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001417

ID-7015 INTERVAL TIMER MODULE
for the
ID-7000 MICROPROCESSOR SYSTEM

Marts 1976

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ID-7015 Interval Timer Module

1. General Description.

The ID-7015 Interval Timer Module is a module, which can be programmed to interrupt the ID-7000 Microprocessor System at regular time intervals.

The module contains a crystal controlled oscillator with a frequency of 1MHz. A DIVIDE COUNTER divides this frequency to produce signals with periods of 100 µs, 1 ms, 10 ms, and 100 ms. A controlword, which is sent to the module by an output instruction, controls which of these signals is used as clockpulse for an eight bit MODULUS COUNTER. The modulus of this counter is determined by a MODULUS REGISTER, which is loaded by another output instruction.

When the MODULUS COUNTER contains 255, the next clock pulse will set the interrupt flip flop INT, and the MODULUS COUNTER will be loaded with the complement of the MODULUS REGISTER. On the following clock pulses the MODULUS COUNTER counts up, until it again contains 255, then the MODULUS COUNTER is loaded as before, and INT is set.

The shortest time between two interrupts is 100 µs, and the longest time is 25.6 sec. If an interrupt is wanted every n clock pulses, the MODULUS COUNTER should be loaded with n-1.

Besides the interrupt flip flop INT, the module contains an interrupt mask flip flop, IM. When INT·IM=1 an interrupt request is sent to the ID-7000 microprocessor on a level determined by a strap on the card.

1.1 Addressing.

The module uses two I/O addresses. ADR(7:1) is compared with a switch register, while ADR(0) determines, if a data word (ADR(0)=0) or a control word (ADR(0)=1) is written into the module, or a status word (ADR(0)=1) is read from the module.

1.2 Controlword.

The controlword is loaded by an output instruction to the high, uneven address of the module. The significance of this controlword is as follows:

bits(1:0): Determine the counting period of the MODULUS COUNTER.

0 0 : 100 µs
0 1 : 1 ms
1 0 : 10 ms
1 1 : 100 ms

bit(2): Starts and stops the counters, by changing the state of an internal flip flop, COUNT. When COUNT=1 both counters are counting.

bit(2)	COUNT	
0	0	: COUNT:=0.
0	1	: COUNT:=0. Stops the counters.
1	0	: COUNT:=1. Resets the DIVIDE COUNTER, loads the MODULUS COUNTER, and starts both.
1	1	: COUNT:=1. Continue counting.

bits(5:3): Not used.

bit(6): Interrupt mask input.

0 : IM:=0. Disable interrupt.
1 : IM:=1. Enable interrupt.

bit(7): Reset interrupt.

0 : INT:=0.
1 : INT:=INT.

1.3 Statusword.

The statusword of the module is read by an input instruction from the high, uneven address. Only two bits are used.

bit(7) : INT: interrupt flip flop.
bit(6) : IM: interrupt mask flip flop.
bits(5:0): not used.

1.4 Dataword.

The MODULUS REGISTER is loaded by an output instruction to the low, even address of the module. The modulus of the MODULUS COUNTER equals one plus the content of the MODULUS REGISTER. If the MODULUS REGISTER is loaded with a zero, the interrupt flip flop INT is set on every clock pulse.

1.5 Reset.

The system RESET signal performs the following functions on the module:

COUNT:=0. Both counters stop.
MODULUS COUNTER:= DIVIDE COUNTER:= 0.
IM:= INT:= 0.
Counting period:= 100 μs.

2.0 Precision.

The frequency is determined by the crystal and the oscillator. The frequency departs from 1 MHz by a fixed amount, which could be removed by trimming and a variable amount caused for instance by temperature and voltage variations.

Tolerances (24 ^{0}c).

