

Programmable
Controller

Process Display and Control

Operating manual

ABB Procontic process display and control

Hand-held monitoring tool
07 BG 60

Order no.
GATS 1340 06 R2001



891171

ABB Schalt- und Steuerungstechnik GmbH

ABB
ASEA BROWN BOVERI

REGULATIONS

Regulations Concerning the Setting up of Installations

Apart from the basic "Regulations for the Setting up of Power Units" VDE* 0100 and for "The Rating of Creepage Paths and Air Gaps" VDE 0110 the regulations "The Equipment of Power Units with Electrical Components" VDE 0160 in connection with VDE 0660, part 500, have to be taken into due consideration. Further attention has to be paid to VDE 0113 in case of the control of working and processing machines. If operating elements are to be arranged near shock-hazard parts with protection against electrical shock, VDE 0106, part 100, is relevant.

The user has to ensure the units as well as the appertaining components to be installed according to these regulations. Respectively valid safety regulations, e.g. regulation for the prevention of accidents and the law concerning technical working material, are valid for machines and units connected as well.

ABB Procontic units have been built according to VDE regulation 0160. The protection against direct touching as demanded by chapter 5.5.1 of this VDE regulation is to be made sure by the user, e.g. by installing a switch cabinet.

ABB Procontic units have been laid out for operation according to insulation class A of VDE 0110. If considerable dirt can be expected during operations, the units have to be installed in casings of the respective kind of protection.

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

Note: Please observe the national regulations for the installation of electrical equipments, which are valid in your country.

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1 Brief description of the hand-held monitoring tool 07 BG 60

Order No.: GJV3074328R101

The 07 BG 60 is a handy and sturdy hand-held monitoring tool for timers and counters belonging to the ABB Procontic T200 controller.

It serves the purpose of ON-LINE display of timers' and counters' current values. The setpoints can also be modified on the keyboard in ON-LINE mode.

2 Technical data

Supply voltage	5 V DC, 0.35 A directly from the connected controller via connecting cable 07 SK 60 R2 or 07 SK 60 R5
Display	LCD, 2 lines of 19 characters each One additional line for special characters Background lighting can be activated/deactivated on the keyboard, contrast adjustment
Character depiction	5 x 7 dots
Keyboard	45 keys, silicone rubber, buzzer can be activated/deactivated on the keyboard
Interface	1 serial interface RS-232-C, 15-pole
Dimensions	92 mm x 178 mm x 38 mm
Operating temperature	0...+ 45 °C
Storage temperature	- 10 ... + 60 °C
Relative humidity	10...90 % (no condensation)
Weight	approx. 400 g
Accessories	Interface cover (included in the scope of delivery) ABB Procontic T200 connecting cables 07 SK 60 R2, length 2 m, order No. GJV3074329R2 ABB Procontic T200 connecting cable 07 SK 60 R5, length 5 m, order No. GJV3074329R5

3 Connecting the 07 BG 60 to the controller

The hand-held monitoring tool can be connected during operation of the controller to the central processing units 07 ZE 60, 07 ZE 61, 07 ZE 62 and 07 ZE 63 and to the decentralized I/O coupler 07 BR 61 R1/R2.

Two cables are available for selection which differ by virtue of their length.

3.1 Description of the connecting cables 07 SK 60 R2 and R5

Design: 15-pole D-subminiature female connector on the connection side for the hand-held monitoring tool 07 BG 60;
15-pole D-subminiature male connector on the connection side for the central unit (ZE) or I/O coupler (BR).

