

MILLER[®]

by Honeywell



Miller DuraHoist™ Portable Confined Space System One-Piece and Two-Piece Adjustable Masts & Accessories

User Instruction Manual

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1.0 General Requirements

Thank You

We would like to thank you for your purchase of Miller Fall Protection equipment. Miller brand products are produced to meet the highest standards of quality at our ISO 9001 certified facility. They are engineered to meet or exceed all applicable CE, EN, OSHA and CSA requirements and standards. Miller Fall Protection equipment will provide you with years of use, if cared for properly.

WARNING

All persons using this equipment must read and understand all instructions. Failure to do so may result in serious injury or death. Do not use this equipment unless you are properly trained.

Questions?

CALL
1.800.873.5242

It is crucial for the owner of this fall protection equipment to read and understand these instructions. In addition, it is also the employer's responsibility to ensure that all users are trained in the proper use, inspection, and maintenance of fall protection equipment. Fall protection training should be an integral part of a comprehensive safety program.

Proper use of fall arrest systems can save lives and reduce the potential of serious injuries from a fall. The user must be aware that forces experienced during the arrest of a fall or prolonged suspension may cause bodily injury. Consult a physician if there is any question about the user's ability to use this product. Pregnant women and minors must not use this product.

Limitations

Consider the following application limitations before using this equipment:

General Warnings

- All warnings and instructions shall be provided to users. Warnings and instructions must be read and understood prior to using this equipment.
- All users must reference applicable standard regulations governing occupational safety.
- To minimize the potential for accidental disengagement, a competent person must ensure system compatibility.
- All equipment must be visually inspected before each use.
- Equipment must not be altered in any way. Repairs must be performed only by the equipment manufacturer, or persons or entities authorized, in writing, by the manufacturer.
- Any product exhibiting deformities, unusual wear, or deterioration must be immediately discarded.
- Any equipment subject to a fall must be removed from service.
- The user shall have a rescue plan and the means at hand to implement it when using this equipment.
- This product is designed for personal fall protection. Never use fall protection equipment for purposes other than those for which it was designed. Fall protection equipment should never be used for towing or hoisting.

Capacity

The maximum working load of Miller DuraHoist components is 450lbs (2.7kN) unless labeled otherwise. Refer to labeling on individual fall protection system components for capacities and warnings.

Free Fall

Personal fall arrest systems must be rigged to limit a free fall to 6ft/1.8m (according to ANSI Z359.1 and ANSI A10.32).

Fall Clearance

Ensure that adequate clearance exists in your fall path to avoid striking an object. The amount of clearance required is dependent upon the type of connecting subsystem and anchorage location.

Environmental Hazards

Use of this equipment in areas where environmental hazards exist may require additional precautions to limit the possibility of injury to the user or damage to the equipment. Hazards may include, but are not limited to high heat, caustic chemicals, corrosive environments, high voltage power lines, explosive or toxic gases, moving machinery, and sharp edges. Polyester should be used in certain chemical or acidic environments. Consult the manufacturer in cases of doubt. All synthetic material must be protected from slag, hot sparks, open flames, or other heat sources. The use of heat resistant materials is recommended in these applications.

System Compatibility

The Miller DuraHoist System is designed for use with Miller approved components. Substitution or replacement with non-approved component combinations, sub-systems, or both, may affect or interfere with the safe function of each other and endanger the compatibility within the system. This incompatibility may affect the reliability and safety of the total system.

Product Groups

A comprehensive fall protection program must be viewed as a “total system” beginning with hazard identification and ending with ongoing management review. Miller Fall Protection views its products as a “system within a system”. Three key components of the “Miller System” need to be in place and properly used to provide maximum worker protection.

A nchor Point/Anchorage Connector

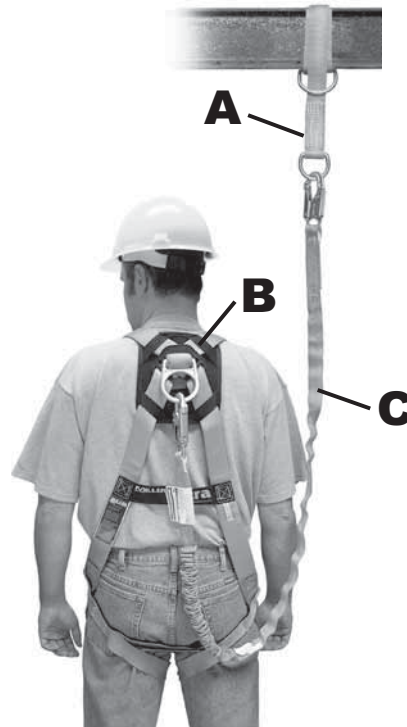
The first component of the system is the anchor point/ anchorage connector. This point must be capable of supporting 5000lbs (22kN) per worker or meet OSHA 1926.502 requirements for a safety factor of two, such as an I-beam or other support structure. Anchorage connectors, such as cross-arm straps and eyebolts, are sometimes necessary to make compatible connections between the connecting device and the anchor point.

B ody Wear

The second component is the personal protective gear worn by workers while performing the job. Miller Fall Protection manufactures full-body harnesses, positioning belts and body belts for use in specific work environments. Full-body harnesses are engineered to aid in the arrest of a free fall and should be worn in all situations where workers are exposed to a potential free fall. The full-body harness must be used in conjunction with shock-absorbing equipment to keep fall forces to a minimum. It is imperative that the harness be worn properly.

C onnecting Devices

The final system component is the connecting device. The most important feature of the connecting device is the built-in shock-absorber. Whether the connecting device is a shock-absorbing lanyard or self-retracting lifeline, they are designed to dramatically reduce fall arresting forces. Rope, web or cable lifelines being used for fall arrest MUST be used in conjunction with a shock-absorber (i.e. Miller SofStop pack.)



Used properly with each other, they form the “Miller System” and become a critically important part of the “total fall protection system.” Individually, none of these components will provide protection from a fall.

⚠ WARNING

•Visually check all buckles to assure proper and secure connections before each use. All straps must be connected and adjusted to provide a snug fit.

•Fall protection connecting devices should be attached to the back D-ring of a full body harness.

•Never attach non-locking snaps to a D-ring.

•Side, front, and chest D-rings should be used for positioning only.

•Shoulder D-rings should be used for retrieval only.

Connecting Devices

- Use only lanyards containing locking snap hooks or auto-locking carabiners.
- Always visually check that each snap hook and carabiner freely engages the D-ring or anchor point, and that its keeper is completely closed and locked.
- Connect in a manner that limits free fall to the shortest possible distance (6ft / 1.8m maximum).
- Shock absorbers will elongate when subjected to fall arrest forces. Refer to the labels and instructions of the connecting device to obtain the maximum elongation distance. This elongation distance must be considered when choosing an anchorage point.
- Connect in a manner which ensures a lower level will not be struck should a fall occur.
- Do not tie knots in lanyards.
- Never disable or restrict a locking keeper or alter connecting devices in any way.
- Do not attach multiple lanyards together, or attach a lanyard back onto itself unless it is specifically designed for that purpose.
- Do not wrap lanyards around sharp or rough edges. Use a cross-arm strap, tie back lanyard or other compatible anchorage connector and connect to the back of the D-ring of the harness.
- Do not allow rope or webbing to come in contact with high temperature surfaces, welding, heat sources, electrical hazards, or moving machinery.
- A shock absorbing lanyard, self-retracting lifeline or other equipment specifically designed for fall arrest must be used as a connecting device.
- Never use natural materials (manila, cotton, etc.) as part of a fall protection system.
- Do not connect onto an object which is not compatible with lanyard snaphooks or carabiners.
- Make sure snaphook is positioned so that its keeper is never load bearing.

Anchor Points

- Anchor points must be capable of supporting 5000lbs. (22kN) or meet OSHA 1926.502 requirements for a safety factor of 2 per worker.
- Always work directly under the anchor point to avoid a swing-fall injury.
- Never wrap lanyards around sharp or rough anchor points. Use a cross-arm strap or other compatible anchorage connector to connect lanyard snaphook.
- Ensure that the anchor point is at a height that limits free-fall distance to 6ft (1.8m) or less.
- Anchor point must be compatible with snaphook or carabiner and must not be capable of causing a load to be applied to the keeper.
- Ensure that the anchor point is at a height that will not allow a lower level to be struck should a fall occur.
- When selecting an anchorage point, always remember that shock absorbers will elongate when subjected to fall arrest forces. Refer to the labels and instructions of the connecting device to obtain the maximum elongation distance. This elongation distance must be considered when choosing an anchorage point.
- Never use an anchor point which will not allow snaphook or carabiner keeper to close.

Installation of Components not Offered by Miller

Your mast can be used as a support structure for various types of safety devices. Some of these can mount directly to the U-bracket at the top of the mast, while others may require an adapter bracket available by Miller DuraHoist. Any accessories being used for the mast must be installed, inspected, maintained, and operated according to Miller instructions. All installations must be approved to local standards by a qualified engineer.

2.0 System Requirements

Compatibility of Components and Subsystems

This equipment is designed for use with Miller DuraHoist approved components and subsystems. Substitutions or replacements made with non-approved components or subsystems may be incompatible, and may jeopardize the safety and reliability of the complete system.

Compatibility of Connectors

Connectors (hooks, carabiners, and D-rings) must support at least 5000lbs. Connectors must be compatible in size, shape, and strength. Non-compatible connectors may unintentionally disengage (roll-out). Do not use non-locking connectors with this equipment.

Structural Strength

The structure or mounting surface to which this equipment is installed must meet the strengths specified below for the application selected:

Fall Arrest: According to ANSI Z359.1, The anchorage selected for personal fall arrest applications must be capable of sustaining static loads applied in the directions permitted by the personal fall arrest system of at least: (a) two times the maximum arrest force permitted on the system when certification exists or (b) 5000lbs (22.2kN) in the absence of certification. If multiple systems are used, the strengths stated in (a) and (b) above must be multiplied by the number of personal fall arrest systems attached to the anchorage. See ANSI Z359.2 for certification definition.

From OSHA 1926.500 and 1910.66: Anchorages used for attachment of personal fall arrest systems shall be independent of any anchorage being used to support or suspend platforms, and capable of supporting at least 5000lbs per user attached, or being designed, installed, and use as part of a complete personal fall arrest system which maintains a safety factor of at least two, and is under the supervision of a qualified person.

Work Positioning: The anchorage to which the work positioning system is attached must sustain static loads applied in the directions permitted by the work positioning system of at least 3000lbs (13.3kN) for non-certified anchorages, or two times the foreseeable force for certified anchorages. See OSHA 1926.502 and ANSI Z359.2. When more than one work positioning system is attached to an anchorage, the strengths stated above must be multiplied by the number of work positioning systems attached to the anchorage.

