

XG6121 (YZ12D)
Vibratory Road Roller

OPERATION AND MAINTENANCE
MANUAL



厦工集团三明重型机器有限公司
SAHM HEAVY-DUTY MACHINE CO., LTD.



Foreword

Thank you for using our product. Please read this manual carefully before operation.

This manual describes the performance, structure, operation, maintenance and general troubleshooting methods of the product. It's intended for use by operators and technical servicing personnel.

With the advancement of technology, the product's structure and performance may undergo constant improvement and upgrade. We reserve the right to change the specification without prior notice.

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Fig.1, Fig.2, Fig.3, Fig.4, Fig.5, Fig.6, Fig.7, Fig.8, Fig.9, Fig.10,

Chapter 1 Overview

The YZ12D Vibratory Roller is a super-heavy, hydrostatic transmission vibratory road roller. The YZ12D Vibratory Roller features steady and reliable performance, powerful centrifugal force, outstanding compacting result, high productivity, good braking performance, and superb exterior design. It's an ideal compacting equipment for applications on highway, mine, railway, airport and water conservancy projects, particularly for the compacting of the foundation and filling of various kinds of construction projects.

YZ12D Vibratory Rollers are mainly comprised of drum, power units, mechanical gearings, hydraulic transmission system, control mechanisms and body.

The drum is designed at the front part of the machine, mounted in a dedicated framework. Between the drum and the framework, the connection is made through a rubber shock absorber to separate the mechanical shock between them. Via the hydraulic transmission system and the eccentric mechanism mounted in the drum, the drum can generate a type of vibrations on the same frequency, but in two different amplitudes. In view of different compact materials and pavement thicknesses, the user can select different amplitudes to perform the compacting operation for the best compacting result.

The power of the vibratory rollers in this series is offered by 6BT5.9 diesel engine manufactured by Dongfeng Cummins, which is mounted on the hitch frame, at the rear of the machine. The driving power outputs from the flywheel side of the engine, driving a hydraulic pump tandem connected together by 2 pumps, and respectively supplying the power required for the travel and vibration. And the power for turning is offered by another force-output port of the engine.

The mechanical gearing of the vibratory roller mainly consists of three parts, namely, gearbox, driving axle and planet reducer of the drum, the major parts for machine travel and transmission. The gearbox and the driving axle are mounted on the hitch frame and the planet reducer on the left of the drum. And the gearbox is a kind of 3-step gearbox, enabling the vibratory roller to have 3 different top travel speeds.

The hydraulic transmission system is mainly comprised of 3 hydraulic transmission systems, traveling, vibrating and turning systems, which are separate to each other and respectively transmit power for traveling, vibrating and turning.

The control assembly of the Vibratory Roller is comprised of units such as travel, vibrating, speed-shifting, foot brake, parking brake and throttle & choke of the engine. In order to facilitate the driver's operation, the control lever is set near to the driver seat.

To make sure of safe driving, especially in the nights and the foggy working conditions, lighting and turning indicators are available at the front and rear ends of the vibratory rollers. The vibratory rollers have comfortable cabs, offering the drivers good working conditions.

The basic type of the vibratory rollers comes in tyre driving-smooth vibrating. And cam-type drum and air-conditioner can be both selected according to the users' requirements.

Chapter 2 Main Performance Parameters

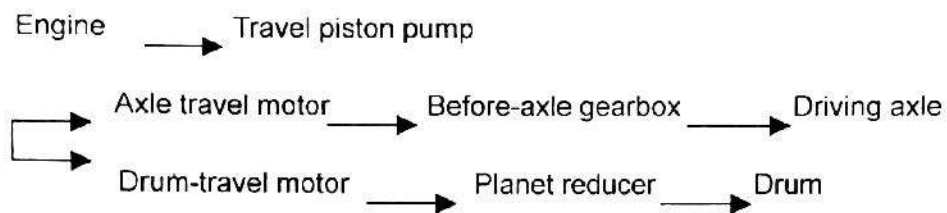
Operating Weigh	kg	12100
Drum Distributed Weigh	kg	7100
Tire Distributed Weigh	kg	5000
Drum Static Linear Load	N/cm	333
Max. Gradeability	%	50
Theoretical Amplitude	mm	1.7 (high) 0.85 (low)
Centrifugal Force	kN	247 (high) 127 (low)
Travel Speed	km/h	
	Step I	0~4.3
	Step II	0~6.4
	Step III	0~9.2
Tyre Model	23.1~26	8PR
Vibration Frequency	Hz	30
Min. Turning Radius	mm	6300
Drum Diameter	mm	1550
Drum Width	mm	2130
Wheel base	mm	2910
Engine Parameter		
Model		6BT5.9
Rated Power	kW	112
Rated Rev	r/min	2400
Overall Dimension (L×W×H)	mm	5688×2410×3200

Chapter 3 Transmission System

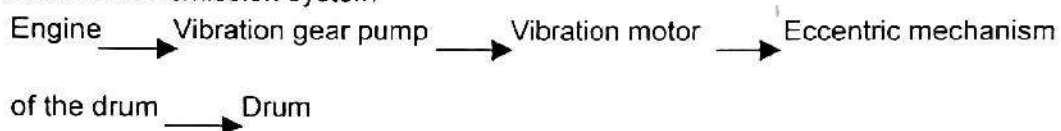
The transmission system of a Vibratory Roller is shown as Figure 1. The shown Vibratory Roller has a full-hydraulic transmission system, mainly comprised of 3 hydraulic transmission systems, traveling, vibrating and turning systems, which are separate to each other. The traveling part is of hydraulic-mechanical transmission and the other 2 parts are of hydraulic transmission.

The following are the transmitting routes of the 3 parts.

(I) Traveling drive system



(II) Vibration transmission system



(III) Turning transmission system



Chapter 4 Structure and Working Principle of Major Parts

I. Drum

The drum structure is shown as Figure 2. The drum is mainly comprised of planet reducer 2, driving board 3, drum body 5, absorber 6, left and right eccentric mechanisms 7 & 9, spline shaft 8, etc.

The power output of the travel piston motor located on the left of drum, is transmitted to the planet reducer through the spline sleeve 1, and then is used to drive the drum by the way of driving board 3 and reducer 6, enabling the vibratory roller to travel.

The vibrating motor on the right of the drum drives the left and right eccentric mechanism 7 and 9 to rotate respectively through spline sleeve 4 and spline shaft 8, and then generate the exciting force to make the drum work.

The structure of left and right eccentric mechanisms is shown as Figure 3, it is comprised of transmission shaft 1, fixed eccentric block 2, flexible eccentric block 3, pintle 4 etc. These 2 fixed eccentric blocks are welded to the transmission shaft, and the flexible ones are set between the 2 fixed ones and flexibly jacket onto the transmission shaft. When the eccentric mechanism rotates clockwise, the fixed and flexible eccentric blocks will be in the same direction (shown as Figure 3B), in this case, the eccentric moment will get its maximum, and generate a big exciting force and amplitude. The other way round, when the eccentric mechanism rotates counter-clockwise, the fixed and flexible eccentric blocks will separate to opposite sides and form an angle of 180° (shown as Figure 3C), in such a case, the eccentric moment will get smaller and generate a smaller exciting force and amplitude. The rotating direction of the eccentric mechanism is realized by changing the rotating direction of vibrating motor. Therefore, via changing the two rotating directions (clockwise or counter-clockwise) of the vibrating motor, the eccentric moment of the eccentric mechanism will be changed, then to provide 2 types of vibrations in different exciting forces and different amplitudes.

Between the drum and the front frame, we can bring a good shock-separating effect to the vibratory roller, with the jointing rubber absorbers (totally 16 PCs) located on 2 sides of the drum, so as to reduce harmful vibrations of the frame and the control bridge and perfect the driver's working conditions.

II. Gearbox

The structure of the gearbox is shown as Figure 4. It's a 3-step gearbox. By choosing different meshes of the gear wheels, you can get 3 different rates and 3 different top travel speeds of the road roller.

The rotation of the axle travel motor transmits to the input gear shaft 7. When the shift control lever is at "I" (see Figure 5), the shift control lever will make the transmission gear 10 (see Figure 4) slide to the right, making its inside teeth mesh the spline teeth of the big gear wheel 12, in this case, the power will be transmitted to the intermediate gear shaft 23 through gear shaft 3 and big gear wheel 25, and then to the spline shaft 17 through big gear wheel 12 and transmission gear 10, with transmission ratio $i_1=4.069$.

When the shift control lever is at "II" (see Figure 5), the transmission gear 10 in

Figure 4 will slide to the middle and mesh the medium gear wheel 24, in this case, the power is transmitted to gear shaft 25 through input gear shaft 3 and big gear 25, and then to the spline shaft 17 through medium gear wheel 24 and transmission gear 10, with transmission ratio $i_i=2.169$.

When the shift control lever is at "III" (see Figure 5), the transmission gear 10 in Figure 4 will slide to the left and mesh the gear shaft 3 through a spline, in this case, the power is transmitted to the spline shaft 17 through gear shaft 3 and transmission gear 10, with transmission ratio $i_i=1$.

On the joint sleeve 17, at the output side of the gearbox, brake disk 16 is fixed, with brake support fixed on the side surface of the gearbox housing. When the hand brake control handle is strained, the control lever 30 can be pulled through the flexible shaft, making the left and right brake blocks 28 & 29 inlaid in those 2 brake boards clamp tightly onto the brake disk 16 to effectuate the braking action. The manual brake mechanism can be used to park the machine after the engine shutoff. And it should be released before the road roller startup. During the traveling of the road roller, do not use the manual brake mechanism.

