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Israeli-Syrian Air and SAM Strength Analysis

Working Estimates of Force Numbers and Location

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Introduction

- This analysis is a rough working paper with estimates drawn from a range of source
- The quality of the systems shown and the way in which they are operationally used and support is far more important than aircraft or missile strength.
- The following main fighting components are considered: The Air Defense, Strike and Air-to-Air Operational Capabilities. The study initially analyses these two components , then applies them to the two armed forces to show the operational superiority of one side versus the other.
- Comments and additional material would be most welcome.

Central Factors in Threat Engagement Analysis:

- C4I (Command Control Communications Computing and Intelligence) and the maximum Air Defense engagement force
- The Operational Readiness of the forces resulting in the combat forces available as Full Mission Capable.
  See (Appendix 1)
- The maximum usable Ground Launch Interceptor force and Combat Air Patrol operations.

The total available combat aircraft at the start of a conflict is the:
(Total Assets) – (Number of Aircraft not Operational Ready)

In the Alert Phase of air operations, the combat ready assets are assigned to the Ground Launched Intercept and Combat Air Operations (CAP).

Maximum Ground Launched Interceptors

- C4I delay time is assumed to be the time taken by the Early Warning Radars in detecting the Intruders, threat assessment and transmission of the data/ information to the various Air Defense sectors and airbases. This time interval has to be minimized and optimized and is dependent on the type of C4I hardware and software that are in place.

- The response time is assumed to begin after airbases are put on alert, and is the scramble time for combat aircraft to be in the air (wheels up). This time interval has also to be minimized and is very dependent on aircraft type.

- At the end of the response time two interceptors are launched and two more are launched every 30 seconds until the interceptors can no longer intercept the intruders outside of the “keep out range”.

- The Maximum Ground Launched Interceptors is highly sensitive to the C4I time delay and the response time (Appendix 2).

Concept of Threat Strike Operations:

- Coordinated offensive air operations involves the accomplishment of several missions or tasks over a specified period of time.

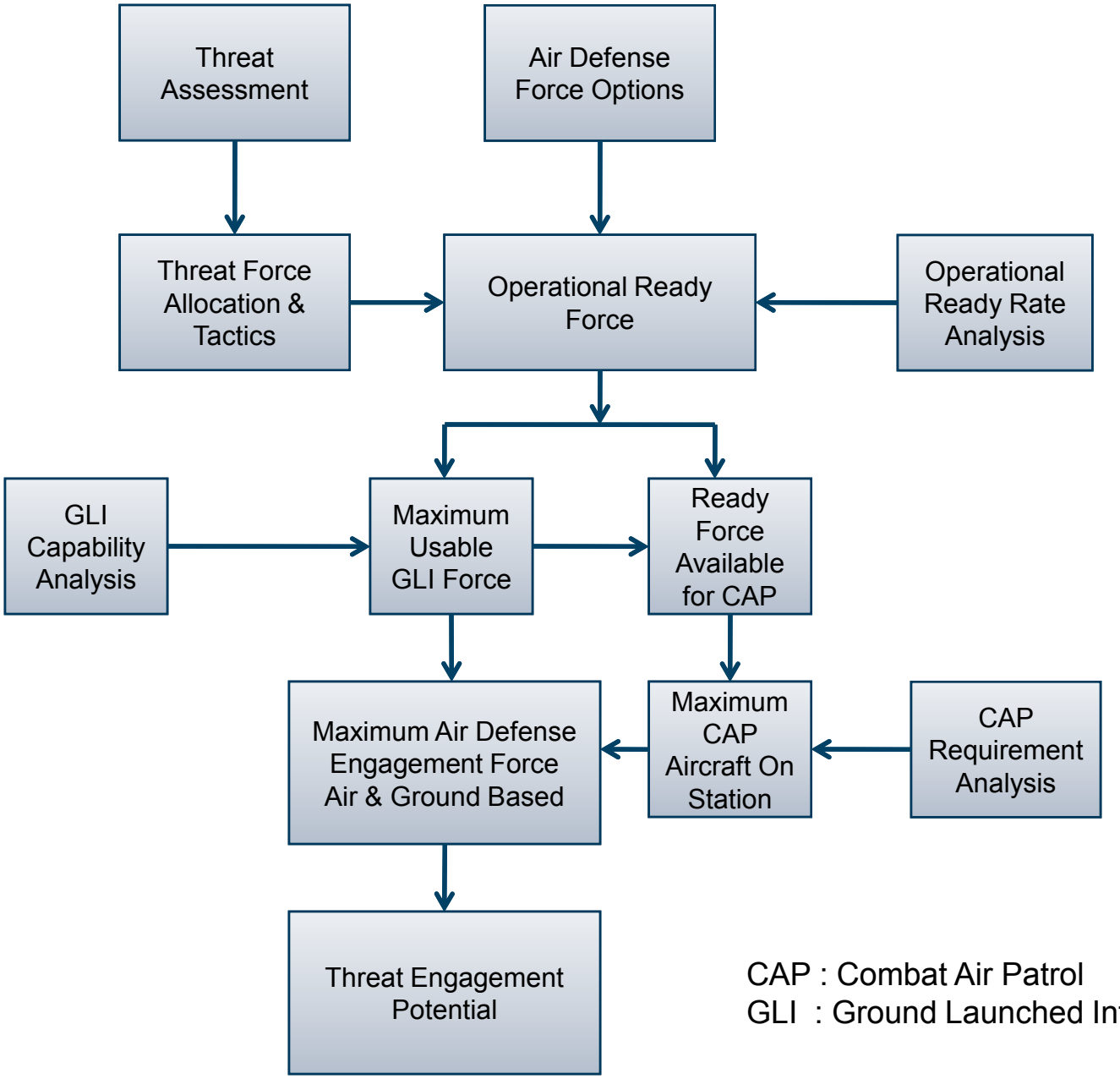
- For this scenario, it is assumed that the threat will initiate the offensive operations with Electronic Warfare, Defense Suppression, and Fighter Sweep in order to reduce the risks to the main strike elements.

- It is further postulated that each strike cell will be formed to include suppression, escorts, and airfield strike capabilities.

Phase I:
- Electronic warfare
- Defense Suppression
- Fighter Sweep

Phase II:
- Local Defense Suppression
- Counter Air Strike
- Local Air Superiority
- Strike Aircraft

Methodology Overview



CAP : Combat Air Patrol
GLI : Ground Launched Intercept

The methodology chart depicts the general process and guidelines of the analysis. The prescribed subjects are analyzed in the following sequence:

