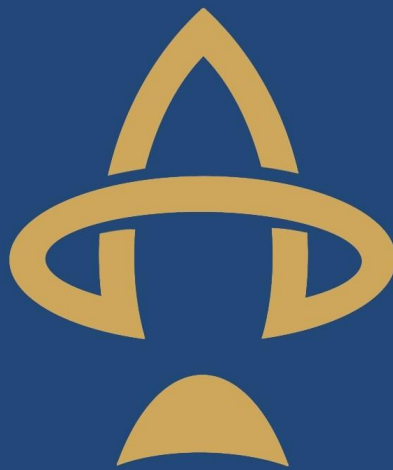




Rocket Mission Works



SEAD Planning Guide
Version 1.0 – October 2023

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1. Overview

This reference guide provides general flight profiles for the primary weapons and decoy used to conduct Suppression of Enemy Air Defenses (SEAD) operations in DCS. This reference guide should be used for planning purposes when mission building or planning for missions that include SEAD strikes or strikes against targets protected by air defenses.

2. Background

Some air defense systems within DCS can engage cruise and anti-radiation missiles. An effective way to attack these air defenses, or targets protected by them, is through a combination of decoys and strike missiles. Such an attack must be carefully coordinated. Incorrect timing can result in strike missiles arriving at the target ahead of or behind the decoys such that the air defense has time to acquire and destroy the strike missiles.

Well executed timing results in the decoys arriving just ahead of the strike missiles. Ideally this will cause air defenses to engage the decoys, leaving limited time to acquire and engage the strike missiles. Adding multiple attack azimuths, and or waves of decoys, will add extra difficulty for the air defense system to overcome.

2. Background

The ADM-141 Tactical Air Launched Decoy (TALD) is an air-launched aerial decoy meant to replicate the RF signature of an aircraft. It flies a pre-programmed flight path to an altitude of 3300 ft where it levels off to present a target for enemy air defenses to engage. This area of the flight is termed the “Operational Zone”.