Travel Restraint: The anchorage to which the travel restraint system is attached must sustain static loads applied in the directions permitted by the travel restraint system of at least 1000lbs (4.5kN) for non-certified anchorages, or two times the foreseeable force for certified anchorages. See ANSI Z359.2. When more than one travel restraint system is attached to an anchorage, the strengths stated above must be multiplied by the number of restraint systems attached to the anchorage.

Rescue: The anchorage to which the rescue system is attached must sustain static loads applied in the directions permitted by the rescue system of at least 3000lbs (13.3kN) for non-certified anchorages, or five times the applied load for certified anchorages. See ANSI Z359.2. When more than one travel restraint system is attached to an anchorage, the strengths stated above must be multiplied by the number of restraint systems attached to the anchorage.

Personal Riding: The anchorage selected for personnel riding applications must be capable of sustaining static loads applied in the directions permitted by the personnel riding system of at least 3100lbs (13.8kN). See ANSI Z359.4. Each mast and base installation must be independently capable of sustaining this load.

WARNING

Masts and mounting bases that are installed for personnel riding, material handling, or rescue applications only, must be labeled as such to prevent the system from being used for fall arrest or work positioning applications, which require greater structural strength.

3.0 Operation and Use

Geometric Requirements

Select a level area near the work opening that will allow the mast to be leveled in accordance with the leveling bubble installed on the base. The location must also provide firm footing that will not allow the base to sink or shift while in use. Position the base so the mast will be directly over the work area. The winch/SRL cable must remain parallel to the mast while in use. Do not position the mast where the worker will have to swing under the mast to reach the work area. The acceptable working area is directly under the mast, between the stabilizer tubes. Avoid positioning the mast where the working line may abrade against sharp edges when in use.

Requirements for Personal Fall Arrest Systems

Personal fall arrest systems used with the mast and base typically include a full body harness, a connecting subsystem (self retracting lifeline or rope grabs), and the necessary hardware to connect the system. Personal fall arrest systems used with this mast and mounting base must meet applicable OSHA requirements.

Inspection of Equipment Prior to Use

- Check all structural parts for damage; dents, cracks, weld bends, or crushed tubes. Minor cosmetic damage will not affect the structural integrity of the system, but any seriously damaged parts must be repaired or replaced before use.

- Check all hardware; pins, tri-screws, adjuster screws, nuts, bolts, pulleys, rollers, and winch brackets for damaged threads, bends, damaged or missing fasteners, or lose fasteners. Check all pulleys and rollers for chips, grooves, and excessive wear. Ensure that all pulleys and rollers turn freely.

- Inspect all equipment for missing, damaged, or otherwise illegible warning stickers. Any damaged, missing, or otherwise illegible stickers must be replaced before using the system.

- If you are using Miller DuraHoist winches with your system, inspect the winch and cable as outlined in their respective operator's manual.

- Any additional winches, self retracting lifelines (SRL's), work positioning, or fall-arrest equipment being used with your Miller DuraHoist System must be installed, inspected, maintained, and operated according to manufacturer's instructions.

- Report any problems with the equipment to your supervisor and do not use the equipment until it has been repaired or replaced.

- Store this equipment in a clean and dry environment out of direct sunlight. Avoid areas with chemical vapors. Inspect equipment after any period of extended storage.

Inspection & Maintenance of Harnesses

Miller harnesses are designed for today's rugged work environments. To maintain their service life and high performance, harnesses should be inspected frequently. Inspect the harness thoroughly before each use. Regular inspection by a competent person for wear, damage or corrosion should be a part of your safety program. Inspect your equipment daily and replace it if any defective conditions are found.

Inspection/Maintenance Schedule

- Daily (before each use):
See above "Inspection of Equipment Prior to Use".

- Weekly:
Perform a complete visual inspection of equipment as outlined in "Inspection of Equipment Prior to Use". Clean equipment as required to thoroughly inspect all welds, labels, pins, fasteners, pulleys, rollers, brackets, and parts. If any problems are found with the equipment do not use until it has been repaired.

- Biannually:
To be completed at least twice a year (every six months). Clean unit thoroughly using a damp cloth and a mild soap solution. Perform a complete visual inspection as described above in "Inspection of Equipment Prior to Use". Record date of inspection on inspection sticker. If any problems are found with the equipment, do not use until it has been repaired.

4.0 Parts and Accessories

This map gives you the basic layout of compatible apparatuses for the DuraHoist System, which consists of four general subsystems. In order to have a fully functional structure, you must satisfy each category; a winch/SRL with retrieval (1), a mounting bracket (2), a mast (3), and a mounting base (4).

