BROADWAY
DIGITAL LED SIGNS™

281-Trillion-Color

VIDEO DISPLAYS
and Monochrome (4-Thousand-Shade)
ELECTRONIC MESSAGE CENTERS

Factory-Direct WHOLESALE to the Public

World's Greatest Digital LED Signs™

Digital Animated LED Electronic Message Centers and Video Displays

Electronic message centers and video displays help your business many ways:

o They allow real-time communication with potential customers. With almost 20% of the US population moving in a year, the success of your business relies heavily on your signage. What is effective now may not be effective later…or after lunch.

o They attract attention through animation and brightness so they increase awareness of your business location and your products.

o Message center signs are prettier than signs with changeable plastic letters, improving the appearance of your business.

o Your message is not limited by the size of your reader board, or to only one message.

o Your advertising dollars are invested in selling in your trade area, preventing excessive advertising expenses.

o Changing your message, any time you wish, is as easy as typing. It can be done often and safely.

o Quality electronic message center displays are readable from a further distance, especially in poor lighting.

Research shows that you have 3 seconds to attract a passer-by's attention and communicate your message. An electronic message center or video display will make your message stand out from the crowd of signs around you. Even displaying the time and temperature can give a viewer valuable information which they will associate with your business. Combining that capability with animated messages, possibly in color, can really drive your sales up 15% to 150%!

Even the Federal Government has determined that signs containing electronic message centers are safety enhancing devices, not traffic hazards! This is why they are used on roadways to communicate with drivers.

Read what the U. S. Small Business Administration (SBA) has to say about the effectiveness of electronic message centers at http://www.sba.gov/starting/signage/text/emc.html.

FREE Programming Computer

Each Broadway Digital LED Signs™ electronic message center or video display comes with a "free" pre-programmed laptop computer ready to remotely program your new electronic message center.

Tutorials are a part of the computer's pre-programming.

Color and monochrome displays can also be programmed using Power-Point, Corel, Photoshop, or any graphics software you are familiar with. You already know how to program the sign!

The computer communicates via Wi-Fi, so you probably already know how to work it, and the sign runs on its own internal processor so the programming computer only needs to be "on" when you are changing the program.

You can create a program at home, and download it to your sign when you get to your business, if you desire.

Encryption in both the sign and the programming computer software make the sign impossible to use by anyone else.

Color Selection and Display Capability

Historically, monochrome "message centers" were much cheaper than color "video displays." This is no longer true.

In making your decision regarding monochrome vs. color realize that colors in motion are proven to be much more attention-getting than moving single-color lights. Monochrome (one color) displays are either Red or Amber (Yellow.)

Because the intensity of a LED light can be changed by increasing or decreasing the voltage to it our monochrome displays feature 4096 shades of either Red or Amber, necessary for clear monochrome animation and video. Some manufacturers call this "grayscale" but generally generate as few as 250 shades.

The cheaper monochrome displays cannot vary their color intensity at all, they are truly one color. However a Broadway Digital LED Signs™ sign can turn it's gradients feature "off" and also display one-color monotone.

Our color video displays feature an almost-infinite 281 trillion colors.

Most competitors have much more restrictive palettes of colors in their "full-color" displays.

What is a Pixel?

An electronic message center is in many ways a large computer screen. The screen is illuminated by turning many individual lights, or pixels, on/off (or varying the voltage to them.)

Tighter spacing between pixels allows more data to be displayed and makes the sign look better but increases cost.

Older generation displays group LEDs in clusters. Modern Broadway Digital LED Signs™ utilize balanced spacing and more modern software for a superior appearance.

Pixel Size - Clusters vs. a Balanced Array™

To produce colors at least 3 different color producing LEDs are utilized; Red, Green, and Blue (RGB.) For the human eye, red, green and blue close together create white. Some electronic message center manufacturers try to overcome inferior LED's (which are greatly less expensive) by adding more than one LED of the same color to each pixel cluster. This makes the pixel cluster larger, which makes the pitch larger, which increases the minimum viewing distance (see below.) It also uses more electricity. A Balanced Array™ only adds an additional red LED when it needs to create a whiter white.

Older generation displays group LEDs in clusters. A more modern Broadway Digital LED Signs™ utilize a Balanced Array™ for a superior appearance because the LEDs are evenly spaced, and more sophisticated software can create "virtual pixels" in 4 potential locations surrounding **every** LED, and each LED can potentially be shared by these 4 different pixels.

What are Pixel Pitches and LED Spacings?

How far pixels are from one another is called "pitch" and is usually expressed in millimeters (mm.)

Older color displays, because each pixel is actually an unequal cluster of 3 or more different colored LED's, cannot have as small a pitch as a monochrome display or the appearance of a more modern display with a Balanced Array™. Therefore they must be viewed from a greater distance to have a quality appearance. There is a lot of blank space between pixels.

Old-style full-color displays are available in 12mm, 16mm, 20mm and larger pitches.

Old-style monochrome displays are available in 9mm, 19mm, 25mm, 35mm, 46mm and larger pitches.

The distance between every LED in a Broadway Digital LED Signs™ Balanced Array™ can be as small as 6 mm, 281-trillion-color or 4,000-shade monochrome. Pixels can overlap in our 281-trillion-color video displays.

Light Density = The Number of LEDs per Square Foot

As the discussion gets more and more technical, the easiest comparison between displays is the number of LED lights in a square foot of sign face.


Number of LEDs per Square Foot - Full Color Classic vs. Balanced Array™
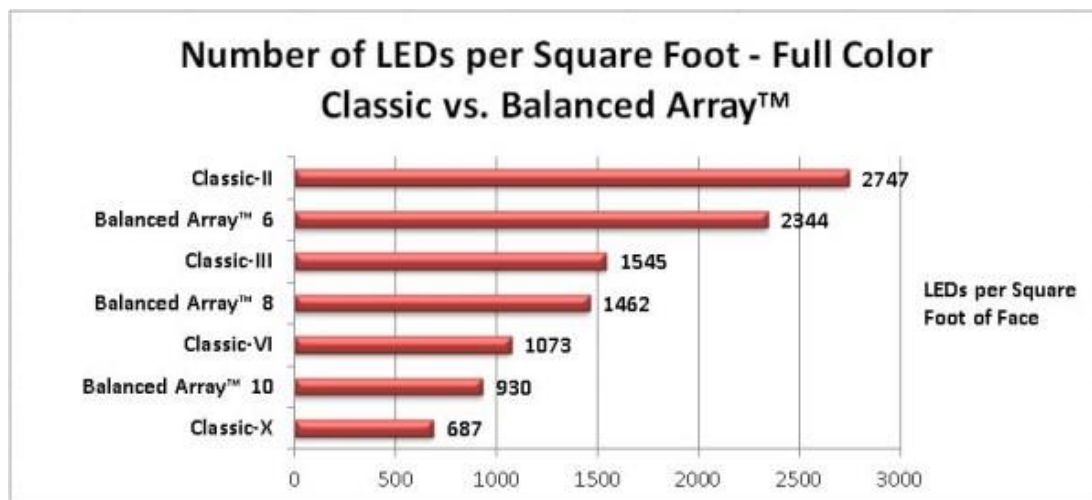
Metric to Inch Conversion	
6mm	¼ inch
8mm	5/16 inch
10mm	3/8 inch
12mm	½ inch
16mm	5/8 inch
19mm	¾ inch
22mm	7/8 inch
25mm	1 inch

As an example a 6mm Balanced Array™ has a Light Density of 2344 (2344 LD.)

On a 6mm Balanced Array™ sign there are LED lights 1/8" apart covering the entire sign face; 1/4" (6mm) center-to-center.

On an 8mm Balanced Array™ sign the LED lights are only 3/16" apart and 5/16" (8mm) center-to-center.

On a 10mm Balanced Array™ sign the LED lights are 1/4" apart and 3/8" (10mm) center-to-center.
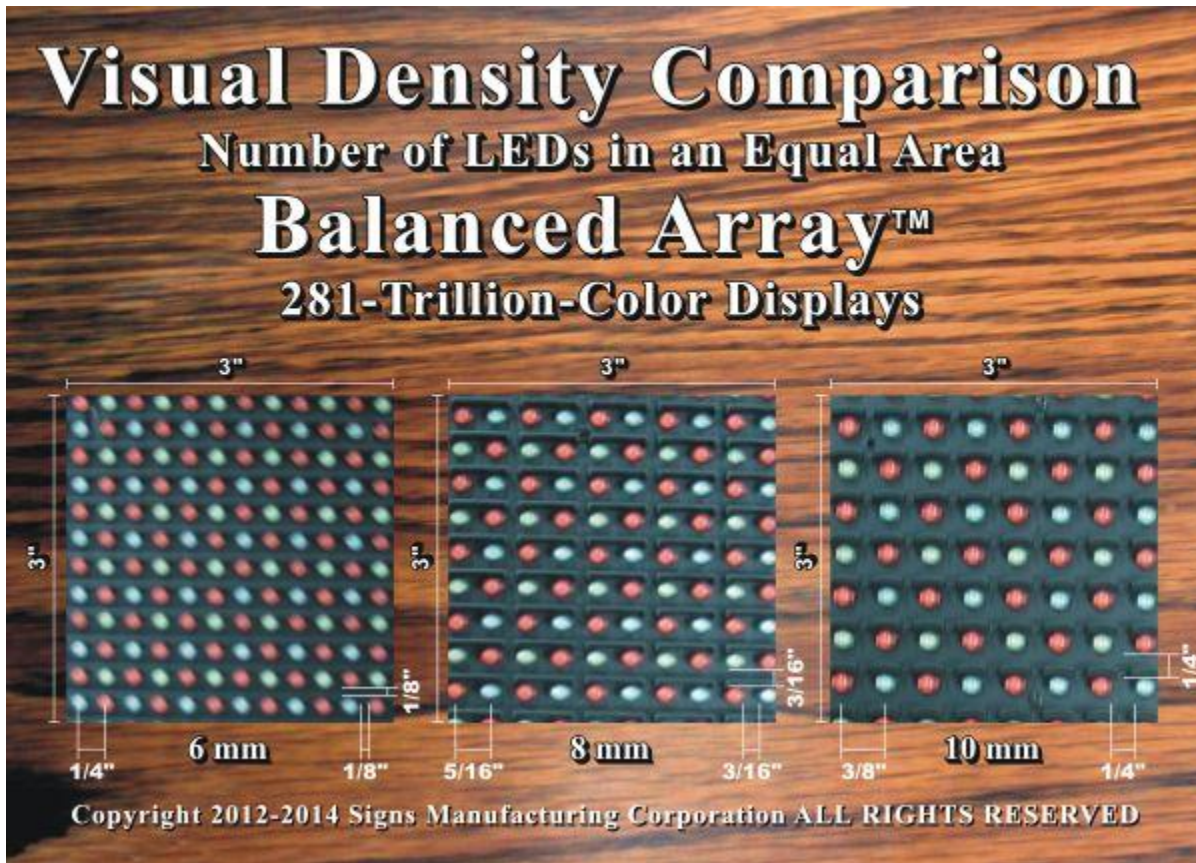
Why are LED Spacing and Pixel Pitch Important?

