DIY Kit188. 40 Second Voice Recorder Module

This kit is the replacement for K146, our previous 40 second voice recorder module. This kit used the now obsolete ISD2540 chip. K188 uses the ISD1740 chip. It has much the same specifications as the previous chip but with some extra features that make it easier to use.

The ISD1700 series of chips offer a wide range of message durations, ranging from 30 seconds up to 240 seconds depending on the chip. The sampling frequency of each chip can also be adjusted from 4 kHz to 12 kHz with an external resistor, giving greater flexibility in duration versus recording quality.

Recordings are stored in on-chip Flash memory, providing non-volatile storage when power is removed. The audio data is stored directly without digital compression, which provides better quality voice and music reproduction.

These chips are designed for operation in either standalone or microcontroller (SPI) mode. This kit provides interfaces for both.

SPECIFICATIONS & FEATURES	
Operating Voltage	8 to 24VDC (see text)
Sampling Frequency	8 kHz default (see text)
Message Length	40 seconds @ 8 kHz (see text)
Standalone Mode	Yes
SPI Mode interface	Yes
Input Source	Onboard electret microphone Analog Line In
Outputs	Direct drive to 8 ohm speaker Analog Aux Output
Visual Indicator	Onboard LED Stays ON during recording BLINKS during playback, etc.

KIT ASSEMBLY
Before starting, check the components supplied in the kit against the parts list.

NOTE: Some components are mounted inside the IC socket. Please ensure that these are pushed all the way into the PCB so they don't interfere with the IC when inserted into the socket.

NOTE: The 5-pin header X3 is not required for standalone operation and has not been supplied.

It is recommended that components be inserted and soldered in the following order:

1. All the resistors and diode D2
2. All the 100nF mono capacitors.
3. The 28 pin IC socket
4. The LED and 78L05 regulator.
5. Slide switch S7
6. Electrolytic capacitors C3, C4 and C10 (4.7uF).
7. The electret microphone
8. Audio jacks X1 and X5
9. Screw terminal block X4
10. Pushbutton switches S1-6
11. DC jack X2
12. Electrolytic capacitor C11 (100uF)

Do not insert the IC into its socket yet. Connect a 9 to 12VDC supply to the kit and measure the voltage across pin 1 (+) and pin 28 (-). It should read 5 volts approx.

If OK then remove power and insert the IC. Take care not to bend any of the IC pins when doing so.

OPERATION
Operating control is via six (6) pushbuttons and one (1) slide switch, as follows:

LINE/MIC	Slide switch to select recording source between external source (LINE) or onboard microphone (MIC)
RECORD	Press and hold to start a new recording. LED is ON during recording. Release when done.
PLAY	Plays the current message. Press and hold to play each message sequentially. LED blinks during playback.
ERASE	Press to erase the current message. LED blinks twice then turns off. Press and hold to erase ALL messages. LED blinks twice, stops then blinks another seven (7) times then turns off.
FWD	Advance to next message.
VOL	Change playback volume in eight (8) steps.
RESET	Return to the default state

NOTE: Each pushbutton has an associated pair of pads next to it. These are for connecting any externally mounted switches or pushbuttons. They simply connect across the onboard pushbuttons. Use either 2-pin headers or solder directly to the PCB.

CONNECTORS

Power Supply	2.5mm DC jack, center positive
Line In	3.5mm mono audio jack. Use for connecting to external audio source such as MP3 player or PC sound card. Slide switch must be set to 'LINE' position.
Aux Output	3.5mm mono audio jack. Use for connecting to external power amplifier.
Speaker	2-way screw terminal block

OPERATING VOLTAGE
The kit has an onboard 5V regulator, allowing it to run from an 8V to 24V DC power source. However the chip itself has an operating voltage range of 2.4V to 5.5V, making it suitable for battery powered applications.

To use these lower voltages the onboard 5V regulator can be omitted and a wire link soldered across the two (2) outer pins. Take care not to short to the centre pin. If the

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regulator is already soldered in then it can be left in place and the wire link added as above.

