



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER
708EC007

PAGE
1

ADDRESS CORRESPONDENCE TO ATTENTION OF
MICHAEL AUSTIN 304-558-2402

*C12081328 770-448-6650
 AMERICAN SIGNAL COMPANY INC
 2755 BANKERS INDUSTRIAL DRIVE
 ATLANTA GA 30360

VENDOR

DIVISION OF HIGHWAYS
 EQUIPMENT DIVISION
 ROUTE 33
 BRUSHY FORK ROAD
 BUCKHANNON, WV
 26201 304-472-1750

SHIP TO

DATE PRINTED 12/20/2007	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
BID OPENING DATE: 01/03/2008		BID OPENING TIME 01:30PM		

LINE	QUANTITY	UOP	CAT. NO.	ITEM NUMBER	UNIT PRICE	AMOUNT
ADDENDUM #5						
THE ATTACHED REVISED SPECIFICATIONS REPLACES THE PREVIOUS SPECIFICATIONS INCLUDING ADDENDUM #3 IN ITS ENTIRETY.						
BID OPENING DATE AND TIME CHANGED						
FROM: 12/27/07 AT 1:30 P.M.						
TO: 01/03/08 AT 1:30 P.M.						
NO OTHER CHANGES						
0001	1	EA		550-96	16,195	16,195
TRAILER MOUNTED SOLAR POWERED MESSAGE BOARD						
***** THIS IS THE END OF RFQ 708EC007 ***** TOTAL:						16,195

SEE REVERSE SIDE FOR TERMS AND CONDITIONS

SIGNATURE <i>C. J. ...</i>	TELEPHONE 770.448.6650	DATE 12/27/07
TITLE Regional Sales Mgr	FEIN 58-1765732	ADDRESS CHANGES TO BE NOTED ABOVE

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
EQUIPMENT DIVISION

NOTE: Vendor should type
Bidder's Evaluation Report

BIDDER'S EVALUATION REPORT

PROCUREMENT SPECIFICATIONS FOR OPEN END CONTRACT
NO. 843-1-F

OPEN END CONTRACT
FULL MATRIX
TRAILER MOUNTED SOLAR POWERED MESSAGE BOARD

NOTE TO BIDDER: Procurement Specification No. 839-1-K, Paragraph 2.0 recommends the completion and submittal of this Report with your bid. Purpose of this Report is to enable the West Virginia Division of Highways Evaluation Committee to make full and fair evaluation of the bid. Addendums in order, along with a summary of exceptions as a separate attachment, should be with Bidder's Evaluation Report.

FAILURE TO SUBMIT THIS REPORT, COMPLETE IN ITS ENTIRETY, MAY SUBJECT THE BIDDER TO DISQUALIFICATION.

Reference Requisition No.: 708EC007

Bidder's Name: American Signal Company

Address: ~~2755 Bankers Industrial Drive~~ Atlanta, GA 30360

Telephone Number: 770.448.6650

Years Bidder has been registered to do business with the State of West Virginia: 4 YRS.

Years Company has been an authorized dealer for proposed unit: 16 YRS.

X3.2 Have you complied with all mandatory specifications? YES NO

X4.2 DELIVERY:

X4.2.1 Delivery date of completed representative unit: 30 Calendar Days After
Receipt of Purchase Agreement

X4.2.2 Delivery date of balance of completed units: 30 Calendar Days After Receipt of
Purchase Agreement

X5.0 AWARD CRITERIA;

X5.1 Prices for unit in quantities of	1-5	16,195	per unit
	6-10	16,195	per unit
	11 and over	16,195	per unit

X6.0 SPECIFICATIONS - GENERAL

X6.1 Manufacturer, model, series, and date of manufacture of proposed unit:

American Signal NTCIP CMS-T333

Is descriptive literature, fully describing proposed unit attached to your bid? YES NO

If not, why? _____

X6.2 Will the required number of service manuals, and complete parts list be delivered to the Equipment Division at Buckhannon upon completion of delivery of total units?

YES NO

Will the required Equipment Preventive Maintenance Form (Section X6.2 of Bidders Evaluation Report) be provided upon inspection of the pilot unit?

YES NO

X6.2
2-10-00

EQUIPMENT PREVENTATIVE MAINTENANCE QUESTIONNAIRE

THIS FORM MUST BE COMPLETED IN ITS ENTIRETY BY SUCCESSFUL BIDDER OR MANUFACTURER'S TECHNICAL REPRESENTATIVE PRIOR TO DELIVERY OF PILOT MODEL TO THE WVDOH.

DESCRIPTION: NTCIP FULL MATRIX MESSAGE SIGN MAKE: AMERICAN SIGNAL

MODEL: NTCIP CMS_T333 YEAR: 2007 PURCHASE AMOUNT: _____

ENGINE: MAKE: _____ MODEL: _____ FUEL TYPE: _____

HORSEPOWER: _____ CYLINDER: _____ ENGINE SERIAL: _____

COOLING SYSTEM CAPACITY: _____

BELTS: DESCRIPTION: _____ PART NUMBERS: _____

GVW: 2940 AXLE CAPACITY: FRONT: 3500 REAR: _____

TIRES: FRONT MAKE & SIZE: _____
P 205-75-15 B

REAR MAKE & SIZE: _____

DIMENSIONS OF UNIT: LENGTH: 190" WIDTH: 79.5" LENGTH: _____

VENDOR CONTACT PERSON: CASEY INOUE PHONE: 770.448.6650

PARTS:

BATTERY MAKE: DEKA MODEL: BCI_GC2@ CCA: _____
TOP OR SIDE POST: top DIMENSIONS: LENGTH _____ WIDTH _____ HEIGHT _____
SPARK PLUGS OR FUEL INJECTORS MAKE: _____ PART # _____
FUEL PUMP OR INJECTION PUMP MAKE: _____ MODEL: _____
ALTERNATOR MAKE: _____ PART #: _____
STARTER MAKE: _____ PART #: _____
TURBO CHARGER MAKE: _____ PART #: _____
TRANS. MAKE: _____ MODEL: _____ AUTO/MANUAL: _____
HYDRAULIC PUMP MAKE: _____ MODEL: _____

FILTERS	MAKE	PART NO.	LUBRICANT	MANUFACTURER TYPE
OIL	_____	_____	ENGINE	_____
AIR INNER	_____	_____	TRANSMISSION	_____
AIR OUTER	_____	_____	POWER STEERING	_____
FUEL PRIMARY	_____	_____	HYDRAULIC	_____
FUEL SECONDARY	_____	_____	DIFFERENTIALS	_____
COOLANT	_____	_____	BRAKE FLUID	_____
HYDRAULIC	_____	_____	COOLANT	_____
OTHER	_____	_____	OTHER	_____

X6.3 TRAINING:

Will training seminar be conducted on Preventive Maintenance, Operator and Mechanic Training
 YES NO

Will you conduct training with each purchase order against this open end contract?
 YES NO

Will training be conducted within 2 working days from the delivery of the pilot unit on the individual purchase order?
 YES NO

If NO, explain time frame _____

Will an Operator's Manual be furnished directly to Letha Lamb, Training Academy prior to the delivery of the pilot?
 YES NO

X6.4 If you are the successful vendor, will you furnish all training aids, i.e., videos, projectors, required in conducting the training?
 YES NO

X6.4.1 Will all manuals, booklets, etc. explaining preventive maintenance, operator procedures, and service schedule be delivered with each unit?
 YES NO
 If NO, explain _____

X6.5 WARRANTY AND SERVICE POLICY

Will the warranty and service you provide comply with all areas as stated in Section 6.5 of specifications
 YES NO

Is warranty literature attached?
 YES NO

Is a minimum two (2) year bumper to bumper basic parts and labor warranty included?
 YES NO

Describe: WARRANTY ATTACHED

Are parts and service facilities within three (3) hours F.O.B. delivery (Buckhannon)
 YES NO

THIS FORM MUST BE COMPLETED IN ITS ENTIRETY BY THE SUCCESSFUL BIDDER OR MANUFACTURERS TECHNICAL REPRESENTATIVE AND SUBMITTED WITH YOUR BID. (If additional lines are needed, make copies of form.)

