21D, 121D, 221D, 321D
WHEEL LOADER

Service Manual

9-93150NA

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Weights

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	Unit	Value
Engine	kg	250
Front axle	kg	230
Rear axle including distrubutor gear and variable displacement motor	kg	312
Driver's cab	kg	470
Variable displacement pump	kg	30
Variable displacement motor	kg	35
Lifting frame	kg	420
Lifting cylinder	kg	30
Cylinder for quick tool coupler	kg	12
Counterweight	kg	393

Further weights see "Technical Datasheet 21D".

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Caratteristiche Tecniche ***Technical Features***

MACCHINA	**Assale Posteriore - *Rear Axle***	*MACHINE*
CODICE	**CA150147**	*CODE*
MODELLO	**28.20 + TB150**	*MODEL*
TIPO DIFFERENZIALE	**Limited slip**	*DIFFERENTIAL TYPE*

DESCRIZIONE	**VALORI VALUES**	**DESCRIPTION**
Riduzione coppia conica	3.66 / 1	*Bevel gear ratio*
Riduzione riduttore epicicloidale	6.00 / 1	*Epicyclic reduction gear ratio*
Riduzione scatola di trasmissione (T.B.)	2.053 / 1	*Transfer box ratio*
Riduzione totale	45.166 / 1	*Total ratio*
Peso a secco	276 kg	*Dry weight*
Rotazione in entrata SENSO ORARIO SENSO ANTIORARIO	 ○ ●	*Input rotation* *CLOCK WISE (C.W.)* *COUNTER CLOCK WISE (C.C.W.)*
Gioco di accoppiamento coppia conica	0.17÷0.24 mm	*Bevel gear set backlash*
Precarico cuscinetti pignone conico (misurato su D=34.8 mm senza anelli tenuta)	P= 9.2÷13.7 daN	*Pinion bearings preloading (measured on D=34.8 mm without seals)*
Precarico totale cuscinetti corona-pignone (misurato su D=34.8 mm senza anelli tenuta)	T= (P+2.5)÷(P+3.8) daN	*Total pinion-ring gear bearing preloading (measured on D=34.8 mm without seals)*
Quantità olio differenziale	8 litri/*litres*	*Differential oil capacity*
Quantità olio riduttore epicicloidale per lato	0.7 litri/*litres*	*Epicyclic reduction gear oil capacity each side*
Quantità olio scatola di trasmissione	1.0 litri/*litres*	*Trasmission box oil capacity*
Specifica olio: USARE I TIPI DI OLIO INDICATI OPPORTUNAMENTE ADDITIVATI.	API GL4/GL5 rispettivamente *respectively* MIL-L2105/2105 D	*Oil specification:* *USE RECOMMENDED OIL ENRICHED IN ADDITIVES.*
Flangia ingresso differenziale	**Vedi:** Dimensioni d'ingombro ***See:*** *Overall dimensions*	*Pinion-driveshaft interface*
Attacco motore idraulico	**Vedi:** Dimensioni d'ingombro ***See:*** *Overall dimensions*	*Hydraulic motor interface*

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E.1 Troubleshooting

This chapter is a descriptive and explanatory guide to common axle problems. This guide suggests the correct repair procedures to be followed.

Problem	Cause	Action
Ring gear tooth broken on the outer side	1. Excessive gear load compared to the one foreseen 2. Incorrect gear adjustment (excessive backlash) 3. Pinion nut loose	Replace bevel gear set Follow carefully the recommended operations for the adjustment of bevel gear set backlash
Ring gear tooth broken on the inner side	1. Load bump 2. Incorrect gear adjustment (insufficient backlash) 3. Pinion nut loose	Replace bevel gear set Follow carefully the recommended operations for the adjustment of bevel gear set backlash.
Pinion or ring gear teeth worn	1. Insufficient lubrication 2. Contaminated oil 3. Incorrect lubrication or depleted additives 4. Worn out pinion bearings that cause an incorrect pinion axle backlash and wrong contact between pinion and ring.	Replace bevel gear set. Follow carefully the recommended operations for the adjustment of bevel gear set backlash. Use correct lubricants, fill up to the right levels and replace according to the recommended program.
Overheated ring and pinion teeth. See if gear teeth have faded	1. Prolong ed functioning at high temperatures 2. Incorrect lubrication 3. Low oil level 4. Contaminated oil	Replace bevel gear set. Use proper lubrication, fill up to right level and replace at recommended program.
Pinion teeth pitting	1. Excessive use 2. Insufficient lubrication	Replace bevel gear set. Use correct lubrication, fill up to the right level and substitute at recommended intervals
Axle beam body bent	1. Vehicle over loaded 2. Vehicle's accident 3. Load bump	Replace axle beam body
Worn out or pitted bearings	1. Insufficient lubrication 2. Contaminated oil 3. Excessive use 4. Normal wear out 5. Pinion nut loosened	Replace bearings. Use correct lubrication fill up, to the right level and replace at recommended intervals
Oil leakage form gaskets and seals	1. Prolonged functioning at high temperature of the oil 2. Oil gasket assembled incorrectly 3. Seal lip damaged 4. Contaminated oil	Replace the gasket or seal and matching surface if damaged. Use correct lubrication and replace at recommended intervals.
Excessive wearing out of input flange spline	1. Exhaustive use 2. Pinion nut loosened 3. Pinion axle backlash	Replace the flange. Check that the pinion spline is not excessively worn out. Replace bevel gear set if required.
Fatigue failure of pinion teeth See if the fracture line is well defined (wave lines, beach lines)	1. Exhaustive use 2. Continuous overload	Replace bevel gear set
Pinion and ring teeth breakage	1. Crash load of differential components	Check and/or replace other differential components.

