THE BEATLES WORKING IN THE STUDIO: DEVELOPMENT OF PARTICULAR RECORDING, EDITING AND PRODUCTION TECHNIQUES BECOME A STANDARD IN THE MUSIC INDUSTRY.

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(3251 words)

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INTRODUCTION.

It was back in the early Sixties when the Beatles went for the first time into the studio at Abbey Road to record *Love me do*. From that day they wrote almost two hundred songs. Some believe these songs left an indelible mark on a whole generation, expressing that sense of freedom, positive thinking and rebellion that pervaded the Beatles' times; others take a colder view and simply look at them as the products of a great pop band.

Figure 1: The Beatles.

The focus of this essay is the one, undisputed certainty of the band's outstanding musical adventure: the Beatles revolutionised the approach to studio recording and music making and paved the way to what would eventually become a standard in the modern music industry.

Three highlights in the creation of a song will be examined, namely structures, recording and editing techniques. To this end, the essay will refer to those songs which, from this point of view, are the most representative.

1. SONG'S SOUND AND STRUCTURE.

This first section analyzes how the band dealt with a song's sound and structure.

The Beatles' sound was different from that of all the other bands around at the time. It was the result of a continuous and unpredictable change of chords, often not belonging to the appropriate tonality, which gave an unexpected and unusual twist to their musical phrasing but never failed to capture the listener. Their flaws in music theory were never an obstacle to their song-writing; in fact, they translated – thanks also to the constant presence of the producer George Martin, often considered the fifth Beatle – into absolute creative freedom, giving the band's work that vitality and originality that even today permeate their songs.[1]

Their approach to the song's structure was quite different, as they adhered to very strict patterns. Almost all their songs – especially during the period up to *Rubber Soul* but also later, albeit to a lesser extent – feature the typically pop CB (Chorus-Bridge) structure. This structure relies on the driving force of the chorus – the song's leading section, often repeated

[1] MacDonald, introduction pp 14-22

throughout the song itself – using bridges to link one chorus to another. The hook – the most interesting and, indeed, hooky part – is placed right at the beginning of the song and in each chorus.

This arrangement can be defined as exclamatory, subtractive, with most of the stress at the beginning rather than at the end of the song. The pleasure is immediate but its source, once it has been introduced, fully expressed and then repeated for the listener to let it fully sink in, is gradually diminished. Indeed, the chorus is never repeated more than once, save for the beginning, and as the track unfolds it is backed and staggered by the bridge where the track eventually settles. This way the CB structure turns out to be very functional in capturing immediately the listener's attention and drawing him right into the song's atmosphere, without beating about the bush.

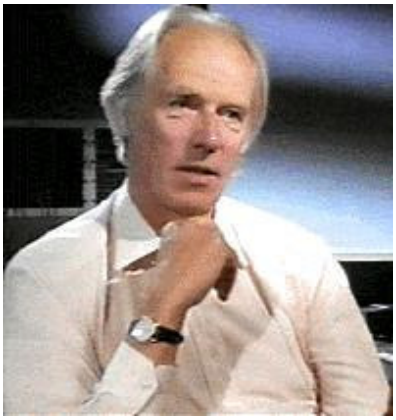


Figure 2: George Martin.

Remember that at the time the songwriters had to adhere to an about two-minute rule as the ideal length of a song. This forced Lennon and McCartney to merge verse and refrain into a single structure which, just like in a real chorus, contained the very best of the song. Today instead, radio-aired songs must last three-four minutes at the most; thus, the CB structure becomes more of a VCB (Verse-Chorus-Bridge) structure where the verse is well-defined and separated from the chorus, which remains the song's topical moment. This new structure and its subsequent effect on a song's duration are due, among others, to a very interesting technological and economic reason. In the late Sixties the market gradually shifted from single records to LPs; the musicians could now benefit from increased time and flexibility in combining their songs. The path was set for major experimentation in every field – sound, structure, etc. – which, in the case of the Beatles, is apparent in albums such as *Sgt. Pepper's Lonely Hearts Club Band* or *The White Album*.[2]

To summarise, it can be said that in general it is very important for music directed to the masses, such as pop music, to have an easily recognisable and very catchy structure. But achieving this structure requires the work of highly specialised professionals.

It is likely that one of the influences behind the choice to adopt this formal solution during the period of the Beatles' first outstanding hits was producer George Martin who, not

[2] This part about the song's structure has been sourced from Fabbri, chapter *Forme E Modelli Delle Canzoni Dei Beatles*.

surprisingly, not only had a musical education but a background as a theatre record producer as well. As a supervisor he was very careful about staging times – a true expert who knew exactly how to set up a line and place it just at the right moment. Many biographies claim that it was Martin who suggested how to open or close many songs; this bears out the notion that most often there is a knowledgeable mind behind a major hit.[3] To further illustrate what has been written thus far, the Appendix 3 includes the score of *I wanna hold your hands* and the structure of *Ticket to ride*. The former is a good example of the band's distinctive unpredictable song-writing; the latter clearly shows the typical CB structure of the Beatles' earlier songs.

