

Vance Atkinson (TX) - The Sherwin-Williams Multi-spec interior paint being used by a lot of builders, including myself, is not as tough as the old Zolatone. The Multi-spec will sometimes bleed through and if you spill gas on it, becomes gummy very quickly.

**WARNING !!**  
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### Alarm Circuit Description

Chuck Busch (CA) - The original Rutan plans alarm circuit, while very functional, had one big drawback - once overridden the only way to get another audible alarm was to have the alarm condition go away and then return. I knew this could be a potential problem when I installed it but figured the chance of something like this happening was remote.

Forty five hours after first flight the "remote chance" bit me and I demonstrated the elegant characteristics of a nose dragger landing to the tower gang at the Napa Valley airport in northern California.

After dusting off my pride I mentally recreated the problem: I left Yolo county airport which is north of Napa and climbed over the intervening mountains. Called Napa tower and was given a straight in to 18. Oh boy, gotta work for this one, I thought to myself. I was expecting a right downwind entry (as always) so I really had to lose a lot of altitude to make the straight in to 18. I immediately pulled power and tapped the override to stop the blaster in my ear. Needless to say, I did not add power between this point and when I was sitting nose down on the runway wondering what happened. The bright side: I did make the runway and the braking was phenomenal!

After thinking some more about this problem I decided to build the circuit shown on the next page. It has a lot of good features, and yes, it will re-arm automatically if the alarm condition does not go away. This circuit gives an alarm exactly as the Rutan design when the alarm occurs. The override also shuts off the audio (Sonalert) but only for a period of about 22 seconds (override timeout) unless the alarm goes away. If the alarm condition goes away everything is reset. Pressing the override button during an already initiated override timeout cycle has no effect: the timing cycle remains at 22 seconds from the first time it was pressed after the alarm occurred. Since the override signal needs only to be a momentary ground I decided to use the same button I use to key the communications transmitter. This has worked out really well.

The circuit operates as follows;

Any alarm condition (I have four wired: gear, canopy, oil pressure and parking brake) will put a ground (low) on pins 8 and 9 of IC-1. This is inverted and passed to pins 2 and 5 of IC-1 which qualifies the NANDs driving the Sonalert. Pin 3 of IC-2 is normally low so its output is inverted and a logic "1" is felt at pins 1 and 6 of IC-1 fully qualifying the NANDs energizing the sonalert. If, at this point, the alarm condition goes away the audio is silenced when the NANDs are disqualified by the low at pins 2 and 5. Simultaneously, the low at IC-1 pin 10 is felt at IC-2 pin 4 forcing a reset of the IC-2 timing cycle. Note that since, in this scenario, we did not press the override button to start a timeout cycle this forced reset is of no consequence.

Ready for the next one?

Now let's assume an alarm occurs and the sonalert is blasting. Momentarily hitting the override button causes a negative pulse to be coupled through C2 to pin 2 of IC-2. This kicks off a timing cycle set by R1 and C1 and causes pin 3 of IC-2 to go

to a logic high which disables the NANDs killing the audio alarm. If nothing else changes, 22 seconds later pin 3 of IC-2 goes low (caused by the charging of C1 through R1) qualifying the NANDs allowing the audio to return. If, however, during the timing cycle the alarm condition goes away the timing cycle is reset by the logic low on pin 4 of IC-2. This immediately forces pin 3 of IC-2 low qualifying the NANDs, but the lack of alarm condition disables pins 2 and 5 of the NANDs ensuring the audio alarm is turned off. Note that holding down the override button has no effect on IC-2 since the reset pulse is capacitively coupled. C5 is for noise bypass.

The only critical parts in the system are C1 and R1 which set the timer period. I chose 22 seconds because I figured that's about the time it takes from initiating the base turn until I'm on short final. R1 is 2.2M ohm and C1 is a 10uFD, 30 WVDC tantalum. Be careful with C1 as it is polarity sensitive and must be installed with the negative terminal to ground. R2, R3 and R6 are 2.2K ohm pull up resistors. Eighth or quarter watt resistors are okay. I made a one off PC board for mine, but a vector board or something similar would also work just fine. If you socket mount the ICs (recommended) use a good quality socket so vibration does not cause problems. The sonalert is from Radio Shack and is the type that emits the pulsed audio. These things require so little current that the 4011 NANDs drive it just fine with the parallel output gate arrangement.

