

How does vintage equipment fit into a modern working process and why does it survive? Rediscovering the merits of valve equipment in a digital world.

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Contemporary students of record production, interested in the development of studio practice and seeking to discover historic techniques will find narratives that not only mythologise the works of producers such as Spector or Martin but cast historic pieces of equipment such as Pultec EQs and Fairchild limiters as mythical figures, venerated for their role in defining the sound of popular music.

Indeed, marketing of software emulations of these historic brands focuses on the associated recordings, unique personalities and role in creating a canon of influential recordings, calling them the "tone titans of hundreds of hit records". (UAD 2018)

Whereas recording studio practitioners in the past concentrated on song, performer and arrangement, viewing sound capture as a technical process provided by engineers, modern recording practice incorporates the sonic design potentials of the control room, using historic pieces of equipment as part of the overall creative process, to recreate sounds of specific eras, provide a sense of creative randomness and distortion to otherwise controllable pristine methods.

Hence equipment, originally designed as options of last resort to repair or control performances, become valorised for their creative potentials and reputation for use by renowned engineers on significant recordings. Items such as the Pultec and Fairchild, etc, abandoned as soon as technically superior units became available are rediscovered, with second hand prices supporting the mythology of the users, software emulations at keen prices granting access to such pieces without suggesting their place in the modern recording chain. Bennett concurs that

"The digital appropriation of analogue systems is particularly prevalent in software plugins" (Bennett 2012)

This chapter considers the continued use and veneration of analogue equipment, whose design first appeared over sixty years ago. As old designs are reissued by various companies copying original electrical circuits and using valves, and digital emulations are marketed as 'tone titans', deifying the original concepts, the question is how does this equipment fit into a modern working process and why does it survive?

Audio processing equipment such as equalisation and compression were developed in the early part of the 20th Century. Equalisation originated as a technological solution to maintain spectral consistency and clarity over long distance telephone lines by compensating for high frequency losses.

Compression and limiting, emerged in the 1930s as an electrical method of automatically controlling audio peaks to protect radio broadcast transmission equipment previously controlled by manual gain riding:

“Operators sat at a console with the sole job of keeping the audio at a constant level, and even more importantly, preventing the program audio from jumping high enough to hit 100%, pinch the carrier off and knock the station off the air. (Somich and Mishkind, 2018)

Hence units such as the Pultec and Fairchild were designed to be transparent control devices, responding to the music in a ‘pas de deux’ of discreet manipulation, to help engineers achieve loud and clean program audio, whether to modulate the transmitter in the best possible way, or in use by recording studios to maximise signal and fidelity for vinyl disc cutting styli.

The chapter follows the fortunes of the Pultec equaliser as an example that has survived in popularity and reputation despite the technological changes that have spawned modern equivalent devices that have impacted upon and shaped modern working practices.

PULTEC

IN 1947, American manufacturer Pulse Industries produced a program equaliser, licensed under Western Electric patents, designed to match timbres between recordings when mastering from different studios or recording dates. The prescriptive tone of the supporting documentation describes its specific design and targeted market as:

“Used by major broadcasting networks, record companies and recording studios to add the final touch to good program material, and to greatly improve program material previously recorded on inferior quality or differing characteristics.”(Pulse Techniques, 1947)

The unit alters input tonal character based on the choice of attenuation or boost at certain frequencies on the front panel, which controls a passive circuit design.¹ A connected compensating line amplifier maintains the signal strength so adds unavoidable colouration by employing transformers and valves at this stage. This inherent characteristic, an artefact of using valve equipment, though acceptable at the time given other signal to noise fluctuations from tape hiss, mains hum and cross talk etc. enhanced the recorded signal and became an important feature in later use. Indeed, digital emulation also recreates the harmonic distortion of this circuit whether the equaliser is switched in or out as well.

¹ Passive electrical circuits use components that do not rely on electrical power for operation but the circuit results in a drop in signal power.

The front panel design is also unusual. Boost and attenuation are not combined but on separate knobs, and emulations eschew standard interface ergonomics to copy this unconventional layout for authenticity. Hence operation does not follow common tacit expectations.

The primitive design with unusual layout of controls became a legendary unit, and was one of few units commercially available for the recording industry, since corporate recording studios tended to use 'in house' designed equipment.²

Although the 1950s are perhaps considered the heyday of valve based technology, outboard units found little use in a recording studio working practice that was geared towards capturing performance and time spacial information of session musicians playing in ensemble in strictly managed sessions³, In *Chasing Sound*, Schmitt Horning describes 1950s studio practice as the 'art of controlling sound' that relied on "an implicit knowledge gained from experience" (Horning, 2013, p. 126) a practice that focused on microphone choice, placement and ambiance as vital ingredients to maintain high standards and create a high fidelity sound mixed direct to tape. ⁴ Since patching in outboard equipment also meant adding noise, engineers avoided them if possible.

