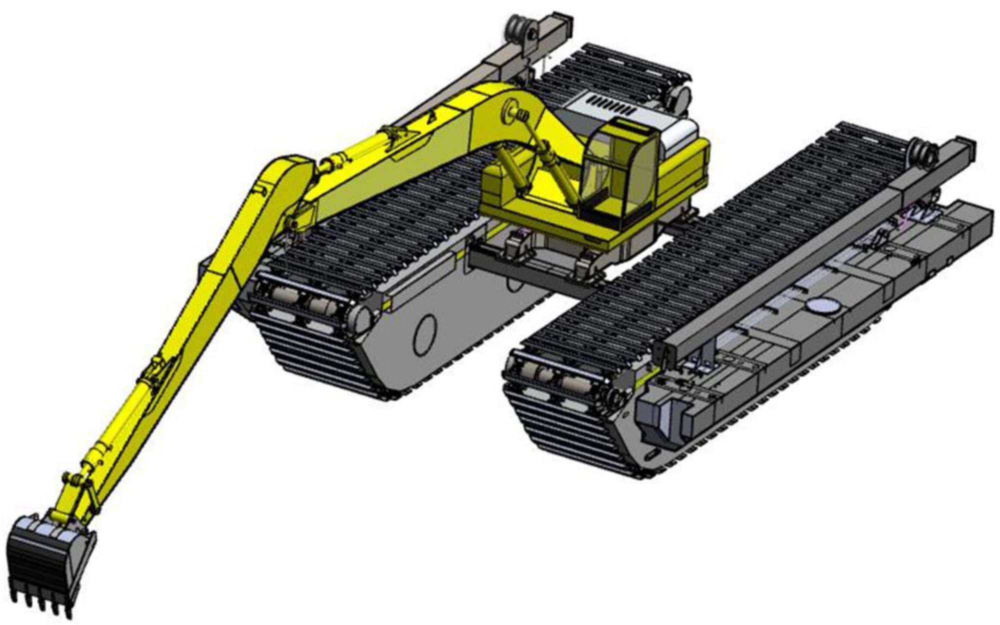
10000 HRS WARRANTY
UHMWPE Track Plates

UltraTreX
AMPHIBIOUS EXCAVATOR

AT300-V2 / AT300PS-V2

AMPHIBIOUS EXCAVATOR

OPERATION, INSTALLATION AND MAINTENANCE MANUAL



www.amphibiousexcavator.com

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FOREWORD

AT300-V2/AT300PS-V2 Amphibious Hydraulic Excavator with two pontoons is a type of fully multipurpose hydraulic excavator developed and manufactured by ULTRATREX MACHINERY SDN. BHD. It is designed for use on soft marshland, swampy land as well as in shallow water.

This manual will help users to understand the structure, features and functions of this machine thoroughly and systematically to facilitate operation and maintenance.

Correct way of operating as well as suitable and timely maintenance can fully develop the best performance of this machine, improving its work efficiency and extend its lifespan. This manual elaborates the operating essentials, maintenance methods and trouble-shooting. The operators and technical personnel must read through the manual before using this machine and follow its requirements. (This manual is a supplementary part of the operation and maintenance manual of AT300-V2/AT300PS-V2 amphibious excavator).

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<u>1.0 MAIN SPECIFICATION</u>

1.1 MAIN PERFORMANCE PARAMETERS

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<tr><th>No</th><th colspan="2">ITEM</th><th>UNIT</th><th>SPECIFICATION</th><th>REMARKS</th></tr>
<tr><td rowspan="2">1</td><td>MAIN</td><td>MODEL</td><td></td><td>AT300-V2/
AT300PS-V2</td><td></td></tr>
<tr><td>TRAVEL MOTOR</td><td>QUANTITY:
4 MOTOR/SET</td><td></td><td>HIGH QUALITY HYDRAULIC MOTOR
ORIGIN: KOREA</td><td></td></tr>
<tr><td>2</td><td>SPUD POLE MOTOR</td><td>QUANTITY:
2 MOTOR/SET</td><td></td><td>HIGH QUALITY HYDRAULIC MOTOR
ORIGIN: KOREA</td><td></td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">TRAVEL SPEED</td><td>LAND</td><td>km/h</td><td>0-3.2</td><td></td></tr>
<tr><td>MARSHLAND</td><td>km/h</td><td>0-2</td><td></td></tr>
<tr><td>IN STILL WATER</td><td>km/h</td><td>0-1.75</td><td></td></tr>
<tr><td>4</td><td colspan="2">GRADEABILITY</td><td></td><td>30</td><td></td></tr>
<tr><td>5</td><td colspan="2">PONTOON VOLUME CAPACITY</td><td>m^3</td><td>60</td><td></td></tr>
<tr><td>6</td><td colspan="2">VOLUME ADDITIONALPONTOON CAPACITY</td><td>m^3</td><td>10.8</td><td></td></tr>
<tr><td>7</td><td>GROUND PRESSURE</td><td>WITH LONG REACH ARM</td><td>MPa</td><td>0.015</td><td></td></tr>
<tr><td>8</td><td>SPUD POLE</td><td>MOVEMENT SPEED</td><td>mm/s</td><td>150</td><td></td></tr>
</table>

1.2 OPERATION CONDITIONS

AT300-V2/AT300PS-V2 hydraulic amphibious excavator is strongly recommended to work in wet land, marshland and shallow water. Amphibious excavator shall be strictly operated according to the allowable conditions as per below mentioned, in order to avoid capsizing and being damaged.

1.2.1 ALLOWABLE CONDITIONS

1. Work on wet land, marshland and shallow water.
2. The machine can travel and work on water not more than 2 meters depth and work normally under the following conditions:
   a) The flow speed of water : is or less than 24m/min
   b) The height of wave : is or less than 0.1m
   c) The speed of wind : is or less than 240m/min

1.2.2 UNALLOWABLE CONDITIONS

1. Don't operate the machine on stump, hard stone and uneven ground that is frozen and solid when mounted with additional pontoons.
2. Do not attempt to operate the excavator when totally floating on water.
3. Don't travel on water of unknown depth.
4. Don't use bucket that is bigger than the designated one, otherwise it'll affect the stability of the machine. The machine is only used for light load and shouldn't be used for heavy load.

2.0 STRUCTURE

AT300-V2/AT300PS-V2 hydraulic amphibious excavator has 4 travelling devices (2 travelling motors per an amphibious undercarriage). Figure 2.0 shows the simple structure drawing of the machine.

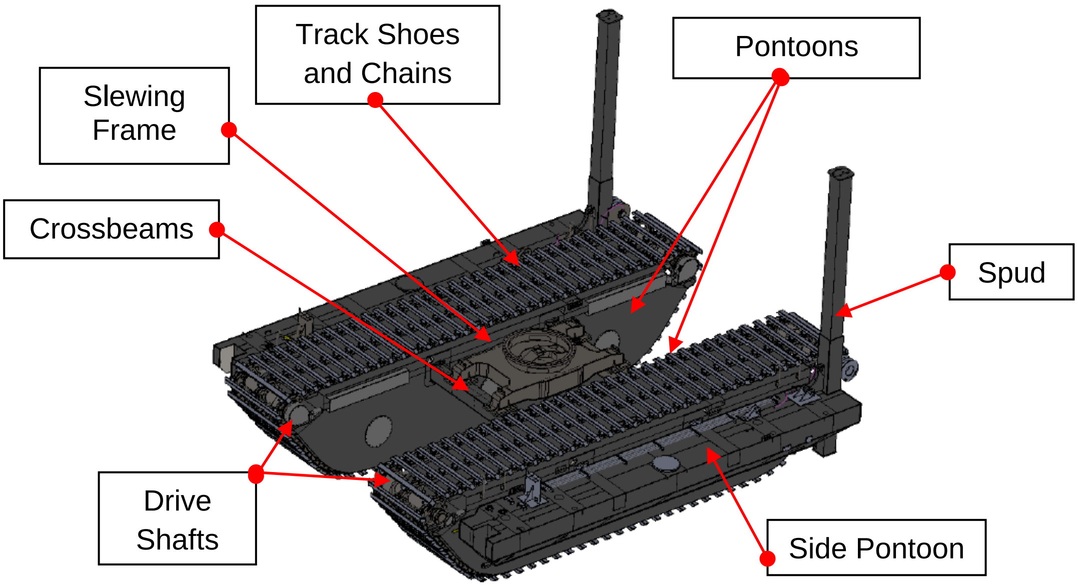

Figure 2.0: *Amphibious Undercarriage Structure*

2.1 TRAVEL BRAKE

The machine is normally being mounted with closed type brake, which is an automatic brake device using spring force when excavator been parks on slope.

When the machine is working, the brake valve in the travelling motor will be released automatically whenever the traveling foot pedal is activated either to move forward or backward positions.

