

The history of recording technology

As part of the requirement to place your knowledge into the context of popular music, the exam board require you to know about the development of recording technology over time.

Edexcel has divided this into five distinct historical periods of technological development. These are:

- Direct to tape **mono** recording (c.1950 – 1963)
- Early multitrack recording (c.1964 – 1969)
- Large-scale analogue multitrack (c.1968 – 1995)
- Digital recording and **sequencing** (c.1980 – present day)
- Digital Audio Workstations (**DAW**) and emerging technologies (c.1996 – present day).

These periods of time and technology are designed to help you reference the appropriate technology that would have been used to create the recording in Section B. When listening to the provided track you need to refer to the technology that would have been used to make it, how this can be heard in the track, how it was relevant to the track and other appropriate examples that should be included.

Direct to tape mono recording (c.1950 – 1963)

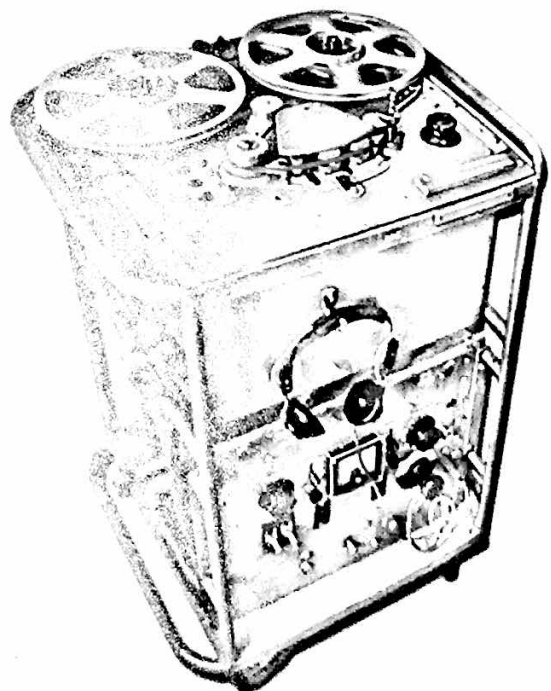
Early recordings from the 1950s were pretty basic affairs and required the artists to perform their complete performance in one take. The artists would assemble in a live room, engineers would place a small number of microphones on them and connect them to a small mixing desk.

These signals would be mixed live, have processing added to them and then be recorded to tape. Very little post-production was available at this time and anything that was applied would essentially have to be applied to the whole mix.

Tape machines at this time in studios were commonly **stereo** machines, but the final mixes were finished as mono productions. The stereo machines would often be used to capture the lead vocal on one **channel** and everything else onto the other channel to allow the engineer retrospectively to change the level of the vocal relative to the backing, but once committed to tape, the recording was largely fixed.

When studios did not have enough microphones or channels on a mixer available to capture everything individually, they would capture the ambient sound, balance the microphones carefully, and position the different sound sources at appropriate distances from the microphones to capture the correct balance.

This method of recording, although offering very little post-production, encouraged the performers to be very accurate in their playing. Any errors in performance would be captured, potentially ruining a take, meaning that the entire performance would have to be re-done or, possibly, that the mistake would end up on the finished recording.

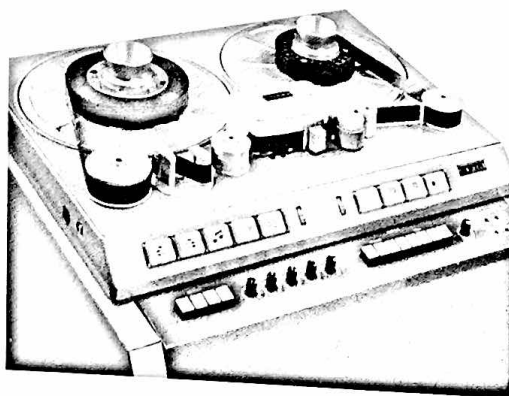


An EMI RD4/2 used by the BBC: essentially an EMI TR-90 in a customised trolley with a choice of mono or stereo heads.

Multiple **takes** were common: performers would record the entire song from beginning to end as many as ten times. Any time something went wrong they would record another take, ultimately choosing the best of the lot. Basic editing was possible, and the splicing of tape could combine different elements of a recording: if a performance had an appropriate gap or section in which an edit would go unnoticed then engineers could combine different takes. However, this was relatively uncommon in popular music recordings at this time, and engineers would normally capture complete performances.

Early multitrack recording (c.1964 - 1969)

By the early 1960s, multitrack machines were becoming more common in professional studios and musicians and engineers began to record instrumental parts separately more frequently. Performers would normally still perform together to record the basic track, but it allowed some separation of the parts so as to re-blend and to apply post-production techniques and processing to the parts independently and retrospectively.



A Studer J37 used in the 1960s

Early multitrack machines could record three or four tracks simultaneously: engineers would continue to record lead vocals to one track and then spread the remaining parts across the other tracks. In addition to the ability to balance and process parts separately, if one particular part on a song needed to be re-recorded, this was now possible. This technique became known as 'dropping-in' and 'dropping-out' as the engineer started and stopped the recording at the relevant point in a song. This feature meant that if a complete song had been recorded but there was one wrong note in one part, then just this part could be re-recorded for the relevant section rather than every performer having to record the complete song.

As with early **mono** recording, there was a lot of sub-mixing taking place during the initial capture prior to the sound reaching the tape. Drums would normally have several microphones to capture them but only one track on the tape machine.