Nevertheless as the decade progressed units such as the Pultec and Fairchild began to find other uses in the studio, to 'reign in' loud amplified sounds that were emerging from rock and roll guitar bands, adapting to methods gleaned from scrutinising recordings made in independent studios, and while engineers continued to fight the medium of tape and limit noise, this

² For example, in 1951 EMI designed a parametric disc cutting equaliser Universal Tone Control UTC or 'curve bender' which played a similar role to the Pultec "to improve the tonal quality of recordings acquired from some external source", implying that EMI recordings did not need fixing but inferior recordings from outside studios did. Ken Scott suggests many EMI engineers learnt about equalising from playing around with the UTC as 2nd engineers cutting acetates. The corporate working practice is underscored with the protocol that the unit was not commonly allowed on recording sessions, since modifying a sound too far from its original state conflicted with their 'true fidelity' ethos. Nevertheless the Beatles were granted exclusive use of the UTC, which can be seen in *Sgt Pepper. Studio photographs*. (Ryan and Kehew, 2006, p. 151)

³ While technological advancements and experimentation in recording studio practice during the 1960s signalled the emergence of multi-tracking, labour agreements dating back to the second world war between the broadcast and recording industries, and the American Federation of Musicians in USA (and Musicians Union in UK) established modes of working that continued to favour live performance. These unions sought to protect their members from a post war music industry based on selling records rather than on live music, dictating terms such as no recorded overdubs that lasted into the 1960s. (Meynell 2017)

⁴ Malcolm Addey concurs, at EMI equalising and limiting at the time of mastering was the order of the day. In fact the first time I wanted to use a limiter on vocal only in the studio, a memo was shown to me expressly forbidding such a thing and I had to have that order waived at managerial level just to get it patched in!
(Massey, 2015, p. 31)

combination of tape saturation and valve distortion created a recognisable sonic character. Zak quotes McCartney's observation that "valve equipment... gives you a record-y type sound - a pleasing sonic distortion part of the aural tradition in rock." (Zak, 2001, p. 99) ⁵

The exploration of the units adaptability led users towards finding new ways to interpret its functionality, discovering that while Pultec's manual clearly states "Do not attempt to boost and attenuate simultaneously on the low frequencies", doing so added a valuable bass 'bump', a feature unique in a world of otherwise crude shelving equalisers. This 'creative abuse' (Keep 2005) was to become a key signature sound of the unit, and followed the notion of antiprogram (Bijker, 1994, p.261) A combination of further technological innovations and engineers inventive adaptations to their use set the stage for the exploitation of the recording studio as a new creative medium in the 1960s. (Schmitt Horning p138)

While the record business followed the paradigm of increased fidelity and stereo reproduction, parallel advances in circuit design and adoption of the transistor as a substitute to the valve amplifier not only reduced inherent noise levels and power requirements, but allowed for the miniaturisation of component parts and opened the way for independent console manufacturers, such as Neve to enter the market, who employed modular convenience and bespoke flexible design to provide multi channel desks laid out in a now familiar channel strip layout.

These innovations were often manufacturers responses resulting from customer interaction and user requests to develop modifications. Kirby (2015) describes the interactive development of the console equaliser at Olympic studios between designer Swettenham and engineer Grant, while Neve began experimenting with transistor technology because he was unable to accommodate feature requests into his original valve mixer design, demonstrating that users can be said to share a technological frame with the equipments designers (Oudshoorn & Pinch, 2003).

Hence innovations once only available on outboard boxes like the Pultec became built into each channel of the mixing desk, and as studio working practice adapted to the concept of serial recording with the introduction of efficient quieter multitrack tape machines, so the use of equalisation changed to sculpting and filtering a multitude of pre-recorded performances into a final soundscape. Active sweepable parametric equaliser on 3 or 4 bands, together with hi and lo cut, on each strip emerged as a standard, replacing bulky valve outboard equaliser units and the development of equaliser, once a

⁵ Kehew notes that every time The Beatles engineer added an equaliser or compressor in circuit, so a tube driven line transformer has to be added to bring up the signal from the passive box. Abbey Road Studios had a very un-orthodox standard for impedances... Standard both the incoming and outgoing signal was 200 ohms. The result was that a lot of line amps were needed. For example the REDD 37 mixing desk needed 31 Siemens V72S valve amps. (Ryan and Kehew, 2006, p. 75)

technological innovation was complete. ⁶ The homogenised control surface became the familiar look, face and main control surface of the studio, allowing control over spacial placement and tone shaping of individual instruments after recording.

While Theberge notes that the development of multitrack recording and associated practices met the technical demands of the new music – rock. (Theberge, 1989, p. 99), the technological advancement also changed the sound of the recorded music, Emerick describes the difficulty in moving from valve to transistor, from Sgt Pepper LP to Abbey Road LP,

“There was presence and depth that the transistors just wouldn't give me that the tubes did...*Abbey Road* was the first album that was recorded through an EMI transistorised desk, and I couldn't get the same sounds at all.” (Droney, 2002)

Nevertheless, as studios kept up with technology, the once valuable valve technology, including Pultecs with awkward layouts found themselves old-fashioned, noisy and redundant units. Built in equalisation meant external was superfluous and Pultec ceased manufacture in the late 1970s.

The eventual EMI ‘sale of the century’ provided proof that the forward facing industry had no romantic attachment to equipment from the past, whether used on iconic recordings or not, the technology was considered valueless and written down industrial equipment, and was thrown away.

Indeed, as the 1970s progressed and a new generation entered the studio so the tacit knowledge of past techniques was lost. 1950s trained engineers, skilled in recording ensembles in three hour sessions on limited equipment, found themselves working for months on end “with untrained musicians with just an idea of a song ...was an affront to their profession and tantamount to deskilling” and left the industry. (Schmidt Horning, 2013, p. 181)

The end of 1970s marked a zenith in the pursuit of analogue high fidelity and manufacturers changed their direction to convenience and control, focusing development on automation, flying faders, adding compression and noise gates on every channel, as desks became the centrepiece of studios, while homogenisation of design allowed engineers to move between studios.

