Abstract: This paper presents a global view on TV sets starting with a short history. Before starting comparing the two TV sets, I have decided to introduce you some important TV set types. Following that, I have started to talk about some important characteristics, showing the pros and cons about LCD and plasma TV, ending with the resulting scorecard that shows which the best is.

Key words: short history, materials used, TV types, scorecard

1. INTRODUCTION

Among the technical developments that have come to dominate our lives, television is one of the top ten. In the US, more than 98% of households own at least one television set and 61% receive cable television. The average household watches television for seven hours per day, which helps to explain why news, sports, and educational entities, as well as advertisers, value the device for communication.

The device we call the television is really a television receiver that is the end point of a broadcast system that starts with a television camera or transmitter and requires a complicated network of broadcast transmitters using ground-based towers, cables, and satellites to deliver the original picture to our living rooms.

2. HISTORY

The development of the television occurred over years, in many countries, and using a wide application of sciences, including electricity, mechanical engineering, electromagnetism, sound technology, and electro-chemistry. No single person invented the television; instead, it is a compilation of inventions perfected by fierce competition. Chemicals that are conductors of electricity were among the first discoveries leading to the TV. Baron von Berzelius, isolated selenium in 1817, and Louis May discovered, in 1873, that the element is a strong electrical conductor. William Crookes invented the cathode ray tube in 1878, but these discoveries took many years to merge into the common ground of television. Paul Nipkow made the first television in 1884. His mechanical system used a scanning disk with small holes to pick up image fragments and imprint them on a light-sensitive selenium tube. A receiver reassembled the picture (fig. 1).

In 1888, W. Hallwachs applied photoelectric cells in cameras; cathode rays were demonstrated as devices for reassembling the image at the receiver by Boris Rosing of Russia and A. A. Campbell-Swinton of Great Britain, both working independently in 1907.

John Logie Baird and Charles F. Jenkins constructed the first true television sets in the 1920s by combining Nipkow's mechanical scanning disk with vacuum-tube amplifiers and photoelectric cells. By 1935, mechanical systems for transmitting black-and-white images were replaced completely by electronic methods that could generate hundreds of horizontal bands at 30 frames per second.

The Columbia Broadcasting System (CBS) had entered the color TV fray and battled with RCA to perfect color television, initially with mechanical methods until an all-electronic color system could be developed.

Rival broadcasts appeared throughout the 1940s although progress was slowed by both World War II and the Korean War. The first CBS color broadcast on June 25, 1951, featured Ed Sullivan and other stars of the network. Commercial color television broadcasts were underway in the United States by 1954.

3. RAW MATERIALS

The television consists of four principle sets of parts, including the exterior or housing, the audio reception and speaker system, the picture tube, and a complicated mass of electronics including cable and antennae input and output devices, a built-in antenna in most sets, a remote control receiver, computer chips, and access buttons. The remote control may be considered a fifth set of parts.

The housing of the set is made of injection-molded plastic, although wood cabinets are still available for some models. Metals and plastics also comprise the audio system.

The picture tube requires precision-made glass, fluorescent chemical coatings, and electronic attachments around and at the rear of the tube. The tube is supported inside the housing by brackets and braces molded into the housing.

The antennae and most of the input-output connections are made of metal, and some are coated with special metals or plastic to improve the quality of the connection or insulate the device. The chips, of course, are made of metal, solder, and silicon.
4. DESIGN

The design of the television requires input and teamwork on design engineers (fig. 2).

![TV Components](image)

Fig.2 TV components.

A new design of television may have one or many new applications of technology as features. It may only be a different size of an existing model, or it may include an array of new features such as an improved sound system, a remote control that also controls other entertainment devices, and an improved screen or picture, such as the flat black screens that have entered the marketplace recently.

5. TV TYPES

5.1. Cathode Ray Tube (CRT)

These screens have been since the very beginning and are still considered highly reliable. CRT TV (fig. 3) screens have a curved glass screen that facilitates the viewing of the television from various angles. It is not mandatory to sit directly in front of a CRT screen to enjoy its picture quality.

