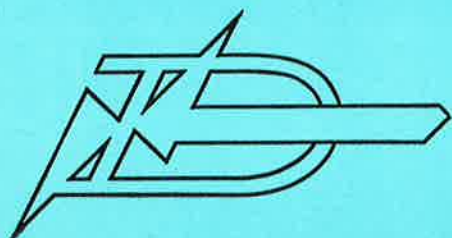
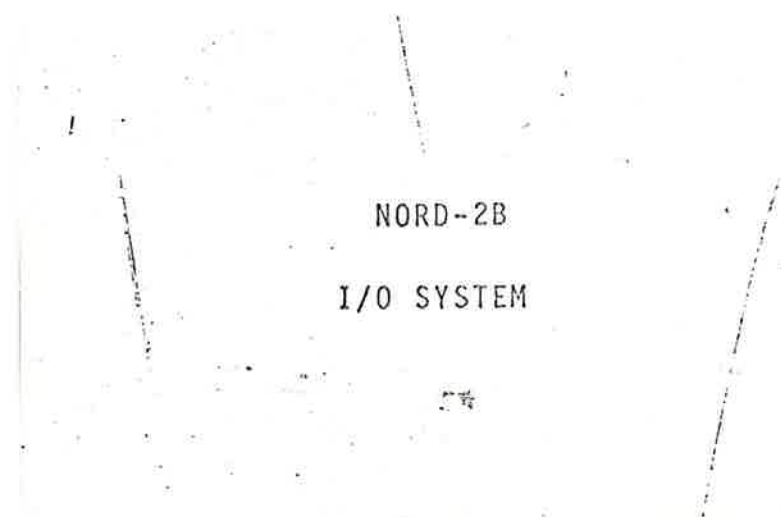


