



**KANGA  
PRODUCTS**

# AUDIO FILTER & MUTE CIRCUIT – SUDDEN 2

## *Construction Documentation:*

*Two – stage active audio filter to improve reception*

*Wide bandwidth for SSB reception.*

*Narrow bandwidth for CW reception*

*Mute circuit for use with a transmitter*

*Adjustable mute bypass for sidetone reception*

*All on-board components, connectors, leads included*

*Detailed instructions and diagrams*

Tick the box after fitting each part

X	Part	Value	Markings	Notes
<input type="checkbox"/>	R11	10K Ohm	Brown, Black, Orange, Gold	
<input type="checkbox"/>	R12	22k Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R13	22K Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R14	22K Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R15	1k5 Ohm	Brown, Green, red, Gold	
<input type="checkbox"/>	R16	22k Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R17	22K Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R18	22K Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R19	220 Ohm	Red, Red, Orange, Gold	
<input type="checkbox"/>	R20	100K Ohm	Brown, Black, Yellow, Gold	
<input type="checkbox"/>	R21	100K Ohm	Brown, Black, Yellow, Gold	
<input type="checkbox"/>	R22	10K Ohm	Brown, Black, Orange, Gold	
<input type="checkbox"/>	VR4	1K Ohm	102 - Yellow Pre-set	Blue maybe supplied
<input type="checkbox"/>	C23	100nF	104 - Light brown disc	
<input type="checkbox"/>	C24	100nF	104 - Light brown disc	
<input type="checkbox"/>	C25	1nF	102 - Blue dipped ceramic	
<input type="checkbox"/>	C26	10nF	103 - Blue or Yellow dipped ceramic 0.2"	
<input type="checkbox"/>	C27	100nF	104 - Blue dipped ceramic	
<input type="checkbox"/>	C28	100nF	104 - Blue dipped ceramic	
<input type="checkbox"/>	C29	10nF	103 - Blue or Yellow dipped ceramic 0.1"	
<input type="checkbox"/>	C30	1nF	102 - Blue dipped ceramic	
<input type="checkbox"/>	C31	10nF	103 - Blue or Yellow dipped ceramic 0.2"	
<input type="checkbox"/>	C32	100nF	104 - Blue dipped ceramic	
<input type="checkbox"/>	C33	10uF	10uF 16v	Observe polarity
<input type="checkbox"/>	IC4 Socket		See notes for correct placing	
<input type="checkbox"/>	IC5 Socket		See notes for correct placing	
<input type="checkbox"/>	P4	4 Pin Plug & Header	See notes for correct placing	
<input type="checkbox"/>	IC4	4066	See notes for correct placing	
<input type="checkbox"/>	IC5	NE5532	See notes for correct placing	

**Notice that C29 has a smaller body and closer lead spacing than C26 and C31**

<input type="checkbox"/>	R23	1M Ohm	Brown, Black, Green, Gold
<input type="checkbox"/>	R24	1M Ohm	Brown, Black, Green, Gold
<input type="checkbox"/>	R25	1M Ohm	Brown, Black, Green, Gold