1. Define the terms of the standard warranty. If not offered, so state. (Attach copy) PARTS AND IN HOUSE LABOR PLUS ONSITE LABOR AS DEEMED NECESSARY TO FULFILL SEEC REQUIREMENTS

2. Define warranty service to be performed at DOH facilities and warranty service to be performed at manufacturer's representative facility. List name and location of manufacturer's representative. ANY NECESSARY ONSITE LABOR TO BE CONDUCTED BY AUTHORIZED LOCAL DEALER OR FACOTRY TRAINED Amsig technician

3. List locations for parts inventories that are within the State of West Virginia. Also, list availability levels, if known. none. All inventory maintained in factory to sufficient levels that parts are available for shipment within 24 hours

4. During the term of warranty, list the guarantee discount to manufacturer's published list price for parts that bidder will sell the parts to owner.

- A. Terms: Net 30 Manufacturer's published list price less: 0 % discount
B. Terms: Net 60 Manufacturer's published list price less: 0 % discount
C. Terms: Net 90 Manufacturer's published list price less: 0 % discount

5. During the term of warranty, will all manufacturers or engineering improvements be submitted to Division of Highways? X YES NO

6. During the term of warranty, list the guaranteed rates charged for repair to the unit.

- A. Shop Rate \$ 85 per mechanic hour
B. Travel Time Charge \$ 85 per mechanic hour (Specify if one-way); port to port
C. Mileage Charge \$ 2.50 per vehicle mile (Specify if one-way); port to port
D. Field Mechanic Rate \$ 85 per mechanic hour
E. Specify period of time that prices are in effect: length of contract
F. Surcharge for miscellaneous items: 15 %

X6.6 EVALUATION COMMITTEE REQUIREMENTS

Is all component specifications, product literature, component models provided for Evaluation Committee bid determination? YES NO

X6.7 Will all parts, equipment, accessories, material, design and performance characteristics not specified herein, but which are necessary to provide a complete unit, be furnished with the unit and conform in strength, quality of material, and quality of workmanship to those which are advertised and provided to the market in general by the unit industry?

YES NO

X6.7.1 Are all parts and accessories adequate and regularly supplied as standard to be included except those which may be duplications of specifications herein, and except these by specification are not to be furnished?

YES NO

X6.7.2 Are all standard safety features that are required by Federal and State statutes of law included?

YES NO

X7.0 SPECIFICATIONS OF THE QUOTED UNIT:

The bidder should complete the following schedule in order for the Division to compare the actual bid unit to the specifications. Should the bidder except a requirement, then such exception may be only on the basis that such feature is not offered by the manufacturer. The Division will have the sole discretion as to whether the bidder's substitution meets the requirements of the specification.

Manufacturer: AMERICAN SIGNAL

Model: NTCIP CMS-T333

Is unit a trailer mounted Full - Matrix Message Board consisting of an optically enhanced L.E.D.'s. YES NO

Are the L.E.D.s minimum of a 30° vertical and 30° horizontal cone of visibility.

YES NO

Is the full matrix panel powered by a bank of batteries in order to convey bright, distinctive messages to the traveling public YES NO

Are full matrix variable message boards tested by AASHTO's National Transportation Product Evaluation Program (NTPEP). YES NO

X7.1 Are batteries automatically recharged by a group of solar panels located at highest point on the unit? YES NO

X7.1.1 Is unit designed to have sufficient energy backup to operate for 30 days without any sun?

YES NO

X7.1.2 Will solar panel generator recharge the battery bank at 2.5 hours sun to one (1) 24 hour period usage? YES NO

X7.2 Sign Panel Construction:

X7.2.1 Is sign panel aluminum constructed or fabricated with powder coated sheet metal and in a flat black finish YES NO

All exposed panels and seams are corrosion proof for a minimum of ten (10) years YES NO

With construction, are all panels/parts assembled as to prevent corrosion or to prevent dissimilar metal reaction for occurring YES NO

X7.2.2 Is sign panel frame a welded assembly and constructed of aluminum alloy channel or from steel panels powder coated in a corrosion proof manner for a minimum of ten (10) years YES NO

X7.2.3 What is length of sign panel 18 inches?

X7.2.4 Does face of sign incorporate measures to prevent fading from UV light, such as polycarbonate or lexan face with UV inhibitors incorporated YES NO

Is another method used? YES NO Has it been reviewed and approved? YES NO

X7.2.5 Does sign face have size to display three (3) separate lines of eight (8) characters YES NO

Size of characters: 18 inches tall and 12 inches wide?

Spacing of characters: 3 inches apart

X7.2.6 Does each character configuration contains 54 LED lamp pixels in six (6) element horizontal by nine (9) element vertical arrangement? YES NO

X7.2.7 Each pixel consists of 4 LED'S

X7.2.8 Message color: 590 nanometers

X7.3 Does sign have capability to display six (6) messages in sequence, with variable timing in 1/4 second increments under computer control? YES NO

X7.3.1 Is arrow display and flashing caution functions included as part of the manufacturer's pre-programmed message sequences YES NO

Will all arrow and flashing caution displays described in the current MUTCD provided YES NO

- X7.3.2** Are all abbreviations used in pre-programmed messages in compliance with the current MUTCD YES NO
- X7.3.3** Does the entire sign have capability to change all lines of message copy in not more than 100 milliseconds YES NO
- X7.3.4** Will sign be clearly visible a minimum of 4500 feet YES NO
- X7.3.5** Will sign legend be legible from a minimum distance of 1,000 feet under daylight conditions as determined by NTPEP for two non-traffic word message. YES NO
- X7.3.6** Will sign legend be legible from a minimum distance of 900 feet under night-time conditions as determined by NTPEP for a two non-traffic word message YES NO
- X7.3.7** Under variable light conditions, will the unit automatically adjust light source so as to meet the visibility requirements, without being too bright or too dim YES NO
- X7.4** Solar Message Board Support:
- X7.4.1** Will solar message board sign panel be supported on a telescoping upright member in order to permit raising the sign panel for operation and lowering for transport? YES NO
- Is the upright capable of 360 degrees rotation and to lock into any position to which it manually or electrically rotated YES NO
- X7.4.2** Raise and lower travel: 4 feet and accomplished by a hydraulic power pack YES NO
- X7.4.3** Bottom of sign 7 feet above ground level when in raise position
- X7.4.4** When transporting, will sign orient to the longitudinal axis of the trailer in a manner that effectively reduces aerodynamic drag during towing? YES NO
- X7.5** Power and Miscellaneous Equipment:
- X7.5.1** Is unit designed to accept two (2) power sources; one (1) being a battery bank consisting of four (4) size 4D, deep cycle, lead acid 12 volt DC batteries wired in parallel (or as designed to meet power/time requirements) YES NO
- X7.5.2** Does second power supply to have capability to accept existing 120 volt commercial electric service? YES NO
- X7.5.3** Batteries are recharged by a solar panel array producing 320 watts of power
- X7.5.4** Does unit have a built-in battery charger with minimum 25 amp per hr rating? YES NO
- X7.5.5** Is battery bank housed in lockable heavy duty weatherproof battery boxes? YES NO