This period of technological innovation also coincided with more musically ambitious recordings by artists and **producers** who wanted to record songs that included keyboards, multiple guitar parts and even entire orchestras as well as the 'traditional' band line-up. Larger ensembles would have to be recorded as **stereo** ambient recordings; close miked larger ensembles could not be captured live because the number of microphones and mixing channels required would not be available to sub-mix before the tape machine.

In order to record more layers of instruments on tape machines that had limited numbers of tracks, engineers used to **bounce down** their mixes while recording and mixing. This meant that the music would be recorded onto several tracks of a tape machine and once full, the engineer would create a mix of these tracks and record them to an empty track on another tape machine. This process theoretically allows an infinite number of tracks to be captured. The engineer balances, applies processing to the already recorded tracks, bounces them to a track on a new tape and then records additional parts on the empty tracks on the new tape. It was normal practice to run the tape machines at roughly the same speed for compatibility and tuning. The band was normally recorded first, then bounced onto one track. On a four-track recorder, this would leave the other three tracks, which were often used for vocal **overdubs**.

The process of bouncing down offered a solution for artistic vision but did carry many drawbacks. Once a sub-mix had been committed to the new track it was fixed and could not

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be altered without re-recording the additional parts that had been captured alongside it. This meant that **producers** and artists had to be entirely happy with all aspects of the sound before they could move on.

Another problem came from the synchronisation between machines. Tape machines are analogue devices and have motors within them. Therefore, if one tape machine is playing slightly faster or slower than the other it will change the pitch and speed of the recording when played back on the other machine. Recording engineers at this time were well practised at adjusting tape machines and would spend a long time ensuring that machines were running exactly in sync and that there was no slip in the timing and tuning because of the tape machines. Occasionally artists would use this slip in timing for their artistic needs: *Strawberry Fields Forever* by the Beatles is actually a combination of two separate tapes in different keys in which one had been sped-up and the other slowed down so that they met in the middle!

The final drawback of this process was the potential for increased background noise on the recording. Every time an engineer **bounced** the recording down to a new track there was the potential to add noise to the recording, so extra care was taken to ensure that no unnecessary **noise** was added that might exacerbate this problem. Regardless, each time the recording was bounced down or transferred to another tape, the amount of hiss would increase.

By the end of the 1960s, 8-track and 16-track machines were becoming more common and began to appear in professional studios. The increased number of available tracks meant that engineers didn't necessarily have to bounce down tracks as part of the recording process.

Large-scale analogue multitrack (c.1968 - 1995)

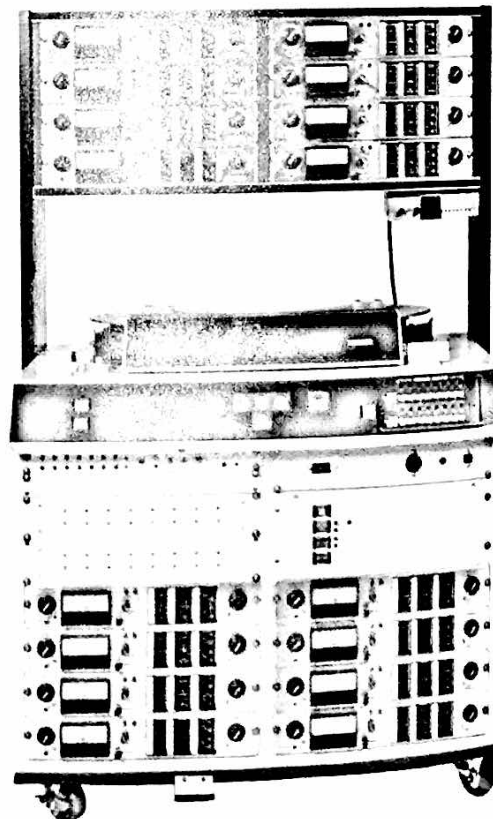
From the late 1960s, larger tape machines were becoming readily available within studios, and machines that featured 8 and 16 tracks were becoming commonplace.

These professional studio machines used 2-inch tape rather than the 1/4-inch tape common on domestic stereo machines. This larger format tape allowed for more tracks in the record head to be used simultaneously and for a greater number of tracks to be recorded on a single tape.

These larger machines encouraged performers to experiment with bigger productions that used more instruments and a greater number of microphones on instruments. This increase in tracks also allowed musicians and performers to have greater separation between parts when recording. It allowed each drum to be recorded on an individual track and for **overdubbing** to become normal practice within recording.

This development in recording technology meant it was less important if a musician made a mistake during recording and that parts that needed replacing after the initial recording could be re-done easily.

It also meant that arrangements did not need to be finalised before the recording process and could evolve during the production phase. Artists in the 1970s would often spend large amounts of time developing their songs within the studio and creating elaborate arrangements that differed vastly from the original



A 16 track Ampex MM-1000, introduced in 1967

COMPONENT 3: LISTENING & ANALYSING

song ideas. Examples of this include *The Chain* by Fleetwood Mac. The band scrapped the original verse and chorus and wrote new sections from the riff section that appears at the end of the song. This is the only section that was kept from the original song.

Synchronisation also improved alongside the size of the tape machines and this allowed bands to link more than one tape machine together to create songs that had 48 tracks. This potential for ever-increasing track counts encouraged musicians to be even more ambitious with what was possible in the studio.

Obviously as the number of tracks it was possible to capture increased, the associated technology needed to produce a recording also had to increase. More **channels** were required on a **mixing desk** to feed all these recordings back in, including **dynamics processing** on each channel. This led to the large-format mixing desk being present in most professional studios. Companies such as SSL and Neve specialised in these desks and fitted them with distinctive sounding pre-amps, compressors and **EQ** channels that have been used on countless recordings since. So important were these 'sounds' to production at the time that they have been emulated ever since in both hardware and software form.