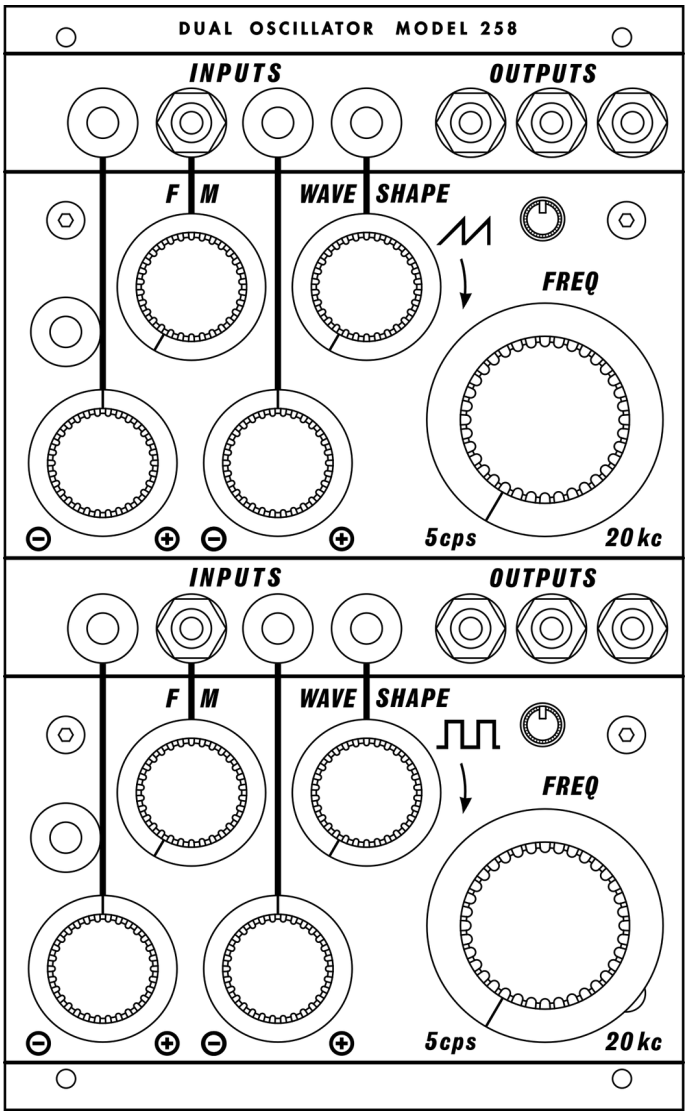
Dunnington Audio

258D Dual Oscillator



The 258D Dual Oscillator is designed to replicate the functionality of the Buchla 258C module using modern construction techniques and readily available parts. Like Mark Verbos' 258V and Dustin Stroh's 258J, the 258D uses the exponential converter and triangle core from the Electronotes VCO option 3, designed by Bernie Hutchins, with output waveshaping derived from Don Buchla's original 258 Design.

Additionally, the 258D includes:

- A stable voltage reference to isolate the frequency controls from fluctuations and noise on the power supply rails
- High frequency compensation for improved tracking
- A scaled V/O CV input in place of the original scaling potentiometer
- The option to select either saw or square waveshapes for each oscillator by setting a jumper on the rear of the module
- A buffered copy of the triangle core replacing the rightmost output of each oscillator

Build Notes:

*** The 258D is designed to be suitable for hand assembly, but it is not recommended as a "learn surface mount" starting point. You should at a minimum have a temperature controlled soldering iron with a reasonably fine point and good quality solder 0.5mm diameter or finer. Some form of magnification may be beneficial for placing/inspecting the SOT-363 packages. ***

Note that Q105/205 should have their $V_{GS(off)}$ selected at ~1.13V for best sine shape, you should buy more than you need for the best chance of success.

It is recommended that the circuit board is populated in the following order:

- SOT-363 packages **(note polarity – these are not symmetrical!)**
- SOT-23 packages
- SOIC packages
- 0805 passives (Use the minimum temperature/time possible when soldering film capacitors C101/201)
- Trimmer potentiometers
- Electrolytic capacitors
- Through hole pin headers
- Power wiring harness

Connectors should have their wire links attached and be mounted to the front panel, along with standoffs. Front panel potentiometers can then be loosely fitted into the PCB and the panel and PCB brought together before gently tightening the potentiometer fixing nuts and soldering the potentiometers and connector to PCB wires into place.

