



OPERATION and MAINTENANCE MANUAL

LIGHTSOURCE LT6K - 50 HZ



This manual contains important safety information.

Do not destroy this manual.

This manual must be available to the personnel who operate and maintain this machine.



Ingersoll-Rand

Utility Equipment
P.O. Box 868 - 501 Sanford Ave
Mocksville, N.C. 27028
www.portablepower.irco.com

Doosan purchased Bobcat Company from Ingersoll-Rand Company in 2007. Any reference to Ingersoll-Rand Company or use of trademarks, service marks, logos, or other proprietary identifying marks belonging to Ingersoll-Rand Company in this manual is historical or nominative in nature, and is not meant to suggest a current affiliation between Ingersoll-Rand Company and Doosan Company or the products of either.

Machine models represented in this manual may be used in various locations worldwide. Machines sold and shipped into European common market countries requires that the machine display the EC Mark and conform to various directives. In such cases, the design specification of this machine has been certified as complying with EC directives. Any modification to any part is absolutely prohibited and would result in the CE certification and marking being rendered invalid. A declaration of that conformity follows:

Declaration of Conformity with EC Directives

98/37/EC, 93/68/EEC, 89/336EEC, 2000/14/EC



Ingersoll-Rand Company
P.O. Box 868
501 Sanford Avenue
Mocksville, North Carolina 27028

We

Represented In EC By:

Ingersoll-Rand Company Limited
Swan Lane, Hindley Green
Wigan WN2 4EZ
United Kingdom

Declare that, under our sole responsibility for manufacture and supply, the product(s)

LT6K Portable Light Tower

To which this declaration relates, is (are) in conformity with the provisions of the directives using the following principal standards

EN29001: EN292, EN60204-1, EN1012-1, PN8NTC2, EN50081, EN50082

Issued at Mocksville on 10-1-02

Ric Lunsford
Manager of Quality Control

CONFORMITY WITH NOISE DIRECTIVE 2000//14/EC

Ingersoll-Rand Company Limited declare that the following Portable Light Towers have been manufactured in conformity with the directive as shown.

Directive	Machine Type	Machine kW	Mean measured value	Guaranteed level	Notified body
2000/14/EC Annex VI Part I	LT6K	8.4	90.6 L _{wa}	91 L _{wa}	A V Technology Stockport UK Nr 1067

Issued at Prague
1st Declaration Oct 2002

Thomas Hibs
Engineering Manager

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FOREWORD

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the Ingersoll-Rand products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data to cover all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorized Ingersoll-Rand service department.

Details of approved equipment are available from Ingersoll-Rand Service departments.

The use of repair parts other than those included within the Ingersoll-Rand approved parts list may create hazardous conditions over which Ingersoll-Rand has no control. Therefore, Ingersoll-Rand cannot be held responsible for equipment in which non-approved repair parts are installed.

Ingersoll-Rand reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

This company accepts no responsibility for errors in translation of this manual from the original English version.

WARRANTY

Ingersoll-Rand, through its distributors, warrants to the initial user that each portable light tower manufactured by it, will be free of defects in material and workmanship for a period of the earlier of twelve (12) months from shipment to or the accumulation of 2,000 hours of service by the initial user.

Portable Light Tower Generators- The generator will be free of defects in material and workmanship for a period of twenty-four (24) months from shipment to or the accumulation of 4,000 hours of service by the initial user.

Ingersoll-Rand will provide a new part or repaired part, at its election, in place of any part, which is found upon its inspection to be defective in material and workmanship during the period prescribed above. Such part will be repaired or replaced without charge to the initial user during normal working hours at the place of business of an Ingersoll-Rand distributor authorized to sell the type of equipment involved or other establishment authorized by Ingersoll-Rand. User must present proof of purchase at the time of exercising warranty.

The above warranty does not apply to failures occurring as a result of abuse; misuse, negligent repairs, corrosion, erosion and normal wear and tear, alterations or modifications made to the product without express written consent of Ingersoll-Rand; or failure to follow the recommended operating practices and maintenance procedures as provided in the product's operating and maintenance publications.

Accessories or equipment furnished by Ingersoll-Rand, but manufactured by others, including, but not limited to, engines, shall carry whatever warranty the manufacturers have conveyed to Ingersoll-Rand and which can be passed on to the initial user.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, (EXCEPT THAT OF TITLE), AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

WARRANTY REGISTRATION

To initiate the machine warranty, fill out the "Warranty Registration" form 85040285 supplied as part of the machine documentation. Keep a copy for your records and mail the original to:

Ingersoll-Rand European Sales LTD
Portable Power Business
Swan Lane, Hindley Green
Wigan
Lancashire WN2 4EZ UK
Attention: Customer Service Department

Note: Completion of this form validates the warranty.

PORTABLE POWER EXTENDED WARRANTY REGISTRATION FORM

Customer Details

Company Name: _____

Contact Name: _____

Signature: _____

Company Address: _____

Post/zip Code: _____

Country: _____

Phone Number: _____

Fax Number: _____

e-mail: _____

Service Provider Details

Service Provider/Distributor: _____

Branch Office: _____

Machine Details

Product Type: _____

Model: _____

Serial Number: _____

Engine Serial Number: _____

Engine Model Number: _____

Airend Serial Number: _____

Alternator Serial Number: _____

Date of start up: _____

ISO SYMBOLS

Look for these signs on machines shipped to international markets outside North America, which point out potential hazards to the safety of you and others. Read and understand thoroughly. Heed warnings and follow instructions. If you do not understand, inform you supervisor.



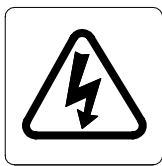
Corrosion risk



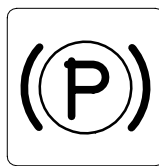
Hot Surface



Lifting point



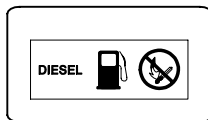
WARNING: Electrical shock risk.



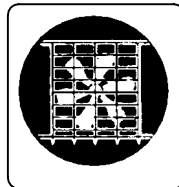
Parking Brake



No open flame



**Diesel Fuel.
No open flame.**



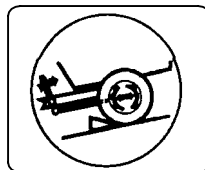
**Do not operate the machine
without guard being fitted.**



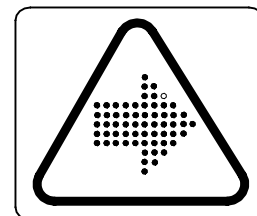
Lifting point



WARNING - Flammable liquid.



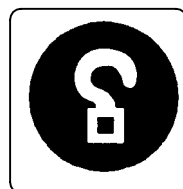
**When parking use prop stand,
handbrake and wheel chocks.**



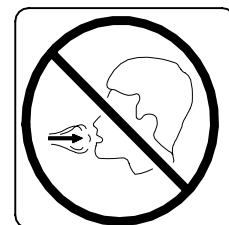
Air/gas flow or Air discharge.



WARNING - Hot and harmful exhaust gas.



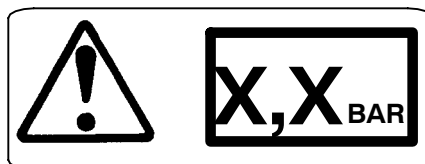
Tie down point



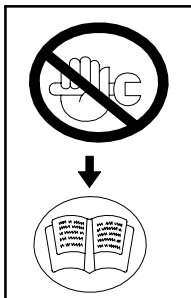
**Do not breathe the compressed
air from this machine.**



Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken.



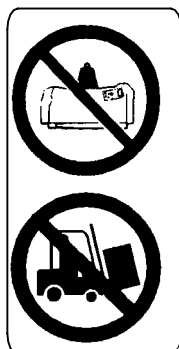
WARNING - Maintain correct tire pressure.
(Refer to the *GENERAL INFORMATION* section of this manual).



WARNING: Consult the operation and maintenance manual before performing any maintenance.

