Chapter 3 Leveling Operation

Laser Land Leveling is a process which can change the rugged land into a plane step by step. It includes plough, measurement/calculation and leveling. The soil can be loosed via plough, and then reduce the resistance when level the land. Then measure the land and make a calculation according to the measuring results. Then draw a topographic map, calculate the average height and workload. You can divide the land into several parts according the height difference, and the height differences can not exceeding 20cm. Then begin to level the land and to reduce the height difference to be less than 2cm, level the several parts one by one, then finish the leveling finally.

The operating photo of laser land leveling

Step 1: Set the laser

Step 2: Measure the land (measure)

Step 3: Draw topographic map and divide the land into several parts (calculate)

Step 4: Calculate the datum of tractor

Step 5: Level the land by parts (level)

1.Installation and placement of the laser transmitter KF-308

The place where to set the laser transmitter is depended on the size of the land, if the scope of the land exceed 800m, it should be placed at the center of the land, if the scope of the land less than 800m, it should be placed at the surrounding.

1: Unfasten the tripod straps and stretch the three legs to the maximum position.

2: Shake the pole of the tripod to the lowest position, rise and fix the tripod according to the height requirement, the three legs of the tripod should be kept at the same height.

3: Fix the position of the tripod according to the wind direction, the straight line which is connected to the two legs of the tripod should be perpendicular relationship to the wind.

4: Fix the laser transmitter to the tripod by the screws.

5: Shake the crank of the tripod, raise the lifting rod, adjust the laser transmitter to stay at the height that needed.

6: Turn on the power of the transmitter and it will start work.

2. Measurement and Calculation

The land need to be divided into several grid, the grid size depend on the size of the land. 15m x 15m is suggested. Set the transmitter on the edge of the land and then handle the measuring rod onto the grid point for measuring, and measure the relative height of each grid point, and record it when measuring.

Land height record sheet

↑ N	1	2	3	4	5	6	7	8	9	10	…
1	2	3.1	3	3	2	2.1	2.4	2.5	3.2	3	3.7
2	2	2.3	2.1	3.4	3.5	3	2.7	3.1	3	2	2.6
3	3	2.3	2.4	2.2	2.9	3.1	3.8	3.3	2.9	2.6	3.0

Then calculate the largest height difference and average height. If the height difference is more than 20cm, divide the land into several parts according the height difference. You can calculate the amount of the soil should be cut and amount of the soil should be filled according to the average height. Then the time required to level the land can be calculated approximately.

3.Land leveling

Firstly, drive the tractor to the place where is the average height; then lifting the laser receiver until the green lamp of the control box is bright, fix the laser receiver and make the switch on the automatic mode. Then start to level the land.

The detailed steps are as follows:

1. Place the leveler on the place where is the average height.

2. Keep the height of the leveler a little higher than the land 1cm to 2cm, lifting the laser receiver until the green lamp of the control box is bright. Then fix the laser receiver and adjust the control box to auto mode, then start to level the land.

3. Level the land from the higher place to the lower place along the ring.

4. In order to improve the work efficiency, drive the leveler to the lower place when the leveler is filled with soil.

5. When the leveler is filled with soils and the tractor can move, raise the leveler via manual mode to release the soil.

