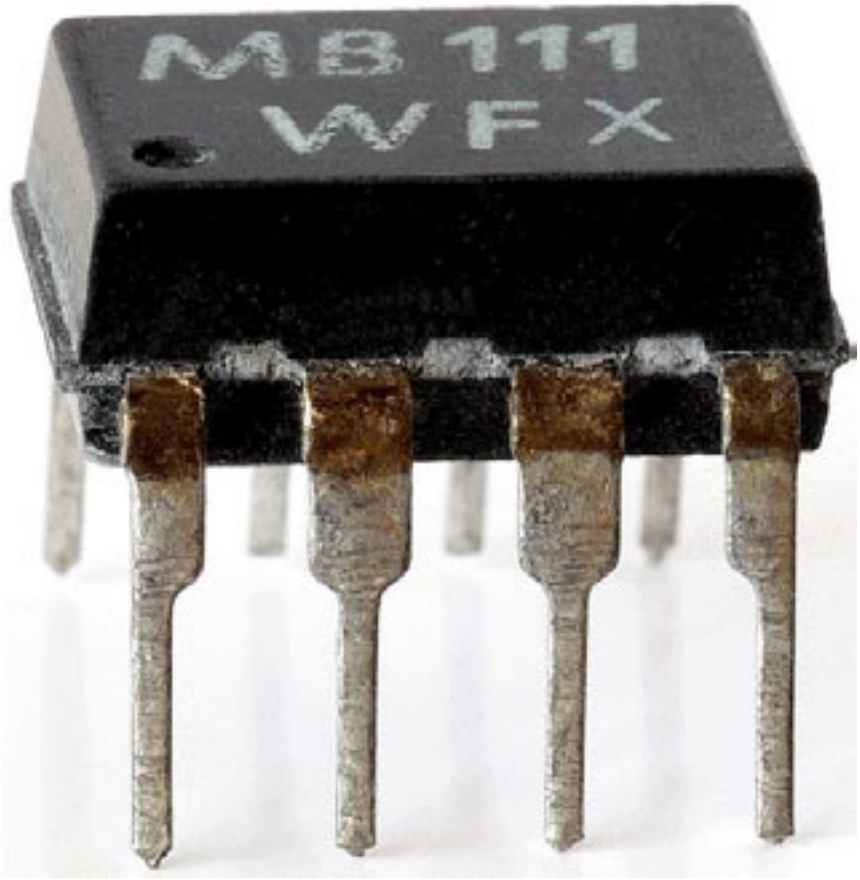
Management of Optocoupled Input Lines.

A typical use of **I/O** lines, available on **Mini Module**, is the management of input signals. In chapter **16** to **22** we have already seen, and tested, how to manage some input lines at **TTL** level.



A typical Optocoupler in 4+4 pins DIL Package.

In many of the applications where it is required an interfacement with **External World**, normally named **Field Applications**, the connection rarely is in TTL type. Normally these lines can arrive even from a long distance but, in detail, they can collect an high number of electric noises, along their cabling.

These noises can have many sources and the result is that they can have interferences with electronic devices and they can even compromise the right functionalities.

In order to reduce the possibility that this happen, it is used an electronic component that ensures to **Galvanically** separate the various lines coming from the field.
The galvanic separation can be easily obtained by using the **Optocouplers**.