Crystal	: ± 10 ppm
Oscillator	: ± 10 ppm
Total	: ± 20 ppm

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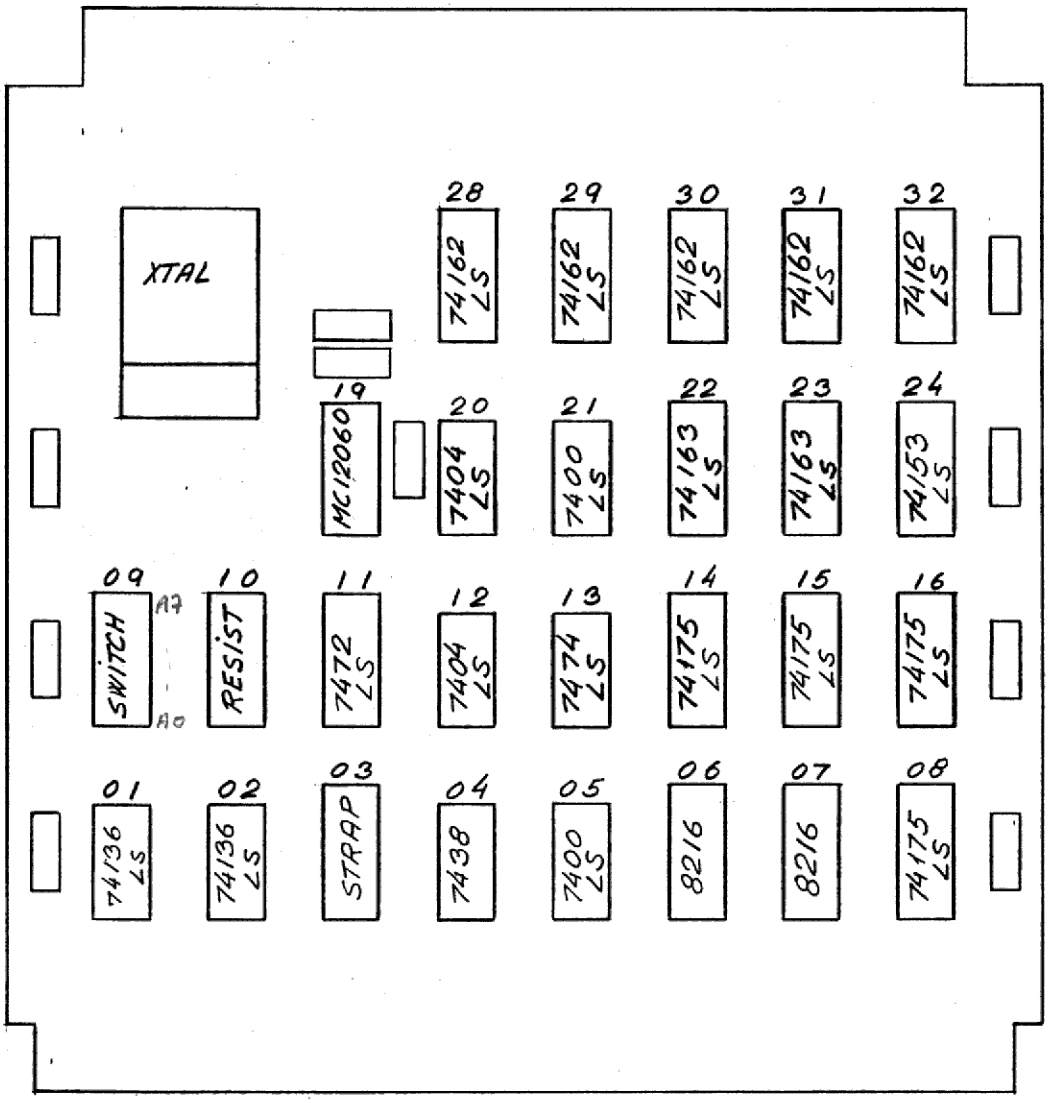
Interval Timer Module



