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# 1 Startup

# 1.1 Procedure

The table below describes the startup procedure after you have switched the system on. This sequence may differ slightly depending upon the software version you are using. Please pay particular attention to the lines in bold type.

|                                             | Monitor                                                                                                                                                                        | Remote control                                              |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Self-test                                   | MAIN CARD DIAGNOSTICS COMPLETE,<br>TEST AND INITIALIZE:<br>DMA CONTROLLERS                                                                                                     | Self-test                                                   |
| CPU card and remote control                 | TIMER ZERO<br>INTERRUPT CONTROLLERS<br>MEMORY<br>CONVENTIONAL MEMORY TEST                                                                                                      | Fault codes                                                 |
|                                             | TOTAL MEMORY 00640 KB<br>_KEYCARD ERROR<br>PRESS <f1> IF HARDWARE SETUP IS<br/>DESIRED<br/>_SYSTEM SET FOR HIGH SPEED<br/>_FLEX DISK<br/>_80287 COPROCESSOR NOT INSTALLED</f1> | Remote control<br>for FLA                                   |
| Screen goes blank                           |                                                                                                                                                                                |                                                             |
| RAM disk is set up                          | VDISK Version 4.01 virtual disk C:<br>Sector size adjusted<br>Directory entries adjusted<br>Buffer size: 32 KB<br>Sector size: 128<br>Directory entries: 64                    |                                                             |
| Screen goes blank                           |                                                                                                                                                                                |                                                             |
| "FLA" appears on screen                     | FLA                                                                                                                                                                            |                                                             |
| Screen goes blank<br>The program is started |                                                                                                                                                                                | CCCC                                                        |
| Selection menu is<br>displayed              | FLA-203 programs<br>Engine power<br>Configuration                                                                                                                              | FLA-203 programs<br>Engine power<br>Wheel power<br>Traction |

## Self-test of CPU card

If the sequence comes to a halt during the self-test, this indicates a defective CPU card.

## Message \_SYSTEM SET FOR HIGH SPEED

This message states the clock frequency with which the CPU card is working.

The default setting should always be HIGH SPEED.

Alternatively, the setting LOW SPEED may also be used but can lead to malfunctions when using the graphics software.

The setting is carried out on the CPU card via a bridge.

#### 1.2 Error messages

#### - NO SYSTEM FILE PROGRAM STOPPED

The system file **FLA.CFG** is not located n the directory **FLA** on the disk which you have inserted.

This file contains the characteristic values (traction pickup, entire roller mass).

On delivery, this file is only contained on the backup disk and must be copied onto the work disk or graphics disk using the function **Copy system file**.

#### - ILLEGAL COPY PROGRAM STOPPED

The factory-installed copy protection of the disk you have inserted is missing or damaged.

#### - No system disk or disk startup error

Error has occurred when loading DOS. Either DOS is missing or the disk is damaged

#### - Command Interpreter missing or illegal

Error has occurred when loading the Command Interpreter. Either the Interpreter is missing or it does not match the actual DOS system.

## 2 Voltage supply

#### Voltage display by LED's

The cards A9, the BUS card and A3, the DMS card, are equipped with voltage display LED's. These indicate whether voltage is applied. They do not provide information as to the accuracy of the displayed voltage.

| A9 | LED1 +5V  | A3 | V4 | +5V  |
|----|-----------|----|----|------|
|    | LED2 -5V  |    | V6 | -5V  |
|    | LED3 +12V |    | V7 | -12V |
|    | LED4 -12V |    | V8 | +12V |

#### Power supply unit G2

#### **Output voltages**

| Output voltage | Min. load | Max. load | Comments |
|----------------|-----------|-----------|----------|
| +5V            | 3.0A      | 15.0A     |          |
| +12V           | 0.5A      | 5.0A      |          |
| -12V           | 0.0A      | 0.7A      |          |
| -5V            | 0.0A      | 0.3A      | not used |

#### Checking and setting

Power supply unit G2 does not have any sensor lines to compensate the voltage drop through the interconnecting cables.

After the power supply unit has been replaced, you must check the output voltages and re-adjust them if they differ from the above values.

Before adjustment

- connect all subassemblies, cards and storage media.

- select the FLA basic screen

| Voltage | Plug/pin | to | Plug/pin | min    | max     | Adjustment<br>with power-<br>supply unit pot. |
|---------|----------|----|----------|--------|---------|-----------------------------------------------|
| +5V     | ST0/11   | -  | ST0/6    | +5.05V | + 5.15V | R 83                                          |
| +12V    | ST0/3    | -  | ST0/6    | +11.8V | +12.2V  | R76                                           |
| -12V    | ST0/4    | -  | ST0/6    | -11.8V | -12.2V  | R 57                                          |

