

OPERATION MANUAL



GLOBUG MODEL GBX24S/GBX24B LIGHT TOWER

Revision #1 (10/02/19)

To find the latest revision of this publication or
associated parts manual, visit our website at:
www.multiquip.com



THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.

PROPOSITION 65 WARNING



REPORTING SAFETY DEFECTS

If you believe that your vehicle has a defect that could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Multiquip Inc. at 1-800-421-1244.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Multiquip Inc.

To contact NHTSA, you may either call the Vehicle Safety Hotline toll-free at 1-888-327-4236 (TTY: 1-800-424-9153), go to <http://www.safercar.gov>, or write to:

Administrator
NHTSA
1200 New Jersey Avenue, SE
Washington, DC 20590

You can also obtain information about motor vehicle safety from
<http://www.safercar.gov>.

TABLE OF CONTENTS

GBX24S/GBX24B

Light Tower

Proposition 65 Warning	2
Reporting Safety Defects.....	3
Safety Information	5–12
Specifications	13
Dimensions.....	14–15
Footcandle Plot.....	16–17
General Information.....	18
Control Panel	19
Components (GBX24S).....	20–21
Components (GBX24B).....	22–23
Setup	24–26
Operation.....	27–28
Storage	29
Transporting.....	30

Maintenance	31–36
Troubleshooting	37–43
Safety Guidelines — Trailers	44–57
Block Diagram	58
AC Wiring Diagram	59
DC Wiring Diagram.....	60
Dimming And Light Switch Wiring Diagram.....	61
Engine Wiring Diagram 1	62
Engine Wiring Diagram 2.....	63
Lights Wiring Diagram (GBX24B)	64
Lights Wiring Diagram (GBX24S).....	65
Light Tower Wiring Diagram.....	66

NOTICE

Specifications and part numbers are subject to change without notice.




SAFETY INFORMATION

Do not operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.

SAFETY MESSAGES








The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

SAFETY SYMBOLS

 DANGER
Indicates a hazardous situation which, if not avoided, WILL result in DEATH or SERIOUS INJURY .
 WARNING
Indicates a hazardous situation which, if not avoided, COULD result in DEATH or SERIOUS INJURY .
 CAUTION
Indicates a hazardous situation which, if not avoided, COULD result in MINOR or MODERATE INJURY .
NOTICE
Addresses practices not related to personal injury.

SAFETY SYMBOLS

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Overspeed hazards
	Rotating parts hazards
	Pressurized fluid hazards
	Electric shock hazards

SAFETY INFORMATION

GENERAL SAFETY

⚠ CAUTION

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.



- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.



- **NEVER** operate this equipment under the influence of drugs or alcohol.



- **ALWAYS** check the equipment for loosened threads or bolts before starting.

- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.
- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.
- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.
- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.

- **ALWAYS** know the location of the nearest fire extinguisher.



- **ALWAYS** know the location of the nearest first aid kit.



- **ALWAYS** know the location of the nearest phone or keep a phone on the job site. Also, know the phone numbers of the nearest **ambulance, doctor** and **fire department**. This information will be invaluable in the case of an emergency.

LIGHT TOWER SAFETY

DANGER

- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death.**



WARNING

- **NEVER** disconnect any **emergency or safety devices.** These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.

CAUTION

- **NEVER** lubricate components or attempt service on a running machine.
- **ALWAYS** ensure light tower is on level ground before use so that it cannot slide or shift around, endangering workers. Always keep immediate area free of bystanders.
- **ALWAYS** make sure trailer is leveled with all outriggers extended before raising tower. Outriggers must remain extended while tower is up.
- **ALWAYS** keep area behind trailer clear of people while raising and lowering mast.
- **NEVER** remove safety pin or pull mast locking pin while tower is in a raised position!
- **CHECK** the mast and winch cables for wear. If any problem occurs when lowering or raising the tower, STOP immediately! Contact a trained technician for assistance.
- **NEVER** pivot or retract mast while unit is operating.
- **NEVER** use the light tower mast as a crane. **DO NOT** lift anything with the mast.
- **ALWAYS** lower the light tower when not in use, or if high winds or electrical storms are expected.

NOTICE

- **ALWAYS** keep the immediate area surrounding the light tower clean, neat, and free of debris.
- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- To prevent the light tower from overturning, **NEVER** use in winds that exceed **45 MPH (72 km/h)** for GBX24S and **34 MPH (55 km/h)** for GBX24B.

LAMP SAFETY

WARNING

- **NEVER** attempt to replace lamp with the power on. Always shut down the engine and turn off circuit breakers when changing the lamp.

CAUTION

- **NEVER** use force when installing the lamp. Excessive force could cause the lamp to break, causing bodily harm.

NOTICE

- **NEVER** leave any grease or oil residue on lamp surface when replacing or removing lamp. This can create hot spots, reducing the service life of the lamp.
- **ALWAYS** make sure lamp surface is clean and dry.
- **ALWAYS** replace with MQ recommended type lamp.
- **ALWAYS** have a **trained technician** install and remove a lamp, or replace any damaged fixture wiring.

SAFETY INFORMATION

ENGINE SAFETY

DANGER

- The engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine of this equipment requires an adequate free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.



WARNING

- **DO NOT** place hands or fingers inside engine compartment when engine is running.
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury.
- **DO NOT** remove the radiator cap while the engine is hot. High pressure boiling water will gush out of the radiator and severely scald any persons in the general area of the generator.
- **DO NOT** remove the coolant drain plug while the engine is hot. Hot coolant will gush out of the coolant tank and severely scald any persons in the general area of the generator.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out of the oil tank and severely scald any persons in the general area of the generator.



CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment.



NOTICE

- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable.
- **NEVER** tip the engine to extreme angles during lifting as it may cause oil to gravitate into the cylinder head, making the engine start difficult.
- Wet stacking is a common problem with diesel engines which are operated for extended periods with light or no load applied. When a diesel engine operates without sufficient load (less than 40% of the rated output), it will not operate at its optimum temperature. This will allow unburned fuel to accumulate in the exhaust system, which can foul the fuel injectors, engine valves and exhaust system, including turbochargers, and reduce the operating performance.



In order for a diesel engine to operate at peak efficiency, it must be able to provide fuel and air in the proper ratio and at a high enough engine temperature for the engine to completely burn all of the fuel.

Wet stacking does not usually cause any permanent damage and can be alleviated if additional load is applied to relieve the condition. It can reduce the system performance and increase maintenance. Applying an increasing load over a period of time until the excess fuel is burned off and the system capacity is reached usually can repair the condition. This can take several hours to burn off the accumulated unburned fuel.

- State Health Safety Codes and Public Resources Codes specify that in certain locations, spark arresters must be used on internal combustion engines that use hydrocarbon fuels. A spark arrester is a device designed to prevent accidental discharge of sparks or flames from the engine exhaust. Spark arresters are qualified and rated by the United States Forest Service for this purpose. In order to comply with local laws regarding spark arresters, consult the engine distributor or the local Health and Safety Administrator.

SAFETY INFORMATION

FUEL SAFETY



DANGER

- **DO NOT** start the engine near spilled fuel or combustible fluids. Diesel fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank, since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine.



TOWING SAFETY — LIGHT TOWER



CAUTION

- Check with your local county or state safety towing regulations, in addition to meeting **Department of Transportation (DOT) Safety Towing Regulations**, before towing your light tower.
- In order to reduce the possibility of an accident while transporting the light tower on public roads, **ALWAYS** make sure the trailer that supports the light tower and the towing vehicle are mechanically sound and in good operating condition.
- **ALWAYS** shutdown engine before transporting.
- Make sure the hitch and coupling of the towing vehicle are rated equal to, or greater than the trailer “gross vehicle weight rating.”



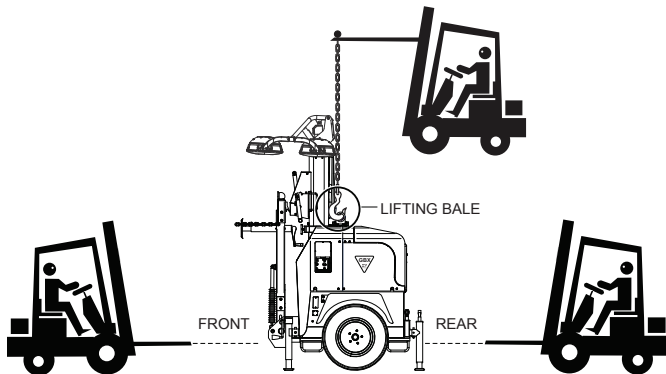
- **ALWAYS** inspect the hitch and coupling for wear. **NEVER** tow a trailer with defective hitches, couplings, chains, etc.
- Check the tire air pressure on both towing vehicle and trailer. **Trailer tires should be inflated to 50 psi cold.** Also check the tire tread wear on both vehicles.
- **ALWAYS** make sure the trailer is equipped with a **safety chain**.
- **ALWAYS** properly attach trailer’s safety chains to towing vehicle.
- **ALWAYS** make sure the vehicle and trailer directional, backup, brake and trailer lights are connected and working properly.
- DOT Requirements include the following:
 - Connect and test electric brake operation.
 - Secure portable power cables in cable tray with tie wraps.
- The maximum speed for highway towing is **55 MPH (86 km/h)** unless posted otherwise. Recommended off-road towing is not to exceed **15 MPH (24 km/h)** or less depending on type of terrain.
- Avoid sudden stops and starts. This can cause skidding, or jack-knifing. Smooth, gradual starts and stops will improve towing.
- Avoid sharp turns to prevent rolling.
- Trailer should be adjusted to a level position at all times when towing.
- Raise and lock trailer jack stands in up position when towing.

SAFETY INFORMATION

TRANSPORTING SAFETY

⚠ CAUTION

- Before lifting, make sure that light tower parts are not damaged and screws are not loosened or lost.
- **ALWAYS** make sure lifting device has been properly secured to lifting hook of the equipment.
- **NEVER** lift the equipment while engine is running.
- Use adequate lifting cable (wire or rope) of sufficient strength.
- Use one point suspension hook and lift straight upwards.

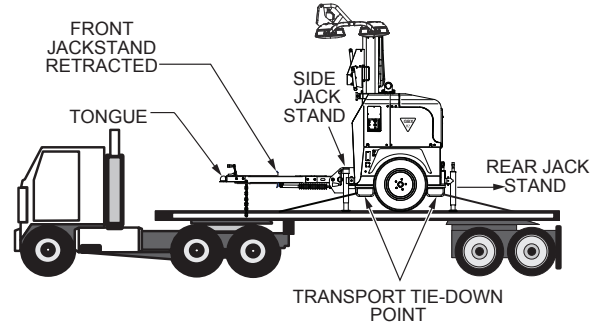


- If lifting through pockets, make sure forks of forklift are inserted in pockets as far as possible before lifting.
- Place **chock blocks** underneath wheel to prevent **rolling** while parked.
- Place **support blocks** underneath the trailer's bumper to prevent **tipping** while parked.
- Use the trailer's swivel jack to adjust the trailer height to a level position while parked.
- **NEVER** allow any person or animal to stand underneath the equipment while lifting.
- **DO NOT** lift equipment to unnecessary heights.

Loading and Tie-Down on Flatbed Truck

NOTICE

- When loading onto flatbed truck, make sure that front jackstand of light tower is retracted and in the horizontal position so that the foot does not make contact with the deck floor.


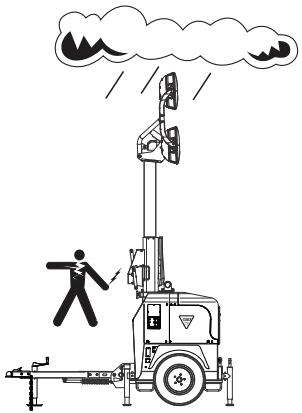
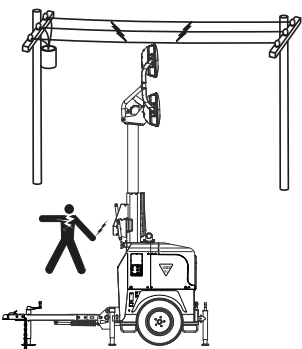



- Make sure that the two side (left and right) and two rear jackstands are in the vertical position, slightly extended, so that each foot makes contact with the deck floor.
- Straps and chains should be routed through the transport tie-down points located beneath each corner of the cabinet to allow even application of force to the front and rear of the machine.
- **DO NOT** secure the unit by running a strap or chain over the tongue of the light tower. This may cause severe damage to the unit.

SAFETY INFORMATION

ELECTRICAL SAFETY

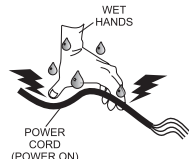
DANGER

- The electrical voltage required to operate the generator can cause severe injury or even death through physical contact with live circuits. Turn generator and all circuit breakers **OFF** before performing maintenance on the generator.
- **NEVER** insert any objects into the output receptacles during operation. This is extremely dangerous. The possibility exists of **electrical shock, electrocution or death.** 
- **NEVER** operate light tower or handle any electrical equipment while standing in water, while barefoot, while hands are wet or in the rain. A dangerous **electrical shock** could occur, causing **severe bodily harm or even death.** 
- **ALWAYS** make sure the area above the light tower is open and clear of overhead power lines and other obstructions. The tower extends in excess of 30 feet (9 meters). Contact with overhead power lines or other obstructions could result in equipment damage, **electrical shock, electrocution and even death.** 
- Similar to boom equipment, light tower may become energized with high voltage. **DO NOT** operate the light tower within a radial distance of 17 feet (5.1 meters) from high voltage power lines. If light tower becomes energized with high voltage, contact with the equipment could result in electrocution.
- **NEVER** operate GBX24S light tower in winds in excess of **45 MPH**.
- **NEVER** operate GBX24B light tower in winds in excess of **34 MPH**.

- Backfeed to a utility system can cause **electrocution** and/or property damage. **NEVER** connect the generator to a building's electrical system without a transfer switch or other approved device. All installations should be performed by a **licensed electrician** in accordance with all applicable laws and electrical codes. Failure to do so could result in electrical shock or burn, causing **serious injury or even death.** 

Power Cord/Cable Safety

DANGER

- **NEVER** let power cords or cables lay in water.
- **NEVER** use **damaged** or **worn** cables or cords when connecting equipment to generator. Inspect for cuts in the insulation.
- **NEVER** grab or touch a live power cord or cable with wet hands. The possibility exists of **electrical shock, electrocution or death.** 
- Make sure power cables are securely connected. Incorrect connections may cause electrical shock and damage to the light tower.

Grounding Safety

DANGER

- The light tower is equipped with a ground terminal for your protection. **ALWAYS** complete the grounding path from the light tower to an external grounding source.
- **ALWAYS** make sure that electrical circuits are properly grounded to a suitable earth ground (ground rod) per the National Electrical Code (NEC) and local codes before operating generator. **Severe injury or death by electrocution** can result from operating an ungrounded generator.
- **NEVER** use gas piping as an electrical ground.

SAFETY INFORMATION

BATTERY SAFETY

DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur.



WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin.
- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gasses.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water.
- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.



CAUTION

- **ALWAYS** disconnect the **NEGATIVE** battery terminal before performing service on the generator.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.

ENVIRONMENTAL SAFETY

NOTICE

- Dispose of hazardous waste properly. Examples of potentially hazardous waste are used motor oil, fuel and fuel filters.
- **DO NOT** use food or plastic containers to dispose of hazardous waste.
- **DO NOT** pour waste, oil or fuel directly onto the ground, down a drain or into any water source.



SPECIFICATIONS

Table 1. GBX24S/B Light Tower Specifications

Model		GBX24S	GBX24B
Light Tower	Voltage	120 VAC	120 VAC
	Frequency	60 Hz	60 Hz
	Max. Current	22 A	22 A
	Wind Stability	45 mph (20 m/s)	34 mph (15 m/s)
Light	Type	LED Spot 600 W (X4)	Balloon 2400 W LED
	Dimming Control	40 - 100%	40 - 100%
	Lumens	399,000 lm	399,000 lm
	Ambient Temperature	14 to 104°F (-10 to 40°C)	14 to 104°F (-10 to 40°C)
Mast	Format	5 Stages Telescopic	5 Stages Telescopic
	Height	23 ft (7 m)	23 ft (7 m)
	Rotation	359°	359°
	Operation Method	Manual	Manual
Trailer	Tire	23.6 in. Dia. (600 mm) x 2 Air Tire	23.6 in. Dia. (600 mm) x 2 Air Tire
	Tire Inflation Pressure	50 psi (344.7 kPa)	50 psi (344.7 kPa)
	Outrigger	Rear: Sliding Type 2, Towbar: 1	Rear: Sliding Type 2, Towbar: 1
	Jack	4	4
Generator	Power	3 kVA	3 kVA
	Output	4600 W	4600 W
Dimensions	Stowed	57.6 x 47.2 x 87 in (1465 x 1200 x 2210 mm)	67.7 x 47.2 x 88.5 in (1720 x 1200 x 2250 mm)
	Working	105.1 x 96.6 x 113.4 - 302 in (2670 x 2455 x 2,880 - 7670 mm)	105.1 x 96.6 x 113.4 - 325.5 in (2,670 x 2,455 x 2,880 - 8,270 mm)
Weight	Operating	1,410 lb (640 kg)	1,366 lb (620 kg)

Table 2. Engine Specifications

Model	Kubota Z482-E4BG
Type	2 Cylinder, Liquid-cooled
EPA Certification	Tier 4F
Fuel Type	Diesel
Output Power	6.1 HP (4.6 kW)
Fuel Capacity	45 gal (170 L)
Oil Capacity	0.66 gal (2.5 L)
Starting Method	Electric Start
Engine Protection	High Temp / Low Oil

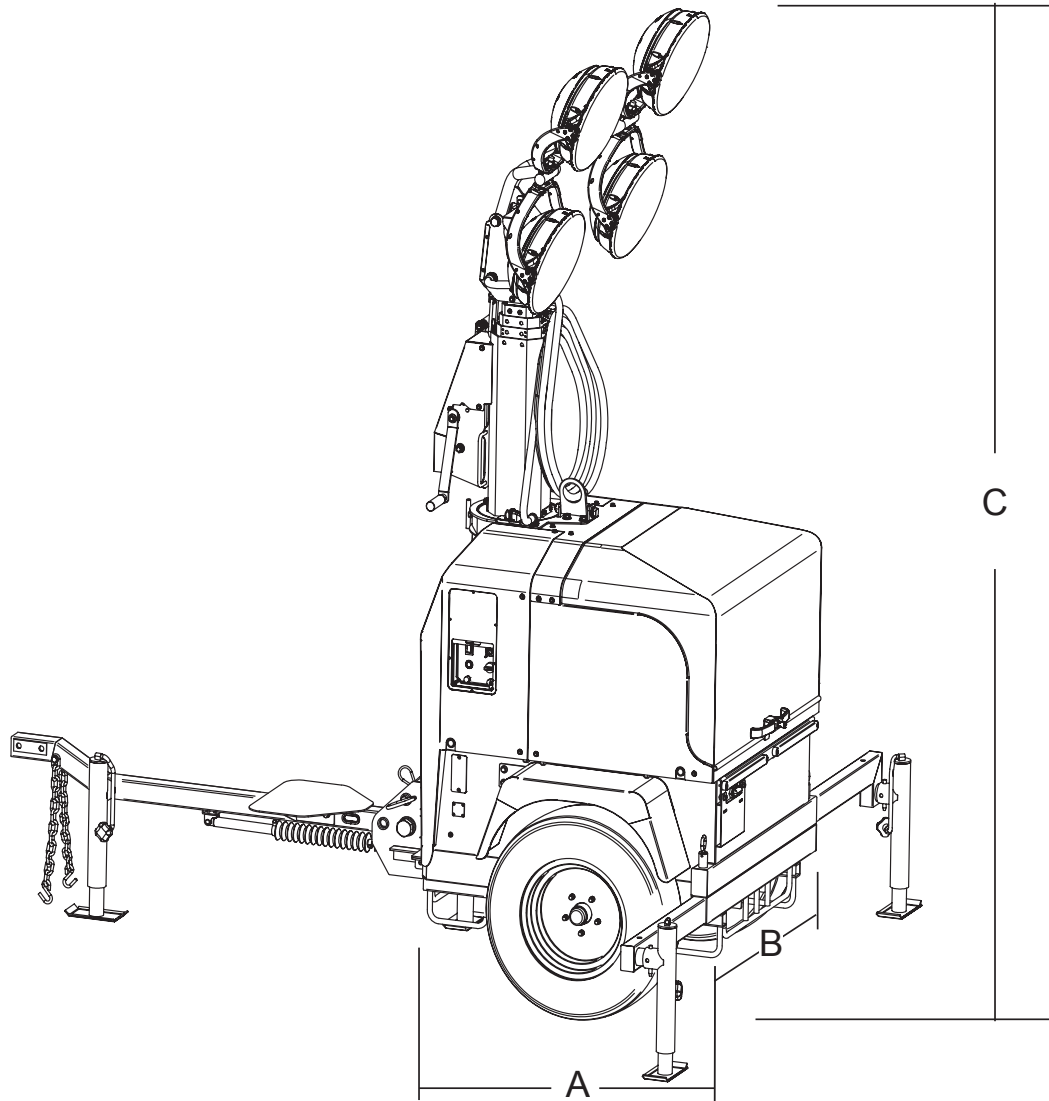


Figure 1. GBX24S Dimensions

Table 3. GBX24S Dimensions	
Reference Letter	Dimension in. (mm)
A	105.1 (2,670)
B	96.6 (2,455)
C	113.4 - 302 (2,880 - 7,670)

