SSI 1276 - INTERFACE - BOARD

HIGHLIGHTS

- INTERFACES 4 SSI-ENCODER
- ZERO POSITION SELECTABLE
- ALL INPUTS OPTICALLY ISOLATED
- 6 DIGITAL OUTPUTS
- ALL OUTPUTS OPTICALLY ISOLATED

General

The SSI 1276 board represents an input/output board for IBM compatible computers. It is especially designed for data transfer from absolute encoders with a SSI interface to a host computer.

The SSI 1276 board is supplied with 4 independent SSI interfaces. All inputs are optically isolated from PC ground. Therefore the board will work well under heavy industrial environment.

Beside the SSI interfaces there are 6 optoisolated digital outputs for switching and or controlling of external components.

Encoder inputs

It is possible to connect 4 encoder to the 4 inputs of the SSI-Interface board.

Each input may be programmed independently of each other concerning clock frequency and length of received datas. This is done by programming an counter circuit of the type 82C54.

If a data transfer from the encoder to the computer is completed an interrupt is generated.

Each encoder input is supplied with an additional digital input. This input is a “Zero Input”. An input signal (low voltage) at the “Zero Input” defines the zero position of the encoder. Zeroing is accompanied by an interrupt.

Digital outputs

The digital outputs are isolated by optocouplers. not only from the computer ground but also from each other. The outputs, open collctor outputs, may switch up to 30V and 25mA.

Installation

Refer to the switches and jumpers information of this chapter

1. Select the I/O adress by setting the 7-pole DIP-swich “S1"
2. Select the interrupt channel by the jumper J1..J4. It must be noted, the interrupts are for AT and not for XT compatible buses!
3. Power OFF all devices (display, printer,...ect.) attached to your computer then power OFF your computer system.
5. Disconnect all cables from the rear of your computer.
6. Remove the system unit cover and the expansion slot cover from the slot you wish to use.
7. Hold the adapter by its top corners and press it down into the expansion slot. Make sure that the adapter is fully seated in the expansion slot, then secure the adapter with the screw you removed in step 6.
8. Replace the computer chassis cover and reconnect all cables to the rear of the computer. Power ON the computer

I/O address selection

The base address can be selected by the DIP-switch ”S1". The I/O base adress can be set within the address range from 100H to 3FFH (factory setting = 300H)

If you need to adjust it to some other address ranges, the switch settings are illustrated as below:

DIP-switch is numbered 1...7. Switch position ON is selected as “0".

7 = 200H
6 = 100H
5 = 80H
4 = 40H
3 = 20H
2 = 10H
1 = 8H

Interrupt channel selection

The interrupt channel can be configured by J1...J4. Selectable interrupts are IRQ10, IRQ11, IRQ12, and IRQ15. Factory setting is IRQ12 (J2)

J1 = IRQ15
J2 = IRQ12
J3 = IRQ11
J4 = IRQ10
Jumper J5 is not used

Programming

The SSI 1276 board uses the I/O address range from base address+0 to base address+7. The address function are illustrated as below:

Port	Default	Direction	Function
Base+0	300H	read/write	Counter 0
Base+1	301H	read/write	Counter 1
Base+2	302H	read/write	Counter 2
Base+3	303H	read/write	Control Word
Base+4	304H	read	Data Bits 0...7
Base+5	305H	read	Data Bits 8...15
Base+6	306H	read	Data Bits 16...24
Base+7	307H	read	Bit 0 = Data Bit 25 Bit 1...4 = Zero Bit
		write	Bit 0/1 = Input Address Bit 2..7 = digital Outputs

Counter device 82C54

The 82C54 contains 3 identical, independent counter blocks. Each counter provides the same functions, but can be programmed to operate in different modes relative to each other (for full information see leaflet of the manufacturer).

The counter is a 16-bit presettable synchronous down counter. Output latches provide a mechanism whereby the CPU can read the current contents of the counter.

Read and write of the counter content is done by the address base+0, base+1, and base+2.

Different modes are programmed by writing a specific control word (address base+3). There are 6 different modes (mode 0 to mode 5). For programming the SSI1276 board the only the modes 0, 1, 2, and 3 are used.

Address base+4, base+5, base+6 and the LSB of base+7 are datas (max. 25 bit) received from the encoder. When reading address base+7, Bit 1 to 4 are indicating zeroing the encoders 1 to4.

When writing address base+7, bit 0 and 1 are addressing the encoder (binary code) of wich datas will be red. Bit 2 to 7 are the six digital outputs.