#### View of power supply unit



# 3 Overview of measuring functions of each test step

| Test step               | Functions involved                             | Test as described in section         |  |  |
|-------------------------|------------------------------------------------|--------------------------------------|--|--|
| Engine power            | Acceleration of support roller and load roller | Roller signals                       |  |  |
|                         | Speed                                          | Roller signals                       |  |  |
|                         | Intake-air temperature                         | Remote control temperature           |  |  |
|                         |                                                | measurement                          |  |  |
|                         | Air pressure                                   | Pressure sensor                      |  |  |
|                         | Engine speed                                   | Remote control speed measurement     |  |  |
| Wheel power<br>Traction | Speed of support roller and load roller        | Roller signals                       |  |  |
| Driving simulation      | Force measurement by DMS sensor                | DMS sensor                           |  |  |
|                         | Braking by electrodynamic retarder             | Actuation of electrodynamic retarder |  |  |
|                         | Engine speed                                   | Remote control speed measurement     |  |  |
| Acceleration            | Speed of support roller and                    | Roller signals                       |  |  |
| Distance                | load roller                                    |                                      |  |  |
| Speedometer check       |                                                |                                      |  |  |

# 4 Roller signals

# 4.1 Functional description

An inductive speed sensor and a trigger wheel which is firmly secured to the roller generate a sinewave voltage which is evaluated by the DLS card.

From the frequency of the sine-wave voltage, the speed and distance for each roller (support and load rollers) is calculated.

One period corresponds to a distance of 1 cm.

The amplitude of the sine-wave voltage depends upon the roller speed and ranges from 0.5Vss at low roller speed to approx. 30 Vss at high roller speed.

The entire measuring chain can be checked with the aid of the Service Program, using the "Roller signals" function. (For opening and operating this program, see the SERVICE PROGRAM section)



# FLA203 ->FD172

# FLA203 FD261->



# FLA 206



# 4.2 Checking the function of the entire measuring chain

- Call the Service Program and the "Roller signals" function
- Start up the support and load rollers with vehicle
- Observe the display on the monitor or remote control The frequency **f** must be displayed continuously from a speed of approx. 3 km/h.
- If **f** is not displayed or is not present all the time, check the individual components.
  - DLS card (see section on checking the DLS card)
  - Air gap between inductive pulse generator and trigger wheel (see section on setting the inductive pulse generator)
  - Inductive pulse generator (dirt, damage)
  - Trigger wheel (dirt, damage)
  - Interconnecting cables (properly plugged in, damage)

# 4.3 Checking the DLS card

In order to check the measuring circuit of the DLS card, a frequency generator (P 200) simulates the roller signals.

To this aim, a sine-wave voltage is fed through an adapter cable into the control unit, where it is measured and displayed in the Service Program in the "Roller signals" function.

| Signal shape:  | Sine                       |                               |  |
|----------------|----------------------------|-------------------------------|--|
| Amplitude:     | 0.5Vss to 30Vss, offset 0V |                               |  |
| Frequency:     | 100Hz to 8kHz              |                               |  |
|                |                            |                               |  |
| Supply to FLA  | 202, 203 up to FD          | Adapter cable type 1          |  |
| (date of manuf | facture) 172:              | Plugs X1 and X2 of plug card  |  |
| Supply to FLA  | 202 203 from FD 261.       | Adapter cable type 2          |  |
| Supply to I LA | 202, 203 Hom 1D 201.       | Plug X4 of plug card          |  |
|                |                            |                               |  |
| Supply to FLA  | A 206 :                    | Adapter cable type 2          |  |
|                |                            | Plugs X4 and X11 of plug card |  |

If the frequency of the frequency generator matches that measured by the DLS card, the measuring circuit is in good working order.

| _           | Display on FLA remote control and monitor |          |      |      |          |       |       |
|-------------|-------------------------------------------|----------|------|------|----------|-------|-------|
| P200        |                                           | f (Hz)   |      |      | v (km/h) |       |       |
|             | settings                                  |          |      |      |          |       |       |
| $U_{ss(V)}$ | f(Hz)                                     | Required | min  | max  | Required | min   | max   |
| 4           | 200                                       | 200      | 195  | 205  | 7.2      | 7.0   | 7.4   |
| 8           | 400                                       | 400      | 393  | 407  | 14.4     | 14.1  | 14.7  |
| 16          | 1600                                      | 1600     | 1581 | 1619 | 57.6     | 56.9  | 58.3  |
| 32          | 6400                                      | 6400     | 6333 | 6467 | 230.4    | 227.9 | 232.8 |

#### Adapter cable connection

P200 input U-R-F

#### P200 settings

- URFIT
- Multi-signal
- AC sine-wave/square-wave signal:

Alternating voltage (Uss):see tableFrequency:see tableType:sine

# Adapter cable 1

Roller signals





# Checking the air gap between inductive pulse generator and trigger wheel



## 5 Air-pressure sensor

The air pressure is measured by the air-pressure sensor B1 on the DLS card.

If the upper limit of 1100 hPa is exceeded (incorrect setting, defective sensor), "\*\*\*\*" appears as an off-scale indication.

In this case, you must set the basic factory setting.

## 5.1 Check

- Call the "Pressure sensor" function in the Service Program
- Compare the displayed value with that of a precise barometer.

Tolerance of FLA air-pressure sensors: 0.6% from measured value  $\pm 6$  hpa

If the displayed value differs, you must correct the air-pressure sensor. If you are unable to correct the air pressure using this procedure, then the DLS card will have to be replaced.

#### 5.2 Basic factory setting

The basic factory setting can only be effected using the monitor keypad.

