4 Symmetries in Single Diagonalization Approach

For J=3/2, m=-3,0,3:

$\Gamma D_{11} + F_3 + \rho_{13}$	$-D_{01}$	D_{-11}	-V			1 .			S_{12}	$-S_{11} - \eta_{13}$	S_{01}	$-S_{-11}$											
$-D_{01}$	$D_{00} + F_3$			-V					S_{02}	S_{10}		S_{10}	$-S_{02}$										
D_{-11}	D_{01}	$D_{11} + F_3 - \rho_{13}$			-V					S_{-11}	S_{01}	$S_{11} - \eta_{13}$	S_{12}										
-V	-		$D_{11} + F_0$	$-D_{01}$	D_{-11}	-V	-						-	S_{12}	$-S_{11}$	S_{01}	$-S_{-11}$		-		-		-
	-V		$-D_{01}$	$D_{00} + F_0$	D_{01}		-V							S_{02}	S_{10}		S_{10}	$-S_{02}$					
		-V	D_{-11}	D_{01}	$D_{11} + F_0$			-V							S_{-11}	S_{01}	S_{11}	S_{12}			-		
			-V			$D_{11} + F_3 - \rho_1$		D_{-11}											S_{12}	$\eta_{13} - S_{11}$	S_{01}	$-S_{-11}$	
				-V	5.0	$-D_{01}$	$D_{00} + F_3$	D_{01}											S_{02}	S_{10}		S_{10}	$-S_{02}$
			-		-V	D_{-11}	D_{01}	$D_{11} + F_3 + \rho_{13}$						-						S_{-11}	S_{01}	$S_{11} + \eta_{13}$	S_{12}
S_{12}	S_{02}								$E_{22} + F_3 + \rho_{23}$	$-E_{12}$	E_{02}			-V									
$-S_{11} - \eta_{13}$	S_{10}	S_{-11}							$-E_{12}$	$E_{11} + F_3 + \rho_{13}$	$-E_{01}$	E_{-11}	2		-V	-							
S_{01}		S ₀₁							E_{02}		$E_{00} + F_3$		E_{02}			-V							
$-S_{-11}$	S_{10}	$S_{11} - \eta_{13}$								E_{-11}	E_{01}	$E_{11} + F_3 - \rho_{13}$	E12				-V						
	$-S_{02}$	S_{12}	-								E_{02}	E_{12}	$E_{22} + F_3 - \rho_{23}$					-v					
			S_{12}	S ₀₂					-V	-V				$E_{22} + F_0$	-E ₁₂	E ₀₂	r.		-v				
			$-S_{11}$ S_{01}	S_{10}	S_{-11}					-v	***			-E ₁₂	$E_{11} + F_0$ $-E_{01}$	-E ₀₁	E_{-11}	r.		-V	***		
				ė.	S_{01}						-v	***		E02		$E_{00} + F_0$	E01	E02			-v		
			$-S_{-11}$	S ₁₀	S ₁₁							-v	T/		E_{-11}	E ₀₁	$E_{11} + F_0$	E_{12} $E_{22} + F_0$				-v	17
			_	$-S_{02}$	S ₁₂	ė.	0						-v	-V	_	L02	E_{12}		E E	$-E_{12}$	E		-v
						S_{12} $\eta_{13} - S_{11}$	S_{10}	S_{-11}						-v	-V				$E_{22} + F_3 - \rho_{23}$ $-E_{12}$	$E_{11} + F_3 - \rho_{13}$	-E ₀₂	E_{-11}	
						$\eta_{13} - S_{11}$ S_{01}		S_{-11} S_{01}								-V			E_{02}	$-E_{01} + F_3 - \rho_{13}$	$E_{00} + F_3$	E_{01}	E_{02}
			1 .				·												A-02	E_{-11}		$E_{11} + F_3 + \rho_{13}$	
						$-S_{-11}$	S_{10}	$S_{11} + \eta_{13}$									-V				En1		E_{12}

After unitary transformations:

