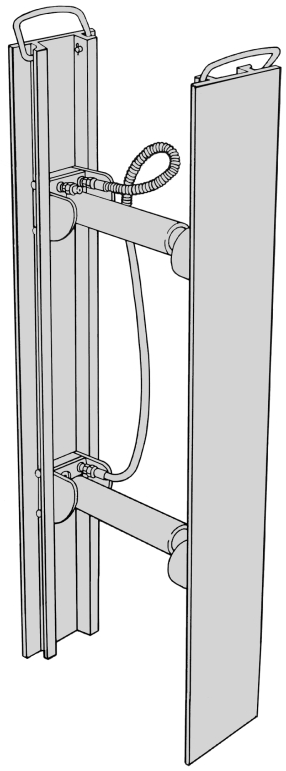
TREN-SHORE

Aluminum Hydraulic Trench Shoring System

MODELS:
1727, 2236, 2542,
3456, 4064, 5288

OPERATION, INSTALLATION,
SERVICE AND SAFETY
INSTRUCTIONS
PARTS LISTS
WARRANTY

Kundel INDUSTRIES



MODEL 1727-7' TREN-SHORE

INTRODUCTION

This manual provides operation and service instructions for the safe use of the various Kundel Tren-Shore models. Job Supervisors, Operators, Maintenance and Service Personnel should carefully read this manual before attempting to use or service Tren-Shore.

The intended application of Tren-Shore exposes it to abuse from handling, accidental damage, and wear of expendable components. The service life of the product is dependent on sensible handling, properly engineered installations and routine maintenance.

KUNDEL TREN-SHORE
IS TO BE USED IN COMPLIANCE
WITH O.S.H.A. REGULATIONS

Kundel Tren-Shore line of aluminum hydraulic trench-shoring should be used in compliance with the OSHA specifications and recommendations.

Tren-Shore is designed to be used in compliance with all federal and state guidelines. Tren-Shore meets or exceeds the requirements of 29 CFR Part 1926 OSHA Subpart P – Excavations, Appendix D. Reprints are available from Kundel upon Request.

Trenches up to 20 ft. in depth and up to 12ft. in width with "hard", compact or likely to crack earth can be shored with Kundel's Tren-Shore. However, other conditions-such as "soft, sandy or filled" earth and "hydrostatic pressure", regardless of depth, require close sheeting. Consult 29 CFR Part 1926 OSHA Subpart P – Excavations, Appendix for complete information in order to make sure you are complying with the department of Labor's requirements.

PLANNING CONSIDERATION

The following is a list of hazards and considerations for trenching and shoring in general. It is not all-inclusive and is provided to dramatize the importance of pre-planning when installing any type of shoring, including Tren-Shore.

- Check if the soil has lost cohesion due to previous excavation.
- Locate all existing utility lines, contact appropriate agencies.
    - Soil near utility lines may not have normal compaction and cohesion.
    - Consider all hazards when exposing and working around buried utilities.
- Determine and/or anticipate ground water problems, and prepare.
- Check for earth gas (methane) and related hazards.
- Consider that vibration from automotive, heavy trucks, machinery traffic, can cause cave-ins. Keep moving traffic away from trench walls.
- Loose spoil and construction material at trench tops can slide into the trench causing severe injury or death. Plan on keeping tools, supplies and spoil a safe distance from the trench.
- The spoilbank must be a minimum of two feet from trench edge.
- Soil composition. The texture of soil is a key to how much support it will require.
    - The more cohesive the earth is, the less likelihood of crumbling and cave-in.
    - Loose grain or sandy soil is dangerous.
    - Materials with great cohesion include hard and compact clays, cemented sand and gravel, and of course, solid rock and hard shale.
    - Be wary of soil compositions which vary in consistency. Shore accordingly.
- Too much water or the loss of water is a major factor in reducing soil stability.
    - Cohesion is weakened by water.
    - Frozen soil is usually stable, but soil below the frost line will not have the same cohesive properties; consider this when excavating frozen soils.
    - Loss of moisture causes shrinkage and cracking.
    - Provide pumps or diversion dikes to keep trenches dry.
- Changes in soil from normal to dry, frozen to thawing, or normal to wet or running, due to changes in weather conditions should also be considered after shoring is installed. Your shoring plan may have to be changed.

GENERAL APPLICATION GUIDELINES:

The standard procedures that are expected and/or required of those working underground should, of course, be followed including location of existing underground service lines, cables, conduit and the like.

Kundel Industries, Inc. can provide specialized trench engineering for excavation projects requiring shoring through their T.E.D. program. Otherwise, selection of proper size, Tren-Shore spacing and use of accessories such as oversleeves and plywood will vary with each job. Contact your Distributor of Consultation references to civil engineers, structural engineers or other qualified people in the locality.

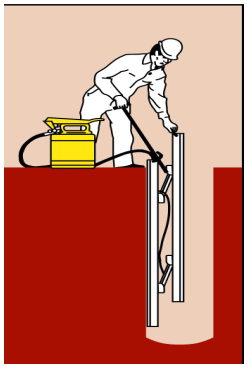
Install Tren-Shore in accordance with all state health and safety ordinances. Use in compliance with sub/part paragraph 1926.652 (and table P2 of that paragraph) of the Department of Labor Safety and Health Regulations for construction, of the Bureau of Labor Standards. For a copy of this regulation, contact your local Federal Government bookstore or write: U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402
Ask for Construction Industry Standards
DFR-1926.

TREN-SHORE SPECIFICATIONS

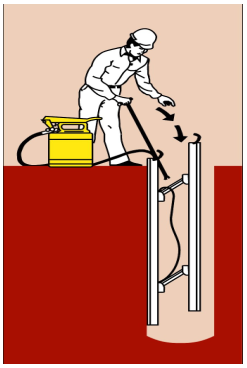
TO BE USED IN COMPLIANCE WITH OSHA REGULATIONS.
DESIGNED FOR TEMPORARY SHORING APPPLICATIONS.

SEE MANUFACTURES TABULATED DATA FOR TECHNICAL DATA RELATED TO KUNDEL TREN-SHORE

TREN-SHORE INSTALLATION

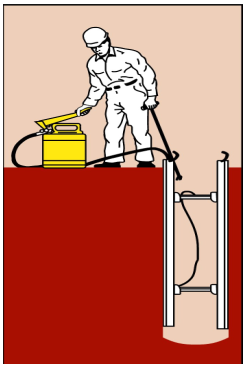


1. a) Place Tren-Shore across trench at proposed point of installation with cylinder and inlet valve on lower side. Top rail should overlap bank of trench on opposite side.
b) Be sure return valve on pump is open, and attach quick disconnect coupling on pump hose to inlet valve on Tren-Shore.
c) Insert release tool through handle on lower rail of Tren-Shore with the hook of the release tool in a position to engage the handle.



2. a) Fold Tren-Shore by pulling top rail toward you.
b) Grasp release tool and lower Tren-Shore into trench to desired position.

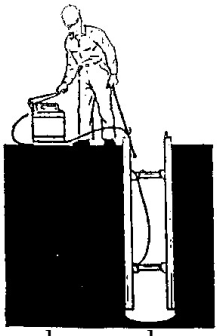
TIP: A bungee cord maybe used diagonally across the Tren-Shore Jack in order to stabilize shore in the upright and open position.



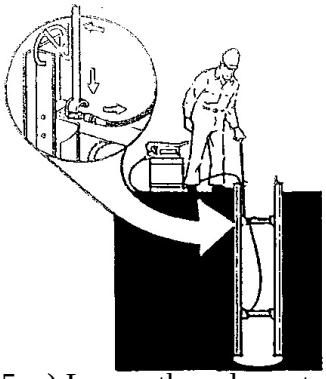
3. a) Release the top rail and allow shore to completely unfold. At this point Tren-Shore is suspended on hook of release tool. Hydraulic cross braces should always be horizontal after unfolding and before pumping up Tren-Shore.

CONTINUED ON NEXT

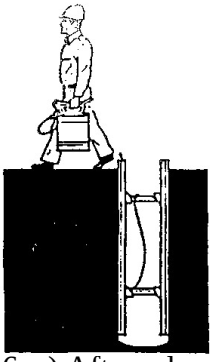
TREN-SHORE INSTALLATION (continued)



4. a) Close return release valve.
b) Pump to 500 P.S.I. gauge pressure.
c) Check to make sure pressure is maintained (return valve on pump must be kept tightly closed before and during removal of pump hose from Tren-Shore).

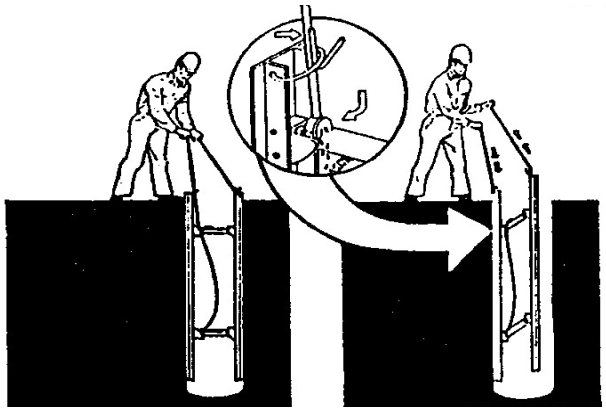


5. a) Lower the release tool (with tool in contact with rail of Tren-Shore) and engage bars of release tool behind collar of quick disconnect coupling
b) Using hook as fulcrum point, tip tool towards yourself and thus release quick disconnect coupling and hose from Tren-Shore.

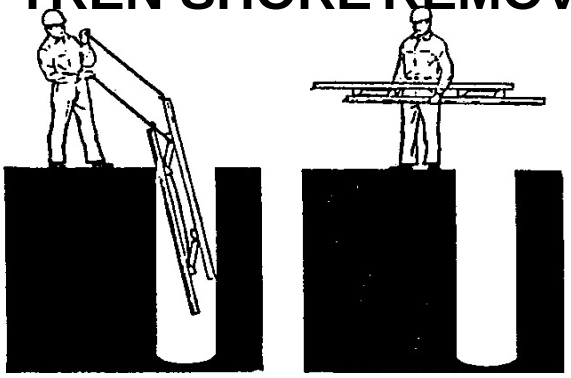


6. a) After release of hose from installed Tren-Shore, clip hose to top of pump (to avoid coupling or dragging in dirt when removing pump to new location).
b) Open return valve on pump and move pump to new location.
c) Locate pump near bank of trench so that it will be close to installation of next Tren-Shore.

TREN-SHORE REMOVAL



1.a) Insert release tool through handle of Tren-Shore with hook toward open trench.
b) Engage the removal hook in the handle of Tren-Shore rail on opposite side of trench.
c) With spray deflector of release tool above inlet valve (with handle as the fulcrum point) depress check valve on inlet fitting, spilling a small quantity of Kundel Shoring Solution in the trench.



2. a) Pull hook, which is engaged with handle of shore rail on far side of trench; de-pressure unit, Tren-Shore rail nearest you moves downward and engages with hook on release tool (de-pressure shore only to point of easy removal).

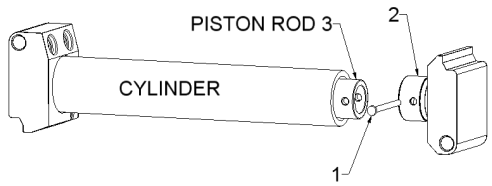
3.a) Remove from trench by pulling with release tool and controlling with hook.

4.) Remove hook and release tool, fold Tren-Shore flat and carry to point of next installation. Simple side boom removal is possible if desired.

TREN-SHORE EXTENSIONS AND OVERSLEEVES

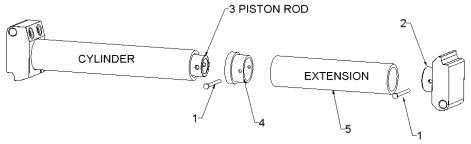
Adding extensions (with required oversleeves) to any model Tren-Shore, for trenches from 99” to 143” (depending upon model), can be done in the field without special tools.

TREN-SHORE AS FURNISHED STANDARD



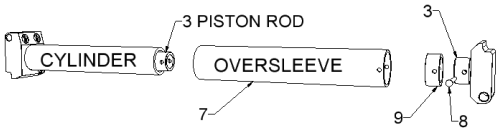
This manual provides operation and service instructions for the safe use of the various Kundel Tren-Shore models. Job Supervisors, Operators, Maintenance and Service
Personnel should carefully read this manual before attempting to use or service Tren-Shore.

TREN-SHORE WITH AN EXTENSION



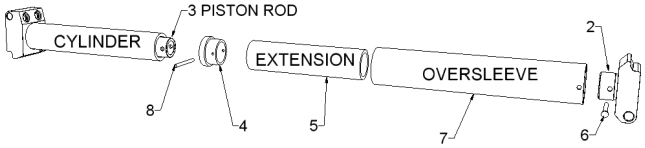
Assembly of Tren-Shores using an 18” extension or less you must disassemble the cross brace as shown above, then place the Extension Adapter (4) over end of Piston Rod (3). Slide Extension(5) over Extension Adaptor 563900 (4) lining up holes. Insert Cotter Pin (1), supplied with Extension. Slide Extension (5) over Collar (2) and insert standard Cotter Pin 563629 (1).

