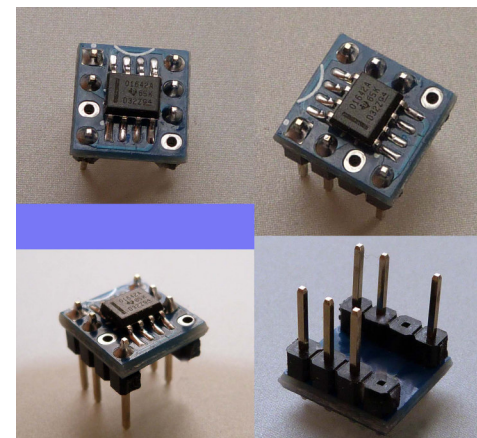
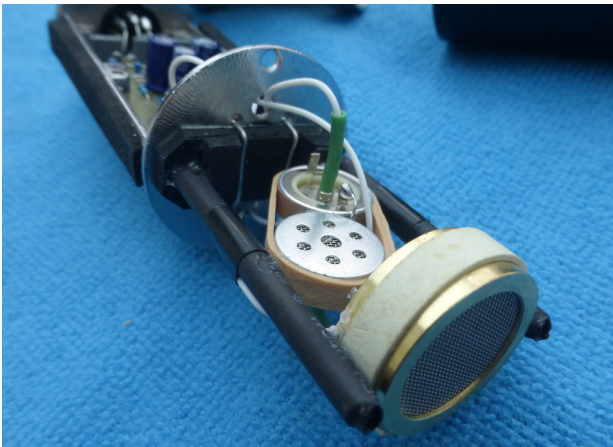
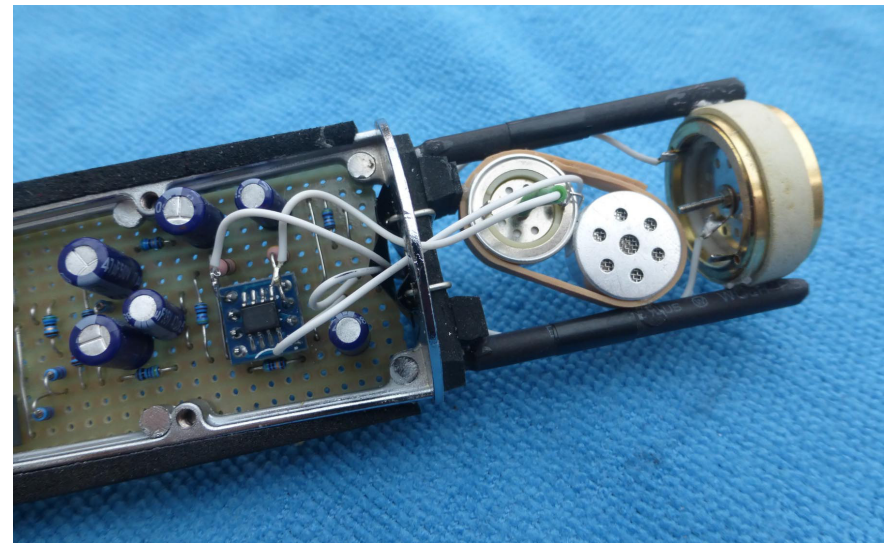


