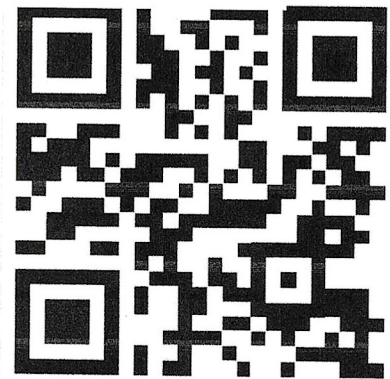




## **Boring Unit Installation & Operation Manual**

**See our Boring Video here...**



## LINE-WARD BA2C BORING ATTACHMENT

The boring attachment has been designed for boring under driveways, sidewalks, and patios, and is adaptable to both the L1 and L2 line-layers with 16HP or 23HP engines.

It is imperative that anyone using this attachment, read through and understand completely, these instructions. Use them in conjunction your OPM owner's manual and TRDVD training video. Helpful illustrations are on pages 8 and 9. Factory support and assistance are available, if needed, at **1-800-816-9621** or [info@lineward.com](mailto:info@lineward.com).

The boring attachment includes the following items as standard equipment, if not factory-installed.

126XW	belt guard	BARG	rod guide
BAAK046	sheave	BAM112	mole / compaction bit
H118	bushing w/ key	BARB178	rock bit
BABOX	storage box	283W	retriever
BAPL	uncoupling pliers	213W	T-bolt clamp
BAR5	5 foot boring rod (6)	215W	balance wheel assembly
		210W	mounting (for machines made before 2000 only)

### INSTALLATION AND SET-UP (if not originally factory-installed.)

**NOTE:** All switches and controls must be in the **off** position when installing the set-up kit.

1. Remove the old style 126W belt guard and discard. Illustration **A**.
2. Remove the 122W bracket from the 119W belt guide and discard. Illustration **A**.
3. Install the BAAK046 sheave as follows:
  - a. Place sheave over engine crankshaft.
  - b. Carefully drive the H118 bushing onto the crankshaft, while centering within the sheave. Be sure to align the larger unthreaded holes in the bushing with the threaded holes in the sheave. Drive the bushing in, until you can start the (2) bolts into the sheave. Insert, but do not tighten at this time. Positioning of the AK46 sheave may not allow for the bushing to be driven fully onto the crankshaft. Continue to drive the bushing into the sheave until it is tightly against the AK46. Tighten the (2) bolts at this time. Illustration **C**.

**NOTE:** The outer groove of the sheave must clear the 119W belt guide after installation so that the boring belt does not rub on the belt guide. Re-position the sheave and bushing if necessary. Illustration **E**.

4. Before installing the 126XW belt guard, it may be necessary to drill a new hole in the 119W belt guide (only on older machines). This is to prevent the FI92 idler pulley from striking the belt guard when engaging the drive belts. Using an 11/64" drill bit, drill a new hole about 5/16" out and away from the old hole location. See illustration **(F)**. Tap the new hole with a 10-24 tap.
5. Install the 126XW and check for clearance. Pull the bottom of the guard outward, if necessary. Avoid excessive force.
6. On older machines that do not have a square channel welded below the 98W engine mount, it will be necessary to install a 210W mounting for the BWA1 balance wheel. Remove (2) 3/8-16 X 1 1/2 bolts from the right side (recoil) of the engine and discard. Install the 210W using the new hardware provided. Refer to illustration **H**.

**NOTE:** Before proceeding, you must determine if the front of the 98W engine mount conforms to the proper angle (**61** degrees from horizontal) as shown in illustration D. This is critical for proper belt tension and overall operation. If necessary, remove the engine and/or the engine mount itself, to obtain the correct angle. Clean and de-burr the front of the engine mount.

**NOTE:** Your machine is now set up to accept the boring unit.

## ATTACHING THE BORING UNIT FOR OPERATION

**NOTE:** If your machine is equipped with a reel carrier attachment, the 198W reel carrying component will need to be removed when using the boring attachment.....Make sure all switches and controls are in the **off** position before proceeding.