Step One – Threat Analysis

Step Two – Operational Ready-Rate Analysis of the various force options

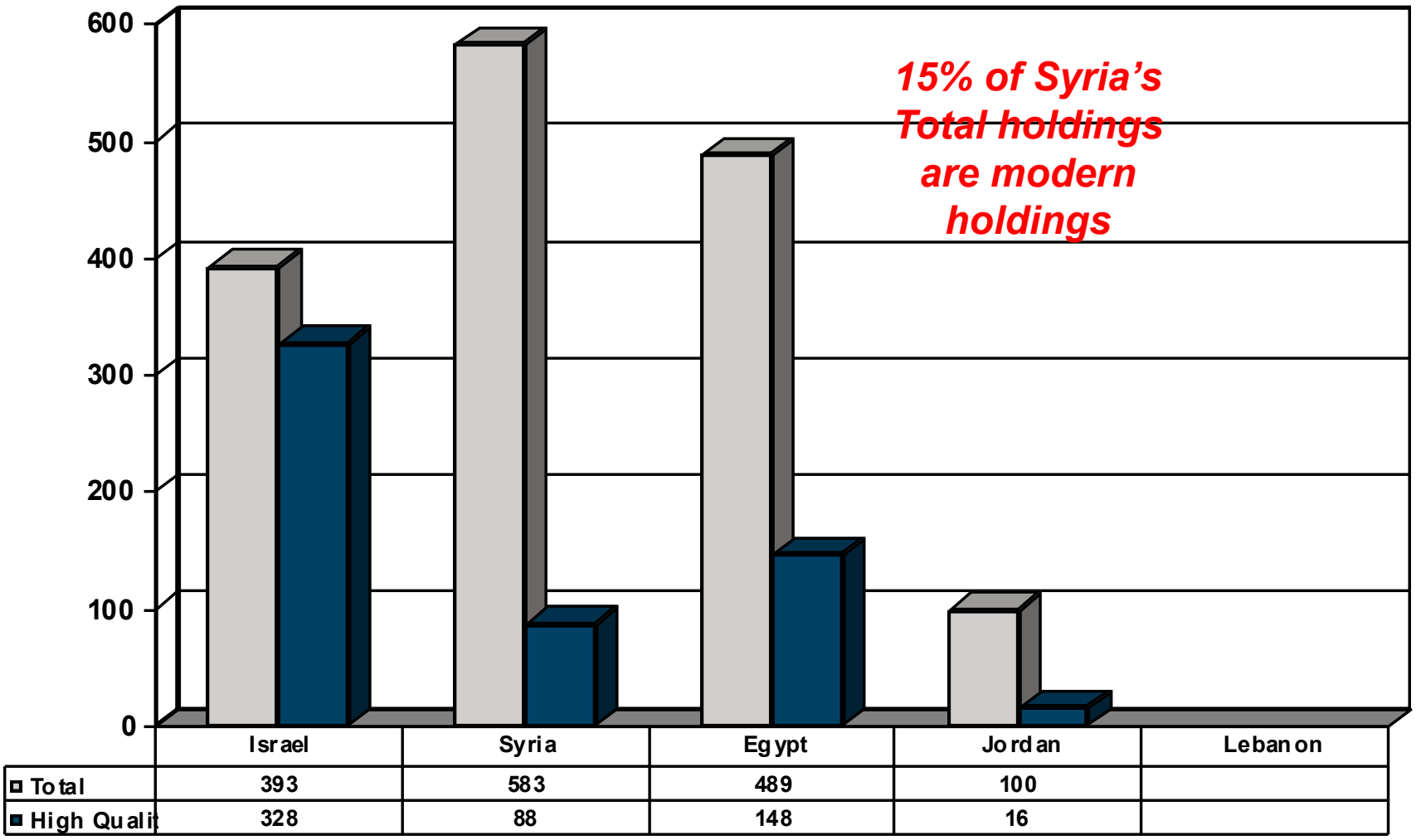
Step Three – GLI capability analysis, the results of which are used to compute the maximum capacity of each airbase to launch interceptors prior to being over run by threat aircraft.

Step Four - CAP capability analysis, to determine:
(a) CAP station locations
(b) Minimum number of required CAP stations

Step Five - Determination of Threat Engagement Potential of the various force options form Ground and Air.

