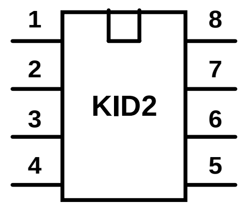
K1EL Single Chip Morse Identifier and K-ID Kit K-ID2

FEATURES

- Seven Triggered Messages
- PTT Output: High true (TTL Level)
- Key Output: High true (TTL Level)
- Sidetone: (800 Hz Square Wave)
- Single Trigger or Repeat (beacon)
- Timed key down
- Timed key up (delay)
- Lowfer QRSS speed support: .02, .04, .2, .4 WPM
- Operating Voltage: 3.3 to 5 VDC, built in oscillator
- Power Consumption: < 5 ma
- Fixed WPM rate set at factory (5 to 40 WPM)
- Fixed message contents programmed at factory

DESCRIPTION

The K-ID is a single chip CW Identifier unit that provides seven pre-progammed messages that can be played when triggered or repeated at a fixed interval. The K-ID uses a Microchip PIC12F629 single chip microprocessor and requires minimal components for operation.



Pin 1: Vcc
Pin 2: PTT Out
Pin 3: Sidetone Output
Pin 4: Trigger 2 Input
Pin 5: Key Output
Pin 6: Trigger 1 Input
Pin 7: Trigger 0 Input
Pin 8: Ground

Introduction

The K-ID was designed to fulfill a need for an inexpensive CW Identifier that can be used in a variety of applications from repeater ID'ers to HF beacons, Fox transmitter controllers, or balloon message generators.

Three inputs are used to select one of seven pre-programmed hard coded CW messages. Each message is pre-programmed to the purchaser's specification. There are a total of 512 characters of message memory available that can be divided up into seven message slots. Asserting a binary code on the message inputs triggers a message to be played. The following table illustrates how selection works:

Trigger 2	Trigger 1	Trigger 0	Message Played
1	1	1	None
1	1	0	Message 1
1	0	1	Message 2
1	0	0	Message 3
0	1	1	Message 4
0	1	0	Message 5
0	0	1	Message 6
0	0	0	Message 7

Table 1 – Message Selection Matrix

K-ID has built in pull up resistors on the Trig0 and Trig1 input lines so that no external components are required on these pins in most applications. Trig2 does not have an internal pull-up so this must be supplied externally. If you choose message slots that don't use Trig2 you can tie Trig2 high and save adding a pullup. (This means you can only use message slots 1, 2, and 3) The Key and PTT outputs are high true TTL outputs that are intended to be used to drive open collector output transistor stages. The outputs can be used without buffering and provide a sink current of 25 Ma when asserted low and 25 Ma source current when asserted high.

Triggered Message Mode

A CW ID can be sent on demand by switching the trigger inputs to ground momentarily. The message selected is determined by the binary combination of trigger inputs pulled low per Table 1. There must be less than 100 µSec skew between the trigger inputs and they must be kept asserted for at least 500 µSec. In Fig 1, the code 010 is asserted which selects message 5 which contains the letter I (two dits). Note that the PTT line is asserted first and it can be used to power up a transmitter. After PTT has been asserted for 500 milliseconds, the key output is asserted for each dit interval and accompanying sidetone is generated. After the message completes there is a short delay of a few microseconds before PTT is de-asserted. Note that the trigger inputs are ignored until after PTT de-asserts. A new trigger input will be captured at that time. A nice feature of Triggered mode is that when the trigger inputs are de-asserted, the PIC goes into low power sleep mode and consumes just a few microamps of current. Watch out for leakage paths in your design which can cancel this out.