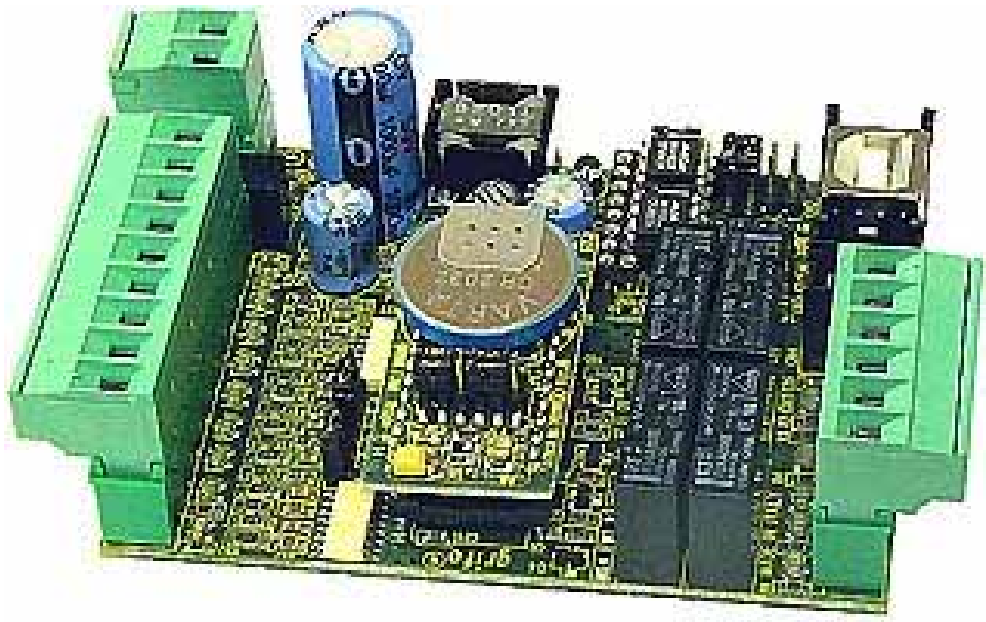
A GMB HR84 with 8 Optocoupled Inputs and 4 Relays Outputs.

One important consideration that must be reminded, because it is frequently ignored , is that the power supplies must be **Galvanically** insulated, too. This seems a deducted consideration, but often so it isn't.
When the **Optocoupled** inputs are used, it is indispensable to maintain separated the ground of the two different power supplies, in order to maintain the important advantage offered by this type of circuit.

If you examine the application diagrams of the suggested examples you will note that, while the **Mini Module** section is powered at **5Vdc**, the **Optocoupled** section has its own different power supply, **Galvanically** insulated from the first one, equal to **12Vdc**.

This is a bond that forces the use of two different power supplies and it is the reason why many industrial applications turn to **DC/DC Converter**, **Galvanically insulated**, in order to obtain these voltages.

For example, this solution is adopted by various **Mini BLOCK**, as the **GMB HR84** with **8 Opto Inputs** and **4 Relays outputs**, that require a single power supply voltage and then they generate on board the second power supply voltage, for the **Optocoupled** input section, through a dedicated **DC/DC Converter**.



GMB HR84 without Case, Complete of Mini Module and RS 422 Serial Interface.

This solution allow to use the **Mini BLOCK** with nothing more than the external sensors and it works correctly.

It is important to underline an additional consideration about the two diffused modalities for input lines connections. These are well known as **NPN** or **PNP** inputs and the difference is in polarity of common pole.

The **NPN** inputs type use the **Negative** as common pole. A typical example are all the electronic circuits at **TTL** level.

The **PNP** inputs type use the **Positive** as common pole. A typical example are all the inputs circuits of **PLC**.

This chapter is not the right place to compare the two modalities and to list their advantages and disadvantages. The most important thing is to knew that this difference exist and how to act in all situations.

When **Mini BLOCK** are used there aren't problems in fact they are capable to correctly manage both the modalities. Furthermore they signalize, through a **bicolour LED**, if the module is configured for **NPN** inputs (**Green LED** activated) or **PNP** inputs (**Red LED** activated).

Example.069. Optocoupled Inputs Management, NPN Type.

