



KANGA PRODUCTS

THE SUDDEN-2 DIRECT CONVERSION 40m RECEIVER



The SUDDEN Direct Conversion Receiver created by the Rev. George Dobbs G3RJV, appeared in SPRAT (Autumn 1989) and has been a very popular club project ever since.

The SUDDEN-2 is based on the original SUDDEN with the following differences:

- Tuned circuits use Toko type coils or toroids and trimmer capacitors
- Oscillator is tuned by potentiometer and variable capacitance diode
- RF Attenuator, Tuning Control and AF Gain Control are mounted on the PCB
- AF Gain Control incorporates the Power Switch.
- AF Amplifier has hiss-reducing components
- Power, Antenna and Headphone connections are made via plugs and sockets
- 9 volt or 12 volt operation
- Optional switched-bandwidth audio filter and mute may be added (*See Picture*)
- PCB has solder mask and white screen-printing to make construction easier

Firstly check you have all components against the components listed for each section. You may find that a direct replacement part has been substituted. This is due to the ever increasing change in electronic component manufacture or components becoming obsolete. These changes will be noted in the component list. If a component is missing or damaged please contact Kanga Products for a replacement.

Stage 1: Audio Amplifier

Start by assembling and testing the audio amplifier. Fit the components in the order listed into their positions marked on the board, solder in place and trim off excess wire. The white band on the body of the electrolytic capacitors must line up with the – sign printed on the board. IC1, IC3, P2 and P3 must be fitted as shown by the white out line.

The wire links A-A and B-B bypass the optional filter circuit.

Fit these now even if you intend to add the filter at a later stage.

STAGE 1. Tick the box after fitting each part

<input checked="" type="checkbox"/>	Part	Value	Markings	Notes
<input type="checkbox"/>	R7	10k Ω	Brown, Black, Orange, Gold	
<input type="checkbox"/>	R8	22 Ω	Red, Red, Black, Gold	
<input type="checkbox"/>	R9	15 Ω	Brown, Green, Black, Gold	
<input type="checkbox"/>	R10	33k Ω	Orange, Orange, Orange, Gold	
<input type="checkbox"/>	C12	1 μ F	1 μ F	Observe polarity
<input type="checkbox"/>	C13	1 μ F	1 μ F	Observe polarity
<input type="checkbox"/>	C15	10 μ F	10 μ F	Observe polarity
<input type="checkbox"/>	C16	2n2F	222 (5mm)	
<input type="checkbox"/>	C17	100 μ F	100 μ F	Observe polarity
<input type="checkbox"/>	C18	10 μ F	10 μ F	Observe polarity
<input type="checkbox"/>	C19	100nF	104	
<input type="checkbox"/>	C20	10nF	103 (5mm)	
<input type="checkbox"/>	C21	10 μ F	10 μ F	Observe polarity
<input type="checkbox"/>	C22	100 μ F	100 μ F	Observe polarity
<input type="checkbox"/>	IC1	78L05	78L05	
<input type="checkbox"/>	IC3	LM386	LM386	Observe pin 1
<input type="checkbox"/>	P2	Molex	Plug/Header - Headphones	2-Pin Blue/Orange Lead
<input type="checkbox"/>	P3	Molex	Plug/Header - Power	2-Pin Black/Red Lead
<input type="checkbox"/>	Wire link A-A			
<input type="checkbox"/>	Wire link B-B			
<input type="checkbox"/>	VR3 with Switch	10KB		Bracket already fitted

When fitting VR3 (and VR2 and VR1 later) remove the nut and washer, fit one of the brackets over the threaded bush and re-fit the washer and nut. See fig. 1.

(The brackets may already be fitted)

Solder the three potentiometer pins to the board first, check that the potentiometer spindle is parallel with the board, and then solder the four bracket pins. Link the lower two terminals of the switch to the holes in the board below them with tinned copper wire trimmed from a resistor.

Plug the Blue/Orange lead on to P3 and connect its free ends to low impedance headphones or small loudspeaker. ***Do not wear the headphones for this test!*** Plug the Black/Red lead on to P2 and connect to a 9 volt supply. Turn the spindle of VR3 fully clock wise (maximum volume) and "***touch Wire Link A-A with fingertip***". A low humming sound should now be heard in the headphones, this indicates that the amplifier is working. Disconnect all the leads.

Notes

Stage 2: Tuning circuit

Now assemble and test the tuning circuit. Fit the parts in the order listed below.

Tick the box after fitting each part

<input type="checkbox"/>	Part	Value	Markings	Notes
<input type="checkbox"/>	R2	10Ω	Brown, Black, Black, Gold	
<input type="checkbox"/>	R3		Wire Link	
<input type="checkbox"/>	R4		Wire Link	
<input type="checkbox"/>	R5	1k5Ω	Brown, Green, Red, Gold	
<input type="checkbox"/>	R6	100kΩ	Brown, Black, Yellow, Gold	
<input type="checkbox"/>	D1	6v2	BZX79C6V2	Band goes to end marked †
<input type="checkbox"/>	D2		Not used in 40m Version	
<input type="checkbox"/>	C14	1μF Tantalum	1μF0 35	Yellow or Blue bead-Observe polarity
<input type="checkbox"/>	VR2	10k Linear	10KA	Bracket already fitted

The + mark on C14 indicates the positive lead, which should go through the hole marked + on the PCB. A Zener diode is used as the tuning device. Two are required for the 80m and 30m versions.