2. RECORDING TECHNIQUES.

This second section focuses on particular recording techniques within the context of song-writing.

In 1966, after the band decided to stop playing live, the Beatles focused their efforts on studio recording. Now that they could write songs without having to worry about how to replicate them on stage, the Beatles were spurred to explore every possible sound solution. The sound engineers' creativity and ingeniousness was pushed to the limits as they were forced to realise the band's every idea and request. This is especially evident in songs such as *Tomorrow never knows*. Let's go over the entire creation process.

Figure 3: Geoff Emerick.

Three tapes were used to complete the song, although the end result is the outcome of countless overdubs, particularly of the loop tapes. Tape 3 was eventually chosen for publishing but for the sake of curiosity and thoroughness the attached CD also includes the version recorded on tape 1[4]. First the rhythm track – bass guitar, drums and tambourine – was recorded; this was on April 6th 1966 in Studio 3 at Abbey Road. The producer was George Martin and the audio engineers were Geoff Emerick and Phil McDonald. The drum part was played mostly on a pair of tom-toms with dampened, slack skins; the part was then compressed and echoed in order to enhance its hypnotic and mournful gait.[5]

[3] MacDonald, song number 23 *Can't Buy My Love*. This is another song that follows the CB structure, well arranged and built by Martin.
[4] See Appendix 4, CD track list.
[5] MacDonald, song number 77 *Tomorrow Never Knows*.

The bass drum's sound was also heavily engineered: Geoff Emerick placed the microphone just three inches from the skin itself – closer than ever before – and inside the drum he put one of those heavy sweaters the Beatles used to wear, in order to dampen the sound. The sound was then passed through valve Fairchild 660 compressors and limiters.[6]

The end result has been described as "a cosmic tabla played by a Vedic deity galloping through a stormcloud".[7] On April 7th, always at Abbey Road, the loops the Beatles had made themselves with their Brennell recorders were overdubbed.[8] These recorders made it possible to disconnect the erase head and record one sound over the other to saturate the tape. The loop – a recorded tape providing a cyclic signal – is one of the most fundamental elements of studio effects and an integral part of noise art language known as *musique concrète*.[9] Pop music had never witnessed anything of the kind and the loops the Beatles made for *Tomorrow never knows* were extraordinary.

There were five loops in all. The first one featured a sound similar to a seagull; some say it is McCartney laughing, others maintain that it is a distorted guitar solo; for sure, it was obtained – like most of the other loops – by means of superposition and acceleration (0.07"). The second loop was an orchestral chord in B-flat major (0.19"); the third was a Mellotron flute (0.22"); the fourth featured Mellotron strings and oscillated in 6/8 between B-flat and C (0.38"); the fifth was an ascending sitar[10] scale, recorded with heavy saturation and acceleration (0.56"). The most remarkable of these loops are the fifth one, which makes up the first four bars of the middle instrumental interlude and then dominates the remaining part of the song, and the third one which, by

Figure 4: Mellotron.

[6] Lewisohn, see Thursday 7th of April (1966).
[7] MacDonald, song number 77 *Tomorrow Never Knows*. An image of a Tabla is available in Appendix 1, figure 4. Tabla sound on the CD, track 14.
[8] Lewisohn, Thursday 7th of April (1966). Image of the Brenell tape recorded available in Appendix 1, figure 1.
[9] *Musique concrète* refers to a form of experimentation that basically meant recording sounds from the environment and then manipulating, cutting and filtering them and using the output as music. This type of manipulation usually makes the original sound unrecognisable; in other words, the "normal", "daily" relationship between the acoustic event as it is and the object or situation that generated it is severed. Example on the CD, track 25.
[10] Picture available in Appendix 1, figure 3.

means of an intricate rhythm pattern, brings the listener to lose the sense of time.[11] The second half of the instrumental interlude comprises parts of McCartney's solo for *Taxman*, slowed down and dropped one tone, cut and played backwards. The loops were mixed live: "The studio was full of people rewinding the tapes with pencils while Geoff took care of the balancing"; "We had five recorders running at the same time"; "The control room was as full of loops as it was of people. I put all the loops on the multi-track and then played the cursors like a modern-day synthesiser".[12]

