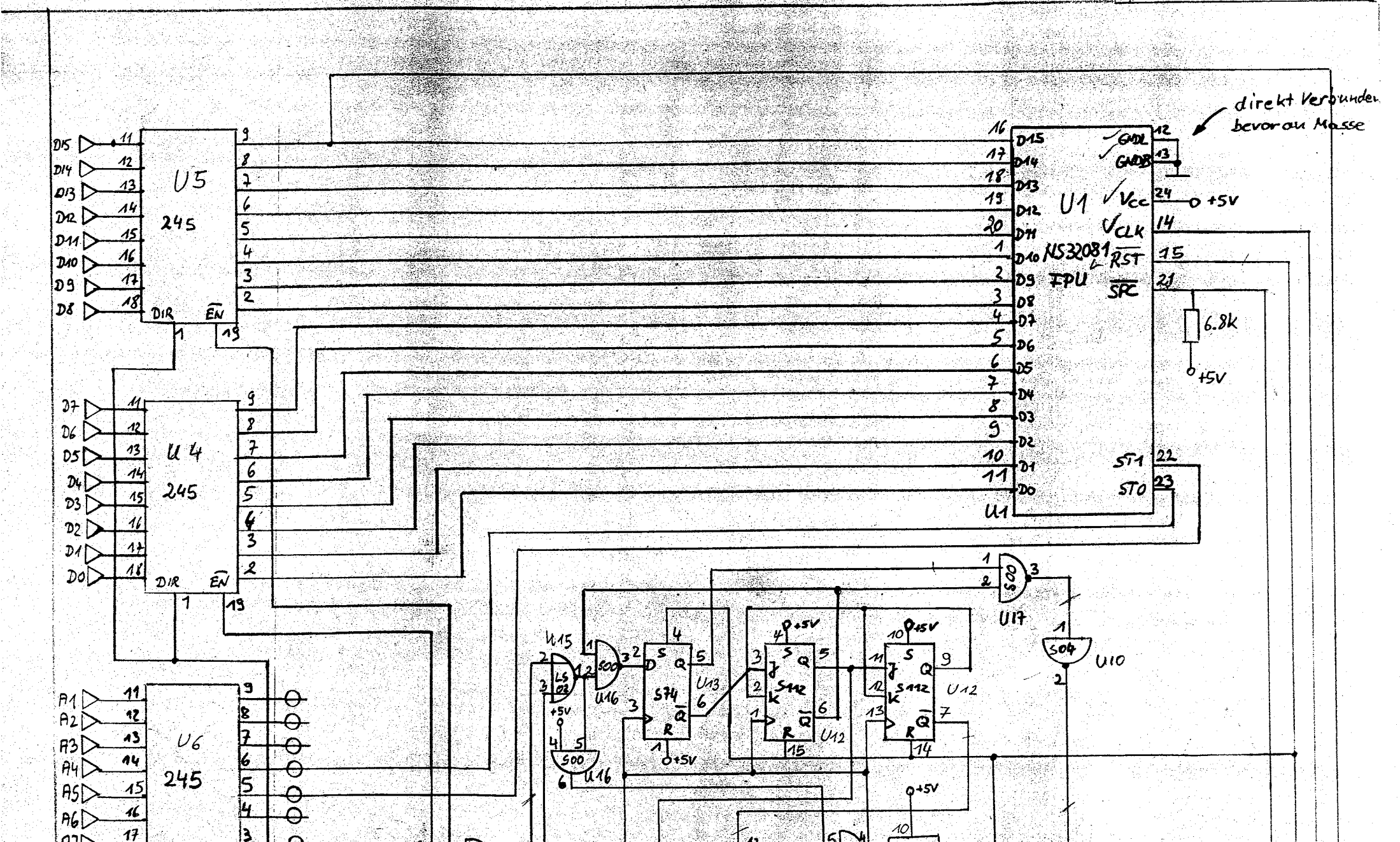