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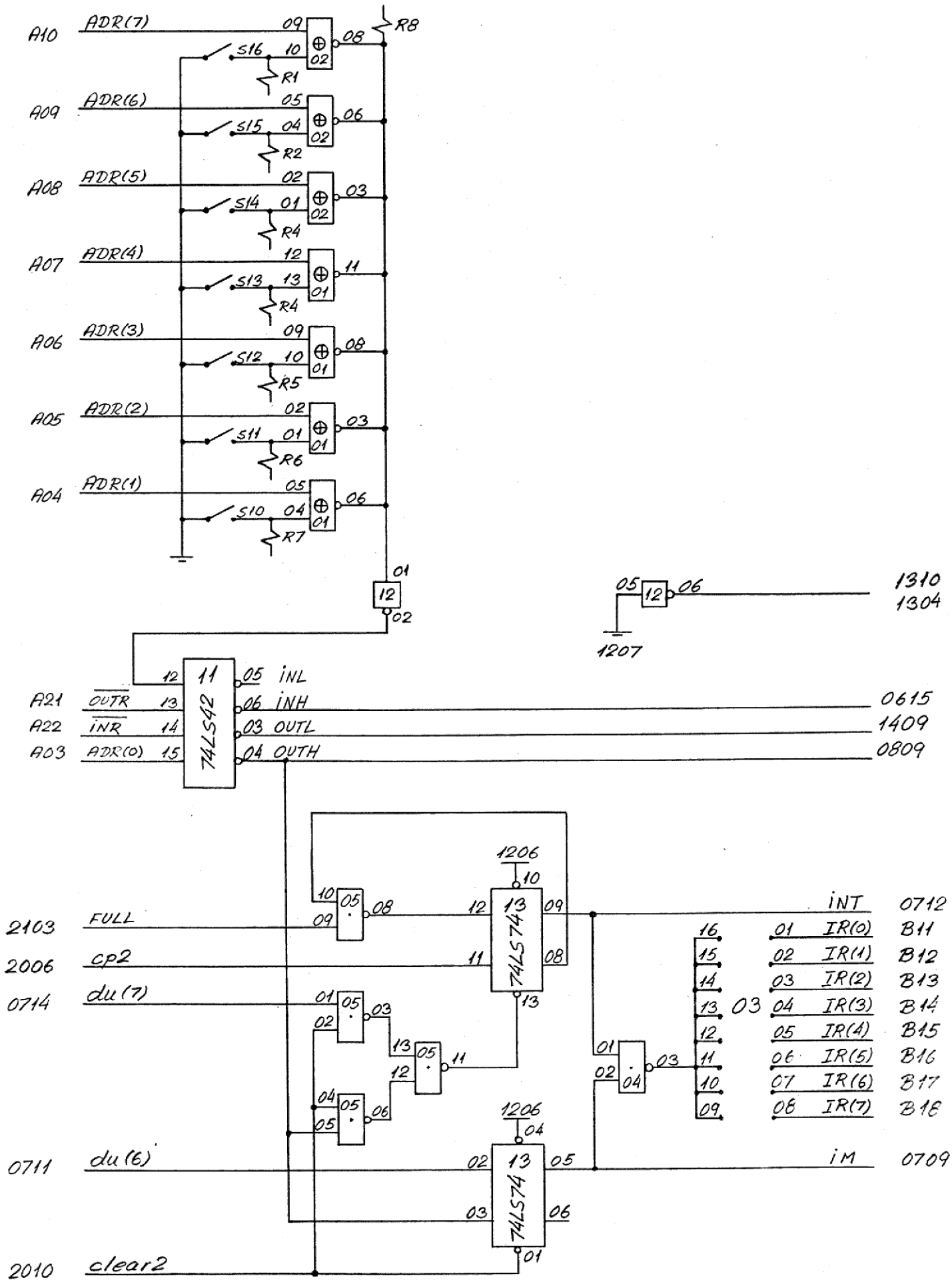