Added Definitions:
None

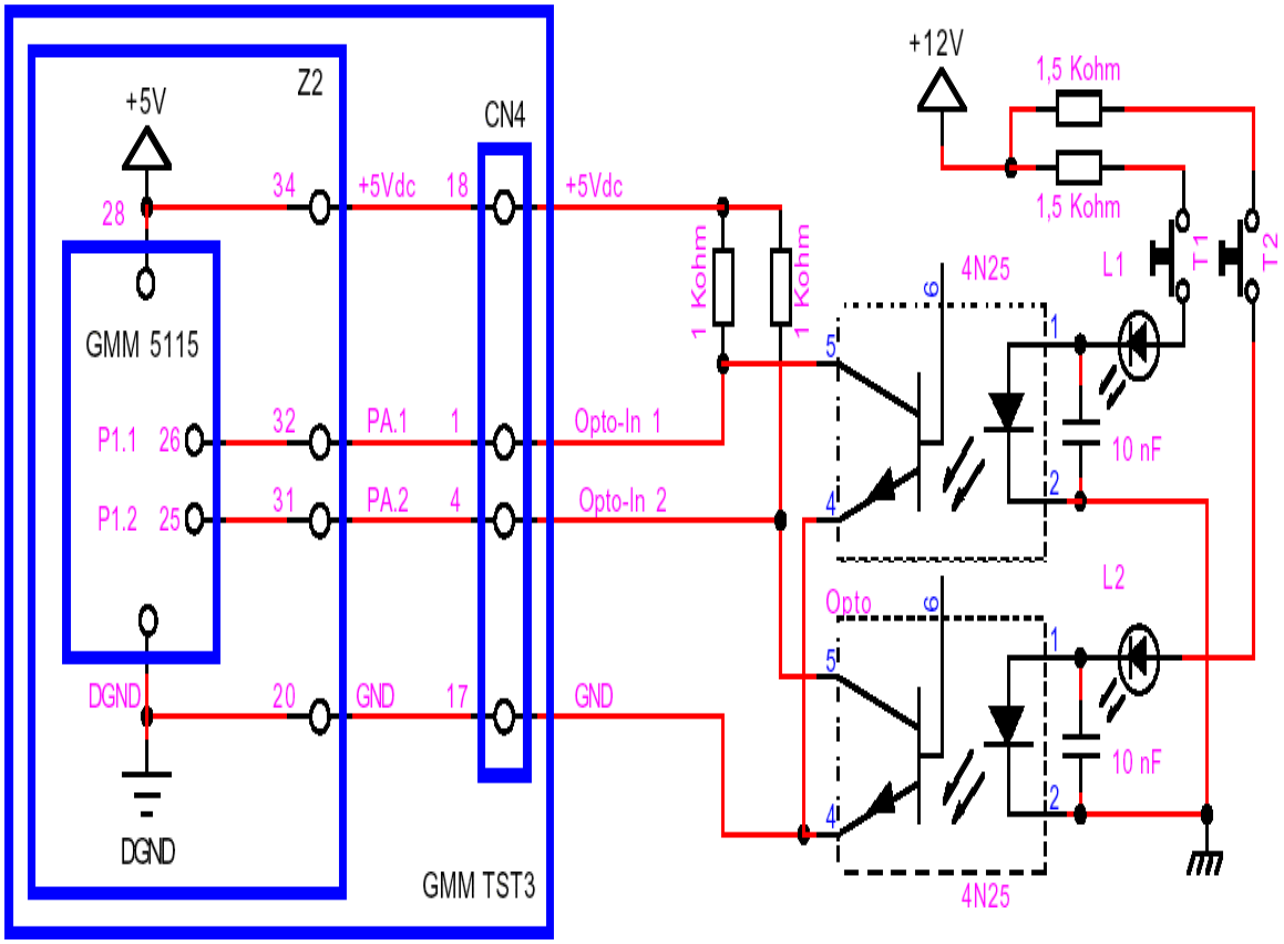
Added Declarations:
None

Added Instructions:
None

Added Operators:
None

Example program **069** of **BASCOM 8051** course.

Optocoupled inputs management: the program acquires the status of **2 NPN** optocoupled digital inputs and it shows them on serial console.



Application Diagram for Optocoupled Inputs of NPN Type.

