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Composing, Recording and Producing with Historical Equipment and Instrument Models

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ABSTRACT

This paper describes how models were created and employed (as accurately as possible, using available resources), to simulate the recording technology and instruments, available at different points in recorded music history, initially with two models, based on 1955 and 1965.

A series of explorative experiments in composing, performing and recording music were conducted with these models, in an effort to understand how the strengths and inherent limitations of the tools available affect both the composition and production process, and also the stylistic identity of the music created. How do influences from different musical genres familiar to the composer, inspire and inform their creative decisions? How much of this influence is dictated by the limitations in the instruments and equipment used?

1 Introduction

Two different models, based on musical instruments and recording technology, available in 1955 and 1965 respectively, were designed and constructed. Both models utilise a combination of modern software (based around a recording and mixing environment created in Logic Pro) and hardware (primarily modern ‘clones’ of vintage equipment). All of the keyboard-based instruments used were software versions of the original electro-mechanical instruments and the percussion sounds were obtained from samples of the electronic drum instruments that were available during the modelled time periods. All guitars and bass guitars are real instruments played by myself, although any amplifiers used were software versions of the equipment that would’ve been available during the recreated time periods

2 Historical Accuracy

In order to keep the experiments repeatable and to enable more objective comparison between the different time periods modelled, a set of restrictions was formulated at the outset and observed for the technical and creative parts of the research.

- All instruments and recording equipment must have been in existence during the modelled time periods. A degree of creative license can be taken in terms of availability at that time, but the equipment must have been in use somewhere in the world, even if it was exclusively available at a certain academic institution, or perhaps existed only as a .a period-correct instrument isn’t available, a tonally and operationally similar alternative can be used.

- The instruments used must be playable by myself and be suitable for use in a home studio environment. The point of this research is to try to understand the impact of these limitations on my 21st century composition and production process, so I must be able to draw direct comparisons with my contemporary creative process. This limits me to keyboard-based instruments, guitar, bass guitar and certain percussion instruments.
- I must adhere strictly to my usual working methods and write, play and record everything myself.
- The limitations and restrictions inherent in the instruments and equipment modelled must be observed as strictly as is possible, or at least as accurately as the tools available to recreate them will allow. This includes not ‘punching in’ on the 1955 model, forcing a ‘one take to get it right’ recording method.
- The quantities of individual equipment items available to use must be appropriate to the modelled time periods. Modern Digital Audio Workstation (DAW) software allows the user to run effectively unlimited numbers of instrument and effect plugins, but this would be inappropriate for recording in 1955 and 1965.

3 International Differences

It’s important to note that my research models use mostly USA-designed equipment, due to the availability of reissue hardware and also to what has been re-created commercially as software emulations of classic equipment.

There were marked differences in the 1950s and 60s between the recording studios in the USA and those of the UK. Indeed, the music created in the two countries had different sonic signatures and this was as much attributable to the equipment available (and also technical standards) as it was to cultural considerations. A UK ban on American imports that stood between 1951 and 1959 meant that the equipment and instruments used in the American

studios of the era was mostly unavailable to British studios and musicians. European-made equipment was generally used instead, which led arguably to a noticeable difference in the sound.

There were economic factors involved too, Whilst Britain was undergoing a period of severe austerity, the situation was markedly different in the USA. Massey (2015, pp5) suggests ‘Large media companies, enjoying the benefits of a post-war economic boom, had encouraged companies like RCA and Ampex to allocate resources towards the development of recording technology’.

4 Methodology

The first task was to assemble a list of the instruments and equipment that would be needed for each model and then to design and test a writing, playing and recording set-up that could be used to create a series of musical pieces. These models would need to be standardised, to facilitate repeated use in an easily re-creatable fashion and also to enable effective comparison of the two different models.

The models are based around software templates that I created in Logic Pro, with the appropriate inputs, outputs and routing requirements configured and the appropriate number of simulated tape tracks, mixer channels, instruments and effects enabled. These were then integrated with the recording equipment in my own studio, to provide me with a simple to use, but flexible environment that would enable me to convincingly simulate the equipment that would’ve been available during the modelled time periods.

