

Segments	B1 setting	B0 setting	Start Time (second)	NOTES
Segment 0	0	0	0	B0 or B1 connected to VCC = logic 1 B0 or B1 connected to VSS = Logic 0
Segment 1	0	1	5	
Segment 2	1	0	10	
Segment 3	1	1	15	

2 Sound recording and replaying

Recording and replaying a single message

For QX-RFLM-10, QX-RFLM-20 and QX-RD1-20 with B0 and B1 both connected permanently to ground, you can only record and play one sound message.

Press and hold RECORD switch causes the module to record sound. While recording is in progress, the LED illuminates. Recording is terminated either by releasing the RECORD switch or by that the recording time exceeds 10 or 20 seconds depending on versions. The recorded message can be shorter than 20 seconds. When RECORD switch is released, an end-of-message is written into the sound memory to indicate the end of the message. When RECORD switch is pressed, the module always enters the record mode regardless of the modes the module was in.

During recording, users can either record sound via the microphone or via the audio line in (Vana pin). When the audio line in is used, the input signal level should be < 100 mV p-p. It is also a common practice to use a 0.1 uF capacitor before the Vana pin to block any DC presented in the audio signal.

After recording, when pressing PLAYE switch, the module replays the complete recorded sound from the beginning of the recording to the end (the length of message depends on how long the RECORD button is pressed and it is always less than 20 seconds). . Sound is replayed at the low-going transition of the PLAYE line. There is no need to hold PLAYE switch during sound replaying. To stop playing, Press PLAYL switch.

Press and hold PLAYL switch enable the module to replay the sound from the beginning. Release the switch stops it replaying.

Recording and replaying multi-segmental messages

With QX-RD1-20, you can record and replay up to 4 sound messages by using B0 and B1. Before recording, select a segment using B0 and B1 pins first, then press and hold RECORD button to record sound. Recording is terminated either by releasing the RECORD switch or the sound memory is full. If the button is pressed longer than 5 seconds, sound will be recorded in the following segment. When the RECORD switch is released, an end-of-message mark is written into the sound memory. From the above description, we can see that in order to record 4 separate messages, the following procedures should be taken:

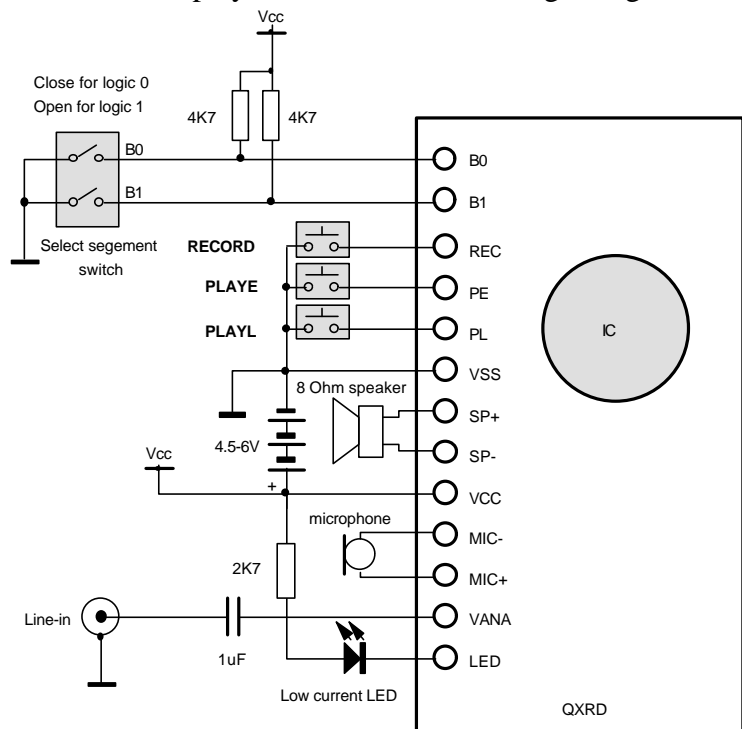


Figure 2 Typical connections of QX-R. Speaker used here is 8 Ohm.