6. Level one part of the land first, and then level the whole land.

4.Work matters need to be noticed

The preparation before land leveling

1. Examine the all fastener is fastened.

2. Confirm the hydraulic oil is enough, oil cylinder and the transmission shaft is clear, and the lubrication is well.

3. Confirm the cables are connected in the right position.

4. Inject the lubricating oil to each lubrication locations.

5. Raise the leveler to the highest position when the tractor is moving (when the land level is stopped).

Maintenance

1. It needs to change into the frost-proof hydraulic oil in winter or cold weather.

2. Keep the hydraulic station clear and maintains daily.

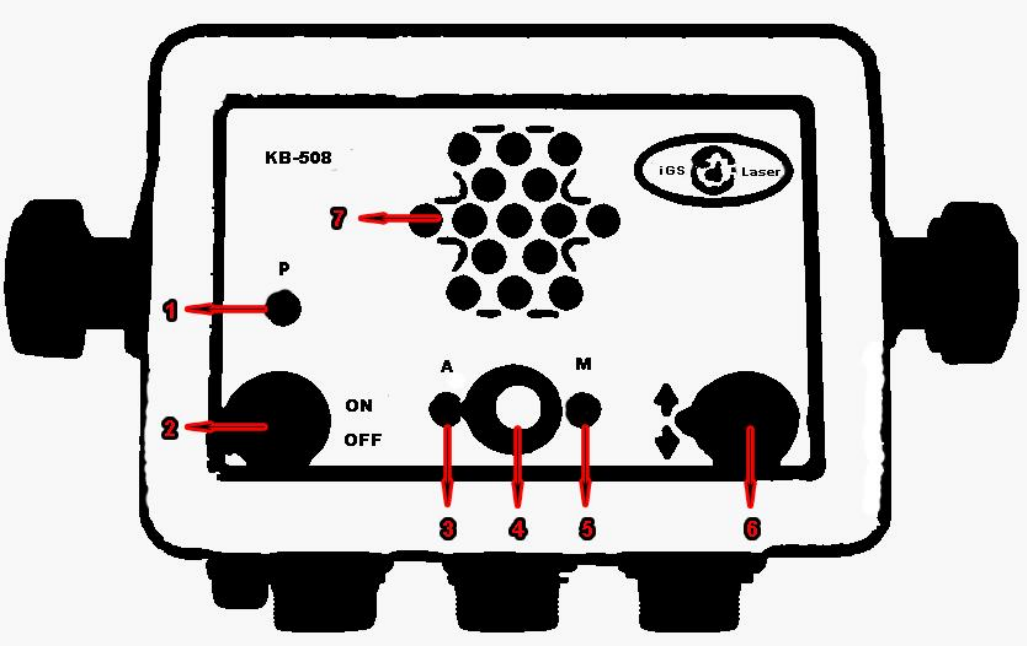
3. Check the oil drain hose regularly, avoid being stopped up.

