

## Jasper Synth Bill of Materials

Resistors ( $\Omega$ )		
10	5	R10, R11, R12, R13, R125
47	1	R88
470	4	R32, R62, R142, R150
1K	12	R19, R25, R74, R76, R78, R105, R116, R117, R143, R154, R153, R172
2K2	1	R16
3K3	4	R75, R79, R80, R110
3K9	2	R9*, R15*
4K7	2	R21, R22
5K6	2	R72, R141
10K	15	R1, R2, R3, R4, R8, R14, R38, R47, R48, R49, R85, R94, R95, R96, R115
15K	1	R130
18K	1	R37
22K	5	R77, R104, R108, R137, R151
33K	34	R17, R18, R23, R24, R29, R30, R31, R34, R35, R36, R39, R40, R51, R52, R63, R81, R82, R84, R97, R98, R103, R106, R107, R111, R119, R128, R131, R140, R113, R120, R121, R123, R156, R164
39K	1	R59
47K	8	R64, R65, R66, R101, R139, R148, R149, R152
56K	5	R42, R67, R68, R93, R114
68K	5	R56**, R99**, R155, R163**, R171**
91K	3	R50, R162, R170
100K	29	R5, R6, R7, R20, R26, R27, R28, R33, R53, R54, R73, R87, R109, R112, R127, R129, R132, R133, R134, R135, R136, R138, R144, R145, R146, R157, R161, R165, R169
120K	2	R43, R92
150K	5	R55, R70, R100, R124, R147
220K	5	R41, R44, R71, R86, R91
330K	7	R60, R102, R126, R158, R159, R166, R167
470K	4	R45, R61, R90, R122
560K	1	R69
1M	5	R46, R57, R58, R83, R89
2M2	1	R118
4M7	2	R160, R168

**Note:** All 1% 0.25W metal film through hole standard resistors

\* R9 and R15 may need changing to adjust master oscillator tuning (4K7 on silkscreen).

\*\* R56, R99, R163, R172 changed to 68K to adjust level of pulse/square when using osc vol pots. (150K on silkscreen)

Potentiometers			Possible Source
5K Lin	1	VR12	Smallbear Musikding
50K Lin	3	VR1, VR4, VR6	Smallbear Musikding
50K Log	1	VR13	Smallbear Musikding
50K Log	2	VR19, VR20	Oscillator volume – off PCB use 9mm pot Thonk Musikding
100K log	1	VR21	Audio input gain – off PCB use 9mm pot Thonk Musikding
1M Log	5	VR2, VR7, VR8, VR16, VR17	Smallbear Musikding
1M rev log	1	VR3	Smallbear Musikding
1M Lin	3	VR5, VR14, VR15	Smallbear Musikding
Dual 1M Log	1	VR11	Glide Smallbear Musikding
Switched 50K log	1	VR10	Omeg 47K Log DPST ECO16 CPC MCM
Switched 50K lin	1	VR9	Omeg 47K Lin DPST ECO16 CPC Conrad MCM
Switched 1M log	1	VR18	Omeg 1M Log DPST ECO16 CPC MCM (lin, but works)

**Note:** 4K7 and 47K can be used in place of 5K and 50K pots. Switched pots are Omeg ECO16 DPST.

Suitable Omeg switched pots for VR9, VR10 and VR18 are supplied with original PCB run

Most pots are 16mm Alpha vertical PCB mount pots with the legs straightened but pots with solder lugs can be used with stiff wire. See build guide.

VR19, VR20, VR21 are soldered to wires terminated in MTA100 connectors. Use small 9mm pots for these to enable adequate clearance with the PCB components underneath.

Presets			Possible Source
1K	1	PR1	6mm trimmer pot Mouser Farnell Bitsbox Tayda
22K	1	PR4	6mm trimmer pot (or 20K/25K) Mouser Farnell Bitsbox Tayda
50K	1	PR2	6mm trimmer pot (or 47K) Mouser Farnell Bitsbox Tayda
100K	1	PR140	6mm trimmer pot Mouser Farnell Bitsbox Tayda
50K	2	PR3, PR5	Thonk Song Huei tall trimmer 9mm pot Thonk
			or Piher 15mm trimmer with 19mm shaft Preset: Rapid Conrad
			Shaft: Rapid Conrad

**Note:** PR3 & PR5 are 9mm vertical pots or 15mm trimmers with long plastic shaft. Rest are 6mm PCB single turn trimmers.