![CRT TV](image)

Fig. 3 CRT TV

However, the curved screen also implies a greater amount of glare being produced by this TV screen. Glare is produced when the curved portion of the screen reflects light back to the viewer. Many people find it extremely difficult to enjoy watching television when any amount of glare is involved.

5.2. Liquid Crystals TV

LCD (fig. 4) has emerged as the clear front-runner for the time being, not necessarily due to superior technology, but simply because more manufacturers are involved in the business than they are in plasma and DLP.

![LCD TV](image)

Fig. 4 LCD TV.

LCD sets are potentially more energy efficient, capable of becoming thinner, and their picture quality – to the untrained eye of most consumers – looks just fine. But don’t count on LCD – at least, not in its current iteration, anyway – to retain that dominance even five years hence.

For starters, the same green agenda that points to plasma as being so energy inefficient also has LCD in its sights.

5.3. Plasma Screens

Extremely large sizes are possible in plasma screens. These screens are very thin and can be easily mounted on the wall or the ceiling. The space taken by plasma screens is minuscule; even the largest screen size in plasma takes very less space.

![Plasma TV](image)

Fig. 5 Plasma TV.

Plasma screens (fig. 5) are very expensive and still have some glaring flaws. The black level is pretty low in plasma screens, which cause the pictures to appear blurred. The life span of a plasma screen is very small, and the images start getting blurred and hazy after only a couple of years. However, very minimal amount of glare occurs through plasma screens, which is a huge plus over the more traditional CRTs.

6. LCD VS PLASMA

Flat-panel HDTVs have taken over the television market. However, which type of flat-panel HDTV should you choose: LCD or plasma? Screens come in many different sizes, with the largest consumer panel topping out at about 70 inches.

6.1 Viewing Angle

Plasma technology has a viewing angle of about 180 degrees without any noticeable loss of picture quality, while LCD, 170 degrees. This is indeed great marketing and wordsmanship, because while you will, in fact, be able to view the TV from these angles, there will be an obvious loss in picture quality that will all but render these angles – for all practical intents and purposes – mostly useless. While LCD has made strides in this regard, more realistic figures on the very high-end brand of LCD televisions might net you viewing angles of about 90 to 130 degrees (fig. 6).
6.2 Image Retention

Due to the twisting nature of crystal technology in LCD, it doesn’t suffer from image retention. Plasma, on the other hand, does. Keep in mind, if the primary use of your plasma TV is movies and cable TV screen burn in is far less of an issue to be concerned about. Flipside, LCD can also suffer from image retention or ghosting which occurs when confronted with a “stuck” pixel or a retained pixel charge that comes from keeping a fixed image on the screen for too long. This happens far less frequently than image burn in with plasma, but it can crop up from time to time.

6.3 Fast-Moving Images

When it comes to fast-moving images or motion, plasma clearly comes out on top. With LCD technology, it suffers from delay problem. When you’re watching movies or sporting events where the action shifts quickly it’s not uncommon to notice pixel blocking or “artifacting” where images seem to create a trailing or ghosting effect of themselves (fig. 7). While newer LCD televisions offer quicker response times – some even advertised as low as four milliseconds – plasmas are about eight times as fast still, usually offering response times that are as commonly low as 0.87 milliseconds.

6.4 Price

In terms of price, it’s also essentially a dead-lock based on like sizes, with the better brand names on both ends commanding about the same in terms of cost. In the 40-plus inch range of TVs though, plasmas might be just a whisker less expensive these days.

6.5 Weight and Mounting

On the average, when looking at similarly-sized LCD and plasma televisions, LCDs tend to be a little lighter on their feet, and therefore prove easier to mount for the average consumer. With the added bit of bulge that comes with plasmas, it’s probably a better idea to have them mounted by a professional and avoid any potential issues.

