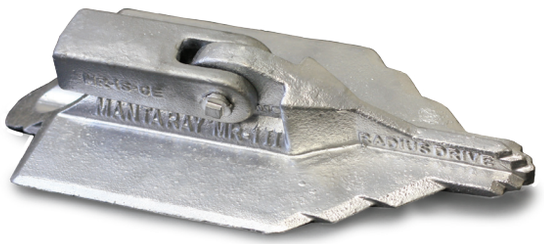
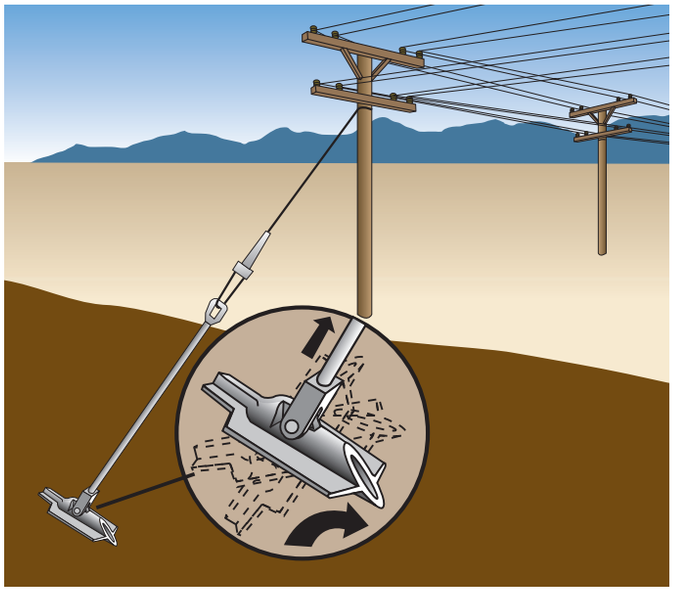
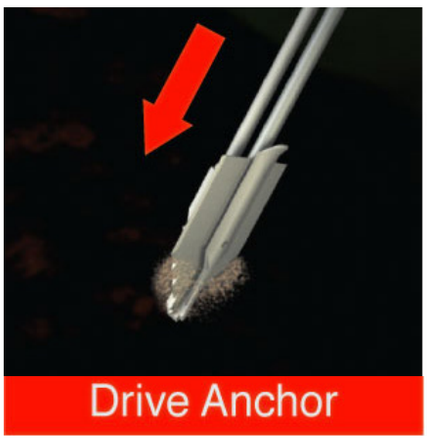
Manta Ray™ Driven Anchors





How it works



Manta Ray™ Driven Anchors

Catalog Number	Anchor Model	Tapped for Rod Size (in)	Ultimate Load Rating (lbs force; rod dependant)	Weight (lbs)
20210-UT-II	MR-3	5/8	16,000	7
20199-UT-II	MR-2	3/4 or 1	23,000 or 36,000	10
20036-UT-II	MR-1			13
20229-UT-II	MR-SR			20

Manta Ray™ Driven Anchor Installation Tools

Catalog Number	Description	Weight (lb)
50087	Hydraulic Hose with Couplers - 25' x 1/2"	8
50243	Standard Drive Steel Kit - 8' total length	60
50127	Load Locker	151
50364	90 lb Hydraulic Breaker	90
50382	Portable Hydraulic Power Unit	315

Manta Ray Anchors Q&A

Frequently Asked Questions

1. Q: What is the load capacity of the Manta Ray anchors?

A: There are 4 models:
MR-3 with 5/8”(1.6 cm) PH rod 16,000 lbs-force (7,257 kg-force) ultimate
MR-1 with 3/4” (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate or with 1” (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) ultimate
MR-2 with 3/4” (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate or with 1” (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) ultimate
MR-SR with 3/4” (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate or with 1” (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) ultimate

2. Q: Into what soils can the Manta Ray anchors be installed?

A: Can be installed through Class 2 soils including decomposed rock and permafrost

3. Q: Is the Manta Ray anchor RUS approved?

A: Yes the MR-1, MR-2, MR-3 and MR-SR are listed in section z of the RUS List of Approved Materials

4. Q: How long have Manta Ray anchors been used?

A: Nearly 30 years

5. Q: How reliable are the Manta Ray anchors?

A: Extremely. They are time tested, used extensively for commercial applications including the support of structures.

6. Q: How deep should the Manta Ray anchor be installed

A: As with other anchors, the Manta Ray anchor must be installed below frost depth and into competent soil. Typical installation is with one 7 ft (2.1 m) length power hub anchor rod.

7. Q: What is maximum installed depth?

A: There is no depth limit. Additional power hub anchor rods with coupling and drive steel tool sections can be added for greater installed depth. Installed depth, when necessary, can exceed the maximum 14 ft (4.3 m) of power hub anchors and 10 ft (3 m)limit for plate anchors.