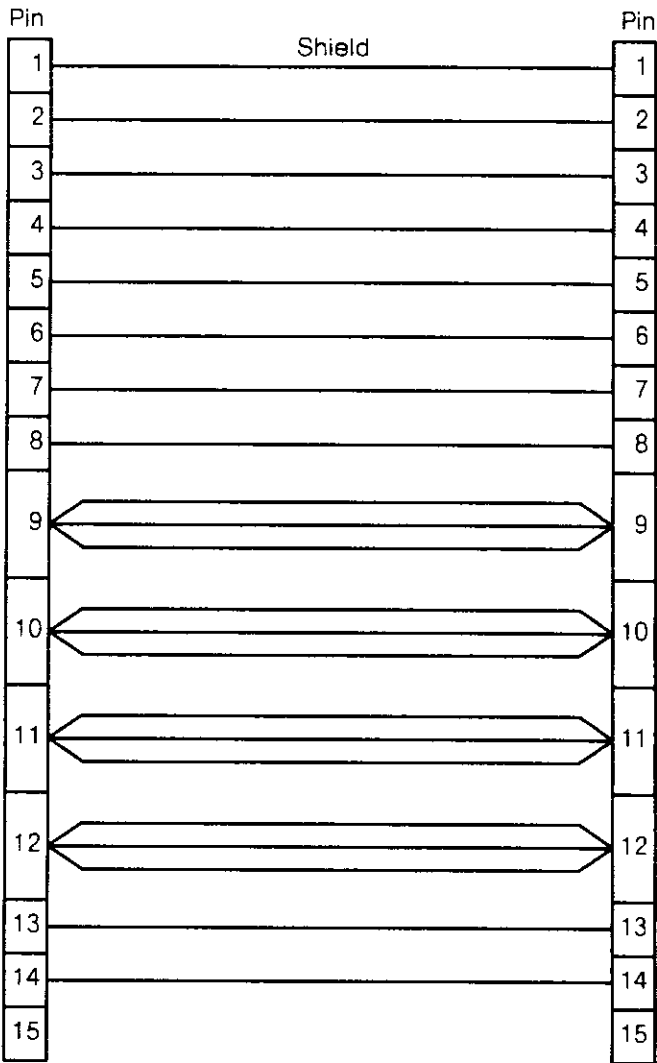
Length: Version R2: 2 m Version R5: 5 m

Order numbers: GJV 30 743 29 R2 GJV 30 743 29 R5

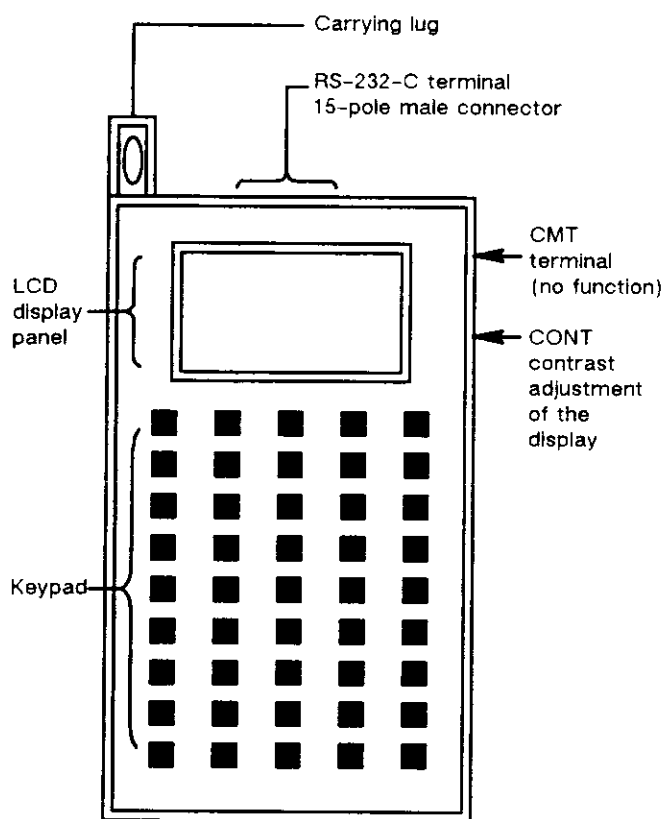
Weight: Version R2: approx. 0.4 kg
Version R5: approx. 0.9 kg

3.2 Connection diagram of cable 07 SK 60

15-pole female connector 07 BG 60 side 15-pole male connector ZE/BR side

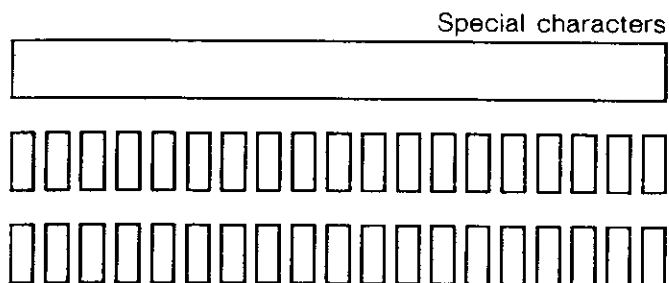


4 Operating controls and connections



4.1 Display panel

The LCD display panel consists of 2 lines of 19 characters and 5 x 7 dots each and of one additional line for special characters. Background lighting can be activated on the keyboard and the contrast is adjusted by means of the adjusting wheel on the side.



