OPERATOR'S AND PARTS MANUAL

ECLIPSE

2220/SE SERIES
FLASHING ARROWBOARD

ALLMAND BROS. INC
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ECLIPSE 2220/SE

For Parts and Updates visit Allmand on the Web at www.allmand.com

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ALLMAND ECLIPSE 2220/SE SERIES SOLAR ASSIST ARROWBOARD DESCRIPTION AND FEATURES

The **ALLMAND ECLIPSE 2220/SE SERIES** solar assist arrowboard uses two, three or four 12V DC 8D deep cycle batteries, providing a nominal 12V DC to the operating system. The battery enclosure is lockable, ventilated and designed to protect the batteries from theft or vandalism. The location of the enclosure allows for easy maintenance or replacement of the battery bank. An electronic control system protects the batteries from overcharging and gassing. The Low Voltage Disconnect (LVD) system protects the battery from excessive discharge which can result in premature battery failure.

Solar charging is accomplished by a 50w, 75w, or 100w class 12V DC single crystalline photovoltaic array located above the sign panel. This provides maximum exposure of the array to the sun. The array location minimizes vandalism or theft. The array constantly charges the batteries when exposed to the sun. An optional **ALLMAND ECLIPSE** battery charger, specifically designed for this unit, allows the batteries to be recharged using standard 115V AC line current.

The **ALLMAND ECLIPSE 2220/SE SERIES** features the Allmand Eclipse LED Lamp consisting of individual ORANGE/AMBER LEDs per lamp. Each LED is situated on a printed circuit board behind an individual Fresnel lens element. If an individual LED burns out, the entire lamp does not go out. This results in greater safety as the sign will still show a complete display even if several individual LEDs in a number of lamps are not functioning. The LED lamp easily interchanges with halogen lamps, allowing older halogen equipped boards to be re-fitted with LED lamps. It is not recommended, however, that LED and halogen lamps be mixed in the same board.

The LED lamp has approximately 1/5 of the power requirement of the ALLMAND halogen lamp, resulting in much longer run time between recharges. With the LED lamp, the display is more defined, resulting in greater legibility distances (greater than one mile, **which exceeds MUTCD** requirements). The ALLMAND LED lamp carries a 5-year limited warranty from the manufacturer against defects in materials and workmanship.

Also available is our proven modular PAR-46 high visibility/high efficiency halogen lamp. The lamp life is over three times that of a standard 4412-A lamp . The lamp housing/reflector and Lexan lens provide an extremely durable and damage-resistant assembly. This lamp assembly easily **meets or exceeds the MUTCD** (Section 6E-9) one mile visibility specification.

The **ALLMAND ECLIPSE 2220/SE SERIES** CONTROLLER is mounted directly on the sign panel to minimize electrical connections and exposed wiring. This feature, along with the lockable cover, also makes malicious mischief or vandalism less likely. This unit is a high-reliability solid state component featuring state of the art electronics and engineering. Lamp dimming during night time hours is accomplished via the **ALLMAND ECLIPSE** SUNTRAK system which automatically varies the lamp intensity relative to ambient light levels.

DESCRIPTION AND FEATURES

A low-voltage disconnect (LVD) system protects the batteries from damage if solar conditions fail to adequately maintain a sufficient charge. This system features a red warning lamp which signals low battery voltage and imminent shutdown of the system. This lamp is mounted on the rear of the sign panel and is easily visible from the jobsite or roadway. If battery voltage becomes dangerously low, the sign panel display will revert to a 4-corner warning mode. **At this time maintenance personnel will need to either recharge the batteries or replace them with fully charged units if necessary.**

The trailer consists of a formed 10 GA steel deck with crossmembers and an integral battery compartment with lockable steel cover. Four steel uprights welded to the deck support the sign panel for operation and transportation. A positive mechanical lock secures the sign in both operating and towing positions. The tongue is constructed of 3" tubing and has a heavy-duty combination 3" diameter pintle ring and 2" ball coupler. A folding screw jack is mounted to the tongue immediately behind the pintle eye. Four adjustable corner stands (one at each corner of the trailer) stabilize the trailer when in operation. They are constructed of 1-3/4" Telespar tubing complete with footpads, locking pins, and clips. The trailer rides on a 1500 lb. tube-type leaf spring axle with 5-lug hubs and 13" 4-ply rated tires and wheels. Raising and lowering of the sign panel is accomplished by a ratchet-type hand crank winch and pulley system with safety brake clutch and a single 3/16" braided steel cable that will raise and lower the sign panel evenly. Flush mounted stop, turn, and taillights with a 4-contact male end connector on the cable insures towing safety. Color coding of the wiring is in accordance with SAE practice, (SAE J560A and SAE J895). The trailer is finished in high-visibility Safety Orange paint.

SAFETY AND PRECAUTIONS

A safe environment around the **ALLMAND ECLIPSE 2220/SE SERIES** SOLAR ASSIST AROWBOARD is encouraged. The following recommendations should be noted since the **ALLMAND ECLIPSE 2220/SE SERIES** is typically used in construction areas with greater traffic congestion, thereby increasing the risk of accidents or injuries.

The sign panel should always be in travel position (lowered) and secured using the attached lock pins when towing the **ALLMAND ECLIPSE 2220/SE SERIES** at highway speeds. Make sure that the hitch is properly engaged with the towing vehicle and that the safety chains are properly fastened and all jacks and/or jackstands are raised and secured before towing. Also be certain that the taillights are connected and working properly before towing the unit.

The trailer should be properly set up with the jack stabilizers, sand bags, etc. in position before leaving the **ALLMAND ECLIPSE 2220/SE SERIES** deployed in the traffic control area. Periodically inspect the tongue, pins, safety chains, hitch, all nuts, bolts, cable clamps, wiring, etc. for wear and repair or replace if necessary.

SAFETY NOTE/DISCLAIMER

ALLMAND BROS. INC. has taken precautions to ensure that the **ALLMAND ECLIPSE 2220/SE SERIES** is safe and reliable. **ALLMAND BROS. INC.**, however, is not responsible for any injuries, accidents or other mishaps as a result of the use or misuse of this or any other **ALLMAND** product. It is the user's responsibility to ensure that the manner in which the **ALLMAND ECLIPSE 2220/SE SERIES** is used is consistent with safe practices and the user is to understand that he/she is the only liable party.

SET-UP/OPERATING INSTRUCTIONS

The following is a step-by-step procedure for set-up and operation of the **ALLMAND ECLIPSE 2220/SE SERIES SOLAR ASSIST ARROWBOARD**.

NOTE: Before transporting the trailer to the jobsite, be certain that the batteries are fully charged using the optional **ALLMAND ECLIPSE** charger or any commercially available **minimum 50 amp battery charger** designed to charge a deep-cycle battery bank of this size. Be certain that the battery bank is charged completely, allowing the unit to operate as long as possible before low-voltage shutdown occurs.

1. Block the wheels of the trailer first, then remove the trailer from the towing vehicle.

2. With the sign panel directed toward the traffic, level unit off the tires using the jacks and /or jackstands.

CAUTION: For safe operation and maximum visibility, sight through the eyelets midway up the right frame uprights to align the unit relative to the roadway and the horizon as illustrated on the following page. Observe the operation of the machine from varying vantage points down the roadway to ensure that maximum visibility is maintained throughout the controlled area.
Lift the controller cover and turn mode switch to desired mode. Turn power switch on and determine that the display that has been selected is the desired mode and that it is operating properly.

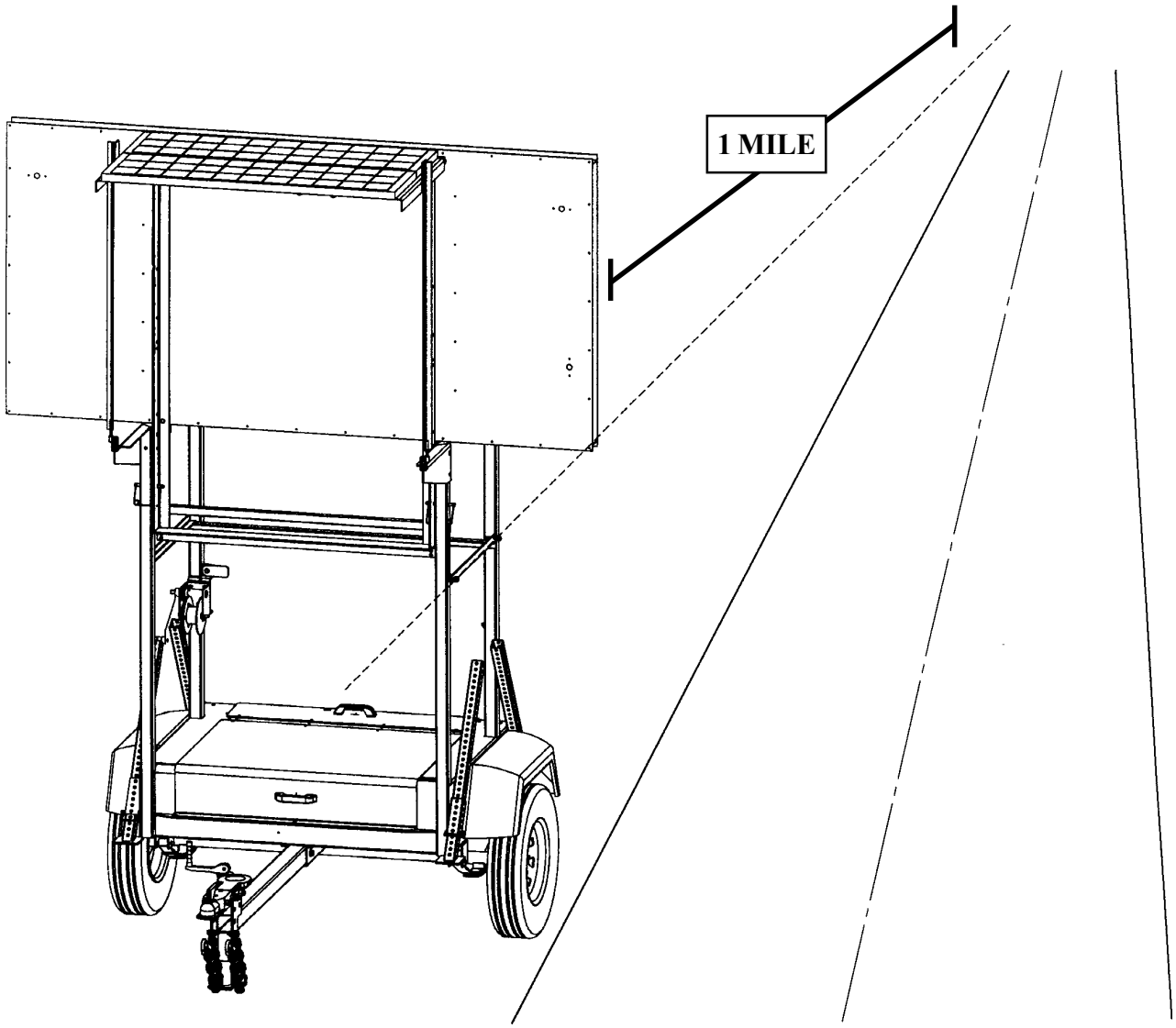
CAUTION: Always check for overhead obstructions before raising sign panel.