3.0 OPERATION

The operator must read the upper body manufacturer’s operation manual and all warning and control tags and/or labels before attempting to operate this machine.

3.1 CAUTIONS ON USING THE NEW MACHINE

The lifespan of an excavator is largely depending on the load condition of initial usage. Operator must increase the load according to below instructions before using a new machine. Operator can establish load time by working hours on display according to lubrication chart and maintenance instructions.

Overload will cause scratches on hydraulic motors and during test run it’ll influence the service life of the said machine.

During Testing:

WORKING TIME	LOAD
First 50 Hours	80% of Load (74% of Diesel Engine Rated rpm)
After 50 Hours	Full Load

3.1.1 INSPECT THE FOLLOWING ITEMS BEFORE OPERATING

1. Check whether there is any broken, lost or loosen parts during transportation.
2. Check the tension of track chain.
3. Make sure that there is no oil and hydraulic oil leakage from any parts of the machine.
4. Use the recommended oil and grease.
5. Ensure no defect on hydraulic hoses and hydraulic piping.
6. Close the manual valve when performing maintenance procedures. Special attention shall be given during opening the manual valve before starting the engine after maintenance.
7. Ensure the spud poles are in original position when travelling.

3.2 OPERATING THE MACHINE

3.2.1 PRECAUTIONS

1. Conduct thorough check for cracks and leakages on pontoon before travelling on marshland or water. If any defects being found, immediately stop operating the machine. Proceed with inspection and repair the defects accordingly.
2. Proper chain tensioning is required during operating as if the machine takes a turn on marshland and its chain is too loose, then it might be resulted in misalignment. On the contrary, if the chain is too tight, it may result in bigger resistance.
3. Apply spent oil to lubricate the track chain frequently, especially after long distance travelling on water or land. This action can help to extend the track chain's life span and to promote better travel performance.

3.2.2 TRAVELING ON LAND

1. Clear the travelling path by using bucket. This is to minimize the damages to the track plates and track chains.
2. Do not travel on stump and uneven land.

3.2.3 TRAVELING ON MARSHLAND

1. The machine may not move effectively when traveling on poor marshland such as soft and muddy hard land. Thus, to maneuver it, working attachments is required.

3.2.4 TRAVELING ON WATER

1. When travelling on water, the operator should adjust the working attachments to ensure amphibious excavator's stability. Refer (Figure 3.0).

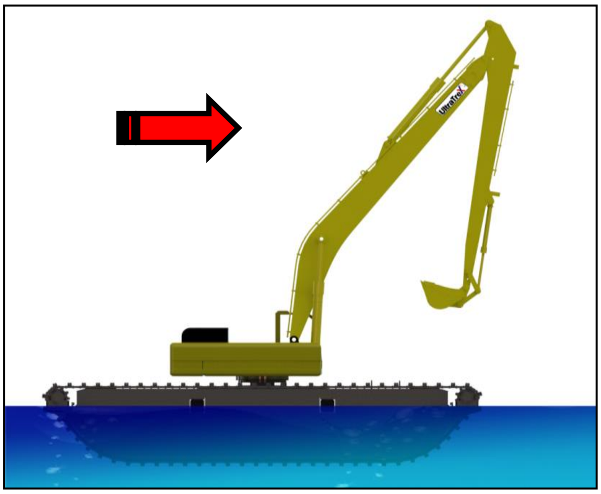

Figure 3.0: *Travelling on water*

2. When the machine is under floating condition, prevent from performing the digging operation.
3. When traveling on water, the requirements of water speed, wave height and wind speed are as follows:
    a) The water speed should be less than 24m/min.
    b) The wave height should be less than 0.1m.
    c) The wind speed should be less than 240m/min
4. Do not travel in bad weather condition. Refer (Figure 3.1).

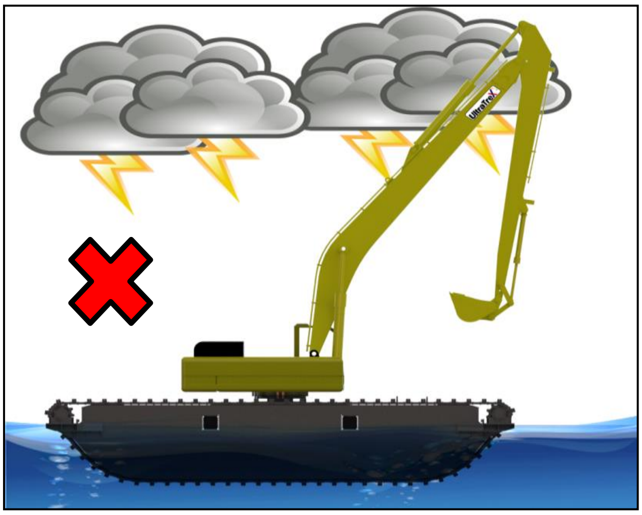

Fig 3-1: *Avoid Travelling in Bad Whether*

3.2.5 ENTERING INTO WATER

1. Check on the water depth before launching the machine. Do not directly launch the machine into the water that as it may capsized.
2. During entering into the water, the recommended launching site that shall be implemented will be in inclined plane position of less than 30 degrees as to prevent the machine from turning over.
   Note: The incline plane position level should go as far as the water depth of not more than 2 meters. Refer (Figure 3.2).
3. If the incline plane is hard, maximum permissible angle will be 15 degrees.
4. If the above-mentioned conditions are not satisfied, bucket can be used for creating path into the water.

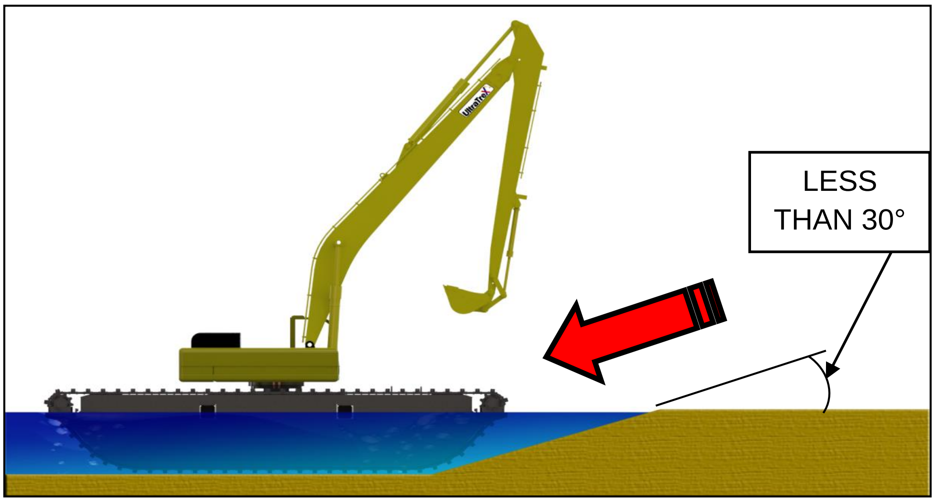

Figure 3.2: *Launching the Amphibious Excavator*

5. Avoid parking the amphibious excavator inside the water. Refer (Figure 3.3).

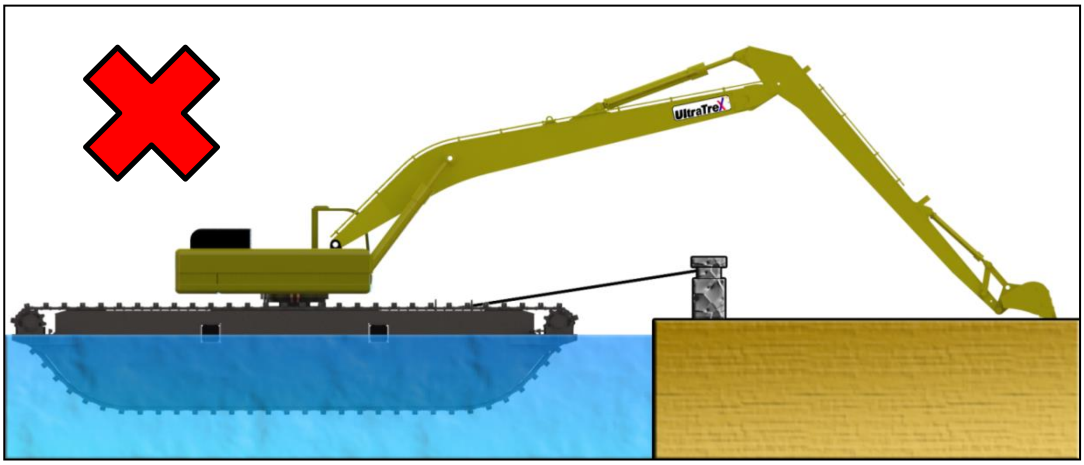

Figure 3.3: *Avoid parking inside the water*

3.2.6 AVOID DIGGING JOB DURING FLOATING

The amphibious excavator is designed to work in soft terrain. Thus, avoid letting it floating in water during working. Performing digging operation during floatation will cause tumbling. Without extra side pontoons and spud poles, digging inside the water only allowed for 2 meters depth. Refer (Figure 3.4).

