



PRACTICAL APPROACH TO **GUIDED AUGER BORING**

An equipment and methodology guide for one of the most popular trenchless installations in North America.



Thank you

Thank you for your interest in Akkerman equipment. If you are interested in further information, please do not hesitate to reach out to one of our sales managers. We would be more than happy to assist you.

Kind regards,
The Akkerman Team

Committed to **Excellence** since 1973



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About Akkerman



Who We Are

For over five decades, Akkerman Inc. has been at the forefront of trenchless technology, delivering reliable, high-performance equipment designed to tackle the most demanding underground construction challenges.

As a leading North American manufacturer in our industry, we have built a reputation for excellence, pioneering cutting-edge solutions that support infrastructure projects across the globe.

Driven by innovation and customer-centric values, Akkerman has continuously evolved to meet the increasing complexities of trenchless construction. Our portfolio encompasses advanced manned pipe jacking, microtunneling, guided boring, earth pressure balance, and sliplining systems, each engineered for versatility across diverse soil conditions. In addition to our standard equipment line, we offer custom manufacturing to accommodate specialized project requirements, including systems up to 14ft (4.26 meters) in diameter.



Justin Akkerman, P.E.
President

Justin earned a bachelor's degree in civil engineering from the University of Minnesota and later obtained his Professional Engineer licensure in the State of Minnesota. As a third generation Akkerman, he has been immersed in the family business all of his life.



Jason Holden
V.P. - Chief Revenue Officer

Jason started his career with Akkerman in 2004 and previously served as the Director of Sales and as a Project Engineer. He holds a technical degree in mobile hydraulics as well as a bachelor's degree in mechanical engineering from Minnesota State University-Mankato.



Jay Zimmerman
V.P. - Chief Financial Officer

Jay plays an integral role in the company's stability with his financial strategy, planning, and related analysis. He joined Akkerman in 1998 after serving 11-years with a Fortune 500 company. Jay is a graduate of University of Wisconsin - Green Bay and holds CMA & CPA certificates. He is proud to be one of only a small number of Green Bay Packer fans working within the ranks of Akkerman.



Brad Wheeler, P.E.
Director of Engineering

Brad earned a bachelor's degree in mechanical engineering from North Dakota State University, a master's degree in business, and later obtained his Professional Engineer licensure in the State of Minnesota. His engineering design and business acumen has been proven throughout Akkerman product lines.



Made in America

Akkerman takes pride on our ability to manufacture high-quality trenchless products using American made materials with dedicated employees.

At the heart of our success is an unwavering commitment to partnership. Our clients rely on us for expert collaboration, precision-engineered products, and comprehensive support throughout the project lifecycle. Backed by a team of team of skilled engineers, seasoned field technicians, and a responsive aftermarket service department, we ensure seamless integration, on-site training, and rapid parts availability to minimize downtime.

Akkerman's legacy is built on reliability, adaptability, and technical excellence. With every project, we reaffirm our dedication to empowering our partners with industry-leading solutions that drive efficiency



Core Values



Teamwork



Integrity



Quality



Innovation



Safety

MANAGEMENT TEAM



PRESIDENT

Justin Akkerman, P.E.

(507) 539-0028 (direct) | jakkerman@akkerman.com

Justin earned a bachelor's degree in civil engineering from the University of Minnesota and later obtained his Professional Engineer licensure in the State of Minnesota. As a third generation Akkerman, he has been immersed in the family business all of his life.



**V.P. - CHIEF
REVENUE OFFICER**

Jason Holden

(507) 539-0022 (direct) | jholden@akkerman.com

Jason started his career with Akkerman in 2004 and previously served as the Director of Sales and as a Project Engineer. He holds a technical degree in mobile hydraulics as well as a bachelor's degree in mechanical engineering from Minnesota State University-Mankato.



**V.P. - CHIEF
FINANCIAL OFFICER**

Jay Zimmerman

(507) 539-0024 (direct) | jzimmerman@akkerman.com

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**DIRECTOR OF
ENGINEERING**

Brad Wheeler, P.E.

(507) 539-0012 (direct) | bwheeler@akkerman.com

Brad earned a bachelor's degree in mechanical engineering from North Dakota State University, a master's degree in business, and later obtained his Professional Engineer licensure in the State of Minnesota. His engineering design and business acumen has been proven throughout Akkerman product lines.

SALES TEAM



**SALES MANAGER
- FLORIDA**

Troy Stokes

(507) 539-0055 (direct) | tstokes@akkerman.com

Troy's experience in the underground industry has spanned nearly four-decades and involved all trenchless technologies. He is a contributing author for several trenchless resource publications including the ASCE 36-15: Standard Design and Construction Guidelines for Microtunneling. **Territories: Southern & Southeastern US, Mexico, South America, Australia, New Zealand.**



**SALES MANAGER
- MINNESOTA**

Robin Lorenzen

(507) 539-0046 (direct) | rlorenzen@akkerman.com

Robin's decades of trenchless experience makes him an integral resource in the conceptualization and design of many Akkerman products. Since 1989, he has been helping contractors install thousands of feet of pipeline all over North America and Europe. **Territories: Midwestern US & Central Canada.**



**SALES MANAGER
- WASHINGTON STATE**

Chris Sivesind

(507) 539-0016 (direct) | csivesind@akkerman.com

Chris began his career at a young age while working at his father's pipejacking and auger boring business. After receiving a bachelor's degree in Business Administration from Washington State University, he continued in the trenchless industry as a specialty shoring installation consultant, and in sales for another trenchless manufacturer. Sivesind is an active participant in many industry associations. **Territories: West Coast, Canada, Europe, & Asia Pacific.**



**SALES MANAGER
- WISCONSIN**

Jon Valin

(507) 539-0047 (direct) | jvalin@akkerman.com

Jon has served the heavy civil, construction, and repair industry for over 20-years and has developed the attention to detail required in the trenchless industry. His knowledge and expertise allow him to understand the challenges of contractors, while his position at Akkerman allows him to provide solutions they require. **Territories: Great Lakes Region, East & Northeastern US, Middle East, and India.**

TECHNICAL SUPPORT



Daryl Anderson

AFTERMARKET PARTS MANAGER

☎ (507) 539-0017 (direct)

🏠 (507) 993-3649 (mobile)

✉ danderson@akkerman.com



Paul Krebsbach

AFTERMARKET SUPPORT SPECIALIST

☎ (507) 539-0043 (direct)

✉ pkrebsbach@akkerman.com



Cameron Landherr

TECH. SUPPORT & SERVICE MANAGER

☎ (507) 539-0013 (direct)

🏠 (507) 440-7044 (mobile)

✉ clandherr@akkerman.com

LOCATION

CORPORATE

58256 266th Street Brownsdale, MN 55918

- ☎ (800) 533-0386
- ✉ akk@akkerman.com
- 🌐 www.akkerman.com







Guided Auger Boring Method

Guided Auger Boring (GAB), often referred to as Pilot Tube Guided Auger Boring (PTGAB) on engineering specifications, is one of the most popular and cost-effective trenchless methods to accurately install steel casing for underground utilities, waterlines, and sanitary sewers. This method combines the pinpoint accuracy of the pilot tube installation to control line and grade with the excavation process of horizontal auger boring.

Key Benefits

 **ACCURACY** - Pilot tube guidance ensures line and grade accuracy prior to advancement of the casing. Standard auger boring accuracy without pilot tube guidance is limited to 1% through industry practices. When combined with an accurate jobsite setup, it is possible to maintain line and grade within 1/4" at distances of 400ft. Given ideal conditions, distances exceeding 600-ft have been successfully achieved with the same level of accuracy.

 **SAFETY** - Pilot tube guidance does not require removal of augers and personnel entry into the steel casing for line and grade control. The most common trenchless crossing in North America is the installation of steel casings (less than 60-in OD) that do not safely allow personnel entry into the tunnel.



