TADANO

Publication No. RTF100-4/O5-1E

# Operation and Maintenance Manual

## Carrier

## Model RTF100-4

Applicable Serial No. WFN4RTBN1 R4080131～

**⚠ CAUTION: Read this manual before operating the crane. Save this manual for future reference.**

TADANO LTD.

Operation and Maintenance Manual

RTF100-4/O5-1E

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## Table of Contents



### Section A) Technical Details

# PREFACE

## Handling

The Operating Manual covers the machine model supplied, however also any possibly available optional equipment. The information desired can be found easily via the Table of Contents.

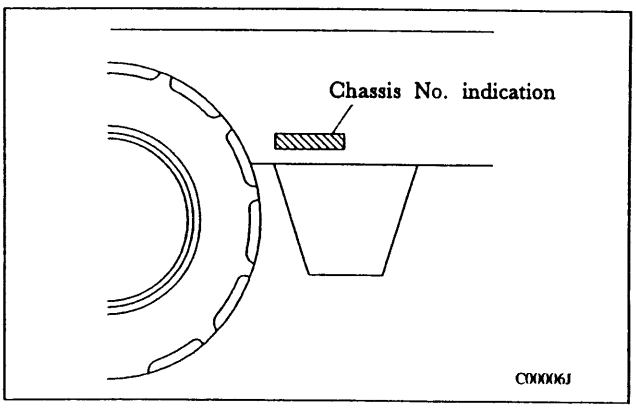
The controls, gauges and switches installed in the driver's cab (at the driver's place) are mentioned on many pages of this Operating Manual. Therefore they are illustrated on folding leaflets at the end of the sections "Operating Instructions - Chassis" or "- Superstructure". When you open the folding leaflets, you may compare them with any text page.

The Figures shown in the Operating Manual may deviate from the machine model actually supplied. This however does not prejudice their relevancy.

Please adhere also to the additional brochures comprized in the set of vehicle documents.

## Chassis No. Indication

The chassis No. is stamped on the right side of the frame, between the 1st and 2nd axles.

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## 2.10 Instruments

Speedometer and mileage recorder, engine revolution counter, fuelmeter, oil pressure pilot lamp, air pressure gauge, engine temperature indicator and pilot lamp, tachograph, hourmeter, transmission oil temperature indicator.

## 2:11 Driver's cab

Front cab for two persons of steel / plastic composite design, windhsield of laminated safety glass, rear and lateral panes made of tempered glass, lateral panes movable.
Spring-suspended driver's seat, roof ventilation, windshield wipers, electrically actuated windshield washing system, 2 rearview mirrors, additional rearview mirrors on the right, assisting in starting.

## 2.12 Heating system

Engine-fed warm water heating system with defroster nozzles for the windshield and air vents for the foot compartment. Optional equipment: TRUMATIC gas heater unit as supplementary heating system.

## 2.13 Frame

The frame is a torsion-resistant and rigid steel structure of box girder design. The rear cross member is provided so as to enable attachment of a trailer coupling device with a D value of 9.5 tons.
Double outrigger casings are integrated on the front and rear ends of the frame.

## 2.14 Outriggers

4 outrigger girders, which can be extended hydraulically to a supporting base up to 7.20 m. Deblockable non-return valves at the outrigger cylinders.
Large-size supporting plates, which can be left on the outriggers during on-road travel, and which can be removed to increase the overhang angle.
Control is effected by means of electro-magnetically operated servo valve spools, independently for each vertical cylinder and for each horizontal cylinder.
Checking of outrigger operation is possible on both sides of the chassis by means of spirit levels.

Operator control:
Extending / retracting the outrigger girders is possible from both sides.
Extending / retracting the outrigger cylinders is possible from both sides.

## 3.4 Monitoring the indicating, pilot and warning lamps as well as the instruments while the engine is running

### 3.4.1 Monitoring the fuel level indicator

If the hand in the instrument **35** drops close to the zero indication, fuel must be topped up in time.

