

FROM: HQ AFCESA/CES
139 Barnes Drive Suite 1
Tyndall AFB FL 32403-5319

SUBJECT: **Engineering Technical Letter (ETL) 98-10: Installation and Operation Guide for the Stanley Hydraulic Power Unit (HPU) (Mobile Aircraft Arresting System (MAAS) Upgrade)**

1. Purpose. This ETL provides a detailed installation guide for mounting the Stanley HP-1 Compact Hydraulic Power Unit on the Mobile Aircraft Arresting System (MAAS), operating instructions for the new HPU and its ancillary equipment, and a replacement equipment parts listing. The Stanley HP-1 HPU replaces the Wacker HPU originally supplied with the MAAS.

2. Application: All Air Force installations.

2.1. Authority: AFD 32-10, *Air Force Installations and Facilities*.

2.2. Effective Date: Immediately.

2.3. Expiration: Will be rescinded upon publication of the supplement to Technical Order (TO) 35E8-2-10-1, 3, 4 containing these instructions.

2.4. Ultimate Recipients: All Air Force MAAS users.

2.5. Coordination: This ETL has been coordinated with San Antonio Air Logistics Center, Ground Support Equipment Engineering Division (SA/ALC/LDEE), and the Aeronautical Systems Center, Air Base Systems Division (ASC/WMO).

3. Referenced Publications: TO 35E8-2-10-1, *Operation and Maintenance Instructions, Arresting Systems, Aircraft, Mobile*.

4. System Description. The HPU provides power to raise and lower the MAAS chassis and operate installation equipment such as hydraulic hammer drills and hydraulic breakers, the stake removal tool, and the on-board winch. The Stanley HP 1 Compact Unit is designed to power Hydraulic Tool Manufacturers Association (HTMA) Type I (5 gallons per minute (gpm) @ 2000 pounds per square inch (psi) and Type II (8 gpm @ 2500 psi) hydraulic tools. The HP 1 comprises a nominally rated 8 gpm @ 2000 psi Intertech hydraulic pump, powered by an 18 horsepower Briggs and Stratton unleaded gasoline engine. It has a 2.7-gallon hydraulic reservoir, and a 4.2-gallon fuel capacity (3½ hours of continuous operation). The unit is 12 Vdc electric start, with an optional pull starter kit available from Briggs and Stratton.

Note: The pull starter option is strongly recommended for all Air Force activities to ensure starting in event of battery failure.

5. Installation.

5.1. Remove Existing Trailer Hydraulic Connections. On the right (curb) side of the MAAS trailer, locate the quick disconnect block. Remove and discard the existing Series 56 male and female couplings, the flat washer, and the dust cap and plug.

Note: These components connect the 8-foot-long transmission hoses of the original Wacker HPU to the trailer.

5.2. Install New Trailer Hydraulic Connections. Install the new series 49 male and female couplers and tethered cap and plug set to the trailer quick disconnect.

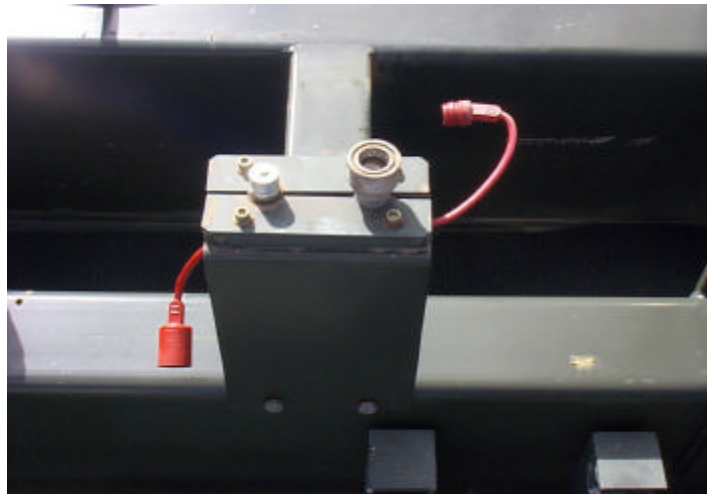


Figure 1. MAAS Trailer Hydraulic Connections

5.3. Remove Existing Wacker HPU Holddown Brackets.

5.3.1. On each HPU platform, remove the two holddown brackets by removing the bolts, nuts, and lock washers (four each). Discard the attaching hardware, latch mechanisms, and bottom mounting plates.