GEOTECHNICAL CONFIRMATION - During the pilot tube installation, the contractor will have

a good indication of the ground conditions. This includes finding potential obstructions as well changes in geological that can be mitigated prior advancing the steel casing.



COST BENEFITS - End users experience social and economic cost benefits through reduced casing diameter requirements through increased accuracy, longer drive lengths, and greater productivity. The overall benefits are realized both as upfront and long-term.



Guided Auger Boring Methodology

The **Guided Auger Boring (GAB)** process combines the Pilot Tube Method (PTM) with the Auger Boring Method (AB) to produce an accurate and straight trenchless installation of steel casing pipe. This method is most common for steel casing pipe diameters ranging from 12in to 72in OD, however larger diameters have been successfully installed throughout North America. Traditional auger boring without pilot tube guidance has limited accuracy due to the inability to accurately determine or manipulate the leading edge of the casing.

Auger Boring (AB)—A technique for forming a bore from a jacking or drive shaft to a receiving shaft by means of a rotating auger with cutting tools. The casings are jacked forward sequentially in a cyclic process while the auger is turned. Spoils are removed back to the drive shaft by helically wound auger flights rotating in the steel casing. The equipment may have limited guidance and steering capability. (ASCE 36-15)

Pilot Tube Method (PTM)—The pilot tube method is defined as a multistage method of accurately installing a pipe to line and grade by use of a guided pilot tube followed by upsizing to install the pipe. (ASCE Manuals and Reports on Engineering Practice No. 133)

SHAFT CONSTRUCTION

The contractor is responsible for the design and construction of the trenchless shafts in accordance with Federal OSHA Code, Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P.

Since the pilot tube equipment is designed to integrate with existing auger boring equipment, the dimensional considerations for the launch shaft size will be the same as standard non-guided operations. It is important to consider the following:



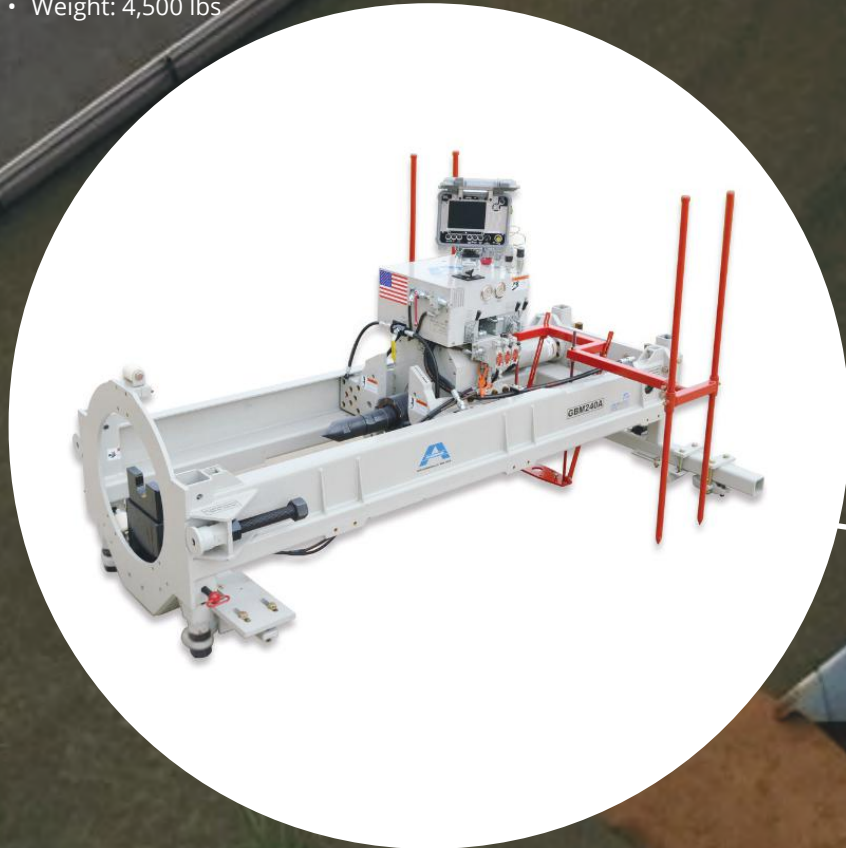
JACKING PIT	CONSIDERATIONS
LENGTH	Determined by overall length of product pipe. Must accommodate ABM, thrust block, thrust cylinders, and 10ft (minimum) pipe.
WIDTH	Provide adequate workspace for spoil removal from ABM, equipment storage (pilot tubes), and worker clearances (safety).
DEPTH	Excavation must be deep enough to allow construction of adequate subfloor to support the weight of the trenchless equipment. Typically 12-in of crushed rock or 6-in of concrete in certain conditions may be required to stabilize ABM track.
DEWATERING	Install pit sump pump(s). Position pump(s) in corner location(s) that allow grade to induce flow towards pump location.

AKKERMAN DUAL-WALL PILOT TUBES

- Standard for all Akkerman GBM System
- 4.1-in OD x 30-in Long each
- Maneuver by hand
- Allows application of lubrication for extreme distances

AKKERMAN MODEL 240A GBM SYSTEM

- Use with an ABM or as stand-alone system.
- Rapidly install pilot tubes in one sequence.
- Capacity: 100-ton thrust / 50-ton pull
- Torque: 10,500 lbf-ft
- Weight: 4,500 lbs

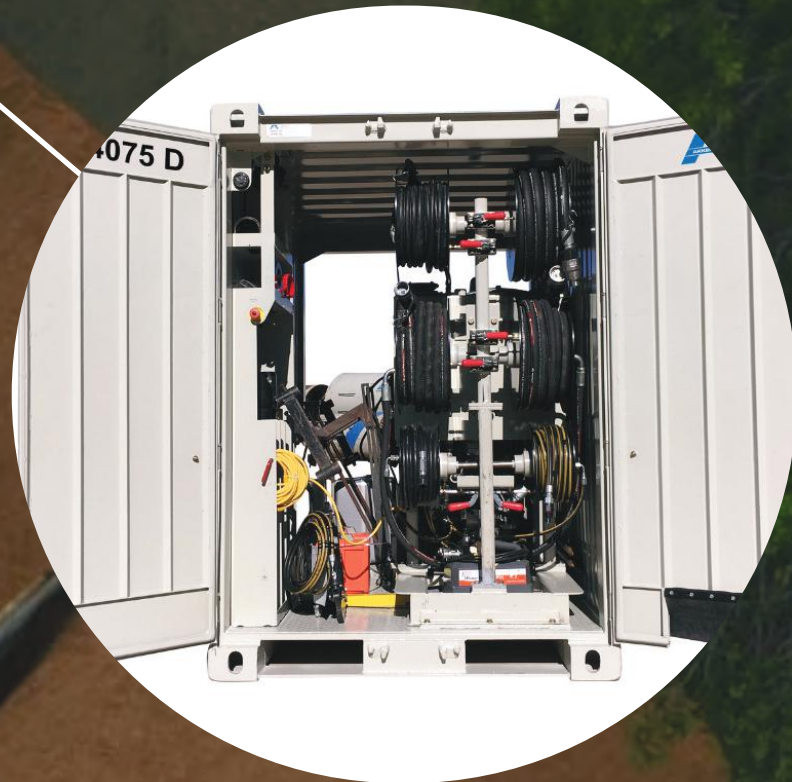


AKKERMAN GBM GUIDANCE SYSTEM

- Advanced optics for increased distances.
- Standard Data Logging
- Nitrogen Purge Kit
- Remote-Controlled Theodolite
- Optional Smart Target Technology

