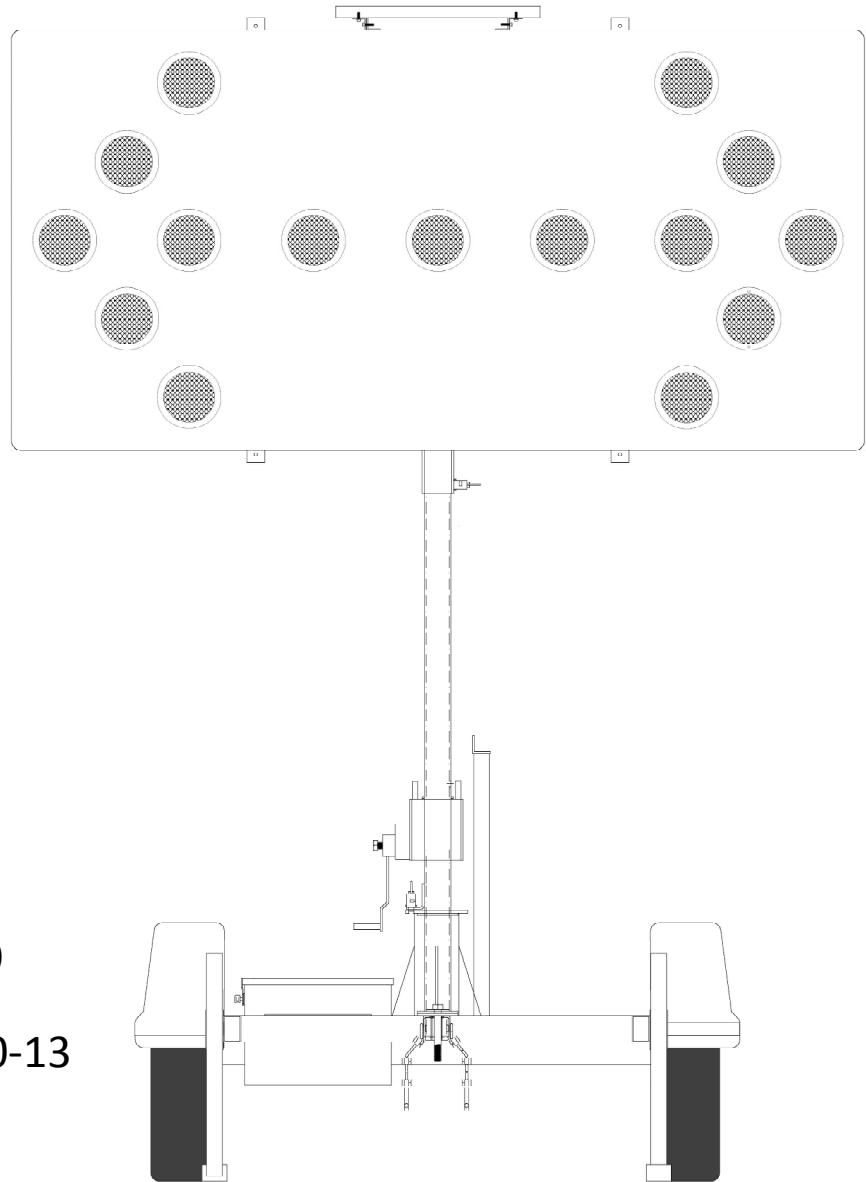


# ArrowMASTER

*Pro-Line*



Users Guide pgs 1 – 9

Repair Manual pgs 10-13



**Work Area Protection Corporation**

# SAFETY WARNINGS

## **DANGER**

- Stay clear of sign during raising and lowering. Do NOT stand under sign without safety pin in place.
- Use extreme care in positioning sign during windy conditions as weathervaning is possible.
- Batteries contain explosive gas. Do not incinerate. Charge only in a well ventilated area away from ignition sources. To be recharged by adults only. Use only the on-board or recommended charger. Do not make a direct connection between POS (+) and NEG (-) terminals, fire and/or severe burns could result.
- Before displaying sign, check the following:
  - Lower all jacks to down position
  - Disengage mast safety pin
  - Raise to full up position
  - Re-engage mast safety pin
  - Disengage mast rotation pin and rotate the sign counterclockwise to the proper position.
  - Re-engage the mast safety pin
- Before towing the sign, check the following:
  - Disengage the mast rotation pin and rotate the sign clockwise to the travel position (parallel to the tongue, over the road-side of the trailer)
  - Re-engage the mast rotation pin
  - Disengage the mast safety pin
  - Lower the sign until fully seated in the travel cradles
  - Re-engage the mast safety pin
  - Turn off sign display

