Build The Autodialer Audio Annunciator

Picture this scenario. You've created a really neat alarm system (either at home on your own time, or just maybe, at work on your bosses time!) that you want to notify someone at a remote location whenever something happens. Anyway, you want this thing to announce this event over a phone line. So what do you do? Well, lets see. You could buy a cheap phone, gut the works, dial a phone number to record it in memory, then maybe tape a message on a continuous loop cassette tape. Then you could design some kind of interface to redial the phone number, pause long enough to be answered and start a taped message! Hmm, this might work but what if the tape breaks, or the power to the phone is interrupted and the number is erased! Or what about if.....

How about if we take this basic concept and consolidate it into a couple of integrated circuits on a small circuit board. We'll use a Microchip Technology PIC microcontroller, an ISD digital speech chip (available at Radio Shack) and a relay and proper interface (FCC part 68) for connecting to the phone lines. Then we add some software timers and decoders for addressing the speech chip and heres what we end up with. A system that lets you record the number that you want to dial in non-erasable memory and then announce up to 3 different messages of 5 seconds duration each when triggered by 3 separate contacts being closed to activate the system. Then, it redials the number every 10 minutes until the alarm condition is reset! Loss of power will retain both the phone number and messages for about 100 years! Sounds pretty good, doesn't it. Well, here's how to do it!

CIRCUIT DESCRIPTION

The circuit is shown schematically in figure 1. Rather than repeat the basic function of address decoding and operation, I'll refer you to the article on the Audio Annunciator available at http://home.att.net/~dennis.shepard (my website!)

Since this is a modification of the audio annunciator project, I'll just cover the changes. Essentially, the output is now fed thru a 600 ohm isolation transformer. Back to back zener diodes protect the chip side of the transformer, and a Metal Oxide Varistor protects the phone line side. A relay in series with the transformer completes the interface to the phone line.

The first channel, which is activated by a jumper (J1 in the schematic) , is for recording and dialing the phone number. Whenever an alarm is triggered, the relay closes and connects the speech chip (via the transformer, of course) to the phone line. The previously recorded phone number is played back, and hence, decoded by the phone company to connect you to the number being dialed. Then, after a 10 second delay, whichever message, or combination of messages will be announced into the answering parties phone. Then the dialer 'hangs up' and calls back after 10 minutes if the alarm register is the same.

Now, here's a neat trick! If another alarm comes in or if more than one alarm was announced and one of them has 'cleared', the system will redial immediately and announce the alarms still active and any new alarms that may have come in. In other words, whenever the status changes, you can notify someone immediately. For obvious reasons, the system won't call you if a single alarm clears without any further alarms being triggered. So, how do you set this thing up? Well, I was just about to come to that part!

PHONE SETUP

The first thing you need is a 'way' to record the DTMF tones for the number that you wish to dial. Well, it seems to me that you ought to be able to use that phone that you've already got since its already got a DTMF keypad! First of all, the phone company generates the 'dial tone' and they also supply the power to line powered phones. Other phones have a small transformer which supplies power to the phone, independent of the phone company. This is the easiest to interface. Since signal level is supposed to be regulated by FCC rules, a simple resistive voltage devider is all that's required for the AC powered phones. A little different approach is required for the line powered phones, namely, a power supply in addition to the voltage divider.

Ideally, you want to supply the strongest signal for recording your phone number. Radio Shack's spec sheet lists a maximum signal level accross pins 17 & 18 of 20 mv p-p. Since I've got an oscilloscope (and I assume that some of you do also), all I need do is 'key' a tone on my phone and monitor the voltage level on my scope. After, testing several phones that ALL had consistent levels, I came up with the voltage divider circuit in figure 2.

Now, back to that line powered phone. Normally, you need a power supply to power this phone when your not connected to the phone jack, but we're going to use several 9 volt batteries in series to take care of this problem since the phone number probably won't be reprogrammed very often. And since the DTMF signal will be 'modulated' on the battery power supply, a different method of 'coupling' the signal is required. The circuit in figure 3 is the result.

MESSAGE SETUP

OK, now that we figured out how to interface the phone to 'record' a phone number, lets go over the actual setup procedure. As mentioned above, jumper J1 is used to initiate recording the phone number. After selecting the appropriate interface circuit (figure 2 or 3 depending on your phone type), connect it between JACK1 on the circuit board and your phone. To actually record, you need to jumper J2, which will light LED2. Now the speech chip is in record mode. OK, you can jumper J1. The Chip Select indicator (LED1) will light. Now you have EXACTLY 5 seconds to record your phone number. If, by chance, you have redial on your phone, dial the number before jumpering J1. Then redial. That way you ensure that you got all of your number recorded! Remove J1 and LED1 will extinguish, then remove J2 and LED2 will extinguish. J1 won't need to be jumpered again unless you reprogram the phone number.

Now you're ready to record some alarm messages. Just plug a microphone into JACK1 and you're ready.To keep system complexity to a minimum, software constraints require a 10 second time delay between the end of the first channel operation (your phone number) and the activation of the message channels (alarms 1-3). LED1 lights for 5 seconds for the dialer recording, then goes out for 10 more seconds, and then, comes on for 5 seconds a second time. For that reason, don't start your alarm message until the Chip Enable indicator (LED1) lights a second time!. Then you have EXACTLY 5 seconds to record the message for that particular channel. The other 2 channels are also recorded in a similar manner. Because the Record Jumper isn't connected to the microcontroller, you must record the phone number AFTER THE MESSAGES ARE RECORDED. OTHERWISE, THE PHONE NUMBER WILL BE ERASED!

That's it. Now put it in service. There are so many things you use can use this project for. Obviously, security alarms and fire alarm systems. Just record the appropriate phone number and record the appropriate message. Since many people now carry voice pagers, just have the system call you! Great for fixing problems before anyone else knows they occurred! Enjoy.

PARTS

A preprogrammed PIC 15C54 microcontroller chip with 4 MHZ ceramic resonator is available for $ 15.00 postpaid in the continental United States only. Please specify part # as DIALER. Method of payment includes cash, money order, certified check (sorry, no personal checks due to time delays for processing)

Please remit to:

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