AMSIG®

AMERICAN SIGNAL COMPANY

Advantage Series

GP-232, 432, 465

Service & Maintenance Manual

Document #: MAN00000023-1
Revision: D
Date: 2-10-06

AMERICAN SIGNAL COMPANY
AmSig â Limited Warranty

Limited Warranty. AmSig® warrants all portable changeable message signs 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, AmSigÒ MAKES NO EXPRESS WARRANTIES. FURTHER, AmSigÒ 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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I. Revision Information

Rev.	Date	Author	Reason	Page
A	7-22-04	Price R. Potter	Initial Release	-
B	11-1-04	Price R. Potter	Add ***CAUTION*** notes to Sign Case Assembly Maintenance	23
			Revise wiring diagrams for Model 232 Adv (30062800-WIR, Rev. D), 432 Adv (30064700-WIR, Rev. F) & 465 Adv (30064600-WIR, Rev. F)	27, 28, 29
C	11-23-04	Price R. Potter	Revise wiring diagrams for Model 232 Adv (30062800-WIR, Rev. E) & 432 Adv (30064700-WIR, Rev. G)	27, 28
D	2-10-06	Price R. Potter	Update Sections 1.1, 1.2 and 1.3; Revise wiring diagram for 232 (30062800-WIR), 432 (30064700-WIR) and 465 (30064600-WIR); Revise mechanical drawing for 232 (30062800), 432 (30064700) and 465 (30064600)	7-12; 30-32; 34-36

1.0 Introduction

The information contained in this manual describes the Advantage Series portable variable message sign (VMS). The American Signal model numbers for these Advantage Series of VMS products are GP-232, GP-432 and GP-465. All of these models have full matrix displays and mount on the Advantage Trailer system. The major differences between these products are the size of the Sign Case and the configuration of the LED Display Panels, which are illustrated in the following chart:

		LED Configuration		
Advantage Model #	Sign Case size (approx.)	Rows	Columns	Pixel
GP-232	3’ High x 6’Wide	28	72	1 LED/Pixel
GP-432	4’ High x 8’ Wide	28	50	2 LEDs/Pixel
GP-465	4’ High x 6’ Wide	28	48	4 LEDs/Pixel

A more complete list of the standard features and available options for each model is contained in the next subsections.

Detailed information on the operation and programming of the VMS software is contained in the 33x/x32 Operations Manual.

1.1 Standard Features and Options List-232

Standard Configuration

AMS30062800 GP-232 Advantage VMS & Trailer

Standard model includes:

- ✓ Highway Orange/Flat Black Color
- ✓ Sign Case: 3' High x 6' Wide (approx.)
- ✓ Full Matrix VMS, 28 Rows x 72 Columns
- ✓ 6" to 18" High Characters, 6 Font Sizes, 1 LED/Pixel
- ✓ 6V Batteries (8x)
- ✓ 55A Charger
- ✓ 80W Solar Panel (1x)
- ✓ Bolt-On Mast
- ✓ 72" Wide x 94" Long Trailer frame fabricated w/ 3"square tubing
- ✓ 2000 lb. Axle w/ 13" Tires (2x) load rated at 1360 lbs. each
- ✓ Low-Profile NEMA 4 Style Pedestal Enclosure
- ✓ Hand-held Terminal
- ✓ 2" Removable Pinned-On Ball Hitch
- ✓ Removable Tongue
- ✓ Hydraulic Pump & Cylinder (for raising/lowering Sign)
- ✓ Leveling Jacks (4x)

Available Options

Color:	Optional color must be specified by FHWA Color Standard 595A (or manufacturer # or color chip)	
Solar Panels:	OPT30065112-2	Solar Panel, Addition 80W (1x)
Radar:	OPT30065082-2	Radar, Fixed Kustom DRU
	OPT30065082	Radar, Swivel Kustom DRU
	OPT30065082-3	Radar, Fixed Kustom DRU KPH
Communication:	OPT30065014-2	Cell Phone, PC Remote Digital 232/432
	OPT30065134	Activation, Cell Digital 33x/Adv
Hitch:	OPT30065106-2	Hitch, 1-7/8" Ball Lever x32Adv
	OPT30065106-1	Hitch, 2.5" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065106	Hitch, 3.0" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065085	Hitch, 2" Ball/2.5" Lunette Eye 33x/x32Adv
	OPT30065085-1	Hitch, 2" Ball/3.0" Lunette Eye 33x/x32Adv
	OPT30065093-1	Hitch/Tailights, European x32 Adv
Tire:	OPT30155050	Spare Tire, Frame-mounted GP-x32Adv
	OPT30065074	Extra Jack, Tongue-mtd 6" Wheel 33x/x32Adv
Security:	OPT30065096-1	Wheel Lock Bar & Padlock, Advantage
	OPT30065102	Locking Lug Nuts

Extended Warranty:	OPT30065079	Warranty, Extended 1 Year
	OPT30065080	Warranty, Extended 2 Years
Additional Manuals:	MAN00000023-1	Manual, Service & Maintenance GP-232,432,465 Adv
	MAN00000023	Manual, Operations GP-33x/x32 Advantage

1.2 Standard Features and Options List-432

Standard Configuration

AMS30064700 GP-432 Advantage VMS & Trailer

Standard model includes:

- ✓ Highway Orange/Flat Black Color
- ✓ Sign Case: 4' High x 8' Wide (approx.)
- ✓ Full Matrix VMS, 28 Rows x 50 Columns
- ✓ 9" to 28" High Characters, 9 Font Sizes, 2 LEDs/Pixel
- ✓ 6V Batteries (8x)
- ✓ 55A Charger
- ✓ 80W Solar Panel (2x)
- ✓ Bolt-On Mast
- ✓ 72" Wide x 94" Long Trailer frame fabricated w/ 3"square tubing
- ✓ 2000 lb. Axle w/ 13" Tires (2x) load rated at 1360 lbs. each
- ✓ Low-Profile NEMA 4 Style Pedestal Enclosure
- ✓ Hand-held Terminal
- ✓ 2" Removable Pinned-On Ball Hitch
- ✓ Removable Tongue
- ✓ Hydraulic Pump & Cylinder (for raising/lowering Sign)
- ✓ Leveling Jacks (4x)

Available Options

Color:	Optional color must be specified by FHWA Color Standard 595A (or manufacturer # or color chip)	
Solar Panels:	OPT30065111-2	Solar Panel, Subtraction 80W (-1x)
	OPT30065098-1	AimStar® Solar Assy, 123W (2x) Adv (replaces standard)
Radar:	OPT30065082-2	Radar, Fixed Kustom DRU
	OPT30065082	Radar, Swivel Kustom DRU
	OPT30065082-3	Radar, Fixed Kustom DRU KPH
Communication:	OPT30065014-2	Cell Phone, PC Remote Digital 232/432
	OPT30065134	Activation, Cell Digital 33x/Adv
Hitch:	OPT30065106-2	Hitch, 1-7/8" Ball Lever x32Adv
	OPT30065106-1	Hitch, 2.5" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065106	Hitch, 3.0" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065085	Hitch, 2" Ball/2.5" Lunette Eye 33x/x32Adv
	OPT30065085-1	Hitch, 2" Ball/3.0" Lunette Eye 33x/x32Adv
	OPT30065093-1	Hitch/Tailights, European x32 Adv
Tire:	OPT30155050	Spare Tire, Frame-mounted GP-x32Adv
	OPT30065074	Extra Jack, Tongue-mtd 6" Wheel 33x/x32Adv

Security:	OPT30065096-1	Wheel Lock Bar & Padlock, Advantage
	OPT30065102	Locking Lug Nuts
Extended Warranty:	OPT30065079	Warranty, Extended 1 Year
	OPT30065080	Warranty, Extended 2 Years
Additional Manuals:	MAN00000023-1	Manual, Service & Maintenance GP-232,432,465 Adv
	MAN00000023	Manual, Operations GP-33x/x32 Advantage