3. Remove sign panel spring pins and erect sign panel by cranking braking winch. See **WINCH OPERATING INSTRUCTIONS** on page 8.

4. Insert spring pins into the trailer uprights to stabilize the sign.

5. Ensure that the display is operating correctly and is readable from an adequate distance before leaving the worksite.

TRAILER ALIGNMENT ILLUSTRATION



CAUTION: For safe operation and maximum visibility, sight through the eyelets midway up the right frame uprights to align the unit relative to the roadway and the horizon as illustrated above. Observe the operation of the machine from varying vantage points down the roadway to ensure that maximum visibility is maintained throughout the controlled area.

SAFETY AND WARNING DECALS

ALWAYS REPLACE ANY SAFETY AND INSTRUCTIONS DECALS THAT BECOME DAMAGED, PAINTED OVER, OR OTHERWISE ILLEGIBLE!

Refer to the following representations of the safety warning decals used on the **ALLMAND ECLIPSE 2220/SE Series** trailer to insure correct ordering if replacement becomes necessary.

WINCH OPERATING INSTRUCTIONS

The winch is designed to lift load (“reel in”) when the crank is turned in a clockwise direction. This action will produce a clicking sound. To lock load at any desired position, simply release the hand crank. To lower load (“reel out”), turn the hand crank in a counter-clockwise direction. To lock load in any desired position, turn handle crank clockwise until at least two clicks are heard before releasing handle.

WARNING: Never exceed rated winch load. Excess load may cause premature failure and could result in serious personal injury. This winch is rated at 1200 pounds with one layer of cable on a 2-1/2" hub. Using more layers of cable increases the load on the winch.

CAUTION: Never apply load to winch with cable fully extended. Keep at least three full turns of cable on the reel.

IMPORTANT: Sufficient load must be applied to the cable to overcome internal resistance and operate brake properly. Otherwise, turning the hand crank counter-clockwise will only remove the crank from the shaft as the reel will not turn. Minimum operating load requirement for the DLB-1200 winch is 75 pounds.

NOT FOR MOVEMENT OF HUMAN BEINGS

WINCH LUBRICATION: This winch has been fully lubricated at the factory, but for continued smooth performance and increased life, occasionally grease gears, reel shaft and handle threads. An occasional drop of oil on drive shaft bearings is also recommended.

CAUTION: DO NOT OIL OR GREASE BRAKE MECHANISM

PERIODIC MAINTENANCE

The **ALLMAND ECLIPSE 2220/SE SERIES** SOLAR ASSIST ARROWBOARD has been designed to minimize maintenance. However it will be necessary to inspect or test the following areas on a periodic basis.

ARRAY MAINTENANCE

1. Clean solar panels.

2. Check solar panels and wiring.

3. Check wiring to ensure that there is no damage caused by normal use, wear and tear, road vibration, etc.

BATTERY MAINTENANCE

4. Check water level on each cell of the batteries. Top off when necessary using only distilled water.

5. Check battery condition . Charge when necessary or when not in use.

GENERAL MAINTENANCE

6. Check taillights to ensure proper operation. Also check tongue, safety chains and pins.

7. Check sign panel for proper lamp operation. Replace lamps when needed.

8. Check tires and wheel bearings.

9. Check all nuts and bolts for tightness.

ARRAY MAINTENANCE

Examine the entire array for the following:

Examine the top (photosensitive) surface of each module for cleanliness. Any visible accumulation of dirt can impair energy production and should be removed. Use a soft cloth and either plain water or a solution of mild detergent (such as dishwashing detergent) followed by a rinse with plain water. Do not spray or direct a solid stream of water at the modules. No abrasive material should be used in cleaning the modules. It is very important to note that water can increase the chance of electrical shocks and burning. Care should be taken to use properly insulated tools and rubber gloves when cleaning the modules.

Examine all electrical cabling. Make certain that connections are tight at the module junction boxes, the controller, and the battery bank. Look for any signs of cable breaks and also for damaged or missing insulation. If any worn or damaged wiring appears likely to interfere with proper operation now or later, replace the damaged wire.

The array may be tested by using a voltmeter to check the voltage across the array (+) terminal and array (-) terminal of the sign connector. Expose array to full sunlight. Using a voltmeter, check open circuit voltage across the leads. The meter should indicate a voltage reading of 16-20V DC.

Check all bolts and nuts. Tighten as needed.

BATTERY MAINTENANCE

Check the level of electrolyte in each battery cell. If necessary, add **DISTILLED** water to bring the electrolyte up to the required level. A hydrometer may be used to test the condition of each individual cell or a voltmeter may be used to test the condition of each individual battery.

Examine all battery terminals for signs of corrosion. If any terminal is corroded, disconnect the battery cable. Clean the battery terminal and the connector on the cable with appropriate wire brushes. Reconnect the cable to the battery terminal.

NOTE: Batteries must be recharged periodically using an AC battery charger to avoid over-sulfating plates and impairment of battery performance.

If **ALLMAND ECLIPSE 2220/SE Series** supplied BATTERY CHARGER is not used, a charge current of at least **50 amps** must be provided to sufficiently charge batteries. Use extreme caution when using other than **ALLMAND ECLIPSE 2220/SE Series**charger to observe correct battery polarity and also to avoid over-charging (“boiling”) of batteries.

CAUTION! Any battery is an infinite current source when the battery terminals are momentarily shorted which can lead to serious bodily injury or fire. Goggles and other protective equipment should be worn to shield skin and eyes from battery acid.

TROUBLESHOOTING

The **ALLMAND ECLIPSE 2220/SE SERIES** SOLAR ASSIST ARROWBOARD is a highly reliable and trouble free piece of equipment. However, should a rare problem occur, the following list of trouble-shooting procedures will assist the operator in locating and correcting the source of the problem.

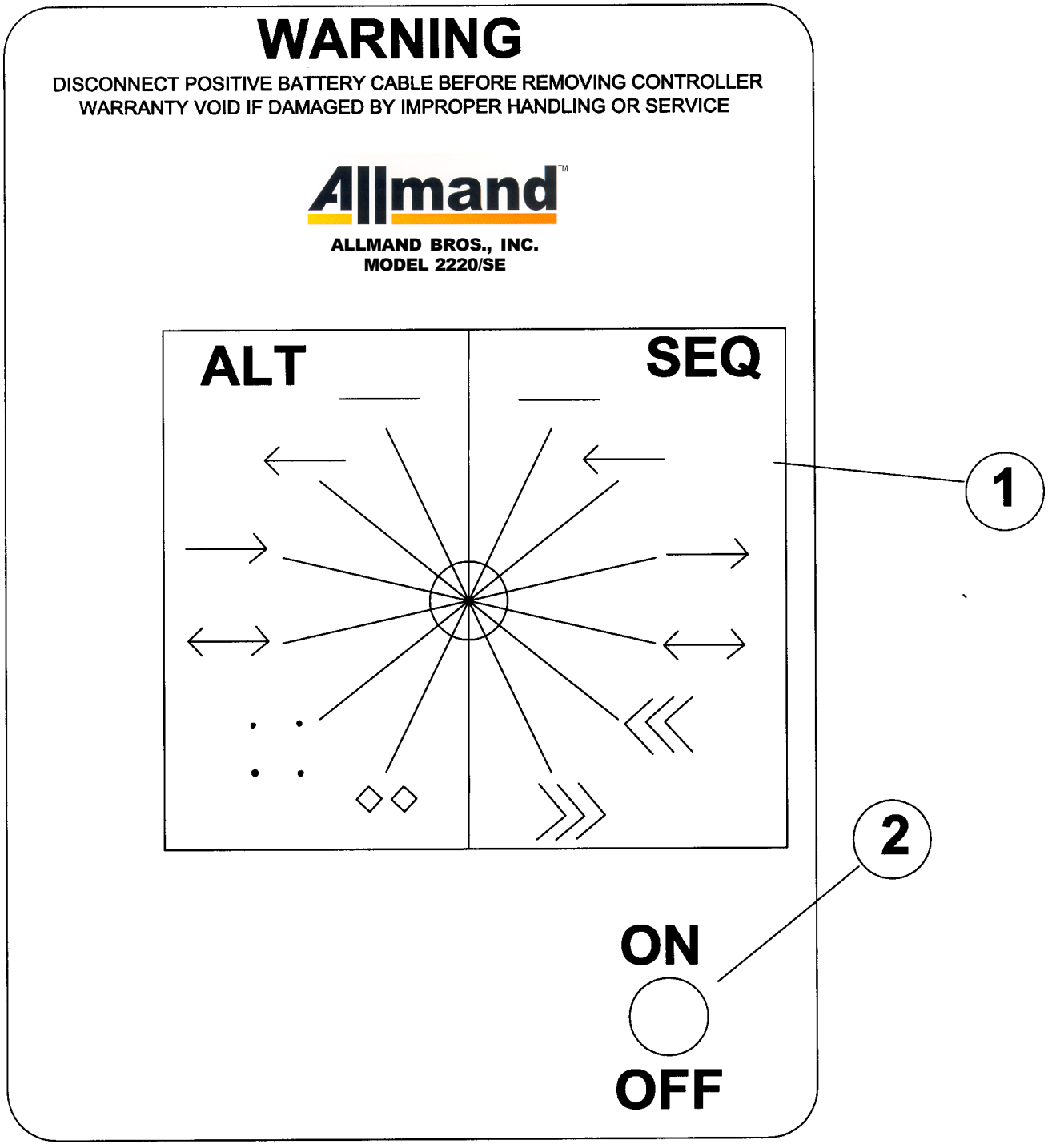
PROBLEM	PROCEDURE
▪ **Display not functioning properly or not functioning at all**.	Check wiring, lamps and connections. Replace lamp elements or controller if necessary Check batteries, re-charge or replace if necessary.
▪ **No power to system.**	Check circuit breakers on controller. Allow to automatically reset if tripped. Check wiring. Replace controller.
▪ **Operational time is less than desired.**	Check battery condition. Charge batteries with heavy-duty AC charger. Use hydrometer to ensure that batteries are fully charged before putting unit into service. (See **BATTERY MAINTENANCE** section). Check solar panels. (See **ARRAY MAINTENANCE** section.)
▪ **LVD lamp illuminated or system shut down.**	Charge batteries using properly sized AC charger until voltmeter or hydrometer indicates batteries are fully charged.
▪ **Batteries will not fully charge.**	Check battery condition**. (**See **BATTERY MAINTENANCE** section**.)** Replace if necessary.

NOTE: If it has been determined that the controller is defective it may be returned freight prepaid to:

ECLIPSE ELECTRONIC REPAIR CENTER
1903 BARRETT DRIVE
TROY, MI 48084
PHONE: (248) 362-0544

Repair (or replacement at our option) and return will be done on a timely basis to minimize downtime. Out-of-warranty units will be repaired on a time and materials basis, usually within two working days of receipt. Be certain to specify the problem and include complete return information (including zip code, phone/FAX numbers, contact person, purchase order number, etc.) with the failed unit.