$D_{11} - D_{-11}$									ρ_{13}	S_{12}			$S_{11} + S_{-11}$							-	η_{13}			. 1
$\sqrt{2}D_0$	D_{00}		$D_{11} + D_{-11} + F_3$							$-\sqrt{2S_{02}}$	$S_{11} - S_{-11}$./50	$\sqrt{2S_{10}}$	e e										
			11 + 22-11 + 23	$D_{11} - D_{-11} + F_0$./5D	•	$-\sqrt{2}V$		•	-	VII - V-II	V 2001		J12	e e	•	-	$S_{11} + S_{-11}$	-	_			7/13	
				$\sqrt{2}D_{01}$	D + F-			$-\sqrt{2}V$							$-\sqrt{2}S_{co}$			$\sqrt{2}S_{10}$						
				V === 0.		$D_{11} + D_{-11} + F_0$			$-\sqrt{2}V$						V =0.02	$S_{11} - S_{-11}$	$\sqrt{2}Sm$	V =10	Sun					
			P13	$-\sqrt{2}V$			$D_{11} - D_{-11} + F_3$	√2Dm			7713				_	011 0-11	1.2001			Sin			$S_{11} + S_{-11}$	
			P-4-0	*	$-\sqrt{2}V$		$\sqrt{2}D_{01}$	$D_{00} + F_3$			74.0									$-\sqrt{2}S_{m}$			√2S10	
017						$-\sqrt{2}V$			$D_{11} + D_{-11} + F_{2}$				n		1 :						$S_{11} - S_{-11}$	$\sqrt{2}S_{co}$		S.,
S ₁₂	-√:	$\sqrt{2}S_{m}$	-		-			-		$E_{22} + F_3$			E ₁₂			-	-		-					ρ23
			$S_{11} - S_{-11}$				η13				$E_{11} - E_{-11} + F_3$	$\sqrt{2}E_{01}$		E_{12}									ρ_{13}	
			$\sqrt{2}S_{01}$								$\sqrt{2}E_{01}$	$E_{00} + F_3$		$\sqrt{2}E_{02}$										
$S_{11} + S$.	-11 √2	$2S_{10}$							ma	E_{12}			$E_{11} + E_{-11} + F_3$								ρ_{13}			
			S_{12}								E_{12}	$\sqrt{2}E_{02}$		$E_{22} + F_3$						ρ_{23}				
				S_{12}	$-\sqrt{2}S_{02}$					-					$E_{22} + F_0$		-	E_{12}		$-\sqrt{2}V$				
						$S_{11} - S_{-11}$										$E_{11} - E_{-11} + F_0$	$\sqrt{2}E_{01}$		E_{12}		$-\sqrt{2}V$			
						$\sqrt{2}S_{01}$										$\sqrt{2}E_{01}$	$E_{00} + F_0$		$\sqrt{2}E_{02}$			$-\sqrt{2}V$		
				$S_{11} + S_{-11}$	$\sqrt{2S_{10}}$										E_{12}			$E_{11} + E_{-11} + F_0$					$-\sqrt{2V}$	- 1
					-	S_{12}				-				-		E_{12}	$\sqrt{2}E_{02}$		$E_{22} + F_0$	- 1				$-\sqrt{2V}$
1 .							S_{12}	$-\sqrt{2}S_{02}$		-				ρ_{23}	$-\sqrt{2}V$	· · · · · ·				$E_{22} + F_3$		ď	E_{12}	
7/13									$S_{11} - S_{-11}$	-			ρ_{13}			$-\sqrt{2}V$	·				$E_{11} - E_{-11} + F_3$	$\sqrt{2E_{01}}$		E12
1 .								÷-	$\sqrt{2}S_{01}$	-							$-\sqrt{2}V$	·		1	$\sqrt{2}E_{01}$	$E_{00} + F_3$		$\sqrt{2}E_{02}$
			η_{13}				$S_{11} + S_{-11}$	$\sqrt{2S_{10}}$	ė.		P13							$-\sqrt{2V}$	Contract	E_{12}	r.	$\sqrt{2}E_{m}$	$E_{11} + E_{-11} + F_3$	
L .			-						S_{12}	ρ_{23}									$-\sqrt{2V}$		E-12	$\sqrt{2E_{02}}$		$E_{22} + F_3$]