**These are required for Audible click modification - See notes**

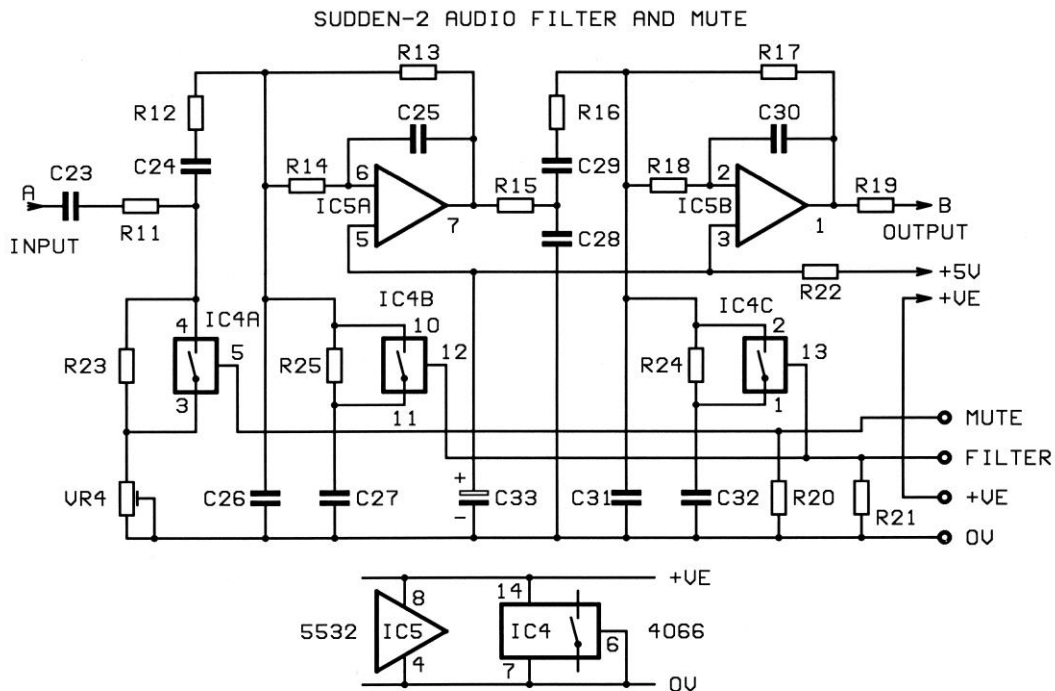
Before starting this kit please ensure that the SUDDEN – 2 Receiver is working correctly. This will make trouble shooting easier, with fewer components on the PCB. Now check components against the supplied list, if there are any missing or damaged parts please contact Kanga Products so that a replacement can be provided. If all is well, you can now continue.

## Filter & Mute Circuit Theory

The audio filter consists of two operational amplifier bandpass filters connected in cascade (see Fig.1). The bandwidth can be made narrower for CW reception by connecting C27 in parallel with C26 and C32 in parallel with C31. Two CMOS switches, IC4B and IC4C, do this when their control inputs (pins 12 & 13) are connected to battery positive line. R24 and R25 maintain the charge on C27 and C32 to prevent an audible click when the filter bandwidth is changed.

The mute circuit uses a third CMOS switch, IC4A, to divert most of the audio input signal through VR4 to ground. Use a spare pole on the transmit/receive change over switch or a relay to connect the receiver's battery positive line to the mute control input.

Fig 1.

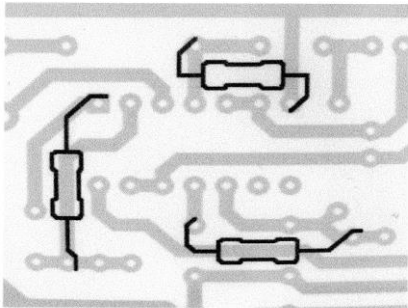


## CONSTRUCTION: Audio Filter and Mute

Un-solder and remove the wire links A-A and B-B which bypass the Filter and Mute circuit. Fit the components in the order they appear in the component list into their position marked on the PCB. Solder them in place and trim off any excess wire. The white band on the body of the Electrolytic Capacitor C33 must line up with the – sign printed on the PCB. P4, IC4 and IC5 MUST be fitted as shown, not reversed. Use the sockets provided for IC4 and IC5, aligning the notch in one end of the socket to the semicircle printed on the PCB. When handling all IC's please ensure you use Anti-Static precautions as you again you can damage the IC's.

### **Modification to prevent audible clicks when changing bandwidth.**

*Now confirm if you have an issue 2 or issue 3 board, this will printed on the underside of the PCB. If you have a issue three you can miss this section, and fit the three resistors to the top of the board. Places are marked for them.*



When the filter bandwidth is switched from wide to narrow, the sudden connection of C27 and C32 can cause a loud click in the Headphones. This can be prevented by soldering three 1M Ohm resistors to the underside of the PCB, beneath IC4. Bend the resistor leads as shown, and trim to length and solder into place.

