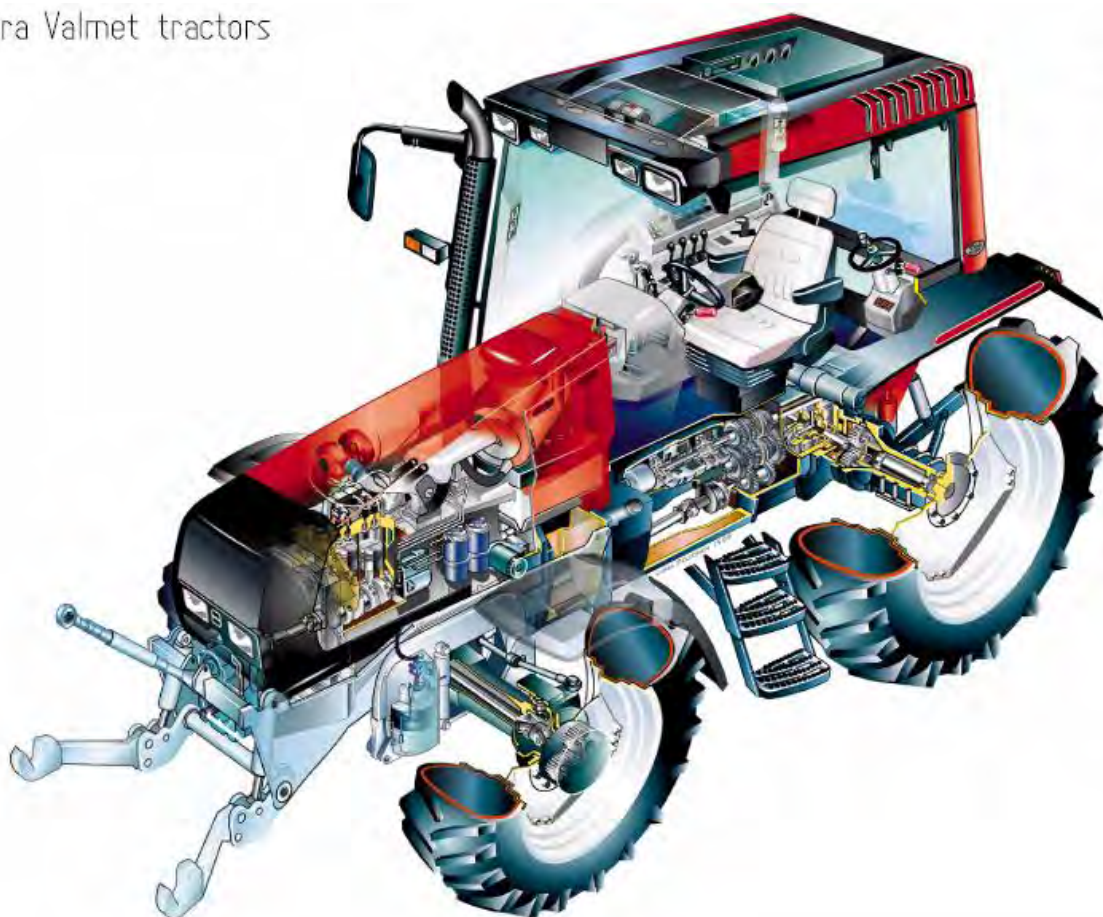


# VALTRA – VALMET MEGA MEZZO HI-TEC

Valtra Valmet tractors



## WORKSHOP MANUAL

# VALTRA

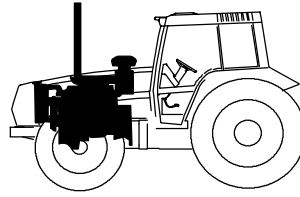
## Service Manual Tractors

Groups 10–100

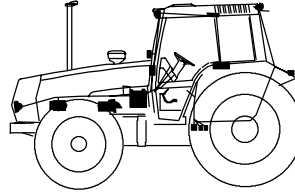
Valtra Inc.  
44200 Suolahti, Finland

Virtakäyttöön Käyttöohje  
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K3 20122001 K4