A_1 matrix:

	$D_{11} - D_{-11} + F_3$	$\sqrt{2}D_{01}$		ρ_{13}	S_{12}	$S_{11} + S_{-11}$				η_{13}		.]
-	$\sqrt{2}D_{01}$	$D_{00} + F_3$			$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$						
-			$D_{11} + D_{-11} + F_0$	$-\sqrt{2}V$			$S_{11} - S_{-11}$	$\sqrt{2}S_{01}$	S_{12}			.
	ρ_{13}		$-\sqrt{2}V$	$D_{11} + D_{-11} + F_3$		η_{13}				$S_{11} - S_{-11}$	$\sqrt{2}S_{01}$	S_{12}
	S_{12}	$-\sqrt{2}S_{02}$			$E_{22} + F_3$	E_{12}						ρ_{23}
	$S_{11} + S_{-11}$	$\sqrt{2}S_{10}$		η_{13}	E_{12}	$E_{11} + E_{-11} + F_3$				ρ_{13}		
			$S_{11} - S_{-11}$				$E_{11} - E_{-11} + F_0$	$\sqrt{2}E_{01}$	E_{12}	$-\sqrt{2}V$		
			$\sqrt{2}S_{01}$				$\sqrt{2}E_{01}$	$E_{00} + F_0$	$\sqrt{2}E_{02}$		$-\sqrt{2}V$	
			S_{12}				E_{12}	$\sqrt{2}E_{02}$	$E_{22} + F_0$			$-\sqrt{2}V$
ł	η_{13}			$S_{11} - S_{-11}$		ρ_{13}	$-\sqrt{2}V$			$E_{11} - E_{-11} + F_3$	$\sqrt{2}E_{01}$	E_{12}
1				$\sqrt{2}S_{01}$				$-\sqrt{2}V$		$\sqrt{2}E_{01}$	$E_{00} + F_3$	$\sqrt{2}E_{02}$
Į				S_{12}	ρ_{23}				$-\sqrt{2}V$	E_{12}	$\sqrt{2}E_{02}$	$E_{22} + F_3$

A_2 matrix:

$D_{11} + D_{-11} + F_3$			ρ_{13}		$S_{11} - S_{-11}$	$\sqrt{2}S_{01}$	S_{12}				η_{13}
	$D_{11} - D_{-11} + F_0$	$\sqrt{2}D_{01}$	$-\sqrt{2}V$					S_{12}	$S_{11} + S_{-11}$		
	$\sqrt{2}D_{01}$	$D_{00} + F_0$		$-\sqrt{2}V$				$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$		
ρ_{13}	$-\sqrt{2}V$		$D_{11} - D_{-11} + F_3$	$\sqrt{2}D_{01}$	η_{13}					S_{12}	$S_{11} + S_{-11}$
		$-\sqrt{2}V$	$\sqrt{2}D_{01}$	$D_{00} + F_3$						$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$
$S_{11} - S_{-11}$			η_{13}		$E_{11} - E_{-11} + F_3$	$\sqrt{2}E_{01}$	E_{12}				ρ_{13}
$\sqrt{2}S_{01}$					$\sqrt{2}E_{01}$	$E_{00} + F_3$	$\sqrt{2}E_{02}$				
S_{12}					E_{12}	$\sqrt{2}E_{02}$	$E_{22} + F_3$			ρ_{23}	
	S_{12}	$-\sqrt{2}S_{02}$						$E_{22} + F_0$	E_{12}	$-\sqrt{2}V$	
	$S_{11} + S_{-11}$	$\sqrt{2}S_{10}$						E_{12}	$E_{11} + E_{-11} + F_0$		$-\sqrt{2}V$
			S_{12}	$-\sqrt{2}S_{02}$			ρ_{23}	$-\sqrt{2}V$		$E_{22} + F_3$	E_{12}
n_{13}			$S_{11} + S_{-11}$	$\sqrt{2}S_{10}$	ρ13				$-\sqrt{2}V$	E_{12}	$E_{11} + E_{-11} + F_3$