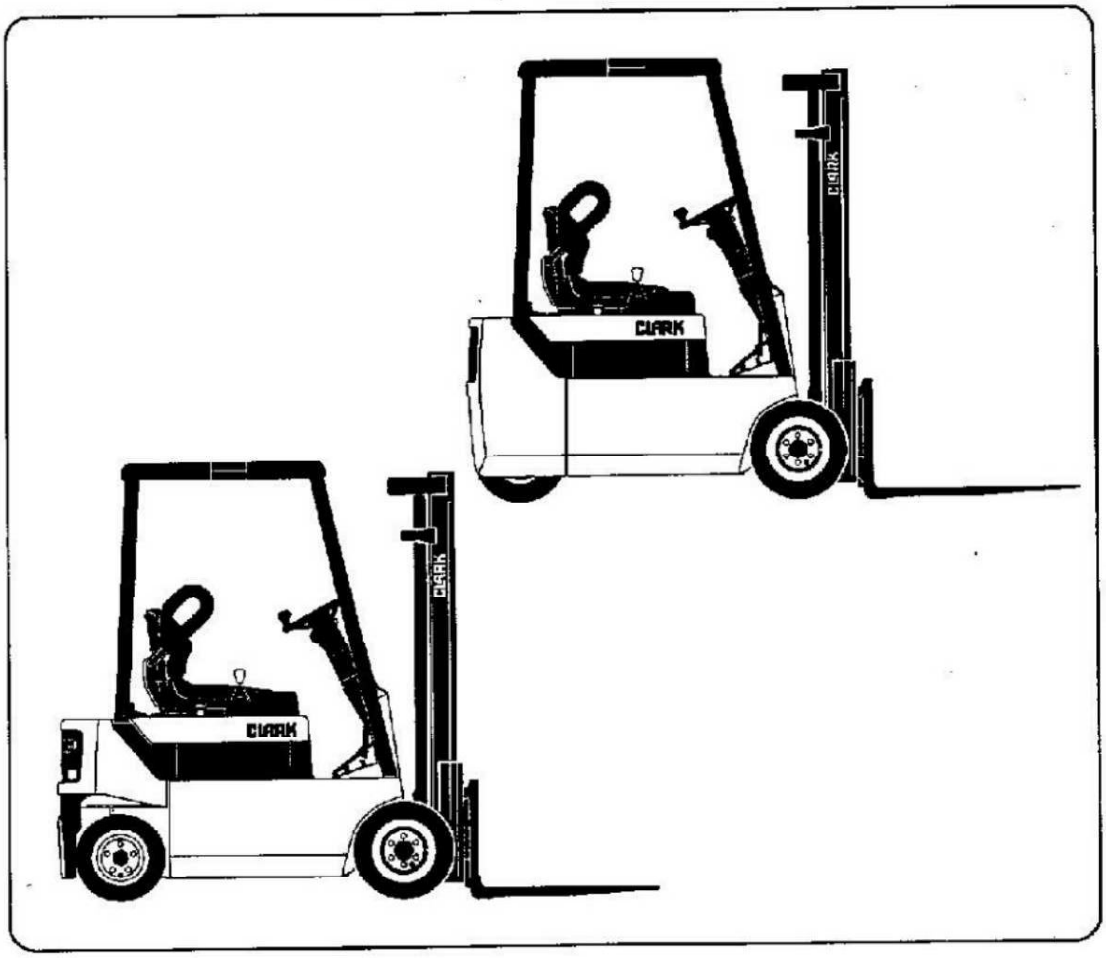
CLARK Material Handling

CTM/CEM 10-20

Lot No. 7096 / 7101

with HPB1 - Control



Training Manual Electr. System incl. Trouble Shooting with LC-Display

SM 5167 GEF GB 02/97

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Fault finding in the HPB1 control

Information on how to use the fault-locating instructions

1. You realize that there is a fault.
2. If the information given by the customer corresponds with your own checking results, follow the inspection and test procedure described in the respective section.
3. If the information given by the customer does not correspond with the results of your own checking, you should in any case talk once more with the operator before trying to locate the fault.
4. If you have difficulties in clearly identifying the components, take another look at the corresponding components in the section "Exerpts from the spare parts catalogue" or in the circuit diagrams of this manual.