**NOTE**
Make sure that the fuel tank is never completely emptied, as otherwise air may get into the fuel system. Consequently the system would have to be bled completely, and filters and piping assemblies would have to be cleansed.

Caution
**Danger of explosion: Do not smoke; do not use any open flames; to fill the fuel tank, make sure the engine does not run and the machine is parked in horizontal position.**

### 3.4.2 Monitoring the engine

#### 3.4.2.1 Monitoring the engine oil pressure

The engine oil pressure is monitored by the warning lamp **7**. If the oil pressure drops below 0.5 bar, this lamp goes on.
If the pressure is slightly below this value, or when the warning lamp goes on for a short moment, this is admissible when the pilot lamp goes out immediately as the engine speed increases.
The warning lamp must have gone out at an engine speed of approx. 650 r.p.m. If the warning lamp remains ON, stop the engine immediately and find out the reason.

#### 3.4.2.2 Monitoring the generator

As soon as the engine is running, the pilot lamp 6 must go out. If it does not go out, or if it goes on during traveling operation, there is a malfunction and the batteries are not charged.
Make sure that the problem is eliminated as soon as possible in a special workshop. The batteries must always be fully charged.

#### 3.4.2.3 Monitoring the engine temperature

The engine temperature is monitored by the instrument **39** and a warning lamp **26**. If the engine temperature exceeds the maximum admissible rating, the pilot lamp goes on and the hand of the instrument moves into the red area. The admissible service temperature and the remedial measures to be taken in case of excess temperature are specified in the operating manual of the engine manufacturer.

#### 3.4.2.4 Monitoring the engine's cooling water level

A probe installed in the compensating tank monitors the cooling water level. When the level is too low, the pilot lamp **25**, which is installed in the dashboard, goes on.
Find out the reason and top up coolant via the filler orifice in the compensating tank.

### 4.1.2.1 Creeping speed (cont'd.)

#### 4.1.2.1.1 Engaging the creeping speed

- Stop the vehicle, or reduce the driving speed to less than 1 km.p.h.
- Set the gearshift selector lever to neutral position "N".
- Connect the front axle drive(s) (refer to item 4.1.3.1). The pilot lamp **12** goes on.
- Actuate the rocker tip switch **55**; the creeping speed is engaged. The pilot lamp **11** "creeping speed ENGAGED" will go on.
- Select a suitable gearstep in accordance to the terrain conditions.
- Accelerate tenderly.

#### 4.1.2.1.2 Disengaging the creeping speed

- Stop the vehicle, or reduce the driving speed to less than 1 km.p.h.
- Set the gearshift selector lever to neutral position "N".
- Actuate the rocker tip switch **55**; the pilot lamp **11** will go out. The creeping speed is disengaged.
- Disengage the front axle drive(s) (refer to item 4.1.3.3). The pilot lamp **12** goes out.

**NOTE:**

When engaging or disengaging the creeping speed, strictly adhere to the sequence of operations described above.

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## 6 Operation in winter time

**NOTE:**
The recommendations as to oil sorts provided in chapter "C" are to be adhered to for the following components.

### 6.1 Engine

#### 6.1.1 Engine oil for operation in winter time

In order to ensure a sufficient lubrication in case the vehicle is to be started at low ambient temperatures, the viscosity of the engine oil must be selected according to the ambient temperatures prevailing at the time before the engine is started.
Adhere to the specifications of the engine manufacturer.

#### 6.1.2 Coolant in water-cooled engines

The coolant must be checked for a sufficient portion of anti-freeze agent in time, before the temperature drops below zero.
Adhere to the specifications of the engine manufacturer.

#### 6.1.3 Diesel fuels for operation in winter time

In order to avoid operating malfunctions, the winter diesel fuel available on the market during the cold season must be used. If only summer-type diesel fuel is available, or if winter-type diesel fuel is used at very low ambient temperatures, a certain amount of petroleum, the quantity of which depends on the ambient temperatures, must be added to the fuel in order to avoid segregation of paraffin.
The approximate values for the amount of additive are indicated in the operating manual of the engine manufacturer.
The diesel fuel can be checked in a simple way for its being appropriate for the prevailing low temperatures:

- Fill diesel fuel into a flask and expose it to the ambient temperatures. If flakes are forming in the fuel (paraffin), the latter is suited only for operation at higher temperatures.