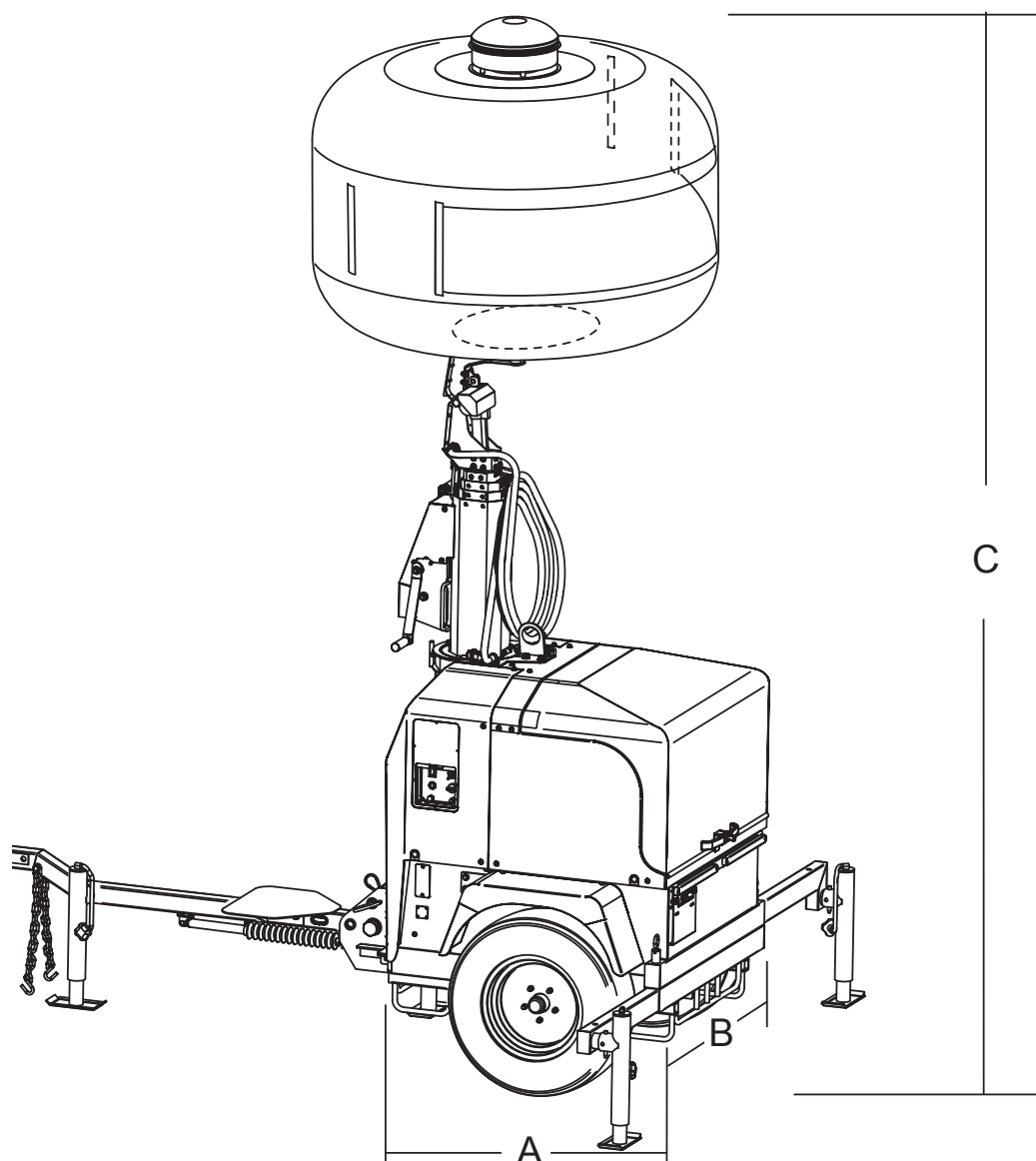
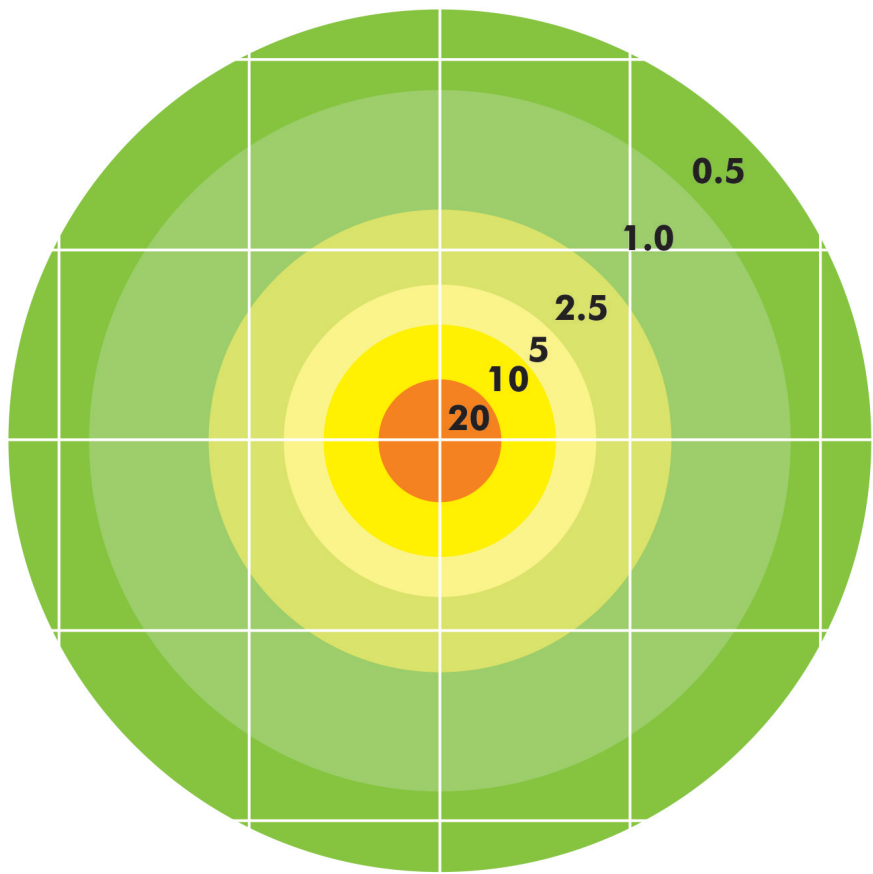


Figure 2. GBX24B Dimensions

Table 4. GBX24B Dimensions	
Reference Letter	Dimension in. (mm)
A	105.1 (2,670)
B	96.6 (2,455)
C	1113.4 - 325.5 (2,880 - 8,270)

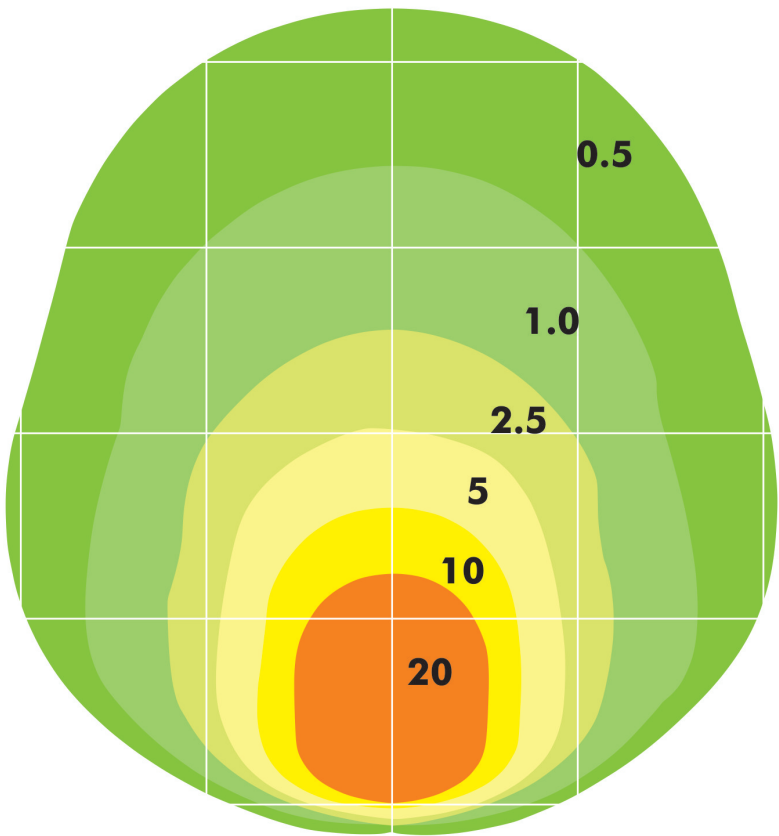
FOOTCANDLE PLOT



1 GRID = 50'

Footcandle	20	10	5	2.5	1.0	0.5
Diameter (Ft)	32	61	82	121	184	226

Figure 3. GBX24B Footcandle Plot



1 GRID = 50'

Footcandle	20	10	5	2.5	1.0	0.5
Diameter (Ft)	54	78	100	126	175	218

Figure 4. GBX24S Footcandle Plot

GENERAL INFORMATION

The Multiquip models GBX24S (4-Spot LED) and GBX24B (LED balloon) are compact, mobile light towers that provide exceptional clear lighting for multiple applications found in: construction, emergency response, special events, security, and general large projection lighting challenges.

The GBX24S utilizes four powerful 600W LED lamps that are supported by industrial grade enclosures that withstand high impact and inclement weather. The LED assembly has a service life of 40,000 hours; and at full power, projects 399,000 lumens. An additional dimmer feature allows the operator to adjust the lamp projection that best supports the application. The four lamps are adjustable to infinite angles and direction for optimum lighting orientation.

The GBX24B is designed with a powerful 2400W LED balloon lamp. The LED assembly has a service life of 40,000 hours; and at full power, projects 399,000 lumens of fully diffused lighting. An additional dimmer feature allows the operator to adjust the balloon output that best supports the application. The balloon utilizes an integrated fan that automatically inflates the unit in 20 seconds.

Both models are supported by a DOT/NHSTA qualified trailer that provides 4 adjustable jack stands, and a retractable tow bar. A five-section, anodized, aluminum mast assembly raises to a maximum height of 23 feet. The light tower cabinet assembly supports the 6.1 HP(4.6 kW) diesel engine, 3 kVA generator, control panel, and fuel tank. A lockable flip-up rear hatch provides easy access to the engine/generator and fuel tank.

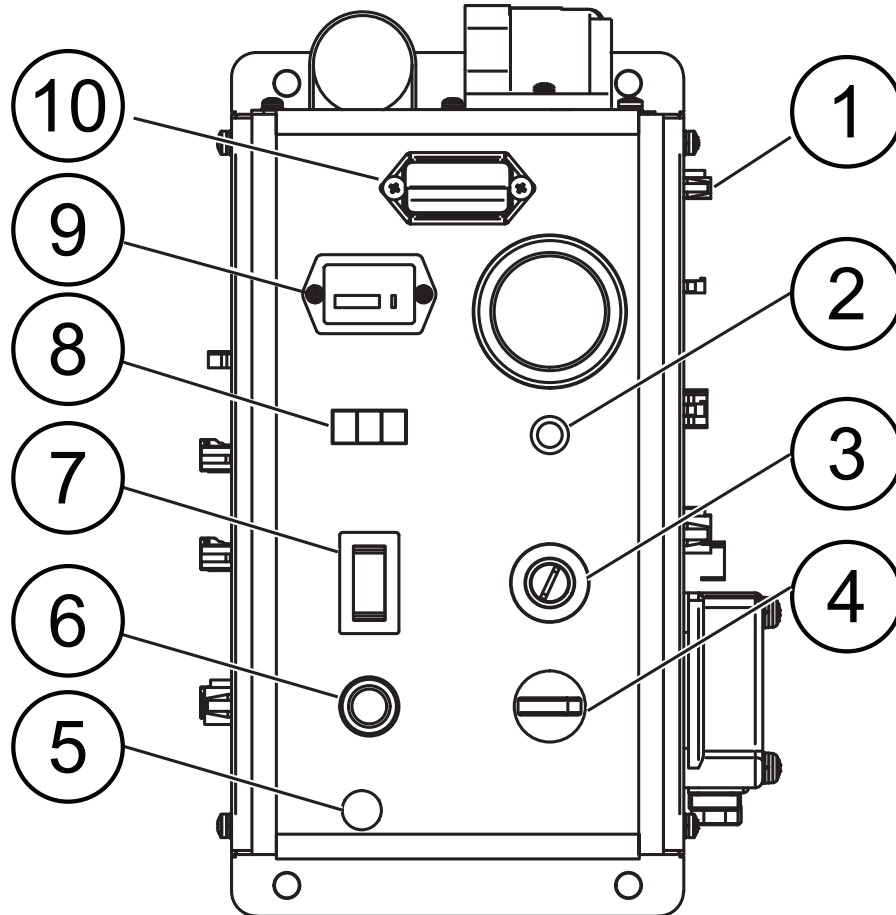


Figure 5. GBX24S/GBX24B Control Panel

1. **Fuses** — Provide circuit protection.
 - a. **Fuse 1** (5 A) - protects the starter circuit
 - b. **Fuse 2** (5 A) - protects the circuit of preheating engine
 - c. **Fuse 3** (10 A) - protects the ECU
 - d. **Fuse 4** (20 A) - protects the motor winch case
 - e. **Fuse 5** (20 A) - protects the engine key switch and component wiring
 - f. **Fuse 6** (30 A) - protects the circuit of the engine heater
2. **Glow Lamp** — Lights to indicate engine error.
3. **Ignition Key Switch** — Starts the engine.
4. **Actuator Switch** — When turned, raises or lowers the lampstand.
5. **Lamp Breaker** — 25A circuit breaker protects lamps from overload. When there is an overload, breaker trips. When problem is corrected, press the breaker to reset.
6. **Lamp Switch** — When pressed, turns all the lamps on or off.
7. **Dimming Control Switch** — When pressed, changes the brightness of the lamp from 100% down to 40%.
8. **Dimming Meter** — Indicates the percentage of the lamps' brightness.
9. **Hour Meter** — Indicates the number of hours that the machine has been in use.
10. **Panel Lamp** — Lights the panel.

COMPONENTS (GBX24S)

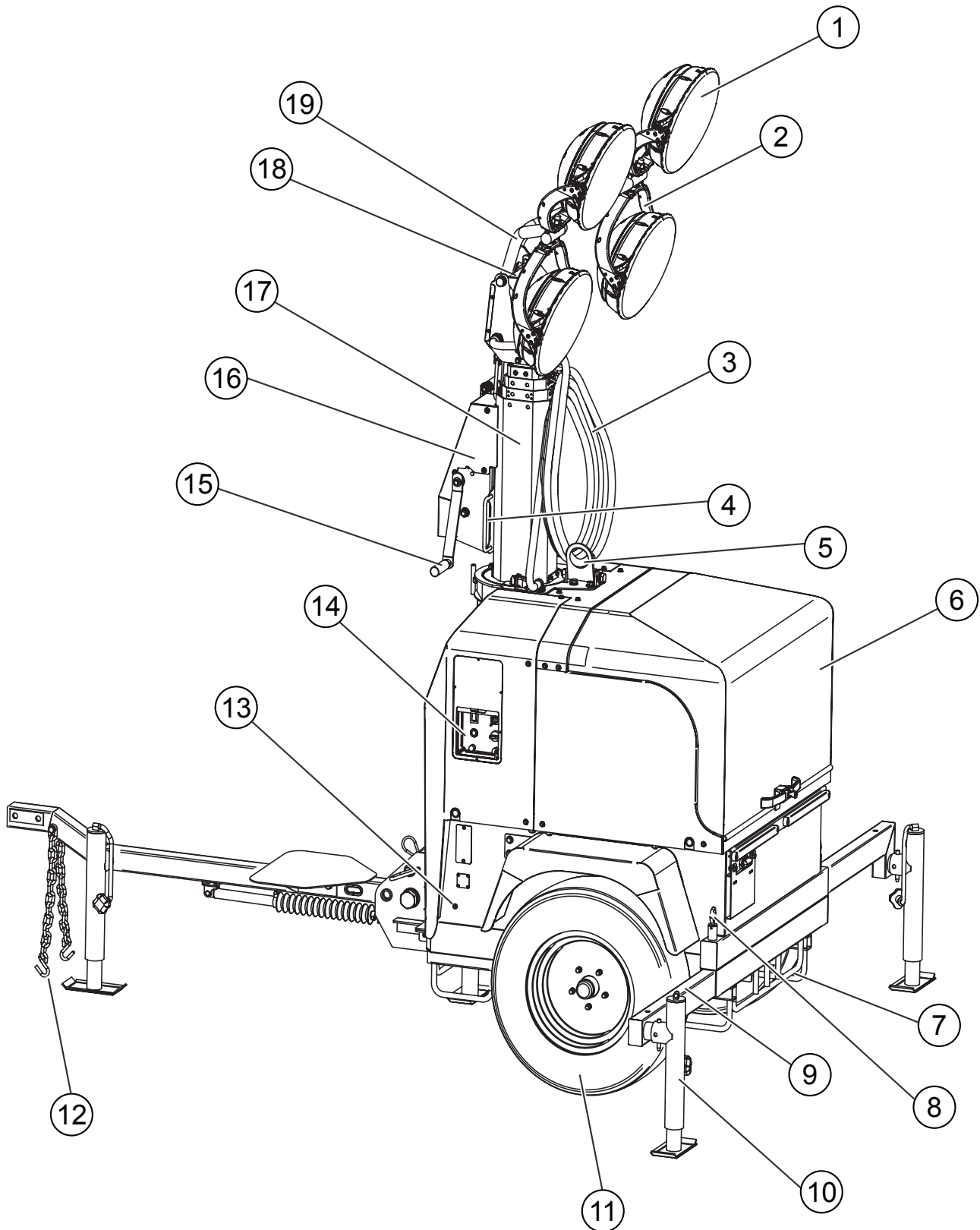


Figure 6. GBX24S Components

COMPONENTS (GBX24S)

Refer to Figure 6 for the location of the components listed below.

1. **Lamp**— 600 Watt LED lamp with industrial grade, impact and weather resistant shell enclosure. Lamp Arm — Holds the lamp and permits multiple directional adjustments.
2. **Lamp Arm** — Holds the lamp and permits multiple directional adjustments.
3. **Main Lamp Power Cable** — Connects the lamp assemblies to the power output of the generator.
4. **Mast Handle** — Aids the operator in rotating the mast to the desired direction. Mast lock must be disengaged to rotate the mast.
5. **Lifting Eye** — Use this center of gravity lifting point when required to transport the unit via a supportive chain or strap. **NEVER** stand underneath the GBX24S while it is being lifted.
6. **Rear Hatch** — Lockable and provides immediate access to the engine, generator, fuel tank, and 12V battery.
7. **Forklift Pockets** — For the ease of light tower transportation via a forklift.
8. **Locking Pin** — These pins must be securely in place once the jackstands are positioned to ensure the overall security of the jackstands and outrigger sections.
9. **Outriggers** — Should always be deployed and locked in place during operation.
10. **Jackstand** — Two jackstands and outrigger assemblies are provided to properly secure the unit including on uneven surfaces and to withstand windy operating conditions.
11. **Tires** — The GBX24S utilizes two ST175/80 R-13 5-lug pneumatic tires. Replace with only recommended type tire. **NEVER** allow the rear tires to go flat.
12. **Safety Chain** — A safety chain is provided to be included in the proper process of preparing the light tower for towing.
13. **Ground Terminal** — Connects to ground.
14. **Control Panel** — The singular control station to start/stop the engine, monitor the engine safeguards, view the hour meter, control the lamp dimmer, adjust the lamp stand position, and access the main circuit breakers.
15. **Winch Handle** — Opposing operating handles that controls the mast sections in travel.
16. **Mast Winch** — A self-locking, mechanical hoist that controls the mast sections to effectively raise and lower the entire assembly. Always be on the lookout for overhead obstructions. Keep immediate area free of bystanders and debris when raising the mast.
17. **Mast** — 5-stage telescopic mast assembly that is mechanically raised to a maximum height of 23 feet, and pivots 359 degrees.
18. **Actuator** — Permits the adjustment of the lamp stand via the control panel.
19. **Lamp Stand** — Secures the 4 LED lamps and is electrically adjustable via the control panel.

