Introduction

The experiments in this lab manual are designed to introduce various aspects of analog electronics starting from the simplest concepts such as Ohm's law and leading to practical electronic circuits including amplifiers, integrated circuits, oscillators, voltage regulators and logic gates. Each lab script is intended for a four-hour lab period. Some students may need more time to complete the labs, especially at the beginning when the equipment is still unfamiliar. Your time can be used more efficiently if you prepare in advance by reading the script and planning the procedure before coming to the lab. There may be homework problems assigned which are intended to be done before the lab in order to prepare.

Each workstation in the lab has the necessary equipment: an oscilloscope, a function generator, a multi-meter and an experimental box. The multi-meter can measure voltage, current, resistance and capacitance. The experimental box includes ±12 V power supplies for operational amplifiers and a +5 V supply for logic chips. The independent Anatek variable power supply includes a robust current limiting control. For those circuits built from independent components not using integrated circuit (IC) chips, it is better to use this power supply because it withstands abuse much better than the power supplies in the experimental box.

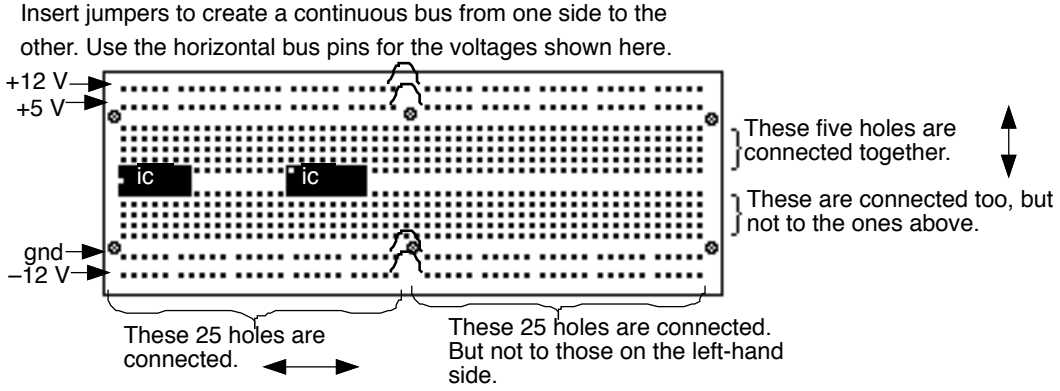

Fig 0.1
The Breadboard Area

The breadboard area on the experimental box has holes for component leads, #22 solid wire and IC pins. Don't try to force larger wire into these hole because it will spring them too far and ruin the board. The horizontal rows of holes on the top and bottom of the breadboard are connected together horizontally. The left and right halves are independent. We suggest that you

use these horizontal rows for power supply voltages and ground. You may wish to put a jumper wire between the left and right halves so that the voltages are the same across the board. The vertical columns of holes are connected electrically in groups of five along a vertical line. The top and bottom halves are independent. Typically one inserts an IC chip straddling the centre trough. There are then four empty holes for making connections to each IC pin. When you plug ICs into the breadboard, a common convention is to put pin 1 on the left. For other components, make sure the leads are not in the same column of five unless you want them connected together.

The oscilloscope has many knobs and buttons which may be confusing at first. It helps if you read the introductory booklet and manual provided by Tektronix. If nothing seems to be happening press AUTOSTART.

N. Alberding, November 1990
Revised, March 1994
Revised, July 1996
Revised, Nov 1998
Revised, March 2002
Revised, April 2005

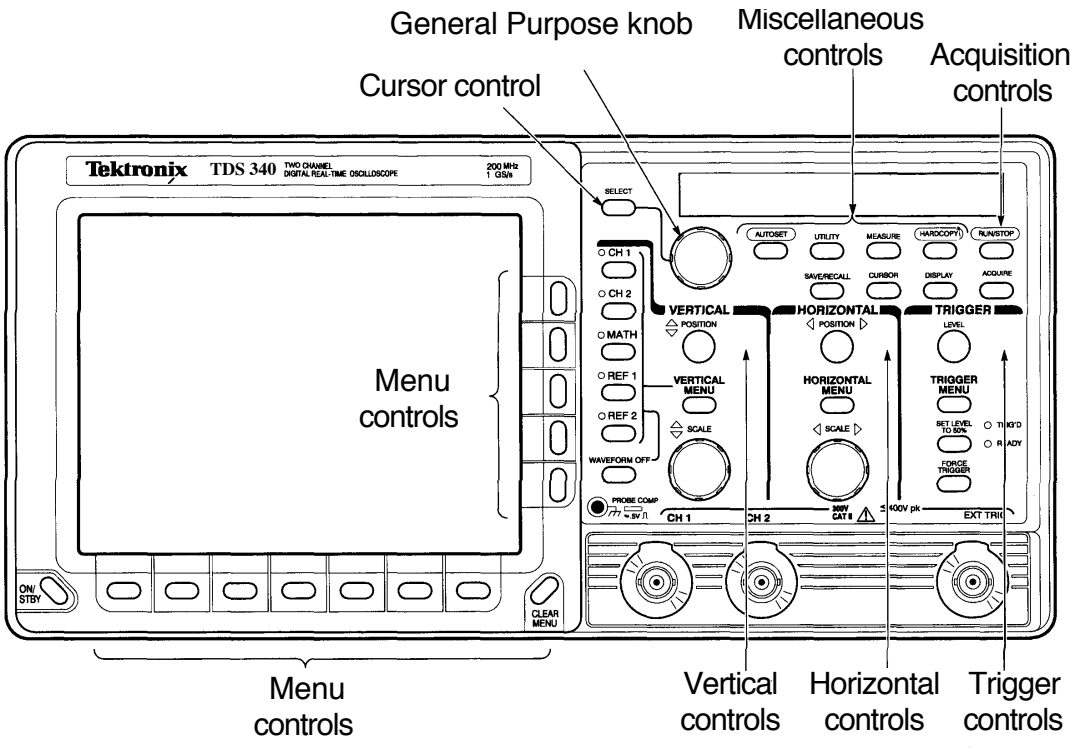

Fig. 0.2
The Tektronix TDS 340 Oscilloscope Control Panel