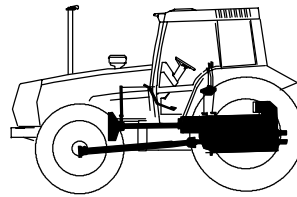
**10** General



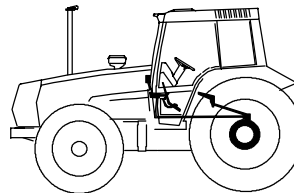
**20** Engine



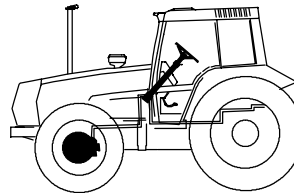
**30** Electrical system



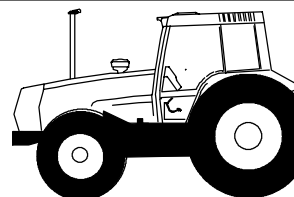
**40** Power transmission



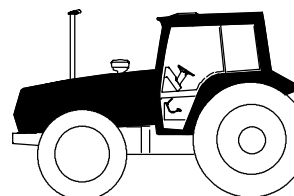
**50** Brake system



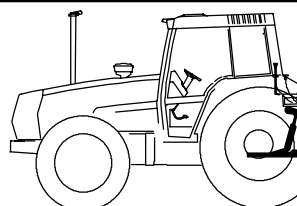
**60** Steering system and Front axle



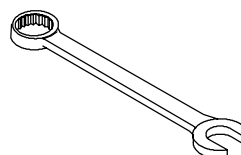
**70** Frame and Wheels



**80** Cab and Shields



**90** Hydraulics



**100** Tools

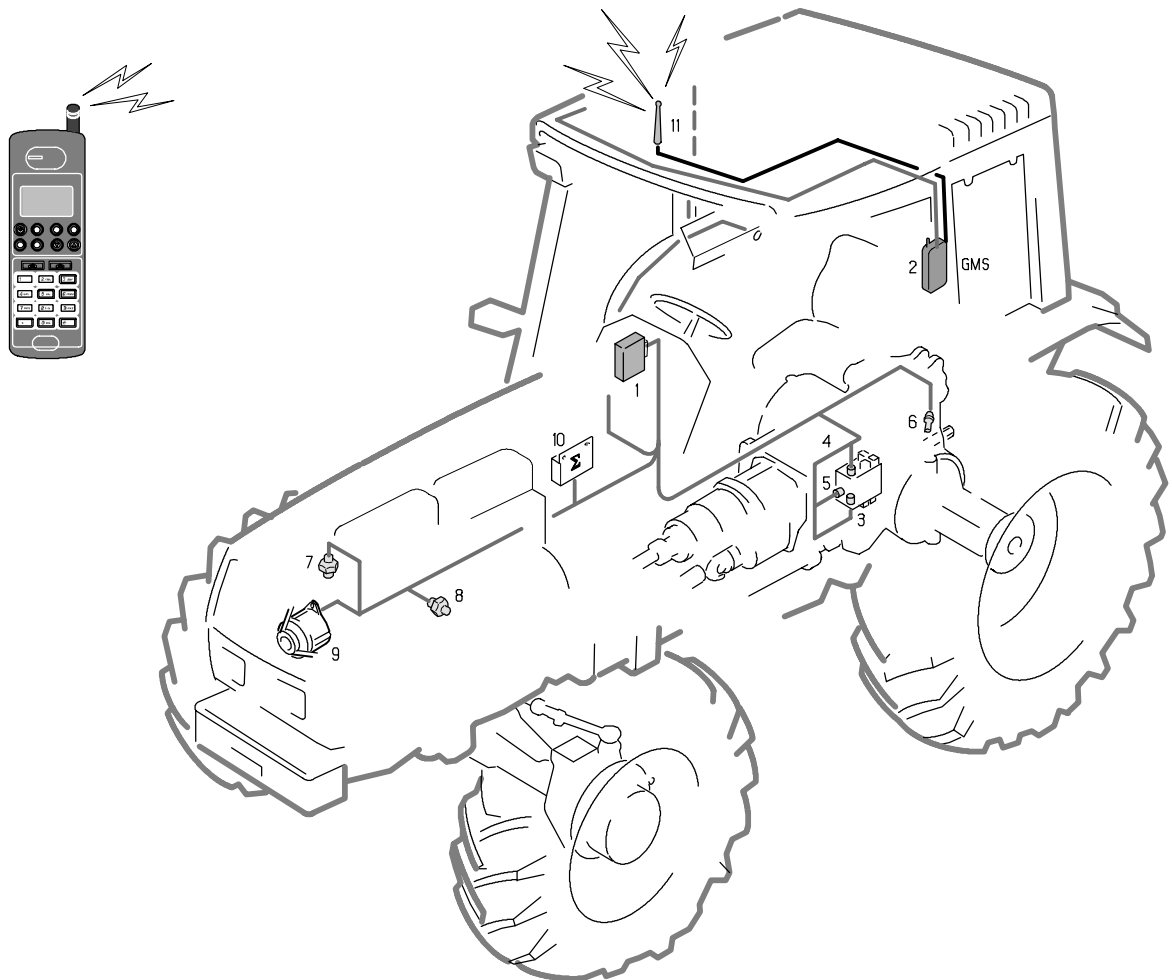
<b>31. CareTel</b>		Model	Code	Page
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CareTel (option) can receive questions from a remote GSM phone and send answers to the GSM phone about different tractor functions. One condition is that the GSM phone is in the phone service area and another that the GSM phone has a short message (SMS) function. The messages can also be received with a computer which is connected to the phone. In addition, CareTel has been programmed to send an alarm message automatically to a selected phone number/numbers, if information from one sensor is in the critical point and the tractor can fail. CareTel data logger includes specified information about the tractor. This information has been fed into the data logger in the factory.

**CareTel measures, gathers and sends information about the following tractor functions:**

- Engine coolant temperature (C°)
- Transmission oil temperature (C°)
- Engine torque, 8750  $\Sigma$ -power only (as percent of the total torque)
- Engine revs (RPM)
- PTO shaft revs (RPM)
- Pressure in low pressure circuit (BAR)
- Lubricating oil pressure in transmission (OK/LOW)
- Engine oil pressure (OK/LOW)
- $\Sigma$ -power (ETB light) (ON/OFF)

In addition, CareTel shows the tractor serial number and running hours at the measuring time. CareTel shows also if the tractor engine is running or not (\*).