X7.5.6 Are the two (2) power sources enclosed in protective housing? YES NO

X7.5.7 Are batteries capable of being recharged by a commercial 110 volt battery charger?
 YES NO

X7.6 Control Requirements:

X7.6.1 Is unit controlled in all functions by an on-board dedicated computer of solid state design and removable? YES NO

X7.6.2 Does unit have keyboard which user originated messages may be entered for display or storage? YES NO

X7.6.3 Does unit have an LCD display screen, where messages are reviewed before being displayed? YES NO

X7.6.4 Computer stores 400 programmed messages for display when called upon by user through keyboard YES NO

X7.6.5 Capability of storing 400 message sequences

X7.6.6 Does unit maintain stored message list? YES NO

X7.6.7 Does unit provide password coding or key entry? YES NO

X7.6.8 Will unit provide control programming to present sequences messages under operator control through keyboard entry? YES NO

X7.6.9 Does unit provide control for moving arrow displays? YES NO

X7.7 Solar Panel Control Unit:

X7.7.1 Is computer and power control unit housed in weather resistant, shock resistant lockable control box including lighting for night time operation? YES NO

X7.7.2 Does power control unit contain two (2) current meters; One (1) shows amperage generated with battery charger operating and one (1) indicates amperage generated from the solar panels be stored in battery bank? YES NO

X7.7.3 Does power control unit incorporate a PV regulator with thermal compensation for variances in ambient temperature to regulate the charge rate to the battery bank? YES NO

X7.7.4 Does unit incorporate an automatic intensity control feature to keep L.E.D. lamp matrix intensity constant with a reduction in voltage? YES NO

X7.7.5 Does message unit provide a photocell to reduce lamp intensity at night eliminating blinding? YES NO

X7.8 Trailer:

- X7.8.1 Is two (2) wheel trailer structurally adequate to serve as both platform for components? YES NO
- X7.8.2 Are fenders made of steel and installed over each wheel? YES NO
- X7.8.3 Is trailer equipped with hydraulic brake actuator system? YES NO
- X7.8.4 Is unit equipped with four (4) crank type, HD industrial leveling jacks; one (1) installed on each corner of the trailer deck? YES NO

X7.9 Lighting:

- X7.9.1 Does unit include LED taillights, stop lights, turn signals, license mount with light and all necessary reflectors? YES NO
- X7.9.2 Are trailer electrical cable and connector (Cole Hersee Pt #12081 male or equal) compatible with towing vehicles installed? YES NO
- X7.9.3 Is all trailer wiring encased in heavy duty hypalon type industrial wire looms clamped to underside of trailer structural tubing? YES NO
- X7.9.4 Does unit have two (2) inch ball type trailer hitch 6000 pound capacity with double safety chains in accordance with SAE J684F installed? YES NO

X7.10 Hydraulic Power Pack:

- X7.10.1 Does unit have 12 volt DC motor, pump, valve, reservoir, manual hand pump or approved equal? YES NO

X7.11 Message Cabinet Dimensions: (approximate)

X7.11.1 Length: 139.5 inches

X7.11.2 Height: 79.5 inches

X7.12 Central Processing Unit - CPU specifications (Minimum):

X7.12.1 Microprocessor Based 27.1 MHz YES NO

If No, you must specify 300MHz.

X7.12.2 Power requirements: ²⁰ mA DC at ¹² volts DC

X7.12.3 Specify screen size: 24 character lines with VGA characters per line

X7.12.4 Are interfaces (2) RS232 9 pin D connectors and documentation on port numbers and pins? YES NO

In addition, is one (1) USB port or one (1) ETHERNET Port with USB adaptor provided YES NO

X7.12.5 Will application source code be delivered with unit YES NO
OR

held in escrow YES NO
and provided to WVDOT in case company goes out of business? YES NO

X7.12.6 Will technical documentation for unit and for application programs be provided? YES NO

X7.12.7 Features considered as standard equipment but not addressed:

X7.12.8 Does unit comply with OSHA of 1979 and subsequent amendments? YES NO

X7.12.9 Will unit be painted manufacturers standard colors and materials YES NO

X7.12.10 Does unit meet guidelines for advertising? YES NO

X7.12.11 Will Manufacturer or Dealer provide training and training aids as specified? YES NO

X7.13 Communications:

X7.13.1 Will unit be guarded from any unwanted outside RF interference which would include but not be limited to VHF/FM receiver, 2 way radio receiver, cell phones etc. YES NO

X7.13.2 Is each PVMS controlled and monitored by its own sign controller directly from the control console inside the control cabinet on the trailer itself YES NO

X7.13.3 Is the PVMS sign controller able to receive instructions from and provide information to a computer containing PVMS control software compliant using NTCIP compliant communications modes YES NO

X7.13.4 Remote Communications control via wireless communications with a remotely located computer YES NO

Does the system communications backbone, as well as all field modems or signal converters, provide the PVMS sign controller with a RS232 signal having a baud rate between 2,400 bps and 115,200 bps. YES NO

Is communications static IP based with a static IP based modem installed on the trailer YES NO

X7.13.5 Is local communications control accomplished via direct connection with a laptop computer that is connected directly to the sign control using a null modem connection and baud rate between 2,400 bps and 115,200 bps. YES NO

X7.13.6 Is local communications control available via a keypad and LCD interface YES NO

Are the features of additional or removal of message or message(s) from the PVMS list of playing messages, adjustment of luminosity to manual or automatic, and the monitoring of miscellaneous data like battery voltage, photocells reading, etc. included YES NO

STATE OF WEST VIRGINIA
Purchasing Division

PURCHASING AFFIDAVIT

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceed five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

LICENSING: Vendors must be licensed and in good standing in accordance with any and all state and local laws and requirements by any state or local agency of West Virginia, including, but not limited to, the West Virginia Secretary of State's Office, the West Virginia Tax Department, West Virginia Insurance Commission, or any other state agencies or political subdivision. Furthermore, the vendor must provide all necessary releases to obtain information to enable the Director or spending unit to verify that the vendor is licensed and in good standing with the above entities.

CONFIDENTIALITY: The vendor agrees that he or she will not disclose to anyone, directly or indirectly, any such personally identifiable information or other confidential information gained from the agency, unless the individual who is the subject of the information consents to the disclosure in writing or the disclosure is made pursuant to the agency's policies, procedures and rules. Vendors should visit www.state.wv.us/admin/purchase/privacy for the Notice of Agency Confidentiality Policies.

Under penalty of law for false swearing (West Virginia Code, §61-5-3), it is hereby certified that the vendor acknowledges the information in this said affidavit and are in compliance with the requirements as stated.

Vendor's Name: American Signal Company

Authorized Signature: Cogh

Date: 12/27/08



AMERICAN SIGNAL COMPANY

*2755 Bankers Industrial Drive
Atlanta, GA 30360
Phone: 770-448-6650
Fax: 770-448-8970*

Exceptions to Specifications

- X7.7.2 Unit to be bid does not incorporate a PV regulator w/ thermal compensation.
- X7.12.3 Unit to be bid has a Quarter VGA LCD screen.

In lieu of NTPEP testing Amsig has submitted to a more stringent standard in the European union, results are included with bid as BSI Test Results.

