METRO™ MESSAGE SIGNS

MODEL WVTMM
PRODUCT SPECIFICATIONS | JANUARY 2014
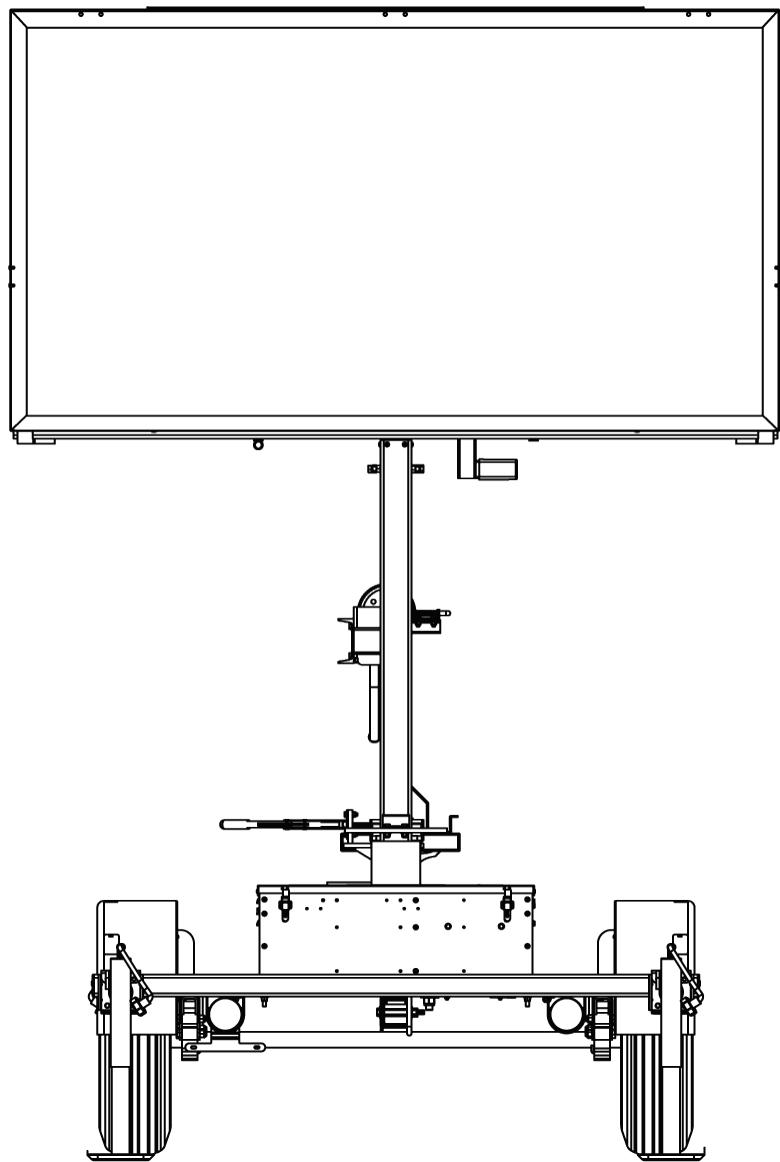
1. DESCRIPTION

1.1.	Description	Wanco® designed the Metro™ message signs for use in metropolitan areas and wherever trailer size is a concern. Metro signs provide the visibility and legibility of other Wanco message signs, but with a smaller footprint. Metro message signs provide information to the public on a large, legible LED display. The display can present messages as text, graphics, or a combination of both.

These signs are portable and self-powered, requiring no permanent installation or wiring. Their compact design makes them highly maneuverable and easy to deploy. They can be towed by most vehicles.

Metro signs have a self-contained onboard computer and a touchscreen controller, making a laptop or external controller unnecessary. A laptop can be connected if desired. The signs come configured with preprogrammed standard messages, and users can create custom messages easily.

For optimal positioning, the message sign display panel rotates independent of the trailer and its height is fully adjustable. Jack-legs provide stability.

Power is provided by maintenance-free batteries, which are charged by an automated solar charging system.

1.2.   Models   Two Metro models are available. The larger display size is wider to accommodate more characters per line of text.

For sample fonts (with sizes and maximum characters per line), see Exhibit A.

1.2.1.   WVTMM-L   Metro matrix message sign with large-size display

1.2.2.   WVTMM-M   Metro matrix message sign with medium-size display

2. FEATURES

2.1.   Setup
- Heavy-duty hand-winch allows one person to easily raise and lower the sign display
- Tower rotates 360 degrees for optimal positioning
- Single disk brake holds tower in place during operation, while a cradle supports and holds board in travel position

2.2.   Operation
- Self-contained onboard computer
- Full-color touchscreen controller with high-resolution display
- User-supplied laptop with Wanco software is optional
- Multi-level password protection restricts access to control software
- Preprogrammed text messages, symbols and graphics
- Internal clock facilitates built-in schedule programming
- Multiple alphanumeric fonts
- Optical lenses and sunshades increase visibility and performance

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2.3.	Power system	• Energy-efficient operation results in long run times
		• Solar panels charge batteries automatically without intervention
		• System shuts down solar-panel charging system when batteries are fully charged, preventing damage
		• Power system allows battery charging with solar panels or commercial power
		• Cooling fan protects battery charger from overheating
		• Battery box can be locked to prevent unauthorized access
2.4.	Maintenance	• Maintenance-free batteries
		• Individual display modules can be replaced easily
		• Standard trailer tires
		• Heavy-duty bolt-on steel fenders can be replaced if damaged
2.5.	Application	Common uses for Metro signs include urban areas where a sidewalk is the only place to put a message sign, congested streets where a full-size sign might impede traffic, and anywhere a full-size sign is not practical. Common applications include:
		• Roadwork zones
		• Traffic calming
		• Road closures
		• Emergency response
		• Public events