- Call the "Pressure sensor" function in the Service Program
- Press softkey F3 (third key from the left in the key bar below the screen).

The air pressure displayed at the moment does not conform to the actual air pressure and must therefore be corrected.

## 5.3 Correcting the air pressure

1. As described in the FLA installation instructions

#### or

2. By means of potentiometer R6 on the DLS card.

#### 6 DMS sensor (not FLA 202)

The braking force of the electrodynamic retarder is transferred to the DMS sensor by means of a lever arm.

The sensor then converts the force to a change in resistance which is measured by the DMS card and passed on to the computer card.



# FLA 203 FD261 ->



# FLA 206



#### 6.1 Checking the function of the entire measuring chain

Note: In the case of the FLA 206, you must perform this test on both DMS sensors. Procedure:

- Call the "Force pickup" function in the Service Program The force measured by the DMS sensor is displayed
- Check the display while the DMS sensor is not under load. The displayed value must lie at around +/- 5 kg. Before each measurement, the basic load is determined and incorporated in the measurement as an offset For this reason, it is not necessary for a precise value of 0 kg to be displayed.
- Check the display with the DMS sensor under load. To this aim, subject the lever arm of the electrodynamic retarder to load (foot) The displayed value should change as a function of the load.

#### Measurement

| Signal   | $\rightarrow$ | Source   | Measured value  |               |
|----------|---------------|----------|-----------------|---------------|
|          |               |          | with DMS sensor | without DMS   |
|          |               |          |                 | sensor        |
| Bridge + | -             | Bridge   | +10V            | approx. 10.3V |
|          |               | - (⊥)    |                 |               |
| Sensor + | -             | Sensor - | +10V            | approx. 10.3V |
| DMS +    | -             | DMS -    | +5V             | 0V            |

# 6.2 Checking the DMS card

The measuring circuit can be checked with the aid of a DMS calibrator and the "DMS card" function of the Service Program.

The DMS calibrator constitutes a high-accuracy resistance bridge which simulates the DMS sensor. It can be connected either to the connecting cable of the DMS sensor in the roller set or to the plug card of the control unit.

Procedure:

- Call the "DMS card" function in the Service Program.
- Connect up the DMS calibrator.
- Set the switch of the DMS calibrator to 0 mV/V A value within the range of +/- 25 should appear on the display.
- Press the Lev
- Set the switch of the DMS calibrator to **1.5** mV/V A value within the range of 3100 - 3170 should appear on the display.

## Adapter cable



# 6.3 Checking the DMS Sensor

#### Function:

The DMS sensor incorporates four strain gauges which are arranged in such a way that, when under strain, two of them expand and the other two compress.

The ohmic resistance of the strain gauges changes in proportion to their alteration in length. This detunes the Wheatstone bridge.

When a bridge supply voltage is applied, the sensor emits a signal which is proportional to the active force.

This signal is recorded by the DMS card.



#### Check

Here, the internal resistance of the sensor is checked whilst the latter is not under load

The measurement may be performed

1. Directly on the plug of the DMS sensor

or

2.On the plug of the DMS connecting cable inserted

in the control unit.

Advantage: The cable is also checked (for damage suffered during installation)

| PIN | $\rightarrow$ | PIN | $R(\Omega)$  |
|-----|---------------|-----|--------------|
| 1   | -             | 2   | $380 \pm 35$ |
| 3   | -             | 4   | $380 \pm 35$ |
| 5   | -             | 6   | $350 \pm 20$ |

# 7 Actuation of the electrodynamic retarder (not FLA 202)

# 7.1 Function

The vehicle is braked in a few test steps by the electrodynamic retarder and by the load roller which is connected firmly to it.

The current required to trigger the electrodynamic retarder is supplied by a thyristor controller which is operated by direct voltage (0V - 10V).

This control voltage is generated by a D/A converter on the DMS card.

In additional, test benches from FD 261 onwards also have an integral thermal cutoff (protecting the electrodynamic retarder from overload).

In the FLA 206, this thermal cutoff is integrated as standard.

For this reason, the signal path differs in the FLA 203.

FLA 203 -> FD172 The DMS card conveys the control voltage directly to the thyristor controller via the plug card.

FLA 203 FD261 ->

The DMS card conveys the control voltage to the thyristor controller via the plug card, the terminal card A16 and relay K2 (thermal cutoff).









# 7.2 Checking the function of the entire actuation

- Call the "Control output" function in the Service Program.
- Increase the control voltage by pressing the > key.
  Setting range: 0V 10V
  If the load roller does not turn, the electrodynamic retarder should hum audibly.

If the load roller is being driven by a vehicle, the braking force should increase perceptibly as the control voltage increases.

Note for FLA 206: Both electrodynamic retarders are actuated simultaneously.

If a malfunction occurs, check the individual components.

- Control voltage
- Thermal cutoff (only FLA 203 from FD261, FLA206)
- Thyristor controller
- Electrodynamic retarder

## 7.3 Checking the individual components

#### 7.4 Control voltage

- Call the "Control voltage" function in the Service Program.
- Alter the control voltage with the < and > keys.
- Measure the control voltage at terminal E to terminal M of the thyristor controller E = Control voltage input M = Ground
- Measure the voltage displayed in the Service Program.
- Note: If no voltage is present in the FLA 203 from FD261 or the FLA 206, first check the thermal cutoff.