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Switches			Possible Source
Rotary Switches	6	S1, S2, S3, S4, S5, S6	Rotary Switch 2pole x 6pos Alpha SR2612F or Lorlin CK1060.
Hold	1	S8	Hold mod SPST; could be slide; toggle or latching pushbutton. Use ultra-miniature toggle
Link Pwr	1	S7	Slide-Switch SPDT 2.54mm pitch or use jumper + header or leave unpopulated

**Note:** Rotary switches are Alpha/Lorlin PCB. Shorting (make before break) switches probably best as this may reduce clicks when switching.

Capacitors		Type + lead pitch	Possible Source
22pF	2	C43, C63	C0G ceramic 2.5mm
68pF	4	C11, C39, C46, C47	C0G ceramic 5mm
330pF	2	C6, C1	C0G ceramic 5mm
1nF	9	C12, C13, C18, C19, C33, C34, C37, C44, C45	Polyester film 5mm
6.8nF	2	C20, C22	Polyester film 5mm
10nF	3	C21, C23, C27	Polyester film 5mm
22nF	2	C16, C31	Polyester film 5mm
33nF	1	C40	Polyester film 5mm
47nF	1	C42	Polyester film 5mm
100nF	4	C2, C4, C7, C15	Polyester film 5mm
0.1uF	38	C41, C50, C57, C58, C59, C60, C61, C62, C64, C65, C66, C67, C68, C69, C70, C71, C72, C73, C74, C75, C76, C77, C78, C79, C80, C81, C82, C83, C84, C85, C86, C87, C88, C89, C90, C91, C92, C93	Decoupling capacitors. Ceramic 2.5mm. Part numbers are not marked in most cases, but are found near to ICs on the PCB.
220nF	4	C9, C10, C51, C52	Polyester film 5mm
470nF	5	C24, C48, C54, C55, C56	Polyester film 5mm
1uF	2	C36, C38	Polyester film 5mm
2.2uF	2	C17, C32	Electrolytic 2.5mm
4.7uF	8	C3, C5, C14, C25, C29, C30, C35, C53	Electrolytic 2.5mm
10uF	2	C26, C49	Electrolytic 2.5mm
220uF	1	C28	Electrolytic 3.5mm
330uF	1	C8	Electrolytic 3.5mm

Semiconductors			Possible Source
BC547B	3	TR3, TR4, TR5	or BC550 (NPN)
BC557B	2	TR1, TR2	or BC560 (PNP)
1N4001	1	D8	Or other 1N4000 series
1N4148	9	D1, D2, D3, D4, D5, D6, D7, D9, D10	Standard small signal diode
3mm LED	1	D11	High brightness type preferred, as uses less current

**Note:** 2N3904/2N3906 transistors will work fine – just place on board oriented 180° to silkscreen marking

**Note:** Adjust brightness of LED with R143

Integrated Circuits			Possible Source
LM386 or NJM386D	1	IC23	DIP8 – NJM386D available from Mouser. LM386 no longer made in PDIP by TI, but still available from several vendors and Ebay.
555	2	IC1, IC2	CMOS 555 like TLC555CP
LM3900	2	IC10, IC12	DIP14
CD4006	1	IC34	DIP14 Obsolete chip, obtainable NOS
CD4013	6	IC9, IC16, IC24, IC37, IC44, IC20	DIP14
CD4016	5	IC17, IC19, IC38, IC42, IC46	DIP14
CD4019	1	IC27	DIP16
CD4024	2	IC8, IC15	DIP14
CD4028	1	IC45	DIP16
CD4040	1	IC32	DIP16
CD4046	2	IC7, IC14	DIP16
CD4052	4	IC39, IC36, IC43, IC47	DIP16
CD4069UBE	8	IC5, IC11, IC18, IC22, IC35, IC41, IC48, IC49	DIP14
CD4070	1	IC33	DIP14
CD4071	2	IC28, IC29	DIP14
CD4081	2	IC21, IC40	DIP14
CD4503	1	IC31	DIP16
LM13700	2	IC6, IC3	DIP16
CD40103	2	IC25, IC26	DIP16
CD40174	1	IC30	DIP16
MCP1702-5002	1	IC13	LDO regulator

**Note:** 78L05 regulator *could* be used if carefully placed on board noting correct pinout.

**Note:** Jasper was tested using TLC555CP timer chips. If using other 555s you may need to adjust R9 & R15 to get correct tuning.