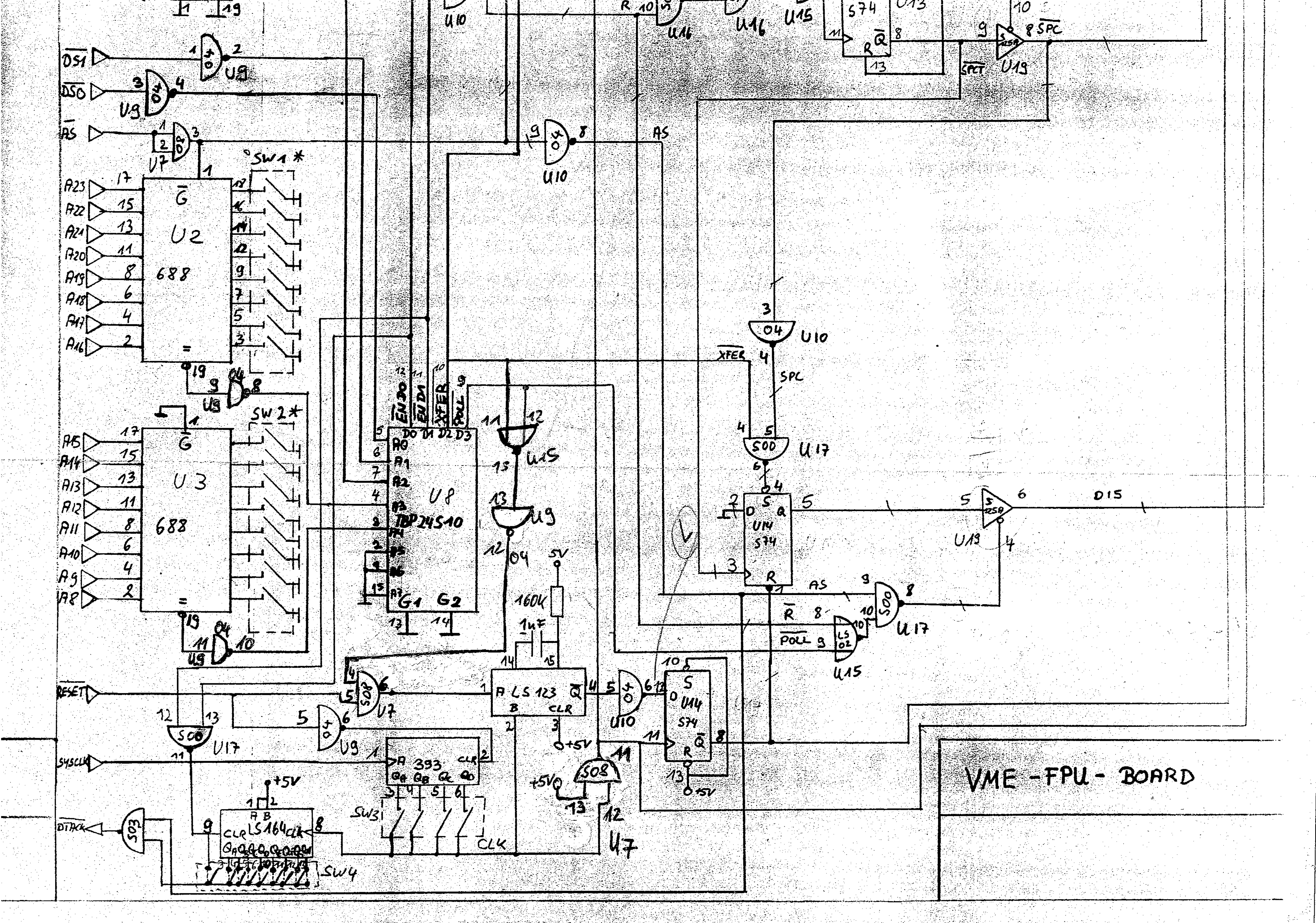
wenn nicht dargestellt IC