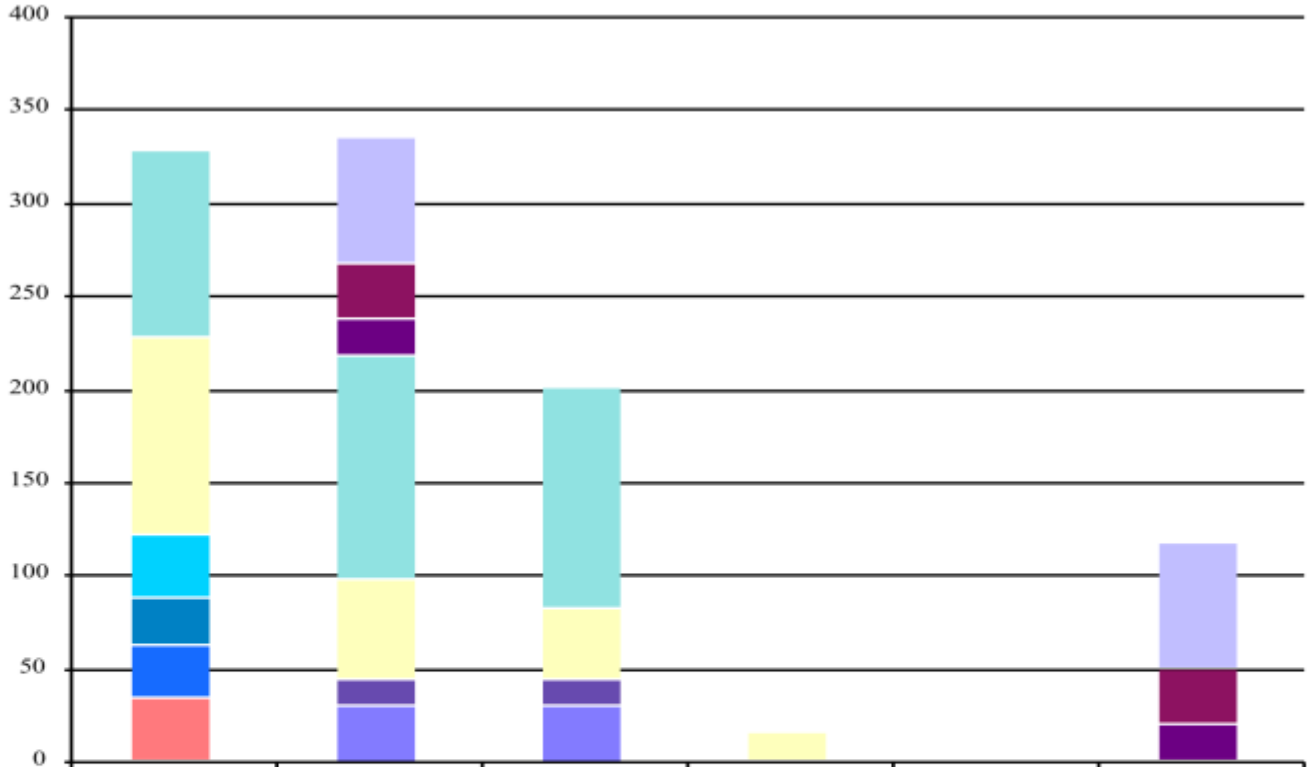
Order of Battle Assessment

Comparative Arab-Israeli Total & High Quality Combat Air Strength By Type



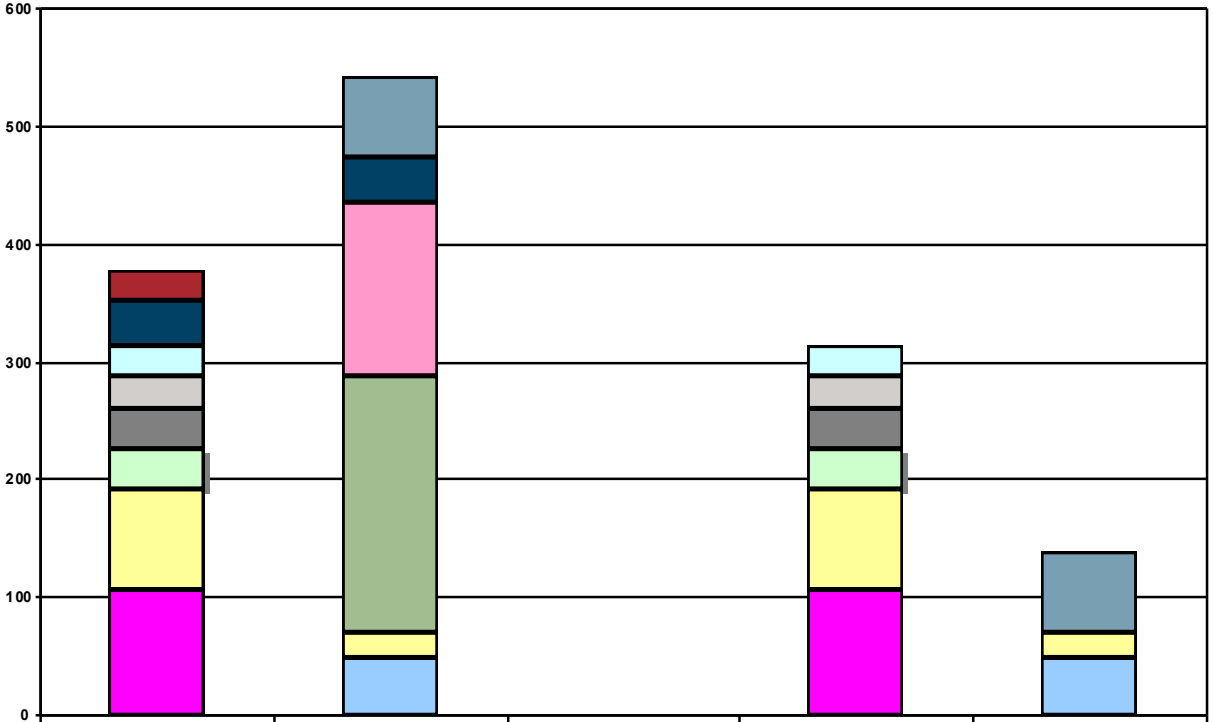
Derived from IISS, Military Balance, 2008

Comparative High Quality Combat Air Strength By Type



	Israel	Total Arab	Egypt	Jordan	Lebanon	Syria
MiG-29		68				68
MiG-25		30				30
Su-24		20				20
F-16C/D	101	119	119			
F-16A/B	106	54	38	16		
F-16I	34					
F-15I	25					
F-15C/D	28					
F-15A/B	34					
Mirage 2000		15	15			
F-4/2000		29	29			

Derived from IISS, Military Balance, 2008

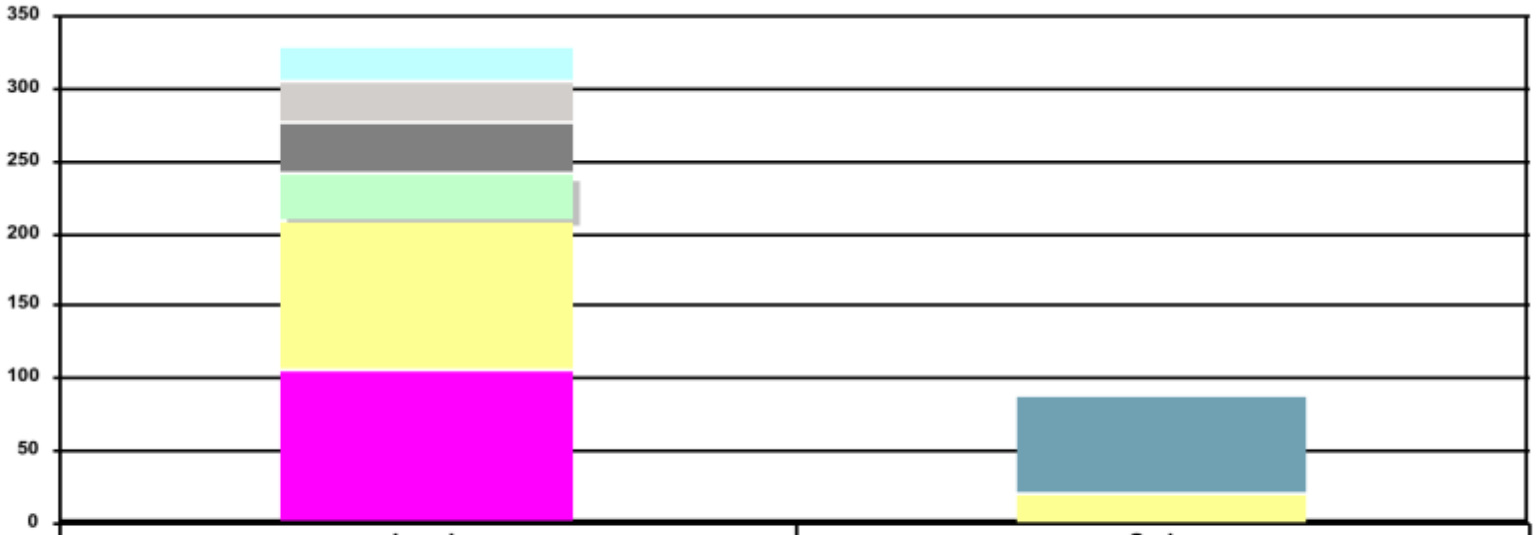


	Israel-Total	Syria-Total	.	Israel-High Quality	Syria-High Quality
TA-4H/4J	26	-		-	-
A-4	39	-		-	-
F-15I	25	-		25	-
F-15C/D	28	--		28	-
F-15A/B	34			34	-
F-16I	34	-		34	-
F-16C/D	86	-		86	-
F-16A/B	106	-		106	-
MiG-29A	-	68		-	68
MiG-25/25F	-	40		-	-
MiG-23	-	146		-	-
MiG-21		219		-	-
Su-24	-	20		-	20
SU-22		50			50