Diode D2 is used to provide protection against reverse polarity connection of the power supply. This diode will drop around 0.6 volts. It can also be omitted or 'shorted out' if necessary for battery operation.

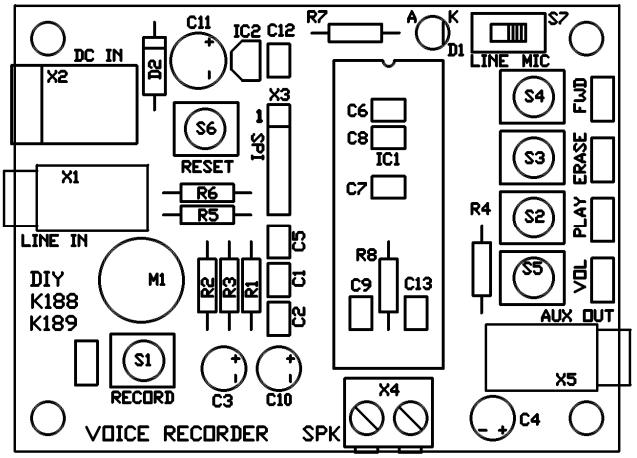
SAMPLING FREQUENCY & MESSAGE LENGTH
The message length of the chip is dependent on the sampling frequency used. Reducing the sampling frequency will increase the message length but with reduced audio quality. This will not be a problem with many applications.

The sampling frequency is set by an external resistor, R4. The resistor supplied, 82K, sets the sampling frequency at 8 kHz which is the 'default' setting. Use the following chart to change the sampling frequency and hence the message length.

Sampling Frequency	Message Length	Resistor (R4) Value
12 kHz	26 secs	53 kΩ
8 kHz	40 secs	80 kΩ
6.4 kHz	50 secs	100 kΩ
5.3 kHz	60 secs	120 kΩ
4 kHz	80 secs	160 kΩ

SPI MODE
SPI mode allows full control of the chip via the serial interface. This includes random access to any location inside the memory array by specifying the start and end address. SPI mode also allows access to an internal register for configuration of audio paths, inputs, outputs and mixing.

The PCB allows for a 5-pin header, labeled X3, to be added so that a microcontroller can be used to control the chip. Please refer to the datasheet for further details. This header is not required for standalone operation and has not been supplied.



TROUBLESHOOTING
Most faults are due to assembly or soldering errors. Verify that you have the right components in the right place.

Inspect your work carefully under a bright light. The solder joints should have a 'shiny' look about them. Check that there are no solder bridges between adjacent pads.

Check that no IC pins are bent up under the body of the IC. This can sometimes happen when inserting ICs into sockets.

DATASHEET
A datasheet and for the ISD1700 series chips can be downloaded from the ISD website at
www.winbond-usa.com/products/isd_products/chipcorder

CONTACT DETAILS
For our full range of kits see our website at
http://www.qkits.com
Kit developer: **http://www.ozitronics.com**

PARTS LIST – K188

Resistors (0.25W carbon film unless specified)

390R	R8	1
470R	R5	1
1K	R6,7	2
4K7	R1,2,3	3
82K	R4	1

Capacitors

100nF mono, 0.1"	C1,2,5,6,7,8,9,12,13	9
4.7uF 16V electrolytic	C3,4,10	3
100uF 25V electrolytic	C11	1

Semiconductors

LED, 3mm, red	D1	1
1N4004	D2	1
ISD1740 ChipCorder	IC1	1
78L05 5V regulator	IC2	1

Miscellaneous

Electret microphone	M1	1
Pushbutton switch 'Zippy' type, long stem	S1,2,3,4,5,6	6
Slide switch, SPDT	S7	1
DC jack, 2.5mm PCB mtg	X2	1
Audio jack, 3.5mm Mono, PCB mtg	X1,5	2
Screw terminal block 2-way	X4	1
IC socket, 28 pin, for IC1		1
K188/K189 PCB		1

~~**NOTE:**~~ 5-pin header X3 is not required for standalone operation and has not been supplied.

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