TREN-SHORE WITH OVERSLEEVE



Installation of Oversleeve on Tren-Shore without Extensions. Remove Cotter Pin (1) from Collar (2) and Piston Rod (3). Slide Oversleeve (7) over Piston Rod and Cylinder, aligning holes. Slide Oversleeve Adaptor (9) and Collar (2), aligning holes. Position Oversleeve Adaptor 563902 (9) and Collar (2) to align with holes of Oversleeve and Piston Rod. Secure with special Cotter Pin 563802 (6).

TREN-SHORE WITH AN EXTENSION AND OVERSLEEVE



All Tren-Shores with Extensions 27” long or longer require the installation of an Oversleeve (7). For correct Oversleeve/Extension combination see the descriptions in the “Suggested List Prices” section. After Extension (5) has been placed over the Piston Rod (3), and Extension Adaptor 563900 (4) align holes and insert Spiral Pin 566006 (8). Slide on Oversleeve (7) over Extension (5), line up Extension and Oversleeve holes with Collar (2) hole and insert special Cotter Pin 563802 (6).

	OVERSLEEVE AND EXTENSION COMBINATIONS				
EXTENSION	1727	2236	2542	4064	5288
Standard Unit, No Extension	*564001 Optional	*564002 Optional	*564004 Optional	563930 Standard	564044 Standard
9" Extension Assy. 563909	**564005 Not Req'd	**56406 Not Req'd	**564007 Not Req'd	*566838	**566852
18" Extension Assy. 563918	**564008 Not Req'd	**56409 Not Req'd	**564010 Not Rq'd	**566847	
27" Extension Assy. 563927	**564011	**564012	**564010	**56847	
36" Extension Assy. 563936	**564014	**564015	**564016		
45" Extension Assy. 563945	**564017	**564018	**564019		
54" Extension Assy. 563954	**564020	**564021	**564022		

*For 1727, 2236, 2542, Tren-Shores equipped with optional Oversleeve and not extension, Oversleeve adaptor 563902 and 563802 cotter pin is required for each Oversleeve.

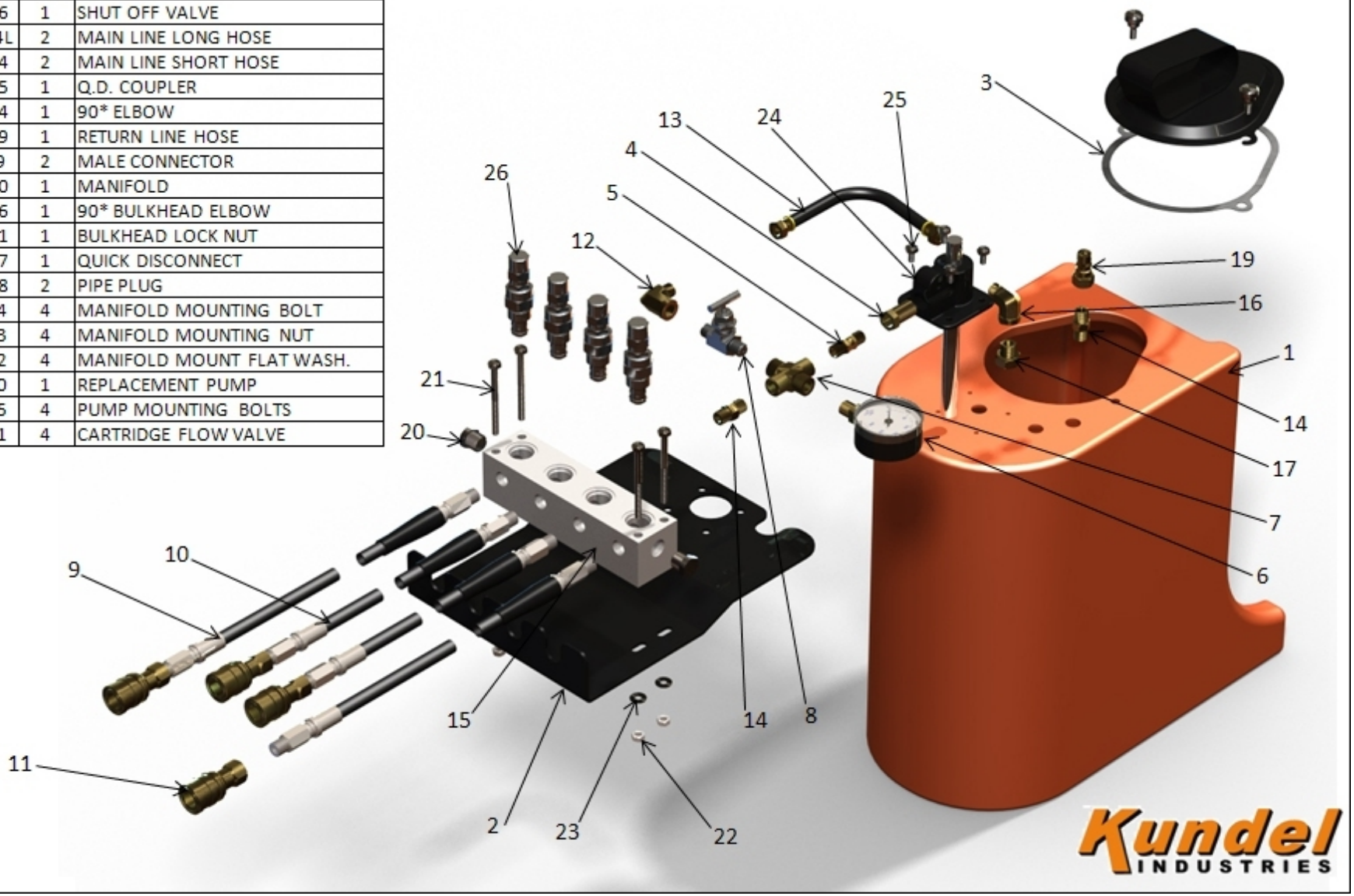
** For Tren-Shores to be equipped with optional oversleeves and extensions, an extension adaptor 563900 and spiral pin 566006 is required for each extension.

*** For other applications up to 12 feet wide, contact your Kundel Distributor for further information.

TREN-SHOR PUMP ASSEMBLY

PRT# 563700 P

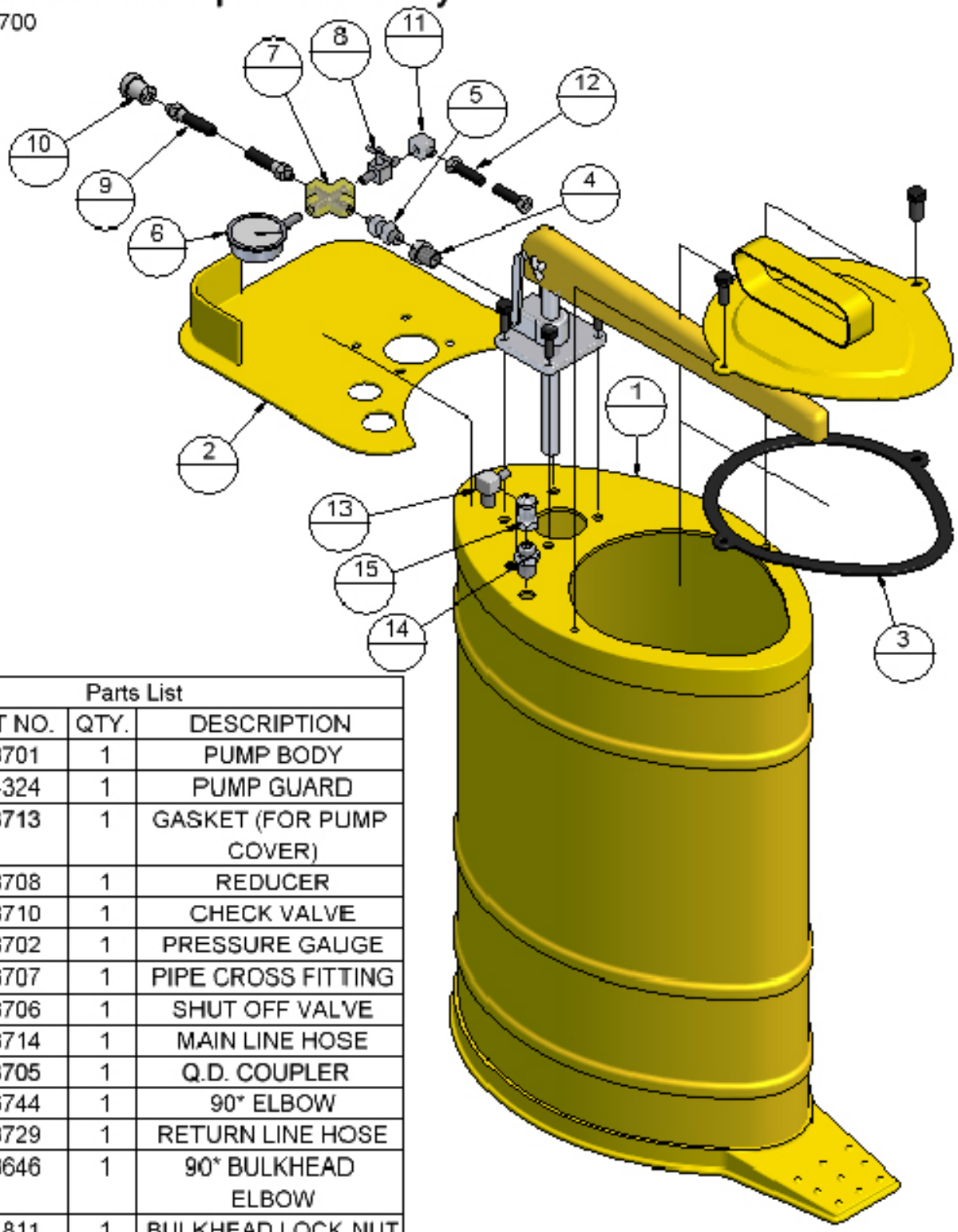
PARTS LIST			
MK #	PART #	QTY	DESCRIPTION
1	563701P	1	PUMP BODY
2	564324M	1	MANIFOLD PUMP GUARD
3	563713	1	GASKET (FOR PUMP COVER)
4	563708	1	REDUCER
5	563710	1	CHECK VALVE
6	563702	1	PRESSURE GAUGE
7	563707	1	PIPE CROSS FITTING
8	563706	1	SHUT OFF VALVE
9	563714L	2	MAIN LINE LONG HOSE
10	563714	2	MAIN LINE SHORT HOSE
11	563705	1	Q.D. COUPLER
12	566744	1	90* ELBOW
13	563729	1	RETURN LINE HOSE
14	659689	2	MALE CONNECTOR
15	563400	1	MANIFOLD
16	883646	1	90* BULKHEAD ELBOW
17	561811	1	BULKHEAD LOCK NUT
19	563617	1	QUICK DISCONNECT
20	561748	2	PIPE PLUG
21	902504	4	MANIFOLD MOUNTING BOLT
22	902503	4	MANIFOLD MOUNTING NUT
23	902502	4	MANIFOLD MOUNT FLAT WASH.
24	563730	1	REPLACEMENT PUMP
25	902505	4	PUMP MOUNTING BOLTS
26	563361	4	CARTRIDGE FLOW VALVE



Kundel INDUSTRIES

Tren-Shore Pump Assembly

Part No. 563700

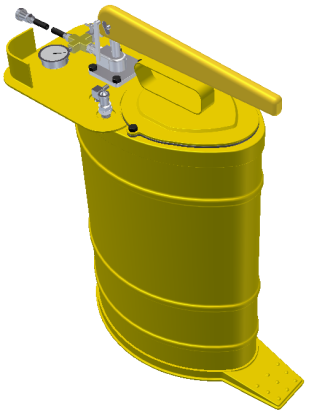


Parts List			
ITEM	PART NO.	QTY.	DESCRIPTION
1	563701	1	PUMP BODY
2	564324	1	PUMP GUARD
3	563713	1	GASKET (FOR PUMP COVER)
4	563708	1	REDUCER
5	563710	1	CHECK VALVE
6	563702	1	PRESSURE GAUGE
7	563707	1	PIPE CROSS FITTING
8	563706	1	SHUT OFF VALVE
9	563714	1	MAIN LINE HOSE
10	563705	1	Q.D. COUPLER
11	566744	1	90° ELBOW
12	563729	1	RETURN LINE HOSE
13	883646	1	90° BULKHEAD ELBOW
13a	561811	1	BULKHEAD LOCK NUT
14	563708	1	REDUCER
15	563617	1	QUICK DISCONNECT
---	563712	1	REPAIR KIT FOR PUMP SEALS
---	563730	1	TUBE & ROD ASSEMBLY

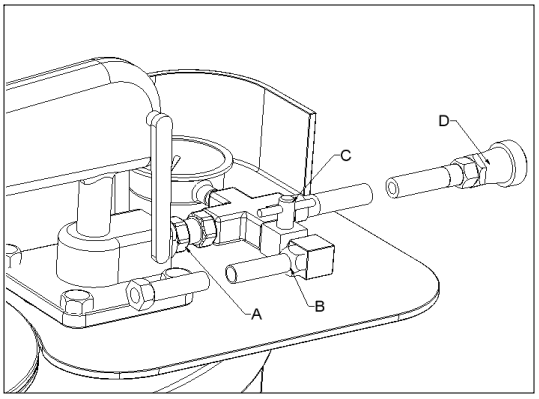
Kundel INDUSTRIES

REF-1634

TREN-SHORE
PUMP ASSEMBLY 563700
OPERATING & MAINTENANCE INSTRUCTIONS



1. Remove pump bucket, pump handle and control assembly from carton.
2. Attach pump handle to bucket and then attach plunger at hole marked “Summer or Light Lube” in order to produce longest plunger stroke.
3. Fill pump bucket through hand-hole opening with Tren-Shore fluid concentrate and water per bottle.
4. Prime pump by stroking pump handle until fuel oil squirts from “A” as shown on sketch. (Note: Holding a cloth close to opening at “A” will prevent splatter).
5. Apply permatex of other sealant to fitting of control assembly and connect to pump at “A” as shown on sketch. This connection must be oil-tight at high pressure. Tighten pump thread so that gauge is facing upward. Do not loosen or “back-off” any connection to accomplish this.