8. Q: Can I use a line truck to install the Manta Ray

A: Yes ---Connect the hand held hydraulic operated jack hammer with up to 50 ft (15.2 m) of hose from the line truck. Typical performance specifications are 1200 blows per minute at 8gpm and 2000 psi (30 lpm/140 bar). Go to installation specification for more detail

9. Q: What depth can I install with the standard SGC-14drive steel tool set?

A: With the standard drive steel tool kit install to 8 ft (2.4 m) depth for countersink for a 7 ft (2.1 m)anchor rod.

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Manta Ray Anchors Q&A

10. Q: Is the same Drive Steel used for all Manta Ray anchors?

A: Yes

11. Q: How long does it take to install a Manta Ray anchor?

A: About the same time as installing a power hub screw anchor. Typically within 30 minutes including set- up and knockdown.

12. Q: What if obstruction is encountered and the Manta Ray anchor cannot be driven further?

A: As long as the drive steel tool is not removed from the anchor, pulling up on the anchor rod attached to the anchor will remove it.

13. Q: Can the Manta Ray anchor be installed through black top (macadam)?

A: Yes – can be driven through black top.

14. Q: Can the Manta Ray be installed in decomposed rock or caliche?

A: Yes --- Go to Installing Instructions for supplementary instructions.

15. Q: Can Manta Ray anchors be installed in permafrost?

A: Yes – Go to Installing Instructions for supplementary instructions for permafrost.

16. Q: Can the Manta Ray anchors be installed in a swamp

A: Yes --- and larger models are available with more surface area.

17. Q: How far apart can I install the Manta Ray anchors?

A: Minimum of 2 feet (.6 m). Based on soil, harder soil allows closer placement, softer soil placement is further apart.

18. Q: What is minimum required hydraulic jack hammer size?

A: Recommend 90 lb Class jack hammer. A 67 lb Class may be used for soft soils.

19. Q: How deep should the Manta Ray be installed with a 7 ft (2.1 m) length power hub anchor rod?

A: When load is applied with the load locker, the anchor will rotate and pull out of the ground typically 1 to 2 times the anchor length, so the eye nut will be sufficiently above grade level. Go to Installing Instructions for more details for each model Manta Ray

20. Q: What is standard pack qty?

A: MR-1 standard pack = 4 each & total carton weight = 48 lbs (21.8 kg)
MR-2 standard pack = 4 each & total carton weight = 40 lbs (18.1 kg)
MR-3 standard pack = 6 each & total carton weight = 43 lbs (19.5 kg)
MR-SR standard pack = 2 each and total carton weight = 43 lbs (19.5 kg)

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Manta Ray Anchors Q&A

21. Q: Who do I contact to place an order?

A: MPS customer service at Fort Mill, S.C.

22. Q: Can I get a sample for tryout?

A: Yes. Place sample order with MPS customer service.

23. Q: What is lead time?

A: In Stock at MDC.

24. Q: Can these be installed manually?

A: No --- Requires a hydraulic power unit and jackhammer.

25. Q: What is recommended proof load?

A: Proof load to 50 % of rod rating or expected working load whichever is less
MR-3 with 5/8"(1.6 cm) PH rod 16,000 lbs-force (7,257 kg-force) ultimate =8,000 lbs-force (3,629 kg-force)
MR-1 with 3/4" (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate = 11,500 lbs-force (5,216 kg-force)
MR-1 with 1" (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) = 18,000 lbs-force (8,165 kg-force)
MR-2 with 3/4" (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate =11,500 lbs-force (5,216 kg-force)
MR-2 with 1" (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) ultimate =18,000 lbs-force (8,165 kg-force)
MR-SR with 3/4" (1.9 cm) PH rod 23,000 lbs-force (10,432 kg-force) ultimate =11,500 lbs-force (5,216 kg-force)
MR-SR with 1" (2.5 cm) rod 36,000 lbs-force (16,329 kg-force) ultimate = 18,000 lbs-force (8,165 kg-force)

26. Q: Do you remove the eye nut to drive the anchor?

A: Yes--- So that Load Locker can be used.

27. Q: What is weight of load locker?

A: total 149 lbs (67.6 kg) but in sections.

28. Q: What is weight of each Load Locker component?

A: Base plate 48 lbs (21.78 kg)
Ram 77 lbs (34.9 kg)
Box 11 lbs (5.0 kg)
Adapter setting bar 9 lbs (4.1 kg)
Tapered jaw set 4 lbs (1.8 kg)

29. Q: What is Gad extractor used for?

A: To remove multiple installed drive tool sections.

30. Q: What is Drive Shank used for?

A: Fits in jackhammer and connects drive steel to the jackhammer.

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Manta Ray Anchors Q&A

31. Q: What is life of Drive Steel tools?

A: Long term--Subject to maintenance.

32. Q: How is Load Locker calibrated?

A: Calibrated at factory. May be recalibration by local hydraulic cylinder supplier.

