Application Information

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Suggested Applications for the CMX673 Call Progress Tone Detector IC

The CMX673 is an 8-pin DIP or 16-pin SOIC signal-detector that operates on energy in the frequency band of about 315 to 650 Hz. Its primary use is in the detection of status tones encountered during the progression of a telephone call. These tones include: dial tone, circuits busy, ring tone, station busy and others. Call status is derived by examining the cadence of those tones - please refer to Table 1, Table 2 and Figure 5.

A selection of typical uses is shown in Figures 1, 2 and 3. Figure 4 shows a simple scheme for connecting the CMX673 to a balanced telephone line.

Please note that rejection of common-mode signals is enhanced by keeping the input network balanced. Thus 1% resistor and capacitor values should be selected so that they are as closely matched as possible.

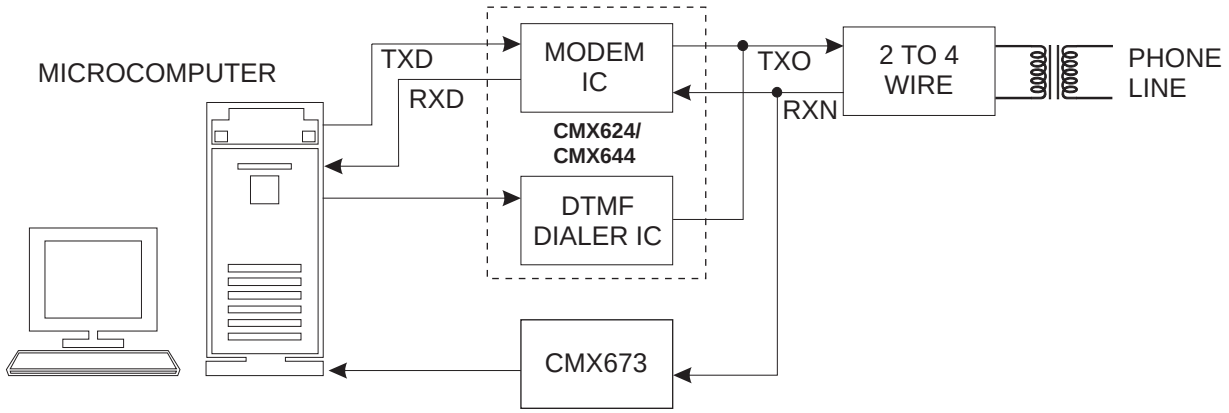


Fig.1 Detecting Dial Tone and Secondary Dial Tones in an Automatic Dialling Data Modem

