

# Workshop Manual

---

---

---

# 20F 20FS

WHEEL LOADER

**KOMATSU**



**KOMATSU  
HANOMAG**

Workshop Manual

**Wheel Loader  
20F 20FS**

VEBM200100



## How to use the present publication

The present workshop manual and training handbook doubles as material for the theoretical part of our service training courses and as reference book for skilled construction equipment mechanics in the workshop and in the field.

The present publication breaks down into two sections :

### **Section 1**

Corresponds to the operators manual and includes a description of the inspection and maintenance operations and technical instructions.

### **Section 2**

Comprises functional descriptions and repair instructions.

For repair instructions of units and part assemblies that go beyond the scope of the present handbook refer to the relevant repair manuals that are available when attending the relevant training course.

All technical data, descriptions of units and illustrations are based on information applicable at the time of printing of this publication or any amendment to it.

Specifications are subject to change without notice, to make allowance for continuous product development.

No claim whatever can be derived from the information contained in this publication.

## TABLE OF CONTENTS

	<b>Page</b>
Preface	0-2
Description of the machine	0-7
Machine identification	0-8
Noise emission levels; Vibration levels	0-11
Dimensions, weights	0-12
Loading and bracing	0-16
<b>Safety precautions</b>	
Warning information and symbols	1-1
Use as intended	1-1
Organizational measures	1-1
Personnel selection, qualification and basic duties	1-2
Notes on safety in particular phases of operation	1-3
References to specific hazards	1-6
Hauling, towing and re-commissioning	1-8
Operation	1-9
Safety covers	1-9
Genuine HANOMAG spare parts	1-9
Parking the machine	1-10
Articulation lock	1-10
Locking the control levers; Supporting the engine cover	1-13
Safety precautions: Machines with forks	1-15
Driving; handling and stacking loads	1-16
Environmentally acceptable use of the machine	1-17

## TABLE OF CONTENTS

	<b>Page</b>
<b>Instruments and controls</b> .....	2-3
Symbols .....	2-4
Starter switch; Socket .....	2-7
Service hour meter; Engine coolant temperature gauge; Fuel gauge; Fuel tank .....	2-8
Warning lights for parking brake, battery charging, engine oil pressure; Air cleaner service indicator .....	2-11
Lighting; Turn signals; Horn .....	2-12
Windscreen wiper, windscreen washer .....	2-15
Cab doors .....	2-16
Operator's seat .....	2-19
Stowage compartment; Engine cover .....	2-20
Heating and ventilating system .....	2-23
<b>Operation</b>	
Starting and stopping the engine; Flame start system .....	3-2
Transmission lever .....	3-5
Accelerator pedal; Brake pedal .....	3-6
Parking brake; Steering system .....	3-9
Stopping the machine .....	3-10
Driving on the road .....	3-13
Towing the machine .....	3-14
<b>Loader hydraulics</b>	
Control levers .....	3-17
Arm rest; Locking the control levers .....	3-18
Bucket position indicator .....	3-21
Quick-attach coupler .....	3-22
Quick-attach coupler (4-in-1 bucket) .....	3-25

## TABLE OF CONTENTS

	<b>Page</b>
<b>INSPECTION AND MAINTENANCE</b>	
<b>Running-in period</b> .....	4-1
<b>Inspection and maintenance chart</b> .....	4-3
<b>Lubricant, fuel and coolant specifications; refill capacities</b> .....	4-4
Lubricants:                    Engine oils, hydraulic oils, gear oils.....	4-5
Diesel fuels.....	4-6
Cooling system protection .....	4-7
 <b>Description of the inspection and maintenance operations</b>	
Engine	Oil level ..... 4-8
	Oil change; Oil filter element; Crankcase breather .. 4-11
	Valve clearance; Fuel injectors..... 4-12
	Drive belt tension..... 4-16
Fuel system	Fuel tank ..... 4-19
	Water separator ..... 4-20
	Fuel filter ..... 4-23
	Priming the fuel system ..... 4-24
Cooling system	Coolant level..... 4-28
	Changing the coolant..... 4-31
	Cleaning the radiator..... 4-31
Air cleaner	Main filter element ..... 4-32
	Safety element ..... 4-39
Battery	Electrolyte level and state of charge..... 4-40
Front axle	Oil level; Oil change..... 4-43
Rear axle	Oil level; Oil change..... 4-44
Transfer gear	Oil level; Oil change..... 4-47
Service brake	Oil level ..... 4-51
	Changing the oil; Bleeding..... 4-52
	Brake disc wear ..... 4-55
Parking brake	Adjusting ..... 4-59
Hydraulic system	Oil level; Adding oil; Pressurizing the oil tank ..... 4-60
	Oil change..... 4-63
	Filter elements ..... 4-64
Lubricating the machine	Articulation joint, steering cylinder; Door hinges .... 4-67
	Universal shafts ..... 4-68
Lubricating the equipment	Loader arms; Bucket cylinder; Tilt lever;
	Tilt link; Lift cylinder; Quick-attach coupler ..... 4-71
System pressures	Checking..... 4-72