33. Q: What tooling is required?

A: Load locker. Required. Catalog number LL-1
Drive Steel Kit. Required. Catalog number SGC-14
Jack hammer. Option if not available. Catalog number HB90-14 Hydraulic Power Unit. Option if not available. Catalog number GPU18-8CE

34. Q: What do I do if driving the Manta Ray anchor is very slow to almost impossible in very tough soil?

A: Go to Installing Instructions for supplementary instructions for special soil conditions.

35. Q: I predrilled a hole but the Manta Ray anchor does not tip up and slides back up the hole

A: Go to Installing Instructions for supplementary instructions for special soil conditions.

36. Q: Why does the load locker register 4,000 lbs-force (1,814 kilogram-force) when there is obviously no load on the anchor and the valve needle is in the neutral position

A: This is a characteristic of the hydraulic valve on the load locker called trapped pressure. Hydraulic pressure is trapped on both sides of the cylinder piston and registers on the gauge. The gauge reads zero when the valve handle is pulled to retract the piston. This does not affect the load locking of the anchors if the proper procedure is followed. Go to Installing Instructions for more details and the proper load locking procedure.

37. Q: What if I want to hold a constant load for a period of time as a proof test?

A: Set the bypass valve on the load locker to the load. This permits the installer to shift the valve on the load locker wide open while the bypass valve limits the pull force to the bypass setting. Then the installer can monitor movement of the anchor without worrying about the load level. Go to Installing Instructions for supplementary instructions.

38. Q: Can a portable power source be used for the jackhammer?

A: Yes – Use GPU18-8CE portable hydraulic unit.

39. Q: Will drive tool fit on all jackhammers?

A: Yes. Standard drive kit for 1-1/4” x 6 inch (3.2 cm x 15.2 cm). Also available 1-1/8” x 6 inch (2.9 cm x 15.2 cm) shank for installing with other generally available hydraulic jack hammers.

40. Q: Is technical support available?

A: Yes. Contact MPS.
Contact your local MPS supplier for assistance.

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MANTA RAY® EARTH ANCHOR SYSTEMS

Manta Ray Installation Instructions

1.0 Description

Manta Ray earth anchors are driven tipping plate soil anchors. These anchors are used with the standard power hub anchor rods (5/8" diameter for up to 16,000 lbs-force, ¾" diameter for up to 23,000 lbs-force and 1" diameter for up to 36,000 lb-force). Deeper installations differ only by requiring additional anchor rods and more drive steel.

The Manta Ray anchor is designed to be driven into the ground with a 90 lb (41kg.) hydraulic jack hammer attached to a drive steel tool. After the anchor has been driven to the depth of the anchor rod, the driving tool (called drive steel) is removed. The anchor is then tipped from its edgewise-driving position to its "load locked" position. This is accomplished with a hydraulic jack called the Load Locker, and provides an immediate proof test of each anchor. The direct reading gauge on the Load Locker makes the proof test easy and fast. There is no guesswork; if the soil is too soft the installer immediately knows to install a second anchor, use a larger anchor, or install to a greater depth.

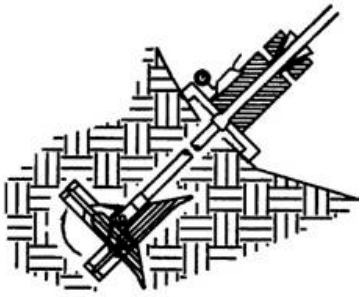
1. THREAD ANCHOR ROD INTO MANTA RAY

2. INSERT DRIVE STEEL INTO ANCHOR

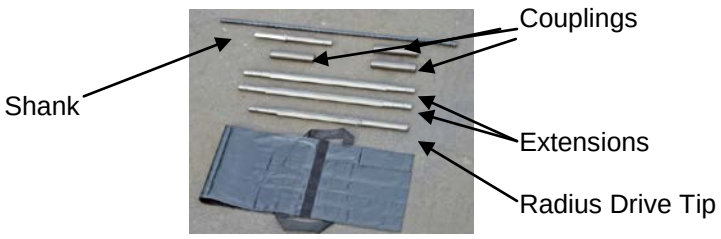
3. POSITION ANCHOR AT PROF LOCATION AND ANGLE

4. DRIVE ANCHOR TO PROPER DEPTH

5. REMOVE DRIVE STEEL



6. USE LOAD LOCKER TO PROOF ANCHOR INTO LOAD LOCK POSITION



The drive steel (installing tool) is required and ordered from the MPS Distributor. The Manta Ray drive steel is a patented design made of high performance materials. It allows the anchor to be driven to depth in discrete increments to allow installation in tight spaces while the operators remain safely on the ground.

The SGC-14 Drive steel kit will install the drive Manta Ray anchors with one 7 ft length power hub anchor rod. Actual depth approximately 8'(2.4m) depth.