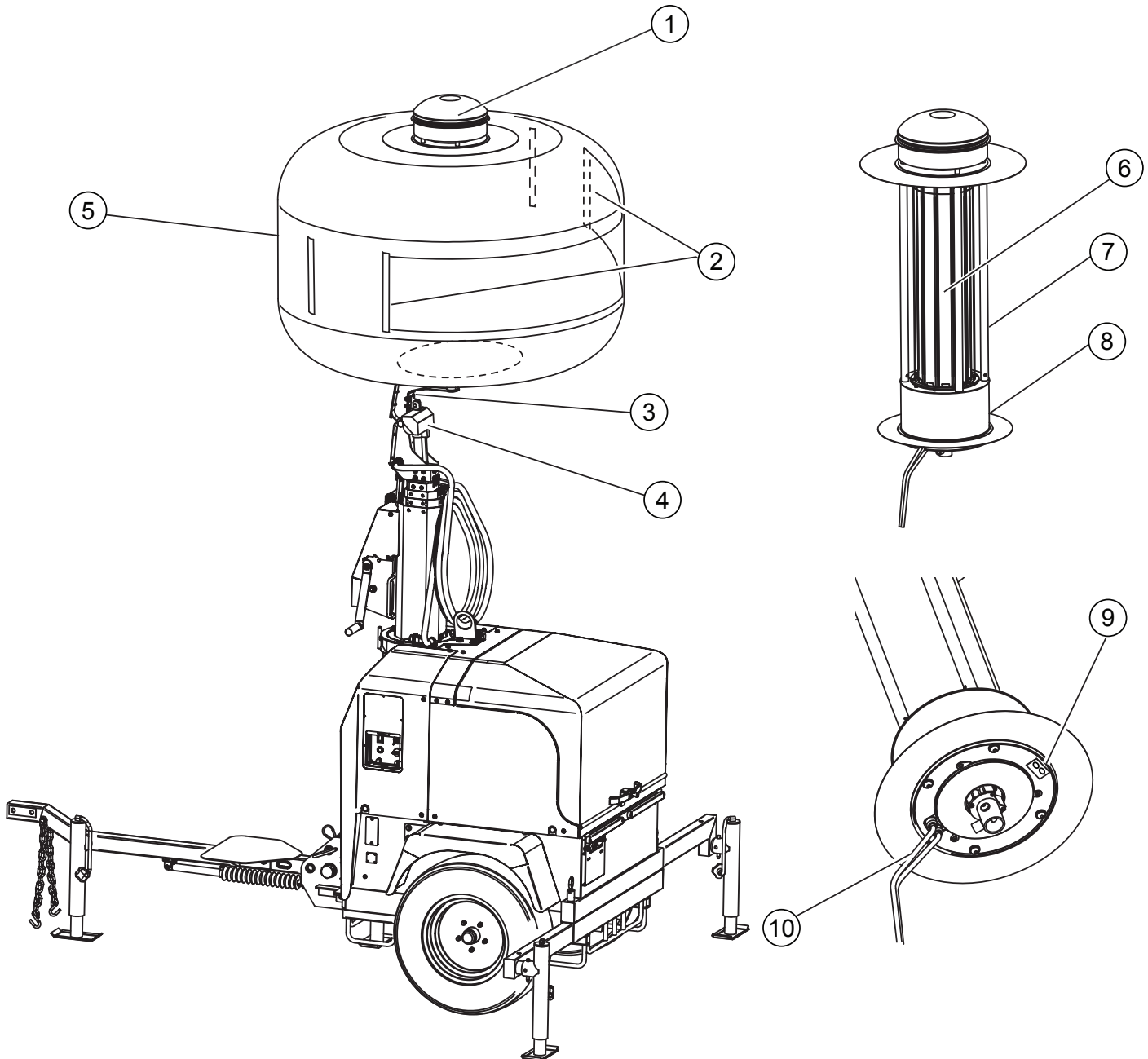


Figure 7. GBX24B Components

COMPONENTS (GBX24B)

Refer to Figure 7 for the location of the components listed below.

1. **Balloon Cover** — Is a zippered, red vinyl bag that covers the 2400 W Lamp. It collapses and secures atop the unit when setting up for operations.
2. **Velcro Strips** — Two Velcro strips are connected to the balloon bag to support optional message strips (contact MQ Sales Department for information).
3. **Balloon Stand** — Holds the balloon lighting system.
4. **Actuator** — Permits the adjustment of the lamp stand via the control panel.
5. **Balloon Bag** — This balloon is made of a heat-resistant, weather-resistant polyester material. The balloon can be easily removed and washed with common washing detergents.
6. **LED Lamp** — 2400 W lamp with dimming control of 40 to 100%.
7. **LED Guard** — Protects the LED lamps from being hit by objects.
8. **Fan** — Inflates the balloon.
9. **Error Indicator** — Lights when an error is detected.
10. **Cable** — Connects the balloon lamp to the power output of the generator.

NOTICE

Refer to Component (GBX24S) page for description of the parts located on the cart.

PREPARATION

1. Place the light tower in an area free of dirt and debris with enough clearance as not to interfere with any overhead obstructions. Make sure it is on secure level ground with chock blocks underneath each wheel to prevent the light tower from rolling.

! DANGER

ALWAYS make sure the area above light tower is open and clear of overhead power lines and other obstructions. The tower extends in excess of 23 ft. (7 meters). Contact with overhead power lines or other obstructions could result in equipment damage, serious injury or death!

2. Extend all the outriggers by pulling the locking pin on the outriggers and hold while sliding out the outriggers assembly (Figure 8).

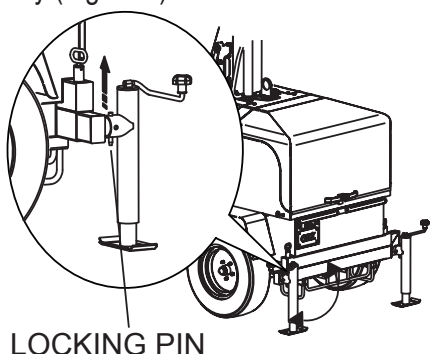


Figure 8. Pulling the Locking Pin

3. As soon as the locking pin clears the travel position hole, release pin and continue sliding out the outrigger. When outrigger is in the extended position, make sure pin snaps into the outrigger locking hole (Figure 9).

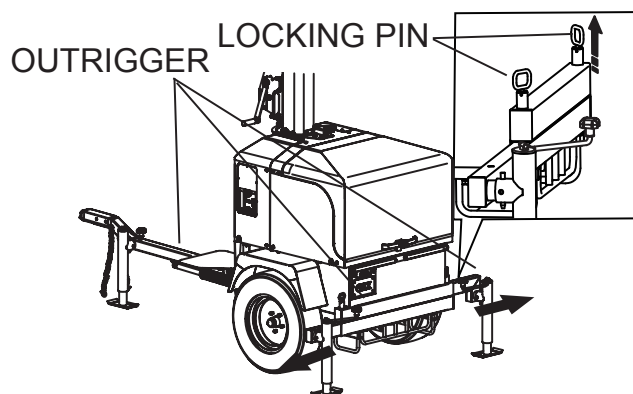


Figure 9. Extending Outriggers

4. After extending all outriggers, rotate all trailer jackstands into the foot-down position. Turn the crank handle on the jackstands clockwise to lower them to the level of the light tower.

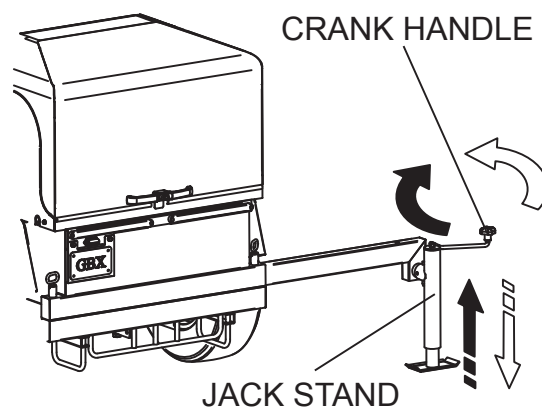


Figure 10. Lowering the Jackstands

CHANGING LAMP DIRECTION

The mast can be rotated to change the direction that the lamps are facing. The lamps can also be rotated individually.

Rotating the Mast

5. With the mast in full vertical position, unscrew the mast locking knob to release the mast for rotation (Figure 11).

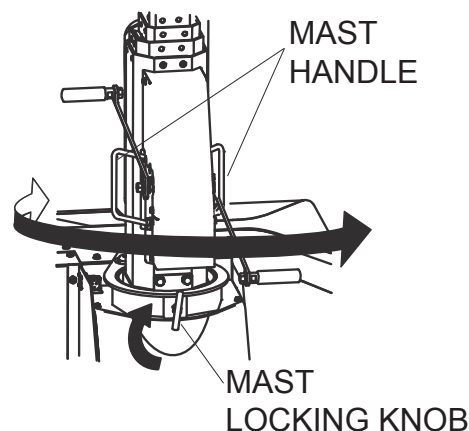


Figure 11. Rotating the Mast

6. Grab the mast handles and rotate the mast until the lamps are facing the desired direction.
7. Tighten the mast locking knob to lock the mast in place.

Rotating and Tilting the Lamps

1. Hold the arms of the individual lamp and rotate it to the desired direction (Figure 12). It is not necessary to loosen the nut to turn the lamps.

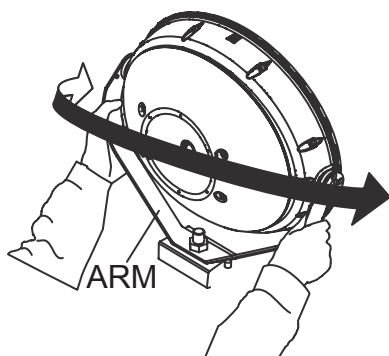


Figure 12. Rotating a Lamp

2. To tilt the lamp to a desired angle, hold the individual lamp and tilt (Figure 13).

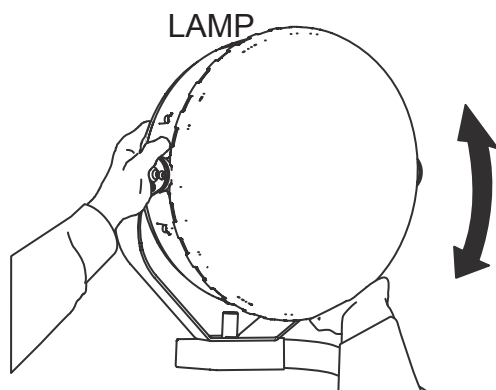


Figure 13. Tilting a Lamp

CAUTION

When tilting the lamp, keep fingers clear of the pinch points to prevent injury.

Tilting the Lamp Stand

NOTICE

The generator does not need to be running in order to operate the actuator switch and the control panel light. Turning the ignition key switch to the ON position will activate these functions.

1. GBX24B Only:

- a. Unfasten the belt buckle on the protective cover.
- b. Remove and fold protective cover into itself at the top of the balloon and zip the cover (Figure 14).



Figure 14. Removing the Protective Cover

2. Turn the actuator switch on the control panel (Figure 15) counterclockwise to tilt the lamp stand up.

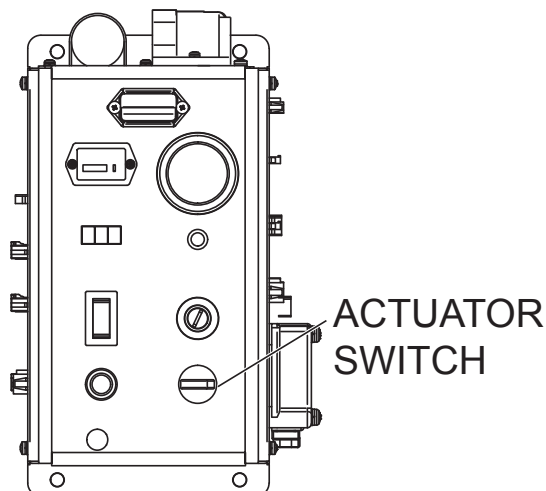


Figure 15. Actuator Switch

3. The lampstand will begin to rise (Figure 16). When the lampstand is in the desired position, release the actuator switch. The actuator switch will return to the center position automatically and lampstand will stop rising.

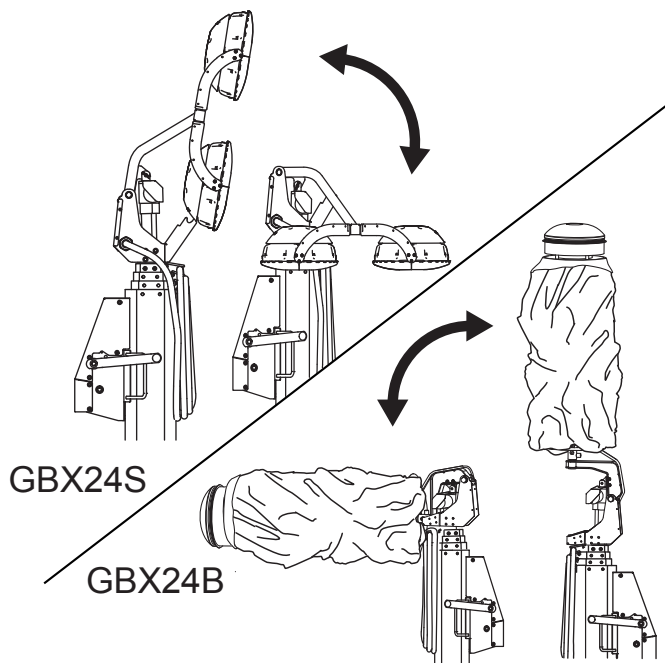


Figure 16. Raising and Lowering Lampstand

4. Turn the actuator switch clockwise to tilt down the lamp stand. When the lamp stand is in the desired position, release the actuator switch. The actuator switch will return to the center position automatically and lampstand will stop lowering.

EXTENDING THE MAST

! DANGER

ALWAYS make sure the area above light tower is open and clear of overhead power lines and other obstructions. The tower extends in excess of 23 ft. (7 meters). Contact with overhead power lines or other obstructions could result in equipment damage, serious injury or death!

! CAUTION

Always make sure the trailer is on level ground with the outriggers fully extended before extending the mast. The outriggers must remain fully extended while the mast is extended.

1. Unlock the shackle (Figure 17).

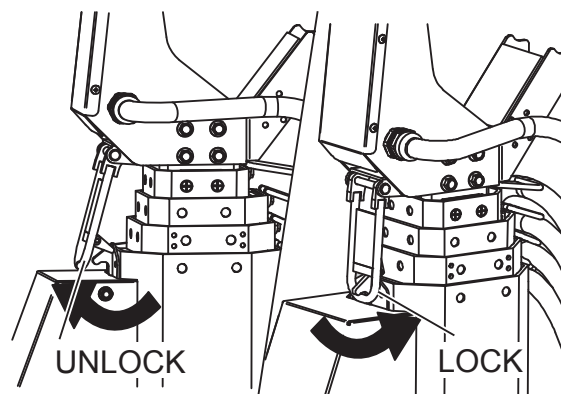


Figure 17. Unlocking the Shackle

! CAUTION

NEVER raise the mast without releasing the shackle. Equipment might get damaged.

2. Turn the mast winch clockwise to raise the mast and observe that the mast begins to extend upwards (Figure 18).

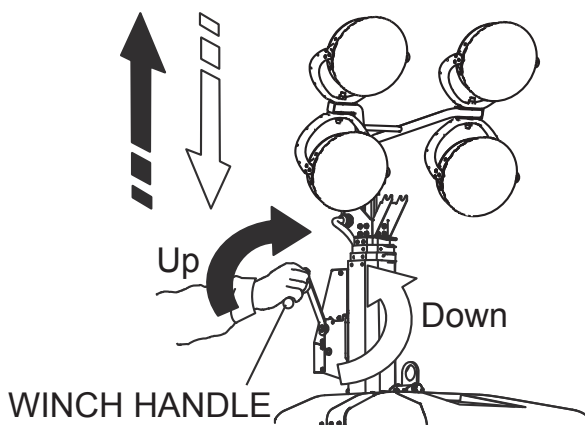


Figure 18. Extending the Mast

3. Continue turning the mast winch clockwise until the desired height has been reached.
4. Release the mast winch. The winch is a self-locking type and the tension on the cable will keep the mast in place.

STARTING THE ENGINE

1. Open the rear cover of the cart. Set the fuel lever to the ON position (Figure 19).

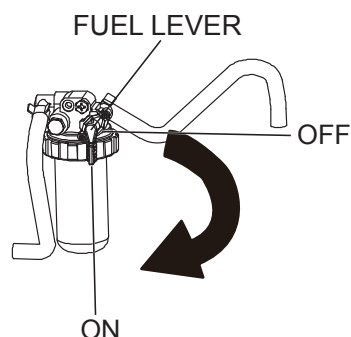


Figure 19. Fuel Lever (ON)

2. Open the panel door to access the control panel.
3. Insert the ignition key into the ignition key switch (Figure 20).

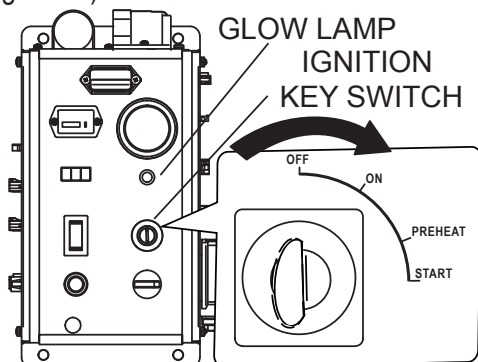


Figure 20. Ignition Switch

4. Turn the ignition key clockwise to the ON position (one click).
5. Turn the ignition key clockwise to the PREHEAT position. The glow lamp will light.
6. Continue turning the ignition key to the START position. When the engine has started, release the key.
7. Check if the glow lamp is off. If lamp is still on, turn off the engine and determine the cause.
8. Before placing the light tower into actual operation, let the engine run for 3 to 5 minutes. Check for any abnormal sounds or smells that would be associated with a defective light tower.
9. If any abnormal condition occurs, shut down the engine and correct the problem.

TURNING ON THE LAMPS

1. Press the lamp switch on the control panel to turn on all the lamps (Figure 21).

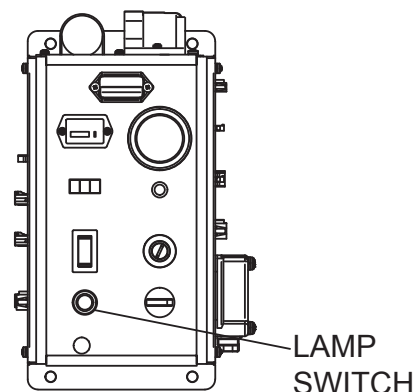


Figure 21. Turning on the Lamps

2. Lamps operate at 2400 W when power is turned on.

DIMMING THE LAMPS

1. Press the lower part of the dimming control switch to dim the lamps. The lamps can be dimmed from 100% to 40% brightness. The dimming meter will indicate how dim the lamps are (Figure 22).

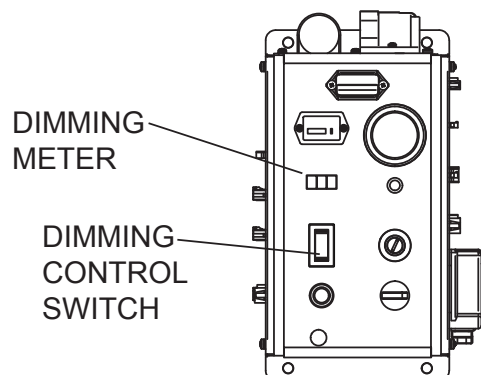


Figure 22. Dimming the Lamps

2. Press the upper part of the dimming control switch to increase the brightness (less dimming).

NORMAL SHUTDOWN

1. Turn off the lamps by pressing the lamp switch on the control panel.
2. Let the engine idle for a few minutes with no load.
3. Turn the ignition key to the off position. Store the key in a safe location.

EMERGENCY SHUTDOWN

4. Place the key switch in the STOP position. Remove key. Place fuel lever in the OFF position.

LOWERING THE MAST AND LAMPSTAND AFTER USE

1. Turn the winch handle counterclockwise and observe the mast until it is completely lowered. The mast locking shackle will lock automatically.
2. To lower lampstand, turn down and hold the actuator switch to the storage position.

PREPARATION FOR STORAGE

1. Place the lamp switch on the control panel to the off position to turn the lamps off.
2. Turn the ignition switch to the OFF position to shut down the engine.
3. Unscrew the mast locking knob to release the mast for rotation.
4. Rotate the mast to the original stow position.
5. Tighten the mast locking knob to secure the mast.
6. Turn the actuator switch to the left and hold until the lampstand is completely lowered.
7. Turn the winch handle counterclockwise until the mast is completely lowered.

BALLOON STORAGE

1. Unzip the cover pocket at the top of the balloon. Take out the cover and fold the balloon with it (Figure 23).

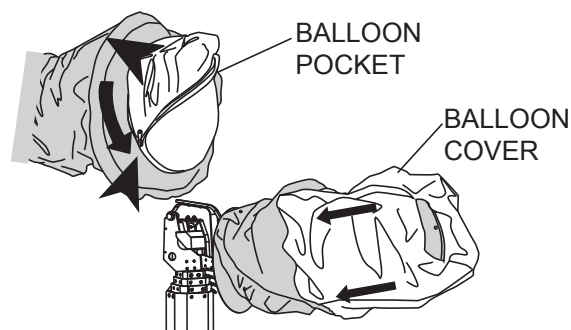


Figure 23. Unzipping Balloon Cover

2. Cover the balloon and lampstand. Zip up the cover and fasten the 4 buckles (Figure 24).

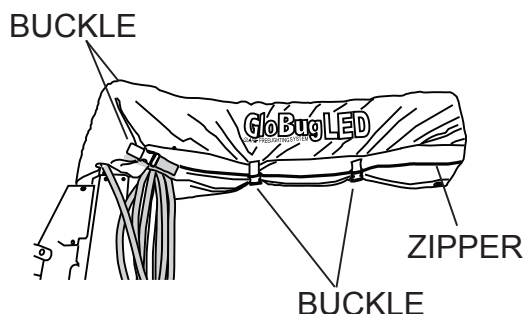


Figure 24. Zipping Balloon Cover

LIGHT TOWER STORAGE

1. Wipe dirt or foreign matter that may have accumulated on the light tower during operation. Use a mild detergent to clean the unit. **DO NOT** spray the engine with water.
2. Avoid storing the light tower in areas that can be exposed to rain, harsh elements, and high humidity.
3. Place the light tower in a clean dry location away from dirt and debris.

1. Before lifting light tower, make sure that the mast is completely lowered.
2. Insert the forklift forks into the fork pockets of the light tower either on the front or rear (Figure 25).