## TABLE OF CONTENTS

	<b>Page</b>
<b>Technical data</b>	
Dimensions; Weights.....	5-1
Engine.....	5-2
Drive system; Travel speeds; Axles; Brakes.....	5-3
Steering system; Electrical system; Equipment hydraulics.....	5-4
Equipment (Bucket).....	5-5
(4-in-1 bucket).....	5-6
(Forks).....	5-6
Buckets.....	5-7
Tyres and inflation pressures.....	5-9
<b>Winter operation.....</b>	<b>5-10</b>
<b>Cleaning the paintwork.....</b>	<b>5-11</b>
<b>Long-term storage of the machine.....</b>	<b>5-12</b>
<b>Electrical system .....</b>	<b>5-15</b>
Battery master switch.....	5-16
Central electrical system: Fuses; Relays.....	5-19
Wiring diagram .....	5-20

## Section 2

### Order of Groups

1.	Test certificate and measuring points	6-1
2.	Tightening torques; general information	7-1
3.	Engine	8-1
4.	Drive system	9-1
5.	Steering system	10-1
6.	Loader hydraulic system	11-1
7.	Frame	12-1
8.	Axles and brakes	13-1



## DESCRIPTION OF THE MACHINE

This wheel loader is a result of continuous product development and extension of our line of tried and tested advanced-design wheel loaders.

The machine consists of a front and a rear frame which are connected by an oscillating joint to allow wide articulation to either side. Steering of the machine is by a hydrostatic power steering system. The front frame supports the working equipment. The rear frame with integrated hydraulic oil tank supports the engine, the hydrostatic drive and the operator's cab.

The water-cooled diesel engine uses a direct injection fuel system and provides economy and reliability of operation.

Engine power is transferred to the drive axles through a hydrostatic drive system using a variable-displacement pump and a variable-displacement motor. The single-stage transfer gear is mounted at the rear axle. Directional changes are effected by reversing the direction of delivery of the variable-displacement pump. Control of the two-stage drive system is electric with full power shifting.

The service brake is designed as a hydrostatic brake. Operation of the brake pedal (inching pedal) produces the braking action by means of a reduction of oil flow. The inching valve can be used to achieve modulated deceleration of the machine, independent of speed and rolling resistance. Additional braking action is produced by hydraulically actuated multiple-disc brakes mounted in the rear axle. The parking brake acts mechanically using the same disc pack.

The machine is equipped with rugged planetary rigid axles featuring self-locking differentials.

The high breakout forces can be attributed essentially to the Z-bar linkage geometry. In tough applications (breakout and tilt back), oil pressure is exerted on the larger piston area of the bucket cylinder to produce high breakout forces. When the bucket is dumped, however, pressure is exerted on the smaller piston area so that a higher dumping speed can be attained.

The wheel loader is one of the new generation of small loaders. Universal application, high performance and economy make the machine a real all-rounder. Because of its excellent manoeuvrability and wide variety of attachments, it will be the right machine in all material handling applications, be it in building firms, large enterprises, wholesale firms, warehouses, industry, municipalities, or in landscaping works.

## MACHINE IDENTIFICATION

In order for us to provide you, the customer, with an efficient and speedy after-sales service, please quote the following information when communicating with our After Sales Service organization on any matter regarding operation, maintenance and servicing of the machine:

Machine Model: \_\_\_\_\_  
Serial Number: \_\_\_\_\_  
Engine Number: \_\_\_\_\_  
Machine delivery date: \_\_\_\_\_  
Service hours completed: \_\_\_\_\_

Enter the details in the spaces provided above so that they are readily available whenever required.