#### 6.1.4 Starting the engine at low ambient temperatures

For steps to be taken and further details, please refer to the brochure of the engine manufacturer.

## 1.5 Tightening torques of screws and bolts

The maximum admissible tightening torque of securing bolts depends on the quality grade and on the thread size.

| Thread size (mm) | Wrench size (mm) | | Tightening torques (Nm) | |
|---|---|---|---|---|
| | Hexagon bolt | Fillister-head screw | Grade 8.8 | Grade 10.9 |
| M 8 | 13 | 6 | 23 | 34 |
| M 8x1 | | | 25 | 37 |
| M 10 | 17 | 8 | 46 | 67 |
| M 10x1.25 | | | 49 | 71 |
| M 12 | 19 | 10 | 79 | 115 |
| M 12x1.5 | | | 83 | 120 |
| M 14 | 22 | 12 | 125 | 185 |
| M 14x1.5 | | | 135 | 200 |
| M 16 | 24 | 14 | 195 | 290 |
| M 16x1.5 | | | 210 | 310 |
| M 18 | 27 | 14 | 280 | 400 |
| M 18x1.5 | | | 315 | 450 |
| M 20 | 30 | 17 | 395 | 510 |
| M 20x1.5 | | | 440 | 630 |
| M 22 | 32 | 17 | 540 | 760 |
| M 22x1.5 | | | 590 | 840 |
| M 24 | 36 | 19 | 680 | 970 |
| M 24x1.5 | | | 740 | 1050 |

## 7 Hydraulic system of chassis

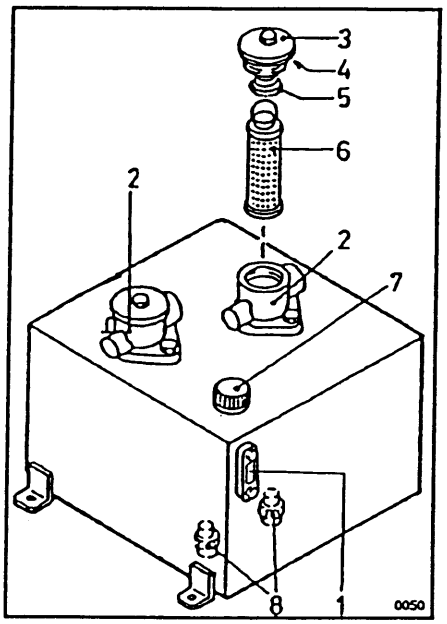
The steering, the outriggers and the suspension are supplied with oil from one common oil tank.

### 7.1 Inspection of hydraulic oil level

Check the oil level only when the engine does not run and when all the outrigger cylinders are retracted.

- Check the oil level with the oil level gauge (1).
- The oil level must not fall below the "min." mark; if necessary, add oil until the level reaches the "max." mark (corresponds to approx. 12.1).

- Fill in oil through of one of the two filters in the return pipe (2 or 3), after having unscrewed the filter cover.
- Check seal (4) for leakages; position cover carefully and tighten it safely.




### 7.2 Replacement of filter cartridges

The filter cartridges (6) must be replaced when the warning lamp 24 goes on.

- Unscrew the filter cover (3).
- Remove the retaining spring (5).
- Lift filter cartridges (6) out.
- Insert new filter cartridges carefully into the filter pipe.
- Position the spring (5); check the seal (4) of the filter cover (3) for damage and tighten filter cover safely.

### 7.3 Replacement of ventilation filter

- If the ventilation filter is dirty or clogged, remove the filter cap (7) and renew the ventilation filter by a new element.