**Picture 1.** CareTel system.

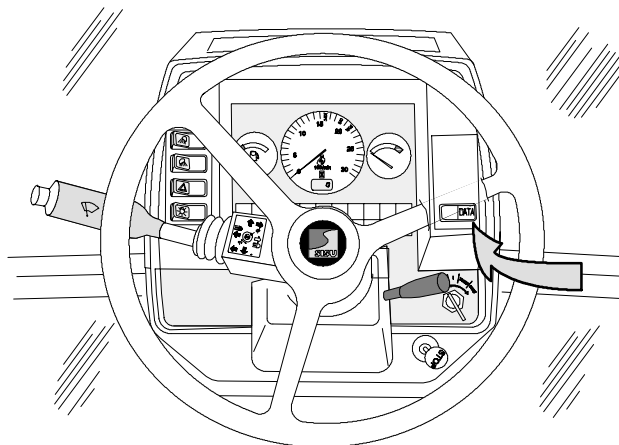
- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Data logger</li> <li>2. GSM phone (Nokia GSM 880, 2110 or 5000)</li> <li>3. Transmission oil temperature sensor</li> <li>4. Transmission oil pressure sensor</li> <li>5. Low pressure circuit pressure sensor</li> </ol> | <ol style="list-style-type: none"> <li>6. Rotation speed sensor of PTO shaft</li> <li>7. Engine coolant temperature sensor</li> <li>8. Engine oil pressure sensor</li> <li>9. Alternator (engine revs, running hours)</li> <li>10. Sigma-Power control unit, 8750</li> <li>11. GSM phone antenna</li> </ol> |
|--|---|

## Data logger

**Note!** In the dashboard there is an indicator light (DATA), which shows the status of the data logger (A1L) as follows when current is switched on:

- lights continually = normal status
- flashes with frequency of 1 Hz = alarm messages in queue, switch on the GSM phone
- flashes with frequency of 10 Hz = faulty or wrong settings in data logger
- light does not light = data logger damaged.

**Note!** If the data logger must be changed, the specified set values must be fed into the spare part logger in the factory. Although supply to the logger is cut off (e.g. battery is disconnected), the set values remain in the logger's memory. The data logger is placed under the dash board on the RH side. It gets supply voltage direct from the battery via fuse F2. The logger gets supply also via the ignition switch (F30). The logger is connected to the tractor electric system with aid of a 26-pin connector (earth points GR4 and GR5).



## CareTel GSM phone

The data logger (A1L) functions alone, but a GSM phone is needed for receiving/sending the SMS-messages. The system phone must be placed in the bracket in the cab, current switched on and activated and its connector must be connected. Tractor works do not dispatch this system phone. The phone bracket is the same as brackets used in cars and the phone is also charged in the bracket.

Care Tel uses Nokia mobile phone technology, and for that reason only Nokia GSM 2110, 5000 or 880 can be used as a system phone. However, messages from/to CareTel system can be sent with all GSM phone which have the text message function. CareTel messages, however, have been formed so that they are most suitable in the Nokia phone displays.



## Sensors

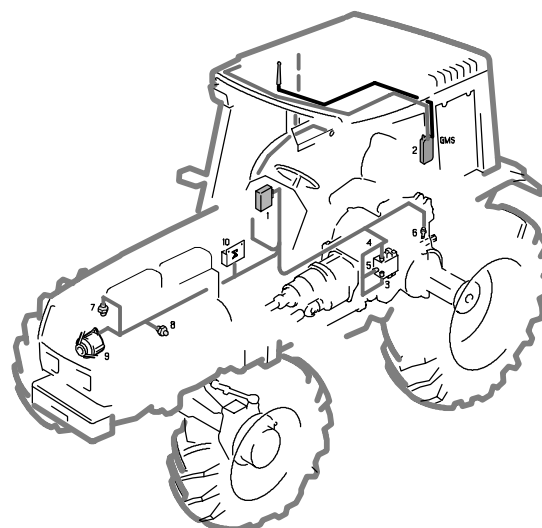
Standard sensors for CareTel use:

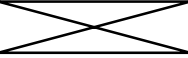
- engine oil pressure sensor (S13) on the RH side of the engine (warning light in the dashboard)
- transmission oil pressure sensor (S17) on the upper surface of the servo valve block (warning light)
- transmission oil temperature sensor (B3) on the lower face of the servo valve block (warning light). Same as used in Agrodata-instrument.

The low pressure circuit sensor (B1L), which is fitted on the front face of the servo valve block, is a special sensor for CareTel use.

CareTel engine temperature sensor (B9C) is the same and in the same place as on E-models, but it has been connected differently. PTO shaft revs sensor (B7) is the same as on E-models and AD-instrument.

Engine revs and running hours CareTel takes from the alternator. In the dashboard, there are corresponding instruments. Engine torque CareTel takes from the Sigma-Power control unit A13 (8750 only) as well as Sigma-power ON/OFF information (ETB light).