1.3 Standard Features and Options List-465

Standard Configuration

AMS30064600 GP-465 Advantage VMS & Trailer

Standard model includes:

- ✓ Highway Orange/Flat Black Color
- ✓ Sign Case: 4' High x 6' Wide (approx.)
- ✓ Full Matrix VMS, 28 Rows x 48 Columns
- ✓ 11" to 33" High Characters, 9 Font Sizes, 4 LEDs/Pixel
- ✓ 6V Batteries (8x)
- ✓ 55A Charger
- ✓ 80W Solar Panel (2x)
- ✓ Bolt-On Mast
- ✓ 72" Wide x 94" Long Trailer frame fabricated w/ 3"square tubing
- ✓ 2000 lb. Axle w/ 13" Tires (2x) load rated at 1360 lbs. each
- ✓ Low-Profile NEMA 4 Style Pedestal Enclosure
- ✓ Hand-held Terminal
- ✓ 2" Removable Pinned-On Ball Hitch
- ✓ Removable Tongue
- ✓ Hydraulic Pump & Cylinder (for raising/lowering Sign)
- ✓ Leveling Jacks (4x)

Available Options

Color:	Optional color must be specified by FHWA Color Standard 595A (or manufacturer # or color chip)	
Solar Panels:	OPT30065111-2	Solar Panel, Subtraction 80W (-1x)
	OPT30065098-1	AimStar® Solar Assy, 123W (2x) Adv (replaces standard)
Radar:	OPT30065082-2	Radar, Fixed Kustom DRU
	OPT30065082	Radar, Swivel Kustom DRU
	OPT30065082-3	Radar, Fixed Kustom DRU KPH
Communication:	OPT30065014-3	Cell Phone, PC Remote Digital 465
	OPT30065134	Activation, Cell Digital 33x/Adv
Hitch:	OPT30065106-2	Hitch, 1-7/8" Ball Lever x32Adv
	OPT30065106-1	Hitch, 2.5" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065106	Hitch, 3.0" Lunette Eye Bolt-On 33x/x32Adv
	OPT30065085	Hitch, 2" Ball/2.5" Lunette Eye 33x/x32Adv
	OPT30065085-1	Hitch, 2" Ball/3.0" Lunette Eye 33x/x32Adv
	OPT30065093-1	Hitch/Tailights, European x32 Adv
Tire:	OPT30155050	Spare Tire, Frame-mounted GP-x32Adv
	OPT30065074	Extra Jack, Tongue-mtd 6" Wheel 33x/x32Adv

Security:	OPT30065096-1	Wheel Lock Bar & Padlock, Advantage
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Additional Manuals:	MAN00000023-1	Manual, Service & Maintenance GP-232,432,465 Adv
	MAN00000023	Manual, Operations GP-33x/x32 Advantage

2.0 Advantage System Components & Options

The Advantage System standard components and their functions are briefly described in this section. References to and pictures showing specific brands of equipment are included for discussion purposes only. All brands, equipment and designs are subject to change at any time without notice. Wiring diagrams, mechanical drawings, part numbers and technical specifications are contained in other sections. (NOTE: P/Ns with revisions are denoted with an "-x" suffix. Call factory for applicable (or current) revision level.)

2.1 Sign Case Assembly

The Sign Case Assembly provides the housing for most of the major VMS components including the Display Panels, Central Processing Unit (CPU), Power Supply and Lens. The Model 465 Sign Case assembly also contains the Power Manager™. See the Trailer Operation section for information on accessing the internal components of the Sign Case.

Display Panel

The Display Panels contain the LEDs and are mounted to the Lens (232) or to a hinged pan (432 & 465) behind the Lens. The LEDs on all of these Display Panels are amber in color. The Display Panels are connected to the CPU in columns with two MTA connectors (232) or one MTA connector (432 & 465) providing power and data to each Panel.

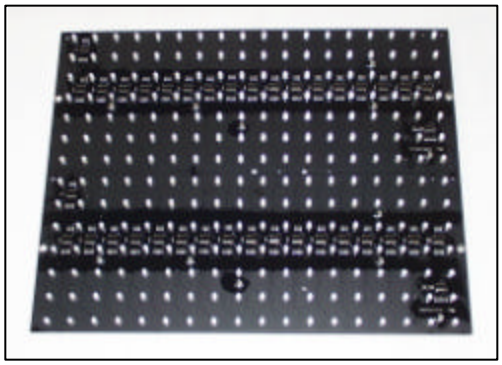


Figure 2-1 232 Display Panel (PNL-318-x)

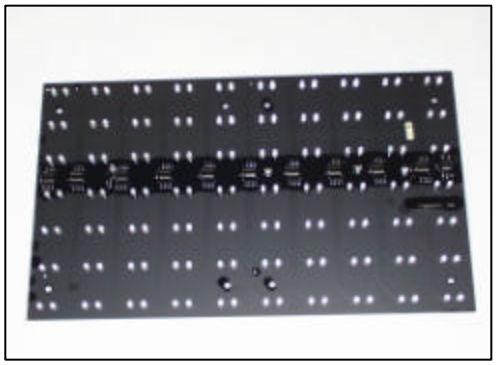


Figure 2-2 432 Display Panel (PNL-307-x)

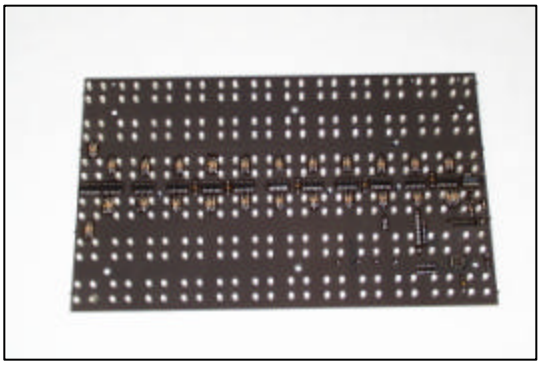


Figure 2-3 465 Display Panel (PNL-342-x)

Central Processing Unit

The CPU is the "brain" of the VMS and is located on the back panel (232) or on the backside of the hinged pan (432 & 465). The CPU provides power & data to the Display Panels, monitors Solar and Battery charging and is connected to the Hand Held Terminal through the Umbilical.

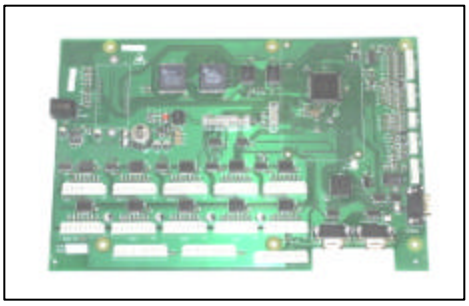


Figure 2-4 CPU (PCB-085-x)

Power Manager™ (465 only)

The Power Manager™ acts as a solar regulator and power supply as well as provides power connections for the CPU and other optional equipment.

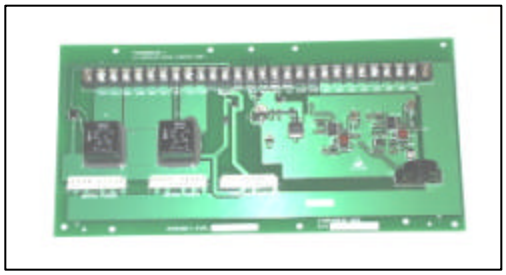


Figure 2-5 Power Manager™ (PCB-290-x)

Power Supply

The Power Supplies are also located on the back panel (232) or on the backside of the hinged pan (432). These Power Supplies convert the 12VDC from the Batteries to 3.3 VDC (232) or 6.0 VDC (432) for the Display Panels. The 465 Display Panel operates at 12VDC and does not require an additional Power Supply.