The inputs are acquired through **2 I/O** lines of microcontroller, connected to **CN4** connector of **GMM TST3**, as described in electric diagram.

The galvanic insulation circuit connected to these lines allows to acquire sensors switches, proximity, photocells, etc.) of **NPN** type.

These sensors can be powered by different voltages from the one of **Mini Module** and they result active when their output contact is connected to the **GROUND** of this voltage.

On the console are continuously displayed the status of the Optocoupled inputs, that is equal to the status of external inputs (**Px** on the diagram), as active or not active.

The program describes its functionalities and uses a serial console provided of monitor and keyboard with a fixed physical protocol at **19.200 Baud**, **8 Bit x chr**, **1 Stop bit**, **No parity**.

This console can be another system capable to support a serial **RS 232** communication.
In order to simplify the use it can be used a **PC** provided of one **COMx** line, that execute a terminal emulation program as **HYPERTERMINAL** or the homonym modality provided by **BASCOM 8051** (see **IDE Configuration**).

The program works only when the **GMM 5115** is mounted on **Z2** socket of **GMM TST3**!!

Example.070. Optocoupled Inputs Management, PNP Type.

Added Definitions:
None

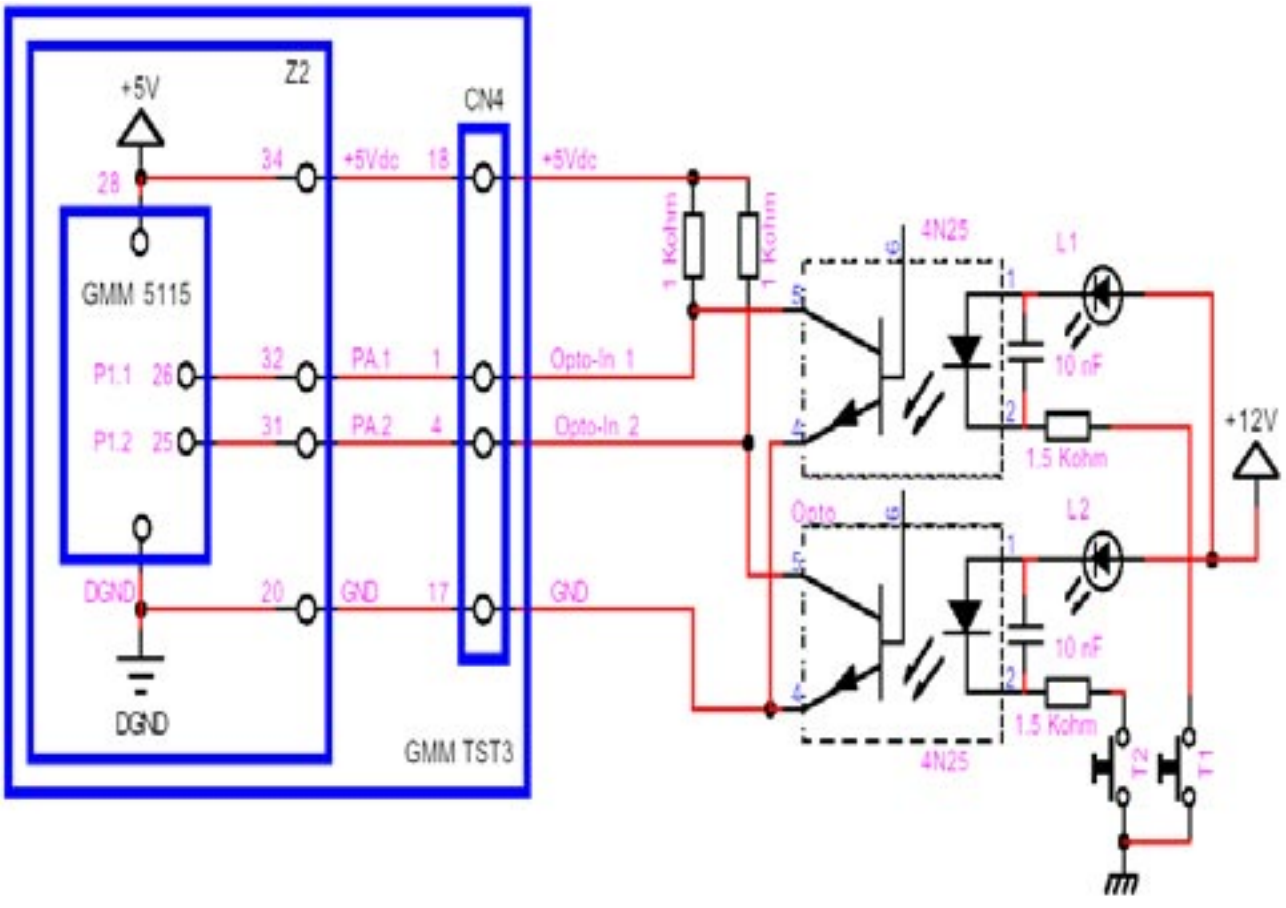
Added Declarations:
None

Added Instructions:
None

Added Operators:
None

Example program **070** of **BASCOM 8051** course.