Control Word Format

Control Word	D7	D6	D5	D4	D3	D2	D1	D0
Function	SC1	SC0	RW1	RW0	M2	M1	M0	BCD

Counter Selection		
SC1	SC0	Counter
0	0	0
0	1	1
1	0	2

Modes 0 bis 5			
M2	M1	M0	Function
0	0	0	Counter
0	0	1	mon. ext. Trigger
0	1	0	Frequency Divider
0	1	1	Frequency Divider
1	0	0	Impuls-soft. Trigger
1	0	1	Impuls-hard. Trigger

Read/Write-Modes		
RW1	RW0	Function
0	0	Counter Latching
0	1	LSB
1	0	MSB
1	1	LSB / MSB

BCD	Function
0	binary
1	dezimal

Counter 0

Output frequency of counter 0 will be the clock frequency for the encoder. Therefore counter 0 must be programmed as divide-by-N counter (mode 3). By this mode internal clock frequency of 2MHz is divided by value N.

Mode 3 is defined by the Control Word. The Control Word is written to address base+3. Subsequently counter 0 will be written with the binary value N (see examples 1 and 2).

Counter 1

Counter 1 is used for counting the number of bits of the encoder (see datas of the used encoders). Input frequency of counter 1 is the output frequency of counter 0. If only one encoder will be used, counter 1 will run in mode1 else in mode 0.

Counter 2

Counter 2 will be programmed in mode 2 and is used for installing the desired measuring rate. Input frequency of counter 2 is the output frequency of counter 0. Counter 2 will work as divide by N counter. Attention must be paid, that the min. pause between two measurements will not be failed.

If counter 2 is not used it must be initialized too.

1. Example 1

- **Datas of the encoder 1**
- Clock frequency = 100kHz
- Resolution/turn = 4096
- Number of turns = 4096
- Overall resolution = 24 bit
- Data format: Multiturn

Adjusting clock freqency of the encoder 1
Internal Clock = 2MHz
Encoder clock frequency = 100 kHz
Divider N for **counter 0**:

N = 2MHz/0.1MHz = 20 (= **14H**)

Programming of counter 1
Counter 1 must be programmed with

25 + 1 = 26 (= **1AH**)

Programming of 82C54

Control-Word Counter 0:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
0	0	0	1	X	1	1	0

Counter 0:

0	0	0	1	0	1	0	0

Control-Word Counter 1:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
0	1	0	1	0	0	0	0

Counter 1:

0	0	0	1	1	0	1	0

Control-Word Counter 2:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
1	0	0	1	X	1	0	0

2. Example 2

- Datas of the encoder 2
- Clock frequency = 200kHz
- Resolution/turn = 4096
- Number of turns = 1
- Overall resolution = 12 bit
- Data format: Singleturn

Adjusting clock freqency of the encoder 2
Internal Clock = 2MHz
Encoder clock frequency = 200 kHz
Divider N for **counter 0**:

N = 2MHz/0.2MHz = 10 (= **0AH**)

Programming of counter 1
Counter 1 must be programmed with

13 + 1 = 14 (= **0EH**)

Programming of counter 2

Desired measuring rate = 100 ms
100ms/(1/200kHz) = 20000 (=**4E20H**)

Programming of 82C54

Control-Word Counter 0:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
0	0	0	1	x	1	1	0

Counter 0:

0	0	0	0	1	0	1	0

Control-Word Counter 1:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
0	1	0	1	0	0	1	0

Counter 1:

0	0	0	0	1	1	1	0

Control-Word Counter 2:

SC1	SC0	RW1	RW0	M2	M1	M0	BCD
1	0	1	1	x	1	0	0

Counter 2, LSB:

0	0	1	0	0	0	0	0

Counter 2, MSB:

0	1	0	0	1	1	1	0

Connector List

Encoder 1	
Clock +	Pin 31
Clock -	Pin 32
Data +	Pin 37
Data -	Pin 19
Encoder 2	
Clock +	Pin 17
Clock -	Pin 18
Data +	Pin 26
Data -	Pin 25
Encoder 3	
Clock +	Pin 29
Clock -	Pin 30
Data +	Pin 23
Data -	Pin 24
Encoder 4	
Clock +	Pin 27
Clock -	Pin 28
Data +	Pin 22
Data -	Pin 21
Zero Inputs	
Zero 1	Pin 4
Zero 2	Pin 3
Zero 3	Pin 1
Zero 4	Pin 2
GND	Pin 20
Digital Outputs	
Out 1 (Emitter)	Pin 9
Out 1 (Collector)	Pin 10
Out 2 (Emitter)	Pin 5
Out 2 (Collector)	Pin 6
Out 3 (Emitter)	Pin 8
Out 3 (Collector)	Pin 7
Out 4 (Emitter)	Pin 12
Out 4 (Collector)	Pin 11
Out 5 (Emitter)	Pin 13
Out 5 (Collector)	Pin 14
Out 6 (Emitter)	Pin 16
Out 6 (Collector)	Pin 15

Technical Datas

In/Outputs	
Digital Outputs Voltage	< 60 VDC
Digital Outputs Current	< 50 mA
Digital Outputs Power	< 150 mW
Clock Output	EIA RS 422
Data Input	EIA RS 422

ISA BUS	5 VDC
Supply Voltage	0.5 A
Current Consumption	190 * 108 mm
Dimensions	220 g
Weight