Israeli-Syrian Total Combat Air Strength By Type

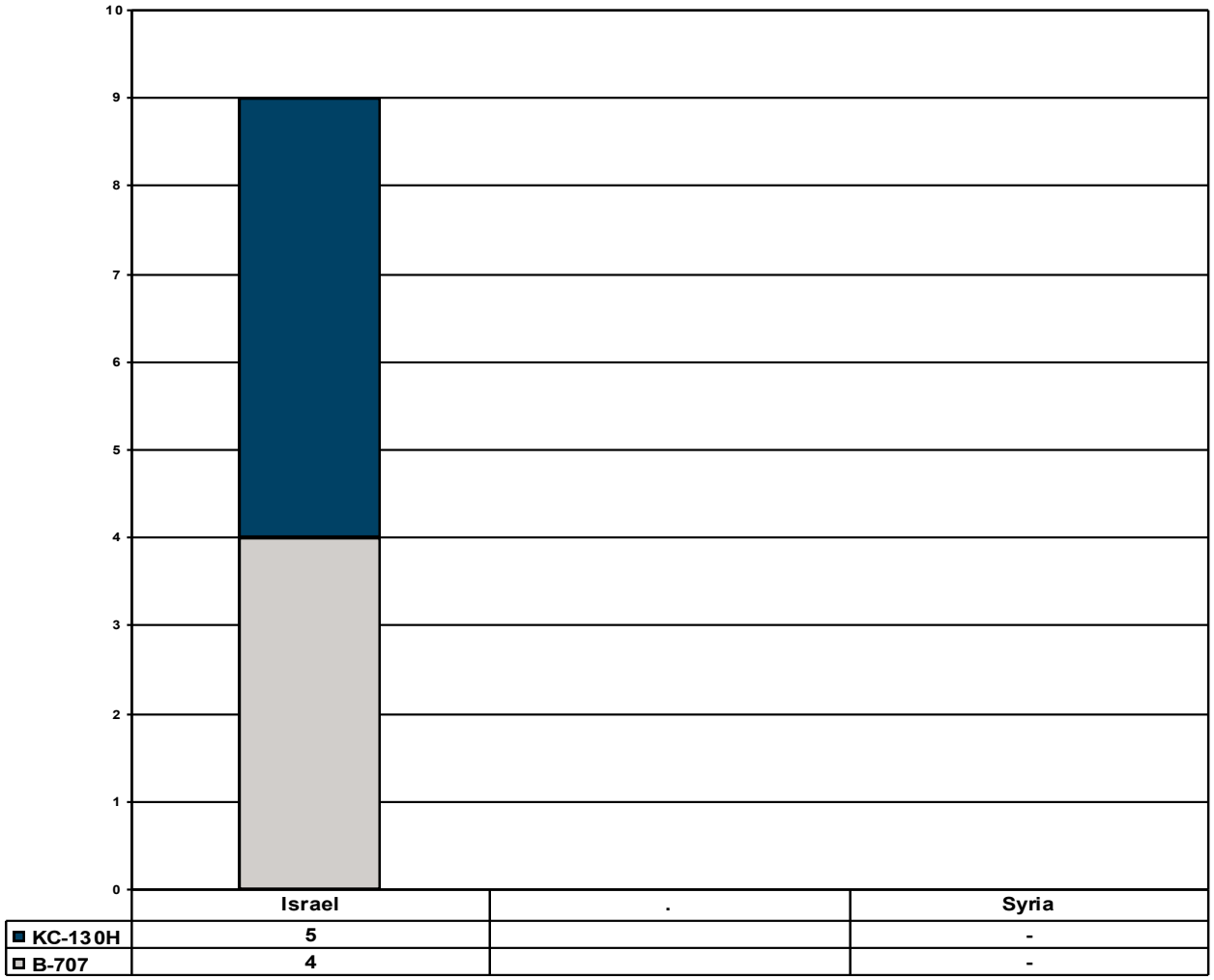
Derived from IISS, Military Balance, 2008

Israeli-Syrian High Quality Combat Air Strength By Type



	Israel	Syria
M-2000C Mirage		
F-15I	25	
F-15C/D	28	
F-15A/B	34	
F-16I	34	
F-16C/D	101	
F-16A/B	106	
MiG-29A		68
Su-24		20

Derived from IISS, Military Balance, 2008

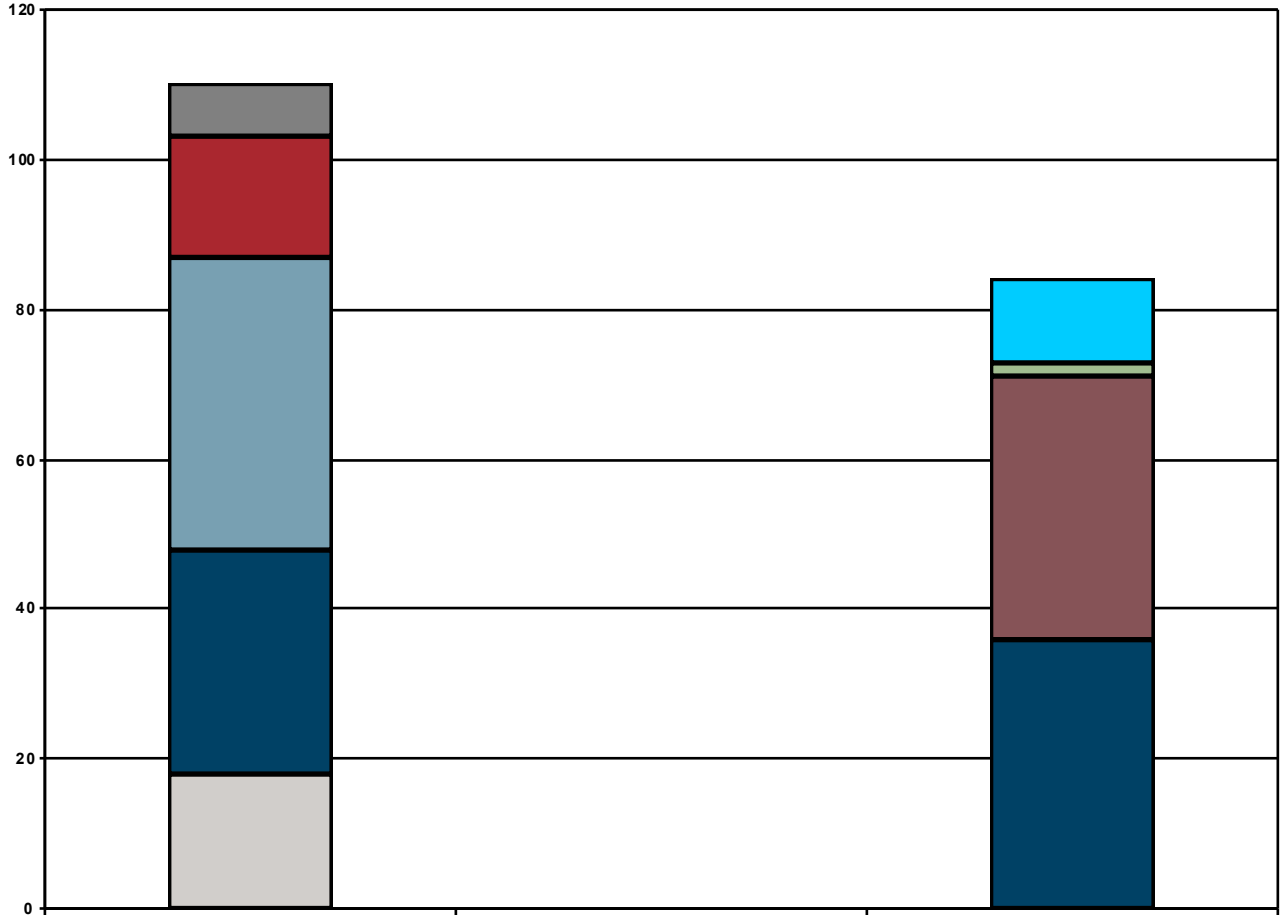


Israeli-Syrian Tanker Strength By Type

Does not take not account the pod capabilities of the IAF and the UAV/UCAV capability on each side.