Optocoupled inputs management: the program acquires the status of **2 PNP** optocoupled digital inputs and it shows them on serial console.



Application Diagram for Optocoupled Inputs of PNP Type.

The inputs are acquired through **2 I/O** lines of microcontroller, connected to **CN4** connector of **GMM TST3**, as described in electric diagram.

The galvanic insulation circuit connected to these lines allows to acquire sensors switches, proximity, photocells, etc.) of **PNP** type.

These sensors can be powered by different voltages from the one of **Mini Module** and they result active when their output contact is connected to the **POSITIVE** of this voltage.

On the console are continuously displayed the status of the Optocoupled inputs, that is equal to the status of external inputs (**Px** on the diagram), as active or not active.

The program describes its functionalities and uses a serial console provided of monitor and keyboard with a fixed physical protocol at **19.200 Baud**, **8 Bit x chr**, **1 Stop bit**, **No parity**.

This console can be another system capable to support a serial **RS 232** communication.
In order to simplify the use it can be used a **PC** provided of one **COMx** line, that execute a terminal emulation program as **HYPERTERMINAL** or the homonym modality provided by **BASCOM 8051** (see **IDE Configuration**).

The program works only when the **GMM 5115** is mounted on **Z2** socket of **GMM TST3**!!

Example.071. Acquirement of 8 Optocoupled Inputs, Displayed on Console.