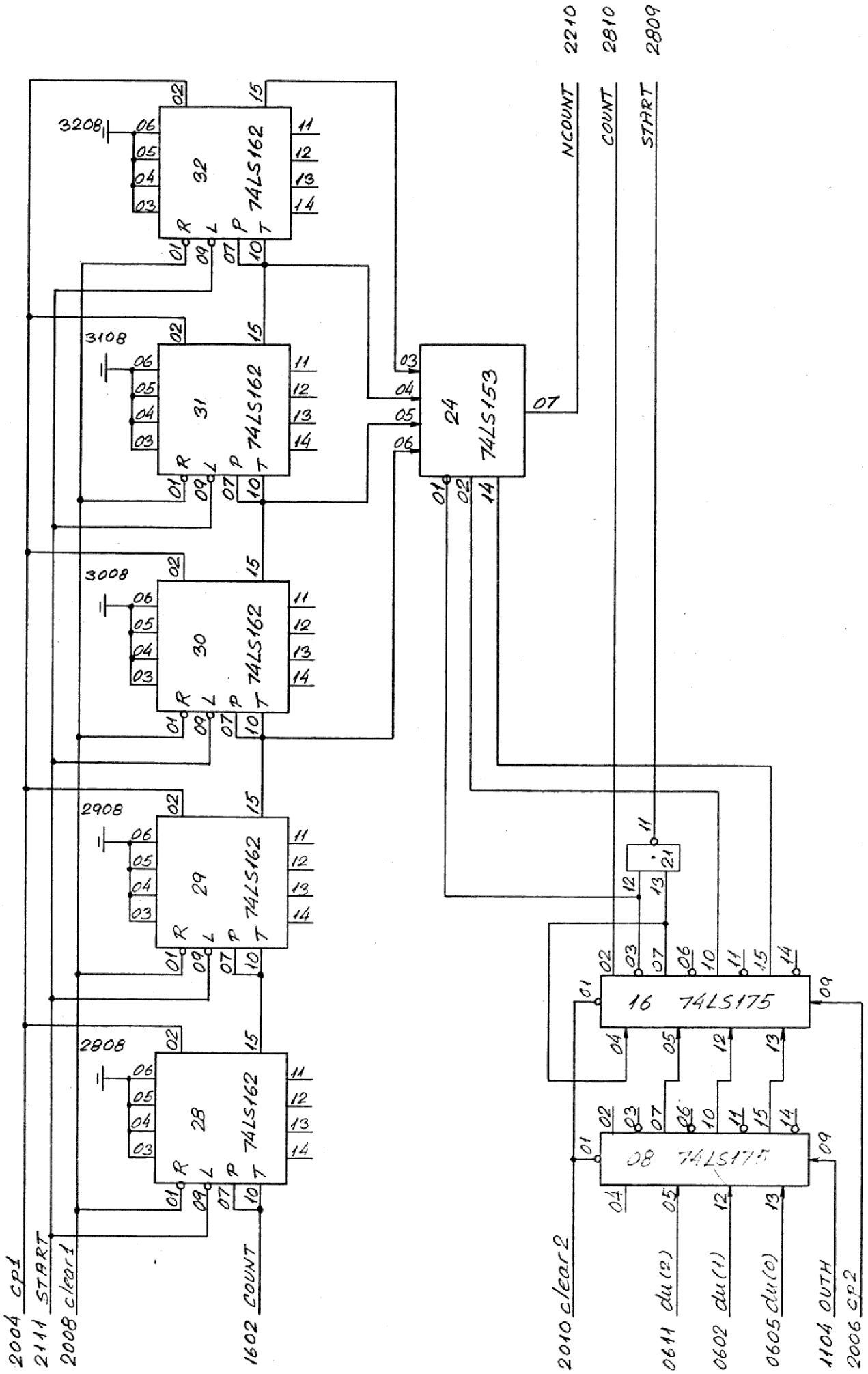
Interval Timer Module