	GND	V_{CC}
14 PIN	7	14
16 PIN	8	16
18 PIN	9	18
20 PIN	10	20

* SW1 und SW2 über Widerstandsnetzwerk an LS668
3,3K auf +5V



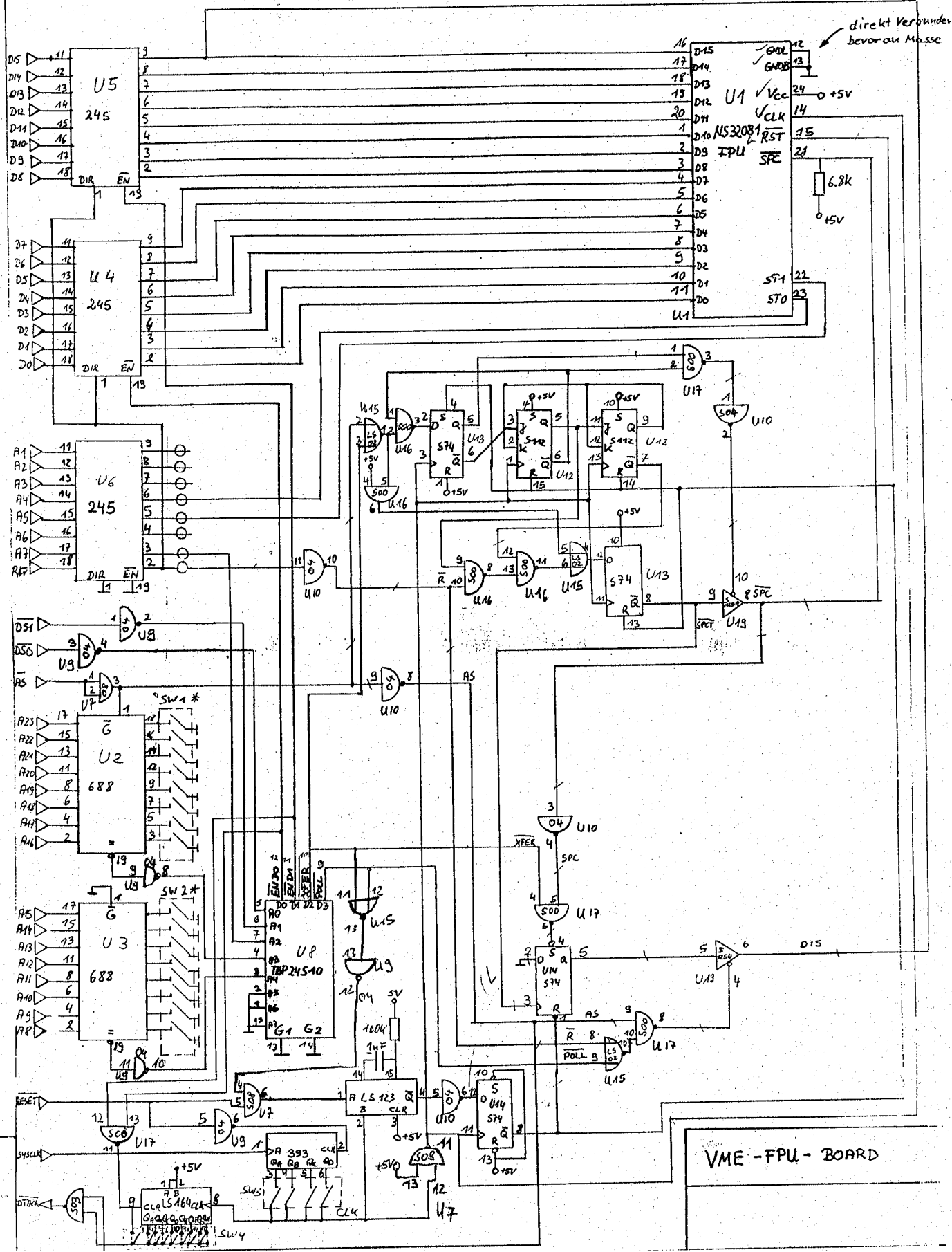


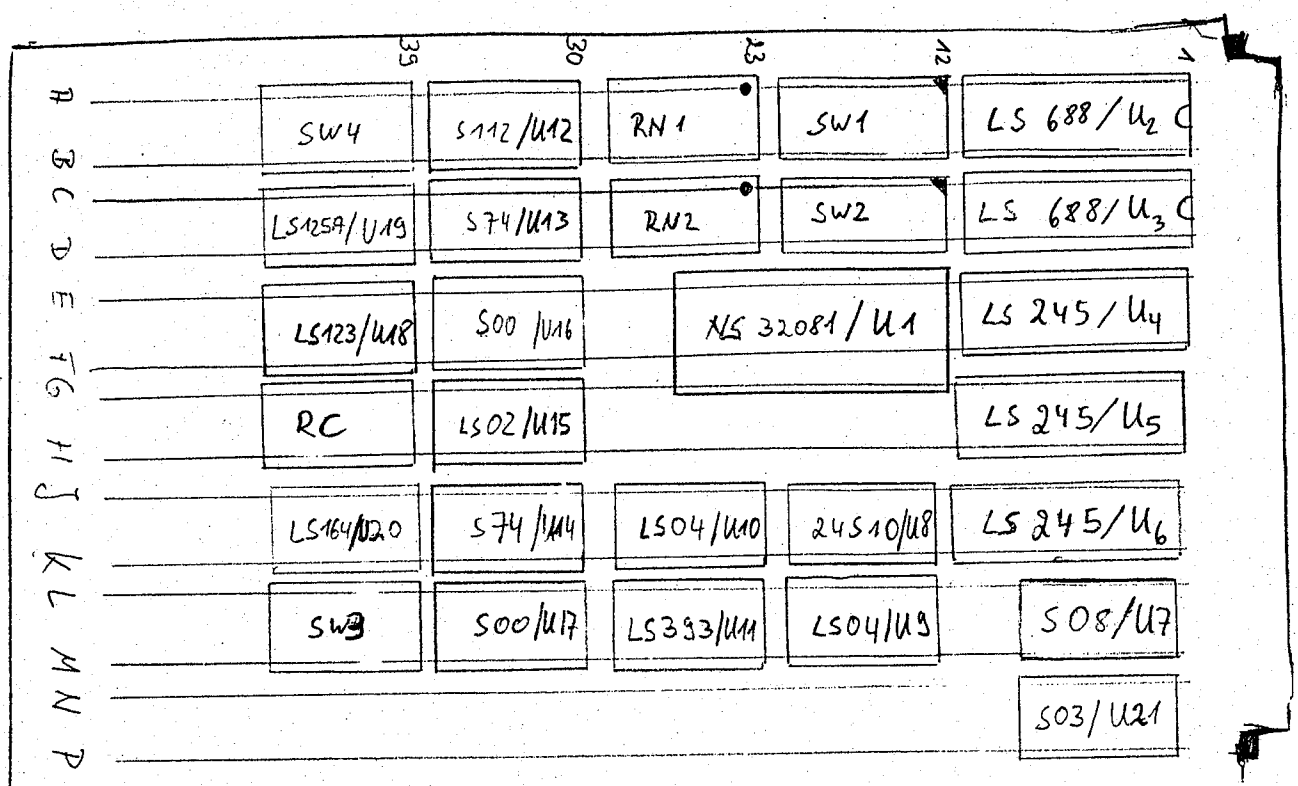
VME-FPU-BOARD

Wenn nicht dargestellt IC

	GND	V_{CC}
14 PIN	7	14
16 PIN	8	16
18 PIN	9	18
20 PIN	10	20

* SW1 und SW2 über Widerstandsnetzwerk an LS 668
3,3K auf +5V




39
30
23
12
1
A B C D E F G H J K L M N P
SW4
S112/U12
RN1
SW1
LS 688/U2
LS125A/U19
S74/U13
RN2
SW2
LS 688/U3
LS123/U18
S00/U16
NS 32081/U1
LS 245/U4
RC
LS02/U15
LS 245/U5
LS164/U20
S74/U14
LS04/U10
24S10/U8
LS 245/U6
SW3
S00/U17
LS393/U11
LS04/U9
S08/U7
S03/U21

ANSTEUERUNG DER FPU

(1) Send ID Byte (always hex BE)
on ST=3 transfer (address D00030)

(2) Send OPERATION Word for ADDF, SUBF, MULF, DIVF
on ST=1 transfer (address D00010)

(3) Send OPERANDS, SWAP register before and
after MOVE.L operation, on ST=1 transfer
(address D00010)

