

ABB Procontic K200

Family of Compact
Programmable Controllers

Programming

**Multi-System
Programming Units**

07 PH 32

7.2

**System-Specific
Programming Software**

907 PC 322

7.3

Multi-System

Programming Software

907 PC 32

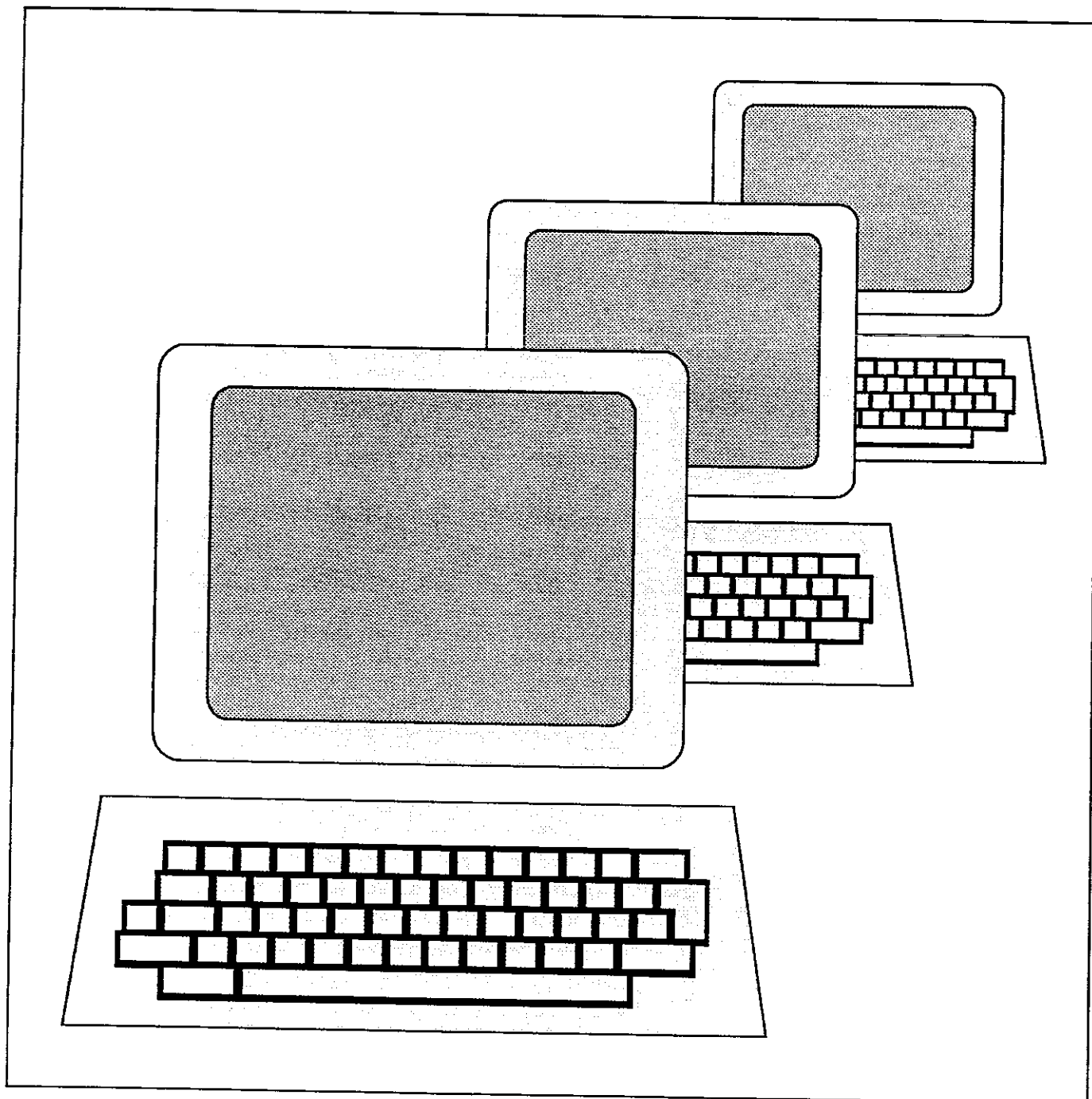
7.4

**System-Specific
Programming Units**

07 PG 200, 07 PG 201

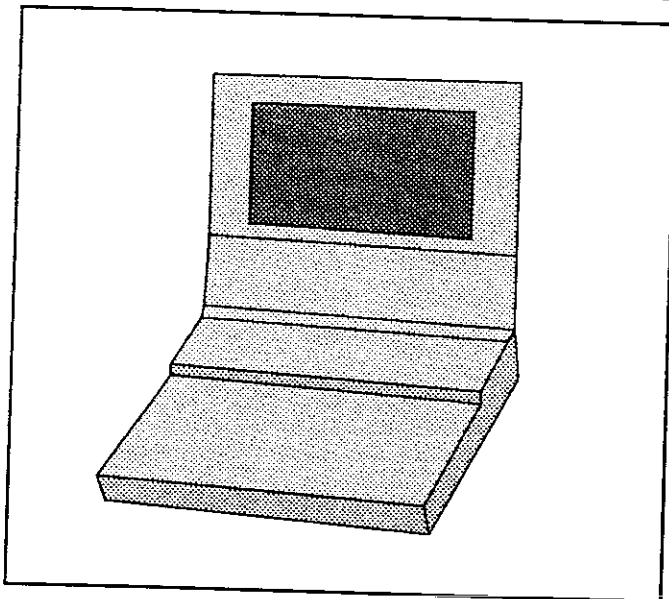
7.5

Multi-System Programming Units



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und Steuerungstechnik**

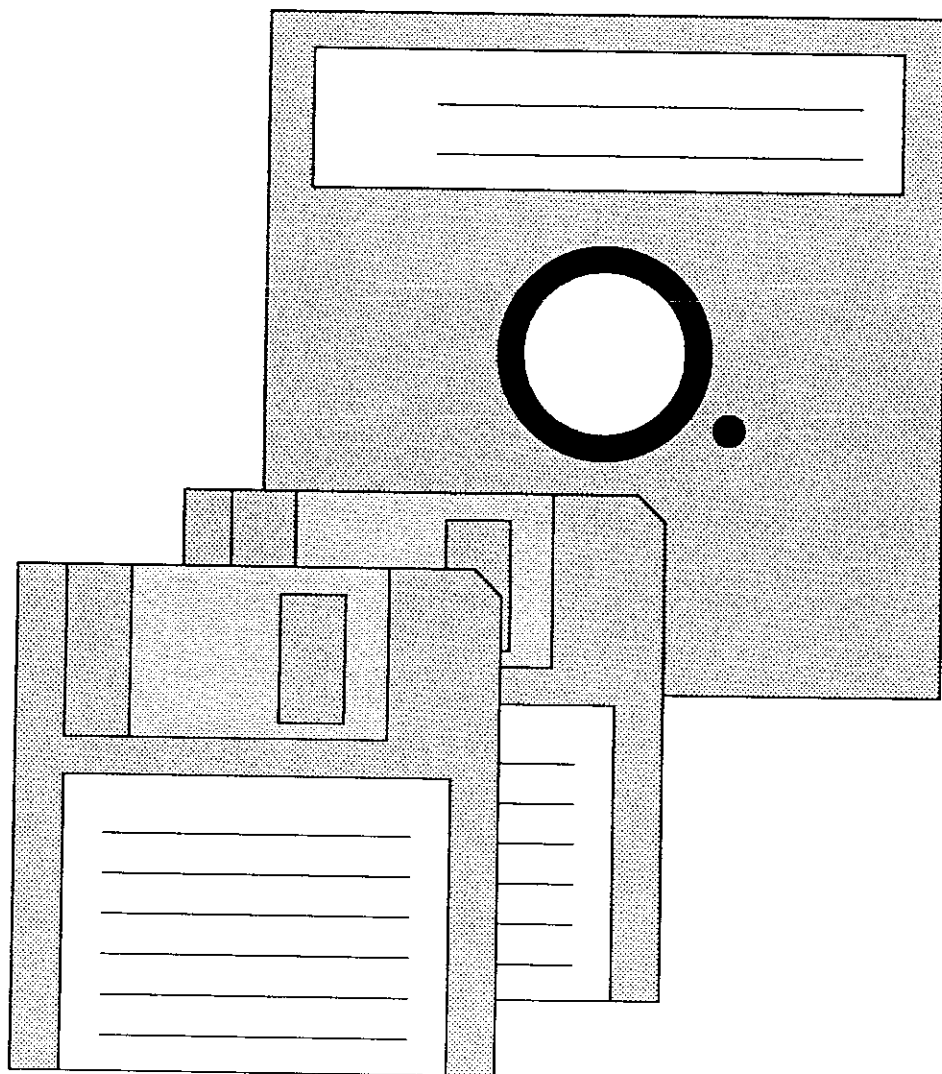
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The 07 PH 32 unit is a commercially available IBM-compatible personal computer with the following system data:

- 80386SL processor, 25 MHz
- 4 Mbytes user memory, suitable for extension to 10 Mbytes
- 1 hard disk drive, 84 Mbytes, access time < 19 ms
- 1 3 1/2" disk drive, 1.44 Mbytes
- 1 parallel interface (Centronics)
- 2 serial interfaces
- Interface for external keyboard, mouse, VGA, digital keyboard, or external options
- MS DOS operating system V5.0
- Maxlight VGA screen 9.5" diagonals, 640 x 640 pixels, 16 grey-scale values
- RGB interface
- Connection for an external bulk storage unit
- Keyboard with 80 keys (including cursor keys and function keys)
- Serial MS mouse for a fast cursor movement, mouse driver installed on PC
- Battery operation (approx. 3.5 hours), exact display on the discharge degree of battery
- Auxiliary battery
- Power supply unit
- Adapter 9-polar to 25-polar

System-Specific Programming Software



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General

The 907 PC 32 programming and test software (order number GJP5202700R0102) for ABB Procontic K200 is supplied together with a detailed operating instruction.

This software was designed for the 07 PH 32 IBM AT compatible personal computer. An extensively automatic installation program loads the 907 PC 322 software package into this unit or into another IBM AT compatible personal computer.

The 907 PC 322 programming and test software allows a simple and economical programming of PLC programs in:

- ☐ Function block diagrams (FBD)
- ☐ Ladder diagrams (LD)
- ☐ Instruction list (IL)

The program can be entered in symbols as well as absolutely. The PLC program is extended by symbolic codes, texts and comments. Help and error messages, which can be recalled at any time, as well as a syntax test facilitates the program entry. The compilation as a FBD or as a LD is carried out in a common editor. The elements can be mixed from FBD and LD and can be combined with each other.

Features

Menu guidance

- Modern, easy-to-follow menus in the pop-up menu technique
- Representation in colour (not for 07 PH 32)
- Fast selection of the menu points with the mouse or keyboard
- Recalling external programmes on the DOS level directly from the menu (DOS shell)

Path data

- Entry of a file name with the respective DOS path
- Displaying the configuration overview by means of the file directory

Password protection

- Access justification in several privileged levels

FBD/LD Editor

- Single editor for the programming with graphic symbols as a function block diagram and as a ladder diagram
- Combination of ladder diagram networks with elements of the function block diagram

Comfortable IL editor

- Representation with symbols and text in various forms
- Cursor control with the mouse
- Selection of connection elements via a selection menu with the mouse

Variable editor

- Complete list of all entered variables
- Ordering according to absolute or symbolic variables
- Acceptance and handing over of variable lists from and to any data processing systems
- Making variable lists available for certain CAD/CAE systems

Text Editor

- Entry of any ASCII files, max. 255 characters per line

Comments

- Verbal description of networks or program segments

Segment plans

- Division of the programs into segment plans
- Simple management by segment plan names and segment plan numbers

Functional scope

An extensive number of commands is available to compile programs:

- Syntax test of all variables
- Block commands
 - marking
 - deleting
 - moving
 - copying
 - saving
 - loading
 - printing
 - deleting unused variables
- Search commands
 - search the set number
 - search the word number
 - search the variable
 - search the symbol
 - search the command
 - search the line number
 - repetition
 - search for the segment plan
 - search for the VE
 - search for the free connection
- Searching and replacing
- Insertion
- Deletion

ONLINE functions

Numerous ONLINE functions support the user when booting up, like, e.g.:

- Status display in
 - Function block diagram
 - Ladder diagram
 - Instruction list
 - Variable list
- Program
 - Transmission
 - Start
 - Abortion
 - Stop
 - Continuation
 - Status
- Triggering
 - by time
 - Variable

Selected variables can also be summarised in ONLINE lists and their status displayed on the screen.

