# Curatorial > PROBES

RÀDIO WEB MACBA

With this section, RWM continues a line of programmes devoted to exploring the complex map of sound art from different points of view organised in curatorial series.

Curated by Chris Cutler, PROBES takes Marshall McLuhan's conceptual contrapositions as a starting point to analyse and expose the search for a new sonic language made urgent after the collapse of tonality in the twentieth century. The series looks at the many probes and experiments that were launched in the last century in search of new musical resources, and a new aesthetic; for ways to make music adequate to a world transformed by disorientating technologies.

**Curated by Chris Cutler** 

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At the start of the seventies, Chris Cutler co-founded The Ottawa Music Company – a 22-piece Rock composer's orchestra - before joining British experimental group Henry Cow, with whom he toured, recorded and worked in dance and theatre projects for the next eight years. Subsequently he co-founded a series of mixed national groups: Art Bears, News from Babel, Cassiber, The (ec) Nudes, p53 and The Science Group, and was a permanent member of American bands Pere Ubu, Hail and The Wooden Birds. Outside a succession of special projects for stage, theatre, film and radio he still works consistently in successive projects with Fred Frith, Zeena Parkins, Jon Rose, Tim Hodgkinson, David Thomas, Peter Blegvad, Daan Vandewalle, Ikue Mori, Lotte Anker, Stevan Tickmayer, Annie Gosfield and spectralists lancu Dumitrescu and Ana Maria Avram. He is a permanent member of The Bad Boys (Cage, Stockhausen, Fluxus &c.), The Artaud Beats and The Artbears Songbook, and turns up with the usual suspects in all the usual improvising contexts. As a soloist he has toured the world with his extended, electrified kit.

Adjacent projects include commissioned works for radio, various live movie soundtracks, *Signe de Trois* for surroundsound projection, the daily year-long soundscape series *Out of the Blue Radio* for Resonance FM, and p53 for Orchestra and Soloists.

He also founded and runs the independent label ReR Megacorp and the art distribution service Gallery and Academic and is author of the theoretical collection File Under Popular – as well as of numerous articles and papers published in 16 languages. www.ccutler.com/ccutler

# **PROBES #7**

In the late nineteenth century two facts conspired to change the face of music: the collapse of common practice tonality (which overturned the certainties underpinning the world of art music), and the invention of a revolutionary new form of memory, sound recording (which redefined and greatly empowered the world of popular music). A tidal wave of probes and experiments into new musical resources and new organisational practices ploughed through both disciplines, bringing parts of each onto shared terrain before rolling on to underpin a new aesthetics able to follow sound and its manipulations beyond the narrow confines of 'music'. This series tries analytically to trace and explain these developments, and to show how, and why, both musical and post-musical genres take the forms they do. Probes #7 examines some of the preparations applied to percussion and voice (these can be risky!) before beginning to look at the recovery and invention of extended performance techniques; starting with the piano. Between not touching it at all and reducing it to firewood many techniques have been proposed. With some extraordinary results.

# **01. Transcript. Studio version**

#### [Gregorio Paniagua, 'Anakrousis', 1978]

#### Percussion

Here's Le Quan Ninh with just one large cymbal resting – and being moved about on – an upended bass drum.

#### [Le Quan Nin, Live performance, place and date unknown]

Percussion preparations are applied typically to drums, gongs and cymbals, rather than to metalophones or wood – and they mostly consist of laying things on top of the heads. Things that resonate – like bowls, bells, boxes, woodblocks and smaller drums; things that bounce and rattle – like snares, chains, pebbles and gourds; or things that mute and dampen – like cloths, pads, paper and heavy stones. And of course things that do all three.

#### [David Moss, 'My Favourite things' (excerpt), 1991] [Roger Turner, 'Sprung from Traps' (excerpt), 1986]

Back at the border now – perhaps we should think of this as a treatment rather than a preparation – this is an extract from John Cage's *Construction in Metal no 1* in which gongs and tam tams are struck and then lowered into bowls of water to shift their pitches.

#### [John Cage, 'Construction in metal no 1' (excerpt), 1939]

Finally, this is from 'Monske' by the Austrian composer Hans Joachim Hespos, it's for a prepared mobile tympano. I've been unable to get hold of the score so I'm not sure exactly what's happening, but I think that there are, at least, ribbed metal rods and battery operated mixers involved.