CONTROLLER ILLUSTRATION



CONTROLLER FEATURES AND OPERATION

1. **MODE SWITCH:** Selects display mode. Rotate switch to select desired display. 15 lamp **ALT** display choices include:

- **LEFT ALTERNATING ARROW**
- **LEFT SEQUENTIAL ARROW**
- **RIGHT ALTERNATING ARROW**
- **RIGHT SEQUENTIAL ARROW**
- **LEFT/RIGHT ALTERNATING ARROW**
- **LEFT/RIGHT SEQUENTIAL ARROW**
- **ALTERNATING CAUTION BAR**
- **4-CORNER WARNING**

The optional 25 lamp **APF** display offers the following display choices in addition to the above:

- **LEFT SEQUENTIAL CHEVRON**
- **RIGHT SEQUENTIAL CHEVRON**
- **DOUBLE DIAMOND WARNING**
- **SEQUENTIAL CAUTION BAR**

2. **ON-OFF SWITCH:** Turns display on or off.

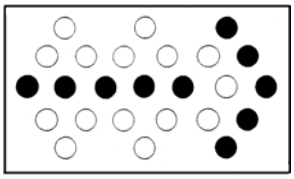
****CIRCUIT BREAKER:** 6 amp auto-reset breaker protects controller from shorts in wiring or lamps.

** **PHOTOCELL:** Located inside bottom frame channel of sign panel directly below controller. **ALLMAND ECLIPSE** SUNTRAK system automatically varies lamp intensity relative to ambient sunlight. Photocell location prevents false brightening of lamps by oncoming vehicle lights.

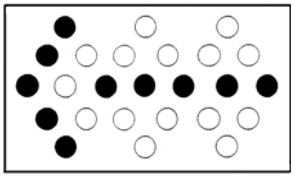
** **LOW VOLTAGE DISCONNECT WARNING LAMP** (**Not Shown**)**:** Located on sign panel directly behind controller, flashes intermittently if battery voltage drops below 11.5 volts. At this time maintenance personnel must take corrective action, as machine shut-down is imminent. See **TROUBLE SHOOTING** and **MAINTENANCE** sections. **(NOTE: Sign panel will default to a 4-corner warning display if battery voltage falls below 10.5 volts.)**

** **POLARITY PROTECTION** (**Not Shown**)**:** Fuse located on P.C. board behind face panel protects against damage to controller from reversed battery polarity.

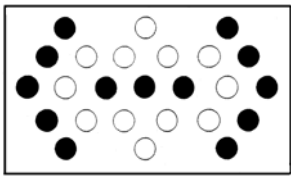
APF FLASHING ARROW DISPLAY SEQUENCES



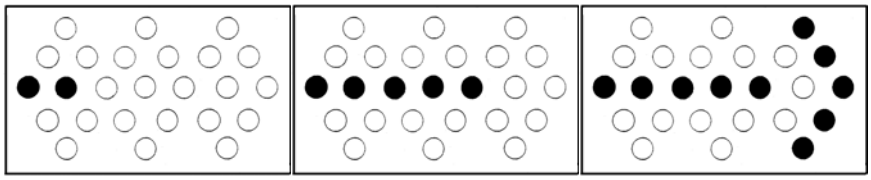
RIGHT FLASHING ARROW



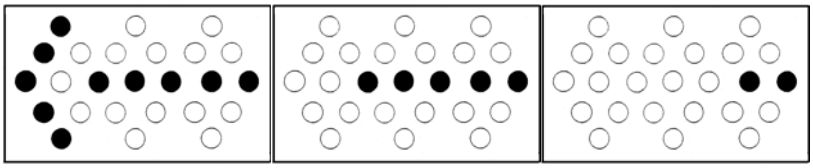
LEFT FLASHING ARROW



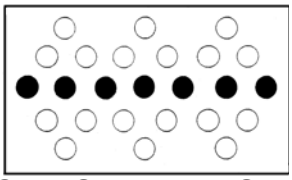
DOUBLE FLASHING ARROW



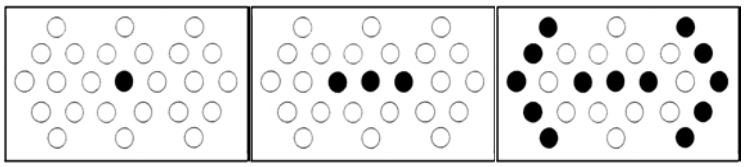
RIGHT SEQUENTIAL ARROW



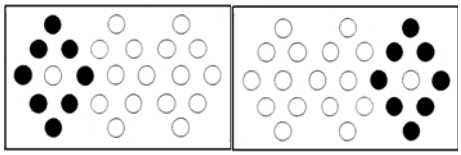
LEFT SEQUENTIAL ARROW



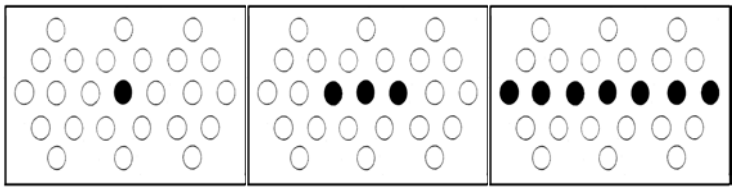
FLASHING WARNING BAR



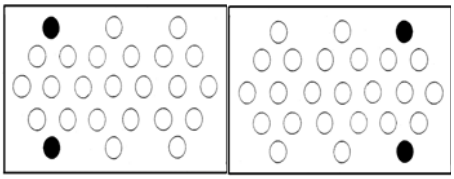
DOUBLE SEQUENTIAL ARROW



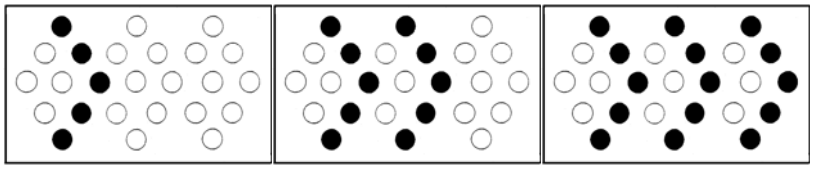
DOUBLE DIAMOND WARNING



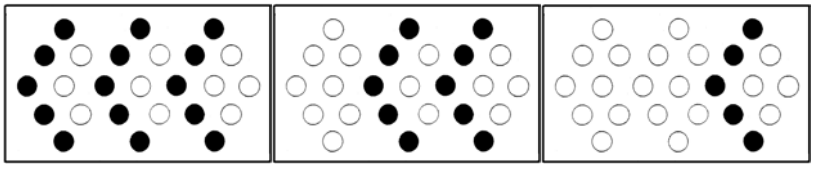
SEQUENTIAL WARNING BAR



4-CORNER WARNING DISPLAY



RIGHT SEQUENTIAL CHEVRON



LEFT SEQUENTIAL CHEVRON

ALLMAND ECLIPSE HALOGEN LAMP DESCRIPTION AND FEATURES

1. **LENS:** Amber Lexan lens provides maximum durability and light transmittal.

2. **HOUSING / REFLECTOR:** Lexan housing provides greater durability than glass lamps. Highly polished reflective surface features a 30° horizontal and 8° vertical beamspread for maximum brightness and off-axis visibility.

3. **LAMP ELEMENT:** 12V DC 5W tungsten-halogen lamp element has three times the life expectancy of a standard 4412A arrowboard replacement lamp.

ALLMAND ECLIPSE LED LAMP DESCRIPTION AND FEATURES

•Each lamp has individual orange/amber LEDs, with each LED situated on a printed circuit board behind an individual Fresnel lens element.

•The orange/amber color of the lamp display is more consistent with the color of the standard lamps used in older diesel boards.

•If an individual LED burns out, the entire lamp does not go out. This results in greater safety as the sign will still show a complete display, even if several individual LEDs in a number of lamps are not functioning.

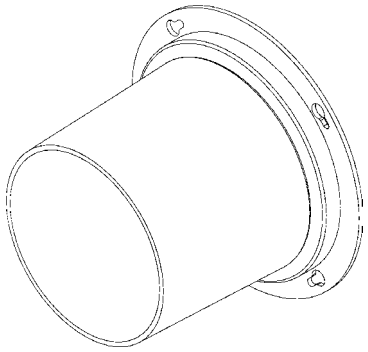
•The LED lamp easily interchanges with halogen lamps, allowing older halogen equipped boards to be re-fitted with LED lamps. (However, it is not recommended that LED and Halogen lamps be mixed in the same board.)

•The LED lamp has approximately 20% of the power requirement of the Eclipse halogen lamp, result ing in much longer run time between recharges.

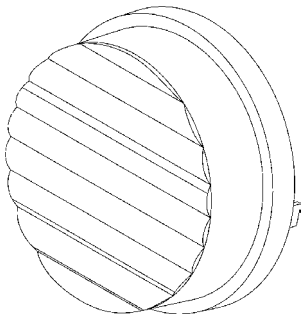
•LED lamp display is more defined, resulting in greater legibility distances (greater than ONE MILE, which exceeds **MUTCD** requirements.)

•The LED lamp carries a 5-year limited warranty from the manufacturer against defects in materials and workmanship.

LAMP VISOR



ALLMAND LED LAMP



ALLMAND ECLIPSE 2220/SE SERIES LED LAMP ASSEMBLY

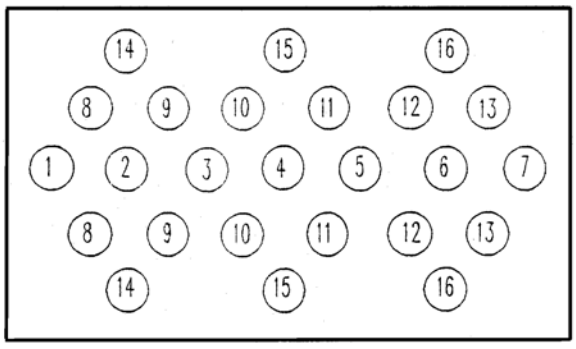
ALLMAND ECLIPSE 2220/SE SERIES ARROWBOARD
SIGN PANEL WIRING DIAGRAM

APF (25-LAMP) SIGN ASSEMBLY

MOLEX CONNECTOR #1			MOLEX CONNECTOR #2		
PIN#	**WIRE COLOR**	**LAMP#**	**PIN#**	**WIRE COLOR**	**LAMP#**
1	BROWN	16	1	YELLOW	4
2	BLACK	9	2	PURPLE	10
3	RED	7	3	GRAY	3
4	YELLOW	12	4	BLUE	8
9	GREEN	6	8	BLACK	**17***
10	BLUE	13	9	GREEN	2
11	GRAY	5	10	BLACK	is
12	PURPLE	11	11	RED	1
			12	BROWN	14