   If you believe to have found the fault by means of the LC-Display, check the component according to the description in section "Checking components" before exchanging it. Only if this checking confirms that the component is defective, exchange it.
5. For troubleshooting on the control unit itself only use the CLARK fault finding display.

   It will show you not only the current faults but also such faults as have occurred during operation (intermittent faults) but have ceased in the meantime.

   With the display it is also possible to measure the voltage ratio on the card and check the setting of the major truck functions. Additionally some of the control unit's performance data can be changed.

   If this is the first time you work with the fault-locating display or if you are not yet sufficiently familiar with the device, the next page of this manual will be of help to you.
6. For tests which can only be carried out under tension, before beginning work you must:
   - jack up the truck
   - connect the battery plug
   - release the Emergency-Off switch
   - turn the key switch to "ON"
   - choose a driving direction
   - depress the accelerator pedal
   - while the parking brake is released and
   - the seat switch is closed (jumpered).
7. It is of utmost importance that you will always - even if you are pressed for time - observe all applicable safety regulations when performing this work.

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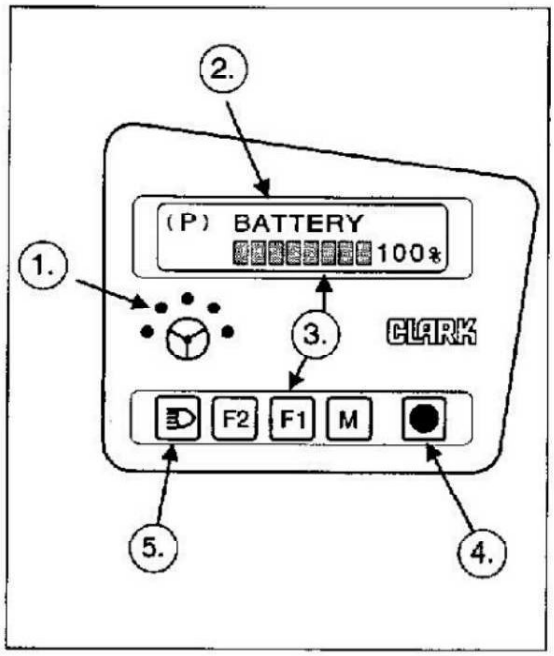
LC Display Unit (instrument panel)

The microprocessor-controlled display unit comprises the microprocessor, the overvoltage-protected inputs and outputs, the illuminated display, a red 10 mm diameter LED, the input keys and 5 yellow LEDs arranged in a semi-circular array.



The functions of this unit can be divided into 5 groups.

1. Display of the current steer angle by way of 5 yellow LEDs.
2. Display of the battery charge and status reports.
3. Facility for dialog-based parameterizing and fault analysis by way of LC display and input keys.
4. Alarm signaling by way of red LED when faults occur.
5. Additional possible connection of illumination functions.

Verification connection plug " I1"

Pin 1	Not used	Pin 19	Hydraulic theor. value to control
Pin 2	Switch reverse R	Pin 20	Signal poti lift
Pin 3	Switch forward F	Pin 21	Signal steer turning
Pin 4	Clock	Pin 22	Pump sensor-output
Pin 5	Data	Pin 23	Mode signal output
Pin 6	Hourmeter-signal	Pin 24	Pump sensor-signal input
Pin 7	Only for test functions	Pin 25	AUX2
Pin 8	Only for test functions	Pin 26	AUX1
Pin 9	Pump sensor-supply 12V	Pin 27	TILT
Pin 10	Not used	Pin 28	HYD PRS (filter)
Pin 11	Poti lift-supply 5V	Pin 29	BR LLS (brake fluid)
Pin 12	Not used	Pin 30	HBS2 (parking brake switch)
Pin 13	Pump sensor-supply 0V	Pin 31	Temperature traction motor
Pin 14	Poti lift-supply 0V	Pin 32	Temperature pump motor
Pin 15	Only for test functions	Pin 33	Brush wear traction motor
Pin 16	0V for Data signals	Pin 34	Brush wear pump motor
Pin 17	UB- common	Pin 35	KS (Key switch) 48V
Pin 18	UB+ 48V		