#### [Hans-Joachim Hespos, 'Monske, ritual for mobile tympani in C major', 1996]

#### Voice

# [The Temperance Seven, 'Everybody Loves my baby' (excerpt), 1992]

There are not many ways to prepare a voice, discounting the smoking of a million cigarettes, or singing, Rudy Vallee style, through a megaphone – or into a resonating drum, or, – as we can hear in this extract from George Crumb's 'Ancient Voices of Children' – a piano with the loud pedal depressed.

# [George Crumb, 'Ancient Voices of Children' (excerpt), 1971]





[David Bedford. Photo: PA]

But there is this impressively political work, much played in the sixties, but perhaps because too close to home, seldom played today – It's Salvatore Martirano's 'L's GA'. Written between 1967 and 1968, it's a multimedia work for film, tape and narrator. The narrator, in a gas mask, attempts to recite Abraham Lincoln's 'Gettysburg Address' (hence the title) while helium is piped into the mask.

#### [Salvatore Martirano, 'L's GA for Gas masked politico, Helium Bomb and Two-Channel Tape', 1967-1968]

The method was also used by the British composer David Bedford for the finale of his 1977 children's mini oratorio 'The Song of the White Horse'. Helium gas is to be inhaled, it says in the score, to enable the singers to reach scarily high pitches.

#### [David Bedford, 'The song of the White Horse', 1983]

Preparations are still fairly exceptional, while extended techniques, to which we now turn have in many cases entered the mainstream vocabulary of music.

So let's look briefly at the investigation, recovery or invention of extended performance techniques:

The first thing to say is that some – in fact, for many instruments, quite a lot – of today's so-called extended techniques have been known and selectively used for centuries mostly for expressive or comic effect. But as pitch domination receded and the focus on sound and *timbre* gained ground, so unconventional techniques began to migrate from the periphery to the centre of much musical thinking. Some techniques were rediscovered, others were newly invented. And, as *timbre* became a matter of substance, as opposed to a matter merely of interpretation, so too the relation between performers and the generative work of composition changed, shifting – at the cutting edges – away from execution and toward origination. This change moved in lock-step with the powerful re-emergence of improvisation as a self-sufficient musical activity. Which is logical. When it comes down to it, only performers have the necessary interactive and symbiotic access to the physical properties and idiosyncratic peculiarities of their instruments.

For a composer, an instrument is part of a puzzle; for a performer it's an expressive device, and all the sounds it can make are of a piece. Looked at this way, the idea of extended technique is meaningless – it's a just technique. But from the position of a nineteenth century composer, tied to a tonal world that is mediated *in absentia* by writing – a world, what's more, in which the central fact and purpose of an instrument is to reproduce calculated pitches, anything else it can do might be interesting, but it falls outside its proper function. I'm sure Duke Ellington's most famous trombonist, Tricky Sam, wasn't thinking about extended techniques when he sang into his horn and waved a sink plunger in front of it, he was just thinking, 'this sounds good'. So although I use the term extended techniques in the programmes that follow, I do so because it's an accepted term, not because I accept the old tonal bias that lies behind it.

#### [Hector Berlioz, 'Symphonie Fantastique, 5<sup>th</sup> Movement: Songe d'une Nuit e Sabbat', (played on original instruments),1830]

In the nineteenth and early twentieth centuries, composers like Berlioz and Ravel pursued the greater exploration of *timbre* through the close control of orchestral colour,<sup>1</sup> because this was an obvious route to take in a context that was defined by pitch. But pitch-thinking is blind – inevitably – to sounds that are understood as being sufficient unto themselves. Indeed, what we might call pure sounds; or sounds *just being* sounds, most typically emerge from empirical experiments pursued beyond the constraints of *do re mi*.<sup>2</sup> And that's why – in the first half of the twentieth century – the grail of distinctive and novel approaches to sound generation was pursued most freely, and most comprehensively, not by composers by way of scores, but by performers and improvisers who were working in the more empirical worlds of popular music and sound recording – because it was there that the qualities of novelty and individuality were most highly valued.





