

# **Service Manual**

## **AC Stacker**

22.07.2005

Revision Level: 3

If any problems are encountered during this test, take the truck out of use until it is fully operational.

#### **3.4.12. Testing the parking brake**

The trucks are equipped with an automatic parking brake. The brake should be active when the main power is off and also when the main power is on unless the accelerator is moved to issue a driving command. Test the parking brake by trying to move the truck. When the brake is active, the truck should not move forward or backward. The parking brake only affects the drive wheel so that the other wheels are still free to turn. The tiller arm can also be freely moved from side to side while the parking brake is active.

#### **3.4.13. Testing the lifting hydraulics and controls**

Test the operation of the lifting hydraulics by lifting and lowering the forks. Refer to *Chapter 2 Operating the truck* for information on the truck's controls. The forks should rise smoothly from the lowest position to the highest position. The forks should stop smoothly when reaching the upper position. If the forks hit the upper position at full speed, there may be a problem in the system. Refer to *Chapter 6 Mechanical maintenance* for information on mechanical maintenance.

### **3.5. Weekly maintenance**

Like daily maintenance, weekly maintenance is important for keeping the truck in full working order. Weekly maintenance should be scheduled for a certain day of the week, so that the maintenance interval does not fluctuate. When weekly maintenance is due, complete all of the daily maintenance procedures first before continuing with the weekly maintenance procedures.

Before beginning, ensure that the main power of the truck is turned off. Open the main and top covers of the truck before commencing with the weekly maintenance procedures. Refer to *Section 3.2 Maintenance guidelines* for information on how to open the truck's covers.

Should the weekly maintenance procedures reveal anything that affects the use or safety of the truck, the truck must immediately be taken out of use until it is restored to full working order.

#### **4.3.2.21. Parameter 81: Lift cut-off**

This parameter controls the lift cut-off function. When it is active, that is, set to 1, lifting is disabled when the low battery warning is triggered. The low battery warning level is set with parameter 175.

#### **4.3.2.22. Parameter 98: Stop mode tiller**

This parameter controls how the controller decelerates when the tiller arm is removed from the driving position. There are three choices, indicated by the number 1, 2 or 3. The default and recommended value is 2. Its advantage is that it reduces the wear of the electrical brake. The alternatives are:

1. The motor's power feed is cut and the brake is applied at the same time.
2. The motor's deceleration ramp is applied and the brake is engaged after the truck has come to a standstill.
3. The motor's deceleration ramp is applied and the brake engaged at the same time.

#### **4.3.2.23. Parameter 107: Warn. temp. contr.**

This parameter sets the temperature level for the controller's high temperature warning. The value is entered in degrees Celsius (°C) and can be between 50 and 79. The default value is 70, which should not be changed.

#### **4.3.2.24. Parameter 133: Acceleration**

This parameter controls the rate at which the truck accelerates when the accelerator is moved to request traction. Acceleration is given in km/h/s with an accuracy of two decimals and in the range from 0.50 to 6.00. The default value is 1.60.

#### **4.3.2.25. Parameter 134: Deceleration**

This parameter controls the rate at which the truck decelerates when the accelerator is released to request stopping. Deceleration is given in km/h/s with an accuracy of two decimals and in the range from 0.50 to 6.00. The default value is 2.50.

2. Raise the forks and lift the truck slightly with a jack.
3. Remove the locking pin from the axle.
4. Remove the load wheel axle.
5. Replace the load wheel and reattach the axle and the locking pin.

To replace double load wheels:

1. Lift the truck using a jack. Place supporting brackets under the truck.
2. Remove the axle bolt using a 8 mm Allen key on both ends of the bolt.
3. Replace the load wheel and reattach the axle bolt.

### **6.1.3. Replacing the castor wheel**

The supporting castor wheel is located under the main chassis opposite to the drive wheel. The castor wheel balances the truck and turns automatically to follow the direction of travel.

To replace the castor wheel:

1. Lift the truck using a jack. Place supporting brackets under the truck.
2. Remove the axle bolt using a wrench on both ends of the bolt.
3. Replace the castor wheel and reattach the axle bolt.