4.2 Keypad

The keypad contains 45 silicone rubber keys, some of which have double assignments.

UP	(D)	MON	AUX	GRS	1st line
					2nd line
T	Z	S	.	CLR	3rd line
EW	AW'				4th line
E	A'	SET	,	=	5th line
AW	+	-			6th line
A	D	E	F	/	7th line
MW					8th line
M	A	B	C	→	9th line
EW'				1S	10th line
E'	7	8	9	←	11th line
MW'				0.1S	12th line
M'	4	5	6	↑	13th line
				0.01S	14th line
DEC	1	2	3	↓	15th line
					16th line
INC	0	CNV	ENT	STA	17th line

4.2.1 Markings and meanings of the keys

1st line (keys)

UP	Activate the 2nd key function *
(D)	Double word *
MON	Select monitor mode
AUX	Select auxiliary mode
GRS	ON/OFF line (general reset)

2nd line (2nd key function)

No assignments

3rd line (keys)

T	Timer
Z	Counter
S	Step *
.	Dot *
CLR	CLEAR, for acknowledging errors, aborting functions or clearing the display

The functions marked * are intended for later expansions.

4th line (2nd key function)

EW Word input *
AW' Word output from the coupler area *

5th line (keys)

E Binary input *
A' Binary output from coupler area *
SET For setting timers' and counters' setpoints
, Comma (for separating group and channel numbers)
= For selecting timers and counters

6th line (2nd key function)

AW Word output *
+ Plus (sign) *
- Minus (sign) *

7th line (keys)

A Binary output *
D Hexadecimal 13
E Hexadecimal 14
F Hexadecimal 15
/ For selecting specific variables *

8th line (2nd key function)

MW Word flag *

9th line (keys)

M Flag *
A Hexadecimal 10
B Hexadecimal 11
C Hexadecimal 12
→ Cursor right

10th line (2nd key function)

EW' Word input from coupler area *
1S 1 second time base

11th line (keys)

E' Bit input from coupler area *
7 Seven
8 Eight
9 Nine
← Cursor left

12th line (2nd key function)

MW' Word flag from coupler area *
0.1S 0.1 second time base

13th line (keys)

M' Bit flag from coupler area *
4 Four
5 Five
6 Six
↑ For selecting a function in AUX mode

14th line (2nd key function)

0.01S 0.01 second time base

15th line (keys)

DEC Decrement, for selecting previous timers/counters
1 One
2 Two
3 Three
↓ For selecting a function in AUX mode

16th line (2nd key function)

No assignments

17th line (keys)

INC Increment, for selecting successive timers/ counters
0 Zero
CNV Hexadecimal, decimal display
ENT Enter
STA To terminate inputs and to execute functions

5 General details of operation

- a. The required mode is selected by pressing the mode keys:

MON

AUX

- b. The functions are each selected with the arrow keys (up or down). Confirm selection by pressing the enter key:

↓

↑

CLR

- c. A function is executed by pressing the STA key:

STA

- d. The CLR key serves to abort a function, to acknowledge an error message or to delete an incorrect input:

CLR

The functions marked * are intended for later expansions.

6 Switching the 07 BG 60 on/off

6.1 Switching on (ON-LINE)

After connection to a central unit or a remote I/O coupler, the 07 BG 60 has OFF-LINE status.

Display:

OFF-LINE
V1.06

Input:

GRS

Display:

BACKLIGHT ON?
PUSH MODE KEY

Input:

STA

with back lighting

CLR

without

Display:

07 BG 60 START
PUSH MODE KEY

6.2 Switching off (OFF-LINE)

Important: It is absolutely necessary to switch the 07 BG 60 to OFF-LINE status before disconnecting it from the controller. (Pay attention to the note on the rear of the unit.)

Input:

GRS

GRS

STA

6.3 Password

(See also Chapter 7, Section 7.3 "Modifying the password")

After switching on, the 07 BG 60 checks whether or not a password is registered in the controller's memory. If a password has been entered during previous work with the 07 BG 60, it will prompt you before allowing ON-LINE operation.

