

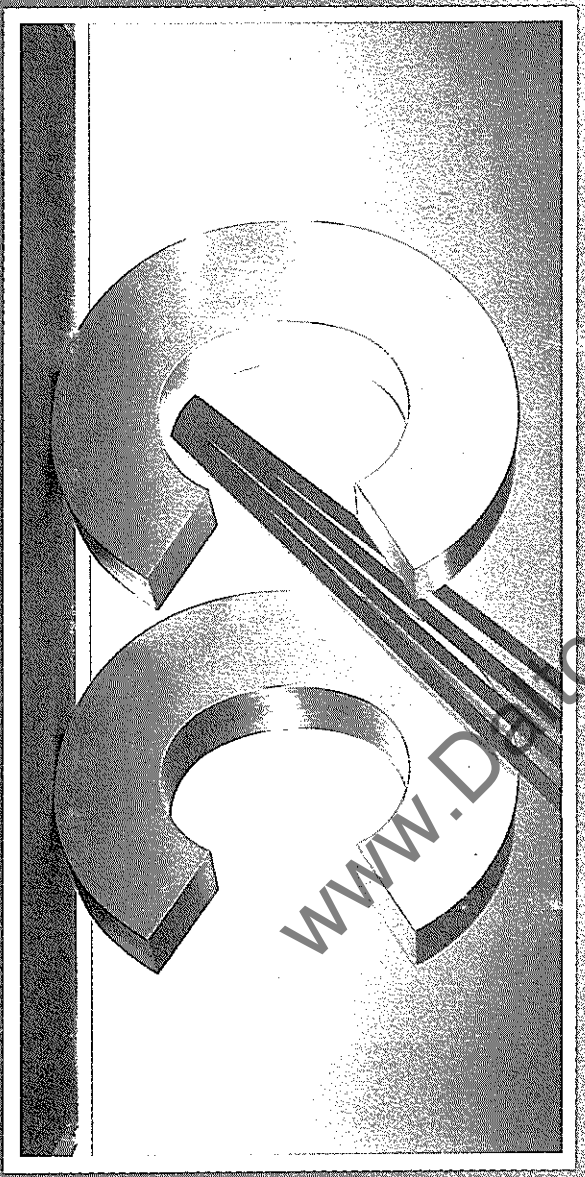
**BOSCH** 

Flexible Automation

**CC 100 M**

**MTB Handbook**

**P.Nr. 3861 / E1 - 03 / 87**



**Numerische Steuerungen  
Computer Numerical Control**

# BOSCH



## Schulungszentrum Flexible Automation

Kurse für:

- Bediener, Einrichter
- Projektoren, Programmierer
- Inbetriebnehmer, Instandhalter

Kurs-themen:

- Numerische Steuerungen (CNC) für Werkzeugmaschinen
- Speicherprogrammierbare Steuerungen (SPS)
- Elektrische Servoantriebe
- Robotersteuerungen für Roboter und Handhabungstechnik
- Widerstands-Schweißsteuerungen

Kurs-bezeichnung:

GL = Grundlagen      C = CPL/CPC  
 B = Bedienen        I = Inbetriebnahme  
 P = Programmieren    Instandhalten

### Ausbildungsvorschlag Numerische Steuerungen

Für Einsteiger ohne Erfahrung (alle Bereiche)

**CC-GL**  
 Basiskurs mit CC 100M

Für Bediener und Einrichter mit allg. NC-Erfahrung

**CC 100M-B**  
 "Fräsen" Bedienen  
 Programmieren

**CC 100T-B**  
 "Drehen" Bedienen  
 Programmieren

**CC 200T-B**  
 "Drehen" Bedienen  
 grafisches Programmieren

**CC 300-B**  
 Für CC 200M  
 CC 300M Bedienen

Für Programmierer mit allg. NC-Erfahrung

**CC 200M-P**  
 grafisches Programmieren

**CC 300-P**  
 für CC 200M  
 CC 300M  
 DIN-Programmieren

Für Programmierer: Aufbaukurs für parametrisches Programmieren

**CC 100-C**  
 für CC 100M  
 CC 100T  
 CPC-Programmieren

**CC 300-C**  
 für CC 200M  
 CC 300M  
 CPL-Programmieren

Für Inbetriebnehmer, Projektoren, Instandhalter mit produktspez. Kenntnissen

**CC 100M-I**  
 Instandhaltung  
 Inbetriebnahme

**CC 100T-I**  
 Instandhaltung  
 Inbetriebnahme

**CC 200T-I**  
 Instandhaltung  
 Inbetriebnahme

**CC 300-I2**  
 für CC 200M  
 CC 300M  
 Inbetriebnahme  
 Projektieren

**CC 300-I1**  
 für CC 200M  
 CC 300M  
 Inbetriebnahme  
 Instandhaltung

**CC 100 M**

**MTB Handbook**

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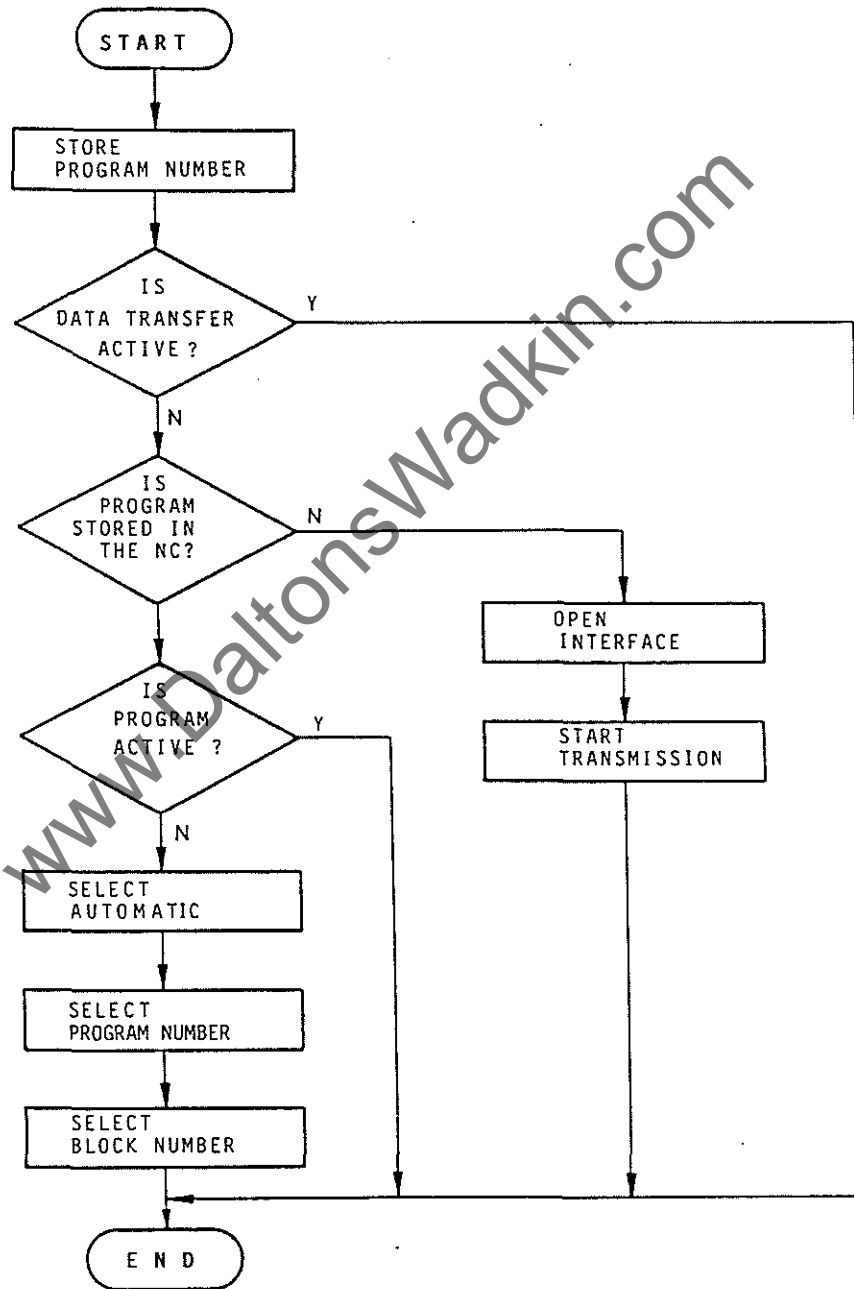
# 1 PIC EXAMPLES (1)

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## EXAMPLE 1

PROGRAM External program selection in conjunction with MINI-DNC

### FLOWCHART



## DESCRIPTION OF PROGRAM

The active program number is accepted and stored in response to the positive edge of the execution signal. If no program is active the selected program is activated and started with the next cycle start on the CC.

When an execution signal is transmitted while a program is running this program will be cancelled after feed hold and the requested program will be activated.

If a program has been activated but not started yet, it will be deactivated and the new one will be activated.

If on line PC mode is not yet active it will be activated with the positive edge of the execution signal.

It is possible to modify the input addresses for program number and execution signal shown in the example in the subsequent program section, if required.

## PROGRAMMING

The allocation of pallet code values (BCD code) to the inputs must be as follows:

Input	BCD value
11.2	1
10.7	2
10.4	4
10.1	8
10.0	10
9.5	20
9.1	40
8.7	80

## 1 PIC EXAMPLES (1)

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For explanations regarding the instruction set see manual 3806 'Connections', p.5-5.

## EXECUTION SIGNAL E 13.6

## RECOGNITION AND STORING OF PALLET CODING

```

-----
00000  1  UN  E  13.6
00001      SPB      34  NOSTORE

00002  2  U    E  11.2
00003      S    M  35.6  MDAT1
00004  3  UN   E  11.2
00005      R    M  35.6  MDAT1

00006  4  U    E  10.7
00007      S    M  35.7  MDAT2
00008  5  UN   E  10.7
00009      R    M  35.7  MDAT2

00010  6  U    E  10.4
00011      S    M  36.0  MDAT4
00012  7  UN   E  10.4
00013      R    M  36.0  MDAT4

00014  8  U    E  10.1
00015      S    M  36.1  MDAT8
00016  9  UN   E  10.1
00017      R    M  36.1  MDAT8

00018 10  U    E  10.0
00019      S    M  36.2  MDAT10

00020 11  UN   E  10.0
00021      R    M  36.2  MDAT10

00022 12  U    E   9.5
00023      S    M  36.3  MDAT20
00024 13  UN   E   9.5
00025      R    M  36.3  MDAT20

00026 14  U    E   9.1
00027      S    M  36.4  MDAT40
00028 15  UN   E   9.1
00029      R    M  36.4  MDAT40

00030 16  U    E   8.7
00031      S    M  36.5  MDAT80
00032 17  UN   E   8.7
00033      R    M  36.5  MDAT80

00034      NOSTORE  <=== JUMP ADDRESS!

```



STORE - TRANSMISSION COMPLETED  
-----

00034	18	U	E	3.0	OAD1	BCD ADDRESS 1 OUT
00035		UN	E	3.1	OAD2	BCD ADDRESS 2 OUT
00036		UN	E	3.2	OAD4	BCD ADDRESS 4 OUT
00037		UN	E	3.3	OAD8	BCD-ADDRESS 8 OUT
00038		U	E	3.4	OAD10	BCD ADDRESS 10 OUT
00039		UN	E	3.5	OAD20	BCD ADDRESS 20 OUT
00040		UN	E	3.6	OAD40	BCD ADDRESS 40 OUT
00041		U	E	3.7	OSTROBE	BCD STROBE OUT
00042		S	M	34.7	TRANSOK	

SET POWER-UP CONDITIONS  
-----

00043	19	UN	M	36.7	POWERUP	
00044		O	E	0.0	RESET	RESET OUT
00045		R	M	35.2	OPENPORT	
00046		R	M	35.1	STRLOAD	
00047		R	M	35.3	AUTO	
00048		R	M	35.5	PROGN	
00049		R	M	35.4	BLOCK	
00050		R	M	36.6	EXIST	
00051		R	M	34.1	STORE10	
00052		R	M	34.2	STORE11	
00053		R	M	34.3	STORE12	
00054		R	M	34.4	STORE13	
00055		R	M	34.5	STORE14	
00056		R	M	38.5	RES	
00057		R	M	37.1	EXISTL	
00058		R	M	37.2	EXISTA	
00059		R	M	34.6	STORE15	

## 1 PIC EXAMPLES (1)

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## CONTINUOUS STROBE FUNCTION

## TIMER 1 AND TIMER 2 RUN ALTERNATELY

TIME 2 ---> STROBE TIME VALUE: 120 MS  
 TIME 1 ---> TIME BETWEEN 2 STROBES VALUE: 120 MS

```

00060 20 UN M 36.7 POWERUP
00061 0 M 33.3 STORE4
00062 = M 61.0 ST1 START TIME 1
00063 R M 62.0 TE1 TIME END 1
00064 S M 36.7 POWERUP

00065 21 U M 33.4 STORE5
00066 R M 62.1 TE2 TIME END 2
00067 = M 61.1 ST2 START TIME 2

00068 22 UN M 62.1 TE2 TIME END 2
00069 R M 33.5 STORE6
00070 23 U M 62.1 TE2 TIME END 2
00071 UN M 33.5 STORE6
00072 S M 33.5 STORE6
00073 = M 33.3 STORE4

00074 24 UN M 62.0 TE1 TIME END 1
00075 R M 33.6 STORE7
00076 25 U M 62.0 TE1 TIME END 1
00077 UN M 33.6 STORE7
00078 S M 33.6 STORE7
00079 = M 33.4 STORE5

```

## CHANGE-OVER TO PLC ON-LINE MODE

```

00080 26 U M 38.4 STORE26
00081 UN E 0.6 ONLINEPC ON LINE PC MODE
00082 S M 37.6 STORE20
00083 S A 3.4 ONLINE ON LINE PIC/PC

00084 27 U M 37.6 STORE20
00085 = A 1.7 CTRLRES NC CONTROL RESET

00086 28 U E 0.0 RESET RESET OUT
00087 R M 37.6 STORE20

00088 29 U E 13.6
00089 0 M 37.5 STORE19
00090 = M 38.2 STORE24

```

RECOGNITION TRANSMISSION CORRECTLY COMPLETED  
-----

00091	30	UN	M	34.7	TRANSOK
00092		R	M	37.4	STORE18
00093	31	U	M	34.7	TRANSOK
00094		UN	M	37.4	STORE18
00095		S	M	37.4	STORE18
00096		=	M	37.5	STORE19
00097		R	M	35.1	STRLOAD

DETERMINATION OF RESET CONDITIONS  
-----

00098	32	U	M	35.4	BLOCK
00099		O	M	35.1	STRLOAD
00100		=	M	38.7	RESET

EDGE RECOGNITION EXECUTION SIGNAL  
-----

00101	33	UN	M	38.2	STORE24
00102		R	M	38.3	STORE25
00103	34	U	M	38.2	STORE24
00104		UN	M	38.3	STORE25
00105		S	M	38.3	STORE25
00106		=	M	38.4	STORE26

INITIATE TRANSMISSION PROTOCOL  
-----

00107	35	U	M	38.4	STORE26
00108		UN	M	36.6	EXIST
00109		UN	M	35.1	STRLOAD
00110		UN	M	35.3	AUTO
00111		UN	M	35.5	PROGN
00112		UN	M	35.2	OPENPORT
00113		S	M	33.7	STORE8

STARTING PROGRAM WHEN PROGRAM IS SELECTED  
-----

ØØ114	36	U	E	1.Ø	START	START OUT
ØØ115	=		A	1.5	CYSTART	(NOT)CYCLE START
ØØ116	37	U	E	Ø.4	PRGACT	PROGRAM ACTIVE
ØØ117		R	M	35.4	BLOCK	
ØØ118	38	UN	A	1.4	FDHOLD	(NOT)FEED HOLD
ØØ119		S	M	35.4	BLOCK	
ØØ12Ø	39	UN	E	Ø.6	ONLINEPC	ON LINE PC MODE
ØØ121		O	E	Ø.Ø	RESET	RESET OUT
ØØ122		O	A	1.7	CTRLRES	NC CONTROL RESET
ØØ123		SPB		348	END	

CHECKING EXISTENCE OF REQUESTED PROGRAM  
-----COPY PROGNO.  
-----

00124	40	UN	M	33.7	STORE8			
00125		UN	M	35.3	AUTO			
00126		SPB		159	TARGET			
00127	41	U	M	35.6	MDAT1			
00128		S	A	7.0	ID1	BCD DATA	1	IN
00129	42	UN	M	35.6	MDAT1			
00130		R	A	7.0	ID1	BCD DATA	1	IN
00131	43	U	M	35.7	MDAT2			
00132		S	A	7.1	ID2	BCD DATA	2	IN
00133	44	UN	M	35.7	MDAT2			
00134		R	A	7.1	ID2	BCD DATA	2	IN
00135	45	U	M	36.0	MDAT4			
00136		S	A	7.2	ID4	BCD DATA	4	IN
00137	46	UN	M	36.0	MDAT4			
00138		R	A	7.2	ID4	BCD DATA	4	IN
00139	47	U	M	36.1	MDAT8			
00140		S	A	7.3	ID8	BCD DATA	8	IN
00141	48	UN	M	36.1	MDAT8			
00142		R	A	7.3	ID8	BCD DATA	8	IN
00143	49	U	M	36.2	MDAT10			
00144		S	A	7.4	ID10	BCD DATA	10	IN
00145	50	UN	M	36.2	MDAT10			
00146		R	A	7.4	ID10	BCD DATA	10	IN
00147	51	U	M	36.3	MDAT20			
00148		S	A	7.5	ID20	BCD DATA	20	IN
00149	52	UN	M	36.3	MDAT20			
00150		R	A	7.5	ID20	BCD DATA	20	IN
00151	53	U	M	36.4	MDAT40			
00152		S	A	7.6	ID40	BCD DATA	40	IN
00153	54	UN	M	36.4	MDAT40			
00154		R	A	7.6	ID40	BCD DATA	40	IN
00155	55	U	M	36.5	MDAT80			
00156		S	A	7.7	ID80	BCD DATA	80	IN
00157	56	UN	M	36.5	MDAT80			
00158		R	A	7.7	ID80	BCD DATA	80	IN