[Alice Coltrane]

#### [Alice Coltrane, 'Universal Consciousness' (excerpt), 1971]

Critical mass was attained between the late fifties and early sixties when, very quickly – and in every field – probes escalated into a mainstream trend: *Musique Concrete* and electronic music introduced radical new sonorities and unorthodox aesthetics; new developments in hi-fi and stereo reproduction gave birth to extreme batchelor-pad exotica – while the more experimental fringes of Free Jazz, contemporary art music and recorded Pop drove one another forward by example, in a climate that was saturated by the promiscuous accessibility of almost every known form of music – ancient and modern, ethnic and urban – on cheap, universally accessible gramophone records. This unprecedented surge in musical experimentation coincided exactly with the accession of sound recordings to the position of a universal reference point for musical culture – the binding forum in which to learn, borrow, adapt and stake one's claim.

#### ['Chaos of World Music', recordings of music from West and Central Africa, Bali, the Balkans, Britain, Burma, France, Japan, Mali, Morocco, North America, Russia, South Africa and Sufi ceremonial, assembled by Bob Drake, 2013]

Think of it this way: Until 150 years ago, music only existed where and when it was performed. Either you were there, or you weren't. You heard it, or you didn't. That simple fact imposed quite narrow limits on any individual's understanding of what music was - or even what it might be. All you knew was came from your neighbourhood or passed through it. And, if you were musically literate, you could also know what had been written down. But actual sound, actual musical experience was rare and fleeting. To experience more than a few hours of music in a week would be exceptional, and very little of what you did hear would be new. And then along came sound recording - a shocking, unprecedented, memory system that loaded every performance into an eternal present. Add to that the postal service, the radio and the world-wide web and, suddenly, everything was in your neighbourhood - and anything could form an active part of your musical education. Electric consciousness and universal aurality, the new existential conditions that Marshall McLuhan had observed and theorised in the early sixties, perfectly described the imaginary solidity of the universe of recorded sound. There was no need to be there anymore because there was everywhere. There would come to you. The realisation of this vast tectonic shift caused a profound crisis of continuity since, once one could experience and learn from - anyone, anywhere in the world, whether dead or alive, then the norm of contiguous community, with its roots in contact and location, inevitably begins to fracture and disappear. And when you can adopt as your mentors any personalised accumulation of otherwise unconnected and incompatible influences - a bit of opera here, some Amazonian tribal ritual there; The Big Bopper, the Modern Jazz Quartet, African pop, Anton Webern – all mixed and stirred together – then, your neighbours are no longer your peers. And in this environment, inevitably, formerly irreconcilable aesthetic differences begin gradually to break down, and what were once rigid genre boundaries start to blur and converge. Community and presence give way to universality and absence. Who knew how to deal with this? But in the sixties, it was just exhilarating, and the probes ran riot.

Amongst other things the mash-up that became European free improvisation grew out of this free-for-all. First appearing on the fringes of jazz but soon taking in participants from rock bands and conservatories, free improvisation was a turboengine for the generation of new preparations and extended techniques.

#### [Globe Unity Orchestra, 'Free improvisation' (excerpt), 1973]

Piano

And now, Maestro, if you please

#### [Stockhausen, 'Klavierstück X' (excerpt), 1954]

Clusters are not complicated – they come naturally to the piano. To form a cluster you simply have to press down a larger or smaller block of adjacent keys, using a fist, or a palm or a forearm or – in the case of Charles Ives's 'Concord Sonata' – a





[Charles Ives, left, captain of the baseball team and pitcher for Hopkins Grammar School]

short plank<sup>3</sup>. A cat can play a cluster. The breakthrough was more in the thinking than the playing because, in the early twentieth century, a cluster was just a noise – it was something to be instinctively avoided. If one minor second is a discord, then a whole stack of minor seconds is... well, it's something too horrible to contemplate. So clusters were taboo, with a few, very rare, exceptions. Mostly dramaturgical exceptions, since they typically involved onomatopoeic gestures celebrating famous battles, or seriously inclement weather.

As a sidenote, here's a wonderful example of accumulated dissonance from 1673. This is Heinrich Biber's 'Battaglia a 10 in D major'

#### [Heinrich Ignaz Franz Von Biber, 'Battaglia a 10 in D major' (excerpt), 1673]

By the late nineteenth century the occasional, more playful, cluster started turning up in Jazz. There's a cylinder, recorded in 1899, for instance, on which Jelly Roll Morton describes his elbow technique and demonstrates it on a version of *Tiger Rag.* Not more than a novelty effect at the time – like so many extended techniques before they moved into the light – but widely heard.