Program documentation

The automatic program documentation includes the output of the following lists by the printer:

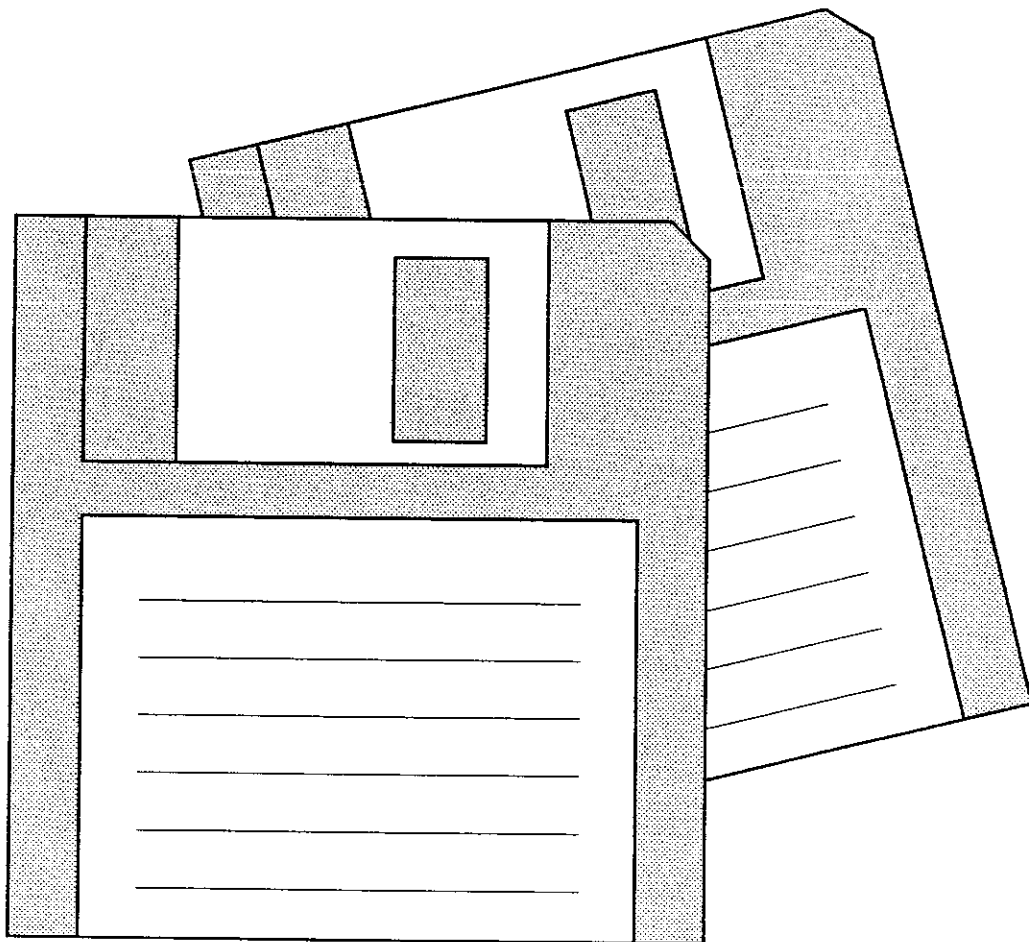
- Function block diagram
- Instruction list
- CE library
- Logic plan
- Ladder diagram
- Variable list
- Cross reference list
- Comment list
- ONLINE list
- Text page
- Data area

The output is adapted to any printer.

Printing format editor

A special printing format editor allows the respective list to be extended by an individual header and footer. Certain data can be output automatically as well using the headers or footers, like, e.g., the name of the project file, date and time.

Multi-System Programming Software



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General

The 907 PC 32 programming and test software (order number GJP202300R102) for ABB Procontic T300, ABB Procontic T200, ABB Procontic b, ABB Procontic CS31, ABB Procontic K200 and SIGMA[®]-tronic p is supplied together with a detailed set of operating instructions.

This software was designed for the 07 PH 32 IBM AT compatible personal computer. An extensively automatic installation program loads the 907 PC 32 software package into this unit or into another IBM AT compatible personal computer.

The 907 PC 32 programming and test software allows a simple and economical programming of PLC programs in:

- ☐ Function block diagrams (FBD)
- ☐ Ladder diagrams (LD)
- ☐ Instruction list (IL)

The program can be entered in symbols as well as absolutely. The PLC program is extended by symbolic codes, texts and comments. Help and error messages, which can be recalled at any time, as well as a syntax test facilitates the program entry. The compilation as a FBD or as a LD is carried out in a common editor. The elements can be mixed from FBD and LD and can be combined with each other.

Features

The scope of the listed features depends on the capabilities of the separate controls.

Menu guidance

- Modern, easy-to-follow menus in the pop-up menu technique
- Representation in colour (not for 07 PH 32)
- Fast selection of the menu points with the mouse or keyboard
- Recalling external programmes on the DOS level directly from the menu (DOS shell)

Path data

- Entry of a file name with the respective DOS path
- Displaying the configuration overview by means of the file directory

Password protection

- Access justification in several privileged levels

Modularisation (not for ABB Procontic K200)

- Handling large projects
- Dividing the projects into logical structures
- Division into program and variable modules

FBD/LD Editor

- Single editor for the programming with graphic symbols as a function block diagram and as a ladder diagram
- Combination of ladder diagram networks with elements of the function block diagram

Comfortable IL editor

- Representation with symbols and text in various forms
- Cursor control with the mouse
- Selection of connection elements via a selection menu with the mouse

Variable editor

- Complete list of all entered variables
- Ordering according to absolute or symbolic variables
- Acceptance and handing over of variable lists from and to any data processing systems
- Making variable lists available for certain CAD/CAE systems

Text Editor

- Entry of any ASCII files, max. 255 characters per line

Comments

- Verbal description of networks or program segments

Segment plans

- Division of the programs into segment plans
- Simple management by segment plan names and segment plan numbers

Functional scope

An extensive number of commands is available to compile programs:

- Syntax test of all variables
- Block commands:
 - marking
 - deleting
 - moving
 - copying
 - saving
 - loading
 - printing
 - deleting unused variables
- Search commands
 - search the set number
 - search the word number
 - search the variable
 - search the symbol
 - search the command
 - search the line number
 - repetition
 - search for the segment plan
 - search for the VE
 - search for the free connection
- Searching and replacing
- Insertion
- Deletion

ONLINE functions

Numerous ONLINE functions support the user when booting up, like, e.g.:

- Status display in
 - Function block diagram
 - Ladder diagram
 - Instruction list
 - Variable list
- Program
 - Transmission
 - Start
 - Abortion
 - Stop
 - Continuation
 - Status
- Single cycle on/off
- Single step on/off
- Breakpoint
 - setting it
 - displaying it
 - deleting it
- Triggering
 - by time
 - Variable

- Overwriting
- Typing
- Forcing
- Altering
 - Time and counter set values
 - Variable addresses
 - Operators
 - Operand codes
 - Program sections to a limited extent

Selected variables can also be summarised in ONLINE lists and their status displayed on the screen.

Program documentation

The automatic program documentation includes the output of the following lists by the printer:

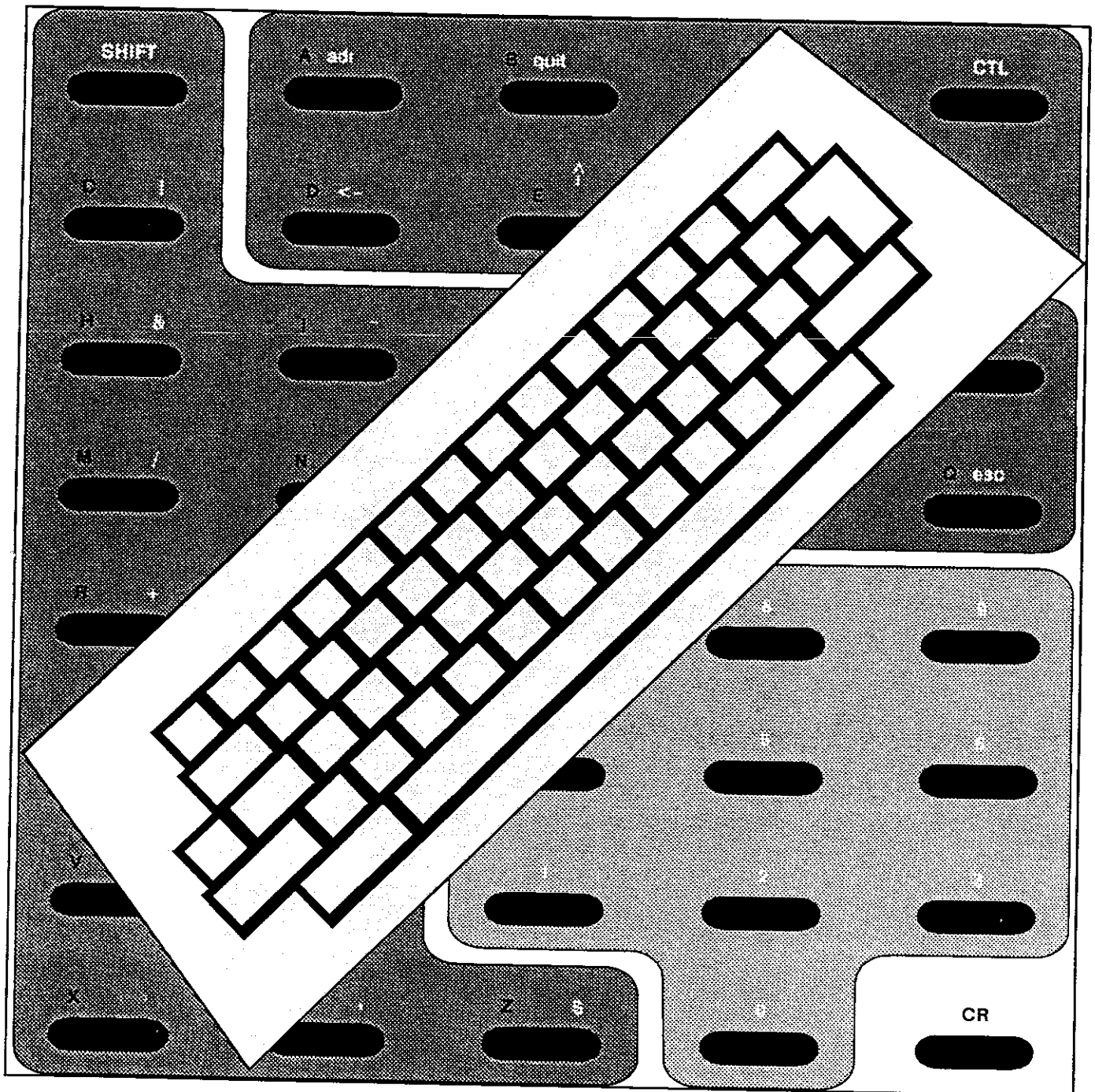
- Function block diagram
- Instruction list
- CE library
- Logic plan
- Ladder diagram
- Variable list
- Cross reference list
- Comment list
- ONLINE list
- Text page
- Data area
- Modular list
- Entire variable list
- Entire reference list
- System configuration

The output is adapted to any printer.