NORD-2B

COMPUTER SYSTEMS



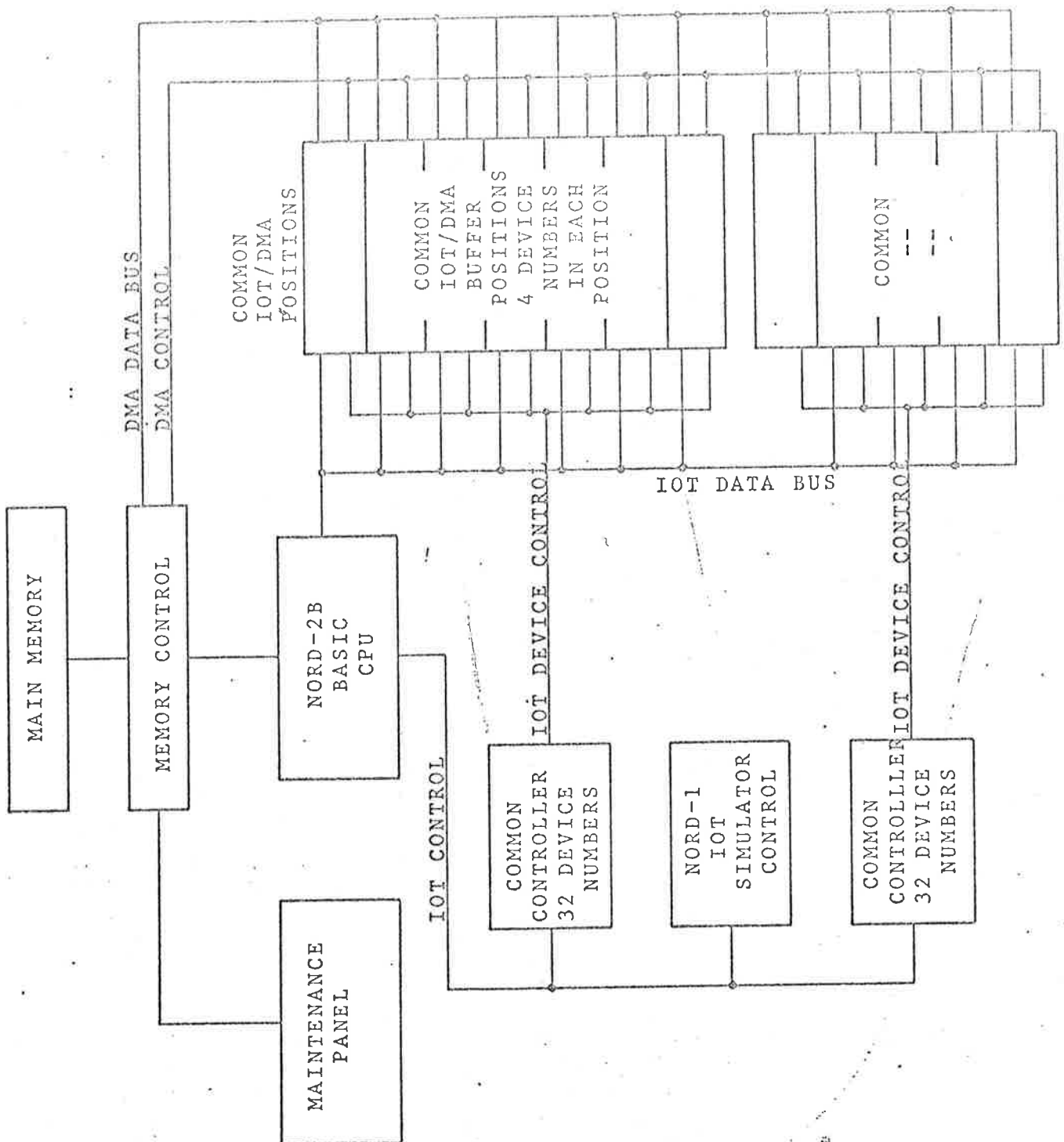
A/S NORSK DATA-ELEKTRONIKK

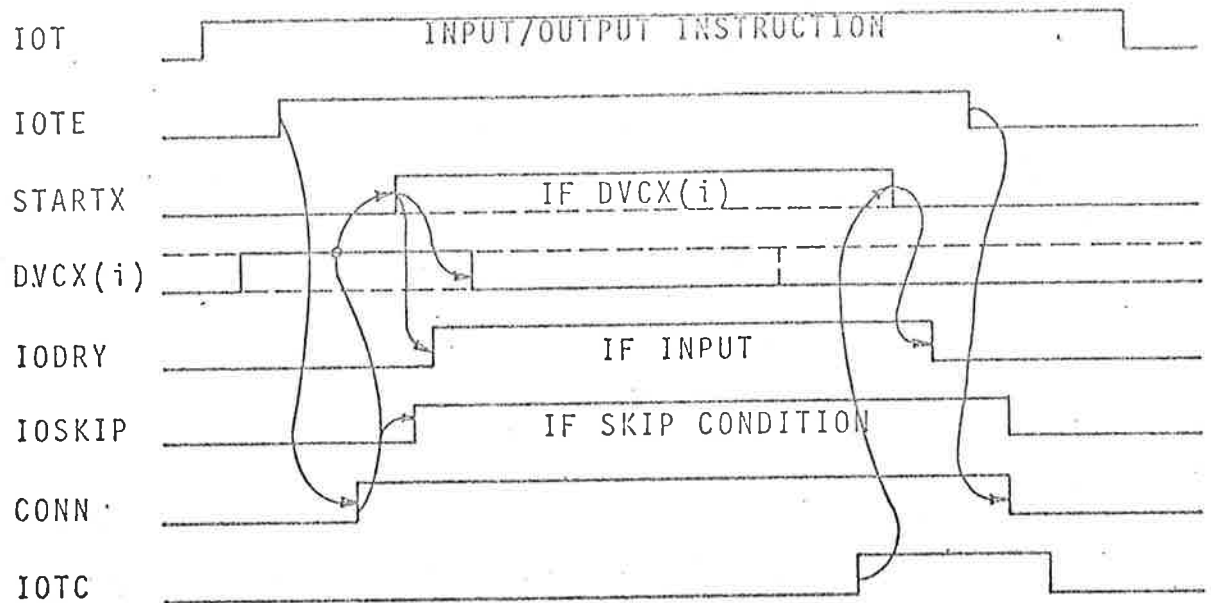
Økernveien 145 - Oslo 5 (Økern)