# OPIC.MID/SIDE – Impedance Converters with dual OPA1642 opamp

Stripboard version for a MID/SIDE stereo microphone

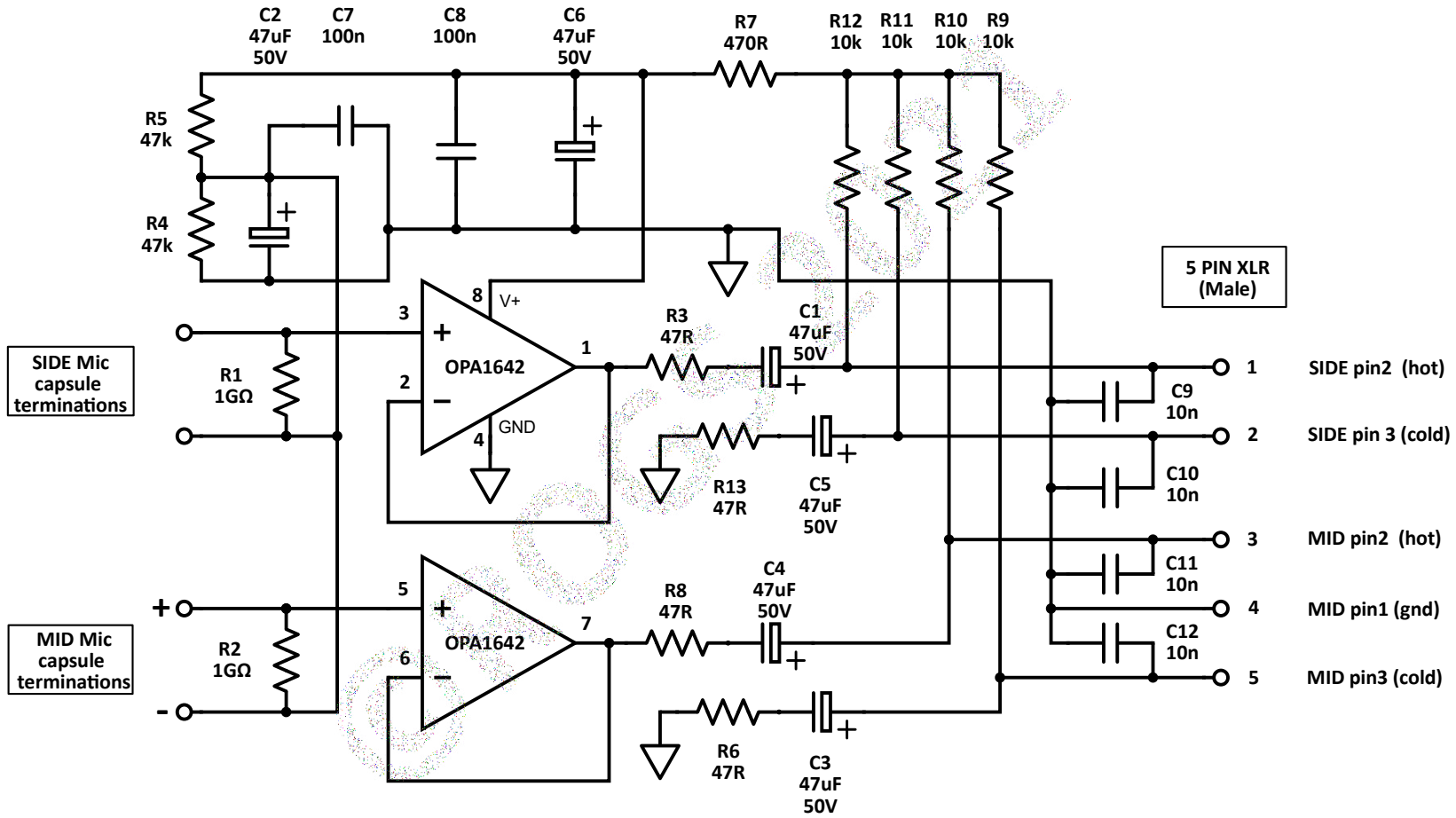
Designed to fit into a BM800 style body



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• OPIC MID/SIDE MIC - STRIPBOARD SCHEMATIC •

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## OPIC.MID/SIDE Circuit description

### Overview:

The circuitry shown in the schematic uses a Texas Instruments OPA1642 JFET dual op-amp as impedance converters for a Mid/Side condenser microphone fitted with 3 x FETless electret capsules in a BM800 'donor' body.

The MID mic channel is a 'forward facing' cardioid FETless electret capsule - typically a 25mm type like the JLI 2555BXZ3.

The SIDE mic channel utilises 2 opposite facing cardioid electret capsules mounted next to each other, and wired in series. This configuration effectively creates the 'figure of 8' microphone pattern required for the side channel.

A typical capsule for that task might be the JLI 165A.

Both types of capsule are available from JLI themselves in the USA, and from Micboosters - based in the UK - for Europe.

The TI OPA1642 dual op-amps used as the impedance converters offer both low noise and low quiescent current, making them ideal for this task.

Each op amp in the dual package is used here to provide a 'single sided' audio output, which is balanced passively to optimise the common mode rejection ratio (CMRR). This technique is used for both channels – one for Mid and one for Side.

### Circuit description:

In the OPA1642 each amplifier is configured as a zero gain non-inverting buffer. Each op-amp output is connected directly to its own inverting input to achieve this.