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## 1. Remote use of CareTel with GSM phone

To/from CareTel can be sent/received SMS–messages with a GSM phone. All GSM phones with the SMS–function can be used. In the CareTel design has been used Nokia 2110 GSM phone. In the display of this phone can be seen 10 characters in three lines.

**Note!** Normally from the GSM phone menu is selected the SMS message typing mode and after typing the message it is sent to the CareTel system phone. See Instruction Manual of the phone.

Care Tel uses five different message types:

- Questions
- Answers
- Settings (have been fed in the factory)
- Confirmations
- Alarm messages (the receiver phone numbers have been fed into the data logger in the factory)

**Important!** It is possible that with the Care Tel set values have been determined different rights of usage for different GSM phones. If a question has been sent from a phone, which has not adequate rights, the CareTel does not send an answer message.

**Note!** Concerning different measuring logs in the data logger, see page **360/8**.

### A. Query of one measuring value

#### Query

**ZZ[–H|L|n][–A|PH|PL]**

**ZZ**=name of measuring value. In the CareTel settings there are determined two–letter names for all different measuring values as follows.:

- TE=Temperature Engine, °C
- TT=Temperature Transmission, °C
- ME=Moment Engine, %, Sigma–Power 8750 only
- RE=Revs Engine, RPM
- RP=Revs PTO, RPM
- PH=Pressure Hydraulics (low pressure circuit), BAR
- PT=Pressure Transmission, OK/LOW
- PE=Pressure Engine, OK/LOW
- SP=Sigma–Power (ETB light), ON/OFF

- H=maximum value
- L=minimum value
- n=which value in order from the last value backwards (in memory 1–195 values)
- A=query is directed to the alarm log (in this log there is stored maximum and minimum values of the critical limit values)
- PH=query from maximum log
- PL=query from minimum log

**Note!** if –A, –PH or –PL parameters are not given, the query is directed to the standard log. If the query is directed to the max. or min. log, parameters –H, –L or –n have no signification.

Care Tel gives value to the asked measurement and, in addition, values to the four previous measurements, if the query is not directed to the min or max logs.

#### Exsamples:

**TE**

Query of five last measurements of engine temperature.

**TT –A**

Query of transmission temperature from the alarm log, five last measurements.

**PT –100**

Query of transmission oil pressure from standard log, five values from value nr 100 backwards.

## Answers

In the answer of one value there is always the tractor serial number in the beginning (fed into the data logger in the factory). In the same line, there is an asterisk, if the engine is running and a log identifier, in which **S**=standard log, **A**=alarm log and **E**=special tracking log.

The measuring frequency has been set in the factory. The frequency below is 10 seconds.

### Exsamples:

Answer to question **PH -n:**

<b>E51032 *S</b>	Serial number, running mode and log identifier.
<b>6000:15:10</b>	Time of measurement n: hours, minutes, seconds
<b>PH: 10 BAR</b>	Measuring value in bars
<b>6000:15:00</b>	Empty line
<b>PH: 18 BAR</b>	Time of measurement n-1
<b>6000: 14:50</b>	Measuring nr n-1 value in bars
<b>PH: 19 BAR</b>	Empty line
<b>6000: 14:40</b>	Time of measurement n-2
<b>PH: 16 BAR</b>	Measuring nr n-2 value in bars
<b>6000:14:30</b>	a.s.o.
<b>PH:10 BAR</b>	

Answer to question **PH -n -A:**

<b>E51032 *A</b>
<b>6000:15:10</b>
<b>PH: 10 BAR</b>
<b>6000:15:00</b>
<b>PH: 18 BAR</b>
<b>6000: 14:50</b>
<b>PH: 19 BAR</b>
<b>6000: 14:40</b>
<b>PH: 16 BAR</b>
<b>6000:14:30</b>
<b>PH:5 BAR</b>

Answer to question **PH -H:**

<b>E51032 *S</b>	Serial number, running mode and log identifier.
<b>6025:23:10</b>	Current running hours
<b>MAX</b>	Maximum value from standard log
<b>6000:15:00</b>	Time of measurement
<b>PH: 21 BAR</b>	Pressure value

Answer to question **PH -L:**

<b>E51032 *S</b>
<b>6025:23:10</b>
<b>MIN</b>
<b>6000:15:00</b>
<b>PH: 4 BAR</b>

Answer to question **PH -PH:**

<b>E51032 *</b>	Current running hours
<b>6025:23:10</b>	Maximum value from maximum/minimum log
<b>MAX PEAK</b>	Minimum value from maximum/minimum log
<b>5253:27:30</b>	Time of measurement
<b>PH: 23 BAR</b>	

Answer to question **PH -PL:**

<b>E51032 *</b>
<b>6025:23:10</b>
<b>MIN PEAK</b>
<b>3200:00:10</b>
<b>PH: 1 BAR</b>