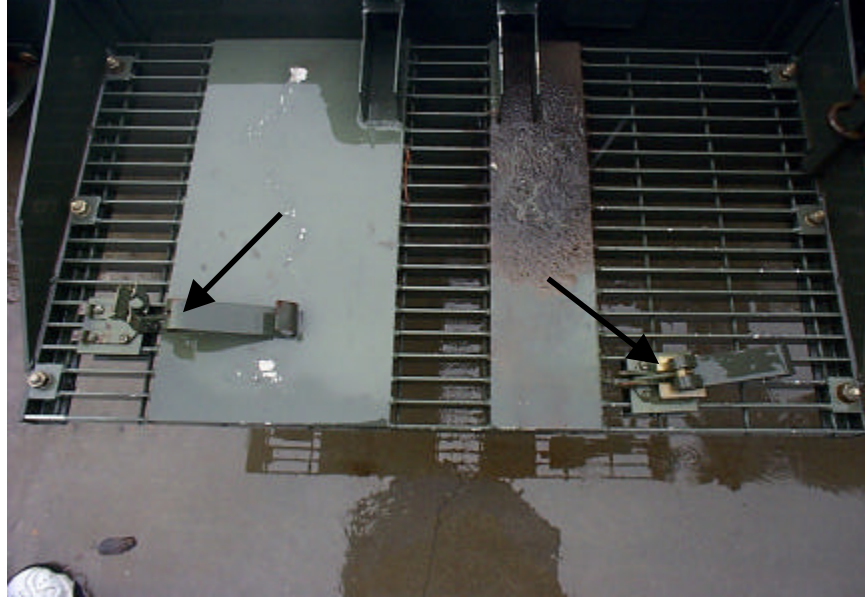


Figure 2. Wacker HPU Holddown Brackets

5.3.2. Remove the center ½" bolt, nut, and lock washer from the center attachment of the grate on the side opposite the breaker mounting post. Discard hardware.

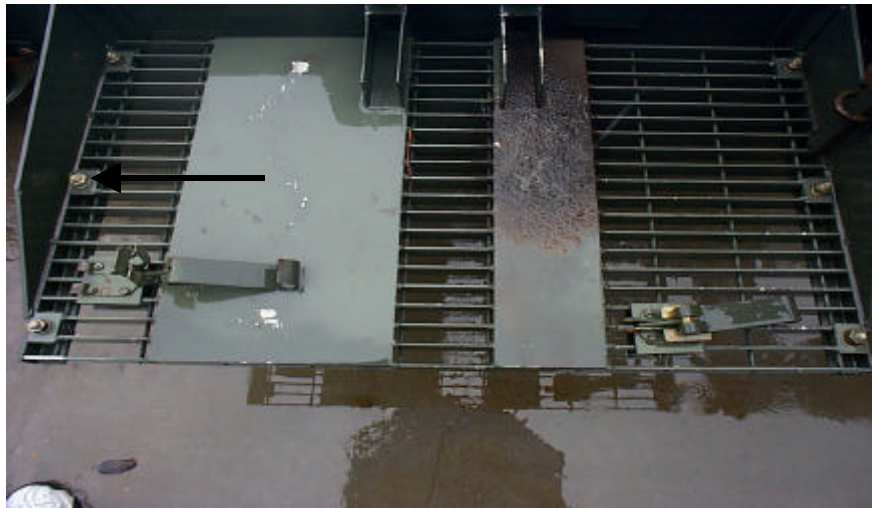


Figure 3. Mounting Platform Bolt Removal

5.4. Install New HPU Rear Holddown Brackets.

5.4.1. Insert the new ½" x 3" stainless hex bolt up through the center hole in the aluminum grated platform where the ½" bolt was removed (paragraph 4.3.2). Install the rear HPU holddown bracket over the bolt; install the nut and tighten finger-tight only.