John Lennon's voice was also heavily processed, using two different types of effect for the song's two parts. In the first part (up to 0.55") ADT (Artificial or Automatic Double Tracking) was used. The Beatles would often double the vocals to increase their presence and force, but it was an arduous and boring task and soon everyone grew tired of the process. It seems that after a particularly taxing overnight session, spent mostly doubling the vocals, Ken Townsend came up with an idea that would influence not only a great part of the Beatles' future songs (this technique was used extensively on *Revolver*) but also recording techniques all over the world.[13] Essentially, Townsend's system used two professional-quality tape decks which were connected to the recording console, and to each other. As a vocal was being recorded onto the first tape machine, a series of specially installed connections simultaneously fed the signal from the record head of the first tape-deck into the record head of the second deck, onto the tape, out from the playback head of the second deck and back into the playback head of the first machine. If the playback heads of the two decks were precisely at the same distance from their respective record heads, the voices would be both recorded and played in perfect unison. However, the double-tracking effect relied on the almost inaudible millisecond delays between the guide vocal and the double-tracked vocal. This was achieved naturally in the old system, because it was in practice impossible for even the best singer to precisely duplicate a previous vocal. Townsend was able to introduce the fractional delay required by adjusting the variable speed oscillator (VSO) that controlled the pitch (speed) of the motor on the second tape deck, so that the tape ran either slower or faster than on the first deck. With this slight delay now introduced, the signal coming out of the playback head on the first deck would be audibly 'doubled', but the delay was not enough to cause the vocals to be noticeably out of synch. An alternate method of creating the required delay, if the second deck did not have a variable speed motor, was to simply apply pressure to the rim (or 'flange') of the feed reel on the second tape deck to slow down the tape speed. This led to the invention being dubbed

[11] MacDonald, song number 77 *Tomorrow Never Knows*. All the loops on the CD, tracks 5-13.
[12] Lewisohn, see Thursday 7th of April (1966).
[13] Lewisohn, see Wednesday 6th of April (1966).

'flanging' by The Beatles. The invention of ADT soon led to the development of other related studio effects, including chorus, phasing and flanging.[14] A similar phenomenon can be observed in photography: if you place a negative over another identical one the image will remain the same, but if you just budge one of the negatives then the image will expand.[15]

In the second part of the song (1.27") a Leslie[16] amp was used. Some say that John Lennon came into the studio one day and demanded: "I want to sound like the Dalai Lama singing from the peak of the highest mountain. And I still want to hear every single word I sing". Others maintain that that John wanted the song to feature at least four thousand Tibetan monks singing in the background. In order to meet his request the engineers filtered his voice through a Leslie amp belonging to a Hammond organ. Organ notes filtered through a Leslie take on that typical Hammond oscillating effect; a voice filtered through a Leslie comes out with more or less the same alteration.[17]

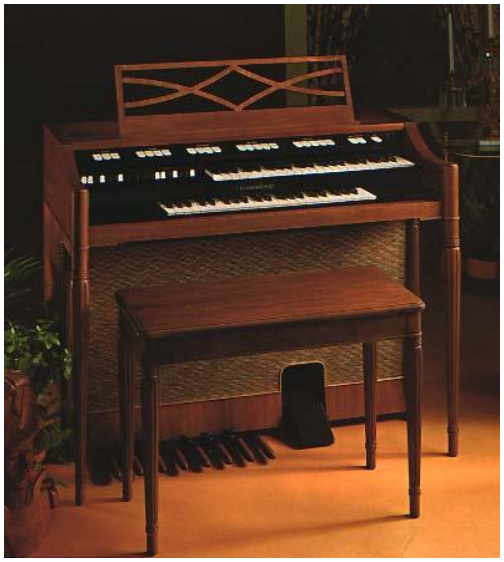


Figure 5: Hammond.

From then on they experimented by filtering every recordable sound through a Leslie: piano, guitar, drums, voice, etc.

While neither the song's structure nor sounds are typically pop – in the most commercial sense of the word and in relation to those days – the song has a good overall flow and keeps the listener hooked. The loops keep the listener interested and curious to hear what will come next while the drums unconsciously make him keep the time with any part of the body. Overall it is a complete and well-developed song that did not pass unnoticed.[18]

[14] Maureen Droney, interview with Geoff Emerick. In Appendix 2, figures 1 and 2, two possible connections between two decks have been drawn.
[15] Lewisohn, see Wednesday 6th of April (1966).
[16] See the picture in Appendix 1, figure 2.
[17] Martin George, Hornsby Jeremy.
[18] The CD features a song from Chemical Brothers – *Let forever be* – that demonstrates how modern was *Tomorrow never knows*; in fact, these two songs have many aspects in common.