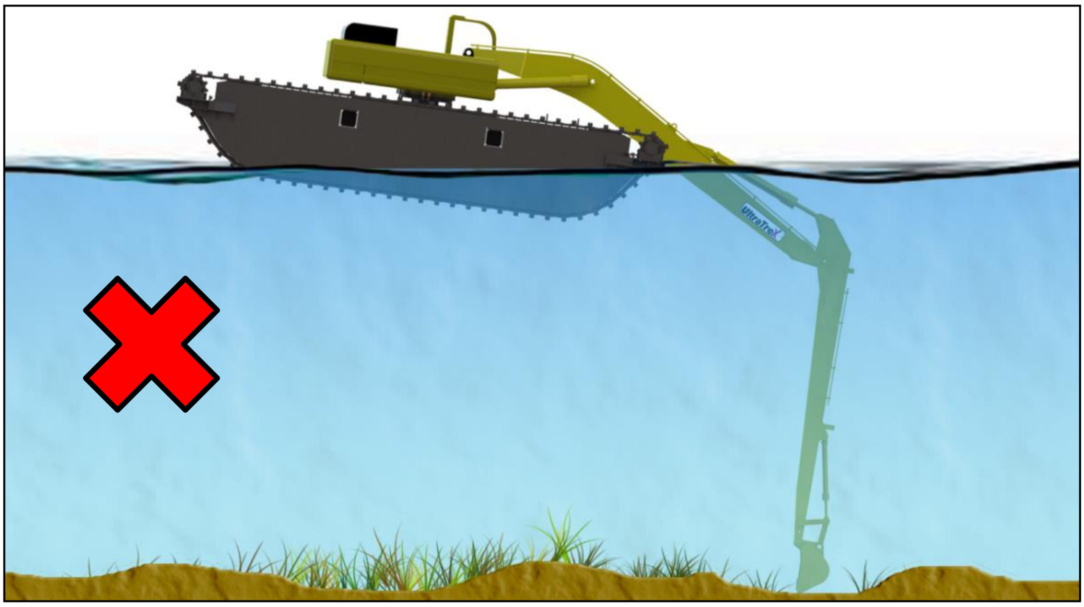

Figure 3.4: *Avoid working while floating*

3.2.7 LANDING

1. Similar methods applied while entering into the water are applicable for landing operations as well.
2. Choose the suitable hard incline plane area and position for landing.
3. Ensure to move towards straight position for landing.
4. Boom and arm shall be placed in front position as per shown in (Figure 3.5).

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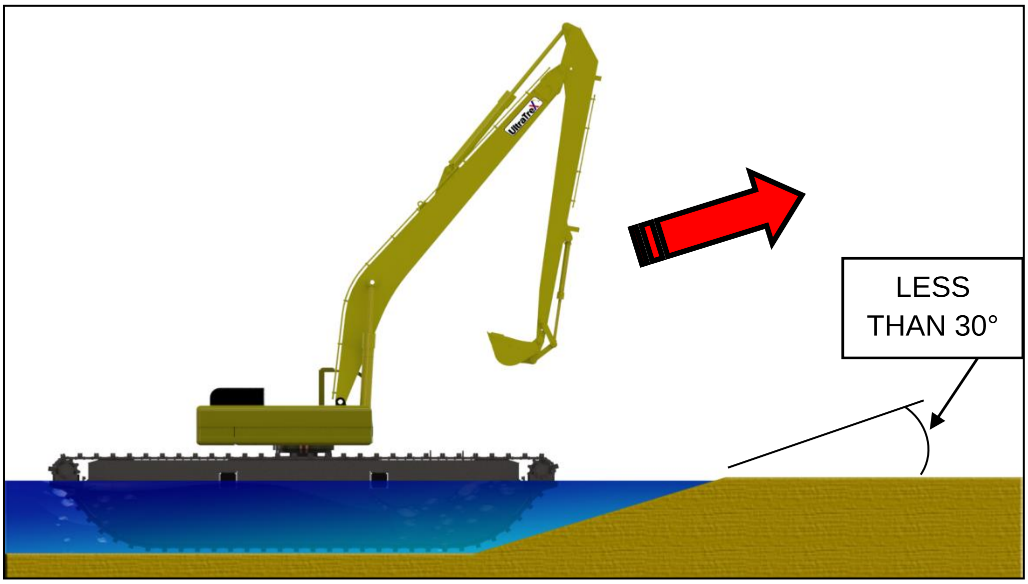

Figure 3.5: *Landing the amphibious excavator*

3.2.8 TRAVELLING ON THE WATER AND THROUGH UNDER THE BRIDGE

The machine can travel through under the bridge. Proper setting shall be applied to ensure safe passing through:

a) Set working attachments level
b) Estimate the height of the working attachments that can pass through the bridge accordingly
c) Ensure the machine is in stable condition
d) Safety measures and precautions shall be applied during the process

3.2.9 SPUD WORKING OPERATION PROCEDURE (HORIZONTAL TO VERTICAL POSITION)

1) Open the ‘A’ and ‘B’ 3/4” three-way ball valves which are being positioned on the rear side of the slewing frame to activate the spud system. Refer (Figure 3.6).

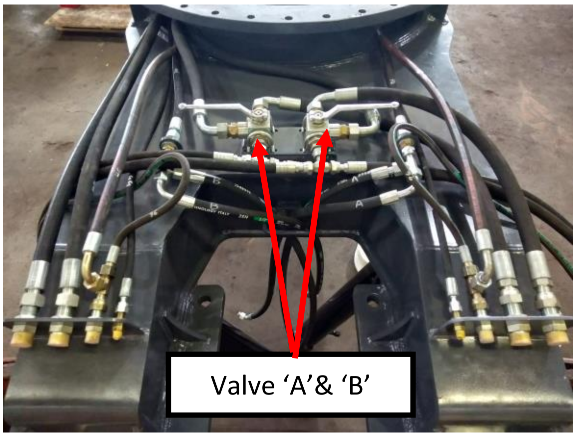

Figure 3.6: *Spud ball valve position on rear slewing frame*

2) Two pieces of 1/2” three-way ball valves been placed on the top of the side pontoons to activate the spud hydraulic cylinder or spud drive motor. Extend the spud cylinder by switching the ball valves. By using the machine’s travelling lever inside the cabin, control the spud and adjust it to the standing position. Refer (Figure 3.7).

Note: Travelling lever is the mechanism used to control spud position either horizontal or vertical and also to lift the spud up or down.

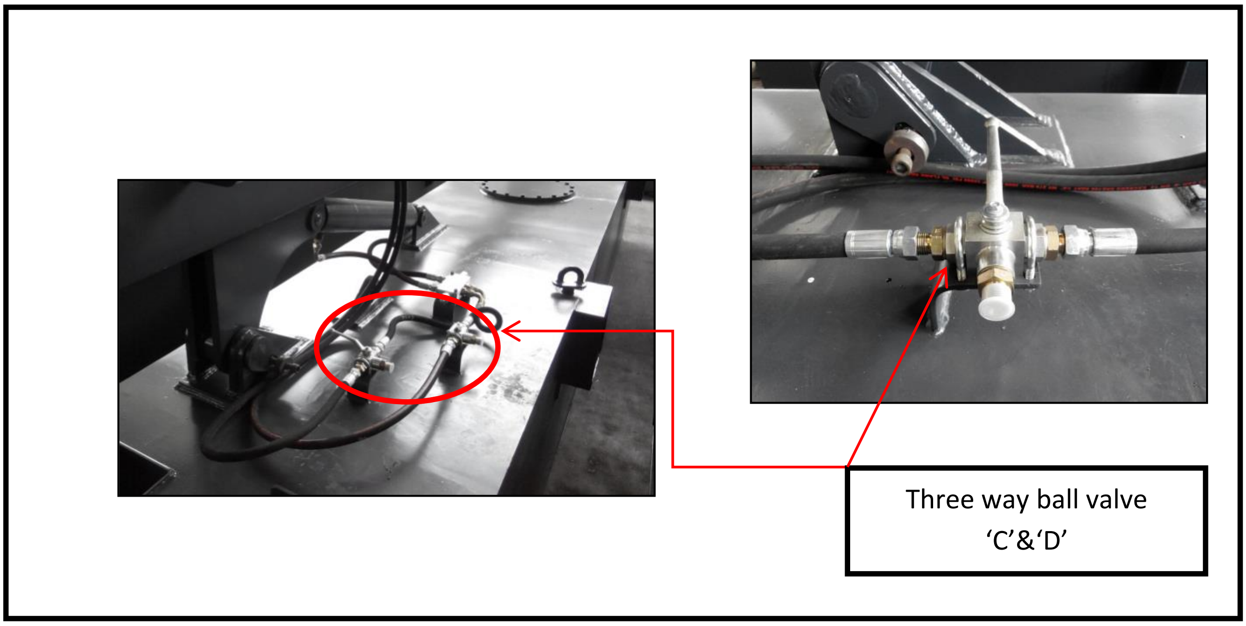

Figure 3.7: *Positioning of three-way ball valves for controlling spud*

3. Two-way ball valves are used to control the hydraulic fluid's flow:
   a) To spud cylinder for extend or retract actions
   b) To motor as to lift the spud up and down.