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Verification plug light kit

Pin 1	+12V
Pin 2	Relay output working light
Pin 3	Relay output working light
Pin 4	+12V
Pin 5	Relay output flash reverse
Pin 6	Relay output flash reverse
Pin 7	+12 V
Pin 8	0 V
Pin 9	Relay output reverse

Steer angle measurement

Input I-21 (steering input) causes the yellow LED corresponding to the steer angle to light up. In addition the signal is passed to the microprocessor so that the voltage corresponding to the angle can be displayed in diagnosis mode.

If none of the yellow LEDs lights up the voltage signal of the potentiometer is outside the tolerance and must be re-adjusted.

Status display inputs

When input I-30 (HBS2) is activated the "Handbrake" symbol appears on the display to the left of the battery indicator.
When the I-6 signal "HM" occurs the hour meter status is increased.
When the I-2 signal is active (reverse direction signal) a backward-pointing arrow appears in the left-hand segment of the display.
When the I-3 signal is active (forward direction signal) a forward-pointing arrow appears in the left-hand segment of the display.
A voltage of UB+ at I-35 starts the microprocessor program.

Supply outputs

I-9 and I-11 are both 12 V voltage supplies. They are intended only for sensor connection.
0 V potentials are applied at pins I-13 and I-14.

Data transfer

Information between the pulse control and LC display unit is exchanged via connectors I-16 (0 V reference), I-4 (clock), I-5 (data) and I-23 (mode).

Setpoint hydraulic values

The signals at inputs I-27 (Tilt), I-26 (AUX1) and I-25 (AUX2) are generated by switches on the hydraulic levers.
Input I-20 (lift) is the output value of a potentiometer linked to the lifting lever.
From these inputs the processor generates the respective setpoint values for the hydraulic motor rotation speed.
This setpoint value is fed from pin I-19 to the pulse control.
It corresponds to a voltage of < 0.8 V for the highest possible rotation speed, and up to > 4.3 V for motor standstill.

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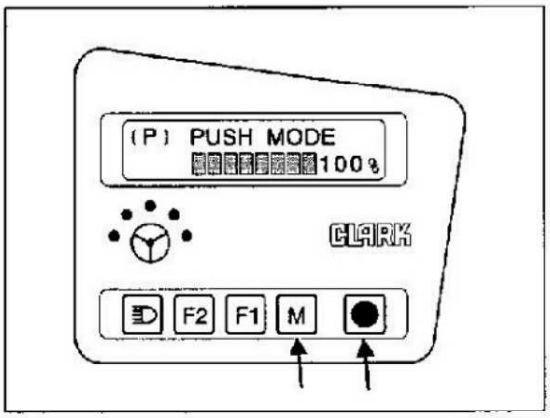
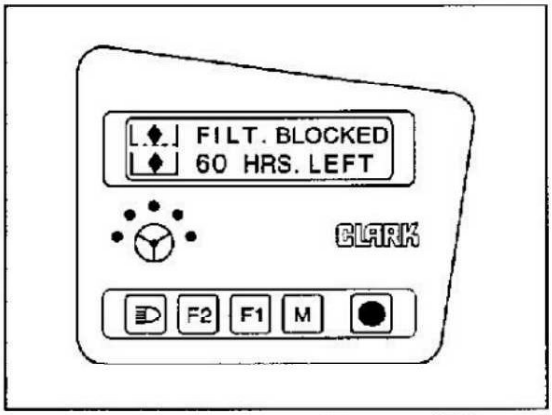
Maintenance and malfunction inputs



When at least one of the following inputs is activated the red 10 mm LED is actuated.