Each amplifier draws around 1.8mA of quiescent current, and this is provided by the 48v phantom power supply from the mic preamp. The resistor summing network R9, R10, R11 and R12 - together with R7 and the de-coupling capacitors C6 and C8 - allow a smoothed supply voltage of around 24v to be presented to pin 8 of the OPA1642. The actual supply voltage is not critical, and the circuitry will automatically adjust the half rail reference to suit the supply voltage.

The op-amp requires a 'dual' voltage supply, and this is provided by the creation of a 'half rail' voltage of around 12.5v by the voltage divider R5 and R4, together with the decoupling capacitors C2 and C7.

This 'half rail' voltage is required to bias the op amp, so that the output can swing symmetrically around this reference voltage. It is fed to the non-inverting inputs of each op-amp via R1 and R2, high value 1GΩ resistors required to bias the purely capacitive mic capsules for effective function.

The op amp outputs (pins 1 and 7) are connected via series resistors R3 and R8 and C1 and C4 respectively to the 'hot' output pins 3 (Mid) and 1 (Side) to pin 2 (hot) of the 5 pin male XLR connector fitted into the mic body. C1 and C4 are required to isolate the DC 'half rail' voltage present on the outputs of the op-amp from the XLR outputs.

R6 and C3, C5 and R13 provide an equivalent 'passively balanced' outputs to the 'cold' pins 5 and 2 of the XLR connector. There is no audio on these pins, the above components are fitted to improve CMRR, which can be important, especially when the mic is connected to a preamp via a long cable run.

C9, C10, C11 and C12 are included to decouple any stray RF interference which may be present to ground.

Pin 4 of the XLR is a common ground connection for both channels.

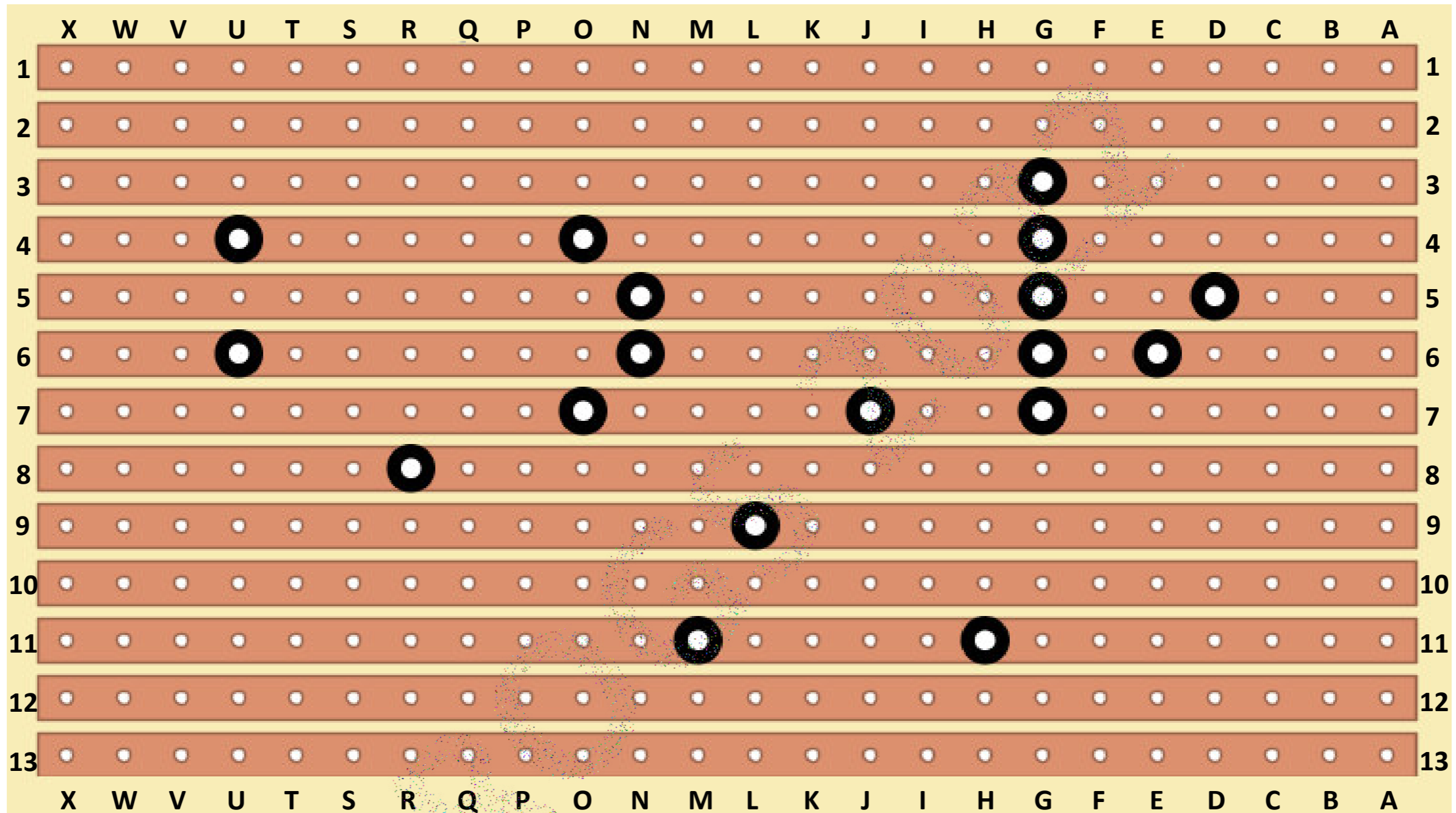
A custom cable is required to allow the single 5 pin XLR fitted to the microphone to feed both Mid and Side channels of the connected recording device.

