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The ANU School of Music Post-Production Suites: Design, Technology, Research and Pedagogy

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ABSTRACT

This engineering brief considers the design, construction, technological capacity, research and pedagogical remit of two post-production suites built at the ANU School of Music. These suites were constructed simultaneously to the recording studio refurbishment, as detailed in AES e-Brief #397 (2017). This new e-Brief first considers the intention and purpose behind the splitting of a single, large control room into two separate, versatile post-production spaces. Secondly, the e-Brief focuses on design and construction, with consideration given to acoustic treatment, functionality, ergonomic workflow and aesthetics. The e-Brief also focuses technological capacity and the benefits of built-in limitations. Finally, the post-production suites are considered in the broader context of both the research and pedagogical activities of the School.

1 Background

This engineering brief follows directly on from AES e-Brief #397, this time focusing on the refurbishment of 2 post-production suites as part of the broader ANU School of Music Recording Studio refurbishment. Plans for the refit began in November

2013 and the newly refurbished studio facilities were finalised and launched in May 2017. The refurbishment was consolidated with a AU\$255,000 Major Equipment Grant, awarded to Associate Professor Samantha Bennett in early 2015 for the undertaking of a large-scale, interdisciplinary research project *Wired for Sound*.

The ANU School of Music building was constructed in 1976. The original recording studios

comprised a 9m² double-height studio floor and an adjacent, single-height control room (B), both constructed on Level 5. Additionally, an upstairs control room (A) of almost identical size was situated directly above on Level 6. The facilities were updated in the early 1990s with some additional acoustic treatment. At one stage, a spiral staircase linked the Level 5 and Level 6 control rooms, however, the staircase had long been removed and the 2 control rooms operated independently from one another, although both featured tie lines to the main recording studio floor.

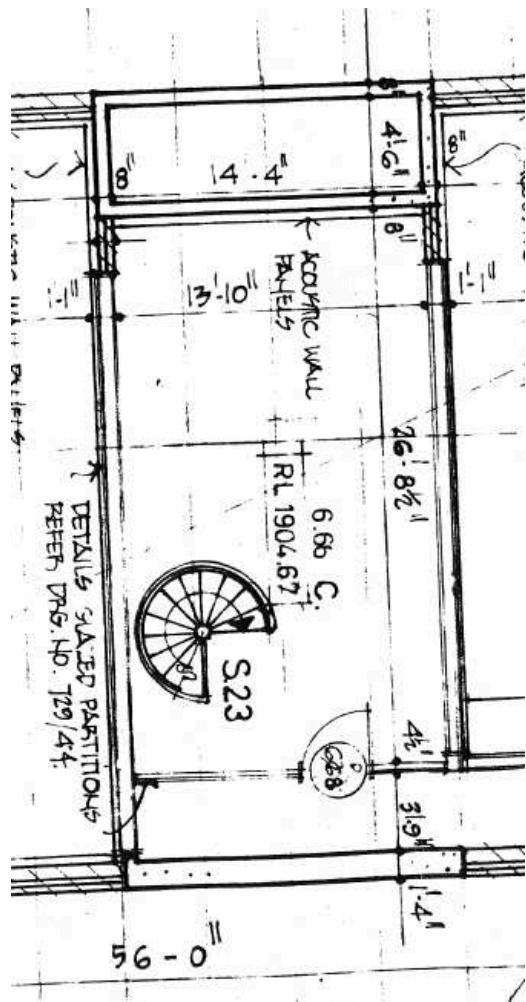


Figure 1. Original scan of the Level 6 control room (A) at the ANU School of Music. Approximate dimensions 9.7m x 4.8m. The spiral staircase originally linked the Level 6 control room (A) with the downstairs Level 5 control room (B).

At the point of refurbishment, the upstairs control room A featured a dated technological complement: a 24 channel DigiDesign D-Command control surface was used in conjunction with the main DAW, Pro Tools v.10, run from an Apple G4 computer. The control room also featured a rack of Apogee A/D converters likely installed much earlier in the 1990s. However, the main control room A also featured numerous operational and valuable technologies which were salvaged, refurbished and integrated into the new recording studio. These included: DynAudio M3-A monitors, a DynAudio AIR-20 series surround sound monitor system, 2 Avalon 737 microphone preamplifiers, 2 MCI 1/4" analogue tape machines, as well as 2 Focusrite Red series and 2 DBX 786 Blue microphone preamplifiers. Additionally, control room A featured 2 broken 1970s DBX 165 over/easy compressors, which were also refurbished, then installed into the new recording studio.