## 7.5 Thermal cutoff (only FLA 203 from FD261, FLA 206)

The coil winding of the electrodynamic retarder contains an integral thermostatic switch which opens at temperatures of >150 °C and interrupts the supply of current to relay K2. This causes the control input E of the thyristor controller to be connected to ground via the break contacts of K2. The electrodynamic retarder is no longer actuated.

In the FLA 206, the thermostatic switches of the two electrodynamic retarders are connected in series.

Check

- Is control voltage present at K2 when checked as per the control voltage section?
- Has the thermostatic switch of the electrodynamic retarder responded?
- Does relay K2 switch through correctly?
- Has the fuse F3 been triggered?

# 7.6 Thyristor controller

The thyristor controller is a generalized phase control which is integrated in a bridge-connected rectifier (two power diodes, two thyristors).

Input voltage: 230 V alternating voltage

Output voltage: Pulsating direct voltage

The thyristors are actuated by the card which is integrated in the thyristor controller.

This card converts the control voltage applied to inputs E and M to switching pulses for the thyristors. Caution: The thyristor controller carries mains voltage.

The electrodynamic retarder is subject to a pulsating direct voltage of up to approx. 200V.

All measurements must be performed floating.

Please observe the safety guidelines.

Check

- Call the "Control voltage" function in the Service Program
- Connect the DVM to the terminal strip in the switch cabinet or to the electrodynamic retarder.

DVM setting: Measurement range VDC, 200V

#### **Connection points**

| Terminal strip FLA 203 up to FD172:            | Term.3, Term.4   |
|------------------------------------------------|------------------|
| Terminal strip FLA 203 from FD261:             | Term.9, Term.10  |
| Terminal strip FLA 206, fixed roller set:      | Term.11, Term.12 |
| Terminal strip FLA 206, adjustable roller set: | Term.9, Term.10  |
| Electrodynamic retarder:                       | Term.1, Term.4   |

- Check the voltage when the control voltage = 0V. Required: <10V
- Increase the control voltage and read the voltage value.
  See graph for guide values.
  It is important that the output voltage of the thyristor controller also changes when the control voltage changes.



#### Setting the thyristor controller

Rear end position: not yet available

Front end position: not yet available Electrodynamic retarder

Circuit diagram

CheckTerm.1 - Term.4Required:  $10\Omega - 12\Omega$ Thermostatic switch:The thermostatic switch must be closed at temperatures below 150 °C.<br/>Resistance test between Term.2 and Term.3 of the electrodynamic retarder

# 8 Remote control

#### 8.1 Circuit diagram of remote control





# 8.3 Function

\_

- Display of measured values and instructions
- Input entries via the keypad
- Evaluation of signals arriving from the sensor block
  - Intake-air temperature
    - Engine speed, petrol engines
      - Engine speed, diesel engines
- Transfer of measured values to the control unit via the serial interface

When the system starts up, the remote control performs a self-test.

During this process, the function of the internal subassemblies is checked.

If faults are detected, the fault codes are displayed briefly on the LCD.

You can also read out the fault codes by means of the "**Display fault codes**" function in the Service Program.

## 8.4 Fault codes

| Fault code | Cause of fault                     |
|------------|------------------------------------|
| 1          | Fault in LCD module                |
| 2          | Fault in internal RAM              |
| 3          | Fault in external RAM              |
| 4          | Checksum fault in PROM             |
| 5          | Checksum fault in EEPROM           |
| 6          | Fault in AD converter              |
| 7          | No sensor block                    |
| 8          | No intake-air sensor               |
| 9          | Short circuit in intake-air sensor |

#### Signals to plug X1

| Pin | Designation | Function                                                                |
|-----|-------------|-------------------------------------------------------------------------|
| 1   | $\perp$     | Ground                                                                  |
| 2   | +12V        | Supply voltage for remote control                                       |
| 3   | RxD         | Input of serial interface                                               |
| 4   | TxD         | Output of serial interface                                              |
| 5   |             | not assigned                                                            |
| 6   |             | not assigned                                                            |
| 7   | $\perp$     | Ground                                                                  |
| 8   | T-Luft      | Analog signal (U) of intake-air sensor                                  |
| 9   | N-Diesel    | Engine speed, diesel engines, square-wave signal (TTL level)            |
| 10  | N-Trig      | Engine speed, petrol engines, square-wave signal (TTL level)            |
| 11  | V-Trig      | Analog signal (U) for ascertaining the trigger threshold when measuring |
|     |             | engine speed using an inductive clip-on trigger sensor                  |
| 12  |             | not assigned                                                            |

# 8.5 Engine speed, PETROL engines

The ignition pulses are measured by the inductive clip-on trigger sensor and converted to squarewave pulses on card A20 of the sensor block (output of plug X2/4, N-TRIG).

In addition, a square-wave voltage proportional to the signal size is generated for the purpose of glitch recognition (output X2/3, V-TRIG).

Both signals are transmitted to the remote control.

The latter calculates the engine speed as a function of the type of ignition (4-stroke, 2-stroke, etc.) and number of cylinders, and transmits this value to the control unit via the serial interface.