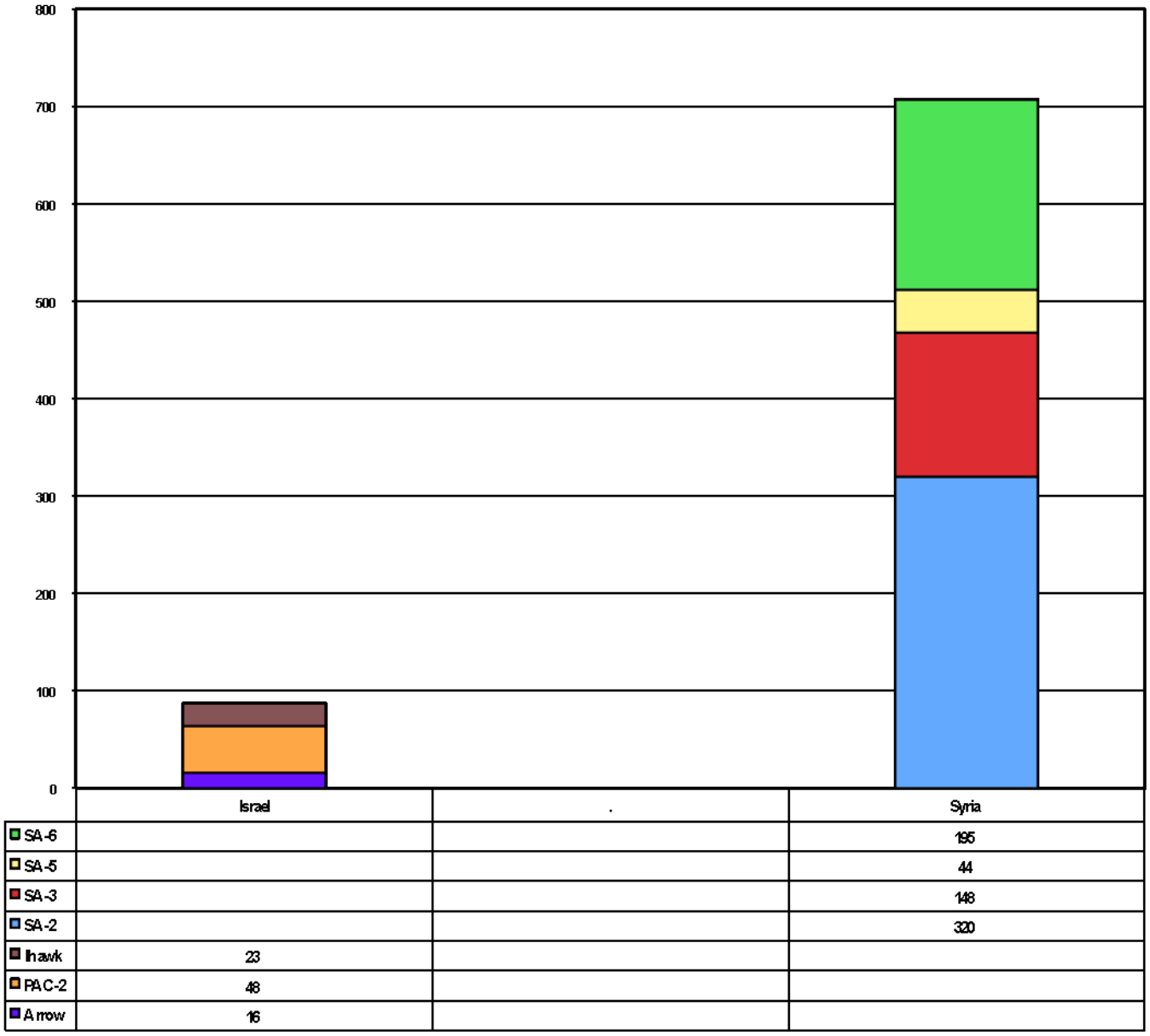
Derived from IISS, Military Balance, 2008

Israeli-Syrian Armed Helicop-ters by Type

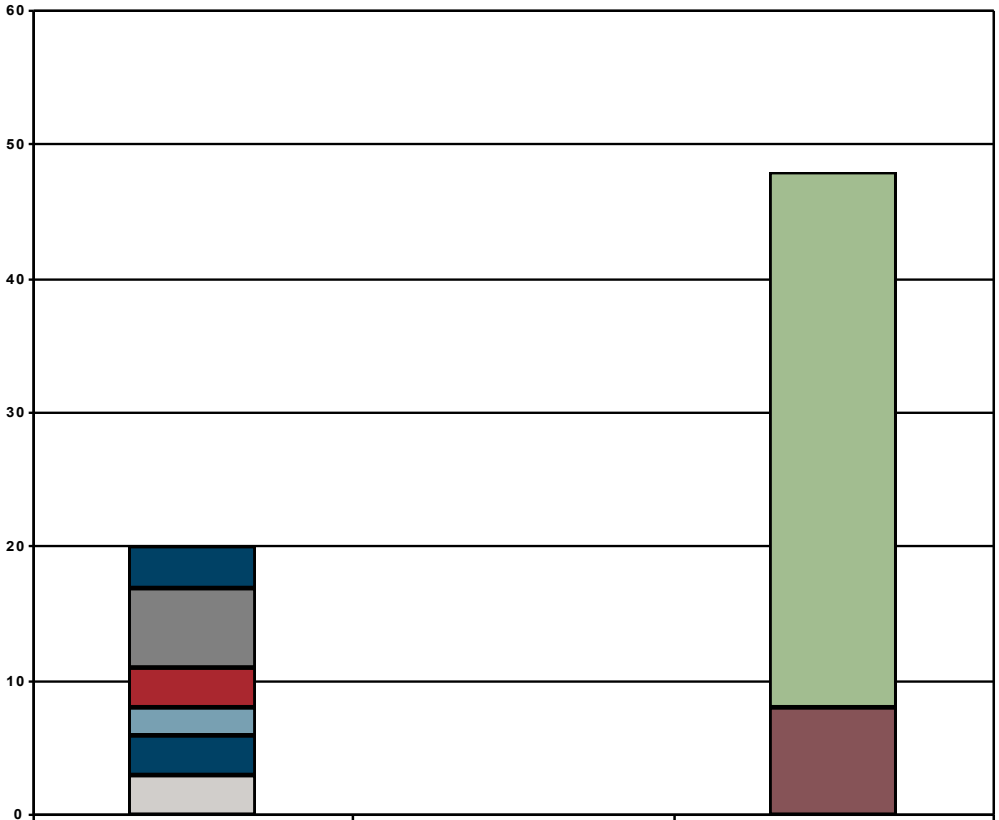


	Israel	.	Syria
M-14	-		11
KA-28	-		2
SA-342L	-		35
Mi-25	-		36
AS565AS	7		-
AH-1E	16		-
AH-1F	39		-
AH-64A	30		-
AH-64D	18		-

Derived from IISS, Military Balance, 2008



Israeli-Syrian Major Surface-to-Air Missile Fire Units/ Launchers



	Israel	.	Syria
MiG-21H/J	-		40
MiG-25R	-		8
Maritime Patrol -IAI 1124	3		-
RC-12D Guardrail	6		-
Gulstream G-550	3		-
EC-13H AEW	2		-
B707 ELINT	3		-
B-707 Phalcon	3		-

Israeli-Syrian EW/ ELINT, AWACS, Maritime Patrol, Recce Air Strength By Type

Does not take not account the pod capabilities of the IAF and the UAV/UCAV capability on each side.