## 1 PIC EXAMPLES (1)

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					TARGET	<=== JUMP ADDRESS!
00159						
00159	57	U	M	33.7	STORE8	
00160		U	M	63.1	TA2	TIME 2 ACTIVE
00161		S	A	6.1	IA1	BCD ADDRESS 1 IN
00162		R	A	6.0	IA0	BCD ADDRESS 0 IN
00163		R	A	6.2	IA2	BCD ADDRESS 2 IN
00164		R	A	6.3	IA3	BCD ADDRESS 3 IN
00165		S	A	6.4	IA4	BCD ADDRESS 4 IN
00166		R	A	6.5	IA5	BCD ADDRESS 5 IN
00167		R	A	6.6	IA6	BCD ADDRESS 6 IN
00168		S	A	6.7	ISTROBE	BCD STROBE IN
00169		S	M	34.2	STORE11	
00170	58	U	M	34.2	STORE11	
00171		U	M	63.0	TA1	TIME 1 ACTIVE
00172		R	M	34.2	STORE11	
00173		R	M	33.7	STORE8	
00174		S	M	36.6	EXIST	
00175		R	A	6.7	ISTROBE	BCD STROBE IN
00176	59	U	M	36.6	EXIST	
00177		U	E	1.3	PRGSTOR	PROGRAM STORED
00178		S	M	37.2	EXISTA	
00179		S	M	38.6	STORE27	
00180		R	M	36.6	EXIST	
00181	60	U	M	36.6	EXIST	
00182		UN	E	1.3	PRGSTOR	PROGRAM STORED
00183		S	M	37.1	EXISTL	
00184		S	M	38.6	STORE27	
00185		R	M	36.6	EXIST	
00186	61	U	E	0.4	PRGACT	PROGRAM ACTIVE
00187		SPB		348	END	
00188	62	U	M	38.6	STORE27	
00189		UN	M	38.7	RESET	
00190		S	M	38.5	RES	
00191		R	M	38.6	STORE27	
00192		SPB		221	NORES	

## 1 PIC EXAMPLES (1)

BOSCH CC 100 M  
MTB HandbookCANCEL PREVIOUSLY ACTIVE MODE  
-----

00193	63	U	M	38.6	STORE27	
00194		U	M	63.1	TA2	TIME 2 ACTIVE
00195		S	A	6.0	IA0	BCD ADDRESS 0 IN
00196		R	A	6.1	IA1	BCD ADDRESS 1 IN
00197		S	A	6.2	IA2	BCD ADDRESS 2 IN
00198		R	A	6.3	IA3	BCD ADDRESS 3 IN
00199		S	A	6.4	IA4	BCD ADDRESS 4 IN
00200		R	A	6.5	IA5	BCD ADDRESS 5 IN
00201		R	A	6.6	IA6	BCD ADDRESS 6 IN
00202		R	A	7.0	ID1	BCD DATA 1 IN
00203		R	A	7.1	ID2	BCD DATA 2 IN
00204		R	A	7.2	ID4	BCD DATA 4 IN
00205		R	A	7.3	ID8	BCD DATA 8 IN
00206		R	A	7.4	ID10	BCD DATA 10 IN
00207		R	A	7.5	ID20	BCD DATA 20 IN
00208		R	A	7.6	ID40	BCD DATA 40 IN
00209		R	A	7.7	ID80	BCD DATA 80 IN
00210		S	A	6.7	ISTROBE	BCD STROBE IN
00211		S	M	38.0	STORE22	
00212	64	U	M	38.0	STORE22	
00213		U	M	63.0	TA1	TIME 1 ACTIVE
00214		U	E	1.2	BCDOK	BCD OK
00215		S	M	38.5	RES	
00216		R	M	38.6	STORE27	
00217		R	M	35.1	STRLOAD	
00218		R	M	38.0	STORE22	
00219		R	A	6.7	ISTROBE	BCD STROBE IN
00220		R	M	35.4	BLOCK	
00221					NORES	<=== JUMP ADDRESS!

## 1 PIC ADDRESSES (1)

BOSCH CC 100 M  
MTB HandbookSELECT AUTOMATIC  
-----

00221	65	U	M	38.5	RES	
00222		U	M	37.2	EXISTA	
00223		U	M	63.1	TA2	TIME 2 ACTIVE
00224		S	A	6.7	ISTROBE	BCD STROBE IN
00225		R	A	6.0	IA0	BCD ADDRESS 0 IN
00226		R	A	6.1	IA1	BCD ADDRESS 1 IN
00227		R	A	6.2	IA2	BCD ADDRESS 2 IN
00228		R	A	6.3	IA3	BCD ADDRESS 3 IN
00229		R	A	6.4	IA4	BCD ADDRESS 4 IN
00230		R	A	6.5	IA5	BCD ADDRESS 5 IN
00231		R	A	6.6	IA6	BCD ADDRESS 6 IN
00232		R	A	7.0	ID1	BCD DATA 1 IN
00233		R	A	7.1	ID2	BCD DATA 2 IN
00234		R	A	7.2	ID4	BCD DATA 4 IN
00235		R	A	7.3	ID8	BCD DATA 8 IN
00236		S	A	7.4	ID10	BCD DATA 10 IN
00237		R	A	7.5	ID20	BCD DATA 20 IN
00238		R	A	7.6	ID40	BCD DATA 40 IN
00239		R	A	7.7	ID80	BCD DATA 80 IN
00240		S	M	34.5	STORE14	
00241	66	U	M	34.5	STORE14	
00242		U	E	1.2	BCDOK	BCD OK
00243		U	M	63.0	TA1	TIME 1 ACTIVE
00244		S	M	35.3	AUTO	
00245		R	M	34.5	STORE14	
00246		R	M	37.2	EXISTA	
00247		R	A	6.7	ISTROBE	BCD STROBE IN
00248		R	M	38.5	RES	



## 1 PIC EXAMPLES (1)

BOSCH CC 100 M  
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-----

00249	67	U	M	35.3	AUTO	
00250		U	M	63.1	TA2	TIME 2 ACTIVE
00251		S	A	6.7	ISTROBE	BCD STROBE IN
00252		S	A	6.0	IA0	BCD ADDRESS 0 IN
00253		R	A	6.1	IA1	BCD ADDRESS 1 IN
00254		R	A	6.2	IA2	BCD ADDRESS 2 IN
00255		R	A	6.3	IA3	BCD ADDRESS 3 IN
00256		R	A	6.4	IA4	BCD ADDRESS 4 IN
00257		R	A	6.5	IA5	BCD ADDRESS 5 IN
00258		R	A	6.6	IA6	BCD ADDRESS 6 IN
00259		S	M	34.6	STORE15	
00260	68	U	M	34.6	STORE15	
00261		U	M	63.0	TA1	TIME 1 ACTIVE
00262		U	E	1.2	BCDOK	BCD OK
00263		S	M	35.5	PROGN	
00264		R	M	34.6	STORE15	
00265		R	M	35.3	AUTO	
00266		R	A	6.7	ISTROBE	BCD STROBE IN

SELECT BLOCK 1  
-----

00267	69	U	M	35.5	PROGN	
00268		U	M	63.1	TA2	TIME 2 ACTIVE
00269		S	A	6.7	ISTROBE	BCD STROBE IN
00270		R	A	6.0	IA0	BCD ADDRESS 0 IN
00271		R	A	6.1	IA1	BCD ADDRESS 1 IN
00272		R	A	6.2	IA2	BCD ADDRESS 2 IN
00273		S	A	6.3	IA3	BCD ADDRESS 3 IN
00274		R	A	6.4	IA4	BCD ADDRESS 4 IN
00275		R	A	6.5	IA5	BCD ADDRESS 5 IN
00276		R	A	6.6	IA6	BCD ADDRESS 6 IN
00277		S	A	7.0	ID1	BCD DATA 1 IN
00278		R	A	7.1	ID2	BCD DATA 2 IN
00279		R	A	7.2	ID4	BCD DATA 4 IN
00280		R	A	7.3	ID8	BCD DATA 8 IN
00281		R	A	7.4	ID10	BCD DATA 10 IN
00282		R	A	7.5	ID20	BCD DATA 20 IN
00283		R	A	7.6	ID40	BCD DATA 40 IN
00284		R	A	7.7	ID80	BCE DATA 80 IN
00285		S	M	34.1	STORE10	
00286	70	U	M	34.1	STORE10	
00287		U	M	63.0	TA1	TIME 1 ACTIVE
00288		U	E	1.2	BCDOK	BCD OK
00289		S	M	35.4	BLOCK	
00290		R	M	34.1	STORE10	
00291		R	M	35.5	PROGN	
00292		R	A	6.7	ISTROBE	BCD STROBE IN

## 1 PIC EXAMPLES (1)

BOSCH CC 100 M  
MTB HandbookLOADING PROCEDURE  
-----OPEN PORT  
-----

00293	71	U	M	38.5	RES	
00294		U	M	37.1	EXISTL	
00295		U	M	63.1	TA2	TIME 2 ACTIVE
00296		R	A	6.0	IA0	BCD ADDRESS 0 IN
00297		R	A	6.1	IA1	BCD ADDRESS 1 IN
00298		R	A	6.2	IA2	BCD ADDRESS 2 IN
00299		R	A	6.3	IA3	BCD ADDRESS 3 IN
00300		R	A	6.4	IA4	BCD ADDRESS 4 IN
00301		R	A	6.5	IA5	BCD ADDRESS 5 IN
00302		R	A	6.6	IA6	BCD ADDRESS 6 IN
00303		S	A	6.7	ISTROBE	BCD STROBE IN
00304		R	A	7.0	ID1	BCD DATA 1 IN
00305		R	A	7.1	ID2	BCD DATA 2 IN
00306		R	A	7.2	ID4	BCD DATA 4 IN
00307		R	A	7.3	ID8	BCD DATA 8 IN
00308		R	A	7.4	ID10	BCD DATA 10 IN
00309		S	A	7.5	ID20	BCD DATA 20 IN
00310		R	A	7.6	ID40	BCD DATA 40 IN
00311		R	A	7.7	ID80	BCD DATA 80 IN
00312		S	M	34.3	STORE12	
00313	72	U	M	34.3	STORE12	
00314		U	E	1.2	BCDOK	BCD OK
00315		U	M	63.0	TA1	TIME 1 ACTIVE
00316		S	M	35.2	OPENPORT	
00317		R	M	34.3	STORE12	
00318		R	A	6.7	ISTROBE	BCD STROBE IN
00319		R	M	37.1	EXISTL	
00320		R	M	38.5	RES	

START LOADING  
-----

```

00321 73 U M 35.2 OPENPORT
00322 U M 63.1 TA2 TIME 2 ACTIVE
00323 S A 6.0 IA0 BCD ADDRESS 0 IN
00324 R A 6.1 IA1 BCD ADDRESS 1 IN
00325 R A 6.2 IA2 BCD ADDRESS 2 IN
00326 R A 6.3 IA3 BCD ADDRESS 3 IN
00327 S A 6.4 IA4 BCD ADDRESS 4 IN
00328 R A 6.5 IA5 BCD ADDRESS 5 IN
00329 R A 6.6 IA6 BCD ADDRESS 6 IN
00330 S A 7.0 ID1 BCD DATA 1 IN
00331 R A 7.1 ID2 BCD DATA 2 IN
00332 R A 7.2 ID4 BCD DATA 4 IN
00333 R A 7.3 ID8 BCD DATA 8 IN
00334 R A 7.4 ID10 BCD DATA 10 IN
00335 R A 7.5 ID20 BCD DATA 20 IN
00336 R A 7.6 ID40 BCD DATA 40 IN
00337 R A 7.7 ID80 BCD DATA 80 IN
00338 S A 6.7 ISTROBE BCD STROBE IN
00339 S M 34.4 STORE13

00340 74 U M 34.4 STORE13
00341 U M 63.0 TA1 TIME 1 ACTIVE
00342 U E 1.2 BCDOK BCD OK
00343 S M 35.1 STRLOAD
00344 R M 34.4 STORE13
00345 R M 35.2 OPENPORT
00346 R A 6.7 ISTROBE BCD STROBE IN
00347 R M 34.7 TRANSOK

00348 END <=== JUMP ADDRESS!

00348 PE

```

## 1 PIC EXAMPLES (2)

BOSCH CC 100 M  
MTB Handbook

## EXAMPLE 2

## PROGRAM DECODING M-FUNCTIONS

The program decodes units and tens digits of the transmitted data separately.  
 In the remaining program M-functions can then be assembled from these two components as required.  
 Data MXn and MnX are SET and must be -RESET by the program in which they are used after they have been processed.  
 If this is not wanted the SET instructions for all the MXn and MnX must be converted into "=". Then the MARKERS will be active for as long as the STROBE is high.

## PROGRAMMING

MX0 -- MX9 ---> ONES DIGITS  
 M0X -- M9X ---> TENS DIGITS

## RECOGNITION OF M-ADDRESS

00000	1	U	E	3.7	OSTROBE	BCD STROBE OUT
00001		U	E	3.0	OAD1	BCD ADDRESS 1 OUT
00002		U	E	3.1	OAD2	BCD ADDRESS 2 OUT
00003		UN	E	3.2	OAD4	BCD ADDRESS 4 OUT
00004		UN	E	3.3	OAD8	BCD ADDRESS 8 OUT
00005		UN	E	3.4	OAD10	BCD ADDRESS 10 OUT
00006		UN	E	3.5	OAD20	BCD ADDRESS 20 OUT
00007		UN	E	3.6	OAD40	BCD ADDRESS 40 OUT
00008		=	M	39.4	MFION	
00009	2	UN	M	39.4	MFION	
00010		SPB		111	NOMFION	

## RECOGNITION OF UNITS DIGITS

00011	3	UN	E	4.0	OD1	BCD DATA 1 OUT
00012		UN	E	4.1	OD2	BCD DATA 2 OUT
00013		UN	E	4.2	OD4	BCD DATA 4 OUT
00014		UN	E	4.3	OD8	BCD DATA 8 OUT
00015		S	M	38.2	MX0	M 0 DECODED STORE
00016	4	U	E	4.0	OD1	BCD DATA 1 OUT
00017		UN	E	4.1	OD2	BCD DATA 2 OUT
00018		UN	E	4.2	OD4	BCD DATA 4 OUT
00019		UN	E	4.3	OD8	BCD DATA 8 OUT
00020		S	M	38.3	MX1	M 1 DECODED STORE

## I PIC EXAMPLES (2)

BOSCH CC 100 M  
MTB Handbook

00021	5	UN	E	4.0	OD1	BCD DATA	1	OUT
00022		U	E	4.1	OD2	BCD DATA	2	OUT
00023		UN	E	4.2	OD4	BCD DATA	4	OUT
00024		UN	E	4.3	OD8	BCD DATA	8	OUT
00025		S	M	38.4	MX2	M 2 DECODED		STORE
00026	6	U	E	4.0	OD1	BCD DATA	1	OUT
00027		U	E	4.1	OD2	BCD DATA	2	OUT
00028		UN	E	4.2	OD4	BCD DATA	4	OUT
00029		UN	E	4.3	OD8	BCD DATA	8	OUT
00030		S	M	38.5	MX3	M 3 DECODED		STORE
00031	7	UN	E	4.0	OD1	BCD DATA	1	OUT
00032		UN	E	4.1	OD2	BCD DATA	2	OUT
00033		U	E	4.2	OD4	BCD DATA	4	OUT
00034		UN	E	4.3	OD8	BCD DATA	8	OUT
00035		S	M	38.6	MX4	M 4 DECODED		STORE
00036	8	U	E	4.0	OD1	BCD DATA	1	OUT
00037		UN	E	4.1	OD2	BCD DATA	2	OUT
00038		U	E	4.2	OD4	BCD DATA	4	OUT
00039		UN	E	4.3	OD8	BCD DATA	8	OUT
00040		S	M	38.7	MX5	M 5 DECODED		STORE
00041	9	UN	E	4.0	OD1	BCD DATA	1	OUT
00042		U	E	4.1	OD2	BCD DATA	2	OUT
00043		U	E	4.2	OD4	BCD DATA	4	OUT
00044		UN	E	4.3	OD8	BCD DATA	8	OUT
00045		S	M	39.0	MX6	M 6 DECODED		STORE
00046	10	U	E	4.0	OD1	BCD DATA	1	OUT
00047		U	E	4.1	OD2	BCD DATA	2	OUT
00048		U	E	4.2	OD4	BCD DATA	4	OUT
00049		UN	E	4.3	OD8	BCD DATA	8	OUT
00050		S	M	39.1	MX7	M 7 DECODED		STORE
00051	11	UN	E	4.0	OD1	BCD DATA	1	OUT
00052		UN	E	4.1	OD2	BCD DATA	2	OUT
00053		UN	E	4.2	OD4	BCD DATA	4	OUT
00054		U	E	4.3	OD8	BCD DATA	8	OUT
00055		S	M	39.2	MX8	M 8 DECODED		STORE
00056	12	U	E	4.0	OD1	BCD DATA	1	OUT
00057		UN	E	4.1	OD2	BCD DATA	2	OUT
00058		UN	E	4.2	OD4	BCD DATA	4	OUT
00059		U	E	4.3	OD8	BCD DATA	8	OUT
00060		S	M	39.3	MX9	M 9 DECODED		STORE