Whereas these large studios were locked into tape and large desk formats, embracing the 1980s era of technological acceleration, Bennett also notes a

In 1971, Daniel Flickinger invented his circuit, known as “sweepable EQ”, allowed arbitrary selection of frequency and gain in three overlapping bands. “I wrote and delivered the AES paper on Parametrics at the Los Angeles show in 1972]... It's the first mention of ‘Parametric’ associated with sweep-tunable EQ” (Massenburg 1972).

practice developing where low and high fidelity existed side by side, identifying the emergence of an anti production ethos

“devoid of the perfection, clarity and polish so associated with technology-driven productions. Nostalgia, technophobia or sentimentalism cannot be attributed to such a technique, rather the knowledge that technologies are a means to an end (Bennet 2010, 244)

noting that this anti production ethos was often the modus operandi of the burgeoning independent studio culture that thrived on second hand equipment,⁷ and while they also adapted quickly to the new technology of midi, drum machines and digital recorders, they also found use in discarded valve technology, once part of traditional recording methods, as devices found a new role, adding colour and character to sounds.

Indeed, the cold and brittle digital sound demanded a hyped input that warmed up the sound, and valve technology was found to be the saviour, entering a renaissance period as manufacturers such as Danish company Tube-Tech introduced new valve outboard, including a replica of the original Pultec in 1985 for users who wanted a reliable version of the original now rare design.

Meanwhile, equipment brokers such as Tony Larking, who had provided a service to small independent studios by breaking large desks into rack mounted devices, giving access to high end channel strips from large and obsolete desks that wouldn't fit into a room, also began to manufacture new valve driven outboard, designed not only to equalise and compress but sold to warm up the signal. Joe Bennett - Bath Spa University provides a typical endorsement

“The VTC ... it gives us that high quality valve sound” <http://www.tludio.co.uk/docs/products/VTC.shtml>

Phil Harding at PWL also describes using two Pultec EQ1A's during this period, specifically on the bass drum, snare or claps as an integral part of the recorded sound of the programmed sampled drums, using the previously discovered unique trick of attenuating and boosting the same frequency at same time. Hence the unit found a new vital role whereas the equalisation circuit wasn't even designed with bass drums in mind.(Harding, 2010)

“The users' discovery of the 'secret trick' demonstrates a process that has only recently been integrated into scholarship ... that users don't always obey the rules, and that when they don't it can often have positive and creative results.” (Zagorski-Thomas, 2014, p. 129)

Keep concurs “Innovation in record production has developed through the

⁷ Much like 1950s American studios repurposed radio broadcast tape machines and mixing desks

creation of new sounds and is more likely to come from heuristic experimentation of existing equipment, rather than adaptation of new technology, while in search for an elusive new sound” (ibid, 2005)

So what was changing wasn't the product but how it was used in the network (Latour 2005), and the Pultec became a secret weapon. The tipping point of the digital revolution can also be seen as the moment valve technology re-entered the studio control room, alongside musicians and engineers who understood the coloration of valve guitar amps etc. while project studios and niche outfits created a demand for hands on manipulation as well as maverick use of MIDI, portable multitracks, ADATs, samplers and other prosumer equipment lauded by the emerging music technology press (Bennett 2010)

Hence the market for new and refurbished valve equipment became established, with rising prices, and a hybrid studio which combined a plethora of analogue equipment on the input chain feeding into a digital workstation began to emerge as a standard working practice, with final mixing back through the existing large desk or summing unit.

Although digital recording eventually replaced tape as a viable alternative, during 2000s, saving studios tape cost, maintenance fees and space, traditionally trained engineers still drew the line at using 'in the box' equalisation and compression, still preferring familiar outboard equipment and citing obvious constraints as processing power, latency and suspicion at the core effect of the processing, that it sounded thin, flat, one dimensional, cheap etc. echoing in fact similar complaints during the move from valve to transistor decades earlier. The inherent distortion characteristics were noticeably missing from digital and so had to be compensated for with liberal use of outboard to recreate that 'record-y sound'

But as DAWs eventually replaced mixing desks as the central focus of recording with improved stock equalisation and compression, so 3rd party software developers moved to branding of otherwise anonymous computer code around emulations of vintage equipment. So companies like Waves, UAD Soft tube etc. created lookalike and vaguely soundalike replicas of key equipment, including the Pultec EQ1A, wrapped in GUI and marketing that immersed the product in an aura of tradition, mojo and reference to historic and venerated recordings with celebrity endorsement. Indeed, remixer brands are now brands in their own right with boutique designed plugin collections, while on-line tutorials, face-to-face masterclasses, and extensive marketing provides an informed perspective on a past once shrouded in secrecy and industrial intrigue. So training and education are also playing a vital role in the selling of the vintage emulation to the student of record production.

Therefore, the Pultec has acted as a silent witness to changes in working practice as it adapts to creative uses. In each example above, the functionality doesn't change but the way it is used has. So it plays a different role in the network, interpretive flexibility is appearing at the user stage of the artefact as the equalisation is used for different purposes. First in radio transmission, and as a program equaliser, then as a general studio equaliser, then as special

bass trick, then as lo fi distortion and warming for digital, then as a model for emulation, and the emulation is marketed as a particular frequency curve useful on drums or air for vocal, not a general equaliser - only for specific jobs - its trick. Even if the outboard version is not used it sells the cache of vintage equipment while the working practice may use the plugin for convenience. So then it becomes a selling point for the studio. So Pultec is more than fidelity, it has name value and vintage connections that allow it to be incorporated into modern working practice.

