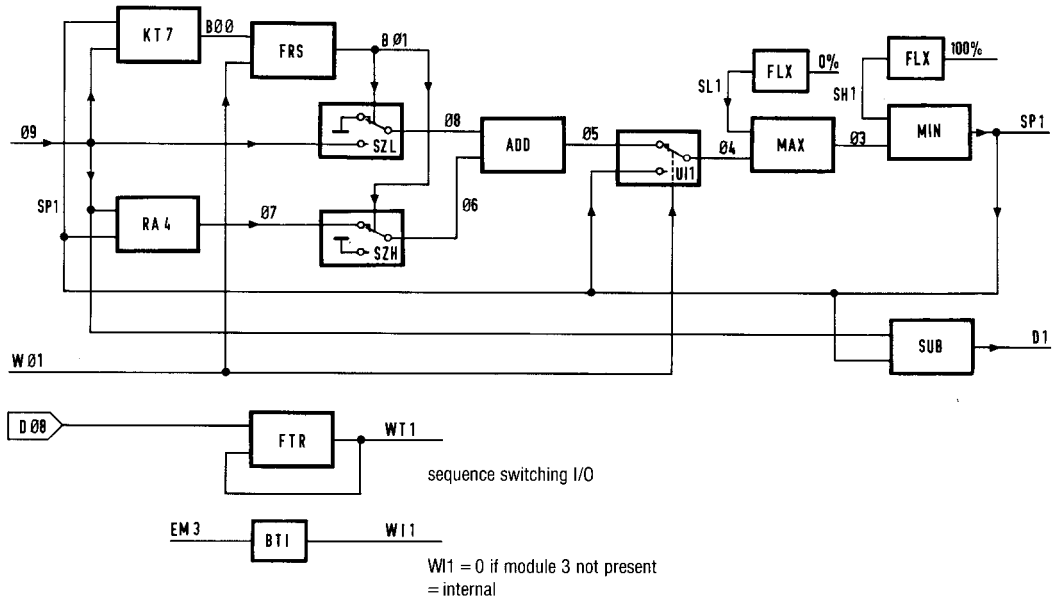
Configuration instructions 42/61-27 EN Rev. 03



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1 Introduction

These instructions contain a description of the software functions of the Digitric P to the extent that they are necessary for compiling customized configurations.

A knowledge of special programming languages is not required. The only assumption made is conversancy with the Operating Manual of the instruments, since the same designations and abbreviations are used.

As a rule a PC (IBM or compatible) is used for compiling configurations. The Configuration program DIGIKON, which is available for this purpose, is to a large extent self-explanatory so that major sections of these instructions are not required.

If the configuration program is not available modifications to the configuration may also be entered via the Digitric P operator level. This procedure, however, calls for prior conversion of all orders into hexadecimal figures and should consequently be only used as an "emergency" for modifying a few commands.

The following terms are used in the Configuration Instructions:

Bit:	Information with the value 1 = yes, and 0 = no
Byte:	Information in an 8-bit-wide memory location e.g.: 11010101 corresponds to hexadecimal D5H and decimal 213
Nibble:	Four-bit-wide part of a byte
High-nibble:	High-order part of a byte 1101 = hexadecimal DH = decimal 13 from the above example
Low-nibble:	Low-order part of a byte 0101 = hexadecimal 5H = decimal 5 from the above example
Value:	Analog values are displayed in Digitric P as 16 bit = 2 byte-wide information, e.g. decimal 100.0% = hexadecimal BE80H = binary 1011 11101000 0000
High byte:	High-order byte, consisting of two bytes, BEH, from the above example
Low byte:	Lower-order byte, consisting of two bytes (80H, from the above example)

The configuration instructions are based on the Digitric P software status index "N". Software updates are to be found in the appendix.

2 Memory organization

The controller firmware is stored in various memory modules.

2.1 Main and auxiliary processor

Essential parts of the firmware are stored in the masks of both processors. They cannot be modified.

2.2 EPROM (IC 17)

The EPROM IC 17 contains among other things the standard configurations and the special configurations or parameter, saved by the manufacturer or customer.

2.3 RAM

The RAM contains the active configuration, value lists and copies of the internal RAM of the processor. It is protected against loss of data by means of a back-up battery.

The value lists are stored in the area 8000H to 81FFH. The processor takes the values required for each calculation from it and saves the values again in this area. Additional memory locations are available in area 8200H to 83FFH for integrators and time elements.

		00 67 | 68 D7 | D8 FF	
	80..	Value list low byte	
	81..	Value list high byte	
	82..	Value list supplement for integrators etc.	
	83..	Value list supplement for integrators etc.	
	84..	Op-codes (analog)	Control code area 1
	85..	Source variable 1 (SR1)	Control code area 2
	86..	Source variable 2 (SR2)	Control code area 3
	87..	Op-code (binary)	Control code area 4
	88..	SR1	Control code area 5
	89..	SR2	Control code area 6
	8A..	Op-codes (analog)	Control code area 1
	8B..	Source variable 1 (SR1)	Control code area 2
	8C..	Source variable 2 (SR2)	Control code area 3
	8D..	Op-code (binary)	Control code area 4
	8E..	SR1	Control code area 5
	8F..	SR2	Control code area 6
9000 to 9FFFH		Informations (see external RAM, Section 12.5)	

The contents of addresses 8400H to 89FFH determine the controller function.

Here the op-codes determine the mathematical combination of both source variables. The control codes control the display, switch and other functions.

The working area 8400H to 89FFH is repeated as editor area 8A00H to 8FFFH. Configurations may be prepared in this range without adversely affecting the controller's running function.

Modified functions can be saved in the EPROM, with only the contents of the working area, but not the value lists, being copied into the EPROM. If values from value list are also to be saved, they must be copied into the working or editor area of the RAM before saving with "St.PA" (see FIX, FLX, PTx, PWx).

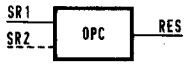
3 Structure of commands

3.1 General

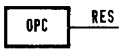
The Digitric P features various command codes (operation codes = op-codes)[1]:

a) Computation commands: The computation commands calculate a result from two input variables e.g. addition, multiplication,...

b) Transfer commands: Calculate a result from the value of an input variable e.g. square rooting, squaring, absolute value,...



c) Value assignments: An analog or binary value is assigned to a variable, e.g. FIX, FLX, BTN,...



d) Empty command: NOP = "No command". The relevant variable is not processed. Its value cannot be defined.

Another division of the OP-codes can be obtained when they are classified acc. to the computation operations:

a) OP-codes for logic combination of analog values:
e.g. square rooting = transfer command
addition = computation command

b) OP-codes for logic combination of binary values:
e.g. inversion = transfer command
exclusive Or = computation command

c) OP-codes for logic combination of analog and binary values:
e.g. switches or comparators

The same syntax applies for all these commands:

RESult: (=) OP code, Input1, Input2

or briefer

RES: OPC, SR1, SR2

RES = result
OPC = Op-code
SR1 = 1st input
SR2 = 2nd input

Transfer commands require only input 1. If a variable is also entered for the second input it shall be ignored.

Examples:

DIR

RES : DIR, SR1

The value of variable SR1 is copied to variable RES. The command line has the same meaning as:

RES : DIR, SR1, SR2

Specification of SR2 is ignored.

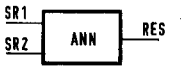
[1] The op-codes are identical to the op-codes of Protronic P, the syntax has been slightly changed to distinguish from variable names.

ADD

RES : ADD, SR1, SR2

This command adds the values of both input variables SR1 and SR2 and saves the result in the result variable.

ANN



RES : ANN, SR1, SR2

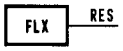
This command combines the binary inputs acc. to the rules of Boolean algebra with "AND" and assigns the result to the binary result variable.

SIH (**S**witch **I**nverted if SR2 = „**H**")

RES : SIH, SR1, SR2

This command copies the value of SR1 into the result variable as long as the binary value of input 2 is "0" = "**L**". If input 2 goes to "1" = "**H**" the inverted value of SR1 is entered into the result variable.

FLX



RES : FLX, # +100.0

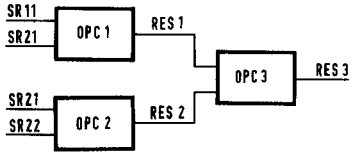
The value 100.0 % is assigned to the result variable. This value can be modified via the operator keys.

3.2 Structure of command sequences

The various op-codes may be used as often as the amount of space available permits.

A calculated result can be used as input at any number of subsequent transfer or computation operations.

Extensive and complicated calculations can be carried out by linking several commands, resulting in the following pattern:



RES1: OPC1, SR11, SR12
RES2: OPC2, SR21, SR22
RES3: OPC3, RES1, RES2

Example:

SR11 = Input 1 (E1) OPC1 = ADD = addition
SR12 = Input 2 (E2)
SR21 = Input 3 (E3) OPC2 = SUB = subtraction
SR22 = Input 4 (E4)
OPC3 = MUL = multiplication

RES3 = (E1 + E2) · (E3 − E4)

4 Instructions for structuring customized configurations

4.1 Task definition

The application envisaged gives rise to a task which is to be performed by Digitric P. This most vital step in solving the problem is an exact description of all demands and conditions as well as all (measuring) ranges.

If this description is available, the total complex must be subdivided until it can be described by the command lines. As an aid for accomplishing this task, please consult the examples in Section 7 and 11 of these Instructions as well as the Technical Information documents on Digitric P and Protronic P.

Practically all tasks can be viewed as a modification of an existing standard configuration. The special configuration is confined to the part to be modified, with the major part of the standard configuration generally remaining unchanged. Location of the interface is facilitated by the hook-up lists of the standard configurations in Section 11 and their graphic display in Section 10.

4.2 Value range

In Digitric P all values in the range between −3996 and +3996 are calculated. This range is displayed as −199.9 to +199.9 % if no user range specification has been given for the respective variable.

If this range is overshot, the result takes on the greatest numerical value possible.

Examples of incorrect comptation results:

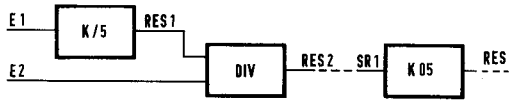
$-150.0\% - 100.0\% = -199.9\%$ instead of -250.0%
$150.0\% + 100.0\% = +199.9\%$ instead of $+250.0\%$
$150.0\% \cdot 150.0\% = +199.9\%$ instead of $+225.0\%$
$100.0\% : 10.0\% = +199.9\%$ instead of $1000.0\% = 10$

It is therefore a matter of converting the output formulas such that the permissible limits are not overshot even under extreme conditions.

This conversion is not possible with certain types of computation. In the case of division, the result is always invalid if the denominator is less than half as large as the numerator. If results are also of importance for denominator values below this limit, input 1 (numerator) must be subdivided by a single factor. After division it is generally possible to cancel the dividing factor again in the course of further calculation. Accordingly, the validity range of the denominator can be extended, however, the value 0.0 % continues to be impossible in the numerator.

Example 1:

Input 1: 0...100 %
Input 2: 0...100 % Result should be valid when input 2 > 10.0 %



$$RES\,1 = \frac{E1}{5} \qquad RES\,2 = \frac{1}{5} \cdot \frac{E1}{E2} \qquad RES\,n = 5 \cdot SR1$$

Example 2:

The following calculation is to be made:
(E1 and E2 are within the range 0 to 100.0 %)

$$RES = \frac{20.0\% + E1}{40.0\% + E2} \cdot 0.4$$

The fraction obtains the value 3 for E2 = 0.0 % and E1 = 100.0 %. There are two means of obtaining correct answers.

a) Calculate the constant factor 0.4 into the numerator before dividing by the denominator

$$RES = \frac{8.0\% + 0.4 \cdot E1}{40.0\% + E2}$$

b) Extending the denominator

$$RES = \frac{20.0\% + E1}{(3/2 \cdot 40.0\% + 3/2 \cdot E2) \cdot 2/3} \cdot 0.4$$

$$RES = \frac{20.0\% + E1}{60.0\% + 1.5 \cdot E2} \cdot 0.6$$

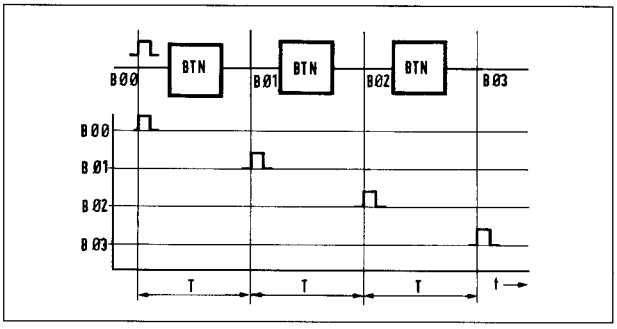
4.3 Signal flow diagram

A signal flow diagram is drawn from the exact task definition, using the computation and transfer modules available. The computation and transfer commands are used as autonomous computation units and are combined together in a suitable manner. Instead of the piping in the pneumatics and the wiring in the electronics, the nomenclature is used for all outputs of the modules being used.

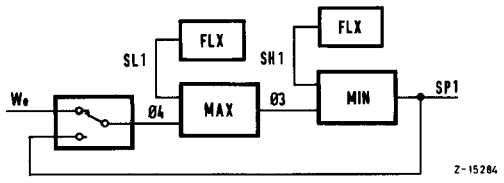
4.4 Determination of the variable names

Each output of a computation or transfer module must answer to an individual name, i.e. a variable or its hex address. The variable names available as well as their hex addresses are listed in Section 12.3 and 12.4. The names can to a large extent be selected freely from this list. The following restrictions apply:

1. No variable can be used twice.
2. The variables have preferably the significance described in Section 12.3 and 12.4. When used for several channels, variables not designated as "intermediate variables" are automatically assigned to the respective channel in the displays.
3. Analog variables are calculated with descending hex address, beginning with Z. = FFH. To expedite value calculations, variables with descending hex addresses should be used in the direction of the signal flow. If the variables in the signal flow direction are given ascending addresses, one cycle per module is required for calculating each result.
4. Binary variables are calculated in a single cycle. The result of these calculations are available to all binary variables in the next cycle after making the calculation. If several binary combinations are switched in succession, a cycle per combination is required for calculating each result. If binary signals are required at different times, this processing method must be observed.



5. If loops are configured (e.g.) for an integrator, the variables must be arranged such that they can be processed in a single cycle (i.e. descending hex addresses in the signal flow direction). The module at whose output the highest hex address and the lowest address at an input meet, can be selected arbitrarily. If a variable in the loop is to be adjusted with keys A or V, it must be given the lowest address in the loop.



6. The analog variables with addresses D8H to FFH can only be used as source variables.
7. The binary variables with bit addresses 00H to 67H can be configured as RESult and source variable. If less than four channels are activated the variables reserved (e.g. CT2 to CT4 in a single-channel controller) for the channels not in use, are also available as intermediate variables to be used freely. The variables with bit addresses 68H to FFH are available only as source variables.

4.5 Noting the configuration text

The configuration is now determined from the signal flow diagram, which is supplemented by variable names, by noting the input and output variables for each computation module (op.-code) with op-code.

RES : OPC, SR1, SR2

5 Entering the configuration text

5.1 Computer (personal computer)

The configuration text is generally entered via a PC and transferred to the controller.

The configuration lines may be entered in any order. The program offers further assistance.

5.2 Entry via the front of unit

In special cases it is also possible to enter the configuration lines (hexadecimal code) via the controller front. Since this method is erroneous, intricate and error-prone, it should only be used in special cases and be confined to minor modifications.

5.2.1 Preparation

Before the configuration can be entered into the controller, all variable names must be replaced by their hex address and the Op-codes by the corresponding hex codes.

From

RD1 : SUB, R1, SP1, 11H : 49H, 10H, 15H is formed.

To enter the absolute values for the op-codes FIX, FLX, PTx, ... the latter must be converted into hex. figures, using the tables in Section 12 or by manual conversion.

The following computation regulations apply:

Positive values: value (in %) · 160 + 32768
Negative values: value (in %) · 160

The decimal value which has been thus determined must be converted into a 4-digit hex figure.

Example:

50.0% · 160 = 8000
32768
40768

Conversion into hex:

40768 : 16 = 2548 Rest 0 (decimal) = . . . 0H
2548 : 16 = 159 Rest 4 (decimal) = . . 4 H
159 : 16 = 9 Rest 15 (decimal) = . F H
9 : 16 = 0 Rest 9 (decimal) = 9 H
40768 decimal = 9F40 hexadecimal

The decimal point position in the display can be determined by changing the last digit, without changing the computation value in the process.

Last digit	Decimal point position
0	xxx.x
1	xx.xx
2	x.xxx
3	xxxx

The result which has been thus calculated is to be divided into high byte 9FH and 40H low byte.

The low byte is entered as source variable 1 and the high byte as source variable 2 into the configuration line.

From

PB1 : FLX, # +0.50 0FH : A5H, 40H, 9FH is formed.

In the case of FLX, PTx and PWx (not FIX) any arbitrary value between 00H and FFH can also be used for the time being for low byte and high byte in the configuration and after entry into the controller, the values which are actually required are set on the unit. Of course, one should not forget to copy the set values into the configuration via "store parameter".

5.2.2 Determination of the memory addresses

When determining the memory addresses, it must be decided whether data are to be entered directly into the working area or initially only into the editing area. They are effective and thus verifiable only in the working area.

In the following, the addresses in the working area shall be specified directly and the addresses in the editor area in ().

Analog variable

Op-code	in 84xxH (8AxxH)
Source variable 1	in 85xxH (8BxxH)
Source variable 2	in 86xxH (8CxxH)

Binary variable

Op-code	in 87xxH (8DxxH)
Source variable 1	in 88xxH (8ExxH)
Source variable 2	in 89xxH (8FxxH)

xx represents the hex address of the respective result variable.

5.2.3 Entry into the controller

The auxiliary routine "**d.CtL**" is used for entering the configuration data in the controller.

Calling and use of all auxiliary routines are described in Operating Manual 42/61-29- EN in section 3.1.10.

The auxiliary routine is called by pressing and holding both the key ◀ and ▶, and tipping the display changeover switch (1). Then "nor" appears in the display (5)[1]. The auxiliary routines can be selected with keys ▼ or ▲. The auxiliary routine displayed is not yet active, as long as the corresponding display flashes. If one wishes to switch from an active routine to another routine, proceed as for the first call (press keys ◀ and ▶ and (1)).

The auxiliary routines are exited by actuating again the three keys ◀ and ▶ and (1). Then one can page forward to "norm." with ▼ and ▲ or select "norm." directly with I/E key.

"E", "C", "d" or "b" appears in the display (9), in each case with a two-digit hex figure. This hex figure is the contents of the address shown in the display (5).

"E" must be selected with key (1) to enter the configurations. Then the required address can be selected with keys ▲ and ▼, with initially only the figure, to which the decimal point is currently assigned as a cursor, being adjusted. This cursor is moved by simultaneously actuating the **I/E** key and one of the keys ▲ or ▼.

The monitor routines "C", "d" and "b" are of no significance in this respect.

1) The numbers in brackets () and the key symbols refer to the front views in Fig. 1. The front views are also shown on the rear fold-out page.

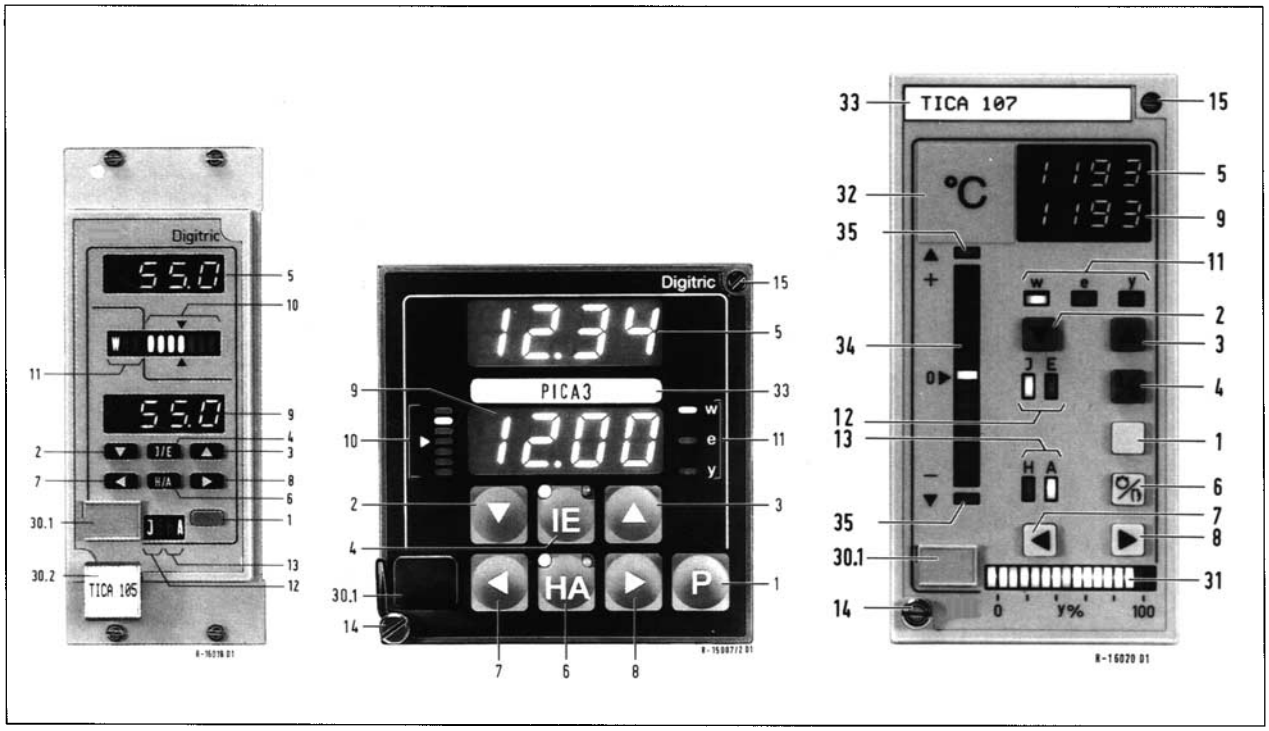


Fig. 1 Front view and standard function of the manual control elements

1 Display changeover switch
2 Universal setting key "lower" (marked in the text with ▼)
3 Universal setting key "more" (marked in the text with ▲)
4 Setpoint transfer switch (marked in the text with I/E key)
5 Upper display line (Controlled variable, variable names, error messages)
6 Manual/automatic switchover (marked in the text with H/A key)
7 Manual setting key "lower" (marked in the text with ◀)
8 Manual setting key "more" (marked in the text with ▶)
9 Bottom display line (Variable value, channel display)
10 Analog display for control deviation, controller output or switching state
11 Display of main variables, see (9)
12 Status display of setpoint internal/external
13 Status display of manual/automatic
14 Closing screw and slide-in unit handle
15 Additional closing screw
30.1 Cover for the configuration jack, designation plate
30.2 Designation plate (only for 19" plug-in card)
31 Output display/switching state
32 Adhesive plate for dimension indication
33 Inscription field

only for 72 mm x 144 mm format:

34 Control deviation display
35 LEDs for control deviation ± 10 %

6 Control codes

The control codes describe functions which cannot be described by the mathematical means of the configuration lines. The following table exemplifies these control codes for the basic configuration "411" (= single-channel on/off controller). The differences are displayed for the other configurations.

Address	Name	Value	Function
Control Code Field 1 ("General instrument functions"):			
General			
84D8H	KEYW	87	Key byte currently always = 87H
84D9H	DISPL	48	Display control bits:

Bit	7	6	5	4	3	2	1	0
Binary	0							

1 0 Lowest brightness (dark)
1 1 Highest brightness
0 Drop-back automatic off
1 Drop-back automatik on
0 0 Small display loop "L"
0 1 Medium display loop "E"
1 0 Large display loop "A"
0 0 XD Bargraph display (not for 72 mm x 144 mm)
0 1 Y bargraph display
1 0 Binary display
0 No meaning

84DAH	FILE_H	00	Configuration code number, high (no influence on function)
84DBH	FILE_L	00	Configuration code number, low (no influence on function)
Serial Interface:			
84DCH	BAUDR	FD	Baudrate of computer communication

Baudrate (Bd)	84 DC / 84 DDD
19200	FD
9600	FA
4800	F4
2400	E8
1200	D0
600	A0
300	40

84DDH	BAUDF	F4	Baudrate, configuration interface on front panel plate
84DEH	TOLNOTEL	0A	Permissible pause (in s) for telegram reception
84DFH	TOLNOFR	0A	Permissible pause (in s) for frame reception
84E0H	SERALENAB1	00	Mask for BWL03 for serial alarm value message
84E1H	SERALENAB2	00	Mask for BWL04 for serial alarm value message (Bit = 0: ignore alarm value)
Controller/Programmer:			
84E2H	CTYP_TIME12	04	Controller type/time range (index = channel): Low nibble = channel 1 or 3 High nibble = channel 2 or 4
84E3H	CTYP_TIME34	00	

Byte	Bit	7	6	5	4	3	2	1	0
84E2		Channel 2				Channel 1			
84E3		Channel 4				Channel 3			

00xx: Channel disabled: xx00: 1...1999s
10xx: Programmer: xx10: 1...19.99h
01xx: Continuous: xx01: 1...199.9min
11xx: Three-position: xx11: 0...1.999kh

84E4H	CONTF1	6D	Controller functions (index = channel):
84E5H	CONTF2	6D	
84E6H	CONTF3	6D	
84E7H	CONTF4	6D	

CONFG	I	D+	CHAR	P	VD	OSRC	D−

0xxxxxxx: Control bits CP_, CI_, CD_ ignored
1xxxxxxx: Control bits CP_, CI_, CD_ changed to AND elements
011x1xx1: PID, differentiation both sides
010x1xx0: PI

Address	Name	Value	Function
Controller/Programmer (continuation)			
84E7H (continuation)			xxx1xxxx: Direct action characteristic ("dir") xxx0xxxx: Reverse action characteristic ("inv.") xxxxx1xx: Vd = 4 xxxxx0xx: Vd = 1 xxxxxx1x: Differentiation control deviation xxxxxx0x: Differentiation variables RU.
84E8H	DPSCON1	84	Step action controller control code (index = channel):
84E9H	DPSCON2	84	(Switching behaviour in dead zone)

84E8H; 84E9H								
Bit	7	6	5	4	3	2	1	0
No actuating pulses	0	x	x	x	x	x	x	x
T_{on} = 7.5 * Xd/Xp	1	1	x	x	x	x	x	x
T_{on} = const. (0..63)*0.06s)	1	0	y	y	y	y	y	y

y = 1 or 0: gives binary number 0 to 63
Multiply the specified times with the factor $(1 + T^{on}/T^{off})$.
The actual smallest pulse time is 80 ms ± cycle length

84EAH	PGREP1	00	Programmer loop begin
84EBH	PGREP2	00	(Index = channel):
84ECH	CONTA	00	Bit 0: disable intelligent integrator control
84EDH		00	reserved
Input/Output:			
84EEH	FILT_E	00	Reserved for filter mode inputs
84EFH	FILT_A	00	Reserved for filter mode outputs
Hysteresis:			
84FOH	HYA	FA	
84F1H	HYB	FA	Hysteresis values for comparator modules
84F2H	HYC	FA	(1 LSB = 0.1 %, default value FAH = 25.0 %)
84F3H	HYD	FA	
Function switch:			
84F4H	Y12_MA	55	Mask for H/A switch channel 1 and channel 2
84F5H	Y34_MA	55	Mask for H/A switch channel 3 and channel 4

84F4H 84F5H								
Bit	7	6	5	4	3	2	1	0
Channel	Channel 2 or 4				Channel 1 or 3			
Display		A	HA	H		A	HA	H
Binary	0	1	0	1	0	1	0	1

84F6H	W12_MA	55	Mask for I/E switch channel 1 and channel 2
84F7H	W34_MA	55	Mask for I/E switch channel 3 and channel 4

84F6H 84F7H								
Bit	7	6	5	4	3	2	1	0
Channel	Channel 2 or 4				Channel 1 or 3			
Display		E	EI	I		E	EI	I
Binary	0	1	0	1	0	1	0	1

Weight factors XD display:			
84F8H	FAK_XD1	0A	Weight factor multichannel display
84F9H	FAK_XD2	0A	Weight factor bargraph display
			(1 LSB = 0.1 %, default value AH = 1.0 %)
Reference file:			
84FAH	REFILE	15	Code number reference file
			(similar or identical with the actual configuration)
			Standard configuration up to 7FH
			User configuration as 80H. Display in the unit of contents REFILE – 80 H.
			See also supplements, Index J.

Address	Name	Value	Function
Self-parameter setting			
84FBH	STCTL1	11	Enable and entry mode

Bit	7	6	5	4	3	2	1	0
Enable Channel					4	3	2	1
Automat. entry	4	3	2	1				
Binary								

84FCH	STCTL2	00	Monitoring of inputs per channel:

Bit	7	6	5	4	3	2	1	0
Binary								

xxxx xx00 E1 in channel 1
xxxx xx01 E2 in channel 1
xxxx xx10 E3 in channel 1
xxxx xx11 E4 in channel 1
xxxx abxx Input E1 to E4 in channel 2
xxab xxxx Input E1 to E4 in channel 3
abxx xxxx Input E1 to E4 in channel 4
(a and b = 0 or 1 as in channel 1)

84FDH	STCTL3	00	Automatic doubling of scan time

Bit	7	6	5	4	3	2	1	0
Channel					4	3	2	1
Binary								

84FEH	REFILE_B	00	Code number of the loaded standard configuration or of the standard configuration on which the user file is based (UFIL); see appendix, Index J.
84FFH	LOCK	00	01H = Software inhibit of the auxiliary routines for a selection from "Normal"; bit 0 80H = Automatic loading of the last user file after a disturbance; bit 7 (PROTECT-CONFI; see Technical Information 30/61-295 XA)

Control code field 2 ("variable modification"):

Modification of variables: (0 = modifiable)

85D8H	CRENAB00	00
85D9H	CRENAB08	00
85DAH	CRENAB10	00
85DBH	CRENAB18	00
85DCH	CRENAB20	00
85DDH	CRENAB28	00
85DEH	CRENAB30	00
85DFH	CRENAB38	00
85E0H	CRENAB40	00
85E1H	CRENAB48	00
85E2H	CRENAB50	00
85E3H	CRENAB58	00
85E4H	CRENAB60	00
85E5H	CRENAB68	00
85E6H	CRENAB70	00
85E7H	CRENAB78	00
85E8H	CRENAB80	00
85E9H	CRENAB88	00
85EAH	CRENAB90	00
85EBH	CRENAB98	00
85ECH	CRENABA0	00
85EDH	CRENABA8	00
85EEH	CRENABB0	00
85EFH	CRENABB8	00
85F0H	CRENABC0	00
85F1H	CRENABC8	00
85F2H	CRENABD0	00
85F3H	CRENABD8	00
85F4H	CRENABE0	00
85F5H	CRENABE8	00
85F6H	CRENABF0	00

G11	D1	C1	B1	A4	A3	A2	A1
Pb1	N1	L1	J1	H1	G41	G31	G21
SL1	SH1	SP1	RU1	RL1	RH1	RD1	R1
YS1	YL1	YH1	YP1	YE1	Y1	TD1	TN1
07	06	05	04	03	02	01	00
15	14	13	12	11	10	09	08
23	22	21	20	19	18	17	16
G42	G32	G22	G12	D2	C2	B2	24
RH2	RD2	R2	Pb2	N2	L2	J2	H2
Y2	TD2	TN2	SL2	SH2	SP2	RU2	RL2
27	26	25	YS2	YL2	YH2	YP2	YE2
35	34	33	32	31	30	29	28
43	42	41	40	39	38	37	36
C3	B3	49	48	47	46	45	44
L3	J3	H3	G43	G33	G23	G13	D3
SP3	RU3	RL3	RH3	RD3	R3	Pb3	N3
YH3	YP3	YE3	Y3	TD3	TN3	SL3	SH3
55	54	53	52	51	50	YS3	YL3
63	62	61	60	59	58	57	56
71	70	69	68	67	66	65	64
G24	G14	D4	C4	B4	74	73	72
R4	Pb4	N4	L4	J4	H4	G44	G34
TN4	SL4	SH4	SP4	RU4	RL4	RH4	RD4
75	YS4	YL4	YH4	YP4	YE4	Y4	TD4
83	82	81	80	79	78	77	76
91	90	89	88	87	86	85	84
99	98	97	96	95	94	93	92
E8	E7	E6	E5	E4	E3	E2	E1
YC4	YC3	YC2	YC1	YR4	YR3	YR2	YR1
YD4	YD3	YD2	YD1	YJ4	YJ3	YJ2	YJ1
ET	UP	UR	UA	YF4	YF3	YF2	YF1

Address	Name	Value	Function
Remote control:			
85F7H	REMCON_MA	00	
85F8H	REMCON1	00	
85F9H	REMCON2	00	
85FAH	REMCON3	00	
85FBH	REMCON4	00	
85FCH	REMCON5	00	
85FDH	REMCON6	00	
85FEH	REMCON7	00	
85FFH	REMCON8	00	

85F7 (H)		Release of the remote control							
Bit		7	6	5	4	3	2	1	0
Binary		0	0	0	0	0	0	0	0
Byte value		0				0			
REMCON 1...8		Definition of remote-controllable variable in the address							
85..(H)		FF	FE	FD	FC	FB	FA	F9	F8
Variable									
Hex.									
E3P	D05	1	0	1	0	1	0	1	0
E3N	D06	1	1	0	0	1	1	0	0
E4P	D07	1	1	1	1	0	0	0	0
E2P	D03	(+) more							
E2N	D04	(–) less							

Defined for active sensors (standard).
For passive sensors, observe address 89A8.

Control code field 3 ("Serial standard answer"):

86D8H	SERLEN	00	Length of list (max. 32)
86D9H	SERVAR00	00	List of variable transferred
86DAH	SERVAR01	00	
86DBH	SERVAR02	00	in the telegram "standard answer"
86DCH	SERVAR03	00	
86DDH	SERVAR04	00	
86DEH	SERVAR05	00	
86DFH	SERVAR06	00	
86E0H	SERVAR07	00	
86E1H	SERVAR08	00	
86E2H	SERVAR09	00	
86E3H	SERVAR10	00	
86E4H	SERVAR11	00	
86E5H	SERVAR12	00	
86E6H	SERVAR13	00	
86E7H	SERVAR14	00	
86E8H	SERVAR15	00	
86E9H	SERVAR16	00	
86EAH	SERVAR17	00	
86EBH	SERVAR18	00	
86ECH	SERVAR19	00	
86EDH	SERVAR20	00	
86EEH	SERVAR21	00	
86EFH	SERVAR22	00	
86F0H	SERVAR23	00	
86F1H	SERVAR24	00	
86F2H	SERVAR25	00	
86F3H	SERVAR26	00	
86F4H	SERVAR27	00	
86F5H	SERVAR28	00	
86F6H	SERVAR29	00	
86F7H	SERVAR30	00	
86F8H	SERVAR31	00	

Reserved

86F9H to 86FFH		00

Address	Name	Value	Function

Control code field 4 ("Display functions"):

Global alarm value:

8768H	GLOBG_MA1	0F	Mask for OR elements G11...G42 (1 = ENABLED)
8769H	GLOBG_MA2	0F	Mask for OR elements G13...G44 (1 = ENABLED)

GLOBG_MA1								
Bit	7	6	5	4	3	2	1	0
Alarm value	G42	G32	G22	G12	G41	G31	G21	G11
Byte value								

GLOBG_MA2								
Bit	7	6	5	4	3	2	1	0
Alarm value	G44	G34	G24	G14	G43	G33	G23	G13
Byte value								

triggers flashing display ER.G_

Display loops:

		Name of variable
876AH	VARSEL001	FF
876BH	VARSEL011	15-SP1
876CH	VARSEL021	11-RD1
876DH	VARSEL031	1A-Y1
876EH	VARSEL041	06-D1
876FH	VARSEL051	07-G11
8770H	VARSEL061	08-G21
8771H	VARSEL071	09-G31
8772H	VARSEL081	0A-G41
8773H	VARSEL091	FE-F6
8774H	VARSEL101	FE-F6
8775H	VARSEL111	FE-F6
8776H	VARSEL121	FE-F6
8777H	VARSEL131	0F-Pb1
8778H	VARSEL141	18-TN1
8779H	VARSEL151	19-TD1
877AH	VARSEL161	1C-YP1
877BH	VARSEL171	1E-YL1
877CH	VARSEL181	1D-YH1
877DH	VARSEL191	17-SL1
877EH	VARSEL201	16-SH1
877FH	VARSEL211	13-RL1
8780H	VARSEL221	12-RH1
8781H	VARSEL231	10-R1
8782H	VARSELLIM1	09

Display loop 1:
Variable address FF produces multichannel info

Main variable is depicted in the top display in the case of w, e, y + multichannel info

Defines the length "small" display loop.

The explanations given above are also valid for display loops 2 to 4.

Variable with addresses 0...D7H are only displayed if op-code is not equal to 0.

Variable with address FEH is always skipped.

Assign linear display 0...100% or one of a total of four USER RANGES to each variable.

Counting begins at 8781H, number in 8782

If one of the variables SP1 to SP4, RD1 to RD4 or Y1 to Y4 is selected, always the value of the variable in address 8781H is shown in the top display. The light emitting diodes w, e, y indicate which of the mentioned variables is to be shown in the bottom display.

Address	Name	Value	Function
USER RANGE definition (continuation)			
8783H	URENAB01	62	Enable user range address 876AH to 8771H
8784H	URENAB11	00	Enable user range address 8772H to 8779H
8785H	URENAB21	F8	Enable user range address 877AH to 8781H
8786H	URSELA01	00	
8787H	URSELA11	00	
8788H	URSELA21	00	
8789H	URSELB01	00	
878AH	URSELB11	00	
878BH	URSELB21	00	

Selection of user ranges 1 to 4 with 8789H for addresses 867AH to 8771H
Selection of user ranges 1 to 4 with 8789H for addresses 8772H to 8779H
Selection of user ranges 1 to 4 with 8789H for addresses 877AH to 8781H

bit 1 in 8786, 8787, 8788	bit 2 in 8789, 878A, 8788	User range
0	0	1
1	0	2
0	1	3
1	1	4

Var.	71H	70H	6FH	6EH	6DH	6CH	6BH	6AH	U.R.
	G31	G21	G11	D1	Y1	RD1	SP1	–	
8783H	0	1	1	0	0	0	1	0	1=yes
8786H	0	0	0	0	0	0	0	0	bit 1
8789H	0	0	0	0	0	0	0	0	bit 2

Var.	79H	78H	77H	76H	75H	74H	73H	72H	U.R.
	TD1	TN1	PB1	–	–	–	–	G41	
8784H	0	0	0	0	0	0	1	0	1=yes
8787H	0	0	0	0	0	0	0	0	bit 1
878AH	0	0	0	0	0	0	0	0	bit 2

Var.	81H	80H	7FH	7EH	7DH	7CH	7BH	7AH	U.R.
	R1	RH1	RL1	SH1	SL1	YH1	YL1	YP1	
8785H	1	1	1	1	1	0	0	0	1=yes
8788H	0	0	0	0	0	0	0	0	bit 1
878BH	0	0	0	0	0	0	0	0	bit 2

Change the mentioned addresses correspondingly for display loops 2 to 4.

Display loop 2:
(see explanation for display loop 1)

878CH	VARSEL002	00	
878DH	VARSEL012	00	
878EH	VARSEL022	00	
878FH	VARSEL032	00	
8790H	VARSEL042	00	
8791H	VARSEL052	00	
8792H	VARSEL062	00	
8793H	VARSEL072	00	
8794H	VARSEL082	00	
8795H	VARSEL092	00	
8796H	VARSEL102	00	
8797H	VARSEL112	00	
8798H	VARSEL122	00	
8799H	VARSEL132	00	
879AH	VARSEL142	00	
879BH	VARSEL152	00	
879CH	VARSEL162	00	
879DH	VARSEL172	00	
879EH	VARSEL182	00	
879FH	VARSEL192	00	
87A0H	VARSEL202	00	
87A1H	VARSEL212	00	
87A2H	VARSEL222	00	
87A3H	VARSEL232	00	
87A4H	VARSELLIM2	00	Division display loop

Address	Name	Value	Function
87A5H	URENAB02	00	User range marking
87A6H	URENAB12	00	
87A7H	URENAB22	00	
87A8H	URSELA02	00	User range selection A
87A9H	URSELA12	00	
87AAH	URSELA22	00	
87ABH	URSELB02	00	User range selection B
87ACH	URSELB12	00	
87ADH	URSELB22	00	
			Display loop 3:
87AEH	VARSEL003	00	(see explanation for display loop 1)
87AFH	VARSEL013	00	
87B0H	VARSEL023	00	
87B1H	VARSEL033	00	
87B2H	VARSEL043	00	
87B3H	VARSEL053	00	
87B4H	VARSEL063	00	
87B5H	VARSEL073	00	
87B6H	VARSEL083	00	
87B7H	VARSEL093	00	
87B8H	VARSEL103	00	
87B9H	VARSEL113	00	
87BAH	VARSEL123	00	
87BBH	VARSEL133	00	
87BCH	VARSEL143	00	
87BDH	VARSEL153	00	
87BEH	VARSEL163	00	
87BFH	VARSEL173	00	
87C0H	VARSEL183	00	
87C1H	VARSEL193	00	
87C2H	VARSEL203	00	
87C3H	VARSEL213	00	
87C4H	VARSEL223	00	
87C5H	VARSEL233	00	
87C6H	VARSELLIM3	00	Division display loop
87C7H	URENAB03	00	User range marking
87C8H	URENAB13	00	
87C9H	URENAB23	00	
87CAH	URSELA03	00	User range selection A
87CBH	URSELA13	00	
87CCH	URSELA23	00	
87CDH	URSELB03	00	User range selection B
87CEH	URSELB13	00	
87CFH	URSELB23	00	
			Display loop 4:
87D0H	VARSEL004	00	(see explanation for display loop 1)
87D1H	VARSEL014	00	
87D2H	VARSEL024	00	
87D3H	VARSEL034	00	
87D4H	VARSEL044	00	
87D5H	VARSEL054	00	
87D6H	VARSEL064	00	
87D7H	VARSEL074	00	
87D8H	VARSEL084	00	
87D9H	VARSEL094	00	
87DAH	VARSEL104	00	
87DBH	VARSEL114	00	
87DCH	VARSEL124	00	
87DDH	VARSEL134	00	
87DEH	VARSEL144	00	
87DFH	VARSEL154	00	

Address	Name	Value	Function
87E0H	VARSEL164	00	
87E1H	VARSEL174	00	
87E2H	VARSEL184	00	
87E3H	VARSEL194	00	
87E4H	VARSEL204	00	
87E5H	VARSEL214	00	
87E6H	VARSEL224	00	
87E7H	VARSEL234	00	
87E8H	VARSELLIM4	00	Division display loop
87E9H	URENAB04	00	User range marking
87EAH	URENAB14	00	
87EBH	URENAB24	00	
87ECH	URSELA04	00	User range selection A
87EDH	URSELA14	00	
87EEH	URSELA24	00	
87EFH	URSELB04	00	User range selection B
87F0H	URSELB14	00	
87F1H	URSELB24	00	

Display, Miscellaneous:

87F2H	OP_NORM	00	Normal decimal point position
87F3H	BITDI1	84	Binary signal display:
87F4H	BITDI2	84	(if bit 6 is set in DISPL)
87F5H	BITDI3	84	
87F6H	BITDI4	30	

Display 10	■□■□■□■			
87F_	3	4	5	6

87F7H	DIG_MA	00	Mask for skipping figures

Bit	7	6	5	4	3	2	1	0
Display Figure	bottom (9) From left to right				top (5) From left to right			
Binary	0	0	0	0	0	0	0	0

The binary variable BLD must additionally be configured, e.g. BLD: BTI, LLL.
With bit 0 or 4, starting at the left, the numerical dissplay is suppressed.

87F8H	DIG_MA2	00	Mask for skipping status display

Bit	7	6	5	4	3	2	1	0
Display		A	H	E	I	y	e	w
Binary	0	0	0	0	0	0	0	0

The binary variable BLD must additionally be configured, e.g. BLD: BTI, LLL.

87F9H	MANOC1	00	Channel 1
87FAH	MANOC2	00	Channel 2
87FBH	MANOC3	00	Channel 3
87FCH	MANOC4	00	Channel 4

Variable adjustable with keys 7 and 8
00 = Y1 to Y4 depending on channel

87FDH	VARPR1	00	Bit 7 = 1: Alternative function of WE3 activated Bit 6 = 1: Alternative function of WT3 activated Bit 5 = 0: Position number of the variable in the display loop which has been brought into the display with the alternative function of WT3. For description, see appendix, Index K.
87FEH	VARPTR2	00	Bit 7 = 1: Alternative function of WE4 activated Bit 6 = 1: Alternative function of WT4 activated Bit 5...0: Position number of the variable in the display loop which has been brought into the display with the alternative function of WT4. For description, see appendix, Index K.

Address	Name	Value	Function

Control code field 5 ("Error message, characteristic"):

Error message:

Masks for handling errors:

8868H	ERR0_MA0	01
8869H	ERR0_MA1	01
886AH	ERR0_MA2	00
886BH	ERR0_MA3	00
886CH	ERR1_MA0	E0
886DH	ERR1_MA1	E0
886EH	ERR1_MA2	00
886FH	ERR1_MA3	00
8870H	ERR2_MA0	50
8871H	ERR2_MA1	50
8872H	ERR2_MA2	00
8873H	ERR2_MA3	00
8874H	BWL05_MA0	00
8875H	BWL05_MA1	00
8876H	BWL05_MA2	00
8877H	BWL05_MA3	00

Bit	7	6	5	4	3	2	1	0
Variable	EAE	EPR	ENA	EOC	ECB	EPH	ERF	E00
Mask MA0	0	0	0	0	0	0	0	1
Mask MA1	0	0	0	0	0	0	0	1
Mask MA2	0	0	0	0	0	0	0	0
Mask MA3	0	0	0	0	0	0	0	0
Variable	EH_	ELP	EBA	ERR	EI2	EI1	ET0	EHP
Mask MA0	1	1	1	0	0	0	0	0
Mask MA1	1	1	1	0	0	0	0	0
Mask MA2	0	0	0	0	0	0	0	0
Mask MA3	0	0	0	0	0	0	0	0
Variable	EG_	EST	ETU	EPG	ENT	ENF	ECH	ENN
Mask MA0	0	1	0	1	0	0	0	0
Mask MA1	0	1	0	1	0	0	0	0
Mask MA2	0	0	0	0	0	0	0	0
Mask MA3	0	0	0	0	0	0	0	0
Variable	AL4	AL3	AL2	AL1	SC4	SC3	SC2	SC1
Mask MA0	0	0	0	0	0	0	0	0
Mask MA1	0	0	0	0	0	0	0	0
Mask MA2	0	0	0	0	0	0	0	0
Mask MA3	0	0	0	0	0	0	0	0

Bit in MA0 / MA1 has following effects:

0 0 : Ignore error
1 0 : Note error on 0/1 transition and in 4 min interval
0 1 : Note error only on 0/1 transition
1 1 : Error always entered

Bit in MA2: 1 = Error is not deleted on disappearance
Bit in MA3: 1 = Error is changed to OR elements in ERF

User-defined tables

8878H	TAB1_H00	00
8879H	TAB1_L00	00
887AH	TAB1_H01	00
887BH	TAB1_L01	00
887CH	TAB1_H02	00
887DH	TAB1_L02	00
887EH	TAB1_H03	00
887FH	TAB1_L03	00
8880H	TAB1_H04	00
8881H	TAB1_L04	00
8882H	TAB1_H05	00
8883H	TAB1_L05	00
8884H	TAB1_H06	00
8885H	TAB1_L06	00
8886H	TAB1_H07	00
8887H	TAB1_L07	00
8888H	TAB1_H08	00
8889H	TAB1_L08	00
888AH	TAB1_H09	00
888BH	TAB1_L09	00
888CH	TAB1_H10	00
888DH	TAB1_L10	00

Number format
4 tables with 11 check values 0%, 10%,.....100% respectively

Address	Name	Value	Function
User-defined tables (continuation)			
888EH	TAB2_H00	00	888EH to 88A3H table 2
88A4H	TAB3_H00	00	88A4H to 88B9H table 3
88BAH	TAB4_H00	00	88BAH to 88CFH table 4
Reserved:			
88D0H to 88FFH			
Control code field 6 ("Hardware-related data"):			
GEDAT (Instrument data):			
8968H	DEFLT	00	

Bit	7	6	5	4	3	2	1	0
Corr.from	VR	KA	A34	A12	E4	E3	E2	E1
Def.value	0	0	0	0	0	0	0	0

0 = Default values, 1 = entered C-values

8969H	VRHI	Reference correction } internal values for A/D conversion
896AH	VRL0	
896BH	KA	Correction comparator offset } internal values for A/D conversion
896CH	CODE_E1	xx

E1: Module code and, if necessary, the carry over from the correction values.
1st data item

Bit	7	6	5	4	3	2	1	0
Byte value	x	y	z	Module code				

x = Add carry from K1. 0... 1 = (0...1) * 256 LSB
yz = Add carry from K2. 00...11 = (0...3) * 256 LSB

Module code	Module, function	Default correction values K1x	K2x
00H	Not equipped	--	--
01H	−3...+23 mV	48	7C
02H	−3...+60 mV	23	8D
03H	−150...+200°C Pt 100, 2-w. circuit	57	81
04H	+100...+450°C Pt 100, 2-w. circuit	5B	80
05H	−200...+800°C Pt 100, 2-w. circuit	2C	80
06H	0/4...20 mA	26	3F
07H	0/2...10 V	26	3F
08H	2 times binary signal input	--	--
. 9H	Special module mV		
. AH	Special module mA		
. BH	Special module V		
. CH	Special module Ohm		
. DH	Four-wire measuring circuit		
. EH	Special module Ohm, 3-w. circuit		
. FH	Special module Ohm, 4-w. circuit		
13H[1)]	−150...+200°C Pt 100, 2-w. circuit		
14H[1)]	+100...+450°C Pt 100, 2-w. circuit		
15H[1)]	−200...+800°C Pt 100, 2-w. circuit		
23H	−150...+200°C Pt 100, 3-w. circuit		
24H	+100...+450°C Pt 100, 3-w. circuit		
25H	−200...+800°C Pt 100, 3-w. circuit		
33H	−150...+200°C Pt 100, 4-w. circuit		
34H	+100...+450°C Pt 100, 4-w. circuit		
35H	−200...+800°C Pt 100, 4-w. circuit		

[1)] Module code for use of the four-wire circuit module as two-wire circuit.

Address	Name	Value	Function
Instrument data (continuation)			
			2nd Data item: Offset correction K1. in 896DH (E1) 8972H (E2) 00...FF = 0...6.375% 8977H (E3) 1 LSB = 0.025% 897CH (E4) Carry over stored in bit 7 von CODE_E.
			3rd Data item: Gain correction K2. in 896EH (E1) 8973H (E2) 00...FF = 0...6.375% 8978H (E3) 1 LSB = 0.025% 897DH (E4) Carry over stored in bit 5 and 6 of CODE_E.
896DH	K11		E1: Offset correction, K1.
896EH	K21		E1: Amplifier correction, K2.
896FH	K31		E1: Start of range of special module
8970H	K41		E1: Span of special module
8971H	CODE_E2		E2: Module code (see 896CH)
8972H	K12		E2: Offset correction, K1.
8973H	K22		E2: Amplifier correction, K2.
8974H	K32		E2: Start of range of special module
8975H	K42		E2: Span of special module
8976H	CODE_E3		E3: Module code (see 896CH)
8977H	K13		E3: Offset correction
8978H	K23		E3: Amplifier correction
8979H	K33		E3: Start of range of special module
897AH	K43		E3: Span of spcial module
897BH	CODE_E4		E4: Module code (see 896CH)
897CH	K14		E4: Offset correction, K1.
897DH	K24		E4: Amplifier correction, K2.
897EH	K34		E4: Start of range of special module
897FH	K44		E4: Span of special module
8980H	CODE_A12	xx	A1/A2: Module code Low nibble Output A1 High nibble Output A2

Code	Module type
0	Not available or not updated
1	0...20 mA
2	0...10 V
8	binary

8981H	K1UA1		A1: Offset correction, voltage
8982H	K2UA1		A1: Amplifier correction, voltage
8983H	K1IA1		A1: Offset correction, current
8984H	K2IA1		A1: Amplifier correction, current
8985H	K1UB1		A2: Offset correction, voltage
8986H	K2UB1		A2: Amplifier correction, voltage
8987H	K1IB1		A2: Offset correction, current
8988H	K2IB1		A2: Amplifier correction, current
8989H	CODE_A34	xx	A3/A4: Module code Low nibble Output A3 High nibble Output A4

[1] In output modules with current and binary output, A2/A4 is the binary output. Correction values = 00H

Address	Name	Value	Function

Instrument data (continutation)

Code	Module type
0	Not available or not updated
1	0...20 mA
2	0...10 V
8	binary
C	2 relays (only for 8989H)

898AH	K1UA2	A3: Offset correction, voltage
898BH	K2UA2	A3: Amplifier correction, voltage
898CH	K1IA2	A3: Offset correction, current
898DH	K2IA2	A3: Amplifier correction, current
898EH	K1UB2	A4: Offset correction, voltage [1]
898FH	K2UB2	A4: Amplifier correction, voltage [1]
8990H	K1IB2	A4: Offset correction, current [1]
8991H	K21B2	A4: Amplifier correction, current [1]

TEMPE (Temperature measurement):

8992H	SKTMP_H	Scale factor high byte	Calibration of reference junction
8993H	SKTMP_L	Scale factor low byte	
8994H	ATMP_H	Lower-range value high byte	
8995H	ATMP_L	Lower-range value low byte	

[1] In output modules with current and binary output, A2/A4 is the binary output. Correction values = 00H

MESSB (Measuring range definition):

module/ module code	sensor code	range	limits
23 mV/1	0	-3...23 mV, linear	variable
	1	-3...23 mV, type L	variable
	2	-3...23 mV, type J	variable
	3	-3...23 mV, type K	variable
	4	-3...23 mV, type S	variable
	5	-3...23 mV, type B	variable
	7	-3...23 mV, externally	variable
	8	0...20 mV, linear	fixed
	9	0... 400 °C, type L	fixed
	A	0... 400 °C, type J	fixed
	B	0... 500 °C, type K	fixed
	C	0...1800 °C, type S	fixed
	D	0...1800 °C, type B	fixed
60 mV/2	0	-3...60 mV, linear	variable
	1	-3...60 mV, type L	variable
	2	-3...60 mV, type J	variable
	3	-3...60 mV, type K	variable
	6	-3...60 mV, type D	variable
	7	-3...60 mA, external	variable
	8	0...50 mV, linear	fixed
	9	0... 900 °C, type L	fixed
	A	0...1000 °C, type J	fixed
	B	0...1400 °C, type K	fixed
	E	0...2000 °C, type L	fixed
20 mA/6 and 10 V/7 for 0/2...10 V identical	0	0...20 mA, linear	variable
	1	0...20 mA, linear	fixed
	2	0...20 mA, type L	variable
	3	0...20 mA, type J	variable
	4	0...20 mA, type K	variable
	5	0...20 mA, type S	variable
	6	0...20 mA, type B	variable
	7	0...20 mA, externally	variable
	8	4...20 mA, linear	variable
	9	4...20 mA, linear	fixed
	A	4...20 mA, type L	variable
	B	4...20 mA, type J	variable
	C	4...20 mA, type K	variable
	D	4...20 mA, type S	variable
	E	4...20 mA, type B	variable
	F	4...20 mA, externally	variable
special module mV/9	0	K3...(K3 + K4) mV, linear	variable
	1	K3...(K3 + K4) mV, type L	variable
	2	K3...(K3 + K4) mV, type J	variable
	3	K3...(K3 + K4) mV, type K	variable
	4	K3...(K3 + K4) mV, type S	variable
	5	K3...(K3 + K4) mV, type B	variable
	6	K3...(K3 + K4) mV, type D	variable
	7	K3...(K3 + K4) mV, externally	variable
	8	K3...(K3 + K4) mV, linear	fixed
special module mA/A	0	K3...(K3 + K4) mA, linear	variable
	8	K3...(K3 + K4) mA, linear	fixed
	9	K3...(K3 + K4) mA, type L	variable
	A	K3...(K3 + K4) mA, type J	variable
	B	K3...(K3 + K4) mA, type K	variable
	C	K3...(K3 + K4) mA, type S	variable
	D	K3...(K3 + K4) mA, type B	variable
	E	K3...(K3 + K4) mA, type D	variable
	F	K3...(K3 + K4) mA, externally	variable

Address	Name	Value	Function

MESSB (Measuring range definition)
(continuation)

Module/ Module code	Sensor code [1]	Range	Limits
2-wire circuit (3)	0 1	−150...+200 °C Pt 100 −150...+200 °C Pt 100	variable fixed
2-wire circuit (4)	0 1	−100...+450 °C Pt 100 −100...+450 °C Pt 100	variable fixed
2-wire circuit (5)	0 1	−200...+800 °C Pt 100 −200...+800 °C Pt 100	variable fixed
2-wire circuit with module for 4-wire circuit (13)	0 1	−150...+200 °C Pt 100 −150...+200 °C Pt 100	variable fixed
2-wire circuit with module for 4-wire circuit (14)	0 1	−100...+450 °C Pt 100 −100...+450 °C Pt 100	variable fixed
2-wire circuit with module for 4-wire circuit (15)	0 1	−200...+800 °C Pt 100 −200...+800 °C Pt 100	variable fixed
3-wire circuit (23)	0 1	−150...+200 °C Pt 100 −150...+200 °C Pt 100	variable fixed
3-wire circuit (24)	0 1	−100...+450 °C Pt 100 −100...+450 °C Pt 100	variable fixed
3-wire circuit (25)	0 1	−200...+800 °C Pt 100 −200...+800 °C Pt 100	variable fixed
4-wire circuit (33)	0 1	−150...+200 °C Pt 100 −150...+200 °C Pt 100	variable fixed
4-wire circuit (34)	0 1	−100...+450 °C Pt 100 −100...+450 °C Pt 100	variable fixed
4-wire circuit (35)	0 1	−200...+800 °C Pt 100 −200...+800 °C Pt 100	variable fixed

"External" see 89BEH to 89F5H

[1] Sensor code 0 also corresponds to 2, 4 or 6.
Sensor code 1 also corresponds to 3, 5 or 7.

Values for address 8996H to 89A1H are determined via routine "InP" and entered directly. In order to linearize a non-linear mA or V signal in the Digitric, module code and sensor code are to be entered directly.

8996H	FUEHL_E1
8997H	ANF1
8998H	UMF1
8999H	FUEHL_E2
899AH	ANF2
899BH	UMF2
899CH	FUEHL_E3
899DH	ANF3
899EH	UMF3
899FH	FUEHL_E4
89A0H	ANF4
89A1H	UMF4

FUEHL_Ex								
Bit	7	6	5	4	3	2	1	0
	Module code				Sensor code			

ANF = Lower-range value for input E1, E2, E3 or E4:
Start in %: 0...90 % corresponding to 00...5AH

Start in °C: $ANF = \frac{\text{temperature (°C)}}{10} + 30 \text{ (in hex.)}$

−270 °C...1800 °C

UMF = Span for input E1, E2, E3 or E4 for linear ranges:
Span in %: 10...100 % corresponding to 0A...64H

Span in °C: $UMF = \frac{\text{temperature (°C)}}{10}$ (in hex.)

Address	Name	Value	Function

Information: Continuation see 89F2H...89F5H

89A2H ZUS1 (E1)
89A3H ZUS2 (E2)
89A4H ZUS3 (E3)
89A5H ZUS4 (E4)

1. Internal or external temperature reference junction

For module code 01, 02 and .9 Reference junction temperature	Byte value
Internal	00H
External 0°C	30H
External 20°C	32H
External 50°C	35H
External 60°C	36H

The entry is also possible in the auxiliary routine <t.rEF>.

2. Value of the line resistance for two- and three-wire circuit.
The entry is also possible in the auxiliary routine <r.LtG>.

Current outputs

89A6H MESSBA

Bit	7	6	5	4	3	2	1	0
Output	-	-	-	-	A4	A3	A2	A1
4...20	x	x	x	x	1	1	1	1

x = any, 1 = 4...20 mA, 0 = 0...20 mA

89A7H TE_INF 00
Processing rate E1/E2
Bit 0 = 0: 18 ms, bit 0 = 1: 36 ms

Binary inputs

89A8H BININ_MA 00
Inverting binary inputs

Bit	7	6	5	4	3	2	1	0
	E4		E3		E2		E1	
Input	D08	D07	D06	D05	D04	D03	D02	D01
Direct	1	1	1	1	1	1	1	1

0 = direct, 1 = inverted
Standard (direct):
D01...D08 = 1 if input ≧ 13 V
= 0 if input ≦ 5 V

89A9H BINOUT_MA 00
Inverting binary outputs

Bit	7	6	5	4	3	2	1	0
Output	AR4	AR3	AR2	AR1	A4	A3	A2	A1
Direct	0	0	0	0	0	0	0	0

0 = direct, 1 = inverted
Standard A1...A4 (direct):
Transistor output conductive if MB1...MB4 = 1
Standard AR1...AR4 (direct):
Relay RS1...RS4 activated if RS1...RS4 = 1

ANZB (Display ranges):

89AAH USRRH_1 User range 1 range (HB)
89ABH USRRL_1 User range 1 range (LB)
89ACH USR0H_1 User range 1 begin (HB)
89ADH USR0L_1 User range 1 begin (LB)
89AEH USRDP_1 User range 1 decimal point position [1)]

89AFH USRRH_2 User range 2 range (HB)
89B0H USRRL_2 User range 2 range (LB)
89B1H USR0H_2 User range 2 begin (HB)
89B2H USR0L_2 User range 2 begin (LB)
89B3H USRDP_2 User range 2 decimal point position [1)]

89B4H USRRH_3 User range 3 range (HB)
89B5H USRRL_3 User range 3 range (LB)
89B6H USR0H_3 User range 3 begin (HB)
89B7H USR0L_3 User range 3 begin (LB)
89B8H USRDP_3 User range 3 decimal point position [1)]

[1)] Decimal point information

Address	Name	Value	Function

ANZB (Display ranges) (continuation)

89B9H	USRRH_4		User range 4 range (HB)
89BAH	USRRL_4		User range 4 range (LB)
89BBH	USR0H_4		User range 4 begin (HB)
89BCH	USR0L_4		User range 4 begin (LB)
89BDH	USRDP_4		User range 4 decimal point position [1]

[1] Decimal point information

89AE(H) 89B3(H) 89B8(H) 89BD(H)	Decimal point information							
Bit	7	6	5	4	3	2	1	0
Binary	0	x	x	x	x	x	x	x
Byte value	x				x			

Bit 0 = Decimal point definition
Bit 1 = Decimal point definition
Bit 7 = 1, for units with thermocouple input the user range can be freely selected (only with module code 01, 02, or 09 in conjunction with thermocouple types L, J, K, S, or B)

For a required range data of the above mentioned address are calculated as follows:

User range span:

$\frac{\&r\,(\%)}{4}$ = XXXXH z.B. $\frac{120.0}{4}$ = 30.0 = 92C0H

User range start:

$\frac{\&0\,(\%)}{4}$ = XXXXH z.B. $\frac{30.0}{4}$ = 7.5 = 84B0H

CURVEX (externally defined linearization curve):

89BEH 89BFH 89C0H		Additional freely definable linearization curve for measuring temperatures.
89C1H to 89F1H		Checkpoints at a distance of 100° degrees

Additional information on the sensor:

89F2H	ZUS._E (E1)	1. Temperature reference junction. Entry in auxiliary routine <t.rEF>
89F3H	ZUS._E (E2)	
89F4H	ZUS._E (E3)	2. Value of the line resistance. Entry in auxiliary routine <r.LtG>
89F5H	ZUS._E (E4)	3. Fine adjustment of the module offset. Entry in auxiliary routine <InP.i>
89F6H...89FDH		Reserved for service entries

Configuration 72 mm x 144 mm

89FEH	TYP_144	01H	Unit identification for configuration 72 mm x 144 mm. Value for all other configuration types = 00H

Instrument address for computer traffic

89FFH	CADR	66

Control codes Suppl. No. 411

84D8H : 87H	85E2H : 00H	86ECH : 00H	8786H : 00H	87B8H : 00H
84D9H : 48H	85E3H : 00H	86EDH : 00H	8787H : 00H	87B9H : 00H
84DAH : 00H	85E4H : 00H	86EEH : 00H	8788H : 00H	87BAH : 00H
84DBH : 00H	85E5H : 00H	86EFH : 00H	8789H : 00H	87BBH : 00H
84DCH : FDH	85E6H : 00H	86F0H : 00H	878AH : 00H	87BCH : 00H
84DDH : FDH	85E7H : 00H	86F1H : 00H	878BH : 00H	87BDH : 00H
84DEH : 0AH	85E8H : 00H	86F2H : 00H	878CH : 00H	87BEH : 00H
84DFH : 0AH	85E9H : 00H	86F3H : 00H	878DH : 00H	87BFH : 00H
84E0H : 00H	85EAH : 00H	86F4H : 00H	878EH : 00H	87C0H : 00H
84E1H : 00H	85EBH : 00H	86F5H : 00H	878FH : 00H	87C1H : 00H
84E2H : 04H	85ECH : 00H	86F6H : 00H	8790H : 00H	87C2H : 00H
84E3H : 00H	85EDH : 00H	86F7H : 00H	8791H : 00H	87C3H : 00H
84E4H : 6DH	85EEH : 00H	86F8H : 00H	8792H : 00H	87C4H : 00H
84E5H : 6DH	85EFH : 00H	86F9H : 00H	8793H : 00H	87C5H : 00H
84E6H : 6DH	85F0H : 00H	86FAH : 00H	8794H : 00H	87C6H : 00H
84E7H : 6DH	85F1H : 00H	86FBH : 00H	8795H : 00H	87C7H : 00H
84E8H : 84H	85F2H : 00H	86FCH : 00H	8796H : 00H	87C8H : 00H
84E9H : 84H	85F3H : 00H	86FDH : 00H	8797H : 00H	87C9H : 00H
84EAH : 00H	85F4H : 00H	86FEH : 00H	8798H : 00H	87CAH : 00H
84EBH : 00H	85F5H : 00H	86FFH : 00H	8799H : 00H	87CBH : 00H
84ECH : 00H	85F6H : 00H	8768H : 0FH	879AH : 00H	87CCH : 00H
84EDH : 00H	85F7H : 00H	8769H : 00H	879BH : 00H	87CDH : 00H
84EEH : 00H	85F8H : 00H	876AH : FEH	879CH : 00H	87CEH : 00H
84EFH : 00H	85F9H : 00H	876BH : 15H	879DH : 00H	87CFH : 00H
84F0H : FAH	85FAH : 00H	876CH : 11H	879EH : 00H	87D0H : 00H
84F1H : FAH	85FBH : 00H	876DH : 1AH	879FH : 00H	87D1H : 00H
84F2H : FAH	85FCH : 00H	876EH : 06H	87A0H : 00H	87D2H : 00H
84F3H : FAH	85FDH : 00H	876FH : 07H	87A1H : 00H	87D3H : 00H
84F4H : 55H	85FEH : 00H	8770H : 08H	87A2H : 00H	87D4H : 00H
84F5H : 55H	85FFH : 00H	8771H : 09H	87A3H : 00H	87D5H : 00H
84F6H : 55H	86D8H : 00H	8772H : 0AH	87A4H : 00H	87D6H : 00H
84F7H : 55H	86D9H : 00H	8773H : FEH	87A5H : 00H	87D7H : 00H
84F8H : 0AH	86DAH : 00H	8774H : FEH	87A6H : 00H	87D8H : 00H
84F9H : 0AH	86DBH : 00H	8775H : FEH	87A7H : 00H	87D9H : 00H
84FAH : 00H	86DCH : 00H	8776H : FFH	87A8H : 00H	87DAH : 00H
84FBH : 01H	86DDH : 00H	8777H : 0FH	87A9H : 00H	87DBH : 00H
84FCH : 00H	86DEH : 00H	8778H : 18H	87AAH : 00H	87DCH : 00H
84FDH : 0FH	86DFH : 00H	8779H : 19H	87ABH : 00H	87DDH : 00H
84FEH : 00H	86E0H : 00H	877AH : 1CH	87ACH : 00H	87DEH : 00H
84FFH : 00H	86E1H : 00H	877BH : 1EH	87ADH : 00H	87DFH : 00H
85D8H : 00H	86E2H : 00H	877CH : 1DH	87AEH : 00H	87E0H : 00H
85D9H : 00H	86E3H : 00H	877DH : 17H	87AFH : 00H	87E1H : 00H
85DAH : 00H	86E4H : 00H	877EH : 16H	87B0H : 00H	87E2H : 00H
85DBH : 04H	86E5H : 00H	877FH : 13H	87B1H : 00H	87E3H : 00H
85DCH : 00H	86E6H : 00H	8780H : 12H	87B2H : 00H	87E4H : 00H
85DDH : 00H	86E7H : 00H	8781H : 10H	87B3H : 00H	87E5H : 00H
85DEH : 00H	86E8H : 00H	8782H : 09H	87B4H : 00H	87E6H : 00H
85DFH : 00H	86E9H : 00H	8783H : 62H	87B5H : 00H	87E7H : 00H
85E0H : 00H	86EAH : 00H	8784H : 00H	87B6H : 00H	87E8H : 00H
85E1H : 80H	86EBH : 00H	8785H : F8H	87B7H : 00H	87E9H : 00H

Control codes Suppl. No. 411 (continuation)

