

## **Stage Accompany X60a, Electronic Crossover.**

### **SA Filters: ingenious designs!**

The X 60A electronic crossover has 2 inputs and 6 outputs. They are all electronically balanced, but can be switched to unbalanced with internal switches. Each output has an individual, 41-step level potentiometer and channel on/off switch. Many combinations can be made to suit your specific needs: 2-way stereo, 2-way + 3-way, 2 x 3-way, 1 x 4-way, 1 x 5-way or 1 x 6-way.

The 24dB/octave Bessel filter-circuitry is carefully designed to very high standards to achieve high slew-rate and minimal phase-shifting in order to obtain outstanding transient response. This results in an extremely natural, clean and open sound. Sub-sonic and ultra-sonic cut-off filters are provided to get rid of rumble and rf interferences.

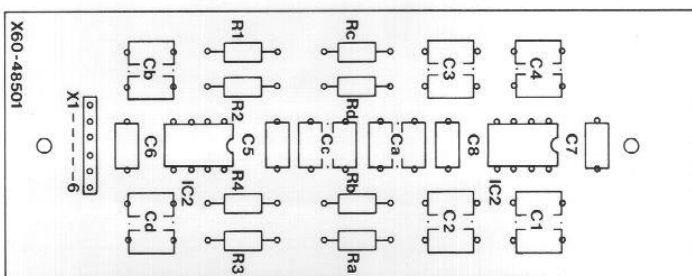
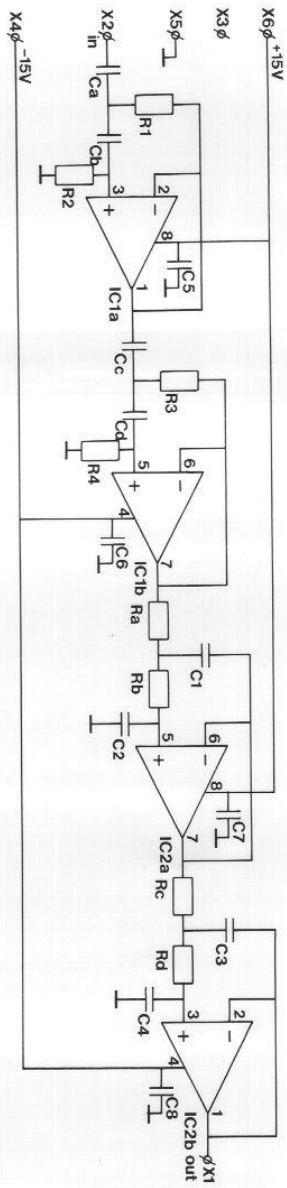
The various turnover-frequencies are selected by means of different plug-in P.C. boards inside the unit, one for each high- or low-pass filter. This allows you to choose different frequencies to "overlap" or make a "hole" in the frequency spectrum. To obtain maximum equality between the different bands and channels, the top-grade components determining the turnover frequencies are individually hand-selected to 1% tolerances.



