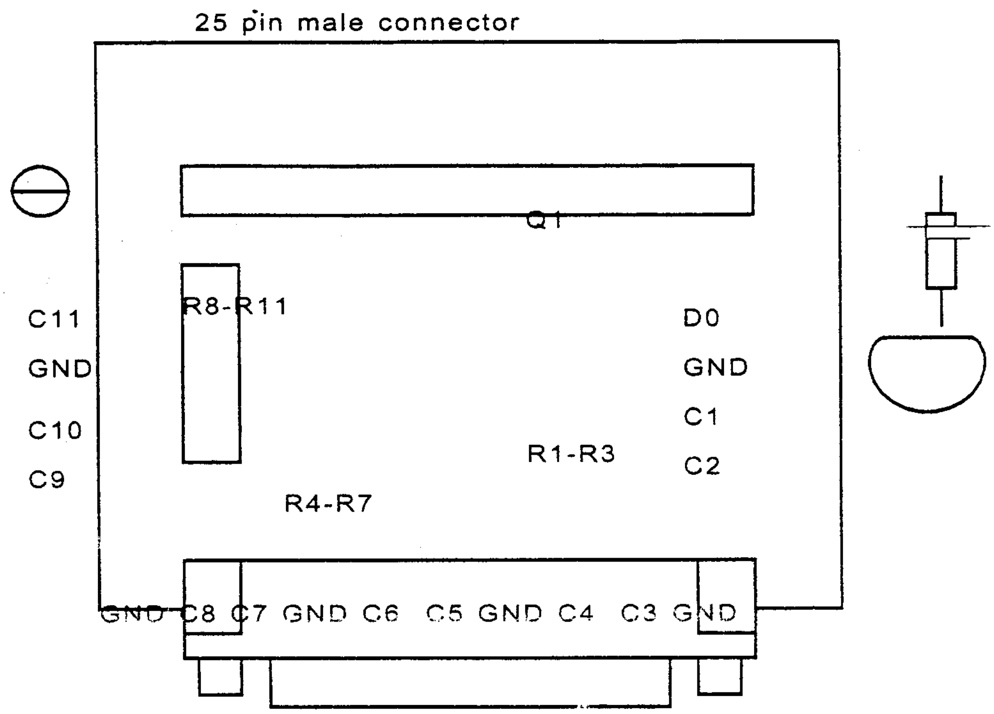
Using the ADC-11 with the Terminal Block

The terminal block is an easy solution for connecting wires to various channels, without having to solder. It also provides a basic PCB layout for simple circuits required for use of sensors in data-logging.



C1 - C11:- connection to Channels 1 - 11

GND:- connection to Ground

D0:- connection to Digital output

R1 - R3:- for placement of pull-up resistors

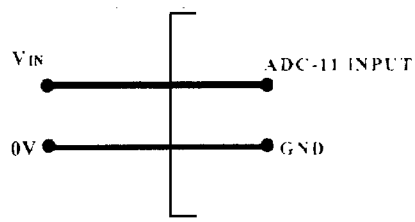
R4 - R11:- for placement of pull-down resistors

Q1:- for placement of LM35 temperature sensor

Note:- when placing a resistor in R4 - R11, it is necessary to cut the thin part of the track for the respective position.

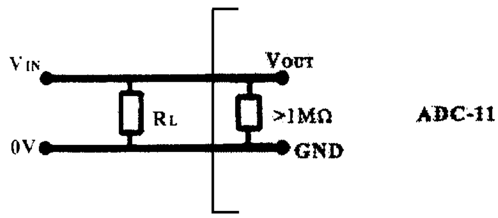
Measuring voltage using the ADC-11 terminal board

Direct inputs
All 11 channels can be fed directly into the ADC-11 board directly using the board; provided that they are within 0-2.5 Volts.



Adding a Load
Inputs C1, C2, C3, C5, C6, C7 and C8 have the capability of having a load added on the terminal board.

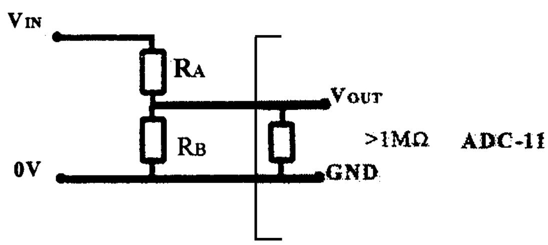
The load R_L should be placed in the following positions on the terminal boad to achieve this.