ALT (15-LAMP) SIGN ASSEMBLY

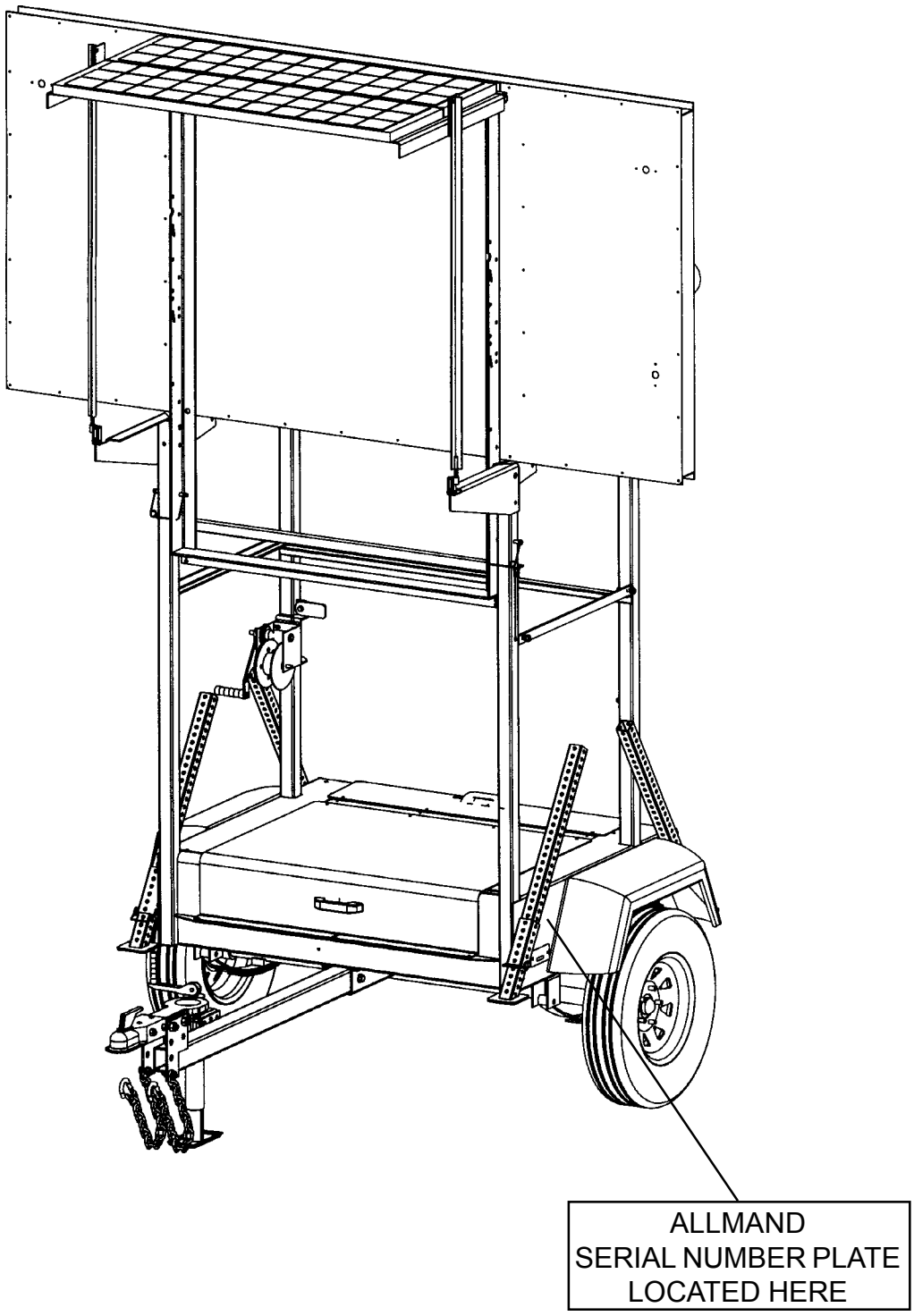
MOLEX CONNECTOR		
PIN#	**WIRE COLOR**	**LAMP #**
1	YELLOW	14
2	GRAY	8
3	BLACK	2
4	RED	3,4
5	PURPLE	1
6	GREEN	5
7	BLUE	6
8	ORANGE	16
9	BROWN	13
10	PINK	7



SIGN PANEL LAMP NUMBERING CHART

(*) NOTE: LAMP #17 IS THE **LOW VOLTAGE WARNING LAMP** located on sign behind controller.

MODEL SERIAL NUMBER PLATE LOCATION



PARTS MANUAL

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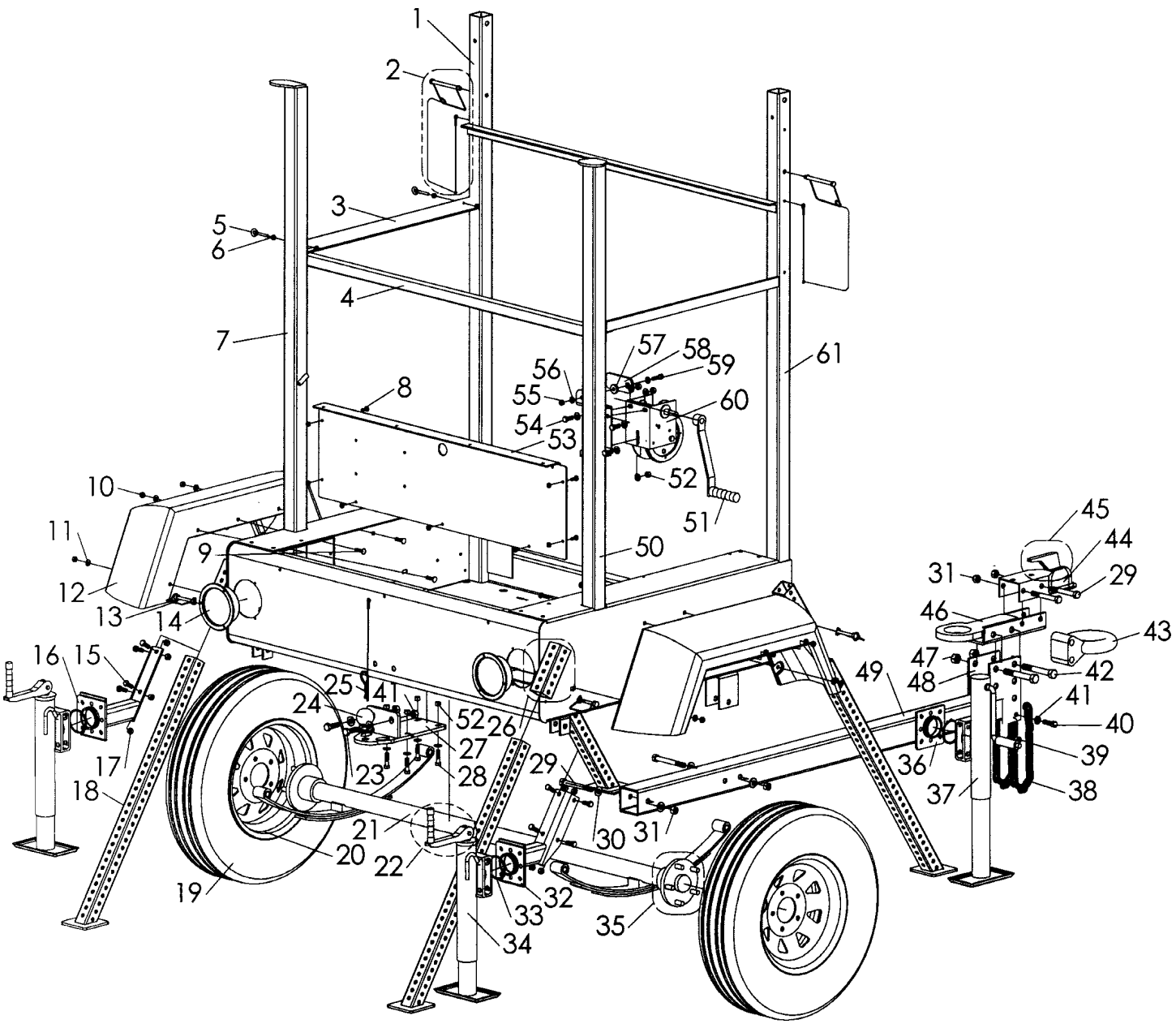
ECLIPSE 2220/SE

