

Neon Flea Circus - Of Dawn Tracking Details

Guitar and Lead Vocals: Dan McLoughlan
Keyboards and Backing Vocals: Fergal Coulter
Bass and Backing Vocals: Brian Hennessy
Drums: Niall Honohan

Lyrics: Dan McLoughlan
Composition: Neon Flea Circus
Recording/Mix Engineer: Josh Fairhead (87602)
Mastering Engineer/Assistant recording engineer: Darren Jennings (78188) [unmastered version presented]

Interface: Digidesign 002 (Desk)

Pre-amps: Focusrite Saffire pro 26i/o and TLAudio Ivory II (12 Channels without use of 002 Pres).

Converters: Focusrite Saffire bypassing 002 through ADAT, TLAudio Ivory II (line) converted by the 002.

Software/DAW: Pro Tools 8.0

Computer: Macbook Pro 2.33ghz, 3gb RAM.

Operating System: Mac OS 10.5

Kick: AKG D112

- Placed inside the shell close to the beater head at the side.

Snare Top: Sure Beta 57

- Pointing close to the center at about 70° from vertical.

Snare Side: C1000s

- Side of snare about 5" away from the body.

Hi-Hats: Studio Projects B1

- Pointing from above towards the edge.

Toms: Sure Sm58

- Between the rack toms.

Ride: AKG C1000

- Above the cymbal (shielding spill somewhat).

Overheads: AKG C2000s

- Spaced cardioids both equal distance from kick drum.

Bass 1: AKG D112

- On axis.

Bass 2: Sure Beta 57

- Off axis.

Guitars 1: Sure Beta 57

- Off axis.

Guitars 2: Studio Projects B1

- About 1ft from grill.

Guitars Ambient: AKG C2000

- 5m away, down some stairs.

Organ amp 1: Sure Beta 57

- Mostly on axis close to grill.

Organ amp 2: AKG C1000

- 5m away, down some stairs.

Rhodes amp: Studio Projects B1

- Close to grill, off axis.

Rhodes amp: Sure Beta 57

- Close to grill, on axis.

Rhodes ambient: AKG C1000

- 5m away, down some stairs.

Lead vocals left: Neumann TLM 103

- One to three foot (dependent on mic technique)

Lead vocals right: Studio Projects B1

- One to three foot (dependent on mic technique)

Harmonies: Neumann TLM 103

- One to three foot (dependent on mic technique)

Undelivered Final Mix Format: stereo WAV 44.1kHz, 24-bit file

Final Competition Delivery Format: stereo WAV 44.1kHz, 16-bit file (dithered)

Intro

This track was recorded as part of a free Creative Commons release; due to this nature the track/album which was entirely self funded by the band and was recorded on a very tight/shoe string budget. The rooms used for recording were selected from a handful of possibilities but was generally in the homes of the band members. All the equipment was either personally owned, borrowed, rented on the cheap or generally cobbled together from a variety of sources.

The setup consisted of my Focusrite Saffire (as ADAT preamps/converter), Digidesign 002 and Macbook Pro paired with Darrens TLAudio Ivory II. The microphones at hand were an AKG D112, 2x AKG C1000s, a Sure Beta 57, a Sure Sm58, a Studio Projects B1 and a rented/not always available Neumann TLM 103 with a pair of AKG C2000s.

Drums

These were recorded in an oddly shaped living room that had a slanted ceiling and plenty of natural diffusion from items such as books, records and other assorted objects. Luckily the flooring of the recording space also consisted of a non-uniform wooden surface that contributed to an acceptable room tone. The keyboard player suggested that we nail some absorbent material to the walls and assured us that the landlord wouldn't mind and so blankets of various densities were attached to critical areas such as the room corners. This was to generally reducing the amount of reflections in the room and thus lower the possibility of unwanted comb-filtering (as the walls were pretty much bare).

Due to a lack of balanced cabling/connectors the drummer had the formidable task of playing with only one earphone working; simply nothing could be done here because a guitar cable was supplying a cheap headphone amp that had no mono button and would only accept a TRS input. Regardless of this the drummer was quite happy and was still able to play tightly, he could hear the click in one ear and his drums within the room without a problem. There was no guide track as he knew the songs well and could easily count the sections.