6. Short hose (return line) attached to pump must be passed under control assembly and coupled at point “B”. No sealant is necessary at this point.
7. Open shut-off valve on return line “C” and stroke pump several times to remove air and complete priming.
8. TO TEST ASSEMBLY: Before use, close shut-off valve “C” and stoke pump to build pressure to approximately 500 lb. Let stand a moment under pressure to determine absence of any leakage (shown by pressure drop on gauge) and then open release valve.
9. TO USE PUMP: Uncoil pump hose and attach to Tren-Shore by quick detach coupling “D” (see Tren-Shore instructions).
10. Install Tren-Shore in trench, close return shut-off valve “C” and inflate to 500 lbs. Gauge (see Tren-Shore instructions).
11. Remove pump hose from Tren-Shore with release tool (see Tren-Shore Instructions). Clip hose and quick detach coupling to pump at clip provided near handle on top of pump bucket (keep fitting out of dirt).
12. Move Pump to next point of installation. Open release valve “C” before attaching pump hose to Tren-Shore. Return to step 10.

PUMP PRIMING INSTRUCTIONS

The proper procedure to prime the Tren-Shore is as follows:
Fill the pump tank with lubricant – with the pump lever, pump oil until oil is discharged at the pump outlet before connecting the hose assembly to the pump outlet.
When the hose assembly is connected to the pump, air locks in the hose prevent priming of a new pump assembly. If an isolated field situation occurs that a pump cannot be primed with the normal procedure, we suggest pouring oil into the pump to expel any air lock.

TREN-SHORE INSPECTION

RECOMMENDED INSPECTION SCHEDULE			
PROCEDURE	At Equipment Yard After Return From Field Use	During Field Use By Foreman**	
		Daily	Weekly
PRESSURE TESTING	w		w
Visual Inspection For Physical Damage to Hoses and Fittings.	w	w	
Visual Inspection For Hydraulic Leaks.	w	w	
Check for Pressure Drop During Prolonged Uninterrupted Duty.		w	
Visual Inspection For Gross Brace Bending, Cylinders, Pistons and Piston End Collars.	w	w	
Check Handles For Missing Nut or Retaining Pins.	w	w	
Check Handles For Cracks From Straightening.	w	w	
Check For Lost or Damaged Hinge Pin Retainers.	w		w
Check For Bent or Missing Finger Guards.	w		w
Check For Bending of Rails	w	w	
Check For Physical Cracks in Rails Due To Straightening.	w		

** Inspections should be made by a fully qualified person capable and with the authority to assure proper maintenance of equipment.

TREN-SHORE TROUBLE-SHOOTING PROCEDURE

HYDRAULIC LEAKAGE

Note: See Section for Testing Procedure

PROBLEM	CORRECTION
A. Leak is isolated around area where block and cylinder thread together.	A. Replace o-ring at base of cylinder block thread, and retest.
B. Leaking around fitting thread at block.	B. Tighten fitting and retest. If leak persists, wrap male fitting of pipe thread with 2 turns of Teflon tape, reinstall and retest.
C. Leaking around hose fitting and JIC connector.	C. Remove hose, inspect fittings, wipe clean, reattach and retest.
D. Persistent leak at hose fitting.	D. Replace fittings and hose as necessary, retest.
E. Leakage at quick disconnect.	E. Check for worn or malfunctioning valve. Clean components, replace as necessary.
F. Leakage at rod end of cylinder.	F. Disassemble, remove worn piston seals, cylinder end wiper and retest.
G. Leaking or damaged hose.	G. Replace.

PHYSICAL DAMAGE

Note: Careful visual inspection is critical to proper maintenance. .

PROBLEM	CORRECTION
A. Bent piston rods.	A. Replace and review installation plan for signs of overloading. Do not attempt straightening of piston rods.
B. Blinding of hinge pin preventing proper folding of the unit.	B. Drive out old pin and replace.
C. Bent rails	C. Straighten rails and inspect for cracks where original bend occurred.
D. Cracks in rails due to bending and/or straightening.	D. Replace. Uncracked lengths may be used as shorter rails if desired.
E. Loose connection at piston collar, unable to tighten piston collar.	E. Inspect for threads stripped on piston end block, replace blocks with more than two full threads missing, or nonfunctional.
F. Handle with cracks from straightening or stripped threads, or pulled out retainer pin holes.	F. Replace.

TEST STAND PROCEDURE

1. After each field use, the Tren-Shore should be thoroughly pressure washed to facilitate visual inspection of the unit.

2. After washing, visually inspect the . Tren-Shore per chart.

3. Visual inspection should also take place after the unit is installed in a suitable test fixture.

3.1 The fixture should withstand a load of 3000 psi minimum. The fixture should be designed to provide a uniform resistance to each cross brace. See the following drawing for test rack concepts.

3.2 Using the Tren-Shore pump, filled with the appropriate mix of fluid, pump the shore to a pressure of 2000 psi for a minimum of 30 seconds. Visually inspect for leaks during this test period. Correct per Trouble-Shooting Chart.

3.3 See page 13 for Test Stand Concepts.

CAUTION

ALWAYS WEAR PROTECTIVE EYE AND FACE WEAR WHEN PRESSURE TESTING SHORING.

REPLACEMENT OF WORN-OUT OR DAMAGED HARDWARE ITEMS:

ITEMS:
Part No. 564331 Hose
(For 3.5 & 5 ft. Tren-Shore)
Part No. 564328 Hose
(For 7 Ft. Tren-Shores)
Part No. 563617 Quick Disconnect.
Part No. 563634 Heavy Duty Handle
Part No. 563751 Pipe Plug
Part No. 564327 Cotter Pin
Part No. 656888 Male Connector
Part No. 659689 Hex Nipple
Cylinder End Side Rail All Sizes
Piston End Side Rail All Sizes

TREN-SHORE FLUID

Tren-Shore fluid is a scientifically compounded petroleum hydrocarbon specifically formulated for use in hydraulic shoring. The concentrate serves to act as a cleaner, lubricant and corrosion inhibitor. The concentrate is a clear brown fluid with a mild odor until mixed with water in the Tren-Shore Pump. When mixed in the recommended ratio of 1 quart concentrate to 5 gallons of water, the fluid will turn milky white.

1 quart brown fluid + 5 gallons water
= pump full of milky fluid

USE KUNDEL TREN-SHORE FLUID EXCLUSIVELY

Do not use diesel fuel, gasoline, or kerosene in Tren-Shore systems. These fluids can be hazardous to workers in and out of the trench. Non-approved mixtures may damage seals and cause loss of hydraulic pressure.

SERVICE NOTES:

1. Replace hoses if they are kinked, cut or abraided and leaking.
2. Use non-hardening permatex on the threads when replacing the pipe plug, male connector or hex nipple.
3. Tighten the above fitting to 30 in. lbs., of torque.
4. Replace bent or broken handles with part no.563634 heavy duty handle. All old style rails will have to be redrilled to fit the new handle. See illustration REF. 1101 and 1116.
5. Any rail that shows cracking from being straightened or over stressed must be replaced.
6. Any piston rod that is bent must be replaced.

SERVICE INSTRUCTIONS FOR KUNDEL TRENSHORE

Replacing Cylinder Seals & Packing.

1. Wash and remove all dirt from Tren-Shore.
   - Note: Cleanliness is important when replacing seals.
2. Disconnect hoses from cylinder end blocks.
3. Remove the hinge pin, quick retainers and hinge pins holding the hydraulic cross brace assemblies to the rails.
4. Remove the cotter pin holding the cylinder rod to the piston collar.
5. Remove the cylinder, guide and wiper assembly from the cylinder end block. Use either the STRAP or PARMALEE WRENCH when performing this operation.

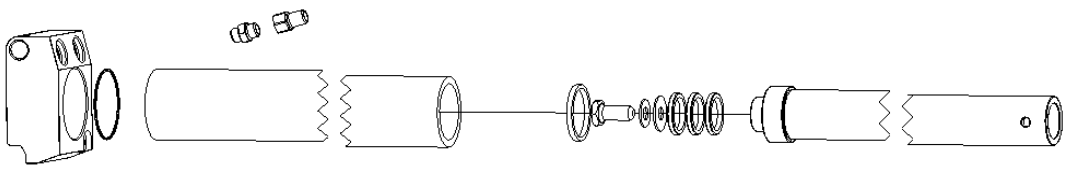
CAUTION: Do Not Use Pipe or Any Other Wrench that is Likely to Score or Collapse Cylinder Wall.

6. Remove the piston rod from the cylinder by pushing completely through from the rod side. Unthread the hex head cap screw, lock washer and large washer from the rod assembly.
7. Remove and replace the piston packing part No. 563607 and part No. 563608. Reassemble large washer, lock washer and screw. Tighten screw to 50 in. lb. follow appropriate assembly drawing in manual.
8. Clean and inspect internal wall surface of the cylinder. There should be no scratches or gouges. Replace if damaged.
9. Replace the rod wiper part No. 563604.
10. Reassemble the piston rod back into the cylinder. Be sure to wipe lubricant on to cylinder wall and seal surface before inserting into cylinder.
11. Replace o-ring part No. 563614 into cylinder block before reassembling cylinder.
    - Note:
      a) A small amount of non-hardening PERMATEX may be used on the threads to assure a tight seal.
      b) Use a strap or PARMALEE wrench to tighten cylinder into cylinder block.

CAUTION: When reassembling cylinder into cylinder block, care must be taken not to cross the threads.

12. Complete the hydraulic cross brace assembly.
13. Assemble cross braces to rails. Follow assembly drawing that is appropriate for the size of Tren-Shore being repaired, shown in the manual.
14. Connect all hoses and test for leaks at 2000 psi for 30 seconds minimum. Use a test fixture. Follow trouble shooting chart.

CYLINDER ASSEMBLY

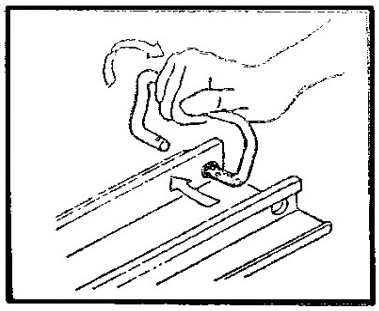


FOR FUTHER INFORMATION, SEE PARTS LISTS ON PGS.14 THRU 23

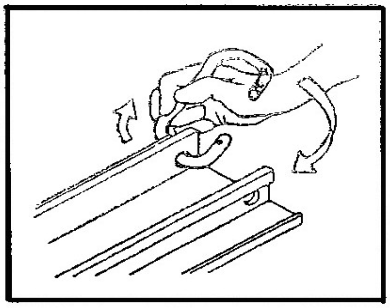
HANDLE INSTALLATION

PART No. 563634

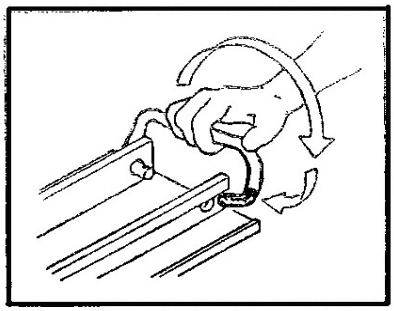
NO BENDING REQUIRED. THE HANDLE EASILY THREADS THRU 7/13 DIA. HOLES



HOLD HANDLE WITH CURVE POINTING AWAY FROM END OF PAIL. FEED THROUGH 7/16 DIA. RAIL HOLE.



THREAD HANDLE 360^{O} THROUGH THE HOLE.



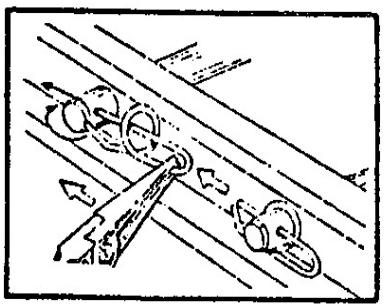
PLACE OPPOSITE END OF HANDLE THROUGH REMAINING PAIL HOLE. RETAIN WITH COTTER PIN PART No. 564327.