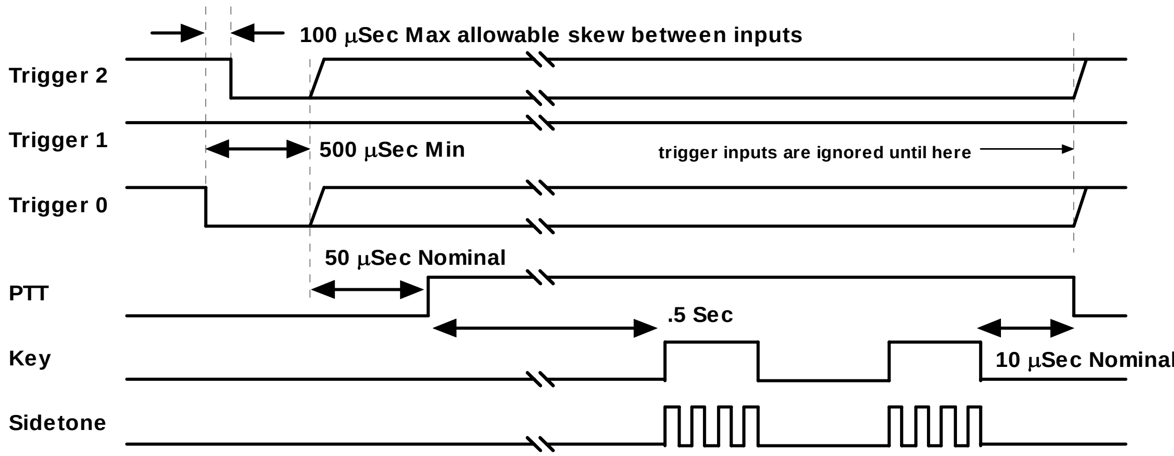


Figure 1 – Triggered Message Mode

Beacon Repeat Mode

Normally the trigger input lines are strobed with a low going pulse of short duration to trigger a single message output. If the input lines are continually asserted then the selected message will repeat continuously. To implement a beacon that occurs at a fixed interval, a delay is placed at the beginning, somewhere in the middle, or at the end of a message. The time interval can be in the range of 5 seconds to 10 minutes. Multiple delays can be placed in one message. In addition, key down intervals can also be placed in a message. When the K-ID2 encounters a delay in the message, PTT is de-asserted during the delay interval. When the delay expires, PTT is re-asserted and after a 500 millisecond delay, keying resumes. This allows a transmitter to be switched off during the delay time. When a key down interval is encountered, PTT is held asserted for the entire key down interval. Note that the K-ID2 will not go into sleep mode if its trigger inputs are continuously asserted.