## B. Query of all measurements

**TO[-n][-A]**

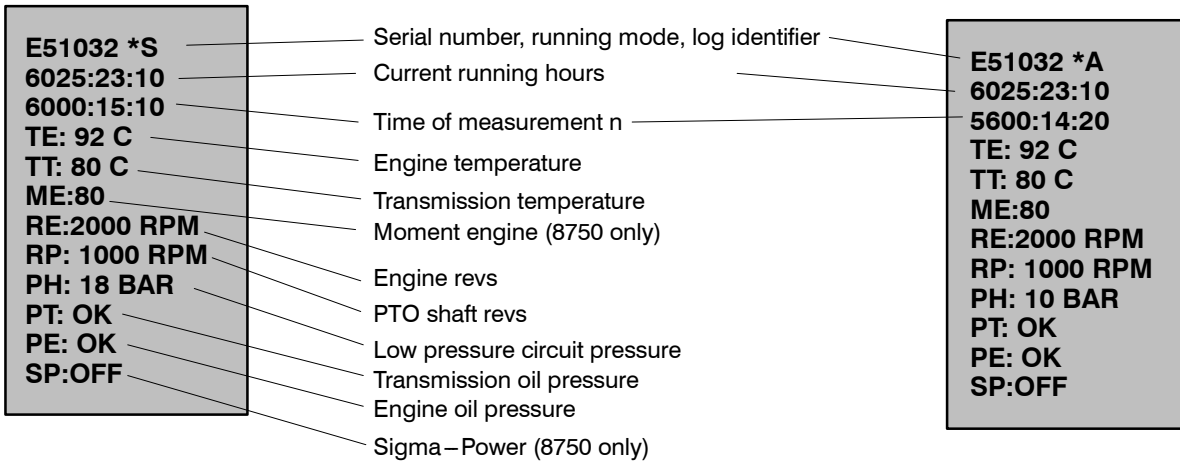
-n=which value in order from the last value backwards (1–195 values in memory)  
 -A=query is directed to the alarm log. If -A is not given, the query is directed to the standard log.

### Answers

#### Exsamples

Answer to question **TO -n**

Answer to question **TO -n -A**



## C. Query of number of exceeding times of warning limits

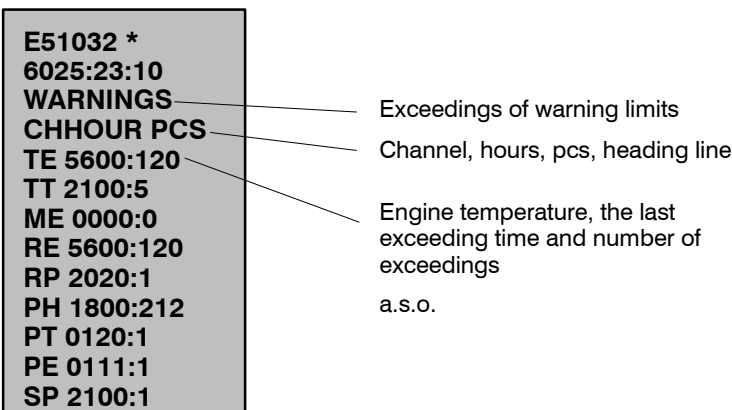
**WA [-H|-L]**

-H=exceeding of upper limits  
 -L=undershoot of lower limits  
 If these parameters are not given, CareTel shows the exceeding of the upper limits.

### Answers

#### Exsamples

Answer to question **WA**



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## D. Query of number of exceeding times of alarm limits

**AL [-H| -L]**

-H=exceedings of upper limits  
 -L=undershoots of lower limits  
 If these parameters are not given, CareTel shows the exceedings of the upper limits.

### Answers

#### Example

Answer to question **AL**

<b>E51032 *</b> <b>6025:23:10</b> <b>ALARMS</b> <b>CHHOUR PCS</b> <b>TE 5600:120</b> <b>TT 2100:5</b> <b>ME 0000:0</b> <b>RE 5600:120</b> <b>RP 2020:1</b> <b>PH 1800:212</b> <b>PT 0120:3</b> <b>PE 0012S</b> <b>SP 5800:ON</b>	<p>Exceedings of alarm limits</p> <p>Channel, hours, pcs, heading line</p> <p>Engine temperature, the last exceeding time and number of exceedings.</p> <p>a.s.o.</p>
--	---

## E. Automatic alarm message

CareTel sends automatically an alarm message, if the alarm limits are exceeded, at the most to three GSM phones determined in the set values. The alarm message includes tractor serial number, running mode, running hours and values of all measurements from the alarm log.

#### Exsample:

<b>E51032 *</b> <b>6025:23:10</b> <b>AUTOALARM</b> <b>CHHOUR PCS</b> <b>TE 5600:120</b> <b>TT 2100:2</b> <b>ME 0000:0</b> <b>RE 5600:20</b> <b>RP 2020:1</b> <b>PH 1800:21</b> <b>PT 0120:LOW</b> <b>PE 1435:LOW</b> <b>SP 5800:ON</b>	<p>Auto alarm identifier</p> <p>Channel, hours, pcs, heading line</p> <p>Engine temperature, the last exceeding time and number of exceedings.</p> <p>a.s.o.</p>
--	--

**Note!** The alarm message is sent only once from every limit exceedings during driving. After engine stop and restarting the alarm messages are sent anew, if the limits are exceeded.



