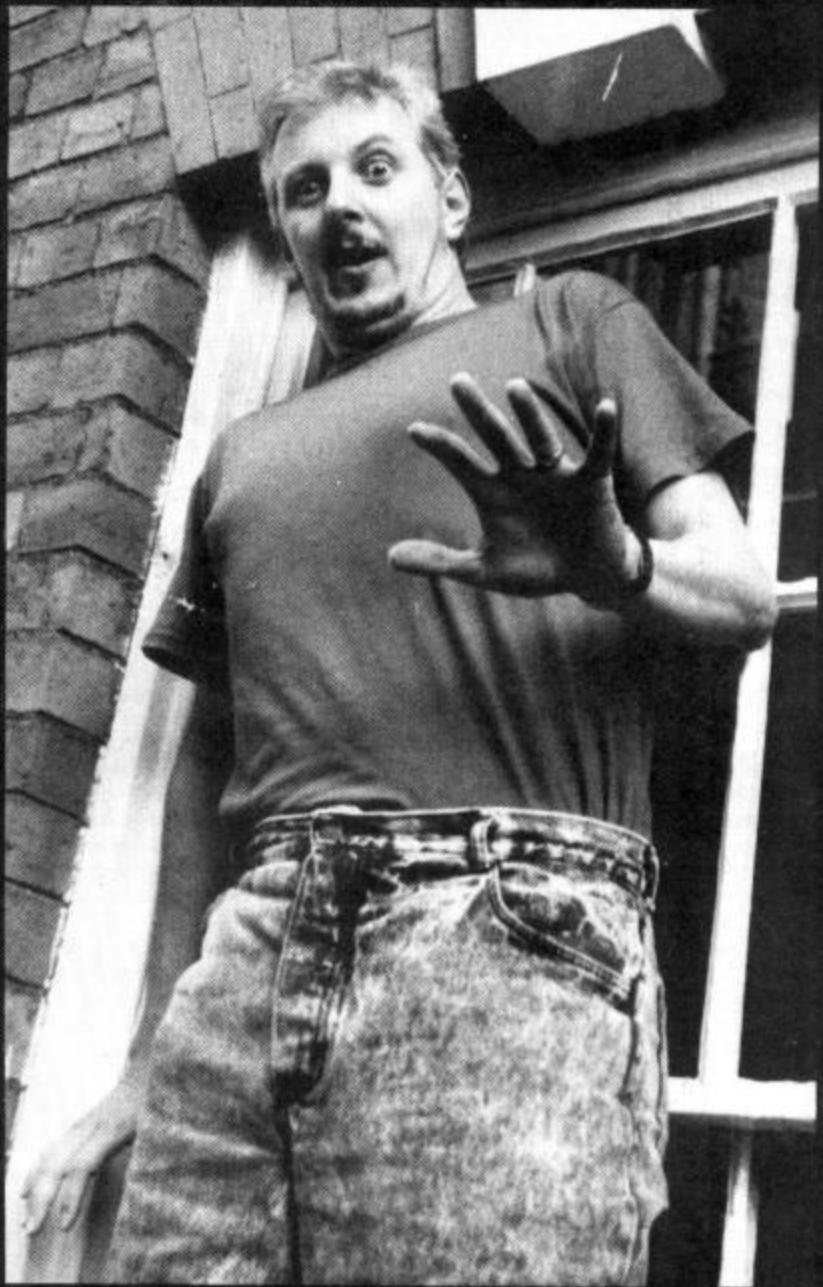
Friday 5th May

Later on a new and devastating type of alien mobile emerged from the sprite editor – the DESTROYER! This will only appear in later levels (a good job too, as you'll need plenty of practice in earlier levels before meeting it for the first time!), but may put in an appearance early on if you hang around too long. It moves quickly, fires a high speed globe and never stops to reload. You'll not thank me the first time you come across one!



Monday 8th May

Well, the events of the past few days can finally be revealed. On Friday I signed a deal with ACTIVISION, who had shown a great deal of interest in CITADEL over the last few weeks, and they now have the rights to publish it around the world! The deal also suggests a finish date of June 1st, which is exactly what I had in mind.



Monday 15th May

The final graphic style is a rather fetching creation in GOTHIC spikes and flourishes. The bosses and shield-like protuberances would not look out of place hanging as trophies from the walls of a Scottish castle. The atmosphere is perfect for the final twist – the traps

will remain shut even if you move directly on top of them. Then, just when you are wondering what possible hazards there could possibly be in a city with no defences, you will discover the dreadful truth. Triggering traps containing energy, switches or equipment will activate every other trapdoor in the vicinity.





Tuesday 9th May

The graphic blocks for the VOID level worked out extremely well today – this city will definitely be one of my favourites. Between each pathway is blackness and despair, and you will despair too when you get attacked by something from the other side of the chasm! This set of graphics completes seven styles in all, so I have one more to go.