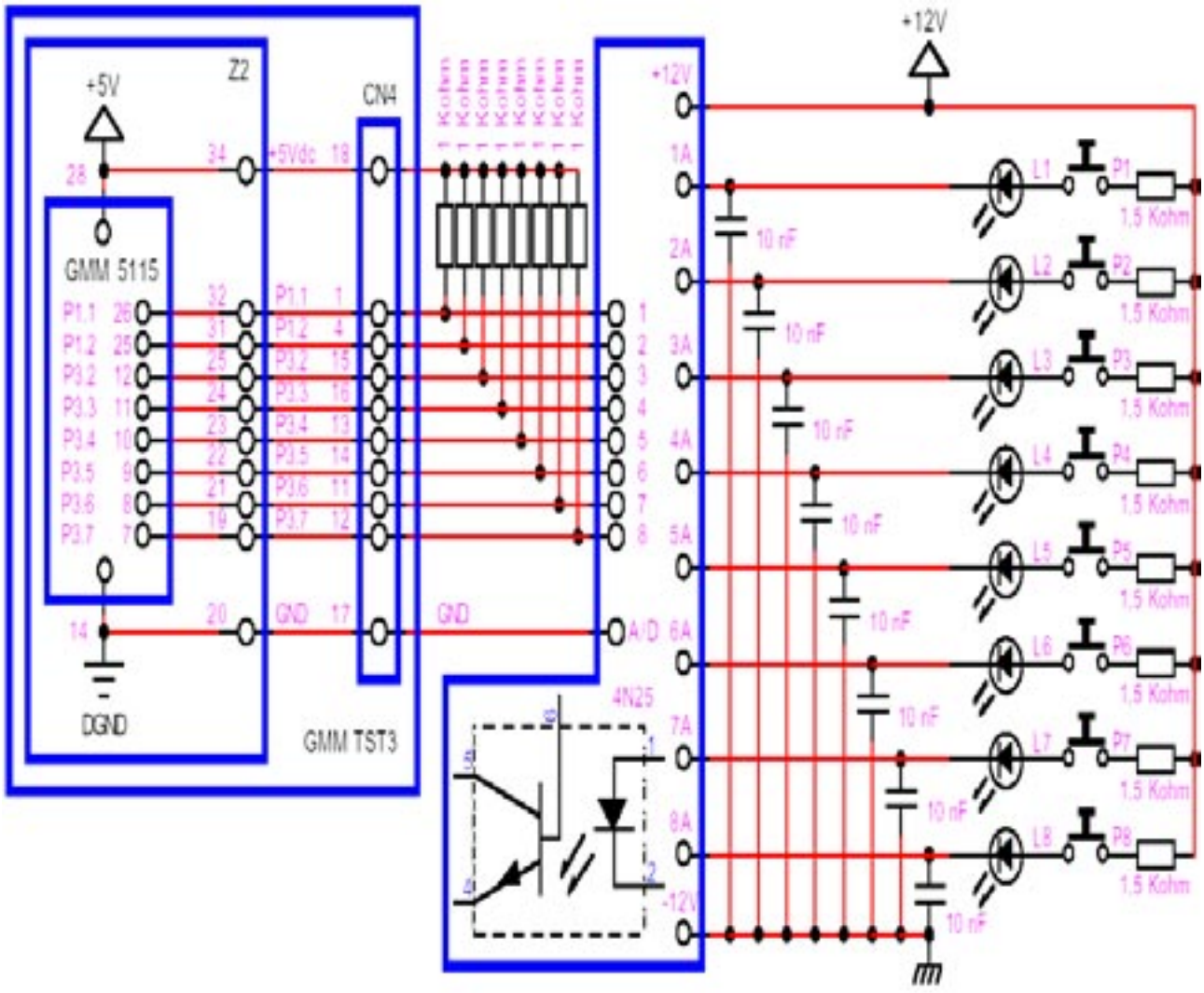
Added Definitions:
None

Added Declarations:
None

Added Instructions:
None

Added Operators:
None

Example program **071** of **BASCOM 8051** course.



Application Diagram for Optocoupled Inputs of PNP Type.

Optocoupled inputs management: the program acquires the status of **8** optocoupled digital inputs and it shows them on serial console.

The **8** inputs are acquired through as many as **I/O** lines of microcontroller, connected to **CN4** connector of **GMM TST3**, as described in electric diagram.

The galvanic insulation circuit connected to these lines allows to acquire sensors (switches, proximity, photocells, etc.) of **PNP** type.

On the console are continuously displayed the status of the **Optocoupled** inputs, that is equal to the status of external inputs (**Px** on the diagram), in **ON** or **OFF** format.

The program describes its functionalities and uses a serial console provided of monitor and keyboard with a fixed physical protocol at **19.200 Baud**, **8 Bit x chr**, **1 Stop bit**, **No parity**.

This console can be another system capable to support a serial **RS 232** communication.
In order to simplify the use it can be used a **PC** provided of one **COMx** line, that execute a terminal emulation program as **HYPERTERMINAL** or the homonym modality provided by **BASCOM 8051** (see **IDE Configuration**).

The program works only when the **GMM 5115** is mounted on **Z2** socket of **GMM TST3**!!