4. These valves are to be adjusted manually by the amphibious excavator operator.

5. After the spuds have been moved from horizontal to vertical position for operation, lock the spuds chambers with the lock pin. Refer (Figure 3.9)

   Note: Ensure the vertical spuds are being locked at all time during operation.

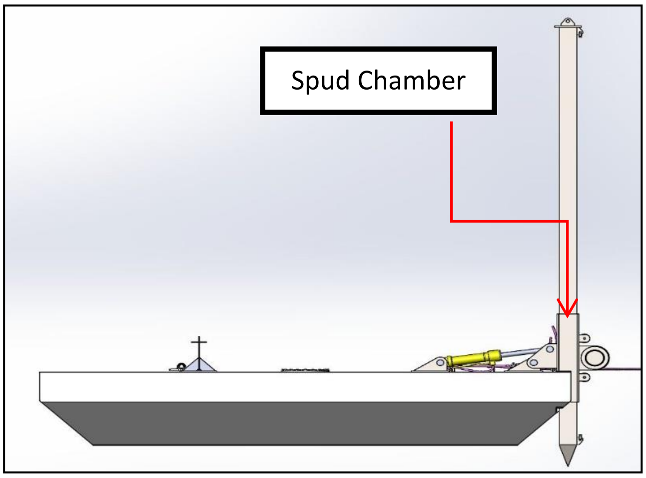

Figure 3.8: *Spud in standing position*

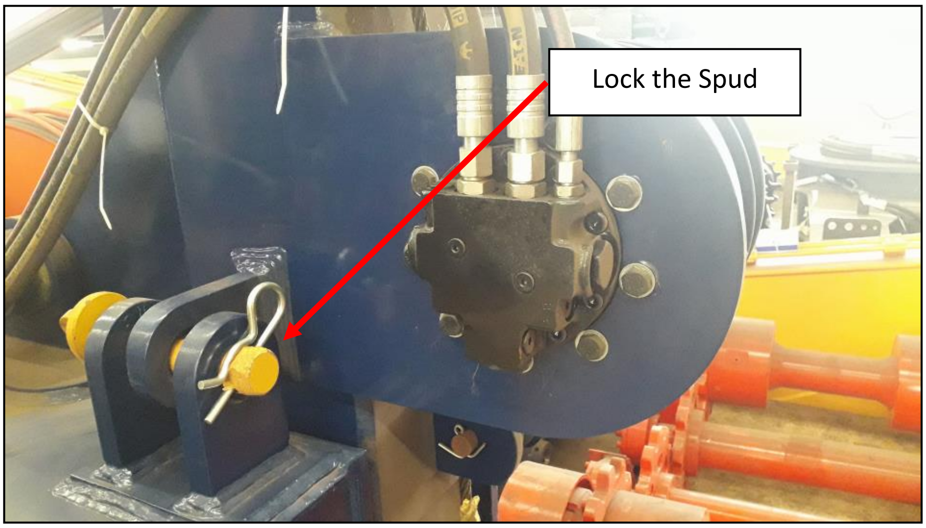

Figure 3.9: *Spud lock pin*

3.2.10 SPUD POSITION DURING TRAVELLING (HORIZONTAL POSITION)

1. Pull off the spud's lock pin.
2. Slowly control the travelling lever to lift down the spuds until it reaches the limit plate. Refer (Figure 3.10)
3. Start travelling.

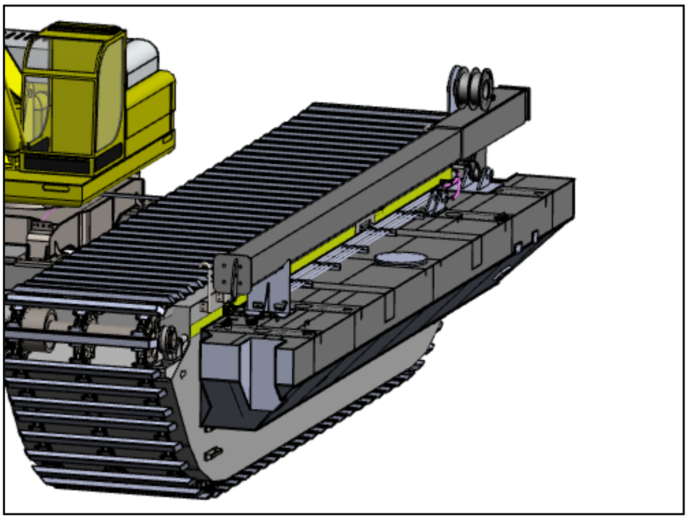

Figure 3.10: *Spuds position during travelling*

4.0 MAINTENANCE

Proper and timely scheduled inspections and maintenances are important factors to extend the lifespan of the machine. Especially when it's working in harsh conditions.

4.1 GENERAL SAFETY PRECAUTIONS

1. Inspection and maintenance can be performed by parking the machine on a solid level surface.
2. Make sure the inspection and maintenance being carried out in good weather conditions.
3. The inspection and maintenance of hydraulic components should be carried out at the place where there is less dust.
4. Avoid carrying out any inspection and maintenance while engine is running. Always stop the engine and allow it to be without load.
5. Before performing any inspection and maintenance to the machine, attach signage of "INSPECTION / MAINTENANCE IN PROGRESS" at the place that is visible to others.
6. Never disassemble or adjust the reversing valves, motor and other hydraulic components. If there is any problem been detected, contact the manufacturer.
7. Use quality products when replacing parts, especially the hydraulic components.
8. Bolts and piping are special ones with high-strength, which cannot be replaced by general ones. Bolts and hydraulics components are tightened under considerable force and required frequent inspection and tightening.
9. Avoid any scratches on the mating face of hydraulic components.
10. Pipes, hoses and oil tanks and etc. must be cleaned before installing.

11. Never use the O-ring with any scratches. Ensure the O-ring is in good condition during assembling.
12. The hose should not be twisted during installation.
13. Operate accordingly to the maintenance requirements and precautions.

5.0 INSPECTION, MAINTENANCE INTERVALS AND ITEMS

5.1 PERIODIC MAINTENANCE

In order to detect and repair minor defects on timely manner and to prevent serious malfunctions, it's recommended to perform periodic maintenance. This will increase the life span of the machine.

Daily Inspection	Routine inspection & maintain every day, before and after day shift operation.
Monthly Inspection	Every month
Replacement of filter, hydraulic oil & lubrication	Replace according to the replacement intervals when performing any daily and monthly inspection and maintenance procedures.

5.2 REQUIREMENTS FOR PERFORMING INSPECTION AND MAINTENANCE

1. Park the machine on a level surface and lower the bucket to the ground. Remove the ignition key from switch and lock the cab door. Refer (Figure 5.0).

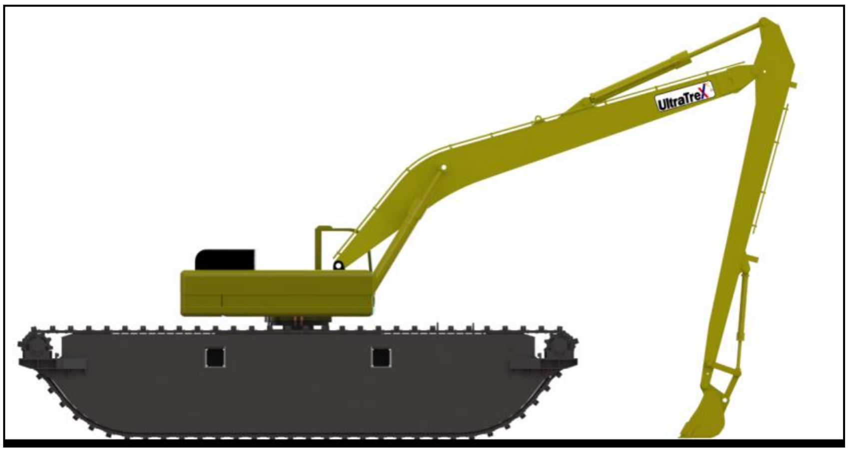

Figure 5.0: *Amphibious excavator position for maintenance*

2. Before performing any inspection and maintenance to the machine, attach signage of "INSPECTION / MAINTENANCE IN PROGRESS" at the place that is visible to others as to avoid any unwanted incidents. Refer (Figure 5.1)

