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M1
Binary Input Module

20M001-00

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1 General Description

1.1 Utilization of the Manual

The manual serves as an instruction for the initial start-up of the module, the connection of peripheral devices, and the integration in a VMEbus system. Beyond that, it shall give the applicator additional information for special applications and configuration possibilities of the assembly.

Detailed informations concerning the individual components (data sheets, and so on) are not part of this manual. In the annex you will find a bibliography.

This manual describes the hardware of the assembly.

Notes concerning nomenclature:

Because of technical reasons, the double row pin connector to the base-board is designated in the circuit diagram as P10 and P11. P10-1 is pin 1 of this transmitting connector. The 25 position peripheral connector is designated as P1 and the 24 position peripheral transmitting connector to the base-board is designated as P2.

Hexadecimal numbers are marked by a leading "$"-sign, as usually at Motorola, for instance: $800000 or $BFFFFF.

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1.2 Essential Features

The M1 plug-in module is an assembly for the optical decoupled acquisition of 16 binary signals.

- Input voltage permitted within -1 up to +36V
- Input constant current source (typ. 5mA)
- Isolation by means of optocouplers
- Debouncing circuit of the input signals
- Interrupt generation in case of change of input signals
- Low heat generation by CMOS technology
- Connection of peripheral optionally on the front via sub-D connector or on the back at the second VG-header (VMEbus P2).

The modue can be plugged to the base-board, for instance to the A201, and it requires one slot. The base-board also controls the processing of an interrupt coming from the module.

1.3 Block Diagram

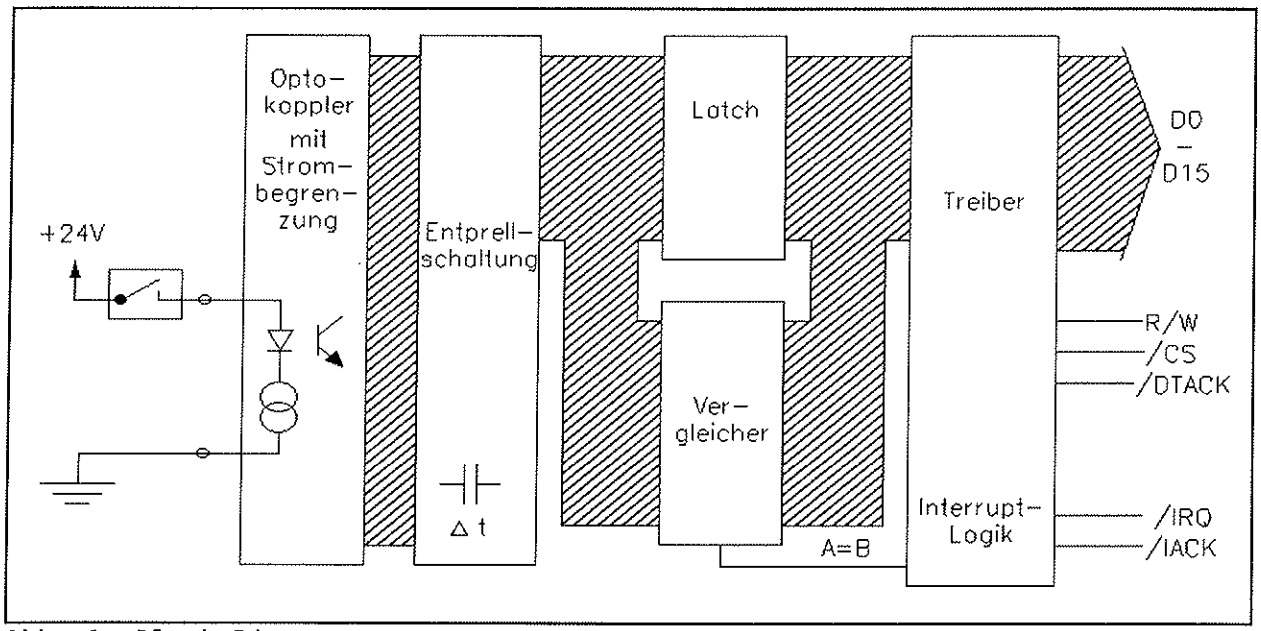


Abb. 1 Block Diagram

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1.4 Notes concerning the initial Start-up

The function of the module is rather simple. In order to proof regular operation of the module, you can proceed as follows:

- Plug module to slot 0 of an A201 base-board
- Install system
- Load an appropriate debugger
- Access to the adjusted base address + 100H reading word by word (access to the interrupt handler)
- If there is a bus error now, the base address of the A201 is adjusted incorrectly --> correct and try again
- Now access reading to the base address itself
- If there is a bus error now, the module is not plugged in the right way
- Now read back $0000 as value.
- Connect negative line of a 24-Volt current supply (12V possible, too) to pin 25 on the D-sub connector of the module.
- Now connect one of the inputs to +24V of this supply, e.g. pin 1 (bit 0)
- Now you should read back the value $0001 under the base address

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2 Module Connection

2.1 Power Supply

Power supply of the logic part is done via base-board. The necessary voltages (only +5V for the M1 module) are transported to the module by means of the 40-pin plug-header of the base-board.

2.2 Peripheral

Two possibilities are provided for the connection of peripheral:

- Connection via 25-pin D-SUB-connector and
- Connection via second VG-header (VMEbus P2).

For the first possibility, connectors for solder, crimp, and insulation displacement technics are available. Round or flat cables can be used.

As for the connection by means of VG-header, input data is led to the module by means of the 24-pin pin-header. For this the mentioned possibilities exist also for 21-pin VG-module connectors (Compare manual of base-board). With these connectors, 3 pins per module of the 96-pin VG-header can not be used.

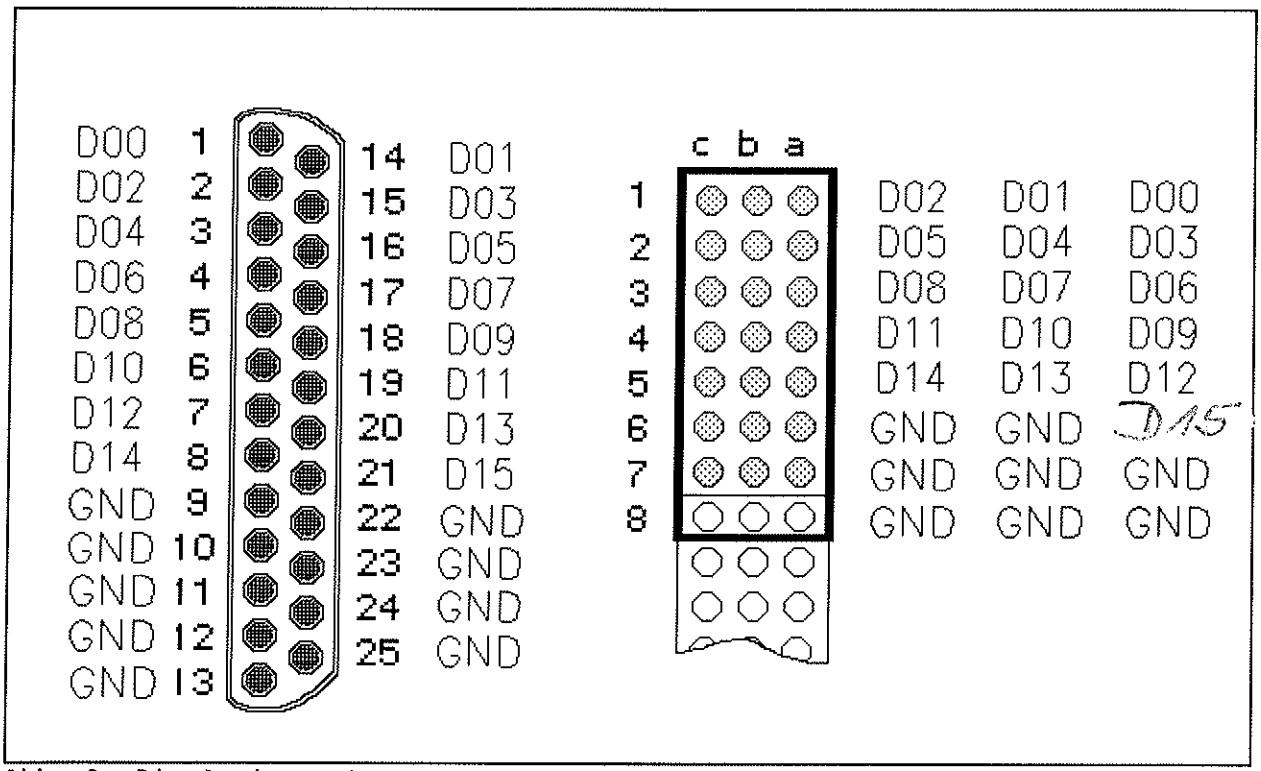


Abb. 2 Pin Assignment

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3 Function of the Module

3.1 Data Acquisition

Referred to an external supply voltage (for instance 24V as usual for process controls), an input signal is "1", if the input signal is on the positive level of this signal, or if a current flows from 5mA (tpy.) through the input to GND.

