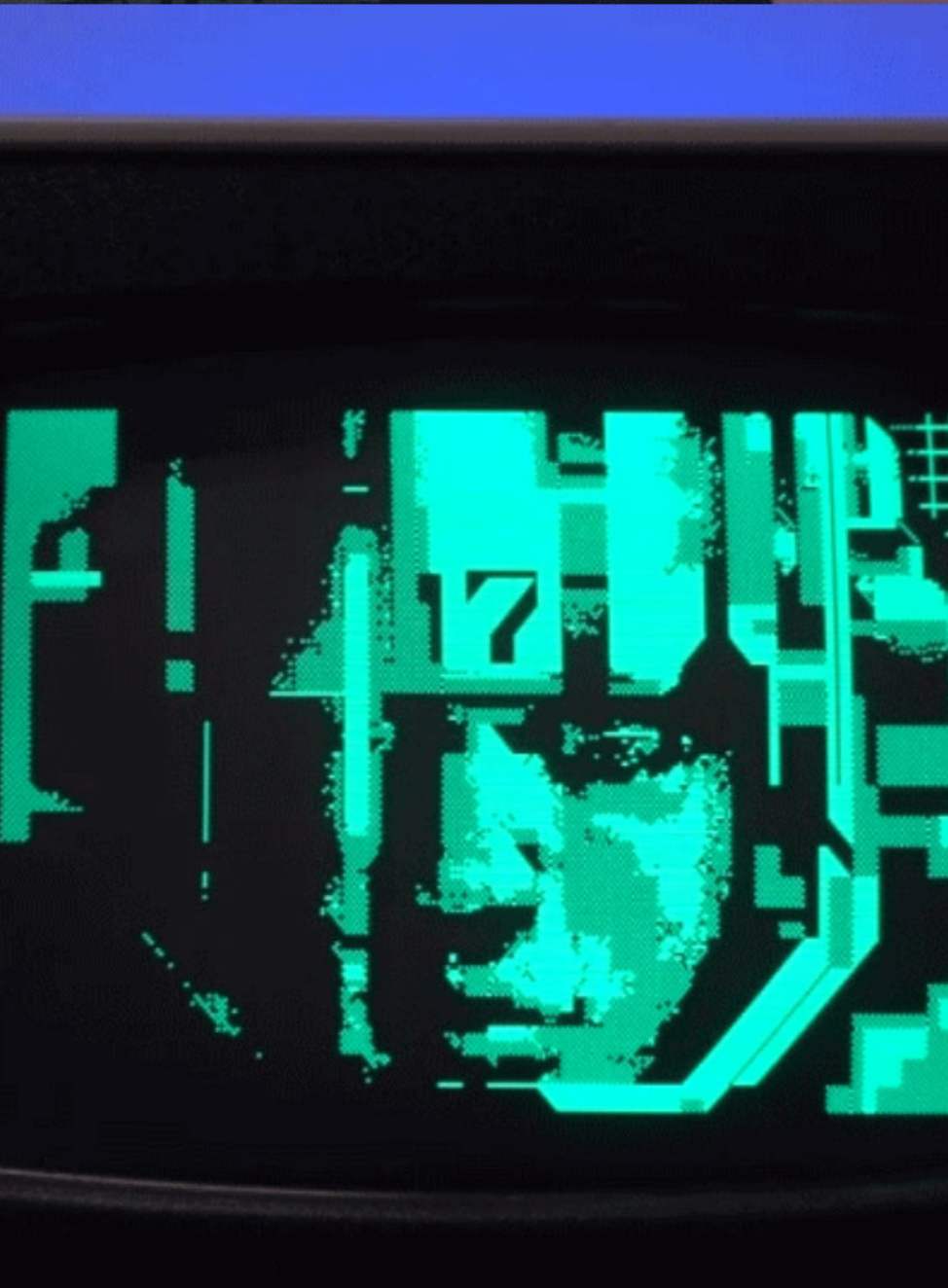


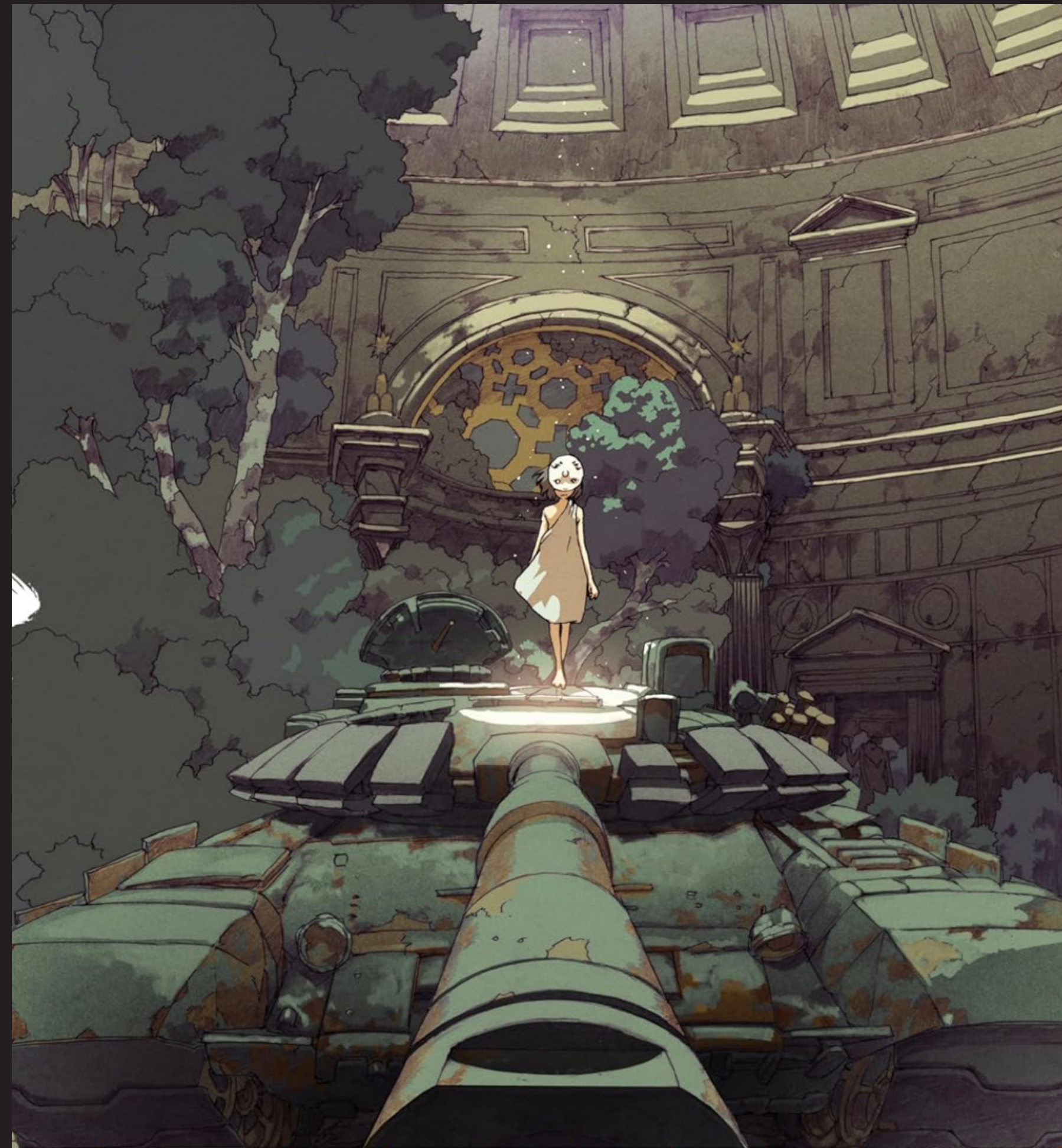
“Surviving the platonic pixel era.”

Hi, my name is LRNZ

I mostly work as a comic book artist, but I did a ton of other things as a graphic / industrial and game designer, director, animator and illustrator.



I recently published my new book, Geist Maschine Vol.02.



Geist MASCHINE

A STORY ABOUT WHAT HAPPENED IN THE FUTURE

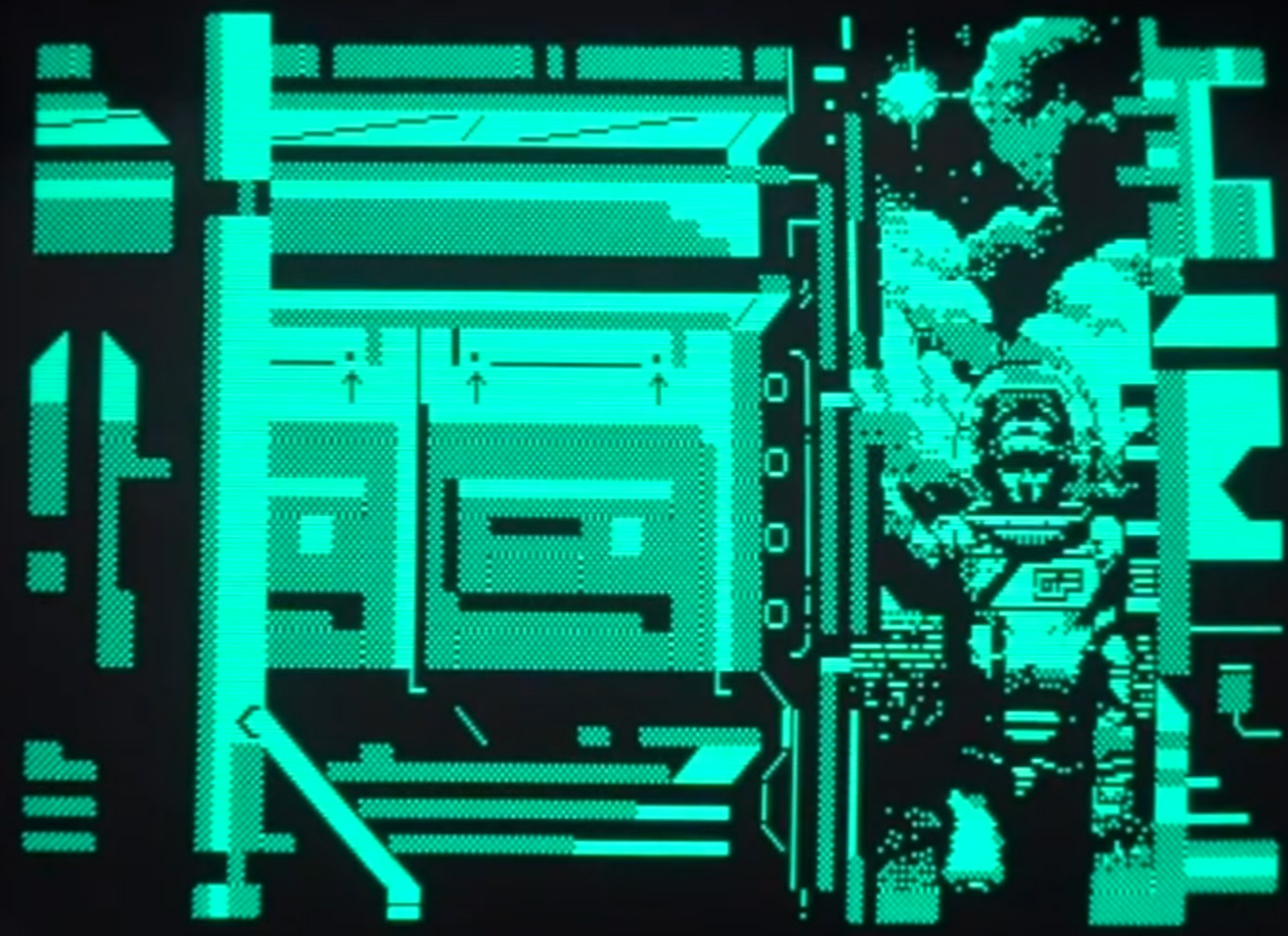


Vol.

