

Serial No 019

Restricted Document

////////// 编号: 019

内部材料, 使用后务必回收

Repair Manual for Modular Bridge Type HZQL75



CHINA HARZONE INDUSTRY CORP., LTD

October, 2015

华舟重工 应急先锋

Repair Manual for Modular Bridge Type HZQL75



CHINA HARZONE INDUSTRY CORP., LTD

October, 2015

CONTENTS

Chapter One	Repair.....	2
Section One	General Technical Requirements.....	2
Section Two	System Repair Requirements.....	10
Section Three	Minor Overhaul Requirements.....	12
Section Four	Minor Overhaul Test on Completion.....	17
Section Five	Major Overhaul Requirements.....	21
Section Six	Major Overhaul Test on Completion.....	25
Section Seven	Troubleshooting of Common Faults.....	29

Chapter One Repair

The repair of equipment consists of minor overhaul and major overhaul.

As an operational repair, minor overhaul is to solve the failure and repair the damaged parts occurred in the equipment operation process. It is conducted one time as long as the equipment is used for one year.

Major overhaul is to repair the equipment's damages and make the equipment back to its original tactical and technical performances. It is conducted every eight years.

The operation for the repaired and changed parts must be recorded.

Minor overhaul is performed in the mechanical repair place and major overhaul is performed in the professional factory.

Section One General Technical Requirements

1. General Technical Requirements

1.1 Make technical preparation before repair. Besides the technical requirements described in this section, parts list and product's operation guide are also needed. Make the record while disassembling. Supply the missed or damaged parts. Assemble the parts in accordance with the procedures.

1.2 Ensure the parts meet the technical requirement. Conduct flaw detection check to the parts with heavy loads. Make linearity and concentricity check to the thin and long parts.

1.3 Use reasonable washing method to wash each part. Surface quality of part should not be affected by the washing. The part should be painted when necessary. Assemble the part when the paint is dry.

1.4 Clean away the rust and burr of the working surface of part. Repair the damaged place.

1.5 The assembling method should be correct without missed assembling parts. The assembling clearance, tolerance and degree of tightening must meet the requirement.

1.6 Generally assemble the parts with pressure under the condition of static pressure. Put the copper plate, copper sleeve or other washers before assembling if the part is inserted by the hammer. Ensure there is no clearance between the surface

2.5 Alloy steel and carbon steel forging must be made through corresponding technical treatment. The mechanical performance of treated part must be in accordance with the requirements of drawing and national standard.

3. Welding

3.1 It is forbidden to put the steel piece, round steel or other things in the clearance of welded part. Preheating operation must be completed before weld with the steel of 40Cr, 30CrMnSiA and 45#. Preserve the heat after welding operation.

3.2 As to the distortion correction by flame, No. 903 steel structure is processed by local heating method. The heating temperature must within the range from 750°C to 900°C.

3.3 Storage and Usage of Welding Rod

3.3.1 The welding rod must be put in the dry storeroom with sound ventilated condition in order to avoid damp and deteriorated problems.

3.3.2 Put cushion underneath the welding rod. The distance between the welding rod and ground should not less than 200mm. Keep some distance from the wall.

3.3.3 Carefully transport and move the welding rod. The coating of welding rod is easily dropped off.

3.3.4 As to the alkaline low hydrogen type welding rod, baking operation is needed before welding. The welding rod of E4315, E5015, E6015 must be baked for 2 hours with the temperature of 250°C to 300°C. Marine welding rod 903 must be baked for 2 hours with the temperature of 400°C to 450°C. Based on the damp condition, The welding rod of E4320 must be baked for 1 to 2 hours with the temperature of 70°C to 150°C. Bake the welding rod again if it will use on the second day.

3.3.5 Baking box must be provided for the baking of welding rod. It is forbidden to put the welding rod in the environment with hot or cold temperature suddenly, otherwise the coating is easily cracked or dropped off.

3.3.6 Remove the water, rust, oxide skin and paint from the welding place (including the adjacent surface with 20mm to 30mm in width).

3.3.7 During connection, ensure the outer surface of steel plate with different

lacquer thinner are not allowed to wash.

4.2.4 Remove the defects such as crack on the paint film first and then paint again.

4.2.5 Primer: the type of F53-3 iron oxide red phenolic rustproof paint is used for the surface of steel component. The type of F53-4 zinc yellow phenolic rustproof paint is used for the surface of nonferrous metal.

