

GRADER PY160G
Operating Manual

Ding Sheng Tian Gong Construction Machinery Stock Co., Ltd.

(Tianjin Engineering Machinery Factory)

Preamble

This operator's manual is primarily meant for the operator. He should make himself thoroughly acquainted with the rules in order to recognize and avoid possible dangers for men and machine. During operating of the unit the operator's manual should always be at his disposal

Operating of the machine. Its maintenance and service should only be performed by qualified personnel.

We are always ready to assist in specialized training for each specific machine. In order to ensure the safe for person and machine, the operator should.

—Make sure that the unit is always in reliable and operationally safe condition.

—Refuse any jobs demanded from him that are not coinciding with the rules.

—Report any special occurrence to his superior, who should decide on any further measures to be taken.

—Refuse unauthorized personnel access to his machine and its working-area.

—Abstain from unauthorized operation. Such as side towing or dragging of loads, performing maintenance work under a tilted and not secured dump body. working under lifted loads. etc.

—Once he recognizes dangers for men and machine. Undertakes all suitable measures to prevent such dangers.

To adapt the different requirements of users. different equipments are assembled on PY160G graders and the descriptions of equipments are adhered to Last page in the Operating Instruction.

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Notice: Any structures of the machine cannot be changed. If anything appears after changing structures, the user is in charge of changing.

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1. Introduction

Because of our rich experiences in the manufacture of engineering machinery, our graders produced from our company have advanced level of design and technology. If you can operate and maintain the machine correctly. The graders will get responsible performances, high production efficiency and long service life.

Free of trouble operations and long service life depend largely on the correct use and maintenances of your grader. So, before using your grader for the first time, we recommend that the operator should read this operating instructions carefully and strictly observe all rules contained in this manual.

After repairs are taken or parts are changed, the respective system must be readjusted and then checked for its correct function. This work is very important for braking and steering system.

After grader are sold. we will provide all necessary repairs and technical service.

The products are according to the standard of Q/12YJ4080-2003 《Motor Grader series》 .

1.1 Guarantee

We observe the contract, supply spare parts and sale services. We are responsible for the replacing, repairing and returning of the machine if faults are found.

1.2 Spare parts

Be sure that in all repair work. Only original spare parts supplied by our company. Are used. This gives you the assurance that you will be protected from damage and your machine will be kept in original condition.

2. Sale-Service dep.

Ding Sheng Tian Gong Construction Machinery Stock Co., Ltd.

(TG ENGINEERING MACHINERY CO., LTD)

Sale-Service dep.

Telephone No.:24390915

Cable :3984

Telex :24390646 24392979

Address :No. 156 Jintang Road, Hedong District, Tianjin China.

Post code :300180

In the product manual, if there will be any changes later, without notice.

3. Accident prevention

1) It is essential that graders will be disassembled or reassembled only by the specialist.

2) Graders may only be driven by suitable person who have got drive license and who are completely familiar with the handling of the machine.

3) Grader drivers must supervise the conditions of the grader.

4) Grader drivers must check the function of the brakes and steering everyday before starting work.

5) The grader driver must inform the inspector for any faults he may have discovered and shift drivers. He is also to inform his relief. If any fault is found to affect the safety operation, the work must stop at once.

6) The operating levers of grader may only be operated from the driver's cab.

7) Graders must be applied and operated in such a manner that their stability is ensured at all times.

8) Graders must only be driven in gears when going for downhill.

9) During transportation and when working in busy working lines. the required safety distance must always be maintained.

10) Always, before starting work and after interruptions in work, grader drivers must be sure that there is nobody within the danger area, when moving off, they must give warning signals.

11) If the grader driver can not see the loading blade from the driver's cab, flag sentries must be posted or suitable measures must be taken.

12) Only reliable person. Fully acquainted with the signals may be used as flag sentries.

13) No person may remain within the working area of graders while graders are at work.

14) During work intervals or when shutting-down the grader, the working equipment must be lowered onto the ground or fixed.

15) Until the working implements have been set on the ground or secured, grader drivers may not leave their machines and must keep the control equipment to original position.

16) Before leaving the driver's cab. Grader drivers must lock the hand brakes and all supplementary safety devices.

17) When work is interrupted or when finishing work, grader drivers must stop the engine. Remove the Ignition key and cut off power main switch (in case it is mounted to prevent the engine from starting suddenly.)

18) Graders may only be entered or left with the agreement of the grader driver and only when the grader is at a stand still.

19) Don't permit grader drivers to let unauthorized persons enter the grader.

20) When any repair work is carried out on grader the following steps are taken;

a) The engine is stopped, the working implements are set down or rigidly fixed.

b) If work has to be taken underneath a raised working implement, it must be rigidly fixed.

c) With machines having articulated steering, the frames must be locked.

d) Don't turn or loosen the joints when the hydraulic system is under pressure.

e) When repairing work is completed. all safety elements must be returned to its original position(splite pins.etc.)

These strict rules that are mentioned above are very important for preventing accidents.

4. Technical data of whole machine

4.1 Dimension(Fig.1)

Tyre(17.5-25)

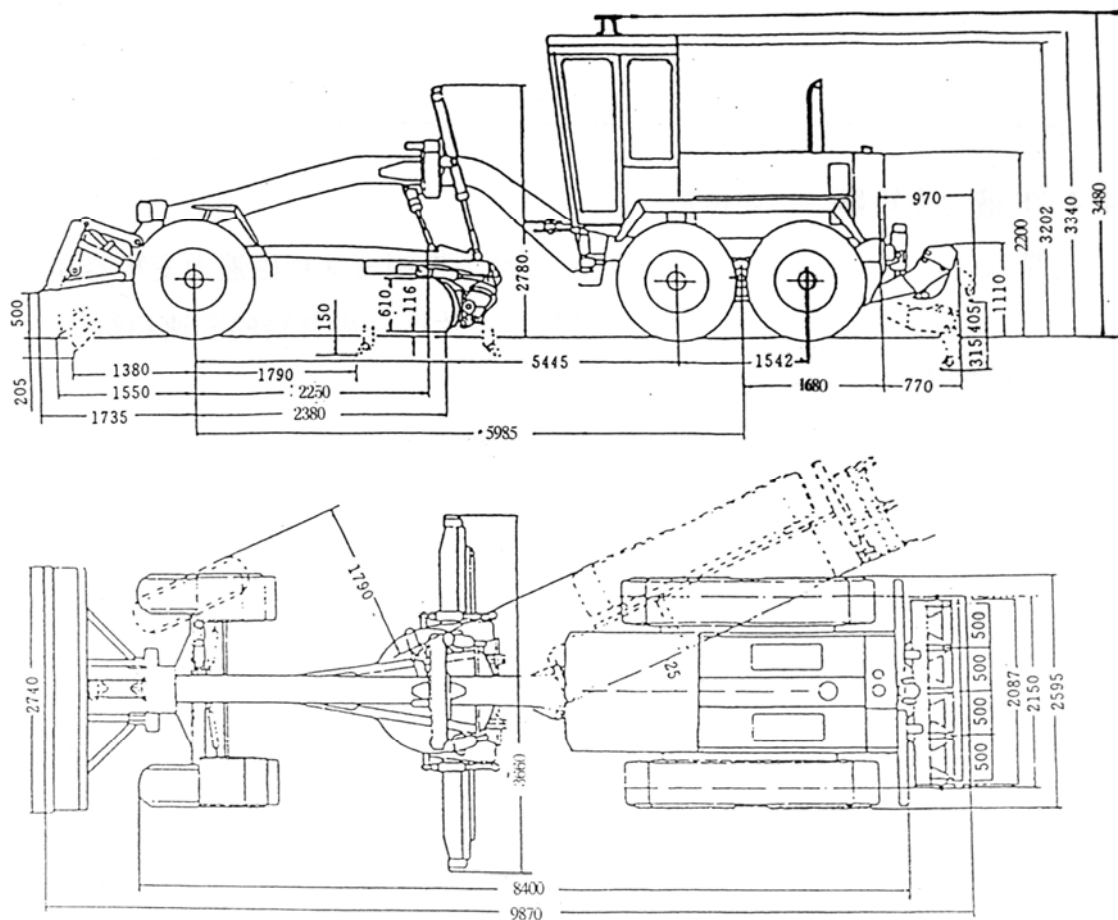


图 1

Fig.1

4.2 Weight(kg)

| | |
|---------------|-------|
| Whole machine | 13500 |
| Front axle | 4050 |
| Rear axle | 9450 |

4.3 Engine

| | | |
|----------------------------------|-------------|-------------|
| Type | 6BTA | D6114ZGIB |
| Rated power | 125kw | 140kw |
| Rated power rev. | 2200r/min | 2300r/min |
| Max. torque | 617N.m | 678N.m |
| Max. torque rev. | 1500r/min | ≤1610r/min |
| Working squence of each cylinder | 1-5-3-6-2-4 | 1-5-3-2-6-4 |
| Starting generator | 7.5kw/24v | 7.5kw/24v |
| Alternator | 28v/1000w | 28v/1000w |

4.4 ZF torque converter transmission

Type: Proer-shifting transmission is made up of torque converter and multi-plate clutch with constant shaft type.

Direction change(power shifting): Forward shifting-idle shifting-reverse shifting

Speed shifting(power shifting): Forward 6 speeds; Reverse 3 speeds

4.5 Axle

4.5.1 Driving axle

Model 3-stage driving axle with no-spin' differential

4.5.2 Driven axle

Model Oscillating and steering front axle of box type, oscillating angle $\pm 15^{\circ}$, front leaning angle $\pm 17^{\circ}$, steering angle 45°

Ground clearance from certer 630mm

4.6 Tandem box

Model Oscillating tandem box, oscillating angle $\pm 15^{\circ}$, heavy-duty roller chains

4.7 Speed

| Forward(km/h) | | | | | | Reverse(km/h) | | |
|---------------|------|-------|------|-------|------|---------------|-------|-------|
| 1st | 2nd | 3rd | 4th | 5th | 6th | 1st | 2nd | 3rd |
| 5.31 | 8.21 | 13.33 | 20.5 | 30.55 | 44.9 | 5.31 | 13.33 | 30.55 |

4.8 Brakes

4.8.1 Service brake(Foot brake)

Pipe system: Brake system consists of one circuit, hydraulic pump and accumulator.

Brake: Pincer-disc brakes are assembled on rear wheels.

4 on two front wheels; 2 on two rear wheels

4.8.2 Parking brake (Hand brake)

Model: Hub brake, mechanically operated on drive shaft of gear box.

4.8.3 Continuous service brake

The torque converter is designed as a continuous service brake.

4.9 Steering system

4.9.1 Front wheel steering

The feature of the structure:

Hydraulic oil from oil tank is achieved by gear pump to supply hydraulic steering-gear which distributes hydraulic oil to steering cylinder.

Service pressure:150bar

Steering angle:45

Turning drde: Without wheel lean 10.9m

With wheel lean 10.4m

4.9.2 Articulation frame

System: The articulation operation between front and rear frame is driven by double acting hydraulic cylinder.

Articulating steering angle: Right and left side 25° .

Min turning circle with articulating steering: 7.5m over the front wheel.

4.10 Hydraulic working system

System: Hydraulic system of double pumps and double circuits.

Control valve: Two valve blocks, each with 5 control valves.

Working pressure: 160bar (circle turning and front dozer 180bar)

Hydraulic pump: Double gear pump of high pressure mounted on power output shaft of the gear box.

Cylinder: Double acting hydraulic cylinders.

4.11 Working equipments

System: Hydraulic adjustment of blade/back ripper and front dozer, ring-gear with rolling plate, scarifier with 6 teeth mounted on blade back.

4.12 Blade turning

Make: Worm gears are driven by hydraulic motor, there are two types of structures, gear ring or rolling plate.

4.13 Wheels and tyres

Rims: 14.00/1.5-2.5(TB)

Standard tyres on all 6 wheels: 17.5-25 PR12

4.14 Front and rear frames

Construction: Front frame: steel beam structure, its section is pressed into U-sleeve, welded like box.

Rear frame: solid beams welded in two sides

4.15 Driver's cab

Model: Welded steel construction with POPS/FOPS according to DIN and ISO, two sliding doors.

4.15.1 Driver's seat

Model: Spring mounted, vibration absorbing, adjustable in horizontal and vertical position and in back rest inclination.

4.15.2 Air conditioning system

The system is matched according to the user's requirement. The air conditioners are heating and cooling devices designed specially for engineering machinery.

Before using air conditioner (for heating or cooling), please read The Instruction of Air conditioner carefully.

4.16 Electrical system

Working voltage: 24v

Fuses: 12 pieces; 5A, 1 piece; 10A, 2 pieces; 15A, 3 pieces; 20A, 6 pieces.

Batteries: two pieces, 12v, 165AMP/h

Working lights: head lights 2, tail lights 2, blinkers 6, braking lights 2,
 working lights 2, Rear lights 2
 Sound signal: horn
 5. Layout and equipments

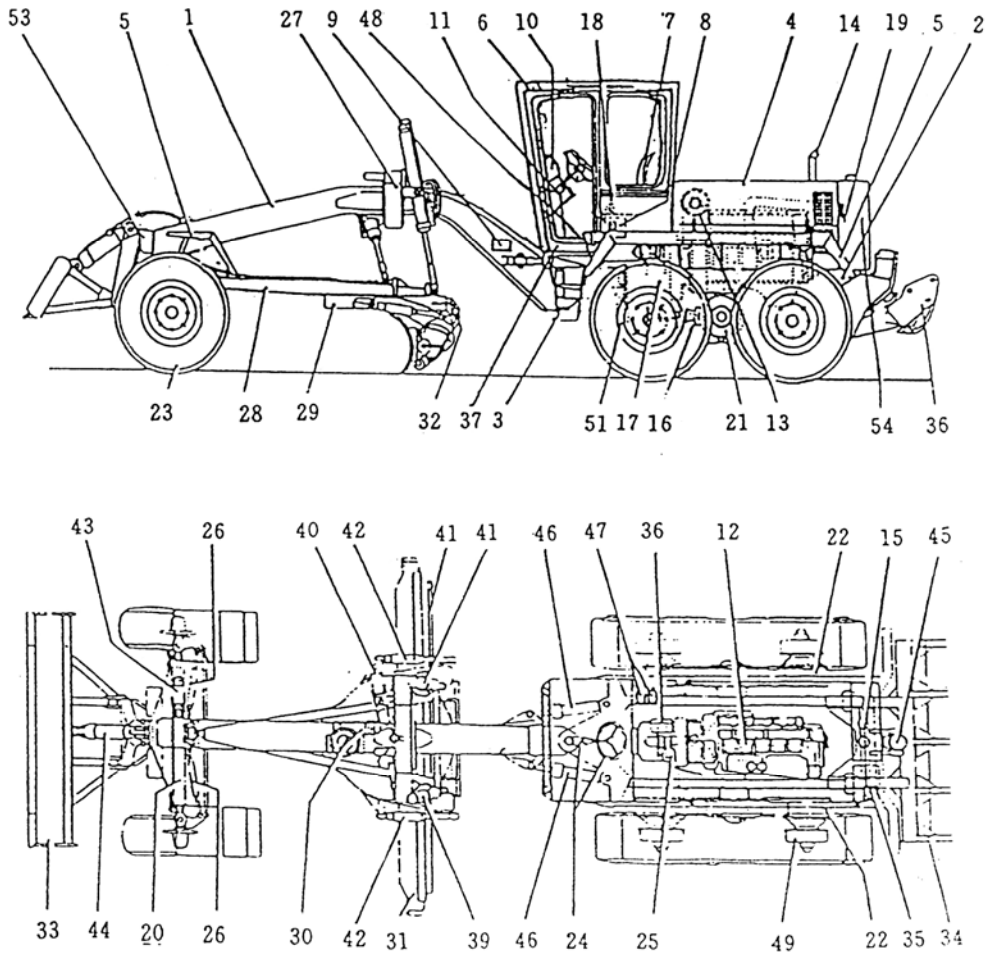


Fig. 2

Frame and accessories:

1. Front frame
2. Rear frame
3. Articulation centre
4. Engine cover
5. Guards
6. Driver's cab
7. Driver's seat
8. Air conditional (optional)
9. Mark plate
10. Instrument plate
11. Removable console

Engine and accessories:

12. 6-cylinder-Diesel Engine
13. Air filter
14. Exhaust system
15. Fuel tank

Gear box, axle, wheel:

16. Driving shaft
17. Torque converter-transmission
18. Gear change lever
19. Torque converter oil cooler
20. Front axle
21. Rear axle
22. Tandem box
23. Front wheel

Steering:

24. Hydraulic steering-gear
25. Steering pump

26. Steering cylinder

Working equipments:

27. Saddle adjustable to 6 positions
28. Blade circle frame

29. Blade circle with rolling plate
30. Blade turning hydraulic motor
31. Blade
32. Scarifier (selecting part)
33. Front dozer (selecting part)
34. Back ripper (selecting part)

Hydraulic system:

35. Hydraulic tank
36. Hydraulic pump
37. Control valves (2 blocks)
39. Hydraulic cylinder, blade lift
40. Hydraulic cylinder, saddle swing
41. Hydraulic cylinder, blade shift
42. Hydraulic cylinder, blade cutting angle
43. Hydraulic cylinder, wheel lean
44. Hydraulic cylinder, front dozer
45. Hydraulic cylinder, back ripper
46. Hydraulic cylinder, articulation

Brakes:

47. Brake accumulator
48. Brake pedal
49. Brake
50. Relief pressure valve of the accumulator
51. Hand brake (disc brake)

Electrics:

52. Batteries (left side of the engine)
53. Head lights
54. Tail lights
55. Indicators, instruments, switches and cables

*. Not shown in picture

6. Description

6.1 Grader

The engine and transmission are mounted on the rear frame. The working equipments is mounted on the front frame. An additional front dozer enlarges the field of application of the grader.

The grader is driven by water-cooling and turbo-charge diesel engine that is composed of 6 cylinders. Straight line and 4 strokes.

The engine power is transmitted to the rear axle by torque converter, transmission and drive shaft, then to the 4 rear wheels via the tandem chain.

The hydraulic steering of front wheel is combined with articulating frame giving the grader a minimum turning radius of 7.5m.

In this manual, the directions “left hand”, “right hand”, “forward” “reverse” are understood in forward travel of the machine.

6.1.1 Engine

The complete driving unit (engine-transmission) is mounted on the rear frame by 6 rubber blocks.

The direction of rotation of the crankshaft is clockwise. Viewed from the engine fan.

Combustion air is drawn through a air filter.

Lubrication of all bearings in the engine as well as cooling of some running engine parts is done by forced feed lubrication. The lubricating system is fed by a pump drawing oil from the engine oil sump. Oil is cooled by oil-cooler mounted in the engine that includes water-cooling plate of row pipes. For details, please see the engine instruction.

6.1.2 Torque converter-transmission (6WG 200) (See Fig.2)

The 6WG 200 transmission is made up of converter and multi-gears transmission of constant shaft, with the speed of 6 forward and 3 reverses.

The converter is simple 3 units construction with no-lock clutch, the circle diameter is $\phi 340$, torque factor KQ is 2.51 at lost speed. The torque converter pump wheel is directly mounted to the engine fly-wheel by means spring plate. The oil temperature should be $80^{\circ}\text{C}\sim 110^{\circ}\text{C}$ when at normal work and allowed to 120°C when at moment.

Transmission has 6 multi disc clutches controlled by hydraulics which can engage and disengage under the load to reach the power shift. The transmission gear is a constant engagement drive, its construction and principal can be seen in the following Fig. A speed ratio for each gear is as follows:

| Forward | | | | | | Reverse | | |
|---------|-------|-------|-------|-------|-------|---------|-------|-------|
| 1st | 2nd | 3rd | 4th | 5th | 6th | 1st | 2nd | 3rd |
| 5.991 | 3.447 | 2.596 | 1.494 | 1.179 | 0.678 | 5.991 | 2.569 | 1.179 |

There are two pumps outside the transmission. They are driven by pump wheel of torque converter. Output shaft of the transmission is combined with driving axle backwards to transmit power to rear axle. Output shaft is connected with park brake forwards. The transmission output shaft is connected to the driving shaft backward and transfers the power to the rear axle. Output shaft is linked to the parking brake forward.

The gear shift control of transmission is operated by electro-hydraulic shift selector (hand control selector) at the driver's right side. The gear shift change can be achieved by each electric magnetic valves connected to hand selector and then to control hydraulic sliding valve. Here the user would pay attention that this operation should be done gradually sequentially without jumping over any gear. Beside, the transmission can achieve reverse control only in 1st gear. During traveling and sliding slope, the respecting gear should be controlled and the engine speed should not be lower than 1200r/min so that the lubricating each part of the transmission can be needed.

The operating pump (gear pump) for supplying oil to torque converter and operating is mounted inside transmission and also controlled by pump wheel.

Its flow is 35L/min, control pressure 1.6-1.8Mpa, Because of cushion construction inside the controlling valve, so the pressure of lowering and rising should have a regularly. During gear change, in this way the gear change can be smooth and less shock.

Because of "Neutral insurance" set in transmission electric circuit, the driver can start the engine when the transmission is in neutral, so this can prevent from mix-controlling.

Diesel oil Mobil Delvac super 1300 15w/40 is applied in the transmission. Filling oil of first time is about 28L. When checking oil level, the engine should be in idle speed and transmission temperature is in normal working condition. At this time, two oil scales indicate the levels 80^oC (upper scale)and 40^oC (lower scale). The oil level will be higher than upper scale if checking the engine without starting the engine.

The transmission oil must be changed after first 100 hours work and later every 1000 hours or least once a year. The oil filter also be changed with oil changing. Please pay attention that the used filter could not be assembled again even no apparent damage.

The towing speed of transmission could be less than 10km/h, traveling distance could be below 10km, When welded on the machine, out off selector cable of shifting-gears to prevent over-large current from damaging inner electric circuit.

For the operation and maintenances of ZF transmission, please refer to «ZF transmission manual» from ZF Machinery Co., LTD with the machine.

6.1.3 Hydraulic system of service brake (foot brake)

a) Description

The foot brake has a one-circuit system with hydraulic pump and accumulator and operates on four rear wheels of the grader. The brake is Pinner-disc brake.