And of course, Charles Ives had flown some early probes in this direction in works like 'Over the Pavements' and 'The Concord Sonata'. But, although both works were written in the early years of the twentieth century, neither was performed until decades later – and Ives was constantly revising them, so an accurate date can't be given. Still there's no shortage of reasons to listen to this timely work, most of which, certainly, was written in 1906<sup>4</sup>. This is Charles Ives' 'Over the Pavements' for piano and a small ensemble.

#### [Charles Ives, 'Over the Pavements' (excerpt), 1906]

Whatever almost all the reference books say, it was actually the composer and virtuoso pianist Leo Ornstein who began substantially to probe the possibilities of the cluster - and indeed, who quickly became a celebrity for doing so. Here's an extract from his 1913 composition 'Danse Sauvage'.

#### [Leo Ornstein, 'Danse Sauvage' (excerpt), 1913]

Two years later, the young Henry Cowell publicly took up the cause. It was he who named the technique and defined it – and it was he who theorised its importance. And certainly, it was his championing of tone-clusters that proved critical - not only to the piano but to the language of contemporary music as a whole.

Here's a bit of 'Tiger'

#### [Henry Cowell, 'Tiger' (excerpt), 1928]

Today, clusters are part of the common keyboard vocabulary – from Thelonius Monk and Cecil Taylor to Karlheinz Stockhausen, who even had special gloves made so that he could play cluster glissandi. And piling up stacks of minor seconds on any instruments is now an uncontroversial commonplace.

#### [Judith Bingham. 'Prague' (excerpt), 1995]

Henry Cowell probed other piano possibilities too. Here's his 1923 composition 'Aeolian Piano' in which one hand silently depresses the keys, while the other works directly on the strings.

#### [Henry Cowell, 'Aeolian Piano' (excerpt), (Live version, piano: Jeremy West), 1923]

And this is the Jazz pianist Keith Jarrett playing directly on the strings, in a very similar way, some 35 years later. It's from Art Blakey's 'Recuerdo', from the album *Buttercorn Lady, Live at the Lighthouse*, recorded in 1966.





[Henry Cowell playing the piano, ca. 1913. Copyright Sidney Robertson Cowell. Cowell Collection at the NYPL]

#### [Art Blakey, 'Recuerdo' (excerpt), pianist: Keith Jarrett, 1966]

The American maverick, George Crumb, spent a lifetime probing and inventing unconventional techniques – across a whole range of instruments; not wilfully but in the service of an allusive, emotive, even metaphysical music. In this piece, Gnomic variations, the pianist also works inside, as well as outside, the instrument. Although it *sounds* as if the piano has been prepared, all the alterations in timbre are in fact controlled through a highly skilled combination of conventional keying combined with plucking, strumming or damping the piano strings directly with the hand.

#### [George Crumb, 'Gnomic variations' (excerpt), 1981]

This is also piano music.<sup>5</sup> To make it, ten people have to stand around a single concert grand, drawing fishing line through the strings. Some may use short horsehair-covered sticks. These techniques, which Stephen Scott says he first saw used in 'Rhapsodies' by the composer C. Curtis Smith which was premiered in 1972, were the jumping off point for Scott's own Bowed Piano Ensemble, which went on to extend and refine those techniques and introduce new ones.

In passing, it's curious that neither Curtis Smith nor Stephen Scott seem to have been aware that the Romanian composer Horatiu Radelescu had pioneered these techniques, very publicly, at least a decade earlier.<sup>6</sup>

This is 'Rainbows' by Stephen Scott.

#### [Stephen Scott, 'Rainbows' (excerpt), 1984]

Here is Scott's ensemble again, in 1995 now, mixing bowing with various other inside-piano techniques. It is hard to believe that this is being played on one piano in real time.

#### [Stephen Scott, 'Vikings of the sunrise' (excerpt), 1995]

Extreme speed and manual independence, amounting to an extended technique, is the key to what the Canadian pianist Lubomyr Melnik calls *Continuous Music*. Something of a one-man-band – in every sense – Melnik is not really part of any recognised musical community, but he has positioned himself as a kind of spiritual warrior. His website makes much of the fact that he is the fastest pianist in the world - sustaining speeds of over 19 and a half notes a second in each hand. What he does – and it is impressive – is to play extremely fast, building interfering waves of sounds, overtones and shifting harmonies.