4.2.6 Finish paint: F04-11 army green phenolic enamel paint.

4.2.7 The superstructure, trestle, launching girder, ramp, mooring cable, tools box and other bracket (seat) that are not described in the document, should be painted with primer and grass green finish paint twice.

4.2.8 The frequently rotated part such as winch, oil pump, steel cable pulley (rollers) must be painted with primer one time and black finish paint twice.

4.2.9 Generally the electric component is not needed to be painted. If the component must be painted, the color must be the same with original one, and the name plate and mark should not be covered.

4.2.10 Each marking, serial number, reversing line on the bridge deck, since they have already been painted before, should be painted with white paint one time again.

4.2.11 The oil inlet, oil cup and oil plug should be painted with red paint one time again.

4.2.12 As to the metal surface without paint, it should be lubricated with rustproof grease in order to avoid rust during transportation or storage.

4.3 Painting Check

The quality requirement of painted surface is the surface is painted comprehensively without crack, spot, bubble or other defects.

5. Galvanization and Oxidization

5.1 The surface of disassembled part should be galvanized or oxidized if rust or dropped galvanized layer is found after washing.

5.2 The covering layer of galvanized or oxidized part should attached tightly to the part surface with enough thickness. The galvanized thickness of unspecified part is generally from 20 to 30 μ m. The galvanized thickness of screw thread is generally

- Check the locking device of widened board, solve the inflexible problem and assemble the part again when necessary.
- Check the winch and steel cable. Repair or change the broken-down and damaged part.

1.2 Assembly of Trestle

- Remove rust and paint.
- Check the component of trestle, correct and repair the local damaged place.
- Check each connecting, disassembled and movable part, repair or change the broken-down and damaged part.

2. Refitting of Bridge Layer

2.1 Launching Girder

- Remove rust and paint.
- Check launching girder and movable arm, correct and repair the local damaged place.
- Check each connecting and movable part as well as steel cable of launching girder, repair or change the damaged part.
- Check bridge deck locking device, repair or change the damaged part.

2.2 Vehicle's frame Refitting System

- Remove rust and paint.
- Check the supporting seat of launching girder, pulling rod and cylinder, repair or change the damaged part.
- Check bottom plate, fixing frame of positioner, box-type transom, repair or change the damaged part.
- Check the rear pulley of vehicle's frame, change the damaged part.
- Check the canvas cover of operation box, tools box and rear mud baffle, correct and repair the local damaged place.

2.3 Assembly of Outrigger

- Remove rust and paint.
- Check the outrigger, repair or change the damaged part.

3. Hydraulic Pneumatic System

pipe and coupling on the valve, change the damaged combined sealing ring of coupling.

- Check the trestle winch. Tighten the sleeve nut of hydraulic oil pipe and coupling on the valve. Change the damaged hydraulic hose and combined sealing ring of coupling.
- Repair the winch seat.
- Repair the bridge span locking device.

2. Assembly of Trestle

- Wash, remove rust and paint.
- Check the trestle component, correct and repair the local damaged place.
- Big shoe: open the drain plug to check whether there water leaking problem. Water tight test must be conducted if leaking problem occurs. Coat suds on the outer surface of shoe, the water tight test is completed under 0.294MPa, remove the rust and weld the leaking place. Conduct the test again until it is repaired.
- Check each connecting, disassembled and movable part, repair or change the broken-down and damaged part.
- Check the steel cable hook, correct it if it is distorted. Weld the joint with crack when necessary.
- Check the hydraulic winch cable of trestle. If the steel cable and wire is damaged or cracked, it must change the damaged into new one in according with the technical requirement.
- Check the guide rollers. If there is crack in the weld joint, welding operation must be conducted.
- Check the middle supporting seat of left and right cylinder. Weld the crack in the component when necessary.

3. Refitting of Bridge Layer

3.1 Launching Girder

- Wash, remove rust and paint.
- Check the launching girder and movable arm, correct and repair the local damaged place.

- Check the rear mud baffle, tighten or change the bolt on the mud baffle. Correct and repair the local damaged place.

3.3 Assembly of Outrigger

- Wash, remove rust and paint.
- Check the outrigger, repair or change the damaged part.
- Check the hydraulic oil circuit. If leaking problem occurs, tighten the sleeve nut of hydraulic oil pipe and coupling on the valve, change the damaged combined sealing ring of coupling. Repair or change the damaged part.

3.4 Chassis

- Check the fan belt and engine belt, change the damaged belt.
- Check the starter, change the damaged starter.
- Check the air filter, engine oil filter and diesel oil filter. Wash or change the filter core.
- Check the lighting system, change the damaged bulb.
- Maintain and repair the chassis in accordance with the operation manual.

