

**Reproduction Reference  
DD4677000  
Vanguard Dynamic Message Sign  
Preliminary Field Test Procedure for Each VMS Site**

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Please direct questions and suggestions to Transportation Admin.

# Vanguard<sup>®</sup> Dynamic Message Sign

Preliminary Field Test Procedure for VMS  
and VSLS with Traffic Cabinet for Each  
VMS Site

DD4677000

Rev 1—4 May 2020

# DAKTRONICS

# Preliminary Field Test Procedure for VMS and VSLS

## Introduction

This test procedure describes the field tests for a VMS and VSLS site for this project. The purpose of this test is:

1. To check that the sign and all related power and communications equipment necessary to make the sign locally operable, has been installed properly.
2. To check that all sign and related power and communications equipment is functioning. Special emphasis is placed on items that, if bad, are not expected to show up as being bad during normal operation. Example: earth grounding not connected.
3. To put the sign into the state needed so that it is ready for normal operation without the need for an additional visit before beginning normal operation.
4. As a record that all tests and setup tasks have been performed at each particular site so that it will not be necessary to re-visit sites later because of not being sure whether or not certain tests or setup items have been done.

Note that this is not a test of all software functions or hardware design limits; this would be very time consuming, and would be redundant, as those tests need to be done only once.

This test should be performed for every sign site at the completion of installation of the particular site.

The test messages to be used should be the test messages approved by the NJTA that will not misdirect or distract traffic.

Test equipment required:

- Boom truck, or whatever is required to get up to the sign
- Digital multimeter
- Laptop computer, with central controller software, miscellaneous software, and null modem cable.
- Common hand tools
- Walkie-Talkies or cell phones for communication between personnel up at the sign and those down at the controller cabinet, if necessary
- Cellular telephone or other means of communication with the Traffic Management Center operator.
- Portable generator and generator cord

## Application Information for this Application

This test procedure applies to:

VF-236X rear-access and a VSLS:

- full color (RGB) modules.
- 20mm modules.
- Any number of lines and columns.
- With internal panelboard.
- With electronically controlled intake fans.

## Preliminary Field Test Procedure for VMS and VSLS

- With or without RPM sensors.
- With or without sign door signal switches.
- With UPS communication with field controller.
- With parallel surge suppressor with remote reporting.

### Traffic cabinet

- System Controller Cabinet (SCC).
- Ground mounted.
- VFC sign controller.
- With UPS communication with sign controller.
- With traffic cabinet door signal switches.
- With generator transfer switch.
- fiber modem, or radio communication; this is a generic communication test procedure that does not list anything specific for specific communication interfaces such as specific dial-up modem, specific fiber modem, etc.

Preliminary Field Test Procedure for VMS and VSLS

**Site Information**

Daktronics Representative: \_\_\_\_\_

Contract number and name: \_\_\_\_\_

Field test procedure addendum ED number, if any ("NA" not applicable): \_\_\_\_\_

Turnpike or Parkway: \_\_\_\_\_

Mile Post (XXX:XX) \_\_\_\_\_

Roadway: \_\_\_\_\_

Sign model no.: VMS: \_\_\_\_\_ VSLS: \_\_\_\_\_

Sign assembly no.: VMS: \_\_\_\_\_ VSLS: \_\_\_\_\_

Sign serial no.: VMS: \_\_\_\_\_ VSLS: \_\_\_\_\_

Traffic cabinet assembly no.: \_\_\_\_\_

Traffic cabinet serial no.: \_\_\_\_\_

Field controller serial no.: VMS: \_\_\_\_\_ VSLS: \_\_\_\_\_

Field controller address no.: VMS: \_\_\_\_\_ VSLS: \_\_\_\_\_

Site IP address: \_\_\_\_\_

**Important: Make sure that the firmware listed below is the most current version, if not make sure to download the latest version of the firmware.**

<u>Firmware:</u>	<u>VMS Version number:</u>	<u>VSLS Version number:</u>
1) VFC	_____	_____
2) Video Processor	_____	_____
3) Display Firmware package	_____	_____
4) Display Module micro	_____	_____
5) Display Module EPLD	_____	_____
6) Display interface micro	_____	_____
7) Display interface EPLD	_____	_____