FOR FAST CYLINDER INTERCHANGE, FOLLOW THESE STEPS:

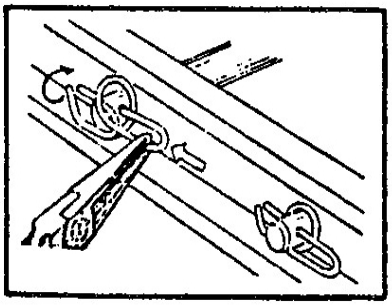
RETAINER INSTALLATION

PART No. 564329

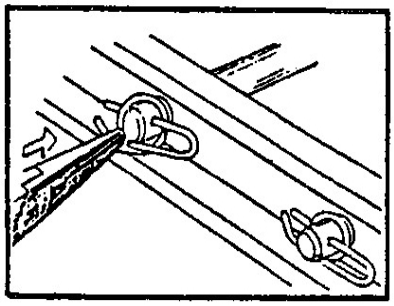
NO SPECIAL TOOLS REQUIRED. INSTALLATION OR REMOVAL SHOULD TAKE 2 SECONDS PER RETAINER AND CAN BE INSTALLED WITH BARE FINGERS WITHOUT TOOLS.



USING PLIERS, INSERT STRAIGHT LEG OF THE RETAINER INTO HOLE OF HINGE PIN.



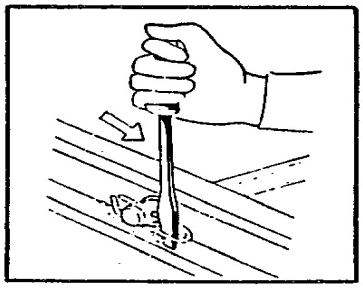
WITH A SINGLE MOTION, PUSH THE RETAINER UNTIL LOOP HAS SNAPPED OVER END OF HINGE PIN.



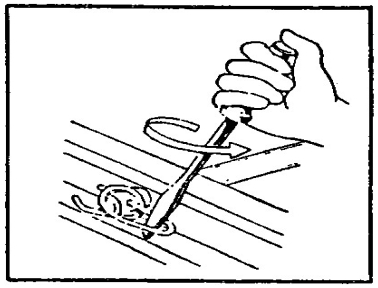
IF SIZE OF PLIERS PREVENTS SINGLE MOTION INSTALLATION; PUSH LOOP OF RETAINER SLIGHTLY – TO SNAP INTO POSITION.

RETAINER REMOVAL

PERMANENT DEFORMING OF RETAINER IS NOT NECESSARY FOR INSTALLATION NOR FOR REMOVAL. THE RETAINER IS DESIGNED FOR RE-USE AND SHOULD BE DISCARDED WHEN RETAINER FAILS TO SNAP OVER THE HANDLE PIN END.



INSERT LARGE SCREWDRIVER BETWEEN TWO STRAIGHT LEGS OF RETAINER AS SHOWN.



TWIST SCREWDRIVER TO RELIEVE TENSION OF LOOP ON PIN AND PULL OFF IN ONE MOTION.

TEST STAND CONCEPTS

These illustrations suggest set-ups in which Tren-Shores may be effectively pressurized for isolation of leaks.
Other suitable means may be devised; the units should be capable of withstanding the thrust of 1000 to 2000 P.S.I.

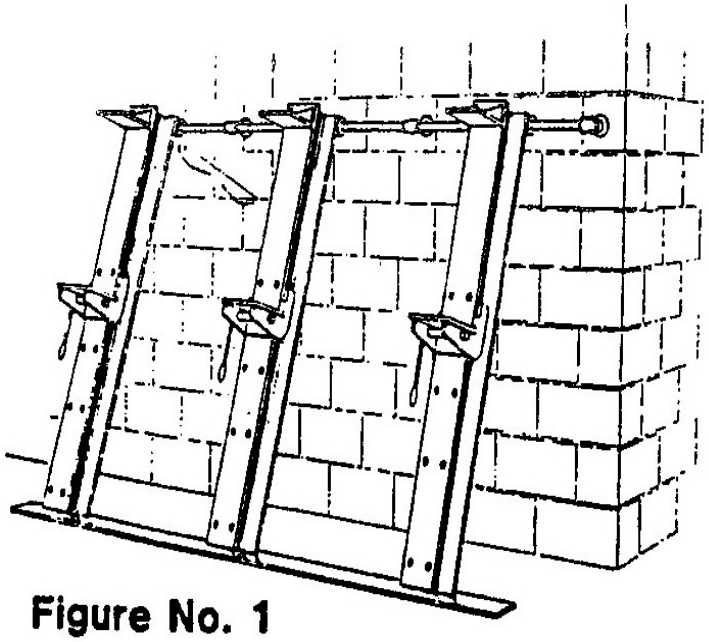


Figure No. 1

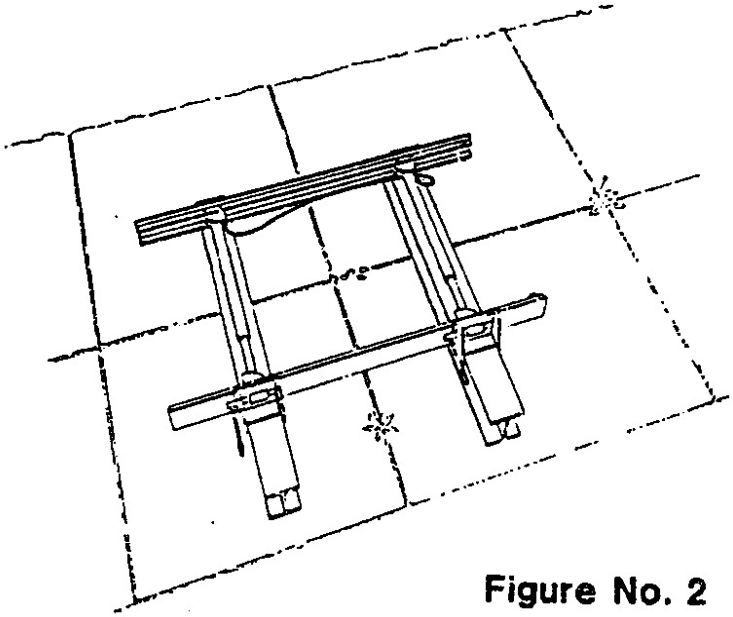


Figure No. 2

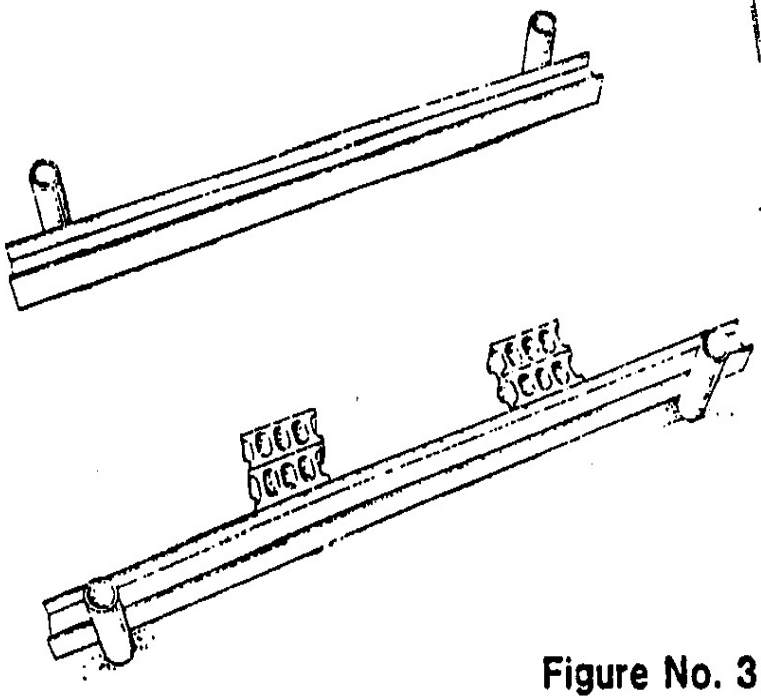
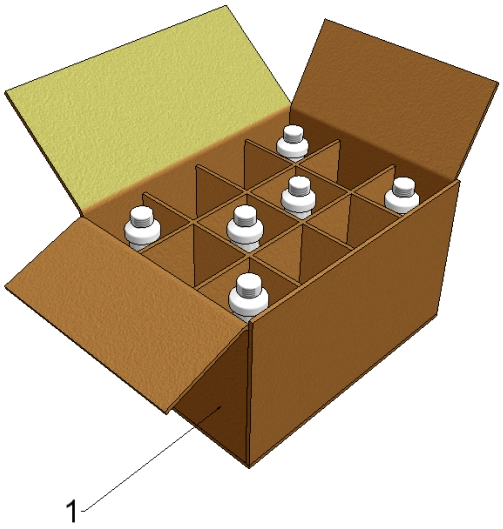


Figure No. 3

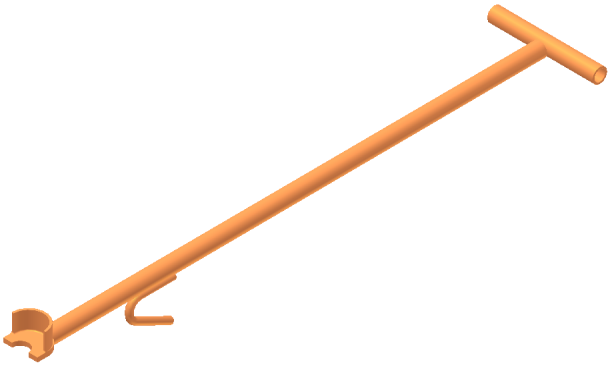
TREN-SHORE ACCESSORIES

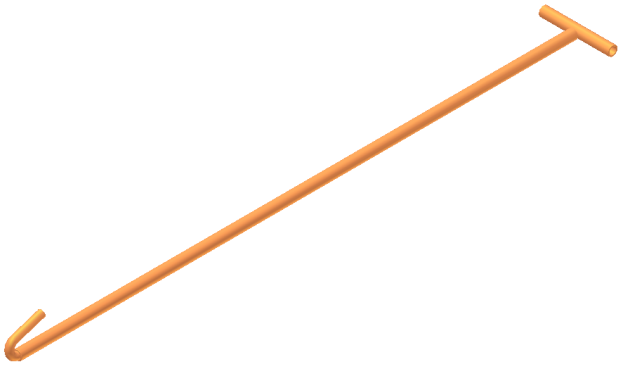


TREN-SHORE FLUID

ITEM	PART No.	QTY.	DESCRIPTION
1	563660	1	CASE, TREN-SHORE FLUID INCLUDES:
2	563659	12	LABEL, TREN-SHORE FLUID
3	563656	12	BOTTLE

INSTALLATION AND REMOVAL TOOLS





TREN-SHORE RELEASE TOOL

Disconnects pump hose after installation of shores and releases fluid prior to removal of shore. 30, 50, and 100 inch lengths are available.

PART No.	LENGTH
563652	100”
563651	50”
563650	30”

TREN-SHORE REMOVAL HOOK

Used to remove Tren-Shore. 30, 50, and 100 inch are available.

PART No.	LENGTH
563655	100”
563653	50”
563654	30”

PARTS INFORMATION

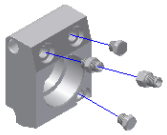
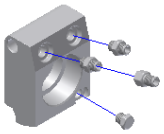
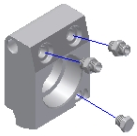
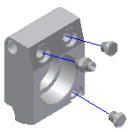
TREN-SHORE CROSS BRACE ASSEMBLIES

FOR TREN-SHORE S/N 100001 & UP

CROSS BRACE FOR	-	PART No. (B/M)	INCLUDES:
1727		564332	563607, 563608 (2), 563609, 563610
2236		564333	563611, 563614, 563624, 563627
2542		564334	563629, 562703 & 562705 (1727) of 563603 & 563605 (2236) or 564203 & 564205 (2542), 564312
4064		564335	563507, 563608 (2), 563609, 563610
5288		564336	563611, 563614, 563624, 563627 563802, 565203 & 566405 (4064) or 568803 & 568805 (5288), 563902, 563930 (4064) or 564044 (5288), 564310