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## F. Query from special tracking log

The measuring values, which are gathered in the special tracking log, are initiated with **ST** message.

**Note!** In the special tracking is gathered 2000 different measuring values from certain sensor in frequency of normal standard log. The measuring frequency has been set in the factory. Default value is 10 seconds.

**ST [-n]**

This question above shows five measuring values from the special tracking log from beginning of measurement no -n and backwards. In this log parameter -n can vary between 1–2000.

## Control of special tracking log

One measuring point is switched on to the special tracking mode with **ST** command.

**ST ZZ**

In the command above, ZZ is a two–letter name of the measuring point in question.

The STOP command below stops the gathering of data into the special tracking log.

**ST STOP**

Zeroing of this log is with the CLEAR command below.

**ST CLEAR**

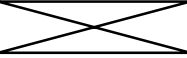
## G. Control of automatic alarm messages

**CALL ID OFF**

**CALL ID ON**

ID=tractor serial number  
 OFF=automatic alarm messages are not sent.  
 ON=automatic alarm messages are sent

When the above shown command has been sent, CareTel sends a confirm (ACK CALL=positive confirm, NACK CALL=negative confirm. The confirms show also the tractor serial number and running hours.).

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## 2. Measuring logs

### Standard log

Measuring data from all sensors is gathered in the standard log with frequency determined in the set values. The measuring frequency can vary between 1–255 seconds. In the standard log, there are stored 195 last measuring values.

### Exceeding log

In this log there are stored exceedings (pcs) of the warning and alarm limits of all sensors, and the last exceeding time of the alarm limits.

### Alarm logs

When an alarm limit of a sensor is exceeded or under-shooted, 195 previous measuring values from all sensors are copied from the alarm buffers to the alarm logs in frequency determined in the settings (1–255 seconds). There are two alarm logs and in them there are stored data from the two last exceedings of the alarm limits. In order to interpret an alarm limit exceeding as a new one, the value must be over five seconds below the alarm limit. When asking data from the alarm logs with a GSM phone, the question is always directed to the newer alarm log.

### Alarm buffer

Measuring values (alarm limit exceeding values), which are copied into the alarm log in turn, are gathered in frequency determined in the setting values into the alarm buffer. The alarm buffer is an internal value table in the data logger, and it is not visible outwards .

### Maximum and minimum logs

Maximum and minimum values from all sensors and their measuring time during the total running time of the tractor are gathered and stored in these logs.

**Special tracking log**, see previous page.

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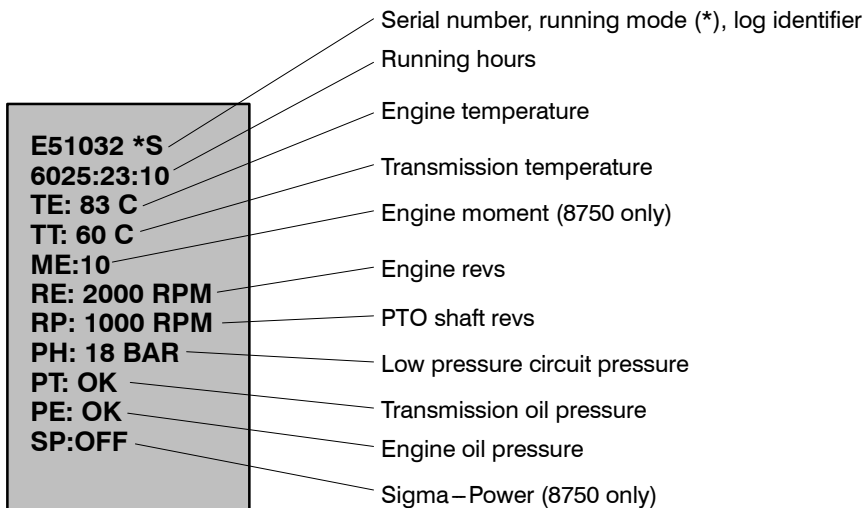
## 1. Checking function of CareTel

### If the system does not function:

- check fuse F2 and F30 in the fuse box
- switch on current to the tractor and check the status of the data logger with aid of the ind. light, see page 360/2.
- ensure that the system phone is switched on, field strength is adequate and that the phone is connected to the bracket connector.
- check wires to/from the bracket (antenna, data logger)
- ring to the system phone with an auxiliary GSM phone and assure, that it receives alarm/message. Ring/send a message with the system phone to the auxiliary phone and ensure that it is functioning.