AKKERMAN LUBRICATION SYSTEMS

- Multiple sizes & capacities available
- High-shear mixing
- Ultra portable for jobsite mobility
- Hi-pressure: 2500 psi (max)
- Pumps up to 50 Marsh Funnel
- Variable flows units (6, 10, 16 gpm)



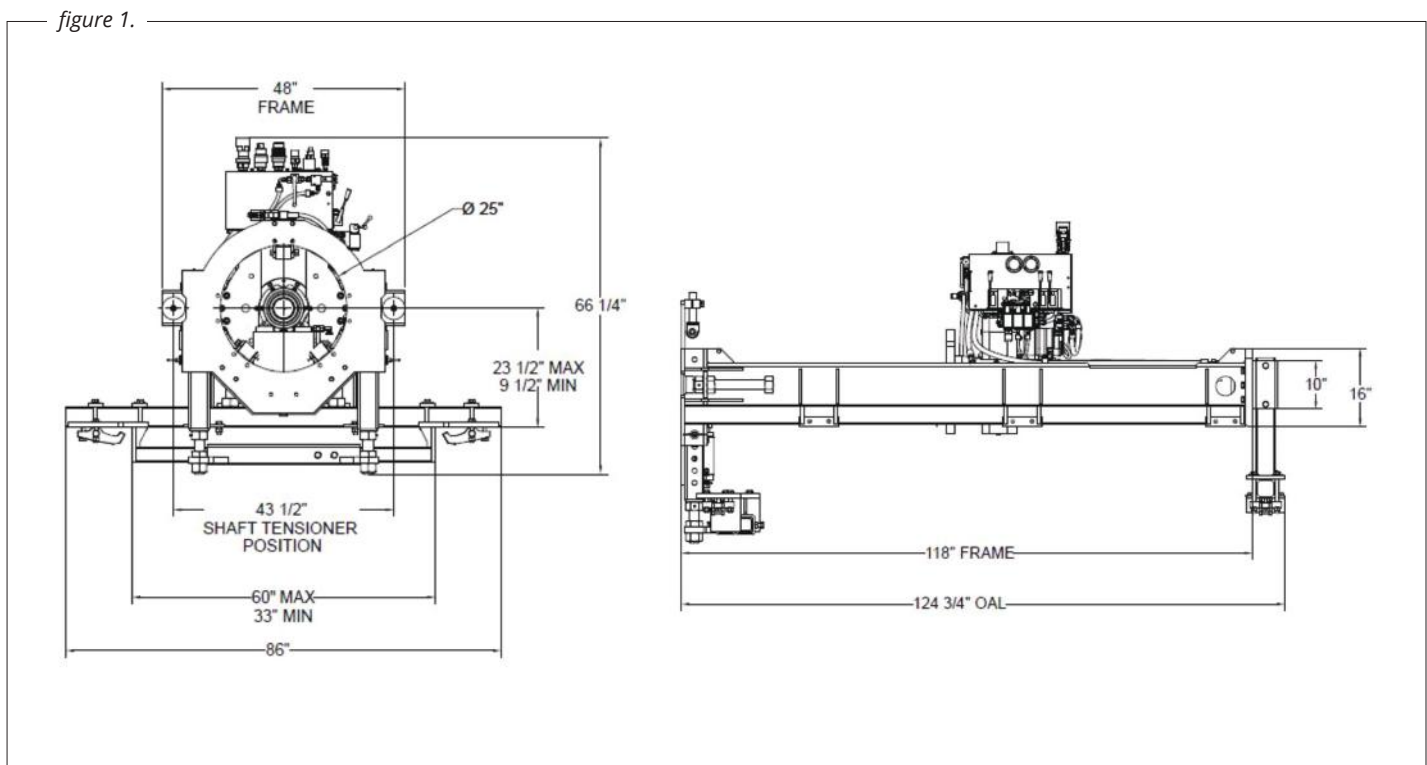
AKKERMAN HYDRAULIC POWER PACK

- Offered in clean Diesel or Electric drive
- Dual Hydraulic System — (2) Variable Piston Pumps
- Larger units available with three hyd. systems.
- Efficiently programmed and quiet.
- Includes accessories and secure equipment storage.

Equipment Setup - Launch Shaft

Properly setting, adjusting, and securing the equipment in the launch shaft is the primary step to achieving accurate results. This phase of the project requires extreme care to ensure that the auger bore track rail and guided boring equipment is properly aligned to the correct slope and centerline of the designed bore path. Confirm the floor-to-centerline dimension of the auger bore machine from the corresponding manufacturer's

literature. The Akkerman Model 240A GBM system is designed with an adjustable base adapter that accepts most manufacturer's ABM units from 30 to 72-in capacity. Custom adapters are also available upon request. Details of the Akkerman Model 240A GBM system with adjustable frame dimensions are shown in *Figure 1* below.



EQUIPMENT SETUP AND SURVEY TECH TIPS

- Use accurate survey to set pins for the alignment of the equipment. Traditional GPS systems are not recommended for this application.
- Ensure site survey and equipment setup is double checked by a competent person to minimize error.
- Resurvey shaft alignment pins as necessary to ensure thrust forces have not cause shaft misalignment.
- Properly anchor and secure equipment.
- Document your work!

GBM Guidance System

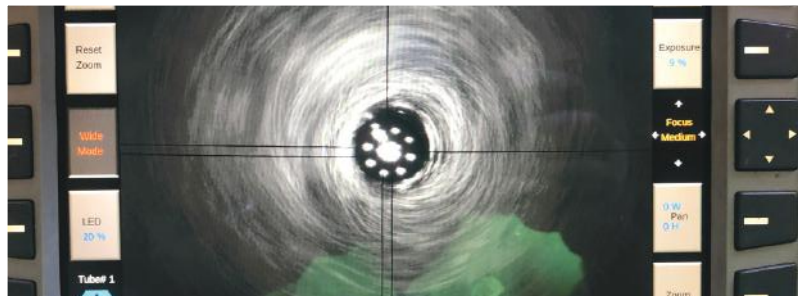
The Akkerman GBM guidance system is designed to provide the highest level of accuracy in the trenchless industry. Using a remote-controlled theodolite and enhanced camera, the guidance system acts as an extension of the site survey allowing the GBM operator to install pilot tubes online and grade.

The navigation system is optical with real-time feedback to the operator through a dedicated display built specifically for rugged environments. This type of system provides the operator with immediate directional information of the steering head and LED target.

After the initial setup in the launch shaft, the guidance system is installed on an adjustable mounting platform

that minimizes the movement and vibration from nearby equipment to maximize accuracy. The alignment of the guidance system is done using the survey pins (marks) to run a stringline with two plumb bobs that transfer the surveyed points on the shaft wall to the shaft floor. To minimize line movement and ensure accurate readings, the plumb bobs should be captured in an oil bath.

The all new Akkerman guidance system includes a standard data logging system. Advanced data logging can be added to include lubrication data and jacking frame operations. It is always recommended to document and monitor guidance system parameters along the alignment in your project's daily job reports.



Installation of the Pilot Tubes

The installation of the pilot tubes is the key process that defines the Pilot Tube Method. Pilot tubes are installed from the launch shaft to the reception shaft, and follow the alignment of the bore path with a high degree of accuracy. An illustration of the installation of the pilot tubes are shown below in *Figure 2*.