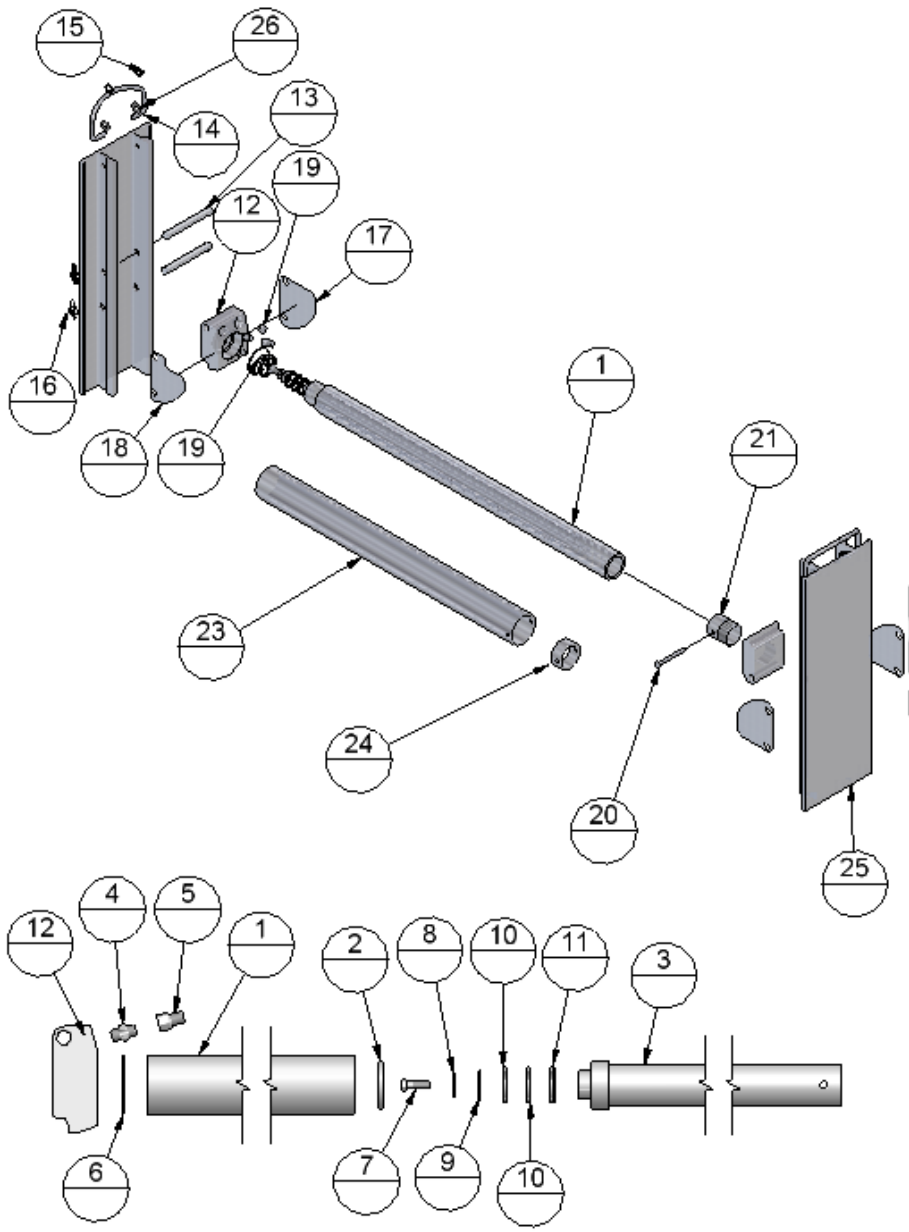
TREN-SHORE FITTING ASSEMBLIES

ASSEMBLIES BELOW ADAPT CROSS BRACE ASSEMBLIES FOR USE IN PARTICULAR SHORE PISTONS

		PART No. (B/M)	INCLUDES:
	2 FOOT (SINGLE CROSS BRACE)	564303	569689, 563617, 563618 (2)
	UPPER CROSS BRACE (EXCEPT 2 FT)	564304	659689, 563617, 656888, 563618
	MIDDLE CROSS BRACE – 12 FT.	564301	656888 (2), 563618
	BOTTOM CROSS BRACE	564302	656888, 563618 (2)

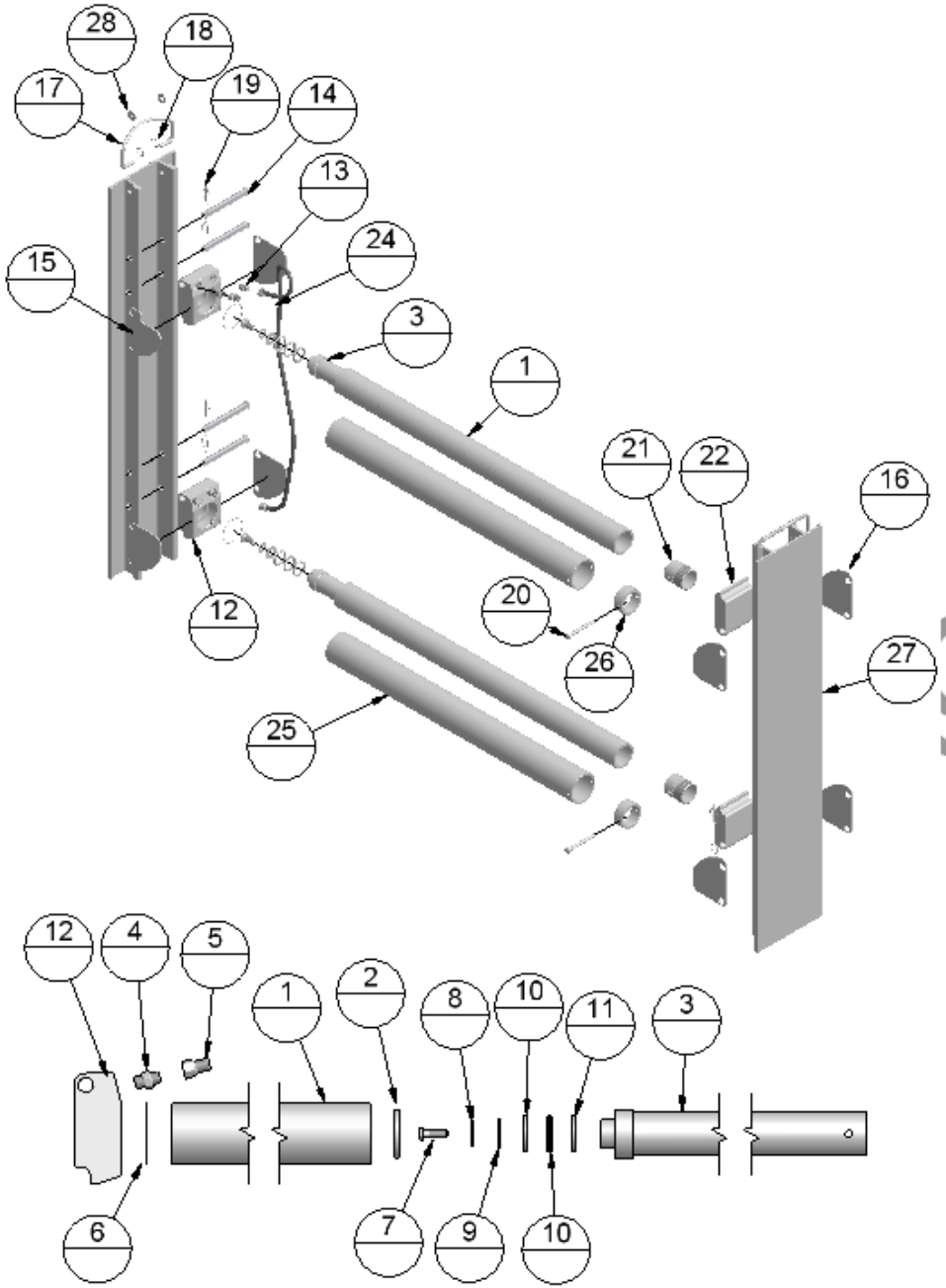
REF.1128

Tren-Shore Heavy Duty - 2'



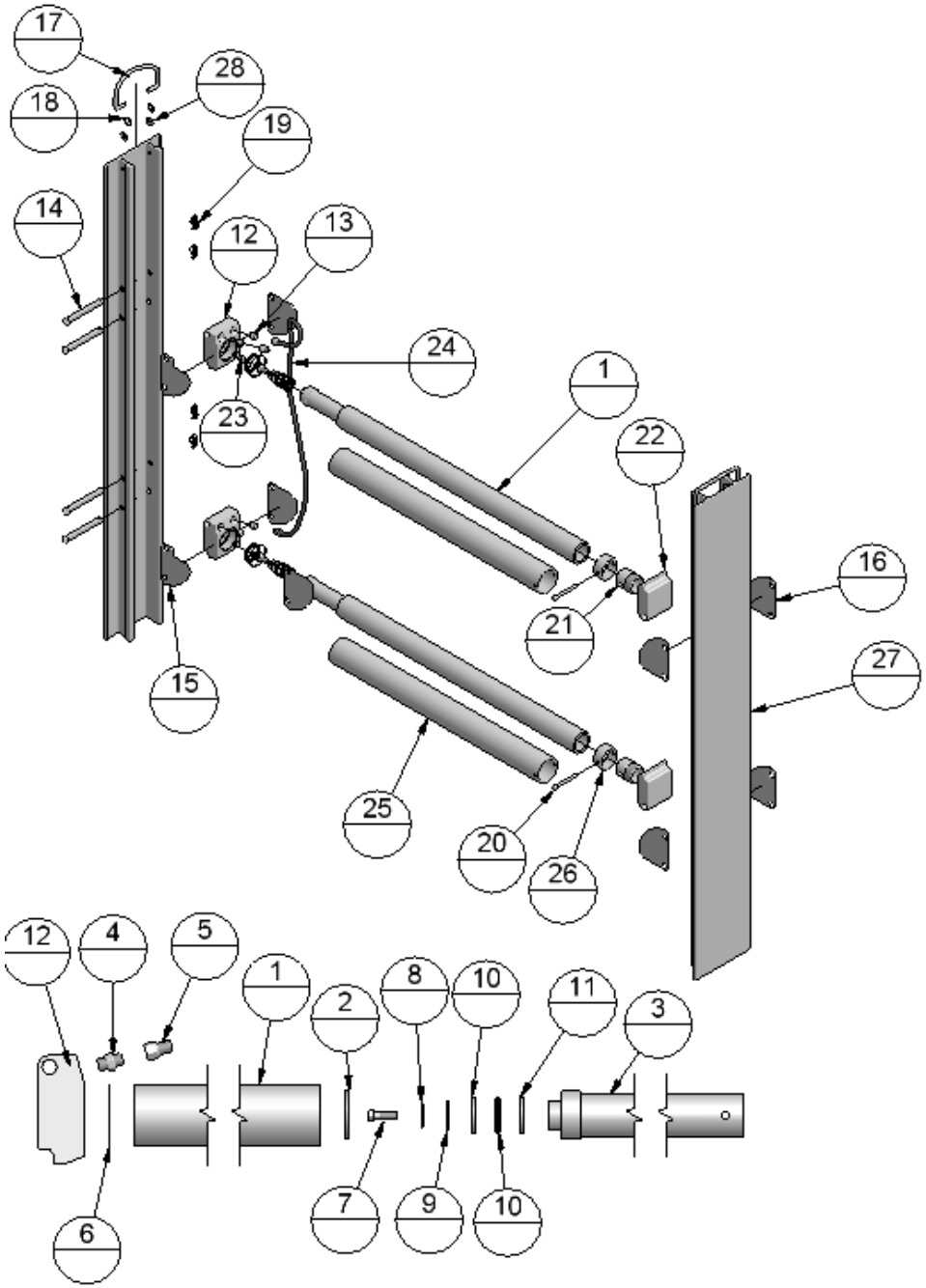
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	1
2	563604	GUIDE & WIPER	1
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	1
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	1
7	563611	HEX HEAD CAP SCREW	1
8	617032	5/8" LOCKWASHER	1
9	563609	WASHER	1
10	563622	PISTON PACKING	2
11	563621	PISTON PACKING	1
12	564312	CYLINDER BLOCK	1
13	561758	PIPE PLUG	2
14	564325	HINGE PIN	4
15	563645	FINGER GUARD	3
16	563745	FINGER GUARD	1
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	8
20	561795	1/4" CLEVIS PIN	1
21	563627	COLLAR	1
22	563624	PISTON END BLOCK	1
23	SEE TABLE IN APPENDIX	OVERSLEEVE	1
24	563902	OVERSLEEVE ADAPTER	1
25	563671	RAIL HEAVY DUTY	2
26	813292	HANDLE WASHER	4

Tren-Shore Heavy Duty - 3.5'