Derived from IISS, Military Balance, 2008

SYRIA

Syrian Strategy vs Israel

- The critical turning point was in the late 1980's when, after the Israeli invasion of Lebanon and Syria's defeat in 1982 in which Israel completely dominated the air warfare and the electromagnetic spectrum, Syria revised its strategy toward Israel.

- Rather than seeking "Strategic Parity" as they claimed in the 1970's early 1980's i.e. number of Combat Aircraft, Main Battle Tanks,.... the goal was turned into "Strategic Deterrence" to discourage any Israeli attack.

- It has become a heavy economic burden to sustain the operational readiness of its armed forces.

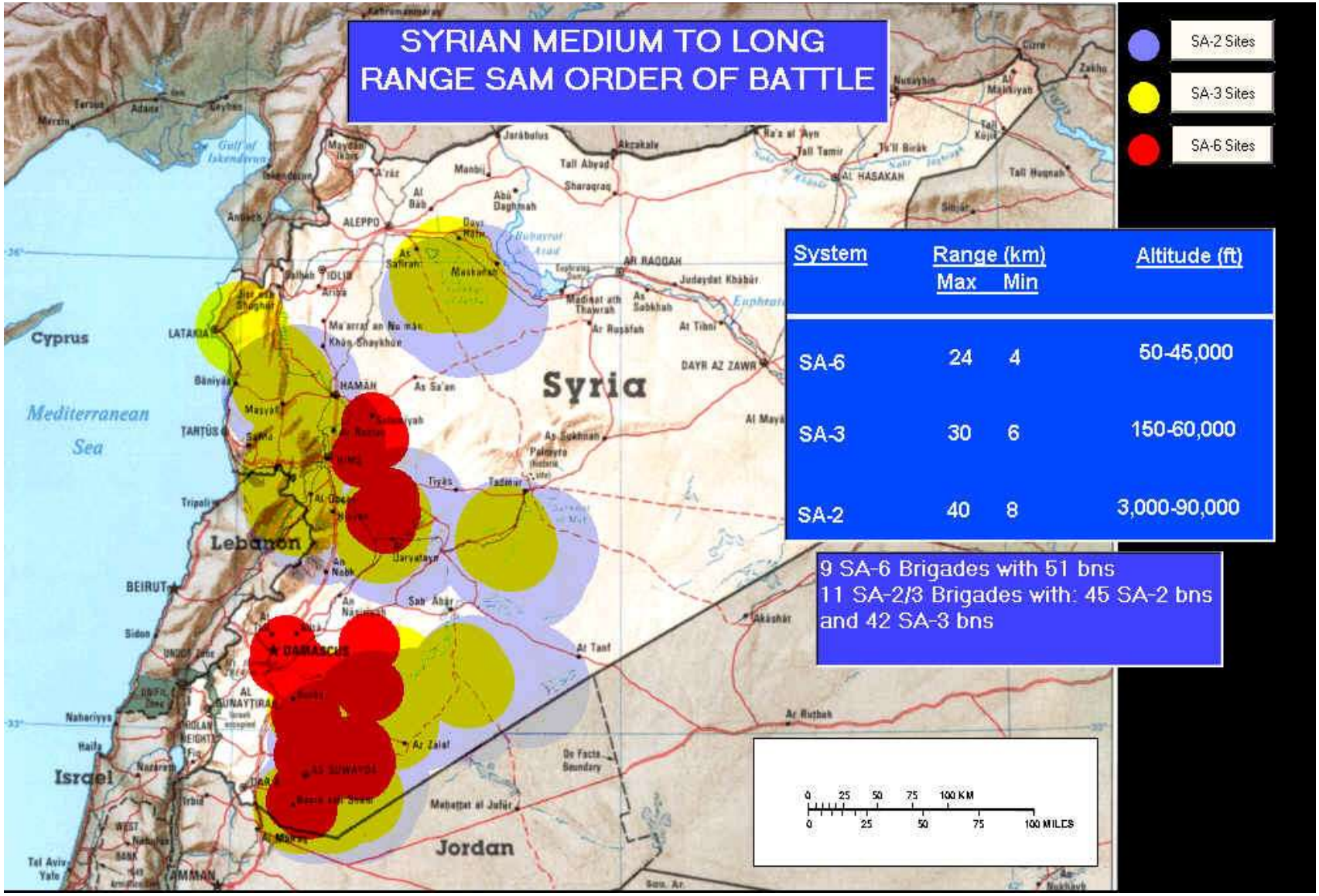
- Air Defense, Air Force and Armed Forces equipment in general are practically obsolete.

- These factors will lead Syria to acquire a cheaper means of Strategic Deterrence, specifically Chemical and Biological Weapons and Surface to Surface Missiles.

- Hence problem of proliferation will persist in the Middle East region.

SYRIA

Air Defense


SYRIAN MEDIUM TO LONG RANGE SAM ORDER OF BATTLE
SA-2 Sites
SA-3 Sites
SA-6 Sites
System | Range (km) Max Min | Altitude (ft)
SA-6 | 24 | 4 | 50-45,000
SA-3 | 30 | 6 | 150-60,000
SA-2 | 40 | 8 | 3,000-90,000
9 SA-6 Brigades with 51 bns
11 SA-2/3 Brigades with: 45 SA-2 bns and 42 SA-3 bns
0 25 50 75 100 KM
0 25 50 75 100 MILES
Syria
Lebanon
Israel
Jordan
Cyprus
Mediterranean Sea
ALEPPO
DAMASCUS
BEIRUT
LATAKIA
HAMAH
DAYR AZ ZAWR
AR RAQQAH
AL HASAKAH

Syrian Medium to Long Range Surface To Air Missile Systems

Air Defense System	Associated Early Warning/Acquisition Radars	Associated Tracking & Guidance Radars	Missile Ranges (km) Altitude (ft)	In Service Date
SA-2	Spoon Rest D (P-18) Flat Face A (P-15)	Fansong A/B	Max (km): 40 Min (km) : 8 Altitude (ft): 3,000 to 90,000	1971 Upgraded
SA-3	Flat Face B (P-19) Squat Eye	Low Blow	Max (km) : 30 Min (km) : 6 Altitude (ft): 150 to 160,000	1971
SA-6	Long Track (P-40) Height Finder: Thin Skin B (PRV-9)	Straight Flush	Max (km): 24 Min (km) : 4 Altitude (ft): 50 to 45,000	1973
SA-8	Flat Face B (P-19) Long Track (P-40) Height Finder: Thin Skin B (PRV-9)	Land Roll	Max (km) : 15 Min (km) : 0.2 Altitude (ft): 40 to 40,000	1982
SA-5	Back Trap (P-80) Tall King C (P-14) Spoon Rest D (P-18) Height Finder: Odd pair (PRV-13) Odd Group (PRV-16)	Square Pair	Max (km) : 250 Min (km) : 20 Altitude (ft): 1,500 to 130,000	1983

The SA-5 Gammon (Soviet Designator S-200)

- Syria was one of the first countries outside Russia (then the Soviet Union) to receive the SA-5 system. The systems were deployed in Homs and South of Dumayr Airfield. Around each SA-5 a complete Early Warning Command and Control System was built. The third Command and Control System was built at Jabal Al-Mani.