3.   DISPLAY

3.1.	Cabinet	
3.1.1.	Description	Weather-resistant cabinet contains display modules and related electronics. Hinged door with full-size display window protects electronics and provides access for maintenance. Clasps hold door closed during operation and the door can be locked with user-supplied padlock.
		See "Options and Optional Equipment" for color display.
3.1.2.	Size	Large display 89" x 49" x 6" (226 x 124 x 15cm) W x H x D
		Medium display 73" x 49" x 6" (185 x 124 x 15cm) W x H x D
3.1.3.	Material	Aluminum sheet, 5052-H32, 0.062" (1.575mm) thick
3.1.4.	Construction	Panels are riveted together, with internal ribs to add lateral strength
3.1.5.	Door	Cabinet door is aluminum extruded frame with sheet metal corner brackets. Stainless steel butt hinges are bolted to top of cabinet and door.
		Window is anti-glare Lexan® solar-grade polycarbonate, 0.150" (3.81mm) thick. Bulb-type weather seal ensures tight fit and seal between window and door frame.

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When sign is in stored position, door fully opens to service the sign cabinet interior. Telescoping prop-slides, one on each side of the cabinet, hold door open.

3.1.6.	Finish	Cabinet and door are coated with oven-baked, powder-coat finish to ensure durability and corrosion protection. Cabinet is coated white on the outside, flat black on the inside; door is flat black. Assemblies are high-pressure phosphate-washed prior to finish coat.
3.1.7.	Wiring	Wiring service loop from computer box to display cabinet is routed inside liquid-tight loom and P-clamped to trailer frame. Service loop length is designed to allow sign rotation. All wiring connectors and procedures are per CSA standards.
3.1.8.	Storage	When lowered for storage and transport, the display cabinet rests in a support cradle, parallel to the trailer length, no locking pins required
3.2.	Display matrix	
3.2.1.	Description	The display matrix is comprised of a series of display modules laid out in a grid across the inside of the display cabinet. Each module has a matrix of LEDs installed on its face, which light up to show a portion of the configured message. Each module features the necessary electronics and coatings to ensure outstanding performance and durability.

3.2.2.	Display modules	Modular design	Allows any display module to be installed in any position in the matrix without repositioning DIP switches
		Wiring	Modules have quick-connect electrical connectors for easy servicing. All wiring terminates at a single terminal strip inside the display cabinet.
		Replacement	Each module can be exchanged in less than two minutes. The only tool needed is a 5/16-inch nut driver socket or slotted screwdriver
			After a new module is installed, a one-step initialization process causes each module to sense its position in the full-matrix display. Initialization is accomplished using the sign's controller.
		Firmware	A program chip is socket replaceable for easy firmware upgrades
		Size	16.0" (40.6cm) wide by 13.13" (33.3cm) high, nominal
		Material	FR4 glass-reinforced epoxy laminate, double-sided, black solder mask with white silkscreen
			Board thickness, 0.094" (2.388mm)
			Copper size, 1 oz. (28.4g)
		Coating	5-mil, military-spec, low-VOC, silicone conformal coating (Dow Corning 1-2577) provides long-term protection against moisture and other atmospheric contaminants, resists corrosion and shorts due to high humidity

	Vibration mounts	All display modules are mounted on rubber vibration-isolation mounts, decreasing risk of physical shock during transport and isolating characters from chassis ground
	Temperature limits	–40 to 176°F (–40 to 80°C)
	Humidity limits	Conformal coating rated to 95% relative humidity
3.2.3. Pixels		Two LEDs form a "pixel"
	Pixel size	0.5" x 0.5" (12.7 x 12.7mm)
	Full matrix	Large sign: 60 pixels wide by 30 pixels high, 1800 pixels total
		Medium sign: 48 pixels wide by 30 pixels high, 1440 pixels total
	Display module	12 pixels wide by 10 high, 120 pixels total
	Pixel pitch	34mm, horizontal and vertical
3.2.4. LEDs	Technology	AlInGaP II (aluminum indium gallium phosphide) technology, T-1¾ size, through-hole auto-insertion
	Color range	Amber, 589.5 to 592.0 nm
	Current	100 mA peak-pulsed forward current
	Temperature limits	Operating temperature, –40 to 212°F (–40 to 100°C)

3.2.5.   Lenses and visors   Each pixel has a snap-in optical lens over the LEDs, enhancing the brightness and angularity of each pixel while reducing power consumption. A polycarbonate visor shades each row of pixels to eliminate glare caused by direct sun exposure. The sunshades snap onto the display module without tools. The lenses snap into the sunshades.

These enhancements enable the message sign to operate with approximately half the power consumption of other message signs. As a result, the system is fully functional using fewer solar panels and batteries, while providing outstanding brightness and readability in all lighting conditions, and 30-day battery autonomy without sun. Reducing the number of solar panels and batteries also lowers the trailer weight and reduces maintenance costs.