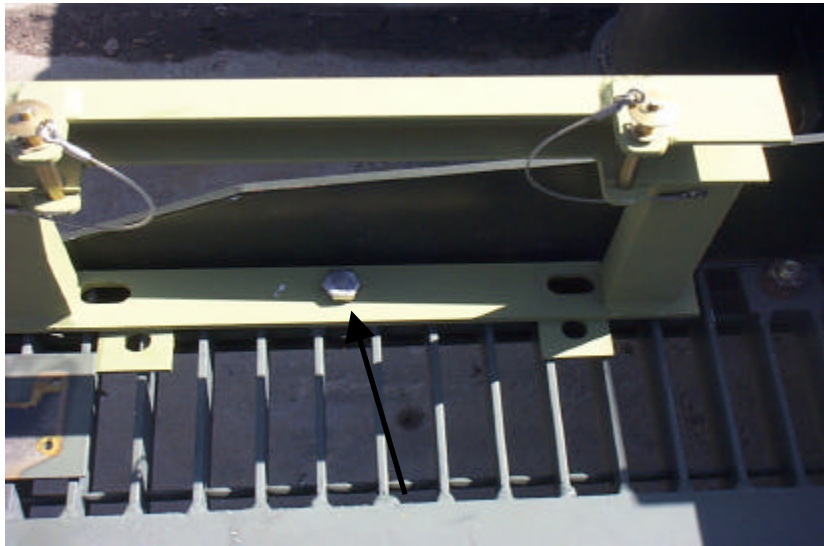


Figure 4. Positioning Rear Holddown Bracket

5.4.2. Align the rear HPU bracket parallel with the side support bracket of the grated platform and mark the two outboard hole locations (center of slotted holes) in the bottom brace of the side support bracket. Remove the previously installed $\frac{1}{2}$ " bolt (paragraph 5.4.1) and remove the rear HPU bracket. Drill the marked holes in the side support bracket with a $\frac{9}{16}$ " drill bit.



Figure 5. Aligning Rear Holddown Bracket



Figure 6. Drilling Platform

5.4.3. Install the rear holddown bracket using the three 1/2" x 3" stainless hex bolts, square spacers on outboard bolts, flat washers (atop the bracket), lock washers, and nuts. Torque the bolts to 40 foot-pounds, or until the lock washer is crushed completely flat. **Note:** The square spacers between the grated platform surface and the bracket base are required to prevent bending of the bracket base as the bolts are tightened.

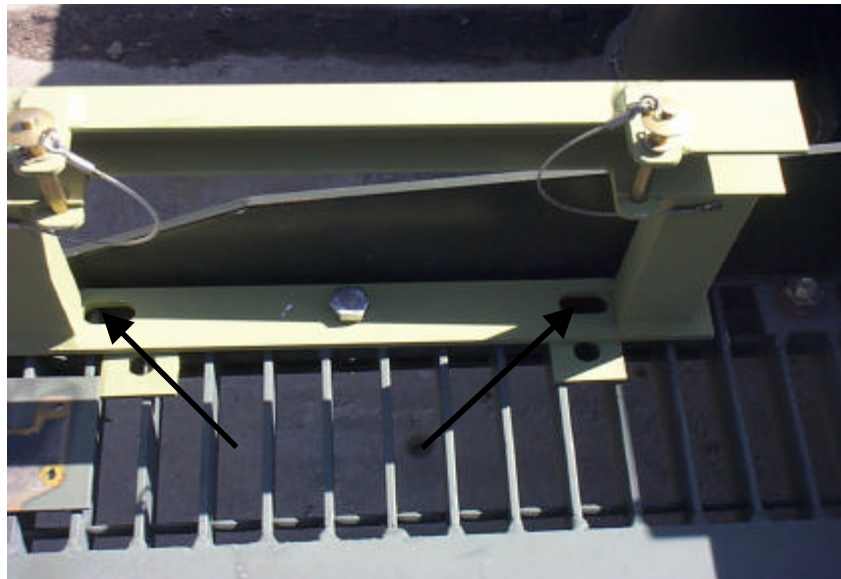


Figure 7. Securing Rear Holddown Bracket

5.5. Install the Stanley HPU. Position the new Stanley HPU on the grated platform and engage the rear cross member of the unit in the aft bracket. Insert the two retention pins (positive lock) through the aft bracket to ensure proper positioning.