On the display the "PUSH MODE" prompt appears above the battery indicator.

In addition a message is stored which is displayed when the MODE key is pressed.

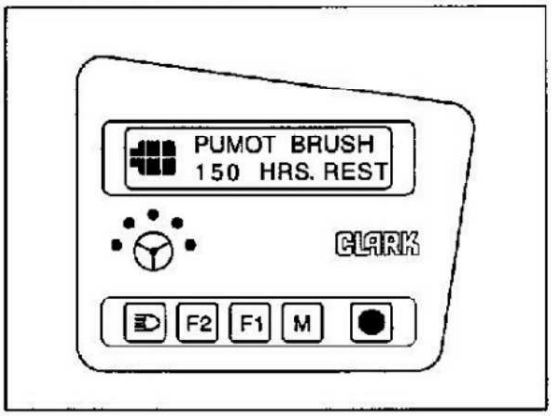


When input I-28 (HYDPRS) is activated the processor loads the value "60 hours" into an internal meter.

This meter counts downwards during operation.

When zero is passed the count starts ascending with a negative preceding sign.

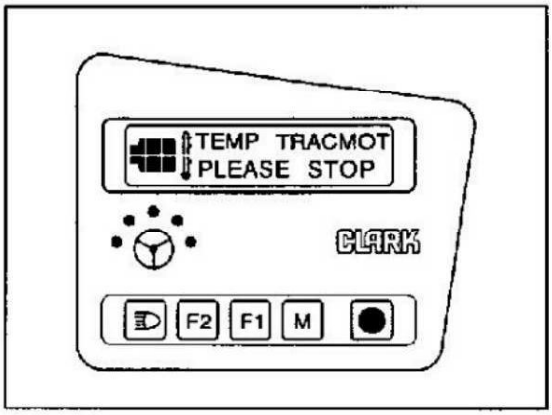
The stored message is "FILT. BLOCKED (meter reading) 60 STD. REST".



When input I-33 (brush wear, traction motors) or I-34 (brush wear, pump motor) is activated the same meter as under "HYDPRS" is loaded, but with a value of 150 hours.

The stored message is "FAMOT or PUMOT BRUSH (meter reading) 150 HRS.REST".

If both messages appear at the same time the lowest meter reading is adopted.



When an active signal is detected at input I-31 (temperature, traction motor) the message "TEMP TRACMOT PLEASE STOP" is stored.

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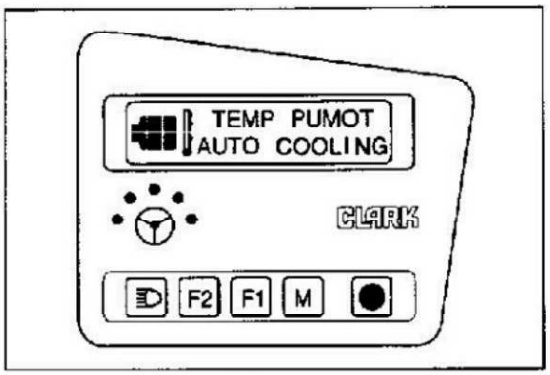
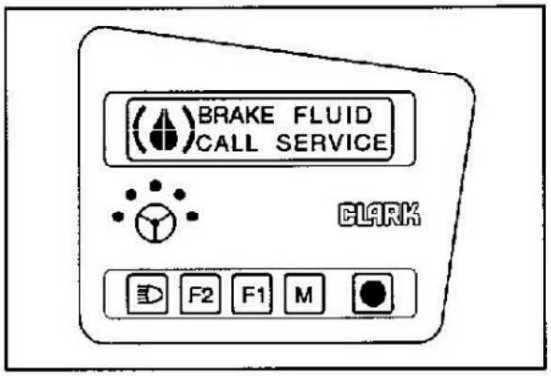
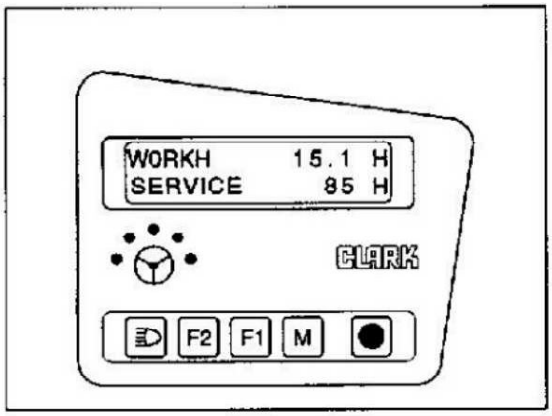