### 7.4 Oilchange in the hydraulic tank

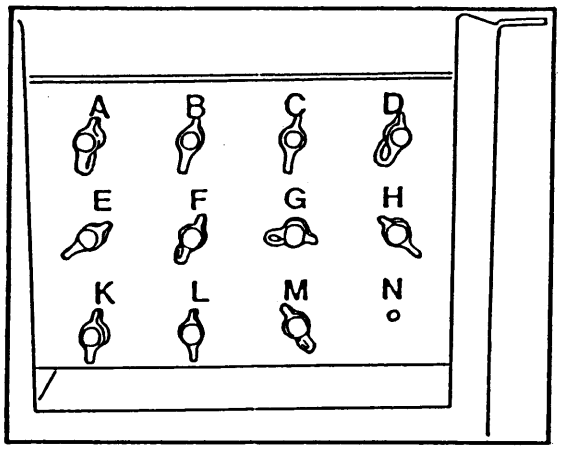
- Release (**but do not unscrew**) the drain plugs (8), until oil escapes. Drain oil completely.
- Close the drain plugs.
- Replace the filter cartridges as it is described under item 7.2.
- Fill in new oil as it is described under item 7.1.

**NOTE**
Take an oil sample at regular intervals. Have the sample analyzed by the oil supplier. The percentage purity must meet ISO 1613 requirements.
On oilchange, make sure to fill in only clean oil.
Filters and used oil must be disposed of in a way not harmful to the environment.

**Filters and used oil must be disposed of in a way not harmful to the environment.**

## 8.7 Test connectors for inspection of the compressed air brake system

As required by the legal provisions of the country where the machine is to be operated (in FRG "Special Brake Inspection" to § 29 StVZO [Federal Motor Vehicle Safety Standards]), the brakes system must be checked by a brakes repair service according to the inspection provisions. To this effect, a portable tester is required. (Test instructions available on request.)




The test connectors are arranged on a test panel on the left side of the vehicle, between the 2nd and the 3rd axles.

| Item | Scope of test and inspection works |
|---|---|
| A | Supply pipe connecting the air compressor to the four-circuit protective valve (supply pipe) |
| B | Reserve pressure, service brake circuit I (BBA I) |
| C | Reserve pressure, service brake circuit II (BBA II) |
| D | Reserve pressure, auxiliary and parking brake (HBA/FBA) |
| E | Reserve pressure, secondary consumers (NVA) |
| F | Line pressure, service brake circuit (BBA I) upstream of matching valve and the two pressure reducing valves |
| G | Brake pressure, diaphragm cylinder, 3rd axle |
| H | Brake pressure, diaphragm cylinder, 4th axle |
| K | Line pressure, air accumulator cylinder, 2nd axle |
| L | Line pressure, air accumulator cylinder, 3rd and 4th axles |
| M | Line pressure, service brake circuit I (BBA I), downstream of the matching valve, however upstream of the pressure limiting valve |
| N | Filler socket for releasing of the air accumulator cylinders |

Test connector on the 2nd axle, left - hand (diaphragm cylinder). Brake pressure, circuit II



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## 12 Air condition

**Attention**
**Repairs, topping up or overhauling works of any kind at the air condition system may be effected only in a specialized workshop by well-trained expert staff.**
**Works at the air condition require specific extraction and filling stations, recovery stations, electronic leakage detectors and special tools, which are available only in special workshops. Therefore correct disposal of dangerous fluids is ensured just as well only in a special workshop.**

### 12.1 Functional check of air condition

The air condition should be put into operation for approx. 10 minutes at regular intervals, also in winter, to maintain it in proper working order.

#### 12.1.1 Inspection for correct fluid level and leakages

- Start the engine of the vehicle.
- Switch on the air condition (see Chapter "B", item 6.9.2). If the system is perfectly sealed, the ball will float in the inspection glass of the fluid tank, indicating the correct fluid level.
- If air inclusions appear in the inspection glass, there are leakages in the system. It should be checked or repaired in a special workshop (electronic leakage detector).
- If traces of corrosion or damp appear on the inspection glass, or if the refrigerant is turbid, the fluid tank and the drier must be replaced in a special workshop.