Again, pixel pitch or LED spacing, as well as image quality, determines how close a sign can be and still deliver quality images. They also determine Resolution (below).

If pitch (spacing) is too large for the viewing distance then images are grainy, maybe unreadable. A potential customer's image of your business suffers. When you see grainy LED signs don't you think of them as "cheap?"

It is therefore better to err on the side of a "tight" array. Visit our showroom to personally compare displays before making this very important decision. Remember, we're local.

How to Determine a Display's Resolution?

Just like a television, resolution determines the quality of the image, and therefore the image of your business.

Resolution is the number of pixels in a square foot of signage. Buy the highest resolution you can afford.
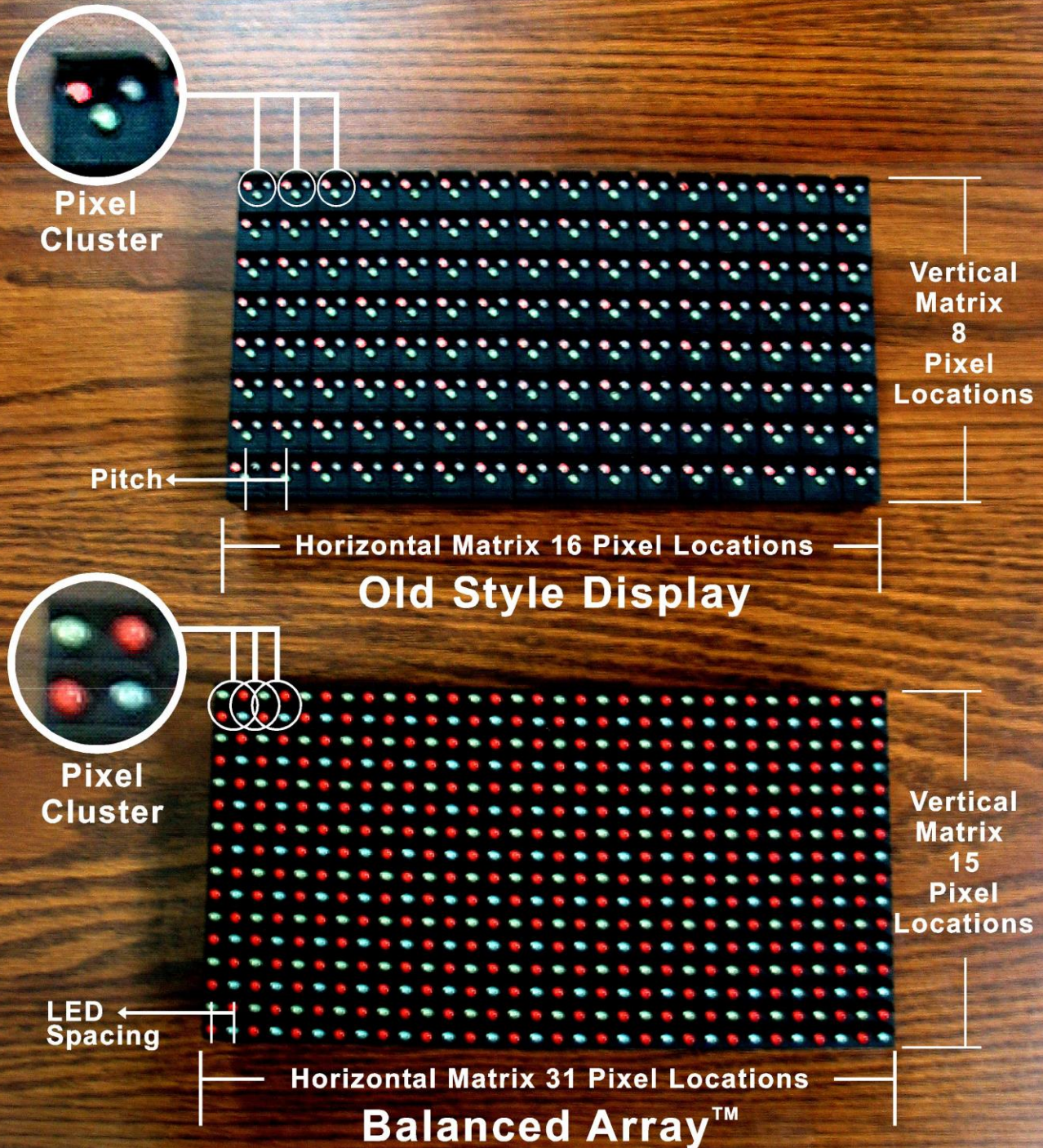
Resolution – Full Color Display	
	Potential Pixels per Sq. Ft.
6mm Balanced Array™	**9376***
8mm Balanced Array™	**5848***
10mm Balanced Array™	**3720***
12mm Pixel Pitch	**586**
16mm Pixel Pitch	**365**
20mm Pixel Pitch	**232**
* Deduct up to 768 Pixels if not surrounded by additional footage. A "Potential Pixel" is a group of LED's that form a Full-Color Pixel if illuminated.	

For comparison purposes a modern television's potential resolution is fixed at 2,073,600 pixels regardless of size. This is why a relatively small screen looks good when close to it, but a very large TV appears grainy up close.
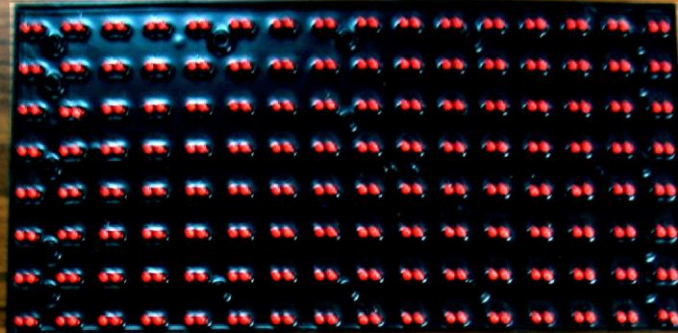
Even so a modern television's picture doesn't look as good when the image is being broadcast in 480i or 720p instead of 1080i. All the potential resolution is not being used. But without the high potential resolution you could never have a quality picture.

A Balanced Array™ can automatically adjust pixel quantity and location to produce as high a resolution as the image will allow for the display size. **Unlike a television, larger LED displays support more detail in images, unless the resolution is reduced. Smaller displays require a higher resolution for a quality image.**

Comparison of Same-Sized Color Displays

Pixel Cluster

Pitch

Vertical Matrix 8 Pixel Locations

Horizontal Matrix 16 Pixel Locations

Old Style Display

Pixel Cluster

LED Spacing

Vertical Matrix 15 Pixel Locations

Horizontal Matrix 31 Pixel Locations

Balanced Array™

Comparison of Same-Sized Monochrome Displays

Old-Style Pixel Cluster Display

Modern Balanced Array™

Why Not Use a Television?

TV's do not have as bright a display as is necessary for long-distance readability in outdoor use..

Glare on the screen is a big problem.

Only "specialty" TV's even claim to be weatherproof.

All modern flat-screen televisions are LCD televisions. So-called "LED" TV's are actually LCD screens, edge or back lighted with LED's.

- o   LCD's will not function with internal temperatures above 122° F. (200° is common in an enclosed box placed outside in a Texas summer.)
- o   LCD's will not function in extreme cold.
- o   LCD screens have limited Viewing Angles (see below.)

Billboard Resolution, as an Example

Roadside digital billboards in Dallas/Fort Worth present slideshow playbacks. No independently entered text, graphics, animation, or video. Only ".jpg" images.

Even so they install displays with either 365 or 256 resolution (16mm or 19mm pixel pitch.) See chart above.

Your sign will probably be viewed from much closer than a highway billboard. Shouldn't your resolution be better than theirs?

What Should Your Minimum Display Size Be?

Videos will run on any size sign, with a resolution equal to the pixel matrix of the display.

This is not true for wording, however. Signs that have a larger pixel pitch will not be able to display small letters as clearly as a sign with a smaller pixel pitch (smaller pixel pitch means more dots per square foot).

Decide on how many lines of text vertically you need to display. Decide the maximum height of the letters you want each row to use.
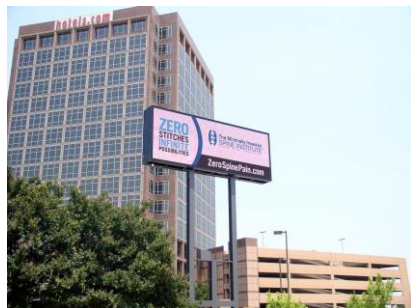
Add at least 2" between rows, and 1.25" top and bottom. If you are going to use both upper and lower case letters allow additional space for the descending letters also. The amount of space varies by letter size and style. Will you want a lighted border around your message?

