Dynamic Message Signs

Qualifications, Technology, Capabilities & Specifications
Listening to You

• DMS Topics
  – Functionality
  – Reliability
  – Legibility
  – Specifications
  – System Integration
  – Support Services
  – Financial
  – Responsiveness
Listening to You

• Wish List and Needs
  – Product Features
  – Product Size
  – Services
  – Specifying DMS Products/Understanding the Criteria
World Leader in LED Displays
Transportation Market

- ITS, Mass Transit, Aviation, and Parking
- Dedicated Manufacturing
- Dedicated Engineering
- Over 5,500 DMS installed nationwide
Transportation Manufacturing

- World Class Manufacturing
- All Products Designed and Manufactured in the USA
- Welding Certifications
- Metal Assembly
- Comprehensive Electronic Assembly Fabrication
- Testing
- Comprehensive QA Program
- ISO 9001:2008 Registered
Product Reliability Lab

- Most Advanced In The Industry
  - HALT Testing
  - Shock, Vibration, Temperature
  - Electrical, Thermal
  - Salt, Fog, Water, Dust
  - Inversion Extreme Testing
  - Assembly and Component Level Testing
National Standards

- AASHTO Standard Specs, 5th Edition
- NTCIP 1203 v3
- ANSI/AWS D1.2, Welding
- MUTCD
- NEMA TS4, Hardware Standards
- UL Certified
- NCHRP Report 412, Fatigue
- In House Testing
- Third Party Testing
- Independent Approvals
- Agency APL and QPL Listings
DMS Applications

Freeway
Arterial
Active Traffic Management
Managed Lanes
Toll Road & Plazas
Travel Time
Lane Status
FLEX Lanes
Parking Management
New Applications

The Future Is Here

HOV to HOT
Reversible Lanes
Express Lanes
Hard Shoulder
Managed Lanes
Active Traffic Management
New Applications: HOT
DMS Evolution

Character Matrix

Full Matrix

Line Matrix
Dynamic Message Sign Terminology

- Pixel
- Access
- Viewing Cone

- Pixel Pitch
- Resolution
- LED Type

- Font Size
- Matrix
- Character Height

- Interline
- Inter Character
Dynamic Message Sign Terminology

Pixel
Grouping of LEDs

Pixel Pitch
Pixel Spacing, mm

LED Color
Amber or RGB
## Terminology: Pixel Pitch

<table>
<thead>
<tr>
<th>Pitch</th>
<th>Calculation*</th>
<th>Calculated Char Height</th>
<th>Nominal Char Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>66mm (2.6”)</td>
<td>2.6” x 7 =</td>
<td>18.2”</td>
<td>18”</td>
</tr>
<tr>
<td>46mm (1.8”)</td>
<td>1.8” x 7 =</td>
<td>12.6”</td>
<td>12”</td>
</tr>
<tr>
<td>34mm (1.3”)</td>
<td>1.3” x 7 =</td>
<td>9.31”</td>
<td>9”</td>
</tr>
<tr>
<td>20mm (.78”)</td>
<td>.78 x 7 =</td>
<td>5.46”</td>
<td>6”</td>
</tr>
</tbody>
</table>
Terminology: Spacing

Character Height
Line 1

Interline spacing

Character Height
Line 2

66mm = 2.6 inches

46mm = 1.8 inches

34mm = 1.3 inches

20mm = 0.78 inches
Terminology: Access Types

Refers To How The Components Are Accessed

Front Access

Walk In Access
Walk-In Access

- Freeway Location, Typically
- Half Span, Full Span, Cantilever, Shoulder Mount
- No Lane Closures, Typically
- Convenient Access To All Components
- Safe Working Environment
- Available Models: VF-2020
Front Access

- Arterial and Active Traffic Management
- Cantilever, Shoulder Mount, Lane Use
- No-Lift, Vertically Hinged Doors
- Smaller Cabinet Area
- Available Models:
  - VF-2420
  - VX-2420 or VX-2428 for ATM
  - VF-2320
  - VS6 Small Arterial
Rear Access

- Freeway Location, Typically
- Application Dependent
- Structure Dependent
- Available Models: VF-2120
Dedicated or “Embedded” DMS

- Travel Time, Toll Rate
- Lightweight, Low Profile
- Direct Static Sign Installation
- All Equipment At Ground Level
- Easy Maintenance
- Easy Installation
- Full Featured
- Available Models: VM-1020
  - Monochrome Amber (A)
  - Tri-Color (R/G)
  - Full Color RGB (20mm)
**Dedicated DMS**