III. Hydraulic transmission system

The hydraulic transmission system of the machine is shown as Figure 6. It is mainly comprised of 3 hydraulic transmission systems, travel driving hydraulic system, vibrating hydraulic system and turning hydraulic system, which are separate to each other. The following is introductions to them:

(I) Travel driving hydraulic system

It is mainly comprised of travel piston pump 2, axle travel motor 11, drum travel motor 1, piping accessories etc. The travel piston pump is manually controlled servo two-way variable pump, mounted at the end of the engine flywheel. Via the control handle of the travel part, the leaning direction and the dip angle of the bevel plate in the piston pump can be changed by control valve and oil cylinder in piston pump, so as to change the output oil flowing direction and the flow from the pump, making 2 motors connected in parallel possible to rotate clockwise or counter-clockwise. The rotating speed of the motor varies with the pump flow rate. Therefore, the road roller can realize advancing, backing and stepless transmission traveling. The axle travel motor is located in the machine body, connected to the gearbox, and the power is transmitted to the tyre by way of before-axle gearbox and driving axle, to drive the roller travel. The drum-travel variable motor is located on the left side of the drum, connected to the planet reducer, and the power is transmitted to the drum by way of planet reducer, to drive the roller travel.

The travel-driving system is a closed system, with rated pressure 40MPa and oil-feeding pressure 2.2MPa.

There is a fine oil-filter 12 at the front of the travel piston pump inlet port. Its filtering accuracy is 10um. Additionally, there is also sharing primary oil-suction filter 13 mounted in the tank 14, which is to assure reaching the cleanness requirement of the system.

(II) Vibration hydraulic system

It is mainly comprised of vibrating gear pump 3, vibrating motor 5, vibrating valve 4, vibrating system cooler 6 and its piping accessories etc.

When the three-position four-way valve in the vibrating valve 4 is at the middle, the oil pumped out will return to the tank by way of the cooler 6. When controlling the vibrating switch to change the valve's work direction, the pumped out oil will flow into the

corresponding side of the vibrating motor to realize its clockwise or counter-clockwise rotating, so as to change the amplitude and reach the vibration compaction requirement

The vibrating switch can not be started until the road roller has been under traveling state. When the amplitude needs to be changed, make sure to stop the vibration for seconds to make the eccentric block in the drum completely still (a ringing sound will be heard), before turning the switch to start the vibration again. When changing the travel direction of road roller, first shut off the vibrating switch.

When the load makes the circuit pressure exceed the preset pressure 14MPa of the precursor overflow valve in the valve block 4, the two-position two-way cone valve will open to protect the pump and motor. We can monitor the pressure via the gauging mouth when adjusting the pressure.

(III) Turning hydraulic system

It is mainly comprised of turning pump 10, whole hydraulic redirector 9, turning oil cylinder 7 and its piping accessories etc. The turning pump is a gear pump, with its power directly obtained from the diesel engine. The whole hydraulic redirector is set in the meter rack of the cab, and it can be controlled through the steering wheel to control the turning of the roller. Two turning oil cylinders are respectively set at opposite sides of the hinges at the front and rear chassis.

Under the whole hydraulic redirector, a combined valve block 8 is mounted to control the system pressure, which is equipped with a relief valve and a bidirectional cushion valve, functionalizing to protect the system and resist the over-shock. The set pressure of the relief valve is 12MPa and that of the cushion valve is 14MPa.

When the engine is shutoff, the cycloid oil motor can be used as a manual oil pump, so the roller can still be manually turned.

VI. Electrical system

1. Electrical system is shown as Figure 7.

The accumulator is set under the cab, comprised of 2 12V batteries connected in series. After startup, the diesel engine can accept charging of the generator. The output of the alternator is adjusted by the outside adjustor, which can automatically increase or decrease the charging, according to the accumulator's demand. [Please see the instruction for details to better maintain the accumulator]

The power supply of the control system is controlled by a startup switch. The control system is wired in single-wire system and the accumulator is earthed by its cathode.

2. Engine startup:

(1) Set the "Forward/Backward" control lever to the neutral gear, and the engine can not be started until the neutral gear positioning switch is turned on.(2) Set the amplitude-selecting switch to the neutral gear and the vibrating switch at the "Stop" position

(3) Insert the key into the startup switch and clockwise turn to "1", the control system will be electrified, then continue to turn to the end, and the motor will be on and started. Once the engine is started, the key must be immediately released, the startup switch will automatically jump to position "1" and the charging indicator will turn off.

Note: The continuous startup time is forbidden to exceed 10 seconds. In order to protect the accumulator, it is required to wait 1 to 2 minutes to restart the engine after each failure.

3. Vibration

The amplitude-selecting switch is used to select high/low amplitudes. And the vibration

switch is used to control the vibration status of the roller.

When the roller vibrates, it should be avoided to shift the amplitude-selecting switch. If shifting the amplitude is required, first turn the switch to the "zero" position and do not turn the switch until 10 seconds later after the vibration halt, so as to avoid that the amplitude-changing pressure damage the hydraulic components.

4. Meter monitoring

- (1) Fuel gauge
- (2) Water thermometer;
- (3) Timer
- (4) Voltmeter
- (5) Engine oil thermometer
- (6) Engine oil pressure gauge
- (7) Air pressure gauge

6. Lighting and auxiliary electrical equipment:

Above the cab, task illumination and direction indicator lamp are respectively mounted, and also dome light that is not controlled by the startup switch, and on the cab glass, windshield wiper is provided.

V. Brake system

(I) Overview:

The brake system is used to decelerate or to brake, and to park for long time on the flat ground or slope.

The local brake system is comprised of travel brake (foot brake) and parking brake (hand brake).

(II) Travel brake system

Travel brake system is used for regular speed control and stop during traveling, and it's also called foot brake. The local travel brake system adopts the shoe brake, namely, the air-control brake valve makes the compressed air push the piston rod move, and then makes the shoe brake cam turn to a certain angle through a leverage mechanism, and the brake shoe opens to brake the roller. The whole course will be conducted by a pedal. The travel brake system has features such as calm brake, secure and reliable, simple structure, easy maintenance, well-sealed brake.

The main structure and principle of the travel brake system are shown as Figure 8.

The output compressed air of the air compressor (4) driven by the engine flows to the air cylinder (6) through the oil-water separating combination valve (5). The system pressure is 6.7~6.9 bar (6.8~7kg/cm²). The air cylinder has an on-route compressed air meter, which is mounted in the cab and can monitor the system pressure. The other route is connected to the inlet of an air brake valve general assembly (1). After stepping on the brake valve pedal and the compressed air flowing in to the air boosting pump (2) by way of the brake valve (1), the braking liquid will be pushed into the front chamber of the caliper brake (3) on both sides and push the piston move forward. With the cam rotating in the leverage mechanism, the brake piece will make the brake push off to brake the roller and achieve the braking or speed reducing. When releasing the pedal, the compressed air in the front chamber of the caliper brake will be discharged into the atmosphere and the piston will be under the action of the return spring (the spring is compressed when braking) to relieve the braking state.

(III) Parking brake system (see the "gearbox" section)

As for the parking brake system, when the handle is pushed backwards, the roller

should be in the braking state, otherwise, the long screw at the end of the caliper brake should be adjusted. Tweak this screw inwards, till the roller reaches the braking state.

(IV) Use and maintenance of the travel brake system

Frequent maintenance upon the travel brake system is very important to assure the brake performance, and to improve the security and reliability of the roller traveling.

(1) The system should be frequently checked for leakage, and all tie-ins and connections for any looseness, and the air & oil system is forbidden to have any seepage

(2) After discharging, while taking the advantage of the left pressure of the air cylinder, open the draining valve at the bottom of the air cylinder to let out all the liquid, otherwise, the left liquid will easily lead to rust and have ill effect on the service life of the rubber components of the air system.

(3) To assure security, frequently check the air pressure gauge. If the reading is lower than 6.7~6.9 bar, the pressure-adjusting valve in the oil-water separator should be adjusted to keep the normal work state.

(4) After the engine startup, the reading of the air pressure gauge should be 6.7~6.9 bar (6.8-7kg/cm²), before the parking handle being pushed forward and the parking brake being released as well as the roller traveling.

(5) When the roller needs to be towed on condition of failure with no air supply, the long screw at the end of the caliper brake should be loosen outwards. And the roller can be towed until the brake is released.

(6) Precautions upon use of the air cylinder are as following:

a) The service life of the air cylinder is 5 years upon being continuously used, but it will be shortened upon being discontinuously used. It will be 3 years roughly upon non-operating time over one month.

b) Frequently check the exterior of the air cylinder. If any corrosion-prevention coating is found peeling off, remove the rust and recoat it with antirust paint; if any bead crack or distortion is found, it should be promptly drawn out of service and replaced.

c) Periodically invite relevant departments or equipment departments to do pressure test upon the air cylinder. It should be done at least once every other year, with the testing pressure 0.88MPa (9kg/cm²). If the machine has been out of service for more than half a year, a pressure test must also be applied before using it again.

Chapter 5 Control Mechanisms and Meters

All of the control components are set near to the driver seat in the cab. The positions of all control components are shown as Figure 9. Functions of the all control components are described in order of following numbers:

1. Steering wheel: used to control turning of the roller. When turning counter-clockwise, the roller will turn left; when turning clockwise, the roller will turn right.

2. Danger-alarming flashing light switch: used to control the flashing of the turning lamp. It's used to warn the all adjacent personnel of safety risk when the roller needs to brake and stop or when other things occur.

3. Combined switch I: used to control turning lamp and headlamp. This switch has 3 rotating positions and it should always be set at the "headlight" position. This switch can also achieve multi-directional sways. When swaying forward, the right turning lamp and turn-right indicator flash; when swaying backward, the left turning lamp and turn-left indicator flash; when swaying up and down, it controls the headlight, and the upper, medium & lower positions are respectively for indicating overtake, dim light and high beam.