(3) POLL DONE register (address D00080)
until SIGN Bit = "1" (FPU ready)

(4) Read STATUS word (address D00020)
on ST=2 transfer. (should be "0000")

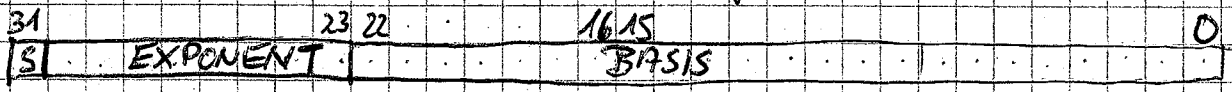
(5) Read RESULT, SWAP register after
MOVE.L operation, on ST=1 transfer (address D00010)

ID - Byte ist BE for following operations

ADDF	0184	Add operand 1 to operand 2
SUBF	1184	Substract operand 1 from operand 2
MULF	3184	Multiply operand 2 by operand 1

DIVF	2184	Divide operand 2 by operand 1
NEGF	584	Negate operand
ABSF	3584	Create absolute value of operand 2

REAL-ZAHLENDARSTELLUNG für single-precision (F)



$$(-1)^{S} * 1.BASIS * 2^{(EXPONENT-BIAS)}$$

BIAS = 7F hex = 0111 1111 bin

Bsp.: 2.0_{dez}

$2.0 = 40000000_{hex}$

S = 0
EXPO = 1000000 = 1 dez
BASIS = 0...0 = 0.0_{dez}

Bsp.: 4.5_{dez}

$4.5 = 40900000_{hex}$

S = 0
EXPO = 10000001 = 2 dez
BASIS = 00100000....0 = 0.125

$(-1)^{SIGN} * 1.FRACT * 2^{EXPO - BIAS}$

BASIS	~~EXPONENT~~
1.0	0 0 0 0 0 0 0 0
1.5	1 0 0 0 0 0 0 0
1.125	0 1 0 0 0 0 0 0
1.0625	0 0 1 0 0 0 0 0
1.03125	0 0 0 1 0 0 0 0
1.015625	0 0 0 0 1 0 0 0
1.0078125	0 0 0 0 0 1 0 0
1.00390625	0 0 0 0 0 0 1 0
1.001953125	0 0 0 0 0 0 0 1

EXPONENT

BIAS 7F = 0111|1111

0
1
2
3
4
5
6
7
8
9
10
-1
-2
-3
-4
-5
-6
-7
-8
-9

0 1 1 1 1 1 1 1
1 0 0 0 0 0 0 0
1 0 0 0 0 0 0 1
1 0 0 0 0 0 1 1

0 0 0 0 0 0 0 1

1000000 : 2 = 0

BE = 1011 1|110

0184 = 0000 0001|1000 0100 ADDF

1000 0100 0000 0001

Single Pr. Float

$(-1)^{SIGN} * 1.FRACT * 2^{(E-Bias)}$

Bias = 01111111

0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10 A	1010
11 B	1011
12 C	1100
13 D	1101
14 E	1110
15 F	1111