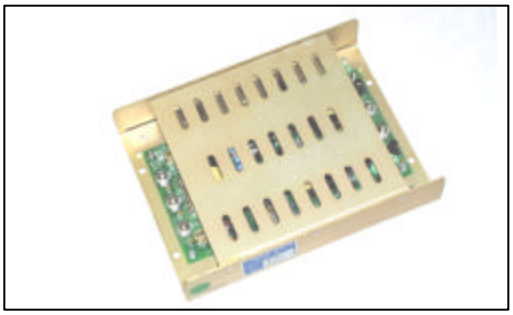


Figure 2-6 3.3 VDC Power Supply (POW-330) or 6.0 VDC Power Supply (POW-405)

Photosensor Board

The Photosensor Board is mounted on the Lens (232), on the Sign Case lower extrusion (432) or on the Sign Case hinged pan (465). The Photosenor is the device that measures the amount of ambient light that is present at the VMS. This value is correlated to a brightness level in the DIM Table and allows control of the LEDs to be brighter or dimmer as current conditions require.

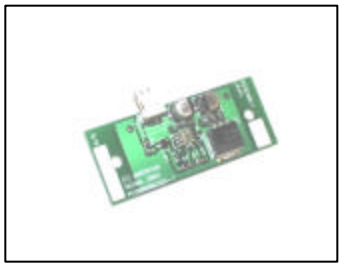


Figure 2-7 Photosensor Board (PCB-265-x)

Lens

The Lens is a UV-protected clear polycarbonate with black silk-screening (232/432) or matte finished (465) to provide contrast, to reduce glare and to protect the LEDs.

2.2 Hydraulic Pump and Cylinder

The Hydraulic Pump & Cylinder provide the lifting mechanism to raise (for operating) and lower (for travel and storage) the Sign Case.

Hydraulic Pump

The Hydraulic Pump is a 12VDC pump and hydraulic reservoir that provides the hydraulic pressure to the Cylinder to raise and lower the Sign Case Assembly. The Pump is mounted in the Battery Box and the "Up-Down" toggle Switch that controls it is located in the Pedestal Assembly Dash Panel. In the event that the Hydraulic Pump malfunctions, it can be manually operated to raise and lower the Sign Case. See Trailer Operation and Specifications section for more information on the Hydraulic Pump.

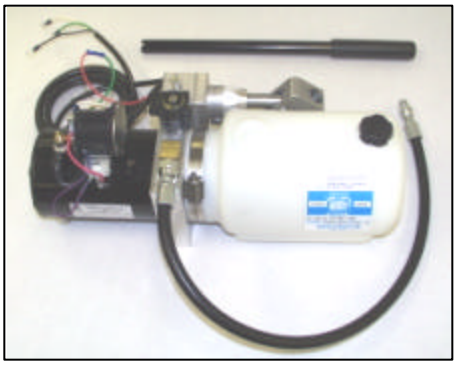


Figure 2-8 Hydraulic Pump (HYD-160)

Cylinder

The lifting Cylinder is located inside of the Mast Assembly and is connected to the Pump by a hydraulic hose and fittings assembly. As the Cylinder extends and retracts, the Sign Case is raised and lowered.

2.3 Solar Panel Assembly

The Solar Panels converts sunlight into electrical power (12VDC) to maintain the charge state of the Batteries. This re-charging of the Batteries allows the VMS to operate over a longer period of time before requiring landline (or generator) 120V charging. The standard Solar Rack Assembly consists of one 80W (232) or two 80W (432 & 465) Solar Panels. See Specifications section for more information on the Solar Panel.

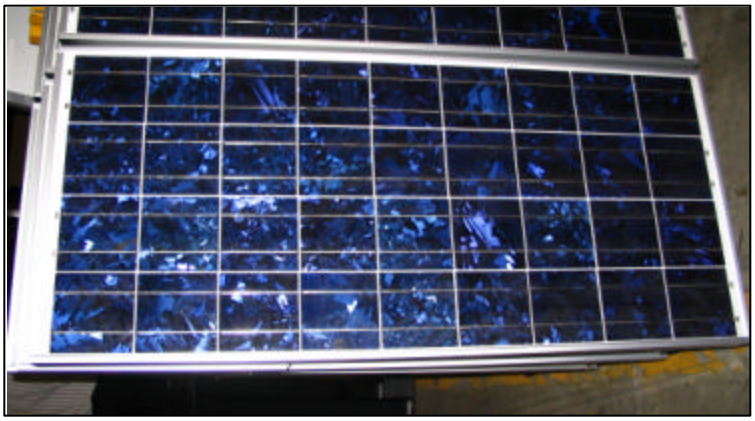


Figure 2-9 Solar Panel (CEL-120)

2.4 Pedestal Assembly

The Pedestal Assembly is located on the Trailer frame in front of the Battery Box. It is a double-flange Nema 4 style enclosure that is pad lockable and contains the following major components:

Hand-held Terminal

The Hand-held Terminal is the device that allows local control of the VMS and is stored at the bottom of the Pedestal Assembly. The Hand-held Terminal features a keypad and a backlit LCD display for superior visibility. The Hand-held Terminal is intended to be portable and is used by releasing the Velcro straps that hold it in its cradle. The Terminal cable is long enough to allow movement of the operator around the Trailer unit. The Terminal can also be totally removed from the Pedestal Assembly and stowed in a separate, more secure area. If the Terminal is disconnected, the VMS will continue to operate as previously programmed. The Terminal is removed by unscrewing the CPC connector at the rear of the Terminal.

Figure 2-10 Hand-held Terminal (TER-105)

Dash Panel

The Dash Panel contains the Main Power/Sign Display "On-Off" switch, the "Up-Down" toggle switch and Battery Ammeter. The 465 also contains an "On-Blank" switch that provides a means of overriding the current message to display no message (blank) without requiring "password" entry into the sign control menu functions. This "blank" mode does not interrupt the solar charging of the Batteries. When the optional Radar is present, an additional "On-Off" switch and fuse are also located on the Dash Panel.

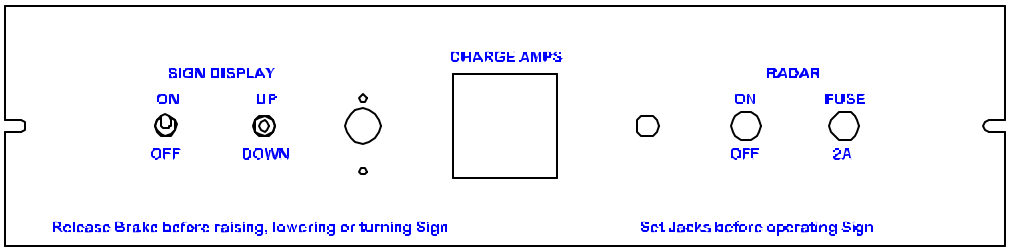


Figure 2-11 Dash Panel – 232 & 432

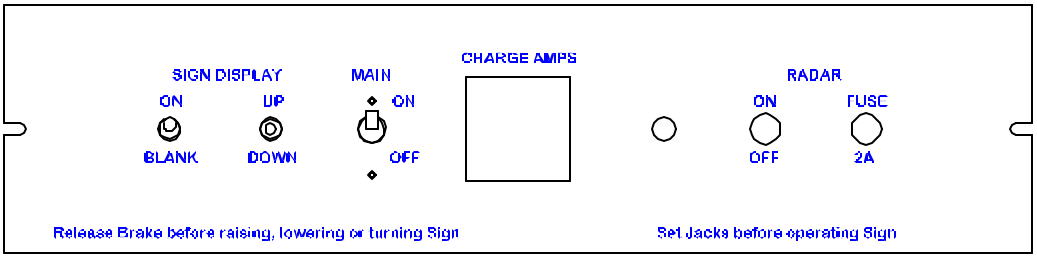


Figure 2-12 Dash Panel - 465

Charger

A 55amp Charger unit is provided that converts landline 120VAC to 12VDC for charging of the Batteries. The Charger is located internally on the left side of the Pedestal Assembly while the covered receptacle for the 120VAC extension cord is accessed from the outside the Pedestal Assembly on the right side. Detailed information on the Charger is found in the Specifications section.