3. EDITING TECHNIQUES.

This third and last section examines the song *Strawberry fields forever*. The song features a remarkable example of musical editing and introduces us to the last element of studio recording and song-writing.

This song alone captures everything the Beatles had learned in four years' studio work, with reverse tapes, varispeeds and unusual instruments. Since the group was no longer under any deadline pressure many versions of the song were recorded, each one with something unique. It took a long time for the band to come up with the song as we now know it. As usual, the recording took place in Studio 2 at Abbey Road, from November to December 1966. The producer was still George Martin, with the support of the audio engineers Emerick, McDonald and, for a certain time, Dave Harries.

First a full, slower version was recorded. It is still in EMI's archives and has never been published. Then other five recordings were made, the last on tape 7. On this tape John's voice was passed through the ADT device and at the time was labelled as the best. But Lennon was not quite satisfied with the end result, so they started all over and switched to string and wind instruments. Martin wrote a score for four trumpets and three cellos, recorded on tape 25 on tracks 3 and 4, while tracks 1 and 2 were used to record the rhythm part and assorted percussive fragments by Starr, as well as Harrison's Indian swordmandel.

The rhythm part included reverse cymbals as well: the sequence was recorded as usual and then transcribed backwards so that, after the tape had been recorded and reversed, the sounds would accurately follow the music.

A further example of this is the guitar solos in *I'm only sleeping*. With the four tracks now full, tape 25 had to be bounced onto two tracks on tape 26, where John's two vocals were eventually recorded.[19] But John was not quite satisfied and said he wanted the first part of

Figure 6: The Beatles.

[19] These three paragraph are sourced from Lewisohn, see 24th , 28th, 29th of November (1966) and 8th , 9th , 15th of December (1966). (CD, tracks 16-20).

the original version to be stitched to the second part of the new version. The required editing was extremely complicated, since the two versions differed in speed and key.

By sheer luck, the difference in speed between the two recordings was almost exactly proportional to the difference in key. Martin and Emerick figured out that if they sped up the first version on tape 7 and slowed the second on tape 26 they would manage to stitch them together, albeit with a difference of a half-key. The two parts were mixed separately on two tapes and then merged on a single tape: this was the version that was eventually published.[20] The stitching is exactly sixty seconds into the song, shortly after the line "Let me take you down 'cause I'm going to…" but, as Lewisohn puts it, "you will look for it at your own risk: if you hear it once, the song may never again be the same for you."[21] Working with the varispeed to bring the two parts to the same velocity, Martin and Emerick performed one of the most remarkable feats of editing in the history of pop music, the only clue being a change in sound. The plunge from the airy first verse-chorus sequence into something deeper, darker and more impelling was just what Lennon had been after and now he had stumbled across it thanks to a casual dubbing side-effect. During the recording of *Strawberry fields forever* the varispeed was used so much that the final mix shifts between two keys, in a "microtonal no-man's-land"[22]: the song opens somewhere between A natural and A sharp and then subtly slips into B flat, albeit not quite in key. The initial tempo is between 90 and 91 bpm and shifts up to 94-95 in the middle section, closing at 100-101 bpm. For an idea of how much the first tape had to be accelerated to stitch it to the second one, simply compare the sound of the snare in the first minute of the song, where it is very high-pitched and rich in high frequencies, with the snare's more natural sound in the rest of the song. The sound of the drum chop that introduces the chorus is clearly different. The chorus is divided in two parts with a completely different sound and presence; even more different is John's tone, which fills up with the low frequencies that are typical of a slow-down in the second part, and with the high ones that are typical of a speed-up in the first.[23]

With 55 hours' studio time, *Strawberry fields forever* broadened the range of recording techniques developed with *Revolver*, breaking new ground for pop music. With enough inventiveness, it was now possible to come up with absolutely original sound images. The Beatles proved that not only do technical shortcuts not limit the imagination, but actually allow it to expand into areas which could be inaccessible to a learned mind. It is worth

[20] Lewisohn, see 22nd , 29th of December (1966).
[21] Lewisohn, see 22nd of December (1966).
[22] Sentence used by MacDonald, song number 93 *Strawberry Fields Forever.*
[23] MacDonald, song number 93 *Strawberry Fields Forever.*

pointing out that while there are countless contemporary artists capable of writing much more complex and technical pieces than the Beatles', there are very few who know how to bring out emotions and imagination in such an immediate, spontaneous and original manner, and – most of all – that are so easy to listen to and understand.[24]

Finally, in order to make a comparison with the software age, the attached CD includes the same song recorded with guitar and voice and edited the way it was back then but exploiting modern-day means.[25]

4. CONCLUSIONS.

At the time, most of the elements dealt with in this essay may not have necessarily been unpublished but they certainly were not very known, nor had they been thoroughly studied. In those years the Beatles gave a remarkable thrust to the refining of studio recording, editing and production, but most of all they revolutionised the concept of song-writing, where every technical and artistic means is exploited to communicate with the listener. Everything the Beatles did – from the use of ADT to cut-and-paste, from reverse loops to unusually processed vocals, from primitive time-stretching to myriad instruments – is now part of the wealth of all modern productions and has become a standard in the music industry. Their approach to in-studio work brought the audio engineer to the forefront: now he was forced to realise the strangest requests with hardly any means at his disposal and thus became himself a musician of sorts, an "audio artist", as it were.