In case the signal is on a potential smaller than 2V, or if no current flows, this input signal is considered "0".

All open inputs with no currents flowing are considered "0".

A debouncing circuit takes care that signals are acknowledged only with changed level, if they are present safely for an adequate time. This time is fixed by a capacitor.

For the calculation of the capacitor in interdependence with the debouncing time we have the subsequent approximation formula:

$$C_{debounce}\ (\text{in nF}) = \text{tdebounce (in ms)} * 0.4\ \text{nF/ms}$$

i.e. 0,4nF per 1ms debouncing time. The module is shipped with a 10nF capacitor. This guarantees a debouncing time of about 25ms.

3.2 Reading Data

Under the respective module base address there can be accessed to the module. Read access to the 16 input bits can be done word by word, Byte by Byte, or bit by bit. Thereat, D0 in the word corresponds to line DD0 of the connector (pin 1 of 25-pin D-sub-connector).

Write accesses to the module are not answered with DTACK. This normally leads to a bus error.

3.3 Interrupt Generation

In case of level changes of one or more outputs the interrupt request line of the module becomes active. The base-board can be prompted to enable a (vector) interrupt on the VMEbus. By means of the IAQ-cycle on the VMEbus to the base-board the interrupt request is set beack on the module by the /IACK-line.

An interrupt only shows a change of input data, but it does not show which data has changed. It can be used to read the input states anew and to actualize the old values in the computer.

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4 Annex

4.1 Bibliography

Specification for Module Control:
MO-Manual, MEN
Specification of Base-Board
A201-Manual, MEN
Debouncing circuit (MC14490)
CMOS Data Manual, Volume 2, Special Functions, Motorola Semiconducter

4.2 Differences compared to former Versions

Version P is the first version that has been delivered

4.3 Technical Data

Slots on the base-board:
One slot required.
Interrupt:
In case of change of input data. Base-board must control the interrupt.
Connections:
To base-board via 40-pin contact.
To peripheral on the front via 25-pin D-Sub-contact or via second VG-header.
Input voltages and currents:
U_{max}=36V;
0..2V_{max}; 0..0,2mA ("Low")
4V..U_{max}; 3..7,5mA (typ. 5mA) ("High")
Debouncing time:
25ms (by changing one capacitor variable in wide ranges)
Power supply:
+5V +10%, -0%, typical 3,5mA