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32
74LS162
3108
31
74LS162
3008
30
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2908
29
74LS162
2808
28
74LS162
24
74LS153
16 74LS175
08 74LS175
NCOUNT
COUNT
START
2210
2810
2809
2004 CP1
2111 START
2008 clear1
1602 COUNT
2010 clear2
0611 du(2)
0602 du(1)
0605 du(0)
1104 OUTH
2006 CP2

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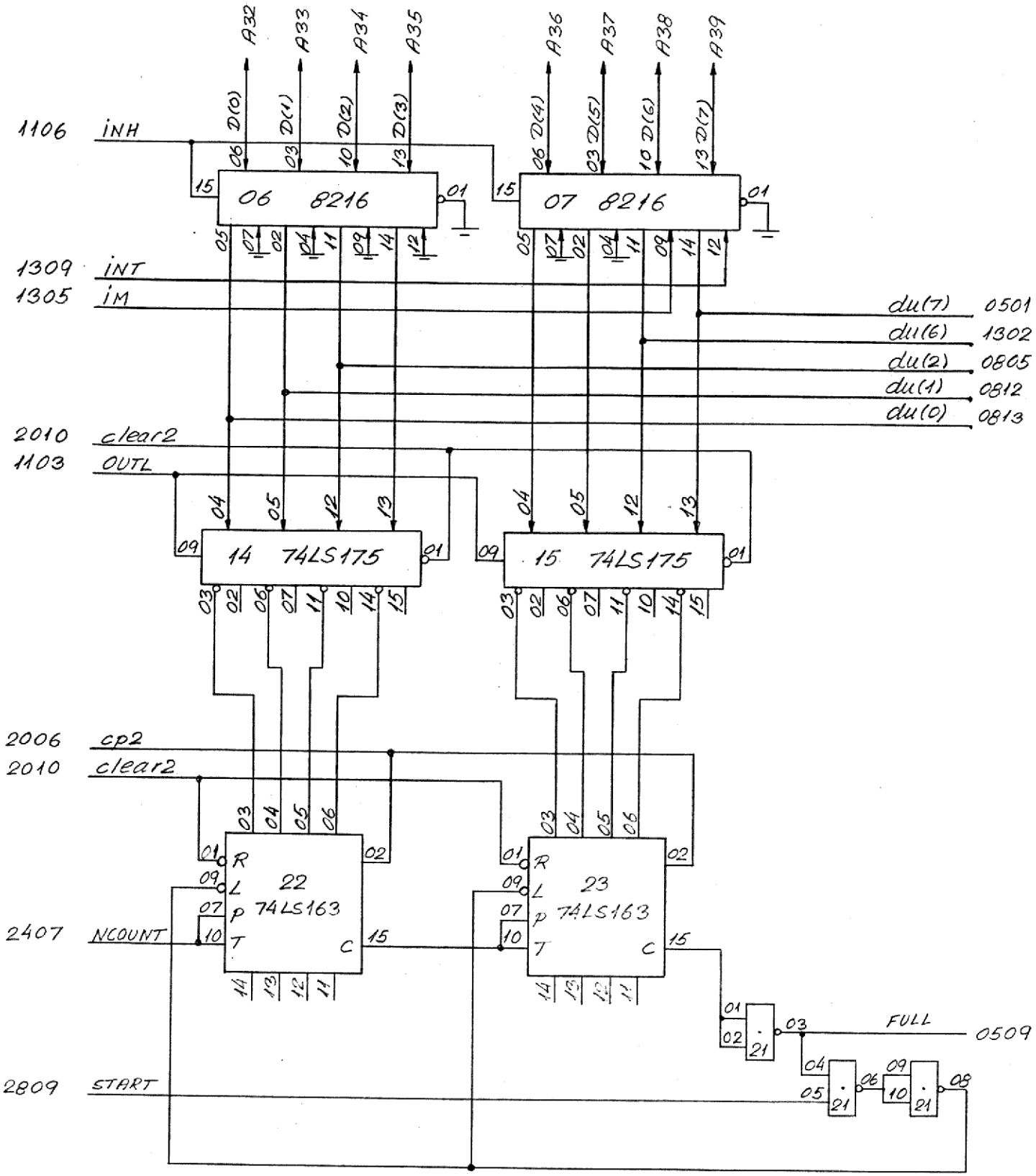