#### Check

- Connect the inductive clip-on trigger sensor to the ignition simulator
- Call the "Remote control" test step in the Service Program

Note: Further settings can only be undertaken via the remote control.

- Call the "Speed" test step
- Specify 4-stroke as the type of ignition
- For measurements via Term. 4, specify the number of cylinders For measurements via cylinder 1, specify the number of cylinders as 1
- Read the speed display on the remote control. It must match the simulator speed.
- Observe the AD value.

(AD = value of the AD converter from the signal size recognition/glitch recognition) It is important that the value on the display is constant and does not jump to any great extent.

#### **Trouble-shooting:**

- Connect the inductive clip-on trigger sensor to the ignition simulator

Simulator settings:

#### **N-TRIG**

A20 X2/4 -  $\perp$  (housing)

## **V-TRIG**

A20 X2/3 -  $\perp$  (housing)



454 143/2

# 8.6 Engine speed, DIESEL engines

The injection pulses are measured by the diesel clip-on sensor and converted to square-wave pulses by card A21 of the sensor block.

These pulses are passed on to the remote control, which calculates the speed and transmits this value to the control unit via the serial interface.

## Check

- Connect diesel simulator P140, the clip-on sensor line, to the sensor block
- Call the "Remote control" test step in the Service Program

Note: Further settings can only be undertaken via the remote control.

- Call the "DIESEL" test step
- Enter the number of cylinders
- Read the speed on the display of the remote control This must match the simulator speed.

## **Trouble-shooting**

N-DIESEL 600 rpm

A21 plug X3/3 -  $\perp$  (housing)

| A                   |                                |    |
|---------------------|--------------------------------|----|
| ATN 2 V             |                                |    |
| CPL DC OFS OV       | ~~~                            |    |
| MTB 10 ms<br>DIY -1 |                                |    |
| SMP 512             |                                |    |
|                     | ···   · · <b>Þ.«   · · · •</b> | 0V |
| SMP 51              |                                | 0V |

#### N-DIESEL 6000 rpm

A21 plug X3/3 -  $\perp$  (housing)

|    |   |                |   |   |       |   |      |      |            |     |     |          |      |   |                   | A               |
|----|---|----------------|---|---|-------|---|------|------|------------|-----|-----|----------|------|---|-------------------|-----------------|
|    |   | <b>/</b> ///// | ~ |   | <br>~ |   | ~~~~ | -**1 |            | ~~~ | -** |          |      | A | ATN<br>CPL<br>OFS | 2 V<br>DC<br>0V |
|    |   |                |   |   |       |   |      |      |            |     |     |          |      |   | MTB<br>DLY        | 10 ms<br>-1     |
| ov | ÷ | I              |   | Ļ | <br>  | J |      |      | <b>.</b> , |     |     | <b>.</b> | •••• |   | SMP               | 512             |

#### 8.7 Intake-air temperature

The intake-air temperature is measured by an NTC resistor (rising temperature, falling resistance). Together with the resistor situated on the CPU card, the NTC forms a voltage divider. The voltage generated in this way is measured by the remote control, converted and transmitted to the control unit via the serial interface.

#### Check

- Call the "Remote control" test step in the Service Program
- Call the "Temperature measurement" test step
- Compare the displayed value with the value of a precise temperature meter

or

- Simulate the NTC using P200 and an adapter cable

| P200 settings | Display on remote control | Tolerance |
|---------------|---------------------------|-----------|
| 1365Ω         | 60 °C                     |           |
| 2048Ω         | 48 °C                     | +/- 2°C   |
| 4096Ω         | 30°C                      |           |
| 8192Ω         | 14°C                      |           |

#### Adapter cable 3 Intake-air temperature

|  | 1<br>2<br>3<br>454 143/23R |  |
|--|----------------------------|--|
|--|----------------------------|--|

#### **Trouble-shooting**

An open circuit (e.g. sensor not connector) or a short circuit at the time of temperature measurement is detected when the system starts up and is displayed as fault code 8 or 9.

Fault codes can be read by means of the "Display fault codes" function in the Service Program.

## 8.8 Connection/interconnecting cables

#### 8.8.1 Control unit – remote control, 1 684 465 218



#### 8.8.2 Remote control – sensor block, 1 684 465 219



#### 8.8.3 Diesel clip-on sensor, 1 684 463 151



# 8.8.4 Inductive clip-on trigger sensor, 1 687 224 718



# 8.8.5 Intake-air temperature sensor



# 9 Actuation of lifting step

# 9.1 Function

The solenoid value of the lifting step is actuated by a miniature relay on the DLS card (A2). The actuation is designed in such a way that the lifting step is lowered or cannot be raised when the rollers are turning or if there is a fault in the electronics. (lifting-step lock)

## 9.2 Check

- Connect up P200 For connection, adapter cable, etc. see the section on **Checking the roller signals**
- Activate the lifting step by pressing the H key or the appropriate key on the remote control
- Call the "Roller signals" test step in the Service Program

| - | Specify sine-wave | e voltage with P200        |      |
|---|-------------------|----------------------------|------|
|   | P200 settings     | AC sine-wave signal        |      |
|   |                   | Alternating voltage [Vss]: | 2    |
|   |                   | Frequency [Hz]:            | 50   |
|   |                   | Туре:                      | Sine |