## The Control Input Connector

Connect the 4 – way lead to the control Plug P4. The functions of the leads are:

- Black – Connected internally to battery negative (0v)
- Red – Connected internally to switched battery positive (+v)
- Green – Filter control input
- Blue – Mute control input

R20 and R21 pull the mute and filter control inputs to 0v. In this condition the filter is set for wide bandwidth and the mute circuit is off. Connect the filter control input to battery positive via a switch to select narrow bandwidth. Connect the mute control input to battery positive to mute the receiver during transmission. The antenna should be disconnected from the SUDDEN – 2 during transmission, using a switch or antenna change over. Kanga products can provide a Antenna Change Over kit.

The mute circuit greatly reduces the sensitivity of the SUDDEN – 2 during transmission. The pre-set control VR4 allows a small sample of transmitted signal to be heard as a sidetone.

## Audio Filter and Mute Circuit Component Positions

(Components fitted previously are shown with thinner outlines)

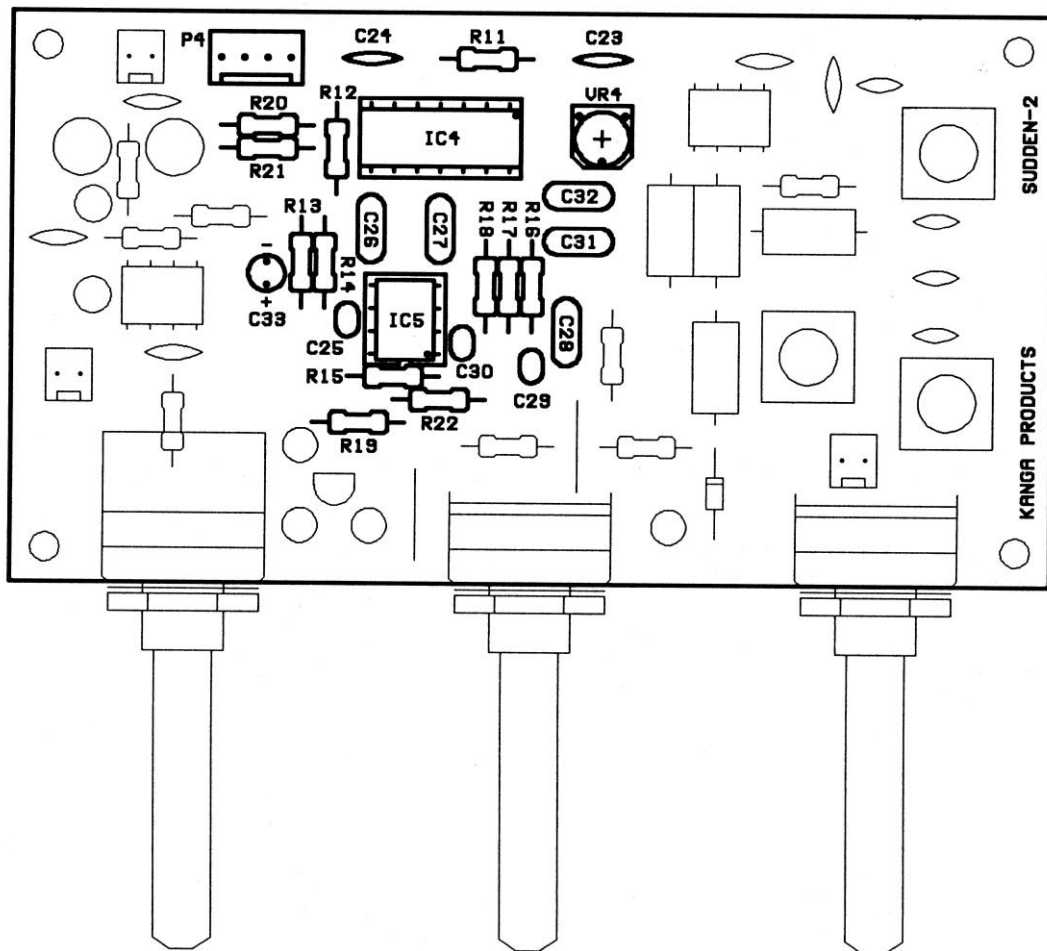


Fig 2.