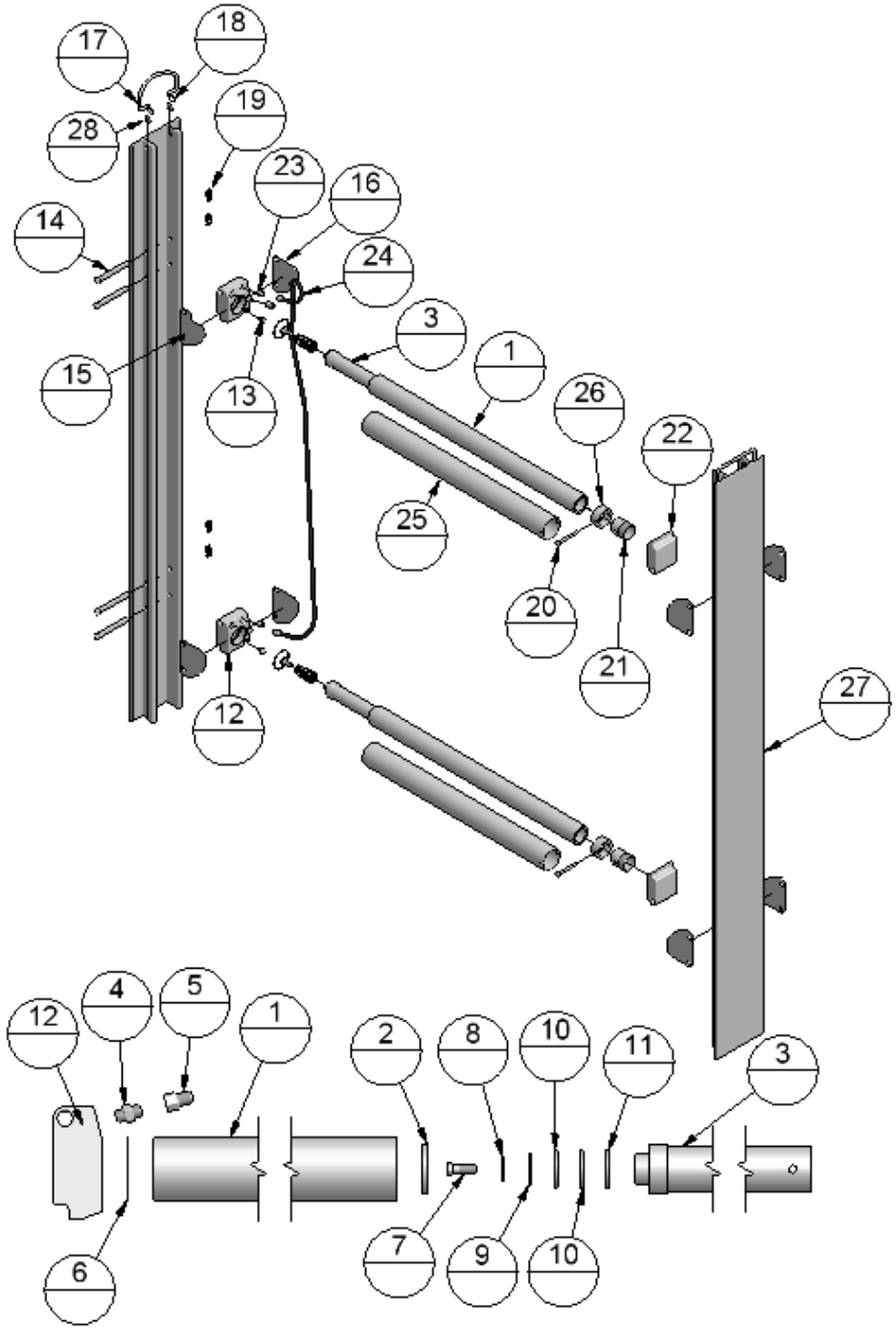
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	2
2	563604	GUIDE & WIPER	2
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	2
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	2
7	563611	HEX HEAD CAP SCREW	2
8	617032	5/8" LOCKWASHER	2
9	563609	WASHER	2
10	563622	PISTON PACKING	4
11	563621	PISTON PACKING	2
12	564312	CYLINDER BLOCK	2
13	561758	PIPE PLUG	3
14	564325	HINGE PIN	8
15	563645	FINGER GUARD	1
16	563745	FINGER GUARD	7
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	16
20	561795	1/4" CLEVIS PIN	2
21	563627	COLLAR	2
22	563624	PISTON END BLOCK	2
23	656888	MALE CONNECTOR	1
24	563565	HOSE ASSEMBLY	1
25	SEE TABLE IN APPENDIX	OVERSLEEVE	2
26	563902	OVERSLEEVE ADAPTER	2
27	563673	RAIL HEAVY DUTY	2
28	813292	HANDLE WASHER	4

Tren-Shore Heavy Duty - 5'



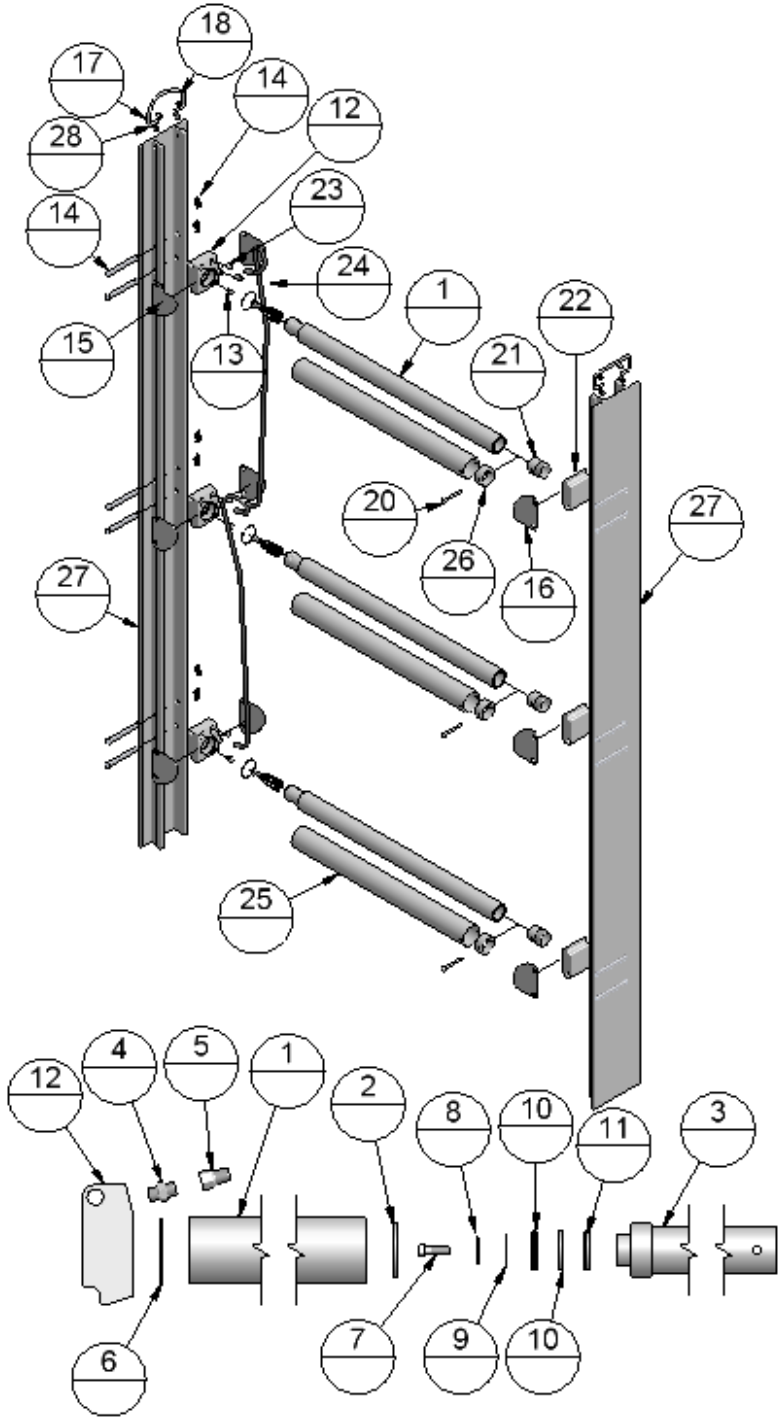
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	2
2	563604	GUIDE & WIPER	2
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	2
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	2
7	563611	HEX HEAD CAP SCREW	2
8	617032	5/8" LOCKWASHER	2
9	563609	WASHER	2
10	563622	PISTON PACKING	4
11	563621	PISTON PACKING	2
12	564312	CYLINDER BLOCK	2
13	561758	PIPE PLUG	3
14	564325	HINGE PIN	8
15	563645	FINGER GUARD	1
16	563745	FINGER GUARD	7
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	16
20	561795	1/4" CLEVIS PIN	2
21	563627	COLLAR	2
22	563624	PISTON END BLOCK	2
23	656888	MALE CONNECTOR	1
24	563565	HOSE ASSEMBLY	1
25	SEE TABLE IN APPENDIX	OVERSLEEVE	2
26	563902	OVERSLEEVE ADAPTER	2
27	563999	RAIL HEAVY DUTY	2
28	813292	HANDLE WASHER	4

Tren-Shore Heavy Duty - 7'



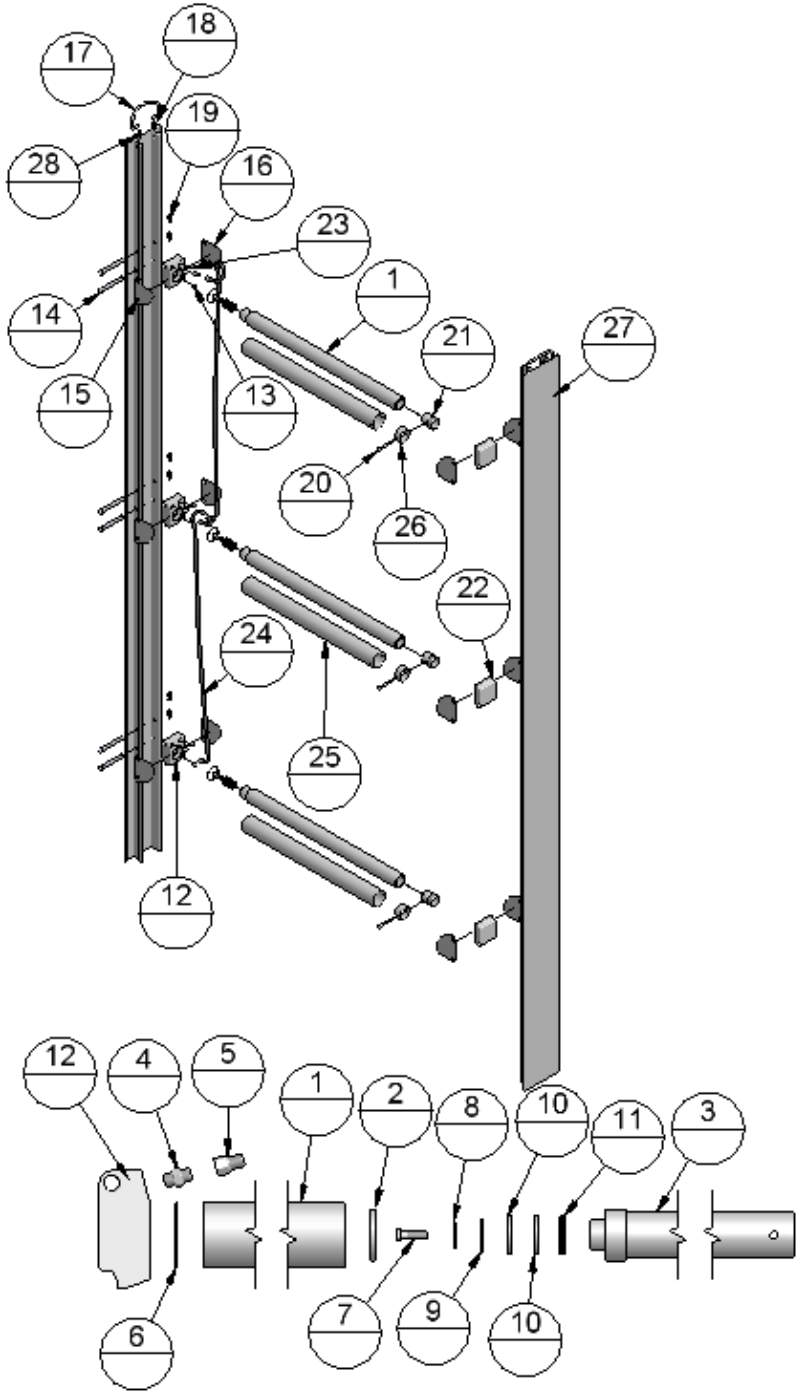
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	2
2	563604	GUIDE & WIPER	2
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	2
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	2
7	563611	HEX HEAD CAP SCREW	2
8	617032	5/8" LOCKWASHER	2
9	563609	WASHER	2
10	563622	PISTON PACKING	4
11	563621	PISTON PACKING	2
12	564312	CYLINDER BLOCK	2
13	561758	PIPE PLUG	3
14	564325	HINGE PIN	8
15	563645	FINGER GUARD	1
16	563745	FINGER GUARD	7
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	16
20	561795	1/4" CLEVIS PIN	2
21	563627	COLLAR	2
22	563624	PISTON END BLOCK	2
23	656888	MALE CONNECTOR	1
24	563566	HOSE ASSEMBLY	1
25	SEE TABLE IN APPENDIX	OVERSLEEVE	2
26	563902	OVERSLEEVE ADAPTER	2
27	563999	RAIL HEAVY DUTY	2
28	813292	HANDLE WASHER	4

Tren-Shore Heavy Duty - 9'



PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	3
2	563604	GUIDE & WIPER	3
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	3
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	3
7	563611	HEX HEAD CAP SCREW	3
8	617032	5/8" LOCKWASHER	3
9	563609	WASHER	3
10	563622	PISTON PACKING	6
11	563621	PISTON PACKING	3
12	564312	CYLINDER BLOCK	3
13	561758	PIPE PLUG	4
14	564325	HINGE PIN	12
15	563645	FINGER GUARD	1
16	563745	FINGER GUARD	11
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	24
20	561795	1/4" CLEVIS PIN	3
21	563627	COLLAR	3
22	563624	PISTON END BLOCK	3
23	656888	MALE CONNECTOR	4
24	563563	HOSE ASSEMBLY	2
25	SEE TABLE IN APPENDIX	OVERSLEEVE	3
26	563902	OVERSLEEVE ADAPTER	3
27	563999	RAIL HEAVY DUTY	2
28	813292	HANDLE WASHER	4

Tren-Shore Heavy Duty - 12'



PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY.
1	562703, 563603, 564203, 561783, 565203, 568803	CYLINDER	3
2	563604	GUIDE & WIPER	3
3	562705, 563605, 564205, 561791, 566405, 568805	PISTON & ROD	3
4	659689	HEX NIPPLE	1
5	563617	Q.D. INLET VALVE	1
6	563614	O-RING	3
7	563611	HEX HEAD CAP SCREW	3
8	617032	5/8" LOCKWASHER	3
9	563609	WASHER	3
10	563622	PISTON PACKING	6
11	563621	PISTON PACKING	3
12	564312	CYLINDER BLOCK	3
13	561758	PIPE PLUG	4
14	564325	HINGE PIN	12
15	563645	FINGER GUARD	1
16	563745	FINGER GUARD	11
17	563634	HANDLE	2
18	563630	1/4" QUICK CLIP	4
19	564329	QUICK RETAINER	24
20	561795	1/4" CLEVIS PIN	3
21	563627	COLLAR	3
22	563624	PISTON END BLOCK	3
23	656888	MALE CONNECTOR	4
24	563566	HOSE ASSEMBLY	2
25	SEE TABLE IN APPENDIX	OVERSLEEVE	3
26	563902	OVERSLEEVE ADAPTER	3
27	563999	RAIL HEAVY DUTY	2
28	813292	HANDLE WASHER	4

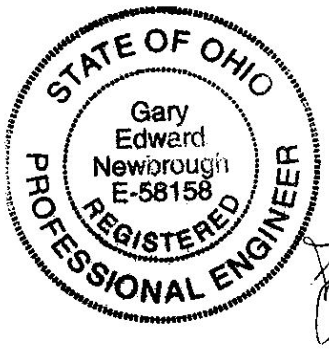
Kundel Industries, Inc

Tabulated Data Tren-Shore®

Aluminum Hydraulic Shoring

Pages 23-29

REVIEWED & APPROVED FOR DECEMBER, 2010
MODIFICATIONS ONLY



12-14-2010

~ WARNING ~

IMPROPER EXCAVATION PROCEDURES MAY RESULT IN INJURY OR DEATH.