Some instruments that are intended to be used in the research are being created from the ground up and due to the Covid 19 shutdown these wouldn’t be ready for this initial ‘proof-of-concept’ stage. These are a recreation of the RCA Mk1 synthesiser for the 1955 model, and the 1965 implementation of the Moog modular synthesiser which are being programmed in Max/MSP. Additionally, a ribbon controller (that will be used to control aspects of both the software Ondes Martenot and the Moog Modular) was to be created in the near future using

the Arduino system. It should be noted that I did use a hardware clone of the Minimoog synthesiser as a placeholder on some of the initial 1965 experiments, as this instrument was created as a portable, hard-wired version of the Moog Modular and can produce some broadly similar sounds.

After designing and testing the models, the next stage would be to create some initial musical sketches, using the models and to note carefully the process. After some initial experimentation I decided to begin by conducting a series of three stylistic experiments with each model.

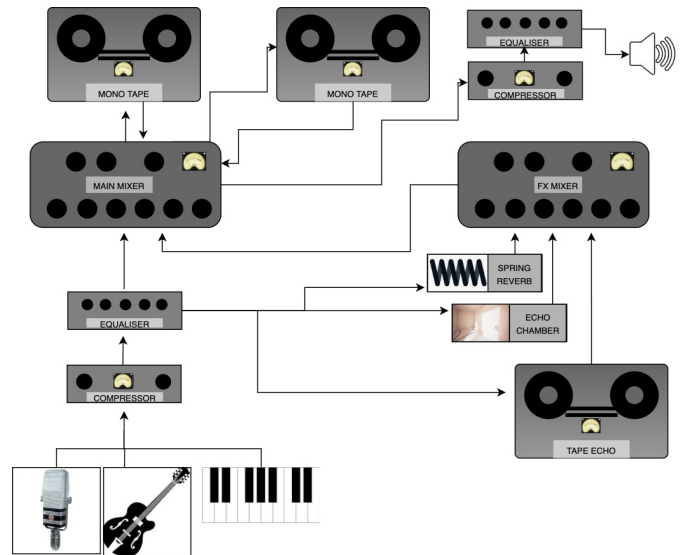
These would be:

- Creating a piece that could be considered as stylistically appropriate to popular music from the re-created time period.
- A piece that could be considered to be perhaps more modern in its instrumentation style and arrangement.
- A piece with no stylistic boundaries, that could be as experimental and avant-garde as I wished. This would enable me to forget pre-conceptions and to perhaps explore more deeply what could be achievable with the instruments and equipment.

5 The 1955 Model

Recording in 1955 was a relatively straightforward process, using all mono equipment and two single-track tape recorders. Although early prototype multi-track tape recorders were in existence in 1955, I decided that to use one in this model would create too much overlap with my 1965 model, so I designed my system to operate by using the prevalent method of the time, which was to record on to one tape machine and then to overdub the next instrument over the tape, via a mixer, onto a second machine.

Figure 1. 1955 Model Signal Flow



The signal from either the microphone or an instrument comes in via a valve microphone/DI and is then processed with a compressor and equaliser (EQ) and then split, with one output passed into the main mixer and the second sent to the chosen effect, in this case either simulated spring reverb, a virtual echo chamber or a slap-back echo from an extra tape recorder.

The outputs from these effects are routed into a second mixer, which is then routed into the main mixer. A choice of signals from the main mixer is sent to the first tape machine and after recording has finished, the output from the tape is routed back into the mixer. This can then be combined, via the mixer, with another instrument, another effect and more compression and equalisation (if required) and the whole can then be recorded on the second tape recorder. The process can then be repeated by recording back to the first tape machine, then again onto the second machine and so on.

The equaliser used in the 1955 model is a modern hardware re-creation of the Pultec EQP-1A, made by Klark Teknik. The Pultec was arguably the industry standard EQ from its inception in the early 1950s

and they are still used extensively today. Although they are relatively limited in terms of features, compared to modern equipment, the Pultec-style EQ still covers the majority of the frequency spectrum and is a capable piece of equipment.

The compressor used during the recording stage is another hardware re-creation made by the same company, this time of the Teletronix LA2A. This unit is a compressor/limiter, based on an optical gain reduction element, with a valve (tube) make-up gain circuit and program-dependant attack and release times that make it respond in a very musical fashion to the dynamics of the signal being processed. I am exercising a small degree of creative license by using this compressor, as the LA2A itself didn't exist as a model until 1961 (although earlier variants did exist in 1955) and it uses technology that was prevalent in the mid 1950s.

It should be noted that both the Pultec EQ and the LA2A compressor have both input and output transformers and it can be argued that these contribute to their sound as much as their valve amplification stages, especially when saturated.