# **WARNING**

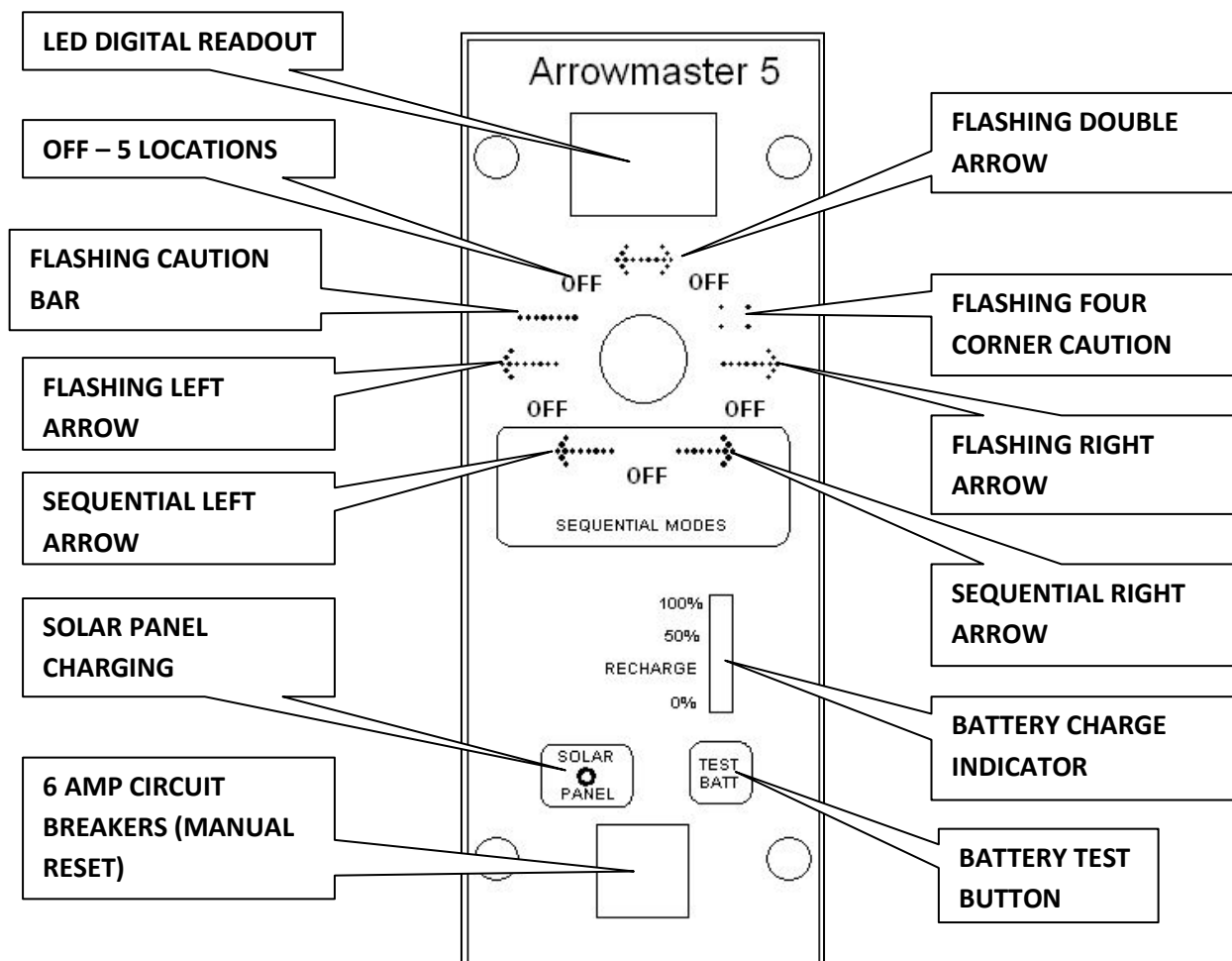
- Do not attempt to operate without reading and fully understanding this instruction manual
- ACID-POISON! BATTERIES CONTAIN SULFURIC ACID\*. Causes severe burns. Do not puncture, drop, disassemble, or charge upside down. Keep away from children. In the event of contact with gelled or liquid content, flush with water. If ingested, do not give emetics; drink water, milk, or milk of magnesia. Call a physician immediately.
- High voltage present – 115 VAC battery charger. Danger of electrical shock. Always turn off the controller / charger when servicing or troubleshooting.
- ALWAYS follow the recommended towing guidelines for your vehicle, and observe all Local, State, and Federal laws regulating towed and towing vehicles.
- ALL Local, State, and Federal laws supersede any guidelines or recommendations given in this manual.