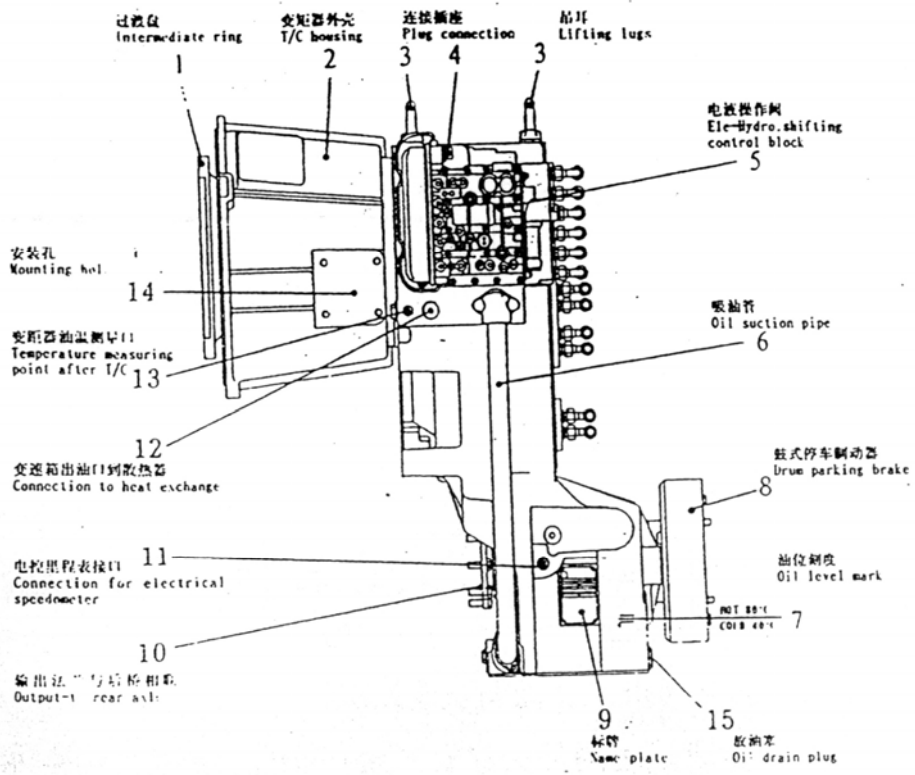
When the engines is running, the double pump (2) of the working hydraulic draws oil from the tank (4).

The oil from the pump is transmitted via the limiting valve (9) into the two accumulators (11) to increase the pressure below 133bar and to cut off in 150bqr.

Filling oil of the acumulator (11) require only short time and then oil intaking valve makes oil flow into hydraulic circuit.

The filling of accumulator (11) has priority and therefor, the pressure oil necessary for the braking system is available as soon as the engine is running. When the pressure on the brake valve (10) drops below 100bar, the lamp on the instrument panel lights. The lamp is switched by the brake service switch. When pressing down the brake valve (10), pressure oil in the accumulator circuit flows to the wheel brake cylinder(12).

At the same time, the brake lights are switched on by the switch.



- 1 BREATHER 透气管
- 2 BOX FILTER 滤油器
- 3 1st POWER TAKE-OFF 第一取力口
- 4 2nd POWER TAKE-OFF 第二取力口
- 5 INDUCTIVE TRANSMITTER FOR TURBINE SPEED 涡轮转速传感器
- 6 ATTACHMENT POSSIBILITY FOR EMERGENCY STEERING PUMP 可选用应急泵（地面泵）接口
- 7 OIL DRAIN PLUG WITH PARKING BRAKE DRUM BRAKE 与后桥相联的输出轴并配有鼓式停车制动器
- 8 INDUCTIVE TRANSMITTER FOR OUTPUT SPEED 输出转速传感器
- 9 HOSE LINES FROM THE CHRYSLER SIGNAL TO THE CLUTCHES 从电液换线阀到离合器的管路
- 10 KA
- 11 KB
- 12 KC
- 13 KD
- 14 KE
- 15 KF

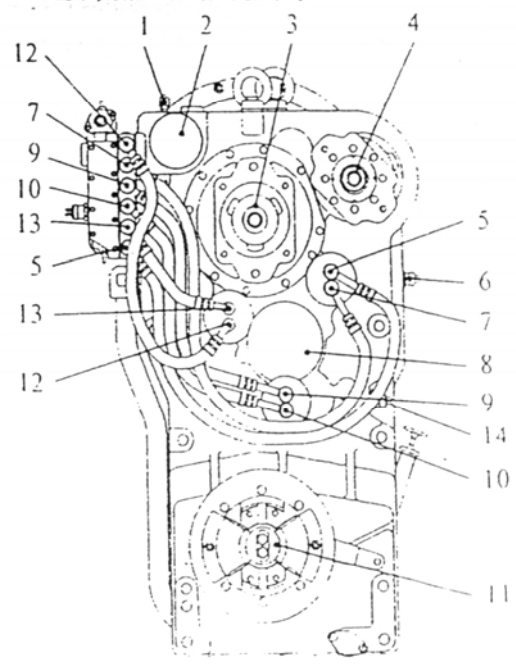


Fig. 2 WG200 power-shift transmission figure

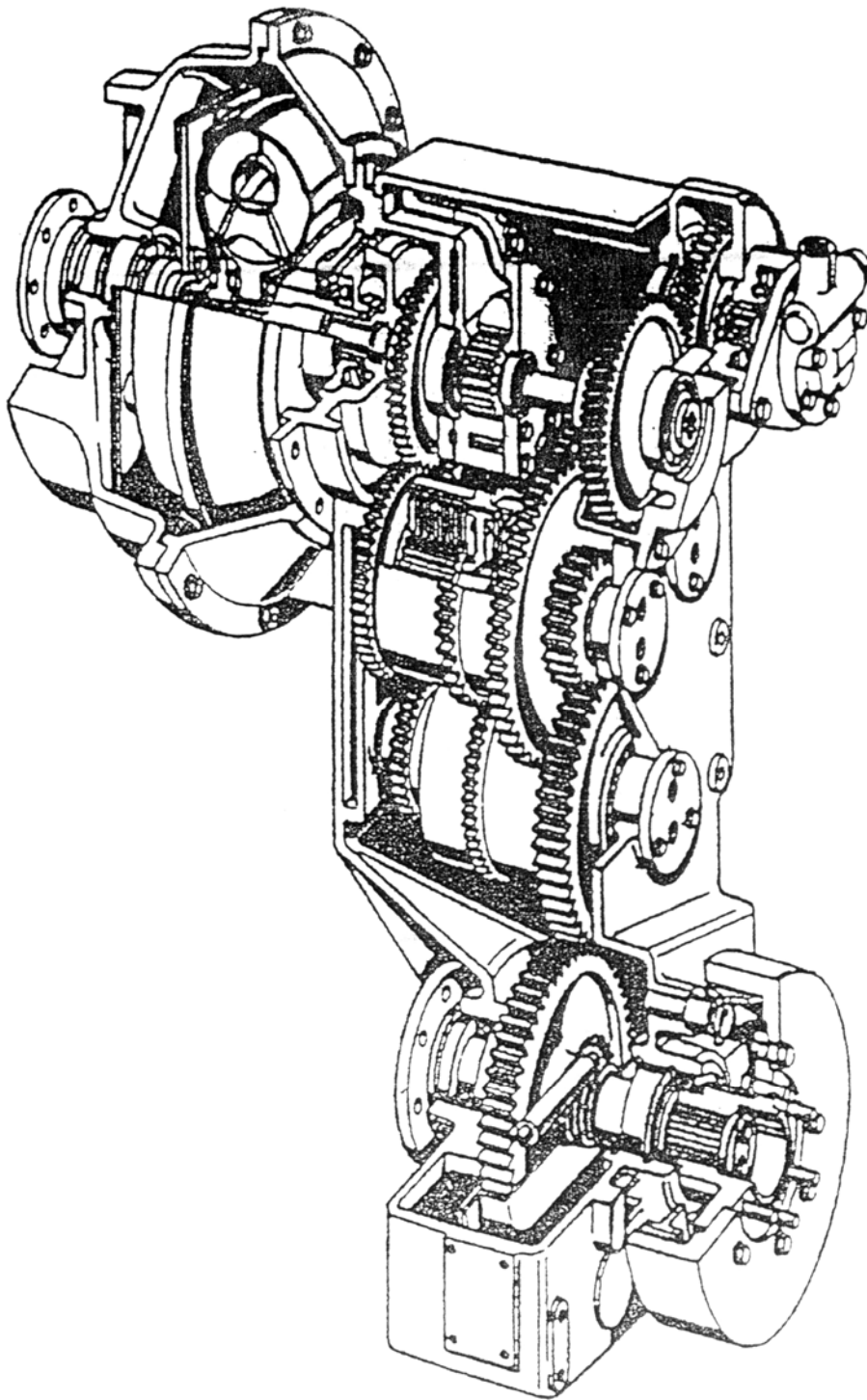
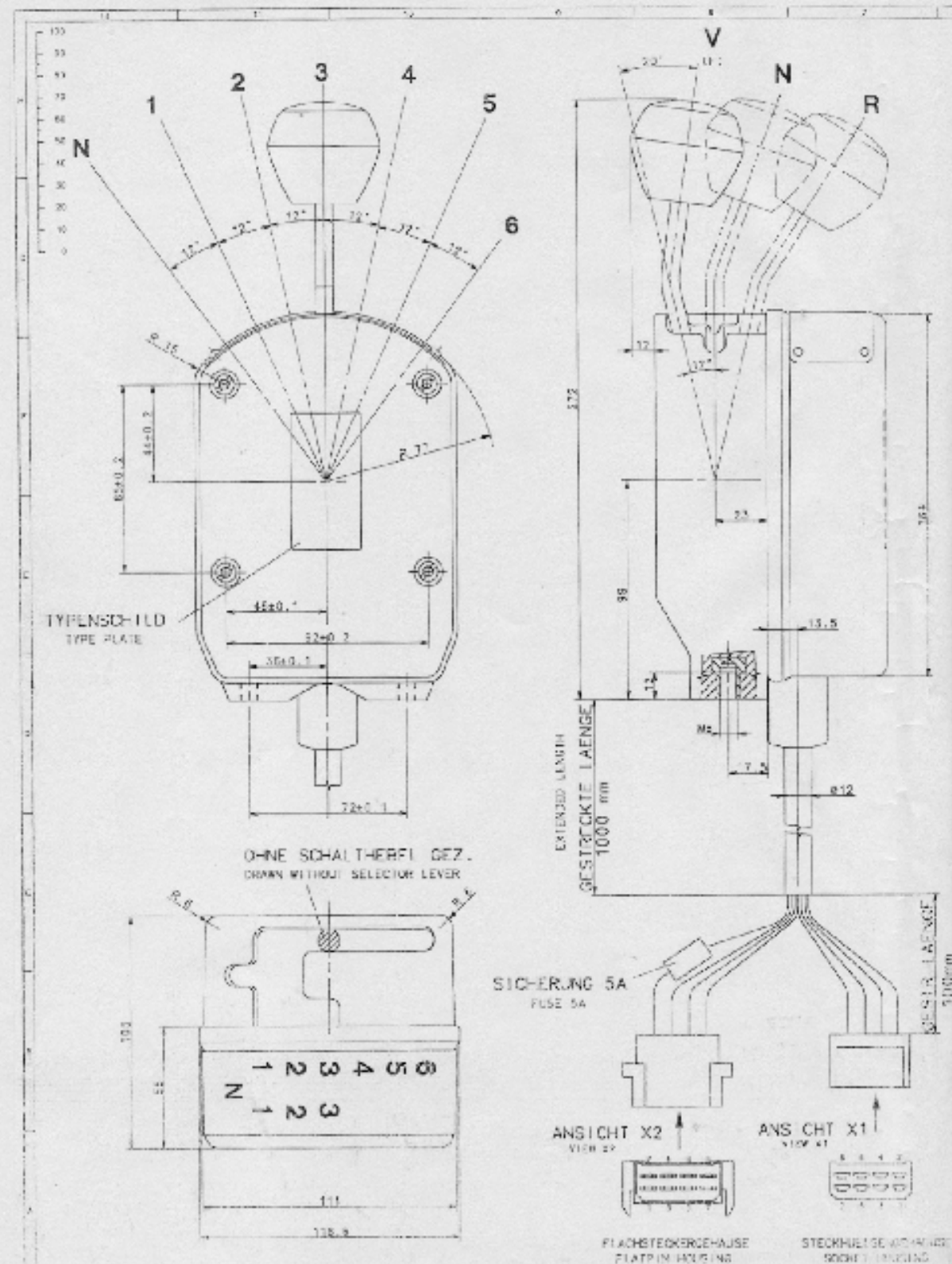


Fig.3 Structure figure



TECHNISCHE DATEN
TECHNICAL FEATURES

NENNENOMMUNG
NOM. VAL. DESIGNATION: U = 24V

BESTIMMUNG
DESIGNATION: 1000-1000

PRÜFSPANNUNG
TESTING VOLTAGE: U_{pr} = 250 ± 0.5V

STROMNOMMUNG
CURRENT DRAW: I_{nom} = 4A

BELASTUNG DER AUSGÄNGE AD1...AD7
LOADING OF OUTPUTS: U_{AD1...AD7} = 24V, I_{AD1...AD7} = 100mA

BEI 25°C
AT 25°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 55°C
AT 55°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 70°C
AT 70°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 85°C
AT 85°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 100°C
AT 100°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 125°C
AT 125°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 150°C
AT 150°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 175°C
AT 175°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 200°C
AT 200°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 225°C
AT 225°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 250°C
AT 250°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 275°C
AT 275°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 300°C
AT 300°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 325°C
AT 325°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 350°C
AT 350°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 375°C
AT 375°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 400°C
AT 400°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 425°C
AT 425°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 450°C
AT 450°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 475°C
AT 475°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 500°C
AT 500°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 525°C
AT 525°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 550°C
AT 550°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 575°C
AT 575°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 600°C
AT 600°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 625°C
AT 625°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 650°C
AT 650°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 675°C
AT 675°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 700°C
AT 700°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 725°C
AT 725°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 750°C
AT 750°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 775°C
AT 775°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 800°C
AT 800°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 825°C
AT 825°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 850°C
AT 850°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 875°C
AT 875°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 900°C
AT 900°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 925°C
AT 925°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 950°C
AT 950°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

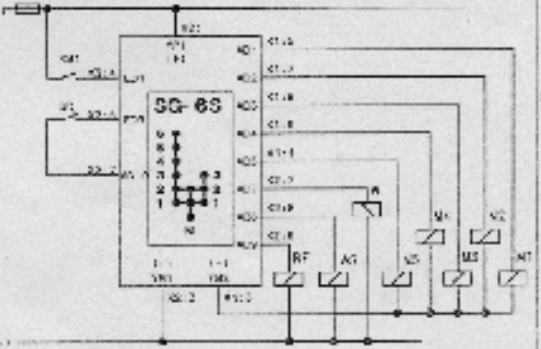
BEI 975°C
AT 975°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

BEI 1000°C
AT 1000°C: U_{pr} = 250 ± 0.5V, I_{pr} = 4A

CODIERUNG
CODE

| AUSGANG | BLATT SIGN. | BELEGUNG |
|---------|-------------|-----------|
| AD1 | W1 | • • • • • |
| AD2 | W2 | • • • • • |
| AD3 | W3 | • • • • • |
| AD4 | W4 | • • • • • |
| AD5 | W5 | • • • • • |
| AD6 | W6 | • • • • • |
| AD7 | W7 | • • • • • |
| AD8 | W8 | • • • • • |

ANSCHLUSSPLAN FAHRSCHALTER
CONNECTION DIAGRAM RANGE SELECTOR



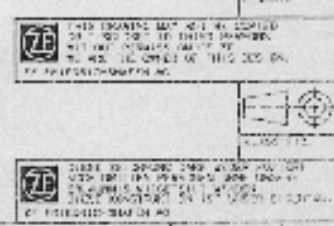
- AD1 = WAGENVENTIL 1 (CARRIAGE VALVE 1)
- AD2 = WAGENVENTIL 2 (CARRIAGE VALVE 2)
- AD3 = WAGENVENTIL 3 (CARRIAGE VALVE 3)
- AD4 = WAGENVENTIL 4 (CARRIAGE VALVE 4)
- AD5 = WAGENVENTIL 5 (CARRIAGE VALVE 5)
- AD6 = WAGENVENTIL 6 (CARRIAGE VALVE 6)
- AD7 = WAGENVENTIL 7 (CARRIAGE VALVE 7)
- AD8 = WAGENVENTIL 8 (CARRIAGE VALVE 8)
- W1 = WAGENVENTIL 1 (CARRIAGE VALVE 1)
- W2 = WAGENVENTIL 2 (CARRIAGE VALVE 2)
- W3 = WAGENVENTIL 3 (CARRIAGE VALVE 3)
- W4 = WAGENVENTIL 4 (CARRIAGE VALVE 4)
- W5 = WAGENVENTIL 5 (CARRIAGE VALVE 5)
- W6 = WAGENVENTIL 6 (CARRIAGE VALVE 6)
- W7 = WAGENVENTIL 7 (CARRIAGE VALVE 7)
- W8 = WAGENVENTIL 8 (CARRIAGE VALVE 8)
- R1 = WAGENVENTIL 1 (CARRIAGE VALVE 1)
- R2 = WAGENVENTIL 2 (CARRIAGE VALVE 2)
- R3 = WAGENVENTIL 3 (CARRIAGE VALVE 3)
- R4 = WAGENVENTIL 4 (CARRIAGE VALVE 4)
- R5 = WAGENVENTIL 5 (CARRIAGE VALVE 5)
- R6 = WAGENVENTIL 6 (CARRIAGE VALVE 6)
- R7 = WAGENVENTIL 7 (CARRIAGE VALVE 7)
- F1 = WAGENVENTIL 1 (CARRIAGE VALVE 1)

BESTELLNUMMER
ORDER NUMBER

6006 222 233

STROMLAUFPAN
WIRING DIAGRAM

6006 200 001



| DATE | BY | REVISION | DESCRIPTION |
|------|-----|----------|-------------|
| 1970 | ... | ... | ... |
| 1971 | ... | ... | ... |
| 1972 | ... | ... | ... |
| 1973 | ... | ... | ... |
| 1974 | ... | ... | ... |
| 1975 | ... | ... | ... |
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| 1986 | ... | ... | ... |
| 1987 | ... | ... | ... |
| 1988 | ... | ... | ... |
| 1989 | ... | ... | ... |
| 1990 | ... | ... | ... |

Fig 5

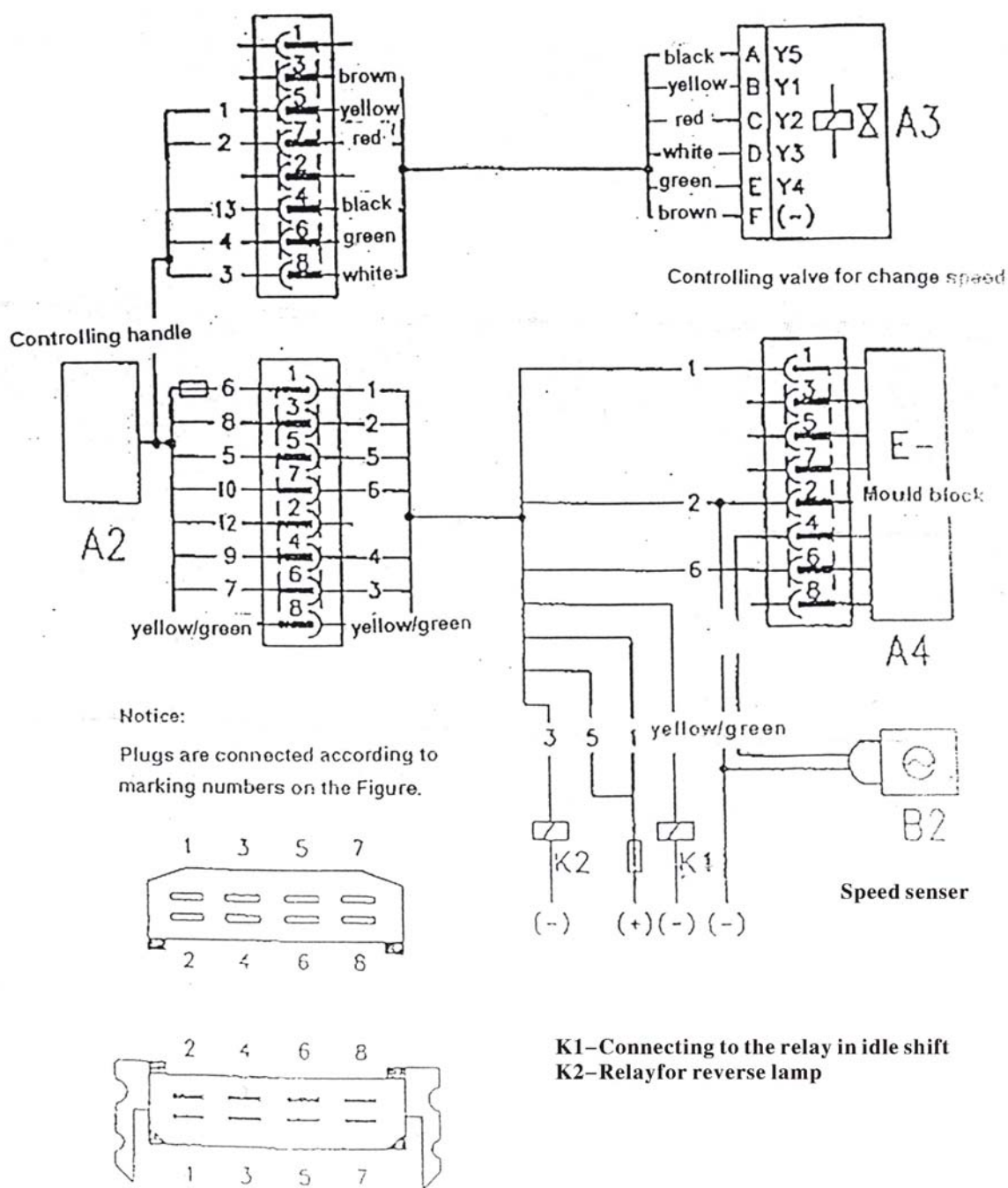


Fig.8 Connecting wire figure for power-shift transmission

6.1.4 Operating hydraulic system and steering hydraulic system

a) Operating hydraulic system

Operating hydraulic system is composed of double pumps and double circuits (Fig.9). It is made up of closed tank (4), two-gang gear pump, two valve blocks for changing direction (five lines 14,15), hydraulic cylinders for operating apparatuses, motor and hydraulic lines. Each system has its own hydraulic pump, but hydraulic oil is supplied from the same tank (4). Hydraulic oil from oil tank (4) is pumped by a two-gang pump (1) into two circuits. Among them, oil flows are equal. When change-direction valves (14,15) are in central position, hydraulic oil, passing through tuning lines and the filter (6), returns to oil tank (4).

When moving one or two operating lever, hydraulic oil pushes one-way valve in changing-direction valves to flow into hydraulic cylinders and motor. The action of one-way valve prevents the oil in working apparatus from returning oil tank (4). It can make sure that hydraulic system is in correct working.

Double direction hydraulic lock (6) mounted on tuning lines for tilting and lifting the blade can guard against moving due to their own weight and the load to make sure safety running and operating accuracy of the blade.

Because of supplying oil in the equal flow, double lifting cylinders for up and down operate in simultaneous and same speed to raise operating performance of the grader. System pressure is controlled by the throttle valve in changing-direction valve (14,15). Pressure value: 16Mpa, System flow:65L/min.

b) Steering system

When hydraulic steering-gear (8) needs the oil, the oil from the tank is intaken by steering pump and delivered. Turning steering wheel, the oil enters into two steering cylinders to make double front wheels steering. Double front wheels are connected by a common pulling lever.

With safety valve (7), oil pressure of steering system is limited in 150bar to guard steering system. Double safety valves (13) prevent hydraulic steering system from overloading. For example, because of the overload caused by road bump, it can be transmitted from front wheels to steering system.

From steering-gear to returning line of the tank, the oil passes the cooler (3).

The hydraulic tank (4) is sealed and is under low pressure controlled by tank valve to 0.7bar. The tank pressure assists in feeding the hydraulic pumps and also prevents the danger of cavitation. It also restricts the ingress of dirt and contamination into the hydraulic system. The inlet valve controls air to enter when oil is drawn out of the tank by the pumps.