### If the answers from the CareTel are faulty, so:

- start the engine and ask with the auxiliary GSM phone with **TO** command current values from all sensors:

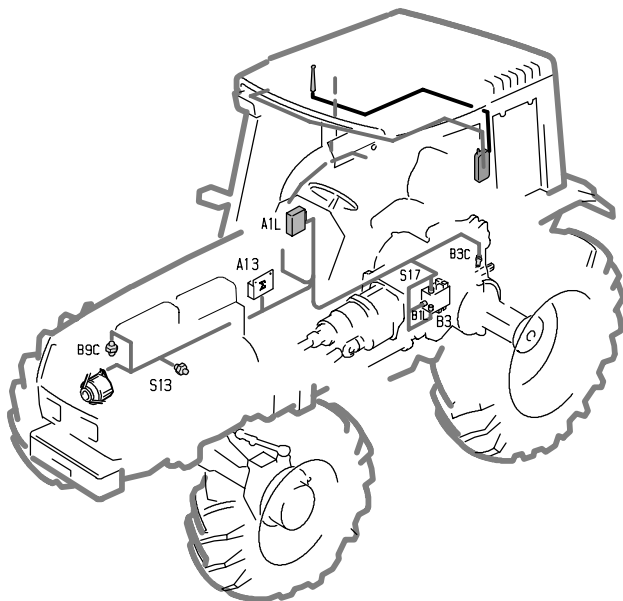


- investigate the message, and ensure whether one or more of the values are clearly faulty or fail.
- raise engine revs and warm the transmission and load it and engage servo functions of the low pressure circuit and carry out a new TO query, and compare values
- if one or more measuring values can easily be verified faulty or it fails, check the sensor in question and its wires, see the following page.
- if the fault cannot be found, change the data logger into a new one.

**Note!** There are specified GSM numbers and rights of usage and the setting values in the data logger. When ordering a new logger, the tractor in question must be specified.

**WARNING!** Electric signals from the GSM phone may affect the tractor electric system (e.g. AC/ACD–power lift). Do not keep the GSM phone on the lever console near the AC/ACD power lift electronics.

## 2. Sensors



### a) Engine oil pressure sensor S13 Transmission oil pressure sensor S17

When the lubricating oil pressures drop under a certain level, the sensors ground the electric circuit and a warning light in question comes on in the dashboard (LOW). When the pressure rises up to a certain level, the sensor cuts off the circuit and the warning light goes out (OK).

Start the engine and ensure that the warning lights do not light. Disconnect the sensor wire and connect it to tractor frame at which time the warning light in question comes on. Connect the wire to the sensor pin and the warning light should go out.

Stop the engine, at which time the warning lights come on and light if the current is switched on. If the warning lights function as shown above, the sensors and wires are probably in order.

### b) Engine temperature sensor B9C

Resistance values of the sensor:  
 – 120–148  $\Omega$  (+60°C)  
 – 47–56  $\Omega$  (+90°C)  
 – 35–42  $\Omega$  (+100°C)  
 (the resistance increases when temperature lowers).

CareTel temperature value can be compared with the reading of the dashboard temperature gauge at which time can be estimated the size class of the value. The working temperature of the engine varies between +75...+95°C according to loading. Engine coolant temperature can be measured with an auxiliary thermometer, at which time is obtained a more accurate value of comparison.

### c) Transmission oil temperature sensor B3

Resistance values of the sensor:  
 – 200–250  $\Omega$  (+60°C)  
 – 75–90  $\Omega$  (+90°C)  
 (the resistance increases when temperature lowers).

If the tractor is equipped with Agrodatabus-instrument, the function of this sensor can be checked by ensuring that the AD-instrument shows a correct temperature value, see code 331.

In the dashboard there is a warning light for too high temperature in the transmission. Transmission oil working temperature varies between +60...+85°C according to the loading.

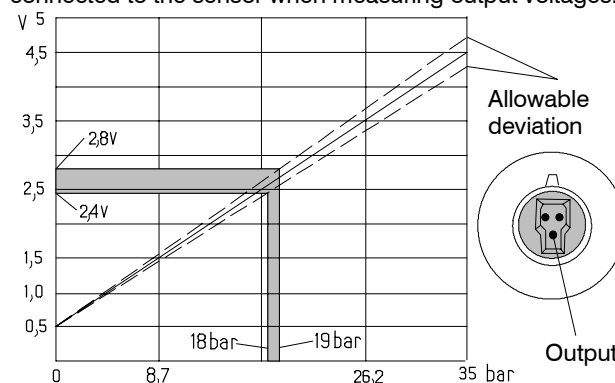
### d) PTO shaft rotation speed sensor B7

Resistance of the sensor should be 1,0–1,10 k $\Omega$ .

If the tractor has AD-instrument, check whether it shows the PTO revs. If it shows the revs and the reading reacts to the alterations of the revs, the sensor is in order.

### e) Pressure sensor B1L for low pressure circuit

The basic pressure of this circuit is 18–19 bar. The circuit maintains clutch pressures in various transmission multi-disc clutches, such as DPS, lock, 4WD, PTO, see pages 911/1–2. Sensor output voltage (DC) depends on the pressure linearly, see diagram below. The connector must be connected to the sensor when measuring output voltages.



## Others

### Engine revs and running hours

CareTel takes engine revs and running hours from the alternator. In the dashboard there is a rev counter. If it seems to function and reacts to the revs alterations, the measuring circuit is in order.

CareTel running hour reading can be checked by comparing it with the reading in the dashboard.