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4.4 Configuration Diagram

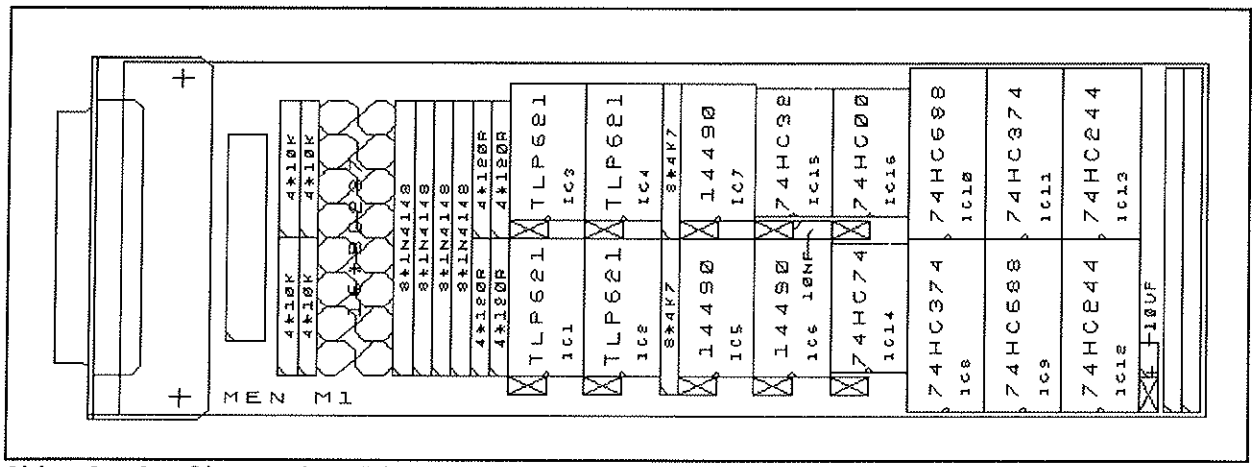
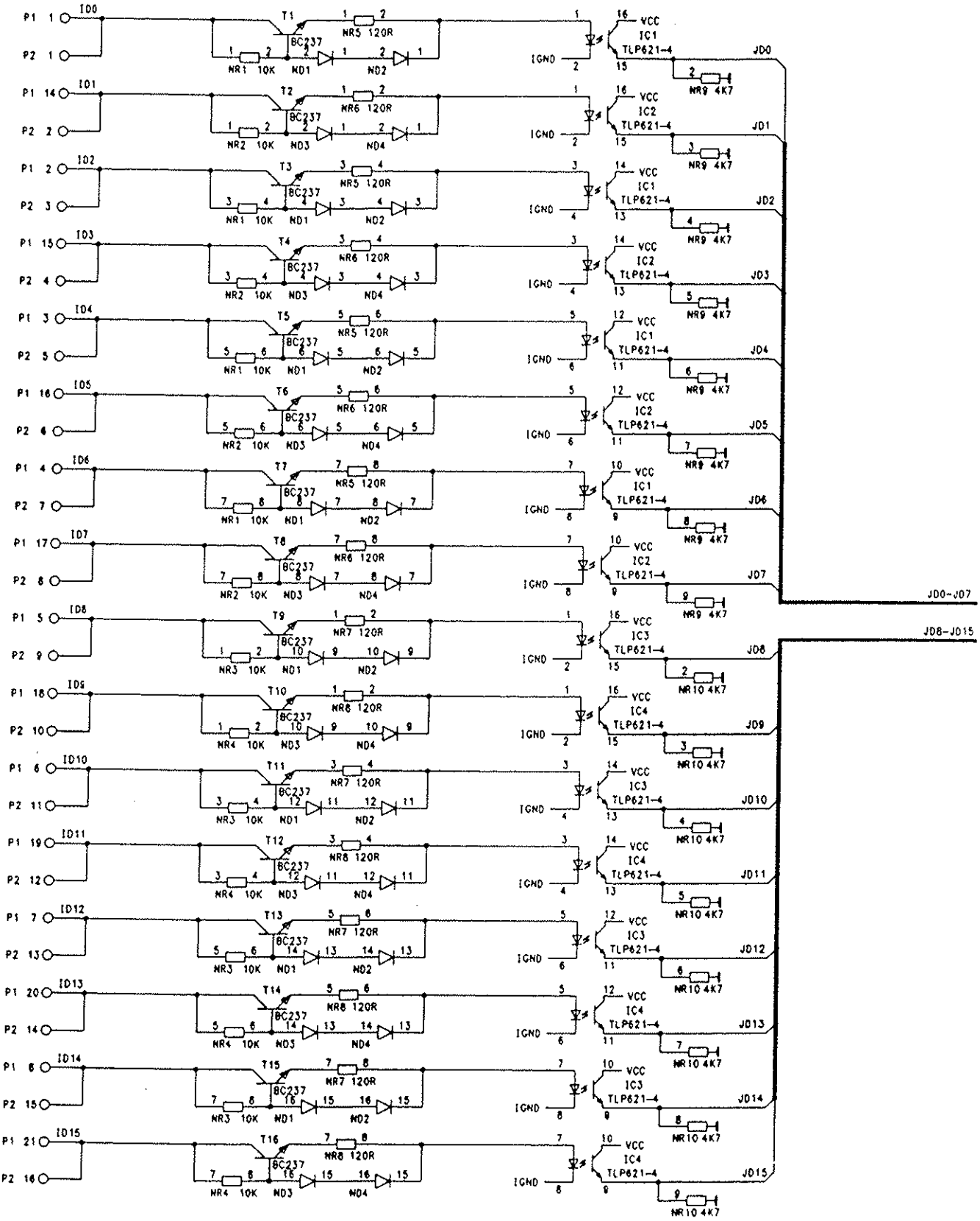