Various tweaks were made to the weapons today – by popular request the burst fire now not only produces a salvo of four bullets simultaneously, but also has an increased range! It does however take more energy to capture and lasts a shorter time before petering out.

restricts this level to four way firing installations only, and this proved to be ideal. You still need eyes in the back of your head though!

Preparation for level seven proved to be quite quick. This one is the aggressive one that traditional shoot-'em-up players will feel quite at home with. All guns continue firing at you even when you are stationary, and they don't stop to fire, but just trundle relentlessly towards you in a threatening manner. The DESTROYERS also put in their first appearance.



Tuesday 16th May

After a neat suggestion by Robin (the graphics king of Cyberdyne) each new MONITOR delivered after a life is lost comes in a different colour. A small modification maybe, but it does enhance the feeling that the player controls many devices. The space bar now allows the player to lock a mobile under control into a fixed position relative to MONITOR. This can be extremely useful for protecting MONITOR from a particular direction whilst firing in eight directions and moving any way you like.



Wednesday 17th May

The proximity routine for the GOTHIC level is now fully debugged, so tomorrow will see the start of design work for the final level. And don't worry about the lastability. If you ever manage to loop the game, restarting on early levels will introduce the random trap option. This will also be available from the options on the title screen, and although allowing the switches or equipment to remain in the same positions, all the enemy defences will be completely

randomised in each level. Not a suitable choice for a beginner, or the faint hearted. You have been warned!



Thursday 18th May

The GOTHIC level is now in and working, and a most mysterious experience it is! There you are, happily floating down a corridor when suddenly all hell breaks loose all about you. Pneumatic trapdoors burst open in every direction, and staying alive just doesn't seem to be so certain any more...



Friday 19th May

This afternoon saw me visiting ACTIVISION again for discussions about the packaging and instructions for CITADEL, as well as showing the latest version of the game to SOFTWARE STUDIOS. I'm pleased to say that by the time I'd finished showing all the new features and playing through the entire game, they sat there with their jaws hanging open. "We didn't realise there was THAT much in it!" was the first response. The new twists add so much variety that many of the later levels feel quite different to play. So, when you've mastered the basic techniques of the game, you will be prepared to enter new experiences in the deeper bowels of the long deserted cities.



Thursday 25th May

The random trap placement option was added today, along with the selection and messages on the title sequence. This option will greatly increase the longevity of the game, as even if you get to know every city backwards a whole new vista opens up. In action it's quite frightening, as approaching any trapdoor is now a nerve-racking experience.



Saturday 27th May

The attract sequence is now well under way, with the appearance of every new device synchronised with the title music. After dismantling my monitor screen today I managed to locate the loose soldered joint that had been causing my picture to disappear over the last few days. That's one less thing to worry about. However, believe

it or not, my 64 power supply seems to be starting to throw out random spikes that cause everything to crash. And you thought a software developer's life was easy?



Tuesday 30th May

The instructions were written today using an ST, after my 64 crashed yet again and lost two hours work. ACTIVISION have despatched a replacement by courier which will arrive tomorrow. However, by this evening I just THINK that I may have traced the problem. I'll let you know at the end of tomorrow if my strange hunch turns out to be true!



Wednesday 31st May

My hunch was correct. The cause of my computer crashes was... MY SOCKS! Believe it or not, after checking when the crashes started, I remembered getting the odd static shock when touching some equipment. These new socks were bought just before it all started, and contain a lot of nylon. A thorough check of all the mains wiring found one loose earth wire. So, after a few hours my static charge was finally discharged through the 64. Crash! All day today (with better earthing and different socks!) there have been no crashes (touch wood, or should that be metal?).



Thursday 1st June

Well here it is. The final (official) day. Although final acceptance date is the 15th, to allow small changes to be made at ACTIVISION's request, this is the date when the latest version will be posted off to Software Studios in Reading for final comments.

This is definitely the last diary instalment, so I'd like to take the opportunity to thank all the people who have helped it on its way. Julian and Steve for asking me to write in the first place, all those moons ago, and Gordon, Kati and Maff for continued enthusiasm, along with Stuart in the final straight (What about me? – Randy). I couldn't go without special thanks to all those Zzap readers who took the trouble to write to me. A special thank you must go to Colin Neal who recently sent a massive 10 page epic complete with sketches, maps and ideas.

Goodbye, and we will meet again (who was that masked man?).

Saturday 13th May

The first design for trap placement in the VOID level was just a bit too fierce – with flak coming from eight directions and from across the chasms too it just seemed too much for my poor brain to take in at once. The revised design

ZAP

Test

STELLER

Electric Dreams, C64 £9.99 cassette, £14.99 disk

● Explore deserted cities in a brilliant mixture of strategy and arcade action.