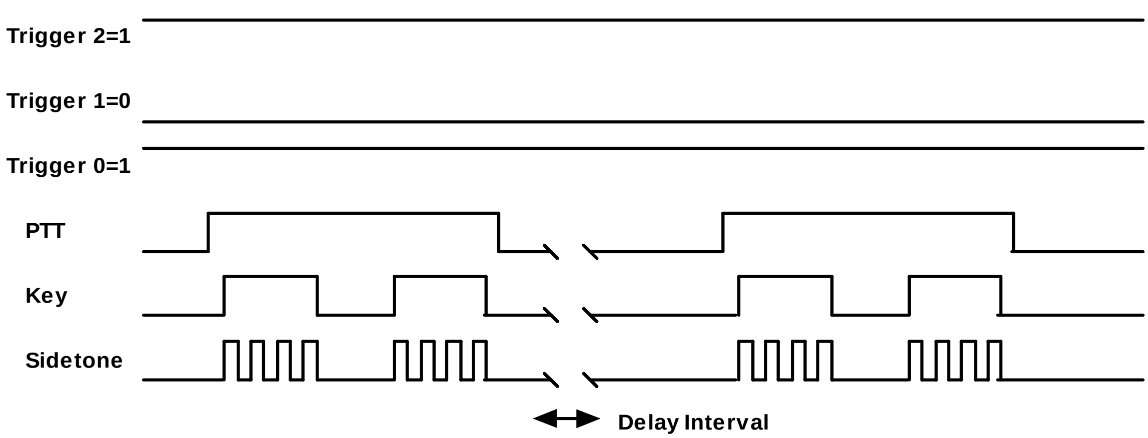


Figure 2 – Continuous Beacon Mode

Beacon Message Examples

```
BCON DE K1EL FN43 <delay 120 sec>
<key down 10 sec><delay 1 sec> BCON DE K1EL <delay 30 sec>
BCON DE K1EL<delay 60 sec>K1EL FN43<delay 60 sec>QSL K1EL AT ARRL.ORG<delay 60 sec>
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Accuracy

K-ID2 uses the internal oscillator inside the PIC12F629 as a timebase for CW speed and interval measurement. This oscillator is accurate to +/- 5% with a regulated supply. This means that the WPM rate and time interval will be accurate to the same degree.

PTT Delay

After a message trigger is asserted, the PTT output is immediately asserted followed by a fixed delay of about 500 mSec. After this delay the message output starts. After the message finishes the PTT output is de-asserted after approximately 10 µSec.

Trigger Input Considerations

The K-ID2 inputs are limited to TTL levels only. If trigger voltages higher than Vcc + .5V are to be used to trigger the K-ID2 inputs, use an NPN transistor stage to protect the K-ID2. Fig. 3 shows one possibility:

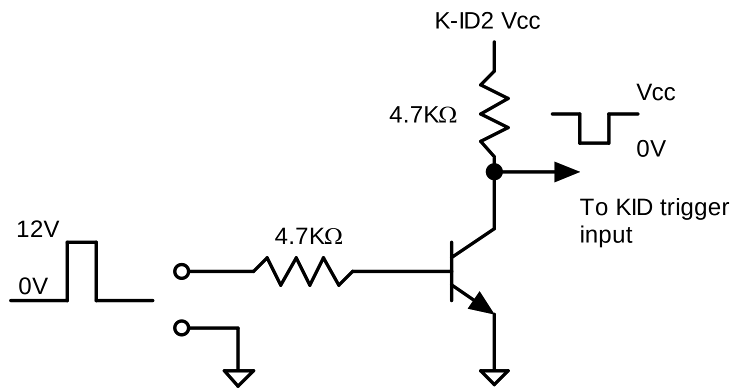

Figure 3 – Input Level Translation Example

Ordering Information

When ordering a K-ID2 please submit the desired programming information for each message. The total length of all messages added together must be less than 512 characters. Include Key Down or Delay intervals in the message. Please don't forget to include the default code speed for non-QRSS messages. ***Only one non-QRSS speed can be specified.*** Specify delays in increments of 1, 5, or 30 seconds.

Here is an example of how to submit the programming data:

Default Code Speed: 20 WPM
Message1: K1EL BEACON XR455 <keydown for 5 seconds> <pause for 120 seconds>