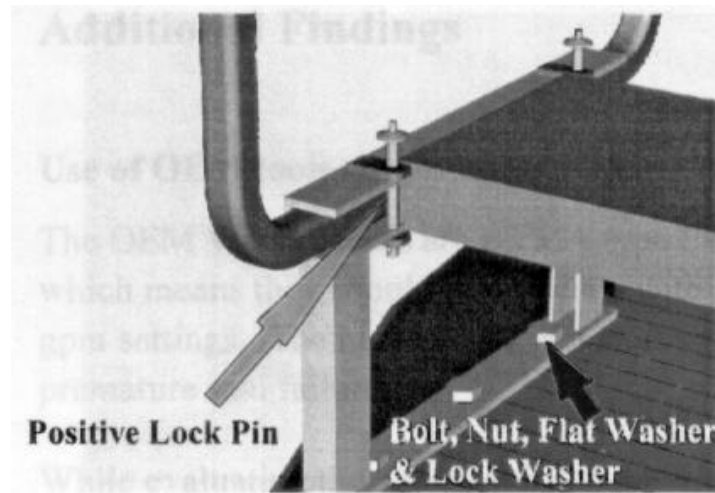


Figure 8. Positioning the Stanley HPU

5.6. Install New HPU Forward Holddown Brackets. Position the two front HPU brackets over the front support legs (skid) of the Stanley HPU and on the grated platform to allow installation of the eight (each) 5/16" x 2-1/4" bolts, flat washers, saddle clips, lock washers, and nuts (bolts should be positioned through the 3rd, 5th, 15th, and 17th grate spaces, counting inward from the edge of the platform). Ensure the retention pin lanyards are attached under the bolts of the appropriate front brackets.

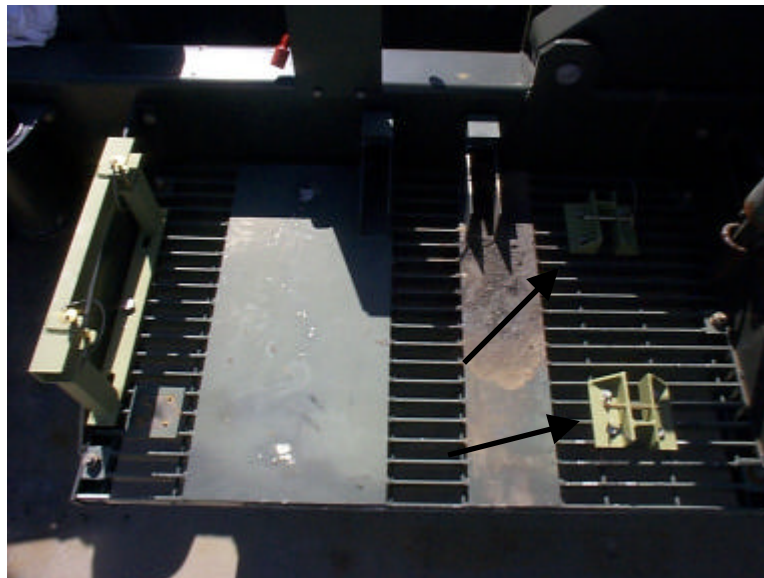


Figure 9. Mounting the Forward Holddown Brackets

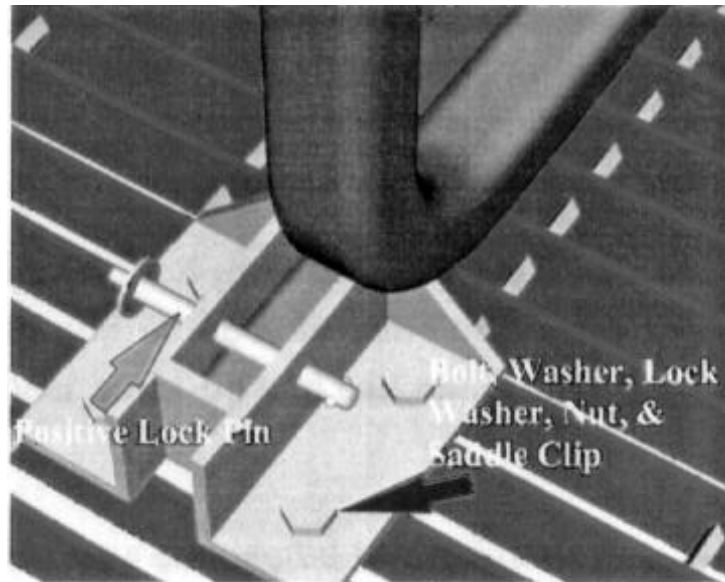


Figure 10. Positive Lock Pin(s)

WARNING

Ensure all retention pins are installed and the HPU is secure before moving the MAAS trailer.