Display:

PASSWORD
=XXXX

The password xxxx is a four-digit hexadecimal number within the range from 0000_H to FFFF_H.

Confirm by pressing:

STA

If you enter an invalid password, the entered characters will be cleared and an audible signal will be sounded.

Note: A registered password cannot be modified when using the programming and test software 907 PC 32. Access to the controller is always possible with 907 PC 32.

7 Functions in AUX mode

7.1 Back light on/off

Input:

AUX

Display:

L C D D I S P L A Y
P U S H K E Y

Input:

ENT

Display:

B A C K L I G H T
X X X

xxx = status ON or OFF. Select with an arrow key:

↓

Execution:

STA

Note: If activated, backlighting will shorten the LCD display's useful life. Therefore, backlighting should be switched off immediately after use.

7.2 Buzzer high/low/off

When an input is made, an audible signal (buzzer) will additionally be sounded in confirmation. Whenever the buzzer is deactivated, an audible signal will nevertheless be heard if an operating error is made or if an error message should appear.

Input:

AUX

↓

Display:

B U Z Z E R
P U S H K E Y

Input:

ENT

Display:

B U Z Z E R
X X X

xxx = select the status HIGH (high tone), LOW (low tone) or OFF with the arrow key:

↓

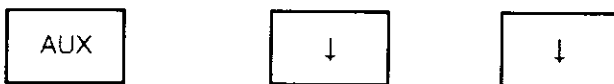
Execution:

STA

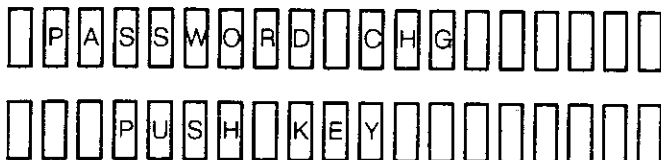
7.3 Modifying the password (PASSWORD CHG)

This function serves to enter a new password or to modify one that has already been registered.

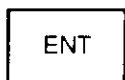
Input:



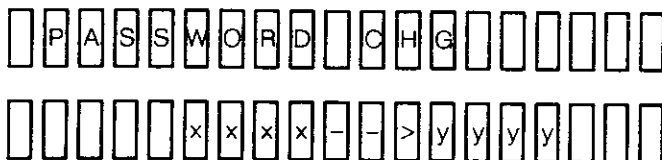
Display:



Input:



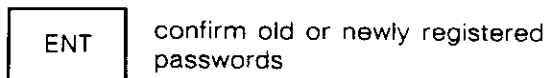
Display:



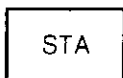
xxxx = old password, if registered
yyyy = new password

The password consists of four digits and is hexadecimal within the range from 0000_H ... FFFF_H.

Input:



Execution:



Important: If the central unit of the ABB Procontic T200 has the RUN status, pressing the STA key will switch it to HLT status for the duration of the change.

8 Functions in MON mode

8.1 Display of timer

8.1.1 ABB Procontic T200 timers

The programming and test software 907 PC 32 is used to allocate a setpoint and a time base (exponent) to the timers. Setpoints can be allocated with the aid of a constant (e.g. #W 100) or with the contents of a word flag (MW xxx,yy).

Important: When using the hand-held monitoring tool 07 BG 60 and when creating a PLC program, it must be borne in mind that, in this case, setpoint allocation is only supported by way of word flags. The relationship between the time address and word flag address is fixed.

The ABB Procontic T200 has 256 timers:

Time address	Word flag address for setpoint
T 00,00 ... T 00,15	MW 032,00 ... MW 032,15
T 01,00 ... T 01,15	MW 033,00 ... MW 033,15
T 02,00 ... T 02,15	MW 034,00 ... MW 034,15
T 03,00 ... T 03,15	MW 035,00 ... MW 035,15
T 04,00 ... T 04,15	MW 036,00 ... MW 036,15
T 05,00 ... T 05,15	MW 037,00 ... MW 037,15
T 06,00 ... T 06,15	MW 038,00 ... MW 038,15
T 07,00 ... T 07,15	MW 039,00 ... MW 039,15
T 08,00 ... T 08,15	MW 040,00 ... MW 040,15
T 09,00 ... T 09,15	MW 041,00 ... MW 041,15
T 10,00 ... T 10,15	MW 042,00 ... MW 042,15
T 11,00 ... T 11,15	MW 043,00 ... MW 043,15
T 12,00 ... T 12,15	MW 044,00 ... MW 044,15
T 13,00 ... T 13,15	MW 045,00 ... MW 045,15
T 14,00 ... T 14,15	MW 046,00 ... MW 046,15
T 15,00 ... T 15,15	MW 047,00 ... MW 047,15