1. Winches/SRL's with Retrieval



The Miller MightEvac® Self Retracting Lifeline w/Emergency Retrieval Hoist



The Miller ManHandler® Hoist

2. Mounting Bracket(s)



DH-19-MILLER
Assembly of DH-19 & DH-AB-MILLER

Can also be purchased as separate components: DH-19 & DH-AB-MILLER

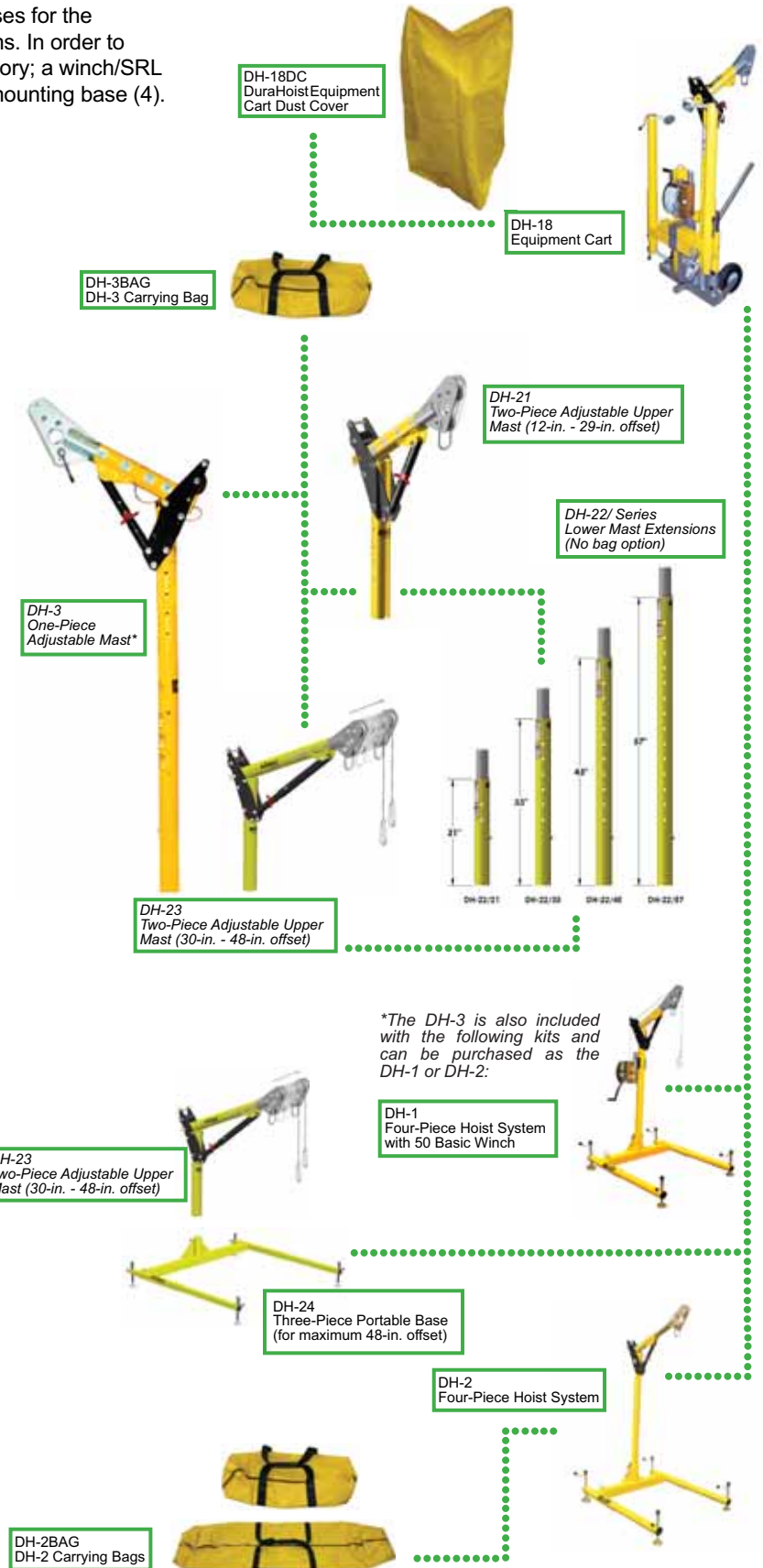


DH-19

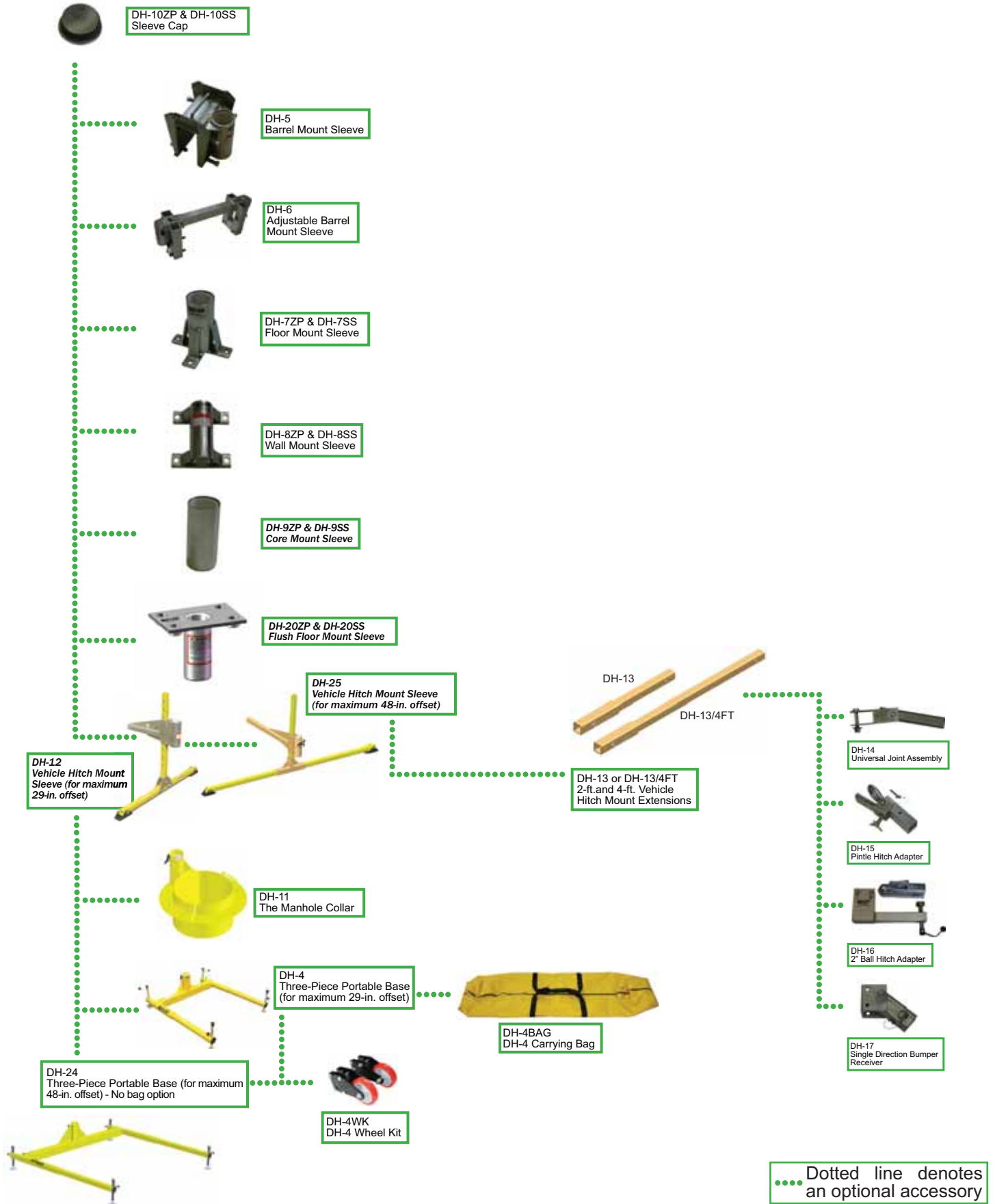


DH-AB-MILLER

3. Mast(s)



4. Base(s)

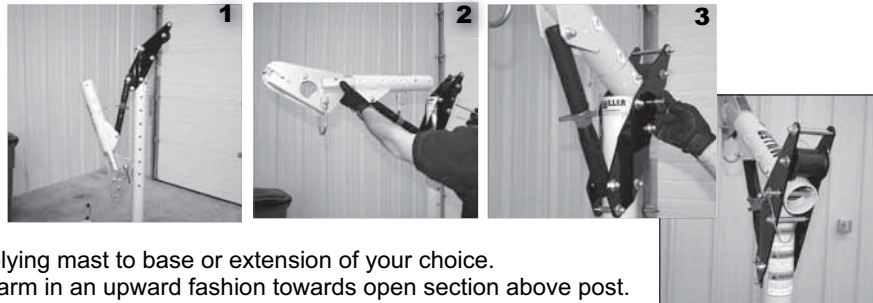


5.0 Assembly and Adjustments of Mast & Base

Assembling One-Piece Mast or Two-Piece Adjustable Upper Mast(s) (Also applies with DH-1 & DH-2 systems)



Before using the One-Piece Mast (DH-3) or Two-Piece Adjustable Upper Mast options (DH-21, DH-23), make sure your mast offset is compatible with base/mounting option you intend to use. See Section 5.1 for offset information.



- 1) Start by applying mast to base or extension of your choice.
- 2) Move mast arm in an upward fashion towards open section above post.
- 3) Secure by inserting pin through hole sets.

Assembling One-Piece Mast or Two-Piece Adjustable Upper Mast(s) with Lower Mast Extensions

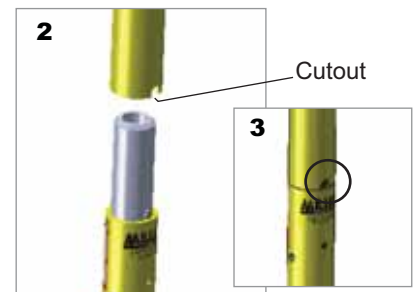
The Lower Mast Extensions (DH-22 Series) can be used with either the the One-Piece Adjustable Mast (DH-3) or the Two-Piece Adjustable Upper Masts (DH-21 or DH-23).

⚠WARNING

- The maximum number of Lower Mast Extensions (DH-22) for the Two-Piece Adjustable Upper Mast (DH-21 or DH-23) is **two** (Upper Mast + Two Lower Mast Extensions). In addition, the maximum length of the combined extensions cannot exceed 90-in. (2.3m). This means any combination of two extensions is allowed EXCEPT the DH-22/45 with a DH-22/57 or two DH-22/57 extensions.
- The maximum number of Lower Mast Extensions (DH-22) for the One-Piece Adjustable Mast (DH-3) is **one** (Mast + one Lower Mast Extension).



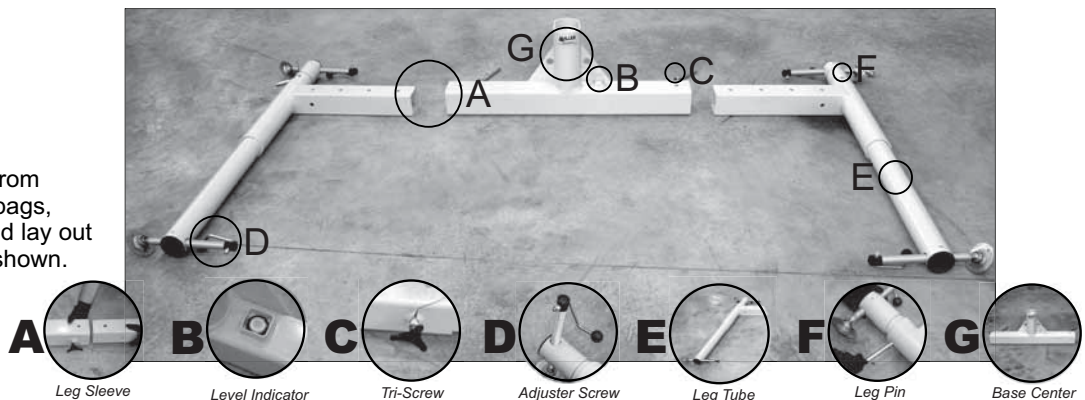
- 1) Insert Lower Mast Extension(s) into base or mount.
- 2) Place One or Two-Piece Mast over top of Lower Mast Extension steel sleeve.
- 3) Align cutout in the One or Two-Piece Mast and cap screw alignment bolt in Lower Mast Extension. Both Mast and Lower Mast Extension(s) should rotate together



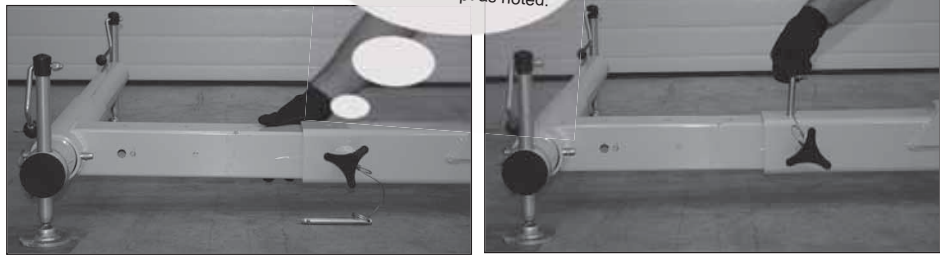
Assembling the Base(s) (DH-4, DH-24) (Also applies with DH-1 and DH-2 systems)



- 1) Remove all parts from storage/transport bags, containers, etc. and lay out on the ground as shown.



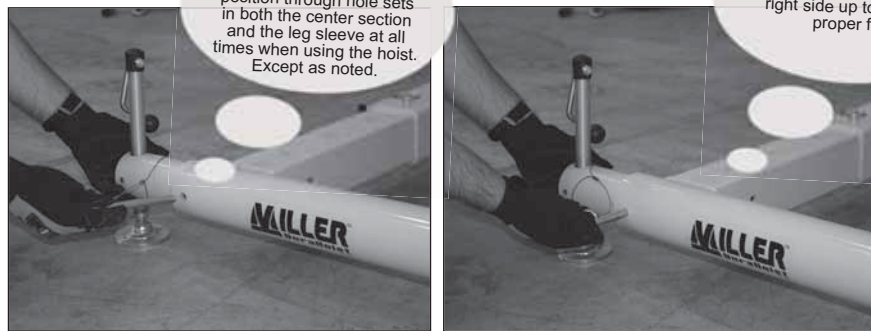
- 2) Insert leg sleeve into base center section. Overall width of base may be adjusted by selecting different hole sets in the leg sleeve and installing the pins.



⚠ WARNING
Leg assemblies must be in operating position at all times when using the system. Except as noted.

Make sure base width is compatible with the mast offset you intend to use. See page 13 for base offset dimensions.

- 3) Remove leg pins and rotate leg tubes in leg sleeve from transport position to operating position.



⚠ WARNING
Base must be pinned into position through hole sets in both the center section and the leg sleeve at all times when using the hoist. Except as noted.

HINT:
Base sections must be assembled with Miller logo right side up to ensure proper fit.

(Can also be used in transport position for certain applications where clearance of manhole ring does not allow for normal operating position. Mounting surface must be flat enough for all (4) adjuster screws to contact ground while level - see step 5.)

- 4) Tighten tri-screws after width adjustment to remove play from base.



- 5) Move base into position over opening. Adjust height and level using adjuster screws and level indicator.

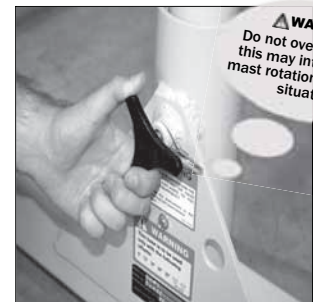
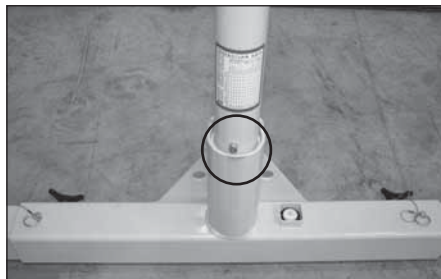


⚠ WARNING
Base must be level at all times.

- 6) Insert mast into base sleeve, as shown.

- 7) Make sure the stop dog faces the front of the sleeve and that the mast rotates freely throughout its range of rotation.

- 8) The mast may be secured into position by tightening the tri-screw located at the back of the sleeve.



⚠ WARNING
Do not over tighten as this may interfere with mast rotation in a rescue situation.