The cumulative total is how tall the minimum display height of your sign must be, in inches.

But, can the display clearly display your smallest letters? For a standard block letter style the smallest letter a 20mm sign can clearly display is a 6.3" tall lower-case character. A 16mm sign can display 5.1" minimum-height characters.

It is possible to go smaller, but it may require some experimentation with letter styles and spacing. Smaller letters probably require a tighter pitched sign.

If you plan on using some lower-case letters recognize that their shorter height is your shortest letter.

To determine minimum letter height for all sign pitches, multiply the pitch of a display you are considering, in millimeters (say 20), or by the LED spacing in a Balanced Array™ times 2, by 0.315. This tells you the smallest letter the display you are considering can reliably display.

Next, decide on the longest message you need to display. Count both the letters and spaces, and include space both before and after the message. Multiply by 0.3145. Now multiply by the pitch of a display you are considering, in millimeters (say 20), or by the LED spacing in a Balanced Array™ times 2. The answer is how long the sign display must be in inches to display the smallest message adequately in most letter styles. Realize that some letter styles would require an even longer display, but this is a good average. **If you plan on running text twice this smallest size, the display will need to be twice as long.**

You now know if the size and pitch of the sign you are considering will meet your needs.

But, remember that size matters! A larger display will support more detail in images.

What are a Display's Viewing Distances?

The Recommended Minimum Viewing Distance is the point at which the display loses its graininess. This can vary depending on the message being displayed.

Recall that a modern television is 2,073,600 pixels, and relatively small. That is why they look good when close to them.

Best Viewing Ranges	
Classic™ Series - II	25 feet+
6mm Balanced Array™	35 feet+
Classic™ Series - III	40 feet+
Ordinary 12mm Pixel Pitch	44 feet+
8mm Balanced Array™	45 feet+
Classic™ Series - VI	50 feet+
Ordinary 16mm Pixel Pitch	57 feet+
10mm Balanced Array™	55 feet+
Classic™ Series - X	60 feet+
Ordinary 20mm Pixel Pitch	70 feet+

The minimum Best Viewing Range is the point at which the display loses significant graininess or color breakdown. Distances can vary depending on the message being displayed.

Minimum Character Size

LETTER VISIBILITY CHART

LETTER HEIGHT	READABLE DISTANCE FOR MAXIMUM IMPACT	MAXIMUM READABLE DISTANCE
3"	30'	100'
4"	40'	150'
6"	60'	200'
8"	80'	350'
9"	90'	400'
10"	100'	450'
12"	120'	525'
15"	150'	630'
18"	180'	750'
24"	240'	1000'
30"	300'	1250'
36"	360'	1500'
42"	420'	1750'
48"	480'	2000'
54"	540'	2250'
60"	600'	2500'

NOTE: The distances will vary approximately 10% with various color combinations. Maximum distance is in color with RED or BLACK on a WHITE background. 5,280' equals one (1) mile.

Prepared by the California Institute of Technology

Smallest* Recommended Character Size

Classic™ Series - II	3.1"
6mm Balanced Array™	3.7"
Classic™ Series - III	3.7"
Ordinary 12mm Pixel Pitch	3.8"
8mm Balanced Array™	4.9"
Classic™ Series - VI	4.9"
Ordinary 16mm Pixel Pitch	5.0"
10mm Balanced Array™	6.2"
Classic™ Series - X	6.2"
Ordinary 20mm Pixel Pitch	6.3"

*For most letter styles to display adequately

Reading Time

The length of time letters are readable when moving towards them. These times are only achievable when viewing signs using LEDs with wide viewing angles, and a tight resolution. Many signs reading times are much shorter for the same sized letter.

	30 MPH	40 MPH	60 MPH	80 MPH
6" LETTERS	1.4 Seconds	1 Second	0.7 Seconds	0.5 Seconds
8" LETTERS	1.8 Seconds	1.4 Seconds	0.9 Seconds	0.7 Seconds
12" LETTERS	3 Seconds	2 Seconds	1.5 Seconds	1 Second
18" LETTERS	4 Seconds	3 Seconds	2 Seconds	1.5 Seconds
24" LETTERS	5.5 Seconds	4 Seconds	2.75 Seconds	2 Seconds
36" LETTERS	8 Seconds	6 Seconds	4 Seconds	3 Seconds

Prepared by Broadway Digital LED Signs™

Viewing Angles

As an automobile driver drives toward an electronic message center which is installed on a 20' tall pole the vertical viewing angle increases from near 0° to almost 90° as the driver passes under the sign. As the viewing angle increases the intensity of the display decreases. The vertical viewing angle of the LED's used in the display plays an important role in the usefulness of the display. (For more information on this see "Glare Shields or Louvers" below.)

As a driver drives toward an electronic message center installed on the side of a road the horizontal viewing angle increases from near 0° to 90° as the driver passes beside the sign. As the viewing angle increases the intensity of the display decreases in this direction also. The horizontal viewing angle of the LED's used in the display also plays an important role in the usefulness of the display.

LED lights are directional, and Glare Shields or Louvers can block visibility. High quality LED's can be viewed by as much as 90° horizontally and vertically and still observe over 70% of the lumen potential. Some LED's lose virtually all of their light at angles over 45°. Less-expensive signs must therefore be viewed nearly straight-on to be legible.

Broadway Digital LED Signs™ are effective at even the most extreme angles.

What Does Matrix Mean?

How many pixels wide and high the display is, which determines how many of what size letters can be displayed at one time.

Most matrix dimensions are in multiples of 8 pixels, or virtual pixels in the case of a Balanced Array™ because 8 pixels are necessary to adequately display most letterstyles.

A larger matrix can display more and larger information at one time.

The Advantages of a Balanced Array™

o Creates a visually a more attractive sign with evenly spaced LED's. Higher Resolution.
o The software generates 4 LED's per "virtual pixel" which allows:
   o Illuminating a second red LED in each virtual pixel to create whiter Whites.
   o Larger pixels and beefier letters containing more illuminated LED's for the same height when compared with a standard array.
o Superior reproduction of letter fonts and graphics.
o Larger LED's are used, creating a brighter sign with increased "fill" (less space between LED's.)
o LED's are 50% closer together than pixels are in a standard array, this provides a much tighter display appearance.
o There are as much as 50% more LED's in any given area.
o One Glare Shield (see below) per LED, rather than one per pixel, maximum.
o Software can shift "pixel" locations to compact the vision even further.

Control Software

"Our guy who did all the programming for the sign doesn't work here anymore and we can't get into the software to change the message. It has a password and we don't know what it is. I tried calling the company that built it but they're no longer in business!"

Mary Chriswell, Adams Valley Farms

More than any other part of the sign the operating software determines the usability of the system.

Most sellers of LED Display signs, whether they manufacture their signs or import them from China, brag about their "Proprietary" software used to operate their signs.

We don't.

Even though our key personnel are very comfortable writing computer programs in several programming languages, we realize that we will never be smarter than the thousands of Microsoft engineers who worked together to create Power-Point.

Because of this, we created an open architecture programming software designed to use Power-Point to create your animation and messaging. Or Corel Draw. Or Photo Shop. Or any graphics software you are familiar with.

You already know how to program the sign because there's no new proprietary programming system to learn.

Proprietary is BAD, not good. Our system uses the ingenuity and creativity of thousands of software engineers, not just a small handful of programmers.

 To make you even more comfortable, our processor's design doesn't lock-out other operating systems, forcing you to use only ours. Many competitors and virtually all Chinese signs do this. If they go out of business, and you have a problem with their processor or computer, the sign is trash.

If, heaven forbid, we go out of business and our processor fails later, you can replace it with several brands of generic processors and operate your sign. (It won't be as efficient, versatile, and friendly as our system, but it will work.)

Standard features of our operating system include:

- o   Encryption so that no one else can operate the sign.
- o   The programming computer's screen displays exactly what the sign will look like.
- o   The software automatically enlarges your graphics and videos to fit the screen, with no additional steps required.
- o   Displays can be programmed using Power-Point, Corel, Photoshop, or any graphics software.
- o   "Pixel Text" can be directly entered.
- o   You can add multiple images at once, speeding set-up time.
- o   The computer communicates with the sign via Wi-Fi, and only needs to be "on" when changing the program. The sign runs on its own internal processor. You can create a program at home, and download it to your sign when you get to your business, if you desire.
- o   One click updates the sign.
- o   The sign is capable of being connected to the internet, so that you can program your sign from home!
- o   Our system allows for the use of Text, Graphics, Animation, Slideshow, Video, Scheduling, Time, Temperature, and Automatic Brightness Control as described individually below.

Both controllers are showing the same image on the same sign, for a "head-to-head" comparison.

Superior™ and Enhanced™ Operating Modes

Broadway Digital LED Signs™ Balanced Array™ gives our sign owners the option of operating their signs in one of two different modes.

In Superior™ mode the sign operates by dividing an image into individual one-color dots (pixels), as many pixels as the signs standard resolution and sign size will allow. It then uses four-led clusters to display the image by recreating these colored dots. Because of our Balanced Array™ the display has smaller holes between the colored dots and 25% more lighted LEDs at any one time, when compared to an older pixel cluster type display, creating a vastly superior image.

In Enhanced™ mode, only possible because of our Balanced Array™, the sign operates by dividing an image into four times as many pixels as the signs standard resolution and sign size would allow, creating additional pixel locations between every standard pixel. Then our processor blends the image together to smooth color flow; envision using a paint brush rather than a dot-matrix printer. Images are much more vibrant. Lines are not as harsh.

Do you realize that a .jpg image file "fades" pixels, smoothing color-flow between pixel locations to continuously create images with smooth edges – not the choppy "building block" look of older image files (and older LED displays.)

In Enhanced™ mode Sunburst's Balanced Array™ processors do this also, to display the best images possible.

Balanced Array™ in "Superior" Mode and "Enhanced" Mode
(As you move this picture away from you observe the differences.)