### Identification plate and number locations

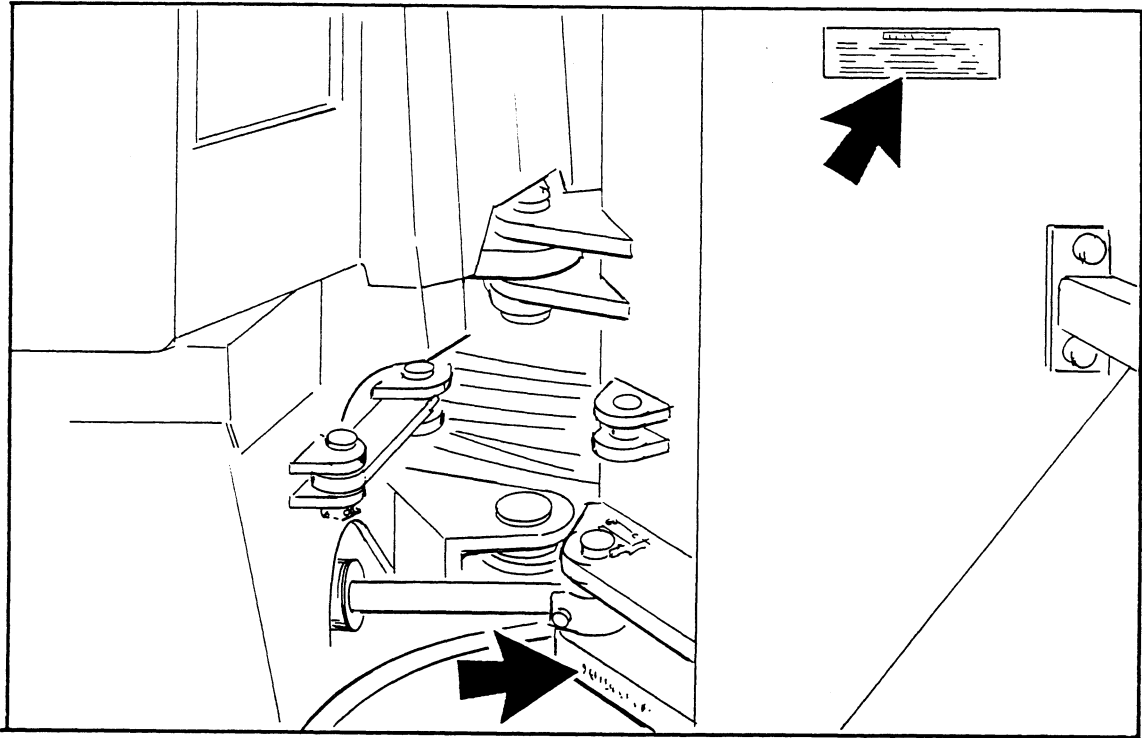
#### **Fig. R 490**

Model identification plate

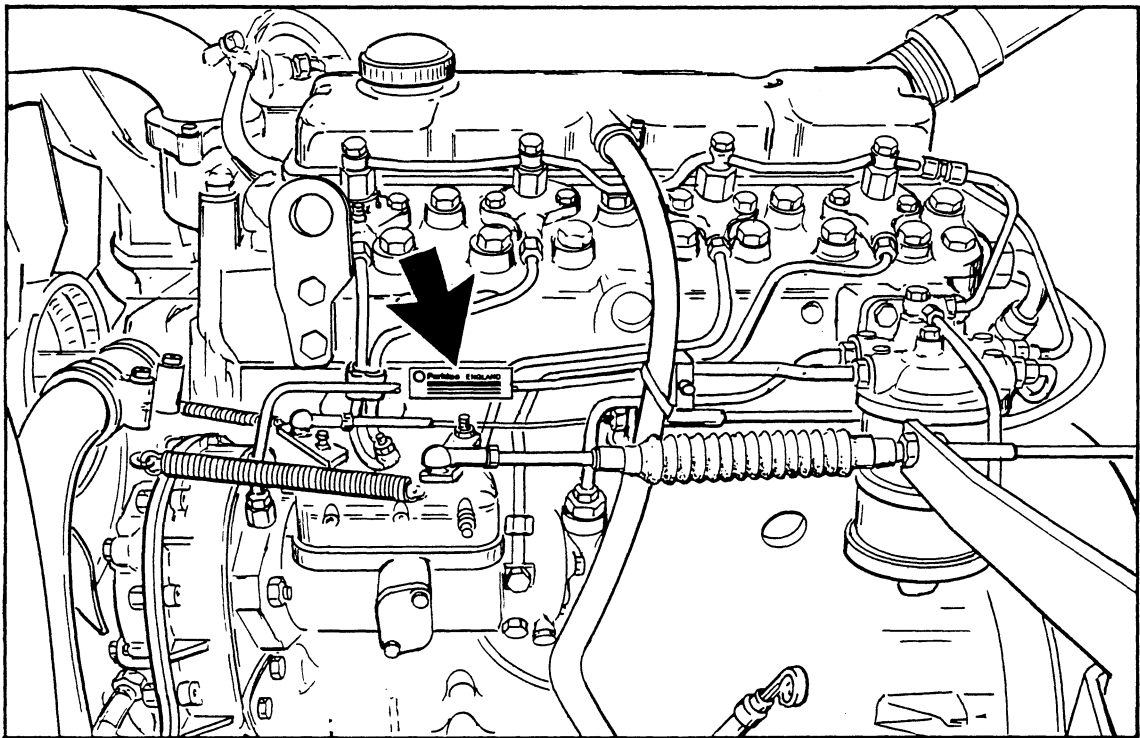
Machine serial number

#### **Fig. R 491**

Engine number



R 490



R 491



## **NOISE EMISSION LEVELS**

The EC directive