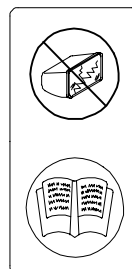


**Rough Service Designation
Wet Location Operation**

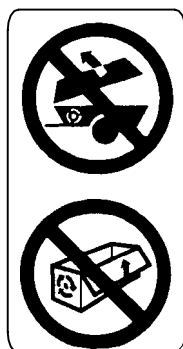
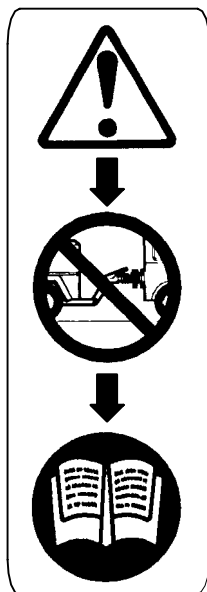


Do not stack

Do not use fork lift truck from this side



Replace any cracked protective shield.



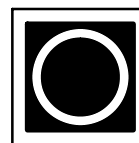
Do not operate with the doors or enclosure open.



On (power).

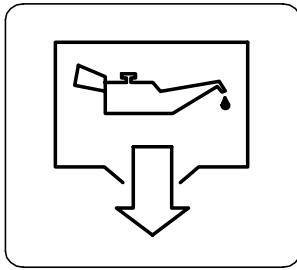


Off (power).

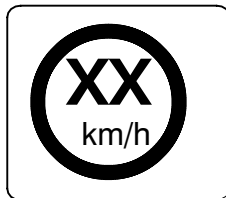


Emergency stop.

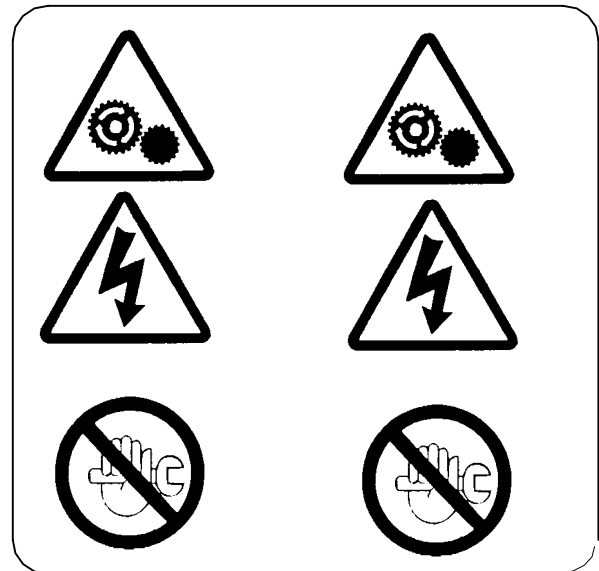
WARNING - Before connecting the tow bar or when preparing to tow, consult the operation and maintenance manual.



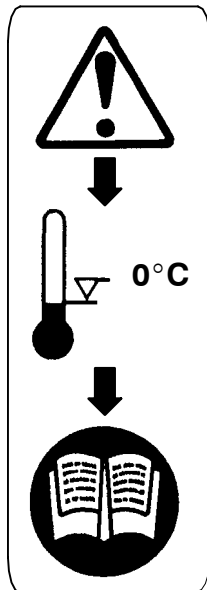
Oil Drain



Do not exceed the speed limit.



WARNING - Do not undertake any maintenance on this machine until the electrical supply is disconnected.



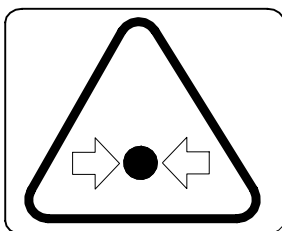
WARNING - For operating temperature below 0°C, consult the operation and maintenance manual.



Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken



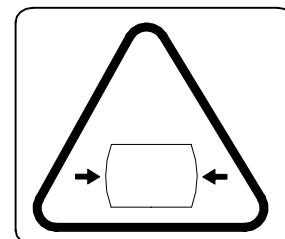
Do not remove the Operating and Maintenance manual and manual holder from this machine.



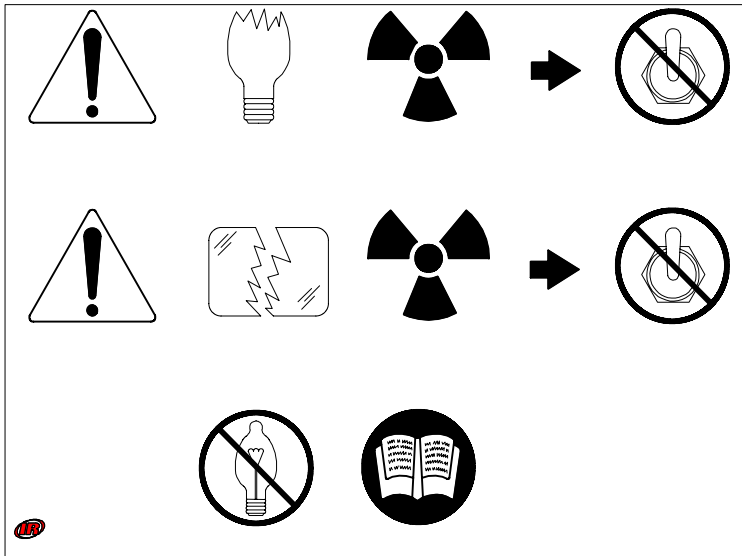
Pressurized vessel.



Use fork lift truck from this side only.



Pressurized component or system.




WARNING


Ultra violet radiation.

Can cause serious skin burn and eye inflammation.

Do not operate lights with missing or broken lens.

Do not operate if glass bulb is broken or punctured.



 **DANGER**

Electric shock hazard.
Will cause serious injury or death.
 Do not position light tower under electric power lines.




 **WARNING**

Non-vertical tower.
Can cause serious injury or death.
 Extend, retract or use in VERTICAL position only.
 Latch and lock pin securely.



 **WARNING**

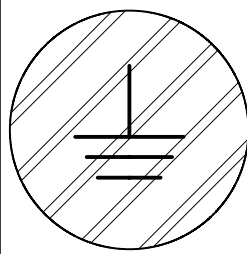
Crush area.
 Can cause serious injury.
 Stay clear.



DO NOT USE ETHER.
ENGINE DAMAGE WILL OCCUR.
 This engine is equipped with an electric heater starting aid.



WARNING



**ELECTRICAL
GROUND/EARTH**

SAFETY

SAFETY PRECAUTIONS

General Light Tower Information

Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.

Ensure that the Operation and Maintenance manual is available to the operator and maintenance personnel.

Ensure that maintenance personnel are adequately trained, competent and have read the manuals.

This machine is not designed for operating life sustaining equipment. It is equipped with a safety shutdown system that will cause the machine to stop operating whenever a shutdown condition is present.

Hazards may exist on the jobsite should this unit shutdown automatically and all lamps be extinguished. Personnel should be advised of this and have additional lighting.

Hot Pressurized Fluid – Remove cap slowly to relieve PRESSURE from HOT radiator. Protect skin and eyes. HOT water or steam and chemical additives can cause serious personal injury.

Electrical shock hazard will cause severe injury or death. Do NOT position light tower under electric power lines.

Improper operation of this machine can result in severe injury or death.

Hazardous Voltage can cause serious injury or death.

Never inspect or service unit without first disconnecting battery cable(s) to prevent accidental starting.

Wear eye protection while cleaning unit with compressed air, to prevent debris from injuring eyes.

Do not enter ballast box while engine is running. Do not steam clean ballast box. Capacitor/Ballast can cause severe injury.

Do not operate lights with broken or missing lens or broken glass bulb. Ultra violet radiation can cause serious skin burn and eye inflammation.

Do not place hand in tower recess while tower is being lowered or raised. Pinch point can cause severe injury.

Ground equipment in accordance with applicable codes. (Consult local electrician).

Do not operate electrical equipment while standing in water, on wet ground, with wet hands or shoes.

Use extreme caution when working on electrical components. Battery voltage (12V) is present unless the battery cables have been disconnected. Higher voltage (potentially 500 volts) is present at all times when the engine is running.

Always treat electrical circuits as if they were energized.

Before attempting any repair service, disconnect all leads to electrical power loads.

Do NOT connect or disconnect lamps while engine is running.

Make sure that all protective covers are in place and that the canopy/doors are closed during operation.

Never operate the engine of this machine inside a building. Avoid breathing exhaust fumes when working on or near the machine. Do not alter or modify this machine.

A battery contains sulfuric acid and can give off gases which are corrosive and potentially explosive. Avoid contact with skin, eyes and clothing. In case of contact, flush area immediately with water.