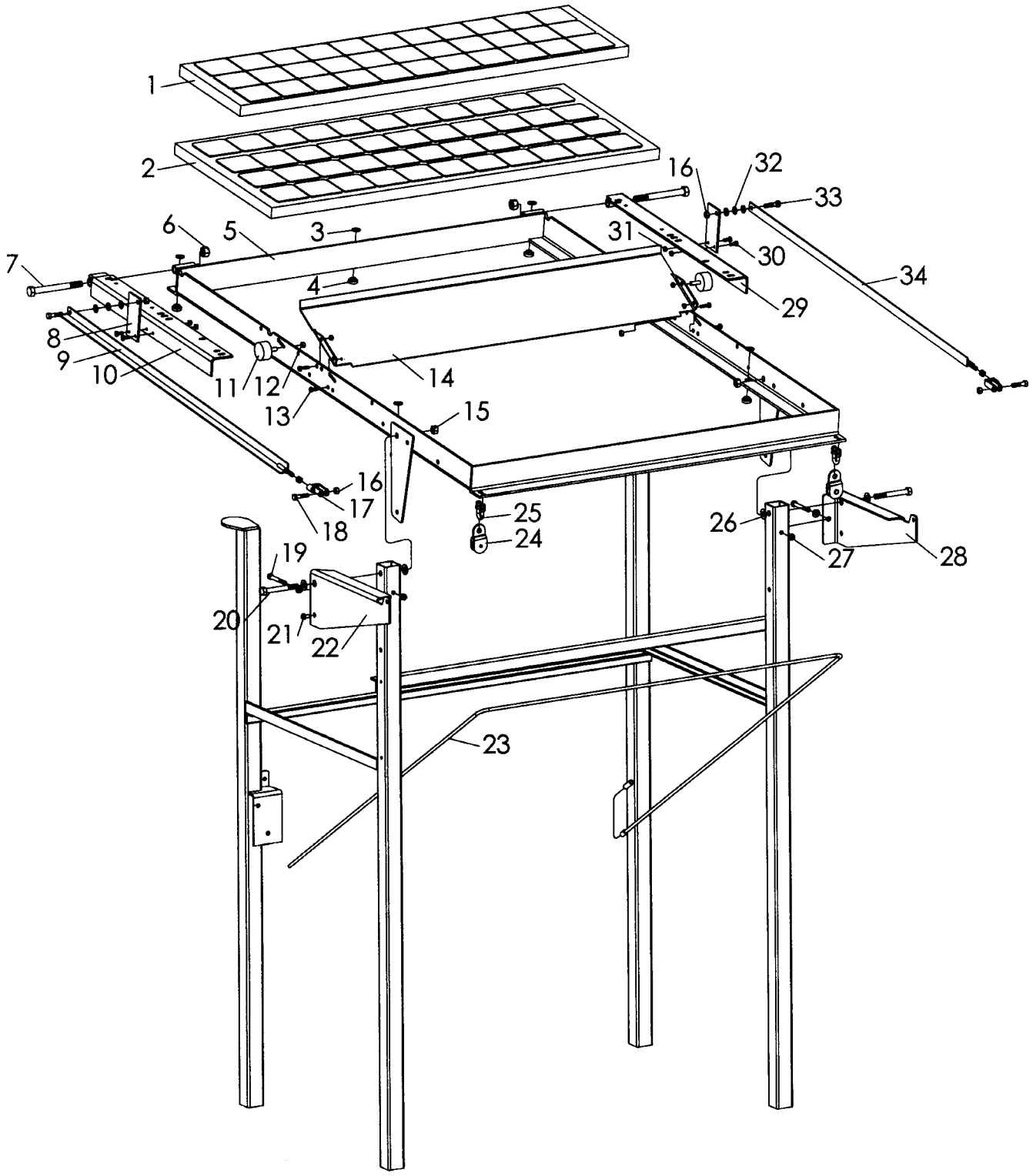
Contents

TRAILER ASSEMBLY PARTS AND ACCESSORIES



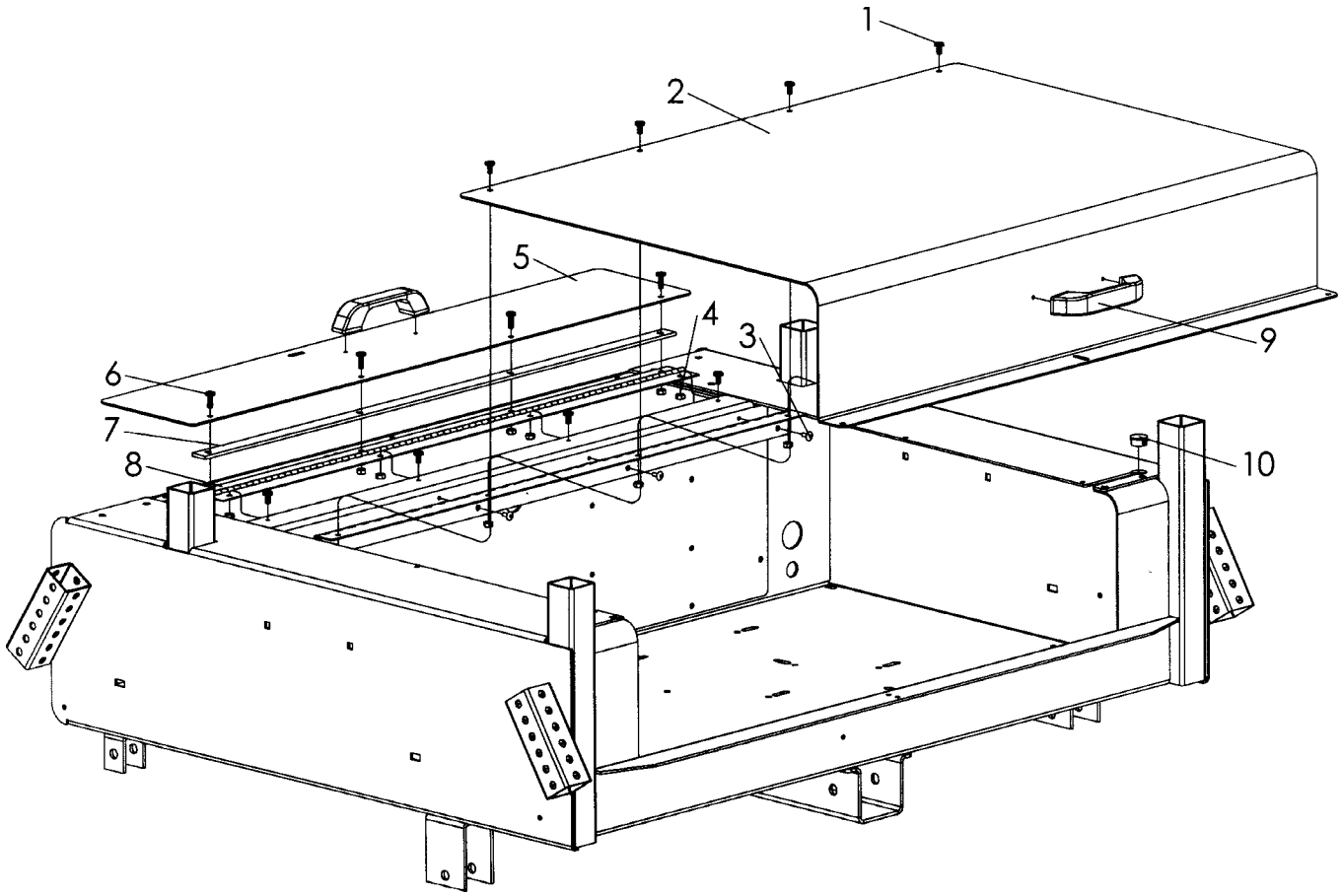
NO	REQ'D	PART NO	DESCRIPTION
1	1	714106	Frame weldment
2	2	712014	Safety pin 3/8 x 3" with steel lanyard
3	1	712562	Crossmember short
4	1	712583	Crossmember long
5	2	045066	Eyebolt 1/4-20
6	11	044021	1/4-20 Keps nut
7	1	715122	Left rear upright (Weld on)
8	7	041050	1/4-20 x .75 Truss head bolt
9	8	053022	5/16-18 x 1.25 Carriage bolt
10	8	044031	5/16-18 Keps nut
11	8	047010	5/16 Flat washer
12	2	650297	Fender black molded (13" only)
NS	2	712150	Fender metal (15" only)
13	4	712016	Safety pin 5/16-2.5" with steel lanyard
14	2	650129	Taillight (Flush mount)
15	16	046110	3/8-16 x 1.0 Hex bolt (Optional)
16	2	712580-05	Screw jack mounting bracket Right front/Left rear (Optional)
17	16	044036	3/8-16 Keps nut (Optional)
18	4	712012	Corner sliding jackstand
19	2	650387-05	Wheel and Tire 13"
NS	2	680124-05	Wheel and Tire 15"
20	1	712116	Wheel 13"
NS	1	352157	Wheel 15"
21	1	712110	Axle assembly (Springs, hubs, etc.)
22	1	330012	Replacement jack handle
23	2	046185	1/2-13 x 1.5 Hex bolt (Optional)
24	1	712056	2" Ball (Optional)
25	1	130108	Pin cotter with lanyard
26	1	712583	Tube outrigger adjust (Weld on)
27	1	714166	Weldment rear hitch (Optional)
28	4	046120	3/8-16 x 1.5 Hex bolt (Optional)
29	4	046220	1/2-13 x 4.0 Hex bolt
30	4	047025	1/2" Flat washer
31	4	044062	1/2-13 Toplock nut
32	2	712609-05	Screw jack mounting bracket Left front/Right rear (Optional)
33	1	330014	Jack snap ring 2 5/16 external
	4	330014	Jack snap ring 2 5/16" external (Optional)
34	4	330010	Jack long (15") (Optional)
35	1	712111	Hub with races
NS	1	712111B	Bearing set
36	1	330009	Jack bracket with snap ring (Weld on)
37	1	650235	Jack short side crank
38	2	049040	Safety chain with latch (27")
39	2	044043	7/16-14 Nylock nut
40	2	046160	7/16-14 x 1.5 Hex bolt
41	10	047015	3/8" Flat washer
42	2	046250	5/8-11 x 4.5 Hex bolt
43	1	330427	Pintle hitch (With 5/8-11 x 4.5 bolts)
44	1	712021	Ball coupler 2"
45	1	650169	Ball coupler kit
46	1	712540	Pintle hitch weldment
47	2	044061	5/8-11 Toplock nut
48	2	712552	Hitch bracket (Weld on)
49	1	714160	Tongue weldment
50	1	715121	Right rear upright (Weld on)
51	1	712032	Winch handle for DLB 1200-7"
52	3	044038	3/8-16 Nylock nut
53	1	714163	Battery compartment separator
54	3	046015	3/8-16 x 1.0 Hex bolt
55	1	044033	5/16-18 Nylock nut
56	2	047010	5/16-18 Flat washer
57	1	711037	Nylon step bushing
58	1	714153-05	Hood safety latch
59	1	046055	5/16-18 x 1.25 Hex bolt
60	1	610531	Winch DLB 1200
61	1	714101	Front upright Left or Right (Weld on)

SWING ARM ASSEMBLY AND PARTS



NO	REQ'D	PART NO	DESCRIPTION
1	1 or 2	711300	Solar panel 50 watts
2	1	711304	Solar panel 75 watts
3	5	711036	.875 O.D. x .312 I.D. Nylon washer
4	5	711037	Nylon step bushing
5	1	712142	Swing arm weldment
6	2	044053	5/8-11 Nylock nut
7	2	046259	5/8-11 x 6 Hex bolt (Grade 8)
8	2	712567	Hinged panel lock bracket
9	1	712574	Hinged panel lift arm right
10	1	712570	Hinged panel bracket right
11	2	713578	Rubber bumper
12	2	044031	5/16-18 keps nut
13	4	046025	1/4-20 x 1.5 Hex bolt
14	1	712565	Air deflector
15	2	044048	1/2-13 Nylock nut
16	2	044038	3/8-16 Nylock nut
17	2	712572	3/8-24 Offset yoke
18	2	046120	3/8-16 x 1.5 Hex bolt
19	2	046137	3/8-16 x 3.0 Hex bolt
20	2	046220	1/2-13 x 4.0 Hex bolt
21	2	041075	5/16-18 x.75 Type F screw
22	1	712569	Hinged panel frame mount right
23	1	712533	Cable assembly (3/16 x 180")
24	2	712545	Pulley winch cable
25	2	045085	U bolt 3/8-16
26	2	047025	1/2 Flat washer
27	2	044036	3/8-16 Keps nut
28	1	712566	Hinged panel frame mount left
29	1	712568	Hinged panel bracket left
30	4	041050	1/4-20 x .75 Truss head bolt
31	8	044021	1/4-20 Keps nut
32	6	044015	1/4 Flat washer
33	2	046115	3/8-16 x 1.25 Hex bolt
34	1	712573	Hinged panel lift arm left