requires attachment of two plates indicating the machine noise levels:

According to EC directive 86/662:

1 plate for the sound pressure level  $L_{pA} = 78 \text{ dB/A}$

1 plate for the sound power level  $L_{WA} = 98 \text{ dB/A}$

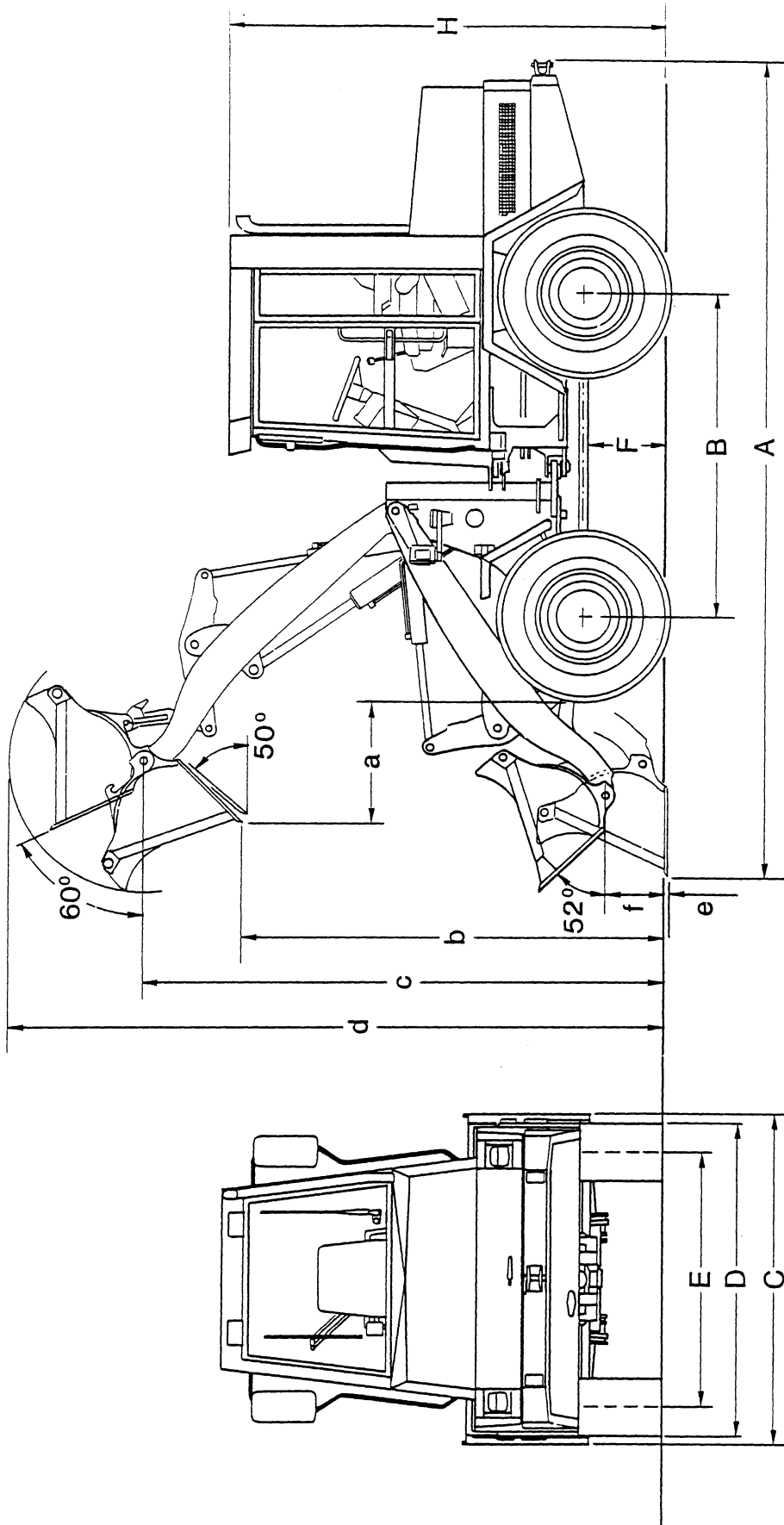
According to RAL UZ 53:

1 plate for the sound pressure level  $L_{pA} = 77 \text{ dB/A}$

1 plate for the sound power level  $L_{WA} = 98 \text{ dB/A}$

## **VIBRATION LEVELS**

When the machine is used as intended, the evaluated vibration acceleration "a<sub>zw</sub>" measured in accordance with ISO 2631, Part 1, is between 0.25 m/s<sup>2</sup> and 2.50 m/s<sup>2</sup>.



## Dimensions

## Operating data

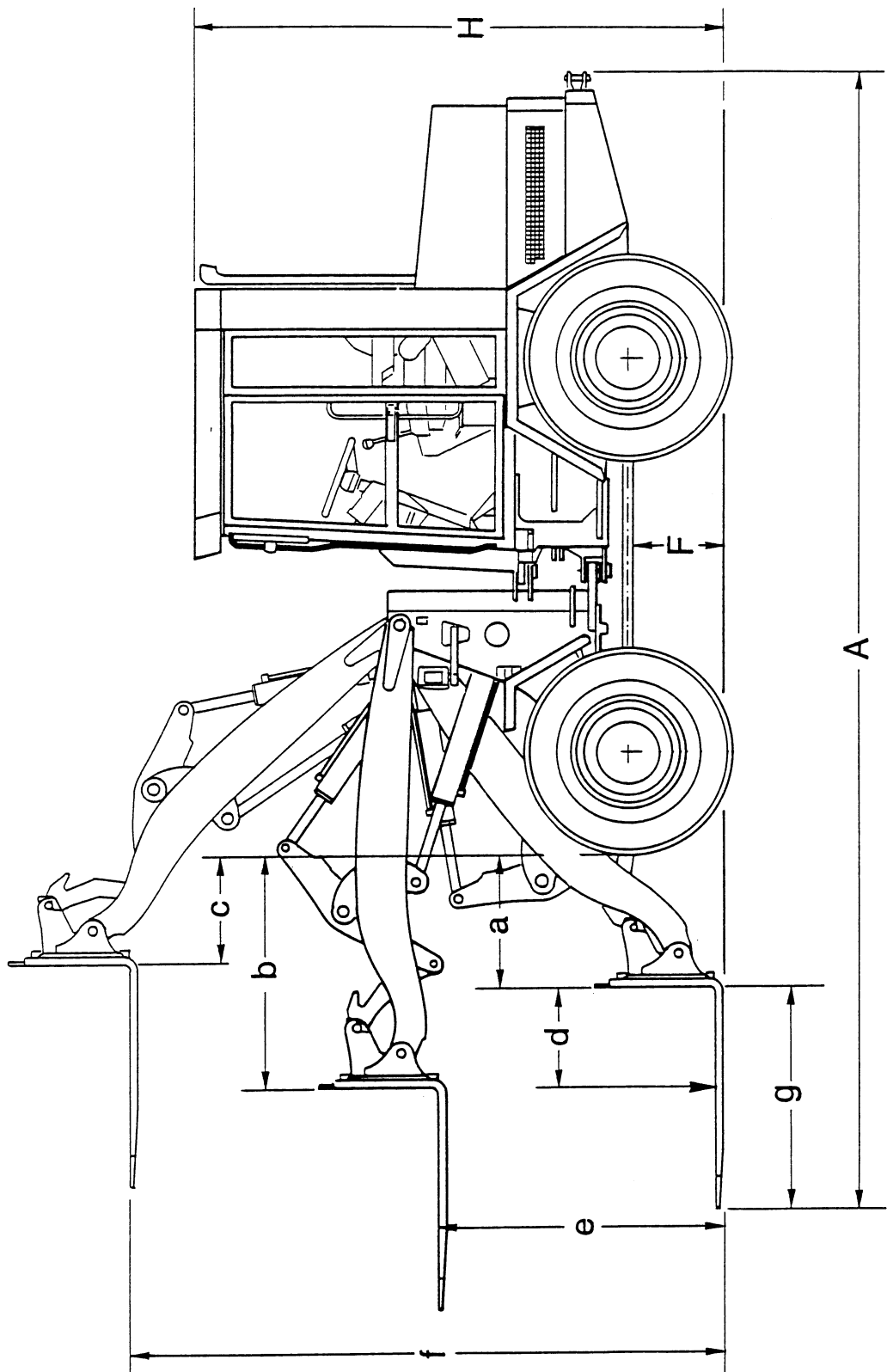
Buckets (SAE heaped)	m <sup>3</sup>	0.9 (m.p.bkt.)	1.0	1.25	1.60
Material density	t/m <sup>3</sup>	1.8	1.8	1.5	1.1
Bucket weight incl. teeth	kg	660	380	470	550
Static tipping load, straight	kg	4540	4600	4460	4380
Static tipping load, 40° articulated	kg	3890	3980	3840	3760
Hydr. breakout force	kN	56.3	70.2	58.3	50.2
Hydr. lifting force	kN	57.4	55.3	55.2	55.0
Operating weight	kg	5960	5680	5770	5850
a Reach at full lift, 45° discharge	mm	919	820	902	997
b Dump height, 45° discharge	mm	2581	2720	2598	2503
c Lift height, hinge pin	mm	3395	3395	3395	3395
d Overall lift height	mm	4375	4410	4455	4530