## Component listing of the X60

NO.	CAPACITORS	NO.	RESISTORS
C 1	10UF 35V TANTALUM	R17	2K2 - 1%
C 2	10UF 35V TANTALUM	R18	470E - 1%
C 3	33PF CERAMIC	R19	7K5 - 1%
C 4	100NF 250V		
C 5	33PF CERAMIC		
C 6	100NF 250V	NO.	TRANSFORMER
C 7	33PF CERAMIC		
C 8	33PF CERAMIC	T1	TOROIDAL 30VA (15V-15V)
C 9	100NF 250V		
C10	100NF 250V		
C11	33PF CERAMIC	NO.	SEMICONDUCTORS
C12	0.1UF 630V		
C13	0.1UF 630V	V1	B125C1500
C14	2200UF 40V		
C15	100UF 50V		
C16	100NF 250V		
C17	2200UF 40V		
C18	100UF 50V		
C19	100NF 250V		
NO.	FUSES		
F1	200MA/T (5x20mm)		
F2	1A/T (5x20mm)		
F3	1A/T (5x20mm)		
NO.	INTEGRATED CIRCUITS		
IC1	NE5534AN		
IC2	NE5532AN		
IC3	LM7915		
IC4	LM7815		
NO.	RESISTORS		
R 1	15K - 1%		
R 2	7K5 - 1%		
R 3	15K - 1%		
R 4	7K5 - 1%		
R 5	10K TRIMPOTMETER		
R 6	22K POTMETER		
R 7	7K5 - 1%		
R 8	7K5 - 1%		
R 9	7K5 - 1%		
R10	15K - 1%		
R11	33E - 1%		
R12	2K2 - 1%		
R13	2K 10 TURNS		
R14	14K - 1%		
R15	15K - 1%		
R16	33E - 1%		

# Electronic Circuit X60 - 48501



<b>STAGE ACCOMPANY</b> ®	
<b>X60A</b>	scale : 1:1
FILTER X60-48501	number:
note :	<b>A4</b>
dawn : E.B.S. Paas	date : 23-05-1985
	<b>2-2</b>

## Component listing of the X60 - 48501

FREQUENCY (HZ)	CALCULATED VALUES				
	LOW-PASS				HIGH-PASS
	C1	C2	C3	C4	Ca---Cd
23	-	-	-	-	481 N
28	-	-	-	-	395 N
50	-	-	-	-	221 N
100	60,5 N	55,3 N	80,1 N	31,1 N	110 N
140	43,3 N	39,5 N	57,2 N	22,3 N	79 N
180	33,6 N	30,7 N	44,5 N	17,3 N	61 N
225	26,9 N	24,6 N	35,6 N	13,8 N	49 N
280	21,6 N	19,8 N	28,6 N	11,1 N	39,5 N
500	12,1 N	11,1 N	16,0 N	6,22N	22,1 N
800	7,56N	6,92N	10,0 N	3,89N	13,8 N
1000	6,06N	5,53N	8,0 N	3,11N	11,06N
1250	4,84N	4,43N	6,4 N	2,49N	8,85N
1600	3,78N	3,46N	5,0 N	1,95N	6,92N
2000	3,03N	2,77N	4,0 N	1,56N	5,53N
2500	2,42N	2,21N	3,2 N	1,24N	4,42N
3500	1,73N	1,58N	2,29N	889 P	3,16N
5000	1,21N	1,11N	1,6 N	622 P	2,21N
8000	757 P	692 P	1,0 N	389 P	1,38N
10000	606 P	553 P	800 P	311 P	1,11N
30000	202 P	184 P	267 P	104 P	-