## **Recommended Method for Towing Your Pro Line Series Product**

1. Make sure both the mast safety pin and the sign rotational pin are in the stowed and locked positions.
2. Check that the towing ball is the same size as the trailer coupler.
3. Line up the towing ball with the trailer hitch, then lower the hitch onto the ball.
4. Latch the trailer coupler locking mechanism to capture the towing ball.
5. Place a safety bolt or lock through the ¼" hole provided in the latch.
6. Secure the tail light wiring harness to the output plug on the towing vehicle. Standard factory wiring is a flat four conductor plug assembly.
7. Secure safety chains to the towing vehicle. Use care not to allow the chains to drag the ground during towing. If the chains are too long, you will need to either shorten the chains, or use a properly rated clevis device to temporarily shorten the chains.
8. Ensure that all jacks are properly positioned for travel.

# Arrowmaster V Controller Functions

15 Light Version



## Feature Description:

**OFF-** Turns display off while allowing solar charge to continue to battery bank.

**Flashing Caution Bar-** Activates the 7 horizontal lamps to indicate caution ahead.

**Flashing Four Corner-** Activates the 4 upper / lower most lamps to indicate caution ahead. This is also the default when the battery voltage gets low. See **Battery Maintenance**.

**Flashing Left / Right Arrow –** Activates a single arrow pattern to indicate in which direction traffic should pass by.

**Flashing Double Arrow –** Activates a two headed arrow to indicate that traffic may pass on either side of the sign.

**Sequential Left / Right Arrow –** Activates a three part single arrow that sequences in the direction of the arrow. It sequences at the same cycle speed as the flashing arrow display and indicates passing direction to traffic.

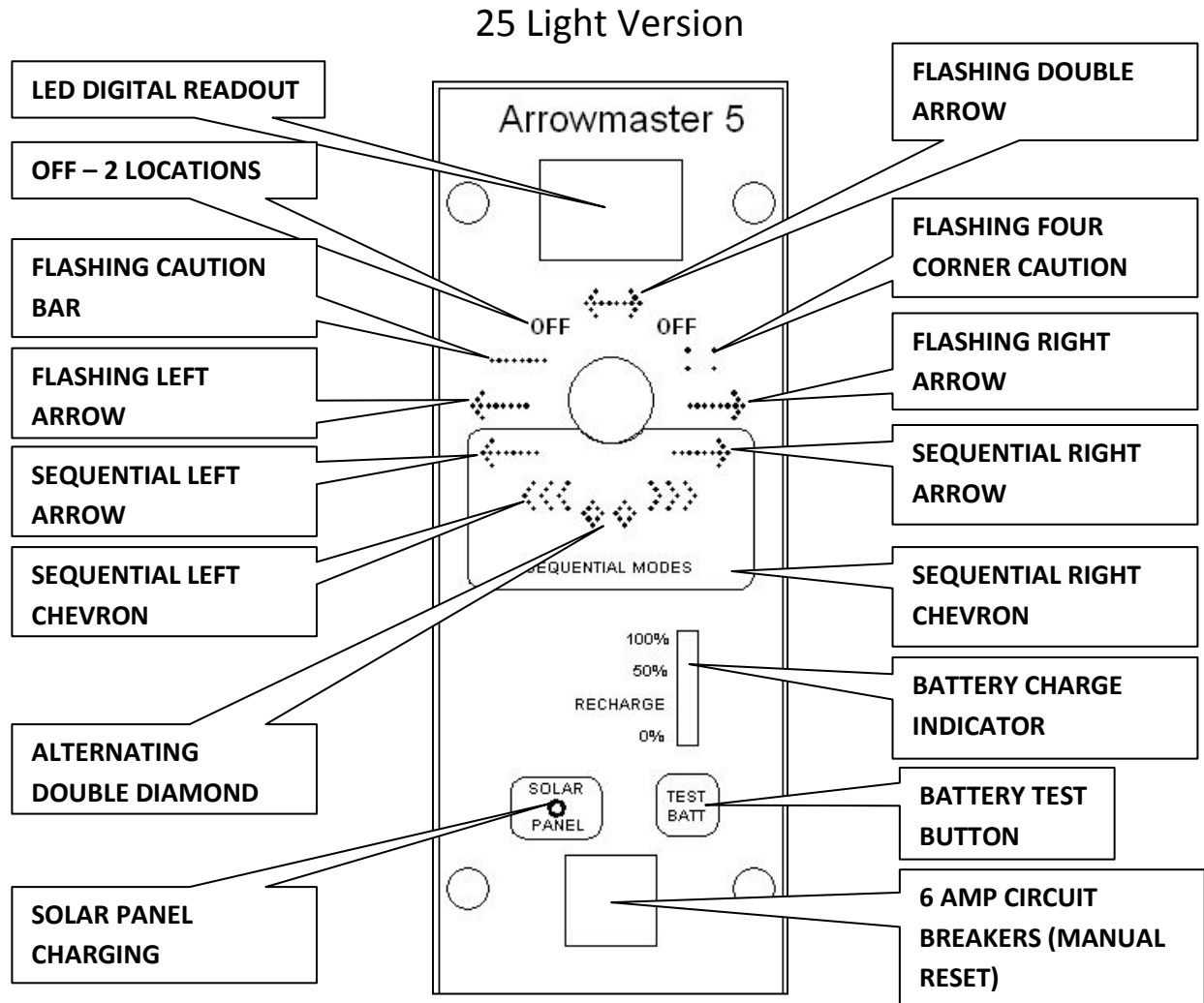
**Solar Panel Charge Indicator –** When lit, it indicates that that the solar panel is charging the battery bank.