Printing format editor

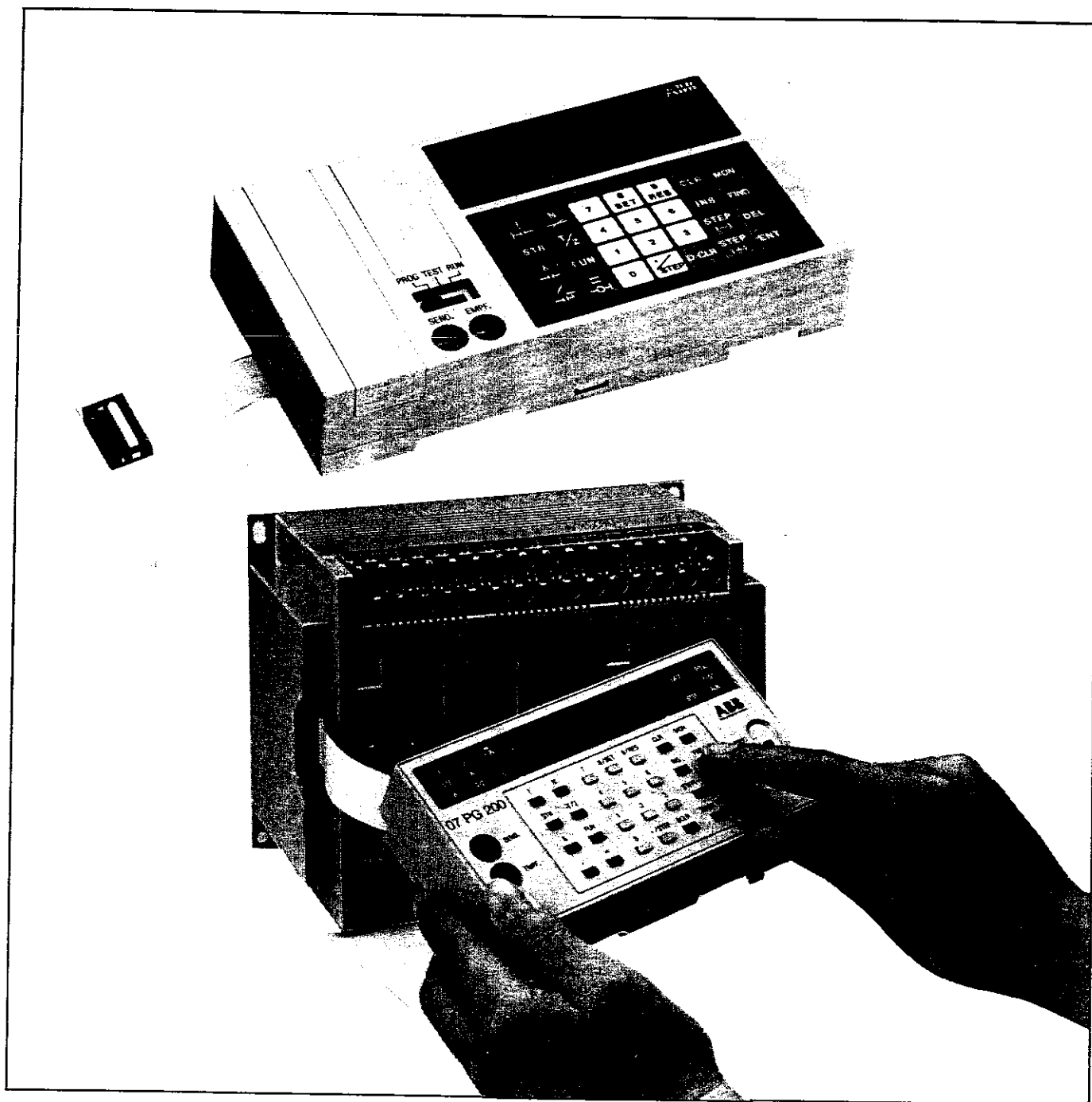
A special printing format editor allows the respective list to be extended by an individual header and footer. Certain data can be output automatically as well using the headers or footers, like, e.g., the name of the project file, date and time.

System-Specific Programming Units



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Regulations

Concerning the Setting up of Installations

Apart from the basic "Regulations for the Setting up of Power Installations" DIN VDE* 0100 and for "The Rating of Creepage Distances and Clearances" DIN VDE 0110 Part 1 and Part 2 the regulations "The Equipment of Power Installations with Electrical Components" DIN VDE 0160 in conjunction with DIN VDE 0660 Part 500 have to be taken into due consideration.

Further attention has to be paid to DIN VDE 0113 Part 1 and Part 200 in case of the control of working and processing machines. If operating elements are to be mounted near parts with dangerous contact voltage DIN VDE 0106 Part 100 is additionally relevant.

If the protection against direct contact according to DIN VDE 0160 is required, this has to be ensured by the user (e.g. by incorporating the elements in a switch-gear cabinet). The devices are designed for pollution severity 2 in accordance with DIN VDE 0110 Part 1. If higher pollution is expected, the devices must be installed in appropriate housings.

The user has to guarantee that the devices and the components belonging to them are mounted following these regulations. For operating the machines and installations, other national and international relevant regulations, concerning prevention of accidents and using technical working means, also have to be met.

The ABB Procontic devices are designed according to IEC 1131 Part 2. Meeting this regulation, they are classified in overvoltage category II which is in conformance with DIN VDE 0110 Part 2.

For the direct connection of ABB Procontic devices, which are powered with or coupled to AC line voltages of overvoltage category III, appropriate protection measures corresponding to overvoltage category II according to IEC-Report 664/1980 and DIN VDE 0110 Part 1 are to install.

Equivalent standards:

DIN VDE 0110 Part 1 $\cong$ IEC 664

DIN VDE 0113 Part 1 $\cong$ EN 60204 Part 1

DIN VDE 0660 Part 500 $\cong$ EN 60439-1 $\cong$ IEC 439-1

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* VDE stands for "Association of German Electrical Engineers".

ABB Schalt- und Steuerungstechnik GmbH Heidelberg

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1.1 Specifications

Specification	Programming unit	
	07 PG 200	07 PG 201
Programming functions	All program delete, program write, program read in, program search	
Editing functions	Instructions change, instructions insert, instructions delete	
Monitor functions	Display of input/output status, display of time and counter values	
Test functions	On/off status, time/counter status, syntax test, test of keyboard entry, I/O number test, set or reset of outputs/flags; set and reset of counters and timers;	
Cassette recorder functions	Program store on cassette, program load from cassette, program compare with cassette	
Load functions	Copy from PLC to external program memory Load from external program memory to PLC Compare PLC with external program memory	
Instruction displays	Display 8 LEDs (!, STR, &, /, N, T/Z, FUN, =)	32 digits and two lines LCD with lighting for step number
Data displays	1 LED (DATA): 6 decades I/O, times, counters, FUN number	
Step displays	Display 1 LED (STEP): It is possible to display the step number in three decades	
Mode	3 LEDs for PROG, TEST, and RUN mode. The three decades display can be switched over between step address and data by the help of the push-button ./Step.	

Specification	Programming unit	
	07 PG 200	07 PG 201
Printer or personal computer interface functions		RS-232-C interface Setting of data format and baud rate (300 to 38400 Baud; 4800 Baud factory set) takes place by DIL switch on 07 PG 201. Setting as printer or PC interface takes place also by the same DIL switch *1) Printer functions: instructions list IL, ladder diagram LD, cross reference list CRL PC functions: Programs load from (to) PC On-line-monitoring
Temperature range	5 °C to 40 °C in operation - 10 °C to 65 °C storage	
Humidity class	30 to 90 % without condensation	

*1) For DIL switch setting see section 1.2

Table 1.1

1.2 Setting of DIL switches on the programming unit 07 PG 201

The baud rate and the word format can be set by the DIL switches of the programming unit.

Position of switches for baud rate:

Switch number			Baud rate
5	4	3	kBaud
ON	ON	ON	38,4
ON	ON	OFF	19,2
ON	OFF	ON	9,6
ON	OFF	OFF	4,8 *2)
OFF	ON	ON	2,4
OFF	ON	OFF	1,2
OFF	OFF	ON	0,6
OFF	OFF	OFF	0,3

*2) factory set

Table 1.2

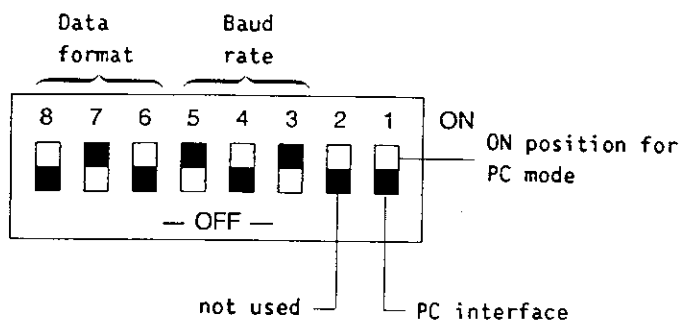


Figure 1.1

Position of switches for data format:

Switch number			Data format			
8	7	6	Start bit	Data bit	Parity bit	Stop bit
ON	ON	ON	1	7	1 even	2
ON	ON	OFF	1	7	1 odd	2
ON	OFF	ON	1	7	1 even	1
ON	OFF	OFF	1	7	1 odd	1
OFF	ON	ON	1	8	--	2
OFF	ON	OFF	1	8	--	1 *2)
OFF	OFF	ON	1	8	1 even	1
OFF	OFF	OFF	1	8	1 odd	1

*2) factory set

Table 1.3

2 Explanation of the keyboard symbols (labels)

2.1 Keyboard labels for programming

Symbol	Name	Function
!	If	Start of a logical operation
STR	Store	Buffer for branches, also for T/Z etc.
&	And	AND operation (series circuit)
/	Or	OR operation (parallel circuit)
N	Not	Inversion of function
T/Z	Timer/counter	Call timer/counter
FUN	Function	Call special functions
=	Then	Result: set outputs or flags or call T/Z

Table 2.1

2.3 Function keys

Symbol	Name	Function
CLR	Clear	Initializes a program
DCLR	Data Clear	Clears a program input in the display
INS	Insert	Insert program addresses
DEL	Delete	Delete program addresses
MON	Monitor	Display states, etc.
FIND	Find	Search for operands, etc.
ENT	Enter	Terminates input
STEP	Step	Step selection
SET	Set	Set (e.g. timer values)
RES	Reset	Reset (e.g. timer values)
STEP +	Step Plus	Display of program step by step forwards
STEP -	Step Minus	Display of program step by step backwards

Table 2.3

2.2 Numeric input keys

Symbol	Function
0 - 9	Input of numeric values
.	Decimal point

Table 2.2

3 Explanation of functions

3.1 Clear all (reset)

The function "User memory clear all" will cause the following actions:

- resetting of timers and counters
- erasing of shift registers
- resetting of outputs/flags

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Clear all			STOP

Input and display					
Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
			PROG STEP 0000		
		E	PROG STEP 0000 E	PROG	
		—	PROG STEP 0000	DATA	Everything cleared

Table 3.1

3.2 Switching from data display to step display

Switching from data display to step display					
Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
		—	PROG STEP 0000	PROG	Data display
		0	PROG STEP 0000	PROG	Step number
		—	PROG STEP 0000	PROG	Data display

Table 3.2

3.3 Writing new programs

- Make sure that the user memory is erased.
- Be convinced that the program is written well, before you push the ENT key.
- When the ENT key will be pushed, the data will be taken from the display into the user program memory and the display becomes free for the next entry.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Writing new programs			STOP

I	0
STR	1
&N	200
/	STR
&N	3
-T/Z	0509.5

Keyboard input and display

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
		—		
	I	0	PROG STEP 000 0	
	STR	1	PROG STEP 0001 STR	PROG
	& N	200	PROG STEP 0002 & N 200	DATA
	/ STR		PROG STEP 0003 / STR	
	& N	3	PROG STEP 0004 & N 3	
	= T/Z	0509.5	PROG STEP 0005 = T/Z 05 09.5	

Table 3.3

3.4 Adding parts to programs

The first free address in the program memory is found by pressing the keys CLR and ./STEP.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Adding program sections			STOP

	0	
STR	1	
&N	200	
/	STR	
&N	3	
=T/Z	0509.5	
!	T05	} Program part will be added
-	56	

Keyboard input and display

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
		—	—	
	IT/Z	05	PROG STEP 0006 I T/Z 05	PROG
	=	56	PROG STEP 0007 = 56	-DATA

Table 3.4

Note: The time lapse observation of the timer T05 is possible in the monitor function (RUN mode is selected) by pushing the following keys:

Explanation: After the program start, the programmed time of 9.5 sec of the timer T05 is running down, visualized in the display of the programming unit. If the programmed time is lapsed the output 56 will be set.