At last! Since April of last year (two editors back!) Martin Walker has kept us enthralled with his diary, day by day detailing his life, his leisure activities and how often he changes his socks. In the odd hour or two aside from writing the many volumes of the diary Martin has also produced his

next opus, Citadel. And lo and behold here it is!

Man has colonised much of the universe in the centuries since leaving mother Earth. But even in this age of advanced technology, a great many things remain a total mystery. One such enigma is that of the barren world far out on the outer rim of

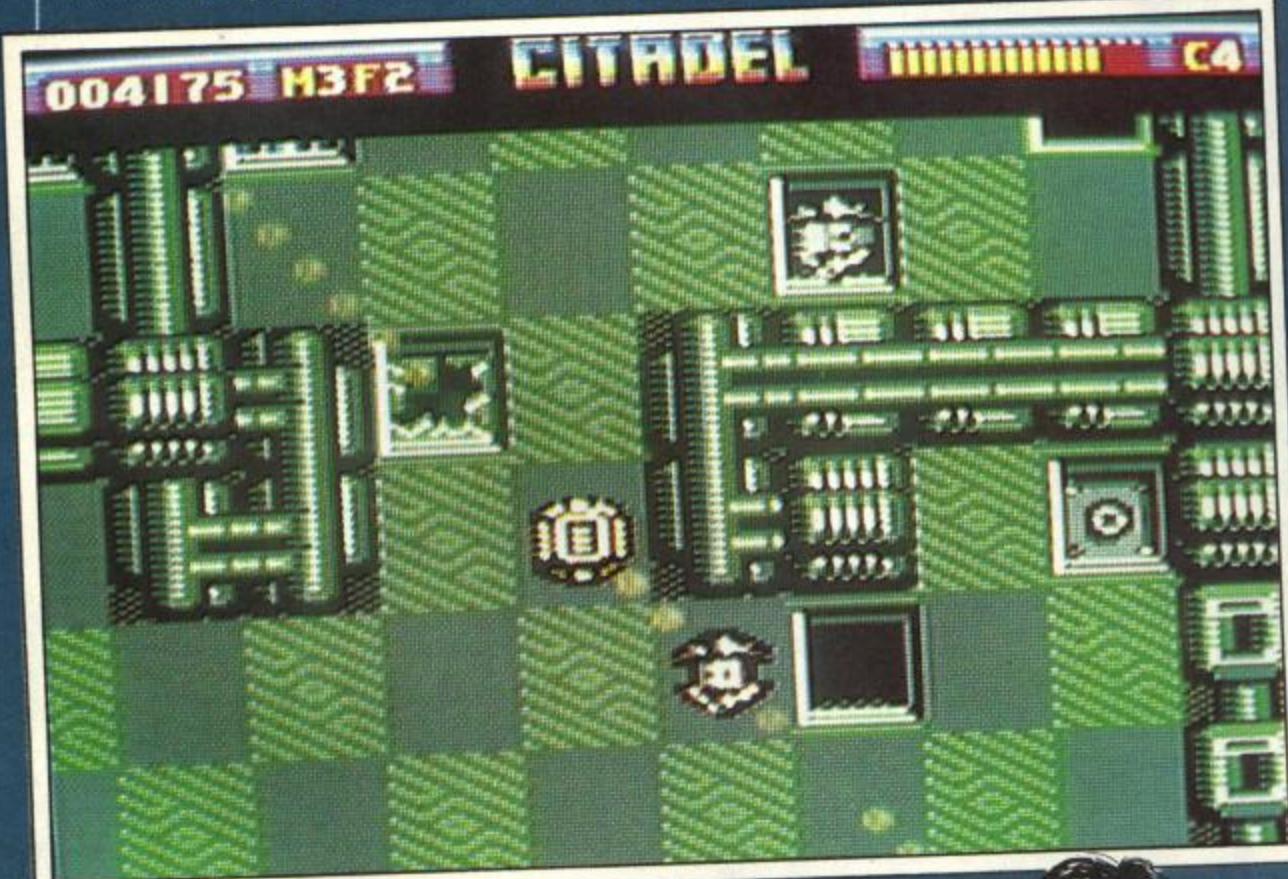
civilisation. Probe exploration has revealed a massive underground complex of deserted rooms, corridors and passageways. Deserted that is except for probe-destroying robotic defences. Whoever built the city forgot to switch off the defences, or maybe they didn't ...

Following the probe's destruction, a remote Monitor Mk IV armed vehicle is beamed down to the surface with orders to reach the heart of the complex and learn all the alien secrets within. The Monitor starts its exploration in the first of eight cities, each city consisting of two levels interconnected by lift shafts, and fiercely guarded by robots and floor guns.