4. Oil gauge/ timer: used to indicate the fuel level and the accumulated work duration of the roller.

5. Engine oil pressure gauge: used to monitor pressure of engine lubricating system. In case of engine rated rotating speed, the engine oil pressure is 207~414kPa(2~4kgf/cm²). Upon idle running (500~600r/min), the engine oil pressure should be no less than 69kPa (0.7kgf/cm²). The machine is equipped with pressure gauge and pressure indicator. And the indicator will put out when the pressure reaches the demand.

6. Air filter alarming light: when it lights up during the working of diesel engine, it indicates the blockage of the filter which should be cleaned or replaced with new filter element.

7. Turn-left indicator: when lighting up, it indicates leftward turning of the roller.

8. Speed indicator: used to show the rotating speed of the diesel engine. The rated engine speed of the diesel engine is 2400rpm.

9. Barometer: used to monitor the air pressure of the foot brake system, with normal reading 0.65-0.7Mpa.

10. Turn-right indicator: when lighting up, it indicates rightward turning of the roller.

11. Brake indicator: lights up when braking.

12. Engine water thermometer: its reading should be 85~93 °C, forbidden to exceed 98 °C.

13. Voltmeter: used to show the voltage of the electrical system, and directly display the recharging state of the generator to the accumulator. The voltage should be 24V~26V.

14. Combined switch II: used to control on/off of the headlamp, by 2 rotating positions.

15. Combined switch III: used to control the windshield wiper by 3 swaying positions, these 3 positions are to control the stop, low speed and high speed motions respectively.

16. Brake pedal: used to control the air-braking part of the roller to achieve brake. Step on the pedal, and the roller will be under the braking state. **Note:** When the roller needs to be braked, forward-backward control lever is needed to be pulled to the middle position, before the pedal can be stepped down to brake.

17. Electrolock: used to control the circuits except for dome light circuit. The circuit

breaks when it's at middle position. When it's at "I", all meters and electric appliances are electrified except the starting motor. The flameout of the diesel engine is also controlled by the electrolock.

18. Rear light switch: used to control rear light.

19. Parking brake handle: used to control the parking brake state of the roller. When the parking brake handle is pushed forward, the hand brake of the roller is released (on condition of enough compressed air in the air cylinder), and the roller is in traveling state; when the brake handle is pulled backward, the roller is in brake state and parking brake is achieved. **Note: It's forbidden to use this brake when the roller is traveling, instead, pedal brake, namely parking brake should be used.**

20. Start button: when the electrolock is open, pressing this button will start the diesel engine.

21. Start-vibration interlocking switch: for interlocking the start and the vibration. It should be turned to "Start" before the diesel engine starts.

22. Amplitude-selecting switch: three-step, vibration stops at the middle position; rightward turning makes larger amplitude and lower frequency while leftward turning makes smaller amplitude and higher frequency.

23. Speaker button: the speaker hoots when the button is pressed.

24. Forward-backward control lever: used to control the stop, advancing or backing of the roller. When the lever is at the middle position, the roller is under stop state; with the lever being pushed forward, the roller advances; when the lever being pulled backward, the roller backs. The travel speed is proportional to the tilt angle of the lever.

25. Throttle lever: used to control turning of the engine. When the lever is pushed forward, the throttle will be bigger and the engine will rotate faster; otherwise, if the lever is pushed backward, the engine will rotate more slowly. **Note: When the roller is under working state, the throttle should be at its maximum, and the throttle flexible shaft should not be used to control the travel speed and vibrating frequency of the roller.**

26. Main power switch: used to control the main power supply.

27. Gearbox shift control lever: used to select the travel speed of the roller. When the operating handle is at the bottom, it's at step "I", "II" when at middle position and "III" for top position. There is a neutral-gear position between every two step positions, and the control lever is at the neutral-gear position in case of the roller parking. For failure in putting into gear when shifting, it's because the internal spline of the gearbox shift gear is not aligned with the external spline of the corresponding gear. In this case, do not pull the lever with too big a force, and adjust the relative position of internal and external splines via the jiggle backward-forward control lever, before pulling the shifting control lever to put into gear.

28. Air-conditioning wind rate switch (optional): used to control the rotating rate of the evaporating blower and select suitable wind rate.

29. Air-conditioning temperature switch (optional): used to adjust the indoor temperature of the cab.

Chapter 6 Operation

I. Safe operation rules

1. Only the driver who has good command of the rollers of this model, is allowed to drive the roller.
2. The roller should be kept clean and in a sound structure, not allowed to work with any fault.
3. The roller should have instruction manual available, so that the driver can record its technical status and work time during the operation.
4. When the roller working in nighttime or foggy weather, lighting facilities must be available in the work field.
5. The unauthorized personnel are forbidden to stay on the roller.
6. It is forbidden to leave the roller uncontrolled during its operation, and the roller driver is forbidden to leave the roller when the roller is traveling.
7. It's forbidden to infuse oil or repair when the roller is traveling.
8. When a workman needs to work under the chassis to repair the roller, the engine flameout should be performed beforehand and the roller must be provided with a reliable brake.
9. When the roller is turning, only slow speed is allowed.
10. When the roller is on the slope, shifting, neutral gear, engine flameout are all forbidden, and only step one is allowed to run when climbing or downgrading.
11. It is forbidden to start the engine by dragging the roller.
12. It is forbidden to run the roller with a second person on.
13. The roller should not vibrate on the hard road surface to avoid any damage to the parts and structure.
14. It should be avoided to have the roller vibrate at the original location.
15. The engine shall stop working when fueling, and smoking is forbidden at site.
16. At least ten seconds of non-vibration is required before the shifting from higher-frequency step to the lower or before shifting from the lower to the higher.
17. The roller should be trigged after work.

II. Preparation before operation

To assure reliable work, the roller needs to be checked with the following. Any abnormal occurrence found, should be cleared up.

1. Any looseness with the fasteners of all connections?
2. Is the engine cooling tank filled with water? Any leakage with the water pipeline connections?
3. Is the diesel tank filled with diesel? Any looseness or leakage at the oil pipeline connections?
4. Is there enough engine oil in the oil sump? Any looseness or leakage at the oil pipeline connections?
5. Is the accumulator recharged enough? Any looseness at the startup circuit connections of the diesel engine?
6. Does the oil level of the hydraulic oil tank reach the relevant prescriptions? Any looseness or leakage at the oil pipeline connections of the system?

7. Is there enough lubricating oil with the gearbox, planet reducer and vibrating bearing of the drum?

8. Is the tightness degree suitable with every belt?

9. If the roller experiences a longtime parking, it should be checked with the lubricating oil for the quality. If the oil is not usable, replace with new oil. Grease should be injected at every part according to the lubrication list, and also check blockage at all piping.

10. Is the tyre air pressure normal? Is there any looseness with the hub nut?

11. When the roller working in nighttime or foggy weather, lighting facilities should be firstly checked.

12. Is the brake system working normally?

13. Release the turning lock between the drum framework and the hitch frame.

III. Startup

The following consequence should be followed to start the roller:

1. Set the shift control lever at the neutral position.

2. Set the vibrating switch at the middle position.

3. Set the forward-backward control lever at the middle position.

4. Set the parking brake handle at the brake state position.

5. Push the throttle lever backward to the end, namely, to the idling position.

6. Close the main power supply switch. Insert the start key and turn rightward to the designated position, then press the start button (No. 20 in Figure 9) and the engine starts. The start button shall be released instantly after the engine start.

7. After start, the engine should keep idling state to warm up for 3~5 minutes, and also check whether the meter readings on the instrumental panel are normal or not, especially the engine oil pressure is over 69kPa or not. If the oil pressure is not high enough, the engine shall be immediately stopped for troubleshooting.

8. Only when the cooling water temperature is warmed up beyond 70°C through idling and the reservoir pressure of the compressed air cylinder reaches 0.45MPa, can the roller be started.

9. Slowly push the throttle lever forward to the maximum, and make the engine reach the rated gauged speed 2400r/min.

10. Turn the steering wheel while keeping the roller at its former place, to check the flexibility of roller turning.

11. Set the parking brake handle at the brake state position. Be sure to keep it in mind!

12. Set the shift control lever at the needed position.

13. Pull the forward-backward control lever forward or backward, the roller will immediately advance or back correspondingly.

IV. Function and operation

1. While the roller is traveling and operating, the driver should always pay attention to its travel direction and use the control handles to operate the roller.

2. The light must be turned on when working in nighttime or foggy weather.

3. Watch out for all the readings on the instrumental panel.

4. When shifting, the forward-backward control lever should be set at the middle and the roller must stop traveling firstly.

5. As for the redirection, it must be done only after the complete stop and it is forbidden to hastily push the redirecting control lever forward or backward. It is strictly prohibited to

use the redirecting control lever to cooperate the roller startup.

6. The steps "I" and "II" are used for vibrating compaction or climbing steeper slopes. Do not use step "III" or make the roller work under small throttle condition, it will get a low efficiency and shorten the service life of the diesel engine.

7. When changing the amplitude, the eccentric block must firstly completely stop rotating. To avoid any damage to the components, it is strictly forbidden to change the amplitude when the eccentric block is still rotating.