Test Report



Product Services

BSI digital copy

Report No	288/DRAFT	This Report consists of 8 pages
Client	Rennicks Sign Manufacturing Kilbride Mulhuddart Dublin 15 Ireland	
Authority & date	Quotation acceptance dated 16 March 2006	
Item tested	Variable Message Sign	
Specifications	Overall specifications: TR 2136 Issue C: March 2002 incorporating IEC 68-2-1:1990 Test A. Cold IEC 68-2-2:1974 Test B. Dry heat IEC 68-2-64:1973 Test Fd Random vibration BS EN 60529:1992 Degrees of protection provided by enclosures (IP code) BS EN 60598-1:2004 Luminaires See limitation note page 6	
Results	See Summary of Results on page 3	
Prepared by	B Pond	Engineer
Authorized by	I McGuinness	Principal Engineer
Issue Date	08 May 2006	
Conditions of issue	This Test Report is issued subject to the conditions stated in current issue of PS082 'General conditions relating to acceptance of testing'. The results contained herein apply only to the particular sample/s tested and to the specific tests carried out, as detailed in this Test Report. The issuing of this Test Report does not indicate any measure of Approval, Certification, Supervision, Control or Surveillance by BSI of any product. No extract, abridgement or abstraction from a Test Report may be published or used to advertise a product without the written consent of the Managing Director, BSI Product Services, who reserves the absolute right to agree or reject all or any of the details of any items or publicity for which consent may be sought.	



0135

TESTING, EXAMINATION AND ASSESSMENT OF VARIABLE MESSAGE SIGN SUBMITTED AS AN INDEPENDENT TEST SAMPLE

INTRODUCTION

At the request of Rennicks Sign Manufacturing the Variable message sign received on 27 April 2006 and detailed below, was tested and assessed against the requirements of the following Specifications:

*Overall specifications:

TR2136C Issue C March 2002 Functional Specification for the Optical Performance of Discontinuous Variable Message Signs Clause 5 and

EN 12966-1:2005 (E) Road vertical signs – Variable message traffic signs – Part 1: Product standard

Incorporating

IEC 60068-2-1:1990 Environmental testing Part 2.1 Tests Test A: Cold

IEC 60068-2-2:1974 Environmental testing Part 2. Tests Test B. Dry heat

IEC 60068-2-64:1993 Environmental testing Part 2: Tests methods - Test Fh: Vibration, broadband random (digital control) and guidance

BS EN 60529:1992 Degree of protection provided by enclosures (IP code)

BS EN 60598-1:2004 Luminaires Part 1: General requirements and tests

from 27 April 2006 as indicated on the following pages of this Report. This request was made in the client's Quotation acceptance dated 26 March 2006. It is emphasized that assessments were not made against the other clauses of the Specifications.

This Report only relates to the actual sample that has been tested and assessed. The results obtained do not necessarily relate to samples from the production line and in no way imply the performance or quality of the continuing production will be maintained.

The tests and assessments contained in this Report were undertaken by BSI Product Services Environmental Laboratory from 27 April 2006.

*The specifications detailed fall within the Laboratory's UKAS assessed capabilities.

TEST ITEM

Variable message sign

SUMMARY OF RESULTS

Cold in accordance with IEC 60068-2-1:1990 Environmental testing Part 2.1
Tests Test A: Cold Section 2. Test Ab sub clause 12

No mechanical degradation or electrical failure. Complied

Hot in accordance with IEC 60068-2-2:1974 Environmental testing Part 2.
Tests Test B. Dry heat Section 2. Test Bb sub clause 12

No mechanical degradation or electrical failure. Complied

Random vibration in accordance with IEC 60068-2-64:1993
Environmental testing Part 2: Tests methods - Test Fh: Vibration, broad-band random (digital control) and guidance

No mechanical degradation or electrical failure. Complied

IP testing in accordance with BS EN 60529:1992 Degree of protection provided by enclosures (IP code) sub clauses 13.1, 13.2, 13.3, 13.4, 14.1, 14.2, 14.2.5 and 14.3

IP5X Category 2 no ingress of dust Complied

IPX5 no ingress of water Complied

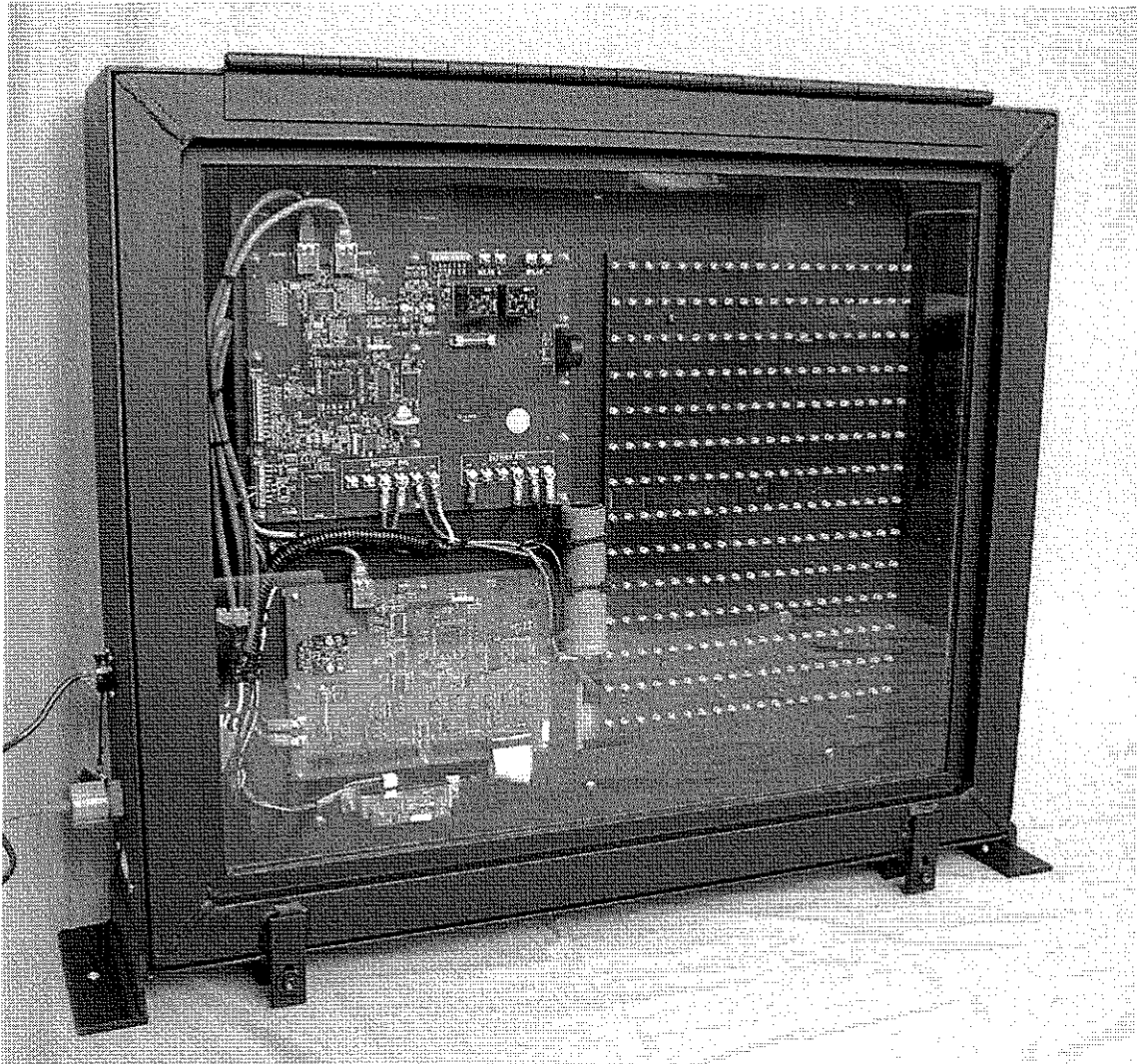
Impact testing in accordance with BS EN 60598-1:2004 Luminaires Part 1: General requirements and tests sub clause 4.13.4*

No mechanical degradation or electrical failure. Complied

***Note:** not UKAS accredited.

1. **SAMPLE SUBMITTED**

Photograph



Variable message sign

2. COMMENTS

2.1 Dry heat (operational)

Initial functional checks Complied

Initial visual examination of the Variable message sign showed no signs of any physical or electrical degradation.

