CL500

MADAP500
Software module description

Version 102

CL500

MADAP500
Software module description

1070 072 130-102 (92.10) GB

Reg. Nr. 16149-03

Discretionary charge 20.– DM

Preface

Users should read this software module description before employing the MADAP500 software. Always keep this manual in a place where it is accessible for all users.

We would ask you to help us improve this software module description by listing any suggestions you may have on the sheet provided at the back of the manual.

WARNING, CAUTION, Note

The use of the terms **WARNING**, **CAUTION** and **Note** throughout this software module description is subject to the following rules.

WARNING 

This heading is used wherever lack of compliance or non–compliance with instructions may result in **personal injury**.

CAUTION 

This heading is used wherever lack of compliance or non–compliance with instructions may result in **damage to equipment or files**.

Note ☞

This heading is used to draw attention to special features.

❑

This symbol is always to be found at the start of a **programming example for a programmable controller**, e.g.:

❑
```
A       -BEDIN1;step enabling condition 1
A       -BEDIN2;step enabling condition 2
```

This software module description is intended for programmers and users of the MADAP500 software. Programming presupposes knowledge of the diagnostic module DB500 and incremental programming.

Note ☞ **The alterations vis a vis Edition E2 are listed in Section A.3 “Alterations”.**

Note ☞ **This software module description applies to the software version 102.**

Contents

Contents

1 Introduction

1.1 Functions and components of the software package

This software package consists of 3 function units.

- **Control**
- **Operate** / **Monitor**
- **Usage**

All 3 function units are self–contained and mutually independent.

Control

- Controls the sequential controls for 64 parallel cascades with up to 128 steps/cascade
- Synchronizes the sequence cascades with the instantaneous machine status
- Administers the plant modes
- Monitors the control process
- Organizes the process: linear/branched
- Outputs commands

Operate / **Monitor**

- Displays plant faults and machine statuses
- Executes 1024 movements directly on the screen

8 function keys and 16 movement keys in a compact, clear–cut control unit make for complete machine operation and visualization.

Usage

Saves and displays production data over 14 days for the following parameters.

- Machine on
- Machine idle
- Production running
- Quantity
- Buffer full
- No components
- Fault

For **production running** and **Quantity** the data for 7 days in 3–shift operation are also saved.

Note ☞

The existing library must not be changed, i.e. its control program is compiled from the library, copied into a separate sub–directory and geared to the appropriate task in the sub–directory.

1.2 Module structure and menu tree

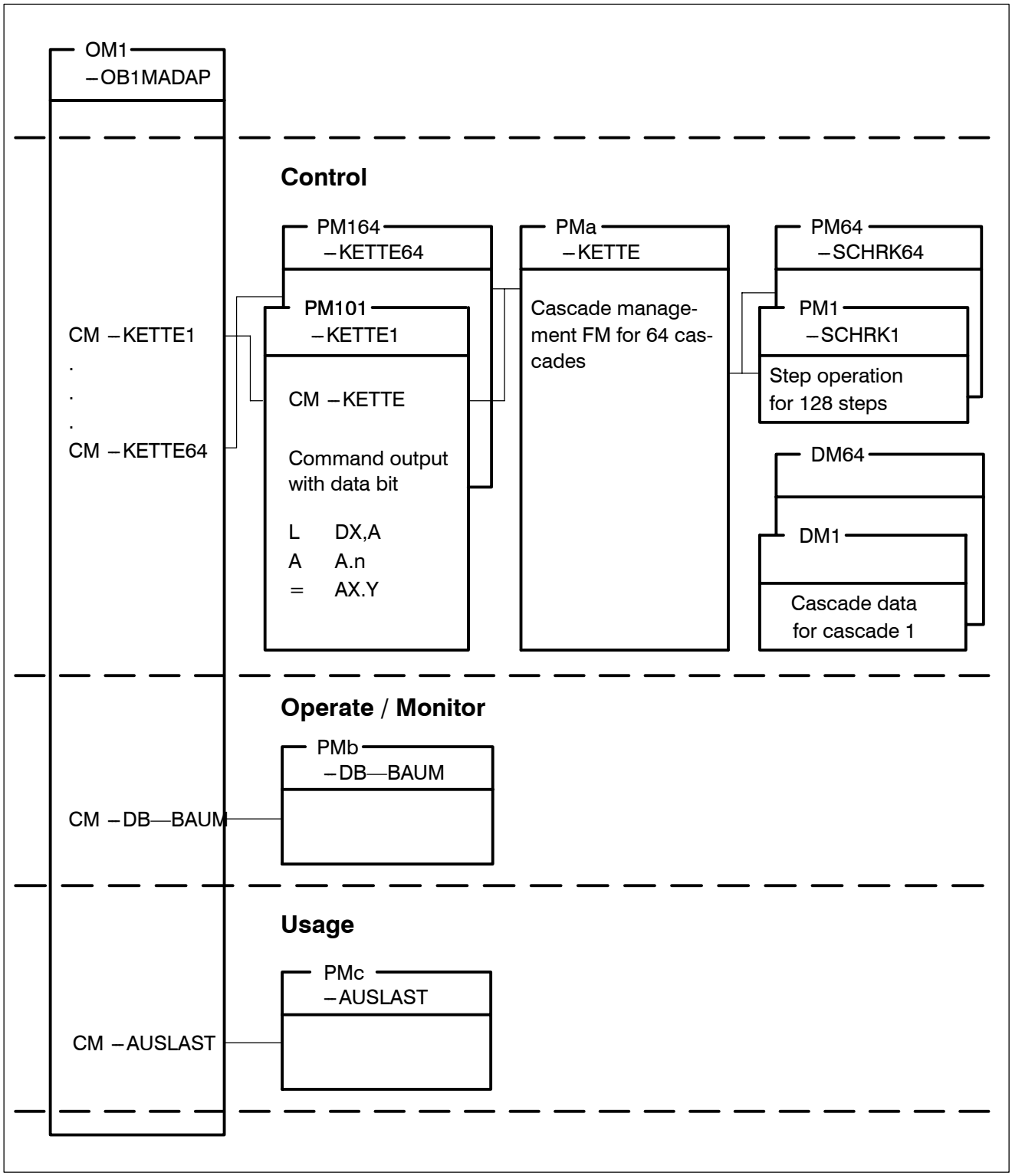


Fig. 1–1 Module structure of entire software package

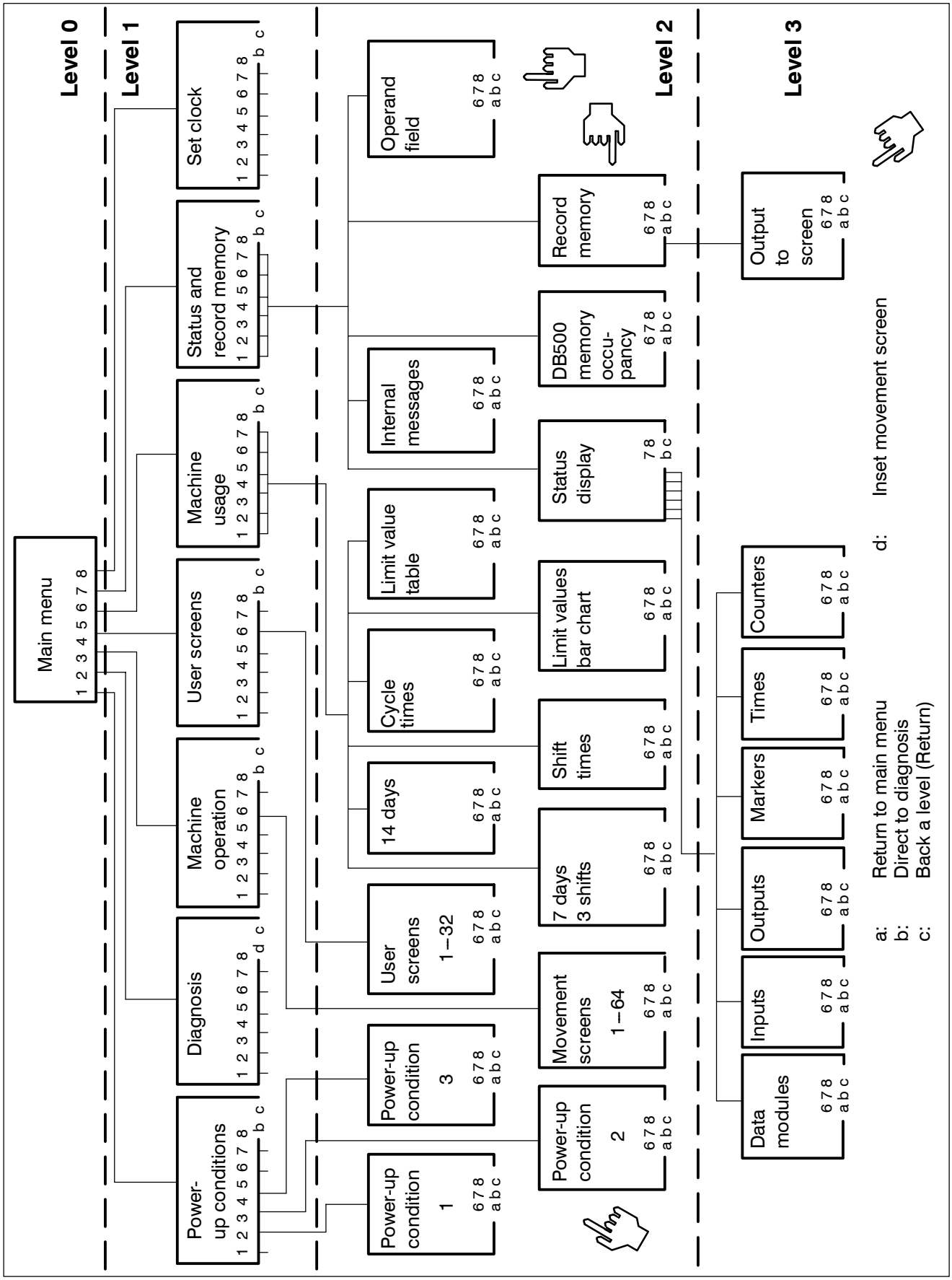


Fig. 1–2 Memory tree

2 Control

- Control of sequential controls for 64 parallel cascades with up to 128 steps/cascade
- Synchronization of sequence cascades with instantaneous machine status
- Administration of plant modes
- Monitoring of control process
- Organization of process: linear/branched
- Output of commands

2.1 General

Cascade organization module –KETTE

The **Cascade organization module –KETTE** manages the cascade sequence. In the initialization phase, after loading the controller program into the CL500, it is likewise responsible for writing all the necessary information into the relevant data modules **DMn**.

As an entirely new function, the PM **–KETTE** is capable of synchronizing executable steps.

The cascade organization module –KETTE is located on the floppy disk in the directory **MADAP.500****STEUERN**, refer to Section 5.2. The cascade organization module must be copied as it stands into your directory.

Note ☞ **Refer also to Section 2.4 Cascade organization module –KETTE.**

Cascade module –KETTEn

The cascade module **–KETTEn** is created once for each cascade. It is called up from **–OB1MADAP.** The module contains

- **Activation** of the corresponding data module **DMn**,
- **Mode** programming,
- **Module call** for cascade organization module **–KETTE** and
- **Command output**.

The cascade module –KETTEn is located on the floppy disk in the directory **\MADAP.500\STEUERN\PB—KETT**, refer to section 5.2. The cascade module has to be copied once for each cascade into your directory. The copies should be designated –KETTE1, –KETTE2, ... –KETTE64. Renaming within the cascade module is also necessary.

Note ☞ **Refer also to Section 2.3 Cascade modules –KETTEn.**

Step module –SCHRKn

The step module **–SCHRKn** is created once for each cascade. It is called up from the **cascade organization module –KETTE**.

The module contains

- The **Jump distributor** and
- the cascade **steps**. The maximum number of steps per cascade is 128.

The step module –SCHRKn is located on the floppy disk in the directory**\MADAP.500\STEUERN\PB—SCHR**, refer to Section 5.2. The step module must be copied once for each cascade into your directory. The copies should be designated –SCHRK1, –SCHRK2, ... –SCHRK64. Renaming within the step module is also necessary.

Note ☞ **Refer also to Section 2.5 Step modules –SCHRKn.**

2.1.1 Definitions

The following definitions are intended to simplify usage.

- Maximum of 64 parallel cascades.
- Maximum of 128 steps per cascade programmed in a single module.
- Each cascade is assigned the following modules:
  Cascade 1:

PM101	**–KETTE1**	as cascade module with module call for **–KETTE** and command output
PM1	**–SCHRK1**	as step module with max. 128 steps
DM1		with all cascade data for cascade 1

  .
  .
  .
  Cascade 64:

PM164	**–KETTE64**	as cascade module with module call **–KETTE** and command output
PM64	**–SCHRK64**	as step module with max. 128 steps
DM64		with all cascade data for cascade 64

- Defined markers:

M230–M255		Scratch marker area
M242	**–VERZWADR**	Branch address
M255.0	**–BEFA**	Command output marker
M255.1	**–WSB**	Step–on condition
M255.2	**–STOEM**	Fault marker
M255.6	**–WZT**	Waiting time status
M255.7	**–FEHLEIN**	No entry in **record memory**, if **1**

- n: Cascade number, $n_{max} = 64$
  N: Step number, $N_{max} = 128$

CAUTION

When using interrupts (e.g. time–controlled processing), the marker words M242 and M254, as well as the arithmetic registers A, B, C and D, must be saved and re–activated after completion of the interrupt routine.

2.1.2 Module structure in the entire software package

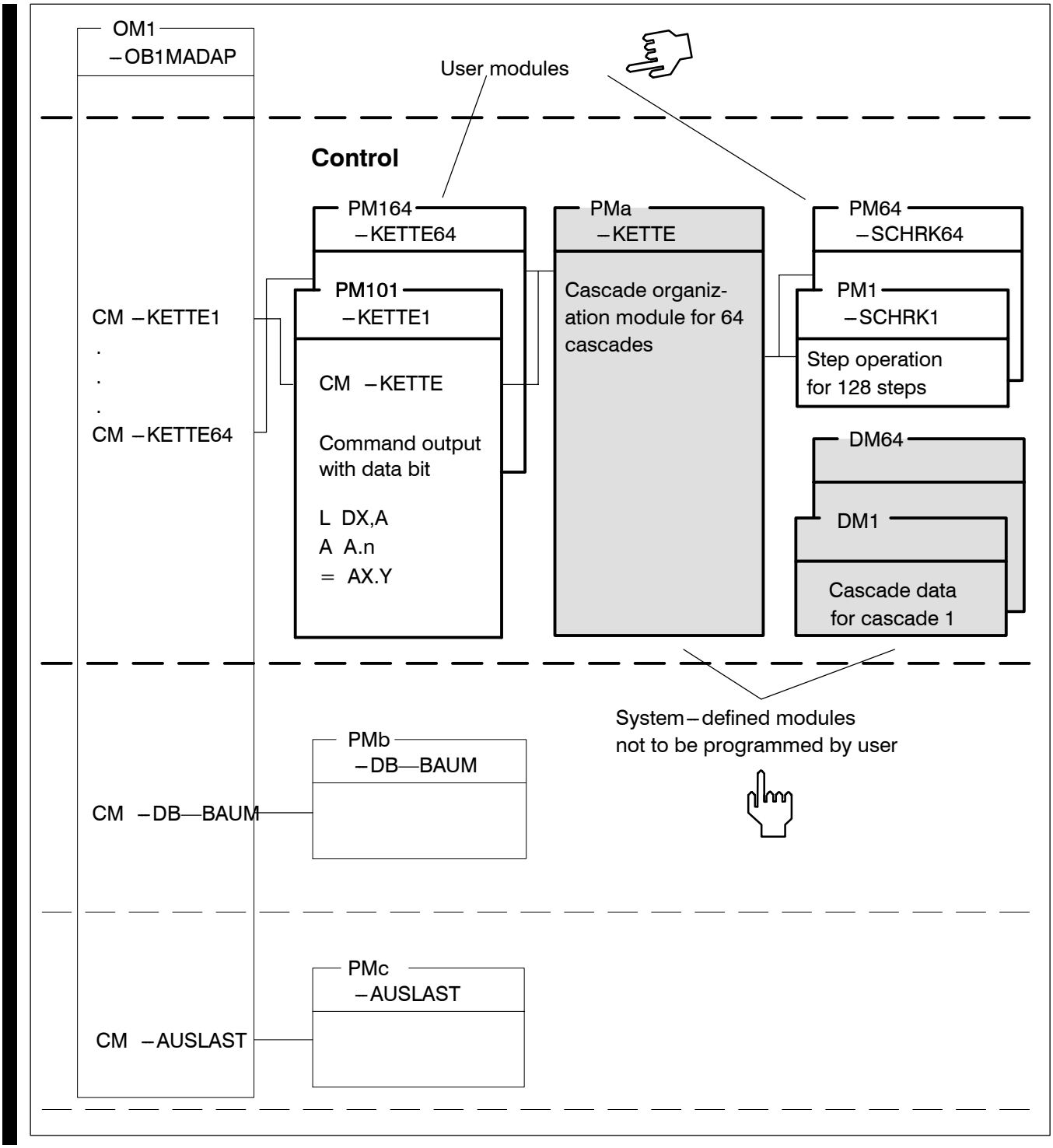


Fig. 2–1 Module structure in the entire software package

2.2 Modes

2.2.1 Manual mode

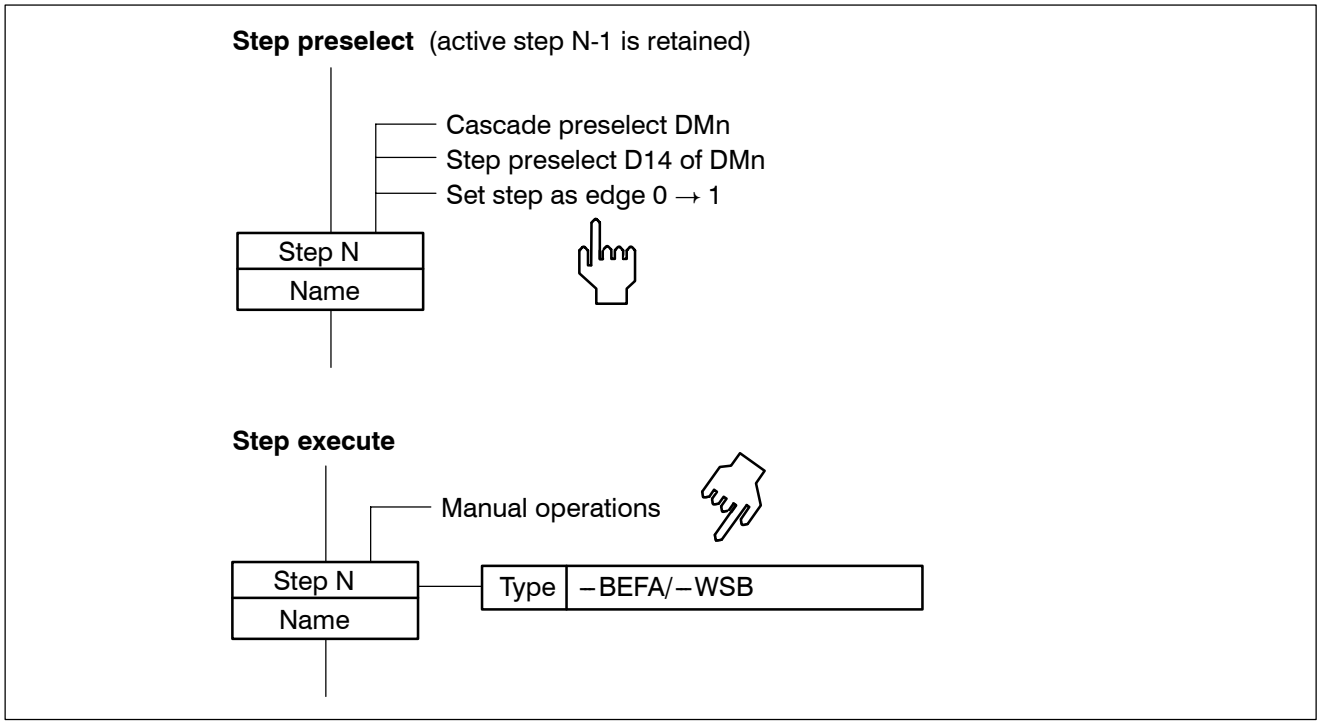


Fig. 2–2 Manual mode

Function

Manual control of steps in accordance with **manual operations**.

Step N is selected and accepted by **set step.**

The last step processed is indicated in manual mode in the data word D12 of DMn.

Command output for step N is effected if

- the manual conditions are satisfied (BEFA = 1)

and

- if D6.3 = 1 (Start).

Command output is effected by way of the data bits nnBEFx (x = 16, 32, ... 128) of DMn (DW80 – DW94).

The preparation of another step is disabled. There is no **step–on**.

Programming

Manual mode must be programmed as follows:

- Set **Bit 0** (Manual mode) in parameter **P1** of cascade management module **–KETTE** to **1**.
- Set **Bit 3** (Start) in Parameter **P1** of cascade management module **–KETTE** to **1**.
- Activate data module **DMn** and enter number of step to be executed in manual mode in D14.
- Generate **positive edge** at **Bit 5** (set step) in parameter **P1** of cascade management module **–KETTE**.

Diagnosis

Manual mode is indicated on the screen by means of the letter **H**.

The **waiting and monitoring times** are set to the values defined in the parameters **P2** and **P3** of the cascade management module **–KETTE**. The times are, however, not started and not subjected to further processing.

It is possible to display **all** manual conditions for the BEFA or WSB branch with highlighting of the missing conditions.

There is

- **no fault indication** and
- **no entry** in the **record memory** of the diagnosis module DB500.

2.2.2 Inching mode (automatic operation at the touch of a button)

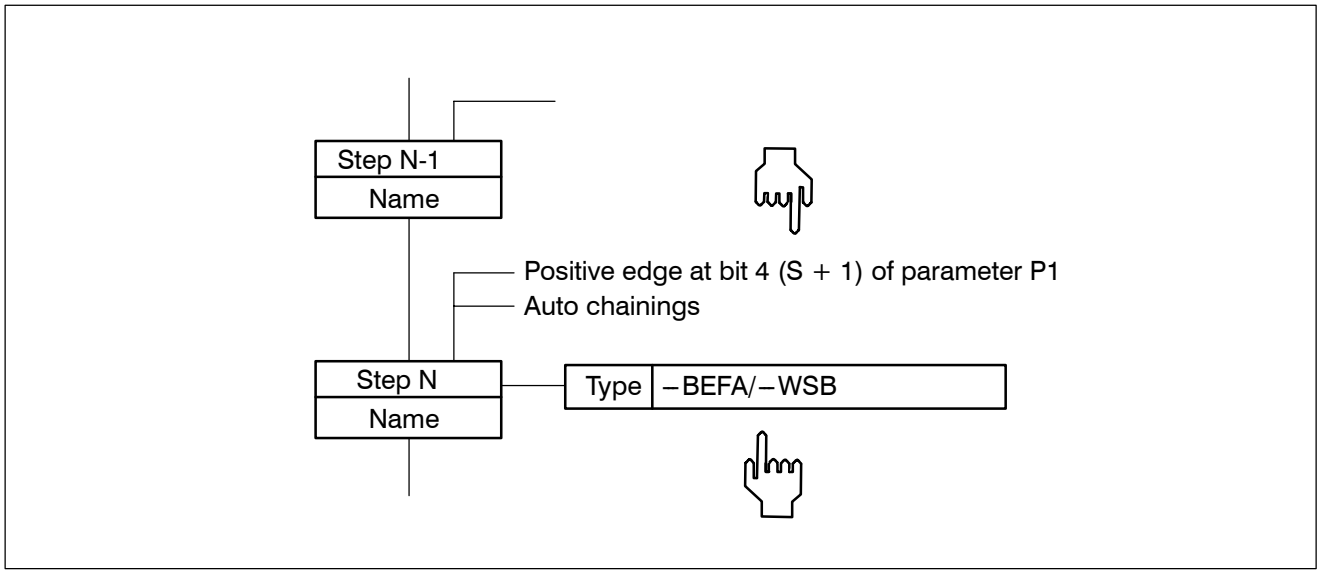


Fig. 2–3 Inching mode

Function

Manual control of steps in accordance with **automatic chainings**.

Command output for step N is effected if

- the automatic chainings are satisfied (BEFA = 1)

and

- if D6.3 = 1 (Start).

The command output is by way of the data bits nnBEFx (x = 16, 32, ... 128) of DMn (DW80 – DW94).

There is **no automatic step–on.**

If **D6.3 = 0** (Start), it is possible to jump to the next step with a **positive edge** in **bit 4** (S + 1) of parameter **P1**. There is then **no** command output and the monitoring/waiting times do **not** run. The bit **D6.3** (Start) must be on **1** for 1 cycle.

Programming

Inching mode must be programmed as follows:

- Set **bit 1** (inching mode) in parameter **P1** of cascade management module **–KETTE** to **1**.
- Set **bit 3** (start) in parameter **P1** of cascade management module **–KETTE** to **1**.
- Generate **positive edge** at **bit 4** (S + 1) in parameter **P1** of cascade management module **–KETTE**.

Diagnosis

Inching mode is indicated on the screen by way of the letter **T**.

The **waiting**/**monitoring** times run with the specified values.

Display potential for **all**

- **autochainings** with highlighting of missing conditions.
- **faulty** cascades.

Faults are entered in the record memory of the diagnosis module DB500.

2.2.3 Automatic mode

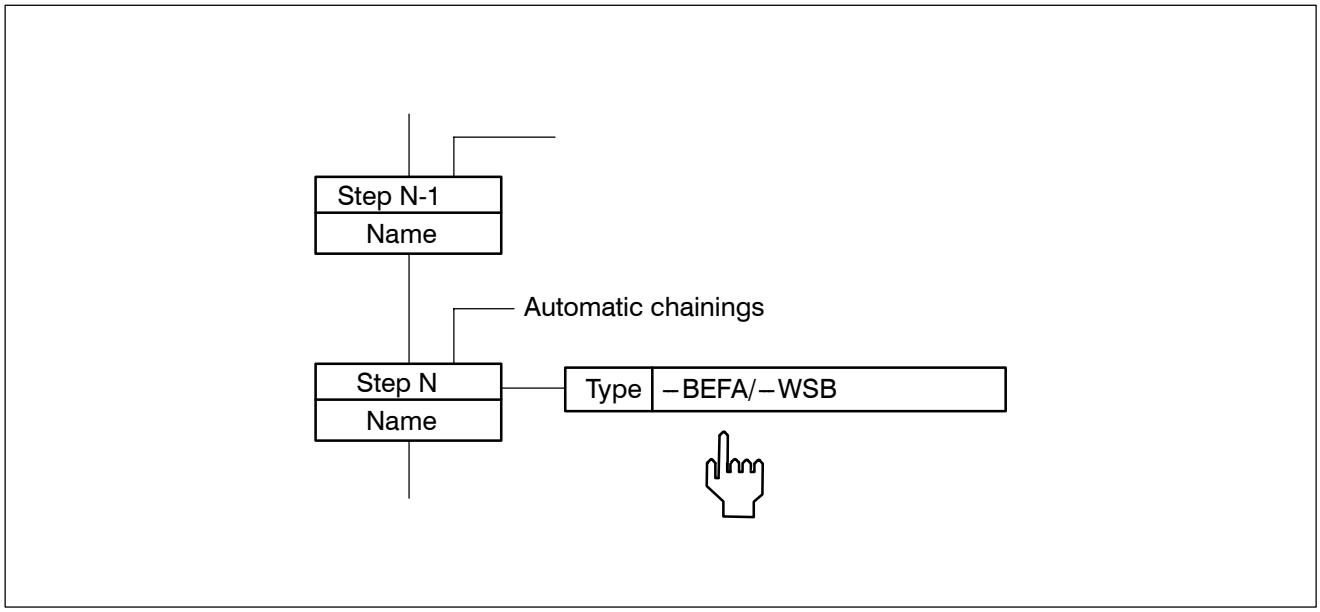


Fig. 2–4 Automatic mode

Function

Automatic running of defined step sequence in accordance with the automatic chainings.

Command output for step N is executed if

- the automatic chainings are satisfied (BEFA = 1)

and

- D6.3 = 1 (Start).

Command output is effected by way of the data bits nnBEFx (x = 16, 32, ... 128) of DMn (DW80 – DW94).

If WSB = 1 in the current step, automatic **step–on** is implemented (preparation of next step).

Programming

Automatic mode must be programmed as follows:

- Set **bit 2** (automatic mode) in parameter **P1** of cascade management module **–KETTE** to **1**.
- Set **bit 3** (start) in parameter **P1** of cascade management module **–KETTE** to **1**.

Diagnosis

Automatic mode is indicated on the screen by way of the letter **A**.

The **waitiing**/**monitoring** times run with the specified values.

Display potential for **all**

- **automatic chainings** with highlighting of missing conditions.
- **faulty** cascades.

Faults are entered in the record memory of the diagnosis module DB500.

2.3 Cascade modules –KETTEn

The cascade module **–KETTEn** (n = 1 – 64) is created once for each cascade. It is called up from **–OB1MADAP**, refer to Fig. 2–1. The module contains

- **Activation** of the corresponding data module **DMn**,
- **Mode** programming, refer to Section 2.2,
- **Module call** for the cascade management module **–KETTE** and
- **Command output**.

2.3.1 Activating data module DMn

The appropriate data module **DMn** is activated in the cascade module –KETTEn.

```
;Cascade module -KETTEn

;Activate data module DMn

CM     DMn                  ;n = 1 - 64
```

Note ☞ **Refer also to Section 2.6 Data modules DMn.**

2.3.2 Call–up of cascade management module –KETTE in cascade module –KETTEn

Each cascade module in turn calls up the cascade management module **–KETTE**. The cascade management module **–KETTE** has 4 input parameters.

```
;Cascade module -KETTEn

;Call-up of cascade management module -KETTE

;                              -KETTE
;
;
;
;-PB/DM          Word ———————  P0
;-BETR           Word ———————  P1
;-KUE            Word ———————  P2
;-KWA            Word ———————  P3
;
CM     -KETTE,4
P0  W  -PB/DM                 ;Cascade No., PM-No., DM-No., n = 1 - 64, e.g.: K10
P1  W  -BETR                  ;Mode selection, mirrored on D6, e.g.: I2.0
P2  W  -KUE                   ;Time value, monitoring time is mirrored on D20,
                              ;e.g.: K20D
P3  W  -KWA                   ;Time value, waiting time is mirrored on D18, e.g.:
K10D
```

Note ☞ **Refer also to Section 2.4 Cascade management module –KETTE.**

2.3.3 Command output in cascade module –KETTEn

Command output in the cascade module –KETTEn must follow on directly from the module call of the cascade management module –KETTE. Command output is effected as follows:

- If the BEFA marker is satisfied in the active step, the corresponding data bit is set in the data area D80 – D94.
  Example:
  Active step: 5
  BEFA = 1
  WSB = 0 (depending on D7.6)
  set data bit: D80.4
- These data bits are output step by step with the following commands.

```
;S1
L      D80,A              ;Loading of BEFA bits, steps 1 - 16
A      A.0                ;Evaluation of individual BEFA bits
;=     OXX.Y              ;Relaying to outputs

:
:

;S16
A      A.15
;=     OXX.Y

EM
```

2.4 Cascade management module –KETTE

The **cascade management module –KETTE** organizes the sequence of the cascades. In the initialization phase, after the controller program has been loaded into the CL500, it is also responsible for writing the necessary information into the corresponding data modules **DMn**.

The cascade management module **–KETTE** has 4 input parameters.

Parameter P0

The parameter **P0** provides the cascade management module –KETTE with the current **cascade number n** for the following modules:

- Number of cascade module –KETTEn
- Number of step module –SCHRKn
- Number of data module DMn

All processed cascades **n** file variable data, e.g. monitoring time, in the appropriate data module **DMn**.

❑

```
P0    W   -PB/DB      ;e.g.: K10
```

The data module entries are described in Section **2.6 Data modules DMn**.

Parameter P1

Parameter P1 informs the cascade management module of the mode selection.

❑

```
P1    W   -BETR       ;e.g.: I2.0
```

P1.0	Manual (M)
P1.1	Inching (I)
P1.2	Automatic (A)
P1.3	Start
P1.4	S + 1
P1.5	Set step
P1.6	Stop acknowledge
P1.7	Reset
P1.8	Stop
P1.9	Synchronize
P1.10	
P1.11	Generate cascade DM
P1.12	No step–on in same cycle
P1.13	Diagnosis, if WSB = 1
P1.14	WSB does not reset BEFA
P1.15	Fault acknowledgement

The cascade management module writes the data into the data word **D6** (nnBAWAHL) of the corresponding **DMn**.

Parameter P2 / P3

The **waiting and monitoring times** for every step are transferred to the cascade management module in each run with the parameters P2 / P3.

❑

```
P2    W   -KUE        ;e.g.: K20D
P3    W   -KWA        ;e.g.: K10D
```

The **time base** for the **waiting and monitoring time** is always **100 ms**. This results, for example, in a time value of 2 seconds with constant K20D. The maximum waiting/monitoring time is 109 minutes.

Characteristic data

Module processing time	: approx. 0.28 ms per cascade
With step–on (processing of next step in same cycle)	: approx. 0.47 ms per cascade
Module length	: approx. 1 k word

2.5 Step modules –SCHRKn

A **step module –SCHRKn** (n = 1 – 64) is created for every **cascade**. The step module contains

- The **jump distributor** to **active** step and
- the max. **128 steps**.

The principle of step programming in a module is that the **cascade management module –KETTE** enters the step module with a correspondiing offset depending on the active step.

Processing of the step module –SCHRKn always starts with the **step–distributor line belonging to the active step**. Branching into the actual **step conditions** is then effected from there.

The step conditions are made up of the

- **Manual conditions** in the manual branch and
- the **automatic/inching conditions** in the automatic branch.

The manual and automatic branches for every step must be concluded with an **end of module command**.

Any desired number of **BEFA branches** can be programmed.

As regards fault diagnosis, only the **first untrue** BEFA branch after the beginning of the step is ever displayed.

If all BEFA branches are true, then the first **untrue WSB branch** is displayed.

Any number of **WSB branches** can be programmed.

For optimum handling of time and display, no more than 16 operations should be programmed in a single branch to be diagnosed (use group markers). This means that only one page is ever displayed in the diagnostic field and there is no need to scroll. The **–DIAG500** must also analize a maximum of 16 instructions, which is of course faster than interpreting 64 criteria.

