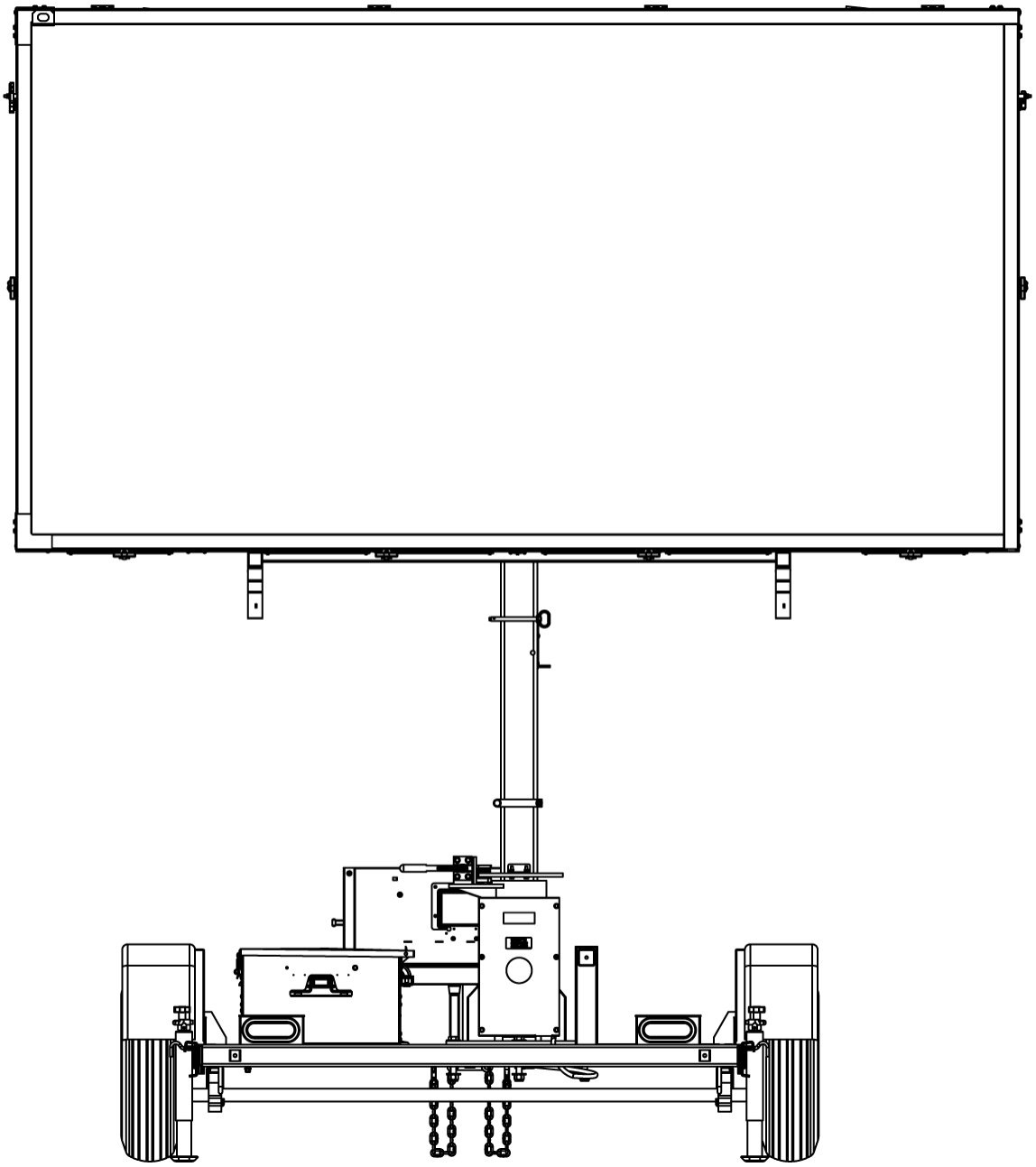
MATRIX MESSAGE SIGNS

MODEL WTMMB
PRODUCT SPECIFICATIONS | JANUARY 2016



1. DESCRIPTION

1.1. Description

Wanco® message signs provide information to the public on a large, legible LED display. These signs are portable and self-powered, requiring no permanent installation or wiring.