**BENEFITS TO AGENCIES:**

- Easily facilitate congestion pricing and display travel time information.
- High reliability, full diagnostics, and simple roadside maintenance. They greatly reduce bucket truck maintenance, improving safety and reducing costs. Only the modules reside inside the LED panels.
- Optimal brightness for legibility in all conditions. The DDMS features an industry-established LED brightness of 9,200 cd/m².
- Automatic control of all displays at each site—easily manage travel times, update prices, and convert lanes from High Occupancy Vehicle (HOV) to High Occupancy Toll (HOT) or Truck-Only Toll (TOT).
- The thin, lightweight LED panels bolt easily on static panels, which can then be mounted on structure. They can also be installed on static panels on-site.
Dedicated DMS

KEY FEATURES

CABINET STYLE
- Front service access
- Aluminum mask over polycarbonate face optimizes contrast
- Many standard configurations
- Standard 18-inch and 12-inch character heights
- Considerably lighter than traditional DMS
- Mounts to static panels

APPEARANCE
- Low-profile design eliminates shadows on accompanying static panels
- 30-degree viewing angle
- Amber, red/green/amber and full-color models available
- Amber 9,200 cd/m², Red/Green/Amber 5,000 cd/m², White 12,400 cd/m² LED brightness for ITS legibility
- Ambient light sensors in each display are regulated by the controller to provide uniform brightness to each site
- High-intensity LED technology

RELIABILITY
- Run diagnostics for all displays in a set at one time
- Easily maintain components from a roadside DDMS cabinet
- Redundant power systems maximize uptime
- Easy front access for replacement of modules
- Install an optional Auxiliary Control Panel inside the DDMS cabinet for simple on-site maintenance without a laptop (optional)
- Operating temperature range: -40° F to 140° F (-40°C to 74°C)

STANDARDS
- NTCIP v2 compliant control system
- NEMA TS 4 standards
- UL listed
- NEC
- AASHTO
Dynamic Message Sign Specifications

THE BASICS-NEED TO KNOW

Application:  Walk In, Front Access, Embedded
Type of Display:  Monochrome Amber or Full Color*
(Full Color:  34mm or 20mm)
Pixel Pitch:  66mm, 46mm, 34mm, 20mm
# of Lines
# of Characters Per Line
Height of Characters:  6”, 9”, 12”, and 18”
(Height usually determined by MPH at location)
Font Size:  Dictated by Pixel Pitch and Character Size
Intended Use:  Text Only or Text and Graphics
Physical Dimensions and/or Weight Limitations (if any)

*  Embedded may be Full Color (RGB), Tri-Color or Monochrome Amber
Dynamic Message Sign Specifications

FREEWAY DMS EXAMPLE [FDMS]

Application: Walk In
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: Three (3)
# of Characters Per Line: Twenty One (21)
Height of Characters: 18”
(Travel Speeds of 55MPH and over require 18 Inch Characters)
Font Size: 20mm using 18” Characters: 23x15 Font with
   Inter Character Spacing of 4
Intended Use: Text and Graphics
Daktronics Model: VF-2020-96x400-20-RGB
Dynamic Message Sign Specifications

ARTERIAL DMS EXAMPLE [ADMS]

Application: Front Access
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: Three (3)
# of Characters Per Line: Eighteen (18)
Height of Characters: 12”
(Travel Speeds of 45MPH)
Font Size: 20mm using 12” Characters: 15x10 Font with
  Inter Character Spacing of 3
Intended Use: Text and Graphics
Daktronics Model: VF-2420-80x240-20-RGB
Dynamic Message Sign Specifications

FREEWAY LANE STATUS DMS EXAMPLE [LDMS]

Application: Front Access/Embedded (Dedicated DMS)
(Typically attached along the bottom of a static sign on the structure)
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: One (1)
# of Characters Per Line: Eighteen (18)
Height of Characters: 18”
(Travel Speeds of 55MPH and over require 18 Inch Characters)
Font Size: 20mm using 18” Characters: 22x14 Font with Inter Character Spacing of 4
Intended Use: Text
Daktronics Model: VM-1020-24x336-20-RGB
ARTERIAL LANE STATUS DMS EXAMPLE [ALDMS]

Application: Front Access/Embedded (Dedicated DMS)
(Typically attached along the bottom of a static sign on the structure)
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: One (1)
# of Characters Per Line: Eighteen (18)
Height of Characters: 12”
(Travel Speeds of 45MPH and less typically use 12 inch Characters)
Font Size: 20mm using 12” Characters: 14x8 Font with
   Inter Character Spacing of 3
Intended Use: Text
Daktronics Model: VM-1020-16x208-20-RGB
Dynamic Message Sign Specifications

FREEWAY TOLL RATE DMS EXAMPLE [TDMS]