Exercise extreme caution when using booster battery.

Never operate unit without first observing all safety warnings and carefully reading the operation and maintenance manual shipped from the factory with this machine.

This machine may include such materials as oil, diesel fuel, antifreeze, brake fluid, oil/air filters and batteries which may require proper disposal when performing maintenance and service tasks. Contact local authorities for proper disposal of these materials.

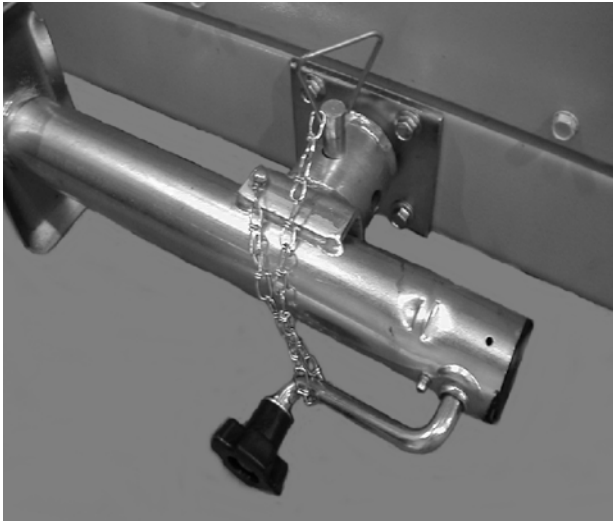
When loading or transporting machines, ensure that the specified lifting and tie down points are used. Ensure that the unit is secured properly before transporting.

Do not store or transport hazardous or combustible materials in or on this unit.

Do not suspend this machine with other equipment hanging from the running gear.

BEFORE TOWING - Make sure wheels, tires and tow bar connectors are in safe operating condition and tow bar is properly connected before towing.

Store the rear jack and secure the handle by wrapping the jack positioning pin chain around the handle to keep it from being damaged during towing.



TOWING - Do not tow this unit with a vehicle whose towing capacity is less than the unit gross weight shown in General Data.

Do not exceed maximum speed of 80km/h (or local legal maximum, if lower) when towing unit.

WELDING - Prior to any welding, disconnect alternator relays, voltage regulator, meters, circuit breakers and battery cables. Open all circuit breakers, and remove any external connections. Connect the welding ground as close as possible to the area being welded.

WINCH OPERATION - Before and during all winch operation, ensure that the area is clear of persons and obstructions over a 2m radius. When the mast has completed its normal travel, or is prevented from travelling, immediately release the control switch, to ensure that no cable overtension occurs.

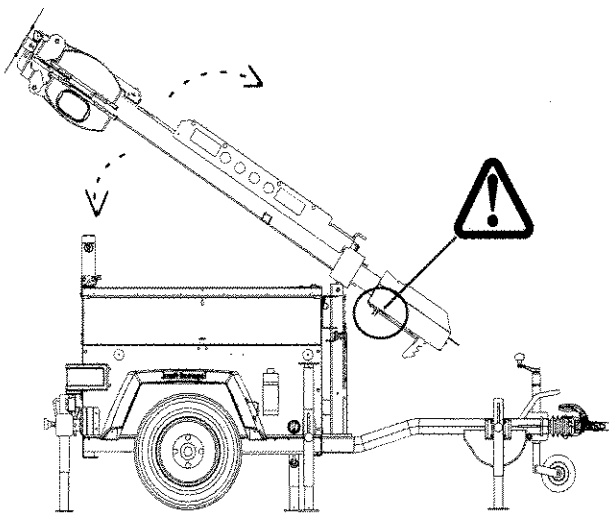
Check that no person is behind the machine (within 10m) while the tower is raised or lowered.

Unit must have all outriggers extended and be level before raising mast.

Do not extend, retract or use tower unless it is in a VERTICAL position with latch and lock pin securely in place.

DO NOT climb on tower. Perform repairs and adjustments with the tower in the down (transport) position.

When tower is pivoting during raising and lowering, be certain anti-telescope latches are engaged. Failure to do this may result in uncontrolled tower extension and/or tower collapse.



When tower is telescoping during raising and lowering, be certain anti-pivot latches are engaged. Latches must remain engaged any time the tower is vertical and extended. Failure to do this may result in uncontrolled tower extension and/or tower collapse.

Damaged cables may break during tower operation allowing the tower to fall. Do not operate tower with damaged cables. Replace damaged cables.

LAMPS - Inspect lamps and replace broken or missing lamp lens or punctured glass bulbs. Do NOT operate lights with broken or missing lens or broken glass bulb.

FLAMMABLE FUELS

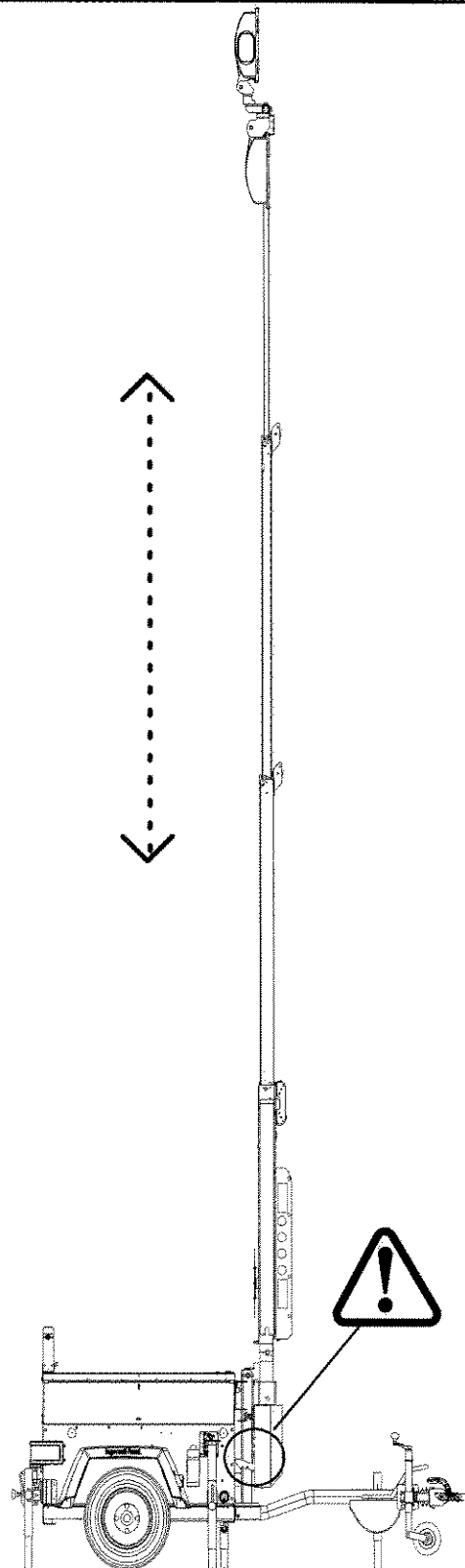
Do not fill fuel tank when engine is running.

Do not smoke or use an open flame in the vicinity of the generator or fuel tank.

Do not permit smoking, or open flame, or sparks to occur near the battery, fuel, cleaning solvents or other flammable substances and explosive gases.

Thoroughly clean up any fuel spills occurring inside this unit.

VOLATILE SUBSTANCE - Ether is extremely volatile. Do NOT use in conjunction with the "Glow plug" PREHEAT system furnished on this engine.