Text, Graphics, or Both

Do you want a message center, or a video display?

Some competitive units only display text, some must display text as a graphic (drawing), some can display both text and graphics. Some competitors can only display stick "pixel text" letters (one line.)

Broadway Digital LED Signs™ open architecture software can display text and graphics, and we can vary the font (letter style) and the thickness of the letters.

Many varied letter-styles (fonts) are pre-programmed in all our units.

All our units can also automatically place text over graphics pictures.

On our monochrome units (one color) text and graphics can be displayed in 1 or 4,000 shades of the one color. Full-color units display 281,000,000,000,000 separate shades.

Animated Text and Graphics

All Broadway Digital LED Signs™ software can display fixed messages or graphics (drawings) or "scroll" messages or graphics (drawings) and include F/X features. We also show a display such as a cartoon with character movement, for instance.

Monochrome displays convert colors to shades of either Red or Amber (Yellow.)

Slideshow Playback

All Broadway Digital LED Signs™ programming can display pre-programmed messages and pictures in a slideshow format, much like a screensaver slideshow showing multiple messages or images.

Video - Prerecorded Clips

All Broadway Digital LED Signs™ open architecture software can display videos of varying random lengths.

Sound Capable

All Broadway Digital LED Signs™ are ready to connect to an audio system. Our internal processor is sound capable. Most competitors are not. Signs with Sound™.

Scheduling

Schedule various messages, graphics or videos to automatically run at various times of day or night with Broadway Digital LED Signs™ software.

Time and Temperature Display

All Broadway Digital LED Signs™ can have the display flash, or constantly display time and temperature. The system self-adjusts for daylight savings time.

Double-Sided Display Programming

Most competitive units display the same message or animation on both sides of a double-sided display.

However some competitive units can only be programmed totally independent of each other. There displays will not synchronize, so they take twice as long to program.

Broadway Digital LED Signs™ standard is a synchronized display, with independent programming included.

Glare Shields or Louvers

Glare shields, also called louvers, prevent a display's LEDs from appearing to be lighted, by sunlight, making your message unreadable.

Broadway Digital LED Signs™ curved glare shields are individually molded into the actual face, not bolted on, to individually shade each LED. These features guarantee that our shields are effective and positioned properly. They also allow our shields to be as small as possible to eliminate their interference with viewing our displays from below or above. This is a very common problem with competitive displays with shields that are straight, or continuous. Theirs are less effective and must be much larger, limiting the viewing angles of their signs.

Automatic Brightness Adjustment

A Broadway Digital LED Signs™ electronic message center or video display automatically adjusts its display brightness for the current lighting conditions. Besides making the display more effective for advertising this feature reduces total electrical consumption and increases component life. A good LED display that is bright enough to draw attention during the day is too bright at night without Automatic Brightness Control. It's like staring into a flashlight; nothing is readable!

Display Brightness

LED's are affected by voltage. For instance, an LED will burn nearly 100% brighter if you double the power feeding it. The LED will last about 1/6 as long, however, making this alternative quite expensive in total cost.

LED's dim as they age. At some point (subjective) they will need to be replaced because they are too dim. Feeding them less voltage extends their useful life.

Broadway Digital LED Signs' engineering goal was to balance brightness and longevity.

If only brightness is important a monochrome display that does not include a grayscale feature, or automatic brightness adjustment, will be the brightest, at least initially, because all LED's will always be fully-powered. The LED's can also be more closely packed because only one color of LED is used; room does not have to be dedicated to other-colored (RGB) LED's.

Colors in motion, though dimmer than monochrome, have proven to be a better attention-getter, and the displays last longer.

Display Refresh Rate

2931 Hz refresh rate (Hz = Hertz, or refresh times per second.) Never any "flickering." As a comparison, a CRT television has a 60 Hz refresh rate.

Internal "Computer" Controls in a Display

Besides the computer that is used to program the sign there is a processor or a computer inside the sign in most systems.

The poorly engineered signs are programmed and controlled by a single computer that is hard-wired to the sign and must be left "on" at all times. Or, in some cheap signs a second "personal computer" is actually installed inside the sign.

The problem with either of these systems is that the sign is running on "Windows" using a CD or hard-drive and is additionally subject to all the viruses, freezes, lock-ups and reboot problems that a personal computer faces. (As a simple example of the problems faced, who climbs the pole of a free-standing pole sign to reboot the computer after a power outage or computer lock-up? Service call.)

Plus, with all the moving parts in hard drives, disk drives, and other humidity and temperature sensitive components, a PC is a poor way to run a sign from inside the sign. They fail often enough when they are used in the controlled environment of a building.

Tremendous cooling is required when there is an "Intel Inside" but many of these poorly engineered units don't even have cooling fans for the LED displays, much less the computer's processor chip.

In the worst of all signs, the software to program the computer inside the sign is not even in the sign owner's possession. It is not on the programming computer, it is "on the cloud." The sign's computer must have high-speed internet access.

What if the sign manufacturer does not own the software, he uses a third-party system, and they notify you that in order to keep your sign operating you will now have to pay them $2,000 per month to continue access to the programming software. This happens all the time with other "free" software. Or, he controls the software "on the cloud" but goes out of business so your sign cannot be programmed by anyone.

We don't have a "computer" in our signs. The processor in our signs is a "mother-board" with a non-volatile memory (no heat-sensitive processor chip) and its sole purpose is to store and control using the commands you send it from the programming computer we furnish Free with the sign. (No rebooting!) This vastly superior system also uses less energy.

The processor stores up to 64 GB of text, images, and video. Enough memory to change the image on the sign every second for 723 days! The memory in non-volatile, no reprogramming after a power failure, as is common in some competitive units.

The programming software comes pre-installed on the computer we give you, and we also give you a back-up copy.

Computer Link Types

Wi-Fi Modem. In all Broadway Digital LED Signs™ a modem in the sign, and one in the computer communicate.

The other available option is:

Phone Control. The unit can have a cell phone number and a modem. Simply call the sign from the controlling computer and tells it what to do. The internal memory of the electronic message center repeats these instructions until they are changed.

Internet Control. The sign is connected to the internet.

Group Links. It is possible to have one computer control multiple electronic message centers (all Long John Silver's are, for example.) This is an available option.

Ventilation

Heat is the enemy of LED's. Broadway Digital LED Signs™ electronic message centers and video displays have multiple inflow and outflow ventilation fans. Additionally, every heat-producing component has its own internal thermostat-controlled cooling fan. Larger units incorporate air conditioners into their design. Excessive heat can shorten LED life by up to 80%.

In poorly engineered signs with little (passive) or no cooling, decreasing the pitch, increasing the size of pixels, or over-driving LED's with higher-than-required voltage to increase their brightness, increases heat, shortening the life of the unit.

SolarGuard™ Protection

Our plastic faces that hold the LEDs, and Glare Shields, have internal UV protection. But your sign needs to look nearly as good 10 to 15 years from now as it looks the day it is installed.

The longevity and appearance of plastic face materials are extended when they are coated with *SolarGuard*™, a special, clear, high-gloss, mar-resistant topcoat which protects plastics from ultraviolet light and ozone so that they last longer, just like your eyeglasses have UV coatings to protect the plastic lens.

Broadway Digital LED Signs™ is an authorized *SolarGuard*™ applicator.

Broadway Digital LED Signs™ adds *SolarGuard*™ protection to every plastic sign face component.

Does SolarGuard™ Protection Work? The face on the right was made of "generic" red acrylic and black trim-cap. The left half was coated with *SolarGuard*™ and the face was left outside for ONLY 7 years; your sign will be out there much longer!

Self-Cleaning Display Faces

Broadway Digital LED Signs™ adds Lumabrite™ coatings to every plastic-faced sign. Lumabrite™ reduces maintenance because of built-in self-cleaning properties.

This products inspiration was the optical plastic lens industry. Our people are factory-trained in the application of Lumabrite™.

Construction Details

Free-standing signs are engineered to survive a 140 mph wind.

All face-plates, the part of the sign that the display's external LED boards are mounted to, are CAD/CNC (Computer Aided Design/Computer Numerical Controlled) routed from solid aluminum plate, to prevent rusting and increase heat dissipation.

An extensive lattice-formed 3-dimensional aluminum frame is welded to the face-plate to insure rigidity and further aid in heat dissipation.

Aluminum is also used for all exterior surfaces of the sign cabinet, again to prevent future rusting. Almost all Chinese-manufactured signs, among others, have steel cabinets and face-plates.

With some manufacturers, incredibly, the face-plate is merely many individual pieces bolted together. Hardly engineered to withstand 140 mph tornado winds.

Water is the enemy of electronic message centers. Broadway Digital LED Signs developed a unique cabinet design that channels water and ice away from vital internal electrical components. The face boards, containing the LEDs, are gasketed and hermetically sealed to prevent moisture from entering the sign through the faces. The interior of the sign incorporates a welded structural-steel frame, necessary for the strength to withstand 140 mph winds. All other interior metal is also aluminum.

All fasteners are galvanized or non-corrosive; no rust.

Which Display "Look" is Best for You?

Some displays have "retainer", or a picture frame around the display.

Some displays are "bleed", or the matrix goes to the edge of the face.

A bleed display give more display area per square foot of sign face; important if city sign ordinances are restrictive.

A Broadway Digital LED Signs™ electronic message center or video display can be manufactured in either configuration.

Certified Welding

We employ Certified Welders; horizontal, vertical, and overhead.
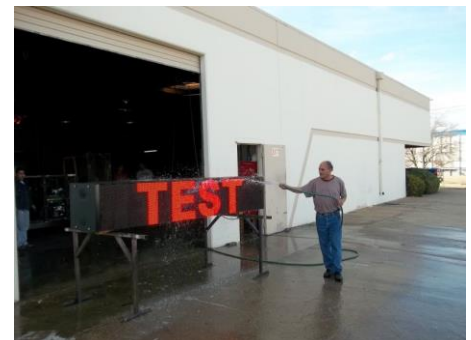
We are virtually the only sign company in the Dallas/Fort Worth Metroplex employing certified welders.

