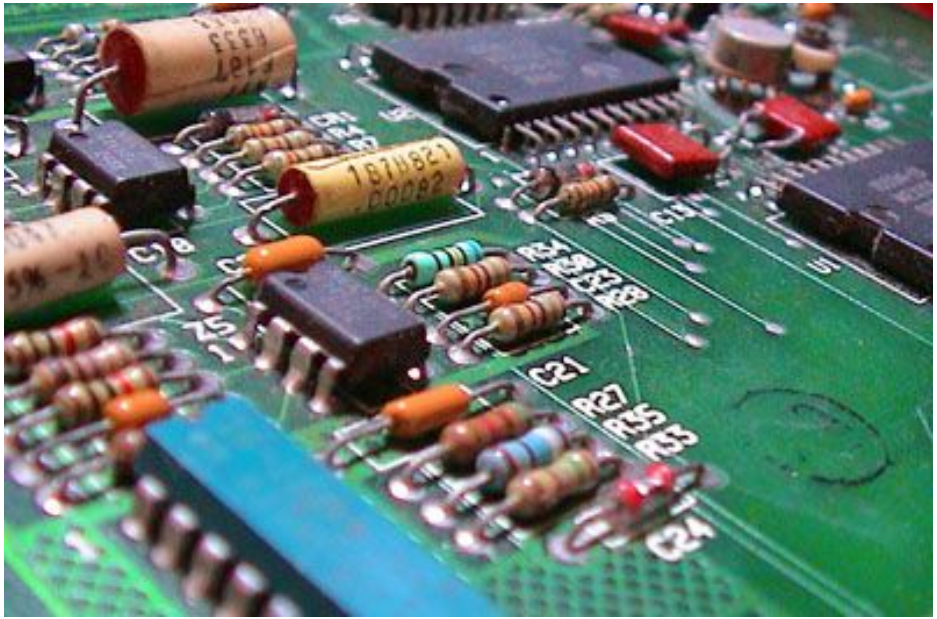


Test Equipment and Electricity Basics

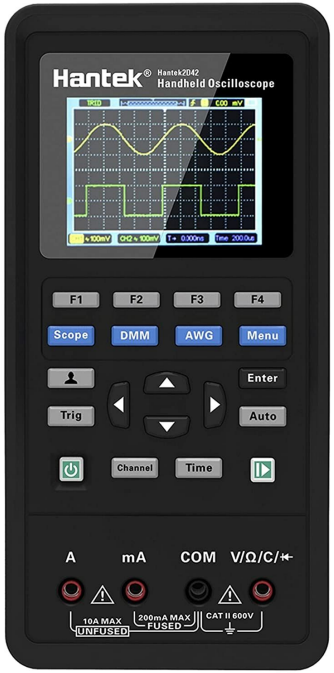
John R. Leeman

GEARS 2022

LEEMANGEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

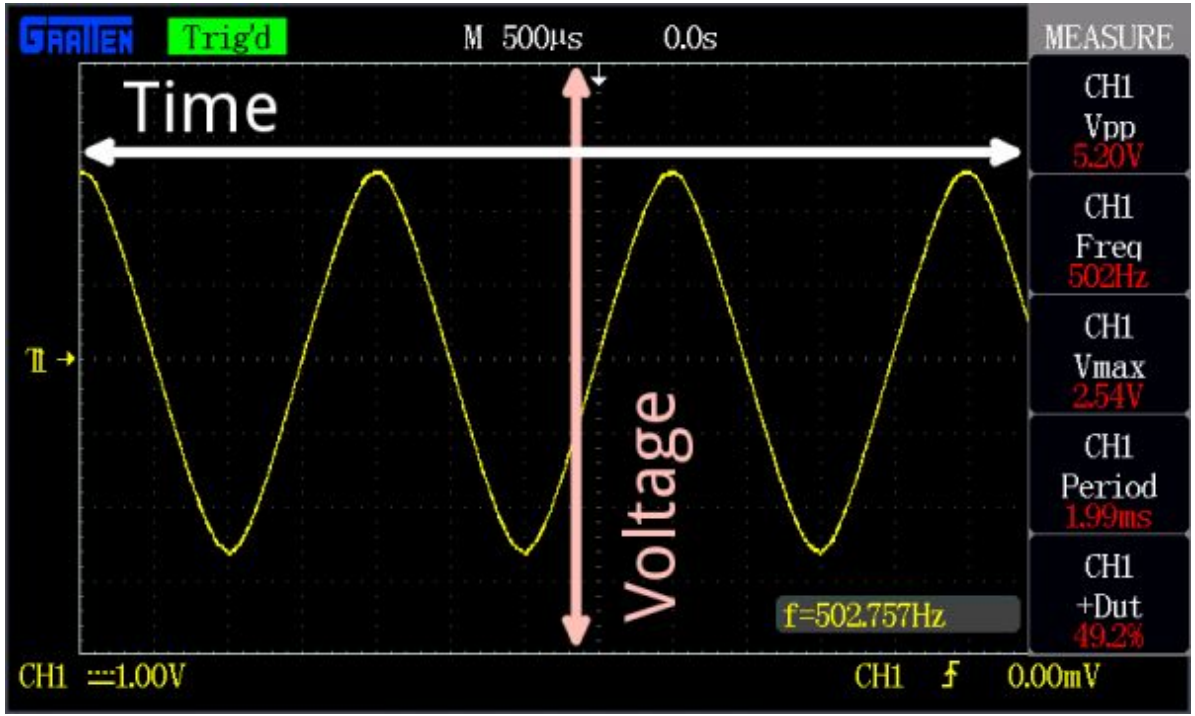
Image: WikiPedia