8. The vibration must be stopped before the roller stop traveling.

V. Shutdown

The following consequence should be followed to shut down the roller, at the closing of the roller's work:

1. Set the forward-backward control lever at the middle position.
2. Set the parking brake handle at the brake state position.
3. Set the shift control lever at the middle position.
4. Push the throttle handle downward to keep the diesel engine in low rotating speed (600-700 rpm). Observe the readings of the water thermometer, the diesel engine flameout shall not be performed unless the water temperature drops below 70°C.
5. When the driver leaves the control bridge after full stop of the roller, he/she should close the circuit safety switch and take down the key by turning leftward.
6. Cut off the main power supply switch.
7. In the cold seasons, the cooling water of the diesel engine should be drained up after shutoff to avoid frost.

Chapter 7 Lubrication and Maintenance

I. Lubrication of the roller

The positions needing lubrication of a roller are shown as Figure 10.

1. Lubrication on vibrating bearing of the drum: apply SAE15W_40 engine oil. There are oil level sighting ports and screw plugs on both sides. To feed oil, turn the plug screw on the drum breadth board to its top and feed oil till the oil level is at the middle of the oil scale glass and tightly lock the plug in the end (need to feed oil on both sides).
2. Planet reducer: It is located on the left of the drum and the oil feeding must be done till lubricating oil overflows out of the horizontal screw plug. And the lubricating oil applied should be 18# hyperbola gear oil.
3. Lubrication on hinged cross shaft joint bearing: there are 4 bearings in total, scattered at upper, lower, front and rear, and 2# lithium based grease should be applied every 50 working hours.
4. Joint bearing of turning oil cylinder: four in total, located at the connections on both sides of the oil cylinder. The oil-feeding holes of the cylinder's rear bearings are located on both sides of the engine, and 2# lithium based grease should be applied every 50 working hours.
5. Driving axle: lubricated with 18# hyperbola gear oil; feed the oil till oil overflows out of the screw plug hole at the middle of the axle housing.
6. Universal bearing: apply 2# lithium based grease every 50 hours.
7. Gearbox: the three-step gearbox is located in the machine body and directly connected to the driving axle, lubricated with 18# hyperbola gear oil.
8. Engine: its lubrication can be referred to Use and Maintenance Instruction of Diesel Engine B Series for details.

II. Hydraulic oil

The hydraulic oil tank is located at the rear-right of the machine, mounted with liquidometer on the upper outside, and the oil should be fed according to the display range of the liquidometer. The hydraulic oil should be Shangchou (super-thick) 40# (N68), low-condensing antifriction hydraulic oil.

III. Diesel engine fuel

The fuel tank is located at rear-left of the machine. The fuel is usually 0# light diesel (cetane number is over 45), in the cold areas, the fuel can be in other types according to the ambient temperature.

III. Maintenance

1. Daily maintenance (every 10 working hours)

- (1) Adjust the fender position: the gap between the fender and the drum should be adjusted to about 10mm.
- (2) Check the engine oil level:
Lay the engine onto the level ground and take out oil gauge to check the oil level. When the level is below the lower mark line, feed oil.
- (3) Check the hydraulic oil level: observe the pressure gauge on the side of the oil tank and feed oil to the prescribed level when the oil is not sufficient.

(4) Adjust and test hand brake and foot brake:

For the hand brake, it should be adjusted that when the parking brake handle is at the brake state position, the roller shall be braked reliably; and when parking brake handle is at the travel state position, the brake shall be released.

Test the foot brake, check and adjust it when bad brake function is found.

(5) Keep the fuel enough:

Check the fuel level and feed fuel fully if insufficient.

(6) Check air filter:

Takedown the paper filter element and lightly flap on it to let down the dust or clean it with compressed air flow. When the air filter alarming indicator lights up, it indicates that the filter element is seriously polluted or damaged and needs to be cleaned or replaced.

(7) Hydraulic oil filter

Check the reading of the vacuumeter on the filter at the driving pump oil inlet (No. 12 in Figure 6), if it's over 0.8bar (on condition of heat engine), the filter element needs to be replaced.

2. Weekly maintenance (every 50 working hours)

(1) Check the drum bearing's lubricating oil level:

Make the oil feeding-discharging screw plug at its top, the oil level should reach the middle of the oil scale glass, and both sides of the drums should be checked separately.

(2) Check the shock absorber and its fastening bolt:

The shock absorber should be assured out of damage, when the sighted crack deep in 20~25mm, it should be replaced. The fastening bolt should be tightened properly.

(3) Check tyre pressure:

The normal work pressure of two tyres are:

YZ12D,: 0.11~0.15MPa;

(4) Check the tightness degree of the wheel nut.

A torque 500NM should be applied to check the tightness degree of all nuts on the wheel.

3. Biweekly maintenance (every 100 working hours)

(1) Rinse the exterior of hydraulic oil cooler and the water tank:

Use water or compressed air flow to clean.

(2) Check the planet reducer oil level:

When checking, the oil feeding plug should be at the top. Clean up the dirt and grease around the screw plug, and loosen the two plugs. If there is no oil overflowing from the lower screw plug hole, oil should be fed till oil overflows out of the hole.

4. Monthly maintenance (every 200 working hours)

(1) Check belt pull of the generator: see the use instruction of the engine.

(2) Check lubricating oil and filter of the engine: see the use instruction of the engine.

(3) Check the three-step gearbox oil level:

When checking, the roller should be on the level ground. Takedown the gearbox oil level plug after wiping off the dirt around it, assuring the oil level reach the oil level plug hole, otherwise, feed the oil to the sufficient level.

5. Quarterly maintenance (every 500 working hours)

(1) Adjust valve clearance of the engine: see the use instruction of the engine.

(2) Replace the hydraulic oil tank air filter:

Takedown the filter, assuring the air hole unblocked. Replace the filter every 500~1000 working hours, but it should be replaced every 500 working hours work when under the dusty conditions.

6. Half-year maintenance (every 1000 working hours)

(1) Replace drum bearing's lubricating oil:

Drive the roller to the ground with a little slope along with the drum axle, and make the drum feeding-discharging plug at the bottom, then take down the plug to discharge the oil, collect the oil into a container and drive the roller onto the level ground, making above-mentioned plug at the top and feed new oil to the middle of the oil scale glass, then tightly lock the oil plug in the end.

Do the same with the other side of the drum.

(2) Waste discharge of the fuel tank:

The water and deposit in the diesel tank can be discharged through the oil plug at the bottom, and the waste discharge should be done some time after the roller stop (say, one night after). When doing waste discharge, it'd be better if the roller can be parked on the ground with a little lateral slope, so as to collect the waste liquid onto one side of the tank bottom.

When doing waste discharge, clean up around the oil plug of the lower side and take down the oil plug, discharge water and deposit till clean diesel flows out. It's forbidden to discharge all the diesel, otherwise air may enter the fuel system. Mount the oil plug in the end.

(3) Replace oil for planet reducer:

Before the oil discharging, the oil temperature in the planet reducer should be at the operating temperature, and drive the roller to the level ground and make the oil plug at the lowest position, turn the oil plug out and discharge the used oil. Then move the roller to make a oil plug at the top, feed new oil till the oil overflows out of the other plug.

7. Annually maintenance (every 2000 working hours)

(1) Replace hydraulic oil:

The hydraulic oil should be replaced when the system gets heated (namely at the end of each shift). Because the heated oil is easy to flow, any impurity is easier to mix into the oil and be discharged with the oil.

After the oil discharging, the oil tank should be cleaned up, then the tank will be fed with new oil, through an oiling machine (with filtering accuracy 10 μ m).

(2) Replace oil for the driving axle:

It should be done after the closing of each shift. It also should be done when the oil is sufficiently hot, because hot oil has more fluidity and is easier to discharge the impurity.

When replacing oil, the dirt around the oil plug should be cleaned up, so as to avoid bringing dirt into the tank when feeding oil.

Chapter 8 Common Failures and Troubleshooting

Shift trips	<p>(1) Improper adjusting of the shift mechanism</p> <p>(2) Shifting fork positioning spring inability</p>	<p>(1) Adjust the shift mechanism</p> <p>(2) Add backing or replace the spring</p>
Foot brake fails	<p>(1) Air pipe leaks</p> <p>(2) Air compressor damaged</p> <p>(3) Brake shoe touches oil or water</p>	<p>(1) Check and repair air pipe</p> <p>(2) Repair air compressor</p> <p>(3) Clean up oil or water</p>
Hydraulic system oil overheated	<p>(1) Hydraulic oil shortage</p> <p>(2) Dirt accumulates on cooler surface</p> <p>(3) Over internal leakage of the pump, motor or cylinder</p>	<p>(1) Check oil level and add enough oil</p> <p>(2) Clean up dirt accumulation</p> <p>(3) Repair or replace the bad pump, motor or oil cylinder</p>
Vibration in too low frequency	<p>(1) Hydraulic oil shortage</p> <p>(2) Fine filter blockage of vibrating pump</p> <p>(3) Over internal leakage of the pump or motor</p>	<p>(1) Check oil level and add enough oil if necessary</p> <p>(2) Replace filter element</p> <p>(3) Repair or replace the bad pump or motor</p>

Chapter 9 Cleaning and Storage

After each work shift, the roller must be cleaned to remove the dirt and dust on it, furthermore, special attention should be paid to the cleaning of the diesel engine, generator, start motor, oil jet pump, oil ejector and the roller external surface. Only dry and soft duster cloth can be used to rub up these locations.

If the roller needs to be parked for a long time, the water in the cooling water tank of the engine must be drained (in winter, the water should be drained after the work of each day). Carefully clean the dust and dirt on the machine. Use kerosene to rinse every external surface and every lubricating hole, check and replace each damaged part with a new one, adjust and sufficiently lubricate every part of the machine.

Try your best to park the roller in the garage that is dry and with coping, and it should also be well covered with a waterproof cloth, if there is no other alternative. As for the non-painted parts of the exposed components, they should be coated with grease or antirust glue, and the roller must be painted at least once a year. When the roller is parked in long-term, it should be started every 3 months and work at low speed for 10~15min.