If the return filter (6) is blocked and the oil can not flow, the filter valve (5) allows the oil over the filter from by passway and therefore it eliminates the block action of the filter element.

Micro-couplings allow pressure gauge to be fitted at various position in the system to adjust the pressure.

Instruction of hydraulic system principle figure:

1. Double-gang operating pump
2. Double-gang operating pump for steering and braking
3. Oil cooler
4. Sealed tank.
5. Filter valve
6. Oil filter
7. Safety valve for steering
8. Steering-gear
9. Relief pressure valve
10. Braking valve
11. Accumulator
12. Brake
13. Safety valve (20MPa)
14. Operating valve, left
15. Operating valve, right
16. Hydraulic lock of double-direction

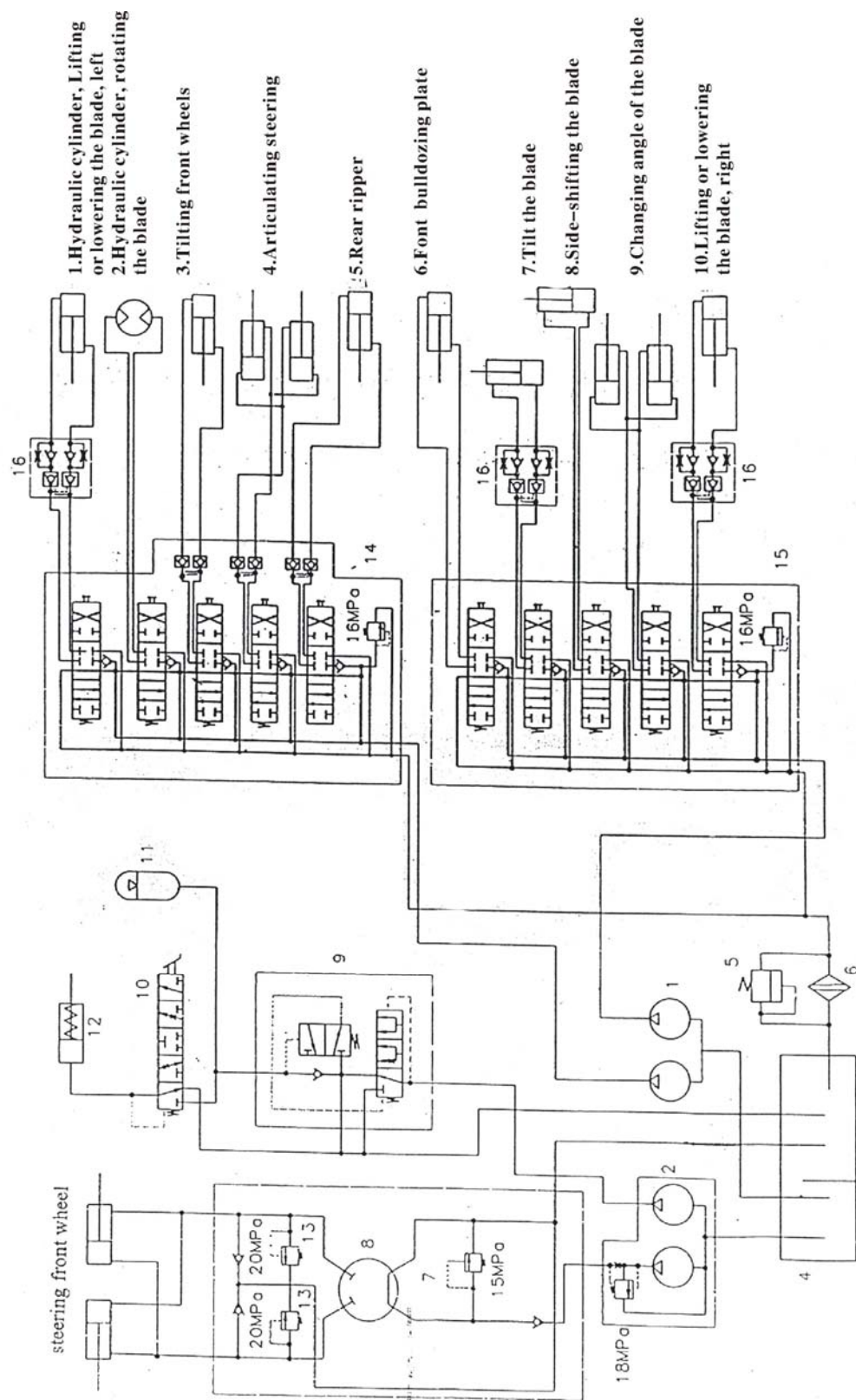
6.1.5 Electrical system

A. Electrical system Figure (P21-2)

B. Description for fuse device

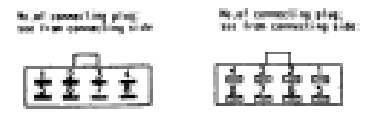
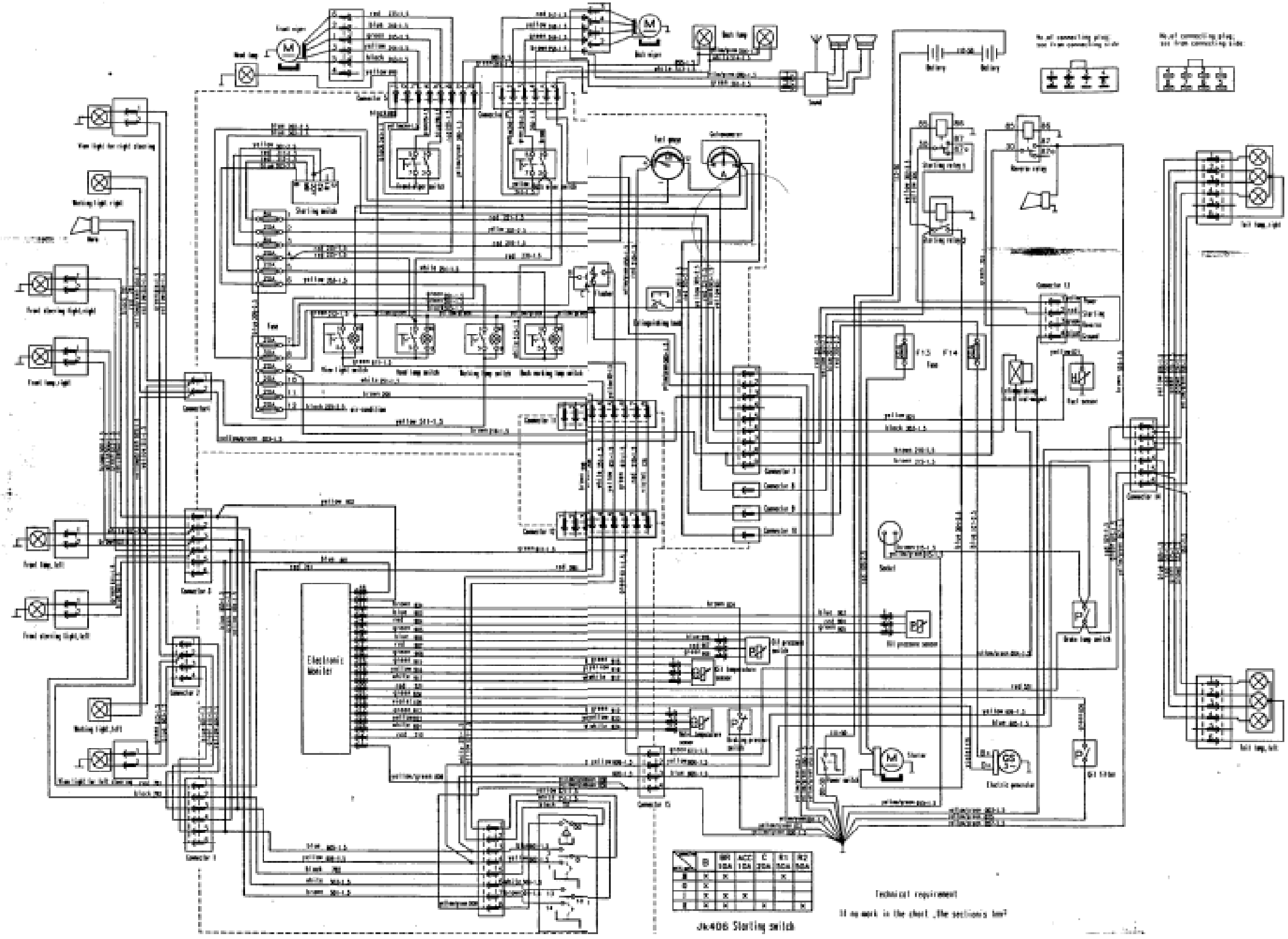
On the right side of the operator's seat and the front of instrument box, fuse devices can be viewed. The sequence is arranged up and down.

| | | |
|-----|-----|--|
| 1# | 5A | Transmission |
| 2# | 20A | Starting relay |
| 3# | 10A | Instrument, oil cutting valve |
| 4# | 15A | Pre-heat relay |
| 5# | 15A | Front/rear wiper, head lamp |
| 6# | 15A | Rear lamp |
| 7# | 20A | Working lamp |
| 8# | 20A | Sound, flash |
| 9# | 20A | View-side lamp, reverse relay brake lamp |
| 10# | 20A | Front lamp |
| 11# | 20A | Horn |
| 12# | 20A | Air conditioner |



- 1. Hydraulic cylinder, Lifting or lowering the blade, left
- 2. Hydraulic cylinder, rotating the blade
- 3. Tilting front wheels
- 4. Articulating steering
- 5. Rear ripper
- 6. Front bulldozing plate
- 7. Tilt the blade
- 8. Side-shifting the blade
- 9. Changing angle of the blade
- 10. Lifting or lowering the blade, right

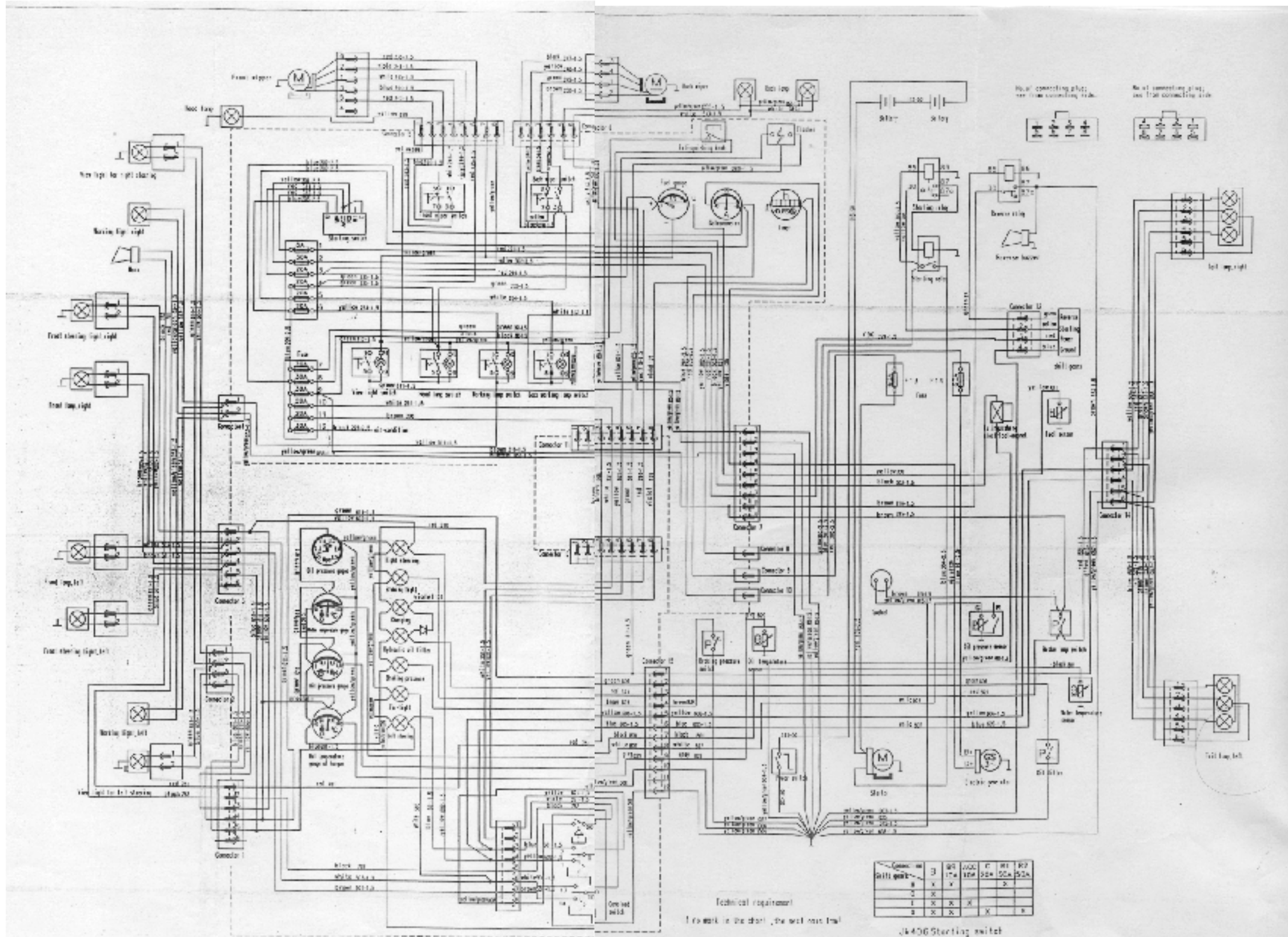
Fig.9 Principle figure of hydraulic system



Technical requirement
If no mark in the sheet, the sections met

| | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|----|----|----|----|----|----|----|----|----|----|
| 10 | | | | | | | | | |
| 11 | | | | | | | | | |
| 12 | | | | | | | | | |
| 13 | | | | | | | | | |
| 14 | | | | | | | | | |
| 15 | | | | | | | | | |
| 16 | | | | | | | | | |
| 17 | | | | | | | | | |
| 18 | | | | | | | | | |

JW40B Starting switch



7. Operating instructions

7.1 Adjust before operating for the first time

We recommend that the machine be inspected before going into service. The machine should be checked in particular for transport damage. We also recommend that the following checks and maintenance works to be carried out;

Check lighting and horn system

Fuel tank to be filled

Wheel nuts checked for tightness

Tyres pressure to be checked

Batteries to be checked (acid level)

Oil level to be checked: Engine

Transmission

Rear axle

Tandems

Worm gear for blade circle

Hydraulic tank

After starting the engine: control lamp for brake service pressure can not light. Check brake and steering for correct function.

The machine have worked for more than one week: all grease nipples should be greased according to lubrication chart.

In case of frost: if necessary, winter diesel oil should be used.

7.2 Running-in time

All moving parts from transmission to hydraulics require running-in during this period, the machine is not used under full load. (less than 70%)

We recommend:

For the first 50 operating hours the grader should not be used full power, Between 50-100 hours full power may be used only for short periods.

7.3 Figures of control instruments and control levers

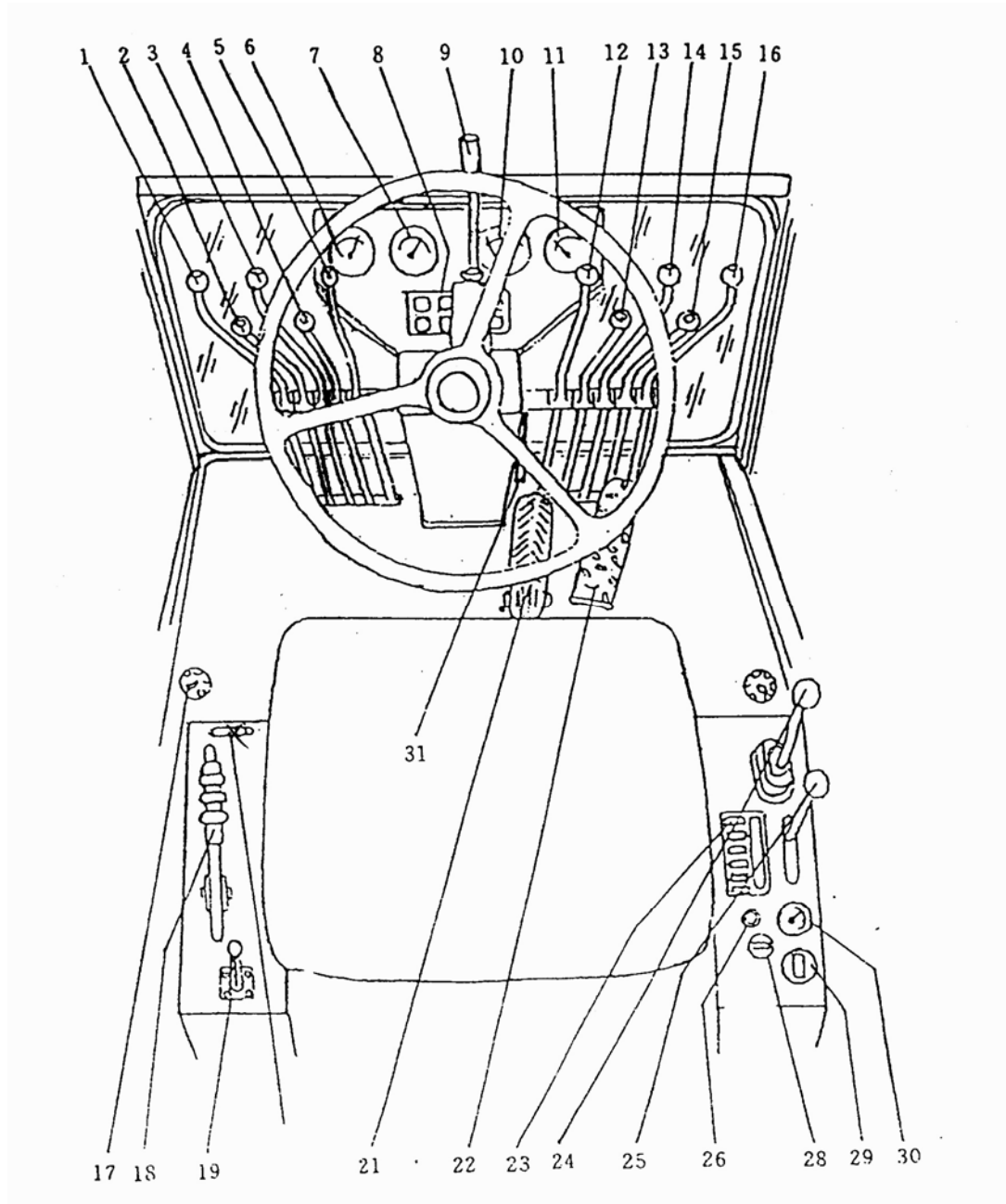


Fig.11

- Fig.13: 1. Control lever for blade lifting, left
2. Control lever for circling the blade
3. Control lever for front wheel lean
4. Control lever for frame articulation
5. Control lever for rear ripper
6. Gauge for oil pressure
7. Gauge for oil pressure of the transmission
8. Four-gang control light
9. Combined switch
10. Oil temperature gauge of torque converter
11. Gauge for water temperature
12. Control level for front bulldozing plate
13. Control lever for tilting the blade
14. Control lever for blade side-shift
15. Control lever for blade cutting angle
16. Control lever for blade lifting, right
17. Pedal for assitant ladder
18. Hand brake lever
19. Main power switch
20. Indicator for rear ripper
21. Brake pedal
22. Pedal acclerator
23. Six-gang switch
24. Control lever for the transmission
25. Control lever for hand accelerator
26. Button for extinguishing engine
27. Fuel gauge
28. Ignition switch
29. Timer
30. Galvanometer
31. Lifting lever

7.3.1 Switch

1) Main power switch

Push down the handle of the main power switch (Fig.11/19) and main power is on .

2) Ignition switch (Fig. 11/28)

Turn it to I gear clock-wise and all of the gauges are on; Turn it to II gear to start the engine.

3) Extinguishing button (Fig.11/26)

Press the button to extinguish the engine.

7.3.2 Instruments

1) Thermometer for torque converter outlet (Fig. 11/10)

Messuring rang: 40-140⁰C. Under normal conditions, the temperature should stay between 80-110⁰C.

It is possible to go up to 120⁰C at a short period.

2) Galvanometer (Fig.11-30)

Messuring rang:-40~+40A

The needle point“-” to indicate battery discharging;

The needle point “+” to indicate battery recharging

3) Water-thermometer (Fig 11/11)

Messuring rang: 50-115⁰C.

It shows the temperature of cooling water for the engine. In the normal conditions, the temperature should be controlled in 90⁰C.

4) Hourmeter (Fig. 11-29)

The range of accumulative total is at 0~9999.9h and gives the operating hours for the engine.

5) Pressure gauge for transmission (Fig. 11-7)

Messuring rang: 0~2.5Mpa

If the oil temperature of transmission varies at 80~90⁰C, its oil pressure will change, 1.3~1.7Mpa

The needle should always be in this area, otherwise, stop the engine immediately and check for troubleshooting.

6) Fuel oil gauge (Fig 11-27)

Messuring rang: 0~1

The fuel gauge shows the amount of fuel in the tank. Don't start the grader without the oil in the tank in order to prevent the system from blocking fuel line or entering the air.

7) Oil pressure gauge

Messuring rang: 0~1Mpa. Min Pressure is not less than 0.2Mpa.

7.3.3 Four-gang indicating light (Fig. 12)

1) Indicating light for charging, red (Fig. 12/1)

The indicating light is on when the engine is running, Charging line or alternator is at fault or the belt is loosened. The battery is not charged, stop the engine and carry on troubleshoot.

2) Indicating light for brake service pressure, red (Fig. 12/2)

The indicating light is on when the engine is running, there are some troubles in the brake system. Stop the grader and engine immediately and troubleshoot.

3) Indicating light for the brake, red (Fig. 12/11)

The indicating light is on while the grader is braked in running.

4) Indicating light for oil filler, red (Fig. 12/4)

The indicating light is on when the engine is running, it shows that oil filters are blocked, clean or replace filter cartridges.

5) Indicating light for far light, blue (Fig. 12/5)

The indicating light is on when front light switch push to far light.

6) Indicating light for right steering, green (Fig 12/6)

The indicating light is on when steering switch push to right steering.

7) Indicating light for left steering, green (Fig, 12/7)

The indicating light is on when steering switch push to left steering.