GENERAL INFORMATION

Light Tower Model	Light Source LT6K
Rated Power Output-kilowatts	6.0
Number of Lamps	4
Type of Lamps	Metal Halide
Engine Model (diesel)	3IRK5N
Crankcase Oil Capacity (litres)	5.1
Coolant Capacity (litres)	3.1
Unit Gross Weight (kilograms) Full fuel	1050
Unit Gross Weight (kilograms) Empty fuel	960

Unit Generator Frequency (Cycles/Second)	50 Hertz
Available Voltage	220V AC

Engine Speed	1500 RPM
Engine Electrical System	12 Volts DC
Fuel Tank Capacity	100 litres

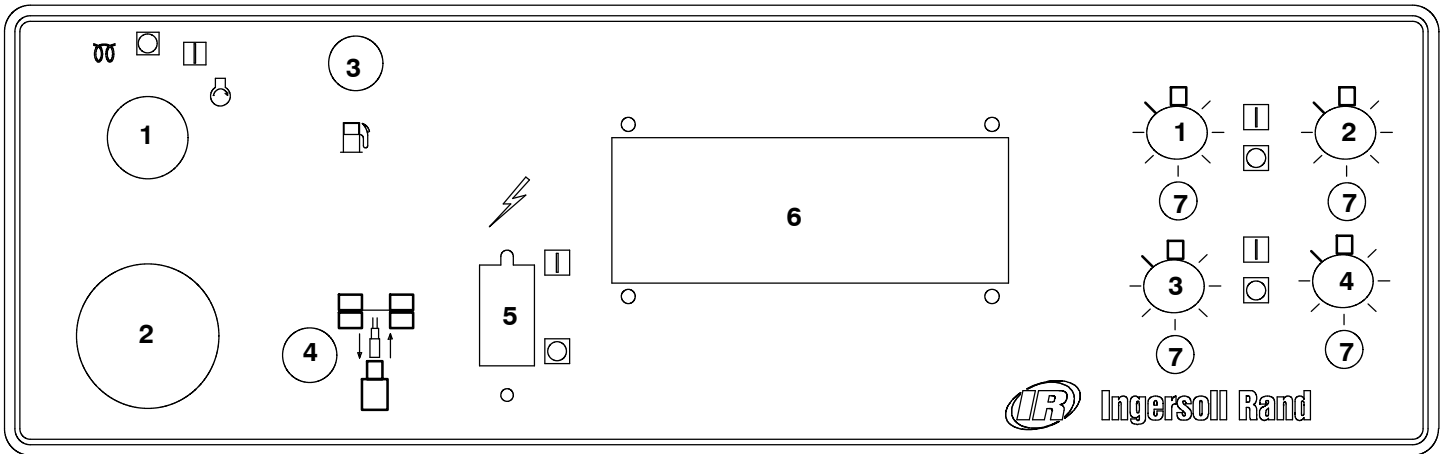
Overall Length	3,8 m
Overall Height	1,5 m
Overall Width	1,6 m
Maximum Tower Height (operating position)	9m

Tire Size	155 R13
Cold Inflation Pressure	2.9 bar
Maximum Towing Speed	80 km/hr (or local legal maximum, whichever is lower)
Wind Speed Rating (steady State-Maximum)	105 km/hr

Warning: Modification or alteration of this machine can result in severe injury or death. Do not modify or alter without the express written consent of Ingersoll-Rand Company.

OPERATING INSTRUCTIONS

CONTROL PANEL



1. IGNITION SWITCH - Positions



OFF - Stops Engine



RUN - Normal engine operating position



START - Energizes engine cranking motor



PREHEAT - Turn rotary switch to PREHEAT position for 5 seconds and then to START

2. HOURMETER - Records engine operating hours for maintenance purposes.

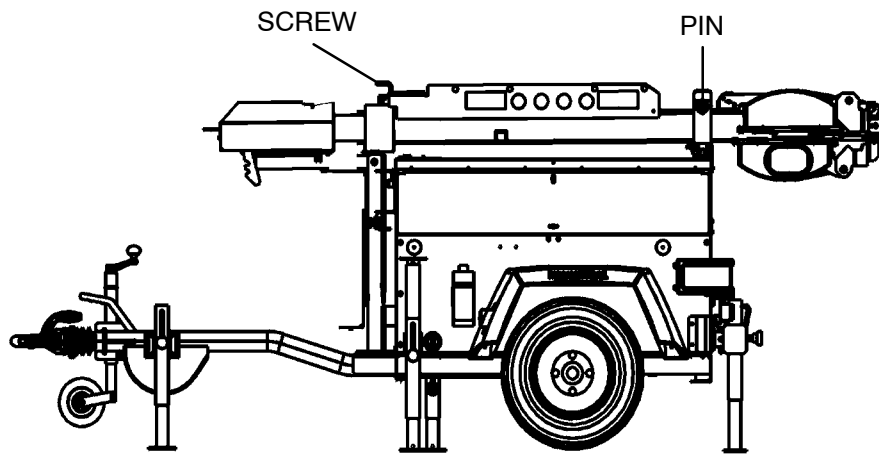
3. LOW FUEL LAMP - Optional

4. WINCH CONTROL SWITCH - Operates winch to raise and lower tower with lamps.

5. WINCH CIRCUIT BREAKER - Protects the winch circuit.

6. MAIN CIRCUIT BREAKER - Protects all lamp circuits.

7. LAMP SWITCH - Controls individual lamps.



SET-UP (PRIOR TO RAISING TOWER)

1. Inspect cables. Cables should not be frayed, cut, abraded, or otherwise damaged. Replace damaged cables.
2. Inspect springs and latch hardware. Replace any damaged or broken springs or hardware.
3. Ensure no obstruction is overhead within 15 meters. Remove transport warning sign from end of crossbar. Sign may be stored in tube on side of mast during operation.
4. Remove pin.
5. Be sure lamps are secure on cross bar and aim as desired.
6. Extend all outriggers fully and insert locking pins fully. Ensure drawbar jack and all outrigger and/or jacks are firmly in contact with ground.
7. Level unit using jacks and bubble level indicator.
8. Jacks must support entire unit weight (tires off the ground).

RAISE TOWER

1. Use winch control switch to raise tower. Allow winch to raise tower to desired height. Do not stop winch before the tower is completely vertical and latches are engaged.

2. Loosen screw to rotate tower. Tighten screw after rotating tower to desired angle.

LOWERING TOWER

1. Switch lamps off.
2. Rotate tower to home position and secure against stop before lowering. Failure to do this may damage latches.
3. Tighten screw.
4. Use winch control switch to lower the tower to horizontal (transport) position.
5. Insert and lock pin before moving or lifting.

WINCH OPERATION

During raising and lowering tower, check that there is no one behind the machine in the area of the tower. Check that no obstruction is overhead. Before operating the winch, inspect the cable for damage. Replace damaged cables. When operating the winch, do NOT overcrank when cable is tight. This will damage the cable. Do not continue cranking winch when cable becomes loose. This will cause the cable to unwind from winch drum causing cable kinks and knots. Before and during all winch operation, ensure the area is clear of persons and obstructions over a 2m radius. When the mast has completed its normal travel, or is prevented from travelling, immediately release the control switch, to ensure that no cable over extension occurs.

TOWING

CAUTION: Assure tow vehicle has towing capacity for weight of this unit as stated in General Information.

When towing unit in the United Kingdom, attach fog lamp on bumper to the right of center. Secure transport warning sign to right end of lamp crossbar.

When towing in Continental Europe and other locations, attach fog lamp on bumper to the left of center. Secure transport warning sign to left end of lamp crossbar.

Connect:

- Rotate lamps to transport position and secure by fitting strap around lamp body.
- Assure tow vehicle hitch is the proper size to securely connect to the eye or coupler on the unit.
- Check eye or coupler bolts for any looseness or wear. Tighten or replace as required.
- Chock wheels.

- Position tow vehicle to align hitch with eye or coupler.

Stand Aside While:

- Operating jack to seat eye or coupler onto hitch.
- Securing hitch.
- Attaching Brake actuator breakaway chain /cable (if supplied).
- Connecting lighting plug.
- Removing wheel chocks.
- Testing brakes (if supplied).

Disconnect:

- Chock wheels.