Soundtoys' 'Radiator' plug-in was used to emulate the sound (and also the saturation) that comes from using a valve-based mixer with transformers. Radiator is sold as a sonically accurate emulation of the Altec 1567A mixer, which was possibly the most commonly used studio mixer in the USA from the early 1950s up until the mid 1960s.

Tape emulation was provided by Slate Digital's VTM (Virtual Tape Machine) plug-in and this is used to simulate the saturation, compression and altered frequency response that analogue tape imparts on an audio signal. The plug-in was set to re-create the settings that would have been in use in the 1950s i.e. 15ips tape speed and the 1/2 inch 2 track setting.

The final stage after the musical piece was recorded would have been to master it to vinyl, usually an acetate test pressing to begin with. This would be facilitated by running the mix through further EQ and limiting to get the highest possible level on the pressing. To simulate this, I used a second Pultec EQ

and a plug-in emulation of the Fairchild 670 limiter. This is an all-valve vari-mu (variable bias) compressor with a fixed high ratio that is useful for compressing a whole mix, (due amongst other factors, including its audio quality) to its very fast attack time. An LA2A has a relatively slow attack time, even at its fastest setting (which is program-dependent and not user-selectable) and this usually makes it unsuitable for mix compression, as it is unable to react in time to fast transients and this can result in a 'smeared' and indistinct attack portion of the signal.

Soundtoys' Echoboy plug-in was used to simulate the second tape machine that provided the slap-back echo (used in both the 1955 and 1965 models)

Reverb in a 1955 studio would have been created with a dedicated 'echo chamber', in essence a special room with the walls covered in reflective materials and with a speaker at one end to play the sound to be treated, and a microphone at the other to record the resulting reflections. This was emulated using Logic Pro's 'Space Designer' reverb plug-in, with a medium-length chamber impulse response.

The original intention was to compare the sounds as recorded by various types of condenser and ribbon microphones, but due to the shutdown caused by the Covid 19 pandemic, I was unable to access these microphones. I sourced, at short notice, a Superlux R102 ribbon microphone, which is a modern re-imagining of a vintage-style ribbon microphone, but is phantom-powered and doesn't present the same impedance issues to my audio interface that a traditional passive ribbon microphone would.

5.1 1955 Instruments

5.1.1 Drums / Percussion

- Chamberlin Rhythmate. Whilst not being the first drum machine made, it was arguably the first to produce a sound that's actually recognizable as drums. It worked on a similar principle to the Chamberlin keyboard (and its later relation, the Mellotron) and used tapes with recordings of real drums and percussion, although unlike the Chamberlin keyboard it

used tape loops that could repeat indefinitely. ‘The instrument had 14 tape loops with a sliding head that allowed playback of different tracks on each piece of tape, or a blending between them’ (120years.net). I simulated the Rhythmate by loading an EXS24 sampler inside Logic Pro with sounds recorded from an original machine and set them to loop when holding the MIDI note that was assigned to each sound. I changed their tempo (and pitch) by tuning the sample in EXS24.

- Tambourine and egg shakers.