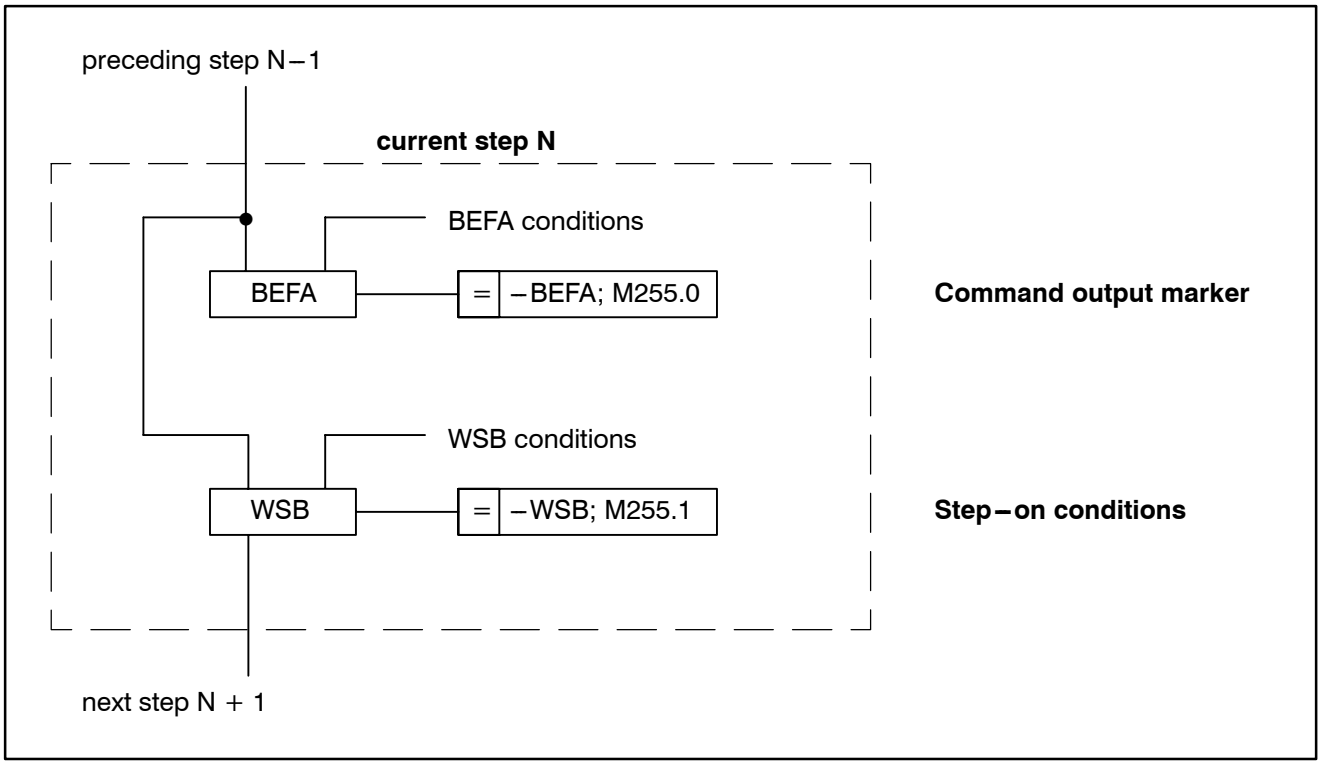


Fig. 2 – 5 Structure of a step

A **module call** from a step module – SCHRKn is **not permitted**.

The **jump distributor** / **jump addresses** in a step module – SCHRKn may **not be altered** by the substitution function in the PC monitor program.

The jump distributor may only contain **unconditional** jumps. The jump sequence must be in line with the sequence of jump addresses.

```
;Jump distributor to active step

JP     [A]                  ;Jump distributor with increment in register A
JP     -S1                  ;to step 1
.
.
JP     -SN                  ;to step N (N_max = 128)

;Step conditions

;Step 1
       -S1
L      D8,A
A      A.4                  ;Automatic or inching active?
JPC    -AUTOS1

;Manual conditions

;The manual mode conditions that set or clear the
;command execute marker are programmed here.
=      -BEFA        M255.0

;Here the movement initiated by the BEFA reports its end position and
;controls the WSB marker.
=      -WSB         M255.1

;The subsequent EM command ensures that only the active step
;is processed.
EM

;Automatic/inching conditions

       -AUTOS1

;The auto or inching mode conditions
;that control the command execute marker are programmed here.
=      -BEFA        M255.0

;Here the movement initiated by the BEFA must report its end position
;and set the step-on conditions to enable the next step
;to be processed.
=      -WSB         M255.1

;The subsequent EM command ensures that only the
;active step is processed.
EM
```

2.5.1 Handling the fault marker –STOEM (M255.2)

The **fault marker –STOEM (M255.2)** makes it possible to display faults independent of the **monitoring time** e.g. limit overshoots with temperature regulation.

Note ☞ **The fault marker –STOEM is controlled solely by the user.**

The fault marker –STOEM has logic **1** status when there are no faults and is **reset** should a fault occur.

Example

```
;Step conditions

;Step 1
       -S1

;Automatic/inching conditions

;Fault marker programming
CPLA   -GRENZW,A             ;Limit overshoot
A      SM31.0                ;arithmetic A > limit
R      -STOEM       M255.2   ;Reset -STOEM triggers diagnosis

;Automatic conditions
=      -BEFA        M255.0

;Movement report
=      -WSB         M255.1

;The subsequent EM command ensures that only the
;active step is processed.
EM
```

The fault marker initiates an entry in the **record memory**.

Dependence of **D7.7** on corresponding **DMn**.

- **D7.7 = 0** : Decade starts automatically following elimination of fault or after movement report WSB.

or

- **D7.7 = 1** : Decade starts after acknowledgement with **D6.6**.

Note ☞ **Refer also to Section 2.6 Data module DMn.**

2.5.2 Handling branch addresses –VERZWADR (M242)

The marker word **–VERZWADR (M242)** is used to transfer step numbers, which define the subsequent program sequence, to the cascade management module **–KETTE**. This enables OR branches to be created.

Example

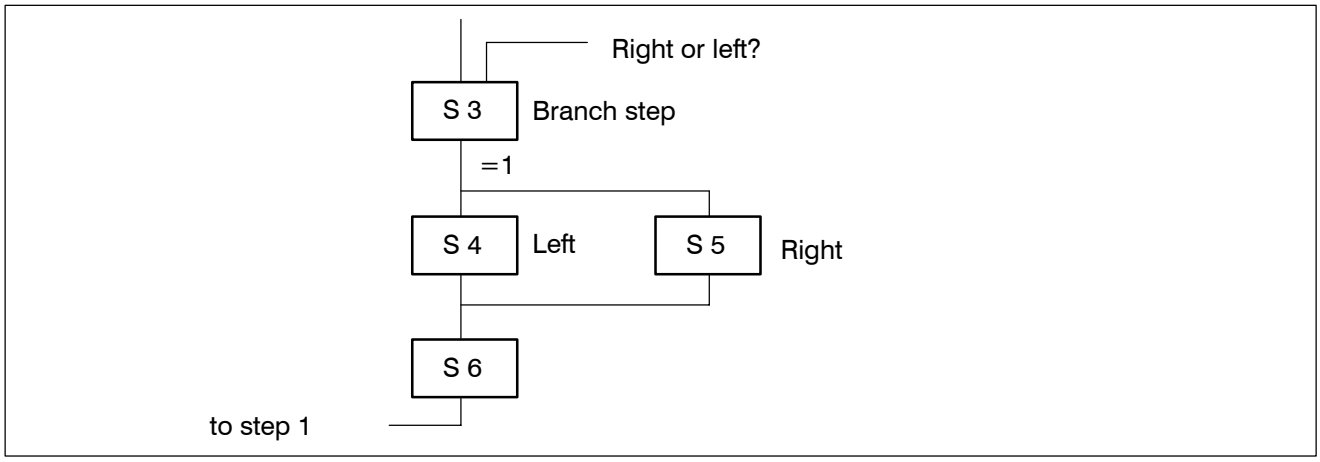


Fig. 2–6 Branch addresses

```
;Branch step 3

       -S3
A      -Links
JPC    -LINKS                ;to step 4

;Right
L      K5,A
T      A,-VERZWADR    M242   ;to step 5

;Automatic conditions
=      -BEFA         M255.0

;Movement report
=      -WSB          M255.1
EM

;Left
       -LINKS

;Automatic conditions
=      -BEFA         M225.0
```

```
;Movement report
=      -WSB          M255.1
EM

;Step 4

       -S4
L      K6,A
T      A,-VERZWADR    M242   ;to step 6

;Automatic conditions
=      -BEFA         M255.0

;Movement report
=      -WSB          M255.1

EM

;Step 5

       -S5

;Automatic conditions
=      -BEFA         M255.0

;Movement report
=      -WSB          M255.1   ;linear continue with step 6

EM

;Step 6

       -S6

;Automatic conditions
=      -BEFA         M255.0

;Movement report
=      -WSB          M255.1   ;linear continue with step 1

EM
```

2.5.3 Changing waiting and monitoring times within steps

The current values for the waiting and monitoring time are taken from the appropriate **DMn** on step execution.

Waiting time: **D18**
Monitoring time: **D20**

Example

```
;Step conditions


;Step N

       -SN

;Transfer of new value only good for this step
;Value = xxx * 100 ms.

L      Kxxx,A
T      A,D18                ;New value for waiting time
L      Kxxx,A
T      A,D20                ;New value for monitoring time

;Automatic/inching conditions

;Automatic conditions
=      -BEFA        M255.0

;Movement report
=      -WSB         M255.1

;The subsequent EM command ensures that only the
;active step is processed.
EM
```

2.5.4 Polling the waiting time

The marker **–WZT (M255.6)** indicates the status of the waiting time.

Example

```
;Step conditions

;Step N

       -SN

;Pole status of M255.6:
;      0 = Waiting time running
;      1 = Waiting time elapsed

;Automatic/inching conditions

;Automatic conditions
=      -BEFA        M255.0

;Movement report
A      M255.6               ;Step-on when waiting time
=      -WSB         M255.1  ;has elapsed

;The subsequent EM command ensures that only the
;active step is processed.

EM
```

2.5.5 Entry in record memory

The marker **–FEHLEIN (M255.7)** makes it possible to establish for every step whether or not there is to be an entry in the **record memory** should a fault occur. There will normally be an entry in the record memory. **No** entry is made in the record memory in the event of a fault, only if the marker bit 255.7 is set to **1**.

Example

```
;Step conditions

;Step N

      -SN

;Pole status of M255.7:
;      0 = Entry in the event of fault
;      1 = No entry in the event of fault

A     -LOG1                ;No entry in the event of fault
=     -FEHLEIN     M255.7

;Automatic/inching conditions

;Automatic conditions
=     -BEFA        M255.0

;Movement report
=     -WSB         M255.1

;The subsequent EM command ensures that only the
;active step is processed.

EM
```

2.6 Data modules DMn

Each cascade has a data module with the appropriate cascade data. The data module is designated **DMn** (n = 1 – 64), refer also to Fig. 2–1.

The data module DMn is activated in the corresponding **cascade module –KETTEn**.

The **cascade management module –KETTE** enters the data into the data module DMn during the initialization phase.

```
;Cascade module -KETTEn

;Activate data module

CM     DMn                  ;n = 1 - 64
```

DW No.	Symbol	Display	Remarks	Entry by: 1: –KETTE 2: User	
0	nnFEHLNR	DEC	Error bits	1	Entry only in case of error
2	nnKETTNR	DEC	Cascade 1–64	1	Transferred in learn phase by P0
4	nnSCHANZ	DEC	Number of cascade steps	1	Calculated from –SCHRKn in learn phase
6	nnBAWAHL	BIN	Mode set	1	Currently mirrored by parameter P1
8	nnBAMLDG	BIN	Mode message	1	Mirrored by parameter P1 via PM –KETTE
10	nnSCHR–1	DEC	Step number (Step N–1)	1	No. of executed step
12	nnSCHR	DEC	Step number (Step N)	1	No. of current step
14	nnSCHRNR	DEC	Set step number	2	No. of prepared step
16					
18	KWA	DEC	Waiting–time actual value	1/2	Time value, parameter P3, learn phase or current
20	KUE	DEC	Monitoring–time actual value	1/2	Time value, parameter P2, learn phase or current
22	nnINT0		Internal use	1	
24	nnINT1		Internal use	1	
26	nnINT2		Internal use	1	
28	nnINT3		Internal use	1	
30	nnINT4		Internal use	1	
32	nnINT5		Internal use	1	
34	nnINT6		Internal use	1	
36	nnINT7		Internal use	1	
38	nnINT8		Internal use	1	
40	nnRES		Spare		
42	nnRES		Spare		
44	nnRES		Spare		
46	nnRES		Spare		
48	nnSYN16	BIN	Synchronization step 1 – 16	1	On request by user
50	nnSYN32	BIN	Synchronization step 17 – 32	1	On request by user
52	nnSYN48	BIN	Synchronization step 33 – 48	1	On request by user

DW No.	Symbol	Display	Remarks	Entry by: 1: –KETTE 2: User	
54	nnSYN64	BIN	Synchronization step 49 – 64	1	On request by user
56	nnSYN80	BIN	Synchronization step 65 – 80	1	On request by user
58	nnSYN96	BIN	Synchronization step 81 – 96	1	On request by user
60	nnSYN112	BIN	Synchronization step 97 – 112	1	On request by user
62	nnSYN128	BIN	Synchronization step 113 – 128	1	On request by user
64	nnSCH16	BIN	Steps 1 – 16	1	current step
66	nnSCH32	BIN	Steps 17 – 32	1	current step
68	nnSCH48	BIN	Steps 33 – 48	1	current step
70	nnSCH64	BIN	Steps 49 – 64	1	current step
72	nnSCH80	BIN	Steps 65 – 80	1	current step
74	nnSCH96	BIN	Steps 81 – 96	1	current step
76	nnSCH112	BIN	Steps 97 – 112	1	current step
78	nnSCH128	BIN	Steps 113 – 128	1	current step
80	nnBEF16	BIN	Command output, steps 1 – 16	1	current command output
82	nnBEF32	BIN	Command output, steps 17 – 32	1	current command output
84	nnBEF48	BIN	Command output, steps 33 – 48	1	current command output
86	nnBEF64	BIN	Command output, steps 49 – 64	1	current command output
88	nnBEF80	BIN	Command output, steps 65 – 80	1	current command output
90	nnBEF96	BIN	Command output, steps 81 – 96	1	current command output
92	nnBEF112	BIN	Command output, steps 97 – 112	1	current command output
94	nnBEF128	BIN	Command output, steps 113 – 128	1	current command output
.				.	
.				.	

The following sub–sections give a detailed description of the data words

- **D0**
- **D6**
- **D8.**

2.6.1 Error bits D0

In the event of faulty programming, information on the type of error is stored in the data bits D0.0, D0.1 and D0.2.

D0.0 **Number of steps** too high or 0
D0.1 **Step module** – SCHRKn not available
D0.2 **Reference list** error for existing modules; re–boot program

2.6.2 Set mode D6

D6 nnBAWAHL

This data word is written by the parameter **P1 –BETR** of the **cascade management module –KETTE**.

D6.0	Manual (M)
D6.1	Inching (I)
D6.2	Automatic (A)
D6.3	Start
D6.4	S + 1
D6.5	Set step
D6.6	Stop acknowledge
D6.7	Reset
D7.0	Stop
D7.1	Synchronize
D7.2	
D7.3	Generate cascade DM
D7.4	No step–on in same cycle
D7.5	Diagnosis if WSB = 1
D7.6	WSB does not reset BEFA
D7.7	Fault acknowledgement

D6.3 Start

- D6.3 = 1 **static for all modes**.
- D6.3 = 0 for **synchronizing mode** in automatic operation, generating DMn. Clears BEFA. Monitoring time is on hold. Waiting time times out.

D6.4 S + 1

Execute next step in **inching mode** (edge–controlled).

D6.5 Set step

Process step from **D14 –nnSCHRNR** in **manual mode** (edge–controlled).

D6.6 Stop acknowledge

Acknowledgement of cascade stop initiated when **monitoring time** times out or on reset of **fault marker –STOEM** (= 0). D6.6 is edge–controlled. This function corresponds with the data bit **D7.7**.

D6.7 Reset

Clear active step. **Step 1** is prepared following reset of D6.7 and the **waiting**/**monitoring times** are set to the specified values.

D7.0 Stop

Stop cascade, further process current step. The **command output** is **not** cleared. **Monitoring**/**waiting** time is stopped.

D7.1 Synchronize cascade

Possible in **manual** and **automatic modes.** Auto also requires **D6.3 = 0**.

If D7.1 is set to **1**, the **cascade management module –KETTE** searches through the cascade for true chainings and synchronizes step processing in line with the mode.

Conditions for established **synchronization**:

- **BEFA = 1**

and

- **WSB = 0**

The **bit** corresponding to the step is set in data blocks **D48 – D62** for all steps where the synchronization conditions are true.

If **precisely 1 step** is found in automatic mode where the synchronization conditions are true, this step is **prepared**.

A

- **multiple** synchronization in automatic mode is indicated in data bit **D9.2,**

a

- **non–possible** synchronization in data bit **D9.1**.

With And branches, it is only possible to have limited synchronization with automatic mode, since the cascades are considered separately.

D7.3 Generate cascade DM

The first call of the **cascade management module –KETTE** generates the corresponding **DMn**. In the generation phase, the cascade–related data from the **step modules** and parametrization of the **cascade management module –KETTE** are entered into the data module DMn.

Generation is also possible **manually** by way of the data bit **D7.3**.

D6.3 must be **0**.

D7.4 No step–on in same cycle

Only in **automatic mode**

- With **D7.4 = 1** only 1 step is processed in each cycle → processing time approx. 0.28 ms.
- With **D7.4 = 0** (presetting), the next step is activated in the same cycle when **–WSB** is set → processing time approx. 0.47 ms.

D7.5 Diagnosis if –WSB = 1

Applies only to automatic diagnosis.

- When **D7.5 = 1**, diagnosis is effected even if the step is terminated with **–WSB = 1**.
- When **D7.5 = 0**, diagnosis is only activated if **–WSB = 0**.

D7.6 –WSB does not reset –BEFA

Manual operation only

- When **D7.6 = 1**, the **–WSB bit** does **not** reset the **–BEFA bit**.
- When **D7.6 = 0**, the true **–WSB bit** resets the **–BEFA bit**.

D7.7 Fault acknowledgement

- If **D7.7 = 1**, the cascade is **halted** and the fault (D9.6 and D9.7) output. Diagnosis is performed (D9.4). The cascade does not start until **acknowledgement has been given** with **D6.6**.
- If **D7.7 = 0**, diagnosis is implemented (D9.4). The cascade remains in automatic operation and **starts automatically** after the fault has been eliminated.

2.6.3 Mode message D8

D8 nnBAMLDG

If several modes are selected simultaneously at parameter **P1 –BETR** of the **cascade management module –KETTE**, priority is established by the **cascade management module**.

Priorities:

1.	Reset	(highest priority)
2.	Stop	
3.	Start	
4.	Manual	
5.	Inching	
6.	Automatic	(lowest priority)

The data word **D8 nnBAMLDG** contains the mode check–back signal after running through the **cascade module –KETTEn**.

D8.0	Manual (M)
D8.1	Inching (I)
D8.2	Automatic (A)
D8.3	Start all modes
D8.4	Auto or inching active
D8.5	Synchro running
D8.6	Waiting time running
D8.7	Reset: cascade reset
D9.0	Stop: cascade stopped
D9.1	Synchro not possible
D9.2	More than one synchro step
D9.3	Cascade DMn generated
D9.4	Execute diagnosis
D9.5	
D9.6	Fault pulse
D9.7	Fault static

D8.5 Synchro running

- **D8.5 = 1** Synchronization running.

D8.6 Waiting time running

- **D8.6 = 0** Waiting time running.
- **D8.6 = 1** Waiting time elapsed.

D8.7 Reset: Cascade reset

Reset cascade, active step is cleared, first step of cascade is processed.

D9.0 Stop: Cascade stopped

Cascade stopped. Set if:

- **D7.0 = 1** (Stop)

or

- **Fault marker –STOEM** reset by user programming

or

- **Fault** in automatic operation (only with **D7.7 = 1**) in steps of expired **monitoring time**.

D9.1 Synchro not possible

The synchronization conditions

- **BEFA = 1**

and

- **WSB = 0**

are not met in any step.

D9.2 More than one synchro step

More than one synchronization step was found during synchronization for **automatic mode**. Synchronized start of automatic operation is **not** possible.

D9.3 Cascade DMn generated

Generation of **DMn** is over when **D9.3 = 1**.

D9.4 Execute diagnosis

Used internally.

D9.6 Fault pulse

Output of **pulse** for one cycle if fault detected. D9.6 = 1 if

- Fault marker – STOEM reset

or

- Monitoring time has elapsed.

D9.7 Fault static

Output of **static** signal if fault detected. D9.6 = 1 if

- Fault marker – STOEM reset

or

- Monitoring time has elapsed.

2.7 Functions of –DIAG500 for cascade faults

–DIAG500 is used to monitor a machine programmed in step cascade form. When a fault occurs, the monitored steps are diagnosed for untrue BEFA or WSB conditions and displayed on the diagnosis module DB500 with first–value error message and follow–on errors.

One step can have a maximum of 64 conditions for BEFA or WSB branches. If more than 64 conditions are required for the BEFA or WSB branch, the BEFA or WSB markers can also be looped:

❑

```
A       -Eingang1
O       -Eingang2
.
.
=       -BEFA

A       -BEFA
A       -Eingang5
.
.
=       -BEFA
```

The **first untrue** BEFA branch is always diagnosed in this case.

The following commands are acceptable for creating step–on conditions:

A
AN
O
ON
=
(
)
)N
NOP0 no representation
NOP1 no representation

Note ☞ **All other bit commands are displayed with a ?.**

The following operands are acceptable:

I	Inputs
O	Outputs
M	Markers
SM	Special markers
T	Times
C	Counters

Criteria analysis

A distinction is made between manual and automatic mode in the representation of the diagnosis result.

If an error has occurred that is being analyzed, a check is initially made as to whether the WSB branch is true. If it is, diagnosis is aborted because the step has been terminated. This can be changed if required as outlined in sub–section **2.6.2 Set mode D6**, D7.5.

If the status of the WSB branch is **0** the first untrue BEFA branch is sought. If all BEFA branches are true, the first **untrue** WSB branch is diagnosed.

This diagnosis technique necessitates the structuring of the step module as described in Section **2.5 Step modules –SCHRKn**.

The –DIAG500 must be incorporated into the symbol file by the user. The module call with corresponding parametrization is made in **–DB_BAUM**.

Only first–value faults and missing conditions in automatic or inching mode are entered in the record memory. Follow–up errors are merely reported in the first–value diagnosis display.

The BEFA and WSB branches can also be displayed and diagnosed in the **ladder diagram**.

3 Operate / Monitor

- **Display** of plant faults and machine statuses
- **Execution** of 1024 movements directly on screen

8 function keys and 16 movement keys in a compact, clear–cut control unit make for total machine operation and visualization.

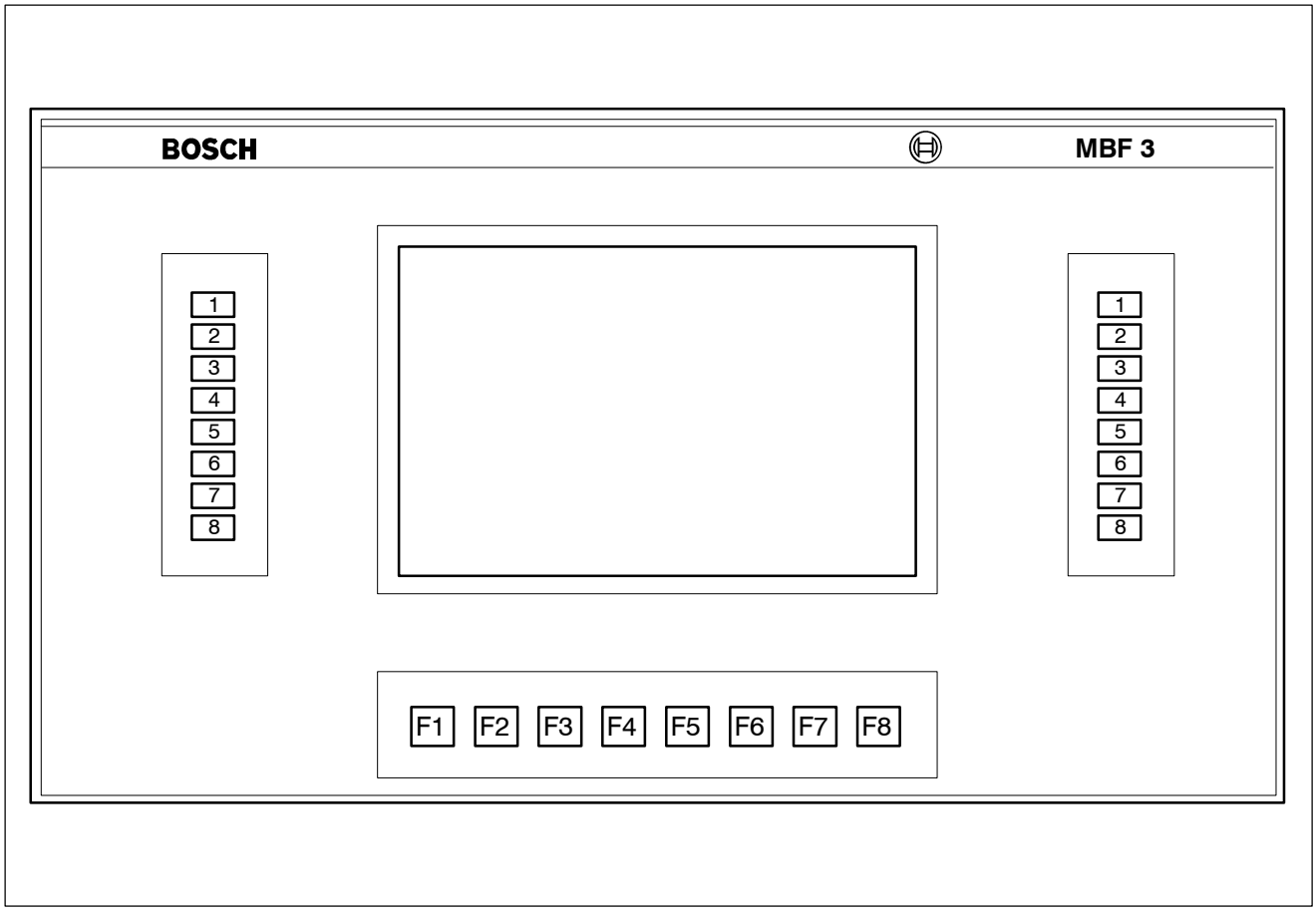


Fig. 3–1 Bosch control unit

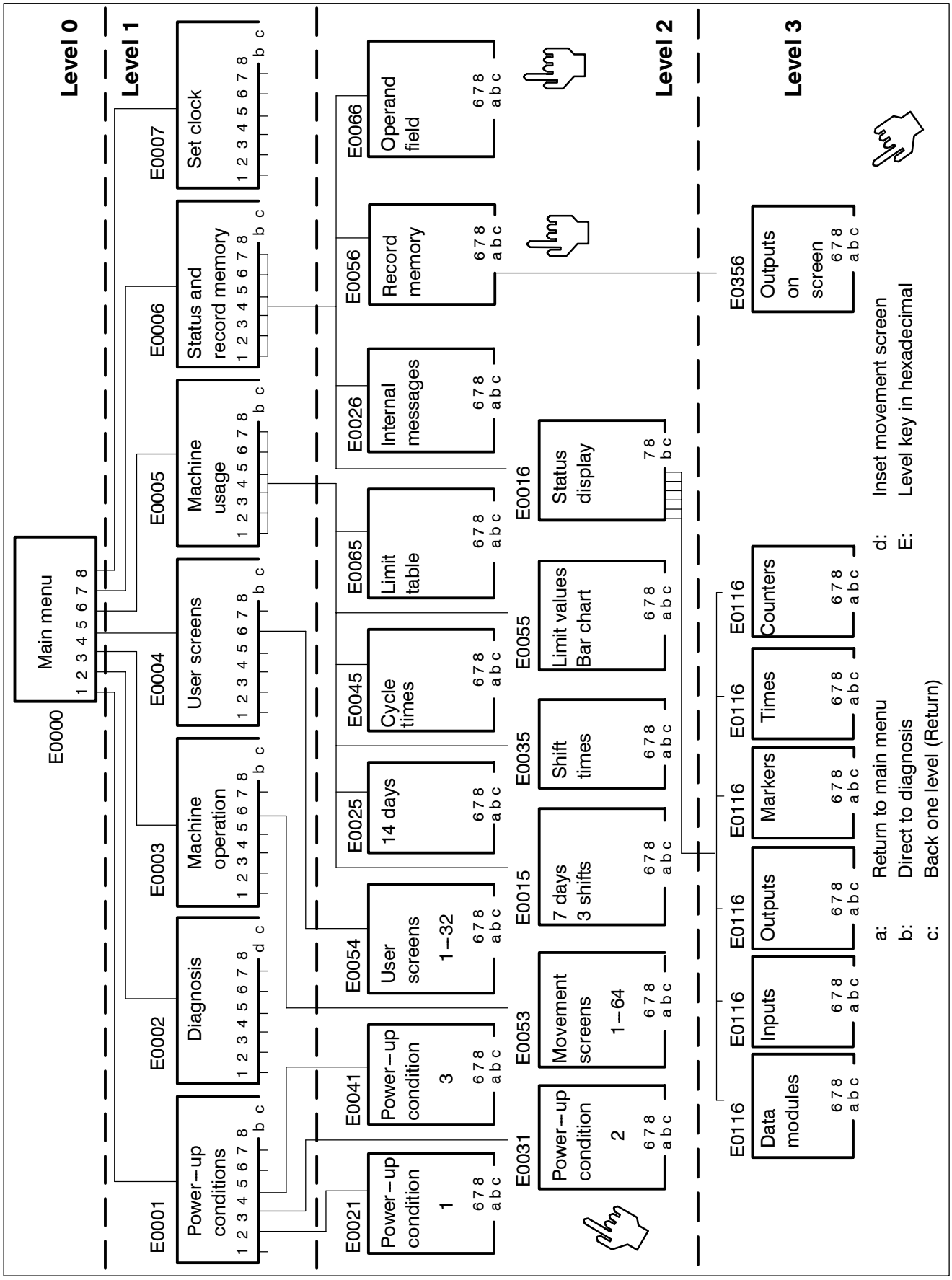


Fig. 3–2 Menu tree

3.1 Principle of standardization

The purpose of standardizing the machine operating and monitoring functions is to provide machine supervisors with uniform operator environments at all times.

This makes it possible to operate the machine with just 8 **function** and 16 **movement keys** in a compact, clear–cut display and control unit directly on the screen.

The display and control unit should be designed as follows since the entire operation is based on this layout.

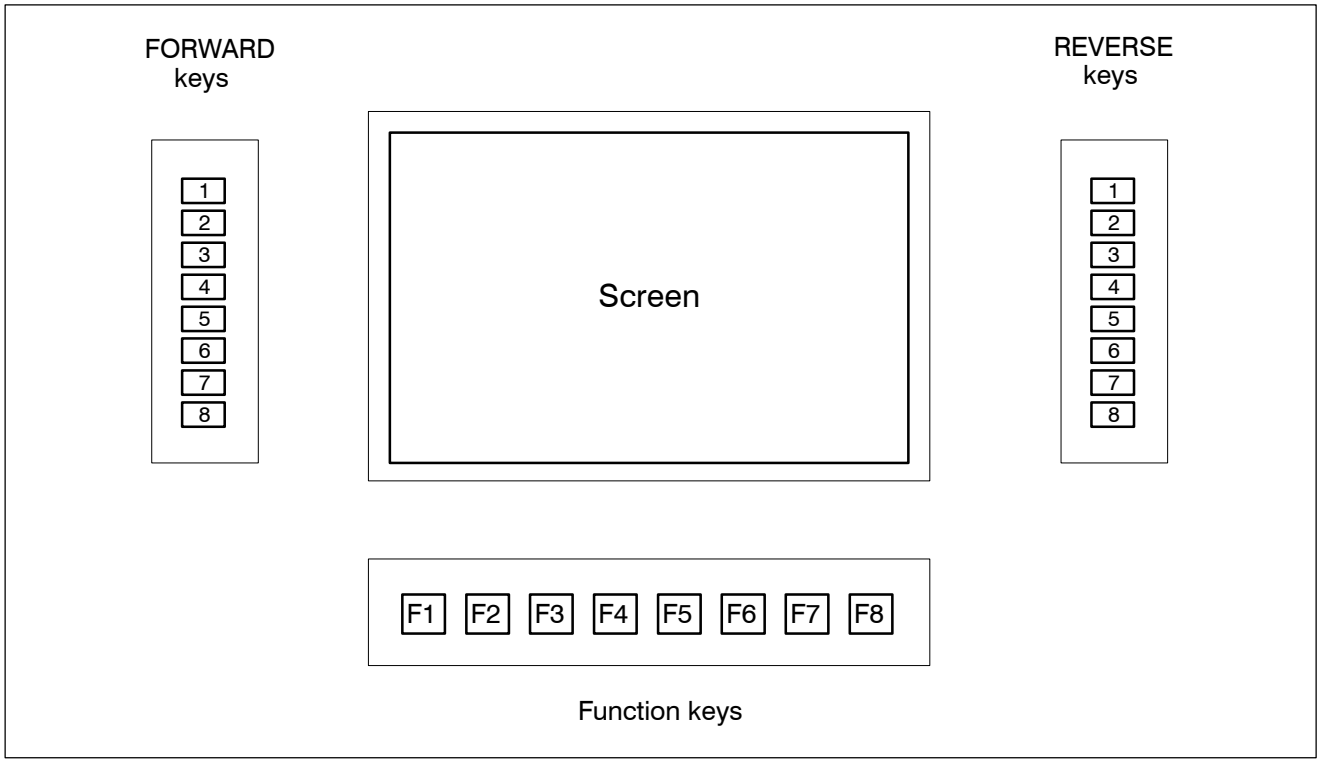


Fig. 3–3 Display and control unit

3.2 Tasks of software package

The software package manages all screens filed in the diagnosis module DB500 see Fig. 3–2, i.e. all screen levels can be selected with 8 function keys.

The software works like this:

When the control is powered up, the main menu , see Fig. 3–4, appears on the monitor. The 8 function keys are used to change screen levels.