The drums were placed on a rug in a position chosen by using the floor tom to find the most desirable resonance¹. After tuning the kit and setting the microphones in position we made the grave error of going for a break and opening the window, upon return we had to start the drum setup from scratch as the change in temperature/pressure was enough to completely detune the kit.

The full mic list can be found in a separately enclosed document, however a notable aspect is that an AKG C1000 was used on the side of the snare rather than on the bottom. The main reason for this was personal taste; captured snare signals from the bottom of the drum rarely sound right to me and my preference is to record them from the side a few inches back from the shell. This captures what I perceive to be a more natural sound with a softer but better defined 'crack'. One reason for this could be that the waveform caught by a side microphone contains a more complex signal better representing the timbre created from interactions between the two membranes, the shell and the room.

¹ Stavrou, M. (2008) Mixing with Your Mind, p53 - Hyde Park Press Pty Ltd. Australia

Although the C1000 may not be the perfect mic it was the best condenser available for side miking. I would normally consider a C1000 as having a bright and slightly brittle character, however in this case it worked quite well capturing a tone that didn't appear overly thin. This is possibly due to a boost in frequency response centered around 5kHz, followed by a dip centered around 7kHz and due to the fact that low frequencies mask high this could account for the perceived sound quality. The ride was also recorded with a C1000 angled so the cymbal would block excess spill and provide further options during the mix process.

Bass

This was recorded in the guitar players flat which was an open plan carpeted room with an adjacent kitchen and bedroom totaling somewhere around an oddly shaped 25 sq/m space. The small dimensions of this space could be seen as advantageous to recording this instrument due to inherent room modes existing in higher registers in comparison to a bass guitars usual range. The bass was recorded in mostly one take with a few drop ins replacing slight mistakes. The only microphones used were an AKG D112 and Sure Beta 57 positioned in the manner stated in attached mic list; by combining two contrasting microphones with different characteristics and positioning with the aim of giving blending options in the mix.

Keys

As the band lived above a doctor/dentist and were the only occupants of the building past 6pm (besides their flatmates) so we had access to record in a large stairwell spanning three floors. The keyboard used was a Nord Electro II running into a gigging Vox amp positioned halfway down the stairwell while he played beside the recording rig at the top so as to separate movement/performance noise etc. The amp was stacked on a chair to decouple it from the ground and placed away from the room boundary (although there wasn't much leeway for movement).

For the organ sound I used a Sure Beta 57 as a close mic and an AKG C1000 as an ambient mic placed further into the reflective field, roughly five meters down the stairs, which picked up a long reverb tail as a partial result of the room height and hard surfaces. Upon reflection² I would have preferred a stereo array as the ambient setup as this contains much more information resulting in a more convincing room sound. Despite this the mono ambience was still very useful as a reverb feed in the mix.

The Rhodes sound was setup the same but with an additional Studio Projects B1 as a spot mic placed off axis. The first time they enter the song is for a solo where the hands were separately tracked in order to allow flexibility during the mix stage and had the added benefit of improving the performance.

Guitars

These were recorded in the same hall as the keyboards with an almost identical setup as the Rhodes sound; an SP B1 and a Beta 57 as close mics with an AKG C2000 as the ambient (the B1 was placed further back). In total there were eight different guitar parts recorded; double tracked main guitars, clean chords behind the key solo, a swelled section, a picked section then joins in with the swells before the overdriven solo arrives and continues to the end of the track alongside double tracked driven chords also backing the outro harmonies. The amplifier tone settings were varied for the various parts to increase the separation between signals and contributed to a fuller guitar sound.

² Pun intended

The solo was recorded in multiple sections by dropping the guitarist in every few bars and then discussing what he could play on each drop which worked well. Due to a good working relationship which the musician, he was open to any suggestions made to him and was willing to experiment with the phrasing. The only problems encountered throughout the night were the bands flatmates arriving home and moving the mics ‘just a little to get past’ but in the end this is just a part of the on-location recording environment.

Vocals

The chorus harmonies were double tracked with a Neumann TLM 103; the usual procedure was to record one good take as a guide and have the band harmonise to that replacing it with a better take and repeating the process once more to gain a ‘second’ track. This approach ensured better takes as the musicians felt more comfortable recording to their own singing especially if the guide was close.

The main vocal was initially single tracked with the TLM 103, however later on it was decided that they should be double tracked; this proved a problem as we could no longer afford to rent the TLM and so we made do with my SP B1 for the right channel. It was regrettable that this had to happen, but having mismatched vocal microphones sounded better than two takes of the B1³ or a single lead vocal with the TLM and so the result is what’s heard.