Discussion

This modern working practice that vintage valve equipment finds itself in differs from the era where the units were first designed. The original program of action was to record music. The program of an eq and compressor is to ensure loudness and clarity. With the affordance of equaliser and compression on separate channels of a mixer together with a multitrack, the new program is a better loudness and clarity and separation, allowing a new working practice to emerge. “You are different with a gun in hand; the gun is different with you holding it” (Latour 1994, 33). Original programmes of action are therefore reshaped while becoming part of a new overall programme of action. Using this example of translation, why would the engineer then use a Pultec to equalise a track? What is it that modern equivalents cannot provide? Is it a specific use, as in PWL to enhance certain frequencies, or to add distortion, or to add mojo or because it is there to satisfy a client? What does it do that the ears say nothing else will do? And why is it worth so much and trouble to add to the circuit? It is a primitive noisy artefact, and the job may be better done with the desk equaliser or the stock plugin?

Although professional users like Andrew Schepps and Tom Lord-Alge both built reputations on use and choice of outboard hardware⁸, modern working practice demands a circular rather than linear mixing approach, often working on concurrent mixes and revisiting previous work for further adjustment before final sign off. Both have recently moved to ‘in the box’ software mixing for pragmatic reasons. Schepps also prefers working ‘in the box’ “because no one comes over - they just get the mix... what they hear is what they get is what they make a judgement on” adding “when they could see your rack they said - what are you using on the bass? I hate that compressor and it changed their perception of what the bass sounded like even if they didn't know” (Music Faculty: University of Oxford, 2017)

Lord-Alge, admits his outboard is ‘gathering dust’ “Today I am able to get the same sound that I was getting from my outboard from plugins. ... It's much easier, also, with respect to recalling mixes”(Tingen, 2015b)

⁸ He still owns £750,000 of outboard gear, recently installed at Monnow Valley Studios, Wales

This perspective is also mirrored in a series of online interviews with soundtrack composers at work in their boutique studios⁹, revealing a broad perspective of current creative working practice. Whereas opening conversations turn to the glamour of the hardware in the racks and associated stories, working practice discussion reveals a constant move towards meeting deadlines and fast turnarounds, the advantage of hardware is described as input coloration, and a “device to make me get up and move across the room so avoiding repetitive strain injury locked into the computer screen all day” (Gray 2018)

All reveal a romantic connection to collected equipment that inspires the initial creative spark, “the hardware makes you want to go to work...you feel involved... its how it makes you feel... software sounds the same but sweeping eq - I feel more involved, its how you engage” Andy Britten

“Less gear constrains options... Promotes creativity” - Orbital

“Satisfaction of turning a knob and playing it like instrument you never get from a plugin” - Sefi Carmel

While Andy Grey, who owns an extensive synthesiser collection explains he uses a small midi keyboard to write, then midi out to CV triggers the original keyboards, before conceding, “Kontakt is 99% of what I use to be honest”

Host Henson is heard to lament that from the perspective of the client customer, “in the box’ is less sociable, I can’t see what’s happening, I don’t want to squint over someone’s shoulder, so theres no point attending the mix any more.” However, Scheps says “that’s what I want - don’t judge my work by my rack gear, listen to the music” (ibid.). Indeed professional mix engineers have now accepted that initial reservations in sound have been overcome and plugin emulations sound the same as the hardware.

Paradoxically, whereas hardware is normally associated with “professional”, the opposite is also true. As professionals find that endless options of equipment choice are less important than establishing a working method of templates and system management that supports the overly complex multi track and multi stage decision process, self producing musicians, hobbyists and niche studios working serial recording sessions, create an environment where there is less necessity to recall mixes. This limited method can embrace analogue hardware because decisions have to be made, budgets and time are finite, and mixes have to be agreed on the spot. These are typically ensemble performances recorded in a traditional studio space to capture feel and ambiance, often serving semi-professional musicians at the end of the long tail, who place value in using professional outboard equipment and traditional methods, these clients rarely have the resources to return and tweak the result, but make a judgement in seeing racks of expensive rare

⁹ Creative Cribs is a series of extensive interviews exploring creative working practice in the context of film and sound design. <https://www.spitfireaudio.com/editorial/cribs/>

outboard, rather than the sound of the mix. So using a Pultec suggests a certain aura even if you haven't even switched it in - its in the rack and you sense the vocals or bass drum are affected and sound bigger because of it, thereby making a judgement not only on what you hear but what is perceived as professional equipment.

Therefore as iconic studios close, or become too prohibitive for mixing so the mojo now exists in associated items or methodology, the Pultec equaliser, the Glyn Johns drum technique, or Phil Spector sound, that may not be appropriate but are metaphors for professional knowledge and embodied heritage, where hardware acts as an investment and selling point. Although limited in use, it suggests a calibre of fidelity, as window dressing enhancing a studio specification to attract clients who are informed via GearslutZ style discussion boards and staged nostalgia of 'Mix with the Masters' style re-enactments.