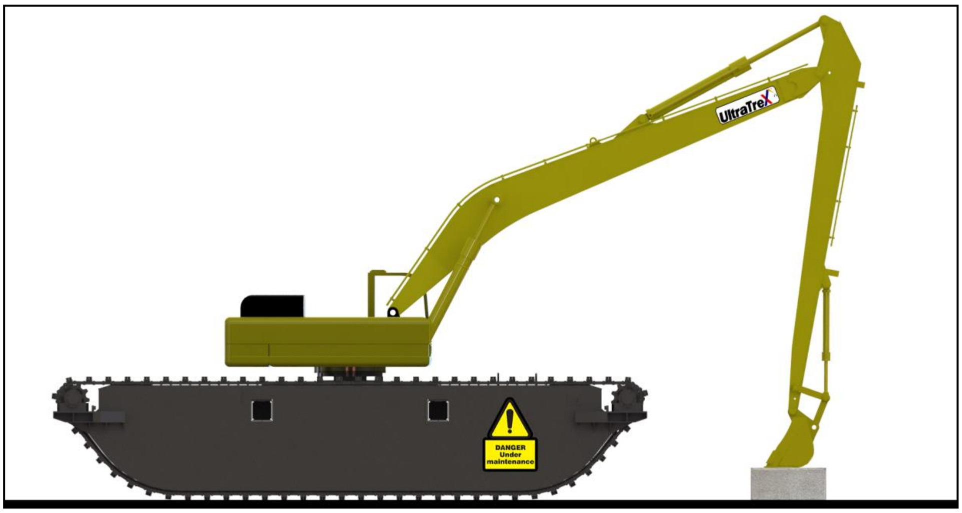

Figure 5.1: Signage during inspection and maintenance

5.3 INSPECTION AND MAINTENANCE (MAINTENANCE BEFORE OPERATING THE MACHINE)

Suggested period for inspection and maintenance activity:

Inspection and maintenance activity	**Period**
All Hydraulic hose connection and functionality	a) Daily
Greasing	a) Daily
The looseness or falling off of bolts nuts and gaskets.	a) Daily
Tensioning the track chain and check whether there is abrasion or damage of the track shoes.	a) Monthly b) Do if necessary
Lubricant the chain	a) Long time Parking: weekly b) Working: Monthly
Tightening slewing frame mounting bolt	a) Monthly b) Do if necessary
Amphibious undercarriage body and parts condition	a) Daily b) Do if necessary
Drive shaft travel device gearbox oil change	a) 3 month / 1000hours

5.4 OTHER MAINTENANCE

5.4.1 TRAVEL DEVICE

Figure 5.2 shows the oil inlet and outlet of the travel devices. Place the machine on level land, and proceed to fill oil through inlet until the oil flow out form oil level plug.

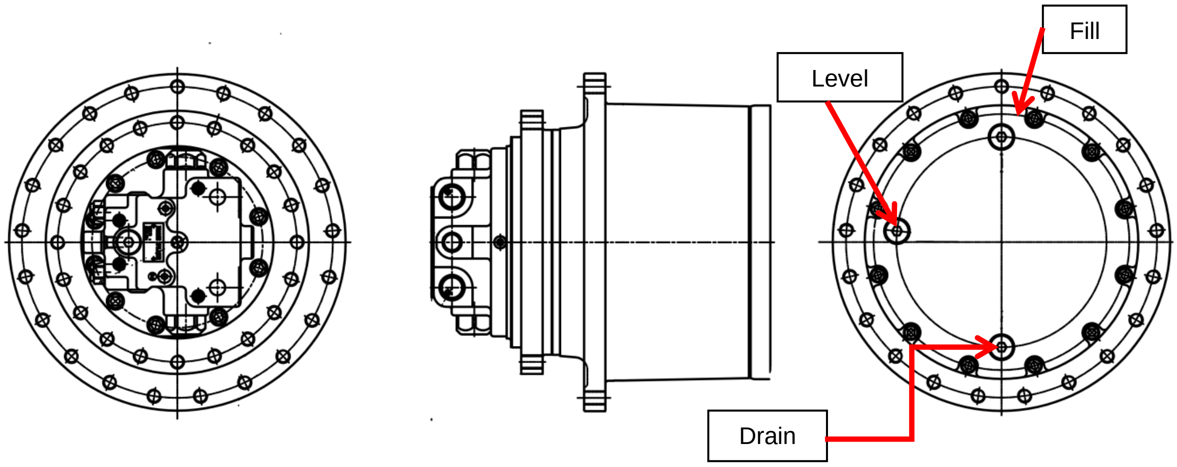

Fig 5-2: *Oil Inlet and Outlet*

Each drive shaft installed with 1 travel device. Each travel device compartments (housing) are being filled with 4-liter grade 90 gearbox oil to prevent internal rust. Refer (Figure 5.3)

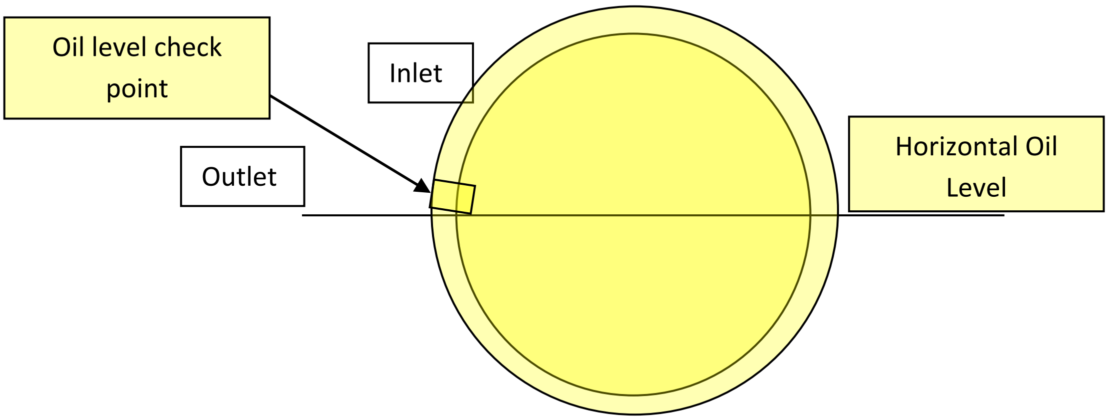

Figure 5.3: *Checking the oil level*

To check the oil level, park the machine on the level land. Rotate the travel motors until the oil level check point is approximately horizontal to imaginary line as per figure 5.3.

IMPORTANT: Oil level check point must be higher than the horizontal oil level before removing the plug. To refill the gearbox oil, park the machine on the level land. Open inlet and outlet plug. Refill the oil until it reaches horizontal oil level and it come out a little from the outlet plug. After that closed back the plugs and tightened it properly.

5.4.2 TIGHTENING SLEWING FRAME MOUNTING BOLT

Conduct proper checking for all front and rear slewing frame mounting bolts. After few hours of operation, there are possibilities that the bolts may become loosen. Slewing frame mounting bolts must be retightened back if it's loosened by using correct size of spanner to prevent the bolt broken as shown in the (Figure 5.4).

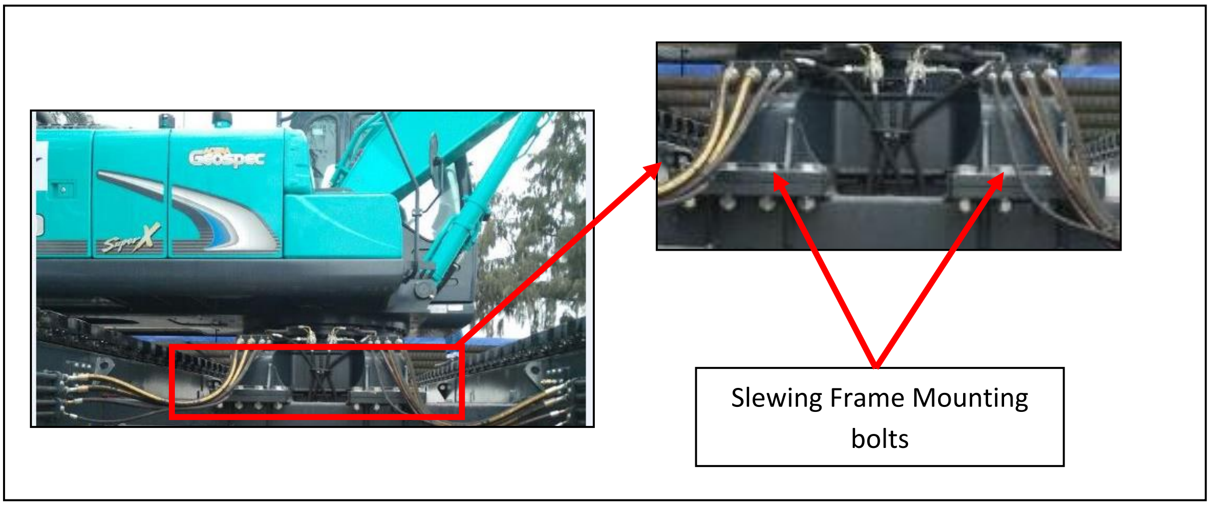

Figure 5.4: *Slewing frame mounting bolts*

5.4.3 ADJUSTING THE TENSION OF TRACK AND OILING THE TRACK CHAINS

To tension the track, firstly, loosen the Hex Nut-A and then loosen the Hex Nut-B as shown in (Figure 5.5). Screw out the adjusting bolts (M36 Bolt) to increase the tension of the track chains. Ensure the tensions of both amphibious undercarriages are same. All the bolts shall be tightened back after the tensioning was completed. Figure 5.6 shows the correct tension measurement for the track chain