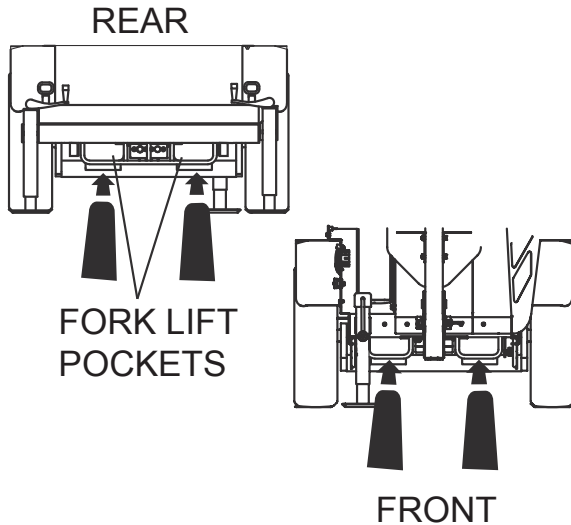


Figure 25. Inserting Forklift Forks (Front/Rear)

CAUTION

Make sure that the generator is securely in place before transporting the light tower with the forklift. Failure to do so could cause the light tower to fall down and cause bodily injury to bystanders.

CAUTION

Do not make sudden stops or turns when transporting the light tower with the forklift to prevent the light tower from falling off.

BASIC ENGINE MAINTENANCE

See Table 5 below for a general inspection and maintenance checklist. For more detailed maintenance, refer to the engine service manual.

Table 5. Engine Maintenance								
Frequency	10 hrs Daily	50 hrs	75 hrs	100 hrs	150 hrs	200 hrs*	400 hrs	500 hrs**
Check Sump Oil Level/Coolant Leaks	X							
Check Fuel Filter	X							
Check Dust in Air Cleaner	X							
Check for Leaks/Visual Walk Around	X							
Check for Loosening of Parts	X							
Check Fuel Pipes and Clamp Bands		X						
Check Fan Belt Tightness				X				
Check Radiator Hoses and Clamp Bands						X		
Check Intake Air Line						X		
Clean Water Separator in Fuel Tank							X	
Clean Fuel Filter				X				
Clean Oil Bath and Air Cleaner Element	X			X				
Clean Water Jacket (Radiator Interior)								X
Replace Engine Oil (initial and thereafter)		X	X					
Replace Filter Cartridge (initial and thereafter)								
Replace Fuel Filter							X	
Replace Air Cleaner and Fan Belt								X
* — low use: every six months ** — low use: every year								

GENERAL INSPECTION

When performing any maintenance on the light tower or engine, follow all safety messages and rules for safe operation stated at the beginning of this manual.

Prior to each use, the light tower should be cleaned and inspected for deficiencies. Check for loose, missing or damaged nuts, bolts or other fasteners. Also check for fuel or oil leaks.

WARNING

Accidental starts can cause severe injury or death. **ALWAYS** place the ON/OFF switch in the OFF position. Disconnect negative battery cable from battery before servicing.

WARNING



Some maintenance operations may require the engine to be run. Ensure that the maintenance area is well ventilated. Exhaust contains poisonous carbon monoxide gas that can cause unconsciousness and may result in **DEATH**.

CAUTION



ALWAYS allow the engine to cool before servicing. **NEVER** attempt any maintenance work on a hot engine.

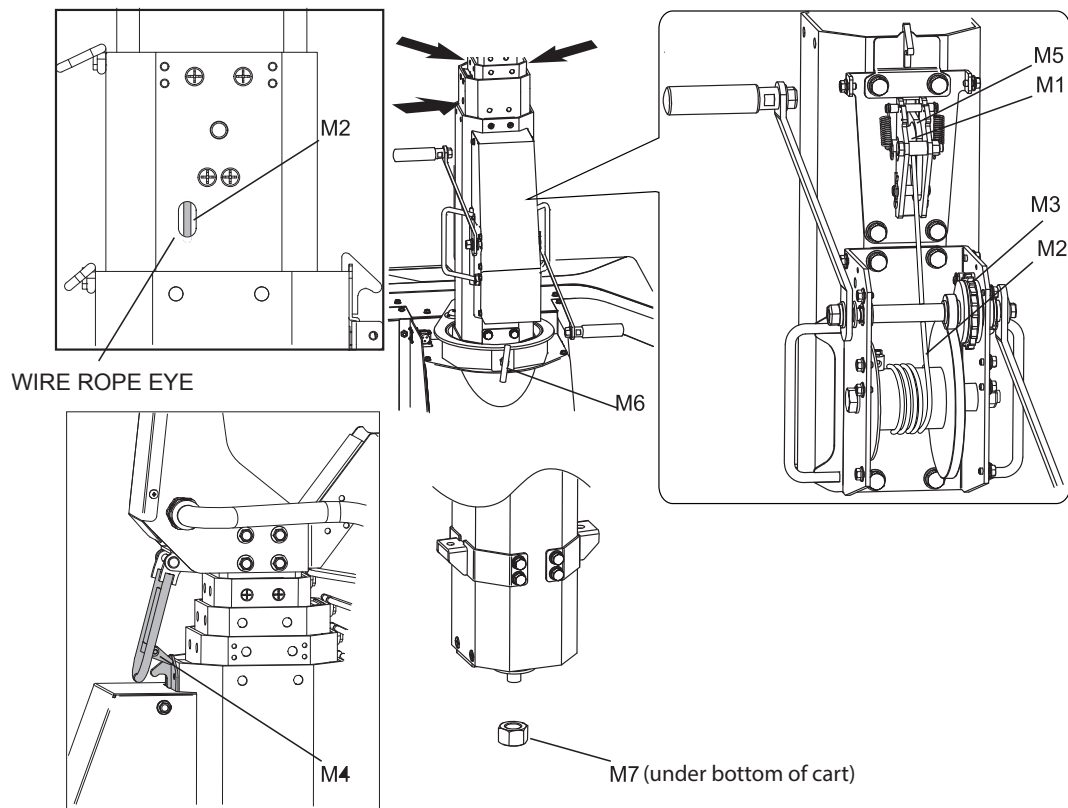
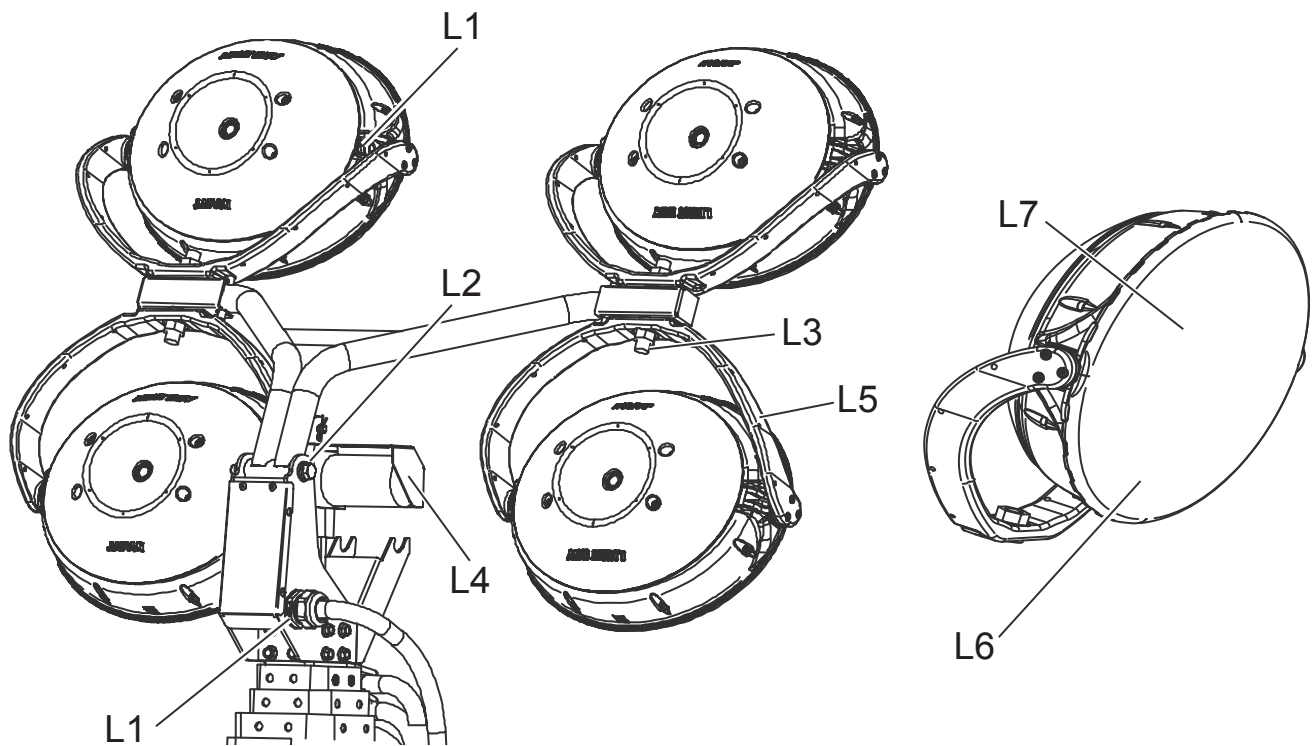


Figure 26. Lamp/Mast Maintenance

Table 6. Lamp/Mast Maintenance

Location		Part	Symptom	Solution	Freq.
Lamp	L1	Cable Gland	Loose?	Screw tightly.	❖
	L2	Lampstand Hinge Joint	Damaged?	Repair.	■
	L3	Nut	Too loose or too tight?	Tighten correctly.	■
	L4	Actuator	Not working properly?	Replace.	●
	L5	Lamp Mounting Spindle	Not spinning smoothly?	Apply grease.	●
	L6	LED Lamp	Lamp burned or damaged?	Replace.	❖
	L7	Polycarbonate Cover	Dirty or Cracked?	Wipe off dirt or replace.	❖
Mast	M1	Pulley, Top of Winch	Does not slide smoothly?	Apply grease.	●
	M2	Wire Rope	Damaged, rusty, frayed?	Replace.	❖
	M3	Winch Brake	Defective?	Replace.	❖
	M4	Mast Locking Shackle	Does not operate properly?	Replace.	❖
	M5	Safety Stopper	Loose wire rope and stopper jutting out?	Replace.	▲
	M6	Mast Rotation	Lock knob not working properly?	Replace knob.	❖
	M6	Mast Rotation	Mast does not rotate smoothly?	Apply grease.	●
	M7	Mast Nut	Missing or damaged nut?	Tighten or replace	■
❖ - Daily Check ■ - Every 20 Hours ● - Every 100 hours ▲ - Every 500 hours					

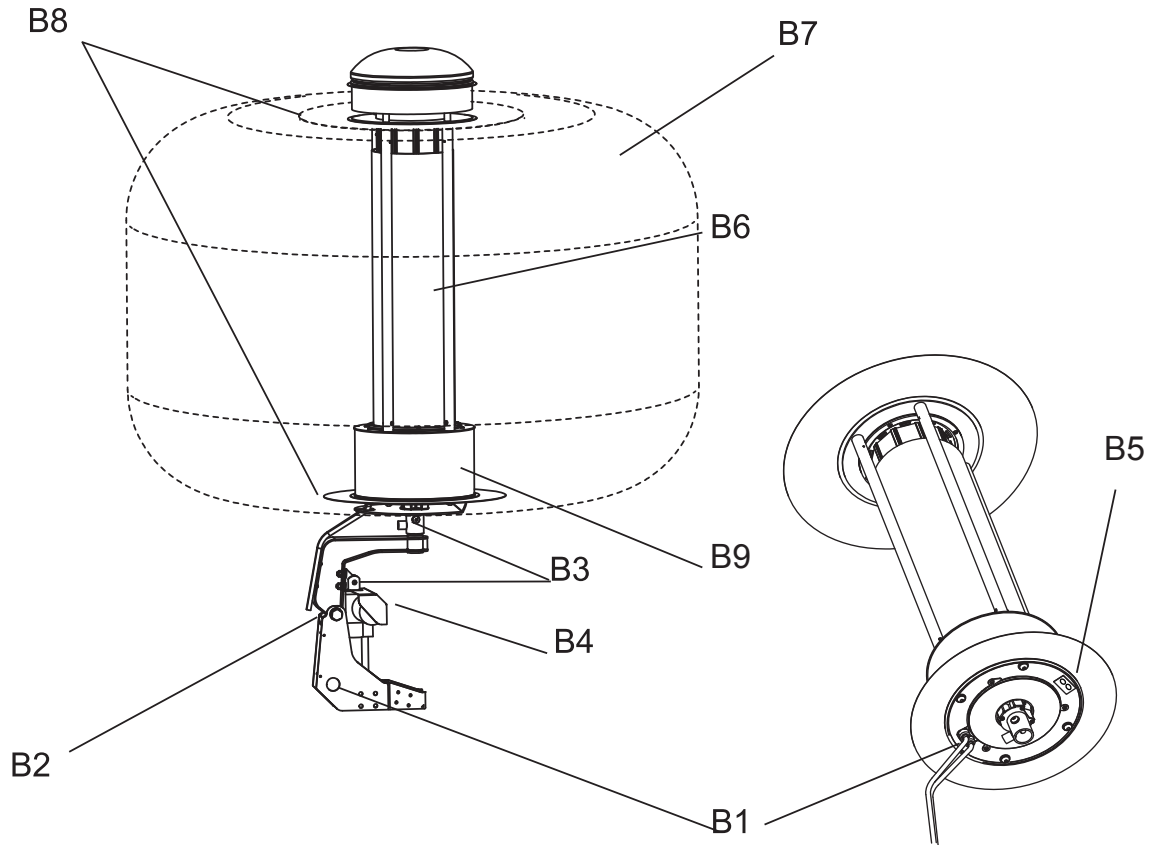


Figure 27. Balloon Maintenance

Table 7. Balloon Light Maintenance

Location		Part	Symptom	Solution	Freq.
Balloon	B1	Cable Gland	Loose?	Screw tightly.	❖
	B2	Lampstand Hinge Joint	Damaged?	Repair.	■
	B3	Bolts, Nuts, and Pins	Too loose or damaged?	Tighten correctly.	■
	B4	Actuator	Not working properly?	Replace.	●
	B5	Error Indicator	Not blinking 3 times initially?	Replace	●
	B6	LED Lamp	Lamp burned or damaged?	Replace.	❖
	B7	Balloon Bag	Dirty or Ripped?	Wipe off dirt/Replace.	❖
	B8	Zipper	Broken?	Replace	❖
	B9	Fan Motors	Not working properly?	Replace	●
❖ - Daily Check ■ - Every 20 Hours ● - Every 100 hours ▲ - Every 500 hours					

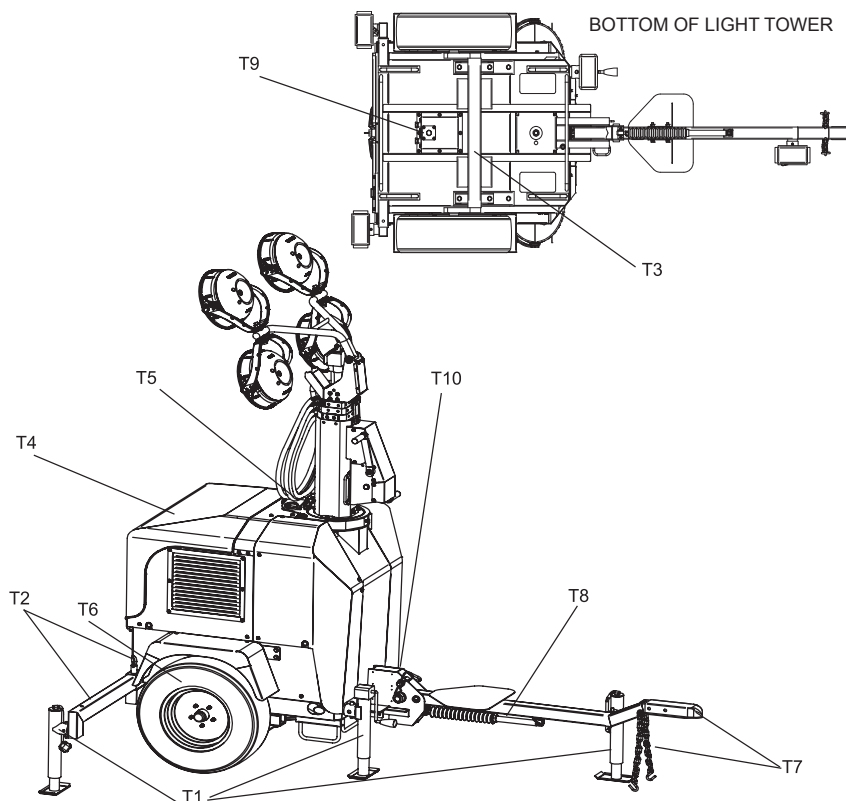


Figure 28. Light Tower Maintenance

Table 9. Light Tower Maintenance					
Location	Part	Symptom	Solution	Freq.	
Light Tower	T1	Jack	Does not operate smoothly? Lock pin is loose?	Apply grease or replace.	❖
	T2	Outrigger	Does not operate smoothly? Lock pin is loose?	Replace.	❖
	T3	Axle Components	Torsion spring not working properly?	Replace.	●
	T4	Cover Gas Spring	Cover too heavy to be opened?	Repair as needed	❖
	T5	Lifting Eye	Loose?	Tighten properly.	❖
	T6	Tire	Damaged? (Tire pressure - 50 psi, 344.7 kPa)	Replace.	❖
	T7	Tongue Coupler and Chains	Damaged?	Replace.	●
	T8	Gas Spring	Gas Leak?	Repair.	●
	T9	Oil Containment	Oil is Contained?	Drain.	❖
	T10	Tow Bar Joint	Pin, bolt, or nut damaged or loose?	Repair or replace as needed.	❖
	T11	All Nuts and Bolts	Damaged or Loosened?	Tighten properly, replace	❖
❖ - Daily Check ■ - Every 20 Hours ● - Every 100 hours ▲ - Every 500 hours					

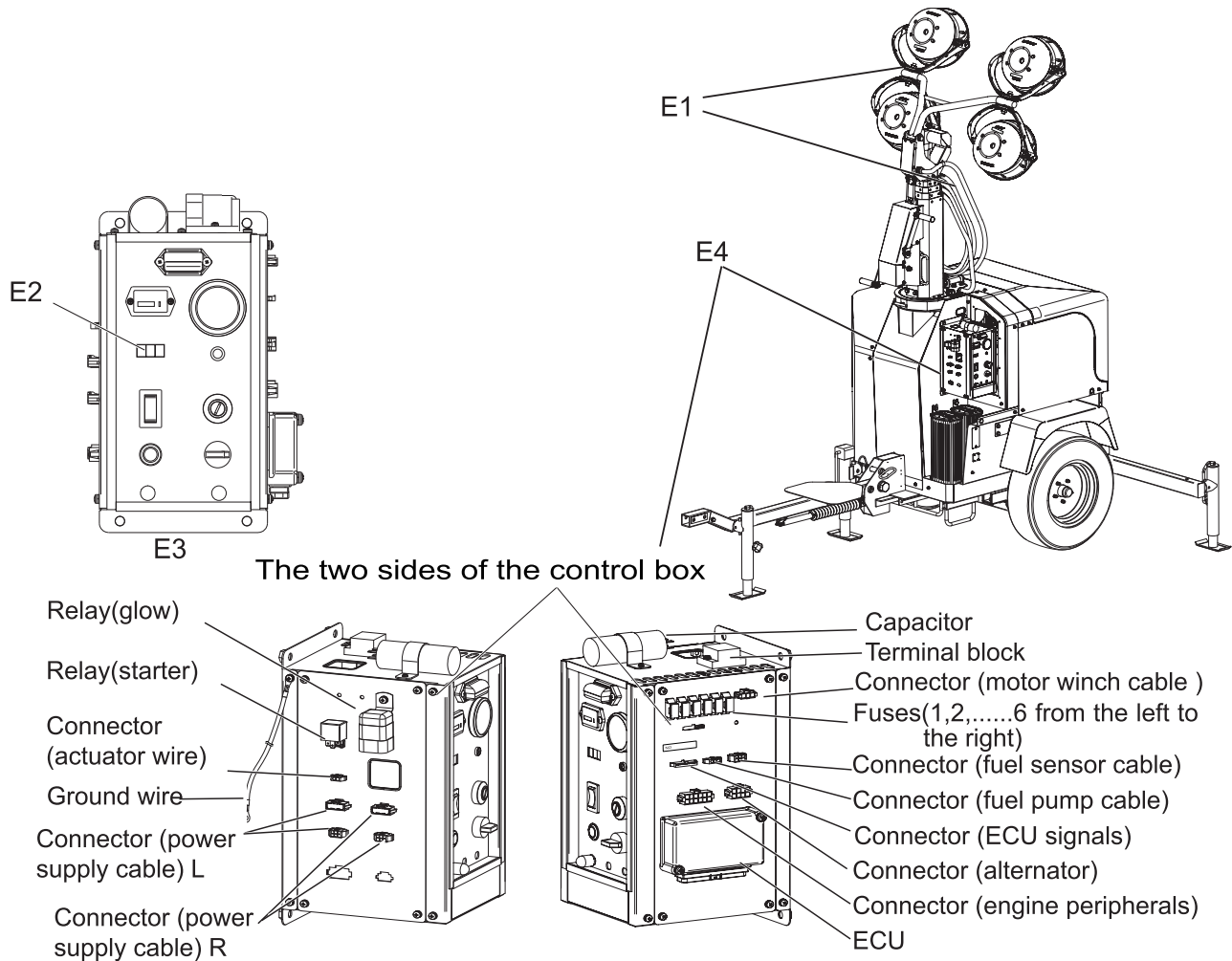


Figure 29. Electrical Components Maintenance

Table 10. Electrical Components Maintenance

Location		Part	Symptom	Solution	Freq.
Electrical	E1	Lamp Cable	Tangled or damaged?	Untangle or replace.	❖
	E2	Dimming Board	Does not display properly?	See Troubleshooting.	❖
	E3	Switches and Meters	Does not work properly?	See Troubleshooting.	❖
Connector	E4	Connectors on Control Box	Not properly connected?	Repair as needed.	●
	E4	Connectors on Control Box	Burnt Connectors?	Replace.	●
❖ - Daily Check ■ - Every 20 Hours ● - Every 100 hours ▲ - Every 500 hours					

TROUBLESHOOTING

Table 11. Lamp Troubleshooting (GBX24B)

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
No display on dimming meter	Miswiring?	Correct the wiring.
	Broken dimming meter?	Replace the dimming meter assy.
	Dimming meter working?	Replace the LED power supply.
Lights up without switching on lamp switch.	Miswiring?	Correct the wiring.
	Broken dimming meter?	Replace the dimming meter assy.
	Dimming meter working?	Replace the LED power supply.
Glow Lamp (Indicator) is not working even when key switch is turned on.	Miswired battery?	Correct wiring.
	Broken fuse on right side of control box?	Replace broken fuse.
	Insufficient voltage applied to battery?	Replace battery.
	Battery works properly?	Replace ignition key switch or ECU.
All lighting units do not light.	Light switch is OFF?.	Push the light switch on the control panel.
	Breaker is tripped?	Push the breaker on the control panel.
	AC120V is not applied to the LED power supply?	Generator problem.
	Miswiring?	Correct the wiring.
Lighting unit(s) is/are not lit up.	Error indicators of the lighting units not lit? Voltage of LED power supply output. DC 240V between 1(+) and 2(-) does not appear?	Replace the problematic LED power supply.
	Voltage of LED power supply output. DC 240V between 1(+) and 2(-) appears?	Replace the lighting unit(s).
	Error indicator(s) of the lighting unit(s) is/are just on?	Replace the control board(s) inside the lighting unit.
Lamp lights up but not so bright.	Error indicator of the lighting unit flashes continuously?	Clean the fan and air passage.