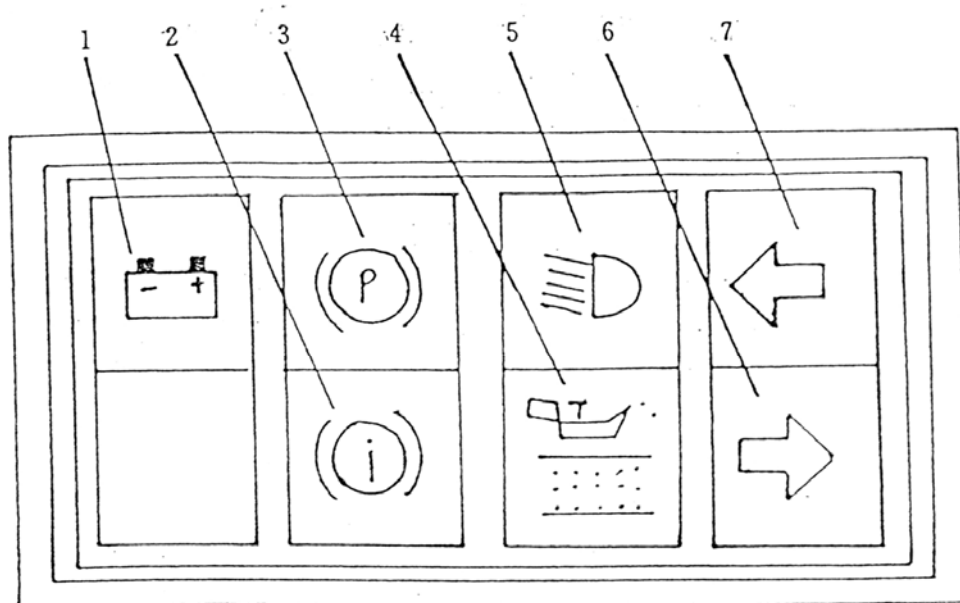


图 12

Fig. 12

7.3.4 Six-gang switch (Fig. 13)

- 1—Switch for operating light
- 2—Switch for rear light
- 3—Head light switch in the cab

- 4—Side-view switch
- 5—Wiper switch for front window
- 6—Wiper switch for rear window

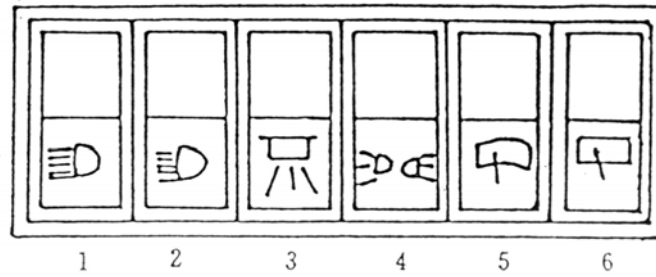


Fig.13

7.3.5 Combinating switch (Fig. 14)

Level in position:

- 1=Switch-off
- 2=Front far light
- 3=Switch-off
- 4=Left-steering
- 5=Right-steering
- 6=Horn
- 7=Front far light

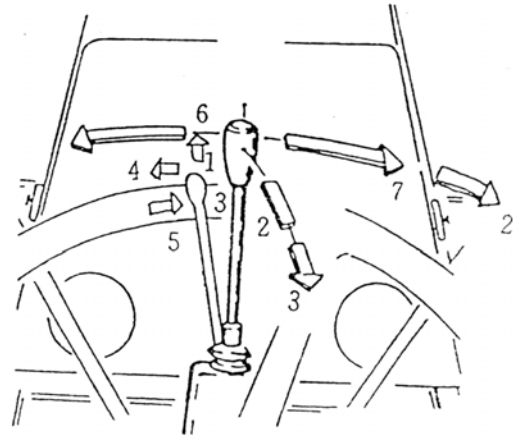


图 14

Fig.14

7.3.6 Accelerator pedal (Fig. 11/21)

This pedal controls the speed of the engine.

7.3.7 Foot brake pedal (Fig. 11/22)

This pedal applies the wheel brakes on the 4 Rear wheels by the hydraulic system. Braking

Pressure depends on the pressure applied to the Brake pedal.

7.3.8 Hand brake lever (Fig. 15)

Pulling up the hand brake level (Fig 15/1)

Applies the parking brake. To release the brake lever,

Pull it slightly up, press the knob (Fig 15/2) and

Push it down completely.

7.3.9 Adjusting steering wheel

To adapt the driver, it is possible to adjust steering wheel in the cab.

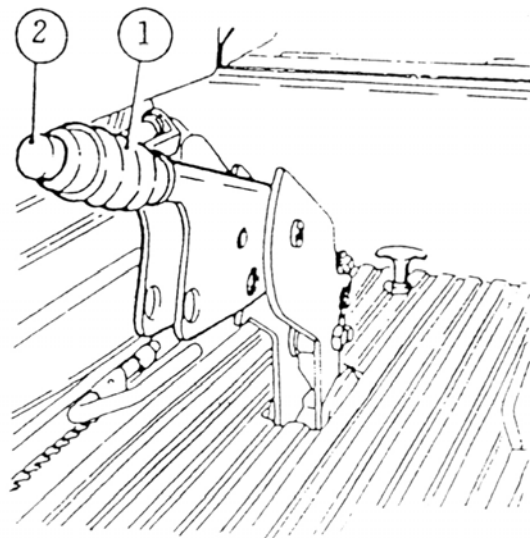


Fig.15

- a) Pull up the lifting lever of the right side of the removeable console.
- b) Move steering wheel up and down to get a proper position (adjusting by yourself)
- c) Loosen lifting lever and fix the console.

7.4 Driver's cab

7.4.1 Cab doors

Pull the door backward to open, Close the door completely to lock,

Right door: Locked from inside

Left door: Locked with key

Steps (Fig 16)

Press the step pedal

The steps can be folded

7.4.2 Driver's seat (Fig. 17)

a. Weight adjustment

The seat can be adjusted for load by turning the knob (1). (60-130kgf)

b. Backrest

The angle of the backrest can be adjusted by use of lever (2). Let the backrest engage the lever (2).

c. Seat height and angle

Both can be adjusted by use of lever (3).

d. To move the complete seat

This is done with lever (4). The seat can be moved forward or backward. Let the seat engage the lever (4).

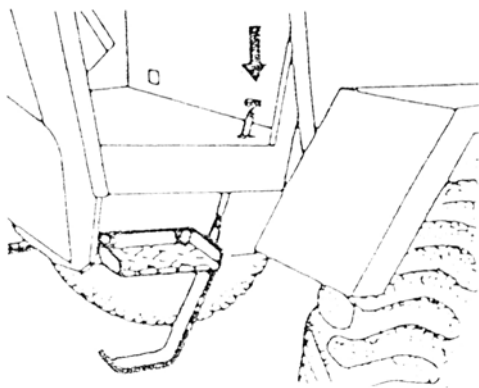


Fig. 16

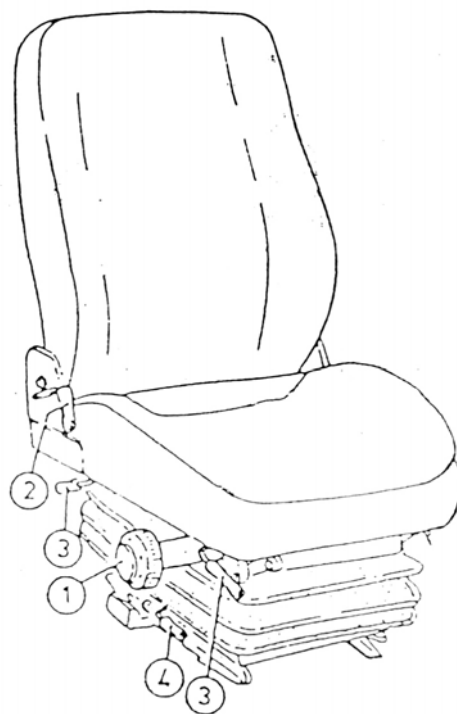


Fig.17

7.5 Operation of working equipment

All adjustment and settings of the working equipment (Except for the ripper teeth)can be done hydraulically form the cab. Setting equipments are done with the following hydraulic eylinders and the hydraulic motors:

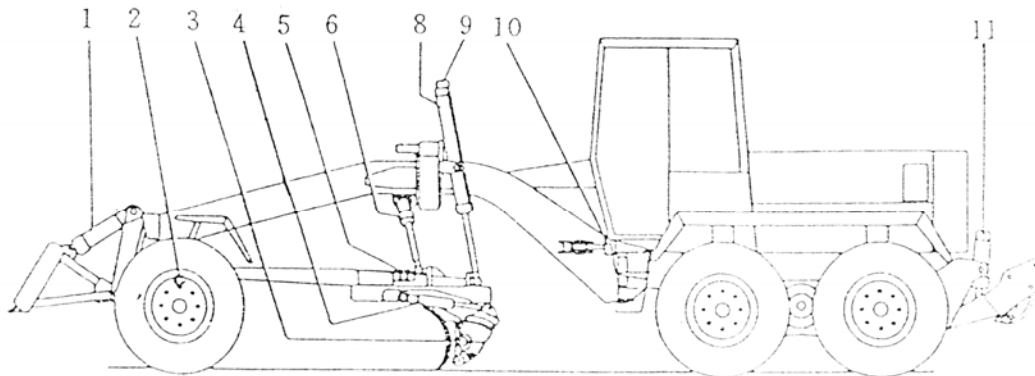


Fig. 18

1. Hydraulic cylinder for front dozer
2. Hydraulic cylinder for whell lean
3. Hydraulic cylinder for blade shift
4. Hydraulic cylinder for cutting angle adjustment
5. Hydraulic motor for circle-ring
6. Hydraulic cylinder for blade swing
8. Hydraulic cylinder for blade lift/lower, left
9. Hydraulic cylinder for blade lift/lower, right
10. Hydraulic cylinder for frame articulation
11. Hydraulic cylinder for back ripper lift/lower

7.5.1 Controls

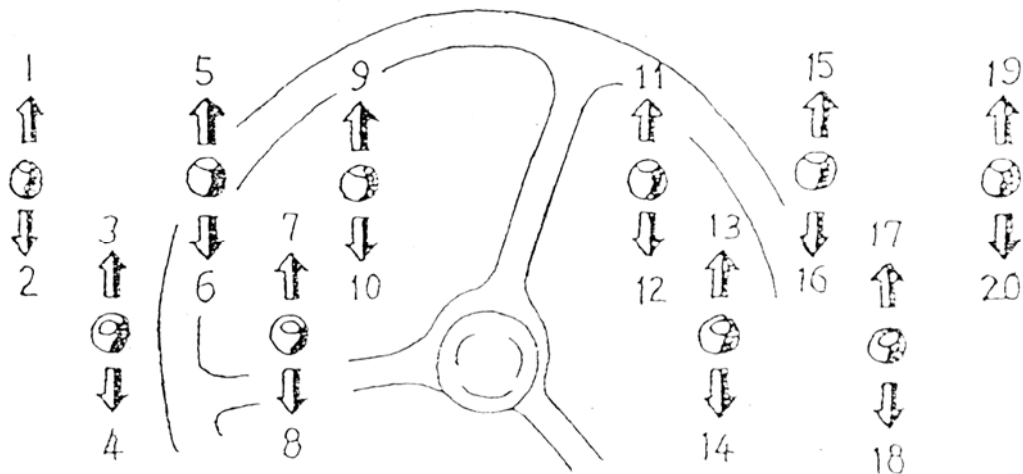


Fig.19

- | | |
|--------------------------------------|------------------------------|
| 1. Blade lower, left | 11. Dozer lower |
| 2. Blade lift, left | 12. Dozer lift |
| 3. Blade turning, clockwise | 13. Blade swing, right |
| 4. Blade turning, counter colockwise | 14. Blade swing, left |
| 5. Wheel lean, left | 15. Blade shift, right |
| 6. Wheel lean, right | 16. Blade shift, left |
| 7. Articulation, left | 17. Reducing cutting angle |
| 8. Articulation, right | 18. Increasing cutting angle |
| 9. Back ripper, lower | 19. Blade lower, right |
| 10. Back ripper, lift | 20. Blade lift, right |

7.5.2 Turning the swing saddle

Note: The saddle is normally locked in horizontal position 3 (Fig. 20)
Positions are seen from driver's seat.

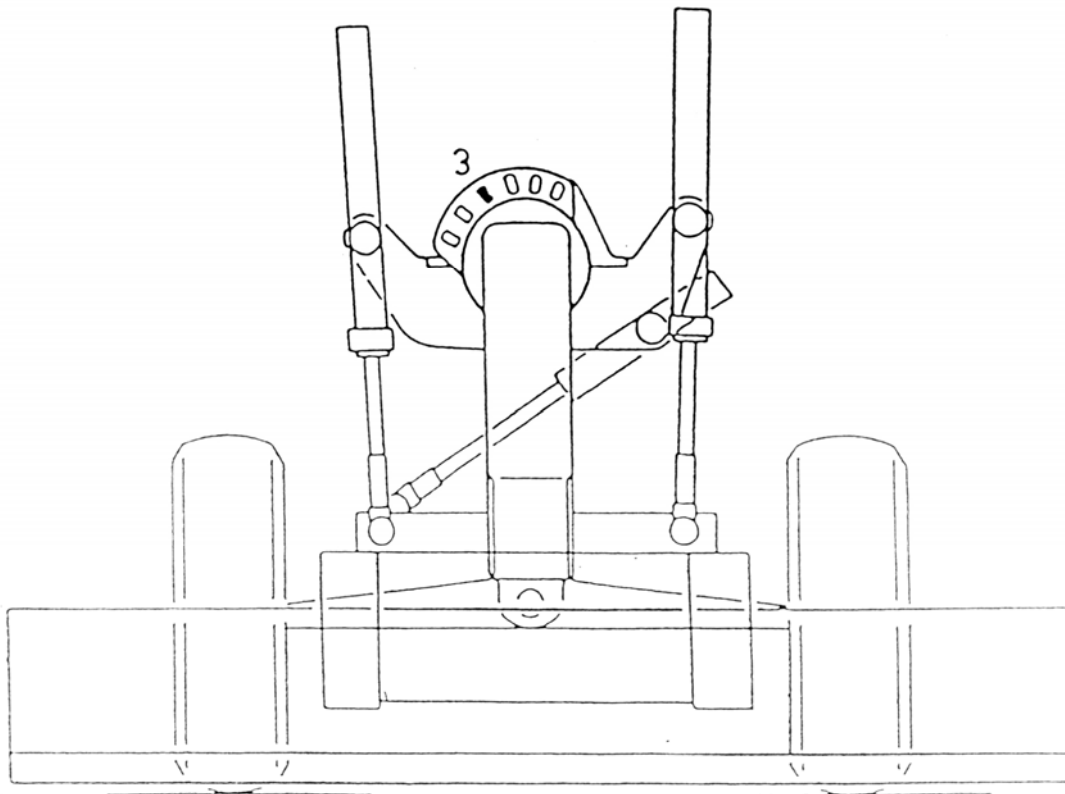


Fig.20

Turn the swing saddle into the positions as No. 1,2,3,4,5,6 as follows.

a) If turn swing saddle positions from 3 to 1 or 2, operare controlling levers (Fig 19 NO.2 14/19) to contract swing cylinder completely.

b) If turn swing saddle positions from 3 to 4 or 6, operare controlling levers (Fig 19 No 1 13 20) to extend swing cylinder completely.

- c) After the operations mentioned above, use left and right cylinders to put the blade down to Ground. (no load in hydraulic system)
- d) Pull out lock pin for swing saddle.
- e) Operate lifting cylinders and swing cylinder again to turn swing saddle to required position.
- f) At last lock swing saddle with lock pin.

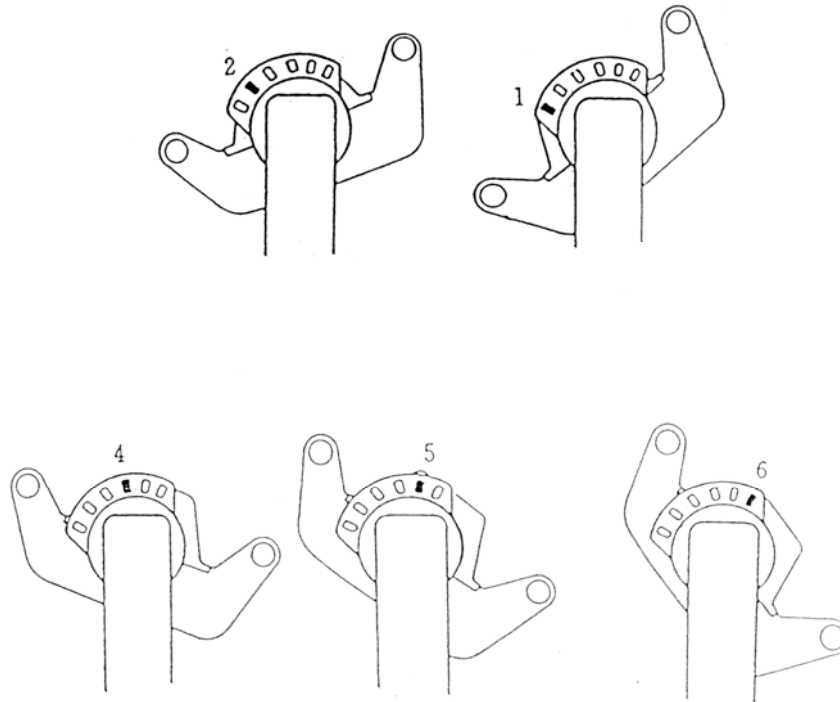


Fig.21

7.5.3 Blade adjustment

By use of the swing hydraulic cylinders the blade with the scarifier can be positioned to suit all working conditions. The blade can be taken in and out to the left or right, and set at any angle, It can also be turned through 360⁰.

Note: When turning the blade. Care should be taken not to damage the frame, steps, tyres and pull-rod of ladder-shaped.

7.5.4 Adjustment of blade cutting angle

The grader is equipped with hydraulic angulator. When operating the control lever in driver's cab, the cutting angle can be adjusted to suit all working conditions.

7.5.5 Blade scarifier

Note: Any number of teeth (1 to 6) can be used for scarifying, Scarifying working can be carried out by turning the blade.

- a) To bring the teeth into working position

1. Remove safety spring (Fig. 22/1) and pull out the rod (Fig. 22/2)

2. After having putted down the scearifer teeth push in an safety rod (Fig. 22/2) if several teeth are operated. Always fit separate sleeves (Fig. 24/3) between two sides of the outer teeth

b) Scarfying

1. Bring the grader into working area lower the teeth on the ground using the blade lift/lower cylinders.

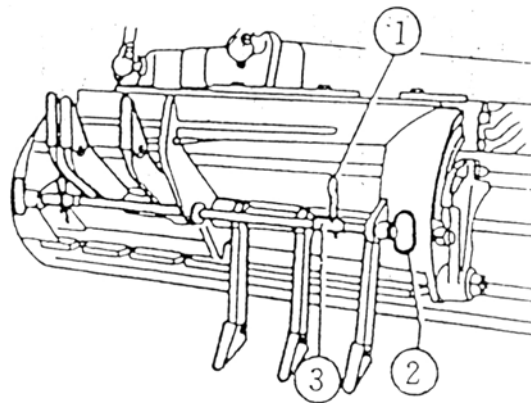


Fig.22

7.5.6 Back ripper

Note: The back ripper is used for tough work and is normally fitted with three ripping teeth.

The teeth are only to be used in symmetric order as follows: in neutral one tooth, two teeth in outside or all 3 teeth together.

a) Back ripper indicator (Fig. 11/20)

The indicator is located on the left side of the driver's seat. The height setting of the teeth is indicated by the pointer (2) on the staff (1) (Fig.23)

b) Tooth adjustment

The 2 Possible positions are shown in the following pictures.

1. Remove spring pin (Fig 24/1)

2. By removing the shaft (Fig 24/2) it is possible to set each tooth into the desired position Then, the shaft is pushed in and spring pin is mounted.

c) Ripper adjustment

1. Transport position (Fig. 24)

Swing the teeth in and lift the ripper throughout. The pointer on the shaft is aligned with the number of right side.

2. Ripping position (Fig. 25)

In the picture the grader is horizontal condition. The teeth are out and resting on the ground. The pointer of the indicator is in the middle position.

3. Deep ripping (Fig. 26)

The ripper is completely pushed down using the hydraulic cylinder. The pointer of the indicator is at the left side.

d) Ripping

Control (lift and lower) of the ripper is by use of a lever (7.5.1) Number of teeth depth and driving speed are depended on by the tyre of ground being cut.

1. Drop the ripper until the teeth lowerson the ground.
2. Drive the graderforward and at the same time lower the ripper further into the ground. Note: Before turning the grader and driving it in reverse, the ripper should be lifted.

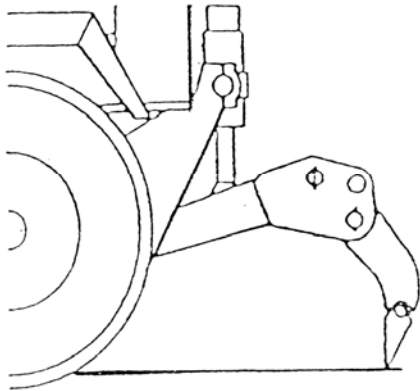


Fig.25

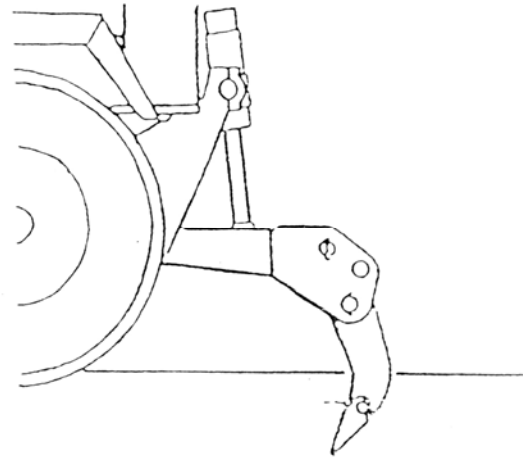


Fig.26

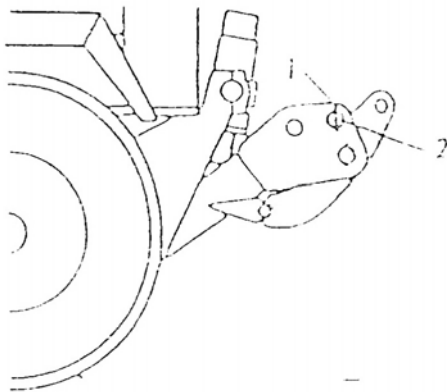


Fig.24

7.5.7 Position indicator of front dozer

Control (lift and lower)of the front dozer is by use of the lever (see 7.5.1). The front dozer is connected with front frame by high strength bolts to enable the dozer mounting and removing quickly.

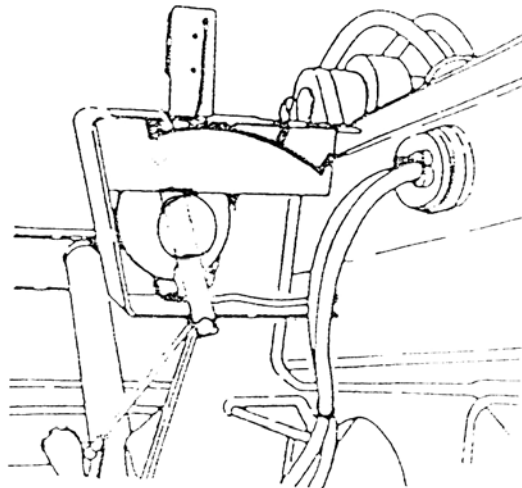


Fig.27

7.5.8 Wheel lean

Control of the wheel lean (left/right) is by use of the lever (See 7.5.1). The wheel lean is realized as follow;

.....A small turning radius, Increasing Sliding Force On the tyre when grading.

.....Good grip when working on banks.

7.6 Driving

7.6.1 Preparatory steps to be taken

- a) Check the fuel level, fill up, if necessary.
- b) Check engine oil level, fill up, if necessary (item 8.3.1 a)
- c) Check the engine air filter

If the indicator for intaking-resistance in air filter is right or not.