Value range for timers:

00001 ... + 32767 (contents of the word flag)

Time base:

E1 = 10 ms = 0.01 s (for T 00,00 ... T 03,15 only)
E2 = 100 ms = 0.1 s
E3 = 1000 ms = 1 s

After selection of the respective time, the 07 BG 60 shows its setpoint and actual value, whereby the setpoint corresponds to the contents of the affiliated word flag. The corresponding setpoint and the time base are allocated if the setting condition for the time is fulfilled. If the start condition for the time is fulfilled, the actual value is updated in the rhythm of the displayed time base.

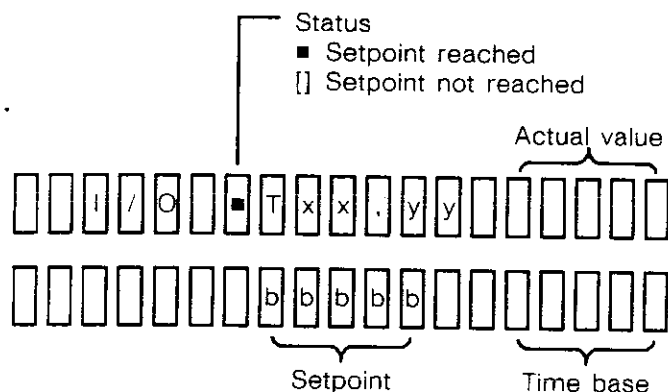
907 PC 32 program:

```
=S   Txx,yy   Set the setpoint for Txx,yy
#E   a        a = 1...3, time base 0.01 s; 0.1 s; 1 s
MW   aaa,bb   Setpoint = contents of the word
                    flag aaa,bb
!    Cond.    Start condition for Txx,yy
=    Txx,yy   Start Txx,yy
```

8.1.2 Selecting timers

MON = T x x , y y STA

Display:



Predecessor and successor times can be selected directly.

Input:



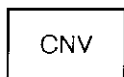
The message

NOT FOUND

is displayed if a time is selected which does not exist in the program.

The display of the actual value can be converted to hexadecimal:

Input:



8.2 Display of counters

8.2.1 ABB Procontic T200 counters

A setpoint is allocated to the counters with the aid of the programming and test software 907 PC 32. The setpoints can be allocated with the aid of a constant (e.g. #Z 100) or with the aid of a word flag's contents (MW xxx,yy).

Important: When using the hand-held monitoring tool 07 BG 60 and when creating a PLC program, it must be borne in mind that, in this case, setpoint allocation is only supported by way of word flags. The relationship between the counter address and word flag address is fixed.

The ABB Procontic T200 has 256 counters:

Counter address	Word flag address for setpoint
Z 00,00 ... Z 00,15	MW 048,00 ... MW 048,15
Z 01,00 ... Z 01,15	MW 049,00 ... MW 049,15
Z 02,00 ... Z 02,15	MW 050,00 ... MW 050,15
Z 03,00 ... Z 03,15	MW 051,00 ... MW 051,15
Z 04,00 ... Z 04,15	MW 052,00 ... MW 052,15
Z 05,00 ... Z 05,15	MW 053,00 ... MW 053,15
Z 06,00 ... Z 06,15	MW 054,00 ... MW 054,15
Z 07,00 ... Z 07,15	MW 055,00 ... MW 055,15
Z 08,00 ... Z 08,15	MW 056,00 ... MW 056,15
Z 09,00 ... Z 09,15	MW 057,00 ... MW 057,15
Z 10,00 ... Z 10,15	MW 058,00 ... MW 058,15
Z 11,00 ... Z 11,15	MW 059,00 ... MW 059,15
Z 12,00 ... Z 12,15	MW 060,00 ... MW 060,15
Z 13,00 ... Z 13,15	MW 061,00 ... MW 061,15
Z 14,00 ... Z 14,15	MW 062,00 ... MW 062,15
Z 15,00 ... Z 15,15	MW 063,00 ... MW 063,15

Value range for counters: 00000 ... 65535 (contents of the word flag)

When allocating by way of word constant, only a range up to + 32767 is possible. If setpoints are higher, these are entered hexadecimally with the programming and test software 907 PC 32.