## Preliminary Field Test Procedure for VMS and VSLS

### Traffic Cabinet Inspection

- \_\_\_ 1.1 Turn off the power to the traffic cabinet.
- \_\_\_ 1.2 Inspect the inside and outside of the traffic cabinet for damage and check for loose parts or connections. Also check that the nuts are installed on the anchor bolts (if ground-mounted traffic cabinet).
- \_\_\_ 1.3 Check that earth grounding wires are secured to earth ground rod(s) at the display(s), cabinet and/or power source.
- \_\_\_ 1.4 Verify that earth ground wire and ground rods are connected properly per site riser.
  - a. Note: Earth ground wire must be a different wire than the power ground wire.
- \_\_\_ 1.5 Remove the panelboard cover. Check that the 2 hot wires, neutral, and earth ground wires from the 120/240 VAC power source are connected into the panelboard main breaker terminals, neutral bus, and earth ground bus, respectively.
- \_\_\_ 1.6 **If Equipped with VSLS:** Check the wiring used to supply power from the traffic cabinet to the VSLS: Check that the one hot wire for feeding UPS power to the VSLS is connected into the "UPS 120 VAC To VSLS" breaker in the UPS panelboard.
- \_\_\_ 1.7 Visually inspect the outside of the sign controller(s) for damage, check that all necessary connectors are plugged into the outside of the sign controller, and check that the connector screws (if any) are tight.
- \_\_\_ 1.8 Inspect the communication interface panel for loose parts or wiring, and check that the wiring or fiber(s) for the communication system is terminated properly.
- \_\_\_ 1.9 Check that all UPS equipment has been installed and connected properly.
  - Check that the AC input and AC output wires are connected into the UPS properly.
  - Inspect the batteries and battery connections at the batteries and UPS.
  - Check that the RS232 cable is connected between the UPS and J10 of the sign controller.
  - Check that the battery temp sensor is taped to one of the batteries, and that the cable is plugged into the UPS. The sensor should be taped onto the inside side (e.g., the right side of the left battery) of one of the batteries, as this is expected to be the warmest location.
- \_\_\_ 1.10 Check that UPS/Generator Transfer Switch has been installed and connected properly.
  - Check that the AC input and AC output wires are connected into the UPS/Generator Transfer Switch properly.

Preliminary Field Test Procedure for VMS and VSLS  
**Traffic Cabinet Power Test**