The full-matrix display can present messages as text, graphics, or a combination of both. Messages are programmed using a self-contained onboard computer, making a laptop or external controller unnecessary. A laptop can be connected if desired. Signs come configured with preprogrammed standard messages, and users can create custom messages easily. A quick-message function provides for display of selected messages with a single keystroke.

For optimal positioning, the sign rotates independent of the trailer and its height is fully adjustable. Jack-legs and optional outriggers provide more adjustability and added stability. The trailer is easy to maneuver and deploy, and can be towed by most vehicles.

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

1.2. Models

1.2.1. WTMMB(A) — Full-size matrix message sign with hydraulic lift

1.2.2. WTMMB(B) — Full-size matrix message sign with hand-operated winch

2. FEATURES

2.1. Setup

- Hydraulic lift or winch with cable raises sign display on tower
- Tower rotates 360 degrees for optimal positioning
- Single disk brake holds display in place during operation, while a cradle supports and holds display in travel position

2.2. Operation

- Self-contained onboard computer, no laptop required
- Multi-level password protection restricts access to control software
- Preprogrammed text messages, symbols and graphics
- Quick-reference instructions, silkscreened on control panel, include most commonly performed tasks
- Easily center each line of text
- Internal clock facilitates built-in schedule programming
- Multiple alphanumeric fonts
- Optical lenses and sunshades increase visibility and performance
- Wide footprint provides stability in high wind, while optional outriggers add even more support
- Cooling fans protect sign cabinet from overheating
- Control box can be locked to prevent unauthorized access
- Standard QWERTY keyboard can be removed and replaced
- Meets MUTCD and NTCIP standards

2.3. Power system

- Battery powered and solar charging
- Energy-efficient operation results in long run times
- Solar panels charge batteries automatically without intervention
- Charging system shuts down 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

- Individual display modules can be replaced easily
- Standard trailer tires
- Heavy-duty bolt-on steel fenders can be replaced if damaged
- Durable powder-coat finish resists the elements

2.5. Application

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 can be locked with user-supplied padlock.

Cabinet face is tapered five degrees downward (it is wider at the top than at the bottom) to face traffic, reducing glare.

3.1.2. Size

138" x 75" x 12" (351 x 189 x 30cm)

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.

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, flat-black, powder-coat finish to ensure durability and corrosion protection. Assemblies are high-pressure phosphate-washed prior to finish coat.

3.1.7.	Wiring		Wiring service loop from control box to display cabinet is routed inside liquid-tight loom and P-clamped to trailer frame. Service loop length is designed to allow 360-degree sign rotation. All wiring connectors and procedures are per CSA standards.
3.1.8.	Ventilation		Two cooling fans located at the top of the display cabinet circulate air into, through, and out of the cabinet to cool electrical components. A duct is located at the top of the cabinet to ensure even airflow. It is proven that electronic components, including LEDs, degrade in conditions of extreme heat. Without the cooling fans the display cabinet can reach over 200 degrees Fahrenheit. A temperature sensor is mounted on the photocell PC board inside the cabinet to control fan operation. Each fan has its own thermal settings, adjustable with the onboard computer, to optimize battery power usage.
3.1.9.	Storage		When lowered for storage and transport, the display cabinet rests in two support cradles, 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.
		Size	20.0" (50.8cm) wide by 22.5" (57.2cm) 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	Four LEDs form a “pixel”	
		Pixel size	1.25" x 1.25" (32 x 32mm)
		Full matrix	48 x 27 pixels (W x H), 1296 pixels total
		Display module	8 x 9 pixels (W x H), 72 pixels total
		Pixel pitch	66mm, 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 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.	Visibility	At least 1 mile (1.6km)	
3.2.7.	Legibility	Word recognition with default font, 814 to 962 ft. (248 to 293m)	
3.2.8.	Viewing angle	Total viewing area with optical lenses, 42.8 to 54.6 degrees	
3.2.9.	Brightness	Factory preset for optimal viewing and power consumption	

3.2.10.	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	
3.2.11.	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
3.2.12.	Fonts	12 fonts	
		See Exhibit A for font samples and additional font information	
		Default size	5 x 7 pixels (W x H), 12.80" x 18.00" (325 x 457mm)
			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
3.3.	Standards	Meets MUTCD standards	