Application: Front Access/Embedded (Dedicated DMS)
(Typically attached to the front of a static sign)
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: One (1)
# of Characters Per Line: Seven (7)
Example: $000.00
Height of Characters: 18”
(Travel Speeds of 55MPH and over require 18 Inch Characters)
Font Size: 20mm using 18” Characters: 22x14 Font with Inter Character Spacing of 4
Intended Use: Text
Daktronics Model: VM-1020-24x128-20-RGB
Dynamic Message Sign Specifications

ARTERIAL TOLL RATE DMS EXAMPLE [ATDMS]

Application: Front Access/Embedded (Dedicated DMS)
(Typically attached to the front of a static sign)
Type of Display: Full Color
Pixel Pitch: 20mm
# of Lines: One (1)
# of Characters Per Line: Seven (7)
Example: $000.00
Height of Characters: 12”
(Travel Speeds of 45MPH and less typically use 12 Inch Characters)
Font Size: 20mm using 12” Characters: 14 x8 Font with
Inter Character Spacing of 3
Intended Use: Text
Daktronics Model: VM-1020-16x80-20-RGB
## Dynamic Message Sign Specifications

<table>
<thead>
<tr>
<th>Size</th>
<th>Font</th>
<th>Inter-Character</th>
<th>Inter-Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>20mm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6”</td>
<td>7x5</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>9”</td>
<td>12x8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12”</td>
<td>15x10</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>12” TDMS/LDMS</td>
<td>14x8</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>15”</td>
<td>19x13</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>18”</td>
<td>23x15</td>
<td>4</td>
<td>12</td>
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<td>2</td>
<td>4</td>
</tr>
<tr>
<td>15”</td>
<td>11x8</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>18”</td>
<td>14x10</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td><strong>46mm</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>12”</td>
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<td>1</td>
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<tr>
<td>18”</td>
<td>7x5</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
CALCULATING MATRIX SIZE

STEP 1: Determine Pixel Pitch
STEP 2: Determine Height of Character
STEP 3: Determine # of Lines
STEP 4: Determine # of Characters Per Line
STEP 5: Identify the Font Size to be used (see previous page)
STEP 6: Determine Matrix Height and Width
CALCULATING MATRIX SIZE

• Font pixel height X number of lines +

• (Number of lines – 1) X interline spaces = Matrix height

Example: 20mm, Walk In DMS, 3 Lines, 21 Characters Per Line using standard 23x15 Font with InterLine Spacing of 12

• 23 x 3 = 69 +
• (3 lines – 1) X 12 interline spaces = 24
• 69+24= 93
• Round to the nearest manufactured matrix size
• Daktronics Matrix Height: 96
CALCULATING MATRIX SIZE

• Font pixel width + inter-character pixels X characters per line = matrix width

• Example: 20mm, Walk In DMS, 3 Lines, 21 Characters Per Line using standard 23x15 Font with Inter-Character Spacing of 4
  • 15 pixels wide + 4 inter-character pixel X 21 characters per line = 399 pixels wide
  • Round up to the next manufactured matrix size
  • Daktronics Matrix Width Size: 400
THE RESULTS

• Walk In (our VF-2020)
• Matrix Height: 96
• Matrix Width: 400
• Pixel Pitch: 20mm
• Color: RGB

• VF-2020-96x400-20-RGB

• 3 Lines, 18” Characters, 21 Characters Per line using 23x15 Font with Intercharacter spacing of 4; Interline spacing of 12
VFC Sign Controller

- NTCIP 1203 v3 Compliant
- Touch screen LCD Interface
- User Friendly
- Embedded Ethernet and serial ports
- Fiber From Controller To DMS
- Full Messaging and Diagnostics
- Equipment Cabinet Mount, Typical
- Multi-sign control (max of 8 DMS)
VFC Auxiliary Controller

- Local/Remote Sign Control
- Laptop Port
- Duplicates the VFC
- Sign Installation, Typical
Vanguard Central Control Software

- Complete DMS Control
- Message Creation, Editing
- Text, Graphics, Color
- NTCIP 1203 v03 compliant
- Scheduling
- Scenarios, Message Plans
- Full Diagnostics, Reporting
- Content Studio
- Client-Server Based
Equipment Cabinets

- Pole Mount
- Ground Mount

Models:

- 334
- 336S
- P4400
Customer Service

- Overview and Model Specifications/
- Project Management
- Submittal Preparation
- Complete Technical Manuals
- On-Site Installation Technicians
- Field Maintenance Capabilities
Service Plan Options

- Multiple Service Agreement options
- Standard Maintenance Agreements
  - Gold: Parts Only Repair and Technical Support
  - Platinum: Full Service Agreement
- Local Service Capability
- Complete Training of Agency Staff
Summary

• Daktronics Strengths
  • Product features increase Customer ROI
  • Industry standards involvement
  • Experience and Track Record
  • Financial Strength
  • Technical Staff
  • Committed to Customer Service
  • Always willing to help where help is needed
Questions?