02



I also did a couple of demos with my soul mate Elder0010 of Genesis Project having fun in trying to explore new possibilities of the never ending commodore PET series.





HERE

To get straight to the point of this panel, I have a crush for pixel art that started a long, long time ago.

I loved videogames and tried with no success to make one since I was 12, when I was lucky enough to get a used mighty commodore A500, expanded.

I'm also born in 1978, so I literally started my life in sync with the very first videogame that sported proper pixel art, with character design and such, Space Invaders.

Of course I was too young (literally 0 years old lol), but for the love of rethorics I had to point that out.

I developed a deep love and authentic artistic admiration for all the incredible artists that expressed themselves with this incredible artform, even before having the opportunity to actually paint some pixels myself.

**To my eyes they were on par with traditional illustrators
if not better.**



Videogame graphics and pixel art impressed me so much that I ended up drawing a lot of what I saw in videogames.

They were my main source of inspiration and they still are, to this day, in my artistic “Pantheon” with the greatest traditional artists.

So let's get to the main topic.

What is pixel art?

Is it still the same form of art that I used to admire as a kid?

Are there different forms and concepts of pixel art?

**Why some pixel artists are so crazy about CRT tubes?
(spoiler: I am)**

**What happens to pixel art in our day and age,
on modern devices?**

**Are we doing something wrong in the way we are keeping
this legacy alive?**

Is there anything more that we can do?

Let's get started with some basic notions.

First of all, what is a pixel?

A pixel is the minimum, discrete, digital visual unit you can control on an analog or digital raster display.

It's the atom of digital images.

**We can all agree that in theory you can't go lower than that.
In practice we may disagree but let's leave this discussion for
the end of the panel.**

Visible pixels are often associated with old, low-resolution tech. As resolution improves and processing techniques like anti-aliasing are used, pixels become much harder to distinguish.

Basically the video technology is steadily heading to the “you can’t see the pixel even if it’s still there” route.

Was the pixel, born in the electronic, digital world?

In short: yes.

But for the love of today's topic it must be pointed out that it has some notable ancestors that were mechanical and/or analog that inevitably helped define its physical form.

Mechanical televisions were invented sometime around the 20s and somehow managed to foreshadow most of the concepts that we still all love in CRT displays: resolution, vertical scan rate and the scanlines.



A spinning NIPKOW DISC presented holes that synchronized with an analog pulsing monochrome light signal so it could reproduce lines of continuous infinite shades of gray video content, quickly updating from left to right similarly to the CRT refresh mechanism.

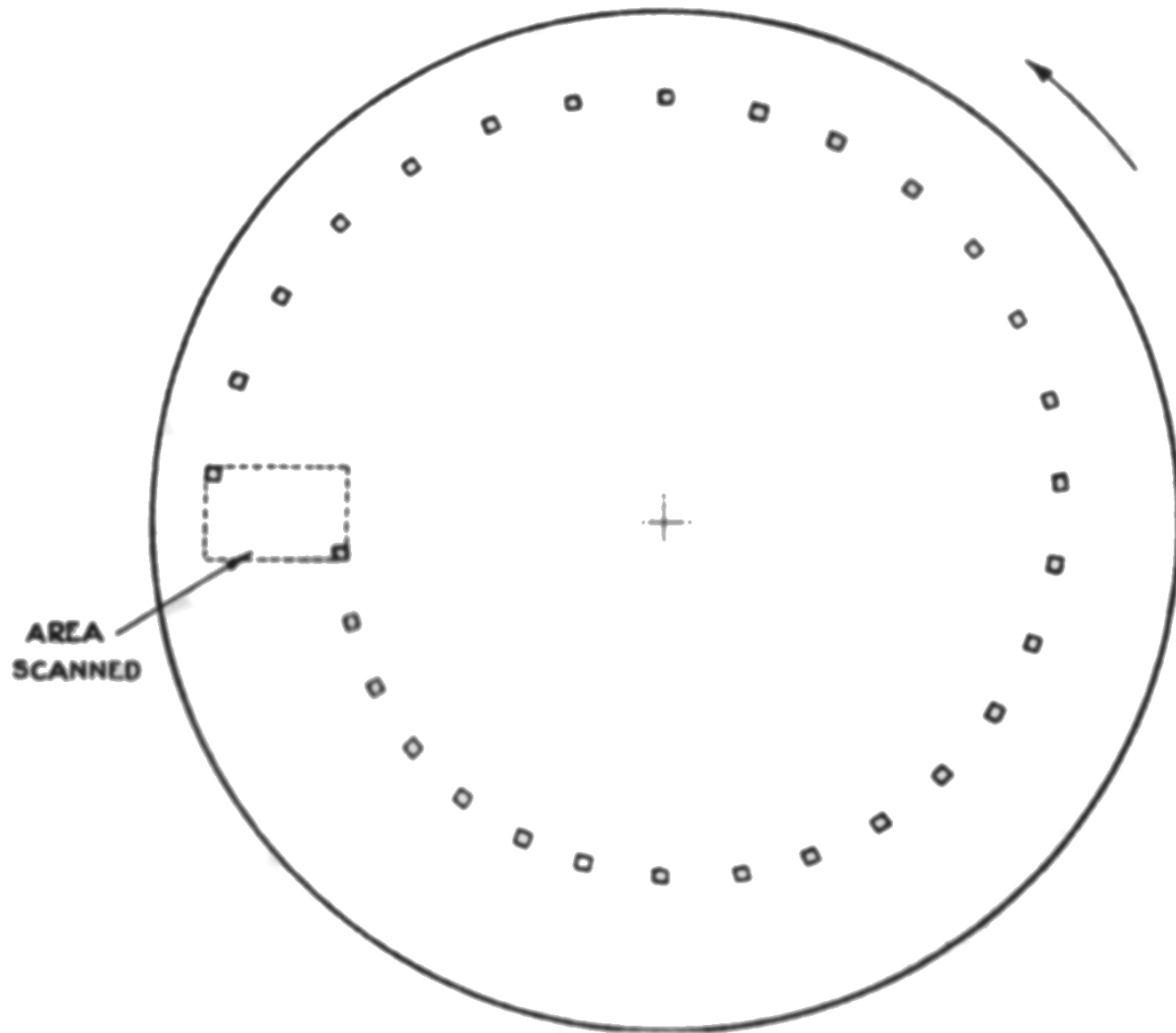
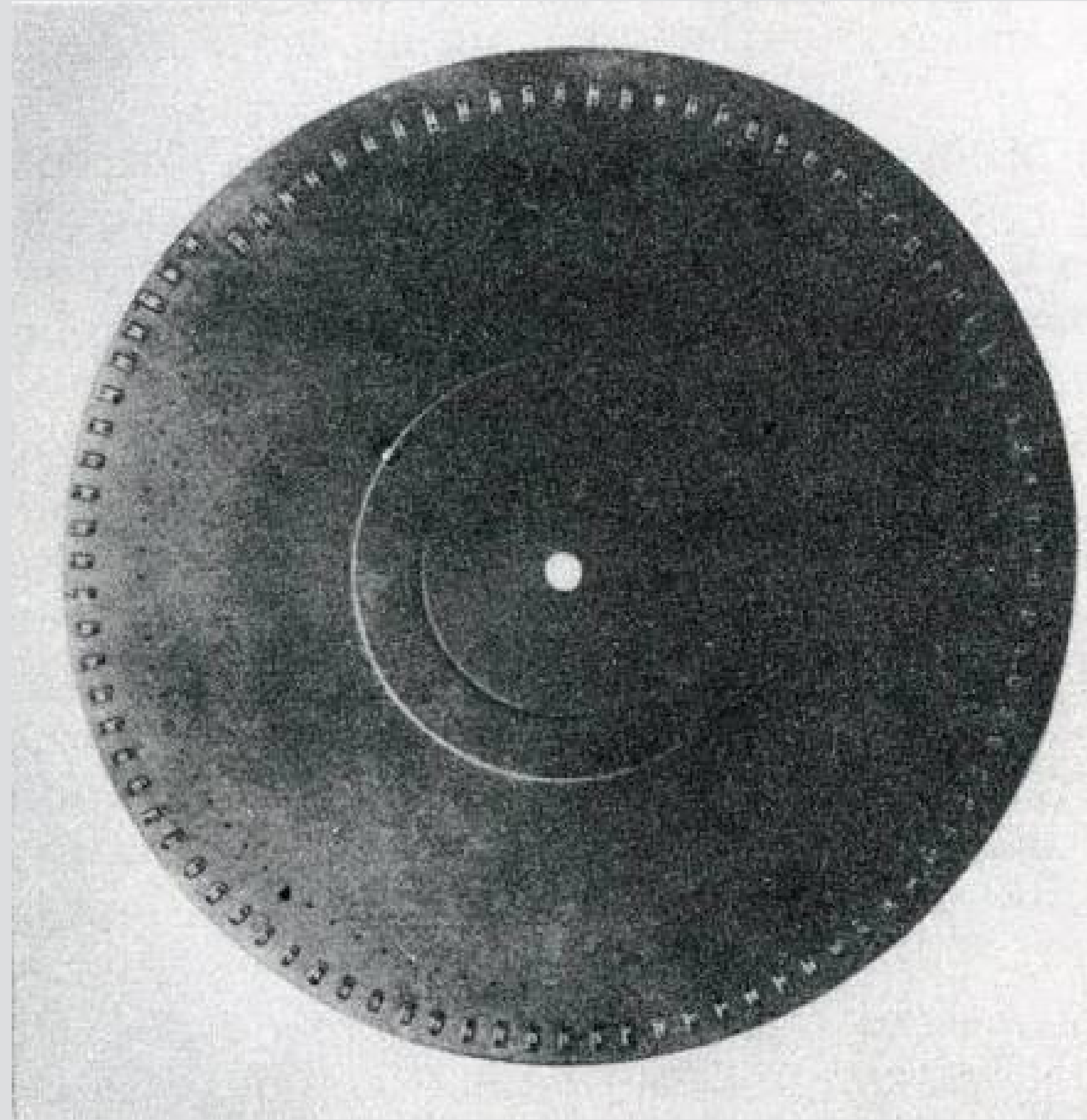