Dry Heat (operational) test in accordance with IEC 68-2-2:1974: Test Bb

Operational temperature - +60°C

Dwell durations - 16 Hours

Ramp rate - 0.5°C/minute

Unit state - Unit operational during the test

During & Post Dry Heat (operational) test functional checks Complied

Post Dry Heat (operational) test visual examination of the Variable message sign showed no signs of any physical or electrical degradation.

2.2 Cold (operational)

Initial functional checks Complied

Initial visual examination of the Variable message sign showed no signs of any physical or electrical degradation.

Cold (operational) test in accordance with IEC 68-2-1:1990: Test Ab

Operational temperature - -15°C

Dwell durations - 16 Hours

Ramp rate - 1.0 °C/minute

Unit state - Unit operational during the test

During & Post Cold (operational) test functional checks Complied

Post Cold (operational) test visual examination of the Variable message sign showed no signs of any physical or electrical degradation.

2. COMMENTS (continued)

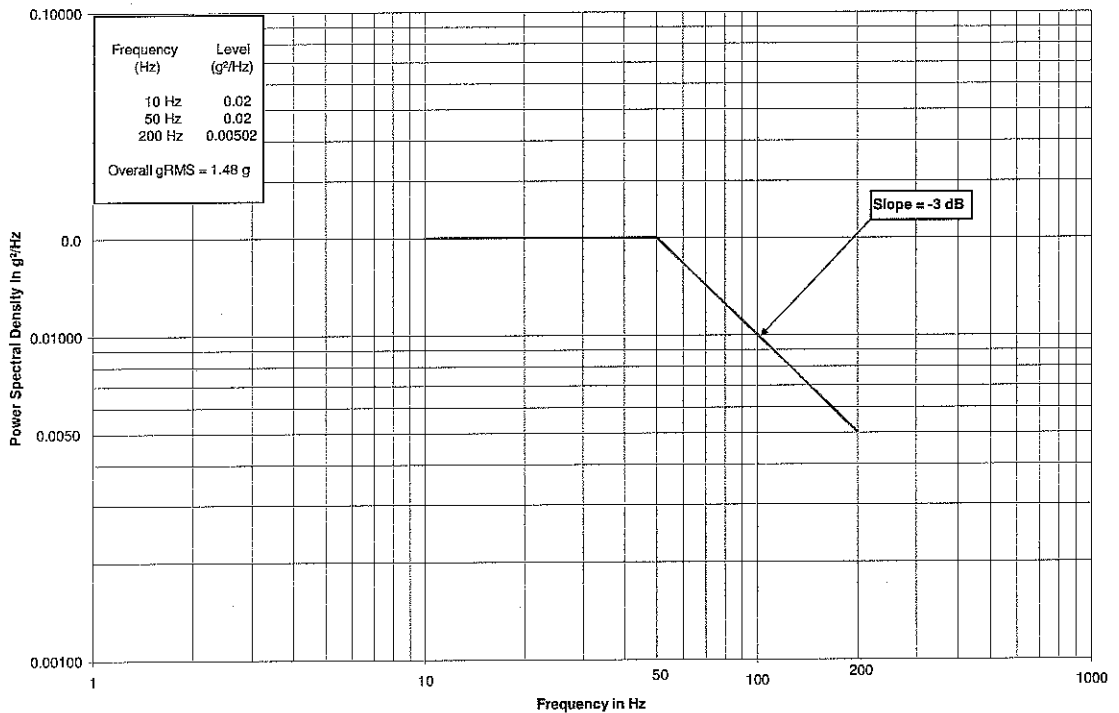
2.3 Random vibration

Lateral, Vertical & Fore/Aft axes

Initial functional checks before both axes Complied

Initial visual examination before both axes showed no signs of any physical or electrical degradation.

Random vibration in accordance with EN 12966-1:2005
(Referencing IEC 68-2-64: 1973: Random vibration)



Duration - 1.5 Hours/axis

Number of axes - 3

Unit state - Unit operational during last 30 minutes/axis

Post random vibration functional checks after both axes Complied

Post random vibration visual examination of the sample revealed no obvious physical degradation.

Note: Due to the specified profile giving an overall g rms value of 1.48 and the level specified in the specification is an overall g rms of 1.2 the testing was performed in accordance with the profile levels as the worst case scenario.

2. COMMENTS (continued)**2.4 IP Tests**

Protection against access to hazardous parts and against solid foreign objects (dust protected) IP5X Category 2

The tests were performed to Category 2, i.e. enclosures where reductions in pressure below the surrounding atmospheric pressure are not present.
Upon completion of the test, inspection revealed no evidence of dust ingress within the test enclosure

Protection against the ingress of water with harmful effects (jetting) IPX5

Upon completion of the IPX5 conditioning, inspection revealed no evidence of water ingress within the inner test enclosure.

2.5 Impact Test

Initial functional checks. Complied

Initial visual examination of the Variable message sign showed no signs of any physical or electrical degradation.

Impact test in accordance with TR2136C:March 2002 "EN 12368:2000 Table 9"
(BS EN 60598-1:2004: Clause 4.13.4)

Pre-conditioning	-	Storage at -5°C for a period of 3 hours
Test type	-	Vertical hammer
Hammer radius	-	50 mm
Hammer weight	-	0.51 kg
Drop height.	-	400 mm
Total energy	-	2.04 joules.
No. of drops	-	1 on to each exposed surface.
Unit state	-	Unit operational after test but not during.

Post Impact functional check Complied

AMERICAN SIGNAL COMPANY

AMERICAN SIGNAL COMPANY AmSig® Limited Warranty

Limited Warranty. AmSig warrants all portable changeable message signs and highway advisory radio systems against manufacturing defects in materials and workmanship for one year from the date of shipment from AmSig's factory. Within this period AmSig will repair or replace equipment returned to the factory prepaid, without charge for parts and labor. After repair or replacement, AmSig will ship the equipment back to the Buyer by the same mode or type of delivery used by the Buyer to send the equipment to AmSig (overnight courier, same class of mail or UPS delivery, freight line, etc).

This limited warranty does not cover (a) damage or failure caused by or attributable to acts of God, abuse, misuse, improper or abnormal usage, faulty installation, improper maintenance, lightning or other incidents of excessive voltage; (b) any repairs other than those provided by an AmSig authorized service facility; or (c) transportation costs other than as provided above; (d) damage or failure caused by any difficulty or impairment in the ability to calculate and compare the date data between the twentieth and twenty-first centuries (commonly known as the "Y2K" problem) or to recognize leap years-all such date related problems are addressed in the Section entitled "Year 2000 Warranty".