Pins 3, 4 and 5 are connected to pins 2, 1 and 3 respectively of one 3 pin male XLR, which would normally be connected to the left hand (MID) channel.

The right hand (SIDE) channel requires pins 1 and 2 to be connected to pins 2 and 3 respectively, of the second channel 3 pin XLR.

A separate ground connection is not normally required for this second channel, as both channel ground connections (XLR pin 1) will be common in the recorder. ( The cable screen can be connected to pin 1 of the SIDE channel XLR at the recorder input end ).

•• Viewed from COPPER TRACK SIDE ••



OPIC.MID/SIDE - stripboard

•• TRACK CUTS VIEWED FROM COPPER SIDE ••

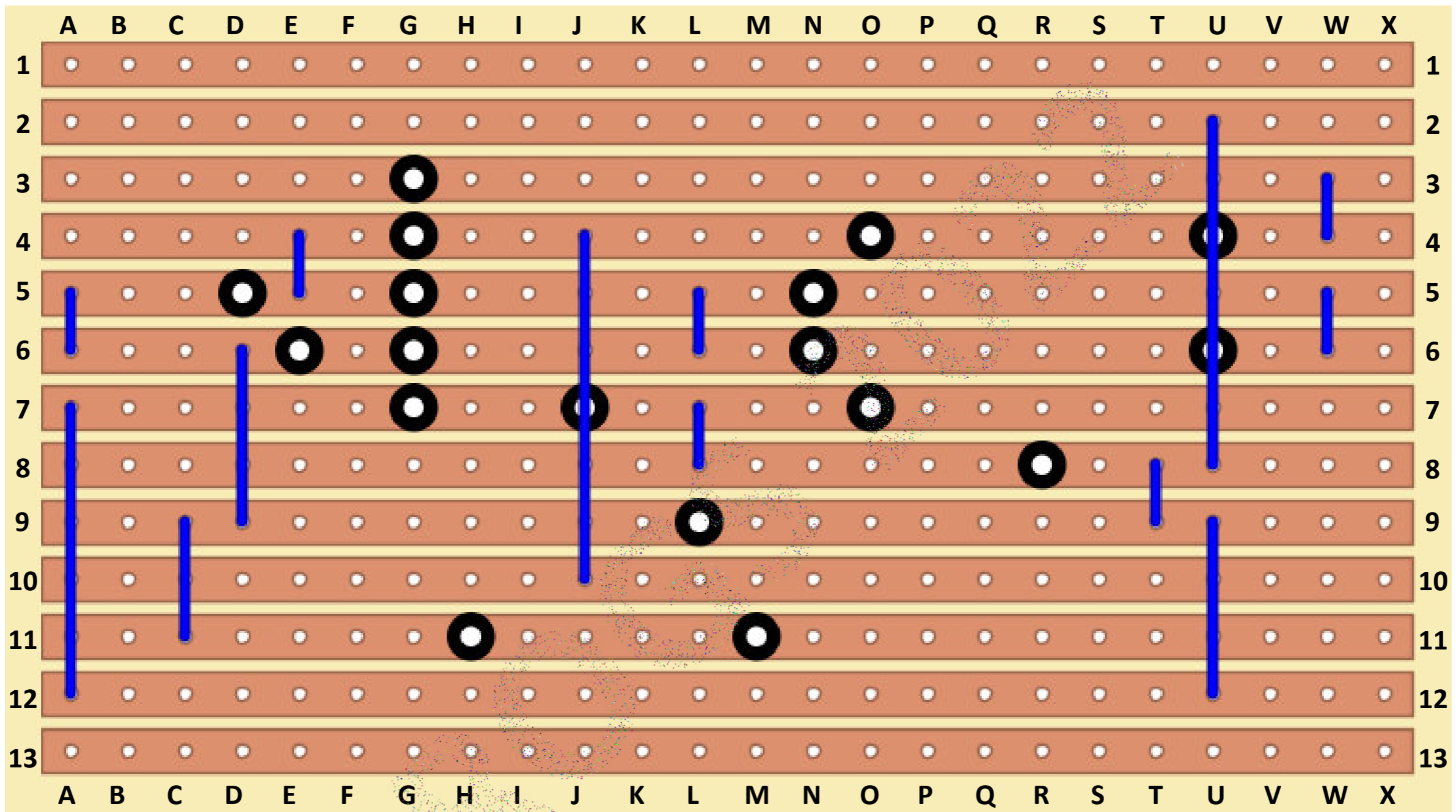
'Spin off' copper with a stripboard track cutter (or drill bit)..