e Digging depth at 0°	mm	101	72	101	101
f Bucket height, carry position	mm	350	350	350	350
A Overall length	mm	5770	5580	5740	5880
B Wheelbase	mm	2150	2150	2150	2150
C Bucket width	mm	2100	2100	2100	2100
D Width less bucket	mm	2010	2010	2010	2010
E Gauge	mm	1590	1590	1590	1590
F/F <sub>1</sub> Ground clearance	mm	490/390	490/390	490/390	490/390
H Overall height	mm	2730	2730	2730	2730

2011/1

All specifications refer to 405/70 R20 SPT 9 tyres.

Please enquire for further bucket sizes.

All details and specifications subject to change without notice.





## FORKS

a	=	Reach with forks at ground level	810 mm
b	=	Reach with forks at height "e"	1330 mm
c	=	Reach with forks at maximum height	590 mm
d	=	Load centre distance	500 mm
e	=	Maximum reach at 1460 mm height	
f	=	Maximum height	3155 mm
g	=	Fork tine length	1200 mm

	<u>Straight</u>	<u>Articulated</u>
Static tipping load, DIN 24094 *	3320 kg	2900 kg
Load centre distance	500 mm	500 mm
Payload	2660 kg	2320 kg

\* Stability factor: 1.25 (level ground, straight)  
2.0 (rough terrain)