B0=0 B1=0 Press RECORD less than 5 seconds to record 1st message
 B0=1 B1=0 Press RECORD less than 5 seconds to record 2nd message
 B0=0 B1=1 Press RECORD less than 5 seconds to record 3rd message
 B0=1 B1=1 Press RECORD less than 5 seconds to record 4th message

If RECORD switch is pressed for more than 5 seconds, the end-of-message marker will be placed in the next segment. As a result, you lose one sound segment.

To replay the sound segment, B0 and B1 are specified first, then press the PLAYE switch. Sound is replayed at the low-going transition of the PLAYE line. During replaying, the module replays sound from the start of a segment (as specified by B0 and B1) to the end-of-message marker. In order to have 4 separate messages, there should be an end-of-message marker in each segment.

Let us see the following example in which the end-of-message marker is in the 2nd segment. When playing the 1st segment (B0=0, B1=0), the message will be longer than 5 seconds (it will go through the 1st segment and stops in the 2nd segment). When playing the message in the 2nd segment, the message will be played from the start of the 2nd segment to the marker.

3 Output amplification

An 8 to 16 Ohm speaker can be connected directly to the module. To boost the audio output, LM386 audio amplifier can be used. Circuits using the LM386 are shown in Figure 3. Other audio amplifier can be also used.

4 Tips to obtain better sound quality

1. Use a good quality 8 Ohm speaker with a cavity such as speakers for computer sound systems. Do not use a bare speaker which gives you degraded sound.
2. For better sound quality, speak with a distance to the on-board microphone and speak clearly. Also keep the background noise as low as possible. Record your sound in a quiet room.
3. For best sound quality, use the Vana pin (Audio Line In). The audio signal is injected into the module between Vana and Ground.

5 Support

We supply ready-made amplifiers, electret microphones and LM386. We also supply other sound recorder modules. See our website for details.

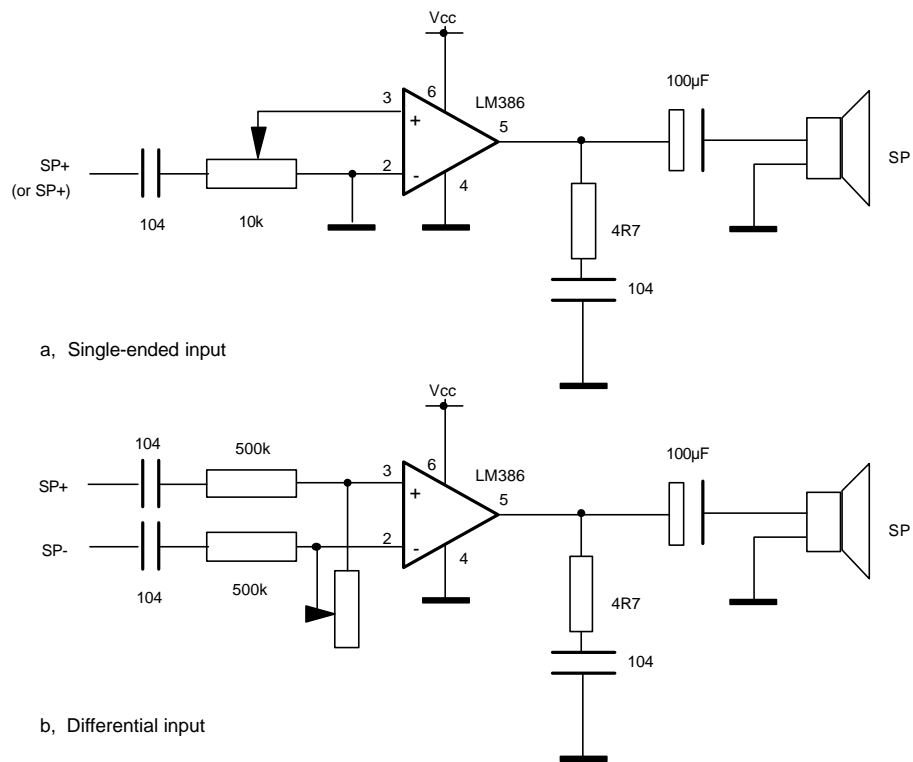
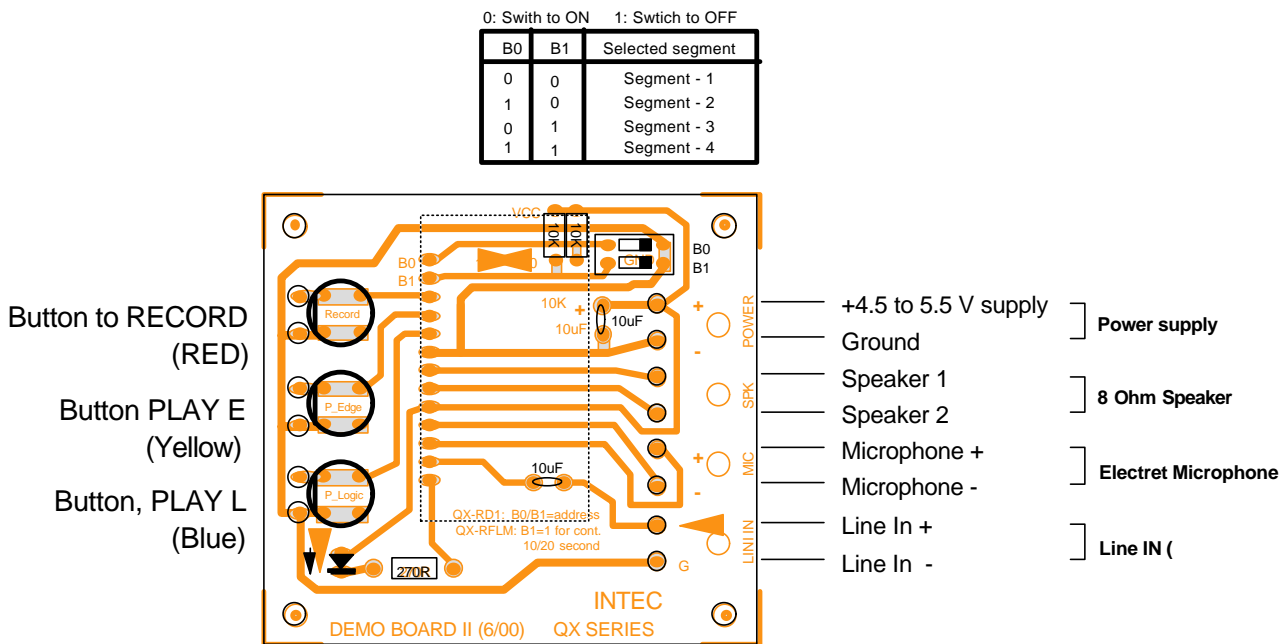


