

times. When using a Fluke 87, the fastest MIN MAX response time is captured when the **“PEAK MIN MAX”** mode is enabled. The same feature is labeled **“FAST MN MX”** on the Fluke 189. In both these meters, these selections set the DMM’s response time to 250 microseconds.

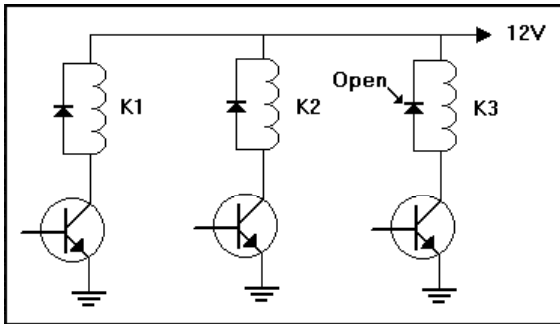


Figure 1.

### Step by step

To demonstrate the use of the MIN MAX function in detecting and measuring transients, consider the example shown in Figure one. The circuit is part of a control circuit that, among other things, controls some dc relays. The diode across the coils of the relays is used to short out any electrical energy created by the collapsing magnetic field in the relay coil when the voltage is removed. Assume for this example that one of the diodes has opened. Without the diode to short out the energy released by the collapsing field around the coil, the energy must be dissipated by the remaining circuitry of our control circuit. With the coil now acting like a source, the voltage it creates will be added to the supply voltage, possibly causing a spike on the dc supply line. As this transient propagates through the circuitry, it may cause erratic and intermittent behavior in our control circuit.

To capture and measure this transient, set up the DMM as follows:

1. Select the dc voltage mode.
2. Plug the red test lead into the **V** jack and the black test lead in the **COM** jack.
3. Connect the black test lead to the dc common of our control circuit and the red test lead on the 12-volt power line going to the relays.
4. Press the **RANGE** until the desired range is selected. This should be done to get the best accuracy before entering the MIN MAX mode.
5. Activate the MIN MAX mode.

#### For the Fluke 87:

Press the **MIN MAX**.

Press the **PEAK** to enter the PEAK MIN MAX mode until 1 mS is displayed.

#### For the Fluke 189:

Activate FAST MN MX by

pressing **FAST** then press **MIN MAX**.

The maximum stored value is presented in the primary display while the secondary display indicates the present measured value.

At this point, the MIN MAX recording mode has been activated and the DMM is comparing each new measurement against the MIN MAX registers and storing any new values it detects. When the relay with the open diode de-energizes, a transient may be detected by the DMM.

To see the recorded values, perform the following.

#### For the Fluke 87:

Press the **MIN MAX** to see the maximum value measured. Press it again to see the minimum value measured.

#### For the Fluke 189:

With the maximum value already displayed in the primary display, each press of **MIN MAX** steps through the minimum (MIN), average (AVG) and back to the maximum (MAX) reading.

Again, the present measured value is always displayed in the secondary display while cycling through the MIN MAX values.

It may also be helpful to know that the amount of time that has elapsed since the MIN MAX mode was activated to the last recorded MAX or MIN value is also displayed.

The MIN MAX function is a very handy addition to a DMM. You will find it very helpful for identifying intermittent problems, such as transients. The Peak or Fast MIN MAX functions greatly enhance DMMs, making your work easier and more productive.

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