5.1 One-Piece or Two-Piece Mast Adjustments

The circumstances in which you are working will establish what offset you need to use with the One-Piece (DH-3) or Two-Piece (DH-21, DH-23) Masts. Once you determine what offset you will apply to your mast, refer to the next page and match the mast offset to your base to ensure a safe and steadily working system.



You may attain the maximum offset by fully collapsing (no visible threads) the adjustable gusset.



To reach the minimum offset, you must fully extend the adjustable gusset.

All pictures are shown with a maximum offset.

The pulley offset is the space between the hanging cable and the mast

Top Pulley Offset

DH-3, DH-21:

Maximum 19" (482mm)

Minimum 13" (330mm)

DH-23:

Maximum 38" (965mm)

Minimum 31" (787mm)

Bottom Pulley Offset

DH-3, DH-21:

Maximum 17" (432mm)

Minimum 12" (305mm)

DH-23:

Maximum 35" (889mm)

Minimum 30" (762mm)

U-Bracket Maximum

DH-3, DH-21:

Anchor Load 5,000 lbs (22.2kN)

DH-23:

Anchor Load 1,800 lbs (8kN)



Pin Position 1



Pin Position 2

Top Pulley Offset

DH-3, DH-21:

Maximum 22" (559mm)

Minimum 15" (381mm)

DH-23:

Maximum 41" (1041mm)

Minimum 34" (864mm)

Bottom Pulley Offset

DH-3, DH-21:

Maximum 19" (476mm)

Minimum 15" (368mm)

DH-23:

Maximum 38" (965mm)

Minimum 32" (813mm)

U-Bracket Maximum

DH-3, DH-21:

Anchor Load 5,000 lbs (22.2kN)

DH-23:

Anchor Load 1,800 lbs (8kN)



Top Pulley Offset

DH-3, DH-21:

Maximum 25" (635mm)

Minimum 18" (457mm)

DH-23:

Maximum 45" (1143mm)

Minimum 37" (940mm)

Bottom Pulley Offset

DH-3, DH-21:

Maximum 23" (584mm)

Minimum 18" (457mm)

DH-23:

Maximum 42" (1067mm)

Minimum 35" (889mm)

U-Bracket Maximum

DH-3, DH-21:

Anchor Load 3,600lbs (16kN)

DH-23:

Anchor Load 1,800 lbs (8kN)



Pin Position 3



Pin Position 4

Top Pulley Offset

DH-3, DH-21:

Maximum 29" (737mm)

Minimum 21" (533mm)

DH-23:

Maximum 48" (1219mm)

Minimum 40" (1016mm)

Bottom Pulley Offset

DH-3, DH-21:

Maximum 26" (660mm)

Minimum 20" (508mm)

DH-23:

Maximum 45" (1143mm)

Minimum 39" (991mm)

U-Bracket Maximum

DH-3, DH-21:

Anchor Load 3,000 lbs (13.3kN)

DH-23:

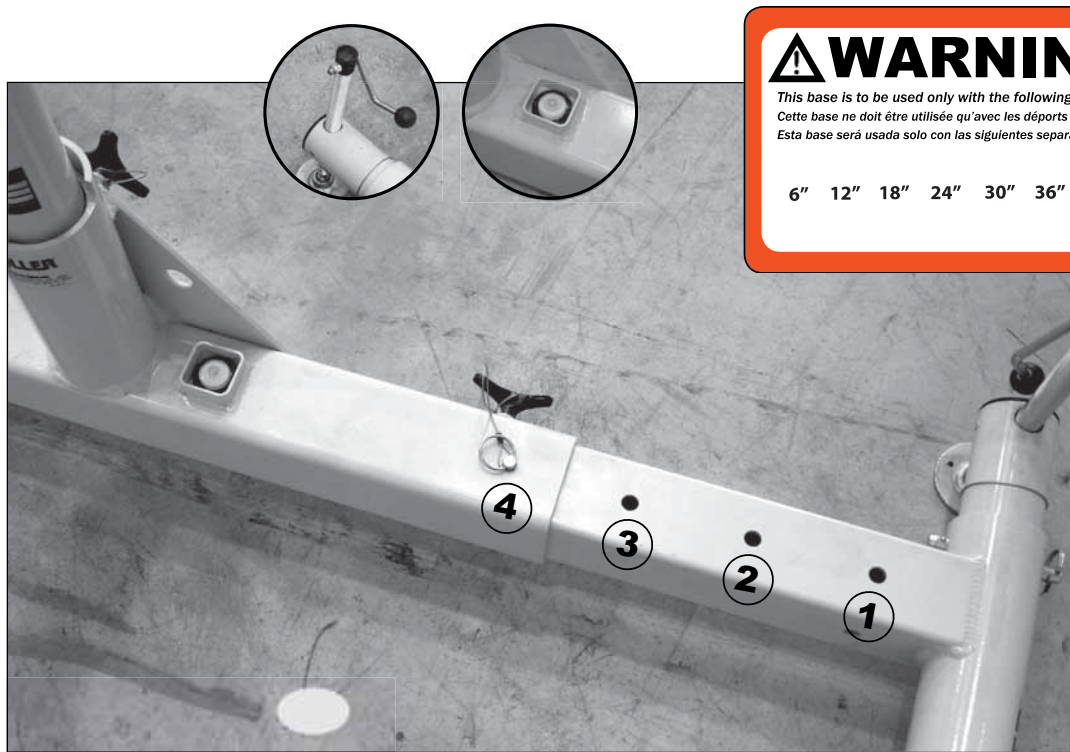
Anchor Load 1,800 lbs (8kN)

5.2 Base Adjustments

- 1) Determine the maximum desired operating offset. See previous page for offset information.
- 2) Adjust the base offset and match it to the offset of the mast using the chart below.
- 3) Level the base by centering the bubble in the level indicator using the adjuster screws.

Note: Mounting surface must be flat enough for all (4) adjuster screws to contact ground while level.

⚠ WARNING
 The Two-Piece Adjustable Upper Mast with 30-in. - 48-in. offset (DH-23) **cannot be used with** the Three-Piece Portable Base for maximum 29-in. offset (DH-4)



⚠ WARNING
 This base is to be used only with the following offsets:
 Cette base ne doit être utilisée qu'avec les déports suivants :
 Esta base será usada solo con las siguientes separaciones:

6" 12" 18" 24" 30" 36" 48"

LB796 REV B

(Base offset currently shown with pin in position 4)

⚠ WARNING
To avoid tipping the base when swinging the mast from side to side, cables from SRL's & winches should stay inside base footprint during standard operation.

Pin Position Configuration for the Four-Piece System (DH-1, DH-2, DH-4) or larger base/offset system (DH-21 or DH-23, DH-22 Series and DH-24)

Base Pin Position	Allowable Mast Offset Pin Position
1	1
2	2 & 1
3	3, 2 & 1
4	4, 3, 2 & 1

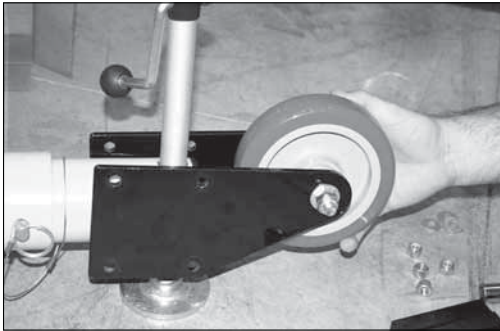
When not sure of your offset, use base position 4 on base setup.

5.3 Installation of Wheel Kit

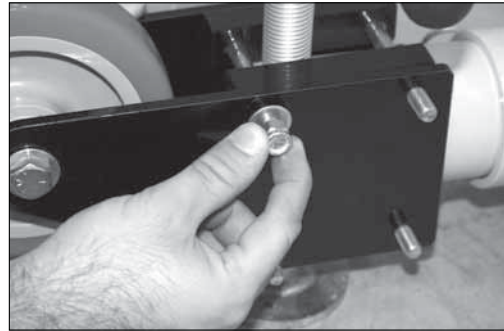


The optional wheel kit (DH-4WK) attaches quick and easy, allowing you the freedom to move the DuraHoist System from entry to entry without having to disassemble it. Installs on Three-Piece Base options (DH-4, DH-24). Wheel kit includes: (2) wheels, (8) bolts, (16) washers and (8) self locking nuts.

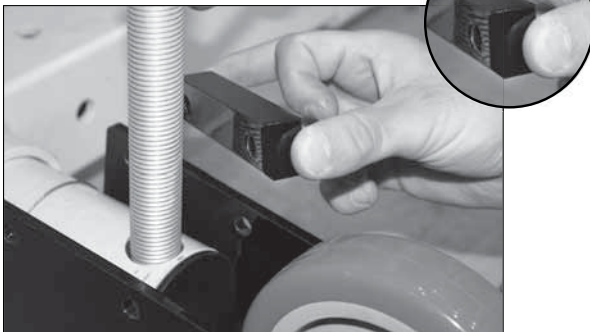
- 1) Select either wheel and center on either base leg, making sure that the flat side of the wheel arm is facing upward.



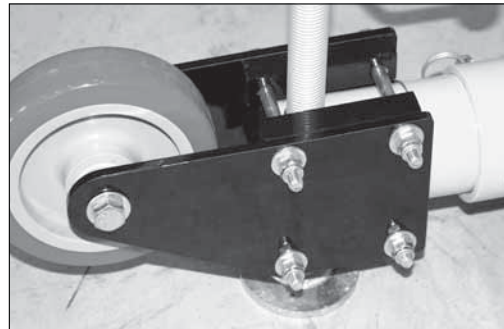
- 4) Continue to insert the lower bolts, through the wheel arms and the wheel spacers, as shown.



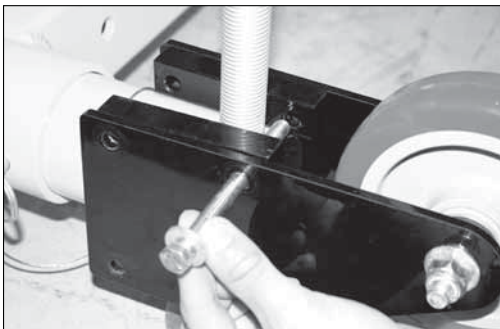
- 2) Place rectangular spacers on the insides of the wheel arms, making sure the angled edges are facing downward.



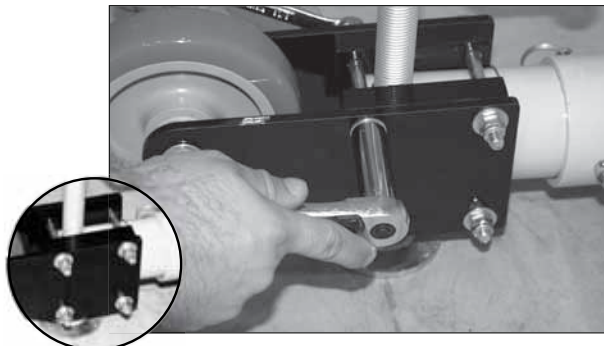
- 5) Once you have all bolts in place, position washers on each of the four exposed threads and accompany with a nut, as shown.