3.2.6.   Viewing angle   Total viewing area with optical lenses, 50 degrees

3.2.7.   Brightness   Factory preset for optimal viewing and power consumption

3.2.8.   Auto dimming   Two photocells detect ambient light on the message sign; the message sign computer adjusts the brightness of the LEDs accordingly, dimming display brightness in darkness, increasing to full brightness in daylight

Photocells are mounted inside the sign cabinet, one facing rear and one facing front

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3.2.9.	Software design	Driver	LEDs controlled through 30mA pulse-width modulation design
		Addressing	Each display module address is selected through a software command; no DIP switches are used. The address does not change until reprogrammed, preventing the message from shifting due to an individual module failure.
		Pixel test	Each module is equipped with individual pixel failure notification
3.2.10.	Fonts	12 fonts (for samples, see Exhibit A)	
		Default size	5 x 9 pixels (W x H), 5.85" x 11.21" (14.9 x 28.5cm)
			Character spacing for standard three line message, 3" (7.6cm) between lines, 2.18" (5.5cm) between letters
			Large display: 3 lines of 10 characters per line, maximum Medium display: 3 lines of 8 characters per line, maximum
		Smallest size	4 x 5 pixels (W x H)
		Largest size	11 x 23 pixels (W x H)
		Other sizes	See Exhibit A

4. CONTROL SYSTEM

4.1. Computer

4.1.1.	Description	Self-contained onboard computer, located inside battery box, comprises main motherboard and power control board, controls sign functions	
4.1.2.	Housing	Material	18ga steel
		Size	11.5" x 9.50" x 3.75" (29.1 x 24.1 x 9.5cm) W x H x D
		Finish	Oven-baked, flat-black, powder-coat finish to ensure durability and corrosion protection; high-pressure phosphate-washed prior to finish coat. All parts powder-coated before assembly.
		Mounting	Welded mounting flanges; bolted to bottom of battery box
		Internal access	Top panel is bolted in place and can be removed for access to internal components
4.1.3.	Temperature limits	–40 to 176°F (–40 to 80°C)	
4.1.4.	Wiring	One CPC connector for wiring cable from message sign	
		One CPC connector for wiring cable from power supply	

4.1.5.	Ports	One USB power/communication port for connection to controller
		One Ethernet communications port for optional connection to laptop computer or modem
		Two DB9 serial ports for connection to auxiliary devices
4.2.	Controller	
4.2.1.	Description	Touchscreen interface, connected to computer for programming and running sign display.
		No laptop computer required, but a laptop with Wanco software can be connected in place of controller if desired.

4.2.2.	Touchscreen	Display	Full color, backlit, 7-inch display
			800 x 480 pixels
			Display automatically shuts off after 10 minutes of inactivity
		Interface	Menu-based structure, accessed with virtual buttons on the touchscreen display, provides access to all sign functions including programming messages
			Virtual keyboard appears when required for text entry
			Multi-level password protection restricts access
			Day/night virtual button, changes contrast for use in bright or dim lighting conditions
			Message on sign is always shown while interface is active
4.2.3.	Housing	Backplate	Internal components mounted to aluminum backplate for rigidity
		Cover	Injection-molded PC/ABS
		Size	8.0" x 5.5" x 1.6" (20.3 x 14.0 x 4.1cm) W x H x D
4.2.4.	Storage and removal	Stored in cradle inside battery box. Can be lifted out of cradle and is designed to be handheld. Can be disconnected and removed.
4.2.5.	Wiring	Connected to computer with USB cable
4.2.6.	Power	Power supplied from computer
		Push-button on bottom of housing provides manual on/off control and interface activation after timeout
		Electronics automatically shut down after 20 minutes of inactivity
4.2.7.	Weight	1.6 lbs. (0.73kg)
4.2.8.	Temperature limits	–4 to 158°F (–20 to 70°C)

4.3.	PC boards		
4.3.1.	Data ports	5 serial ports; 2 USB ports, 1 Ethernet port	
4.3.2.	Coating	100% coated with military-spec, low-VOC, silicone conformal coating to provide long-term protection against moisture and other atmospheric contaminants. Resists corrosion and shorts due to high humidity.	
4.3.3.	Temperature limits	–4 to 176°F (–20 to 80°C)	
4.3.4.	Humidity limits	Conformal coating rated to 95% relative humidity	
4.4.	Controller software		
4.4.1.	Standards	Fully NTCIP-compliant	
4.4.2.	Security	Three levels of password protection	
4.4.3.	Message programming	Instant access to program new messages	
		Extremely easy to program	
4.4.4.	Message types	Quick-messages	Easy quick-message activation
		Permanent	Over 90 preprogrammed permanent messages, including arrows and FHWA standards
		Changeable	250 changeable messages stored in NV flash
		Temporary	10 temporary or volatile messages, for ITS systems
		Blank	Easy sign blanking/power off
4.4.5.	Interface display	WYSIWYG (What You See Is What You Get) while programming	
4.4.6.	Text alignment	Selectable: left, center, or right; and top, middle, or bottom	
4.4.7.	Fonts	Selectable: see Exhibit A	
4.4.8.	Blinking	Each character can individually blink	
		Individual lines of a multi-line message can blink	
		The entire message can blink	
		Adjustable timing and duty cycle	
4.4.9.	Message pages	Maximum 10 sequential "pages" per message, sequencing speed from 0.1 to 25.5 sec.	
4.4.10.	Scheduling	Real-time clock and calendar with DST control	