When an active signal is detected at input I-32 (temperature, pump motor) the required pump motor rotation speed is raised to 80% of the maximum speed in order to provide better motor cooling, and the message
"TEMP PUMOT AUTOCOOLING"
is stored.



When input I-29 (BRLLS) is activated the message "BRAKE FLUID CALL SERVICE" is stored.

How to use the LC display

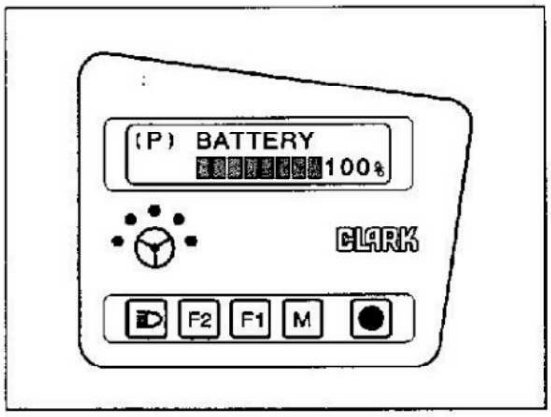


When the unit is switched on the hour and service meter readings are shown for a few seconds.

The display then switches to operating mode. The first line now displays the word "BATTERY".

In the second line a bar representing the battery charge appears, followed by a percentage figure.

If the charge falls below 30% the display flashes.



At <10% charge the hydraulic output is reduced till the requirement steering idle.

When the parking brake is applied the "Parking brake" symbol lights up at the left.

When the forklift is moving the pre-selected direction is shown in the left-hand segment of the display.

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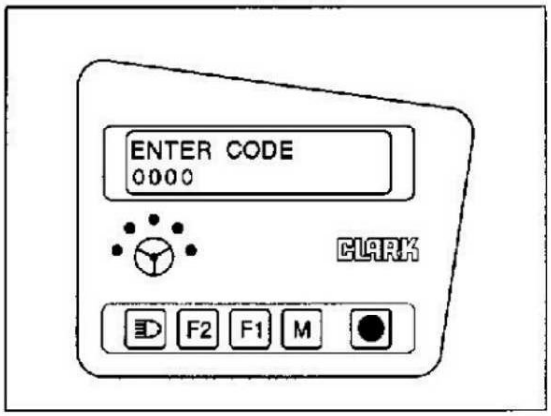
Diagnosis and settings

There are two different diagnosis options.

1. Diagnosis, forklift periphery

The forklift remains operational during diagnosis.



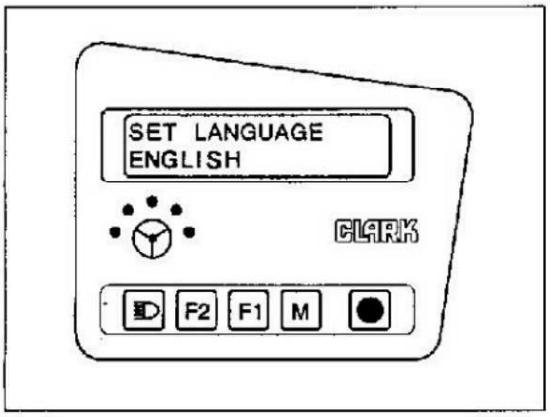
To switch to this mode the "LIGHT" key must be pressed while switching on the keyswitch.