6.6 Style and Real Estate

In terms of style and the space they take up, both are ultra-thin and mountable –plasmas are as thin as three inches, while LCDs can get as low as two inches – blending seamlessly into any room with the style and ease of a picture or painting that hangs in your home.

6.7 Durability and Longevity

While both plasma and LCD will offer a display life anywhere from 30,000 to 50,000 hours, with LCD there is the potential of losing slight picture quality and color accuracy once the backlight fades over time. With plasma, at about half-life of the display, you’ll lose about half of the image brightness, but really, this isn’t as bad as it sounds, as it’s still two to three times brighter than regular TV.

6.8 Black Levels and Contrast

Although LCD has made up a lot of ground in this regard, in both instances – and by nature of the very mechanics of their respective technologies – plasma still gets the edge here. While plasma can get really black, LCD tends to be more on the dark gray side-of-things (fig. 8). This is an important round as well, because when it comes to understanding what takes an image from merely good to great, contrast and black levels play a huge part in the overall picture.

6.9 General Picture Quality and Color Accuracy

Plasma tends towards a richer, smoother, and more natural-looking picture which works best in mid to low-level lighting conditions, while LCD does still suffer somewhat from the stigma of being a more “digital-looking” picture, with colors that don’t appear as natural or realistic. The plasma advantage is due in no small part to a technological engine that features pixels which contain RGB (red, green, blue) elements that can produce millions upon millions of colors for unsurpassed color accuracy, and hence, a better overall picture. With LCD, the modus operandi which drives the technology calls for color to be reproduced by manipulating light waves and subtracting colors from white light. This is a more difficult blueprint to follow, and as such, plasma is able to deliver a consistently better image than its LCD counterpart. If you’re focused strictly on still images, or specifically computer displays and applications, LCD technology was designed (at least initially) for this, and
consequently fares far better in this regard, even managing to trump its bitter rival in this category (fig. 9).

![Fig. 9 Color Accuracy – (a) LCD and (b) Plasma TV.](image)

### 6.10 High Altitude Viewing

While this isn’t a concern for the average consumer looking to add that theatrical-viewing element to their home, in terms of which technology takes the cake when viewed at extremely high altitudes (6,5000 feet or more), LCD is the clear winner, as it’s not affected nearly as much by fluctuations in air pressure as plasma is.

### 6.11 Power Usage

With respect to power consumption, LCD, by virtue of utilizing backlighting to produce its images, operates on far less power than does plasma, which has to light – subsequently using more power – each and every pixel that comprise its images.

Plasma has been shown to be at least equal to LCD in terms of power consumption, and in some cases, may even use less energy based on the fact that plasma power consumption is based upon how dark or bright the image is. So, if you’re watching mostly darker programming, in theory, your plasma display would be using less power, whereas with LCD, it uses the same constant, median supply of power, no matter what you happen to be watching (fig. 10).

![Fig. 10 Power Usage – (a) LCD and (b) Plasma TV.](image)

### 6.12 Scorecard

In the Table 1 are shown several properties of LCD and plasma TV.

<table>
<thead>
<tr>
<th>Function</th>
<th>LCD</th>
<th>Plasma</th>
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<tbody>
<tr>
<td>Viewing Angle</td>
<td></td>
<td>✓</td>
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<tr>
<td>Image Retention</td>
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<td>Fast moving images</td>
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<tr>
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<tr>
<td>Weight and Mounting</td>
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### 7. CONCLUSION

Plasma scores the unanimous victory in this bout. While this debate has surely been slanted more in the direction of the home-theatre universe, the truth is that when you or I discuss and/or consider plasma or LCD, we do so mainly under the pretext of home theatre purchases.

At the end of all this spirited banter, there are enough well-known and researched facts out there about both technologies that allow the above conclusion to be drawn with the utmost of confidence, and free of any controversy. Having said that, both camps can take great comfort in the fact that plasma and LCD technology represents a giant leap forward from the not-so glory days of big and bulky tube televisions, and that they can, and will, only continue to get better, further astounding us with their awe-inspiring images.

### 8. REFERENCES


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