**Battery Test Button / Battery Charge Indicator –** When the battery test button is depressed, the battery charge indicator will show the charge status of the battery bank in percentage of capacity. It is recommended that the batteries be charged (following approved procedures) if the battery bank reaches 20% or less capacity.

**6 AMP Circuit Breaker –** Protects the complete system and will trip if a short is detected. It must be manually reset by depressing the top mounted switch lever.

**Digital Readout –** LED Matrix displays mode selection, error codes, or the letters Lo if the unit is in LVD.

# Arrowmaster V Controller Functions



## Feature Description:

**OFF, Flashing Caution Bar, Flashing Four Corner, Flashing Left / Right Arrow, Flashing Double Arrow, Sequential Left / Right Arrow, Solar Panel Charge Indicator, Battery Test Button / Battery Charge Indicator, 6 AMP Circuit Breaker, and Digital Readout** all function the same as the 15 light system.

**Sequential Left / Right Chevron** – Activates a three part chevron display that sequences in the direction of the arrowhead.

**Alternating Double Diamond** – Alternates between a left and right diamond shaped pattern, and is used to indicate caution ahead.

# **Maintenance Guide**

## **Cleaning Variable Message Sign Window**

Whenever needed, clean the lamps (or message board window) with a soft cloth and mild, non-abrasive soap with warm water. The polycarbonate material used for the window is strong and tough, but it scratches easily, so wash it carefully. Wash the surface with a gentle motion and limited pressure to avoid marring.

## **Cleaning the Solar Module**

To ensure you Pro-Line product operates up to your expectations it is necessary to periodically check the surface of the solar modules for dust or dirt. A dirty solar panel drastically reduces the ability of the panel to maintain the battery charge and can cause premature battery failure. Clean the solar module face with a soft cloth and non-abrasive soap with warm water. Like the display window and lenses, the solar module surface is tough and durable, but can be scratched.

## **Tire and Wheel Maintenance**

Prior to towing, check the tire pressure and check wheels for loose lug nuts. Acceptable tire pressure is listed by the manufacturer on the outer sidewall of the tire. Acceptable torque for the lug nuts on the wheel is 80 to 90 ft-lbs. When replacing wheels, torque all lug nuts up to 15 ft-lbs prior to tightening to final torque.

## **Cleaning the System**

When you wash your Pro-Line trailer use care around all electronics including lamps, controllers, chargers, character boards, etc... Do not use high pressure washer on the front of the display, the control console, or the battery box.