Figure 7: The Beatles.

[24] Ibid., song number 93 *Strawberry Fields Forever*.
[25] CD, tracks 21-24.

APPENDIX 1

Figure 1. Brenell tape recorder.

Figure 2: Leslie speaker.

Figure 3: Sitar.

Figure 4: Tabla.

APPENDIX 2

Figure1: Two tape decks connected in order to get the ADT. The playback head of deck 2 is connected to the playback head of deck 1. Playing with the varispeed will produce the required delay. With no varispeed the two signals are in sync.

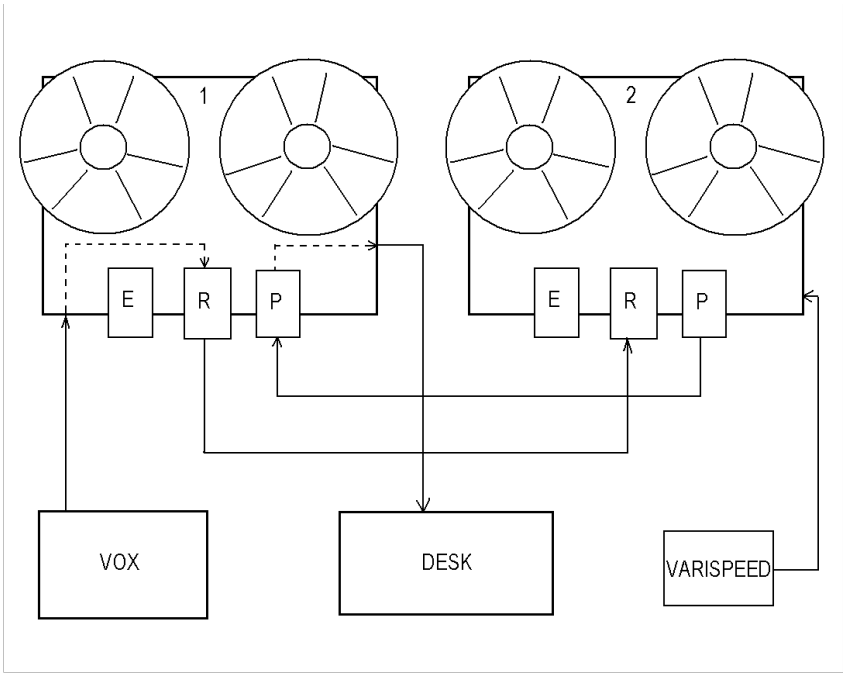
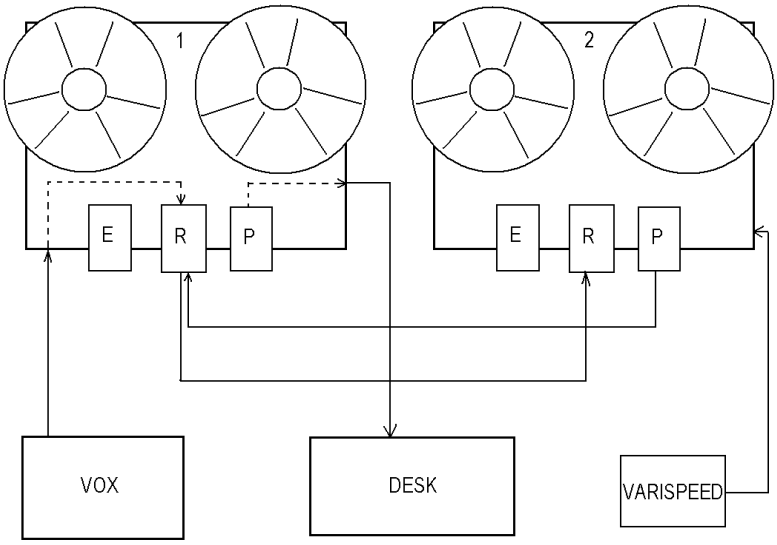


Figure2: Two tape decks connected in order to get the ADT. The playback head of deck 2 is connected to the record head of deck 1.