## I PIC EXAMPLES (2)

BOSCH CC 100 M  
MTB HandbookRECOGNITION OF TENS DIGITS  
-----

00061	13	UN	E	4.4	0D10	BCD DATA 10 OUT
00062		UN	E	4.5	0D20	BCD DATA 20 OUT
00063		UN	E	4.6	0D40	BCD DATA 40 OUT
00064		UN	E	4.7	0D80	BCD DATA 80 OUT
00065		S	M	37.0	M0X	M NO TENS DECODED STORE
00066	14	U	E	4.4	0D10	BCD DATA 10 OUT
00067		UN	E	4.5	0D20	BCD DATA 20 OUT
00068		UN	E	4.6	0D40	BCD DATA 40 OUT
00069		UN	E	4.7	0D80	BCD DATA 80 OUT
00070		S	M	37.1	M1X	M10 DECODED STORE
00071	15	UN	E	4.4	0D10	BCD DATA 10 OUT
00072		U	E	4.5	0D20	BCD DATA 20 OUT
00073		UN	E	4.6	0D40	BCD DATA 40 OUT
00074		UN	E	4.7	0D80	BCD DATA 80 OUT
00075		S	M	37.2	M2X	M20 DECODED STORE
00076	16	U	E	4.4	0D10	BCD DATA 10 OUT
00077		U	E	4.5	0D20	BCD DATA 20 OUT
00078		UN	E	4.6	0D40	BCD DATA 40 OUT
00079		UN	E	4.7	0D80	BCD DATA 80 OUT
00080		S	M	37.3	M3X	M30 DECODED STORE
00081	17	UN	E	4.4	0D10	BCD DATA 10 OUT
00082		UN	E	4.5	0D20	BCD DATA 20 OUT
00083		U	E	4.6	0D40	BCD DATA 40 OUT
00084		UN	E	4.7	0D80	BCD DATA 80 OUT
00085		S	M	37.4	M4X	M40 DECODED STORE
00086	18	U	E	4.4	0D10	BCD DATA 10 OUT
00087		UN	E	4.5	0D20	BCD DATA 20 OUT
00088		U	E	4.6	0D40	BCD DATA 40 OUT
00089		UN	E	4.7	0D80	BCD DATA 80 OUT
00090		S	M	37.5	M5X	M50 DECODED STORE
00091	19	UN	E	4.4	0D10	BCD DATA 10 OUT
00092		U	E	4.5	0D20	BCD DATA 20 OUT
00093		U	E	4.6	0D40	BCD DATA 40 OUT
00094		UN	E	4.7	0D80	BCD DATA 80 OUT
00095		S	M	37.6	M6X	M60 DECODED STORE

## 1 PIC EXAMPLES (2)

BOSCH CC 100 M  
MTB Handbook

00096	20	U	E	4.4	0D10	BCD DATA 10 OUT
00097		U	E	4.5	0D20	BCD DATA 20 OUT
00098		U	E	4.6	0D40	BCD DATA 40 OUT
00099		UN	E	4.7	0D80	BCD DATA 80 OUT
00100		S	M	37.7	M7X	M70 DECODED STORE
00101	21	UN	E	4.4	0D10	BCD DATA 10 OUT
00102		UN	E	4.5	0D20	BCD DATA 20 OUT
00103		UN	E	4.6	0D40	BCD DATA 40 OUT
00104		U	E	4.7	0D80	BCD DATA 80 OUT
00105		S	M	38.0	M8X	M80 DECODED STORE
00106	22	U	E	4.4	0D10	BCD DATA 10 OUT
00107		UN	E	4.5	0D20	BCD DATA 20 OUT
00108		UN	E	4.6	0D40	BCD DATA 40 OUT
00109		U	E	4.7	0D80	BCD DATA 80 OUT
00110		S	M	38.1	M9X	M90 DECODED STORE
00111					NOMFION	<===JUMP ADDRESS!
00111					PE	

PROGRAM  
EXAMPLE

Decoding M25

U	M	39.4	M-address
U	M	38.7	BCD-5
U	M	37.2	BCD-20
=	A	....	

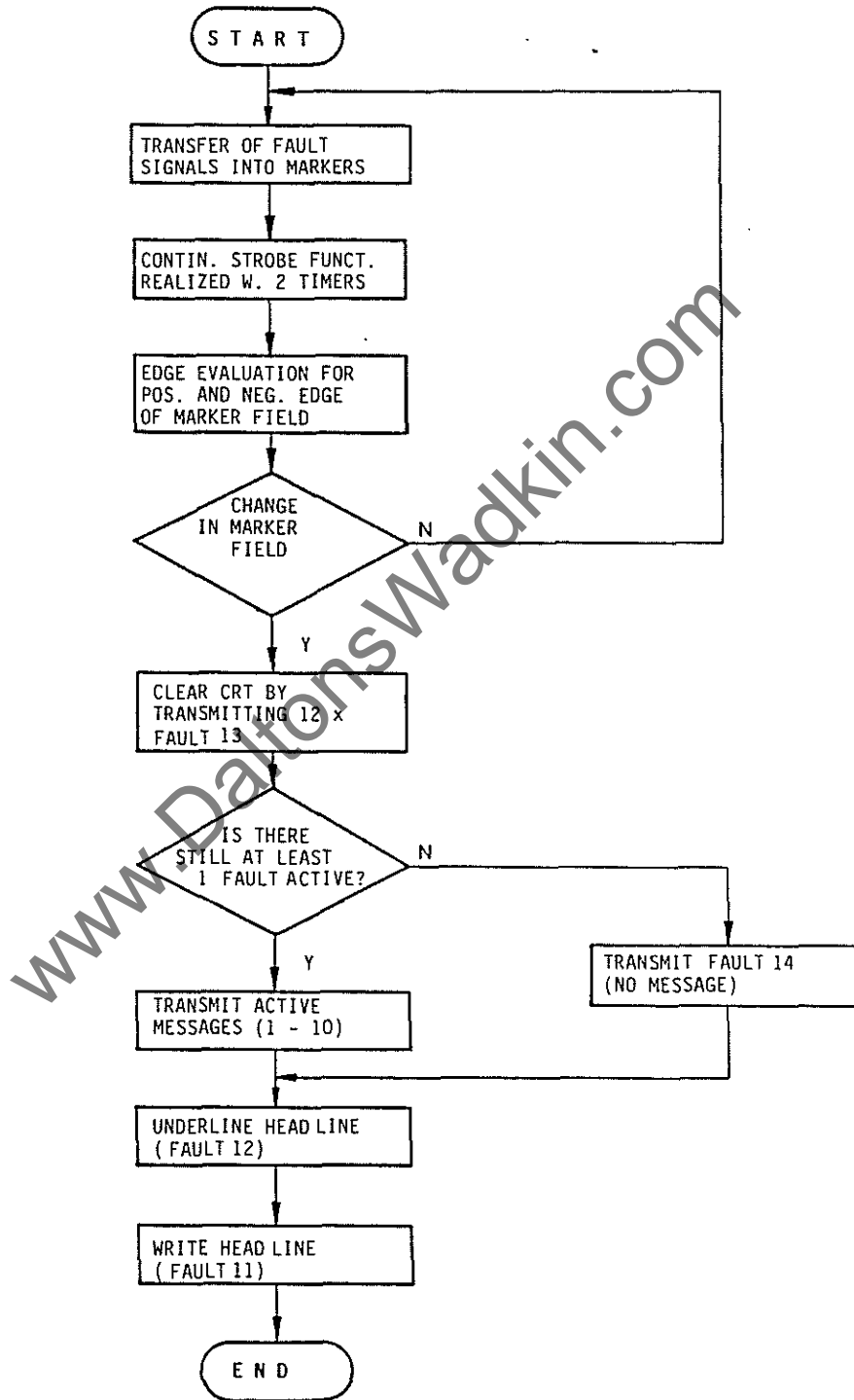
1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

EXAMPLE 3

PROGRAM Machine status display after occurrence of a fault condition.

FLOWCHART





## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB HandbookPROGRAM  
DESCRIPTION

Up to 10 status related pieces of clear text can be displayed. The fault conditions are stored in a 10 bit MARKER field (see section "Simulation of faults via interface").

The MARKER field must be continually updated. If no fault is present code 14 will be displayed.

Currently active fault signals will be displayed whenever the status of one or several fault MARKERS changes.

The number of faults can be increased up to 99. But only 10 faults can be displayed simultaneously on the screen.

Note that the "END" bit is always SET by the last fault (see section "fault 10" in this connection).

If the BCD INPUT BUS is used by further program sections an inhibit can be created via MARKER "STORE 3". "STORE 3" is HIGH from the request of the updated fault list to the end of the transmission.

## PROGRAMMING

## TIMERS AND COUNTERS

-----  
TIMERS 1 AND 2 FOR CONT. STROBE EACH MIN. 30MS  
COUNTER 1 WITH VALUE 12

## INPUT OF FAULT TEXTS INTO CC100

-----  
FAULT 1 - 10 : FAULT TEXTS  
FAULT 11 : TEXT \*\*\* ACTIVE MESSAGES \*\*\*  
FAULT 12 : TEXT -----  
FAULT 13 : NO TEXT  
FAULT 14 : TEXT \*\*\* ALL SYSTEMS BACK TO NORMAL \*\*\*

## SIMULATION OF FAULTS VIA INTERFACE

-----  
00000 1 U E 11.2  
00001 S M 37.0 FAULT01  
00002 2 UN E 11.2  
00003 R M 37.0 FAULT01  
  
00004 3 U E 10.7  
00005 S M 37.1 FAULT02  
00006 4 UN E 10.7  
00007 R M 37.1 FAULT02

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00008	5	U	E	10.4	
00009		S	M	37.2	FAULT03
00010	6	UN	E	10.4	
00011		R	M	37.2	FAULT03
00012	7	U	E	10.1	
00013		S	M	37.3	FAULT04
00014	8	UN	E	10.1	
00015		R	M	37.3	FAULT04
00016	9	U	E	10.0	
00017		S	M	37.4	FAULT05
00018	10	UN	E	10.1	
00019		R	M	37.4	FAULT05
00020	11	U	E	9.5	
00021		S	M	37.5	FAULT06
00022	12	UN	E	9.5	
00023		R	M	37.5	FAULT06
00024	13	U	E	9.1	
00025		S	M	37.6	FAULT07
00026	14	UN	E	9.1	
00027		R	M	37.6	FAULT07
00028	15	U	E	8.7	
00029		S	M	37.7	FAULT08
00030	16	UN	E	8.7	
00031		R	M	37.7	FAULT08
00032	17	U	E	11.5	
00033		S	M	38.0	FAULT09
00034	18	UN	E	11.5	
00035		R	M	38.0	FAULT09
00036	19	U	E	11.7	
00037		S	M	38.1	FAULT10
00038	20	UN	E	11.7	
00039		R	M	38.1	FAULT10

## CONT. STROBE WITH TWO TIMERS

```

-----
00040 21 UN M 42.5 POWERUP
00041 O M 39.0 STORE4
00042 = M 61.0 ST1 START TIME 1
00043 R M 62.0 TE1 TIME END 1
00044 S M 42.5 POWERUP

00045 22 U M 39.1 STORE5
00046 R M 62.1 TE2 TIME END 2
00047 = M 61.1 ST2 START TIME 2

00048 23 UN M 62.1 TE2 TIME END 2
00049 R M 39.2 STORE6
00050 24 U M 62.1 TE2 TIME END 2
00051 UN M 39.2 STORE6
00052 S M 39.2 STORE6
00053 = M 39.0 STORE4

00054 25 UN M 62.0 TE1 TIME END 1
00055 R M 39.3 STORE7
00056 26 U M 62.0 TE1 TIME END 1
00057 UN M 39.3 STORE7
00058 S M 39.3 STORE7
00059 = M 39.1 STORE5

```

## PROCESSING OF POS. AND NEG. FAULT MARKER EDGES

```

-----
00060 27 UN M 37.0 FAULT01
00061 R M 0.0 ME1
00062 28 U M 37.0 FAULT01
00063 UN M 0.0 ME1
00064 S M 0.0 ME1
00065 = M 3.6 F11

00066 29 UN M 37.1 FAULT02
00067 R M 0.1 ME2
00068 30 U M 37.1 FAULT02
00069 UN M 0.1 ME2
00070 S M 0.1 ME2
00071 = M 3.7 F12

00072 31 UN M 37.2 FAULT03
00073 R M 0.2 ME3
00074 32 U M 37.2 FAULT03
00075 UN M 0.2 ME3
00076 S M 0.2 ME3
00077 = M 4.0 F13

```

## I PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00078	33	UN	M	37.3	FAULT04
00079		R	M	0.3	ME4
00080	34	U	M	37.3	FAULT04
00081		UN	M	0.3	ME4
00082		S	M	0.3	ME4
00083		=	M	4.1	F14
00084	35	UN	M	37.4	FAULT05
00085		R	M	0.4	ME5
00086	36	U	M	37.4	FAULT05
00087		UN	M	0.4	ME5
00088		S	M	0.4	ME5
00089		=	M	4.2	F15
00090	37	UN	M	37.5	FAULT06
00091		R	M	0.5	ME6
00092	38	U	M	37.5	FAULT06
00093		UN	M	0.5	ME6
00094		S	M	0.5	ME6
00095		=	M	4.3	F16
00096	39	UN	M	37.6	FAULT07
00097		R	M	0.6	ME7
00098	40	U	M	37.6	FAULT07
00099		UN	M	0.6	ME7
00100		S	M	0.6	ME7
00101		=	M	4.4	F17
00102	41	UN	M	37.7	FAULT08
00103		R	M	0.7	ME8
00104	42	U	M	37.7	FAULT08
00105		UN	M	0.7	ME8
00106		S	M	0.7	ME8
00107		=	M	4.5	F18
00108	43	UN	M	38.0	FAULT09
00109		R	M	1.0	ME9
00110	44	U	M	38.0	FAULT09
00111		UN	M	1.0	ME9
00112		S	M	1.0	ME9
00113		=	M	4.6	F19
00114	45	UN	M	38.1	FAULT10
00115		R	M	1.1	ME10
00116	46	U	M	38.1	FAULT10
00117		UN	M	1.1	ME10
00118		S	M	1.1	ME10
00119		=	M	4.7	F20

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00120	47	U	M	37.0	FAULT01
00121		R	M	1.2	ME11
00122	48	UN	M	37.0	FAULT01
00123		UN	M	1.2	ME11
00124		S	M	1.2	ME11
00125		=	M	2.4	F1
00126	49	U	M	37.1	FAULT02
00127		R	M	1.3	ME12
00128	50	UN	M	37.1	FAULT02
00129		UN	M	1.3	ME12
00130		S	M	1.3	ME12
00131		=	M	2.5	F2
00132	51	U	M	37.2	FAULT03
00133		R	M	1.4	ME13
00134	52	UN	M	37.2	FAULT03
00135		UN	M	1.4	ME13
00136		S	M	1.4	ME13
00137		=	M	2.6	F3
00138	53	U	M	37.3	FAULT04
00139		R	M	1.5	ME14
00140	54	UN	M	37.3	FAULT04
00141		UN	M	1.5	ME14
00142		S	M	1.5	ME14
00143		=	M	2.7	F4
00144	55	U	M	37.4	FAULT05
00145		R	M	1.6	ME15
00146	56	UN	M	37.4	FAULT05
00147		UN	M	1.6	ME15
00148		S	M	1.6	ME15
00149		=	M	3.0	F5
00150	57	U	M	37.5	FAULT06
00151		R	M	1.7	ME16
00152	58	UN	M	37.5	FAULT06
00153		UN	M	1.7	ME16
00154		S	M	1.7	ME16
00155		=	M	3.1	F6
00156	59	U	M	37.6	FAULT07
00157		R	M	2.0	ME17
00158	60	UN	M	37.6	FAULT07
00159		UN	M	2.0	ME17
00160		S	M	2.0	ME17
00161		=	M	3.2	F7

