KIT 131. SOLID STATE VOICE RECORDER

Solid state recording systems are no longer confined to toys and other gadgets thanks to the continuing development of IC's that deliver an output that sounds almost natural. The IC in this project - APR9301 - is probably a copy of the ISD chip type, one of which we use in our Kit 64. The IC manufacturer describes it thus:
Invox' proprietary analog/multi-leval storage technology is implemented in advanced Flash non-volatile memory cells, each of which can typically store more than 256 voltage levels. The APR9301 stores and reproduces voice signals in their natural forms, eliminating the distortion that is often introduced by encoding and compression.

The IC has outputs to directly drive a 16 ohm speaker but to give a higher sound level and to allow the inclusion of a volume control, this project includes an LM386 audio amplifier IC. Sound is recorded via an electret microphone, and recording is done by holding down the hatkey switch while you want to record (that is, level activated.) A LED lights while recording is in progress. The message is retained in the IC even after the power is removed; it is **non-volatile**.

Playback occurs when the zippy tact switch is momentarily pressed (that is, edge activated.) Playback only plays back the last recorded message. Playback is always from the start of the message. It can be interrupted by pressing the play button. Pad for both record and playback are available for switches located remote from the PCB. As you can see from the schematic both record and play is achieved by taking a pin on the IC to ground.

Resistor R1 sets the sampling frequency and hence the record duration. As you would expect the longer the recording time, the lower the sampling rate and hence the poorer quality the sound. The 56K resistor supplied gives 20 seconds of godd quality sound. 67K will give 24 seconds. 89K will give 30 seconds.

The APR9031 is designed to operate at 5V, up to a maximum of 7V. It draws a standby current of 1uA. But the LM38 takes about 5mA in standby mode so idf the circuit is run from a battery you bettery provide a switch. Remember that the message remains stored in the IC even when the power is completely removed.

Construction. Several components are fitted under the IC to save space so an IC socket must be used. Take care to get the polarity of the LED &electrolytic capacitors around the correct way. Align the flat on the hatkey switch with the flat as indicated on the PCB overlay. Pads have been provided to locate the Play and Record switches some distance from the PCB if that is desired. We have not supplied a speaker since most hobbyists will have one.

Operation. The record system is very sensitive. You do not have to shout into the microphone from 6 inches away as many people seem to want to do when a microphone is put in front of them! The LED should go on when you push the Record switch. If it does not work check the alignment of all components.

This project was published in *Electronics Australia* magazine, january 1999. (Note that that original article contained an error. The C11 capacitor at 10uF was wrong. It should have been 0.1uF. The Zobel network is not required for the LM386-N1 so we removed it from our circuit.)

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Component Listing

Resistors 5%, carbon film		
470R yellow violet brown	R5 R6	2
1K brown black red	R2 R4	2
4K7 yellow violet red	R7	1
56K green blue orange	R1	1
220K red red yellow	R3	1
10K 103 Koa trimpot		1
100n 104 monoblok	C1 C3 C6 C7 C10	5
100uF 16V mini ecap	C4 C5 C8 C9	4
4.7uF ecap	C2	1
APR9301 IC	IC1	1
LM386N-1	IC2	1
28 pin IC socket		1
8 pin IC socket		1
Electret microphone		1
5mm LED		1
Zippy tact switch		1
Hatkey switch		1
Kit 131 PCB		1

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