TROUBLESHOOTING

Table 12. Lamp Troubleshooting (GBX24B continued)

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Lamp only lights for a short time.	Error indicator of the lighting unit flashes twice continuously. Voltage of the LED power supply output. DC24V between 3(+) and 4(-) appears?	Clean or replace fan.
	Error indicator of the lighting unit flashes twice continuously. Voltage of the LED power supply output. DC24V between 3(+) and 4(-) does not appear?	Replace defective LED power supply
	Error indicator of the lighting unit flashes thrice continuously. Voltage of the LED power supply output. DC24V between 1(+) and 2(-) does not appear?	Replace defective LED power supply
	Error indicator of the lighting unit flashes thrice continuously. Voltage of the LED power supply output. DC24V between 1(+) and 2(-) appears?.	Replace the lighting unit.
Lamp lights up but not so bright or only lights for a short time.	Error indicator flashes 4 or 5 or 6 times continuously? Miswiring?	Correct the wiring.
	Error indicator flashes 4 or 5 or 6 times continuously? Some LEDs are not lit up?	Replace problematic LED panel.
	Error indicator flashes 4 or 5 or 6 times continuously? Wiring and LED ok?	Replace the control board inside the lighting unit.
Lampstand actuator not working.	The ignition key is not turned to the ON position?	Turn ignition key to the ON position.
	Miswiring?	Correct the wiring.
	Fuses on the right side of the control panel broken?	Replace broken fuse and correct cause.
	DC12V is applied to the lampstand actuator?	Replace the lampstand actuator.
Lampstand actuator not working or too slow.	DC12V is applied to the lampstand actuator but when operating, voltage at battery is down?	Charge or replace the battery.
	DC12V is applied to the lampstand actuator but when operating, voltage at battery is not down?	Replace the contact blocks behind the actuator switch or cables.

TROUBLESHOOTING

Table 13. Lamp Troubleshooting (GBX24S)

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
No displays on dimming meter.	Miswiring?	Correct the wiring.
	Wiring correctly?	Replace the dimming meter assy.
	Dimming meter assy is not broken?	Replace the LED power supply R.
Lighting up without switching on the light switch.	Miswiring?	Correct the wiring.
	Wiring correctly?	Replace the dimming meter assy.
	Dimming meter assy is not broken?	Replace the LED power supply.
Glow lamp is not working even though turning the ignition key switch.	Miswiring on the battery?	Correct wiring.
	Fuses on the right side of the control panel(box)?	Check the page of "Fuse", replace the broken fuse and remove the cause of it.
	Battery voltage? Sufficient voltage is normally 12- 14V.	Charge or replace the battery.
	Battery works properly?	Replace the ignition switch or ECU.
All lighting units are not lit up.	Light switch is OFF?	Push the light switch on the control panel.
	Breaker is tripped?	Push the breaker on the control panel.
	AC120V is not applied to the LED power supply?	Generator could be problematic.
Lighting units are not lit up.	Miswiring?	Correct the wiring.
	Error indicators of the lighting units not lit?	Replace the defective LED power supply.
	Voltage of LED power supply output DC 240V between 1(+) and 2(-) does not appear.	
Lighting unit(s) is/are not lit up.	Voltage of LED power supply output. DC 240V between 1(+) and 2(-) appears?	Replace the lighting unit(s).
	Error indicator(s) of the lighting unit(s) is/are just on?	Replace the control board(s) inside the lighting unit.
Lighting up, but not so bright.	Error indicator of the lighting unit flashes continuously?	Clean the fan and air passage.
Lamps only lights for a short time.	Error indicator of the lighting unit flashes twice continuously?	Clean or replace the fan.
	Voltage of the LED power supply output. DC24V between 3(+) and 4(-)appears.	

TROUBLESHOOTING

Table 13. Lamp Troubleshooting (GBX24S continued)

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Lamps only lights for a short time.	Error indicators of the lighting units flash twice continuously? Voltage of the LED power supply output. DC24V between 3(+) and 4(-) does not appear.	Replace defective LED power supply.
	Error indicators of the lighting units flash 3 times continuously? Voltage of the LED power supply output. DC240V between 1(+) and 2(-) does not appear.	Replace defective LED power supply.
	Error indicator of the lighting unit flashes 3 times continuously? Voltage of the LED power supply output. DC240V between 1(+) and 2(-) appears.	Replace lighting unit.
Lighting up, but not so bright or only lights for a short time.	Error indicator of the lighting unit flashes 4 or 5 or 6 times continuously. Miswiring?	Correct the wiring.
	Error indicator of the lighting unit flashes 4 or 5 or 6 times continuously. Some LED chips are not lit up?	Replace the LED panel or the whole lighting unit.
	Error indicator of the lighting unit flashes 4 or 5 or 6 times continuously. Wiring correct and all LED chips OK?	Replace the control board inside the lighting unit.
Lampstand actuator not working.	The ignition key switch is not turned to ON position?	Turn the ignition key switch.
	Miswiring?	Correct the wiring.
	Fuses on the right side of the control panel(box) broken?	Check the "Fuse" page, replace the broken fuse and remove the cause of it.
	DC12V is applied to the lampstand actuator?	Replace the lampstand actuator.
Lampstand actuator is not working or is too slow.	DC12V is applied to the lampstand actuator but when trying to operate, the voltage measured at battery is down?	Charge or replace the battery
	DC12V is applied to the actuator, and when trying to operate, the voltage measured at battery is not down, but the lampstand actuator is?	Replace the contact blocks behind the actuator switch or cables.

TROUBLESHOOTING

Table 14. Mast Troubleshooting

SYMPTOM	POSSIBLE PROBLEM	SOLUTION
Mast cannot be raised.	Mast not properly operated?	Check operation section for correct procedure.
	Cable tangled with the mast?	Disentangle cable.
	Is there foreign matter on the mast?	Remove foreign matter.
	Is mast not greased sufficiently?	Apply grease.
	Is wire terminal on the winch loose?	Tighten the wire terminal properly.
	Damaged wire?	Replace.
	Broken winch?	Repair or replace.
Mast cannot be lowered.	Is light tower not on a level surface?	Set jackstands to make it level.
	Is there foreign matter on the mast?	Remove foreign matter.
	Is mast not greased sufficiently?	Apply grease.
	Is wire caught on safety stopper?	Replace wire.
	Is mast bended?	Repair mast.
	Broken winch?	Repair or replace.

TROUBLESHOOTING

Table 15. Engine Error Indicators

Diagnostic Trouble Code (DTC)	DTC Set Parameter	Lamp Blinking Pattern	Limp Home Action by Engine ECU
Oil Pressure Error	Despite rpm, oil pressure switch is ON	Long 1 Short 2	Engine stops after 10 sec from Engine start
Engine Overheat	Engine water temperature $\geq 110^{\circ}\text{C}$	Long 1 Short 6	Engine stops
Water Temperature Sensor: High	Voltage of coolant temperature sensor is 4.9 V or above	Long 2 Short 4	Engine stops after 10 sec from Engine start
Water Temperature Sensor: Low	Voltage of coolant temperature sensor is 0.1 V or less	Long 2 Short 5	Engine stops after 10 sec from Engine start
Battery Voltage: High	ECU recognition of battery voltage is above 18 V	Long 3 Short 1	Engine stops
Engine Overrun	Engine speed $>2070\text{ min}^{-1}$ (rpm)	Long 1 Short 1	Engine stops
Sensor Supply Voltage1:Low	Voltage to sensor is below 4 V	Long 2 Short 7	Engine stops after 10 sec from Engine start
Actuator Abnormal	Actuator current $>3.0\text{ A}$ or $<80\text{ mA}$	Long 2 Short 2	Engine stops
Engine Speed Sensor Abnormal	Engine Speed = 0 min^{-1} (rpm)	Long 2 Short 1	Engine stops after 10 sec from Engine start
Starter Error	Starter Running Time is above 12 sec	Long 1 Short 7	Engine stops
Alternator L Terminal abnormal	Alternator L terminal has voltage while 0 rpm (after key on)	Long 2 Short 6	Engine stops after 10 sec from Engine start
Charging Failure	Alternator L terminal is 0 V while engine is running	Long 1 Short 3	Engine stops after 10 sec from Engine start

Table 16. Fuse Troubleshooting

FUSE	REASON FOR TURNING OFF	CAUSE
Fuse 1	Starter does not perform properly. Everything works properly except for starter. No errors indicated.	Problems on the ECU or other things related to the starter.
Fuse 2	Engine is not started in cold environments (glow heater does not perform). Glow lamp is not lit.	Problems on the ECU or the other things related to the glow lamp.
Fuse 3	The start failure or the glow trouble occurs sometimes.	Problems on the ECU or around it.
Fuse 4	Motor winch for the mast does not perform properly.	Problems on the motor winch on the mast or the wirings to it.
Fuse 5	Non-reactive after the key switch turns to ON and preheat. Starter performs properly, but engine is not started. Fuel pump does not work (under the normal condition, there will be the pump noise when turning the ignition key switch to ON).	Problems on fuel pump, fuel sensor, fuel meter, the lampstand actuator, panel lamp, glow lamp, alternator or wirings to these components.
Fuse 6	Engine is not started in cold environments (glow heater does not perform). Glow lamp is ON.	Problems on the glow heater, wirings to the glow heater or around it.
PAL Fuse (50 A)	Engine is not started. Nothing happens even when key switch is turned. Actuator on lampstand does not work properly. Lamps such as tail lamps work properly.	Problems related to DC12V (battery connection) or wirings to these components.

SAFETY GUIDELINES — TRAILERS

The following guidelines are intended to assist the operator in the operation and handling of a trailer.

Safety precautions should be followed at all times when operating a trailer. Failure to read, understand and follow the safety guidelines could result in injury to yourself and others. Loss of control of the trailer or tow vehicle can result in death or serious injury.

COMMON CAUSES FOR LOSS OF TRAILER

- Driving too fast for the conditions (maximum speed when towing a trailer is 55 mph).
- Overloading the trailer or loading the trailer unevenly.
- Trailer improperly coupled to the hitch.
- Not maintaining proper tire pressure.
- Not keeping lug nuts tight.
- Not properly maintaining the trailer structure.
- Ensure machine is towed level to tow vehicle.

TRAILER TOWING GUIDELINES

- Recheck the load tiedowns to make sure the load will not shift during towing.
- Before towing, check coupling, safety chain, safety brake, tires, wheels and lights.
- Check the lug nuts or bolts for tightness.
- Check coupler tightness after towing 50 miles.
- Use your mirrors to verify that you have room to change lanes or pull into traffic.
- Use your turn signals well in advance. Allow plenty of stopping space for your trailer and tow vehicle.
- Allow plenty of stopping space for your trailer and tow vehicle.
- **DO NOT** drive so fast that the trailer begins to sway due to speed.
- Allow plenty of room for passing. A rule of thumb is that the passing distance with a trailer is 4 times the passing distance without the trailer.

- **ALWAYS** use lower gears for climbing and descending grades.
- **DO NOT** ride the brakes while descending grades, they may get so hot that they stop working. Then you will potentially have a runaway tow vehicle and trailer.
- To conserve fuel, don't use full throttle to climb a hill. Instead, build speed on the approach.
- Slow down for bumps in the road. Take your foot off the brake when crossing the bump.
- **DO NOT** brake while in a curve unless absolutely necessary. Instead, slow down before you enter the curve and power through the curve. This way, the towing vehicle remains in charge.
- **DO NOT** apply the brakes to correct extreme trailer swaying. Continued pulling of the trailer, and even slight acceleration, will provide a stabilizing force.
- Anticipate the trailer "swaying." Swaying is the trailer reaction to the air pressure wave caused by passing trucks and buses. Continued pulling of the trailer provides a stabilizing force to correct swaying. **DO NOT** apply the brakes to correct trailer swaying.
- Use lower gear when driving down steep or long grades. Use the engine and transmission as a brake. Do not ride the brakes, as they can overheat and become ineffective.
- Be aware of your trailer height, especially when approaching roofed areas and around trees.
- Make regular stops, about once each hour. Confirm that:
 - Coupler is secure to the hitch and is locked.
 - Electrical connectors are secure.
 - There is appropriate slack in the safety chains.
 - Tires are not visibly low on pressure.

SAFETY GUIDELINES — TRAILERS

DRIVING CONDITIONS

When towing a trailer, you will have decreased acceleration, increased stopping distance, and increased turning radius (which means you must make wider turns to keep from hitting curbs, vehicles, and anything else that is on the inside corner). In addition, you will need a longer distance to pass, due to slower acceleration and increased length.

- Be alert for slippery conditions. You are more likely to be affected by slippery road surfaces when driving a tow vehicle with a trailer, than driving a tow vehicle without a trailer.
- Check rearview mirrors frequently to observe the trailer and traffic.
- **NEVER** drive faster than what is safe.

WARNING

Driving too fast for severe road conditions can result in loss of control and cause death or serious injury.

Decrease your speed as road, weather, and lighting conditions deteriorate.

Always check for local trailer tow speed limits in your area.

WARNING

DO NOT transport people on the trailer. The transport of people puts their lives at risk and may be illegal.

COUPLING TO THE TOW VEHICLE

Follow all of the safety precautions and instructions in this manual to ensure safety of persons, equipment, and satisfactory life of the trailer. Always use an adequate tow vehicle and hitch. If the vehicle or hitch is not properly selected and matched to the Gross Vehicle Weight Rating (GVWR) of your trailer, you can cause an accident that could lead to death or serious injury.

If you already have a tow vehicle, know your vehicle tow rating and make certain the trailer's rated capacity is less than or equal to the tow vehicle's rated towing capacity. If you already have (or plan to buy) a trailer, make certain that the tow rating of the tow vehicle is equal to or greater than that of the trailer.

The trailer VIN tag contains the critical safety information for the use of your trailer. Again, be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating of your trailer.

WARNING

Proper selection and condition of the coupler and hitch are essential to safely towing your trailer. A loss of coupling may result in death or serious injury.

- Be sure the hitch load rating is equal to or greater than the load rating of the coupler.
- Be sure the hitch size matches the coupler size.
- Observe the hitch for wear, corrosion and cracks before coupling. Replace worn, corroded or cracked hitch components before coupling the trailer to the tow vehicle.
- Be sure the hitch components are tight before coupling the trailer to the tow vehicle.

WARNING

An improperly coupled trailer can result in death or serious injury.

DO NOT move the trailer until:

- The coupler is secured and locked to hitch.
- The safety chains are secured to the tow vehicle.
- The trailer jack(s) are fully retracted.

DO NOT tow the trailer on the road until:

- Tires and wheels are checked.
- The load is secured to the trailer.
- The trailer lights are connected and checked.

WARNING

Use of a hitch with a load rating less than the load rating of the trailer can result in loss of control and may lead to death or serious injury.

Use of a tow vehicle with a towing capacity less than the load rating of the trailer can result in loss of control, and may lead to death or serious injury.

Be sure your hitch and tow vehicle are rated for the Gross Vehicle Weight Rating of your trailer.

SAFETY GUIDELINES — TRAILERS

INOPERABLE LIGHTS OR MIRRORS

Be sure that all of the lights on your trailer are functioning properly before towing your trailer. Check the trailer taillights by turning on your tow vehicle headlights. Check the trailer brake lights by having someone step on the tow vehicle brake pedal while you look at trailer lights. Do the same thing to check the turn signal lights. See Trailer Wiring Diagram section in this manual.

Standard mirrors usually do not provide adequate visibility for viewing traffic to the sides and rear of a towed trailer. You must provide mirrors that allow you to safely observe approaching traffic.

WARNING

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and can lead to collision.

Before each tow, check that the tail lights, brake lights and turn signals work.

TRAILER TOWING TIPS

Driving a vehicle with a trailer in tow is vastly different from driving the same vehicle without a trailer in tow. Acceleration, maneuverability and braking are all diminished with a trailer in tow.

It takes longer to get up to speed, you need more room to turn and pass, and more distance to stop when towing a trailer. You will need to spend time adjusting to the different feel and maneuverability of the tow vehicle with a loaded trailer.

Because of the significant differences in all aspects of maneuverability when towing a trailer, the hazards and risks of injury are also much greater than when driving without a trailer. You are responsible for keeping your vehicle and trailer in control, and for all the damage that is caused if you lose control of your vehicle and trailer.

As you did when learning to drive an automobile, find an open area with little or no traffic for your first practice trailering. Of course, before you start towing the trailer, you must follow all of the instructions for inspection, testing, loading and coupling. Also, before you start towing, adjust the mirrors so you can see the trailer as well as the area to the rear of it.

Drive slowly at first, 5 mph or so, and turn the wheel to get the feel of how the tow vehicle and trailer combination responds. Next, make some right and left hand turns. Watch in your side mirrors to see how the trailer follows the tow vehicle. Turning with a trailer attached requires more room.

It will take practice to learn how to back up a tow vehicle with a trailer attached. Take it slow. Before backing up, get out of the tow vehicle and look behind the trailer to make sure that there are no obstacles.

Some drivers place their hands at the bottom of the steering wheel, and while the tow vehicle is in reverse, “think” of the hands as being on the top of the wheel. When the hands move to the right (counterclockwise, as you would do to turn the tow vehicle to the left when moving forward), the rear of the trailer moves to the right. Conversely, rotating the steering wheel clockwise with your hands at the bottom of the wheel will move the rear of the trailer to the left while backing up.

If you are towing a bumper hitch rig, be careful not to allow the trailer to turn too much because it will hit the rear of the tow vehicle. To straighten the rig, either pull forward or turn the steering wheel in the opposite direction.

TRAILER VIN TAG

Figure A below is a sample of the Vehicle Identification Number (VIN) Tag which is typically located on the left front of the trailer. See Figure A for location.

U/FABRICATED BY / FABRIQUE PAR: _____ DATE _____

R / PNRV _____ KG (_____ LB) _____ KG (_____ LB) TIRES / PNEU _____

R (EACH AXLE) / PNEU (CHAQUE ESSIEU) _____

/ JANTIS _____

I INFL. PRESS. / PRESS. DE GONFL. A FROID _____ KPA (_____ PSI / LPOX ☐ SINGLE ☐ DUAL

VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.
VEHICULE CONFORME A TOUTES LES NORMES QUI LUI SONT APPLICABLES EN VERTU DU REGLEMENT SUR LA SECURITE DES VEHICULES AUTOMOBILES DU CANADA EN VIGUEUR A LA DATE DE SA FABRICATION.

/ N.I.M.: _____ TYPE / TYPE: TRAILER TRA / REM _____ FD-306 REV A

Figure A. Vehicle VIN Tag

SAFETY GUIDELINES — TRAILERS

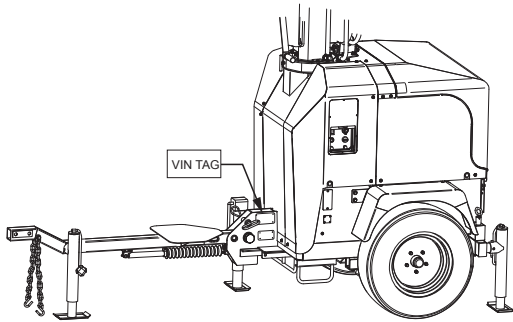


Figure B. VIN Tag Location

The trailer VIN Tag (Figure B) contains the following critical safety information for the use of your trailer.

GAWR: The maximum gross weight that an axle can support.

GVWR: The maximum allowable gross weight of the trailer and its contents. The gross weight of the trailer includes the weight of the trailer and all of the items within it. GVWR is sometimes referred to as GTWR (Gross Trailer Weight Rating), or MGTW (Maximum Gross Trailer Weight). GVWR, GTWR and MGTW are all the same rating.

The sum total of the GAWR for all trailer axles may be less than the GVWR for the trailer, because some of the trailer load is to be carried by the tow vehicle, rather than by the trailer axle(s). The total weight of the cargo and trailer must not exceed the GVWR, and the load on an axle must not exceed its GAWR.

PSIC: The tire pressure (psi) measured when cold.

VIN: The Vehicle Identification Number.

EMPTY WEIGHT: Some information that comes with the trailer (such as the Manufacturer's Statement of Origin) is not a reliable source for "empty" or "net" weight. The shipping documents list average or standard weights and your trailer may be equipped with options.