87EAH : 00H	8884H : 00H	88B6H : 00H	88E8H : 00H	
87EBH : 00H	8885H : 00H	88B7H : 00H	88E9H : 00H	
87ECH : 00H	8886H : 00H	88B8H : 00H	88EAH : 00H	
87EDH : 00H	8887H : 00H	88B9H : 00H	88EBH : 00H	
87EEH : 00H	8888H : 00H	88BAH : 00H	88ECH : 00H	
87EFH : 00H	8889H : 00H	88BBH : 00H	88EDH : 00H	
87F0H : 00H	888AH : 00H	88BCH : 00H	88EEH : 00H	
87F1H : 00H	888BH : 00H	88BDH : 00H	88EFH : 00H	
87F2H : 00H	888CH : 00H	88BEH : 00H	88F0H : 00H	
87F3H : 84H	888DH : 00H	88BFH : 00H	88F1H : 00H	
87F4H : 84H	888EH : 00H	88C0H : 00H	88F2H : 00H	
87F5H : 84H	888FH : 00H	88C1H : 00H	88F3H : 00H	
87F6H : 34H	8890H : 00H	88C2H : 00H	88F4H : 00H	
87F7H : 00H	8891H : 00H	88C3H : 00H	88F5H : 00H	
87F8H : 00H	8892H : 00H	88C4H : 00H	88F6H : 00H	
87F9H : 00H	8893H : 00H	88C5H : 00H	88F7H : 00H	
87FAH : 00H	8894H : 00H	88C6H : 00H	88F8H : 00H	
87FBH : 00H	8895H : 00H	88C7H : 00H	88F9H : 00H	
87FCH : 00H	8896H : 00H	88C8H : 00H	88FAH : 00H	
87FDH : 00H	8897H : 00H	88C9H : 00H	88FBH : 00H	
87FEH : 00H	8898H : 00H	88CAH : 00H	88FCH : 00H	
87FFH : 00H	8899H : 00H	88CBH : 00H	88FDH : 00H	
8868H : 01H	889AH : 00H	88CCH : 00H	88FEH : 00H	
8869H : 01H	889BH : 00H	88CDH : 00H	88FFH : 00H	
886AH : 00H	889CH : 00H	88CEH : 00H		
886BH : 00H	889DH : 00H	88CFH : 00H		
886CH : E0H	889EH : 00H	88D0H : 00H		
886DH : E0H	889FH : 00H	88D1H : 00H		
886EH : 00H	88A0H : 00H	88D2H : 00H		
886FH : 00H	88A1H : 00H	88D3H : 00H	89A6H : 00H	
8870H : D0H	88A2H : 00H	88D4H : 00H	89A7H : 00H	
8871H : D0H	88A3H : 00H	88D5H : 00H	89A8H : 00H	
8872H : 00H	88A4H : 00H	88D6H : 00H	89A9H : 00H	
8873H : 00H	88A5H : 00H	88D7H : 00H		
8874H : 00H	88A6H : 00H	88D8H : 00H		
8875H : 00H	88A7H : 00H	88D9H : 00H		
8876H : 00H	88A8H : 00H	88DAH : 00H		
8877H : 00H	88A9H : 00H	88DBH : 00H		
8878H : 00H	88AAH : 00H	88DCH : 00H		
8879H : 00H	88ABH : 00H	88DDH : 00H		
887AH : 00H	88ACH : 00H	88DEH : 00H		
887BH : 00H	88ADH : 00H	88DFH : 00H		
887CH : 00H	88AEH : 00H	88E0H : 00H		
887DH : 00H	88AFH : 00H	88E1H : 00H		
887EH : 00H	88B0H : 00H	88E2H : 00H		
887FH : 00H	88B1H : 00H	88E3H : 00H		
8880H : 00H	88B2H : 00H	88E4H : 00H		
8881H : 00H	88B3H : 00H	88E5H : 00H		
8882H : 00H	88B4H : 00H	88E6H : 00H		
8883H : 00H	88B5H : 00H	88E7H : 00H		

Deviating control codes

Display loops

	Catalog No.																					
Channel 1	x11,x71,x14 x15,x16,x21 x36,x56,x57 x58,x74,x75 x76,x77,x78			x12/x72			x31,x34,x35			x32			x51,x54,x55			x52			x53			x73		
Address	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR
876AH	FE	RF	-	FE	RF	-	FE	RF	-	FE	RF	-	FF	RF	-	FE	RF	-	FE	RF	-	FE	RF	-
876BH	15	SP1	1	15	SP1	3	15	SP1	1	15	SP1	3	15	SP1	1	15	SP1	3	15	SP1	3	15	SP1	3
876CH	11	RD1	-	11	RD1	-	11	RD1	-	11	RD1	-	11	RD1	-	11	RD1	-	11	RD1	-	11	RD1	-
876DH	1A	Y1	-	1A	Y1	-	1A	Y1	-	1A	Y1	-	1A	Y1	-	1A	Y1	-	1A	Y1	-	1A	Y1	-
876EH	06	D1	-	06	D1	-	06	D1	-	06	D1	-	06	D1	-	06	D1	-	06	D1	-	06	D1	-
876FH	07	G11	1	07	G11	3	07	G11	1	07	G11	3	07	G11	1	07	G11	3	07	G11	1	07	G11	1
8770H	08	G21	1	08	G21	3	08	G21	1	08	G21	3	08	G21	1	08	G21	3	08	G21	1	08	G21	1
8771H	09	G31	-	09	G31	-	09	G31	-	09	G31	-	09	G31	-	09	G31	-	09	G31	-	09	G31	-
8772H	0A	G41	-	0A	G41	-	0A	G41	-	0A	G41	-	0A	G41	-	0A	G41	-	0A	G41	-	0A	G41	-
8773H	FE	-	-	D8	E1	3	FE	-	-	D8	E1	1	FE	-	-	D8	E1	1	10	R1	1	10	R1	1
8774H	FE	-	** -	D9	E2	2	FE	-	-	D9	E2	2	FE	-	-	D9	E2	2	D9	E2	2	D9	E2	2
8775H	FE	-	-	DB	E4	4	FE	-	-	DB	E4	4	FE	-	-	DB	E4	4	FE	-	-	FE	-	-
8776H	FE	-	-	FE	-	-	FF	-	-	FF	-	-	FE	-	-	FE	-	-	FE	-	-	FE	-	-
8777H	0F	PB1	-	0F	PB1	-	0F	PB1	-	0F	PB1	-	0F	PB1	-	0F	PB1	-	0F	PB1	-	0F	PB1	-
8778H	18	TN1	-	18	TN1	-	18	TN1	-	18	TN1	-	18	TN1	-	18	TN1	-	18	TN1	-	18	TN1	-
8779H	19	TD1	-	19	TD1	-	19	TD1	-	19	TD1	-	19	TD1	-	19	TD1	-	19	TD1	-	19	TD1	-
877AH	1C	YP1	-	1C	YP1	-	1C	YP1	-	1C	YP1	-	0B	H1	-	0B	H1	-	0B	H1	-	1C	YP1	-
877BH	1E	YL1	-	1E	YL1	-	0B	H1	-	1E	YL1	-	1E	YL1*	-	1E	YL1	-	1E	YL1	-	1E	YL1	-
877CH	1D	YH1	-	1D	YH1	-	1D	YH1	-	1D	YH1	-	1D	YH1*	-	1D	YH1	-	1D	YH1	-	1D	YH1	-
877DH	17	SL1	1	17	SL1	3	17	SL1	1	17	SL1	3	17	SL1	1	17	SL1	3	17	SL1	3	17	SL1	3
877EH	16	SH1	1	16	SH1	3	16	SH1	1	16	SH1	3	16	SH1	1	16	SH1	3	16	SH1	3	16	SH1	3
877FH	13	RL1	1	13	RL1	3	13	RL1	1	13	RL1	3	13	RL1	1	13	RL1	3	13	RL1	3	13	RL1	1
8780H	12	RH1	1	12	RH1	3	12	RH1	1	12	RH1	3	12	RH1	1	12	RH1	3	12	RH1	3	12	RH1	1
8781H	10	R1	1	10	R1	3	10	R1	1	10	R1	3	10	R1	1	10	R1	3	10	R1	3	32	18	3

* For 455/555: no output limit contents: FE

** For 477, 478: DA E3 –

Various control codes

Display loops (continuation)

Channel 2	Catalog No. x14,415,416 x74,x75 UR = 2: x21,x76,x77 x78			Catalog No. x11,x12,x31 x32,x51,x52 x53,x71,x72 x73			Catalog No. x34,x35 x36			Catalog No. x54,x55 x56,x57 x58		
Address	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR
878CH	FF	RF	-	00	-	-	FF	RF	-	FF	RF	-
878DH	4A	SP2	3	00	-	-	4A	SP2	-	4A	SP2	3
878EH	46	RD2	-	00	-	-	46	RD2	-	46	RD2	-
87EFH	4F	Y2	-	00	-	-	4F	Y2	-	4F	Y2***	-
8790H	3B	D2	-	00	-	-	3B	D2	-	3B	D2	-
8791H	3C	G12	3	00	-	-	3C	G12	1	3C	G12	3
8792H	3D	G22	3	00	-	-	3D	G22	1	3D	G22	3
8793H	3E	G32	-	00	-	-	3E	G32	-	3E	G32	-
8794H	3F	G42	-	00	-	-	3F	G42	-	3F	G42	-
8795H	FE	-	-	00	-	-	FE	-	-	FE	-	-
8796H	FE	-	-	00	-	-	FE	-	-	FE	-	-
8797H	FE	-	-	00	-	-	FE	-	-	FE	-	-
8798H	FE	-	-	00	-	-	FE	-	-	FE	-	-
8799H	44	PB2	-	00	-	-	44	PB2	-	44	PB2	-
879AH	4D	TN2	-	00	-	-	4D	TN2	-	4D	TN2	-
879BH	4E	TD2	-	00	-	-	4E	TD2	-	4E	TD2	-
879CH	51	YP2	-	00	-	-	51	YP2	-	40	H2	-
879DH	53	YL2	-	00	-	-	40	H2	-	53	YL2***	-
879EH	52	YH2	-	00	-	-	52	YH2	-	52	YH2***	-
879FH	4C	SL2	3	00	-	-	4C	SL2	1	4C	SL2	3
87A0H	4B	SH2	3	00	-	-	4B	SH2	1	4B	SH2	3
87A1H	48	RL2	3	00	-	-	48	RL2	1	48	RL2	3
87A2H	47	RH2	3	00	-	-	47	RH2	1	47	RH2	3
87A3H	45	R2	3	00	-	-	45	R1	1	45	R2	3

Channel 3	Catalog No. x21,481			Catalog No. x31,x32,x34 x35,x42					
Address	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR
87AEH	FF	RF	-	FF	RF	-	00	-	-
87AFH	7F	SP3	3	FE	-	-	00	-	-
87B0H	7B	RD3	-	FE	-	-	00	-	-
87B1H	84	Y3	-	1A	Y1	-	00	-	-
87B2H	70	D3	-	79	PB3	-	00	-	-
87B3H	71	G13	3	82	TN3	-	00	-	-
87B4H	72	G23	3	83	TD3	-	00	-	-
87B5H	73	G33	-	86	YP3	-	00	-	-
87B6H	74	G43	-	FE	-	-	00	-	-
87B7H	FE	-	-	FE	-	-	00	-	-
87B8H	FE	-	-	FE	-	-	00	-	-
87B9H	FE	-	-	FE	-	-	00	-	-
87BAH	FE	-	-	FE	-	-	00	-	-
87BBH	79	PB3	-	FE	-	-	00	-	-
87BCH	82	TN3	-	FE	-	-	00	-	-
87BDH	83	TD3	-	FE	-	-	00	-	-
87BEH	86	YP3	-	FE	-	-	00	-	-
87BFH	88	YL3	-	FE	-	-	00	-	-
87C0H	87	YH3	-	FE	-	-	00	-	-
87C1H	81	SL3	3	FE	-	-	00	-	-
87C2H	80	SH3	3	FE	-	-	00	-	-
87C3H	7D	RL3	3	FE	-	-	00	-	-
87C4H	7C	RH3	3	FE	-	-	00	-	-
87C5H	7A	R3	3	10	R1	1	00	-	-

*** For 455/555: FE – –

Deviating control codes

Display loops

	Catalog No.											
Channel 4	x21,481			x34,x35,x36			Others without programmer		
Address	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR
8700H	FF	RF	-	FF	RF	-	00	-	-
8701H	B4	SP4	4	FE	-	-	00	-	-
8702H	B0	RD4	-	FE	-	-	00	-	-
8703H	B9	Y4	-	4F	Y2	-	00	-	-
8704H	A5	D4	-	AE	PB4	-	00	-	-
8705H	A6	G14	4	B7	TN4	-	00	-	-
8706H	A7	G24	4	B8	TD4	-	00	-	-
8707H	A8	G34	-	BB	YP4	-	00	-	-
8708H	A9	G44	-	BC	YH4	-	00	-	-
8709H	FE	-	-	FE	-	-	00	-	-
870AH	FE	-	-	FE	-	-	00	-	-
870BH	FE	-	-	FE	-	-	00	-	-
870CH	FE	-	-	FE	-	-	00	-	-
870DH	AE	PB4	-	FE	-	-	00	-	-
870EH	B7	TN4	-	FE	-	-	00	-	-
870FH	B8	TD4	-	FE	-	-	00	-	-
87E0H	BB	YP4	-	FE	-	-	00	-	-
87E1H	BD	YL4	-	FE	-	-	00	-	-
87E2H	BC	YH4	-	FE	-	-	00	-	-
87E3H	B6	SL4	4	FE	-	-	00	-	-
87E4H	B5	SH4	4	FE	-	-	00	-	-
87E5H	B2	RL4	4	FE	-	-	00	-	-
87E6H	B1	RH4	4	FE	-	-	00	-	-
87E7H	AF	R4	4	45	R2	3	00	-	-

Program controller and programmer

	Catalog No.											
Channel 1	422,482			442			462			491,492		
Address	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR	Hex	Var.	UR
876AH	FF	RF	-	FF	RF	-	FF	RF	-	FF	RF	-
876BH	15	SP1	1	15	SP1	1	15	SP1	1	15	SP1	1
876CH	11	RD1	-	11	RD1	-	11	RD1	-	0E	N1	-
876DH	1A	Y1	-	1A	Y1	-	1A	Y1	-	18	TN1	-
876EH	06	D1	-	06	D1	-	06	D1	-	10	R1	-
876FH	07	G11	1	07	G11	1	07	G11	1	16		1
8770H	08	G21	1	08	G21	1	08	G21	1	17		1
8771H	09	G31	-	09	G31	-	09	G31	-	20		1
8772H	0A	G41	-	0A	G41	-	0A	G41	-	21		1
8773H	43	N2	-	43	N2	-	43	N2	-	22		1
8774H	4D	TN2	-	4D	TN2	-	4D	TN2	-	23		1
8775H	FE	-	-	FE	-	-	FE	-	-	24		1
8776H	FE	-	-	FE	-	-	FE	-	-	25		1
8777H	0F	PB1	-	0F	PB1	-	0F	PB1	-	26		1
8778H	18	TN1	-	18	TN1	-	18	TN1	-	27		1
8779H	19	TD1	-	19	TD1	-	19	TD1	-	2A		-
877AH	1C	YP1	-	1C	YP1	-	0B	H1	-	2B		-
877BH	1E	YL1	-	0B	H1	-	1E	YL1	-	2C		-
877CH	1D	YH1	-	1D	YH1	-	1D	YH1	-	2D		-
877DH	17	SL1	1	17	SL1	1	17	SL1	1	2E		-
877EH	16	SH1	1	16	SH1	1	16	SH1	1	2F		-
877FH	13	RL1	1	13	RL1	1	13	RL1	1	30		-
8780H	12	RH1	1	12	RH1	1	12	RH1	1	FE		-
8781H	10	R1	1	10	R1	1	10	R1	1	F0	YR1	1

Various control codes

Program controller and programmer (continuation)

Channel 2	Catalog No.					
	All programm controllers + x 92			x91		
Address	Hex	Var.	UR	Hex	Var.	UR
878CH	FF	RF	-	00	-	-
878DH	FE	-	1	00	-	-
878EH	43	N2	-	00	-	-
878FH	4D	TN2	-	00	-	-
8790H	45	R2	-	00	-	-
8791H	FE	-	1	00	-	-
8792H	FE	-	1	00	-	-
8793H	55	25	1	00	-	-
8794H	56	26	1	00	-	-
8795H	57	27	1	00	-	-
8796H	58	28	1	00	-	-
8797H	59	29	1	00	-	-
8798H	5A	30	1	00	-	-
8799H	5B	31	1	00	-	-
879AH	5C	32	1	00	-	-
879BH	5F	35	-	00	-	-
879CH	60	36	-	00	-	-
879DH	61	37	-	00	-	-
879EH	62	38	-	00	-	-
879FH	63	39	-	00	-	-
87A0H	64	40	-	00	-	-
87A1H	65	41	-	00	-	-
87A2H	FE	-	-	00	-	-
87A3H	F1	YR2	1	00	-	-

Channel 3	Catalog No.					
	x22, x62, x82 x92			442		
Address	Hex	Var.	UR	Hex	Var.	UR
87AEH	00	-	-	FF	RF	-
87AFH	00	-	-	1A	Y1	-
87B0H	00	-	-	79	PB3	-
87B1H	00	-	-	82	TN3	-
87B2H	00	-	-	83	TD3	-
87B3H	00	-	-	86	YP3	-
87B4H	00	-	-	87	YH3	-
87B5H	00	-	-	FE	-	-
87B6H	00	-	-	FE	-	-
87B7H	00	-	-	FE	-	-
87B8H	00	-	-	FE	-	-
87B9H	00	-	-	FE	-	-
87BAH	00	-	-	FE	-	-
87BBH	00	-	-	FE	-	-
87BCH	00	-	-	FE	-	-
87BDH	00	-	-	FE	-	-
87BEH	00	-	-	FE	-	-
87BFH	00	-	-	FE	-	-
87C0H	00	-	-	FE	-	-
87C1H	00	-	-	FE	-	-
87C2H	00	-	-	FE	-	-
87C3H	00	-	-	FE	-	-
87C4H	00	-	-	FE	-	-
87C5H	00	-	-	10	R1	1

User range definition

Channel	Address	Catalog No.																																
		x11	x12	x14	x15	x16	x21	x22	x31	x32	x34	x35	x36	x42	x51	x52	x53	x54	x55	x56	x57	x58	x62	x71	x72	x73	x74	x75	x76	x77	x78	x81	x82	x91	x92
Channel 1	8783	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E2	E2
	8784	00	0E	-	-	-	-	-	-	0E	-	-	-	-	-	0E	06	-	-	-	-	-	-	-	0E	06	-	-	-	-	-	-	-	7F	7F
	8785	F8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	80
	8786	00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8787	00	0C	-	-	-	-	-	-	0C	-	-	-	-	-	0C	0C	-	-	-	-	-	-	-	0C	0x	-	-	-	-	-	-	-	-	-
	8788	00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8789	00	00	-	-	-	-	-	-	00	-	-	-	-	-	00	62	-	-	-	-	-	-	-	00	02	-	-	-	-	-	-	-	-	-
	878A	00	08	-	-	-	-	-	-	08	-	-	-	-	-	08	08	-	-	-	-	-	-	-	08	-	-	-	-	-	-	-	-	-	-
	878B	00	00	-	-	-	-	-	-	00	-	-	-	-	-	00	F8	-	-	-	-	-	-	-	00	98	-	-	-	-	-	-	-	-	-
Channel 2	87A5	00	-	62	62	62	62	E2	-	-	62	62	62	E2	-	-	-	62	62	62	62	62	E2	-	-	-	62	62	62	62	62	62	62	-	E2
	87A6	00	-	-	-	-	-	7F	-	-	-	-	-	7F	-	-	-	-	-	-	-	-	7F	-	-	-	-	-	-	-	-	-	7F	-	7F
	87A7	00	-	F8	F8	F8	F8	80	-	-	F8	F8	F8	80	-	-	-	F8	F8	F8	F8	F8	80	-	-	-	F8	F8	F8	F8	F8	F8	80	-	80
	87A8	00	-	-	-	FF	FF	-	-	-	-	-	FF	-	-	-	-	-	-	FF	FF	FF	-	-	-	-	-	-	FF	FF	FF	FF	-	-	FF
	87A9	00	-	-	-	FF	FF	-	-	-	-	-	FF	-	-	-	-	-	-	FF	FF	FF	-	-	-	-	-	-	FF	FF	FF	FF	-	-	FF
	87AA	00	-	-	-	FF	FF	-	-	-	-	-	FF	-	-	-	-	-	-	FF	FF	FF	-	-	-	-	-	-	FF	FF	FF	FF	-	-	FF
	87AB	00	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-
	87AC	00	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-
	87AD	00	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-	FF	FF	-	-	-	-	-	-	-
Channel 3	87C7	00	-	-			62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62	-	-	-
	87C8	00	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	87C9	00	-	-			F8	-	80	80	80	80	-	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F8	-	-	-
	87CA	00	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	87CB	00	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	87CC	00	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	87CD	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87CE	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87CF	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
Channel 4	87E9	00	-	-			62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	62	-	-	-
	87EA	00	-	-				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	87EB	00	-	-			F8	-	-	-	80	80	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	F8	-	-	-
	87EC	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87ED	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87EE	00	-	-			FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87EF	00	-	-			FF	-	-	-	FF	FF	FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87F0	00	-	-			FF	-	-	-	FF	FF	FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-
	87F1	00	-	-			FF	-	-	-	FF	FF	FF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	FF	-	-	-

Deviating control codes outside the display loops (and the user range definition) (continuation)

	Catalog No.														
	x11	x12	x1x	x15	x16	x21	x22	x31	x32	x3x	x35	x36	xx2	x51	x52
84D9	48	=	=	=	=	=	=	=	=	=	=	=	=	=	=
84E2	04	=	44	44	44	44	84	=	=	44	44	44	84	0C	0C
84E3	00	=	=	=	=	44	=	04	04	44	44	40	04	=	=
84E4	6D	=	=	=	4C	=	=	=	=	=	=	4C	=	4C	4C
84E5	6D	=	4C	4C	4C	4C	4C	=	=	=	=	=	=	=	=
84E6	6D	=	=	=	=	=	=	7D	7D	7D	7D	=	7D	=	=
84E7	6D	=	=	=	=	=	=	=	=	7D	7D	7D	=	=	=
84F4	55	=	=	=	=	=	B5	=	=	=	=	=	B5	=	=
84F6	55	=	11	=	51	11	45	=	=	11	=	51	45	=	51
84F7	55	=	=	=	=	11	=	58	58	88	88	88	58	=	=
84FA	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E
84FB	01	00	03	03	00	0F	=	00	00	00	00	00	00	=	00
84FC	00	=	08	08	08	E4	=	=	=	08	08	08	=	=	=
8768	0F	=	FF	FF	FF	FF	=	=	=	FF	FF	FF	=	=	=
8769	00	=	=	=	=	FF	=	=	=	=	=	=	=	=	=
876D	1A	=	=	FE	=	=	=	=	=	=	=	=	=	=	=
87F3	84	=	=	=	=	33	=	=	=	37	37	37	=	=	=
87F4	84	=	=	=	=	32	=	=	=	36	36	36	=	=	=
87F5	84	=	35	35	40	35	=	35	35	35	35	=	35	35	35
87F6	34	=	=	=	=	=	=	=	=	=	=	84	=	=	=
87F8	00	=	=	=	=	=	=	18	18	18	18	40	18	=	=
87F9	00	=	=	=	=	=	=	1A	1A	1A	1A	=	1A	=	=
87FA	00	=	=	=	=	=	=	=	=	4F	4F	4F	=	=	=
87FB	00	=	=	=	=	=	=	1A	1A	1A	1A	=	1A	=	=
87FC	00	=	=	=	=	=	=	=	=	4F	4F	4F	=	=	=

Key

- Binary display
- Controller type/time range 1/2
- Controller type/time range 3/4
- Channel 1, Channel 2, Channel 3, Channel 4 } Control function
- Mask A/H switch 1/2
- Mask I/E switch 1/2
- Mask I/E switch 3/4
- Serial file no.
- Self-parameter setting – channel monitoring
- Global alarm value 1/2
- Global alarm value 3/4

} Binary signal display (see also 84D0)

Status gate-out

Channel 1, Channel 2, Channel 3, Channel 4 } Variables adjustable with keys 7 and 8 (00 = Y_ per channel)

Deviating control codes outside the display loops (and the user range definition) (continuation)

	B-Nr.																			
	x11	x53	x5x	x55	x56	x57	x58	x62	x71	x72	x73	x7x	x75	x76	x77	x78	x81	x82	x91	x92
84D9	48	=	=	=	=	=	=	=	28	28	28	28	28	28	28	28	28	28	08	08
84E2	04	0C	CC	CC	C4	C4	C4	8C	=	=	=	44	44	44	44	44	44	84	08	88
84E3	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	44	=	=	=
84E4	60	4C	4C	4C	4C	=	=	4C	=	=	=	=	=	4C	=	=	=	=	=	=
84E5	60	=	4C	4C	4C	4C	4C	=	=	=	=	=	=	=	=	=	=	=	=	=
84E6	60	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
84E7	60	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
84F4	55	=	=	=	=	=	=	85	=	=	=	=	=	=	=	=	=	85	88	88
84F6	55	=	11	=	51	11	11	45	=	=	=	11	=	51	11	11	11	45	=	=
84F7	55	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	11	=	=	=
84FA	00	0F	10	11	12	13	14	15	16	17	18	19	1A	1B	1C	1D	1E	1F	20	21
84FB	01	00	03	03	00	00	00	=	=	00	00	03	03	00	00	00	0F	=	00	00
84FC	00	=	08	0B	08	08	08	=	=	=	=	08	08	08	08	08	E4	=	=	=
8768	0F	=	FF	FF	FF	FF	FF	=	=	=	=	FF	FF	FF	FF	FF	FF	=	00	00
8769	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	FF	=	=	=
876D	1A	=	=	FE	=	=	=	=	=	=	=	=	=	=	=	=				
87F3	84	=	33	33	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87F4	84	=	32	32	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87F5	84	35	35	35	35	35	35	35	=	=	=	35	35	35	35	35	35	=	=	=
87F6	34	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87F8	00	=	=	=	40	40	40	=	=	=	=	=	=	40	40	40	=	=	=	=
87F9	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87FA	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87FB	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=
87FC	00	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=	=

Key

- Binary display
- Controller type/time range 1/2
- Controller type/time range 3/4
- Channel 1 } Control function
- Channel 2 } Control function
- Channel 3 } Control function
- Channel 4 } Control function
- Mask A/H switch 1/2
- Mask I/E switch 1/2
- Mask I/E switch 3/4
- Serial file no.
- Self-parameter setting – channel monitoring
- Global alarm value 1/2
- Global alarm value 3/4

} Binary signal display (see also 84D0)

- Status gate-out
- Channel 1 } Variables adjustable with keys 7 and 8 (00 = Y_ per channel)
- Channel 2 } Variables adjustable with keys 7 and 8 (00 = Y_ per channel)
- Channel 3 } Variables adjustable with keys 7 and 8 (00 = Y_ per channel)
- Channel 4 } Variables adjustable with keys 7 and 8 (00 = Y_ per channel)

6.1 Additional Information concerning CURVEX

(Control codes 84BEH to 89F5H)

6.1.1 General

For connecting a sensor type which is not yet built-in the required input curve has to be saved in the Digitric P.

Curve limits are −270 °C and +2000 °C. The following temperature curves are already built-in:

Thermocouple type L, type J, type K, type S, type B, type D and resistance thermometer Pt 100.

The values to be saved should possibly reproduce precisely the sensor curve. From 100 to 100 °C voltage values in µV or resistance values in mΩ are saved as 2-bytes-Date. For values −200 °C the lowest supporting point has to be extrapolated to −300 °C. Only positive ascending curves are tolerated.

When evaluating the curve intermediate values are interpolated linearily. The resulting unilateral error can be converted into a smaller error with alternating signs by correction of the supporting values.

6.1.2 Curve data

The following data (saving in control code field 6) are to be defined:

Address	Date	Function
89BEH 89BFH	INF AWT	Curve data Lower range value in °C
89C0H 89C1H	AW.Hi AW.Lo	Lower range value in µV or mΩ
89C2H / 89C3H	STW 1.Hi / STW 1.Lo	support. value 1
89C4H / 89C5H	STW 2.Hi / STW 2.Lo	support. value 2
89C6H / 89C7H	STW 3.Hi / STW 3.Lo	support. value 3
89C8H / 89C9H	STW 4.Hi / STW 4.Lo	support. value 4
89CAH / 89CBH	STW 5.Hi / STW 5.Lo	support. value 5
89CCH / 89CDH	STW 6.Hi / STW 6.Lo	support. value 6
89CEH / 89CFH	STW 7.Hi / STW 7.Lo	support. value 7
89D0H / 89D1H	STW 8.Hi / STW 8.Lo	support. value 8
89D2H / 89D3H	STW 9.Hi / STW 9.Lo	support. value 9
89D4H / 89D5H	STW10.Hi / STW10.Lo	support. value 10
89D6H / 89D7H	STW11.Hi / STW11.Lo	support. value 11
89D8H / 89D9H	STW12.Hi / STW12.Lo	support. value 12
89DAH / 89DBH	STW13.Hi / STW13.Lo	support. value 13
89DCH / 89DDH	STW14.Hi / STW14.Lo	support. value 14
89DEH / 89DFH	STW15.Hi / STW15.Lo	support. value 15
89E0H / 89E1H	STW16.Hi / STW16.Lo	support. value 16
89E2H / 89E3H	STW17.Hi / STW17.Lo	support. value 17
89E4H / 89E5H	STW18.Hi / STW18.Lo	support. value 18
89E6H / 89E7H	STW19.Hi / STW19.Lo	support. value 19
89E8H / 89E9H	STW20.Hi / STW20.Lo	support. value 20
89EAH / 89EBH	STW21.Hi / STW21.Lo	support. value 21
89ECH / 89EDH	STW22.Hi / STW22.Lo	support. value 22
89EEH / 89EFH	STW23.Hi / STW23.Lo	support. value 23
89F0H / 89F1H	STW24.Hi / STW24.Lo	support. value 24

6.1.2.1 Explanation

INF: Curve data

Bit 0...Bit 4 Number of supporting values from 100° to 100 °C [HEX-format] (max. 24 values are possible)

Bit 5 Sign for curve lower range value AW
pos.: Bit 5 = 1
neg.: Bit 5 = 0 (not possible with mΩ)

Bit 6...Bit 7 Adaptation factor between module values K3, K4 and curve
Factor = 1000 : Bit 6 = 0, Bit 7 = 0,
Factor = 500 : Bit 6 = 1, Bit 7 = 0,
Factor = 200 : Bit 6 = 0, Bit 7 = 1

K3, K4 1 LSB corresponds to 1000 µV with µV with therm.-E. / mV-modules
1 LSB corresponds to 2000 mΩ with resistance therm.-modules

Curve **1 µV corresponds to 1 LSB** (adaptation factor = 1000), if lower range value of curve −65.535...65.535 mV and the difference between upper and lower range value ≦ 65.535 mV.
2 µV corresponds to 1 LSB (adaptation factor = 500), if lower range value of curve −131.070...131.070 mV and the difference between upper and lower range value is 65.536...131.070 mV.
10 mΩ corresponds to 1 LSB (adaptation factor = 200), if lower range value of curve 0...655.35 Ω and the difference between upper and lower range value ≦ 655.35 Ω.

AWT **Curve lower range value** in °C (corresponds to supporting value 1)

$$AWT = \frac{\text{Temp. (°C)}}{10} + 30 \rightarrow \text{1 byte HEX-format}$$

AW **Curve lower range value** (corresponds to supporting value 1)
The value to be saved in 2 bytes HEX-format is the actual curve lower range value in µV or mΩ with respect to the selected adaptation factor.
For error minimization a corresponding value correction can be useful.

STW1.Hi / STW1.10...STWn.Hi / STWn.10:
Curve supporting values from 100 to 100 °C
(n = 2...24)
The value to be saved in 2 bytes HEX-format is the difference between the actual value and lower range value of the curve in µV or mΩ with respect to the selected adaptation factor.
For error minimization a corresponding value correction can be useful.
Supporting value 1 is always 00:00H
Only positive ascending input curves are tolerated, i.e. the supporting value must be equal to or bigger than the value of the preceding supporting value.

6.1.3 Example: Thermocouple value type R

−50 °C...+1769 °C corr. −0.226 mV...21.121 mV
Reference: 0 °C

The complete curve has to be saved, i.e. supporting values from −100 °C to +1800 °C are required. The two not defined values −100 °C and +1800 °C have to be extrapolated. Here a graphic representation of the curve in the two limit ranges is useful in order to recognize the trend.

6.1.3.1 INF determination

Number of supporting values: 20 → INF = xxx1 : 0100 (14H)
Sign for curve lower range value: negative
→ INF = xx0x : xxxx (Bit 5 = 0)
Adaptation factor: 1000 → INF = 00xx : xxxx
Result: **INF = 0001 : 0100 → 14H**

6.1.3.2 AWT determination

$$AWT = \frac{-100\ (°C)}{10} + 30 = 20 \rightarrow \textbf{AWT = 14H}$$

6.1.3.3 Curve value correction

Temp. (°C)	linear			UTh corr. (mV)	Difference (mV)
	UTh (mV)	interpol. (mV)	Diff. (mV)		
*(–100)	(–0.375)		0	*(–0.444)	
– 50	–0.226	–0.188	+0.038	–0.226	0
* 0	0		0	*–0.008	–0.008
50	0.296	0.324	+0.028	0.312	+0.016
* 100	0.647		0	* 0.631	–0.016
150	1.041	1.058	+0.017	1.047	+0.006
* 200	1.468		0	* 1.462	–0.006
250	1.923	1.934	+0.011	1.929	+0.006
* 300	2.400		0	* 2.395	–0.005
350	2.896	2.904	+0.008	2.899	+0.003
* 400	3.407		0	* 3.403	–0.004
450	3.933	3.939	+0.006	3.936	+0.003
* 500	4.471		0	* 4.468	–0.003
550	5.021	5.027	+0.006	5.024	+0.003
* 600	5.582		0	* 5.579	–0.003
650	6.155	6.162	+0.007	6.159	+0.004
* 700	6.741		0	* 6.738	–0.003
750	7.339	7.345	+0.006	7.342	+0.003
* 800	7.949		0	* 7.946	–0.003
850	8.570	8.576	+0.006	8.573	+0.003
* 900	9.203		0	* 9.200	–0.003
950	9.848	9.853	+0.005	9.850	+0.002
* 1000	10.503		0	*10.500	–0.003
1050	11.170	11.175	+0.005	11.172	+0.002
* 1100	11.846		0	*11.844	–0.002
1150	12.532	12.535	+0.003	12.534	+0.002
* 1200	13.224		0	*13.223	–0.001
1250	13.922	13.924	+0.002	13.923	+0.001
* 1300	14.624		0	*14.623	–0.001
1350	15.329	15.330	+0.001	15.329	0
* 1400	16.035		0	*16.035	0
1450	16.741	16.740	–0.001	16.741	0
* 1500	17.445		0	*17.446	+0.001
1550	18.146	18.144	–0.002	18.145	–0.001
* 1600	18.842		0	*18.844	+0.002
1650	19.533	19.529	–0.004	19.531	–0.002
* 1700	20.215		0	*20.218	+0.003
1750	20.878	20.870	–0.008	20.874	–0.004
*(1800)	(21.525)		0	*(21.529)	+0.004

* supporting values

6.1.3.4 AWT determination from corrected curve values

AW corresponds to UTh corr. for –100°C

Adaptation factor is 1000:1 µV corresponds to 1 LSB

AW = 444 µV = 444 LSB ▶ **AW = 01BCH**

Lower range value sign is saved in INF.

6.1.3.5 Determination of 20 supporting values (STW)

STW corresponds to the difference between UTh corr. and AW.

Adaptation factor is 1000:1 µV corresponds to 1 LSB

STW1 = –444 µV – (–444 µV) = 0 µV ▶ STW1 = 0000H

STW2 = – 8 µV – (–444 µV) = 436 µV ▶ STW2 = 01B4H

STW3 = –631 µV – (–444 µV) = 1075 µV ▶ STW3 = 0433H

STW20 = 21529 µV – (–444 µV) = 21973 µV ▶ STW20 = 55D5H

6.1.3.6 Data summary for storage in control code field 6

Address	Date	Function
89BEH	14H	INF; 20 Werte
89BFH	14H	AWT = –100°C
89COH / 89C1H	01BCH	AW = –0,044 mV
89C2H / 89C3H	0000H	–100°C
89C4H / 89C5H	01B4H	0°C
89C6H / 89C7H	0433H	100°C
89C8H / 89C9H	0772H	200°C
89CAH / 89CBH	0B17H	300°C
89CCH / 89CDH	0F07H	400°C
89CEH / 89CFH	1330H	500°C
89D0H / 89D1H	1787H	600°C
89D2H / 89D3H	1C0EH	700°C
89D4H / 89D5H	20C6H	800°C
89D6H / 89D7H	25ACH	900°C
89D8H / 89D9H	2AC0H	1000°C
89DAH / 89DBH	3000H	1100°C
89DCH / 89DDH	3563H	1200°C
89DEH / 89DFH	3ADBH	1300°C
89E0H / 89E1H	405FH	1400°C
89E2H / 89E3H	45E2H	1500°C
89E4H / 89E5H	4B58H	1600°C
89E6H / 89E7H	50B6H	1700°C
89E8H / 89E9H	55D5H	1800°C

7 Description of commands

On the following pages the commands used in the Protronic P are described. An abbreviated summary is given in Section 12.2.

The following abbreviations are used.

RES = Result of an operation
stands in place of an output variable
SR1 = Input 1 of an operation command
stands in place of an input variable
SR2 = Input 2 of an operation command
stands in place of an input variable

7.1 Logical commands

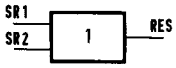
Overview:

SR1	SR2	ANN	ANI	AIN	AII	ONN	ONI	OIN	OII	XNN	XNI
1	1	1	0	0	1	1	0	1	0	0	1
0	1	0	1	1	0	1	0	1	0	1	0
1	0	0	1	0	1	1	0	0	1	1	0
0	0	0	1	0	1	0	1	1	0	0	1

Mnemonic: **BTN** **HEX 01H**

Function: **B**it-**T**ransfer-**N**ot-negated
RES = SR1
SR2 is not processed

Symbol:



Truth table:

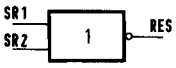
SR1	SR2	RES
1	1	1
0	1	0
1	0	1
0	0	0

Time requirement: 88 ... **89** ... 90 µs

Mnemonic: **BTI** **HEX 02H**

Function: **B**it-**T**ransfer-**I**nverted
RES = $\overline{SR1}$
SR2 is not processed

Symbol:



Truth table:

SR1	SR2	RES
1	1	0
0	1	1
1	0	0
0	0	1

Time requirement: 88 ... **89** ... 90 µs

Mnemonic: **ANN** **HEX 03H**

Function: **A**nd-**N**ot-**N**egated = UND
Input and output not inverted
RES = SR1 AND SR2

Symbol:

Truth table:

SR1	SR2	RES
1	1	1
0	1	0
1	0	0
0	0	0

Time requirement: 109 ... **111** ... 112 µs

Mnemonic: **ANI** **HEX 04H**

Function: **A**nd-**N**ot-**I**nverted
Input not inverted, output inverted
RES = $\overline{SR1 \text{ AND } SR2}$

Symbol:

Truth table:

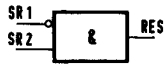
SR1	SR2	RES
1	1	0
0	1	1
1	0	1
0	0	1

Time requirement: 109 ... **111** ... 112 µs

Mnemonic: **AIN** **HEX 05H**

Function: **A**nd-**I**nverted-**N**ot-inverted
Input 1 inverted, output not inverted
RES = $\overline{SR1}$ AND SR2

Symbol:



Truth table:

SR1	SR2	RES
1	1	0
0	1	1
1	0	0
0	0	0

Mnemonic: **AII** **HEX 06H**

Function: **A**nd-**I**nverted-**I**nverted
Input 1 and output inverted
RES = $\overline{SR1 \text{ AND } SR2}$

Symbol:

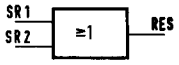
Truth table:

SR1	SR2	RES
1	1	1
0	1	0
1	0	1
0	0	1

Mnemonic: **ONN** **HEX 07H**

Function: **O**r-**N**ot-**N**egated = OR
Input and output not inverted
RES = SR1 OR SR2

Symbol:



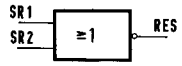
Truth table:

SR1	SR2	RES
1	1	1
0	1	1
1	0	1
0	0	0

Mnemonic: **ONI** **HEX 08H**

Function: **O**r-**N**ot inverted-**I**nverted
Input not inverted, output inverted
RES = $\overline{\text{SR1 OR SR2}}$

Symbol:



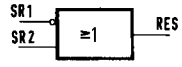
Truth table:

SR1	SR2	RES
1	1	0
0	1	0
1	0	0
0	0	1

Mnemonic: **OIN** **HEX 09H**

Function: **O**r-**I**nverted-**N**ot inverted
Input 1 inverted, output not inverted
RES = $\overline{\text{SR1}}$ OR SR2

Symbol:



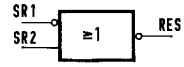
Truth table:

SR1	SR2	RES
1	1	1
0	1	1
1	0	0
0	0	1

Mnemonic: **OII** **HEX 0AH**

Function: **O**r-**I**nverted-**I**nverted
Input 1 and output inverted
RES = $\overline{\overline{\text{SR1}} \text{ OR SR2}}$

Symbol:



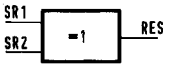
Truth table:

SR1	SR2	RES
1	1	0
0	1	0
1	0	1
0	0	0

Mnemonic: **XNN** **HEX 0BH**

Function: **EX**clusive-**O**r-**N**ot inverted
Inputs and output not inverted
RES = SR1 exclusive Or SR2

Symbol:



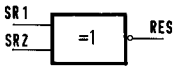
Truth table:

SR1	SR2	RES
1	1	0
0	1	1
1	0	1
0	0	0

Mnemonic: **XNI** **HEX 0CH**

Function: **EX**clusive-**O**r-**I**nverted
Inputs not inverted, output inverted
RES = $\overline{\text{SR1 exclusive Or SR2}}$

Symbol:



Truth table:

SR1	SR2	RES
1	1	1
0	1	0
1	0	0
0	0	1

Mnemonic: **FRS** **HEX 0DH**

Function: Static RS Flip-flop

Symbol:

Truth table:

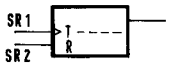
t_n			t_{n+1}
SR1	SR2	RES	RES
1	0	0	1
1	0	1	1
x	1	x	0

x = any

Mnemonic: **FTR** **HEX 0EH**

Function: Edge-triggered TR Flip-flop

Symbol:



Truth table:

t_n			t_{n+1}
SR1	SR2	RES	RES
⎍	0	0	1
⎍	0	1	0
x	1	x	0

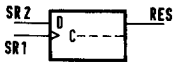
x = any
⎍ = positive edge

Mnemonic: **FDH** **HEX 0FH**

Function: Edge-triggered D-flip-flop
rising edge

Positive edge of SR1 switches RES to "1" if SR2 = "1"
Positive edge of SR1 switches RES to "0" if SR2 = "0"

Symbol:



Truth table:

t_n			t_{n+1}
SR1	SR2	RES	RES
⌐	0	0	0
⌐	1	0	1
⌐	0	1	0
⌐	1	1	1
0	x	0	0
0	x	1	1

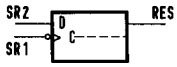
x = any
⌐ = positive edge

Mnemonic: **FDL** **HEX 10H**

Function: Edge-triggered D-flip-flop
falling edge

Negative edge of SR1 switches RES to "1" if SR2 = "1"
Negative edge of SR1 switches RES to "0" if SR2 = "0"

Symbol:



Truth table:

t_n			t_{n+1}
SR1	SR2	RES	RES
⌙	0	0	0
⌙	1	0	1
⌙	0	1	0
⌙	1	1	1
0	x	0	0
0	x	1	1

x = any
⌙ = negative edge

7.2 Switch functions

Mnemonic: **SOL** **HEX 11H**

Function: **S**witch **O**pen if actuation "0" (0 = **L**ow)

Symbol:

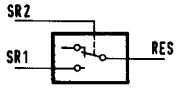


Table:

SR2	RES
1	SR1
0	Last value of SR1

Mnemonic: **SOH** **HEX 12H**

Function: **S**witch **O**pen if actuation "1" (1 = **H**igh)

Symbol:

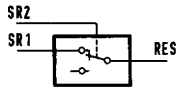


Table:

SR2	RES
0	SR1
1	Last value of SR1

Mnemonic: **SIH** **HEX 13H**

Function: **S**witch-**I**nverse Output
if actuation = "1" (**H**igh)

Symbol:

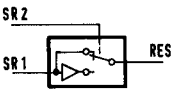


Table:

SR2	RES
1	−SR1
0	SR1

Mnemonic: **SIL** **HEX 14H**

Function: **S**witch-**I**nverse Output
if actuation = "0" (**L**ow)

Symbol:

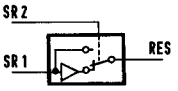


Table:

SR2	RES
1	SR1
0	−SR1

Mnemonic: **SZL** **HEX 15H**

Function: **S**witch-RES = (**Z**ero)
if actuation = "0" (**L**ow)

Symbol:

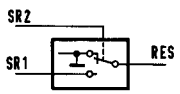


Table:

SR2	RES
1	SR1
0	0

Mnemonic: **SZH** **HEX 16H**

Function: **S**witch-RES = (**Z**ero), if actuation = "1" (**H**igh)

Symbol:

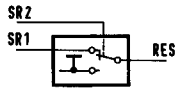


Table:

SR2	RES
0	SR1
1	0

Mnemonic: **UM1 to U25** **HEX see table**

Function: **C**hangeover switch actuated by **S3/1, S3/2** and **S3/3**

Symbol:

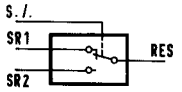


Table:

U..	RES
1	SR2
0	SR1

Mnem.	HEX	S.	Mnem.	HEX	S.
UM1	17H	Y01	UI1	27H	W01
U11	18H	Y11	U18	28H	B18
UA1	19H	Y21	UE1	29H	W21
U31	1AH	Y31	U20	2AH	B20
UM2	1BH	Y02	UI2	2BH	W02
U12	1CH	Y12	U22	2CH	B22
UA2	1DH	Y22	UE2	2DH	W22
U32	1EH	Y32	U24	2EH	B24
UM3	1FH	Y03	UI3	2FH	W03
U13	20H	Y13	U19	30H	B19
UA3	21H	Y23	UE3	31H	W23
U33	22H	Y33	U21	32H	B21
UM4	23H	Y04	UI4	33H	W04
U14	24H	Y14	U23	34H	B23
UA4	25H	Y24	UE4	35H	W24
U34	26H	Y34	U25	36H	B25

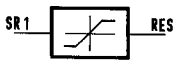
7.3 Limiters

Mnemonic: **LB1** **HEX 37H**

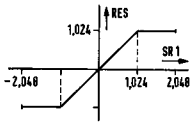
Function: **L**imiter **B**ipolar

RES = SR1 for $-102{,}4 \leqq SR1 \leqq +102.4\%$
RES = 102.4 for $102.4 \leqq SR1 \leqq 204.8\%$
RES = -102.4 for $-204.8 \leqq SR1 \leqq -102.4\%$

Symbol:



Characteristic:

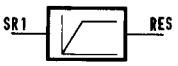


Mnemonic: **LU1** **HEX 38H**

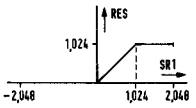
Function: **L**imiter **U**nipolar

RES = SR1 for $0.0 \leqq SR1 \leqq 102.4\%$
RES = 0 for $-102.4 \leqq SR1 \leqq 0.0\%$
RES = 102.4 for $102{,}4 \leqq SR1 \leqq 204.8\%$

Symbol:



Characteristic:



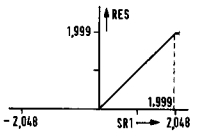
Mnemonic: **LU2** **HEX 39H**

Function: **L**imiter **U**nipolar

RES = SR1 for $0.0 \leqq SR1 \leqq 199.9\%$
RES = 0.0 for $-204.8 \leqq SR1 \leqq 0.0\%$
RES = 199.9 for $199.9 \leqq SR1 \leqq 204.8\%$

Symbol:

Characteristic:



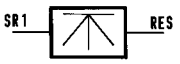
7.4 Calculation functions

Mnemonic: **NEG** **HEX 3AH**

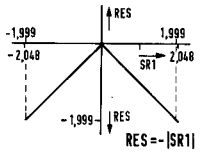
Function: **Neg**ative absolute value of the input

RES = −|SR1| for −199.9 ≦ SR1 ≦ 199.9%
RES = −199.9 for 199.9 ≦ SR1 ≦ 204.8%

Symbol:



Characteristic:



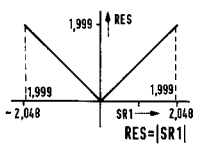
Mnemonic: **ABS** **HEX 3BH**

Function: Formation of the **Abs**olute value

RES = SR1 for 0.0 ≦ SR1 ≦ 199.9%
RES = 199.9 for 199.9 ≦ SR1 ≦ 204.8%
RES = −SR1 for −199.9 ≦ SR1 ≦ 0.0%
RES = −199.9 for −204.8 ≦ SR1 ≦ −199.9%

Symbol:

Characteristic:

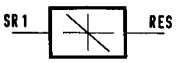


Mnemonic: **INV** **HEX 3CH**

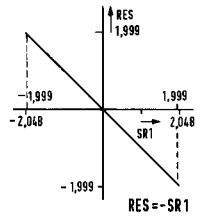
Function: **Inv**ert the input

RES = −SR1 for −199.9 ≦ SR1 ≦ +199.9%
RES = 199.9 for 199.9 ≦ SR1 ≦ 204.8%
RES = −199.9 for −204.8 ≦ SR1 ≦ −199.9%

Symbol:



Characteristic:

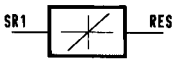


Mnemonic: **DIR** **HEX 3DH**

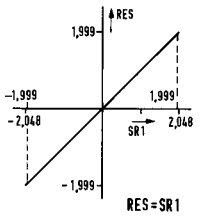
Function: **Dir**ect transfer of the input to the output

RES = SR1 for −199.9 ≦ SR1 ≦ 199.9%
RES = 199.9 for 199.9 ≦ SR1 ≦ 204.8%
RES = −199.9 for −204.8 ≦ SR1 ≦ −199.9%

Symbol:



Characteristic:



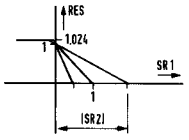
Mnemonic: **YK1** **HEX 42H**

Function: Characteristic displacement and rotation

$$RES = 100\% - \frac{SR1}{|SR2|}\ \%$$

Symbol:

Characteristic:



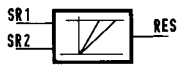
Value range: Inputs: −199.9...+199.9%
Output: 0.0...+102.4%

Mnemonic: **YK2** **HEX 43H**

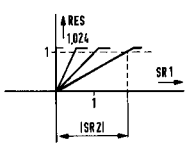
Function: Characteristic displacement and rotation

$$RES = \frac{SR1}{|SR2|}\ \%$$

Symbol:



Characteristic:



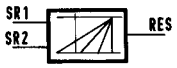
Value range: Inputs: −199.9...+199.9%
Output: 0.0...+102.4%

Mnemonic: **YK3** **HEX 44H**

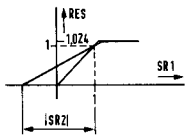
Function: Characteristic displacement and rotation

$$RES = 100\% + \frac{SR1 - 100}{|SR2|}\ \%$$

Symbol:



Characteristic:



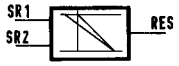
Value range: Inputs: −199.9...+199.9%
Output: 0.0...+102.4%

Mnemonic: **YK4** **HEX 45H**

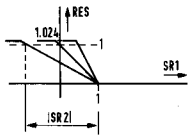
Function: Characteristic displacement and rotation

$$RES = \frac{100\% - SR1}{|SR2|}\ \%$$

Symbol:



Characteristic:



Value range: Inputs: −199.9...+199.9%
Output: 0.0...+102.4%

Mnemonic: **MAX** **HEX 46H**

Function: **Max**imum selection

RES = SR1 if SR1 ≧ SR2
RES = SR2 if SR1 < SR2

Symbol:

Value range, input and output:
−204.8...+204.8%

Mnemonic: **MIN** **HEX 47H**

Function: **Min**imum selection

RES = SR1 if SR1 ≦ SR2
RES = SR2 if SR1 > SR2

Symbol:

Value range, input and output:
−204.8...+204.8%

Mnemonic: **ADD** **HEX 48H**

Function: **Add**ition

RES = SR1 + SR2

Symbol:

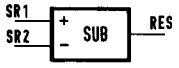
Value range, input and output:
−199.9...+199.9%

Mnemonic: **SUB** **HEX 49H**

Function: **Sub**traction

RES = SR1 − SR2

Symbol:



Value range, input and output:
−199.9...+199.9%

Mnemonic: **MUL** **HEX 4AH**

Function: **Mul**tiplication

RES = SR1 · SR2

Symbol:

Value range, input and output:
−199.9...+199.9%

Example: 100.0% x 50.0% = 50.0% No overflow
150.0% x 150.0% = 225.0% Overflow!
Limitation to 199.9%

Mnemonic: **DIV** **HEX 4BH**

Function: **Div**ision

RES = SR1 : SR2

Symbol:

Value range, input and output:
−199.9...+199.9%

Examples: 40.0% : −50.0% = −80.0% No overflow
80.0% : 20.0% = 400.0% Overflow!
Limitation to 199.9%

Mnemonic: **REZ** **HEX 4CH**

Function: Formation of **Rec**iprocal

$$RES = \frac{1}{SR1}$$

Symbol:

Value range: Input: −204.8...+204.8%
Output: −199.9...+199.9%
Overflow as from SR1 ≦ 50.0%

Examples: 1 : 40.0% = 250.0% Overflow!
Limitation to 199.9%

Mnemonic: **QUA** **HEX 4DH**

Function: **Squa**re

$$RES = SR1^2$$

Symbol:

Value range: Input: −204.8...+204.8%
Output: −199.9...+199.9%
Overflow as from SR1 ≦ 141.4%

Examples: $(150.0\%)^2 = 225.0\%$ Overflow!
Limitation to 199.9%

Mnemonic: **RAD** **HEX 4EH**

Function: Square root extraction

$RES = +\sqrt{SR1}$ for SR1 ≧ 0
$RES = -\sqrt{SR1}$ for SR1 < 0

Symbol:

Value range: Input: −199.9...+199.9%
Output: −141.4...+141.4%

Mnemonic: **EXP** **HEX 4FH**

Function: Form the **exp**onential function

$$RES = 0.1 \cdot 10^{SR1}$$

Symbol:

Value range: Input: −199.9...+199.9%
Output: 0.0...+199.9%
Overflow as from SR1 = 130.0%

Examples: $0.1 \cdot 10^{150.0\%} = 316.2$ Overflow!
Limitation to 199.9%

7.5 Tables functions

Mnemonic: **TA1 to TA4** **HEX 50H to 53H**

Function: **Ta**bles for linearisation
Can be parameterized by the customer
RES = Function of SR1

Tables available

TA1 Hex 50H
TA2 Hex 51H
TA3 Hex 52H
TA4 Hex 53H

The linearization tables TA1 to TA4 convert each input value into a nonlinear output value. The curve shape is traced by 11 abscissas which are parameterized via the auxiliary routine **tAb.**

After selecting the auxiliary routine tAb according to Operating Manual 42/61-29 EN, section 3.1.7, the 11 tiepoints can be entered in %.

Entering the values, the following might be a help. Between the tiepoints the output value is interpolated linearly.

See also the collection of examples in section 11.3.

Number of the tiepoint	Values in %	
	Input	Output
0	0.0	
1	10.0	
2	20.0	
3	30.0	
4	40.0	
5	50.0	
6	60.0	
7	70.0	
8	80.0	
9	90.0	
10	100.0	

In the display:
here the tiepoints are presented and switched forward with the display changeover switch (1) from 0...11
and the linearization functions are displayed from 1...4 and switched forward with the key H/ A.

With the keys ▼ or ▲ the individual tiepoints are ajdusted and illustrated in display (5). A quick re-adjustment can be performed by pressing the I/E **in addition** to one of the keys ▼ or ▲.

Mnemonic: **TA5 to TA8** **HEX 54H to 57H**

Function: Pre-configured linearization tables with a higher resolution for thermocouples
type T, type E, type R and WRe.
RES = 0...1 if SR1 = 0...1

Available tables

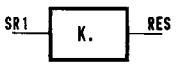
TA5 HEX 54H −270...+ 400°C type T
TA6 HEX 55H −270...+1000°C type E
TA7 HEX 56H 0...+1800°C type R
TA8 HEX 57H 0...+2400°C W3Re-W25Re

See also Section 6.1.

7.6 Multiplication factors

Mnemonic	Hex	Factor
K.1	58H	1/10
K/8	59H	1/8
K/5	5AH	1/5
K/4	5BH	1/4
K/3	5CH	1/3
K/2	5DH	1/2
K02	5EH	2
K03	5FH	3
K04	60H	4
K05	61H	5
K08	62H	8
K10	63H	10
K20	64H	20
K40	65H	40
K50	66H	50
KHU	67H	100

Symbol:



Value range, input and output: −199.9...+199.9%

Arithmetical results that fall outside these limits are limited to the numerical value 199.9.

7.7 Time functions (without programmer)

If there are further functional modules in the negative feedback circuit (the connection from the output to input 2), these must be computed in one cycle, i.e. the variables must be arranged in **reverse** alphabetical order (descending hex addresses) from the output to input 2 (see Section 4.4).

Rate Limiter

Mnemonic	Hex	Time for 100% change
RA1	68H	2 s
RA2	69H	4 s
RA3	6AH	8 s
RA4	6BH	16 s
RA5	6CH	50 s
RA6	6DH	100 s
RA7	6EH	200 s
RA8	6FH	400 s
RA9	70H	1000 s
RAA	71H	2000 s
RAB	72H	4000 s
RAC	73H	8000 s

Function: Rapid changes of input signal SR1 are limited to the rate of change defined by the module used. Slower rates of change are not affected. Continuous adjustment of the rate of change is not possible.

Permitted output variable: K1 to Z.

Symbol:

Value range for input and output:
−199.9...+199.9%

Fixed-time integrators

Mnemonic	Hex	Time constant TN
IG1	74	1 s
IG2	75	4 s
IG3	76	10 s
IG4	77	25 s
IG5	78	2 min
IG6	79	8 min
IG7	7A	20 min
IG8	7B	50 min

Function: Integration of the input signal with the selected time constant

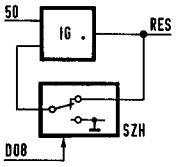
$$RES = SR2 + \frac{SR1}{TN} \cdot 1$$

Value range, input and output: −199.9...+199.9%

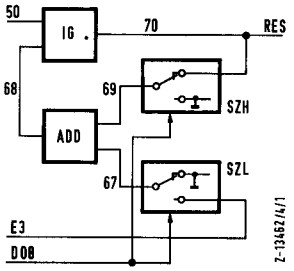
Symbol:

Circuit examples:

a) Initial condition 0%:



b) Initial condition corresponding to another variable:



Processing of variables in loop K.1 – C0 – C, interface at module IG5.

Delays

Mnemonic	Hex	Time constant T1
VZ1	A7H	1 s
VZ2	A8H	4 s
VZ3	A9H	10 s
VZ4	AAH	25 s
VZ5	ABH	2 min
VZ6	ACH	8 min
VZ7	ADH	20 min
VZ8	AEH	50 min

Function: Delay of input signal according to the selected time constant

$$RES = SR2 + \frac{SR1 - SR2}{T1} \cdot t$$

Symbol:

Value range, input and output: −199.9...+199.9%

7.8 Decimal point position in the display

Mnemonic: **MA0 to MA3** **HEX 3EH to 41H**

Function: Sets the position of the decimal point for a variable, provided it is not defined in the USER RANGE (Section 6). If address 87F2H contains 00 the following decimal point position results. The calculated value is not altered by this.

Mnemonic	Hex	Display
MA0	3EH	123.4
MA1	3FH	12.34
MA2	40H	1.234
MA3	41H	1234

Symbol:

Value range, input and output: −199.9 ... +199.9 %

7.9 Assignment of values

Mnemonic: **FIX** **HEX A4H**

Function:

Initialization of a variable and assignment of a fixed value including the decimal point position

RES = Input value

Symbol:

Value range: −199.9 ... +199.9

Note: The value cannot be adjusted with keys ▲ and ▼ even if the point (6) in the index displays is illuminated, i.e. adjustability appears to be enabled.

For assignment of the numerical value to SR1 and SR2 for entry via the controller front see Section ...

Low-Byte		Configurator notation	Display	Calculated value in %
Bit 1	Bit 0			
0	0	FIX, # + 100.0	100.0	100.0
0	1	FIX, # − 10.00	− 10.00	− 100.0
1	0	FIX, # + 0.500	0.500	50.0
1	1	FIX, # + 1999	1999	199.9

Mnemonic: **FLX** **HEX A5H**

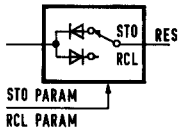
Function:

1. A variable is initialized. In the computation the value is disregarded until RCL PARAM is initiated and its value thus copied to the value list. It is adjustable over the whole range with keys ▲ and ▼, if the adjustability is enabled (6.2.4).
2. The contents of SR1 and SR2 is the default value. The decimal point position for the display is coded in bits 0 and 1 (see FIX).
3. The current value in the value list can be transferred to the configuration with STO PARAM in place of the original values SR1 and SR2.
   If the configuration is stored on a disc or in the E(E)PROM (IC 19) the new value functions as the default value. In the standard configuration in IC 15 the default values cannot be changed.
4. After a RESET (message Er.00) the current value in the value list is replaced by the default value from the configuration stored.

RES = Input value

Symbol:

Equivalent diagram:



Value range: −199.9 ... +199.9 %

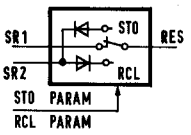
Mnemonic: **PAR** **HEX A6H**

Function:

1. Transfer of input SR1 to output RES
2. Transfer of output to SR2 on operating STO PARAM (switch S4 and S5)
3. Transfer of input SR2 to output RES on operating RCL PARAM (switch S4 and S5)

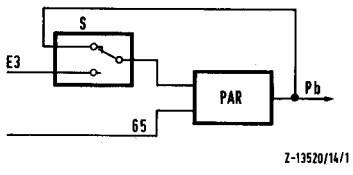
Symbol:

Equivalent diagram:



Configuration example:
The value for Pb can either be set directly (S in the position drawn) or come from outside after switching over S. Via STO PARAM the value of Pb is transferred to 65, with RCL PARAM the value of 65 to Pb.

Value range: −199.9 ... +199.9 %



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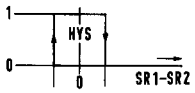
7.10 Comparators and hysteresis functions

Mnemonic: **KB0 to KB9** **HEX see table**

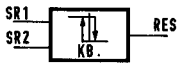
Mnemonic	Hex	Hysteresis width
KB0	7CH	Adjustable <84F0H>
KB1	7DH	0.025 %
KB2	7EH	0.05 %
KB3	7FH	0.1 %
KB4	80H	0.25 %
KB5	81H	0.5 %
KB6	82H	0.8 %
KB7	83H	0.1 %
KB8	84H	1.5 %
KB9	85H	2.0 %

Function: Compare input 1 with input 2
Output is a binary variable
RES = 0 for (SR1 – SR2) > HYS/2
RES = 1 for (SR1 – SR2) < HYS/2
RES = Old result within the hysteresis

Characteristic:



Symbol:



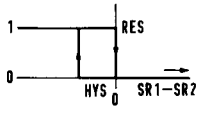
Hysteresis range: 0.0...25.5 % ≙ 0...FFH in 84F0H
Value range of inputs: −199.9...+199.9 %

Mnemonic: **KU0 to KU9** **HEX see table**

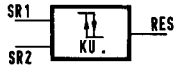
Mnemonic	Hex	Hysteresis width
KU0	86H	Adjustable <84F1H>
KU1	87H	0.025 %
KU2	88H	0.05 %
KU3	89H	0.1 %
KU4	8AH	0.25 %
KU5	8BH	0.5 %
KU6	8CH	0.8 %
KU7	8DH	1.0 %
KU8	8EH	1.5 %
KU9	8FH	2.0 %

Function: Compare input 1 with input 2
Output is a binary variable
RES = 0 for (SR1 – SR2) > 0
RES = 1 for (SR1 – SR2) ≦ −HYS
RES = Old result within the hysteresis

Characteristic:



Symbol:



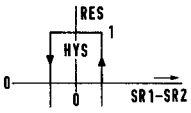
Hysteresis range: 0.0...25.5 % ≙ 0...FFH in 84F1H
Value range of inputs: −199.9...+199.9 %

Mnemonic: **KT0 to KT9** **HEX see table**

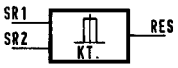
Mnemonic	Hex	Hysteresis width
KT0	90H	Adjustable <84F2H>
KT1	91H	0.025 %
KT2	92H	0.05 %
KT3	93H	0.1 %
KT4	94H	0.25 %
KT5	95H	0.5 %
KT6	96H	0.8 %
KT7	97H	1.0 %
KT8	98H	1.5 %
KT9	99H	2.0 %

Function: Compare input 1 with input 2
Output is a binary variable
RES = 0 for (SR1 – SR2) > HYS/2
RES = 1 for (SR1 – SR2) ≦ HYS/2

Characteristic:



Symbol:



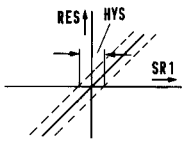
Hysteresis range: 0.0...25.5 % ≙ 0...FFH in 84F2H
Value range of inputs: −199.9...+199.9 %

Mnemonic: **KL0 to KL9** **HEX see table**

Mnemonic	Hex	Hysteresis width
KL0	9AH	Adjustable <84F3H>
KL1	9BH	0.025 %
KL2	9CH	0.05 %
KL3	9DH	0.1 %
KL4	9EH	0.25 %
KL5	9FH	0.5 %
KL6	A0H	0.8 %
KL7	A1H	1.0 %
KL8	A2H	1.5 %
KL9	A3H	2.0 %

Function: Transfer of input to output has changed by more than half the hysteresis width compared with the output (= previous input value).

Characteristic:



Symbol:

Hysteresis range: 0.0...25.5 % ≙ 0...FFH in 87F3H
Value range of inputs: −199.9...+199.9 %

Hysteresis setting for KL0:
Entry of a hex value in address 8743H.

Conversion table Decimal in Hexadecimal

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0.0	00	01	02	03	04	05	06	07	08	09
1.0	0A	0B	0C	0D	0E	0F	10	11	12	13
2.0	14	15	16	17	18	19	1A	1B	1C	1D
3.0	1E	1F	20	21	22	23	24	25	26	27
4.0	28	29	2A	2B	2C	2D	2E	2F	30	31
5.0	32	33	34	35	36	37	38	39	3A	3B
6.0	3C	3D	3E	3F	40	41	42	43	44	45
7.0	46	47	48	49	4A	4B	4C	4D	4E	4F
8.0	50	51	52	53	54	55	56	57	58	59
9.0	5A	5B	5C	5D	5E	5F	60	61	62	63
10.0	64	65	66	67	68	69	6A	6B	6C	6D
11.0	6E	6F	70	71	72	73	74	75	76	77
12.0	78	79	7A	7B	7C	7D	7E	7F	80	81
13.0	82	83	84	85	86	87	88	89	8A	8B
14.0	8C	8D	8E	8F	90	91	92	93	94	95
15.0	96	97	98	99	9A	9B	9C	9D	9E	9F
16.0	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9
17.0	AA	AB	AC	AD	AE	AF	B0	B1	B2	B3
18.0	B4	B5	B6	B7	B8	B9	BA	BB	BC	BD
19.0	BE	BF	C0	C1	C2	C3	C4	C5	C6	C7
20.0	C8	C9	CA	CB	CC	CD	CE	CF	D0	D1
21.0	D2	D3	D4	D5	D6	D7	D8	D9	DA	DB
22.0	DC	DD	DE	DF	E0	E1	E2	E3	E4	E5
23.0	E6	E7	E8	E9	EA	EB	EC	ED	EE	EF
24.0	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9
25.0	FA	FB	FC	FD	FE	FF	—	—	—	—

Table for conversion of decimal values to hex values. (Decimal point position only applies to hysteresis of comparators.)

7.11 Programmer OP-CODES

Mnemonic: **PW0 to PWF** **HEX E0H to EFH**

Function:

1. Specification of restart values (W) for programmer with the same function as op code FLX.
2. Specification of binary values for programmer by the third character in the name of the op code. This hex numeral is transferred in the associated program section to the lower half of address 3AH (1st channel) or 39H (2nd channel) in the internal RAM. It thus determines for a program section the value of the binary variables 'F3 to 'F0 or 'EB to 'E8 (see table).

Permitted variables: All variables
Permitted value range: −199.9...199.9 %

On configuration, note that with op code PWx one instruction must be present more (value at time 0) than the instructions with op code PTy.

The configuration lines are processed in ascending order of hex address of the resulting variables.

00 : PW5, # +030.0 is processed before
01 : PW1, # +050.0

Definition of binary variables:

	1st channel/ single-channel				2nd channel/ programm controller			
Hex	P14 F3H	P13 F2H	P12 F1H	P11 F0H	P24 EBH	P23 EAH	P22 E9H	P21 E8H
PW0	0	0	0	0	0	0	0	0
PW1	0	0	0	1	0	0	0	1
PW2	0	0	1	0	0	0	1	0
PW3	0	0	1	1	0	0	1	1
PW4	0	1	0	0	0	1	0	0
PW5	0	1	0	1	0	1	0	1
PW6	0	1	1	0	0	1	1	0
PW7	0	1	1	1	0	1	1	1
PW8	1	0	0	0	1	0	0	0
PW9	1	0	0	1	1	0	0	1
PWA	1	0	1	0	1	0	1	0
PWB	1	0	1	1	1	0	1	1
PWC	1	1	0	0	1	1	0	0
PWD	1	1	0	1	1	1	0	1
PWE	1	1	1	0	1	1	1	0
PWF	1	1	1	1	1	1	1	1

Hex	P18 F7H	P17 F6H	P16 F5H	P15 F4H	P28 EFH	P27 EEH	P26 EDH	P25 ECH
PT0	0	0	0	0	0	0	0	0
PT1	0	0	0	1	0	0	0	1
PT2	0	0	1	0	0	0	1	0
PT3	0	0	1	1	0	0	1	1
PT4	0	1	0	0	0	1	0	0
PT5	0	1	0	1	0	1	0	1
PT6	0	1	1	0	0	1	1	0
PT7	0	1	1	1	0	1	1	1
PT8	1	0	0	0	1	0	0	0
PT9	1	0	0	1	1	0	0	1
PTA	1	0	1	0	1	0	1	0
PTB	1	0	1	1	1	0	1	1
PTC	1	1	0	0	1	1	0	0
PTD	1	1	0	1	1	1	0	1
PTE	1	1	1	0	1	1	1	0
PTF	1	1	1	1	1	1	1	1

Mnemonic: **PT0 to PTF** **HEX F0H to FFH**

Function:

1. Specification of the time section (T) for programmer with the same functions as in op code FLX. Bits 0 and 1 determine the time base valid in the section.