### 12.2 Cleaning the air condition condenser

The condenser is installed in front of the vehicle's radiator.
- Clean the condenser at regular intervals to remove dust, insects, etc. (blowing-out or washing-down).

### 12.3 Checking the evaporator with blower fan

The evaporator is installed centrally in the driver's cab.
- Check discharge of condensed water.
- Check evaporator block for contamination and deformed ribs.

### 12.4 Checking Vee belt of air-conditioner compressor

- Check Vee belt for good condition, cracks, fouling and wear.
- Check Vee belt for correct tension.

#### 12.4.1 Check oil level in air-conditioner compressor

The oil level in the compressor can be checked only after a repair, or every time before the air condition system is filled anew with refrigerant. For the oil level inspection, no refrigerant may be present in the circulation.



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## 14 Oil sorts, filling capacities (recommended oil sorts) - Chassis

NOTE
The filling quantities specified below are approximate values. For precise measurements, the oil level inspections plugs, oil dispsticks, or inspection glasses are valid. Only those qualities may be used which are listed in the charts of approved consumables of the component's manufacturer, or which are indicated on the nameplates of those components.

| Maintenance point | Oil sorts | Filling capacities |
|---|---|---|
| **Engine**<br>MERCEDES-BENZ<br><br>Type OM 402 LA | Engine oil, grade S-3<br><br>SAE or viscosity grades depending on temperature and use of single-grade or multi-grade oils (please refer to the engine manufacturer's specificatios of consumables, p. 224.<br><br>For approved oils, taking in account the aggravation factor, please refer to the specifications of consumables, for<br>**Single-grade oils:** p. 227.0 / 228.0 / 228.2,<br>**Multi-grade oils:** p. 227.1 / 228.1 / 228.3<br>issued by the engine manufacturer. | approx. 19.0 l w/o filter replacement<br><br>approx. 21.5 l with filter replacement |
| **Coolant** | Composition:<br>50 % of tap water and 50 % of anti-freeze agent<br><br>For approved **anti-freeze corrosion inhibitors**, please refer to the engine manufacturer's specifications of consumables, page 325.0 and 325.2;<br>approved kinds of **tap water** are listed on p. 310 of the engine manufacturer's specification of consumables. | approx. 60 l |
| **Fuel tank** | Diesel fuel (DIN 51601), sulphur content less than 0.5 % | approx. 400 l |
| **Powershift gearbox**<br><br>ZF 6 WG 250 | Engine oil as per specifications:<br><br>MIL-L-2104 C / -D / -E,<br>MIL-L-46152 C / -D / -E<br>API: CD / CE / CF / SF / SG<br>**SAE 15 W 40**<br><br>**Attention: Engine oil and ATF fluids cannot be mixed with each other**<br><br>Automatic Transmission Fluids (ATF) such as DEXRON II D **may be used only at ambient temperatures lower than -10 °C** | approx. 36 l |

## 2 Gearbox ZF - Type 6 WG 250

| Malfunction | Possible cause | Remedy |
|---|---|---|
| Oil temperature in gearbox excessively high (warning lamp is lit) | Heat exchanger (gearbox) or engine cooler dirty | Clean heat exchanger<br>Clean cooler |
| | Loss of oil | Check oil level; check gearbox for leakages; top up oil |
| | Valve block (between 2nd and 3rd axles on the right) defective (cooler circuit: gearbox - engine) | Check valves in valve block for proper function in a specialized workshop |
| | Thermostatic valve in cooler circuit (near blower fan) defective | Replace thermostatic valve |
| | Torque converter output pressure: too low: | *) Replace torque converter pressure relief valve |
| | too high: | *) Replace control pressure valve |
| | Torque converter seal defective | *) Replace seal |
| | Incorrect operation | Select an appropriate gearstep; the parking brake must be released |
| Control pressure peaks caused by gearshift operation | Control pressure too low | *) Check lubricating oil pressure<br>*) Check control pressure valve |
| | Lubricating pressure too low | *) Check pressurized oil pump or, if necessary, replace |
| | Pressure control valve defective | *) Repair or replace |
| | | *) in a specialized workshop |

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