On the display the prompt "Enter code 0000" appears.

With keys F1 and F2 the individual digits can now be entered by counting up or down as appropriate.

The cursor moves on one position each time the MODE key is pressed.

Input is terminated with the LIGHT key.



On entry of the correct code the display "SET LANGUAGE" appears.

Keys F1 and F2 can now again be used to scroll through all possible settings.

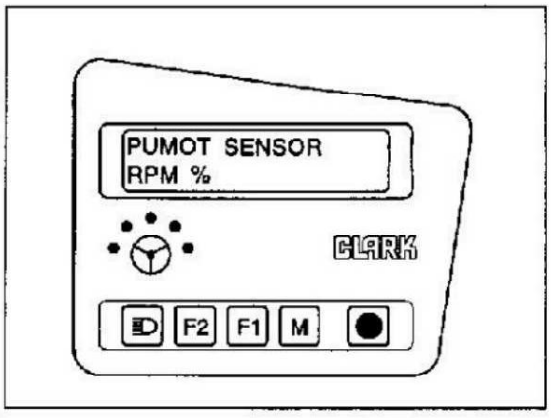
To select the option currently displayed, press the LIGHT key.

Acknowledge entries with the LIGHT key.

SET LANGUAGE:

Language setting for all displays.

(From 1996 all EC languages possible).



PUMOT SENSOR:

To check the pump motor rotation speed the mark-to-space ratio in % and the motor speed in rpm are displayed here.

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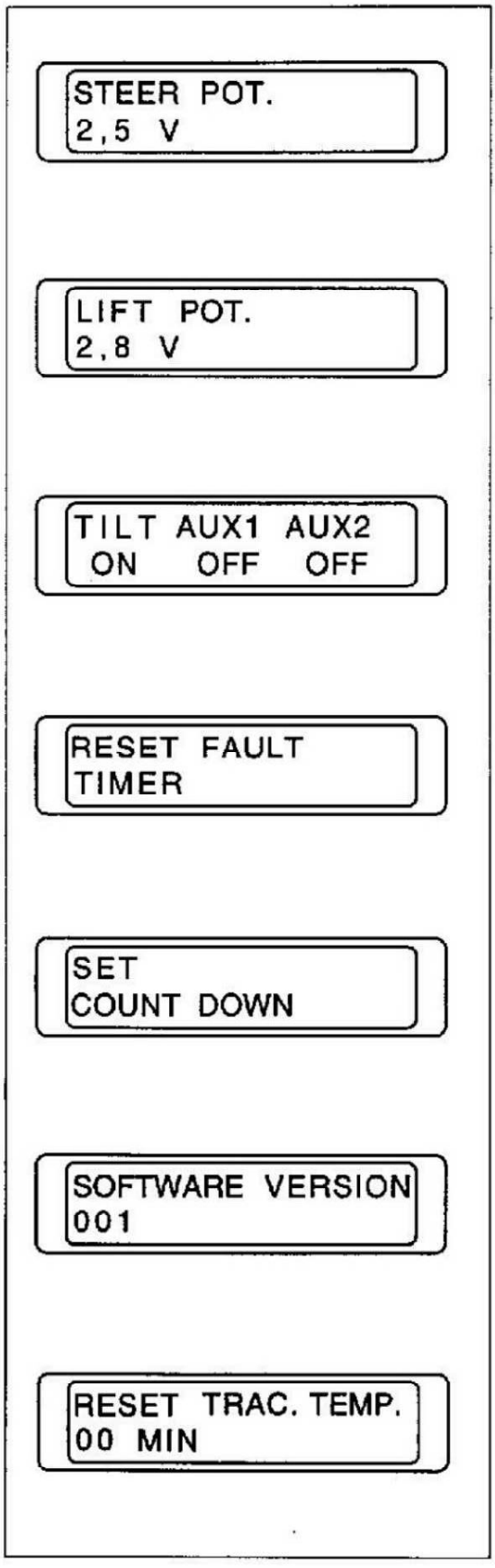