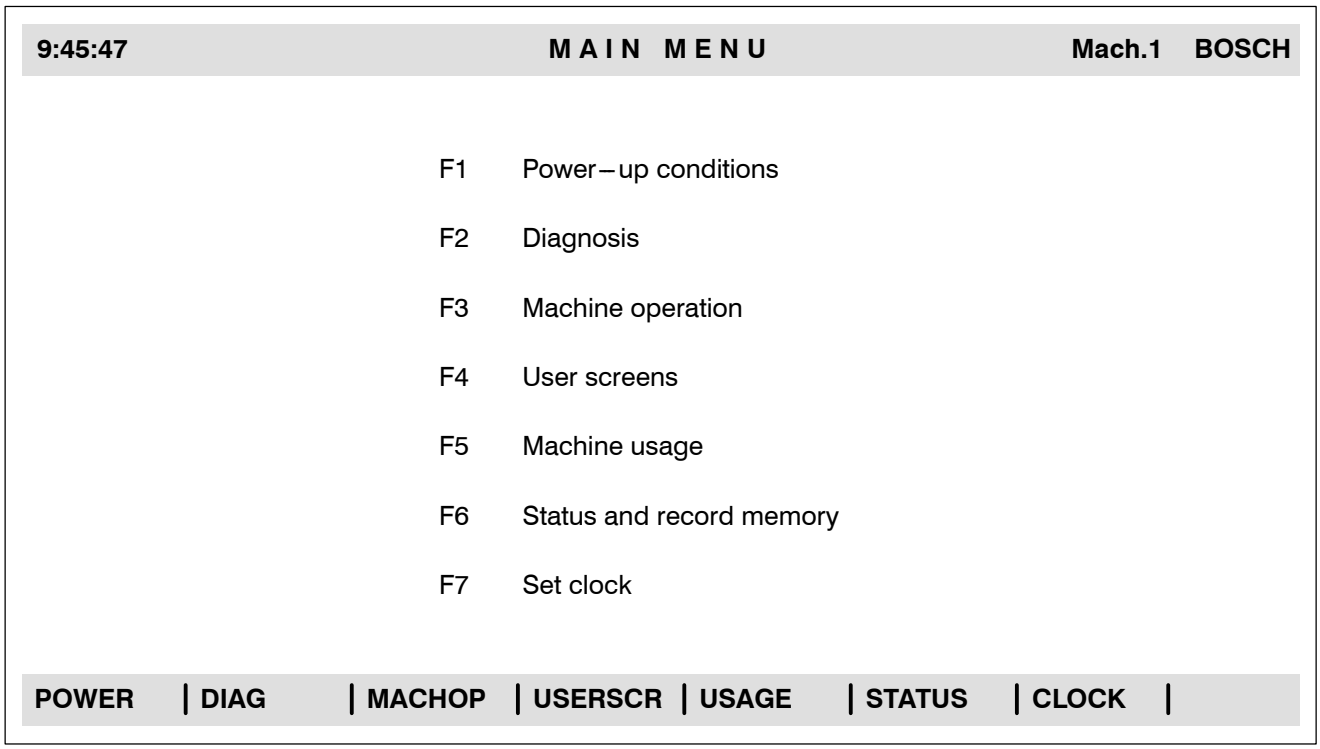


Fig. 3–4 Main menu

The following sub–screens can be called up from the main menu:

F1	**Power–up conditions**	(Sub–section 3.2.1)
F2	**Diagnosis**	(Sub–section 3.2.2)
F3	**Machine operation**	(Sub–section 3.2.3)
F4	**User screens**	(Sub–section 3.2.4)
F5	**Machine usage**	(Sub–section 3.2.5)
F6	**Status and record memory**	(Sub–section 3.2.6)
F7	**Set clock**	(Sub–section 3.2.7)

3.2.1 F1 Power–up conditions

This menu option makes it possible to define the machine power–up conditions. It provides a rapid overview of the system status.

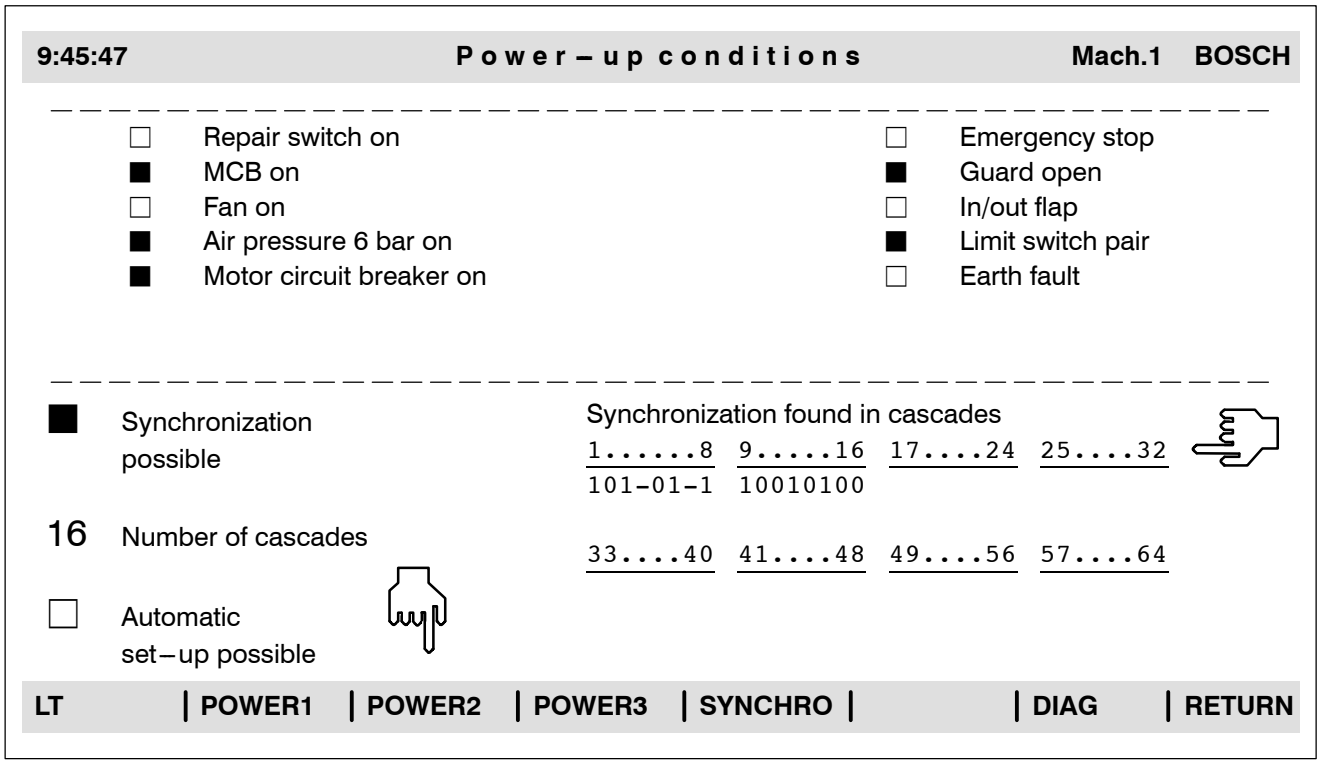


Fig. 3–5 Power–up conditions

The variables and texts on this screen are entered individually by the user.

With this screen it is also possible to look for synchronization steps (set–up steps in automatic mode). To do this, **all** cascades to be synchronized must be in automatic with Start = 0.

1 appears on the display for the cascades for which **only 1** executable step was found. **0** appears in the event of **more than 1** or no synchronized step.

If the **mode is incorrect**, this is indicated by way of the letter **B**.

If precisely **1** executable step is found in all step cascades permitted for synchronization, the machine can be started as of the steps found by setting the start signal to the cascade modules.

If **synchronization** is disabled by way of the blocking bit (DM127, D125.4), the following message appears: **Synchronization disabled**.

A mask for ignoring synchronization can be defined in data words D126–132 of DM127 for standard cascades, e.g. limit switch pair monitoring, which have a fixed, non–modifiable mode.

Example:

D126: 0048H
corresponding to: 0000 0000 0100 1000 binary
Cascades 4 and 7 are **ignored** as regards synchronization.

Ignored cascades can be presented on the screen with the symbol **–**.

Function key F1 has an underlying lamp test as an additional function. When it is operated, the datum D32.0 in DM127 is set to log **1** and returns to log **0** when operated again. The lamp test is reset when the operator exits from the level.

F2–F4 can be used to call up additional screens with power–up conditions.

3.2.2 F2 Diagnosis

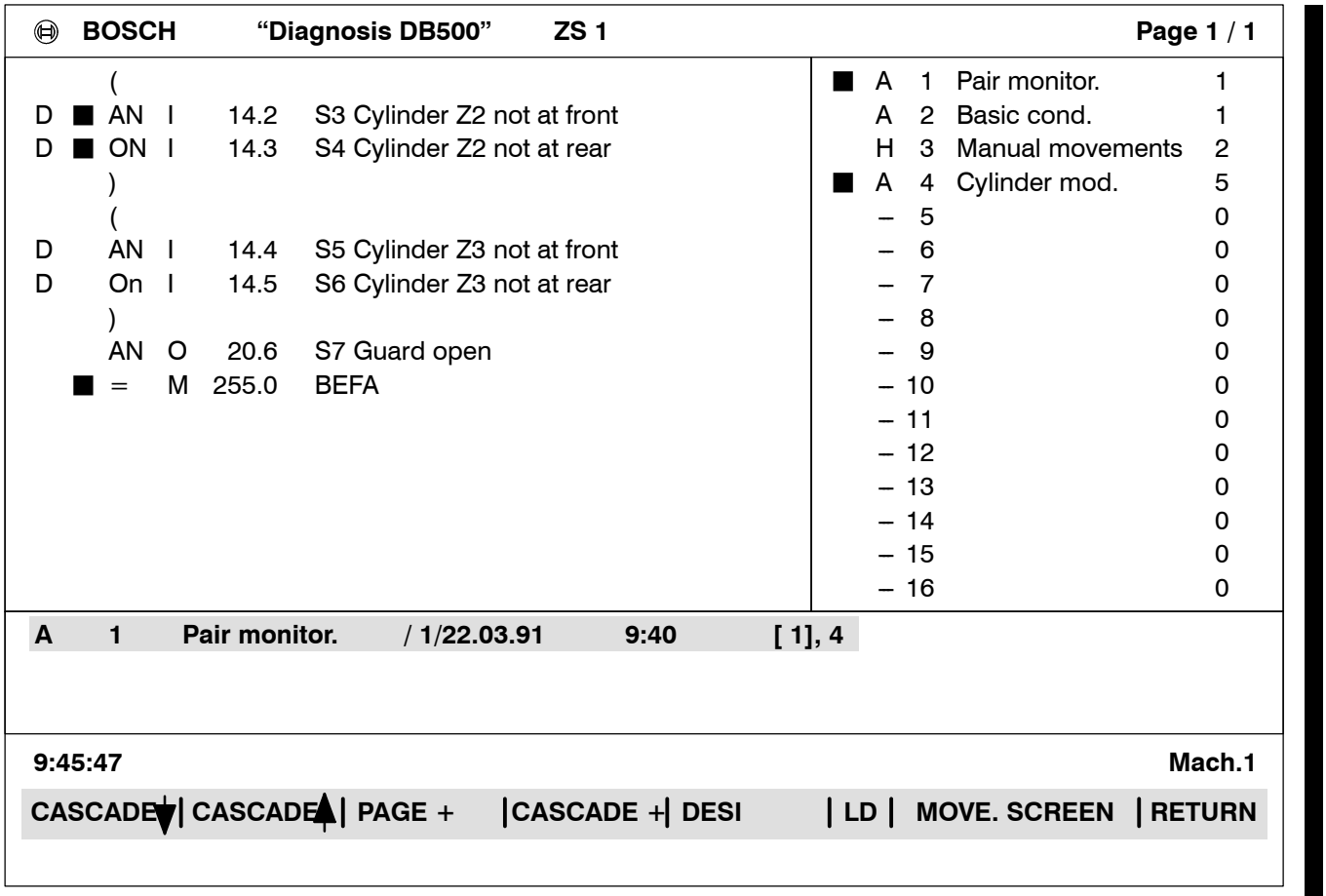


Fig. 3–6 Diagnosis screen

When diagnosing in automatic mode, the first–value error message is displayed on the diagnosis screen. Follow–up errors are displayed on the baseline of the screen (cascade number). The first–value error message is also filed in DM120.

Layout of data module DM120

DW	Highbyte content	Lowbyte content
D000	Flags	
D002	Day	Month
D004	Year	Hour
D006	Minute	Second
D008	Weekday (0 = Sunday)	free
D010	Cascade number	Step number
D012	Module type	Module number
D014	Cascade status	Number of messages
D016	Opcode 1	
D018	Opcode 2	
D020	Opcode 3	
D022	Opcode 4	
:	:	
D140	Opcode 63	
D142	Opcode 64	

Note ☞

Refer also to Technical Documentation:
CL500
Diagnostic Module DB500
Module description
P.–Nr. 4125

F1 / F2

Function keys F1/F2 can be used for dedicated diagnosis of the programmed cascade by means of cursor superinposition, i.e. the current step is directly displayed. A decision is also taken as to whether to have display of the manual or automatic branch.

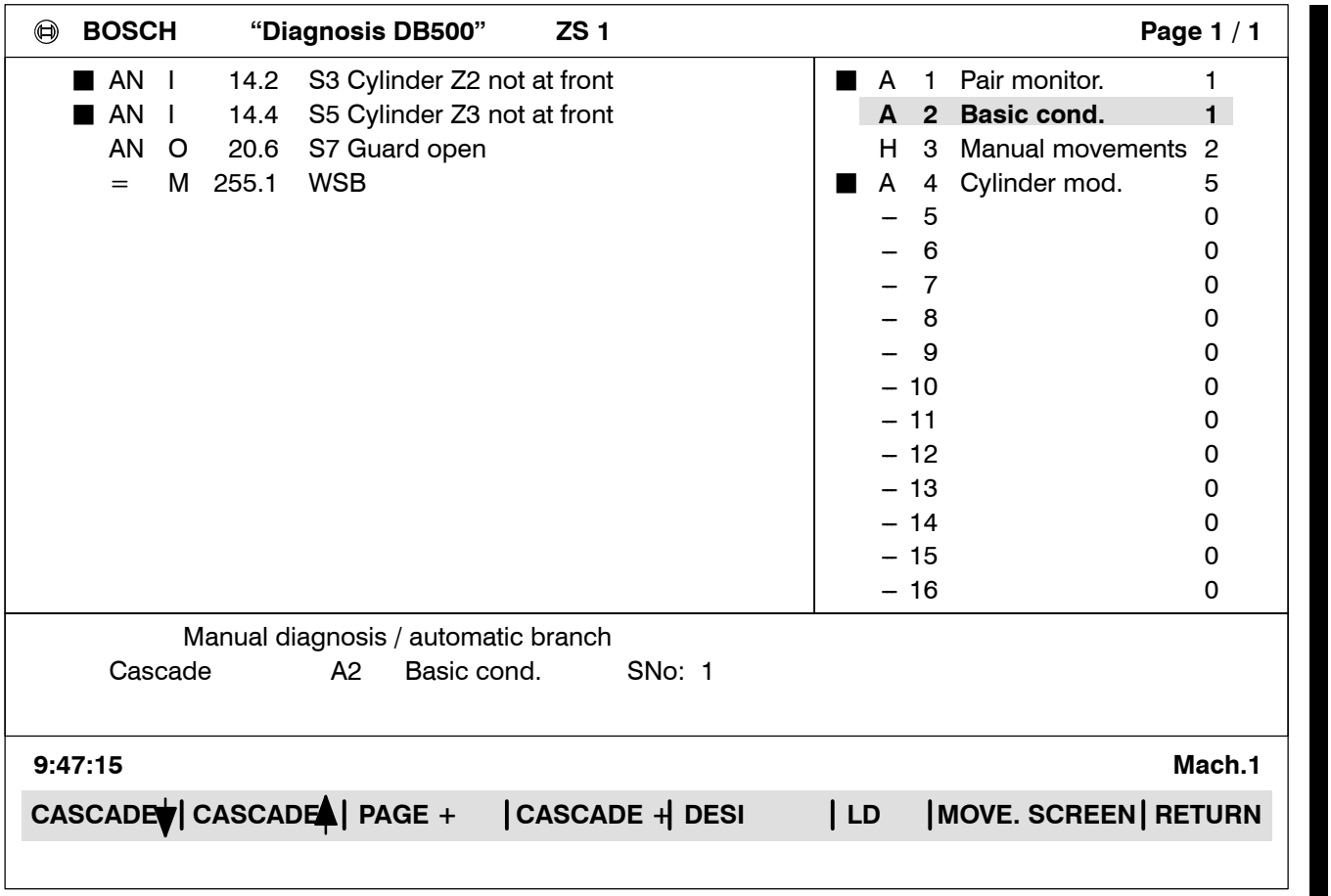


Fig. 3–7 Diagnosis screen with cursor superinposition

F3

Function key F3 is used to scroll the diagnosis field (left–hand half of screen).

F4

Function key F4 is used to scroll the cascade texts (right–hand half of screen).

F5

Function key F5 is used to display any **DESI messages**. This function is only possible with IL presentation.

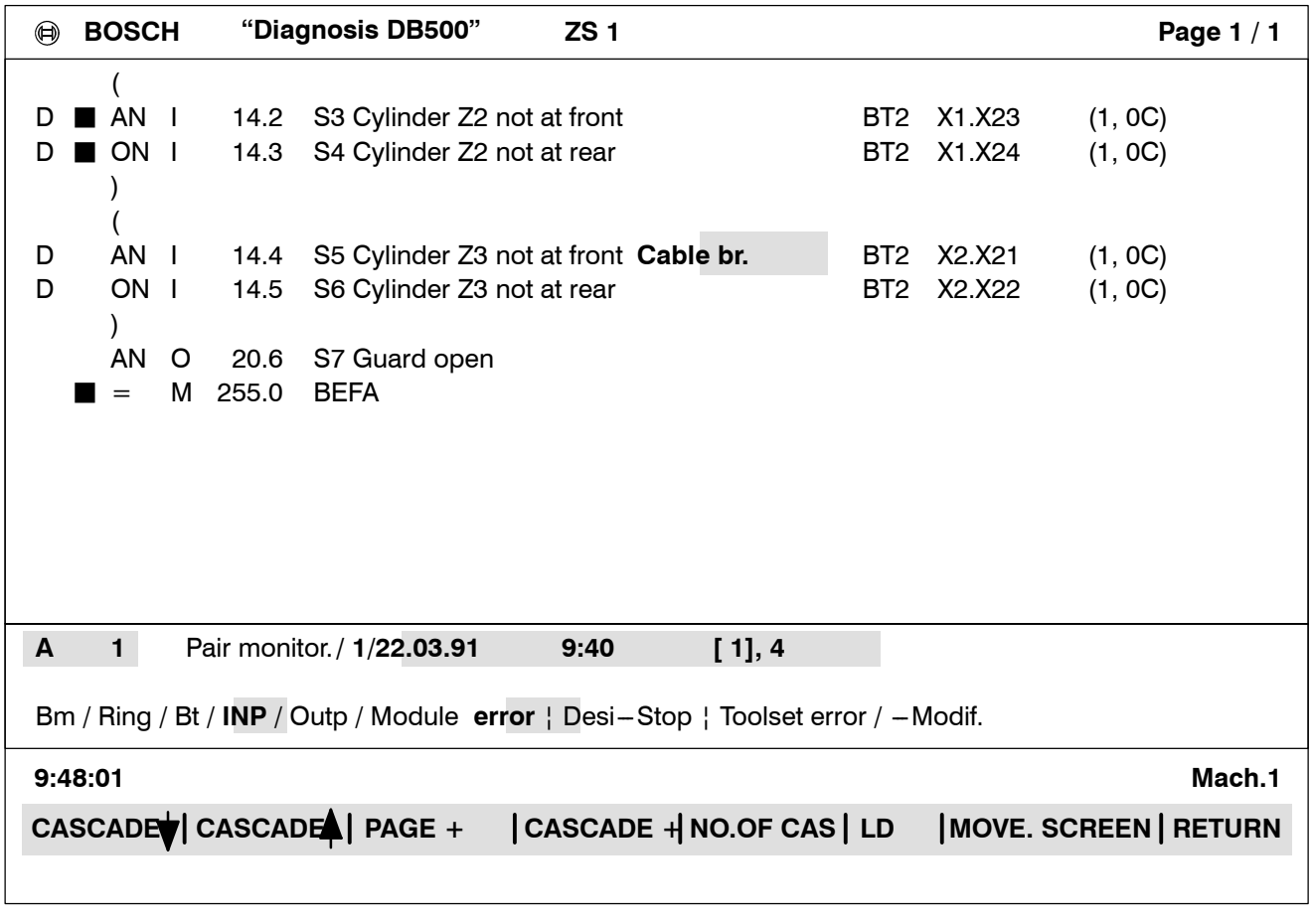


Fig. 3–8 DESI messages

F6

Function key F6 is used to switch from **IL** to **LD representation**.

This function makes it possible to likewise display the programmed step cascades in the ladder diagram; refer to section **3.8 Function key assignment in DB500 standard screens**.

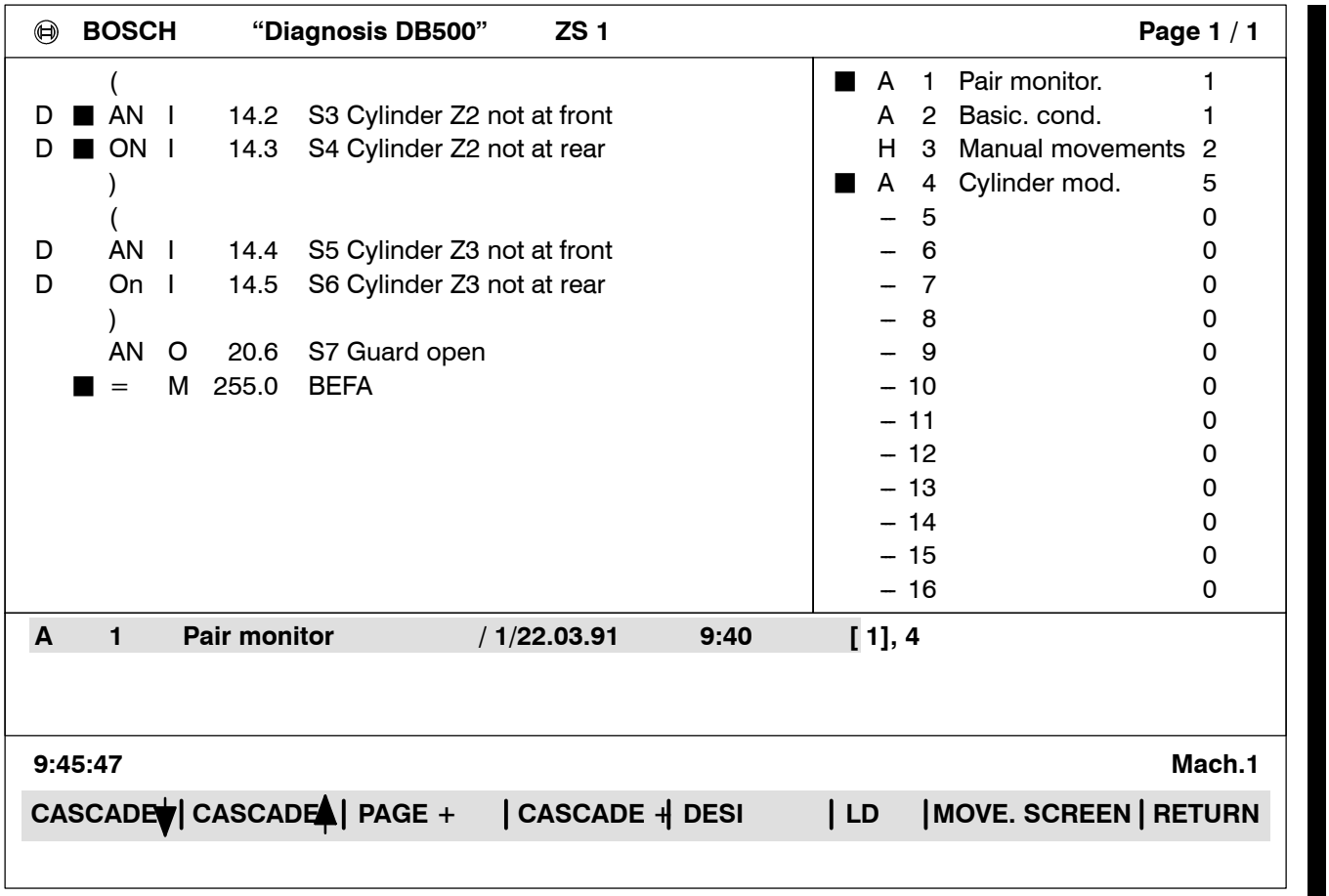


Fig. 3–9 IL display

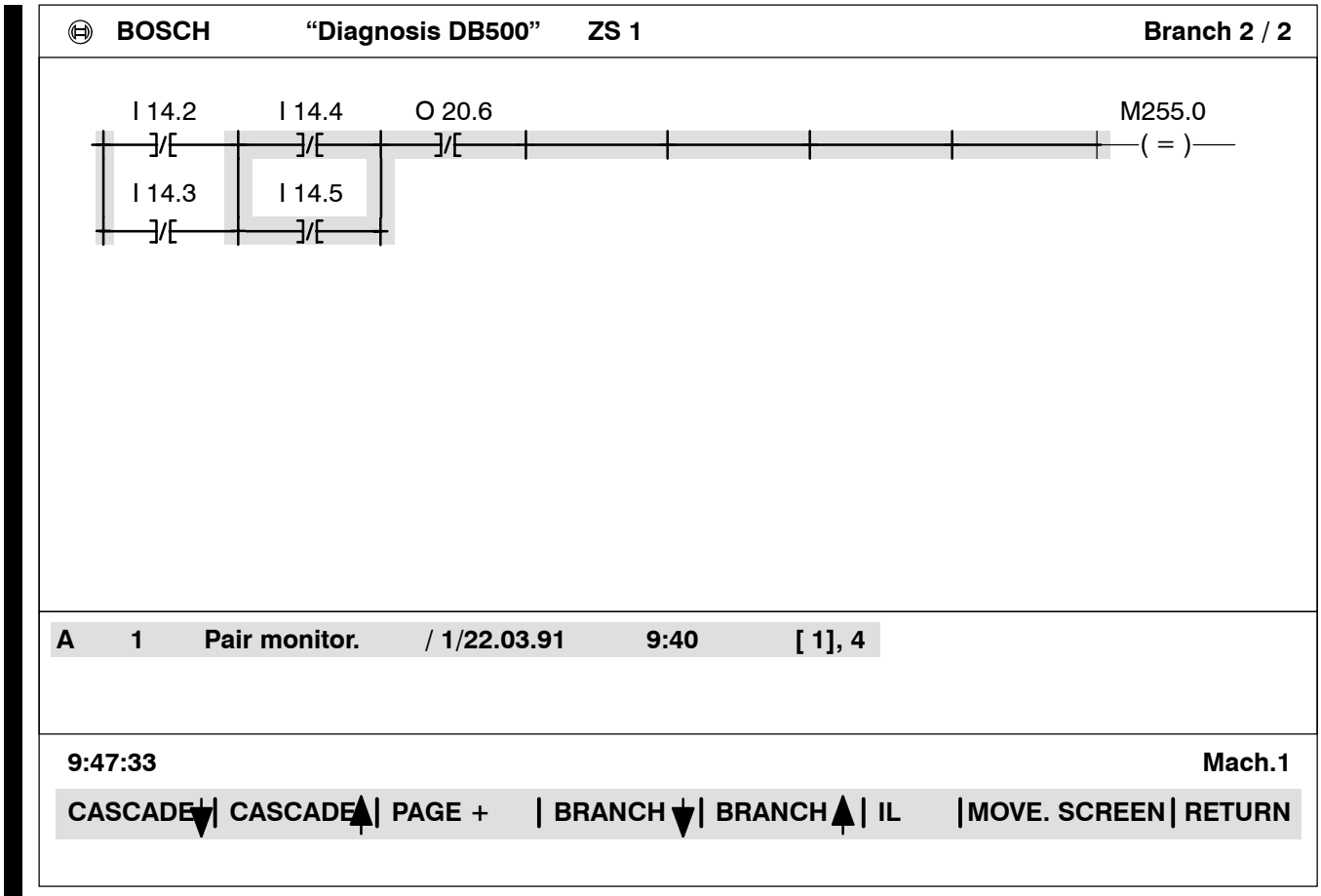


Fig. 3 – 10 LD display

F7

In the diagnosis screen the user can also employ F7 to scroll a movement screen, but only when there is a reference in the movement screen to the selected cascade with the locked–on step. If there is no reference point for the movement screens, the movement screen menu is activated.

If this function is used, it is essential to enter the cascade number and step number in the data modules of the movement screens; refer to sub–section **3.2.3 F3 Machine operation**.

The full function key assignment is given in the section **3.8 Function key assignment in DB500 standard screens**.

3.2.3 F3 Machine operation

In the **Machine operation** screen it is possible to select and call 64 movement screens with the cursor.

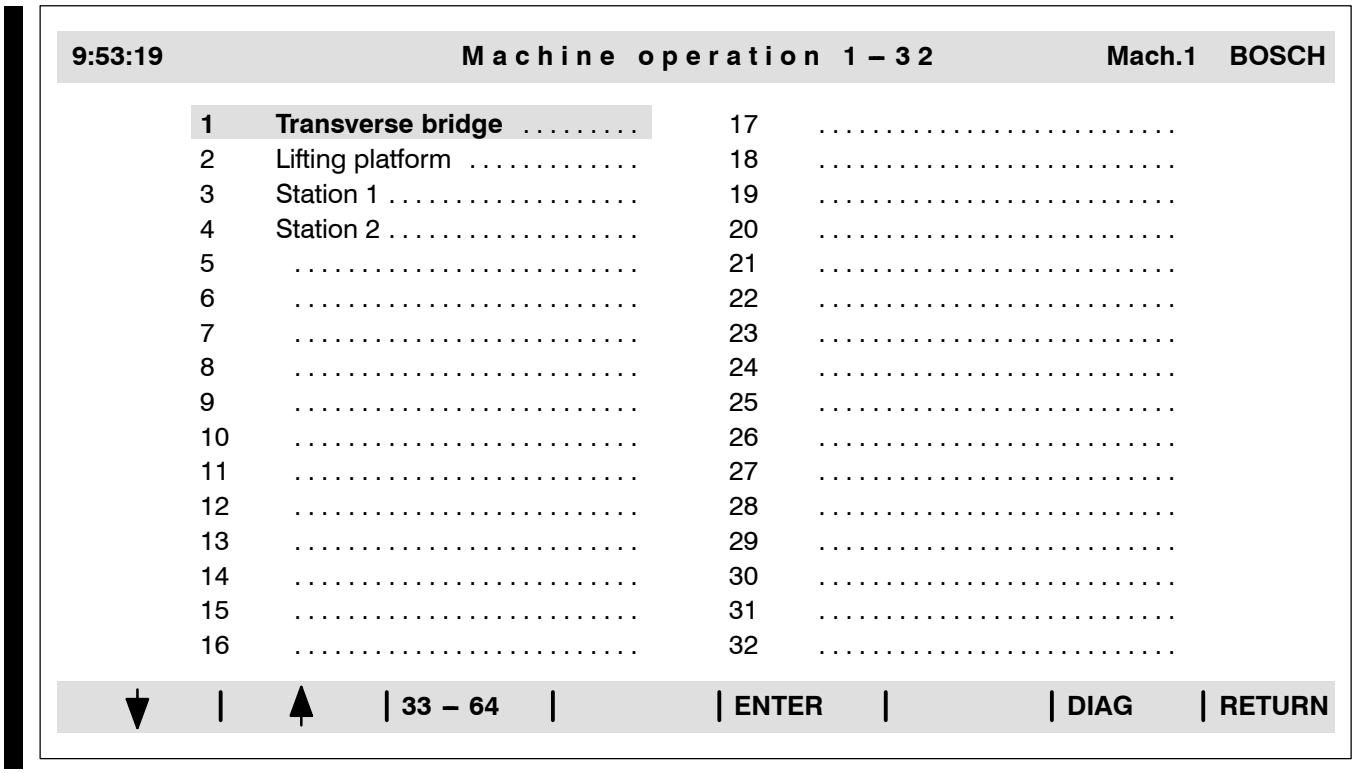


Fig. 3 – 11 Machine operation

The cursor and the save are operated by the function keys.

The movement screens each contain 16 different movements which can be activated in **MANUAL** mode using the external **FORWARD** and **REVERSE** keys. Movement of the appropriate text line is executed when the keys are activated. A command output is enabled only for as long as the key is operated, this means that releasing the key stops the movement immediately.

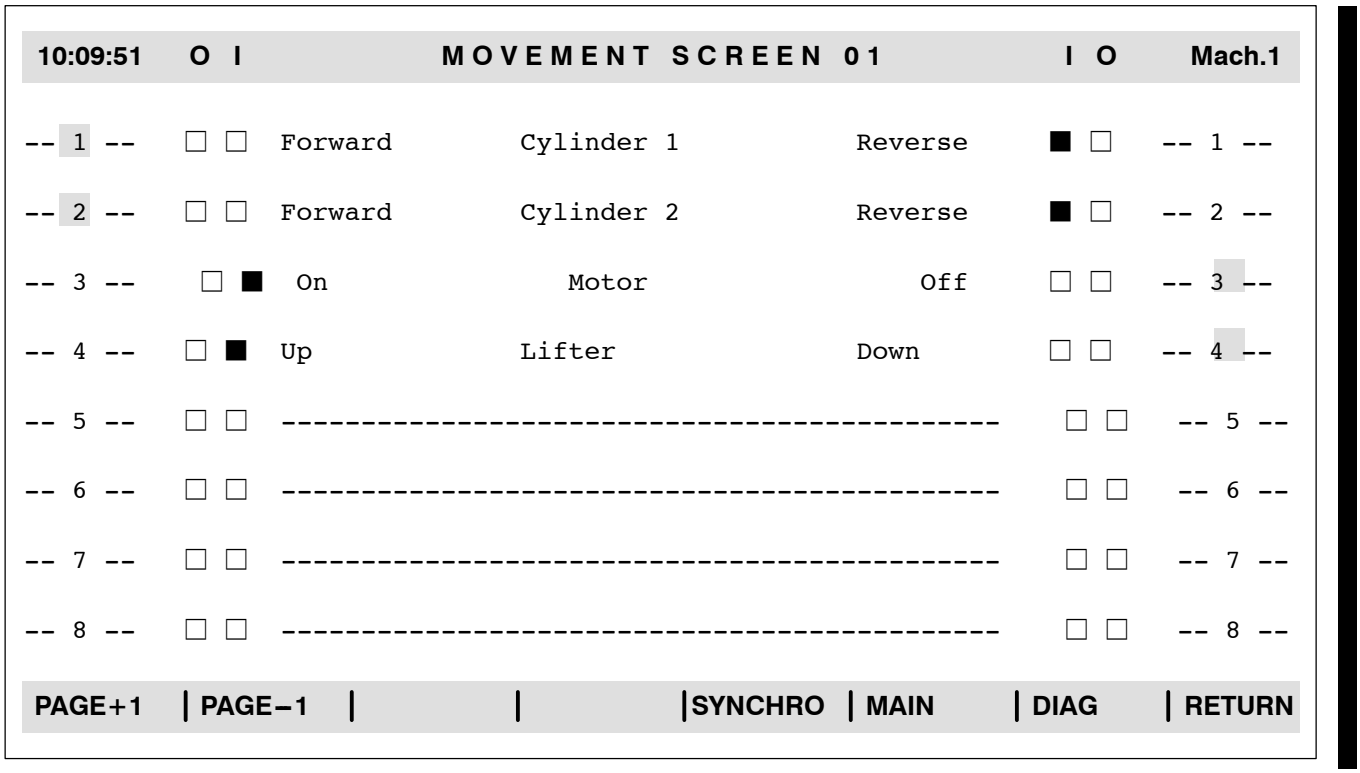


Fig. 3–12 Movement screen

If the diagnosis is scrolled after a movement key is operated, the cascade number and the step just activated are automatically displayed on the diagnosis screen.