Chapter 10 Transporting and Hoisting

When transporting the roller along with the intact road, one can drive the roller itself to the destination when the distance is no farther than 50kM.

When transporting it over farther distance or along the bad road, other transporting tools should be applied to avoid any damage to the components and wheel face.

Lifting lugs are provided at the front and rear of the roller, which can be used to hoist the roller. When hoisting the roller, the turning locks (located between the front and rear chassis) of front and rear chassis should be firmly fixed. Special attention should be paid to the safety when hoisting.

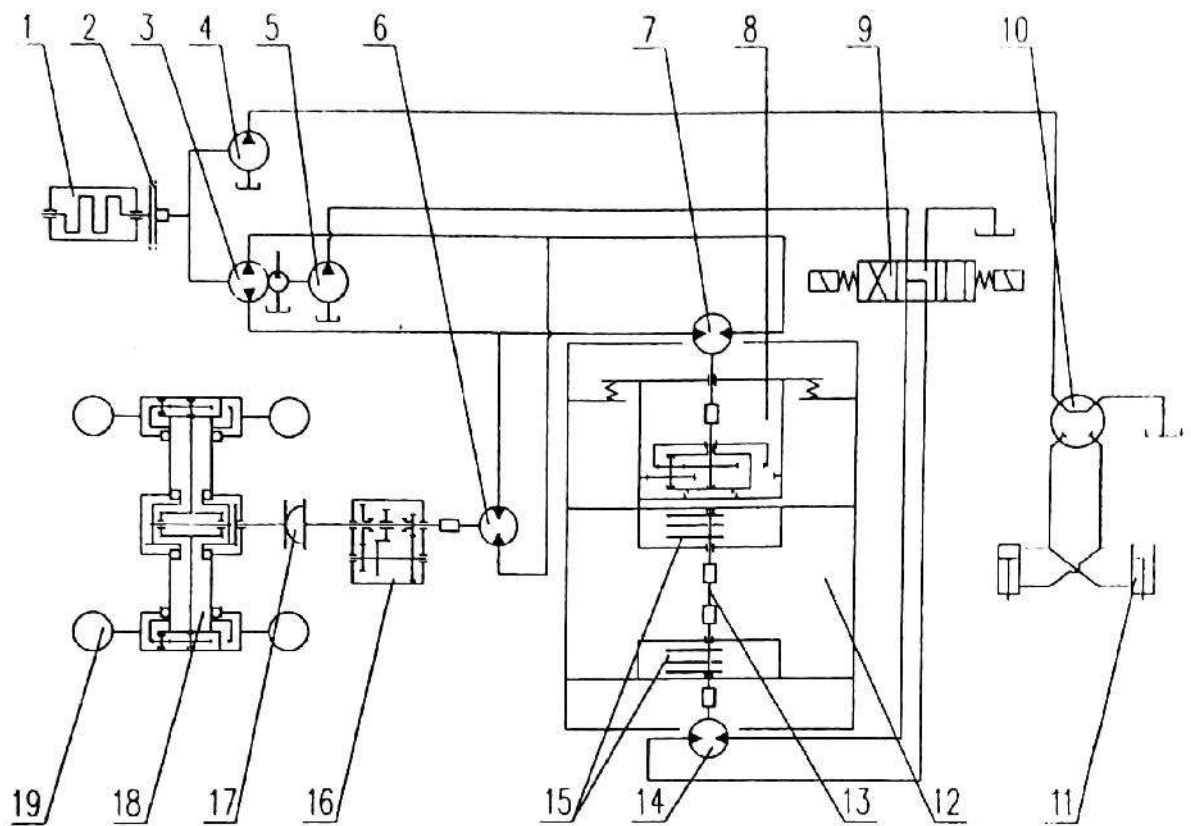


Fig. 1 General drawing of the transmission system

1. Diesel engine 2. Engine and pump connecting 3. Travel piston pump 4. Turning pump
 5. Vibrating gear pump 6. Axle travel motor 7. Drum travel motor 8. Planet reducer
 9. Electromagnetic turning valve 10. Whole hydraulic redirector 11. Turning oil cylinder
 12. Drum 13. Spline shaft 14. Vibrating motor 15. Eccentric mechanism
 16. Gearbox 17. Universal joint 18. Driving axle 19. Tyre

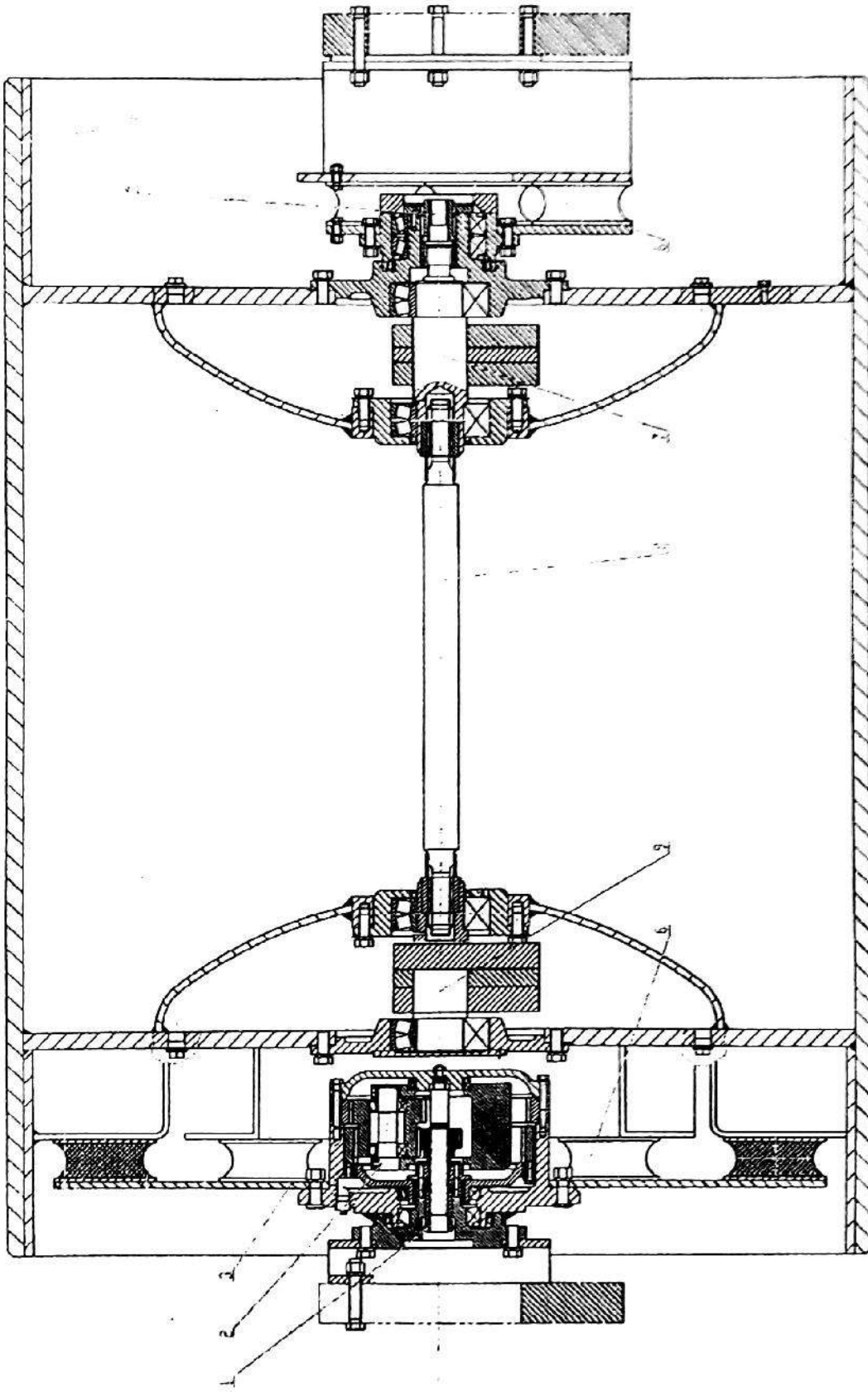


Fig. 2 Drum structure

- 1. Spline sleeve
- 2. Planet reducer
- 3. Driving board
- 4. Spline sleeve
- 5. Drum body
- 6. Absorber
- 7. Right eccentric mechanism
- 8. Spline shaft
- 9. Left eccentric mechanism

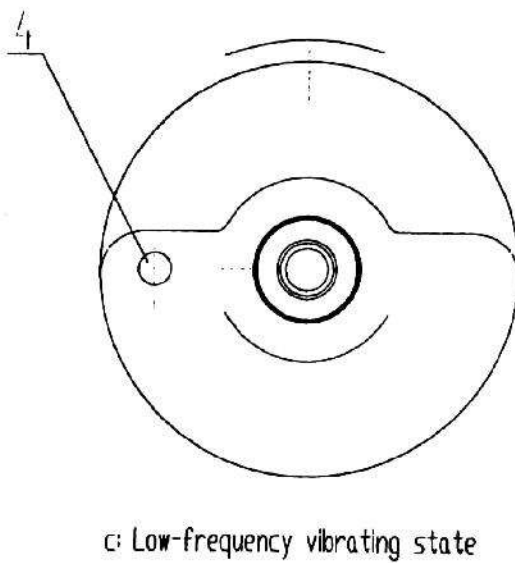
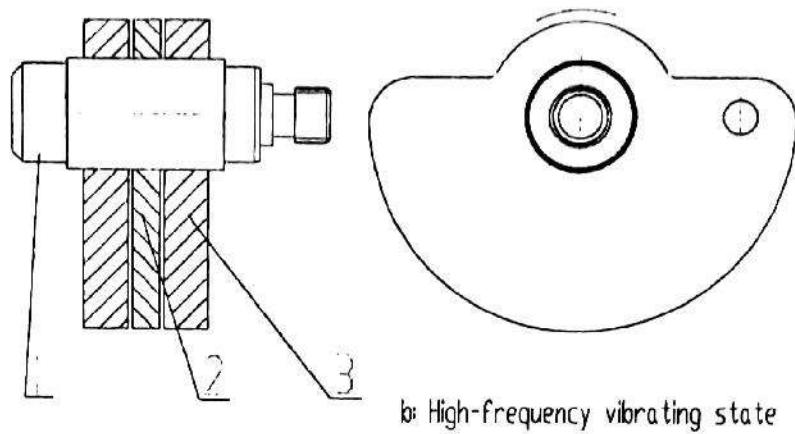