To determine the "empty" or "net" weight of your trailer, weigh it on an axle scale. To find the weight of the trailer using an axle scale, you must know the axle weights of

your tow vehicle without the trailer coupled. Some of the trailer weight will be transferred from the trailer to the tow vehicle axles, and an axle scale weighs all axles, including the tow vehicle axles.

TOW VEHICLE

The towing hitch attached to your tow vehicle must have a capacity equal to or greater than the load rating of the trailer you intend to tow. The hitch capacity must also be matched to the tow vehicle capacity. Your vehicle dealer can provide and install the proper hitch on your tow vehicle.

SUSPENSION SYSTEM

Sway bars, shock absorbers, heavy duty springs, heavy duty tires and other suspension components may be required to sufficiently tow the trailer.

SIDE VIEW MIRRORS

The size of the trailer that is being towed and your state law regulations determine the size of the mirrors. However, some states prohibit extended mirrors on a tow vehicle, except while a trailer is actually being towed. In this situation, detachable extended mirrors are necessary. Check with your dealer or the appropriate state agency for mirror requirements.

HEAVY DUTY FLASHER

A Heavy Duty Flasher is an electrical component that may be required when your trailer turn signal lights are attached to the tow vehicle flasher circuit.

ELECTRICAL CONNECTOR

An Electrical Connector connects the lights on the trailer to the lights on the towing vehicle.

EMERGENCY FLARES AND TRIANGLE REFLECTORS

It is wise to carry these warning devices even if you are not towing a trailer. It is particularly important to have these when towing a trailer because the hazard flashers of your towing vehicle will not operate for as long a period of time when the battery is running both the trailer lights and tow vehicle lights.

SAFETY GUIDELINES — TRAILERS

ELECTRICAL CONNECTOR

Light Tower to Tow Vehicle Electrical Wiring Connection

This light tower is provided with an electrical FLAT 4-Pin molded connector (Figure C) that when connected to the towing vehicle connects the various safety lighting signals.

Other “Pin-type” connectors can be utilized with your light tower as shown in Figure C.

WARNING

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and can lead to collision.

Before each tow, check that the tail lights, brake lights and turn signals work.

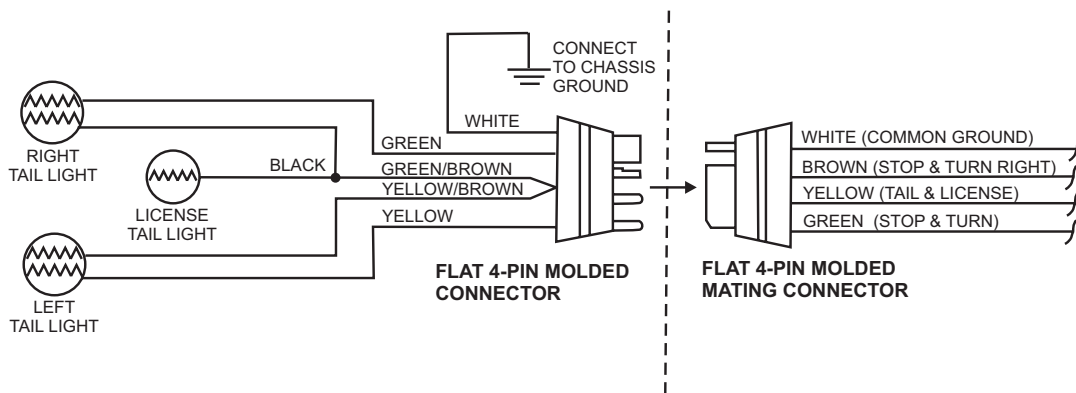


Figure C. Tow Vehicle Electrical Wiring

SAFETY GUIDELINES — TRAILERS

SAFETY CHAINS

If the coupler connection comes loose, the safety chains can keep the trailer attached to the tow vehicle. With properly rigged safety chains, it is possible to keep the tongue of the trailer from digging into the road pavement, even if the coupler-to-hitch connection comes apart.

JACKSTAND

A device on the trailer that is used to raise and lower the coupler. The jack is sometimes called the “landing gear” or the “tongue jack”.

COUPLER TYPES

The GBX24S and GBX24B come standard with a 2" ball coupler.

BALL COUPLER

A standard 2" ball coupler (Figure D) connects to a 2" ball hitch normally located on the bumper of the tow vehicle. All ball couplers come with a locking latch atop the coupler that must be engaged to ensure that the hitch ball is securely locked to the trailer coupler.

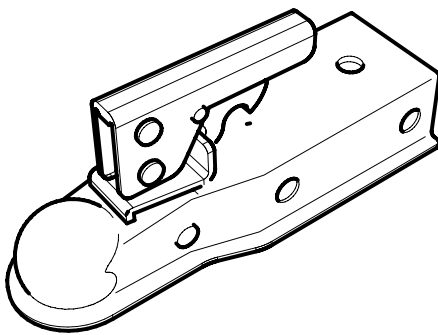


Figure D. Ball Coupler

Before each tow, coat the ball with a thin layer of automotive bearing grease to reduce wear and ensure proper operation. Check the locking device that secures the coupler to the ball for proper operation.

If you see or feel evidence of wear, such as flat spots, deformations, pitting or corrosion, on the ball or coupler, immediately have your dealer inspect them to determine the proper action to prevent possible failure of the ball and coupler system. All bent or broken coupler parts must be replaced before towing the trailer.

The coupler handle lever must be able to rotate freely and automatically snap into the latched position. Oil the pivot points, sliding surfaces, and spring ends with SAE 30W motor oil. Keep the ball socket and latch mechanism clean. Dirt or contamination can prevent proper operation of the latching mechanism.

The load rating of the coupler and the necessary ball size are listed on the trailer tongue. You must provide a hitch and ball for your tow vehicle where the load rating of the hitch and ball is equal to or greater than that of your trailer.

Also, the ball size must be the same as the coupler size. If the hitch ball is too small, too large, is underrated, is loose or is worn, the trailer can come loose from the tow vehicle and may cause death or serious injury.

THE TOW VEHICLE, HITCH AND BALL MUST HAVE A RATED TOWING CAPACITY EQUAL TO OR GREATER THAN THE TRAILER **Gross Vehicle Weight Rating (GVWR)**. IT IS ESSENTIAL THAT THE HITCH BALL BE OF THE SAME SIZE AS THE COUPLER.

The ball size and load rating (capacity) are marked on the ball. Hitch capacity is marked on the hitch.

WARNING

Coupler-to-hitch mismatch can result in uncoupling, leading to death or serious injury.

Be sure the **LOAD RATING** of the hitch ball is equal or greater than the load rating of the coupler.

Be sure the **SIZE** of the hitch ball matches the size of the ball coupler.

SAFETY GUIDELINES — TRAILERS

WARNING

A worn, cracked or corroded hitch ball can fail while towing and may result in death or serious injury.

Before coupling trailer, inspect the hitch ball for wear, corrosion and cracks.

Replace worn or damaged hitch ball.

WARNING

A loose hitchball nut can result in uncoupling, leading to death or serious injury.

Be sure the hitch ball is tight to the hitch before coupling the trailer.

- Rock the ball to make sure it is tightened to the hitch, and visually check that the hitch ball nut is solid against the lock washer and hitch frame.
- Wipe the inside and outside of the coupler. Clean and visually inspect it for cracks and deformations. Feel the inside of the coupler for worn spots and pits.
- Be sure the coupler is secured tightly to the tongue of the trailer. All coupler fasteners must be visibly solid against the trailer frame.
- The bottom surface of the coupler must be above the top of the hitch ball. Use the tongue jackstand to support the trailer tongue. Wood or concrete blocks may also be used.

Coupling the Trailer to the Tow Vehicle (Ball Hitch)

- Lubricate the hitch ball and the inside of the coupler with a thin layer of automotive bearing grease.
- Slowly back up the tow vehicle so that the hitch ball is near or aligned under the coupler.
- Using the jackstand at the front of trailer (tongue), turn the jackstand crank handle to raise the trailer. If the ball coupler does not line up with the hitch ball, adjust the position of the tow vehicle.
- Open the coupler locking mechanism. Ball couplers have a locking mechanism with an internal moving piece and an outside handle. In the open position, the coupler is able to drop fully onto the hitch ball.

- Lower the trailer (Figure E) until the coupler fully engages the hitch ball.

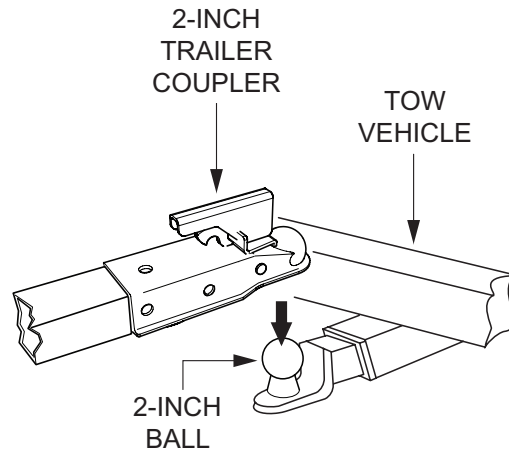


Figure E. Ball Hitch Coupling Mechanism

- Engage the coupler locking mechanism. In the engaged position, the locking mechanism securely holds the coupler to the hitch ball.
- Insert a pin or lock through the hole in the locking mechanism.
- Be sure the coupler is all the way on the hitch ball and the locking mechanism is engaged. A properly engaged locking mechanism will allow the coupler to raise the rear of the tow vehicle. Using the trailer jackstand, verify that you can raise the rear of the tow vehicle by 1 inch after the coupler is locked to the hitch.
- Lower the trailer so that its entire tongue weight is held by the hitch.
- Raise the jackstand to a height where it will not interfere with the road.

NOTICE

Overloading can damage the tongue jack. **DO NOT** use the tongue jack to raise the tow vehicle more than one inch.

If the coupler cannot be secured to the hitch ball, do not tow the trailer. Call your dealer for assistance. Lower the trailer so that its entire tongue weight is held by the hitch and continue retracting the jack to its fully retracted position.

SAFETY GUIDELINES — TRAILERS

Attaching Safety Chain

Visually inspect the safety chains and hooks for wear or damage. Replace worn or damaged safety chains and hooks before towing.

Attach the safety chains so that they:

- Cross underneath the coupler. See Figure F.

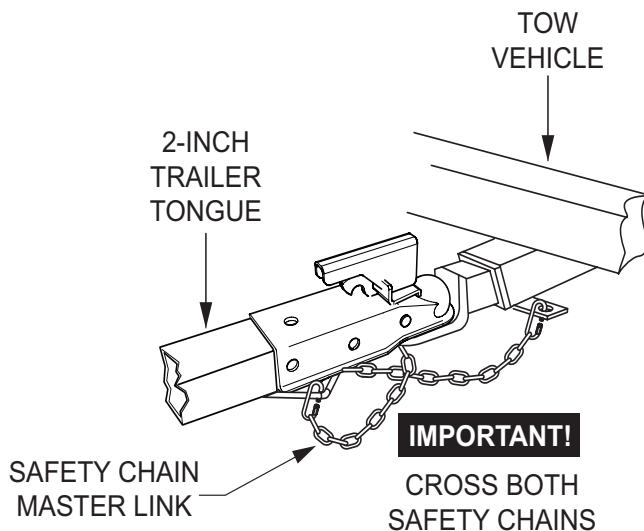


Figure F. Attaching Safety Chain (Ball Hitch)

- Loop around a frame member of the tow vehicle or holes provided in the hitch system (**DO NOT** attach them to an interchangeable part of the hitch assembly).
- Have enough slack to permit tight turns, but not be close to the road surface, so if the trailer uncouples, the safety chains can hold the tongue up above the road

WARNING

Improper rigging of the safety chains can result in loss of control of the trailer and tow vehicle, leading to death or serious injury, if the trailer uncouples from the tow vehicle.

- Fasten chains to frame of tow vehicle. **DO NOT** fasten chains to any part of the hitch unless the hitch has holes or loops specifically for that purpose.
- Cross chains underneath hitch and coupler with enough slack to permit turning and to hold tongue up, if the trailer comes loose.

Connecting Trailer Lights

Connect the trailer lights to the tow vehicle's electrical system using the electric connectors at the front of the trailer (tongue). Refer to the wiring diagram shown in the trailer wiring diagram section of this manual. Before towing the trailer check for the following:

- Running lights (turn on tow vehicle headlights).
- Brake Lights (step on tow vehicle brake pedal).
- Turn Signals (activate tow vehicle directional signal lever).

WARNING

Improper electrical connection between the tow vehicle and the trailer will result in inoperable lights and electric brakes, and can lead to collision.

Before each tow:

- Check that the taillights, brake lights and turn signals work.
- Check that the electric brakes work by operating the brake controller inside the tow vehicle.

Uncoupling the Ball Hitch

Follow these steps to uncouple ball hitch from tow vehicle:

- Block trailer tires to prevent the trailer from rolling, before jacking the trailer up.
- Disconnect the electrical connector.
- Before extending jackstand, make certain the ground surface below the jackstand foot will support the tongue load.
- Rotate the jackstand handle (or crank) clockwise. This will slowly extend the jack and transfer the weight of the trailer tongue to the jack.

SAFETY GUIDELINES — TRAILERS

TIRE SAFETY

Unsafe Tires, Lug Nuts or Wheels

Trailer tires and wheels are more likely to fail than car tires and wheels because they carry a heavier load. Therefore, it is essential to inspect the trailer tires before each tow.

If a tire has a bald spot, bulge, cuts, is showing any cords, or is cracked, replace the tire before towing. If a tire has uneven tread wear, take the trailer to a dealer service center for diagnosis.

Uneven tread wear can be caused by tire imbalance, axle misalignment or incorrect inflation.

Tires with too little tread will not provide adequate tracking on wet roadways and can result in loss of control, leading to death or serious injury.

Improper tire pressure causes an unstable trailer and can result in a tire blowout and loss of control. Therefore, before each tow you must also check the tire pressure. Tire pressure must be checked when tires are cold.

Allow 3 hours cool-down after driving as much as 1 mile at 40 mph before checking tire pressure. Trailer tires will be inflated to higher pressures than passenger vehicle tires.

Since trailer wheels and lug nuts (or bolts) are subjected to greater side loads than automobile wheels, they are more prone to loosen. Before each tow, check to make sure they are tight.

The proper tightness (torque) for lug nuts is listed in the lug nut tightening section of this manual. Use a torque wrench to tighten the lug nuts. If you do not have a torque wrench, use a lug wrench (from your tow vehicle) and tighten the nuts as much as you can. Then have a service garage or trailer dealer tighten the lug nuts to the proper torque.

WARNING

Metal creep between the wheel rim and lug nuts will cause rim to loosen and could result in a wheel coming off, leading to death or serious injury.

Tighten lug nuts before each tow.

Lug nuts are also prone to loosen after first being assembled. When driving a new trailer (or after wheels have been remounted), check to make sure they are tight after the first 10, 25 and 50 miles of driving and before each tow thereafter.

Failure to perform this check can result in a wheel parting from the trailer and a crash, leading to death or serious injury.

WARNING

Lug nuts are prone to loosen after initial installation, which can lead to death or serious injury.

Check lug nuts for tightness on a new trailer or when wheel(s) have been remounted after the first 10, 25 and 50 miles of driving.

WARNING

Improper lug nut torque can cause a wheel parting from the trailer, leading to death or serious injury.

Be sure lug nuts are tight before each tow.

WARNING

Improper tire pressure can result in a blowout and loss of control, which can lead to death or serious injury.

Be sure tires are inflated to pressure indicated on side wall before towing trailer.

Determining Load Limit of Trailer

Determining the load limits of a trailer includes more than understanding the load limits of the tires alone. On all trailers there is a Federal certification/VIN label that is located on the forward half of the left (road) side of the unit. This certification/VIN label will indicate the trailer's Gross Vehicle Weight Rating (GVWR). This is the most weight the fully loaded trailer can weigh. It will also provide the

Gross Axle Weight Rating (GAWR). This is the most a the axle can weigh.

SAFETY GUIDELINES — TRAILERS

There is a vehicle placard (Figure G) located in the same location as the certification label described above. This placard provides tire and loading information. In addition, this placard will show a statement regarding maximum cargo capacity.

TIRE	SIZE	COLD TIRE PRESSURE
FRONT		
REAR		
SPARE		

Figure G. Trailer Tire Placard

If additional work items (hoses, tools, clamps etc.) are going to be added to the trailer, be sure they are distributed evenly to prevent overloading front to back and side to side. Heavy items should be placed low and as close to the axle positions as reasonable. Too many items on one side may overload a tire.

Excessive loads and/or underinflation cause tire overloading and, as a result, abnormal tire flexing occurs. This situation can generate an excessive amount of heat within the tire. Excessive heat may lead to tire failure. It is the air pressure that enables a tire to support the load, so proper inflation is critical. The proper air pressure may be found on the certification/VIN label and/or on the Tire and Loading Information placard. This value should never exceed the maximum cold inflation pressure stamped on the tire.

Perform the following steps to determine the load limit of your trailer.

Step 1.

Locate the statement, “The weight of cargo should never exceed XXX kg or XXX lbs.,” on your vehicle’s Tire and Loading Information placard (Figure G). This value equals the available amount of equipment load capacity.

Step 2.

Determine the weight of the equipment being loaded on the tow vehicle. That weight may not safely exceed the available equipment load capacity. The trailer’s Tire Information Placard is attached adjacent to or near the trailer’s VIN (Certification) label at the left front of the trailer (See Figure G).

Determining Load Limit of Tow Vehicle

Step 1.

Locate the statement, “The combined weight of occupants and cargo should never exceed XXX lbs.,” on your vehicle’s placard.

Step 2.

Determine the combined weight of the driver and passengers who will be riding in your vehicle.

Step 3.

Subtract the combined weight of the driver and passengers from XXX kilograms or XXX pounds.

Step 4.

The resulting figure equals the available amount of cargo and luggage capacity. For example, if the “XXX” amount equals 1400 lbs. and there will be five 150 lb. passengers in your vehicle, the amount of available cargo and luggage capacity is 650 lbs. (1400-750 (5 x 150) = 650 lbs.).

Step 5.

Determine the combined weight of luggage and cargo being loaded on the vehicle. That weight may not safely exceed the available cargo and luggage capacity calculated in Step 4.

If your vehicle will be towing a trailer, load from your trailer will be transferred to your vehicle. Consult the tow vehicle’s manual to determine how this weight transfer reduces the available cargo and luggage capacity of your vehicle.

Studies of tire safety show that maintaining proper tire pressure, observing tire and vehicle load limits (not carrying more weight in your vehicle than your tires or vehicle can safely handle), avoiding road hazards and inspecting tires for cuts, slashes and other irregularities are the most important things you can do to avoid tire failure, such as tread separation or blowout and flat tires. These actions, along with other care and maintenance activities, can also:

- Improve vehicle handling.
- Help protect you and others from avoidable breakdowns and accidents.
- Improve fuel economy.
- Increase the tire life.

SAFETY GUIDELINES — TRAILERS

Use the information contained in this section to make tire safety a regular part of your vehicle maintenance routine. Recognize that the time you spend is minimal compared with the inconvenience and safety consequences of a flat tire or other tire failure.

TIRE FUNDAMENTALS

Federal law requires tire manufacturers to place standardized information on the sidewall of all tires (Figure H). This information identifies and describes the fundamental characteristics of the tire and also provides a tire identification number for safety standard certification and in case of a recall.

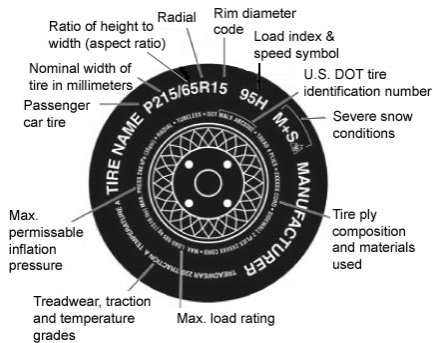


Figure H. Standard Tire Sidewall Information

P: The “P” indicates the tire is for passenger vehicles.

Next number: This three-digit number gives the width in millimeters of the tire from sidewall edge to sidewall edge. In general, the larger the number, the wider the tire.

Next number: This two-digit number, known as the aspect ratio, gives the tire’s ratio of height to width. Numbers of 70 or lower indicate a short sidewall for improved steering response and better overall handling on dry pavement.

P: The “R” stands for radial. Radial ply construction of tires has been the industry standard for the past 20 years.

Next number: This two-digit number is the wheel or rim diameter in inches. If you change your wheel size, you will have to purchase new tires to match the new wheel diameter.

Next number: This two- or three-digit number is the tire’s load index. It is a measurement of how much weight each tire can support. You may find this information in your owner’s manual. If not, contact a local tire dealer. *Note:*

You may not find this information on all tires because it is not required by law.

M+S: The “M+S” or “M/S” indicates that the tire has some mud and snow capability. Most radial tires have these markings; hence, they have some mud and snow capability.

Speed Rating: The speed rating denotes the speed at which a tire is designed to be driven for extended periods of time. The ratings range from 99 miles per hour (mph) to 186 mph. These ratings are listed in Table A. *Note:* You may not find this information on all tires because it is not required by law.

Table A. Speed Rating

Letter Rating	Speed Rating
Q	99 mph
R	106 mph
S	112 mph
T	118 mph
U	124 mph
H	130 mph
V	149 mph
W	168* mph
Y	186* mph

U.S. DOT Tire Identification Number: This begins with the letters “DOT” and indicates that the tire meets all federal standards. The next two numbers or letters are the plant code where it was manufactured, and the last four numbers represent the week and year the tire was built. For example, the numbers 3197 means the 31st week of 1997. The other numbers are marketing codes used at the manufacturer’s discretion. This information is used to contact consumers if a tire defect requires a recall.