Figure 3 Amplification circuits

6 Experimental board

The experimental board allows users to evaluate the module with ease.



B0 and B1 settings:

For 20 second 4 segment module QX-RD1-20, B0 and B1 select a segment of sound

For 10/20 second 1 segment module (QX-RFLM-10 and QX-RFLM-20),

B1 switched to right for single-shot sound play.

B1 switched to left for continuous sound play

B0 is not used for these modules

7 Application circuits

Basic circuit

Figure 2 gives the circuit diagram for basic operation. The circuit can be used for a simple message memo.

Circuit for continuous play of a sound track

It is often required that a sound track is played again and again. A circuit shown in Figure 4 can be used for such a purpose. In that circuit, the LED pin is connected to a 555 mono-stable and the output from the mono-stable is connected to the PLAYE pin. The LED pin is normally at logic high (LED is off). After a complete message is played, the pin generates a short low-going pulse. The LED flashes and the signal triggers the mono-stable. The output of the mono-stable goes high for a pre-set period of time then becomes low. At the high-to-low transition on the PLAYE pin, the sound track is played again. The delay period is determined by R and C values.

To record message, just press RECORD switch. In this circuit B0 and B1 are pulled to ground. So the message length can be up to 20 seconds.

Circuit for recording and playing 4 sound tracks

Figure 5 shows a circuit that allows one of 4 sound tracks to play by pressing one of 4 switches. The circuit is based on a standard CMOS logic IC, CD4532 keyboard encoder. It converts 8 parallel

data (D0 to D7) into a binary data on Q0, Q1 and Q2 pins. D0 through to D7 are pulled down to ground via pull-down resistors (RL). While no switch is pressed, Q0, Q1 and Q2 output zero. Q_{gs} pin is also at low. If a segment-select switch is pressed, the corresponding line (D0 to D3) becomes high. Q0 and Q1 output a binary data, which supply the address bits for B0 and B1. While the switch is pressed, Q_{gs} pin also goes high. When the switch is released, Q_{gs} pin goes low. At the transition from logic high to low, the module replays the sound stored in that particular segment.