Crucially, whereas the vintage Pultec can survive because its design can be copied¹⁰, and circuit diagrams and components are readily available, even as D-I-Y build yourself kits, more 'modern' electronic items such as tape machines that incorporate logic boards and other computer-controlled components have not survived as they rely on key items no longer manufactured, so are defunct. Indeed, one can argue that the built-in obsolescence of computerisation, abandoned operating systems and connecting systems creates a vortex of updates and abandoned formats, whereas vintage gear is the only long term reliable item in the room. Windows 95 PC's, ISA cards, 1630 tape, zip discs, rs422 cables, etc, the industry is strewn with equipment that cannot connect to each other or play back vital recordings, whereas a valve machine can connect to a transistor unit and a tape recorded fifty years ago can play back on any 2 to 24-track machine.

While vintage gear is being used as a metaphor for creativity, professionalism and style by associating with celebrity recordings rather than perhaps being correct choices for recordings, the branding is being used in software to create an aspirational product out of anonymous programming, implying no matter how dull your recordings, this plugin will make them technicolor like the old days. Indeed, the description says you don't even have to switch it on for it to work its magic. The implication is that respected engineers from the past sounded good because they used valve equipment, glossing over the artistry, musicianship, room, tacit knowledge, working experience. With the same gear you can too.

But if software equivalents of vintage hardware do not have the advantage of tactile interaction, and are simply selling you the idea it is used on old records so it must be good, then why use an emulation of a sixty-year old design when a modern process may achieve better results? While the plugin market is overflowing with permutations of saturators, distortion, tape emulations, why

¹⁰ The original Western Electric patent has expired.

use the version cloaked in a vintage GUI when you can use an alternative at half the price to do a better job? How strong is the marketing and who is responding to that? Who's ears are you trusting?

Developments in machine learning and AI now provide plugin equalisation that can match famous recordings, provide preset combinations of settings and create aural equivalents of sepia, retrolux, or monochrome filters etc. Industry commentators bemoan that these innovations remove the human element or nuance of possibilities, promoting a “Fisher Price - my first mix” reliance from suggested presets (Senior, 2017), an approach that doesn't tell you how or why to equalise. This argument also echoes Lanier's proposition that modern technology, while giving an illusion of empowerment is increasingly about removal of liberty and homogenising the user base, where “keeping up with new technology actually ends up shepherding the creation process along quite restrictive lines”(Pattison, 2013) The idea that not knowing what is 'under the hood' in the algorithm underscores a suspicion that the device may also be biased towards evaluating a generic or safe solution rather than a creative and ingenious hunch based on outside the box circumstances or wider network influences. Indeed, developers concede that cost and processing limitations stops them modelling the absolute boundary responses of hardware units, yet these responses, when things go wrong or break down are the very nuances that created the palate of undiscovered sounds and ideas that created the trick or special identity and draw users to the original hardware.

Hence using hardware vintage outboard equipment suggests the work involves specialised craftsmanship, reflects the handmade personality of the maker, the imprint of humanity and the feeling of being in control. Indeed, using hardware becomes the industry anti-program, rather than an expression of nostalgia or anti-technology, as the DAW environment increasingly depends on learning new versions, renewing licences, and discovering your new updated operating system has just deleted favourite legacy plugins and won't open previous session templates and mixes. As Townshend says

“It looks like vanity or elitism. But what we know about vintage studio equipment is that it makes us feel different about what we do, and how we do it, in the studio...we are following in a long line of studio process and tradition that reminds us that if we use these great vintage tools carefully, but audaciously, we might break new ground all over again. (Townshend, 2018)

THE THREE CASE STUDIES

The following three contrasting examples of mixer, producer and recording engineer provide contrasting methodological frameworks showing how users embrace vintage gear.

KESHA – “PRAYING” 2017

Mixer Jon Castelli (Lady Gaga, Ariana Grande) combines outboard valve equipment with an 'in the box' strategy in his LA studio.

“The reason I have the tube gear is because it creates harmonic content that I don’t believe exists in the digital realm” and describes the sonic advantage as warm, musical, fat, with more headroom acting as a safety net against digital clipping.

His VLC-1 console is “based on a vintage RCA preamp tube circuit, with a Pultec-style EQ on every channel.” and comes up as inserts in Pro Tools. He used one channel as an insert on the lead vocal, and two channels on the mix bus for Kesha’s song. He employs this console and outboard on 80% of mixes as a matter of taste, but accepts that he can also achieve depth, separation and clarity in the box “I’m not precious about my analogue gear anymore, despite spending a lot of money on it!”

After an ‘in the box’ rough mix was approved by Kesha, her manager and record company, Castelli decided to redo the rough mix incorporating his outboard analogue equipment. Although Kesha and her label agreed it was better, her management preferred the timbre of the original rough mix and asked for adjustments.

Castelli describes the rough mix as ‘bedroom’, raw and dryer, whereas the analogue remix was ‘platinum’, lush, gigantic, hifi, clear, top 20, but conceded it was the rawness that the people responded to, that gave ‘goosebumps’. Six weeks and nineteen further remixes failed to deliver an accepted result using the hybrid of analogue and plugin processing. The final approved mix was an edited amalgam of the original ‘bedroom’ mix for the verses, spliced with the ‘platinum’ mix for the 2nd chorus onwards.¹¹ The choice of mix selection rested on which soundscape complimented the lyrical performance, which went from intimate in the verse to bombastic in the chorus. The description of ‘bedroom rough mix’ belies the fact it was “70 tracks processed with several hundred instances of plugins”, mostly UAD vintage and tube emulations. The platinum mix reduced this arrangement to 33 stem tracks, which were further treated with outboard and vintage plugins.