~ CAUTION ~

READ THIS DOCUMENT COMPLETELY BEFORE INSTALLING VERTICAL SHORES.

1.0 Important Safety Information

1.1 Never enter an excavation that is not properly shored, shielded, or sloped.

1.2 Inspect excavations and shoring systems daily or whenever soil conditions are subject to change because of changes in weather, soil moisture content, vibration or surcharge loads. Refer to Sections 2.2 and 2.3.

1.3 Always enter, work and exit the excavation within the protected area.

1.4 Always enter and exit the excavation using ladders or other approved means. Do not use any shoring system for ingress or egress unless approved by the manufacturer.

1.5 Inspect all related equipment such as ladders and lifting accessories for damage and suitable capacity. Repair or replace as required.

2.0 General

2.1 Kundel Industries, Inc. Tabulated Data is in accordance with federal regulations, 29 CFR Part 1926, OSHA Subpart P, Excavations.

2.2 A "Competent Person" is one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

2.3 The "Competent Person" shall use Kundel's Tabulated Data for the proper application of Kundel Tren-Shore® Vertical Hydraulic Shores, referred to hereafter as Shores. Refer to this data during project planning and installation.

2.4 The latest revision of this Tabulated Data supersedes all previous revisions and takes precedence when in conflict with 29 CFR Part 1926. Any topics not addressed by this Tabulated Data shall be governed by the OSHA regulations. For conditions not addressed by either this Tabulated Data or OSHA regulations, a site specific engineered shoring system is required. Contact a registered, professional engineer for proper design and certification.

2.5 State and local safety agencies may impose additional requirements. Contact state and local offices to determine if such regulations exist.

3.0 Soil Classification

3.1 Generally, Type A soil is a cohesive soil with an unconfined compressive strength of 1.5 tons per square foot (144 kPa) or greater. Refer to 29 CFR Part 1926 Subpart P for a complete description of Type A soils, examples, and external factors that affect soil classification.

3.2 Generally, Type B soil is a cohesive soil with an unconfined compressive strength greater than 0.5 tons per square foot (48 kPa) but less than 1.5 tons per square foot (144 kPa). Also, certain cohesion less soils may qualify as Type B. Refer to 29 CFR Part 1926 Subpart P for a complete description of Type B soils, examples, and external factors that affect soil classification.

3.3 “Free Standing C” soil is a moist dense sand or a moist cohesive which is not fluid or submerged. “Free Standing C” soil also includes soils that are initially classified Type B soils but are subject to external factors that cause the soil to become less stable. This includes soils that are subject to moisture from thaw or light rain. Free Standing C soil is capable of supporting a vertical cut to full depth and is capable of standing unsupported until the shoring system is properly installed.

3.4 The “Competent Person” shall continuously monitor the excavation for changes in soil condition. Such changes may require soil reclassification.

4.0 Design Considerations and Limitations

4.1 The Tabulated Data includes the surcharge effect of a spoil pile two foot high within a horizontal distance from the excavation equal to the excavation depth. Shores are not designed to support extreme surcharge loads, structural foundations, construction equipment, or vehicles. If excessive surcharge load conditions exist, additional excavation support may be necessary. Contact a registered, professional engineer for a proper shoring system design.

4.2 Shore cross braces are not designed to support vertical loads. Only use approved means for ingress and egress from the trench.

4.3 The Tabulated Data is only valid for Shores in good structural condition. Do not use damaged Shores. Damage reduces the Shore’s structural capability, nullifies the Tabulated Data, and voids the manufacturer’s warranty.

4.4 Do not use Shores when submerged under water. De-water the excavation and allow the competent to assess the proper soil condition before entering the excavation. Shores shall then be installed in correspondence with the proper soil type as shown in figures 6.1 – 6.4. See also section 5.7.

4.5 Do not stack Shores to span widths greater than the Shore’s maximum reach.

5.0 Installation - Preparation and Monitoring

5.1 All personnel shall be trained in the proper use and installation of Shores and in general construction safety practices. For detailed installation procedures, refer to the TrenShore® Operation, Installation, Service and Safety manual.

5.2 All personnel must be aware of excavation conditions at all times. If a decrease in soil stability is observed or suspected or if excessive Shore or sheeting deformation is observed; all personnel shall vacate the excavation until the Competent Person can properly assess the situation.

5.3 A copy of this Tabulated Data shall be at each site where Shores are installed.

5.4 The Competent Person shall (1) Determine the soil type or types in accordance with OHSA regulations and Tabulated Data definitions, and (2) Monitor the conditions of the excavation site for signs of deterioration. Excavation conditions must be assessed daily, after rain or thaw, and after any event that may decrease soil stability.

5.5 Prior to Shore installation, the excavation face must be near vertical and capable of standing, full depth, unsupported until the shoring system is properly installed. Typically, in order to properly

distribute brace loads, Shore rails must bear continuously against the soil or, if used or required, approved sheeting. Approved sheeting shall bear uniformly against the soil. In all other situations, voids must be filled with compacted fill material or a stable solid substitute that will properly distribute the cross brace compressive load.

5.6 During installation check to insure installation pressure is maintained. If pressure cannot be maintained, check for leaks and repair. If no leaks exist and pressure cannot be maintained, the soil may be too soft for Shore use. Under these conditions, another type of protective system is required.

5.7 The excavation should be free of water i.e. water seeping from sidewalls of excavation. Divert surface water away from the excavation. All standing water should be pumped from the excavation. After water removal, soil stability must be assessed by the competent person for decreased soil stability or excess lateral pressure caused by ground water.

6.0 Tabulated Data

6.1 All Shores shall be installed in accordance with Tables 6.1, 6.2 and 6.3 and Figures 6.1 through 6.4.

6.2 The top cross brace shall be no less than one foot and no more than two feet below the top of the excavation.

6.3 The lowest cross brace shall be no more than four feet above the bottom of the excavation.

6.4 Shores may be installed in any orientation provided the rails are perpendicular to the cross braces and the other Tabulated Data requirements are satisfied.

6.5 Shores shall be installed in a minimum of three vertical planes unless the excavation is 4 feet or less in length and be in accordance with the provisions of the Tabulated Data. If only two vertical planes can be installed, the safe working area is between the cross braces. Excavation ends must be properly shored or sloped before entering the excavation.

6.6 Sheeting, while not required for Type A and B soils, is always recommended to prevent spalling or sloughing of the excavation walls. Sheeting, if used, shall extend to within two feet from the bottom of the excavation. Sheeting is required if spilling or sloughing is evident.

6.7 Sheeting is required for Free Standing C soils. Sheeting can be spaced (bottom and sides) to a maximum of 24 inches if soil conditions permit through judgment of the competent person. If soil conditions seem unstable, excessive sloughing occurs or water seepage is present then the sheeting shall be continuous, i.e., no gaps between sheets, and shall extend to the excavation bottom.

6.8 The following materials are approved for use as sheeting with Shores. All approved sheeting must be kept in good condition, free from damage and delamination, and other defects which compromise structural integrity.

a. Arctic white birch, ¾ inch thick, 14-ply plywood with phenolic resin surface finish. Examples: Finn Form or Shorform brand.
b. CDX grade, 1-1/8 inch thick, 7 ply plywood. Plywood surfaces shall be properly coated with a waterproofing agent or paint to prevent the moisture absorption.
c. Two sheets of CDX grade, 3/4 inch thick, 5 ply plywood used as a double thick single sheet. Plywood surfaces shall be properly coated with a waterproofing agent or paint to prevent the moisture absorption.
d. Steel plate, minimum ½ inch thick. Approved steel shall have a minimum yield stress of 36,000 psi and a modulus of elasticity of 29,000,000 psi.

TABLE 6.1 – Type "A" Soil

Trench Depth (Ft)	Number of Cylinders Vertically	Max Vertical Spacing (Ft)	Trench Width (Ft)				Sheeting[2] Required
			0 to 12		12 to 18		
			Max Horizontal Spacing (Ft)	Oversleeve[1] Required	Max Horizontal Spacing (Ft)	Oversleeve[1] Required	
0 to 6	1	4	8	No	8	Yes	No
6 to 11	2	4	8	No	8	Yes	No
11 to 15	3	4	8	No	8	Yes	No
15 to 19	4	4	8	No	8	Yes	No
19 to 22	5	4	8	No	8	Yes	No
22 to 25	6	4	8	No	8	Yes	No

TABLE 6.2 – Type "B" Soil

Trench Depth (Ft)	Number of Cylinders Vertically	Max Vertical Spacing (Ft)	Trench Width (Ft)				Sheeting[2] Required
			0 to 12		12 to 18		
			Max Horizontal Spacing (Ft)	Oversleeve[1] Required	Max Horizontal Spacing (Ft)	Oversleeve[1] Required	
0 to 6	1	4	8	No	8	Yes	No
6 to 11	2	4	8	No	8	Yes	No
11 to 15	3	4	8	No	8	Yes	No
15 to 19	4	4	6	No	6	Yes	No
19 to 22	5	4	6	No	6	Yes	No
22 to 25	6	4	6	No	6	Yes	No

TABLE 6.3 – Free Standing "C" Soil

Trench Depth (Ft)	Number of Cylinders Vertically	Max Vertical Spacing (Ft)	Trench Width (Ft)				Sheeting[2] Required
			0 to 12		12 to 18		
			Max Horizontal Spacing (Ft)	Oversleeve[1] Required	Max Horizontal Spacing (Ft)	Oversleeve[1] Required	
0 to 6	1	4	6	No	6	Yes	Yes
6 to 11	2	4	6	No	6	Yes	Yes
11 to 15	3	4	6	No	6	Yes	Yes
15 to 19	4	4	4	No	4	Yes	Yes
19 to 22	5	4	4	No	4	Yes	Yes
22 to 25	6	4	4	No	4	Yes	Yes

Notes for Tables 6.1, 6.2 and 6.3:

1. For Oversleeve Required applications, the Oversleeve shall be the Kundel structural steel type designed for the specific Shore model and length. The structural oversleeve shall extend the full length of the retracted cylinder.

2. For Sheeting Required applications, the Sheeting shall be one of the approved types specified in Section 6.8. The Sheeting shall be installed in accordance with Section 6.6 and 6.7.

STATE OF OHIO Gary Edward Newbrough E-58158 REGISTERED PROFESSIONAL ENGINEER
12-14-2010