4. CONTROL CONSOLE

4.1.	Description	Self-contained onboard computer for programming and running sign display. No laptop computer required. Located inside a locking control box near front of trailer. Operator can sit on trailer frame while using the computer. A laptop with Wanco software can be connected if desired.
4.2.	Control box	
4.2.1.	Rating	NEMA 4 (IP53) type, dust and weatherproof steel box
4.2.2.	Size	24.0" x 16.0" x 9.5" (61.0 x 40.6 x 24.1cm) W x H x D
4.2.3.	Material	14ga CRS
4.2.4.	Door	Front-panel is a door, hinged at the bottom, which drops down when opened.
		A bracket inside the door holds the computer operation manual, which has pages made of synthetic paper for resistance to wet weather conditions.
4.2.5.	Latch	Handle on front of control box door operates three-point latching mechanism to keep hinged door closed. Handle is keyed and can be locked.

4.2.6.	Finish	Cabinet and door are coated with oven-baked, equipment-white, powder-coat finish to ensure durability and corrosion protection. Assemblies are high-pressure phosphate-washed prior to finish coat.
4.2.7.	Serviceability	Entire console box is removable for service; all wiring has quick-connect plugs
4.2.8.	Console light	A nightlight inside control box is controlled by magnetic reed switch on door, and illuminates the control panel and manual area for nighttime reading. Light shuts off automatically after a period of keyboard inactivity.
4.3.	Control panel	
4.3.1.	Operation instructions	Easy-to-follow instructions are silkscreened on front of control panel for easy reference while using the computer. No stickers or decals, the silkscreen is durable and long-lasting.
4.3.2.	Display	An LCD displays menus and status information, providing interactivity with the sign. Full matrix LCD, 160 pixels wide by 128 pixels high, 101 by 82mm viewing area Large pixel size with good angularity for better viewing, 0.56mm wide and high Rotary switch adjusts LCD brightness for optimum viewing LCD has green LED backlighting LCD automatically shuts off after a period of inactivity; pushbutton switch activates LCD Temperature limits: –4 to 158°F (–20 to 70°C)
4.3.3.	LED indicators	Indicates the status conditions. Depending on user-specified message sign options, may include one or more of the following: Active alarms Message sign power is on Solar charging system is charging batteries Programmed schedule is active Radar power is on Highway radio is on Low battery voltage detected, system power shutdown occurred
4.4.	PC boards	
4.4.1.	Data ports	1 serial port, 2 USB ports, 1 Ethernet port
4.4.2.	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.
4.4.3.	Temperature limits	–4 to 176°F (–20 to 80°C)
4.4.4.	Humidity limits	Conformal coating rated to 95% relative humidity
4.5.	Keyboard	Detachable standard desktop-computer keyboard, IBM compatible, 101 USB connection

4.6.	Controller software		
4.6.1.	Standards	Fully NTCIP-compliant	
4.6.2.	Security	Three levels of password protection	
4.6.3.	Message programming	Instant access to program new messages Extremely easy to program	
4.6.4.	Message types	Quick-messages	One-click quick-message activation using keyboard function keys
		Permanent	Over 90 preprogrammed permanent messages, including arrows and FHWA standards
			One-click activation using keyboard function keys
		Changeable	250 changeable messages stored in NV flash
			One-click activation using keyboard function keys
		Temporary	10 temporary or volatile messages, for ITS systems
		Blank	One-click sign blanking/power off
4.6.5.	Interface display	WYSIWYG (What You See Is What You Get) while programming	
4.6.6.	Text alignment	Selectable: left, center, or right; and top, middle, or bottom	
4.6.7.	Fonts	Selectable: see Exhibit A	
4.6.8.	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	
4.6.9.	Message pages	Maximum 10 sequential “pages” per message, sequencing speed from 0.1 to 25.5 sec.	
4.6.10.	Scheduling	Real-time clock and calendar with DST control	
4.6.11.	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 stem arrow Sequencing left or right walking arrow Sequencing left or right chevron arrows Alternating diamonds (for samples, see Exhibit B)