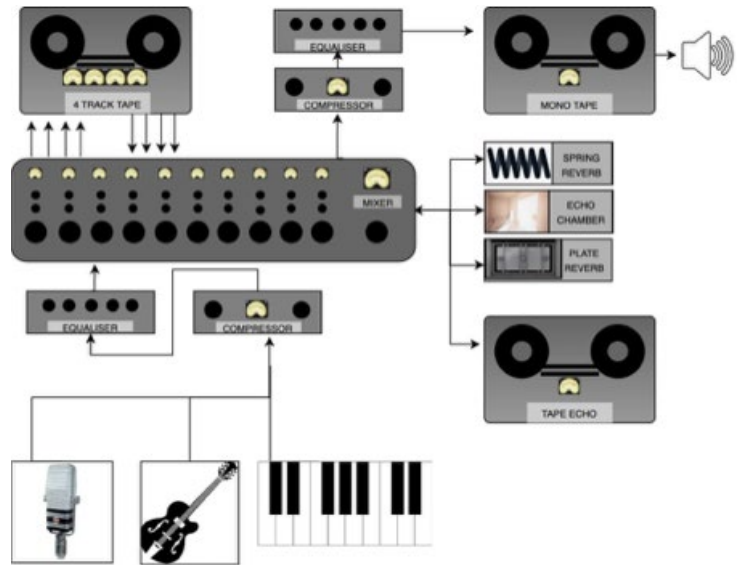
5.1.2 Keyboards

- Acoustic Piano. An upright piano library was loaded into Native Instruments’ Kontakt software sampler.
- Hammond Organ: A Hammond B3 sample library was loaded into Kontakt .
- Chamberlin: Arturia’s Mellotron plug-in was set to ‘flute’, a sound that was available on the original Chamberlin library for the Model 200 that was built from 1951-1959 (120years.net, 2013)
- Wurlitzer 112: This early version of the Wurlitzer electric piano was emulated using Arturia’s ‘Wurli’ plug-in.
- Ondes Martenot: Emulated using a Kontakt library. The ribbon controller that enables the real-time hands-on control that makes this instrument unique would be built later. For now, I used a patch that emulates this by mapping the modulation wheel to pitch glide.
- Clavioline/Solovox/Ondioline: All versions of the same early valve-driven synthesiser built by different manufacturers. I used an Ondioline Library inside Kontakt.

5.1.3 Guitars Fender Telecaster, Epiphone Swingster Archtop with Bigsby vibrato

6 The 1965 Recording System

Figure 2. 1965 Model Signal Flow



The 1965 model is broadly similar to the 1955 version, but the addition of a 4-track tape recorder dramatically changes the recording workflow. This enables me to record three tracks consecutively, before having to ‘bounce’ to the fourth track, after which I can record further instruments. It also facilitates the ability to apply EQ, compression and effects to individual tracks before committing to the mixdown.

The four tracks are mixed via a larger mixer than was used in the 1955 Model. This is equipped with more inputs and outputs, and also adds simple two band ‘bass’ and ‘treble’ EQs on each channel. The outboard effects used in this model are the same as in 1955, but with the addition of a ‘plate’ reverb simulation (provided by Arturia’s ‘Rev Plate 140’ plug-in), as the EMT 140 plate had been available for some years by 1965. The outputs of these effects are brought into extra channels on the expanded mixer. The output of this mixer is then routed through another Pultec EQ and a Fairchild 670

limiter, and then into a mono tape machine that records the final mixdown.

Whilst there wasn't a huge amount of development in recording technology between 1955 and 1965, mixing consoles did become larger and more flexible, mostly reflecting the boom in 4-track recording that had happened by that time. Although solid-state technology was becoming available by 1965, most recording consoles were still valve-based, so I continued to use the Radiator plug-in for its signal colouration.

Although stereo records were well-established by 1965, it was pre-dominantly used for classical recordings and most popular music was still monoaural, so for this reason I decided to continue to work in mono.

6.1. 1965 Instruments

These were the same as the 1955 model with some additions.

6.1.1 Drums / Percussion

- Wurlitzer Sideman Drum Machine. This was the first commercially available drum machine with preset patterns that change tempo without changing pitch. It generates its sounds using valve technology. It also has pushbuttons that trigger the individual drum hits. I emulated this machine by creating Apple Loops of the patterns and using samples inside EXS24 of the individual hits that I could trigger with a drum pad MIDI controller

6.1.2 Keyboards

- Fender Rhodes Electric Piano. Emulated using a Kontakt library.
- Vox Continental Organ. A solid-state organ with a different sound to the Hammond, this was emulated with Arturia's 'Continental V' plug-in.
- Farfisa Compact Organ. Another solid-state organ with a thinner, more electronic sound than

the other two. Emulated by Arturia's 'Farfisa V' Plug-in.

- Moog Modular Synthesiser. This is based on one of the first production configurations of the instrument, with a relatively limited feature set, compared to later models. Emulated for this initial experimental stage with a hardware Minimoog clone.

6.1.3 Guitars

Epiphone Casino hollow-body with P90 pickups, Fender Stratocaster

7 Initial Musical Experiments

Although six musical pieces were created at this initial stage of the research, space considerations only permit description of three.

7.1 1955 Experiment 1 (See accompanying sound file 1955 Exp 1.wav)

I decided that this should be a piece that fits as closely to the 1950s stylistic aesthetic as possible, so it should probably be based around a I,vi,IV,V chord progression and have a 'shuffle' rhythmic feel. This chord progression was extremely popular in 1950s and 1960s popular music and is still frequently heard in contemporary music today. The shuffle feel was extremely common at the time.