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00162	61	U	M	37.7	FAULT08
00163		R	M	2.1	ME18
00164	62	UN	M	37.7	FAULT08
00165		UN	M	2.1	ME18
00166		S	M	2.1	ME18
00167		=	M	3.3	F8
00168	63	U	M	38.0	FAULT09
00169		R	M	2.2	ME19
00170	64	UN	M	38.0	FAULT09
00171		UN	M	2.2	ME19
00172		S	M	2.2	ME19
00173		=	M	3.4	F9
00174	65	U	M	38.1	FAULT10
00175		R	M	2.3	ME20
00176	66	UN	M	38.1	FAULT10
00177		UN	M	2.3	ME20
00178		S	M	2.3	ME20
00179		=	M	3.5	F10
00180	67	U	M	2.4	F1
00181		0	M	2.5	F2
00182		0	M	2.6	F3
00183		0	M	2.7	F4
00184		0	M	3.0	F5
00185		0	M	3.1	F6
00186		0	M	3.2	F7
00187		0	M	3.3	F8
00188		0	M	3.4	F9
00189		0	M	3.5	F10
00190		0	M	3.6	F11
00191		0	M	3.7	F12
00192		0	M	4.0	F13
00193		0	M	4.1	F14
00194		0	M	4.2	F15
00195		0	M	4.3	F16
00196		0	M	4.4	F17
00197		0	M	4.5	F18
00198		0	M	4.6	F19
00199		0	M	4.7	F20
00200		=	M	38.6	STORE2

INITIATE TRANSMISSION PROTOCOL  
-----

00201	68	U	M	38.6	STORE2	
00202		UN	M	38.7	STORE3	
00203		S	A	6.0	IA0	BCD ADDRESS 0 IN
00204		S	A	6.1	IA1	BCD ADDRESS 1 IN
00205		S	A	6.2	IA2	BCD ADDRESS 2 IN
00206		R	A	6.3	IA3	BCD ADDRESS 3 IN
00207		R	A	6.4	IA4	BCD ADDRESS 4 IN
00208		R	A	6.5	IA5	BCD ADDRESS 5 IN
00209		R	A	6.6	IA6	BCD ADDRESS 6 IN

CLEAR SCREEN (NO. 13)  
-----

00210	69	U	M	38.6	STORE2	
00211		UN	M	38.7	STORE3	
00212		S	M	38.7	STORE3	
00213		S	M	38.2	CLEARSCR	
00214		R	M	60.0	CE1	COUNTER 1 = 0
00215		R	M	42.4	SCREENCL	
00216	70	UN	M	60.0	CE1	COUNTER 1 = 0
00217		U	M	38.2	CLEARSCR	
00218		U	M	63.0	TA1	TIME 1 ACTIVE
00219		R	A	6.7	ISTROBE	BCD STROBE IN
00220		S	A	7.0	ID1	BCD DATA 1 IN
00221		S	A	7.1	ID2	BCD DATA 2 IN
00222		R	A	7.2	ID4	BCD DATA 4 IN
00223		R	A	7.3	ID8	BCD DATA 8 IN
00224		S	A	7.4	ID10	BCD DATA 10 IN
00225		R	A	7.5	ID20	BCD DATA 20 IN
00226		R	A	7.6	ID40	BCD DATA 40 IN
00227		R	A	7.7	ID80	BCD DATA 80 IN
00228	71	U	E	1.2	BCDOK	BCD OK
00229		U	M	38.2	CLEARSCR	
00230		U	M	39.1	STORE5	
00231		=	M	59.0	CLK1	DECREMENT COUNTER 1
00232	72	U	M	60.0	CE1	COUNTER 1 = 0
00233		U	M	38.2	CLEARSCR	
00234		R	M	38.2	CLEARSCR	
00235		S	M	42.4	SCREENCL	

## WRITE HEADLINE (NO.11)

```

-----
00236 73 U M 38.3 UNDERLIN
00237 U M 63.0 TA1 TIME 1 ACTIVE
00238 S A 6.7 ISTROBE BCD STROBE IN
00239 S A 7.0 ID1 BCD DATA 1 IN
00240 R A 7.1 ID2 BCD DATA 2 IN
00241 R A 7.2 ID4 BCD DATA 4 IN
00242 R A 7.3 ID8 BCD DATA 8 IN
00243 S A 7.4 ID10 BCD DATA 10 IN
00244 R A 7.5 ID20 BCD DATA 20 IN
00245 R A 7.6 ID40 BCD DATA 40 IN
00246 R A 7.7 ID80 BCD DATA 80 IN
00247 S M 39.6 STORE10

00248 74 U M 39.6 STORE10
00249 U M 63.1 TA2 TIME 2 ACTIVE
00250 U E 1.2 BCDOK BCD OK
00251 R M 39.6 STORE10
00252 R M 38.3 UNDERLIN
00253 S M 38.4 HEADLINE
00254 R A 6.7 ISTROBE BCD STROBE IN
00255 R M 38.7 STORE3

```

## UNDERLINE HEADLINE (NO.12)

```

-----
00256 75 U M 42.7 END
00257 U M 63.0 TA1 TIME 1 ACTIVE
00258 S A 6.7 ISTROBE BCD STROBE IN
00259 R A 7.0 ID1 BCD DATA 1 IN
00260 S A 7.1 ID2 BCD DATA 2 IN
00261 R A 7.2 ID4 BCD DATA 4 IN
00262 R A 7.3 ID8 BCD DATA 8 IN
00263 S A 7.4 ID10 BCD DATA 10 IN
00264 R A 7.5 ID20 BCD DATA 20 IN
00265 R A 7.6 ID40 BCD DATA 40 IN
00266 R A 7.7 ID80 BCD DATA 80 IN
00267 S M 39.7 STORE11

00268 76 U M 39.7 STORE11
00269 U M 63.1 TA2 TIME 2 ACTIVE
00270 U E 1.2 BCDOK BCD OK
00271 R M 42.7 END
00272 S M 38.3 UNDERLIN
00273 R A 6.7 ISTROBE BCD STROBE IN
00274 R M 39.7 STORE11

```



## NO MESSAGE ACTIVE (NO.14)

```

-----
00275 77 UN M 37.0 FAULT01
00276 UN M 37.1 FAULT02
00277 UN M 37.2 FAULT03
00278 UN M 37.3 FAULT04
00279 UN M 37.4 FAULT05
00280 UN M 37.5 FAULT06
00281 UN M 37.6 FAULT07
00282 UN M 37.7 FAULT08
00283 UN M 38.0 FAULT09
00284 UN M 38.1 FAULT10
00285 = M 43.0 NOMESS

00286 78 U M 42.4 SCREENCL
00287 UN M 43.0 NOMESS
00288 S M 42.3 NOFAULT
00289 R M 42.4 SCREENCL
00290 SPB 311 12

00291 79 U M 43.0 NOMESS
00292 U M 63.0 TA1 TIME 1 ACTIVE
00293 U M 42.4 SCREENCL
00294 S A 6.7 ISTROBE BCD STROBE IN
00295 R A 7.0 ID1 BCD DATA 1 IN
00296 R A 7.1 ID2 BCD DATA 2 IN
00297 S A 7.2 ID4 BCD DATA 4 IN
00298 R A 7.3 ID8 BCD DATA 8 IN
00299 S A 7.4 ID10 BCD DATA 10 IN
00300 R A 7.5 ID20 BCD DATA 20 IN
00301 R A 8.6 ID40 BCD DATA 40 IN
00302 R A 7.7 ID80 BCD DATA 80 IN
00303 S M 39.5 STORE9

00304 80 U M 39.5 STORE9
00305 U M 63.1 TA2 TIME 2 ACTIVE
00306 U E 1.2 BCDOK BCD OK
00307 S M 42.3 NOFAULT
00308 R A 6.7 ISTROBE BCD STROBE IN
00309 R M 42.4 SCREENCL
00310 R M 39.5 STORE9

```

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00311 12 &lt;=== JUMP ADDRESS!

TRANSMISSION OF ACTIVE FAULT MESSAGES  
-----FAULT 1  
-----

00311	81	U	M	42.3	NOFAULT	
00312		UN	M	37.0	FAULT01	
00313		S	M	40.0	STORE12	
00314		R	M	42.3	NOFAULT	
00315		SPB		336	02	
00316	82	U	M	42.3	NOFAULT	
00317		U	M	37.0	FAULT01	
00318		U	M	63.0	TA1	TIME 1 ACTIVE
00319		S	A	6.7	ISTROBE	BCD STROBE IN
00320		S	A	7.0	ID1	BCD DATA 1 IN
00321		R	A	7.1	ID2	BCD DATA 2 IN
00322		R	A	7.2	ID4	BCD DATA 4 IN
00323		R	A	7.3	ID8	BCD DATA 8 IN
00324		R	A	7.4	ID10	BCD DATA 10 IN
00325		R	A	7.5	ID20	BCD DATA 20 IN
00326		R	A	7.6	ID40	BCD DATA 40 IN
00327		R	A	7.7	ID80	BCD DATA 80 IN
00328		S	M	40.1	STORE13	
00329	83	U	M	40.1	STORE13	
00330		U	E	1.2	BCDOK	BCD OK
00331		U	M	63.1	TA2	TIME 2 ACTIVE
00332		R	A	6.7	ISTROBE	BCD STROBE IN
00333		S	M	40.0	STORE12	
00334		R	M	42.3	NOFAULT	
00335		R	M	40.1	STORE13	
00336				02		<=== JUMP ADDRESS!

FAULT 2  
-----

00336	84	U	M	40.0	STORE12	
00337		UN	M	37.1	FAULT02	
00338		S	M	40.2	STORE14	
00339		R	M	40.0	STORE12	
00340		SPB		361	03	

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00341	85	U	M	40.0	STORE12	
00342		U	M	37.1	FAULT02	
00343		U	M	63.0	TA1	TIME 1 ACTIVE
00344		S	A	6.7	ISTROBE	BCD STROBE IN
00345		R	A	7.0	ID1	BCD DATA 1 IN
00346		S	A	7.1	ID2	BCD DATA 2 IN
00347		R	A	7.2	ID4	BCD DATA 4 IN
00348		R	A	7.3	ID8	BCD DATA 8 IN
00349		R	A	7.4	ID10	BCD DATA 10 IN
00350		R	A	7.5	ID20	BCD DATA 20 IN
00351		R	A	7.6	ID40	BCD DATA 40 IN
00352		R	A	7.7	ID80	BCD DATA 80 IN
00353		S	M	40.3	STORE15	
00354	86	U	M	40.3	STORE15	
00355		U	E	1.2	BCDOK	BCD OK
00356		U	M	63.1	TA2	TIME 2 ACTIVE
00357		R	A	6.7	ISTROBE	BCD STROBE IN
00358		R	M	40.0	STORE12	
00359		S	M	40.2	STORE14	
00360		R	M	40.3	STORE15	
00361				03		<=== JUMP ADDRESS!

FAULT 3  
-----

00361	87	U	M	40.2	STORE14	
00362		U	M	37.2	FAULT03	
00363		S	M	40.4	STORE16	
00364		R	M	40.2	STORE14	
00365		SPB	M	386	04	
00366	88	U	M	40.2	STORE14	
00367		U	M	37.2	FAULT03	
00368		U	M	63.0	TA1	TIME 1 ACTIVE
00369		S	A	6.7	ISTROBE	BCD STROBE IN
00370		S	A	7.0	ID1	BCD DATA 1 IN
00371		S	A	7.1	ID2	BCD DATA 2 IN
00372		R	A	7.2	ID4	BCD DATA 4 IN
00373		R	A	7.3	ID8	BCD DATA 8 IN
00374		R	A	7.4	ID10	BCD DATA 10 IN
00375		R	A	7.5	ID20	BCD DATA 20 IN
00376		R	A	7.6	ID40	BCD DATA 40 IN
00377		R	A	7.7	ID80	BCD DATA 80 IN
00378		S	M	40.5	STORE17	

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00379	89	U	M	40.5	STORE17	
00380		U	E	1.2	BCDOK	BCD OK
00381		U	M	63.1	TA1	TIME 1 ACTIVE
00382		R	M	40.2	STORE14	
00383		R	A	6.7	ISTROBE	BCD STROBE IN
00384		S	M	40.4	STORE16	
00385		R	M	40.5	STORE17	
00386				04		<=== JUMP ADDRESS!

FAULT 4  
-----

00386	90	U	M	40.4	STORE16	
00387		UN	M	37.3	FAULT04	
00388		S	M	40.6	STORE18	
00389		R	M	40.4	STORE16	
00390		SPB		411	05	
00391	91	U	M	40.4	STORE16	
00392		U	M	37.3	FAULT04	
00393		U	M	63.0	TA1	TIME 1 ACTIVE
00394		S	A	6.7	ISTROBE	BCD STROBE IN
00395		R	A	7.0	ID1	BCD DATA 1 IN
00396		R	A	7.1	ID2	BCD DATA 2 IN
00397		S	A	7.2	ID4	BCD DATA 4 IN
00398		R	A	7.3	ID8	BCD DATA 8 IN
00399		R	A	7.4	ID10	BCD DATA 10 IN
00400		R	A	7.5	ID20	BCD DATA 20 IN
00401		R	A	7.6	ID40	BCD DATA 40 IN
00402		R	A	7.7	ID80	BCD DATA 80 IN
00403		S	M	40.7	STORE19	
00404	92	U	A	40.7	STORE19	
00405		U	E	1.2	BCDOK	BCD OK
00406		U	M	63.1	TA2	TIME 2 ACTIVE
00407		R	M	40.4	STORE 16	
00408		R	A	6.7	ISTROBE	BCD STROBE IN
00409		S	M	40.6	STORE18	
00410		R	M	40.7	STORE19	
00411				05		<=== JUMP ADDRESS!

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB HandbookFAULT 5  
-----

00411	93	U	M	40.6	STORE18	
00412		UN	M	37.4	FAULT05	
00413		S	M	41.0	STORE20	
00414		R	M	40.6	STORE18	
00415		SPB		436	06	
00416	94	U	M	40.6	STORE18	
00417		U	M	37.4	FAULT05	
00418		U	M	63.0	TA1	TIME 1 ACTIVE
00419		S	A	6.7	ISTROBE	BCD STROBE IN
00420		S	A	7.0	ID1	BCD DATA 1 IN
00421		R	A	7.1	ID2	BCD DATA 2 IN
00422		S	A	7.2	ID4	BCD DATA 4 IN
00423		R	A	7.3	ID8	BCD DATA 8 IN
00424		R	A	7.4	ID10	BCD DATA 10 IN
00425		R	A	7.5	ID20	BCD DATA 20 IN
00426		R	A	7.6	ID40	BCD DATA 40 IN
00427		R	A	7.7	ID80	BCD DATA 80 IN
00428		S	M	41.1	STORE21	
00429	95	U	M	41.1	STORE21	
00430		U	E	1.2	BCDOK	BCD OK
00431		U	M	63.1	TA2	TIME 2 ACTIVE
00432		R	A	6.7	ISTROBE	BCD STROBE IN
00433		R	M	40.6	STORE18	
00434		S	M	41.0	STORE20	
00435		R	M	41.1	STORE21	
00436					06	<=== JUMP ADDRESS!

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB HandbookFAULT 6  
-----

00436	96	U	M	41.0	STORE20	
00437		UN	M	37.5	FAULT06	
00438		S	M	41.2	STORE22	
00439		R	M	41.0	STORE20	
00440		SPB		461	07	
00441	97	U	M	41.0	STORE20	
00442		U	M	37.5	FAULT06	
00443		U	M	63.0	TA1	TIME 1 ACTIVE
00444		S	A	6.7	ISTROBE	BCD STROBE IN
00445		R	A	7.0	ID1	BCD DATA 1 IN
00446		S	A	7.1	ID2	BCD DATA 2 IN
00447		S	A	7.2	ID4	BCD DATA 4 IN
00448		R	A	7.3	ID8	BCD DATA 8 IN
00449		R	A	7.4	ID10	BCD DATA 10 IN
00450		R	A	7.5	ID20	BCD DATA 20 IN
00451		R	A	7.6	ID40	BCD DATA 40 IN
00452		R	A	7.7	ID80	BCD DATA 80 IN
00453		S	M	41.3	STORE23	
00454	98	U	M	41.3	STORE 23	
00455		U	E	1.2	BCDOK	BCD OK
00456		U	M	63.1	TA2	TIME 2 ACTIVE
00457		R	A	6.7	ISTROBE	BCD STROBE IN
00458		R	M	41.0	STORE20	
00459		R	M	41.3	STORE23	
00460		S	M	41.2	STORE22	
00461					07	<=== JUMP ADDRESS!