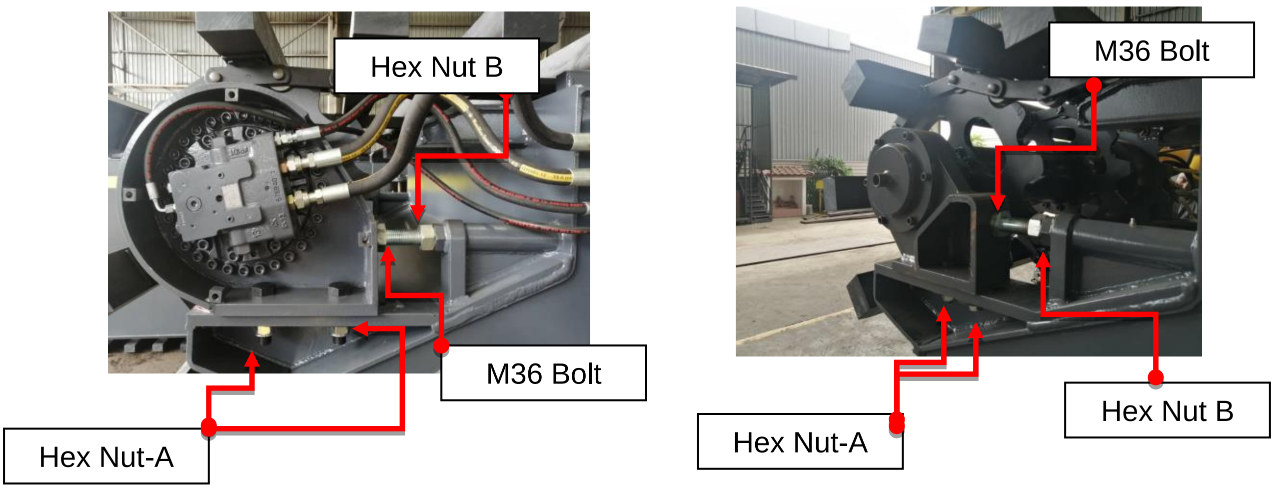

Figure 5.5: *Track tensioning bolts and nuts position*

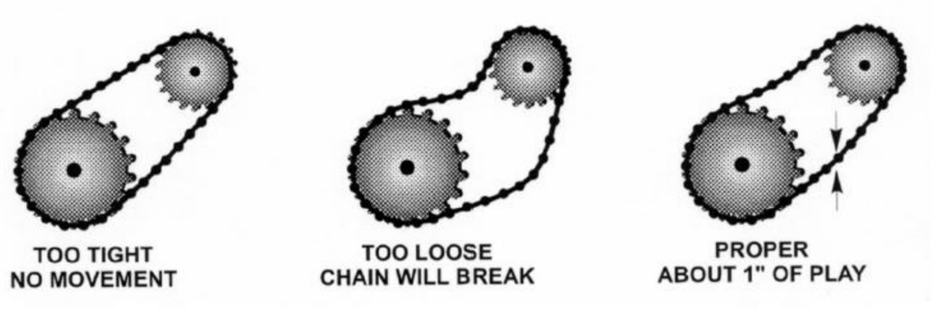

Figure 5.6: *Track chain tensioning*

After tensioning process is completed, oiling the track chains is required as to enable the amphibious excavator to move smoothly. This process shall be carried out if the amphibious excavator has been parked for a long period.

5.4.4 WEARING PLATE

The wearing plates, which are contacting with the chain rollers, are welded to the pontoons. The wearing plates must be replaced if they are worn badly. Operator can use carbon arc to remove the used wearing plates and replace those with new wearing plates. Refer (Figure 5.7)

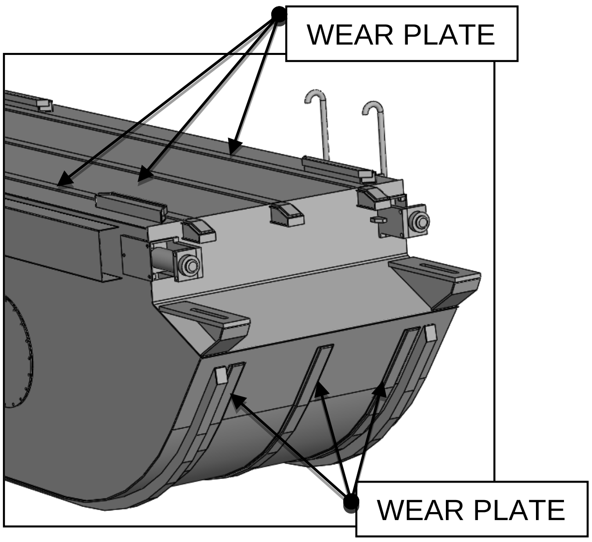

Figure 5.7: *Wearing Plate*

6.0 INSTALLATION AND TRANSPORTATION

6.1 TRANSPORTATION

For transportation purposes, all AT300-V2/AT300PS-V2 parts must be dismantled before loading onto lorry trailer. Follow instruction in clause "**6.4 DISASSEMBLY THE MACHINE"** to do the dismantled process. Load the amphibious parts carefully and make sure it fit and safe.

6.2 ASSEMBLING THE MACHINE

After unloading from the transportation, the reassembly sequences are as follows:

1. Obtain a crane of sufficient reach and size to lift the excavator undercarriage. Select an area of flat level ground which is large enough for the whole machine. Place and align the left and right undercarriage body components with the correct distance apart. Refer (Figure 6.2)

Figure 6.2

2. Install the cross beams to the inner C-Chamber on one of the undercarriage body, according to the proper positioning. Lock the crossbeams using the lock pin. Refer (Figure 6.3)

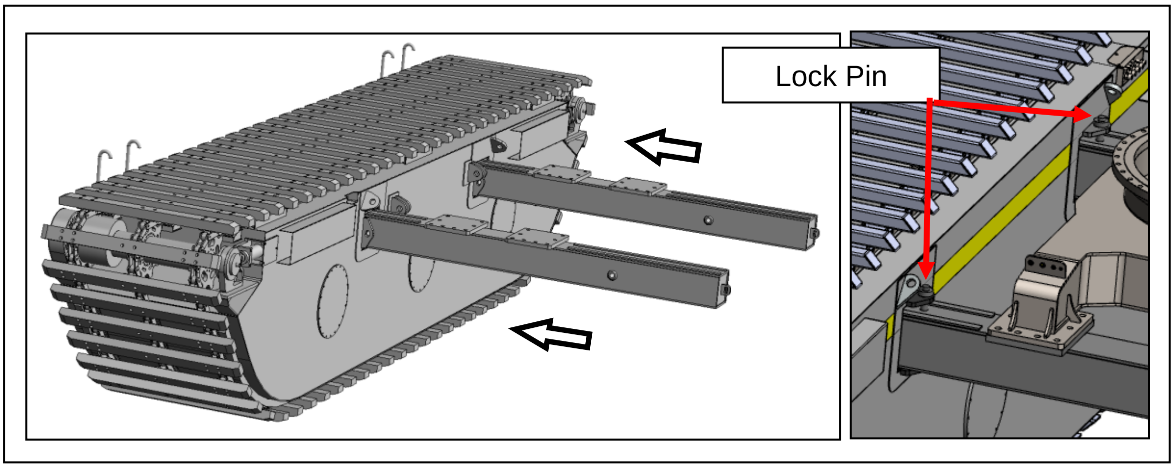

Figure 6.3

3. Move the second undercarriage unit to the preassembled unit. Insert the undercarriage to the crossbeam. Lock the crossbeams using the lock pin. Refer (Figure 6.4)