- 3) Insert the first bolt and washer, in front of the adjuster screw, through the wheel arms and the wheel spacers.



- 6) Using a 9/16" socket, secure each bolt with a snug fit (approx. 20ft-lbs.), as shown.



6.0 Installation of Other Bases

6.1 Temporary Bases

Minimum Mounting Requirements:

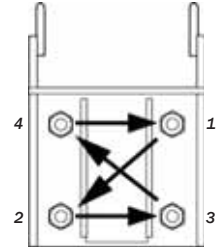
Excessive wall taper can cause the retaining screws to slip. Each installation must be certified by the installing engineer. Wall in excess of 1° from vertical on either wall must be modified to meet this specification.

The structure in the area of the clamp must withstand a 90,000in.-lbs. (10,000N.m) moment without deformation. Each installation must be certified by the installing engineer.



DH-5 Barrel Mount Sleeve With 3.5" Opening

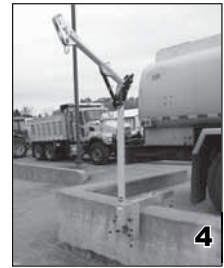
The Barrel Mount Sleeve w/3.5" opening is a portable, temporary base. It's designed to fit over the rim of barrel structures. When installed, the base should rest fully on the rim of the barrel and be centered over the rim so that the retaining bolts have the same amount of adjustment. The Barrel Mount Sleeve may be used on vertical surfaces only, so that the mast, when mounted, is in a vertical orientation. The retaining bolts should be tightened gradually in order to keep the base normal to the center of the barrel. See chart (right) for tightening sequence. Tighten bolts to 60ft-lbs.



DH-6 Adjustable Barrel Mount Sleeve

The Adjustable Barrel Mount Sleeve is designed for shoring, wall parapet applications where frequent setup over varying wall thicknesses is required. Anodized welded aluminum with zinc plated steel hardware for lightweight durability. Refer to chart above for bolt tightening pattern.

- 1) Slip adjustable barrel mount sleeve over wall and close the sleeve to the closest mounting position.
- 2) Insert pin to fix position.
- 3) Screw Tightening Procedure (see DH-5 tightening sequence chart, above).
 - a. Turn all 4 screws until they are in contact with the clamping surface.
 - b. Tighten Screws 4 and 1 approximately 1/8 of a turn.
 - c. Turn in Screws 2 and 3 until they are again in contact with the clamping surface, then tighten approximately 1/8 of a turn.
 - d. Using the proper sequence, tighten all 4 screws approximately 1/8 of a turn, or until evenly tight against the clamping surface. The goal is to have all 4 screws evenly tight against the clamping surface.
 - e. Use the chart sequence and tighten all screws an additional 1/8 of a turn if necessary.
 - f. Do not over tighten screws, especially on surfaces such as concrete as this will cause the clamping surface to degrade and the mount will become loose. Some trial and error is needed to be sure surface is not damaged. Consult with a qualified engineer to verify integrity of mounting.
- 4) Insert mast and adjust tri-screw as needed.
- 5) Once unit is loaded, re-check screw tightness.
 - a. Remember to double check all 4 screws on a regular basis (See section 3.0 – Inspection of Equipment Prior to Use).



DH-11 Manhole Collar

Manhole Collars are designed for applications involving frequent set-ups over similarly sized access openings. Lightweight, powder-coated aluminum construction for portability. Slip collar into sewer manhole, tank hatch or other opening. Insert mast and adjust tri screw as needed.

⚠WARNING: The Two-Piece Adjustable Upper Mast with 30-in. - 48-in. offset (DH-23) **cannot be used with** the Manhole Collar (DH-11).

6.2 Permanent Bases

The following bases are permanently installed either by bolting or welding them to a concrete or steel structure. To ensure a safe working environment, a qualified engineer must approve each installation to local standards. Refer to specification sheets (provided in product box) for further mounting dimension requirements.



Zinc & Stainless Steel Wall and Floor Mount Sleeve (DH- 7ZP & SS and DH-8ZP & SS)

The Wall Mount Sleeve mounts vertically and the Floor Mount Sleeve mounts horizontally; both to concrete or steel structures.

Bolting Procedure

Follow the subsequent bolt pattern using four $\varnothing 3/4"$ (19mm) fasteners. Make sure that the area of the clamp is capable of safely withstanding a 90,000in.-lbs. (10,000N.m) moment and a 5000lbs. (22.2kN) vertical load without deformation.

Warning: Miller will not be held liable for the welding techniques used for welding the plate to the surface. The surface must be capable of withstanding the specification requirements stated in the appropriate Miller specification sheet. A qualified engineer must approve each installation to local standards. Miller will not be held liable for any damage to the structure or other equipment sustained from welding.

Miller Welding Procedure

1. Clean and prepare the surface for welding by removing all oils, grease, etc.
2. If you are dealing with any existing surface coatings like paints or plating, grind and clean the surfaces exposing a bare steel area approximately the size of the mounting plate.
3. Lightly grind the edges of the mounting plate on the sleeve before welding to expose a bare steel surface.
4. Weld the mounting plate on using a $1/4"$ (6mm) fillet weld around the perimeter of the mounting plate, ensuring a seal to prevent surface rusting underneath.

Note: Use a $1/4"$ (6mm) weld inside and all around the four hardware-mounting slots to properly seal the mounting plate to the surface in order to prevent rusting underneath the sleeve.

5. If you are concerned with the life expectancy of the welding being exposed to harsh environments, use a surface coating that protects against rust and pitting.

To ensure a safe working environment, a qualified engineer must approve each installation to local standards.

Zinc & Stainless Steel Core Mount Sleeve (DH-9ZP & SS)



The Core Mount Sleeve is designed for slip-in installation into a $\varnothing 4.0$ -in. core hole in concrete. Sleeves are designed to withstand the proof load rating of all Miller DuraHoist masts. No epoxy, glue or sealer is required. Concrete must be sufficiently thick or have sufficient underlying structure to support a 90,000in.-lbs. (10,000N.m) moment and a 5,000 lbs. (22.2kN) vertical load. Installation must be approved to local standards by a qualified engineer.

Zinc & Stainless Steel Flush Floor Mount Sleeve (DH-20ZP & 20SS)



The Flush Floor Mount Sleeve is designed to mount vertically in both concrete and steel structures.

Bolting Procedure

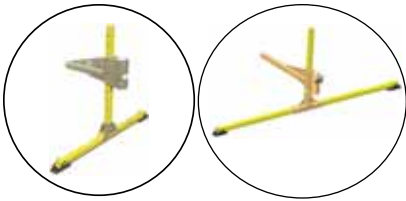
Follow the pattern in the zinc or stainless steel plated Flush Floor Mount Sleeve and use four (4) $5/8$ -in. (16mm) fasteners. Make sure the bolting method is capable of withstanding the required 90,000 in.-lbs. (10,000N-m) moment and 5,000 lb (22.2kN) vertical load without deformation.

Concrete Structures

In addition to the bolting procedure, a 4-in. (102mm) diameter hole may be required for clearance of the sleeve.

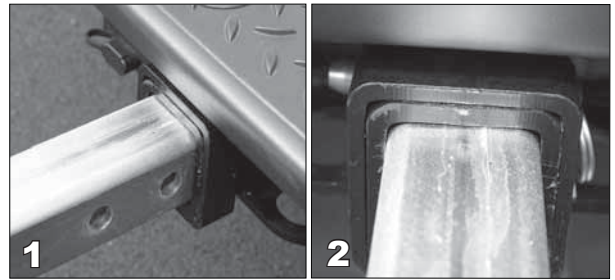
6.3 Installation of the Vehicle Hitch Mount Sleeves & Accessories

6.3.1. Mounting the Vehicle Hitch Mount to a Hitch Receiver

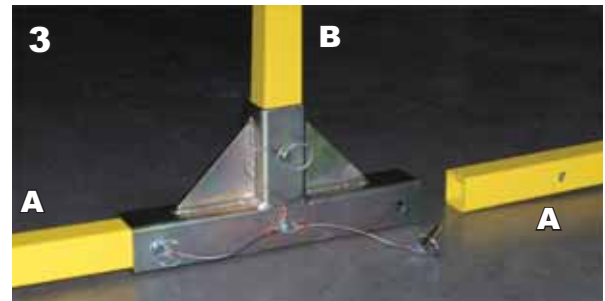


The Vehicle Hitch Mount Sleeves (DH-12 and DH-25) are designed to install into a 2-in. hitch receiver on an attendant vehicle to provide a portable anchor point for confined space entry/retrieval, rescue and fall arrest systems. Various sockets, extensions and accessories are available for use with the sleeves.

- 1) Insert the back end of the Vehicle Hitch Mount Sleeve into the hitch receiver.
- 2) Secure the Vehicle Hitch Mount Sleeve by pinning into position.
- 3) A - Insert leg tubes into center Tee section and pin in place.
NOTE: The DH-12 does not have legs that need pinned, they are already attached to the Tee with bolts.
 B - Drop vertical tube through center Tee section and pin in place.
- 4) On the front end of the Vehicle Hitch Mount Sleeve, adjust the height by inserting the pin into whatever hole set best suits your needs.
- 5) Once the Vehicle Hitch Mount Sleeve is secure, insert the One-Piece Adjustable Mast into the barrel sleeve and tighten tri screw if needed. If using a Two-Piece Adjustable Upper Mast (DH-21 or DH-23), a Lower Mast Extension (DH-22 Series) must also be considered.

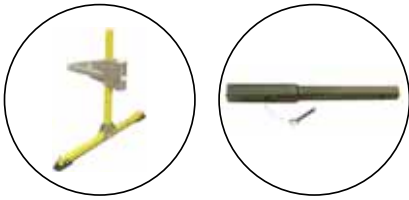


WARNING: For proper operation, pin must be in place.