FAULT 7  
-----

00461	99	U	M	41.2	STORE22
00462		UN	M	37.6	FAULT07
00463		S	M	41.4	STORE24
00464		R	M	41.2	STORE22
00465		SPB		486	08

## 1 PIC EXAMPLES (3)

BOSCH CC 100 M  
MTB Handbook

00466	100	U	M	41.2	STORE22	
00467		U	M	37.6	FAULT07	
00468		U	M	63.0	TA1	TIME 1 ACTIVE
00469		S	M	6.7	ISTROBE	BCD STROBE IN
00470		S	A	7.0	ID1	BCD DATA 1 IN
00471		S	A	7.1	ID2	BCD DATA 2 IN
00472		S	A	7.2	ID4	BCD DATA 4 IN
00473		R	A	7.3	ID8	BCD DATA 8 IN
00474		R	A	7.4	ID10	BCD DATA 10 IN
00475		R	A	7.5	ID20	BCD DATA 20 IN
00476		R	A	7.6	ID40	BCD DATA 40 IN
00477		R	A	7.7	ID80	BCD DATA 80 IN
00478		S	M	41.5	STORE25	
00479	101	U	M	41.5	STORE25	
00480		U	E	1.2	BCDOK	BCD OK
00481		U	M	63.1	TA2	TIME 2 ACTIVE
00482		R	A	6.7	ISTROBE	BCD STROBE IN
00483		R	M	41.2	STORE22	
00484		S	M	41.4	STORE24	
00485		R	M	41.5	STORE25	
00486				08		<=== JUMP ADDRESS!

## FAULT 8

-----

00486	102	U	M	41.4	STORE24	
00487		U	M	37.7	FAULT08	
00488		S	M	41.6	STORE26	
00489		R	M	41.4	STORE24	
00490		SPB		511	09	
00491	103	U	M	41.4	STORE24	
00492		U	M	37.7	FAULT08	
00493		U	M	63.0	TA1	TIME 1 ACTIVE
00494		S	A	6.7	ISTROBE	BCD STROBE IN
00495		R	A	7.0	ID1	BCD DATA 1 IN
00496		R	A	7.1	ID2	BCD DATA 2 IN
00497		R	A	7.2	ID4	BCD DATA 4 IN
00498		S	A	7.3	ID8	BCD DATA 8 IN
00499		R	A	7.4	ID10	BCD DATA 10 IN
00500		R	A	7.5	ID20	BCD DATA 20 IN
00501		R	A	7.6	ID40	BCD DATA 40 IN
00502		R	A	7.7	ID80	BCD DATA 80 IN
00503		S	M	41.7	STORE27	

## 1 PIC EXAMPLES

BOSCH CC 100 M  
MTB Handbook

00504	104	U	M	41.7	STORE27	
00505		U	E	1.2	BCDOK	BCD OK
00506		U	M	63.1	TA2	TIME 2 ACTIVE
00507		R	A	6.7	ISTROBE	BCD STROBE IN
00508		R	M	41.4	STORE24	
00509		R	M	41.7	STORE27	
00510		S	M	41.6	STORE26	
00511				09		<=== JUMP ADDRESS!

## FAULT 9

-----

00511	105	U	M	41.6	STORE 26	
00512		UN	M	38.0	FAULT09	
00513		S	M	42.0	STORE28	
00514		R	M	41.6	STORE26	
00515		SPB		536	10	
00516	106	U	M	41.6	STORE26	
00517		U	M	38.0	FAULT09	
00518		U	M	63.0	TA1	TIME 1 ACTIVE
00519		S	A	6.7	ISTROBE	BCD STROBE IN
00520		S	A	7.0	ID1	BCD DATA 1 IN
00521		R	A	7.1	ID2	BCD DATA 2 IN
00522		R	A	7.2	ID4	BCD DATA 4 IN
00523		S	A	7.3	ID8	BCD DATA 8 IN
00524		R	A	7.4	ID10	BCD DATA 10 IN
00525		R	A	7.5	ID20	BCD DATA 20 IN
00526		R	A	7.6	ID40	BCD DATA 40 IN
00527		R	A	7.7	ID80	BCD DATA 80 IN
00528		S	M	42.1	STORE29	
00529	107	U	M	42.1	STORE29	
00530		U	E	1.2	BCDOK	BCD OK
00531		U	M	63.1	TA2	TIME 2 ACTIVE
00532		S	M	42.0	STORE28	
00533		R	M	41.6	STORE26	
00534		R	M	42.1	STORE29	
00535		R	A	6.7	ISTROBE	BCD STROBE IN
00536				10		<=== JUMP ADDRESS!



## 1 PIC EXAMPLES (3)

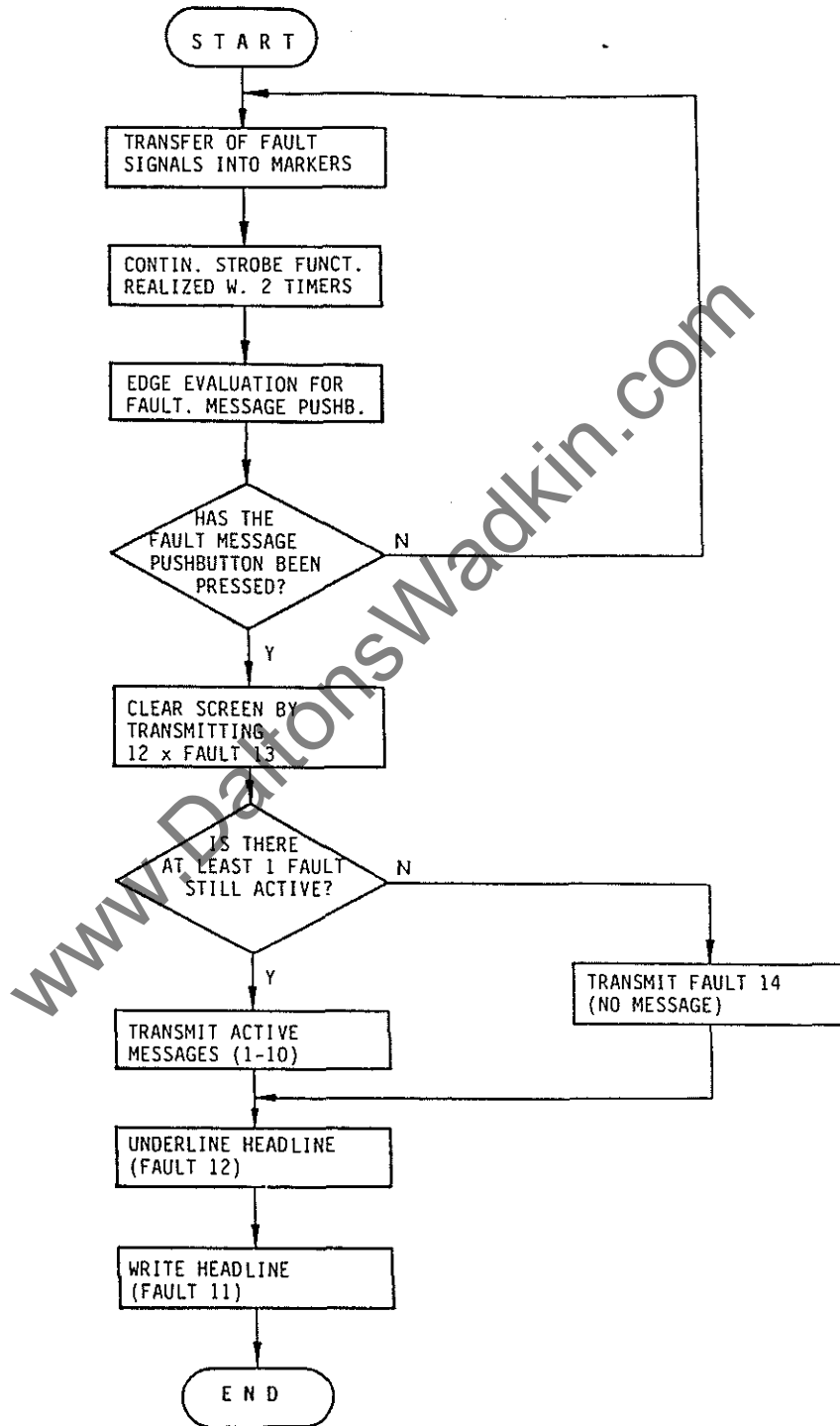
BOSCH CC 100 M  
MTB HandbookFAULT 10  
-----

00536	108	U	M	42.0	STORE28	
00537		UN	M	38.1	FAULT10	
00538		R	M	42.0	STORE28	
00539		S	M	42.7	END	
00540		SPB		561	11	
00541	109	U	M	42.0	STORE28	
00542		U	M	38.1	FAULT10	
00543		U	M	63.0	TA1	TIME 1 ACTIVE
00544		S	A	6.7	ISTROBE	BCD STROBE IN
00545		R	A	7.0	ID1	BCD DATA 1 IN
00546		R	A	7.1	ID2	BCD DATA 2 IN
00547		R	A	7.2	ID4	BCD DATA 4 IN
00548		R	A	7.3	ID8	BCD DATA 8 IN
00549		S	A	7.4	ID10	BCD DATA 10 IN
00550		R	A	7.5	ID20	BCD DATA 20 IN
00551		R	A	7.6	ID40	BCD DATA 40 IN
00552		R	A	7.7	ID80	BCD DATA 80 IN
00553		S	M	42.2	STORE30	
00554	110	U	M	42.2	STORE30	
00555		U	E	1.2	BCDOK	BCD OK
00556		U	M	63.1	TA2	TIME 2 ACTIVE
00557		R	M	42.0	STORE28	
00558		S	M	42.7	END	
00559		R	A	6.7	ISTROBE	BCD STROBE IN
00560		R	M	42.2	STORE30	
00561					11	<=== JUMP ADDRESS!
00561		PE				

EXAMPLE 4

PROGRAM Machine status display via pushbutton actuation

FLOWCHART



PROGRAM  
DESCRIPTION

Example 4 is a special form of example 3.

The display of the current fault messages is generated by actuation of a fault message pushbutton (PB3 in this case).

The program description of example 3 applies, without the elaborate edge evaluation of the fault MARKERS.

## PROGRAMMING

## TIMERS AND COUNTERS

-----  
TIMERS 1 AND 2 FOR CONT. STROBE EACH MIN. 30MS  
COUNTER 1 WITH VALUE 12

## INPUT OF FAULT TEXTS INTO CC100

-----  
FAULT 1 - 10 : FAULT TEXTS  
FAULT 11 : TEXT \*\*\* ACTIVE MESSAGES \*\*\*  
FAULT 12 : TEXT -----  
FAULT 13 : TEXT \*\*\* NONE \*\*\*

## SIMULATION OF FAULTS VIA INTERFACE

-----  
00000 1 U E 11.2  
00001 S M 37.0 FAULT01  
00002 2 UN E 11.2  
00003 R M 37.0 FAULT01  
  
00004 3 U E 10.7  
00005 S M 37.1 FAULT02  
00006 4 UN E 10.7  
00007 R M 37.1 FAULT02  
  
00008 5 U E 10.4  
00009 S M 37.2 FAULT03  
00010 6 UN E 10.4  
00011 R M 37.2 FAULT03  
  
00012 7 U E 10.1  
00013 S M 37.3 FAULT04  
00014 8 UN E 10.1  
00015 R M 37.3 FAULT04

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00016	9	U	E	10.0	
00017		S	M	37.4	FAULT05
00018	10	UN	E	10.0	
00019		R	M	37.4	FAULT05
00020	11	U	E	9.5	
00021		S	M	37.5	FAULT06
00022	12	UN	E	9.5	
00023		R	M	37.5	FAULT06
00024	13	U	E	9.1	
00025		S	M	37.6	FAULT07
00026	14	UN	E	9.1	
00027		R	M	37.6	FAULT07
00028	15	U	E	8.7	
00029		S	M	37.7	FAULT08
00030	16	UN	E	8.7	
00031		R	M	37.7	FAULT08
00032	17	U	E	11.5	
00033		S	M	38.0	FAULT09
00034	18	UN	E	11.5	
00035		R	M	38.0	FAULT09
00036	19	U	E	11.7	
00037		S	M	38.1	FAULT10
00038	20	UN	E	11.7	
00039		R	M	38.1	FAULT10

CONT. STROBE WITH 2 TIMERS

00040	21	UN	M	42.5	POWERUP	
00041		O	M	39.0	STORE4	
00042		=	M	61.0	ST1	START TIME 1
00043		R	M	62.0	TE1	TIME END 1
00044		S	M	42.5	POWERUP	
00045	22	U	M	39.1	STORE5	
00046		R	M	62.1	TE2	TIME END 2
00047		=	M	61.1	ST2	START TIME 2
00048	23	UN	M	62.1	TE2	TIME END 2
00049		R	M	39.2	STORE6	
00050	24	U	M	62.1	TE2	TIME END 2
00051		UN	M	39.2	STORE6	
00052		S	M	39.2	STORE6	
00053		=	M	39.0	STORE4	

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

```

00054 25 UN M 62.0 TE1 TIME END 1
00055 R M 39.3 STORE7
00056 26 U M 62.0 TE1 TIME END 1
00057 UN M 39.3 STORE7
00058 S M 39.3 STORE7
00059 = M 39.1 STORE5

```

## EDGE EVALUATION FAULT MESSAGE PUSHBUTTON

```

00060 27 UN E 2.2 PB3 MTB BUTTON 3
00061 R M 38.5 STORE1
00062 28 U E 2.2 PB3 MTB BUTTON 3
00063 UN M 38.5 STORE1
00064 S M 38.5 STORE1
00065 = M 38.6 STORE2

```

## INITIATE TRANSMISSION PROTOCOL

```

00066 29 U M 38.6 STORE2
00067 UN M 38.7 STORE3
00068 S A 6.0 ID1 BCD DATA 1 IN
00069 S A 6.1 ID2 BCD DATA 2 IN
00070 S A 6.2 ID4 BCD DATA 4 IN
00071 R A 6.3 ID8 BCD DATA 8 IN
00072 R A 6.4 ID10 BCD DATA 10 IN
00073 R A 6.5 ID20 BCD DATA 20 IN
00074 R A 6.6 ID40 BCD DATA 40 IN

```

## CLEAR SCREEN (NO.13)

```

00075 30 U M 38.6 STORE2
00076 UN M 38.7 STORE3
00077 S M 38.7 STORE3
00078 S M 38.2 CLEARSCR
00079 R M 60.0 CE1 COUNTER 1 = 0
00080 R M 42.4 SCREENCL

00081 31 UN M 60.0 CE1 COUNTER 1 = 0
00082 U M 38.2 CLEARSCR
00083 U M 63.0 TA1 TIME 1 ACTIVE
00084 = A 6.7 ISTROBE BCD STROBE IN
00085 S A 7.0 ID1 BCD DATA 1 IN
00086 S A 7.1 ID2 BCD DATA 2 IN
00087 R A 7.2 ID4 BCD DATA 4 IN
00088 R A 7.3 ID8 BCD DATA 8 IN
00089 S A 7.4 ID10 BCD DATA 10 IN
00090 R A 7.5 ID20 BCD DATA 20 IN
00091 R A 7.6 ID40 BCD DATA 40 IN
00092 R A 7.7 ID80 BCD DATA 80 IN

```

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00093	32	U	E	1.2	BCDOK	BCD OK
00094		U	M	38.2	CLEARSCR	
00095		U	M	39.1	STORE5	
00096		=	M	59.0	CLK1	DECREMENT COUNTER 1
00097	33	U	M	60.0	CE1	COUNTER 1 = 0
00098		U	M	38.2	CLEARSCR	
00099		R	M	38.2	CLEARSCR	
00100		S	M	42.4	SCREENCL	

## WRITE HEADLINE (NO.11)

00101	34	U	M	38.3	UNDERLIN	
00102		U	M	63.0	TA1	TIME 1 ACTIVE
00103		S	A	6.7	ISTROBE	BCD STROBE IN
00104		S	A	7.0	ID1	BCD DATA 1 IN
00105		R	A	7.1	ID2	BCD DATA 2 IN
00106		R	A	7.2	ID4	BCD DATA 4 IN
00107		R	A	7.3	ID8	BCD DATA 8 IN
00108		S	A	7.4	ID10	BCD DATA 10 IN
00109		R	A	7.5	ID20	BCD DATA 20 IN
00110		R	A	7.6	ID40	BCD DATA 40 IN
00111		R	A	7.7	ID80	BCD DATA 80 IN
00112		S	M	39.6	STORE10	
00113	35	U	M	39.6	STORE10	
00114		U	M	63.1	TA2	TIME 2 ACTIVE
00115		U	E	1.2	BCDOK	BCD OK
00116		R	M	39.6	STORE10	
00117		R	M	38.3	UNDERLIN	
00118		S	M	38.4	HEADLINE	
00119		R	A	6.7	ISTROBE	BCD STROBE IN
00120		R	M	38.7	STORE3	

## UNDERLINE HEADLINE (NO.12)

00121	36	U	M	42.7	END	
00122		U	M	63.0	TA1	TIME 1 ACTIVE
00123		S	A	6.7	ISTROBE	BCD STROBE IN
00124		R	A	7.0	ID1	BCD DATA 1 IN
00125		S	A	7.1	ID2	BCD DATA 2 IN
00126		R	A	7.2	ID4	BCD DATA 4 IN
00127		R	A	7.3	ID8	BCD DATA 8 IN
00128		S	A	7.4	ID10	BCD DATA 10 IN
00129		R	A	7.5	ID20	BCD DATA 20 IN
00130		R	A	7.6	ID40	BCD DATA 40 IN
00131		R	A	7.7	ID80	BCD DATA 80 IN
00132		S	M	39.7	STORE11	

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00133	37	U	M	39.7	STORE11	
00134		U	M	63.1	TA2	TIME 2 ACTIVE
00135		U	E	1.2	BCDOK	BCD OK
00136		R	M	42.7	END	
00137		S	M	38.3	UNDRELIN	
00138		R	A	6.7	ISTROBE	BCD STROBE IN
00139		R	M	39.7	STORE11	

NO MESSAGE ACTIVE (NO.14)

-----						
00140	38	UN	M	37.0	FAULT01	
00141		UN	M	37.1	FAULT02	
00142		UN	M	37.2	FAULT03	
00143		UN	M	37.3	FAULT04	
00144		UN	M	37.4	FAULT05	
00145		UN	M	37.5	FAULT06	
00146		UN	M	37.6	FAULT07	
00147		UN	M	37.7	FAULT08	
00148		UN	M	38.0	FAULT09	
00149		UN	M	38.1	FAULT10	
00150		=	M	43.0	NOMESS	
00151	39	U	M	42.4	SCREENCL	
00152		UN	M	43.0	NOMESS	
00153		S	M	42.3	NOFAULT	
00154		R	M	42.4	SCREENCL	
00155		SPB		176	12	
00156	40	U	M	43.0	NOMESS	
00157		U	M	63.0	TA1	TIME 1 ACTIVE
00158		U	M	42.4	SCREENCL	
00159		S	A	6.7	ISTROBE	BCD STROBE IN
00160		R	A	7.0	ID1	BCD DATA 1 IN
00161		R	A	7.1	ID2	BCD DATA 2 IN
00162		S	A	7.2	ID4	BCD DATA 4 IN
00163		R	A	7.3	ID8	BCD DATA 8 IN
00164		S	A	7.4	ID10	BCD DATA 10 IN
00165		R	A	7.5	ID20	BCD DATA 20 IN
00166		R	A	7.6	ID40	BCD DATA 40 IN
00167		R	A	7.7	ID80	BCD DATA 80 IN
00168		S	M	39.5	STORE9	
00169	41	U	M	39.5	STORE9	
00170		U	M	63.1	TA2	TIME 2 ACTIVE
00171		U	E	1.2	BCDOK	BCD OK
00172		S	M	42.3	NOFAULT	
00173		R	A	6.7	ISTROBE	BCD STROBE IN
00174		R	M	42.4	SCREENCL	
00175		R	M	39.5	STORE9	

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00176 12 &lt;=== JUMP ADDRESS!