3.5 Reading out of programs

Programs can be read out starting at address 0 or at any required address No. (STEP No.).

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Reading out programs			RUN/STOP

! STR 0
&N 1
/ 200
&N STR
=T 3
! 0509.5
- T05 } Program part
56 will be added

Keyboard input and displays

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
	I	0	RUN STEP 0000 0	DATA
	STR	1	RUN STEP 0001 STR 1	
	& N	200	RUN STEP 0002 & N 200	
	/ STR		RUN STEP 0003 / STR	(PROG)
	& N	3	RUN STEP 0004 & N 3	TEST
	= T/Z	0509.5	RUN STEP 0005 = T/Z 05 09.5	RUN
	I T/Z	5	RUN STEP 0006 I T/Z 5	
	-	56	RUN STEP 0007 = 56	

Table 3.5

Inputs/outputs, timers, counters, functions also can be read out.

Read out start. at address 0		→	or
Read out start. at address ?		→	or
I/Os or flags	(Note 1)	(Note 2)	→ or
Timers/counters			→ or
Functions (FUN)			→ or
Note 1. Key = means that outputs are to be read out			
Note 2. Key FIND is used to find the next step in which the desired operand was programmed.			

Table 3.6

Note: The function "Read out starting from address?" cannot be executed in RUN mode.

3.6 Replacing values, commands, etc. in a program

- Search for the step (STEP No.) in which the data are to be replaced.
- After the address is called off then enter the new data. Pressing of the key ENT stores the new data on the displayed address and the data of the next address are displayed.
- Caution: This function does not modify all addresses at which data are to be replaced in one operation.

Note:

Assumption: The same instruction (e. g. &N3) is in several addresses. After the replacement of one instruction (see above), the data will be interchanged only at this appointed address.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Replacement in program			STOP

Before replacement

After replacement

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
CLR & N 3 FIND	& N	3	PROG STEP 0004 & N 3	DATA
CLR			PROG STEP 0004	
& N 4	& N	4	PROG STEP 0004 & N 4	-PROG
ENT	T/Z	0509.5	PROG STEP 0005 = T/Z 05 09.5	
CLR			PROG STEP 0005	
= 0 5 0 1 3	=	05013	PROG STEP 0005 = T/Z 05 013	
ENT	T/Z	5	PROG STEP 0006 T/Z 5	

Table 3.7

When the FIND key is pushed the corresponding STEP No. will be displayed at the programming unit 07 PG 201, in this example "0004".

3.7 Insertion of program instructions

Search for the step number at which data are to be inserted. Then write the data to be entered and transfer the data to the memory with the key INS. When the data are transferred into the memory the old data reappear in the display, but the address (step number) is increased by 1.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Insertion of program addresses			STOP

Before insertion

After insertion

Input key 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
CLR & N 4 INS	& N	4	PROG STEP 0004 & N 4	DATA
CLR			PROG STEP 0004	
& N 3	& N	3	PROG STEP 0004 & N 03	-PROG
INS	& N	4	PROG STEP 0005 & N 4	
STEP	& N	3	PROG STEP 0004 & N 3	

Table 3.8

3.8 Deletion of program parts

- Search for the address number at which data are to be deleted. Pressing of the key DEL deletes the data and the next address is displayed.
- Each pressing of the key DEL deletes the statement which is currently displayed.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Deleting program addresses			STOP

Before deletion

After deletion

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display
CLR & N 4 FIND	& N	4	PROG STEP 0005 & N 4	DATA
DEL	=	0513.0	PROG STEP 0005 = T/Z 05 13.0	
STEP	& N	3	PROG STEP 0004 & N 3	-PROG

Table 3.9

After pushing the FIND key at the programming unit 07 PG 201 the STEP number will be displayed; in this example "0005".

3.9 Conduction check

- a. This function allows to check the passage of the user program. In the following example it is assumed that the input 1 is on ("1" signal). The programmed rest conditions (N200 and N03) of the input 3 and of the flag 200 give a "1" signal at T05.
- b. The decimal point in the last display digit (07 PG 200) or the last point ■ in the display of 07 PG 201 indicates the following:
 - * Is the time of the programmed timer elapsed?
 - * Has the counter reached the value zero (0)?
 - * Is the programmed output set (triggered)?
 - * Are the inputs or the flags in accordance with the programmed instruction?

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Conduction check			RUN

Acceptance:
Contacts, 1, 200 und 3 ... connected
Contact 0 ... not connected

T05 is elapsed

Keyboard input and display

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
	T/Z	05013.	RUN STEP 0005 = T/Z 05 13.0■		Shows that time 5 has been termin.
	& N	3	RUN STEP 0004 & N 3 ■	DATA	Switching-through condition fulfilled
	/		RUN STEP 0003 / STR	RUN	Contact 0 is open
	& N	200	RUN STEP 0002 & N 200■		Switching-through condition fulfilled
	STR	1	RUN STEP 0001 STR 1 ■		Contact 1 is closed
	!	0	RUN STEP 0000 ! 0		Contact 0 is open

Table 3.10

3.10 Forced setting and resetting outputs with FUN 3

- a. In this operating mode, outputs or flags can be set and reset in order to check the wiring.

If this mode is selected (with the help of FUN 3), the RUN contact of the basic module will be switched on.
- b. When the mode is reset, all outputs are returned to the initial status and the RUN contact is opened.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Setting and resetting outputs			STOP

Input keys 07 PG 200/07 PG 201	Comm.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
		A---	TEST R--- 0 ROM MODE		Select mode
		0----	TEST 0 3 FORCED OUT	DATA	Switch on
		0-50.	TEST 0--- = 3 FORCED OUT50■	TEST	Output 50 on
		0-55.	TEST 0--- = 3 FORCED OUT55■		Output 55 on
		0-55	TEST 0--- 3 FORCED OUT55		Output 55 off
		0-50	TEST 0--- = 3 FORCED OUT50		Output 50 off
			TEST STEP ■■■■		Reset mode

Table 3.11

Caution: Make sure that there is no danger for man and machine when executing this mode.

3.11 Changing the values of timers/counters during program execution

- This function permits the value of a timer/counter to be changed during execution of the program. After input of the new value, it is transferred to the memory by pressing the key ENT.
- If the value of a timer or counter is changed during execution of the program, this change becomes effective only at the next set or reset operation.

Caution: Changes are possible only if during the execution the programming unit is switched from RUN mode to TEST mode.

3.12 Forced setting or resetting of flags (buffered) or timers and counters

- Forced setting or resetting of counters

Setting: After selecting the counter and pressing key SET, the counter output switches to ON or the counter value is set to 0.

Resetting: After pressing the key RES, the counter output switches to OFF and the counter value is set to the programmed value.

- Forced setting and resetting of timers (buffered flags)

The sequence for setting and resetting is the same as for counters, but care must be taken that no external reset input is present. Possibly, buffered flags must be reset to the initial status when the mode is left.

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Changing the values of timers/counters during processing			RUN

Input keys 07 PG 200/07 PG 201	Com.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
OA - [2] 0 5 [FWD]	= T/Z	0513.0	RUN STEP 0005 = T/Z 05 13.0	DATA	Search for time 5
[1] 5 0 [ENT]	= T/Z	0515.0	RUN STEP 0005 = T/Z 05 15.0	RUN (TEST)	Enter new value

Table 3.12

Function	Position of MODE switch		System status
	07 PG 200	07 PG 201	
Forced set or reset			RUN

Input keys 07 PG 200/07 PG 201	Com.	Display 07 PG 200	Display 07 PG 201	Mode display	Remarks
OA - [2] 5 0 [FWD]	= T/Z	50900	RUN STEP 0000 = T/Z 50 900		Display counter 50
[SET]	= T/Z	50000	RUN STEP 0000 = T/Z 50 000	DATA	Set
[RES]	= T/Z	50900	RUN STEP 0000 = T/Z 50 900	RUN (TEST)	Reset Contact off
OA					Reset mode

Table 3.13

3.13 Monitor functions

Function	Mode	System status			
	 TEST RUN	RUN			
Keyboard input and display					
	Input	Com.	Display	Mode display	Remarks
Input/ output	  		1		Input 1 on Input 2 on
			2		
Output flag	   	=	201	-DATA -RUN	Flag 201 on Flag 202 off
		=	202		
Timer/ counter	   	T/Z	10	(TEST)	Timer 10 finished Timer 7 off
		T/Z	7		
Timer/ counter value	    	=	60005		Counters 60 and 61 with values
		=	61010		

Table 3.14

- a. Inputs/outputs or timers/counters can be stepped: With the "STEP-" key one steps the direction to zero, with the "STEP+" key one steps the direction to the highest input.
- b. If the value of timers and counters is displayed and the time is elapsed (or the counter has reached the end value), a decimal point in the last display digit of 07 PG 200 or the last LCD point in the display of 07 PG 201 will appear.

For instance: 12000. or 50000.

3.14 Searching within a program

Function	Mode		System status		
Searching in program	 PROG TEST RUN		RUN/STOP		
Keyboard input and displays					
	Input	Com.	Display	Mode display	Remarks
I/Os or flags	  	&	1	-DATA -PROG	Input
Output or flag	   	=	200		Flag 200
Timer/ counter number	   	& T/Z	4		Timer 4
Timer/ counter value	    	= T/Z	10300		Timer 10 300 sec.
I/Os Timers/ counter	  	!	2		Input 2 Input 2 Input 2
		&	2		
		/	2		
Search contents/ step	  	&	3	Command step 3 is displayed	
Search specific comm.	    	FUN	02		
	    	FUN	47400	Contents	

Tabele 3.15

- a. If it is necessary to search for an I/O or flag, a timer or counter, or a special function, then pressing the appropriate keys and the key FIND causes this I/O or command to be displayed. If FIND is pressed again, the program is searched to determine whether this I/O or command is used elsewhere. The address (STEP No.) can be displayed by pressing the key ./STEP (07 PG 200 only). If the I/O or command does not exist elsewhere in the program, the first free address number is displayed.
- b. If no address with the I/O or command was found, the display contains -. Pressing the key ./STEP can now be used to switch to the first free address in the memory.
- c. It is possible to step forwards or backwards in the program after each search operation with the keys STEP - or STEP +.
- d. If only the key FIND is pressed, the first free address number is displayed. New statements can then be entered after pressing the key ./STEP.