5.7. Remove Hydraulic Hoses and Tools. Remove and discard the existing 50-foot and 8-foot hydraulic hoses. Remove the BH90 Breakers (two) and the HHB9 Hydraulic Hammer Drill (two), including any drill bits (HHB9 bits will not fit the new Stanley HD45110 Hammer Drill). Remaining on-board tools for the Wacker Pavement Breaker will fit the new Stanley BR67130 Pavement Breaker and should remain on-board.

6. Operation.

WARNING

Review the Stanley Operations and Maintenance Manual (provided with all HPUs and tools) before connecting or operating any equipment. Observe all safety precautions and ensure MAAS operations are in compliance with Technical Order 35E8-2-10-1.

6.1. Preliminary. Accomplish the actions in paragraphs 6.1.1 through 6.1.4 to prepare the HP-1 for operation.

6.1.1. Check the hydraulic fluid reservoir to ensure it is full. **Note:** The unit is shipped from the factory with the recommended hydraulic fluid. If hydraulic fluid is required, Stanley Tools recommends any of the following:

- AMS-Oil Hydraulic Fluid A/150 SSU, 100 V.I.
- Chevron AW-MV-32
- Exxon "Univis" J-26
- Mobile D.T.E

Note: Refer to the Stanley HP1 Compact Manual for a complete list of approved fluids.

6.1.2. Fill the 4.2-gallon fuel tank with regular unleaded fuel.

CAUTION

Wear protective clothing and observe all safety precautions while handling and charging the battery.

6.1.3. Remove the 12 Vdc battery supplied with the HPU. Fill the battery with electrolyte and ensure the battery is adequately charged. Place the battery back onto the HPU and secure with the hardware provided.

CAUTION

To prevent engine exhaust from damaging the neoprene hoses, remove hoses from the basket before operating the HPU.

6.1.4. Install the ½-inch diameter by 50-foot long, dual hydraulic hose assembly. Attach the male and female Aeroquip 49 series couplers to the PRESSURE and RETURN couplers on the dashboard of the HPU. The hoses will be stored in the hose basket mounted atop the HPU. The opposite ends of the dual hoses are connected to the trailer hydraulic connections that were installed on the curb side of the trailer chassis (paragraph 5.2), or to one of the on-board Stanley tools. The HPU is supplied with one pair of hydraulic hose connections (input and output), rather than the manifold system (diverter valve) that is supplied with the Wacker HPU. This simplifies the hydraulic connections, but requires that the hoses be manually changed from trailer operation to one of the hydraulic tools.



Figure 11. Hydraulic Hose Connections

6.2. Pre-Start.

6.2.1. Position the hydraulic circuit control lever in the OFF position.



Figure 12. Stanley HPU Controls

6.2.2. Select the AUTO throttle operating mode by positioning the governor lever so the guide hole aligns with the appropriate hole in the cylinder lever, then insert the faspin.



Figure 13. Governor Lever Automatic Position

6.3. Engine Start.

6.3.1. Place the ENGINE ON/OFF switch in the ON position. Place the hydraulic circuit control lever in the START position. Engage the choke if necessary. When the engine starts, release the control lever to the TOOL OFF position. Allow the engine to warm up until it runs smoothly when the choke is released. Remove the hydraulic hoses from the hose basket.

