Loop Current Sensing and Ring Chatter

The M-949 signaling devices sense when a telephone goes off-hook by monitoring loop current. Ringing is accomplished by a 20 Hz sine wave with a nominal amplitude of 86Vrms. The signal is applied to the ring lead (referenced to tip) so is superimposed on -48 volts. Originating from the Central Office, ringing voltage often contains harmonics so peak voltage may not be related to the rms value by exactly $\sqrt{2}$. Rapid contact switching or “ring chatter” is a common result of ringing. Ring chatter occurs when sufficient ringing current is drawn to operate the loop current detector. While ring chatter does not harm the loop sense relay, it can result in false loop current detects. Since ring chatter is a function of ring current, limiting the ringload avoids the problem. This is easy to do when monitoring for a ring signal, but presents a problem when several phones are connected to the line.

The situation can be tackled with a hardware or a software design solution. A software approach to the problem would invalidate the loop detect signal while ringing is detected. The hardware fix consists of slowing down the response of the loop detect logic signal. Note that if the application counts rotary dial pulses, resulting make/break ratios (at Detect Output) may be somewhat inaccurate. In general, ringer loads greater than 1 Ringer Equivalence (6.8Ω) will require larger r/c values. Shown to the right is an active low “loop Detect” Output. The capacitor is charged to V_{CC} volts via R1 with D1 included to bypass R1. Switch S1 represents the loop detect contacts on the line sensing relay. When the relay is activated, C1 discharges to ground through R2 and D1 is reverse biased. The time count is found from the following equation:

V_{DD} (e) = V_T

where n=-t/rc, and V_T is the voltage threshold of the logic family being used. Assuming a V_{CC} of 5 volts and V_T of 2.5 volts, the above equation can be written as:

t/rc = 0.693

Use this equation to determine r/c values for any given delay time. The values shown below will provide an approximately symmetrical delay of 16 ms. Feeding the loop detect output through a comparator will ensure clean switching action.

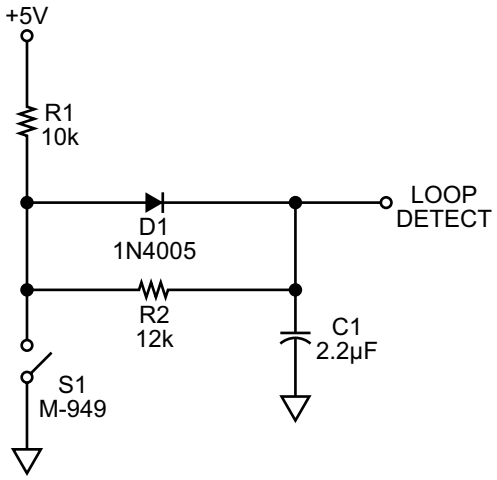

Figure 1 Loop Detect Output Diagram

For additional information please visit our website at: www.ixysic.com

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