NORD-2B

I/O SYSTEM

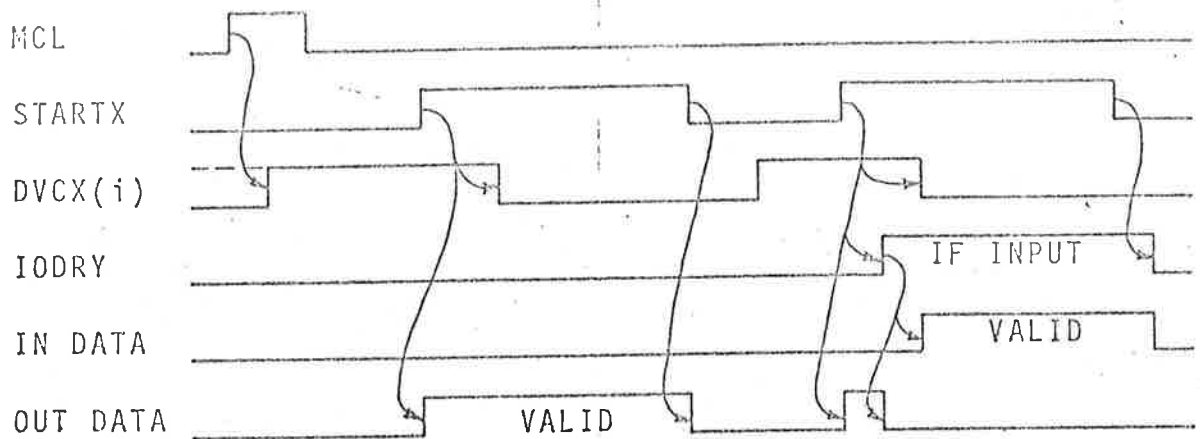
THE GENERAL NORD-2B SYSTEM





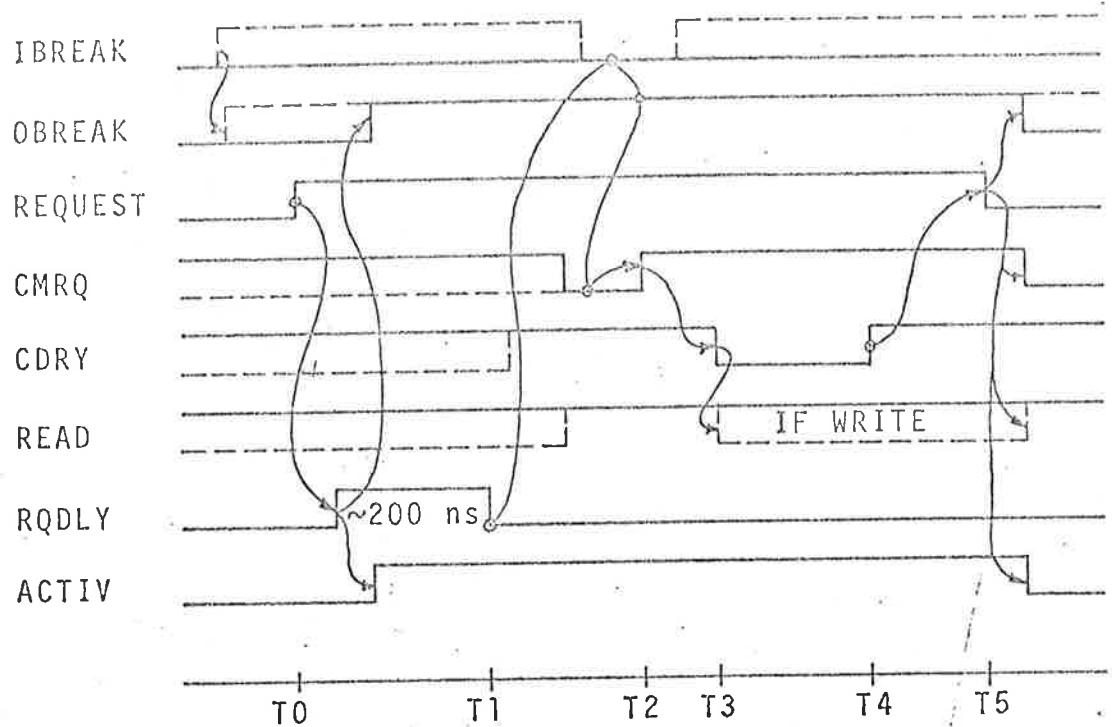
NORD-2B
I/O TIMING

NORD-2B TIMING I/O BUFFER



1. IODRY must be presented not later than 200 ns after STARTX arrives.
2. STARTX must be decoded with IRO and IR1 to define one of four START pulses.
3. Each DVCX corresponds to only one START pulse.
4. IODRY disables data from CPU.
5. Data from device should be enabled synchronous to IODRY.
6. Data may be transferred both to and from the A-register on the same IOT by strobing output data on the leading edge of START and then presenting IODRY.
7. DVCX must disappear during START in order to get the corresponding device busy.