This is from his 'Lund-St.Petri Symphony' for solo piano

#### [Lubomyr Melnyk, 'The Lund-St.Petri Symphony' (for solo piano), 1981]

Where George Crumb's approach is onomatopoeic, or at least figurative and programmatic, Helmut Lachenmann's is austere, abstract and somewhat theatrical. Lachenmann finds ways to coax the most unexpected and unfamiliar sounds from the most familiar instruments. It's fair to say that almost every technique he uses is an extended technique of some sort, some of them impressively exotic. Listening to his work on record, it can sometimes be quite difficult to identify the source, which accords with his own description of his work as *musique concrète instrumentale*, the sounds being so consciously alienated from the instruments as we know them. In this piano piece, 'Guero', he sounds only the keys – very carefully – so as never actually to activate the strings.

#### [Helmut Lachenmann, 'Guero' (excerpt), 1970]

And now, without touching the keys or the strings, here's John Cage's 1942 setting of James Joyce's 'Wonderful Widow of Eighteen Springs'. In the Western orchestra the piano belongs, officially, to the percussion section – and here Cage uses, percussively, only the shell of the instrument to accompany the pianist's singing. Exactly how and where the piano is to be hit is, of course, carefully specified. This is Jenny Q Chai.





[Helmut Lachenmann]

#### [John Cage, 'The Wonderful Widow of Eighteen Springs' (excerpt), 1942, played and sung by Jenny Q Chai]

So we arrive, inevitably, at a music in which the piano is not touched at all. This is 'Holding Pattern', commissioned by Sarah Cahill in 2000, from the composer Maggi Payne. Three e-bows are used to set the strings in motion.

The e-bow is a small battery-powered device. It was invented by Greg Heet in 1969 to produce long, level, tones from a steel-string electric guitar. Held very close to – but not actually touching – the string, it sets up a magnetic feedback loop, which keeps the string in motion and therefore sounding. This is an acoustic composition: with just a normal grand piano and no electronics.

#### [Maggi Payne, 'Holding Patterns' (excerpt), 2000]

Taking a guitar accessory to the piano is imaginative. And yet, ninety years earlier, when the electromagnetic principle behind the e-bow was first musically employed, it was used – precisely – to modify the *timbre* of a piano. This was the principle as you will recall, behind the Coralcelo, an instrument - millions of dollars in the making and now remembered only by a handful of music historians. Perhaps, if there's a *lietmotif* in this group of programmes, it is how easily we forget, and how often we therefore climb the same hills over and over again.

I'll end this chapter with Philip Corner's Piano Activities, because it stands on the threshold between a musical probe and what we might call a post-musical provocation - or, to be more generous, a meta-art interrogation. With this piece we leave the realm of music altogether and start looking backwards rather than forwards. Again, John Cage takes a leading role. Cage made his own critical decision in 1951 when he abandoned intentional composition in favour of chance procedures and thereby moved - in my opinion - away from the world of music and into... some other aesthetic realm for which we don't yet have a name. He taught these revolutionary principles, in his experimental composition classes at the New School for Social Research in New York – a course that he ran between 1957 and 1959. I think it's fair to say that the Fluxus movement more or less emerged out of a confluence of this class and a sudden renewal of interest in the innovations of early twentieth century Dada<sup>7</sup>. The composer Philip Corner who, before becoming a founding member of Fluxus, had studied with Otto Luening, Henry Cowell and Olivier Messiaen<sup>8</sup> - wrote *Piano Activities* in 1962 for a series of European Fluxus-events. The score – which consists of just a few sentences calls for a group of people to play, pluck, tap, scratch, rub and drop objects onto a piano, as well as to drag various objects across it and, I quote, 'to act in any way on its underside'. These instructions led, notoriously - at the 1962 Wiesbaden festival – to the complete destruction of the instrument.<sup>9</sup>

#### [Sic Transit Gloria Mundi]<sup>10</sup>

Be Not Afraid! In the next programme we will be looking at ways to coax unusual sounds out of strings.

#### [Gregorio Paniagua, 'Anakrousis', 1978]

<sup>1</sup> Which is why Ravel was so interested in the Lutheal.

<sup>2</sup> Or at least, access to – and close collaboration with – people who have those skills: in other words, performers.