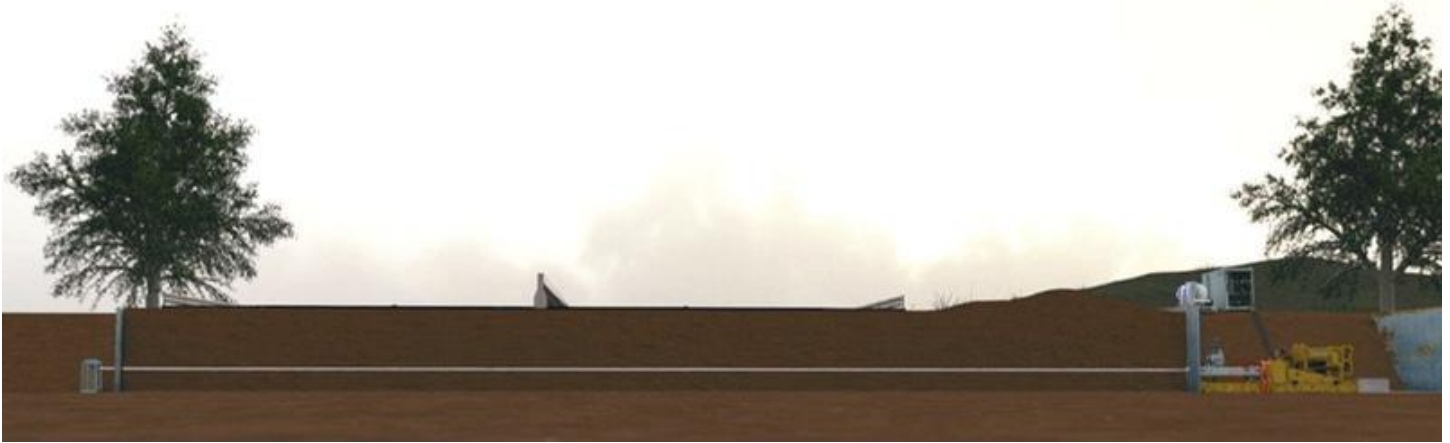
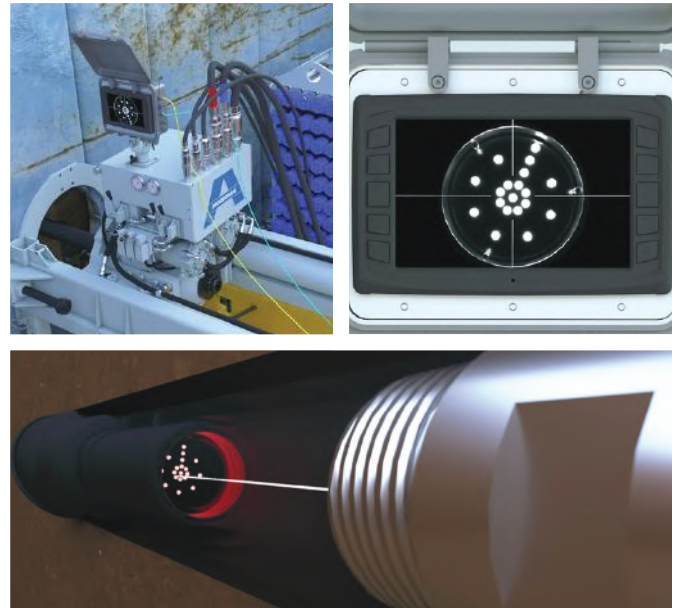


Figure 2: Installation of pilot tube online and grade.

As the pilot tubes advance through the ground, the operator monitors the position of the LED target that is located within the slant-faced steering head via the digital monitor. The angular position of the steering head is timed with an indicator line on the LED target to provide the operator with the intended direction of steer while advancing the pilot tube string.

Recent innovations have allowed pilot tubes to be installed in a wider range of ground conditions. While additional tooling is available for these applications, the most common installations are in displaceable ground conditions. Standard penetration tests (SPT) in accordance with ASTM D1586/D1586M are used to correlate the relative blow count (N-value) of the soil. Standard soft ground tooling is effective in soil conditions up to SPT N-Value < 50. Below is a table of the relationship of relative density and SPT N-Values.



RELATIVE DENSITY	SPT N VALUE	BULK DENSITY (KG/M ³)
VERY LOOSE	0-4	<1,600
LOOSE	5-10	1,530-2,000
MEDIUM	11-30	1,750-2,100
DENSE	11-30	1,750-2,245
VERY DENSE	>50	>2,100

Table 2: US Army Corps of Engineers, Engineering Manual EM 1110-2-2504, Table 3-1, dated 31 March 1994

Advancing the Pilot Tubes

As pilot tubes are advanced through the ground, the pilot tubes displace the soil along the bore path. Rotational torque is used for steering correction as necessary based on feedback from the guidance system. While this concept may be similar to Horizontal Directional Drilling (HDD), the difference is very significant. In the pilot tube method, the steering head over cut is very minimal, and cuttings are not being carried out of the borehole by a large volume of slurry flow like in the HDD method. This eliminates the risk of frac-out that often occur in HDD.

In the event that the pilot tubes encounter an obstacle or obstruction along the alignment, the pilot tubes can be pulled-back to the launch shaft, while the in-situ properties of the soil allows itself to return to its native state.

PILOT TUBE LUBRICATION

The dual-wall pilot tubes allow Akkerman GBM systems to introduce lubrication to the steering head, while maintaining a proper line-of-sight for the guidance system. Lubricants are critical for extending drive distances, reducing thrust & torque, cooling the LED target, and maintaining a stable bore path. In combination with Akkerman lubrication systems, contractors have been able to successfully complete installations in excess of 600+ft in conducive ground conditions. Lubrication is only pumped through the pilot tubes at rates to adequately coat the pilot tube and stabilize the small over cut. This practice is the same as other pipejacking methods such as microtunneling and conventional TBM pipejacking. Unlike HDD where drilling fluids are used to carry and suspend cuttings to the launch shaft through a large annulus, the pilot tube method utilizes lubrication as a means to increase efficiency. No frac-out!



Bentonite lubrication moves through the outer ring of the dual-wall pilot tube to the steering head port to reduce jacking forces as the steering head displaces the ground.

Lubrication Tech Tips

- **Adjust the pH level** of the supply water to 8.5-9.5 by adding soda ash to ensure full hydration.
- **Gradually pour** any additives into mixing tank per recommended instructions.
- Allow proper time for “engineered lubricant” mixture to **fully hydrate in mixing tanks** before use.
- Lube mixtures are never considered as “one-size-fits-all”. **Consult a mud engineer** that is familiar with your anticipated ground conditions, trenchless method of installation, and equipment



Successful Installation

The pilot tube installation is complete when the steering head reaches the reception area. The pilot tube should now established a path for subsequent tooling and pipe installation with the auger boring machine. A final site survey is recommended to verify and document the location of the steering head in

accordance with the site plans. Since the pilot tubes are a straight line extension of the launch shaft setup with an accuracy of +/- 1-in from grade and +/- 3-in from alignment, any errors that occurred during the initial setup will be evident and can be corrected by reinstalling pilot tubes prior to the next phase.



Figure 3: Photo of steering head in reception shaft and view of target (naked-eye) of installed pilot tubes at 300-ft.

Break-out Tool and Reception Shaft Lubrication

Equipment such as the lubrication system, pilot tube break-out tool, and empty pilot tube racks can now be mobilized to the reception shaft to capture pilot tubes as they advance into the reception shaft during the next phase of the project.

A key advantage of the Akkerman GBM system is the ability to **provide lubrication from the reception shaft back through the pilot tubes** to the upsize tooling if required. This can be done by simply utilizing the air/fluid adapter that is a standard component in all Akkerman GBM systems.



Figure 4: Illustration of the Akkerman pilot tube break-out tool, lubrication system, and air/fluid adapter setup in reception shaft. By threading on the air fluid adapter to the last pilot tube, lubrication can be added from the reception shaft, through the pilot tube string to the cutter face to reduce jacking forces and assist in processing the material.

Installation of the Product Pipe - Guided Auger Boring

After the successful installation of the pilot tubes along the bore path, the GBM guidance system and jacking frame are removed from the launch shaft and can be mobilized to another site if required. The auger bore machine is positioned to accept the required length steel casing to be installed. The steel casing will be

connected to the previously installed pilot tubes to provide guidance for the operation. The type and size of connection between the pilot tubes and lead casing must be selected based on the ground conditions, diameter of casing, and length of bore.