If the user activates the movement screens and the cascades are in manual mode, manual synchronization is automatically performed. This function is likewise executed when key F5 is operated manually (or by the user program) and whenever a movement key is released. The text lines of the executable movements are also highlighted.

No movement can be performed while the cascade is being synchronized. Should this nevertheless become necessary, the synchronization can be deactivated (DM127 D125.3). Synchronization is then initiated exclusively by way of the function key **SYNCHRO** or by changing screen.

All synchronization results are cancelled after releasing the movement keys.

The user must enter the limit switch variables in the placeholders in the defined screens.

In the defined data modules the screens also include the cascade and associated step number so that the marked movement can be performed.

Each screen is assigned a specific data module. The first movement screen is assigned data module 1 which also contains the data for cascade 1. The cascade and step numbers in which the desired movement is initiated must be entered in address D100B to D130B. Data word D100B contains the cascade number in the left byte and the step number of the first movement in the right byte. (Top left in movement screen). The 8 forward movements are first defined in ascending order followed by the 8 reverse movements.

Example

Data module 1 contains cascade 1

Data byte	BL	BR	
D100B	0	10	Cascade 0 not permitted
D102B	10	5	Cascade 10 step 5
D104B	1	0	Step 0 not permitted

Impermissible entries are ignored.

Note ☞ **All data modules must be at least 164 data words long.**

The residual data area should **not** be used since this area is accessed by extended modules (refer to Section **6 Extended modules**) and future extensions to the software package MADAP500.

Note ☞ **The data entries in the data modules must be made in hexadecimal form.**

Examples:

0A05H	:	Cascade 10, step 5
1005H	:	Cascade 16, step 5

3.2.4 F4 User screens

In the **user screens** submenu it is possible to select and call 32 user screens with the cursor. The cursor and save are operated by the function keys.

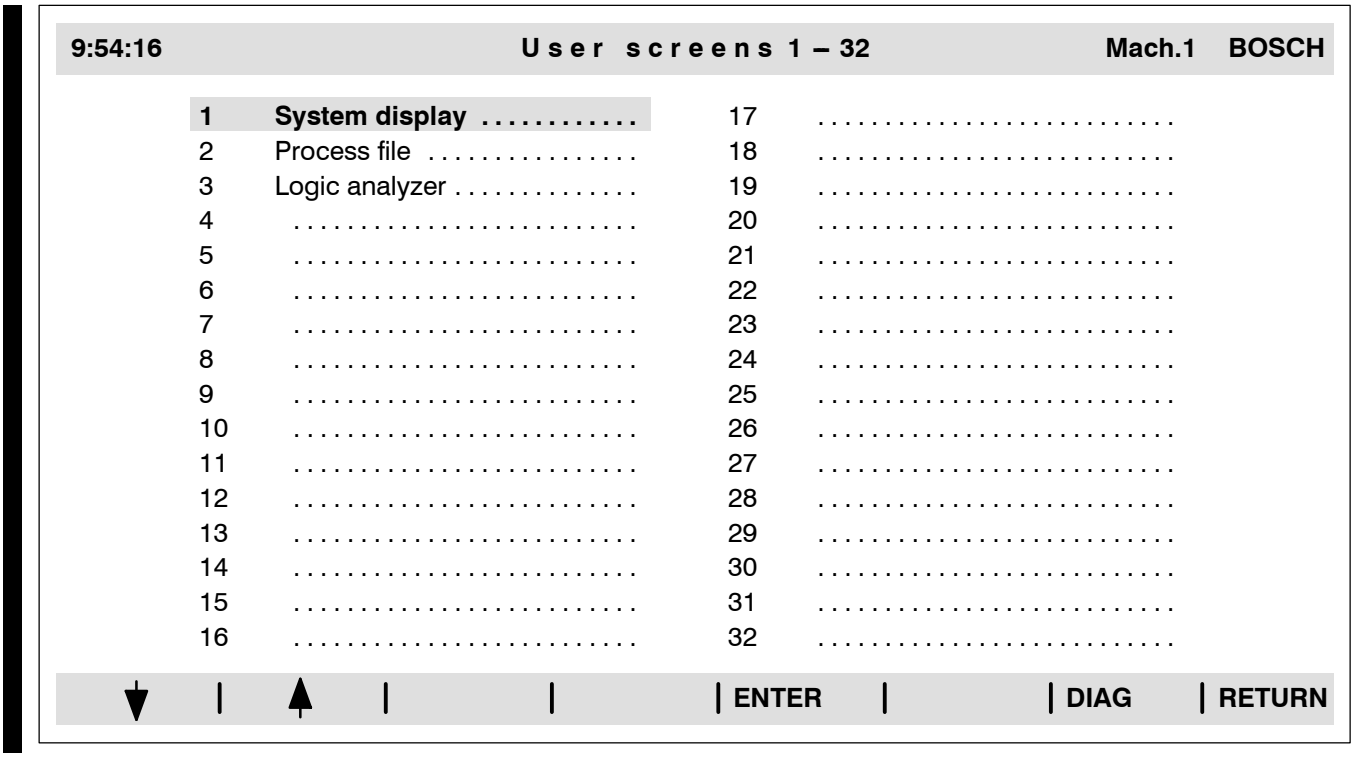


Fig. 3 – 13 User screens

The max. 32 user screens are edited by the user.

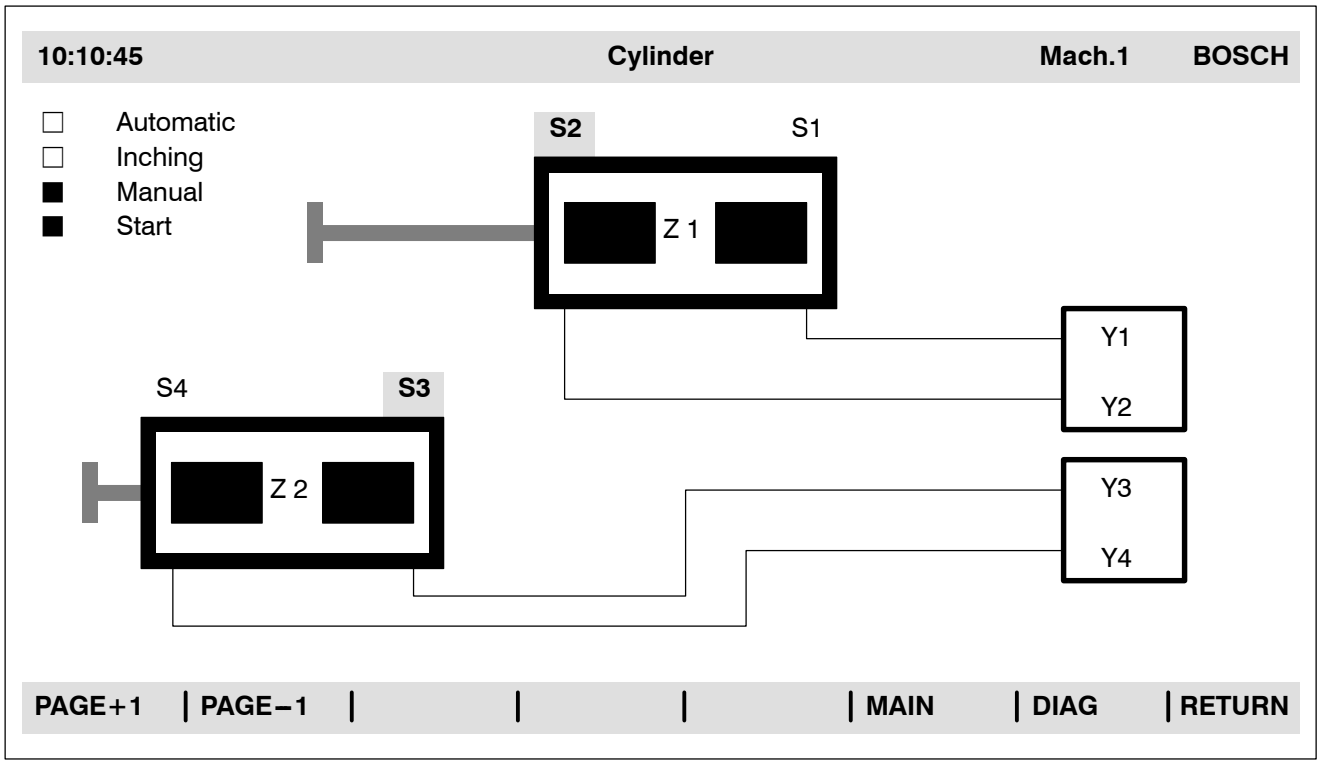


Fig. 3–14 User screen

3.2.5 F5 Machine usage

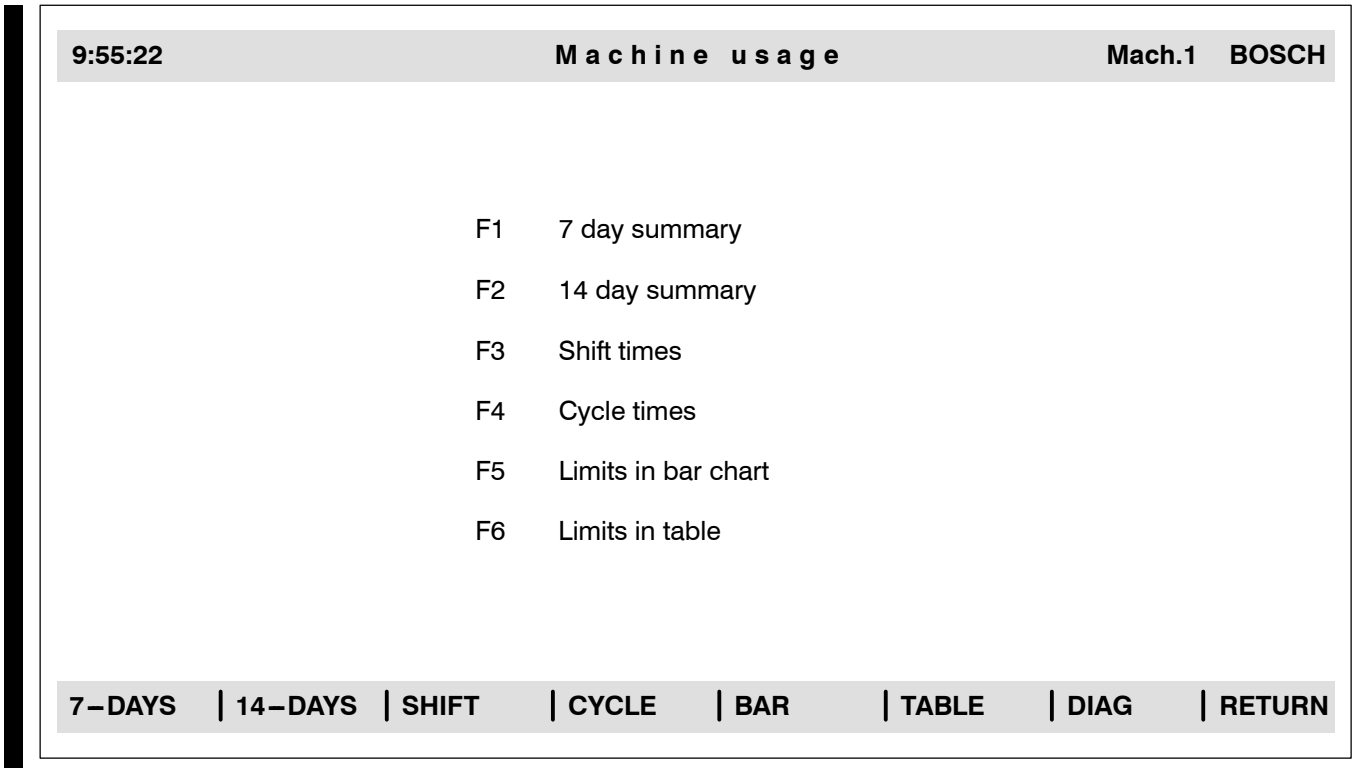


Fig. 3–15 Machine usage

The **Machine usage** submenu is used to call the following functions:

F1 7 day summary
F2 14 day summary
F3 Shift times
F4 Cycle times
F5 Limits in bar chart
F6 Limits in table

F1 7 day summary

This option contains 3 different screens: The 7 day summary for shifts 1, 2 and 3.

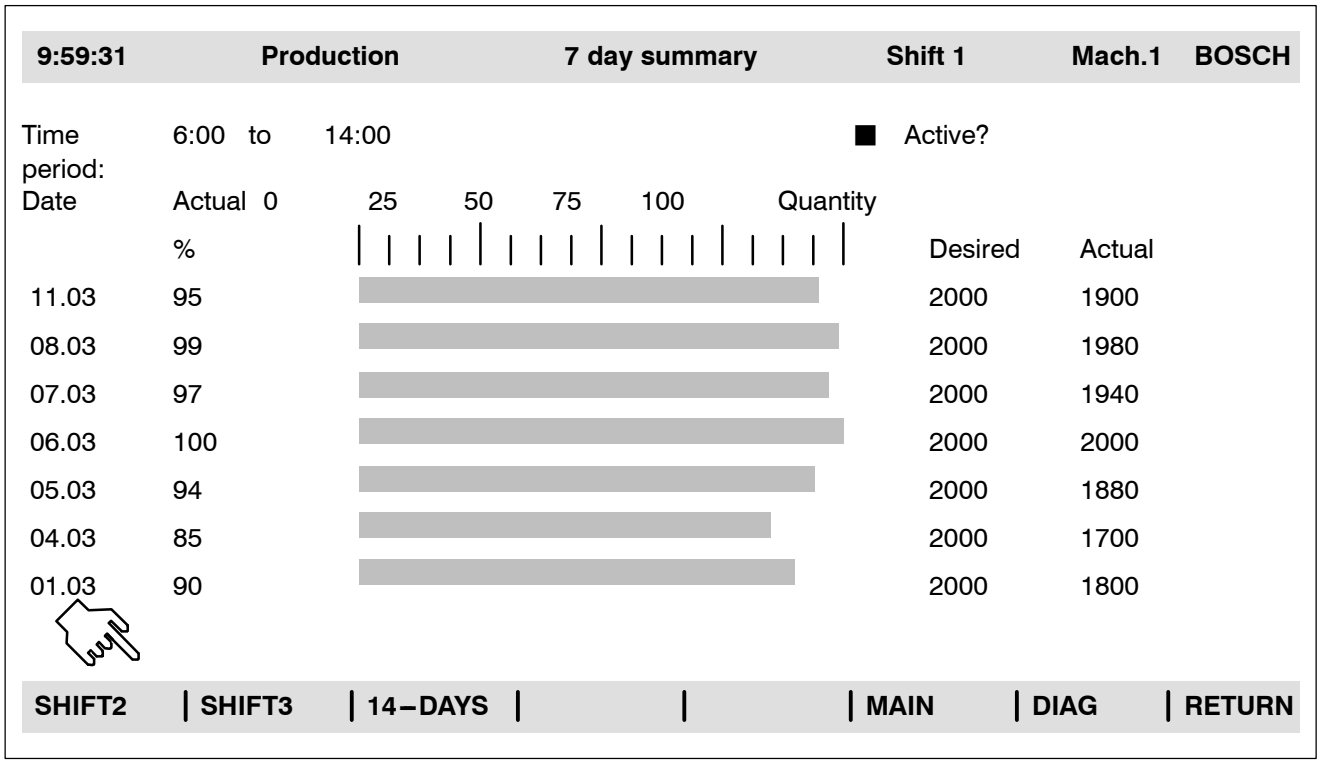


Fig. 3–16 7 day summary

F2 14 day summary

Calls **14 day summary** screen.

10:02:41 **14 day summary** **Mach.1 BOSCH**

Date	MACH. ON %	PRODUCT. %	NO T. %	BUFFER F. %	FAULT %	DOWN %	PCS.
11.03	100	95	1	0	3	1	5700
08.03	100	99	0	0	1	0	5940
07.03	100	97	0	1	1	1	5820
06.03	100	100	0	0	0	0	6000
05.03	100	94	0	0	5	1	5640
04.03	96	94	0	0	2	0	5100
01.03	100	90	0	2	7	1	5400
28.02	100	95	0	0	0	5	5700
27.02	100	100	0	0	0	0	6000
26.02	100	100	0	0	0	0	6000
25.02	99	99	0	0	0	0	5940
22.02	100	100	0	0	0	0	6000
21.02	80	78	0	0	0	2	4680
20.02	100	100	0	0	0	0	6000

| | 7–DAYS | | | MAIN | DIAG | RETURN

Fig. 3–17 14 day summary

F3 Shift times

The **Shift times** screen is used to enter the three different shift times (hours and minutes) with 6 break times each. The times are set with the function keys.

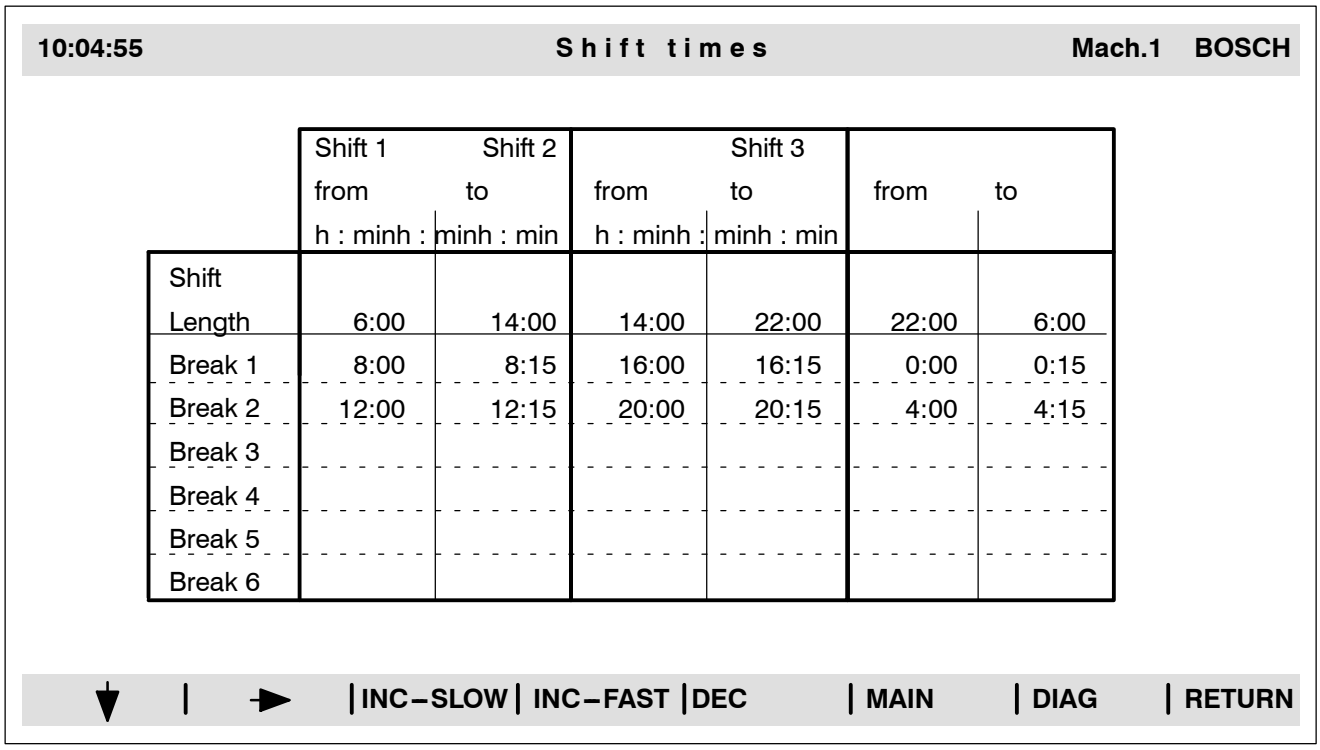


Fig. 3–18 Shift times

F4 Cycle times

Calls diagnosis module DB500 **cycle times** standard function. The values of the 36 cycle times are filed in DM121 (refer to Sub–section **5.7.5 Data module preassignment for 36 cycle times**) and have to be written by the user.

Note ☞ **Refer also to Section 6.3 Cycle time management with –TAKT and –TZ_INC.**

BOSCH "Diagnosis DB500" ZS 1 > CYCLE TIMES <

Station:		Value:	Station:	Value:
CT 1	Total cycle time	2.0 s	CT 19	0.0 s
CT 2	Feed	0.2 s	CT 20	0.0 s
CT 3	Machining	0.1 s	CT 21	0.0 s
CT 4	Transit	0.5 s	CT 22	0.0 s
CT 5		0.0 s	CT 23	0.0 s
CT 6		0.0 s	CT 24	0.0 s
CT 7		0.0 s	CT 25	0.0 s
CT 8		0.0 s	CT 26	0.0 s
CT 9		0.0 s	CT 27	0.0 s
CT 10		0.0 s	CT 28	0.0 s
CT 11		0.0 s	CT 29	0.0 s
CT 12		0.0 s	CT 30	0.0 s
CT 13		0.0 s	CT 31	0.0 s
CT 14		0.0 s	CT 32	0.0 s
CT 15		0.0 s	CT 33	0.0 s
CT 16		0.0 s	CT 34	0.0 s
CT 17		0.0 s	CT 35	0.0 s
CT 18		0.0 s	CT 36	0.0 s

13:37:26 **Mach.1**

					MAIN	**DIAG**	**RETURN**

Fig. 3–19 Cycle times

F5 Limits in bar chart
F6 Limits in table

F5 and F6 display the limits in a **bar chart** and **table** respectively.

Note ☞ **The function key assignment is indicated in Section 3.8 Function key assignment in DB500 standard screens.**

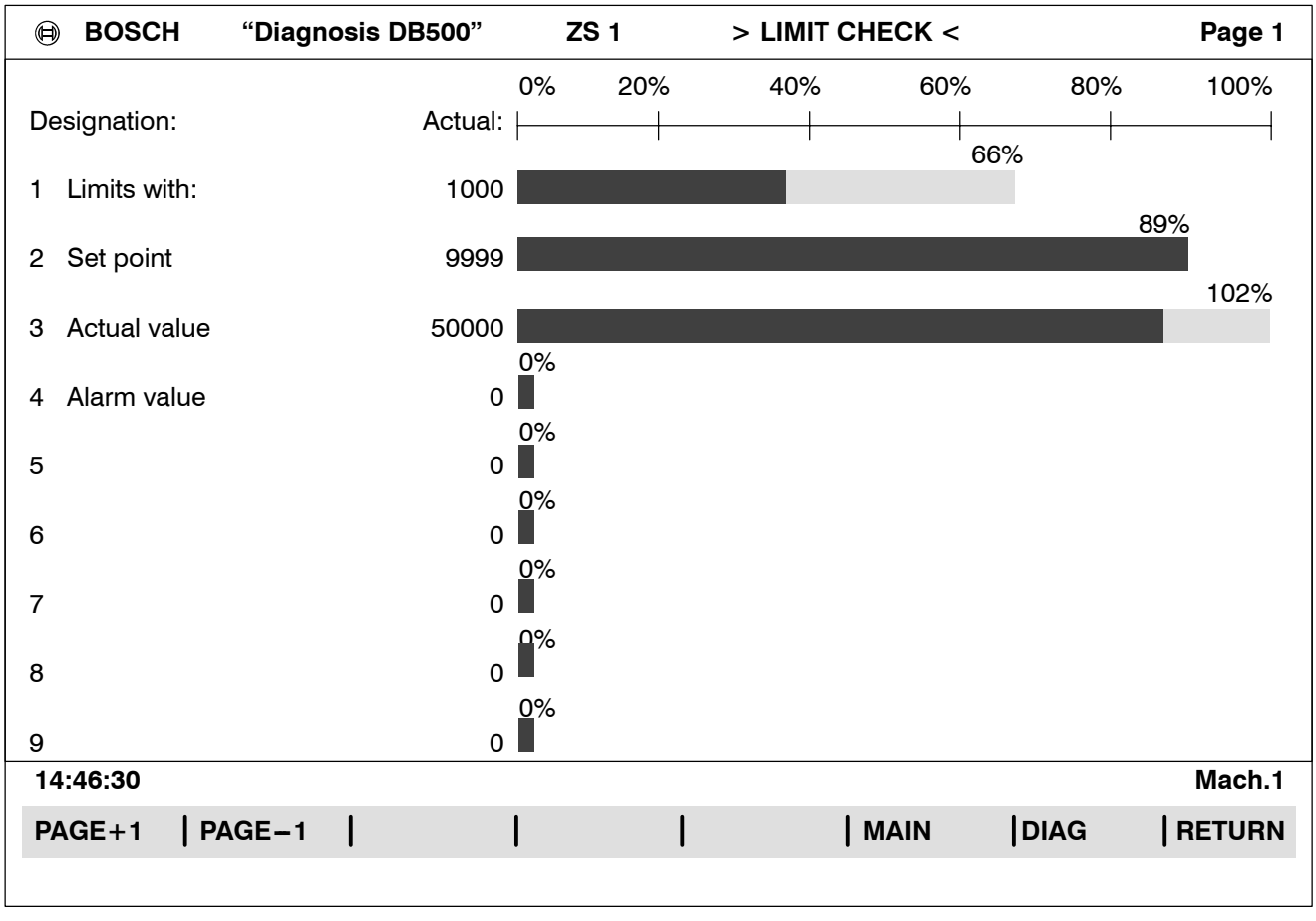


Fig. 3–20 Limits in bar chart

Pages 1–4 in the bar chart are **scrolled forwards F1** and **backwards F2**.

BOSCH "Diagnosis DB500" ZS 1 > LIMIT CHECK <

	Designation:	Set:	Actual:	Alarm:		Designation:	Set:	Actual:	Alarm:
1	Temp. reg. 1	65	60	70	19		0	0	0
2	Silo level	800	554	50	20		0	0	0
3	Tool corr.	100	77	110	21		0	0	0
4	Hydraulic pressure	5	4	6	22		0	0	0
5		0	0	0	23		0	0	0
6		0	0	0	24		0	0	0
7		0	0	0	25		0	0	0
8		0	0	0	26		0	0	0
9		0	0	0	27		0	0	0
10		0	0	0	28		0	0	0
11		0	0	0	29		0	0	0
12		0	0	0	30		0	0	0
13		0	0	0	31		0	0	0
14		0	0	0	32		0	0	0
15		0	0	0	33		0	0	0
16		0	0	0	34		0	0	0
17		0	0	0	35		0	0	0
18		0	0	0	36		0	0	0

13:37:26 **Mach.1**

▼ | INCR. | DECR. | FAST/SLOW | ALTER | MAIN | DIAG | RETURN

Fig. 3–21 Limits in table

The limits can only be changed in the table or by way of direct writing of DM122, refer to Sub–section **5.7.6 Data module preassignment for 36 limits**.

3.2.6 F6 Status and record memory

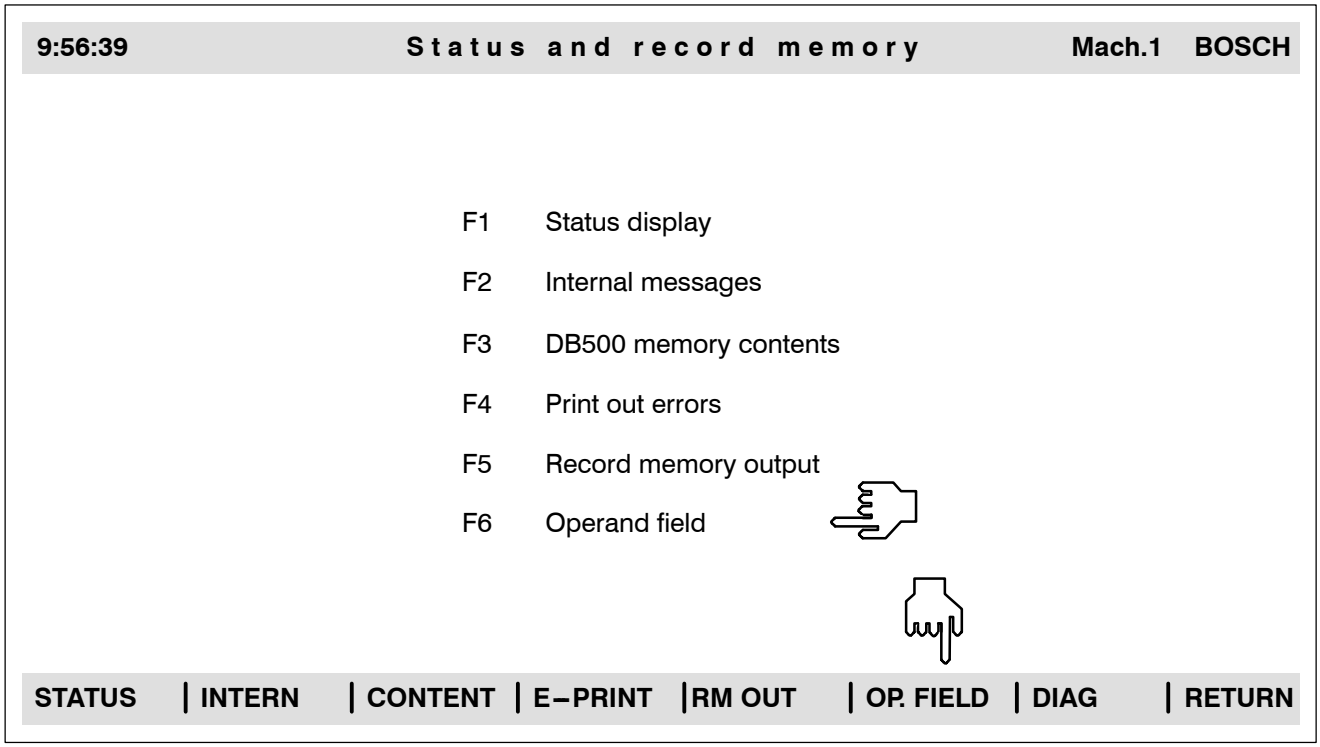


Fig. 3–22 Status and record memory

The following functions are possible from the **status and record memory** screen:

F1 Status display
F2 Internal messages
F3 DB500 memory contents
F4 Print out errors
F5 Record memory
F6 Operand field

F1 Status display

The status display contains a further menu used to select the following operands:

F1 Data module
F2 Inputs
F3 Outputs
F4 Markers
F5 Timers
F6 Counter

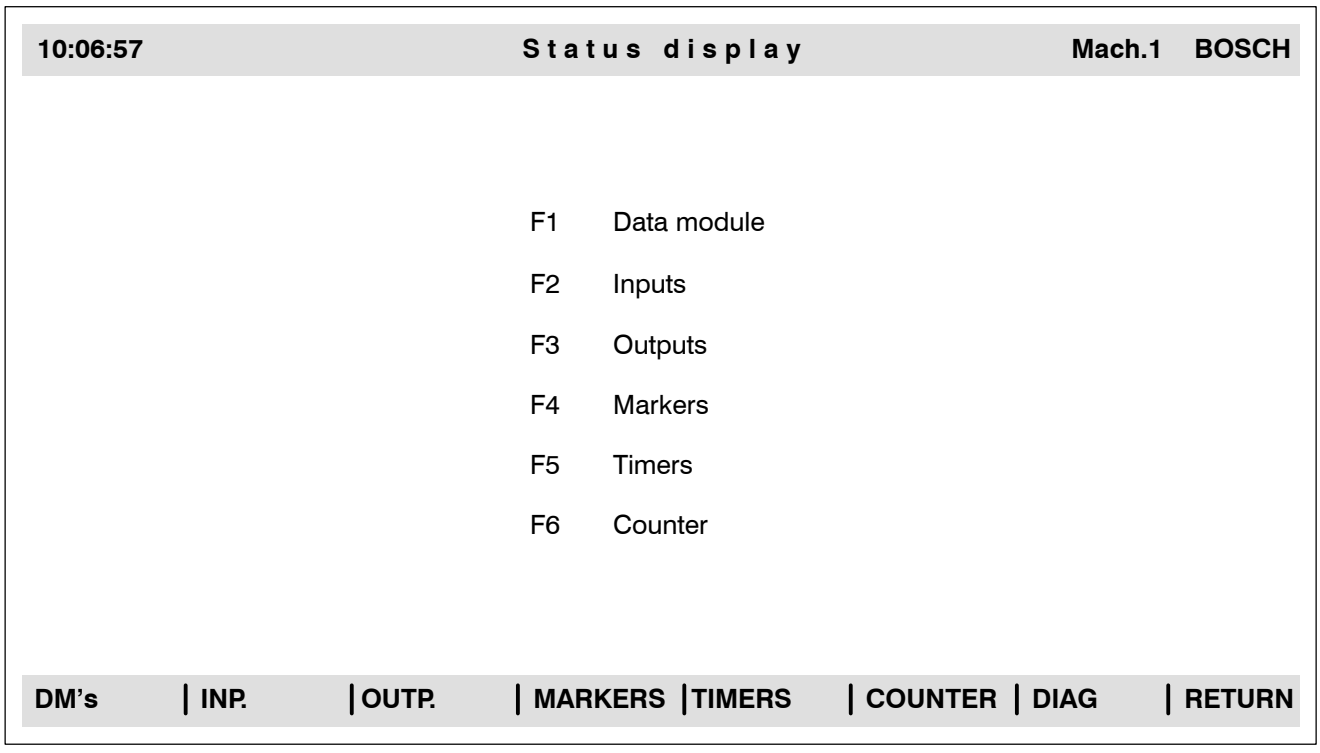


Fig. 3–23 Status display

If markers are selected, operating F3 will toggle between **markers**/**special markers**.

if the **data module** option is selected, the first data module defined in the CL500 is sought and displayed. F3 displays the next available data module. F4 searches for the previous data module and displays it. F1 and F2 scroll forwards and backwards in all status screens.