3.15 Storing of programs on cassette using 07 PG 200

Function		Mode		System status	
Cassette recorder functions		 PROG		STOP	
Keyboard input and display					
Function	Connections	Input	Com.	Display	Mode diapt. Remarks
Cass. Funct. ON		CLR SET SET ENT FUN 1		A--- C---	Function ON
Store	Trans. Micro PG 200 Re-corder	= ENT	=	C---P Transfer C--- End	Memory ↓ cass. recorder
Load	Re-corder phones PG 200 Re-corder	STR ENT	STR	C---H Wait 30 s C---P Transfer C--- End	PROG ↑ Memory ↑ cass. recorder
Compare	Re-corder phones PG 200 Re-corder	& ENT	&	C---H Wait 30 s C---P Compare C--- End	DATA ↑ Memory ↑ cass. recorder
Error-indicat.				C---E Wrong key C62E Transfer error C7-E Comparison error C8-E Format error	Press key CLR to acknowledge error
Cass. Function OFF		CLR RES RES ENT			Function OFF

Table 3.16

Caution:

- Use a mono recorder (switch a stereo recorder to mono)
- Set the record level control to maximum
- Set the volume control to maximum
- Ensure that the cassette is rewound before starting
- If the device has no voltage, if the cassette is removed, or if the key CLR is pressed during transmission, the transmission must be restarted by pressing the appropriate keys.
- During loading or comparison of user programs, the symbol H appears in the display for approximately 30 seconds. This provides time to rewind the tape to the start. If the symbol is still in the display after 30 seconds, the cassette contains no data. In this case, the user program should be transferred to cassette again.
- The connection cable between the cassette recorder and the programming unit 07 PG 200 should not contain resistors.

3.16 Storing of programs on cassette using 07 PG 201

User programs, which are stored in the EEPROM on the basic modules, can be stored with the help of this function (FUN 1) on a cassette or can be transferred from the cassette into the EEPROM of the basic module.

Various modes are possible as follows:

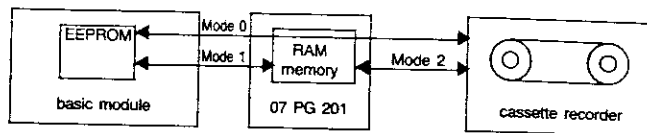


Figure 3.1

- 0 Mode: User programs will be transferred between the basic modules and the cassette recorder.
- 1 Mode: User programs will be transferred between the basic module and the programming unit 07 PG 201.
- 2 Mode: User programs will be transferred between the programming unit 07 PG 201 and the cassette recorder.

For storing user programs on the cassette recorder, the 0 mode will be used. The 2 mode will be used, when user programs should be interchanged between two different cassette recorders, without changing of the user program on the basic modules.

Note:

- Use a mono cassette recorder. Set the volume switch to maximum (set stereo cassette recorder to mono).
- Be sure that the tape is rewound to the beginning, before you transfer or make a comparison.
- The connecting cable to the cassette recorder must be without terminating resistors.
- The transfer time depends on the length of the user program.
Transfer time = 40 sec. + Step numbers x .22 sec
- The records stored on cassette using the programming unit 07 PG 200 can be loaded by 07 PG 201 – but not the opposite way.

3.17 Cassette (CMT) Interface function (FUN 1)
07 PG 201

Function		Entry		Display	Remarks
		Connections	07 PG 201		
			CLR SET SET ENT FUN 1	PROG C - - - 1 CMT MODE	Cassette recorder function switched on
Store	Mode 0	Transmitter Head phones ○ □ □ ○ 07 PG 201 Recorder	= ENT	PROG C - - P - = 1 CMT MODE	K200 EEPROM to Recorder
	Mode 1		= 1 ENT	PROG C - - P - = 1 CMT MODE	K200 EEPROM to 07 PG 201 RAM
	Mode 2		= 2 ENT	PROG C - - P - = 2 1 CMT MODE	07 PG 201 RAM to Recorder
Load	Mode 0	Receiver Head phones ○ □ □ ○ 07 PG 201 Recorder	STR ENT	PROG C - - P - STR 1 CMT MODE	Recorder to K200 EEPROM
	Mode 1		STR 1 ENT	PROG C - - P - STR1 1 CMT MODE	07 PG 201 RAM to K200 EEPROM
	Mode 2		STR 2 ENT	PROG C - - P - STR2 1 CMT MODE	Recorder to 07 PG 201 RAM
Compare	Mode 0	Receiver Head phones ○ □ □ ○ 07 PG 201 Recorder	& ENT	PROG C - - P - & 1 CMT MODE	Comparison K200 EEPROM with Recorder
	Mode 1		& 1 ENT	PROG C - - P - &1 1 CMT MODE	Comparison K200 EEPROM with 07 PG 201 RAM
	Mode 2		& 2 ENT	PROG C - - P - &2 1 CMT MODE	Comparison 07 PG 201 RAM with Recorder
Error display		Entry error		C - - - E	Push key CLR to delete error and start again
		Load error		C 6 2 E	
		Compare error		C 7 - E	
		Format error		C 8 - E	
			CLR RES RES ENT		Cassette recorder functions switched off

Table 3.17

Note:

- The symbol "P" goes out, when the transmission is over.
- Using the functions "Load" and "Compare" the symbol "H" appears in the display for about 30 sec., until the tape is rewound to the beginning.

3.18 Supplementary copy functions with the help of 07 PG 201

With the help of programming and testing unit 07 PG 201 one has the possibility to copy (to write) user programs into the EPROM memory module 07 PR 210, supplementary to the functions described in section 3.20.

This mode is possible only when the EPROM module 07 PR 210 is inserted into the unit 07 PG 201. The same module inserted into the unit 07 PG 201 allows to perform the functions described in section 3.20 also.

3.18.1 ROM function 2 (FUN 2)

The memory modules 07 PR 201 and 07 PR 210 can be copied and loaded with the help of this ROM function 2, when they are inserted into the programming unit 07 PG 201.

Three modes are possible:

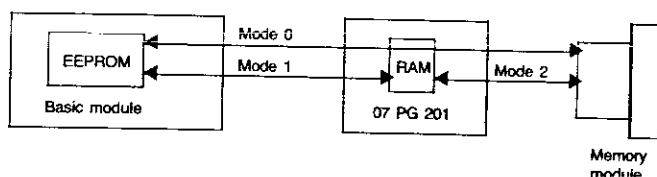


Figure 3.2

0 Mode: User programs will be transferred between the basic units and the memory module.

1 Mode: User programs will be transferred between basic units and the RAM of the programming unit 07 PG 201.

2 Mode: User programs will be transferred between the RAM of the programming unit 07 PG 201 and the memory module.

The 2 mode will be used to transfer user programs between two different memory modules, without to have an influence on the user program in the basic units.

The entry of the mode and of the type of the memory module is done as follows:

Keys	=	Mode no.	Type of memory modules
		0, 1, 2	1 EPROM 2 K 2 EPROM 2 K

Example: 1 mode, 2 K EPROM

Solution: = 1 2

Attention:

1. An inserted EEPROM module will be destroyed, if "mode no. 2" will be entered, because the 2 stands for to load an EPROM.
2. The programs will be destroyed, if the instruction "Load" will be entered without to have a memory module inserted in 07 PG 201.
3. All the memory modules (EEPROM and EPROM) must not be inserted or pull out of the socket when the power supply is on, otherwise the modules will be destroyed.

Table 3.18 (see page 3-10) gives a summary of the functions.

Function		Entry	Display	Remarks
		CLR SET SET ENT FUN 2	PROG R - - - 2 ROM MODE	ROM function 2 switched on
Copy	Mode 0	= 0 0 ENT 2 K EEPROM: 1, EPROM:2	PROG R - - P - = 0 0 2 ROM MODE	K200 EEPROM to memory module
	Mode 1	= 1 0 ENT 2 K EEPROM: 1, EPROM:2	PROG R - - P - = 1 0 2 ROM MODE	K200 EEPROM to 07 PG 201 RAM
	Mode 2	= 2 0 ENT 2 K EEPROM: 1, EPROM:2	PROG R - - P - = 2 0 2 ROM MODE	07 PG 201 RAM to memory module
Load	Mode 0	STR ENT	PROG R - - P - STR 2 ROM MODE	Memory module to K200 EEPROM
	Mode 1	STR 1 ENT	PROG R - - P - STR 1 2 ROM MODE	07 PG 201 RAM to K200 EEPROM
	Mode 2	STR 2 ENT	PROG R - - P - STR 2 2 ROM MODE	Memory module to 07 PG 201 RAM
Compare	Mode 0	& ENT	PROG R - - P - & 2 ROM MODE	Comparison K200 EEPROM with memory module
	Mode 1	& 1 ENT	PROG R - - P - & 1 2 ROM MODE	Comparison K200 EEPROM with 07 PG 201 RAM
	Mode 2	& 2 ENT	PROG R - - P - & 2 2 ROM MODE	Comparison 07 PG 201 RAM with memory module
Empty check Error display		N ENT Entry error Copy error Compare error Empty check error CLR RES RES ENT	PROG R - - P - N 2 ROM MODE R - - - E R 6 2 E R 7 - E R 6 1 E	error check for EPROM exchange the memory module EPROM is not erased ROM function 2 switched off

Table 3.18

Note: The symbol "P" of the display goes out, when the transmission is over.

3.19 Syntax check

a. A program will be checked on syntax errors up to the program end.

b. The following table shows errors and remedies.

Function	Mode	System status
Syntax check	 PROG	STOP

Input	Result	Com.	Display	Mode display	
 	No error in program		235	PROG	First free position
	Error in 134		134 E	STEP	

Table 3.19

Syntax check Errors and remedy			
Error display at programming unit	Meaning	Description	Remedy
Step no. 	Syntax error	1. Is ! (IN) used correctly? 2. Is FUN 04-05 and FUN 06-07 used by pairs?	Bring te program into the correct format
Step no. 	Stack OVER error	1. Is STR (STR N) used more than 7 times in a program branch? 2. Is FUN 04-05 used more than 3 times in a program branch? 3. Is FUN 06 programmed more than one time in a network? 4. Is FUN 05 programmed before FUN 04? 5. Are = Z, FUN 40, FUN 45, FUN 47 or, STR (STR N) programmed too often? 6. Is & STR (/ STR) too often programmed compared with STR (STR N)?	Erase the too much entered STR (STR N) Erase the too much entered FUN 04, FUN 05 Erase the too much programmed FUN 06 Program FUN 04 before FUN 05 Erase the too much programmed FUNs Erase & STR (/ STR) or insert STR (STR N) in the program
Step no.  -  (END Step no.)	Stack UNDER error	1. Is & STR (/ STR) sufficiently often programmed versus STR (STR N)? 2. Is STR (STR N) sufficiently often programmed with = Z, FUN 03, FUN 40, FUN 45, FUN 47? 3. Is FUN 05 sufficiently often programmed versus FUN 04? 4. Is FUN 07 sufficiently often programmed versus FUN 06? 5. Is the assignment (=) sufficiently often programmed?	Erase the too much programmed & STR (/ STR) or insert STR (STR N) Insert the necessary STR (STR N) Insert FUN 04 or erase FUN 05 Insert FUN 06 or erase FUN 07 Check the assignments
Step no. 	Output-double assignment	1. No error, if the outputs are double assigned after FUN 02, 03 and FUN 06 2. for the instuctions (FUN 47, 40 or FUN 34 e.g.) only the programmed outputs/flag no. will be checked on double assignment	Check and change the program
Step no. 	Bit error	An instruction bit is lacking	Bring the program into the correct format

Table 3.20

3.20 Duplicating user programs with 07 PG 200 and 07 PG 201

The system ABB Procontic K200 contains an EEPROM memory with a capacity of 1 K instructions. If this space is insufficient for the user program, it is possible to double the capacity with the program memory module 07 PR 201 (EEPROM). The memory module 07 PR 210 can be used in order to file programs on an EPROM.

If a memory module is plugged into the basic configuration, the CPU uses the program of the module, which is plugged-in. The internal EEPROM is switched off automatically. However the contents of the internal EEPROMs are saved. Programs can be copied in both directions.

