

**DEFINITIONS:
DANGER/WARNING/CAUTION**

DANGER

[Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.]

! WARNING

[Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.]

! CAUTION

[Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.]

CAUTION

[Indicates a potential for property damage.]

The following **DANGERS, WARNINGS, CAUTIONS,** and Notes are provided to prevent serious injury or death, minor injuries, and property damage. Read and understand the following information. If there are any questions, or if you are unclear of the instruction, please contact the factory.

DANGER

STAY CLEAR OF POWER LINES

<u>VOLTAGE</u>	<u>MIN CLEARANCE</u>
UP TO 50KV	10 FT
50 TO 200KV	15 FT
200 TO 350KV	20 FT
350 TO 500KV	25 FT
750 TO 1000KV	45 FT

**GROUND PERSONNEL TO STAY
AWAY FROM MACHINE WHEN NEAR
POWER LINES**



WARNING

Serious injury or death can result from contact with moving components and discharge of spoils.

- Keep all personnel off of drill unit during operation. When training an individual in operation of the drill, secure that person from falling.
 - Keep all ground personnel clear of drill unit during set up and operation.
 - Warn ground personnel to stay clear of swing radius of drill unit and clear of drilling tool.
 - Do not lubricate or service any component while the drill unit is in operation or in motion.
 - Keep ground personnel clear of tool and kelly when making up the connection.
 - Confirm that no one is in line with the kelly when raising mast.
 - The operator must keep hands and feet away from all controls, or shut down the drill unit, when ground personnel are installing tool retaining pin or key.
- Use caution when entering the operator's area with the engine running
 - Avoid contact with any controls
 - Avoid stepping on winch release valve in floor panel
 - Shut down the drill unit before working on the drilling tool.
 - Warn ground personnel about the danger of flying spoils during spin-off, to ensure they keep adequate distance from the tool.
 - Confirm swing and track alarms are functioning before beginning operations.
 - On units equipped with a pilot kill switch in the armrest, confirm proper functioning of kill switch before leaving the operator's area with the engine running. The winch brake release (free-fall) control pedal is not deactivated by the pilot kill switch.
 - Keep all ground personnel clear of drill unit and trailer when loading and unloading.
 - Ground personnel should observe areas that are not visible to facilitate safe loading and unloading. Radio communication is recommended.
 - On units equipped with an air bag support between the truck and the drill unit frame, keep hands clear of support when activating.



WARNING

Serious injury or death can result from overturning of the drill unit.

- The drill unit is not a crane. When picking loads operate with extreme caution.
- Pick loads in vertical direction only. Do not use auxiliary line to drag objects to the rig. The front of the mast must face toward the load (do not pull sideways on the mast).
- Retract slide as follows when using auxiliary line:
 - Mast can be boomed out 5 degrees (maximum) only with slide frame fully retracted.
 - Mast must be vertical if slide is partially extended (up to a maximum of one-half way between full retract and full extend).
- Before beginning operations or using auxiliary line, be sure the ground is firm and stable and is capable of supporting the working loads applied at the tracks or outriggers.
 - The work site should be graded and firm, and mats used as necessary, to insure a stable platform for the drill unit.
 - Level the drill unit before drilling. Outrigger stroke, undercarriage tilt, and mast tilt are used for fine leveling.
- Truck or Carrier mounted drills: Fully extend the outrigger beams (if so equipped) and firmly plant the outrigger pads before raising mast. Use mats under outrigger pads as required to spread the load.
- Crawler mounted drills: Fully extend the side frames (if so equipped) before raising mast.
- Do not travel on inclinations that exceed 10 degrees side-to-side or 20 degrees end-to-end (20 degree slope on mast).
- When moving the drill unit on uneven terrain do not raise the mast beyond 30 degrees. The mast must be aligned with the slope and the heavier end of the drill unit toward the uphill direction. Engage the houselock (if so equipped). Do not swing when traveling on uneven terrain.
- Avoid drilling on terrain that is greater than 15 degrees out of level. Drilling on uneven terrain requires a high level of caution and experience. When drilling on inclines the drill unit must be aligned with the slope and the shaft drilled on the downward side of the slope.
- When drilling off of the side, retract the upper unit to the mid-slide position or further in.
- Only track with the mast raised on firm, level ground and in low speed. The mast must be lowered when traveling on uneven or softer soil. The upper unit should be in the fully extended position with the mast lowered and mid-slide travel with the mast raised.
 - When tracking at higher speed or for longer distances, the mast should be in the mast rest or raised 30+ degrees to avoid excessive loads on

the mast journals resulting from sudden side movements.

- Do not move truck/carrier mounted drill units unless the mast is fully lowered and supported by the mast rest.
- If drill unit is equipped with removable counterweight, raise mast with unit slid in to install counterweight. Do not drill or lift loads with the counterweight removed.

WARNING

Serious injury or death can result from accidents during transport of the drill unit.

- Make certain the upper part of the drill unit is secured from rotation with tie-downs and the houselock (if equipped) is engaged.
- On truck mounted drill units, confirm that the mounting of the drill unit to the truck frame is secure, the fasteners are tight and visually inspect the welds securing the mounting components.
- On units with expandable side frames, the tracks must be retracted for travel.
- Confirm that the tractor-trailer combination is appropriate for the load being transported.

- Curves should be approached at reduced speed. Some drill unit configurations can be more top-heavy than others.
- Confirm adequate clearance exists under all overpasses.
- Confirm that outriggers, if equipped, are fully retracted. On units with extendable outriggers, confirm that extension beams are fully retracted.
- The load must have the appropriate flags, banners, and/or escorts as required by the transport authority in the areas of travel.

WARNING

Serious injury or death can result from improper and unsafe practices or lack of periodic inspections.