Programmer	Value of LB		
	Bit 1	Bit 0	Time range
	1	1	0...1999 s
	0	0	0...199.9 min.
	0	1	0...19.99 h
	1	0	0...1.999 h · 1000

2. Specification of the binary values for the programmer by the third character in the name of the op code. This hex numeral is transferred in the associated program section to the higher half of address 3AH (1st channel) or 39H (2nd channel) in the internal RAM. It thus determines for a program section the value of binary variables 'F7 to 'F4 or 'EF to 'EC (see table).

Permitted variables: All variables
Permitted value range: 0...1999 seconds
0...199.9 minutes
0...19.99 hours
0...1.999 · 1000 hours

The configuration lines are processed in ascending order of hex address of the resulting variables.

10 : PT5, # +03.00 is processed before
11 : PT1, # +05.00

7.12 Control outputs of the programmer and program controller

In the time intervals 1 to 7 the control outputs P1. to P4. can be set to 0 or 1 by changing the storage contents independently of each another.

1 = Output P1. ... P4.: Transistor conductive or resp. relay energized

0 = Output P1. ... P4.: Transistor blocked or resp. relay de-energized

Channel 1	Interval address 1 = 842AH 5 = 842EH 2 = 842BH 6 = 842FH 3 = 842CH 7 = 8430H 4 = 842DH							
Bit	7	6	5	4	3	2	1	0
Function	–	–	–	–	P4.1	P3.1	P2.1	P1.1
Binary	1	1	1	1	0	1	0	1
Hex. number	F				5			

Channel 2	Interval address 1 = 84F5H 5 = 8463H 2 = 8460H 6 = 8464H 3 = 8461H 7 = 8465H 4 = 8462H							
Bit	7	6	5	4	3	2	1	0
Function	–	–	–	–	–	–	P2.2	P1.2
Binary	1	1	1	1	0	0		
Hex. number	F							

Example:
If F5H is entered as contents into address 842AH, as mentioned above, outputs P1.1 and P3.1 are set to "1" for the duration of the program section 1. Outputs P2.1 and P4.1 are still on "0".

8 Explanation of binary variables and monitor Md and Mb

Terms used in logic control systems for processing binary signals include

- binary inputs
- binary outputs
- binary notes = binary storage locations in which interim results are stored (noted).

In the Digitric P there are also the operating mode status messages and the controller changeover functions (see Annex 3).

In Digitric P the binary variables are stored in a processor-internal RAM in bytes 1CH to 3BH. This range includes 64 bytes with 256 bits or 256 binary variables. The 64 bytes value can be read out on monitor Md, the value of the individual binary variable can be read out on monitor Mb.

From 256 binary variables the variables YA1 = 00H to B25 = 67H can be used as target variable i.e. a value can be assigned by configuration. They can also be used as source variables in the configuration.

Binary variables T1S = 68H to DO8 = FFH can only be introduced as source variables.

8.1 Binary inputs

Hardware inputs are the condition for binary inputs.

Binary inputs D01 to D08 are equivalent. Please note that with activated remote control (control code range 85F7H to 85FFH) these inputs have a non configurable function.

Switching performance is controlled via hardware (active/passive sensors) and software (solder link on input modules or modification of control code register 89A8H).

8.2 Binary outputs

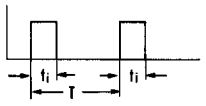
Binary outputs MB1 ... MB4, RS1 ... RS4 can only be activated when the hardware has been selected accordingly.

Switching performance is fixed by control code register 89A9H.

8.3 Internal binary functions

8.3.1 Timing mark pulse generator

Binary variables T1S = 68H to T08 = 77H periodically change value:



Variable		Cycle time T	Pulse duration t_i
Mnem.	Hex.		
T1S	68H	1 s	1 computation cycle approx. 30 ms to 60 ms
T2S	69H	2 s	
T4S	6AH	4 s	
T8S	6BH	8 s	
THS	6CH	16 s	
T1M	6DH	1 min.	
T2M	6EH	2 min.	
T4M	6FH	4 min.	

Variable		Cycle time T	Pulse duration t_i
Mnem.	Hex.		
T01	74H	0.1 s	1 computation cycle
T02	75H	0.2 s	approx. 30 ms
T04	76H	0.4 s	to 60 ms
T0H	77H	1.6 s	
TF1	70H	200 ms	100 ms (5 Hz)
TF2	71H	400 ms	200 ms (2.5 Hz)
TF4	72H	1 s	400 ms (1 Hz)
TF8	73H	1 s	200 ms (1 Hz)

8.3.2 Other information

Other binary variables are briefly explained in section 12.4.

8.4 Binary inputs and outputs of control and programmer modules

8.4.1 Binary outputs of control modules

The continuous control module has no binary outputs.

Two-point algorithm is generated by configuration outside the control module.

The step-controller sets bits R11/R21 or R12/R22 in byte 38H as controller outputs. These outputs are switched via configuration to the hardware outputs.

8.4.2 Binary outputs of programmer modules

The programmers set the binary variables de fined according to their configuration in bytes 39H and 3AH. They can – if necessary – be switched via the configuration to the hardware outputs, see Section 7.12.

8.4.3 Binary inputs of control modules

In the names for the below listed binary variables x stands for the channel number.

Variable function during transition from 0 to 1

YAx sets controller on automatic
YMx sets controller on manual
WEx switches over to external set point
Wlx switches over to internal set point
YTx switches the manual/automatic-switch one position further
WTx switches the I/E-switch one position further
CPx switches on the P-part
CTx switches on track function (Yx = YEx)
Clx switches on I-part
CDx switches on D-part

8.4.4 Programmer binary inputs

CPx Step change to programm start, repeating counter is deleted.
CTx Start high-speed run (approx. 8 per section)
Clx Program start
CDx Step change to start of next section
Y0x Manual
Y1x runs once through program
Y2x repeating operation
Y3x high-speed pre-travel

8.5 Display modules binary inputs

BLH switches off the horizontal analog display
BLV switches off the vertical analog display (72 x 144)
BLD switches off display defined in masks 87F7H and 87F8H
OLD Commutation H/A and I/E without blinking, i. e. immediately.

8.6 Marker

The binary variables B00(4CH) to B25(67H) can be used as markers if their function is not needed in the standard configuration.

Unused binary variables in the range of YA1(00H) to 0LD(48H) can always be used for own configuration if the associated channel is not used.

The message-capable binary variables from SC1(288H) to AL4(2FH) are also freely available if their message function is not activated.

8.7 Sundry information in Md

Other displays on monitor Md are internally relevant and cannot be used for configuration.

9 Standard function variants

Overview

Note:

Suppl. no. 4... in versions without relays; Suppl. no. 5... in versions with relays (suppl. no. = instrument configuration no.)

Serial No.	Channel, logic	Type of controller: On/off controller 1 Control output (Z1)	On/off controller 2 Control outputs (Z2)	Three-position step-controller (D)	Continuous controller (K)
Single-channel					
1.	Fixed value (Optionally external set point)	Suppl. No. 4 1 1 Suppl. No.5 1 1 Page 49	**Suppl. No. 4 3 1** Suppl. No. 5 3 1 Page 54	**Suppl. No. 4 5 1** Suppl. No. 5 5 1 Page 58	**Suppl. No. 4 7 1** Suppl. No. 5 7 1 Page 49
2.	Multi-components	Suppl. No. 4 1 2 Suppl. No. 5 1 2 Page 49	Suppl. No. 4 3 2 Suppl. No. 5 3 2 Page 54	Suppl. No. 4 5 2 Suppl. No. 5 5 2 Page 58	Suppl. No. 4 7 2 Suppl. No. 5 7 2 Page 49
3.	Ratio			Suppl. No. 4 5 3 Suppl. No. 5 5 3 Page 58	Suppl. No. 4 7 3 Suppl. No. 5 7 3 Page 49
Two-channel without channel logic					
4.	2 x fixed value	Suppl. No. 4 1 4 Suppl. No. 5 1 4 Page 52	**Suppl. No. 4 3 4** Suppl. No. 5 3 4 Page 56	**Suppl. No. 4 5 4** Suppl. No. 5 5 4 Page 59	**Suppl. No. 4 7 4** Suppl. No. 5 7 4 Page 52
5.	2 x fixed value / cascade	Suppl. No. 4 1 5 Suppl. No. 5 1 5 Page 52	Suppl. No. 4 3 5 Suppl. No. 5 3 5 Page 56	Suppl. No. 4 5 5 Suppl. No. 5 5 5 Page 59	Suppl. No. 4 7 5 Suppl. No. 5 7 5 Page 52
Two-channel with channel logic					
6.	Cascade controller: 1 Mast controller, 1 Slave controller	**Suppl. No. 4 1 6** Suppl. No. 5 1 6 Page 61	**Suppl. No. 4 3 6** Suppl. No. 5 3 6 Page 62	**Suppl. No. 4 5 6** Suppl. No. 5 5 6 Page 64	Suppl. No. 4 7 6 Suppl. No. 5 7 6 Page 61
	Override controller: 1 Master controller 1 Slave controller				
7.	Min. selection			**Suppl. No. 4 5 7** Suppl. No. 5 5 7 Page 66	**Suppl. No. 4 7 7** Suppl. No. 5 5 7 Page 67
8.	Max. selection			Suppl. No. 4 5 8 Suppl. No. 5 5 8 Page 66	Suppl. No. 4 7 8 Suppl. No. 5 7 8 Page 67
Four-channel without channel logic					
9.	4 x fixed value	Suppl. No. 4 2 1 BA-Nr. 5 2 1 Page 69			**Suppl. No. 4 8 1** Page 69
Program controller **Two-channel** with channel logic					
10.	Program controller: 1 Programmer 1 Controller	**Suppl. No. 4 2 2** Suppl. No. 5 2 2 Page 71	**Suppl. No. 4 4 2** Suppl. No. 5 4 2 Page 72	**Suppl. No. 4 6 2** Suppl. No. 5 6 2 Page 74	**Suppl. No. 4 8 2** Suppl. No. 5 8 2 Page 75
Programmer (see also Serial No. 10) **Single-channel**					
11.	1 x Programmer	**Suppl. No. 4 9 1** Suppl. No. 5 9 1 Page 77			
Two-channel without channel logic					
12.	2 x Programmer	**Suppl. No. 4 9 2** Suppl. 5 9 2 Page 78			
Process interface					
13.	Process interface	Suppl. No. 4 8 5 Suppl. No. 5 8 5 Page 52			

Remarks:

All Suppl. Nos. in bold face are basic configurations on which the other configurations (Suppl. Nos.) are built.

In the foliowing hook-up lists the normal standard configuration of the instruments is described.

Basic configuration Suppl. No. 471: For better understanding, the program lines which are not used (marked "NOP") are also presented.

All configuration lists have been generated with the configuration sofware DIGIKON.

Suppl. No. 471
Single-channel controller, continuous
Fixed value/cascade

This configuration as the basis for:
571, 411/511, 412/512, 472/572 und 473/573

For better understanding with respect to basic configuration Suppl. No. 471, the program lines which are not used (marked with "NOP") are also presented.

Analog function list 471 Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A2 : NOP, ,	8401H: 00H,00H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
A4 : NOP, ,	8403H: 00H,00H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: NOP, ,	840BH: 00H,00H,00H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
N1: NOP, ,	840EH: 00H,00H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
16 : NOP, ,	8430H: 00H,00H,00H
17 : NOP, ,	8431H: 00H,00H,00H
18 : NOP, ,	8432H: 00H,00H,00H
19 : NOP, ,	8433H: 00H,00H,00H
20 : NOP, ,	8434H: 00H,00H,00H
21 : NOP, ,	8435H: 00H,00H,00H
22 : NOP, ,	8436H: 00H,00H,00H
23 : NOP, ,	8437H: 00H,00H,00H
24 : NOP, ,	8438H: 00H,00H,00H
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: NOP, ,	843BH: 00H,00H,00H
G12: NOP, ,	843CH: 00H,00H,00H

Analog- and binary function list 471 Mnemo text	Hex code
G22: NOP, ,	843DH: 00H,00H,00H
G32: NOP, ,	843EH: 00H,00H,00H
G42: NOP, ,	843FH: 00H,00H,00H
H2: NOP, ,	8440H: 00H,00H,00H
J2: NOP, ,	8441H: 00H,00H,00H
L2: NOP, ,	8442H: 00H,00H,00H
N2: NOP, ,	8443H: 00H,00H,00H
PB2: NOP, ,	8444H: 00H,00H,00H
R2: NOP, ,	8445H: 00H,00H,00H
RD2: NOP, ,	8446H: 00H,00H,00H
RH2: NOP, ,	8447H: 00H,00H,00H
RL2: NOP, ,	8448H: 00H,00H,00H
RU2: NOP, ,	8449H: 00H,00H,00H
SP2: NOP, ,	844AH: 00H,00H,00H
SH2: NOP, ,	844BH: 00H,00H,00H
SL2: NOP, ,	844CH: 00H,00H,00H
TN2: NOP, ,	844DH: 00H,00H,00H
TD2: NOP, ,	844EH: 00H,00H,00H
Y2: NOP, ,	844FH: 00H,00H,00H
YE2: NOP, ,	8450H: 00H,00H,00H
YP2: NOP, ,	8451H: 00H,00H,00H
YH2: NOP, ,	8452H: 00H,00H,00H
YL2: NOP, ,	8453H: 00H,00H,00H
YS2: NOP, ,	8454H: 00H,00H,00H
25 : NOP, ,	8455H: 00H,00H,00H
26 : NOP, ,	8456H: 00H,00H,00H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : NOP, ,	8458H: 00H,00H,00H
29 : NOP, ,	8459H: 00H,00H,00H
30 : NOP, ,	845AH: 00H,00H,00H
31 : NOP, ,	845BH: 00H,00H,00H
32 : NOP, ,	845CH: 00H,00H,00H
33 : NOP, ,	845DH: 00H,00H,00H
34 : NOP, ,	845EH: 00H,00H,00H
35 : NOP, ,	845FH: 00H,00H,00H
36 : NOP, ,	8460H: 00H,00H,00H
37 : NOP, ,	8461H: 00H,00H,00H
38 : NOP, ,	8462H: 00H,00H,00H
39 : NOP, ,	8463H: 00H,00H,00H
40 : NOP, ,	8464H: 00H,00H,00H
41 : NOP, ,	8465H: 00H,00H,00H
42 : NOP, ,	8466H: 00H,00H,00H
43 : NOP, ,	8467H: 00H,00H,00H
44 : NOP, ,	8468H: 00H,00H,00H
45 : NOP, ,	8469H: 00H,00H,00H
46 : NOP, ,	846AH: 00H,00H,00H
47 : NOP, ,	846BH: 00H,00H,00H
48 : NOP, ,	846CH: 00H,00H,00H
49 : NOP, ,	846DH: 00H,00H,00H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
D3: NOP, ,	8470H: 00H,00H,00H
G13: NOP, ,	8471H: 00H,00H,00H
G23: NOP, ,	8472H: 00H,00H,00H
G33: NOP, ,	8473H: 00H,00H,00H
G43: NOP, ,	8474H: 00H,00H,00H
H3: NOP, ,	8475H: 00H,00H,00H
J3: NOP, ,	8476H: 00H,00H,00H
L3: NOP, ,	8477H: 00H,00H,00H
N3: NOP, ,	8478H: 00H,00H,00H
PB3: NOP, ,	8479H: 00H,00H,00H
R3: NOP, ,	847AH: 00H,00H,00H
RD3: NOP, ,	847BH: 00H,00H,00H
RH3: NOP, ,	847CH: 00H,00H,00H
RL3: NOP, ,	847DH: 00H,00H,00H
RU3: NOP, ,	847EH: 00H,00H,00H
SP3: NOP, ,	847FH: 00H,00H,00H
SH3: NOP, ,	8480H: 00H,00H,00H
SL3: NOP, ,	8481H: 00H,00H,00H

Analog function list 471 (continuation)

Mnemo text	Hex code
TN3: NOP, ,	8482H: 00H,00H,00H
TD3: NOP, ,	8483H: 00H,00H,00H
Y3: NOP, ,	8484H: 00H,00H,00H
YE3: NOP, ,	8485H: 00H,00H,00H
YP3: NOP, ,	8486H: 00H,00H,00H
YH3: NOP, ,	8487H: 00H,00H,00H
YL3: NOP, ,	8488H: 00H,00H,00H
YS3: NOP, ,	8489H: 00H,00H,00H
50 : NOP, ,	848AH: 00H,00H,00H
51 : NOP, ,	848BH: 00H,00H,00H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
53 : NOP, ,	848DH: 00H,00H,00H
54 : NOP, ,	848EH: 00H,00H,00H
55 : NOP, ,	848FH: 00H,00H,00H
56 : NOP, ,	8490H: 00H,00H,00H
57 : NOP, ,	8491H: 00H,00H,00H
58 : NOP, ,	8492H: 00H,00H,00H
59 : NOP, ,	8493H: 00H,00H,00H
60 : NOP, ,	8494H: 00H,00H,00H
61 : NOP, ,	8495H: 00H,00H,00H
62 : NOP, ,	8496H: 00H,00H,00H
63 : NOP, ,	8497H: 00H,00H,00H
64 : NOP, ,	8498H: 00H,00H,00H
65 : NOP, ,	8499H: 00H,00H,00H
66 : NOP, ,	849AH: 00H,00H,00H
67 : NOP, ,	849BH: 00H,00H,00H
68 : NOP, ,	849CH: 00H,00H,00H
69 : NOP, ,	849DH: 00H,00H,00H
70 : NOP, ,	849EH: 00H,00H,00H
71 : NOP, ,	849FH: 00H,00H,00H
72 : NOP, ,	84A0H: 00H,00H,00H
73 : NOP, ,	84A1H: 00H,00H,00H
74 : NOP, ,	84A2H: 00H,00H,00H
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
D4: NOP, ,	84A5H: 00H,00H,00H
G14: NOP, ,	84A6H: 00H,00H,00H
G24: NOP, ,	84A7H: 00H,00H,00H
G34: NOP, ,	84A8H: 00H,00H,00H
G44: NOP, ,	84A9H: 00H,00H,00H
H4: NOP, ,	84AAH: 00H,00H,00H
J4: NOP, ,	84ABH: 00H,00H,00H
L4: NOP, ,	84ACH: 00H,00H,00H
N4: NOP, ,	84ADH: 00H,00H,00H
PB4: NOP, ,	84AEH: 00H,00H,00H
R4: NOP, ,	84AFH: 00H,00H,00H
RD4: NOP, ,	84B0H: 00H,00H,00H
RH4: NOP, ,	84B1H: 00H,00H,00H
RL4: NOP, ,	84B2H: 00H,00H,00H
RU4: NOP, ,	84B3H: 00H,00H,00H
SP4: NOP, ,	84B4H: 00H,00H,00H
SH4: NOP, ,	84B5H: 00H,00H,00H
SL4: NOP, ,	84B6H: 00H,00H,00H
TN4: NOP, ,	84B7H: 00H,00H,00H
TD4: NOP, ,	84B8H: 00H,00H,00H
Y4: NOP, ,	84B9H: 00H,00H,00H
YE4: NOP, ,	84BAH: 00H,00H,00H
YP4: NOP, ,	84BBH: 00H,00H,00H
YH4: NOP, ,	84BCH: 00H,00H,00H
YL4: NOP, ,	84BDH: 00H,00H,00H
YS4: NOP, ,	84BEH: 00H,00H,00H
75 : NOP, ,	84BFH: 00H,00H,00H
76 : NOP, ,	84C0H: 00H,00H,00H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
78 : NOP, ,	84C2H: 00H,00H,00H
79 : NOP, ,	84C3H: 00H,00H,00H
80 : NOP, ,	84C4H: 00H,00H,00H
81 : NOP, ,	84C5H: 00H,00H,00H
82 : NOP, ,	84C6H: 00H,00H,00H
83 : NOP, ,	84C7H: 00H,00H,00H

Analog function list 471 (continuation)

Mnemo text	Hex code
84 : NOP, ,	84C8H: 00H,00H,00H
85 : NOP, ,	84C9H: 00H,00H,00H
86 : NOP, ,	84CAH: 00H,00H,00H
87 : NOP, ,	84CBH: 00H,00H,00H
88 : NOP, ,	84CCH: 00H,00H,00H
89 : NOP, ,	84CDH: 00H,00H,00H
90 : NOP, ,	84CEH: 00H,00H,00H
91 : NOP, ,	84CFH: 00H,00H,00H
92 : NOP, ,	84D0H: 00H,00H,00H
93 : NOP, ,	84D1H: 00H,00H,00H
94 : NOP, ,	84D2H: 00H,00H,00H
95 : NOP, ,	84D3H: 00H,00H,00H
96 : NOP, ,	84D4H: 00H,00H,00H
97 : NOP, ,	84D5H: 00H,00H,00H
98 : NOP, ,	84D6H: 00H,00H,00H
99 : NOP, ,	84D7H: 00H,00H,00H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTI,EM3,	870CH: 02H,9AH,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: NOP, ,	871CH: 00H,00H,00H
Q22: NOP, ,	871DH: 00H,00H,00H
Q32: NOP, ,	871EH: 00H,00H,00H
Q42: NOP, ,	871FH: 00H,00H,00H
Q13: NOP, ,	8720H: 00H,00H,00H
Q23: NOP, ,	8721H: 00H,00H,00H
Q33: NOP, ,	8722H: 00H,00H,00H
Q43: NOP, ,	8723H: 00H,00H,00H
Q14: NOP, ,	8724H: 00H,00H,00H
Q24: NOP, ,	8725H: 00H,00H,00H
Q34: NOP, ,	8726H: 00H,00H,00H
Q44: NOP, ,	8727H: 00H,00H,00H
SC1: NOP, ,	8728H: 00H,00H,00H
SC2: NOP, ,	8729H: 00H,00H,00H
SC3: NOP, ,	872AH: 00H,00H,00H
SC4: NOP, ,	872BH: 00H,00H,00H
AL1: NOP, ,	872CH: 00H,00H,00H
AL2: NOP, ,	872DH: 00H,00H,00H
AL3: NOP, ,	872EH: 00H,00H,00H
AL4: NOP, ,	872FH: 00H,00H,00H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTI,Q11,	8731H: 02H,18H,00H
MB3: NOP, ,	8732H: 00H,00H,00H
MB4: BTN,Y01,	8733H: 01H,B0H,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
RS2: NOP, ,	8735H: 00H,00H,00H

Analog function list 471 (continuation)

Mnemo text	Hex code
RS3: NOP, ,	8736H: 00H,00H,00H
RS4: NOP, ,	8737H: 00H,00H,00H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: BTN,LLL,	874EH: 01H,84H,00H
B03: NOP, ,	874FH: 00H,00H,00H
B04: NOP, ,	8750H: 00H,00H,00H
B05: NOP, ,	8751H: 00H,00H,00H
B06: NOP, ,	8752H: 00H,00H,00H
B07: NOP, ,	8753H: 00H,00H,00H
B08: NOP, ,	8754H: 00H,00H,00H
B09: NOP, ,	8755H: 00H,00H,00H
B10: NOP, ,	8756H: 00H,00H,00H
EX1: NOP, ,	8757H: 00H,00H,00H
B11: NOP, ,	8758H: 00H,00H,00H
B12: NOP, ,	8759H: 00H,00H,00H
B13: NOP, ,	875AH: 00H,00H,00H
B14: NOP, ,	875BH: 00H,00H,00H
B15: NOP, ,	875CH: 00H,00H,00H
B16: NOP, ,	875DH: 00H,00H,00H
B17: NOP, ,	875EH: 00H,00H,00H
EX2: NOP, ,	875FH: 00H,00H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B19: NOP, ,	8761H: 00H,00H,00H
B20: NOP, ,	8762H: 00H,00H,00H
B21: NOP, ,	8763H: 00H,00H,00H
B22: NOP, ,	8764H: 00H,00H,00H
B23: NOP, ,	8765H: 00H,00H,00H
B24: NOP, ,	8766H: 00H,00H,00H
B25: NOP, ,	8767H: 00H,00H,00H

Compare 571 and 471

Mnemo text	Hex code
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS2: BTN,Q21,	8735H: 01H,19H,00H
RS3: BTN,Q31,	8736H: 01H,1AH,00H
RS4: BTN,Q41,	8737H: 01H,1BH,00H

Compare 411 and 471

Mnemo text	Hex code
MB2: BTI,Q41,	8731H: 02H,1BH,00H

Compare 511 and 471

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS2: BTN,Q41,	8735H: 01H,1BH,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 412 and 471

Mnemo text	Hex code
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
MB2: BTI,Q41,	8731H: 02H,1BH,00H

Compare 512 and 471

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS2: BTN,Q41,	8735H: 01H,1BH,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 472 and 471

Mnemo text	Hex code
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H

Compare 572 and 471

Mnemo text	Hex code
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS2: BTN,Q21,	8735H: 01H,19H,00H
RS3: BTN,Q31,	8736H: 01H,1AH,00H
RS4: BTN,Q41,	8737H: 01H,1BH,00H

Compare 473 and 471

Mnemo text	Hex code
A3 : K/2,SP1,	8402H: 5DH,15H,00H
RD1: SUB, R1,16	8411H: 49H,10H,30H
SH1: FLX,#+199.9	8416H: A5H,F0H,FCH
16 : MUL,SP1,17	8430H: 4AH,15H,31H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : DIV, R1,17	8432H: 4BH,10H,31H

Compare 573 and 471

Mnemo text	Hex code
A3 : K/2,SP1,	8402H: 5DH,15H,00H
RD1: SUB, R1,16	8411H: 49H,10H,30H
SH1: FLX,#+199.9	8416H: A5H,F0H,FCH
16 : MUL,SP1,17	8430H: 4AH,15H,31H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : DIV, R1,17	8432H: 4BH,10H,31H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS2: BTN,Q21,	8735H: 01H,19H,00H
RS3: BTN,Q31,	8736H: 01H,1AH,00H
RS4: BTN,Q41,	8737H: 01H,1BH,00H

Compare 485/585 and 471 [1]

Mnemo text	Hex code
A1 : FLX,#+000.0	8400H: A5H,00H,80H
A2 : FLX,#+000.0	8401H: A5H,00H,80H
A3 : FLX,#+000.0	8402H: A5H,00H,80H
A4 : FLX,#+000.0	8403H: A5H,00H,80H
R2: ADD,27 ,C2	8445H: 48H,57H,3AH
R3: ADD,52 ,C3	847AH: 48H,8CH,6FH
R4: ADD,77 ,C4	84AFH: 48H,C1H,A4H
YT1: FTR,D07,YA1	8710H: 0EH,FEH,00H
WT1: FTR,D08,YA1	8714H: 0EH,FFH,00H
Q11: KU7, R1,A1	8718H: 8DH,10H,00H
Q21: KU7,G21,A1	8719H: 8DH,08H,00H
Q31: KU7,RD1,A1	871AH: 8DH,11H,00H
Q41: KU7,G41,A1	871BH: 8DH,0AH,00H
MB1: NOP, ,	8730H: 00H,00H,00H
MB2: NOP, ,	8731H: 00H,00H,00H
MB4: NOP, ,	8733H: 00H,00H,00H
RS1: BTN,MB1,	8734H: 01H,30H,00H
RS2: BTN,MB2,	8735H: 01H,31H,00H
RS3: BTN,MB3,	8736H: 01H,32H,00H
RS4: BTN,MB4,	8737H: 01H,33H,00H
B00: KT7,SP1,A1	874CH: 97H,15H,00H
B01: FRS,B00,YA1	874DH: 0DH,4CH,00H

[1] The Suppl. Nos. 485 and 585 are to be found only in Digitric P19" process interface and are shared in the user file under UFIL 01.

Suppl. No. 474
Two-channel controller, continuous, 2 x fixed value

This configuration serves as the basis for:
574, 475/575, 414/514, 415/515

Analog and binary function list 474

Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,27 ,C2	8429H: 48H,57H,3AH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,52 ,C3	8445H: 48H,8CH,6FH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H

Analog and binary funktion list 474 (continuation)

Mnemo text	Hex code
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: DIR,YR2,	844FH: 3DH,E1H,00H
YE2: DIR,F7 ,	8450H: 3DH,FFH,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FLX,#+000.0	8453H: A5H,00H,80H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2,30 ,SP2	8459H: 2BH,5AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : IG3,38 ,37	8461H: 76H,62H,61H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS2	8463H: 15H,F8H,35H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTI,Q12,	8733H: 02H,1CH,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
RS2: KB0,F7 ,37	8735H: 7CH,FFH,61H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H

Analog and binary function list 474 (continuation)

Mnemo text	Hex code
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: BTN,LLL,	874EH: 01H,84H,00H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H

Compare 574 and 474

Mnemo text	Hex code
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS2: BTN,Q12,	8735H: 01H,1CH,00H
RS3: BTN,Q31,	8736H: 01H,1AH,00H
RS4: BTN,Q32,	8737H: 01H,1EH,00H

Compare 475 and 474

Mnemo-Text	Hex.-Code
no difference	

Compare 575 and 474

Mnemo text	Hex code
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS2: BTN,Q12,	8735H: 01H,1CH,00H
RS3: BTN,Y01,	8736H: 01H,B0H,00H
RS4: BTN,Y02,	8737H: 01H,B4H,00H

Compare 414 and 474

Mnemo text	Hex code
MB3: BTI,Q41,	8732H: 02H,1BH,00H
MB4: BTI,Q42,	8733H: 02H,1FH,00H

Compare 514 and 474

Mnemo text	Hex code
MB1: BTN,Y01,	8730H: 01H,B0H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H
MB3: BTI,Q41,	8732H: 02H,1BH,00H
MB4: BTI,Q42,	8733H: 02H,1FH,00H
RS3: BTN,Q41,	8736H: 01H,1BH,00H
RS4: BTN,Q42,	8737H: 01H,1FH,00H

Compare 415 and 474 Mnemo-Text	Hex.-Code
MB3: BTI,Q41,	8732H: 02H,1BH,00H
MB4: BTI,Q42,	8733H: 02H,1FH,00H

Compare 515 and 474 Mnemo text	Hex code
MB1: BTN,Y01,	8730H: 01H,B0H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H
MB3: BTI,Q41,	8732H: 02H,1BH,00H
MB4: BTI,Q42,	8733H: 02H,1FH,00H
RS3: BTN,Q41,	8736H: 01H,1BH,00H
RS4: BTN,Q42,	8737H: 01H,1FH,00H

Suppl. No. 431
Single channel controller Z2
fixed value / cascade

This configuration serveds as the basis for:
531, 432 / 532

Analog and binary function list 431 Mnemo text	Hex code
A1 : LU1, Y1,	8400H: 38H,1AH,00H
A2 : LU1, J3,	8401H: 38H,76H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: FLX,#+004.0	840BH: A5H,80H,82H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
N1: K/4,10 ,	840EH: 5BH,2AH,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: LB1,53 ,	841AH: 37H,8DH,00H
YE1: SZL, Y1,B06	841BH: 15H,1AH,52H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FIX,#+000.0	841EH: A4H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : IG2,11 ,20	842AH: 75H,2BH,34H
11 : MUL,55 ,12	842BH: 4AH,8FH,2CH
12 : ADD, Y1,13	842CH: 48H,1AH,2DH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : SZL,F0 ,RS2	842FH: 15H,F8H,35H
20 : LB1,10 ,	8434H: 37H,2AH,00H
21 : K/2, H1,	8435H: 5DH,0BH,00H
22 : INV,21 ,	8436H: 3CH,35H,00H
23 : FIX,#+160.0	8437H: A4H,00H,E4H
24 : FIX,#+160.0	8438H: A4H,00H,E4H
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
J3: INV, Y1,	8476H: 3CH,1AH,00H
L3: DIR,RD1,	8477H: 3DH,11H,00H
PB3: FLX,#+0100	8479H: A5H,43H,86H
RD3: DIR,RD1,	847BH: 3DH,11H,00H
RU3: DIR,RU1,	847EH: 3DH,14H,00H
TN3: FLX,#+0040	8482H: A5H,83H,82H
TD3: FLX,#+0010	8483H: A5H,A3H,80H

Analog and binary funktion list 431 (continuation)

Mnemo text	Hex code
YE3: SZL,50 ,B08	8485H: 15H,8AH,54H
YP3: FLX,#+050.0	8486H: A5H,40H,9FH
YH3: FLX,#+100.0	8487H: A5H,80H,BEH
YL3: FIX,#+000.0	8488H: A4H,00H,80H
YS3: DIR,YS1,	8489H: 3DH,1FH,00H
50 : INV, Y1,	848AH: 3CH,1AH,00H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
53 : U21,54 , Y1	848DH: 32H,8EH,1AH
54 : SUB,YR1,YR3	848EH: 49H,E0H,E2H
55 : U24,23 ,24	848FH: 2EH,37H,38H
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: FTR,Y23,YA1	8700H: 0EH,BAH,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: FTR,Y21,YA3	8702H: 0EH,B2H,02H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: FTR,Y03,YM1	8704H: 0EH,B8H,04H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: FTR,Y01,YM3	8706H: 0EH,B0H,06H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTI,EM3,	870CH: 02H,9AH,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: ANN,OC1,KP4	8716H: 03H,D4H,83H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
SC1: ONN,B14,B21	8728H: 07H,5BH,63H
SC3: ONN,B11,B21	872AH: 07H,58H,63H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB4: BTN,Y01,	8733H: 01H,B0H,00H
RS1: KU0,F7 , N1	8734H: 86H,FFH,0EH
RS2: KU0, N1,F7	8735H: 86H,0EH,FFH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: OIN,B06,B21	873CH: 09H,52H,63H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: OIN,B08,B21	873EH: 09H,54H,63H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H

Analog and binary function list 431 (continuation)

Mnemo text	Hex code
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: KU2, Y1,F7	874EH: 88H,1AH,FFH
B06: FRS,SC3,B02	8752H: 0DH,2AH,4EH
B08: FRS,SC1,B16	8754H: 0DH,28H,5DH
B11: KU1,RD1,22	8758H: 87H,11H,36H
B14: KU1,21 ,RD1	875BH: 87H,35H,11H
B16: KU2,F7 , Y1	875DH: 88H,FFH,1AH
B18: BTN,CL1,	8760H: 01H,79H,00H
B19: BTN,Y01,	8761H: 01H,B0H,00H
B21: BTN,B19,	8763H: 01H,61H,00H
B24: KB9, N1,F7	8766H: 85H,0EH,FFH

Compare 531 and 431

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 432 and 431

Mnemo text	Hex code
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H

Compare 532 and 431

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Suppl. No. 434
Two channel controller Z2
2 x fixed value

This configuration serves as the basis for:
534, 435 / 535

Analog and binary function list 434

Mnemo text	Hex code
A1 : LU1, Y1,	8400H: 38H,1AH,00H
A2 : LU1, J3,	8401H: 38H,76H,00H
A3 : LU1, Y2,	8402H: 38H,4FH,00H
A4 : LU1, J4,	8403H: 38H,ABH,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: FLX,#+004.0	840BH: A5H,80H,82H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
N1: K/4,10 ,	840EH: 5BH,2AH,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: LB1,53 ,	841AH: 37H,8DH,00H
YE1: SZL, Y1,B06	841BH: 15H,1AH,52H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FIX,#+000.0	841EH: A4H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,27 ,C2	8429H: 48H,57H,3AH
10 : IG2,11 ,20	842AH: 75H,2BH,34H
11 : MUL,55 ,12	842BH: 4AH,8FH,2CH
12 : ADD, Y1,13	842CH: 48H,1AH,2DH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : SZL,F0 ,RS2	842FH: 15H,F8H,35H
20 : LB1,10 ,	8434H: 37H,2AH,00H
21 : K/2, H1,	8435H: 5DH,0BH,00H
22 : INV,21 ,	8436H: 3CH,35H,00H
23 : FIX,#+160.0	8437H: A4H,00H,E4H
24 : FIX,#+160.0	8438H: A4H,00H,E4H
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
H2: FLX,#+004.0	8440H: A5H,80H,82H
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
N2: K/4,35 ,	8443H: 5BH,5FH,00H

Analog and binary function list 434 (continuation)

Mnemo text	Hex code
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,52 ,C3	8445H: 48H,8CH,6FH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: LB1,78 ,	844FH: 37H,C2H,00H
YE2: SZL, Y2,B07	8450H: 15H,4FH,53H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FIX,#+000.0	8453H: A4H,00H,80H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2,30 ,SP2	8459H: 2BH,5AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : IG2,36 ,45	845FH: 75H,60H,69H
36 : MUL,80 ,37	8460H: 4AH,C4H,61H
37 : ADD, Y2,38	8461H: 48H,4FH,62H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS3	8463H: 15H,F8H,36H
40 : SZL,F0 ,RS4	8464H: 15H,F8H,37H
45 : LB1,35 ,	8469H: 37H,5FH,00H
46 : K/2, H2,	846AH: 5DH,40H,00H
47 : INV,46 ,	846BH: 3CH,6AH,00H
48 : FIX,#+160.0	846CH: A4H,00H,E4H
49 : FIX,#+160.0	846DH: A4H,00H,E4H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
J3: INV, Y1,	8476H: 3CH,1AH,00H
L3: DIR,RD1,	8477H: 3DH,11H,00H
PB3: FLX,#+0100	8479H: A5H,43H,86H
RD3: DIR,RD1,	847BH: 3DH,11H,00H
RU3: DIR,RU1,	847EH: 3DH,14H,00H
TN3: FLX,#+0040	8482H: A5H,83H,82H
TD3: FLX,#+0010	8483H: A5H,A3H,80H
YE3: SZL,50 ,B08	8485H: 15H,8AH,54H
YP3: FLX,#+050.0	8486H: A5H,40H,9FH
YH3: FLX,#+100.0	8487H: A5H,80H,BEH
YL3: FIX,#+000.0	8488H: A4H,00H,80H
YS3: DIR,YS1,	8489H: 3DH,1FH,00H
50 : INV, Y1,	848AH: 3CH,1AH,00H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
53 : U21,54 , Y1	848DH: 32H,8EH,1AH
54 : SUB,YR1,YR3	848EH: 49H,E0H,E2H
55 : U24,23 ,24	848FH: 2EH,37H,38H
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
J4: INV, Y2,	84ABH: 3CH,4FH,00H
L4: DIR,RD2,	84ACH: 3DH,46H,00H
PB4: FLX,#+0100	84AEH: A5H,43H,86H
RD4: DIR,RD2,	84B0H: 3DH,46H,00H
RU4: DIR,RU2,	84B3H: 3DH,49H,00H
TN4: FLX,#+0040	84B7H: A5H,83H,82H
TD4: FLX,#+0010	84B8H: A5H,A3H,80H
YE4: SZL,75 ,B09	84BAH: 15H,BFH,55H
YP4: FLX,#+050.0	84BBH: A5H,40H,9FH
YH4: FLX,#+100.0	84BCH: A5H,80H,BEH

Analog and binary function list 434 (continuation)

Mnemo text	Hex code
YL4: FIX,#+000.0	84BDH: A4H,00H,80H
YS4: DIR,YS2,	84BEH: 3DH,54H,00H
75 : INV, Y2,	84BFH: 3CH,4FH,00H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
78 : U23,79 , Y2	84C2H: 34H,C3H,4FH
79 : SUB,YR2,YR4	84C3H: 49H,E1H,E3H
80 : U25,48 ,49	84C4H: 36H,6CH,6DH
YA1: FTR,Y23,YA1	8700H: 0EH,BAH,00H
YA2: FTR,Y24,YA2	8701H: 0EH,BEH,01H
YA3: FTR,Y21,YA3	8702H: 0EH,B2H,02H
YA4: FTR,Y22,YA4	8703H: 0EH,B6H,03H
YM1: FTR,Y03,YM1	8704H: 0EH,B8H,04H
YM2: FTR,Y04,YM2	8705H: 0EH,BCH,05H
YM3: FTR,Y01,YM3	8706H: 0EH,B0H,06H
YM4: FTR,Y02,YM4	8707H: 0EH,B4H,07H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: ANN,B13,KP4	8716H: 03H,5AH,83H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
SC1: ONN,B14,B21	8728H: 07H,5BH,63H
SC2: ONN,B15,B23	8729H: 07H,5CH,65H
SC3: ONN,B11,B21	872AH: 07H,58H,63H
SC4: ONN,B12,B23	872BH: 07H,59H,65H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: BTN,RS3,	8732H: 01H,36H,00H
MB4: BTN,RS4,	8733H: 01H,37H,00H
RS1: KU0,F7 , N1	8734H: 86H,FFH,0EH
RS2: KU0, N1,F7	8735H: 86H,0EH,FFH
RS3: KU0,F7 , N2	8736H: 86H,FFH,43H
RS4: KU0, N2,F7	8737H: 86H,43H,FFH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: OIN,B06,B21	873CH: 09H,52H,63H
CT2: OIN,B07,B23	873DH: 09H,53H,65H
CT3: OIN,B08,B21	873EH: 09H,54H,63H
CT4: OIN,B09,B23	873FH: 09H,55H,65H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H

Analog and binary function list 434 (Fortsetzung)

Mnemo text	Hex code
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: KU2, Y1,F7	874EH: 88H,1AH,FFH
B03: KU2, Y2,F7	874FH: 88H,4FH,FFH
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: FRS,SC3,B02	8752H: 0DH,2AH,4EH
B07: FRS,SC4,B03	8753H: 0DH,2BH,4FH
B08: FRS,SC1,B16	8754H: 0DH,28H,5DH
B09: FRS,SC2,B17	8755H: 0DH,29H,5EH
B10: BTN,Y02,	8756H: 01H,B4H,00H
B11: KU1,RD1,22	8758H: 87H,11H,36H
B12: KU1,RD2,47	8759H: 87H,46H,6BH
B13: ONN,OC1,OC2	875AH: 07H,D4H,D5H
B14: KU1,21 ,RD1	875BH: 87H,35H,11H
B15: KU1,46 ,RD2	875CH: 87H,6AH,46H
B16: KU2,F7 , Y1	875DH: 88H,FFH,1AH
B17: KU2,F7 , Y2	875EH: 88H,FFH,4FH
B18: BTN,CL1,	8760H: 01H,79H,00H
B19: BTN,Y01,	8761H: 01H,B0H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H
B21: BTN,B19,	8763H: 01H,61H,00H
B23: BTN,B10,	8765H: 01H,56H,00H
B24: KB9, N1,F7	8766H: 85H,0EH,FFH
B25: KB9, N2,F7	8767H: 85H,43H,FFH

Compare 534 and 434

Mnemo-Text	Hex.-Code
MB1: BTN,Y01,	8730H: 01H,B0H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H

Compare 435 and 434

Mnemo text	Hex code
no difference	

Compare 535 and 434

Mnemo text	Hex code
MB1: BTN,Y01,	8730H: 01H,B0H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H

Suppl. No. 451
Single channel step action controller
fixed value / cascade

This configuration serves as the basis for:
551, 452 / 552, 453 / 553

Analog function list 451

Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A3 : FIX,#+100.0	8402H: A4H,80H,BEH
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: FLX,#+001.0	840BH: A5H,A0H,80H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: MUL,92 ,B4	841AH: 4AH,D0H,A3H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#-001.2	841EH: A5H,C0H,00H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
92 : ADD,E4 ,C4	84D0H: 48H,DBH,A4H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H

Analog and binary function list 451 (continuation)

Mnemo text	Hex code
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTI,EM3,	870CH: 02H,9AH,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB4: BTI,Q11,	8733H: 02H,18H,00H
RS1: AIN,R21,R11	8734H: 05H,E1H,E0H
RS2: AIN,R11,R21	8735H: 05H,E0H,E1H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: BTN,LLL,	874EH: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H

Compare 551 and 451

Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 452 and 451

Mnemo text	Hex code
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
Y1: MUL,52 ,B3	841AH: 4AH,8CH,6EH
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
52 : ADD,E3 ,C3	848CH: 48H,DAH,6FH

Compare 552 and 451 Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
R1: ADD,19 ,16	8410H: 48H,33H,30H
RU1: DIR,19 ,	8414H: 3DH,33H,00H
Y1: MUL,52 ,B3	841AH: 4AH,8CH,6EH
16 : SUB,17 ,18	8430H: 49H,31H,32H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : ADD,77 ,C4	8432H: 48H,C1H,A4H
19 : ADD,02 ,C1	8433H: 48H,22H,05H
52 : ADD,E3 ,C3	848CH: 48H,DAH,6FH
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 453 and 451 Mnemo text	Hex code
RD1: SUB, R1,16	8411H: 49H,10H,30H
SH1: FLX,#+199.9	8416H: A5H,F0H,FCH
16 : MUL,SP1,17	8430H: 4AH,15H,31H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : DIV, R1,17	8432H: 4BH,10H,31H

Compare 553 and 451 Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
RD1: SUB, R1,16	8411H: 49H,10H,30H
SH1: FLX,#+199.9	8416H: A5H,F0H,FCH
16 : MUL,SP1,17	8430H: 4AH,15H,31H
17 : ADD,27 ,C2	8431H: 48H,57H,3AH
18 : DIV, R1,17	8432H: 4BH,10H,31H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Suppl. No. 454
Two channel step action controller
2 x fixed value

This configuration serves as the basis for:
554, 455/555

Analog and binary function list 454 Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : FIX,#+100.0	8402H: A4H,80H,BEH
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: FLX,#+001.0	840BH: A5H,A0H,80H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: MUL,42 ,B2	841AH: 4AH,66H,39H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#-001.2	841EH: A5H,C0H,00H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,27 ,C2	8429H: 48H,57H,3AH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
H2: FLX,#+001.0	8440H: A5H,A0H,80H
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,52 ,C3	8445H: 48H,8CH,6FH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH

Analog and binary function list 454 (continuation)

Mnemo text	Hex code
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: MUL,92 ,B4	844FH: 4AH,D0H,A3H
YE2: DIR,F7 ,	8450H: 3DH,FFH,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FLX,#-001.2	8453H: A5H,C0H,00H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2,30 ,SP2	8459H: 2BH,5AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : IG3,38 ,37	8461H: 76H,62H,61H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS2	8463H: 15H,F8H,35H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
42 : ADD,E2 ,C2	8466H: 48H,D9H,3AH
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
92 : ADD,E4 ,C4	84D0H: 48H,DBH,A4H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: AIN,R22,R12	8732H: 05H,E5H,E4H

Analog and binary function list 454 (continuation)

Mnemo text	Hex code
MB4: AIN,R12,R22	8733H: 05H,E4H,E5H
RS1: AIN,R21,R11	8734H: 05H,E1H,E0H
RS2: AIN,R11,R21	8735H: 05H,E0H,E1H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: BTN,LLL,	874EH: 01H,84H,00H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H

Compare 554 and 454

Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
A2 : FIX,#+100.0	8401H: A4H,80H,BEH
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,MB3,	8736H: 01H,32H,00H
RS4: BTN,MB4,	8737H: 01H,33H,00H

Compare 455 and 454

Mnemo text	Hex code
Y1: FIX,#+050.0	841AH: A4H,40H,9FH
YH1: FIX,#+100.0	841DH: A4H,80H,BEH
YL1: FIX,#+000.0	841EH: A4H,00H,80H
Y2: FIX,#+050.0	844FH: A4H,40H,9FH
YH2: FIX,#+100.0	8452H: A4H,80H,BEH
YL2: FIX,#+000.0	8453H: A4H,00H,80H

Compare 555 and 454

Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
A2 : FIX,#+100.0	8401H: A4H,80H,BEH
Y1: FIX,#+050.0	841AH: A4H,40H,9FH
YH1: FIX,#+100.0	841DH: A4H,80H,BEH
YL1: FIX,#+000.0	841EH: A4H,00H,80H
Y2: FIX,#+050.0	844FH: A4H,40H,9FH
YH2: FIX,#+100.0	8452H: A4H,80H,BEH
YL2: FIX,#+000.0	8453H: A4H,00H,80H
MB1: BTN,Y01,	8730H: 01H,B0H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H
RS3: BTN,MB3,	8736H: 01H,32H,00H
RS4: BTN,MB4,	8737H: 01H,33H,00H

Suppl. No. 416
Cascade logic combination:
1 Master controller, continuous, 1 slave controller (on/off) Z1 fixed value / cascade, combined

This configuration serves as the basis for: 516, 476/576

Analog and binary function list 416

Mnemo text	Hex code
A1 : DIR,40 ,	8400H: 3DH,64H,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR, R2,	841BH: 3DH,45H,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,27 ,C2	8445H: 48H,57H,3AH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H

Analog and binary function list 416 (continuation)

Mnemo text	Hex code
TN2: FLX,#+0040	844DH: A5H,83H,82H
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: DIR,YR2,	844FH: 3DH,E1H,00H
YE2: DIR,F7 ,	8450H: 3DH,FFH,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FLX,#+000.0	8453H: A5H,00H,80H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2, Y1,SP2	8459H: 2BH,1AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : IG3,38 ,37	8461H: 76H,62H,61H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS1	8463H: 15H,F8H,34H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,Y01,	8700H: 01H,B0H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: ANN,Y01,Y22	8705H: 03H,B0H,B6H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,S21,	870AH: 01H,D0H,00H
WE4: ANN,OC1,S23	870BH: 03H,D4H,D2H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: BTN,LLL,	8710H: 01H,84H,00H
YT2: FTR,D07,YT2	8711H: 0EH,FEH,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: FTR,D08,WT2	8715H: 0EH,FFH,15H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTI,Q42,	8731H: 02H,1FH,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTN,Y02,	8733H: 01H,B4H,00H
RS1: KB0,F7 ,37	8734H: 7CH,FFH,61H

Analog and binary function list 416 (Fortsetzung)		
Mnemo text		Hex code
RS2: KB0,F7 ,37	8735H:	7CH,FFH,61H
CP1: BTI,LLL,	8738H:	02H,84H,00H
CP2: BTI,LLL,	8739H:	02H,84H,00H
CP3: BTI,LLL,	873AH:	02H,84H,00H
CP4: BTI,LLL,	873BH:	02H,84H,00H
CT1: ONN,Y02,W02	873CH:	07H,B4H,C4H
CT2: BTN,LLL,	873DH:	01H,84H,00H
CT3: BTN,LLL,	873EH:	01H,84H,00H
CT4: BTN,LLL,	873FH:	01H,84H,00H
CI1: BTI,LLL,	8740H:	02H,84H,00H
CI2: BTI,LLL,	8741H:	02H,84H,00H
CI3: BTI,LLL,	8742H:	02H,84H,00H
CI4: BTI,LLL,	8743H:	02H,84H,00H
CD1: BTI,LLL,	8744H:	02H,84H,00H
CD2: BTI,LLL,	8745H:	02H,84H,00H
CD3: BTI,LLL,	8746H:	02H,84H,00H
CD4: BTI,LLL,	8747H:	02H,84H,00H
BLH: BTN,OC1,	8748H:	01H,D4H,00H
BLV: BTN,LLL,	8749H:	01H,84H,00H
BLD: ANN,B02,TF8	874AH:	03H,4EH,73H
OLD: BTN,LLL,	874BH:	01H,84H,00H
B00: KT7,SP1,09	874CH:	97H,15H,29H
B01: FRS,B00,W01	874DH:	0DH,4CH,C0H
B02: ANN,Y02,OC1	874EH:	03H,B4H,D4H
B04: KT7,SP2,34	8750H:	97H,4AH,5EH
B05: FRS,B04,W02	8751H:	0DH,50H,C4H
B06: BTN,LLL,	8752H:	01H,84H,00H
B18: BTN,CL1,	8760H:	01H,79H,00H
B20: BTN,CL2,	8762H:	01H,7AH,00H

Compare 516 and 416		
Mnemo text		Hex code
MB1: BTN,Y02,	8730H:	01H,B4H,00H
MB2: BTN,W02,	8731H:	01H,C4H,00H
RS2: BTN,Q42,	8735H:	01H,1FH,00H
RS3: BTN,Q11,	8736H:	01H,18H,00H
RS4: BTN,Q12,	8737H:	01H,1CH,00H

Compare 476 and 416		
Mnemo text		Hex code
39 : SZL,F0 ,RS2	8463H:	15H,F8H,35H
MB2: BTI,Q12,	8731H:	02H,1CH,00H
RS1: KB0,F7 ,12	8734H:	7CH,FFH,2CH

Compare 576 and 416		
Mnemo text		Hex code
39 : SZL,F0 ,RS2	8463H:	15H,F8H,35H
MB2: BTN,Y02,	8731H:	01H,B4H,00H
RS1: BTN,Q12,	8734H:	01H,1CH,00H
RS2: BTN,Q11,	8735H:	01H,18H,00H
RS3: BTN,Q22,	8736H:	01H,1DH,00H
RS4: BTN,Q21,	8737H:	01H,19H,00H

Suppl. No. 436
Cascade logic combination:
1 Master controller, continuous, 1 slave controller (on/off) Z2 fixed value / cascade, combined

This configuration serves as the basis for: 536

Analog and binary function list 436		
Mnemo text		Hex code
A1 : LU1, Y2,	8400H:	38H,4FH,00H
A2 : LU1, J4,	8401H:	38H,ABH,00H
A3 : LU1, Y2,	8402H:	38H,4FH,00H
A4 : LU1, J4,	8403H:	38H,ABH,00H
B1 : FLX,#+100.0	8404H:	A5H,80H,BEH
C1 : FLX,#+000.0	8405H:	A5H,00H,80H
D1: SUB,09 ,SP1	8406H:	49H,29H,15H
G11: FLX,#+100.0	8407H:	A5H,80H,BEH
G21: FLX,#+000.0	8408H:	A5H,00H,80H
G31: FLX,#+100.0	8409H:	A5H,80H,BEH
G41: FLX,#-100.0	840AH:	A5H,80H,3EH
J1: DIR, Y1,	840CH:	3DH,1AH,00H
L1: DIR,RD1,	840DH:	3DH,11H,00H
PB1: FLX,#+0100	840FH:	A5H,43H,86H
R1: ADD,02 ,C1	8410H:	48H,22H,05H
RD1: SUB, R1,SP1	8411H:	49H,10H,15H
RH1: MAX, R1,01	8412H:	46H,10H,21H
RL1: MIN, R1,00	8413H:	47H,10H,20H
RU1: DIR, R1,	8414H:	3DH,10H,00H
SP1: MIN,SH1,03	8415H:	47H,16H,23H
SH1: FLX,#+100.0	8416H:	A5H,80H,BEH
SL1: FLX,#+000.0	8417H:	A5H,00H,80H
TN1: FLX,#+0040	8418H:	A5H,83H,82H
TD1: FLX,#+0010	8419H:	A5H,A3H,80H
Y1: DIR,YR1,	841AH:	3DH,E0H,00H
YE1: DIR, R2,	841BH:	3DH,45H,00H
YP1: FLX,#+050.0	841CH:	A5H,40H,9FH
YH1: FLX,#+100.0	841DH:	A5H,80H,BEH
YL1: FLX,#+000.0	841EH:	A5H,00H,80H
YS1: DIR,F7 ,	841FH:	3DH,FFH,00H
00 : U18,RL1, R1	8420H:	28H,13H,10H
01 : U18,RH1, R1	8421H:	28H,12H,10H
02 : MUL,E1 ,B1	8422H:	4AH,D8H,04H
03 : MAX,SL1,04	8423H:	46H,17H,24H
04 : UI1,05 ,SP1	8424H:	27H,25H,15H
05 : ADD,08 ,06	8425H:	48H,28H,26H
06 : SZH,07 ,B01	8426H:	16H,27H,4DH
07 : RA4,09 ,SP1	8427H:	6BH,29H,15H
08 : SZL,09 ,B01	8428H:	15H,29H,4DH
09 : ADD,52 ,C3	8429H:	48H,8CH,6FH
10 : SIH, Y1,B02	842AH:	13H,1AH,4EH
11 : SZL,F0 ,B02	842BH:	15H,F8H,4EH
12 : IG3,13 ,12	842CH:	76H,2DH,2CH
13 : SUB,15 ,14	842DH:	49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH:	15H,F8H,34H
15 : ADD,10 ,11	842FH:	48H,2AH,2BH
B2 : FLX,#+100.0	8439H:	A5H,80H,BEH
C2 : FLX,#+000.0	843AH:	A5H,00H,80H
D2: SUB,34 ,SP2	843BH:	49H,5EH,4AH
G12: FLX,#+100.0	843CH:	A5H,80H,BEH
G22: FLX,#+000.0	843DH:	A5H,00H,80H
G32: FLX,#+100.0	843EH:	A5H,80H,BEH
G42: FLX,#-100.0	843FH:	A5H,80H,3EH
H2: FLX,#+004.0	8440H:	A5H,80H,82H
J2: DIR, Y2,	8441H:	3DH,4FH,00H
L2: DIR,RD2,	8442H:	3DH,46H,00H
N2: K/4,35 ,	8443H:	5BH,5FH,00H
PB2: FLX,#+0100	8444H:	A5H,43H,86H
R2: ADD,27 ,C2	8445H:	48H,57H,3AH
RD2: SUB, R2,SP2	8446H:	49H,45H,4AH
RH2: MAX, R2,26	8447H:	46H,45H,56H
RL2: MIN, R2,25	8448H:	47H,45H,55H
RU2: DIR, R2,	8449H:	3DH,45H,00H

Analog and binary function list 436 (continuation)

Mnemo text	Hex code
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: LB1,78 ,	844FH: 37H,C2H,00H
YE2: SZL, Y2,B07	8450H: 15H,4FH,53H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FIX,#+000.0	8453H: A4H,00H,80H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2, Y1,SP2	8459H: 2BH,1AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : IG2,36 ,45	845FH: 75H,60H,69H
36 : MUL,80 ,37	8460H: 4AH,C4H,61H
37 : ADD, Y2,38	8461H: 48H,4FH,62H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS3	8463H: 15H,F8H,36H
40 : SZL,F0 ,RS4	8464H: 15H,F8H,37H
45 : LB1,35 ,	8469H: 37H,5FH,00H
46 : K/2, H2,	846AH: 5DH,40H,00H
47 : INV,46 ,	846BH: 3CH,6AH,00H
48 : FIX,#+160.0	846CH: A4H,00H,E4H
49 : FIX,#+160.0	846DH: A4H,00H,E4H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
J4: INV, Y2,	84ABH: 3CH,4FH,00H
L4: DIR,RD2,	84ACH: 3DH,46H,00H
PB4: FLX,#+0100	84AEH: A5H,43H,86H
RD4: DIR,RD2,	84B0H: 3DH,46H,00H
RU4: DIR,RU2,	84B3H: 3DH,49H,00H
TN4: FLX,#+0040	84B7H: A5H,83H,82H
TD4: FLX,#+0010	84B8H: A5H,A3H,80H
YE4: SZL,75 ,B09	84BAH: 15H,BFH,55H
YP4: FLX,#+050.0	84BBH: A5H,40H,9FH
YH4: FLX,#+100.0	84BCH: A5H,80H,BEH
YL4: FIX,#+000.0	84BDH: A4H,00H,80H
YS4: DIR,YS2,	84BEH: 3DH,54H,00H
75 : INV, Y2,	84BFH: 3CH,4FH,00H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
78 : U23,79 , Y2	84C2H: 34H,C3H,4FH
79 : SUB,YR2,YR4	84C3H: 49H,E1H,E3H
80 : U25,48 ,49	84C4H: 36H,6CH,6DH
YA1: ONN,Y01,B11	8700H: 07H,B0H,58H
YA2: FTR,Y24,YA2	8701H: 0EH,BEH,01H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: FTR,Y22,YA4	8703H: 0EH,B6H,03H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: ONN,B06,B08	8705H: 07H,52H,54H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: FTR,Y02,YM4	8707H: 0EH,B4H,07H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,S21,	870AH: 01H,D0H,00H
WE4: ANN,OC1,S23	870BH: 03H,D4H,D2H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H

Analog and binary function list 436 (Fortsetzung)

Mnemo text	Hex code
YT1: BTN,LLL,	8710H: 01H,84H,00H
YT2: FTR,D07,YT2	8711H: 0EH,FEH,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: FTR,D08,WT2	8715H: 0EH,FFH,15H
WT3: ANN,B13,KP4	8716H: 03H,5AH,83H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
SC2: ONN,B15,B23	8729H: 07H,5CH,65H
SC4: ONN,B12,B23	872BH: 07H,59H,65H
MB1: BTN,RS3,	8730H: 01H,36H,00H
MB2: BTN,RS4,	8731H: 01H,37H,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTI,Q12,	8733H: 02H,1CH,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
RS2: KB0,F7 ,37	8735H: 7CH,FFH,61H
RS3: KU0,F7 , N2	8736H: 86H,FFH,43H
RS4: KU0, N2,F7	8737H: 86H,43H,FFH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: ONN,Y02,W02	873CH: 07H,B4H,C4H
CT2: OIN,B07,B23	873DH: 09H,53H,65H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: OIN,B09,B23	873FH: 09H,55H,65H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC1,	8748H: 01H,D4H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: ANN,B02,TF8	874AH: 03H,4EH,73H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: ANN,Y02,OC1	874EH: 03H,B4H,D4H
B03: KU2, Y2,F7	874FH: 88H,4FH,FFH
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: ANN,Y01,Y22	8752H: 03H,B0H,B6H
B07: FRS,SC4,B03	8753H: 0DH,2BH,4FH
B08: FTR,Y04,B08	8754H: 0EH,BCH,54H
B09: FRS,SC2,B17	8755H: 0DH,29H,5EH
B10: BTN,Y02,	8756H: 01H,B4H,00H
B11: FTR,Y24,B11	8758H: 0EH,BEH,58H
B12: KU1,RD2,47	8759H: 87H,46H,6BH
B13: ONN,OC1,OC2	875AH: 07H,D4H,D5H
B15: KU1,46 ,RD2	875CH: 87H,6AH,46H
B17: KU2,F7 , Y2	875EH: 88H,FFH,4FH
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H
B23: BTN,B10,	8765H: 01H,56H,00H
B25: KB9, N2,F7	8767H: 85H,43H,FFH

Compare 536 and 436 Mnemo text	Hex code
39 : SZL,F0 ,RS1	8463H: 15H,F8H,34H
40 : SZL,F0 ,RS2	8464H: 15H,F8H,35H
MB1: BTN,Y02,	8730H: 01H,B4H,00H
MB2: BTN,W02,	8731H: 01H,C4H,00H
RS1: KU0,F7 , N2	8734H: 86H,FFH,43H
RS2: KU0, N2,F7	8735H: 86H,43H,FFH
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q12,	8737H: 01H,1CH,00H

Suppl. No. 456
Cascade logic combination:
Master controller, continuous controller
Slave controller: step action controller,
fixed value / cascade, combined
This configuration serves as the basic for: 556

Analog and binary function list 456 Mnemo text	Hex code
A1 : DIR,40 ,	8400H: 3DH,64H,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : FIX,#+100.0	8402H: A4H,80H,BEH
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR, R2,	841BH: 3DH,45H,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
H2: FLX,#+001.0	8440H: A5H,A0H,80H
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,27 ,C2	8445H: 48H,57H,3AH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H

Analog and binary function list 456 (continuation)

Mnemo text	Hex code
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: MUL,52 ,B3	844FH: 4AH,8CH,6EH
YE2: DIR,F7 ,	8450H: 3DH,FFH,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: FLX,#-001.2	8453H: A5H,C0H,00H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,29	8458H: 46H,4CH,59H
29 : UI2, Y1,SP2	8459H: 2BH,1AH,4AH
30 : ADD,33 ,31	845AH: 48H,5DH,5BH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : IG3,38 ,37	8461H: 76H,62H,61H
38 : SUB,40 ,39	8462H: 49H,64H,63H
39 : SZL,F0 ,RS2	8463H: 15H,F8H,35H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : ADD,E3 ,C3	848CH: 48H,DAH,6FH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,Y01,	8700H: 01H,B0H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: ANN,Y01,Y22	8705H: 03H,B0H,B6H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,S21,	870AH: 01H,D0H,00H
WE4: ANN,OC1,S23	870BH: 03H,D4H,D2H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: BTN,LLL,	8710H: 01H,84H,00H
YT2: FTR,D07,YT2	8711H: 0EH,FEH,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: FTR,D08,WT2	8715H: 0EH,FFH,15H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTI,Q12,	8733H: 02H,1CH,00H

Analog and binary function list 456 (continuation)

Mnemo-Text	Hex.-Code
RS1: AIN,R22,R12	8734H: 05H,E5H,E4H
RS2: AIN,R12,R22	8735H: 05H,E4H,E5H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: ONN,Y02,W02	873CH: 07H,B4H,C4H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC1,	8748H: 01H,D4H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: ANN,B02,TF8	874AH: 03H,4EH,73H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: ANN,Y02,OC1	874EH: 03H,B4H,D4H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H

Compare 556 and 456

Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
MB2: BTN,Y02,	8731H: 01H,B4H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q12,	8737H: 01H,1CH,00H

Suppl. No. 457
Override step action controller, min. selection
2 x fixed value, combined

This configuration serves as the basis for:
557, 458, 558

Analog and binary function list 457

Mnemo text	Hex code
A1 : DIR,40 ,	8400H: 3DH,64H,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : FIX,#+100.0	8402H: A4H,80H,BEH
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR, Y2,	841BH: 3DH,4FH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: ADD, Y2,F5	841DH: 48H,4FH,FDH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
H2: FLX,#+001.0	8440H: A5H,A0H,80H
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,27 ,C2	8445H: 48H,57H,3AH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H

Analog and binary function list 457 (continuation)

Mnemo text	Hex code
TN2: FLX,#+0040	844DH: A5H,83H,82H
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: MUL,52 ,B3	844FH: 4AH,8CH,6EH
YE2: DIR,YH2,	8450H: 3DH,52H,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: DIR, Y1,	8452H: 3DH,1AH,00H
YL2: FLX,#-001.2	8453H: A5H,C0H,00H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,SP2	8458H: 46H,4CH,4AH
29 : SZH, Y1,D08	8459H: 16H,1AH,FFH
30 : SZL,09 ,D08	845AH: 15H,29H,FFH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : SZH, Y2,D08	8461H: 16H,4FH,FFH
38 : SZL,09 ,D08	8462H: 15H,29H,FFH
39 : ADD,YH2, H2	8463H: 48H,52H,40H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : ADD,E3 ,C3	848CH: 48H,DAH,6FH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,Y01,	8700H: 01H,B0H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: ANN,Y01,Y22	8705H: 03H,B0H,B6H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,S21,	870AH: 01H,D0H,00H
WE4: ANN,OC1,S23	870BH: 03H,D4H,D2H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: BTN,LLL,	8710H: 01H,84H,00H
YT2: FTR,D07,YT2	8711H: 0EH,FEH,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTI,Q12,	8733H: 02H,1CH,00H

Analog and binary function list 457 (continuation) Mnemo text	Hex code
RS1: AIN,R22,R12	8734H: 05H,E5H,E4H
RS2: AIN,R12,R22	8735H: 05H,E4H,E5H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,Y02,	873CH: 01H,B4H,00H
CT2: KB1,39 , Y2	873DH: 7DH,63H,4FH
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC1,	8748H: 01H,D4H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: ANN,B02,TF8	874AH: 03H,4EH,73H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: ANN,Y02,OC1	874EH: 03H,B4H,D4H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H

Compare 557 and 457 Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
MB2: BTN,Y02,	8731H: 01H,B4H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q12,	8737H: 01H,1CH,00H

Compare 458 and 457 Mnemo text	Hex code
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: SUB, Y2,F5	841EH: 49H,4FH,FDH
YE2: DIR,YL2,	8450H: 3DH,53H,00H
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: DIR, Y1,	8453H: 3DH,1AH,00H
39 : SUB,YL2, H2	8463H: 49H,53H,40H
CT2: KB1, Y2,39	873DH: 7DH,4FH,63H

Compare 558 and 457 Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: SUB, Y2,F5	841EH: 49H,4FH,FDH
YE2: DIR,YL2,	8450H: 3DH,53H,00H
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: DIR, Y1,	8453H: 3DH,1AH,00H
39 : SUB,YL2, H2	8463H: 49H,53H,40H
MB2: BTN,Y02,	8731H: 01H,B4H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: BTN,Q12,	8737H: 01H,1CH,00H
CT2: KB1, Y2,39	873DH: 7DH,4FH,63H

Suppl. No. 477
Override – continuous controller, min. selection
2 x fixed value, combined

This configuration serves as the basis for:
577, 478/578

Analog and binary function list 477 Mnemo text	Hex code
A1 : DIR,40 ,	8400H: 3DH,64H,00H
A2 : DIR,40 ,	8401H: 3DH,64H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,09 ,SP1	8406H: 49H,29H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR, Y2,	841BH: 3DH,4FH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: ADD,39 ,F5	841DH: 48H,63H,FDH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,05 ,SP1	8424H: 27H,25H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
D2: SUB,34 ,SP2	843BH: 49H,5EH,4AH
G12: FLX,#+100.0	843CH: A5H,80H,BEH
G22: FLX,#+000.0	843DH: A5H,00H,80H
G32: FLX,#+100.0	843EH: A5H,80H,BEH
G42: FLX,#-100.0	843FH: A5H,80H,3EH
J2: DIR, Y2,	8441H: 3DH,4FH,00H
L2: DIR,RD2,	8442H: 3DH,46H,00H
PB2: FLX,#+0100	8444H: A5H,43H,86H
R2: ADD,27 ,C2	8445H: 48H,57H,3AH
RD2: SUB, R2,SP2	8446H: 49H,45H,4AH
RH2: MAX, R2,26	8447H: 46H,45H,56H
RL2: MIN, R2,25	8448H: 47H,45H,55H
RU2: DIR, R2,	8449H: 3DH,45H,00H
SP2: MIN,SH2,28	844AH: 47H,4BH,58H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: FLX,#+0040	844DH: A5H,83H,82H

Analog and binary function list 477 (continuation)

Mnemo text	Hex code
TD2: FLX,#+0010	844EH: A5H,A3H,80H
Y2: DIR,YR2,	844FH: 3DH,E1H,00H
YE2: DIR,F7 ,	8450H: 3DH,FFH,00H
YP2: FLX,#+050.0	8451H: A5H,40H,9FH
YH2: ADD,29 ,30	8452H: 48H,59H,5AH
YL2: FLX,#+000.0	8453H: A5H,00H,80H
YS2: DIR,F7 ,	8454H: 3DH,FFH,00H
25 : U20,RL2, R2	8455H: 2AH,48H,45H
26 : U20,RH2, R2	8456H: 2AH,47H,45H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 : MAX,SL2,SP2	8458H: 46H,4CH,4AH
29 : SZH, Y1,D08	8459H: 16H,1AH,FFH
30 : SZL,09 ,D08	845AH: 15H,29H,FFH
31 : SZH,32 ,B05	845BH: 16H,5CH,51H
32 : RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 : SZL,34 ,B05	845DH: 15H,5EH,51H
34 : ADD,77 ,C4	845EH: 48H,C1H,A4H
35 : SIH, Y2,B06	845FH: 13H,4FH,52H
36 : SZL,F0 ,B06	8460H: 15H,F8H,52H
37 : SZH, Y2,D08	8461H: 16H,4FH,FFH
38 : SZL,09 ,D08	8462H: 15H,29H,FFH
39 : ADD,37 ,38	8463H: 48H,61H,62H
40 : ADD,35 ,36	8464H: 48H,5FH,60H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,Y01,	8700H: 01H,B0H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: ANN,Y01,Y22	8705H: 03H,B0H,B6H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,S21,	870AH: 01H,D0H,00H
WE4: ANN,OC1,S23	870BH: 03H,D4H,D2H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: BTN,LLL,	8710H: 01H,84H,00H
YT2: FTR,D07,YT2	8711H: 0EH,FEH,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,Y02,	8731H: 01H,B4H,00H
MB3: BTI,Q11,	8732H: 02H,18H,00H
MB4: BTI,Q12,	8733H: 02H,1CH,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH

Analog and binary function list 477 (continuation)

Mnemo text	Hex code
RS2: KB0,F7 ,37	8735H: 7CH,FFH,61H
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,Y02,	873CH: 01H,B4H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC1,	8748H: 01H,D4H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: ANN,B02,TF8	874AH: 03H,4EH,73H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: ANN,Y02,OC1	874EH: 03H,B4H,D4H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: FRS,B04,W02	8751H: 0DH,50H,C4H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H

Compare 577 and 477

Mnemo text	Hex code
RS1: BTN,Q12,	8734H: 01H,1CH,00H
RS2: BTN,Q11,	8735H: 01H,18H,00H
RS3: BTN,Q22,	8736H: 01H,1DH,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Compare 478 and 477

Mnemo text	Hex code
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: SUB,39 ,F5	841EH: 49H,63H,FDH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: ADD,29 ,30	8453H: 48H,59H,5AH

Compare 578 and 477

Mnemo text	Hex code
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: SUB,39 ,F5	841EH: 49H,63H,FDH
YH2: FLX,#+100.0	8452H: A5H,80H,BEH
YL2: ADD,29 ,30	8453H: 48H,59H,5AH
RS1: BTN,Q12,	8734H: 01H,1CH,00H
RS2: BTN,Q11,	8735H: 01H,18H,00H
RS3: BTN,Q22,	8736H: 01H,1DH,00H
RS4: BTN,Q21,	8737H: 01H,19H,00H

Suppl. No. 481
Four channel controller, continuous,
4 x fixed value

This configuration serves as the basis for:
421 / 521

Analog and binary function list 481		
Mnemo text		Hex code
A1 :	DIR,15 ,	8400H: 3DH,2FH,00H
A2 :	DIR,40 ,	8401H: 3DH,64H,00H
A3 :	DIR,65 ,	8402H: 3DH,99H,00H
A4 :	DIR,90 ,	8403H: 3DH,CEH,00H
B1 :	FLX,#+100.0	8404H: A5H,80H,BEH
C1 :	FLX,#+000.0	8405H: A5H,00H,80H
G11:	FLX,#+100.0	8407H: A5H,80H,BEH
G21:	FLX,#+000.0	8408H: A5H,00H,80H
G31:	FLX,#+100.0	8409H: A5H,80H,BEH
G41:	FLX,#-100.0	840AH: A5H,80H,3EH
J1:	DIR, Y1,	840CH: 3DH,1AH,00H
L1:	DIR,RD1,	840DH: 3DH,11H,00H
PB1:	FLX,#+0100	840FH: A5H,43H,86H
R1:	ADD,02 ,C1	8410H: 48H,22H,05H
RD1:	SUB, R1,SP1	8411H: 49H,10H,15H
RH1:	MAX, R1,01	8412H: 46H,10H,21H
RL1:	MIN, R1,00	8413H: 47H,10H,20H
RU1:	DIR, R1,	8414H: 3DH,10H,00H
SP1:	MIN,SH1,03	8415H: 47H,16H,23H
SH1:	FLX,#+100.0	8416H: A5H,80H,BEH
SL1:	FLX,#+000.0	8417H: A5H,00H,80H
TN1:	FLX,#+0040	8418H: A5H,83H,82H
TD1:	FLX,#+0010	8419H: A5H,A3H,80H
Y1:	DIR,YR1,	841AH: 3DH,E0H,00H
YE1:	DIR,F7 ,	841BH: 3DH,FFH,00H
YP1:	FLX,#+050.0	841CH: A5H,40H,9FH
YH1:	FLX,#+100.0	841DH: A5H,80H,BEH
YL1:	FLX,#+000.0	841EH: A5H,00H,80H
YS1:	DIR,F7 ,	841FH: 3DH,FFH,00H
00 :	U18,RL1, R1	8420H: 28H,13H,10H
01 :	U18,RH1, R1	8421H: 28H,12H,10H
02 :	MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 :	MAX,SL1,SP1	8423H: 46H,17H,15H
04 :	UI1,05 ,SP1	8424H: 27H,25H,15H
05 :	ADD,08 ,06	8425H: 48H,28H,26H
06 :	SZH,07 ,B01	8426H: 16H,27H,4DH
07 :	RA4,09 ,SP1	8427H: 6BH,29H,15H
08 :	SZL,09 ,B01	8428H: 15H,29H,4DH
09 :	ADD,27 ,C2	8429H: 48H,57H,3AH
10 :	SIH, Y1,B02	842AH: 13H,1AH,4EH
11 :	SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 :	IG3,13 ,12	842CH: 76H,2DH,2CH
13 :	SUB,15 ,14	842DH: 49H,2FH,2EH
14 :	SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 :	ADD,10 ,11	842FH: 48H,2AH,2BH
B2 :	FLX,#+100.0	8439H: A5H,80H,BEH
C2 :	FLX,#+000.0	843AH: A5H,00H,80H
G12:	FLX,#+100.0	843CH: A5H,80H,BEH
G22:	FLX,#+000.0	843DH: A5H,00H,80H
G32:	FLX,#+100.0	843EH: A5H,80H,BEH
G42:	FLX,#-100.0	843FH: A5H,80H,3EH
J2:	DIR, Y2,	8441H: 3DH,4FH,00H
L2:	DIR,RD2,	8442H: 3DH,46H,00H
PB2:	FLX,#+0100	8444H: A5H,43H,86H
R2:	ADD,27 ,C2	8445H: 48H,57H,3AH
RD2:	SUB, R2,SP2	8446H: 49H,45H,4AH
RH2:	MAX, R2,26	8447H: 46H,45H,56H
RL2:	MIN, R2,25	8448H: 47H,45H,55H
RU2:	DIR, R2,	8449H: 3DH,45H,00H
SP2:	MIN,SH2,28	844AH: 47H,4BH,58H
SH2:	FLX,#+100.0	844BH: A5H,80H,BEH
SL2:	FLX,#+000.0	844CH: A5H,00H,80H
TN2:	FLX,#+0040	844DH: A5H,83H,82H
TD2:	FLX,#+0010	844EH: A5H,A3H,80H

Analog and binary function list 481 (continuation)		
Mnemo text		Hex code
Y2:	DIR,YR2,	844FH: 3DH,E1H,00H
YE2:	DIR,F7 ,	8450H: 3DH,FFH,00H
YP2:	FLX,#+050.0	8451H: A5H,40H,9FH
YH2:	FLX,#+100.0	8452H: A5H,80H,BEH
YL2:	FLX,#+000.0	8453H: A5H,00H,80H
YS2:	DIR,F7 ,	8454H: 3DH,FFH,00H
25 :	U20,RL2, R2	8455H: 2AH,48H,45H
26 :	U20,RH2, R2	8456H: 2AH,47H,45H
27 :	MUL,E2 ,B2	8457H: 4AH,D9H,39H
28 :	MAX,SL2,SP2	8458H: 46H,4CH,4AH
29 :	UI2,30 ,SP2	8459H: 2BH,5AH,4AH
30 :	ADD,33 ,31	845AH: 48H,5DH,5BH
31 :	SZH,32 ,B05	845BH: 16H,5CH,51H
32 :	RA4,34 ,SP2	845CH: 6BH,5EH,4AH
33 :	SZL,34 ,B05	845DH: 15H,5EH,51H
34 :	ADD,77 ,C4	845EH: 48H,C1H,A4H
35 :	SIH, Y2,B06	845FH: 13H,4FH,52H
36 :	SZL,F0 ,B06	8460H: 15H,F8H,52H
37 :	IG3,38 ,37	8461H: 76H,62H,61H
38 :	SUB,40 ,39	8462H: 49H,64H,63H
39 :	SZL,F0 ,RS2	8463H: 15H,F8H,35H
40 :	ADD,35 ,36	8464H: 48H,5FH,60H
B3 :	FLX,#+100.0	846EH: A5H,80H,BEH
C3 :	FLX,#+000.0	846FH: A5H,00H,80H
G13:	FLX,#+100.0	8471H: A5H,80H,BEH
G23:	FLX,#+000.0	8472H: A5H,00H,80H
G33:	FLX,#+100.0	8473H: A5H,80H,BEH
G43:	FLX,#-100.0	8474H: A5H,80H,3EH
J3:	DIR, Y3,	8476H: 3DH,84H,00H
L3:	DIR,RD3,	8477H: 3DH,7BH,00H
PB3:	FLX,#+0100	8479H: A5H,43H,86H
R3:	ADD,52 ,C3	847AH: 48H,8CH,6FH
RD3:	SUB, R3,SP3	847BH: 49H,7AH,7FH
RH3:	MAX, R3,51	847CH: 46H,7AH,8BH
RL3:	MIN, R3,50	847DH: 47H,7AH,8AH
RU3:	DIR, R3,	847EH: 3DH,7AH,00H
SP3:	MIN,SH3,53	847FH: 47H,80H,8DH
SH3:	FLX,#+100.0	8480H: A5H,80H,BEH
SL3:	FLX,#+000.0	8481H: A5H,00H,80H
TN3:	FLX,#+0040	8482H: A5H,83H,82H
TD3:	FLX,#+0010	8483H: A5H,A3H,80H
Y3:	DIR,YR3,	8484H: 3DH,E2H,00H
YE3:	DIR,F7 ,	8485H: 3DH,FFH,00H
YP3:	FLX,#+050.0	8486H: A5H,40H,9FH
YH3:	FLX,#+100.0	8487H: A5H,80H,BEH
YL3:	FLX,#+000.0	8488H: A5H,00H,80H
YS3:	DIR,F7 ,	8489H: 3DH,FFH,00H
50 :	U22,RL3, R3	848AH: 2CH,7DH,7AH
51 :	U22,RH3, R3	848BH: 2CH,7CH,7AH
52 :	MUL,E3 ,B3	848CH: 4AH,DAH,6EH
53 :	MAX,SL3,SP3	848DH: 46H,81H,7FH
60 :	SIH, Y3,B01	8494H: 13H,84H,4DH
61 :	SZL,F0 ,B01	8495H: 15H,F8H,4DH
62 :	IG3,63 ,62	8496H: 76H,97H,96H
63 :	SUB,65 ,64	8497H: 49H,99H,98H
64 :	SZL,F0 ,RS3	8498H: 15H,F8H,36H
65 :	ADD,60 ,61	8499H: 48H,94H,95H
B4 :	FLX,#+100.0	84A3H: A5H,80H,BEH
C4 :	FLX,#+000.0	84A4H: A5H,00H,80H
G14:	FLX,#+100.0	84A6H: A5H,80H,BEH
G24:	FLX,#+000.0	84A7H: A5H,00H,80H
G34:	FLX,#+100.0	84A8H: A5H,80H,BEH
G44:	FLX,#-100.0	84A9H: A5H,80H,3EH
J4:	DIR, Y4,	84ABH: 3DH,B9H,00H
L4:	DIR,RD4,	84ACH: 3DH,B0H,00H
PB4:	FLX,#+0100	84AEH: A5H,43H,86H
R4:	ADD,77 ,C4	84AFH: 48H,C1H,A4H
RD4:	SUB, R4,SP4	84B0H: 49H,AFH,B4H
RH4:	MAX, R4,76	84B1H: 46H,AFH,C0H
RL4:	MIN, R4,75	84B2H: 47H,AFH,BFH

Analog and binary function list 481 (continuation)

Mnemo text	Hex code
RU4: DIR, R4,	84B3H: 3DH,AFH,00H
SP4: MIN,SH4,78	84B4H: 47H,B5H,C2H
SH4: FLX,#+100.0	84B5H: A5H,80H,BEH
SL4: FLX,#+000.0	84B6H: A5H,00H,80H
TN4: FLX,#+0040	84B7H: A5H,83H,82H
TD4: FLX,#+0010	84B8H: A5H,A3H,80H
Y4: DIR,YR4,	84B9H: 3DH,E3H,00H
YE4: DIR,F7 ,	84BAH: 3DH,FFH,00H
YP4: FLX,#+050.0	84BBH: A5H,40H,9FH
YH4: FLX,#+100.0	84BCH: A5H,80H,BEH
YL4: FLX,#+000.0	84BDH: A5H,00H,80H
YS4: DIR,F7 ,	84BEH: 3DH,FFH,00H
75 : U24,RL4, R4	84BFH: 2EH,B2H,AFH
76 : U24,RH4, R4	84C0H: 2EH,B1H,AFH
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
78 : MAX,SL4,SP4	84C2H: 46H,B6H,B4H
85 : SIH, Y4,B05	84C9H: 13H,B9H,51H
86 : SZL,F0 ,B05	84CAH: 15H,F8H,51H
87 : IG3,88 ,87	84CBH: 76H,CCH,CBH
88 : SUB,90 ,89	84CCH: 49H,CEH,CDH
89 : SZL,F0 ,RS4	84CDH: 15H,F8H,37H
90 : ADD,85 ,86	84CEH: 48H,C9H,CAH
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: FTR,D08,WT1	8714H: 0EH,FFH,14H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,S23,	8717H: 01H,D2H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
Q12: KU7, R2,G12	871CH: 8DH,45H,3CH
Q22: KU7,G22, R2	871DH: 8DH,3DH,45H
Q32: KU7,RD2,G32	871EH: 8DH,46H,3EH
Q42: KU7,G42,RD2	871FH: 8DH,3FH,46H
Q13: KU7, R3,G13	8720H: 8DH,7AH,71H
Q23: KU7,G23, R3	8721H: 8DH,72H,7AH
Q33: KU7,RD3,G33	8722H: 8DH,7BH,73H
Q43: KU7,G43,RD3	8723H: 8DH,74H,7BH
Q14: KU7, R4,G14	8724H: 8DH,AFH,A6H
Q24: KU7,G24, R4	8725H: 8DH,A7H,AFH
Q34: KU7,RD4,G34	8726H: 8DH,B0H,A8H
Q44: KU7,G44,RD4	8727H: 8DH,A9H,B0H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H
MB3: BTN,RS3,	8732H: 01H,36H,00H
MB4: BTN,RS4,	8733H: 01H,37H,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
RS2: KB0,F7 ,37	8735H: 7CH,FFH,61H
RS3: KB0,F7 ,62	8736H: 7CH,FFH,96H
RS4: KB0,F7 ,87	8737H: 7CH,FFH,CBH

Analog and binary function list 481 (continuation)

Mnemo text	Hex code
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,LLL,	8748H: 01H,84H,00H
BLV: BTN,LLL,	8749H: 01H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KT7,SP1,09	874CH: 97H,15H,29H
B01: BTN,LLL,	874DH: 01H,84H,00H
B02: BTN,LLL,	874EH: 01H,84H,00H
B04: KT7,SP2,34	8750H: 97H,4AH,5EH
B05: BTN,LLL,	8751H: 01H,84H,00H
B06: BTN,LLL,	8752H: 01H,84H,00H
B18: BTN,CL1,	8760H: 01H,79H,00H
B20: BTN,CL2,	8762H: 01H,7AH,00H
B22: BTN,CL3,	8764H: 01H,7BH,00H
B24: BTN,CL4,	8766H: 01H,7CH,00H

Compare 421 and 481

Mnemo text	Hex code
no difference	

Compare 521 and 481

Mnemo text	Hex code
MB1: ANI,B08,B09	8730H: 04H,54H,55H
MB2: ANI,B14,B15	8731H: 04H,5BH,5CH
B00: ANN,Q31,Q41	874CH: 03H,1AH,1BH
B03: ANN,Q32,Q42	874FH: 03H,1EH,1FH
B04: ANN,Q33,Q43	8750H: 03H,22H,23H
B07: ANN,Q34,Q44	8753H: 03H,26H,27H
B08: ANN,B00,B03	8754H: 03H,4CH,4FH
B09: ANN,B04,B07	8755H: 03H,50H,53H
B10: ANN,Q11,Q21	8756H: 03H,18H,19H
B11: ANN,Q12,Q22	8758H: 03H,1CH,1DH
B12: ANN,Q13,Q23	8759H: 03H,20H,21H
B13: ANN,Q14,Q24	875AH: 03H,24H,25H
B14: ANN,B10,B11	875BH: 03H,56H,58H
B15: ANN,B12,B13	875CH: 03H,59H,5AH

Suppl. No. 422
Program controller:
1 Single-channel program controller with on/off controller Z1 fixed value / program, combined

This configuration, serves as the basis for: 522

Analog and binary function list 422

Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A2 : DIR,SP2,	8401H: 3DH,4AH,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,YF2,SP1	8406H: 49H,F1H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,YF2,SP1	8424H: 27H,F1H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
N2: MA3,YD2,	8443H: 41H,EDH,00H
RD2: FIX,#+000.0	8446H: A4H,00H,80H
SP2: MIN,SH2,YL2	844AH: 47H,4BH,53H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: DIR,YJ2,	844DH: 3DH,E9H,00H
YP2: FIX,#+000.6	8451H: A4H,60H,80H
YH2: FIX,#+099.9	8452H: A4H,70H,BEH
YL2: MAX,SL2,YS2	8453H: 46H,4CH,54H
YS2: UI2,YF2,SP2	8454H: 2BH,F1H,4AH
25 : PW0,#+010.0	8455H: E0H,40H,86H
26 : PW0,#+050.0	8456H: E0H,40H,9FH
27 : PW0,#+050.0	8457H: E0H,40H,9FH
28 : PW0,#+080.0	8458H: E0H,00H,B2H
29 : PW0,#+080.0	8459H: E0H,00H,B2H
30 : PW0,#+070.0	845AH: E0H,C0H,ABH
31 : PW0,#+060.0	845BH: E0H,80H,A5H

Analog and binary function list 422 (continuation)

Mnemo text	Hex code
32 : PW0,#+020.0	845CH: E0H,80H,8CH
35 : PT1,#+00.10	845FH: F1H,A1H,80H
36 : PT2,#+00.10	8460H: F2H,A1H,80H
37 : PT4,#+00.20	8461H: F4H,41H,81H
38 : PT8,#+00.50	8462H: F8H,21H,83H
39 : PT0,#+00.50	8463H: F0H,21H,83H
40 : PT0,#+00.25	8464H: F0H,91H,81H
41 : PT0,#+00.25	8465H: F0H,91H,81H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,D06,	8705H: 01H,FDH,01H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: FTR,B05,YT2	8711H: 0EH,51H,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: AIN,OC2,S23	8717H: 05H,D5H,D2H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTI,Q41,	8731H: 02H,1BH,00H
MB3: ONN,B16,Y01	8732H: 07H,5DH,B0H
MB4: BTN,Y01,	8733H: 01H,B0H,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTN,D06,	8739H: 01H,FDH,01H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: ONN,B00,D05	873DH: 07H,4CH,FCH
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: FTR,B09,CI2	8741H: 0EH,55H,41H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTN,LLL,	8745H: 01H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC2,	8748H: 01H,D5H,00H
BLV: BTN,OC2,	8749H: 01H,D5H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: AIN,B12,B13	874CH: 05H,59H,5AH
B01: KU1,YP2, N2	874DH: 87H,51H,43H
B02: BTN,LLL,	874EH: 01H,84H,00H

Analog and binary function list 422 (continuation)

Mnemo text	Hex code
B03: ANN,B07,YT2	874FH: 03H,53H,11H
B05: AIN,B03,D08	8751H: 05H,4FH,FFH
B07: ONN,Y22,Y12	8753H: 07H,B6H,B5H
B09: BTI,Y02,	8755H: 02H,B4H,00H
B12: KU2,F6 , N2	8759H: 88H,FEH,43H
B13: KU1,YF2,F7	875AH: 87H,F1H,FFH
B15: KU1,YH2,TN2	875CH: 87H,52H,4DH
B17: ANN,B01,B15	875EH: 03H,4DH,5CH
B18: BTN,CL1,	8760H: 01H,79H,00H

Compare 522 and 422

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS2: BTN,Q41,	8735H: 01H,1BH,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: ONN,B17,Y02	8737H: 07H,5EH,B4H

Suppl. No. 442
Program controller:
1 Programmer with on/off controller Z2
fixed value / program, combined

This configuration serves as the basis for: 542

Analog- und Binär-Funktionsliste 442

Mnemo text	Hex code
A1 : LU1, Y1,	8400H: 38H,1AH,00H
A2 : LU1, J3,	8401H: 38H,76H,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,YF2,SP1	8406H: 49H,F1H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
H1: FLX,#+004.0	840BH: A5H,80H,82H
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
N1: K/4,10 ,	840EH: 5BH,2AH,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: LB1,53 ,	841AH: 37H,8DH,00H
YE1: SZL, Y1,B06	841BH: 15H,1AH,52H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FIX,#+000.0	841EH: A4H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,YF2,SP1	8424H: 27H,F1H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : IG2,11 ,20	842AH: 75H,2BH,34H
11 : MUL,55 ,12	842BH: 4AH,8FH,2CH
12 : ADD, Y1,13	842CH: 48H,1AH,2DH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : SZL,F0 ,RS2	842FH: 15H,F8H,35H
20 : LB1,10 ,	8434H: 37H,2AH,00H
21 : K/2, H1,	8435H: 5DH,0BH,00H
22 : INV,21 ,	8436H: 3CH,35H,00H
23 : FIX,#+160.0	8437H: A4H,00H,E4H
24 : FIX,#+160.0	8438H: A4H,00H,E4H
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
N2: MA3,YD2,	8443H: 41H,EDH,00H
RD2: FIX,#+000.0	8446H: A4H,00H,80H
SP2: MIN,SH2,YL2	844AH: 47H,4BH,53H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: DIR,YJ2,	844DH: 3DH,E9H,00H
YP2: FIX,#+000.6	8451H: A4H,60H,80H
YH2: FIX,#+099.9	8452H: A4H,70H,BEH
YL2: MAX,SL2,YS2	8453H: 46H,4CH,54H
YS2: UI2,YF2,SP2	8454H: 2BH,F1H,4AH

Analog and binary function list 442 (continuation)

Mnemo text	Hex code
25 : PW0,#+010.0	8455H: E0H,40H,86H
26 : PW0,#+050.0	8456H: E0H,40H,9FH
27 : PW0,#+050.0	8457H: E0H,40H,9FH
28 : PW0,#+080.0	8458H: E0H,00H,B2H
29 : PW0,#+080.0	8459H: E0H,00H,B2H
30 : PW0,#+070.0	845AH: E0H,C0H,ABH
31 : PW0,#+060.0	845BH: E0H,80H,A5H
32 : PW0,#+020.0	845CH: E0H,80H,8CH
35 : PT1,#+00.10	845FH: F1H,A1H,80H
36 : PT2,#+00.10	8460H: F2H,A1H,80H
37 : PT4,#+00.20	8461H: F4H,41H,81H
38 : PT8,#+00.50	8462H: F8H,21H,83H
39 : PT0,#+00.50	8463H: F0H,21H,83H
40 : PT0,#+00.25	8464H: F0H,91H,81H
41 : PT0,#+00.25	8465H: F0H,91H,81H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
J3: INV, Y1,	8476H: 3CH,1AH,00H
L3: DIR,RD1,	8477H: 3DH,11H,00H
PB3: FLX,#+0100	8479H: A5H,43H,86H
RD3: DIR,RD1,	847BH: 3DH,11H,00H
RU3: DIR,RU1,	847EH: 3DH,14H,00H
TN3: FLX,#+0040	8482H: A5H,83H,82H
TD3: FLX,#+0010	8483H: A5H,A3H,80H
YE3: SZL,50 ,B08	8485H: 15H,8AH,54H
YP3: FLX,#+050.0	8486H: A5H,40H,9FH
YH3: FLX,#+100.0	8487H: A5H,80H,BEH
YL3: FIX,#+000.0	8488H: A4H,00H,80H
YS3: DIR,YS1,	8489H: 3DH,1FH,00H
50 : INV, Y1,	848AH: 3CH,1AH,00H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
53 : U21,54 , Y1	848DH: 32H,8EH,1AH
54 : SUB,YR1,YR3	848EH: 49H,E0H,E2H
55 : U24,23 ,24	848FH: 2EH,37H,38H
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: FTR,Y23,YA1	8700H: 0EH,BAH,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: FTR,Y21,YA3	8702H: 0EH,B2H,02H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: FTR,Y03,YM1	8704H: 0EH,B8H,04H
YM2: BTN,D06,	8705H: 01H,FDH,01H
YM3: FTR,Y01,YM3	8706H: 0EH,B0H,06H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: FTR,B05,YT2	8711H: 0EH,51H,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: ANN,OC1,KP4	8716H: 03H,D4H,83H
WT4: AIN,OC2,S23	8717H: 05H,D5H,D2H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
SC1: ONN,B14,B21	8728H: 07H,5BH,63H
SC3: ONN,B11,B21	872AH: 07H,58H,63H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTN,RS2,	8731H: 01H,35H,00H

Analog and binary function list 442 (continuation)

Mnemo text	Hex code
MB3: ONN,B16,Y01	8732H: 07H,5DH,B0H
MB4: BTI,Q11,	8733H: 02H,18H,00H
RS1: KU0,F7 , N1	8734H: 86H,FFH,0EH
RS2: KU0, N1,F7	8735H: 86H,0EH,FFH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTN,D06,	8739H: 01H,FDH,01H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: OIN,B06,B21	873CH: 09H,52H,63H
CT2: ONN,B00,D05	873DH: 07H,4CH,FCH
CT3: OIN,B08,B21	873EH: 09H,54H,63H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: FTR,B09,CI2	8741H: 0EH,55H,41H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTN,LLL,	8745H: 01H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC2,	8748H: 01H,D5H,00H
BLV: BTN,OC2,	8749H: 01H,D5H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: AIN,B12,B13	874CH: 05H,59H,5AH
B01: KU1,YP2, N2	874DH: 87H,51H,43H
B02: KU2, Y1,F7	874EH: 88H,1AH,FFH
B03: ANN,B07,YT2	874FH: 03H,53H,11H
B05: AIN,B03,D08	8751H: 05H,4FH,FFH
B06: FRS,SC3,B02	8752H: 0DH,2AH,4EH
B07: ONN,Y22,Y12	8753H: 07H,B6H,B5H
B08: FRS,SC1,B16	8754H: 0DH,28H,5DH
B09: BTI,Y02,	8755H: 02H,B4H,00H
B11: KU1,RD1,22	8758H: 87H,11H,36H
B12: KU2,F6 , N2	8759H: 88H,FEH,43H
B13: KU1,YF2,F7	875AH: 87H,F1H,FFH
B14: KU1,21 ,RD1	875BH: 87H,35H,11H
B15: KU1,YH2,TN2	875CH: 87H,52H,4DH
B16: KU2,F7 , Y1	875DH: 88H,FFH,1AH
B17: ANN,B01,B15	875EH: 03H,4DH,5CH
B18: BTN,CL1,	8760H: 01H,79H,00H
B19: BTN,Y01,	8761H: 01H,B0H,00H
B21: BTN,B19,	8763H: 01H,61H,00H
B24: KB9, N1,F7	8766H: 85H,0EH,FFH

Compare 542 and 442

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: ONN,B17,Y02	8737H: 07H,5EH,B4H

Suppl. No. 462
Program controller:
Programmer with step action controller
fixed value / program, combined

This configuration serves as the basis for: 562

Analog and binary function list 462		
Mnemo text		Hex code
A1 :	DIR,15 ,	8400H: 3DH,2FH,00H
A2 :	DIR,SP2,	8401H: 3DH,4AH,00H
A3 :	FIX,#+100.0	8402H: A4H,80H,BEH
B1 :	FLX,#+100.0	8404H: A5H,80H,BEH
C1 :	FLX,#+000.0	8405H: A5H,00H,80H
D1:	SUB,YF2,SP1	8406H: 49H,F1H,15H
G11:	FLX,#+100.0	8407H: A5H,80H,BEH
G21:	FLX,#+000.0	8408H: A5H,00H,80H
G31:	FLX,#+100.0	8409H: A5H,80H,BEH
G41:	FLX,#-100.0	840AH: A5H,80H,3EH
H1:	FLX,#+001.0	840BH: A5H,A0H,80H
J1:	DIR, Y1,	840CH: 3DH,1AH,00H
L1:	DIR,RD1,	840DH: 3DH,11H,00H
PB1:	FLX,#+0100	840FH: A5H,43H,86H
R1:	ADD,02 ,C1	8410H: 48H,22H,05H
RD1:	SUB, R1,SP1	8411H: 49H,10H,15H
RH1:	MAX, R1,01	8412H: 46H,10H,21H
RL1:	MIN, R1,00	8413H: 47H,10H,20H
RU1:	DIR, R1,	8414H: 3DH,10H,00H
SP1:	MIN,SH1,03	8415H: 47H,16H,23H
SH1:	FLX,#+100.0	8416H: A5H,80H,BEH
SL1:	FLX,#+000.0	8417H: A5H,00H,80H
TN1:	FLX,#+0040	8418H: A5H,83H,82H
TD1:	FLX,#+0010	8419H: A5H,A3H,80H
Y1:	MUL,52 ,B3	841AH: 4AH,8CH,6EH
YE1:	DIR,F7 ,	841BH: 3DH,FFH,00H
YP1:	FLX,#+050.0	841CH: A5H,40H,9FH
YH1:	FLX,#+100.0	841DH: A5H,80H,BEH
YL1:	FLX,#-001.2	841EH: A5H,C0H,00H
YS1:	DIR,F7 ,	841FH: 3DH,FFH,00H
00 :	U18,RL1, R1	8420H: 28H,13H,10H
01 :	U18,RH1, R1	8421H: 28H,12H,10H
02 :	MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 :	MAX,SL1,04	8423H: 46H,17H,24H
04 :	UI1,YF2,SP1	8424H: 27H,F1H,15H
05 :	ADD,08 ,06	8425H: 48H,28H,26H
06 :	SZH,07 ,B01	8426H: 16H,27H,4DH
07 :	RA4,09 ,SP1	8427H: 6BH,29H,15H
08 :	SZL,09 ,B01	8428H: 15H,29H,4DH
09 :	ADD,52 ,C3	8429H: 48H,8CH,6FH
10 :	SIH, Y1,B02	842AH: 13H,1AH,4EH
11 :	SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 :	IG3,13 ,12	842CH: 76H,2DH,2CH
13 :	SUB,15 ,14	842DH: 49H,2FH,2EH
14 :	SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 :	ADD,10 ,11	842FH: 48H,2AH,2BH
B2 :	FLX,#+100.0	8439H: A5H,80H,BEH
C2 :	FLX,#+000.0	843AH: A5H,00H,80H
N2:	MA3,YD2,	8443H: 41H,EDH,00H
RD2:	FIX,#+000.0	8446H: A4H,00H,80H
SP2:	MIN,SH2,YL2	844AH: 47H,4BH,53H
SH2:	FLX,#+100.0	844BH: A5H,80H,BEH
SL2:	FLX,#+000.0	844CH: A5H,00H,80H
TN2:	DIR,YJ2,	844DH: 3DH,E9H,00H
YP2:	FIX,#+000.6	8451H: A4H,60H,80H
YH2:	FIX,#+099.9	8452H: A4H,70H,BEH
YL2:	MAX,SL2,YS2	8453H: 46H,4CH,54H
YS2:	UI2,YF2,SP2	8454H: 2BH,F1H,4AH
25 :	PW0,#+010.0	8455H: E0H,40H,86H
26 :	PW0,#+050.0	8456H: E0H,40H,9FH
27 :	PW0,#+050.0	8457H: E0H,40H,9FH
28 :	PW0,#+080.0	8458H: E0H,00H,B2H
29 :	PW0,#+080.0	8459H: E0H,00H,B2H
30 :	PW0,#+070.0	845AH: E0H,C0H,ABH

Analog and binary function list 462 (continuation)		
Mnemo text		Hex code
31 :	PW0,#+060.0	845BH: E0H,80H,A5H
32 :	PW0,#+020.0	845CH: E0H,80H,8CH
35 :	PT1,#+00.10	845FH: F1H,A1H,80H
36 :	PT2,#+00.10	8460H: F2H,A1H,80H
37 :	PT4,#+00.20	8461H: F4H,41H,81H
38 :	PT8,#+00.50	8462H: F8H,21H,83H
39 :	PT0,#+00.50	8463H: F0H,21H,83H
40 :	PT0,#+00.25	8464H: F0H,91H,81H
41 :	PT0,#+00.25	8465H: F0H,91H,81H
B3 :	FLX,#+100.0	846EH: A5H,80H,BEH
C3 :	FLX,#+000.0	846FH: A5H,00H,80H
52 :	ADD,E3 ,C3	848CH: 48H,DAH,6FH
B4 :	FLX,#+100.0	84A3H: A5H,80H,BEH
C4 :	FLX,#+000.0	84A4H: A5H,00H,80H
77 :	MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
92 :	ADD,E4 ,C4	84D0H: 48H,DBH,A4H
YA1:	BTN,LLL,	8700H: 01H,84H,00H
YA2:	BTN,LLL,	8701H: 01H,84H,00H
YA3:	BTN,LLL,	8702H: 01H,84H,00H
YA4:	BTN,LLL,	8703H: 01H,84H,00H
YM1:	BTN,LLL,	8704H: 01H,84H,00H
YM2:	BTN,D06,	8705H: 01H,FDH,01H
YM3:	BTN,LLL,	8706H: 01H,84H,00H
YM4:	BTN,LLL,	8707H: 01H,84H,00H
WE1:	BTN,LLL,	8708H: 01H,84H,00H
WE2:	BTN,LLL,	8709H: 01H,84H,00H
WE3:	BTN,LLL,	870AH: 01H,84H,00H
WE4:	BTN,LLL,	870BH: 01H,84H,00H
WI1:	BTN,LLL,	870CH: 01H,84H,00H
WI2:	BTN,LLL,	870DH: 01H,84H,00H
WI3:	BTN,LLL,	870EH: 01H,84H,00H
WI4:	BTN,LLL,	870FH: 01H,84H,00H
YT1:	FTR,DQ7,YT1	8710H: 0EH,FEH,10H
YT2:	FTR,B05,YT2	8711H: 0EH,51H,11H
YT3:	BTN,LLL,	8712H: 01H,84H,00H
YT4:	BTN,LLL,	8713H: 01H,84H,00H
WT1:	BTN,LLL,	8714H: 01H,84H,00H
WT2:	BTN,LLL,	8715H: 01H,84H,00H
WT3:	BTN,KP4,	8716H: 01H,83H,00H
WT4:	AIN,OC2,S23	8717H: 05H,D5H,D2H
Q11:	KU7, R1,G11	8718H: 8DH,10H,07H
Q21:	KU7,G21, R1	8719H: 8DH,08H,10H
Q31:	KU7,RD1,G31	871AH: 8DH,11H,09H
Q41:	KU7,G41,RD1	871BH: 8DH,0AH,11H
MB1:	BTN,RS1,	8730H: 01H,34H,00H
MB2:	BTN,RS2,	8731H: 01H,35H,00H
MB3:	ONN,B16,Y01	8732H: 07H,5DH,B0H
MB4:	BTI,Q11,	8733H: 02H,18H,00H
RS1:	AIN,R21,R11	8734H: 05H,E1H,E0H
RS2:	AIN,R11,R21	8735H: 05H,E0H,E1H
CP1:	BTI,LLL,	8738H: 02H,84H,00H
CP2:	BTN,D06,	8739H: 01H,FDH,01H
CP3:	BTI,LLL,	873AH: 02H,84H,00H
CP4:	BTI,LLL,	873BH: 02H,84H,00H
CT1:	BTN,LLL,	873CH: 01H,84H,00H
CT2:	ONN,B00,D05	873DH: 07H,4CH,FCH
CT3:	BTN,LLL,	873EH: 01H,84H,00H
CT4:	BTN,LLL,	873FH: 01H,84H,00H
CI1:	BTI,LLL,	8740H: 02H,84H,00H
CI2:	FTR,B09,CI2	8741H: 0EH,55H,41H
CI3:	BTI,LLL,	8742H: 02H,84H,00H
CI4:	BTI,LLL,	8743H: 02H,84H,00H
CD1:	BTI,LLL,	8744H: 02H,84H,00H
CD2:	BTN,LLL,	8745H: 01H,84H,00H
CD3:	BTI,LLL,	8746H: 02H,84H,00H
CD4:	BTI,LLL,	8747H: 02H,84H,00H
BLH:	BTN,OC2,	8748H: 01H,D5H,00H
BLV:	BTN,OC2,	8749H: 01H,D5H,00H
BLD:	BTN,LLL,	874AH: 01H,84H,00H

Analog and binary function list 462 (continuation)

Mnemo text	Hex code
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: AIN,B12,B13	874CH: 05H,59H,5AH
B01: KU1,YP2, N2	874DH: 87H,51H,43H
B02: BTN,LLL,	874EH: 01H,84H,00H
B03: ANN,B07,YT2	874FH: 03H,53H,11H
B05: AIN,B03,D08	8751H: 05H,4FH,FFH
B07: ONN,Y22,Y12	8753H: 07H,B6H,B5H
B09: BTI,Y02,	8755H: 02H,B4H,00H
B12: KU2,F6 , N2	8759H: 88H,FEH,43H
B13: KU1,YF2,F7	875AH: 87H,F1H,FFH
B15: KU1,YH2,TN2	875CH: 87H,52H,4DH
B17: ANN,B01,B15	875EH: 03H,4DH,5CH
B18: BTN,CL1,	8760H: 01H,79H,00H

Compare 562 and 462

Mnemo text	Hex code
A1 : FIX,#+100.0	8400H: A4H,80H,BEH
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS3: BTN,Q11,	8736H: 01H,18H,00H
RS4: ONN,B17,Y02	8737H: 07H,5EH,B4H

Suppl. No. 482
Program controller:
Programmer with continuous controller fixed value / program, combined

This configuration serves as the basis for: 582

Analog and binary function list 482

Mnemo text	Hex code
A1 : DIR,15 ,	8400H: 3DH,2FH,00H
A2 : DIR,SP2,	8401H: 3DH,4AH,00H
A3 : DIR,SP1,	8402H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
D1: SUB,YF2,SP1	8406H: 49H,F1H,15H
G11: FLX,#+100.0	8407H: A5H,80H,BEH
G21: FLX,#+000.0	8408H: A5H,00H,80H
G31: FLX,#+100.0	8409H: A5H,80H,BEH
G41: FLX,#-100.0	840AH: A5H,80H,3EH
J1: DIR, Y1,	840CH: 3DH,1AH,00H
L1: DIR,RD1,	840DH: 3DH,11H,00H
PB1: FLX,#+0100	840FH: A5H,43H,86H
R1: ADD,02 ,C1	8410H: 48H,22H,05H
RD1: SUB, R1,SP1	8411H: 49H,10H,15H
RH1: MAX, R1,01	8412H: 46H,10H,21H
RL1: MIN, R1,00	8413H: 47H,10H,20H
RU1: DIR, R1,	8414H: 3DH,10H,00H
SP1: MIN,SH1,03	8415H: 47H,16H,23H
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: FLX,#+0040	8418H: A5H,83H,82H
TD1: FLX,#+0010	8419H: A5H,A3H,80H
Y1: DIR,YR1,	841AH: 3DH,E0H,00H
YE1: DIR,F7 ,	841BH: 3DH,FFH,00H
YP1: FLX,#+050.0	841CH: A5H,40H,9FH
YH1: FLX,#+100.0	841DH: A5H,80H,BEH
YL1: FLX,#+000.0	841EH: A5H,00H,80H
YS1: DIR,F7 ,	841FH: 3DH,FFH,00H
00 : U18,RL1, R1	8420H: 28H,13H,10H
01 : U18,RH1, R1	8421H: 28H,12H,10H
02 : MUL,E1 ,B1	8422H: 4AH,D8H,04H
03 : MAX,SL1,04	8423H: 46H,17H,24H
04 : UI1,YF2,SP1	8424H: 27H,F1H,15H
05 : ADD,08 ,06	8425H: 48H,28H,26H
06 : SZH,07 ,B01	8426H: 16H,27H,4DH
07 : RA4,09 ,SP1	8427H: 6BH,29H,15H
08 : SZL,09 ,B01	8428H: 15H,29H,4DH
09 : ADD,52 ,C3	8429H: 48H,8CH,6FH
10 : SIH, Y1,B02	842AH: 13H,1AH,4EH
11 : SZL,F0 ,B02	842BH: 15H,F8H,4EH
12 : IG3,13 ,12	842CH: 76H,2DH,2CH
13 : SUB,15 ,14	842DH: 49H,2FH,2EH
14 : SZL,F0 ,RS1	842EH: 15H,F8H,34H
15 : ADD,10 ,11	842FH: 48H,2AH,2BH
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
N2: MA3,YD2,	8443H: 41H,EDH,00H
RD2: FIX,#+000.0	8446H: A4H,00H,80H
SP2: MIN,SH2,YL2	844AH: 47H,4BH,53H
SH2: FLX,#+100.0	844BH: A5H,80H,BEH
SL2: FLX,#+000.0	844CH: A5H,00H,80H
TN2: DIR,YJ2,	844DH: 3DH,E9H,00H
YP2: FIX,#+000.6	8451H: A4H,60H,80H
YH2: FIX,#+099.9	8452H: A4H,70H,BEH
YL2: MAX,SL2,YS2	8453H: 46H,4CH,54H
YS2: UI2,YF2,SP2	8454H: 2BH,F1H,4AH
25 : PW0,#+010.0	8455H: E0H,40H,86H
26 : PW0,#+050.0	8456H: E0H,40H,9FH
27 : PW0,#+050.0	8457H: E0H,40H,9FH
28 : PW0,#+080.0	8458H: E0H,00H,B2H
29 : PW0,#+080.0	8459H: E0H,00H,B2H
30 : PW0,#+070.0	845AH: E0H,C0H,ABH
31 : PW0,#+060.0	845BH: E0H,80H,A5H

Analog and binary function list 482 (continuation)

Mnemo text	Hex code
32 : PW0,#+020.0	845CH: E0H,80H,8CH
35 : PT1,#+00.10	845FH: F1H,A1H,80H
36 : PT2,#+00.10	8460H: F2H,A1H,80H
37 : PT4,#+00.20	8461H: F4H,41H,81H
38 : PT8,#+00.50	8462H: F8H,21H,83H
39 : PT0,#+00.50	8463H: F0H,21H,83H
40 : PT0,#+00.25	8464H: F0H,91H,81H
41 : PT0,#+00.25	8465H: F0H,91H,81H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,LLL,	8704H: 01H,84H,00H
YM2: BTN,D06,	8705H: 01H,FDH,01H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,D07,YT1	8710H: 0EH,FEH,10H
YT2: FTR,B05,YT2	8711H: 0EH,51H,11H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: AIN,OC2,S23	8717H: 05H,D5H,D2H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: BTI,Q11,	8731H: 02H,18H,00H
MB3: ONN,B16,Y01	8732H: 07H,5DH,B0H
MB4: BTN,Y01,	8733H: 01H,B0H,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
CP1: BTI,LLL,	8738H: 02H,84H,00H
CP2: BTN,D06,	8739H: 01H,FDH,01H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: BTN,LLL,	873CH: 01H,84H,00H
CT2: ONN,B00,D05	873DH: 07H,4CH,FCH
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: BTI,LLL,	8740H: 02H,84H,00H
CI2: FTR,B09,CI2	8741H: 0EH,55H,41H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTI,LLL,	8744H: 02H,84H,00H
CD2: BTN,LLL,	8745H: 01H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTN,OC2,	8748H: 01H,D5H,00H
BLV: BTN,OC2,	8749H: 01H,D5H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H

Analog and binary function list 482 (continuation)

Mnemo text	Hex code
B00: AIN,B12,B13	874CH: 05H,59H,5AH
B01: KU1,YP2, N2	874DH: 87H,51H,43H
B02: BTN,LLL,	874EH: 01H,84H,00H
B03: ANN,B07,YT2	874FH: 03H,53H,11H
B05: AIN,B03,D08	8751H: 05H,4FH,FFH
B07: ONN,Y22,Y12	8753H: 07H,B6H,B5H
B09: BTI,Y02,	8755H: 02H,B4H,00H
B12: KU2,F6 , N2	8759H: 88H,FEH,43H
B13: KU1,YF2,F7	875AH: 87H,F1H,FFH
B15: KU1,YH2,TN2	875CH: 87H,52H,4DH
B17: ANN,B01,B15	875EH: 03H,4DH,5CH
B18: BTN,CL1,	8760H: 01H,79H,00H

Compare 582 and 482

Mnemo text	Hex code
MB2: BTN,Y01,	8731H: 01H,B0H,00H
RS1: BTN,Q11,	8734H: 01H,18H,00H
RS3: BTN,P62,	8736H: 01H,EDH,00H
RS4: ONN,B17,Y02	8737H: 07H,5EH,B4H

Suppl. No. 491
Single-channel programmer

This configuration serves as the basis for: 591

Analog and binary function list 491

Mnemo text	Hex code
A1 : DIR,SP1,	8400H: 3DH,15H,00H
B1 : FLX,#+100.0	8404H: A5H,80H,BEH
C1 : FLX,#+000.0	8405H: A5H,00H,80H
N1: MA3,YD1,	840EH: 41H,ECH,00H
RD1: FIX,#+000.0	8411H: A4H,00H,80H
RH1: MUL,E1 ,B1	8412H: 4AH,D8H,04H
RL1: ADD,RH1,C1	8413H: 48H,12H,05H
SP1: MIN,SH1,YL1	8415H: 47H,16H,1EH
SH1: FLX,#+100.0	8416H: A5H,80H,BEH
SL1: FLX,#+000.0	8417H: A5H,00H,80H
TN1: DIR,YJ1,	8418H: 3DH,E8H,00H
YP1: FIX,#+000.6	841CH: A4H,60H,80H
YH1: FIX,#+099.9	841DH: A4H,70H,BEH
YL1: MAX,SL1,YS1	841EH: 46H,17H,1FH
YS1: UI1,YF1,SP1	841FH: 27H,F0H,15H
00 : PW0,#+010.0	8420H: E0H,40H,86H
01 : PW0,#+050.0	8421H: E0H,40H,9FH
02 : PW0,#+050.0	8422H: E0H,40H,9FH
03 : PW0,#+080.0	8423H: E0H,00H,B2H
04 : PW0,#+080.0	8424H: E0H,00H,B2H
05 : PW0,#+070.0	8425H: E0H,C0H,ABH
06 : PW0,#+060.0	8426H: E0H,80H,A5H
07 : PW0,#+020.0	8427H: E0H,80H,8CH
10 : PT1,#+00.10	842AH: F1H,A1H,80H
11 : PT2,#+00.10	842BH: F2H,A1H,80H
12 : PT4,#+00.20	842CH: F4H,41H,81H
13 : PT8,#+00.50	842DH: F8H,21H,83H
14 : PT0,#+00.50	842EH: F0H,21H,83H
15 : PT0,#+00.25	842FH: F0H,91H,81H
16 : PT0,#+00.25	8430H: F0H,91H,81H
B2 : FLX,#+100.0	8439H: A5H,80H,BEH
C2 : FLX,#+000.0	843AH: A5H,00H,80H
27 : MUL,E2 ,B2	8457H: 4AH,D9H,39H
B3 : FLX,#+100.0	846EH: A5H,80H,BEH
C3 : FLX,#+000.0	846FH: A5H,00H,80H
52 : MUL,E3 ,B3	848CH: 4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H: A5H,80H,BEH
C4 : FLX,#+000.0	84A4H: A5H,00H,80H
77 : MUL,E4 ,B4	84C1H: 4AH,DBH,A3H
YA1: BTN,LLL,	8700H: 01H,84H,00H
YA2: BTN,LLL,	8701H: 01H,84H,00H
YA3: BTN,LLL,	8702H: 01H,84H,00H
YA4: BTN,LLL,	8703H: 01H,84H,00H
YM1: BTN,D05,	8704H: 01H,FCH,00H
YM2: BTN,LLL,	8705H: 01H,84H,00H
YM3: BTN,LLL,	8706H: 01H,84H,00H
YM4: BTN,LLL,	8707H: 01H,84H,00H
WE1: BTN,LLL,	8708H: 01H,84H,00H
WE2: BTN,LLL,	8709H: 01H,84H,00H
WE3: BTN,LLL,	870AH: 01H,84H,00H
WE4: BTN,LLL,	870BH: 01H,84H,00H
WI1: BTN,LLL,	870CH: 01H,84H,00H
WI2: BTN,LLL,	870DH: 01H,84H,00H
WI3: BTN,LLL,	870EH: 01H,84H,00H
WI4: BTN,LLL,	870FH: 01H,84H,00H
YT1: FTR,B04,YT1	8710H: 0EH,50H,10H
YT2: BTN,LLL,	8711H: 01H,84H,00H
YT3: BTN,LLL,	8712H: 01H,84H,00H
YT4: BTN,LLL,	8713H: 01H,84H,00H
WT1: BTN,LLL,	8714H: 01H,84H,00H
WT2: BTN,LLL,	8715H: 01H,84H,00H
WT3: BTN,KP4,	8716H: 01H,83H,00H
WT4: BTN,LLL,	8717H: 01H,84H,00H
Q11: KU7, R1,G11	8718H: 8DH,10H,07H
Q21: KU7,G21, R1	8719H: 8DH,08H,10H
Q31: KU7,RD1,G31	871AH: 8DH,11H,09H

Analog and binary function list 491 (continuation)

Mnemo text	Hex code
Q41: KU7,G41,RD1	871BH: 8DH,0AH,11H
MB1: BTN,RS1,	8730H: 01H,34H,00H
MB2: ONN,B16,Y01	8731H: 07H,5DH,B0H
MB3: BTN,P51,	8732H: 01H,F4H,00H
MB4: BTN,P61,	8733H: 01H,F5H,00H
RS1: KB0,F7 ,12	8734H: 7CH,FFH,2CH
CP1: BTN,D05,	8738H: 01H,FCH,00H
CP2: BTI,LLL,	8739H: 02H,84H,00H
CP3: BTI,LLL,	873AH: 02H,84H,00H
CP4: BTI,LLL,	873BH: 02H,84H,00H
CT1: ONN,B12,D06	873CH: 07H,59H,FDH
CT2: BTN,LLL,	873DH: 01H,84H,00H
CT3: BTN,LLL,	873EH: 01H,84H,00H
CT4: BTN,LLL,	873FH: 01H,84H,00H
CI1: FTR,B08,CI1	8740H: 0EH,54H,40H
CI2: BTI,LLL,	8741H: 02H,84H,00H
CI3: BTI,LLL,	8742H: 02H,84H,00H
CI4: BTI,LLL,	8743H: 02H,84H,00H
CD1: BTN,LLL,	8744H: 01H,84H,00H
CD2: BTI,LLL,	8745H: 02H,84H,00H
CD3: BTI,LLL,	8746H: 02H,84H,00H
CD4: BTI,LLL,	8747H: 02H,84H,00H
BLH: BTI,LLL,	8748H: 02H,84H,00H
BLV: BTI,LLL,	8749H: 02H,84H,00H
BLD: BTN,LLL,	874AH: 01H,84H,00H
OLD: BTN,LLL,	874BH: 01H,84H,00H
B00: KU1,YP1, N1	874CH: 87H,1CH,0EH
B01: FRS,B00,W01	874DH: 0DH,4CH,C0H
B02: ANN,B06,YT1	874EH: 03H,52H,10H
B04: AIN,B02,D07	8750H: 05H,4EH,FEH
B06: ONN,Y21,Y11	8752H: 07H,B2H,B1H
B08: BTI,Y01,	8754H: 02H,B0H,00H
B10: KU2,F6 , N1	8756H: 88H,FEH,0EH
B11: KU1,YF1,RL1	8758H: 87H,F0H,13H
B12: AIN,B10,B11	8759H: 05H,56H,58H
B14: KU1,YH1,TN1	875BH: 87H,1DH,18H
B16: ANN,B00,B14	875DH: 03H,4CH,5BH
B18: BTN,CL1,	8760H: 01H,79H,00H

Compare 591 and 491

Mnemo text	Hex code
RS1: BTN,P51,	8734H: 01H,F4H,00H
RS2: BTN,P61,	8735H: 01H,F5H,00H
RS3: BTN,P71,	8736H: 01H,F6H,00H
RS4: BTN,P81,	8737H: 01H,F7H,00H

Suppl. No. 492
Two-channel programmer

This configuration serves as the basis for: 592

Analog and binary function list 492		
Mnemo text	Hex code	
A1 : DIR,SP1,	8400H:	3DH,15H,00H
A2 : DIR,SP2,	8401H:	3DH,4AH,00H
B1 : FLX,#+100.0	8404H:	A5H,80H,BEH
C1 : FLX,#+000.0	8405H:	A5H,00H,80H
N1: MA3,YD1,	840EH:	41H,ECH,00H
RD1: FIX,#+000.0	8411H:	A4H,00H,80H
RH1: MUL,E1 ,B1	8412H:	4AH,D8H,04H
RL1: ADD,RH1,C1	8413H:	48H,12H,05H
SP1: MIN,SH1,YL1	8415H:	47H,16H,1EH
SH1: FLX,#+100.0	8416H:	A5H,80H,BEH
SL1: FLX,#+000.0	8417H:	A5H,00H,80H
TN1: DIR,YJ1,	8418H:	3DH,E8H,00H
YP1: FIX,#+000.6	841CH:	A4H,60H,80H
YH1: FIX,#+099.9	841DH:	A4H,70H,BEH
YL1: MAX,SL1,YS1	841EH:	46H,17H,1FH
YS1: UI1,YF1,SP1	841FH:	27H,F0H,15H
00 : PW0,#+010.0	8420H:	E0H,40H,86H
01 : PW0,#+050.0	8421H:	E0H,40H,9FH
02 : PW0,#+050.0	8422H:	E0H,40H,9FH
03 : PW0,#+080.0	8423H:	E0H,00H,B2H
04 : PW0,#+080.0	8424H:	E0H,00H,B2H
05 : PW0,#+070.0	8425H:	E0H,C0H,ABH
06 : PW0,#+060.0	8426H:	E0H,80H,A5H
07 : PW0,#+020.0	8427H:	E0H,80H,8CH
10 : PT1,#+00.10	842AH:	F1H,A1H,80H
11 : PT2,#+00.10	842BH:	F2H,A1H,80H
12 : PT4,#+00.20	842CH:	F4H,41H,81H
13 : PT8,#+00.50	842DH:	F8H,21H,83H
14 : PT0,#+00.50	842EH:	F0H,21H,83H
15 : PT0,#+00.25	842FH:	F0H,91H,81H
16 : PT0,#+00.25	8430H:	F0H,91H,81H
B2 : FLX,#+100.0	8439H:	A5H,80H,BEH
C2 : FLX,#+000.0	843AH:	A5H,00H,80H
N2: MA3,YD2,	8443H:	41H,EDH,00H
RD2: FIX,#+000.0	8446H:	A4H,00H,80H
RH2: MUL,E2 ,B2	8447H:	4AH,D9H,39H
RL2: ADD,RH2,C2	8448H:	48H,47H,3AH
SP2: MIN,SH2,YL2	844AH:	47H,4BH,53H
SH2: FLX,#+100.0	844BH:	A5H,80H,BEH
SL2: FLX,#+000.0	844CH:	A5H,00H,80H
TN2: DIR,YJ2,	844DH:	3DH,E9H,00H
YP2: FIX,#+000.6	8451H:	A4H,60H,80H
YH2: FIX,#+099.9	8452H:	A4H,70H,BEH
YL2: MAX,SL2,YS2	8453H:	46H,4CH,54H
YS2: UI2,YF2,SP2	8454H:	2BH,F1H,4AH
25 : PW0,#+010.0	8455H:	E0H,40H,86H
26 : PW0,#+050.0	8456H:	E0H,40H,9FH
27 : PW0,#+050.0	8457H:	E0H,40H,9FH
28 : PW0,#+080.0	8458H:	E0H,00H,B2H
29 : PW0,#+080.0	8459H:	E0H,00H,B2H
30 : PW0,#+070.0	845AH:	E0H,C0H,ABH
31 : PW0,#+060.0	845BH:	E0H,80H,A5H
32 : PW0,#+020.0	845CH:	E0H,80H,8CH
35 : PT1,#+00.10	845FH:	F1H,A1H,80H
36 : PT2,#+00.10	8460H:	F2H,A1H,80H
37 : PT4,#+00.20	8461H:	F4H,41H,81H
38 : PT8,#+00.50	8462H:	F8H,21H,83H
39 : PT0,#+00.50	8463H:	F0H,21H,83H
40 : PT0,#+00.25	8464H:	F0H,91H,81H
41 : PT0,#+00.25	8465H:	F0H,91H,81H
B3 : FLX,#+100.0	846EH:	A5H,80H,BEH
C3 : FLX,#+000.0	846FH:	A5H,00H,80H
52 : MUL,E3 ,B3	848CH:	4AH,DAH,6EH
B4 : FLX,#+100.0	84A3H:	A5H,80H,BEH
C4 : FLX,#+000.0	84A4H:	A5H,00H,80H
77 : MUL,E4 ,B4	84C1H:	4AH,DBH,A3H
YA1: BTN,LLL,	8700H:	01H,84H,00H

Analog and binary function list 492 (Fortsetzung)		
Mnemo text	Hex code	
YA2: BTN,LLL,	8701H:	01H,84H,00H
YA3: BTN,LLL,	8702H:	01H,84H,00H
YA4: BTN,LLL,	8703H:	01H,84H,00H
YM1: BTN,D05,	8704H:	01H,FCH,00H
YM2: BTN,D06,	8705H:	01H,FDH,01H
YM3: BTN,LLL,	8706H:	01H,84H,00H
YM4: BTN,LLL,	8707H:	01H,84H,00H
WE1: BTN,LLL,	8708H:	01H,84H,00H
WE2: BTN,LLL,	8709H:	01H,84H,00H
WE3: BTN,LLL,	870AH:	01H,84H,00H
WE4: BTN,LLL,	870BH:	01H,84H,00H
WI1: BTN,LLL,	870CH:	01H,84H,00H
WI2: BTN,LLL,	870DH:	01H,84H,00H
WI3: BTN,LLL,	870EH:	01H,84H,00H
WI4: BTN,LLL,	870FH:	01H,84H,00H
YT1: FTR,B04,YT1	8710H:	0EH,50H,10H
YT2: FTR,B05,YT2	8711H:	0EH,51H,11H
YT3: BTN,LLL,	8712H:	01H,84H,00H
YT4: BTN,LLL,	8713H:	01H,84H,00H
WT1: BTN,LLL,	8714H:	01H,84H,00H
WT2: BTN,LLL,	8715H:	01H,84H,00H
WT3: BTN,KP4,	8716H:	01H,83H,00H
WT4: BTN,LLL,	8717H:	01H,84H,00H
Q11: KU7, R1,G11	8718H:	8DH,10H,07H
Q21: KU7,G21, R1	8719H:	8DH,08H,10H
Q31: KU7,RD1,G31	871AH:	8DH,11H,09H
Q41: KU7,G41,RD1	871BH:	8DH,0AH,11H
MB1: BTN,RS1,	8730H:	01H,34H,00H
MB2: ONN,B16,Y01	8731H:	07H,5DH,B0H
MB3: ONN,B16,Y01	8732H:	07H,5DH,B0H
MB4: ONN,B17,Y02	8733H:	07H,5EH,B4H
RS1: KB0,F7 ,12	8734H:	7CH,FFH,2CH
CP1: BTN,D05,	8738H:	01H,FCH,00H
CP2: BTN,D06,	8739H:	01H,FDH,01H
CP3: BTI,LLL,	873AH:	02H,84H,00H
CP4: BTI,LLL,	873BH:	02H,84H,00H
CT1: AIN,B10,B11	873CH:	05H,56H,58H
CT2: AIN,B12,B13	873DH:	05H,59H,5AH
CT3: BTN,LLL,	873EH:	01H,84H,00H
CT4: BTN,LLL,	873FH:	01H,84H,00H
CI1: FTR,B08,CI1	8740H:	0EH,54H,40H
CI2: FTR,B09,CI2	8741H:	0EH,55H,41H
CI3: BTI,LLL,	8742H:	02H,84H,00H
CI4: BTI,LLL,	8743H:	02H,84H,00H
CD1: BTN,LLL,	8744H:	01H,84H,00H
CD2: BTN,LLL,	8745H:	01H,84H,00H
CD3: BTI,LLL,	8746H:	02H,84H,00H
CD4: BTI,LLL,	8747H:	02H,84H,00H
BLH: BTI,LLL,	8748H:	02H,84H,00H
BLV: BTI,LLL,	8749H:	02H,84H,00H
BLD: BTN,LLL,	874AH:	01H,84H,00H
OLD: BTN,LLL,	874BH:	01H,84H,00H
B00: KU1,YP1, N1	874CH:	87H,1CH,0EH
B01: KU1,YP2, N2	874DH:	87H,51H,43H
B02: ANN,B06,YT1	874EH:	03H,52H,10H
B03: ANN,B07,YT2	874FH:	03H,53H,11H
B04: AIN,B02,D07	8750H:	05H,4EH,FEH
B05: AIN,B03,D08	8751H:	05H,4FH,FFH
B06: ONN,Y21,Y11	8752H:	07H,B2H,B1H
B07: ONN,Y22,Y12	8753H:	07H,B6H,B5H
B08: BTI,Y01,	8754H:	02H,B0H,00H
B09: BTI,Y02,	8755H:	02H,B4H,00H
B10: KU2,F6 , N1	8756H:	88H,FEH,0EH
B11: KU1,YF1,RL1	8758H:	87H,F0H,13H
B12: KU2,F6 , N2	8759H:	88H,FEH,43H
B13: KU1,YF2,RL2	875AH:	87H,F1H,48H
B14: KU1,YH1,TN1	875BH:	87H,1DH,18H
B15: KU1,YH2,TN2	875CH:	87H,52H,4DH
B16: ANN,B00,B14	875DH:	03H,4CH,5BH
B17: ANN,B01,B15	875EH:	03H,4DH,5CH
B18: BTN,CL1,	8760H:	01H,79H,00H

Compare 592 and 492 Mnemo text	Hex code
RS1: ONN,B16,Y01	8734H: 07H,5DH,B0H
RS2: ONN,B17,Y02	8735H: 07H,5EH,B4H
RS3: BTN,P51,	8736H: 01H,F4H,00H
RS4: BTN,P52,	8737H: 01H,ECH,00H

10 Graphic presentation of the hook-up lists

Overview

Catalog-No.	Input signal connect-ion	Output signal connect-ion	Catalog-No.	Input signal connect-ion	Output signal connect-ion
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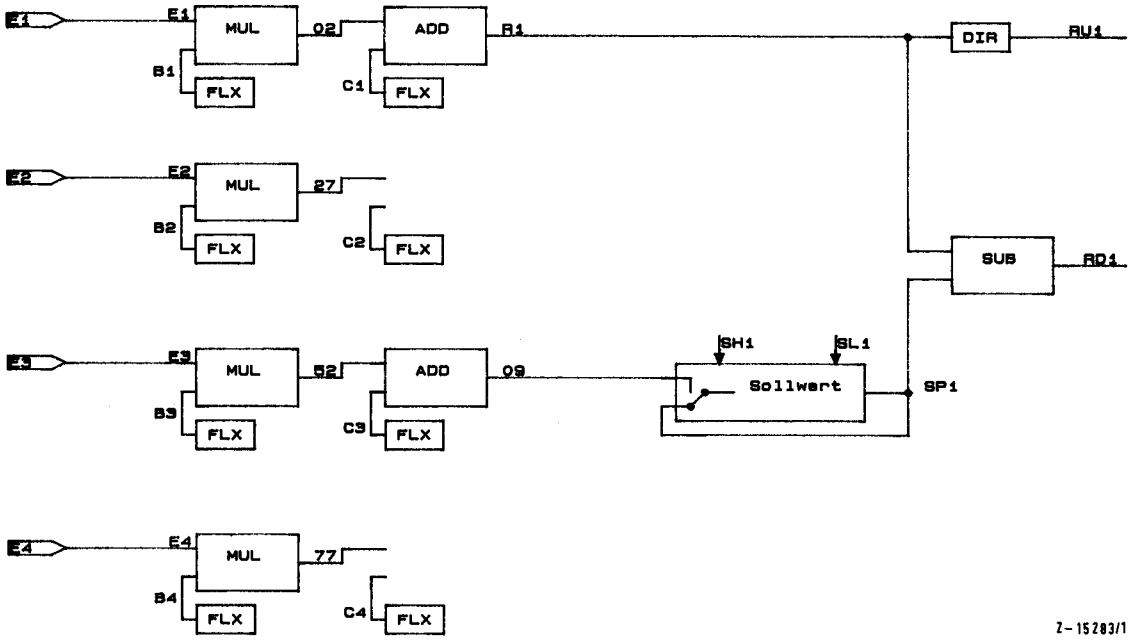
			492/592	Page 81	Page 93

Glossary to figure description (pages 80...100)

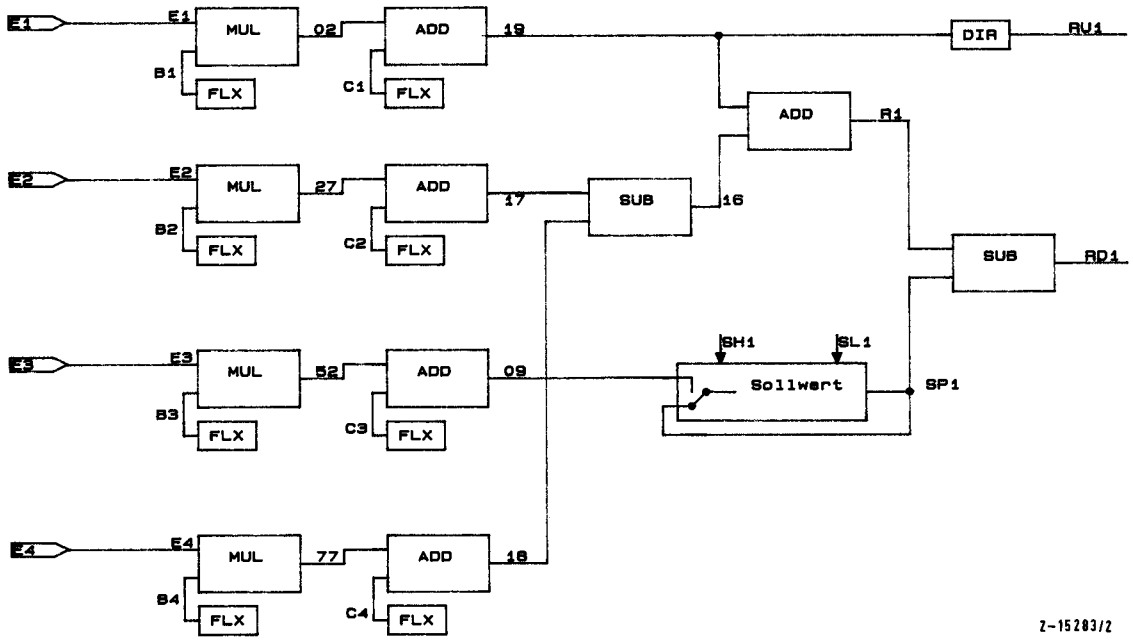
Sollwert	= set point
BA-Nr.	= supplementary no(s)
Eingang	= input
Stellungsrückmeldung	= position feedback signal
externe Führung der Stellgrenzen	= external guide of control limits
Fortschaltung	= sequence switching
Y-Anzeige	= Y-display
vorbereitet für Zweipunkt-regler	= prepared for on/off controller
Kanal	= channel
Kont.	= Continuous (Cont.)
Programmgeber	= Programmer
nicht bei Version < G	= not for versions < G
Führungsregler	= Master controller
bei Eingang Verhältnis	= with input ratio
Ende	= end

10.1 Input signal connection



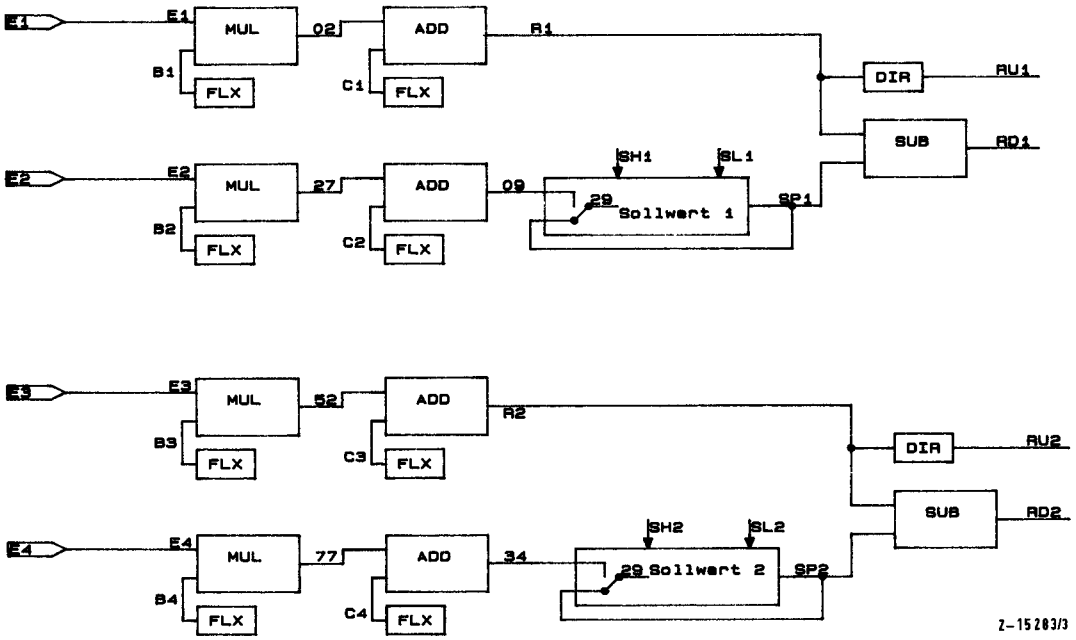
Input single channel fixed value/cascade

