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1. There are many people that have made strong statements on the technological possibilities/impossibilities they have personally discovered in the video recordings of Billy Mitchell's various game plays of Donkey Kong. All of these tests are looking for the sources of the anomalies on the Billy Mitchell videotapes. Many claim to have wired their systems exactly as Billy Mitchell did but, in the end, fail to achieve the same anomalies. Here are some of my opinions on these issues.
  - a) When Billy is recording from the arcade machine running at 60 fps (frames per second), he plugs that 60 fps stream into a Two Bit Converter box (the converter) and the converter outputs a 30 fps stream to a VHS VCR for recording. There is no apparent sync signal from the 60 fps device to the converter box outputting a 30 fps stream. The purpose of the sync signal would be to make sure there is some kind of frame alignment. Without the sync signal and frame alignment, we actually don't know what the converter is really doing. If we had frame alignment, we would expect that two frames from the 60 fps stream would be used to create one frame in some fashion. If we don't have perfect frame alignment, then we are going to see visual artifacts such as the anomalies at issue. And all of the analyses of the Billy Mitchell tapes rest on anomalies recorded in this fashion.
  - b) Another issue not well addressed is that of component aging. The Nintendo Donkey Kong boards are old and their various electronic parts are aging at different rates. As those components near failure, the potential for visual artifacts increases. This means there is no way to compare different Donkey Kong boards as their component failures most likely are in different parts. This includes the power supplies that power the Donkey Kong boards. As those power supplies age, we have no way of measuring how that aging will impact the Donkey Kong board's operations and visual display. As such, there may not be any way to compare recordings from the same board done at different times. In my opinion component aging could produce the anomalies at issue.
  - c) Another issue brought to mind is that of copies of copies of videotapes. As videotapes are copied and handed out to someone who then makes copies, visual artifacts often appear as second and third generation and beyond copies are made. It is important to note that it is unknown how many generations of copies were created to arrive at the current videotapes. Another issue with respect to this is whether the videotape heads were cleaned before the copies were made, including whether Billy Mitchell was cleaning his VCR's heads before he recorded the Donkey Kong play. It is my understanding that he was not. Further, it is my understanding that Billy Mitchell recorded his tapes at long play (LP) to save on the cost of videotape. LP recordings are lower quality recordings and often record with much on tape visible noise. It is also my understanding that Billy Mitchell reuses videotapes without re-blackening the tapes beforehand. With dirty record heads, this often means that previous recording information will bleed through and be visible. In my opinion, this could produce the anomalies at issue.

- d) The wiring of test systems also seems to have the potential for causing visual anomalies. Questions like, “do the video carrying cables drape over or near a power supply?” and “are the cables carrying the video shielded cables or unshielded cables?” do not seem well answered. These scenarios could also produce the anomalies at issue.
- e) Component aging with respect to the Two Bit Converter is also a large issue. Recently, Neil Hernandez obtained a Two Bit Converter from Billy Mitchell’s garage in Florida and attempted to get it working with a Donkey Kong machine. It is my understanding that the converter had been sitting in Billy Mitchell’s un-airconditioned garage for many years. The initial connection showed completely wrong colors so Neil decided to see if he could repair the converter. Neil’s instincts as an arcade game technician told him he should start with the capacitors. Neil changed out the capacitors in the converter and as a result had an almost perfect picture output with proper colors. With replacing just the capacitors, Neil saw the “girder finger” on the monitor receiving the output from the rebuilt converter. Neil took one still picture of that girder. A copy of that picture is attached. Neil then replaced the old resistors on the converter board. When he completed that replacement of the resistors, the “girder finger” was no longer present. So, component failure from the old resistors produced the “girder finger” in the converter in this case. Neil hypothesizes that the decaying resistors were outputting the wrong voltage and the new resistors fixed that. In my opinion this is a reasonable hypothesis.

I asked Neil Hernandez to rebuild the converter with the old resistors to see if we could get a consistent “girder finger” output from that converter to the connected monitor. That experiment failed likely because the combination of heat from the soldering gun and the fragility of the resistors finally made them completely stop working, with the converter failing to work at all after that experiment.

However, Mr. Hernandez’s experiment, which I saw recordings of, depict numerous anomalies, including different numbers of girder fingers, Mario teleporting around the screen, barrels rolling the wrong directions including uphill, pies disappearing, and the hammer not vanishing when it is dropped. These resulting anomalies are consistent with my expert opinion that the game play on the subject video tapes, including the anomalies depicted, could be from original Donkey Kong hardware, and that the anomalies are the result of component degradation in the Two Bit converter.

- 2. So, with all of these potential sources of anomalies and with all of the differing wiring and test configurations, it seems unlikely to me that definitive answers are readily obtainable from Billy’s recorded play sessions watched and single-framed on second and third generation and beyond videotape copies. The likelihood that Two Bit Converter components would fail identically across multiple converters so that experiments could be attempted is unlikely and makes definitive answers from such tests unlikely. However, it is clear that the video tapes could depict game play on original Donkey Kong hardware despite the anomalies depicted.