

### APPENDIX G: PO EVOLUTION TABLES

The tables below summarize the effect of a coupled evolution on each of the sixteen POs of an AX system (two spin 1/2 nuclei). The first column in each table indicates the PO before the evolution, while the next columns indicate the newly created POs (including the initial one). A coupled evolution implies three PO operations: shift A, shift X, coupling  $J$ . Nevertheless no more than four terms are generated from the initial one: when both shifts are active the coupling is not.

a. First subset (not affected by evolution)

Initial PO	F i n a l POs			
[11]	[11]	0	0	0
[z1]	0	[z1]	0	0
[1z]	0	0	[1z]	0
[zz]	0	0	0	[zz]

b. Second subset (affected by A shift and  $J$  coupling)

Initial PO	F i n a l POs			
[x1]	$cC[x1]$	$sC[y1]$	$-sS[xz]$	$cS[yz]$
[y1]	$-sC[x1]$	$cC[y1]$	$-cS[xz]$	$-sS[yz]$
[xz]	$-sS[x1]$	$cS[y1]$	$cC[xz]$	$sC[yz]$
[yz]	$-cS[x1]$	$-sS[y1]$	$-sC[xz]$	$cC[yz]$

c. Third subset (affected by X shift and  $J$  coupling)

Initial PO	F i n a l POs			
[1x]	$c'C[1x]$	$-s'S[zx]$	$s'C[1y]$	$c'S[zy]$
[zx]	$-s'S[1x]$	$c'C[zx]$	$c'S[1y]$	$s'C[zy]$
[1y]	$-s'C[1x]$	$-c'S[zx]$	$c'C[1y]$	$-s'S[zy]$
[zy]	$-c'S[1x]$	$-s'C[zx]$	$-s'S[1y]$	$c'C[zy]$

d. Fourth subset (affected by A shift and X shift)

Initial PO	F i n a l POs			
[xx]	$cc'[xx]$	$sc'[yx]$	$cs'[xy]$	$ss'[yy]$
[yx]	$-sc'[xx]$	$cc'[yx]$	$-ss'[xy]$	$cs'[yy]$
[xy]	$-cs'[xx]$	$-ss'[yx]$	$cc'[xy]$	$sc'[yy]$
[yy]	$ss'[xx]$	$-cs'[yx]$	$-sc'[xy]$	$cc'[yy]$

$$\begin{aligned}
 c &= \cos \Omega_A t & ; & & c' &= \cos \Omega_X t & ; & & C &= \cos \pi J t \\
 s &= \sin \Omega_A t & ; & & s' &= \sin \Omega_X t & ; & & S &= \sin \pi J t
 \end{aligned}$$