4. Inject the lubricating oil and lubricating grease into the position of transmission shaft pin.

5. Keep the machine clear after finish the work and store it in the warehouse.

Appendix

The instruction of the control box KB-508



1 – Power indicator light

2 – Power button

3 – Auto indicator light

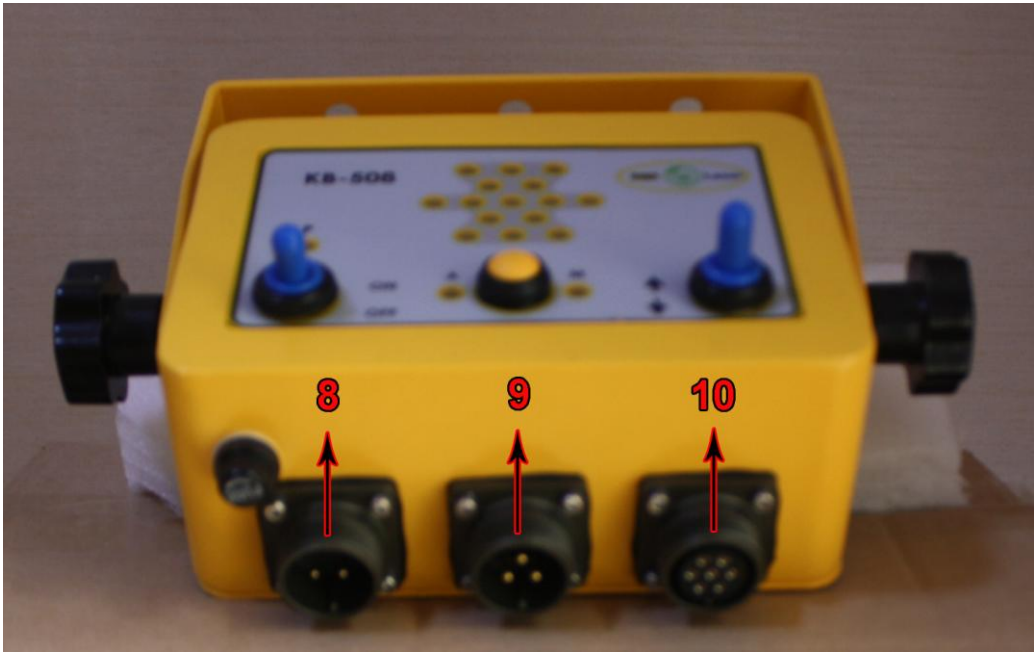
4 – Auto/manual switch

5 – Manual indicator light

6 – Manual lifting switch

7 – Indicator light

Instruction 2



8 – power interface

9 – Electromagnetic reversing valve interface

10 – Laser receiver interface

Specifications:

1: Laser Transmitter KF-308

Laser Land Leveling AG 308 System	
Laser Leveling KF-308	
	**Features:** **1.** Highly visible beam **2.** Automatic Self-Leveling **3.** Intuitive one-touch operator controls **4.** One-person operation reduces labor costs **5.** Automatic compensation for level and plumb **6.** Temperature Calibrated, high accuracy for consistent performance across larger job sites **7.** Multiple power option, NIMH rechargeable Batteries, direct power or alkaline batteries for reduces downtime **8.** Fast setup, minimal training time, and automatic Self-Leveling minimizes operating costs and boosts productivity **9.** Rugged, durable, Light weight Eye Receiver HR 350 makes fill simpler
Laser Source :	4.99 mw maximum
Laser accuracy :	±10 arc sec. (± 1.5 mm at 30 m)
Self-leveling Range :	±5 degrees
Receiver Operating Dia. :	900 m
Rotation Speed :	Four preset speeds from 10 to 600rpm
Operating Temperature :	-20 °C to 50 °C (-4 °F to 122 °F)
Storage Temperature :	-20 °C to 70 °C (-4 °F to 158 °F)
Size :	21L × 18W × 20H cm
Weight :	3.1 kg (6.8 lbs)

2: Control Box KB-508

Control Box IGS KB-508	
	**Features:** **1.** IGS KB508 is rugged, operator interface for single Laser-Based control systems. This is simple to setup and use. **2.** This device is design to be installed in the cab while in operation, and be quickly removed for storage when not in use. **3.** Control Box allows the user to manually control the elevation of blade, for balancing or rough grading using the LCD indicator or to automatically control the blade for fine grading. **4.** The IGS KB508 features PT valve control for a smooth and quick corrections making more consistent and accurate finish grade. It can be easily moved from the machine to machine.

3: Laser Receiver LS-508

Features (LS-508)

1. Works with both the GCS300 and GCS400
2. Optional three foot and four foot electric mast capability
3. LED set up lights
4. Rugged design; 100% weatherproof
5. Auto detection and connection to PA control systems

Laser Transmitter Speed:	270 to 1320 RPM
Laser Beam Accept Angle:	360°
Detection Window:	231mm (9.1”)
Operating Temperature:	-40°C to 71°C (-40°F to +160°F)
Storage Temperature:	-55°C to 85°C (-67°F to +185°F)
Electric Input:	10 to 30 V DC

4: Scraper (3m)

Bucket Scraper for Laser Land Leveler	
	
Bucket:	Thickness: 10 mm ; Weight: 1300 kg ; Height: 70 cm ; Width: 300 cm ; Depth: 102 cm
Drawbar:	Length: 178 cm ; Top-Link-Pin for adjustment of bucket
Mast:	Automatic Motor driven Electric Mast. Rigid Mast with Manual height adjustment
Blade:	Length: 300 cm ; Height: 16 cm ; Thickness: 16mm
Excel:	Length: 192 cm
Tyres:	No. of wheels: Two, Tyres size: 65 cm Recommended Tyre Pressure: 28p