- \_\_\_\_\_ 2.1 Check that all traffic cabinet utility panelboard and UPS panelboard circuit breakers are off, except for the "Panelboard Surge Suppressor" breaker, which should be on. Apply power to the traffic cabinet **only**.
- \_\_\_\_\_ 2.2 Using a safe procedure, measure the AC voltage from the panelboard main breaker input lugs to neutral; it should measure between 105 and 125 VAC. Also, check the voltage from neutral to earth ground. It should measure less than 10 VAC. (This is a no-load test of the input voltage.) Record below.
- L1 to neutral: \_\_\_\_\_ L2 to neutral: \_\_\_\_\_ Neutral to earth ground: \_\_\_\_\_
- \_\_\_\_\_ 2.3 Re-install the panelboard cover.
- \_\_\_\_\_ 2.4 Check that all control equipment, including communication equipment for use between the sign site and the central controller, is plugged into the control equipment outlet strip. **Note:** This outlet strip is powered from the UPS, so other equipment must not be plugged in, because that may overload the UPS or shorten the amount of time that the UPS will operate from batteries.
- \_\_\_\_\_ 2.5 Check that the control equipment outlet strip is plugged into the surge protected AC outlet labeled "For Control Equipment Outlet Strip Only". **Note:** This outlet strip is powered from the UPS, so other equipment must not be plugged in, because that may overload the UPS or shorten the amount of time that the UPS will operate from batteries.
- \_\_\_\_\_ 2.6 Check that all control equipment inside the traffic cabinet is switched OFF, and turn ON the "Main" circuit breaker and "Lights & GFCI outlet" circuit breaker in the utility panelboard. Check that the traffic cabinet light is ON and that the "Utility" AC outlet inside the traffic cabinet is live. ("Control Equipment" outlet should not yet be ON, and will be checked later.) **If equipped with two doors:** Close the door that is currently open and open the other door, and check that the traffic cabinet light is ON.
- \_\_\_\_\_ 2.7 Turn ON the "UPS, Control Equip & VSLS" breaker in the utility panelboard, and turn ON the "Exhaust Fan & Control Equipment Outlet" breaker in the UPS panelboard. Turn ON the UPS by turning ON the AC "Input Circuit Breaker" and the DC "Battery Breaker" on the UPS. The UPS should go into "line", "buck", or "boost" mode. Check that the "Control Equipment" AC outlet inside the traffic cabinet is now live by using a multimeter, the outlet should measure between 105 and 125 VAC.
- \_\_\_\_\_ 2.8 Confirm that the UPS has been configured properly (settings found on bottom of UPS).
- Inverter: (UPS factory default – off.)
  - Inv bypass: (UPS factory default – off.)
  - Auto test: (UPS factory default – off.)
  - Shutdown: (UPS factory default – off.)
  - Sense type: Generator.
  - Function mode: Automatic Voltage Regulation (AVR)
  - Voltage: (UPS factory default – 120 VAC.)
  - Frequency: (UPS factory default – 60 Hz.)
  - Date select: (Any setting; has no effect on operation.)
  - Inv. Record: (Any setting; has no effect on operation.)
  - Qual time: 3 seconds.
  - Battery comp: -5 mV/°C/Cell,
  - Charge Current: 10 A.

- \_\_\_\_\_ 2.9 Push and hold the override button on the thermostat assembly and verify the fan turns ON. Check that air blows out of the exterior roof vents. Release the button and make sure the fan turns OFF.

### Sign Exterior Inspection

- \_\_\_\_\_ 3.1 Visually inspect the outside of the sign for damage.
- \_\_\_\_\_ 3.2 Check that the light sensors are unobstructed.

### Power Connection Inspection for VMS

- \_\_\_\_\_ 4.1 Turn off the power to the sign, from outside the sign.
- \_\_\_\_\_ 4.2 Check that the two hot wires, neutral, and earth ground wires from the 120/240 VAC power source are connected into the panelboard main breaker terminals, neutral bus, and earth ground bus, respectively.
- \_\_\_\_\_ 4.3 Check that the earth grounding wire is secure from the case of the sign (inside or outside) to the earth ground rod(s) near the base of the sign.
- \_\_\_\_\_ 4.4 Check that all panelboard circuit breakers are off, except for the "Panelboard Surge Suppressor" breaker, which should be on. Apply power to the sign.
- \_\_\_\_\_ 4.5 Using a safe procedure, measure the AC voltage from the panelboard main breaker input lugs to neutral; it should measure between 105 and 125 VAC. Also, check the voltage from neutral to earth ground; should be less than 10 VAC. (This is a no-load test of the input voltage.) Record below.

L1 to neutral: \_\_\_\_\_ L2 to neutral: \_\_\_\_\_ Neutral to earth ground: \_\_\_\_\_

### Power Connection Inspection for VSLS

- \_\_\_\_\_ 5.1 Turn off the power to the sign, from outside the sign. **Caution:** Power is supplied to the sign from the UPS via the "UPS 120 VAC To VSLS" breaker in the UPS panelboard in the traffic cabinet.
- \_\_\_\_\_ 5.2 Check that the one hot wire, neutral, and earth ground wires from the "UPS 120 VAC to VSLS" breaker in the UPS panelboard in the traffic cabinet are connected into the panelboard main breaker terminal, neutral bus, and earth ground bus, respectively.
- \_\_\_\_\_ 5.3 Check that the earth grounding wire is secure from the case of the sign (inside or outside) to the earth ground rod(s) near the base of the sign.
- \_\_\_\_\_ 5.4 Apply power to the sign by turning ON the "UPS 120 VAC to VSLS" breaker in the UPS panelboard in the traffic cabinet. Using a safe procedure, measure the AC voltage from the panelboard main breaker input lugs to neutral; it should measure between 105 and 125 VAC. Also, check the voltage from neutral to earth ground; should be less than 10 VAC. (This is a no-load test of the input voltage.) Record below.