- d) Check hydraulic oil level in the tank

Carry out this check after lowering the blade, hydraulic cylinders on the ground and cooling hydraulic oil (item 8.3.6c).

- e) Check with running the engine:

1. Steering: When turning the steering wheel to the left and to the right, The steering must run casily and the front wheel steering must react.

2. Braking system The control lamp of service pressure must not light.

After travelling a short distance, check the function of the brakes by operating the brake.

7.6.2 Starting the engine

- a) Release the hand brake and gear shift lever to idle.
(If this is not done, the engine will not start)

- b) Insert the key into the ignition switch to turn 1 gear

Note: All lamps light on and the instruments indicate. This shows all electrical lines are right Otherwise, they will be checked.

- c) Press down accelerator pedal (approx 1/4 engine speed)

d) Turn the starter knob (second step). Release the starter knob as soon as the engine runs. Do not keep the starter running continuously for more than 15 seconds.

Note: To protect the battery, wait 1 to 2 minutes before making another starting.

e) As soon as the engine is running smoothly, reduce engine speed. At the time, the gauge is right and red indicator are off.

Note: Avoid high engine revolutions when the engine is still cold.

Travelling on the road for a short period, the engine will be warmed up.

f) The choice of lubricating oil depends on the temperatures at which the engine is started. You could not mention the affect of enviremnt temperature if suing stipulated oil in winter. (See 8.2.4)

g) Pay attention to a good condition of the battery. Lowering the limit temperature by 4-5⁰C is possible by raising the battery temperature to about +20⁰C. This is done by removing the battery with the engine stopped and storing it in a warm room. When installing the battery, keep contact surface of the terminal clean and bright and ensure good contact.

7.6.3 Warming up for the transmission and hydraulic system

If the grader has been idle for a long time, especially at temperature around or below 0⁰C, the transmission and hydraulic system must be warmed up at medium engine speed. While the temperature is below 0⁰C, normal revolutions of 1/2 or 2/3 are not exceeded to prevent starting engine from over-loading, during the first 30 minutes of working.

a) Warm up the transmission

1. Joint hand brake.
2. Start engine and let it run at medium speed.
3. Set the gear shift level on “forward” or on “reverse” and on fifth or sixth gear Change the positions several times. Carry on until the temperature gauge of torque converter indicates approx 60⁰C.

Warning!

The driver can not leave the cab during warming up and must check the temperature continuously.

b) Warming hydraulic system for the working

During waring the transmission, also warm the hydraulic system for the working by moving the hydraulic cylinders.

Note!

The warming must not be done by holding the control lever to its final position.

7.6.4 Driving the grader

- a) Set gear shift lever at I gear or II gear on “forward” or on “reverse”.
- b) After sounding the horn, releasing hand brake and pressing on the accelerator, the grader begins to drive.

7.6.5 Instrument indication during travelling

- a) The indicating lamps for battery charge, red

brake service pressure, red
oil filters, red

Must not light.

b) The following instruments must be watched:

The needle of the pressure gauge must indicate in 13~17bar ZF transmission.

Notice!

If one of the indicating lamps mentioned above is light and unusual conditions happen in the pressure gauges of the transmission, the oil and water temperature, the engine must be stopped immediately, you check the cause of the fault. Especially in barke pressure lamp, before starting, you must check if the line is right, When brake pressure lamp is light in running you must stop the grader and check brake system.

Notice!

When the grader is operating in travelling, the driver must check oil temperature gauge of torque converter. Oil temperature would be 80-110⁰C. In short period, allow to reach 120⁰C, but not over 120⁰C ,If the temperature has reached 120⁰C, you would immediately release oil valve, change gear-shift and lower travelling speed. After the temperature is dropped, make it return original operating speed.

7.6.6 Continuous service brake (torque converter)

By selecting the appropriate gear on downslops, the torque converter can have a braking effect when the speed of the turbine of torque converter is faster than pump gear linked with engine.

Travelling speed of the II gear is suitable for plain road or middle slope to travel down . For sharp slope, the I gear is used for proper speed, with accelerating pedal, you can make the grader using foot brake within min Limit.

7.6.7 Steering

a) Hydraulic steering system of front wheels.

The steering of front wheels is controlled by steering wheel.

b) Steering of articulated frame

Articulated frame steering is controlled by a controlling lever (see 7.5.1) . Before steering with the articulation, first remove the safety lever under articulated cylinders.

7.6.8 Preparation before driving

Before driving on the road, the following instructions would be carried out:

1) Clean the grader of heavy dirt.

2) Check brakes, steering tyres and lights.

3) Set articulating steer, Front and rear wheels must be in line (Fig. 29)

4) Check front wheels lean and set front wheels vertically.

5) Bring the blade in travel position and lift as high as possible.

6) Lift the dozer completely.

7) Pay attention that blade and dozer are not put lower during travel. Lift it again if necessary.

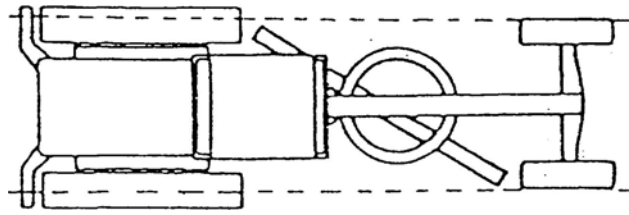


Fig.29

7.6.9 Stopping the grader

a) Release accelerator
 b) Put shift-gear lever into neutral position and stop the grader using the foot brake.

c) Pull hand brake

7.6.10 Stopping the engine

Press the extinguishing button down until the engine is stopped.

Warning: Do not stop the engine under full load. Always allow it to run idle for 1 to 2 minutes.

7.6.11 Parking the grader

a) Pull hand brake and hold it .

b) Put the working equipments on the ground.

c) Remove ignition key, lock the driver's cab.

Note: If the machine is parked on a gradient , the wheels would be chocked.

7.6.12 Towing the grader

If the grader is towed, the operating level of high-lower speed would be in neutral position.

If possible, the engine would be running so that steering and braking assistances is still available.

If the grader is towed with a rope, care would be taken that nobody is in the area between the towing vehicle and the grader.

7.6.13 Tow starting

Because of the torque converter it is impossible to tow starting grader Any tow starting will lead the transmission damage.

7.6.14 Transportation on road or railway

a) Set the frame articulation straight and the front wheels in vertical position lower blade in travel position and set down the front dozer.

b) Chock the wheels and strap the grader down.

7.6.15 Working on slopes and inclines

When working on stops and inclines, the following values would not be exceeded in order to avoid an insufficient or interrupted lubrication of the engine. Engine damages can occur due to lubrication problems.

| | Transverse slop | Longitudinal slope | |
|---------------|-----------------|--------------------|-----------------|
| | Left and right | Forward | Reverae |
| Allowed angle | 20 ⁰ | 25 ⁰ | 25 ⁰ |

7.6.16 Use of the grader

We recommend that the grader driver would receives instructions from our service technicians so as to develop the applications of the grader.

Our suggestion in using the graer are as follows:

1) Clearing base ground-fine grading-ripping out old road and hard ground-cutting slopes, profiles, mixing, distributing, collecting and compacting materials-clearing snow and ice, etc.

2) The articulation gives the grader a min. Turning radius and when doing the above metioned work, allows the grader much more maneuverability. It is possible to drive the grader in a “crab” position. This allows the blade to lengthen out of the rear wheels and so preventing the rear wheels driving over the leveled surface. The articulation also allows the grader a action of self recovery in difficult conditions.

3) further use of the grader can be made with the following equipments:

Back ripper

Front dozer

Towing attachment rear

Extra balance weights. Front and rear

4) An important factor for the optimum efficiency of the grader is the choice of correct turning and cutting angle of the blade. We recommend a relatively large turning angle is used and thus a high cutting pressure is got in working length of per om. Small cutting angle decrease the cutting resistance in cutting operation. Large cutting angle increases the levelling and mixing effect.

5) The front wheels should be leaned towards the side from which the material is running off. When working on slopes, the fron't wheels can be set vertically giving better traction with the aid of the wheel lean.

6) By acting the blade side-shift the blade can be moved out during grading without changing the operating height.

7) The grader should not be used underground or in badly ventilated areas because the engine is of the direct injection type and special filtering of the engine exhaust is not enough.

8. Care and maintenance

8.1 Safely rules

1. Place the grader horizontally on the hard ground.
2. Set the working equipments (blade dozer) on the ground.
3. Pull hand brake.
4. Fix the articulated steering of the grader by inserting the safety rod to prevent movement(Fig. 28)

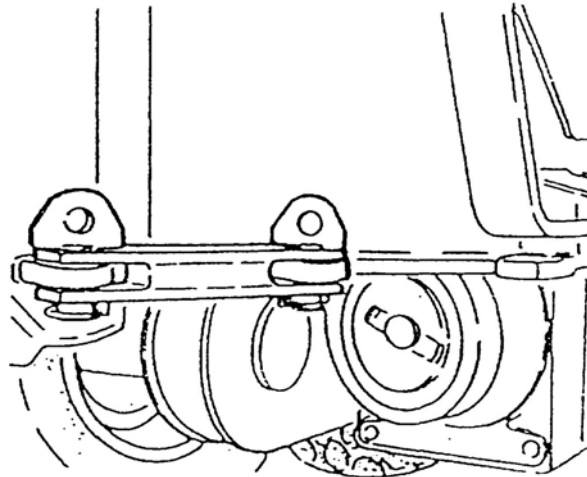


Fig.28

5. Extinguish the engine. Do not ignore this item except that the maintenance and check work are not done without running the engine.
6. If a working equipments must stay raised. Support it firmly
7. Fix a raised materials upon the grader corretly.
8. Never turn the joints of the hydraulic system when it is under Load.
9. Keep the mudguards clean from hurting.
10. After maintenance work replace all fastenings (cotter pins circlips etc)
11. Engine hood is made of glass fibre reinforce plastic (also called glass steel)and dumping backward. In all cases forbid climb.

8.2 Lubrication chart (Fig. 30)

8.2.1 Instructions for lubrication

- a. Service and maintenance works would be carried out carefully and than clean the machine.

Oil change is only to be carried with the engine at working temperatures.

All oil change should be carried out at the correct intervals at least once a year.

- b. Clean all grease nipples before greasing.

Fill up with grease untii fresh grease emerges.

c. Clean all oil nipple and draining plugs (and their surroundings) before doing oil change.

Use a fine mesh for filling oil.

Clean sealing surface.

8.2.2 Description of the lubrication chart

1. During the first 200 operation hours the engine oil level should be checked twice a day (10h a day).

2. When greasing driving shafts, only low pressure should be applied. Avoid hard pushing and too much lubrication.

3. In dusty working conditions all cooling fins on oil coolers and water tank often should be cleaned more than times stipulated in the lubrication chart.

8.2.3 First oil and filter changes and maintenance works

See operating hours below:

| Operating hours | Work to done |
|------------------------|--|
| After 50h | Change engine oil Change oil filter cartridge of the engine Tighten bolts on oil tank of the engine Tighten fixing clip of intake and exhaust manifold on cylinder head Tighten loose parts on the engine Check valve clearance. Adjust it if necessary |
| 100h 1st inspection | Change oil in torque converter-transmission Change oil in the rear axle Change oil tandem-box Change oil in worm gear of the circle Change filter cartridge in the transmission Clean oil filter mesh in the transmission Change filter cartridge of hydraulic returning oil |
| 500h | Change oil in hydraulic tank |

8.2.4 Lubricating oils and greases

The details of lubricating oil and grease are attached in the last section of the instruction.

The details of lubricating oil and grease see following below.

| Groupe | Lubricant |
|--|---|
| Grease nipples and other greasing places | Lithium based grease No.2 |
| Engine | GF-4/SG 15W-40 |
| Torque converter and transmission | Mobil Delvac super 1300 15W/40 |
| Rear axle tandem drive and worm gearbox | Gear oil SAE90,MIL-L2105A or APIGL3/GL4/GL5 |
| Working-hydraulic and steering system | Hydraulic oil of N32 resisting-worn Frigidzone, hydraulic oil of N32 resisting-worn |

8.2.5 Table of capacities

Note: The indicated capacities are approximate capacities.

Competent are the marks on the dipstick, the sight glasses or the control opening.

| Unite resp. group | Approx capacity | Oil resp. fule |
|---|-----------------|---|
| Fuel tank | 220L | Diesel fuel GB252-87 Winter season: No.0 to-35 Summer season:No.0 or 10 |
| Hydraulic system First:filing oil change | 80L 60L | Hydraulic oil of N32 resisting-worn Frigidzone, hydraulic oil of N32 resisting-worn |
| Engine change oil with filter | 22.4L | GF-4/SG 15W-40 |
| Torque converter and transmission first filling oil chang | 26L 21L | Mobil Delvac super 1300 15W/40 |
| Rear axle | 28L | SAE90, MIL-L2105A or API GL3/GL4/GL5 |
| Tandem drive | 23L(each side) | SAE90, MIL-L2105A or API GL3/GL4/GL5 |
| Worm gearbox | 2.5L | SAE90, MIL-L2105A or API GL3/GL4/GL5 |

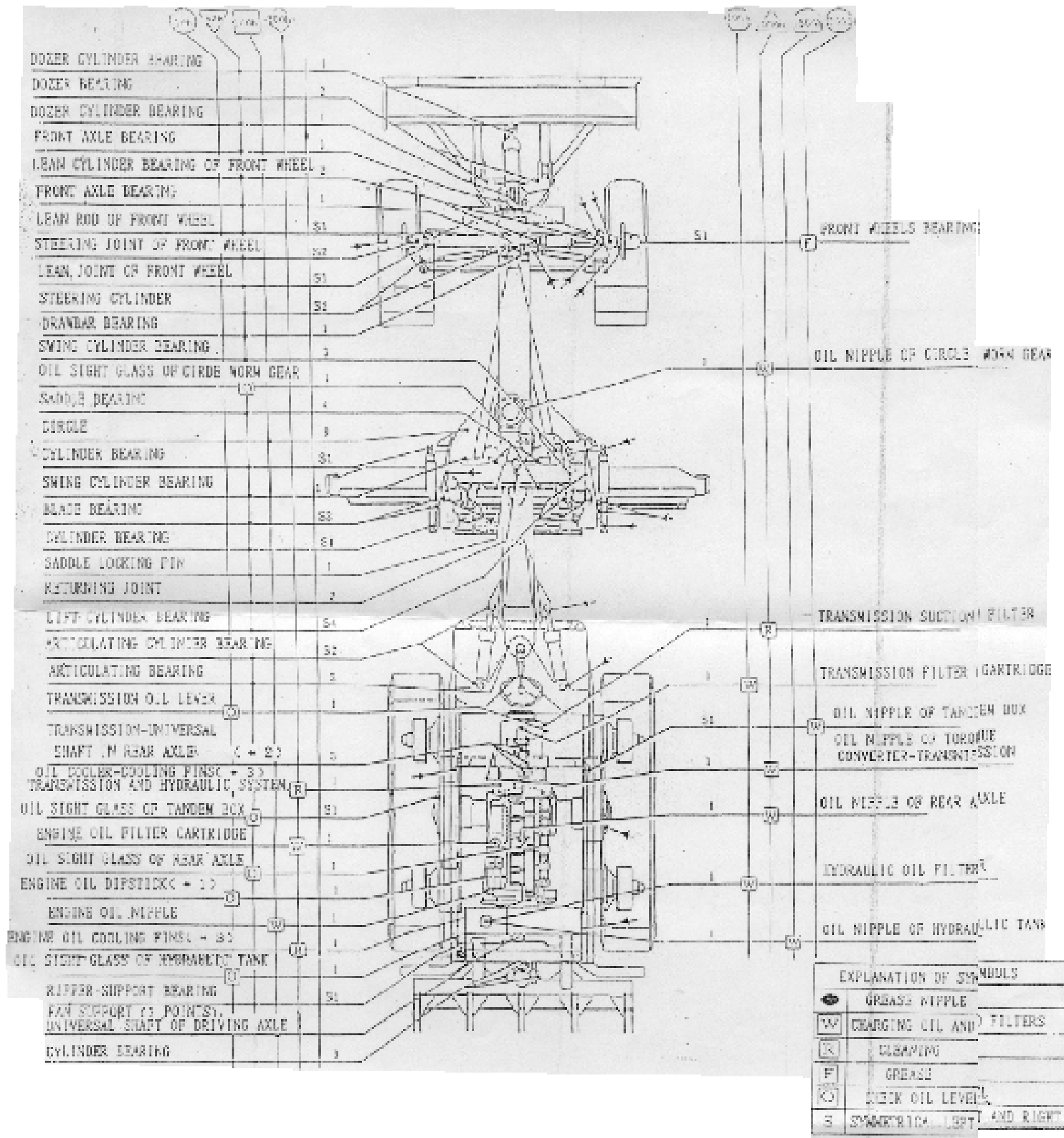


Fig.30 lubrication chart

8.3 Check oil level, change the oil and filter

See description of lubrication chart, item 8.2 and 8.3 for maintenance intervals.

8.3.1 Engine

Note: Two engine oil filters are accessible when the left engine hood is opened. Filter inlet and engine oil dipstick in point 3 are accessible when the right engine hood is opened (one is in the oil bottom and others are injection oil pump and governer).

a. Check engine oil level

Note: During the running-in period (first 200 operating hours) usually engine oil is worn too high, the oil level should e checked twice a day. After that period. Check once a day. The checking should be made when the grader is in horizontal position.

Pull out dipstick, wipe it with a nonfraying rag. Push it in as far as it will go and than pull out dipstick. At this moment. The oil level should extend to the mark between the upper and lower.

b. Changing the engine oil

Remark: Change oil while in hot state, avoid danger of scalding when draining off the hot oil.

Old oil is put into a suitable container.

Refillting with fresh engine oil up to the upper mark.

Oil changing periods

| Oil quality | Oil change intervals (According to service hours) |
|----------------|---|
| CF-4/SG 15W/40 | 200 |

Avoid mixing of different oils.

8.3.2 Transmission

Refer to the item b.1.2 Torque Converter-Transmission(GWG200)

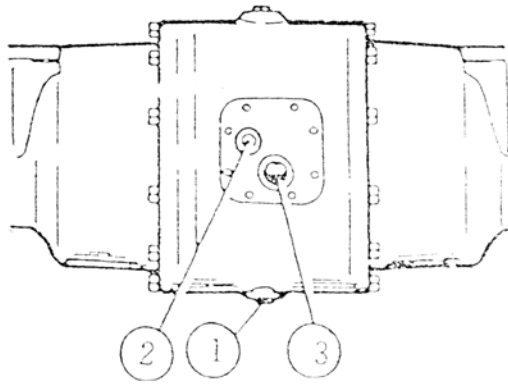


Fig.31

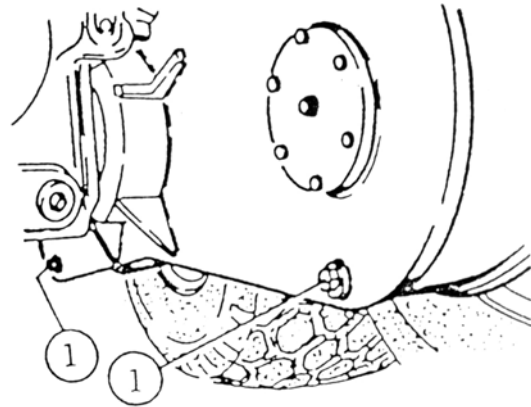


Fig.32

8.3.3 Rear axle

a. Note: Check oil level and change the oil according to lubrication chart (8.2)

1. Remove drain plug (Fig.31/1) and drain oil into a container. To assist draining, Unscrew the opening (Fig. 32/2). Close it only if oil is drained off.

2. Clean drain plug (Fig.31/1) and use a new sealing ring. Refit and retighten.

3. Fill up fresh oil at the filter opening (Fig.31/2) of axles until the middle of the sight glass (Fig. 31/3) is reached.

4. Refit screw plug and tighten. Capacity; approx 28L oil level is in the middle of the sight glass.

b. Checking oil level

1. Oil level must be in the middle of the sight glass (Fig. 31/3)

2. Fill up as required at. Filter opening (Fig. 31/2)

8.3.4 Tandem box

a. Oil changing

1. Unscrew the plug (Fig. 32/1) (2 plugs on each tandem box) and drain oil into a container. Close it only if oil is drained off.

2. Clean plugs (Fig.32/1) renew seating ring screw in and tighten the plugs.

3. Unscrew the breather (Fig. 32-1) and fill with new oil to the middle of the sight glass maximum oil level.

4. Screw in the breather (Fig. 32-1) and tighten it .

Capacity about 23L each tandem.

Oil level is in the middle of the sight glass.

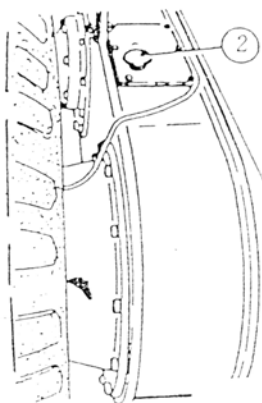


Fig. 32-1

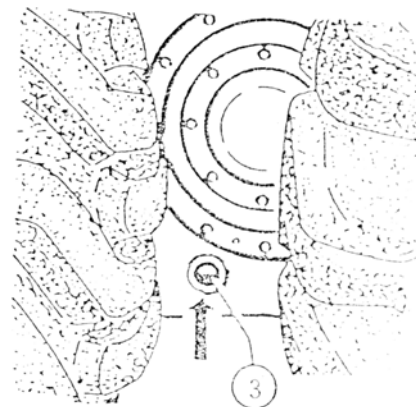


Fig. 33

b. Check the oil level

1. The oil level must be in the middle of the sight glass (Fig. 33/3) I.e,max oil level.

2. Fill up oil after taking off the breather (Fig.32-1)

8.3.5 Worm-gearbox of rotating blade

Note: Check oil level and change the oil according to the lubrication chart (item 8.2).

a. Change the oil

1. For better oil draining swing the grader blade. It is inclined towards the oil drain plug (Fig. 34/1) and put the blade on the ground.

2. Remove draining plug (Fig.34/1) and drain oil into a container, Remove the plug (Fig 34/2) for better draining of the oil. Close drain plug only when oil has completely drained.

3. Clean drain plug, use a new sealing ring and tighten.

4. Place blade exactly horizontal with the lift cylinder.

5. Refill with new oil through the filling hole (Fig 34/2) until the oil reaches the middle of sight glass (Fig. 34/3).

6. Clean the plug (Fig 34/2) use a new sealing ring and tighten.

Capacity approx 25L in the middle of the sight glass.

b. Check oil level

1. Worm gear of blade rotating should be horizontal.

2. The oil level must be in the middle (oil level max.) of the sight glass (Fig 34/3).

3. If necessary fill up oil by the opening (Fig. 34/2)

8.3.6 Hydraulic operating and steering system

Note: The hydraulic tank is in the left part of engine covering .Check oil level and change the oil filter according to lubrication chart (item 8.2)

a. Bleeding air of the tank

Note: Before opening the tank (filling cover or tank valve) air must be bled in the tank.

1. Loose fastenings and remove the cover.

2. Remove rubber cap from the bleed valve (Fig 35/1)

3. Unscrew the bleed valve approx 1/2 turn.

4. When no more air escapes screw the bleed valve and replace the rubber cap.

b. Changing hydraulic oil

Note: Change oil after use prescribed operating hours (item 8.2) In two special conditions. The oil must be changed whenever the oil has become so contaminated that a drop specimen placed on a piece of filter or blotting paper leaves a sharply dark spot after a few hours.

