

Introduction of Products

Small-sized wheel loader WA100-6/WA150-6 Introduction of product

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Komatsu developed small-sized wheel loaders WA100-6 and WA150-6 as a model change to meet the 3rd emission regulations. The outlines of those new models are introduced in this report.

Key Words: *WA100-6, WA150-6, wheel loader, 3rd emission regulations, HST, traction control system, auto-reverse cooling fan, snow removal, livestock breeding*

1. Introduction

Former models WA100-5 and WA150-5 were put in the market in 2003 as the machines equipped with the HST (hydrostatic transmission) and have enjoyed a good reputation since then.

This time, we developed the HST further to meet the third emission regulations in Japan, USA, and Europe and developed and released wheel loaders WA100-6 and WA150-6 having sales features for snow removal and livestock breeding that were the main field in Japan. In this report, the outlines of these models are introduced.



Fig. 1 Appearance photo of WA100-6

2. Aims of development

Similarly to the former models, WA150-6 was developed as a global machine to be used in Japan, USA, Europe and other districts and WA100-6 was developed as a special model for Japanese market.

To attain the “features for environment”, “workability”, and “reliability”, we established following (1) to (4) as the basic ideas similarly to the upper models.

- ① To meet the emission regulations in Japan, USA, and Europe that will be put in force in 2008.
- ② To develop the HST and electronic control further and improve the workability.
- ③ To extend the radiator cleaning interval by employing the automatic reverse cooling fan system.
- ④ To improve the operator comfort by employing the cab having the concept of the medium-sized wheel loaders.

Since the wheel loaders of the WA100/WA150 class are sold more in the areas where they are used in the snow removal and livestock breeding fields in Japan, we employed the sales features for the users in those fields, as well as the above, to the new models.

3. Main sales features

Table 1 shows the main sales features employed in the new models.

In particular, the items that can positively appeal to the snow

removal and livestock breeding fields are marked with circles.

Table 1 Main sales features of WA100-6 and WA150-6

No.	Sales feature	Snow removal	Livestock breeding
1	Conformance with the 3rd emission regulations	○	○
2	Variable traction control system	○	○
3	New addition of S mode	○	
4	One-push traction control switch		○
5	Accelerator work sensory HST control *)	○	
6	Automatic reverse cooling fan system		○
7	Installation of air conditioner unit in the front of cab	○	○
8	Rectangular radiator as standard for livestock breeding specification machine		○
9	Employment of ECSS (Electronically Controlled Suspension System) as standard	○	○
10	Employment of KOMTRAX Step 2.5 as standard	○	○
11	Increase of work equipment PPC piping size	○	
12	Prevention of traction force drop at high oil temperature **)		○
13	Increase of departure angle	○	○
14	Shortening of rear overhang **)	○	○

*) For WA150-6 only, **) For WA100-6 only

3.1 Conformance with the 3rd emission regulations

The new models have cleared the 3rd emission regulations by employing the electronically controlled common rail engines.

In addition, the engine was downsized from the former SAA4D102 engine to SAA4D95 engine.

3.2 Variable traction control system

We further developed the traction control system which has been employed to improve the working efficiency and to reduce slipping of the tires during the loading work. While this system is turned ON, the maximum traction force can be set to one of three levels (single level in the former models) and the traction force can be set properly according to the loaded material and the road surface condition with the further developed HST electronic control system. (STARE II-HST) (Fig. 2, Table 2)

<Traction control system>

The traction control system is Komatsu’s unique system developed to reduce the working loss caused by pushing in the bucket too much, and wear and damage of the tires caused by slipping during product loading work, by restraining the

maximum traction force with the HST motor control system.

3.3 New addition of S mode

The “S mode” for controlling the traction force on slippery roads is added to the traction control system. (Named after Snow, Sand, Slip, and Smooth)

In the S mode, sudden slip on a slippery road can be prevented by controlling the engine speed and HST motor during the low travel speed. Slipping of the tires of the snow removing machines in good demand can be reduced with this function during snow removal work. (Fig. 2, Table 2)

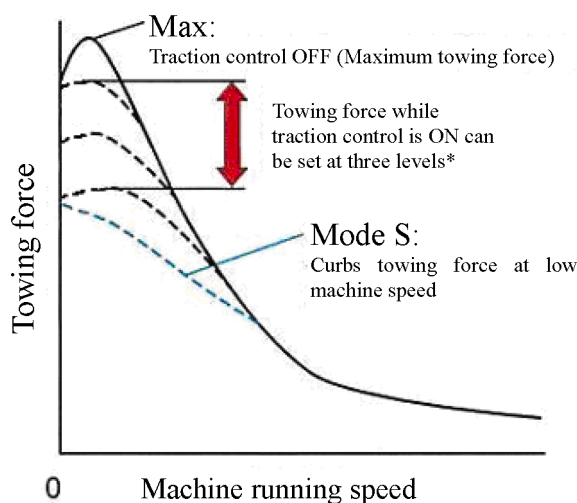


Fig. 2 Traction force curves of traction control

Table 2 Using condition of traction control

	Switch position	Mark on switch	Indicati on on monitor	Traction level selection	Feature		
					Towing force	Loaded load	Road surface conditions
Traction control OFF	(a)	MAX	None	---	Large	Suitable for heavy load	Suitable for less slippery road
Traction control ON	(b)	⊙	⊙	A	↕	↕	↕
				B			
				C			
S Mode	(c)	⊙	⊙	---	Optimum driving force can be yielded on slippery road such as in snowplowing, assuring easy work with less tire slippage.		