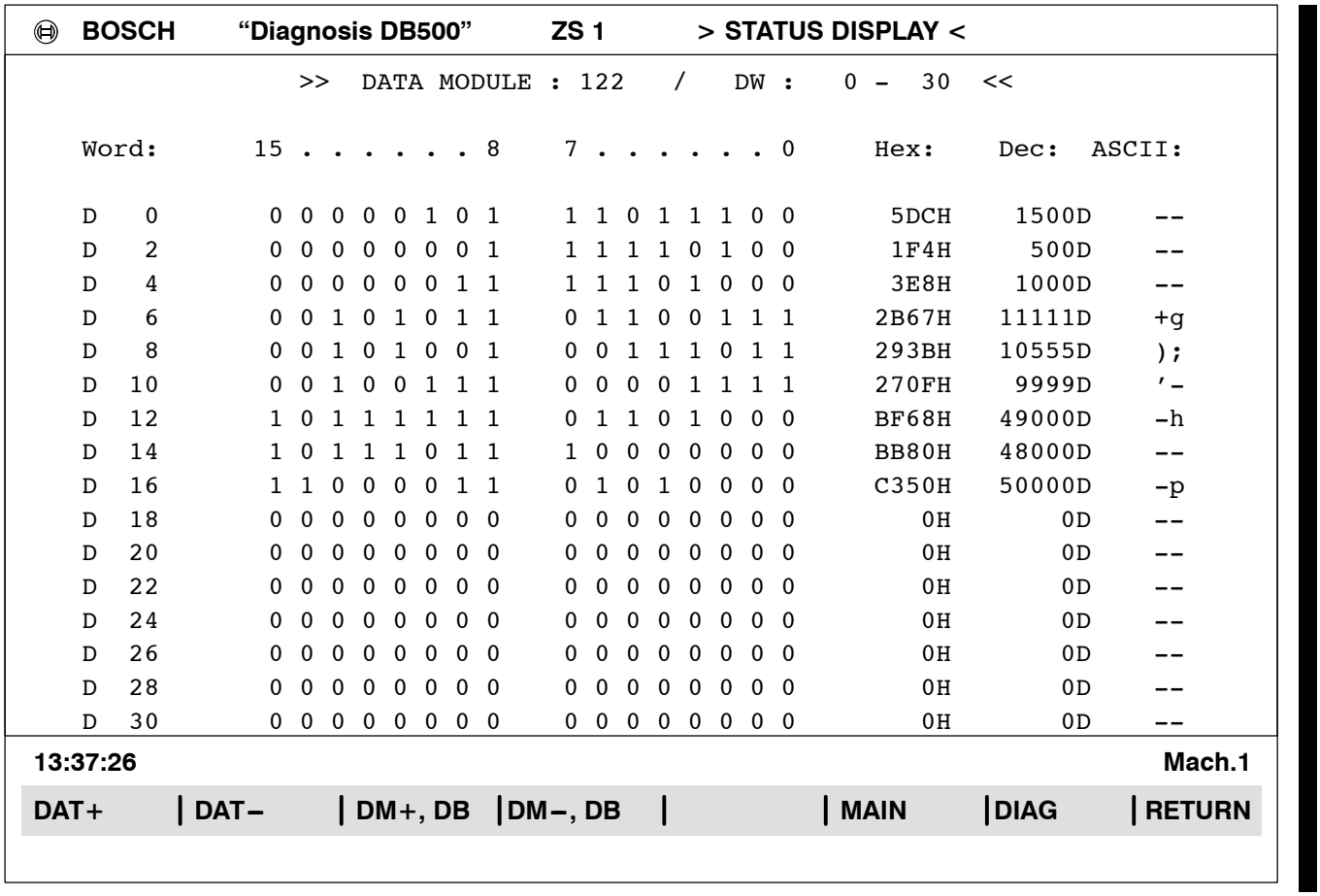


Fig. 3–24 Data module

The data buffer is presented after the last data module.

F2 Internal messages

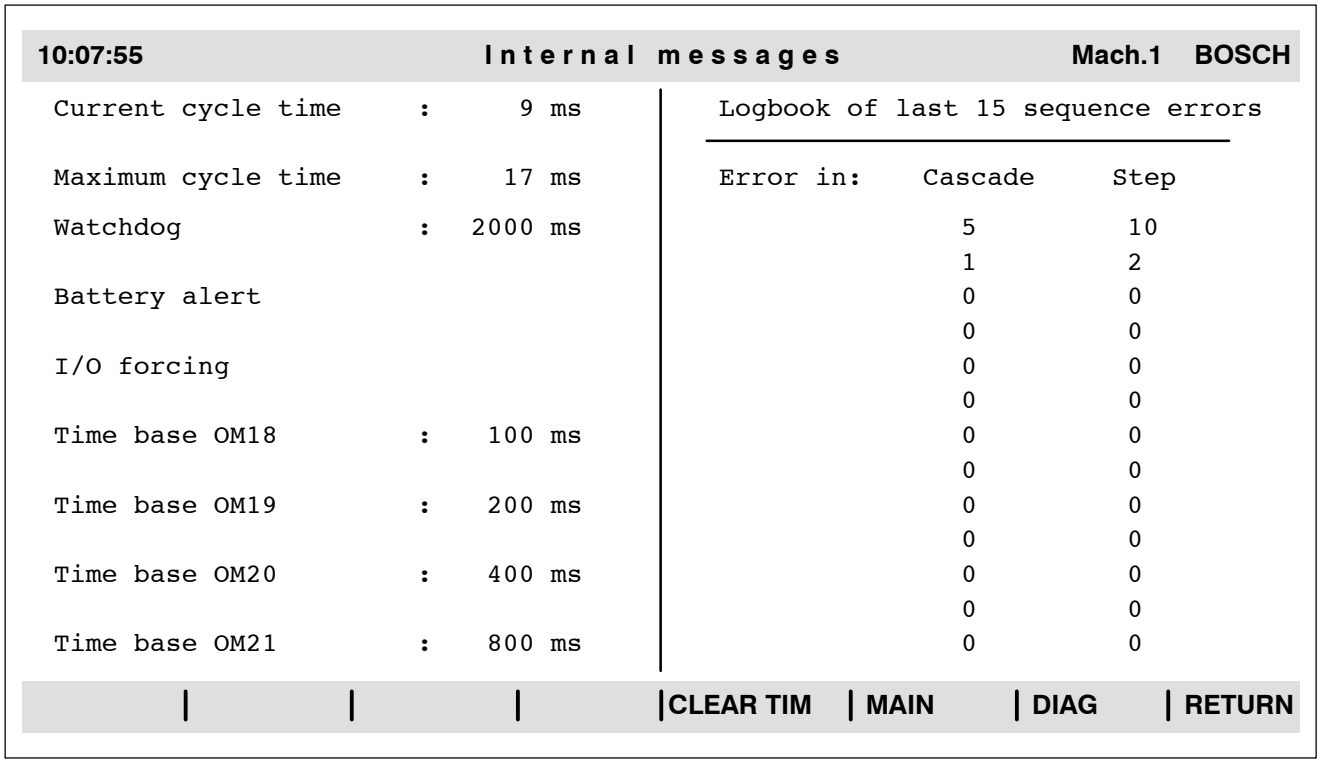


Fig. 3–25 Internal messages

The following data are filed in this function:

- Current cycle time
- Maximum cycle time
  The maximum time can be cleared with key F5.
- Watchdog
- Battery alert
- I/O forcing available?
- Time base for OM18–OM21
- The last 15 first–level messages are displayed

F3 DB500 Memory contents

Display of

- Type of memory used
- Size of memory and
- Memory position being used

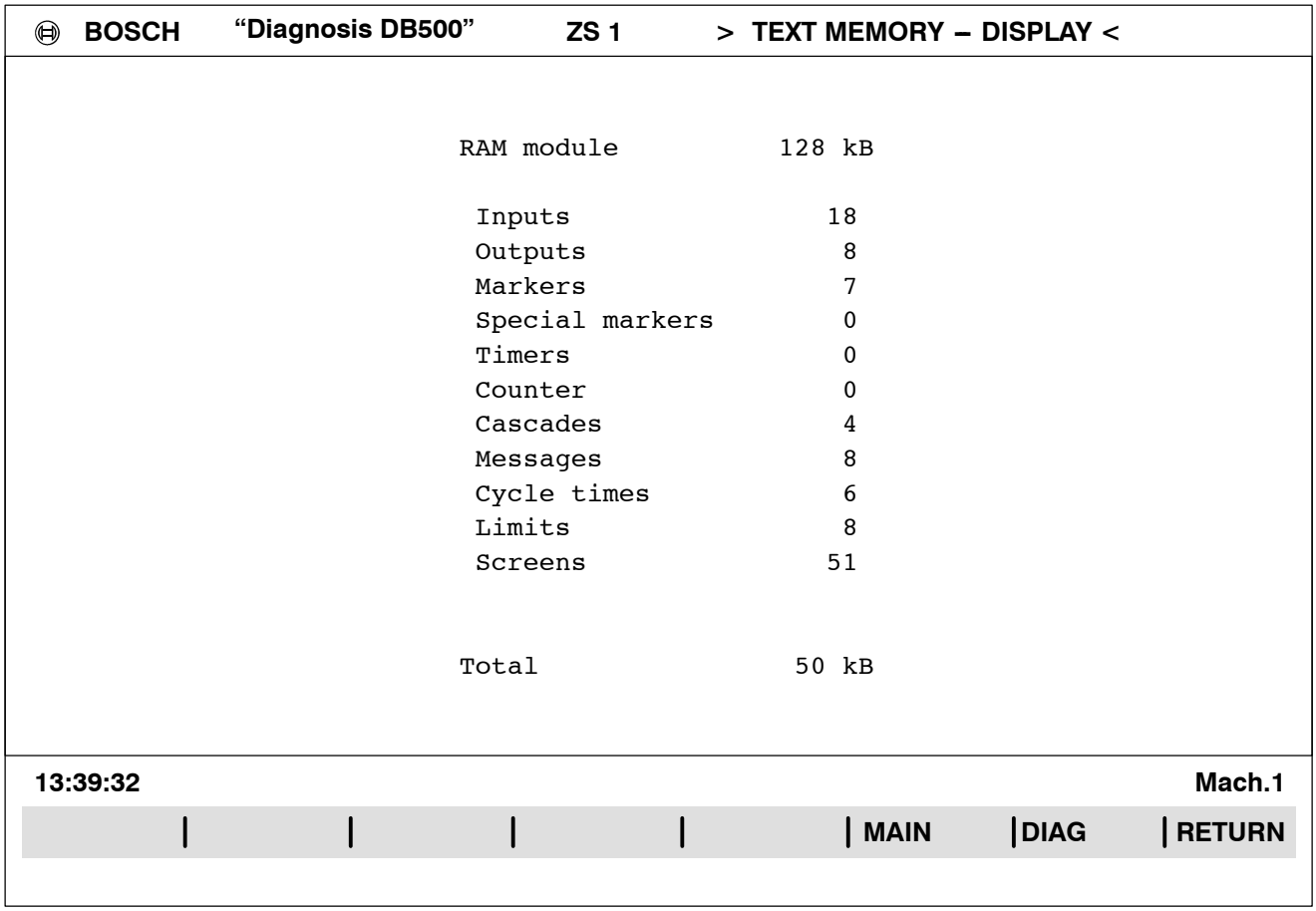


Fig. 3–26 DB500 memory contents

F4 Print out errors

This function makes it possible to have an ongoing record of the errors in the step cascades. F4 serves as a YES/NO toggle

F5 Record memory

This function is used to preset the output of the record memory.

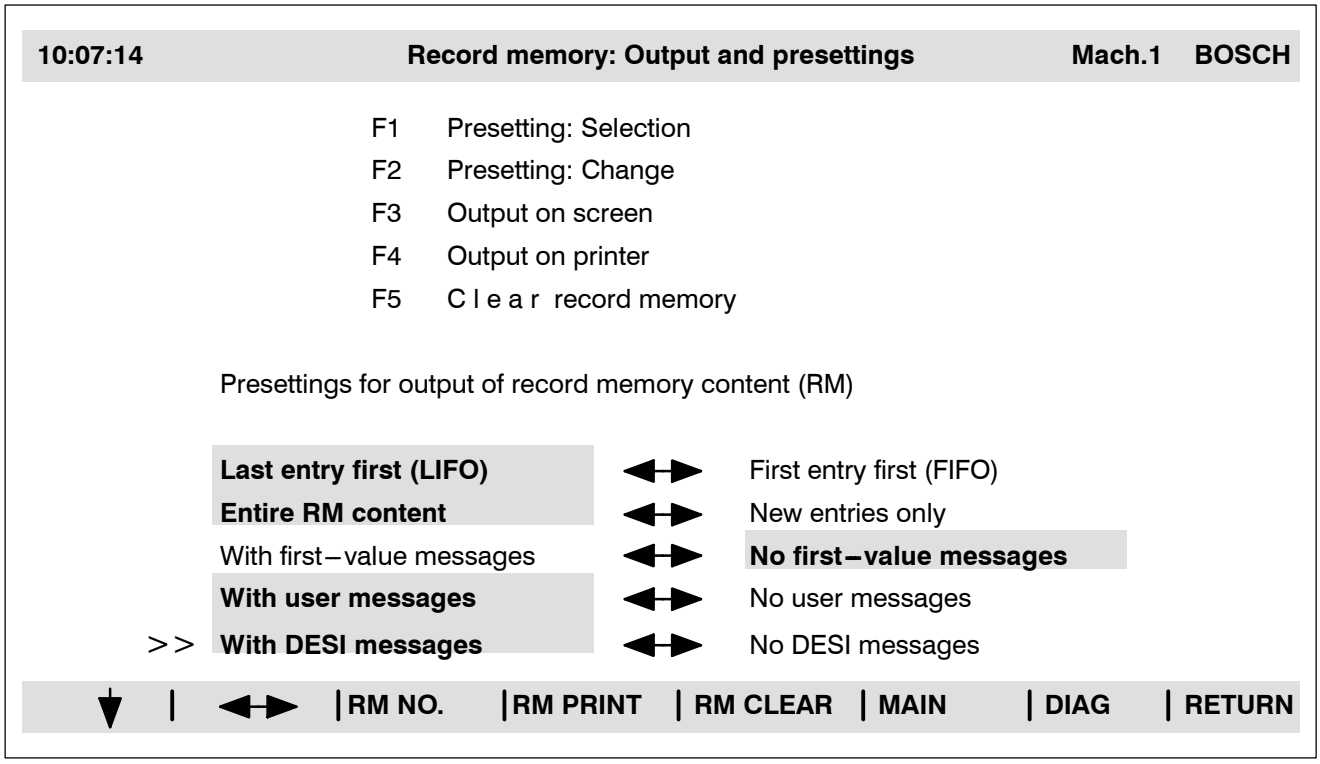


Fig. 3–27 Record memory

It is basically possible to have output on printer or screen.

The presettings make for selection of the record memory entries to be output.

F6 Operand field

This function provides direct access to the status of operands in the running program and makes it possible to alter them.

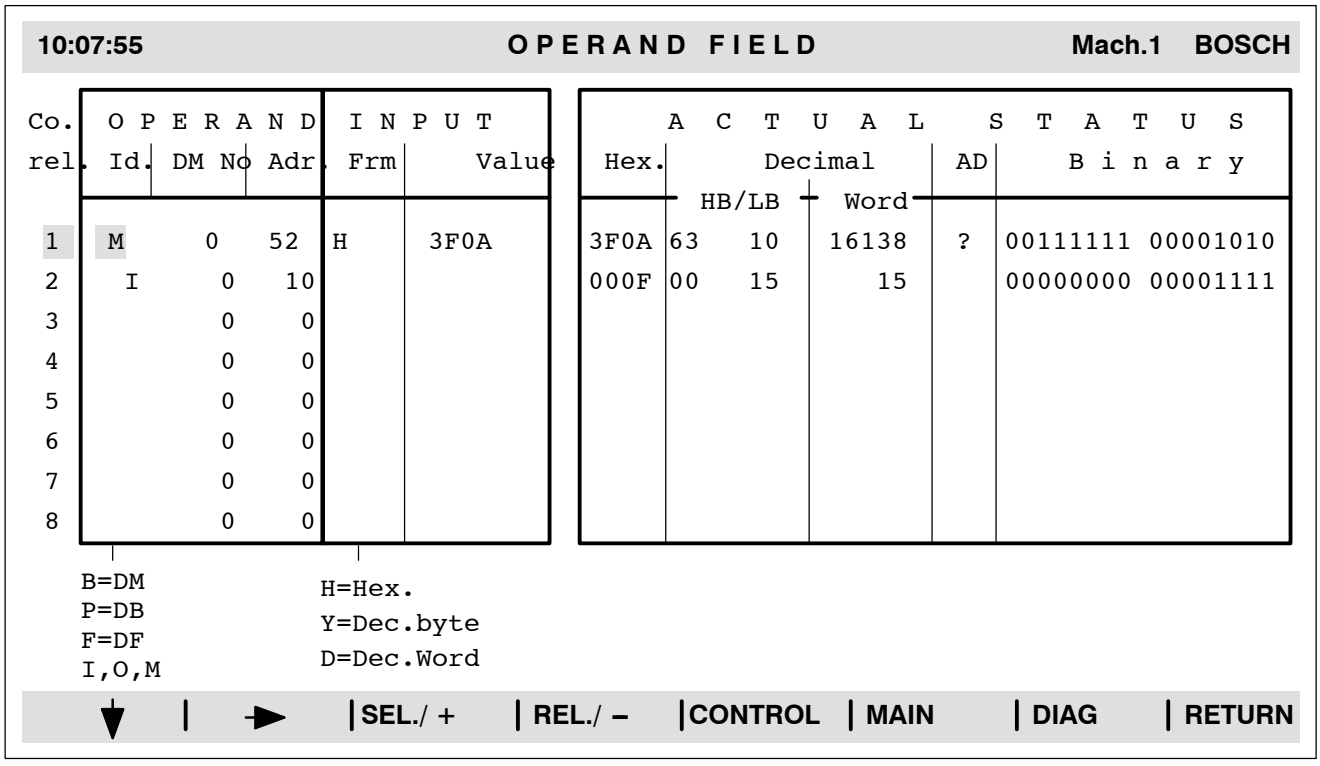


Fig. 3–28 Operand field

F1 Selection of input line
F2 Selection of input column
F3 – Selection of operand identifier
– Incrementation of operand address
– Selection of number format for input
– Incrementation of data module number
F4 – Control function enable for line
– Decrementation of operand address
– Decrementation of data module number
F5 Execute control function for lines enabled

3.2.7 F7 Set clock

This function makes it possible to set the system clock on the system coordinator SK500.

Hour, minute, weekday, day, month and year are selected and altered by way of the function keys. The enter key is then used to transfer the set time to the system coordinator SK500ü.

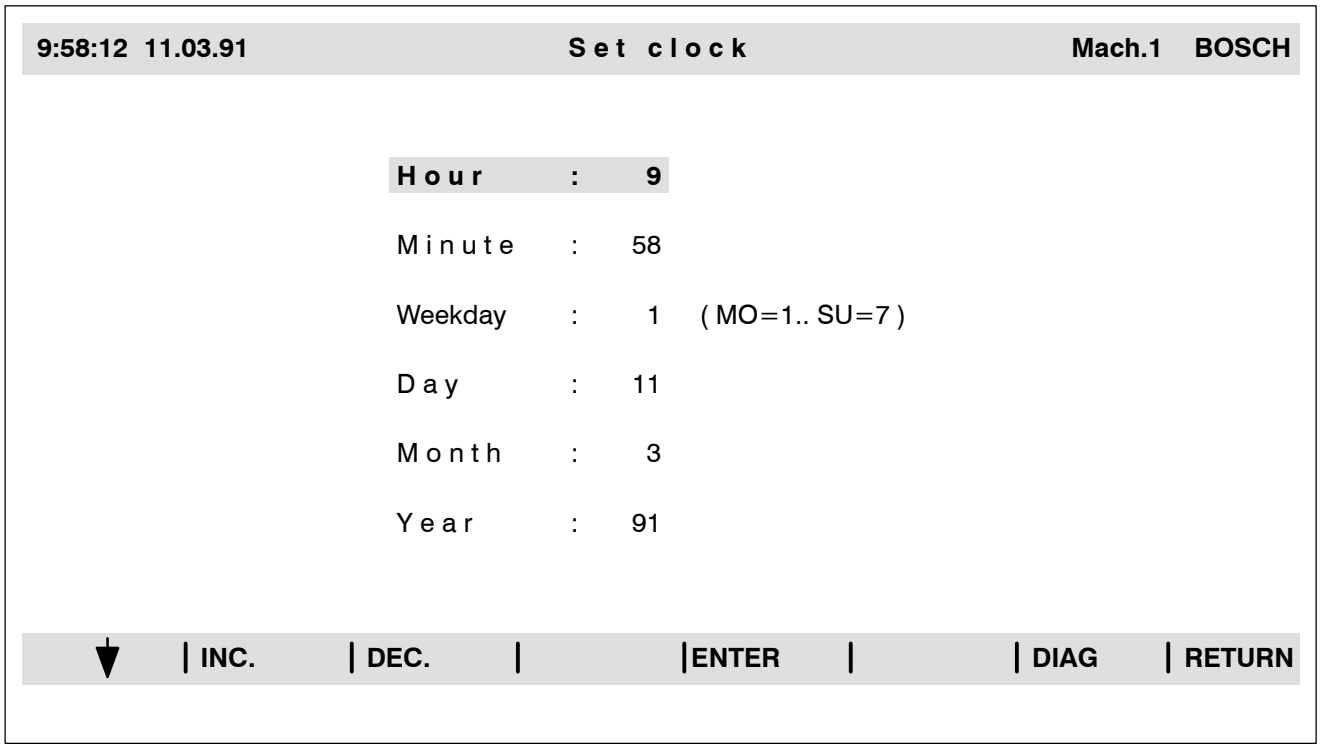


Fig. 3–29 Setting clock

3.3 List of program modules used

Address	Function of standard program modules	R/E
PM401	DIAG500	R
PM402	TRANS500	R
PM403	DESI500	R
PM404	DESIBMS	R
PM420	DB_BAUM	R
PM421	GRUNDMEN	R
PM422	EINSCHLT	R
PM423	DIAG	R
PM424	MASCHBED	R
PM425	BEWEGPIC	R
PM426	ANWEND	R
PM427	ANWPIC	R
PM428	MAUSLAST	R
PM429	7TAGE	R
PM430	14TAGE	R
PM431	SCHICHT	R
PM432	TAKTZEIT	R
PM433	TAKTTAB	R
PM434	TAKTBALK	R
PM435	STATFEHL	R
PM436	STATMENU	R
PM437	INTMELD	R
PM438	DATA	R
PM439	STATUS	R
PM440	UHR	R
PM442	FSVOR	R
PM443	FSDAR	R
PM444	EINSCH21	R
PM445	EINSCH31	R
PM446	EINSCH41	R
PM447	STEUERN	R
PM448	STEUERN1	R
PM449	EINGABE	R
PM450	CURSOR	R

Address	Function of standard program modules	R/E
PM451	BEWEGUNG	R
PM452	SYNCHRO	R

The following data modules are defined for **Operate** / **Monitor**.

Address	Symbol	Explanation	R/E
DM120	DB120	First–value error message	R
DM121	DB121	36 cycle times	R
DM122	DB122	36 limit values	R
DM123	DB123	Cursor positions MADAP500	R
DM126	DB126	Shift times/Quantity	R
DM127	DB127	Management module MADAP500	R
DM128	DB128	Operand field	R

3.4 Module structure in total software package

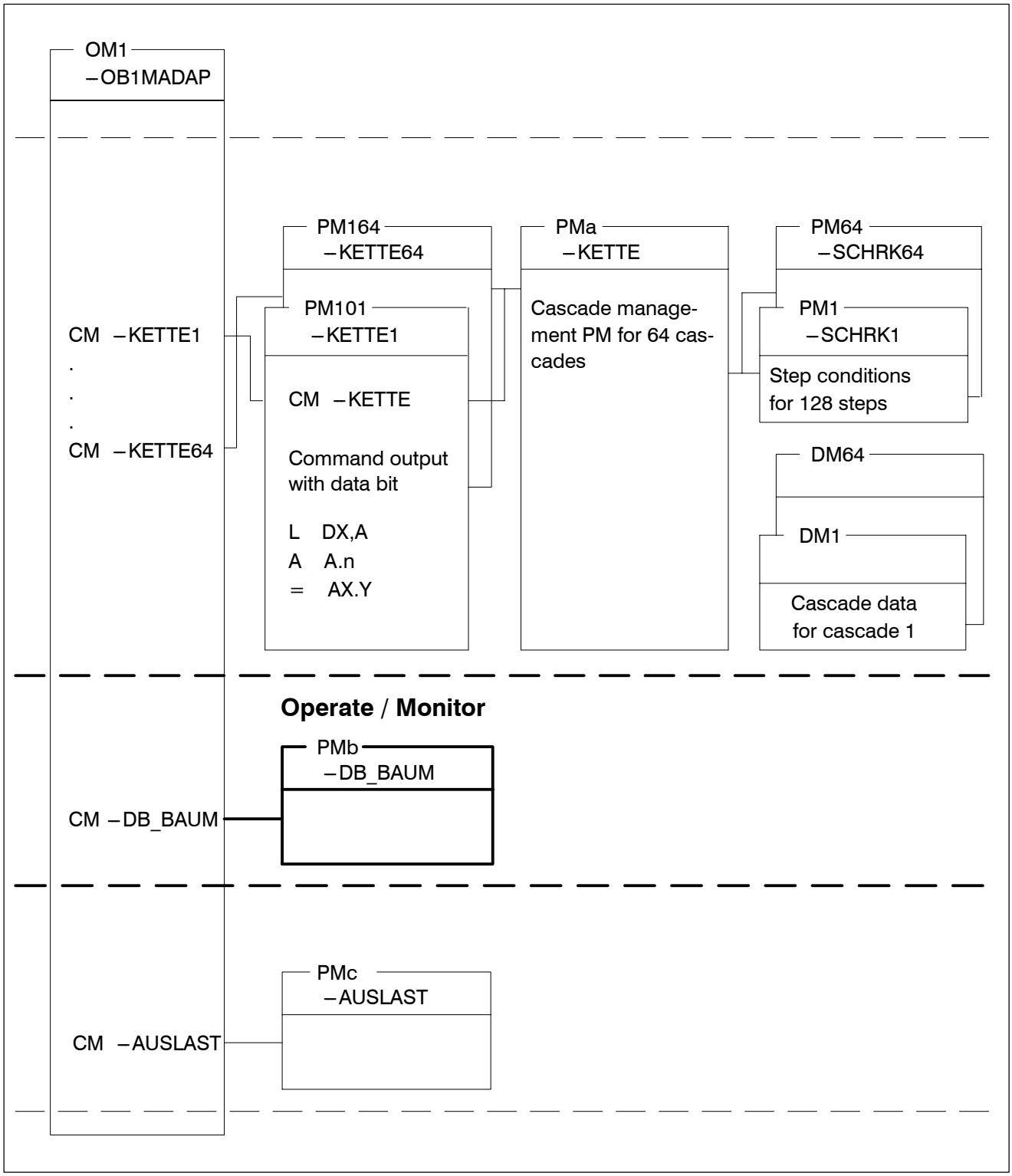


Fig. 3–30 Module structure in total software package

3.5 Module parameters of program module –DB_Baum

Only the program module **–DB_BAUM** has to be parametrized by the user.

```
;Call-up of program module -DB_BAUM
```

```
;                  -DB_BAUM
;
;-SOFTKEY     W     P0
;-BEWTAST     W     P1
;-KETTZAHL    W     P2
;-BEWBILDZ    W     P3
;-ANWBILDZ    W     P4
;
```

```
CM     -DB_BAUM,5            ;Call operator environment
P0  W  -SOFTKEY              ;Function key input word
P1  W  -BEWTAST              ;Movement key input word
P2  W  -KETTZAHL             ;Number of cascades (max.64)
P3  W  -BEWBILDZ             ;Number of movement screens (max.64)
P4  W  -ANWBILDZ             ;Number of user screens (max.32)
```

P0 W –SOFTKEY

The input word contains the function keys in the right byte. The left byte is not assigned.

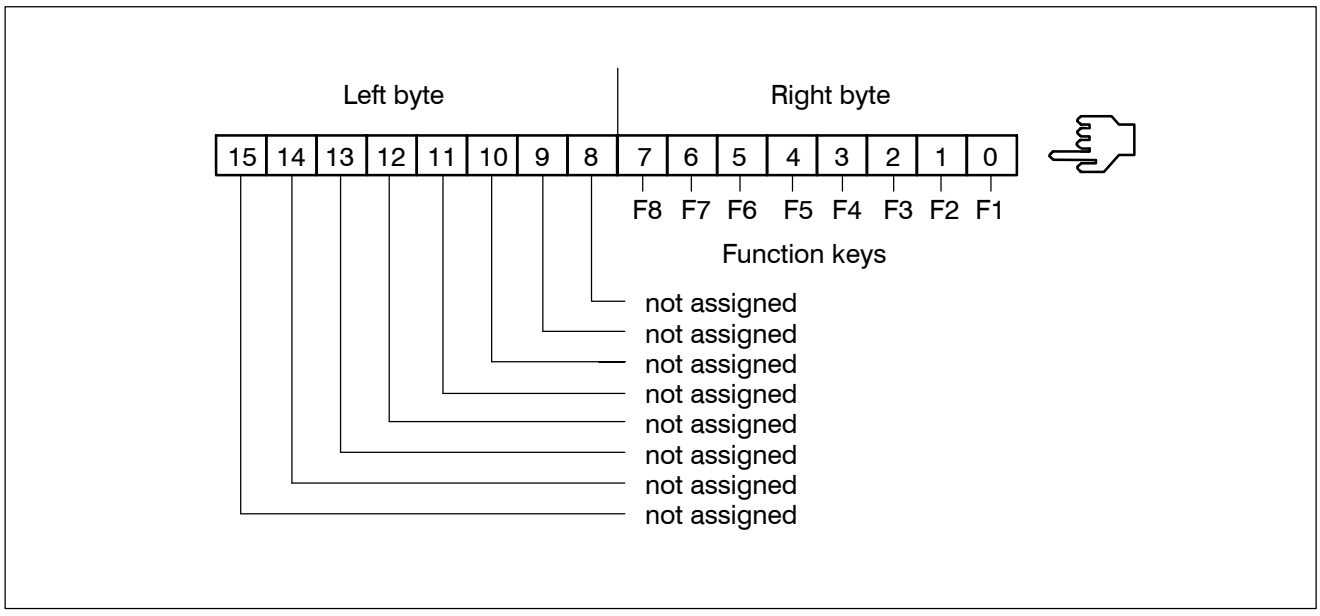


Fig. 3–31 Function key input word

P1 W –BEWTAST

The movement keys are assigned to the movement screens and are active when one of these screens is displayed.

The FORWARD keys are in the right byte.

The REVERSE keys are in the left byte.

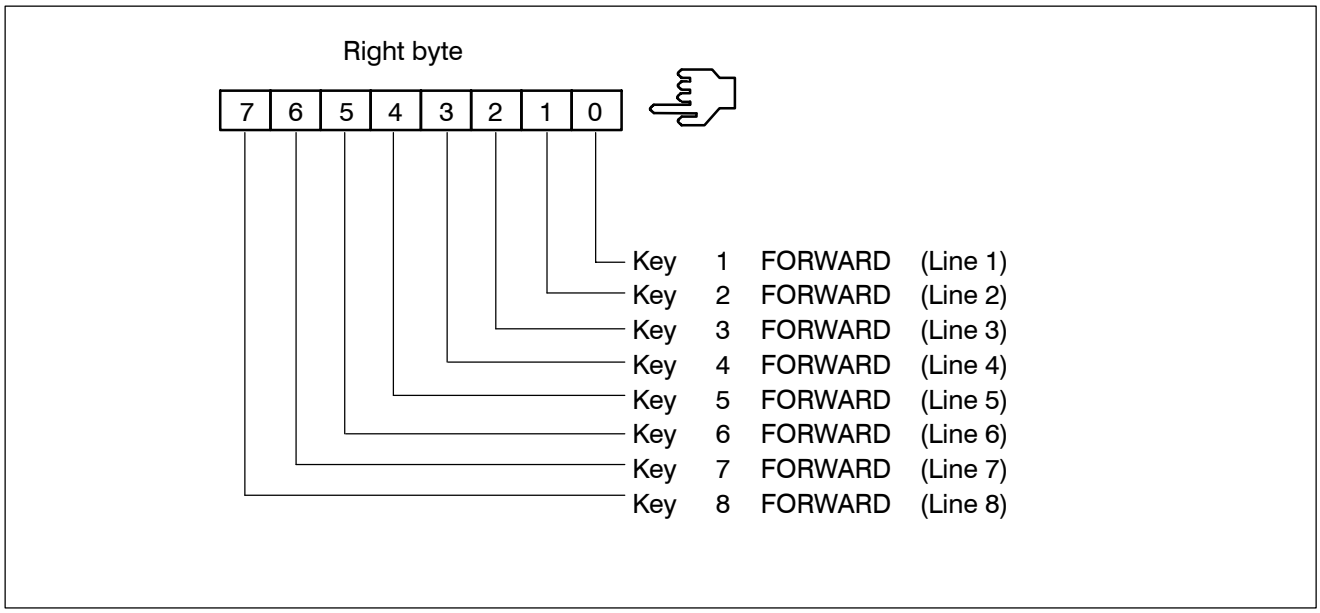


Fig. 3–32 FORWARD movement keys

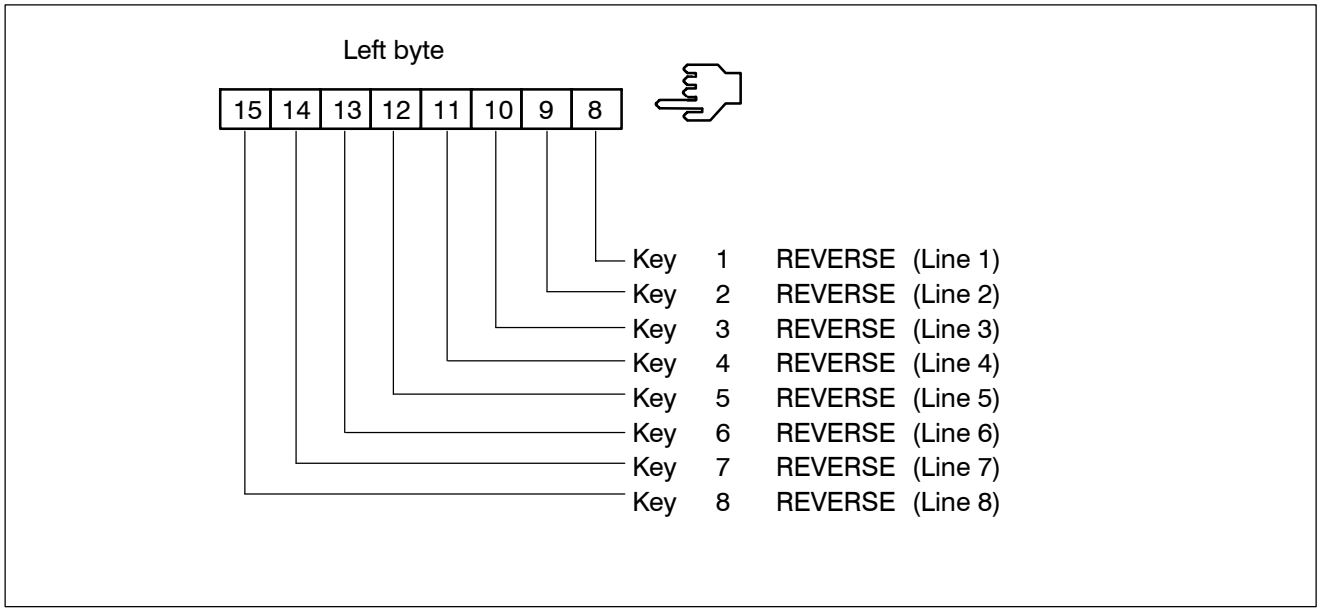


Fig. 3–33 REVERSE movement keys

P2 W –KETTZAHL

Number of cascades

This parameter contains the number of all possible cascades.