• ensure each 'spin off' cuts the track completely •

'Spin off' the copper track at the following 18 locations:

- D5      • G5      • J7      • N6      • U4
- E6      • G6      • L9      • O4      • U6
- G3      • G7      • M11    • O7
- G4      • H11    • N5      • R8

•• TRACK CUTS AND WIRE LINKS VIEWED FROM COMPONENT SIDE ••



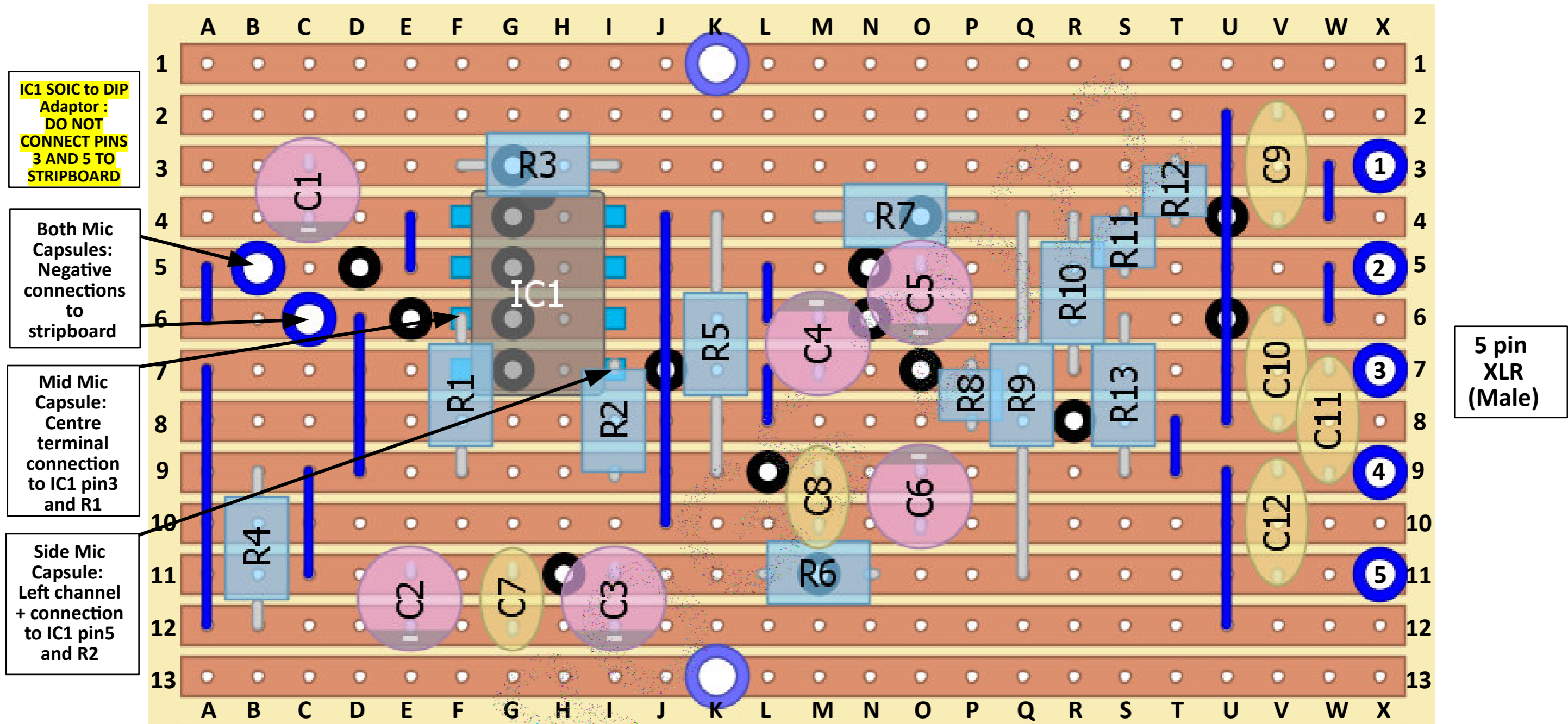
OPIC.MID/SIDE - stripboard

•• TRACK CUTS AND WIRE LINKS VIEWED FROM COMPONENT SIDE ••

Make links from 0.56swg (or equivalent) tinned copper wire,  
and fit to the locations shown in blue above

Fit wire links to the 13 locations listed below:

- A (5,6)
- A (7,12)
- C (9,11)
- D (6,9)
- E (4,5)
- J (4,10)
- L (5,6)
- L(7,8)
- T (8,9)
- U (2,8)
- U (9,12)
- W (3,4)
- W (5,6)



**IC1 SOIC to DIP Adaptor : DO NOT CONNECT PINS 3 AND 5 TO STRIPBOARD**

**Both Mic Capsules: Negative connections to stripboard**

**Mid Mic Capsule: Centre terminal connection to IC1 pin3 and R1**

**Side Mic Capsule: Left channel + connection to IC1 pin5 and R2**

**5 pin XLR (Male)**

**OPIC.MID/SIDE – stripboard**  
**Complete stripboard component layout**  
**•• VIEWED FROM COMPONENT SIDE ••**

**K1 and K13 are PCB mounting holes**

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- Fit the components to the locations listed below:**