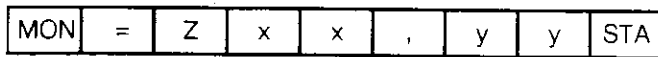
After the respective counter has been selected, the 07 BG 60 shows its setpoint and actual value, whereby the setpoint corresponds to the respective word flag's contents. The corresponding setpoint is allocated if the setting condition to the counter is fulfilled. If the counting condition for the counter is fulfilled, the actual value is updated in the rhythm of the counting clock.

907 PC 32 program:

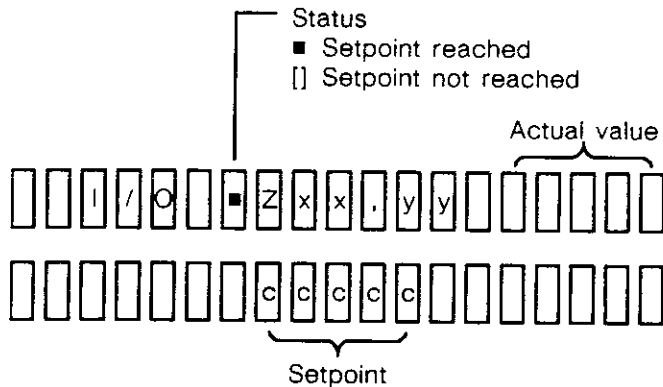
```
=S   Zxx,yy   Set the setpoint for Zxx,yy
MW   aaa,bb   Setpoint = contents of the word
               flag aaa,bb

!    Count    Counting input for Zxx,yy
=    Zxx,yy    Counter Zxx,yy
```

8.2.2 Selecting counters



Display:



Predecessor and successor counters can be selected directly:

Input:



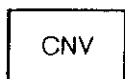
The message

NOT FOUND

is displayed if a counter is selected which does not exist in the program.

The display of the actual value can be converted to hexadecimal:

Input:



8.3 ON-LINE modification of timer set-points and time bases

8.3.1 Important notes

8.3.1.1 Modification (word flag contents)

When a timer setpoint is modified, merely the contents of the affiliated word flag of the controller are overwritten. This, as the result of the program, the word flag's contents are overwritten again, the setpoint modified with the 07 BG 60 is valid.

A continuous setpoint allocation must be realized in the program if the modified setpoints are to be adopted immediately.

Example:

```

I  M   126,04      Flag always "1"
=S T    00,00
#E2
   MW  032,00      Word flag for timer setpoint
  
```

8.3.1.2 Updating

The setpoint display is not updated cyclically. If modified by the program, the setpoint is displayed correctly after the timer has been selected again (e.g. with INC, DEC).

8.3.1.3 Modifying the time base

When the time base is modified, it is overwritten in the user program (program memory). When modifying a timer setpoint, you are therefore advised to retain the original time base so that the program created with 907 PC 32, possibly in the Function Block Diagram, will agree with the one stored in the program memory of the ABB Procontic T200.

8.3.1.4 Modification when the timer has started

The following relating to the reaction to modifications of a timer setpoint and the time base once the timer has started will be explained by reference to an example:

If the setpoint 400 (time base 0.1 s) = 40 s was registered, the actual value is counted up to 400 in a 0.1 s rhythm. If the time is to be increased within the 40 s to 50 (time base 1 s) = 50 s, the actual value now applies with a time base of 1 s. If the actual value has reached 150 (time base 0.1 s), for instance, and so the time of 40 s has not yet elapsed, any output to be allocated after expiry of the timer will be set immediately on adoption of the new setpoint of 50 (time base 1 s) because the "counted value" of 50 has already been exceeded and a new time base applies.

8.3.1.5 Later entry of setpoints

After the time base has been modified with the 07 BG 60 and left in the program memory of the ABB Procontic T200, the new timer must be added later in the program created with 907 PC 32.