Mix/Aims

The drums were ‘built’ from the overheads as they sounded quite good with spot mic’s used to augment them, they were also paralleled to add extra weight. Due to *Of Dawn* being in the vein of classic rock tracks, the drummer expressed to me that he wanted a ‘soft’ kick. He admitted that really this meant he wanted to go to tape but since that wasn’t a viable option I left a lot of its midrange in the mix and boosted very little of the beater click; this was somewhat revised during the guitar solo passage as it needed the extra edge and so an equaliser band was automated in to increase the high end just for this section. The attack/release times of a compressor were the primarily tools used to shape the drum tone and were particularly effective as drummers footwork was fairly consistent requiring very little compression for dynamic control.

At one point the band were considering giving out the session files/session to interested bodies as a promotional tool and so the project was primarily mixed with the bundled plugins that come with pro tools; the only third party additions being an exciter on the harmonies and an amp simulator for processing the bass (which had a slightly dead tone and needed the help). The main plugins used were EQ3, Com/Lim3 and the AIR reverb.

An initial factor I was concerned with was the issue of phase relationships and so the instruments were time aligned. Although the resulting tones created from multiple mics are often pleasant due to desirable cancellations, they can also present problems as balance is altered. Should a channel need to be boosted or cut it often requires equalisation settings to counteract the large scale tonal changes caused by interrelating microphone balance; due to the heavy use of automation this was undesirable and phase alignment helped reduce these drastic variations.

³ Frequency response of B1 causing build-up to vocals

The most prominent instrument tracks were routed into their own auxiliary bus/group fader and given a designated reverb. The common use of the same artificial reverb to place the instruments/musicians in the same theoretical space in order to achieve an illusion of reality is a practice that works well. In an adaption to this practice reverbs were often copied to another channel or group with minor alterations made to allow further flexibility with the same illusion.

Because both hands of the keyboard solo were tracked separately, the right hand could be panned around the stereo field for effect but not in such excess so as to retain mono compatibility which was being checked regularly. The organ sound worked well on the introduction but seemed overly ‘churchy’ for other sections due to the drawbar settings, this was remedied as much as possible by automating in a low pass filter to reduce high frequencies and lower its presence in the mix at the appropriate moments.

This was followed by the guitar swell section that appears before the solo; because the amplifier was slightly noisy at low volumes and the guitars potentiometers clearly worked on a linear scale; the swells had to have quite a lot of automation applied so as to time correctly as well as to reduce ambient noise. At one point the guitarists strap rattles in the background, but in time, we decided that this was quite a nice imperfection and opted to keep it rather than re-recording. Some interference was however picked up from a phone and went unnoticed until mix down on a different swell and although barely audible it is one of the many possible problems with recording in an unprofessional environment. Luckily advancements in affordable noise removal technologies meant that it could be reduced as much as possible without degrading the signals with too many added artifacts.

A major concern when mixing was not to over-compress the instruments; with the loudness war often seeming to only concern mastering engineers, it is also very important for mix engineers to ensure there are sufficient dynamics left in a track to allow flexibility in the mastering stage. ‘Of Dawn’ contains a maximum peak of -1.7dBFS before being sent to the mastering engineer with a RMS ranging from a healthy -13db to -16db between various passages.⁴

Some compression was clearly necessary but most of the time there wasn’t excessive dynamic reduction. I hold the belief that an engineer’s dependence on compression purely for level control is a counterproductive approach due to the natural dynamics of most recorded music; as the musician plays louder it is met by increased resistance from the compressor in question. A byproduct of such an approach also yields higher levels of uncontrollable harmonic distortion introduced into the signal and by instead first setting a working level through manual automation, compression can be applied more subtly and ‘musically’ as a tonal control. Use of automation in such a manner can be time consuming however the advantages are well worth the effort and there’s no better judge of level than human ears.

The final mix was a stereo 44.1kHz, 24bit and has been dithered down to the 16bit Redbook standard for presentation. As the track was released online by the band the final version of the track (not presented) was in the 24bit format for presentation to the mastering engineer. Although the tracks were recorded at 44.1kHz, this decision was regretted at a later stage; recording at 96kHz often introduces issues with storage and transfer speeds from hard-drives with little perceived difference to 48kHz. In hindsight

⁴ See attached screenshot of the track’s waveform at the back.