## **6.2. Replacing the tiller arm gas spring**

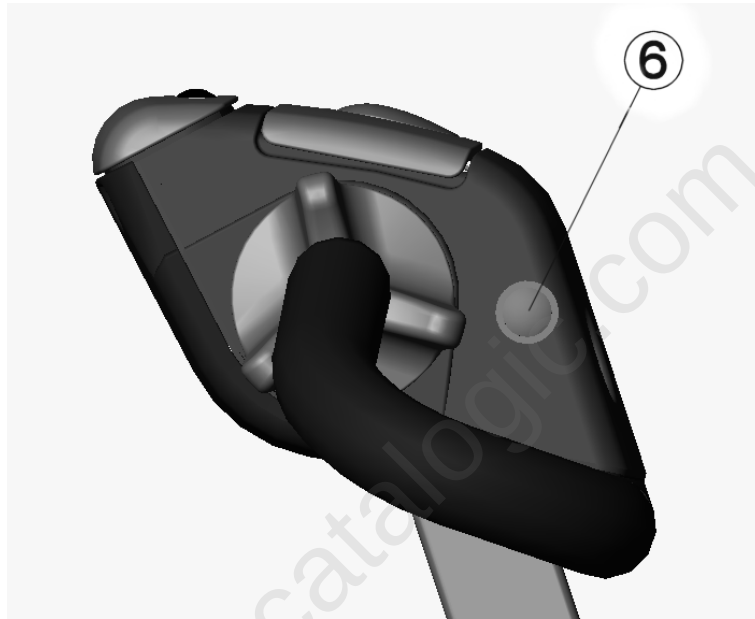
This section gives instructions on how to replace the gas spring of the tiller arm. The purpose of the gas spring is to return the tiller arm automatically to the upright resting position. It is a safety device, which must always be fully operational.

To replace the gas spring:

1. Remove the cover from the base of the tiller arm.

carriage. Note that the carriage can be lowered at two speeds. Press down lightly to lower the carriage slowly and press more firmly to lower the carriage faster.

If the truck is equipped with the initial lifting function, this is controlled with push buttons (6) on either side of the tiller arm head assembly. The button on the right-hand side lifts and the button on the left-hand side lowers.



*Figure 2.3. Push buttons (6) for controlling the initial lifting function*

If the proportional lifting lever (7) is present, the height of the fork carriage can be controlled proportionally. Use the lifting lever (7) to position the carriage at the desired height. If the truck also has the initial lifting function, use the lifting and lowering controls (2) to control initial lifting and lowering. On a truck with proportional lifting but without the initial lifting function, the lifting and lowering controls (2) also control the fork carriage but not proportionally.

List of succeeding displayable parameters:

| text             | parameter number |
|------------------|------------------|
| software version | 0                |
| serial number    | 7                |
| operating hours  | 9                |
| actual speed     | 10               |
| speed set value  | 11               |
| temp. inverter   | 17               |
| operating state  | 25               |
| value speed pot. | 30               |
| temp. inverter   | 32               |
| battery voltage  | 33               |
| connector X1     | 46               |
| connector X2     | 47               |
| connector X3     | 48               |
| connector X4     | 49               |
| connector X5     | 50               |
| connector X6     | 51               |

#### Description of the parameters:

|                   |                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Serial number:    | Explicit number identifying each individual unit                                                                                         |
| Operating hours:  | Actual counted time in which the motor has been operated.                                                                                |
| Actual speed:     | The actual measured speed of the controlled motor.                                                                                       |
| Speed set value:  | The actual speed demand of the controlled motor.                                                                                         |
| Operating state:  | 0= Fault, 1= Ready, 2= Power stage active (current in motor)                                                                             |
| Speed potentiom.: | Displays the analog voltage on input pin X6.6 in the range of 0..1023.<br>This input is the speed reference coming from the tiller head. |
| Battery voltage:  | Displayed in % of the nominal voltage (e.g. 24V, 48V or 80V)                                                                             |

State display for connectors X1 - X6:

Example 1:

Connector X1

|                                 |
|---------------------------------|
| <b>connector X1</b><br><b>2</b> |
|---------------------------------|

This display shows that the pin 2 on connector X1 is active, meaning that the internal transistor connects pin 2 to battery minus.

Pin 1: Key Switch (Battery voltage)  
**Pin 2: Digital output 2**  
 Pin 3: Analogue output minus  
 Pin 4: Analogue output

Example 2:

Connector X3

|                                    |
|------------------------------------|
| <b>connector X3</b><br><b>67 A</b> |
|------------------------------------|

This display shows that the inputs pin 6, pin 7 and pin 10 (A=10) are activated.