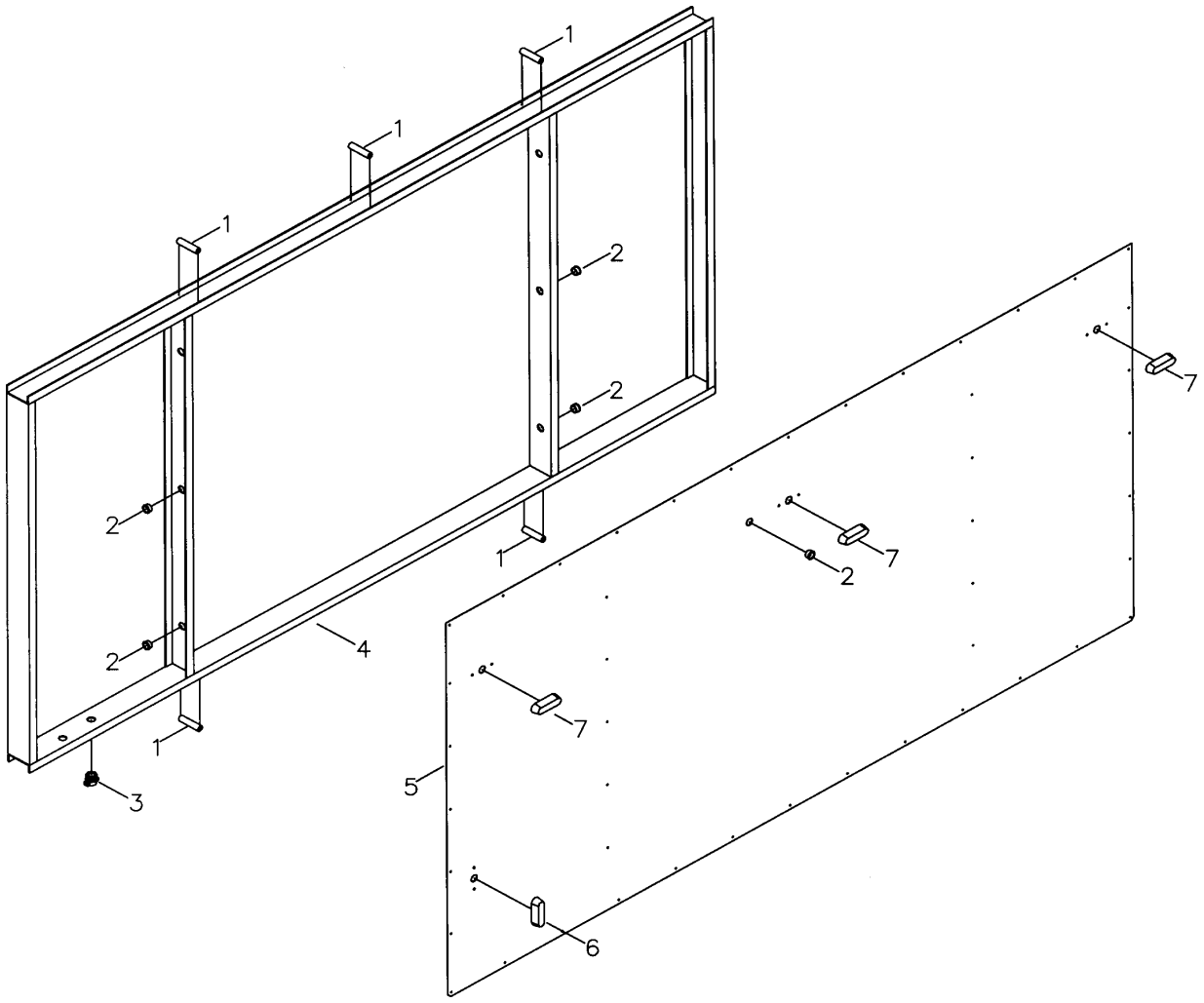
HOOD ASSEMBLY AND PARTS



HOOD ASSEMBLY AND PARTS

NO	REQ'D	PART NO	DESCRIPTION
1	8	041078	1/4-20 X .50 Truss head bolt
2	1	714116-05	Hood metal
3	4	045115	Rivet 3/16 steel large head
4	12	044021	1/4-20 Keps nut
5	1	714150-05	Lid rear
6	4	041050	1/4-20 X .75 Truss head bolt
7	1	714168	Spacer hinge plate
8	2	714154	Hinge metal hood
9	2	712395	Handle
10	1	711029	Plug Ø.875

SIGN FRAME ASSEMBLY AND PARTS

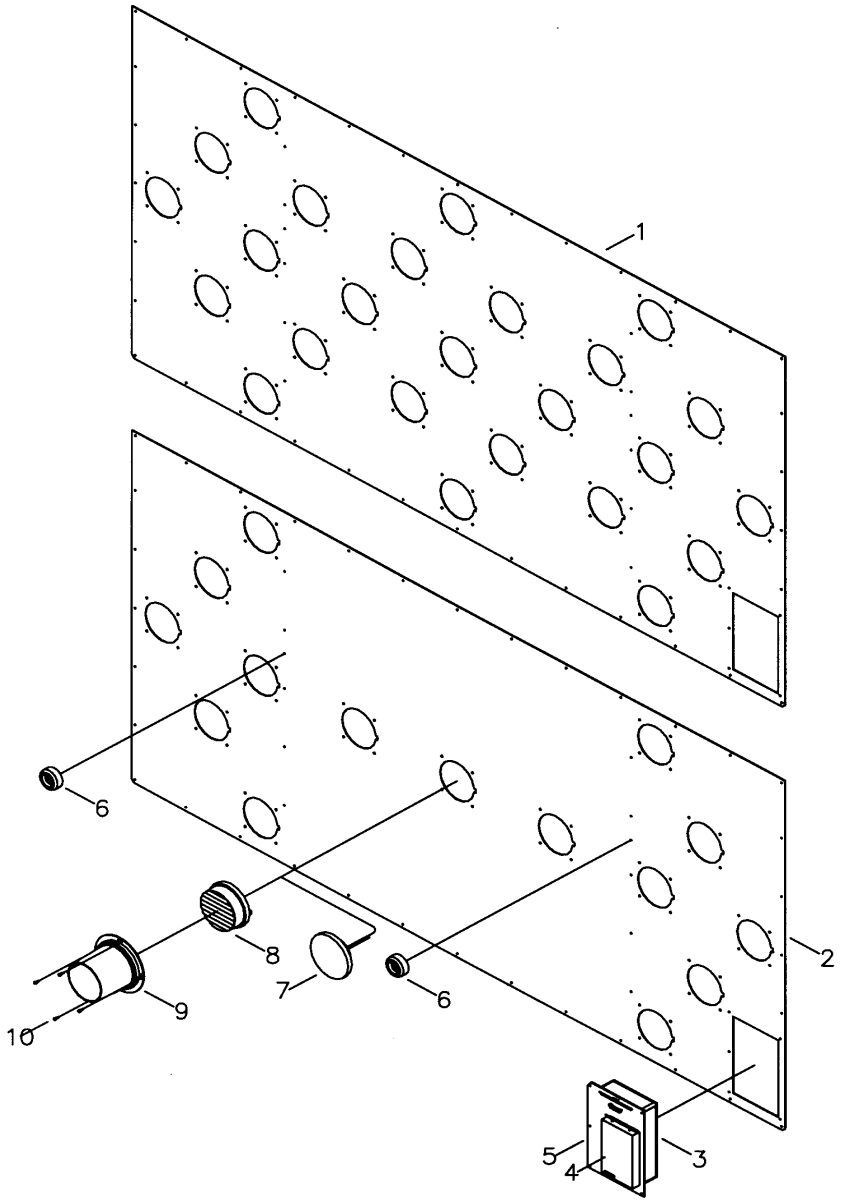


SIGN FRAME ASSEMBLY AND PARTS

NO	REQ'D	PART NO	DESCRIPTION
1	3	711035	Sign mount spacer tube
2	5	711033	Plastic grommet (5 req. for ALT, 4 req. for APF)
3	1	711031	Romex Connector 3/8
4	1	711521	Sign panel frame only
5	1	711145	Sign rear panel
6	1	711042R	Low voltage disconnect warning lamp (RED)
7	3	711042	Rear indicator lamp (AMBER)
NS	1	711038	Blind rivets (PKG/100)

LEGEND:NS NOT SHOWN
ALT: 15 LIGHT DISPLAY
APF: 25 LIGHT DISPLAY

SIGN ASSEMBLY AND PARTS

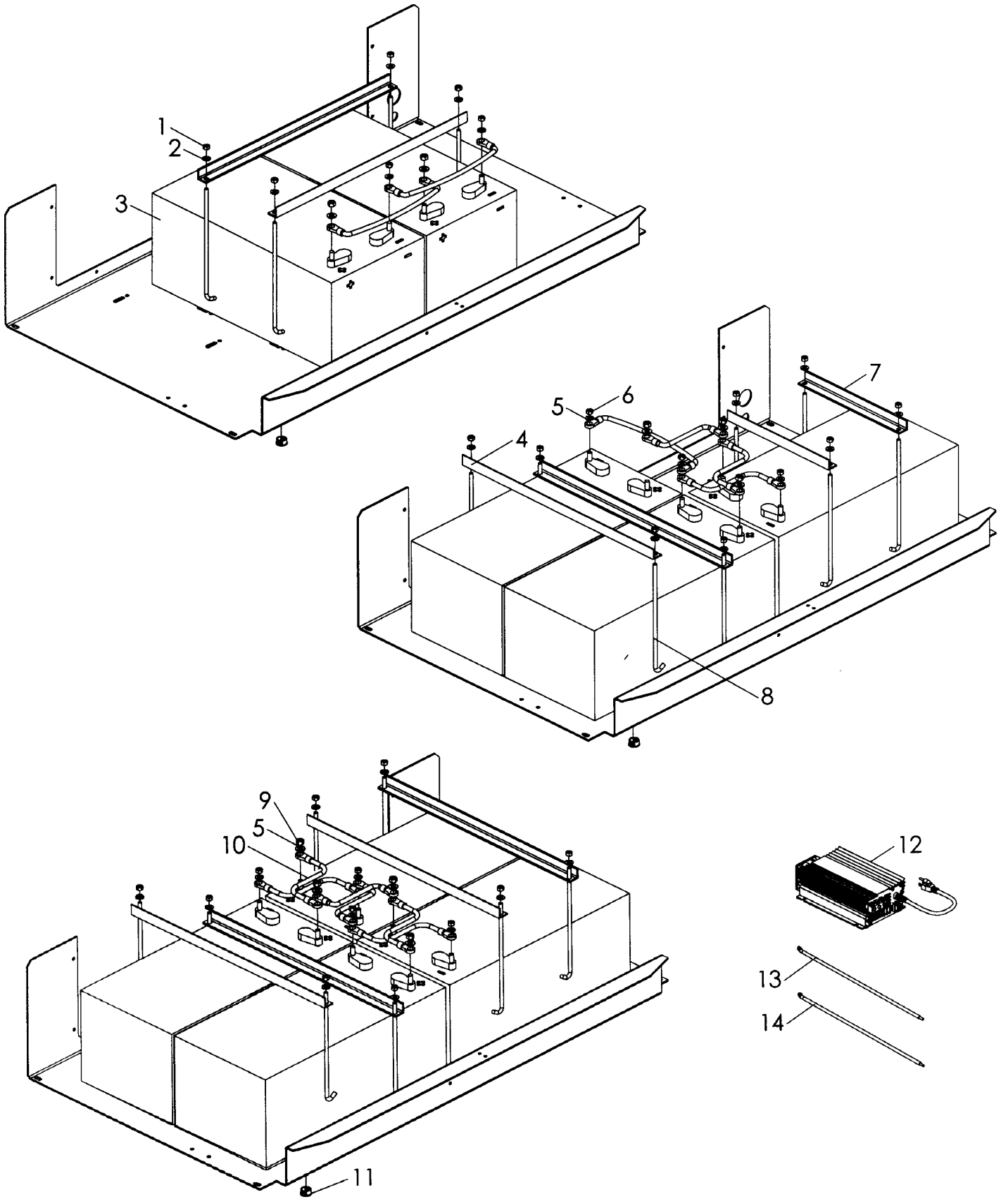


SIGN ASSEMBLY AND PARTS

NO	REQ'D	PART NO	DESCRIPTION
1	1	711143	Sign front panel APF
2	1	711140	Sign front panel ALT
3	1	711457	Controller rear enclosure
4	1	711165	Controller cover w/hinge
5	1	711453D	Controller Assembly--ALT
	1	711454D	Controller Assembly--APF
6	2	711032	Rubber Sign Rest Bumpers
7		711311	Halogen lamp assembly
8		711413	LED lamp
9		711041	Lamp Visor
10		711039	Visor Screw