7. Loosen the wingnut on the 126XW belt guard and open the guard door.
8. Carefully slide the boring unit down the front of the 98W engine mount until the unit is fully seated. Care must be taken to avoid damage to the solenoid on the engine and any exposed wiring on units equipped with electric start. Refer to the NOTE at the top of this page.
9. Slip the AP43 belt of the boring unit onto the groove of the BAAK046 sheave. Make sure the belt is positioned properly. **The belt must ride above (on) the 1/2" adjusting bolt of the 246W steel belt guard of the boring unit**

**NOTE:** Although your boring attachment has been run in and adjusted at our factory, it may need further belt adjustment for use with your particular machine. It may also need belt adjustment in the future, as the belt stretches with wear. Follow step 10 for belt adjustment.

10. With all the switches and controls in the **off** position, engage the main drive control of the boring unit. Engaging the BAFI64 idler pulley should provide sufficient tension to prevent the AP43 belt from slipping. Too much tension can damage the bearing of the idler pulley. Adjust the tension on the boring unit as follows:
  - a. Loosen the 3/8-24 nut above the clevis yoke on the 115XW(C) idler arm control rod.
  - b. Remove (2) 114W bolts from the 112W main drive control of the boring unit.
  - c. Turn the rod into the clevis to increase belt tension. Start with **2 - 3** full turns and check. Readjust as necessary.
  - d. Unscrewing the rod from the clevis will decrease belt tension.
  - e. Install and retighten the 114W bolts and the 3/8-24 nut.
11. Close and secure the guard door of the 126XW belt guard. The unit should now be ready for operation.



## SAFE OPERATION OF THE BA2C BORING ATTACHMENT \*

\* **SAFETY PRACTICES ARE VITALLY IMPORTANT IN THE USE OF THE BORING ATTACHMENT. EXERCISING INTELLIGENCE, CARE, AND COMMON SENSE, IS FUNDAMENTAL TO THE PREVENTION OF ACCIDENTS OR DAMAGE.**

- Make sure that all personnel operating the boring attachment, read and understand these instructions, and are completely familiar with its operating and safety features.
- Make sure that all personnel read, understand, and follow the **safety precautions** listed on this page and elsewhere in these instructions, as well as those listed on tools and equipment.
- Always contact your local utility companies to locate and mark underground services, prior to boring.
- Always use a minimum of two persons when boring. The machine operator must remain at his station at all times, so that he can shut the unit down in case of an emergency. He must always shut the engine off whenever leaving his station. The helper will be involved with adding boring rods, guiding the rods, changing bits, etc.
- Always disengage the boring unit and always engage the 257W safety lock-out pin, when adding or removing boring rods, changing bits, attaching a service to the retriever, or any function related to the drill string. Refer to illustration **G**.
- Never handle, stand on, or straddle the drill string, when the boring unit is engaged, or when the engine is running.
- Never wear loose clothing. It could become entangled with moving parts.
- Always use the BARG rod guide to support, position, direct, and align the boring rods. Never use hands, feet, shovels, or other tools for these purposes.
- Never have more than 10 - 20 feet of rod exposed. Too much exposed rod may cause excessive whipping action.
- Inspect your equipment often and maintain or repair as required.
- Always replace broken and/or worn parts with factory approved parts only.
- Keep all unauthorized personnel away from the work area. It is recommended that the area be secured and posted.



## BORING PREPARATION AND PROCEDURE

**NOTE:** When working on established lawns, carefully remove the sod from the work areas and set aside. Replace the sod after finishing the bore, to complete the job.....While there is no substitute for experience (and a little luck), taking the time to make sure that each of the preliminary steps is done properly, will increase the chances of a successful bore.