8.3.1.6 Using the program memory 07 PR 62/63

It is not possible to modify the time base when using the program memories

07 PR 62 and 07 PR 63.

8.3.1.7 HALT on modification

During modification, the central unit switches to HLT status.

8.3.1.8 Range for time base for 0.01 s

The time base E1 = 10 ms = 0.01 s can only be selected for timers T 00,00 to T03,15.

8.3.2 Selection

Select the timers as described in Chapter 8, Section 8.2.

8.3.3 Modification

Input:



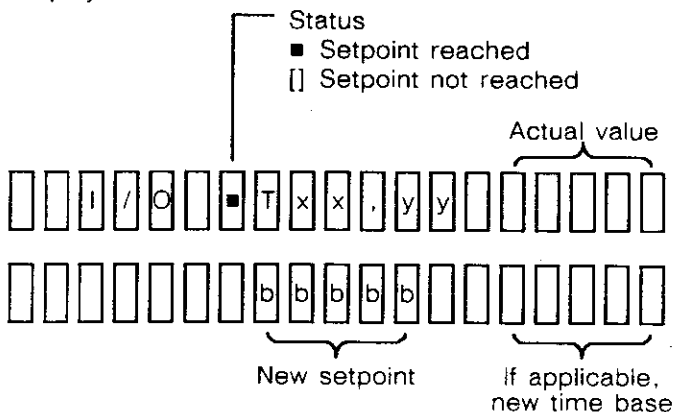
0.1S

1S

Time basis selection

bbbbbb = new time setpoint

Display:



8.4 ON-LINE modification of counter setpoints

8.4.1 Important notes

8.4.1.1 Modification (contents of the word flag)

When a counter setpoint is modified, merely the contents of the affiliated word flag in the controller are overwritten. If, as the result of program, the word flag's contents are overwritten again, the setpoint modified with the 07 BG 60 is invalid.

A continuous setpoint allocation must be implemented in the program if the modified setpoints are to be adopted immediately.

Example:

!	M	126,04	Flag always "1"
=S	Z	00,00	
	MW	048,00	Word flag for timer setpoint

8.4.1.2 Updating

The display of the setpoint is not updated cyclically. If modified by the program, the setpoint will be displayed correctly once the counter has been selected again (e.g. with INC; DEC).

8.4.1.3 HALT for modification

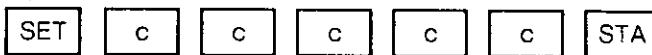
The central unit switches to HLT during modification.

8.4.2 Selection

Select the counters as described in Chapter 8, Section 8.2.

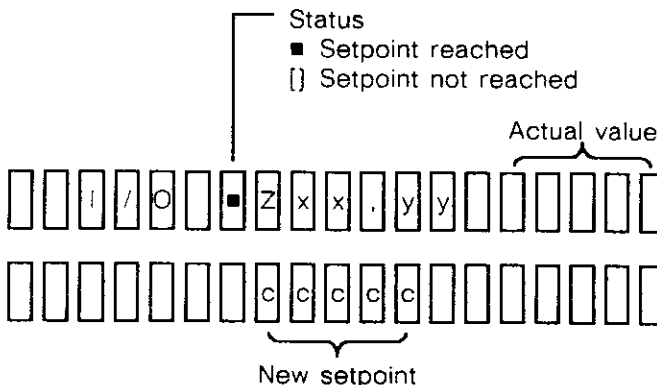
8.4.3 Modification

Input:



cccccc = new counter setpoint

Display:



8.5 Buffering of timers and counters

The corresponding area must be specified in the configuration menu "flag configuration" of the programming and test software 907 PC 32 if it is intended to buffer timers and counters.

8.5.1 Buffering of setpoints

The setpoints are not buffered. If a constant (#W xxxxx or #Z xxxxx) has been allocated to the timers or counters of a setpoint, it must be allocated again if the power should ever fail.

If a setpoint is allocated by way of word flags, these word flags can be specified as buffered by configuration using the programming and test software 907 PC 32. This will ensure buffering of the setpoints on activation of the power (allocation of the word flag's contents as timer/counter setpoints with each cycle start).