NORD-2B
DMA TIMING



$$OBREAK_1 = IBREAK_1 + ACTIV_1$$

$$RQDLY_1 = REQUEST(0,1) (\sim 200 \text{ ns})$$

$$ACTIV_1 = RQDLY_1 + ACTIV_1 \cdot REQUEST_1$$

$$CMRQ_1 = (RQDLY_0 \cdot ACTIV_1 \cdot IBREAK_0 \cdot CMRQ_0) (0,1) \\ + CMRQ_1 \cdot REQUEST_1$$

T0 Local request

T1 OBREAK has reached all lower priority devices

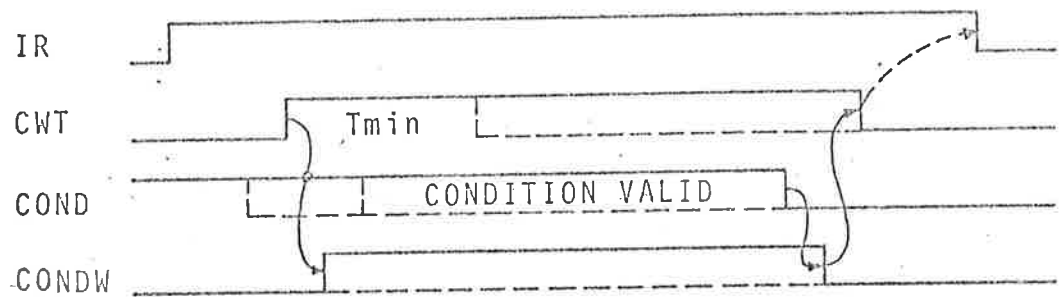
T2 Access initiated

T3 Present address

T4 Data available (or if WRITE: Present data)

T5 Access finished.

NORD-2B
CONDITIONAL WAIT



$$CONDW_1 = CWT_1 \cdot COND_1$$

$$T_{min} \approx 2-300 \text{ ns}$$

Terminal	G= output	Signal	Polarity	Connected to terminals	Terminal	G= output	Signal	Polarity	Connected to terminals
1		+5V			31	W	IOTD14	1	
2		Ground			32	W	MDB14	1	
3	W	IOTD0	1		33	W	IOTD15	1	
4	W	MDB0	1		34	W	MDB15	1	
5	W	IOTD1	1		35		IR0	1	
6	W	MDB1	1		36		IR1	1	
7	W	IOTD2	1		37		IR2	1	
8	W	MDB2	1		38		IR3	1	
9	W	IOTD3	1		39		IR4	1	
10	W	MDB3	1		40		IR5	1	
11	W	IOTD4	1		41		IR6	1	
12	W	MDB4	1		42		IR7	1	
13	W	IOTD5	1		43	W	IODRY	0	
14	W	MDB5	1		44				
15	W	IOTD6	1		45	G	DCX3	0	
16	W	MDB6	1		46		IBREAK	0	
17	W	IOTD7	1		47	G	DCX2	0	
18	W	MDB7	1		48	G	OBREAK	0	
19	W	IOTD8	1		49	G	DCX1	0	
20	W	MDB8	1		50	W	READ	1	
21	W	IOTD9	1		51	G	DCX0	0	
22	W	MDB9	1		52	W	CMRO	0	
23	W	IOTD10	1		53		STARTX	0	
24	W	MDB10	1		54		CDRY	0	
25	W	IOTD11	1		55	W	CONDW	0	
26	W	MDB11	1		56	W	LOAD	0	
27	W	IOTD12	1		57		CWT	0	
28	W	MDB12	1		58		MCL	0	
29	W	IOTD13	1		59		+5V		
30	W	MDB13	1		60		Ground		