Suppl. Nos.
411/511; 431/531; 451/551; 471/571



Input channel multicomponent

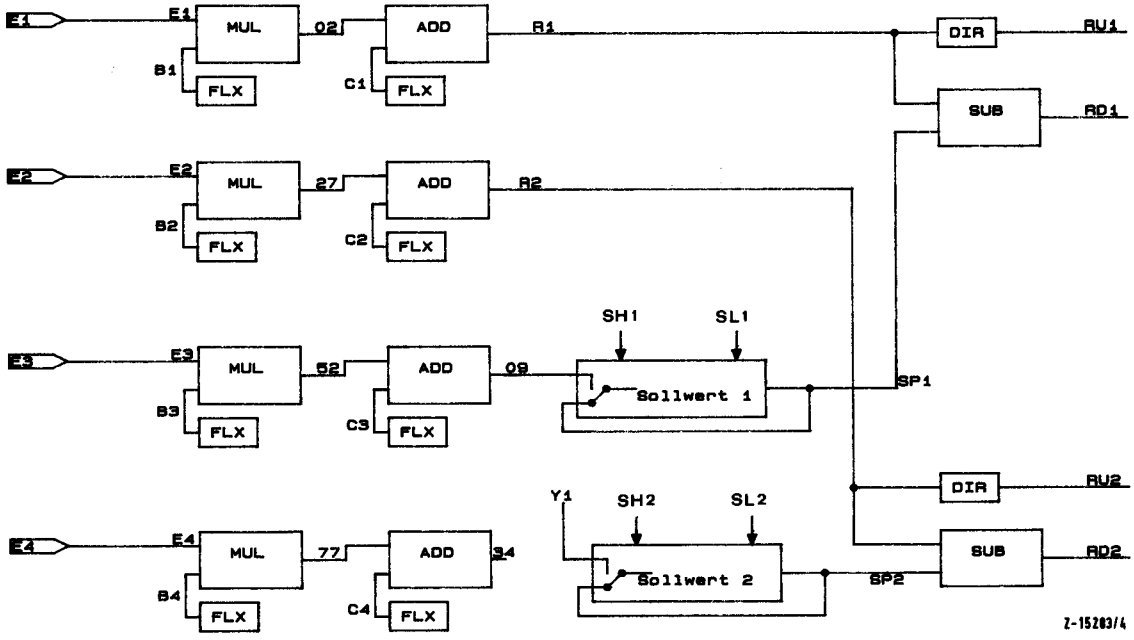
Suppl. Nos.
412/512; 432/532; 452/552; 472/572



Two channel input fixed value/cascade

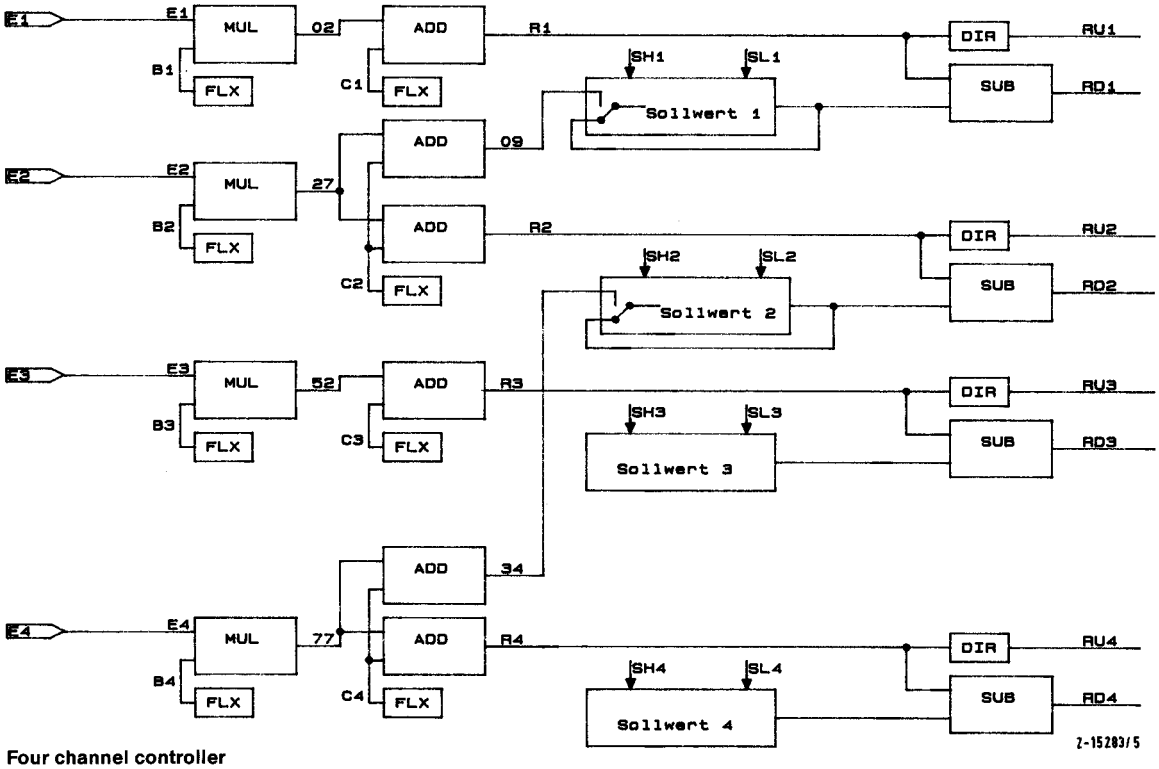
Suppl. Nos.
415/515; 435/535; 455/555; 475/575

The configuration is identical for 414/514; 434/534; 454/554 and 474/574.
Switchover is, however, inhibited



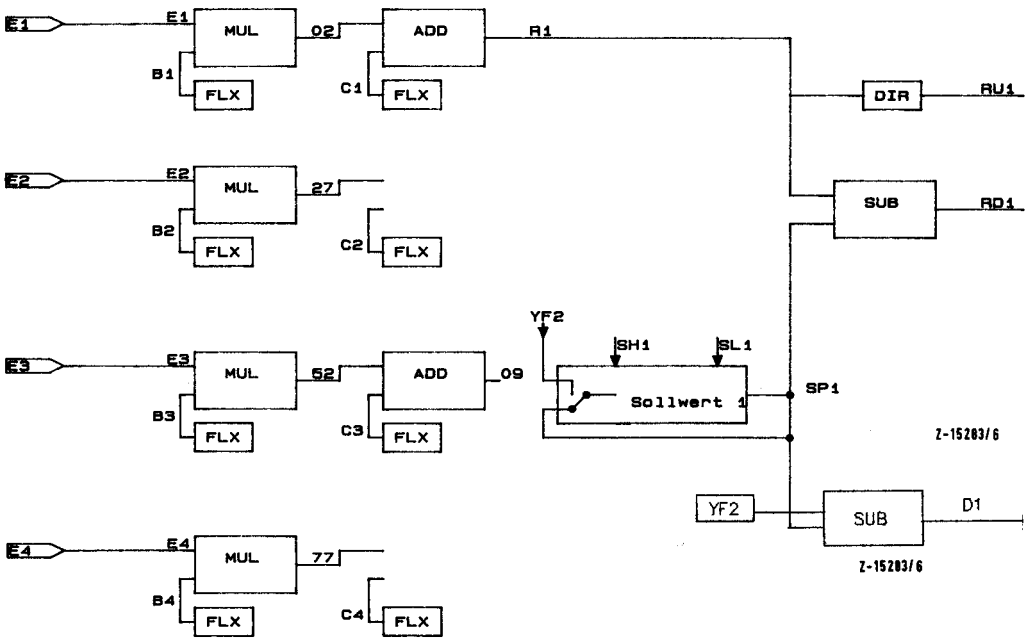
Cascade controller

Suppl. Nos.
416/516; 436/536; 456/556; 476/576



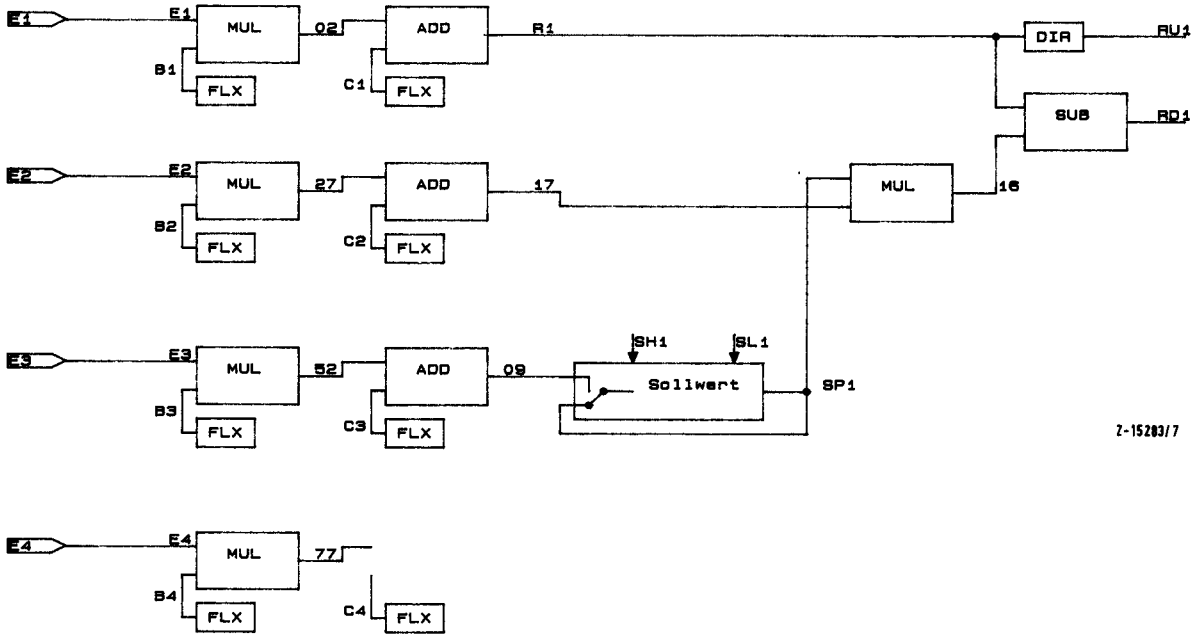
Four channel controller

Suppl. Nos.
421/521; 481



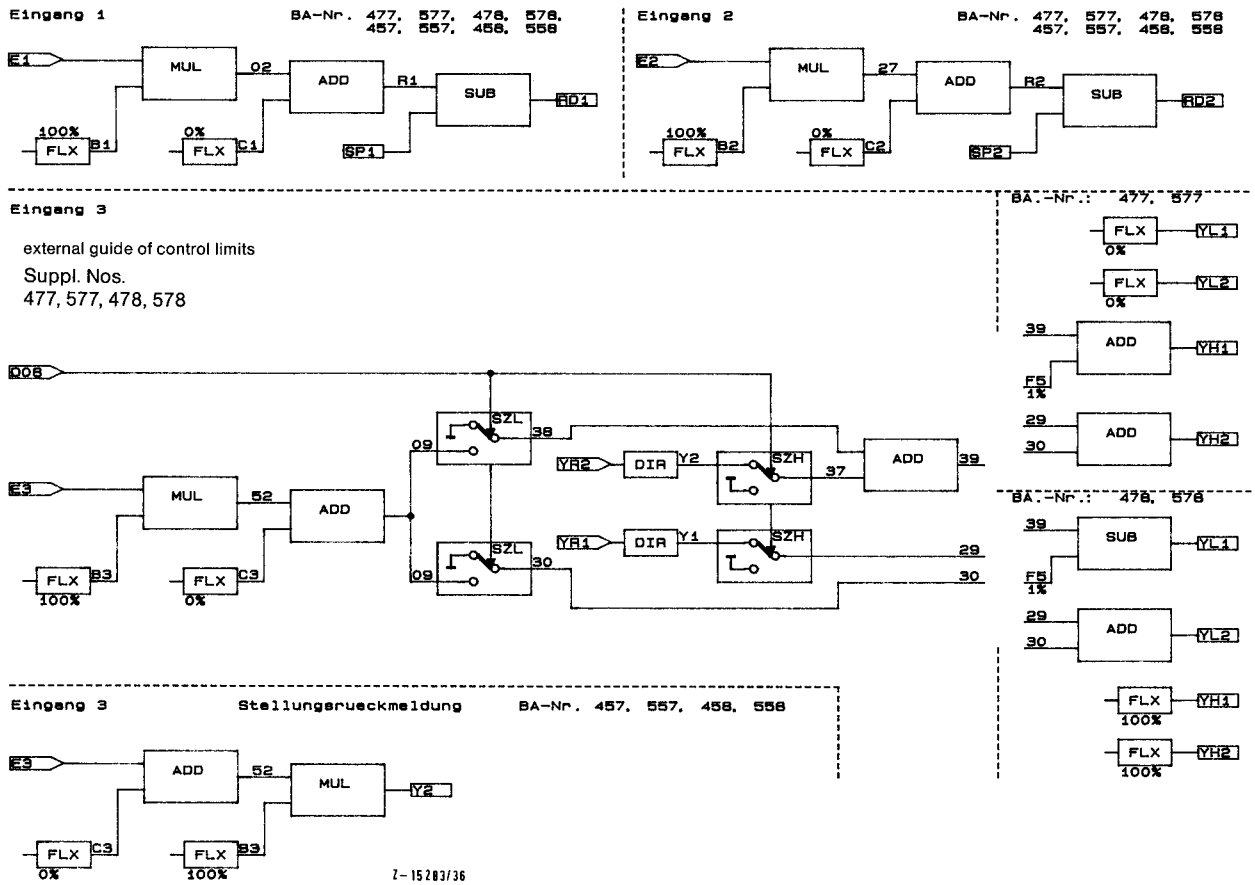
Program controller

Suppl. Nos.
422/522; 442/542; 462/562; 482/582



Input ratio

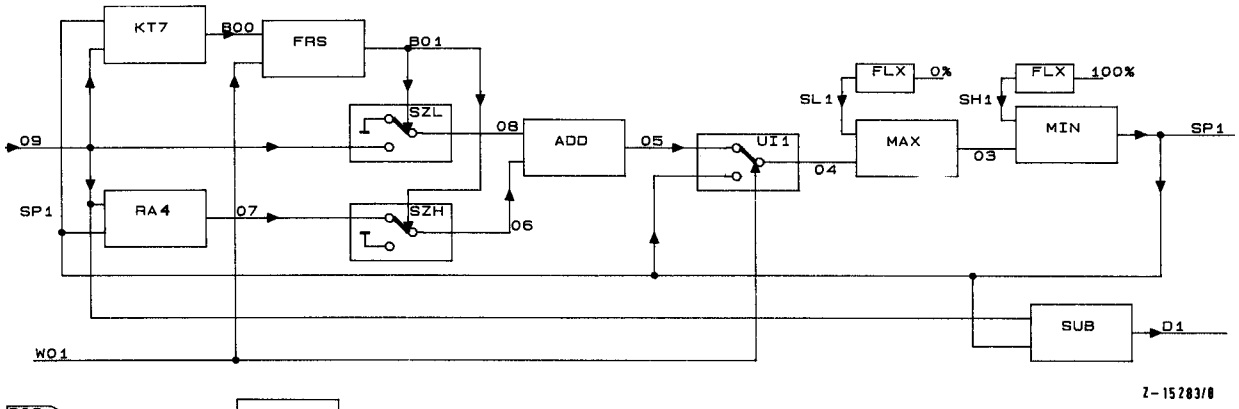
Suppl. Nos.
453/553; 473/573

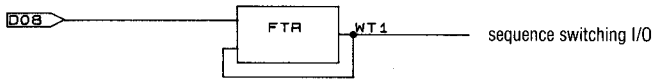


Override controller

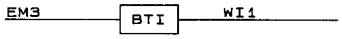
Suppl. Nos.
457; 557; 458; 558; 477; 577; 478; 578

10.2 Set points





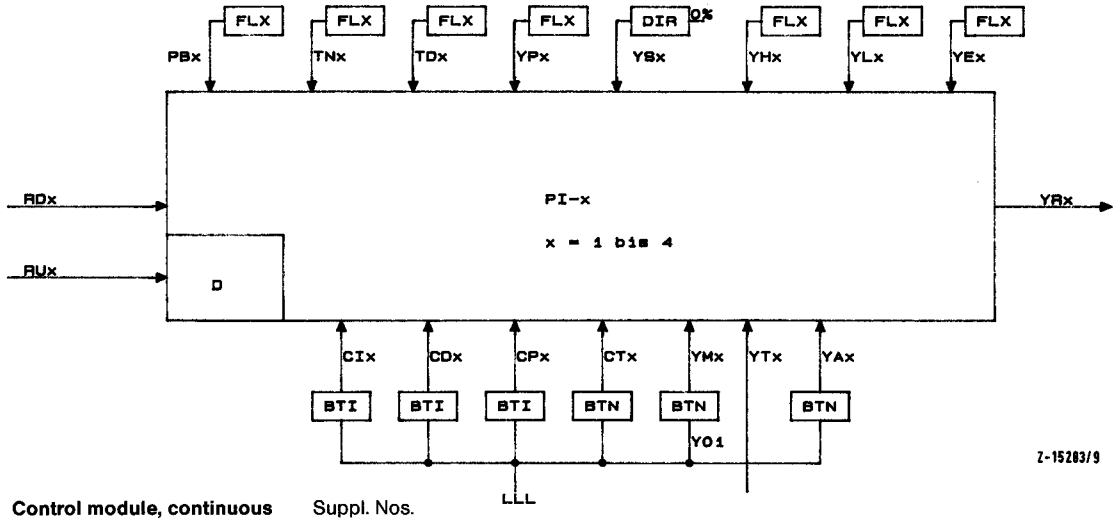
Consult the hook-up lists for the variables for the other channels



Set point 1st channel

WI1 = 0 if module 3 not present
= internal

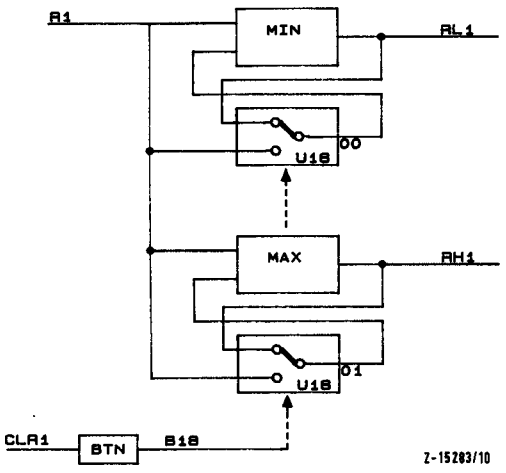
10.3 Control module



Control module, continuous

Suppl. Nos.
41x/51x; 42x/52x;
47x/57x; 48x/58x

10.4 Non-return pointer

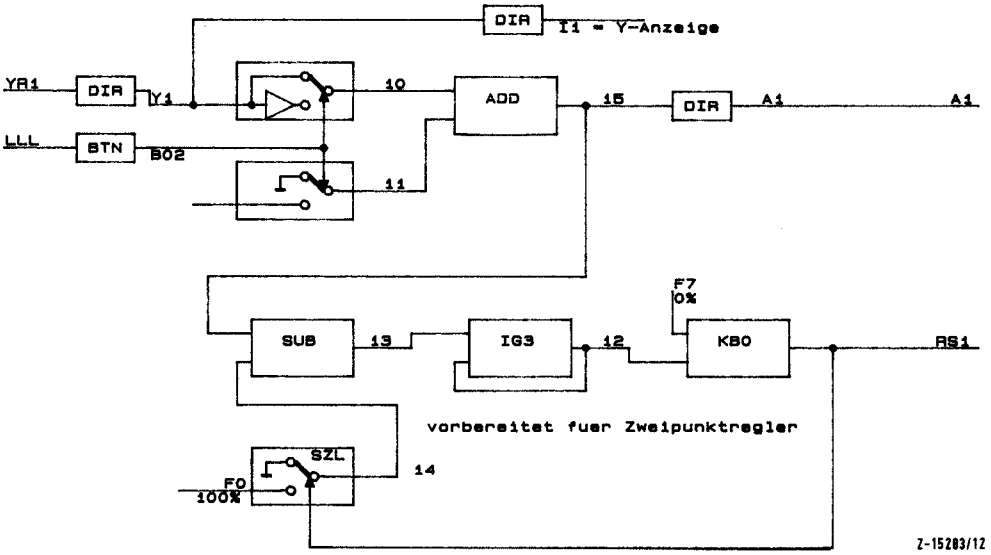


Channel	1	2	3	4
Input	R1	R2	R3	R4
Min.	RL1	RL2	RL3	RL4
Max.	RH1	RH2	RH3	RH4
	00	25	50	75
	01	25	51	76
Reset	B18	B20	B22	B24

Non-return pointer

Suppl. Nos.
All except 491/591; 492/592

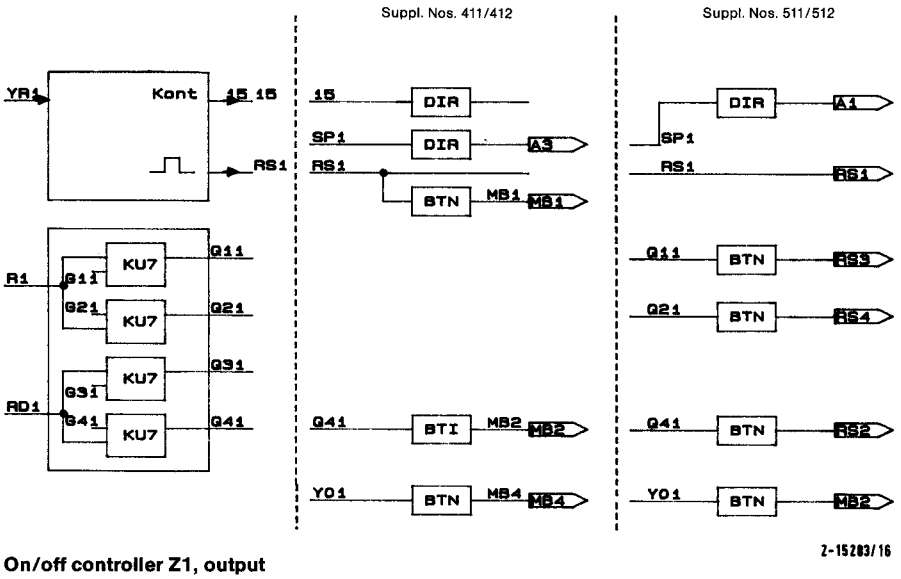
10.5 Output signal connection



Channel 1	10	11	12	13	14	15	A1	RS1
Channel 2	35	36	37	38	39	40	A2	RS2
Channel 3	60	61	62	63	64	65	A3	RS3
Channel 4	85	86	87	88	89	90	A4	RS4

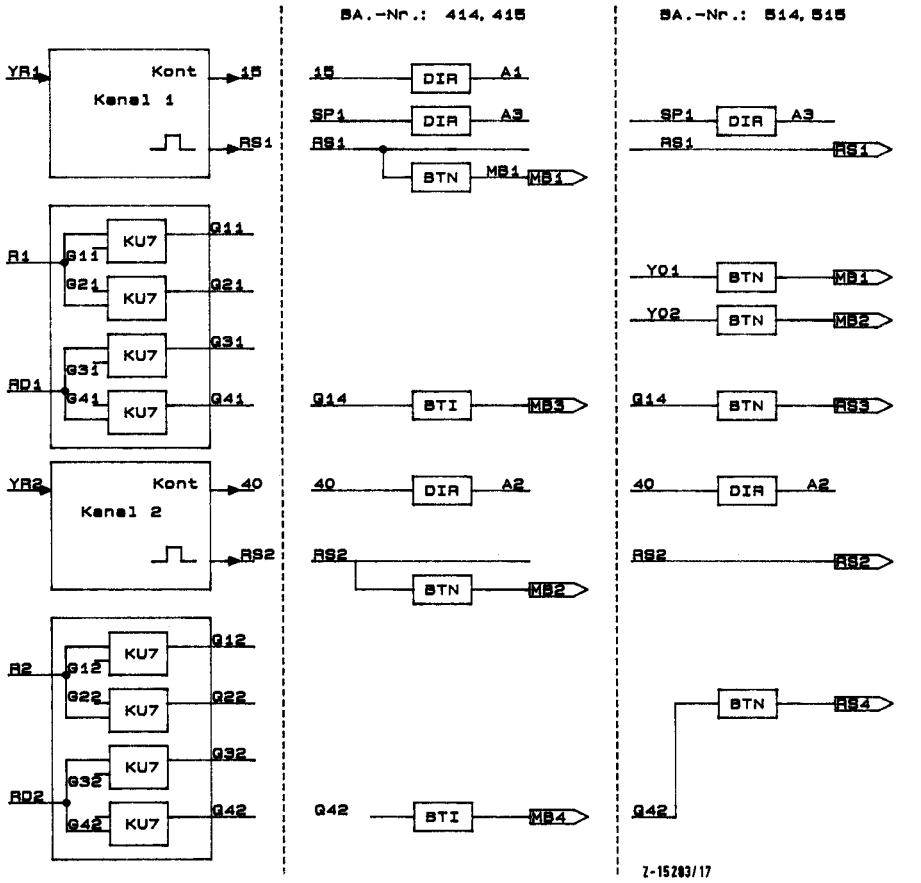
Continuous and on/off output

Suppl. Nos.
diverse



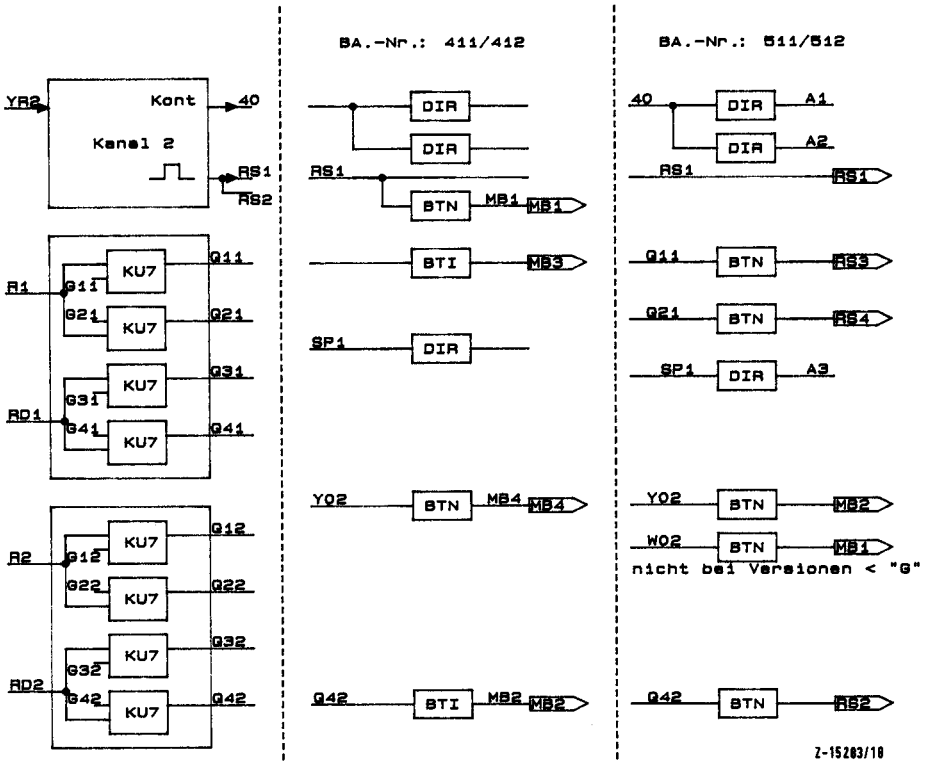
On/off controller Z1, output

Suppl. Nos.
411/511; 412/512



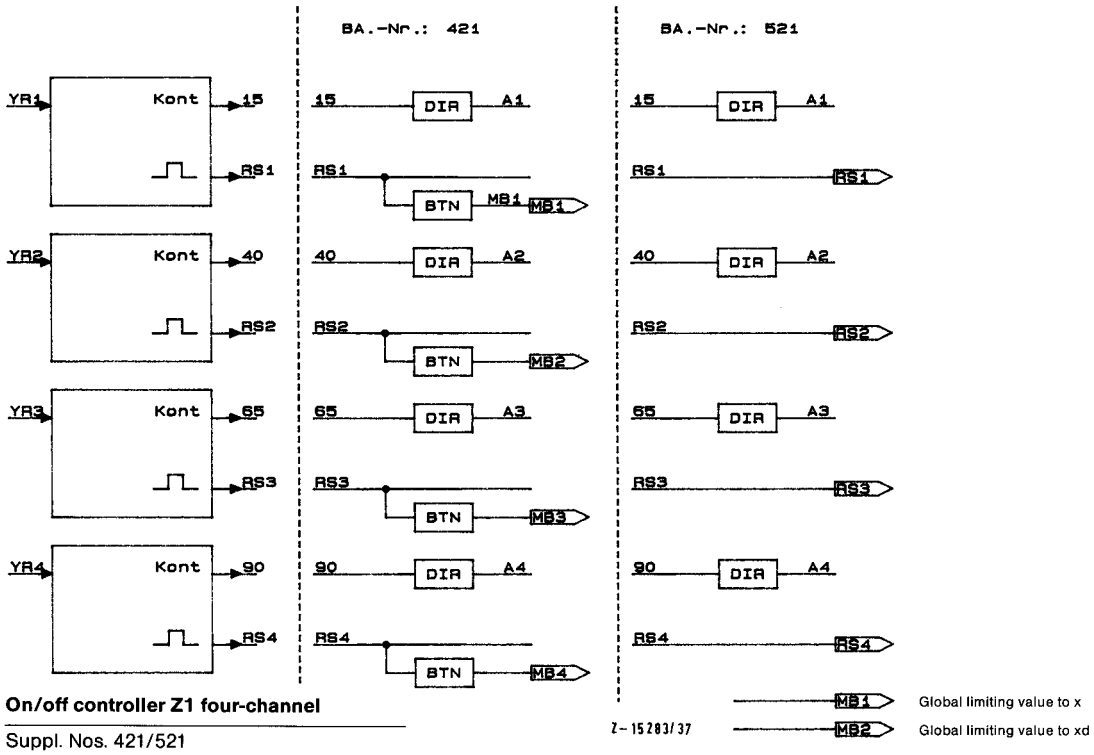
On/off controller Z1, two-channel output

Suppl. Nos.
414/514; 415/515



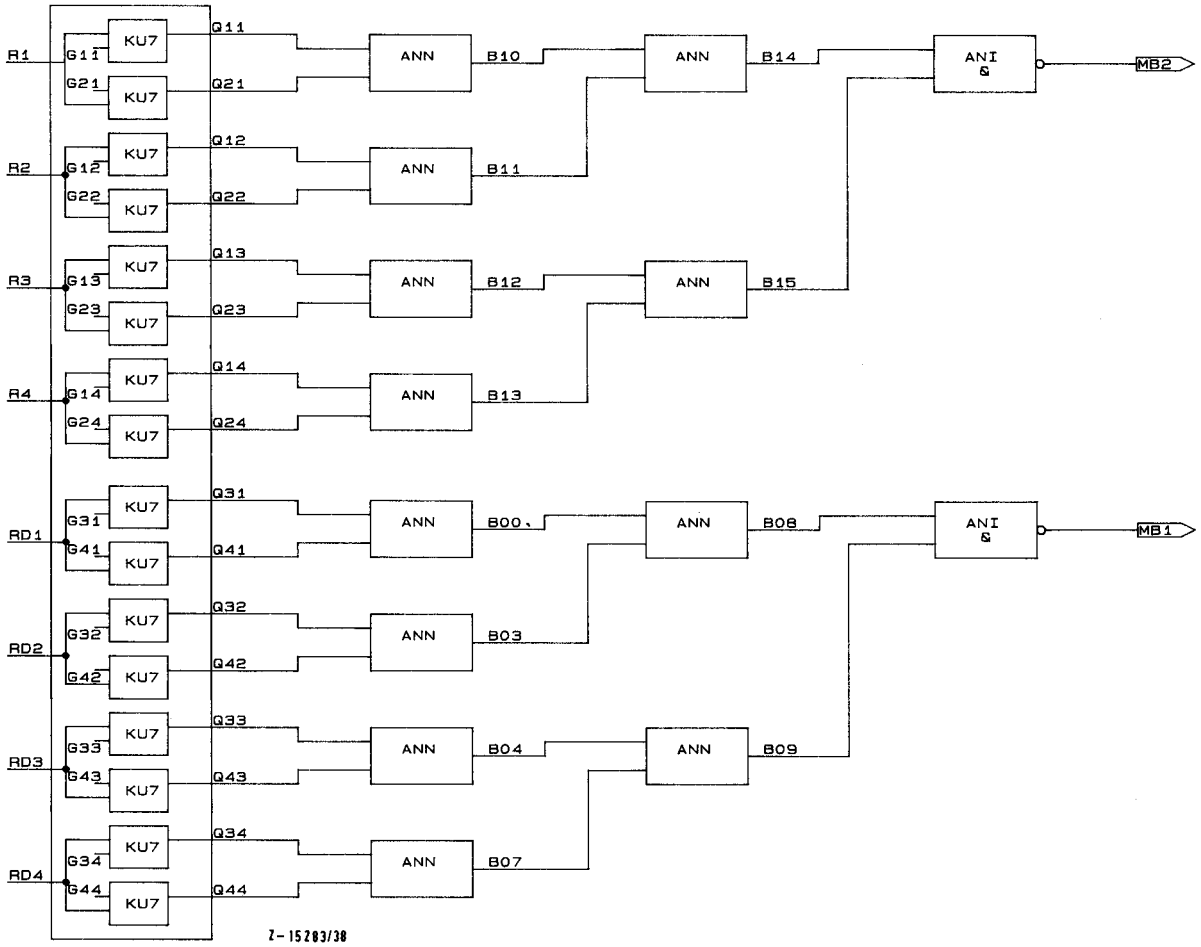
On/off controller Z1, cascade

Suppl. Nos.
416/516



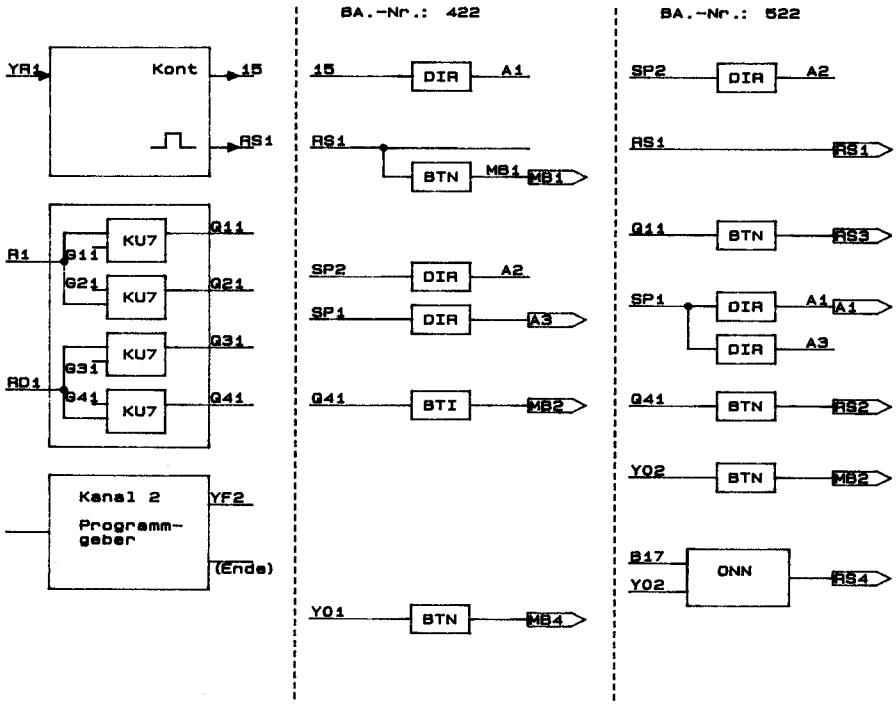
On/off controller Z1 four-channel

Suppl. Nos. 421/521



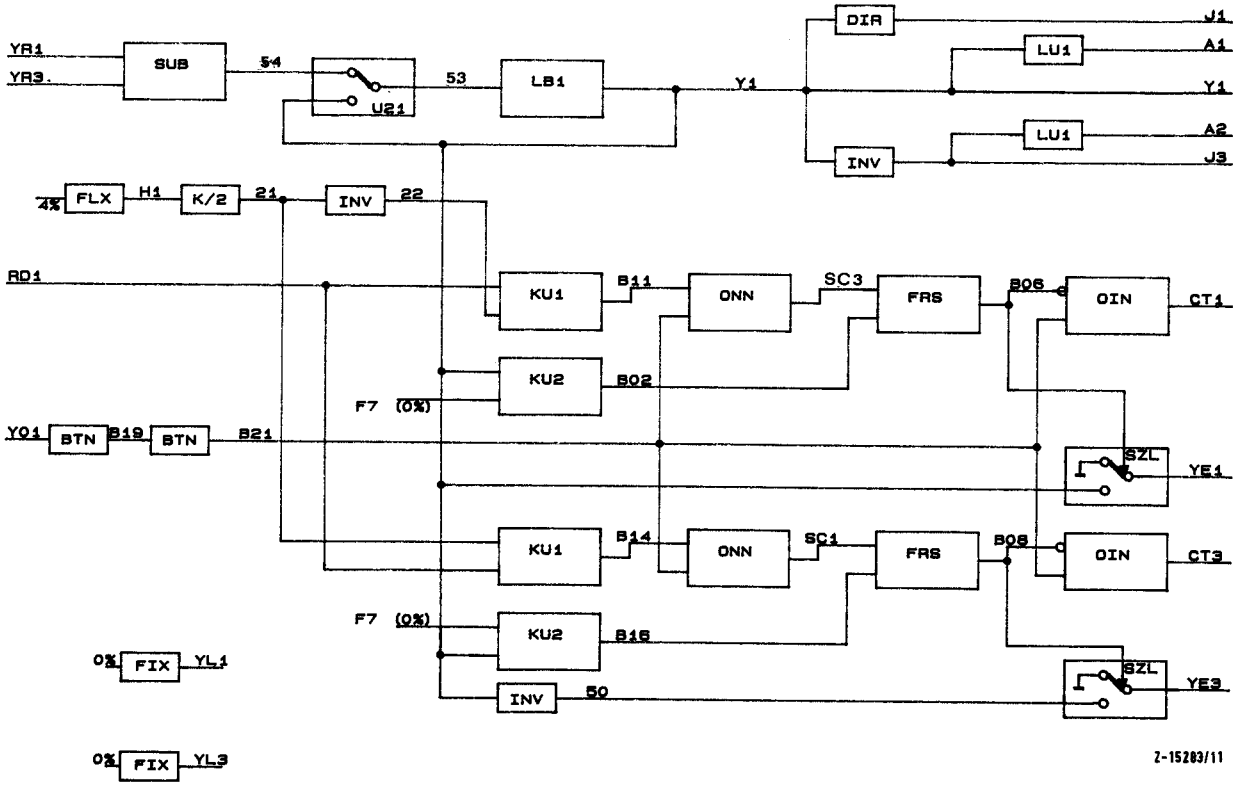
Global limiting values to Suppl. No.: 521

Suppl. No. 521



Programmer-on/off controller Z1, output

Suppl. Nos.
422/522

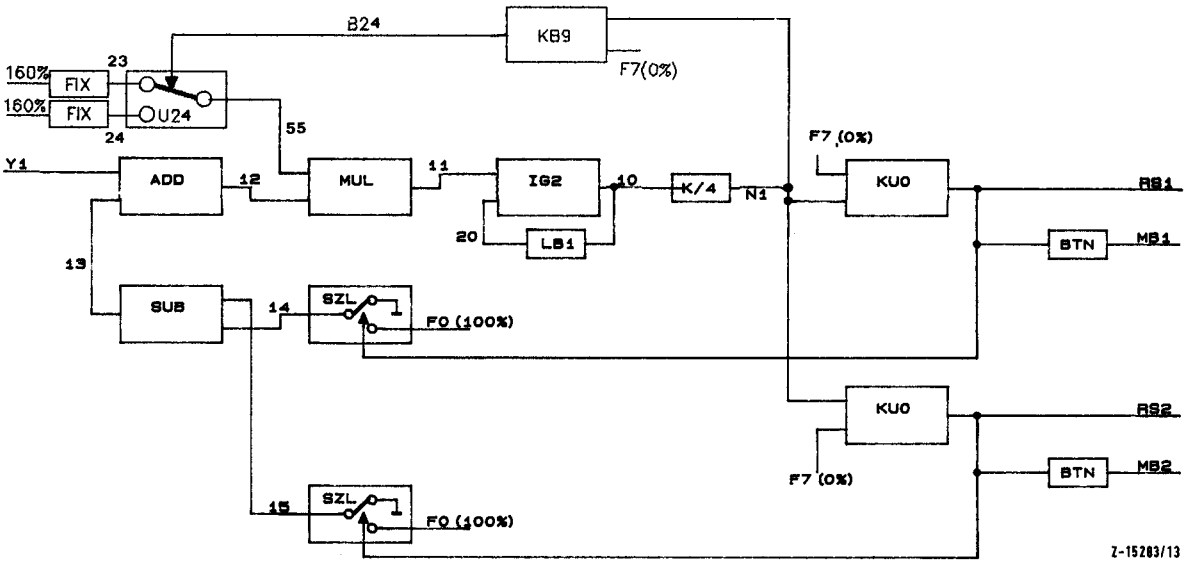


Controller output Z2 (1), channel 1 (and 3)

Suppl. Nos.
431/531; 432/532; 434/534; 435/535; 442/542

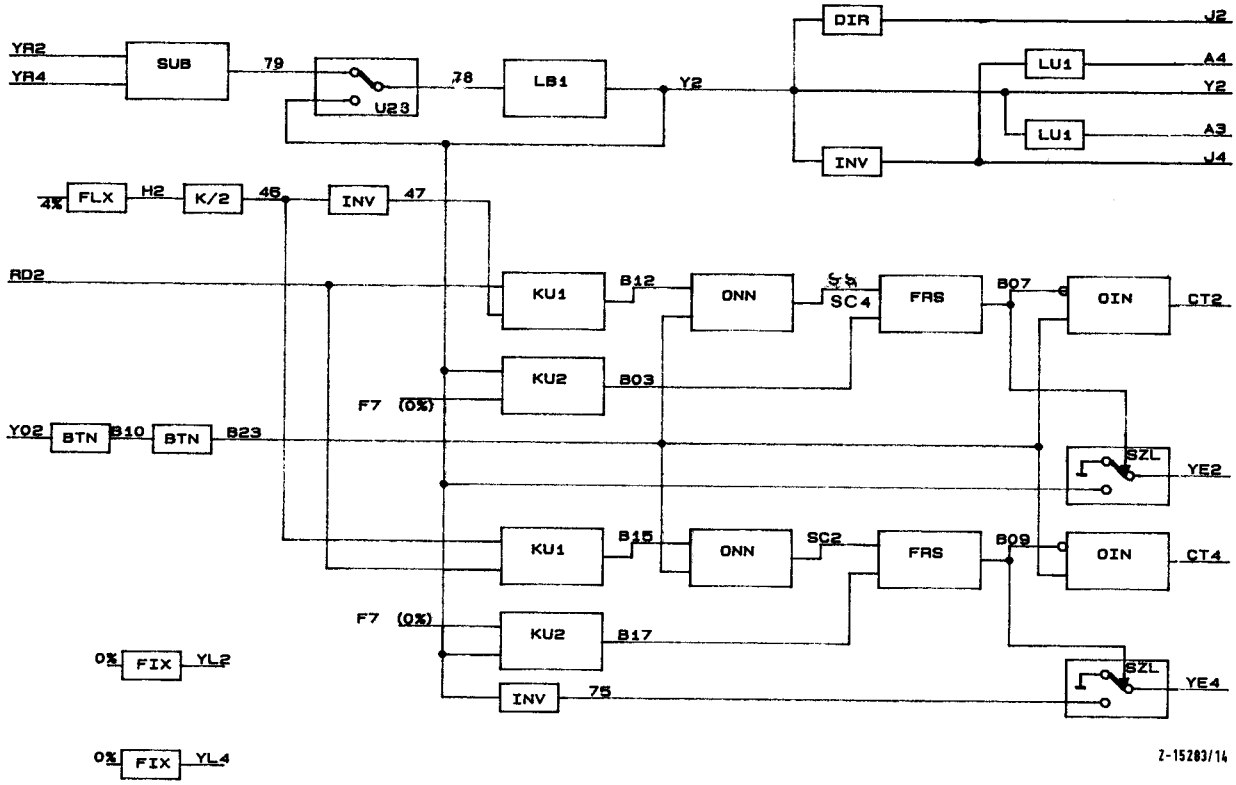
A1

A2



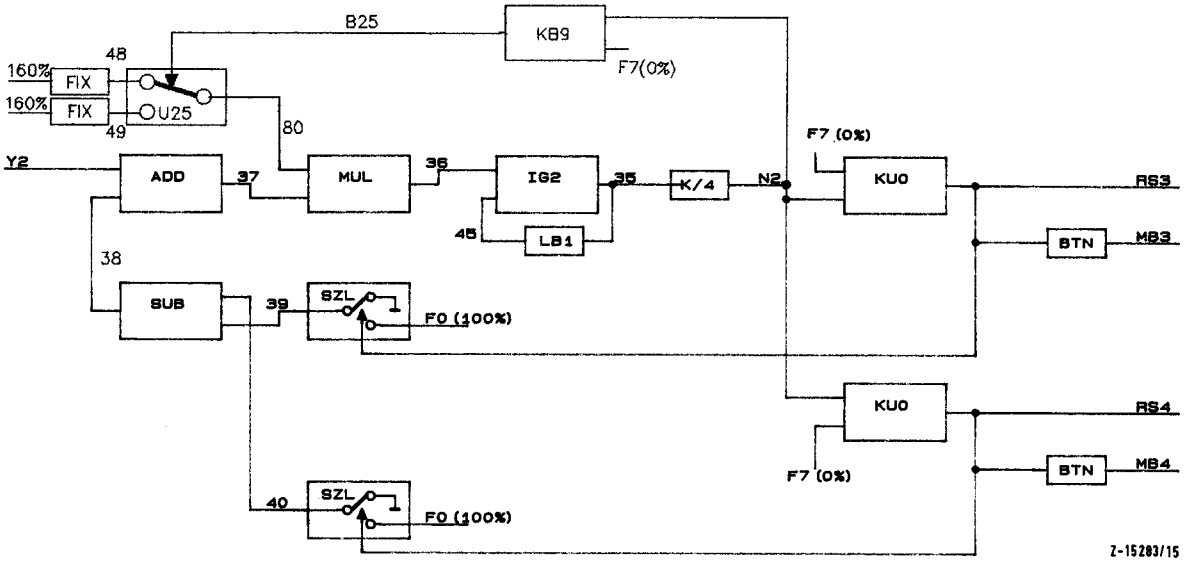
Controller output Z2 (1), channel 1 (and 3)

Suppl. Nos.
431 / 531; 432 / 532; 434 / 534; 435 / 535; 442 / 542



Controller output Z2 (2), channel 2 (and 4)

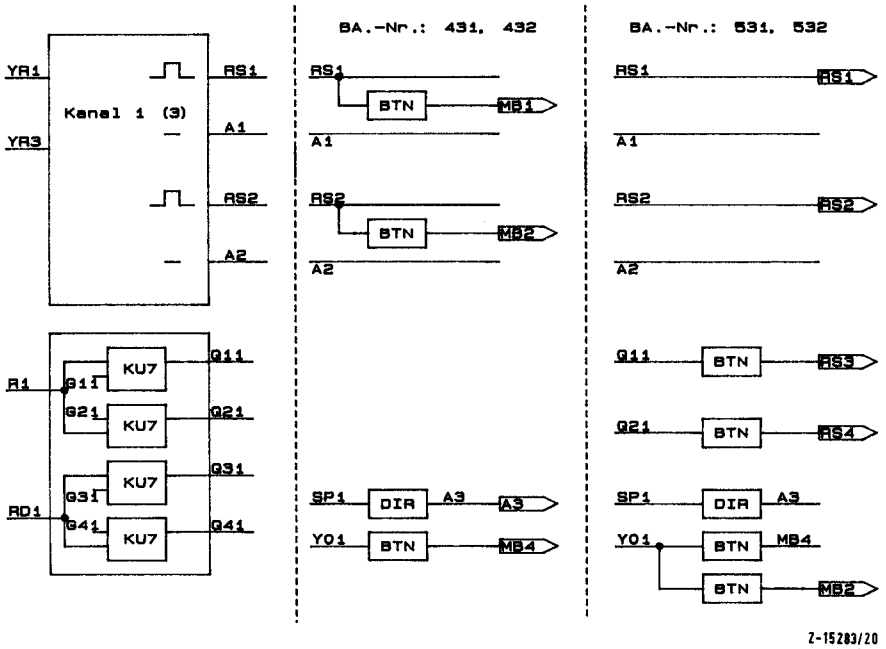
Suppl. Nos.
434/534; 435/535



Controller output Z2 (2), channel 2 (and 4)

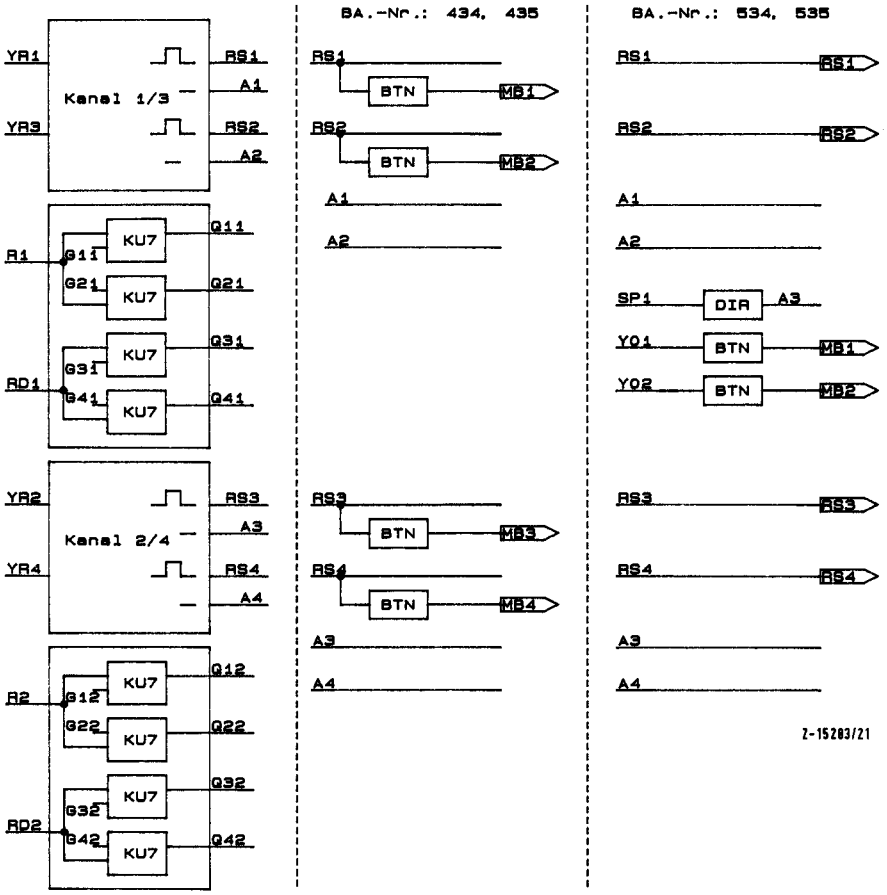
Suppl. Nos.
434 / 534; 435 / 535; 436 / 536 [1)]

[1)] see also page 91



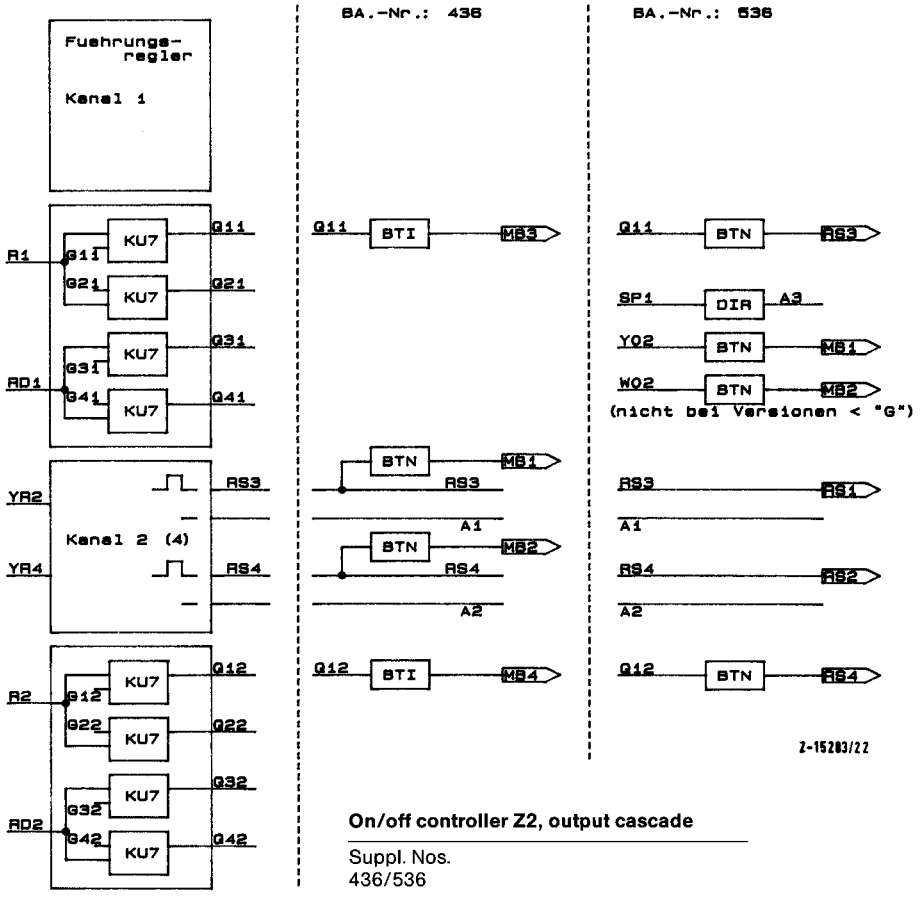
On/off controller Z1, single-channel output

Suppl. Nos.
431/531; 432/532



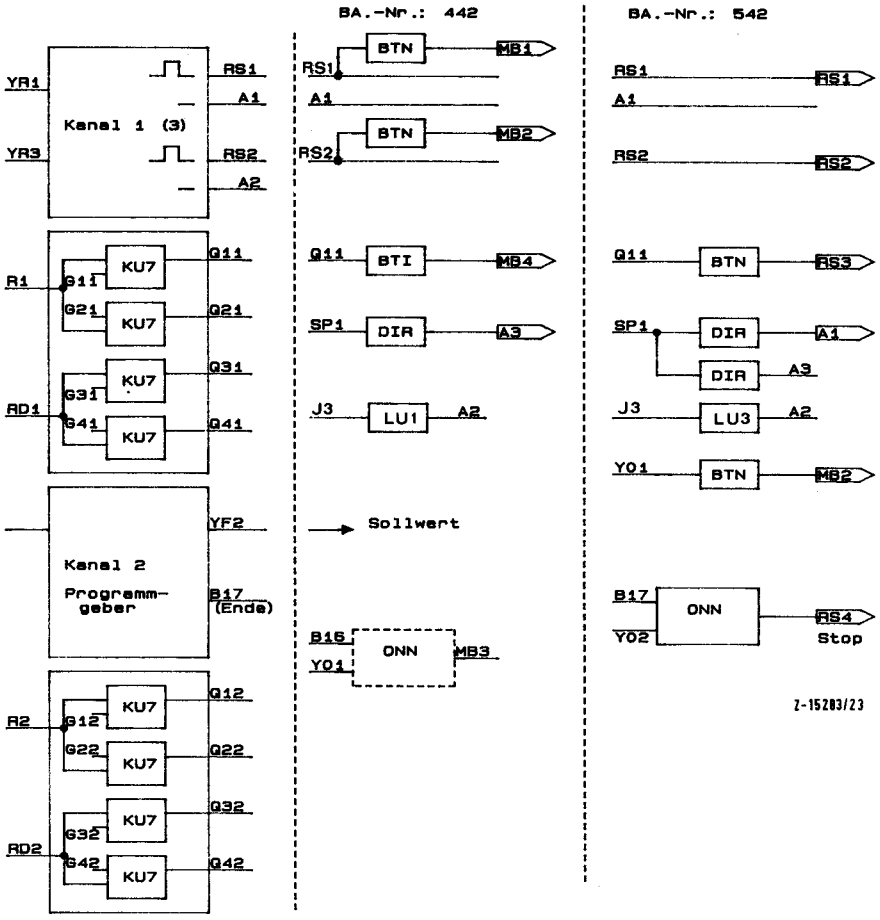
On/off controller Z2 two-channel output

Suppl. Nos.
434/534; 435/535



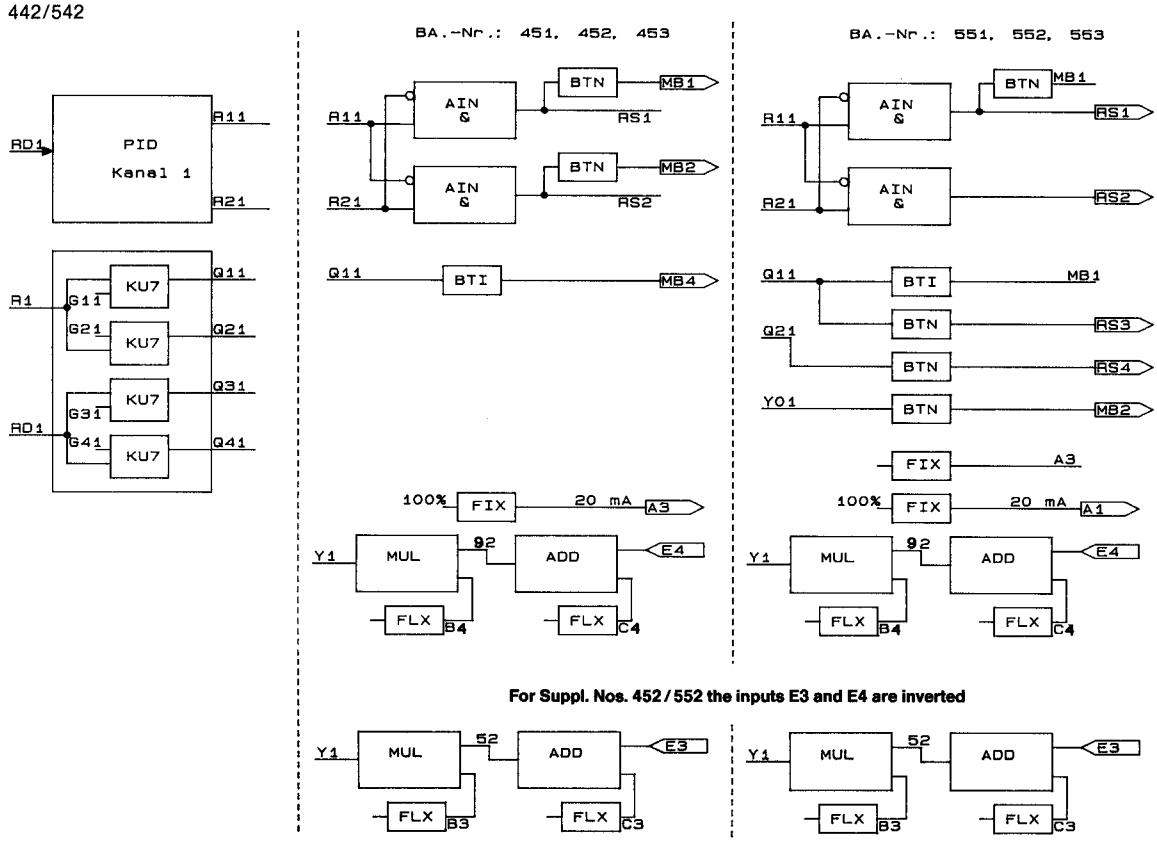
On/off controller Z2, output cascade

Suppl. Nos.
436/536



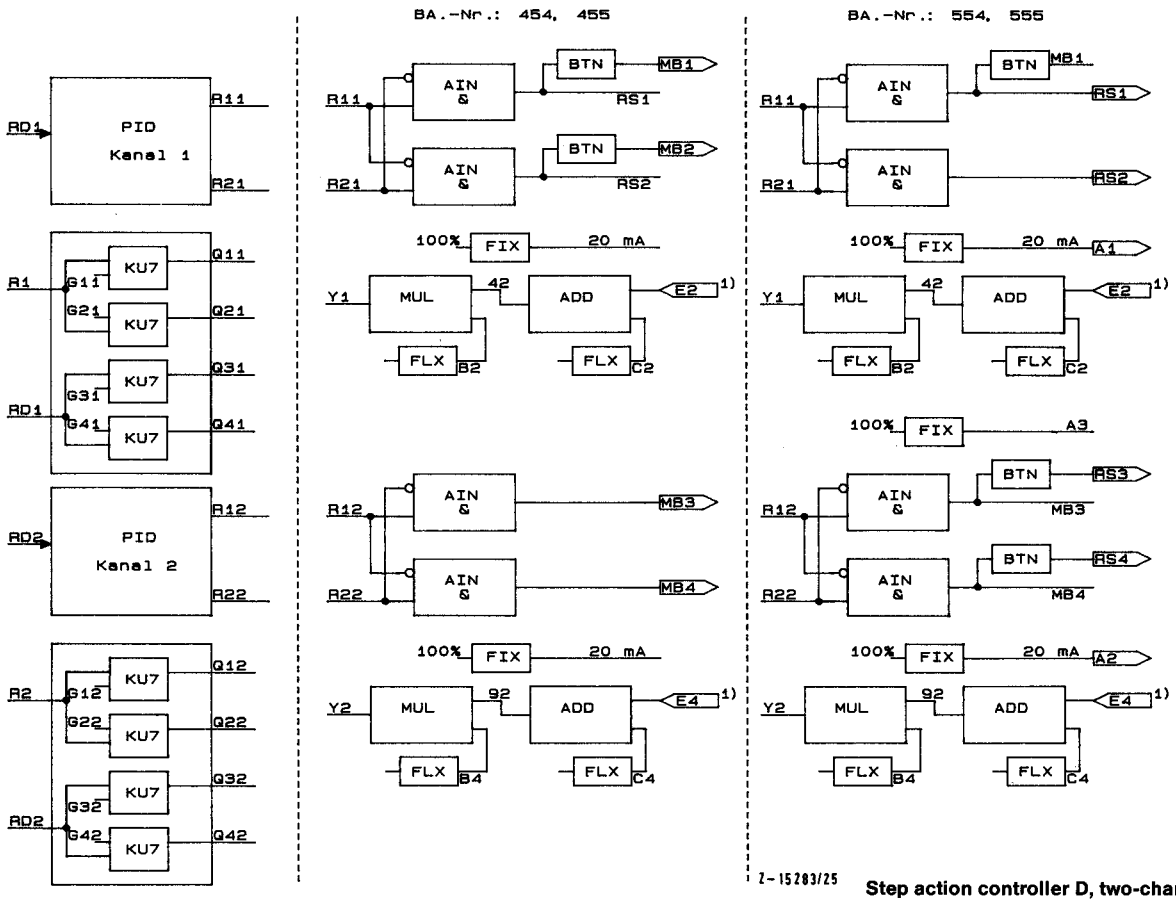
Program-on/off controller Z2 output

Suppl. Nos.
442/542



Step action controller D, single-channel output

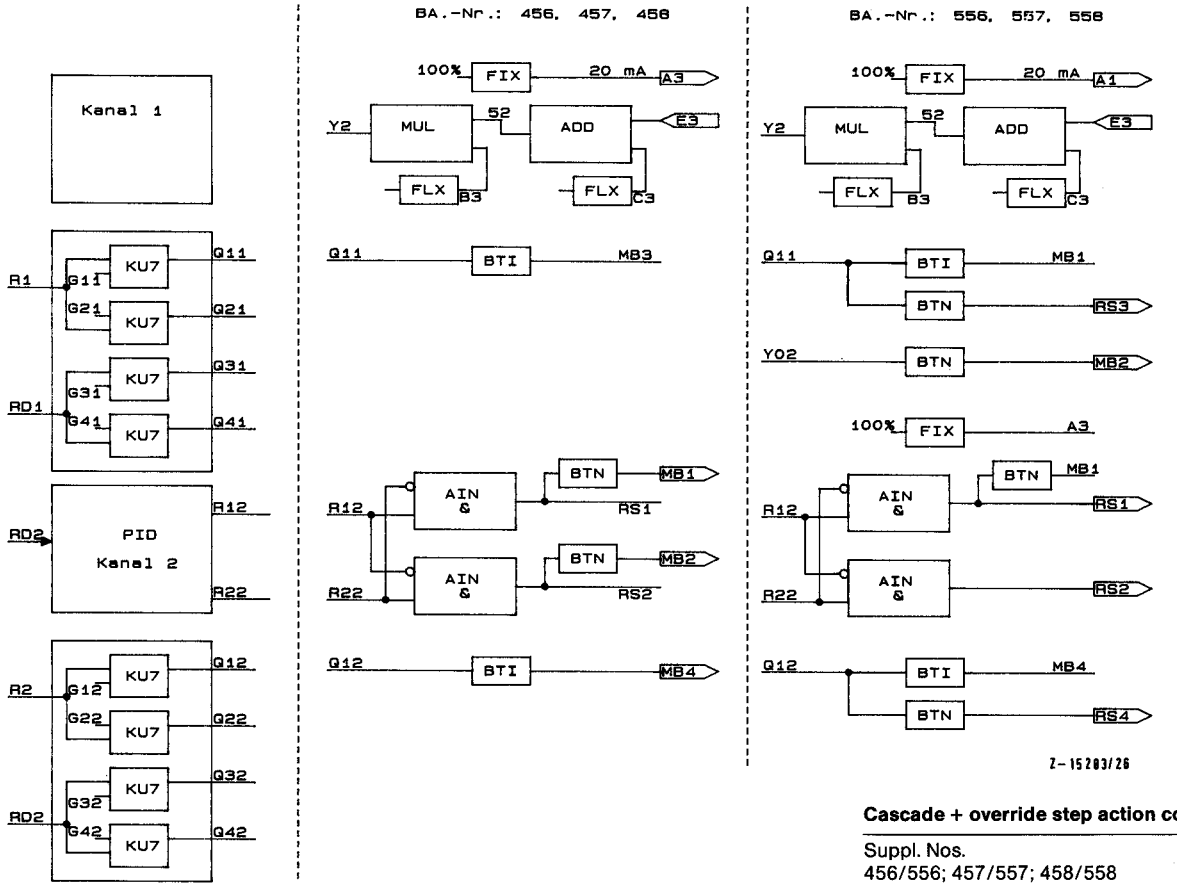
Suppl. Nos.
451/551; 452/552; 453/553



1) Input for position feedback signal not available with Suppl.No. 455 and 555

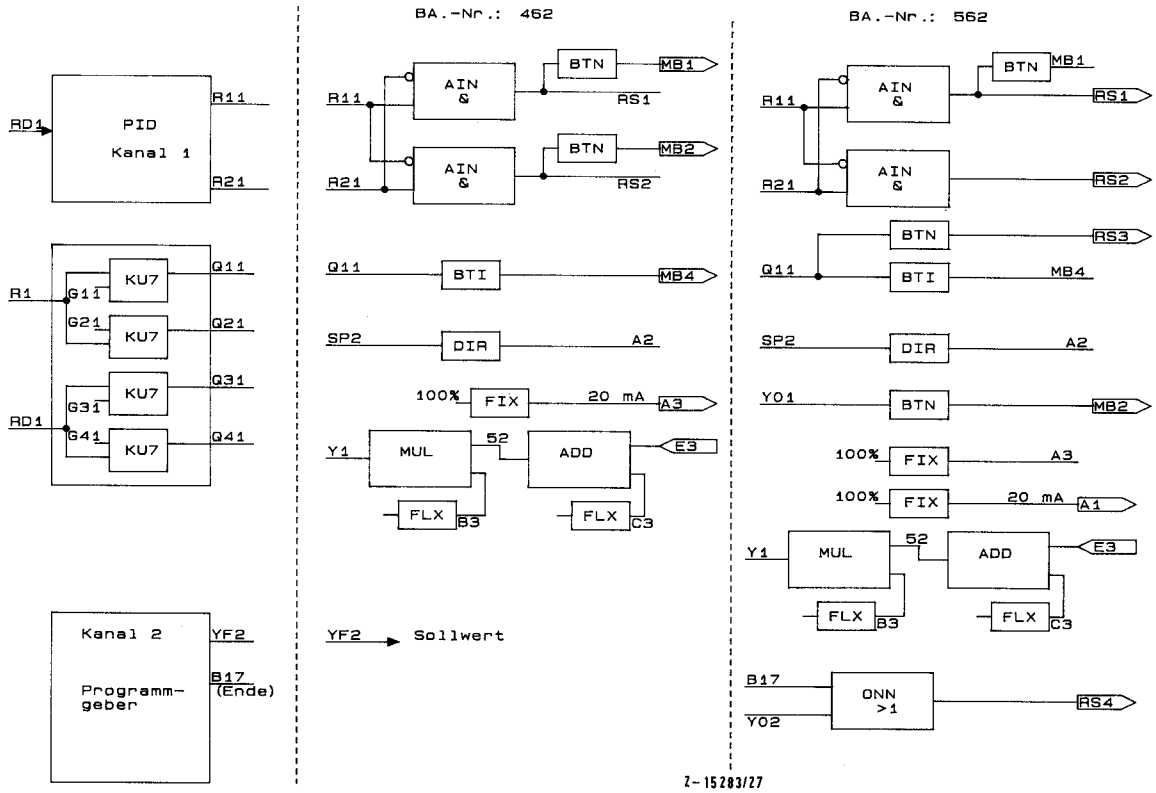
Step action controller D, two-channel output

Suppl. Nos.
454/554; 455/555



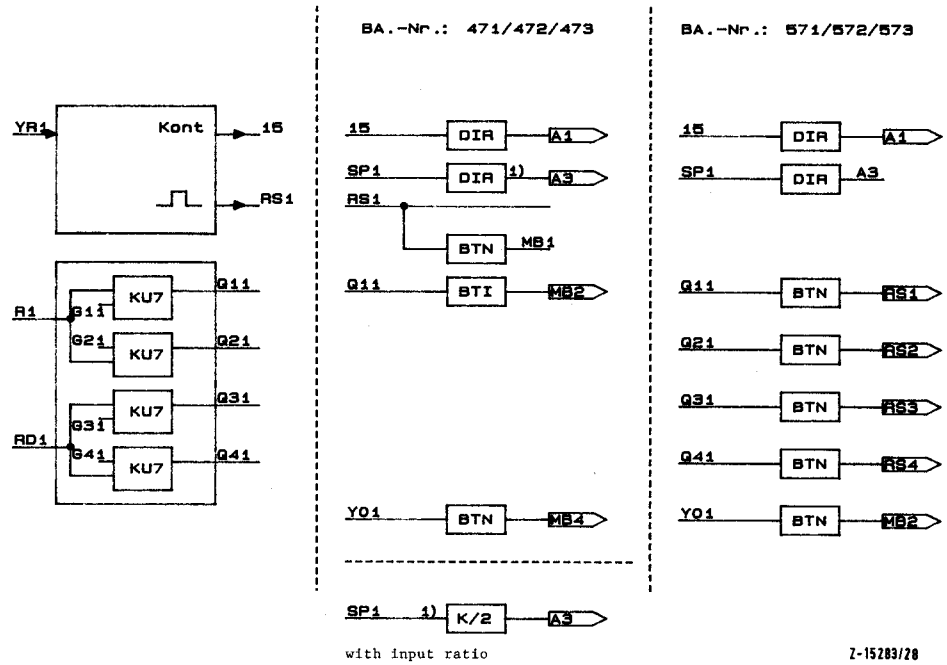
Cascade + override step action controller D

Suppl. Nos.
456/556; 457/557; 458/558



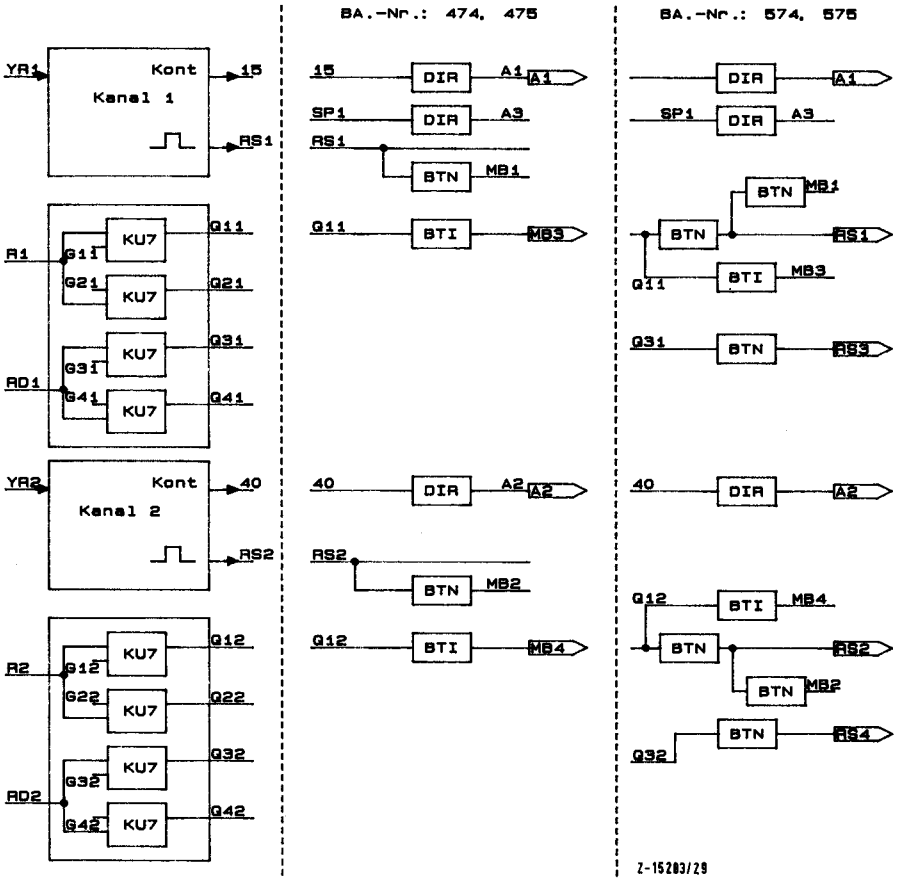
Programm step action controller D output

Suppl. Nos.
462/562



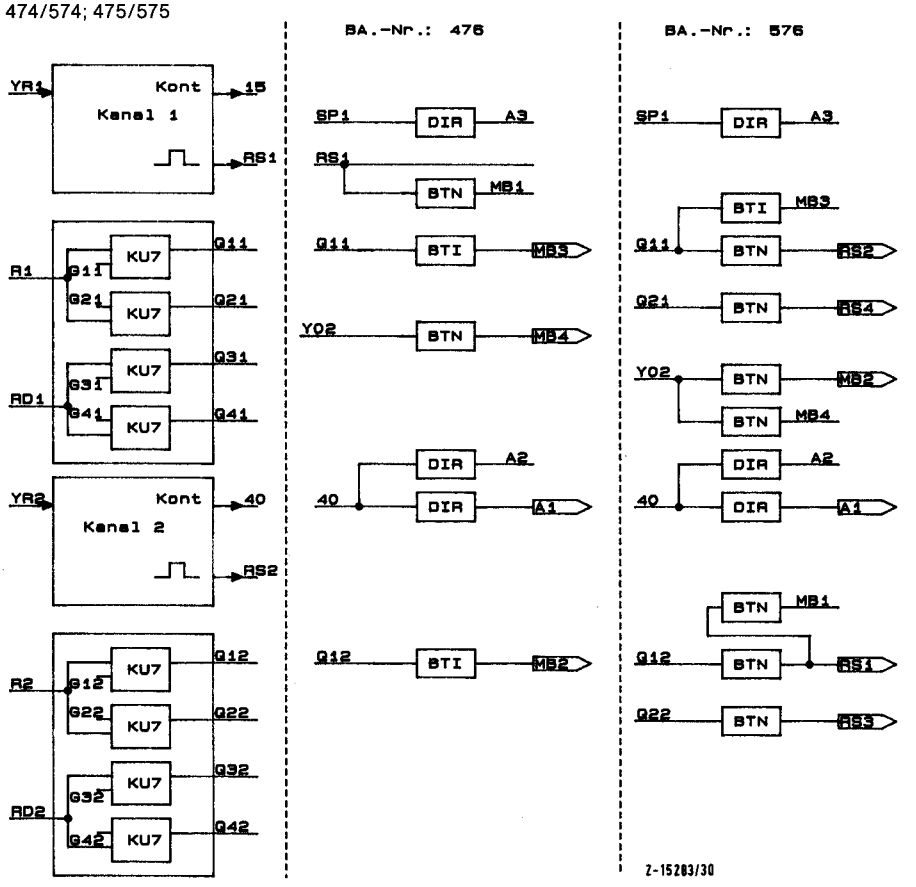
Continuous output single-channel

Suppl. Nos.
471/571; 472/572; 473/573



Continuous controller K, two-channel output

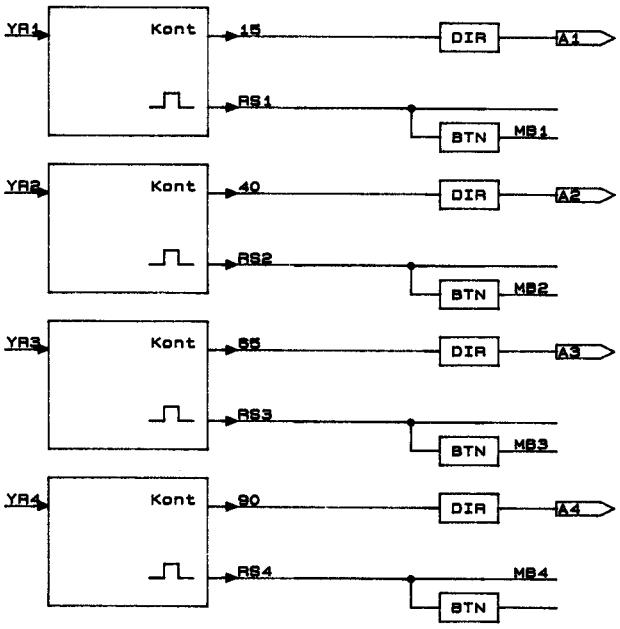
Suppl. Nos.
474/574; 475/575



Cascade continuous controller K, output

Suppl. Nos.
476/576; 477/577; 478/578

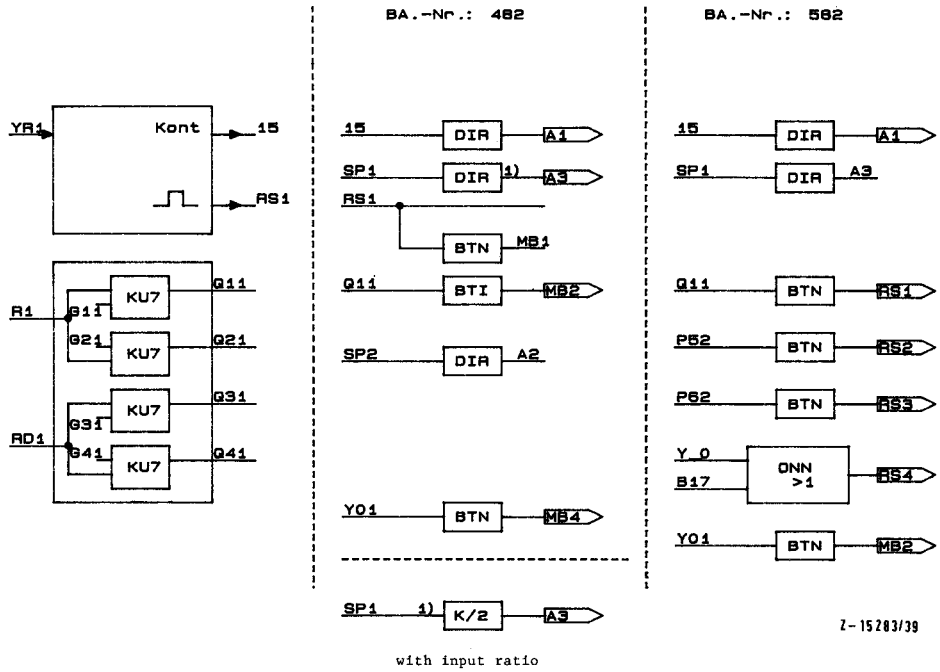
With override-controllers outputs MB2 and MB4 are interchanged.