TRANSMIT ACTIVE FAULT MESSAGES  
-----FAULT 1  
-----

00176	42	U	M	42.3	NOFAULT	
00177		UN	M	37.0	FAULT01	
00178		S	M	40.0	STORE12	
00179		R	M	42.3	NOFAULT	
00180		SPB		201	02	
00181	43	U	M	42.3	NOFAULT	
00182		U	M	37.0	FAULT01	
00183		U	M	63.0	TA1	TIME 1 ACTIVE
00184		S	A	6.7	ISTROBE	BCD STROBE IN
00185		S	A	7.0	ID1	BCD DATA 1 IN
00186		R	A	7.1	ID2	BCD DATA 2 IN
00187		R	A	7.2	ID4	BCD DATA 4 IN
00188		R	A	7.3	ID8	BCD DATA 8 IN
00189		R	A	7.4	ID10	BCD DATA 10 IN
00190		R	A	7.5	ID20	BCD DATA 20 IN
00191		R	A	7.6	ID40	BCD DATA 40 IN
00192		R	A	7.7	ID80	BCD DATA 80 IN
00193		S	M	40.1	STORE13	
00194	44	U	M	40.1	STORE13	
00195		U	E	1.2	BCDOK	BCD OK
00196		U	M	63.1	TA2	TIME 2 ACTIVE
00197		R	A	6.7	ISTROBE	BCD STROBE IN
00198		S	M	40.0	STORE12	
00199		R	M	42.3	NOFAULT	
00200		R	M	40.1	STORE13	
00201					02	<=== JUMP ADDRESS!

FAULT 2  
-----

00201	45	U	M	40.0	STORE12	
00202		UN	M	37.1	FAULT02	
00203		S	M	40.2	STORE14	
00204		R	M	40.0	STORE12	
00205		SPB		226	03	



## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00206	46	U	M	40.0	STORE12	
00207		U	M	37.1	FAULT02	
00208		U	M	63.0	TA1	TIME 1 ACTIVE
00209		S	A	6.7	ISTROBE	BCD STROBE IN
00210		R	A	7.0	ID1	BCD DATA 1 IN
00211		S	A	7.1	ID2	BCD DATA 2 IN
00212		R	A	7.2	ID4	BCD DATA 4 IN
00213		R	A	7.3	ID8	BCD DATA 8 IN
00214		R	A	7.4	ID10	BCD DATA 10 IN
00215		R	A	7.5	ID20	BCD DATA 20 IN
00216		R	A	7.6	ID40	BCD DATA 40 IN
00217		R	A	7.7	ID80	BCD DATA 80 IN
00218		S	M	40.3	STORE15	
00219	47	U	M	40.3	STORE15	
00220		U	E	1.2	BCDOK	BCD OK
00221		U	M	63.1	TA2	TIME 2 ACTIVE
00222		R	A	6.7	ISTROBE	BCD STROBE IN
00223		R	M	40.0	STORE12	
00224		S	M	40.2	STORE14	
00225		R	M	40.3	STORE15	
00226				03		<=== JUMP ADDRESS!

FAULT 3  
-----

00226	48	U	M	40.2	STORE14	
00227		UN	M	37.2	FAULT03	
00228		S	M	40.4	STORE16	
00229		R	M	40.2	STORE14	
00230		SPB		251	04	
00231	49	U	M	40.2	STORE14	
00232		U	M	37.2	FAULT03	
00233		U	M	63.0	TA1	TIME 1 ACTIVE
00234		S	A	6.7	ISTROBE	BCD STROBE IN
00235		S	A	7.0	ID1	BCD DATA 1 IN
00236		S	A	7.1	ID2	BCD DATA 2 IN
00237		R	A	7.2	ID4	BCD DATA 4 IN
00238		R	A	7.3	ID8	BCD DATA 8 IN
00239		R	A	7.4	ID10	BCD DATA 10 IN
00240		R	A	7.5	ID20	BCD DATA 20 IN
00241		R	A	7.6	ID40	BCD DATA 40 IN
00242		R	A	7.7	ID80	BCD DATA 80 IN
00243		S	M	40.5	STORE17	
00244	50	U	M	40.5	STORE17	
00245		U	E	1.2	BCDOK	BCD OK
00246		U	M	63.1	TA2	TIME 2 ACTIVE
00247		R	M	40.2	STORE14	
00248		R	A	6.7	ISTROBE	BCD STROBE IN
00249		S	M	40.4	STORE16	
00250		R	M	40.5	STORE17	

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00251 04 &lt;=== JUMP ADDRESS!

FAULT 4  
-----

00251	51	U	M	40.4	STORE16	
00252		UN	M	37.3	FAULT04	
00253		S	M	40.6	STORE18	
00254		R	M	40.4	STORE16	
00255		SPB		276	05	
00256	52	U	M	40.4	STORE16	
00257		U	M	37.3	FAULT04	
00258		U	M	63.0	TA1	TIME 1 ACTIVE
00259		S	A	6.7	ISTROBE	BCD STROBE IN
00260		R	A	7.0	ID1	BCD DATA 1 IN
00261		R	A	7.1	ID2	BCD DATA 2 IN
00262		S	A	7.2	ID4	BCD DATA 4 IN
00263		R	A	7.3	ID8	BCD DATA 8 IN
00264		R	A	7.4	ID10	BCD DATA 10 IN
00265		R	A	7.5	ID20	BCD DATA 20 IN
00266		R	A	7.6	ID40	BCD DATA 40 IN
00267		R	A	7.7	ID80	BCD DATA 80 IN
00268		S	M	40.7	STORE19	
00269	53	U	M	40.7	STORE19	
00270		U	E	1.2	BCDOK	BCD OK
00271		U	M	63.1	TA2	TIME 2 ACTIVE
00272		R	M	40.4	STORE16	
00273		R	A	6.7	ISTROBE	BCD STROBE IN
00274		S	M	40.6	STORE18	
00275		R	M	40.7	STORE19	

00276 05 &lt;=== JUMP ADDRESS!

FAULT 5  
-----

00276	54	U	M	40.6	STORE18	
00277		UN	M	37.4	FAULT05	
00278		S	M	41.0	STORE20	
00279		R	M	40.6	STORE18	
00280		SPB		301	06	
00281	55	U	M	40.6	STORE18	
00282		U	M	37.4	FAULT05	
00283		U	M	63.0	TA1	TIME 1 ACTIVE

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00284	S	A	6.7	ISTROBE	BCD STROBE IN
00285	S	A	7.0	ID1	BCD DATA 1 IN
00286	R	A	7.1	ID2	BCD DATA 2 IN
00287	S	A	7.2	ID4	BCD DATA 4 IN
00288	R	A	7.3	ID8	BCD DATA 8 IN
00289	R	A	7.4	ID10	BCD DATA 10 IN
00290	R	A	7.5	ID20	BCD DATA 20 IN
00291	R	A	7.6	ID40	BCD DATA 40 IN
00292	R	A	7.7	ID80	BCD DATA 80 IN
00293	S	M	41.1	STORE21	
00294	56	U	M	41.1	STORE21
00295		U	E	1.2	BCDOK BCD OK
00296		U	M	63.1	TA2 TIME 2 ACTIVE
00297		R	A	6.7	ISTROBE BCD STROBE IN
00298		R	M	40.6	STORE18
00299		S	M	41.0	STORE20
00300		R	M	41.1	STORE21
00301				06	<=== JUMP ADDRESS!

## FAULT 6

-----

00301	57	U	M	41.0	STORE20
00302		UN	M	37.5	FAULT06
00303		S	M	41.2	STORE22
00304		R	M	41.0	STORE20
00305		SPB		326	07
00306	58	U	M	41.0	STORE20
00307		U	M	37.5	FAULT06
00308		U	M	63.0	TA1 TIME 1 ACTIVE
00309		S	A	6.7	ISTROBE BCD STROBE IN
00310		R	A	7.0	ID1 BCD DATA 1 IN
00311		S	A	7.1	ID2 BCD DATA 2 IN
00312		S	A	7.2	ID4 BCD DATA 4 IN
00313		R	A	7.3	ID8 BCD DATA 8 IN
00314		R	A	7.4	ID10 BCD DATA 10 IN
00315		R	A	7.5	ID20 BCD DATA 20 IN
00316		R	A	7.6	ID40 BCD DATA 40 IN
00317		R	A	7.7	ID80 BCD DATA 80 IN
00318		S	M	41.3	STORE23
00319	59	U	M	41.3	STORE23
00320		U	E	1.2	BCDOK BCD OK
00321		U	M	63.1	TA2 TIME 2 ACTIVE
00322		R	A	6.7	ISTROBE BCD STROBE IN
00323		R	M	41.0	STORE20
00324		R	M	41.3	STORE23
00325		S	M	42.2	STORE22

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

000326 07 &lt;=== JUMP ADDRESS!

FAULT 7  
-----

000326	60	U	M	41.2	STORE22	
000327		UN	M	37.6	FAULT07	
000328		S	M	41.4	STORE24	
000329		R	M	42.2	STORE22	
000330		SPB		351	08	
000331	61	U	M	41.2	STORE22	
000332		U	M	37.6	FAULT07	
000333		U	M	63.0	TA1	TIME 1 ACTIVE
000334		S	A	6.7	ISTROBE	BCD STROBE IN
000335		S	A	7.0	ID1	BCD DATA 1 IN
000336		S	A	7.1	ID2	BCD DATA 2 IN
000337		S	A	7.2	ID4	BCD DATA 4 IN
000338		R	A	7.3	ID8	BCD DATA 8 IN
000339		R	A	7.4	ID10	BCD DATA 10 IN
000340		R	A	7.5	ID20	BCD DATA 20 IN
000341		R	A	7.6	ID40	BCD DATA 40 IN
000342		R	A	7.7	ID80	BCD DATA 80 IN
000343		S	M	41.5	STORE25	
000344	62	U	M	41.5	STORE25	
000345		U	E	1.2	BCDOK	BCD OK
000346		U	M	63.1	TA2	TIME 2 ACTIVE
000347		R	A	6.7	ISTROBE	BCD STROBE IN
000348		R	M	41.2	STORE22	
000349		S	M	41.4	STORE24	
000350		R	M	41.5	STORE25	

000351 08 &lt;=== JUMP ADDRESS!

FAULT 8  
-----

000351	63	U	M	41.4	STORE24	
000352		UN	M	37.7	FAULT08	
000353		S	M	41.6	STORE26	
000354		R	M	41.4	STORE24	
000355		SPB		376	09	
000356	64	U	M	41.4	STORE24	
000357		U	M	37.7	FAULT08	
000358		U	M	63.0	TA1	TIME 1 ACTIVE

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB Handbook

00359	S	A	6.7	ISTROBE	BCD STROBE IN
00360	R	A	7.0	ID1	BCD DATA 1 IN
00361	R	A	7.1	ID2	BCD DATA 2 IN
00362	R	A	7.2	ID4	BCD DATA 4 IN
00363	S	A	7.3	ID8	BCD DATA 8 IN
00364	R	A	7.4	ID10	BCD DATA 10 IN
00365	R	A	7.5	ID20	BCD DATA 20 IN
00366	R	A	7.6	ID40	BCD DATA 40 IN
00367	R	A	7.7	ID80	BCD DATA 80 IN
00368	S	M	41.7	STORE27	
00369	65	U	M	41.7	STORE27
00370		U	E	1.2	BCDOK BCD OK
00371		U	M	63.1	TA2 TIME 2 ACTIVE
00372		R	A	6.7	ISTROBE BCD STROBE IN
00373		R	M	41.4	STORE24
00374		R	M	41.7	STORE27
00375		S	M	41.6	STORE26
00376				09	<=== JUMP ADDRESS!

## FAULT 9

-----

00376	66	U	M	41.6	STORE26
00377		UN	M	38.0	FAULT09
00378		S	M	42.0	STORE28
00379		R	M	41.6	STORE26
00380		SPB		401	10
00381	67	U	M	41.6	STORE26
00382		U	M	38.0	FAULT09
00383		U	M	63.0	TA1 TIME 1 ACTIVE
00384		S	A	6.7	ISTROBE BCD STROBE IN
00385		S	A	7.0	ID1 BCD DATA 1 IN
00386		R	A	7.1	ID2 BCD DATA 2 IN
00387		R	A	7.2	ID4 BCD DATA 4 IN
00388		S	A	7.3	ID8 BCD DATA 8 IN
00389		R	A	7.4	ID10 BCD DATA 10 IN
00390		R	A	7.5	ID20 BCD DATA 20 IN
00391		R	A	7.6	ID40 BCD DATA 40 IN
00392		R	A	7.7	ID80 BCD DATA 80 IN
00393		S	M	42.1	STORE29
00394	68	U	M	42.1	STORE29
00395		U	E	1.2	BCDOK BCD OK
00396		U	M	63.1	TA2 TIME 2 ACTIVE
00397		S	M	42.0	STORE28
00398		R	M	41.6	STORE26
00399		R	M	42.1	STORE29
00400		R	A	6.7	ISTROBE BCD STROBE IN
00401				10	<=== JUMP ADDRESS!

## 1 PIC EXAMPLES (4)

BOSCH CC 100 M  
MTB HandbookFAULT 10  
-----

00401	69	U	M	42.0	STORE28	
00402		UN	M	38.1	FAULT10	
00403		R	M	42.0	STORE28	
00404		S	M	42.7	END	
00405		SPB		426	11	
00406	70	U	M	42.0	STORE28	
00407		U	M	38.1	FAULT10	
00408		U	M	63.0	TA1	TIME 1 ACTIVE
00409		S	A	6.7	ISTROBE	BCD STROBE IN
00410		R	A	7.0	ID1	BCD DATA 1 IN
00411		R	A	7.1	ID2	BCD DATA 2 IN
00412		R	A	7.2	ID4	BCD DATA 4 IN
00413		R	A	7.3	ID8	BCD DATA 8 IN
00414		S	A	7.4	ID10	BCD DATA 10 IN
00415		R	A	7.5	ID20	BCD DATA 20 IN
00416		R	A	7.6	ID40	BCD DATA 40 IN
00417		R	A	7.7	ID80	BCD DATA 80 IN
00418		S	M	42.2	STORE30	
00419	71	U	M	42.2	STORE30	
00420		U	E	1.2	BCDOK	BCD OK
00421		U	M	63.1	TA2	TIME 2 ACTIVE
00422		R	M	42.0	STORE28	
00423		S	M	42.7	END	
00424		R	A	6.7	ISTROBE	BCD STROBE IN
00425		R	M	42.2	STORE30	
00426					11	<=== JUMP ADDRESS!
00426		PE				

## 1 PIC EXAMPLES (5)

BOSCH CC 100 M  
MTB Handbook

## EXAMPLE 5

PROGRAM Controlling the switching module for 4 x CC 100 M

DESCRIPTION OF PROGRAM The method by which the switching module CCB for Bosch CC 100 M is controlled in this program is based on the MASTER/SLAVE principle.  
I.e. one CC 100 operates the switching module and receives control signals from other CC 100. The MASTER CC must therefore be switched on if the switching module is to be operated.  
Technical data and signal allocation are described in the connections manual, as is the instruction set (page 5-5).