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4.4.11.	Arrow board functions	Sign can display any of the following 12 full-size arrow functions

		Modes	Flashing left or right arrow
			Flashing double arrow
			Flashing four-corner warning
			Flashing caution-bar warning
			Sequencing left or right arrow
			Sequencing left or right stem arrow
			Sequencing left or right chevron arrows
			Alternating diamonds
			(for samples, see Exhibit B)
		Bold graphics	Each arrow and bar is 5 pixels wide

4.4.12.	Configuration	Menus provide access to all message sign configuration settings
4.4.13.	Troubleshooting	Status and diagnostic menus provide message sign information to assist in troubleshooting

5. TRAILER

5.1.	Frame	All welded structural steel
5.2.	Fenders	Round full wheel coverage fenders with inner splash panel on each fender. Fenders are bolted to the trailer frame. Material: 16ga steel
5.3.	Tie-downs	Three tie-downs: one on each front corner of frame, one centered on rear of frame
5.4.	Finish	Frame is coated with oven-baked, safety-orange powder-coat finish to ensure durability and corrosion protection. Assemblies are run through a five-stage, high-pressure phosphate-wash prior to finish coat. See "Options and Optional Equipment" for color options.
5.5.	Axle assembly	2000 lb. (907kg) capacity, 5 on 4.5" B.C. idler hub
5.6.	Springs	Double-eye leaf springs
5.7.	Tires	ST205/75D15 steel-belted trailer tires, load rating B
5.8.	Drawbar	
5.8.1.	Construction	Telescopes inside receiver sleeve welded under trailer frame. Removable for shipping and for added theft protection if needed. Secures with two 1/2-inch (12mm) diameter bolts.
5.8.2.	Material	Square tubing, 3" x 3/16" wall (7.62cm x 0.476cm wall)
5.8.3.	Jack	Top-wind swivel, 800-lb. (363kg) capacity with caster wheel to make moving trailer easier

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5.8.4.	Tow hitch	Standard 2-inch ball coupler tow-hitch, SAE Class 2, 3500-lb. (1588kg) capacity. Bolts to drawbar, removable and replaceable.

See "Options and Optional Equipment" for tow-hitch options.

5.8.5.	Tow chains	Two high-test proof coil chain assemblies, with "latching" S-hooks for towing. Chains attached to drawbar with quick connectors.

Material diameter	0.406" (10.3mm)
Working load limit	5400 lbs. (2450kg)
Breaking force	16,200 lbs. (72kN)

5.9.	Stabilizer jacks	Four swivel jacks, each with 2000-lb. (907kg) capacity, mounted on corners of trailer frame
5.10.	Wind resistance	In the deployed position, the maximum sustainable wind speed before overturning, when supported by the standard jack stands with tires off the ground, is 50 mph (80km/h)
5.11.	Wiring	
5.11.1.	Description	Wiring to connect tow vehicle and trailer for trailer taillights is installed inside drawbar, with pigtails and connectors at both ends; no crimping required
5.11.2.	Trailer plug	A sealed, molded, 4-square connector plugs into harness under trailer
5.11.3.	Tow-vehicle plug	Two-piece assembly with 4-flat molded connector on harness plugs into tow vehicle

Meets SAE J1239

See "Options and Optional Equipment" for tow-vehicle plug options

5.11.4.	Protection	All trailer wiring encased in UV protective loom, and attached with P-clamp riveted to trailer frame; no exposed wires
5.12.	Taillights	
5.12.1.	Type	Two oval-shaped, sealed, combination stop, turn and taillights
5.12.2.	Location	Mounted to top of trailer deck behind fenders
5.12.3.	Mounting	No screws used for mounting; bracket is welded to trailer frame; each light held in place and sealed with snap-in rubber grommet
5.13.	License plate	A lighted license plate light holder is mounted to rear trailer frame
5.14.	Reflectors	Sides of trailer have amber reflectors near front and red reflectors near rear

See "Options and Optional Equipment" for reflective tape

5.15.   Tower assembly

5.15.1. Function   Sign cabinet is raised and lowered on a telescoping tower

5.15.2. Tower construction   Two sections of square steel tubing with the inner section telescoping inside the outer section. The inner section is zinc plated to prevent corrosion.

Nylon guide blocks keep the sections tight, eliminating the need for greasing the tower and preventing dirt from building up on the inner tower section. Dirt would cause performance problems and maintenance issues.

5.15.3. Swivel base   A steel tubular weldment is bolted to the trailer frame. The outer tower section rotates on a thrust bearing and washers inside the swivel base, reducing rotating friction.

5.15.4. Height   At fully deployed height, 84" (213cm) from ground to bottom of display cabinet

5.15.5. Height lock   Spring-loaded locking pin prevents tower from falling if the winch or cable were to fail. Also locks tower when fully lowered into travel position.

5.15.6. Winch assembly

	Function	Hand-operated winch raises and lowers sign cabinet
	Capacity	1500 lbs. (680kg)
	Brake	Safety friction-brake prevents display cabinet from falling if operator looses grip on winch handle
	Cable	1/4" (6.35mm) diameter galvanized aircraft cable

5.15.7. Rotation   Sign rotates by hand, pivoting 360 degrees on tower

5.15.8. Rotation lock   Sign rotation is locked with an adjustable lever that operates a mechanical friction caliper and disk brake. The ½-inch thick, round, zinc-plated brake disk is bolted to the outer tower section.