Continuous controller K, four-channel output

Z-15283/31

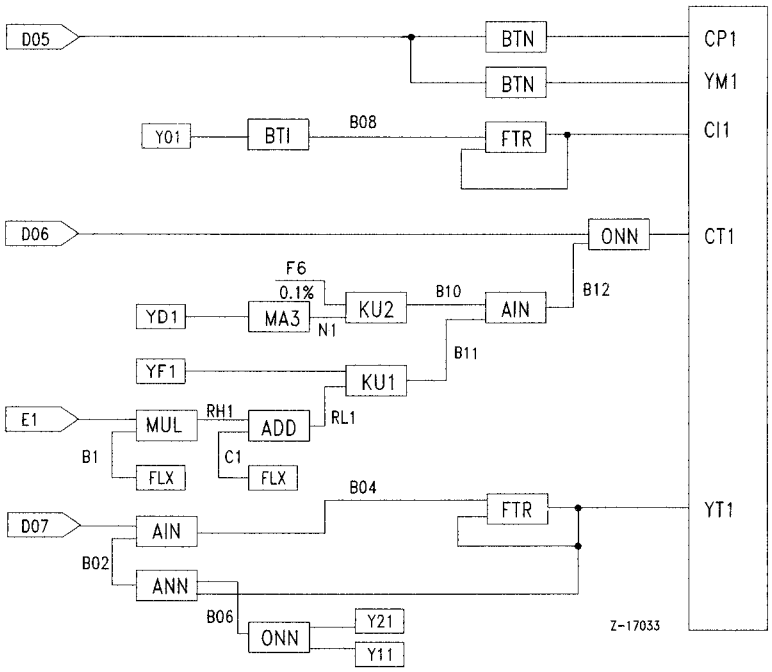
Suppl. No. 481



Z-15283/39

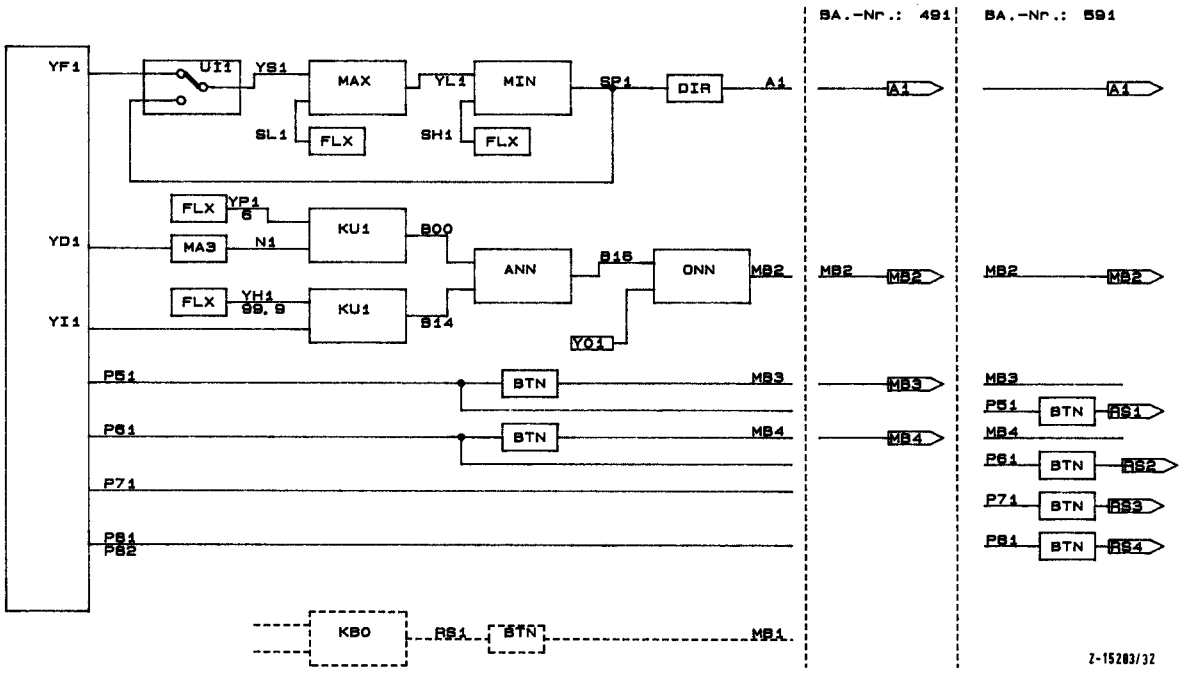
Program controller, continuous output

Suppl. Nos.
482/582



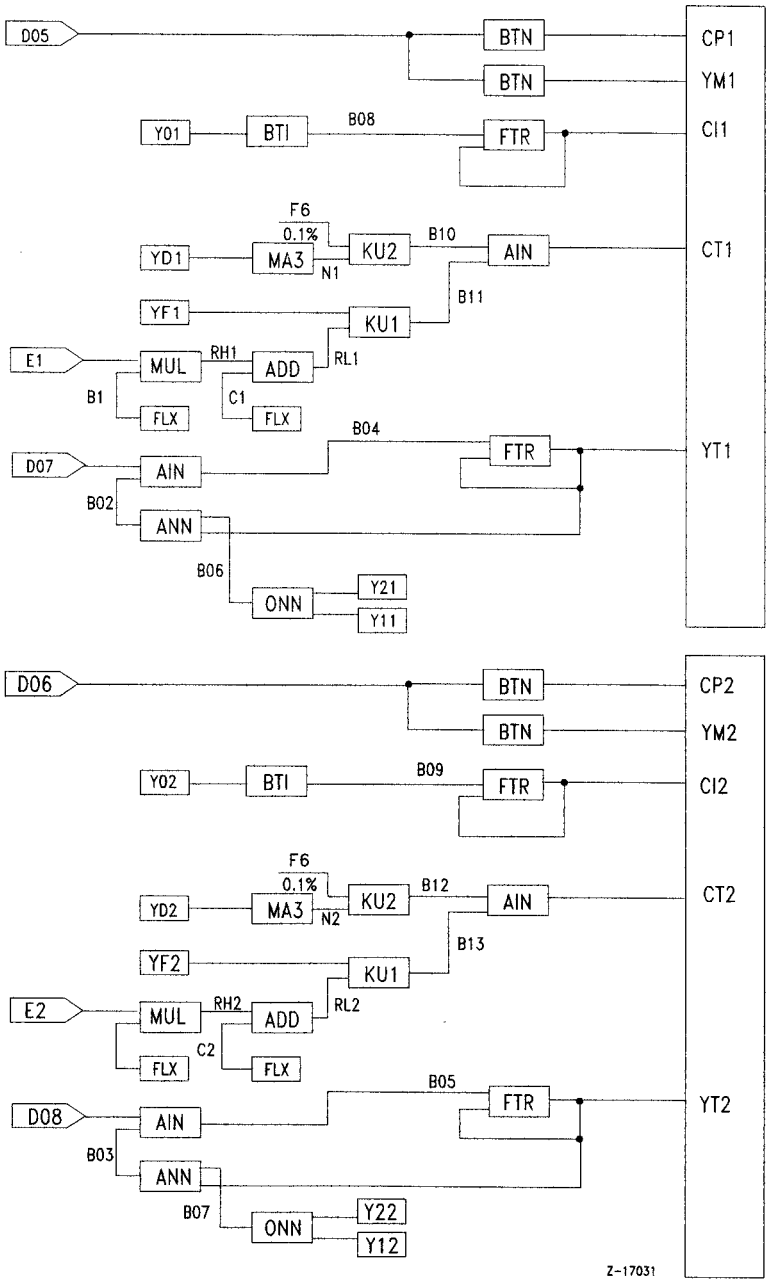
Programmer single channel, inputs

Suppl. Nos.
491, 591



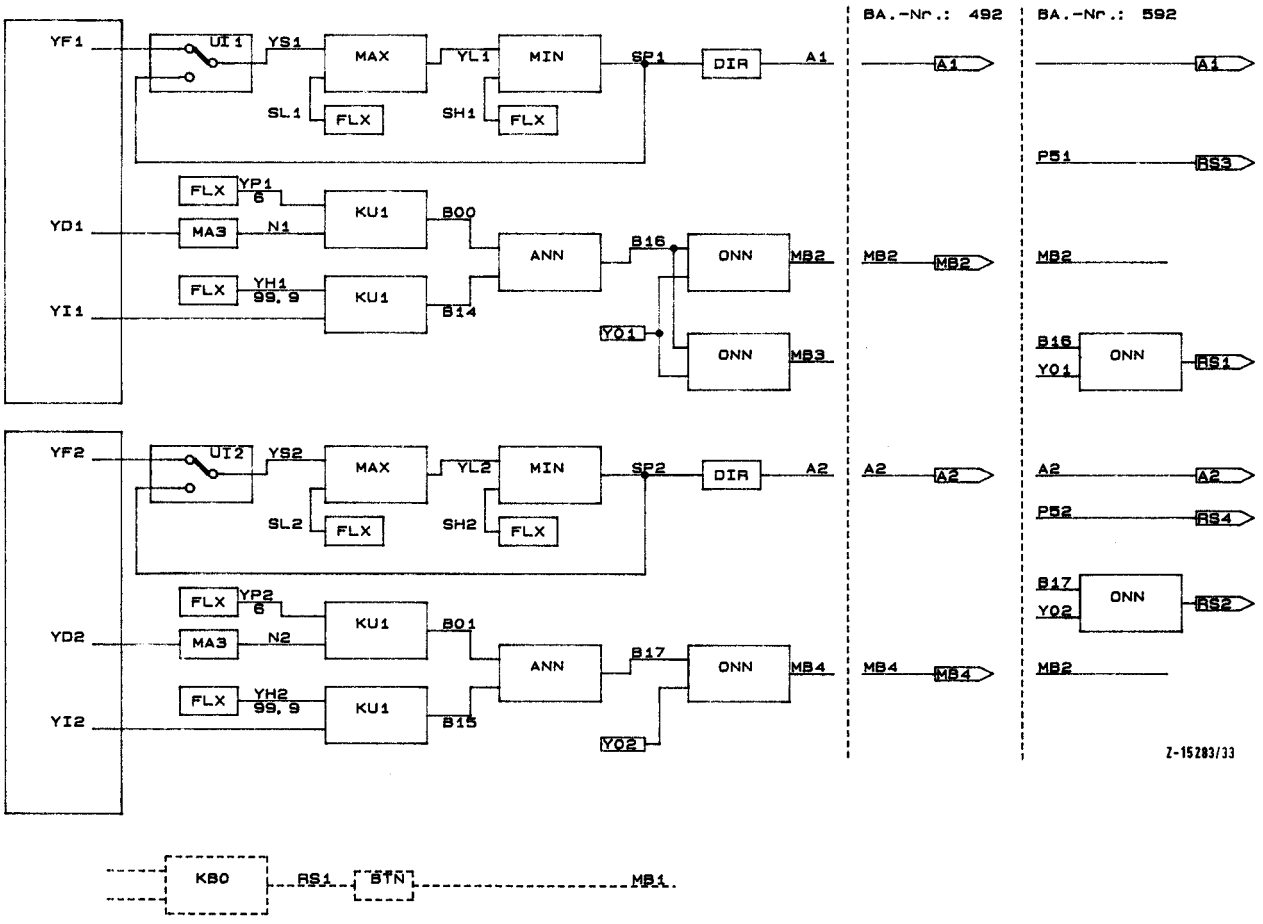
Programmer single channel, outputs

Suppl. Nos.
491, 591



Programmer, two-channel, inputs

Suppl. Nos.
492 / 592

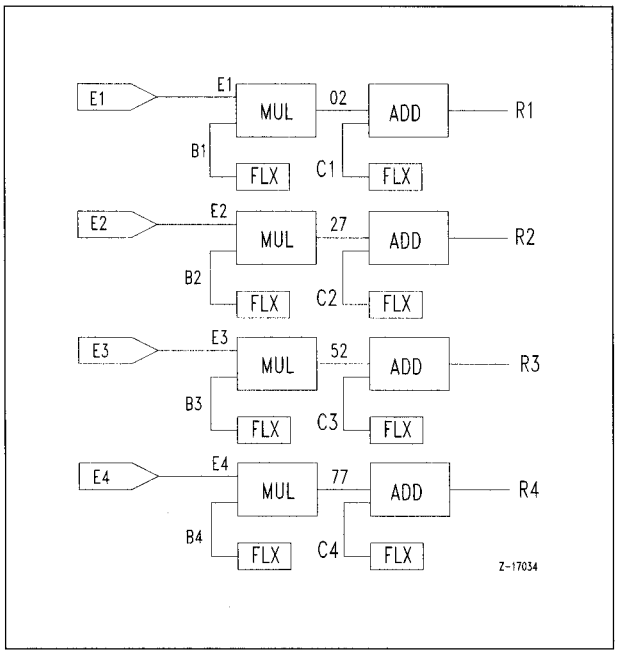


Programmer, two-channel, outputs

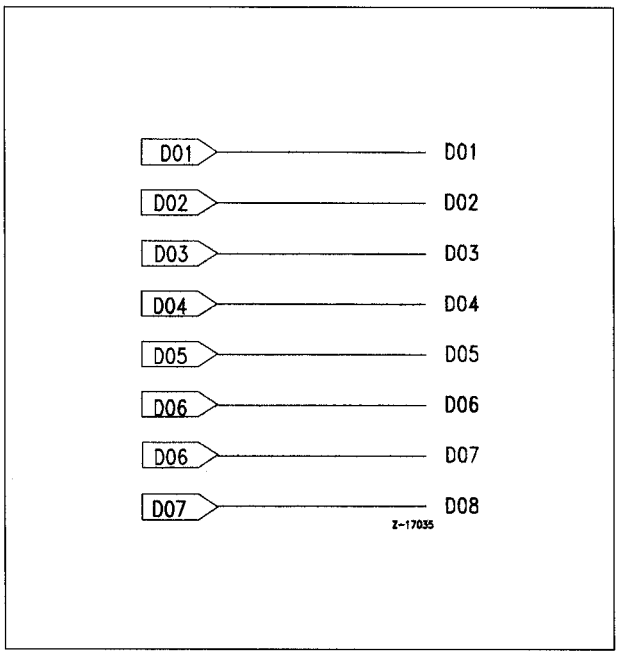
Suppl. Nos.
492 / 592

10.6 Process interface

Input signal connection

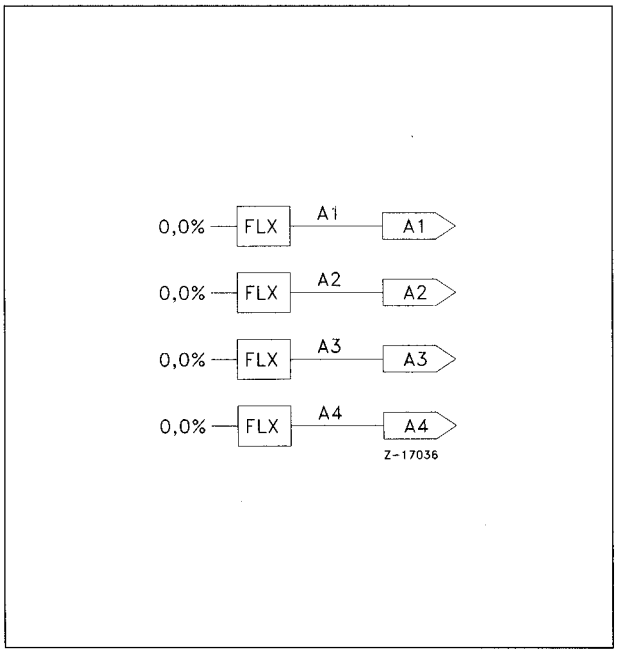


Analog inputs

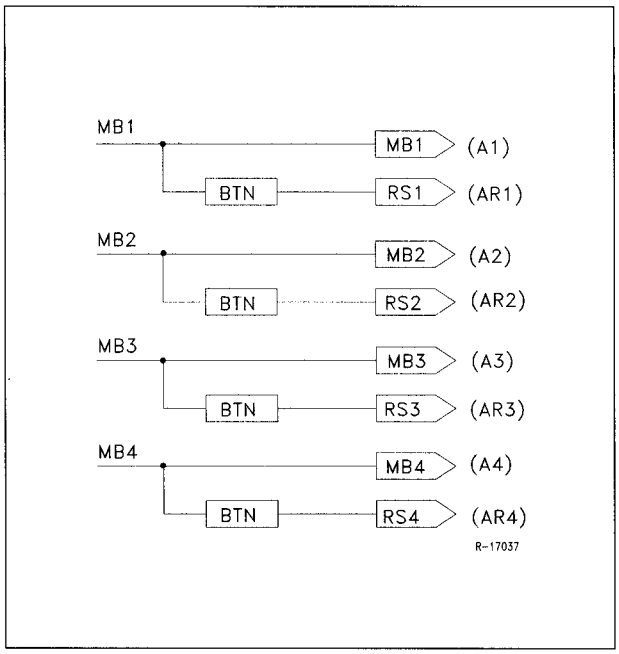


Binary inputs

Output signal connection



Analog outputs



Binary or relay outputs

Process interface

Suppl. Nos.
485 / 585

10.7 Non-configurable control and programmer modules

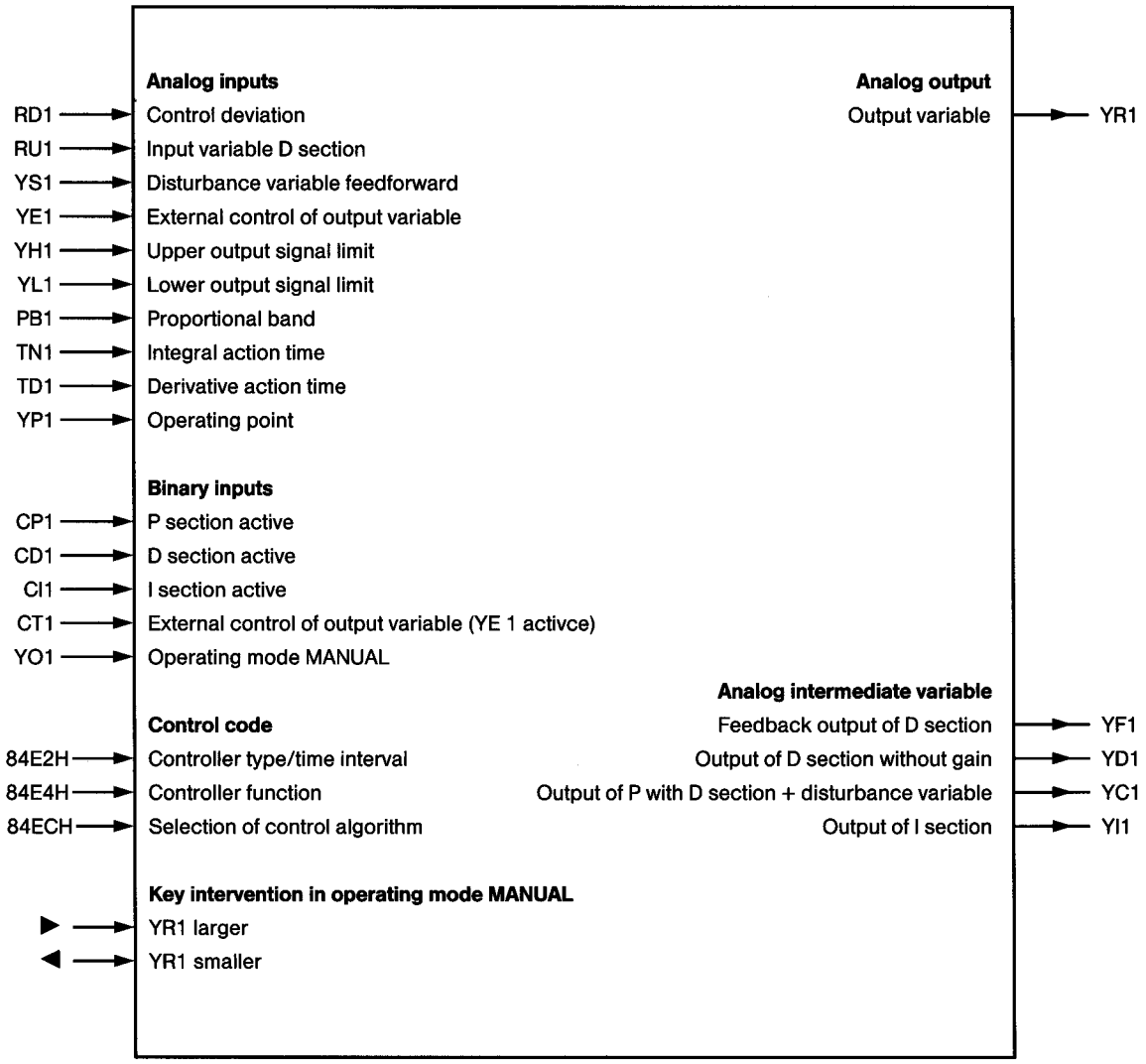


Fig. 2 Control module, continuous controller channel 1

Remark:
The display shows the control module of the 1st channel which interently cannot be configured. For the other channels 2 to 4 the displays are identical. Only the numbers of the input and output variables are changed, e.g. 3rd channel: YS3, RU3, RD3 etc.

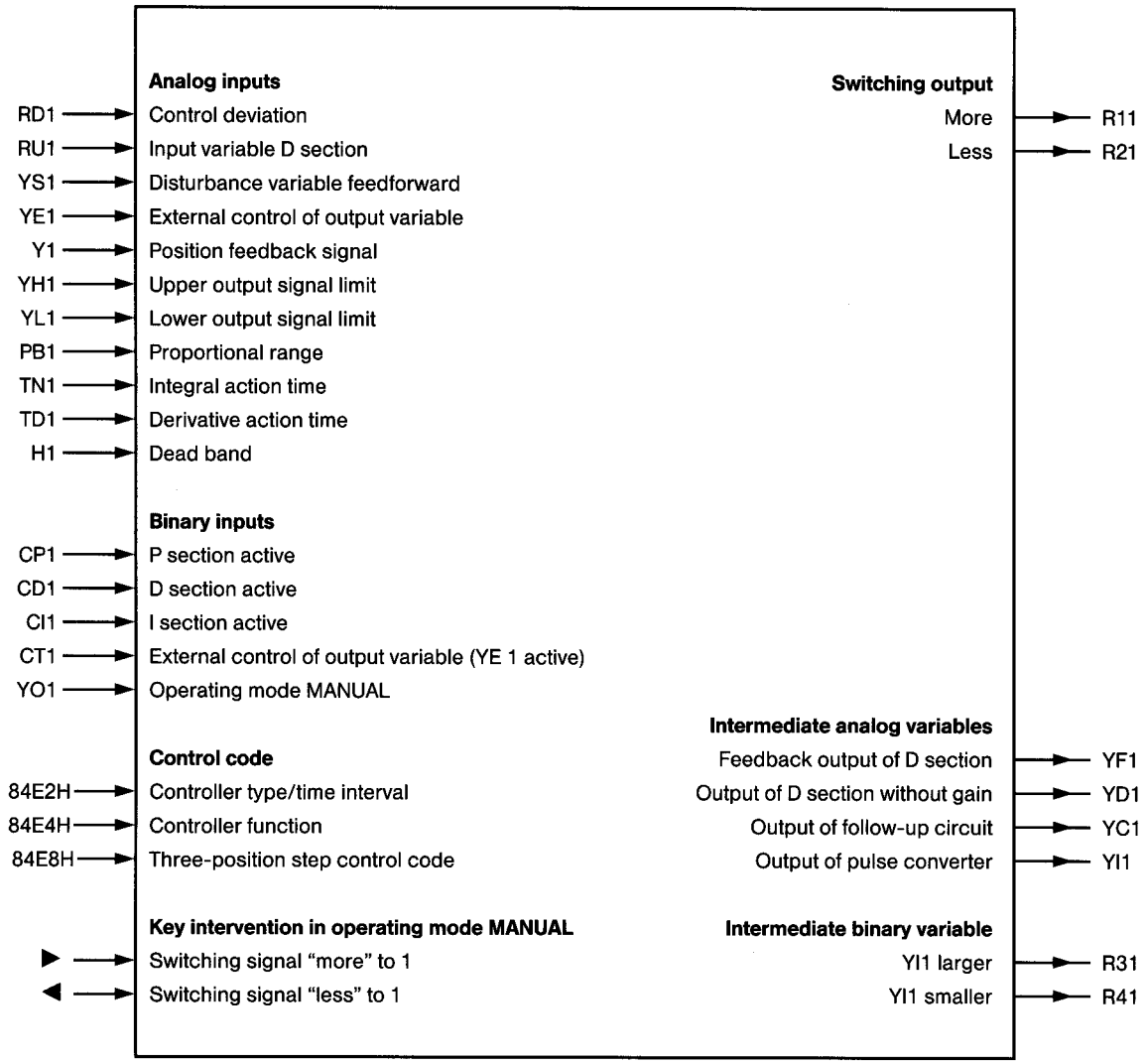


Fig. 3 Control module, step controller channel 1

Remark:
The display shows the control module of the 1st channel which interently cannot be configured. For the 2nd channel the display is identical. Only the numbers of the input and output variables, e.g. 2nd channel: YS2, RU2, RD2 etc., are changed.

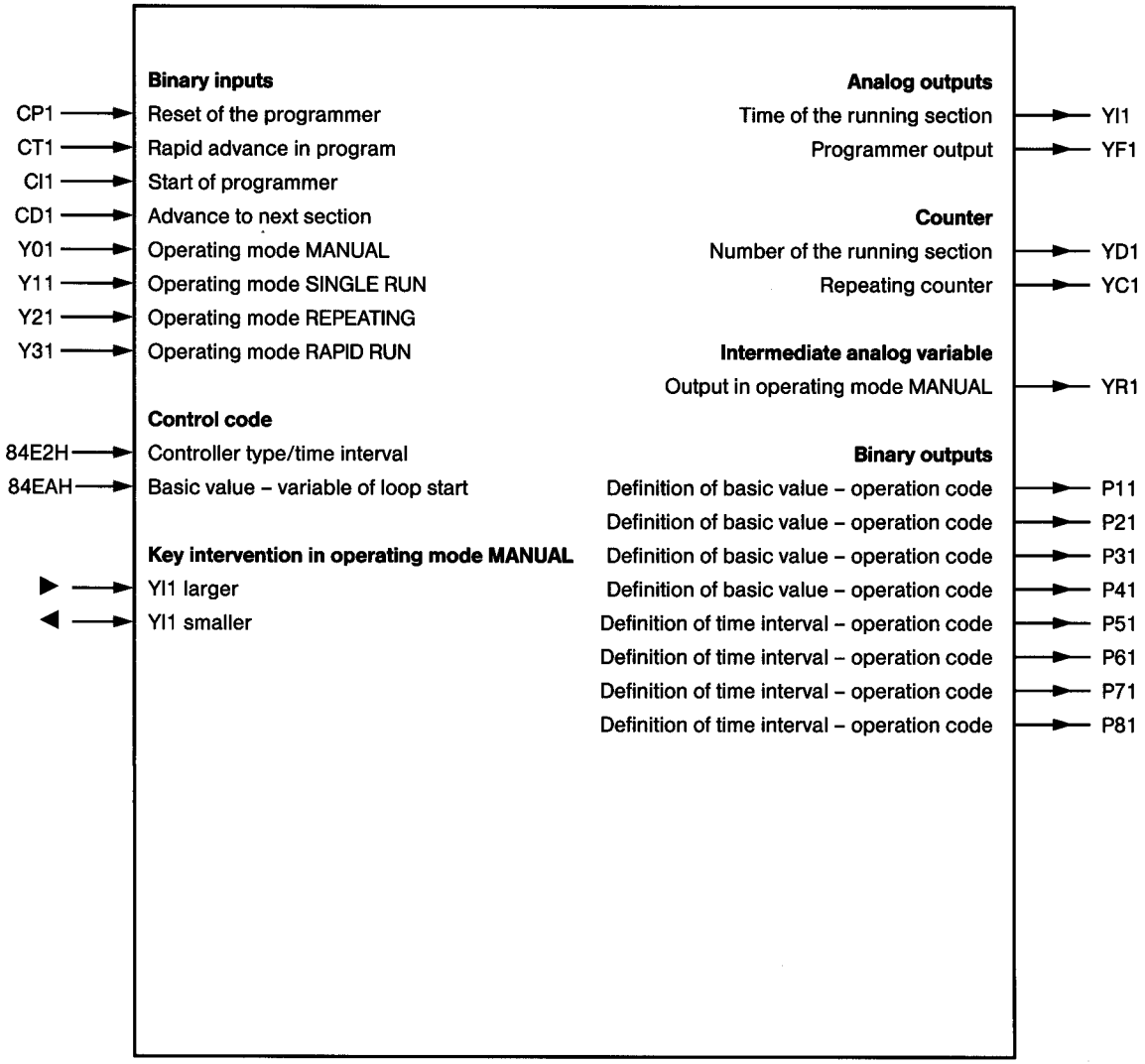


Fig. 4 Programmer module, channel 1

Remarks:
The display shows the programmer module of the 1st channel which interently cannot be configured. For the 2nd channel the display is identical. Only the numbers of the input and output variables, e.g. 2nd channel: YF2, YD2, P12 instead of 11 etc., are changed.

11 Examples

The given examples show some interesting aspects. The variables used here are not always free. Before taking over an example it should therefore be checked whether these variables are still available for the basic configuration. When fixing other variables, please note the Indications in section 4.

Further examples are given in section 10.

Explanations for individual examples

11.1 Adjustment with dead zone

For an adjustable range (dead zone) system deviation is always set to 0 via a selector module. Dead zone is set symmetrically to set point via variable H1.

11.2 Shift register (dead time)

The variable B value is assigned to variable x with a time delay. When assigning variables to the registers take care of the ascending hex-numbers from input to output of the shift register.

The delay depends upon the number of registers and the cycle time. Cycle time depends upon the integrator time constant and the variable H1. By adequate dimensioning the delay time (in seconds) could be set directly with variable H1.

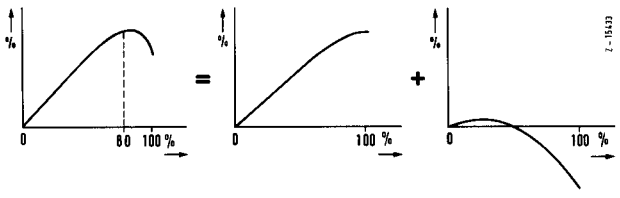
$$T_{delay}(s) = \frac{H1 \cdot TI \cdot N}{100\,\%} = \frac{H1 \cdot 10 \cdot 10}{100\,\%} = H1$$

N = number of switches (5).

11.3 Combination of tables with strongly bent characteristics

Table functions in Digitric P give an approximative characteristic. One table has 11 supporting values for linear interpolation. Distance between two supporting values is thus 10 %. This grid is too coarse for strongly bent characteristics. The configuration permits a characteristic division into two sections. Each section has an own table with 11 supporting values. The sections are of different dimensions. The separating point can be fixed with variable H1. Note that the second table starts with zero, i.e. from each value of the original characteristic the upper range value of the first section is to be subtracted.

Example:



11.4 ON delay

A signal from binary input E2P (= DO3) is switched through binary output A2 (= MB2) with a freely adjustable delay. Delay time depends upon integrator time constant F4 and variable H1 (off = not delayed)

11.5 OFF delay

Inversely to example 11.4 here a signal is delayed (on = not delayed).

11.6 Rate of change limitation

OP-codes RA1 to RAC permit a rate of change limitation. Time constant setting is not possible with these OP-codes.

In the example setting of the gradient for lowering or rising into position is set via variable H1. The gradient depends upon variable H1 and the integrator time constant.

11.7 Motor simulation

Simulation of a motor setting in order to test a 3-position step-action output cirucit.

Motor running time (60 s) can be influenced by integrator time constant and variable 46.

11.8 XP-Changeover (bumpless)

Binary input E4P (= DO7) permits switching over between two XP-values. XP-values are set via variables 61 and 62. A possible P-jump during changeover is avoided by short-ferme setting of trackbit CT1.

11.9 x-Tracking

As long as the controller is in manual mode set point follows the current actual value. Thus a bumpless changeover from manual to automatic mode is given.

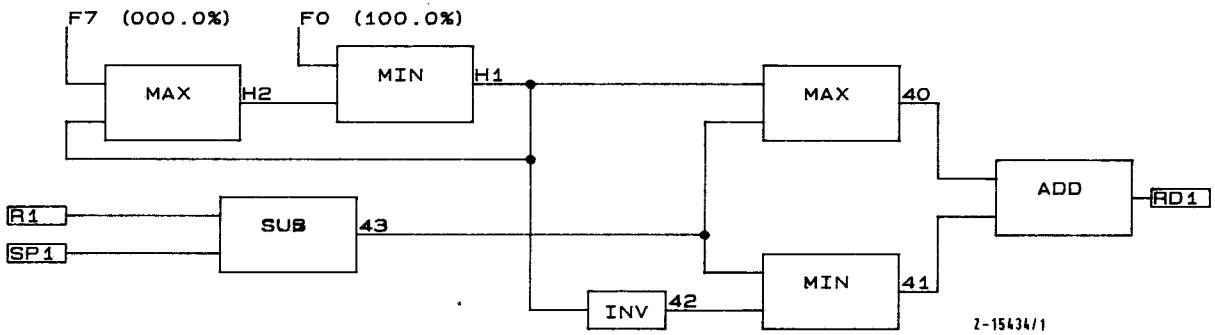
11.10 State correction with ideal gas

Gas flow-rate measurement needs to be corrected according to pressure and temperature. The physical background for this special configuration is described in detail in the Technical Information 30/62-1512 EN.

Input assignment:
E1: Differential pressure signal for flow-rate measurement
E2: Absolute pressure (correction value)
E3: Temperature (correction value)

Glossary to Examples 11.1 to 11.10 (pages 105...114)

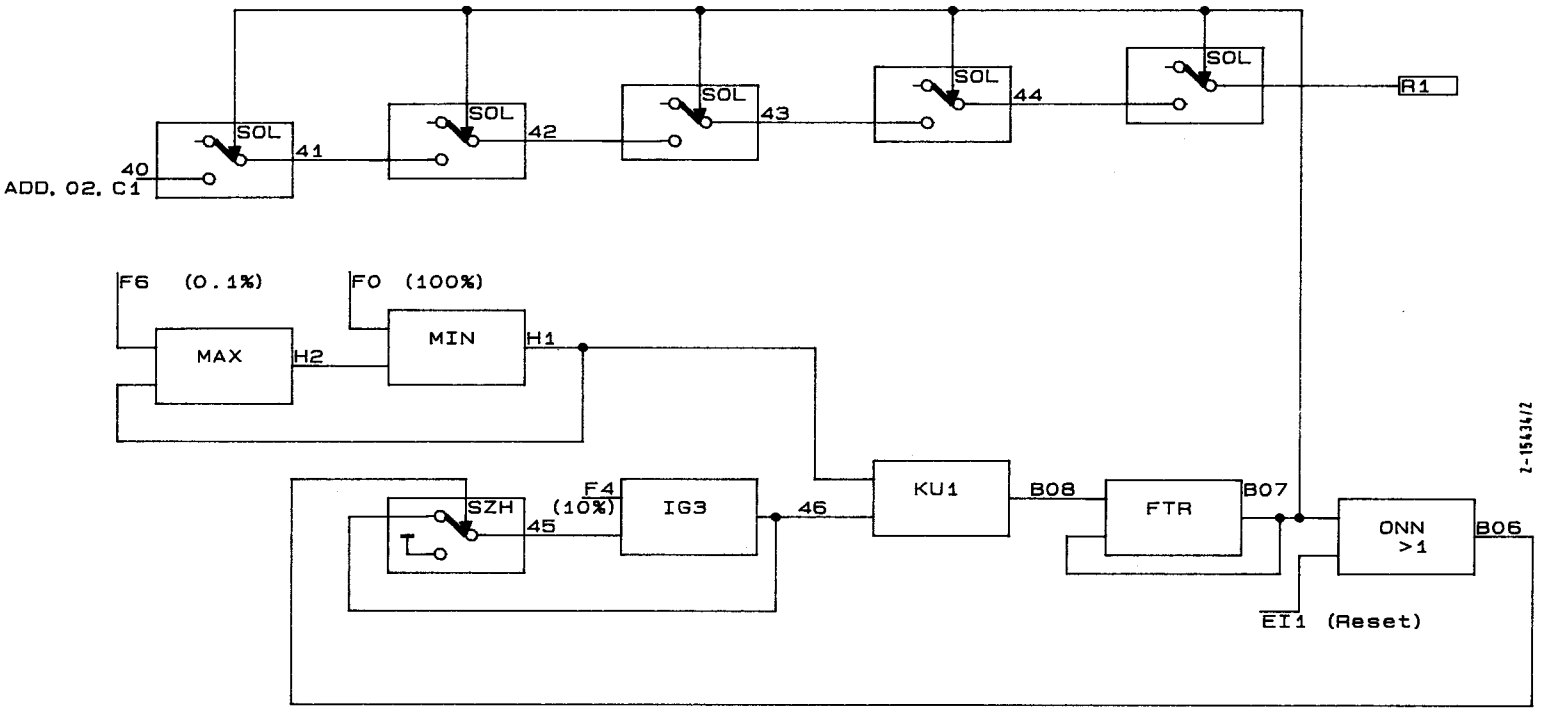
Uebergang zur Standard-konfigurierung	= Transition to standard configuration
Programmzeilen (Unterschied)	= Program lines (difference)
Konfigurierung	= Configuration
Vergleichs-konfigurierung	= Reference configuration
Kontrollcode (Unterschied)	= Control code (difference)



▭ = Uebergang zur Standardkonfigurierung

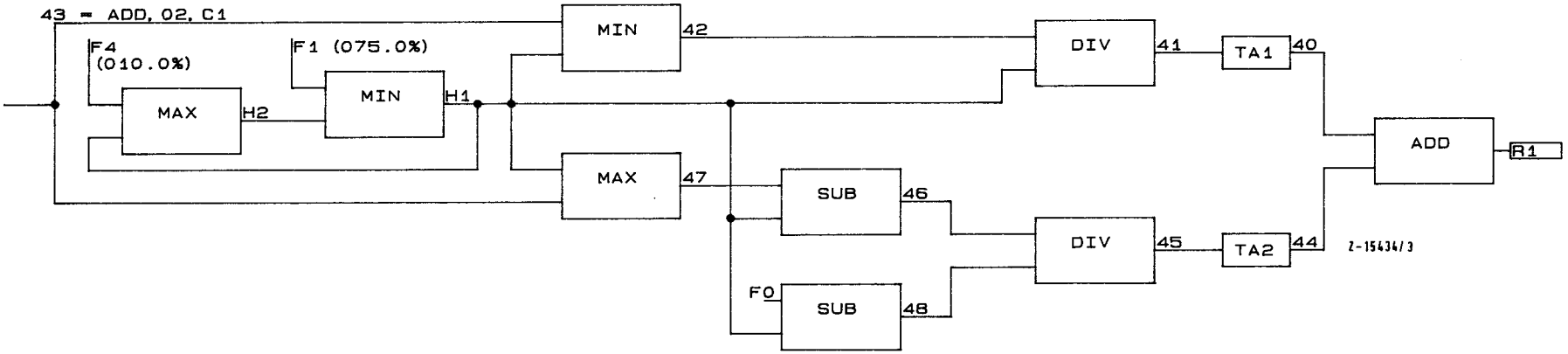
```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:      0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:      0
   H1: FLX,#+005.0  840BH: A5H,20H,83H | 41 : MIN,42 ,43   8465H: 47H,66H,67H
  RD1: ADD,40 ,41   8411H: 48H,64H,65H | 42 : INV, H1,      8466H: 3CH,0BH,00H
  40 : MAX, H1,43   8464H: 46H,0BH,67H | 43 : SUB, R1,SP1  8467H: 49H,10H,15H
Programmzeilen :  6 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
----------------------------------
8773H: 0BH | 8782H: 0AH |
Kontrollcode :  2  Unterschied(e)
```


Example 11.1 Adjustment with dead zone



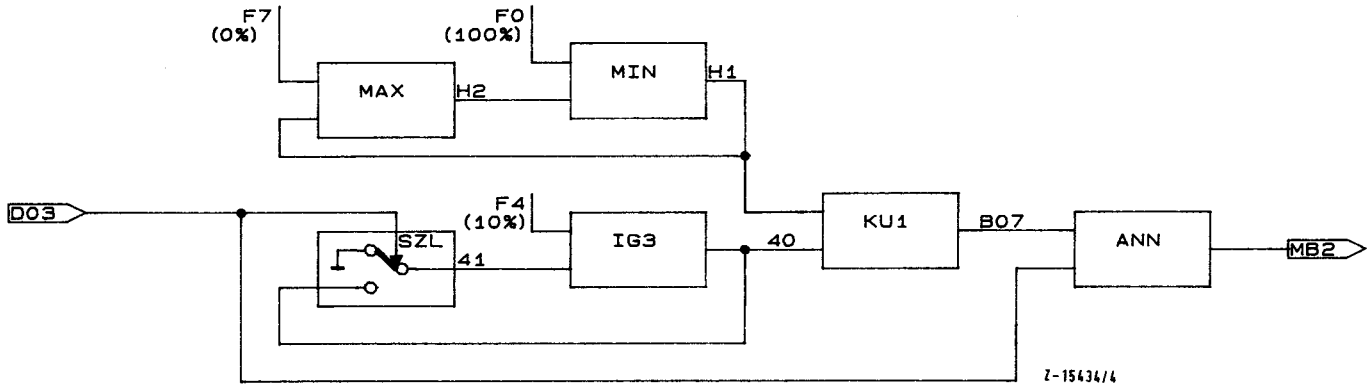

```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
   H1: MIN,F0 , H2  8408H: 47H,F8H,40H | 44 : SOL,43 ,B07  8468H: 11H,67H,53H
   R1: SOL,44 ,B07  8410H: 11H,68H,53H | 45 : SZH,46 ,B06  8469H: 16H,6AH,52H
   H2: MAX,F6 , H1  8440H: 46H,FEH,0BH | 46 : IG3,F4 ,45   846AH: 76H,FCH,69H
  40 : ADD,02 ,C1   8464H: 48H,22H,05H | B06: ONN,B07,EI1  8752H: 07H,53H,A2H
  41 : SOL,40 ,B07  8465H: 11H,64H,53H | B07: FTR,B08,B07  8753H: 0EH,54H,53H
  42 : SOL,41 ,B07  8466H: 11H,65H,53H | B08: KU1, H1,46   8754H: 87H,0BH,6AH
  43 : SOL,42 ,B07  8467H: 11H,66H,53H |
Programmzeilen :  13 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
--------------------------

  8773H: 0BH | 8782H: 0AH |
Kontrollcode :  2  Unterschied(e)
```

Example 11.2 Shift register (dead time)




```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
   H1: MIN,F1 , H2   840BH: 47H,F9H,40H | 43 : ADD,02 ,C1   8467H: 48H,22H,05H
   R1: ADD,40 ,44    8410H: 48H,64H,68H | 44 : TA2,45 ,      8468H: 51H,69H,00H
   H2: MAX,F4 , H1   8440H: 46H,FCH,0BH | 45 : DIV,46 ,48'   8469H: 48H,6AH,6CH
  40 : TA1,41 ,      8464H: 50H,65H,00H | 46 : SUB,47 , H1   846AH: 49H,6BH,0BH
  41 : DIV,42 , H1   8465H: 48H,66H,0BH | 47 : MAX,43 , H1   846BH: 46H,67H,0BH
  42 : MIN,43 , H1   8466H: 47H,67H,0BH | 48 : SUB,F0 , H1   846CH: 49H,F8H,0BH
Programmzeilen :  12 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
--------------------------

 8773H: 0BH
 8782H: 0AH
```

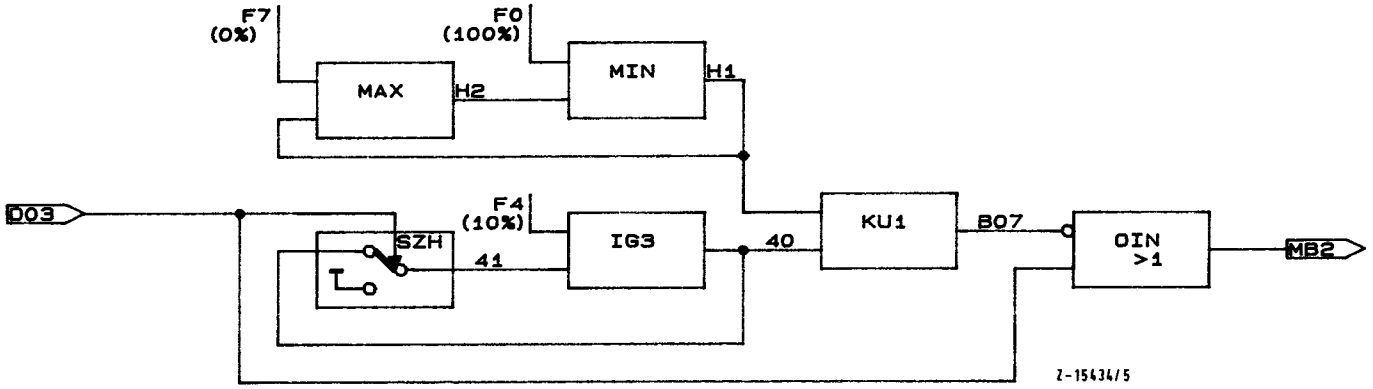

Example 11.3 Combination of tables with strongly bent characteristic



Additional hardware: input module 2x binary in module slot E2
eventually invert input (89AB:FF)

```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
   H1: MIN, H2,F0   8408H: 47H,40H,F8H | 41 : SZL,40 ,D03  8465H: 15H,64H,FAH
   H2: MAX, H1,F7   8440H: 46H,0BH,FFH | MB2: ANN,B07,D03  8731H: 03H,53H,FAH
  40 : IG3,F4 ,41   8464H: 76H,FCH,65H | B07: KU1, H1,40   8753H: 87H,0BH,64H
Programmzeilen :  6 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  8773H: 0BH | 8782H: 0AH |
Kontrollcode :  2  Unterschied(e)
```

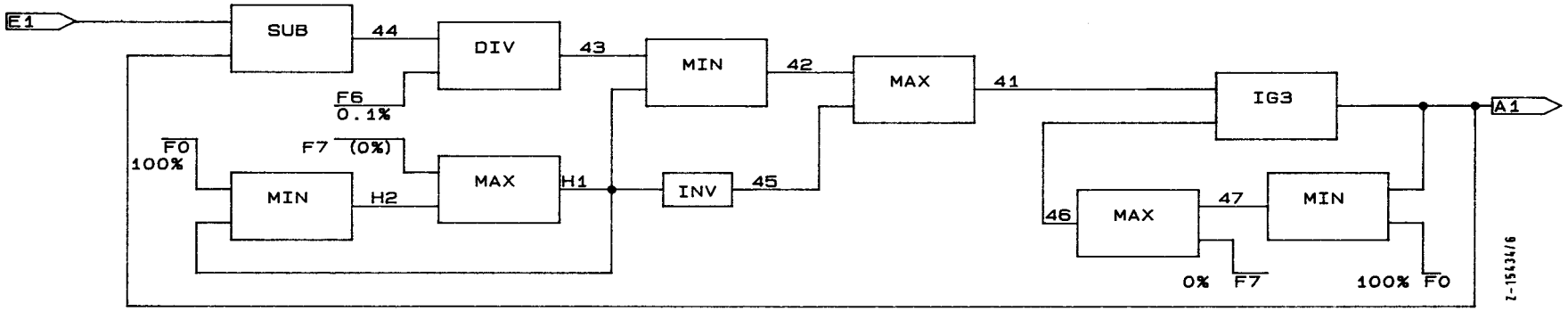
Example 11.4 ON delay



Zusatzhardware: Eingangsmodul 2 x Binaer auf Steckplatz E2
ggf. Eingaenge invertieren (89A8: FF)

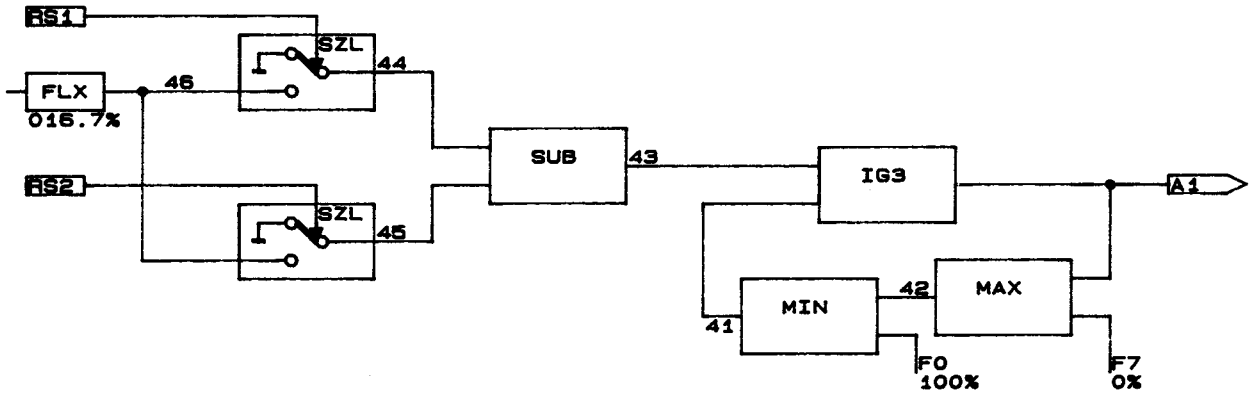
```
--------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
--------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
   H1: MIN,F0 , H2  8408H: 47H,F8H,40H | 41 : SZH,40 ,D03  8465H: 16H,64H,FAH
   H2: MAX,F7 , H1  8440H: 46H,FFH,08H | MB2: OIN,B07,D03  8731H: 09H,53H,FAH
  40 : IG3,F4 ,41   8464H: 76H,FCH,65H | B07: KU1, H1,40   8753H: 87H,08H,64H
Programmzeilen :  6 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
--------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  8773H: 08H | 8782H: 0AH |
Kontrollcode :  2  Unterschied(e)
```


Example 11.5 OFF delay




```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  A1 : IG3,41 ,46   8400H: 76H,65H,6AH | 43 : DIV,44 ,F6   8467H: 4BH,68H,FEH
   H1: MAX,F7 , H2  8408H: 46H,FFH,40H | 44 : SUB,E1 ,A1   8468H: 49H,D8H,00H
   H2: MIN,F0 , H1  8440H: 47H,F8H,0BH | 45 : INV, H1,     8469H: 3CH,0BH,00H
  41 : MAX,42 ,45   8465H: 46H,66H,69H | 46 : MAX,F7 ,47   846AH: 46H,FFH,6BH
  42 : MIN,43 , H1  8466H: 47H,67H,0BH | 47 : MIN,F0 ,A1   8468H: 47H,F8H,00H
Programmzeilen :  10 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  8773H: 0BH | 8782H: 0AH |
Kontrollcode :  2  Unterschied(e)
```

Example 11.6 Rate of change limitation



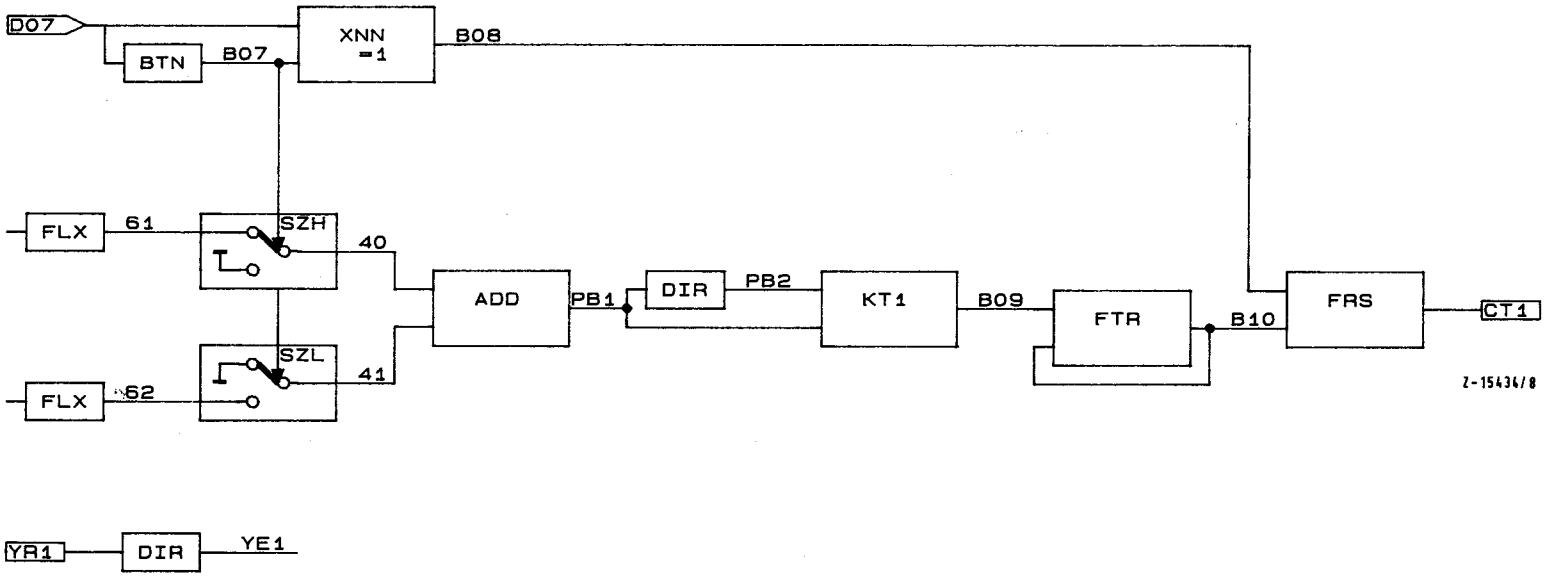
Basic configuration: BA-551

Acting time for a 100% modification = 50 seconds

Z-15434/7

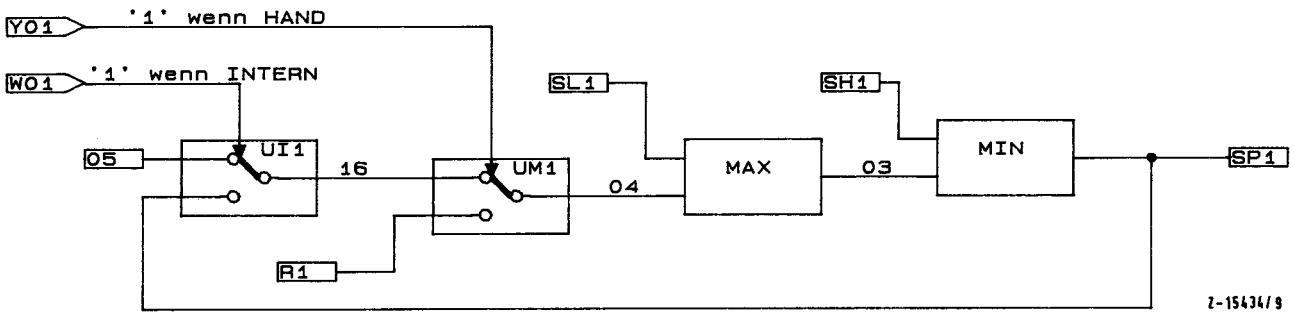
```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (551)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (551)  VERSION: 5      KONFI-NR.:     0
  A1 : IG3,43 ,41   8400H: 76H,67H,65H | 44 : SZL,46 ,RS1  8468H: 15H,6AH,34H
  41 : MIN,42 ,F0   8465H: 47H,66H,F8H | 45 : SZL,46 ,RS2  8469H: 15H,6AH,35H
  42 : MAX,A1 ,F7   8466H: 46H,00H,FFH | 46 : FLX,#+016.7  846AH: A5H,70H,8AH
  43 : SUB,44 ,45   8467H: 49H,68H,69H |
Programmzeilen :  7 Unterschied(e)
```


Example 11.7 Motor simulation for testing a step-action controller



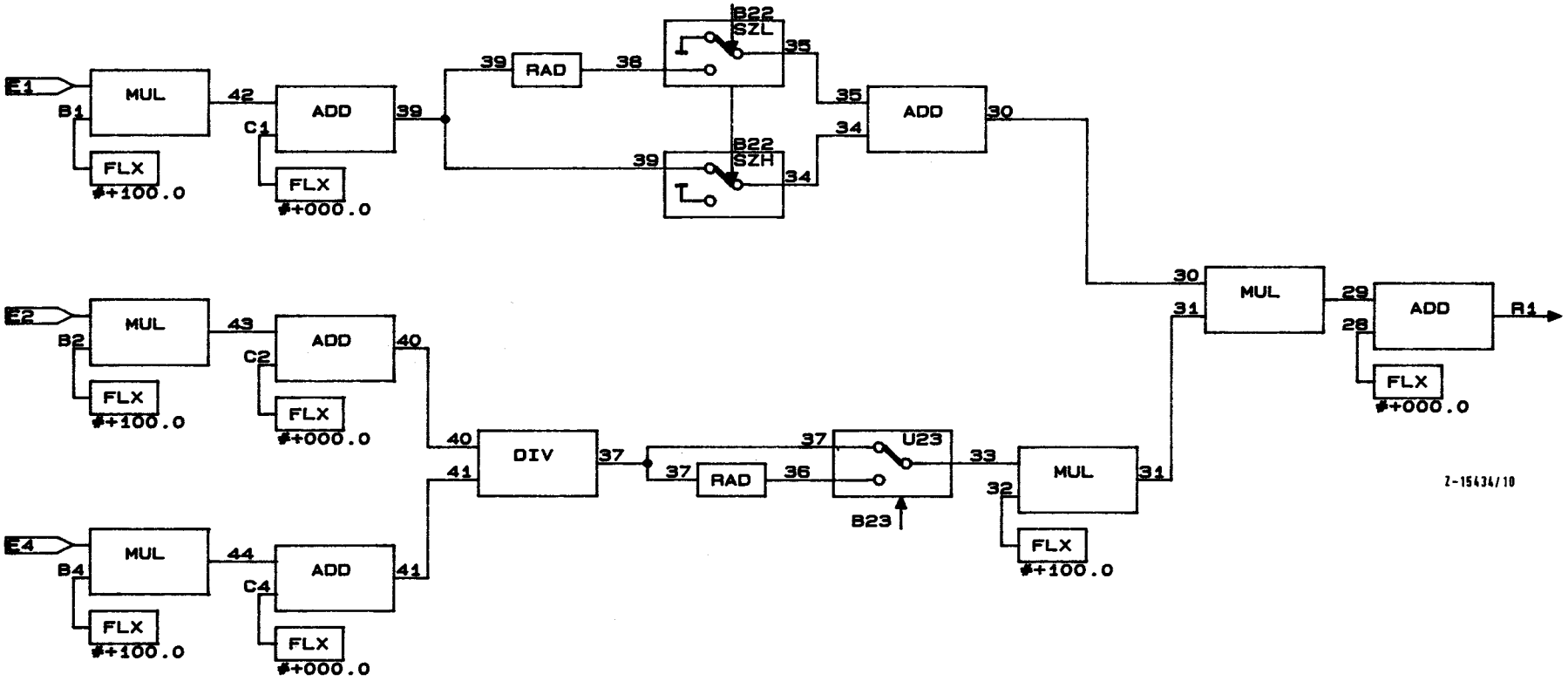

```
--------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
--------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  PB1: ADD,40 ,41    840FH: 48H,64H,65H | YT1: BTN,LLL,      8710H: 01H,84H,00H
  YE1: DIR,YR1,      841BH: 3DH,E0H,00H | CT1: FRS,B08,B10   873CH: 0DH,54H,56H
  PB2: DIR,PB1,      8444H: 3DH,0FH,00H | B07: BTN,D07,      8753H: 01H,FEH,00H
  40 : SZH,61 ,B07   8464H: 16H,95H,53H | B08: XNN,D07,B07   8754H: 0BH,FEH,53H
  41 : SZL,62 ,B07   8465H: 15H,96H,53H | B09: KT1,PB2,PB1   8755H: 91H,44H,0FH
  61 : FLX,#+010.0   8495H: A5H,40H,86H | B10: FTR,B09,B10   8756H: 0EH,55H,56H
  62 : FLX,#+015.0   8496H: A5H,60H,89H |
Programmzeilen :  13 Unterschied(e)

KONTROLLCODE (UNTERSCHIED)
------------------------------------------
  8773H: 95H | 8774H: 96H | 8782H: 0BH |
Kontrollcode :  3  Unterschied(e)
```