48kHz should have been used as the audible high frequencies are of higher fidelity due to the increased sample accuracy, while having no serious trade off against transfer speed/storage space of digital memory.

As with any project there are many things I would now do differently that I learnt either during the project (at which point it was too late) or after the project was completed. There are two main methodologies to which I now work that were not incorporated (or only to a degree) in this project; the first is using automation to keep the level mostly consistent pre-compression and then writing the macro dynamics back in afterwards. This essentially gives the compressor a signal of consistent overall level resulting in settings that will not radically alter the timbre between passages. After processing the macro dynamics are written back into the track so as to be ‘musically appropriate’; ensuring the compression doesn’t add too many unwanted artifacts and less accurate dynamic processing.

The second thing is an awareness of the time smearing effects caused by equalisation due to the principals by which a filter works and as such I am a lot more cautious with it (especially narrow bandwidth settings). On this track I mistakenly thought it to be a good idea to cut out the ‘inaudible low end’ of a lot of instruments in order to increase headroom and ‘cut the mud’ as I had often read about. This now seems like a mostly destructive process due to the phase ripple effect common in most minimum-phase (IIR⁵) filter designs, such as EQ3. Understandably equalisation is necessary in places, however it is the trade off against the time smear that I’m now concerned about. High pass filtering to instruments such as the bass guitar could be seen as destructive to the audio as inter-aural timing differences are used to localise low frequencies. Despite this aspect only being in regard to the localisation of a sound and low frequency primarily being placed in the center (mono), introducing such phase distortions in the low end should be carefully considered or ideally accounted for at the recording stage.

Although I now have better access to equipment, I’m happy with the results and the experience of dealing with a ‘bare necessities’ production of this manner has been great. Obviously there are small changes I would make with hindsight however its something I can let rest, especially as everyone involved were pleased with the outcome.

⁵ Infinite Impulse Response

Neon Flea Circus - *Of Dawn* lyrics

Figures in the forest weeping
Fearful of the night
Devils lurk in high rise buildings
Blocking out the light

Stealing through the dim and secret
Passageways and stairs
Portraits on the wall look on with
Disapproving stares

Chorus:

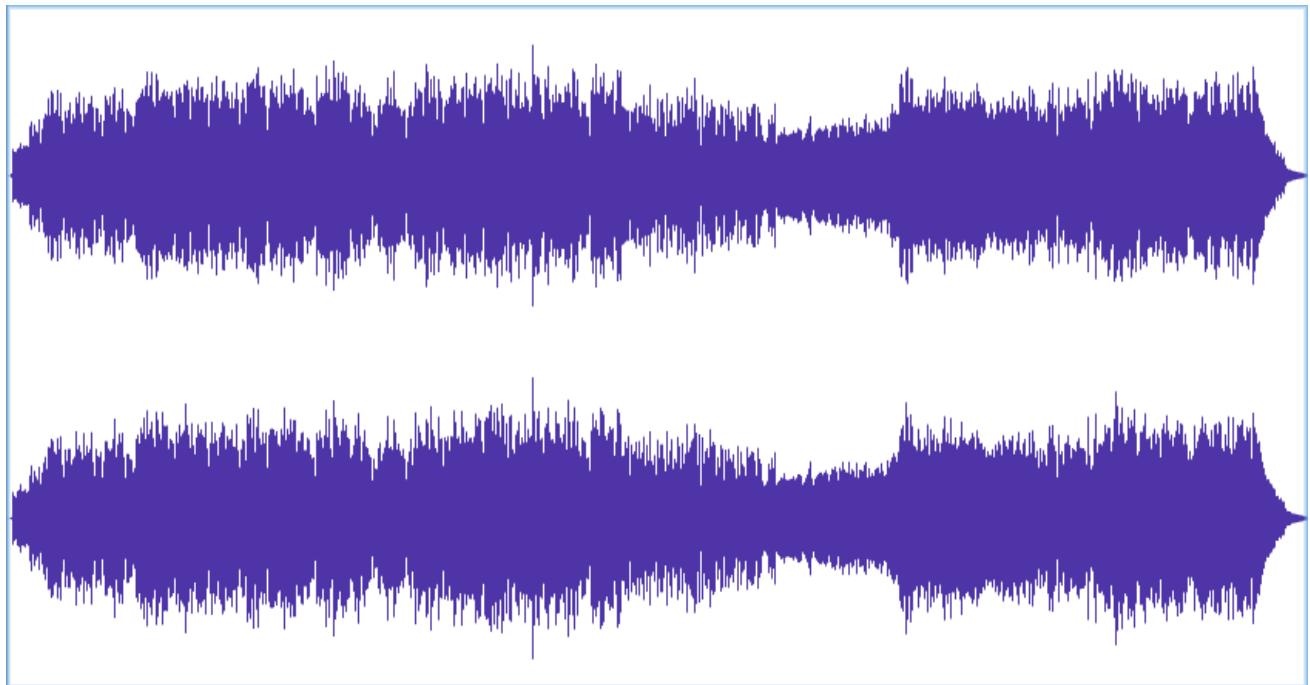
Every wave brings new horizons
As the tale winds on
From shade to shadow, make our journey
Against the glaze
Of dawn