The above example illustrates that although the mixers creative preference may be to incorporate vintage hardware equipment to add harmonic distortion to colour the sound and also provide a creative tactile relationship to the process, the workload increasingly dictates an abandonment of this style of working, staying within a digital environment to manipulate a complex hyper fidelity approach of layering, processing and managing sounds and mix decisions. Thus the mixers preferred prerogative to employ tacit skills to achieve an accepted paradigm of fidelity conflicted with the instinctive judgement of the wider network and how the mix made them feel. The plugins, although precise emulations, did not achieve the same sonic openness, although they created a more than acceptable result.

CLEAN BANDIT – SOLO 2018

¹¹ A Similar solution to George Martin’s approach following Lennons request to combine two separate recordings of ‘Strawberry Fields Forever’.

Following five years mixing exclusively 'in the box', former session musician, turned producer and mixer Mark Ralph (Hot Chip, Years & Years, Rudimental, Jess Glynne). now incorporates a hybrid approach to create electronica / organic soundscapes from his SSL equipped facility.¹²

"When mixing, I get the mix up to about 70 percent, using desk EQ and compression and analogue outboard to shape the sound. When it's time to start the automation, I transfer all 48 channels back into the same Pro Tools session, get rid of the tracks I don't use, and finalise the mix inside the box, with the four groups coming back up on the desk again."

Ralph further states "the creative process by which I arrive at a sound and the way in which I perform with a piece of hardware is completely different to staring at a computer screen, moving a mouse around a picture of a piece of equipment." Although accepting plugins can achieve similar sonic signatures to hardware counterparts, and acknowledging the disadvantage of losing plugin automation, instant total recall and versatility, he argues outboard focuses on committing to sounds before digitising, avoids later manipulation to fix and correct, and results in smaller final arrangements and less processing.

"I find the clarity and separation of summing through the mix bus section of the desk much better than summing in digital.... I find it easier to make judgements in analogue at an early stage, when you need to make important decisions... the moment I began splitting things out over a desk again, it gave me 10 to 20 percent more clarity and separation."

Ralph also describes how the 'physical contact environment' engenders an intuitive and spontaneous performative creative process that extends the studio as instrument ethos into a social event, especially relevant when working with musicians in the control room. "Everyone can get involved. That is impossible when it's just one guy working in the box... When I have bands in the studio, multiple people can play multiple pieces of hardware at the same time.."

He extends the notion of vintage outboard to synths and oft forgotten early reverbs and effects units famous for grainy digital, noting the largest piece of outboard is the desk.

Although the methodology to print outboard processing into Protools and sub-mix stems back out to capture a final SSL buss compressor mix appears an elaborate workaround to incorporate outboard and maintain a tactile relationship with the mix process, he argues that the approach outweighs any logistical constraints and produces better results.

Nevertheless he accepts "In the old days, recalls would take two hours on an SSL so you didn't do them too often. But today there are endless requests for changes. By the time you have done all those minute changes, you can sometimes end up with more than 50 mix versions."

¹² He has developed the former Beethoven Street studio in London into a multi room production complex

BOB DYLAN – SHADOWS IN THE NIGHT 2014

Engineer and mixer Al Schmitt (24 Grammy Awards) has been recording since 1957 and is renowned for his vast experience and tacit understanding of historic methodology, eschewing equalisation and compression for microphone choice and placement, capturing ambiance and spill, and committing ensemble performances direct to tape, often riding the vocal track volume fader while recording to avoid later processing. Dylans album of Sinatra covers was recorded as a live ensemble at Capital studios B in Los Angeles, using seven microphones to record Dylan and his five piece combo, using the Neve 8068 desk and 24-track analogue tape machine, also direct to stereo. Indeed, three songs mixed live to 2-track during the session became the final masters. The final mix of the other seven tracks simply incorporated level adjustments with no further processing or edits. No headphones were used, live room balancing a matter of placing musicians in a semi circle so they could see and hear each other. Additional horn performers on three tracks, were positioned away from the main ensemble but mainly picked up by the omnidirectional microphone in the centre of the semicircle.

Schmitt concurs “A lot of the time was spent on making sure that each musician was playing the right parts, with the right performances. We also wanted to make sure that everyone was comfortable and could hear each other... Sometimes the very first take would be the take, so there was nothing to adjust, but most of the time after listening to it, they had their ideas, and I would say that I would need a little bit more volume here, or little bit less there, and I asked them to adjust that in the room. When there was a guitar solo, he just played a little louder. I did not want to be riding faders, I wanted it to be natural. I rode faders on the vocals, but for the rest, once I set it up they balanced themselves in the room. After this there was very little for me to do. That was it. There was no editing, no fixing, no tuning. Everything was just the way it was.”

Dylan describes the vocal sound as “ the best he’s heard in 40 years” Schmitt used a Neumann U47 and Neve 1173 for vocals, with Audio-Technica ribbon microphones on the instruments, noting “The only compression I used on the entire album was on Bob’s voice, a tiny bit of an old mono Fairchild. I barely touched it, I used it mainly for the tube sound. It just added some warmth. On the desk I also mixed in some of Capitol’s live chamber number four on his voice.”