## Trailer Maintenance

- Clean, Check, and repack wheel bearings every 10, 000 miles, or once a year.
- Check tail lights and tail light wiring, including the white ground wire, which must be connected to the trailer frame for the lights to function properly.
- Inspect the lifting cable for signs of wear and fraying, and replace when necessary.
- Inspect the mast safety pin and the mast rotation pin for proper engagement as these pins are critical for proper operation.
- Ensure that the removable draw bolt and the anti-sway bolt are properly secured. The anti-sway bolt ensures the tongue draw bar will not move inside the tongue sleeve, eliminating the back and forth sway of the trailer while towing, thus reducing the stress placed on the draw bar itself.

# **Battery Maintenance**

## **Required Battery Maintenance Intervals**

**Every 30 Days:** Check fluid levels. If water is required, use ONLY distilled water. Do not overfill. Each battery has a fill tube that should just touch the water when full.

**Every 90-120 Days:** Charge the battery bank with on-board AC charger, or an approved equal. Charge for 48 hours minimum or until fully charged. Make sure the nuts are tight on all battery terminals and the terminals and connections are clean and dry.

**Precautions:** When in use or in storage, avoid placing the unit under trees, bridges, or anything that limits sunlight. Partial shading of any solar panel will halt solar charge from that panel.

If the Battery Charge indicator displays a capacity at or below the recharge level (arrow board), or if the LVD indicator is on (message board), recharge the battery bank with the on-board AC charger, or an approved equal.

## **Charging the Batteries**

To use the on-board AC charger, find the polarized two prong plug in the battery compartment and plug it into any 120VAC wall outlet. You may use an extension cord if necessary. On an arrow board, the charger must be in Deep Cycle mode, and the Current switch needs to be in the 10 AMP position. On an SMC 4000 message board, there are no settings to adjust, just plug in the charger. Once the batteries are fully charged, disconnect the AC power from the plug, and stow the cable inside the battery box. If a deep discharge has occurred, a recharge should be done immediately to prevent damage to the batteries.

## *Other Battery Maintenance*

The battery terminals should be checked periodically for corrosion and cleaned when necessary. The unit is initially shipped with a protective, anti-corrosive coating over the terminals.

From time to time a battery bank failure may occur due to a bad cell in one of the batteries. Before performing any test, fill the battery to the proper level with distilled water then fully charge the battery bank. Once the batteries are fully charged, allow a few hours for batteries to normalize prior to testing.

To isolate a bad battery, remove all wiring from the battery terminals on all batteries. Allow an hour for each battery to normalize. Take voltage readings from each individual battery. If the readings from each battery are more than .10 volt different, the lower voltage battery is suspect and requires further testing.

To identify a bad cell or bad battery, a hydrometer can be used. A hydrometer checks the specific gravity (SG) of the acid in the cell. The specific gravity of the acid increases as charge levels increase, so a fully charged battery may have a SG of 1.300 while a discharged battery may have a SG of 1.100 or less. Check each individual cell on all batteries and compare the results. If difference from cell to cell is greater than .050, the battery may be suspect and will need to be load tested to verify the condition. If there is a difference from battery to battery, but the cells of each battery are within range of each other, check the cables connecting the batteries for loose or corroded connectors, recharge, and test again.

It is recommended that when replacing a battery, the entire battery bank should be replaced as a unit, and you should never partially replace a battery bank. If a battery is bad, there is a reason, and the rest of the battery bank is suspect since it has been in the same environment as the bad battery. The one exception is new batteries that have failed prematurely. If a battery is less than 1 year old, and ALL MAINTENANCE WAS PERFORMED IN ACCORDANCE WITH THESE GUIDELINES, you may choose to replace a single battery in the system.

# Arrowmaster V Troubleshooting

## Error Codes

When an error is detected, the controller with the mode prior to the error condition. Error codes are displayed on the dot matrix display of the Arrowmaster V controller. The error conditions listed below are hypothetical and do in no way indicate that any type of error is likely. The error corrections listed are possible solutions that can be performed by a field technician.

**E1** Loss of communication with the main control board.

**Probable cause:** 1. Disconnected / defective internal ribbon cable.  
2. Disconnected / defective remote serial port cable.  
3. Remote serial cable shorted to truck chassis.