STEER POTI:

Steering potentiometer display in Volts. With the rear wheel in the straight-ahead position 2.5 V ± 0.1 V. With wheel set for left cornering less than 2.5 V to min. 0.9 V - 0.2 V; with wheel set for right cornering greater than 2.5 V to max. 4.0 V + 0.2 V.

LIFT POTI:

Lifting potentiometer display in Volts. When the lifting lever is not actuated, > 2.8 V; with 100% lift, < 0.8 V.

TILT AUX1 AUX2

Under the lever symbol "ON" appears when the microswitch is activated, and "OFF" when it is deactivated.

RESET FAULT MEMORY (TIMER)

By pressing the MODE key, entries made in the countdown meter for clogged filter and brush wear can be reset here.

The key must be held down for 10 seconds.

SET COUNT DOWN:

Here the service meter reading can be set in 10-hour increments.

The meter counts downwards during operation, and when zero is passed the count starts ascending with a negative preceding sign.

The reading is shown for a few seconds every time the forklift is switched on.

SOFTWARE VERSION:

The release number of the built-in LC display software is displayed.

OVERHEATING, TRACTION/PUMP MOTOR

Here is indicated how much time the traction motor was overheated longer than 5 minutes.

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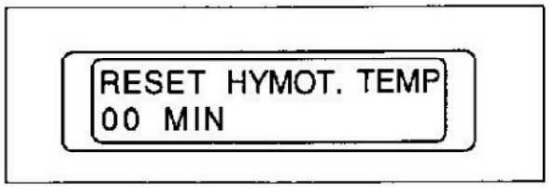
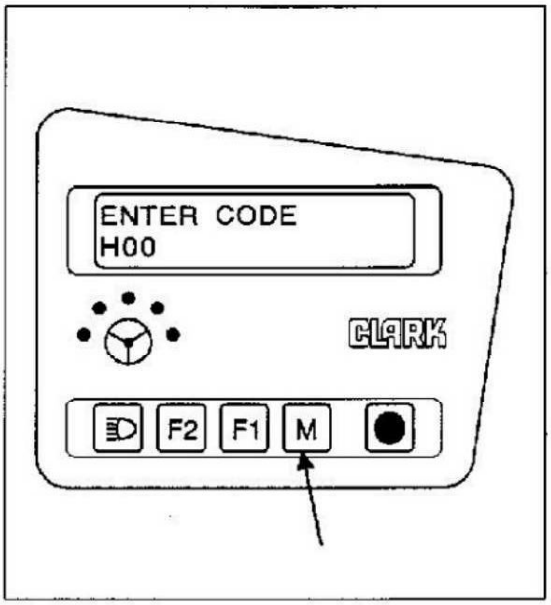


Here is indicated how much time the pump motor was overheated longer than 5 minutes.

2. Diagnosis, Pulse control

During this diagnosis the forklift is not operational.

To switch to this mode the "MODE" key must be pressed while switching on the keyswitch.



H00 appears on the display.

With keys F1 and F2 the code can be set.

Move to the next position by pressing the MODE key.

Pressing F1 and F2 accesses the various lists.

For explanations of the individual list positions see the parameter sheets.
The content of a displayed position is shown when the MODE key is pressed.

With the two function keys the values released for editing can be modified.

For rapid alteration, the increment is greater than 1.

When the MODE key is pressed twice in immediate succession the display counts down from 9 to 0.

This countdown can be interrupted by pressing the MODE key again. When 0 is reached the altered value is written to the memory.

When the MODE key is pressed once the control returns to display of the list position after 1 second.

If the MODE key is pressed during display of the fault memory, the fault memory is cleared on completion of the countdown.

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