	Bold graphics	Each arrow and bar is 5 pixels wide
	One-click activation	All modes can be activated using keyboard function keys
4.6.12.	Configuration	Menus provide access to all message sign configuration settings
4.6.13.	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	Rectangular Jeep-style fenders are bolted to the trailer frame
		Material: 16ga steel
5.3.	Tie-downs	One on each corner 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.	Traction tape	Traction tape on top of frame, sign side only, prevents slipping when standing on the frame to service sign
5.6.	Axle assembly	3500 lb. (1588kg) capacity, 4" (10cm) drop-axle, 5 on 4.5" B.C. idler hub
		See “Options and Optional Equipment” for brake options
5.7.	Springs	Double-eye leaf springs
5.8.	Tires	ST205/75D15 steel-belted trailer tires, load rating B
5.9.	Drawbar	
5.9.1.	Construction	Telescopes inside receiver sleeve integrated into trailer frame. Removable for shipping and for added theft protection if needed. Secures with two 1/2-inch diameter bolts.
5.9.2.	Material	Straight square tubular steel, 3" x 3/16" wall (7.62cm x 0.476cm wall)
5.9.3.	Jack	Top-wind swivel, 800-lb. (363kg) capacity with caster wheel to make moving trailer easier
5.9.4.	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.

5.9.5.	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)
5.10.	Stabilizer jacks	Four swivel jacks, each with 2000-lb. (907kg) capacity, mounted on corners of trailer frame
		See "Options and Optional Equipment" for outriggers
5.11.	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 72 mph (115km/h)
5.12.	Taillights	Two oval-shaped, sealed, combination stop, turn and taillights
		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.	Wiring	
5.13.1.	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
5.13.2.	Protection	All trailer wiring encased in UV protective loom, and attached with P-clamp riveted to trailer frame; no exposed wires
5.14.	License plate	Lighted license plate light holder
5.15.	Reflectors	Sides of trailer have amber reflectors near front and red reflectors near rear
		See "Options and Optional Equipment" for reflective tape
5.16.	Tower assembly	
5.16.1.	Function	Sign cabinet is raised and lowered on a telescoping tower
5.16.2.	Tower construction	Two sections of square steel tubing with the inner section telescoping inside the outer section.
		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.
5.16.3.	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.

5.16.4.	Finish	Winch model	Tower sections and swivel base are treated for corrosion resistance	
		Hydraulic lift model	Tower sections and swivel base are fully galvanized	
5.16.5.	Height	At fully deployed height, 84" (213cm) from ground to bottom of display cabinet		
5.16.6.	Height lock	Winch model	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.	
		Hydraulic lift model	Locking pin inserted through the tower in the up position prevents the tower from falling if the hydraulics were to fail. Replaces spring-loaded locking pin.	
5.16.7.	Winch assembly (winch model only)	Function	Hand-operated winch raises and lowers sign cabinet	
		Capacity	2500 lbs. (1134kg)	
		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	
5.16.8.	Hydraulic lift (hydraulic model only)	Function	Raises display cabinet with a hydraulic power unit that pressurizes a cylinder; lowered by controlled gravity return. Control switch for hydraulic lift is located inside control box.	
		Hydraulic cylinder	Single stage hydraulic, rated to 1500 psi, bottom end cap is keyed to prevent cylinder from rotating	
		Hydraulic power unit	Type	Electric motor driven See “Options and Optional Equipment” for hand pump
			Voltage	12Vdc
			Flow rate	1.5 gpm
			Pressure rating	Factory set to 950 psi
			Mounting	Installed vertically on bracket that is mounted to swivel base
			Fluid	AW-32 hydraulic oil
			Tank capacity	1.2 gal. total, 0.766 gal. usable capacity
			Cover	Sheet metal cover protects power unit from vandalism and environmental contaminants. Security screws fasten cover to power unit.
5.16.9.	Rotation	Sign rotates by hand, pivoting 360 degrees on tower		

5.16.10.	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.
5.16.11.	Sight tube	A sight tube for aiming the message sign in desired direction is mounted to tower mast