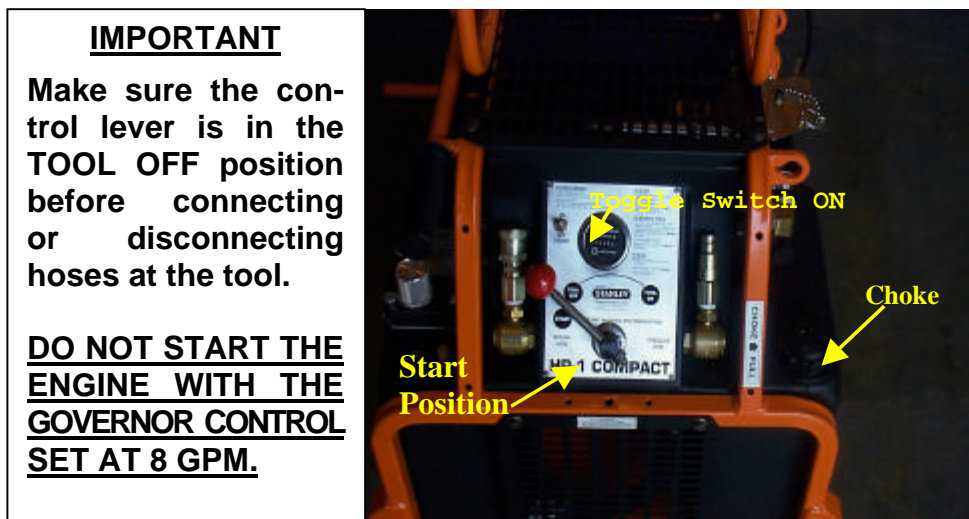


Figure 14. Starting the Stanley HPU

CAUTION

Operating the HPU with the hoses in the basket will damage the hoses and may cause hose failure.

6.3.1. Once the engine has warmed up, select a mode of operation:

6.3.1.1. AUTO. No action is required if the HPU was started in AUTO mode and will be operated in the automatic position.

CAUTION

To avoid damaging hydraulic components, do not start the HPU with the throttle control set at 8 gpm.

6.3.1.2. HOLD 8/5 GPM. Remove the faspin and position the governor lever so the 8 or 5 hole aligns with the corresponding hole in the stop bracket, then insert the faspin.

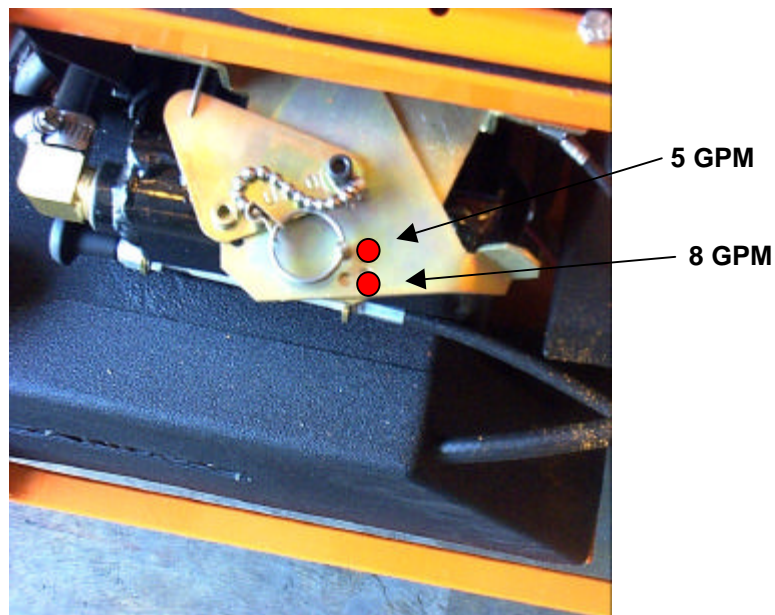


Figure 15. Governor Control Setting for 5 and 8 GPM

6.4. Tools Connection. Connect the hydraulic hoses to a tool (hammer drill, pavement breaker) or the MAAS trailer. Make sure all hoses are tightened securely to the fittings at the tool and power unit. With the engine running and the choke off, move the control lever to the TOOL ON position.

WARNING

Observe all applicable safety precautions. The Stanley operation and maintenance manuals (provided with the HP 1 Compact and the hydraulic tools) provide a complete operational scenario, and must be reviewed before operating the HPU and tools.

CAUTION

Do not actuate the tool operating trigger without the proper attachment installed.

To avoid damaging hydraulic components, do not start the HPU with the throttle control set at 8 gpm.

6.5. Tools Operation. When operating any of the MAAS on-board hydraulic tools (hammer drill, pavement breaker, winch, or stake removal tool), set the HPU governor throttle setting in the 8 gpm position first. Start the HPU in the automatic position and allow sufficient time for the HPU to warm up before selecting the proper operating mode. To operate the hydraulic tools, hold the actuating trigger in the closed position (this completes the hydraulic fluid circuit and permits operation of the tool). Review the operating instructions for all functions of the MAAS hydraulic system before installing and operating the new Stanley HPU (T.O. 35E8-2-10-1).



Figure 16. Hydraulic Tool Connection

6.6. Trailer Raise/Lower. Set the HPU governor throttle setting (for operating the MAAS trailer raise/lower controls) in the automatic position. (paragraph 6.3.1.1). This will provide sufficient operating pressure to activate the hydraulic cylinders that rotate the axle assemblies up and away from the chassis. Operations for the trailer raise/lower functions (four way valves) are identical to the operating instructions for the Wacker HPU identified in T.O. 35E8-2-10-1.