FIG 1. NIPKOW DISK

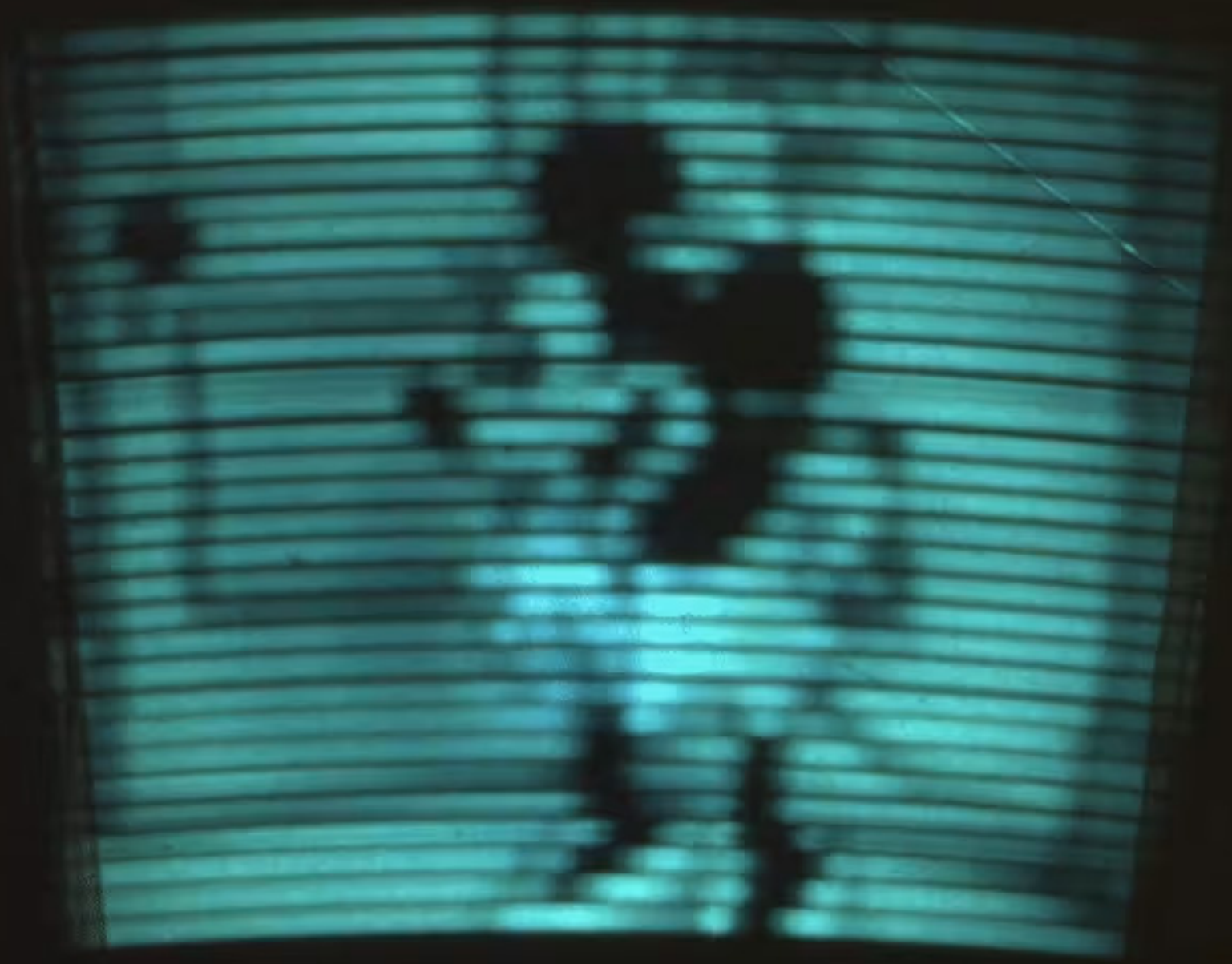
The hole dimension and the gap size between one and another introduced a very rudimentary version of our modern video resolution concept.

The Nipkow disc's holes are probably the only things to vaguely resemble pixels that we will see for years, before the electronic television set is born and connected to a computer.



**That holes on a disc were the very first, discrete, identifiable,
unique picture elements.**

Mechanical TV sets also were our first encounter with something that looked a lot like our modern idea of a scanline.



Compared to the modern PAL SD standard of 625 vertical tv lines, mechanical TVs could reproduce signals ranging mostly from 30 to 120 tv lines with peaks of 200, depending to the rotating disk size and hole detail.

**The issues that this technology posed were of course
inconceivable by today's standards.**

You needed quite a big device to visualize a very little and messy, wobbly picture, usually 5 by 6 centimeters even if there were some fairly bigger ones. Mechanical TVs were also insanely expensive and were mostly used as a public utility device, it wasn't an individual consumer product.

Even taking all these drawbacks into account, the concept of deconstructing images piece by piece, line by line, of transmitting them over time by an electric signal, being able to reconstruct them on a remote display device was already there in full effect.

It was during the consumer electronic revolution, between the late 30's and the 40s, with a little bit of chemistry and physics black magic that we happily transitioned to the cathode ray tube, the CRT.

The CRT tube was designed from the fundamentals of mechanical TVs: it eliminated the rotating disk in favour of the cathodic electron beam cannon, flyback and deflecting coils.

The CRT TV was capable of producing a way bigger, sharper and better picture overall in an exponentially smaller form factor, with no moving parts and no native resolution limits.

While technically being able to freely draw with no real resolution constraints we adopted adopted a raster scan video signal setup with the electron beam painting horizontal lines from left to right, top to bottom with an impressive speed and precision.

**This had undeniable advantages over a free, drive deflection
usage of the electron beam cannon:**

1) Easy sincronization.

the vertical raster scan time was synced to the electricity phase so you could divide the video information in frames that had all the same duration regardless if they were full of information or empty. Vector drawings take different time to be completed based on their complexity so synchronization is a very big issue.

2) Simpler way to achieve complex, photographic images.

vector images are generated with geometric information and are, in general, not capable of representing photographic content with complex shading.

**Raster scan setups solved all of these problems:
it kept the unlimited shades of gray of the analog signal, with
an image fidelity that was no match in terms of detail and
stability, with set it and forget it synchronization system.**



Sears SOLID STATE

VHF



UHF

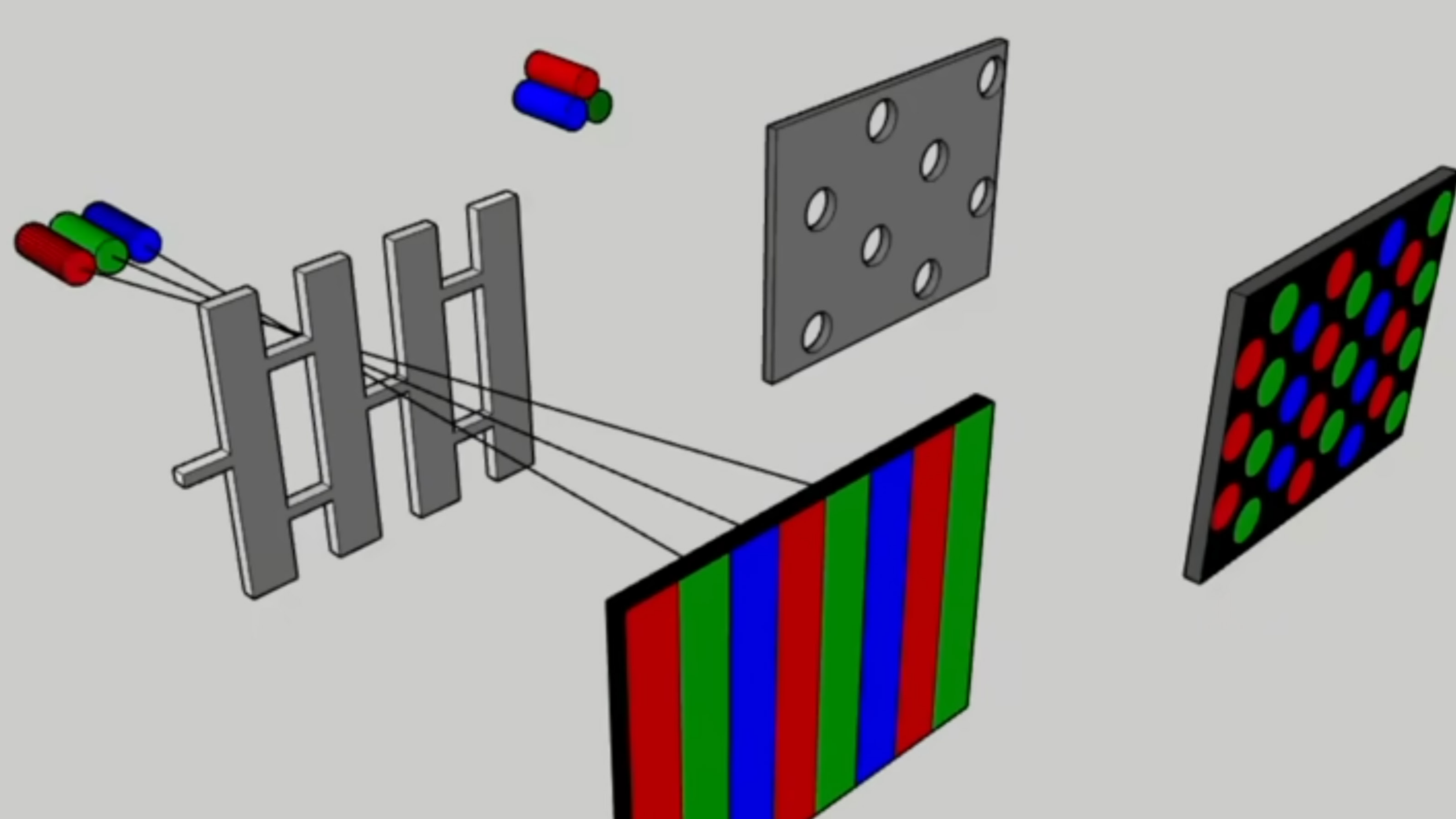


Then a long and steady era of continuous improvement that lasted something like 20 years, brought us more fundamental features of broadcast video and most importantly mass produced consumer TV sets.

Interlacing.
Broadcast video standards.

The next biggest milestone in the video display timeline was undoubtedly the introduction of color TV.

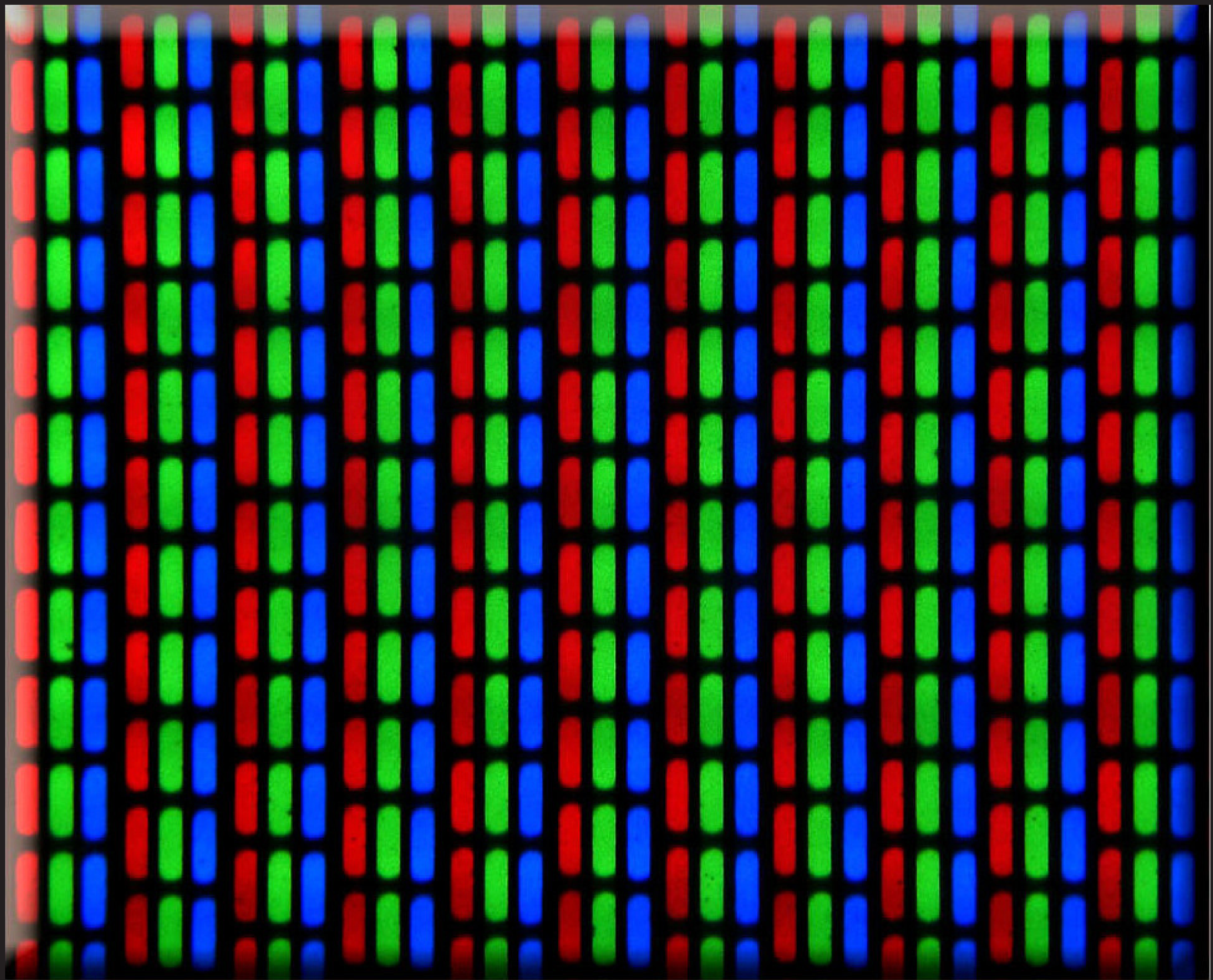
It was made possible thanks to the shadow mask system, a sort of very precise stencil pattern that made dedicated video informations emitted thru a triple electron beam cannon lit only very specific parts of the phosphor coating.



