

Jasper Synth Bill of Materials

Resistors (Ω)	
10	5 R10, R11, R12, R13, R125
47	1 R88
470	4 R32, R62, R142, R150
1K	10 R19, R25, R74, R76, R78, R105, R116, R117, R153, R154
2K2	1 R16
3K3	4 R75, R79, R80, R110
4K7	4 R9, R15, R21, R22
5K6	2 R72, R141
10K	16 R1, R2, R3, R4, R8, R14, R38, R47, R48, R49, R85, R94, R95, R96, R115, R143
15K	1 R130
18K	1 R37
22K	5 R77, R104, R108, R137, R151
33K	32 R17, R18, R23, R24, R29, R30, R31, R34, R35, R36, R39, R40, R51, R52, R63, R81, R82, R84, R97, R98, R103, R106, R107, R111, R113, R119, R120, R121, R123, R128, R131, R140
39K	1 R59
47K	8 R64, R65, R66, R101, R139, R148, R149, R152
56K	5 R42, R67, R68, R93, R114
68K	1 R155
91K	1 R50
100K	25 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
120K	2 R43, R92
150K	7 R55, R56, R70, R99, R100, R124, R147
220K	5 R41, R44, R71, R86, R91
330K	3 R60, R102, R126
470K	4 R45, R61, R90, R122
560K	1 R69
1M	5 R46, R57, R58, R83, R89
2M2	1 R118

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

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 normal solder terminals and stiff wire can be used

VR19, VR20, VR21 are soldered to wires terminated in MTA100 connectors. It is best to 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	2 PR2, PR140	6mm trimmer pot (or 47K) Mouser Farnell Bitsbox Tayda
50K	2 PR3, PR5	Thonk Song Huei tall trimmer 9mm pot Thonk or Piher 15mm trimmer with 19mm shaft Preset: Mouser Rapid Conrad Shaft: Mouser Rapid Conrad

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

Switches		Possible Source
Rotary Switches	6 S1, S2, S3, S4, S5, S6	Rotary Switch 2pole x 6pos Alpha SR2612F or Lorlin CK1060. Non-shorting (or MBB) is probably best to reduce switching glitches Lorlin: Mouser Farnell Alpha: Rapid Musikding Mouser
Hold	1 S8	Hold mod SPST; could be slide; toggle or latching pushbutton. Use ultra-miniature toggle Mouser Rapid
Link Pwr	1 S7	Slide-Switch SPDT 2.54mm pitch or use jumper + header or leave unpopulated Mouser Farnell Rapid CPC

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

Jasper Bill of Materials

Capacitors		Type + lead pitch	Possible Source
22pF	2 C43, C63	C0G ceramic 2.5mm	Mouser Farnell
68pF	4 C11, C39, C46, C47	C0G ceramic 5mm	Mouser Farnell
330pF	2 C1, C6	C0G ceramic 5mm	Mouser Farnell
1nF	9 C12, C13, C18, C19, C33, C34, C37, C44, C45	Polyester film 5mm	Mouser Farnell
6.8nF	2 C20, C22	Polyester film 5mm	Mouser Farnell
10nF	3 C21, C23, C27	Polyester film 5mm	Mouser Farnell
22nF	2 C16, C31	Polyester film 5mm	Mouser Farnell
33nF	1 C40*	Polyester film 5mm	Mouser Farnell
47nF	1 C42	Polyester film 5mm	Mouser Farnell
100nF	4 C2, C4, C7, C15	Polyester film 5mm	Mouser Farnell
0.1uF	37 C41, C50, C54, C55, C56, 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	Decoupling capacitors. Ceramic 2.5mm. Part numbers are not marked in most cases, but are found near to ICs on the PCB.	Mouser Farnell
220nF	4 C9, C10, C51, C52	Polyester film 5mm	Mouser Farnell
470nF	2 C24, C48	Polyester film 5mm	Mouser Farnell
1uF	2 C36, C38	Polyester film 5mm	Mouser Farnell
2.2uF	2 C17, C32	Electrolytic 2.5mm	Mouser Farnell
4.7uF	8 C3, C5, C14, C25, C29, C30, C35, C53	Electrolytic 2.5mm	Mouser Farnell
10uF	2 C26, C49	Electrolytic 2.5mm	Mouser Farnell
220uF	1 C28	Electrolytic 3.5mm	Mouser Farnell
330uF	1 C8	Electrolytic 3.5mm	Mouser Farnell