5.15.9. Sight tube   A sight tube for aiming the message sign in desired direction is mounted to the underside of the display cabinet frame

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6.   POWER SYSTEM

6.1.	Description	Electronics powered by batteries, which are charged automatically with integrated solar charging system
6.2.	Battery box	
6.2.1.	Function	Holds batteries and remote charger
		See "Options and Optional Equipment" for heavy-duty secure battery box
6.2.2.	Construction	Riveted all-steel construction
		All parts powder-coated before assembly
		Divider panel inside box separates batteries from electronics
		Louvers provide ventilation
		Latches keep cover closed and can accept user-supplied padlocks
6.2.3.	Location	Centered over axle on between fenders, bolted to trailer frame
6.3.	Batteries	
6.3.1.	Description	Two 4D AGM 12Vdc batteries
		See "Options and Optional Equipment" for battery options
6.3.2.	Features	100% maintenance-free
		Sealed and spill-proof
		Faster recharge and greater freeze resistance than conventional batteries
		Contains less lead than conventional batteries
6.3.3.	Voltage	12Vdc each
6.3.4.	Weight	Approx. 160 lbs. (72kg) each
6.3.5.	Capacity	400 Ah total
6.4.	Remote charger	
6.5.	Function	Plugs into a standard commercial power source to recharge batteries if battery voltage drops due to lack of sun for automated solar charging system
6.5.1.	Type	12-volt battery charger
6.5.2.	Location	Inside battery box, mounted to divider panel on opposite side from batteries
6.5.3.	Output capacity	15A

| 6.5.4. | Output voltage | 13.2Vdc range "float" mode |
		13.6Vdc range "absorption" mode
		14.2Vdc range "bulk" mode
6.5.5.	Input voltage	105 to 135Vac, standard three-prong plug
6.5.6.	Input frequency	50 to 60 Hz
6.5.7.	Cooling	Fan cooled when charger temperature reaches 95°F (35°C)
6.5.8.	Protection	Automotive-style replaceable fuses
6.6.	Solar	
6.6.1.	Panels	One high-efficiency multi-crystal photovoltaic solar module
6.6.2.	Location	Behind message sign, over tower. Solar panel array lies flat; rises and rotates with message sign. No shadowing effect on any trailer component.
6.6.3.	Power output	85W
		See "Options and Optional Equipment" for solar options
6.6.4.	Current	9.5A max. system current
		10.3A open short-circuit current
6.6.5.	Voltage	17.9Vdc max.
		21.8Vdc open short-circuit voltage
6.6.6.	Regulation	Solar panels regulated by computer power board
6.6.7.	Security	Solar panel array bolted to message sign frame with security screws and special security nut. Tool for security screws mounted inside battery box.

7.   DIMENSIONS & WEIGHT

7.1.   Dimensions

7.1.1.   Large sign

inches
(cm)

Travel position

120
(304)

91
(231)

73
(185)

Deployed

89
(226)

49
(124)

133
(337)

84
(213)

57
(143)

8
(21)

73
(185)

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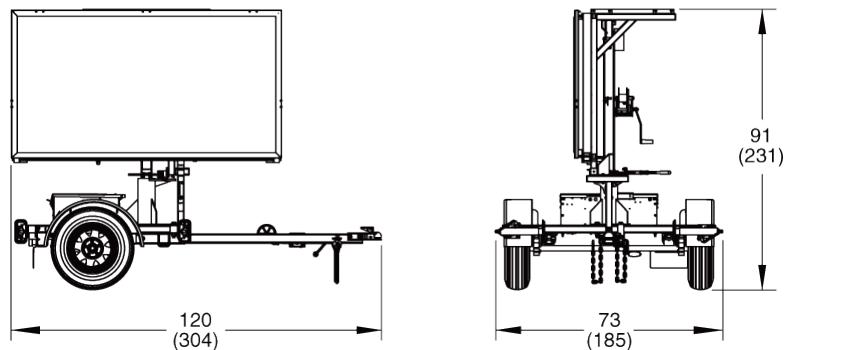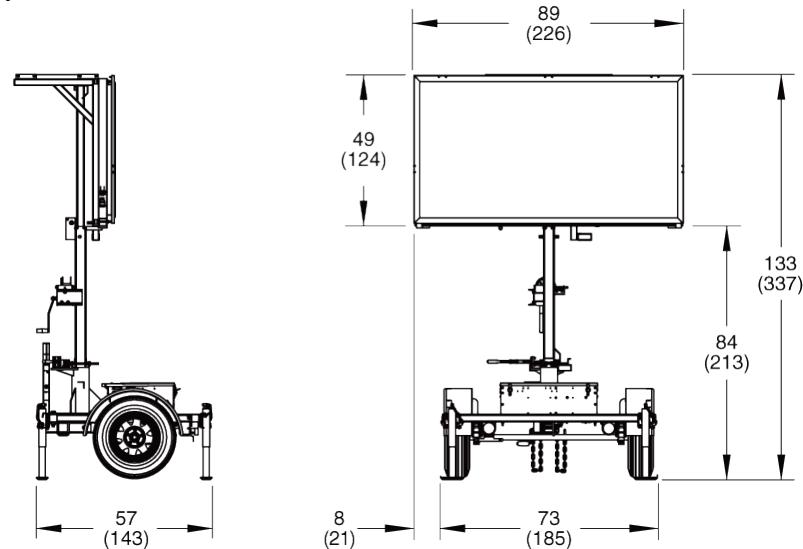
7.1.2.   Medium sign   *inches*
                               (cm)