I installed this circuit in 1984 and it has performed superbly for over 800 hours. The whole thing can be built for around \$10.

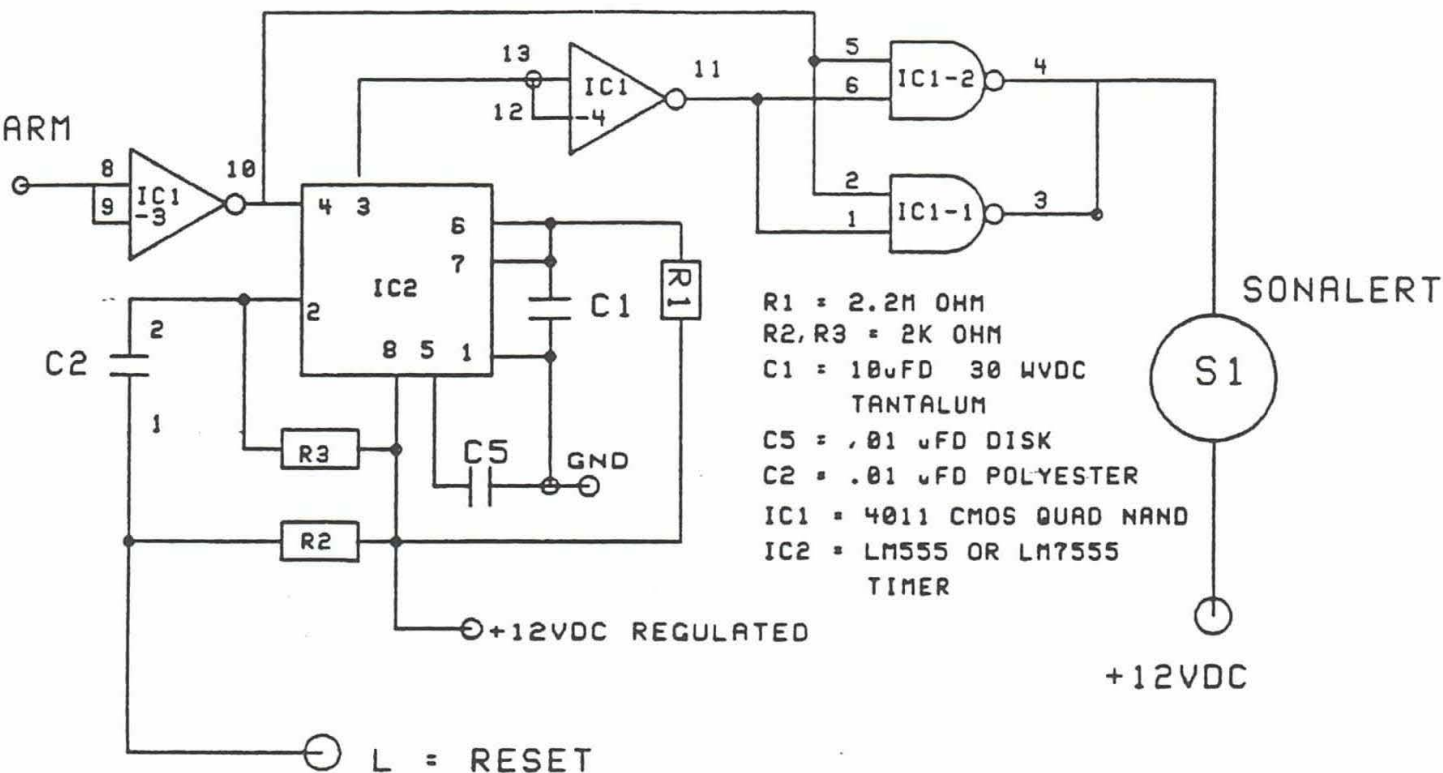
Drop me a line if you have any questions,

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L = ALARM



INPUT  
IC1-8,9

RESET  
SWITCH

RESET  
C2-2  
IC2-3  
DISABLE

IC1-4,5