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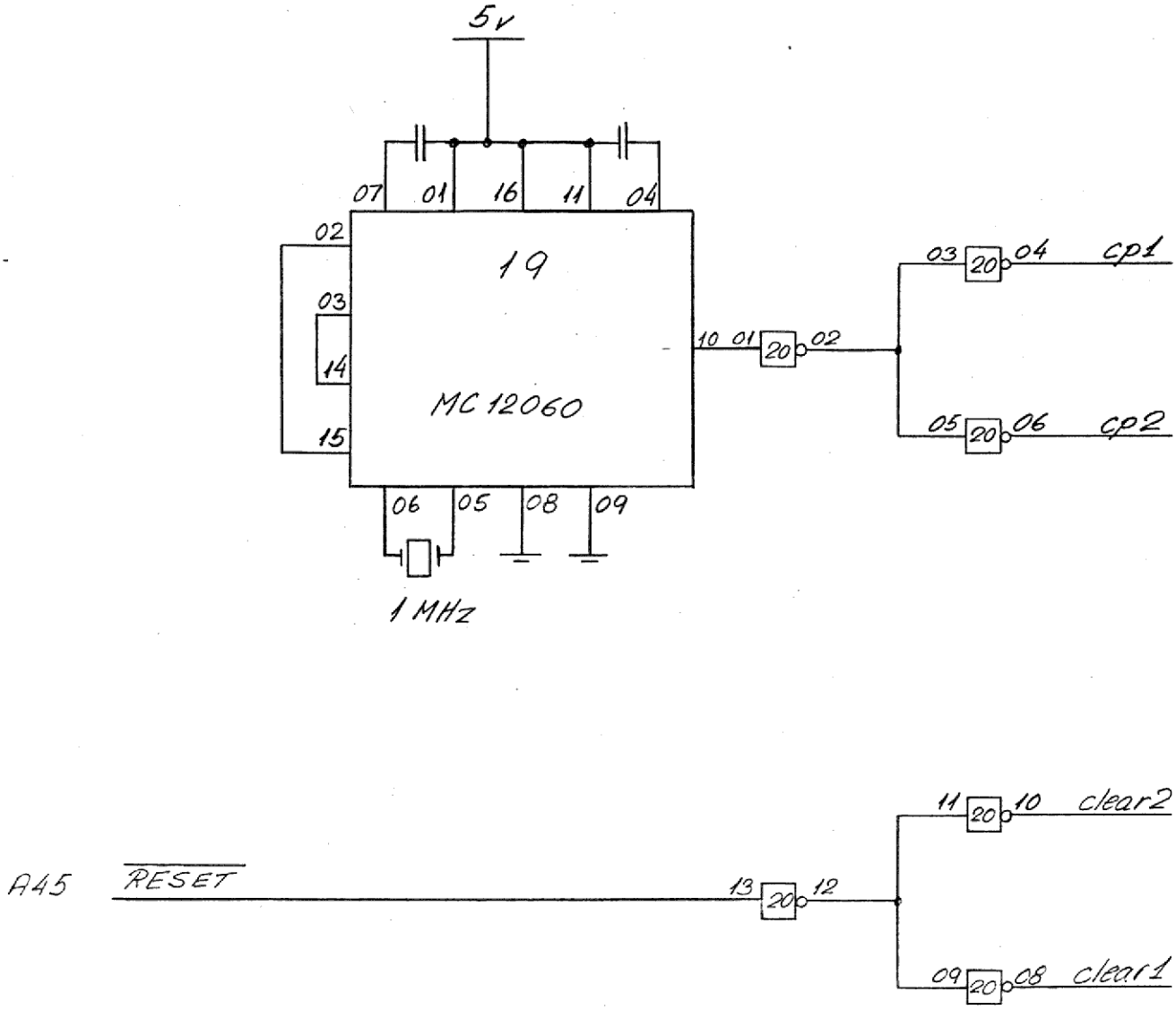
Interval Timer Module