Caution: Program memory modules must be plugged in only when the supply voltage is switched off.

The various copying facilities are described below.

3.20.1 Load a user program from the internal EEPROM (1 K) to the memory module 07 PR 201 (EEPROM)

- The module must not be plugged in
- Press keys (select operating mode)
- Press keys (transfer program to internal RAM)
- Switch off voltage, plug in module into basic configuration, switch on voltage.
- Press keys
- Press keys (load program into module)
- Press keys (switch off operating mode)

The user program has now been copied to the module.

3.20.2 Load a user program from the memory module (EPROM, EEPROM) to the internal EEPROM

- The module must be plugged into the basic configuration before switching voltage on.
- Press keys
- Press keys
- Switch off voltage, remove module, switch on voltage
- Press keys
- Press keys
- Press keys

The user program is now in the system memory.

3.20.3 Duplication of external modules (EEPROM)

- External module to be duplicated must be plugged in before switching on the voltage
- Press keys
- Press keys
- Switch off voltage, plug in other module, switch on voltage
- Press keys
- Press keys
- Press keys

The user program has now been copied to the module.

If a comparison (verify) of the duplicated programs is required, push the following keys after step f.:

Press keys

Caution: Loading of the EPROM memory module 07 PR 210 is possible only with the programming unit 07 PG 201. For procedure please refer to table 3.18 on page 3-10.

3.21 Programming units 07 PG 200 and 07 PG 201

3.21.1 Keyboard and connections of 07 PG 200

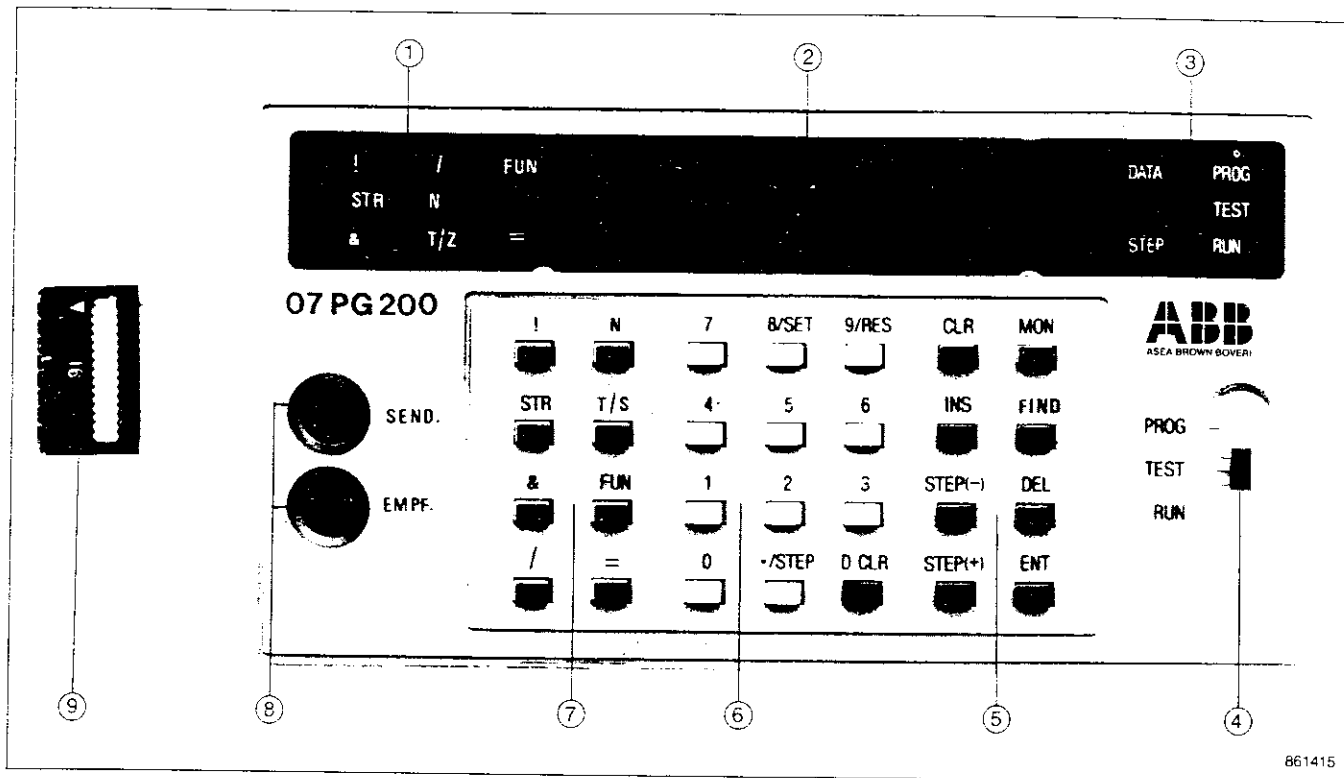


Figure 3.3

- 1 Programming instruction display
- 2 Data display
- 3 Mode display
- 4 Mode switch
 - PROG: Program writing
 - TEST: Testing
 - RUN: Program running
- 5 Function keys
- 6 Numerical entry keys
- 7 Programming instruction entry keys
- 8 Cassette recorder connectors
- 9 Connection cable to basic module

3.21.2 Dimensions of 07 PG 200

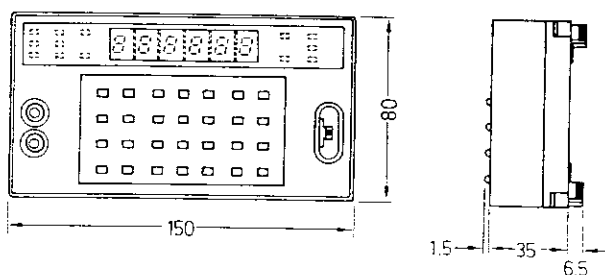


Figure 3.4

3.21.3 07 PG 201 general data

The programming and testing unit 07 PG 201 can be snapped onto the control system. In contrast to the miniature programming unit 07 PG 200 it has the following features in addition:

- a. An integrated serial interface in accordance with RS-232-C for connection of an IBM or compatible personal computer.
- b. A printer can be connected via the same interface. Using the printer it is possible to print out ladder diagram, instruction list and cross reference list (without comments).
- c. A socket for copying of EPROM modules (07 PR 210) or EEPROM modules (07 PR 201) is built in.
- d. Keys in different colours allow a comfortable programming.

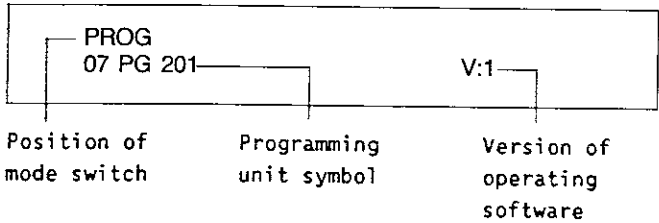
LC display of 07 PG 201:

A two lines LC display is built in. This display is lighted for better reading. After turn on of the power supply the display answers with the following turn-on figure:

The following table shows display examples in operation:

Function	Entry	Display
Clear all	[CLR] [ENT] [DEL]	PROG STEP ■ ■ ■ ■ PROG STEP ■ ■ ■ ■ E PROG STEP 0000
Entry examples	[1] [2] [3] [4] [5] [6] [7] [8] [9] [0] [.] []	PROG STEP 0000 I N T 4 PROG STEP 0001 T 1/2 10 950
SYN TAX CHK ECK K	No error	PROG STEP 0350
	Dual counter error	PROG STEP 0123 0E = 50
	Stack UNDER error	PROG STEP 0233 0E FUN 45 550
	Stack OVER error	PROG STEP 0350 0E FUN 45 560
	Format error	PROG STEP 0120 0E
Monitor function	[MON] [1] [2] [3]	RUN STEP ■ ■ ■ ■ = 50 On
Branch check	[BR] [ENT]	RUN STEP 0001 200 ■ Branch
Entry error	[1] [2] [3] [4] [ENT]	PROG STEP 0000 E 999 Error
Sum check error	—	RUN STEP 51E ■ ■ ■ ■
Indefinite error	—	RUN STEP 4E

Table 3.21



3.21.4 Keyboard and connections of 07 PG 201

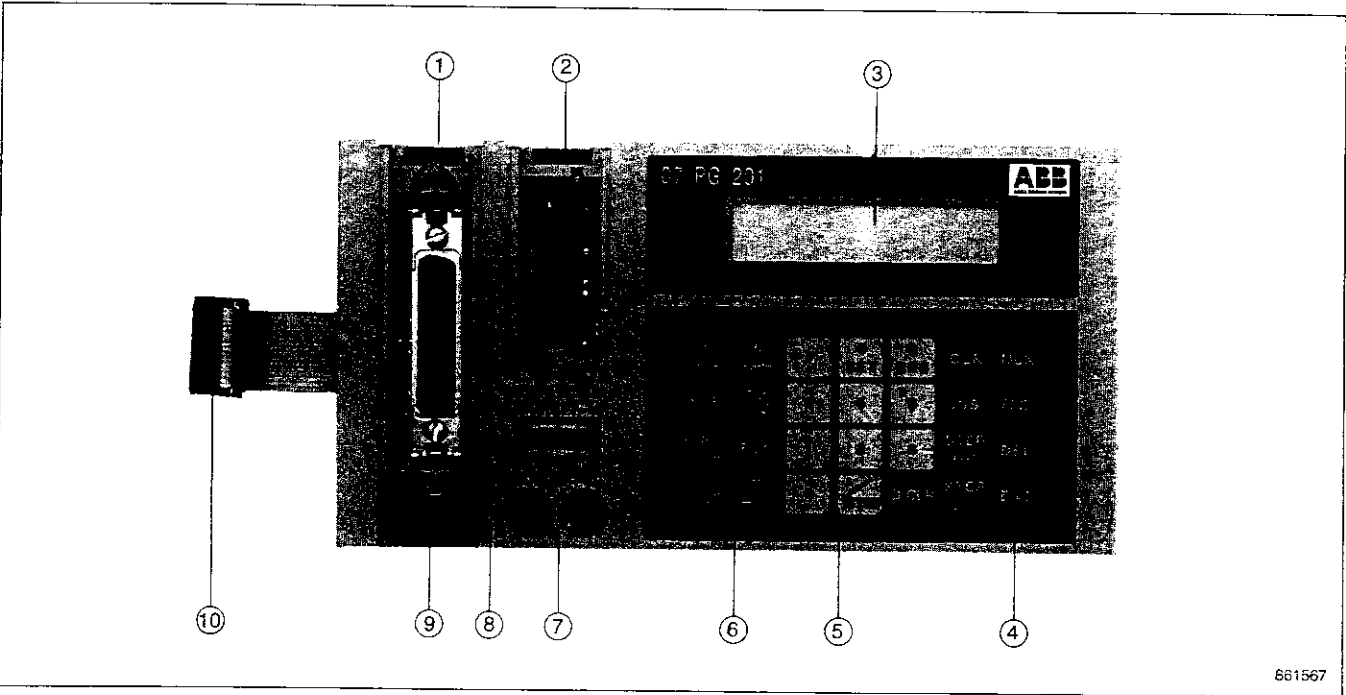


Figure 3.5

Legend to figure 3.5

- 1 RS-232-C interface for personal computer or printer
- 2 Socket for memory module (07 PR 201/07 PR 210)
- 3 Two lines LC display (32 digits)
- 4 Function keys
- 5 Numerical entry keys
- 6 Programming instruction entry keyboard
- 7 Cassette recorder connections
- 8 Mode switch
 - PROG: Program writing
 - TEST: Program testing
 - RUN: Program running
- 9 DIL switch
- 10 Connection cable for basic modules

3.21.5 Dimensions of 07 PG 201

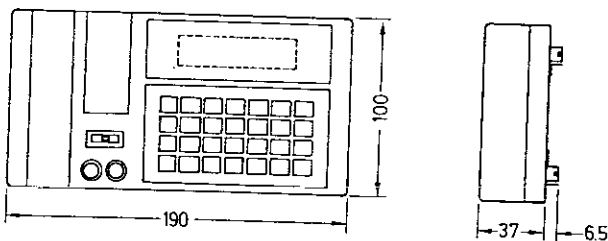


Figure 3.6

3.22 Special functions only with 07 PG 201

3.22.1 Programming functions

The inputs for programming and the possible functions with 07 PG 201 are the same as with the miniature programming unit 07 PG 200.