Connect the battery lead and battery again and switch on. Connect the negative lead of a voltmeter to the bracket of VR2 and the positive lead to the lower end of R2. The voltage should be 5 volts. Now move the positive lead of the meter to the left-hand end of R6. Turn the spindle of VR2 fully anticlockwise. The voltage should read 0 volts. Turn the spindle or VR2 slowly clockwise. The voltage should rise to 5 volts. Disconnect the battery.

Stage 3: RF Filter and Mixer

Now assemble and test the RF stage. Fit the remaining parts in the order listed below into their positions marked on the board, solder them in place and trim off excess wire.

Tick the box after fitting each part

<input type="checkbox"/>	Part	Value	Markings	Notes
<input type="checkbox"/>	R1	27KΩ	Red, Violet, Orange, Gold	
<input type="checkbox"/>	C1	100pF	101	Ceramic (2.5mm)
<input type="checkbox"/>	C2	100pF	101	Ceramic (2.5mm)
<input type="checkbox"/>	C3	8.2pF	8.2 (2.5mm)	Ceramic (5mm maybe supplied)
<input type="checkbox"/>	C4	100pF	101	Ceramic (2.5mm)
<input type="checkbox"/>	C5	10nF	103	Ceramic (5mm)
<input type="checkbox"/>	C6	100nF	104	Ceramic
<input type="checkbox"/>	C7	680pF	680J Polystyrene	If possible polystyrene capacitors
<input type="checkbox"/>	C8	680pF	680J Polystyrene	will be provided for C7 to C10
<input type="checkbox"/>	C9	270pF	270J Polystyrene	If these are not available, ceramic
<input type="checkbox"/>	C10		Not used	capacitors will be provided
<input type="checkbox"/>	C11	47pF	47	Ceramic (5mm)
<input type="checkbox"/>	T1	5U3H	5U3H	
<input type="checkbox"/>	T2	5U3H	5U3H	
<input type="checkbox"/>	T3	BKXNSK4173	41730	
<input type="checkbox"/>	P1	Molex Header/Plug		2 Pin Plug Yellow/Black wire
<input type="checkbox"/>	VR1	1k Linear	1KA	Bracket already fitted
<input type="checkbox"/>	IC2	SA602/SA612	SA602 or SA612	Either will be supplied due to availability

Figure 2 shows the completed SUDDEN-2 without optional audio filter.

Setting up the RF stage involves adjusting the oscillator frequency with T3 and aligning the input filter with T1 and T2. **(DO NOT USE A METAL SCREWDRIVER)** Use another receiver or a signal generator to set the oscillators frequency.

Using another receiver

Switch on the SUDDEN-2 Receiver. Set the tuning control (VR2) fully anticlockwise. Connect a wire to the other receiver's antenna and place it near the SUDDEN-2. Tune the second receiver up and down the 40m (7 MHz) band to find the oscillation from the SUDDEN-2. Use a nylon trimming tool **(DO NOT USE A METAL SCREWDRIVER)**, turn the core of T3 until the oscillator frequency is 7.000MHz. Turn VR2 fully clockwise, find the signal again and note the frequency on the receiver. The turning range should be approximately 7.000 to 7.150 MHz

Using a signal generator

Switch on the SUDDEN-2 and the signal generator (let the signal generator warm up first). Set the SUDDEN-2's tuning control (VR2) fully anticlockwise. Connect the Black/Yellow wires to P1. Connect a wire to the signal generator's output and place it near the Yellow wire. Tune the signal generator up and down the band until its signal is heard in the SUDDEN's headphones **(Be careful about the volume in the headphones)**. Now turn the core of T3, **(do not use a metal screwdriver)** also re-adjust the signal generators frequency until the signal is heard at the anticlockwise end of the tuning control this should be 7.000MHz. Turn VR2 fully clockwise, retune the signal generator until its signal is heard again, and note the frequency. The tuning range should be approximately 7.000 to 7.150 MHz

Peaking the input filter

Plug the Black/Yellow wires on to P1, connect the antenna (Yellow to antenna, black to ground) and find a signal near the middle of the tuning range. Turn the cores of T1 and T2 until the signal is loudest. Repeat this with a signal near the high-frequency end of the band (VR2 clockwise) and then with a signal near the low-frequency end. Finally adjust the cores again while listening to a signal near the middle of the band. If no signal can be heard on the bands use a signal generator to provide a weak signal. The SUDDEN-2 is now ready for use. The board may be mounted in a case by screws through the corner mounting holes or by the three potentiometer bushes fitted through 10mm panel holes.

Please Notes

In some cases there may be "steppiness" in the tuning range. This can be improved by increasing the value of C14 or, better still, replacing VR2 with high-quality 10k linear cermet potentiometer. For very fine tuning a 10-turn wirewound potentiometer can be used for VR2. The bandwidth of the input filter is quite narrow. It can be widened, at the expense of out-of-band rejection, by increasing the value of C3.