6. POWER SYSTEM

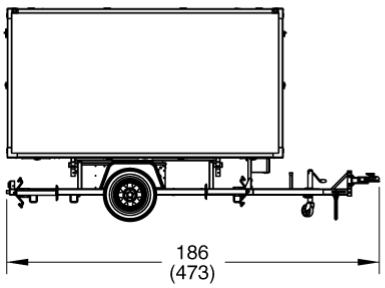
6.1.	Description	Electronics powered by batteries, which are charged automatically with integrated solar charging system
6.2.	Battery box	
6.2.1.	Function	Holds batteries and remote charger See “Options and Optional Equipment” for heavy-duty secure battery box
6.2.2.	Construction	Riveted all-steel construction 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 left side of trailer, bolted to trailer frame
6.3.	Batteries	
6.3.1.	Description	Four deep-cycle Group 24 batteries, wired in parallel and series for a 12-volt system See “Options and Optional Equipment” for battery options
6.3.2.	Voltage	6Vdc each
6.3.3.	Weight	Approx. 60 lbs. (26kg) each
6.3.4.	Capacity	430 Ah total capacity @ 12Vdc
6.4.	Remote charger	
6.4.1.	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
6.4.2.	Type	12-volt battery charger
6.4.3.	Location	Inside battery box, mounted to divider panel on opposite side from batteries
6.4.4.	Output capacity	15A
6.4.5.	Output voltage	13.2Vdc range “float” mode 13.6Vdc range “absorption” mode 14.2Vdc range “bulk” mode

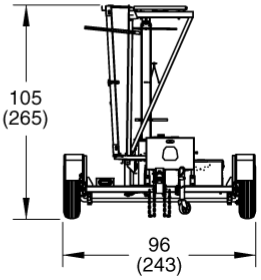
6.4.6.	Input voltage	105 to 135Vac, standard three-prong plug
6.4.7.	Input frequency	50 to 60 Hz
6.4.8.	Cooling	Fan cooled when charger temperature reaches 95°F (35°C)
6.4.9.	Protection	Automotive-style replaceable fuses
6.5.	Solar	
6.5.1.	Panels	High-efficiency multi-crystal photovoltaic solar modules
6.5.2.	Location	Behind message sign, over tower. Solar panel array lies flat, rises and rotates with message sign. No shadowing effect on any trailer component.
6.5.3.	Power output	130W See “Options and Optional Equipment” for solar power options
6.5.4.	Current	9.5A max. system current 10.3A open short-circuit current
6.5.5.	Voltage	17.9Vdc max. 21.8Vdc open short-circuit voltage
6.5.6.	Regulation	Solar panels regulated by message sign control system
6.5.7.	Security	Solar panel array bolted to message sign frame with security screws and special security nut. Tool for security screws mounted inside control box.

7. DIMENSIONS & WEIGHT

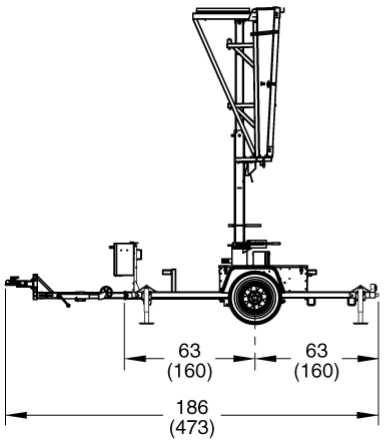
7.1. Dimensions *inches (cm)*

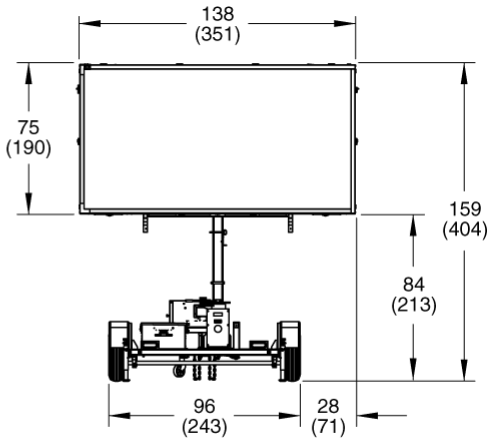
Travel position





Deployed





7.2. Weight Approx. 2100 lbs. (953 kg)

8. OPTIONS AND OPTIONAL EQUIPMENT

8.1. Integral drawbar — Integrated into trailer frame, with added "A-frame" supports that extend from corners of trailer frame to end of drawbar

Replaces removable drawbar, uses same tow hitch and swivel jack as removable drawbar

Message sign weight with A-frame: approx. 2640 lbs. (1193 kg)

8.2. Tow hitch

8.2.1. Combo hitch — Combo-hitch for pintle hook and 2-inch ball hitch

Heavy-duty lunette ring, 3" ID x 1⅝" cross-section

8.2.2. Lunette ring — Heavy-duty lunette ring for pintle hook, 3" ID x 1⅝" cross-section

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

8.4. Brakes

8.4.1. Hydraulic — Hydraulic surge brakes

8.4.2. Electric — Electric brakes

8.5. Outriggers — Telescoping outriggers (jack extensions), one at each corner of the trailer, expand trailer width when deployed, for extra wind-load resistance

Width of trailer with outriggers extended: 126" (320cm)

8.6. Hand pump — A mechanical hand pump can raise and lower the sign if batteries go dead and hydraulic lift fails to operate. Pump handle is stored inside battery box.