In theory, Monitor can wander the corridors in complete safety if it doesn't get too near traps where robots lurk. Stray within two spaces of one and it'll open to reveal any one of six types of mobile guard or four types of increasingly smart static guns. Protecting long-gone masters, the defences still perform their function with total efficiency.

The long term objective is to reach the heart of the complex, something which will take a lot of puzzling over seemingly impossible defences. A laser bolt will usually do just fine on the guns but often traps contain a never ending stream of mobile guards - best to use discretion and sneak past, especially if it's a Destroyer or Homer looking for targets.

Monitor has a special capture probe built into its hardware. By activating it Monitor can use switches and pick up weapons. Most importantly however, it can be used to capture enemy robots (although this costs energy). Once caught the hos-



Alright, so it hasn't got the pure, non-stop action of *Armalyte*, or the unadulterated puzzles of *Tetris*, but what it does have is a superb mix of the two different game-styles. Presentation throughout is very slick indeed and the graphics, in particular, are faultless, chrome-like shading and look amazing when closely examined. Each city has not only its own unique look but a marvellous background 'hum' as well (listen out for the pumps in the Second City). A first class and brain-bending shoot-'em-up.

MOBILE ROBOTS

Watcher - Hovers nearby
Stunner - 4 way horizontally/vertically firing
Diagonoid - 4 way diagonally firing
Assassin - Rams on sight
Blocker - Fires in all 8 directions
Aggressor - Fires in all 8 directions
Dropper - Fires lethal Homer missiles
Destroyer - 8 way firing and fast with it!

STATIC GUNS

Dome Gun - Fires in 4 directions horizontally and vertically
Diagun - Fires in 4 directions diagonally
Turret Gun - Fast at firing in all 8 directions - mean!
Steppergun - Fires Homer missiles - REAL mean!

WEAPON PODS

Rapid Firing - says it all
2 way firing - rear and front fire
3 way firing - forward 3 directional fire
Burst firing - long range rapid salvo fire

age robot can be put into any of eight positions around Monitor to serve as a shield and battering ram - the stronger the robot to begin with, the longer it will last before being destroyed. The robot can also be fixed in a set position to pass trickier obstacles.

If Monitor gets within two spaces of a trap and it hasn't opened then Monitor's luck is in. The 'trap' is either a switch (used to turn off forcefields barring the way to other areas of the city), a weapon pod (one of four increasingly powerful types), or

an energy recharge pod (like gold dust on the later levels - few and far between but priceless when found). Collected weapons will eventually run out of power so make careful use of them.

Our metallic friend also has a finite energy level which can be reduced by contact with laser bolts, homing missiles or suicidal robots. Total destruction results in another Monitor (one of six) being beamed down to the last lift shaft used. A new droid is earned every 10,000 points.



Well, we've waited a long time for **Citadel** and it's something of a relief to be able to report Martin Walker has used all that time to excellent effect. On first sight what comes to mind is **Paradroid** which also has an overhead view of robot warfare, but **Citadel** plays a lot differently. While shoot-'em-up reflexes are vital, the real heart of the game is thinking ahead and - most importantly - not panicking! The background graphics are above-average, but what really shines (literally) are the enemies. The one I like best has a sort of strobe effect inside it - superb! This is an excellent game, and if you're prepared to persist for the hour or so it needs to fully get the hang of, then you're in for a real treat.



Citadel is one of the most absorbing games I've played in ages. Far from being the fast shoot-'em-up most people expected, it is an original mixture of strategy and arcade action, with the emphasis on the former. Simply charging around trying to blast everything in sight triggers more traps than can be handled. If you want to avoid an early grave you must plan your attack, then charge around blasting everything while following a plan. The eight levels present a big challenge, but even when you've just died after spending ages getting somewhere, there's something which draws you back. Beautifully presented with an excellent soundtrack, **Citadel** is a great original game - a classic not to be missed.

amiga

The good news is that an Amiga version is under consideration - let's hope it doesn't take as long to appear as the original!

update

PRESENTATION 88%

Demonstration sequence, random normal trap layout with a superb attract mode showing what's lined up.

GRAPHICS 85%

The enemy robots are so well polished they look brand new. Subtly different cities contain well-drawn pipes and corridors etc.

SOUND 93%

Each city has its own type of highly atmospheric 'hum' accompanied with above-average tunelets. The pounding title tune is brilliant too.

HOOKABILITY 78%

First attempts will be met with utter confusion but the method of play is quickly mastered and easy to use.

LASTABILITY 93%

Eight cities increasing dramatically in difficulty with the random traps to pose a REAL challenge even if you complete the game.

OVERALL 91%

It's been a long time in the making but Martin Walker's come up with the goods in fine style. An excellent cross-breed of shoot-'em-up and puzzle action.