The original layout of control room A was problematic for multiple reasons. Firstly, there was no direct line of sight down to the main studio floor. Whilst glass panelling had originally been installed to the right hand wall, this had long been covered with acoustic treatment obscuring the view to the main studio floor. To compensate, a video system had been set up with a large video camera positioned in the main studio floor linked to a video monitor to the rear of control room A. Headphone mixes were routed through a dated Soundtracs Virtua console. This led to numerous communication issues between the main studio floor and the upstairs control room A. Secondly, a storage space was situated to the far back of control room A. This storage space had been used to house multiple spare auxiliary equipment such as cables and other systems, as well as main power switches, yet was extremely difficult to access since it was situated behind the rear partition wall. Since the access point was restricted by the position of the computer, DAW screen and large table housing the D-Command control surface, this

made the control room difficult to maintain. Additionally, the rear storage room also housed a ladder which led up to a ceiling recess. Not only was this hazardous, but the recessed space resulted in a low ceiling and subsequently a sub-optimal workspace. As such, the original Level 6 control room A was not fit for pedagogical purpose and, despite it housing some professional audio equipment, was used only for staff projects or the documentation of School concerts.

As detailed in e-Brief #397, the decision was made to refurbish the original Level 5 control room B, positioned directly adjacent to the main recording studio floor, as the main studio control room. During the period of acoustic design in 2014, and after considering the research and pedagogical remit of the School, likely future student numbers and best-practice examples of music technology facilities in Universities, the decision was made to split the original Level 6 control room A into 2 smaller control rooms in order to accommodate post-production research, teaching and learning, as well as commercial work. Associate Professor Samantha Bennett continues to oversee the pedagogical and research aspects of the suites and Senior Technical Officer Matt Barnes oversees technical operation and maintenance.



Figure 2. Original control room A situated on Level 6 of the School of Music building. Plenty of operational equipment was salvaged, refurbished and repurposed. The site itself was divided into 2 post-production suites.

2 Aims

Since the post-production suites were designed and built as part of the broader ANU School of Music recording studio refurbishment, the aims and purpose of the suites are primarily linked to research and pedagogy. The main rationale and aims of the post-production suites are:

- To complement the refurbished main studio floor and main control room A with 2 post-production suites
- To enable 2 controlled listening spaces for staff, student and commercial post-production work
- To facilitate individual, small group and tutorial teaching in areas of the Music Technology major and minor and Composition for Film and Video Games major and minor
- To promote self-directed learning in post-production across our BMus and BA programs
- To future proof our curriculum in music technology and composition for film and video games
- To create 2 mirrored suites with distinct purposes
- Control room B is fitted with a technological complement for the purpose of audio mastering, archival work to include audio restoration, field recording production and tape transfer
- Control room C is fitted with a technological complement for the purposes of audio editing, mixing, audio visual synchronisation work to include audio for film, television and games
- To respond to growing student numbers whilst alleviating pressure on our main control room by enabling simultaneous recording, mixing and mastering workflows

3 Suite design and technology

The School of Music post-production suites were built with 2 distinct purposes. Control room B designed primarily for mastering and audio restoration work and control room C designed for general post-production and editing. The suites were ‘mirrored’ in design; both are of similar sizes, construction and overall aesthetic in terms of finishes and colours. Both suites were designed to

minimise reflections and eliminate standing waves; each room features a combination of angled surfaces of slotted pine timber and felt for both absorption and diffusion. The flooring is a matte finish Tasmanian oak, which is a durable hardwood native to Australia. Both suites feature large wall-mounted screens, allowing for computer use and post-production visuals without acoustically interfering with monitoring configuration.

