

96K6 Pantsir S1 System	Possible Early Warning [6]			Missile Battery Tracking and Launch Decision					Missile Launch and Flyout / Gun Fire					
Equipment Type Nominal Detection/Flight Range/Freq. Circular Sweep Rate (Seconds) [1] Flight Speed	91N6 Big Bird (similar for 59N6 Protivnik) S-400 Early Detection / Battle Management 100km / 2.5GHz 6 or 12 N/A			2RL80E Pantsir SPAAGM Acquisition 20km / 3GHz 2 or 4 N/A		1RS2-1 Phazotron Pantsir SPAAGM Engage 10km / 7GHz N/A N/A		9S737MK Pantsir Command Post N/A N/A N/A		57E6 / SA-22 Pantsir Surface to Air Missile 20km N/A 800m/sec				
Engagement Sequence Entry Points:	1			3										
Sequence Status:	UNDETECTED	ACQUISITION	HANDOVER [9]	ACQUISITION	TRACKING	SLEW / CUE	TRACKING	LAUNCH DECISION [17]	LAUNCH/FIRE	ORIENT	FLYOUT [19]	ENDGAME	IMPACT	
Sequence Status ID:	00	01	02	13	14	15	16	17	18	19	20	21	22	
Target Detectable + Maintained LOS [2]:														
91N6 Big Bird >>	[7]	[10]												
2RL80E SPAAGM AR >>				[11]	[15]									
1RS2-1 Phazotron SPAAGM ER >>														
57E6 / SA-22 >>														
2A38 30mm Gun												[22]	[23]	
Engagement Required Times (Seconds):														
Radar Acquisition and Tracking														
Min...Max [3]		4.5 + 12...24	3...9	1.5 + 4...8	1...5	1.5 + 2...4 [16]	1...3							
Average		22.5	4.5	7.5 [12]	2.5	4.5	2							
Staff Evaluation and Decisions														
Min...Max			2...5					1...5 or 5...10 [18]						
Average			2.5					2.5						
SAM Missile														
Launch / Flight Time									1...5	0.1	km*1.25-(2...4)[21]	2...4	-	
Average									2.5	0.1	km*1.25-3	3	-	
Cumulative Times (Seconds):				[13]							(at nominal 10km)			
Min...Max	-	16.5...28.5	21.5...42.5	27...52	28...57	31.5...62.5	32.5...65.5	33.5...80.5	34.5...85.5	34.6...85.6	45.1...95.1	47.1...98.1	47.1...98.1	
Max-minus-Min Mean	-	22.5	32	39.5	42.5	47	49	57	60	60.1	70.1	72.6	72.6	
Simulated Cumulative Seconds	0	22.5	29.5	37	39.5	44	46	48.5	51	51.1	60.6	63.6	63.6	
Seconds for Loss of Target [4]:	-	9	4.5	3	2.5	2	2	2	2	2	2	1	-	
Integrated Events:	-	[8]	-	[14]	-	-	-	-	-	-	-	-	[24]	
Algorithm Movement Cost Multiplier [5]:	x 1	x 5	x 10	x 30	x 40	x 50	x 60	x 100	x 400	x 450	x 500	x 1,000	x 10,000	

- NOTES IN BRACKETS [ ]:
- A minimum of two radar sweeps is required to detect and acquire a target
  - "Detectable" is defined as the radar cross section aspect shown of the target having a probability of detection greater than 90% for given radar equipment performance specification:  
"LOS" is defined as a clear straight-line path ("line-of-sight") existing between the radar and the target containing no terrain or other obstructions
  - For radar sweeps, preliminary value is 180 degree average sweep/slew distance to be covered before first target return C43(90 degree in case of 91N6 as it is dual-faced
  - This is the loss of consecutive target track time that makes it necessary for the sequence to be started from scratch at Entry Point 1 or 3 in order to reacquire a target
  - A danger-escalation cell movement cost "penalty" multiplier for the A\* Algorithm. Used for potential movement evaluation during each status indicated
  - Early detection may take place if the TLAM is observable within range and LOS of any system early detection radar
  - TLAM will remain undetected by flying behind terrain masking and/or remaining out of detectable radar range
  - A. Brigade command post notified. + B. All IADS assets put on sector alert.
  - Involves delay for human interpretation and decision
  - 91N6 Big Bird and 2RL80E detection does not need to be concurrent after this point for handover to occur
  - 2RL80E can autonomously acquire targets with 2 radar sweeps of a detectable object
  - Half this value (3.75 seconds) is used if Early Warning exists.
  - With Sequence Entry Point 3, cumulative time value at Handover (29.5 Seconds) can be subtracted
  - For autonomous battery acquisition, missiles are readied at this time
  - 2RL80E and 1RS2-1 detection does not need to be concurrent after this point
  - 1.5 second average initial slew is removed if Early Warning exists.
  - Possible existence of a Pantsir S1 "full automatic" mode may preclude any battery decision delays if it is activated
  - 1...5 if no Early Warning is necessary.
  - The 57E6 missile guidance will aim for projected target location at time of impact
  - Only 1RS2-1 Phazotron tracking is necessary during missile flyout, however a 2 second tracking loss will result in errant missiles that do not impact the target
  - Includes 0% time penalty for missile control maneuvering delays and non-direct flight. 3 seconds is subtracted for average Endgame phase length
  - Radar tracking continues to be necessary during final 3 seconds of missile endgame
  - Salvos of 2 missiles are normally fired, making the probability of missile misses insignificant for a slow-moving TLAM type target
  - TLAM destruction -- probability 100%.
  - At maximum range (4km), 30mm gun fire will take approximately 4 seconds to close the distance to the target at 980m/s. Target must remain in sight during this entire period
  - TLAM destruction -- probability 100%.