The required delay time is due to the distance between the record and the playback head of deck 2. (The varispeed can also be used).



APPENDIX 3

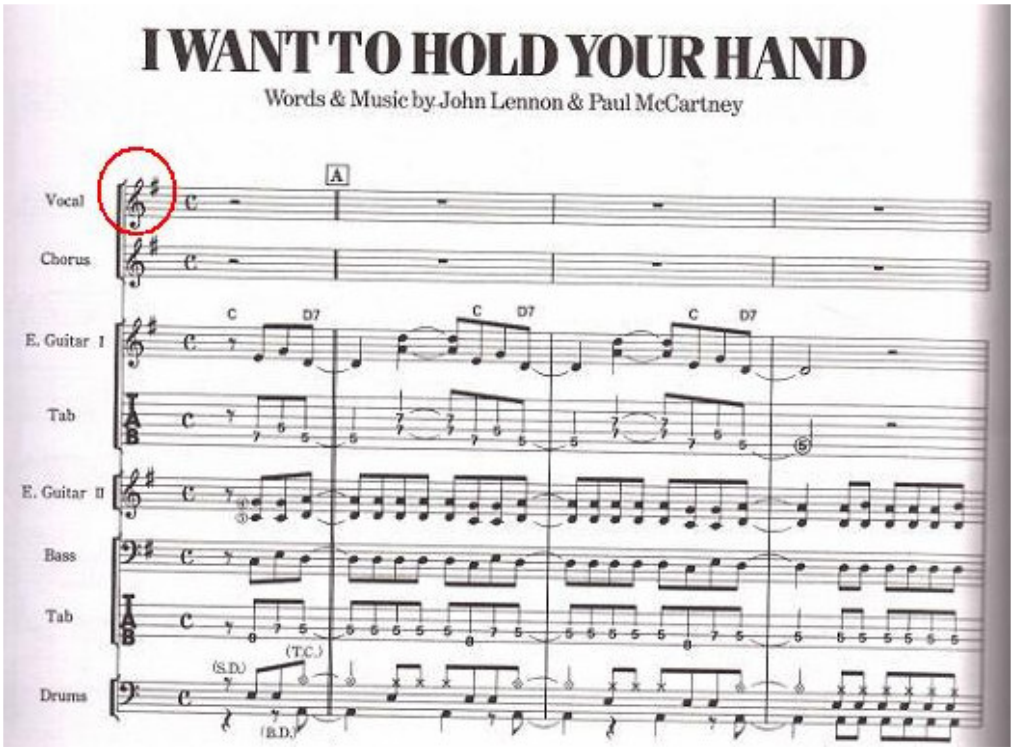
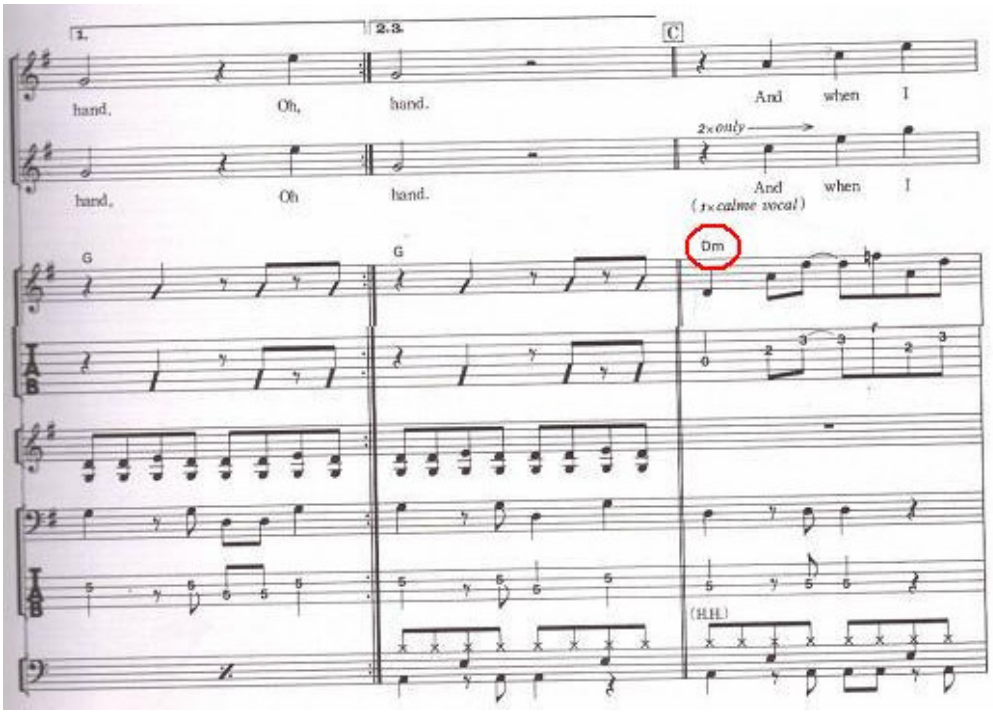


Figure1: the key is G major. (G, A, B, C, D, E, F#).