3F800000

0 01111111 0000 0 0 0 0 0 0

− 01111111

00000000 → $(-1)^0 \cdot 1.0 \cdot 2^0$

1.015625
1.015625
31250

1,5 = 3FC00000

STATUSWORT

0000 O.K.

00000001
01111111
0 1000000 0100
4 0 0

3 = 40400000

7F

1 = 3F800000

2 = 40000000

2,5 = 40200000

1.25 · 2^1

010

4,5 = 40900000

2,25
1,125 · 2^2

00000010
01111111
0 1000000 1 001
4 0 9

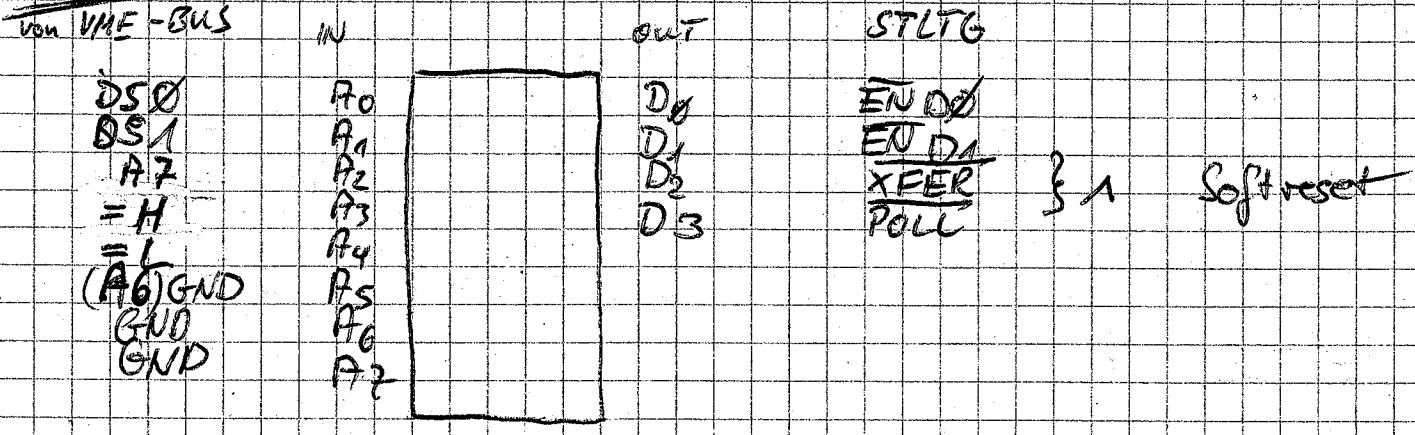
00000011
01111111
10000011

10000001
− 01111111
00000010

00000001
01111111
000000000

ADDF	1000	0100	0000	0001	0184
SUBF	1000	0100	0001	0001	1184
MULF	1000	0100	0011	0001	3184
DIVF	1000	0100	0010	0001	2184
NEGF	1000	0100	0001	0101	1584
ABSF	1000	0100	0011	0101	3584
ADDL	1000	0100	0000	0000	0084
SUBL	1000	0100	0001	0000	1084
MULL	1000	0100	0011	0000	3084
DIVL	1000	0100	0010	0000	2084
NEGL	1000	0100	0001	0100	1484
ABSL	1000	0100	0011	0100	3484

PROM 24S10



	PROM Eingänge								PROM Ausgänge				Inhalt	
	A7	A6	A5	A4	A3	A2	A1	A0	D3	D2	D1	D0		
XFER	0	0	0	1	1	0	1	1	1	0	0	0	1B	8
POLL	0	0	0	1	1	1	1	1	0	1	0	0	1F	4
SOFTRESET	0	0	1	1	1	1	1	1	0	0	1	1	3F	3
	Alle anderen auf F												sonst	F

ADRESS BELEGUNG

	23	A16	A15	A8 A7 A0	
XFER	DIP SWITCH	DIP SWITCH		0 x x x x x x x	≤ 7F
XFER ST1	DIP SWITCH	DIP SWITCH		0 0 0 1 0 0 0 0	10
XFER ST2	DIP SWITCH	DIP SWITCH		0 0 1 0 0 0 0 0	20
XFER ST3	DIP SWITCH	DIP SWITCH		0 0 1 1 0 0 0 0	30
POLL	DIP SWITCH	DIP SWITCH		1 0 0 0 0 0 0 0	80
SOFTRESET	DIP SWITCH	DIP SWITCH		1 1 x x x x x x	≥ C0

DIP-SWITCHS

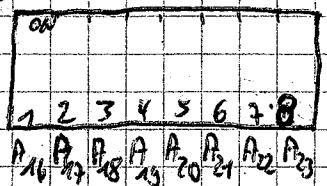
SW 1 ADRESSEN A16 - A23

SW 2 ADRESSEN A 8 - A15

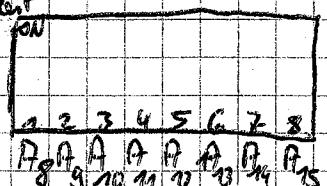
SW 3 CLOCK

SW 4 DTACK

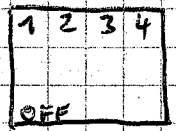
SW1 Um ein Adressbit zu selektieren muß der dazugehörig Switch auf OFF gestellt sein



SW 2

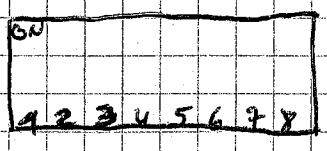


SW 3 Es darf nur ein SWITCH auf ON sein !!