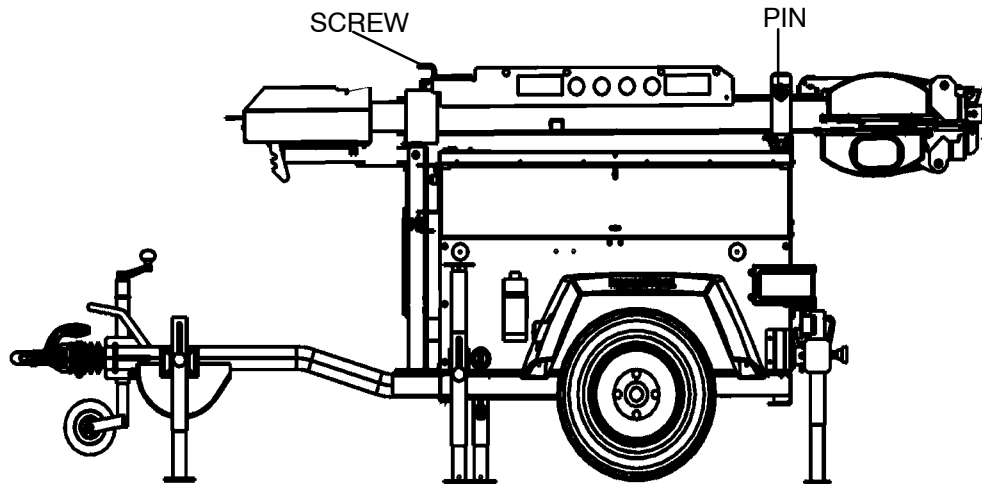
Stand Aside While:

- Disconnecting brake actuator breakaway chain/cable, if supplied.
- Disconnecting lighting plug.
- Releasing Hitch.
- Operating jack to raise eye or coupler from hitch.
- Moving tow vehicle.
- Leveling machine.

WARNING: Make certain hitch is completely engaged to tow vehicle and is secure. Failure to do so could result in serious personal injury.

MAINTENANCE and REPAIR - Do not use eye or coupler with any bent or otherwise damaged parts.

LIFTING INSTRUCTIONS



BEFORE LIFTING ENSURE :

TOWER HOLDDOWN PIN IS FULLY INSERTED THROUGH BOTH SIDES OF TOWER REST AND LOCK PIN IS INSTALLED.

NO LOOSE OBJECTS SHALL BE STORED INSIDE OR ON TOP OF MACHINE.

NO ADDITIONAL EQUIPMENT IS TO BE HUNG ONTO OR UNDER MACHINE.

ANY DEVICE USED FOR LIFTING SHALL BE RATED AT A MINIMUM OF 2 TON WORKING CAPACITY.

NO PERSONNEL SHOULD BE ON OR UNDER MACHINE AT ANY TIME DURING LIFTING.

THE RECTANGULAR HOLES MAY BE USED FOR LIFTING WITH A FORKLIFT. FOR SINGLE POINT LIFT, USE THE ROUND HOLE THAT KEEPS THE UNIT MOST LEVEL.

BEFORE STARTING

Check the Following:

1. **Engine oil level.** Add as required.
2. **Engine coolant level.** Add as required.
3. **Fuel filter.** Drain any accumulation of water. Clean or replace element as required.
4. **Air cleaner service indicator (if equipped).** Service when showing "red".
5. **Fuel level in tank** - Fill, using CLEAN DIESEL fuel, at the end of the day to minimize condensation.
6. **Battery** - Keep terminals clean and lightly greased.
7. **Engine belts and hoses** - Check for proper fit and/or damage. Service as required.
8. **Air Vents/Grilles** - Both engine radiator and generator cooling air. Check for obstructions (leaves, paper, etc.)
9. **Visual inspection** - Check for excessive fluid leaks, evidence of arcing around control panel, loose wire-routing clamps, etc.

CAUTION: Call qualified person to make electrical repairs.

STARTING

1. Main Circuit Breaker and Lamp switches shall be "OFF".
2. Turn Ignition Switch to "PREHEAT" for 5 seconds prior to starting.

Note: In extreme cold temperatures, this may take up to 10 seconds.

WARNING: Electrical power is present upon cranking engine.

3. Immediately turn Ignition Switch to "START".

Note: Do NOT crank for more than 15 seconds without allowing starter to cool for 30 seconds. If engine does not start after a few attempts, refer to Fault Finding.

4. Release Ignition Switch to "ON" after engine continues to run.
5. Allow the engine to warm-up for 3 to 5 minutes.
6. Turn on main circuit breaker.
7. Lamp Switches may now be used.

WARNING: Keep side doors closed for optimum cooling and safety of unit while running.

STOPPING

1. Turn Lamps "OFF".
2. Turn Main Breaker "OFF".
3. Turn Ignition Switch "OFF".

Note: If lights are turned off, a fifteen minute cooldown is required before they will restrike.

The engine in this unit is protected with sensors for high coolant temperature and low oil pressure. Should either of these conditions occur, the engine will automatically stop causing a loss of power to all lamps. Before restarting the unit, check the fuel level and engine/radiator thoroughly and correct the problem. The lamps should not be restarted for approximately fifteen (15 minutes).

MAINTENANCE

CAUTION: Any unauthorized modification or failure to maintain this equipment may make it unsafe and out of factory warranty.

WARNING: Before attempting any repair service, disconnect engine battery cables and all leads to electrical power requirements. Failure to do so can result in severe personal injury, death or damage to the equipment.

GENERAL

In addition to periodic inspections, many of the components in this unit requires periodic servicing to provide maximum output and performance. Servicing may consist of pre-operation and post-operation procedures to be performed by the operating or maintenance personnel. The primary function of preventive maintenance is to prevent failure, and consequently, the need for repair. Preventive maintenance is the easiest and the least expensive type of maintenance. Maintaining your unit and keeping it clean at all times will facilitate servicing.

SCHEDULED MAINTENANCE

The maintenance schedule is based on normal operation of the unit. In the event unusual environmental operating conditions exist, the schedule should be adjusted accordingly.

Wire Routing Clamps

Daily check for loose wire routing clamps. Clamps must be secure and properly mounted. Also check wiring for wear, deterioration and vibration abrasion.

Electrical Terminals

Check daily for evidence of arcing around the electrical terminals.

Grounding Circuit

Daily check that the grounding circuit is in accordance with local code requirements. Check to ensure continuity between the grounding terminal, frame, generator and engine block.

Hoses

Each month it is recommended that the intake hoses from the air cleaner and all flexible hoses used for water and fuel be inspected for the following:

1. All rubber hose joints and the screw type hose clamps must be tight and the hoses showing no signs of wear, abrasion or deterioration.
2. All flexible hoses must be free of wear, deterioration and vibration abrasion. Routing clamps must be secure and properly mounted.

Wiring Insulation

Daily check for loose, or frayed wiring insulation or sleeving.

Fuel/Water Separator

Daily check for water in the fuel filter/water separator unit (if equipped). Some engines have a translucent bowl for visual indication, and others have a drain valve below the primary element.

Every six months or 500 hours, or less if fuel is of poor quality or contaminated, replace the fuel element(s).

Air Vents

Daily clean the air vents of any obstructions or debris.

Air Cleaner

Proper maintenance of the air cleaner provides maximum protection against airborne dust. Squeeze the rubber valve (precleaner dirt dump) periodically to ensure that it is not clogged.

To service the air cleaners, proceed as follows:

1. Remove filter element.
2. Inspect air cleaner housing for any condition that might cause a leak and correct as necessary.
3. Wipe inside of air cleaner housing with a clean, damp cloth to remove any dirt accumulation. This will permit better seal for gasket on filter element.
4. Install element.

The air cleaner assembly (housing) should be inspected every three months or 250 hours for any leakage paths.

Note: Make sure the inlet is free from obstruction.

Make sure the air cleaner mounting bolts and clamps are tight and the air cleaner is mounted securely. Check the air cleaner housing for dents or damage to the cleaner, which could lead to a leak.

Tires

Weekly check the condition of the tires, and gauge the air pressure. Tires that have cuts or cracks or little tread should be repaired or replaced.

Tower Cables

Each day the tower lifting cables should be inspected to ensure the ends are attached securely. The cables should be checked for fraying or other damage and replaced if damaged. Also the pulleys should be checked for unusual wear or damage and replaced if worn excessively or damaged.