Revolutionary Ceramic Vacuum Microsphere Shield

During the summer, your video display or electronic message center can experience daily internal heat levels of over 200* F, enough to seriously damage it, shorten its life, and cause you expensive repairs.

High heat is very hard on electronics and LED's, and shortens both their lives.

NASA, with the Space Shuttle program, has proven the value of insulating ceramic vacuum microspheres as a thermal barrier to both heat and cold.

While not as debilitating as temperatures experienced by the Shuttles, we commonly experience temperatures well over 200° inside signs. Water boils at 212° at sea level.

Broadway Digital LED Signs™ builds a better sign. We cover the metal exterior of each Sunburst LED Display™ with the same ceramic vacuum microsphere barrier developed by NASA.

We have documented 30% internal heat differences, 60° cooler at 200°, accompanied by an 80% increase in heat dissipation when compared to identical signs without our ceramic shield.

NASA confirms that 90% of solar infrared and 85% of ultraviolet rays are reflected back into the atmosphere by this revolutionary product.

Visually the only difference is the very slightly textured appearance of our ceramic barrier when compared to uncoated metal; a small price to pay, especially since you will never notice the difference. We still use the same wonderful paints with the same excellent results.

Impact protection from hail, asteroids, and other objects is vastly improved also.

Automotive+ Paint Finishes for a Durable, Quality Appearance

Broadway Digital LED Signs™ uses the new Signlux Paint Systems™ paints and two-part primer systems.

The entire sign will be epoxy primed, then finished with Signlux™ modern acrylic urethane automotive type finish coats, to insure that it continues to look good for many years. Even though these paints and primers are five times more expensive the long-term results are well worth the price.

In fact, the same paint types are used by BMW, Ferrari, Rolls Royce, and many other luxury automobile manufacturers to paint their cars!

But, Signlux™ offers many advantages over "automotive" paint when used on signs.

Signlux™ features compatible systems of very durable, high solid yet flexible paints specifically formulated for applications on metals, plastics, wood, banners and flexible sign-face materials. These paints do not chip off the surface because of heat-freeze cycles. The paints are UV stabilized to virtually eliminate fading.

Signlux Paint Systems™ feature their own paint intermix system. The system uses the latest in paint mixing technology; more sophisticated than any paint store's.

An astonishing 32,807 colors can be mixed. Virtually all PMS (Pantone) colors can be closely matched.

Color-matching opaque and translucent paint formulas are featured. Metals are painted opaquely. Plastic and flexible sign-face materials are painted translucently so that the sign face lights in color at night. Not all sign companies do this!

Metals can be painted with either a solid color or "metallic" finish.

Signlux™ is compatible with our Ceramic Vacuum Microsphere coatings protecting the electronics in the Digital LED Electronic Message Centers and Video Displays we manufacture.

Our painters are factory-trained and certified.

Our painting is virtually blemish-free.

Painting air is cleaned and dried twice before entering the paint booth, and again before painting.

Our state-of-the-art paint booth, 25' by 25' by 16' tall, with full-sized entry/exit doors on each end, filters the air coming into the booth as well as the air discharge. (The booth even has its own built-in explosion-proof lifting crane.)

The goal of every sign is to be noticed. Paint your sign some color other than Architectural Brown. Stand out. You have 32,807 choices. Maybe even add a neon border. We can do that!

Water Repellant Interior Coatings

To add additional protection for all internal electronic and electrical components and all wiring, above and beyond the US military specification electronics insulating coating we coat all circuitry boards with (MIL-I-46058C), we coat the entire interior of each sign with H2ORepel™ after the sign is totally completed.

We have found that this double+ coating lowers future service calls even further.

We do everything we can to build a better sign.

Light Emitting Diode (LED) Technology

A light-emitting diode (LED) is a semiconductor device that emits incoherent monochromatic light when electrically biased in the forward direction. This effect is a form of electroluminescence. The color depends on the semiconducting material used, and can be near-ultraviolet, visible or infrared.

A LED is a special type of semiconductor diode. Like a normal diode, it consists of a chip of semiconducting material impregnated, or doped, with impurities to create a structure called a pn junction. Charge-carriers (electrons and holes) are created by an electric current passing through the junction, and release energy in the form of photons as they recombine. The wavelength of the light, and therefore its color, depends on the band gap energy of the materials forming the pn junction.

A normal diode, typically made of silicon or germanium, emits invisible far-infrared light, but the materials used for a LED have band gap energies corresponding to near-infrared, visible or near-ultraviolet light.

Unlike incandescent bulbs, which can operate with either AC or DC, LED's require a DC supply of the correct polarity. When the voltage across the pn junction is in the correct direction, a significant current flows and the device is said to be forward biased. The voltage across the LED in this case is fixed for a given LED and is proportional to the energy of the emitted photons. If the voltage is of the wrong polarity, the device is said to be reverse biased, very little current flows, and no light is emitted.

Conventional LED's are made of inorganic minerals such as:

- aluminum gallium arsenide (AlGaAs) - red and infrared
- gallium arsenide/phosphate (GaAsP) - red, orange and yellow
- gallium nitride (GaN) - green
- gallium phosphate (GaP) - green
- zinc selenide (ZnSe) - blue
- indium gallium nitride (InGaN) - blue
- silicon carbide (SiC) - blue
- diamond (C) - ultraviolet

LED development began with infrared and red devices, and technological advances have made possible the production of devices with ever shorter wavelengths.

Blue LED's became available in the late 1990s. They can be added to existing red and green LED's to produce white light. Most "white" LED's in production today use a blue LED chip covered by a scintillate coating made of Zinc solenoid (ZnSe). The LED chip emits blue light, part of which is converted to yellow by the ZnSe. This mixture of blue and yellow light creates the impression of white - hence the bluish or yellowish tint that these diodes usually exhibit.

The most recent innovation in LED technology is a device that can emit ultraviolet light. When ultraviolet light illuminates certain materials, these materials will fluoresce or give off visible light. White light LED's have been produced by building ultraviolet elements inside material that fluoresces to produce white light.

The semiconducting chip is encased in a solid plastic lens, which is much tougher than the glass envelope of a traditional light bulb or tube. The plastic may be colored, but this is only for cosmetic reasons and does not affect the color of the light emitted.

Most typical LED's are designed to operate with no more than 30-60 millewatts of electrical power. In 2002, 5 watt LED's became available with efficiencies of 18-22 lumens per watt.

SMD (Surface Mounted Device) LED's have been created that combine RGB (Red, Green, Blue - which can make White) color sources in one LED. This allows the display matrix, pitch, to be much closer. They are very expensive, but more importantly do not have the nits (candela per square meter) for outdoor use. Manufacturers currently brag that they can produce 4-6,000 nits. We are patiently watching this development.

Broadway Digital LED Signs™'s Broadway Digital LED Signs™ Solarbrite™ LED's are 8,000 to 13,000 nits, depending on color. (The brightness of Solarbrite™ LED's can be turned down if they are too bright.)

Many companies manufacture LED's. There are over 5,000 varied LED's available, and they vary greatly as to brightness, nits, lux, light-dispersal (viewing) angle, useful lifetime, and lifetime.

Some are very cheap, some are quite expensive.

Broadway Digital LED Signs™'s Broadway Digital LED Signs™ only use Solarbrite™ LED's that are rated to retain 80% of their brightness for 60,000+ hours. These are the most expensive, but highest value, conventional LED's. Our selection of LED's is what makes our signs brighter, and last longer.

A Solarbrite™ LED incorporates a new kind of chip, different from all other LED's. Broadway Digital LED Signs™ is an industry leader in the implementation of new technology in advertising.

Solarbrite™ LED's utilize military specification coatings on the circuit boards the LED's are attached to, preventing corrosion and electrical problems.

LED's are also affected by voltage. For instance, an LED will also burn nearly 100% brighter if you double the power feeding it. The LED will last about 1/6 as long, however, making this alternative quite expensive in total cost.

We power our Solarbrite™ LED's properly, and offer a 5 year warranty on the LED's in our lighted signs.
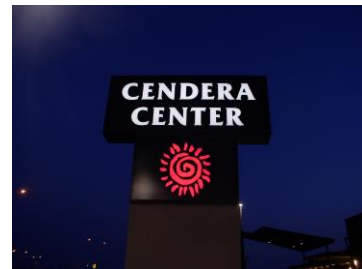
LED Size Matters

Notice the size of the LED's in the comparison photograph on page 6. Sunburst Displays™ Balanced Array™ (the bottom LED board) uses LED's that are 250% larger in area than virtually all LED's used by manufacturers that still manufacture pixel cluster displays.

Our purpose-built LED is oval, focusing most of the light forward, to the sides, and down. No reason to waste energy shining light on the glare shield above the LED. These larger oval LED's result in brighter signs with more "light-fill" in every image.

The Value of "Listed" Signs

Virtually ALL cities adopt the National Electric Code as law.

The National Electric Code (NEC) requires that for electrical, structural, and installation safety all electrical signs be "Listed" (tested and labelled with an appropriate Listing Mark.)

Certification (testing and labelling) organizations acceptable in the USA to test to the multitude of Standards signs are required to meet are determined by OSHA.

For you the Listing Mark is insurance. It means that the sign has been tested to insure that it is structurally and electrically safe, and will be installed properly. You benefit from the knowledge that it is not solely us telling you that our signs are safe, this is what the testing laboratories and the US Government says also.

Will your sign be tested and approved for safe use in a Wet (Outdoor) location?

Underwriters Laboratories ("UL" Listing Mark) and Intertek ("ETL" Listing Mark – originally Edison Testing Laboratory founded by Thomas Edison) are the premier certification organizations and 80% of all things electrical are tested by them.

Intertek is over twice the size of UL, and has a greater global presence. UL is the largest in the USA. We have both companies test and apply Listing Marks to various signs.