UPS 120 VAC to neutral: \_\_\_\_\_ Neutral to earth ground: \_\_\_\_\_



Preliminary Field Test Procedure for VMS and VSLS

VLSL VMS

**Sign Interior Inspection**

- \_\_\_\_\_ 6.1 Make sure the Site Information for the sign is filled out: sign serial number, sign model number, sign assembly number, etc.
- \_\_\_\_\_ 6.2 Inspect the inside of the sign for damage. Check for loose parts, connections and wiring, inside of the sign including everything on the power supply mounting plate. Also, verify that the fiber-optic cables are connected to the proper location(s) on the PLR board.
- \_\_\_\_\_ 6.3 Check that all conduits that enter the sign are sealed inside at the end that enters the sign.

**Sign Power Test**

- \_\_\_\_\_ 7.1 Turn on all circuit breakers.

**VFC Functional Test**

- \_\_\_\_\_ 8.1 Turn on the sign controller(s) power switch(es), check that the power indicator LED is on.
- \_\_\_\_\_ 8.2 Configure the controller for sign control; address, module type, sign height, sign width, sign type, access type, and peripherals. See contract site config sheet for details.
- \_\_\_\_\_ 8.3 Set the time, date, and correct time zone.
  - a. Login to the DMP and VIP UI using a computer and set the time on the VIP and DMP
  - b. Set Time on the VFC LCD screen or NTCIP icon on the DMP UI

**Functional Test**

- \_\_\_\_\_ 9.1 Display the "All On 100% Burn" test pattern; check that every intake and circulation fan turns ON. Blank the sign to turn OFF the "All On 100% Burn" test pattern.
- \_\_\_\_\_ 9.2 Check that all power supplies indicate pass.
- \_\_\_\_\_ 9.3 Check that the value indicated by each of the light sensors appears reasonable for the current ambient lighting conditions. Record below:  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_ Sky Conditions \_\_\_\_\_  
 VMS Light sensor readings: 1: \_\_\_\_\_ 2: \_\_\_\_\_ 3: \_\_\_\_\_  
 VSLS Light sensor readings: 1: \_\_\_\_\_ 2: \_\_\_\_\_ 3: \_\_\_\_\_
- \_\_\_\_\_ 9.4 Check that the Module and external temperatures appear correct and record below: **Note:** Temp sensors utilize digital integrated circuits, which are calibrated at the integrated circuit factory, and do not require additional calibration.  
 VMS Module temp degrees F: \_\_\_\_\_ External temp degrees F: \_\_\_\_\_  
 VSLS Module temp degrees F: \_\_\_\_\_ External temp degrees F: \_\_\_\_\_

## Preliminary Field Test Procedure for VMS and VSLS

VSLS VMS

- \_\_\_\_\_ 9.5 Run the following test patterns and verify they display properly.
- a. Alphabet
  - b. Line numbers
  - c. Auto test pattern
- \_\_\_\_\_ 9.6 Set to “None” and exit the test pattern mode.
- \_\_\_\_\_ 9.7 Display signal testing using the VIP diagnostics tool to test signal connections.
- a. Using the VIP diagnostics tool to test module signal connections DD2699549 </support/kb/Pages/DD2699549.aspx>
  - b. Display alphabet test pattern then disconnect fiber port B from VFC.
    - a. Check the signal loss value on the controller under configuration/system/optional/signal loss.
    - b. Leave the test pattern running for a minimum of 60 seconds longer than the signal loss setting.
      - i. If test pattern goes off, then troubleshoot fiber connections.
    - c. Plug fiber port B back in and repeat test with fiber port A unplugged.
- \_\_\_\_\_ 9.8 Display a message (not a test pattern) that will not misdirect traffic and that has characters that butt up to the top, bottom, left, and right edges of the sign and verify that it displays correctly. This verifies proper message display capability for this sign size.
- \_\_\_\_\_ 9.9 Sign Load test.
- a. **When load testing during Daytime:** Run the “All On 100% Burn” test pattern and leave the brightness set to 100%.
  - b. **When Load testing during Nighttime:** Select test patterns and select “all on red 10%”. Turn-on fans log into controller, select sign 1, (2) diagnostics, down arrow to (2) run fans and heaters, select option from list and then (1) turn on. Return to normal operation when testing is done.