WARNING: The Two-Piece Adjustable Upper Mast with 30-in. - 48-in. offset (DH-23) **cannot be used with** the Vehicle Hitch Mount Sleeve for maximum 29-in. offset (DH-12)

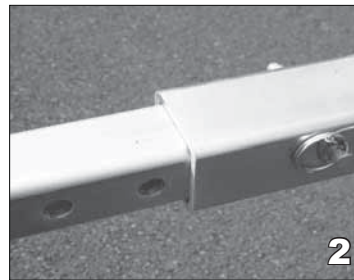
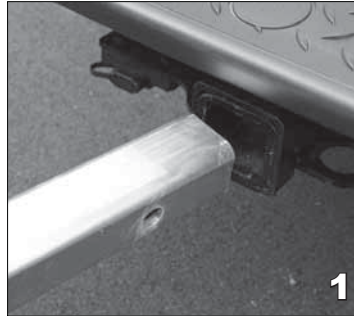
6.3.2 Mounting the Vehicle Hitch Mount 2-ft. or 4-ft. Extensions to the Vehicle Hitch Mount Sleeves



The 2-ft. or 4-ft. Vehicle Hitch Mount Extensions (DH-13, DH-13/4FT) install between the Vehicle Hitch Mount Sleeve (DH-12, DH-25) and the attendant vehicle to provide extra distance that may be needed between the vehicle and entry point.

- 1) Insert the Vehicle Hitch Mount Extension into the hitch receiver and pin into position.
- 2) Insert the Vehicle Hitch Mount Sleeve into the Vehicle Hitch Mount Extension receiver and pin through hole set.

⚠ WARNING: Only **one** Vehicle Hitch Mount Extension can be used at one time.

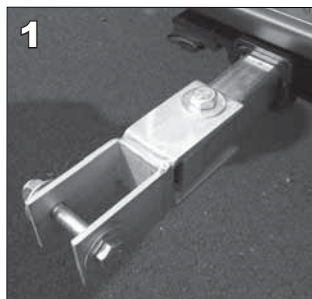


6.3.3 Mounting the Universal Joint Assembly to the Vehicle Hitch Mount Sleeve



The Universal Joint Assembly (DH-14) installs between the Vehicle Hitch Mount Sleeve (DH-12, DH-25) or Vehicle Hitch Mount Sleeve Extension (DH-13, DH-13/4FT) and the attendant vehicle to compensate for uneven ground conditions on the job site.

- 1) Insert the Universal Joint Assembly (DH-14) into the hitch receiver and pin into position, as shown.
- 2) Attach the Vehicle Hitch Mount Sleeve (DH-12 or DH-25) to the Universal Joint Assembly (DH-14) by inserting the bolt through the hole sets, as shown.

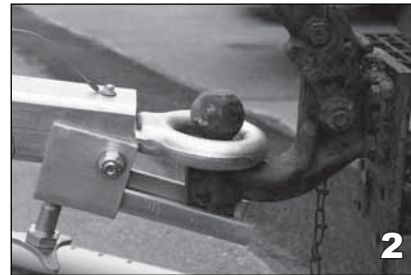
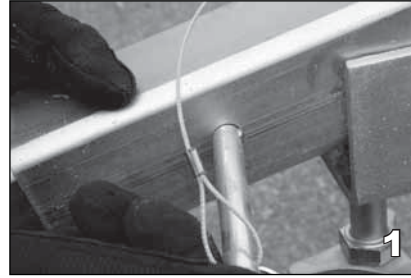


6.3.4 Mounting the Pintle Hitch Adapter to the Vehicle Hitch Mount Sleeve



The Pintle Hitch Adapter (DH-15) installs between the Vehicle Hitch Mount Sleeve (DH-12, DH-25) and the attendant vehicle and mates to pintles hitches found on emergency vehicles.

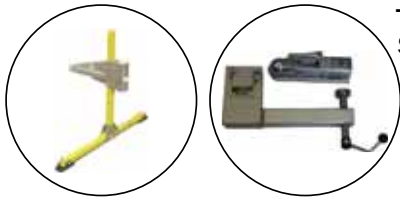
- 1) Align Vehicle Hitch Mount and Pintle Hitch Adapter and insert pin into hole sets.
- 2) Mount pintle hitch adapter over pintle hitch.
- 3) Tighten tri- screw, located on the bottom side of the pintle hitch adapter.
- 4) Insert cotter pin through the vehicle pintle hitch adapter.
- 5) Slide the Vehicle Hitch Mount Sleeve (DH-12 or DH-25) over the post, as shown, and insert pin making sure the sleeve is level with the ground. See procedure from Section 6.3.1



WARNING
Tri-screws should be tight!

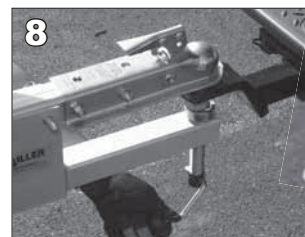
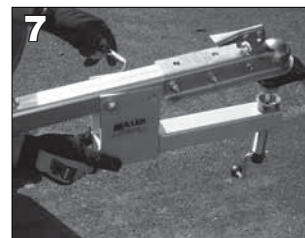
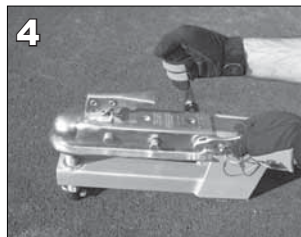
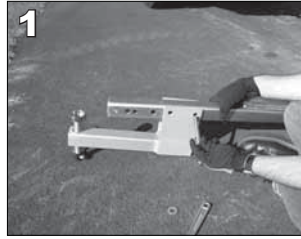


6.3.5 Mounting the 2-in. Ball Hitch Adapter to the Vehicle Hitch Mount Sleeve



The 2-in. Ball Hitch Adapter (DH-16) installs between the Vehicle Hitch Mount Sleeve (DH-12, DH-25) and the attendant vehicle and mates with all standard 2-in. ball hitches.

- 1) Align bottom portion of the Ball Hitch Adapter (DH-16) with the last hole set on the Vehicle Hitch Mount Sleeve (DH-12, DH-25).
- 2) Apply washer to bolt, insert bolt and apply second washer. Then secure nut with a snug fit (approx. 20 ft-lbs.).
- 3) Secure upper portion of the Ball Hitch Adapter (DH-16) to the Vehicle Hitch Mount Sleeve (DH-12, DH-25) by inserting both bolts (add a washer to both ends of the bolts).
- 4) Apply nut to both bolts and tighten to a snug fit (approx. 20 ft-lbs.).
- 5) Slip Ball Hitch Adapter (DH-16) over Vehicle Hitch Mount Sleeve (DH-12, DH-25) post and insert pin to secure position, making sure Vehicle Hitch Mount Sleeve is level with ground.
- 6) Lay Ball Hitch Adapter (DH-16) over hitch receiver and lock into position by pushing lever down.
- 7) Lift bottom half Ball Hitch Adapter (DH-16) and secure by inserting pin into hole set near the bolt you applied in step 2.
- 8) Tighten adjuster screw on bottom portion of Ball Hitch Adapter (DH-16).
- 9) Insert mast and tighten tri-screw as needed.



WARNING
Tri-screws should be tight!



Complete Installation

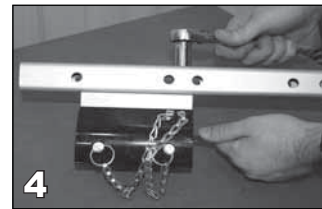
7.0 Installation of Winch or Self-Retracting Lifeline's (SRL) with Retrieval to Adjustable Mast

7.1 Assembly Of Winch Brackets

7.1.1 Assembly of Brackets DH-19 to DH-AB-Miller (DH-19-Miller combined)



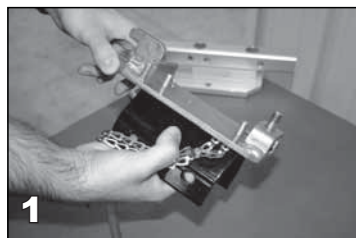
- 1) Assemble both bolts through DH-19 spacer.
- 2) Assemble long portion of adapter bracket on top of spacer.
- 3) Assemble washer and nuts to both bolts.
- 4) Tighten nuts using a 9/16" socket and 7/32" hex wrench to a snug fit (approx. 20 ft-lbs.).
- 5) To ensure proper fit of bracket to winch/SRL, attach winch/SRL to bracket prior to use for verification of fit and make sure adaptor bracket and DH-19 are aligned parallel.



7.1.2 Assembly of Brackets DH-19 to DH-AP-8 (DH-19-AP-8 combined)

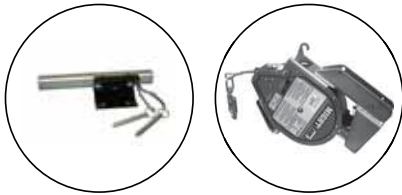


- 1) Assemble bolts through DH-19 and DH-AP-8.
- 2) Assemble nuts to both bolts.
- 3) Tighten nuts using a 9/16" socket and 7/32" hex wrench to a snug fit (approx. 20 ft-lbs.).



7.2 Mounting Winches to Winch Brackets

7.2.1 Mounting the Bracket DH-19-MILLER to the Miller MightEvac® SRL



1.) Mount only the DH-19-MILLER to the mast, short end up, by choosing an appropriate hole set and by inserting the two pins.

2.) On the MightEvac bracket, insert only the top pin.

3.) Holding the MightEvac by the handle on the back, and making sure the inserted pin is on the top half of the bracket, hang the MightEvac onto the DH-19-MILLER.

4.) Secure by inserting the second pin through the bottom hole sets of both the DH-19-MILLER and the MightEvac brackets.



NOTE: Make sure rescue handle rotates 360° with no interference.

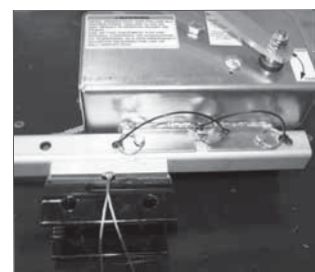
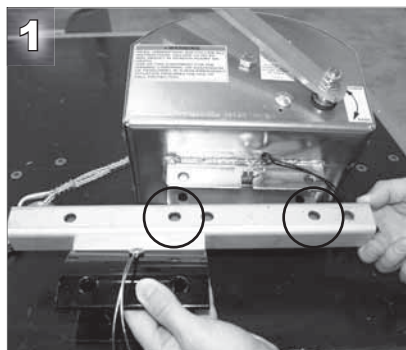
7.2.2 Mounting the Bracket DH-19-MILLER to the ManHandler® Hoist/Winch



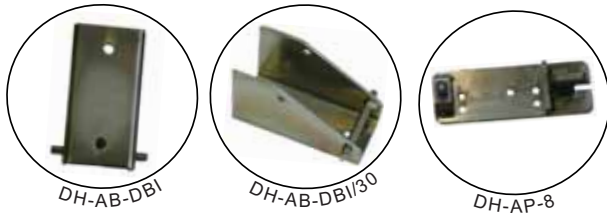
1) Align the bracket [(DH-19-MILLER) (illustrated hole set)] with the ManHandler.

Note: The illustrated hole set on the bracket (DH-19-MILLER) is the only set that will fit the ManHandler.