Abb. 3 Configuration Diagram

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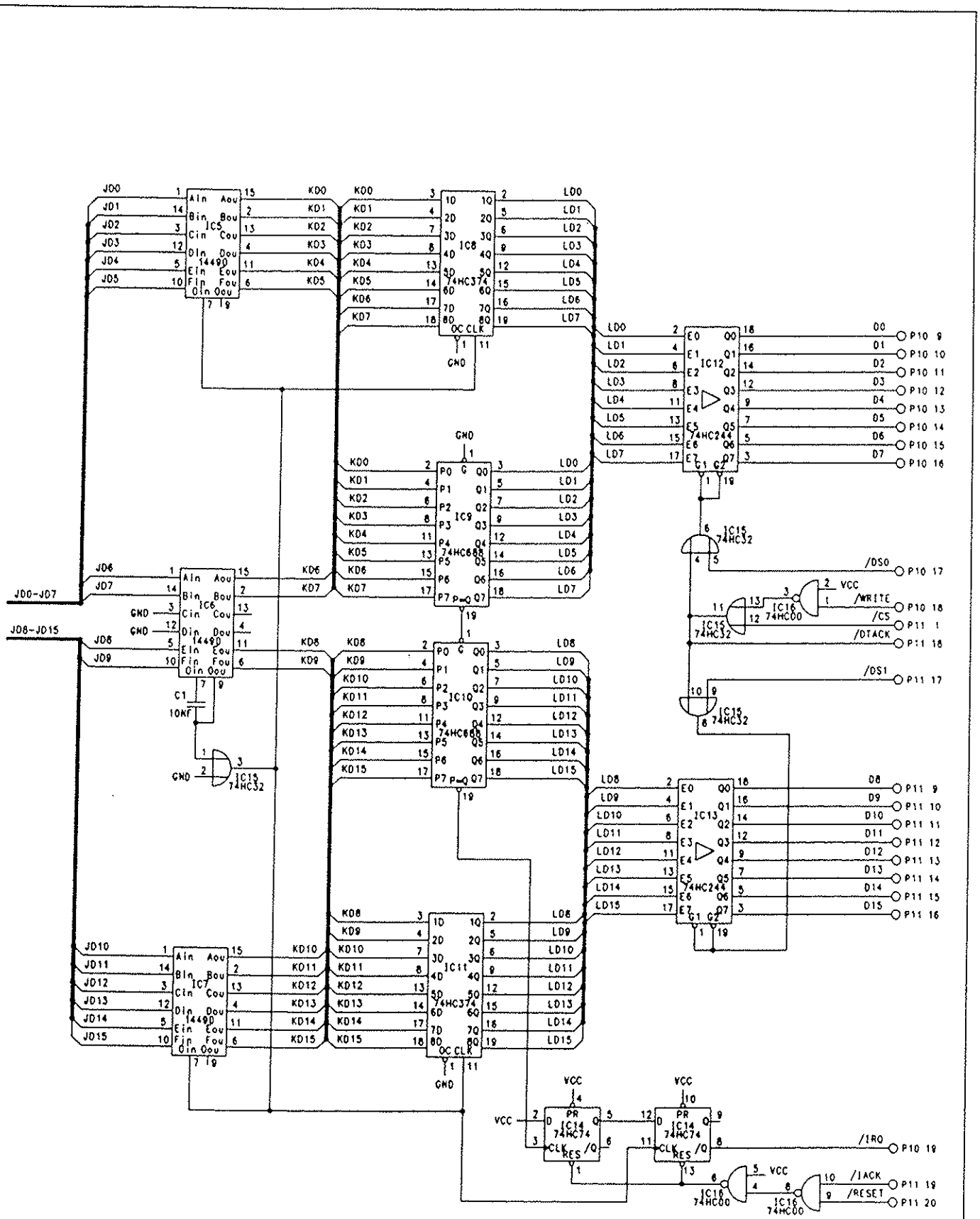
4.5 Circuit Diagram

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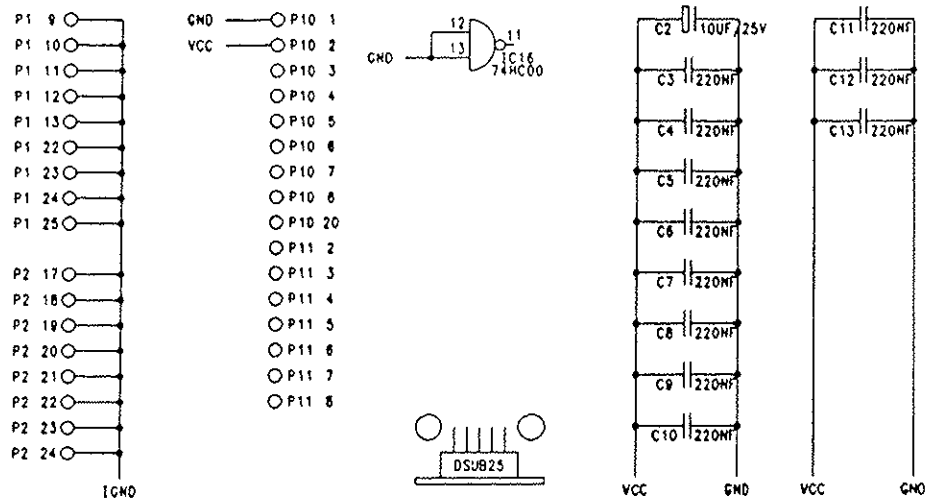
MEN MIKRO ELEKTRONIK GMBH NUERNBERG				VERSION 0 JOBNAME M1-R0	M1 BLATT 1
	03.05.88	G. LUGNER			