Figure 2-13 55A Charger (CHG-150)

Solar Regulator

The Solar Regulator is mounted to the back panel in the Pedestal Assembly and controls the flow of electricity from the Solar Panels to the Batteries (232 & 432). On the 465, solar regulation is handled by the Power Manager™ (located in the Sign Case Assembly). Detailed information on the Solar Regulator is found in the Specifications section.

Figure 2-14 Solar Regulator (CEL-045)

Courtesy Light
A light bulb is located behind the Dash Panel and shines downward to provide additional light to the Pedestal and Hand-held Terminal. A door switch turns the light off when the Pedestal door is closed.

Umbilical Assembly
An Umbilical Assembly connects the Sign Case and Pedestal Assembly. This Umbilical contains data and power wires and is comprised of watertight, vandal-resistant tubing.

2.5 Batteries and Fuse

Batteries
The Advantage series Trailers are populated with eight (8) 6V Batteries wired to provide 12VDC to the sign. The Batteries are located in the Battery Box compartment. Detailed information on the Battery is found in the Trailer Operation section, Maintenance section and Specifications section.

Figure 2-15 6V Battery (BAT-140)

Fuse
A 90amp Fuse is mounted in the Battery Box to provide protection to the electrical system.

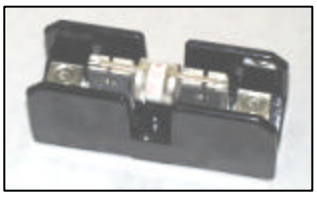


Figure 2-16 90A Fuse (FUS-325) & Fuse Holder (FUS-315)

2.6 Tires & Axle

Tires
The Tires are 13" 6 ply tires and mount to the axle hub with 5 lugs on 4-1/2" centers. They are load rated for 1360 lbs each.

Axle
The Axle is 2000 lb. rated straight idler with 64" hub face distance and 5 lugs on 4-1/2" centers. The suspension is double eye 1200 lb. leaf springs with 53" centers.

2.7 Tongue Assembly

The Tongue Assembly is a removable Tongue that allows the Trailer to be towed by other vehicles. A 2" twist knob Ball Hitch that is rated for 5,000 lbs and is pinned to a 3" square tube is provided as standard. See Trailer Operation section for more information on the Tongue Assembly and see the Specification section for more information on the Hitch.

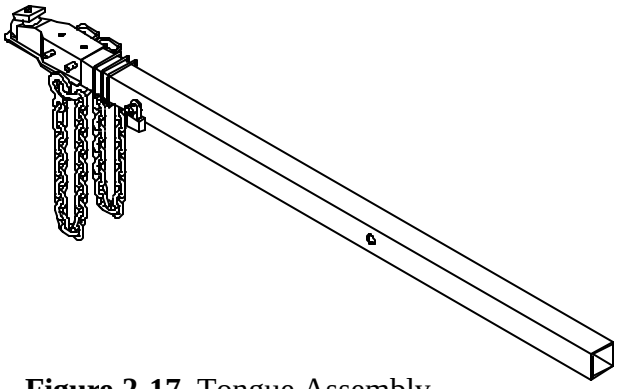


Figure 2-17 Tongue Assembly

2.8 Leveling Jacks

The Leveling Jacks are located at the four corners of the Trailer and are top wind, swivel-mounted Jacks used to level and stabilize the VMS. The Jacks are rated for 2000 lbs each and have a travel range of 15". See Trailer Operation section and Specification section for more information on the Leveling Jacks.

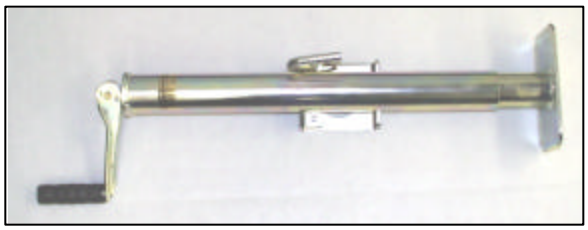


Figure 2-18 Leveling Jack (JAC-085)

2.9 Advantage Trailer Options

The following is a brief description of the options available with the Advantage Trailers. More complete and detailed information for some options is contained in other literature.

2.9.1 Solar Option

The AimStar® Solar Panel Assembly contains two 123W Solar Panels that can be oriented and angled independent of the Sign Case. By pointing the Solar Panels more toward the path of the sun, they can generate additional power during available daylight hours for recharging of the Batteries. The AimStar® option replaces the existing flat Solar Panel Assembly.

2.9.2 Radar Options

The optional Radar unit is a Kustom Directional Radar Unit (DRU) that can measure oncoming traffic data (speed). This speed can also be dynamically displayed on the VMS to inform motorist of their rate of travel. The Radar is mounted under the Sign Case Assembly and can be provided in a fixed or swivel configuration.

2.9.3 Communication Options

The Advantage Series VMS can be remotely controlled and operated through a cell phone/modem connection from a personal computer. Digital and Analog options are available depending on the location and the equipment is mounted in the Sign Case Assembly.

2.9.4 Hitch Options

The standard 2" Ball Hitch can be replaced or used in conjunction with by a 2.5" or 3.0" Lunette Eye. An adjustable bolt-on mounting configuration can also be provided.

2.9.5 Tire Options

A spare tire and mount can be bolted to the Trailer. An extra tongue-mounted Jack can also be added to the Trailer.

2.9.6 Security Options

A Wheel Lock Bar & Padlock can be provided to give added security to the VMS. By sliding the Wheel Lock Bar through both Tire rims and padlocked in place, unauthorized movement of the Trailer and/or removal of the Tires is prevented. During travel, the Wheel Lock Bar is stored and secured inside of the Tongue tube under the Trailer. Another security option is the Locking Lug Nuts that stop theft of the tires.

3.0 Advantage Trailer Operation

3.1 Raise & Lower Sign Case (Hydraulically)

To Raise Sign Case:

Under normal operating conditions, the Sign Case is raised and lowered via the Hydraulic Pump and Cylinder mechanism. To raise the Sign Case, perform the following steps:

- Loosen the Brake Band on the Mast Assembly with the provided closed-end ratchet (located in the bottom of the Dash Panel Assembly). Failure to loosen the Brake Band before attempting to raise the VMS may cause damage to the unit.
- Toggle the "Up-Down" switch on the Dash Panel in Pedestal Assembly to the upper position. The operator can place a hand on the Sign Case as it is raised to avoid unwanted rotational movement.

Figure 3-1 Brake Band

- When the Cylinder has reached its maximum extension, the Sign Case will stop (with an audible thump). Slide the Safety Pin, chained to the outer Mast, through the two holes in the inner Mast. It may be necessary to stand on the Trailer frame to reach the Safety Pin and inner Mast holes. The Safety Pin will stop the Sign Case from failing in the event of Cylinder malfunction or loss of hydraulic pressure.

Figure 3-2 Safety Pin

- Once the Safety Pin is in place, the Sign Case should be lowered to rest on the Pin. The Sign Case is free to rotate more than 360 degrees and can now be aimed in the desired direction.
- After the VMS is oriented correctly, use the ratchet to tighten the Brake Band thereby preventing the Sign Case from rotating.

To Lower Sign Case:

- Use the ratchet to loosen the Brake Band.
- Toggle the "Up-Down" switch on the Dash Panel to the upper position to lift the Sign Case off of the Safety Pin.