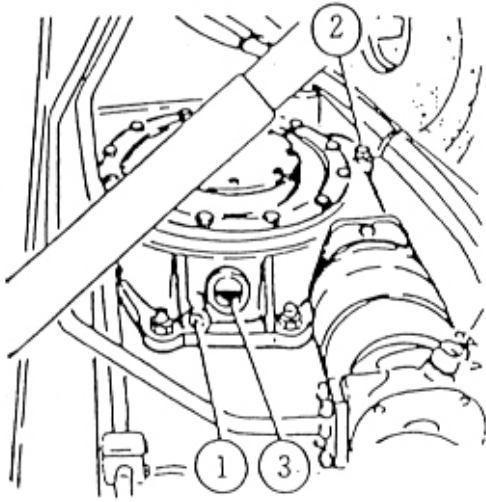


Fig.34

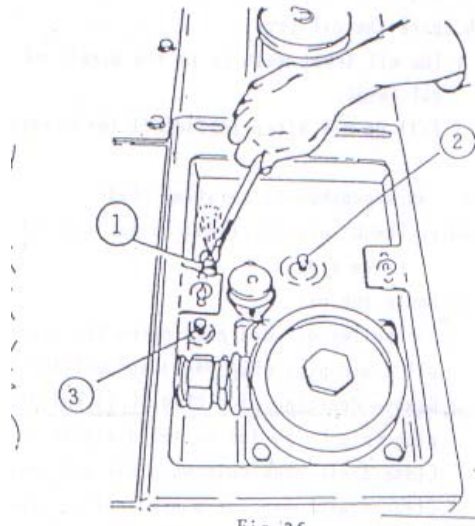


Fig.35

1. Set the blade on the ground. Lift dozer blade to stop.
 2. Stop engine and lower dozer blade to the ground by operating the control level.
 3. Bleed the tand (Fig.35)
 4. Loosen the nut (Fig 36/2) on the bottom side of the tank by a few turns and let oil drain into a container. Screw the nut if oil is drained off.
Remark: Place hose over the nut (Fig 36/2) to control the oil draining.
 5. Fasten the nut (Fig 36/2)
 6. Open the filter cover (Fig 37/3) and fill with prescribed hydraulic oil up to the middle of the sight glass (Fig 38/4)
 7. Refit the filter cover (Fig .37/3) and shut the bleeding valve (Fig. 35/1)
 8. Start engine and operate controlling level of all working implements several times from stop to stop. This is necessary to fill up oil and bleed air in the hydraulic system.
 9. Set the working implements on the ground. Stop engine and bleed air from hydraulic tank.
 10. Fill up oil to the middle of the sight glass If necessary, at the filter opening (Fig 38/4)
- Note: Pay attention to proper sealing of the filter opening Use new sealing ring if necessary.
- Screw in filter cover (Fig 38/3) carefully in order to avoid damage of the fine thread.
- Capacity: approx 80L at the sight glass.

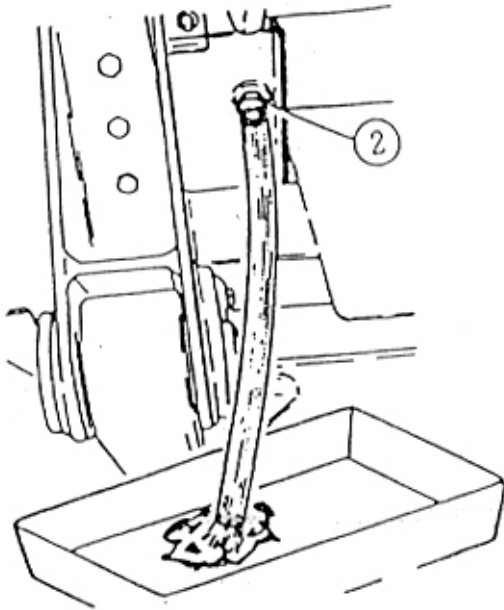


Fig.36

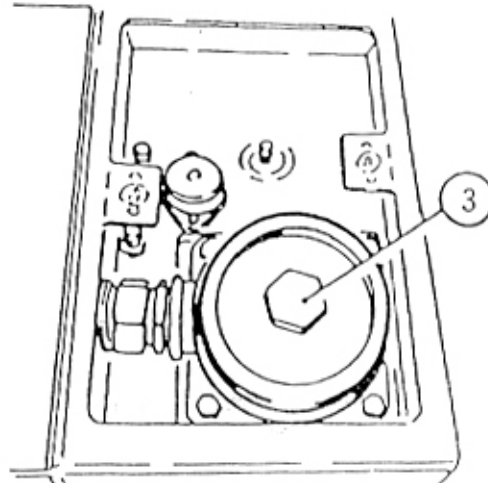


Fig.37

c. Checking oil level

1. The oil level must be in the middle of the sight glass (Fig 38/4) with the engine stopped and working implements on the ground.

2. If necessary fill up prescribed hydraulic oil.

Note: At loss of oil check for leaks and seal.

d. Repair or renew operating pump and steering pump

1. Take off rubber cap on exhausting valve (Fig 35/2 or 35/3)

2. Loose exhausting valve approx. 1/2 turn.

3. After repairing. Close the exhausting valve reassembly the rubber cap.

e. Change the hydraulic filter cartridge of return flow.

1. Loosen fastenings and take off the cover plate.

2. Bleed air from the tank.

3. Unscrew filter cover.

4. Remove complete filter cartridge (Fig 39/2) and pressure cap (Fig 39/3)

5. Pull out the split pin (Fig 40/4) and unscrew the castl nut (Fig. 40/5)

Remove spring support (Fig 40/6) pressure spring (Fig 40/7) and filter cartridge (Fig 40/8) from the filter holder (Fig 40/9)

6. Clean magnet (Fig 40/10) and cartridge holder (Fig 40/9)

7. Reassemble with a new filter cartridge in reverse.

Note: When reassembling use a new split pin (Fig 40/4) Renew seal ring of filter holder. If necessary. When securing the new filter cariridge. Make sure that it sits flat against the filter holder .When replacing the complete filter into the tank. Care must be taken that the seat Screw in filter cover (Fig 39/1) carefully.

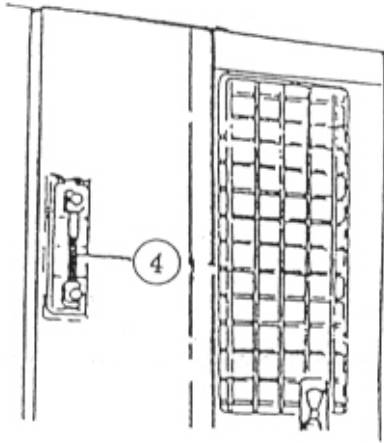


Fig.38

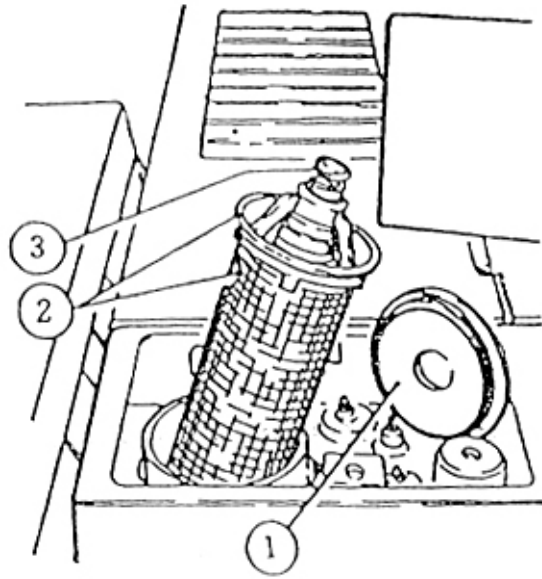


Fig.39

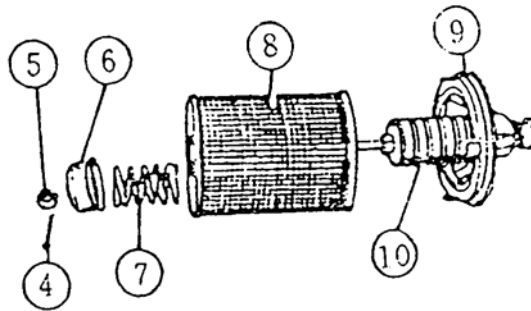


Fig. 40

8.4 Maintenance schedule

Maintenance to be carried out according to the prescribed intervals.

| Operating hours | Maintenance |
|--|---|
| Daily(10 operating hours) | <p>Engine:</p> <ol style="list-style-type: none"> 1. Check lubricating face of the oil-bath, governor and injecting oil pump. If the oil level is not enough, fill up to the prescribed values. 2. Check the capacity for cooling water. 3. Secure bolts of the diesel engine and attachments tightly. 4. When the temperature is below 5⁰C, drain the cooling water off (without resising frseeze oil) after parking. 5. Keep diesel engine cleaning washing it if necessary. 6. Eliminate all breake-down occurred and unusual conditions. |
| | <p>Hydraulic system: Check seals for leaks (visual inspection).</p> |
| | <p>Electrical system Check connections and cable (visual inspection).</p> |
| | <p>Wheels and tyres: Check air pressure in the tyres fitted into item 8.10.2 Check tyres for damage removing foreign bodies.</p> |
| | <p>Brake system: Check function of the foot brake.</p> |
| | <p>Steering system: Check funtion of the steering system.</p> |
| | Weely (50 operating hours) |
| <p>Electrical equipment. Check electrolyte level in the battery</p> | |
| <p>Wheels and tyres Check air pressure in the tyres check wheel nuts Tighten it if necessary. (tightening torque 450 Nm)</p> | |

| | |
|---|--|
| <p>The first 100 Operating hours (Ist inspection)</p> | <p>Engine:</p> <ol style="list-style-type: none"> 1.Drain out oil in the oil filter and diesel fuel in diesel fuel filter and clean their cartridges. 2.Maintenance the air filter, clean the dirt in cartridge and in dust container. 3.Check V-belt tension. 4.Clean outside on the engine and fins of the oil coolers and water tank. 5.Check air intake and exhaust manifolds Check connections for tightness. Clean air ducting of intake and exhaust manifolds if necessary. 6.Check the engine in idle speed and adjust it. After main tenance. Reassembly it in a correclty place Then starting the engine. Check it with running Remove troubles and unusual conditions existed (Following maintenances in every class should be done). |
| | <p>Brake svstem: Check hand brake adjust if necessary</p> |
| | <p>Hydraulic working and steering system. Check tank pumps ovlinders pipes hoses and conne tions for tightness (visual inspection) Check service pressure.</p> |
| | <p>Steering system: Check fasteners for tightness included slot nut of steering rod Tighten if necessary Check service pressure.</p> |
| | <p>Working implement. Check play of hlade guide</p> |
| | <p>Wheels and typres Tighten wheel nuts (tightening torque 450 Nm)</p> |
| | <p>Tandem box: Check chain tension tighten if necessary</p> |

| | |
|------------------------------------|--|
| After every 250 Operating hours | <p>Engine: Also following works should be made. Except finished all maintenance after 100 operating hours.</p> <ol style="list-style-type: none"> 1.Change engine oil. 2.Adjust valve clearance. 3.Check injecting pressure of oil injector and injection. Clean and adjust it .if necessary. 4.Check advanced angle of feeding oil Adjust if necessary 5.Change fuel cartridge. 6.Clean fuel tank, pump, cartridge and pipes. 7.Blow the dust in the generator with compress air and check properly, clean if necessary. |
| | <p>Hydraulic working and steering system: Check tank, pump cylinder, pipes, hoses and connectors for leak (visual inspection).</p> |
| | <p>Steering system: Check fastener of the steering system for tightness, Included slot nut of steering rod tighten if necessary.</p> |
| | <p>Brake system Check hand brake, adjust if necessary Change damaged disc.</p> |
| | <p>Working implement: Check play of blade guide and oircle gear, adjust if necessary</p> |
| | <p>Engine: Make maintenance prescribed above.</p> |
| After every 500 Operating hours | <p>Brake system: Check linings of wheel brake.</p> |
| | <p>Torque conver-transmission: Check chain tension tighten if necessary</p> |
| | <p>Universal shaft: Check universal shaft from gearbox-rear axle and fan Check universal shaft clearance for excessive play.</p> |
| | |

| | |
|---|--|
| <p>After 1000 Operating hours Before cold season begins</p> | <p>Engine: Make maintenances prescribed above.</p> |
| | <p>When the temperature is below 5⁰C, the maintenance should be made specialy. 1.Must use engine oil and fuel oil in winter and pay specially attention to the capacity of water in fuel to avoid oil pipes blocked up. 2.Fill up resisting freeze oil in cooling system, other vise, drain the cooling water while the temperature is down to 40-50⁰C after stopping the grader. 3.Graders shouldn't be parked in the open air in cold season and areas. Other-vise. While starting warm-up the cooling water for pre-heating the body, using air heater for engine oil If these works are done well, usually, the engine could started at -20⁰C.</p> |
| <p>After every 2000 Operating hours</p> | <p>Engine: Make maintenances prescribed above.</p> <p>Front axle: Change the rim grease adjust the bearing clearance in front wheels. Rear axle Check axial clearance of main driving pinion Readjust if the clearance is more than 0.06mm</p> |
| <p>After every 3000 Operating hours</p> | <p>Engine: Apart form finished maintenances prescribed above. This items should be done as follow. 1.Clean the cooling system. 2.Clean engine oil cooler. 3.Check inner seals of the water pump fill up fresh grease. 4.Remove and check the engine and starter. Clean maintenance and fill up new grease. 5.Remove cylinder cover repair and grind valve. If necessary 6.Adjust injecting fuel pump, if necessary. 7.Check oil capacity of engine oil pump, if necessary 8.Change air filter cartridge. 9.Check rear axle axial clearance of the driving pinion, readjust if the clearance is more than 0.05mm.</p> |

8.5 Engine

8.5.1 Air filter of the engine (Fig. 41)

Note: Open the left hood of the engine to touch air filter and resistance radiator of air intake is mounted on air filter. When the window of the radiator turns from yellow to red and at the same time, blue arrow shows 7.5kpa at vacuum That is, the air filter will be dusted and maintained immediately. After maintenance, press on the radiator to make radiating mark return.

Necessary tools for maintenance:

For dry-type air filter. Wrench sizes from 13mm to 24mm. Compressed air gun with pipe. Cleaning rags, hand lamp.

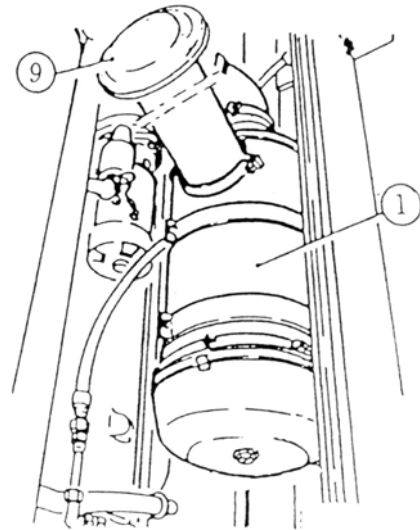


Fig.41

Components of dry-type air filter(Fig 42)

| | | | |
|-------------------------|-----|----------------|-----|
| Filter housing | (1) | Medium support | (4) |
| Main filter cartridge | (2) | Dust collector | (5) |
| Safely filter cartridge | (3) | Fastening bolt | (6) |

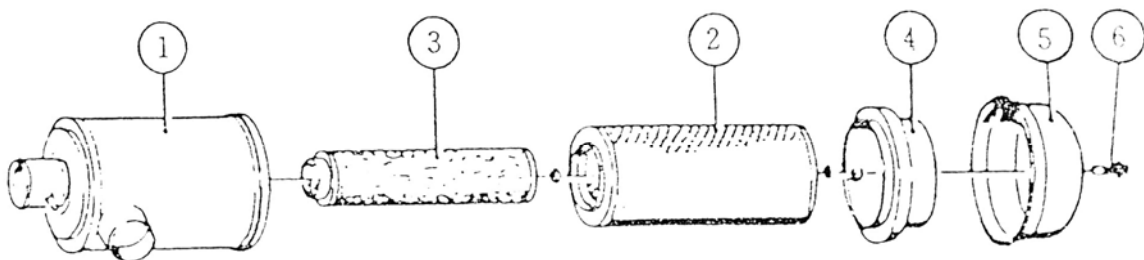


Fig.42

a. Cap(9)

The cap is mounted on left suction tube behind the cab.

1. The grid on the side of the cap must be kept from leaves, paper and similar objects.

b. Dust container (Fig.43)

The dust container (5) should never be allowed to be more than 2/3 full of dust, Therefore, the dust container should be cleaned, if necessary, every day, depending on the amount of dust.

1. Remove fastening bolts(6) and dust container(5) from the filter housing (1).
2. Remove lock washer(8), medium support(4) from dust container(5) and clean.
3. Clean container, medium support and fastening bolt.
4. When reassembling of container and medium support. Pay attention to fixing, then insert fastening bolt into the container and fix medium support by means of the lock washer.
5. Check main filter cartridge (2) for tight seat.
6. Reinstall the assembled dust container.

Fig.43

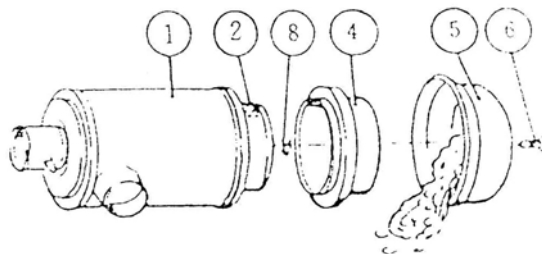


图 43

c. Clean and replace main filter cartridge (Fig 44)

Note: Air filter indicator light, engine off. Clean and renew main filter cartridge(2).

1. Remove dust container.
2. Loosen hex, nut and remove main filter cartridge (2) from filter housing.
3. Clean and replace new cartridge.

Note: Renew filter cartridge if it is defective. After cleanings for 5 times or 2 years, replace filter cartridge.

4. Clean filter housing with a damp rag (The filter housing must not be blown).

As well as the sealing surfaces of housing and safety cartridge.

5. Insert the cleaned or new filter cartridge so that it is tightly fixed on the bottom of filter housing and tighten hex, nut.

6. Replace dust container.

d. Replace safety filter cartridge (Fig 45)

Attention: Replace safety filter cartridge (3) after 5 maintenance operations. During maintenance of the main filter cartridge. If it becomes defective or if the maintenance indicator lights after maintenance operation. The safety cartridge (3) must also be replaced.

1. Remove dust container and main filter cartridge.
2. Loosen fastening nut and take out safety cartridge.
3. Clean the inside of the filter housing with wet clothes.

Attention: Avoid that any dirt gets into the suction tube of the engine.

4. Put the new safety cartridge (3), into the housing, pay attention that it is correctly sealed at the housing bottom, tighten hex nut.

5. Install the main filter cartridge and the dust container.

e. Clean the main filter cartridge (Fig. 46 Fig.47)

Attention: All main filter cartridges should not be cleaned by washing.

Pay attention to manufacturer's label. If cleaning by washing is allowed, pay attention to the directions of the manufacturer concerning the cleaning agents. Dry-cleaning by blowing with compressed air.

Note: Max. air pressure 5 bar.

For doing, this a tube should be attached to the compressed air piston, the end of which should have a bend of approx 90° . The tube should be long enough to reach to the bottom of the cartridge.

First blow the cartridge from outside to Cartridge surface. Then blow from the inside Until no more dust falls out.

f. Check main filter cartridge for damage.

1. Check the cleaned cartridge for crack and holes in the paper element-using a hand lamp from inside and the metal case for bumps.

2. Check seal

If the cartridge shows any sign of damage, renew it at once.

g. Check air duct (hoses and pipes) between air filter and engine for holes breaks.

Attention: Renew defective parts.

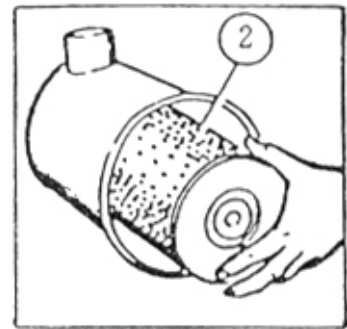


Fig.44

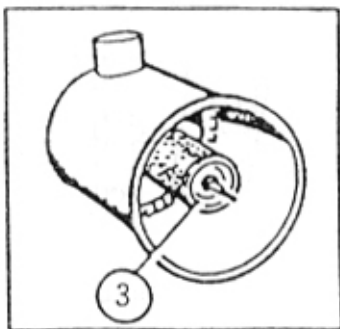


Fig.45

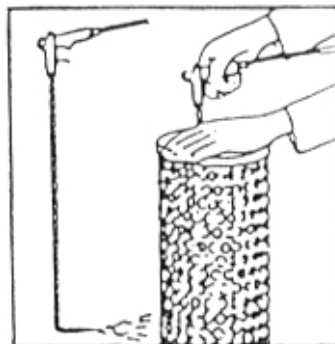


Fig.46



Fig.47

8.5.2 Fuel system

Attention: When working on fuel system, do not smoke or use open fire.

Do not spill fuel.

8.5.2.1 fuel and fuel tank

a. Fuel

The following fuel specifications are approved:

Diesel oil GB252-87 Winter-grade:0 to -35 Summer-grade:0 or 10

b. Fuel tank

The fuel tank is fitted the right side of the rear engine covering.

1. Fuel dipstick

The level of fuel is checked with dipstick in the filter socker (Fig 48/1)

2. Filling up the fuel tank

①When filling up the tank, don't allow to smoke and open fire. The engine would be stopped.

②The tank should always be filled completely in order to avoid the condensation of water.

③To fill up the tank, open the cap (Fig.48/2) and make sure that the screen(Fig.48/3) is in the filling oil hole.

④After filling up, close cap. Keep tank always closed in order to avoid contamination of the fuel.

3. Cleaning the fuel tank

①The tank cap (Fig.48/2) and the screen (Fig.48/3) should be thoroughly cleaned with kerosene from time to time.

②Unscrew the screw cap on the bottom side of the tank for some turns and drain off some litres of fuel into a container, retighten the screw cap. Pay attention to normal seal.

Note: Cleaning should be done with the tank only partly full (approx 1/4). Before cleaning the tank, the grader would remain stationary for some time to collect the contamination settled in the tank bottom.