STATE OF OHIO HENRY J. VENETTA 25091 REGISTERED PROFESSIONAL ENGINEER
7-26-00

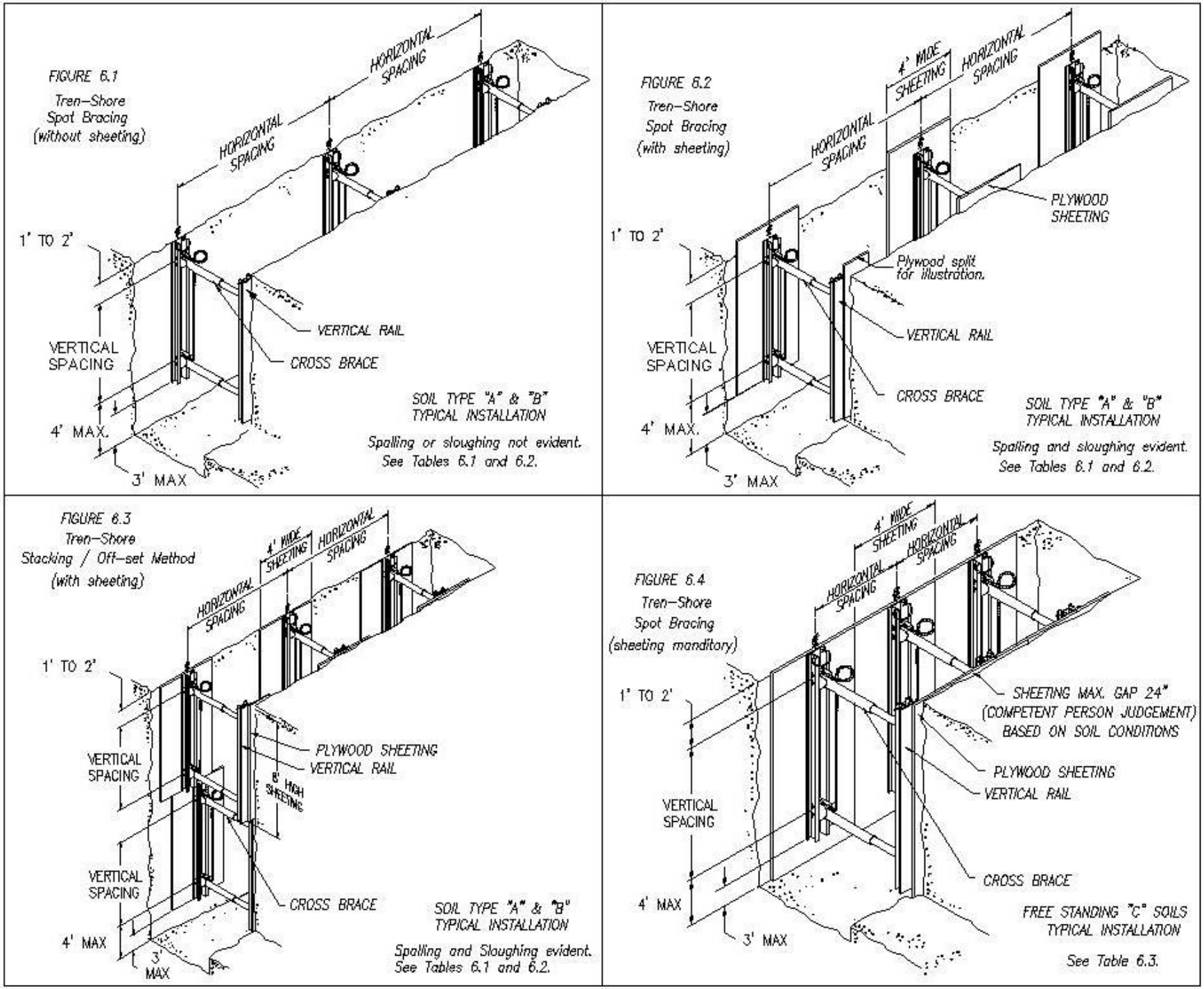
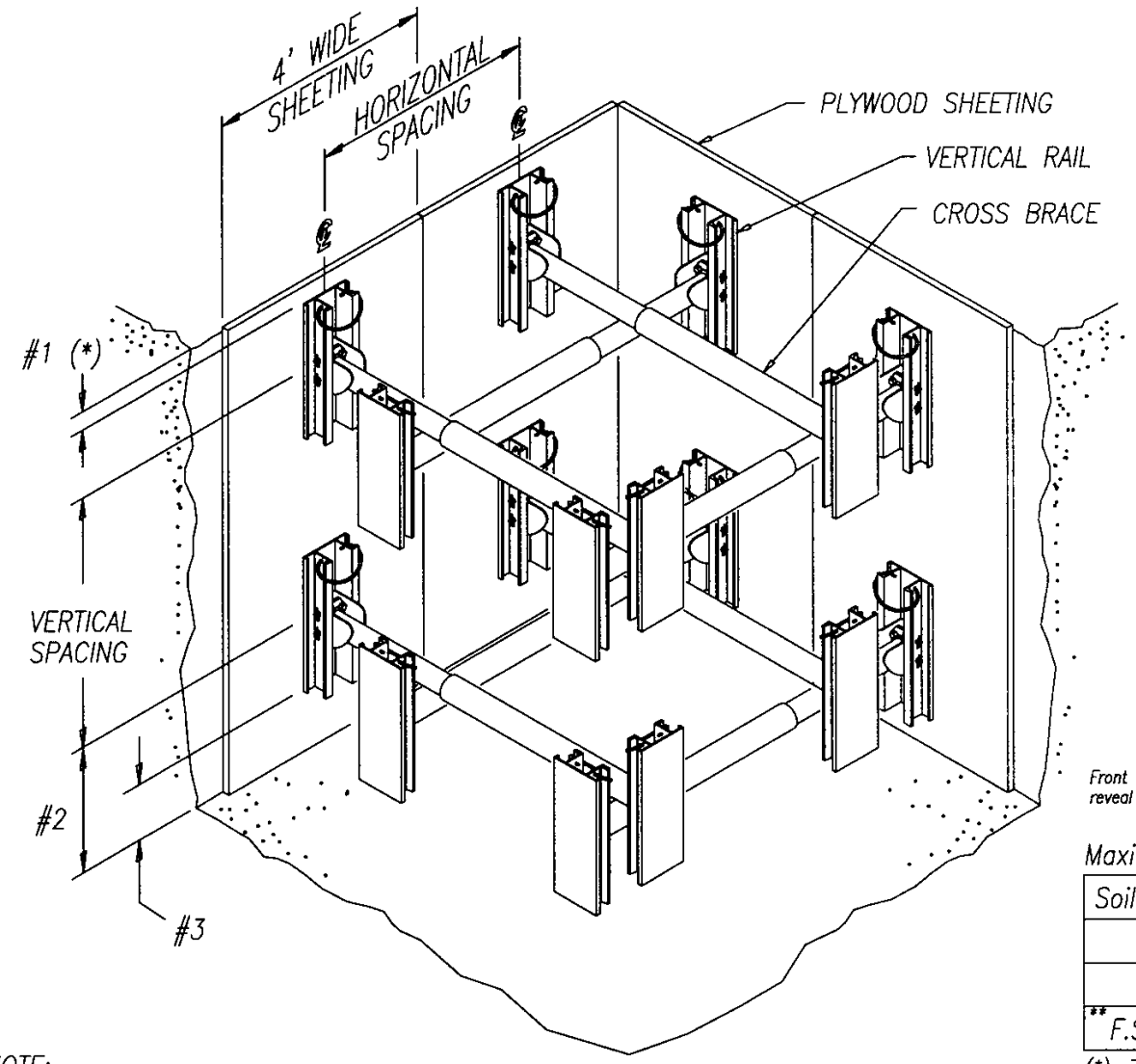


FIGURE 6.1
Tren-Shore
Spot Bracing
(without sheeting)
HORIZONTAL SPACING
HORIZONTAL SPACING
1' TO 2'
VERTICAL SPACING
4' MAX.
3' MAX
VERTICAL RAIL
CROSS BRACE
SOIL TYPE "A" & "B"
TYPICAL INSTALLATION
Spalling or sloughing not evident.
See Tables 6.1 and 6.2.
FIGURE 6.2
Tren-Shore
Spot Bracing
(with sheeting)
4' WIDE SHEETING
HORIZONTAL SPACING
HORIZONTAL SPACING
PLYWOOD SHEETING
1' TO 2'
Plywood split for illustration.
VERTICAL RAIL
VERTICAL SPACING
CROSS BRACE
4' MAX.
3' MAX
SOIL TYPE "A" & "B"
TYPICAL INSTALLATION
Spalling and sloughing evident.
See Tables 6.1 and 6.2.
FIGURE 6.3
Tren-Shore
Stacking / Off-set Method
(with sheeting)
4' WIDE SHEETING
HORIZONTAL SPACING
HORIZONTAL SPACING
1' TO 2'
PLYWOOD SHEETING
VERTICAL RAIL
VERTICAL SPACING
8' HIGH SHEETING
VERTICAL SPACING
CROSS BRACE
4' MAX
3' MAX
SOIL TYPE "A" & "B"
TYPICAL INSTALLATION
Spalling and Sloughing evident.
See Tables 6.1 and 6.2.
FIGURE 6.4
Tren-Shore
Spot Bracing
(sheeting manditory)
4' WIDE SHEETING
HORIZONTAL SPACING
HORIZONTAL SPACING
1' TO 2'
SHEETING MAX. GAP 24"
(COMPETENT PERSON JUDGEMENT)
BASED ON SOIL CONDITIONS
PLYWOOD SHEETING
VERTICAL RAIL
VERTICAL SPACING
CROSS BRACE
4' MAX
3' MAX
FREE STANDING "C" SOILS
TYPICAL INSTALLATION
See Table 6.3.

Kundel INDUSTRIES
Giving Support to the People in the Trenches

(REF. 1641-B)



SHORING FOR A MANHOLE

(Using 2' Shores)

Minimum of 8 individual, 2 foot shores required for installation.

Front walls cut away to reveal shore placement.

Maximum Dimensions:

Soil Type	*#1	#2	#3
'A'	6"	4'	2'
'B'	6"	4'	2'
**F.S. 'C'	6"	3'	1'

(*): Zero to 6" below grade line.

(**): Free Standing 'C' soil – see definition on page 5 of REF. 1641

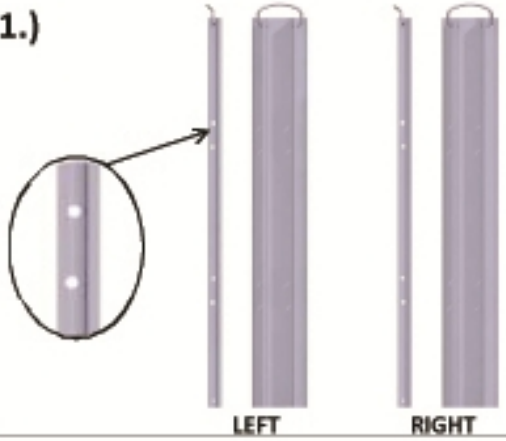
NOTE:

Refer to the tables in REF. 1641 for complete spacing dimensions based on soil type and for complete application and usage information.

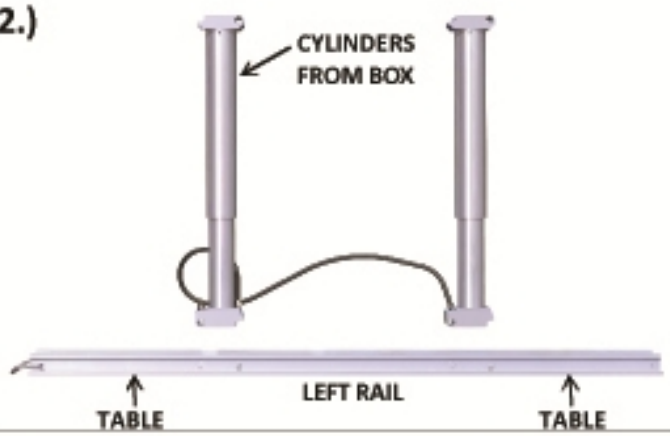
Sheeting is recommended for all applications but required for free standing 'C' type soils.

HYDRAULIC JACK SETUP GUIDE

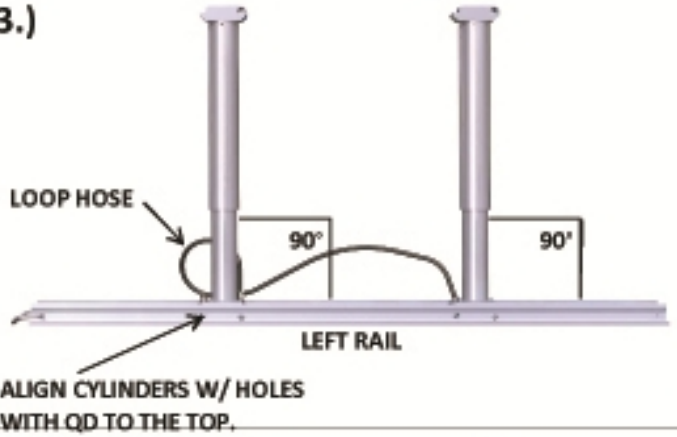
1.)



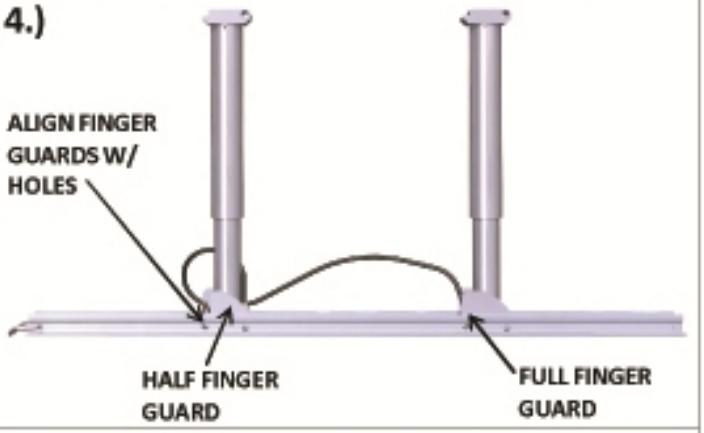
2.)



3.)

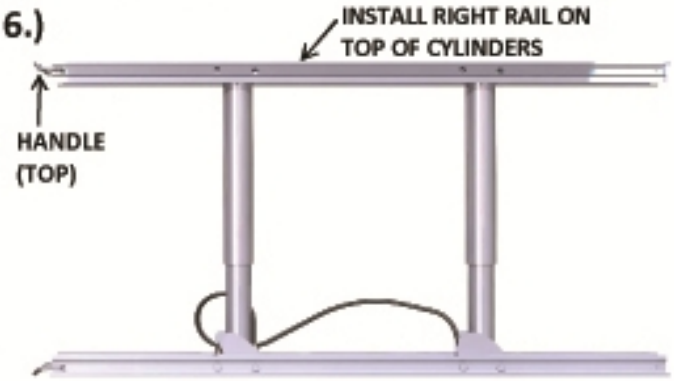


4.)



5.)

6.)



7.)

8.)