PROGRAMMING THE LEADING EDGE ONE SHOT  
MASTER CC

```
=====
00000 1 UN M 32.0 EDGE0
00001 = M 32.5 LEOSHOT LEADING EDGE ONE SHOT
00002 S M 32.0 EDGE0
```

SELECT CC1

=====

CC1 IS ACTIVATED AFTER SWITCH-ON

PUSHBUTTON IMPULSE

```
00003 2 U E 10.0 PB21 X22.13!SELECT CC 1 FROM CC 2
00004 UN M 32.1 EDGE1
00005 0 E 10.3 PB31 X22.43!SELECT CC 1 FROM CC 3
00006 UN M 32.1 EDGE1
00007 0 E 10.6 PB41 X22.42!SELECT CC 1 FROM CC 4
00008 UN M 32.1 EDGE1
00009 = M 32.6 STORE1 MARKER PUSHBUTTON 1
00010 S M 32.1 EDGE1
```

```
00011 3 UN E 10.0 PB21 X22.13!SELECT CC 1 FROM CC 2
00012 UN E 10.3 PB31 X22.43!SELECT CC 1 FROM CC 3
00013 UN E 10.6 PB41 X22.42!SELECT CC 1 FROM CC 4
00014 R M 32.1 EDGE1
```

SELECT CHANNEL 1

```
00015 4 U M 32.6 STORE1 MARKER PUSHBUTTON 1
00016 UN M 32.7 STORE2 MARKER PUSHBUTTON 2
00017 UN M 33.0 STORE3 MARKER PUSHBUTTON 3
00018 UN M 33.1 STORE4 MARKER PUSHBUTTON 4
00019 0 M 32.5 LEOSHOT LEADING EDGE ONE SHOT
00020 S A 8.0 SELCC1 X11.27!CC 1 IS SELECTED
00021 R A 8.1 SELCC2 X11.50!CC 2 IS SELECTED
00022 R A 8.2 SELCC3 X11.09!CC 3 IS SELECTED
00023 R A 8.3 SELCC4 X11.33!CC 4 IS SELECTED
```

## 1 PIC EXAMPLES (5)

BOSCH CC 100 M  
MTB Handbook

## PANEL ON 1ST CC

00024	5	UN	E	11.1	ACTCC1	X22.41!CC1 IS ACTIVE
00025		0	E	11.2	SWACT	X22.09!SWITCHING ACTIVE
00026		=	A	3.2	PNLINH	PANEL INHIBIT

## SELECT CC2

=====

## PUSHBUTTON IMPULSE

00027	6	U	E	2.1	PB2	MTB BUTTON 2
00028		UN	M	32.2	EDGE2	
00029		0	E	10.4	PB32	X22.11!SELECT CC 2 FROM CC 3
00030		UN	M	32.2	EDGE2	
00031		0	E	10.7	PB42	X22.10!SELECT CC 2 FROM CC 4
00032		UN	M	32.2	EDGE2	
00033		=	M	32.7	STORE2	MARKER PUSHBUTTON 2
00034		S	M	32.2	EDGE2	
00035	7	UN	E	2.1	PB2	MTB BUTTON 2
00036		UN	E	10.4	PB32	X22.11!SELECT CC 2 FROM CC 3
00037		UN	E	10.7	PB42	X22.10!SELECT CC 2 FROM CC 4
00038		R	M	32.2	EDGE2	

## SELECT CHANNEL 2

00039	8	U	M	32.7	STORE2	MARKER PUSHBUTTON 2
00040		UN	M	32.6	STORE1	MARKER PUSHBUTTON 1
00041		UN	M	33.0	STORE3	MARKER PUSHBUTTON 3
00042		UN	M	33.1	STORE4	MARKER PUSHBUTTON 4
00043		S	A	8.1	SELCC2	X11.50!CC2 IS SELECTED
00044		R	A	8.0	SELCC1	X11.27!CC1 IS SELECTED
00045		R	A	8.2	SELCC3	X11.09!CC3 IS SELECTED
00046		R	A	8.3	SELCC4	X11.33!CC4 IS SELECTED

## SELECT CC3

=====

## PUSHBUTTON IMPULSE

00047	9	U	E	2.2	PB3	MTB BUTTON 3
00048		UN	M	32.3	EDGE3	
00049		0	E	10.1	PB23	X22.12!SELECT CC 3 FROM CC 2
00050		UN	M	32.3	EDGE3	
00051		0	E	11.0	PB43	X22.26!SEELCT CC 3 FROM CC 4
00052		UN	M	32.3	EDGE3	
00053		=	M	33.0	STORE3	MARKER PUSHBUTTON 3
00054		S	M	32.3	EDGE3	
00055	10	UN	E	2.2	PB3	MTB BUTTON 3
00056		UN	E	10.1	PB23	X22.12!SELECT CC 3 FROM CC 2
00057		UN	E	11.0	PB43	X22.26!SELECT CC 3 FROM CC 4
00058		R	M	32.3	EDGE3	



## 1 PIC EXAMPLES (5)

BOSCH CC 100 M  
MTB Handbook

## SELECT CHANNEL 3

00059	11	U	M	33.0	STORE3	MARKER PUSHBUTTON 3
00060		UN	M	32.6	STORE1	MARKER PUSHBUTTON 1
00061		UN	M	32.7	STORE2	MARKER PUSHBUTTON 2
00062		UN	M	33.1	STORE4	MARKER PUSHBUTTON 4
00063		S	A	8.2	SELCC3	X11.09!CC 3 IS SELECTED
00064		R	A	8.0	SELCC1	X11.27!CC 1 IS SELECTED
00065		R	A	8.1	SELCC2	X11.50!CC 2 IS SELECTED
00066		R	A	8.3	SELCC4	X11.33!CC 4 IS SELECTED

## SELECT CC4

=====

## PUSHBUTTON IMPULSE

00067	12	U	E	2.3	PB4	MTB BUTTON 4
00068		UN	M	32.4	EDGE4	
00069		O	E	10.2	PB24	X22.28!SELECT CC 4 FROM CC 2
00070		UN	M	32.4	EDGE4	
00071		O	E	10.5	PB34	X22.27!SELECT CC 4 FROM CC 3
00072		UN	M	32.4	EDGE4	
00073		=	M	33.1	STORE4	MARKER PUSHBUTTON 4
00074		S	M	32.4	EDGE4	
00075	13	UN	E	2.3	PB4	MTB BUTTON 4
00076		UN	E	10.2	PB24	X22.28!SELECT CC 4 FROM CC 2
00077		UN	E	10.5	PB34	X22.27!SELECT CC 4 FROM CC 3
00078		R	M	32.4	EDGE4	

## SELECT CHANNEL 4

00079	14	U	M	33.1	STORE4	MARKER PUSHBUTTON 4
00080		UN	M	32.6	STORE1	MARKER PUSHBUTTON 1
00081		UN	M	32.7	STORE2	MARKER PUSHBUTTON 2
00082		UN	M	33.0	STORE3	MARKER PUSHBUTTON 3
00083		S	A	8.3	SELCC4	X11.33!CC 4 IS SELECTED
00084		R	A	8.0	SELCC1	X11.27!CC 1 IS SELECTED
00085		R	A	8.1	SELCC2	X11.50!CC 2 IS SELECTED
00086		R	A	8.2	SELCC3	X11.09!CC 3 IS SELECTED

00087 PE

On the CC 100 M controls which are designated as SLAVE controls the MTB pushbuttons must activate OUTPUTS, which must be connected to INPUTS of the MASTER CC. In addition signals "SWITCHING ACTIVE" and "CC ACTIVE" must be linked with signal "PANEL INHIBIT" in the CC 100 M designated as slaves.

Example for SLAVE 2:

UN	E	ACTCC2
O	E	SWACT
=		PNLINH

## 1 PIC EXAMPLES (5)

BOSCH CC 100 M  
MTB Handbook

## SYMBOL TABLES

ADDRESS	SYMBOL	DESCRIPTION
E 2.0	PB1	MTB BUTTON 1
E 2.1	PB2	MTB BUTTON 2
E 2.2	PB3	MTB BUTTON 3
E 2.3	PB4	MTB BUTTON 4
E 2.4		
E 2.5		
E 2.6		
E 2.7		

ADDRESS	SYMBOL	DESCRIPTION
E 10.0	PB21	X22.13!SELECT CC 1 FROM CC 2
E 10.1	PB23	X22.12!SELECT CC 3 FROM CC 2
E 10.2	PB24	X22.28!SELECT CC 4 FROM CC 2
E 10.3	PB31	X22.43!SELECT CC 1 FROM CC 3
E 10.4	PB32	X22.11!SELECT CC 2 FROM CC 3
E 10.5	PB34	X22.27!SELECT CC 4 FROM CC 3
E 10.6	PB41	X22.42!SELECT CC 1 FROM CC 4
E 10.7	PB42	X22.10!SELECT CC 2 FROM CC 4

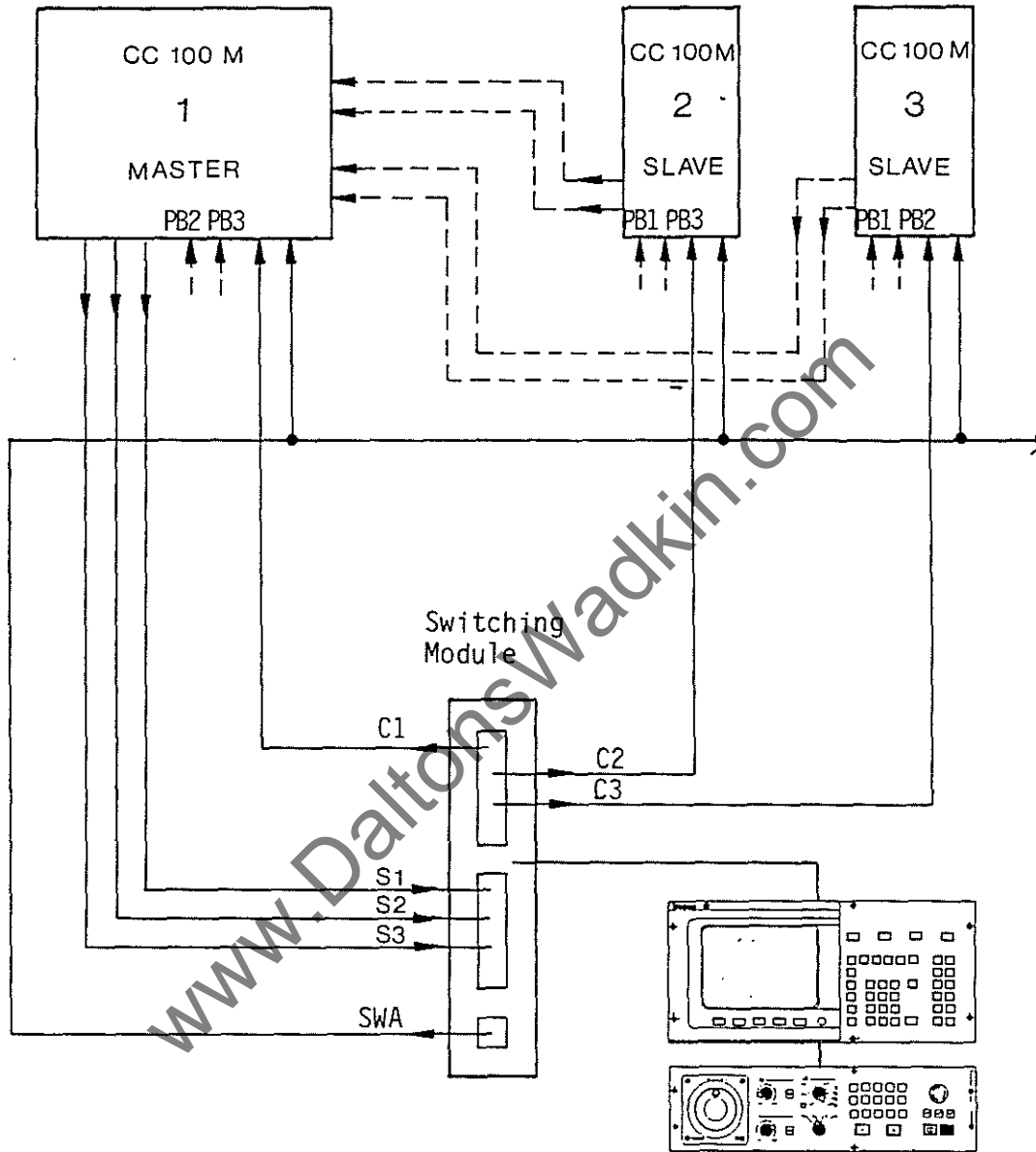
ADDRESS	SYMBOL	DESCRIPTION
E 11.0	PB43	X22.26!SELECT CC 3 FROM CC 4
E 11.1	ACTCC1	X22.41!CC 1 IS ACTIVE
E 11.2	SWACT	X22.09!SWITCHING ACTIVE
E 11.3		
E 11.4		
E 11.5		
E 11.6		
E 11.7		

ADDRESS	SYMBOL	DESCRIPTION
A 3.0		
A 3.1		
A 3.2	PNLINH	PANEL INHIBIT
A 3.3		
A 3.4		
A 3.5		
A 3.6		
A 3.7		

ADDRESS	SYMBOL	DESCRIPTION
A 8.0	SELCC1	X11.27!CC 1 IS SELECTED
A 8.1	SELCC2	X11.50!CC 2 IS SELECTED
A 8.2	SELCC3	X11.09!CC 3 IS SELECTED
A 8.3	SELCC4	X11.33!CC 4 IS SELECTED
A 8.4		
A 8.5		
A 8.6		
A 8.7		

ADDRESS	SYMBOL	DESCRIPTION
M 32.0	EDGE0	
M 32.1	EDGE1	
M 32.2	EDGE2	
M 32.3	EDGE3	
M 32.4	EDGE4	
M 32.5	LEOSHOT	LEADING EDGE ONE SHOT
M 32.6	STORE1	MARKER PUSHBUTTON 1
M 32.7	STORE2	MARKER PUSHBUTTON 2
M 33.0	STORE3	MARKER PUSHBUTTON 3
M 33.1	STORE4	MARKER PUSHBUTTON 4
M 33.2		
M 33.3		

SIGNAL FLOW DIAGRAM



- C1 (ACTCC1) = channel 1 active
- 
- S1 (SELCC1) = channel selection 1
- 
- PB1 (PB1) = MTB pushbutton 1 on Bosch manual panel
- 
- SWA (SWACT) = switching active

## 2 TOOL CHANGE CYCLE

**BOSCH CC 100 M**  
MTB Handbook

### GENERAL

The CC 100 M offers the possibility of storing the complete tool change sequence in a cycle (77). This cycle is called up with "M06"; the "M06" is not output at the interface.

When programming the tool change cycle it must be ensured that active values, such as F, S, G54, G38 etc. , which must be modified during the tool change, are stored in variables and reactivated after the tool change.

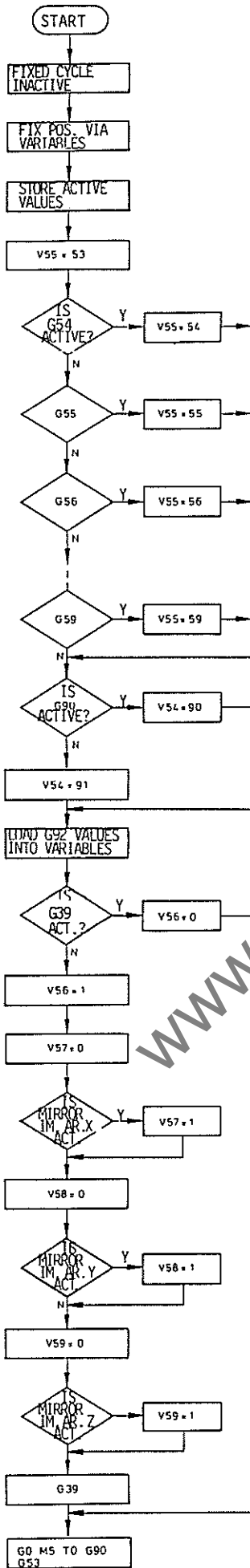
The following example shows how a tool change cycle can be constructed.