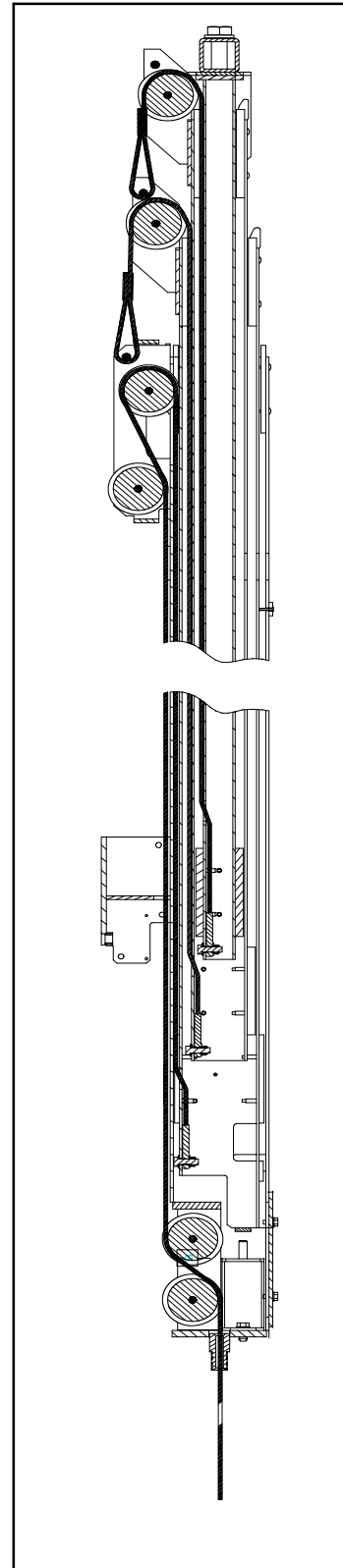
Tower Latches and Locking Pins

All tower latches and locking pins should be checked daily. Replace any missing or damaged parts before lifting the unit or raising the tower.

Tower Guides

Every month inspect all of the tower guides for proper operation. Clean sliding surfaces. Replace any missing or damaged parts before raising the tower.

CABLE ROUTING DIAGRAM



Engine Radiator

Check the coolant level in the radiator. The coolant must cover the tubes in the top tank (approximately 1 inch high on a clean measuring rod, stuck down filler neck).

WARNING: Remove cap slowly to relieve Pressure from HOT radiator. Protect skin and eyes. Hot water or steam and chemical additives can cause serious personal injury.

The engine coolant system is normally filled with a 50/50 mixture of water and ethylene glycol. This permanent type anti-freeze contains rust inhibitors and provides protection to -35°F (-37°C). The use of such a mixture is recommended for both summer and winter operation.

It is recommended to test the freezing protection of the coolant every six months or prior to freezing temperatures. Replenish with a fresh mixture every twelve months.

Each month, inspect the radiator exterior for obstructions, dirt and debris. If present, blow water or compressed air containing a non-flammable solvent between the fins in a direction opposite the normal air flow. Should the radiator be clogged internally, reverse flushing, using a commercial product and the supplier's recommended procedure, may correct the problem.

Engine Protection Shutdown System

The operation of the engine protection shutdown system should be checked every month, or whenever it appears not to be operating properly. The three switches involved in this protective shutdown system are the engine coolant high temperature switch, the engine oil pressure switch and the low fuel switch. (optional)

The engine oil pressure switch prevents the engine from operating with low oil pressure. Once a month, remove a wire from the engine oil pressure switch to check the shutdown system for proper operation.

Test the engine oil pressure switch by removing it and connecting it to a source of controlled pressure while monitoring an ohmmeter connected to the switch terminals.

As pressure is applied slowly from the controlled source, the switch should close at 12 psi (84 kPa) and show continuity through the contacts. As the pressure is slowly decreased to 10 psi (70 kPa) the contacts should open and the ohmmeter should show a lack of continuity through the contacts. Replace a defective switch before continuing to operate the unit.

Once a year, the temperature actuated switch should be tested by removing it from the unit and placing it in a bath of heated oil. The engine coolant high temperature switch will require a temperature of approximately 220°F (104°C) to actuate.

Note: The engine temperature switch does NOT offer protection when NO coolant is present. Test the switch operation by connecting an ohmmeter between the two wire terminals. The ohmmeter should show zero ohms. When the switch is placed in the heated oil bath and its contact open, the ohmmeter should indicate infinite ohms. Tap the switch lightly during the checking operation. Replace any defective switch before continuing to operate the unit.

CAUTION: Never operate the unit with a defective safety shutdown switch or by by-passing a switch.

Control Compartment

Every six months or 500 hours with the unit "OFF", perform visual inspection for loose connections, dirt, arcing, damage to electrical components.

Fuel Tank

In order to minimize condensation inside the fuel tank, refill as soon as possible after every use or at the end of each work day. Use only clean, DIESEL fuel. When using a funnel, ensure that it is clean and free from dust. Every six month, drain any sediment or accumulated condensate.

Battery

Keep the battery posts and cable connections clean and lightly coated with a grease.

Fasteners

Monthly spot check several capscrews and nuts for proper torque. If any are found loose, a more thorough inspection must be made and deficiencies corrected.

Running Gear/Wheels

Check the wheel nut torque 20 miles (30 kilometres) after refitting the wheels.

Lifting jacks should only be used under the axle.

The bolts securing the running gear to the chassis should be checked periodically for tightness (refer to the PREVENTATIVE MAINTENANCE CHART for frequency) and re-tightened where necessary.

Brakes

Check and adjust the brake linkage at 500 miles (850Km) then every 3000 miles (5000Km) or 3 months (whichever is the sooner) to compensate for any stretch of the adjustable cables. Check and adjust the wheel brakes to compensate for wear.

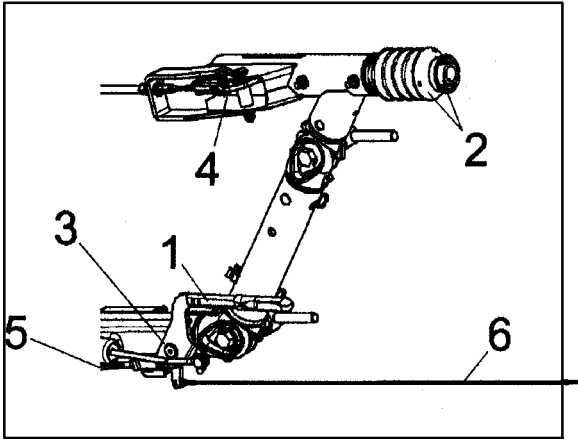
Adjusting the overrun braking system (KNOTT Running Gear)

Preparation:

Jack up the machine

Disengage the handbrake lever [1].

Fully extend the draw bar [2] on the overrun braking system.



- 1. Handbrake lever
- 2 Draw bar and bellows
- 3 Handbrake lever pivot
- 4 Transmission lever
- 5 Brake cable
- 6 Breakaway Cable

Requirements:

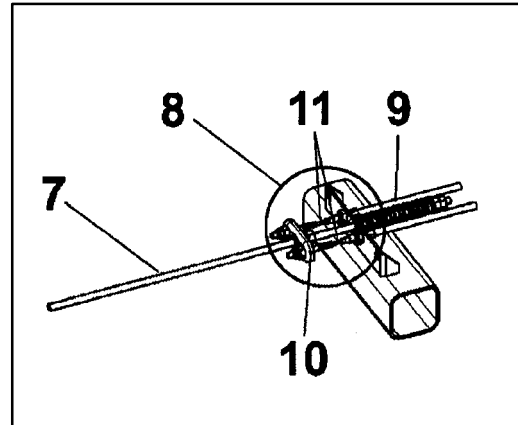
During the adjustment procedure always start with the wheel brakes.

Always rotate the wheel in the direction of forward movement.

Ensure that an M10 safety screw is fitted to the handbrake pivot.

The brake actuators must not be pre-tensioned –if necessary loosen the brake linkage [7] on the brake equalisation assembly [8].

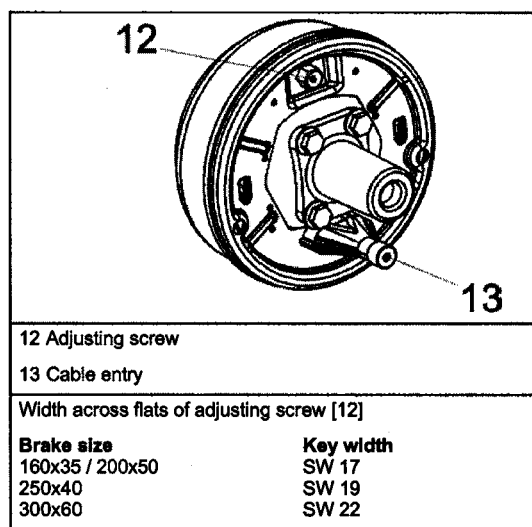
Check that brake actuators and cables [11] operate smoothly.