8.7. Power

8.7.1. 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:
- Two additional 6Vdc deep-cycle batteries, 215Ah additional capacity
- Four additional 6Vdc deep-cycle batteries, 430Ah additional capacity
- Six additional 6Vdc deep-cycle batteries, 645Ah additional capacity

8.7.2. AGM batteries — Replace deep-cycle batteries with top-of-the-line absorbed glass mat (AGM) batteries

Features:
- 100% maintenance-free
- Sealed and spill-proof
- Faster recharge and greater freeze resistance than conventional batteries
- Contains less lead than conventional batteries

		Options	Two 4D AGM 12Vdc batteries, 400Ah total capacity	
			Three 4D AGM 12Vdc batteries, 600Ah total capacity	
		Weight	Approx. 160 lbs. (72kg) each	
8.7.3.	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
8.7.4.	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 170W, 215W, 260W, and 390W solar arrays; contact factory for details		
8.8.	**Secure battery box**	High-security battery box features heavy-gauge steel lid, hidden hinges, and heavy-duty hidden-shackle padlocks. Replaces standard battery box.		
8.9.	**Taillights**			
8.9.1.	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		
8.9.2.	Single LED	Single LED taillights replace standard sealed-bulb taillights		
8.9.3.	Dual LED	Dual LED taillights replace standard sealed-bulb taillights		
		Requires SAE J560 7-pole round-pin trailer plug to replace standard trailer plug		
8.10.	**Reflective tape**	Reflective red-and-white conspicuity tape across rear trailer frame for increased visibility		
8.11.	**Finish color**	Specify power-coat color and, if applicable, color scheme		
8.12.	**Radar-based speed monitoring system**			
8.12.1.	Description	Radar senses the largest, nearest mass moving toward it. The message sign conveys a user-selected message to the motorist.		
8.12.2.	Sensor	Microwave K-band, approach-only		
8.12.3.	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		

8.12.4.	Enclosure	Radar head is sealed to withstand the elements, while an aluminum cover goes over the head unit for impact resistance	
8.12.5.	Standards compliance	FCC approved CE compliant	
8.12.6.	Distance range	1000 ft. (305 m)	
8.12.7.	Speed range	5 to 138 mph (8 to 222 km/h)	
8.12.8.	Accuracy	mph	±1 mph from 5 to 40 mph ±2 mph from >40 to 100 mph
		km/h	±1.6 km/h from 8 to 64 km/h ±3.2 km/h from >64 to 161 km/h
8.12.9.	Temperature limits	–40 to 185 °F (–40 to 85 °C)	
8.12.10.	Electrical protection	Fused and reverse-polarity protected	
8.12.11.	Calibration	Calibration not required	

8.13. Cellular modem package

8.13.1.	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.	
8.13.2.	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
8.13.3.	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® 10, Chrome™, or Safari®) with JavaScript enabled A platform that supports one of these browsers (smartphone, laptop computer, or desktop computer) Internet connection

8.13.4.	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 10, Chrome, or Safari)
			A platform that supports one of these browsers (laptop or desktop computer)
			Internet connection
8.13.5.	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).
8.13.6.	Modem	Compact industrial 3G cellular gateway with GPS	
		Variety of models; contact factory for details	

8.14. Traffic Data Classifier System

8.14.1.	Design	Radar-based, nonintrusive, does not require loops or hoses, no disturbance of traffic flow during installation or use
8.14.2.	Direction	Registers both approaching and receding vehicles
8.14.3.	Traffic lanes	Most effective for 2-lane roads
8.14.4.	Traffic count	Can record data for 5 million vehicles in internal memory
8.14.5.	Data format	Speed, date, time, direction, length for each vehicle
8.14.6.	Units	English or metric
8.14.7.	Time stamp	Yr,Mo,Dy,Hr,Min,Sec
8.14.8.	Speed range	5 to 138 mph (8 to 222 km/h)
8.14.9.	Sensor	Microwave K-band 24.125 GHz