Oscilloscopes are the second most used tool and are available at many price points and form factors



LEEMANGEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

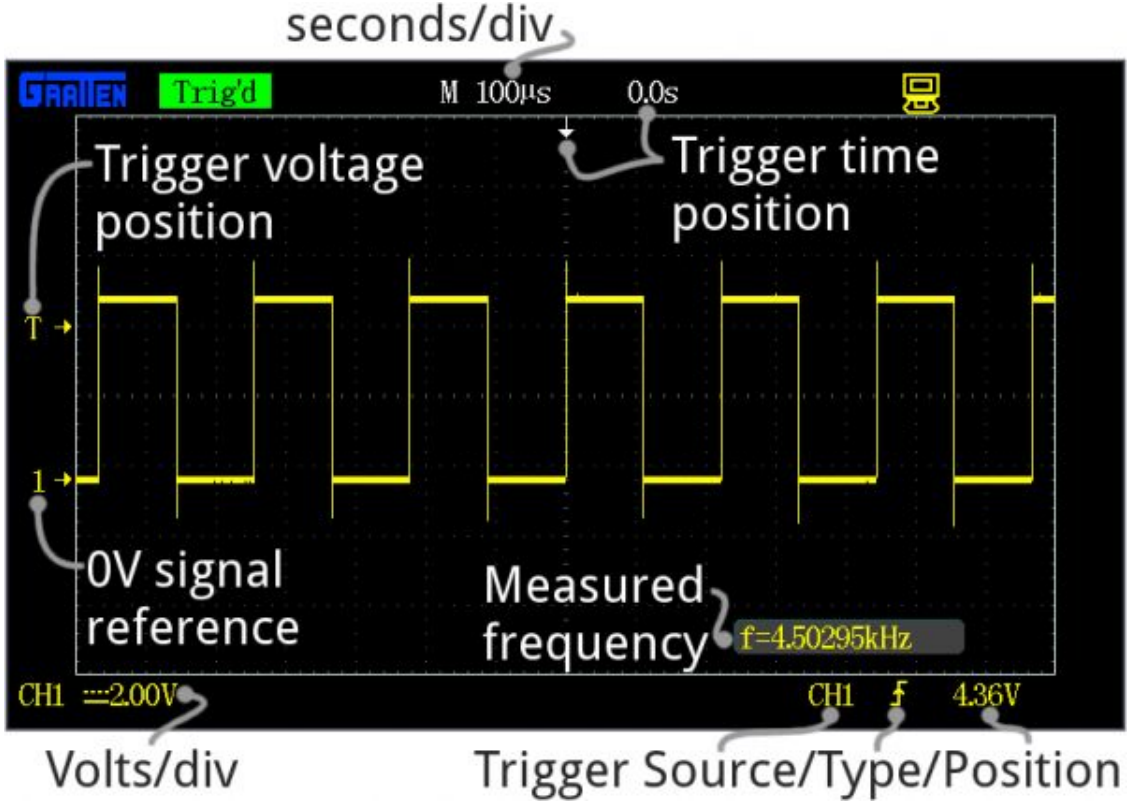
Oscopes graph voltage over time with generally large bandwidths



LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

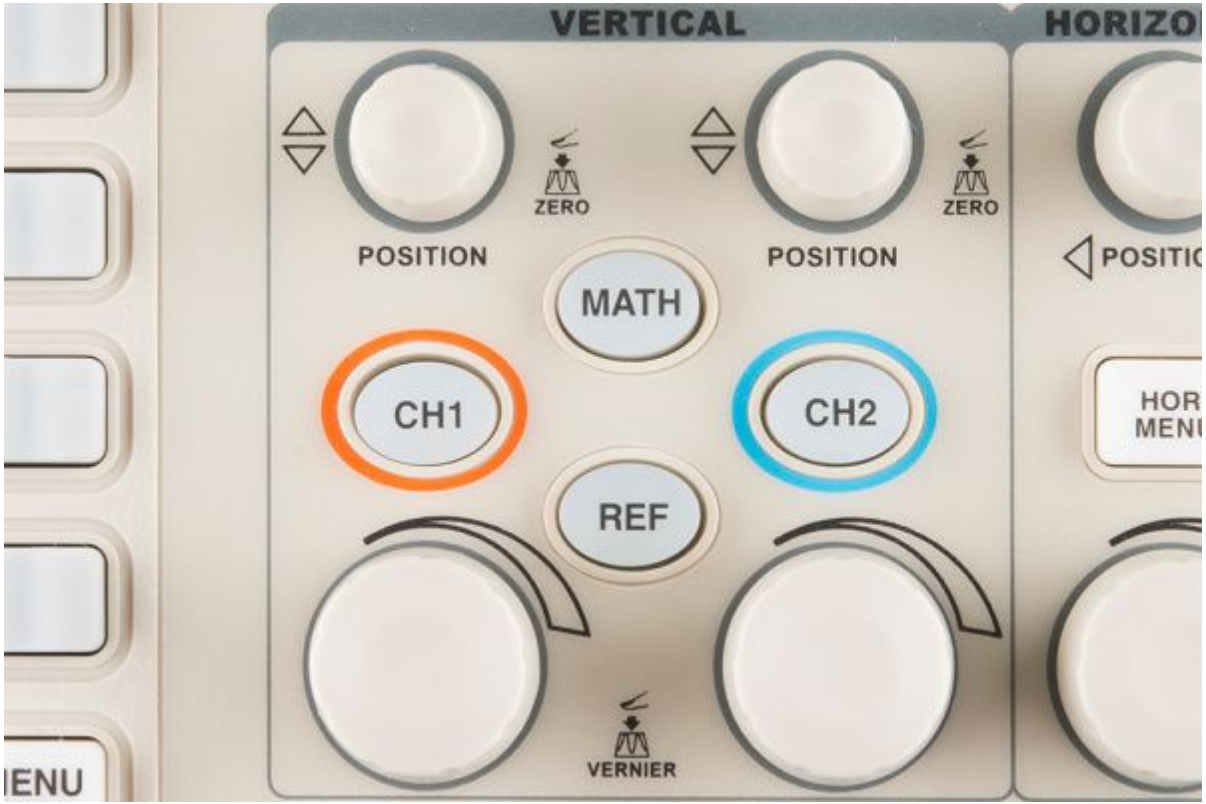
The main screen generally tells you most of the things you need