## Testing the Audio Filter and Mute

Connect headphones, antenna, control cable and battery to the SUDDEN – 2 and switch on. Tune up and down the band to find a signal. Temporarily connect the blue wire of the control cable to the red wire. Notice the signal strength is reduced and may be adjusted by VR4. Now connect the green wire to the red wire and notice the bandwidth of the audio signal is reduced, making it more suitable for CW reception.

The black (0v) lead is not needed for switching either filter or mute circuit, but a “**power on**” LED (not supplied) can be connected between the red and black leads, using a suitable current limiting resistor in series.

## Using the SUDDEN – 2 with a transmitter

The diagram below shows connections for the SUDDEN – 2 when used with a transmitter. Switch S1 selects narrow/wide filter bandwidth. Switch S2 has two poles. S2A operates the mute circuit and optional transmit and receive LEDs. The current-limiting resistors in series with LEDs should be 1K Ohm to 47K Ohm. S2B switches the antenna between the receiver and transmitter. When in the transmit mode, some energy from the transmitter will reach the SUDDEN – 2’s input stage through stray capacitance of S2B. The two diodes across the input connector P1 limit this voltage to safe level. Schottky diodes such as BAT42 are a suitable type to use.

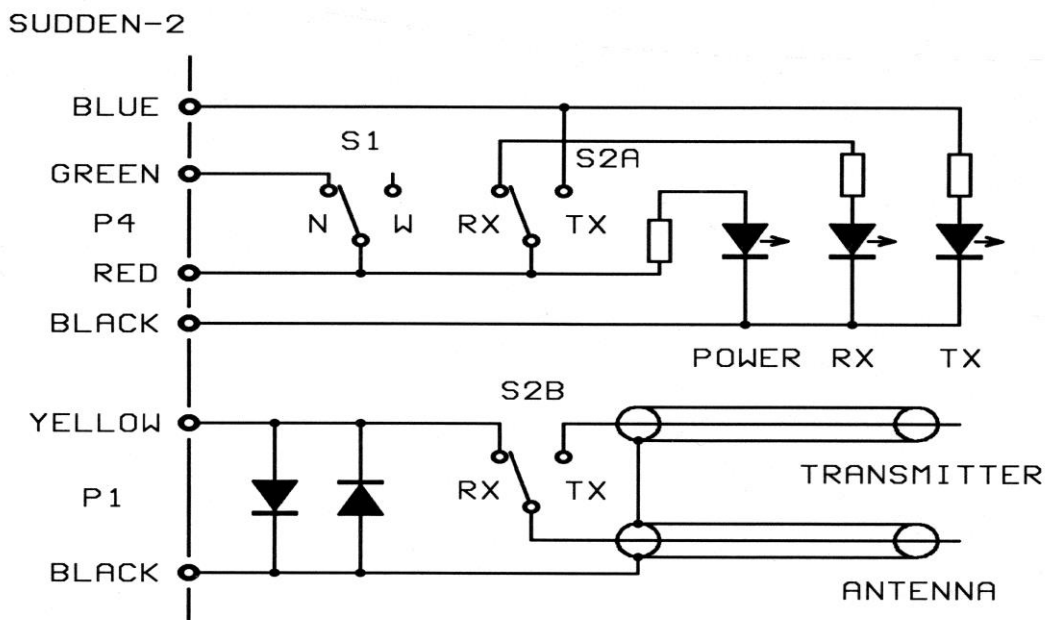


Fig 3