Figure 5: Illustration of starter casing connected to installed pilot tube via a Weld-On Reaming Head (WORH)

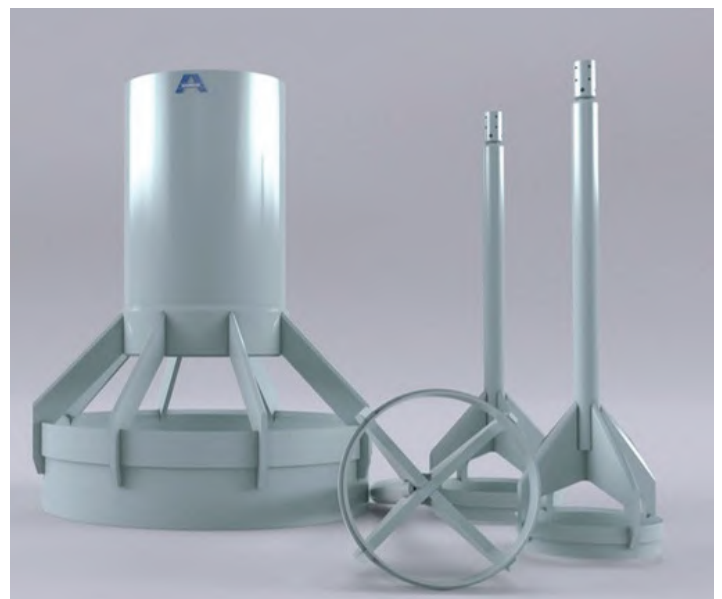
WELD-ON REAMING HEADS (WORH) - UPSIZE TOOLING

In soft, non-compacted ground, where the casing can be easily advanced with the thrust of the auger boring machine, a Weld-On Reaming Head (WORH) is most commonly used to rigidly connect the pilot tubes to the steel casing. As the name implies, WORHs are welded to the lead casing and feature rigid arms that connect the casing to the pilot tube adapter. Each WORH undergoes an extensive weld-process to ensure proper alignment and quality. To reduce thrust forces required on the ABM, an overcut band is installed and all leading edges include a machined taper.

Depending on the soil conditions, a standard cutter head with the wing cutters removed, or a lead auger with carbide teeth can be used for removing spoils inside the WORH.

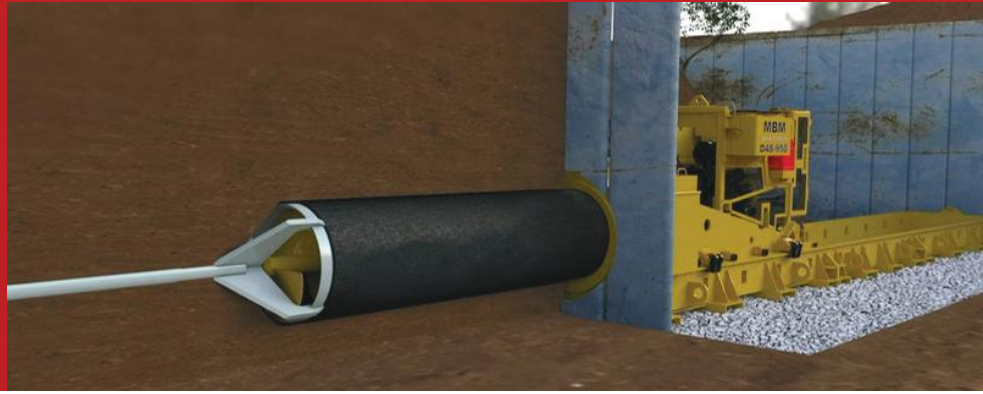
Steel casing diameters up to 36-in OD can be directly installed behind the pilot tubes in one step. Larger diameter installations require multiple-stages in order to properly maintain line and grade. Two-stage WORHs are available in multiple configurations based

on available auger and casing preference. Industry practice is to install the first stage at approximately 1/2 the diameter of the final pipe diameter for casing larger than 36-in OD.



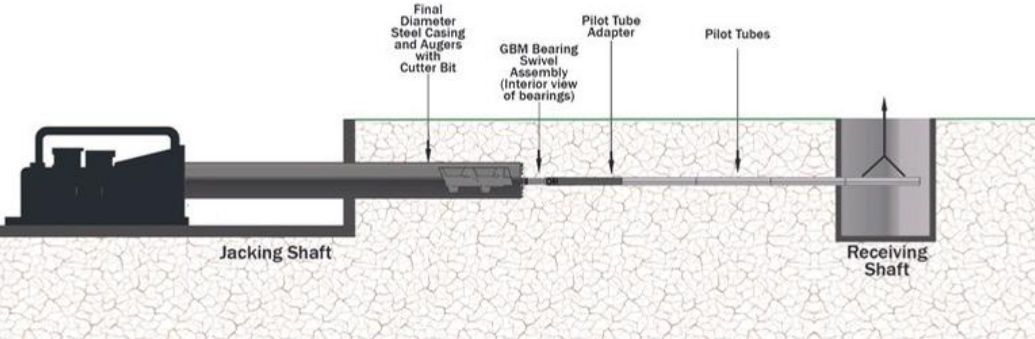
Weld-On Reaming Head Applications

- Best suited for soils with N-value < 30.
- Single stage installations up to 36-in OD.
- Multi-Stage installations up to 72-in OD+.
- Trip out augers easily (single stage)
- Ability to remove lead section of auger to create a plug in saturated, flowing ground.
- Can adapt to pneumatic hammer if req'd.



INLINE BEARING SWIVELS - UPSIZE TOOLING

A GBM bearing swivel is used between the pilot tube adapter and an ABM cutter head. Designed to accommodate up to 50-ton of continuous thrust loads, these swivels will prevent the rotation of pilot tubes while maintaining alignment of steel casing. These swivels are best suited for installations up to 30-in OD where ground conditions require direct ground engagement of a cutter head.

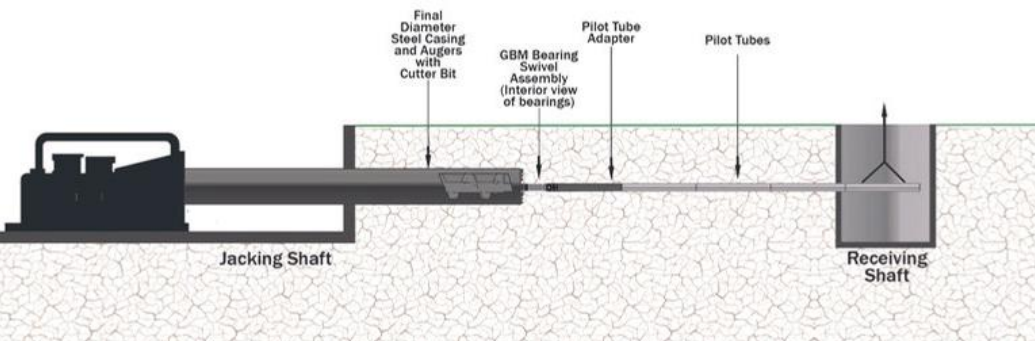


| Figure 6: Illustration of GBM bearing swivel. Suitable for diameters up to 30-in OD.

GUIDE ROD SWIVEL (GRS) CUTTER HEADS - UPSIZE TOOLING

The Akkerman Guide Rod Swivel (GRS) cutter heads are an integrated 50-ton bearing and auger bore cutter head design. The high thrust bearing swivel assembly is interchangeable between various diameter heads making this unit economic and versatile. With a range of diameters from 24-in to 42-in, this series of heads fit all

common steel casing diameters and include retractable wing cutters and a starter casing. Torque is applied from the ABM to the cutter face through a 5-in hex connection at the rear of the bearing swivel that can be adapted to fit smaller augers.



| Figure 7: Illustration of GRS Installation and Cutter Head.