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	03.05.88	G. LUGNER			

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EU Manufacturer Declaration

acc. to art. 4 par. 2 of EU guideline 89/392/EEC

EU-Herstellererklärung *nach Art. 4 Abs. 2 der EU-Richtlinie 89/392/EWG*

Déclaration UE de Fabricant *selon article 4 alinéa 2 de la directive UE 89/392/CEE*

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Document no./month, year ***Dokument-Nr./Monat, Jahr*** ***Numéro du document/mois, an***	20M001-00 / January, 1996
Manufacturer ***Hersteller*** ***Fabricant***	MEN Mikro Elektronik GmbH
Address ***Anschrift*** ***Adresse***	Wiesentalstr. 40 90419 Nürnberg
Product Designation ***Produktbezeichnung*** ***Désignation du produit***	M1

The above product was solely designed for installation into another machine. Operation is not permitted until conformity of the final product with guideline 89/392/EEC has been verified.

Das bezeichnete Produkt ist ausschließlich zum Einbau in eine andere Maschine bestimmt. Die Inbetriebnahme ist solange untersagt, bis die Konformität des Endproduktes mit der Richtlinie 89/392/EWG festgestellt ist.

Le produit ci-dessus a été désigné uniquement pour l'incorporation dans une autre machine. Il est interdit de le mettre en marche jusqu'au moment où la conformité du produit final avec la directive 89/392/CEE a été établie.

We confirm conformity of the above product with the standards listed in annex to this declaration.

Wir bestätigen die Konformität des oben bezeichneten Produktes mit den im Anhang zu dieser Erklärung gelisteten Normen.

Nous confirmons la conformité du produit ci-dessus avec les normes mentionnées dans la liste jointe à cette déclaration.

Issued by ***Aussteller*** ***Certifié par***	Manfred Schmitz
Place, date ***Ort, Datum*** ***Lieu, date***	Nürnberg, 8.1.96
Legally binding signature ***Rechtsverbindliche Unterschrift*** ***Signature obligatoire***	

The annex is part of this declaration.
This declaration is not a guarantee for any characteristics.
The notes on safety in the supplemented product documentation must be adhered to.

Der Anhang ist Bestandteil dieser Erklärung.
Diese Erklärung beinhaltet keine Zusicherung von Eigenschaften.
Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten.

L'annexe fait partie de cette déclaration.
Cette déclaration n'inclut pas d'assurance de propriétés.
Les renvois de sécurité dans la documentation supplementée du produit doivent être considérés.

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Annex to EU Manufacturer Declaration

Anhang zur EU-Herstellererklärung
Annexe à la Déclaration UE de Fabricant

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Document no./month, year 20M001-00 / January, 1996
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Product Designation M1
Produktbezeichnung
Désignation du produit

The conformity of the above product with the regulations of guideline 89/392/EWG is verified by complete observation of the following standards:

Die Übereinstimmung des bezeichneten Produkts mit den Vorschriften der Richtlinie 89/392/EWG wird nachgewiesen durch die vollständige Einhaltung folgender Normen:

La conformité du produit ci-dessus avec les dispositions de la directive 89/392/EWG est prouvée par l'observation totale des normes suivantes:

harmonized European standards:
harmonisierte Europäische Normen:
normes européennes harmonisées:

Reference number *Referenznummer* *Numéro de référence*	Date of issue *Ausgabedatum* *Date de validité*
EN 55 022 (Class B)	1987
EN 50 082-2	1995

IEC standards:
IEC-Standards:
normes CEI:

Reference number *Referenznummer* *Numéro de référence*	Date of issue *Ausgabedatum* *Date de validité*
IEC 801-2	1991
IEC 801-3	1984
IEC 801-4	1988
IEC 801-5	1990

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