The following are the drive steel installing tool parts;

Radius Drive Tip- (SG- 3) This piece is shaped to fit into the anchor on one end and threaded on the other end to accept a coupler

Shank- (SG-14)The shank (or striking bar) has a 1 ¼" hex x 6" (32mm hex x 152mm) shank configuration on one end to match the HB90-14 hammer chuck and is threaded on the other to accept a coupler

Extension- (SG-2) Extensions (33 inch length) are threaded on both ends to accept a coupler

Coupler- (SG-4) internally threaded to join shanks, radius tips and extensions together.

For additional depth, order extensions and couplers.

The SG drive steel uses a partial left hand thread that allows very efficient impact energy transfer from the jack hammer to the anchor. All joints should be lubricated with light oil or spray lubricant prior to assembly. After installing an anchor the drive steel joints should be cleaned of dirt which will enter the couplers during driving. Failure to clean and lubricate the drive steel and couplers will result in premature failure. Contact your MPS Distributor.

2.2 Hydraulic Jackhammer: A 90lb. (41kg.) hand held hydraulic jack hammer is required. Typical performance specifications are 1200 blows per minute at 8gpm and 1500 psi (30 lpm/140 bar). The HB90-14 anchor driving hammer with 1 ¼" hex x 6" (32mm x 152mm) chuck and HTMA flush face couplers is available from a MPS Distributor. Hydraulic jackhammers outperform the pneumatics for driving Manta Rays, especially in the harder soils.

2.3 Hydraulic Power unit: A line truck hydraulic system can be used to operate the jack hammer. Typical specifications are 18hp, 8gpm, 2000 psi (30 lpm/140 bar) with hydraulic oil cooler. As an alternate, the GPU18-8CE hydraulic power unit is available from a MPS Distributor

2.4 Hydraulic hoses: Should be ½" (12.5mm) nominal size and 25' (7.6m) length with HTMA flush face couplers. Two (2) sets of hoses may be coupled together to provide a 50 foot (15.2m) reach from the power unit to the anchor installation. A maximum 50 ft hose length is recommended. HC-16-25 hydraulic hoses that meet all these requirements are available from a MPS Distributor.

Jack Hammer

Portable Power Supply

Hydraulic Hoses

2.5 LL-1 Load Locker

The Manta Ray LL-1 Load Locker is required to load lock and proof test the anchor. It is a double acting hollow hydraulic jack with a base reaction plate and a direct reading gage. Use of this tool provides an immediate proof test of each Manta Ray anchor.

The Load Locker can be used with the same hydraulic from the line truck used to drive the jack hammer. The portable GPU18-8CE hydraulic power unit that is used to power the HB90-14 anchor driving jack hammer can also be used.

The LL-1 uses quick release gripping jaws that grip an Adapter Setting Bar (ASB) that passes through the center of the jack. The ASB extends the anchor rod and precludes any damage to the anchor rod from the gripping jaws.

The base plate is designed for anchors that are installed at an angle to the ground: it has a large and a small cross member. For angled guy anchors the shorter of the two cross members should be placed toward the tower and perpendicular to the axis of the anchor rod.

The Load locker and base are designed to self align to the actual angle between the anchor and the ground. The vertical legs of the Base cut into the soil during use to help keep the base from skidding.

When load locking angled anchors the knife edges of the Load Locker jack should engage the square tabs on the base that are closest to the short cross member.

Load Locker

Setting Up the Load Locker

3.0 Step-by-Step Installation Instructions

CAUTIONS: ALL SUBSURFACE UTILTIY LOCATION PRECAUTIONS MUST BE OBSERVED PRIOR TO INSTALLATION. DO NOT DRIVE MANTA RAY ANCHORS WITHOUT AN UNDERGROUND UTILITY LOCATION REPORT.

PERSONNEL MUST USE SAFETY GEAR INCLUDING BUT NOT LIMITED TO: HARD HATS, GLOVES, STEEL TOE BOOTS, EYE AND HEARING PROTECTION.

3.1. Assemble the anchor

Thread the power hub screw anchor rod into the anchor shackle and tighten with a wrench. Place the anchor at the required location. For guy anchors the anchor should point away from the pole or tower and the anchor rod should point directly at the pole or tower.

Wrench tighten the power hub anchor rod to the clevis on the Manta Ray anchor (minimum 40 ft-lbs)

3.2. Assemble the first section of drive steel

The shank, a coupler and the radius tip are threaded together. Lubricate the threads prior to assembly with light oil or spray lubricant

Note that the drive steel system has left handed partial threads. Make sure that the steel is fully threaded into the coupler, and that the coupler can "free float" once the steel is coupled together. Check this "free float" by moving the coupler back and forth on the drive steel. It should move freely 3/4 inches before stopping.

Always check for this free float. If the coupler is not completely threaded into the free float position it will break when the hammer is turned on.

Vibration during driving may cause anchor rods to loosen. Do not allow the anchor rod to completely un-thread from the anchor. Check the anchor rod after adding each tool section to be sure the power hub rod remains tight.