Using a safe procedure, check and record the AC voltage from the sign panelboard main breaker input lugs to neutral; it should measure between 105 and 125 VAC. Also, check the voltage from neutral to earth ground; it should measure less than 10 VAC. (This is a loaded test of the input voltage.) Record below.

VMS:  
L1 to neutral: \_\_\_\_\_ L2 to neutral: \_\_\_\_\_ Neutral to earth ground: \_\_\_\_\_

VSLS:  
UPS 120 VAC to neutral: \_\_\_\_\_ Neutral to earth ground: \_\_\_\_\_
- \_\_\_\_\_ 9.10 Perform a pixel test and verify that all pixels are reported as good.

## Preliminary Field Test Procedure for VMS and VSLs

VSLs VMS

- \_\_\_\_\_ \_\_\_\_\_ 9.11 RPM Sensors with electronically controlled fans.
- a. **Daytime testing:** Run the “All On 100% Burn” test pattern. Verify the fans turn on and the RPM sensors indicate pass. When done turn test patterns to none.
- a. **Nighttime testing:** Turn-on fans log into controller, select sign 1, (2) diagnostics, down arrow to (2) run fans and heaters, select option from list and then (1) turn on. Verify the fans turn on and the RPM sensors indicate pass. Return to normal operation when testing is done.
- \_\_\_\_\_ \_\_\_\_\_ 9.12 Sign door signal switches (for rear access VMS only). **Note:** It may take up to 10 seconds after the door position is changed to indicate the change:
- Display the View Peripherals Menu on the controller. Close all sign doors, and check that the controller indicates that the doors are closed.
- \_\_\_\_\_ 9.13 Parallel surge suppressor with remote reporting:
- Display the “View Peripherals” screen on the controller, and check that the Surge Suppressor entry indicates “Pass”.
- \_\_\_\_\_ 9.14 Traffic cabinet door detection switches. **Note:** Operate the doors, not just the switches, to be sure that the switches adjustments are correct. It may take up to 10 seconds after the door position is changed to indicate the change.
- Display the View Peripheral Menu on the controller. Close both traffic cabinet doors, and check that the controller indicates that the doors are closed.
  - Open the one door, and check that the controller indicates that the door is open.
  - Open the other door, and check that the controller indicates that the door is open.
- \_\_\_\_\_ 9.15 UPS communication with sign controller.
- Display the View Peripherals Menu on the controller, and check that the UPS entry indicates “AC line”.
  - Turn off the “UPS, CNTRL Equip & VSLs” circuit breaker. Check that the UPS entry changes to “Battery”. It may take a few seconds for the entry to change.
  - Turn on the “UPS, CNTRL Equip & VSLs” circuit breaker. Check that the UPS entry changes to “AC line”.
  - Connect the UPS Ethernet port to a laptop and verify proper operation of the on-board UPS software and Ethernet communication settings.
- \_\_\_\_\_ \_\_\_\_\_ 9.16 Reinstall all enclosure covers.
- \_\_\_\_\_ \_\_\_\_\_ 9.17 Record the installed firmware version numbers (from the sign controller “Version Information” page), and the dimensions of the sign. (If the dimension of the sign doesn’t match the actual sign size, correctly configure the sign controller for this site.) Record the information above, under the Site Information.