2) Insert pins into both hole sets, as shown.



7.2.3 Competitor Units - DH-AB-DBI & DH-AB-DBI/30



Miller can provide these three brackets that allow for mounting DBI winches and SRL units with retrieval to the One-Piece Adjustable mast (DH-1), Two-Piece Adjustable Upper Masts (DH-21, DH-23) or Four-Piece Systems (DH-1 and DH-2) provided retrieval unit has appropriate mounting bracket.

DH-AB-DBI is used for mounting unit on back side of the One or Two-Piece Mast options (DH-3, DH-21, DH-23). DH-AB-DBI/30 is used for mounting unit on front side of the One or Two-Piece Mast options and provides proper cable angle to pulley.

Please note, DBI brackets must be used with DH-19 bracket for attachment to mast assembly.

7.3 Mounting Winch/SRL with Retrieval to One and Two-Piece Adjustable Masts

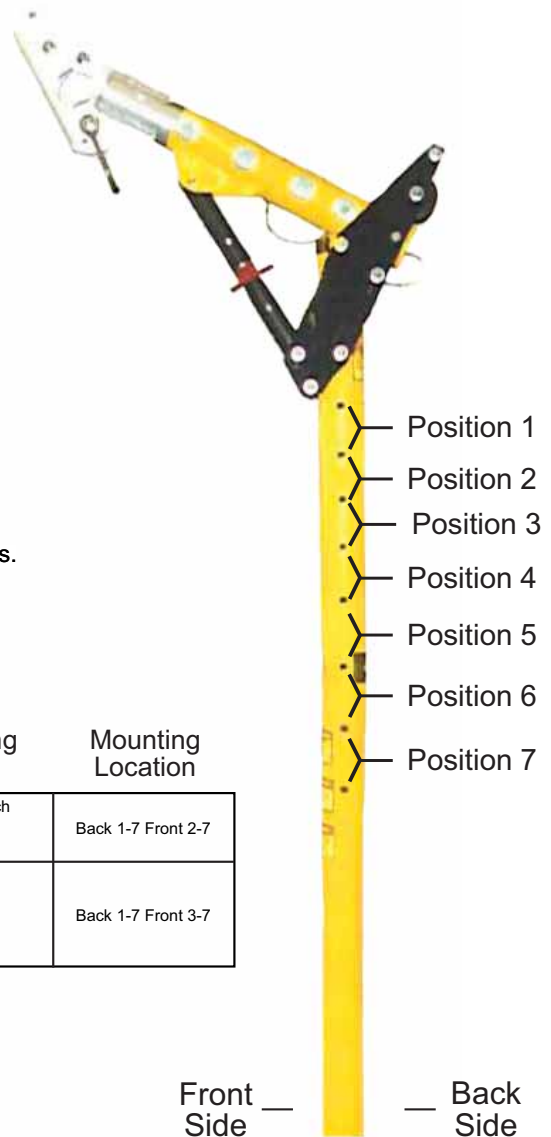
Mounting Locations for One-Piece Applications



- 1) Align the bracket (DH-19) with any allowable hole set of your choice (see chart).



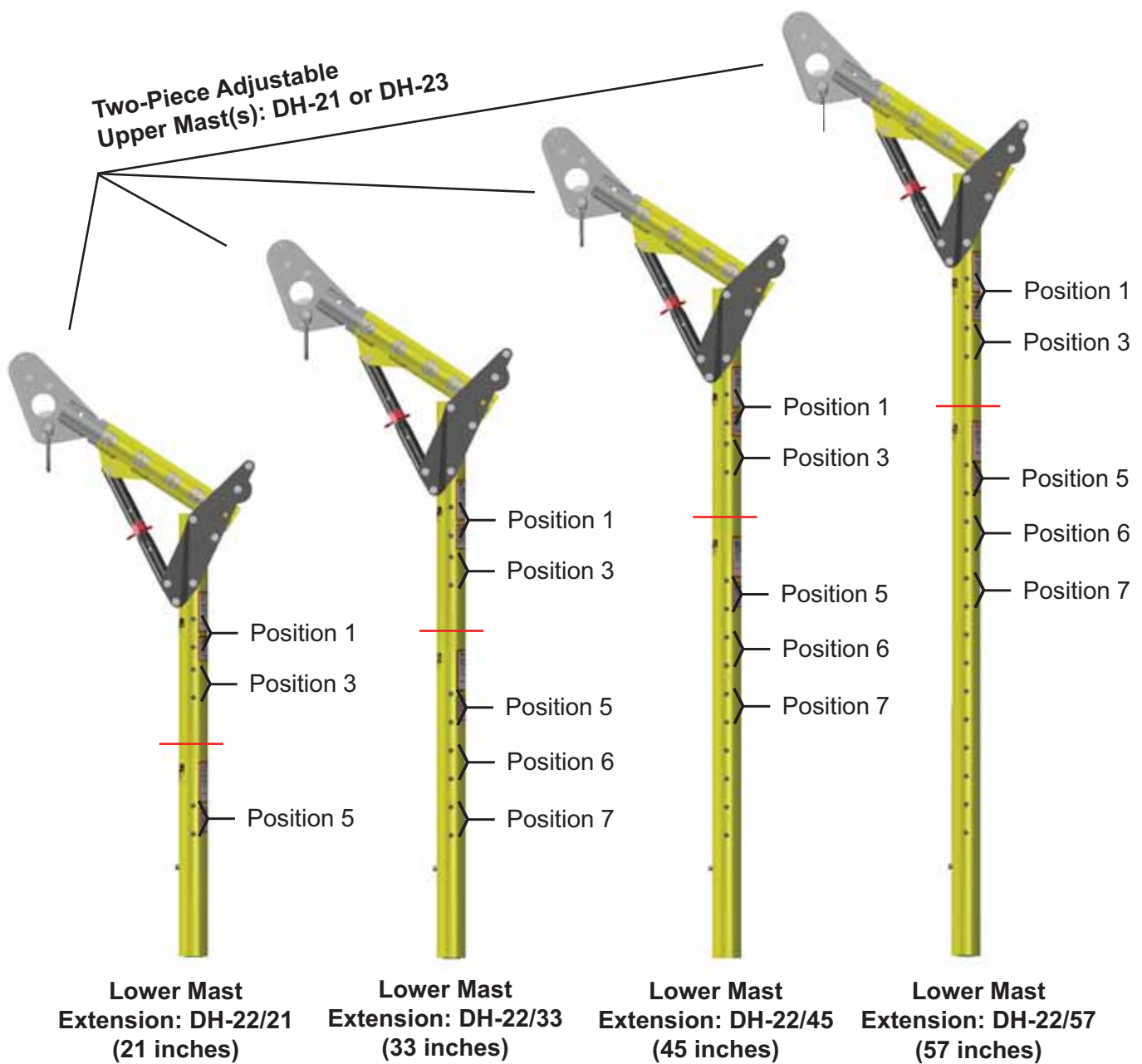
- 2) Secure winch/SRL with retrieval by inserting pins through both hole sets.



Winch/Mounting Bracket	Mounting Location
ManHandler® Hoist/Winch and DH-19-MILLER	Back 1-7 Front 2-7
Miller MightEvac® SRL (9066EV or 9054EV) and DH-19-MILLER	Back 1-7 Front 3-7

Mounting Locations for Two-Piece Applications

When using the Two-Piece Adjustable Upper Masts (DH-21, DH-23) with the Lower Mast Extensions (DH-22 Series), Position 2 does not exist due to tight spacing on the Upper Mast tube. Also, with 45-in. (1.1m) and 57-in. (1.5m) Lower Mast Extensions, there are pin positions available beyond position 7.

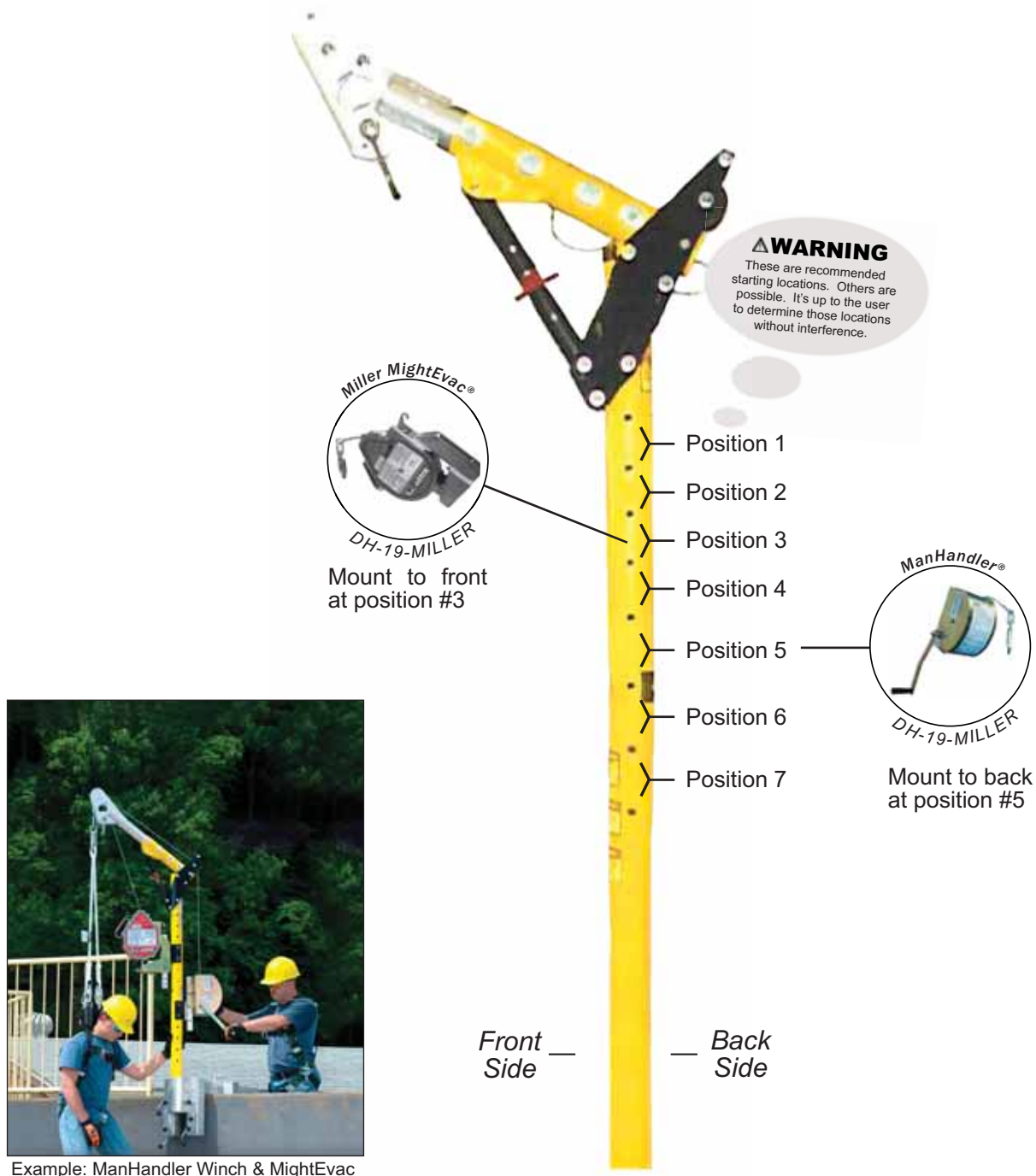


Combination Applications

To ensure that your winch/SRL doesn't encounter interference from proper operation, refer to the recommended mounting positions below.