The following table shows differences and additional features of the programming unit 07 PG 201:

Function	Entry	Display	Remark
Switch on of ROM function 1	CLR SET SET ENT	PROG O ROM R . . . MODE PROG O ROM R . . . MODE	PROG or TEST mode System in STOP mode
Cassette interface (CMT) function	F.A. C	PROG 1 CMT C . . . MODE	Copying of user programs. Memory module inserted in basic unit
ROM function 2	F.A. I	PROG 2 ROM R . . . MODE	Transmitting of user programs to (from) cassette recorder
Set/reset (FORCE) of outputs	F.A. 3	TEST 3FORCED O . . . OUT	Copying of user programs Memory module inserted in 07 PG 201
Printer interface function	F.A. 4	PROG 4 PRINT P . . . OUT	Forced setting or resetting of outputs in TEST mode
Switch off of function	CLR RES RES ENT		User programs are printed out
			PROG or TEST mode System in STOP mode

Table 3.22

Explanations:

- a. The various possible functions after turn on with will be selected by the instructions FUN 0 to FUN 4.
- b. FUN 0 needs not to be selected, because the ROM function 1 will be automatically switched on after functions turn on. The switch on of this function is necessary only if another function was selected before.
- c. The functions will be switched off by pushing the following keys:

ROM function 1 (FUN 0):

With the help of this function, a user program memory module which is inserted in the basic unit will be copied or loaded (in the mode PROG).

Entry	Display	Remark
Copying into memory module		
No module is inserted CLR SET SET ENT STR ENT	PROG O ROM R . . . MODE PROG O ROM R . . . P * - STR	ROM function 1 is switched on Copy user program EEPROM → RAM K 200
Turn the power supply off Insert the module Turn the power supply on		
CLR SET SET ENT P ENT P ENT CLR RES RES ENT	PROG O ROM R . . . MODE PROG O ROM R . . . P * - = PROG O ROM R . . . P * - & PROG O ROM R . . . MODE	ROM function 1 is switched on Copy from RAM → memory K200 module Compare RAM → memory K200 module ROM function 1 is switched off

Table 3.23

* P appears in the display for about 0.1 sec.

Entry	Display	Remark
Load into the basic unit PROCONTIC K200		
Insert the memory module, turn the power supply on 	PROG 07 PG 201 V:1 PROG R - - - O ROM MODE	ROM function 1 is switched on
Switch power supply off Remove the module. Switch power supply on 	PROG R - - P - - STR O ROM MODE	Load the user program memory module - RAM
	PROG 07 PG 201 V:1 PROG R - - - O ROM MODE	ROM function 1 is switched on
	PROG R - - P - - = O ROM MODE	Load user program RAM - EEPROM K200
		ROM function 1 is switched off

Table 3.24

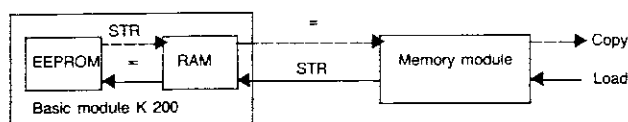


Figure 3.7

3.22.2 RS-232-C interface to printer (FUN 4)

Three modes and various lists to be printed out can be selected (ladder diagram LD, instructions list IL or cross reference list CR).

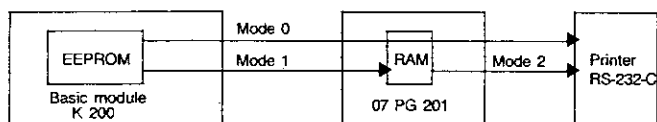


Figure 3.8

0 mode: User programs of ABB Procontic K200 will be printed out.

1 mode: User programs will be transferred from EEPROM of ABB Procontic K200 into the RAM of the programming unit 07 PG 201.

2 mode: User programs in RAM of programming unit 07 PG 201 will be printed out.

The mode and printing format entry will be performed as follows:

Keys
 0, 1, 2 s. table 3.25

Format of print out:

Selection	Frontispiece	IL	LD	QVL
0	X	X	X	X
1	-	X	-	-
2	-	-	X	-
3	-	-	-	X

Table 3.25

IL = Instructions list

LD = Ladder diagram

CR = Cross reference list

X = will be printed out

Example: in 0 mode the LD shall be printed.

Solution: Press keys

The following table shows the inputs and displays of the 07 PG 201:

Function Printing	Input	Display	Remarks
		Prog P - - - 4 PRINT OUT	Printer interface is switched on
Mode 0		Prog P - - P - - = 0 2 4 PRINT OUT	Transmission K200 - Printer
Mode 1		Prog P - - P - - = 1 4 PRINT OUT	Transmission K200 - 07 PG 201
Mode 2		Prog P - - P - - = 2 1 4 PRINT OUT	Transmission 07 PG 201 - Printer
			Printer interface is switched off

Table 3.26

* Display "P" goes out, when transmission is finished.

3.22.3 DIL switch setting at the programming unit 07 PG 201

The Baud rate and the word format can be set at the DIL switch of the programming unit.

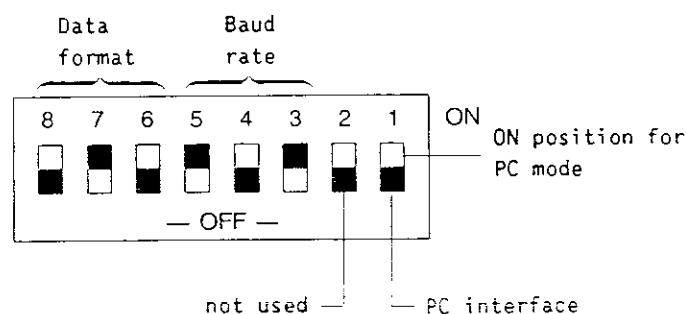


Figure 3.9

Switch No.			Baud rate
5	4	3	kbaud
ON	ON	ON	38.4
ON	ON	OFF	19.2
ON	OFF	ON	9.2
ON	OFF	OFF	4.8 *1)
OFF	ON	ON	2.4
OFF	ON	OFF	1.2
OFF	OFF	ON	0.6
OFF	OFF	OFF	0.3

*1) factory set

Table 3.27

Data format

Switch no.			Data format			
8	7	6	Start bit	Data bit	Parity bit	Stop bit
ON	ON	ON	1	7	1 even	2
ON	ON	OFF	1	7	1 odd	2
ON	OFF	ON	1	7	1 even	1
ON	OFF	OFF	1	7	1 odd	1
OFF	ON	ON	1	8	-	2
OFF	ON	OFF	1	8	-	1 *1)
OFF	OFF	ON	1	8	1 even	1
OFF	OFF	OFF	1	8	1 odd	1

*1) factory set

Table 3.28

3.22.4 Restrictions at printing out

- A branch of a ladder diagram will be printed out without restrictions, if the branch consists of a maximum of 8 contacts in series, 26 lines, and 7 STR.
- In spite of transgressing the restrictions given in a., it will be printed out with restrictions.

Example: A branch of a ladder diagram (LD) consisting of 10 contacts in series shall be printed out. Only the first 8 contacts are printed out. For marking an asterisk (*) is printed above the line number (s. figure 3.10).

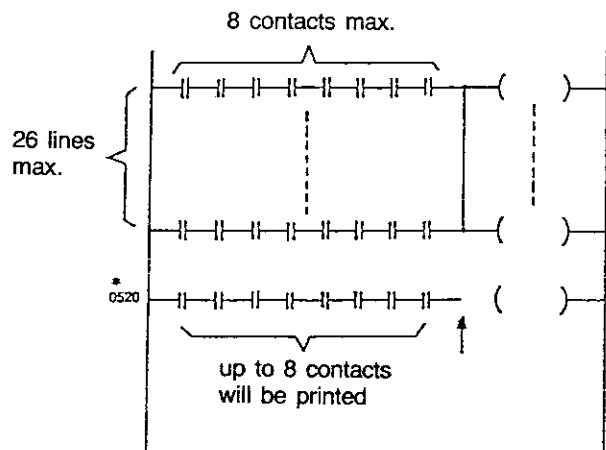


Figure 3.10

- If the user program contains syntax errors, this errors are printed out in the ladder diagram (LD). For examples see figure 3.11 a-b on page 3-18.

SEITE 001 07PG201 VERS. 1.0

a) STEP

The start condition is lacking

! is lacking →

801
/2
= 50

802

error

803

end

850

b) The assignment part is lacking

= is lacking →

STEP	
0000	000 001
0001	002
0002	003
0003	
0004	end

error

c)

The command /STR
is lacking

```
STEP
!00      !
&01      !    000   001
STR2     0000 ←-----
&03      !    002   003
          !-----> error
          !-----> (058)
/STR is lacking → =50 0005 end
```

[illegible]

Figure 3.11 a-b: Examples for errors

```
*****
*
*
*      PROCONTIC SYSTEM K200
*
*      PROGRAM
*
*
*
*
* PROGRAM NAME:
* -----
*
*
* PROGRAM TITLE:
* -----
*
*
*
* DATE          PROGRAMMER
* -----
*
*
*****
```

SEITE 002 INSTRUCTIONS LIST

STEP			STEP			STEP		
0000 !		001 *	0010 &		T/Z 00 *	0019 /		051
0001 & N	050	* 0011 FUN		02	* 0020 & N	T/Z 02		
0002 STR	050 *	0012 * N	050 *	0021 =		051		
0003 & N	001 *	0013 :	000 *	0022 ' N	T/Z 03			
0004 / STR	*	0014 =	T/Z 01 *	0023 *	T/Z 04			
0005 =	T/Z 00	*	05.0					01.0
	05.0	* 0015 +	051		0024 !			
0006 !	T/Z 00	* 0016 & N	000 *	0025 =	T/Z 03			
0007 FUN	02 *	0017 =	T/Z 02 *					02.0
0008 =	050 *		03.0		0026 =			052
0009 ' N	001 *	0018 !	T/Z 01 *	0027 ENDE				

SEITE 003 LADDER DIAGRAM

Timing diagram for the 68000 microprocessor showing the sequence of operations for the instruction "LDW.B #0, D0". The diagram illustrates the execution of the instruction across 27 steps.

Key events and timing points:

- Step 0:** Instruction address 0000, PC 050, and the start of the instruction cycle.
- Step 1:** Instruction address 050, PC 001, and the start of the instruction cycle.
- Step 2:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 3:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 4:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 5:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 6:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 7:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 8:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 9:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 10:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 11:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 12:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 13:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 14:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 15:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 16:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 17:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 18:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 19:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 20:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 21:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 22:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 23:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 24:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 25:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 26:** Instruction address 001, PC 001, and the start of the instruction cycle.
- Step 27:** Instruction address 001, PC 001, and the start of the instruction cycle.