Certain components of the equipment are covered by warranties from manufacturers other than AmSig. Copies of those warranties will be delivered to the Buyer along with the equipment AmSig has no liability for and does not provide warranty service for these items, which include engine, battery or batteries, battery charger, hydraulic pump system, tires, wheels, axles, brakes, and trailer hitch (if any). The Buyer should consult the applicable manufacturer for a specific warranty regarding a specific component. AmSig's limited warranty does not cover any damages to parts otherwise covered by AmSig's limited warranty if and to the extent that such damages are caused by or result from a defective or malfunctioning item warranted by another manufacturer

AmSig's limited warranty obligation shall be automatically suspended upon the Buyer's failure to pay any obligation owed to AmSig according to the terms agreed upon between them (whether pursuant to this Quotation or any other agreement between them). Such suspension shall continue until the Buyer has paid such obligation in full. Notwithstanding the foregoing, AmSig shall honor its limited warranty obligation for any equipment that has been sold by the Buyer, unless the owner of the equipment is in default under any obligation to pay the Buyer for such equipment

YEAR 2000 WARRANTY

In addition to the foregoing, AmSig warrants to owner that its products sold hereunder, in the form delivered by AmSig, will without impairment in the functioning of the product, be able to calculate and compare date data between the twentieth and twenty-first centuries, and will recognize the year 2000 as a leap year. However, this limited Year 2000 Warranty shall apply if (i) AmSig's products are used properly and in accordance with the documentation provided by AmSig, (ii) all associated products, such as, but not limited to hardware, software, and firmware, used in combination with the product exchange date data with AmSig's products, and (iii) AmSig is provided with written notice of a defect or other problem claimed under this limited Year 2000 Warranty within one (one) year of such shipment of said AmSig product.

As owner's sole and exclusive remedy under these warranties, AmSig shall, in its sole discretion either (i) provide services to repair a nonconformity with these limited warranties, or (ii) replace the nonconforming component of its product. THE FOREGOING IS OWNER'S SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THESE WARRANTIES.

EXCEPT AS PROVIDED ABOVE, AmSig MAKES NO EXPRESS WARRANTIES. FURTHER, AmSig MAKES NO WARRANTY OF MERCHANTABILITY AND NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSES WHATSOEVER WITH RESPECT TO THE EQUIPMENT BEING SOLD.

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CMS-T300 Series
Solar Charged, Battery Powered All LED
NTCIP Compliant Portable Changeable Message Sign

SCOPE

This specification defines the characteristics and features of a portable changeable message sign. This system allows the user to display a message on a sign display to inform motorists and the traveling public of oncoming road conditions and advisories. The display format for the sign display may be Character, Line, or Full Matrix. The sign is battery powered with both solar and 110 VAC charging systems. These portable signs can also be used as a platform and power source for many Intelligent Transportation System (ITS) devices.

GENERAL**MESSAGE SIGN DISPLAY**

Description: The display formats available: Character, Line, or Full Matrix. Each display format shall be configured of all light emitting diode (LED) with each having an operational characteristics of Amber 590nm LEDs with a 30° cone of angularity.

Character Matrix (Model CMS-T331): The display shall consist of three lines, each of which shall contain eight display panels. The display panels shall be uniformly spaced horizontally across the display face with a physical space of 3.6-inches between adjacent panels. Each line is vertically separated by a space of 6-inches. A 6-inch contrast border is located at the top, bottom, and both ends of the display.

Line Matrix (Model CMS-T332): The display shall consist of three lines, each of which shall contain fifty (50) vertical pixel columns. Each line utilizes ten display panels in a continuous line matrix. The display panels in each line shall be mounted horizontally across the display face such that there are 50 equally spaced columns on 2.7-inch centers by 7 pixel rows. Each line shall be separated vertically by a physical space of 6-inches. A 6-inch contrast border is located at the top, bottom of the display.

Full Matrix (Model CMS-T333): The display shall consist of an LED pixel matrix comprised of 28 continuous rows by 50 continuous columns. Each pixel is spaced 2.8-inches vertically and 2.7-inches horizontally. The full matrix display consists of forty (40) identical and interchangeable panels without computer modifications.

ELECTRICAL:

Display Panels: Each display panel shall be nominally 19.4" in height and 12.6" in width. Display panels shall be 100% solid state with no moving parts and shall be identical to, and mutually interchangeable with, all other panels; no field hardware or programming modifications shall be required to exchange or replace individual display panels. The pixels on each display panel shall be arranged in a matrix of 5 columns by 7 rows with the pixels spaced on 2.80" centers vertically by 2.70" centers horizontally. Each panel shall be able to monitor and determine pixel failure. Pixel failure will be represented on host software and local control system identifying location of failed pixel. Controller display will be in WYSIWYG format, (What You See Is What You Get.).

Pixel: An individual pixel shall consist of four Dynapoint™ lens enhanced LED's spaced on 1.0" centers both vertically and horizontally. The LED's shall be ITE amber wide angle providing for both daylight and nighttime legibility and shall be rated for a service life of 100,000 hours, and shall have an operating temperature range of -40° F. to +165° F.

General Characteristics:

Number of Pixels: 35 standard, 7 pixels rows, 5 pixel columns
Number of LED's per pixel: 4 standard
Operating Voltage: 12VDC nominal
Brightness Control: Pulse width modulation
Current Limiting: One external resistor per driver
Pixel Feedback: Differential amplifier per pixel (where provided)
Feedback Logic: CPLD on-board
Column Decoding: CPLD on-board
Optics: Dynapoint™ Lens System
LED Driver: Power shift register technology with programmable current limit
Temperature Range: -40° F to +165° F

CPU:

- Processor: 32 bit 300 MHz minimum
- RAM Memory: SDRAM SIMMS in any configuration from 64M to 1G
- Flash Memory: Compact flash modules from 64M to 1G
- Ethernet Port: at least two 10/100bT
- Temperature Range: -49°F to +185° F
- Serial Port(s): at least 2, RS232 (Comm1 and Comm2)
- Digital I/O: at least one port of eight lines, configurable as input or output
- PCB Form Factor: PC104
- Architecture: Embedded PC
- Display: VGA and/or LCD
- Keyboard – PS2
- Mouse: PS2
- Power Requirements: +5VDC (low current +12VDC)
- Unit form factor: 1.5RU or 2RU depending on requirements
- Additional Ethernet port
- Additional Serial Ports (Comm3 and Comm4)
- AC97 Audio Codec
- IDE Port for Disk Drive
- PC104+ port for expansion cards
- USB Port
- Additional Digital I/O Port

Data Distributor:

The data distributor board formats and renders messages based on the incoming packets from the CPU. The data distributor also reads the pixel information from the display boards and sends that information to the CPU. The pixel feedback enables any host application that communicates with the CPU to generate a WYSIWYG interface. If a pixel has failed, the user will know it, since the host display will show the failed pixel.