8.14.10.	Power	Uses radar-speed sign power supply
8.14.11.	Power output	20 dbm (EIRP)
8.14.12.	Current	110 mA
8.14.13.	Temperature	Operating limits: –40 to 185 °F (–40 to 85 °C)
8.14.14.	Internal memory	1MB (1,048,576 bytes)
8.14.15.	Baud rate	9600, 8 bit, no parity
8.14.16.	Calibration	Calibration not required
8.14.17.	Installation	Automatically positioned horizontally when trailer is level; adjustable bracket allows user to point toward traffic at a 45-degree angle
8.14.18.	Analytic software	Wanco Traffic Analyzer

8.15. RemoteUI control software

8.15.1.	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.
8.15.2.	Fleet limits	Connects to one sign at a time; maximum number of signs is unlimited
8.15.3.	Security	Multi-level password protection
8.15.4.	System requirements	Computer requires Microsoft Windows (most versions) or Unix® operating system Message sign requires cellular modem package

8.16. Remote-Video Monitoring System

8.16.1.	Description	Monitor activity around the trailer remotely, using an integrally installed video camera and a computer with an Internet connection Specifications for this option are provided in a separate document

EXHIBIT A: MESSAGE FONTS

Font 1

5 x 7 pixels

Equivalent size: 12.80" x 18.00" (325 x 457mm)

Physical size: 11.64" x 16.84" (296 x 428mm)

Standard fixed-width font with lower-case letters

3 lines of 8 characters, maximum

Font 2

5 x 7 pixels

Equivalent size: 12.80" x 18.00" (325 x 457mm)

Physical size: 11.64" x 16.84" (296 x 428mm)

Fixed-width font with lower-case letters

3 lines of 8 characters, maximum

Font 3

6 x 9 pixels

Equivalent size: 15.40" x 23.20" (391 x 589mm)

Physical size: 14.24" x 22.04" (362 x 560mm)Bold proportional font with 4x9-pixel capitals for lower-case letters

2 lines of 7 characters, typical

Font 4

6 x 11 pixels

Equivalent size: 15.40" x 28.39" (391 x 721mm)

Physical size: 14.24" x 27.23" (362 x 692mm)

Bold proportional font with lower-case letters and accented characters

2 lines of 6 characters, typical

Font 5

6 x 11 pixels

Equivalent size: 15.40" x 28.39" (391 x 721mm)

Physical size: 14.24" x 27.23" (362 x 692mm)

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

2 lines of 6 characters, typical

Font 6

5 x 12 pixels

Equivalent size: 12.80" x 30.99" (325 x 787mm)

Physical size: 11.64" x 29.83" (296 x 758mm)Tall fixed-width font with 5x8-pixel capitals for lower-case letters

2 lines of 8 characters, maximum

Font 7

7 x 12 pixels

Equivalent size: 18.00" x 30.99" (457 x 787mm)

Physical size: 16.84" x 29.83" (428 x 758mm)Bold fixed-width font with 6x8-pixel capitals for lower-case letters

2 lines of 6 characters, maximum

Font 8

7 x 23 pixels

Equivalent size: 18.00" x 59.57" (457 x 1513mm)

Physical size: 16.84" x 58.42" (428 x 1484mm)

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

1 line of 6 characters, maximum

Font 9

11 x 23 pixels

Equivalent size: 28.39" x 59.57" (721 x 1513mm)

Physical size: 27.23" x 58.42" (692 x 1484mm)

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

1 line of 4 characters, maximum

Font 10

4 x 5 pixels

Equivalent size: 10.20" x 12.80" (259 x 325mm)

Physical size: 9.05" x 11.64" (230 x 296mm)

Mini proportional font with limited lower-case

4 lines of 9 characters, typical

Font 11

7 x 10 pixels

Equivalent size: 18.00" x 25.80" (457 x 655mm)

Physical size: 16.84" x 24.64" (428 x 626mm)

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

2 lines of 5 characters, maximum

Font 12

9 x 14 pixels

Equivalent size: 23.20" x 36.19" (589 x 919mm)

Physical size: 22.04" x 35.03" (560 x 890mm)

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

1 line of 4 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 stem arrow

Sequencing left or right walking arrow

Sequencing left or right chevron arrows

Alternating diamonds