* C40 marked as 47nF on PCB. Smaller value shortens time before envelope can be retriggered

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

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.	NJM: Mouser LM386: Newark Newark(US) Rapid Bitsbox RS Tayda
LM555	2 IC1, IC2	CMOS 555 chips will work fine	Mouser Farnell
LM3900	2 IC10, IC12	DIP14	Mouser Farnell
CD4006	1 IC34	DIP14 Obsolete chip, obtainable NOS	
CD4013	6 IC9, IC16, IC24, IC37, IC44, IC20	DIP14	Mouser Farnell
CD4016	5 IC17, IC19, IC38, IC42, IC46	DIP14	Mouser Farnell
CD4019	1 IC27	DIP16	Mouser Farnell
CD4024	2 IC8, IC15	DIP14	Mouser Farnell
CD4028	1 IC45	DIP16	Mouser Farnell
CD4040	1 IC32	DIP16	Mouser Farnell
CD4046	2 IC7, IC14	DIP16	Mouser Farnell
CD4052	4 IC39, IC36, IC43, IC47	DIP16	Mouser Farnell
CD4069UBE	6 IC5, IC11, IC18, IC22, IC35, IC41	DIP14	Mouser Farnell
CD4070	1 IC33	DIP14	Mouser Farnell
CD4071	2 IC28, IC29	DIP14	Mouser Farnell
CD4081	2 IC21, IC40	DIP14	Mouser Farnell
CD4503	1 IC31	DIP16	Mouser Farnell
LM13700	2 IC6, IC3	DIP16	Mouser Farnell
CD40103	2 IC25, IC26	DIP16	Mouser Farnell
CD40174	1 IC30	DIP16	Mouser Farnell
MCP1702-5002	1 IC13	LDO regulator	Mouser Farnell

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

IC Sockets			Possible Source
8 pin DIP socket	3 8 pin		Mouser Farnell Rapid
14 pin DIP socket	27 14 pin		Mouser Farnell Rapid
16 pin DIP socket	15 16 pin		Mouser Farnell Rapid

Sockets			Possible Source
Stereo PCB 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) solid core tinned wire (19AWG)			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.

Stranded hook up wire for speaker, Enhanced mod board, hold switch, oscillator volume pots etc.

Misc Sockets/headers/hardware			
MTA100 2way	2	SP1, S8	Speaker and hold switch header
MTA100 3way	3	VR19, VR20, VR21	Oscillator volume and input gain – off PCB
MTA100 4way	2	P20, P21	Optional for enhanced wave PCBs
4x AA PCB Battery holder	2	BATT1, BATT2	PCB battery holders are optional. Separate battery pack can be attached to a 2.54mm header.
1 x 9way 2.54mm header	1	P5	Optional header for internal Link port + 5V & GND
17mm hex spacers	6		Supports top panel - Farnell 1466723 or use 16mm + 2x M3 washers
Fixing screws for hex spacers	6		M3 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

Enhanced Mode PCB

Use same sources as main BOM above

Resistors (Ω)			
330K	4	R1, R2, R9, R10	
100K	4	R3, R7, R11, R15	
91K	2	R4, R12	
150K	2	R5, R13	
33K	2	R6, R14	
4M7	2	R8, R16	LFO timing. A carbon resistor may offer some random drift and variation in modulation between the two modules.

Capacitors			
100nf	2	C1, C4	Ceramic for power decoupling 2.5mm lead pitch
470nF	4	C2, C3, C5, C6	Polyester Film for AC coupling input signal & LFO timing

ICs			
CD4069UBE	2	U1, U2	Also 14 way IC socket

Other			
4way MTA-100 plug	2	P1, P2	plug to match header on Jasper or just solder wires directly