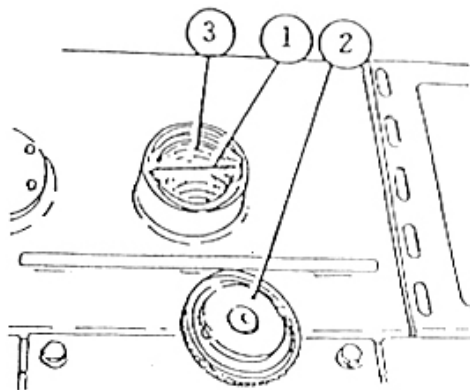


Fig.48

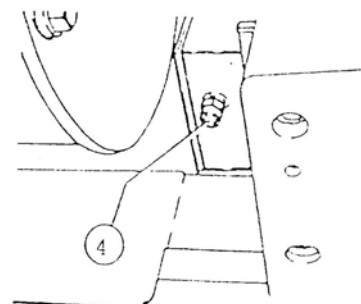


图 49

Fig.49

8.6 Brake system

8.6.1 Pincer-disc brake

a. Brake

Pincer-disc brakes are used on the graders. All of them are mounted on four rear wheels. Among them, four brakes are used for two front wheels and two brakes for two rear wheels, Diameter of the brake disc is \varnothing 450mm. There are many advantages in the brake such as hydraulic braking, stable, safe and responsible performances good radiating-heat, simple structure, convenient maintenance and character of resist-water-fail.

b. Structure principle

The brake is the type of fixed clamp. The brake disc is combined with the wheel hub, turning with the wheels. By the transition-plate, the clamp is fixed on shaft-connected plate (see attached Fig). When braking, hydraulic oil is entered into each piston cylinder to make the piston I push the friction disc 2 and press brake disc 3 so as to produce braking torque. After releasing hake, by elastic action of rectangular gasket, the piston is returned its orginal position. After friction discs were worn, the tolerance increase between friction discs and braking plate. Movement of the piston produce bigger deformation than rectangular gasket. Between the piston and rectangular gasket, it will produce opposite movement to compensate the rear of friction discs. On friction discs, there are three longitudinal slots which are the marks of friction. Before the rear of fricition discs reaches the bottom of the slot, replaced by new one Loose locking screw 5, get the pin 6 out and remove friction discs to replace.

Otherwise, if the chains in tandem box are loosened, adjust and the brake must be accordant with adjusting to make the brake assembled in the positions (point 3 and 9) that is put exhaust vent up.

c. Disassembly (see attached pages)

① Remove exhaust vent assembly 7, and turn two locking screw 5 off on one and of the clamps. Turn the screw M10 to get the pin 6 out and remove friction disc assembly 2.

② Remove another end of locking screw 5 to get the other pin out.

③ Remember the positions of top and bottom caps. Screw the bolt 8 of cylinder cap off and get cylinder cap 9 off. Remove O-ring 10 from cylinder cap.

④ Push oil piston I out from the hole outside the clamp. Inside the hole remove rectangular gasket 4 and dust-proof ring 11.

d. Inspection

① Inspect friction discs of the assembly for rearing. Replace if the rear limit which is mentioned above has been reached.

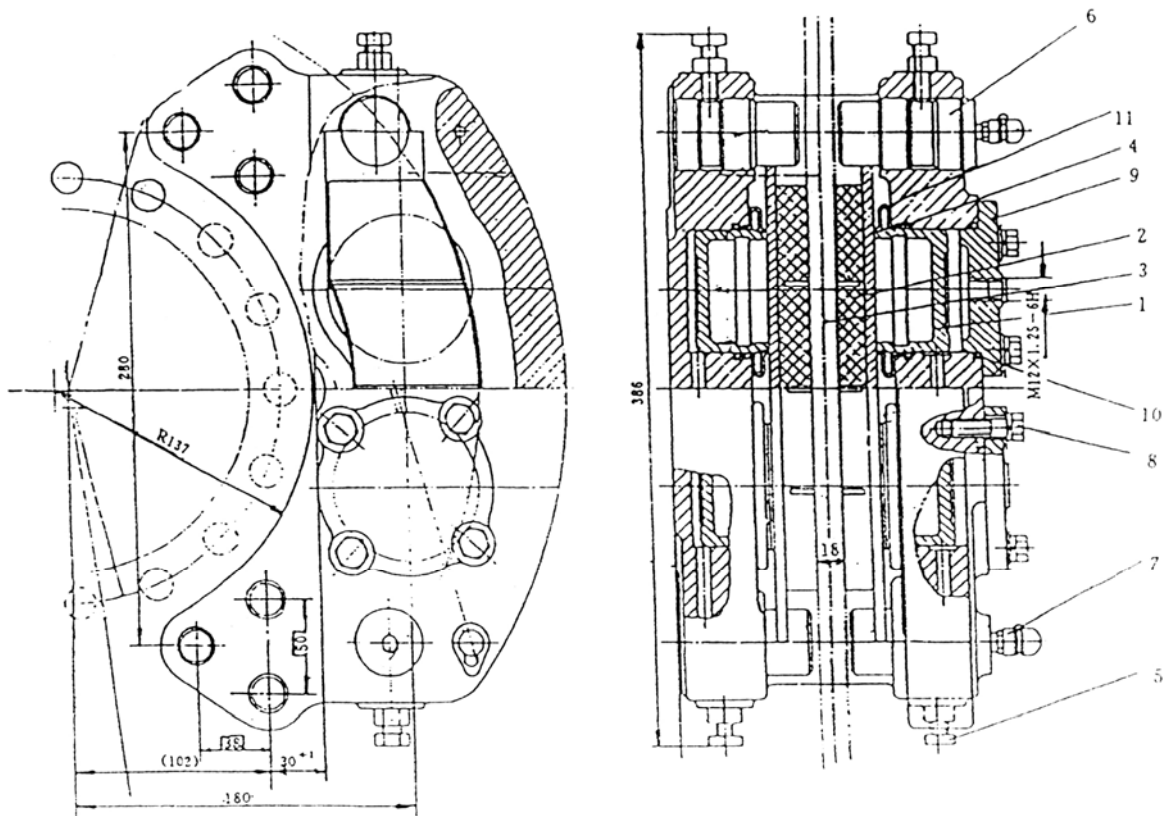
② Replace if there is any damage on oil seal and dust-proof ring.

③ Clean the clamp (use mineral oil).

④ Inspect the piston hole for scratches and corrosions. Replace the clamp if there is any heavy damage.

⑤ Inspect the piston for scratches and corrosions. Replace if there is any heavy damage

⑥ Replace if the pin is so worn that it can't guide for friction discs.



Attached Fig Pincer-disc brake

1. Piston 2. Friction disc assembly 3. Braking plate 4. Rectangular gasket
 5. Locking screw 6. Pin 7. Exhaust vent 8. Bolt of cylinder cap
 9. Cylinder cap 10. O-ring 11. Dust-proof ring

e. Assembly.

① When assembling all of the parts will be cleaned and forbid to use braking liquid.

② Screwing torque for cylinder cap is 60Nm.

f. Inspection of braking performance

Braking performance is relative to safe running and efficiency. After repairing, inspect braking performances for good conditions. Braking distance is considered as constant braking distance is $S \leq 13.2\text{km/h}$.

g. Maintenance

Cleaning brake is the key for maintaining

Replace if there is any aged rubber parts.

8.6.2 Bleeding air of the hydraulic brake system.

Note: the air in hydraulic system must be bled after changing oil in the hydraulic tank, loosening or repairing pipes.

While the engine is running and the hydraulic tank was filled up and bled as prescribed to bleed air in brake system. The bleeding has to be done by 2 persons on all bleed valves of the wheel brakes.

1. Loosen the bleed bolt (Fig 50/7) and press down the brake pedal.

As soon as oil spills out from bleed bolt, tight the bleed bolt and release the pedal.

Note: Oil spilling from bleed bolt is only for a moment, so it must be properly fitted for bleeding air.

2. Now bleeding air on other wheel brake cylinders as prescribed.

8.6.3 Hand brake

Note: The hand brake is adjusted by pulling the level upward to the 4th notch, the full braking effect is reached (Fig.51) If the level can be pulled up with normal force over the 6th notch of the detent, the hand brake must be readjusted.

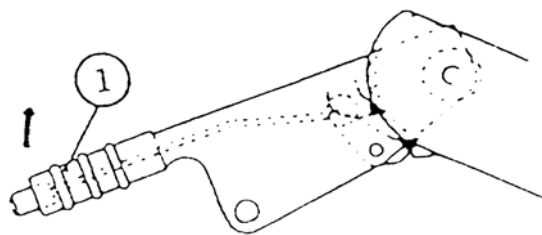


Fig.51

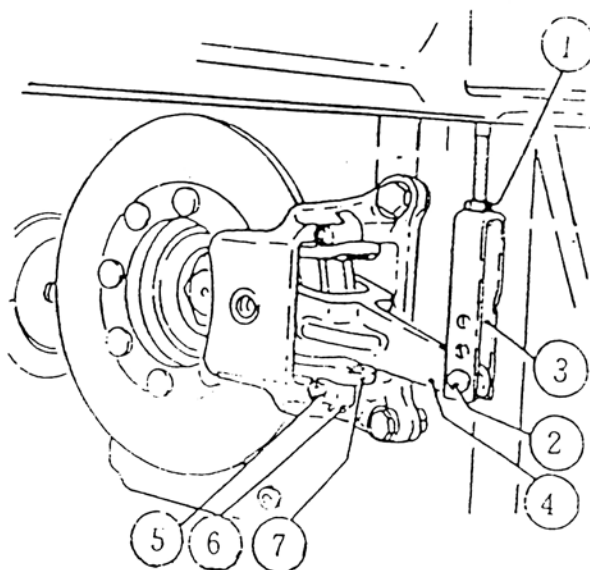


Fig.52

a. Adjusting of the hand brake

1. Loosen lock nut (Fig.52/1) for some turns.
2. Remove pin (Fig 52/2)
3. Loosen the forked piece from brake lever (4) and screw it on some turns (Fig 52/3)
4. Put forked piece (3) on brake lever (4) install pin (2) and tighten lock nut (1) (Fig 52/4)

b. Replacing the hand-brake linings (clark transmission)

Note: The lining of the handbrake must be replaced before the brake level (4) touches the upper lining support when applying the hand brake. This is very important. Because the lever is stopped before brake force is not achieved.

1. Loosen screw (Fig 52/5) and remove locking plate (6).
2. Pull out lining support (7) along the direction of brake level (4) to loosen brake level until the brake linings fall out.

3. Renew brake linings-the linings are mounted along the direction of brake disc. Push in lining support and fastened with locking plate. Screw must be tightened with adhesive.

Torque 23-25 Nm (2.3-2.5kgm).

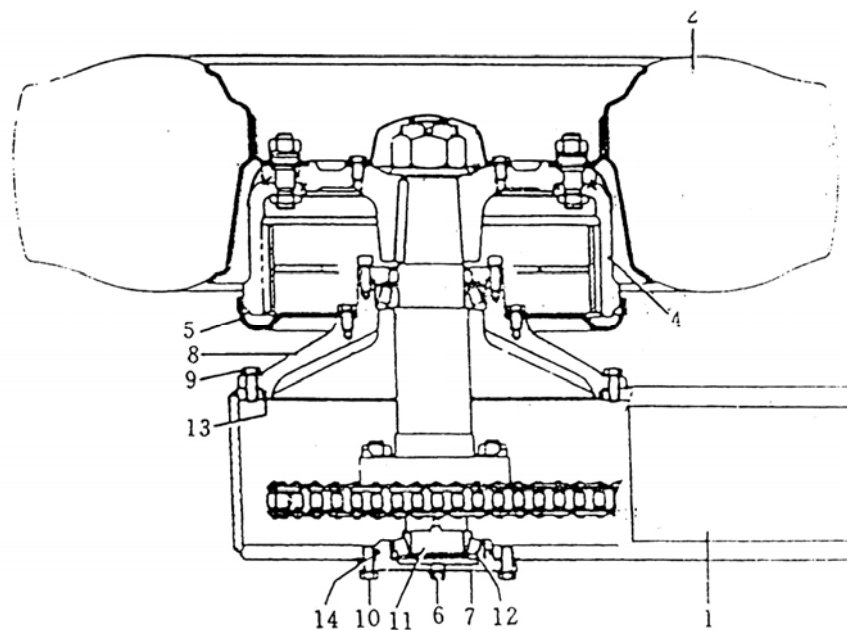


Fig. 53

8.7 Adjust the chain of tandem box (Fig. 53)

Notice: There are two chains in tandem box. Always check two chains together.

8.7.1 Inspect tension of the chains.

1. Disassemble two cup plates (1) on the tandem box.
2. Support the tandem box to make the wheels leave ground.
3. When the chains are in tension, they are lengthened. If the chains collide with tandem box, the chains will be retightened.

The tension of the chains are adjusted by turning bias bearing cap.

The tension of the chains are adjusted by special technician.

a. Retighten the chains.

1. Support tandem box to make the wheels leave ground and drain off oil.
2. Disassembling the wheels (2) and brake hub (4).
3. By special tools, loosen brake pipe, dismount brake plate (5).
4. Dismount the screw plug (6), change the bolt (10) in original position and take two turns in screw hole of chain wheel shaft (11).
5. Disassemble the bolt (9) on connecting plate (8) of the shaft and the bolts (10) on the cap (7).
6. Turn connecting plate (8) and the cap (7) with the same hole pitches in the same direction till the chains are tightened.

Note: The marks "o" on the (4) and (7) are aligned oppositely.

Notice: When turning connecting plate (8) of the shaft and the cap (7), take care to prevent o-rings (13), (14) from damaging.

7. Reassemble (7) and (8) by the hex. Bolts (9) and (10). Tighten the bolts face to face in intersection.
8. Disassemble bolts on the cap (7) and the screw (8) is changed.
9. Mount brake plate, connecting brake pipe.
10. Assemble brake hub and the wheels.
11. Charging oil for tandem box and reassemble cap plate (1).
12. Adjust brake system and drain off air to use.

8.8 Lubrication and adjustment for front wheel bearings (Fig.54)

Note: The maintenance of the front wheel bearings would be carried out only by the trained person.

Grease quantity: approx 280g per wheel.

Grease quality: lithium saponified grease No. 2.

1. support the front axle and remove front wheels.
2. Check the play of wheel hub (Fig. 54/1)
3. Unscrew hex. Bolt (2) and socket head bolts (3).
4. Remove cover (2). Fig 54/4
5. Count the numbers of the shims (4).
6. Pull off the hub (1) with extracting tool.

Clean hub. Axle bearing and cover. Renew sealing ring and bearing on the cover if they are damaged.

7. Filling new grease.

8. Mount wheel hub.

9. Check play of the bearing and take out a shim (5), if necessary.

10. Replace cover (4), screw in fastening screws and tighten with prescribed torque.

Socket head screw (3)=78Nm: Hex.screw(2)=250 Nm

Tighten socket head screws crosswise.

11. The hub (1) should be turned easily and without jacking. When checking, the hub should not have a vibrating play.

8.9 Working implement-blade

Note: If the play of the grader blade is too big the wear strips and the guide bushings must be exchanged. Always exchange bushings and strips in pairs. High wear can be reduced if roughness on the guide rails is removed in time. A file can be used.

8.9.1 Replace guide bushing(Fig 55)

1. Place blade on two pieces of wood.
2. Remove holder (Fig 55/2)
3. Disassemble the blade by sliding and guide bushing (Fig55/1)
4. Install new bushing. Fasten holders.

8.9.2 Replace guide plate (Fig 56)

1. Place blade on two pieces of wood.
2. Unscrew fastening bolts (1)
3. Remove guide plate (fig56/2)
4. Put in new guide plate and fasten with locking bolts.

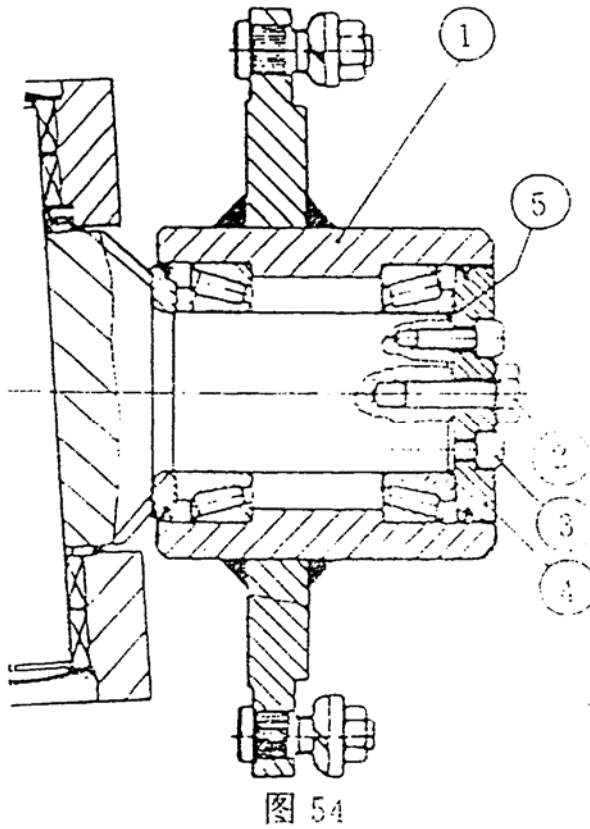


Fig.54

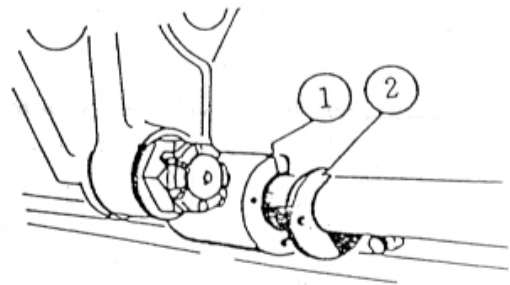


Fig.55

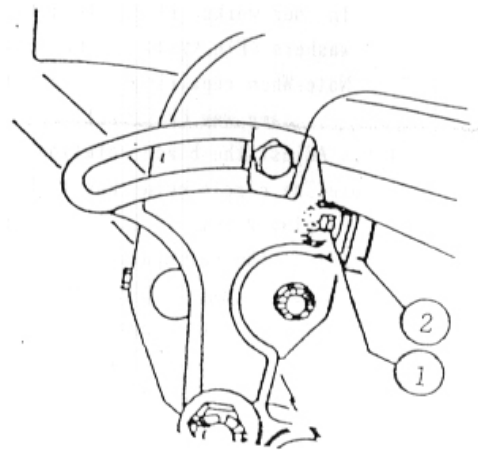


Fig.56

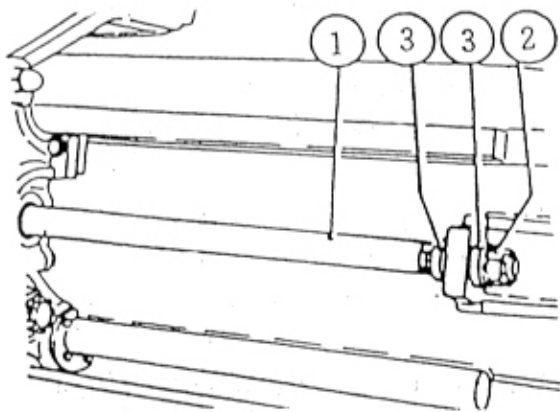


Fig.57

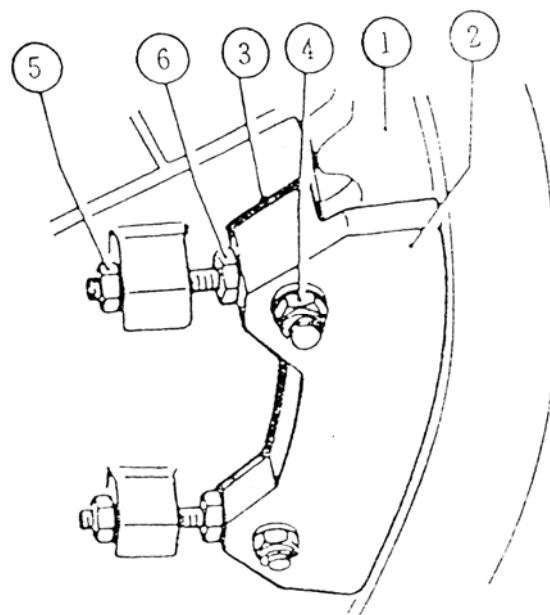


Fig. 58

8.9.3 Fasten the piston rod of the blade shift cylinder (Fig 57)

In our works if castle nuts (Fig 57/2) are locked by piston rod, two cone washers (Fig 57/3) can be turned by hand.

Note: When repairing or changing the cylinder, fasten the piston rod in the same way (Fig 57/1)

8.9.4 Adjust the blade rotation circle (Fig 58)

Note: The circle guide has to be adjusted if radial play exceeds 3mm and axial play 2.5 mm. If it is gear-ring structure of rolling plate, don't adjust.

a. Adjust the guide, axial

1. Measure axial plays between the circle (Fig 58/1) and all four guides (Fig 58/2) by means of a feeler gauge. The play is 0.6-0.8mm(Fig.58/3)

2. Remove all 4 guide shims (Fig 58/3) after unscrewing the locking nuts (Fig 58/4) to get the correct play shims (Fig 58/3) Refit guides.

b. Adjusting the circle radial

1. Loosen nuts (Fig 58/4 and 58/5) and adjust the guide by screwing the bolts (Fig 58).

2. Retighten all nuts. Tightening torque of nuts (Fig 58/4)=590Nm

3. On testing. The circle must turn free through 360°

8.10 Tyres

Note: On all 6 wheels the same size of tyres be mounted.

8.10.1 Tyre maintenance

- a. Check tyres daily for cuts, ruptures or sharp objects on the surface and immediately remove all foreign bodies.
- b. The tyres must be protected from fuel, oil and grease.
- c. The valve caps must be fitted so that no dirt can get into the valves.
- d. Leaking valve cores would be replaced.
- e. The tyre pressure must be checked regularly. Tyre pressure that are too low or too high will lead to excessive or one –side wear of the tyres.

Note: Correct tyre pressure are very important in determining the life and efficiency of tyres.

The following air pressure specified apply to cold tyres (begin to run), during travelling, the flexing of the tyres causes the raise of the temperature and leads to raise air pressure. But this increased air pressure is a protection. So you would not correct it and don't lower air pressure by releasing air.

8.10.2 Air pressure of the tyre (bar)

| Tyre | Layer | Front wheels | Rear wheels |
|----------|-------|--|-------------|
| 14.00-24 | 12 | 2.0 | 2.5 |
| 17.5-25 | 14 | The same pressure 2-2.3bar in front and rear wheel | |

8.11 Fasten and change the wheel

8.11.1 Fastening wheels

Wheel nuts should be checked daily for tightness during the first 100 operating hours and should be tightened if necessary. Then after every 50 operating hours. Tightening torque 450Nm.

Tightening is necessary since bolts and wheel nuts as well as the coat of the lacquer of the rims is settled for a long time. When travelling, if the wheel is loosened and bolt holes are damaged. The wheel will fall off. For tightening, check the proper fit and retighten the wheel nuts to ensure the specified tightening torque by torque wrench.

8.11.2 Changing wheels

Apply the hand brake before changing a wheel. Before lifting the grader. Loosen the wheel nuts by approx one turn.

For changing rear wheel, one side of the grader can be jacked up hydraulically, For this purpose, the blade is turned in such a manner that the blade tip is in front of the tandem wheels which have to be lifted. Then jack up the grader with the lift cylinder on the side where the wheel is to be changed.

The front wheels can be lifted by bulldozing plate or the blade.
Before removing the wheels, support the grader suitably.
Unscrew wheel nuts and remove wheel.

Attention When removing and mounting the wheel, the threads of the wheel bolts can not be damaged.

After mounting the wheel, tighten the wheel nuts crosswise.

After changing every wheel for 100 operating hours the wheel

Nuts are retightened daily with specified torque (450Nm).



8.11.3 Direction of tyre tread.

When mounting the wheel tyre. Pay attention to the direction of the tyre tread. We recommend that the driving rear wheels are mounted so that the tread is in accordance with the illustration (Fig 66) to give the greatest tractive power in the forward direction of the travel (see arrow) to the rear wheels.