- At each SA-5 the following radars are deployed:
  - For Early Warning: Backtrap Radars, Tall King Radar
  - Height Finders: Odd pair (PRV-13)/Odd Group (PRV-16)
  - Acquisition: Spoon Rest D Radars/ Clam Shell Radar
  - Tracking & Guidance: Square Pair Radars

- Because the SA-5 is essentially a long range high altitude system (250 km), each site has a combination of SA-6/8/9/7 surface to air missiles and ground troops with AAA guns to protect the site from very low altitude penetrating targets.

- Two Soviet Command and Control Centers were integrated into the system:
  - Vozdukh – 1M
  - Vector System. A semi-automated system, with the man in the loop design.


SYRIAN SAM-5
RANGES
CYPRUS
SYRIA
HOMS
250 KM RANGE
LEBANON
Beirut
DUMAYR
ISRAEL
JORDAN
Amman
Peninsula
An Nafūd
0
200 nmi

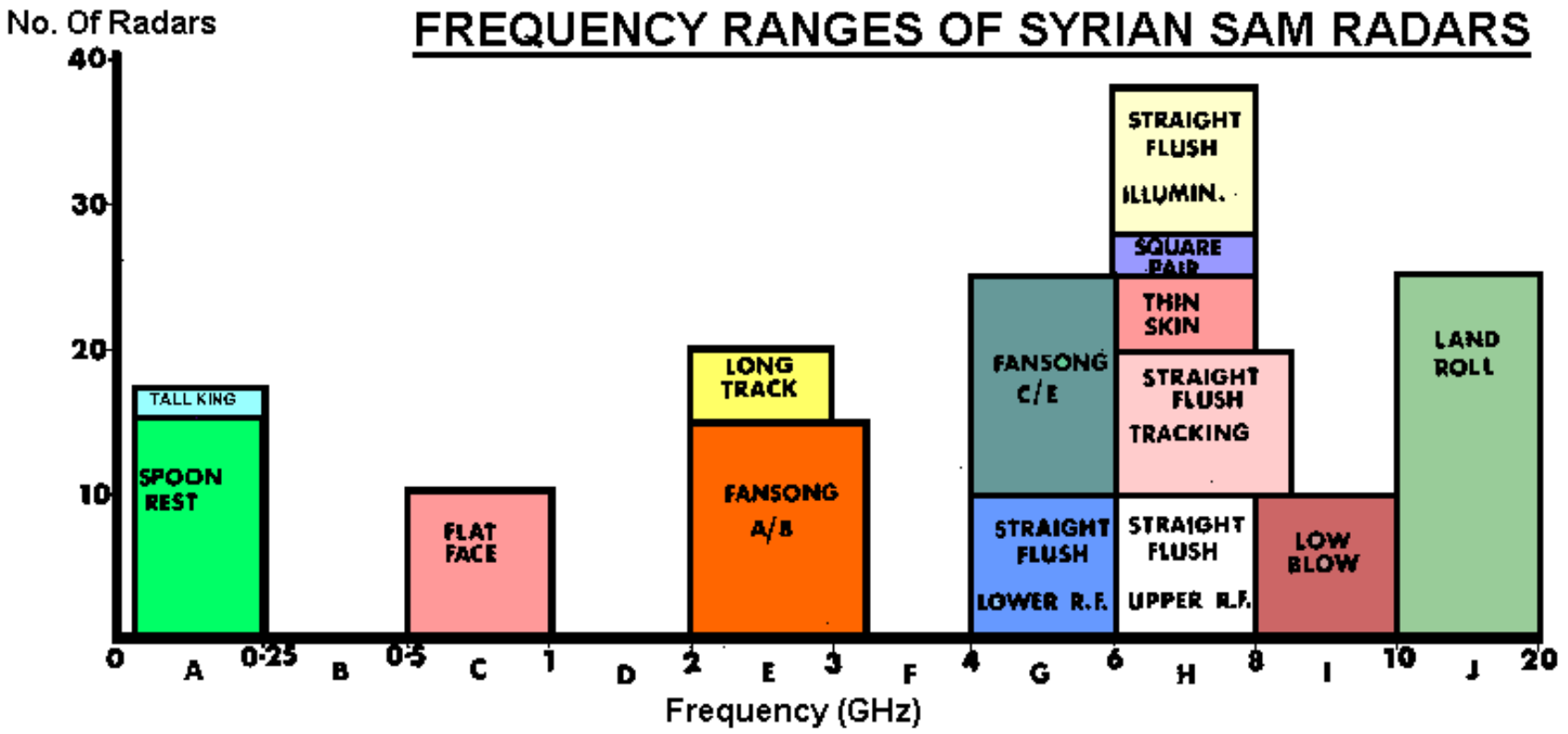
- Despite the scale of the Syrian Air Defense System, it has become largely obsolescent even though some SA-2 upgrade has been reported to have taken place.

- The main weakness of the Air Defense system is that the SA-2/3/5 are static and extremely hard to redeploy, making them easy to avoid during a deep strike interdiction raid into Syria territory, and easy to apply ECM against them and destroying them using anti-radiation air to surface missiles.