In order to play 4 sound tracks, 4 separate sound tracks must be stored in each segment. This is done by holding a segment-select switch and pressing the RECORD switch the same time. The record time for each segment must be less than 5 seconds.

Audio amplifiers

An 8 to 16 Ohm speaker can be connected to the module. To boost audio output, LM386 or other types of audio amplifier can be used. Circuits using an LM386 IC are shown in Figure 3. Figure 6 shows a circuit diagram using a hybrid audio amplifier (see details of these amplifiers at www.intec-group.co.uk).

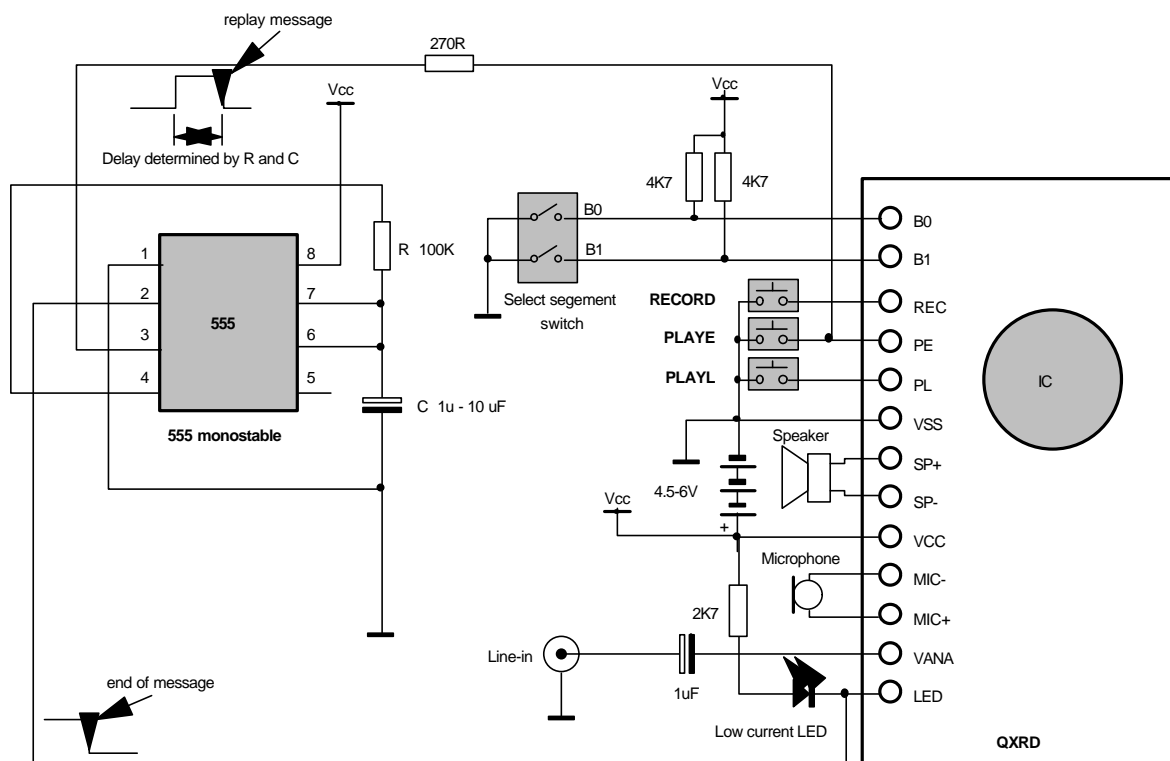


Figure 4. A 555 mono-stable circuit is used here to enable the QXR to play a sound track continuously.