## **LOADING AND BRACING**

### **Fig. R 513**

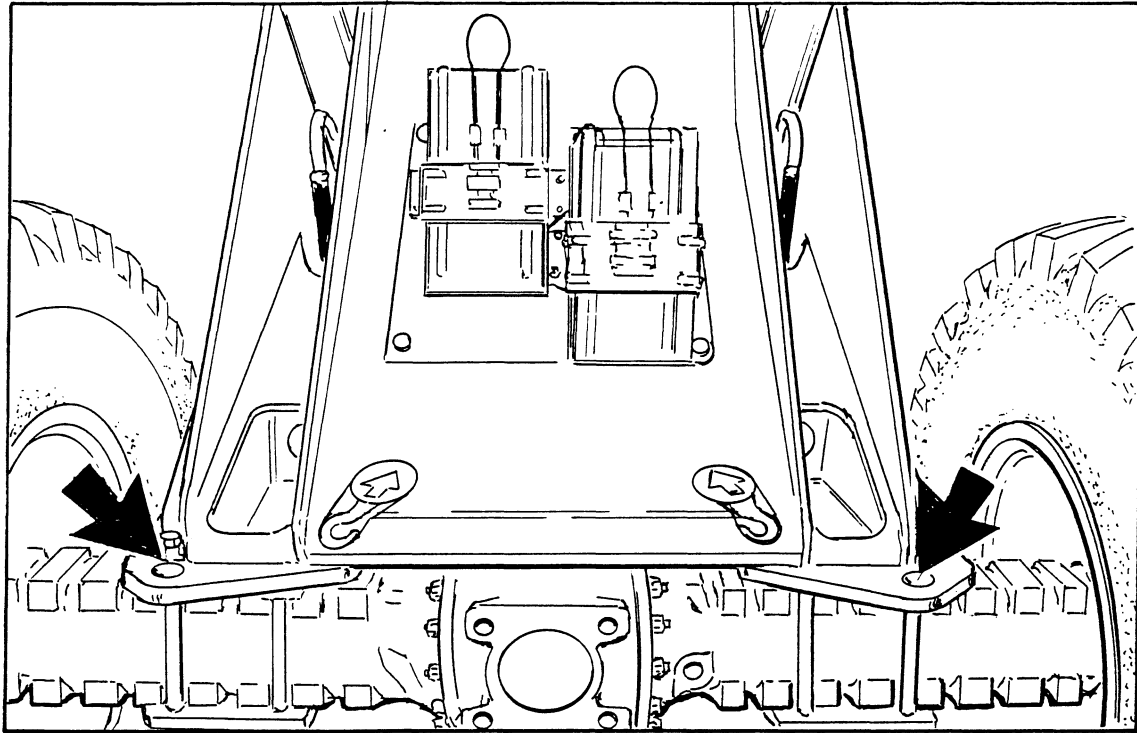
Front attachment points for lifting and bracing.

### **Fig. R 464**

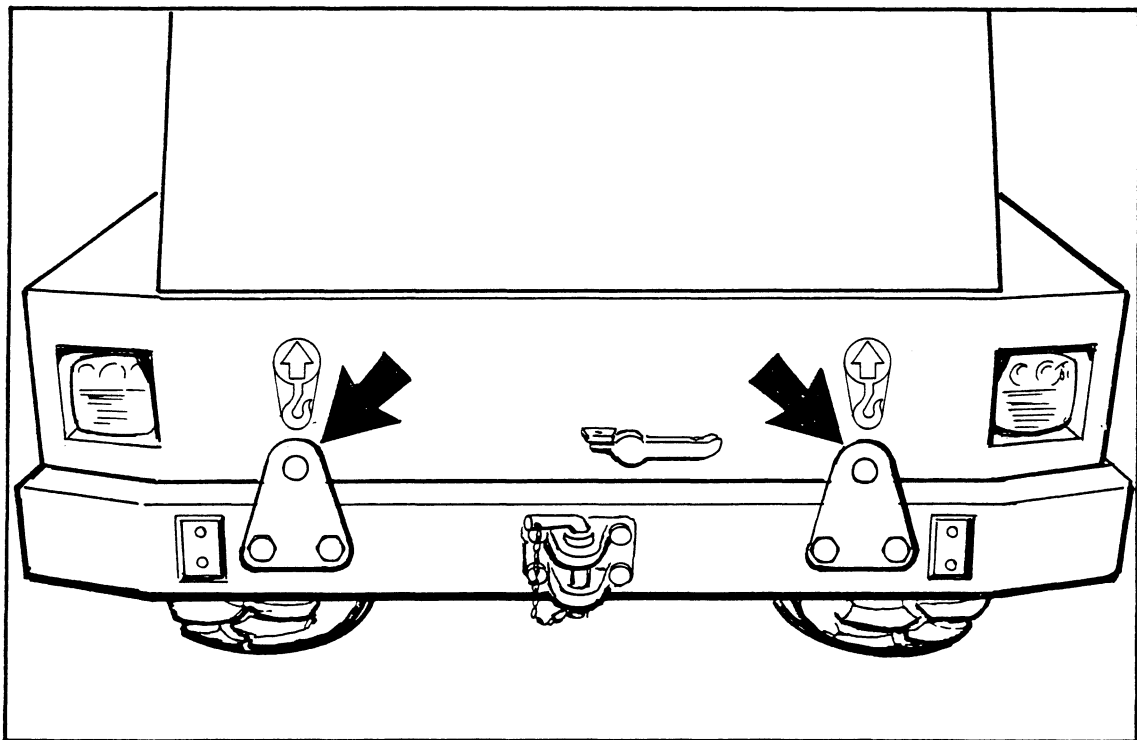
Rear attachment points for lifting and bracing.

