KIT No 1197 TWO ZONE ALARM SYSTEM

The alarm systems nowadays have become very important for our safety, as they are a good way to secure our property and prevent any disturbance of our privacy.

For the consumer who wants to have an alarm at an affordable price, we present a device that can watch over your property and your family. Using a number of sensors, this «guard» can survey several areas at the same time and inform you at once if some intruder is present in the protected areas.

The kit that we introduce here is a two zone alarm system suitable for your home, your office, or any area that you would like to secure on a 24 hour basis. The first zone is delayed and the second is direct. You can connect any type of sensors to each zone, such as infrared or ultrasonic detectors, magnetic contacts, vibration sensors etc. The kit also includes a charger for the siren's battery, in case that you use a siren with external power supply.

The heart of the circuit is a microcontroller that gives the alarm functionality, reliability and trustworthy operation as good as any other more complex and expensive device of the market.

GENERAL CHARACTERISTICS:

- ZONE NUMBERS: 2 (One direct and one delayed)
  Both zones work with normally closed (N.C.) contacts connected in series.
- OUTPUT FOR SIRENS:2
  One for normal siren and one for self-powered siren
- Two LEDs showing the system status. The first is indicating that the alarm is turned on and the second informs us if an intruder that entered one of the protected areas has activated the system.
- EXIT TIME: 15 SEC.
- DELAY TIME: 10 SEC.
- ALARM DURATION: 30 SEC.
- CHARGER SUITABLE FOR A 12V/3Ah BATTERY.

TECHNICAL CHARACTERISTICS:

1. POWER SUPPLY: 17VAC/2A MAINS TRANSFORMER (NOT INCLUDED IN THE KIT).
2. OPERATION VOLTAGE: 13.8 V DC
3. POWER CONSUMPTION AT IDLE: 35 mA
4. MAXIMUM RELAY CURRENT: 10 A

CIRCUIT ANALYSIS:

As discussed earlier, the kit is based on a microcontroller, the PIC 12C508, executing most of the alarm's functions and commands, thus reducing the need of additional components to a minimum.

We will describe how the circuit is working in three sections:

1. THE POWER SUPPLY

The 17 VAC from the mains transformer are converted to DC by the 4 rectifier diodes D1 to D4 connected in bridge mode. After that bridge, the voltage is connected in parallel to the capacitors C1 and C2 in order to smooth out any riplle present at this point. Then it is driven to the voltage regulator LM317T (IC2). This IC is protected by the D5, D6 diodes and the R2 resistor.

A network consisiting of the R1 resistor, C3 capacitor and P1 trimmer is connected to the ADJ pin of IC2 in order to adjust the supply voltage exactly to 13.8 Volts DC. This voltage is smoothed once more by the C4 and C4 capacitors and then it is connected to terminals 6 and 4 (positive) and 5 and 3 (negative). Using terminals 5 and 6 you can supply with voltage any active sensors like radars. From terminals 3 and 4 a siren battery can be charged safely through the fuse.

The LM7805 (IC3) and capacitors C6 to C9 provide the necessary 5 Volts for the microcontroller.

As for the system's clock, no crystal is needed, because the system has its own internal oscillator.

The L1 LED is an on – off indicator of the alarm. To turn the alarm on you must connect a key switch to the terminals 10 and 11 (microcontroller's pin 4).

2. SIGNAL TRACING OF THE ALARM SYSTEM

The system's sensors of any kind must be connected between terminals 12 and 14 for the direct zone and terminals 13 and 14 for the delayed zone.

3. THE OUTPUTS

When the alarm is triggered, the Q1 transistor is activated from the pin 2 (GP5) of the microcontroller. the relay is closing the contact and the siren starts to sound.

Diode D8 is connected in parallel to the relay's coil to protect the Q1 transistor from the inductive voltage that occurs the moment the relay is activated.

The capacitor connected between the pin 1 (VDD) and 8 (VSS) of the microcontroller removes the «noise» from the power supply voltage.

ASSEMBLY

After recognizing all the items of the parts list, start the assembly by soldering the non polar devices like the resistors, pins, IC base, trimmer, fuse holder, ceramic and polyester capacitors. These items are rather insensitive to heat.

Continue by soldering – watching carefully for the correct polarity – the diodes, the transistor, the LEDs and the voltage regulators. The rear side of these regulators is marked on the PCB with a thick line. The last item to be soldered is the relay.

Put the fuseholder in place and insert a 2 Amperes fuse. Fit the heat sinking device to the IC2 voltage regulator. Then fix the combination of the two on the PCB, using the existing holes and screws.

The microcontroller must be placed on its base, with the indication gap facing the C10 electrolytic capacitor, after every other device is already soldered in place.

CONNECTIONS

Connect the 17 Volts output of the transformer to terminals 1 and 2 of the PCB. Then connect the output of a 12 Volt battery to terminals 3 (0) and 4 (+) of the PCB. From terminals 5 (-) and 6 (+) you can supply voltage to the infrared detectors. A simple siren must be connected to terminals 7 (A1) and 9 (-), while a self powered siren must be connected to terminals 8 (A2) and 9 (-)..This type of siren is activated when its power supply voltage is switched off.

For the connection of the various types of sensors, the next steps must be followed:

- Connect the power supply of the radars to terminals 5 (0) an 6 (13V) and the detecting circuit to terminals 13 and 14 (COM). This zone is delayed, meaning that it triggers the alarm after a certain period of time and also, when the system is activated, it inserts a time delay before the siren starts to sound.
- The other zone, which is a direct zone, is connected to terminals 12 and 14 (COM). You can connect magnetic, vibration sensitive or mercury contacts and also ultrasonic detectors to this zone.
- A key switch is connected to treminals 10 and 11.