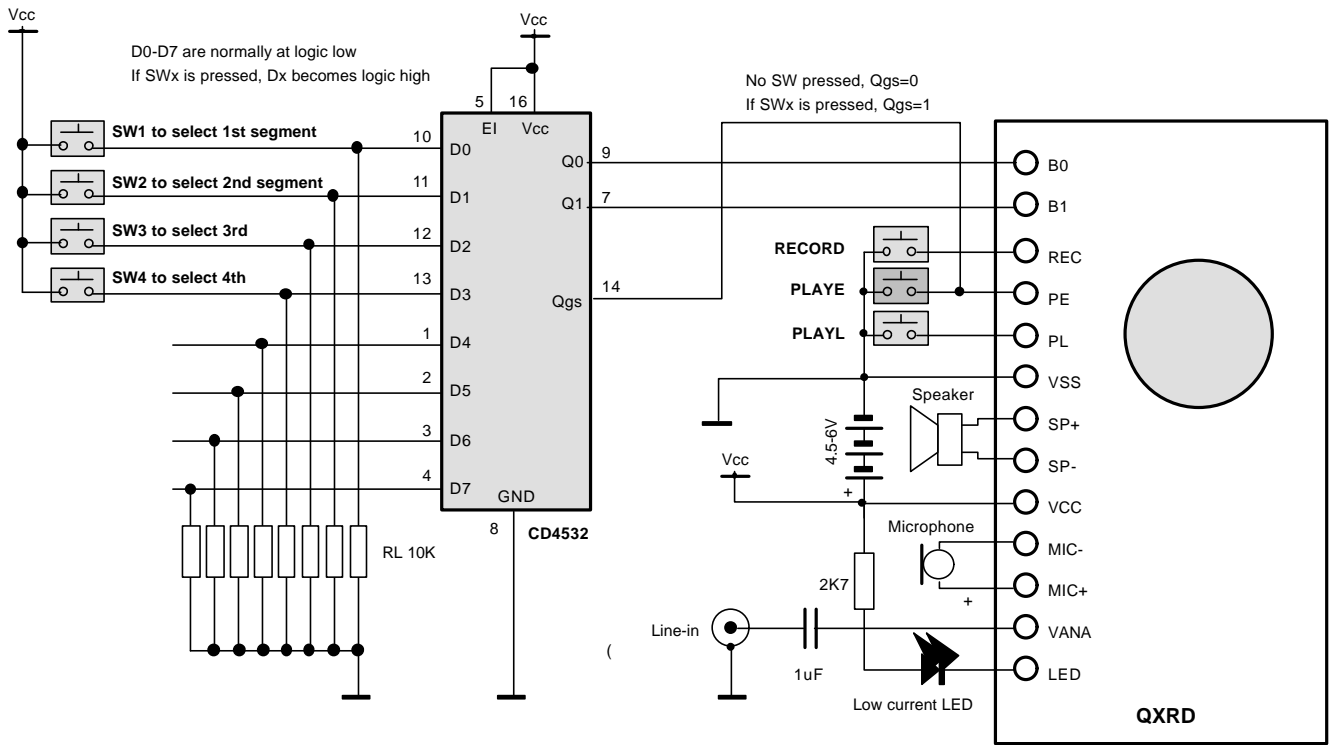


Figure 5. Application circuit to play 4 messages. CD4532 is a CMOS keyboard encoder IC.

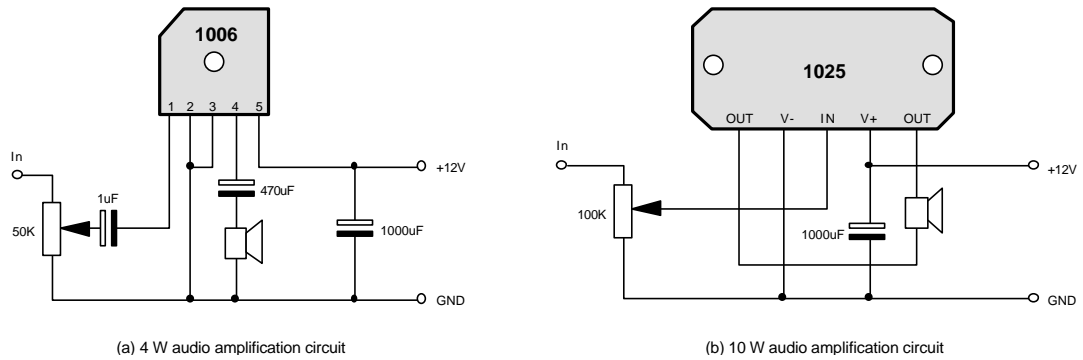


Figure 6. Two circuits (4W and 10W version) using hybrid audio amplifiers. In both circuits, the speaker is 4Ohm to 8 Ohm.