Pin 1: Protected key switch voltag  
 Pin 2: Protected key switch voltag  
 Pin 3: Supply voltage for the horn  
 Pin 4: Supply voltage for the lowering valve  
 Pin 5: Supply voltage for the contactor that switches on the pump-motor  
**Pin 6: Input safety socket**

|                                          |     |   | NSP10N | NSP12N | NSP12NI | NSP16N | NSP16NI | NSP_N(I)<br>Speed Red. |                                                                  | D=Diagnostics                                                                                                                |
|------------------------------------------|-----|---|--------|--------|---------|--------|---------|------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Warn.temp.Contr.                         | 107 | x | 70     | 70     | 70      | 70     | 70      | 70                     | 50°C...79°C                                                      | Level of high temp.warning                                                                                                   |
| Acceleration                             | 133 | x | 1.60   | 1.60   | 1.60    | 1.60   | 1.60    | 1.60                   | 0,50kmh/s...6,00kmh/s                                            |                                                                                                                              |
| Deceleration                             | 134 | x | 2.50   | 2.50   | 2.50    | 2.50   | 2.50    | 2.50                   | 0,50kmh/s...6,00kmh/s                                            |                                                                                                                              |
| Smoothing Curve                          | 137 | x | 5      | 5      | 5       | 5      | 5       | 5                      | 0...9                                                            |                                                                                                                              |
| Progress. Curve                          | 138 | x | 75     | 75     | 75      | 75     | 75      | 75                     | 0...100                                                          |                                                                                                                              |
| Reverse Braking                          | 139 | x | 3.50   | 3.50   | 3.50    | 3.50   | 3.50    | 3.50                   | 0,50kmh/s...6,00kmh/s                                            |                                                                                                                              |
| Dec.Belly&Tiller                         | 142 | x | 6.00   | 6.00   | 6.00    | 5.00   | 5.00    | 5.00                   | 0,50kmh/s...9,00kmh/s                                            |                                                                                                                              |
| Level low batt.                          | 175 | x | 2      | 2      | 2       | 1      | 1       | 1                      | 1...5                                                            | Level for lift cut-off activation                                                                                            |
| Low Batt.Speed                           | 176 | x | 33     | 33     | 33      | 33     | 33      | 33                     | 10%...100%                                                       | % of Max.Speed                                                                                                               |
| Min. voltage to reactivate the brake PWM | 178 | 0 | 16.1   | 16.1   | 16.1    | 16.1   | 16.1    | 16.1                   |                                                                  |                                                                                                                              |
| Max.Speed FWD                            | 211 | x | 5.60   | 5.60   | 5.60    | 6.00   | 6.00    | 6.00                   | 0,50km/h...6,00km/h                                              |                                                                                                                              |
| Max.Speed BWD                            | 216 | x | 5.60   | 5.60   | 5.60    | 6.00   | 6.00    | 6.00                   | 0,50km/h...6,00km/h                                              |                                                                                                                              |
| Opt.Speedlimit1                          | 221 | x | 100    | 100    | 100     | 100    | 100     | 10                     | 10%...100%                                                       | % of Max.Speed                                                                                                               |
| Brake Rel.Speed                          | 222 | x | 33     | 33     | 33      | 33     | 33      | 33                     | 10%...100%                                                       | % of Max.Speed                                                                                                               |
| Tiller Type                              | 223 | x | 0      | 0      | 0       | 0      | 0       | 0                      | 0=with NO contact (SICK)<br>1=with NO+NC contact (TELEMECANIQUE) |                                                                                                                              |
| Start Up Delay                           | 224 | 0 | 1.5    | 1.5    | 1.5     | 1.5    | 1.5     | 1.5                    | 0-10 s                                                           | Start up delay for traction . Active when throttle lever is pushed before tiller switch state is changed to driving position |
| Error message                            | 249 | x | D      | D      | D       | D      | D       | D                      | 0                                                                | Error number                                                                                                                 |
| Program throttle                         | 251 | x | 0      | 0      | 0       | 0      | 0       | 0                      | 1=program throttle                                               |                                                                                                                              |

## Full Version Available

### Caterpillar NSP16NI Stacker Service, Operator and Schematic Manual (WHSM0005)

Caterpillar NSP16NI Stacker service manual, covers mast, hydraulics, drive unit, wiring, and diagnostics. Downloadable PDF format.

**[VIEW THE FULL MANUAL](#)**