The non-driven front wheel should be fitted so that the tread is opposite.

Note:

For special operating situations, an alternative arrangement of the wheels may be of advantage. We recommend, however, that you would follow the advice of the tyre manufactures.

8.12 Steering

The steering is regularly checked for correct function.

a. Check steering pump, cylinders pipes and joints of hydraulic steering system according to maintenance schedule (8.4) for leaks. Repair any leakings.

b. Check nuts and bolts of steering, trapezoid rod and steering cylinders and tighten if necessary.

Note: In the event of any fault in the hydraulic steering, stop operation and have the fault repaired by Sale-Service Dep. Or trained person.

8.13 Hydraulic operating system

a. Check hydraulic pump, cylinders, valves, pipes and joints for leakings according to the maintenance schedule (8.4)

b. Operating pressure of the hydraulic operating system All relief valves in the entire hydraulic system are set to the correct operating pressure and these settings are sealed. If finding any faults. Operating pressure would be readjusted by our service person. If the seals are opened during the guarantee period in the event of damage caused by excessive pressure settings. The guarantee will be extinct.

8.14 Driving shaft

If there is any noticeable plays between the universal joints and forked sleeves, the driving shaft must be renewed.

The mounted balancing plates should not be removed The damage of balancing plate will lead to unstable running and to be worn easily.

8.15 Electrical equipment of the grader

8.15.1 Working before the repair

When repairing the electrical system, first switch off the main power and stop the system operation.

8.15.2 The cables are an important part of the electrical system and must be carefully protected from damage. During the maintenance of the electrical system, the cables should be checked for looseness, touching and damaging of insulating cables.

8.15.3 Three-phases alternator

The maintenance and notice items of the alternator are contained in the engine repair instruction.

Regularly check for correct V-belt tension on driving device of the alternator.

In order to avoid the damage of the three-phase alternator and the regulator, the following instructions would be followed carefully.

1. When starting the engine with the aid of an external source, note to connect positive and negative pole with batteries correctly.
2. During fast charging, ensure firm connections between the batteries and the rapid charger.
3. When welding on the grader, the ground is directly connected to the part to be welded on the grader.
4. If the indicating light is off, the alternator is charging for the batteries. To monitor the charging, replace the damaged indicating light.

8.15.4 Battery

Never place any conductive parts (tools etc.) on the batteries in order to avoid short circuit.

a. Checking the acid level

Check the acid level according to the maintenance schedule (8.4). Remove all caps, The acid level must be 10-15_{mm} above the pole plates. Pay attention to level marks. Check the acid level by means of a clean wooden stick. Fill up distilled water, if necessary. When filling, do not use a metal container.

b. Checking the charge of the battery

The acid concentration is the most important effect for the charge of the battery. An acid tester is used for checking the acid concentration.

The concentration of the acid is specified in the battery at +20°C.

Fully charged at 1.28 kg/l

Half charged at 1.28 kg/l

NO-charged at 1.28 kg/l

c. Disassemble and assemble the battery

When disassembling the battery, disconnect the negative cables(-) and then the positive cables(+).

When assembling, the battery is connected in the reverse order.

The battery must be firmly fixed on the grader and properly connected to charging circuit of the electrical system.

Stintly grease the terminals with no-acid grease.

Keep the battery clean and dry.

8.16 Store the grader

8.16.1 Store the grader

1. Before laying-up the grader, it should be thoroughly cleaned and lubricated, polished parts should be greased, piston rings should be heavily coated with no-acid grease (Vaseline) and possibly, up with paper strips.
2. The grader is best laid up under cover or the workshop so that the tyres are protected from sunlight, heat and moisture. The tyre pressure must be checked according to 8.10.1.
3. If the grader is laid up in the open air or on uneven ground, it is preferable to put chocks under the grader to relieve the tyres from the vibration. The tyre pressure should then be reduced by 50%. Protect the tyres from direct sunlight by covers.
4. In order to avoid damage from corrosion, the fuel tank should be completely filled. Add an inhibitor, if possible (10% of the amount filled in).
5. It is advisable to run the grader or regularly, if possible, warm up the machine once two weeks, if possible, travel a short distance. If the grader is on chocks, run every shifting-gear of driving system to warm up.
6. The batteries should be removed during breaks in operation of more than 4 weeks. Keep the battery in a dry and anti-freezing place, recharge the batteries once a month.

8.16.2 Starting operation again

If the grader has been laid up for approx. 1 year, change the oils of the hydraulic system. The oils in the transmission, rear axle, tandem box, the blade rotating gear and the engine (8.3.1) will be replaced at the same time.

1. Thoroughly clean the piston rods. Grease all grease nipples of the grader.
2. Carry out the following checks:
Check oil levels in the engine, transmission, rear axle-tandem box, blade rotating gear and hydraulic tank.
Check electrolyte level in batteries and tyre pressures.

9. Faults and remedies

We recommend that our sales-service Dept be called in for any repairs including those listed below under remedies. Our technicians are specially

trained on our company and are provided with suitable tools. This means that repairs can often be carried out more quickly and correctly.

Welding work on loading parts of the grader may only be performed by our sales Service Dept or at the factory to ensure the strength of the parts. It is not permissible to carry out welding work on the axles or to connect the ground of the welding apparatus to the axles.

Descriptions of faults.possible causes and trouble shooting.

| Faults | Possible causes | Remedies |
|--|--|---|
| 1.Engine 1.1Engine fails or difficult start | 1.problem in fuel system a.Air in fuet system b.Fuel system clogged c.No oil supply d.Injector defective e.Incorrect advanced angle of supplying oil | Bleed air in fuel system with Pump. Check system for leaks. Disconnecting and clean. Check pump. Check injector. Check injector pump, valve and spring. Check and adjust. |
| | 2.Pressure force too low a.Piston worn out b.Piston ring formed rubber c.Valve leaks d.Pressure temperature low | Renew piston ring. Clean rubber. Valve spring defective,incorrect Clearance valve,cone seal defective Repair Low temperature in outside Pre-heating. |
| | 3.Electrical problem a.low pressure in the battery b.poor touching on terminals c.poor conduct between starter brush and rectifier d.low torque of starter cluth. slippery e.Starter gear does not touth with flying gear | Charge Ttghten and clean. Repair and renew.Clean rectifier Surface. Add shims and adjust. Check and repair. |
| 1.2Unsteady running of the engine | 1.Air in fuel system 2.Too much water in fuel 3.Fuel lines leak 4.Incorrect work in the adjustor 5.Cylinder defective | Bleeding air in fuel system. Check water content in fuel. Check and repair. Check and readjust. Check cylinder bolts and renew the Washer of cylinder cap. check height tolerance between the crest of cylinder sleeve and the surface of the body. |

| Fault | Possible causes | Remedies |
|--|--|---|
| | <p>6. Incorrect oil supply in the cylinder</p> <p>a. Uneven supplying oil of injecting pump</p> <p>b. Incorrect injecting or coupling part clipped</p> <p>c. The brades of inject-ing pump spring</p> | <p>Check and adjust</p> <p>Check, clean and renew.</p> <p>Renew spring.</p> |
| 1.3 Low engine power and suddenly falls down | <p>1. Air filler clogged</p> <p>2. Valve spring or valve Rod wornout</p> <p>3. Incorrect valve clearance</p> <p>4. Low compressing pressure</p> <p>5. Incorrect advanced andle of supply oil</p> <p>6. Air in fuel system or Clogged</p> <p>7. Low oil supply.</p> <p>8. Sprayer difective</p> <p>9. Speed regulator Defective</p> <p>10. Overheating of the engine</p> <p>11. Too much carbon Settled in engine</p> <p>12. Exhaust tube colgged</p> | <p>Clean and renew filter cartridge.</p> <p>Renew</p> <p>Adjust</p> <p>Repair according to the items 1.2 in the charpter.</p> <p>Check and adjust.</p> <p>Repair according to above 1.a.b in The charpter.</p> <p>Check injecting pump plunger and oil valve</p> <p>Check, clean and adjust pressure.</p> <p>Check and adjust.</p> <p>Check cooling system, clean the incrustation.</p> <p>Clean setted carbon.</p> <p>Take out the clogged matter.</p> |
| 1.4 Unnormal sound of the engine | <p>1. Advanced injecting oil</p> <p>2. Late injeucting oil</p> <p>3. Too much clearance between the piston and cylinder</p> | <p>Adjust advanced angle of the supply oil.</p> <p>Adjust advanced angle of the supply oil.</p> <p>Renew the piston or cylinder.</p> |

| Faults | Possible causes | Remedies |
|--|---|---|
| | <p>4. Too much clearance between the piston pin and pin hole</p> <p>5. Too much clearance between main bearing and the bearing of connecting rod</p> <p>6. Too much clearance of crank shaft, axial</p> <p>7. Break of valve spring, bend of push rod, too much valve clearance</p> <p>8. The piston collides with cylinder cover</p> <p>9. Worn gears cause too much clearance</p> | <p>Renew parts</p> <p>Renew parts</p> <p>Renew pushing plate.</p> <p>Renew parts, check and adjust valve clearance.</p> <p>Check the collision between the piston and valve.</p> <p>Check the mark for the piston and distributing gear.</p> <p>Renew gear.</p> |
| 1.5 Too high temperature of engine oil | <p>1. Too high engine load</p> <p>2. Too low or too high oil level</p> <p>3. Air leak</p> <p>4. Clogged in oil cooler.</p> <p>Incorrect pressure of by-pass valve, clogged by the dirt on the cover</p> | <p>Decrease the load</p> <p>Increase or decrease the oil</p> <p>Check piston ring and cylinder sleeve</p> <p>Check, clean, adjust by-pass valve.</p> |
| 1.6 Abnormal fumes drained from the engine | <p>1. Fume "blue"</p> <p>a. Too much engine oil. piston ring upset, clipped or worn</p> <p>b. Oil sealing of valve rod damaged</p> <p>2. Fume "white"</p> <p>a. Abnormal injection. leaks</p> <p>b. With water in the cylinder</p> | <p>Check and repair.</p> <p>Renew O-ring.</p> <p>Adjust injecting pressure.</p> <p>Check seals.</p> <p>Check and repair.</p> |

| Faults | Possible causes | Remedies |
|--|---|--|
| | 3. Fume "black" a. Running in overload b. Too much oil injection c. Too late oil supply d. Incorrect valve clearance, leaks e. Air filter clogged | Adjust to prescribed load. Adjust supply amount. Adjust oil supply angle. Check valve clearance, valve spring. Change seal and repair. Check and repair. |
| 1.7 Low oil pressure of the engine | 1. Pressure gauge damaged or oil pipes clogged 2. Too low oil level in oil basin 3. Engine oil too dilute 4. Oil pump gear worn out or poorly mounted 5. Oil filter cartridge clogged 6. Pressure limited valve, valve spring deflected 7. Oil pipe clogged or leaks 8. Too large clearances | Renew pressure gauge or clean pipes Fill up engine oil. Check oil quality. Adjust clearance or replace. Clean or replace. Replace Check and repair. Check and repair. |
| 1.8 Too hot temperature of cooling water | 1. Temperature gauge or reaction plug defected 2. Lacking water 3. Too much incrustation in engine water passage Radiator or copper tube clogged 4. Running in overload | Check and repair. Fill up cooling water. bleed air. Adjust belt tension. Check the clearance of water pump Check and clean. Decrease the load. |
| 1.9 Lacking oil in oil pump | 1. oil pump non-return spring breaks or valve worn out 2. Plugger worn out 3. Oil intake bolt leaks or pipe tight clogged | Replace spring or repair valve. Renew plugger. Replace washer. clean. |

| Faults | Possible causes | Remedies |
|-------------------------------|--|---|
| 1.10 Defect of injecting pump | 1. No-supply oil a. Defect in oil pump b. Filter and pipe clogged c. Air in fuel system d. Outlet spring of oil valve broken 2. Uneven draining oil a. Air in fuel system b. Outlet spring of oil valve broken c. Sealing surfaces worn between oil valve and its external cylindrical surface d. Plug-pairs worn out or spring broken e. Plug pairs dirtied f. Too low pressure in oil inlet 3. Lacking oil supply a. Valve leaks b. Connections leaks c. Plugger worn out | Check and repair. Clean and replace parts Bleed air Replace spring Bleed air Replace spring Renew parts Renew parts Clean Check oil pump or filter Repair or replace parts Repair Renew parts |
| 1.11 Defect of the injector | 1. Too less injecting oil or not oil a. Air in fuel pipe b. Needle valve and valve bitted c. Too much clearance between needle valve and body d. Leaks in oil supply system e. Incorrect oil supply in injecting pump 2. Too low injecting pressure a. Adjust the screw b. Changing shape of the spring | Bleed air Repair and replace. Replace Tighten connections or replace parts. Readjust injecting pump in test table. Adjust to prescribed torque. Renew spring. |

| Faults | Possible causes | Remedies |
|------------------------------|---|--|
| | 3. Too high injecting pressure a. Needle valve blocked b. Oil passage clogged c. Too high spring force 4. Oil leaks a. Pressure spring broken b. Surface defect between needle valve and valve seat c. Needle valve blocked d. Changing shape of the cover e. Defect of connecting surface 5. Worse injecting fog a. Changing shape of needle valve or worn out b. Surface worn out or burned between needle valve and valve seat c. Injector clogged d. Needle valve blocked | Repair Clean Readjust Renew spring Repair or replace Clean or renew parts. Renew parts Repair or replace. Renew parts Renew parts Clean Repair or renew |
| 1.12 Defect of the regulator | 1. Incorrect regulating Speed a. No-even supply oil of the cylinder b. Injector. clogged or leaks c. oil pump plug clogged spring broken 2. Too low idle a. operating arm doesn't reach the bottom b. Gear circle and adjust rod blocked | Adjust oil supply. Check or replace parts. Replace spring Check and readjust. Check and repair. |

| Faults | Possible causes | Remedies |
|----------------------------|--|---|
| | 3.Out of order a.Adjust spring is out of shape b.Opening or closing distances of fly hammer are not equal c.The worn clearance of a floating lever is too large 4.Turning at high speed a.Revolutions at high speed b.The spring of the governor c.Adjusting gear lever and circle ring are blocked | Renew the spring Check and correct Check and repair Check and readjust Replace spring Check and repair |
| 1.13 Engine stop suddenly | 1.Crank shaft can not turn after stopping a.Crank shaft and axle sleeve blocked b.Piston and cylinder blocked 2.Crank shaft can turn freely a.Air in fuel system b.Fuel system clogged c.Air filter clogged | Check crank shaft and axle sleeve Or repair. Replace the piston or the sleeve Bleed air Clean Clean |
| 1.14 Defect of the starter | 1.The starter can not turn a.Connecting cable connected poorly b.Battery not to be charged c.Poor brush touch d.Circuit of the starter broken | Clean and tighten terminals. Charge or replace Clean Repair |

| Faults | Possible causes | Remedies |
|---|--|--|
| | 2.Idle starter a.Bearing sleeve worn out b.Poor brush touch c.Dirty changer of burned out d.Terminals broken e.Poor touch f.Poor switch touch g.Battery not to be charged or low electrical quacity h.Clutch slipped 3.Difficult gear return a.switch burned out | Renew the sleeve Clean Clean Clean and weld Clean and tighten Check Charge or renew the battery Adjust clutch torque Repair the switch |
| 1.15 Defect of the generator | 1.No-recharging 2.Not fully charged 3.More-over charged 4.Unsteady charging current | Repair Repair |
| 2.Transmission 2.1Control levers slipped no-engaged valve piston | Incorrect adjustment or connertion of control level | Adjust or connect |
| 2.2 Too low shifting pressure in all gears(Pressure gauge showed) | Too low oil level Defect of operating pump Defective of gearshift pressure | Fill up to presctibed oil pressure Sale-Service Dep. Sale- Service Dep. |
| 2.3 Too low shifting pressure in a singlegear | Sealing parts pisonring gear clutch worn or brogken | Sale-Service Dep. |

| Faults | Possible causes | Remedies |
|---|--|---|
| 2.4 Too high oil temperature(Temperature gauge on instrument panel) | Low oil level | Top up transmission oil to Max.oil level. |
| | Dirty fins of oil cooler | Clean oil cooler. |
| | High or low gears used for a long time | Change method of driving i.e. select a different gear. |
| | Defect in safety valve of torque converter | Sale-Service Dep. |
| 3 Brake | Resetting springs broken or no lining-layer | Repair or renew springs.(Sale-Service Dep.) |
| 3.1 Brake linings are not separated with the brake drum | | |
| 3.2 Ineffective brake performance | Air in brake system | Bleeding air in brake system. |
| | Joints of barking pipe leaked | Tighten joints or replace sealing parts. |
| | Seals in wheel brake-cylinders leaked. | Replace sealing parts.(Sale-Service Dep.) |
| | Lining-discs damaged or worn | Replace complete brake and linings Sale-Service Dep. |
| 4.Hydraulic steering | | |
| 4.1 Hydraulic steering gear or steering pump defected | | |
| 4.2 Front wheels wobbled | Bearing of steering cylinders or track rod worn | Renew bearings or ball joints. |
| 5 Working equipments | Too low oil level in the hydraulic tank | Fill up to the prescribed oil level. |
| 5.1 Ineffective working equip-ments or not to remain selected positions | Piston seals in the dydraulic cylinder defected | Renew seals(Sale-Service Dep.) |
| | Incrrect pressure of relief valve | Readjust valve (Sale-Service Dep) |
| | The required pressure in relief valve not to be remained | Renew spring or the valve. (Sale-Service Dep.) |

| Faults | Possible causes | Remedies |
|--|--|---|
| 5.2 Blade wobbled 5.3 Not to turn the blade | Too much guide play Leakage at the joints of hydraulic motor Parts worn in the hydraulic motor | Renew or grind lining-sleeve of guide plate. Renew the sealing parts. Renew hydraulic motor. (Sale-Service Dep.) |
| 5.4 Too less supply oil and too large noise in hydraulic pump 5.5 Control levers can't return to neutral position | Too low oil level in the hydraulic tank Hydraulic pump defected Weak return spring or broken | Fill up to prescribed oil level. Renew hydraulic pump(Sale-Service Dep.) Renew return spring(Sale-Service Dep.) |
| 6 Electrical system 6.1 The lamp does not light 6.2 An electrical equipment does not work | Fuse burned-out Bulb defected Fuse is burned-out The electrical equipment is defected | Replace the fuse. Replace the bulb. Replace fuse. Replace electrical equipment (Sale-Service Dep.) |

10. Lubricants

Note: It is very importance to use of suitable lubricants for the efficiency and the service life of the graders and gain remarkable effects. Thus we recommend that only high quality oils and lubricants be used that the following specifications would be met.

10.1 Greases

Lithium group grease No.2

10.2 Engine oil

GF-4/SG 15W-40

10.3 Driving oil

10.3.1 Oil for the torque converter and transmission

Mobil Delvac super 1300 15W/40

10.3.2 Oil for tandem box, rear axle and worm-gear box

Gear oil SAE90, MIL-L-2105A or APIGL3/GL4.

10.4 Hydraulic oil

antiwear oil No. N32, antifreez oil No. N32 in frigid zone.

10.5 Fuel

diesel oil GB242-87 0-35 in winter 0-10 in summer

11. Shoe brake

11.1 Brake system

Note: Repair and maintenance should only be carried out by the trained person.

11.2 Check the brake linings

Check the thickness of the brake linings according to the maintenance schedule. Renew the linings when the thickness is less than 3mm.

11.3 Renew brake linings

The renewing of the brake linings should only be carried out by the trained person.

The brake linings have been grinded and matched with brake drum to secure touching area. Otherwise, to avoid unbalanced brake force, the opposite linings of the wheel always are replaced together.

11.4 Adjust the foot brake

Note: When exchanging the brake with linings, all 4 tandem wheel would be adjusted.

Always adjust both brake shoes together, the sequence is not important.

The adjustment has to be done by two persons. One person turns the wheel while the other is adjusting the brake.

1. Lift one side of the grader by means of pressing the blade until the wheels are free.

2. Support the tandem box, loosen the hand brake.

3. Turn the wheel by hand and fasten with the adjusting screw (Fig.60/1) in narrow directoin until the wheel is blocked, using a wrench size 22mm.

(Both barke shoes are then touching the drum.)

Attention:Do not apply too much force to the adjusting screw (Fig 61/1), the cam Plate welded on the inside is forced largely.

4. If loosening the adjusting screw (Fig 61/1) in direction “Loose” for about 30° the tolerance between both braking shoes and drums is released to approx 0.75 mm

5.Adjust an other barke drum, pay attention that the roating diretion of the adjusting bolts (Fig 61/1) is inverse.

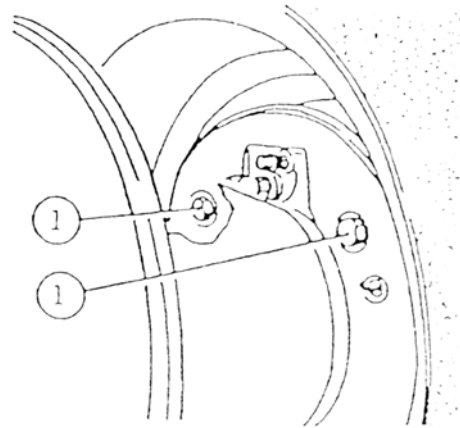


Fig.60

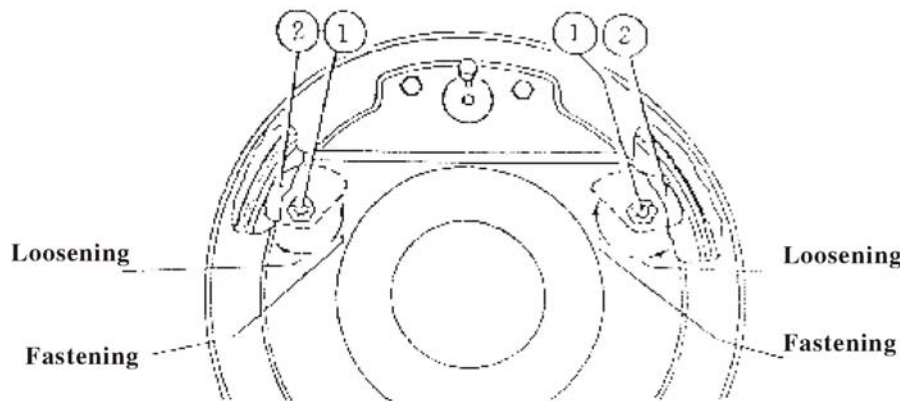


Fig.61

12. When assembling electronic monitor, please you refer to the Electrical system Figure (p20-1). For the operation, please read 《Operation Manual of Electronic Monitor》 .

13.

Comparison table of lubricant oil

| No | Type | Lubricant oil | Mobil oil |
|----|---------------|---|--------------------------------|
| 1 | Gear oil | SAE90 or MIL-L-2105A or API GL3/GL4/GL5 | Mobil HD 80W 90 |
| 2 | Hydraulic oil | Hydraulic oil of N32 resistance-worn;Frigidzone:Hydraulic oil of N32 resistance-worn (low condensation) | Mobil DTE 24 |
| 3 | Engine oil | CF-4/SG 15W-40 | Mobli Delval super 1300 15W-40 |