<sup>3</sup> On a piano the smallest cluster is three notes, the largest is eighty-eight – that's every key. Step forward Joseph Schwantner, who wrote an 88 note cluster in the second movement of his 1983 song cycle Magabunda.

<sup>4</sup> Though not publicly performed until 1963.

<sup>5</sup> 'In 1976 I heard David Burge play a solo piano piece by Curtis Curtis-Smith which included a few single sustained tones created with nylon fishing line drawn under the strings. This sound amazed and captivated me, and I wrote to Curtis to ask how he made his 'bows'. He sent me a sample, which I adapted and modified to be used by a group of players to produce sustained, organ-like chords from an open grand piano. In my first piece for the bowed-piano medium, I wanted to create sustained five-note chords leading smoothly to other five-note chords, which required ten players (all surrounding one concert grand piano) to accomplish.

I also wanted to make repeating hockets of staccato notes in fast tempo. As the fish line bows, which I call 'soft bows', were unwieldy for the precision needed for the hockets, I experimented with a variety of small bows, to be manipulated by the hand and wrist against the side of the piano strings. I finally settled on 'popsicle' sticks with horsehair glued and tied to one or both sides'.



<sup>6</sup> The first public performance was in 1974 at the Festival de Provence.

<sup>7</sup> Robert Motherwell's *The Dada Poets and Painters: An Anthology* was published in 1951 and exercised a powerful and obvious influence on the American would-be *avant gardes*.

<sup>8</sup> He inherited Cage's class at the School of Social Research between 1967-1970.

<sup>9</sup> An outcome that future performances seem to have focused on, although it's not specified in the score. More protectively, but equally unmusically, La Monte Young, in his 'Piece for David Tudor #1', has a bale of hay and a bucket of water brought to the stage for the piano – the workhorse of art music - to eat and drink. The score allows the piano to be fed or to be left to feed itself. If the latter, it is deemed over when the piano eats, or decides not to. Young also wrote Piano Piece for Terry Riley #1, the score of which reads: Push the piano up to a wall and put the flat side flush against it. Then continue pushing into the wall. Push as hard as you can. If the piano goes through the wall, keep pushing in the same direction regardless of new obstacles and continue to push as hard as you can whether the piano is stopped against an obstacle or moving. The piece is over when you are too exhausted to push any longer. It is also worth mentioning here that, already in 1917, the great soviet experimentalist, Arseny Avraamov, had set before Anatoly Lunarcharsky, commissar for public enlightemment, his project to burn all pianos, as symbols of the 12-tone, octave-based 'well tempered' scale that had had such a terrible effect on the western ear for more than three hundred years...

<sup>10</sup> Sound of the Drakian Brotherhood at prayer.

# **02. Selected links**

#### Roger Turner's website

www.roger-turner.com

# Lê Quan Ninh's website www.lequanninh.net

Hans-Joachim Hespos' website www.hespos.info

George Crumb's website www.georgecrumb.net

David Bedford's website www.davidbedfordmusic.co.uk

Karlheinz Stockhausen's website www.stockhausen.org

#### Charles lves' website www.charlesives.org

#### Henry Cowell's website

www.henrycowell.org

#### Art Blakey's website

www.artblakey.com

Keith Jarrett's unofficial website www.keithjarrett.org

The Bowed Piano Ensemble's website www.bowedpianoensemble.com

#### Lubomyr Melnyk's website www.lubomyr.com

# Maggi Payne's website

www.maggipayne.com

## **03. Notes**

#### On length and edits.

The purpose of these programmes is to give some practical impression of the probes we discuss. This necessitates for the most part extracting short stretches of music from longer wholes, which, of course, compromises the integrity and disrupts the context inherent in the original works. I have also, on occasion,

edited different sections of a longer work together, better to illustrate the points under discussion. So the examples played in the programmes should not be confused with the works themselves. Wherever the word (excerpt) appears after a title in the programme transcript, this indicates that what follows is an illustration, not a composition as it was conceived or intended. If something catches your ear, please do go back to the source.

#### Notification

If you want to be notified when a new probe goes up, please mail rermegacorp@dial.pipex.com with subject: Probe Me.

## **04.** Acknowledgments

With thanks to Tony Buck, Sarah Cahill, Bob Drake, Charles O'meara, David Moss, Maggi Payne, David Petts, Keith Rowe, Bill Sharp, Andrey Smirnov and Robert Zank.

# 05. Copyright note

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