4. Hydraulic Pneumatic System

4.1 Pneumatic System

- Check the air pipe, coupling, air valve and air cylinder of pneumatic system, repair or change the leaked and damaged part.
- Adjust the engine speed: the high engine speed is from 1600 to 1700rpm, the low engine speed is from 1100 to 1200rpm, and the idle speed is from 600 to 650rpm.

4.2 Hydraulic System Component

- Check the oil circuit and coupling. Tighten the sleeve nut of hydraulic hose and coupling on the valve if oil leaking problem occurs, change the damaged combined sealing ring and hose.
- Check the coupling, oil pump, valve and cylinder. Change the damaged combined sealing ring of connecting part.

4.3 Hydraulic oil tank

- Check the connecting place of hydraulic oil tank, tighten the bolt (screw) and change the sealing washer if leaking problem occurs.

2. Assembly of Trestle

- There is no leakage with the big shoe.
- Smooth launch and retrieval of trestle.
- The total length of the shoe assembly is 3700mm after launch. The distance between the center of two ball-type hinges is 2500mm. The width of shoe is 780 ± 2 mm.
- There is no leakage in the hydraulic part.

3. Launching Girder

- The safe pulling rod can be folded flexibility. The adjusting screw moves smoothly.
- In order to ensure the same concentricity of lifting cylinder and launching girder, the supporting wood of cylinder must be assembled and fixed when the cylinder and steel cable is loaded with weight. The supporting wood can be adjusted or added with gasket on site.

4. Vehicle's frame Refitting System

- The bridge span is located on the fixing seat smoothly after it is retrieved.
- Orderly and tight arrangement of hydraulic winch steel cable on the winch drum.
- All the fixing devices can work properly.

5. Assembly of Outrigger

- There is no leakage in the hydraulic part.
- The launching and retrieval of cylinder is flexible.

6. Pneumatic System

- There is no leakage in the air circuit.
- Engine speed meets the requirement: The high speed is 1600 to 1700rpm, the low speed is 1100 to 1200rpm and the idle speed is 600 to 650rpm.

7. Hydraulic System Components

- Each component works normally without leakage problem.
- The filter isn't blocked.

8. Hydraulic Oil Tank

- There is no leakage in the oil tank.

- The total driving distance is 100km.
- Loose and damaged problems are not allowed with the refitted and tightening parts. Check the welded part carefully with record.
- Make the record of the vehicle's highest driving speed, engine oil temperature and technical condition of each system.

Section Five Major Overhaul Requirements

1. Bridge Span

- Clean and remove the rust.
- Check the bridge span component with regard to rust, abrasion, distortion and crack, repair the damaged part according to the technical requirement.
- The maximum upper camber of semi-span is 0 to 5mm. Lower deflection is not allowed.
- The difference of deflection between the left and right girder should not more than 3mm. After use, if the upper camber exceeds -2mm and the deflection between the two girders is equal or more than 5mm, it must be corrected and repaired.
- The transverse upper deflection of semi-span is 0 to 5mm. After use, if the upper camber exceeds -5mm, it must be corrected and repaired.
- After corrosion or abrasion, if the thickness of local part is less than 70% of the original length, this local part should be changed into new one. If serious crack or distortion occurs in the local part, correct, weld or change the defected part.
- After the whole bridge is assembled, the camber of middle span is +10 to 20mm.
- Check the rust, corrosion, abrasion and distortion condition of widened board component, repair the cracked component according to the technical requirement.
- Check whether the widened board is distorted, if it is difficult to unfold or fold because of distortion, it must be corrected.
- Check the torsion bar of widened board, change the damaged part.
- Disassemble hydraulic winch of trestle, change the unqualified part and assemble the winch in accordance with technical requirement.
- Check the hydraulic pipe of bridge span. If the hydraulic part is leaking, tighten the sleeve nut of hydraulic oil pipe and coupling on the valve, change the damaged

- Check the steel cable and change the unqualified one.
- Disassemble the movable part and change the damaged part.
- Change the pulley and bearing of pulley assembly and pulley bracket.
- Adjust the clearance of bridge deck locking device, repair or change the locking hook.
- Repair or change the transverse cylinder seat on the rear axle.
- Change the roller or roller's shaft of shaft sleeve assembly.
- Paint the primer twice and finish coat in grass green color twice.

