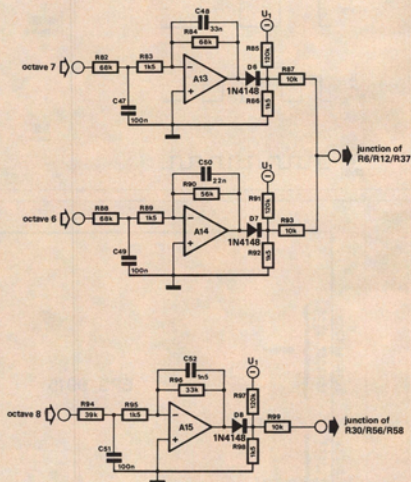




Although the compass of the Elektor piano which was published in September of this year (Elektor No. 41) originally covered only five octaves, it was stated then that thanks to its modular design, it could be easily extended to span 6, 7 or even 8 octaves. Judging by the reaction from our readers, it does in fact appear that there is a considerable interest in an electronic piano with a full 8-octave compass, i.e. ninety-six keys and a fundamental frequency range extending from 7.4 to 4148 Hz. For this reason the following short article provides readers with details of the changes in component values and of the additions to the filter circuits which will be required to extend the compass of the Elektor piano.

1

A13,A14,A15 = 741 of 1/4 TL 074, 1/4 TL 084
1/4 R4212

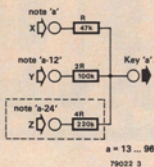


TL 074, TL 084, XR 4212: $\ominus = \#4 (U_3)$
 $\ominus = \#11 (U_1)$
741 : $\oplus = \#7 (U_3)$
 $\ominus = \#4 (U_1)$

Firstly there is the question of the values of the discharge resistors R1 through R12 on the extra octave boards (EPS 9981). For the highest octave, i.e. octave 8, R1 through R6 = 100 k, and R7 through R12 = 120 k. For octave 6, the second *lowest* octave, R1 through R6 = 1 M, and R7 through R12 = 1M2, whilst for octave 7, the lowest octave, R1 through R6 = 1M5, and R7 through R12 = 1M8.

The original board layout for the filter circuits (EPS 9981) was designed for the 5-octave version. Thus, depending on however many extra octaves are required, it will be necessary to incorporate one or more of the additional filter circuits shown in figure 1. These will, of course, have to be mounted on, e.g. a small piece of Veroboard, and housed in the vicinity of the filter board proper. This seems a useful opportunity to

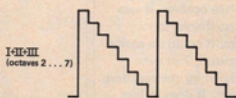
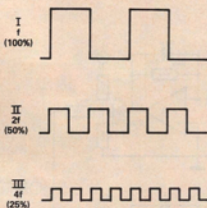
2



mention an interesting possibility for those readers who, without wishing to redesign the voicing circuits, might like to experiment with altering the sound of the original piano. The following tip has been received from a Dutch reader: a Mr. Hulshoff from Rotterdam, who recommends introducing even harmonics (the second, fourth, sixth harmonic etc. of the fundamental) into the squarewave outputs of the master tone generator which being symmetrical, are presently composed only of the fundamental and a number of odd harmonics.

With the aid of the resistor network shown in figure 2, the master tone-generator outputs are not fed straight to the corresponding inputs of the keying circuits; rather they are summed with one, or in most cases, two squarewave signals which successively have twice the frequency but half the amplitude of the