Travel position

118
(299)

91
(231)

73
(185)

Deployed

73
(185)

49
(124)

133
(337)

84
(213)

57
(143)

73
(185)
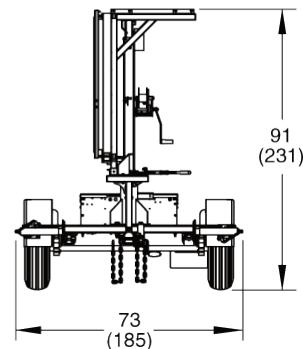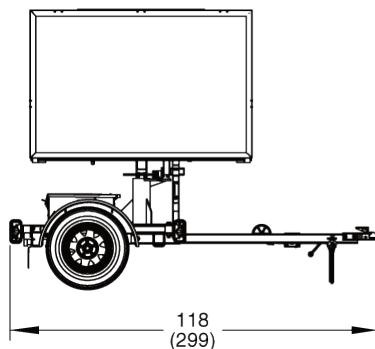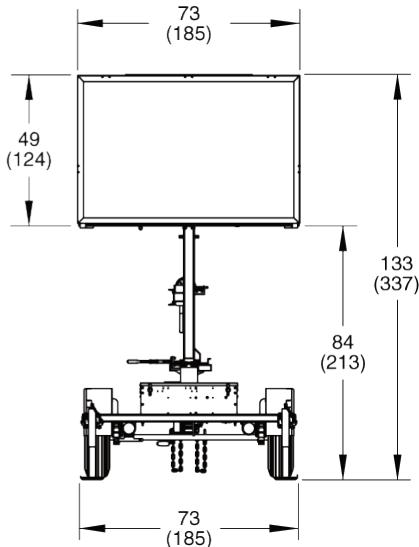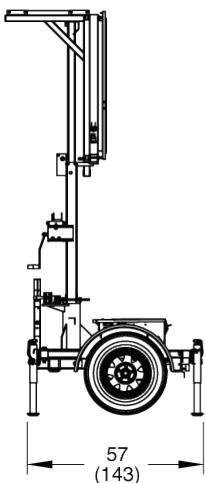
7.2.   Weight

7.2.1.   Large sign   Approx. 1500 lbs. (680 kg)

7.2.2.   Medium sign   Approx. 1400 lbs. (635 kg)

8. OPTIONS AND OPTIONAL EQUIPMENT

8.1. **Tow hitch** Combo-hitch for pintle hook and 2-inch ball hitch

Heavy-duty lunette ring, 2½" ID x 1⅝" cross-section

8.2. **Tow-vehicle plug** Many types of plugs available, prewired at the factory; contact factory for details

8.3. **Power**

8.3.1. Additional batteries For geographic locations with less solar charging potential or colder weather, and for applications that require year-round charging, add batteries for greater capacity

Options	One additional 4D AGM 12Vdc batteries, 200Ah additional capacity
	Two additional 4D AGM 12Vdc batteries, 400Ah additional capacity

8.3.2. 6-volt batteries Replace standard batteries with lighter-weight 6Vdc batteries, wired in parallel and series for a 12-volt system

Options	Four Group 24 AGM 6Vdc batteries, 430Ah total capacity
	Six Group 24 AGM 6Vdc batteries, 645Ah total capacity
	Eight Group 24 AGM 6Vdc batteries, 860Ah total capacity
Weight	Approx. 60 lbs. (26kg) each

8.3.3. Remote charger When required for added battery charging capacity, replace standard remote charger with higher amperage charger

Options	12-volt, 45-amp charger	
	12-volt, 75-amp charger	
Details	Output voltage	13.4Vdc @ full load
		13.6Vdc standard float voltage
		14.2Vdc with dual-voltage jack installed
	Input voltage	108 to 132Vac, standard three-prong plug
	Input frequency	50 to 60 Hz

8.3.4. Solar For geographic locations with less solar charging potential or colder weather, and for applications that require year-round charging, additional solar power is available

Options include 130W, 170W, 260W, and 390W solar arrays; contact factory for details

8.4. **Color display** Display modules with colored LEDs replace the standard amber modules.

Specifications for this option are provided in a separate document.

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8.5.   Secure battery box

8.5.1.	Battery box	High-security battery box features heavy-gauge steel lid, hidden hinges, and heavy-duty hidden-shackle padlocks. Replaces standard battery box.
8.5.2.	Crossbar	Optional heavy-duty, lockable crossbar fits over top of secure battery box, preventing lid from opening

8.6.   Taillights

8.6.1.	Dual sealed-bulb	Dual sealed-bulb taillights replace standard sealed-bulb taillights
		Requires SAE J560 7-pole round-pin trailer plug to replace standard trailer plug
8.6.2.	Single LED	Single LED taillights replace standard sealed-bulb taillights
8.6.3.	Dual LED	Dual LED taillights replace standard sealed-bulb taillights
		Requires SAE J560 7-pole round-pin trailer plug to replace standard trailer plug

8.7.	**Reflective tape**	Reflective red-and-white conspicuity tape across rear trailer frame for increased visibility
8.8.	**Finish color**	Specify power-coat color and, if applicable, color scheme