SEITE 004 CROSS REFERENCE LIST

```

STEP
000 0013 0016
001 0000 0003 0009
050 0001 0002 (0008) (0012)
051 0015 0019 (0021)
052 (0026)
T/Z 00 05.0 (0005) 0006 0010
T/Z 01 05.0 (0014) 0018
T/Z 02 03.0 (0017) 0020
T/Z 03 02.0 0022 (0025)
T/Z 04 01.0 (0023) 0024
ENDE

```

Figure 3.12: Example of a complete printout

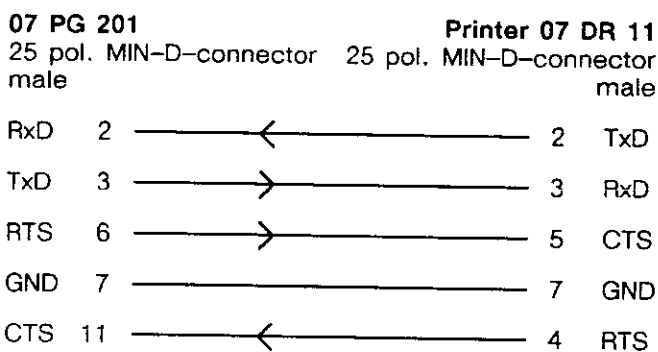
3.22.5 Remark for using the printer

- To abort the print out, press the key CLR. The display disappears and the print out is interrupted.
- If the supply voltage of the printer is interrupted during printing or the paper of the printer is empty, restart the print out.
- The perforated part of the printer paper is to be positioned in the center of the head of the printer.

3.22.6 Assignment of the interface at 07 PG 201

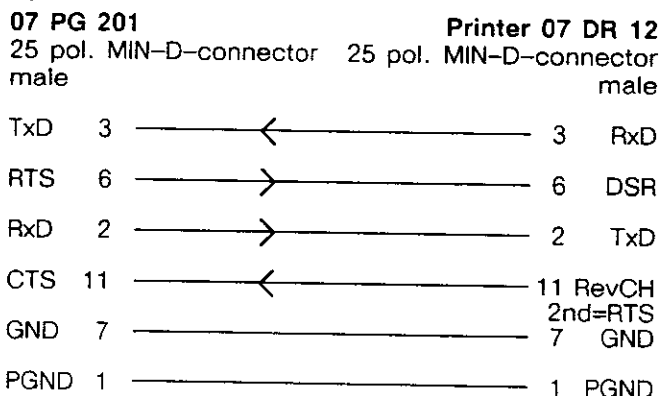
An interface in accordance with RS-232-C is integrated in the programming unit. This interface is connected at an 25-pole MIN-D connector (female).

System cable 07 SK 203 R1



Signal names			
RxD	Receive Data	GND	Ground
TxD	Transmit Data	CTS	Clear to send
CTS	Request to send		

System cable 07 SK 203 R2



Signal names			
TxD	Transmit Data	DSR	Data set ready
RxD	Receive Data	GND	Ground
RTS	Request to send	PGND	Protective Ground
CTS	Clear to send		

3.22.7 Function to control a personal computer (IBM or compatible)

Setting of DIL switches at 07 PG 201:

When the DIL switches are set as shown in figure 3.13, it is possible to communicate with the personal computer.

Switching the supply voltage on results in the display of the programming unit 07 PG 201 as shown in figure 3.14.

Switch no.	Position	
8	OFF	1 start bit, 8 data bits no parity 1 stop bit
7	ON	
6	OFF	
5	ON	9600 Baud
4	OFF	
3	ON	
2	ON	not used
1	ON	PC interface on

Table 3.29

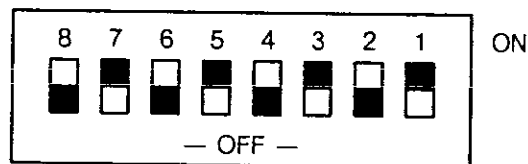


Figure 3.13

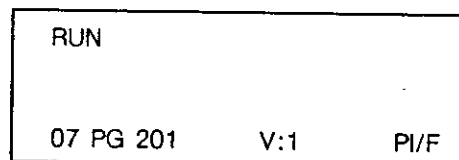


Figure 3.14

The keyboard of the 07 PG 201 is not in operation, because the commands of the personal computer have the priority.

3.22.8 Programming with the personal computer

3.22.8.1 Software package 907 PC 20

Order No.: GJV3900800R302

The software package 907 PC 20 allows to create user programs in ladder diagram (LD) as well as in instructions list (IL) in a comfortable way.

The following functions are possible in addition:

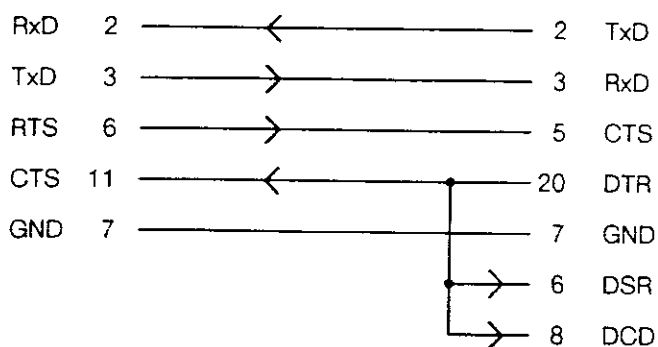
- Monitor functions
- Forced setting and resetting of the outputs
- Test functions in online operation

For the data refer to the operating manual 907 PC 20 — Testing and programming system for ABB Procontic K200.

Cable to the personal computer (IBM or compatible)
System cable 07 SK 202 R2

07 PG 201

25 pol. MIN-D-connector male 25 pol. MIN-D-connector female



Signal names			
RxD	Receive Data	GND	Ground
TxD	Transmit Data	DSR	Data set ready
CTS	Clear to Send	DCD	Data carrier detect
DTR	Data terminal ready	RTS	Request to send

The DIL switches are set as shown in figure 3.13.

3.22.8.2 Software package 907 PC 31

Order No.: GJP5200100R402

907 PC 31 is a programming and test software for ABB Procontic T300, ABB Procontic b, ABB Procontic K200 and SIGMA®-tronic p.

The program package 907 PC 31 permits easy and cost-effective programming of PLC programs in the function plan (FUP) or instruction list (IL) using IBM-XT, IBM-AT or compatible systems. The program input can be either symbolic or absolute. The PLC program is supplemented by symbolic identifiers, long text and comments. "Help" and error messages and a syntax check facilitate the program input. A wide range of commands are available for program generation:

- Insert
- Delete
- Search
- Search and replace
- Branch commands
- Block commands
 - mark
 - delete
 - shift
 - copy
 - store
 - load

The function plan is sub-divided logically into part plans.

Part plan functions are:

- Enter name of a part plan
- Insert part plan
- Delete part plan
- Search for part plan according to name or number
- Print part plan

The instruction list (IL) is generated automatically from the new function plan (FUP). A symbol editor and variable editor can also be used. Additional program descriptions, for example, can be generated using the text editor.

A large number of online functions are provided to assist the user during commissioning, such as:

- Status display in
 - function plan
 - instruction list
 - variable list
 - symbol list
- Start/stop program
- Program status, etc.

Furthermore, it is possible to summarize certain variables in online lists and to display their status on the monitor.

The automatic program documentation incorporates the output of the following lists on the printer:

- Instruction list
- Function plan
- Variable list
- Symbol list
- Cross-reference list
- Symbol-reference list
- Logic plan
- Ladder diagram
- Comment list
- Logic element library
- Text page
- Online list

A special printing format editor allows an individual header and footer to be added to the various lists. In this header or footer, certain information can be automatically printed out with the list, such as name of the project file, date, time.

3.22.8.3 Software package 907 PC 312

Order No.: GJP5200500R102

The programming and test software 907 PC 312 has the same functions as 907 PC 31, but programming is only possible for ABB Procontic K200.

4.1 Error messages and remedy

Error display at programming unit	Meaning	Description	Remedy	When does the error appear?
4E	undefined instruction error Watch-dog error	undefined operation code was stated The watch dog error appears in case of excessive cycle time	a) Switch the system off and then on. If this doesn't help, change-basic module b) If this error appears after exchange of the basic module again, there may be EMC problems. Earth the basic module	Error is possible during all operating modes
51E	Syntax error	This error appears, if the program in the memory contains syntax errors	Check the program on syntax errors and correct the program (s. section 3)	If a start signal (STA) is given
7-E	ROM error	This error appears, if after calling a ROM function (copy a user program) this function is not reset	Call the ROM function reset	If a start signal (STA) is given
A62E	Program memory module error in writing	It is not possible to write on the program memory module, which is pluggend in. The EEPROM module is faulty	Switch power supply off and on, retry writing into the module or exchange the program memory module	During writing into the program memory module
A7-E	EEPROM↔RAM compare error	Compare error may be appear, when the power supply voltage is switched off longer than 14 days		
C62E	EEPROM error in writing	Data cannot be transferred from cassette recorder to EEPROM (Rest same as A62E.)	Refer to error A62E or exchange basic module	When transferring user programs from the cassette recorder
C7-E	Cassette recorder ↔EEPROM compare error	Program on the cassette recorder is not the same as on the EEPROM	Transfer the data from cassette recorder to EEPROM again	When comparing the data of the cassette recorder with them of the EEPROM
C8-E	Format error	Program on the cassette recorder is not the same as on the EEPROM	a) exchange the cassette b) check transfer	During transferring to the basic module

Error display at programming unit	Meaning	Description	Remedy	When does the error appear ?
[-- H	Time-exceeding error	Data transfer must be started within 30 sec.	a) Are the data on the tape? b) Check connection of the cables c) Check cassette recorder d) Check transfer level (if necessary clean recording head)	During copying to the basic module
E	Syntax error	1. Is ! (!N) used correctly? 2. Are FUN 04-05 and FUN 06-07 used by pairs?	Correct the format of the program	When a start signal (STA) is given or during syntax check
U	Stack OVER error	1. Is STR (STR N) used more than 7 times in a program branch? 2. Is FUN 04-05 used more than 3 times in a program branch? 3. Is FUN 06 programmed more than one time in a network? 4. Is FUN 05 programmed before FUN 04? 5. Are = Z, FUN 40, FUN 45, FUN 47 or STR (STR N) programmed too often? 6. Is & STR (/STR) programmed too often compared with STR (STR N)?	Delete the STR (STR N), which are programmed too often Delete the FUN 04, FUN 05, which are programmed too often Delete the FUN 06, which are programmed too often Program FUN 04 before FUN 05 Delete FUNs, which are programmed too often Delete & STR (/STR) or insert STR (STR N) into the program	When a start signal (STA) is given or during syntax check
U	Stack UNDER error	1. Is & STR (/STR) sufficiently often programmed versus STR (STR N)? 2. Is STR (STR N) sufficiently often programmed with = Z, FUN 03, FUN 40, FUN 45, FUN 47? 3. Is FUN 05 sufficiently often programmed versus FUN 04? 4. Is FUN 07 sufficiently often programmed versus FUN 06? 5. Is the assignment (=) sufficiently often programmed?	Delete & STR (/STR), which are programmed too often or insert STR (STR N) Insert STR (STR N), which are programmed too less Insert FUN 04 or delete FUN 05 Insert FUN 06 or delete FUN 07 Check the assignments	When start signal (STA) is given or during syntax check

Error display at programming unit	Meaning	Description	Remedy	When does the error appear?
E.	Output double assignment	1. No error, if the outputs are double assigned after FUN 02, 03 and FUN 06 2. For the instructions (FUN 47, 40, or FUN 34 e. g.) only the programmed output/flag no. will be checked of double assignment	Check the program and correct it	During syntax check
F	Bit error	An instruction bit is lacking	Repeat the input of the instruction	During syntax check or STA signal
n	Keyboard input error	a) The prog. step. no. shall not be shown in the display b) The 970th instruction is displayed and the key STEP/+ is pushed	Press key CLR, to eliminate the error (repeat keyboard input)	During programming
U	Keyboard input error	Key STEP/- was pushed after the power supply was switched on or start signal in RUN mode	Press key CLR to eliminate the error. (Repeat keyboard input)	
E	Keyboard input error	Undefined keyboard input was done	Press key DCLR to eliminate the error. Repeat the instruction	



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