C5---C8 = 100N

IC1, IC2 = TL072CP

R1 : 20K - 1%

R2 : 24K - 1%

R3 : 15K - 1%

R4 : 36K - 1%

Ra---Rd = 20K

### TOLERANCES:

C1---C4, Ca---Cd: 2,5%

C5---C8 :10%

R1---R4, Ra---Rd: 1%

## Calculation tables

<b>Calculation 4th order low pass VCVS Bessel filters (- 3dB)</b>										
<b>Fc</b>		<b>Ca,c ind.</b>		<b>C1,3</b>		<b>C2</b>	<b>C4</b>		<b>Ra,b</b>	<b>Rc,d</b>
63		159E-9		100E-9		100E-9	39E-9		17400	24900
80		125E-9		100E-9		100E-9	39E-9		13700	19600
100		100E-9		100E-9		100E-9	39E-9		11000	15800
125		80E-9		100E-9		100E-9	39E-9		8870	12400
160		63E-9		100E-9		100E-9	39E-9		6810	9760
200		50E-9		33E-9		33E-9	12E-9		16500	24900
250		40E-9		33E-9		33E-9	12E-9		13300	19600
315		32E-9		33E-9		33E-9	12E-9		10500	15800
400		25E-9		33E-9		33E-9	12E-9		8250	12400
500		20E-9		33E-9		33E-9	12E-9		6650	9760
630		16E-9		10E-9		10E-9	3.9E-9		17400	24900
800		13E-9		10E-9		10E-9	3.9E-9		13700	19600
1000		10E-9		10E-9		10E-9	3.9E-9		11000	15800
1250		8.0E-9		10E-9		10E-9	3.9E-9		8870	12400
1600		6.3E-9		10E-9		10E-9	3.9E-9		6810	9760
2000		5.0E-9		3.3E-9		3.3E-9	1.2E-9		16500	24300
2500		4.0E-9		3.3E-9		3.3E-9	1.2E-9		13300	19600
3150		3.2E-9		3.3E-9		3.3E-9	1.2E-9		10500	15800
4000		2.5E-9		3.3E-9		3.3E-9	1.2E-9		8250	12400
5000		2.0E-9		3.3E-9		3.3E-9	1.2E-9		6650	9760
6300		1.6E-9		1.0E-9		1.0E-9	390E-12		17400	24900
8000		1.3E-9		1.0E-9		1.0E-9	390E-12		13700	19600
10000		1.0E-9		1.0E-9		1.0E-9	390E-12		11000	15800
12500		800E-12		1.0E-9		1.0E-9	390E-12		8870	12400
16000		625E-12		1.0E-9		1.0E-9	390E-12		6810	9760
20000		500E-12		330E-12		330E-12	120E-12		16500	24900
25000		400E-12		330E-12		330E-12	120E-12		13300	19600
31500		317E-12		330E-12		330E-12	120E-12		10500	15800
40000		250E-12		330E-12		330E-12	120E-12		8250	12400

### Calculation 4th order high pass VCVS Bessel filters (- 3dB)

$f_c$	C ind.	$C_{a..d}$	R1	R2	R3	R4
20	500E-9	1E-6	10700	11800	7870	20500
25	400E-9	1E-6	8660	9310	6340	16200
31.5	317E-9	1E-6	6810	7500	4990	13000
40	250E-9	1E-6	5360	5900	3920	10200
50	200E-9	1E-6	4320	4750	3160	8060
63	159E-9	330E-9	10500	11300	7500	19600
80	125E-9	330E-9	8250	8870	5900	15400
100	100E-9	330E-9	6490	7150	4750	12400
125	80E-9	330E-9	5230	5760	3830	9760
160	63E-9	330E-9	4120	4420	2940	7680
200	50E-9	100E-9	10700	11800	7870	20500
250	40E-9	100E-9	8660	9310	6340	16200
315	32E-9	100E-9	6810	7500	4990	13000
400	25E-9	100E-9	5360	5900	3920	10200
500	20E-9	100E-9	4320	4750	3160	8060
630	16E-9	33E-9	10500	11300	7500	19600
800	13E-9	33E-9	8250	8870	5900	15400
1000	10E-9	33E-9	6490	7150	4750	12400
1250	8.0E-9	33E-9	5230	5760	3830	9760
1600	6.3E-9	33E-9	4120	4420	2940	7680
2000	5.0E-9	10E-9	10700	11800	7870	20500
2500	4.0E-9	10E-9	8660	9310	6340	16200
3150	3.2E-9	10E-9	6810	7500	4990	13000
4000	2.5E-9	10E-9	5360	5900	3920	10200
5000	2.0E-9	10E-9	4320	4750	3160	8060
6300	1.6E-9	3.3E-9	10500	11300	7500	19600
8000	1.3E-9	3.3E-9	8250	8870	5900	15400
10000	1.0E-9	3.3E-9	6490	7150	4750	12400
12500	.8E-9	3.3E-9	5230	5760	3830	9760

Dimensions X60 - 48501: 40mm x 104mm