Telemetry Card:

The telemetry card provides system housekeeping functions. It connects the system via the 10/100bT Ethernet network. The telemetry card performs the following functions:

- Monitors battery current up to 90 amps
- Monitors battery voltage up to 20 volts
- Provides digital input for photo sensor (ambient light measurement)
- Spare A/D input
- Four auxiliary digital inputs / outputs
- Solar Charge Control Relays (2)
- Connection for other 12 volt electronics

Technical Specifications:

- Processor: 66MHz Motorola Coldfire 32 Bit
- Flash Memory: 2M x 8
- SDRAM: 2M x 32
- Ethernet Port(s): (2) 10/100bT
- Ethernet Switch: basic layer 2, standalone
- A/D Inputs: 4
- Form factor: Amsig, Proprietary
- Power Requirements: 9 – 16 VDC, +12VDC nominal
- Temperature Range: -40°F to +185°F
- Digital I/O: Four inputs / outputs
- Solar Charge Control: Relays for two panels
- Temperature Monitor: Digital on-board

CONTROL & OPERATION:

Description: The CPU shall consist of a single printed circuit board, which shall contain all of the sign message memory as well as the sign operating software. The CPU shall be conformal coated, 100% solid-state unit with no moving parts or switches. It shall be operable in 0-95% non-condensing humidity conditions at temperatures from -30 degrees F to +165 degrees F. Message memory shall be retained during power interruptions or failures, and the CPU shall be capable of operating the sign system in the event that the keyboard controller is disconnected.

MESSAGE SIGN CONTROLLER TERMINAL

Controller Description: The controller shall utilize

- Standard PC104 QWERTZY keyboard w/ integrated mouse.
- Full Color quarter VGA LCD screen capable of displaying and mimicking display.

MESSAGE SIGN OPERATING SYSTEM

Description: The sign operates through a menu driven system which allows the user to input commands using standard keystrokes to generate messages, message pages, review diagnostics, and generate operation schedules. The sign operating system shall perform the minimum items:

- Password Protected: Multi-levels, User, Maintenance / Factory Diagnostic
- NTCIP Compliant V1203 standard objects
- Sign Diagnostics
- Battery Voltage
- Charging Voltage (Landline & Solar)
- Individual Pixel Feedback
- Component Failure Status
- Adjust Brightness levels
- Message Scheduling
- Additional component use (e.g. Radar, Cellular)

SYSTEM POWER SOURCE

Description: The 12 VDC power source for the system shall be a battery pack charged primarily by a solar array that provides virtual autonomy for the system. A 110 VAC charging system is also standard on all units and available for landline operation of the system. Control of the sign power supply shall be provided by a power management system that shall regulate the charging of the batteries by the solar charging system, and shall provide for temperature compensation, regulation, and distribution of power to the various sign functions. The charging of the 12 VDC power source batteries shall be independent of the position of any switch on the control panel.

Battery Pack: The battery pack shall consist of 6VDC deep cycle golf cart type lead /acid batteries (BCI Group GC-2) that when in a fully charged condition shall provide sufficient electrical energy for the continuous and proper operation of the sign system for a nominal period of twenty-one days without the necessity of recharging. Warranty service for the batteries shall be locally available on a nationwide basis from the batteries manufacturer.

Charging: The sign system shall be equipped to provide for the charging of the 12 VDC power source batteries by either a solar charging system, or alternatively, by a 110 VAC charging system.

Solar Charging System: The solar charging system shall consist of a photovoltaic array mounted at the top of the sign case and a power management system. The system shall provide regulated, "on demand" charging consistent with battery condition, with the ambient solar luminance at the photovoltaic array, and with net power consumption within the sign system. Charging of the batteries shall be independent of the position of any switch on the control panel. Initiation of 110 VAC charging service shall completely disconnect the solar array from the charging circuit.

Aimstar™ Adjustable Solar Assembly (Optional): The solar charging system shall be adjustable to be positioned, regardless of the direction of the sign display, by the user to be angled towards the Southern Hemisphere. The positioning of the solar assembly allows the power system to achieve an increased collection rate of solar power throughout normal daylight operation. This provides a 40% to 50% more efficient recharge rate to the batteries than utilizing a non-adjusting solar assembly.

110 VAC Charging System: The 110 VAC charging system, supplied as standard equipment, shall consist of a temperature compensating, 110 VAC input battery trickle charger, an ammeter for monitoring the charging process, and an electrical receptacle mounted on the control pedestal. The system shall be configured so as to initiate charging of the power supply batteries when the 110 VAC service is connected without the necessity of operator intervention, and shall be capable of completely charging the battery pack within a 24 to 72 hour time period. The actual charging time will vary depending upon conditions and state of charge/discharge of the batteries.

MESSAGE SIGN CENTRAL PROCESSING UNIT

FONT TABLE

CMS-T331 – Character Matrix

Font	Nominal Height	Nominal Width	Characters per Line	Lines per Display	Legibility Distance
4 x 7	18"	10"	8	3	1,000'
5 x 7	18"	12"	8	3	1,250'

CMS-T332 – Line Matrix

Font	Nominal Height	Nominal Width	Characters per Line	Lines per Display	Legibility Distance
3 x 7	18"	8"	12	3	900'
4 x 7	18"	10"	12	3	1,000'
5 x 7	18"	12"	10	3	1,250'

CMS-T333 – Full Matrix

Font	Nominal Height	Character/Line	Lines/Sign Face	Legibility Distance
4 x 7	18"	8	3	1,250 ft.
5 x 7	18"	8	3	1,300 ft.
5 x 7 W	18"	7	3	1,350 ft.
7 x 7	18"	7	3	1,375 ft.
7 x 7 W	18"	6	3	1,400 ft.
6 x 11	28"	6	2	1,500 ft.
7 x 20	53"	5	2	1,900 ft.
9 x 20	53"	4	1	2,200 ft.

W = Wide Stroke, Additional pixel of blank space between character

PHYSICAL SIGN & TRAILER CHARACTERISTICS

Description: The sign case and trailer frame shall be completely designed and fabricated from metal. The sign case shall be aluminum and the trailer frame shall be steel. A electric hydraulic mast is supplied to raise the display from travel mode into display mode. A backup handpump for the hydraulic mast is required. The display shall have a silk screened polycarbonate lens system to improve conspicuity of display in standard operation conditions.

Sign Case: The sign case shall be of all aluminum construction fabricated utilizing ASTM B 209 6063-T5 and 6061-T6 aluminum extrusions and 3003-H14 aluminum sheet material with aluminum and/or stainless steel fasteners and plastic lenses. The case shall be 137.75 " in width (139.75" with running lights), 79.5" in height, and nominally 6.2" in thickness.

Lenses: Polycarbonate lenses shall serve as the front of the sign case (three lenses for CMS-T331 and T332 models, 4 lenses for CMS-T333 model) and shall be removable by sliding to either side to facilitate ease of internal service. The lenses shall be 3/16 " in thickness per accepted plastics industry convention, shall be suitably stabilized to resist degradation due to exposure to ultraviolet (UV) radiation. The lens shall have the front surface screened with a flat black ink to reduce glare from ambient solar illumination or from vehicle headlights. The screening pattern shall be consistent with the position of the LED pairs in the display and provide for the viewing of only the illuminated pixels during message display.

Description: The mounting post shall support the sign case in a vertical position and serve as an integral part of a system facilitating the vertical and rotational movement of the sign case. The post assembly shall consist of two concentric round steel tubes, the inner (lower) being 5 1/2" OD x 3/8" wall steel (ASTM A 513), and the outer (upper) 6" OD x 3/16" wall. The post assembly and attendant hydraulic cylinder shall enable the operator to raise the bottom of the sign case to a minimum height of 7 feet above the surface of the roadway, and to rotate the sign case through 360 degrees. A positive brake assembly shall be provided to prevent unwanted movement once the sign case is in the desired display position. A mast safety pin shall be provided to prevent the sign case from falling in the event of a hydraulic system failure.

Hydraulic System: A hydraulic cylinder shall be encased within the inner (lower) portion of the post assembly and shall be used to raise the outer (upper) portion and attached sign case. The cylinder shall be driven by an electrically powered hydraulic pump (with attached fluid reservoir) controlled by the UP/DOWN toggle switch on the control panel. The hydraulic system shall include an auxiliary manual pump with release for emergency use.