8.9.   Radar-based speed monitoring system

8.9.1.	Description	Approach-only radar senses the largest moving mass moving toward it. The message sign conveys a user-selected message to the motorist.
8.9.2.	Band	K-band transmitter
8.9.3.	Location	Radar head located on the bottom of the message sign display cabinet, just off-center, for maximum effectiveness regardless of which side of the road the trailer is being used
8.9.4.	Enclosure	Radar head is sealed to withstand the elements, while an aluminum cover goes over the head unit for impact resistance
8.9.5.	Standards compliance	FCC approved CE compliant
8.9.6.	Distance range	1000 ft. @ 5 to 85 mph (305m @ 8 to 137km/h)
8.9.7.	Speed range	5 to 99 mph (8 to 222km/h)
8.9.8.	Accuracy	±1 mph from 5 to 40 mph, ±2 mph from 40 to 100 mph (±1.6km/h from 8 to 64km/h, ±3.2 from 64 to 161km/h)
8.9.9.	Frequency	24.150 ± 0.05 GHz
8.9.10.	Electrical protection	Fused and reverse-polarity protected

8.9.11.	Calibration		Radar is factory calibrated; a tuning fork for verifying radar is operating correctly is attached inside the control cabinet door; when struck and held in front of the radar head, the tuning fork vibrations simulate 55 mph

8.10.   Cellular modem package

8.10.1.	Purpose		The remote communications package enables the message sign to be controlled from remote locations away from the message sign, using an Internet-connected computer, tablet, or smartphone. Includes all of the items described below.
8.10.2.	Remote NTCIP central control software	Description	Easy-to-use program connects a computer to an individual message sign via an Internet connection. Used for changing messages, checking on trailer health status (such as battery voltages), viewing GPS locations, and setting message schedules.
		System requirements	Microsoft® Windows® (most versions)
			.NET framework
			Internet connection
8.10.3.	Web-based remote control	Description	Using a standard Web browser, allows connection to an individual message sign without software. Ideal for smartphone users.
		System requirements	Modern standards-compliant Web browser (such as Mozilla® Firefox®, Microsoft Internet Explorer® 7, Opera™, or Safari®) with JavaScript enabled
			A platform that supports one of these browsers (smartphone, laptop computer, or desktop computer)
			Internet connection
8.10.4.	Wanco Fleet Manager	Description	Web-based application for managing even the most diverse message sign fleets
		Features	Add or remove equipment to groups for quick access, ideal for managing contractor rentals or entire projects all at once
			Map GPS locations of entire message sign fleet simultaneously
			Record vital information from signs, such as message changed by user and date, battery and solar voltages, and equipment alarms
			Mass broadcast capability, perfect for Amber Alerts and emergencies
		System requirements	Modern standards-compliant Web browser (such as Mozilla Firefox, Microsoft Internet Explorer 7, Opera, or Safari)
			A platform that supports one of these browsers (laptop or desktop computer)
			Internet connection

8.10.5.	Cellular plans	User provided	User obtains cellular data plan from, and makes monthly payments to, service provider. Wanco programs modem according to user-provided specifications at time of modem purchase. Wanco tests modem setup.
		Wanco cellular service	Wanco provides Verizon® cellular service without activation charges, monthly payments, or overage charges. User makes a single payment annually to Wanco. For increased security, Wanco hosts the service on a virtual private network (VPN).
8.10.6.	Modem	Compact industrial cellular gateway	
		Optional modems available; contact factory for details	
		Carriers	Approved for use on Verizon, AT&T®, Sprint®, Rogers™, Bell™, and Telus®
		Security	Latest levels in security, IP sec, SSL, and GRE VPN client
		Power	Input voltages range: 7 to 28Vdc
			Typical power consumption: 250mA @ 12Vdc
		Operating temperature	−22 to 158°F (−30 to 70°C)
8.10.7.	Antenna	Low-profile dual-function GSM/GPS	
		Location	Installed at highest point on message sign
		GPS L1 antenna	1575.42 ±3 MHz center frequency <15mA @ 3 to 5V
		GSM antenna	Dual band, 824 to 896 MHz and 1710 to 1990 MHz
		Connectors	SMA connectors for GSM and GPS antennas

8.11.   Traffic Data Classifier System

8.11.1.	Design	Radar-based, nonintrusive, does not require loops or hoses, no disturbance of traffic flow during installation or use
8.11.2.	Direction	Registers both approaching and receding vehicles
8.11.3.	Traffic lanes	Most effective for 2-lane roads
8.11.4.	Traffic count	Can record data for more than 1 million vehicles in internal memory
8.11.5.	Data format	Speed, date, time, direction, length for each vehicle
8.11.6.	Units	English or metric
8.11.7.	Time stamp	Yr,Mo,Dy,Hr,Min,Sec.
8.11.8.	Speed range	5 to 138 mph (8 to 222 km/h)
8.11.9.	Sensor	Microwave K-band 24.125 GHz

8.11.10. Power	Uses radar-speed sign power supply
8.11.11. Power output	20 dbm (EIRP)
8.11.12. Current	110 mA
8.11.13. Temperature	Operating limits: –40 to 185 °F (–40 to 85 °C)
8.11.14. Internal memory	1MB (1,048,576 bytes)
8.11.15. Baud rate	9600, 8 bit, no parity
8.11.16. Calibration	Self-calibrating
8.11.17. Installation	Automatically positioned horizontally when trailer is level; adjustable bracket allows user to point toward traffic at a 45-degree angle