**Correction:** If using a remote panel, check cable and connectors for damage.

**E2** Mode switch not detected.

**Probable cause:** 1. Switch not set completely on a mode indent.  
2. Dirty switch contacts.

**Correction:** Make sure that the switch is set correctly. Rotate the mode knob several complete turns. The switch has wiping contacts that may polish off any dirt or oxidation.

**E3** Mode switch is indicating more than one mode selection

**Probable cause:** Accumulated condensation & salt spray within the mode switch.

**Correction:** Rotate the mode knob several complete turns to dissipate the accumulation. Keep battery lid closed to prevent rain from hitting the top of the controller.

**E4** Main control board is not set to 15 or 25 light model.

**Probable cause:** Small jumper clip not in place.

**Correction:** Insert a jumper onto the 3 pin header located on the main control board. This jumper sets the controller as a 15 or a 25 light model. Incorrect installation will cause the dot matrix display not to match the mode switch setting.

**E5** Remote panel mismatches the main controller.

**Probable cause:** The model of the remote panel is not of the correct type for the main controller. For example; if a 25 light remote panel were connected to a 15 light main controller.

**Correction:** Replace the remote panel with the correct model. The main control unit can still be used once the incorrect remote panel is disconnected.

# Optional equipment

Pintle Eye hitch

Combo 2" ball / Pintle eye hitch

Bulldog™ 2" ball hitch assembly

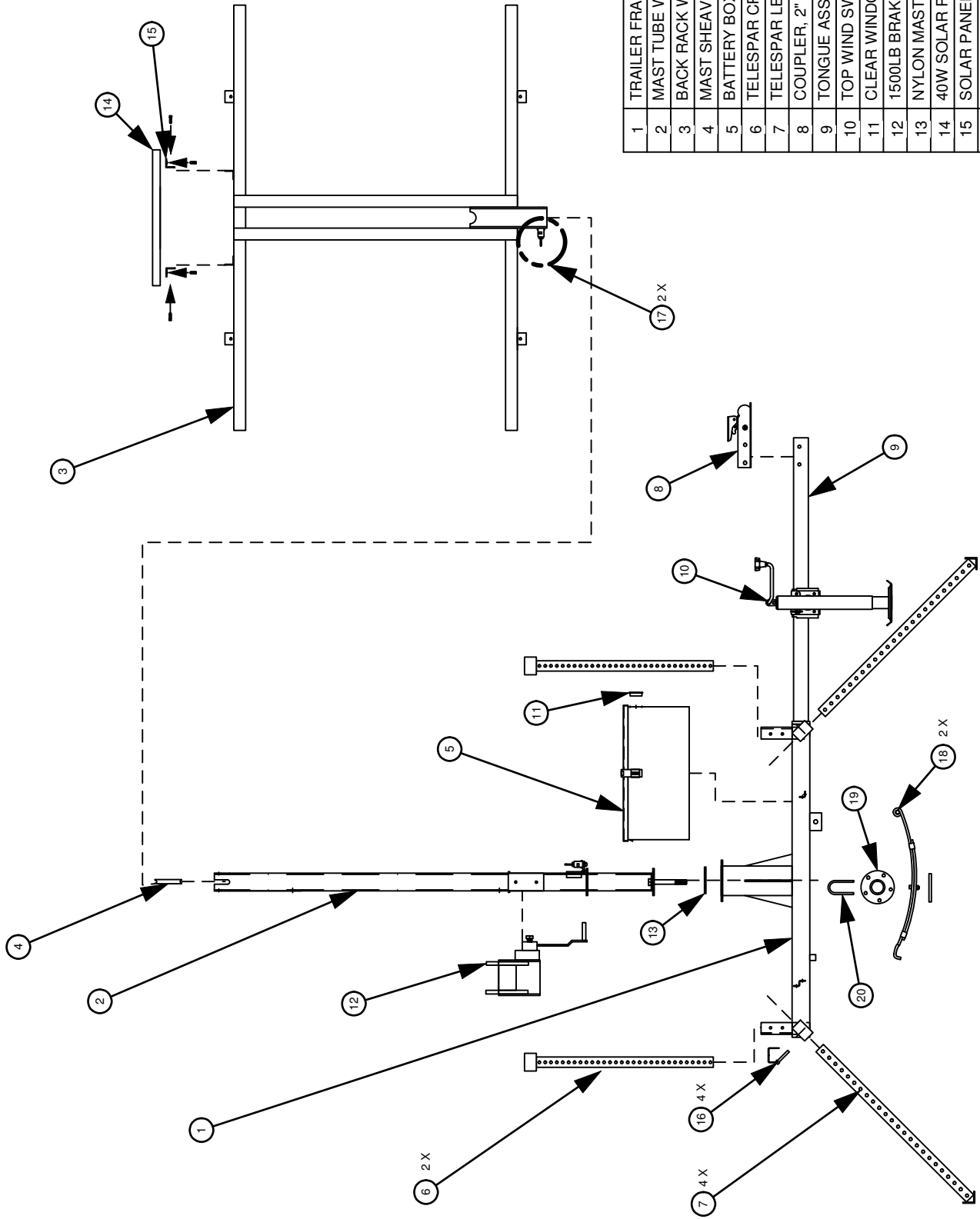
55 Watts solar panel upgrade

Tilt solar panel mechanism

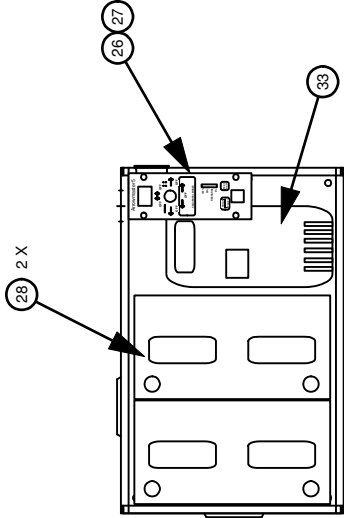
\*Rear mounted ball hitch bracket

10 AMP 120VAC battery charger

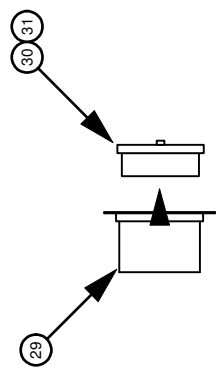
**\*WARNING – THE REAR MOUNTED BALL HITCH BRACKET IS INTENDED FOR OFF ROAD USE ONLY. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT ALL LOCAL, STATE, AND FEDERAL LAWS ARE FOLLOWED. WORK AREA PROTECTION IS NOT LIABLE FOR DAMAGES, INJURY, OR DEATH THAT MAY OCCUR DUE TO IMPROPER AND / OR UNLAWFUL USE OR MISUSE OF EQUIPMENT. IT IS THE RESPONSIBILITY OF THE USER TO ENSURE THAT THE PROPER SIZED HITCH AND RECIEVER ARE USED TO PROPERLY SECURE THE TRAILER TO THE TOWING VEHICLE.**