Whether it's channel letters, a wall cabinet sign, a monument sign, pole or pylon signs, electronic message centers, neon or other electric signs Intertek and Underwriters Laboratories pose the toughest design, structural, electrical, and installation standards on the products they approve.

We are the 9th oldest UL Listed Manufacturer in North Texas. (File #UXYT.E149959)

To see if a manufacturer is a UL Listed electronic sign manufacturer go to http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/ccnsrch.html and enter "UYFS" in the "UL Category Code" box, replacing "%ccn%".

To see if a manufacturer is an ETL Listed sign manufacturer go to http://etlwhidirectory.etlsemko.com/WebClients/ITS/DLP/products.nsf/ and enter "UL-48" in the search box.

We are the third oldest ETL Listed sign company in Texas. (File # 4007685) (One of the two older companies makes lighted scoreboards, the other makes lighted office door signs.)

Incidentally, ISO (International Organization of Standardization) Standards, such as ISO 2001, are NOT electrical Listings (similar to a UL or ETL Listing) that allow a sign to be installed. That said, components in our electronic signs also meet ISO 2008, ISO 9001, ISO 14001 and RoHS standards.

Listing Testing

As a part of UL/ETL product testing, in addition to the evaluations of materials, methods of construction, and how the sign will be installed, the following tests are performed:

- o 24 hour Temperature Rise Test (ANSI/UL 5.2)
- o 24 hour Electrical Usage and Stability (ANSI/UL 5.5)
- o Gasket Aging Test (ANSI/UL 5.7)
- o Gasket Adhesion Test (ANSI/UL 5.8)
- o Exclusion of Water Test (ANSI/UL 5.9)
- o Hi-Pot Test while the Sign is Wet (ANSI/UL 5.3)
- o Bond Impedance (ANSI/UL 5.1)
- o Electronics Input Test (ANSI/UL 8.2)
- o Electronics Humidity Test (ANSI/UL 8.12.1)

To become Listed a sign must Pass every test.

Additional Testing

In addition to the testing required by OSHA, UL and/or Intertek (ETL), Broadway Digital LED Signs™ has tested our signs for the following:

- o High Temperature Test. (Mil Std 883) Broadway Digital LED Signs™ constructed an "atmosphere chamber" we can place entire signs in and control the environment they operate in. We have proven the electronics, wiring, and design of our Video Displays and Electronic Message Centers beyond 210°F.
- o High Altitude Test. (Mil Std 810) Using another mode of our "atmosphere chamber" we have proven the electronics, wiring, and design of our Video Displays and Electronic Message Centers at an altitude of 18,000 feet - halfway through the earth's atmosphere. Electricity arcs to grounded objects from much further away in thinner air.
- o Dielectric Voltage Withstand Test. (ASTM D149-09) The electronic components and wiring in every Video Display and Electronic Message Center is "Hi-Pot" tested at 1,200 volts to make sure that the system will not "leak" voltage even under extreme circumstances. .

The Savings Advantage of a "Listed" Sign

Listed Signs Save You Money.

Broadway Digital LED Signs Video Displays and Electronic Message Centers, because they are Listed, are approved to operate with approximately 40% of the power supply requirements of unlisted signs.

This is a huge savings in installation costs, as only 1/3 of the comparable electrical service needs to be provided.

And since the National Electrical Code limits the branch circuits serving signs to 20 amps maximum, this equates to many fewer circuits.

For safety, an untested sign (not Listed) must be supplied with enough electricity to meet the total "continuous" needs of each internal components rating. (Each components rating x 125%)

A Listed sign has been tested as a whole, and the amount of energy actually used has been determined. The sign is approved for use when supplied with this amount of electricity, regardless of the ratings of the individual components. This is always much less than the rating of each internal component taken individually, so the cost of installing electricity to the sign will be significantly less.

Servicing

To speed trouble-shooting we've also incorporated our LED's into our circuit boards as a diagnostic aid. Few manufacturers of LED signs have taken this logical step.

Electrical Service

120 volt single phase service is normally required because these Listed displays do not consume a great deal of energy.

Remember, however, that other parts of the sign can have electrical requirements also.

Energy Consumption

This varies by the message displayed, and how long the electronic message center is on. That said, it is uncommon for ANY Broadway Digital LED Signs™ electronic (LED) message center to use over $1.00 in electricity in a day.

Energy Caveat

Some electronic message center manufacturers, more interested in the sale than the needs of the customer, overdrive their LED's to make them brighter (usually because they are using inferior LED's.)

Besides shortening the lifetime of the display to 1/6 of a properly manufactured display it wastes energy.

Broadway Digital LED Signs™ does none of this!

We do provide internal overvoltage, low voltage, spike and brownout protection for the sign. Many manufacturers do not.

Electromagnetic Interference

Radio Frequency (RF) interference from an electronic sign can cause the sign to interfere with radios, cell phones, radar, TV signals, automatic door openers, hospital equipment, etc.

Radio frequency interference can also cause radios, cell phones, radar, automatic door openers, TV signals, hospital equipment, etc. to interfere with an electronic sign.

Although not required in the United States, Sunburst Displays™ had our electronic signs tested for Electromagnetic Compatibility (EMC) and Electromagnetic Interference (EMI), even testing beyond the rigorous European standards. (IEC/EN 61000-4-1 thru 6-4)

Our non-intrusive circuitry even protects itself, rebooting the sign automatically if an extreme circumstance interferes with our sign. This assures you of an even-more-trouble-free sign when you purchase from Broadway Digital LED Signs™.

Zap Protection™

Optional Electrical Surge and Lightning Protection

Electrical surges on a sign's incoming power supply, and lightning strikes, are not covered by any manufacturer's warranty, and they are common.

As technology has moved us from the use of electrical components such as core-and-coil ballasts to electronic components, primarily to reduce power consumption, the susceptibility of a sign to damage from electrical power surges or lightning strikes has increased dramatically. Old-style electrical components are simply no longer available in most cases.

Broadway Digital LED Signs™ offers surge and lightning Zap Protection™, at a reasonable additional cost, adding components to signs to lower the potential for damage from an occurrence. These components are over 90% effective when an occurrence occurs. 150 VRMS clamping volts for ground, 310 VRMS for line. Maximum surge current 100,000 amps, 0-400 Hz, UL Listed.

Zap Insurance™

Electrical Surge/Lightning Insurance

Unfortunately no surge/lightning protection system is 100% effective.

Your property insurance should cover this eventuality. But if it doesn't, we will cover this continuing risk with optional electrical surge/lightning Zap Insurance™, available for signs which have our electrical surge/lightning Zap Protection™ (above) installed.

If a Zap Insured™ sign is damaged by either electrical surge or lightning strike we cover all costs of repair, up to and including replacing the entire sign if it is destroyed by an occurrence.

No other sign company offers electrical surge/lightning protection, or this assurance; in fact many are using these events to make more money.

"Surge damage is not covered under our warranty and when we suspect surge we charge for the replacement parts...We found the internal fuse…had blown."

Laura Rein**n, Customer Service Supervisor, Wat***ire Signs (Rather than return warranted parts to service with new fuses, or let us replace fuses, they charge the customer for new parts.)

Installation, Operating and Safety Instructions.

Instructions for installation and use are provided.

They include:

- Identification of any user maintenance.
- Instructions for installation, including mounting details and wiring methods.

Installation instructions are prepared custom for each sign, and will be in the form of drawings and/or diagrams as well as written form.

Warranty

If ANY part of a Broadway Digital LED Signs™ video display or electronic message center fails in the first three years of service, if properly supplied with power, Broadway Digital LED Signs™ will provide parts FREE OF CHARGE through our authorized representative where the sign was purchased. This Initial Warranty is optionally extendable to six years.

See our complete warranty for full details.

Helping Our Environment

Broadway LED Signs™ does all we can to be responsible members of society.

In addition to environmentally friendly painting, and paint and solvent disposal practices, we recycle steel, aluminum, copper, plastic, tire, battery, oil, oil filter, coolant, paint filter, paper, and wood, including all the old signs we remove for customers, even though we have to pay to have many of these recycled.

REAL "Carbon-Offsets."

We champion energy-saving signs solutions that save our customers money while protecting our environment.

We are VOLUNTARILY inspected on a regular basis.

Broadway Digital LED Signs™ has again been awarded the Compliance Commitment Partnership (C²) Award by the State of Texas, recognizing 100% compliance with all Texas, City of Dallas, and E.P.A. environmental rules and regulations, for 11 years in a row.

Of all of the businesses in Texas we were one of 105 recipients this year, one of 87 multi-year recipients ever. We are the only **sign company** to ever receive this commendation from the State.

We are very proud that we can operate our business in an environmentally friendly manner.

Quality Certified Signs™ Trained Technicians

All of our shop personnel are QualityCertifiedSigns™ trained technicians.

Portable Video Display and Message Center

There is no question that LED electronic message centers and video displays are the business signage communication wave of the future. Local advertising has never been cheaper because of them.

Every business has a need to promote special events, sales, sponsorships, etc.; either at their business location and/or at local sports events, parades, church and school events, picnics.

If your business is not located where you can have a permanent messaging sign, or you could promote business by advertising at multiple locations (like the kid's soccer game), the question is, HOW?

This question has been answered with The LED Sled™, Broadway Digital LED Signs™'s new portable self-powered LED electronic message center and video display.

Local businesses have never before been able to be so creative, to think so far outside the box to gain a competitive advertising advantage.

"To rent, or to own, THAT is the question." (sorry Shakespeare.) How often do you need to promote your business?

If you are a multi-location business you need to own one of these! Some location ALWAYS has special needs or opportunities. Or you have a new store under construction.

Securing Your Investment

"After being ripped-off by one Sign Company, who took my several-thousand-dollar deposit but never delivered my sign, I was nervous. I'm sure glad I met you guys!" Paul Lewis, Jubilee Mortgage

All too often we hear about sign companies who took deposits from customers but never delivered their signs. In every instance, because the sign company had few assets, there was no recourse.