1 8 MHz gewählt CLK
2 4 MHz
3 2 MHz auf ON
4 1 MHz

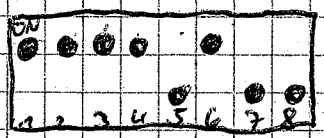
SW 4 Es darf nur ein SWITCH auf ON sein !!



1 0 CLK-Zyklus verzögert
2 0-1 " "
3 1-2 " "
4 2-3 " "
5 3-4 " "
6 4-5 " "
7 5-6 " "
8 6-7 " "

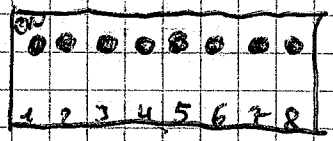
Es sind folgende Einstellung für die Basis-Adresse D00000 zu wählen

SW1



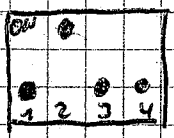
0 | D

SW2



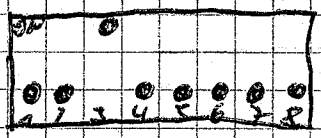
0 | 0

SW3



4 MHz

SW 4



u.U. DIP 4 anstelle DIP 3 ON

```
 1
 2            ORG      0
 3            LEA      -*-2(PC),A4
 4            MOVEA.L  #$D00010,A1
 5            MOVEA.L  #$D00020,A2
 6            MOVEA.L  #$D00030,A3
 7            MOVEA.L  #$D00080,A0
 8   *
 9   L1       LEA      OUT11(A4),A5
10            LEA      OUT19(A4),A6
11            BSR      OUTMSG
12            BSR      INW
13            MOVE.L   D0,D1
14            LEA      OUT21(A4),A5
15            LEA      OUT29(A4),A6
16            BSR      OUTMSG
17            BSR      INW
18            MOVE.L   D0,D2
19            LEA      OUT31(A4),A5
20            LEA      OUT39(A4),A6
21            BSR      OUTMSG
22            BSR      INL
23            MOVE.L   D0,D3
24            LEA      OUT41(A4),A5
25            LEA      OUT49(A4),A6
26            BSR      OUTMSG
27            BSR      INL
28            MOVE.L   D0,D4
29   *
30            MOVE.L   #$FFFFF,D0
31   TIME     MOVE.W   D1,(A3)
32            MOVE.W   D2,(A1)
33            SWAP     D3
34            MOVE.L   D3,(A1)
35            SWAP     D3
36            SWAP     D4
37            MOVE.L   D4,(A1)
38            SWAP     D4
39   *
40   POLL     MOVE.W   (A0),D6
41            BPL      POLL
42   *
43            MOVE.W   (A2),D5
44            MOVE.L   (A1),D6
45            SWAP     D6
46   *
47            SUB.L    #1,D0
48            BNE      TIME
49   *
50            MOVE.W   D5,D0
51            BSR      OUTW
52            MOVE.L   D6,D0
53            BSR      OUTL
54            BRA      L1
55   *
56   *
57   OUTW     MOVEQ    #$23,D7
58            MOVEA.L  #$25000,A6
59            TRAP     #15
60            MOVEQ    #$2,D7
61            MOVEA.L  #$25000,A5
```

```
                TRAP    #15
                RTS
OUTL            MOVEQ   #$25,D7
                MOVEA.L #$25000,A6
                TRAP    #15
                MOVEQ   #$2,D7
                MOVEA.L #$25000,A5
                TRAP    #15
                RTS
OUTMSG          MOVEQ   #6,D7
                TRAP    #15
                RTS
INL             LEA     INSL1(A4),A5
                LEA     INSL1(A4),A6
                MOVEQ   #1,D7
                TRAP    #15
                MOVEQ   #$20,D7
                TRAP    #15
                RTS
INW             LEA     INSW1(A4),A5
                LEA     INSW1(A4),A6
                MOVEQ   #1,D7
                TRAP    #15
                MOVEQ   #$20,D7
                TRAP    #15
                RTS

*
OUT11           DATA    'EINGABE ID-Byte ..... :'