Shank **Coupler** **Radius Tip – add arrow**

3.3 Set up Jackhammer

Place the jackhammer on the ground behind the anchor and insert the drive steel shank into the hammer.

Insert the radius tip into the back of the anchor.

Position the anchor at the point of entry into the ground.

3.4 Make hydraulic power connections

Connect the jackhammer to hydraulic power unit with the hoses, start the power unit and turn the hydraulic circuit on.

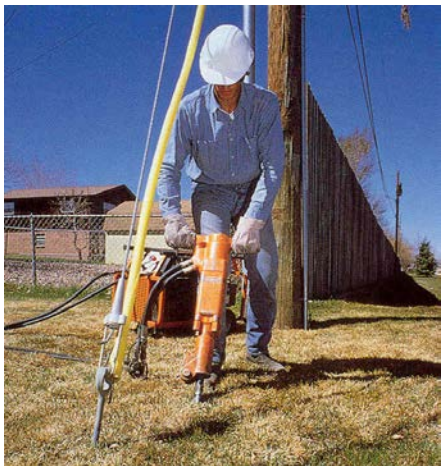
Caution: When using a line truck or other hydraulic power source make sure the pressure and flow does not exceed the jackhammer capacity or the seals may burst. A flow control device may be required.

3.5 Drive the first section

Raise the jackhammer to required guy angle and begin to drive the anchor. To avoid "skidding'" at the start of angled drives, start closer to vertical, then lower the jackhammer to the proper angle as the anchor begins to penetrate the ground.

The installer must support the weight of the hammer. Do not let the weight of the hammer apply a side load on the drive steel or premature drive steel failure will occur. Drive the anchor until the first drive steel coupler is approximately at ground level.

Set-up and position to install the Manta Ray anchor



Drive steel coupler at ground level

3.6 Add drive steel extensions

Open the jackhammer latch and remove the jackhammer from the shank, being careful not to remove the radius drive tip from the anchor.

CAUTION: THE DRIVE STEEL, ESPECIALLY THE COUPLERS, CAN BE HOT. WEAR GLOVES.

Remove the drive steel shank from the coupler. Remember the drive steel has a left hand partial thread. It helps to hold the coupler and pull upward on the shank while turning clockwise (as viewed from above) to the get the partial threads to engage.

Place a drive steel extension and another coupler between the original tip and shank. Remember to lubricate the drive steel threaded parts prior to assembly.

Replace hammer on the shank and continue driving the anchor until the second coupler is at ground level.

Repeat this step with the second drive steel extension.

If greater than 7 ft anchor rod depth is required, add a power hub rod extension (with coupling) and drive steel extensions to continue installation. There is no depth limit for installing the Manta Ray anchors. Typically it takes approximately 6-8 minutes for an 8 foot depth in medium to soft soils, and longer in proportion to the hardness of the soil, up to a maximum of 15-20 minutes in extremely hard soils.

NOTE: If the anchor strikes an object and makes no further movement for five minutes, an object is probably in its path; a rock, layer of rock, or other solid objects, and the anchor may not penetrate to the depth desired. At this stage the anchor can still be removed, as long as the drive steel is not removed from the anchor

Retrieve the anchor with the Load Locker. This is done by removing the jackhammer from the drive steel but leaving the drive steel in the anchor. Then place the LL-1 Load locker over the anchor rod and use it to pull the anchor out.

Leaving the drive steel in the anchor prevents it from tipping and locking when LL-1 pulls on the anchor rod.

Be careful to stop pulling when the anchor gets close to the bottom of the Load Locker. In most cases a bit of shovel work is required to retrieve the anchor. After retrieval try a slightly different location or angle with a new anchor to attempt to miss the object.

3.7 Complete the installation by attaching the Adapter Setting Bar (ASB) and countersink

When the top of the anchor rod is at ground level, stop driving and thread the Load Locker Adapter Setting Bar (ASB) onto the anchor rod. The purpose of the ASB is to extend the anchor rod so the Load Locker can grip it. Because the anchors pull back upward during load locking, some experience is required to properly estimate how far to drive the anchors to achieve the required minimum finished depth. A good rule of thumb is the anchor will pull back approximately 1 to 2 times its length.

Manta Ray Anchor	Anchor Length inches
MR-1	14.44
MR-2	14.44
MR-3	11.9
MR-SR	17.25

After threading on the ASB, drive the anchor until the top of the anchor rod is below grade by approximately the length of the anchor. This is called “countersinking the anchor”. The ability to estimate how much to countersink comes with experience. Softer soils and larger anchors require greater countersink. Some very soft soils will require the installer to countersink 18-36 inches (.45 – .9m). Harder soils require less if Any countersink.

Top of anchor rod at grade, and Adapter Setting Bar (ASB) being installed.

3.8 Removing the drive steel.

In most cases the drive steel is simply removed by an upward pull on the hammer. A very rapid upward pull usually breaks the drive steel free. After the drive steel is broken free, remove the jackhammer and pull the drive steel out of the hole by hand.