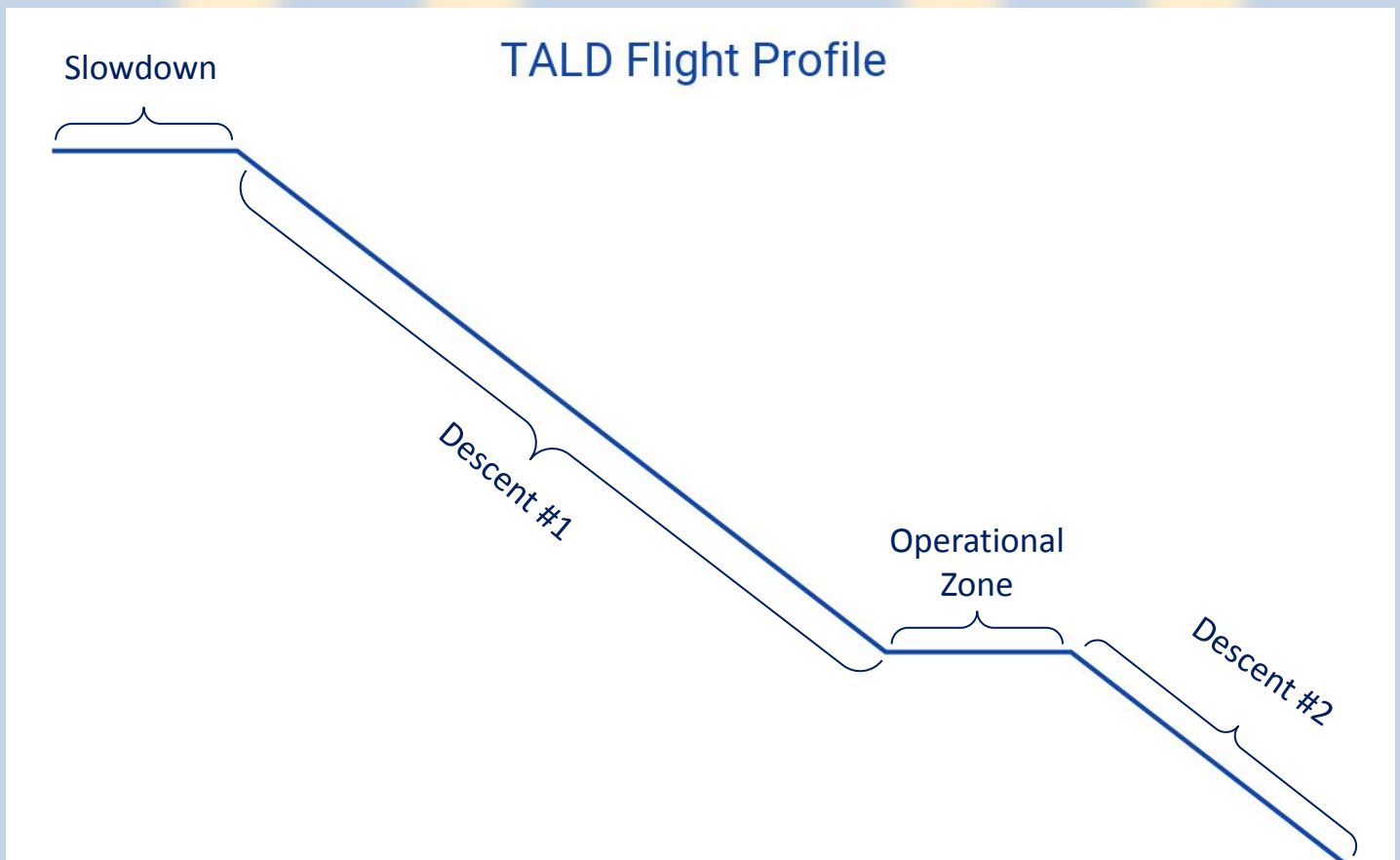
Flight Phases

Slowdown: Level flight at launch altitude slowing to ~ TAS 290 kts.

Descent #1: Dive at 3 kft/min at ~ TAS 290 kts.

Operational Zone: Level flight at 3300 ft slowing to ~TAS 190 kts.

Descent #2: Final descent to ground.



3. Methodology

This reference guide primarily focuses on the ADM-141 TALD aerial decoy and the AGM-88C, LD-10, Kh-25MPU, and Kh-58U anti-radiation missiles. Launches were conducted at .9 Mach.

TALD Table

TALD launches were conducted at launch altitudes of 10-40 kft in increments of 5 kft. Range and time-of-flight (TOF) were recorded to build a flight profile and determine the operational zone.

Anti-Radiation Missile Table

Maximum range and TOF were recorded for each anti-radiation missile at launch altitudes of 10-40 kft in increments of 5 kft.

Classical Doctrine Tables

TOF was recorded for each anti-radiation missile based on the classic DCS doctrine of 1 NM of launch range for every 1 kft of altitude at launch.

Note: The SU-25T, used to launch the Kh-25MPU and Kh-58U, can't operate at altitudes above 35 kft MSL and only up to .8 Mach.

4. Results- TALD Table

The table below shows the range and TOF for the operational zone of the AGM-141 TALD, relative to time and point of launch.

Launch Altitude	Time (MM:SS)	Range (NM)
40 kft	13:18 - 14:30	67 - 71
35 kft	11:48 - 12:59	59 - 63
30 kft	10:07 - 11:22	51 - 56
25 kft	8:28 - 9:39	43 - 47
20 kft	6:41 - 7:54	34 - 38
15 ft	4:32 - 5:44	23 - 27
10 kft	2:55 - 4:05	15 - 19

5. Results- Anti-Radiation Missile Table

The table below shows the maximum range and TOF for the selected anti-radiation missiles at the respective altitudes.

Launch Altitude	AGM-88C		LD-10		Kh-58U		Kh-25MPU	
	TOF	Range	TOF	Range	TOF	Range	TOF	Range
40 kft	3:00	63	3:06	63	-	-	-	-
35 kft	3:00	61	3:11	61	7:32	77	1:19	22
30 kft	3:00	59	3:29	59	7:09	73	1:19	21
25 kft	3:00	56	3:50	56	6:39	67	1:20	20
20 kft	3:00	53	3:59	50	3:20	40	1:18	18
15 kft	3:00	49	3:40	43	2:29	32	1:17	18
10 kft	3:00	43	3:40	37	2:00	26	1:16	16
All ranges shown are in NM. All times shown in MM:SS.								

