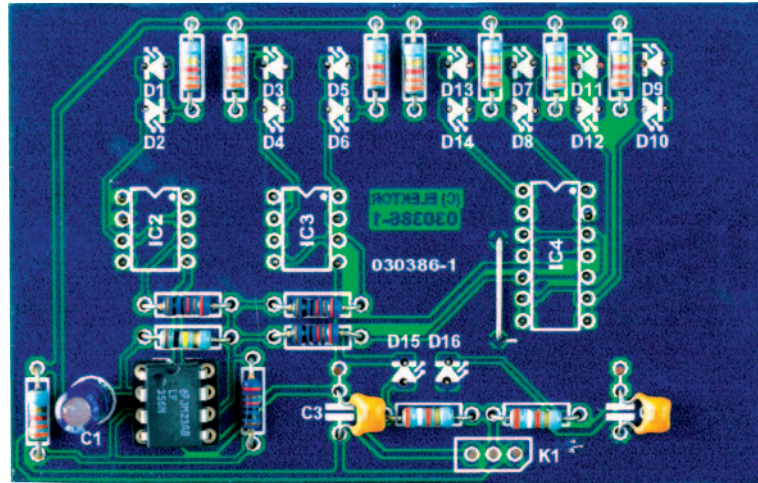


OPAMP TESTER

kitchen table

Quick go/no-go testing for operational amplifiers

Dirk Schumacher



Not a microcontroller in sight, and yet this item of test equipment will be found very handy in any electronics lab.

If you ever want to use an operational amplifier salvaged from an old circuit or from the junk box, you will take into account that the device may no longer work properly. Unfortunately, it is not as easy to perform a quick go/no-go test on an operational amplifier using a multimeter as it is with a resistor, coil, fuse, diode or even a capacitor. Although an opamp tester would obviously be a useful thing to have, a dedicated instrument is not easy to come by. However, you can build this item of test gear yourself in a few minutes, and it certainly won't break the bank.

The test circuit just consists of a simple squarewave oscillator (IC1) which oscillates with a frequency of about 1 Hz. The output of the oscillator, on pin 6, therefore swings between 'high', $+(V_b - 0.5 \text{ V})$, and 'low', $-(V_b - 0.5 \text{ V})$, with a period of about 1 s.

Most operational amplifiers come in packages containing one, two or four identical circuits. All the manufactur-

ers have standardised on three pinouts, irrespective of the part number of the device. (There are some devices with non-standard pinouts, but they are very rare.) These are shown in the circuit diagram as 'type 1', 'type 2' and 'type 3'. The part numbers of a few 'general purpose' opamps are also shown. Single and dual opamps come in eight-pin packages, quad opamps in 14-pin packages. All the opamps under test are identically wired, as voltage followers/impedance converters. The output voltage is equal to the voltage at the non-inverting input, and so the squarewave from IC1 will therefore be present on all the relevant pins.

The results of the test are displayed using low current LEDs. If the output of the opamp is high, the red LED will light; if the output is low, the yellow LED will light. The opamps under test will need to be able to sink and source a current of at least 2 mA.

The test unit is powered from two 9 V PP3 (6F22) type batteries (BT1 and

BT2). D15 and D16 indicate when the supply voltage is present on all the relevant pins of the oscillator and of all the test sockets.

As a glance at the printed circuit board layout in **Figure 2** will reveal, populating the board should present no difficulties. There are many LEDs, which must all, of course, be fitted the right way around; the same goes for the small electrolytic capacitor and the oscillator IC. Don't forget the one wire link, which connects the two parts of the ground plane. It is worth clearly marking the position of pin 1 of the test sockets on the front panel of the enclosure, to ensure that devices under test are never inadvertently inserted incorrectly. Otherwise the opamp being tested will quickly give up the ghost, as you will be able to demonstrate when you subsequently insert it correctly!

(030386-1)