8.5.2 Buffering of actual values

If it is intended to buffer the actual value of a timer or counter, the buffered area for timers or counters must be specified during the course of configuration of the flag areas using the programming and test software 907 PC 32. Any area can be selected if it is intended only to buffer actual timer or counter values. However, a coherent area must be selected for buffering actual timer and counter values.

Example: It is intended to buffer the actual timer values T 10,00 to T 15,15 and the actual counter values Z 00,00 to Z 09,15

Timers: T 10,00 – 15,15

Counters: Z 00,00 – 09,15

Important: If no coherent area is specified for timers and counters, no error message will be issued and the complete area will nevertheless be buffered.

Example: Input in configuration of the programming and test software 907 PC 32:

Timers: T 10,00 – 12,03

Counters: Z 02,05 – 06,03

The following area is buffered:

Timers: T 10,00 – 15,15

Counters: Z 00,00 – 06,03

9 Short-form operating instructions

- (1) Select the mode by pressing the mode keys **MON** , **AUX**
- (2) Select the functions with the arrow keys **↓** or **↑** and **ENT**
- (3) Execute the selected function by pressing the key **STA**
- (4) Acknowledge error messages and abort a selected function by pressing the **CLR** key

No.	Function	Procedure	Remarks
1	Display of timers/counters	<pre> graph TD MON[MON] --> EQ[=] EQ --> T[T] EQ --> Z[Z] T --> T1[Timer xx,yy] Z --> C1[Counter xx,yy] T1 --> STA[STA] C1 --> STA STA --> FWD{for-ward} FWD -- yes --> INC[INC] INC --> FWD FWD -- no --> EQ FWD --> BWD{back-ward} BWD -- yes --> DEC[DEC] DEC --> BWD BWD -- no --> EQ </pre>	
2	Modification of timers/counters, setpoints/time bases	<pre> graph TD MON[MON] --> EQ[=] EQ --> T[T] EQ --> Z[Z] T --> T1[Timer xx,yy] Z --> C1[Counter xx,yy] T1 --> STA[STA] C1 --> STA STA --> SET[SET] SET --> 0.01s[0.01s] SET --> 0.1s[0.1s] SET --> 1s[1s] 0.01s --> DOTS[....] 0.1s --> DOTS 1s --> DOTS DOTS --> STA </pre>	For counters, enter the setpoint only For timers, enter the time base and setpoint

No.	Function	Procedure	Remarks
3	Back-lighting on/off	<pre> graph LR AUX[AUX] --> ENT[ENT] ENT --> D1[↓] D1 --> STA[STA] STA --> ENT </pre>	Deactivate backlighting on completion
4	Buzzer	<pre> graph LR AUX[AUX] --> D1[↓] D1 --> ENT[ENT] ENT --> D2[↓] D2 --> STA[STA] STA --> ENT </pre> HIGH/LOW/OFF selection	High tone Low tone Off
5	Password	<pre> graph LR MON[MON] --> D1[↓] D1 --> D2[↓] D2 --> ENT[ENT] ENT --> set{set} set -- no --> OP[old password] OP --> STA1[STA] set -- yes --> mod{mod.} mod -- yes --> NP[new password] NP --> STA2[STA] mod -- no --> dots[....] dots --> STA2 </pre>	4 hexadecimal characters

10 Error messages

10.1 System

No.	Display	Cause	Remedy
1	CHANGE ERROR	The setpoint cannot be modified.	Press the [CLR] key and if necessary, repeat the function
2	CPU MEMORY ERROR	Invalid system configuration	Select OFF-LINE with the [GRS] key and check the configuration
3	MEMORY ASSIGN ERROR	Invalid data (program) in the central processing unit's memory	Select OFF-LINE with the [GRS] key and check the configuration
4	NO PROGRAM	No program in the program memory	Select OFF-LINE with the [GRS] key and check or if necessary, transfer the program
5	NOT FOUND	Selected timer(s)/counter(s) not found	
6	ROM MEMORY ERROR	Function not possible with the program memory 07 PR 62/07 PR 63	Modify time value only and use the same time base

10.2 07 BG 60

No.	Display	Cause	Remedy
1	E – 01	ROM error, system ROM in the 07 BG 60 defective	If necessary, replace the unit
2	E – 02	RAM error, system RAM in the 07 BG 60 defective	If necessary, replace the unit
3	Not defined	Processor malfunction	Disconnect the connection to the ABB Procontic T200 and then connect the unit again



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