3.4 One-push traction control switch

While the machine is in digging work with the traction control turned ON or in the S mode, the traction control can be turned OFF temporarily to increase the traction force to 100% with the “one-push traction control switch” installed on the work equipment control lever. This function is effective for heap-up work etc. when a large traction force is required after digging work. (In Fig. 3, ④ is the one-push traction control switch and ③ is the traction control and S mode selector switch)



Fig. 3 Right console of operator's seat

3.5 Accelerator work sensory HST control (WA150-6 only)

On WA150-6 equipped with two motors, the acceleration and deceleration shocks are reduced, and smoother travel and energy saving operation can be made by controlling the speed according to the depressing angle of the accelerator pedal by using the newly developed electric accelerator pedal angle sensor.

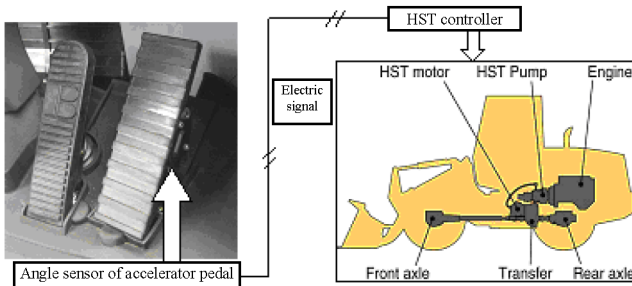


Fig. 4

3.6 Automatic reverse cooling fan system

The automatic reverse cooling fan system which has been employed in the medium-sized wheel loaders is installed as standard. The hydraulically driven fan can be rotated in reverse by operating the fan reverse switch installed in the cab to blow off dirt sticking to the radiator, aftercooler, and hydraulic oil cooler.

With this function, the cleaning interval of the radiator is extended and cleaning work is facilitated in jobsites of livestock breeding etc. where light material such as grass is handled.

The fan reverse switch has the manual reverse mode and automatic reverse mode. In the automatic reverse mode, the fan can be rotated in reverse at the intervals of the reverse operation time that are set in the timer to extend the cleaning interval. The automatic reverse intervals and reverse operation time can be changed in the service mode of the monitor according to the working condition. (In Fig. 3, ⑤ is the location of the fan reverse switch.)

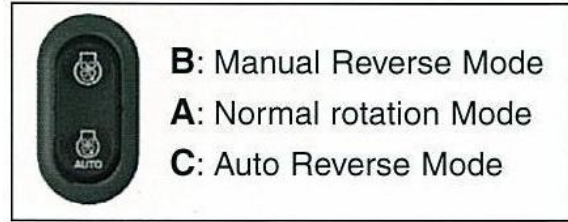


Fig. 5 Fan reverse switch

3.7 Installation of air conditioner unit in the front of cab

The air conditioner unit is installed in the front of the cab on the small-sized models similarly to the medium-sized models and the following improvements have been made.

- A wide space has been secured behind the seat so that sufficient room is given to even a large operator.
- The large-sized filters for fresh air and recirculation air have been installed to places where they can be replaced easily to improve the maintainability.

3.8 Rectangular radiator as standard on livestock breeding specification machine

The rectangular radiator having the radiator core with wide fin-to-fin clearances has been employed as standard on the livestock breeding specification machine. (Fig. 6)

This radiator is not clogged easily with small pieces of dirt such as grass in livestock breeding field, thus it can prevent overheat and extend the cleaning intervals.

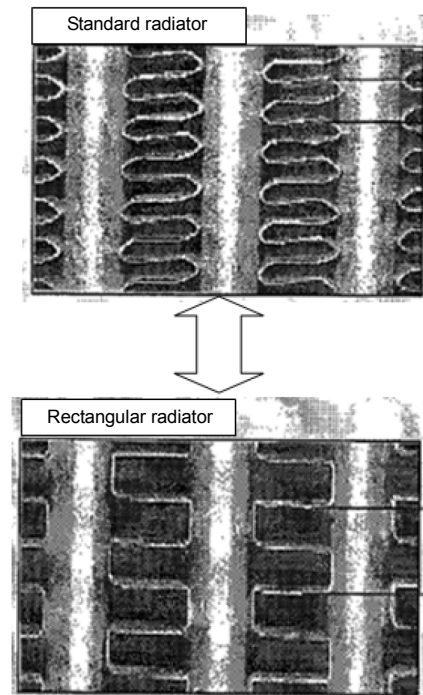


Fig. 6 Comparison of shapes of radiator fins

3.9 Employment of ECSS (Electronically Controlled Suspension System) as standard

The ECSS of travel speed sensory type which has enjoyed a good reputation is installed as standard to the machines with Japanese market specification. (Optional for WA150-6 with overseas market specification)

3.10 Employment of KOMTRAX Step 2.5 as standard

KOMTRAX which has been optional to the former models is employed as standard.