- Remove Safety Pin from inner Mast and replace in hole in outer Mast bracket.
- Rotate the VMS so as to orientate the Sign face to the side of the Trailer and away from the Pedestal Assembly.
- Toggle the "Up-Down" switch on the Dash Panel to the lower position to begin lowering the Sign Case. It will be necessary to place a hand on the Sign Case as it is lowered to avoid unwanted rotational movement. It is important that the Sign Case be guided downward so as to not be lowered onto the Trailer Pedestal Assembly (damage) or other personnel (serious injury or death).
- Continue guiding the Sign Case down until it rests on the cradle rubber strip on the Battery Box (travel position).
- After the VMS is oriented correctly on the Battery Box, use the ratchet to tighten the Brake Band thereby preventing the Sign Case from rotating. The Sign Case must be in the cradle and the Brake Band must be tightened prior to towing the trailer.

Figure 3-3 Sign Case Cradle

3.2 Raise & Lower Sign Case (Manually)

In the event that the Hydraulic Pump malfunctions, it can be manually operated to raise and lower the Sign Case. To manually raise or lower the Sign, follow all of the steps involved in hydraulically moving it up and down, except instead of operating the "Up-Down" toggle Switch, do the following:

<u>To Manually Raise Sign Case:</u>

- Open the split lid on the Battery Box (the side that does not have the Sign Case cradle)
- Insert the Pump handle (mounted in Battery Box next to Pump) into the manifold on the side of the Pump.
- Push the Pump handle back & forth to force hydraulic fluid into the Cylinder, thereby raising the Sign

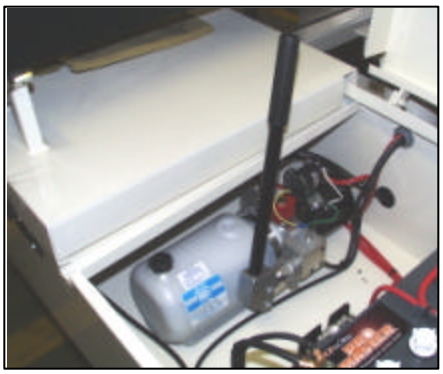


Figure 3-4 Manual Pump Operation

<u>To Manually Lower Sign Case:</u>

- Open the split lid on the Battery Box (the side that does not have the Sign Case cradle)
- Place notch in end of Pump handle over T-handle valve on top of Pump.
- Rotate the Pump handle to release hydraulic pressure in the Cylinder and lower the Sign.

3.3 Open the Sign Case

Open the 232 Sign Case

- If the Sign Case is lowered, it must first be raised slightly (1”-2”) above the cradle to allow opening of the Door.
- Loosen captive socket head cap screws at bottom of Door.
- Lift open Door and use Prop Rod on the right side of inside Sign Case to prop Door Assembly open. Put tube end of Prop Rod onto bent rod in Sign Case. Place the other end of Prop Rod with straight pin into hole in side of Door Frame.

Open the 432 & 465 Sign Case

- If the Sign Case is lowered, it must first be raised slightly (1”-2”) above the cradle to allow opening of the Door.
- Loosen captive socket head cap screws at bottom of Door.
- Lift open Door and use Prop Rod on left or right side of inside Sign Case to prop Door Assembly open. Put tube end of Prop Rod onto bent rod in Sign Case. Place the other end of Prop Rod with straight pin into hole in side of Door Frame.
- Remove two screws and washers on lower left and lower right of hinged pan.
- Lift open hinged pan and use remaining Prop Rod to prop hinged pan with Display Panels open. Put tube end of Prop Rod onto bent rod in Sign Case. Place the other end of Prop Rod with straight pin into hole in hinged pan bar at bottom of hinged pan.

3.4 Charge the Batteries

The Solar power supply system furnished with the Advantage Series VMS includes multiple deep-cycle 6V Batteries which are uniquely able to withstand the deep discharges that occur periodically during normal operation. The system has been designed to provide sign operation over all of the usable state of charge level of the Batteries.

Depending upon several factors (i.e. length & duration of message displayed, the brightness level, the number of Solar Panels, the amount of available sunlight, the number of Batteries, the age of the Batteries and the ambient temperature), voltage level of the Battery pack can eventually drop below 11.2VDC (Default) and the VMS will stop operating. At that time (or sooner if desired), it will be necessary to recharge the Batteries with 120VAC (from a landline or generator). An abbreviated summary of steps to charge the Batteries with the provided 55A Charger are shown below:

- Turn the VMS system off at Main Power or Sign Display Switch. (Note: The system can be left on during charging, however, it will require more time to fully recharge the Batteries.)
- Bring 120VAC to Trailer and plug into covered Receptacle on right side of Pedestal Assembly

- For fully discharged Batteries, charge for a minimum of 72 hours. Batteries in a higher state of initial charge can be charged for less than 72 hours.
- When Batteries are fully charged, unplug 120VAC power source from Pedestal. Batteries are fully charged when the Specific Gravity with a temperature compensated hydrometer is 1.25 ±.010.

In dealing with Batteries, great care should be taken during their handling, charging and maintenance. More detailed information on aspects of and precautions for charging Batteries is provided in the Maintenance section and Specification section.

3.5 Stow/Remove Tongue Assembly or Remove Hitch

Stow the Tongue Assembly

The Tongue Assembly can be retracted and stowed to reduce the area needed to store the Trailer. To stow the Tongue Assembly:

- Unlock Padlock through Pin located in center tube of Trailer frame.
- Remove Pin from hole in center tube.
- Push Tongue Assembly back until forward hole in Tongue lines up with hole in center tube of Trailer frame.
- Reinsert Pin thorough mating holes and lock Padlock through hole in Pin

Remove the Tongue Assembly

The Tongue Assembly can also be removed to prevent theft of the Trailer. To remove the Tongue Assembly:

- Unlock Padlock through Pin located in center tube of Trailer frame.
- Remove Pin from hole in center tube.
- Unplug Trailer Lights wiring connection.
- Pull Tongue Assembly forward until Tongue comes completely out of center tube of Trailer frame.
- Reinsert Pin thorough mating holes and lock Padlock through hole in Pin.

Remove the Hitch

Instead of removing the entire Tongue Assembly, the Hitch can be removed individually to inhibit theft of the Trailer. Due to size and weight considerations, removal of the Hitch is sometimes a more appropriate method of preventing theft. To remove the Hitch:

- Remove cotter pins (2x) from Hitch Pins (2x).
- Slide Hitch Pins out of Hitch.
- Remove the Hitch from Tongue tube.

3.6 Level Trailer

Operating Position

To level the Advantage Trailer, pull the spring-loaded lock pin and rotate Jacks to the down position. Crank the handle at the top of each Jack to extend the support leg and foot down to the ground/pavement. Adjust extension of four Jacks as needed to level the Trailer.

Travel Position

Before moving the Trailer, secure the Tongue Hitch to the towing vehicle. Crank the handle at the top of each Jack to fully retract the support leg and foot. Pull the spring-loaded lock pin and rotate the four (4) Jacks to the horizontal position. In order to keep the horizontal Jacks within the footprint of the Trailer, rotate each Jack with the foot facing outward and the top crank handle pointing inward. Ensure that the lock pin snaps into position when the Jack is horizontal.

4.0 Advantage System Maintenance

4.1 Sign Case Assembly Maintenance

Display Panel Maintenance (232)
The Display Panels do not need maintenance, however if an LED is not operating, the Panels can be removed and replaced. To remove a Display Panel:

- Open the Sign Case Door (see Trailer Operation section).
- Remove the two MTA data/power connectors from the rear of the Panel and unscrew the nylon wing nuts holding the Panels to the Lens.

*** * * CAUTION * * ***
DO NOT disconnect or reconnect Display Panels with sign display power ON.

- When removing Display Panel(s), it may require the removal of more than just that Panel to be serviced since they are layered together when assembled at the factory.

Display Panel Maintenance (432 & 465)
The Display Panels do not need maintenance, however if an LED is not operating, the Panels can be removed and replaced. To remove a Display Panel:

- Open the Sign Case Door and hinged pan (see Trailer Operation section).
- Remove the MTA data/power connector from the rear of the Panel and lower the hinged pan back to the closed position.