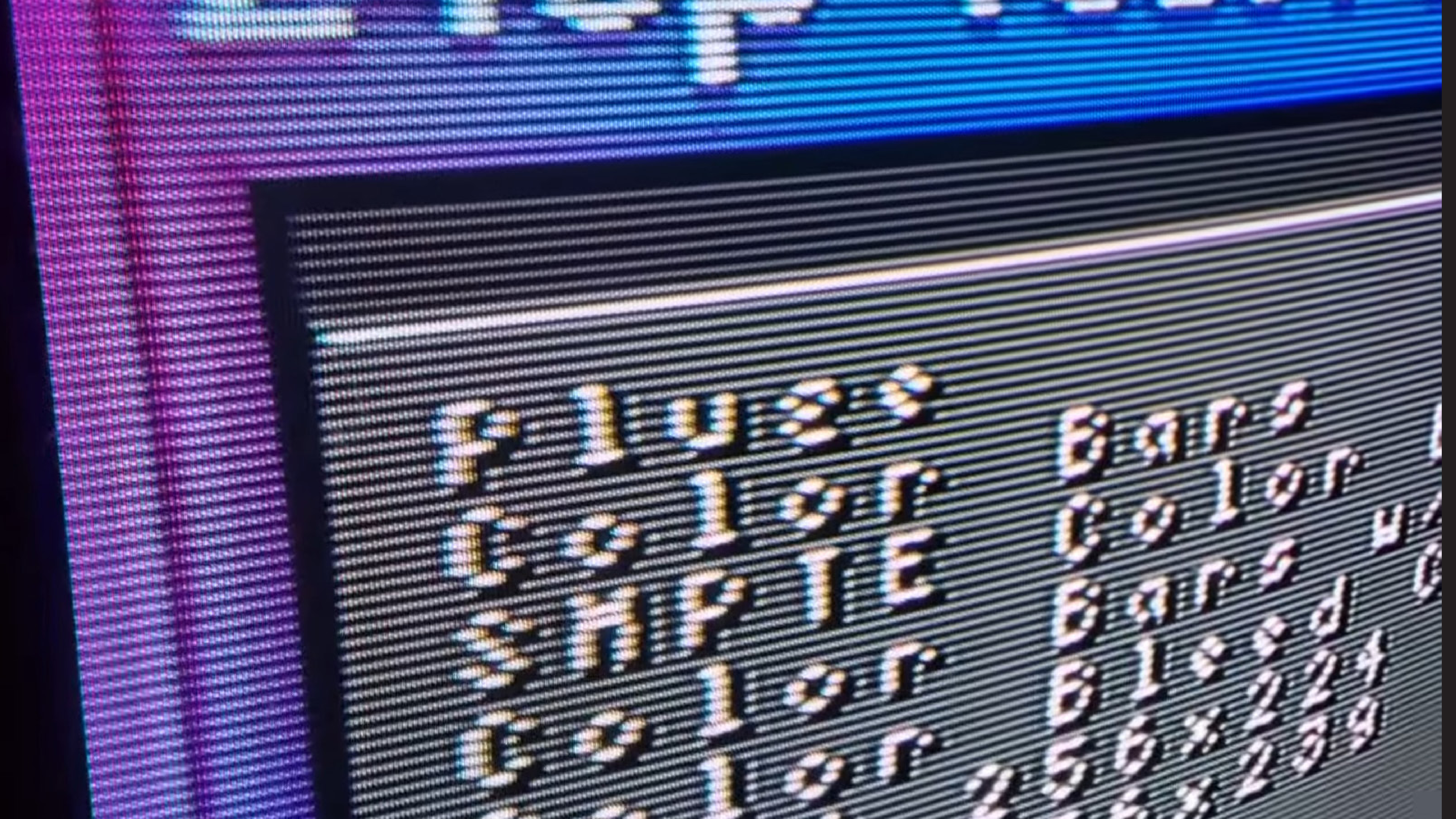
These parts were individually painted each one of a specific color: red, green and blue.

Relying on the luminous nature of phosphors, additive color synthesis made possible to approximate every color imaginable in a very convincing way.

The shadow mask (or aperture grille as it's called in SONY Trinitron displays) together with color phosphors gave us the very first perceivable visual building block of a color video image, a regular pattern of distinct and very small triadic elements.



Still, not a pixel in the proper sense.



Also, scanlines, visible horizontal dark gaps between the luminous phosphor lines artifacts that created a regular geometric pattern along the display made their first appearance as with black and white CRT TV there were no triadic elements to hit with precision, no grid or physical subdivisions.

The beam could be softer and the scanlines, while there, were kinda impossible to see with your naked eye.

This was particularly true with video small mono CRT displays like the ones used in intercom devices.

On the display side we're finally there. There's everything we need, but to meet our first, proper pixel we have to add digital computing machines to the system.

Computers and digital information made us capable of quantizing the video information into indexed, individually controllable, memorizable, discrete video elements on a xy matrix.

To put it very simple, with computers and digital images, we end talking about just video signal and raster lines and we start to talk about individual dots (again, but differently from mechanical TVs).

**Directly editable entities.
On an orthogonal grid.
With discrete, regular, positions.
With arbitrary colors.**

**And this is when our beloved pixel art became finally possible
in the proper sense:**

a CRT TV, fed with a digitally created video signal.

**A little note before we go further in this crazy deep
rabbit hole:**

Even if the pixel “thing” was born only after colour CRT TV was invented, it mostly made its first public appearances on monochrome screens.

The reasons are simple:

1) Most of end users didn't have a Color TV set (we're in the early 70's and the most significant mass update from black and white to color home sets roughly happened in the early 80's, with portable systems by the end of the decade) and connected their home computers to black and white displays.

2) The very first computer did not have a real graphic video mode, they mostly displayed text and were capable of 1bit per pixel color depth graphics. That's why they shipped mostly with green or amber displays, some of them sporting slower phosphors (that me and Elder0010 exploited in our PET demo "Ephemeral Cathodic Relay" - also we managed to do real hi res graphics with a PET but that's another story) to avoid vertical retrace flicker and reduce eye strain, I guess.

Usually, when random people talks about pixel art is intending soimething like “Visual art made of blocky, geometric, square colorful pixels like in old videogames.”

**A very informal, more educated yet superficial definition
of pixel art may be:**

**Low resolution digital visual art, where the pixel limitations
are used as distinctive, creative style.**

A more universal definition:

Digital images realized only by the deliberate juxtaposition of selected colors in a predefined regular grid array of atomic discrete positions.

A compo compliant definition:

Digital images realized only by the deliberate juxtaposition of selected colors from a limited, indexed palette in a predefined low resolution regular grid array of atomic discrete positions

**The definition I would love to read in an old school graphic
compo FAQ:**

**Digital images realized only by the deliberate juxtaposition of
selected colors from a limited, indexed palette in a predefined
low resolution regular grid array of atomic discrete positions,
exploiting all the visual artifacts generated by the display
device chosen by the artist or as defined in the compo
requirements.**

The very first piece of software ever conceived was, in a way, inspired by another very early pixel graphics file ancestor: programs saved on punch cards, for cross stitching loom machines.



The Idea to use these cards as very early computer programs came from Ada Lovelace that you should all perfectly know.

Well, back in the 80's pixel art started mostly as a paper and pencil design process that ended up being fed into arcade games by manually inputting the individual pixel color and position values in the game code.

PLAYER

1P側



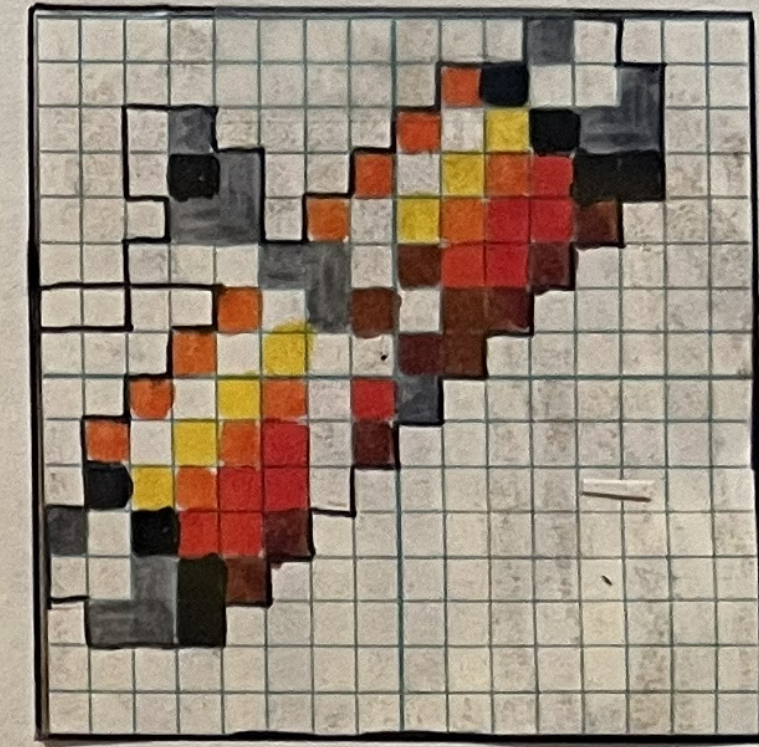
SONSON



2人目からの SONSON

4方向レバー と発射ボタン 1コ
で操作する。

敵に やられると、回転しながら
海に落ちていき、次の④が
雲に変わり現れる。(この間
当り判定なしで、弾は出る)
雲は 10秒くらいで点滅し、
2.3秒後 消える。10秒以内
でなくても、レバーを動かすと消える。



天空にある巻物
(30000 Pts)

2P側



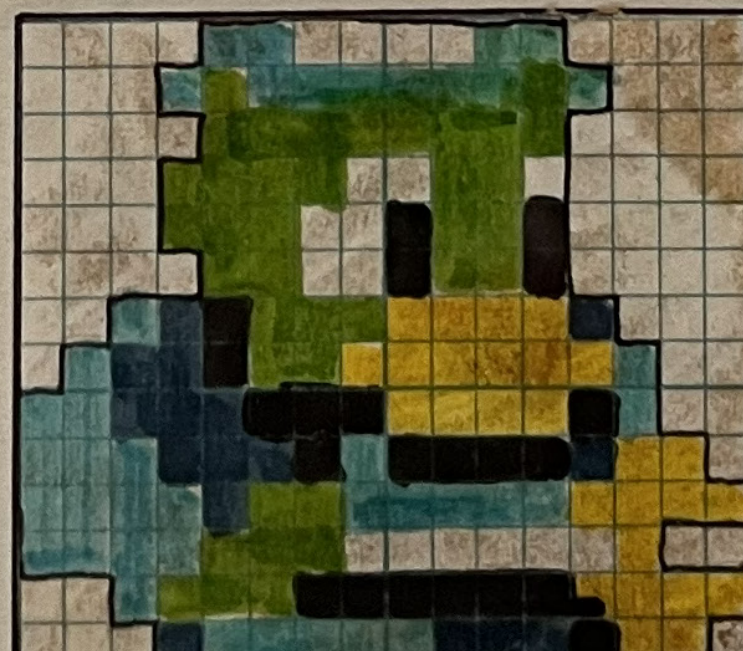
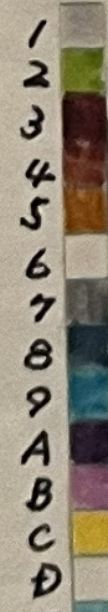
TONTON