CAUTION: THE DRIVE STEEL, ESPECIALLY THE COUPLERS, CAN BE HOT. WEAR GLOVES.

If the steel does not break free easily, pull upward while operating the jackhammer to “vibrate” the steel free. After the steel has broken free, remove the jackhammer and pull the drive steel out of the hole by hand.

There are occasions when the drive steel will not manually break free. This can occur in dry, rocky soil when rocks fall into the hole made by driving the anchor and lodge against the drive steel.

This can also occur in very soft, wet (muddy) soil when the soft soil collapses around the drive steel during driving. The drive steel can also become stuck when anchors "steer" around small obstacles such as imbedded rocks. This "steering" can cause the drive steel to bow slightly which will bind it in the ground.

An "Extractor Bar" (SG-X) is included with each drive steel set, or may be purchased separately. If the drive steel does not manually break free, simply remove the jackhammer from the shank, screw the extractor bar into the coupler. Use the Load Locker to pull up on the "extractor bar" to break the drive steel free. Be careful as the drive steel is pulled out and removed to not allow portions of the drive steel to fall back down the hole. Usually there is some obstruction to removing the drive steel, and once they are broken free with the Load Locker they can easily be removed by hand.

Note: This illustrates the installer removing the drive steel by hand after it has broken free. It does not show the adapter Setting Bar (ASB) on the anchor rod, but normally it would be on the anchor rod as shown in the previous picture.

4.0 Set up the Load Locker

The anchor must be tipped and proof tested (using the Load Locker) to the desired holding capacity

The Load Locker consists of a base plate, hollow hydraulic jack, hydraulic control valve, a gauge, adapter setting bar, and tapered jaws to grab the adapter setting bar (ASB The Load Locker requires hydraulic power supply with these requirements: 2000-2500 PSI maximum pressure, 2-8 GPM, open center.

The MANTA RAY® Load Locker is a custom designed hydraulic jack designed to read the force applied to the anchor directly in LBS. or KN on the gauge.- The Load Locker should be calibrated by a test lab using the same gauge. This calibration should be performed prior to the start of the job, and any time a gauge is changed. MPS can provide load verification services or calibration instructions for independent test labs.

Caution: When using a line truck or other hydraulic power source make sure the pressure and flow does not exceed the Load Locker capacity or the seals may burst. A flow control device may be required.

Caution: The Load Locker can develop up to 25,000 lb-force.Wear proper safety attire including but not limited to: steel-toe shoes, gloves, hard hat and safety glasses.

- Ensure full engagement of threaded connections
- DO NOT stand directly in line with the adapter setting bar or anchor rod during load locking. Stand off to the side.
- Set the by-pass pressure on the Load Locker to ensure that the maximum load applied does not exceed the strength rating of the anchor parts.

4.1 Place the base plate over the Adapter Setting Bar (ASB) with the shorter cross member toward the tower and perpendicular to the axis of the ASB.

Align and adjust the position of the base plate so that the ASB is even with the square steel tabs closest to the small cross member.

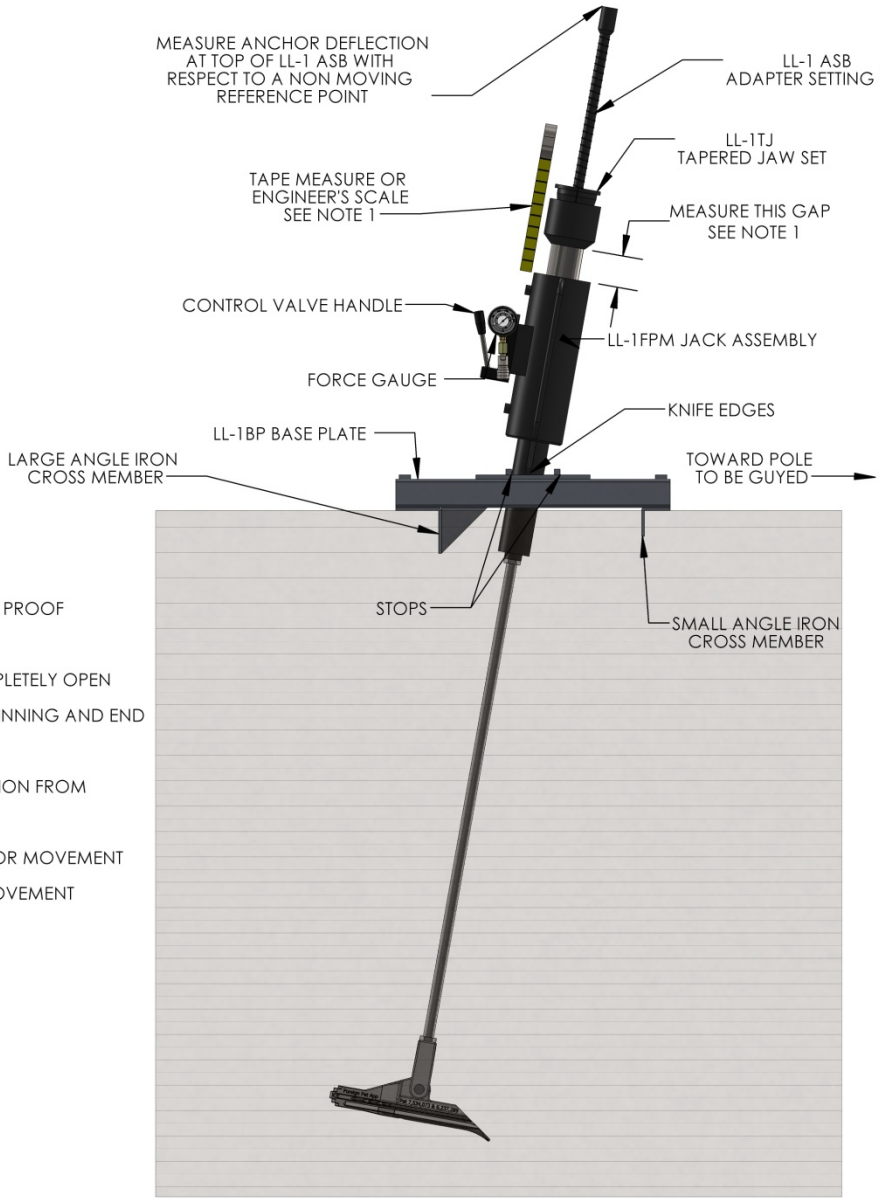
Slide the Load Locker jack over the ASB so knifed edges on the jack engage the square tabs on the base.