Figure2: Here is a chord not in the right key: D minor (it should be D major).



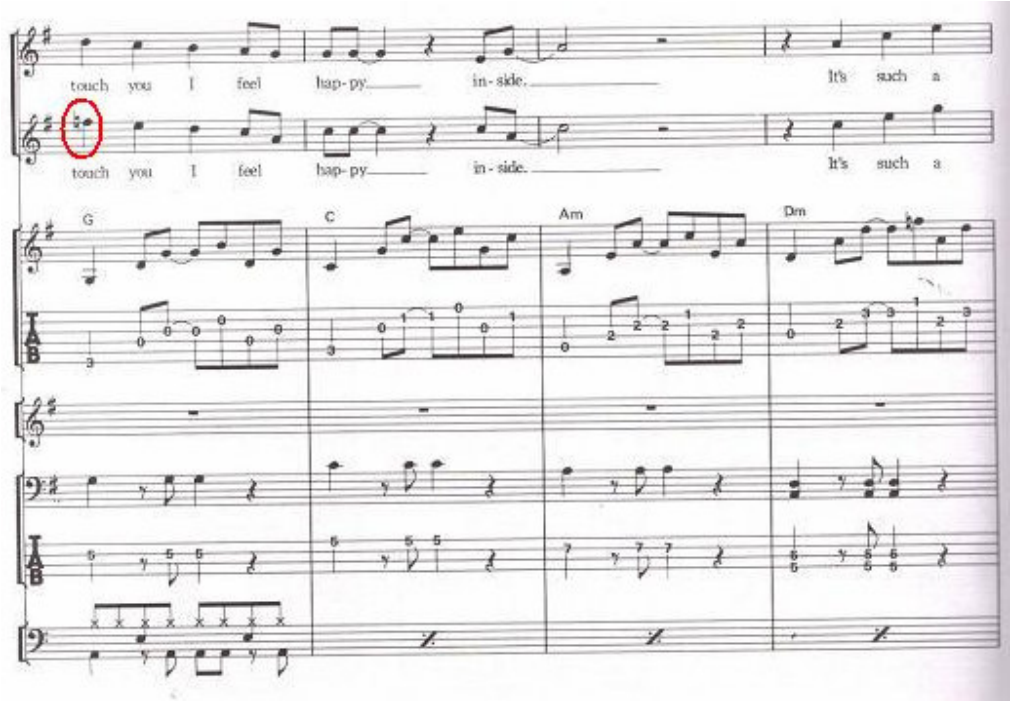


Figure3: F# is changed with F. With a G chord, F is used to get the 7th .