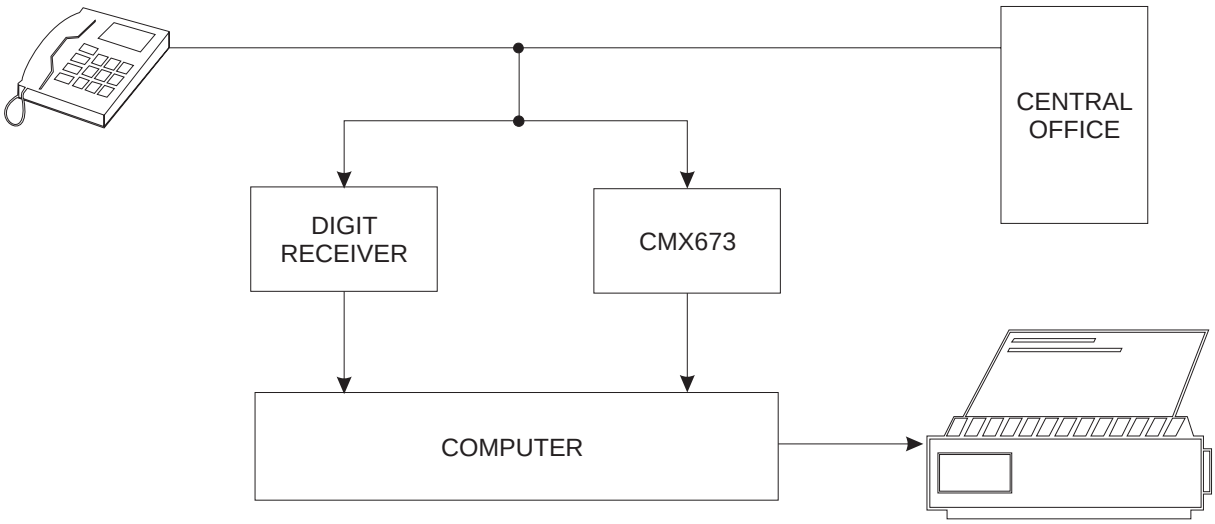


Fig.2 Call Detail and Completion Monitor in a Billing System

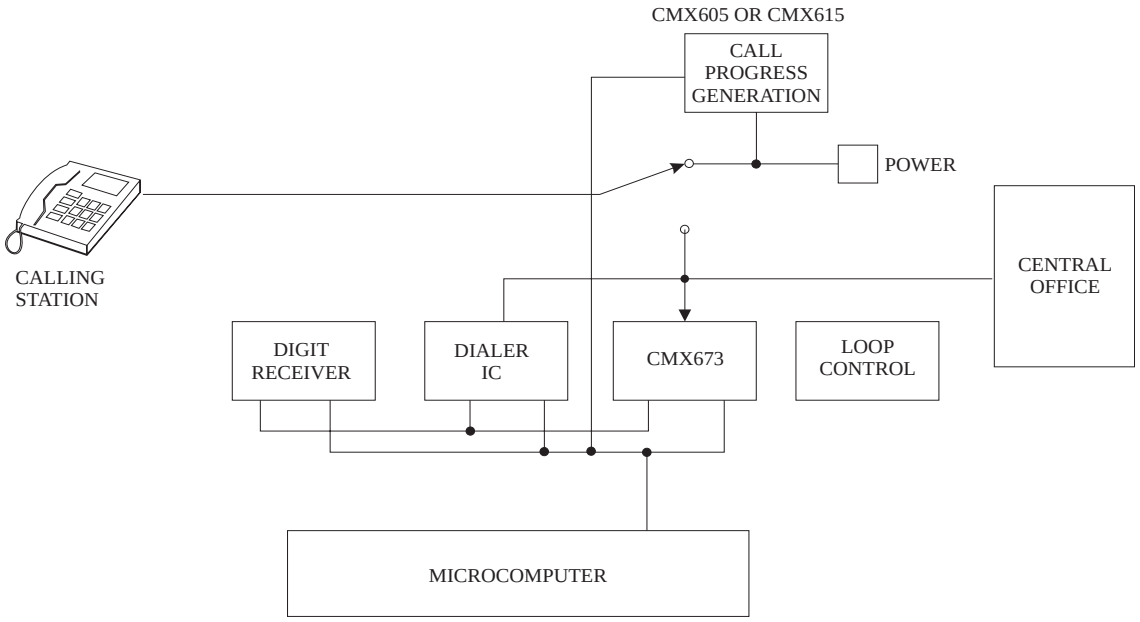


Fig.3 Call Routing in a Speed Dialling System

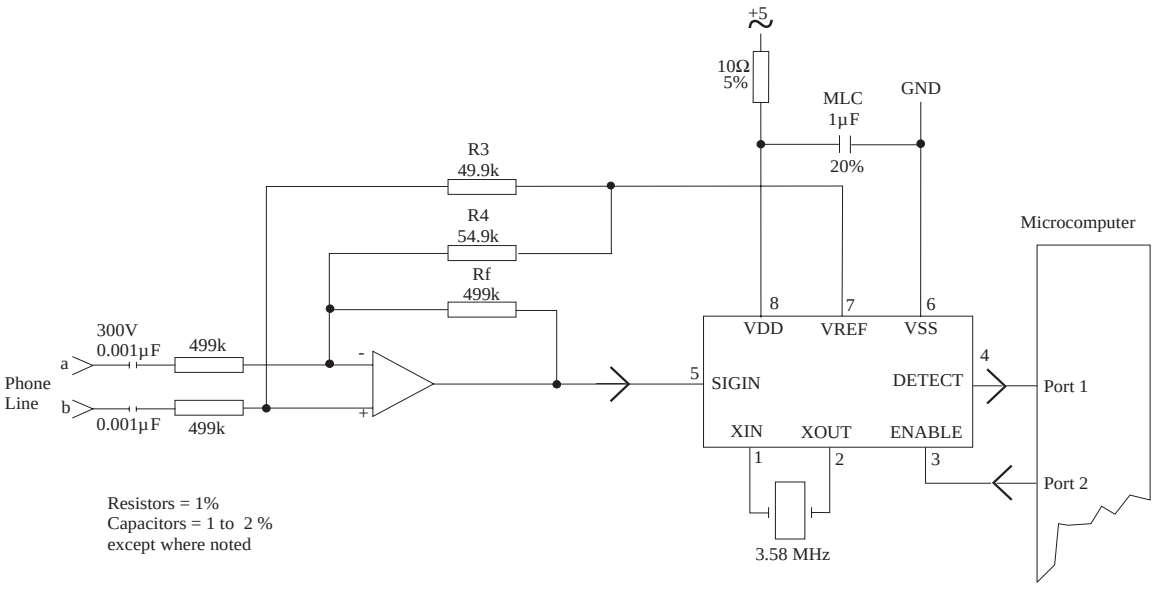


Fig.4 Monitoring Signals from a Balanced Phone Line

The minimum level required by the CMX673 is -38dBm. In general to optimise transient response and to limit spurious DETECTs, it is best to use the least sensitive configuration possible. However the gain of the buffer stage shown in Figure 4 may be varied to obtain the sensitivity required for a given application. The gain of this stage is equal to the ratio of Rf to Rin(-ve).

When the value of Rf is changed from that shown above and in the data sheet, R3 must be changed to keep the parallel combination of Rf and R4 equal to R3.

Tones	Frequencies (a) (Hz) 350	440	480	620	Power per frequency at exchange[b] where tone is applied[c]	Cadence
Dial Tone	O	O			-13dBmO[h]	Continuous tone
Dial Tone - Modern PABX only	O	O			-16dBmO	Continuous tone
Recall Dial Tone	O	O			-13dBmO	3 bursts of 0.1s followed by a continuous tone[e]