Make a thorough check, and if everything is O.K., turn the key switch on.

OPERATION

1. **Stand-by mode.**
   The key switch is off, no LED is lit and no alarm can be detected.
2. **Enable mode.**
   To put the alarm in this mode, turn the key switch on. The microcontroller checks all zones, and if they are not triggered the LED2 is illuminated. Then the microcontroller starts sweeping the zones, checking for any triggering signal after the exit time has expired.
   At this point we have to mention that the alarm will not be enabled if a sensor is open when you turn on the key switch and the LED2 will not illuminate.

Suppose that a violation occurs in zone 1. This zone is direct, so we expect the following to happen:

1. LED1 will be lit and the siren will start to sound.
2. After the alarm duration time (preset to 30 seconds) has expired, the siren will stop and the LED1 will be off again. The LED1 and the siren are always activated together. If you turn the key switch off, the siren will stop sounding.

Now suppose that a violation occurs in zone 2. This zone is delayed, so we expect the following to happen:

1. The LED1 will illuminate immediately.
2. When the delay time expires, the siren will start to sound.
3. After the alarm duration time (preset to 30 seconds) has expired, the siren will stop and the LED1 will be off again. The LED1 and the siren are always activated together. If you turn the key switch off, the siren will stop sounding.

Note that you have the ability to check if a violation or an attempt occurred during your absense, by checking the status of LED1. As mentioned before, this LED will lit when the alarm is activated and will go off along with the siren. The difference is that when you turn the alarm off the LED will illuminate if there was a violation when you were not present.

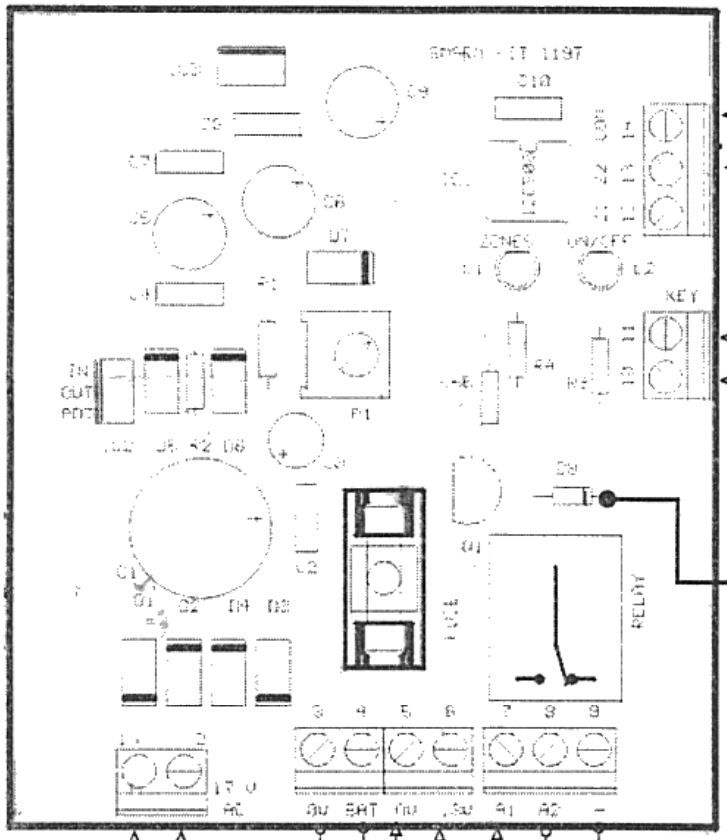
If all the above seems like Greek to you, just have in mind the following:

1. *Use the key switch to turn the alarm on and off.*
2. *LED2 is illuminated every time the alarm is activated.*
3. *The siren sounds when the alarm is activated and stops after 30 seconds.*

IF IT DOESN'T WORK..

- Make sure that everything is placed and connected properly, especially the jumpers. Check the positions of the components and see that there are no components missing or inserted in wrong place.
- Check your soldering for possible dry joints. Bridges across adjacent tracks or soldering flux residues usually cause problems. Clean the PCB with a cleaning spray or acetone (e.g. PCM 200 from ELECTROLUBE). Cleaning the PCB also helps finding the problem more easily and faster.
- Make sure that the power supply has the correct voltage and polarity.
- Check your project for faulty or damaged components.
- Check the polarity of diodes, electrolytic capacitors, LEDs and the voltage regulators observing the silkscreen and the schematic supplied with the kit. Also check that the voltage regulators have not changed places to one another.
- Check the micro controller for correct placing. Also examine its pins for possible damage when inserting it to the base.
- Pull out the micro controller and check that the 5 Volts are present to pin No 1 of the IC's base.

If everything is checked and your project still does not work, please contact Smart kit's distributor in your area or country and their service will repair it for you.



MAIN
KEY
SWITCH

330µF

ATTENTION
YOU MUST CONNECT
A 330µF CAPACITOR
AT CATHODE OF D8 (+)
AND NEGATIVE RAIL (-)

TRANSFORMER
SECONDARY 17V

12V
2Ah

BATTERY

SIREN

PASSIVE I.R. DETECTOR

NOTE
IN ZONES 1 AND 2 YOU CAN
CONNECT ANY NORMALLY
CLOSED DETECTORS AS
RADARS, SHOCK SENSORS,
VIBRATORS, MERCURY SWITCHES
OR PASSIVE INFRARED DETECTORS
THE ZONES HAVE INSTANT ACTIVATION

MAGNETIC
SWITCH

SOCK
SENSORS

SELF POWERED SIREN