

Tone Wheel Generator & Dividers.

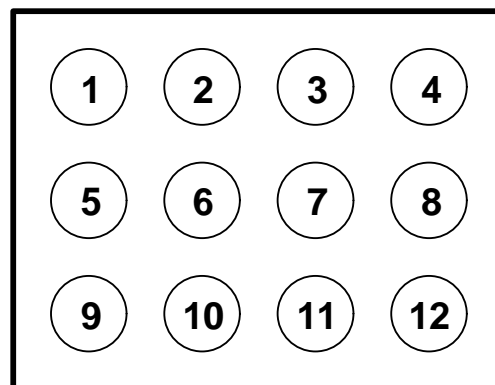
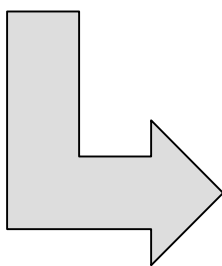
The Top-Octave frequencies are generated by one Tone-Wheel-Generator (TWG) driven by one self-starting synchronous motor (50 Hz version for Export). The motor has been cleaned (air-pressure) and was not oiled since many years, very dry indeed. Similarly, the TWG itself was not properly oiled either.

Surprising to notice that a lot of people are forgotten this TWG located just under the swell pedal while the scanners are over-oiled.

Bearings and threads were really dry as well and were lubricated directly with an extra-small paint brush after cleaning of course. Then, the motor has been powered by 115V/50Hz through an auto-transformer and measurements were listed on the table here under.

Output #	Top Key Ref.	Theoretical frequencies	Measured frequencies *	Output level (open circuit)
1	A	7040.00 Hz	7041 Hz	0,6 Vpp
2	F#	5919.91 Hz	5920 Hz	0,6 Vpp
3	D#	4978.03 Hz	4977 Hz	0,7 Vpp
4	C	4186.01 Hz	4185 Hz	0,65 Vpp
5	A#	7458.62 Hz	7457 Hz	0,7 Vpp
6	G	6271.93 Hz	6269 Hz	0,65 Vpp
7	E	5274.04 Hz	5272 Hz	0,6 Vpp
8	C#	4434.92 Hz	4432 Hz	0,6 Vpp
9	B	7902.13 Hz	7901 Hz	0,65 Vpp
10	G#	6644.88 Hz	6643 Hz	0,6 Vpp
11	F	5587.65 Hz	5587 Hz	0,6 Vpp
12	D	4698.64 Hz	4696 Hz	0,6 Vpp

* Effective values measured at TWG output connector.



TWG Connector pinning layout

The current consumption of the this TWG motor is: 350 mA at 115V/50Hz and is rotating at 3000 RPM. Do not forget black ground leads when re-installing.

X-66 Tone-Generator concept.

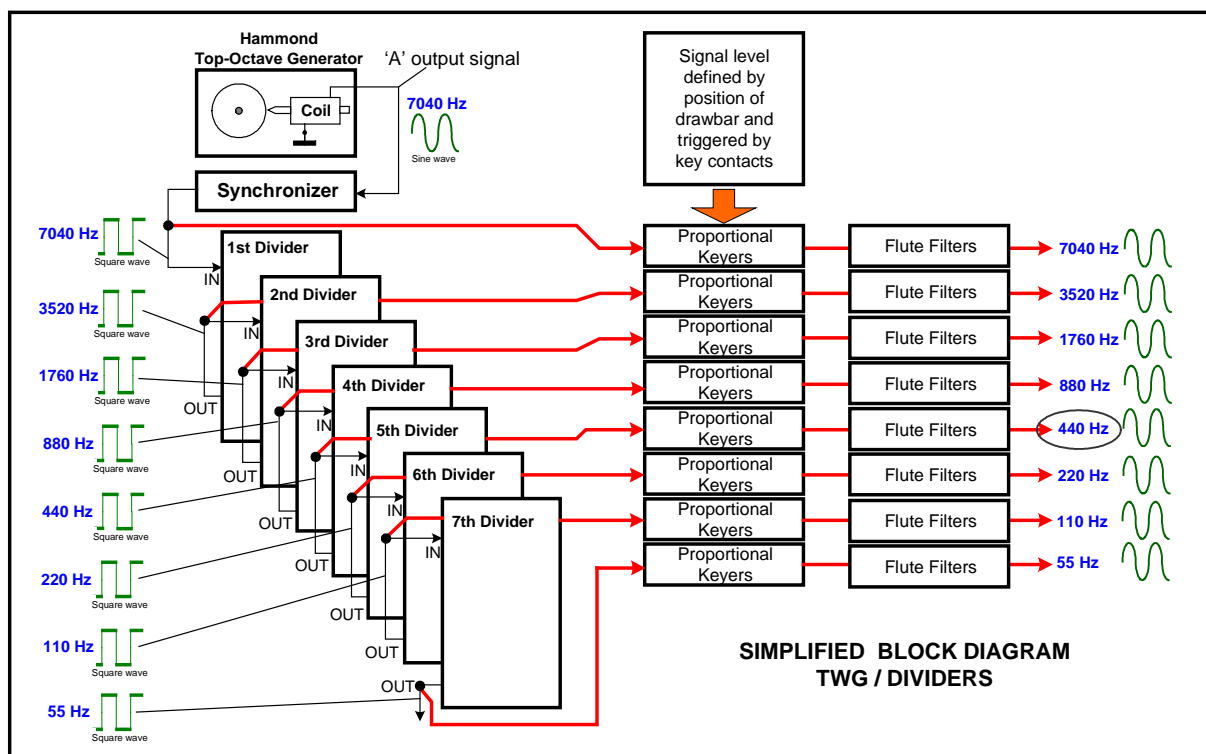
The purpose of this presentation was not focused on circuits but in the case of the X-66, it's worth while to make a short description of the Tone-Generator concept.