## Preliminary Field Test Procedure for VMS and VSLS

### Generator Test

VSLS VMS

- \_\_\_\_\_ 10.1 With the generator OFF, hookup the generator plug to the generator inlet. **Note:** Make sure the plug and inlet are pinned the same, for example: Neutral to Neutral, L1 to L1, etc.
- \_\_\_\_\_ 10.2 Display a test message on the VSLS that will not misdirect traffic.
- \_\_\_\_\_ 10.3 Verify the Line/GEN switch is set to GEN, and turn the Bypass/Ups switch to Bypass .
- \_\_\_\_\_ 10.4 Turn the generator on; then turn off the utility power by turning off the Main breaker in the traffic cabinet panel board.
- \_\_\_\_\_ 10.5 Verify the VSLS is operating normally running off of the generator.
- \_\_\_\_\_ 10.6 Verify that all the VFC controllers are still normally running off of the generator.
- \_\_\_\_\_ 10.7 Turn back on the utility power by turning on the Main breaker in the traffic cabinet panel board.
- \_\_\_\_\_ 10.8 Turn off the Generator and disconnect the generator plug from the generator inlet.
- \_\_\_\_\_ 10.9 Turn the Bypass/UPS switch back to UPS.

### **Sign Controller & Display UPS System Battery Back-up Test**

- \_\_\_\_\_ 11.1 Confirm that the batteries are fully charged. Measure and record the voltage of each battery.  
Battery #1:\_\_\_\_\_ Battery #2:\_\_\_\_\_ Battery #3:\_\_\_\_\_ Battery #4:\_\_\_\_\_
- \_\_\_\_\_ 11.2 Double-check that no additional loads have been plugged into the control equipment outlets inside the traffic cabinet. The only items that should be plugged into the control equipment outlets in the traffic cabinet are the sign controller(s), and communication equipment used between the sign controller(s) and the central controller.
- \_\_\_\_\_ 11.3 Display a test message on the VSLS that will not misdirect traffic.
- \_\_\_\_\_ 11.4 Note the time and turn OFF the utility power to the traffic cabinet via turning OFF the main circuit breaker in the Utility panelboard.
- \_\_\_\_\_ 11.5 Verify that the sign controller(s) are operational for 60 minutes, and if the VSLS installed, it continues to display the test message for 60 minutes.
- \_\_\_\_\_ 11.6 Turn ON the utility power to the traffic cabinet via turning on the main circuit breaker in the Utility panelboard.

### Final Details

- \_\_\_\_\_ 12.1 Confirm that all sign and traffic cabinet equipment cover (if any) are installed.
- \_\_\_\_\_ 12.2 Verify the sign is blank.
- \_\_\_\_\_ 12.3 Verify that any test messages you created have been removed from the sign controller(s).
- \_\_\_\_\_ 12.4 Record if main breaker is left on or off: On: \_\_\_ Off: \_\_\_ Date: \_\_\_\_\_

**Note:** The UPS must be turned OFF by turning OFF the AC “Input Circuit Breaker” and the DC “Battery Breaker” on the UPS if utility power is to be left OFF at the site.

- \_\_\_\_\_ 12.5 Make sure the Site Information is filled out: serial numbers, site location, phone number, sign dimension, firmware versions, etc.

Preliminary Field Test Procedure for VMS and VSLS

\_\_\_\_\_  
Turnpike/Parkway

\_\_\_\_\_  
Milepost

\_\_\_\_\_  
Roadway

Test Status:

\_\_\_\_ Pass - No exceptions noted

\_\_\_\_ Fail - Requires re-testing

\_\_\_\_ Conditional Pass - Complete the following punch list

Punch List Item*	Technician (initials)	Customer (initials)
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

\* Include only items that failed testing or require re-testing. The Construction Punch List will be developed separately. Notify Authority and Resident Engineer upon completion of punch list to arrange for re-testing if required.

**Daktronics Technician**

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**NJ Turnpike Authority**

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Resident Engineer**

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**DAKTRONICS PERSONNEL MUST RETURN THIS COMPLETED DOCUMENT TO THE DAKTRONICS CONTRACT SERVICE COORDINATOR.**