Place the gripping jaws around the ASB and into the tapered rod end of the jack. Use light oil or spray lubricant on the outside surfaces of the gripping jaws so easier to release. New jaws have a tendency to stick. Connect the hydraulic jack to the power unit and turn on the hydraulic circuit.

With the hydraulic circuit deactivated, attach the hydraulic hoses from the power source to the hoses on the control valve mounted on the jack.

Inserting Load Locker hydraulic cylinder over the ASB

Applying load to the Manta Ray anchor



PROOF TEST PROCEDURE:

1) SET BYPASS VALVE TO DESIRED PROOF TEST VALUE
2) HOLD CONTROL VALVE COMPLETELY OPEN
3) MEASURE DEFLECTION AT BEGINNING AND END OF REQUIRED TIME
4) SUBTRACT BEGINNING DEFECTION FROM ENDING DEFLECTION
5) THIS DIFFERENCE IS THE ANCHOR MOVEMENT
6) COMPARE TO ALLOWABLE MOVEMENT

NOTES:

1) FOR NON CRITICAL ANCHOR APPLICATIONS SOME INSTALLERS USE A TAPE MEASURE AND MONITOR THE MOTION OF THE CYLINDER TO INDICATE ANCHOR MOVEMENT. BE AWARE THAT SLIP BETWEEN THE LL-1ASB AND THE JAWS OR SINKING OF THE BASE CAN BE A FALSE INDICATOR OF ANCHOR MOVEMENT

MacLean Power Systems

PROOF TESTING USING LL-1 ANCHOR LOCKING KIT

SCALE1:14 | SHEET NUMBER: 1 OF 1

5.0 Load lock the anchors (tipping) and proof test the anchor

5.1 After activating the hydraulic circuit, shift the valve so the jack extends pulling the anchor back and rotating the anchor into the locked position by observing the gauge on the Load Locker, the operator can determine the holding capacity at any time during the Load Locker cycle.

Up to three to four cycles could be required to set the anchor depending upon anchor size and soil conditions. Each time the jack is retracted the jaws must be re-set. New jaws have a tendency to stick. To release them retract the jack about halfway and give the ASB a very swift side to side jerk. This should release the jaws and the jack should fall back onto the base plate. Fully retract the jack and reset the jaws.

5.2 Hold the load on the anchor as measured on the direct reading gage and monitor the movement of the anchor. If the anchor holds the required load for 1 minute with no more than ½" (12.5mm) of movement then the anchor has passed the proof test. A common method to measure the movement of the anchor is to use a tape measure between the top of the cylinder portion of the Jack and the bottom of the tapered barrel that holds the gripping jaws.

To maintain a load, the operator must "feather" the control valve and monitor the pressure reading on the gauge or set the bypass valve on the Load Locker.

5.3 Recommended Proof Loads

Manta Ray Anchor	Power hub anchor rod size (inches)	PH rod ultimate tension rating lbs-force (kn)	Recommended Proof Load lbs-force (kn)
MR-1	¾"	23,000 (102.3kn)	11,500 (51.2kn)
MR-1	1"	36,000 (160.1 kn)	18,000 (80.1kn)
MR-2	¾"	23,000 (102.3kn)	11,500 (51.2kn)
MR-2	1"	36,000 (160.1 kn)	18,000 (80.1kn)
MR-3	5/8"	16,000 (71.2kn)	8,000 (35.6kn)
MR-SR	¾"	23,000 (102.3kn)	11,500 (51.2kn)
MR-SR	1"	36,000 (160.1 kn)	18,000 (80.1kn)

In softer soil the base plate can be set on top of timbers for increased surface area so that any sinking tendency will be eliminated.