The connection between the bearing swivel and pilot tubes not only allows for auger pull-back, lubrication ports are added to assist the flow of excavated material and keep the cutter head clear.

GRS cutter heads are most commonly used in harder ground conditions found as the N-Value exceeds 30. When combined with a Rock Drill Adapter and TriHawk tooling, GRS cutter heads can advance through soft, weather rock and shales. Typical limitations of carbide tooling is around UCS 3000 psi, however various other conditions may apply.

NOTES



Standard Equipment - 240A GBM System Specifications

The Akkerman 240A GBM system is the most versatile and widely used system available. The base system can be used for several types of trenchless installations such as guided auger boring, guided pipe ramming, direct installations, geotechnical investigations (probing), as well as others. The common components of the base system are shown below.

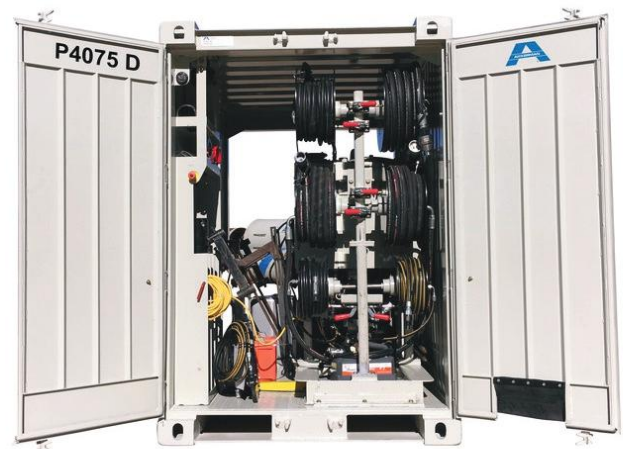


AKKERMAN MODEL 240A GBM FRAME

- Designed to mount on ABM units or independently in trenchbox shafts (10' x 10').
- **Torque:** 10,500 ft-lbs (14,240 N-m) @ 5000 psi
- **Speed:** 3-speed, 0-25 rpm, 0-37 rpm, 0-50 rpm
- **Force:** 100 ton (thrust), 50 ton (pull)
- **Stroke:** 48-in single stroke cylinders
- **Dimensions:** 48in W x 118in L x 55in H
- **Weight:** 4500 lbs
- **Pipe:** Accommodates up to 24-in OD direct installations

AKKERMAN MODEL P4075D/P100E POWER PACK

- Provides mobile hydraulic power to equipment. Both Tier IV
- diesel and electric/hydraulic models are available.
- **Power:** 75hp (55kW) Tier IV Diesel / 100hp (75kW) Electric
- **Pumps:** (2) Variable Piston, 0-34 gpm, 5000 psi
- **Packaging:** Secured Quad-con, 60" W, 82" H, 96" L
- **Weight:** 5500 lbs dry
- **Includes:** Remote-control pendant, pilot breakout tool & power pack, pilot tube steering heads, adapters, guidance system storage, air/fluid adapters, nitrogen purging kit, additional pilot tube accessories.



AKKERMAN GBM GUIDANCE SYSTEM

- Complete package for all Akkerman GBM systems.
- **Includes:** Theodolite w/remote control, LED Target, monitor assembly, digital camera, lateral slide assembly, elevator column assembly, counterweight, alignment holder, bore sight tool, cables, and protective cases
- **Theodolite Accuracy:** 5 sec (1.5 mgon) DIN
- **System Accuracy:** +/- 1 in grade, +/- 3 in alignment with site setup allowances.
- **Data Logging:** Standard, enhanced metrics are optional

Standard Equipment - 240A GBM System



AKKERMAN GBM LUBRICATION PUMP

- Akkerman offers multiple lubrication pumps to fit the needs of the contractor. The most common lubrication systems for 240A GBM systems are the 1325B and the 1525BD.
- **1325B specs:** 14hp (gas), 6 gpm flow, 2500 psi, 325 gal tank
- **1525BD specs:** 20.7hp (diesel), 10 gpm flow, 2500 psi, 525 gal tank
- **Fluid Capacity:** water, water w/bentonite up to 50 marsh funnel
- **Mixing:** Hi-Shear, in-tank agitator for quick mixing
- **Weight:** 1325B - 1000 lbs dry / 1525Bd - 2200 lbs dry
- **Operation:** Manual bypass control pendant. ABIS control Optional

AKKERMAN DUAL WALL PILOT TUBES

- Akkerman dual wall pilot tubes are offered in horizontal racks for ease of operation. Each rack of pilot tubes is 100 linear feet.
- **Includes:** (1) horizontal rack, (40) pilot tubes, caps & plugs, lifting bar.
- **Weight:** 3300 lbs (horizontal assembly) / 70 lbs (single pilot tube)



GBM TOOLING AND ACCESSORIES - INCLUDED IN STANDARD PACKAGE

These items are integral with the purchase of Akkerman hydraulic power packs and are necessary on guided boring projects:

- **Steering Head Adapter:** Tooling for standard steering head, LED target, and provisions for lubrication of pilot tube string.
- **Breakout Tool & Power Pack:** Necessary for breaking down pilot tubes in the reception shaft.
- **Steering Heads:** Each system comes standard with common-use steering heads for typical ground conditions.
- **Nitrogen Purge System:** Used to clear condensation from dual wall pilot tubes site path for increased drive lengths.
- **Air/Fluid Adapter:** Add lubrication or nitrogen through pilot tubes
- **Pull-back Tooling:** Wrenches and tooling to assist pull-back functions.
- **Additional Storage:** Power packs are built with additional storage to accommodate future needs.

GBM Enhancements

Akkerman has a variety of equipment enhancements and upgrades that are available to new and existing customers. These upgrades maximize the performance of Akkerman GBM systems.

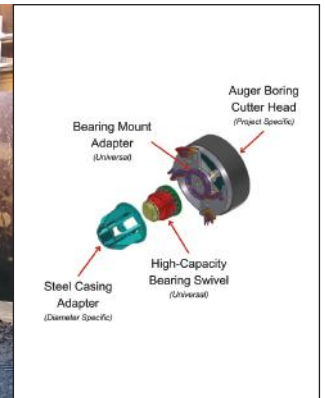
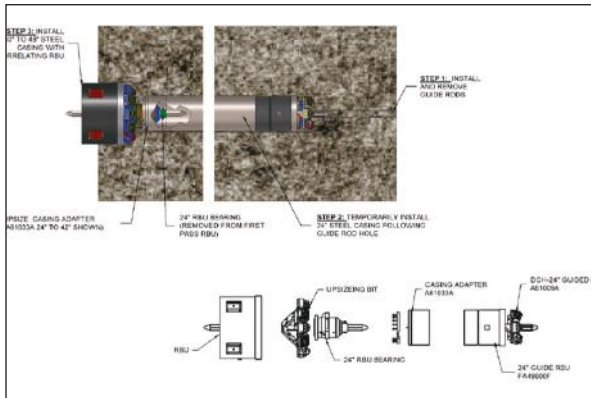


Triple-Wall Pilot Tubes (Spinner Tubes) integrate a line-of-sight for the optical guidance system, fluid passage for drilling fluids, and an outer shell that freely rotates as it progresses through the ground. The triple-wall tubes reduce the overall torque and thrust required to install pilot tubes in sandy and clay soils leading to less torque requirements resulting in longer drives and less fatigue on auger boring machines.

The new **Launch Shaft Break-Out Tool** is such a game-changer for crews that it is now a standard item for any new GBM build. This tool allows your crew to rapidly pull-back and release pilot tubes inside the launch shaft without the using heavy manual wrenches.