Example:

maximum possible cascades:	1, 2, 3
used:	1, 3
P2 –KETTZAHL:	3

As regards non–used cascades, the corresponding data modules DMn **must** be incorportated into the program with **at least 164** data words.

P3 W –BEWBILDZ

Number of movement screens

Up to 64 different movement screens can be selected from the **machine operation screen**. The number of movement screens can be limited using parameter P3. If the number of screens is reduced, then screens 3 **MASCHBED.003** and 4 **MASCHBED.004** can also be shortened.

For every movement screen the corresponding data module must likewise be incorporated into the program with **at least 164 words**.

P4 W –ANWBILDZ

Number of user screens

Up to 32 different user screens can be selected from the **User menu screen**. The number of user screens can be restricted by way of parameter P4. If the number of screens is reduced, it is also possible to shorten screen 5 **ANWENDER.005**.

3.6 User block DM127

The user block DM127 is used to enter important system information and to select functions.

DM 127 Name: DB127 Remarks: Management module MADAP RAM/EPROM: R						
No.		**Symbol**	**Type**	**S n**	**Data field / remarks**	**F**
D	0		Word	N	Binary value of function key rail	D
D	2		Word	N	Current command code of diagnosis module DB500	D
D	4		Word	N	Current function parameter, e.g. screen number	D
D	6		Word	N	Current operating level	D
D	8		Word	N	Previous operating level	D
D	32		Word	N	D32.0: Bit for lamp test	D
D	100		Word	N	Address of diagnosis module DB500 / P0 TRANS	D
D	102		Word	N	Operating word / P1 TRANS	D
D	110		Word	N	Message number / P9 TRANS	D
D	114		Word	N	Screen number / P14 TRANS	D
D	116		Word	N	Function key number / P11 TRANS	D
D	118		Word	N	FMSTATUS / P12 TRANS	D
D	120		Word	N	Cascade number / P13 TRANS	D
D	122		Word	N	Blocking word 1	D
D	124		Word	N	Blocking word 2	D
D	126		Word	N	Mask for synchronization in initial screen	D
D	128		Word	N	Mask for synchronization in initial screen	D
D	130		Word	N	Mask for synchronization in initial screen	D
D	132		Word	N	Mask for synchronization in initial screen	D
D	486		Word	N	Dimming time current	D
D	488		Word	N	Dimming time setpoint	D
D	500		Word	N	User identifier 1 in ASCII	D
D	502		Word	N	User identifier 2 in ASCII	D
D	504		Word	N	User identifier 3 in ASCII	D

D0 Binary value of function key rail

The correct binary value is entered depending on the function key pressed.

D2 Current command code of diagnostic module DB500

Contains a coding which conforms to parameter **P2** of **TRANS500**; see Technical Documentation:
CL500
Diagnostic Module DB500
Module description
P.–Nr. 4125

D4 Current screen number

Displays the current screen number when screen is selected.

D6 Current operating level

Contains the identifier of the current operating level; see Fig. 3–2.

D8 Previous operating level

Contains the identifier of the previous operating level.

D32.0 Lamp test bit

If the lamp test function is selected in the initial screen, then bit D32.0 is processed depending on the key selection.

D100 Address of diagnostic module DB500

The address of the diagnostic module DB500 as declared in the system configuration **must** be entered here, otherwise the control is STOPPED.

D102 Operating word

A positive edge to bit D103.7 is used to print a hard copy of the current screen content.

D110 Message number

This word can be used to display user–specific messages on the screen.

No.	Function
0–8	static, message number (1–511: Message present, 0: No current message)
9	
10	
11	
12	static, message to printer with time and date
13	static, enter message in record memory
14	static, display message on screen
15	static, message coming (0) / message going (1)

Note ☞

Refer also to Section 6.4 and description of TRANS500 in Technical documentation:
CL500
Diagnostic Module DB500
Module description
P.–Nr. 4125

D114 Screen number

By defining an existing screen number it is possible to overlay a second screen on the current screen (**not** on standard screens).

D116 Function key number

By defining an existing function key number it is possible to overlay another function key rail. This is only possible with standard screens.

D118 FM status

Internally detected program or system errors are filed here.

No.	Function
0	
1	Screen change enabled (0) / disabled (1)
2	Message coming/going enabled (0) / disabled (1)
3–9	
10	Faulty variable in screen/status display
11	Data field address too big
12	DB 500 firmware version number not valid
13	No operation of DB500 by the TRANS500
14	DB500 not initialized
15	DB500 not found

D120 Cascade number

The cascade number selected in the cascade field (diagnosis screen) is filed in the data word.

D122 Blocking word 1

Blocking word 1 is used to disable functions of the operator surface.

D122.0 Power–up conditions
D122.1 Diagnosis
D122.2 Machine operation
D122.3 Movement screens
D122.4 User screens/menu
D122.5 User screens
D122.6 Machine usage/menu
D122.7 7 day summary Shift 1–3

D123.0 14 day summary
D123.1 Shift times
D123.2 Modify shift times
D123.3 Cycle times
D123.4 Limits in bar chart
D123.5 Limits in tabulated form
D123.6 Modify limits
D123.7 Modify time

D124 Blocking word 2

Blocking word 2 is used to disable functions of the operator environment.

D124.0	Status and record memory
D124.1	Status display
D124.2	Internal messages
D124.3	Memory contents
D124.4	Print errors
D124.5	Record memory output
D125.0	Power–up condition 1
D125.1	Power–up condition 2
D125.2	Power–up condition 3
D125.3	Synchronization of manual operation (movement screen)
D125.4	Synchronization of automatic operation (initial screen)
D125.5	Operand field
D125.6	Operand control

D126 – D132 synchronization mask in initial screen

The data words D126 – D132 make it possible to block individual cascades during synchronization. There is one bit for every cascade. If the bit is set to **1**, **no** allowance is made for the cascade during synchronization.

Date	**Cascade**	**Data bit**	**15**	**8**	**7**	**0**
D126	Cascade 1 – 16	Cascade	16	9	8	1
D128	Cascade 17 – 32	Cascade	32	25	24	17
D130	Cascade 33 – 48	Cascade	48	41	40	33
D132	Cascade 49 – 64	Cascade	64	57	56	49

Other options

Monitor dimming

If monitor dimming is required, the brightening time can be specified in data word D488. If no function key is operated, the time times out (current value in D486). If dimming is not required, enter value **0** in data word D488.

User identifier

A personalized identifier with up to 6 ASCII characters can be entered in each screen. These entries are filed in data words D500–D504.

Entries in system area

The real–time clock data are available in the system area. These are refreshed every second by the system coordinator SK500. The data take up one byte each and are filed in hexadecimal form.

No.	Function
S504	Seconds
S505	Minutes
S506	Hours
S507	Day
S508	Month
S509	Year
S510	Weekday

3.7 Screen names and numbers

1.	Main menu	MAIN	.001	
2.	Power–up conditions	EINSCH	.002	*
3.	Machine operations Items 1–32	MASCHBED	.003	*
4.	Machine operations Items 33–64	MASCHBED	.004	*
5.	User screens Items 1–32	ANWENDER	.005	*
6.	Machine usage	AUSLAST	.006	
7.	Status and record memory	FEHLER	.007	
8.	Set clock	UHR	.008	
9.	7 day summary Shift 1	7TAGE1	.009	
10.	7 day summary Shift 2	7TAGE2	.010	
11.	7 day summary Shift 3	7TAGE3	.011	
12.	14 day summary	14TAGE	.012	
13.	Shift times	SCHICHT	.013	
14.	Status display	STATUS	.014	
15.	Internal messages	INTERN	.015	
16.	Record memory	PSPAUSG	.016	
17.	Operand field	STEUERN	.017	
20.	Movement screens	BEW1	.020	*
.	.	.	.	*
.	.	.	.	*
83.	Movement screens	BEW64	.083	*
84.	User screens	ANW1	.084	*
.	.	.	.	*
.	.	.	.	*
115.	User screens	ANW32	.115	*
120.	Function key rail Data modules	SKDATEN	.120	
121.	Function key rail Inputs	SKEING	.121	
122.	Function key rail Outputs	SKAUSG	.122	
123.	Function key rail Markers	SKMERK	.123	
124.	Function key rail Timers	SKZEIT	.124	
125.	Function key rail Counters	SKZAEHL	.125	
126.	Function key rail Cycle times	SKTAKTZ	.126	
127.	Function key rail Limits table	SKGRENZT	.127	
128.	Function key rail Limits B–chart	SKGRENZB	.128	
129.	Function key rail Diagnosis/ IL	SKDIAG	.129	

130.	Function key rail Record memory	SKPSP	.130
131.	Function key rail DM DB500 Content	SKDBINH	.131
132.	Function key rail Diagnosis/ LD	SKKPL	.132
150.	Power–up conditions 1	EINSCH1	.150
151.	Power–up conditions 2	EINSCH2	.151
152.	Power–up conditions 3	EINSCH3	.152

* = These screens must be adapted to suit the specific plant.

Movement screens

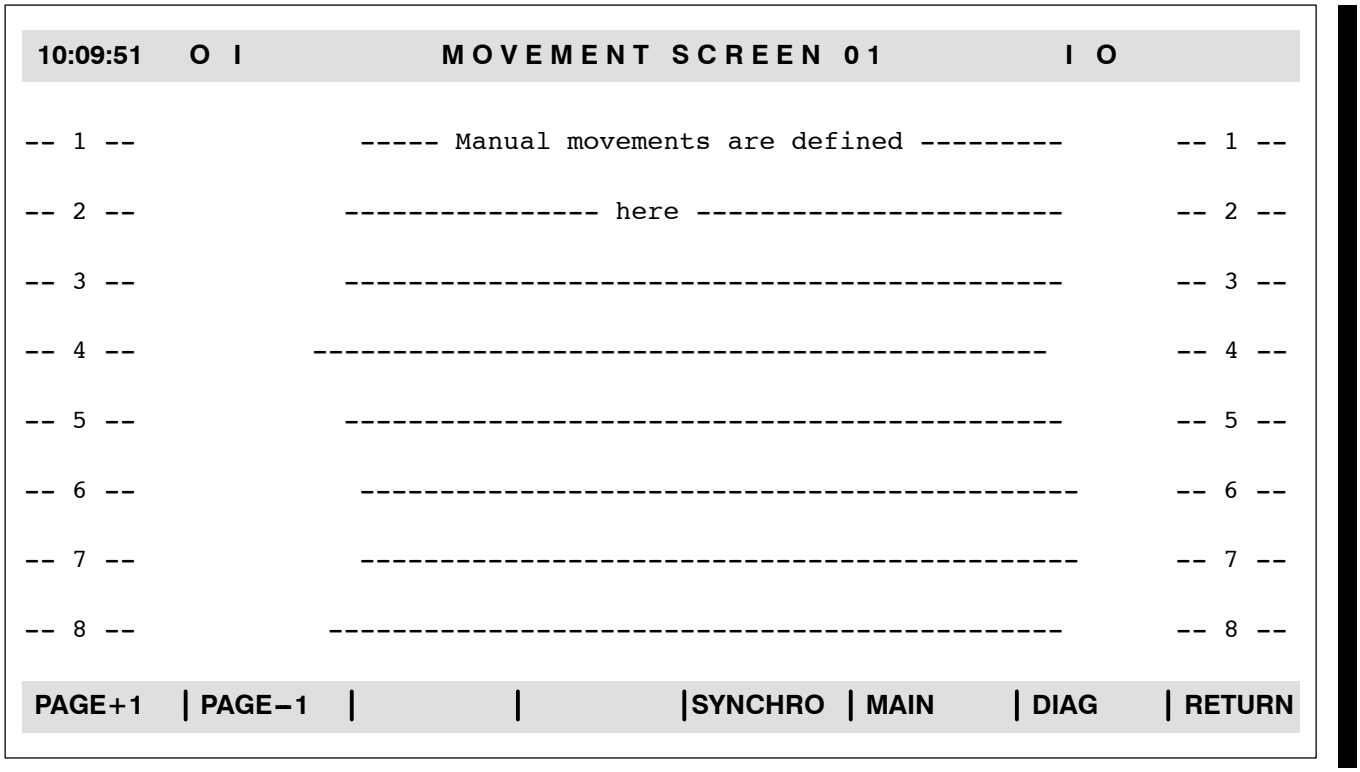


Fig. 3-34 Movement screen BEW1.020

If several movement screens are used, the movement screen BEW1 .020 must be copied as often as required and modified accordingly. This involves the following procedure:

- ★ Copy screen BEW1.020 with a new screen name e.g. BEW10.029.
- ★ Modify the screen number at top left of movement screen, e.g. B020 becomes B029.
- ★ Enter commentaries related to the movement key in the movement screen.
- ★ Adapt application-specific inputs and outputs in the prepared user field of the movement screen.

★ Change the data module no. in the variables definition of the cursor block for the synchronization results.

Example:
V,Lnnn,Snnn B001xxxA → B010xxxA

Movement screen 10 = DM10

Movement screen 1 = DM1

★ Add new movement screen to stack file.

User screens

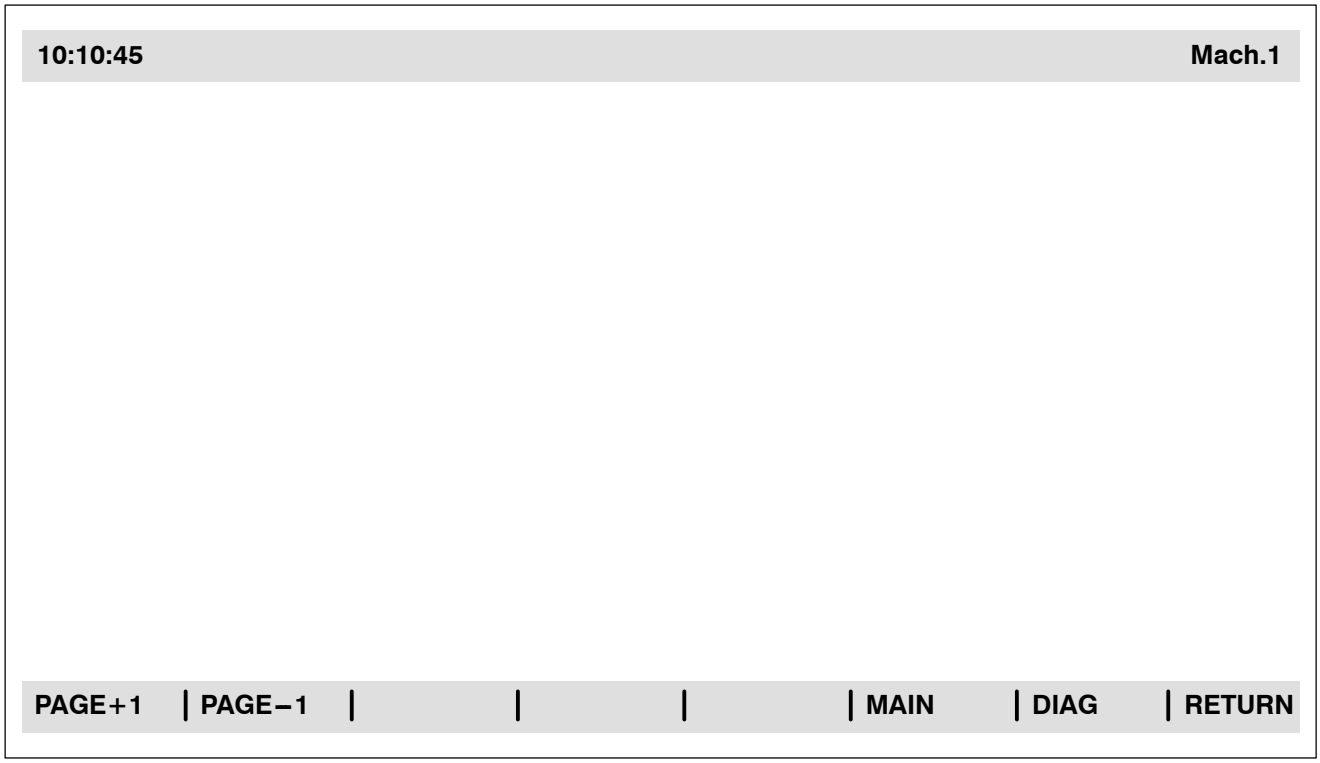


Fig. 3–35 User screen ANW1.084

If several user screens are employed, then user screen ANW1.084 must be copied as often as necessary and modified accordingly.

This involves the following procedure:

★ Copy screen ANW1.084 with a new screen name, e.g. ANW10.093.

★ Modify the screen number at the top left of the user screen, e.g. B084 to B093.

★ Create user screen.

★ Add new user screen to stack file.

3.8 Function key assignment in DB500 standard screens

Diagnosis

Instruction list IL

F1	Increment cascade number
F2	Decrement cascade number
F3	Scroll diagnosis field
F4	Scroll cascade texts
F5	DESI
F6	Ladder diagram
F7	Movement screens
F8	Return

Ladder diagram LD

F1	Increment cascade number
F2	Decrement cascade number
F3	Scroll branch
F4	Scroll down
F5	Scroll up
F6	Instruction list
F7	Movement screens
F8	Return

Limits table

F1	Cursor down
F2	Increment value
F3	Decrement value
F4	Toggle fast/slow
F5	Select modify
F6	Main menu
F7	Diagnosis
F8	Return

Limits bar chart

F1	Scroll page + 1
F2	Scroll page – 1
F3	–
F4	–
F5	–
F6	Main menu
F7	Diagnosis
F8	Return

Cycle times

F1	–
F2	–
F3	–
F4	–
F5	–
F6	Main menu
F7	Diagnosis
F8	Return

Status I/O/M/T/C

F1	Scroll page + 1
F2	Scroll page – 1
F3	Toggle M/SM, only if marker selected
F4	–
F5	–
F6	Main menu
F7	Diagnosis
F8	Return

Status data module

F1	Scroll page + 1
F2	Scroll page – 1
F3	Data module no. INCR.
F4	Data module no. DECR.
F5	–
F6	Main menu
F7	Diagnosis
F8	Return

3.9 General data

3.9.1 ZS500 memory contents

The full memory content for the function unit **Operate** / **Monitor** is approx. 17 k words.

Note ☞ **ZS500 as of version 102**
SK500 as of version 103

3.9.2 DB500 memory contents

1. Main menu
2. Power–up conditions
3. Machine operation (Selection)
4. User screens (Selection)
5. Machine usage (Selection)
6. Status and record memory
7. Set clock
8. 64 movement screens
9. 32 user screens (blank)
10. Three 7 day summary screens
11. 14 day summary screen
12. Shift times
13. Status display
14. Record memory
15. Operand field

These contents require a capacity of approx. 63 k bytes in the DB500.

Note ☞ **DB500 as of version 102**

3.9.3 Processing times

The stated time is an approximate time.

MADAP500: Total function package: approx. 10 ms

CAUTION 

When using interrupts (e.g. time–controlled processing), markers M230 and M244 must be saved and re–activated on completion of the interrupt routine.

For your notes:

4 Usage

Storage and display of production data over 14 days for the following parameters:

- Machine on
- Machine idle
- Production running
- Pieces
- Buffer full
- No parts
- Fault

The data for **production running** and **pieces** are also logged for 7 days in 3 shift operation.

4.1 Operating logic for machine condition times

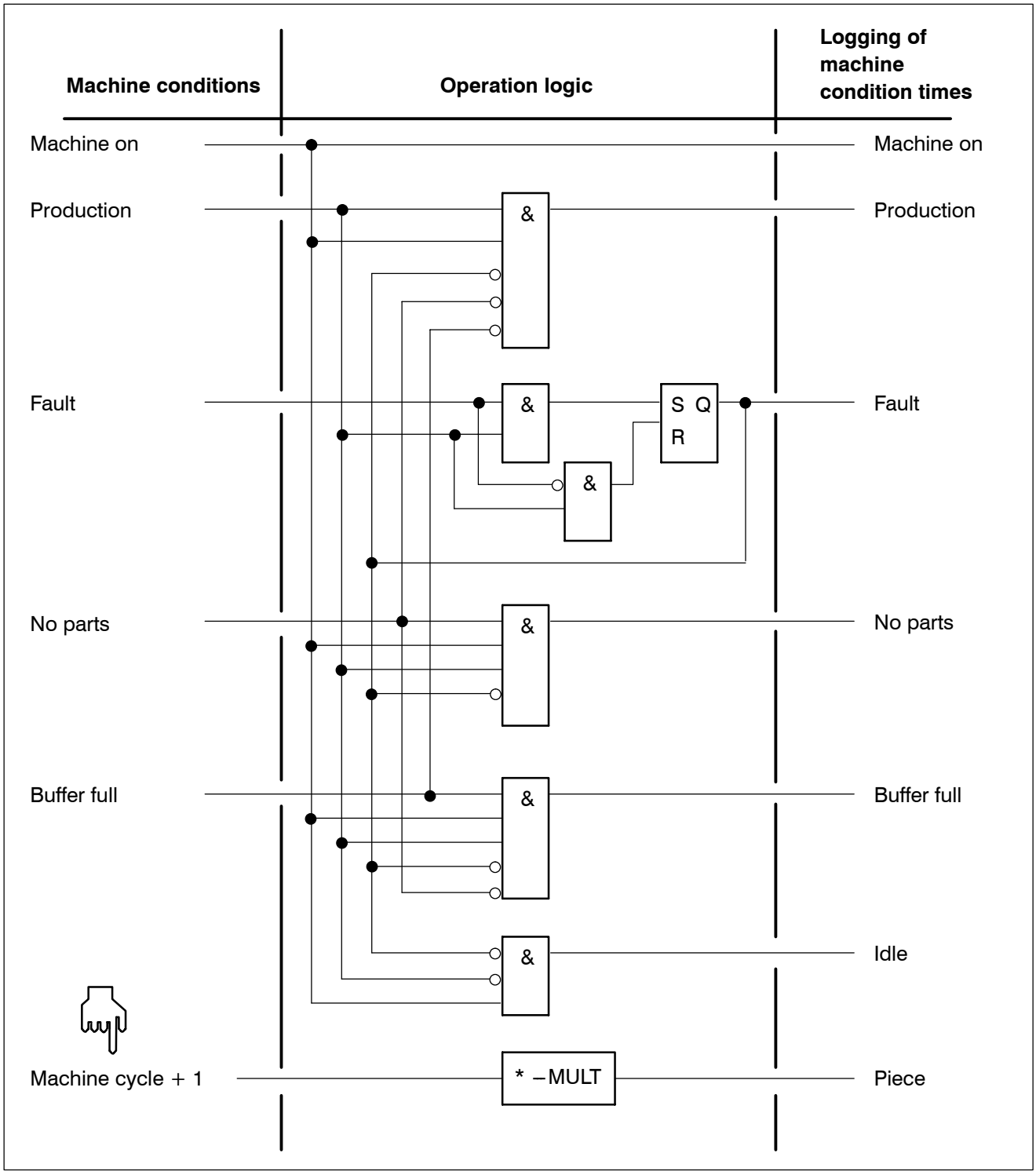
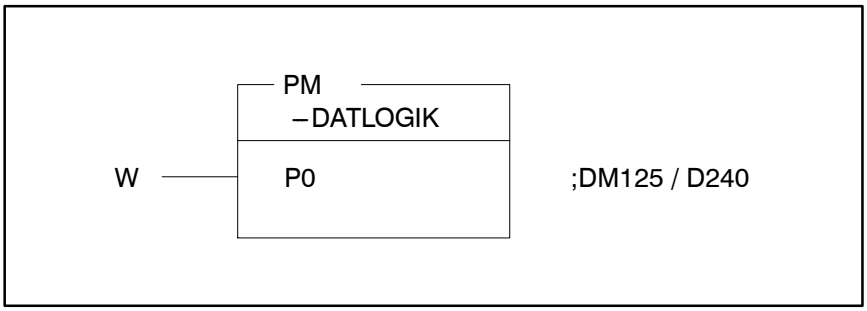


Fig. 4–1 Operation logic for machine condition times

This operation logic is executed by the **DATLOGIK** program module.

The **–DATLOGIK** module call is performed by the **AUSLAST** program module described below and therefore does not have to be programmed by the user.



The module –DATLOGIK has an input parameter **P0**. The data for the input parameter are contained in data module **DM125** in data bytes **D240** and **D241**.

D240

Default bits

0 = Machine on
1 = Production
2 = No parts
3 = Buffer full
4 = Fault
5 = Spare
6 = Machine cycle + 1
7 = Clear

D241

Transformed logging enables

0 = Machine on
1 = Production
2 = No parts
3 = Buffer full
4 = Fault
5 = Idle
6 = Piece
7 = Clear

If you wish to use another logic for data logging, it will be necessary to create this module again with the default parameters and names.

4.2 Principle of data logging

The usage data to be logged are captured by simulated **stop watches** with intermediate time recording on a minute basis and converted if required to a % value. Timers T119–T127 are used to form the base times. This function ensures that the time measurement runs on whenever a signal for data logging occurs. Therefore the measured value is the sum of the current log data. Variations in the measured times are of the order of max. 5s/day irrespective of the PLC cycle.

All data are stored whenever the shift change Shift 3 → Shift 1 is detected.

Processing the complete logging package takes approx. 3 ms. To achieve this time, the program processing is distributed over several PLC cycles. It must be ensured that the machine cycle counter pulse is > 0.2 s.

The 100 % value is defined as follows for computing the individual data:

Shift data

- Production: Shift length minus the sum of all breaks in minutes
- Pieces: Values to be specified

Day data

- Machine on: Sum of shift time in minutes
- Idle time: dto.
- Production: dto.
- Buffer full: dto.
- No parts: dto.
- Fault: dto.
- Sum: Sum of individual shift values

The following data are also logged:

- Date day/month as ASCII values for 14 days
- Target pieces for 3 shifts over 14 days

CAUTION 

Data activation must be implemented once with the function “Set clock” by pressing the enter key F5 in the clock screen. This likewise applies to data modification in on–line operation, i. e. desired pieces.

Note ☞

Within the modules there are no checks as to meaningful shift–time and break–time entries in respect of duration and overlap.

4.3 Modules and timers used

The following program modules are defined for **machine usage**.

Address	Symbol	Function of standard program modules	R/E
PM410	AUSLAST	Management of data to be logged	R
PM411	DATDATUM		R
PM412	DATSTCK		R
PM413	DATPROZ		R
PM414	DATLOGIK		R
PM415	DATSCHT		R
PM416	BALK		R

The following data modules are defined for **machine usage**. The full organization and assignment are given in Section **5 Layout** / **Library**.

Address	Symbol	Remarks	R/E
DM 124	DB124	3 shifts: Production, Actual pieces 14 days: Production, Actual pieces, Machine on, No parts, Buffer full, Fault, Idle, Date day/month in ASCII	R R R
DM 125	DB125	Bar conditions and associated % values	R
DM 126	DB126	Shift times in ASCII and shift length in minutes. Also logged data for target pieces for 3 shifts.	R R
DM 127	DB127	Management module for operation and display; refer to Section **3.6 User block DM127**.	R R

The following timers are utilized for **machine usage**.

Address	Symbol	Function of standard function modules
T 119	BZSS	**Idle**, 14 day base time for time logging
T 120	BZSt	**Fault**
T 121	BZPV	**Buffer full**
T 122	BZKT	**No parts**
T 123	BZME	**Machine on**
T 124	BZPr	**Production**
T 125	BZPrS3	**Production shift 3**
T 126	BZPrS2	**Production shift 2**
T 127	BZPrS1	**Production shift 1**

4.4 Module structure of total software package

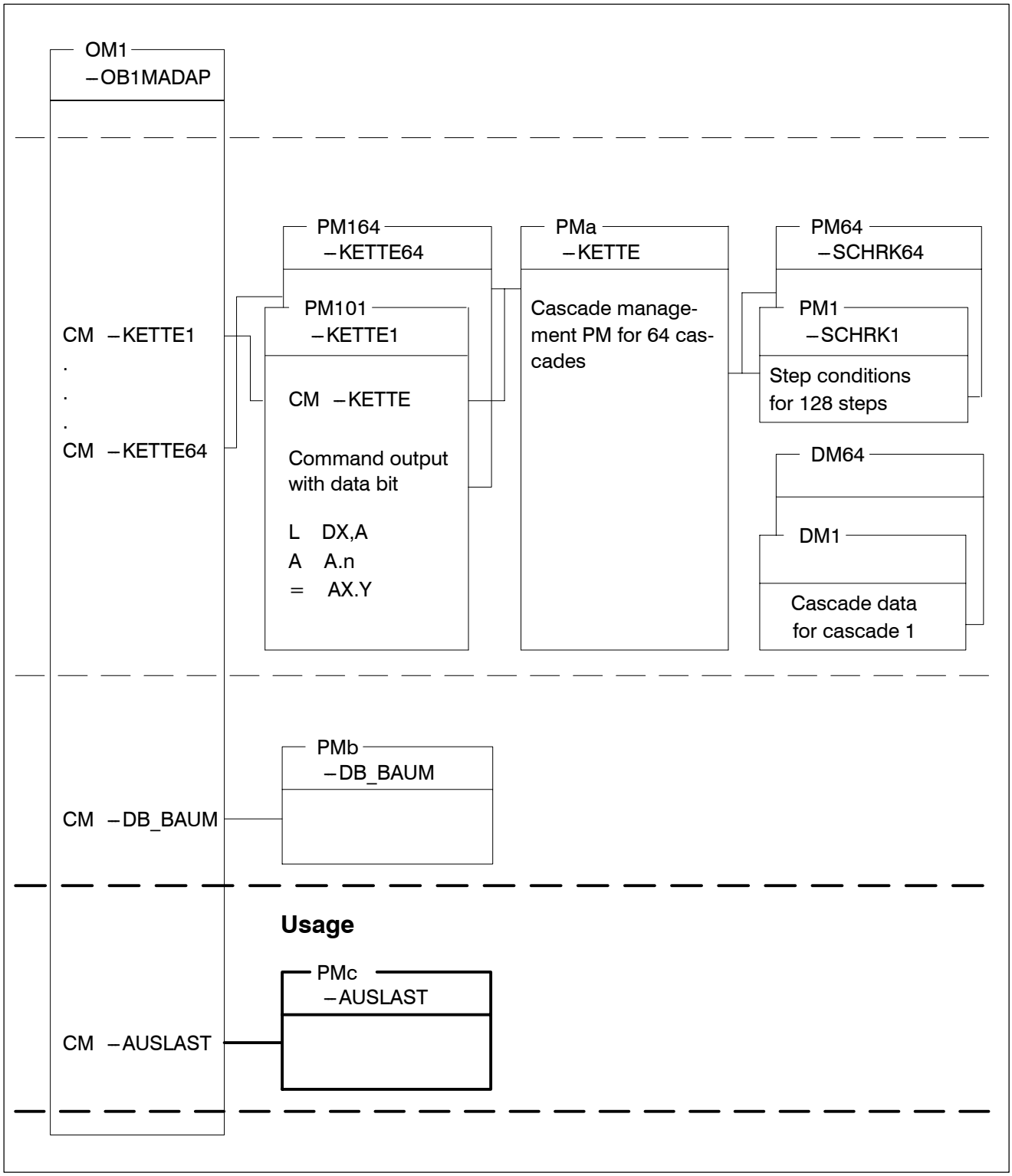


Fig. 4–2 Module structure of total software package

4.5 Module parameters of PM AUSLAST

Only the PM **AUSLAST** has to be parametrized by the user. All other program modules need only be incorporated into the program. The calls are made directly by the PM **AUSLAST**.

```
;Call of PM AUSLAST

;                    AUSLAST
;
;-AUSDAT   BY ———|  P0
;-MULT     BY ———|  P1
;
```

```
CM     -AUSLAST,2
```

```
P0  BY -AUSDAT              ;Usage data converted to DATLOGIK
                            ;Bit 0: Machine on
                            ;Bit 1: Production
                            ;Bit 2: No parts
                            ;Bit 3: Buffer full
                            ;Bit 4: Fault
                            ;Bit 5: Not used
                            ;Bit 6: Machine cycle + 1 (pieces)
                            ;Bit 7: Clear all logged values
```

```
P1  BY -MULT                ;Multiplier when more than one piece is produced per
                            ;machine cycle
                            ;(max. 255).
```

The piece targets for shifts 1 – 3 are filed in DM125 and the user must specify them as follows:

D244	Piece target shift 1
D248	Piece target shift 2
D252	Piece target shift 3

5 Layout / Library

Information on diskette layouts and the available module library of the total software package.