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IC Sockets			Possible Source
8 pin DIP socket	3	8 pin	Mouser Farnell Rapid
14 pin DIP socket	29	14 pin	Mouser Farnell Rapid
16 pin DIP socket	15	16 pin	Mouser Farnell Rapid

Sockets			Possible Source
Stereo PCB socket	3	J1, J2, J5	PCB audio sockets are Cliff-FCR1295 Farnell Rapid CPC
2.1mm PCB DC Jack	1	J3	Standard PCB DC power jack Mouser Farnell Rapid
Mini DIN 8pin PCB socket	2	P2, P4	Mouser Farnell Rapid

Inductor			Possible Source
Ferrite Bead	1	L1	Or use wire link/10Ω resistor Mouser

Loudspeaker		
8Ω loudspeaker	1	Fixed to case/top panel. If not used, use a 47Ω resistor in place of the speaker header.

Wire			Possible Source
35mm long wire link	1	LK1	Insulated hookup wire. Single core.
200mm 7 way ribbon wire	1	LINK1-LINK2	2.54mm pitch wire – or use 7 separate wires Connects Link port DIN sockets to centre of PCB, or normal ribbon cable and splay the ends.
20SWG (0.914mm dia, 19AWG) solid core tinned wire			For adapting pots for the PCB. Other solid core wire is OK, but thicker wire is better for mechanical strength – especially if using solder lugged pots. Rapid
Stranded hook up wire for speaker, hold switch, oscillator volume pots etc.			

Misc Sockets/headers/hardware			Possible Source
MTA100 2way	3	SP1, S8, S8	Speaker and hold switch header
MTA100 3way	6	VR19, VR20, VR21, P5-Link2	Oscillator volume and input gain – off PCB. Internal Link header is 9way, but 3x way MTA100 connectors can be used.
4x AA PCB Battery holder	2	BATT1, BATT2	PCB battery holders are optional. Separate battery pack can be attached to a 2.54mm header. Mouser Rapid
17mm hex spacers	6		Supports top panel - Farnell 1466723 or use 16mm + 2x M3 washers
Fixing screws for hex spacers	6		M3 or whatever matches the spacers. 10mm

MTA100 type connectors are best as the wires enter the plug housing horizontally and are not as tall as MolexKK. Other 2.54mm pitch headers/sockets could be used. Ensure height of header+plug+wire clearance is less than 17mm  
Other hardware will be required depending on enclosure chosen to hold completed Jasper

### Knobs

27 knobs are required for the potentiometers and rotary switches. The type depends on your pots and switches. Cliff K21 series knobs are available for the various shaft types and are pretty close to the original on the Gnat/Wasp.. They take coloured inserts with indicator lines, just like the original and can be rotated to match the markings on the panel.

Datasheet: <http://www.farnell.com/datasheets/1900427.pdf>

The range is available from Rapid:

<http://www.rapidonline.com/Knobs/Cliff-K21-Control-Knobs-and-Coloured-Caps-539014>

On Farnell search for "Cliff 19.3mm" for the knobs and "cliff K21" for the caps.

Cliff CL178887 K21 Control Knob Black 1/4" Screw Fix

Rapid: 32-1914 Farnell: 2473103

Cliff CL178886 K21 Control Knob Black 1/4" D Shaft

Rapid: 32-1912 Farnell: 2473102

Cliff CL178883 K21 Control Knob Black 6mm D Shaft

Rapid: 32-1906 Farnell: 2473100

Cliff CL1772 K21 Knob Cap - Yellow With Marker Line

Rapid: 32-1942 Farnell: 2473104