1. Begin by digging an entry trench to accept the boring rods. The entry point (head end) should be deep enough to sufficiently clear any base fill (crushed stone, gravel, etc.) beneath the driveway, sidewalk, or patio. It should also be approximately 8 to 10 times the entry point depth in length, and at least 3" wide. The entry trench must be long enough to allow for the flexing and maneuvering of the drill string by the helper, as he strives to guide and steer it into position during the bore, using the BARG rod guide.
2. Determine the projected exit point of the bore and dig an exit pit perpendicular to the surface being bored. It should be long enough to allow for some variance of the exit point, due to possible rod deflection, and wide enough to remove the bit and attach the retriever and wire, cable, or conduit.
3. With the boring unit installed, move your machine in line with the entry trench. Allow enough room to attach the initial drill string (boring rods and bit). Turn the engine off and engage the 257W safety lock-out pin of the boring unit. Insert the 215W balance wheel into its mounting and secure with the 213W T-bolt. See illustration H. The 215W balance wheel will help to keep the machine stabilized, as it propels forward.

**NOTE:** Before starting the job, measure the length of the bore to determine the number of rods needed. Knowing how many rods are being used, can be helpful in calculating the distance bored and the location of the head end of the drill string as it nears the exit trench.....A locating device, if available, would also be helpful in locating the position and direction of the drill string as it advances beneath the surface.

4. Start by attaching no more than **10 - 15** feet of rod. Select the proper bit for the bore conditions and attach it to the lead rod. Make sure that each snap button connector is functioning properly and that each connection is locked securely in place. **Disengage the 257W safety lock-out pin** by pulling ring outward and lock in place.

**NOTE:** Never have more than **2** rods exposed behind the entry trench. Never substitute pins or bolts for the snap button connectors.....**Always engage the 257W safety lock-out pin when working on the drill string.**

5. Start the engine, but do not engage the boring unit at this time. Slowly ease your machine forward, with your helper holding and guiding the drill string with the BARG rod guide, to the initial entry point. The helper should be positioned on the right side of the trench, holding the rod guide just behind the boring bit.

**NOTE:** The forward speed of your machine is critical and must be constantly regulated by the operator. Crowding (moving at too fast a rate), will cause the drill string to bow. Adjusting your speed to conditions, will prevent any bowing. Feathering the 112W main drive control handle of the machine, rather than fully engaging it, will allow the operator more latitude to regulate the speed. Always have your machine in its lowest forward gear and/or range.

6. As soon as the bit has entered the soil, stop the forward motion of your machine. Make sure the bit is entering the soil at the proper entry point and that the drill string is in proper alignment. Engage the 112W main drive control handle of the boring unit, after clearing the area around the drill string.
7. With the drill string now turning, the operator should slowly ease the machine forward. The helper must make sure that the drill string enters the soil, straight and level to the grade. This is accomplished by using the BARG rod guide tool for the first **5 - 10** feet of entry.

8. After almost 10 feet of rod has entered the soil, stop the machine, disengage the boring unit and engage the 257W safety lock-out pin. The helper, using the BAPL uncoupling pliers, should disconnect the rods at the BAUNV universal joint. The operator can now back the machine up, so that 1 or 2 more rods can be added to the existing drill string. After the helper ensures that the snap buttons are fully engaged, he can then disengage the safety lock-out pin. (**Important:** have no more than 2 rods exposed behind the entry trench). Remember how many rods are being used, as you progress.
9. The operator should now re-engage the boring unit and continue to ease the machine forward at a speed slow enough to prevent any bowing of the drill string, as it continues to penetrate the soil. The helper can assist in monitoring its position, by holding a shovel to the surface above the boring bit and placing an ear on the hand holding the handle of the shovel and listening for the grinding sound produced by the rotating drill string beneath the surface. He can determine if the bore is proceeding at the desired depth and if it is also in line with the exit pit. As previously noted (page 5), a locating device, used properly, can be helpful in locating the drill string during and after the bore.
10. Continue to install additional rod(s), if necessary, by repeating steps 8 and 9, until the drill string has reached the exit pit area. After the boring bit has penetrated the exit pit wall, the helper should advise the operator as to when the bit is in position to be removed, so the operator can stop the machine, disengage the boring unit, shut down the engine, and engage the lock-out pin. The helper can now remove the boring bit and attach the 283W retriever. The retriever has a reverse thread pattern to help in removing the drill string.
11. The helper should now attach the service to be pulled, (wire, cable, conduit, etc.) to the retriever. He should make sure that it and the retriever are securely fastened in place.
12. At this point, make sure to attach the balance wheel, if not already inserted in its mounting. Refer to page 5, step 3. The balance wheel will help keep the machine level, as the operator backs it away from the bore pit. Disengage the lock-out pin.

