

## A ML2010 Mini-Lab program for TestEquity

I have been asked to prepare TestEquity Sales and Marketing for the introduction of the ML2010 MiniLab.

As the name suggests, this is a portable set of instrumentation designed for the student or experimenter. All interfaces to our sense are analog but the information to sensual awareness is handled digitally. Thus those developing electronic solutions must have grounding in both digital and analog circuits. The ML2010 provides the platform for developing an understanding of both. Simulation software can predict results but actual circuit construction usually produces surprises and anomalies. Thus we have breadboard platforms. The large center area of the MiniLab consists of such a breadboard. It is surrounded by power supplies, stimuli, input/output ports (I/O), switches, and indicators. Let's look at each part in more technical depth.

**Breadboard-** This is central to easily be in reach of required functions. Above it we find the Indicators and Power Supplies. To the left there is a 1MHz function Generator below a Sweep Generator. To the right are a proto board and various switch styles. The right and left bottom sides have the various connectors for I/O. Above the indicators there is a pulse generator and above the power supplies there are two potentiometers and connections to a speaker.

**Power Supplies-** The fixed DCV supplies are +/- 12V and +/- 5V. These are typical for TTL circuits and computer drives and power supplies. There are variable +/- 18 VDC supplies with a floating center reference. With care the two supplies can be stacked to produce a power supply of 36 VDC. The variable supplies are useful for analog circuitry where more "headroom" is needed. The only AC supply is a center tapped 30VAC. This can be used for coil voltages, regulated supplies and heaters among other things.

**Function Generator stimulus-** The FG can generate Square waves, triangular waves and sine waves from 1Hz to 1 MHz in six ranges. Each range has a fine frequency adjustment from .1 to 1. The amplitude is a max of 18Vp-p but will be affected by offset. The output may be modulated with a sweep, amplitude, or burst. While the frequency amplitude and offset + modulation are adjusted a circuit can be guided by the clock output.

**Sweep Ramp Generator stimulus-** The sweep ramp generator produces a continuous cycle ramp up to maximum output in a range from 1 millisecond to one second and then drops to zero (resets). It can amplitude modulate or sweep (Frequency Modulate) a function or other waveform generator/input.

**Pulse Generator stimulus-** The pulse generator produces pulses of various widths and cycles (spacing) but fixed TTL amplitude. It may be modulated, gated or Triggered by the function generator (or other source) to allow pulse bursts and conversion of analog signals to digital via Pulse Width or Pulse Position Modulation.

**Protoboard-** This board is for converting a breadboard with its inherent anomalies to a board w/more strict layout to avoid internal circuit interferences. From this an actual layout of a circuit can be converted to a circuit board with less chance of hidden problems.

**I/O ports-** The DB25 and the DB9 connectors on the right are all connected 1 to 1 thru the first 9 pins with the remaining 16 DB25 pins also connected 1 to 1. The same is true for the DB connectors on the left. Thus either side can be jumpered to the breadboard for inputs and/or outputs either male or female. The DB9 is a convenient place to adapt to other connectors such as USB or RJ45. The 3 BNC coax connectors are usually used for Oscilloscope Trigger and channel inputs for measuring Hi speed signals but are adaptable to other coax style connectors such as F (TV), N, RCA, or TNC.

**Switches-** 8 Unbuffered Level switches provide digital logic outputs; 2 momentary switches provide pulses w/ complimentary outputs; 2 Single Pole Double Throw (SPDT) toggle switches provide a normally open (NO) and normally closed (NC) connection around a common (C); 2 SPDT momentary toggle switches are also provided.

**Indicators-** 8 buffered LEDs can be wired in to show the on/off status of either TTL or MOS logic.

So much for the recap, now where is TestEquity most likely to strike Gold with the ML2010. My guess is that students with research projects in Biomedical, Electrical and Electronic Engineering often choose TestEquity as their parts source. If they wish to experiment off campus or are in an online program, this platform will be helpful. Inspiration may come in a more comfortable setting than a cold University Lab at midnight.

Deployed Military have vast periods of boredom to deal with. The curious in technical areas start to think about their careers after exit. Many take it upon themselves to learn electronics basics. This platform will be an advance over others available.

The graying of American service technicians is producing awareness in corporations that Technicians are in short supply. Not only the trade schools but, more importantly, Corporate training centers have the need for assuring their Techs know what they are doing. These training centers are a perfect opportunity to place ML2010's. With the extensive address to corporations thru MRO sales, TestEquity can ascertain which corporations have their own departments for tech training, who is in charge, and where to send a sample for evaluation.

There will probably need to be a demo program for this, as a decision to purchase at a corporation may involve a buy of 10-30 units and must be incorporated into curriculum. Should questions arise I'm ready to help.



Colton Hart  
Educational Division  
Knight Electronics, Inc.