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2 TOOL CHANGE CYCLE

BOSCH CC 100 M  
MTB Handbook

FLOWCHART OF TOOL CHANGE SEQUENCE



```

    CYCLE 77 M 06 CYCLE M RWED 5
    N 1 G80
    N 2 V60=300 V61=200 V62=100
    N 3 V55=53 TSTG54 BNEP1 V55=54 BRAP6
    N 4 $1 TSTG55 BNEP2 V55=55 BRAP6
    N 5 $2 TSTG56 BNEP3 V55=56 BRAP6
    N 6 $3 TSTG57 BNEP4 V55=57 BRAP6
    N 7 $4 TSTG58 BNEP5 V55=58 BRAP6
    N 8 $5 TSTG59 BNEP6 V55=59 BRAP6
    N 9 $6 V54=90 TSTG90 BEQP7 V54=91
    N 10 $7 TRF=G92 V50=X V51=Y V52=Z
    N 11 V56=0 TSTG39 BEQP10 V56=1
    N 12 V57=0 TSTQX BNEP8 V57=1
    N 13 $8 V58=0 TSTQY BNEP9 V58=1
    N 14 $9 V59=0 TSTQZ BNEP20 V59=1
    N 15 $20 G39
    N 16 $10 GO M5 T00
    N 17 G90
    N 18 G53
    N 19 V68=V60-V51 V69=V61-V71
    N 20 Y=V68 Z=V69
    N 21 M16
    N 22 M0
    N 23 (TOOL CHANGE COMPLETED)
    N 24 S250 M3
    N 25 V63=75 V64=3000
    N 26 G=V63 Z=V70 F=V64
    N 27 V65=Z V71=V65-V70
    N 28 G92 Z123
    N 29 G=V55
    N 30 G=V54
    N 31 TSTV56 BEQP11
    N 32 TSTV57 BEQP12
    N 33 G38 X
    N 34 $12 TSTV58 BEQP13
    N 35 G38 Y
    N 36 $13 TSTV59 BEQP11
    N 37 G38 Z
    N 38 $11
    N 39 M2
    
```

} Activate modified values

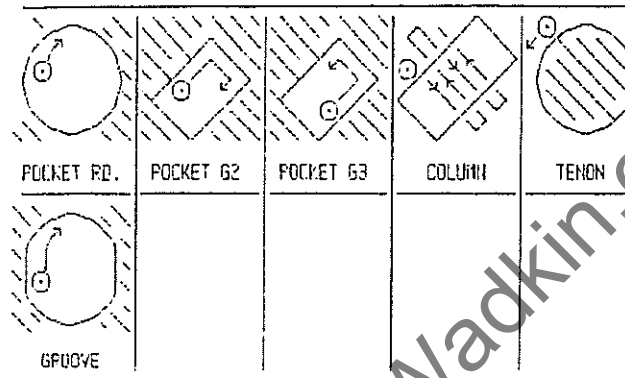
## 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

## GENERAL

The following milling cycles can be called up as required:

Cycle no.	description
63	pocket (round)
58	pocket (rectangular)
59	pocket (rectangular)
65	groove
66	column
67	tenon



All the milling cycles are kept very general and they can be used in the XY, ZX or the YZ plane. If a milling cycle only needs to be used in one plane, several subprograms can be deleted.

active plane	subprograms which can be deleted
G17	SBP18, SBP19, SBP28, SBP29
G18	SBP17, SBP19, SBP27, SBP29
G19	SBP17, SBP18, SBP27, SBP28

Before a milling cycle can be called up the following values must be programmed or be active:

- feedrate (F)
- tool with tool radius
- cycles which are called up by the milling cycle

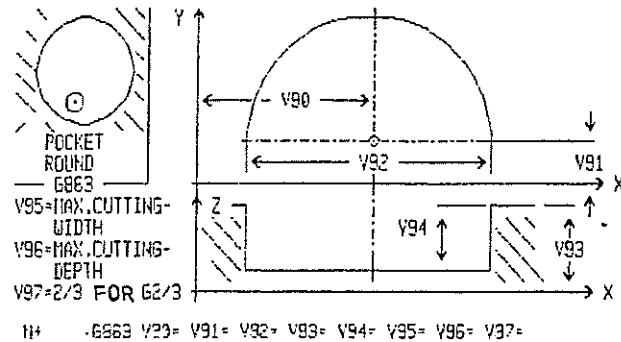
The positioning movement to the first point in the positioning plane is made in rapid (G0).

G0 is activated at the end of the cycle.

## 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

## POCKET (ROUND)



Input	distance A	V90 mm inc.
	distance O	V91 mm inc.
	pocket diameter	V92 mm abs.
	feed-in plane	V93 mm inc.
	depth of pocket	V94 mm abs.
	max. cutting width	V95 mm abs.
	max. feed-in depth	V96 mm abs.
	direction of milling	V97 abs.

- Sequence
1. Positioning axes traverse in rapid to A=V90/O=V91; feed-in axis remains at traversing height.
  2. Change-over to F/4; feed-in axis traverses to V93.
  3. First feed-in (V96).
  4. Free cutting time.
  5. Change-over to F; milling of the pocket in a spiral action.
  6. Tangential exit from the contour in the positioning plane; (possibly further feed-in (---> 4)).
  7. Feed-in axis to V93.

Note The last level is machined twice.

Call-up G863 V90=... V91=...

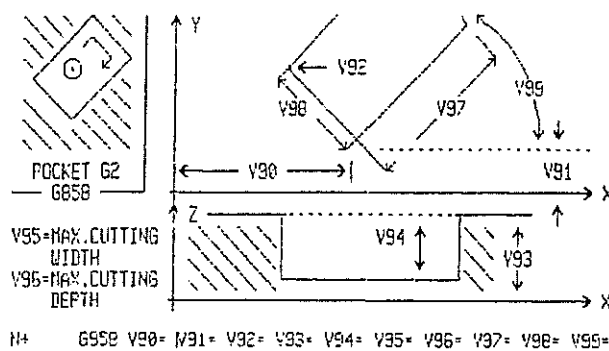
Variables used VA - VZ, V1 - V4, V90 - V99



## 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

## POCKET (rectangular)



## Input

distance A	V90 mm	inc.
distance O	V91 mm	inc.
contour radius	V92 mm	abs.
feed-in plane	V93 mm	inc.
depth of pocket	V94 mm	abs.
max. cutting width	V95 mm	abs.
max. feed-in depth	V96 mm	abs.
length of pocket	V97 mm	abs.
width of pocket	V98 mm	abs.
position of pocket	V99 degrees	inc.

## Sequence

1. Positioning axes traverse in rapid to the calculated entry position; feed-in axis remains at traversing height.
2. Change-over to F/5; feed-in axis traverses to V93.
3. First feed-in (V96).
4. Free cutting time.
5. Change-over to F; machining down to finishing allowance.
6. Change-over to F/5; machining of the last path (finishing cut).
7. Tangential exit from contour; (possibly further feed-in (---> 4)).
8. Change-over to F; feed-in axis to V93.

### 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

Call-up                    Clockwise direction of milling:  
                              G858 V90=... V91=...

                              Counter-clockwise direction of milling:  
                              G859 V90=... V91=...

Cycles to be available in PP memory                    Cycles 64, 69

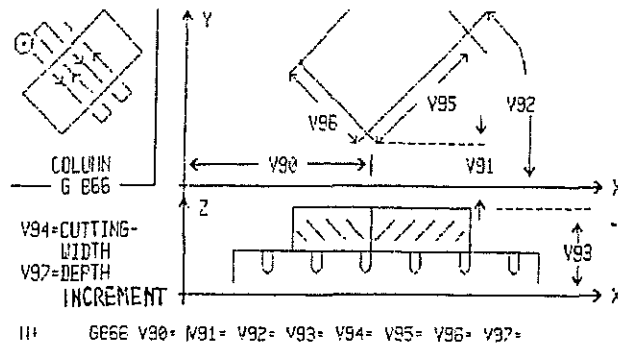
Variables used            VA - VZ, V1 - V12, V89 - V99

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## 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

## COLUMN



## Input

distance A	V90 mm inc.
distance O	V91 mm inc.
position of column	V92 degrees inc.
1st milling plane	V93 mm inc.
cutting width	V94 mm abs.
machining length	V95 mm abs.
machining width	V96 mm abs.
feed-in depth	V97 mm abs.

## Sequence

1. Positioning axes traverse in rapid to A=V90/O=V91; feed-in axis remains at traversing height.
2. Change-over to F; feed-in axis traverses to V93.
3. Parallel-stroke milling until the machining length has been reached.
4. Traverse to V90/V91; (possibly further feed-in (--> 3))
5. Feed-in axis back to the position it occupied before the call-up of the cycle.

## Note

If no feed-in movement is required ---> V97=0.  
Otherwise a question will appear on the screen after one machining operation as to whether a feed-in of V97 is required or whether further machining is to be discontinued.

## Call-up

G866 V90=... V91=...

## Cycle to be available in PP memory

Cycle 69

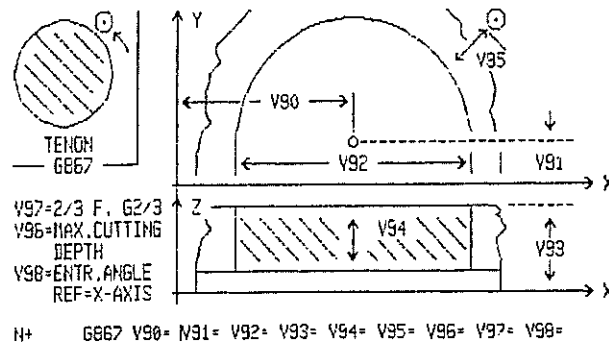
## Variables used

VA - VZ, V90 - V99, V1 - V9

## 3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

## TENON



## Input

distance A	V90 mm inc.
distance O	V91 mm inc.
tenon diameter	V92 mm abs.
feed-in plane	V93 mm inc.
height of tenon	V94 mm abs.
feed-in point	V95 mm abs.
max. feed-in depth	V96 mm abs.
direction of milling	V97 abs.
position of feed-in point	V98 degrees inc.

## Sequence

1. Positioning axes traverse in rapid to feed-in point; feed-in axis remains at traversing height.
2. Change-over to F; feed-in axis traverses to V93.
3. First feed-in movement (V96).
4. Tangential approach to contour; tenon milling
5. Tangential exit from contour; traverse to feed-in point; (possibly further feed-in (--->4)).
6. Feed-in axis to V93.

## Call-up

G867 V90=... V91=...

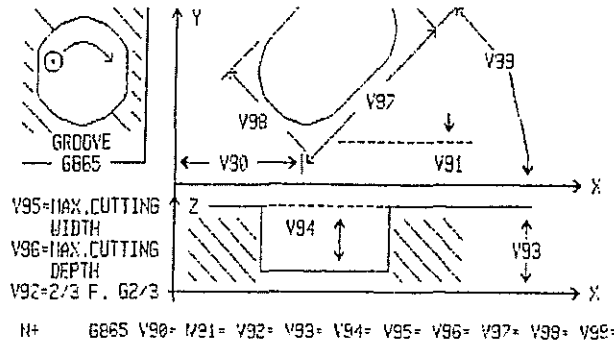
## Variables used

VA - VZ, V89 - V99, V1 - V5

3 MILLING CYCLES

BOSCH CC 100 M  
MTB Handbook

GROOVE



Input

distance A	V90 mm inc.
distance O	V91 mm inc.
direction of milling	V92 abs.
feed-in plane	V93 mm inc.
depth of groove	V94 mm abs.
max. cutting width	V95 mm abs.
max. feed-in depth	V96 mm abs.
length of groove	V97 mm abs.
width of groove	V98 mm abs.
position of groove	V99 degrees inc.

Sequence

1. Positioning axes traverse to calculated entry position in rapid; feed-in axis remains at traversing height.
2. Change-over to F/3; feed-in axis traverses to V93.
3. First feed-in (V96).
4. Free cutting time.
5. Change-over to F; machining down to the finishing allowance.
6. Change-over to F/3; machining of the last path (finishing cut).
7. Tangential exit from contour; (possibly further feed-in (---> 4)).
8. Change-over to F; feed-in axis to V93.

Call-up

G865 V90=... V91=...

Cycle to be available in PP memory

Cycle 69

Variables used

VA - VZ, V1 - V14, V89 - V99

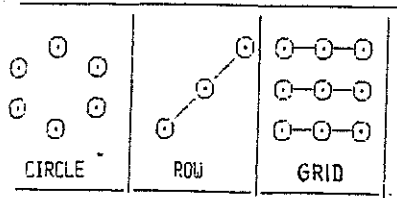
4 HOLE PATTERNS

BOSCH CC 100 M  
MTB Handbook

GENERAL

The following hole patterns can be called up as required:

cycle no.	description
60	circle of holes
61	row of holes
62	grid of holes



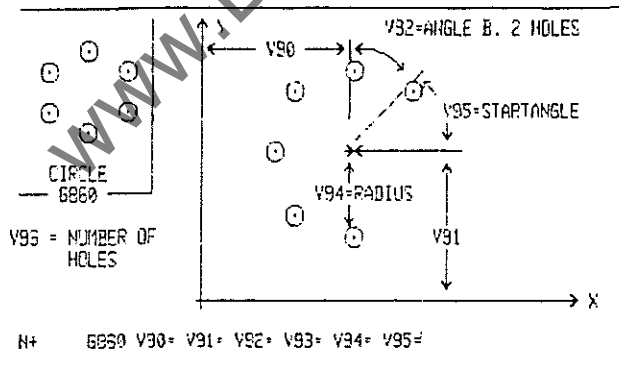
All the hole patterns are kept general and they can be used in the XY, ZX or the YZ plane. If a hole pattern only needs to be used in one plane, several subprograms can be deleted in order to save on storage capacity.

active plane	subprograms which can be deleted
G17	SBP18, SBP19, SBP28, SBP29
G18	SBP17, SBP19, SBP27, SBP29
G19	SBP17, SBP17, SBP27, SBP28

Before a hole pattern cycle can be called up a drilling cycle must be programmed or active. In addition the following cycles must be stored in the part program memory: 57-68.

Description

HOLE CIRCLE



Call-up

G860 V90=... V91=... V92=...

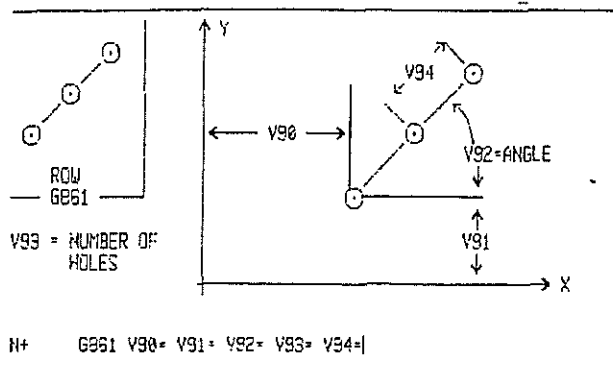
Variables used

V90 - V99, VA - VD, VJ, VX, V11 - V13

4 HOLE PATTERNS

BOSCH CC 100 M  
MTB Handbook

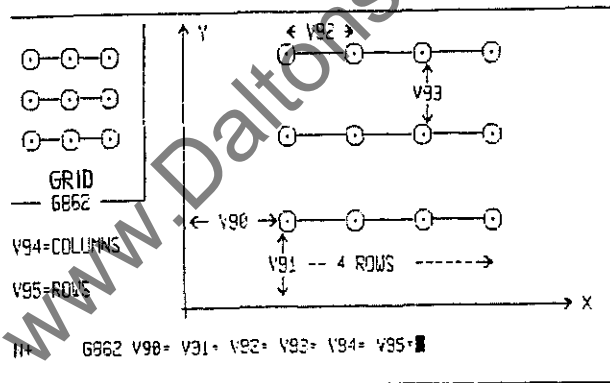
Description ROW OF HOLES



Call-up G861 V90=... V91=...

Variables used V90 - V99, VA - VD, VJ, VX, V11 - V13

Description



Call-up G862 V90=... V91=...

Variables used V90 - V99, VA - VD, VJ, VU - VZ, V11 - V15

## 4 HOLE PATTERNS

**BOSCH CC 100 M**  
MTB Handbook

- Sequence**
1. Traverse to the starting position for of hole pattern.
  2. Call-up of the programmed drilling cycle.
  3. Traverse to the next position of the hole pattern.
  4. Call-up of the drilling cycle, etc.

**Example**

```
N 1  G0 X100 Y200 Z50
N 2  F200
N 3  G81 V1=40 V2=10
N 4  G860 V90=150 V91=250 V92=30 V93=4 V94=50 V95=25
N 5  G861 V90=40 V91=50 V92=80 V93=4 V94=20
N 6  G862 V90=70 V91=65 V92=10 V93=20 V94=4 V95=3
N 7  G80
N 8  Z50
N 9  M2
```

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## 5 APPLICATION EXAMPLES OF MTB PUSHBUTTONS

BOSCH CC 100 M  
MTB Handbook

### EXAMPLE 1

**Description** Store current position by actuation of a pushbutton.

**Sequence** By actuating a particular pushbutton in main mode "MACHINE" the current axis position value is transferred into the zero shift table (G54) and zero shift G54 is activated.

**Programming** Cycle XX

```

N 1 G92
N 2 G4 F2
N 3 G22 P1 L1
N 4 G54
N 5 M2
N 6 $1
N 7 V1=X V2=Y V3=Z
N 8 TRF=G54 X=V1 Y=V2 Z=V3
N 9 G99

```

### EXAMPLE 2

**Description** Teach-in programming with incremental input (G91).

**Sequence** The axis display is set to "ZERO" by key actuation. Programming can then be performed with incremental input in "TEACH IN" mode.

**Programming** Cycle XX

```

N1 G92 X0 Y0 Z0
N2 M2

```

The allocation of the cycle to a particular pushbutton is made in cycle 78:

Cycle 78

```

N1 GXX

```

Numerische Steuerungen · Computer Numerical Control  
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 Robotersteuerungen · Robot Controls  
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