The Current Probe and Amplifier (Tektronics P6021 and 134)

Background

The current probe amplifier type 134 (Figure 1) with a Tektronix current probe P6021 (Figure 2) and an oscilloscope form a complete alternating current measuring system. The current probe uses inductive coupling to change the current being measured into a voltage that can be read on an oscilloscope. This is useful because it allows us to simultaneously observe the current and voltage waveforms on the scope screen. It also provides the safety of load isolation.

Figure 1: Type 137 Current Probe Amplifier

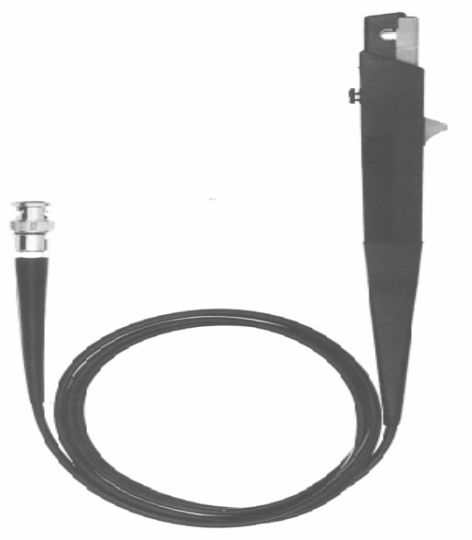

Figure 2: P6021 Current Probe

Setup

1) Plug the current probe amplifier power unit into the power source.

2) Connect the current probe amplifier to the vertical input of an oscilloscope. DC-couple the oscilloscope input and set the deflection factor first to lowest calibration i.e. 1mA. After the whole setup, if you find that waveform on the oscilloscope is clipped (see Figure 3) then increase the deflection factor the next higher calibration to improve the waveform (Figure 4).