We are also told of companies that don't pay for the materials used in a sign, and/or never pay their laborers, in which case(s) THE CUSTOMER is legally liable for these bills EVEN THOUGH they paid the sign company!

Broadway Digital LED Signs™ protects our customers, as the law allows, by providing them with both "Partial" and "Final" Lien Releases to legally protect them should ANYONE question whether we paid for materials and/or labor.

Also, size DOES matter. Our size and our investment in the community, and our State licensing, insures our customers that we will be here to deliver and install our signs.

We also offer all our customers to be listed as "Additional Insured" for free on our $2,000,000 insurance policy, providing coverage if we default.

Changeable Message Signs – A Brief History

When LED lighting first replaced incandescent lighting in changeable message signs their color was monochrome, and their array was balanced.

When color LED's were introduced existing computers could not coordinate the virtually unlimited display options a balanced array offered. This resulted in a very "grainy" product. The 3 led colors (RGB) were therefore grouped into "pixel clusters" so that these classic computers could control the display, providing better results.

We've come a long way; computers and processors are thousands of times faster than early models.

The technical ability to place larger individual LED's closer together without electrical co-interference has greatly improved also.

Not bound by pre-existing equipment or designs, and rather than invest in dated technology, Broadway Digital LED Signs™ utilizes modern computing power to control the virtually limitless potential of our large LED Balanced Array™ Video Displays and Digital Electronic Message Center Signs.

Will My Video Display Sign Become Obsolete Soon?

Many people who purchase Chinese LED Displays, knowingly or unknowingly, quickly find that they cannot purchase parts for their sign (sometimes within a matter of weeks.)

> "...the sign will be dismantled. ...not knowing when and how to get parts was a major factor..."

> Cathy Clarke, Johnson Elementary School, Southlake. They threw away their $40,000 six-month old sign because they couldn't get parts to repair it (company out of business.)

Can this happen to you?

The Chinese' problem is with complete LED displays and is politically caused. The Chinese Government financially supports a new Chinese company to get it into business. Big time support. When they stop their support the company almost always goes out of business. No one knows where the company got their parts, so the product cannot be repaired, even though their parts are probably still being made, somewhere.

Many times Chinese "brokers" sell the unsuspecting these signs after the manufacturing company is already bankrupt, assumingly without telling them the facts. "Buyer Beware" is an accepted part of the Chinese culture.

Broadway Digital LED Displays™ are made in Dallas, Texas. Parts are made for us in many locations, but they are parts, not signs.

If we have a problem with a parts supplier we have a different company build the same part for us.

Broadway Digital LED Displays™, and the parent company Signs Manufacturing Corporation are solid companies, have been here 34 years so far, and parts availability will continue. We want to continue to buy groceries!

Clearly it is to your advantage to purchase your sign from the sign manufacturer, not someone importing completed signs. No matter what an importer says, they have no control. Buyer Beware.

How Can You Determine if a Sign is Imported?

This could be difficult since many small sign companies try to hide the fact that they import their signs by placing their own label on the exterior of the sign. It is difficult, normally, for a customer to view the interior of a sign cabinet.

However, no currently imported Chinese sign is "Listed", tested and approved for use by an OSHA approved testing laboratory.

ETL and UL are the industry-leading testing laboratories, and 80% of everything electrical is tested by them. Both companies have testing laboratories worldwide, including in China.

If they have approved a sign their Listing label will be on the exterior of the sign.

Every major US Video Display and Electronic Message Center manufacturer manufactures Listed signs.

Virtually all Texas cities, counties, and the State of Texas adopt the National Electric Code (NEC) as their electrical code. The NEC REQUIRES that a sign be Listed to be installed. If you purchase an un-listed sign you might have trouble when it is installed.

See page 17 for more details on Listed signage.

Software Obsolescence

More than any other part of the sign the operating software determines the usability of the system.

Most sellers of LED Display signs, whether they manufacture their signs or import them from China, brag about their "Proprietary" software used to operate their signs.

We don't.

Even though our key personnel are very comfortable writing computer programs in several programming languages, we realize that we will never be smarter than the thousands of Microsoft engineers who worked together to create Power-Point.

Because of this, we created an open architecture programming software designed to use Power-Point to create your animation and messaging. Or Corel Draw. Or Photo Shop. Or any graphics software you are familiar with.

You already know how to program the sign because there's no new proprietary programming system to learn.

Proprietary is BAD, not good. Our system uses the ingenuity and creativity of thousands of software engineers, not just a small handful of programmers.

To make you even more comfortable, our processor's design doesn't lock-out other operating systems, forcing you to use only ours. Many competitors and virtually all Chinese signs do this. If they go out of business, and you have a problem with their processor or computer, the sign is trash.

If, heaven forbid, we go out of business and our processor fails later, you can replace it with several brands of generic processors and operate your sign. (It won't be as efficient, versatile, and friendly as our system, but it will work.)

Future Technological Obsolescence

With respect to technology, the current Balanced Array™ design is about as good as it can get. Individual LED's that are used in future displays may be brighter, but we are dimming the current ones most of the time already.

The next major LED development will be with the "SMD" LED chip. They already exist. SMD LED's are 3 very small, different colored (RGB) LED's, surface-mounted in one shell. Currently they are not bright enough for use in outdoor video displays. (Larger LED's this close together interfere with each other electronically.)

When they become bright enough there is still the question as to whether or not they will be useful in outdoor signs. If we use them we will be back to a "Pixel Cluster" display, but with very small Pixel Clusters; 3 LED's grouped very close together, with vast distances between them. Visually this will be a step back, not a step forward.

Grouping many SMD LED chips very closely together to overcome this "great divide" gives a "dynamite" display; some very expensive indoor displays are manufactured this way, but the cost of these "dynamite" indoor displays is as much as 15 times the current pricing of our Balanced Array™.

Up close they look VERY good, but from 50' away indoors our Balanced Array™ is their equal, except that we can be brighter if we turn our automatic Brightness Control "Off." (Outdoors in direct daylight our sign is readable, there's is not.)

For all of these reasons we don't expect any major changes in our outdoor LED display signs.
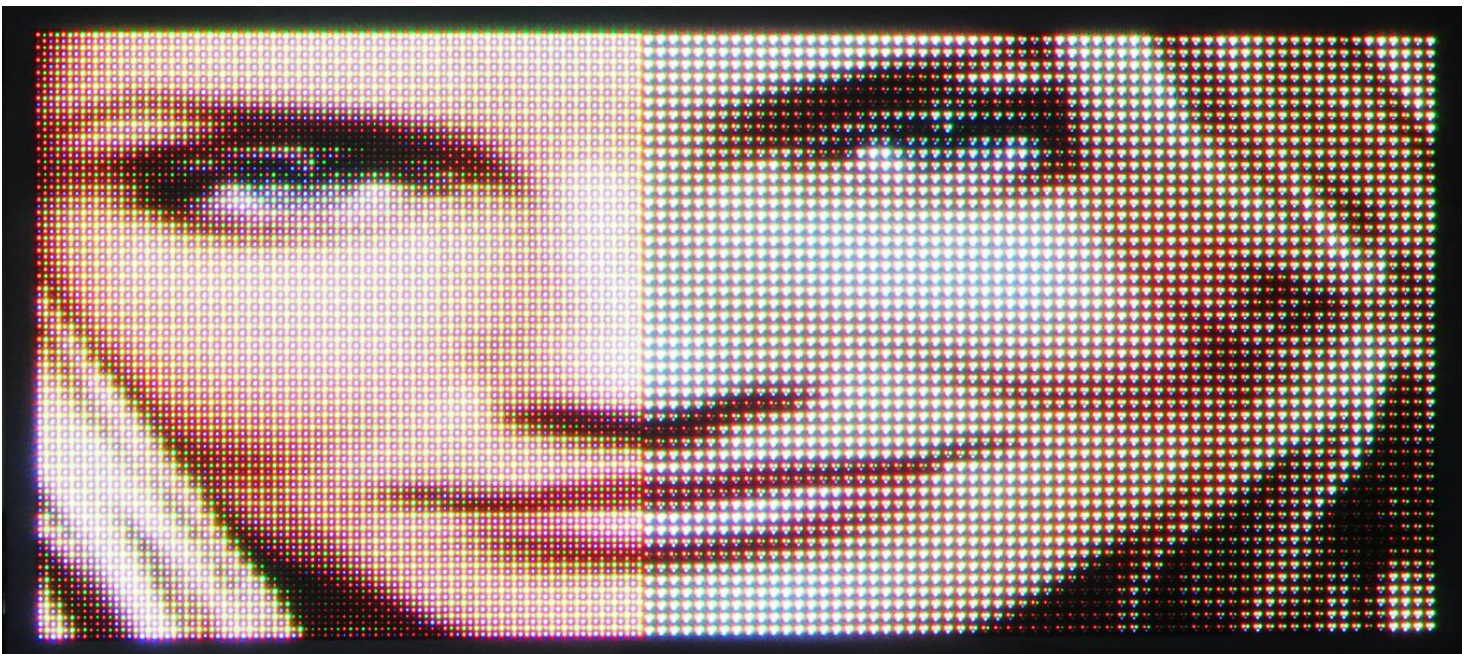
Balanced Array™ compared to Pixel Cluster Display

Here is an interesting set of pictures.

This first one is a single sign face with a Balanced Array™ adjoining a closely-matched Pixel Cluster Display. The distances between individual red LEDs, between green LEDs, or between blue individual LEDs is 20mm in both arrays. (Close-up photo)

This is an un-retouched photo of a picture displayed on this sign.

Balanced Array™ on the left, Pixel Cluster Display on the right.