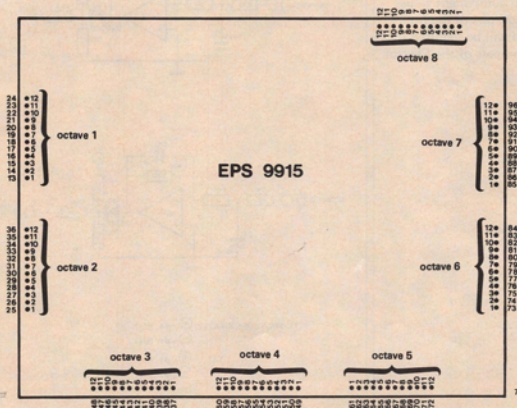
3



I-II octave 1

79022 2

4



79022 4

key number	number ...	of octave ...	X	Y	Z
1	1	8	—	—	—
2	2	8	—	—	—
3	3	8	—	—	—
4	4	8	—	—	—
5	5	8	—	—	—
6	6	8	—	—	—
7	7	8	—	—	—
8	8	8	—	—	—
9	9	8	—	—	—
10	10	8	—	—	—
11	11	8	—	—	—
12	12	8	—	—	—
13	1	1	13	1	—
14	2	1	14	2	—
15	3	1	15	3	—
16	4	1	16	4	—
17	5	1	17	5	—
18	6	1	18	6	—
19	7	1	19	7	—
20	8	1	20	8	—
21	9	1	21	9	—
22	10	1	22	10	—
23	11	1	23	11	—
24	12	1	24	12	—
25	1	2	25	13	1
26	2	2	26	14	2
27	3	2	27	15	3
28	4	2	28	16	4
29	5	2	29	17	5
30	6	2	30	18	6
31	7	2	31	19	7
32	8	2	32	20	8
33	9	2	33	21	9
34	10	2	34	22	10
35	11	2	35	23	11
36	12	2	36	24	12
37	1	3	37	25	13
38	2	3	38	26	14
39	3	3	39	27	15
40	4	3	40	28	16
41	5	3	41	29	17
42	6	3	42	30	18
43	7	3	43	31	19
44	8	3	44	32	20
45	9	3	45	33	21
46	10	3	46	34	22
47	11	3	47	35	23
48	12	3	48	36	24
49	1	4	49	37	25
50	2	4	50	38	26

key number	number ...	of octave ...	X	Y	Z
51	3	4	51	39	27
52	4	4	52	40	28
53	5	4	53	41	29
54	6	4	54	42	30
55	7	4	55	43	31
56	8	4	56	44	32
57	9	4	57	45	33
58	10	4	58	46	34
59	11	4	59	47	35
60	12	4	60	48	36
61	1	5	61	49	37
62	2	5	62	50	38
63	3	5	63	51	39
64	4	5	64	52	40
65	5	5	65	53	41
66	6	5	66	54	42
67	7	5	67	55	43
68	8	5	68	56	44
69	9	5	69	57	45
70	10	5	70	58	46
71	11	5	71	59	47
72	12	5	72	60	48
73	1	6	73	61	49
74	2	6	74	62	50
75	3	6	75	63	51
76	4	6	76	64	52
77	5	6	77	65	53
78	6	6	78	66	54
79	7	6	79	67	55
80	8	6	80	68	56
81	9	6	81	69	57
82	10	6	82	70	58
83	11	6	83	71	59
84	12	6	84	72	60
85	1	7	85	73	61
86	2	7	86	74	62
87	3	7	87	75	63
88	4	7	88	76	64
89	5	7	89	77	65
90	6	7	90	78	66
91	7	7	91	79	67
92	8	7	92	80	68
93	9	7	93	81	69
94	10	7	94	82	70
95	11	7	95	83	71
96	12	7	96	84	72

N.B. 1 A standard upright piano keyboard extends from key 4 up to and including key 88.

N.B. 2 The shaded section of the table covers those keys included in the 5-octave version of the piano.



original squarewave. As figure 3 clearly shows, the result is a staircase waveform which has a high proportion of even harmonics. (Obviously, in the case of octave 1, i.e. the second highest octave, it is only possible to sum the corresponding master tone generator outputs with one signal of twice the frequency, i.e. that of octave 8 - the highest octave, whilst in the case of octave 8 itself, the

above procedure is impossible).

The connection points X, Y and Z, for the resistor network of figure 2 are given in the accompanying table. As is apparent, each note is accorded both a key number (a procedure which was necessary to simplify the figure on page 9-10, Elektor 41), an octave number (1...8) and a number which indicates its position in the octave.

Finally, to prevent any lingering confusion figure 4 once more shows the component layout of the board for the master tone generator. As most readers soon spotted the original layout on page 9-11 of Elektor 41 transposed the indications for notes 1 to 12 on all but octave 4. However this fault does not appear on the actual boards.