The assistance information for energy saving operation, containing the data of the loading frequency of the HST travel hydraulic pressure, ECO indicator lighting frequency, fuel consumption information, etc. has been newly added.

3.11 Increase of work equipment PPC piping size (Japanese specification machine only)

The boom raising response at low oil temperature has been improved by increasing the boom PPC piping size of the work equipment hydraulic circuit. With this improvement, the boom can be raised quickly during snow removing work.

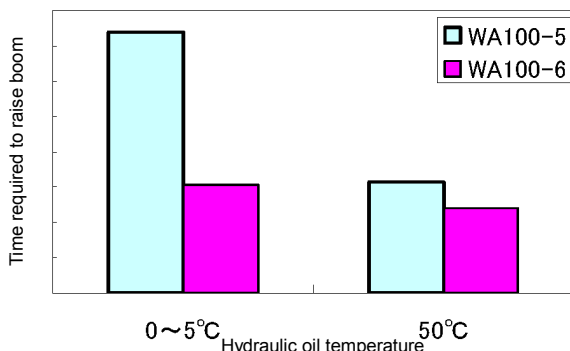


Fig. 7 Time required to raise boom

3.12 Prevention of traction force drop at high HST oil temperature (WA100-6 only)

In WA100-6 which is the 1-motor specification machine, the HST charge pump has been changed from the trochoid pump to the gear pump whose volumetric efficiency drops less at high HST oil temperature, and the charge pump pressure drop has been restrained in order to prevent the traction force drop when the HST oil temperature becomes high.

With this improvement, the HST oil circuit pressure drop (leads to the traction force drop) can be restrained when the HST oil temperature is high.

When a machine of the WA100 class is used in the livestock breeding field, large traction force is required at high HST oil temperature for grass heap-up work etc. The improvement made at this time meets this requirement.



Fig. 8 Grass heap-up work

3.13 Increase of departure angle

The shape of the counterweight has been changed to make the departure angle larger than that of the former models to improve the heap-up work.

Table 3 Departure angle

	Type 5	Type 6
WA150	30°	32°
WA100	29°	32°

3.14 Shortening of rear overhang (WA100-6 only)

The rear overhang has been shortened by 70mm from that of the former models by downsizing the engine. With this change, the workability in narrow places has been improved.

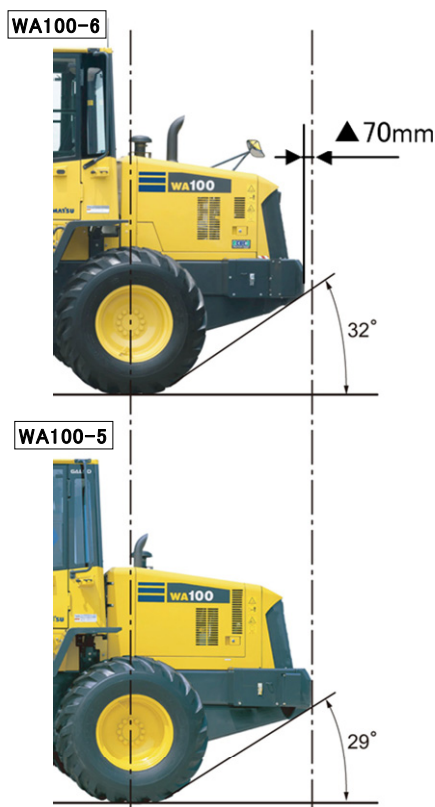


Fig. 9 Rear overhang and departure angle of WA100-6

3.15 Other sales features

- ① Addition of automatic engine warm-up operation function
- ② Addition of function of automatically correcting fuel injection at high altitude
- ③ Employment of temperature-based variable speed cooling fan system
- ④ Employment of high-efficiency ring fan
- ⑤ Equipping with “ECO” indicator
- ⑥ Improvement of rear visibility by changing location of exhaust outlet

4. Conclusion

The former models have been evaluated high as the machines with the HST for their high working efficiency and

low fuel consumption inside and outside Japan.

In the development of the machine this time, we employed the sales features described above in the products to increase the user's advantages in the snow removal and livestock breeding fields in Japan where the wheel loaders are in good demand, in addition to further development of the HST and conformance with the 3rd emission regulations.

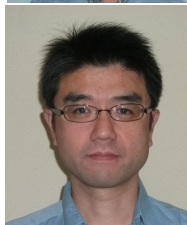
With these improvements, we are expecting that the new models will be evaluated higher.

Introduction of the writers



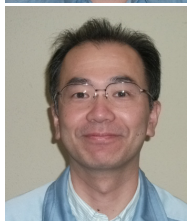
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[A few words from writers]

This time we developed WA100-6 and WA150-6 simultaneously, but it took us longer time to complete WA100-6 because of several troubles to be solved.

However, we did not compromise in keeping quality and succeeded in making up good products in cooperation with the manufacturing plant and other technical centers.

We hope that this result will satisfy Komatsu's customers and the Komatsu's technologies will be evaluated high.