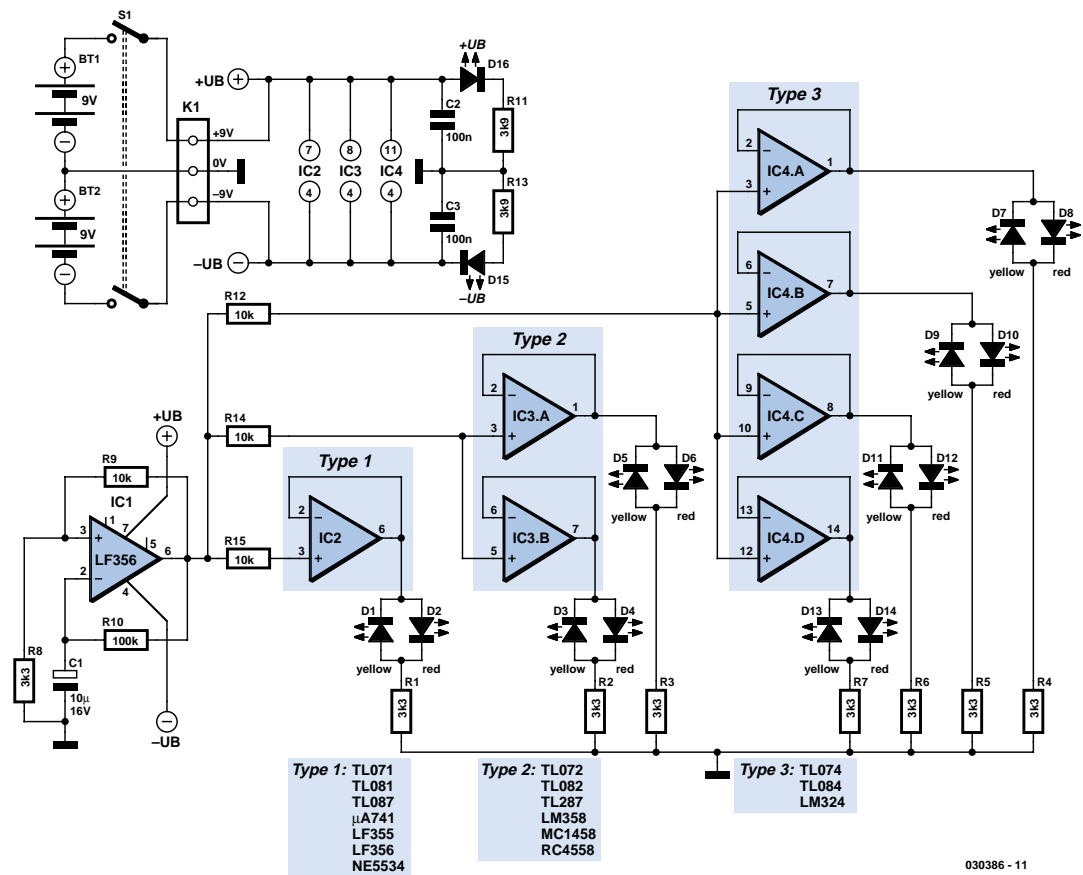


Figure 1. The circuit can test single, dual and quad opamps.

COMPONENTS LIST

Resistors:

R1-R8 = 3k Ω
 R9,R12,R14,R15 = 10k Ω
 R10 = 100k Ω
 R11,R13 = 3k Ω

Capacitors:

C1 = 10 μ F 16V radial
 C2,C3 = 100nF

Semiconductors:

D1,D3,D5,D7,D9,D11,D13,D15,D16 = LED, 3mm, yellow, low current
 D2,D4,D6,D8,D10,D12,D14 = LED, 3mm, red, low current
 IC1 = LF356

Miscellaneous:

2 8-way IC socket
 1 14-way IC socket
 S1 = double-pole on/off switch
 BT1,BT2 = 9-V battery with clip-on connector
 Enclosure, Hammond type 1591B
 1 wire link
 PCB, order code **030386-1**, see Readers Services page

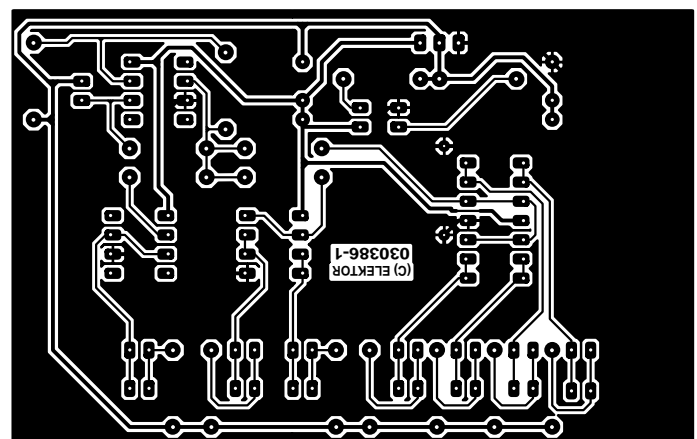
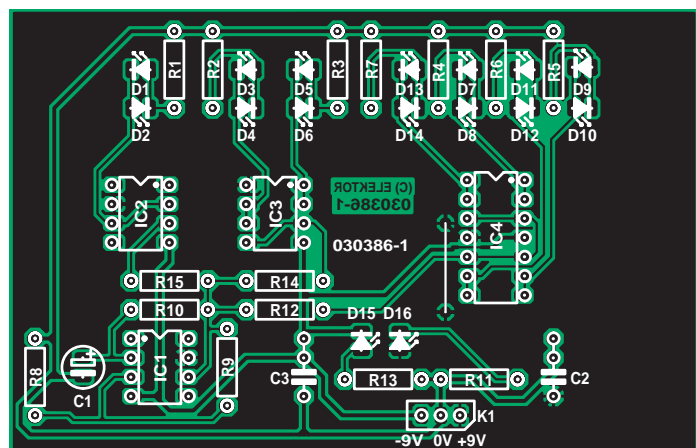


Figure 2. The printed circuit board is clearly laid out.