Input	C1	C2	C3	C5	C6	C7	C8
R_L	R1	R2	R3	R8	R9	R10	R11

Measuring voltages greater than 2.5 volts

The terminal board can be used to measure voltages greater than 2.5 volts by incorporating a simple potential divider circuit. There are four inputs on the ADC-11 terminal board on which this potential divider circuit can be built.
The positions for RA and RB are as folows



Input	C5	C6	C7	C8
R_A	R4	R5	R6	R7
R_B	R8	R9	R10	R11

note: when placing resistors R4,R5,R6 and R7 it is neccessary to cut a thin bit of track indicated on the board.

In order to obtain values for these resistors, the following equation is used:-

$$V_{OUT} = V_{IN} * \frac{R_B}{R_A + R_B}$$

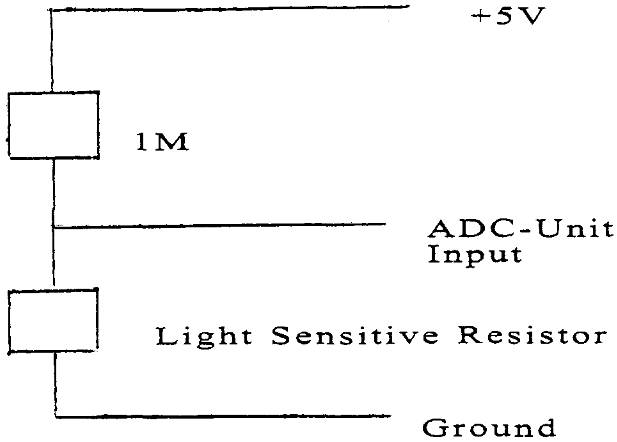
When RB is greater than 10KΩ it is neccessary to take into account the ADC-11's input impedance I:-

$$R_{BOLD} = R_B$$

$$\frac{1}{R_B} = \frac{1}{R_{BOLD}} + \frac{1}{I}$$

If noise is a problem a capacitor should be added between V_{OUT} and GND to eliminate it.

Light Sensor

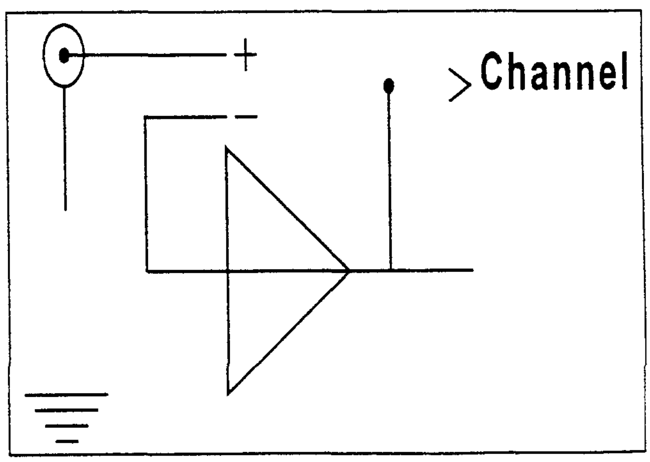


This circuit is used to measure light intensity, it uses a 1M resistor in series with a light sensitive resistor as shown in the diagram.

The measurements taken by the ADC-unit are in ADC counts. Since most light sensors are not linear, it is necessary to do a look up table within picolog. The information required to do this should be available upon request from the supplier of the sensor.

You will notice ADC counts are inversely proportional to the light intensity.
The cause of this is the resistance dropping as the light level increases. The effect of this is that the voltage and the ADC count decreasing. e.g. Note that the light sensitive resistor drops,as a result of this the voltage and the ADC count drops.

pH



The circuit shown to the right can be used in conjunction with a pH probe to measure pH on an ADC-unit. We tested the circuit using a LT1114CN op-amp. If you use a different op-amp ensure that it has a very high input impedance.

Before use, it is important that you calibrate the probe, otherwise the readings may be wildly inaccurate. Calibration is done by monitoring the ADC counts when the probe is placed in a solution of a known pH(ie. buffer solutions). Two or more known solutions must be used for calibration, the pH of which should be the minimum/maximum of the pH you are trying to measure. The more points known, the greater the accuracy as it isn't a linear relationship. The ADC values are then used in the look-up table along with the corrosponding pH.