7.1.1 Drums / Percussion

The first stage would be to lay down the rhythm track from the Chamberlin Rhythmate, so I listened to the drum patterns available and chose a suitable candidate with a swing feel, as that would fit my intended shuffle groove. I found a second loop that fitted quite well as a variation and a third, tom-tom-based rhythm too that would work too and set about laying down the rhythm track for the piece. The Rhythmate can play elements from up to three of its patterns simultaneously, depending on where the sliding playback head is, relative to the tape loops, so I simulated moving this in real time by triggering midi notes from a controller keyboard to change the

loop playing from the EXS24 sampler instrument containing the Rhythmate loops.

I felt that the chosen loops had an obtrusively ‘honky’ lower mid-range content, so I patched in the Pultec EQ and notched out the offending frequencies, as well as boosting the top end a little, but being careful not to also bring up too much of the hiss inherent in the machine’s samples. This was recorded through the all-valve signal chain and into my Logic Pro system. On playback through the valve mixer and tape emulation plug-ins, I realised that there was too much bass in the drum track, and this would probably interfere with the bass guitar that I planned to record shortly. The main limitation with this *single-track to single-track* recording system is that there is only one ‘undo’ and once I’ve passed that point the only way to change something is to start the whole piece again from the beginning.

After re-playing and recording the Rhythmate drum track with less low-end EQ, I added a tambourine part, recorded with the ribbon microphone from about three feet away, as my previous experience of tracking percussion with ribbons suggested that distance is a good starting point. I added reverb from the echo chamber simulation to the tambourine signal and played the part, recording it over the drum track onto the second (virtual) tape machine.

7.1.2 Bass Guitar

The bass part was played on a modern re-creation of a Hofner Violin bass fitted with period-correct flat-wound strings. This is a hollow-bodied instrument with a distinctive percussive attack portion of the sound, especially when played with a pick. I used the Pultec EQ to tame the low end slightly and compressed it fairly heavily with the LA2A, as this would be my only chance to shape the sound before committing it to the mix. On playback I noticed that the bass sound clashed harmonically with the tomtom part in the rhythm track. If this was a piece to be played publicly, I would’ve started again and changed the tempo slightly to re-pitch the drum track, but as it was just an exploratory piece, I decided to tolerate the slight dissonance.

7.1.2 Guitars

I then turned my attention to the guitar parts and there was a period of experimentation before I kept any takes, as I quickly realised that there are extra considerations when recording through an entirely valve signal chain to tape. Setting a suitable level was the first one, as what sounded acceptable when working out the parts and recording was fairly obviously not on playback of the virtual tape. Additionally, the more layers that went into the piece, the lower-mid-range ‘mud’ and unwanted saturation became evident in the recording. I found that the individual characters of the guitars played were quickly lost in the mix and at one point I struggled to tell the difference between my Fender telecaster and my Epiphone Emperor Archtop – two guitars that sound as unlike each other as is possible under normal circumstances. The levels of any effects also had to be boosted to an unexpectedly high level in order to be heard in the mix, especially the slap-back tape echo that was a common feature of 1950s guitar parts.

I eventually recorded a chord part with the telecaster, through a slap-back echo and then added a palm- muted low string picked part with the archtop, with occasional chord strums that were bent downwards using the Bigsby vibrato, the whole part being processed with spring reverb. Using the Bigsby can cause the guitar to go out of tune very quickly, especially with the vintage-correct very heavy 12-gauge flat-wound strings that I’ve fitted. To tune the guitars, I used the old-fashioned method of tuning the low E string to a piano note and then the remaining strings relative to that.

After recording what I felt was a superb guitar part, I realised that I had forgotten to switch out the Pultec EQ that had been used to thin out the lower mid-range on the previous take and it had now caused the whole mix to sound thin and nasal. The only option was to play the whole part again.

7.1.3 Keyboards

I added a Hammond organ part next and whilst in 1955 a B3 would’ve been recorded by mic’ing its Leslie cabinet, these are not facilities that I have access to, so a plug-in version would suffice instead. On listening back to the new mix with the organ I

noticed an unpleasant howl that I ascertained to be around 800 Hz. After some investigation I realised that it was coming from the drums and was also inherent on most of the Rhythmate samples. It is probably a resonance from the speaker cabinet of the machine that had been sampled. Up to this point I hadn't really noticed it but adding the organ part, with its strong harmonic around the same frequency had really accentuated this howl. Normally I would have used a narrow band EQ to notch out the offending frequency, but unfortunately the only EQ I have for this model (besides the simple treble and bass on the Radiator plug-in) is the Pultec, which doesn't allow that level of control.