Example 11.8 Bumpless XP-changeover depending input D07




```
------------------------------------------------------------------------------
PROGRAMMZEILEN (UNTERSCHIED)
------------------------------------------------------------------------------
KONFIGURIERUNG..... 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
VERGLEICHSKONFIGURIERUNG 6141X-0-...  (471)  VERSION: 5      KONFI-NR.:     0
  04 : UM1,16 , R1  8424H: 17H,30H,10H | 16 : UI1,05 ,SP1  8430H: 27H,25H,15H
Programmzeilen :  2 Unterschied(e)
```


Example 11.9 x-Tracking (Set pointt follows actual value in manual mode)



Adjustment:
Differential pressure method:

B22 = 0, if Ei proportional to differential pressure root
B22 = 1, if Ei directly proportional to differential pressure

Speed rate method:
Basic adjustment:
Switch positions:
B23 normally = B22
Input assignment = Ri:
with 451/551

B22 = 0
Bi = B2 = B3 = B4 = 100.0%, 28 = 0%
B22 = B23 = 0
Deviations see calculation sheet

with 471

Example 11.10 State correction with ideal gas

12.1 Tables for conversion of % into HEX. Figures

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.0	8000	8010	8020	8030	8040	8050	8060	8070	8080	8090
1.0	80A0	80B0	80C0	80D0	80E0	80F0	8100	8110	8120	8130
2.0	8140	8150	8160	8170	8180	8190	81A0	81B0	81C0	81D0
3.0	81E0	81F0	8200	8210	8220	8230	8240	8250	8260	8270
4.0	8280	8290	82A0	82B0	82C0	82D0	82E0	82F0	8300	8310
5.0	8320	8330	8340	8350	8360	8370	8380	8390	83A0	83B0
6.0	83C0	83D0	83E0	83F0	8400	8410	8420	8430	8440	8450
7.0	8460	8470	8480	8490	84A0	84B0	84C0	84D0	84E0	84F0
8.0	8500	8510	8520	8530	8540	8550	8560	8570	8580	8590
9.0	85A0	85B0	85C0	85D0	85E0	85F0	8600	8610	8620	8630
10.0	8640	8650	8660	8670	8680	8690	86A0	86B0	86C0	86D0
11.0	86E0	86F0	8700	8710	8720	8730	8740	8750	8760	8770
12.0	8780	8790	87A0	87B0	87C0	87D0	87E0	87F0	8800	8810
13.0	8820	8830	8840	8850	8860	8870	8880	8890	88A0	88B0
14.0	88C0	88D0	88E0	88F0	8900	8910	8920	8930	8940	8950
15.0	8960	8970	8980	8990	89A0	89B0	89C0	89D0	89E0	89F0
16.0	8A00	8A10	8A20	8A30	8A40	8A50	8A60	8A70	8A80	8A90
17.0	8AA0	8AB0	8AC0	8AD0	8AE0	8AF0	8B00	8B10	8B20	8B30
18.0	8B40	8B50	8B60	8B70	8B80	8B90	8BA0	8BB0	8BC0	8BD0
19.0	8BE0	8BF0	8C00	8C10	8C20	8C30	8C40	8C50	8C60	8C70
20.0	8C80	8C90	8CA0	8CB0	8CC0	8CD0	8CE0	8CF0	8D00	8D10
21.0	8D20	8D30	8D40	8D50	8D60	8D70	8D80	8D90	8DA0	8DB0
22.0	8DC0	8DD0	8DE0	8DF0	8E00	8E10	8E20	8E30	8E40	8E50
23.0	8E60	8E70	8E80	8E90	8EA0	8EB0	8EC0	8ED0	8EE0	8EF0
24.0	8F00	8F10	8F20	8F30	8F40	8F50	8F60	8F70	8F80	8F90
25.0	8FA0	8FB0	8FC0	8FD0	8FE0	8FF0	9000	9010	9020	9030
26.0	9040	9050	9060	9070	9080	9090	90A0	90B0	90C0	90D0
27.0	90E0	90F0	9100	9110	9120	9130	9140	9150	9160	9170
28.0	9180	9190	91A0	91B0	91C0	91D0	91E0	91F0	9200	9210
29.0	9220	9230	9240	9250	9260	9270	9280	9290	92A0	92B0
30.0	92C0	92D0	92E0	92F0	9300	9310	9320	9330	9340	9350
31.0	9360	9370	9380	9390	93A0	93B0	93C0	93D0	93E0	93F0
32.0	9400	9410	9420	9430	9440	9450	9460	9470	9480	9490
33.0	94A0	94B0	94C0	94D0	94E0	94F0	9500	9510	9520	9530
34.0	9540	9550	9560	9570	9580	9590	95A0	95B0	95C0	95D0
35.0	95E0	95F0	9600	9610	9620	9630	9640	9650	9660	9670
36.0	9680	9690	96A0	96B0	96C0	96D0	96E0	96F0	9700	9710
37.0	9720	9730	9740	9750	9760	9770	9780	9790	97A0	97B0
38.0	97C0	97D0	97E0	97F0	9800	9810	9820	9830	9840	9850
39.0	9860	9870	9880	9890	98A0	98B0	98C0	98D0	98E0	98F0
40.0	9900	9910	9920	9930	9940	9950	9960	9970	9980	9990
41.0	99A0	99B0	99C0	99D0	99E0	99F0	9A00	9A10	9A20	9A30
42.0	9A40	9A50	9A60	9A70	9A80	9A90	9AA0	9AB0	9AC0	9AD0
43.0	9AE0	9AF0	9B00	9B10	9B20	9B30	9B40	9B50	9B60	9B70
44.0	9B80	9B90	9BA0	9BB0	9BC0	9BD0	9BE0	9BF0	9C00	9C10
45.0	9C20	9C30	9C40	9C50	9C60	9C70	9C80	9C90	9CA0	9CB0
46.0	9CC0	9CD0	9CE0	9CF0	9D00	9D10	9D20	9D30	9D40	9D50
47.0	9D60	9D70	9D80	9D90	9DA0	9DB0	9DC0	9DD0	9DE0	9DF0
48.0	9E00	9E10	9E20	9E30	9E40	9E50	9E60	9E70	9E80	9E90
49.0	9EA0	9EB0	9EC0	9ED0	9EE0	9EF0	9F00	9F10	9F20	9F30
50.0	9F40	9F50	9F60	9F70	9F80	9F90	9FA0	9FB0	9FC0	9FD0

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
50.0	9F40	9F50	9F60	9F70	9F80	9F90	9FA0	9FB0	9FC0	9FD0
51.0	9FE0	9FF0	A000	A010	A020	A030	A040	A050	A060	A070
52.0	A080	A090	A0A0	A0B0	A0C0	A0D0	A0E0	A0F0	A100	A110
53.0	A120	A130	A140	A150	A160	A170	A180	A190	A1A0	A1B0
54.0	A1C0	A1D0	A1E0	A1F0	A200	A210	A220	A230	A240	A250
55.0	A260	A270	A280	A290	A2A0	A2B0	A2C0	A2D0	A2E0	A2F0
56.0	A300	A310	A320	A330	A340	A350	A360	A370	A380	A390
57.0	A3A0	A3B0	A3C0	A3D0	A3E0	A3F0	A400	A410	A420	A430
58.0	A440	A450	A460	A470	A480	A490	A4A0	A4B0	A4C0	A4D0
59.0	A4E0	A4F0	A500	A510	A520	A530	A540	A550	A560	A570
60.0	A580	A590	A5A0	A5B0	A5C0	A5D0	A5E0	A5F0	A600	A610
61.0	A620	A630	A640	A650	A660	A670	A680	A690	A6A0	A6B0
62.0	A6C0	A6D0	A6E0	A6F0	A700	A710	A720	A730	A740	A750
63.0	A760	A770	A780	A790	A7A0	A7B0	A7C0	A7D0	A7E0	A7F0
64.0	A800	A810	A820	A830	A840	A850	A860	A870	A880	A890
65.0	A8A0	A8B0	A8C0	A8D0	A8E0	A8F0	A900	A910	A920	A930
66.0	A940	A950	A960	A970	A980	A990	A9A0	A9B0	A9C0	A9D0
67.0	A9E0	A9F0	AA00	AA10	AA20	AA30	AA40	AA50	AA60	AA70
68.0	AA80	AA90	AAA0	AAB0	AAC0	AAD0	AAE0	AAF0	AB00	AB10
69.0	AB20	AB30	AB40	AB50	AB60	AB70	AB80	AB90	ABA0	ABB0
70.0	ABC0	ABD0	ABE0	ABF0	AC00	AC10	AC20	AC30	AC40	AC50
71.0	AC60	AC70	AC80	AC90	ACA0	ACB0	ACC0	ACD0	ACE0	ACF0
72.0	AD00	AD10	AD20	AD30	AD40	AD50	AD60	AD70	AD80	AD90
73.0	ADA0	ADB0	ADC0	ADD0	ADE0	ADF0	AE00	AE10	AE20	AE30
74.0	AE40	AE50	AE60	AE70	AE80	AE90	AEA0	AEB0	AEC0	AED0
75.0	AEE0	AEF0	AF00	AF10	AF20	AF30	AF40	AF50	AF60	AF70
76.0	AF80	AF90	AFA0	AFB0	AFC0	AFD0	AFE0	AFF0	B000	B010
77.0	B020	B030	B040	B050	B060	B070	B080	B090	B0A0	B0B0
78.0	B0C0	B0D0	B0E0	B0F0	B100	B110	B120	B130	B140	B150
79.0	B160	B170	B180	B190	B1A0	B1B0	B1C0	B1D0	B1E0	B1F0
80.0	B200	B210	B220	B230	B240	B250	B260	B270	B280	B290
81.0	B2A0	B2B0	B2C0	B2D0	B2E0	B2F0	B300	B310	B320	B330
82.0	B340	B350	B360	B370	B380	B390	B3A0	B3B0	B3C0	B3D0
83.0	B3E0	B3F0	B400	B410	B420	B430	B440	B450	B460	B470
84.0	B480	B490	B4A0	B4B0	B4C0	B4D0	B4E0	B4F0	B500	B510
85.0	B520	B530	B540	B550	B560	B570	B580	B590	B5A0	B5B0
86.0	B5C0	B5D0	B5E0	B5F0	B600	B610	B620	B630	B640	B650
87.0	B660	B670	B680	B690	B6A0	B6B0	B6C0	B6D0	B6E0	B6F0
88.0	B700	B710	B720	B730	B740	B750	B760	B770	B780	B790
89.0	B7A0	B7B0	B7C0	B7D0	B7E0	B7F0	B800	B810	B820	B830
90.0	B840	B850	B860	B870	B880	B890	B8A0	B8B0	B8C0	B8D0
91.0	B8E0	B8F0	B900	B910	B920	B930	B940	B950	B960	B970
92.0	B980	B990	B9A0	B9B0	B9C0	B9D0	B9E0	B9F0	BA00	BA10
93.0	BA20	BA30	BA40	BA50	BA60	BA70	BA80	BA90	BAA0	BAB0
94.0	BAC0	BAD0	BAE0	BAF0	BB00	BB10	BB20	BB30	BB40	BB50
95.0	BB60	BB70	BB80	BB90	BBA0	BBB0	BBC0	BBD0	BBE0	BBF0
96.0	BC00	BC10	BC20	BC30	BC40	BC50	BC60	BC70	BC80	BC90
97.0	BCA0	BCB0	BCC0	BCD0	BCE0	BCF0	BD00	BD10	BD20	BD30
98.0	BD40	BD50	BD60	BD70	BD80	BD90	BDA0	BDB0	BDC0	BDD0
99.0	BDE0	BDF0	BE00	BE10	BE20	BE30	BE40	BE50	BE60	BE70
100.0	BE80	BE90	BEA0	BEB0	BEC0	BED0	BEE0	BEF0	BF00	BF10

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
100.0	BE80	BE90	BEA0	BEB0	BEC0	BED0	BEE0	BEF0	BF00	BF10
101.0	BF20	BF30	BF40	BF50	BF60	BF70	BF80	BF90	BFA0	BFB0
102.0	BFC0	BFD0	BFE0	BFF0	C000	C010	C020	C030	C040	C050
103.0	C060	C070	C080	C090	C0A0	C0B0	C0C0	C0D0	C0E0	C0F0
104.0	C100	C110	C120	C130	C140	C150	C160	C170	C180	C190
105.0	C1A0	C1B0	C1C0	C1D0	C1E0	C1F0	C200	C210	C220	C230
106.0	C240	C250	C260	C270	C280	C290	C2A0	C2B0	C2C0	C2D0
107.0	C2E0	C2F0	C300	C310	C320	C330	C340	C350	C360	C370
108.0	C380	C390	C3A0	C3B0	C3C0	C3D0	C3E0	C3F0	C400	C410
109.0	C420	C430	C440	C450	C460	C470	C480	C490	C4A0	C4B0
110.0	C4C0	C4D0	C4E0	C4F0	C500	C510	C520	C530	C540	C550
111.0	C560	C570	C580	C590	C5A0	C5B0	C5C0	C5D0	C5E0	C5F0
112.0	C600	C610	C620	C630	C640	C650	C660	C670	C680	C690
113.0	C6A0	C6B0	C6C0	C6D0	C6E0	C6F0	C700	C710	C720	C730
114.0	C740	C750	C760	C770	C780	C790	C7A0	C7B0	C7C0	C7D0
115.0	C7E0	C7F0	C800	C810	C820	C830	C840	C850	C860	C870
116.0	C880	C890	C8A0	C8B0	C8C0	C8D0	C8E0	C8F0	C900	C910
117.0	C920	C930	C940	C950	C960	C970	C980	C990	C9A0	C9B0
118.0	C9C0	C9D0	C9E0	C9F0	CA00	CA10	CA20	CA30	CA40	CA50
119.0	CA60	CA70	CA80	CA90	CAA0	CAB0	CAC0	CAD0	CAE0	CAF0
120.0	CB00	CB10	CB20	CB30	CB40	CB50	CB60	CB70	CB80	CB90
121.0	CBA0	CBB0	CBC0	CBD0	CBE0	CBF0	CC00	CC10	CC20	CC30
122.0	CC40	CC50	CC60	CC70	CC80	CC90	CCA0	CCB0	CCC0	CCD0
123.0	CCE0	CCF0	CD00	CD10	CD20	CD30	CD40	CD50	CD60	CD70
124.0	CD80	CD90	CDA0	CDB0	CDC0	CDD0	CDE0	CDF0	CE00	CE10
125.0	CE20	CE30	CE40	CE50	CE60	CE70	CE80	CE90	CEA0	CEB0
126.0	CEC0	CED0	CEE0	CEF0	CF00	CF10	CF20	CF30	CF40	CF50
127.0	CF60	CF70	CF80	CF90	CFA0	CFB0	CFC0	CFD0	CFE0	CFF0
128.0	D000	D010	D020	D030	D040	D050	D060	D070	D080	D090
129.0	D0A0	D0B0	D0C0	D0D0	D0E0	D0F0	D100	D110	D120	D130
130.0	D140	D150	D160	D170	D180	D190	D1A0	D1B0	D1C0	D1D0
131.0	D1E0	D1F0	D200	D210	D220	D230	D240	D250	D260	D270
132.0	D280	D290	D2A0	D2B0	D2C0	D2D0	D2E0	D2F0	D300	D310
133.0	D320	D330	D340	D350	D360	D370	D380	D390	D3A0	D3B0
134.0	D3C0	D3D0	D3E0	D3F0	D400	D410	D420	D430	D440	D450
135.0	D460	D470	D480	D490	D4A0	D4B0	D4C0	D4D0	D4E0	D4F0
136.0	D500	D510	D520	D530	D540	D550	D560	D570	D580	D590
137.0	D5A0	D5B0	D5C0	D5D0	D5E0	D5F0	D600	D610	D620	D630
138.0	D640	D650	D660	D670	D680	D690	D6A0	D6B0	D6C0	D6D0
139.0	D6E0	D6F0	D700	D710	D720	D730	D740	D750	D760	D770
140.0	D780	D790	D7A0	D7B0	D7C0	D7D0	D7E0	D7F0	D800	D810
141.0	D820	D830	D840	D850	D860	D870	D880	D890	D8A0	D8B0
142.0	D8C0	D8D0	D8E0	D8F0	D900	D910	D920	D930	D940	D950
143.0	D960	D970	D980	D990	D9A0	D9B0	D9C0	D9D0	D9E0	D9F0
144.0	DA00	DA10	DA20	DA30	DA40	DA50	DA60	DA70	DA80	DA90
145.0	DAA0	DAB0	DAC0	DAD0	DAE0	DAF0	DB00	DB10	DB20	DB30
146.0	DB40	DB50	DB60	DB70	DB80	DB90	DBA0	DBB0	DBC0	DBD0
147.0	DBE0	DBF0	DC00	DC10	DC20	DC30	DC40	DC50	DC60	DC70
148.0	DC80	DC90	DCA0	DCB0	DCC0	DCD0	DCE0	DCF0	DD00	DD10
149.0	DD20	DD30	DD40	DD50	DD60	DD70	DD80	DD90	DDA0	DDB0
150.0	DDC0	DDD0	DDE0	DDF0	DE00	DE10	DE20	DE30	DE40	DE50

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
150.0	DDC0	DDD0	DDE0	DDF0	DE00	DE10	DE20	DE30	DE40	DE50
151.0	DE60	DE70	DE80	DE90	DEA0	DEB0	DEC0	DED0	DEE0	DEF0
152.0	DF00	DF10	DF20	DF30	DF40	DF50	DF60	DF70	DF80	DF90
153.0	DFA0	DFB0	DFC0	DFD0	DFE0	DFF0	E000	E010	E020	E030
154.0	E040	E050	E060	E070	E080	E090	E0A0	E0B0	E0C0	E0D0
155.0	E0E0	E0F0	E100	E110	E120	E130	E140	E150	E160	E170
156.0	E180	E190	E1A0	E1B0	E1C0	E1D0	E1E0	E1F0	E200	E210
157.0	E220	E230	E240	E250	E260	E270	E280	E290	E2A0	E2B0
158.0	E2C0	E2D0	E2E0	E2F0	E300	E310	E320	E330	E340	E350
159.0	E360	E370	E380	E390	E3A0	E3B0	E3C0	E3D0	E3E0	E3F0
160.0	E400	E410	E420	E430	E440	E450	E460	E470	E480	E490
161.0	E4A0	E4B0	E4C0	E4D0	E4E0	E4F0	E500	E510	E520	E530
162.0	E540	E550	E560	E570	E580	E590	E5A0	E5B0	E5C0	E5D0
163.0	E5E0	E5F0	E600	E610	E620	E630	E640	E650	E660	E670
164.0	E680	E690	E6A0	E6B0	E6C0	E6D0	E6E0	E6F0	E700	E710
165.0	E720	E730	E740	E750	E760	E770	E780	E790	E7A0	E7B0
166.0	E7C0	E7D0	E7E0	E7F0	E800	E810	E820	E830	E840	E850
167.0	E860	E870	E880	E890	E8A0	E8B0	E8C0	E8D0	E8E0	E8F0
168.0	E900	E910	E920	E930	E940	E950	E960	E970	E980	E990
169.0	E9A0	E9B0	E9C0	E9D0	E9E0	E9F0	EA00	EA10	EA20	EA30
170.0	EA40	EA50	EA60	EA70	EA80	EA90	EAA0	EAB0	EAC0	EAD0
171.0	EAE0	EAF0	EB00	EB10	EB20	EB30	EB40	EB50	EB60	EB70
172.0	EB80	EB90	EBA0	EBB0	EBC0	EBD0	EBE0	EBF0	EC00	EC10
173.0	EC20	EC30	EC40	EC50	EC60	EC70	EC80	EC90	ECA0	ECB0
174.0	ECC0	ECD0	ECE0	ECF0	ED00	ED10	ED20	ED30	ED40	ED50
175.0	ED60	ED70	ED80	ED90	EDA0	EDB0	EDC0	EDD0	EDE0	EDF0
176.0	EE00	EE10	EE20	EE30	EE40	EE50	EE60	EE70	EE80	EE90
177.0	EEA0	EEB0	EEC0	EED0	EEE0	EEF0	EF00	EF10	EF20	EF30
178.0	EF40	EF50	EF60	EF70	EF80	EF90	EFA0	EFB0	EFC0	EFD0
179.0	EFE0	EFF0	F000	F010	F020	F030	F040	F050	F060	F070
180.0	F080	F090	F0A0	F0B0	F0C0	F0D0	F0E0	F0F0	F100	F110
181.0	F120	F130	F140	F150	F160	F170	F180	F190	F1A0	F1B0
182.0	F1C0	F1D0	F1E0	F1F0	F200	F210	F220	F230	F240	F250
183.0	F260	F270	F280	F290	F2A0	F2B0	F2C0	F2D0	F2E0	F2F0
184.0	F300	F310	F320	F330	F340	F350	F360	F370	F380	F390
185.0	F3A0	F3B0	F3C0	F3D0	F3E0	F3F0	F400	F410	F420	F430
186.0	F440	F450	F460	F470	F480	F490	F4A0	F4B0	F4C0	F4D0
187.0	F4E0	F4F0	F500	F510	F520	F530	F540	F550	F560	F570
188.0	F580	F590	F5A0	F5B0	F5C0	F5D0	F5E0	F5F0	F600	F610
189.0	F620	F630	F640	F650	F660	F670	F680	F690	F6A0	F6B0
190.0	F6C0	F6D0	F6E0	F6F0	F700	F710	F720	F730	F740	F750
191.0	F760	F770	F780	F790	F7A0	F7B0	F7C0	F7D0	F7E0	F7F0
192.0	F800	F810	F820	F830	F840	F850	F860	F870	F880	F890
193.0	F8A0	F8B0	F8C0	F8D0	F8E0	F8F0	F900	F910	F920	F930
194.0	F940	F950	F960	F970	F980	F990	F9A0	F9B0	F9C0	F9D0
195.0	F9E0	F9F0	FA00	FA10	FA20	FA30	FA40	FA50	FA60	FA70
196.0	FA80	FA90	FAA0	FAB0	FAC0	FAD0	FAE0	FAF0	FB00	FB10
197.0	FB20	FB30	FB40	FB50	FB60	FB70	FB80	FB90	FBA0	FBB0
198.0	FBC0	FBD0	FBE0	FBF0	FC00	FC10	FC20	FC30	FC40	FC50
199.0	FC60	FC70	FC80	FC90	FCA0	FCB0	FCC0	FCD0	FCE0	FCF0
200.0	FD00	FD10	FD20	FD30	FD40	FD50	FD60	FD70	FD80	FD90

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.0	0000	0010	0020	0030	0040	0050	0060	007@	0080	0090
-1.0	00A0	00B0	00C0	00D0	00E0	00F0	0100	0110	0120	0130
-2.0	0140	0150	0160	0170	0180	0190	01A0	01B0	01C0	01D0
-3.0	01E0	01F0	0200	0210	0220	0230	0240	0250	0260	0270
-4.0	0280	0290	02A0	02B0	02C0	02D0	02E0	02F0	0300	0310
-5.0	0320	0330	0340	0350	0360	0370	0380	0390	03A0	03B0
-6.0	03C0	03D0	03E0	03F0	0400	0410	0420	0430	0440	0450
-7.0	0460	0470	0480	0490	04A0	04B0	04C0	04D0	04E0	04F0
-8.0	0500	0510	0520	0530	0540	0550	0560	0570	0580	0590
-9.0	05A0	05B0	05C0	05D0	05E0	05F0	0600	0610	0620	0630
-10.0	0640	0650	0660	0670	0680	0690	06A0	06B0	06C0	06D0
-11.0	06E0	06F0	0700	0710	0720	0730	0740	0750	0760	0770
-12.0	0780	0790	07A0	07B0	07C0	07D0	07E0	07F0	0800	0810
-13.0	0820	0830	0840	0850	0860	0870	0880	0890	08A0	08B0
-14.0	08C0	08D0	08E0	08F0	0900	0910	0920	0930	0940	0950
-15.0	0960	0970	0980	0990	09A0	09B0	09C0	09D0	09E0	09F0
-16.0	0A00	0A10	0A20	0A30	0A40	0A50	0A60	0A70	0A80	0A90
-17.0	0AA0	0AB0	0AC0	0AD0	0AE0	0AF0	0B00	0B10	0B20	0B30
-18.0	0B40	0B50	0B60	0B70	0B80	0B90	0BA0	0BB0	0BC0	0BD0
-19.0	0BE0	0BF0	0C00	0C10	0C20	0C30	0C40	0C50	0C60	0C70
-20.0	0C80	0C90	0CA0	0CB0	0CC0	0CD0	0CE0	0CF0	0D00	0D10
-21.0	0D20	0D30	0D40	0D50	0D60	0D70	0D80	0D90	0DA0	0DB0
-22.0	0DC0	0DD0	0DE0	0DF0	0E00	0E10	0E20	0E30	0E40	0E50
-23.0	0E60	0E70	0E80	0E90	0EA0	0EB0	0EC0	0ED0	0EE0	0EF0
-24.0	0F00	0F10	0F20	0F30	0F40	0F50	0F60	0F70	0F80	0F90
-25.0	0FA0	0FB0	0FC0	0FD0	0FE0	0FF0	1000	1010	1020	1030
-26.0	1040	1050	1060	1070	1080	1090	10A0	10B0	10C0	10D0
-27.0	10E0	10F0	1100	1110	1120	1130	1140	1150	1160	1170
-28.0	1180	1190	11A0	11B0	11C0	11D0	11E0	11F0	1200	1210
-29.0	1220	1230	1240	1250	1260	1270	1280	1290	12A0	12B0
-30.0	12C0	12D0	12E0	12F0	1300	1310	1320	1330	1340	1350
-31.0	1360	1370	1380	1390	13A0	13B0	13C0	13D0	13E0	13F0
-32.0	1400	1410	1420	1430	1440	1450	1460	1470	1480	1490
-33.0	14A0	14B0	14C0	14D0	14E0	14F0	1500	1510	1520	1530
-34.0	1540	1550	1560	1570	1580	1590	15A0	15B0	15C0	15D0
-35.0	15E0	15F0	1600	1610	1620	1630	1640	1650	1660	1670
-36.0	1680	1690	16A0	16B0	16C0	16D0	16E0	16F0	1700	1710
-37.0	1720	1730	1740	1750	1760	1770	1780	1790	17A0	17B0
-38.0	17C0	17D0	17E0	17F0	1800	1810	1820	1830	1840	1850
-39.0	1860	1870	1880	1890	18A0	18B0	18C0	18D0	18E0	18F0
-40.0	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990
-41.0	19A0	19B0	19C0	19D0	19E0	19F0	1A00	1A10	1A20	1A30
-42.0	1A40	1A50	1A60	1A70	1A80	1A90	1AA0	1AB0	1AC0	1AD0
-43.0	1AE0	1AF0	1B00	1B10	1B20	1B30	1B40	1B50	1B60	1B70
-44.0	1B80	1B90	1BA0	1BB0	1BC0	1BD0	1BE0	1BF0	1C00	1C10
-45.0	1C20	1C30	1C40	1C50	1C60	1C70	1C80	1C90	1CA0	1CB0
-46.0	1CC0	1CD0	1CE0	1CF0	1D00	1D10	1D20	1D30	1D40	1D50
-47.0	1D60	1D70	1D80	1D90	1DA0	1DB0	1DC0	1DD0	1DE0	1DF0
-48.0	1E00	1E10	1E20	1E30	1E40	1E50	1E60	1E70	1E80	1E90
-49.0	1EA0	1EB0	1EC0	1ED0	1EE0	1EF0	1F00	1F10	1F20	1F30
-50.0	1F40	1F50	1F60	1F70	1F80	1F90	1FA0	1FB0	1FC0	1FD0

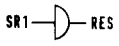
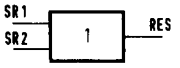
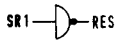
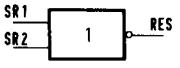
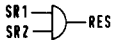
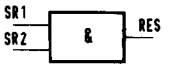
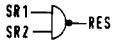
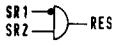
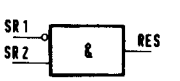
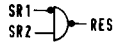
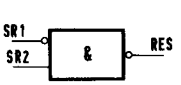
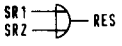
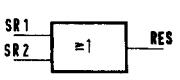
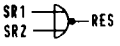
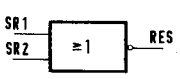
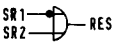
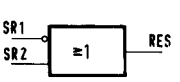
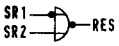
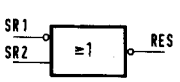
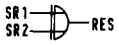
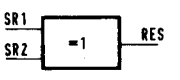
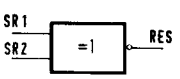
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
-50.0	1F40	1F50	1F60	1F70	1F80	1F90	1FA0	1FB0	1FC0	1FD0
-51.0	1FE0	1FF0	2000	2010	2020	2030	2040	2050	2060	2070
-52.0	2080	2090	20A0	20B0	20C0	20D0	20E0	20F0	2100	2110
-53.0	2120	2130	2140	2150	2160	2170	2180	2190	21A0	21B0
-54.0	21C0	21D0	21E0	21F0	2200	2210	2220	2230	2240	2250
-55.0	2260	2270	2280	2290	22A0	22B0	22C0	22D0	22E0	22F0
-56.0	2300	2310	2320	2330	2340	2350	2360	2370	2380	2390
-57.0	23A0	23B0	23C0	23D0	23E0	23F0	2400	2410	2420	2430
-58.0	2440	2450	2460	2470	2480	2490	24A0	24B0	24C0	24D0
-59.0	24E0	24F0	2500	2510	2520	2530	2540	2550	2560	2570
-60.0	2580	2590	25A0	25B0	25C0	2500	25E0	25F0	2600	2610
-61.0	2620	2630	2640	2650	2660	2670	2680	2690	26A0	26B0
-62.0	26C0	26D0	26E0	26F0	2700	2710	2720	2730	2740	2750
-63.0	2760	2770	2780	2790	27A0	27B0	27C0	27D0	27E0	27F0
-64.0	2800	2810	2820	2830	2840	2850	2860	2870	2880	2890
-65.0	28A0	28B0	28C0	28D0	28E0	28F0	2900	2910	2920	2930
-66.0	2940	2950	2960	2970	2980	2990	29A0	29B0	29C0	29D0
-67.0	29E0	29F0	2A00	2A10	2A20	2A30	2A40	2A50	2A60	2A70
-68.0	2A80	2A90	2AA0	2AB0	2AC0	2AD0	2AE0	2AF0	2B00	2B10
-69.0	2B20	2B30	2B40	2B50	2B60	2B70	2B80	2B90	2BA0	2BB0
-70.0	2BC0	2BD0	2BE0	2BF0	2C00	2C10	2C20	2C30	2C40	2C50
-71.0	2C60	2C70	2C80	2C90	2CA0	2CB0	2CC0	2CD0	2CE0	2CF0
-72.0	2D00	2D10	2D20	2D30	2D40	2D50	2D60	2D70	2D80	2D90
-73.0	2DA0	2DB0	2DC0	2DD0	2DE0	2DF0	2E00	2E10	2E20	2E30
-74.0	2E40	2E50	2E60	2E70	2E80	2E90	2EA0	2EB0	2EC0	2ED0
-75.0	2EE0	2EF0	2F00	2F10	2F20	2F30	2F40	2F50	2F60	2F70
-76.0	2F80	2F90	2FA0	2FB0	2FC0	2FD0	2FE0	2FF0	3000	3010
-77.0	3020	3030	3040	3050	3060	3070	3080	3090	30A0	30B0
-78.0	30C0	30D0	30E0	30F0	3100	3110	3120	3130	3140	3150
-79.0	3160	3170	3180	3190	31A0	31B0	31C0	31D0	31E0	31F0
-80.0	3200	3210	3220	3230	3240	3250	3260	3270	3280	3290
-81.0	32A0	32B0	32C0	32D0	32E0	32F0	3300	3310	3320	3330
-82.0	3340	3350	3360	3370	3380	3390	33A0	33B0	33C0	33D0
-83.0	33E0	33F0	3400	3410	3420	3430	3440	3450	3460	3470
-84.0	3480	3490	34A0	34B0	34C0	34D0	34E0	34F0	3500	3510
-85.0	3520	3530	3540	3550	3560	3570	3580	3590	35A0	35B0
-86.0	35C0	35D0	35E0	35F0	3600	3610	3620	3630	3640	3650
-87.0	3660	3670	3680	3690	36A0	36B0	36C0	36D0	36E0	36F0
-88.0	3700	3710	3720	3730	3740	3750	3760	3770	3780	3790
-89.0	37A0	37B0	37C0	37D0	37E0	37F0	3800	3810	3820	3830
-90.0	3840	3850	3860	3870	3880	3890	38A0	38B0	38C0	38D0
-91.0	38E0	38F0	3900	3910	3920	3930	3940	3950	3960	3970
-92.0	3980	3990	39A0	39B0	39C0	39D0	39E0	39F0	3A00	3A10
-93.0	3A20	3A30	3A40	3A50	3A60	3A70	3A80	3A90	3AA0	3AB0
-94.0	3AC0	3AD0	3AE0	3AF0	3B00	3B10	3B20	3B30	3B40	3B50
-95.0	3B60	3B70	3B80	3B90	3BA0	3BB0	3BC0	3BD0	3BE0	3BF0
-96.0	3C00	3C10	3C20	3C30	3C40	3C50	3C60	3C70	3C80	3C90
-97.0	3CA0	3CB0	3CC0	3CD0	3CE0	3CF0	3D00	3D10	3D20	3D30
-98.0	3D40	3D50	3D60	3D70	3D80	3D90	3DA0	3DB0	3DC0	3DD0
-99.0	3DE0	3DF0	3E00	3E10	3E20	3E30	3E40	3E50	3E60	3E70
100.0	3E80	3E90	3EA0	3EB0	3EC0	3ED0	3EE0	3EF0	3F00	3F10

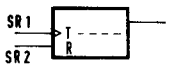
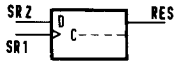
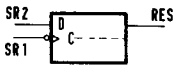
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
-100.0	3E80	3E90	3EA0	3EB0	3EC0	3ED0	3EE0	3EF0	3F00	3F10
-101.0	3F20	3F30	3F40	3F50	3F60	3F70	3F80	3F90	3FA0	3FB0
-102.0	3FC0	3FD0	3FE0	3FF0	4000	4010	4020	4030	4040	4050
-103.0	4060	4070	4080	4090	40A0	40B0	40C0	40D0	40E0	40F0
-104.0	4100	4110	4120	4130	4140	4150	4160	4170	4180	4190
-105.0	41A0	41B0	41C0	41D0	41E0	41F0	4200	4210	4220	4230
-106.0	4240	4250	4260	4270	4280	4290	42A0	42B0	42C0	42D0
-107.0	42E0	42F0	4300	4310	4320	4330	4340	4350	4360	4370
-108.0	4380	4390	43A0	43B0	43C0	43D0	43E0	43F0	4400	4410
-109.0	4420	4430	4440	4450	4460	4470	4480	4490	44A0	44B0
-110.0	44C0	44D0	44E0	44F0	4500	4510	4520	4530	4540	4550
-111.0	4560	4570	4580	4590	45A0	45B0	45C0	45D0	45E0	45F0
-112.0	4600	4610	4620	4630	4640	4650	4660	4670	4680	4690
-113.0	46A0	46B0	46C0	46D0	46E0	46F0	4700	4710	4720	4730
-114.0	4740	4750	4760	4770	4780	4790	47A0	47B0	47C0	47D0
-115.0	47E0	47F0	4800	4810	4820	4830	4840	4850	4860	4870
-116.0	4880	4890	48A0	48B0	48C0	48D0	48E0	48F0	4900	4910
-117.0	4920	4930	4940	4950	4960	4970	4980	4990	49A0	49B0
-118.0	49C0	49D0	49E0	49F0	4A00	4A10	4A20	4A30	4A40	4A50
-119.0	4A60	4A70	4A80	4A90	4AA0	4AB0	4AC0	4AD0	4AE0	4AF0
-120.0	4B00	4B10	4B20	4B30	4B40	4B50	4B60	4B70	4B80	4B90
-121.0	4BA0	4BB0	4BC0	4BD0	4BE0	4BF0	4C00	4C10	4C20	4C30
-122.0	4C40	4C50	4C60	4C70	4C80	4C90	4CA0	4CB0	4CC0	4CD0
-123.0	4CE0	4CF0	4D00	4D10	4D20	4D30	4D40	4D50	4D60	4D70
-124.0	4D80	4D90	4DA0	4DB0	4DC0	4DD0	4DE0	4DF0	4E00	4E10
-125.0	4E20	4E30	4E40	4E50	4E60	4E70	4E80	4E90	4EA0	4EB0
-126.0	4EC0	4ED0	4EE0	4EF0	4F00	4F10	4F20	4F30	4F40	4F50
-127.0	4F60	4F70	4F80	4F90	4FA0	4FB0	4FC0	4FD0	4FE0	4FF0
-128.0	5000	5010	5020	5030	5040	5050	5060	5070	5080	5090
-129.0	50A0	50B0	50C0	50D0	50E0	50F0	5100	5110	5120	5130
-130.0	5140	5150	5160	5170	5180	5190	51A0	51B0	51C0	51D0
-131.0	51E0	51F0	5200	5210	5220	5230	5240	5250	5260	5270
-132.0	5280	5290	52A0	52B0	52C0	52D0	52E0	52F0	5300	5310
-133.0	5320	5330	5340	5350	5360	5370	5380	5390	53A0	53B0
-134.0	53C0	53D0	53E0	53F0	5400	5410	5420	5430	5440	5450
-135.0	5460	5470	5480	5490	54A0	54B0	54C0	54D0	54E0	54F0
-136.0	5500	5510	5520	5530	5540	5550	5560	5570	5580	5590
-137.0	55A0	55B0	55C0	55D0	55E0	55F0	5600	5610	5620	5630
-138.0	5640	5650	5660	5670	5680	5690	56A0	56B0	56C0	56D0
-139.0	56E0	56F0	5700	5710	5720	5730	5740	5750	5760	5770
-140.0	5780	5790	57A0	57B0	57C0	57D0	57E0	57F0	5800	5810
-141.0	5820	5830	5840	5850	5860	5870	5880	5890	58A0	58B0
-142.0	58C0	58D0	58E0	58F0	5900	5910	5920	5930	5940	5950
-143.0	5960	5970	5980	5990	59A0	59B0	59C0	59D0	59E0	59F0
-144.0	5A00	5A10	5A20	5A30	5A40	5A50	5A60	5A70	5A80	5A90
-145.0	5AA0	5AB0	5AC0	5AD0	5AE0	5AF0	5B00	5B10	5B20	5B30
-146.0	5B40	5B50	5B60	5B70	5B80	5B90	5BA0	5BB0	5BC0	5BD0
-147.0	5BE0	5BF0	5C00	5C10	5C20	5C30	5C40	5C50	5C60	5C70
-148.0	5C80	5C90	5CA0	5CB0	5CC0	5CD0	5CE0	5CF0	5D00	5D10
-149.0	5D20	5D30	5D40	5D50	5D60	5D70	5D80	5D90	5DA0	5DB0
-150.0	5DC0	5DD0	5DE0	5DF0	5E00	5E10	5E20	5E30	5E40	5E50

	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
-150.0	5DC0	5DD0	5DE0	5DF0	5E00	5E10	5E20	5E30	5E40	5E50
-151.0	5E60	5E70	5E80	5E90	5EA0	5EB0	5EC0	5ED0	5EE0	5EF0
-152.0	5F00	5F10	5F20	5F30	5F40	5F50	5F60	5F70	5F80	5F90
-153.0	5FA0	5FB0	5FC0	5FD0	5FE0	5FF0	6000	6010	6020	6030
-154.0	6040	6050	6060	6070	6080	6090	60A0	60B0	60C0	60D0
-155.0	60E0	60F0	6100	6110	6120	6130	6140	6150	6160	6170
-156.0	6180	6190	61A0	61B0	61C0	61D0	61E0	61F0	6200	6210
-157.0	6220	6230	6240	6250	6260	6270	6280	6290	62A0	62B0
-158.0	62C0	62D0	62E0	62F0	6300	6310	6320	6330	6340	6350
-159.0	6360	6370	6380	6390	63A0	63B0	63C0	63D0	63E0	63F0
-160.0	6400	6410	6420	6430	6440	6450	6460	6470	6480	6490
-161.0	64A0	64B0	64C0	64D0	64E0	64F0	6500	6510	6520	6530
-162.0	6540	6550	6560	6570	6580	6590	65A0	65B0	65C0	65D0
-163.0	65E0	65F0	6600	6610	6620	6630	6640	6650	6660	6670
-164.0	6680	6690	66A0	66B0	66C0	66D0	66E0	66F0	6700	6710
-165.0	6720	6730	6740	6750	6760	6770	6780	6790	67A0	67B0
-166.0	67C0	67D0	67E0	67F0	6800	6810	6820	6830	6840	6850
-167.0	6860	6870	6880	6890	68A0	68B0	68C0	68D0	68E0	68F0
-168.0	6900	6910	6920	6930	6940	6950	6960	6970	6980	6990
-169.0	69A0	69B0	69C0	69D0	69E0	69F0	6A00	6A10	6A20	6A30
-170.0	6A40	6A50	6A60	6A70	6A80	6A90	6AA0	6AB0	6AC0	6AD0
-171.0	6AE0	6AF0	6B00	6B10	6B20	6B30	6B40	6B50	6B60	6B70
-172.0	6B80	6B90	6BA0	6BB0	6BC0	6BD0	6BE0	6BF0	6C00	6C10
-173.0	6C20	6C30	6C40	6C50	6C60	6C70	6C80	6C90	6CA0	6CB0
-174.0	6CC0	6CD0	6CE0	6CF0	6D00	6D10	6D20	6D30	6D40	6D50
-175.0	6D60	6D70	6D80	6D90	6DA0	6DB0	6DC0	6DD0	6DE0	6DF0
-176.0	6E00	6E10	6E20	6E30	6E40	6E50	6E60	6E70	6E80	6E90
-177.0	6EA0	6EB0	6EC0	6ED0	6EE0	6EF0	6F00	6F10	6F20	6F30
-178.0	6F40	6F50	6F60	6F70	6F80	6F90	6FA0	6FB0	6FC0	6FD0
-179.0	6FE0	6FF0	7000	7010	7020	7030	7040	7050	7060	7070
-180.0	7080	7090	70A0	70B0	70C0	70D0	70E0	70F0	7100	7110
-181.0	7120	7130	7140	7150	7160	7170	7180	7190	71A0	71B0
-182.0	71C0	71D0	71E0	71F0	7200	7210	7220	7230	7240	7250
-183.0	7260	7270	7280	7290	72A0	72B0	72C0	72D0	72E0	72F0
-184.0	7300	7310	7320	7330	7340	7350	7360	7370	7380	7390
-185.0	73A0	73B0	73C0	73D0	73E0	73F0	7400	7410	7420	7430
-186.0	7440	7450	7460	7470	7480	7490	74A0	74B0	74C0	74D0
-187.0	74E0	74F0	7500	7510	7520	7530	7540	7550	7560	7570
-188.0	7580	7590	75A0	75B0	75C0	75D0	75E0	75F0	7600	7610
-189.0	7620	7630	7640	7650	7660	7670	7680	7690	76A0	76B0
-190.0	76C0	76D0	76E0	76F0	7700	7710	7720	7730	7740	7750
-191.0	7760	7770	7780	7790	77A0	77B0	77C0	77D0	77E0	77F0
-192.0	7800	7810	7820	7830	7840	7850	7860	7870	7880	7890
-193.0	78A0	78B0	78C0	78D0	78E0	78F0	7900	7910	7920	7930
-194.0	7940	7950	7960	7970	7980	7990	79A0	79B0	79C0	79D0
-195.0	79E0	79F0	7A00	7A10	7A20	7A30	7A40	7A50	7A60	7A70
-196.0	7A80	7A90	7AA0	7AB0	7AC0	7AD0	7AE0	7AF0	7B00	7B10
-197.0	7B20	7B30	7B40	7B50	7B60	7B70	7B80	7B90	7BA0	7BB0
-198.0	7BC0	7BD0	7BE0	7BF0	7C00	7C10	7C20	7C30	7C40	7C50
-199.0	7C60	7C70	7C80	7C90	7CA0	7CB0	7CC0	7CD0	7CE0	7CF0
-200.0	7D00	7D10	7D20	7D30	7D40	7D50	7D60	7D70	7D80	7D90

12.2 Summary of commands

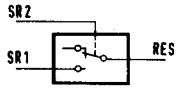
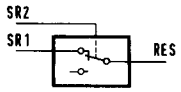
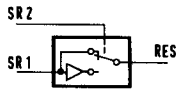
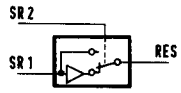
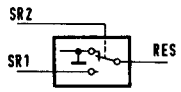
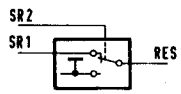
Binary functions

Mnemonic	Opcode	Description to DIN 40700		Truth table
		old symbol	new symbol	
BTN	01H			SR1 SR2 RES 1 1 1 0 1 0 1 0 1 0 0 0
BTI	02H			SR2 ist not processed SR1 SR2 RES 1 1 0 0 1 1 1 0 0 0 0 1
ANN	03H			SR2 ist not processed SR1 SR2 RES 1 1 1 0 1 0 1 0 0 0 0 0
ANI	04H			SR1 SR2 RES 1 1 0 0 1 1 1 0 1 0 0 1
AIN	05H			SR1 SR2 RES 1 1 0 0 1 1 1 0 0 0 0 0
AII	06H			SR1 SR2 RES 1 1 1 0 1 0 1 0 1 0 0 1
ONN	07H			SR1 SR2 RES 1 1 1 0 1 1 1 0 1 0 0 0
ONI	08H			SR1 SR2 RES 1 1 0 0 1 0 1 0 0 0 0 1
OIN	09H			SR1 SR2 RES 1 1 1 0 1 1 1 0 0 0 0 1
OII	0AH			SR1 SR2 RES 1 1 0 0 1 0 1 0 1 0 0 0
XNN	0BH			SR1 SR2 RES 1 1 0 0 1 1 1 0 1 0 0 0
XNI	0CH			SR1 SR2 RES 1 1 1 0 1 0 1 0 0 0 0 1

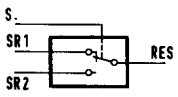
Mnemonic	Opcode	Description	Truth table
FRS	**ODH**		t_n | t_n+1 SR1 | SR2 | RES | RES 1 | 0 | 0 | 1 1 | 0 | 1 | 1 x | 1 | x | 0
FTR	**OEH**		t_n | t_n+1 SR1 | SR2 | RES | RES ⌟ | 0 | 0 | 1 ⌟ | 0 | 1 | 0 x | 1 | x | 0
FDH	**OFH**		t_n | t_n+1 SR1 | SR2 | RES | RES ⌟ | 0 | 0 | 0 ⌟ | 1 | 0 | 1 ⌟ | 0 | 1 | 0 ⌟ | 1 | 1 | 1 0 | x | 0 | 0 0 | x | 1 | 1
FDL	**10H**		t_n | t_n+1 SR1 | SR2 | RES | RES ⌞ | 0 | 0 | 0 ⌞ | 1 | 0 | 1 ⌞ | 0 | 1 | 0 ⌞ | 1 | 1 | 1 0 | x | 0 | 0 0 | x | 1 | 1

x = arbitrary
⌟ = positive flank
⌞ = negative flank

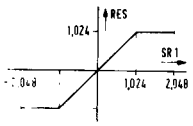
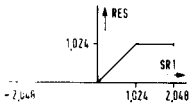
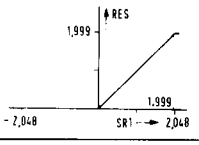
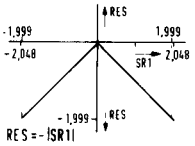
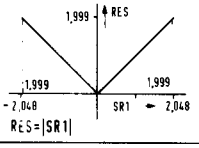
Switching functions

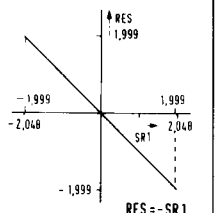
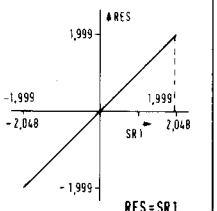
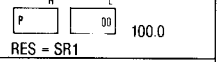
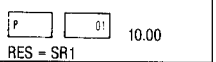
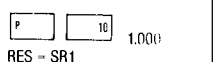
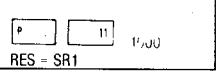
Mnemonic	Opcode	Description	Truth table
SOL	**11H**		SR2 | RES 1 | SR1 0 | last value of SR1
SOH	**12H**		SR2 | RES 0 | SR1 1 | last value of SR1
SIH	**13H**		SR2 | RES 1 | −SR1 0 | +SR1
SIL	**14H**		SR2 | RES 1 | SR1 0 | −SR1
SZL	**15H**		SR2 | RES 1 | SR1 0 | 0
SZH	**16H**		SR2 | RES 0 | SR1 1 | 0

Switching functions

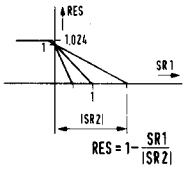
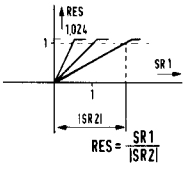
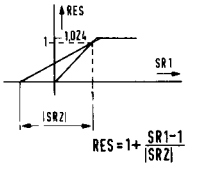
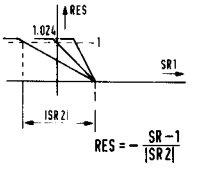
Mnemonic	Opcode	S.	Description	Truth table
UM1	17	Y01		S. | RES 1 | SR2 0 (open) | SR1
U11	18	Y11		
UA1	19	Y21		
U31	1A	Y31		
UM2	1B	Y02		
U12	1C	Y12		
UA2	1D	Y22		
U32	1E	Y32		
UM3	1F	Y03		
U13	20	Y13		
UA3	21	Y23		
U33	22	Y33		
UM4	23	Y04		
U14	24	Y14		
UA4	25	Y24		
U34	26	Y34		
UI1	27	W01		
U18	28	B18		
UE1	29	W21		
U20	2A	B20		
UI2	2B	W02		
U22	2C	B22		
UE2	2D	W22		
U24	2E	B24		
UI3	2F	W03		
U19	30	B19		
UE3	31	W23		
U21	32	B21		
UI4	33	W04		
U23	34	B23		
UE4	35	W24		
U25	36	B25		

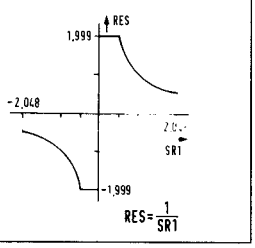
Limitation and transfer functions

Mnemonic	Opcode	Description
LB1	37	
LU1	38	
LU2	39	
NEG	3A	
ABS	3B	

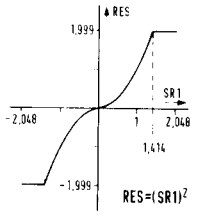
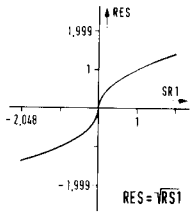
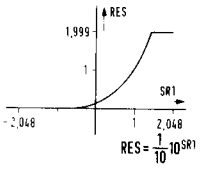
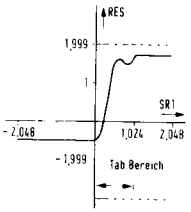
Mnemonic	Opcode	Description
INV	3C	
DIR	3D	
MA0	3E	
MA1	3F	
MA2	40	
MA3	41	

Arithmetic functions

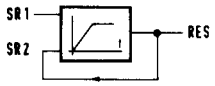
Mnemonic	Opcode	Description
YK1	42	
YK2	43	
YK3	44	
YK4	45	

Mnemonic	Opcode	Description
MAX	46	RES = SR1, if SR1 ≧ SR2 RES = SR2, if SR1 < SR2 $-2{,}048 \leqq RES \leqq 2{,}048$
MIN	47	RES = SR1, if SR1 ≦ SR2 RES = SR2, if SR1 > SR2 $-2{,}048 \leqq RES \leqq 2{,}048$
ADD	48	RES = SR1 + SR2 $-1{,}999 \leqq RES \leqq 1{,}999$
SUB	49	RES = SR1 − SR2 $-1{,}999 \leqq RES \leqq 1{,}999$
MUL	4A	RES = SR1 · SR2 $-1{,}999 \leqq RES \leqq 1{,}999$
DIV	4B	RES = SR1 : SR2 $-1{,}999 \leqq RES \leqq 1{,}999$
REZ	4C	

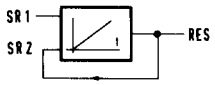
Arithmetic functions (continued)

Mnemonic	Opcode	Description
QUA	4D	
RAD	4E	
EXP	4F	
TA1 TA2 TA3 TA4	50 51 52 53	 variable (resolution 1‰) variable (resolution 1‰) variable (resolution 1‰) variable (resolution 1‰)
TA5 TA6 TA7 TA8	54 55 56 57	−270...+ 400 °C type T (SR1 = 0...1 → RES = 0...1) −270...+1000 °C type E (SR1 = 0...1 → RES = 0...1) 0...+1800 °C type R (SR1 = 0...1 → RES = 0...1) 0...+2400 °C WRe-WRe25 (SR1 = 0...1 → RES = 0...1)
K.1 K/8 K/5 K/4 K/3 K/2 K02 K03 K04 K05 K08 K10 K20 K40 K50 KHU	58 59 5A 5B 5C 5D 5E 5F 60 61 62 63 64 65 66 67	CONSTANT = 1/10 CONSTANT = 1/8 CONSTANT = 1/5 CONSTANT = 1/4 CONSTANT = 1/3 CONSTANT = 1/2 CONSTANT = 2 CONSTANT = 3 CONSTANT = 4 CONSTANT = 5 CONSTANT = 8 CONSTANT = 10 CONSTANT = 20 CONSTANT = 40 CONSTANT = 50 CONSTANT = 100 RES = SR1 · CONSTANT −1.999 ≦ RES ≦ 1.999

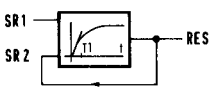
Slew-Rate limitation

Mnemonic	Opcode	Description
		 $RES = SR\,2 + \underbrace{Sign\,(SR1 - SR2)}_{Sign}\ \underbrace{K \cdot \Delta T}_{Increment}$ $-1{,}999 \leqq RES \leqq 1{,}999$
RA1	68	Rate (time for 100 % change) = 2 s
RA2	69	Rate (time for 100 % change) = 4 s
RA3	6A	Rate (time for 100 % change) = 8 s
RA4	6B	Rate (time for 100 % change) = 16 s
RA5	6C	Rate (time for 100 % change) = 50 s
RA6	6D	Rate (time for 100 % change) = 100 s
RA7	6E	Rate (time for 100 % change) = 200 s
RA8	6F	Rate (time for 100 % change) = 400 s
RA9	70	Rate (time for 100 % change) = 1000 s
RAA	71	Rate (time for 100 % change) = 2000 s
RAB	72	Rate (time for 100 % change) = 4000 s
RAC	73	Rate (time for 100 % change) = 8000 s

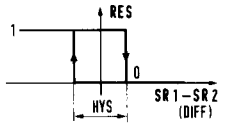
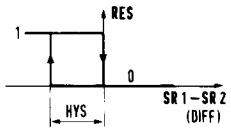
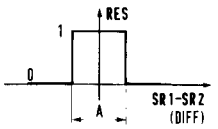
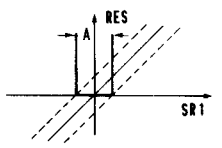
Fixed-time integrator

Mnemonic	Opcode	Description
		 $RES = SR2 + \frac{SR1}{T_N}\ \Delta T \qquad -1{,}999 \leqq RES \leqq 1{,}999$
IG1	74	T_N = 1 s
IG2	75	T_N = 4 s
IG3	76	T_N = 10 s
IG4	77	T_N = 25 s
IG5	78	T_N = 2 min
IG6	79	T_N = 8 min
IG7	7A	T_N = 20 min
IG8	7B	T_N = 50 min

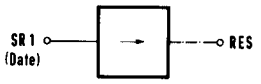
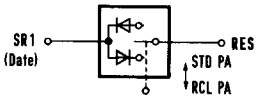
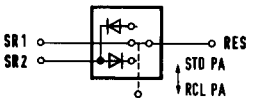
Retardations

Mnemonic	Opcode	
		$RES = SR2 + \frac{SR1 + SR2}{T1} \cdot \Delta T \qquad -1{,}999 \leqq RES \leqq 1{,}999$ 
VZ1	A7	T_1 = 1 s
VZ2	A8	T_1 = 4 s
VZ3	A9	T_1 = 10 s
VZ4	AA	T_1 = 25 s
VZ5	AB	T_1 = 2 min
VZ6	AC	T_1 = 8 min
VZ7	AD	T_1 = 20 min
VZ8	AE	T_1 = 50 min

Hysteresis functions

Mnemonic	Opcode	Description
		 DIFF > $\frac{HYS}{2}$: „0" DIFF < $\frac{HYS}{2}$: „1" within HYS old RES
KB0	7C	HYS = var. from 0 ... 25.5 % (in address 84F0)
KB1	7D	= 0
KB2	7E	= 0,05 %
KB3	7F	= 0,1 %
KB4	80	= 0,25 %
KB5	81	= 0,5 %
KB6	82	= 0,8 %
KB7	83	= 1,0 %
KB8	84	= 1,5 %
KB9	85	= 2,0 %
		 DIFF pos. : „0" DIFF < – HYS: „1" within HYS old RES
KU0	86	HYS = var. from 0 ... 25.5 % (in address 84F1)
KU1	87	= 0
KU2	88	= 0,05 %
KU3	89	= 0,1 %
KU4	8A	= 0,25 %
KU5	8B	= 0,5 %
KU6	8C	= 0,8 %
KU7	8D	= 1,0 %
KU8	8E	= 1,5 %
KU9	8F	= 2,0 %
		 IDIFFI > $\frac{A}{2}$: „0" IDIFFI ≦ $\frac{A}{2}$: „1"
KT0	90	A = var. from 0 ... 25.5 % (in address 84F2)
KT1	91	= 0
KT2	92	= 0,05 %
KT3	93	= 0,1 %
KT4	94	= 0,25 %
KT5	95	= 0,5 %
KT6	96	= 0,8 %
KT7	97	= 1,0 %
KT8	98	= 1,5 %
KT9	99	= 2,0 %
		 ISR1 – RESI > $\frac{A}{2}$: RES – SR1 ISR1 – RESI ≦ $\frac{A}{2}$: old RES
KL0	9A	A = var. from 0 ... 25.5 % (in address 84F3)
KL1	9B	= 0
KL2	9C	= 0,05 %
KL3	9D	= 0,1 %
KL4	9E	= 0,25 %
KL5	9F	= 0,5 %
KL6	A0	= 0,8 %
KL7	A1	= 1,0 %
KL8	A2	= 1,5 %
KL9	A3	= 2,0 %

Value assignments

Mnemonic	Opcode	Description
FIX	A4	 Data item as result
FLX	A5	 Call a data item or save a result
PAR	A6	 Output of SR1 as result also optionally call SR2 or save a RES – SR2

Programmer

Mnemonic	Opcode	Description
PW.	EO to EF	Support value
PT.	FO to FF	Time section

12.3 Analog variables in Digitric P

The remarks on the function of the individual variables refer to a four-channel controller. The variables can also take on other function in other controller configurations.

Define the following values by 216 program lines:

HEX	LABEL	FUNCTION
00H	A1	Output 1
01H	A2	Output 2
02H	A3	Output 3
03H	A4	Output 4
04H	B1	Multiplicative constant E1
05H	C1	Additive constant E1
06H	D1	Ext./int. set point difference channel 1
07H	G11	Alarm value 1, channel 1
08H	G21	Alarm value 2, channel 1
09H	G31	Alarm value 3, channel 1
0AH	G41	Alarm value 4, channel 1
0BH	H1	Switching distance three-position controller, channel 1
0CH	J1	LED display 1 (Y), channel 1
0DH	L1	LED display 2 (RD), channel 1
0EH	N1	Programmer section, channel 1
0FH	PB1	Proportional range, channel 1
10H	R1	Controlled variable, channel 1
11H	RD1*	Control deviation, channel 1
12H	RH1	Maximum controlled variable, channel 1
13H	RL1	Minimum controlled variable, channel 1
14H	RU1	Input variable D-component, channel 1
15H	SP1*	Set point, channel 1
16H	SH1	Upper set point limit channel 1
17H	SL1	Lower set point limit channel 1
18H	TN1	Integral action time, channel 1
19H	TD1	Derivative action time, channel 1
1AH	Y1*	Output variable, channel 1
1BH	YE1	External output variable, channel 1
1CH	YP1	Operating point, channel 1
1DH	YH1	Upper output limit, channel 1
1EH	YL1	Lower output limit, channel 1
1FH	YS1	Disturbance variable input, channel 1
20H	00	Intermediate variable, preferably channel 1
21H	01	Intermediate variable, preferably channel 1
22H	02	Intermediate variable, preferably channel 1
23H	03	Intermediate variable, preferably channel 1
24H	04	Intermediate variable, preferably channel 1
25H	05	Intermediate variable, preferably channel 1
26H	06	Intermediate variable, preferably channel 1
27H	07	Intermediate variable, preferably channel 1
28H	08	Intermediate variable, preferably channel 1
29H	09	Intermediate variable, preferably channel 1
2AH	10	Intermediate variable, preferably channel 1
2BH	11	Intermediate variable, preferably channel 1
2CH	12	Intermediate variable, preferably channel 1
2DH	13	Intermediate variable, preferably channel 1
2EH	14	Intermediate variable, preferably channel 1
2FH	15	Intermediate variable, preferably channel 1
30H	16	Intermediate variable, preferably channel 1
31H	17	Intermediate variable, preferably channel 1
32H	18	Intermediate variable, preferably channel 1
33H	19	Intermediate variable, preferably channel 1
34H	20	Intermediate variable, preferably channel 1
35H	21	Intermediate variable, preferably channel 1
36H	22	Intermediate variable, preferably channel 1
37H	23	Intermediate variable, preferably channel 1
38H	24	Intermediate variable, preferably channel 1

Display of variables designated by * at the bottom of the display is indicated by the marking LED "w", "e", "y". Here generally the main variable of the respective channel appears instead of the variable name on top of the display. It is defined by the last position of the VARSEL list (small and large display loop).

The address FEH serves as a blank position in the VERSAL lists (small and large display loop).

Address FFH is used for calling the multichannel info display.