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Hydraulic circuit diagram, key

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1 - Diesel engine
2 - Double pump steering and working hydraulics / braking system and fan drive
9 - Front axle
10 - Rear axle
T1 - Hydraulic reservoir
T2 - Combined radiator
T3 - Hydraulic oil return-flow filter with bypass
T4 - Non-return valve
T5 - Non-return valve
T6 - Non-return valve
T7 - Distributor with non-return valves
L1 - Steering cylinder
L2 - Steering valve
L3 - Secondary valves steering
L4 - Primary valve steering
L5 - Non-return valve
L6 - Priority valve
L7 - Valve block for emergency steering
H1 - Lifting cylinder
H2 - Tipping cylinder
H3 - Quick tool coupler locking cylinder
H4 - Hydraulic cylinder 3rd function
H5 - Solenoid for quick tool coupler locking device
H6 - Control block working hydraulics
H7 - Secondary valve "back-tipping" with replenishing valve
H8 - Secondary valve "Dumping" with replenishing valve
H9 - Primary valve
H10 - Replenishing valve
H11 - Pressure-maintaining valve "Lifting / Lowering"
H12 - Pressure-maintaining valve "Dumping"
H13 - Pressure-maintaining valve "3rd function"
H14 - Control piston "Lifting / Lowering / Floating position"
H15 - Control piston "Back-tipping-Dumping"
H16 - Control piston "3rd function"
H17 - Hydraulic pump steering and working hydraulics
H18 - Secondary valve "3rd function"
H19 - Secondary valve "3rd function"
H20 - Secondary valve "Lifting" with replenishing valve
H21 - Valve block "OLS" with pressure accumulator
H22 - Pipe-break protection lifting cyinder
H23 - Pipe-break protection dumping cyinder
B1 - Brake oil and fan pump
B2 - Accumulator charging valve
B4 - Brake accumulator
B5 - Pedal braking valve
B6 - Pressure switch stop light
B7 - Pressure switch accumulator warning
B8 - Sequence valve
B9 - Disk brake
B10 - Inching valve
B11 - Multiple-disk brake
B12 - Pressure switch fast-speed select
B13 - Restrictor non-return valve
K2 - Fan motor
K3 - Pressure relief valve for fan motor
K4 - Replenishing valve
A1 - Feed circuit filter
A2 - Feed pump
A3 - Axial piston variable displacement pump
A4 - High-pressure relief valves, pilot-controlled
A5 - Replenishing valves
A7 - Regulator valve
A8 - Pressure cut-off
A9 - Feed pressure relief valve
A10 - Restrictor
A11 - Electromagnetic switching valve for forward and reverse travel
A13 - Adjusting cylinder forward / reverse / neutral
A15 - Axial piston oil motor
A16 - Non-return valve
A17 - Electromagnetic switching valve for slow-speed range
A18 - Adjusting cylinder for displacement volume circuit
A19 - Valve block fast-speed switch-over
A20 - Adjusting piston fast-speed switch-over
A21 - Flushing valve
A22 - Feed-pressure valve
A23 - Travel direction valve

Pressure measuring ports

P_H - Pump pressure for working and steering hydraulics

P_{SP} - Feed pressure

P_{HD} - Travel high pressure

P_{HD^*} - Travel high pressure (at travel motor)

P_{in} - Inching pressure

P_{BR} - Braking pressure (to service brakes)

X_1 - Adjusting pressure

X_2 - Adjusting pressure

M1 - Regulation start (travel motor)

VA - Contamination indicator (filter)

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