LEGEND:NS NOT SHOWN
ALT: 15 LIGHT DISPLAY
APF: 25 LIGHT DISPLAY

BATTERY COMPARTMENT AND ACCESSORIES

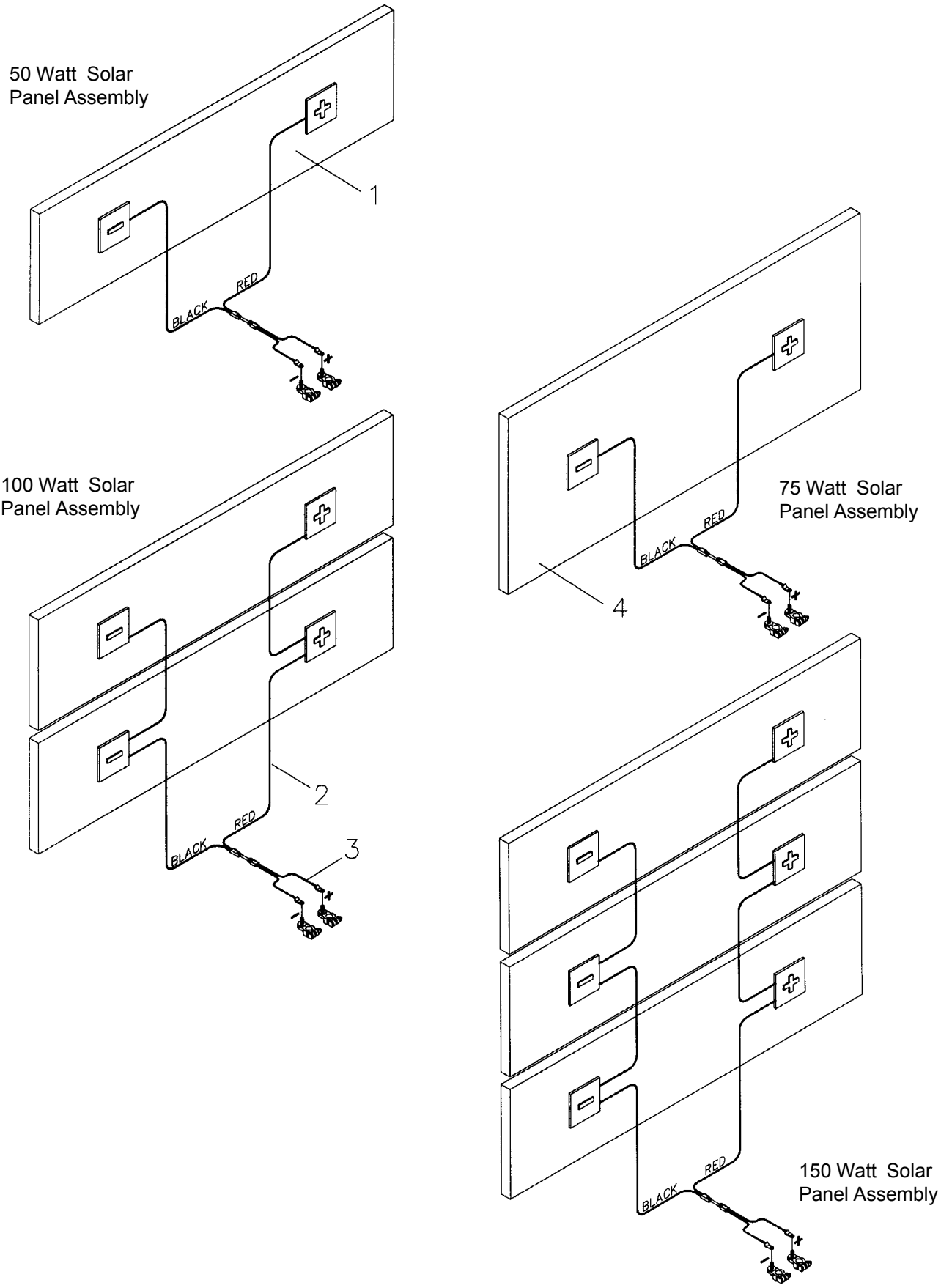


BATTERY COMPARTMENT AND ACCESSORIES PARTS

NO	REQ'D	PART NO	DESCRIPTION
1	4	044033	5/16-18 Nylock nut (2 Battery option)
	8	044033	5/16-18 Nylock nut (3 Battery option)
	8	044033	5/16-18 Nylock nut (4 Battery option)
2	4	047005	1/4 Flat washer (2 Battery option)
	8	047005	1/4 Flat washer (3 Battery option)
	8	047005	1/4 Flat washer (4 Battery option)
3	2	024009	Battery 8D deep cycle (2 Battery option)
	3	024009	Battery 8D deep cycle (3 Battery option)
	4	024009	Battery 8D deep cycle (4 Battery option)
4	2	713513T	Battery hold down long (2 Battery option)
	3	713513T	Battery hold down long (3 Battery option)
	4	713513T	Battery hold down long (4 Battery option)
5	4	047010	5/16 Flat washer (2 Battery option)
	6	047010	5/16 Flat washer (3 Battery option)
	8	047010	5/16 Flat washer (4 Battery option)
6	2	044030	5/16-18 Hex nut (2 Battery option)
	3	044030	5/16-18 Hex nut (3 Battery option)
	4	044030	5/16-18 Hex nut (4 Battery option)
7	2	713511T	Battery hold down short (2 Battery option)
8	4	433507	J-Bolt 5/16-18 x 11" (2 Battery option)
	8	433507	J-Bolt 5/16-18 x 11" (3 Battery option)
	8	433507	J-Bolt 5/16-18 x 11" (4 Battery option)
9	2	044035	3/8-16 Hex nut (2 Battery option)
	3	044035	3/8-16 Hex nut (3 Battery option)
	4	044035	3/8-16 Hex nut (4 Battery option)
10	2	713198	Battery cable 12" (2 Battery option)
	4	713198	Battery cable 12" (3 Battery option)
	6	713198	Battery cable 12" (4 Battery option)
11	2	711033	Grommet plastic
12	1	713506	Battery charger on-board - 55 Amp.
13	1	713530	Battery charger cable Positive (Red, 6 gauge, 20")
14	1	713531	Battery charger cable Negative (Black, 6 gauge, 20")

LEGEND:NS NOT SHOWN
ALT: 15 LIGHT DISPLAY
APF: 25 LIGHT DISPLAY

50, 75, 100, AND 150 WATT SOLAR PANEL WIRING

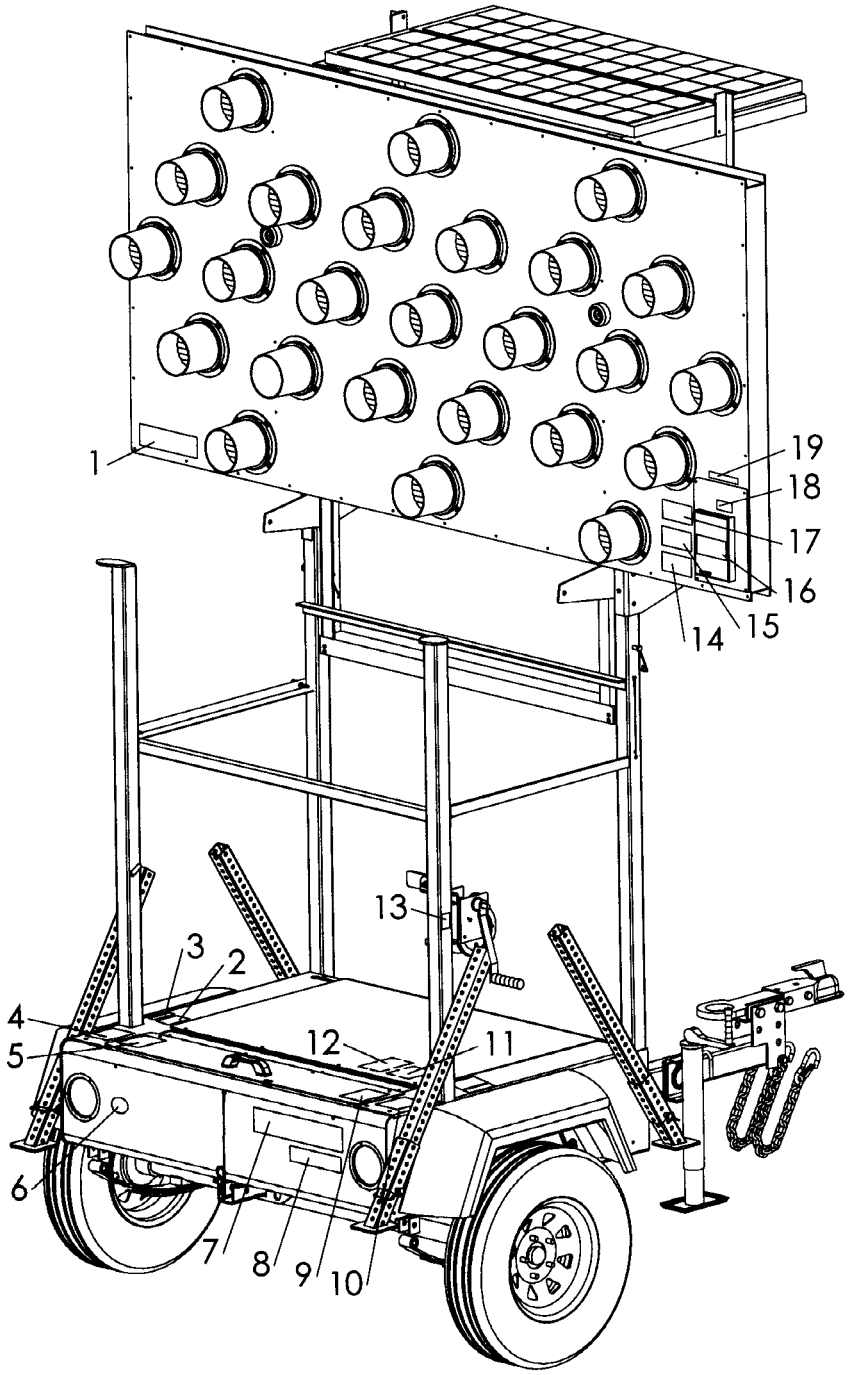


50, 75, 100, AND 150 WATT SOLAR PANEL WIRING

NO	REQ'D	PART NO	DESCRIPTION
1	AS REQ'D	711300	Solar panel 50 watt
2	1	713583	Power cable
3	1	711468	Power cable
4	1	711304	Solar panel 75 watt