3.2 Vehicle's frame Refitting System

- Clean and remove the rust.
- Change the connecting block (1303-403-002) on the vice vehicle's frame, connecting bolt (M16×55, GB/T1228-1991) on the chassis girder and nut (GB/T1229-1991).
- Change the assembly of pulling rod supporting seat.
- Repair the fixing bracket of positioner.
- Change the right flange of winch coupling. Take the key out during disassembling since it is easily dropped on the ground. After assembling, it can't be used for the launching and retrieval of bridge span directly. Try to lift a weight of 3t first to ensure the good installation condition of winch coupling right flange.
- Change the damaged bolt of cylinder supporting seat: Bolt M16×90, M16×100, M16×130, GB/T27-1988, Grade 10.9. Bolt M16, GB/T6170-2000, Grade 10. Washer 16, GB/T93-1987.
- Check the supporting seat of launching girder, pulling rod and cylinder, repair or change the damaged part.
- Check the bottom plate, fixing frame of positioner, box-type transom, repair or change the damaged part.
- Check the rear pulley of vehicle's frame, change the damaged part.
- Check the canvas cover of operation box, tools box and rear mud baffle, correct and change the local damaged place.
- Paint the primer twice and finish coat in grass green color twice.

1.2 Pipe

All the pipes must be arranged orderly. The pipe clip is tight and reliable.

1.3 Chassis

The working condition of chassis is good.

2. Bridge Span

- The two semi-spans after repair rotate flexibility within 180 degrees. Under folded condition, let one end of lower flange contact with the outer side of lug and yolk from 1500mm distance. The clearance near lug and yolk must be within the range of 8 to 13mm.
- The widened board after repair rotate flexibility within 180 degrees. Under unfolded condition, the farthest flange of widened board must be 10 to 15mm higher than upper flange of girder.
- There is no leakage in the hydraulic part.
- The hydraulic winch of trestle rotates flexibility.

2.1 Trestle

- The maximum launching height is 5000 ± 5 mm.
- The minimum launching height is 3320 ± 5 mm.
- The center distance of two trestle columns is 2900 ± 2 mm when the trestle is launched transversely.
- The center distance of two trestle columns is 1730 ± 4 mm when the trestle is retrieved transversely.
- The distance between the lifting ring center and centerline of transom is 400 ± 1 mm and 334 ± 1 mm respectively.
- The unfolding and folding operation of shoe, transverse movement of trestle column and rotation of trestle column around transom is flexible without block.
- The locking and unlocking operation of trestle locking device is flexible.

2.2 Launching Girder

- After repair, the rear shaft bearing is limited without movement in the axial direction. Relative movement is not allowed between the rear shaft and launching girder axis.

- Loose and damaged problems are not allowed with the refitted and tightening parts. Check the welded part carefully with record.
- Make the record of the vehicle's highest driving speed, engine oil temperature and technical condition of each system.

5	Oil leaks between piston rod and cylinder.	Oil seal ring on upper cover of cylinder is worn.	Replace oil seal.
6	Winch fails to work	1. Solenoid pneumatic valve inoperative. 2. Broken electric circuit and blockaded air line. 3. Trouble of winch itself.	1. Check, clean and replace valves. 2. Find out possible cause of broken lines. 3. Repair or replace it.
7	Cable fouling	Winch run without load.	Slack off fouling cable and rewind it tightly.
8	Failure of span to stop falling at a certain point as required, but fall by itself.	Hydraulic brake of winch defective.	Check and replace it.
9	One winch is sliding when lift the bridge span	The two winches don't receive the pressure oil at the same time.	1. Get the pressure oil at both sides and then lift the bridge span. 2. Check the flow diverter valve, repair or change it when necessary.
10	Oil leak in some joints	Joint nut loose or the sealing ring is aging or damaged.	1. Tight the joint nut. 2. Change the damaged sealing ring and O-shape ring.
11	The power takeoff doesn't work	The air control circuit in the power takeoff is blocked.	1. Check whether the stop valve of oil returning pipe is opened or not. 2. Check the air pipe and clean it.
12	The winch control switch doesn't work: 1. Manual operation is OK. 2. Manual operation doesn't work	1. Air valve is damaged. 2. Selector valve is damaged or the winch is locked.	1. Repair or change the air valve. 2. Check whether the pushing cylinder is pushed to the right position. The rotating arm must be put down to unlock the winch. Repair or change the selector valve if necessary.

2. Troubleshooting of Common Faults in Electric System

Table 2 Troubleshooting of Common Faults in Electric System

No.	Trouble	Possible Cause	Remedy
-----	---------	----------------	--------