Message2: K1EL XBN <keydown for 10 seconds> <pause for 10 seconds>
Message3: K1EL BEDFORD NH
Message4: K1EL K1EL K1EL <keydown for 10 seconds>
Message5: K1EL
Message6: K1EL BCN <pause for 10 secs> K1EL BCN <pause for 120 seconds>
Message7: <keydown for 30 seconds>

If message 1 is sent continually there will be a 120 second pause between each transmission, this is how a beacon interval can be implemented. Message 2 will repeat every 10 seconds. Alternatively you could have a message like Message 3 which has no pause at the end. You could repeat this at whatever spacing you like by triggering the message from an external controller. Note that PTT is released during pauses.

For Lowfer applications four fixed super slow sending speeds are supported:
.2 WPM (1 dit = 6 secs) .02 WPM (1dit = 1minute) .4 WPM (1 dit = 3 secs) .04 WPM (1 dit = 30 secs)

To specify a slow speed setting in a message, format it like this:
Message1: <Set .2 WPM> K1EL XBN
Message2: <Set .02 WPM> K1EL XBN <Reset Speed> K1EL FN43

Message 1 will be sent at .2 WPM, message 2 has two parts, the first part sent at .02 WPM and a second part which is a quick ID sent at the normal WPM setting.

K-ID2 Application Examples

Figure 4 is a schematic of a CW Identifier using a minimum of components. In this application the K-ID is used as a pushbutton triggered CW ID'er. Its PTT output is used to enable a transmitter and the Key is used for on/off keyed CW. Message 3 is selected when the pushbutton is pressed since both the trigger 0 and 1 inputs are asserted simultaneously. The sidetone output is not used. Unused trigger input 2 needs to be pulled up since it is the only trigger input that does not have an internal pull-up resistor to keep it at logic one (high). Always include the .1 µF bypass cap to decouple the K-ID2's power supply pins, place the cap as close to the pins as practical.