Recall Dial Tone - Modern PABX only[g]	O	O			-16dBmO	3 bursts of 0.1s followed by a continuous tone[e]
Busy Tone			O	O	-24dBmO	Burst 0.5s / silence 0.5s
Busy Tone - Modern PABX only			O	O	-21dBmO	Burst 0.5s / silence 0.5s
Reorder Tone			O	O	-24dBmO	Burst 0.25s / silence 0.25s
Reorder Tone - Modern PABX only			O	O	-21dBmO	Burst 0.25s / silence 0.25s
Audible Ringing Tone		O	O		-19dBmO	Burst 2s / silence 4s
Audible Ringing Tone - Modern PABX only		O	O		-16dBmO	Burst 1s / silence 3s
Call Waiting Tone		O			-13dBmO	Burst of 0.3s every 10s
Call Waiting Tone - Modern PABX only[g]		O			-16dBmO	Burst of 0.3s Station Call Waiting -16dBmO 2 bursts of 0.1s (e) Outside Call Waiting -16dBmO 3 bursts of 0.1s (e) Urgent Call Waiting
Busy Verification		O			-13dBmO	A 2.0s burst followed by 0.5s bursts every 10s
Busy Verification - Modern PABX only[g]		O			-14dBmO	Burst of 1.5 to 2.0 s followed by ....[f]
Executive Override - Modern PABX only[g]		O			-14dBmO	Burst of 3.0s
Confirmation Tone	O	O			-13dBmO	Burst of 0.1s / silence 0.1s / burst 0.3s
Confirmation Tone - Modern PABX only[g]	O	O			-16dBmO	3 bursts 0.1s [e]