5.1 Module structure of overall software package

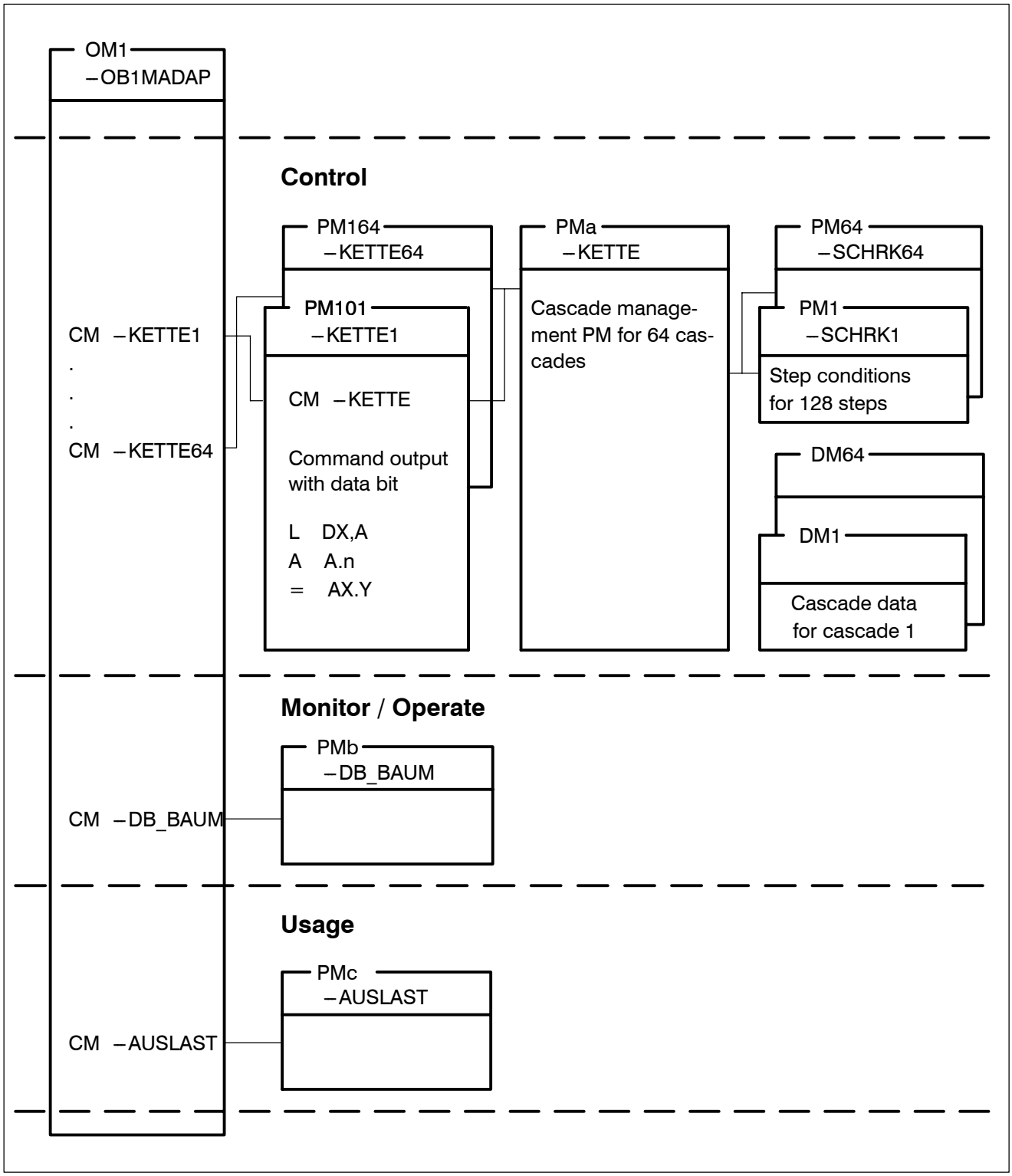
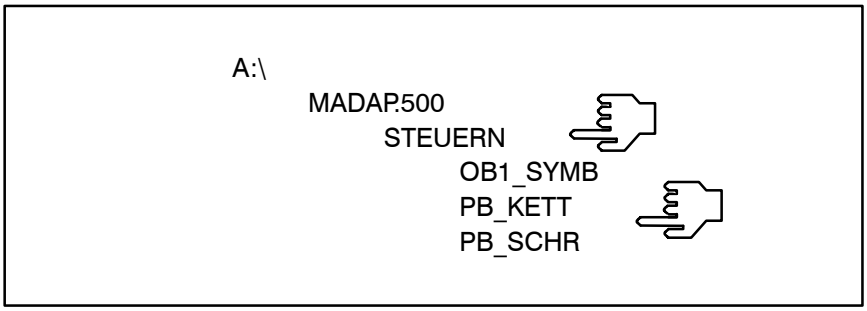


Fig. 5–1 Module structure of total software package

5.2 Diskette layout – Control



Path: A:\MADAP.500\STEUERN

KETTE .P5O

Path: A:\MADAP.500\STEUERN\OB1_SYMB

MADAP .S5S
OB1MADAP .P5T

Path: A:\MADAP.500\STEUERN\PB_KETT

KETTE1 .P5T

Path: A:\MADAP.500\STEUERN\PB_SCHR

SCHRK1 .P5T

5.3 Diskette layout – Operate / Monitor

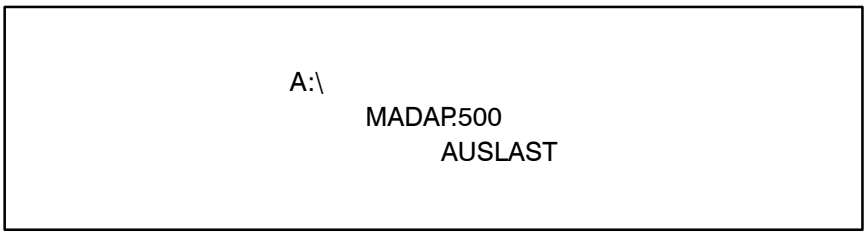
Path: A:\MADAP.500\BEDIENEN

DB_BAUM	.P5T	TAKTTAB	.P5T	TRANS500	.P5O
GRUNDMEN	.P5T	TAKTBALK	.P5T	DIAG500	.P5O
EINSCHLT	.P5T	STATFEHL	.P5T	DESI500	.P5O
DIAG	.P5T	STATMENU	.P5T	DESIBMS	.P5O
MASCHBED	.P5T	INTMELD	.P5T	EINSCH21	.P5T
BEWEGPIC	.P5T	DATA	.P5T	EINSCH31	.P5T
ANWEND	.P5T	STATUS	.P5T	EINSCH41	.P5T
ANWPIC	.P5T	UHR	.P5T	STEUERN	.P5T
MAUSLAST	.P5T	FSVOR	.P5T	STEUERN1	.P5T
7TAGE	.P5T	FSDAR	.P5T	EINGABE	.P5T
14TAGE	.P5T	CURSOR	.P5T		
SCHICHT	.P5T	BEWEGUNG	.P5T		
TAKTZEIT	.P5T	SYNCHRO	.P5T		

Path: A:\MADAP.500\BILDER

GRUND	.001	SKDATEN	.120
EINSCH	.002	SKEING	.121
MASCHBED	.003	SKAUSG	.122
MASCHBED	.004	SKMERK	.123
ANWENDER	.005	SKZEIT	.124
AUSLAST	.006	SKZAEHL	.125
FEHLER	.007	SKTAKTZ	.126
UHR	.008	SKGRENZT	.127
7TAGE1	.009	SKGRENZB	.128
7TAGE2	.010	SKDIAG	.129
7TAGE3	.011	SKPSP	.130
14TAGE	.012	SKDBINH	.131
SCHICHT	.013	SKKPL	.132
STATUS	.014	EINSCH21	.150
INTERN	.015	EINSCH31	.151
PSPAUSG	.016	EINSCH41	.152
STEUERN	.017	STAPEL	.STP
BEW1	.020		
ANW1	.084		

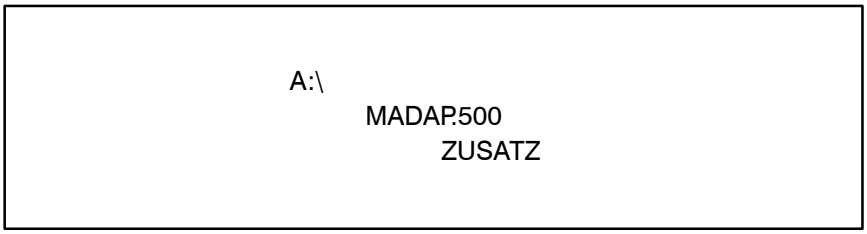
5.4 Diskette layout – Usage



Path: A:\MADAP.500\AUSLAST

AUSLAST .P5T
DATDATUM .P5T
DATSTCK .P5T
DATPROZ .P5T
DATLOGIK .P5T
DATSCHT .P5T
BALK .P5T

5.5 Diskette layout – Extended modules



Path: A:\MADAP.500\ZUSATZ

HAND_DEC .P5T
HAND_ETW .P5T
TAKT .P5T
TZ_INC .P5T
MELD_NR .P5T
MBF3_DEC .P5T
MBF5_DEC .P5T

5.6 Printouts of prepared modules

5.6.1 Organization module OB1MADAP.P5T

```
;Organization module OM1 for cyclical sequence

;Module call -KETTE1

CM     -KETTE1       PM101

; :
; :

;Module call -KETTE64

;CM    -KETTE64      PM164

;Usage

CM     -AUSLAST,2    PM410
P0  BY -AUSDAT               ;Usage data
P1  BY -MULT                 ;Multiplier

;Diagnosis and machine operation

CM     -DB_BAUM,5    PM420
P0  W  -SOFTKEY              ;Function key input word
P1  W  -BEWTAST              ;Movement key
P2  W  -KETTZAHL             ;Number of cascades (max. 64)
P3  W  -BEWBILDZ             ;Number of movement screens (max. 64)
P4  W  -ANWBILDZ             ;Number of user screens (max. 32)

;Further PLC program

; :
; :

;End of program

EP
```

5.6.2 Cascade module –KETTE1.P5T

Cascade module –KETTE1.P5T as an example for all cascades.

```
;Cascade module -KETTE1 for cascade 1 including command output

;Activate data module DM1

CM     DM1

;Program step preselection, branch management, modes here.

;Customized PLC program

;Step preselection
;Modes
;Branch management

;Call cascade management module

;                 -KETTE
;                ┌──────┐
;-PB/DB    W ────┤ P0   │      Cascade, DM No.
;-BETR     W ────┤ P1   │      Mode selector
;-KUE      W ────┤ P2   │      Monitoring time value
;-KWA      W ────┤ P3   │      Waiting time value
;                └──────┘
;

CM  -KETTE,4          PM400
P0  W  K1                      ;Cascade, DM-No.
P1  W  -Merker                 ;Mode select
P2  W  K100                    ;100 x 100 ms = 10 s Monitoring time
P3  W  K50                     ;50 x 100 ms = 5 s Waiting time

;Command output

L      D80,A                   ;Load BEFA bits for steps 1 - 16

;Step 1
A      A.0
;=     OXX.Y
:
:
;Step 16
A      A.15
;=     OXX.Y

EM
```

5.6.3 Step module –SCHRK1.P5T

Step module –SCHRK1.P5T as an example for all cascades.

```
;Jump rail to active step

JP     [A]                  ;Jump rail with jump displacement in register A

JP     -S1                  ;To step 1
:
:
JP     -S16                 ;To step 16

;Step 1

       -S1
L      D8,A
A      A.4                  ;Automatic or inching active?
JPC    -AUTOS1

;Manual conditions

=      -BEFA        M255.0

=      -WSB         M255.1

EM

;Automatic/inching conditions

       -AUTOS1

=      -BEFA        M255.0

=      -WSB         M255.1

EM

;Step 2

       -S2
L      D8,A
A      A.4                  ;Automatic or inching active?
JPC    -AUTOS2
```

```
;Manual conditions

=       -BEFA         M255.0

=       -WSB          M255.1

EM

;Automatic/inching conditions

        -AUTOS2

=       -BEFA         M255.0

=       -WSB          M255.1

EM
:
:
;Step 15

        -S15
L       D8,A
A       A.4                    ;Automatic or inching active?
JPC     -AUTOS15

;Manual conditions

=       -BEFA         M255.0

=       -WSB          M255.1

EM

;Automatic/inching conditions

        -AUTOS15

=       -BEFA         M255.0

=       -WSB          M255.1

EM
```

```
;Step 16

       -S16
L      D8,A
A      A.4                  ;Automatic or inching active?
JPC    -AUTOS16

;Manual conditions

=      -BEFA        M255.0

=      -WSB         M255.1

EM

;Automatic/inching conditions

       -AUTOS16

=      -BEFA        M255.0

=      -WSB         M255.1

EM
```

5.7 Printout of prepared symbol file

5.7.1 Module lists

Type		Organization module OM1	R/E
OM	1	OB1MADAP	R

Address		Function of standard program modules	R/E
PM	400	KETTE	R
PM	401	DIAG500	R
PM	402	TRANS500	R
PM	403	DESI500	R
PM	404	DESIBMS	R
PM	410	AUSLAST	R
PM	411	DATDATUM	R
PM	412	DATSTCK	R
PM	413	DATPROZ	R
PM	414	DATLOGIK	R
PM	415	DATSCHT	R
PM	416	BALK	R
PM	420	DB_BAUM	R
PM	421	GRÜNDMEN	R
PM	422	EINSCHLT	R
PM	423	DIAG	R
PM	424	MASCHBED	R
PM	425	BEWEGPIC	R
PM	426	ANWEND	R
PM	427	ANWPIC	R
PM	428	MAUSLAST	R
PM	429	7TAGE	R
PM	430	14TAGE	R
PM	431	SCHICHT	R
PM	432	TAKTZEIT	R
PM	433	TAKTTAB	R
PM	434	TAKTBALK	R
PM	435	STATFEHL	R
PM	436	STATMENU	R
PM	437	INTMELD	R
PM	438	DATA	R
PM	439	STATUS	R

Address	Function of standard program modules	R/E
PM 440	UHR	R
PM 442	FSVOR	R
PM 443	FSDAR	R
PM 444	EINSCH21	R
PM 445	EINSCH31	R
PM 446	EINSCH41	R
PM 447	STEUERN	R
PM 448	STEUERN1	R
PM 449	EINGABE	R
PM 450	CURSOR	R
PM 451	BEWEGUNG	R
PM 452	SYNCHRO	R

Address	Symbol	Remarks	R/E
PM 101	KETTE1	Call of –KETTE including command output for 64 cascades	R
.	.		.
.	.		.
PM 164	KETTE64		R

Address	Symbol	Remarks	R/E
PM 1	SCHRK1	Step programming for 64 cascades with BEFA and WSB markers	R
.	.		.
.	.		.
PM 64	SCHRK64		R

5.7.2 Reserved marker and time layout

Address	Symbol	Remarks	Type
. .			
M 230.0		Reserved for scratch marker area	
M 242.0	VERZWADR	Branch address	
M 255.0	BEFA	Command output	
M 255.1	WSB	Step–on	
M 255.2	STOEM	Fault marker	
M 255.6	WZT	Status of waiting time	
M 255.7	FEHLEIN	Entry in record memory	

Address	Symbol	Remarks
T 119	BZSS	Idle,14 day base time for time logging
T 120	BZSt	Fault
T 121	BZPV	Buffer full
T 122	BZKT	No parts
T 123	BZME	Machine on
T 124	BZPr	Production
T 125	BZPrS3	Production shift 3
T 126	BZPrS2	Production shift 2
T 127	BZPrS1	Production shift 1

Address	Symbol	Remarks	R/E
DM 120	DB120	Error entry	R
DM 121	DB121	Machine cycle times	R
DM 122	DB122	Limits, individually adjustable	R
DM 123	DB123	Management module for cursor positions	R
DM 124	DB124	3 shifts: Production, actual pieces 14 days: Production, actual pieces, Machine on, No parts, Buffer full, Fault, Idle, Date day/month in ASCII	R R R
DM 125	DB125	Bar conditions and associated % values	R
DM 126	DB126	Shift times in ASCII and as shift duration in minutes; also logged data for target pieces for 3 shilfts.	R R
DM 127	DB127	Management module for operate and display; refer to Section **3.6 User block DM127**.	R R
DM 128	DB128	Operand field, display/control	R

5.7.3 Data module default layout for cascade data 1–64

DM 1–64 (DMn)				Remarks: Cascade data for 64 cascades (n)		
No.	**Symbol**	**Type**	**Sn**	**Explanation**		**F**
D 0	nFEHLNR	Word	N	Error bits		D
D 2	nKETTNR	Word	N	Cascade 1–64		D
D 4	nSCHANZ	Word	N	Number of steps		D
D 6	nBAWAHL	Word	N	Mode set		B
D 8	nBAMLDG	Word	N	Mode message		B
D 10	nSCHR–1	Word	N	Step no. of preceding step		D
D 12	nSCHR	Word	N	Step no. of current step		D
D 14	nSCHRNR	Word	N	Set step no.		D
D 18	nKWA	Word	N	Waiting time actual value		D
D 20	nKUE	Word	N	Monitoring time actual value		D
D 22	nDBADR	Word	N	Hardware address diagnosis module DB500		D
D 24	nINT1	Word	N	Internal		H
D 26	nINT2	Word	N	Internal		H
D 28	nINT3	Word	N	Internal		H
D 30	nINT4	Word	N	Internal		H
D 32	nINT5	Word	N	Internal		H
D 34	nINT6	Word	N	Internal		H
D 36	nINT7	Word	N	Internal		H
D 38	nINT8	Word	N	Internal		H
D 40	nINT9	Word	N	Internal		H
D 42	nINT10	Word	N	Internal		H
D 44	nINT11	Word	N	Internal		H
D 46	nINT12	Word	N	Internal		H
D 48	nSYN16	Word	N	Synchronization facility step	1–16	B
D 50	nSYN32	Word	N	Synchronization facility step	17–32	B
D 52	nSYN48	Word	N	Synchronization facility step	33–48	B
D 54	nSYN64	Word	N	Synchronization facility step	49–64	B
D 56	nSYN80	Word	N	Synchronization facility step	65–80	B
D 58	nSYN96	Word	N	Synchronization facility step	81–96	B
D 60	nSYN112	Word	N	Synchronization facility step	97–112	B
D 62	nSYN128	Word	N	Synchronization facility step	113–128	B
D 64	nSCH16	Word	N	Step being processed 1–16		B
D 66	nSCH32	Word	N	Step being processed 17–32		B
D 68	nSCH48	Word	N	Step being processed 33–48		B
D 70	nSCHJ64	Word	N	Step being processed 49–64		B
D 72	nSCH80	Word	N	Step being processed 65–80		B
D 74	nSCH96	Word	N	Step being processed 81–96		B
D 76	nSCH112	Word	N	Step being processed 97–112		B
D 78	nSCH128	Word	N	Step being processed 113–128		B

DM 1–64 (DMn)				Remarks: Cascade data for 64 cascades (n)		
No.		Symbol	Type	Sn	Explanation	F
D	80	nBEF16	Word	N	Command output bits steps 1–16	B
D	82	nBEF32	Word	N	Command output bits steps 17–32	B
D	84	nBEF48	Word	N	Command output bits steps 33–48	B
D	86	nBEF64	Word	N	Command output bits steps 49–64	B
D	88	nBEF80	Word	N	Command output bits steps 65–80	B
D	90	nBEF96	Word	N	Command output bits steps 81–96	B
D	92	nBEF112	Word	N	Command output bits steps 97–112	B
D	94	nBEF128	Word	N	Command output bits steps 113–128	B
D	96		Word	N		H
D	98		Word	N		H
D	100	nK/S_1L	Word	N	Casc no./step no., movem.scr n Pos. 1 left	H
D	102	nK/S_2L	Word	N	Casc no./step no., movem.scr n Pos. 2 left	H
D	104	nK/S_3L	Word	N	Casc no./step no., movem.scr n Pos. 3 left	H
D	106	nK/S_4L	Word	N	Casc no./step no., movem.scr n Pos. 4 left	H
D	108	nK/S_5L	Word	N	Casc no./step no., movem.scr n Pos. 5 left	H
D	110	nK/S_6L	Word	N	Casc no./step no., movem.scr n Pos. 6 left	H
D	112	nK/S_7L	Word	N	Casc no./step no., movem.scr n Pos. 7 left	H
D	114	nK/S_8L	Word	N	Casc no./step no., movem.scr n Pos. 8 left	H
D	116	nK/S_1R	Word	N	Casc no./step no., movem.scr n Pos. 1 right	H
D	118	nK/S_2R	Word	N	Casc no./step no., movem.scr n Pos. 2 right	H
D	120	nK/S_3R	Word	N	Casc no./step no., movem.scr n Pos. 3 right	H
D	122	nK/S_4R	Word	N	Casc no./step no., movem.scr n Pos. 4 right	H
D	124	nK/S_5R	Word	N	Casc no./step no., movem.scr n Pos. 5 right	H
D	126	nK/S_6R	Word	N	Casc no./step no., movem.scr n Pos. 6 right	H
D	128	nK/S_7R	Word	N	Casc no./step no., movem.scr n Pos. 7 right	H
D	130	nK/S_8R	Word	N	Casc no./step no., movem.scr n Pos. 8 right	H
D	132	nCURS1L	Word	N	Shown inverted when sync true Pos. 1 left	H
D	134	nCURS2L	Word	N	Shown inverted when sync true Pos. 2 left	H
D	136	nCURS3L	Word	N	Shown inverted when sync true Pos. 3 left	H
D	138	nCURS4L	Word	N	Shown inverted when sync true Pos. 4 left	H
D	140	nCURS5L	Word	N	Shown inverted when sync true Pos. 5 left	H
D	142	nCURS6L	Word	N	Shown inverted when sync true Pos. 6 left	H
D	144	nCURS7L	Word	N	Shown inverted when sync true Pos. 7 left	H
D	146	nCURS8L	Word	N	Shown inverted when sync true Pos. 8 left	H
D	148	nCURS1R	Word	N	Shown inverted when sync true Pos. 1 right	H
D	150	nCURS2R	Word	N	Shown inverted when sync true Pos. 2 right	H
D	152	nCURS3R	Word	N	Shown inverted when sync true Pos. 3 right	H
D	154	nCURS4R	Word	N	Shown inverted when sync true Pos. 4 right	H
D	156	nCURS5R	Word	N	Shown inverted when sync true Pos. 5 right	H
D	158	nCURS6R	Word	N	Shown inverted when sync true Pos. 6 right	H
D	160	nCURS7R	Word	N	Shown inverted when sync true Pos. 7 right	H
D	162	nCURS8R	Word	N	Shown inverted when sync true Pos. 8 right	H

5.7.4 Layout of data module DM120

DW	Highbyte content	Lowbyte content
D000	Flags	
D002	Day	Month
D004	Year	Hour
D006	Minute	Second
D008	Weekday (0 = Sunday)	free
D010	Cascade number	Step number
D012	Module type	Module number
D014	Cascade status	Number of messages
D016	Opcode 1	
D018	Opcode 2	
D020	Opcode 3	
D022	Opcode 4	
:	:	
D140	Opcode 63	
D142	Opcode 64	

Note ☞ **For detailed description refer to Technical Documentation:**
CL500
Diagnosis Module DB500
Module description
P.–Nr. 4125

5.7.5 Data module default layout for the 36 cycle times

DM 121		Name: DB121			Remarks: Cycle times for 36 cycle times	
No.		**Symbol**	**Type**	**Sn**	**Explanation**	**F**
D	0	TZ1	Word	N	Cycle time 1 = Total cycle time	H
D	2	TZ2	Word	N	Cycle time 2	H
D	4	TZ3	Word	N		H
.						.
.						.
D	68	TZ35	Word	N	Cycle time 35	H
D	70	TZ36	Word	N	Cycle time 36	H

5.7.6 Data module default layout for the 36 limit values

DM 122		Name: DB122			Remarks: Limit controls for 36 limits	
No.		**Symbol**	**Type**	**Sn**	**Explanation**	**F**
D	0	GW1S	Word	N	Setpoint for limit 1	H
D	2	GW1W	Word	N	Alert value for limit 1	H
D	4	GW1I	Word	N	Actual value for limit 1	H
D	6	GW2S	Word	N		H
D	8	GW2W	Word	N		H
D	10	GW2I	Word	N		H
.						.
.						.
.						.
D	204	GW35S	Word	N		H
D	206	GW35W	Word	N		H
D	208	GW35I	Word	N		H
D	210	GW36S	Word	N	Setpoint for limit 36	H
D	212	GW36W	Word	N	Alert value for limit 36	H
D	214	GW36I	Word	N	Actual value for limit 36	H

5.7.7 Data module default layout for the cursor position

DM 123		Name: DB123			Remarks: Cursor position for management	
No.		**Symbol**	**Type**	**Sn**	**Explanation**	**F**
D	0		Word	N	Internal use only	H
.						.
.						.
D	510		Word	N	Internal use only	H

5.7.8 Data module default layout for machine operation, shift times and machine usage

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 0	%S1PrT1	Word	N	% data Shift 1 “Production” Day 1	D
D 2		Word	N		D
D 4		Word	N		D
D 6		Word	N		D
D 8		Word	N		D
D 10		Word	N		D
D 12		Word	N		D
D 14		Word	N		D
D 16		Word	N		D
D 18		Word	N		D
D 20		Word	N		D
D 22		Word	N		D
D 24		Word	N		D
D 26	%S1PrT14	Word	N	% data Shift 1 “Production” Day 14	D
D 28	S1Prs	Word	N	Logging time running in seconds	D
D 30	S1Prmin	Word	N	Logging time running in minutes	D
D 32	%S2PrT1	Word	N	% data shift 2 “Production” Day 1	D
D 34		Word	N		D
D 36		Word	N		D
D 38		Word	N		D
D 40		Word	N		D
D 42		Word	N		D
D 44		Word	N		D
D 46		Word	N		D
D 48		Word	N		D
D 50		Word	N		D
D 52		Word	N		D
D 54		Word	N		D
D 56		Word	N		D
D 58	%S2PrT14	Word	N	% data Shift 2 “Production” Day 14	D
D 60	S2Prs	Word	N	Logging time running in seconds	D
D 62	S2Prmin	Word	N	Logging time running in minutes	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 64	%S3PrT1	Word	N	% data Shift 3 “Production” Day 1	D
D 66		Word	N		D
D 68		Word	N		D
D 70		Word	N		D
D 72		Word	N		D
D 74		Word	N		D
D 76		Word	N		D
D 78		Word	N		D
D 80		Word	N		D
D 82		Word	N		D
D 84		Word	N		D
D 86		Word	N		D
D 88		Word	N		D
D 90	%S3PrT14	Word	N	% data Shift 3 “Production” Day 14	D
D 92	S3Prs	Word	N	Logging time running in seconds	D
D 94	S3Prmin	Word	N	Logging time running in minutes	D
D 96	S1StT1	Word	N	Actual data Shift 1 “Pieces” Day 1	D
D 98		Word	N		D
D 100		Word	N		D
D 102		Word	N		D
D 104		Word	N		D
D 106		Word	N		D
D 108		Word	N		D
D 110		Word	N		D
D 112		Word	N		D
D 114		Word	N		D
D 116		Word	N		D
D 118		Word	N		D
D 120		Word	N		D
D 122	S1StT14	Word	N	Actual data Shift 1 “Pieces” Day 14	D
D 124	MULT	Word	N	Multiplier (n x multipl. = pieces day 1)	D
D 126	S1MZYKL	Word	N	n = Machine cycles	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 128	S2StT1	Word	N	Actual data Shift 2 “Pieces” Day 1	D
D 130		Word	N		D
D 132		Word	N		D
D 134		Word	N		D
D 136		Word	N		D
D 138		Word	N		D
D 140		Word	N		D
D 142		Word	N		D
D 144		Word	N		D
D 146		Word	N		D
D 148		Word	N		D
D 150		Word	N		D
D 152		Word	N		D
D 154	S2StT14	Word	N	Actual data Shift 2 “Pieces” Day 14	D
D 156		Word	N	Multiplier (n x multipl. = Pieces day 1)	D
D 158	S2MZYKL	Word	N	n = Machine cycles	D
D 160	S3StT1	Word	N	Actual data Shift 3 “Pieces” Day 1	D
D 162		Word	N		D
D 164		Word	N		D
D 166		Word	N		D
D 168		Word	N		D
D 170		Word	N		D
D 172		Word	N		D
D 174		Word	N		D
D 176		Word	N		D
D 178		Word	N		D
D 180		Word	N		D
D 182		Word	N		D
D 184		Word	N		D
D 186	S3StT14	Word	N	Actual data Shift 3 “Pieces” Day 14	D
D 188		Word	N	Multiplier (n x multipl. = Pieces day 1)	D
D 190	S3MZYKL	Word	N	n = Machine cycles	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 192	PrT1	Word	N	% data “Production” day 1	D
D 194		Word	N		D
D 196		Word	N		D
D 198		Word	N		D
D 200		Word	N		D
D 202		Word	N		D
D 204		Word	N		D
D 206		Word	N		D
D 208		Word	N		D
D 210		Word	N		D
D 212		Word	N		D
D 214		Word	N		D
D 216		Word	N		D
D 218	PrT14	Word	N	% data “Production” Day 14	D
D 220	Prs	Word	N	Logging time running in seconds	D
D 222	Prmin	Word	N	Logging time running in minutes	D
D 224	StT1	Word	N	Actual data “Pieces” Day 1	D
D 226		Word	N		D
D 228		Word	N		D
D 230		Word	N		D
D 232		Word	N		D
D 234		Word	N		D
D 236		Word	N		D
D 238		Word	N		D
D 240		Word	N		D
D 242		Word	N		D
D 244		Word	N		D
D 246		Word	N		D
D 248		Word	N		D
D 250	StT14	Word	N	Actual data “Pieces” Day 14	D
D 252		Word	N	Multiplier (n x multipl. = Pieces Day 1)	D
D 254	MZYKL	Word	N	n = Machine cycles	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 256	MET1	Word	N	% data “Machine on” Day 1	D
D 258		Word	N		D
D 260		Word	N		D
D 262		Word	N		D
D 264		Word	N		D
D 266		Word	N		D
D 268		Word	N		D
D 270		Word	N		D
D 272		Word	N		D
D 274		Word	N		D
D 276		Word	N		D
D 278		Word	N		D
D 280		Word	N		D
D 282	MET14	Word	N	% data “Machine on” Day 14	D
D 284	MEs	Word	N	Logging time running in seconds	D
D 286	MEmin	Word	N	Logging time running in minutes	D
D 288	KTT1	Word	N	% data “No Parts” Day 1	D
D 290		Word	N		D
D 292		Word	N		D
D 294		Word	N		D
D 296		Word	N		D
D 298		Word	N		D
D 300		Word	N		D
D 302		Word	N		D
D 304		Word	N		D
D 306		Word	N		D
D 308		Word	N		D
D 310		Word	N		D
D 312		Word	N		D
D 314	KTT14	Word	N	% data “No Parts” Day 14	D
D 316	KTs	Word	N	Logging time running in seconds	D
D 318	KTMin	Word	N	Logging time running in minutes	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 320	PVT1	Word	N	% data “Buffer Full” Day 1	D
D 322		Word	N		D
D 324		Word	N		D
D 326		Word	N		D
D 328		Word	N		D
D 330		Word	N		D
D 332		Word	N		D
D 334		Word	N		D
D 336		Word	N		D
D 338		Word	N		D
D 340		Word	N		D
D 342		Word	N		D
D 344		Word	N		D
D 346	PVT14	Word	N	% data “Buffer Full” Day 14	D
D 348	PVs	Word	N	Logging time running in seconds	D
D 350	PVmin	Word	N	Logging time running in minutes	D
D 352	StgT1	Word	N	% data “Fault” Day 1	D
D 354		Word	N		D
D 356		Word	N		D
D 358		Word	N		D
D 360		Word	N		D
D 362		Word	N		D
D 364		Word	N		D
D 366		Word	N		D
D 368		Word	N		D
D 370		Word	N		D
D 372		Word	N		D
D 374		Word	N		D
D 376		Word	N		D
D 378	StgT14	Word	N	% data “Fault” Day 14	D
D 380	Stgs	Word	N	Logging time running in seconds	D
D 382	Stgmin	Word	N	Logging time running in minutes	D

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 384	SST1	Word	N	% data “Idle” Day 1	D
D 386		Word	N		D
D 388		Word	N		D
D 390		Word	N		D
D 392		Word	N		D
D 394		Word	N		D
D 396		Word	N		D
D 398		Word	N		D
D 400		Word	N		D
D 402		Word	N		D
D 404		Word	N		D
D 406		Word	N		D
D 408		Word	N		D
D 410	SST14	Word	N	% data “No Parts” Day 14	D
D 412	SSs	Word	N	Logging time running in seconds	D
D 414	SSmin	Word	N	Logging time running in minutes	D
D 416	DTT1	ASCII	N	Date “Day” in ASCII Day 1	
D 418		ASCII	N		
D 420		ASCII	N		
D 422		ASCII	N		
D 424		ASCII	N		
D 426		ASCII	N		
D 428		ASCII	N		
D 430		ASCII	N		
D 432		ASCII	N		
D 434		ASCII	N		
D 436		ASCII	N		
D 438		ASCII	N		
D 440		ASCII	N		
D 442	DTT14	ASCII	N	Date “Day” in ASCII Day 14	
D 444		ASCII	N		
D 446		ASCII	N		

DM 124	Name: DB124			Remarks: Shift data	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 448	DMT1	ASCII	N	Date “Month” in ASCII Day 1	
D 450		ASCII	N		
D 452		ASCII	N		
D 454		ASCII	N		
D 456		ASCII	N		
D 458		ASCII	N		
D 460		ASCII	N		
D 462		ASCII	N		
D 464		ASCII	N		
D 466		ASCII	N		
D 468		ASCII	N		
D 470		ASCII	N		
D 472		ASCII	N		
D 474	DMT14	ASCII	N	Date “Month” in ASCII Day 14	
D 476		ASCII	N		
D 478		ASCII	N		
D 480		Word	N		D
.					.
.					.
D 510	END124	Word	N		D

DM 125		Name: DB125		Remarks: Bar data		RAM/EPROM: R
No.		**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D	0	B1	ASCII	N	––––––––––––––––––– ; Representation bar 1	
D	32	B2	ASCII	N	––––––––––––––––––– ; Representation bar 2	
D	64	B3	ASCII	N	––––––––––––––––––– ; Representation bar 3	
D	96	B4	ASCII	N	––––––––––––––––––– ; Representation bar 4	
D	128	B5	ASCII	N	––––––––––––––––––– ; Representation bar 5	
D	160	B6	ASCII	N	––––––––––––––––––– ; Representation bar 6	
D	192	B7	ASCII	N	––––––––––––––––––– ; Representation bar 7	
D	224	%B1	Word	N	; Percentage bar 1	D
D	226	%B2	Word	N	; Percentage bar 2	D
D	228	%B3	Word	N	; Percentage bar 3	D
D	230	%B4	Word	N	; Percentage bar 4	D
D	232	%B5	Word	N	; Percentage bar 5	D
D	234	%B6	Word	N	; Percentage bar 6	D
D	236	%B7	Word	N	; Percentage bar 7	D
D	238		Word	N		H
D	240	ERFASS	Word	N	Active logged data High–Byte: Default Low–Byte: Transformed to logic	B
D	242	S1IST	Word	N	Actual value Shift 1	D
D	244	S1SOLL	Word	N	Target value Shift 1	D
D	246	S2IST	Word	N	Actual value Shift 2	D
D	248	S2SOLL	Word	N	Target value Shift 2	D
D	250	S3IST	Word	N	Actual value Shift 3	D
D	252	S3SOLL	Word	N	Target value Shift 3	D
.						.
.						.