TRAILER

Description: The trailer shall be nominally 197 inches in length with the removable tongue in place and 79.2 inches in width; shall be constructed of 3"x3" and 3"x 5" steel tube (ASTM A36) with 3/16 " wall thickness, and shall be welded in accordance with applicable American Welding Society (AWS) standards. The trailer shall have a lockable, internally illuminated, weatherproof equipment cabinet housing the keyboard terminal and control panel. The trailer shall also have a lockable pump housing for the hydraulic pump, and two lockable battery boxes (front/rear) for the power source batteries. The trailer shall have a single axle with dual axles as an option, and a fixed height ball hitch (fixed height towing and adjustable height ball or tow ring hitches optional).

Rating: The trailer and springs and axle shall be rated for 3500 pounds. The removable tongue assembly with hydraulic surge brakes shall be constructed from 3" x 3" steel tube (ASTM A 36) with 3/8" wall thickness, rated for 6000 pounds, and fitted with a 2" ball hitch. Wheels shall be 15" steel with 5 lug bolts per wheel and fitted with P 205-75-15 B rated tires.

Removable Tongue: The removable tongue shall have safety chains attached. No tools shall be required for removal or remounting of the tongue; it shall not be necessary to disconnect any hydraulic brake lines to effect complete removal, and it shall not be necessary to bleed the brake system upon re-installation of the tongue.

Leveling Jacks: The trailer chassis shall have at each corner a 2000 pound leveling jack affixed in such a manner that the jacks may be readily placed and locked in a horizontal position for traveling without necessitating the use of any tools. The trailer and sign assembly, when stationary and supported properly with the leveling jacks shall withstand AASHTO rated 100 MPH wind gusts.

OPTIONAL EQUIPMENT:

Description: The sign may be equipped with various Intelligent Transportation System (ITS) devices to provide for remote operations, sensor control or activation, and conditional response.

Remote Communications: The sign system shall be equipped so as to provide for host computer/remote sign interaction through either a landline telecommunication / modem link.

Amsig.NET™ Software: The Amsig.NET Host software package shall enable the sign to be contacted via users choice of remote communication. This software is found to be compliant with all current versions of Microsoft's Windows. In addition this software is presented in a graphical user interface (GUI) format allowing the user to select the appropriate sign on the screen for communications.

Radar Transducer: A Doppler effect microwave radar transducer can be outfitted to the message sign to provide the sign with added traffic calming capabilities. These abilities include: Instantaneous speeds of front most and fastest target or activation of an overspeed sequence, which automatically interrupts current sequence.

Radar Data Logging Capability: Sign used in conjunction with Radar Option and Cellular Communications Software Option can be utilized to collect traffic data such as average speeds, 85th percentile, 50th percentile, and average # of cars. All data is presented in graph format accessed within the software.

Voicestar™ Highway Advisory Radio: The sign may be outfitted with an optional Highway Advisory System which broadcasts an audio message on the AM band in either low or high frequency.

Aimstar™: This option outfits the signs with an adjustable solar assembly. Through positioning the solar assembly aimed toward the southern hemisphere, the unit is able to receive an increased rate of charge for the battery bank.

Queue Detection: American Signal Changeable Message Signs are able to be paired with an American Signal Queue Detection Trailer and connected wirelessly to be able to instantly display a condition responsive sequence of messages pre-set by the user.

Integrated Traffic Management Solution (ITMS): Any of American Signal Company's message signs or sign systems can be integrated to work within our ITMS system. This self-activating system of multiple sensor and sign systems runs continuously and is guided by complex traffic algorithms. The algorithms are used to determine any alteration in the flow of traffic throughout the system. When a change is sensed, the central controller automatically updates the complete system to display and broadcast correct up-to-the-minute information.

Miscellaneous: American Signal is able to meet the users needs for additional hardware items. We are able to provide any hitch type (Ball, Pintle or Lunette Eye, Bulldog, Adjusting Height, etc...), axle type, lift requirements, color specifications, alarms, etc.

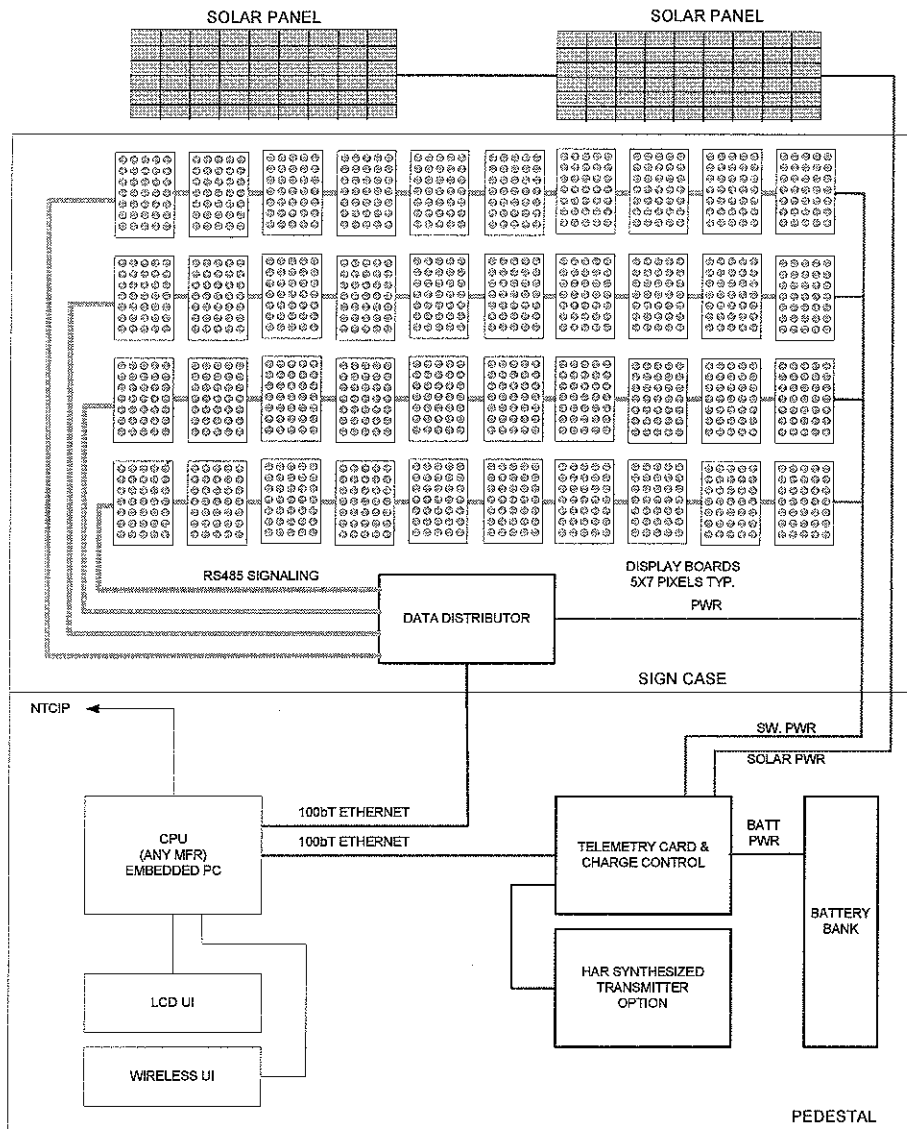


FIGURE #3 - REVISED TRAILER ARCHITECTURE BLOCK DIAGRAM