2人目からの TONTON

プレイヤーは スタート時は 3人で、
20,000点で 1人、80,000点で
1人、以後 75,000点毎に
1人増える。表示は 4人まで。

☐ フォト、GOAL 後の ボース表示に登場。



SPECIAL BONUS CHARACTER



えりまきとかげ

1000 ~ 9000 Pts のジャンボフーズを
とりながすと 走り出てくる。
画面から消えた直後に、のがした
ジャンボフーズの半分の得点のジャンボ
フーズに変わる。

ex. 1000 → 1000
4000 → 2000
5000 → 2000

*破壊不可



HIBARI

10000 Pts のジャンボいちごを
とりながしたときに 出てくる。
5000 Pts のショートケーキに
変わる。

*破壊不可



えりまき "YASHICHI"

塔を 20 秒以内に クリアすると
看板にのって 現われる。

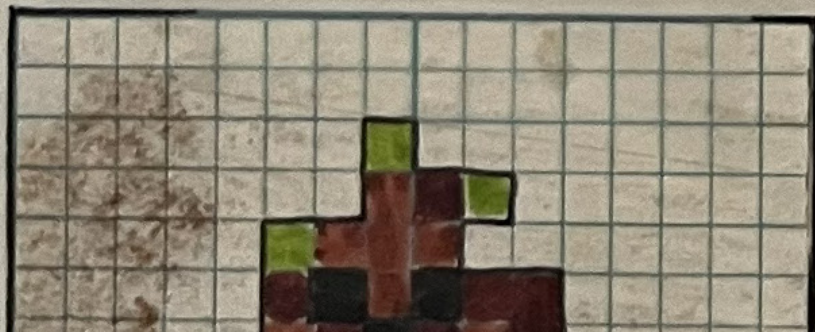
4000 ~ 10000 Pts

*「バルガス」の敵キャラの 1 つ



Magic Power!

ゴールまじの 3 か所と、看板上の
ジャンボフーズを 8 つ食べた時点
で 現われる。 ^{とる}それと
そのときの画面
上の敵が 全て ジャンボフーズに
変わる。(下図参照)