- Read the measured FLA frequency on the remote control or monitor. Required: 50 Hz, 1.8 km/h
- The lifting step must stay up
- Change the frequency P200 entry: Frequency [Hz]: 200
- Read the measured FLA frequency on the remote control or monitor. Required: 200 Hz, 7.2 km/h
- The lifting step **must** be lowered The lifting-step lock has been activated

## **Trouble-shooting**

| Specified input   | Measuring point           | Measured value |
|-------------------|---------------------------|----------------|
| Lifting step up   | Solenoid valve connection | +12V           |
| Lifting step down | Solenoid valve connection | 0V             |

#### 9.3 Pneumatic circuit diagram



# 9.4 Braking the rollers with a lifting beam

The vehicle cannot be driven off the rollers or only with difficulty because the rollers are rotating, even though the lifting beam has been raised.

Cause :

Due to the accumulating production tolerances, several FLAs are not adequately clamped by the brake pads on the lifting beam.

Remedy :

Using 4 packing shims 1 681 032 055, raise both pneumatic bellows (see diagram, Position 1).



#### 10 Actuation of lifting step, extraction, fan, roller-set adjustment

# 10.1 Circuit diagram







# 11 Actuation of hydraulic motor

# 11.1 Circuit diagram



# 12 Keypad of operator/display unit

## 12.1 Circuit diagram operator/display unit 1 687 240 748



#### 12.2 Replacement for operator/display unit 1 687 240 748

The installed monitor of the operator/display unit is no longer available and is being replaced by a 17" monitor and a keyboard.

Pay attention to the different versions of the operator/display unit at the modification of FLA for operation with 17" monitor and keyboard.

- a) Control units with 80286 CPU pc board (1 688 300 764) with 720 kB floppy disk drive
- b) Control units with 80286 CPU pc board (1 688 300 764)) with 1,44 MB floppy disk drive
- c) Control units with 80386 CPU pc board (1 688 400 013) without VGA adapter
- d) Control units with 80386 CPU pc board (1 688 400 013) and VGA adapter
- e) Control units with 80386 CPU pc board (1 688 400 013) and 14" monitor

#### The following parts should be ordered for the modification of version a) and b)

| 1x | 1 681 020 011 | retaining plate                                         |
|----|---------------|---------------------------------------------------------|
| 1x | 1 688 400 013 | CPU pc board                                            |
| 1x | 1 687 022 806 | 1,44 MB floppy disk drive - only for version a)         |
| 1x | 1 687 000 870 | Backup disk V4.3                                        |
| 1x | 1 687 000 871 | Work disk V4.3                                          |
| 1x | 1 687 000 871 | Graphics package V4.3 G (optional)                      |
| 1x | 1 687 022 600 | Installation kit operator/display unit with 17" monitor |
| 1x | 1 688 006 133 | Swivel arm – only at mounting on the control cabinet    |
|    |               |                                                         |

#### The following parts should be ordered for the modification of version c) and d)

| 1x | 1 687 000 747 | VGA adapter only version c)                             |
|----|---------------|---------------------------------------------------------|
| 1x | 1 687 000 870 | Backup disk V4.3                                        |
| 1x | 1 687 000 871 | Work disk V4.3                                          |
| 1x | 1 687 000 871 | Graphics package V4.3 G (optional)                      |
| 1x | 1 687 022 600 | Installation kit operator/display unit with 17" monitor |
| 1x | 1 688 006 133 | Swivel arm – only at mounting on the control cabinet    |
|    |               |                                                         |

#### The following parts should be ordered for the modification of version e)

| 1x | 1 687 000 870 | Backup disk V4.3                                     |
|----|---------------|------------------------------------------------------|
| 1x | 1 687 000 871 | Work disk V4.3                                       |
| 1x | 1 687 000 871 | Graphics package V4.3 G (optional)                   |
| 1x | 1 687 023 331 | 17" monitor                                          |
| 1x | 1 685 519 974 | retaining plate                                      |
| 1x | 1 685 105 726 | mounting plate                                       |
| 1x | 1 688 006 133 | Swivel arm – only at mounting on the control cabinet |

# **Preparatory work**

# Before the work at, the test stand is to be separated from the power supply and to secure against switched on.

- Disassemble the control cabinet from the test bench
- Open the control cabinet and disassemble it from the
- Disassemble the swivel-type base from the test bench
- If the swivel arm is mounted to the control cabinet, the cabinet must be mounted close to the test bench, for example on a wall, or be replaced by the swivel arm 1 688 006 133.
  Reason: Due to the overall height of the 17" monitor, the swivel arm ... 095 is no longer able to be swivelled over the monitor.
- Remove the diskette drive/floppy controller ribbon cable from the floppy controller
- Remove the floppy controller (it is no longer required and remains with the customer)
- Only version a):
- Remove disk drive and through disk drive 1 687 022 806 replace
- Remove the VGA board already fitted (is no longer required and remains with the customer)
- Remove the CPU pc board 1 688 300 764 and the CMOS battery
- The rear panel of the housing must have an opening for the keyboard connector. If not, you must drill one. See the drawing below for the dimensions.