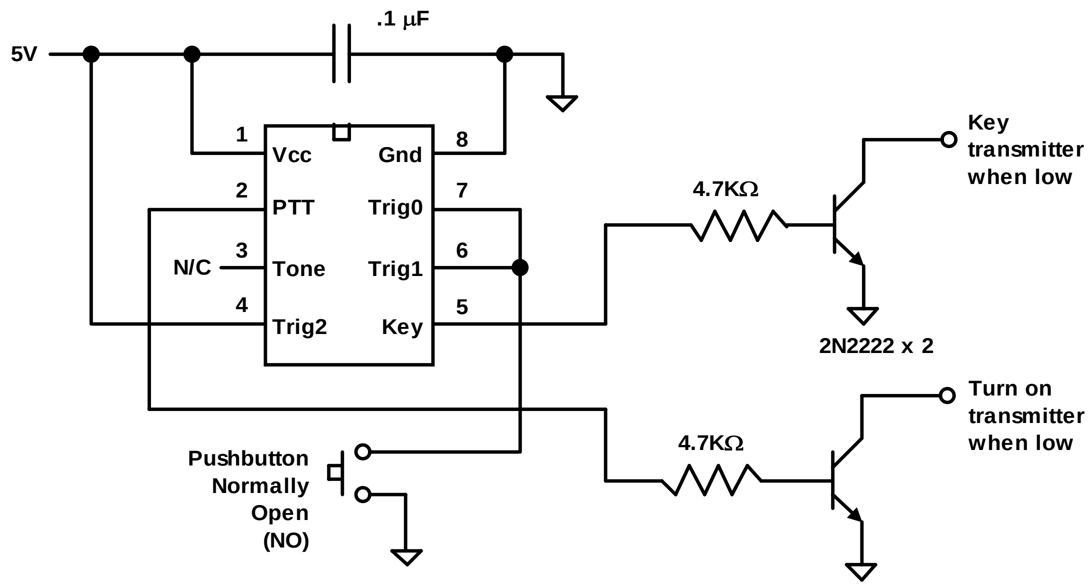

Figure 4 – Single Message Trigger Example

Figure 5 illustrates a simple way to select multiple messages using diode switching. Note that since the Trig2 input is being used it needs an external pull-up. Make sure you use normally open push-button switches, often times really inexpensive pushbuttons are normally closed. (that's why they were cheap !)

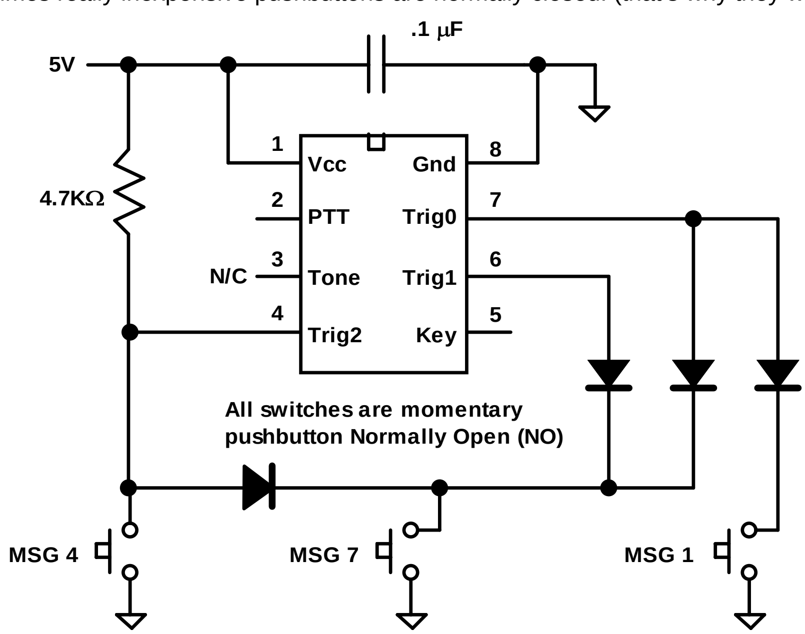

Figure 5 – Multiple message selection

Figure 6 shows a K-ID2 being controlled by a separate microcontroller. This could be another PIC or other device. Configure the microcontroller pins that drive the K-ID2 as outputs. A pull-up resistor on Trig2 is not required since the microcontroller's outputs will never float in normal operation and always rest constant high or low.

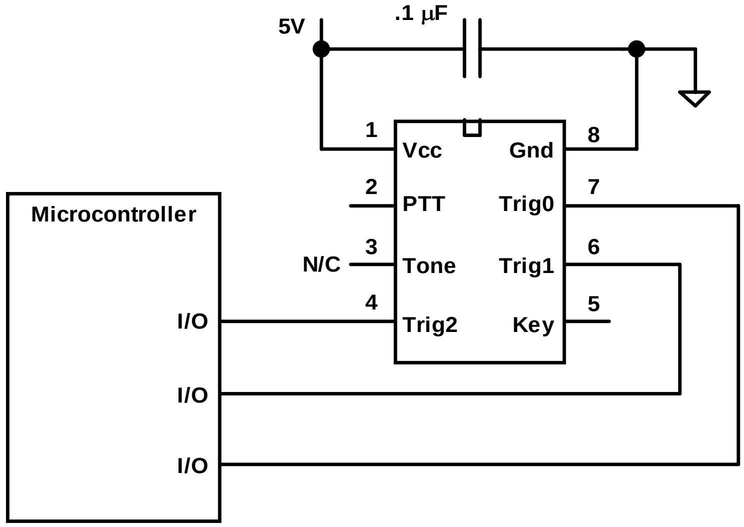

Figure 6 – K-ID2 controlled by Microcontroller

The K-ID2 keyer is fully guaranteed, if you are not satisfied please return the K-ID2 for a full refund. Please post questions on the K1EL Yahoo message group (see www.k1el.com for details)

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Watch the K1EL Website for latest updates and new product offerings: http://www.k1el.com

Revision History

Chip Rev A Original Release
Chip Rev B Revamped to allow longer messages.

K-ID PCB Kit Construction

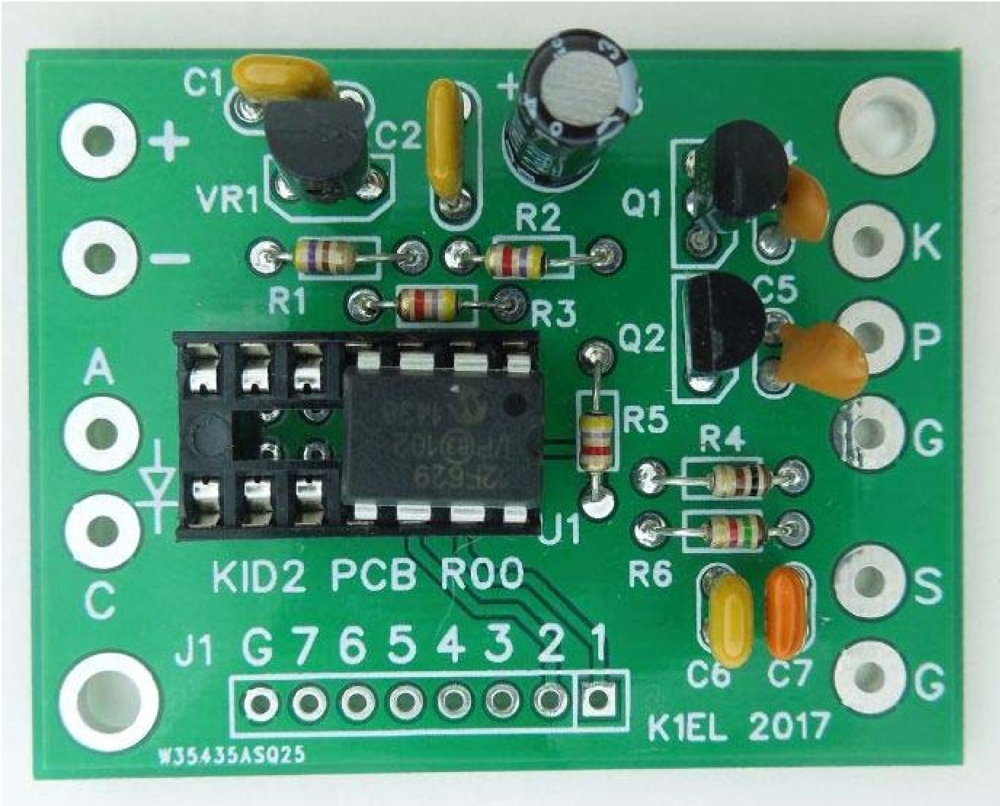


Figure 7 – Assembled K-ID PC Board

K-ID PC Board Introduction

This part of the manual will describe the assembly and testing of the K-ID PC board. The board is designed to support the K-ID2 IC as described in the first part of the manual. It will also support the KID3 IC that will be available in early 2018.