Fig. 3 Eccentric mechanism

1. Transmission shaft 2. Flexible eccentric block 3. Fixed eccentric block 4. Pin

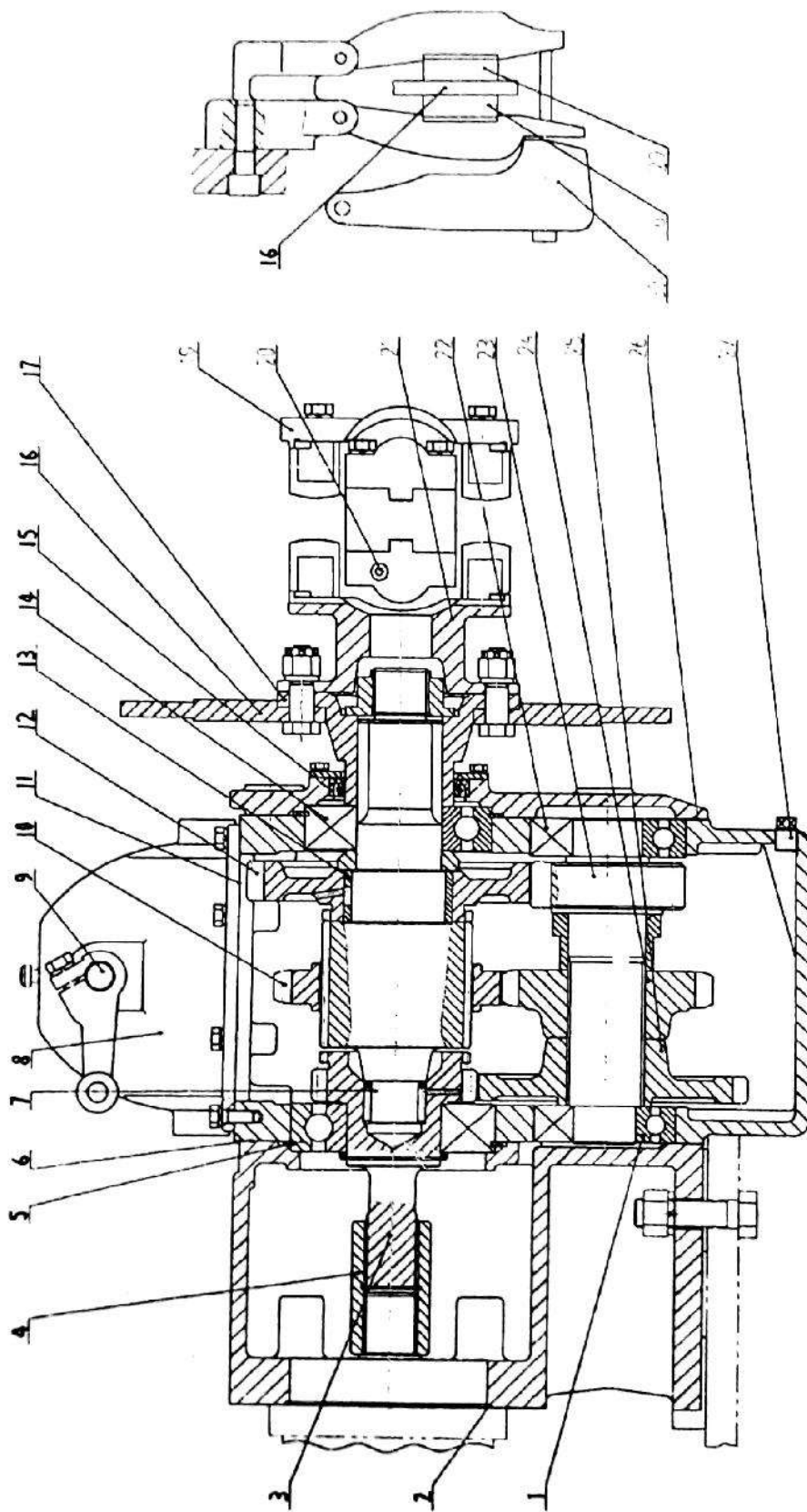


Fig. 4 Gearbox and universal joint

- 1. bearing 2. O' seal ring 3. Gear shaft 4. Splined joint sleeve 5. bearing 6. Gasket 7. needle bearing 8. Top cover folk mechanism 9. Folk shaft
- 10. Transmission gear 11. Gasket 12. Gearwheel 13. Shaft sleeve 14. Bearing 15. Oil seal 16. Brake disk 17. Brake shaft 19. Joint sleeve 20. Oil cup
- 21. Rotating flange 22. bearing 23. Gear shaft 24. Middle gear 25. Gearwheel 26. Gasket 27. Oil plug 28. Skate brake (left) 29. Skate brake (right)
- 30. Control lever