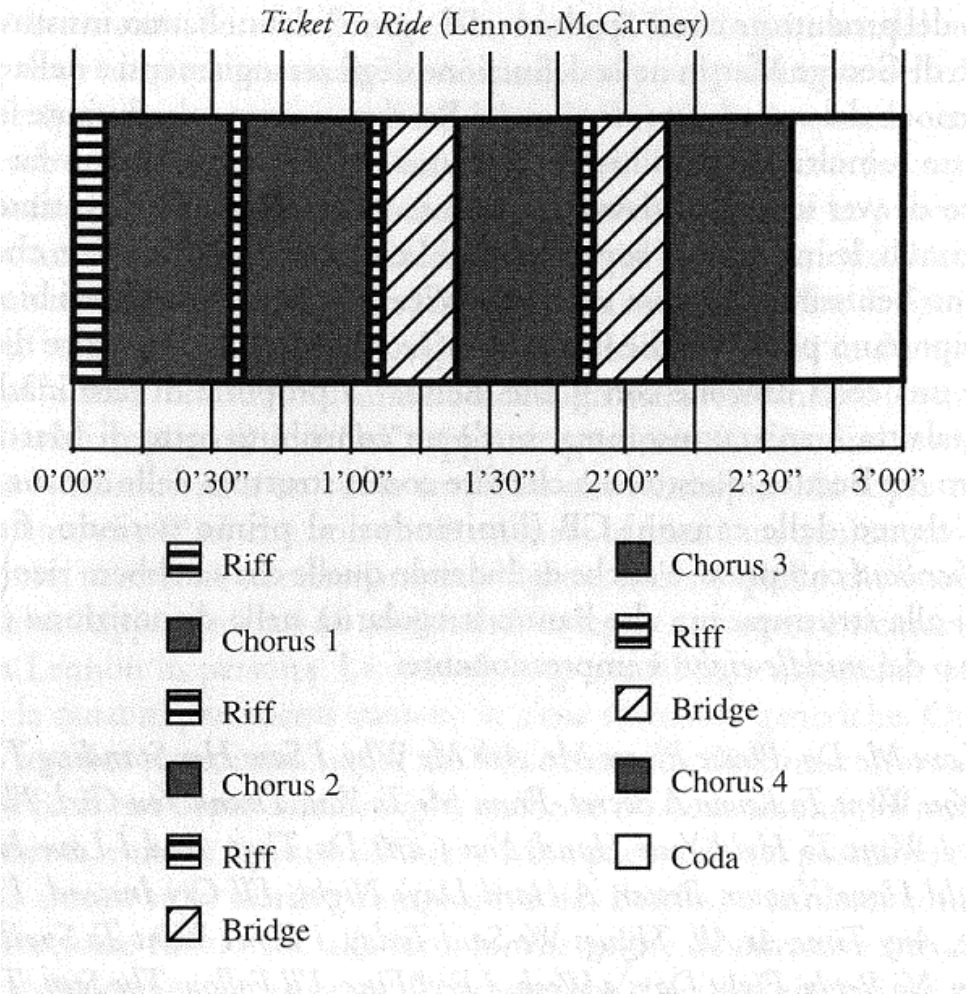


Figure4: Ticket to ride: song structure.

APPENDIX 4

CD TRACK LIST:

1. I Want To Hold Your Hands
2. Ticket To Ride
3. Tomorrow Never Knows
4. Strawberry Fields Forever
5. Loop 1: Paul laughing
6. Loop 2: Chord B flat major
7. Loop 3: Mellotron 1
8. Loop 4: Mellotron 2 (a drum sound has been recorded on the left channel in order to hear the 6/8 tempo)
9. Loop 5: Sitar (original)
10. Sitar (reversed and time stretched in order to hear the original sitar sound)
11. Guitar solo (from Taxman, for Tomorrow Never Knows; original)
12. Guitar solo (from Taxman, for Tomorrow Never Knows; reversed and pitch shifted to the original key: D)
13. Guitar solo (original from Taxman)
14. Tabla loops
15. Tomorrow Never Knows (unpublished version)
16. Strawberry Fields Forever (demo version)
17. Strawberry Fields Forever (first version)
18. Strawberry Fields Forever (take 7)
19. Guitar solo (I'm Only Sleeping, original)
20. Guitar solo (I'm Only Sleeping, reversed)
21. Strawberry Fields Forever (vox & guitar, recorded nowadays at 90 bpm, key A)
22. Strawberry Fields Forever (vox & guitar, recorded nowadays at 100 bpm, key B)
23. Strawberry Fields Forever, "editing remake"; (Pro Tools editing; pitch shift & time stretching on tracks 19 and 20 to get them to 95 bpm and key B flat)
24. Strawberry Fields Forever (original version, each part has been time stretched and pitch shifted so that they sound as before the editing made by Martin)
25. Concrete music: Pierre Schaeffer - etude aux chemins de fer
26. Let Forever Be, Chemical Brothers

BIBLIOGRAPHY

- Lewisohn Mark, The Beatles: Recording Sessions, Harmony Books, New York, 1990;
- Martin George, Hornsby Jeremy, All You Need Is Ears, St. Martin's Press, New York, 1979;
- Ian Mcdonald, Revolution In The Head: The Beatles Records Of The Sixties, Fourth Estate, London, 1994;
- Mark Hertsgaard, A Day In The Life – The Music and Artistry of the Beatles, 1995;
- Franco Fabbri, Il Suono In Cui Viviamo, Arcana Musica, Roma, 2002;
- Chicco, Mauriglio, La Nascita Della Pop-song , Ed. Migale & Bassi, Sondrio, 2000.
- Maureen Droney, Mix Masters: Platinum Engineers Reveal Secrets For Success
- The Beatles Score;

DISCOGRAPHY

- The Beatles / 1962-1966, CD1, CD2, EMI Records Ltd;
- The Beatles / 1967-1970, CD1, CD2, EMI Records Ltd;
- The Beatles, Revolver, EMI Records Ltd;
- The Beatles, Anthology 2, CD1, CD2, EMI Records Ltd;
- Pierre Schaeffer, etude aux chemins de fer;
- Chemical Brothers, Let Forever Be.

SOFTWARES

- Pro Tools LE 6.4;
- Fruity Loops 5.0;
- Sonar 4;
- Sound Forge 7.0;
- Cool Edit Pro 2.0;
- Microsoft Word.