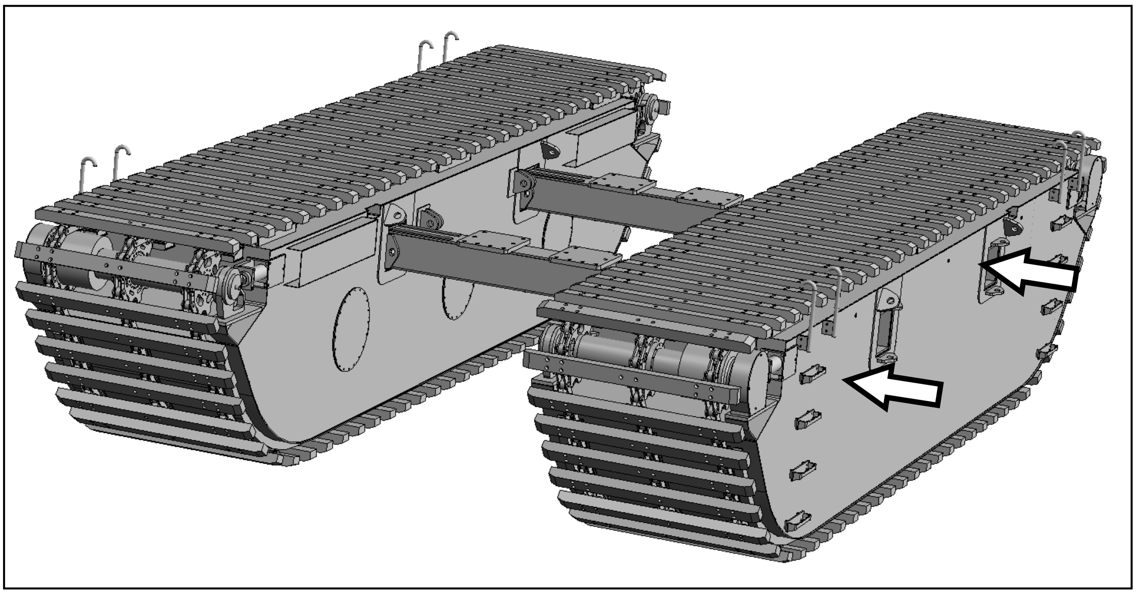

Figure 6.4

4. Place the slewing frame on the cross beams. Align the slewing frame mounting flange with the cross beams mounting flange. Refer (Figure 6.5)

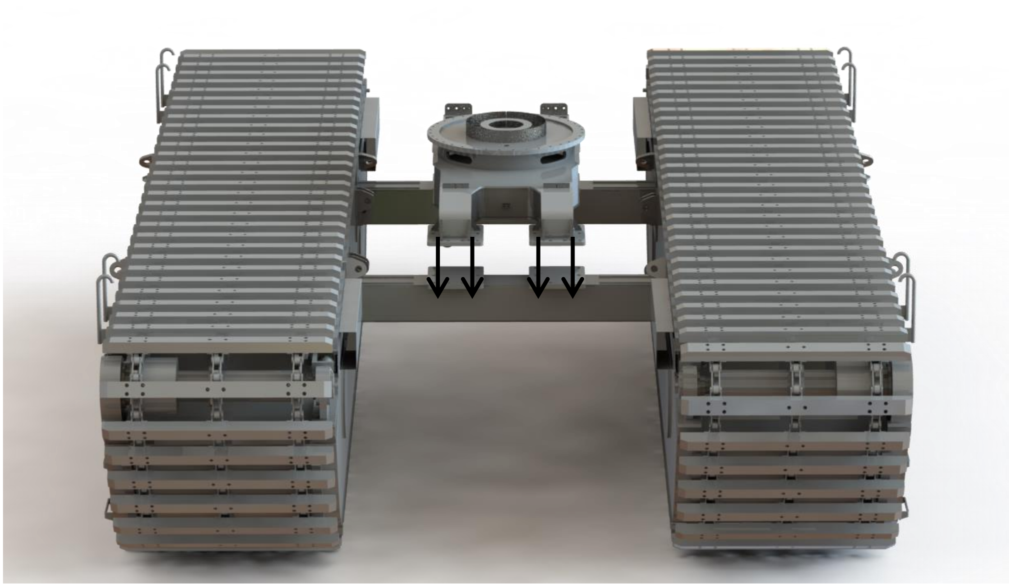

Figure 6.5

5. Tighten the slewing frame upper mounting flange onto the bottom mounting flange as per shown in the (Figure 6.6). There are total of 32 bolts at 4 corners which need to be tightened.

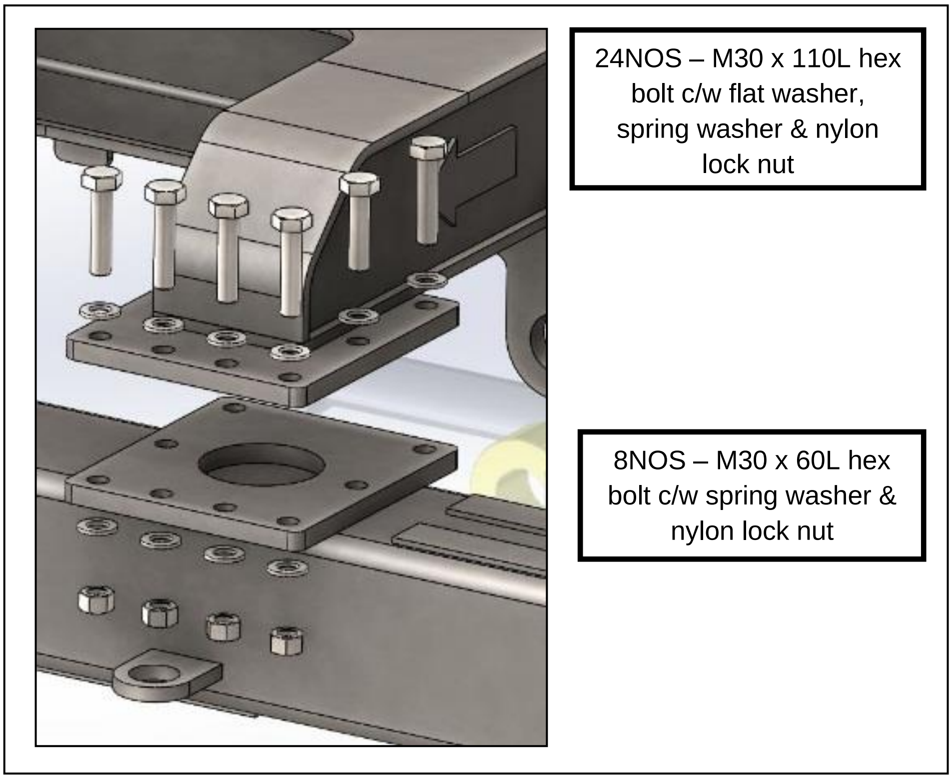

Figure 6.6

6. Install the excavator upper body and attachments by referring the manual and guidelines provided by the upper body manufacturer. Check alignments for both upper body swivel flange and slewing frame flange and tighten all the bolts thereafter. Refer (Figure 6.7).

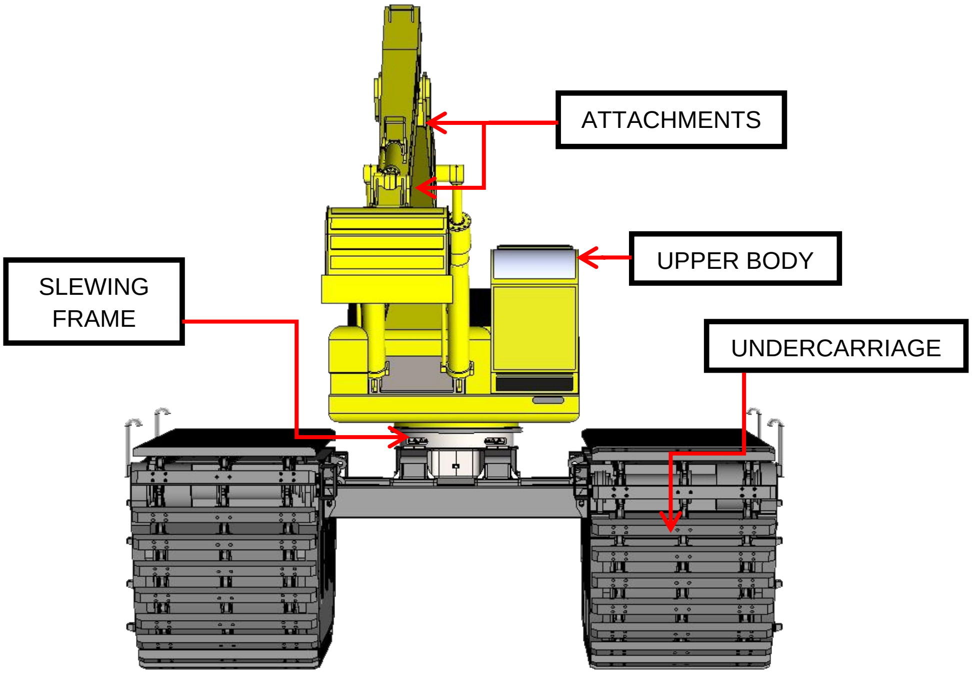

Figure 6.7

7. Install hydraulic hoses from pontoon to the slewing frame and from slewing frame to the upper body center joint. Thereafter, install the hydraulic hose one at a time by removing the protective caps and fix the hoses on the right fitting. Check all the connection for proper tightness. Refer (Figure 6.8 and 6.9)