Hence the compressor wasn’t used for its original design intention but its inherent character was used to shine a sonic spotlight and further lift the vocal in the mix. Indeed, the ribbon microphones, desk and tape machines were ‘modern’ in design and Schmitt relied on ensemble working practice to capture the ‘old school’ character of the songs and performances rather than employ an elaborate array of available vintage equipment to further imitate the historic spirit of Sinatras original session.

Although Schmitt has successfully mixed 'in the box' his preference is to use a console, which not only matches his methodology but has clear sonic advantages, while the simplicity provided by committing to sonic decisions during recording avoids later complex mixing scenarios.

CONCLUSION

Historic recording studios are endowed by mythology as representing some of the most creative, uplifting, and noble spaces. These spaces still serve symbolically to reinforce the spirit of a golden age of recording, as palaces of expertise where engineering experience and interaction with technology create a powerful sense of importance.

In recent years, recording spaces have been altered to accommodate an increasingly digital environment and have adapted to changes in working practices emerging from new musical styles, abilities and declines in recording budgets.

Tacit knowledge of working practices which incorporated vintage equipment such as the Pultec that was designed for specific use in the 1950s, is now invisible and mythologised in the context of current practice. This mythology is mostly marketing of tradition for branding.

Whilst the Pultec has an undeniable sonic signature its use as an equaliser is limited compared to modern technology. Its continued function is a product of adapting to the changes in working practice rather than changes in specification.

The Pultec has survived, not because the functionality was changed but the way it is used was, so it played a different role in the network.

First in radio transmission,
Then as program equaliser
Then as a special bass trick
Then as lo-fi distortion
Then as warming for digital
Then as a model for emulation
Then as selling point for studio

Its adaptability belies its simplicity, and the old technology with availability of components ensures it is a repairable and repeatable design rather than later technology that incorporated integrated circuits and redundant computer protocol.

Even if not used it sells the cache of vintage equipment while the working practice may use the plug in for convenience. Hence it becomes a trophy, a statement art piece that confers an aura of tradition, mojo and reference to historic and venerated recordings

While analogue is often associated with "professional user", the opposite is also true. Famous ardent analogue users are now self confessed 'in the box' users because the industry demands it, as the job is not only creative, it's recall, organisation, storage, etc, even if they have racks upon racks of high end outboard. Nevertheless, commentators often appear polarised, seeing mixing 'in the box' as being a causal agent of change rather than as an opportunity of change. As Henson says, "I want to see what you are using to feel part of the process", whereas Scheps says "you don't hear the gear only the end result". Meanwhile, hobbyists, tinkerers and niche studios maintain a prodigious enthusiasm for otherwise redundant technology, to create recordings bearing the patina of a previous époque.

The above studio examples illustrate hardware is still in use for tracking, adding familiar harmonic content to the sonic signal prior to digitisation, by engineers who just like to be hands-on and make better decisions when turning knobs, or by users who want to have fun unencumbered by client turnaround time or the economics of running a business. However, there is a danger the studio as an instrument can become studio as an indulgence, without prior commercial thought beyond creative freedom and no deadline.

Rediscovering the merits of valve equipment in a digital world also involves the deification of vintage technology, to emulations, to change in story as the collective memory of working practice is replaced by a romantic view of what we think it was like, misunderstanding the role of vintage equipment related to historic hit records and identifying its role as another tool within the context of current methodology, rather than designed to serve an industry dealing with tape hiss, distortion and working practices developed for radio broadcast and live recording. Nevertheless, while its original use may not provide an adequate solution amongst the plethora of modern technological options, new groups of users have applied subsequent interpretations, influenced by the scope and adaptability of the units functionality, allowing divergent interpretations to be realised, sustaining the reputation and longevity of the technology.

Bibliography:

Akrich, M. *et al.* (2002) 'THE KEY TO SUCCESS IN INNOVATION PART I: THE ART OF INTERESSEMENT', *International Journal of Innovation Management*, 06(02), pp. 187–206.

Bennett, S. (2012) *Journal on the Art of Record Production » Endless Analogue: Situating Vintage Technologies in the Contemporary Recording & Production Workplace.*

Bennett, S. (2009) 'Journal on the Art of Record Production » Revolution Sacrilege! Examining the Technological Divide among Record Producers in the late 1980s'

Bennett, S. K. (2010) *Examining the Emergence and Subsequent Proliferation of Anti Production Amongst the Popular Music Producing Elite*. University of Surrey.

Bijker, W., Pinch, T. and Hughes, T. (2012) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, Mass: MIT Press.

Billboard (1980) 'EMI Sale of Century', *Billboard*, 30 August.

Doherty, N. F., Coombs, C. R. and Loan-Clarke, J. (2006) 'A re-conceptualization of the interpretive flexibility of information technologies: redressing the balance between the social and the technical', *European Journal of Information Systems*, 15(6), pp. 569–582.

Droney, M. (2002) *Geoff Emerick - Mixonline*.

Emerick, G. and Massey, H. (2007) *Here, There and Everywhere: My Life Recording the Music of the Beatles*. Gotham.

Harding, P. (2010) *PWL From the Factory Floor*. London: CHERRY RED BOOKS.

Hodgson, J. (2019) *Understanding Records, Second Edition: A Field Guide to Recording Practice*. 2nd Revised edition edition. New York, NY: Bloomsbury Academic.

Hommels, A., Peters, P. and Bijker, W. (2007) 'Techno therapy or nurtured niches? Technology studies and the evaluation of radical innovations', *Research Policy*, 36, pp. 1088–1099.