In both suites, soffit mounted monitors ensures acoustic continuity between rooms. This limits the user's ability to shift and manipulate the stereo image of the monitors within the space as well as the EQ features on the rear of the speakers. For a modest carpentry cost the soffit cavities may be resized with a replacement timber front panel cut to size should monitoring and monitor dimensions change over time. To ensure continuity and a sonically consistent point of reference, monitoring is the same in both suites. Monitors are DynAudio BM15's with optional 12" Genelec active subs and powered via a separate wall mounted switch. The physical separation between these two means of "powering up" allow users to clearly identify a correct start up procedure has been observed; monitors last on, first off.

All outboard processing in both suites is presented on a Bantam TT patch bay below the main work surface. Users can patch a specific signal chain without having to access the rear of the consoles thereby limiting confusion and speeding up the setup and pack down procedures. This is particularly useful in a university context whereby multiple users of varying abilities are operating. This configuration also prevents the loss of valuable work surface space to patching and patch bay equipment, which should be rarely accessed in comparison to the outboard parameters themselves.

Other connectivity present on the patch bay includes 12 ties lines to the main recording studio machine room and interface I/O situated at the back of the main control room on Level 5. The machine room tie lines can be used to route analogue signals from around the building, including from the main studio floor, Llewellyn Hall Stage or Llewellyn Hall catwalk for ambient room micing or from the various Llewellyn Hall live sound operator positions.

Also present immediately above the bantam patch bays is ethernet patching to the machine room, which can be utilised for multiple connectivity, including Dante control to Llewellyn Hall or remote control to the Ampex ATR 100 analogue mastering machine. Other cabling infrastructure present in both suites includes SDI for external video signal and redundant cabling for multiple monitoring setups.

At the time of installation, patching was terminated to the Bitree bantam patch bay with a Bitree proprietary "Punchdown Tool". This allows cables to be terminated without the need for soldering whereby upon "punching down" or using the tool to push a cable into the correct termination point will automatically strip the cable of its insulation and create contact with the +, - or ground casing of the TT point.

Control room B has additional functionality. Below the work surface, the Mac Pro is horizontally mounted in a 19" Sonnet rack chassis. The chassis has USB access on the front panel, again preventing the need to access the rear of the console for data transfer or hard drive I/O. A blue LED indicates computer power while a rack mounted shelf above provides convenience for external hard drive placement. All outboard equipment is powered from a single power conditioner. The Mac Pro is also set to boot up upon seeing power present from this source. A USB C "fly lead" to and from the audio interface is available on the main work surface for users wishing to master directly from their own laptop. Placement of processors within the console resembles a signal chain starting from top left and making a "U" shape to finish at the top right. The units most commonly reached for are situated closest to the user with preamplifiers and AD/DA conversion at the extremities. An exception to the "U" shaped signal path placement is the interface, being located closest to the user and to the right. This is to ensure monitor level control is as convenient as possible. Should the need to hold a computer mouse while simultaneously controlling monitor levels be identified (based on the more common right-handed computer operation), it is possible to move the interface to the left side of the console.

4 Control room B technology

Control room B is designed specifically for mastering and other ‘end-of-chain’ audio work, including file preparation, archival and restoration work, critical listening, field recording production and tape transfer. Control room B is equipped with the following technologies:

- Apple Mac Pro 3.5 GHz 6 Core Intel Xeon E5 12 GB 1866MHz DDR3 in Sonnet chassis
- Universal Audio Apollo 8X interface
- Cranesong HEDD Stereo ADDA
- Focusrite Red 8 stereo preamplifier
- Manley Vari-mu Stereo Compressor
- GML 8200 Parametric Equaliser
- Chandler Limited TG1 Dual Mono/Stereo Compressor/Limiter
- AVID Pro Tools v.12.8
- Steinberg WaveLab v.9
- Apple Logic Pro X
- Adobe Creative Suite CS6



Figure 3. Refurbished control room B

5 Control room C technology

Control room C is designed purposefully for mix preparation, mixing, editing and synchronization work. The suite may also be used for single track recording work to include voiceovers, podcasts, light

overdubbing and speech recording. Control room C is equipped with the following technologies:

