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A Mode Indicator for the MC34118 Speakerphone Circuit

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Introduction

In most applications involving a normal conversation, the operating mode (receive, transmit, idle) of the MC34118 speakerphone IC is obvious to the users of the speakerphone. There are some applications, however, where it is beneficial to have an indication of the operating mode. This indication may have to be visual, or logic levels to a microprocessor or other circuitry. This application note describes how to create a mode indicator for use with the MC34118 speakerphone circuit.

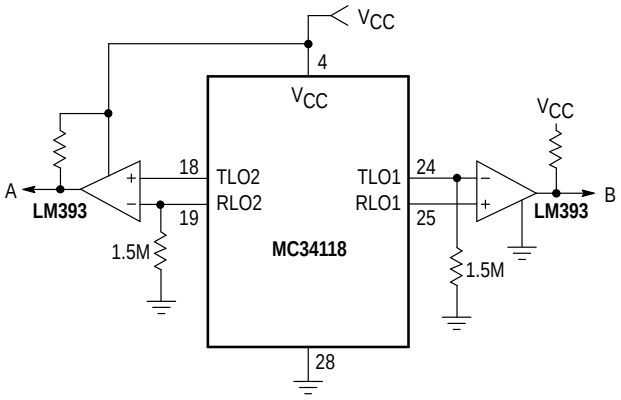
Concept

Within the MC34118 are two comparators driven by the level detectors which are sensing the speech signals (see MC34118/D Data Sheet, Figure 24). The comparators' outputs drive the attenuator control block which sets the operating mode. The circuit described below parallels the internal comparators with external ones.

Circuit

Figure 1 shows the additional circuitry. The two comparators parallel the two which are inside the IC, located at the outputs of the level detectors. Output A will be high when the level detectors on the left side sense a transmit condition, and low when they sense a receive condition. Output B has the opposite polarity.

Figure 1. Mode Indicator Circuit



The two 1.5 MΩ resistors create a slight offset by draining a trickle current out of Pins 19 and 24 in order to well define the idle state. This is necessary due to the fact that when in an idle state (no signal on either side) TLO2 and RLO2 will be very similar in voltage (within a few millivolts of each other). The same is true of TLO1 and RLO1. This, coupled with the normal offset which exists at the comparator inputs, would make it difficult to predict the state of the A and B outputs during idle.

Table 1 defines the comparator outputs. The fast idle mode is uncommon, occurring rarely. Only the slow idle mode is of concern here.

Table 1

Mode	Output	
	A	B
Transmit	High	Low
Receive	Low	High
Slow Idle	High	High
Fast Idle	Low	Low

Circuit Variations

The outputs (A and B) in Figure 1 can be connected to additional circuitry in a variety of ways. Figures 2 to 4 provide a few suggestions. In Figure 2, the A and B outputs are simply directed to a microprocessor for decoding. In Figure 3, LED A will be ON in the receive mode, and LED B will be ON in the transmit mode. In Figure 4, the outputs are decoded to provide an idle/non-idle indication, and a Transmit/Receive indication. Another alternative is to drive LEDs from the decoded outputs of this circuit.

The value of the pull-up resistors at the comparator outputs depends on the circuit which follows the comparators. When driving CMOS logic, for example, 43 kΩ resistors are adequate.

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When driving LEDs, they must generally be under 1.0 kΩ, depending on the specific LEDs which must be illuminated. If the circuit is phone-line powered, the pull-up resistors must be as high a value as possible to minimize the drain on the loop current.

The LM393 comparator was chosen due to its low input bias current, as well as its low supply current and input offset. The low bias current is very necessary so as to not upset the level detector outputs any more than absolutely necessary. The resistors at the level detector inputs (Pins 17, 20, 23, 26) will generally have to be readjusted slightly after adding the Figure 1 circuit to compensate for the slight offset which has been added to the system. In most cases, it will be necessary only to slightly increase the resistor at TL12 (Pin 17).

Figure 2

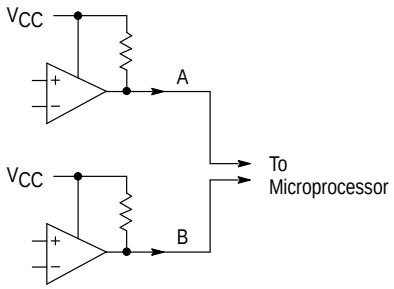


Figure 3

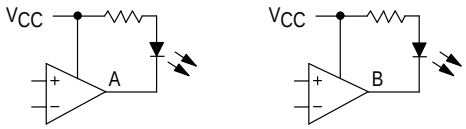
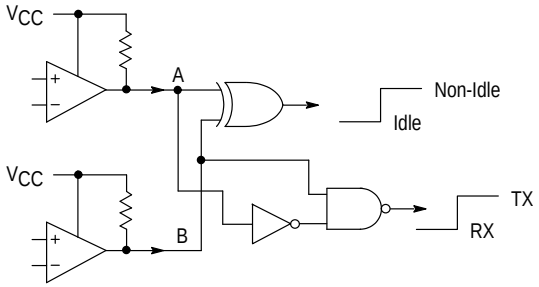


Figure 4



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