- 7 Brake Linkage
- 8 Equalization Assembly
- 9 Compression Spring
- 10 Equalizer Plate
- 11 Cable

CAUTION: The compression spring [9] must only be lightly pre-tensioned and when operating must never touch the axle tube. Never adjust the brakes at the brake linkage [7].

Brake Shoe Adjustment



Tighten adjusting screw [12] clockwise until the wheel locks.

Loosen adjusting screw [12] anti-clockwise (approx. 1/2 turn) until the wheel can be moved freely.

Slight dragging noises that do not impede the free movement of the wheel are permissible.

This adjustment procedure must be carried out as described on both wheel brakes.

When the brake has been adjusted accurately the actuating distance is approximately 5–8mm on the cable [11]

Compensator Assembly Adjustment

Variable Height models

Fit an M10 safety screw to the handbrake pivot.

Disconnect the handbrake cable [5] at one end.

Pre-adjust brake linkage [7] lengthways (a little play is permissible) and re-insert the cable [5], adjusting it to give a small amount of play.

Remove the M10 safety screw from the handbrake pivot.

All Models

Engage the handbrake lever [1] and check that the position of the equaliser plate [10] is at right angles to the pulling direction. If necessary correct the position of the equaliser plate [10] on the cables [11].

The compression spring [9] must only be slightly pre-tensioned and when engaged must not touch the axle tube.

Brake Linkage Adjustment

Adjust the brake linkage [7] lengthways without pre-tension and without play in the transmission lever [4].

Readjustment

Engage the hand brake lever [1] forcefully a number of times to set the brake.

Check the alignment of the equalisation assembly [8], this should be at right angles to the pulling direction

Check the play in the brake linkage [7]

If necessary adjust the brake linkage [7] again without play and without pre-tensioning

There must still be a little play in cable [5] (Variable Height Only)

Check the position of the hand brake lever [1]. The start of resistance should be approximately 10–15mm above the horizontal position.

Check that the wheels move freely when the handbrake is disengaged.

Final Test

Check the fastenings on the transmission system (cables, brake equalization system and linkage).

Check the hand brake cable [5] for a small amount of play and adjust if necessary (Variable height only)

Check the compression spring [9] for pre-tensioning.

Test Run

If necessary carry out 2–3 test brake actions.

Test Brake Action

Check the play in brake linkage [7] and if necessary adjust the length of brake linkage [7] until there is no play.

Apply the handbrake while rolling the machine forward, travel of the hand brake lever up to 2/3 of maximum is allowed.

Re-adjusting the overrun braking system (KNOTT Running Gear)

Re-adjustment of the wheel brakes will compensate for brake lining wear. Follow the procedure described in 2: Brake Shoe Adjustment.

Check the play in the brake linkage [7] and re-adjust if necessary.

Important: Check the brake actuators and cables [11]. The brake actuators must not be pre-tensioned.

Excessive operation of the handbrake lever, which may have been caused by worn brake linings, must not be corrected by re-adjusting (shortening) the brake linkage [7]

Re-adjustment

The handbrake lever [1] should be engaged forcefully several times to set the braking system.

Check the setting of the brake equalisation assembly [8], which should be at right angles to the pulling direction.

Check the play in the brake linkage [7] again, ensuring that there is no play in the brake linkage and that it is adjusted without pre-tension.

Check the position of the hand brake lever [1], cable [5] (with little play) and the compression spring [9] (only slight pre-tension). The start of resistance of the handbrake lever should be approximately 10–15mm above the horizontal position.

Final Test

Check the fastenings on the transmission system (cables, brake equalization system and linkage).

Apply the handbrake while rolling the machine forward, travel of the handbrake lever up to 2/3 of maximum is allowed.

Check the handbrake cable [5] for a small amount of play and adjust if necessary (variable height only).

CAUTION: Check the wheel nut torque 20 miles (30 kilometres) after refitting the wheels (Refer to the TORQUE SETTING TABLE).

Running Gear Wheel Bearings

Wheel bearings should be packed with grease every 6 months. The type of grease used should conform to Specification MIL-G-10924.

Instruments

Inspect the instrument lamps, gauges and switches prior to start-up and during operation to ensure proper functioning.

Cleaning Instructions (General)

Keeping the generator set clean of any oil and dirt is recommended for both appearance and maximum service life of the equipment. The frequency of cleaning will be dependent on local conditions and the severity and frequency of operation.

Note: Do not use high pressure water, steam or solvent on the exterior finish of the unit housing.

EXTERIOR FINISH CARE

This unit was painted and heat cured at the factory with a high quality, thermoset polyester powder coating. The following care will ensure the longest possible life from this finish.

1. If necessary to remove dust, pollen, etc. from housing, wash with water and soap or dish washing liquid detergent. Do not scrub with a rough cloth, pad, etc.
2. If grease removal is needed, a fast evaporating alcohol or chlorinated solvent can be used. Note: This may cause some dulling of the paint finish.
3. If the paint has faded or chalked, the use of a commercial grade, non-abrasive car wax may partially restore the color and gloss.

FIELD REPAIR OF TEXTURE PAINT

1. The sheet metal should be washed and clean of foreign material and then thoroughly dried.
2. Clean and remove all grease and wax from the area to be painted using Duponts 3900S Cleaner prior to sanding.
3. Use 320 grit sanding paper to repair any scratches or defects necessary.
4. Scuff sand the entire area to be painted with a red scotch brite pad.
5. Wipe the area clean using Duponts 3900S.
6. Blow and tack the area to be painted.
7. Apply a smooth coat of Duponts 1854S Tuffcoat Primer to all bare metal areas and allow to dry.
8. Apply 2 medium – wet coats of Duponts 222S Adhesion Promoter over the entire area to be painted, with a 5 minute flash in between coats.
9. To apply the texture coat, use Duponts 1854S Tuffcoat Primer. The proper technique to do this is to spray the Tuffcoat Primer using a pressure pot and use about 2–5 pounds of air pressure. This will allow the primer to splatter causing the textured look. Note: you must be careful not to put too much primer on at one time, this will effect the amount of texture that you are trying to achieve. Allow the texture coat to flash for 20 minutes or until dry to touch.
10. Apply any of Duponts Topcoat Finishes such as Imron™ or Centari™ according to the label instructions.

Note: To re-topcoat the textured surfaces when sheet metal repairs are not necessary, follow steps 1, 2, 4, 5, 6, 8 and 10.

Generator Interior

The generator may be cleaned internally following the below listed procedure.

1. Start and operate the engine unloaded.
2. Use dry compressed air (25 psi maximum) to blow loose dirt and debris from the interior of the generator.

WARNING: Wear eye protection to prevent debris from injuring eye (s). Do not allow the blow gun tip to come into contact with rotating or moving parts. Personal injury or equipment damage may result.

Control Box Interior

The generator control box is partially sealed to minimize the entrance of dust and other contaminants and should require little cleaning. If cleaning is required, the following procedure is recommended.

1. Disconnect the battery cables.
2. Open the top and/or front of the generator control box and vacuum out the interior.

CAUTION: The following should only be performed in a well ventilated area.

3. Spray all switch contacts with a quality commercial electrical contact cleaner. Cycle the switches through all possible positions, spraying at each position. Leave control box door open until completely dry.

The cleaner must have an evaporative carrier agent which leaves no residue after application.

PREVENTIVE MAINTENANCE SCHEDULE

If operating in extreme environments (very hot, cold, dusty or wet), these time periods should be reduced.

	Daily	Wkly	MO.	3 MO. 250 HRS	6 MO. 500 HRS	12 MO. 1000 HRS.
Evidence of Arcing Around Elect. Terminals	C					
Tower Cables	C					
Latches & Springs	C					
Loose Wire Routing Clamps	C					
Engine Oil and Coolant Level	C					
Proper Grounding Circuit	C					
Instruments	C					
Frayed/Loose Fan Belts, Hoses, Wiring Insulation	C					
Obstructions in Air Vents	C					
Fuel/Water Separator (if equipped)	Drain					
Precleaner Dumps		C				
Tires		C				
Battery Connections		C				
Engine Radiator (exterior)			C			
Air Intake Hoses and Flexible Hoses			C			
Fasteners (tighten)			C			
Emergency Stop Switch Operation			C			
Engine Protection Shutdown System			C			
Diagnostic Lamps (if equipped)			C			
Air Cleaner Housing				C		
Control Compartment (Interior)					C	
Fuel Tank (fill at end of each day)					Drain	
Fuel/Water Separator Element					R	
Running Gear Fasteners					C	
Wheel Bearings & Grease Seals					Repack	
Engine Shutdown System Switches (setting)						C
Exterior Finish	As needed					
Engine	Refer to Engine Operator Manual					
Decals	Replace decals if removed, damaged or missing					
C=Check (and adjust or replace if necessary). WI=OR when indicated. R = Replace						
Ingersoll-Rand						

Unit _____

Date: _____

Hours _____

Serviceman _____

FAULT FINDING

Introduction

Trouble shooting for a portable light tower is an organized study of a particular problem or series of problems and a planned method of procedure for investigation and correction. The trouble shooting chart that follows includes some of the problems that an operator may encounter during the operation of a portable generator.