Tire Ply Composition and Materials Used: The number of plies indicates the number of layers of rubber-coated fabric in the tire. In general, the greater the number of plies, the more weight a tire can support. Tire manufacturers also must indicate the materials in the tire, which include steel, nylon, polyester, and others.

Maximum Load Rating: This number indicates the maximum load in kilograms and pounds that can be carried by the tire.

SAFETY GUIDELINES — TRAILERS

Maximum Permissible Inflation Pressure: This number is the greatest amount of air pressure that should ever be put in the tire under normal driving conditions.

Uniform Tire Quality Grading Standards (UTQGS)

Treadwear Number: This number indicates the tire's wear rate. The higher the treadwear number is, the longer it should take for the tread to wear down. For example, a tire graded 400 should last twice as long as a tire graded 200.

Traction Letter: This letter indicates a tire's ability to stop on wet pavement. A higher graded tire should allow you to stop your car on wet roads in a shorter distance than a tire with a lower grade. Traction is graded from highest to lowest as "AA", "A", "B", and "C".

Temperature Letter: This letter indicates a tire's resistance to heat. The temperature grade is for a tire that is inflated properly and not overloaded. Excessive speed, underinflation or excessive loading, either separately or in combination, can cause heat build-up and possible tire failure. From highest to lowest, a tire's resistance to heat is graded as "A", "B", or "C".

Refer to Figure I for additional tire information for light trucks.

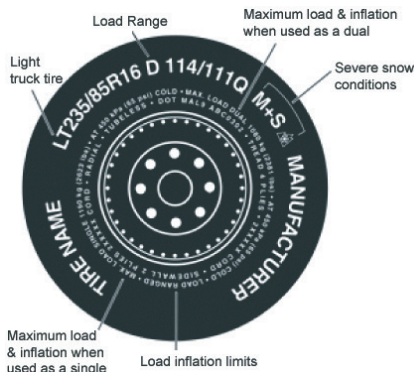


Figure I. UTQGS Tire Information

Tires for light trucks have other markings besides those found on the sidewalls of passenger tires.

LT: The "LT" indicates the tire is for light trucks or trailers.

ST: An "ST" is an indication the tire is for trailer use only.

Max. Load Dual kg (lbs) at kPa (psi) Cold: This information indicates the maximum load and tire pressure when the tire is used as a dual, that is, when four tires are put on each rear axle (a total of six or more tires on the vehicle).

Max. Load Single kg (lbs) at kPa (psi) Cold: This information indicates the maximum load and tire pressure when the tire is used as a single.

Load Range: This information identifies the tire's load-carrying capabilities and its inflation limits.

Tire Safety Tips

- Slow down if you have to go over a pothole or other object in the road.
- **DO NOT** run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.
- Check tire inflation pressure weekly during use to insure the maximum tire life and tread wear.
- **DO NOT** bleed air from tires when they are hot.
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and foreign objects wedged in the tread.
- Make sure your tire valves have valve caps.
- **ALWAYS** check tire pressure on tow vehicle and trailer before towing. Check tire pressure at least once a month.
- **DO NOT** overload tow vehicle. Check the tire information and loading placard for safe allowable tire loading conditions.

Tire Repair







The proper repair of a punctured tire requires a plug for the hole and a patch for the area inside the tire that surrounds the puncture hole. Punctures through the tread can be repaired if they are not too large, but punctures to the sidewall should not be repaired. Tires must be removed from the rim to be properly inspected before being plugged and patched.

Replacing Worn or Damaged Tires

Replace the tire before towing the trailer if the tire treads have less than 1/16 inch depth or the telltale bands are visible. Check inflation pressure weekly during use to insure the maximum tire life and tread wear. A bubble, cut or bulge in a side wall can result in a tire blowout. Inspect both side walls of each tire for any bubble, cut or bulge; and replace a damaged tire before towing the trailer.

SAFETY GUIDELINES — TRAILERS

Table B below will help pinpoint the causes and solutions of tire wear problems.

Table B. Tire Wear Troubleshooting			
Wear Pattern		Cause	Solution
	Center Wear	Over inflation.	Adjust pressure to particular load per tire manufacturer.
	Edge Wear	Under inflation.	Adjust pressure to particular load per tire manufacturer.
	Side Wear	Loss of camber or overloading.	Make sure load does not exceed axle rating. Align wheels.
	Toe Wear	Incorrect toe-in.	Align wheels.
	Cupping	Out-of-balance.	Check bearing adjustment and balance tires.
	Flat Spots	Wheel lockup and tire skidding.	Avoid sudden stops when possible and adjust brakes.

WARNING



ALWAYS wear safety glasses when removing or installing force fitted parts. **DO NOT** attempt to repair or modify a wheel. **DO NOT** install an inner-tube to correct a leak through the rim. If the rim is cracked, the air pressure in the inner tube may cause pieces of the rim to explode (break off) with great force and cause serious eye or bodily injury.

Wheel Rims

If the trailer has been struck, or impacted, on or near the wheels, or if the trailer has struck a curb, inspect the rims for damage (i.e. being out of round); and replace any damaged wheel. Inspect the wheels for damage every year, even if no obvious impact has occurred.

Wheels, Bearings and Lug Nuts

A loose, worn or damaged wheel bearing is the most common cause of brakes that grab.

To check wheel bearings, jack trailer and check wheels for side-to-side looseness. If the wheels are loose, or spin with a wobble, the bearings must be serviced or replaced. Check inflation pressure weekly during use to insure the maximum tire life and tread wear. Most trailer axles are built with sealed bearings that are not serviceable. Sealed bearings must be replaced as complete units.

WARNING

Lug nuts are prone to loosen after initial installation, which can lead to death or serious injury. Check all wheel lug nuts periodically.

Lug Nut Torque Requirements

It is extremely important to apply and maintain proper wheel mounting torque on the trailer. Be sure to use only the fasteners matched to the cone angle of the wheel. Proper procedure for attachment of the wheels is as follows:

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts in sequence. See Figure J. **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table C.

NOTICE

NEVER use an pneumatic air gun to tighten wheel lug nuts.

Over-tightening lug nuts will result in breaking the studs or permanently deforming the mounting stud holes in the wheels.

3. Check to see if the lug nuts are tight after the first 10, 25 and 50 miles of driving and before each tow thereafter

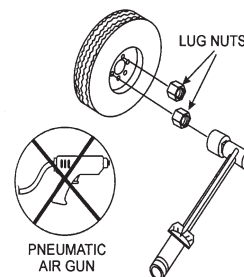
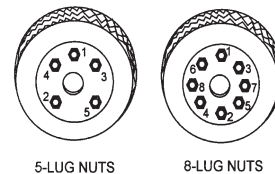
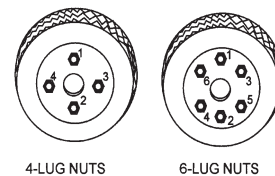


Figure J. Wheel Lug Nuts Tightening Sequence

Table C. Tire Torque Requirements

Wheel Size	First Pass FT-LBS	Second Pass FT-LBS	Third Pass FT-LBS
12"	20-25	35-40	50-65
13"	20-25	35-40	50-65
14"	20-25	50-60	90-120
15"	20-25	50-60	90-120
16"	20-25	50-60	90-120

Lights and Signals

Before each tow, check the trailer taillights, stoplights, turn signals and any clearance lights for proper operation.

Replace any broken or burned-out lamps as necessary. Check the wire harness for cuts, fraying or other damage. If it needs replacing, contact your dealer.

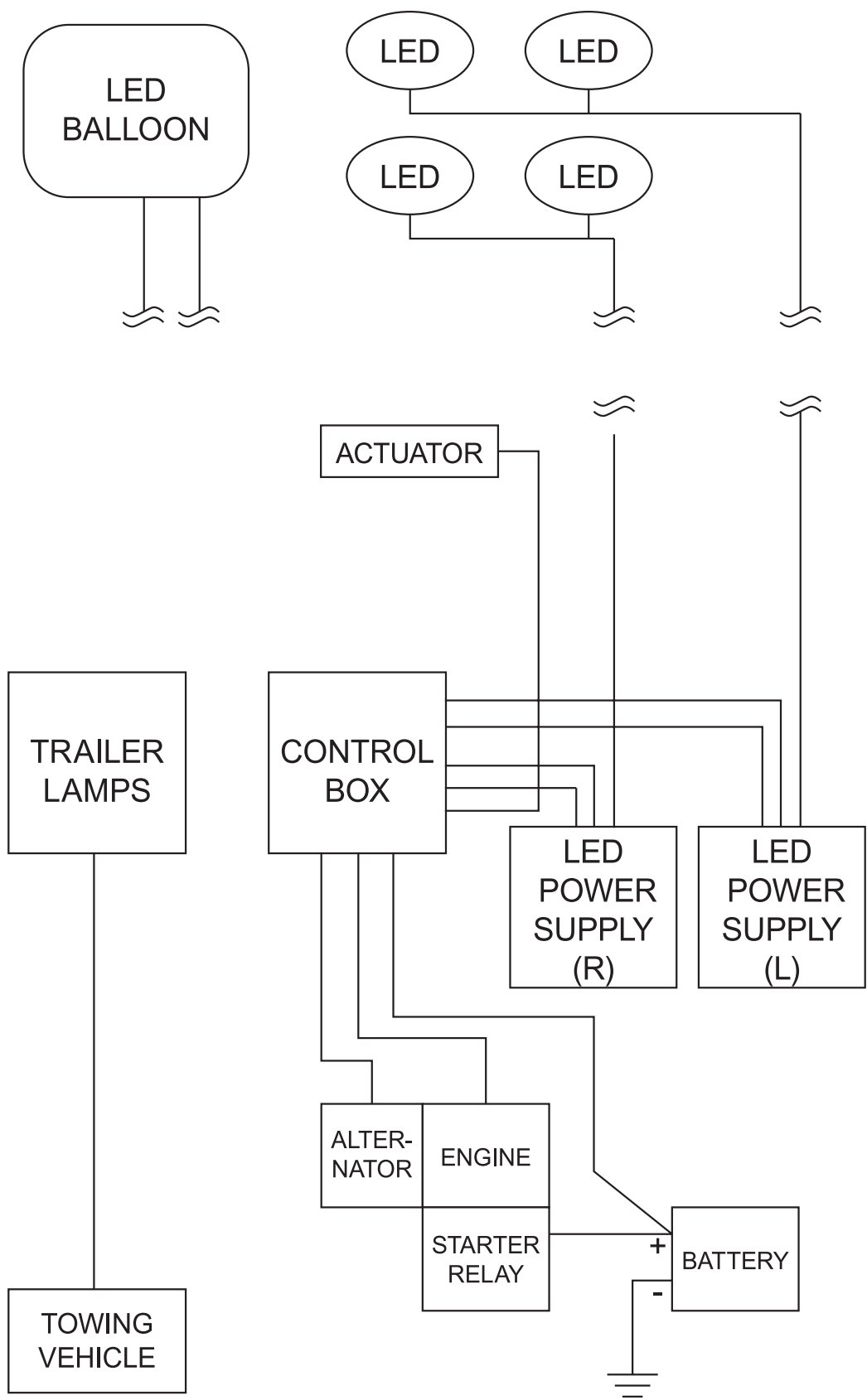


WARNING

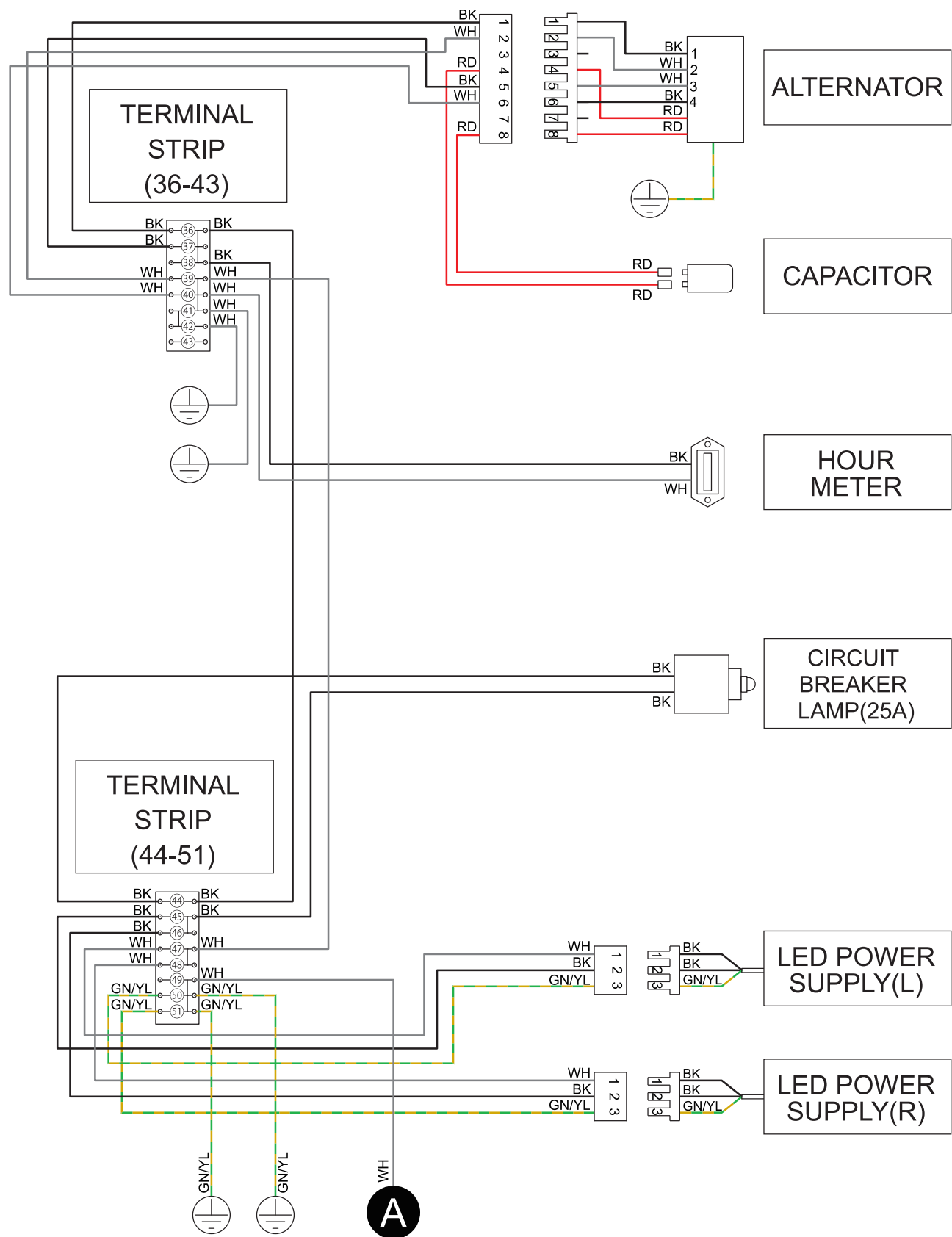
Improper operating taillights, stoplights and turn signals can cause collisions.

Check all lights before each tow.