*** * * CAUTION * * ***
DO NOT disconnect or reconnect Display Panels with sign display power ON.

- Remove black screws holding the Display Panel to the hinged pan.

Lens Maintenance
In order to provide maximum visibility and clarity, the Lens should be cleaned periodically. It is recommended that the lens be cleaned with a mild soap and water solution, using a soft cloth so as not to scratch the silk-screening (232 & 432).

If the Len is damaged (cracked or severely scratched) or visibility is impaired, it can be removed and replaced. To remove the Lens, open the Sign Case Door and prop open with provided Prop Rod mounted on the inside of the Sign Case. Take out the Lens Retaining Plates on the inside sides and bottom of the Door Frame. Once these Plates are removed, the Lens will drop out of the Door Frame. Replace new Lens with silk-screening (232 & 432) or textured surface (465) facing out.

4.2 Hydraulic Pump Maintenance

In order for the Hydraulic Pump to operate correctly, it requires adequate quantities of hydraulic fluid. The level of fluid in the holding tank on the Pump should be periodically checked and refilled to 1" below the filler opening if low. Also check the hose and fittings for leaking and repair if necessary. See the Specifications section for more information on the Hydraulic Pump.

4.3 Battery Maintenance

During operation (particularly in the summer months), it is necessary to insure that the Battery electrolyte level is properly maintained.

During the winter months, it is necessary to insure that the Battery state of charge remains above the level necessary to prevent the batteries from freezing. When temperatures below freezing are forecast, test the electrolyte levels in the Batteries using a hydrometer. The voltage level alone is not an accurate indicator of electrolyte freezing temperature. A chart in the Specification section shows how to determine electrolyte freezing points at various hydrometer readings. In the event the hydrometer reading shows that the specific gravity of the electrolyte is low enough to allow the Batteries to freeze, it may be necessary to recharge them.

Stratification

Stratification occurs when the Batteries have not moved over a long period of time and the electrolyte fluid in the Battery begins to separate. Stratification results in only the lower parts of the Battery cells doing the work causing reduced Battery capacity and life. The electrolyte stratification that occurs in wet Batteries, standing still at float voltages, can be reduced by inserting the Dual Voltage Plug into the Charger. The Dual Voltage Plug allows for occasional fast charging at 14.2VDC and can cause the Batteries to bubble for a few hours. Be sure to check and maintain the water levels in the batteries before and after the bubbling charge. After the fast charge, remove the Dual Voltage Plug to avoid boiling the batteries dry. See Specification section for more information on Charger.

Stratification does not occur in Batteries which are jostled by frequent moving of the vehicle they are mounted in.

Detailed Sequence of Battery Charging Actions

- Make sure you wear protective clothing and a face shield when doing any kind of maintenance or charging of Battery system.
- Disconnect Battery Cables.
- Wash dirt off the top of the Batteries.
- Measure the specific gravity of all cells and remove those Batteries having more then .050 variation between the cells.

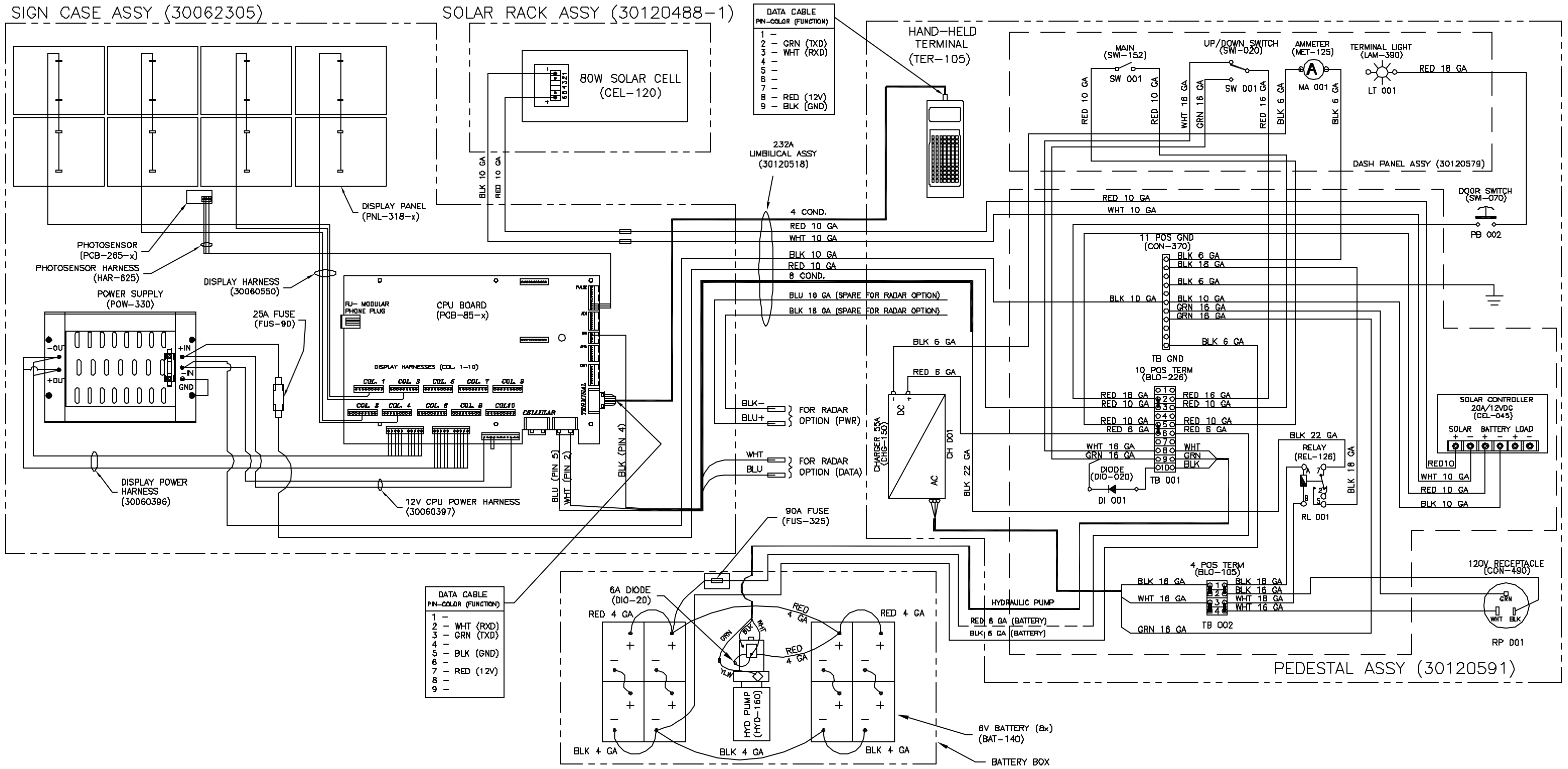
- Reconnect the Battery cables to allow charging of those remaining.
- Be sure that all remaining Battery cells have sufficient electrolyte to cover the plates plus ¼ of an inch. Use only distilled or deionized water.
- Connect 120VAC to the covered Receptacle on right side of Pedestal Assembly.
- Do a "dirty connection" check by using a sensitive DC voltmeter to measure the voltage drop between the battery "Posts" at the ends of each jumper cable of the battery pack. If there is more than 4 millivolts drop from Post to Post, then disconnect the 120VAC from the Receptacle and clean and reconnect the cable connections.
- Reconnect the 120VAC to the Pedestal Receptacle.
- After Batteries become fully charged (specific gravity 1.25 +/- ,010 with a temperature compensated hydrometer), replace those which were rejected with good, fully charged batteries of the **SAME** brand and size as the rest of the pack.