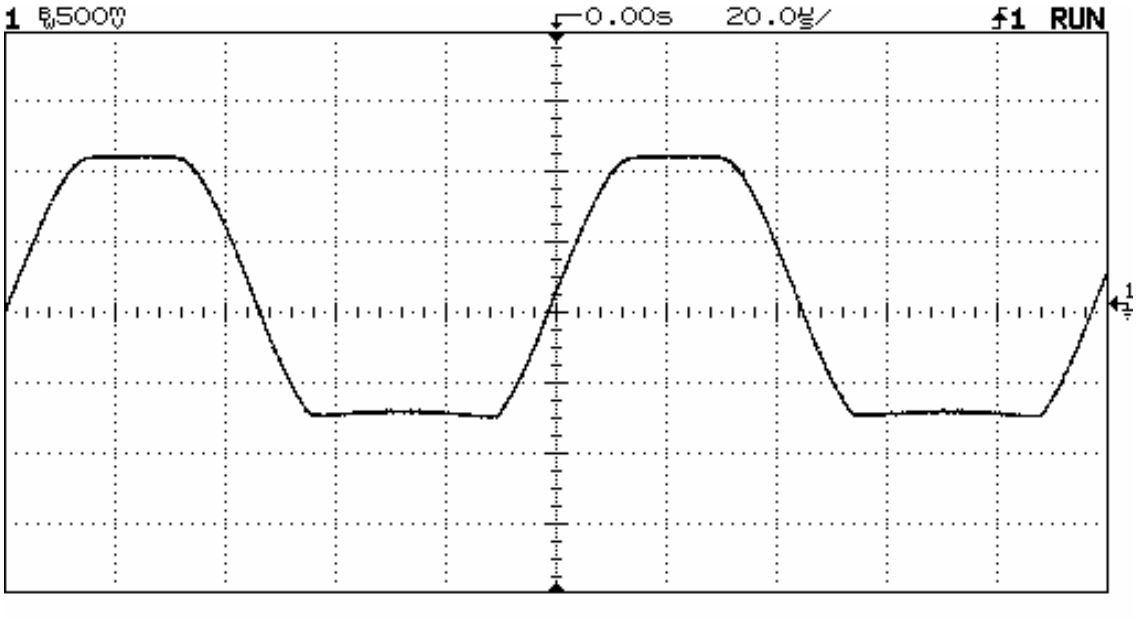

Figure 3: Clipped waveform at 1mA calibration on current probe amplifier

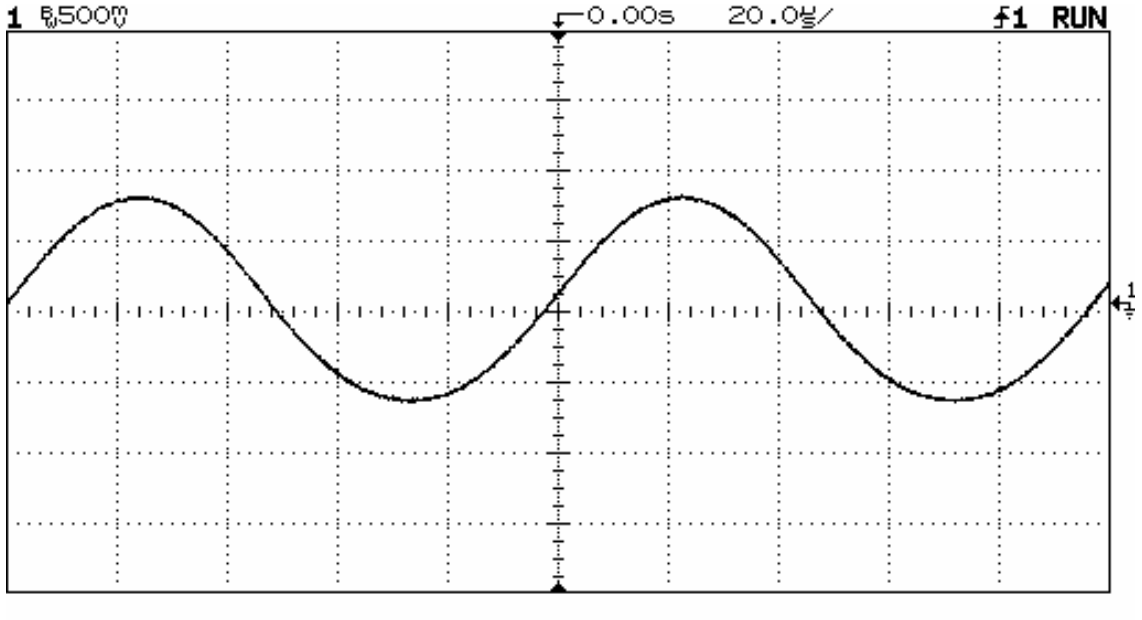

Figure 4: Improved waveform with 2mA setting on current probe amplifier

3) Select the P6021 setting on the current probe amplifier. Connect the P6021 current probe at input location below the Current/Div knob (see Figure 1).

4) The thumb-controlled probe slider opens the transformer core located in the end of the probe and closes it around the conductor under test (see Figure 5).

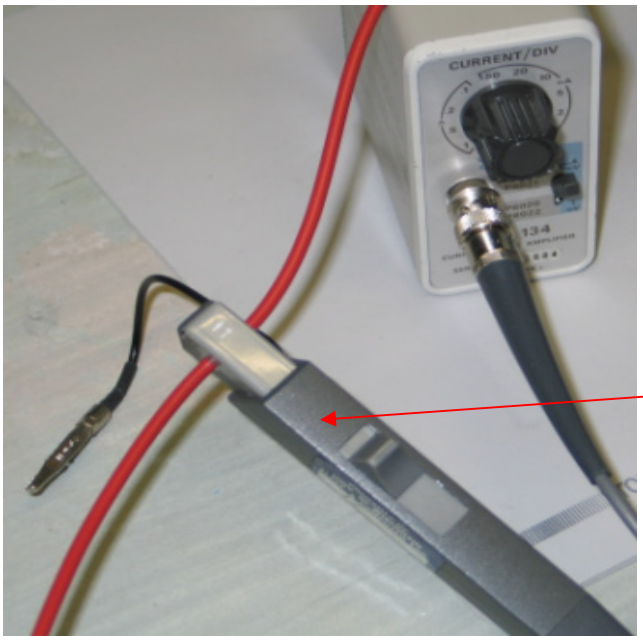

Figure 5: Probe slider around the conductor under test

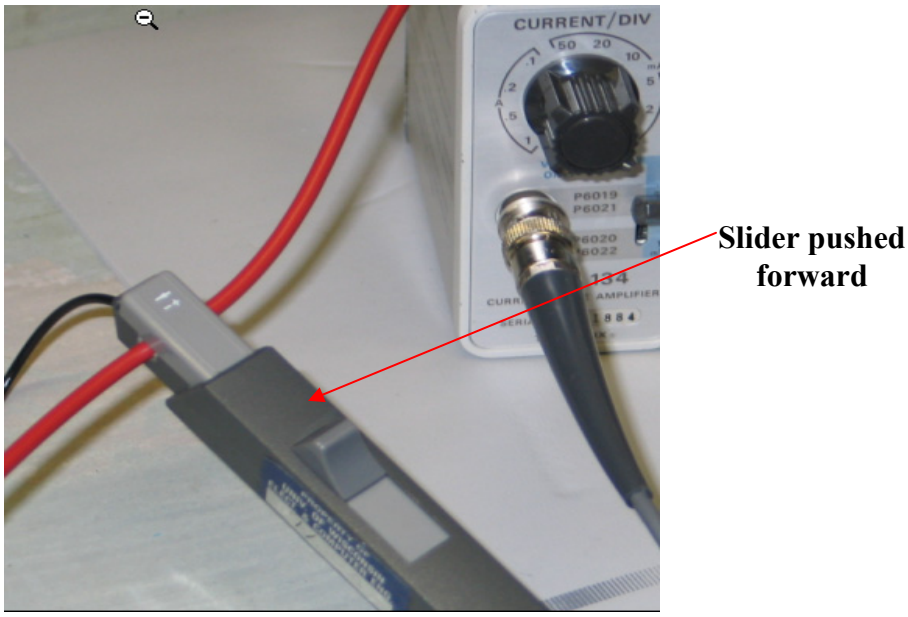

Figure 6: Probe Slider locked

The conductor under test becomes the primary of the transformer when the core is closed. When measurements are being made, the slider should always be pushed all the way forward i.e. in locked position (see Figure 6), as this applies pressure to the movable portion of the transformer core, assuring complete contact to the stationary

portion of the transformer core. If the probe is not locked (an easy step to forget), the results you get may appear valid, but upon closer inspection, they will be very wrong.

5) The current probe connection that connects to the oscilloscope is a 1:1 probe. If you fail to change your oscilloscope setting (and back again when finished), your reading will be off by a factor of 10!

6) Finally, since the current probe changes a current into a voltage, you need to be aware of the scaling factor. The current probe outputs 50mV/"XmA," where "X" is the setting on the current probe dial (Current/Div). For example, if the current probe dial is on the 10mA setting, 20mA of current will translate into 100mV on your oscilloscope.

Things to remember when using the Current Probe

1) Current probe is a 1:1 connection to the oscilloscope
2) Must be in the locked position to function properly
3) Output switch position must be set properly
4) Scaling factor is 50mV/"XmA"
5) If measuring phase angle, use caution to improve accuracy of the reading
6) Current probe needs to be plugged into the wall outlet to get power