DRAWN BY JEJ/eml

Remarks

Replacement for Date

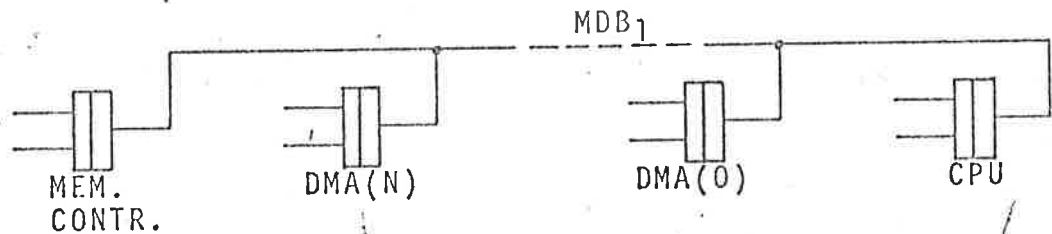
APPROVED BY

Replaced by Date

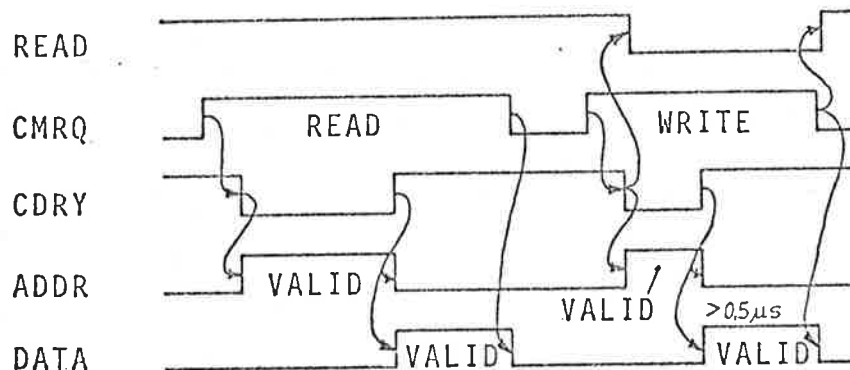
DATE 3/3/71

NORD-2B MEMORY DATA BUS

1. MDB is a two-way wired-or line, 16 bits wide and logic "1" is high.
2. When referencing memory, a 16 bits address is first transmitted along MDB to memory. Thereafter a 16 bits data word is transferred in either direction on MDB, depending on read or write to memory.
3. Hardware:



4. Timing:



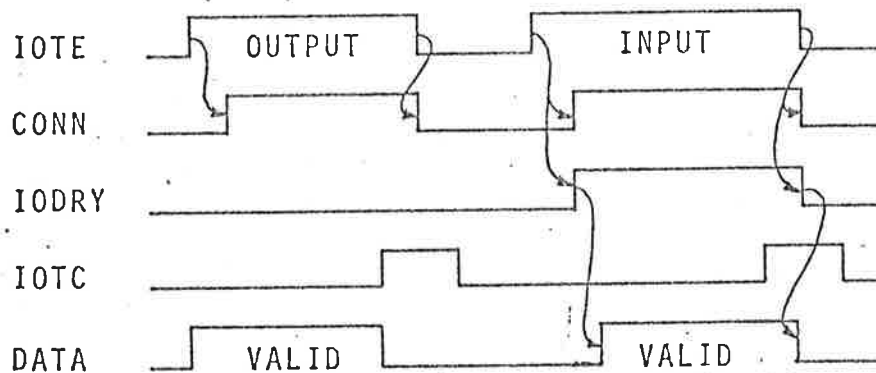
5. Write data must be valid at least 0,5 μs.
Read data are valid until CMRQ drops.
New memory access is inhibited until CMRQ drops.

NORD-2B
IOT DATA BUS

1. IOTD is a two-way wired-or line, 16 bits wide.
2. Logic "1" is high for output and low for input to CPU.
3. The data transfer direction is controlled by "Data Ready", IODRY. Data go from the CPU unless the addressed device signals IODRY.
4. Hardware:



5. Timing:



6. A two-way device should strobe output data on the leading edge of $CONN_1 \cdot IODRY_1$.