- Insert the mounting plate into the rear panel and screw tight
- Prepare the CPU board 1 688 400 013 for installation; to do this, check the following plug-in jumpers:

X1 (Col/Mono) plugged in "Col" X6 (DRV H/L) plugged in "L" X3 (VGA\_EN) plugged X9 (IRQ\_9) plugged



- Fit X23 with the enclosed POWER GOOD module (PGM)
- Connect the ribbon cable from the diskette drive to plug X11 of the CPU printed circuit board (comply with the pin 1 marking on the ribbon cable)
- Insert the CPU printed circuit board into the control unit and screw tight
- Connect the CMOS battery to plug X2
- Insert the terminal strip (1 687 000 747), included with the CPU board for connecting the VGA monitor into a free slot at the rear of the PC and screw it tight.
- Connect the connecting cable of the terminal strip to connector X15 on the CPU board. Connect the monitor to the terminal strip.
- If not available, must be drilled the holes for the swivel-type base ( $\emptyset$  7 mm) and the implementation for the protective earth conductor ( $\emptyset$  9 mm) into the upper section of the housing of the control unit.



- The further installation is described in installation instructions 1 689 978 380 (supplied with the monitor)
- When the 17" control and display unit 1 687 022 600 is used, the swivel arm for the hand-held remote control unit must be removed, because the arm can no longer be swivelled over the monitor due to the size of the monitor. To remedy this situation, the swivel arm can be attached to the wall in the vicinity of the test stand or you can fit swivel arm 1 688 006 133 (special accessory) instead.

## 12.3 Overview – 1,44 MB – Floppy disk drive

- 1 687 022 272 (Teac FD-235 HF-3201-U) Plug-in jumper X6 of CPU pc board at position H
- 1 687 022 299 (Teac FD-235 HF-5429-U5) Plug-in jumper X6 of CPU pc board at position H

(Teac FD-235 HF-6429-U5) ■ Plug-in jumper X6 of CPU pc board at position L

control the setting of plug-in jumpers of the floppy disk drive



1 687 022 606 (ALPS DF-354-H912-A) Plug-in jumper X6 of CPU pc board at position L

> 1 687 022 607: Has been internally set to DriveSelect 1 (DS1). Therefore, no need to make adjustment with plug-in jumpers prior to installation. (No more plug-in jumpers available))

1 687 022 806 Plug-in jumper X6 of CPU pc board at position L

#### 13 Service Program

#### 13.1 Opening the program





The "Service and Test Programs" are selected by pressing the keys

1 9 5 8



| SERVICE-PROGRAMM<br>ROLLER SIGNALS | FLA-SERVICE AND      | TEST-PROGRAMM      |
|------------------------------------|----------------------|--------------------|
| MONITOR                            | ROLLER SIGNALS       | POWER CAPACITOR    |
|                                    | REMOTE CONTROL       | PARAMETERS         |
| 0                                  | MONITOR              | DMS-PC             |
|                                    | KEYBOARD MONITOR     | CONTROL EXIT       |
| 4                                  | TEST ENGINE PERF.    | PRINTER            |
| 3                                  | PRESSURE SENSOR      | FBD <-> PC         |
|                                    | SELECT PROGRAMM WITH | ↓ AND START WITH → |
|                                    |                      | 454156/5           |
|                                    |                      |                    |

# 13.2 Roller signals, screen, screen keypad



#### 13.3 Engine power test

#### 13.4 Pressure sensor



# 13.5 Force pickup, characteristic values



454 143/37R

#### 13.6 DMS card

# 13.7 Control output

# 13.8 Printer





#### 13.9 Remote control

# 14 Control unit subassemblies

## 14.1 A8, CPU card 1 688 300 764, FD -> 12/93



14.2 A8, CPU card 1 688 400 013, FD 1/94 ->



#### 14.2.1 Scope of delivery

- 386 CPU card equipped with 2 MB RAM and CMOS battery
- Power Good module. Designated as PGM.

This card enables the CPU card to be reset when a supply voltage of 4.75 V or more is reached.

- Slot plate adapter for SER2 and VGA

#### 14.2.2 Required software:

The CPU card ...013 may only be operated with software of version 3.5 or higher. From this version onwards, the SETUP.COM file on the FLA disk has been adapted to suit the CPU card ...013.

#### 14.2.3 Installation:

- Insert plug-in jumper X3, VGA\_En
- Insert plug-in jumper X9, IRQ\_9
- Insert plug-in jumper X1, Col/Mono in Col
- Insert plug-in jumper X6, see 12.3
- Insert Power Good module in X23
- Insert the CPU card in the slot to the left of the disk drive (as seen from the front).

If CPU card ...013 is replacing a CPU card ...764, the VGA card and Disk Controller must be unplugged. Their function will be assumed by the CPU card ...013.

- Insert the connector of the lithium battery mounted on the CPU card in X2
- Install a slot plate with connector for SER2 and VGA next to the CPU card in the rear of the control unit and insert the ribbon cables of connectors X13 and X15 of the CPU card.