Load locker base is placed on timbers in soft soil, and finished anchor with eye nut installed.

5.4 After the Load Locker is removed, the appropriate eye nut is attached to the anchor rod and installation is complete, with an anchor that has been proof tested to the desired capacity.

6.0 Special Cases- Manta Ray Installing in Tough to Penetrate Soils

Refusal is defined as a penetration rate of 1/2" (12.5 mm) or less in 5 minutes of driving. This can indicate extremely hard soil or an impenetrable object.

The MR-2 Manta Ray® anchors can be installed in dense soils such as caliche or decomposed rock. The following are suggested procedures to supplement the standard installation procedure.

Predrilling a hole is recommended when advancing the Manta Ray® anchor is slow and difficult because the soil is so hard or refusal. It is recommended to pre-drilling a 4 inch (10.2 cm) diameter hole for faster installation than when using the class 90 jackhammer.

Model	Minimum Pilot Hole Diameter for Hard Soil
MR-1	4" (10.2 cm)
MR-2	4" (10.2 cm)
MR-3	4" (8.9 cm)
MR-SR	4" (10.2 cm)

The LB-1 earth auger it is powered by the same hydraulic power unit as used with the jackhammer and Load Locker and comes with sufficient 4" (102mm) diameter augers and extensions to drill an 8 foot (2.4m) deep pilot hole.
Typically installation with a single 7 ft power hub anchor rod is sufficient. Extensions can be added as needed if greater depth is required to reach competent soil.

- **Soils with rocks and gravel:** Predrilling a 4 inch hole for the Manta Ray anchor hole is recommended when rocks and gravel are present. Generally rock drilling equipment is recommended for best results.
- **Considerations for pre-drilling:** Gun barrel effect. Sometimes the pre-drilling will create a "gun barrel" effect with the hole wall extremely slick and hard. This may prevent the anchor from rotating when load is applied with the load locker. The following have been used to complete the anchor installation:
  - Fill the hole with the drill tailings and tamp well to compact the soil
  - If rotating the anchor still is difficult, using a hand grinder sharpen the outturned edge so the anchor can better penetrate with the sharpened bill into the side of the hole.
  - drive the anchor beyond the end of the pilot hole
  - or try a larger diameter pilot hole

The soil should be well compacted. Finally using the Load Locker tension the anchor. Contact your local MPS supplier for assistance.

Installing in Permafrost

There are several methods to install MR-1 and MR-2 Manta Ray® anchors in permafrost.

The following are suggested procedures depending on conditions encountered.

Thin layer/lense of permafrost.
If the permafrost layer is up to approximately 1.5 ft in thickness, then the normal driving procedure will generally result in the anchor passing through the permafrost layer and then continue installation into non-frozen and into competent soil. Refer to the standard installation procedure of Manta Ray® anchors for complete installation instructions.

The MR-1 and MR-2 are recommended for this application. Typically installation with a single 7 ft power hub anchor rod is sufficient. Extensions can be added as needed if greater depth is required to reach competent soil.

Very hard and or thick layer of permafrost.
Predrilling a hole is recommended when advancing the Manta Ray® anchor is slow and difficult because the permafrost is very hard. Pre-drilling a hole may be faster than using a 90 Class jack hammer. This will also reduce wear of the drive steel.

The MR-2 is recommended for the hard permafrost with a predrilled 4 inch diameter hole. Then drive the anchor down the hole. Fill the hole with the drill tailings and tamp. Finally using the Load Locker tension the anchor.

Typically installation with a single 7 ft power hub anchor rod is sufficient. Extensions can be added as needed if greater depth is required to reach competent soil.

Permafrost with rock
Predrilling a 4 inch hole for the Manta Ray anchor hole is recommended when rocks and gravel are present in the permafrost. Generally rock drilling equipment is recommended for best results.

Considerations for pre-drilling
Gun barrel effect. Sometimes in permafrost pre-drilling will create a “gun barrel” effect with the hole wall extremely slick and hard. This may prevent the anchor from rotating when load is applied with the load locker. The following have been used to complete the anchor installation:

- Pour hot/warm water into the pre drilled hole. This will temporarily melt or soften the frozen soil and permit the anchor to rotate when load is applied with the load locker. Once the soil has refrozen it will develop the full anchor load capacity.
- Use a steam wand inserted to the bottom of the hole to heat and locally melt the permafrost
  - In addition, if rotating the anchor still is difficult, using a hand grinder sharpen the outturned edge so the anchor can better penetrate with the sharpened bill into the side of the hole.

Contact your local MPS supplier for assistance.