IMPORTANT NOTES:

- ✓ Electrolyte level in the Batteries should be checked before and after each charging in addition to regular, periodic examinations. Replenish electrolyte with either distilled or de-ionized water up to the bottom of the 'fill' vent tube (but no higher). Note: adding water just before taking hydrometer readings will yield erroneous readings.
- ✓ A battery having a lesser or greater charge level than the pack must not be connected to that pack. To do so risks battery explosion.
- ✓ Any sparking as the cables are being connected indicates uneven charging and may ignite an explosion.
- ✓ Charging to specific gravity readings above 1.265 will cause damage to the Battery plates.
- ✓ For proper charging and electrolyte destratification, allow charging, from the 120V line, to continue until the charging voltage drops back from 14.1V+/- to 13.2V+/-. Note that, at the start of charging, the charging voltage may be 13.2V, more or less, but will be rising rather than dropping back.
- ✓ Batteries allowed to be abused by being discharged below the factory 'default' level will require considerable time on the Charger just to bring them up to a condition in which they can begin to accept a charge. Under certain low temperature conditions, excessive discharging can permanently damage the Batteries due to freezing. Charging of damaged Batteries can cause a potentially dangerous condition for personnel and equipment. Therefore, maintain a good charge level in the Batteries during cold weather because lead/acid batteries can freeze and can be ruined if they are sufficiently discharged.
- ✓ Interruptions of the 120VAC supply line may cause the Charger to reset which will lengthen the charging time. It may be necessary to disconnect both AC and DC from the Charger, put a load on the Batteries to burn off any surface charge and then reconnect the Batteries and 120VAC to restart the Charger.
- ✓ 12GA 120VAC inlet cords (min.) should be used with the 75A Chargers.
- ✓ 14GA 120VAC inlet cords (min.) should be used with the 55A Chargers.
- ✓ 120VAC generators used with these Chargers should be rated at 5KW, heavy duty (min.).

5.0 Wiring Diagrams

The following pages contain the system wiring diagrams for the various Advantage Series Trailers.



TITLE: GP-232 ADVANTAGE

ELECTRICAL WIRING DIAGRAM

DRAWN. BY:	DATE:	PAGE	SCALE:
PRP	3/31/03	1 OF 1	NONE

DATE:	REV.	
6-17-04	C	30120591 WAS 30120489, CEL-101 WAS CEL-100, REVISED 30120518, -WIR WAS -ELEC
10-29-04	D	CORRECT HYD. PUMP WIRING & DIO-020 DIRECTION
11-22-04	E	ADD PREWIRE INFO FOR RADAR OPTION
02/07/06	F	REPLACED CEL-101 WITH CEL-120

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DWG. NO. 30062800-WIR REV. F

ITEM #	PART #	DESCRIPTION	QTY

SOLAR RACK ASSEMBLY (30120508-1)

80W SOLAR CELL (CEL-120)

80W SOLAR CELL (CEL-120)

BLK 10 GA

RED 10 GA

DATA CABLE

PIN-COLOR (FUNCTION)
1 –
2 – GRN (TXD)
3 – WHT (RXD)
4 –
5 –
6 –
7 –
8 – RED (12V)
9 – BLK (GND)

HAND-HELD TERMINAL (TER-105)

COL. 5 COL. 4 COL. 3 COL. 2 COL. 1

DISPLAY PANEL (PNL-307-x)

PHOTOSENSOR HARNESS (HAR-265)

DISPLAY HARNESS (AMS30080358)

PHOTOSENSOR (PCB-265-x)

RJ- MODULAR PHONE PLUG

CPU BOARD (PCB-85-x)

DISPLAY HARNESSES (COL. 1-10)

COL. 1 COL. 3 COL. 5 COL. 7 COL. 9

COL. 2 COL. 4 COL. 6 COL. 8 COL.10

CELLULAR

TERMINAL

BLU (PIN 5)

WHT (PIN 2)

BLK/PIN4

PWR HARNESS AMS30060396

FUSE, 2A (FUS-020)

PWR HARNESS AMS30080387

-DUT +DUT +IN -IN GND

RED/10

BLK/10

POWER SUPPLY (POW-405)

BLK/16

RED/16

RED/18

RED/16

(BLU-226)

WHT/10

RED/10

BLK/10

RED/10

WHT

BLU

FOR RADAR OPTION (DATA)

4 COND.

RED 10 GA

WHT 10 GA

BLK 10 GA

RED 10 GA

8 COND.

BLU 16 GA (SPARE FOR RADAR OPTION)

BLK 18 GA (SPARE FOR RADAR OPTION)

432-A UMBILICAL ASSY (30120517)

BLK-

BLU+

FOR RADAR OPTION (PWR)

BLK 6 GA

RED 6 GA

DC

AC

CHARGER 55A (CHG-150)

CH 001

BLK 22 GA

MAIN (SWI-152)

SW 001

RED 10 GA

RED 10 GA

UP/DOWN SWITCH (SWI-020)

SW 001

WHT 16 GA

GRN 16 GA

RED 18 GA

BLK 6 GA

AMMETER (MET-125)

MA 001

BLK 6 GA

TERMINAL LIGHT (LAM-390)

LT 001

RED 18 GA

DASH PANEL ASSY (30120579)

DOOR SWITCH (SWI-070)

PB 002

11 POS GND (CON-370)

BLK 6 GA

BLK 18 GA

BLK 6 GA

BLK 10 GA

BLK 10 GA

GRN 16 GA

GRN 16 GA

BLK 6 GA

TB GND

10 POS TERM (BLO-226)

RED 18 GA

RED 10 GA

RED 18 GA

RED 10 GA

RED 10 GA

RED 6 GA

RED 10 GA

RED 6 GA

WHT 16 GA

GRN 16 GA

WHT

GRN

BLK

DIODE (DIO-020)

DI 001

TB 001

BLK 22 GA

RELAY (REL-128)

RL 001

BLK 18 GA

SOLAR CONTROLLER 20A/12VDC (CEL-045)

SOLAR

BATTERY LOAD

RED10

WHT 10 GA

RED 10 GA

BLK 10 GA

DATA CABLE

PIN-COLOR (FUNCTION)
1 –
2 – WHT (RXD)
3 – GRN (TXD)
4 –
5 – BLK (GND)
6 –
7 – RED (12V)
8 –
9 –

SIGN CASE ASSY (30120494)

80A FUSE (FUS-325)

6A DIODE (DIO-20)

RED 4 GA

RED 4 GA

RED 4 GA

RED 4 GA

GRN

BLK

WHT

YLW

HYD PUMP (HYD-160)

BLK 4 GA

BLK 4 GA

BLK 4 GA

6V BATTERY (8x) (BAT-140)

BATTERY BOX

HYDRAULIC PUMP

RED 6 GA (BATTERY)

BLK 6 GA (BATTERY)

4 POS TERM (BLO-105)

BLK 16 GA

WHT 16 GA

GRN 16 GA

BLK 18 GA

BLK 16 GA

WHT 18 GA

WHT 16 GA

TB 002

120V RECEPTACLE (CON-490)

GRN

WHT

BLK

RP 001

PEDESTAL ASSY (30120593)

OVERALL ASSEMBLY: GP-432 ADVANTAGE

NEXT LEVEL ASSEMBLY:

THIS ASSEMBLY: ELECTRICAL WIRING DIAGRAM

DRAWN. BY: PRP | DATE: 3/24/03 | PAGE 1 OF 1 | SCALE: NONE

DATE:	REV.	
6-17-04	E	30120593 WAS 30120491, CEL-101 WAS CEL-100, REVISED 30120517, -WIR WAS -ELEC
10-29-04	F	CORRECT HYD. PUMP WIRING & DIO-020 DIRECTION
11-22-04	G	ADD PREWIRE INFO FOR RADAR OPTION, DELETE BLO-265 (FOR SOLAR PANEL)
02/07/06	H	REPLACED CEL-101 WITH CEL-120