#### 14.2.4 BIOS settings

The BIOS settings constitute the basic setting of the CPU card, e.g. date, time, type of disk drive, etc. The data are stored in a CMOS RAM on the CPU card. This CMOS-RAM is supplied with voltage by a lithium battery mounted on the CPU card. If this battery is not connected or is fully discharged, the BIOS settings are lost when the system is switched off.

In case this happens, each FLA disk contains the SETUP.COM program. This recognizes that the BIOS settings have been lost and sets the basic values once again. However, the date and time must be set anew using the FLA program.

The BIOS settings can also be changed manually via CMOS-SETUP. The latter is a program which is contained in an EPROM on the CPU card. To change settings in this way, a PC keyboard must be connected to CPU card ...013. The procedure is described below.

Call CMOS-Setup: Simultaneously press keys **CTRL ALT INS** on the PC keyboard.

| Press: | Key                            | Function                                    |
|--------|--------------------------------|---------------------------------------------|
|        | ↑ and ↓                        | Select the desired field                    |
|        | $\rightarrow$ and $\leftarrow$ | Change the contents of the field            |
|        | Page ↓ (PgUp)                  | Display further options                     |
|        | ESC                            | Quit Setup without saving changes           |
|        | F10                            | Save changes, quit Setup                    |
|        |                                | This process must be confirmed once more by |
|        |                                | pressing <b>F5</b> .                        |
|        | F3                             | Change between color and black/white image  |

# Basic settings for CPU card ...013

| Time (HH:MM:SS)    | <1 ime of day>                                                                                                                                                 |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |                                                                                                                                                                |
| Date (MM/DD/YY)    | <date></date>                                                                                                                                                  |
|                    |                                                                                                                                                                |
| DISK A:            | 1.4M                                                                                                                                                           |
| DISK B:            | NONE                                                                                                                                                           |
|                    |                                                                                                                                                                |
| HARD DISK 1:       | NONE                                                                                                                                                           |
| HARD DISK 2:       | NONE                                                                                                                                                           |
|                    |                                                                                                                                                                |
| BASE MEMORY:       | 640K                                                                                                                                                           |
| EXTENDED MEMORY:   | 1024K                                                                                                                                                          |
| VIDEO DISPLAY:     | EGA/VGA                                                                                                                                                        |
| COPROCESSOR INST.: | NO                                                                                                                                                             |
|                    |                                                                                                                                                                |
| ERROR HALT:        | HALT ON ALL ERRORS                                                                                                                                             |
| SPEED SELECT:      | HIGH                                                                                                                                                           |
|                    | DISK A:<br>DISK B:<br>HARD DISK 1:<br>HARD DISK 2:<br>BASE MEMORY:<br>EXTENDED MEMORY:<br>/IDEO DISPLAY:<br>COPROCESSOR INST.:<br>ERROR HALT:<br>SPEED SELECT: |

| Additional System Options | SYSTEM LOAD:        | STANDART              |
|---------------------------|---------------------|-----------------------|
|                           | SECURITY FEATURES:  | DISABLED              |
|                           | SHADOW BIOS ROM:    | SYSTEM AND VIDEO BIOS |
|                           | BASE MEMORY:        | 640K                  |
|                           | RE_MAP UNUSED MEM.: | NO                    |
|                           | SERIAL 1:           | COM1 (3F8h)           |
|                           | SERIAL 2:           | COM2 (2F8h)           |
|                           | PARALLEL:           | LPT1 (378h)           |
|                           | PAR MODE:           | PRINTER               |
|                           | DISKETTE CTRLR:     | ENABLED               |
|                           | HARD DISK CTRLR:    | DISABLED              |

#### 14.2.5 Program crash - FLA with 386 CPU

When the FLA 202, 203 or 206 with CPU 386 is booted, the RAM-Parity Error error message is displayed or the computer program stops (program crashes - usually during printing). The cause are defective memory modules

Remedy:

Replace all existing SIMMs with two 4 MB SIMMs 1 688 400 150. The 4 MB SIMMs must be inserted into Bank 1 (see diagram, Pos. 1).



When the RAM modules have been replaced, the RAM-size error message is displayed during the boot procedure (error message occurs during every boot procedure); however, this error message is ignored by the system and the computer still starts.



A9

BUS



#### 14.5 DMS-LPA3



# 15 New logging printer

As from 6/92 the logging printer 1 684 022 200 is being replaced by the logging printer 1 684 022 282 The new logging printer only can be used with software V 3.1 or higher. Which printer type the program supports can be specified as from software Version 3.1. The following printers are available for selection: 4-colour dot-matrix plotter 1 687 022 200 to FD 266

Thermal printer 1 687 022 282 as from FD 266

The printer is installed as described in the installation manual for FLA 202 and FLA 203, WEF 415/1.

Before starting the installation work, switch OFF the main switch and secure it to prevent unintentional restarting!

The printer is supplied with the mains cable already connected to the terminal connector (Fig. 2, Ref.2).

Fig. 2 - Arrangement of the modules



Fig. 2a- Mains connection diagram for connecting the control unit to the printer



The printer is selected in the customer-service program, Printer function. When the printer selection is changed, the selected printer type is stored on disk.

## 16 Switch cabinet subassemblies