OUT19           EQU     *
OUT21           DATA    'EINGABE OPERATION-Word  :'
OUT29           EQU     *
OUT31           DATA    'EINGABE ERSTER-Operand  :'
OUT39           EQU     *
OUT41           DATA    'EINGABE ZWEITER-Operand :'
OUT49           EQU     *
INSW1           BSS     16
INSL1           BSS     16
*
                END
```

```
 1            ORG      0
 2            LEA      -*-2(PC),A4
 3            MOVEA.L  #$D00010,A1
 4            MOVEA.L  #$D00020,A2
 5            MOVEA.L  #$D00030,A3
 6            MOVEA.L  #$D00080,A0
 7   *
 8   L1       LEA      OUT11(A4),A5
 9            LEA      OUT19(A4),A6
10            BSR      OUTMSG
11            BSR      INW
12            MOVE.L   D0,D1
13            LEA      OUT21(A4),A5
14            LEA      OUT29(A4),A6
15            BSR      OUTMSG
16            BSR      INW
17            MOVE.L   D0,D2
18            LEA      OUT31(A4),A5
19            LEA      OUT39(A4),A6
20            BSR      OUTMSG
21            BSR      INL
22            MOVE.L   D0,D3
23            LEA      OUT41(A4),A5
24            LEA      OUT49(A4),A6
25            BSR      OUTMSG
26            BSR      INL
27            MOVE.L   D0,D4
28  *
29            MOVE.W   D1,(A3)
30            MOVE.W   D2,(A1)
31            SWAP     D3
32            MOVE.L   D3,(A1)
33            SWAP     D3
34            SWAP     D4
35            MOVE.L   D4,(A1)
36            SWAP     D4
37  *
38  POLL      MOVE.W   (A0),D6
39            BPL      POLL
40  *
41            MOVE.W   (A2),D5
42            MOVE.L   (A1),D6
43            SWAP     D6
44            MOVE.W   D5,D0
45            BSR      OUTW
46            MOVE.L   D6,D0
47            BSR      OUTL
48            BRA      L1
49  *
50  *
51  OUTW      MOVEQ    #$23,D7
52            MOVEA.L  #$25000,A6
53            TRAP     #15
54            MOVEQ    #$2,D7
55            MOVEA.L  #$25000,A5
56            TRAP     #15
57            RTS
58  OUTL      MOVEQ    #$25,D7
59            MOVEA.L  #$25000,A6
60            TRAP     #15
61            MOVEQ    #$2,D7
```

```
62            MOVEA.L ##$25000,A5
63            TRAP    #15
64            RTS
65    OUTMSG  MOVEQ   #6,D7
66            TRAP    #15
67            RTS
68    INL     LEA     INSL1(A4),A5
69            LEA     INSL1(A4),A6
70            MOVEQ   #1,D7
71            TRAP    #15
72            MOVEQ   ##$20,D7
73            TRAP    #15
74            RTS
75    INW     LEA     INSW1(A4),A5
76            LEA     INSW1(A4),A6
77            MOVEQ   #1,D7
78            TRAP    #15
79            MOVEQ   ##$20,D7
80            TRAP    #15
81            RTS
82
83    *
84    OUT11   DATA    'EINGABE ID-Byte ..... :'
85    OUT19   EQU     *
86    OUT21   DATA    'EINGABE OPERATION-Word  :'
87    OUT29   EQU     *
88    OUT31   DATA    'EINGABE ERSTER-Operand  :'
89    OUT39   EQU     *
90    OUT41   DATA    'EINGABE ZWEITER-Operand :'
91    OUT49   EQU     *
92    INSW1   BSS     16
93    INSL1   BSS     16
94    *
95            END
96
97
98
```