7. Replacement Items. Table 1 lists part numbers and National Stock Numbers (NSN) for items required to modify the MAAS to accept the Stanley HPU. Table 2 lists items that must be removed from the MAAS trailer and replaced with the Stanley equipment. Table 3 lists existing MAAS tools and accessories compatible with the Stanley HPU.

Table 1. New Equipment Required to Upgrade MAAS Trailer

Nomenclature	Part Number	National Stock Number	Units per Trailer	CAGE Code
Hydraulic power unit, HP-1, with hose basket	HP18299	None	2	54252
Pull starter, manual, Briggs & Stratton engine	808087	None	2	08645
Flywheel cup, Briggs & Stratton engine	805877	none	2	08645
50 foot x ½ inch dual hydraulic hoses with series 49 coupler ends	31848	None	2	54252
Series 49 tethered cap and plug set	03288	None	1	54252
Series 49 Aeroquip coupler set (male and female) 3/8" NPT	24069	None	4 (as required for additional tools)	54252
Breaker, pavement	BR67130	3820-01-159-5470	2	54252
Hammer drill, hydraulic	HD45110	5130-01-178-6338	2	54252
Carbide drill bit (1"x 24")	02281	5130-00-061-4115	4	54252
Mounting brackets	MHU-1	None	2	None

Notes:

1. The Pavement Breaker BR67130 and the Hammer Drill HD45110 hoses will have 3/8 inch NPT male ends. The connectors Stanley provides are known as flush face connectors and do not use dust caps/plugs.
2. The specification and design package (and a source of supply) for the holddown brackets has been validated and is available from HQ AFCESA/CEMR. Contact Mr. John Smith at DSN 523-3865.

Table 2. Equipment to be Removed from MAAS Trailer

Nomenclature	T.O. 35E8-2-10-4 Illustration	Part Number	National Stock Number	Units per Trailer	CAGE Code
Coupling, female, Series 56	19-17	5601-6-6S	4730-00-939-5533	1	01276
Washer, flat	19-18	495-060-A3		1	51506
Dust cap	19-20	5657-6	5340-00-071-3829	1	01276
Dust cap	19-21	5659-6	5340-00-071-3830	1	01276
Coupling, male, Series 56	19-39	5602-6-6S	4730-01-063-9285	1	01276
Wacker HPU	19-1	52D9014-101	4940-01-356-3478	2	21439
Hose assy	30-7	52C8620-1	4720-01-254-0957	2	21439
Hose assy	30-13	52C8621-1	4720-01-255-7799	2	21439
Breaker	20-3	BH90	1710-01-315-0463	2	28792
Hammer drill	30-5	52B9493-1	5130-01-307-1108	2	21439
Bit, helical	30-4	5620072	5130-01-253-6345	4	11239
Hook	19-3	52B10766-1	5340-01-309-6248	4	21439
Tension latch	19-4	37L33-1-4AB		4	71286
Nut, hex (AP)	19-4	01857-002		16	21439
Screw (AP)	19-4	18257-043	5305-01-254-9062	16	21439
Lockwasher	19-4	14218-004		16	21439
Plate	19-5	52B10768-1		8	21439
Lateral restraint assy	19-9	52B11041-1	1710-01-309-6214	4	21439

Table 3. Wacker Tools Compatible with the Stanley HPU Equipment

Nomenclature	T.O. 35E8-2-10-4 Illustration	Part Number	National Stock Number	Units per Trailer	CAGE Code
Stake driver	30-8	52C7235-1	5120-01-305-1855	2	21439
Driver shank, 1¼"	30-9	310		2	85416
Spade, clay	30-10	275	3820-01-254-9848	1	85416
Chisel, digging	30-11	270	3820-01-254-9846	2	85416
Moil point	30-12	163	3820-01-254-9847	1	85416
Stake puller	27	52D-9002-101	1710-01-255-3246	1	21439

8. Points of Contact. Mr. John W. Smith, HQ AFCESA/CEMR, DSN 523-3865, commercial (850)283-3865, Internet smithjw@afcesa.af.mil; or Mr. Michael D. Ates, HQ AFCESA/CESC, DSN 523-6351, commercial (850)283-6351, Internet atesm@afcesa.af.mil.