- This drill unit should be operated only by trained and experienced operators.
- Before operations each day, visually inspect the mast cylinder retaining pins to confirm that the retaining device is secure on both the base and the rod end.
 - Retaining devices can be retaining (snap) rings, bolted joints, or other mechanical retention means.

- Each week visually inspect the mast cylinder head retaining cap to confirm that it has not unscrewed to any degree.
- Each week inspect the connections for the kelly cylinder base and rod end. Make sure the kelly cylinder support bracket around the cylinder barrel is secure.
- Each week confirm the mounting of the outrigger cylinders (if equipped) is secure. Inspect the rod end of the outrigger cylinders to make sure the head has not unscrewed to any degree.
- If the drill unit has a hoist or hoists on the main frame, pay out cable while raising the mast.
 - Drill units equipped with a brake release or “free-fall” on the kelly winch can use these systems to keep cable slack when raising mast. Maintain control over the position of the inner bar so that it does not release beyond a safe position (contact with the ground or adjacent equipment).
 - Make sure the outer element is in the fully retracted position to prevent possible “two-blocking” with the inner kelly.
- Make sure there are no loose articles (tools, fittings, fasteners, etc.) on or in the mast before raising.
- Confirm that all rigging components (chains, hooks, slings, etc.) are rated for the capacity of the auxiliary hoist.
- Do not use the auxiliary hoist to raise or lower personnel (some drill units are equipped with a special “personnel hoist” specifically for this purpose).

- Do not use mast raising cylinders or outrigger cylinders to assist in applying lifting forces.
- Do not use hoists in tandem for any purpose.
- Do not “part” the line on the auxiliary hoist to increase lift capacity.
- Do not use the kelly cylinder (outer kelly lift) in conjunction with the inner kelly hoist to increase lifting forces.
- Do not transport with a drilling tool attached to the kelly foot (stub).
- Do not modify drill unit without approval from the manufacturer.

The following apply to the Model 3110 only:

- Engage the hoist lock brake before releasing the foot brake on the kelly or the auxiliary hoist. Always use the parking brake to suspend a load.
- Always have control of the load with the brake before releasing either the kelly or the auxiliary hoist drum clutch. When hoisting, always have control of the load with the clutch before releasing either the kelly or the auxiliary hoist drum brake.
- Kelly and auxiliary hoist parking brakes must be released before raising the mast.
- When the “hydraulic control” mode is being used (either the kelly or auxiliary hoist clutch is engaged with the selector valve), do not disengage without having control of the load with the brake.

- When the “hydraulic control” mode is being used (either the kelly or auxiliary hoist clutch is engaged with the selector valve), do not shift the powershaft into the “run” mode. Only use the directional control valve to raise and lower loads in this mode.
- Use the “hydraulic control” mode for fine positioning of loads (making up tools to the kelly or positioning tools with the auxiliary line).

CAUTION

Minor or moderate injury may result if the following practices are not followed:

- Prior to transport clean the drill unit so that rocks, dirt, etc. do not fall off. Make sure all tools and accessories are secured or removed from the drill unit.
- Secure outrigger pads, if equipped, in their mounting devices.
- Confirm that outriggers, if equipped, are fully retracted. On units with extendable outriggers, confirm that extension beams are fully retracted.
- Do not adjust the operating characteristics of the drill unit without first contacting the factory.

- California Proposition 65: Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

CAUTION

Damage to the drill unit and other property may result if the following practices are not followed:

- Prior to transport clean the drill unit so that rocks, dirt, etc. do not fall off. Make sure all tools and accessories are secured or removed from the drill unit.
- Secure outrigger pads (if equipped) in their mounting devices.
- Snug the kelly and auxiliary hoist lines before transport.
- On units equipped with an air bag support between the truck and the drill unit frame, engage the support before transport. After arrival at site, disengage before raising the mast or swinging.
- On non-adjustable swing frame supports, the mast must be raised prior to swinging.
- Disengage houselock (if equipped) prior to swinging.

- When lowering the mast, approach the mast rest slowly so that gentle contact is made between the mast and the mast rest. Apply only light force after contact. Do not pull down hard with the mast cylinders.
- On drill units where the mast rest is not integral with the upper unit, be sure that the mast is raised out of the mast rest before swinging or sliding.
- When moving on the job site, the mast should be in the mast rest or raised approximately 30 degrees to avoid excessive loads on the mast journals resulting from sudden side movements.
- Always check for buried utilities or other buried obstructions through the appropriate local authorities.
- Do not adjust the operating characteristics of the drill unit without first contacting the factory.
- Lower the mast to between horizontal and 30 degrees from horizontal if the drill unit is not going to be operated for extended periods of time (overnight, weekends, etc.)

NOTES – to improve performance, prevent damage and extend life of the machine

- The rain cap on the engine exhaust must be secured if rig position during transport results in wind forces opening the rain cap (unlubricated turbine rotation can occur).
- Prior to loading retract the tracks (if equipped with extendable tracks) unless transport method requires tracks to be below beam of trailer. In this case, load with tracks extended and retract after loading and lifting trailer.
- When transporting on a beam trailer, it may be necessary to bind up the bottom of the track chain to maximize road clearance.
- Disconnect battery cables before welding on the drill unit.
- On truck/carrier mounted drills the typical travel position is with the slide in. However, slide position should be based upon axle loads. The unit should be positioned to achieve the necessary axle loading to be consistent with the rules of the local transport authority.
- When traveling on slopes it may be necessary to raise the mast as required to prevent the header from contacting the ground.



The stated information in this Safety Manual may be viewed on our company website at (www.watsonusa.com).

Please check periodically for newly published safety information.

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