HEX	LABEL	FUNCTION
39H	B2	Multiplicative constant E2
3AH	C2	Additive constant E2
3BH	D2	Ext./int. set point difference channel 2
3CH	G12	Alarm value 1, channel 2
3DH	G22	Alarm value 2, channel 2
3EH	G32	Alarm value 3, channel 2
3FH	G42	Alarm value 4, channel 2
40H	H2	Switching distance three-position controller, channel 2
41H	J2	LED display 1 (Y), channel 2
42H	L2	LED display 2 (RD), channel 2
43H	N2	Programmer section, channel 2
44H	PB2	Proportional range, channel 2
45H	R2	Controlled variable, channel 2
46H	RD2*	Control deviation, channel 2
47H	RH2	Maximum controlled variable, channel 2
48H	RL2	Minimum controlled variable, channel 2
49H	RU2	Input variable D-component, channel 2
4AH	SP2*	Set point, channel 2
4BH	SH2	Upper set point limit channel 2
4CH	SL2	Lower set point limit channel 2
4DH	TN2	Integral action time, channel 2
4EH	TD2	Derivative action time, channel 2
4FH	Y2*	Output variable, channel 2
50H	YE2	External output variable, channel 2
51H	YP2	Operating point, channel 2
52H	YH2	Upper output limit, channel 2
53H	YL2	Lower output limit, channel 2
54H	YS2	Disturbance variable input, channel 2
55H	25	Intermediate variable, preferably channel 2
56H	26	Intermediate variable, preferably channel 2
57H	27	Intermediate variable, preferably channel 2
58H	28	Intermediate variable, preferably channel 2
59H	29	Intermediate variable, preferably channel 2
5AH	30	Intermediate variable, preferably channel 2
5BH	31	Intermediate variable, preferably channel 2
5CH	32	Intermediate variable, preferably channel 2
5DH	33	Intermediate variable, preferably channel 2
5EH	34	Intermediate variable, preferably channel 2
5FH	35	Intermediate variable, preferably channel 2
60H	36	Intermediate variable, preferably channel 2
61H	37	Intermediate variable, preferably channel 2
62H	38	Intermediate variable, preferably channel 2
63H	39	Intermediate variable, preferably channel 2
64H	40	Intermediate variable, preferably channel 2
65H	41	Intermediate variable, preferably channel 2
66H	42	Intermediate variable, preferably channel 2
67H	43	Intermediate variable, preferably channel 2
68H	44	Intermediate variable, preferably channel 2
69H	45	Intermediate variable, preferably channel 2
6AH	46	Intermediate variable, preferably channel 2
6BH	47	Intermediate variable, preferably channel 2
6CH	48	Intermediate variable, preferably channel 2
6DH	49	Intermediate variable, preferably channel 2

HEX	LABEL	FUNCTION	HEX	LABEL	FUNCTION
6EH	B3	Multiplicative constant E3	A3H	B4	Multiplicative constant E4
6FH	C3	Additive constant E3	A4H	C4	Additive constant E4
70H	D3	Ext./int. set point difference channel 3	A5H	D4	Ext./int. set point difference channel 4
71H	G13	Alarm value 1, channel 3	A6H	G14	Alarm value 1, channel 4
72H	G23	Alarm value 2, channel 3	A7H	G24	Alarm value 2, channel 4
73H	G33	Alarm value 3, channel 3	A8H	G34	Alarm value 3, channel 4
74H	G43	Alarm value 4, channel 3	A9H	G44	Alarm value 4, channel 4
75H	H3	Switching distance three-position controller, channel 3	AAH	H4	Switching distance three-position controller, channel 4
76H	J3	LED display 1 (Y), channel 3	ABH	J4	LED display 1 (Y), channel 4
77H	L3	LED display 2 (RD), channel 3	ACH	L4	LED display 2 (RD), channel 4
78H	N3	Programmer section, channel 3	ADH	N4	Programmer section, channel 4
79H	PB3	Proportional range, channel 3	AEH	PB4	Proportional range, channel 4
7AH	R3	Controlled variable, channel 3	AFH	R4	Controlled variable, channel 4
7BH	RD3*	Controlled deviation, channel 3	B0H	RD4*	Control deviation, channel 4
7CH	RH3	Maximum controlled variable, channel 3	B1H	RH4	Maximum controlled variable, channel 4
0DH	RL3	Minimum controlled variable, channel 3	B2H	RL4	Minimum controlled variable, channel 4
7EH	RU3	Input variable D-component, channel 3	B3H	RU4	Input variable D-component, channel 4
7FH	SP3*	Set point, channel 3	B4H	SP4*	Set point, channel 4
80H	SH3	Upper set point limit channel 3	B5H	SH4	Upper set point limit channel 4
81H	SL3	Lower set point limit channel 3	B6H	SL4	Lower set point limit channel 4
82H	TN3	Integral action time, channel 3	B7H	TN4	Integral action time, channel 4
83H	TD3	Derivative action time, channel 3	B8H	TD4	Derivative action time, channel 4
84H	Y3*	Output variable, channel 3	B9H	Y4*	Output variable, channel 4
85H	YE3	External output variable, channel 3	BAH	YE4	External output variable, channel 4
86H	YP3	Operating point, channel 3	BBH	YP4	Operating point, channel 4
87H	YH3	Upper output limit, channel 3	BCH	YH4	Upper output limit, channel 4
88H	YL3	Lower output limit, channel 3	BDH	YL4	Lower output limit, channel 4
89H	YS3	Disturbance variable input, channel 3	BEH	YS4	Disturbance variable input, channel 4
8AH	50	Intermediate variable, preferably channel 3	BFH	75	Intermediate variable, preferably channel 4
8BH	51	Intermediate variable, preferably channel 3	C0H	76	Intermediate variable, preferably channel 4
8CH	52	Intermediate variable, preferably channel 3	C1H	77	Intermediate variable, preferably channel 4
8DH	53	Intermediate variable, preferably channel 3	C2H	78	Intermediate variable, preferably channel 4
8EH	54	Intermediate variable, preferably channel 3	C3H	79	Intermediate variable, preferably channel 4
8FH	55	Intermediate variable, preferably channel 3	C4H	80	Intermediate variable, preferably channel 4
90H	56	Intermediate variable, preferably channel 3	C5H	81	Intermediate variable, preferably channel 4
91H	57	Intermediate variable, preferably channel 3	C6H	82	Intermediate variable, preferably channel 4
92H	58	Intermediate variable, preferably channel 3	C7H	83	Intermediate variable, preferably channel 4
93H	59	Intermediate variable, preferably channel 3	C8H	84	Intermediate variable, preferably channel 4
94H	60	Intermediate variable, preferably channel 3	C9H	85	Intermediate variable, preferably channel 4
95H	61	Intermediate variable, preferably channel 3	CAH	86	Intermediate variable, preferably channel 4
96H	62	Intermediate variable, preferably channel 3	CBH	87	Intermediate variable, preferably channel 4
97H	63	Intermediate variable, preferably channel 3	CCH	88	Intermediate variable, preferably channel 4
98H	64	Intermediate variable, preferably channel 3	CDH	89	Intermediate variable, preferably channel 4
99H	65	Intermediate variable, preferably channel 3	CEH	90	Intermediate variable, preferably channel 4
9AH	66	Intermediate variable, preferably channel 3	CFH	91	Intermediate variable, preferably channel 4
9BH	67	Intermediate variable, preferably channel 3	D0H	92	Intermediate variable, preferably channel 4
9CH	68	Intermediate variable, preferably channel 3	D1H	93	Intermediate variable, preferably channel 4
9DH	69	Intermediate variable, preferably channel 3	D2H	94	Intermediate variable, preferably channel 4
9EH	70	Intermediate variable, preferably channel 3	D3H	95	Intermediate variable, preferably channel 4
9FH	71	Intermediate variable, preferably channel 3	D4H	96	Intermediate variable, preferably channel 4
A0H	72	Intermediate variable, preferably channel 3	D5H	97	Intermediate variable, preferably channel 4
A1H	73	Intermediate variable, preferably channel 3	D6H	98	Intermediate variable, preferably channel 4
A2H	74	Intermediate variable, preferably channel 3	D7H	99	Intermediate variable, preferably channel 4

The following 40 valuers are defined internally (not by program lines):

HEX	LABEL	FUNCTION
D8H	E1	Input 1, unfiltered
D9H	E2	Input 2, unfiltered
DAH	E3	Input 3, unfiltered
DBH	E4	Input 4, unfiltered
DCH	E5	Input 1, filtered
DDH	E6	Input 2, filtered temporarily not
DEH	E7	Input 3, filtered available
DFH	E8	Input 4, filtered
E0H	YR1	Entire output controller 1 / Programmer 1 [1]
E1H	YR2	Entire output controller 2 / Programmer 2 [1]
E2H	YR3	Entire output controller 3
E3H	YR4	Entire output controller 4
E4H	YC1	P+D disturbance variable component controller 1 / Programmer 1 [2]
E5H	YC2	P+D disturbance variable component controller 2 / Programmer 2 [2]
E6H	YC3	P+D disturbance variable component controller 3
E7H	YC4	P+D disturbance variable component controller 4
E8H	YJ1	I-component controller 1 / Programmer 1 [3]
E9H	YJ2	I-component controller 2 / Programmer 2 [3]
EAH	YJ3	I-component controller 3
EBH	YJ4	I-component controller 4
ECH	YD1	D-component controller 1 / Programmer 1 [4]
EDH	YD2	D-component controller 2 / Programmer 2 [4]
EEH	YD3	D-component controller 3
EFH	YD4	D-component controller 4
F0H	YF1	Feedback D section of controller 1 [5]
F1H	YF2	Feedback D section of controller 2 [6]
F2H	YF3	Feedback D section of controller 3
F3H	YF4	Feedback D section of controller 4
F4H	UA	Variable selected for bottom digital display
F5H	UR	Variable addressable by remote control
F6H	UP	Ramp-shaped test signal
F7H	ET	Measured temperature at the terminal level
F8H	F0	Fixed constant 100.0%
F9H	F1	Fixed constant 075.0%
FAH	F2	Fixed constant 050.0%
FBH	F3	Fixed constant 025.0%
FCH	F4	Fixed constant 010.0%
FDH	F5	Fixed constant 001.0%
FEH	F6	Fixed constant 000.1%
FFH	F7	Fixed constant 000.0%

[1] Intermediate variable for manual adjustment
[2] Repeating counter
[3] Time in the running interval
[4] Number of the interval
[5] Program generator output 1
[6] Program generator output 2

12.4 Binary variables in Digitric P

Internal RAM address 1CH to 3BH

Configurable binary variable

Variable's name	Bit address	Byte address	Function	
YA1	00H	1CH	Automatic channel 1	
YA2	01H	BWL00	Automatic channel 2	
YA3	02H		Automatic channel 3	
YA3	03H		Automatic channel 4	
YM1	04H		Manual channel 1	
YM2	05H		Manual channel 2	
YM3	06H		Manual channel 3	
YM4	07H		Manual channel 4	
WE1	08H	1DH	Set point external channel 1	
WE2	09H	BWL01	Set point external channel 2	
WE3	0AH		Set point external channel 3	
WE4	0BH		Set point external channel 4	
WI1	0CH		Set point internal channel 1	
WI2	0DH		Set point internal channel 2	
WI3	0EH		Set point internal channel 3	
WI4	0FH		Set point internal channel 4	
YT1	10H	1EH	Switch-forward H/A switch channel 1	
YT2	11H	BWL02	Switch-forward H/A switch channel 2	
YT3	12H		Switch-forward H/A switch channel 3	
YT4	13H		Switch-forward H/A switch channel 4	
WT1	14H		Switch-forward I/E switch channel 1	
WT2	15H		Switch-forward I/E switch channel 2	
WT3	16H		Switch-forward I/E switch channel 3	
WT4	17H		Switch-forward I/E switch channel 4	
Q11	18H	1FH	Alarm value comparison channel 1	
Q21	19H	BWL03	Alarm value comparison channel 1	0 = alarm value is infringe
Q31	1AH		Alarm value comparison channel 1	
Q41	1BH		Alarm value comparison channel 1	
Q12	1CH		Alarm value comparison channel 2	
Q22	1DH		Alarm value comparison channel 2	
Q32	1EH		Alarm value comparison channel 2	
Q42	1FH		Alarm value comparison channel 2	
Q13	20H	20H	Alarm value comparison channel 3	
Q23	21H	BWL04	Alarm value comparison channel 3	0 = alarm value is infringe
Q33	22H		Alarm value comparison channel 3	
Q43	23H		Alarm value comparison channel 3	
Q14	24H		Alarm value comparison channel 4	
Q24	25H		Alarm value comparison channel 4	
Q34	26H		Alarm value comparison channel 4	
Q44	27H		Alarm value comparison channel 4	
SC1	28H	21H	Reportable variable	
SC2	29H	BWL05	Reportable variable	
SC3	2AH		Reportable variable	
SC4	2BH		Reportable variable	
AL1	2CH		Reportable variable	
AL2	2DH		Reportable variable	
AL3	2EH		Reportable variable	
AL4	2FH		Reportable variable	
MB1	30H	22H	Activation of binary output 1	
MB2	31H	BWL06	Activation of binary output 2	
MB3	32H		Activation of binary output 3	
MB4	33H		Activation of binary output 4	
RS1	34H		Activation of relay 1	
RS2	35H		Activation of relay 2	
RS3	36H		Activation of relay 3	
RS4	37H		Activation of relay 4	

Variable's name	Bit address	Byte address	Function
CP1	38H	23H [1]	P-action (1 = on, 0 = off) channel 1
CP2	39H	BWL07	P-action (1 = on, 0 = off) channel 2
CP3	3AH		P-action (1 = on, 0 = off) channel 3
CP4	3BH		P-action (1 = on, 0 = off) channel 4
CT1	3CH		Track bit channel 1
CT2	3DH		Track bit channel 2
CT3	3EH		Track bit channel 3
CT4	3FH		Track bit channel 4
CI1	40H	24H [1]	I-action (1 = on, 0 = off) channel 1
CI2	41H	BWL08	I-action (1 = on, 0 = off) channel 2
CI3	42H		I-action (1 = on, 0 = off) channel 3
CI4	43H		I-action (1 = on, 0 = off) channel 4
CD1	44H		D-action (1 = on, 0 = off) channel 1
CD2	45H		D-action (1 = on, 0 = off) channel 2
CD3	46H		D-action (1 = on, 0 = off) channel 3
CD4	47H		D-action (1 = on, 0 = off) channel 4
BLH	48H	25H	Blanking of the bargraph/ analog display (10)
BLV	49H	BWL09	Blank vertical analog display (72 x 144) (34)
BLD	4AH		Blank figures or status displays (5, 9, 11)
OLD	4BH		H/A- or I/E changeover without flashing
B00	4CH		Binary intermediate variable
B01	4DH		Binary intermediate variable
B02	4EH		Binary intermediate variable
B03	4FH		Binary intermediate variable
B04	50H	26H	Binary intermediate variable
B05	51H	BWL10	Binary intermediate variable
B06	52H		Binary intermediate variable
B07	53H		Binary intermediate variable
B08	54H		Binary intermediate variable
B09	55H		Binary intermediate variable
B10	56H		Binary intermediate variable
EX1	57H		Not configurable
B11	58H	27H	Binary intermediate variable
B12	59H	BWL11	Binary intermediate variable
B13	5AH		Binary intermediate variable
B14	5BH		Binary intermediate variable
B15	5CH		Binary intermediate variable
B16	5DH		Binary intermediate variable
B17	5EH		Binary intermediate variable
EX2	5FH		Not configurable
B18	60H	28H	Binary intermediate variable
B19	61H	BWL12	Binary intermediate variable
B20	62H		Binary intermediate variable
B21	63H		Binary intermediate variable
B22	64H		Binary intermediate variable
B23	65H		Binary intermediate variable
B24	66H		Binary intermediate variable
B25	67H		Binary intermediate variable

Internally defined binary variable

Variable's name	Bit address	Byte address	Function
T1S	68H	29H	Time flags 1s
T2S	69H	TIMREG1	Time flags 2s
T4S	6AH		Time flags 4s
T8S	6BH		Time flags 8s
THS	6CH		Time flags 16s
T1M	6DH		Time flags 1min
T2M	6EH		Time flags 2min
T4M	6FH		Time flags 4min
TF1	70H	2AH	Flashing frequency 5 Hz
TF2	71H	TIMREG2	Flashing frequency 2.5 Hz
TF4	72H		Flashing frequency 1 Hz (400 ms on, 600 ms off)
TF8	73H		Flashing frequency 1 Hz (200 ms on, 800 ms off)
T01	74H		Time flags 0.1s
T02	75H		Time flags 0.2s
T04	76H		Time flags 0.4s
T0H	77H		Time flags 1.6s
CL0	78H	2BH	Control bit clear 0
CL1	79H	DATATRS	Control bit clear 1
CL2	7AH		Control bit clear 2
CL3	7BH		Control bit clear 3
CL4	7CH		Control bit clear 4
SPA	7DH		Control bit store parameter
RPA	7EH		Control bit recall parameter
STR	7FH		Control bit steady-state condition reached self param
KP1	80H	2CH	Key state key 1(gray, P)
KP2	81H	KEYPOS	Key state key 2 (▼)
KP3	82H		Key state key 3 (▲)
KP4	83H		Key state key 4 I/E
LLL	84H		Binary zero
KP6	85H		Key state key 6 A/H
KP7	86H		Key state key 8 (▶)
KP8	87H		Key state key 7 (◀)
KA1	88H	2DH	Key transition off/on key 1
KA2	89H	KEYAKT	Key transition off/on key 2
KA3	8AH		Key transition off/on key 3
KA4	8BH		Key transition off/on key 4 I/E
KA5	8CH		Binary zero
KA6	8DH		Key transition off/on key 6 A/H
KA7	8EH		Key transition off/on key 8 (▶)
KA8	8FH		Key transition off/on key 7 (◀)
E00	90H	2EH	Error bit Er00 = Unacknowledged reinitialisation
ERF	91H	ERR0	Error bit ErFA = Fatal error
EPH	92H		Error bit ErPH = Incomplete processing cycle (mode HOLD)
ECB	93H		Error bit ErCb = key byte 87D8H does not equal 87H
E0C	94H		Error bit ErOC = illegal OP code
ENA	95H		Error bit ErnA = unsuccessful data transfer attempt in the RAM or EPROM
EPR	96H		EPROM currently being written
EAE	97H		Data difference between editing and operation area

[1] For deviating functions in the programmer, see page 132

Variable's name	Bit address	Byte address	Function
EM1	98H	2FH	Input module 1 available
EM2	99H	GENP	Input module 2 available
EM3	9AH		Input module 3 available
EM4	9BH		Input module 4 available
AM1	9CH		Output module 1 available
AM2	9DH		Output module 2 available
AM3	9EH		Output module 3 available
AM4	9FH		Output module 4 available
EHP	A0H	30H	Error bit ErHP = Auxiliary processor 80C49 incorrect
ETO	A1H	ERR1	Error bit ErtO = Cycle time overshot
EI1	A2H		Error bit Erl1 = 1st cycle after reset
EI2	A3H		Error bit Erl2 = Up to 32nd cycle after reset
ERR	A4H		Error bit Errr = Too frequent reset (> 3/16s)
EBA	A5H		Error bit ErbA = Battery fault (only if EHP = 0)
ELP	A6H		Error bit ErLP = voltage control at the lower limit (only if EHP = 0)
EH_	A7H		Error bit ErH_ = Hardware fault EPROM, RAM, 80C49
ENN	A8H	31H	Error bit Ernn = not in the normal mode
ECH	A9H	ERR2	Error bit ErCh = RS-485 Interface not available
ENF	AAH		Error bit ErnF = Frames too infrequent [2]
ENT	ABH		Error bit ErnT = Telegrams too infrequent [3]
EPG	ACH		Error bit ErPG = Programmer fault
ETU	ADH		Error bit ErtU = Self-parameter setting is active
EST	AEH		Error bit ErSt = Self tune error
EG_	AFH		Error bit ErG_ = Global alarm value [4]
Y01	B0H	32H	Switch position 0 H/A switch channel 1 "manual"
Y11	B1H	FUY12	Switch position 1 H/A switch channel 1
Y21	B2H		Switch position 2 H/A switch channel 1 "automatic"
Y31	B3H		Switch position 3 H/A switch channel 1
Y02	B4H	(4CH)	Switch position 0 H/A switch channel 2 "manual"
Y12	B5H	RQY12 [1]	Switch position 1 H/A switch channel 2
Y22	B6H		Switch position 2 H/A switch channel 2 "automatic"
Y32	B7H		Switch position 3 H/A switch channel 2
Y03	B8H	33H	Switch position 0 H/A switch channel 3 "manual"
Y13	B9H	FUY34	Switch position 1 H/A switch channel 3
Y23	BAH		Switch position 2 H/A switch channel 3 "automatic"
Y33	BBH		Switch position 3 H/A switch channel 3
Y04	BCH	(4DH)	Switch position 0 H/A switch channel 4 "manual"
Y14	BDH	RQY34 [1]	Switch position 1 H/A switch channel 4
Y24	BEH		Switch position 2 H/A switch channel 4 "automatic"
Y34	BFH		Switch position 3 H/A switch channel 4
W01	C0H	34H	Switch position 0 W/E switch channel 1 "internal"
W11	C1H	FUW12	Switch position 1 W/E switch channel 1
W21	C2H		Switch position 2 W/E switch channel 1 "external"
W31	C3H		Switch position 3 W/E switch channel 1
W02	C4H	(4EH)	Switch position 0 W/E switch channel 2 "internal"
W12	C5H	RQW12 [1]	Switch position 1 W/E switch channel 2
W22	C6H		Switch position 2 W/E switch channel 2 "external"
W32	C7H		Switch position 3 W/E switch channel 2
W03	C8H	35H	Switch position 0 W/E switch channel 3 "internal"
W13	C9H	FUW34	Switch position 1 W/E switch channel 3
W23	CAH		Switch position 2 W/E switch channel 3 "external"
W33	CBH		Switch position 3 W/E switch channel 3
W04	CCH	(4FH)	Switch position 0 W/E switch channel 4 "internal"
W14	CDH	RQW34 [1]	Switch position 1 W/E switch channel 4
W24	CEH		Switch position 2 W/E switch channel 4 "external"
W34	CFH		Switch position 3 W/E switch channel 4
S21	D0H	36H	Status display H/A flashing
S22	D1H	SWI2	Status display I/E flashing
S23	D2H		Switchover to Y display
S24	D3H		Any key whatever pressed within the last 2 s
S25	D4H		Channel 1 in the display
S26	D5H		Channel 2 in the display
S27	D6H		Channel 3 in the display
S28	D7H		Channel 4 in the display
S11	D8H	37H	Manual binary input
S12	D9H	SWI1	Manual binary input
S13	DAH		Manual binary input
S14	DBH		Manual binary input
S15	DCH		Manual binary input
S16	DDH		Manual binary input
S17	DEH		Manual binary input
S18	DFH		Manual binary input

[1] Target address for direct access via the serial interface
[2] Interface RS-485 not operated since n seconds (n is defined in address 84DFH)
[3] No message reception since m seconds (m is defined in address 84DEH)
[4] An alarm value is over or undershot if activated in the addresses 8768H or 8769H.

Variable's name	Bit address	Byte address	Function
R11	E0H	38H	Step action controller channel 1 "raise"
R21	E1H	CONT3P	Step action controller channel 1 "lower"
R31	E2H		Step action controller channel 1 (internal)
R41	E3H		Step action controller channel 1 (internal)
R12	E4H		Step action controller channel 2 "raise"
R22	E5H		Step action controller channel 2 "lower"
R32	E6H		Step action controller channel 2 (internal)
R42	E7H		Step action controller channel 2 (internal)
P11	E8H	39H	Programmer 2, binary output
P22	E9H	PROG2	Programmer 2, binary output
P32	EAH		Programmer 2, binary output
P42	EBH		Programmer 2, binary output
P52	ECH		Programmer 2, binary output
P62	EDH		Programmer 2, binary output
P72	EEH		Programmer 2, binary output
P82	EFH		Programmer 2, binary output
P11	F0H	3AH	Programmer 1, binary output
P21	F1H	PROG1	Programmer 1, binary output
P31	F2H		Programmer 1, binary output
P41	F3H		Programmer 1, binary output
P51	F4H		Programmer 1, binary output
P61	F5H		Programmer 1, binary output
P71	F6H		Programmer 1, binary output
P81	F7H		Programmer 1, binary output
D01	F8H	3BH	Binary input 1 of module 1
D02	F9H	BININ	Binary input 2 of module 1
D03	FAH		Binary input 1 of module 2
D04	FBH		Binary input 2 of module 2
D05	FCH		Binary input 1 of module 3
D06	FDH		Binary input 2 of module 3
D07	FEH		Binary input 1 of module 4
D08	FFH		Binary input 2 of module 4
Deviating functions in the programmer			
CPx	38...3B	23	Jump to the start of the program, repeating counter is delected
CTx	3C...3F	23	Rapid run
CIx	40...43	24	Start
CDx	44...47	24	Jump to the next section
Y0x	B0; B4	32	Stop
	B8; BC	33	Stop
Y1x	B1; B5	32	Normal operation, once
	B9; BD	33	Normal operation, once
Y2x	B2; B6	32	Repeating operation
	BA; BE	33	Repeating operation
Y3x	B3; B7	32	Rapid advance
	BB; BF	33	Rapid advance

x = 1 or 2 depending on the channel

12.5 External RAM

Memory assignment of the external RAM-range 9000H to 9FFFH
(For range 8000H to 8FFFH see 12.3)

Address From	to	Name	Function
		Retrieval areas	
9000H	907FH	R_IRAM	Retrieval areas for internal RAM inter alia
9080H	9088	R_SFR	Retrieval area special function register
		Transmission buffer	
9089H		UEBERT	Counter for transmission buffer
908AH		LEN	Length of transmission buffer
908BH	90FFH	SENDBUF	Transmission buffer (117 bytes long)
		Diverse data	
9100H		Z_RESET	Reset counter
9101H		MODTIM	Mode display timer
9102H		USRD1	Auxiliary register USR channel 1 to 4
9103H		USRD2	Auxiliary register USR 9DH = begin, BC = range
9104H		TABD	Auxiliary register user tables
9105H		REGD	Auxiliary register controller structure
9106H		INPD	Auxiliary register input modules
9107H		REFD	Auxiliary register temperature reference
9108H		WIDD	Auxiliary register line resistance
9109H		OUTD	Auxiliary register output modules
910AH		CLRD	Auxiliary register Clr. 0 to Clr. 4
910BH	9117H	LBWL	Binary value list from last cycle
		Current channel	
9118H		CONTCT	Current channel (1 to 4)
9119H		SHCONT3P	Auxiliary register for step action controller output
		Monitor data	
911AH	9121H	MONDAT	Monitor data
		Test + Info	
9122H	9126H	TESTDAT	Test + Information
		Operator interface	
9127H	9129H	BDOP	Information for display loop
912AH		TIM_A	Any key actuated
912BH			Timer W- or Y- let go
912CH			Timer W-, Y- or display changeover key
912DH		TIM_VMWK	Timer variable raise/lower key briefly actuated
912EH			Timer variable raise/lower key actuated for a long time
912FH			Timer < or > briefly actuated
9130H			Timer < or > actuated for a long time
9131H			Timer <, > and display changeover actuated
		Error messages	
9132H		ERPT	Pointer for error message register
9133H			Message register ERR0
9134H			Message register ERR1
9135H			Message register ERR2
9136H			Message register BWL05
9137H			Old value ERR0
9138H			Old value ERR1
9139H			Old value ERR2
913AH			Old value BW105
		Time generation	
913BH	9140H	TIMDAT	Time generation in units of 10 ms and 15 ms
9141H	9145H	ZYL10_15	Cycle length in units of 10 and 15 ms
		Programmer	
9146H	9153H	BDZTPL	Programmer functions

Address From	to	Name	Function
		Computer traffic	
9154H		CMAN3P	Timer step action controller manual adjustment direction
9155H			Timer step action controller manual adjustment channel 1
9156H			Timer step action controller manual adjustment channel 2
9157H		CTNOFR	Counter "incomplete telegrams"
9158H		CTNOTEL	Counter "seconds without telegrams"
9159H	917FH	DIREG144	Reserved
		Process interface	
9180H	91A7H	GEDAT_AKT	Current hardware parameters
91A8H	91AFH	MODWL	List of uncorrected input values
91B0H	91C3H	SENDWL	Transmission value list of auxiliary processor
91C4H		RAMBUF	
91C5H	91FFH	MESSBI	Measuring range data
		Linearization table	
9200H	9277H	LINTAB	Linearization table for inputs dependent on range
		EPROM programming with auxiliary processor	
9278H		EP_PROG	Pulse duration
9279H			EPROM address HB
927AH			EPROM address LB
		Temperature measurement	
927BH	9282H	TEMPI	Internal data for temperature measurement
		Saving in EPROM	
9283H		ZPPROGA	Dummy address for programming
9284H	929BH	BDSTO	Field for data
		Current configuration	
929CH	929DH	RCLDAT	No. of current configuration
929EH	93FFH		reserved
		Self-parameter setting	
9400H	94FFH	TRACE1	Transition function 1 self-parameter setting
9500H	95FFH	TRACE2	Transition function 2 self-parameter setting
9600H	96FFH	TRACE3	Transition function 3 self-parameter setting
9700H	97FFH	TRACE4	Transition function 4 self-parameter setting
9800H	9F7FH	SADAPT	Reserved
		Write-protected area	
9F80H	9FDCH	PIPE	Queue value changes per telegram
9FDEH	9FEFH		Reserved
		Check-sums and reference function	
9FF0H		EP_CHS	Check-sum
9FF1H		ED_ADCHS	Address counter EPROM check-sum
9FF2H		AE_VERGL	Reference working/editor area
		Retrieval area for register on interrupt	
9FF5H	9FF6H	RETWI_KO	Retrieval area for register on interrupt
9FF7H	9FFDH	RETWI_DA	

12.6 Internal RAM 2CH to 6AH

(1CH to 3BH, see annex 2)

Individual bits are not addressable in the addresses mentioned below.

Address	Name	Function
3CH	TICACC	Intermediate counter for interrupt calls (1 LSB = 4 ms)
3DH	TICCT	Cycle length counter (1 LSB = 4 ms)
3EH	LTHO	Reading timer TH0 on last interrupt
3FH	POF	Number of timer interrupts since last ser. interrupt
40H	CAP_H	Register for measuring temperatures HB
41H	CAP_L	Register for measuring temperatures LB
42H	DII0	7 segment display top line 1st position from left
43H	DII1	7 segment display top line 2nd position from left
44H	DII2	7 segment display top line 3rd position from left
45H	DII3	7 segment display top line 4th position from left
46H	DII4	7 segment display bottom line 1st position from left
47H	DII5	7 segment display bottom line 2nd position from left
48H	DII6	7 segment display bottom line 3rd position from left
49H	DII7	7 segment display bottom line 4th position from left
4AH	LED1	Individual LED's, line
4BH	LED2	Individual LED's, status
4CH	RQY12	Function A/H switch channel 1 + 2, copied to FUY12
4DH	RQY34	Function A/H switch channel 3 + 4, copied to FUY34
4EH	RQW12	Function I/E switch channel 1 + 2, copied to FUW12
4FH	RQW34	Function I/E switch channel 3 + 4, copied to FUW34
50H	NORMCYC	Number of normal cycles since start (stop on Hold)
51H	AUXTIFL	Additional time information
52H	CYCRAC	Cycle rate counter (c/s decimal)
53H	SECCT	Seconde counter (up to FFH with overflow)
54H	VARINDI	Address of variables in the display
55H	KEYTST	Key status modification (on/off and off/on)
56H	NDIDP	Decimal point position for DII0 to DII7
57H	FUMODE	Control byte for mode, processing
58H	RQMODE	Control code for mode, selection
59H	CADRI	Internal bus address
5AH	PNT	Frame pointer for serial interface
5BH		Reception/transmission buffer to 68H
6AH	STACK	Stack grows to 7FH

Appendix, Supplements, Follow-ups, Software Up-dates

Appendix

Exchange of EPROMs (IC17)

It becomes necessary to exchange EPROMs (IC17) when:

- a new firmware version is to be installed (update),
- the storage capacity for saving "User-Files" (i.e. configurations/parameter settings) is exhausted and new "User files" are to be created,
- the old EPROM is defective (e.g. error message "Er. H _"),
- a new EPROM with special configuration has been ordered for the company.

Preliminary remarks

The balancing data needed for the hardware must be transferred from the target unit into the new EPROM. This takes place automatically when the RAM contents are stored in the User file 00 of the new EPROM. If several User files are to be transferred from the old EPROM, this transfer should take place in ascending order of the User file No. In order to save storage space, state the code No. of the standard software serving as basis for the first software transfer in the 84FAH address.

Working procedure

1. Loading a configuration

The configuration/parameter setting to be adapted should be available in the working memory of RAM.

a) This is already the case, if only a single configuration/parameter setting is required. Item 2 *"changing of the EPROMs"* can then follow.

b) If more than one configuration/parameter setting should be adapted, loading should start with the User files with the lowest Nos., as indicated in the preliminary remarks:

- Switch on unit with old EPROM.
- Call up the help routine "rC.Pr".
- Select "U-FIL" with key ▶.
- Select File No. of the software to be adapted with the keys ▲ or ▼.
- Press the H/A key while holding the I/E key (the indicator springs into the "nor." mode).
- Check the contents of the storage location 84FAH using the Help routine "dCtl", selection "E":
  If this value < 80H, it corresponds to a standard configuration based on the loaded User File. Item 2 *"exchange of EPROMs"* can then follow.
  If the value in 84FAH < 80H, search for the code number of the next standard configuration in address 929DH as of EPROM Index "G" in address 929DH and enter it into the 84FAH address. (in case of doubt, the code Number 16H may be entered.)

c) If an new EPROM with special configuration should be installed, first carry through item 2 "Exchange of EPROMs", then select and load those standard configuration from the new EPROM from which the special configuration is derived, as stated in the order specifications.

- switch on unit with new EPROM.
- call up the help routine "rC.Pr".
- select "Suppl. No." with key ▶.
- Set Suppl. No. with key ▲ or with key ▼.
- Press the key H/A while holding the I/E key (the indicator springs into the "nor." mode).
  Then continue the fourth step with item 3:
  Call up the *help routine "St.Pr"* and continue.

2. Exchanging EPROM

- Cut out the supply voltage.
- Static discharge of body through contact with an earthed conducting object.
- Take out the plug-in unit from case.
- Remove old EPROM with a little screw driver carefully from the base, do not bend the connectors
  (IC 17 can be recognized by the fact that it is the only pluggable component on the pcb).
- Plug in new EPROM.
  (pay attention that the position of the IC notch matches with that of the base notch).
- Write protection (plug-in jumper Br3 beside the EPROM base) must be blocked.
- Push the slide-in unit into the case.

3. Storing the RAM contents

- Switch on the supply voltage.
- Select the help routine "St.PA".
- Press the H/A key ("donE" appears in the display)
- Call up the help routine "St.Pr".
- Press the H/A key three times
  (successful storage is shown by the display of consecutive addresses on the lower display line).

The unit becomes functional if only one configuration is adopted.

If it is a new EPROM with special configuration, the user file 01 can be loaded into the working memory in the usual way. After setting the parameters and testing the programme, it is recommended to re-store the special configuration/parameter setting.

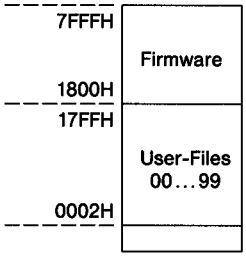
If several configurations are adopted, the required configuration can be loaded into the working memory in the usual way.

Please note that after pressing der reinitialization button only the last user file will be loaded.

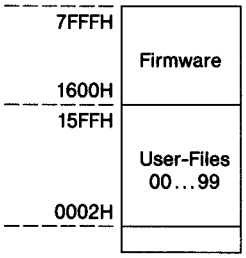
Reusing old EPROMs or blank EPROMs purchased from other manufacturers

If a suitable EPROM programming device is available you may also generate such EPROMs yourself by copying the firmware in blank EPROMs. If you also have a UV delete device exchanged EPROMs can be regenerated. To this end, it is important to know the following memory assignment.

Memory allocation to Index J



Memory allocation from Index K



A new EPROM with firmware is characterized by user file memory 0002 to 17FFH or 0002H to 15FFH respectively being blank, i.e. containing the value FFH. If from an EPROM already containing user file(s) a new EPROM shall be regenerated with firmware only the user-memory must be copied and must be filled with FFH before programming.

Suitable EPROMs (IC17)

Type:	27 C 256
Memory capacity:	256 KB

Note: We recommend to purchase blank EPROMs as well as EPROMs with firmware from H&B as only such EPROMs are not involved with any errors since they are subjected to a special electrical test of goods received.

Ordering from Hartmann&Braun

- blank EPROM (without firmware) — index no. 0853875
- EPROM (with firmware) — index no. 3100237 (not individually packed, large quantities); index No. 0344065 (individually packed)
- EPROM (with firmware and special configuration) — index no. 310 0913 + Suppl. No. ... (see Data sheet 10/61–4.70)

Technical state of firmware by end 1991

EPROM IC17 INDEX	Date (week, year)	Version
A	43.88	FF
B	44.88	00
C	48.88	01
D	49.88	02
E	01.89	03
F	15.89	04
G	24.89	05
H	35.89	06
J	38.89	07
K	11.90	08
L	48.90	09
M	10.91	0A
N	17.91	0B

The index (technical state) of a firmware has been printed on adhesive label above EPROM window.

The date of generation can be called from the controller by means of "InF.0" routine. Calendar week appears in lower left-hand display and year of generation in lower right-hand display.

The version-no. is the hexadecimal assignment to the index. In d.CtL. routine, C selection, and after adjusting 7FFA address, the version-no. is indicated in the lower display,

e. g. C 08 ("C" for code-memory)

Likewise the version-no. is indicated in the maine display of "DIGIKON" program after "data loading by controllers".

Control

The figure shows the unconfigurable control module of the first channel. For the other channels the same figures are applicable; only the numbers for the input and output variables are changed, e.g. 3rd channel: YS3, RU3, RD3...

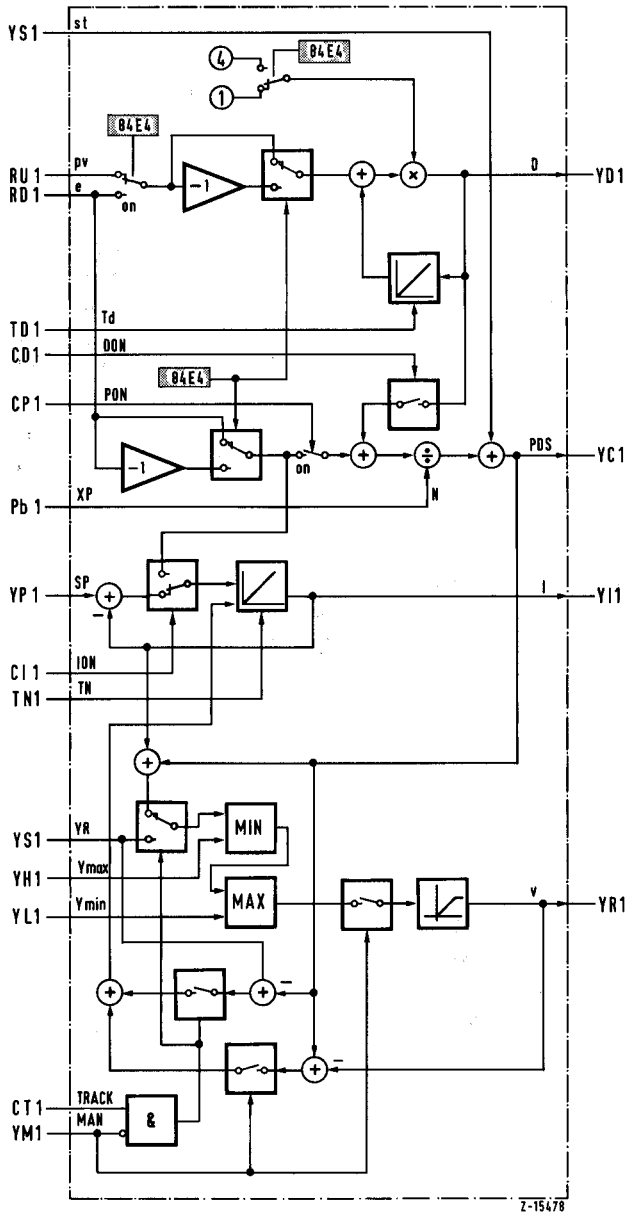


Figure Continuous control module, 1st channel

e = Input for control deviation (XD)
p^v = Differenciation input for freely configurable process variable
st = Input for disturbance variable feed forward
X_p = Input for value of proportional range
T_n = Input for value of integral action time
T_d = Input for value of derivative action time
SP = Input for value of operating point
Ymax = Input for value of upper output limit
Ymin = Input for value of lower output limit
Y_r = Feedback input (track input)
D = Output of D action

PDS = Output sum of P action, D action and disturbance variable

I = Integrator output
Y = Controller output
PON = P action active
DON = D action active
ION = I action (integrator) active
TRACK = Y_r active
MAN = Manual operation
84E4 = Controller functions, 1st channel, e.g. reverse
84E5 2nd channel
84E6 3rd channel
84E7 4th channel

DIGITRIC P firmware (EPROM 3100237.0) Index G (code "24.89")

Summary of changes:

1. Self tune function:

In the previous version, error bit EST was set (message "Er.St" + abort; cause of error "F" = cuve shape error) if at the end of a run the control deviation was more than twice the control deviation change caused by the output variable jump. The self tune function operated correctly only if the initial control deviation was sufficiently small (set point near the actual value).

This program error has been rectified; an error message resulting from error cause "F" = curve shape error now only occurs as described.

2. Storing and recalling user configurations:

The following errors and shortcomings were found in the previous versions:

- If when it is stored as file number n in byte REFILE (address 84FAH), a user configuration contained the reference to an older user configuration (file number m; m < n) (e.g. after reloading it prior to further processing), on recalling the user configuration n so stored the difference in configuration n compared with configuration m outside control code field 6 ("hardware related data") were lost. This could be remedied by entering the code number of the basis standard configuration in byte REFILE (address 84FAH) before storing. This limitation has been rectified.
- Correct functioning was not guaranteed for file numbers > 31. This limitation has been rectified.
- When a user configuration was recalled, it was not always possible to show on which standard configuration it was based. An addition to the program now makes this possible at any time after calling function "rC.Pr", mode "U.FIL", as follows:
  Load the special configuration to the edit area by pressing key 6 (file number stops flashing). Now display the Supplementary No. of the basis standard configuration by pressing key 8 *).

3. Changing standard configurations:

3.1 Formal change with no effect on the function

New: WI1: BTN, LLL Formerly: WI1: BT1, EM3

in the following standard configurations (Supplementary Nos.): 414, 434, 454, 474, 415, 435, 455, 475, 421, 481, 416, 436, 456, 476, 457, 477, 458, 478, 514, 534, 554, 574, 515, 535, 555, 575, 521, 516, 536, 556, 576, 557, 577, 558, 578

3.2 On/off controller with 2 control switching points

The following program lines enable the full correcting range to be available in manual mode irrespective of the set output limits.

New:		Formerly:	
Y1:	LB1,53	Y1:	MAX,53 54
53:	U21,54 Y1	53:	INV,YH3
54:	SUB,YR1 YR3	54:	MIN,YH1 55
55:	NOP	55:	U21,56 Y1
56:	NOP	56:	SUB,YR1 YR3

in the following standard configurations (Supplementary Nos.): 431, 432, 434, 435, 442, 531, 532, 534, 535, 542.

New:		Formerly:	
Y2:	LB1,78	Y2:	MAX,78 79
78:	U23,79 Y2	78:	INV,YH4
79:	SUB,YR2 YR4	79:	MIN,YH2 80
80:	NOP	80:	U23,81 Y2
81:	NOP	81:	SUB,YR2 YR4

in the following standard configurations (Supplementary Nos.): 434, 435, 436, 534, 535, 536.

3.3 Cascade connection with relay output

Supplement to "open" feedback signal via binary output A2.

New: MB2: BTN,W02 Formerly: MB2: NOP

in the following standard configurations (Supplementary Nos.): 516, 536

3.4 Supplement to Z2 controller configurations (preparation for split range)

New: A1: LU1,Y1 Formerly: A1: DIR, 15

in the following standard configurations (Supplementary Nos.): 431, 432, 434, 435, 442, 534, 535

New: A2: LU1,J3 Formerly: A2: NOP

in the following standard configurations (Supplementary Nos.): 431, 432, 531, 532

New: A2: LU1,J3 Formerly: A1: DIR, 40

in the following standard configurations (Supplementary Nos.): 434, 435, 534, 535

New: A2: LU1,J3 Formerly: A2: DIR,SP2

in the following standard configurations (Supplementary Nos.): 442, 542

New:			Formerly:	
A3:	LU1,Y2		A3:	DIR,SP1
A4:	LU1,J4		A4:	NOP

in the following standard configurations (Supplementary Nos.): 434, 435, 534, 535

New:			Formerly:	
A1:	LU1,Y2		A1:	DIR, 40
A4:	LU1,J4		A2:	DIR, 40

in the follwing standard configurations (Supplementary Nos.): 436, 536

*) Corrected on 20.07.1989

DIGITRIC P firmware (EPROM 3100237.0) Index H (code "35.89"), version 06

Summary of changes:

1. Disabling calls of auxiliary functions:

Two means have been provided preventing unauthorized persons and insufficiently skilled operators from (inadvertently) calling auxiliary functions and so being able to intervene in the operation of the unit. They prevent or make harder the usual call from the normal function ("nor.") with key combination 'press keys 7 and 8, then key 1'.

Hardware disable (prevents simultaneous computer operation):

While the positive terminal (S1) for the RS-485 interface is connected to reference potential (⊥) (e.g. via a key-operated switch), normal function once selected cannot be left by means of manual key operations. This disable is not active in any other function. Software disable (does not impair simultaneous computer operation):

If the value 1 is entered in control code byte 84FFH, normal function once selected cannot be left by means of manual key operations, except by pressing key 1 about 12 times in quick succession while holding keys 7 and 8 depressed. This disable is not active in any other function.

2. Self tune function:

Time range overlap:

Formerly the 4 biggest self tune time ranges of 1.80 hours to 14.40 only functioned if the controller time constant range of 00.00 h to 19.99 h was also selected for the control channel in question. Now the 8 biggest self tune time ranges of 6.4 min to 14.40 h function if the controller time constant range of 00.00 h to 19.99 h is selected for the control channel in question.

The 8 smallest self tune time ranges still only function if the controller time constant range of 0000 s to 1999 s is selected for the control channel in question.

This means that the 4 middle self tune time ranges of 6.4 minutes to 51.2 minutes now function in both controller time constant ranges. The automatic time range increase now always functions up to the maximum self tune time range possible for the particular controller time constant range.

Improved steady state test after start.

It sometimes occurred formerly possible that shortly after the start a premature leaving of the steady state was detected which had nothing to do with the excitation that had just taken place. If the steady state criterion was fulfilled once more soon after this (before the step response had properly begun), the step response was assumed to be complete and the procedure aborted with the error message 'time range too large', although actually too small a time range had been selected. This effect prevented usable results being obtained if the suitable time range, starting at the smallest time range of all, was completely unknown.

The tolerance band for the steady test at the beginning of the start phase has now been reset. The 'time range too large' error is also only set if a new steady state with a certain amplitude is present before approx. 44 % of the time range has expired. This makes selection of the initial time range less critical and largerly prevents misleading error messages.

3. User range transformation correction:

In the last two versions (Index F and G), with a large numerical range (from about 3000 digits for 100 %) the user range transformation was not correctly processed. Values affected by manual adjustment could cause unsystematic value jumps. The relevant processing error has now been rectified.

4. Supplement to telegrams for byte modification in internal RAM:

In the telegrams with function code 0DH and 0FH (cause byte modification in internal RAM), depending on the time at which the telegram was received it was possible up to and including firmware version "24.88" (EPROM index "G") for bits not continuously updated by program lines in bytes 1CH to 2FH to be overwritten once more with the former contents. This effect has been rectified.

3 new telegrams (modifications of telegram with function code 0FH) have also been defined; they can be used to influence single bits of a byte in the internal RAM.

Set single bits in 1 – 4 bytes in the internal RAM of the µC

A2H/DA/SA/1FH/A1/D1/A2/D2/A3/D3/A4/D4/FCS/16H

An = Byte address

Dn = bit mask, the bits set in the mask are set in the byte (OR function)

Used to set single bits in 1 to 4 freely definable bytes in the enquiry telegram in the internal RAM of the microcomputer of a DIGITRIC P, provided their content is not continuously updated by the program.

Delete single bits in 1 – 4 bytes in the internal RAM of the µC

A2H/DA/SA/2FH/A1/D1/A2/D2/A3/D3/A4/D4/FCS/16H

An = Byte address

Dn = bit mask, the bits reset in the mask are deleted in the byte (AND function)

Used to delete single bits in 1 to 4 freely definable bytes in the enquiry telegram in the internal RAM of the microcontroller of a DIGITRIC P, provided their content is not continuously updated by the program.

Change single bits in 1 – 4 bytes in the internal RAM of the µC

A2H/DA/SA/3FH/A1/D1/A2/D2/A3/D3/A4/D4/FCS/16H

An = Byte address

Dn = bit mask, the bits set in the mask are changed in the byte (EXOR function)

Used to change single bits in 1 to 4 freely definable bytes in the enquiry telegram in the internal RAM of the microcontroller of a DIGITRIC P, provided their content is not continuously updated by the program.

5. Program modification in the event of CPU reset:

The program part executed in a CPU reset has been given an additional time delay and validation of the current content of the internal RAM. This is intended to prevent a large number of resets being recorded in the event of the supply voltage dying away gradually, and this causing unnecessary reinitialization ("Er.00") on next switching on, even after a fairly long supply voltage interruption.

DIGITRIC P firmware (EPROM 3100237.0) Index J (code "35.89"), version 07

Summary of changes:

1. Set point modification via serial interface

When set points were set via the serial interface it was possible for the transferred value not to take effect despite a positive acknowledgement, because hitherto the 'set value' command, unlike the 'change value' command, was not put in a queue but executed immediately. This meant that if it was received in the appropriate processing segment it could be overwritten as a result of the looped processing structure for the set point. The 'change value' command is now also placed in the queue and only executed at the end of the list interpreter program part, thus reliably avoiding the described effect.

2. Identifying the basis standard configuration in user configurations

It was required to see from every user configuration the basis standard configuration from which it has been derived. For this purpose, each time a user file is loaded the hex code number (00H ... 42H, see Annex) of the standard configuration on which the user file is based is transferred to control code byte 84FEH. Each time a standard configuration is loaded the hex code number (00H ... 42H) of the standard configuration is transferred to control code byte 84FAH and to control code byte 84FEH.

When any configuration is stored the content of control code byte 84FEH is used as a basis value if control code byte 84FAH contains the code number of a non-existent user life.

This means that error message "Er.nA" now virtually never occurs on the first storage operation after retrofitting a new EPROM. As all former firmware versions and the first advance version of the configuration program DIGIKON wrote the value 00H to the hitherto unused control code byte 84FEH, in cases of doubt when such a configuration is stored Supplementary No. 411 is chosen as the basis. This results in correct but unnecessarily space-consuming storage operations and interpretation problems. These can be avoided by continuing to check or enter the code number of the relevant basis standard configuration in the control code byte before the first storage operation.

3. Self tune function

A flag (bit 1 in byte 92B7H) which was set after detecting a section with all-pass action was formerly not always correctly reset. This could lead to wrong results. (Remedy in old firmware version: write 00H to this byte before starting the self tune function.)

The calculation of a decision criterion has also been improved, making the occurrence of negative parameter values less likely in sections with small Tu/Tg.

4. Display test function supplement

The decimal points of the 7-segment displays are now activated in the display test function, unlike formerly.

Suppl. Code No.	Code numbers	Brief description
411	00H	Single-channel controller Z1, fixed value/cascade
412	01H	Single-channel controller Z1, fixed value/cascade, 3 components
414	02H	Two-channel controller Z1, fixed value
415	03H	Two-channel controller Z1, fixed value/cascade
416	04H	Cascade connection: master controller continuous, slave controller Z1
421	05H	Four-channel controller Z1, fixed value
422	06H	Single-channel program controller Z1
431	07H	Single-channel controller Z2, value/cascade
432	08H	Single-channel controller Z2, value/cascade, 3 components
434	09H	Two-channel controller Z2, fixed value
435	0AH	Two-channel controller Z2, fixed value/cascade
436	0BH	Cascade logic operation: master controller Continuous, slave controller Z2
442	0CH	Single-channel program controller Z2
451	0DH	Single-channel controller DPS, fixed value/cascade
452	0EH	Single-channel controller DPS, fixed value/cascade, 3 components
453	0FH	Single-channel controller DPS, fixed value/cascade, ratio
454	10H	Two-channel controller DPS, fixed value
455	11H	Two-channel controller DPS, fixed value/cascade
456	12H	Cascade connection: master controller continuous, slave controller DPS
457	13H	Override min. selection, DPS controller
458	14H	Override max. selection, DPS controller
462	15H	Single-channel program controller DPS
471	16H	Single-channel controller continuous, fixed value/cascade
472	17H	Single-channel controller continuous, fixed value/cascade, 3 components
473	18H	Single-channel controller continuous, fixed value/cascade, ratio
474	19H	Two-channel controller continuous, fixed value
475	1AH	Two-channel controller continuous, fixed value/cascade
476	1BH	Cascade connection: master controller continuous, slave controller continuous
477	1CH	Override min. selection, continuous controller
478	1DH	Override max. selection, continuous controller
481	1EH	Four-channel controller continuous, fixed value
482	1FH	Single-channel program controller continuous
485	16H	Process interface [1)]
491	20H	Single-channel programmer
492	21H	Two-channel programmer
511	22H	Single-channel controller Z1, fixed value/cascade, relay
512	23H	Single-channel controller Z1, fixed value/cascade, 3 components, relay
514	24H	Two-channel controller Z1, fixed value, relay
515	25H	Two-channel controller Z1, fixed value/cascade, relay
516	26H	Cascade connection: master controller continuous, slave controller Z1, relay
521	27H	Four-channel controller Z1, fixed value, relay
522	28H	Single-channel program controller Z1, relay
531	29H	Single-channel controller Z2, fixed value/cascade, relay
532	2AH	Single-channel controller Z2, fixed value/cascade, 3 components, relay
534	2BH	Two-channel controller Z2, fixed value, relay

Table of Supplementary Nos. and code numbers (cont. page 144)

Suppl. Code No.	Code numbers	Brief description
535	2CH	Two-channel controller Z2, fixed value/ cascade, relay
536	2DH	Cascade logic operation: master controller Continuous, slave controller Z2, relay
542	2EH	Single-channel program controller Z2, relay
551	2FH	Single-channel controller DPS, fixed value/cascade, relay
552	30H	Single-channel controller DPS, fixed value/ 3 components, relay
553	31H	Single-channel controller DPS, fixed value/ cascade, ratio, relay
554	32H	Two-channel controller DPS, fixed value, relay
555	33H	Two-channel controller DPS, fixed value/ cascade, relay
556	34H	Cascade connection: master controller continuous, slave controller DPS, relay
557	35H	Override min. selection, DPS controller, relay
558	36H	Override max. selection, DPS controller, relay
562	37H	Single-channel program controller DPS, relay
571	38H	Single-channel controller continuous, relay
572	39H	Single-channel controller continuous, fixed value/cascade, 3 components, relay
573	3AH	Single-channel controller continuous, fixed value/cascade, ratio, relay
574	3BH	Two-channel controller continuous, fixed value, relay
575	3CH	Two-channel controller continuous, fixed value/cascade, relay
576	3DH	Cascade connection: master controller continuous, slave controller continuous, relay
577	3EH	Override min. selection, continuous controller, relay
578	3FH	Override max. selection, continuous controller, relay
582	40H	Single-channel program controller continuous, relay
585	16H	Process interface, relay [1]
591	41H	Single-channel programmer, relay
592	42H	Two-channel programmer, relay

Table of Supplementary Nos. and Code Nos.

[1] The process interface is not contained in the firmware. Suppl. No. 471 is the basic configuration. The Suppl. Nos. 485/585 are loaded in the UFIL 01.

DIGITRIC P firmware (EPROM 3100237.0) Index K (code "11.90"), version 08

The improvements and corrections described below have also been made to the DIGITRIC P firmware.

Description of changes:

1. New functions of binary variables to improve operation

Control code byte 87FDH (VARPTR1) can be used to switch over the function of binary variables WE3 and WT3.

Bit 7 = 1: Enable new function for WE3 (see below for description)
Bit 6 = 1: Enable new function for WT3 (see below for description)
Bits 0 .... 5: Position in the display loop (greatest valid value 17H)

Control code byte 87FEH (VARPTR2) can be used to switch over the function of binary variables WE4 and WT4.

Bit 7 = 1: Enable new function for WE4 (see below for description)
Bit 6 = 1: Enable new function WT4 (see below for description)
Bit 0 .... 5: Position in the display loop (greatest valid value 17H)

Enabling the new functions automatically blocks the former functions.

New functions of target variables after switching over:

WE4 (0BH) switches the operable channel one position forward in each cycle. The function is given in all operating modes except HOLD.

As long as it set, WE3 (0AH) superimposes the multichannel display in the lower seven-segment display if the upper seven-segment display is showing the preferred variable (i.e. no channel address). Channel switchover is not possible while w, e and y are superimposed; keys 2 and 3 are inactive. WT4 (17H) causes the variable to be displayed that is in the display loop position specified in control code byte 87FEH (VARPTR2). WT4 is inactive in the large loop. If the specified position cannot be displayed, the system switches to the next higher position. If the maximum permitted position is exceeded, the system switches to position 0.

WT3 (16H) causes the variable to be displayed that is in the display loop position specified in control code byte 87FDH (VARPTR1). WT3 is inactive in the large loop. If the specified position cannot be displayed, the system switches to the next higher position. If the maximum permitted position is exceeded, the system switches to position 0.

New source variable, hitherto without function:

S21 (D0H) is set after the H/A key is released while the H/A display is flashing (1 sec) and OLD = 0.

S22 (D1H) is set after the I/E key is released while the I/E display is flashing (1 sec) and OLD = 0.

S23 (D2H) is set for one cycle after actuating the H/A key in operating mode "A" or key 7 or 8 in mode "H".

S24 (D3H) is set when any key is pressed and remains set for a further 2 seconds after releasing it.

ENN (A8H) is set when the unit is not in normal mode ("nor.").

2. Reduction of storage area for user configurations

As the firmware needed more space in the EPROM, the storage area for user configurations was reduced by 512 bytes to 5630 bytes.

3. Changing a default value in self tune

The default value for the number of runs (n) has been reduced from 2 to 1.

4. Changes to standard configurations

4.1 Switching to set point display ("w" in status display 11) if key I/E is pressed

The following program line causes the switchover for Supplementary Nos.
411, 412, 414, 415, 416, 421, 422, 451, 452, 453, 454, 455, 456, 457, 458, 462, 471, 472, 473, 474, 475, 476, 477, 478, 481, 482, 491, 492, 511, 512, 514, 515, 516, 521, 522, 551, 552, 553, 554, 555, 556, 557, 558, 562, 571, 572, 573, 574, 575, 776, 577, 578, 582, 591, 592

New: WT3: BTN,KP4 Formerly: WT3: BTN,LLL

The following program line causes the switchover in channel 1 only for Supplementary Nos.
431, 432, 442, 531, 532, 542

New: WT3: ANN,OC1,KP4 Formerly: WT3: BTN,LLL

The following progam line causes the switchover in channels 1 and 2 only for Supplementary Nos.
434, 435, 436, 534, 535, 536

New: WT3: ANN,B13,KP4 Formerly: WT3: BTN,LLL
B13: ONN,OC1,OC2 B13: NOP

4.2 Switching to correction value

("y" in status display 11) when key H/A is pressed with operating mode "A" selected, or when keys 7 or 8 are pressed with mode "H" selected.

The following program line causes the switchover for all Supplementary Nos. except
422, 442, 462, 482, 491, 492, 522, 542, 562, 582, 591, 592

New: WT4: BTN,S23 Formerly: WT4: BTN,LLL

The following program line causes the switchover in channel 2 only for Supplementary Nos.
422, 442, 462, 482, 522, 542, 562, 582

New: WT4: AIN,OC2,S23 Formerly: WT4: BTN,LLL

4.3 Switching to channel 2 with cascade connection and override control,

if channel 1 in the display and operating mode "H" is selected. While status display 13 flashes, channel 2 is in mode "A" and "w", "e" or "y" is in status display 11, multichannel display also appears.

The following program lines cause the switchover for Supplementary Nos.
416, 436, 456, 457, 458, 476, 477, 578, 516, 536, 556, 557, 558, 576, 577, 578

New: WE3: BTN,S21 Formerly: WE3: BTN,LLL
WE4: ANN,OC1,S23 WE4: BTN,LLL

4.4 Function switchover of binary variables WE3, WE4, WT3 and WT4

for the new functions described in 4.1 to 4.3.

Set WT3 function change and at the same time position 1 as jump destination in the display loop(s) on switchover for all Supplementary Nos except 416, 436, 456, 457, 458,476, 477, 478, 516, 536, 556, 557, 558, 576, 577, 578 with the following control code change.

New: 87FDH (VARPTR1): 41H Formerly: 00

Set WE3 and WT3 function change and at the same time position 1 as jump destination in the display loop(s) on switchover for Supplementary Nos. 416, 436, 456, 457, 458, 476, 477, 478, 516, 536, 556, 557, 558, 576, 577, 578 with the following control code change.

New: 87FDH (VARPTR1): C1H Formerly: 00

Set WT4 function change and at the same time position 3 as jump destination in the display loop(s) on switchover for all Supplementary Nos. except 416, 436, 456, 457, 458,476, 477, 478, 516, 536, 556, 557, 558, 576, 577, 578 with the following control code change.

New: 87FEH (VARPTR2): 43H Formerly: 00

Set WE4 and WT4 function change and at the same time position 4 as jump destination in the display loop(s) on switchover for Supplementary Nos. 416, 436, 456, 457, 458, 476, 477, 478, 516, 536, 556, 557, 558, 576, 577, 578 with the following control code change.

New: 87FEH (VARPTR2): C3H Formerly: 00

4.5 No multichannel display on single-channel units except for Z2

The following control code change removes the multichannel display for Supplementary Nos. 411, 412, 451, 452, 453, 471, 472, 473, 491, 511, 512, 551, 552, 553, 571, 572, 573, 591. If automatic drop-back has been activated, this causes automatic drop-back to the set point.

New: 876AH (VARSEL001): FEH Formerly: FFH

4.6 Transferring the multichannel display in double on/off controllers (Z2)

The following control code change shifts the multichannel display from position 0 to position 12 in the display loop for Supplementary Nos. 431, 432, 531, 532. Hence it is only available in the "middle" display loop for parameter changes in the "cool" controller. If automatic drop-back has been activated, drop-back to the set point now takes place.

New: 876AH (VARSEL001): FEH Formerly: FFH
876AH (VARSEL121): FFH FEH

4.7 Changing the user range assignment with multi-component input

The following control code change causes variables SP1, G11, G21, SH1, SL1, RL1, RH1 and R1 in user range 1 (input 1 assigned) to be displayed for Supplementary Nos. 412, 432, 452, 472, 512, 532, 552, 572.

New: 8789H (URSELB01): 00 Formerly: 62H
878BH (URSELB21): 00 F8H

4.8 Disabling setting "I" in channel 2 in program controllers

In program controllers, set point switchover of the programmer in channel 2 has no function. It is permanently held at "E" for Supplementary Nos. 422, 442, 462, 482, 522, 542, 562, 582 by the following control code change.

New: 84F6H (W12_MA): 45H Formerly: 55H

4.9 Displaying the difference between programmer set point and controller set point in program controllers

Formerly variable D1 had no meaningful value assigned to it. This is now done with the following program line for Supplementary Nos. 422, 442, 462, 482, 522,542, 562, 582.

New: D1: SUB,YF2,SP1 Formerly: D1: SUB,09,SP1

4.10 Blanking the vertical LED chain in programmers with dimensions 144*72

Formerly the vertical LED chain in programmers with dimensions 144*72 showed random values.

The following control code change blanks them out for Supplementary Nos. 491, 492, 591, 592.

New: BLV: BTI,LLL Formerly: BLV: BTN,LLL

The following control code change blanks them out for Supplementary Nos. 422, 442, 462, 482, 522, 542, 562, 582.

New: BLV: BTN,OC2 Formerly: BLV: BTN,LLL

4.11 Improving the output modulator in double on/off controllers (Z2)

Formerly the switching frequency in the double on/off controller could only be changed jointly for the "heating" and "cooling" range.

With the following program line changes, the switching frequency can be set with variable 23 in the "heating" range (channel 1) and with variable 24 in the "cooling" range (channel 3) for Supplementary Nos. 431, 432, 434, 435, 442, 531, 532, 534, 535, 542. Because of the small resolution of the correction value, avoid values of 23 and 24 that are less than 10%.

New:	Formerly:
11: MUL,55,12	11: MUL,23,12
24: FIX, #+160.0	24: NOP
55: U24,23,24	55: NOP
SC3: ONN,B11,B21	SC3:NOP
B06: FRS,SC3,B02	B06: FRS,B24,B02
B24: KB9,N1,F7	B24: ONN,B11,B21

With the following program line changes, the switching frequency of the 2nd controller can be set with variable 48 in the "heating" range (channel 2) and with variable 49 in the "cooling" range (channel 4) for Supplementary Nos. 434, 435, 436, 534, 535, 536. Because of the small resolution of the correction value, avoid values of 48 and 49 that are less than 10%.

New:	Formerly:
36: MUL,80,37	11: MUL,48,37
49: FIX, #+160.0	49: NOP
80: U25,48,49	80: NOP
SC4: ONN,B12,B23	SC4:NOP
B07: FRS,SC4,B03	B07: FRS,B25,B03
B25: KB9,N2,F7	B25: ONN,B12,B23

4.12 Resorting the display loops in double on/off controllers (Z2)

Due to the function described under 4.2, the correction value must be in the same position in all display loops.

The following control code change brings this about for Supplementary Nos. 431, 432, 434, 435, 442, 531, 532, 534, 535, 542 in channel 3.

New:	Formerly:
87AFH (VARSEL013): FE	1AH
87B0H (VARSEL023): FE	79H
87B1H (VARSEL033): 1A	82H
87B3H (VARSEL053): 82	86H
87B4H (VARSEL063): 83	87H
87B5H (VARSEL073): 86	FEH
87B2H (VARSEL043): 79	83H
87C6H (VARSELLIM4): 04	02H

The following control code change brings this about for Supplementary Nos. 434, 435, 436, 534, 535, 536 in channel 4.

New:	Formerly:
87D1H (VARSEL014): FE	4FH
87D2H (VARSEL024): FE	AEH
87D3H (VARSEL034): 4F	B7H
87D4H (VARSEL044): AE	B8H
87D5H (VARSEL054): B7	BBH
87D6H (VARSEL064): B8	BCH
87D7H (VARSEL074): BB	FEH
87D8H (VARSEL084): BC	FEH
87E8H (VARSELLIM4): 04	02H

4.13 Formal change in program controller Z2 with no effect on the function

In program controllers with Supplementary Nos. 442 and 542 the following program line is changed.

New: A2: LU1, J3 Formerly: A2: DIR,SP2

4.14 No message in upper 7-segment display if alarm value exceeded

Formerly the message "Er.G" was intermittently superimposed on the upper 7-segment display if one or more alarm values were exceeded. This message is prevented for all Supplementary Nos. with the following control code change.

New:	Formerly:
8870H (ERR2_MA0): 50H	D0H
8871H (ERR2_MA1): 50H	D0H

5. Modifications in the operator interface

On quick selection of the multichannel display (hold key 3 down, then press key 1) the display loop pointer is decremented so that on leaving it by briefly pressing 1 the variable previously displayed reappears.

The masks for the function switches (control code 84F4H to 84F7H) were hitherto only validity checked if operator interventions were made via the keys. Now it is ensured in each cycle that the switch bits can only stand in the enabled positions. If e.g. a bit is placed in a non-enabled position by telegram, the system goes to the next lower enabled position. If the mask contains 0, the lowest status is set.

6. Error elimination in OP code RAD (square root function)

The square root routine hitherto used had errors of up to 0.75% at output values of more than 100%. Moreover, with an input value of 82.65% the output value was 97.675% instead of 90.900%. The new square root routine now has an error of less than 0.075% throughout.

7. Expanding the processing of input resistance signals

The resistane input module with module code C can now be operated. A linear characteristic, Pt 100 or user-defined characteristic is possible.

Module characteristic values: K3 = 0...510 Ω (start)
K4 = 16...510 Ω (span)
K3/K4 = 6.5

8. Expansion of auxiliary routine "InP."

The resistance input module with module code C is now supported. A linear characteristic can now be set with key 3 for inputs with module codes 6, 7, A and B.

DIGITRIC P firmware (EPROM 3100237.0) Index L (identification code "48.90"), version 09

In the following, further improvements and corrections of the Digitric P firmware are described.

1. New functions in auxiliary routine "InP."

1.1 Supporting the future four-wire circuit

The four-wire circuit available since April 1991 replacing the current, restricted four-wire circuit (= two-wire circuit + line measuring circuit for short-circuit loop) has been taken into account in the "InP." auxiliary routine.

1.2 Fine calibration of the module offset

On the level of the current display of the input variable, "CAL.x" can be brought into the lower display by actuating the I/E key. This makes a fine calibration possible.

By tipping ▼ the value displayed in the top line becomes smaller and by tipping ▲ it becomes larger. By **simultaneously** holding ▼ and ▲ the fine calibration is set to zero.

(tipping 1 times corresponds to 0.025 %; ± 0.775 % are possible.)

By pressing the I/E key once more, "CAL.x" is deleted again from the bottom display, and the calibration is blocked.

A fine calibration is not necessary and thus not provided in case of module code

03...05, xC (two-wire circuit)
13...15
23...25, xE, xD (line measuring module)

The calibration data are saved in the control code field. The final data item should be saved in the EPROM.

2. Sign fault during step controller output variable modification via the serial interface eliminated

With a positive sign of the transferred increment value the "Less relay" is activated in Digitric P firmware versions up to Index "K" through value change messages (see Operating Manual 42/61-31-EN "Serial interface", Section 6.1.5) and vice versa. This sign fault has been eliminated.

3. Unsteady decimal point in the output variable display of the on/off and continuous controllers

With Digitic P firmware versions up to Index "K" it was possible (for certain adjusted values of Td) to influence the flag bits of the output variables YR1 ... YR4 which are decisive for the decimal point position of the display. For that reason the decimal point in the output variable display was unsteady. This effect has been eleminated.

4. Correction of self-tune for the 2nd step controller

Up to now the self-tune function did not function correctly for the 2nd channel of step controllers. This fault has been eliminated.

5. Automatic parameter takeover now standard feature for self-tune

For all standard configurations where the self-tune function has been released, the corresponding control code bit for automatic parameter takeover has been set in the control code byte, address 84FBH. The effect is that after a faultless run of the self-tune function the determined parameter values are automatically taken over (and not only after acknowledgement by a corresponding key actuation as it used to be).

6. New default value for alarm value G2

The default value for the minimum alarm values G2; G2.1 ... G2.4 provided in the standard configurations has been modified from −30 % to 0 % (lower-range value).

7. Modification of the control algorithm K/Z ("Intelligent integrator control")

The control algorithm for continuous and on/off controllers has been changed with regard to the control of the I-section during start-up. The control of the I-section as a function of the P-section minus the D-section and the distance to the output limits now makes sense since it is not only stopped when the output signal reaches the lower or upper output limit. In that connection it has to be considered that the set value of TD, also if the D-section is switched off, and the set value of YP (operating point), also if the I section is switched on, influence the control-action result. YP should not be set below 50.0 % an normally not to 50.0 %.

In special cases it is possible to switch off the control of the I-section depending on the P-section minus D-section if in the control code byte the value 01H is entered with address 84ECH.

8. Free selection of the user range for temperature measuring ranges

Up to now, editing the display range for temperature measuring ranges was not possible since any modification was overwritten automatically after a short interval with the auxiliary routine "USr.". A free selection of the resolution (1 K instead of 0.1 K) or a transformation into °F was not simply possible.

This is still the normal case; but now the auxiliary routine "USr." offers another selection possibility to switch off that automatic action. After repeated actuation of key 1 the character c or u appears in the upper display (5) on the right. By pressing ▲ c (= automatic range takeover switched on) can then be transformed into u (= automatic range takeover switched off) and vice versa.

9. Easier time range selection in auxiliary routine "PID"

The auxiliary routine "PID" in which the controller structure can be modified now has a further menu point which can be reached with key 1. With that new menu point the time range for integral action time and derivative action time can now be easily modified. As soon as "tttt" (+ decimal point) appears in the upper display line, the decimal point position can be changed with ▼.

This corresponds to the selection of the time range for which the

DIGITRIC P firmware (EPROM 3100237.0) Index M, identification code "10.91" Version 0A

Further modifications of the Digitric P firmware are described below.

1. Fault elimination when reinitializing

During reinitialization "ER.00" the RAM is filled with the value 0.

2. Fault elimination for the serial communication

Effects of faults in conjunction with the value modification messages for the range-limited variables YRx, PBx, TNx, TDx have been eliminated.

DIGITRIC P firmware (EPROM 3100237.0) Index N, identification code "17.91" Version 0B

Further modifications of the Digitric P firmware are described below.

1. Fault elimination for the serial communication

Elimination of fault effects in conjunction with singular interruption constellations with the result that the message is not executed (the probability that this occurs is some ppm). Furthermore, an indeterminated behavior has been eliminated. Due to a two-fold incremental modification of a value in a message (two times functions code 02, two times same address), a double or simple value change took place depending on the time of the message.

2. Configuration protection function "PROTECT CONFI"

The Digitric P now has the possibility to protect parameter default values and configuration data from being modified unintentionally, for example due by wrong operation or electromagnetic interference (EMI).

In case of a fault (= software infringement) the following steps are automatically triggered off.

- Releating of the user file last saved in the Digitric P (= highest UFILE number).
- Releating of the user-specific parameters, like alarm value, proportional range, display range, output limits etc. defined with that user file.
- Setting of the reference error bit EAE.

The results are an increased electromagnetic compatibility and a better protection against unintentional interventions.

For the factory delivery of the Digitric P the software protection is not activated since otherwise changes of the factory settings would not be possible.

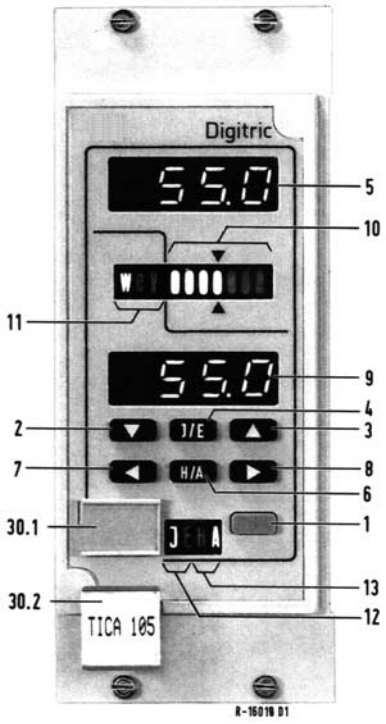
In case of a faulty instrument the upload fo the saved software cannot be recognized unless the error message "Er.AE" is activated.

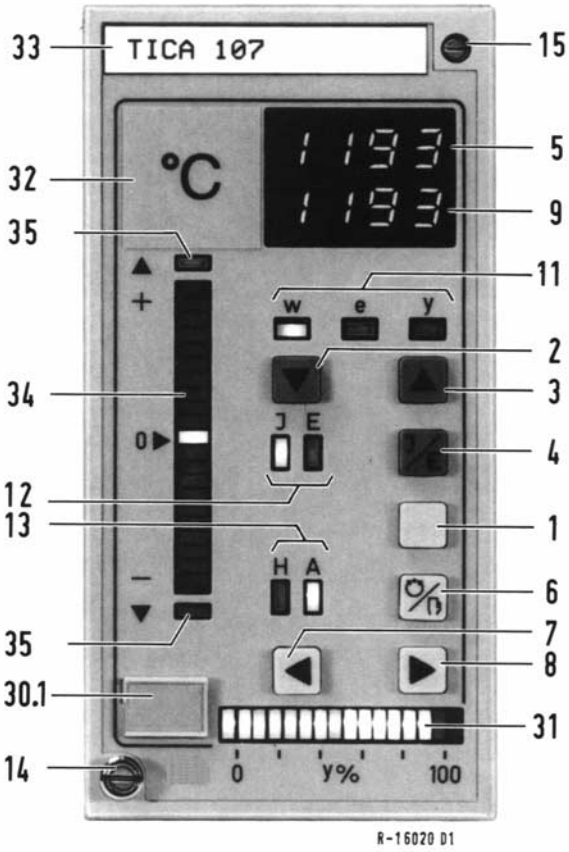
Every appearance of the error message Er.AE" in the normal mode (= operator control level), however, has to be interpreted as an indication of disturbance. If such disturbances appear frequently this is an indication an excessive electromagnetic interference. In this case the interverence source in the process plant should be suppressed. It is also possible to use a Digitric P with an increased electromagnetic compatibility (EMC) (configuration 96 mm x 96 mm, 72 mm x 144 mm, Suppl. No. 310).

Unintentional operator interventions in the parameter definition or configuration level (= auxiliary routines) can be suppressed by a hardware or software interlock.

See Operating Manual 42/61-29 EN, Section 1.1 and 3.1.11.

For activation and handling of the configuration protection "PROTECT CONFI", see "Technical Information 30/61-295 XA EN".





Format 72 mm x 144 mm

Format 96 mm x 96 mm

1 Display changeover switch (marked 1 in the text)
2 Universal setting key "Lower" (marked in the text with ▼)
3 Universal setting key "More" (marked in the text with ▲)
4 Setpoint transfer switch (marked in the text with I/E key)
5 Upper display line (Controlled variable, variable names, error messages)
6 Manual/automatic switchover (marked in the text with H/A key)
7 Manual setting key "Lower" (marked in the text with ◀)
8 Manual setting key "More" (marked in the text with ▶)
9 Bottom display line (variable value, channel display)
10 Analog display for control deviation, controller output or switching state
11 Display of main variables, see (9)
12 Status display of setpoint internal/external
13 Status display of manual/automatic
14 Closing screw and slide-in unit handle
15 Additional closing screw
30.1 Cover for the configuration jack, designation plate
30.2 Designation plate (only for 19" plug-in card)
31 Output display/switching state
32 Adhesive plate for dimension indication
33 Inscription field

only for 72 mm x 144 mm format:
34 Control deviation display
35 LEDs for control deviation ± 10 %

Subject to technical changes.

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