(a) Frequency limits are ± 0.5% of the nominal frequency.
(b) PABX tone levels are measured at the PABX interfaces (typically at customer premises). Power levels are 2dB lower for private line interfaces.
(c) Power level tolerances are +1.5dB.
(d) Tolerance level for PABX dial tone is +0.75dB.
(e) Bursts are separated by 0.1s.
(f) Burst of 1.5 to 2.0s before attendant intervenes, followed by repeated bursts of 0.5 to 0.8s, 8 to 20s apart.
(g) Tones applied at PABX station or private line interfaces and not at the exchange interfaces.
(h) dBmO - dBm referred to or measured at a point of zero transmission level (0dBmO = 489mV = -4dBm).

Table 1. Call Progress Tone Cadence and Frequencies - Taken from the CCITT Blue Book (Fascicle II.2 - Suppl. No. 3)

DIAL TONE

Cadence	On, Steady
Frequencies	400, 425, 350 + 440, 600 x 120, 33 Hz

AUDIBLE RING

Cadence	2 sec. on, 4 sec. off, …, or 1/3 sec. on, 1/3 sec. off, 1/3 sec. on, 2 sec off .....
Frequencies	400, 425, 440 + 480, 420 x 40, 450 ,400 x 25 Hz

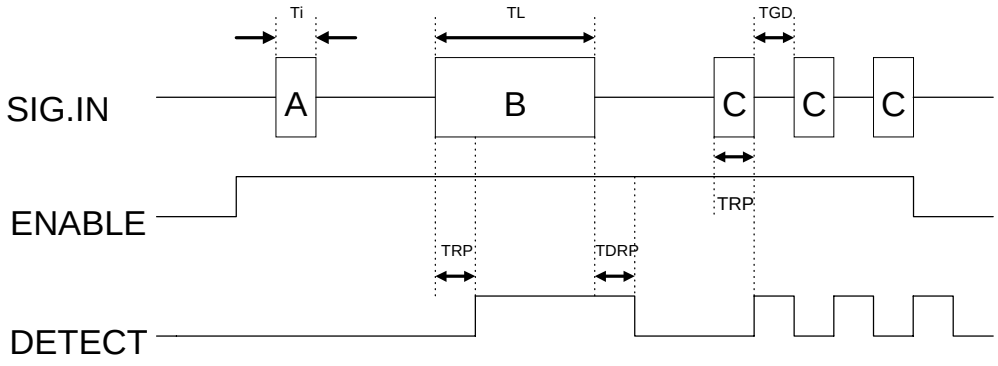
BUSY STATION

Cadence	1/2 sec. On, 1/2 sec. Off, …,
Frequencies	400, 425, 480 + 620, 600 x 120, 450 Hz

RECORDER (Busy Circuits)

Cadence	1/4 sec. On, 1/4 sec. Off, …, or 1/2 sec. On, 1 sec off, …
Frequencies	400, 425, 480 + 620, 600 x 120, 450 Hz

Table 2. Some Common Call Progress Tone Cadences and Frequencies



KEY

A	=	Signal within call progress detection range, but not of sufficient duration to be detected
B	=	Contiuous call progress tone. i.e. Dial Tone
C	=	3 bursts of 0.1s followed by a continuous tone (not shown) in the call progress band. i.e. Recall Dial Tone
Ti	=	Burst length ingnored
TL	=	Burst length detected
TGD	=	Call progress tone gap length detected
TRP	=	Call progress response time
TDRP	=	Call progress tone de-response time

Fig.5 An Example of Tone Detection (via Tone Cadence) using the CMX673

Note that this Application Note is intended to be used in conjunction with the current CML Product Data Sheet; printed Specifications apply.
CML does not assume any responsibility for the use of any circuitry described. No circuit patent licences are implied
and CML reserves the right at any time without notice to change the said circuitry.

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