Existing contractors can easily update their GBM frames by adding the updates. Simply contact Akkerman Aftermarket Support for further details.



Installing diameter steel casing larger than 36-in OD with exact line and grade tolerances in hard ground has been challenging for auger bore contractors. Akkerman has developed a **Hi-Capacity Bearing Swivel** that allows a seamless transition between a smaller diameter and larger diameter casing. The bearing swivel can be guided by as small as a 16-in casing, which would be ultimately have been installed behind a pilot tube. For hard clay, shale and weather rock less than 4000-

psi, the redesigned GRS cutter heads can be linked together by the hi-capacity bearing swivel. The initial pass would install a 16- to 24-in casing on line and grade, then follow-up with a final diameter up to 48-in GRS coupled to the lead casing by the bearing swivel. Similarly, Rock Boring Units (RBUs) can be coupled together as shown above. An initial guided, RBU-24 would install a primary casing. The bearing swivel would then connect the 24-in to a larger diameter as shown.

Optional Accessories

Akkerman has a variety of optional accessories available for pilot tube systems. Below are a few of the common items:



PULL-BACK ADAPTERS

- Utilize Akkerman GBM systems to pull-back utilities on-line and grade. Avoid existing buried utilities.
- HDPE, PVC, Electrical, Telecommunications, Geothermal, etc.
- Custom upsize tooling available upon request.



TRIHAWK STEERING HEADS & ROCK DRILL ADAPTER

- Steering head conversion kit for non-displaceable ground applications. Utilize existing guidance system.
- **Rock Drill Adapter:** (aka TriHawk Adapter) LED Target Housing, Lube Ports, Pilot Tube-to-TriHawk adapter.
- **TriHawk I:** 5.12-in OD, Compacted Soils, Cobble, Soft Rock.
- **TriHawk III:** 5.5-in OD, Hard Soil, Soft Rock
- **TriHawk IV:** 5.5-in OD, Till, Cobble, Soft Rock
- **TriHawk V:** 4.8-in OD, Gravel, Loose Fill, Dense Soil
- **Other:** Additional options may be available directly through DitchWitch.
- **Note:** 5.5-in OD cut head may be required depending on application



AKKERMAN GBM SONDE HOUSINGS

- Pilot tube sonde housing - Standard or TriHawk
- Fits a standard 15in Sonde
- Operator can utilize both the Akkerman GBM guidance system and walkover type locating system.
- Sonde placement is between the steering head and LED target.
- Custom units are available upon request.

Akkerman GBM Rock Hammer Kit - 240A GBM



Achieving accurate pilot tube installations in rock is now possible with the addition of an Akkerman GBM Rock Hammer Kit. Proven at distances up to 300-ft in solid rock formations, the rock hammer kit provides the basic necessities to convert the world's premier guided boring machine into a guided rock drill.

Akkerman engineers have developed smart target technology with the rigors to withstand the forces of the horizontal hammer, allowing contractors to use the trusted line-of-site GBM guidance system that has set the standard within the industry.

A customize air/fluid adapter and rock ready pilot tubes maximize the airflow to the 4-in pneumatic hammer.



PNEUMATIC HAMMER EQUIPMENT CONTAINER

The pneumatic hammer container is the jobsite workshop and secured storage for your hammer equipment. Standard jobsite contents include tool cabinet, dual-fuel generator, oxy/acetylene torch, custom cylinder vise for hammer equipment, custom wrenches, and LED lighting.

Hammer equipment includes:

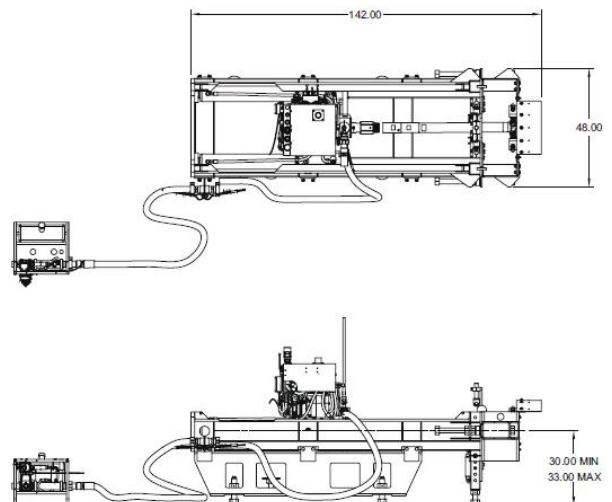
- 4-in Horizontal Pneumatic Hammer
- 5-in PDC Reamer Bit
- 5-in Directional Hammer Bit
- Various hammer bits and bent subs
- GBM Hammer Drive Swivel
- Multi-Position Target & Adapters
- Launch Shaft Frame Support and more....



ADDITIONAL REQUIREMENTS

Consumable items such as pneumatic hammer oil, hammer foam, and polymer is required during hammer operations. It is recommended to have the following onsite for each drive.

- 5-gallons of Bio-Blend Pneumatic Hammer Air Oil
 - Est. consumption: 1-2 qt/hr on 4in hammer.
- 5-gallons of Platinum Plus Hammer Foam
 - est. consumption: 2 gal/min on 4in hammer.
- Qty of T-100 Polymer
- Hammer Lubrication Pump
- 400-800 CFM @ 200psi Air Compressor



The following list is to be used as a general guideline when preparing for your GBM project. Some of the items may not be used on your project, however the following list is a general representation of the most-common items to have available for efficient and productive operation. For additional information, please refer to the GBM Operator's Manual or contact the Aftermarket Support department for further assistance.

CONSUMABLE ITEMS

- Diesel/Gasoline for hydraulic power pack and lubrication system.
- Fuel Stabilizer
- 5 to 6 gallons of Propylene Glycol (RV Antifreeze) for winterizing equipment.
- Spare cutterhead tooling (bullet bits, spade tooling, disc cutters) - PRH, PCH, RBU, TriHawk
- Mobil SHC 630 or equivalent for jacking frame gearbox, PRH & PCH bearings and auger drive gearboxes.
- Mobil 636 or equivalent gear oil for integral bearing swivel cutterhead bearings.
- Mobilgrease XHP222 or equivalent and grease gun for equipment lubrication points, jacking frame leveling screws, and drive adapter assemblies.
- ISO-VG-4G 20W Premium Hydraulic Turbine Oil for breakout tool power pack.
- Anti-Sieze lubricant for pilot tube threads.
- Oil absorbent pads
- Rubber gloves.
- Minimum of 2 - 1.5 V, Size D replacement batteries for LED target. Recommend Duracell brand.
- Minimum of 6 - Size AA replacement batteries for theodolite
- Minimum of 3 - Size 392 button type replacement batteries for laser bore sight tool.
- 50 - Replacement pilot tube o-rings.
- 1 set - Replacement hydraulic, engine, air, water, fuel filter set.
- Replacement pilot tube caps & plugs.
- Replacement casing clips.
- Shop towels & rags.
- Paint rollers for cleaning pilot tube inner rods.
- Wood cribbing
- Steel tubing - 2x2, 3x3, or other for misc supporting.

JOBSITE TOOLS

- Basic Mechanical Hand Tools - Standard & Metric
- Wrenches to 1 1/4-in
- Adjustable wrenches - 12, 15, 18-in
- Allen wrench set - standard & metric
- 3-lb hammer
- Prybar set
- Punches and chisels
- Large maul
- Shovels, brooms, rakes.
- 4-ft level for assisting setting equipment
- Welder, welding rods, and safety equipment
- Grinding equipment
- Torch Set with extension leads and safety equipment.
- Tarp or pop-up tent for rain

SUPPORT EQUIPMENT

- Bentonite & Lubrication testing & consumables
 - Bentonite / Polymer / Additives
 - Marsh Funnel test kit
 - Clean water - ph test kit
- 110 Vac Generator for Breakout tool - 2200W or larger
- Air Compressor - Hand Tools
- Air Hammer - Temp. Augers and Casings
- Nitrogen Tank - Purge pilot tubes (moisture)



Facility Tour



SALES

Akkerman sales team has decades of industry experience and is ready to help. Whether you have an inquiry about one of our products or would simply like to learn about a particular trenchless method, our sales team has the knowledge and experience to guide you in the right direction.