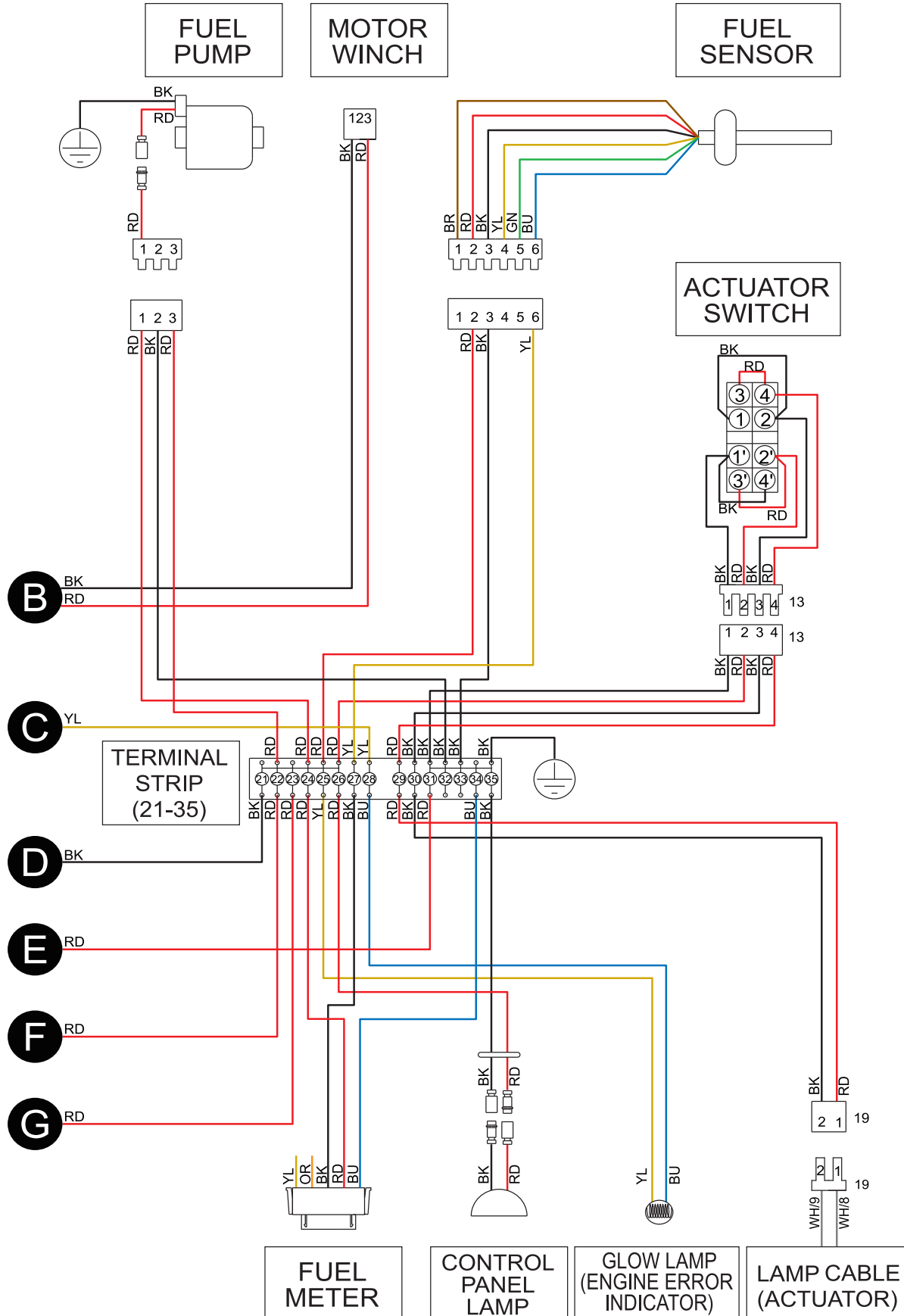
BLOCK DIAGRAM



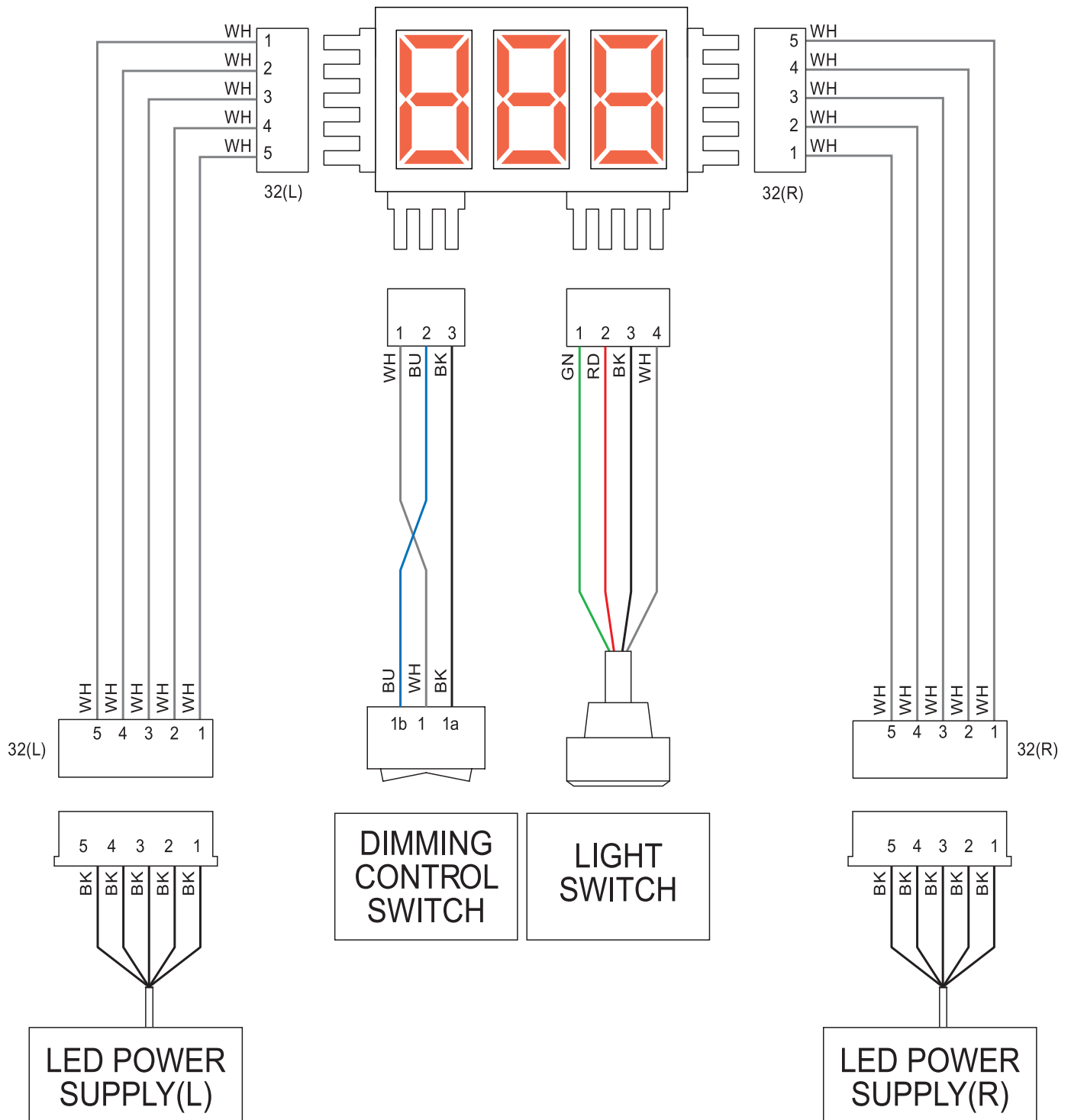
AC WIRING DIAGRAM



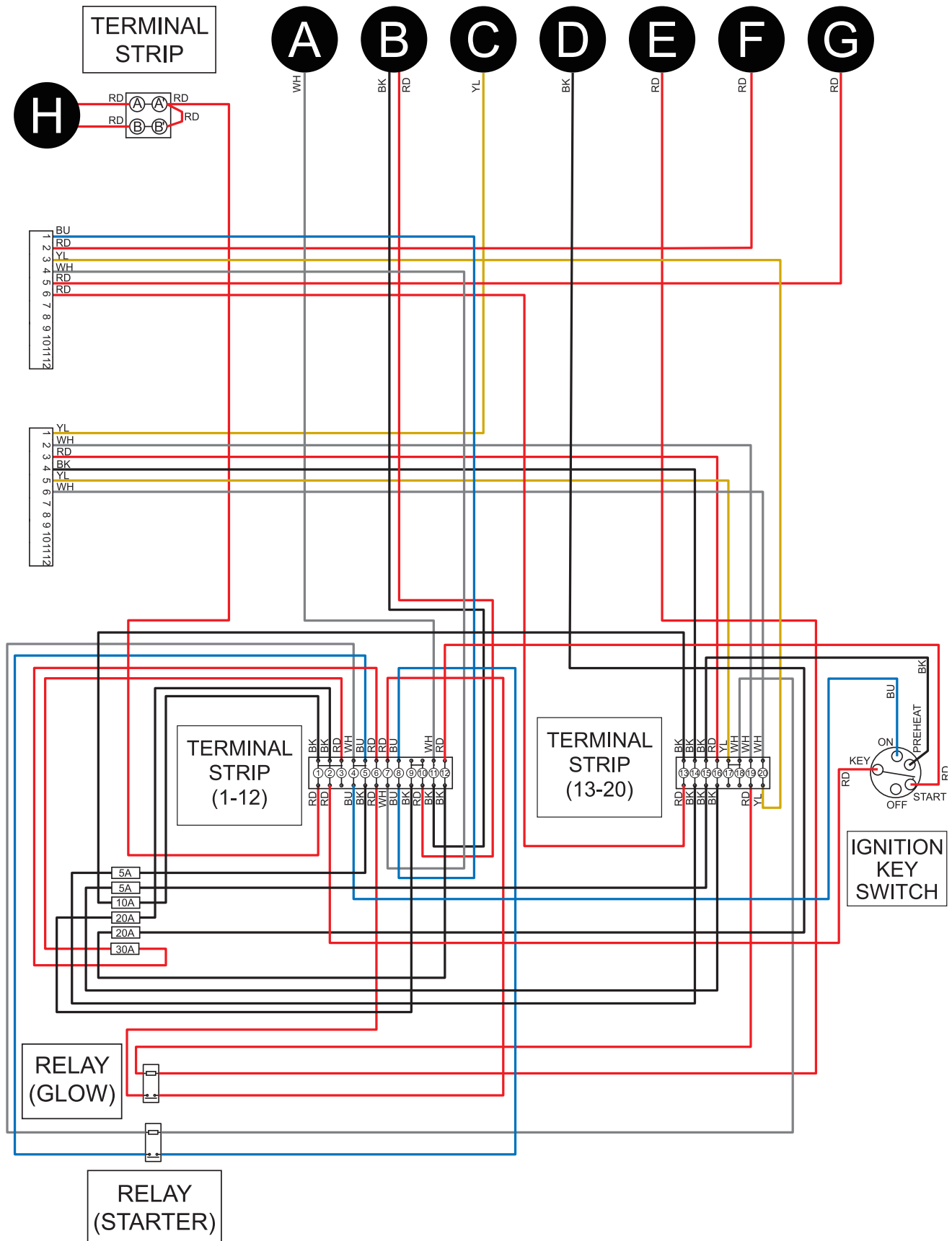
DC WIRING DIAGRAM



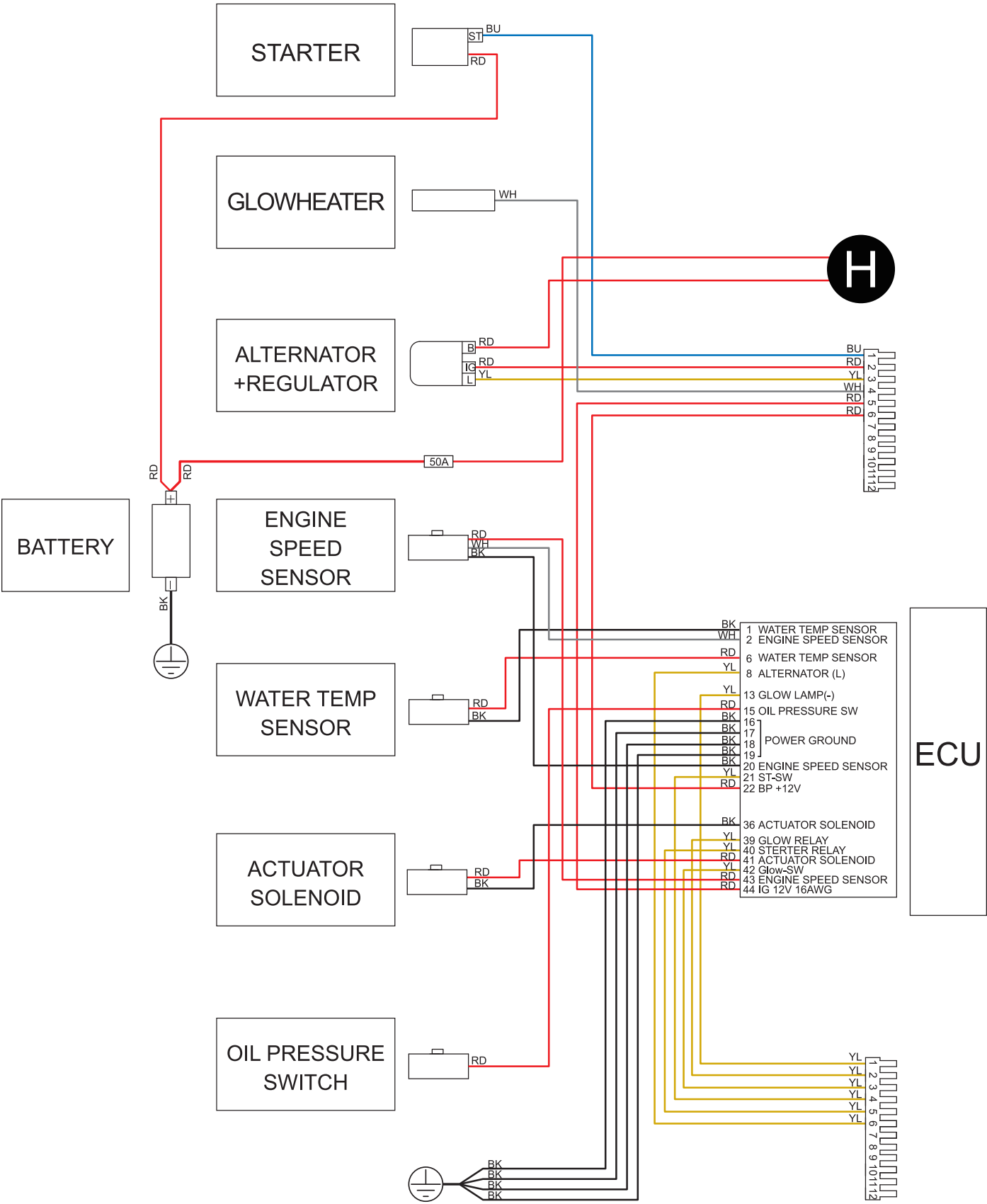
DIMMING AND LIGHT SWITCH WIRING DIAGRAM



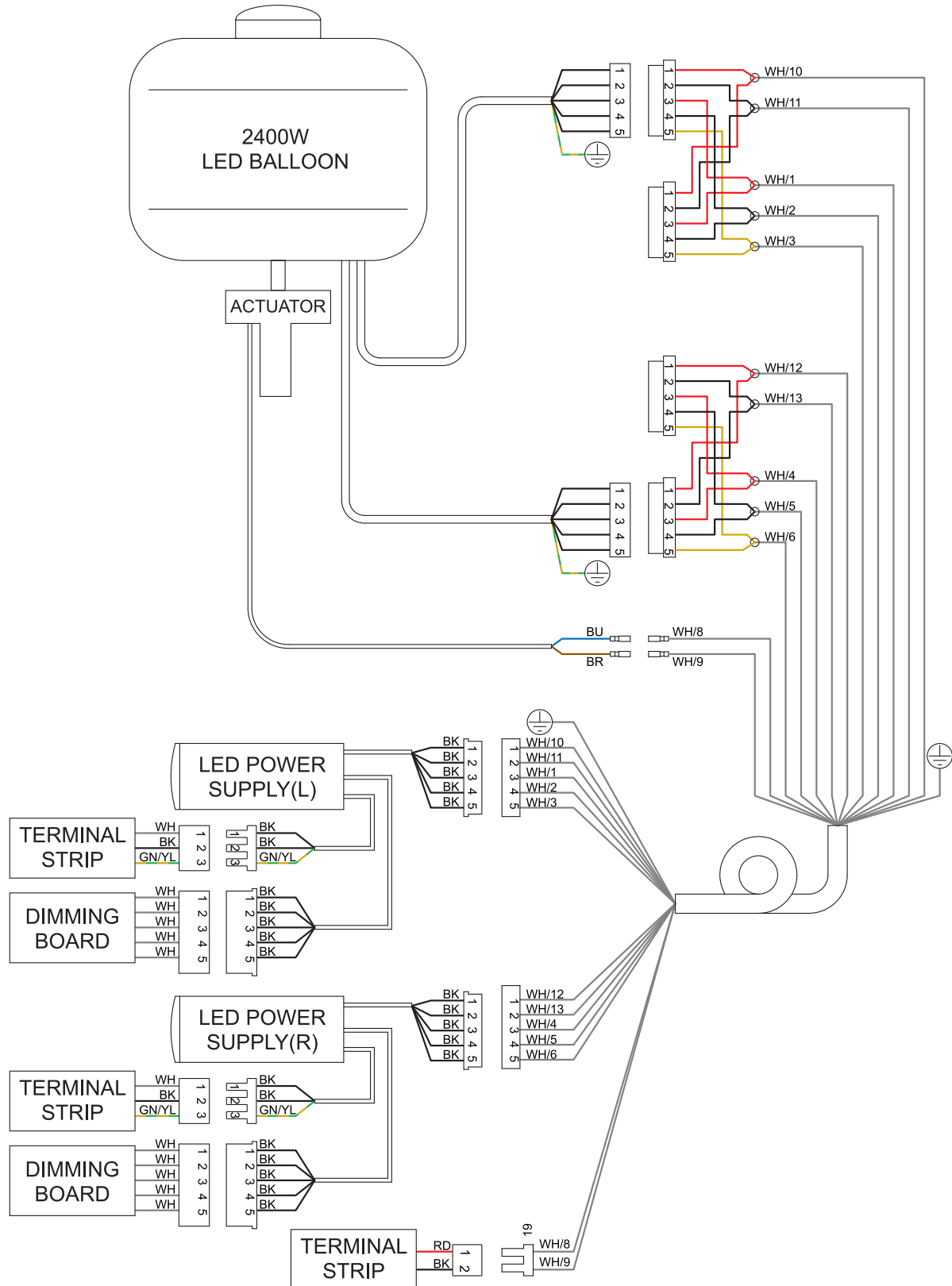
ENGINE WIRING DIAGRAM 1



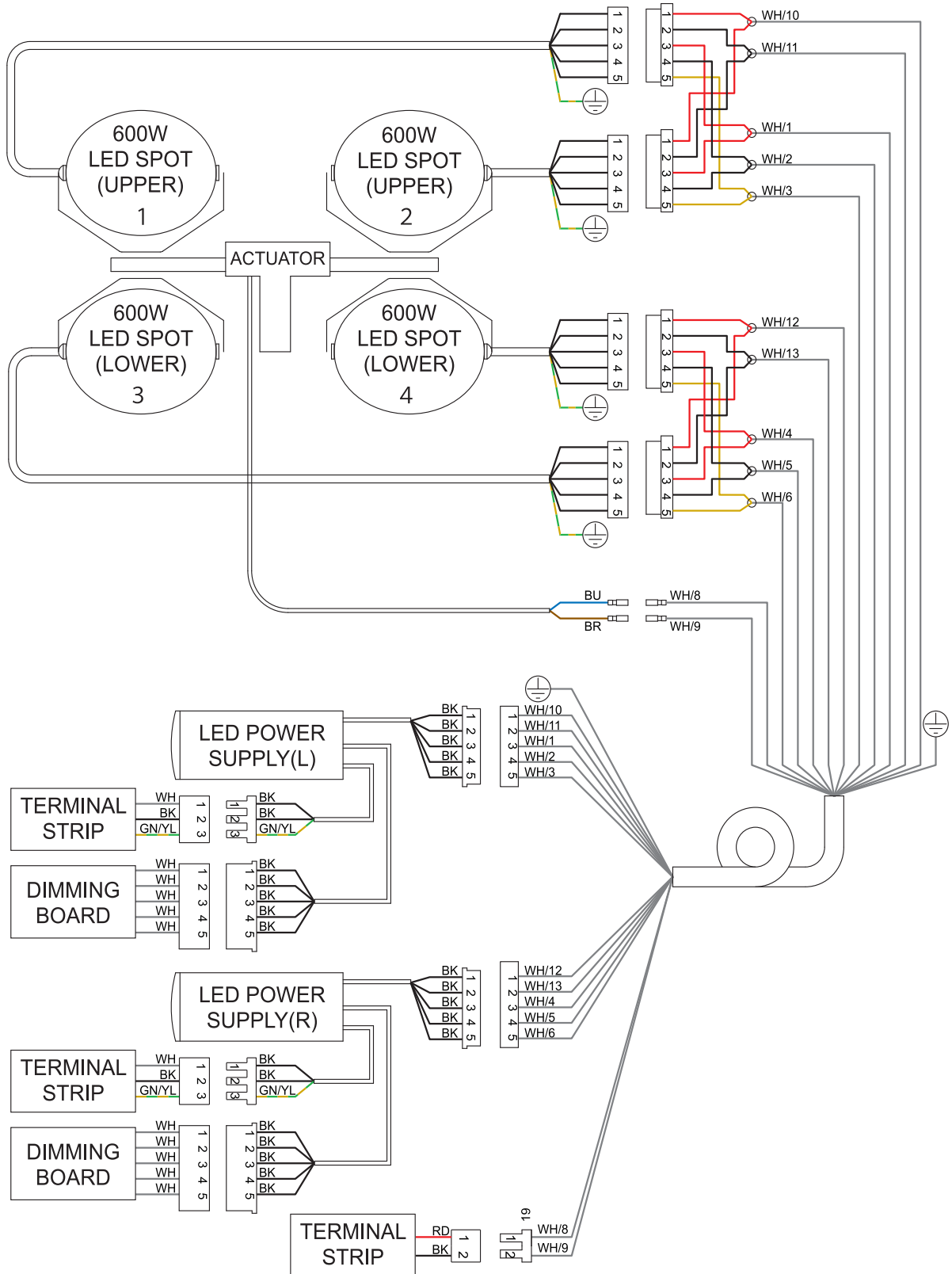
ENGINE WIRING DIAGRAM 2



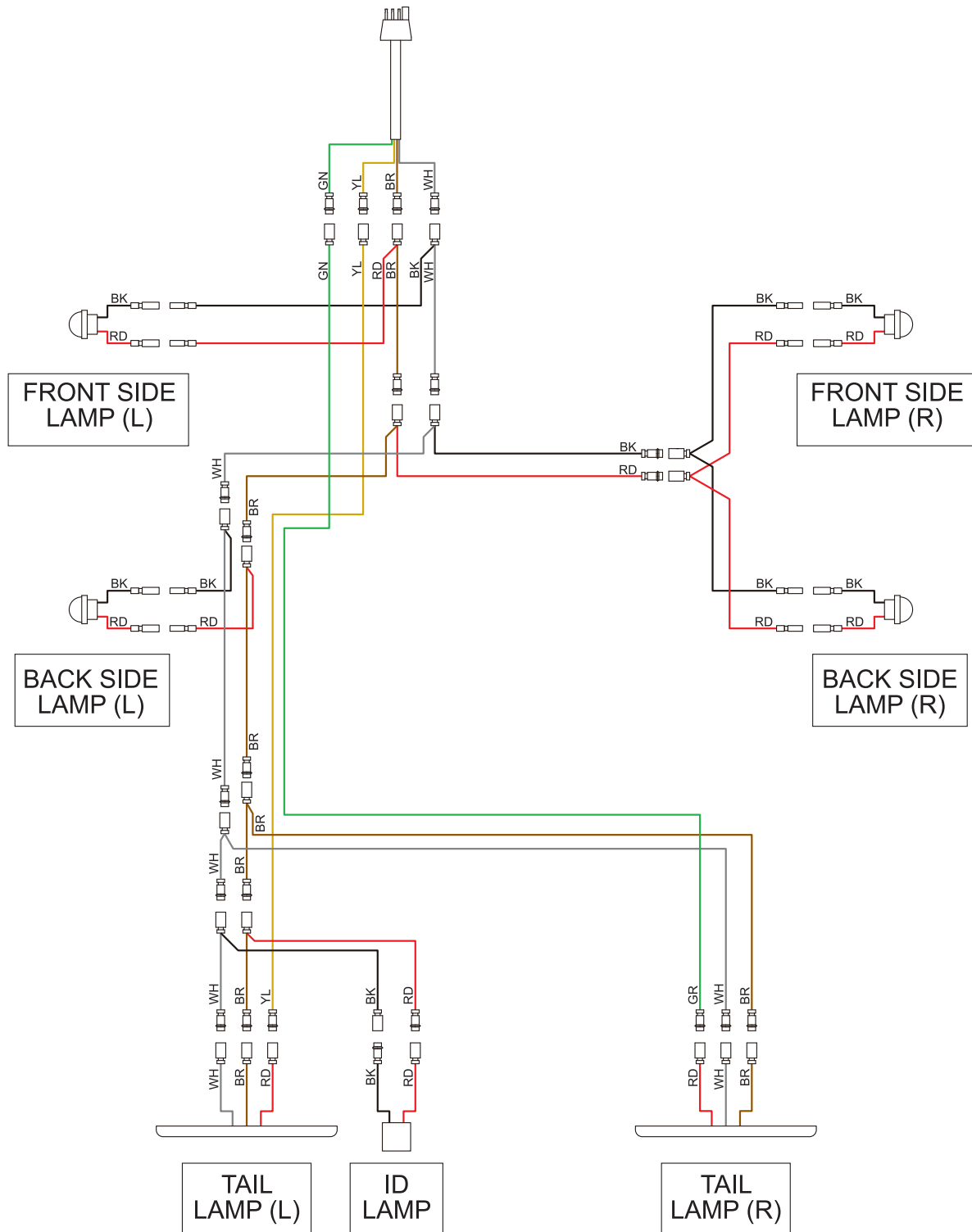
LIGHTS WIRING DIAGRAM (GBX24B)



LIGHTS WIRING DIAGRAM (GBX24S)



LIGHT TOWER WIRING DIAGRAM



[illegible]

OPERATION MANUAL

HERE'S HOW TO GET HELP

PLEASE HAVE THE MODEL AND SERIAL
NUMBER ON-HAND WHEN CALLING

UNITED STATES

Multiquip Inc.

(310) 537- 3700
6141 Katella Avenue Suite 200
Cypress, CA 90630
E-MAIL: mq@multiquip.com
WEBSITE: www.multiquip.com

CANADA

Multiquip

(450) 625-2244
4110 Industriel Boul.
Laval, Quebec, Canada H7L 6V3
E-MAIL: infocanada@multiquip.com

UNITED KINGDOM

Multiquip (UK) Limited Head Office

0161 339 2223
Unit 2, Northpoint Industrial Estate,
Globe Lane,
Dukinfield, Cheshire SK16 4UJ
E-MAIL: sales@multiquip.co.uk

© COPYRIGHT 2019, MULTIQUIP INC.

Multiquip Inc, the MQ logo are registered trademarks of Multiquip Inc. and may not be used, reproduced, or altered without written permission. All other trademarks are the property of their respective owners and used with permission.

This manual MUST accompany the equipment at all times. This manual is considered a permanent part of the equipment and should remain with the unit if resold.

The information and specifications included in this publication were in effect at the time of approval for printing. Illustrations, descriptions, references and technical data contained in this manual are for guidance only and may not be considered as binding. Multiquip Inc. reserves the right to discontinue or change specifications, design or the information published in this publication at any time without notice and without incurring any obligations.