LEGEND:NS NOT SHOWN
ALT: 15 LIGHT DISPLAY
APF: 25 LIGHT DISPLAY

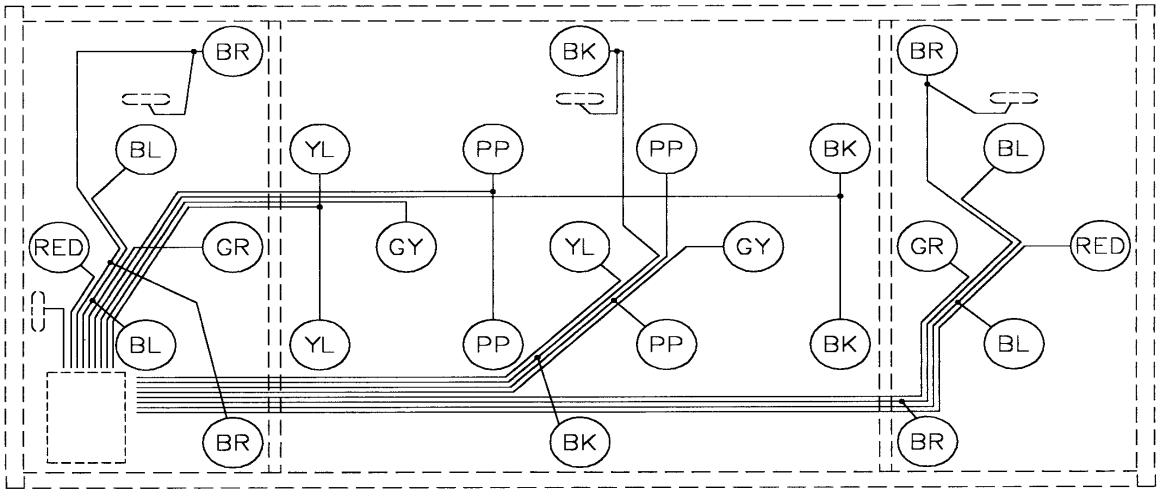
DECAL PLACEMENT DETAIL



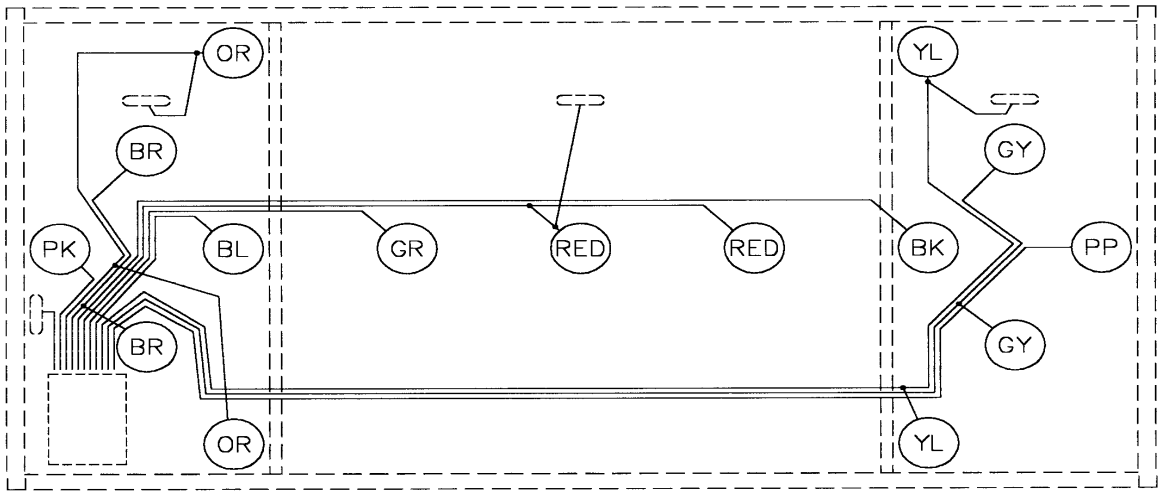
DECAL PLACEMENT PARTS LIST

NO	REQ'D	PART NO	DESCRIPTION
1	2	090279	Decal Allmand (Also on back)
2	2	090125	Decal Warning - Corner stand
3	2	090147	Decal No Step
4	1	090148	Decal Warning - Do not operate
5	1	090091	Decal Warning - Trailer alignment
6	1	090322	Decal Allmand Assurance 3"
7	2	090269	Decal Allmand 11.75"
8	1	090275	Decal Eclipse 8.375"
9	1	090175	Decal Caution - Position outriggers
10	1	090079	Decal Warning - Before towing
11	1	090171	Decal Battery Charging Instructions
12	1	090146	Decal Danger - Battery gas
13	1	090008	Decal Warning - Overhead obstructions
14	1	090245	Decal Battery Disconnect
15	1	090244	Decal LED - Replace with 711413
	1	090337	Decal Halogen - Replace with 711311
16	1	090132	Decal Warning - Battery recharge
17	1	090088	Decal Warning - Check sign visually
18	1	090366	Decal Warning - Secure warranty (Back of controller)
19	1	090286	Decal Florida Approval - {FL-W6036} (2 Battery)
	1	090134	Decal Florida Approval - {FL-W630R} (Retro-fit)

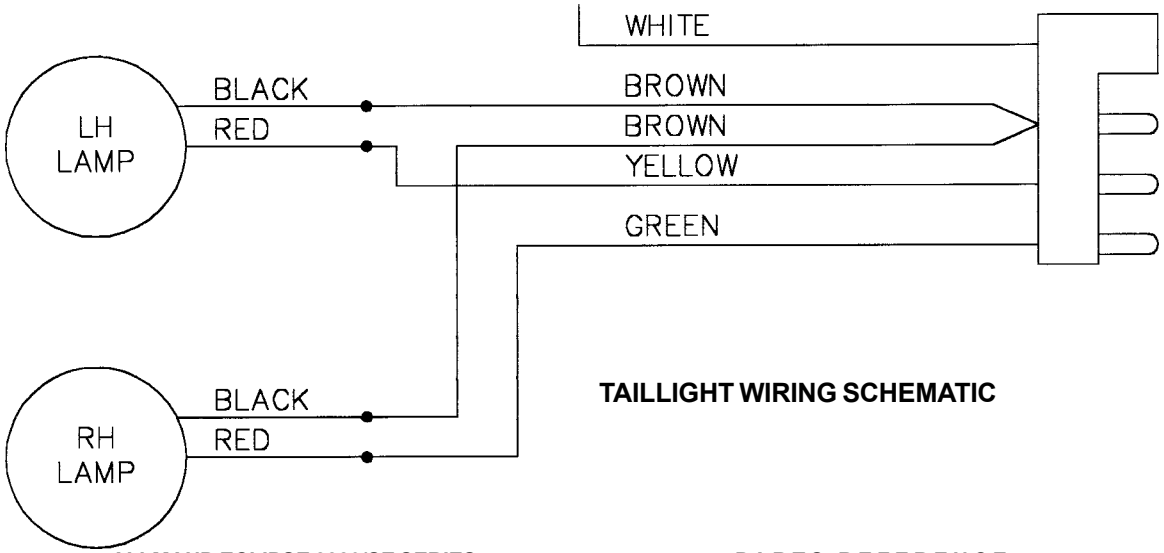
APF WIRING SCHEMATIC 711444



ALT WIRING SCHEMATIC 711442



LEGEND: BK = BLACK YL = YELLOW GR = GREEN RED = RED
BL = BLUE OR = ORANGE PP = PURPLE
BR = BROWN PK = PINK GY = GRAY
ALL LIGHTS USE COMMON WHITE WIRE POSITIVE.



TAILLIGHT WIRING SCHEMATIC

ALLMAND
LIMITED WARRANTY

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED INCLUDING WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR PURPOSE, AND ANY EXCEPTIONS ARE DESCRIBED IN THE PUBLISHED LIMITED WARRANTY ADDENDUM, AVAILABLE UPON REQUEST.

COMPONENTS, SUB-ASSEMBLIES AND DEVICES MANUFACTURED BY OTHER MANUFACTURERS ARE NOT COVERED BY THIS WARRANTY AND ALL WARRANTY INFORMATION FROM SUCH OTHER MANUFACTURERS IS PROVIDED WITHIN OR ACCOMPANY THESE GOODS.

Subject to the foregoing, the manufacturer, Allmand Bros. Inc., hereby warrants all equipment manufactured by Allmand Bros. Inc. to be free from defects in material and workmanship for a period of one (1) year after delivery to the original purchaser, or eighteen (18) months after shipment from the factory, whichever comes first. Additionally, Allmand Bros. Inc., hereby warrants all replacement parts supplied by Allmand Bros. Inc. to be free from defects in material and workmanship for a period of 90 days after date of invoice. Delivery shall be deemed for the purposes of this warranty to have occurred no later than five days following the date of sale agreement or invoice unless the purchase agreement or invoice specifically states a later delivery date in which case such delivery date shall control. The original purchaser shall be deemed to be a person who places the goods or products in actual use, and any person holding such goods solely for wholesale or retail sale purposes shall not constitute an original purchaser. PROVIDED, any leasing of these goods or other use beyond normal demonstration of same shall be deemed to be a use by an original purchaser and all warranty periods shall commence at the time of such use. During the warranty period any defective goods or parts hereof shall be repaired or replaced at manufacturer's discretion. In the event it is necessary to return such goods or parts to the factory, all transportation charges shall be prepaid. The manufacturer shall in no event pay mileage expenses, but will warrant outbound ground freight.

The obligations of the manufacturer is solely to repair or replace defective goods or parts or to refund the cost of the same if it is determined by the manufacturer that repair or replacement will not return the goods to proper working order or utility. **THE REMEDIES SET FORTH HEREIN ARE EXCLUSIVE AND MANUFACTURER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES. THE OBLIGATIONS OF THE MANUFACTURER HEREUNDER SHALL IN NO WAY EXCEED THE PRICE OF THE EQUIPMENT OR PART UPON WHICH SUCH LIABILITY IS BASED.**

The warranty shall not extend to tires, lamps and batteries or parts which have been altered, changed, damaged or improperly installed, repaired, operated or maintained. Provided, this exclusion shall not apply to installations, repairs or other work done at the manufacturer's plant or under direct manufacturer's supervision. The Operator's Manual, to the extent covered therein, is deemed to set forth the proper procedures for operation, repair, installation and maintenance of theses goods.

No representative, dealer or distributor of the company is authorized to make any changes or exceptions to this warranty unless expressly authorized in writing from the manufacturer. All warranty claims must be filed within forty-five (45) days of the failure.

ALLMAND BROS. INC., 1502 W 4TH AVENUE, P.O. BOX 888, HOLDREGE, NE 68949 (308) 995-4495

ALLMAND LIMITED WARRANTY 1 YR/7.02.01