The final stage was to add a top-line melody part, using my virtual Ondioline and after adding on far more chamber reverb than I would have used under normal circumstances, I improvised a part that consisted mainly of moving up and down the keyboard playing chord tones, whilst using the modulation wheel to control volume in the same way that the knee lever on the original instrument does. It did yield a surprisingly pleasing 1950s style melody though.

7.2 1955 Experiment 2 (See accompanying sound file 1955 Exp 2.wav)

This was to be a more experimental, avant-garde piece so I decided to ignore any kind of pre-ordained musical identity and explore the instruments to see what kinds of interesting sounds that I could make.

7.2.1 Drums / Percussion

I wanted the rhythm track on this piece to be less important and not to dominate the piece, so I selected a loop on the Rhythmate that was as understated as possible and removed most of the low end by heavy processing with the Pultec EQ.

I then used my archtop guitar to create more percussion sounds by tapping in different places on the instrument. I found that hitting the muted strings directly over the neck pickup yielded the most bass

heavy tone and that tapping the guitar's body gave a higher-pitched, more tom-tom-like sound. I then decided to add some tambourine by placing it on the floor in front of the microphone and stamping on it. This I did whilst playing percussion on the guitar, enabling me to add two percussion instruments in one go. Not being a drummer, it took a couple of takes to 'lock in' to the feel of the drums and be consistent with my foot-operated tambourine. I added some chamber reverb to both new sounds as I played over the Rhythmate loop, recording the output of all to tape.

7.2.2 Keyboards

I began with an acoustic piano part, playing low Bb pedal tones and the occasional high 'tinkling' notes at the other end of the keyboard. By this point I'd decided that I wanted to evoke a cinematic feeling with this piece, so I used a generous amount of chamber reverb on the piano, giving it a distant and ethereal sound.

I next went to the Chamberlin and this time loaded it with its 'French Horn' sound set. I compressed this with the LA2A and added some Low end from the Pultec EQ to fill out the sound. I doubled the low Bb piano notes with the lowest Bb on the Chamberlin (it has a fairly restrictive 3 octave range) and also played some Bbm chords with it.

I added an Ondes Martenot part on top of this and this time used the pitch modulation very heavily to create a lot of warbling and droning sounds. For this piece I selected the regular speaker, to give a warm, less treble-y sound.

7.2.3 Bass Guitar

Overall, I was pleased with the direction that this piece had taken, but now I felt that it lacked enough low-end to feel properly anchored. I wanted the bass part to be as deep as possible, so I used the neck pickup only, with the tone rolled back all the way and used the Pultec EQ to remove any remaining upper mid-range. This was played on a Fender Jazz Bass, a model that technically wasn't available until 1961, but is close enough in sound to the Fender

Precision Bass that was around in 1955. I played finger-style Bb notes, with occasional slides up and down the strings and plucked the strings far up the neck at the 12th fret, which produces a purer tone, that's very close to a square wave. On reflection, I should probably have de-tuned the E string to give a Bb an octave lower, but that didn't occur to me at the time.

8.0 1965 Model Experiments

Although technologically, the 1965 model is not hugely dissimilar to the 1955 model, the addition of 4-track recording dramatically alters the recording process and imparts a great deal more flexibility to all aspects of the composition and production workflow.

8.1 1965 Experiment 2 (See accompanying sound file 1965 Exp 2.wav)

This was to be an experimental piece, so I decided to focus on synthesiser and keyboard sounds, with heavy use of effects and an emphasis on improvisation and not dwelling too much on musical dogma.

8.1.1 Synthesiser

For this piece I began with a synthesiser part, using my hardware Minimoog synthesiser clone that was temporarily standing in for the Moog Modular and programmed a simple two oscillator, slightly de-tuned sawtooth patch with a long filter attack envelope time and a long amplifier release time. I played a low droning F pedal tone, with occasional octaves and tweaked the filter cut-off frequency, resonance and the envelope depth as I played. I felt that this had come out rather well, so I added another synthesiser layer, playing a similar part but with C notes this time, to create an F5 chord. Again, this seemed to work well so I added another related part, playing G# (the minor third) to create an F minor chord in certain places during the piece. I'd used up my three available recording tracks now and needed to bounce them to the fourth track to be able to record further instruments, so I did this and added a large amount of plate reverb whilst doing so.

