FUNKTION-ONE

The crossover points and time alignment settings are absolute.

If anything is unclear please e-mail us.

The crossover points are an integral part of our system design and the time alignment figures are a manifestation of the relative physical location of the devices. Great care and attention has been taken in arriving at these settings with regard to alignment, phase, location and the physical parameters of the drivers and waveguides themselves. Where a delay between an enclosure and a separate Bass speaker is quoted, the figure is stated assuming that the fronts of the enclosures are aligned.

There are no fixed inherent EQ settings for any of the drivers as these would degrade available headroom and phase coherence. We do not believe at all in fixing the loudspeakers' response electronically; we prefer to take the time to get the speaker design right as this is in keeping with our purist approach.

Relative drive levels are dependent on the amplifier's through gain. For example: If a Resolution 2 is driven by two amplifiers (one for the 15" Bass and one for Mid-High) with the same through gain then, as you will see from the settings page, the Bass will need to be run at +8 dB relative to the Mid-Highs. In the real world however the two amplifiers may not have the same gain. For example if a QSC Powerlight 4 (gain 38dB) is used for Bass and a Powerlight 2HV (gain 36dB) is used for Mid-High then that the Bass will need to be run at +6 dB relative to the Mid-Highs to maintain the correct ratio.

Limiter settings, on the other hand, are dependent on through gain, sensitivity and the loudspeaker's power handling ability. The most important thing is that the amplifier should never be allowed to run into continuous clip, because a clipped output approaches a square wave and this is more damaging to speakers than anything else. To avoid this, the limiters should be set at least 1 dB below the amplifier's input sensitivity. The following conversion table may be useful:

RMS Volts	dBu (or dBv)	dBV
2.47	+10	+8
1.95	+8	+6
1.56	+6	+4
1.24	+4	+2
0.98	+2	0
0.78	0	-2
0.62	-2	-4
0.49	-4	-6
0.39	-6	-8
0.31	-8	-10
0.25	-10	-12

Setting limiters in this way does not make allowance for the fact that the amplifiers' power capability may exceed that which the speaker can handle. We would therefore suggest that the Bass limiting be set in the above way with each successive band being reduced by a further dB (assuming equal input sensitivities and gains). Therefore on a Resolution 5 four-way system, the HF limiters would end up being set at least 3dB safer than the Bass; (of course input sensitivity and gain have to be taken into account). The other factor at play here is how many drivers are connected to each amplifier channel. The lower the impedance of the load the earlier the amplifier will clip and therefore limiters should be set for the maximum number of drivers that will be driven per channel (the lowest impedance).

Remember: Crossover limiters are there to protect the system from sudden and unexpected high level signals and occasional transients. They are not intended for use as compressors and therefore limit lights should almost never be seen. If a system is limiting heavily, audio quality and drive units will suffer.

LIMITERS NEED TO BE SET CAREFULLY TO PROTECT YOUR SYSTEM AND THIS INFORMATION IS PROVIDED PURELY AS A GUIDE TO APPROACHING THIS.

Another point is that digital crossovers need to be driven to nearly their full capacity to ensure maximum use of the resolution available, because at low input drive levels fewer bits are used. Because Funktion One equipment is so intrinsically efficient (high conversion of amplifier energy into acoustic energy) we usually find ourselves turning the amplifier front panel gain controls down so as to drive the crossover harder. This will also improve the signal to noise ratio. A suitable amplifier input sensitivity to achieve this would be +10 dBu. For example a QSC PL4 (input sensitivity of +2.7 dBu) with its gain turned down by 8dB (to +30dB) then has an input sensitivity of +10.7 dBu. If an amplifier is run with the gain control turned down, then limiters will need to be adjusted accordingly.

Care has to be taken here not to turn the front panel gain control up again without re-adjusting the limiters. Crew or other operators must be made aware of this. In a 'dry-hire' environment it may not be possible to safely let a system out in this way without locking the amplifier level controls to avoid unauthorised adjustment. If this isn't possible, then the sonic advantages may have to be forgone. Some amplifiers have rear-panel DIP switches to enable user-selection of input sensitivity which mean that this objective can be met whilst leaving the front panel gain control safely on maximum.

	Component	Delay (mS)	Polarity	X-over point (high pass) (Hz)	X-over type (high pass)	X-over point (low pass) (Hz)	X-over type (low pass)	Relative Gain Settings* (dB)
RES 2	15"	0	+	28.4	24dB But	250	24dB LR	+8
	8" + 1"	3.268	+	250	24dB LR	22k	24dB LR	0
RES 2 Mid-High with F118	F118	0	+	28.4	24dB But	250	24dB LR	+8
	8" + 1"	4.768	+	250	24dB LR	22k	24dB LR	0
RES 2 with F218	F218	0	+	24.8	24dB B	60	24dB LR	+8
	15"	1.500	+	60	24dB LR	250	24dB LR	+8
	8" + 1"	4.768	+	250	24dB LR	22k	24dB LR	0
AX88 with F218	F218	0	+	28.4	24dB But	180	24dB LR	+8
	8" + 1"	0.876	+	180	24dB LR	22k	24dB LR	0
RES 4 (Passive HF) with F218	F218	0	+	24.8	24dB But	114	24dB LR	+8
	12"	1.500	+	114	24dB LR	445	24dB LR	+5
	8" + 1"	5.390	+	437	24dB LR	22k	24dB LR	- 1
RES 4 with F218	F218	0	+	24.8	24dB But	114	24dB LR	+8
	12"	1.500	+	114	24dB LR	445	24dB LR	+5
	8"	5.390	+	437	24dB LR	5k77	24dB LR	- 1
	1"	5.632	-	5k55	24dB LR	22k	24dB LR	0
RES 5 with F218	F218	0	+	24.8	24dB But	114	24dB LR	+8
	12"	1.500	+	114	24dB LR	445	24dB LR	+5
Small System	8"	5.151	+	437	24dB LR	5k77	24dB LR	- 3
	1"	5.562	-	5k55	24dB LR	22k	24dB LR	- 3
RES 5 with F218	F218	0	+	24.8	24dB But	100	24dB LR	+3
	12"	1.500	+	114	24dB LR	445	24dB LR	+1
Large System	8"	5.151	+	437	24dB LR	7k55	24dB LR	0
	1"	5.517	-	5k55	24dB LR	22k	24dB LR	- 1
RES Downfill (Res 4D)	8"	5.390	+	437	24dB LR	5k77	24dB LR	0
	1"	5.632	-	5k55	24dB LR	22k	24dB LR	- 1
RES 9 with two F218s	F218	0	+	24.8	24dB But	85	24dB LR	+5
	15"	0.590	+	85	24dB LR	445	24dB LR	+3
	8"	3.762	+	445	24dB LR	6k99	24dB LR	- 4
	1"	4.060	-	6k47	24dB LR	22k	24dB LR	- 2
RES 9 as long throw add-on to Res 5 system	15"	1.982	+	85	24dB LR	445	24dB LR	0
	8"	5.151	+	445	24dB LR	6k99	24dB LR	+2
	1"	5.454	-	6k47	24dB LR	22k	24dB LR	+5

Notes

* Assuming amplifiers of identical input sensitivity and through gain

Gains are given as a starting point and not an absolute

(LR - Linkwitz Riley : But - Butterworth)

Delay times assume fronts of enclosures aligned

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