- |   |  |   |  |
|---|--|---|--|
| <ul style="list-style-type: none"> <li>• C1 - C6 are all 47uF 50v electrolytics</li> <li>• C1 47uF 50v (C3+, C4)</li> <li>• C2 47uF 50v (E11+, E12)</li> <li>• C3 47uF 50v (I11+, I12)</li> <li>• C4 47uF 50v (M7+, M6)</li> <li>• C5 47uF 50v (O5+, O6)</li> <li>• C6 47uF 50v (O10+, O9)</li> </ul> | <ul style="list-style-type: none"> <li>• C7- C12 are all X7R 63V mlc</li> <li>• C7 100n (G11, G12)</li> <li>• C8 100n (M9, M10)</li> <li>• C9 10n (V2, V4)</li> <li>• C10 10n (V6, V8)</li> <li>• C11 10n (W7, W9)</li> <li>• C12 10n (V9, V11)</li> </ul> | <ul style="list-style-type: none"> <li>• All resistors (except R1 and R2) are 1/8th watt metal film</li> <li>• R1 1GΩ (10%) (F6, F9)</li> <li>• R2 1GΩ (10%) (I7, I9)</li> <li>• R3 47R (F3, I3)</li> <li>• R4 47K (B9, B12)</li> <li>• R5 47k (K4, K9)</li> <li>• R6 47R (L11, N11)</li> </ul> | <ul style="list-style-type: none"> <li>• R7 470R (M4, P4)</li> <li>• R8 47R (P7, P8)</li> <li>• R9 10k (Q4, Q11)</li> <li>• R10 10k (R4, R7)</li> <li>• R11 10k (S4, S5)</li> <li>• R12 10k (T3, T4)</li> <li>• R13 47R (S6, S9)</li> <li>• IC1 OPA1642 (via adaptor)</li> </ul> |
|---|--|---|--|