The Tone-Wheel-Generator of X-66 is only providing sinus top-octave signals that are later on 'squared' and routed through dividers chains.

The role of each 'flip-flop' divider is to divide by a factor of two the incoming signal. The so-divided signal is routed later on to the next one for another division by two and so on.

The output signals from the dividers are sent to the proportional keyers. This means that the level of the signal is firstly defined by the position of the drawbar and is triggered by the corresponding key-contacts.

X-66 has been so designed to eliminate any 'key-click' contrarily to B3, C3, A-100 series. The signals available at the output of the proportional keyers are filtered later on by the flute filters in order to get at the output a pure sinewave signal.

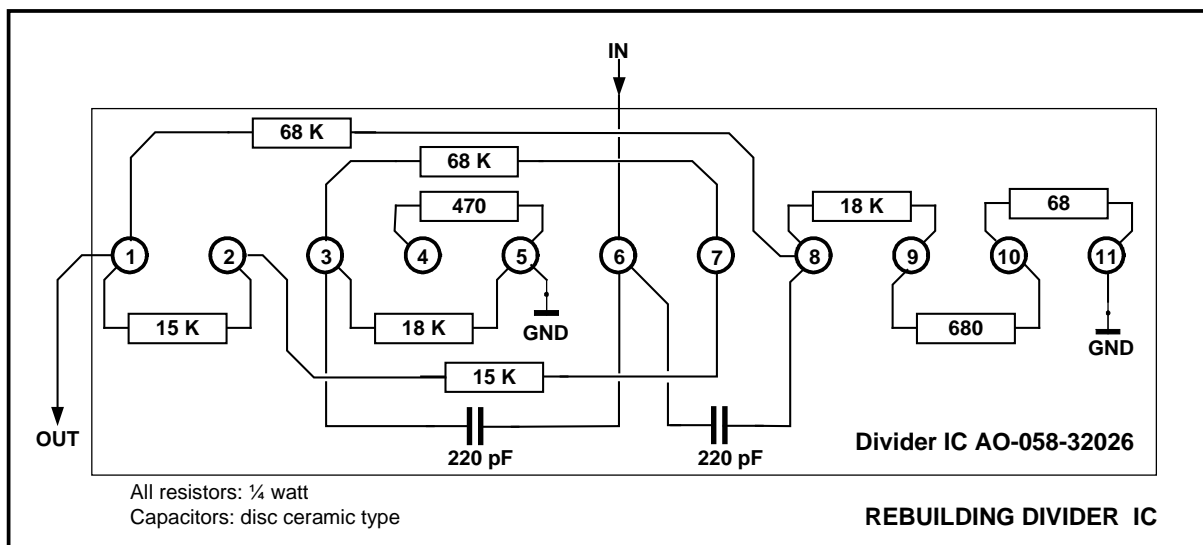


Problem found on Dividers

The 7th stage of G# board was found inoperative, no output signal. This means one tone missing on keyboards.

Both transistors of this divider were tested and surprisingly were good !
 The conclusion is that the Divider IC itself is defective and needs to be replaced.
 Several attempts to find a replacement IC was done but unsuccessfully.
 The only remaining alternative was to reconstitute this faulty IC with discrete components on a small board.

Hereunder is the schematic diagram of this Divider IC.



After installation of this small PCB on the G# divider board, normal operation was restored at once.