LEEMAN GEOPHYSICAL CONSULTING & INSTRUMENTATION LLC

Images: Sparkfun

The vertical system controls the volts/div and offset of **each channel**



LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

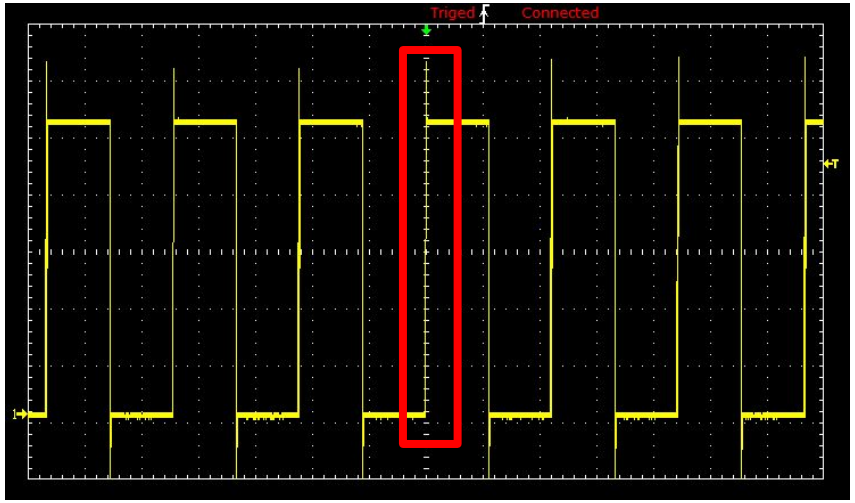
Images: Sparkfun

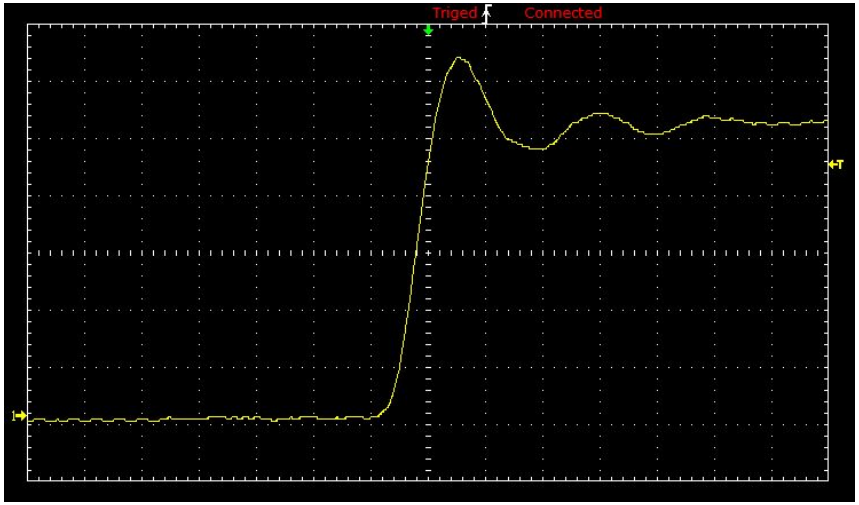
The horizontal system controls time scale of trigger offset

LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

Choosing the right time base lets you see what you're interested in

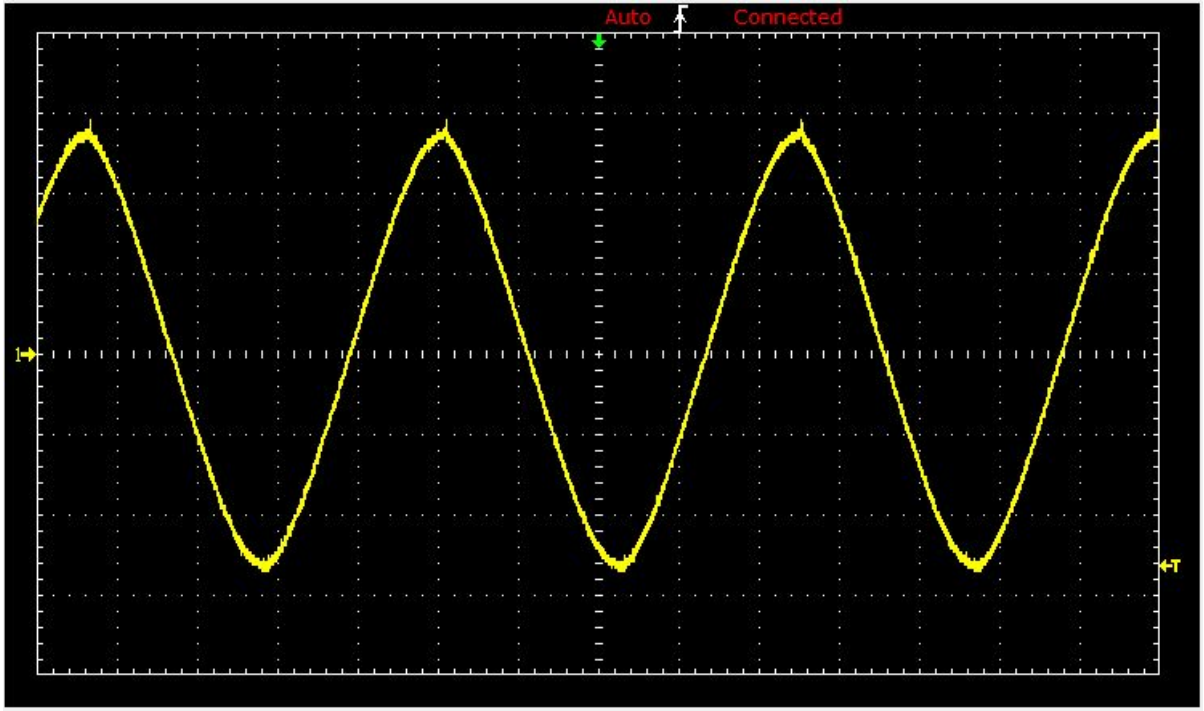




LEEMANGEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

Just free-running in time can produce nauseating displays



LEEMANGEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

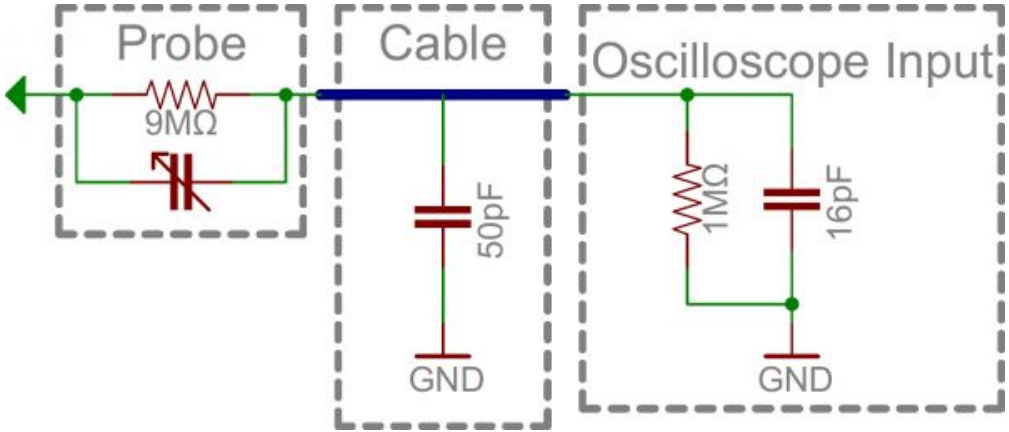
The trigger system is designed to “freeze” a waveform

- Trigger level
- Type (edge, pulse, slope)
- 50%
- Force
- Trigger Hold Off

LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

Probes should be “invisible”, but at high frequencies this means some RF magic



LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

Full size scopes have test points for probe compensation

LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Sparkfun

Scopes can be easily smoked (along with you) when probing non-isolated circuits

LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Digikey

There are a number of specs to consider when buying a scope

- Bandwidth
- Analog vs. Digital
- Channel Count
- Sampling Rate
- Rise Time
- Maximum Input Voltage
- Resolution
- Vertical Sensitivity
- Time Base
- Input Impedance

Images: Sparkfun

Function generators can create known signals to feed into systems and can be found from a few hundred dollars

LEEMAN GEOPHYSICAL LLC
CONSULTING & INSTRUMENTATION

Images: Amazon