Building the K-ID kit is quite easy. All components are through hole to make it easy. It will take a beginner about an hour to build the kit, previous soldering experience is suggested.

KID PCB Features

- On board regulated 5 volt supply accepts a supply voltage between 7 and 13 VDC on the **+** and **-** pads.
- Open collector **K** (Key) and **P** (PTT) outputs utilizing a 2N7000 MOSFET buffer.
- Filtered sidetone audio that can be fed to an audio amplifer.
- Seven message input triggers. In KID2 mode only pads 1-3 are used as binary coded inputs. In KID3 mode these are seven individual message triggers
- LED interface on the **A** and **C** pads. An on board current limiting resistor sets LED current at 10 mA.

Parts Inventory

U1	-	K-ID IC (8 DIP or 14 DIP)
VR1	-	LM78L05 5.0V regulator TO92
R1, 4	-	470Ω 1/8 watt (yellow violet brown)
R2, 3, 5	-	4.7KΩ 1/8 watt (yellow violet red)
R6	-	1K 1/8 watt (brown black red)
S1	-	14 pin DIP socket

C3	-	22 uF electrolytic capacitor
C1, C2	-	.01 uF ceramic capacitor, 103
C6, 7	-	.1 uF ceramic capacitor, 104
C4, C5	-	.001 uF ceramic disk cap, 102
Q1, Q2	-	2N7000 MOSFET, TO92
PC1	-	KID printed circuit board
LED	-	Used for testing or as monitor

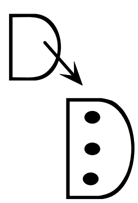
PCB Assembly

1) Install resistors, R1 - R6. Color codes noted above. If in doubt, verify value with a multimeter. Trim leads after soldering.

2) Install the 14 pin DIP socket at U1, locate the notch in the socket to match the PCB silkscreen.

3) Install Ceramic Capacitors: C1, C2, C4, C5, C6, and C7. These are marked as follows:
.001 uF = 102, .01 uF = 103, .1 uF = 104
Trim leads after soldering.

4) Install Q1, Q2, and VR1 and trim leads after soldering. Align parts as shown below:

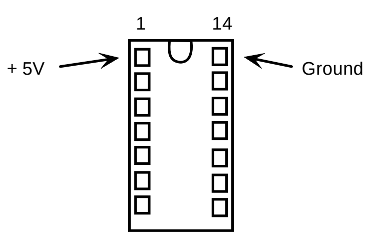


5) Install Electrolytic capacitor C3. **Observe polarity** : Long lead goes in the square hole. Trim leads after soldering.

6) Attach power supply wire leads to the **+** and **–** pads of the PC board, this is the power supply connection. If possible use red for + and black for –

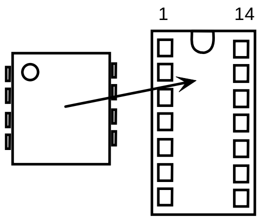
7) Connect supply wires to a DC power supply set to 9 V. (any value between 7V and 13V is OK). Make sure power supply is initially off. Observe power supply polarity, **+** lead goes to positive **-** lead goes to ground.

8) Turn power on and verify that there is +5V between pins 1 and 14 of the socket. Pin 1 should be positive with respect to pin 14. Turn power off.



9) An optional LED can be populated in the A and C pads. A = Anode, C = cathode.

10) Install U1 (KID IC) align pin one of the IC with pin 1 of the socket as shown in this diagram:



KID2, DIP8 shown

The KID2, which is in an 8 pin package, will reside in the upper part of the socket. Please reference the picture on page 6 for clarification.

11) Apply power and temporarily connect J1 pad 1 to ground (G) with a resistor lead or wire. If you have an LED connected, you will see it light in sync with the Morse message in slot 1. Measure the K pad to ground with a multi-meter, you should see continuity change with the Morse message. Measure the P pad and it will be continuously connected to ground.

12) Finishing up. The K-ID board can be mounted in a separate enclosure or in an existing enclosure with other equipment. Connect the DC power supply, a power on/off switch can be included if desired.

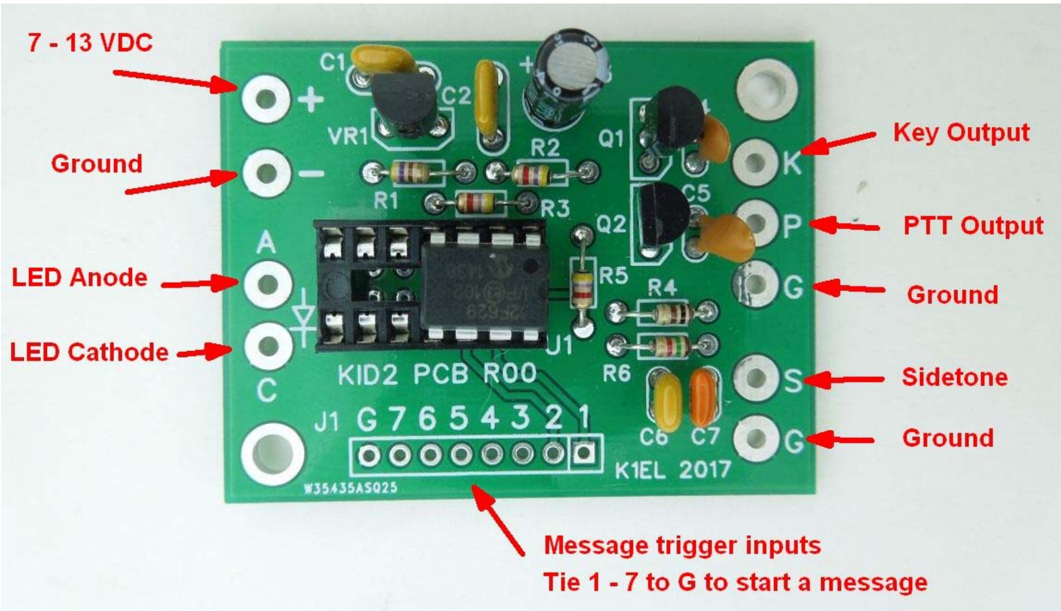


Figure 8 – K-ID PC Connections

KID PCB Schematics