ゴールまじに 64 本 かけられている。
1 回 ゼア上を通ると 生えてきて
(500 Pts), それと とると 1000 Pts

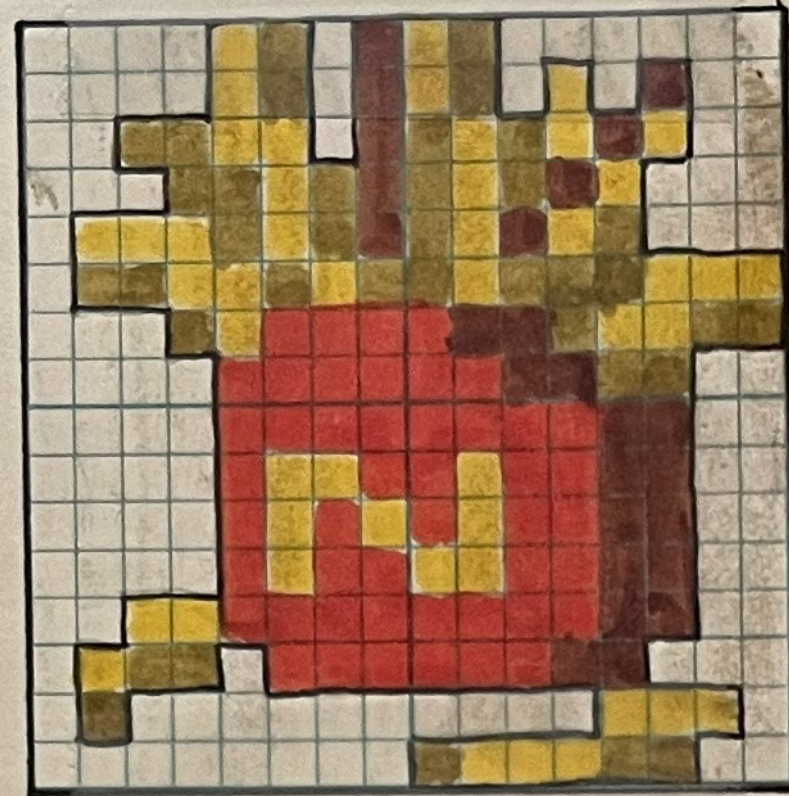


JUMBO FOODS

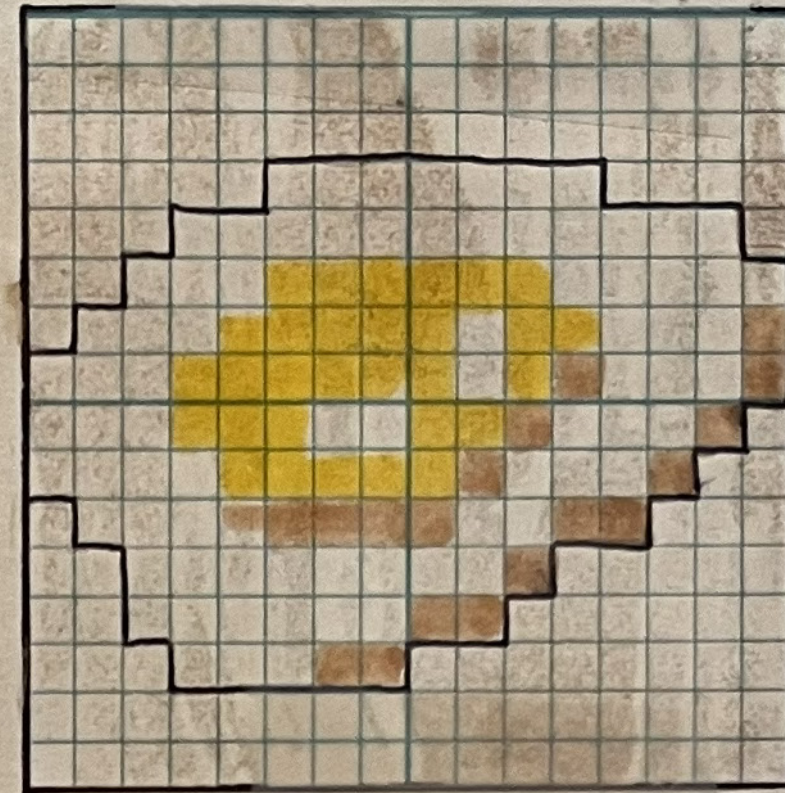
■ スモールフーズを6コとると、1コ平均の100倍のジャンボフーズが出る。



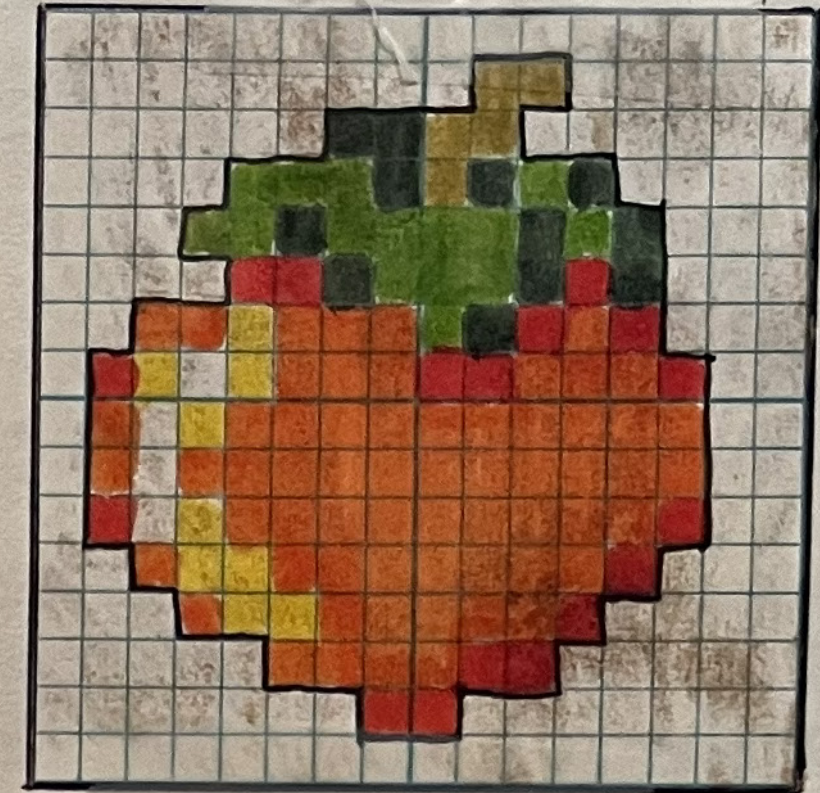
1000 にんじん



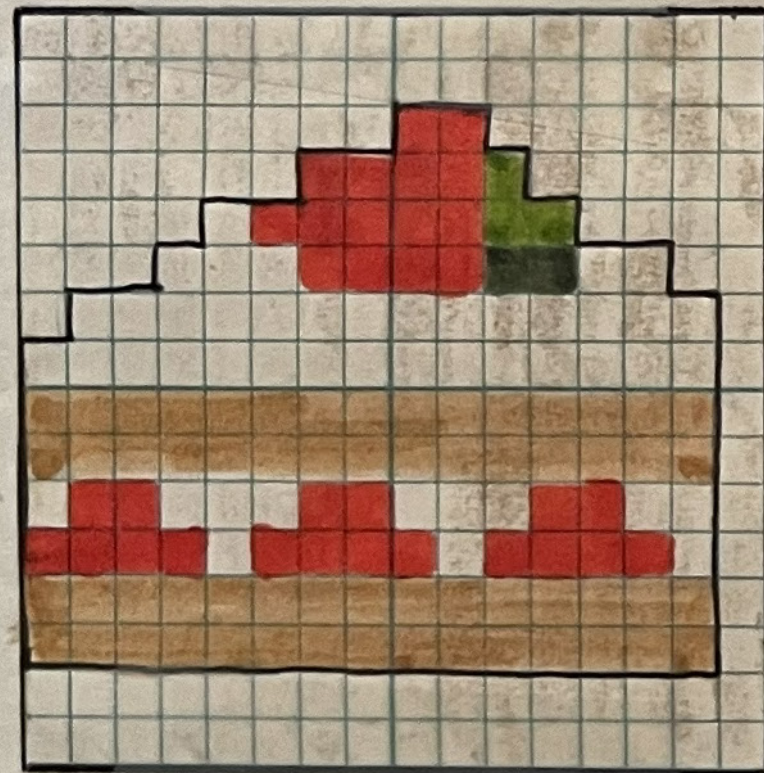
2000 フライドポテト



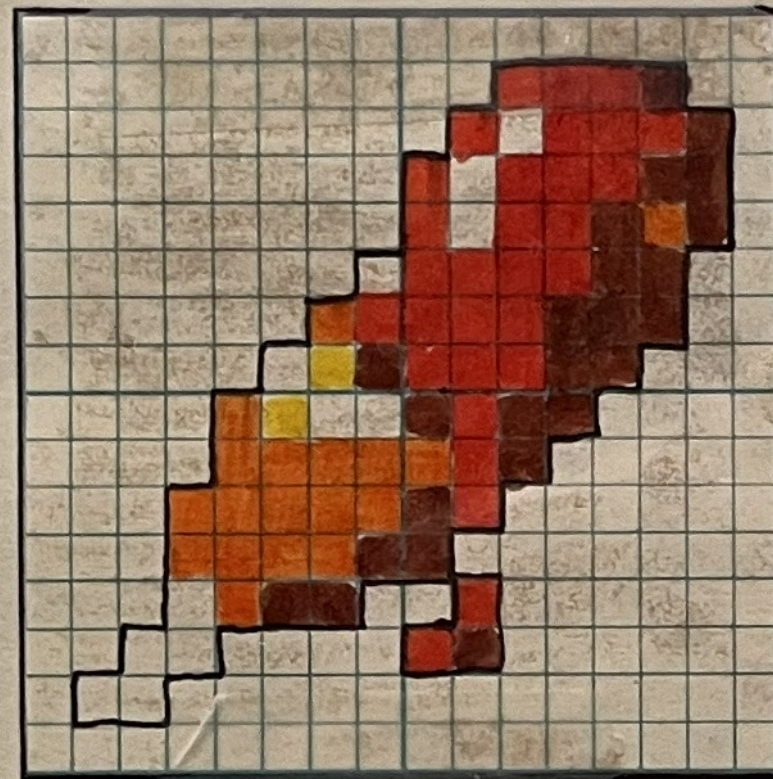
3000 目玉焼き



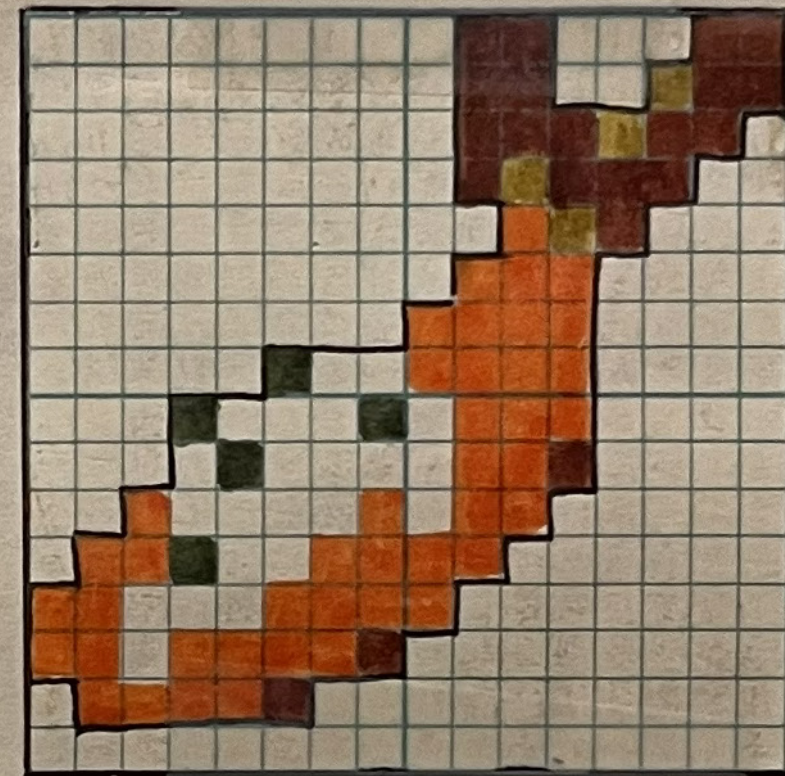
4000 柿



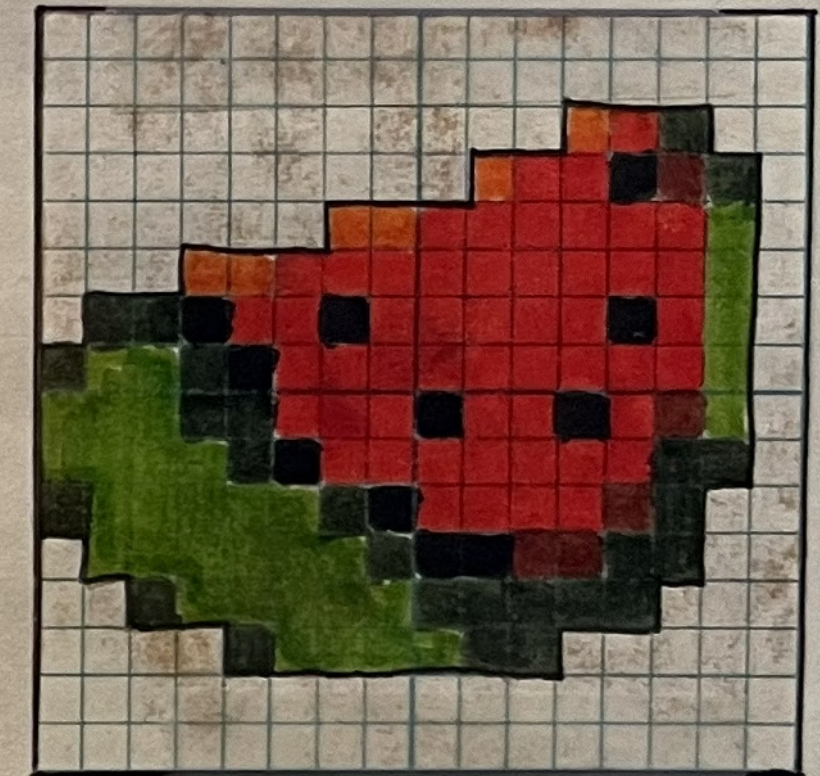
5000 ショートケーキ



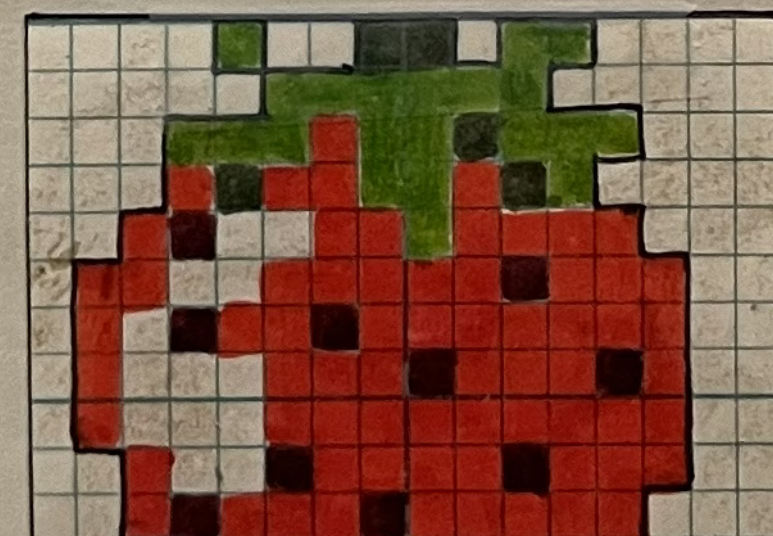
6000 フランクフルト



7000 イディライ



8000 すいか



Initially with a keyboard, later, thanks to the huge contribution by software and hardware engineers, with editors and more natural devices like lightpens or graphic tablets.

**like we just saw with the loom punch cards by ada lovelace
the artist marked squares on a paper grid painstakingly crea-
ting designs for the game graphics, defining pixel by pixel by
hand.**

During this visually limited era of arcade videogames they usually ended up being helped by the cover and commercial promotional illustrations.



Illustrators had to enhance the game graphics, sometimes trying to represent ingame elements with more artistic freedom and detail (think of Super Mario), sometimes by creating completely different and original imagery to suggest what was completely missing from the game due to technical limits.

There were some very impressive and cool illustrations trying to drive the player's imagination while he interacted with very minimal and simple ingame graphics that had very little to do with all those wonderful images.

ATARI[®] 2600[™]

DEFENDER[™]



NEW INSIDE VOL. 1
The ATARI[®] first edition
action-packed



So it was mostly drawings to plan pixel art and illustrations to give a more general and effective idea of the visual concept.

I would like to make a brief focus on two main domestic gaming platforms of the 8bit era.

The Nintendo Entertainment System (NES, or Famicom) and the Commodore 64.

These two platforms are the perfect example to introduce a new concept to our analysis.

The concept is that hardware limitations are for sure fuel for creativity, but in this specific case, hardware limitations are designed reflecting radically different visual cultures and defined two distinct branches of pixel art as a medium.

**The NES was designed in Japan.
Japanese art has some very unique characteristics:**

Highly stylized art with a lineart, it's all about graphic drawing.

**It has mostly flat, vibrant limited colours
(from Ukyio-e to anime)**

富嶽三十六景
江都駿河町
三井見世略圖

松竹舟為之景





That's why NES (and Japanese arcade games) had a higher resolution that helped graphic artists achieve anime looking linework with a wide range of flat, bright colors.



The C64 was made by western people. European and American visual culture is rooted in:

Painting realism with dynamic brush strokes that define volumes by color and light.

Natural shade of colors to catch nuances.