A typical application includes a MightEvac (retractable), which should be mounted to the front of the mast and a ManHandler which is mounted to the back. Other mounting locations are possible; it is up to the user to determine alternative applications and to make sure there is no interference.

NOTE: Make sure rescue handle rotates 360° with no interference.



7.3.1 Cable Routing

Front Mounted Units

1) Insert cable through the bottom of the mast head.



2) Pull cable through to the top of the mast head.



3) Insert cable into opening above bottom pulley.



4) Pull cable over bottom pulley.

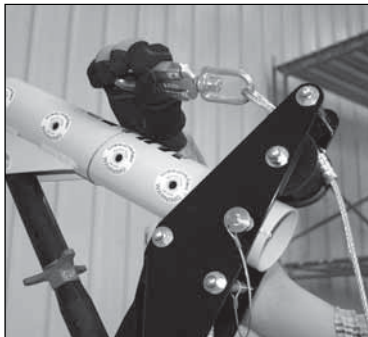


Back Mounted Units

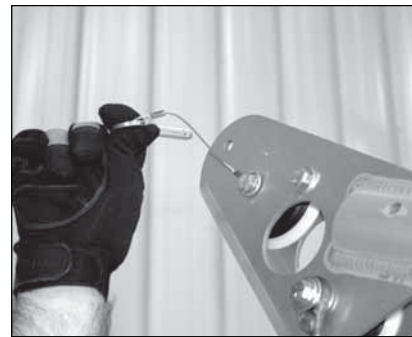
1) Insert cable through opening; over pulley and under metal bar, at the back end of the mast.



2) Pull cable through opening, stringing along mast arm.



3) Remove pin on mast head.



4) Pull cable over pulley.



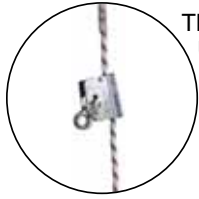
5) Reinsert pin.



WARNING

After cable routing is complete, ensure proper operation of all equipment.

7.4 Mounting to the U-bracket



The One or Two-Piece Mast can be used as a standard anchorage point for fall arrest by using the U-bracket provided. This U-bracket has various strength ratings depending upon pin location on mast (see section 5.1 for ratings). Any accessories being used for the Mast must be installed, inspected, maintained, and operated according to these instructions. All installations must be approved to local standards by a qualified engineer.



U-bracket

7.5 Replacement Parts

Apparatus

DH-1, DH-2, DH-3, DH-21, DH-23
 DH-1, DH-2, DH-3, DH-21, DH-23
 DH-1, DH-2, DH-3, DH-21, DH-23
 DH-1, DH-2, DH-4, DH-24
 DH-1, DH-2, DH-4, DH-24
 DH-1, DH-2, DH-4, DH-24
 DH-1, DH-2, DH-4, DH-24
 DH-1, DH-2, DH-4, DH-24
 DH-5
 DH-6
 DH-11 (all)
 DH-12, DH-25
 DH-12, DH-25
 DH-12, DH-25
 DH-13, DH-13/4FT
 DH-15
 DH-16
 DH-17
 DH-19 (all)
 DH-19-Miller, AB-Miller
 DH-1, DH-2, DH-4
 DH-1, DH-2, DH-4, DH-24

Description

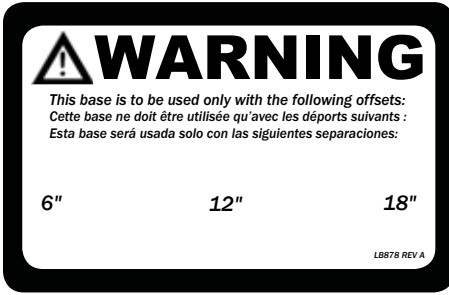
Mast Head - Receiver Pin and Lanyard
 Mast Head - Offset Pin and Lanyard
 Mast Head - Pulley Cable Pin and Lanyard
 Mast Support Base - Tri-Screw Knob and Lanyard
 Mast Support Base - Tri-Screw Knob/Quick Release Pin and Lanyard
 Mast Support Base - Bubble Level
 Mast Side Leg - Anti-Rotation Pin and Lanyard
 Mast Side Leg - Screw leg Crank Handle
 DH-5 Barrel Mount - Clamp Bolt
 DH-6 Clamp Pin Assembly
 DH-11 Tri-Screw and Lanyard
 DH-12 Vehicle Hitch Mount - Tri-Screw and Lanyard
 DH-12 Vehicle Hitch Mount - Height Adjust Pin and Lanyard
 DH-12 Vehicle Hitch Base - Tee Assembly Pin and Lanyard
 DH-13 Hitch Mount Extension - Pin and Lanyard
 DH-15 Pintle Hitch Mount - Pin and Lanyard
 DH-16 Ball Hitch Mount - Pin and Lanyard
 DH-17 Bumper Receiver - Pin and Lanyard
 DH-19 Mounting Bracket - Pin and Chain
 DH Miller Hardware Pack
 Mast Side Leg - Complete Assembly
 Base Screw Leg Replacement Assembly

Part Number

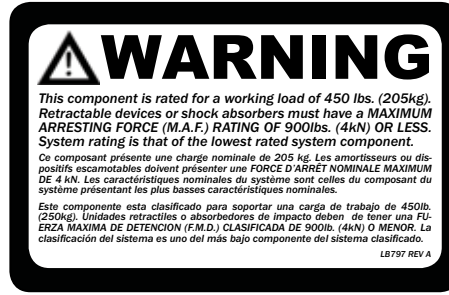
DH-PARTS-1
 DH-PARTS-2
 DH-PARTS-3
 DH-PARTS-4
 DH-PARTS-5
 DH-PARTS-6
 DH-PARTS-7
 DH-PARTS-8
 DH-PARTS-9
 DH-PARTS-10
 DH-PARTS-11
 DH-PARTS-12
 DH-PARTS-13
 DH-PARTS-14
 DH-PARTS-15
 DH-PARTS-16
 DH-PARTS-17
 DH-PARTS-18
 DH-PARTS-19
 DH-PARTS-20
 DH-PARTS-21
 DH-PARTS-22

Product Labels

The following warning labels must be present and fully legible at all times:



Appears on:
DH-11



Appears on:
DH-1, DH-2, DH-3, DH-11, DH-21 and DH-23



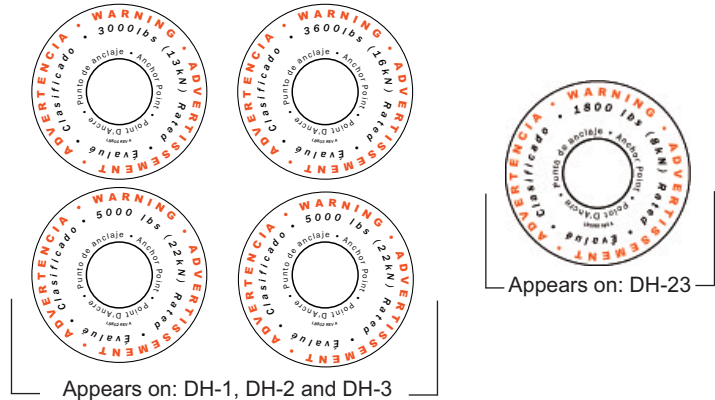
Appears on:
DH-1, DH-2,
DH-4, DH-12,
DH-24 and
DH-25



Appears on:
ManHandler
DH-1, DH-2, DH-3, DH-4,
DH-21, DH-23 and DH-24

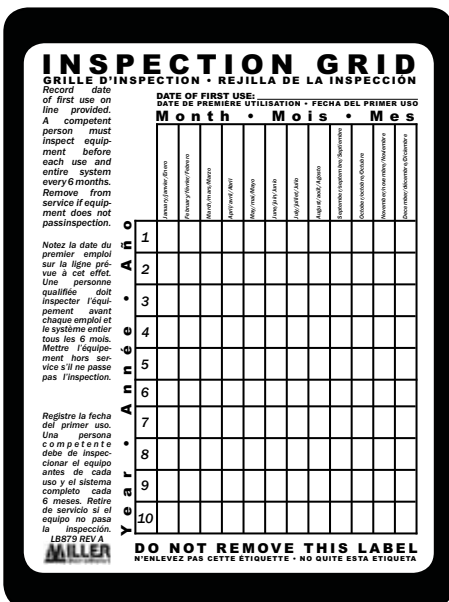


Appears on:
DH-1, DH-2, DH-3, DH-21 and DH-23



Appears on: DH-1, DH-2 and DH-3

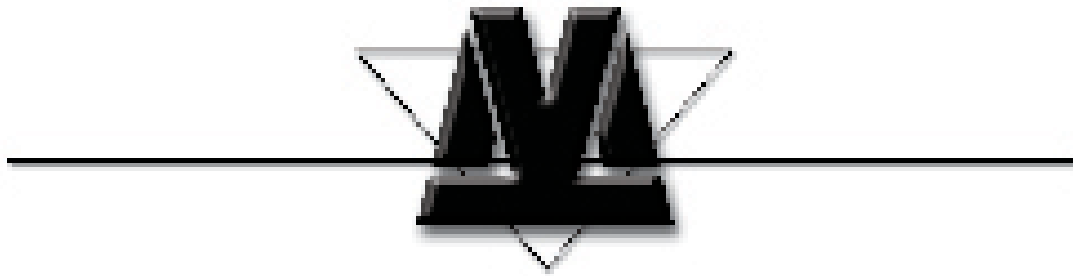
Appears on: DH-23



Appears on:
DH-1, DH-2, DH-3, DH-21 and DH-23



Appears on:
DH-1, DH-2,
DH-3, DH-5,
DH-6,
DH-7ZP&SS,
DH-8ZP&SS,
DH-12, DH-13,
DH-13/4FT,
DH-21, DH-23,
DH-22/21, DH-22/33, DH-22/45,
DH-22/57



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Manufacturing specifications are subject to change without notice.



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