DM 126		Name: DB126		Remarks:	Shift data / Target figures			RAM/EPROM: R
No.		**Symbol**	**Type**	**Sn**	**Data field / Remarks**			**F**
					Values for shift 1 (S1)			
D	0	S1VONH	Word	N	6	;Length S1	FROM value /Hours	D
D	2	S1VONM	Word	N	00		/minutes	D
D	4	S1P1VONH	Word	N		;Length S1/Break 1	FROM value /Hours	D
D	6	S1P1VONM	Word	N			/Minutes	D
D	8	S1P2VONH	Word	N		;Length S1/Break 2	FROM value /Hours	D
D	10	S1P2VONM	Word	N			/Minutes	D
D	12	S1P3VONH	Word	N		;Length S1/Break 3	FROM value /Hours	D
D	14	S1P3VONM	Word	N			/Minutes	D
D	16	S1P4VONH	Word	N		;Length S1/Break 4	FROM value /Hours	D
D	18	S1P4VONM	Word	N			/Minutes	D
D	20	S1P5VONH	Word	N		;Length S1/Break 5	FROM value /Hours	D
D	22	S1P5VONM	Word	N			/Minutes	D
D	24	S1P6VONH	Word	N		;Length S1/Break 6	FROM value /Hours	D
D	26	S1P6VONM	Word	N			/Minutes	D
D	28	S1BISH	Word	N	14	;Length S1	TILL value /Hours	D
D	30	S1BISM	Word	N	00		/Minutes	D
D	32	S1P1BISH	Word	N		;Length S1/Break 1	TILL value /Hours	D
D	34	S1P1BISM	Word	N			/Minutes	D
D	36	S1P2BISH	Word	N		;Length S1/Break 2	TILL value /Hours	D
D	38	S1P2BISM	Word	N			/Minutes	D
D	40	S1P3BISH	Word	N		;Length S1/Break 3	TILL value /Hours	D
D	42	S1P3BISM	Word	N			/Minutes	D
D	44	S1P4BISH	Word	N		;Length S1/Break 4	TILL value /Hours	D
D	46	S1P4BISM	Word	N			/Minutes	D
D	48	S1P5BISH	Word	N		;Length S1/Break 5	TILL value /Hours	D
D	50	S1P5BISM	Word	N			/Minutes	D
D	52	S1P6BISH	Word	N		;Length S1/Break 6	TILL value /Hours	D
D	54	S1P6BISM	Word	N			/Minutes	D

DM 126	Name: DB126	Remarks:	Shift data / Target figures			RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**		**F**
				Values for shift 2 (S2)		
D 56	S2VONH	Word	N	14	;Length S2 FROM value /Hours	D
D 58	S2VONM	Word	N	00	/Minutes	D
D 60	S2P1VONH	Word	N		;Length S2/Break 1 FROM value /Hours	D
D 62	S2P1VONM	Word	N		/Minutes	D
D 64	S2P2VONH	Word	N		;Length S2/Break 2 FROM value /Hours	D
D 66	S2P2VONM	Word	N		/Minutes	D
D 68	S2P3VONH	Word	N		;Length S2/Break 3 FROM value /Hours	D
D 70	S2P3VONM	Word	N		/Minutes	D
D 72	S2P4VONH	Word	N		;Length S2/Break 4 FROM value /Hours	D
D 74	S2P4VONM	Word	N		/Minutes	D
D 76	S2P5VONH	Word	N		;Length S2/Break 5 FROM value /Hours	D
D 78	S2P5VONM	Word	N		/Minutes	D
D 80	S2P6VONH	Word	N		;Length S2/Break 6 FROM value /Hours	D
D 82	S2P6VONM	Word	N		/Minutes	D
D 84	S2BISH	Word	N	22	;Length S2 TILL value /Hours	D
D 86	S2BISM	Word	N	00	/Minutes	D
D 88	S2P1BISH	Word	N		;Length S2/Break 1 TILL value /Hours	D
D 90	S2P1BISM	Word	N		/Minutes	D
D 92	S2P2BISH	Word	N		;Length S2/Break 2 TILL value /Hours	D
D 94	S2P2BISM	Word	N		/Minutes	D
D 96	S2P3BISH	Word	N		;Length S2/Break 3 TILL value /Hours	D
D 98	S2P3BISM	Word	N		/Minutes	D
D 100	S2P4BISH	Word	N		;Length S2/Break 4 TILL value /Hours	D
D 102	S2P4BISM	Word	N		/Minutes	D
D 104	S2P5BISH	Word	N		;Length S2/Break 5 TILL value /Hours	D
D 106	S2P5BISM	Word	N		/Minutes	D
D 108	S2P6BISH	Word	N		;Length S2/Break 6 TILL value /Hours	D
D 110	S2P6BISM	Word	N		/Minutes	D

DM 126	Name: DB126	Remarks:	Shift data / Target figures				RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**			**F**
				Values for shift 3 (S3)			
D 112	S3VONH	Word	N	22	;Length S3	FROM value /Hours	D
D 114	S3VONM	Word	N	00		/Minutes	D
D 116	S3P1VONH	Word	N		;Length S3/Break 1	FROM value /Hours	D
D 118	S3P1VONM	Word	N			/Minutes	D
D 120	S3P2VONH	Word	N		;Length S3/Break 2	FROM value /Hours	D
D 122	S3P2VONM	Word	N			/Minutes	D
D 124	S3P3VONH	Word	N		;Length S3/Break 3	FROM value /Hours	D
D 126	S3P3VONM	Word	N			/Minutes	D
D 128	S3P4VONH	Word	N		;Length S3/Break 4	FROM value /Hours	D
D 130	S3P4VONM	Word	N			/Minutes	D
D 132	S3P5VONH	Word	N		;Length S3/Break 5	FROM value /Hours	D
D 134	S3P5VONM	Word	N			/Minutes	D
D 136	S3P6VONH	Word	N		;Length S3/Break 6	FROM value /Hours	D
D 138	S3P6VONM	Word	N			/Minutes	D
D 140	S3BISH	Word	N	6	;Length S3	TILL value /Hours	D
D 142	S3BISM	Word	N	00		/Minutes	D
D 144	S3P1BISH	Word	N		;Length S3/Break 1	TILL value /Hours	D
D 146	S3P1BISM	Word	N			/Minutes	D
D 148	S3P2BISH	Word	N		;Length S3/Break 2	TILL value /Hours	D
D 150	S3P2BISM	Word	N			/Minutes	D
D 152	S3P3BISH	Word	N		;Length S3/Break 3	TILL value /Hours	D
D 154	S3P3BISM	Word	N			/Minutes	D
D 156	S3P4BISH	Word	N		;Length S3/Break 4	TILL value /Hours	D
D 158	S3P4BISM	Word	N			/Minutes	D
D 160	S3P5BISH	Word	N		;Length S3/Break 5	TILL value /Hours	D
D 162	S3P5BISM	Word	N			/Minutes	D
D 164	S3P6BISH	Word	N		;Length S3/Break 6	TILL value /Hours	D
D 166	S3P6BISM	Word	N			/Minutes	D

DM 126	Name: DB126	Remarks:		Shift data / Target figures	RAM/EPROM: R
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 168		Word	N		H
.					.
.					.
D 190		Word	N		H
D 192	Zyk..	Word	N	Cycle counter for split processing “Usage”	D
D 194	S1	Word	N	Shift 1: Length in minutes	D
D 196	S1INFO	Word	N	Help bits: Bit 0 = Shift active	B
D 198	S1P1	Word	N	Length of break 1 in minutes	D
D 200		Word	N		D
D 202	S1P2	Word	N	Length of break 2 in minutes	D
D 204		Word	N		D
D 206	S1P3	Word	N	Length of break 3 in minutes	D
D 208		Word	N		D
D 210	S1P4	Word	N	Length of break 4 in minutes	D
D 212		Word	N		D
D 214	S1P5	Word	N	Length of break 5 in minutes	D
D 216		Word	N		D
D 218	S1P6	Word	N	Length of break 6 in minutes	D
D 220	100%S1	Word	N	100 % = Shift length − Σ Breaks	D
D 222	S2	Word	N	Shift 2: Length in minutes	D
D 224	S2INFO	Word	N	Help bits: Bit 0 = Shift active	B
D 226	S2P1	Word	N	Length of break 1 in minutes	D
D 228		Word	N		D
D 230	S2P2	Word	N	Length of break 2 in minutes	D
D 232		Word	N		D
D 234	S2P3	Word	N	Length of break 3 in minutes	D
D 236		Word	N		D
D 238	S2P4	Word	N	Length of break 4 in minutes	D
D 240		Word	N		D
D 242	S2P5	Word	N	Length of break 5 in minutes	D
D 244		Word	N		D
D 246	S2P6	Word	N	Length of break 6 in minutes	D
D 248	100%S2	Word	N	100 % = Shift length − Σ Breaks	D

DM 126	Name: DB126	Remarks:		Shift data / Target figures	RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**		**F**
D 250	S3	Word	N	Shift 3:	Length in minutes	D
D 252	S3INFO	Word	N		Help bits: Bit 0 = Shift active	B
D 254	S3P1	Word	N		Length of break 1 in minutes	D
D 256		Word	N			D
D 258	S3P2	Word	N		Length of break 2 in minutes	D
D 260		Word	N			D
D 262	S3P3	Word	N		Length of break 3 in minutes	D
D 264		Word	N			D
D 266	S3P4	Word	N		Length of break 4 in minutes	D
D 268		Word	N			D
D 270	S3P5	Word	N		Length of break 5 in minutes	D
D 272		Word	N			D
D 274	S3P6	Word	N		Length of break 6 in minutes	D
D 276	100%S3	Word	N		100 % = Shift length −Σ Breaks	D
D 278	100%TAG	Word	N	100% daily value = Σ of 100% shift values		D
D 280		Word	N			H
.						.
.						.
D 382		Word	N			H
D 384	S1St1S	Word	N	Target data Shift 1 “Pieces” Day 1		D
D 386		Word	N			D
D 388		Word	N			D
D 390		Word	N			D
D 392		Word	N			D
D 394		Word	N			D
D 396		Word	N			D
D 398		Word	N			D
D 400		Word	N			D
D 402		Word	N			D
D 404		Word	N			D
D 406		Word	N			D
D 408		Word	N			D
D 410	S1St14S	Word	N	Target data Shift 1 “Pieces” Day 14		D
D 412		Word	N			D
D 414		Word	N			D

DM 126	Name: DB126	Remarks:	Shift data / Target figures	RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 416	S2St1S	Word	N	Target data Shift 2 “Pieces” Day 1	D
D 418		Word	N		D
D 420		Word	N		D
D 422		Word	N		D
D 424		Word	N		D
D 426		Word	N		D
D 428		Word	N		D
D 430		Word	N		D
D 432		Word	N		D
D 434		Word	N		D
D 436		Word	N		D
D 438		Word	N		D
D 440		Word	N		D
D 442	S2St14S	Word	N	Target data Shift 2 “Pieces” Day 14	D
D 444		Word	N		D
D 446		Word	N		D
D 448	S3St1S	Word	N	Target data Shift 3 “Pieces” Day 1	D
D 450		Word	N		D
D 452		Word	N		D
D 454		Word	N		D
D 456		Word	N		D
D 458		Word	N		D
D 460		Word	N		D
D 462		Word	N		D
D 464		Word	N		D
D 466		Word	N		D
D 468		Word	N		D
D 470		Word	N		D
D 472		Word	N		D
D 474	S3StT14S	Word	N	Target data Shift 3 “Pieces” Day 14	D
D 476		Word	N		D
D 478		Word	N		H
D 480		Word	N		H
.					.
.					.
D 510	SCHTEND	Word	N		H

DM 127	Name: DB127	Remarks:	Management module MADAP	RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
D 0		Word	N	Binary value of function key rail	D
D 2		Word	N	Current command code of diagnostic module DB500	D
D 4		Word	N	Current function parameter, e. g. screen number	D
D 6		Word	N	Current operating level	D
D 8		Word	N	Previous operating level	D
D 32		Word	N	D32.0: Lamp test bit	D
D 100		Word	N	Address of diagnostic module DB500 / P0 TRANS	D
D 102		Word	N	Operating word / P1 TRANS	D
D 110		Word	N	Message number / P9 TRANS	D
D 114		Word	N	Screen number / P11 TRANS	D
D 116		Word	N	Function key number / P12 TRANS	D
D 118		Word	N	FMSTATUS / P13 TRANS	D
D 120		Word	N	Cascade number / P14 TRANS	D
D 122		Word	N	Blocking word 1	D
D 124		Word	N	Blocking word 2	D
D 126		Word	N	Mask for synchronization in initial screen	D
D 128		Word	N	Mask for synchronization in initial screen	D
D 130		Word	N	Mask for synchronization in initial screen	D
D 132		Word	N	Mask for synchronization in initial screen	D
D 486		Word	N	Dimming time current	D
D 488		Word	N	Dimming time setpoint	D
D 500		Word	N	User identifier 1 in ASCII	D
D 502		Word	N	User identifier 2 in ASCII	D
D 504		Word	N	User identifier 3 in ASCII	D

Note ☞ **Unnamed data words are used internally.**

DM 128	Name: DB128	Remarks: Control of operands		RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field**	**F**
Line 1					
D 0	1Z_OpdKz	ASCII	N		
D 2	1Z_OPDF	ASCII	N		
D 4	1Z_SWert	ASCII	N		
D 10	1Z_IWert	Word	N		D
D 12	1Z_iAdr	Word	N		H
D 14	1Z_Curs	ASCII	N		
D 22		ASCII	N		
D 24	1Z_Frg	Word	N		H
D 26	1Z_Adr	Word	N		D
D 28	1Z_DB–Nr	Word	N		D
Line 2					
D 30	2Z_OpdKz	ASCII	N		
D 32	2Z_OpdF	ASCII	N		
D 34	2Z_SWert	ASCII	N		
D 40	2Z_IWert	Word	N		D
D 42	2Z_iAdr	Word	N		H
D 44	2Z_Curs	ASCII	N		
D 52		ASCII	N		
D 54	2Z_Frg	Word	N		H
D 56	2Z_Adr	Word	N		D
D 58	2Z_DB_Nr	Word	N		D
Line 3					
D 60	3Z_OpdKz	ASCII	N		
D 62	3Z_OpdF	ASCII	N		
D 64	3Z_SWert	ASCII	N		
D 70	3Z_IWert	Word	N		D
D 72	3Z_iAdr	Word	N		H
D 74	3Z_Curs	ASCII	N		
D 82		ASCII	N		
D 84	3Z_Frg	Word	N		H
D 86	3Z_Adr	Word	N		D
D 88	3Z_DB–Nr	Word	N		D

DM 128	Name: DB128	Remarks: Control of operands		RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field**	**F**
Line 4					
D 90	4Z_OpdKz	ASCII	N		
D 92	4Z_OpdF	ASCII	N		
D 94	4Z_SWert	ASCII	N		
D 100	4Z_IWert	Word	N		D
D 102	4Z_iAdr	Word	N		H
D 104	4Z_Curs	ASCII	N		
D 112		ASCII	N		
D 114	4Z_Frg	Word	N		H
D 116	4Z_Adr	Word	N		D
D 118	4Z_DB–Nr	Word	N		D
Line 5					
D 120	5Z_OpdKz	ASCII	N		
D 122	5Z_OpdF	ASCII	N		
D 124	5Z_SWert	ASCII	N		
D 130	5Z_IWert	Word	N		D
D 132	5Z_iAdr	Word	N		H
D 134	5Z_Curs	ASCII	N		
D 142		ASCII	N		
D 144	5Z_Frg	Word	N		H
D 146	5Z_Adr	Word	N		D
D 148	5Z_DB–Nr	Word	N		D
Line 6					
D 150	6Z_OpdKz	ASCII	N		
D 152	6Z_OpdF	ASCII	N		
D 154	6Z_SWert	ASCII	N		
D 160	6Z_IWert	Word	N		D
D 162	6Z_iAdr	Word	N		H
D 164	6Z_Curs	ASCII	N		
D 172		ASCII	N		
D 174	6Z_Frg	Word	N		H
D 176	6Z_Adr	Word	N		D
D 178	6Z_DB–Nr	Word	N		D

DM 128	Name: DB128	Remarks: Control of operands		RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Data field**	**F**
Line 7					
D 180	7Z_OpdKz	ASCII	N		
D 182	7Z_OpdF	ASCII	N		
D 184	7Z_SWert	ASCII	N		
D 190	7Z_IWert	Word	N		D
D 192	7Z_iAdr	Word	N		H
D 194	7Z_Curs	ASCII	N		
D 202		ASCII	N		
D 204	7Z_Frg	Word	N		H
D 206	7Z_Adr	Word	N		D
D 208	7Z_DB–Nr	Word	N		D
Line 8					
D 210	8Z_OpdKz	ASCII	N		
D 212	8Z_OpdF	ASCII	N		
D 214	8Z_SWert	ASCII	N		
D 220	8Z_IWert	Word	N		D
D 222	8Z_iAdr	Word	N		H
D 224	8Z_Curs	ASCII	N		
D 232		ASCII	N		
D 234	8Z_Frg	Word	N		H
D 236	8Z_Adr	Word	N		D
D 238	8Z_DB–Nr	Word	N		D
Internal functions					
D 240	Auto_Rep	Word	N		H
D 242	Schl_St	Word	N		H
D 244	ST_int	Word	N		H
D 246	Curs_ver	Word	N		H
D 248	Curs_hor	Word	N		H
D 250	Eing.Bas	Word	N		D
D 252	Eing.Inf	ASCII	N		
D 254	Eing.Bit	Word	N		H
D 256	Eing.Pos	Word	N		H

Entries in system area

The system area contains the data for the real time clock. These are freshened every second by the system coordinator SK500. The data occupy one byte each and are filed in hexadecimal form.

No.	Function
S504	Seconds
S505	Minutes
S506	Hours
S507	Day
S508	Month
S509	Year
S510	Weekday

6 Extended modules

The extended modules supplement the software package MADAP500. The functions of the extended modules can also be employed outside the software package MADAP500.

Should the plant configuration be such that the use of a control panel (e.g. Bosch – MBF3) is dispensed with, the necessary key operations for manual movements can also be implemented by way of a decade switch as well as “Forward” and “Back” keys. These functions are supported by the two modules

- **– HAND_DEC** (Section 6.1) and
- **– HAND_ETW** (Section 6.2).

6.1 Manual movement by way of decade switch and Forward/Back keys with module –HAND_DEC

The desired manual movement can be executed by influencing the cascade management module **–KETTE**. The extended module **–HAND_DEC** makes it possible to utilize a **decade switch** and corresponding **Forward**/**Back keys** for the chosen movement. This is necessary, for example, in the case of a system with no control panel.

The software package **MADAP500** is **not** needed.

```
;                -HAND_DEC
;
;-BEDFNR     BY ─┐ P0      Control panel number 1 - 64 identical to
;                │         data module number n
;-DECSCH     BY ─┤ P1      Decade switch, 2-position, BCD-encoded
;-BEWVOR     B  ─┤ P2      set movement FORWARD
;-BEWRUECK   B  ─┘ P3      set movement BACK
;
CM     -HAND_DEC,4          ;Module call
P0  BY -BEDFNR              ;Control panel number, e.g. K2 (data module number
                            ;1 - 64)
P1  BY -DECSCH              ;Decade switch, 2-position, BCD-encoded, e.g. I6
P2  B  -BEWVOR              ;Movement FORWARD, e.g. I5.0
P3  B  -BEWRUECK            ;Movement BACK, e.g. I5.1
```

Note ☞

When used in conjunction with MADAP500, the module –HAND_DEC must be before the module calls for the cascade modules –KETTEn or after the module call for the module –DB_BAUM.

The following 87 words for

- the **assignment of decade switch** and **Forward**/**back key → increment**/**step number** and
- **Auxiliary functions**

are defined as of date **D170** in the data module indicated by the parameter P0.

Pressing the forward/return key causes the assigned step for the appropriate cascade to be transferred and executed. At the same time, **command output** is activated whilst the key is being pressed.

40 forward/back movements (corresponding to 80 individual movements and 80 steps) can be defined in the 64 data modules.

Note ☞ **Do not use data word as input parameter.**

DMn Data module content for HAND_DEC

n: Cascade number
N: Step number

DM	DMn	Name:	DMn	Remarks:		RAM/EPROM: R
No.		**Symbol**	**Type**	**Sn**	**Data field / Remarks**	**F**
:		:	:	:		:
D	170	nL_DBD	Word	N	Internal: last active DM	H
D	172	nL_BEWD	Word	N	Last executed movement n/N	H
D	174	nL_DEC	Word	N	Last key operation	B
D	176	n_Offs	Word	N	Tens offset for tens movement block	H
D	178	n_Einer	Word	N	Ones decade	B
D	180	n_Zehn	Word	N	Tens decade	B
D	182	n_00V	Word	N	Movement number 00 FORWARD	H
D	184	n_00R	Word	N	Movement number 00 BACK	H
D	186	n_01V	Word	N	:	H
D	188	n_01R	Word	N	:	H
:		:	:	:	:	:
D	334	n_38V	Word	N	:	H
D	336	n_38R	Word	N	:	H
D	338	n_39V	Word	N	Movement number 39 FORWARD	H
D	340	n_39R	Word	N	Movement number 39 BACK	H
D	342		Word	N		H
:						

D170

Number of last **active data module**.

D172

Last executed **movement n/N**.

n: Cascade number
N: Step number

D174

Last used **movement key**/**movement number**.

Left byte	Right byte
00 for FORWARD	Movement number (BCD)
10 for BACK	Movement number (BCD)

D176

The data word **D176** is used to input **tens offsets**. In other words, an offset can be assigned to every tens movement block. For example: Movements 10 – 19 forward/back can be assigned to the switch position 70 – 79.

D176 = abcdH
d: 1. Block of ten 00 – 09
c: 2. Block of ten 10 – 19
b: 3. Block of ten 20 – 29
a: 4. Block of ten 30 – 39

If 0000H is entered in D176, the movement numbers are identical to the switch positions.

Example:
D176 = 2579H

	Block of ten	Switch positons	Movements
9	1st	90 – 99	00 – 09
7	2nd	70 – 79	10 – 19
5	3rd	50 – 59	20 – 29
2	4th	20 – 29	30 – 39

D178 / **D180**

The binary encoded **decade switch position** is contained in **D178** and **D180**. D178 contains the **ones decade** and D180 the **tens decade**.

D182 – D240

Date	Movement number	Cascade number n Step number N
D182	00 FORWARD	n/N
D184	00 BACK	n/N
D186	01 FORWARD	n/N
D188	01 BACK	n/N
:	:	:
D338	39 FORWARD	n/N
D340	39 BACK	n/N

Example:

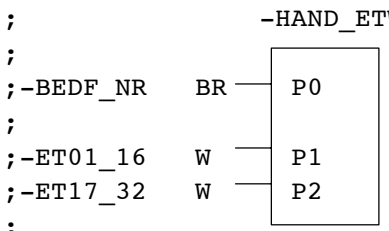
Date	Content	Signifies
D182	0A05H	Cascade 10, step 5
D184	0A0FH	Cascade 10, step 15
D186	2002H	Cascade 32, step 2

6.2 Manual movement by way of individual keys with module –HAND_ETW

The required manual movements can be executed by influencing the cascade management module **–KETTE**.

The module **–HAND_ETW** makes it possible to use individual keys. This is necessary, for example, in the case of a control panel with no screen.

The software package **MADAP500** is **not** needed.




```
;                -HAND_ETW
;
;-BEDF_NR    BR ---- P0      Control panel number 1 - 64 identical to
;                            Data module number n
;-ET01_16    W  ---- P1      Individual keys 1 - 16
;-ET17_32    W  ---- P2      Individual keys 17 - 32
;
CM     -HAND_ETW,3           ;Manual movement in sequence cascades with individual
                             ;key
P0  BY -BEDF_NR              ;Control panel number (Data module number 1 - 64)
P1  W  -ET01_16              ;Individual keys 1 - 16
P2  W  -ET17_32              ;Individual keys 17 - 32
```

Note ☞

When used in conjunction with MADAP500, the module –HAND_ETW must be before the module calls for the cascade modules –KETTEn or after the module call for the module –DB_BAUM.

The following 35 words for

- the **assignment of key → cascade/step number** and
- **auxiliary functions**

is defined as of date **D170** in the data module indicated by the parameter P0.

Pressing a key causes the assigned step in the appropriate cascade to be transferred and executed. At the same time, **command output** is activated whilst the key is being pressed.

Note ☞ **Do not use data word as input parameter.**

DMn Data module content for HAND_ETW

n: Cascade number
N: Step number

DM	DMn	Name:	DMn	Remarks:		RAM/EPROM: R
No.		**Symbol**	**Type**	**Sn**	**Remarks**	**F**
:		:	:	:		:
D	170	nL_DBE	Word	N	Internal: last active DM	H
D	172	nL_BEWE	Word	N	Last executed movement n/N	H
D	174	nL_TAST	Word	N	Spare	H
D	176	nT1	Word	N	n/N key 1	H
D	178	nT2	Word	N	:	H
D	180	nT3	Word	N	:	H
D	182	nT4	Word	N	:	H
:		:	:	:	:	H
D	232	nT29	Word	N	:	H
D	234	nT30	Word	N	:	H
D	236	nT31	Word	N	:	H
D	238	nT32	Word	N	n/N key 32	D
:						

D170

Number of last **active data module**.

D172

Last executed **movement n/N**.

n: Cascade number
N: Step number

D176 – D238

Keys 1 – 32 n/N

Example:

Date	Content	Signifies
D176	0A05H	Cascade 10, step 5
D178	0A0FH	Cascade 10, step 15
D180	2002H	Cascade 32, step 2

6.3 Cycle time management with –TAKT and –TZ_INC

The software MADAP500 makes it possible to manage 36 machine **cycle times**. Cycle time 1 corresponds to the **overall cycle time**. The cycle times 2 – 36 correspond to arbitary individual cycle times.

The cycle time management is made up of two modules:

- **–TAKT** freerunning 0.1 s/1 s measurement cycle
- **–TZ_INC** management module for 36 cycle times of diagnosis module DB500

–TAKT

This module generates a freerunning measurement cycle. The cycle is controlled by way of the input parameter P0 –TAKTDEF.

- P0 = 0 → 0.1 s cycle
- P0 = 1 → 1 s cycle

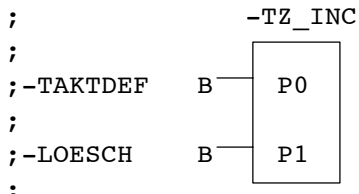
The measurement cycle is available at the output parameter P1.

```
;                -TAKT
;
;-TAKTDEF    B    P0        ;Cycle definition: P0 = 0 → P1 = 0.1 s cycle
;                           ;                  P0 = 1 → P1 = 1 s cycle
;-1s/0.1s    B      P1      ;Cycle pulse (1 cycle) every 0.1 s or 1 s
```

```
CM     -TAKT,2              ;Module call
P0  B  -TAKTDEF             ;Cycle definition
P1  B  -1s/0,1s             ;Cycle pulse
```

–TZ_INC

This module manages the 36 **cycle times** of the diagnosis module DB500 in the data module DM121. The module –TZ_INC must be called up **if necessary** as a function of the desired incrementation cycle in the corresponding time cycle.




```
;                -TZ_INC
;
;-TAKTDEF    B    P0          ;Cycle definition: P0 = 0 → 0.1 s cycle
;                              ;                  P0 = 1 → 1 s cycle
;-LOESCH     B    P1          ;Cancel all displayed and measured values
;
A       -1s/0,1s
CMC     -TZ_INC,2             ;Conditional module call
P0  B   -TAKTDEF              ;Cycle definition
P1  B   -LOESCH               ;Cancel
```

The following **36** data words for the timed–out cycle times are defined as of **D0** in the data module **DM121**. The diagnosis module DB500 indicates these data words.

As of **D100**, the measured values of the cycle times for which the number is entered in **D80** are incremented.

Incrementation is enabled by defined **start bits**. The measured values thus determined are transferred to the appropriate display values by the **stop bits** and then cancelled.

The program processing of the start/stop bits must be controlled by the user program.

DM121

DM 121	Name: DB121	Remarks:	Cycle times	RAM/EPROM: R	
No.	**Symbol**	**Type**	**Sn**	**Remarks**	**F**
D 0	TZ01	Word	N	Cycle time 1: Display value on screen of DB500	H
D 2	TZ02	Word	N	:	H
:	:	:	:	:	:
D 68	TZ35	Word	N	:	H
D 70	TZ36	Word	N	Cycle time 36: Display value on screen of DB500	H
D 72		Word	N		H
:					
D 78		Word	N		H
D 80	TZ_ANZ	Word	N	Number of cycle times to be processed	D
D 82	STA16–01	Word	N	Start bits for cycle times 1 – 16	B
D 84	STA32–17	Word	N	Start bits for cycle times 17 – 32	B
D 86	STA36–33	Word	N	Start bits for cycle times 33 – 36	B
D 88	STP16–01	Word	N	Stop bits for cycle times 1 – 16	B
D 90	STP32–17	Word	N	Stop bits for cycle times 17 – 32	B
D 92	STP36–33	Word	N	Stop bits for cycle times 33 – 36	B
D 94	BAS16–01	Word	N	Time base bits for cycle times 1 – 16	B
D 96	BAS32–17	Word	N	Time base bits for cycle times 17 – 32	B
D 98	BAS36–33	Word	N	Time base bits for cycle times 33 – 36	B
D 100	AE_TZ01	Word	N	Cycle time 1: Measured value	H
D 102	AE_TZ02	Word	N	:	H
:	:	:	:	:	:
D 168	AE_TZ35	Word	N	:	H
D 170	AE_TZ36	Word	N	Cycle time 36: Measured value	H
D 172	T_INT0.1	Word	N	Internal measured value for clock generator 0.1 s	H
D 174	T_INT1.0	Word	N	Internal measured value for clock generator 1 s	H
D 176	T_KORR	Word	N	Correction value for cycle time in %	H
:					

CAUTION

Time base bits must coincide with the cycle pulse applied!
0: 0.1 s grid
1: 1 s grid

D82 – D92

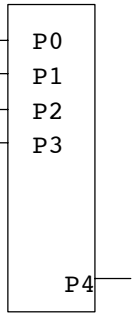
Date		Cycle time	Bits
D	082	01 – 16	0 – 15
D	084	17 – 32	0 – 15
D	086	33 – 36	0 – 3
D	088	01 – 16	0 – 15
D	090	17 – 32	0 – 15
D	092	33 – 36	0 – 3
D	094	01 – 16	0 – 15
D	096	17 – 32	0 – 15
D	098	33 – 36	0 – 3

Programming examples

```
;Example

;0.1 s cycle measurement

CM     -TAKT,2              ;Module call
P0  B  SM30.3               ;Logic 0
P1  B  -0,1sTakt
A      -0,1sTakt
CMC    -TZ_INC,2            ;Conditional module call
P0  B  SM30.3               ;Logic 0
P1  B  -LOESCH              ;Cancel

;Example

;1 s cycle measurement

CM     -TAKT,2              ;Module call
P0  B  SM31.1               ;Logic 1
P1  B  -1sTakt
A      -1sTakt
CMC    -TZ_INC,2            ;Conditional module call
P0  B  SM31.1               ;Logic 1
P1  B  -LOESCH              ;Cancel
```

6.4 Processing coming and going messages of diagnosis module DB500 with module –MELD_NR

The module –MELD_NR makes it possible to evaluate and further process the coming and going messages of the diagnosis module DB500.



```
;                -MELD_NR
;
;-M_NR      W     P0          ;Message number 1 - 511
;-KOMMT     B     P1          ;Message coming
;-GEHT      B     P2          ;Message going
;-WIRKUNG   BY    P3          ;Effect:  Bit 0 = 1  direct output on printer
;                              ;         Bit 1 = 1  Entry in record memory
;                              ;         Bit 2 = 1  Output on screen in
;                              ;                    alarm line
;-FREI?     B       P4        ;Message transfer guaranteed? Yes with P4 = 1
;
CM     -MELD_NR,5              ;Module call
P0  W  -M_NR                   ;Message number 1 - 511
P1  B  -KOMMT                  ;Message coming
P2  B  -GEHT                   ;Message going
P3  BY -WIRKUNG                ;Effect
P4  B  -FREI?                  ;Message transfer guarantee?
```

6.5 Decoder modules

The decoder modules **MBF3_DEC.P5T**/**MBF5_DEC.P5T** must be employed when using the **monitor control panels MBF3**/**MBF5**.

MBF3_DEC.P5T

Decoder module for monitor control panel MBF3.

```
CM      -MBF3_DEC,3          ;Module call
P0      -EINGANG             ;Output signal of monitor control panel to be decoded
P1      -SOFTKEY             ;Decoded function keys, conditioned for MADAP500
P2      -BEWTAST             ;Decoded movement keys, conditioned for MADAP500
```

MBF5_DEC.P5T

Decoder module for monitor control panel MBF5.

```
CM      -MBF5_DEC,5          ;Module call
P0      -EINGANG             ;Output signal of monitor control panel to be decoded
P1      -SOFTKEY             ;Decoded function keys, conditioned for MADAP500
P2      -BEWTAST             ;Decoded movement keys, conditioned for MADAP500
P3      -SONDTAST            ;Special keys, refer to list below
P4      -ASCIITAS            ;ASCII characters of monitor control panel
```

P3 –SONDTAST

Bit	Special key
0	CE
1	I
2	II
3	III
4	IV
5	◄┘
6	Not used
7	Not used
8	↑
9	↓
10	→
11	←
12	.
13	+/–
14	*
15	Strobe signal

For your notes:

A Appendix

A.1 Abbreviations

A	And
AN	And not
BIN	Binary
BY	Byte
C	Counter
CM	Call module
CPLA	Compare logical and arithmetical
D	Date
DEC	Decimal
DM	Data module
EM	End of module
EP	End of program
I	Input
IL	Instruction list
JPC	Jump conditional, RES = 1
JP	Jump
Kx	Constant (x = 1, 2, ...)
L	Load
LD	Ladder diagram
M	Marker
MBF	Monitor control panel
n	Cascade number
N	Step number
O	Output
OM	Organization module
P	Parameter (Pn with n = 1, 2, ...)
PM	Program module
R	Reset
RES	Result
S	Set
SM	Special marker

T	Transfer
T	Time
W	Word
WSB	Step – on condition

A.2 Index

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A3 Alterations

This edition E3 replaces edition E2. Alternations vis a vis the old edition E2 appear on the following pages of this revised edition E3.

- 0–X
  1–1, 1–4
  2–1 to 2–36
  3–1 to 3–36, 3–38 to 3–43, 3–45, 3–47 to 3–49, 3–51, 3–52, 3–54, 3–55
  4–2 to 4–6, 4–8
  5–3, 5–4, 5–6 to 5–9, 5–12 to 5–15, 5–17 to 5–19, 5–22, 5–25, 5–34 to 5–37
  6–1 to 6–13

Paragraphs or illustrations which have been altered are marked in the margin by a thick black vertical line. Alterations in the pictures additionally feature the following symbol.

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