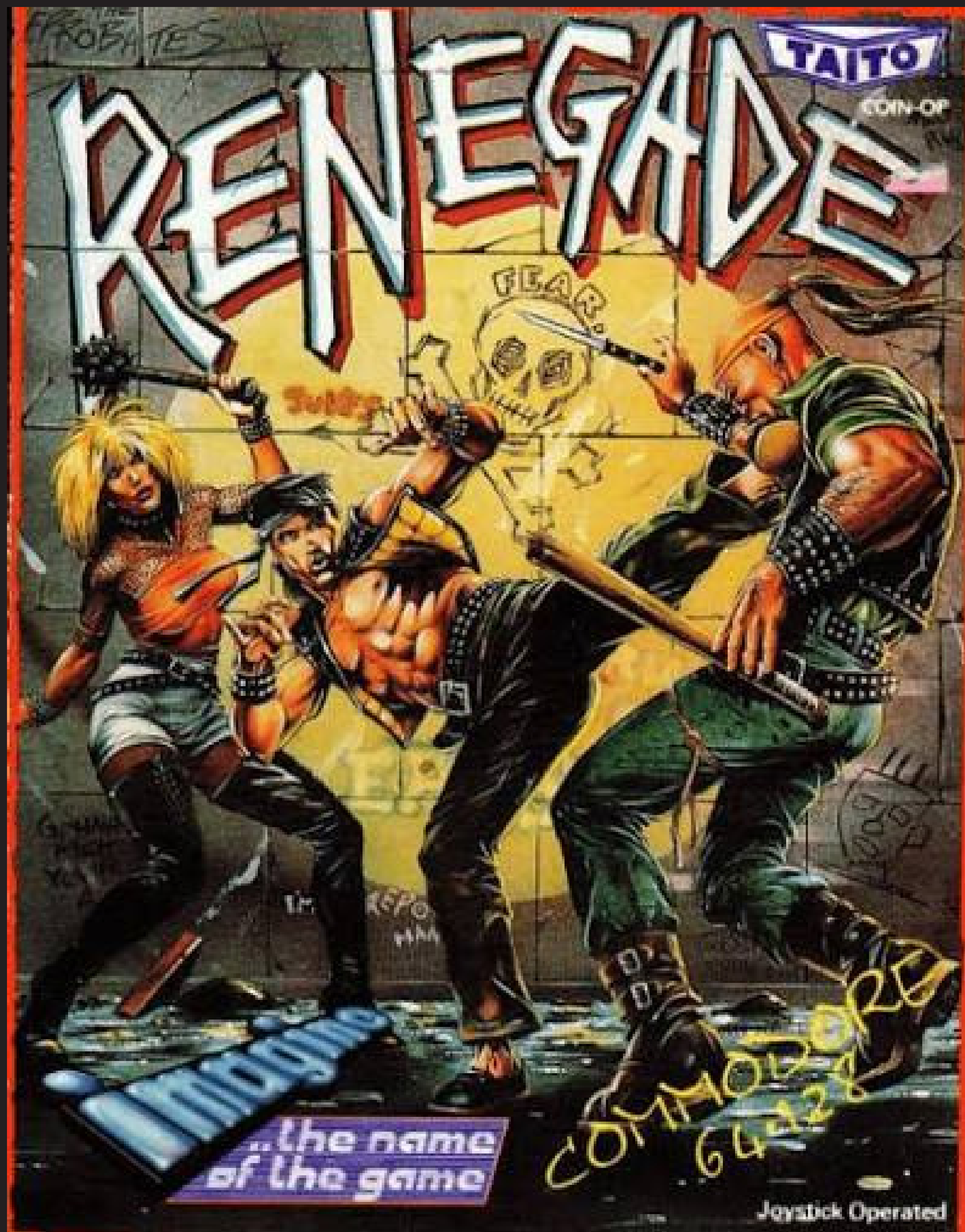
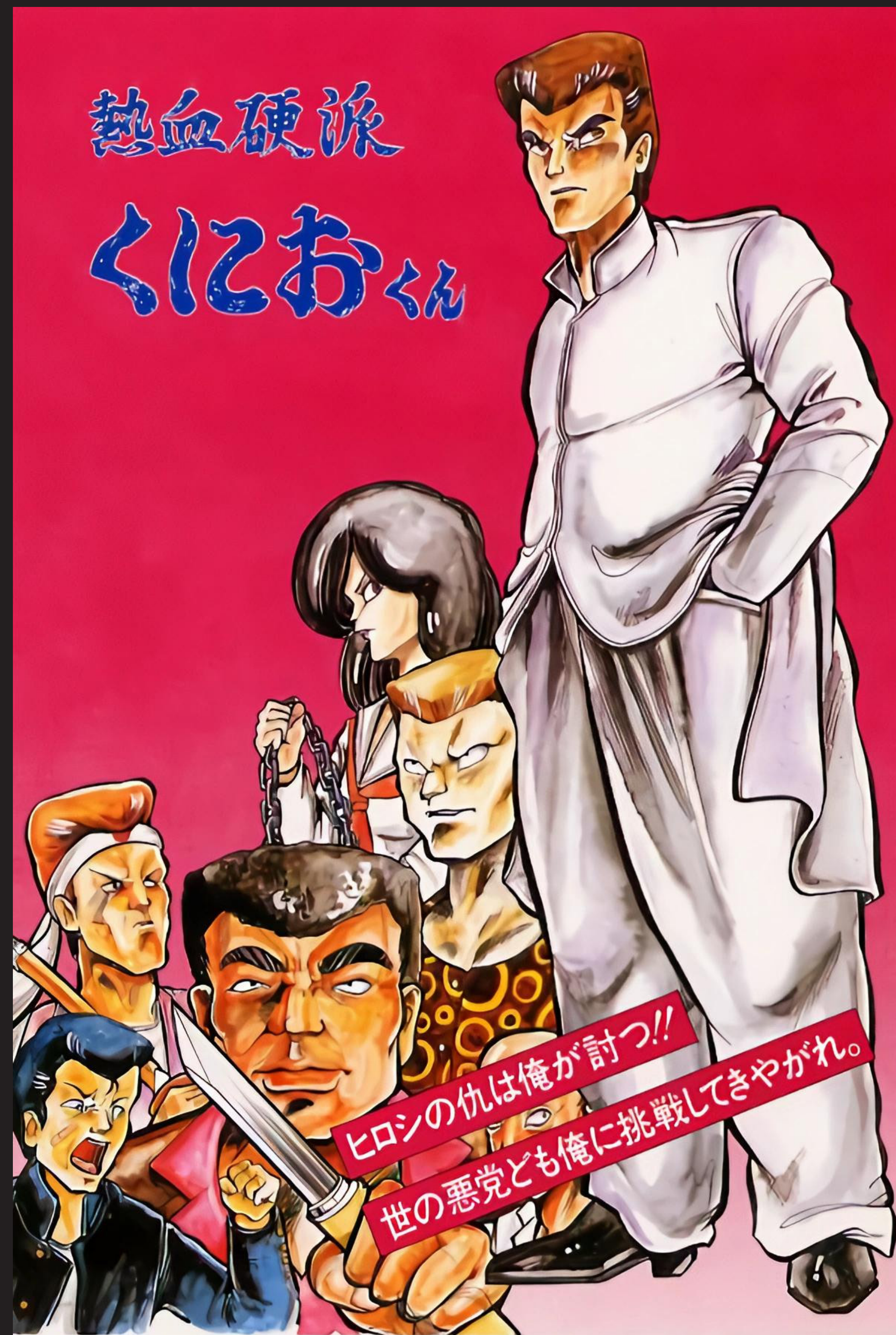




As a result, Commodore 64 had a very bold take on graphics with blocky pixels and a very special palette that sported a lot of muddy, desaturated colors that could blend together perfectly with natural fleshtones and some brighter, saturated ones to make accents or special matches and was perfect to serve the realistic and impressionistic american and european illustration style.



It's also interesting to see how cover art usually changed from Japan to Europe to match this specific difference in visual tradition and technical limitations.



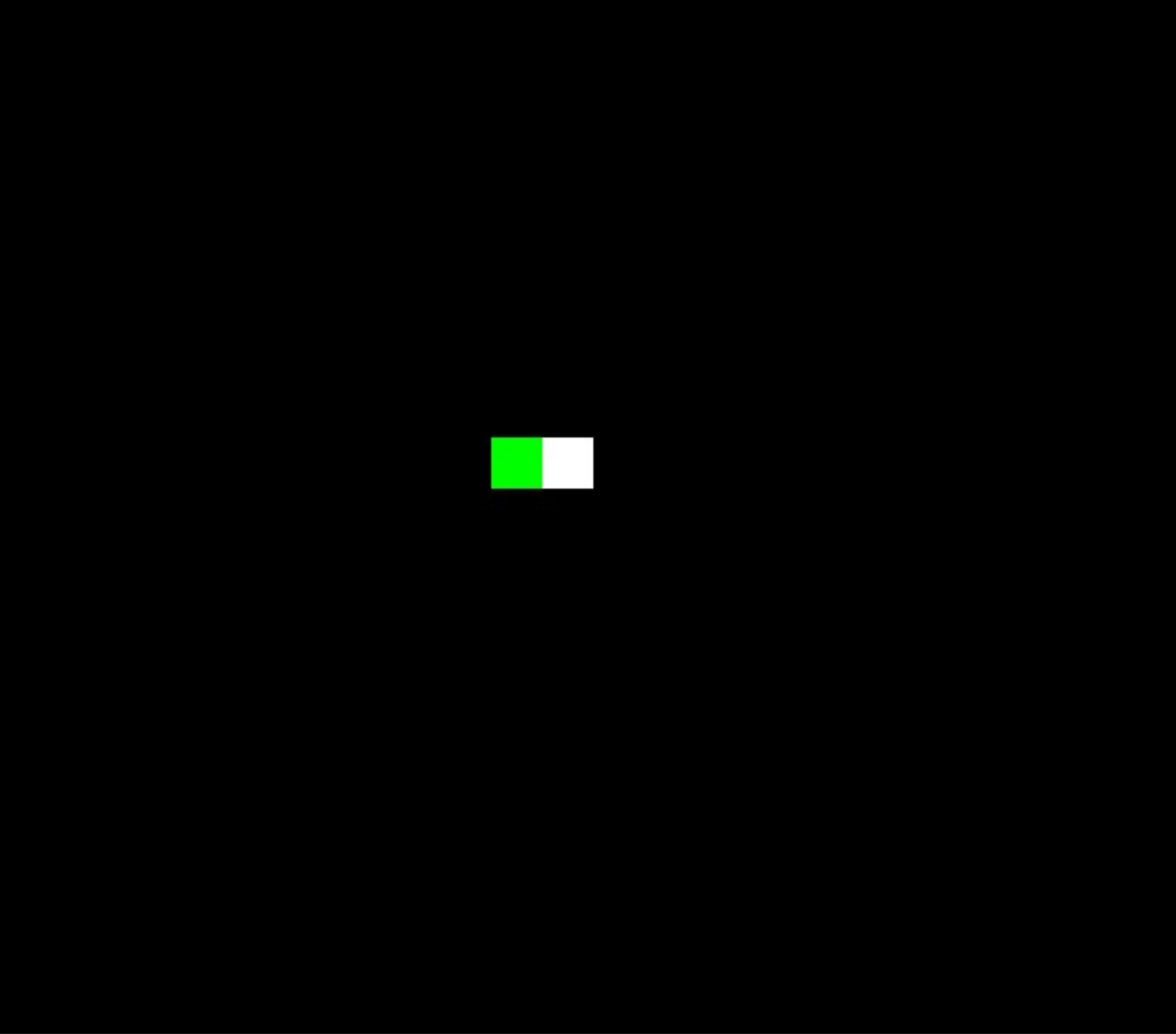
Then pixel art started to be created with dedicated tools and editors, one more powerful hardware that let the artists use more colors on higher resolution graphics systems and somehow things started to radically change.

Both in Japan, America and Europe, artists started to sketch their art on paper freely, with no grids to be constrained in and were able to reproduce this sketches in a fairly accurate way in the computer, achieving graphics that matched if not surpassed the cover or commercial illustrations.

CRT televisions started to be treated like proper artistic mediums with incredibly talented artists that started to go way beyond the idea of pixels as a rigid grid of graphic dots and more like a way of painting with luminescent phosphor thru the shadow mask.

Each pixel was carved keeping in mind its triadic nature, keeping in mind the subpixel, working on every single color element in the RGB triad.











This way you could obtain way more effects and colors just by making advantage of the limited precision CRT TVs had in isolating low resolution pixels with tiny shadow mask patterns resulting in light leaking from a pixel to another, from a subpixel to another, activating color components that weren't planned in the digital palette but that were achievable from a perceptual standpoint.





Painting pixels with software like Deluxe Paint became a proper standard in digital visual art with every artist providing a distinct style and artistic vision of what a game world could look like by pushing limitations way over the official hardware technical specifications.

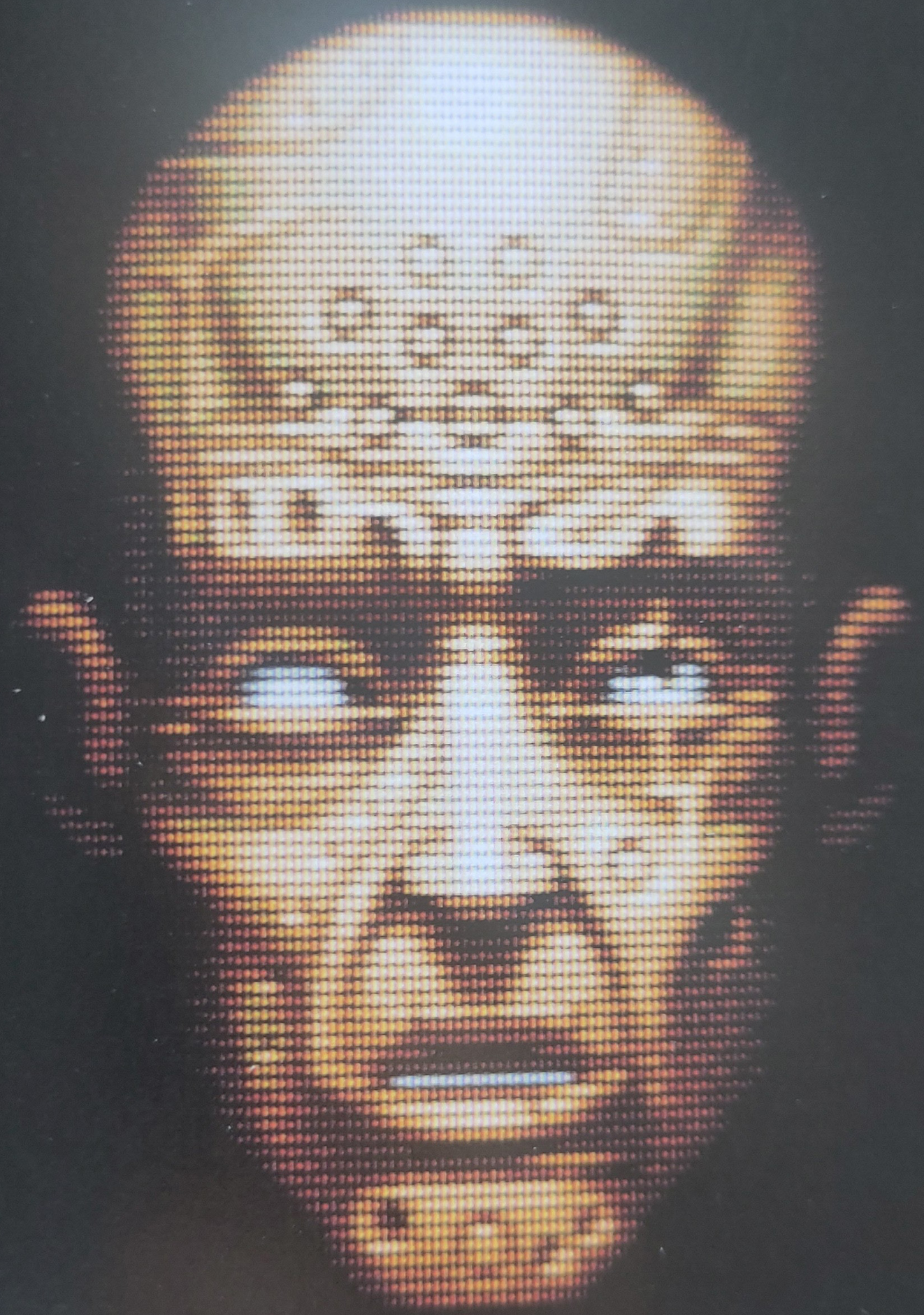
32 color palettes looked like hundreds if not thousands, with discrete picture elements blending and mixing into the other.