The chart does not attempt to list all of the troubles that may occur, nor does it attempt to give all of the answers for correction of the problems. The chart does give those problems that are most apt to occur. To use the trouble shooting chart:

- A. Find the "complaint" depicted as a bold heading.
- B. Follow down that column to find the potential cause or causes.

Action Plan

A. Think Before Acting

Study the problem thoroughly and ask yourself these questions:

- (1) What were the warning signals that preceded the trouble?
- (2) Has a similar trouble occurred before?
- (3) What previous maintenance work has been done?
- (4) If the generator will still operate, is it safe to continue operating it to make further checks?

B. Do The Simplest Things First

Most troubles are simple and easily corrected.

Always check the easiest and most obvious things first; following this simple rule will save time and trouble.

Note: For trouble shooting electrical problems, refer to the Wiring Diagram Schematic.

C. Double Check Before Disassembly

The source of most troubles can be traced not to one component alone, but to the relationship of one component with another. Too often, a machine can be partially disassembled in search of the cause of a certain trouble and all evidence is destroyed during disassembly. Check again to be sure an easy solution to the problem has not been overlooked.

D. Find And Correct Basic Cause

After a mechanical failure has been corrected, be sure to locate and correct the cause of the trouble so the same failure will not be repeated. A complaint of "premature breakdown" may be corrected by repairing any improper wiring connections, but something caused the defective wiring. The cause may be excessive vibration.

FAULT FINDING CHART

Bold Headings depict the COMPLAINT - Subheadings depict the CAUSE

Note: Subheadings suggest order to follow in cause of troubleshooting.

Short Air Cleaner Life

Dirty Operating Conditions
Inadequate Element Cleaning
Defective Service Indicator
Wrong Air Filter Element

Engine RPM Low

Clogged Fuel Filter
Incorrect Engine Speed Adjustment
Dirty Air Filter
Electrical Output Overload
Engine Malfunctioning
Generator Malfunctioning

Excessive Vibration

Low Engine RPM
Rubber Mounts Damaged
Out of Balance Fan
Engine Malfunctioning
Generator Malfunctioning

Unit Shutdown

Out of Fuel
Engine Oil Pressure Too Low
Engine Temperature Too High
Broken Engine Fan Belt
Loose Wire Connection
Defective Switches
Defective Fuel Solenoid
Malfunctioning Relay
Blown Fuse
Engine Malfunctioning

Unit Fails To Shutdown

Defective Switches
Defective Fuel Solenoid
Malfunctioning Relay
Defective Engine Start Switch

Won't Start/Run

Low Battery Voltage
Blown Fuse
Malfunctioning Engine Start Switch
Clogged Fuel Filters
Out of Fuel
Defective Fuel Solenoid
Engine Water Temp. Too High
Engine Oil Pressure Too Low
Loose Wire Connection
Defective Switches
Malfunctioning Relay
Engine Malfunctioning

No Generator Voltage Output

Main Circuit Breaker "OFF"
Panel Circuit Breaker "OFF"
Loose or Intermittent Wire
Electrical Output Overload
Low Engine Power
Incorrect Electrical Connection
Defective Capacitor
Defective Generator

High/Low Generator Voltage Output

Incorrect Electrical Connection
Incorrect Engine Speed Adjustment
Unstable Engine Speed (oscillation)
Unstable Electrical Requirements
Low Engine Power
Loose or Intermittent Wire Connection(s)
Defective Capacitor
Clogged Air/Fuel Filter(s)

High/Low Generator Frequency Output

- Incorrect Engine Speed Adjustment
- Incorrect Electrical Connection
- Low Engine Power
- Unstable Engine Speed (Oscillation)
- Unstable Electrical Connection
- Electrical Output Overload
- Loose or Intermittent Wire Connections
- Clogged Air/Fuel Filter(s)

Fluctuating Generator Frequency/Voltage and or Oscillating Engine

- Unstable Electrical Requirements
- Unstable Engine Speed (oscillation)
- Incorrect Engine Speed Adjustment
- Low Engine Power
- Electrical Output Overload
- Clogged Air/Fuel Filter(s)
- Loose or Intermittent Wire Connection(s)
- Incorrect Electrical Connection
- Main Circuit Breaker(s) "OFF"
- Defective Generator

Overcurrent Protection Relay Trips

- Electrical Output Overload
- Loose or Intermittent Wire Connection(s)
- Incorrect Electrical Connection
- Defective Overcurrent Protection Relay

PARTS ORDERING

GENERAL

This publication, which accompanies an illustrated parts breakdown manual, has been prepared as an aid in locating those parts which may be required in the maintenance of the unit. Always insist on genuine Ingersoll-Rand Company parts.

NOTICE

Ingersoll-Rand Company can bear no responsibility for injury or damages resulting directly from the use of non-approved repair parts.

DESCRIPTION

The illustrated parts breakdown illustrates and lists the various assemblies, subassemblies and detailed parts which make up this particular machine. This covers the standard models and the more popular options that are available.

MARKINGS AND DECALS

NOTICE: Do not paint over safety warnings or instructional decals. If safety warning decals become illegible, immediately order replacements from the factory.

Part numbers for original individual decals and their mounting locations are shown within Parts List Section. These are available as long as a particular model is in production.

Afterwards, service sets of exterior decals and current production safety warning decals are available.

HOW TO USE PARTS LIST

- a. Locate the area in which the desired part is used and find illustration page number.
- b. Locate the desired part on the illustration by visual identification and make note of part number and description.

HOW TO ORDER

The satisfactory ordering of parts by a purchaser is greatly dependent upon the proper use of all available information. By supplying your nearest sales office, autonomous company or authorized distributor, with complete information, you will enable them to fill your order correctly and to avoid any unnecessary delays. In order that all avoidable errors may be eliminated, the following instructions are offered as a guide to the purchaser when ordering replacement parts:

- a. Always specify the model number of the unit.
- b. Always specify the serial number of the unit. **THIS IS IMPORTANT.** The serial number of the unit will be found stamped on a plate attached to the unit.
- c. Always specify the quantity of parts required.
- d. Always specify the part number, as well as the description of the part, or parts, exactly as it is given on the parts list illustration.
- e. Special order parts may not be included in this manual. Contact the Ingersoll-Rand Parts Department at 1-800-633-5206 with the unit serial number for assistance with these special parts.

In the event parts are being returned to your nearest sales office, autonomous company or authorized distributor, for inspection or repair, it is important to include the serial number of the unit from which the parts were removed.

TERMS AND CONDITIONS ON PARTS ORDERS

Acceptance: Acceptance of an offer is expressly limited to the exact terms contained herein. If purchaser's order form is used for acceptance of an offer, it is expressly understood and agreed that the terms and conditions of such order form shall not apply unless expressly agreed to by Ingersoll-Rand Company ("Company") in writing. No additional or contrary terms will be binding upon the Company unless expressly agreed to in writing.

Taxes: Any tax or other governmental charge now or hereafter levied upon the production, sale, use or shipment of material and equipment ordered or sold is not included in the Company's price and will be charged to and paid for by the Purchaser.

Shipping dates shall be extended for delays due to acts of God, acts of Purchaser, acts of Government, fires, floods, strikes, riot, war, embargo, transportation shortages, delay or default on the part of the Company's vendors, or any other cause beyond the Company's reasonable control.

Should Purchaser request special shipping instruction, such as exclusive use of shipping facilities, including air freight when common carrier has been quoted and before change order to purchase order can be received by the Company, the additional charges will be honored by the Purchaser.