In a Nutshell:

The Special Features and Benefits of Broadway Digital LED Signs™

- **Solarbrite™ Large LED**s – A brighter sign with exceptional viewing angles.
- **Balanced Array™** - A better looking sign.
- **Classic™ Series** – A traditional pixel-cluster sign.
- **Internal Processor** – Not a computer with all the associated problems they create.
- **Open Architecture Programming Software** – Proprietary is Bad, The Cloud is Bad, Open Architecture is Good.
- **Both Superior™ and Enhanced™ Operating Modes** – Even More Versatility. Lets the sign owner decide which display "look" is best for them.
- **Text, Graphics, Text-over-Image, Fonts, Clip-Art, Pre-Programmed Video, Video, Animation, Slide-Shows, Time, Temperature, Sound** – Absolute versatility.
- **64 GB Non-Volatile Memory** – This sign will run, and do, whatever you want it to do – every time.
- **Individual Glare Shields** – A sign you can read during the day.
- **Free Programming Computer, Pre-Programmed** – No learning curve.
- **Structural Steel Frames with Aluminum Exterior Skins** – No rust and lasts forever. Virtually Hail-proof.
- **Ceramic Vacuum Microsphere Exterior Coating** – Temperature protection for the sign.
- **The Same Exterior Paint Type They Paint a Ferrari with** – Looks new virtually forever, helping your business.
- **SolarGuard™ and Lumabrite™ Protected Plastics** – Won't fade and look bad to customers.
- **Self-Cleaning Sign Faces** – Your sign never looks dirty and dingy, chasing potential customers away.
- **US Military Specification Electrical Insulating Coating** – Protects all interior electronics and electrics.
- **H2ORepel™ Waterproof Interior Coating** – Double+ protects all interior electronics, electrics and wiring.
- **Energy Saving Electrical** – Saves 35% or more of electricity costs.
- **Thermostat-controlled Ventilation Fans** – Saves maintenance costs while reducing operating costs.
- **UL/ETL Listed Sign** – This sign can be installed anywhere, and moved anywhere at a later time. Requires much less electrical service than an unlisted sign.

Special Features and Benefits of doing business with Broadway Digital LED Signs™

- **Lifetime Warranty*** – Saves you money forever.
- **Product Liability Insurance** – Protects you and your customers forever.
- **Deposit Insurance** – Your money is protected even if we were to default.
- **Trained QualityCertifiedSigns™ Technicians** – We understand quality.
- **Established 1979** – We back our claims.
- **Better Business Bureau Accredited Business** – Others back our claims, too.

BROADWAY DIGITAL LED SIGNS
ELECTRONIC MESSAGE CENTER AND VIDEO DISPLAY SPECIFICATIONS

Color(s)	Red, Amber, or RGB (Color)
Solarbrite™ LEDs	Yes
Display Capability	4,096 shades/281,000,000,000,000 colors
Matrix	Varies by size
Balanced Array™	6, 8, or 10 mm
Classic™ Series	II, III, VI, or X
LED's per Square Foot (6, 8, 10 mm / II, III, VI, X)	2344, 1462, or 930 / 2747, 1545, 1075, 687
Resolution (Pixels/Foot) (6, 8, 10 mm / II, III, VI, X)	9376, 5848, or 3720 / 703, 365, 232
Viewing Angles (Horizontal and Vertical)	170° horizontally, 85° vertically
Display Type	Retainer faces or bleed faces
Glare Shields	Individual shields and curved
Minimum Character Size	Varies by Array or Pitch, 2 3/8" minimum
Time and Temperature Option	Included
Automatic Brightness Control	Included
Computer Link Type	Wi-Fi
Open Architecture Programming Software	Yes
Both Superior™ and Enhanced™ Operating Modes	Yes
Text/Graphics Capability	Both
Text-over-Image	Yes
Preprogrammed Fonts	Yes
Animation	Yes
Slideshow Playback	Yes
Video	Yes
Signs with Sound™ Capable	Yes
Clip-Art	Yes
64 GB Non-volatile Memory	Yes
Double-faced Sign Single/Double Programming Options	Yes
Multiple Power Ventilation – Thermostat-controlled	Yes
No Internal Computer - Processor Only - Does Not Operate on "Windows"	Yes
SolarGuard™ Protection	Yes
Lumabrite™ Protection - Self-Cleaning Faces	Yes
Power Requirement	120v 1ph 60 amps or other
Overvoltage, Low Voltage, Spike, Brownout Electrical Protection	Yes
Free Programming Computer - Preprogrammed	Yes
All Aluminum Exterior Metal	Yes
Structural Steel Interior Frame	Yes
CNC Precision Manufacturing	Yes
Vacuum Ceramic Microsphere Shield	Yes
Painted with Signlux Paint System™	Yes
US Military Specification Electrical Insulating Coating (MIL-I-46058C)	Yes
H2ORepel™ Waterproof Interior Coating	Yes
All components will be new.	Yes
All fasteners will be galvanized or non-corrosive.	Yes

24 hour Temperature Rise Tested (ANSI/UL 5.2)	Yes
24 hour Electrical Usage and Stability Tested (ANSI/UL 5.5)	Yes
Gasket Aging Tested (ANSI/UL 5.7)	Yes
Gasket Adhesion Tested (ANSI/UL 5.8)	Yes
Exclusion of Water Tested (ANSI/UL 5.9)	Yes
Hi-Pot Tested while the Sign is Wet (ANSI/UL 5.3)	Yes
Bond Impedance Tested (ANSI/UL 5.1)	Yes
Electronics Input Tested (ANSI/UL 8.2)	Yes
Electronics Humidity Tested (ANSI/UL 8.12.1)	Yes
Hi Temperature Tested (Mil Std. 883)	Yes
High Altitude Test (Mil Std. 810)	Yes
Dielectric Voltage Withstand Tested (ASTM D149-09)	Yes
EMI and EMC Tested (IEC/EN 61000-4-1 thru 6-4)	Yes
ETL or UL Listing Mark	Yes
Warranty	3 Years on all Parts (See Terms and Conditions)
Zap Protection™	optional
Zap Insurance™	optional
Product Liability Insurance	Yes

A Moving Message by Broadway Digital LED Signs™

How do you get the most results from advertising with a LED Message Center or Video Display?

How do you attract the most attention possible?

The LED digital electronic message center or video display offers a whole new way of advertising, a way to change your message to potential customers based on the day of the week, time of the day, the weather, even whether or not the Cowboys won.

Define your goal:

- Do you want people to walk into your store?
- Remember you for later?
- Call you?
- Email you?
- Read your website?
- Come to an event?
- Or are you trying to promote a product?
- Do you want neighbors to think of you as involved in the community?

Develop a strategy to meet that goal. Don't try to accomplish too much at once.

If you display a single message, or the same group of messages repeatedly, you are not reaching the potential this medium has to promote your business.

If you display red lettered messages, when you have a palate of 281,000,000,000,000 shades and colors to use to attract attention you are short-changing yourself. Moving colors attract attention.

Add a border around text so that it doesn't blend in with the background.

If your messages are constantly different the people who view your store the most often, people who live and work in the area and are potentially your core customers, will look at your sign and business as an entertaining landmark.

Have a differing set of messages, ones that change morning, afternoon and evening. You can optionally have different messages on opposite sides of the sign; "Have a Good Day" and "Welcome Home" at the same time.

Think about what your customers want at differing times of the day, week, or weather and offer it to them.

Keep messages as short and direct as possible. Most people reading your sign are in vehicles and must absorb your message quickly. Long or confusing messages have proven to not be effective in attracting customers. Keep it simple and easy to assimilate at one glance. Scrolling messages do not work.

Show prices to bring in customers.

Show pictures of products.

Advertise specials.

Display special events.

Display news and updates.

Use fast transition animations (you're not trying to show them the animation, you want to show the message).

If the message is written too small to be read easily from the distance it is viewed it will not be effective.

If you own a portable display, think of all the creative places you can advertise your business: parades, picnic, local sporting events, high school football games, church, school, meetings, garage sales, chamber of commerce meetings. Loaning your sign to worthy causes, because of your graphics on the trailer, gains you very positive attention without the need to display messages on the actual message center.

Customer Comments

"In my previous 9 years of being in business I have never had 40 customers in a day. Since you put up my LED Display sign I have so-far averaged 53 customers per day, but my business is still growing again."
Muhammad Faridi, MD, McAllen Medical Center, Dallas, Texas

*"We paid $34,000 for a full-color LED message center from Wal**** Signs & Lighting. It took them 11 months to get it installed. It is now 4 months old and has never worked in full-color mode. They don't know how to make it work. Can you fix it?"*
Jack Miller, Grace Point Church

"We have spent over $6,300 installing warranty parts in our LED message center. Wish we had your warranty!"
David Worley, Harvest Church

"You made a pole sign for my business about the same time another business across the highway had one made. Mine looks new, his looks like "hell" and he's no longer in business. Thought you'd like to know."
John Kaye, Kaye's Jewellers (Canada)

"Our LED electronic-message-center which cost us over $28,000 failed when it was 2 weeks old. The company that installed it refuses to repair it - saying it can't be fixed. The manufacturer refuses to fix it also. Please repair or replace it."
Mark McCarthy, Harvest Christian Fellowship (We had to replace it, they had to sue the old manufacturer and installer.)

"Our ($70,000) electronic-message-centers were nightmares. Even though they were only 2 years old the manufacturer refused to service them. Your years of service have been exceptional. Your new replacement signs are wonderful."
Major Vincent, Salvation Army

*"I had a ****-a-**** (sign company) right across the street … that store's out of business now … I found out they hired some other company to build and install our sign and they did a really #@%&&$ job, the thing has never lit right. ****-a-**** Corporate won't do anything, they say the closed store was an independent franchise, and the sign builder/installer won't fix it, they say we weren't their customer. I need you to come out, tell me what it will cost to get the thing working properly and get it fixed."*
Chris Jennings, Jimmy Johns

"Over many years we have observed that the businesses which survive are the ones which have the nicer, larger, more expensive signs."
Bob Robbins, CentreCorp Management (A shopping center development and management corporation)

FCC Statement: Broadway Digital LED Signs™ does not provide any compensation for testimonials.

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