**NOTE:** The 215W balance wheel must be in place as referenced in step 3 on page 4, to stabilize the machine as it moves backward. See illustration H.

13. The operator can now restart the engine, shift the machine into reverse, and engage the boring unit. As the operator slowly backs the machine up, extracting the drill string, the helper should observe and/or help guide the service being retrieved, to ensure that it is retracting properly.

**NOTE:** Increasing engine speed slightly, when extracting the rods, can often boost the efficiency of the retriever, in compacting the soil. However, the operator must still prevent the drill string from whipping.

14. If room permits, the operator can continue to extract the full length of the drill string until it completely emerges from below the bored surface. If room does not permit, then boring rods will need to be removed as necessary. Refer to the steps and safety precautions previously outlined. After the retriever has reached the entry trench, the operator should stop the machine and disengage the boring unit.
15. It must be determined how much wire, cable, or conduit will be needed to complete the job. If you choose to pull it back with the machine, leave the service attached to the retriever, until the required amount is exposed. If you choose to pull the wire, cable, or conduit through by hand, the operator must engage the lock-out pin before the helper removes the service from the retriever. Pull back the desired amount.
16. With the engine off, remove the retriever and all remaining boring rods from the boring unit. Remove the boring unit from the machine. It is recommended that all boring unit components be cleaned and serviced, prior to placement in the storage box or truck, if possible.



5. Start the engine, but do not engage the boring unit at this time. Slowly ease your machine forward, with your helper holding and guiding the drill string with the BARG rod guide, to the initial entry point. The helper should be positioned on the right side of the trench, holding the rod guide just behind the boring bit.

**NOTE:** The forward speed of your machine is critical and must be constantly regulated by the operator. Crowding (moving at too fast a rate), will cause the drill string to bow. Adjusting your speed to conditions, will prevent any bowing. Feathering the 112W main drive control handle of the machine, rather than fully engaging it, will allow the operator more latitude to regulate the speed. Always engage your machine in its lowest forward gear and/or range.

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8. After almost 10 feet of rod has entered the soil, stop the machine, disengage the boring unit and engage the 257W safety lock-out pin. The helper, using the BAPL uncoupling pliers, should disconnect the rods at the BAUNV universal joint. The operator can now back the machine up, so that 1 or 2 more rods can be added to the existing drill string. After the helper ensures that the snap buttons are fully engaged, he can then disengage the safety lock-out pin. (**Important:** no more than 2 rods exposed behind the entry trench). Remember how many rods are being used, as you progress.
9. The operator should now re-engage the boring unit and continue to ease the machine forward at a speed slow enough to prevent any bowing of the drill string, as it continues to penetrate the soil. The helper can assist in monitoring its position, by holding a shovel to the surface above the boring bit and placing an ear on the hand holding the handle of the shovel and listening for the grinding sound produced by the rotating drill string beneath the surface. He can determine if the bore is proceeding at the desired depth and if it is also in line with the exit pit. As previously noted (page 5), a locating device, used properly, can be helpful in locating the drill string during and after the bore.