Verse 2:

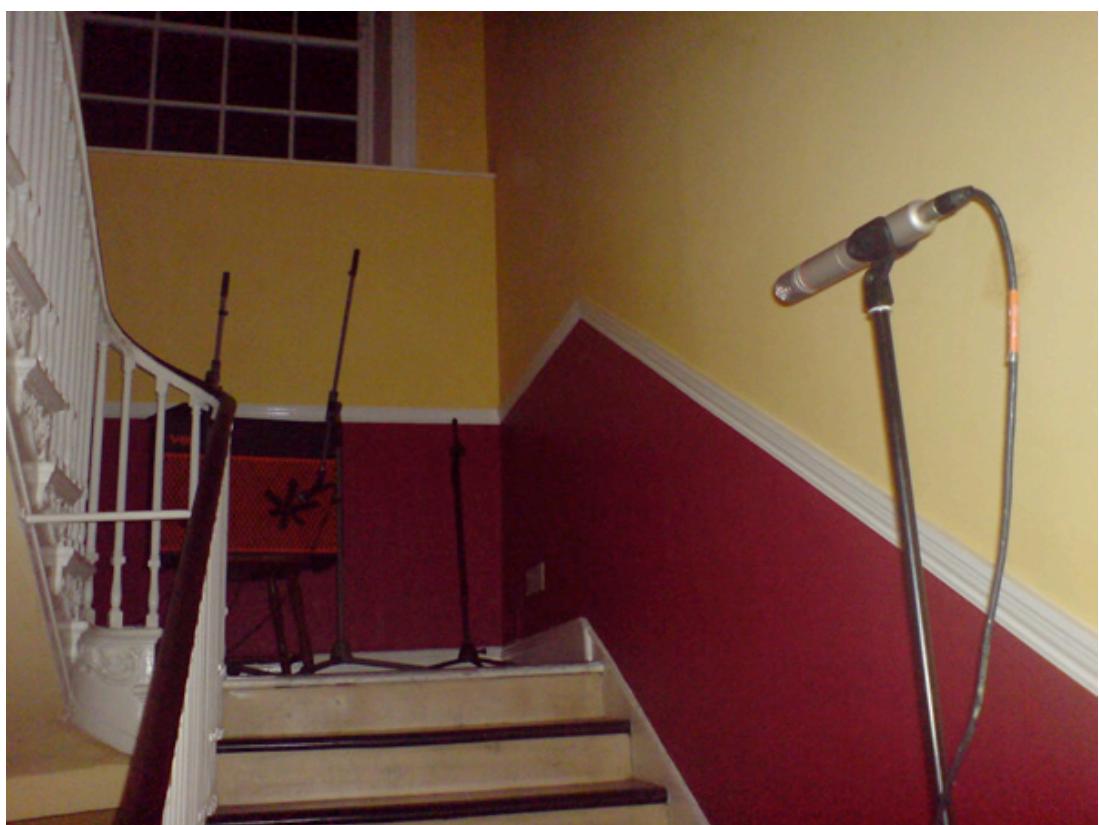
Corruption on a sea of sorrow
Body ripped from soul
Regal bears in iron helmets
Do just as they're told

Worlds collide and fight each other
Clouded mountains reign
Tearing squares out of the air
T'will never be the same

Of Dawn Waveform



Stairwell used for keys/guitar (Rhodes setup)



The room the drums were placed in (minus lighting)



Floor Plan