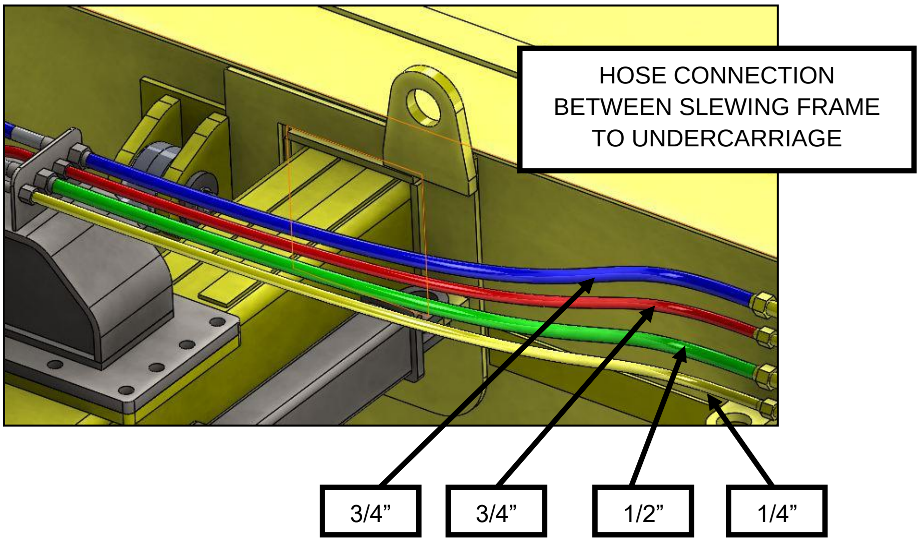

Figure 6.8: *Hydraulic hose connection from slewing frame to pontoon*

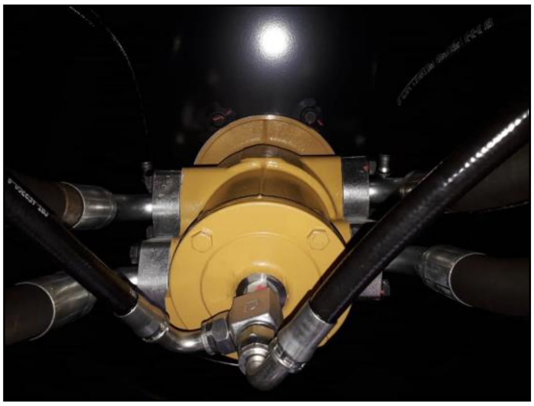

Figure 6.9: *Hydraulic hose connection from slewing frame to center joint*

8. Follow the start-up instruction provided with the upper body manual operation and start the machine. Operate the hydraulic system and check for right hydraulic motor rotation, long reach arm or standard arm movements and any hydraulic leakage.
9. The machine is now ready for operation.

Note: Used only the suitable size hydraulic hoses to connect one to another. Before connecting, clean the hydraulic fittings and hoses. After dismounting the hoses, ensure each hose and fitting are well sealed.

6.3 ASSEMBLING THE SIDE PONTOONS

1. By using crane, lift the side pontoon and ensure the side pontoon box beam centre is aligning with pontoon S-chamber.
2. Insert side pontoon box beam into the pontoon S-chamber.
3. Lock the side pontoon by inserting the lock pin as shown in the (Figure 6.10).
4. Connect the hydraulic system from slewing frame two-way ball valves to pontoon body and two-way ball valves on the top of side pontoon to the pontoon body as show in (Figure 6.11) and (Figure 6.12).

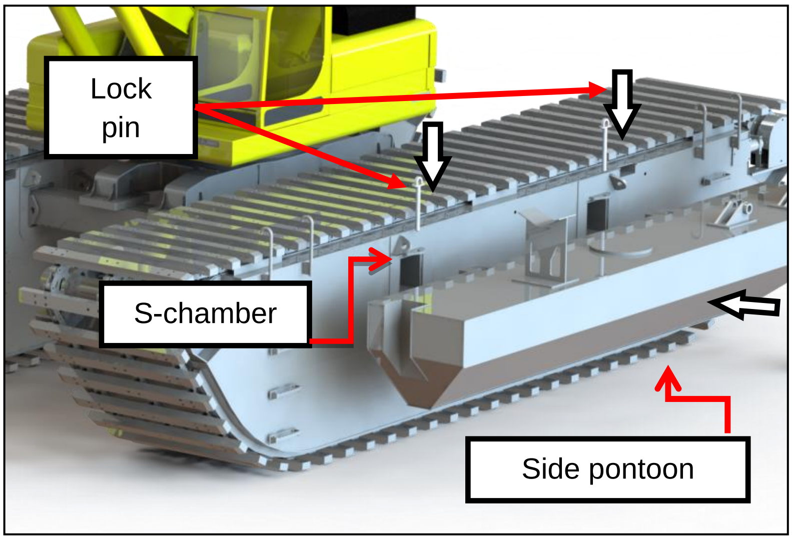

Figure 6.10

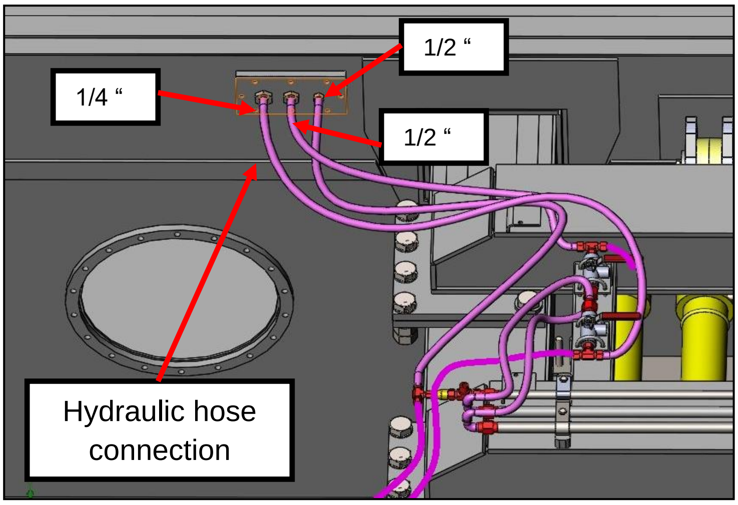

Figure 6.11

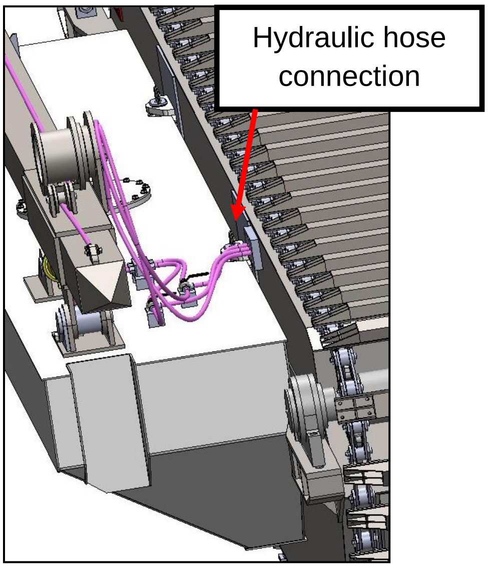

Figure 6.12

6.4 DISASSEMBLY THE MACHINE

Disassembling sequences of the amphibious hydraulic undercarriage are as follows:

1. Disconnect all the hydraulic hoses on the center joint and slewing frame. Caution on the hydraulic oil spillage. Plug the openings hoses with caps or plugs.
2. Remove the hydraulic cylinder pins from undercarriage hydraulic cylinder brackets (Dismantling hydraulic cylinder from slewing frame is not required). Use rope to tie or hang the hydraulic cylinder to the slewing frame.
3. Take out all the hex bolts which connected the slewing frames to the cross beams. Slowly take out the slewing frame from the cross beams.
4. Separate one of the undercarriages apart to accommodate room for releasing the cross beams.
5. Lastly, take out the two crossbeams.
6. The disassembling process is completed.

Thank you for spending some time reading this manual. We hope you have a pleasant experience by using our Amphibious Excavator AT300-V2/AT300PS-V2 product. For any further information, do not hesitate to contact us.

ULTRATREX MACHINERY SDN. BHD

TEL : +607 355 7777
FAX : +607 351 0229
E-MAIL : marketing@ultratrex.com.my

PLO 229, JALAN KENCANA MAS 2,
KAWASAN PERINDUSTRIAN TEBRAU 3,
81100 JOHOR BAHRU,JOHOR, MALAYSIA.