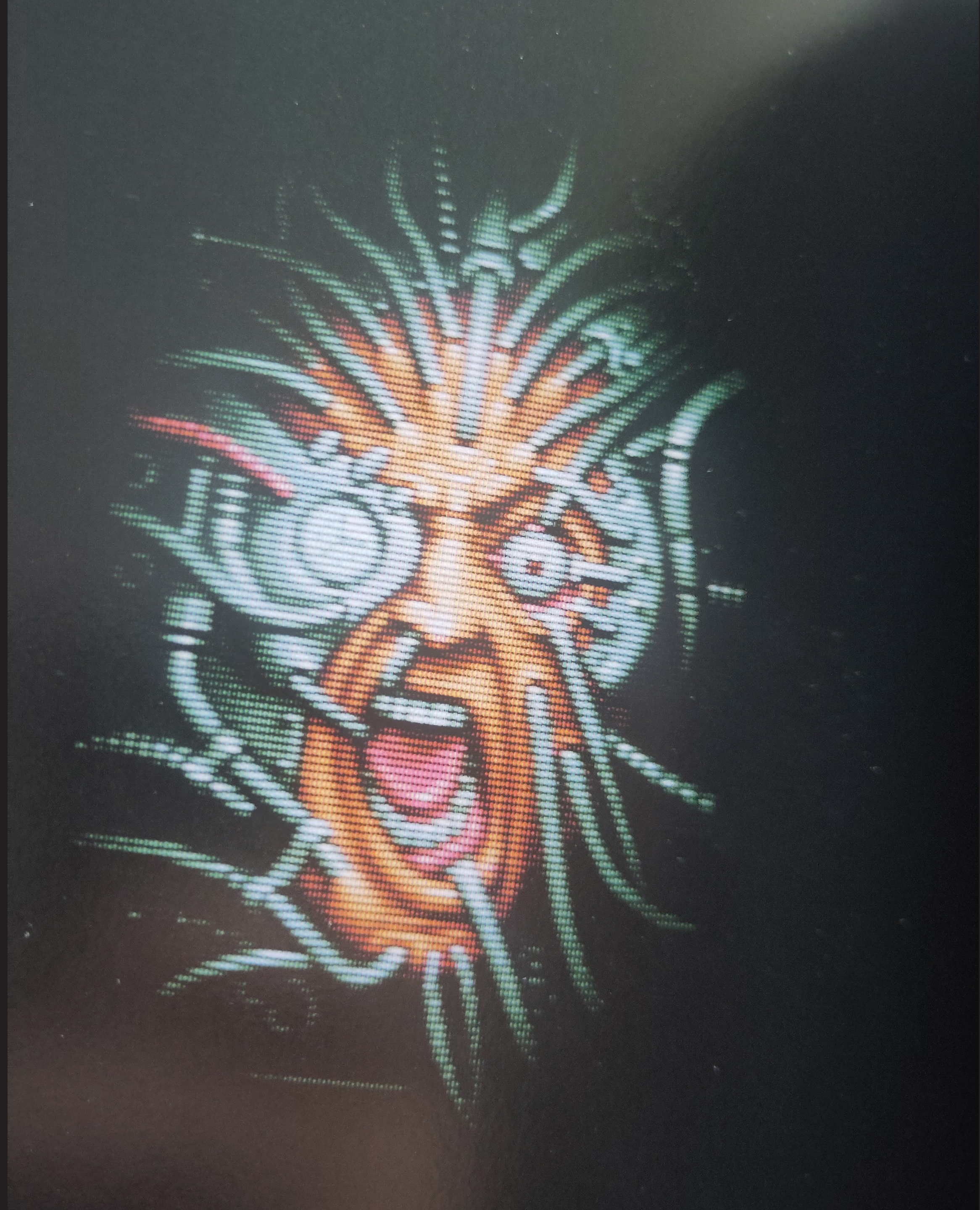
Many talented artists from very different fields of visual art started to work with game studios to create consistent experiences from the box art to the game graphics: Roger Dean for Psygnosis, Simon Bisley for the Bitmap Brothers just to name a few were among these very special artists.



Psygnosis started to hire artists specifying that no technical skill was required: they were looking for real traditional artists, not software engineers with a drawing hobby.

Dan Malone and Mark Coleman from the Bitmap Brothers, made some very complex and accurate pencil sketches that ended up being adapted in pixel art form for their games Xenon 2, Speedball 2 and The Chaos Engine in such a way that the final digital pieces were no match for the original paper ones, surpassing the traditional medium thru impressive pixel art techniques.





Game screenshots started to be used as cover images for game related magazines, maybe because they appealed to more readers.

**Pixel art became something more than illustration:
it somehow managed to make very complex and realistic
visuals animate bypassing traditional animation standards,
often sporting way more complex visual worlds and taking
the player inside them.**

Then as every pixel art enthusiast on the planet I noticed something broke.

The 486 first and Playstation generation made their planetary takeover.

2D graphics resisted for a while as a niche on machines like the SEGA Saturn and most of portable consoles while a first catastrophic era made its debut:

The 2.5D torture garden.

After the first wave of raycasting engine based FPS like ID software's Wolfenstein and Doom, a very specific variety of arcade games started to appear on console games and in the arcades.

These games used 2d pixel art mapped on non antialiased or filtered polygons.

Games like arcade Strider 2 by CAPCOM, home of some of the most amazing 2D pixel art ever made, sported some really beautiful character sprites that were resized without any filtering, caution or mercy by putting them in the 3d space.



Odd pixels due to blowing up sprites to weird scale factors made these games look terrible and me honestly wanting to see them go for a full 3D solution or a better implementation for 2D sprites, like avoiding zooming in and out.

Anyway the most important rule was broken and pixels started to be treated from video elements to an abstract “platonic entity”.

Simply put: a colored perfect square, in 3d space.

Even 2D sanctuaries like fighting games started to be contaminated with this idea of the “Platonic Pixel”.

Things went only worse and all the console scene slowly and painfully shifted from pixel perfect graphics to very bad 2d/3d hybrids to full 3D.

Pixel art enthusiasts had very few choices. Some very rare hand drawn pixel game (yes: a lot of 2D games were stuffed with pre-rendered puke) and the demoscene, of course.

While 3D games became bigger and better, let's say in the ps3 / xbox 360 era (roughly 2005) a more significant evolution in technology changed everything forever.

The HD LCD flat panel TV market takeover.

HD LCD flat panel TVs had some very special features.

They were flat, light, energy efficient, high resolution.

But they also were bad at contrast ratio and color accuracy, very bad from the viewing angle image consistency standpoint and most important:

they have a fixed resolution.

Feeding any different resolution from the default one implied software or hardware scaling with horrible artifacts, odd pixels, tearing or bilinear interpolation making everything look soft and messy.

CRT TVs (and PC Monitors) were mostly dead.

In a few years a new generation of artists that never saw a CRT TV was starting developing games, looking at the great gaming classics from the past and experiencing pixel graphics thru this distorted lens where pixels were all “platonic pixels”, nothing was rendered as intended, every magic from of the pixel art was gone and they became a meta visual language.

It should be also noted that the classic games that became more popular in terms of pixel art were the japanese ones.

Remember the two visual branches, the NES and the C64 ones? Well: Eastern graphics were more resilient for their stylized nature, while all the european painterly graphics, deprived of all the CRT magic looked goofy, cheesy if not straight up horrible.

At the same time rotating pixels, different image resolutions within the same sprite, irregular pixel grids, pixels moving by half a pixel, gaussian blur and glow effects everywhere, every imaginable insult to the original pixel art form was out there.

**Pixel art suddendly transcended in its true post modern platon-
tonic form.**

Artists like EBOY became mainstream.

The “platonik” became the mainstream, official pixel.

A square.

Some very impressive visionaries managed to do this in what I consider an appropriate and elegantly visual form: Marcus Perrson, with his Minecraft. Same goes for Phil Fish with FEZ.



Both had a very self aware take on the platonic pixel bringing it to the next level, the pixel in the third dimension as a geometric three dimensional primitive.

A new, beautiful take on voxels.

(voxels stand for volume pixels, please have mercy if I won't go in detail about this specific technique but it's 2:29 AM and I still have to make the slides and the images for this presentation, if there will be any).

A great friend of mine (should be here, somewhere) Sergio Paolantonio (Raul from Pornorockerz) once told me about a young japanese student who wanted to understand old school pixel graphics by studying the ancient rome monuments. If I don't go wrong, she was interested in the way we look at ancient Rome relics.

Take statues, just to make an example: we know they probably weren't white, but we are so used to seeing them that way that our idea of classic sculpture implies some figure sculpted out of white marble.

Same goes for pixel art seen with the eyes of new generations that never saw games thru a proper cathodic TV set. It must imply visual art made of blocky, square, colorful elements, in a regular grid.

**That said I'm about to end this near endless rambling by
extending my doubts to the entire demoscene,
all the wonderful parties out there.**

I fear that ditching CRT TVs as a delivery standard for old school platforms graphic compos (and demos) could be an error.

I fear it for several reasons.

First of all: if it's an old school graphic compo it should be faithful to its name and keep the old school way of making graphics alive, helping these obscure, powerful techniques be passed to new generations, promoting new ideas and evolutions of this wonderful medium.

Too many relevant formal choices and features are lost in the LCD translation. The artworks come out adulterated and spoiled of their best and most refined artistic features.

I also think pixel art on CRT screens is such a peculiar and unique technique that could give compos an unmistakable visual signature. I think that looking at c64 and amiga streamed stuff thru a LCD projector or a digital direct feed makes the “platonic” take on pixel stronger and somehow kills the real magic that can be only seen in these incredibly rare and special events.

Moreover: it's in the demoscene artists best interest as they're mostly in the "c64 branch" of Pixel art I mentioned before: highly rendered and complex images just work better on CRT TVs.

This also reasonably implies that people would come to see our artworks with different eyes, to appreciate its preciousness, seeing something very different from everyday digital images, helping people reason out of the box.

I know that I'm not in the position to teach anybody on how to make demo parties and, to be perfectly clear:

I LOVE demo parties

I just feel that if in demoparties we don't do our best to show the world how wonderful a piece of pixel art can look on an old tv set, how fluid and complex an animation on a 40 years old computer can be if we don't worship artistic form, if we don't pay attention to every single detail we're missing the chance of showing the world how truly legendary these artists and their outstanding achievements are.

Thank you!