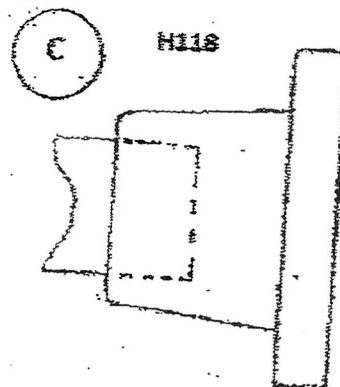
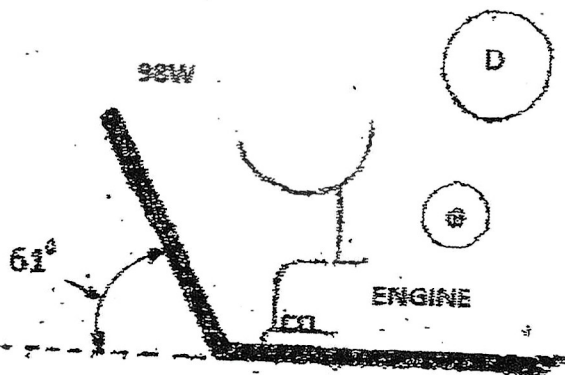
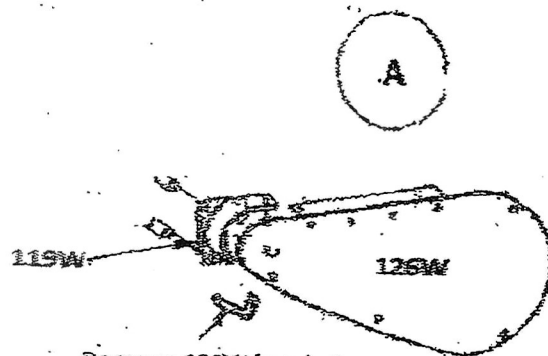
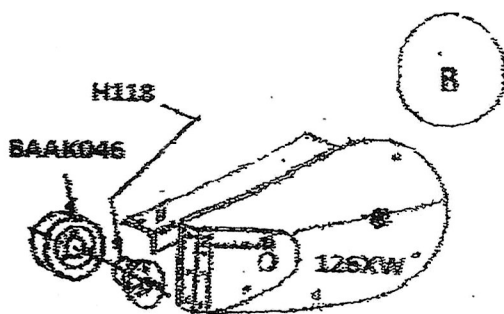
10. Continue to install additional rod(s), if necessary, by repeating steps 8 and 9, until the drill string has reached the exit pit area. After the boring bit has penetrated the exit pit wall, the helper should advise the operator as to when the bit is in position to be removed, so the operator can stop the machine, disengage the boring unit, shut down the engine, and engage the lock-out pin. The helper can now remove the boring bit and attach the 283W retriever for service pull-back.
11. The helper should now attach the service to be pulled, (wire, cable, conduit, etc.) to the retriever. He should make sure that it and the retriever are securely fastened in place.
12. At this point, make sure to attach the balance wheel, if not already inserted in its mounting. Refer to page 5, step 3. The balance wheel will help keep the machine level, as the operator backs it away from the bore pit. Disengage the lock-out pin.

**NOTE:** The balance wheel should be used whenever a problem arises in keeping the machine level and/or balanced. See illustration (H).

13. The operator can now restart the engine, shift the machine into reverse, and engage the boring unit. As the operator slowly backs the machine up, extracting the drill string, the helper should observe and/or help guide the service being retrieved, to ensure that it is retracting properly.

**NOTE:** Increasing engine speed slightly, when extracting the rods, can often boost the efficiency of the retriever, in compacting the soil. However, the operator must still prevent the drill string from whipping.

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15. It must be determined how much wire, cable, or conduit will be needed to complete the job. If you choose to pull it back with the machine, leave the service attached to the retriever, until the required amount is exposed. If you choose to pull the wire, cable, or conduit through by hand, the operator must engage the lock-out pin before the helper removes the service from the retriever. Pull back the desired amount.
16. With the engine off, remove the retriever and all remaining boring rods from the boring unit. Remove the boring unit from the machine. It is recommended that all boring unit components be cleaned and serviced, prior to placement in the storage box or truck, if possible.



# ILLUSTRATIONS (continued)