8.12.   RemoteUI control software

8.12.1. Description	The Wanco RemoteUI program allows operators to control the message board using a laptop computer or touchscreen device. The computer must be connected to the message sign; wireless access is not recommended.
8.12.2. Fleet limits	Connects to one sign at a time; maximum number of signs is unlimited
8.12.3. Security	Multi-level password protection
8.12.4. System requirements	Microsoft Windows (most versions) or Unix® operating system

EXHIBIT A: MESSAGE FONTS

Large sign

Font 1

5 x 9 pixels

5.85" x 11.21" (149 x 285mm)

Standard fixed-width font with lower-case letters

3 lines of 10 characters, maximum

Font 2

5 x 9 pixels

5.85" x 11.21" (149 x 285mm)

Standard fixed-width font with lower-case letters and increased horizontal spacing

3 lines of 7 characters, maximum

Font 3

6 x 9 pixels

7.19" x 11.21" (183 x 285mm)

Bold proportional font with 4x9-pixel capitals for lower-case letters

3 lines of 8 characters, typical

Font 4

6 x 11 pixels

7.19" x 13.89" (183 x 353mm)

Bold proportional font with lower-case letters and accented characters

2 lines of 8 characters, typical

Font 5

6 x 11 pixels

7.19" x 13.89" (183 x 353mm)

Bold proportional font with lower-case letters, accented characters, and increased spacing

2 lines of 7 characters, typical

Font 6

5 x 12 pixels

5.85" x 15.22" (149 x 387mm)

Tall fixed-width font with 5x8-pixel capitals for lower-case letters

2 lines of 10 characters, maximum

Large sign *(continued)*

Font 7

7 x 12 pixels

8.53" x 15.22" (217 x 387mm)

Bold fixed-width font with 6x8-pixel capitals for lower-case letters

2 lines of 7 characters, maximum

Font 8

7 x 23 pixels

8.53" x 29.95" (217 x 761mm)

Large fixed-width font with 6x14-pixel capitals for lower-case letters

1 line of 7 characters, maximum

Font 9

11 x 23 pixels

13.89" x 29.95" (353 x 761mm)

Large bold fixed-width font, capitals only (no lower-case letters)

1 line of 5 characters, maximum

Font 10

4 x 5 pixels

4.52" x 5.85" (115 x 149mm)

Mini proportional font with limited lower-case

5 lines of 12 characters, typical

Font 11

7 x 10 pixels

8.53" x 12.55" (217 x 319mm)

Large fixed-width font, capitals only (no lower-case letters)

2 lines of 6 characters, maximum

Font 12

9 x 14 pixels

11.21" x 17.90" (285 x 455mm)

Large bold fixed-width font, capitals only (no lower-case letters)

2 lines of 4 characters, maximum

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Medium sign

Font 1

5 x 9 pixels

5.85" x 11.21" (149 x 285mm)

Standard fixed-width font with lower-case letters

3 lines of 8 characters, maximum

Font 2

5 x 9 pixels

5.85" x 11.21" (149 x 285mm)

Standard fixed-width font with lower-case letters and increased horizontal spacing

3 lines of 6 characters, maximum

Font 3

6 x 9 pixels

7.19" x 11.21" (183 x 285mm)

Bold proportional font with 4x9-pixel capitals for lower-case letters

3 lines of 7 characters, typical

Font 4

6 x 11 pixels

7.19" x 13.89" (183 x 353mm)

Bold proportional font with lower-case letters and accented characters

2 lines of 6 characters, typical

Font 5

6 x 11 pixels

7.19" x 13.89" (183 x 353mm)

Bold proportional font with lower-case letters, accented characters, and increased spacing

2 lines of 6 characters, typical

Font 6

5 x 12 pixels

5.85" x 15.22" (149 x 387mm)

Tall fixed-width font with 5x8-pixel capitals for lower-case letters

2 lines of 8 characters, maximum

Medium sign *(continued)*

Font 7

7 x 12 pixels

8.53" x 15.22" (217 x 387mm)

Bold fixed-width font with 6x8-pixel capitals for lower-case letters

2 lines of 6 characters, maximum

Font 8

7 x 23 pixels

8.53" x 29.95" (217 x 761mm)

Large fixed-width font with 6x14-pixel capitals for lower-case letters

1 line of 6 characters, maximum

Font 9

11 x 23 pixels

13.89" x 29.95" (353 x 761mm)

Large bold fixed-width font, capitals only (no lower-case letters)

1 line of 4 characters, maximum

Font 10

4 x 5 pixels

4.52" x 5.85" (115 x 149mm)

Mini proportional font with limited lower-case

5 lines of 9 characters, typical

Font 11

7 x 10 pixels

8.53" x 12.55" (217 x 319mm)

Large fixed-width font, capitals only (no lower-case letters)

2 lines of 5 characters, maximum

Font 12

9 x 14 pixels

11.21" x 17.90" (285 x 455mm)

Large bold fixed-width font, capitals only (no lower-case letters)

2 lines of 3 characters, maximum

EXHIBIT B: ARROW-BOARD FUNCTIONS

Flashing patterns

Flashing left or right arrow

Flashing double arrow

Flashing four-corner warning

Flashing caution-bar warning

Sequential patterns

Sequencing left or right arrow

Sequencing left or right stem arrow

Sequencing left or right chevron arrows

Alternating diamonds