6. Results- Classical Doctrine Table

The table below shows the TOF for the selected anti-radiation missiles using the classical DCS doctrine of 1 NM of range for every 1 kft of altitude at launch.

40 kft Launch	5 NM	10 NM	15 NM	20 NM	25 NM	30 NM	35 NM	40 NM
AGM-88C	00:18	00:28	00:38	00:48	00:58	01:10	01:24	01:43
LD-10	00:12	00:21	00:31	00:41	00:52	01:05	01:20	01:45
Kh-58U	-	-	-	-	-	-	-	-
Kh-25MPU	-	-	-	-	-	-	-	-

35 kft Launch	5 NM	10 NM	15 NM	20 NM	25 NM	30 NM	35 NM
AGM-88C	00:17	00:27	00:37	00:47	00:59	01:13	01:33
LD-10	00:13	00:22	00:33	00:44	00:57	01:13	01:40
Kh-58U	00:18	00:29	00:42	00:56	01:13	01:32	01:57
Kh-25MPU	-	-	-	-	-	-	-

6. Results- Classical Doctrine Table

30 kft Launch	5 NM	10 NM	15 NM	20 NM	25 NM	30 NM
AGM-88C	00:17	00:27	00:37	00:49	01:03	01:24
LD-10	00:12	00:22	00:33	00:46	01:02	01:32
Kh-58U	00:17	00:29	00:42	00:59	01:15	01:38
Kh-25MPU	-	-	-	-	-	-

25kft Launch	5 NM	10 NM	15 NM	20 NM	25 NM
AGM-88C	00:17	00:27	00:37	00:51	01:13
LD-10	00:12	00:22	00:34	00:51	01:22
Kh-58U	00:18	00:30	00:45	01:01	01:23
Kh-25MPU	-	-	-	-	-

20 kft Launch	4 NM	8 NM	12 NM	16 NM	20 NM
AGM-88C	00:14	00:23	00:31	00:41	00:59
LD-10	00:10	00:18	00:28	00:43	01:10
Kh-58U	00:14	00:24	00:36	00:48	01:04
Kh-25MPU	00:10	00:19	00:32	00:49	01:16

6. Results- Classical Doctrine Table

15kft Launch	3 NM	6 NM	9 NM	12 NM	15 NM
AGM-88C	00:10	00:19	00:24	00:32	00:43
LD-10	00:09	00:14	00:21	00:31	00:51
Kh-58U	00:12	00:20	00:28	00:38	00:49
Kh-25MPU	00:13	00:22	00:32	00:45	01:05

10 kft Launch	2 NM	4 NM	6 NM	8 NM	10 NM
AGM-88C	00:09	00:15	00:19	00:24	00:29
LD-10	00:08	00:11	00:15	00:21	00:32
Kh-58U	00:09	00:15	00:21	00:27	00:32
Kh-25MPU	00:10	00:15	00:21	00:29	00:38

7. Results- Shooter Separation

Shooter separation was also be calculated in terms of distance between decoy launch aircraft and strike missile launch aircraft. This distance separation allows for more flexible employment, especially against targets where prior planning is not possible. The below table was based on the classical doctrine.

	10 NM	15 NM	20 NM	25 NM	30 NM	35 NM	40 NM
AGM-88C Separation	10.0	16.9	23.2	29.5	36.3	43.1	50.0
LD-10 Separation	9.5	15.6	21.5	28.1	35.1	42.1	49.7
Kh-25MPU Separation	15.6	26.3	37.0	46.0	56.3	65.2	-
Kh-58U Separation	14.0	22.1	33.9	-	-	-	-
AGM-88C and LD-10 separation given in NM Kh-25MPU and Kh-58U separation given in km							