Lance C. Brendel, Colonel, USAF
Director of Technical Support

- 2 Atch
1. Optional Stanley Hydraulic Tools
 2. Distribution List

Optional Stanley Hydraulic Tools

A1. Background. During operational test and evaluation of the Stanley HPU, ASC/WMO and SA-ALC/LDEE learned of two additional Stanley tools that can enhance MAAS installation and removal. These tools replace the existing MAAS hydraulic breaker and driver shank, and the stake-removal tool. ASC/WMO and SA-ALC/LDE representatives worked with engineering representatives from Stanley Tool Works to further develop and evaluate these tools. They found that the performance of these modified tools was much better than the original equipment supplied with MAAS. The optional tools are identified as the PD48142 Post Driver, and the PP10100A Post Puller. The San Antonio Air Logistics Center, Ground Support Equipment Engineering Division (SA-ALC/LDEE) approved these tools for use with MAAS that have been equipped with the Stanley HPU.

A2. PD48142 Post Driver. The PD48142 Post Driver is a Stanley PD45142 Post Driver fitted with a larger piston and anvil. Use of this tool eliminates the need for the technician to stand on top of the work stand to drive stakes, as shown in Figure A1.



Figure A1. Driving Stakes from the MAAS Work Stand

The PD48142 Driver has a 7.75-inch-deep cup that fits on top of the cruciform stake and is operated by personnel standing on the ground as shown in Figure A2.



Figure A2. Driving Stakes Using the PD48142

A3. PP10100 Post Puller. The PP10100A is a Stanley PP10100 Post Puller with a lengthened base weldment. The base is also modified to accept an additional vertical leg that can be pinned at four different positions. The upper three holes in the leg allow the operator to adjust the leg to stabilize the puller when removing moil points. The lower hole in the leg allows the operator to adjust the angle of the puller to approximately 15° when removing stakes (see Figures A3 and A4). The post puller has an additional guide approximately one foot above the modified grip-jaws to support the stake during removal. This reduces the twisting moment incurred when removing stakes with the existing stake removal tool, and causes less damage to the stakes.



Figure A3. Stanley PP10 Base Weldment (Left), Stanley PP10100A Modified Base (Right)

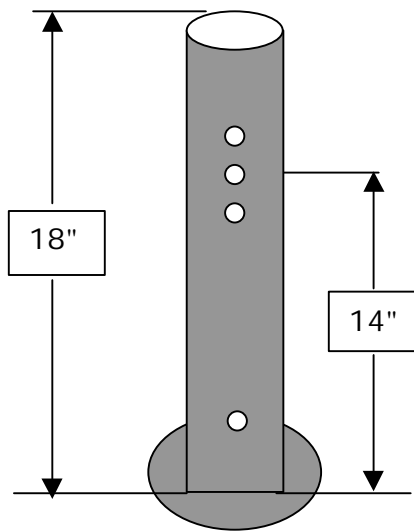


Figure A4. PP10100A Vertical Leg



Figure A5. PP10100A Post Puller

Note: Users should substitute only one signpost driver per trailer. One breaker must be retained on each trailer for installation of moil point anchors used during asphalt-over-soil installations.

WARNING

Users must read the manufacturer's manual before connecting or operating these tools and observe all applicable safety precautions.

A4. Operation and Maintenance of the PD48142 and the PP10100A. The PD45 Post Driver and the PP10 Post Puller are supplied with Stanley commercial manuals and Stanley supplements *PD48 Post Driver*, and *PP10100A Post Puller*. Operation and maintenance of the optional Stanley tools is covered within these commercial manuals and there are no unique requirements for use of these tools with MAAS.

DISTRIBUTION LIST

DEPARTMENT OF DEFENSE

Defense Commissary Service	(1)	Defense Technical Information	
Director of Facilities		Center	(1)
Bldg 8400		ATTN: DTIC-FDA	
Lackland AFB TX 78236-5000		Alexandria VA 22034-6145	

AAFES/ATTN: CFE	(1)
PO Box 660320	
Dallas TX 75266-0320	

SPECIAL INTEREST ORGANIZATIONS

IHS (S. Carter)	(1)	Construction Criteria Database	(1)
15 Inverness Way East Stop A-111		National Institute of Bldg Sciences	
Englewood CO 80112		1201 L Street NW, Suite 400	
		Washington DC 20005	