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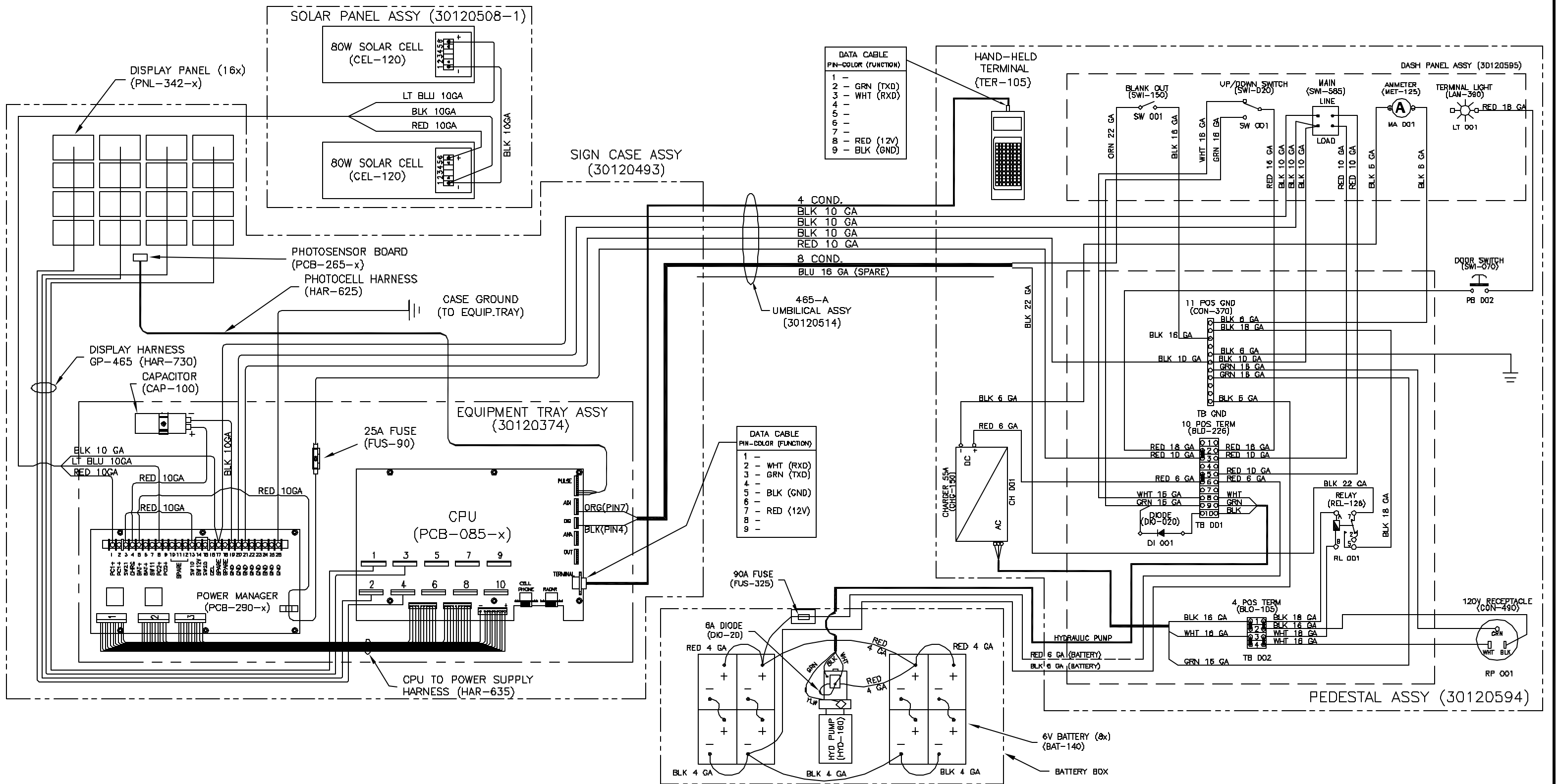
DWG. NO. 30064700-WIR | REV. H



OVERALL ASSEMBLY: GP-465 ADVANTAGE

NEXT LEVEL ASSEMBLY:

THIS ASSEMBLY: ELECTRICAL WIRING DIAGRAM

DRAWN. BY: PRP | DATE: 3/14/03 | PAGE 1 OF 1 | SCALE: NONE

DATE:	REV.	
3-14-03	A,B,C,D	DEVELOPMENT PROTOTYPES PRIOR TO PRODUCTION RELEASE
6-17-04	E	30120594 WAS 30120490, CEL-101 WAS CEL-100. REVISE 30120514, -WIR WAS -ELEC
10-29-04	F	CORRECT HYD. PUMP WIRING & DIO-020 DIRECTION
02/08/06	G	REPLACED CEL-101 WITH CEL-120

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DWG. NO. 30064600-WIR | REV. G

6.0 Mechanical Drawings

The following pages contain the system mechanical component drawings for the various Advantage Series Trailers.

6.1 Model 232 Advantage

Insert Drawing # 30062800

6.2 Model 432 Advantage

Insert Drawing # 30064700

6.3 Model 465 Advantage

Insert Drawing # 30064600

7.0 Spare Parts List

		Advantage Model		
AmSig® P/N	Description	232	432	465
Sign Case Assy:				
PNL00000318-x	Display Panel, 18x14 1 LED/Pixel 30 deg	●		
PNL00000307-x	Display Panel, GP-432 2 LED/Pixel 23 deg		●	
PNL00000342-x	Display Panel, 12x6 4 LED/Pixel 23 deg			●
PCB00000085-x	CPU Board, All LED w/ Cell Pwr Save	●	●	●
POW00000290-x	Power Manager™ Board, All LED			●
POW00000330	Power Supply, 12VDC In 3.3VDC Out	●		
POW00000405	Power Supply, 10.5-16VDC In 6.0VDC Out		●	
PCB00000265-x	Photosensor Board, LED	●	●	●
AMS30060928	Lens, Silkscreened GP-232	●		
AMS30060157	Lens, Silkscreened GP-432		●	
PLA00000310	Polycarb, .236”x44.639”x74.917”			●
Hydraulic Pump and Cylinder:				
HYD00000160	Hydraulic Pump, Combo 12V + Lever	●	●	●
HYD00000275	Cylinder, Hydraulic 1-1/4 Bore 44” Stroke	●	●	●
Solar Panel Assembly:				
CEL00000120	Solar Panel, 80W @17.1V	●	●	●
Pedestal Assembly:				
TER00000105	Terminal, Handheld Keyboard “98”	●	●	●
CHG00000150	Charger, 55A 120V 13.2V to 14.4V	●	●	●
CEL00000045	Regulator, 12V 20A Solar Panel	●	●	
Trailer Assembly:				
BAT00000140	Battery, 6V Deep Cycle 215 Amp-Hrs	●	●	●
FUS00000325	Fuse, Circuit Breaker 90A	●	●	●
WHE00000050	Wheel, Tire B78-13ST 6 Ply 1360#	●	●	●
AXL00000110	Axle, 2000# Straight Idler 64” Hub	●	●	●
AMS30120478	Tongue Assembly, x32 Advantage	●	●	●
HIT00000050	Hitch, 2” Ball Socket Twist Knob	●	●	●
JAC00000085	Jack, 2000# Top Wind Swivel Mount 15”	●	●	●
LAM00000020	Lamp, Tail Left Side	●	●	●
LAM00000030	Lamp, Tail Right Side	●	●	●
Miscellaneous:				
WRE00000010	Wrench, Box Racthet 5/8” x 11/16”	●	●	●
BIT00000190	Bit, Torx ¼” Pin-In-Head Screw	●	●	●

NOTE: P/Ns with revisions are denoted with an “-x” suffix. Call factory for applicable (or current) revision level.

8.0 Specification Section

The following pages contain vendor specifications of products utilized in the Advantage Series VMS Trailers.