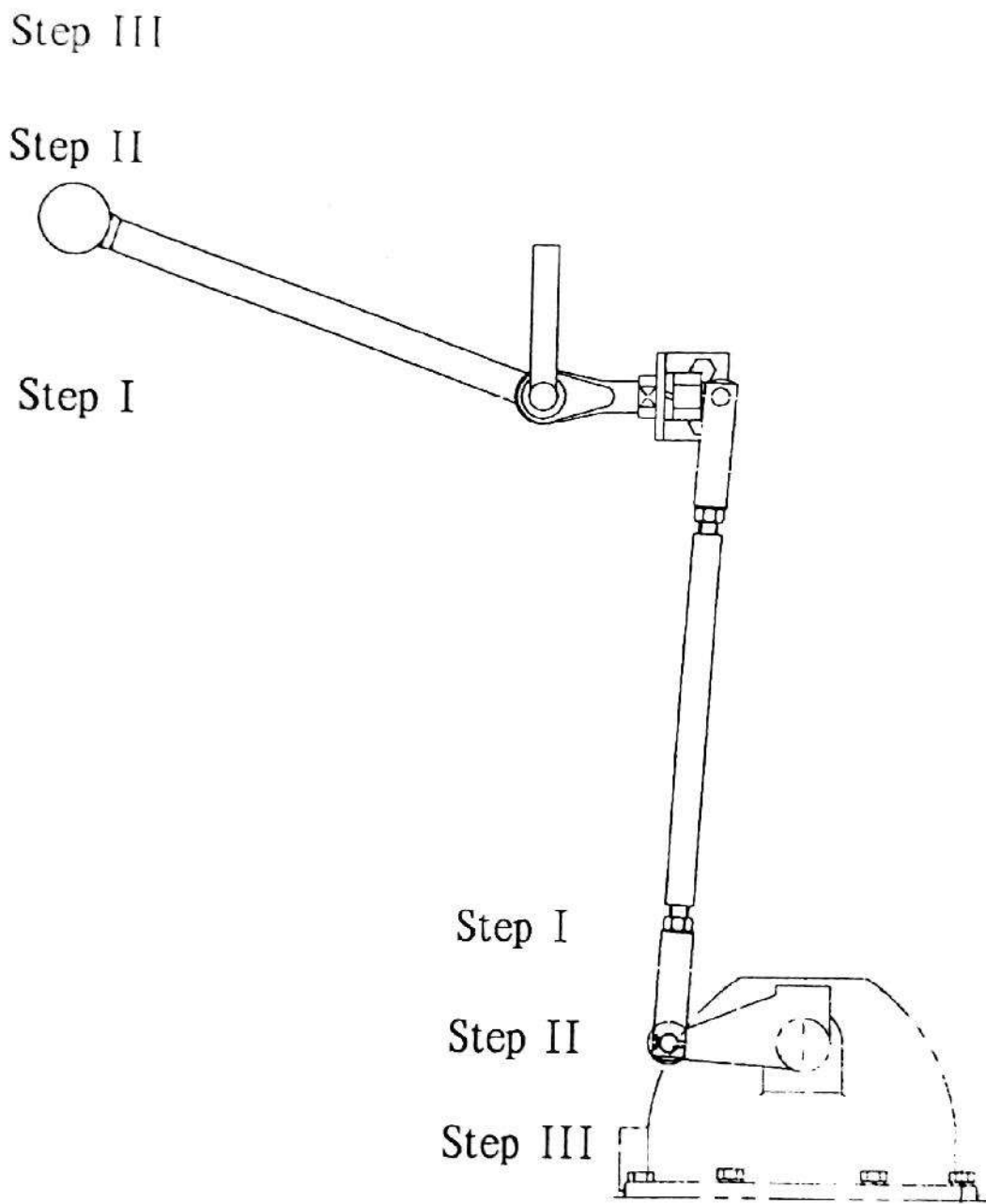


Fig. 5 Shift control sketch map

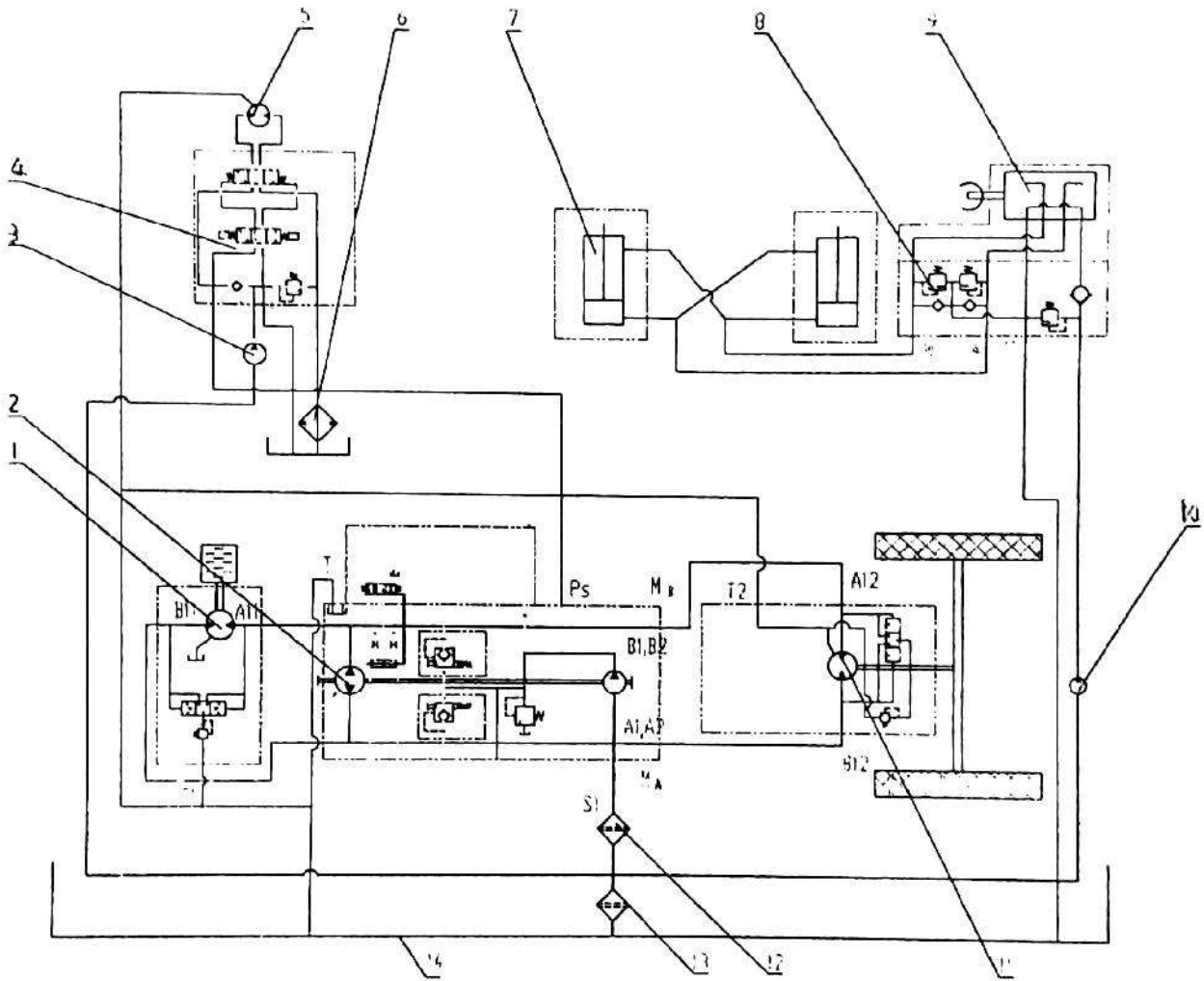


Fig.6 Hydraulic transmission system

- | | | | |
|-------------------------------|----------------------------|-------------------------|-------------------------|
| 1. Drum-travel motor | 2. Travel piston pump | 3. Vibrating gear pump | 4. Vibrating valve |
| 5. Vibrating motor | 6. Vibrating system cooler | 7. Turning oil cylinder | 8. Combined valve block |
| 9. Whole hydraulic redirector | 10. Turning pump | 11. Axle travel motor | 12. Fine oil-filter |
| 13. Oil-suction filter | 14. Tank | | |

总开关	电动机	电动机	电锁	启动按钮	发电机	断电磁阀	振幅选择	喇叭	列车报警	指示	照明	转向灯	雨刷													
蓄电池	电动机	电动机	启动继电器	启动按钮	发电机	断电磁阀	大振	小振	指示灯	蜂鸣器	计时器	空气滤清器报警	油位	水位	水压	机油压力	电压	气压	油机转速	前灯	后灯	顶灯	左	右	前	后