#### **Notes:**

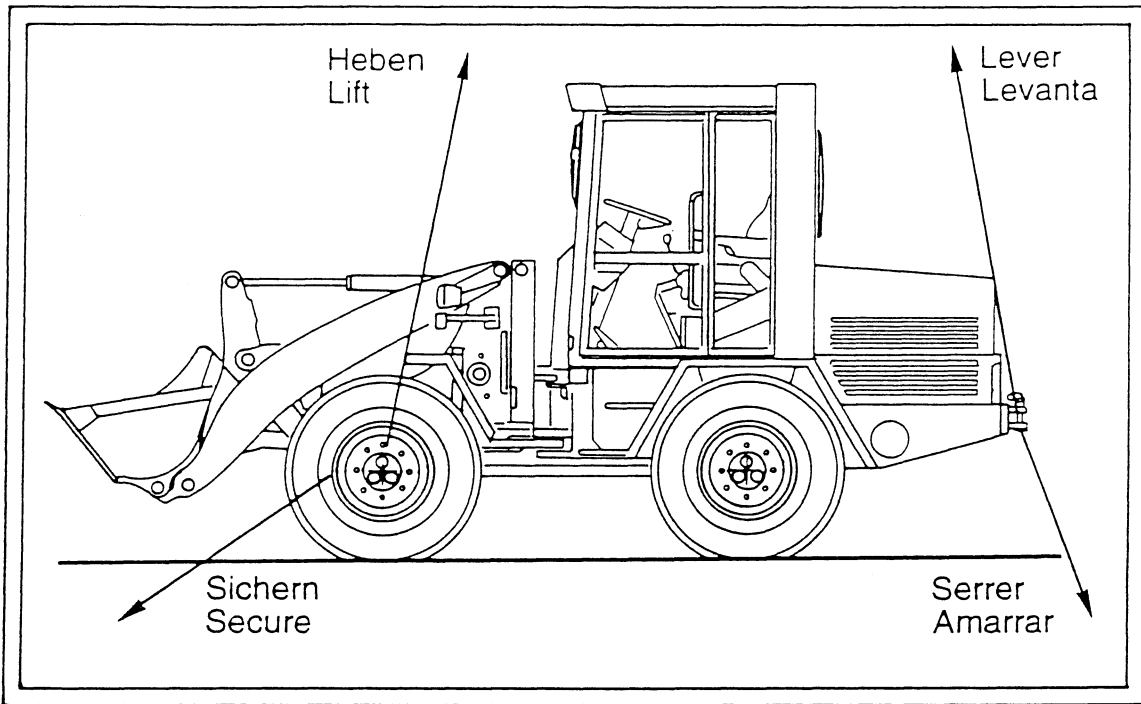
- (a) The lifting brackets are to be found in the stowage compartment of the operator's cab.
- (b) For bracing purposes, use may also be made of the towing hitch.



R 513



R464



R465