8. Application

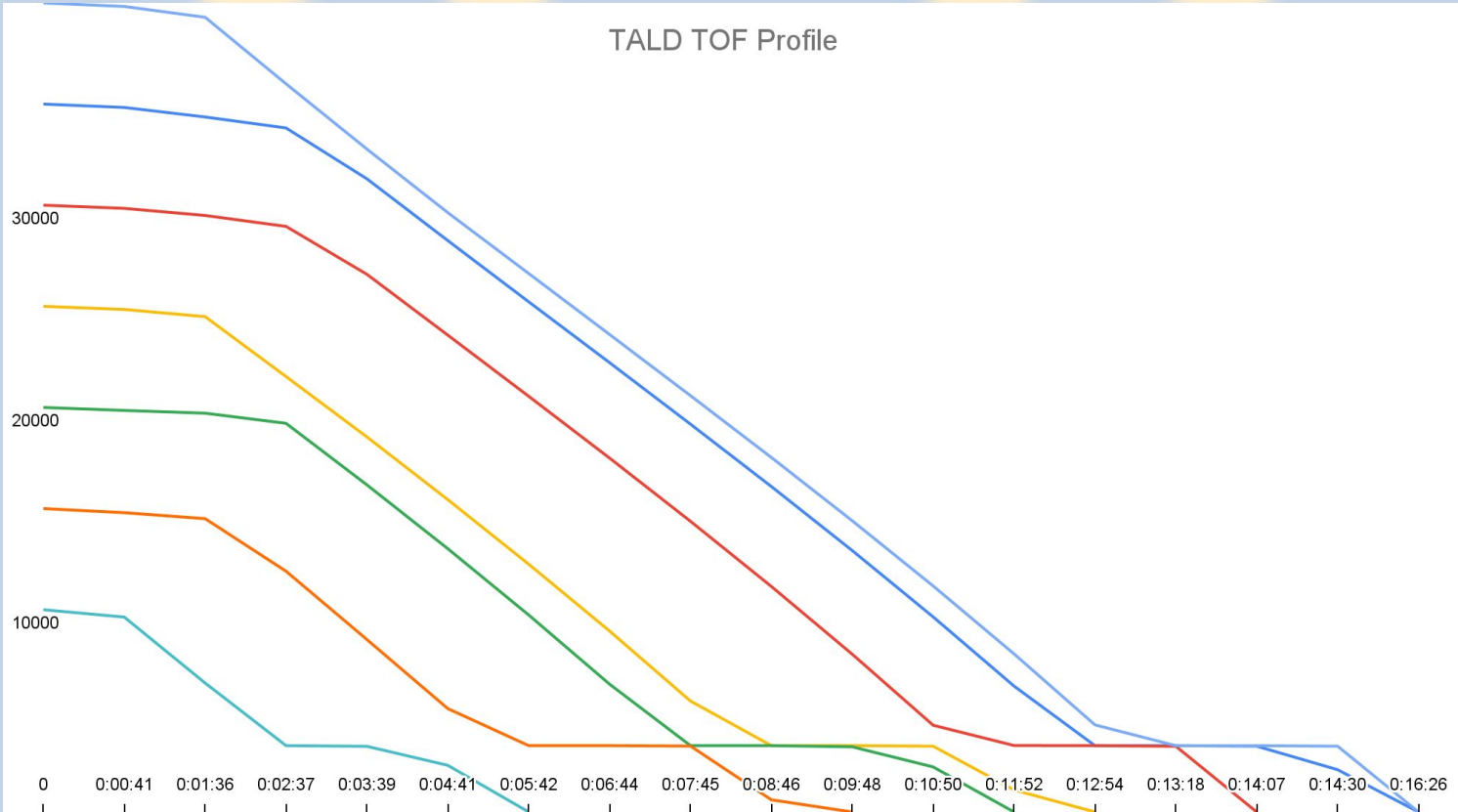
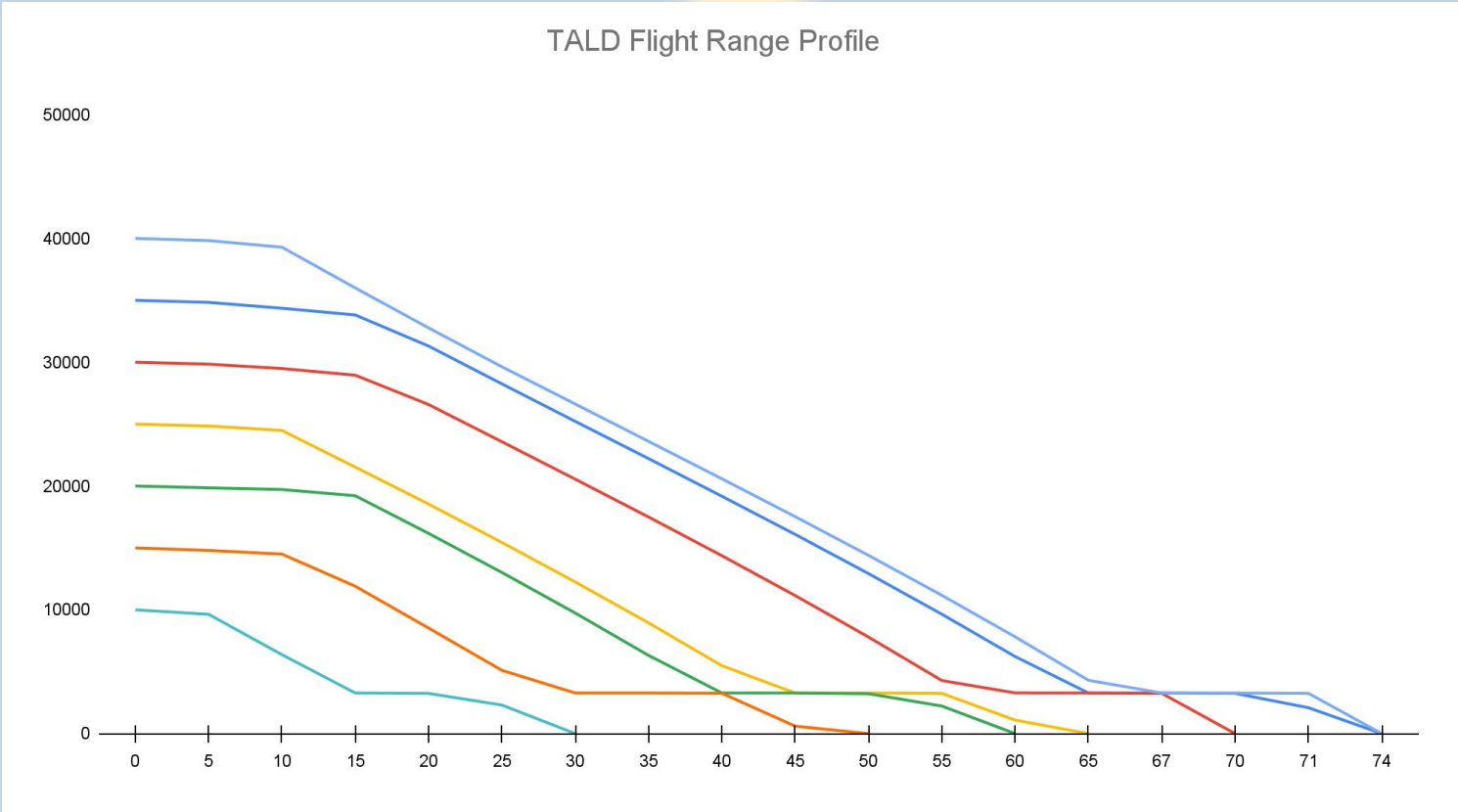
Application of the reference guide will depend on the individual mission plan, target, and air defenses involved.

A general application begins with a desired time-on-target (TOT). TOFs for the aerial decoy and strike missiles are found in the guide for the desired launch range to reach an enemy air defense unit. Consideration should be given to the air defense units actual engagement zone, as it will begin engaging the decoy before it overflies the unit.

Subtracting the TOF from the TOT, including a desired wave separation time, decoy and strike missile launch times can be calculated.

Example: 40kft Launch on SA-10 TER- No wave separation	
Desired TOT	8:30:00
ADM-141 TOF	14:00
AGM-88 TOF	3:00
Decoy launch time	8:16:00
Strike missile launch time	8:27:00

Appendix 1: TALD Flight Profiles



Appendix 2: Mach Speeds

Below is a table of velocity values at various altitudes. These values can be used to calculate separation distance for values not listed in Section 7.

	10 kft	15 kft	20 kft	25 kft	30 kft	35 kft	40 kft
.9 Mach	579	569	558	547	536	524	522
.8 Mach	974	937	919	900	882	863	859
.9 Mach speed in kts .8 Mach speed in km/h							