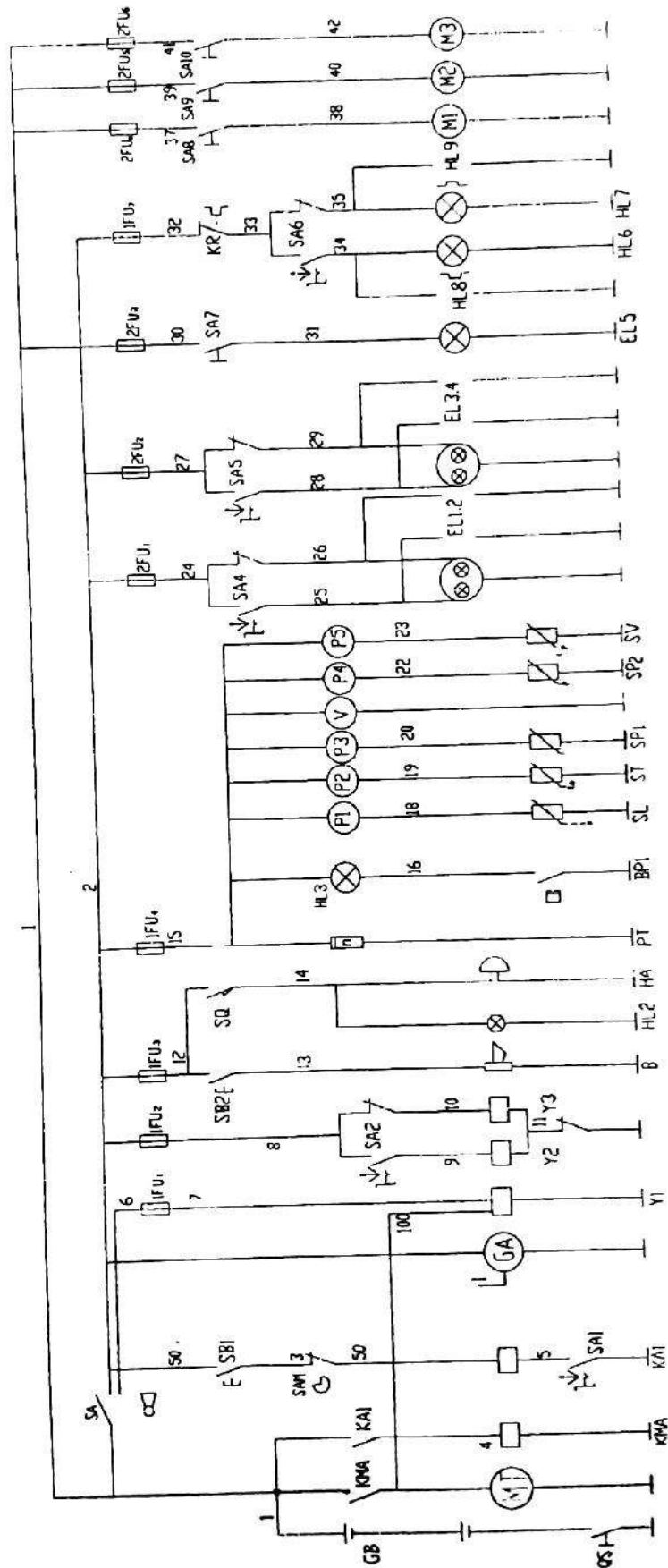


Fig. 7 Electrical system

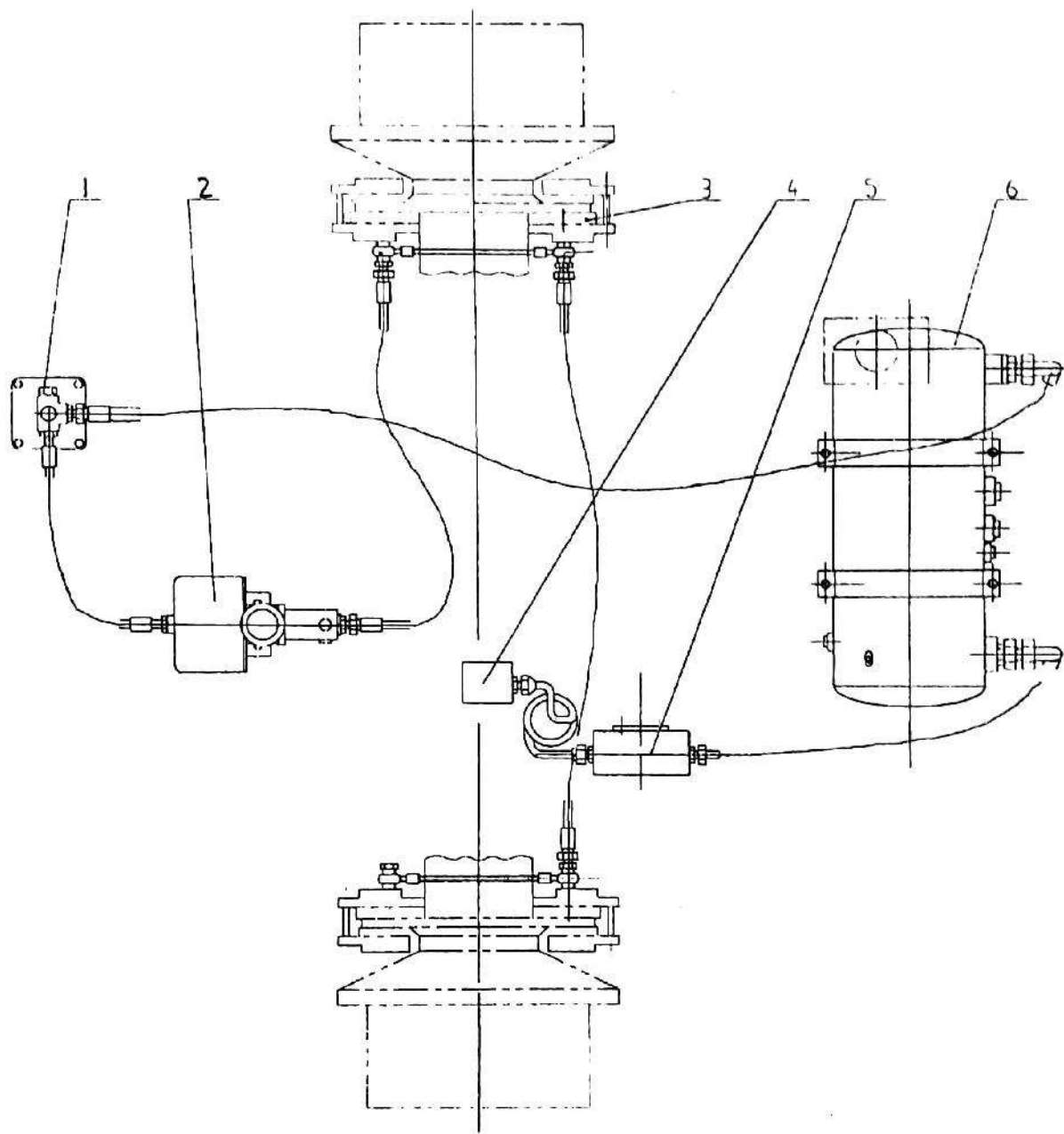


Fig.8 Brake system sketch map

1. Air brake valve general assembly 2. Air boosting pump 3. Disk brake
 4. Air compressor 5. Oil-water separator 6. Air cylinder general assembly

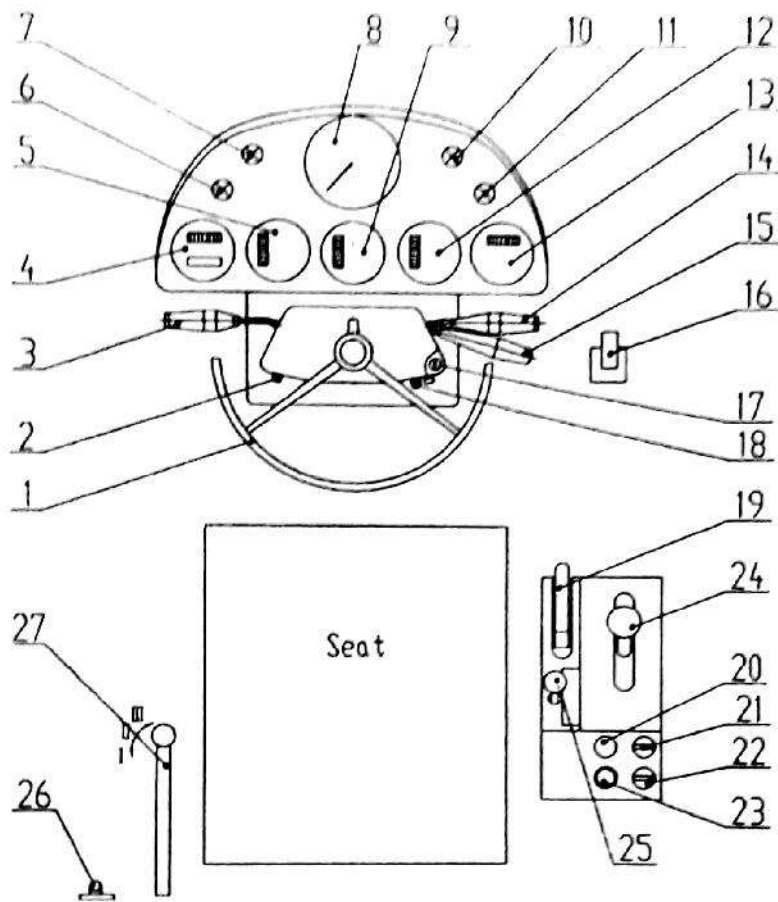


Fig.9 Control Mechanisms and Meters

1. Steering wheel
2. Danger-alarming flashing light switch
3. Combined switch I
4. Oil gauge/ timer
5. Engine oil pressure gauge
6. Air filter alarming light
7. Turn-left indicator
8. Speed indicator
9. Barometer
10. Turn-right indicator
11. Brake indicator
12. Engine water thermometer
13. Voltmeter
14. Combined switch II
15. Combined switch III
16. Brake pedal
17. Electrolock
18. Rear light switch
19. Parking brake handle
20. Start button
21. Start-vibration interlocking switch
22. Amplitude-selecting switch
23. Speaker button
24. Forward-backward control lever
25. Throttle lever
26. Main power switch
27. Gearbox shift control lever

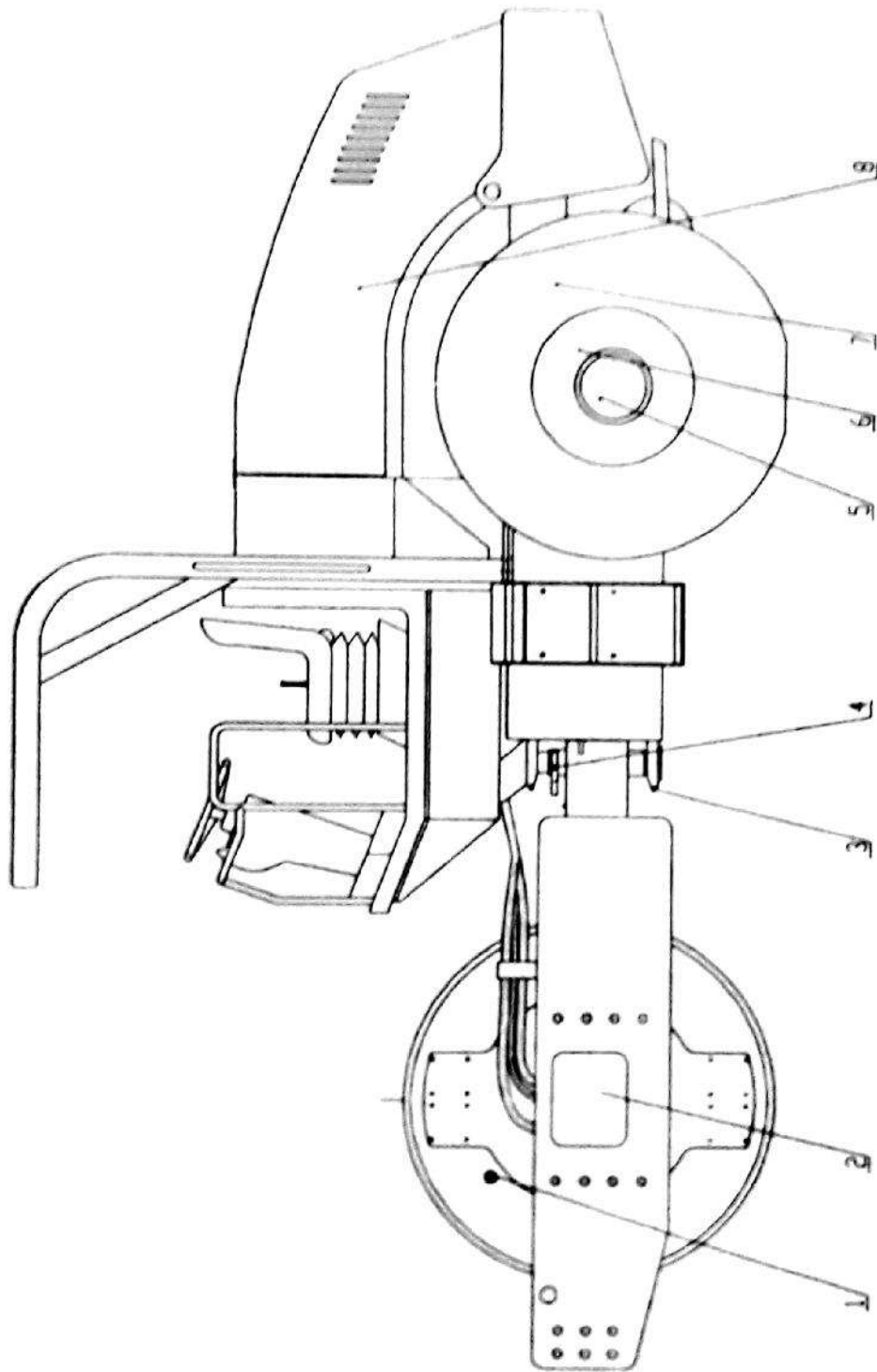


Fig.10 The positions needing lubrication sketch map

- 1 Vibrating bearing
- 2 Planet reducer
- 3 Joint bearing
- 4 Joint bearing of turning oil cylinder
- 5 Driving axle
- 6 Universal bearing
- 7 Gearbox
- 8 Engine

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