Horning, S. S. (2013) *Chasing Sound: Technology, Culture, and the Art of Studio Recording from Edison to the LP*. Baltimore: Johns Hopkins University Press.

Kirby, P. R. (2015) *The Evolution and Decline of the Traditional Recording Studio*. phd. University of Liverpool.

Latour, B. (1988) *Science in Action: How to Follow Scientists and Engineers Through Society*. New Ed edition. Cambridge, Mass.: Harvard University Press.

Latour, B. (1990) 'Technology is Society Made Durable', *The Sociological Review*, 38(1_suppl), pp. 103–131.

Leyshon, A. (2009) *The Software Slump?: Digital Music, the Democratisation of Technology, and the Decline of the Recording Studio Sector within the Musical Economy*.

Leyshon, A. (2014) *Reformatted: Code, Networks, and the Transformation of the Music Industry*. Oxford, New York: Oxford University Press.

- Massenburg, G. 'Parametric equalisation'. *In Proceedings of the 42nd Convention of the Audio Engineering Society, Los Angeles, CA, USA, 2–5 May 1972.*
- Massey, H. (2015) *The Great British Recording Studios*. Milwaukee, WI: Hal Leonard Corporation.
- Meynell, A. (2017) *How recording studios used technology to invoke the psychedelic experience: the difference in staging techniques in British and American recordings in the late 1960s*. doctoral. University of West London.
- Millard, A. (2006) *America on Record: A History of Recorded Sound*. 2 edition. Cambridge ; New York, NY: Cambridge University Press.
- Moore, A. (2012) 'All Buttons In: An investigation into the use of the 1176 FET compressor in popular music production', *Journal on the Art of Record Production*.
- Music Faculty: University of Oxford (2017) *Andrew Scheps at the University of Oxford - 'What Comes Out Of The Speakers'*. Oxford University.
- Oudshoorn, N. (ed.) (2005) *How Users Matter (Inside Technology): The Co-Construction of Users and Technology*. New Ed edition. Cambridge, Mass. London: MIT Press.
- Pattison, L. (2013) *Boards of Canada: 'We've become a lot more nihilistic over the years'*, *The Guardian*.
- Pinch, T. J. and Bijker, W. E. (1984) 'The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other', *Social Studies of Science*, 14(3), pp. 399–441.
- Lambert, M. (2010) *Plug-in Modelling*.
- Pulse Techniques (1947) *Pultec Manual EQP-1*.
- Putnam, M. T. (2006) 'A Thirty-five Year History And Evolution of the Recording Studio'. AES Historical Committee.
- Robjohns, H. (2010) 'Analogue Warmth'. *Sound on Sound*
- Ryan, K. and Kehew, B. (2006) *Recording the Beatles*. Curvebender Publishing.
- Schulz-Schaeffer, I. (2006) 'Who Is the Actor and Whose Goals Will Be Pursued', p. 17.
- Senior, M. (2017) 'iZotope Neutron |', *Sound on Sound*
- Shanks, Wi. and Berners, D. (2018) *UA's Art and Science of Modeling UAD Plug-Ins, Part 2 | Universal Audio*.

- Somich, J. and Mishkind, B. (2018) 'SOUND PROCESSING A History of Audio Processing', *Broadcasters' Desktop Resource*.
- Squire, R. (2014) 'ON THE BENCH: EQUALISERS', 5 May.
- Theberge, P. (1989) 'Paul Theberge - The "Sound" of Music. Rationalization and the Production of Popular Music | Drum Kit | Bureaucracy',
- Théberge, P. (2004) 'The Network Studio: Historical and Technological Paths to a New Ideal in Music Making', *Social Studies of Science*, 34(5), pp. 759–781.
- Tingen, P. (2015a) *Al Schmitt: Recording Bob Dylan's Shadows In The Night*
- Tingen, P. (2015b) *Inside Track: Tom Lord-Alge*
- Tingen, P. (2017) *Inside Track: Kesha 'Praying'*.
- Tingen, P. (2018) *Inside Track: Clean Bandit 'Solo'*
- Townshend, P. (2018) *The Fairchild 660 / 670 Tube Compressor/Limiter - Vintage King*.
- Valimaki, V. and Reiss, J. (2016) 'All About Audio Equalization: Solutions and Frontiers', *Applied Sciences*, 6(5), p. 129.
- Wadsworth, P. (2007) *Strawberry Recording Studios and the Development of Recording Studios in Britain c.1967-93*.
- White, P. (2005) *Modelling Classic Hardware In Software*.
- Wyman, B. (2017) *Beatles Engineer Geoff Emerick on Recording Sgt. Pepper*, *Vulture*.
- Zagorski-Thomas, S. (2014) *The Musicology of Record Production*. S.I.: Cambridge University Press.
- Zak, A. J. (2001) *The Poetics of Rock: Cutting Tracks, Making Records*. University of California Press.

Discography:

- The Beatles (1967), [LP] Sgt. Pepper's Lonely Hearts Club Band, Parlophone.
- The Beatles (1969), [LP] Abbey Road, Parlophone.
- Clean Bandit (2018), [digital download] 'Solo', Atlantic.
- Dylan, Bob (2015), [CD] 'Shadows In The Night', Columbia.
- Kesha (2017), [digital download] 'Praying', Kemosabe/RCA.
- Sinatra, Frank (1957), [LP] Where Are You, Capitol.