- Apple iMac Pro 2.3 GHz Intel Xeon W 128GB 2666 MHz DDR4
- Argosy Halo Base Workstation
- SSL Nucleus 2 16 fader control surface
- AVID Pro Tools v.12.8
- Apple Logic Pro X
- Adobe Creative Suite CS6



Figure 4. Refurbished control room C

6 Research and Pedagogy

As detailed in e-Brief #397, the School of Music technology facilities include a 20-workstation lab, as well as the newly refurbished main control room A, studio floor and machine room. The lab is designed for tutorial-based work, to include software discussion and workstation-oriented pedagogy. Whilst each workstation features headphones, the lab environment is neither intended nor appropriate for critical listening tasks, group work or professional mixing, mastering or digitisation work. The main control room and studio floor is designed for the front-end recording process and mixing. Whilst this adequately accommodates staff and student projects as well as commercial work, mix projects undertaken in control room A preclude the use of the studio floor thus limiting operational capacity. Since the post-production suites are designed for the accommodation of curriculum and

research projects in mixing, mastering, digitisation, speech audio production and audio for visual media synchronisation, this alleviates pressure on the main control room and studio floor. In saying that, control room C may also be used for general housekeeping and editing tasks prior to undertaking mixing in control room A where the full complement of outboard equipment is accessible.

The post-production suites promote the separation of the recording, mixing and mastering processes in a music and/or music and visual media project in line with theoretical content as delivered in the School's music technology program. In 2019, the introductory music technology course (MUSI1110) has 100+ enrolments, with the flagship recording techniques course (MUSI2209) capped at 60 students in Semester 2. Both courses are compulsory to the BMus Music Technology major and minor, therefore operational facilities are paramount. The curriculum will expand at undergraduate level to include an advanced music technology course from 2021. Along with a projected increase in graduate students and an increase in commercial opportunities, we predict more work will be undertaken in the post-production suites.

Where the main control room A has a theatre seating set-up for larger tutorials for up to 12 students, the post-production suites are designed for self-directed learning. The post-production suites also enable the expansion of higher degree research capacity since they are not designed for classroom teaching nor tutorial-based pedagogies. Due to their small yet spacious design, the suites assist facilitation of Honours, Masters and PhD projects where the investigation is conducted by an individual. However, both suites may accommodate 1-to-1 tutorials, which is particularly important for higher degree research candidates, as well as small group learning models (up to 6). The suites also allow for the delivery of niche masterclasses for up to 6 participants including the instructor.

The suites accommodate a variety of research projects undertaken by academic and professional staff. Aside from the usual mixing and mastering work, two recent projects demonstrate the breadth of project work undertaken in the suites. Film music composer and Film & Video Game Composition

Convenor Prof. Kenneth Lampl substitutes the SSL control with a MIDI keyboard to utilise the facility as a fully self-contained soft-synth environment. Working mostly with cinematic orchestral arrangements, these productions will often include the acoustic recording of occasional elements such as violin or cello from the main studio to offset a wholly synthetic composition. Ethnomusicologist Dr Bonnie McConnell has utilised the mastering suite facilities to enhance stereo field recordings from her field work in the Gambia. An example includes reducing the level of one particular instrument (whistle) to be appropriately represented in spectral balance as it was initially observed. The listening environment, coupled with Izotope RX7's restoration technology, allowed for easy identification and rectification of such problematic instances.

7 Conclusions

Augmenting the main control room A and studio floor with 2 post-production suites has multiple benefits. The suites allow for simultaneous workflows in recording, mixing and mastering thus maximising undergraduate and graduate capacity in music technology and other areas of the curriculum. The suites mirror best practice design and technological complement of commercial project facilities. Additionally, the connectivity to School-wide studio and concert hall locations allows for numerous performance and recording workflows. The technological complement includes software and outboard systems for the undertaking of both common and niche post-production practices. This ensures a broad pedagogical, research and commercial project capacity as well as plenty of room for upgrades.

References

- [1] Bennett, S and Barnes, M, "The ANU School of Music Recording Studios: Design, Technology, Research and Pedagogy" *Audio Engineering Society Convention e-Brief 397*. (2017) <http://www.aes.org/elib/browse.cfm?elib=19345>