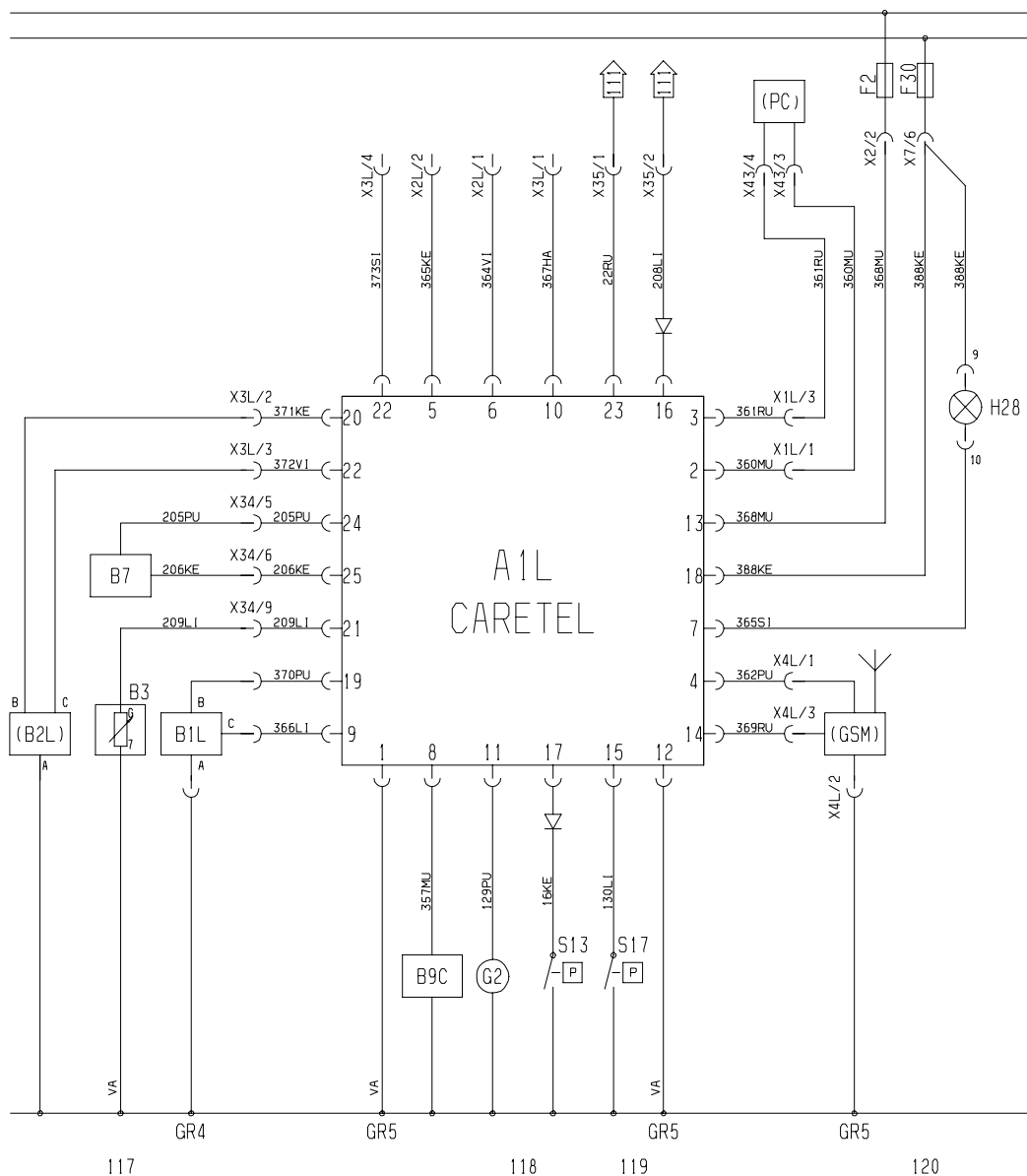
CareTel takes the engine running mode (\*) from the ignition switch position and engine revs (charging light), so that when the engine revs are over 400 r/min, CareTel assumes that the engine is running, if the ignition switch is in the running position.

### Engine moment and $\Sigma$ -power

These functions only on 8750 tractor, which has  $\Sigma$ -power, see under code 313.

In point SP there is ON, when the engine is working in the higher output range, at which time also the dashboard ETB-light lights, otherwise OFF.

CareTel shows the engine torque as percents of the total torque.

**Wiring diagram** (see also diagrams on pages 310/33-38)**Position of connectors:**

- X34: Connector in the rear part of the lever console (9 pins)
- X35: Connector in the lever console (9 pins)
- X43: Socket on the lever console on the driver's right (8 pins)
- X2: Connector in the fuse box (9 pins)
- X7: Connector in the fuse box (9 pins)
- X1L: Under the AC/ACD switch panel in the lever console on the driver's right (8 pins)
- X2L: In the steering wheel console under the dashboard (3 pins)
- X3L: In the steering wheel console under the dashboard (9 pins)
- X4L: In the cab roof on the LH side (3 pins)

- GR4: Earth point in the rear part of the lever console
- GR5: Earth point on the cab front wall under the dashboard

- Ru = brown
- Pu = red
- Ke = yellow
- Si = blue
- Mu = black
- Vi = green
- Va = white
- Ha = grey
- Li = lilac



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### Code 371:

**Note!** Under code 371 are shown AC 5.2 system's properties, which differ from AC 5 and which cannot be shown under code 370 due to lack of space. Under code 370 are given necessary references to code 371.

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