Modifications:

There are a number of changes that can be made to alter the behaviour of the module to suit the needs of the end user:

- Resistors R103/203 set the range of the coarse frequency pot. A value of 150k matches the response approximately to the front panel scale of 5Hz to 20kHz. A value of 180k reduces the range to around 5Hz to 12kHz which improves the ease of tuning if using the oscillators for pitched material. Higher frequencies are still available using external CV.
- Resistors R105/205 set the range of the V/O scaling. A value of 120k gives good adjustment for 1.2 V/O scaling. For 1 V/O scaling, reduce the value, or for 2 V/O scaling increase it.
- The waveshapes available from each oscillator can be selected between sine/saw and sine/square by changing the location of a jumper on the rear of the PCB. After changing this setting, SHAPE ZERO should be recalibrated.

Calibration procedure:

Equipment required:

- Power supply delivering +/- 15V, current limit at 50mA
- Oscilloscope
- DC Voltage source capable of 0-10V to 1mV accuracy
- Frequency counter and/or tuner

The following steps should be repeated for each oscillator:

1. Fit shape select jumpers for desired shape on both oscillators.

2. Set front panel controls as follows:
    - VR103/104/203/24 CV inputs 1 & 2 – Centre
    - VR105/205 FM input – Fully CCW
    - VR106/206 Wave Shape – Fully CCW
    - VR101/201 Coarse Frequency – Fully CCW
    - VR102/202 Fine tune - Centre

3. Set trimpots as follows (direction as viewed from the rear of the module):
    - TR103/203 V/O SCALE – Centre
    - TR102/202 HF COMP – Fully CW
    - TR105/205 SHAPE ZERO – Fully CW
    - TR101/201 FREQ OFFSET – Centre
    - TR104/204 SINE SHAPE – Centre

4. Apply power to the module and check for approx 35mA draw on each rail.

5. Connect the rightmost output of the oscillator to the oscilloscope and check for approx 4.5V pk-pk triangle wave. Repeat for leftmost output and check for approx 4.5V pk-pk sine wave.

6. Adjust coarse frequency control for approx. 1kHz output. Adjust **SINE SHAPE** trimpot for best sine shape. If a good sinewave cannot be obtained when the trimpot is fully CCW, decrease the value of R142/R242.

7. Adjust **SHAPE ZERO** trimpot CCW until a small spike becomes visible at the low peak of the sinewave output, then back off slightly. The front panel Wave Shape control should now give a good range of control from sine to saw/square. Reset the front panel control fully CCW. Check for roughly equivalent response when applying 10V from the DC voltage source to the wave shape CV input.

8. Connect the leftmost output of the oscillator to the frequency counter/tuner. Set the DC voltage source to 0V and connect its output to the scaled (grey) CV input of the oscillator. Using the front panel coarse/fine frequency controls, set the oscillator frequency to 16.35Hz/C0. Set the output of the DC voltage source to 6.0V and check the output frequency – if it is higher than 523.25Hz/C5, adjust the **V/O SCALE** trimpot slightly CCW, or slightly CW if the output is lower (reverse the direction if a 3314J single turn pot is used). Reset the DC voltage source to 0V, set the oscillator output to 16.35Hz/C0 using the front panel controls and repeat the above until the oscillator outputs exactly 16.35Hz/C0 with 0V applied and exactly 523.25Hz/C5 with 6.0V applied.

9. Set the DC voltage source to 7.2V and check the frequency of the output. If it is lower than 1.0465kHz/C6, adjust the **HF COMP** trimpot slightly CCW. Repeat step 8 and 9 until the best average response between the two is found. It is likely that C6 will be slightly sharp when the rest of the range is well tuned.

10. Set the DC voltage source to 0V. Set the front panel fine tune control to centre and the coarse frequency control fully CW and measure the frequency of the output. Adjust the **FREQ OFFSET** trimpot for approx 20kHz.