ENGINEERING

Our engineering team is dedicated to providing our customers with innovative trenchless solutions using proven design concepts. The experienced team uses state-of-the-art modeling, finite element analysis, and design process tracking software to ensure Akkerman products are built to the highest quality standards.



PRODUCTION CONTROL

Short lead times, on-time deliveries, and quality of every piece is critical. Akkerman uses customized ERP systems to streamline inventory levels, track work orders, and customize process sheets to capture historical knowledge.



RAW MATERIAL INITIAL PROCESSING

Akkerman sources the best materials from the most trusted suppliers in the United States. We dedicate temperature controlled indoor storage for steel to ensure CNC cut quality. Every piece of steel on an Akkerman TBM passes through initial process before it takes shape.



WELD SHOP

Akkerman recently expanded our weld shop in 2021 to include additional bays, new equipment, new overhead cranes, and a generous staging area for equipment builds. Experienced welders are trained on the latest techniques and methods to ensure strong, safe, and smooth welds are laid. Akkerman welders take pride in their craft, and their craftsmanship is on display with every piece of Akkerman equipment.



MACHINE SHOP

Akkerman has a state-of-the-art machine shop with some of the largest vertical turning lathe CNC machines in the Midwest. We have a mix of both large and small CNC mills and lathes to produce most of our parts in-house, which allows Akkerman to quickly produce components when needed. Our skilled machinists are trained, knowledgeable, and meet high quality standards.



PAINT SHOP

Even though the paint wears off trenchless equipment rather quickly, every TBM that leaves the Akkerman factory will always have the infamous blue stripe, Akkerman logo, and American flag proudly displayed.



EQUIPMENT ASSEMBLY & TESTING

Quality is a critical part of everything we do. We diligently adhere to the highest quality standards and are in complete control of the manufacturing process from start to finish.



TECHNICAL SERVICES & REFURBISHMENT

Customer support is a top priority for Akkerman and our customers. Akkerman technicians are available for operational training or equipment repair. In-house technical services include equipment refurbishment, warranty, rebuilding, repurposing, and updating.



AFTERMARKET PARTS

Akkerman aftermarket support is available to assist any of your parts needs with well over 1,000,000+ in-stock parts. Customized parts kits can be arranged specifically for your specific needs.



SHIPPING & LOGISTICS

The quality of Akkerman extends to shipping. Whether it is a part or an entire TBM system, we can help you get it there. Our logistics team can help customize your load if you do not have a preferred carrier.



D.H. AKKERMAN TRAINING AND DEVELOPMENT GROUNDS

Development of the current and future workforce is critical to Akkerman. Completed in 2023, the D.H. Akkerman Training and Development Grounds was developed specifically for the enhancement of guided boring operational training. Interested clients can sign-up to attend a customized training course at: akkerman.com/training-center



USED INVENTORY

Akkerman used inventory is inspected, refurbished, and tested to new standards. Akkerman used equipment is often rental equipment that has only been used on one or two projects. Once the equipment has been factory certified, it is sold with a factory warranty as if it were NEW.



NEW INVENTORY

Akkerman carries an extensive stock of equipment inventory in the most common pipe jacking diameters. Our customers appreciate quick lead times and the ability to respond to emergency infrastructure projects.



EMPLOYEES

We believe that our greatest strength is our employees. We are proud of our employee's commitment to excellence. Our skilled professionals are dedicated to advancing trenchless technology, equipment reliability, and responsive service. We are Driven for Customer Success!

RESOURCES

Standards & Best Practices

Akkerman has been invested in advancement of the trenchless industry for over 50-years. We recommend the following resources that are available to further your trenchless knowledge and assets of the industry. These resources were referenced in the creation of this document.

ASCE Manual and Reports on Engineering Practice No. 133. Pilot Tube and Other Guided Boring Methods. 2017

- This abstract was prepared by a professional task committee and covers the design and installation of utility pipelines of various types of pilot tube applications under roads, railroads, constructed and natural structures, and other surface obstacles.

The National Utility Contractor's Association. Trenchless Construction and New Installation Methods - 5th Edition. 2022

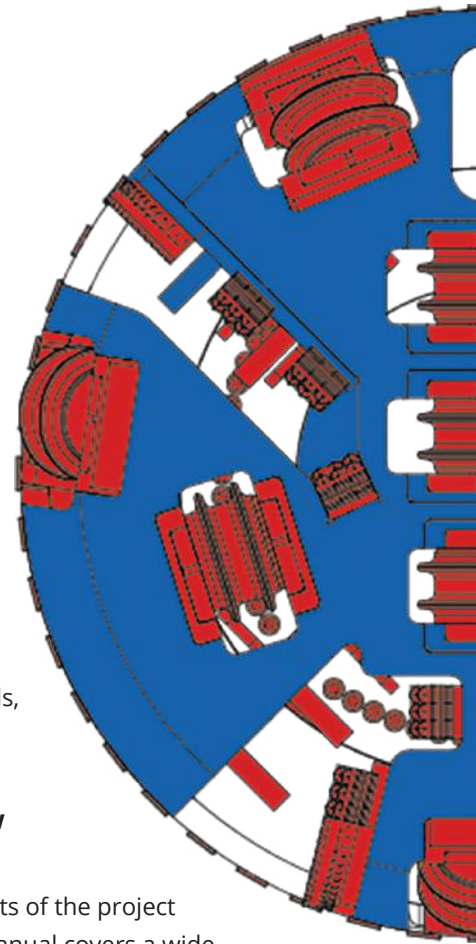
- This manual was prepared by a committee of trenchless professionals selected from all aspects of the project phase including owners, engineers, contractors, manufacturers, attorneys, and more. This manual covers a wide variety of new construction trenchless installations.

American Society of Civil Engineers (ASCE/CI 36-15). Standard Design and Construction Guidelines for Microtunneling. 2015

- This standard guideline covers planning, design, pipe materials, and construction of microtunneling.

Pipe Jacking Association. An Introduction to pipe jacking and microtunnelling. 2017

- This document is produced by the Pipe Jacking Association and provides valuable information regarding various pipe jacking techniques.





TRENCHLESS INDUSTRY

ORGANIZATIONS

Dedicated to Trenchless Construction

Akkerman supports the advancement of the trenchless industry through education, membership, and advocacy to several industry organizations that are dedicated to furthering the growth of utility construction. These organizations can offer several benefits to owners, engineers, and contractors in the trenchless construction industry. Listed below are a few examples. Several opportunities exist on a local region or state level.

North American Society For Trenchless Technology - NASTT

- NASTT is an engineering society of individuals, public organizations and private companies with strong beliefs in the practical, social and environmental benefits of trenchless technology.

www.nastt.org

National Utility Contractors Association - NUCA

- NUCA is the leading trade association working solely for the utility construction and excavation industry in the United States. NUCA's core purpose is to improve the operational proficiency and financial performance of its members.

www.nuca.com

International Society of Trenchless Technology - ISTT

- ISTT seeks to advance the science and practice of trenchless technology for the public benefit and to promote education, training, study and research in the said science and practice for the public benefit, and to publish the useful results of the same

www.istt.com

Underground Construction Association - UCA

- UCA provides technical resources, professional development, and networking opportunities to engineers and related professionals in the tunneling and underground construction industries.

www.smenet.org



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