8.1.2 Keyboards

I expanded on the F minor theme by adding a chordal part from the Farfisa organ, playing low variations of this chord and adding in some higher chord tones here and there. This sound was given some spring reverb to help it sit with the previously recorded synthesiser parts. By now, the piece had taken on a sinister, but pleasing electronic sound, reminiscent of 1980s John Carpenter/Alan Howarth horror and sci-fi film soundtracks, so I decided to continue in that musical direction

The Wurlitzer electric piano was used next, to create a glassy, tinkling, almost 'liquid' sound. This was achieved by playing glissandi high up the keyboard and bathing the sound in a very large amount of chamber reverb.

8.1.3 Drums / Percussion

Although I was happy with how this piece was sounding, I felt it needed some rhythmic interest, although not necessarily a regular drum part. I decided to try triggering the drum hits on the Sideman and bathing these in reverb too, which turned the kick drum into a deep and cavernous boom, that I felt worked well in the context of this piece. It only took one take to get this part right and I was particularly pleased with how the percussion hits saturated when I played them repeatedly towards the end of the piece – a very musical and warm distortion, characteristic of overdriving valve equipment.

I had intended to add guitars to this piece but now felt that it worked well as it was, so I replaced some of the high-end that had been lost in the recording process by turning up the treble EQ on the Radiator plug-in on the master output and then bounced it down to the mono tape machine.

9 Conclusions

It should go without saying that working with these models is hugely different from my regular composing and recording workflow and required a completely different approach to every aspect of the process.

9.1 Composition

The rhythmic limitations of both models forced me to think more about melody and harmony as the basis for each piece. I found that using such vintage-flavoured sounds influenced my thinking (especially when using the more old-fashioned chord progressions too) and when improvising and writing new parts I found myself being ‘guided by the music’ and unconsciously referencing famous old records. I found this happened even when I was deliberately trying to sound modern.

9.2 Rhythm

I come from a background of creating drum-based music, so rhythm is a very important part of my 21st century composition process and usually my starting point when embarking on a new piece. I found the preset-only rhythms of the Sideman and Rhythmate to be very limiting and that they imposed too much of their own feel on my music, especially the very stylised Rhythmate patterns. With the 1965 model I found that this pushed me to start the composition process with a piano or guitar, and I realised that I could record these initial parts by playing to a metronome, without thinking about drums. But with the 1955 model there is realistically no choice but to get the drum track down first and this really dictates how the rest of the piece takes shape. It would’ve been good to be able to layer patterns from the two drum machines but getting them in sync to do this would’ve been very difficult with the original hardware and quite labour intensive to emulate with my model. It’s certainly something I will look at as my research progresses.

9.3 Performance and Playing Instruments

Using these models really enforces discipline when playing and recording instruments. This is especially true of the 1955 model where there is only one chance to get it right and any mistake means starting again. This shifted my perception of what was ‘correct’ and I found myself keeping takes with minor mistakes if I felt that the rest of the performance was good. As I was generally making up the parts as I was recording them (and there was very little time to practice them beforehand) almost

all of my performances were below the level that I’d normally deem acceptable.

9.4 Production and Audio Fidelity

The use of an all-valve signal chain in both models has forced me to approach the recording and mixing process in a different way. Previously, I’ve only really used valve processing on selected sounds as a special effect to accentuate them. However, when every instrument has at least two stages of valve saturation (not including the EQ and compressor) the saturation can soon become overbearing unless levels are managed very carefully.

Working entirely in mono was also a new challenge. It wasn’t an issue for the 1955 model, but for 1965 I missed the ability to be able to pan instruments across the stereo image, to create space in the mix.

The ‘mix as you go’ approach that both models require creates a whole new approach to recording and things like gain structure and noise levels become very important. Congestion in the lower mid-range and bass frequencies builds up quickly and without the surgical equalisation tools that I can normally access, this can be almost impossible to correct. Although the 1965 model offers more control, the process still requires bouncing to a single track after recording every two additional instruments, so problems appear quite quickly and sometimes can’t be fixed without starting again.

For the 1955 model, the inability to process individual tracks after recording means that equalisation and compression has to be used across the whole mix and I sometimes found later in the process that I regretted some of these processing decisions, but had gone too far to reverse them.

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