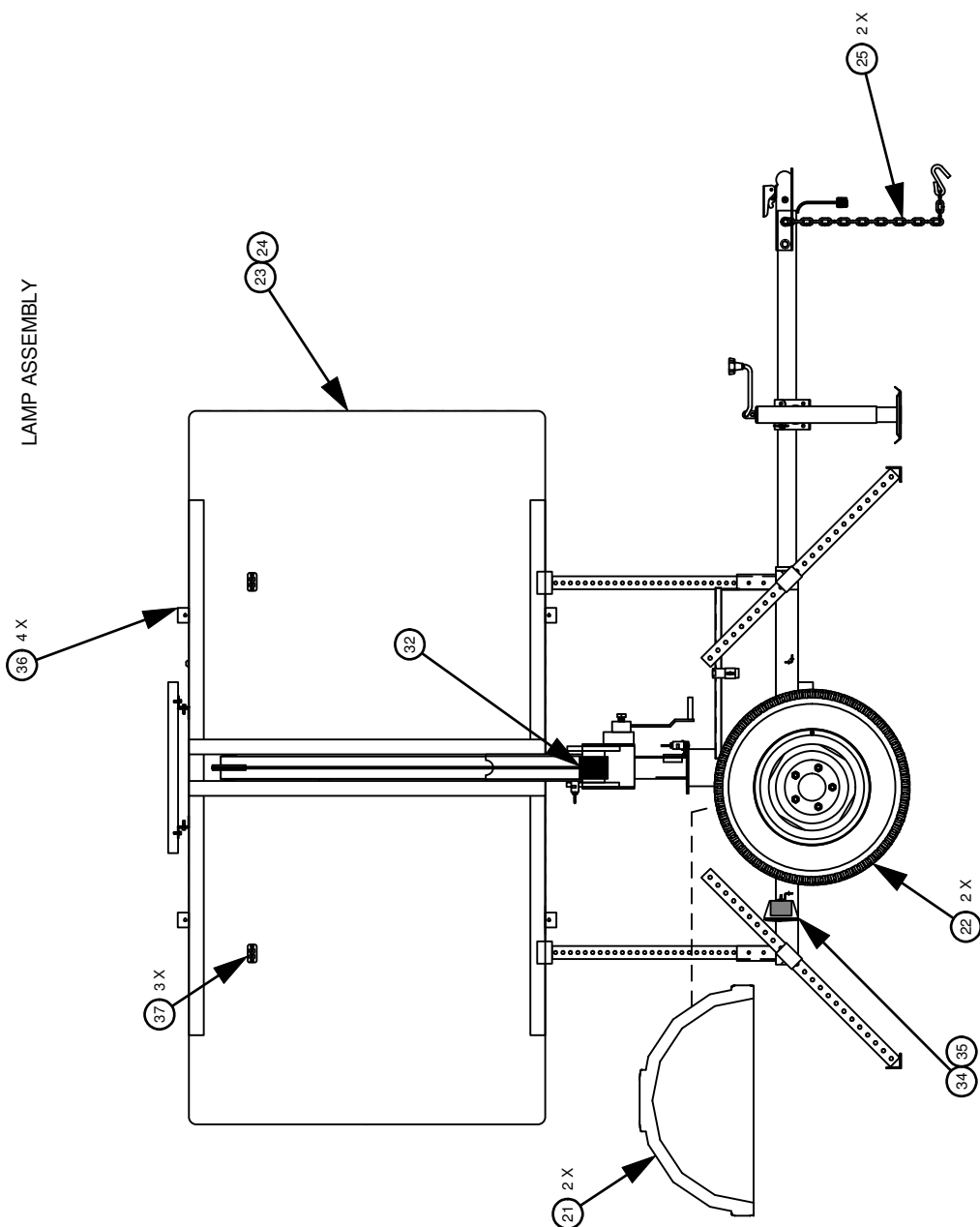
1	TRAILER FRAME ASSEMBLY	5632
2	MAST TUBE WELDMENT	5614
3	BACK RACK WELDMENT	5621
4	MAST SHEAVE (PULLEY)	5683
5	BATTERY BOX	5636
6	TELESPAR CRADLE	8756
7	TELESPAR LEG	5640
8	COUPLER, 2" BALL	5692
9	TONGUE ASSEMBLY W/O COUPLER	8757
10	TOP WIND SWIVEL JACK, 10"	1133
11	CLEAR WINDOW PLUG	5038
12	1500LB BRAKE WINCH	5685
13	NYLON MAST SPACER	8760
14	40W SOLAR PANEL	5655
15	SOLAR PANEL BRACKETS, PAIR	8761
16	JACK LEG PIN	5664
17	SPRING LOCK PIN	5740
18	700 LBS LEAF SPRING	5681
19	2000 LBS AXLE ASSEMBLY	5680
20	1.75" U-BOLT KIT	5682



BATTERY BOX COMPONENTS



LAMP ASSEMBLY



21	BLACK PLASTIC 14" FENDER	5722
22	14" WHEEL AND TIRE ASSEMBLY	3658
23	REPLACEMENT DISPLAY CABINET 15 LT	8767
24	REPLACEMENT DISPLAY CABINET 25 LT	8768
25	SAFETY CHAIN W/ HOOK	1035
26	ARROWMASTER V CONTROLLER 15LT	4221
27	ARROWMASTER V CONTROLLER 25LT	4223
28	GROUP 27 LEAD ACID BATTERY	5654
29	LAMP HOOD	2300
30	LED ARROW LAMP STANDARD ANGLE	4262
31	LED ARROW LAMP WIDE ANGLE	4426
32	1/4" WINCH CABLE, 11' WIRE ROPE	5686
33	OPTIONAL A/C BATTERY CHARGER	XXXX
34	LEFT TAIL LIGHT	5395
35	RIGHT TAIL LIGHT	5394
36	PANEL CLAMP	4048
37	LED INDICATOR LAMP	5690
38	CABLE ASSEMBLY, P1	5693
39	.....	
40	.....	