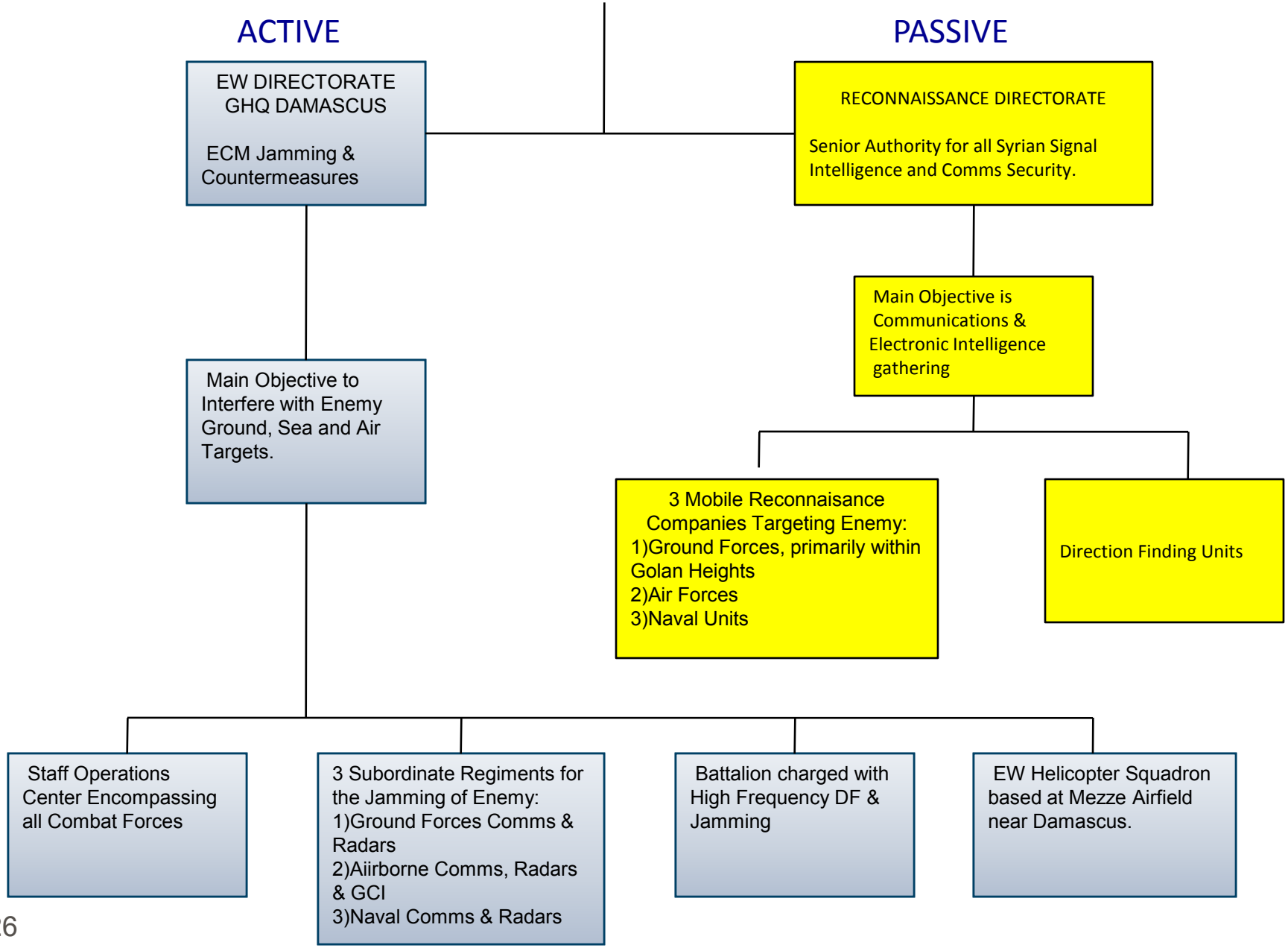
- Israeli air defense system upgrade programs is far more advanced than any upgrade Syria has been trying to make.

- The density and overlap of Syrian Air Defense batteries might have given it a certain edge in a complete Israeli air onslaught, however with the new technologies in the latest generation of precision guided weapons and GPS, this deployment strategy will not be that effective against any offensive forces.

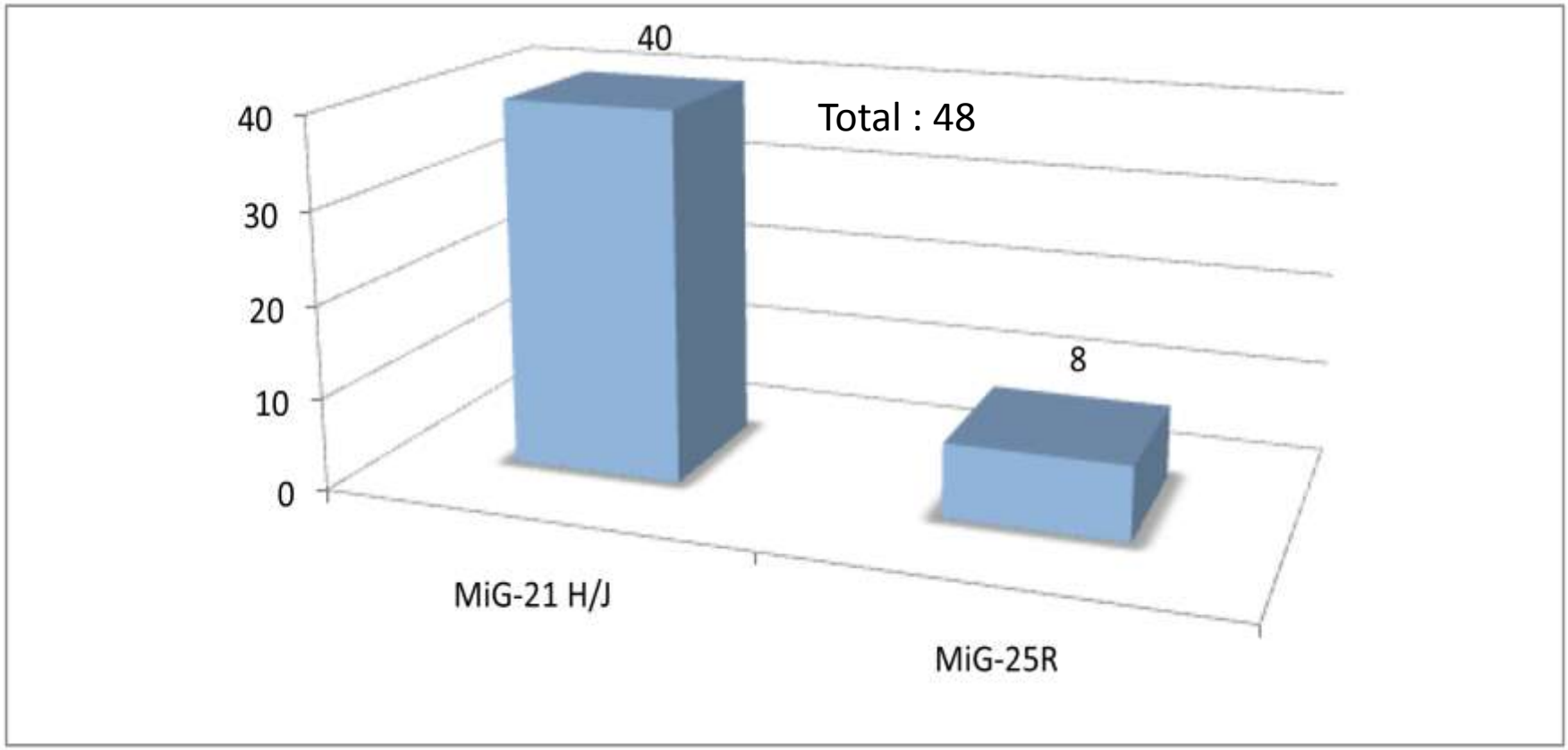
- Syria lacks the modern weapon systems, integration and C4I Battle Management to reduce the potential destructive effectiveness of any offensive interdiction missions by Israel. This implies that the Air Defense System will not act as a deterrent to an Israeli attack.


FREQUENCY RANGES OF SYRIAN SAM RADARS
No. Of Radars
40
30
20
10
TALL KING
SPOON REST
FLAT FACE
LONG TRACK
FANSONG A/B
FANSONG C/E
STRAIGHT FLUSH ILLUMIN.
SQUARE PAIR
THIN SKIN
STRAIGHT FLUSH TRACKING
STRAIGHT FLUSH LOWER R.F.
STRAIGHT FLUSH UPPER R.F.
LOW BLOW
LAND ROLL
0
A
0·25
B
0·5
C
1
D
2
E
3
F
4
G
6
H
8
I
10
J
20
Frequency (GHz)

Syria Electronic Warfare



Syrian EW/ELINT/Recce Order of Battle - 2008



- Since the 1982 Israeli invasion of Lebanon, Syria embarked on an extensive program to upgrade its electronic countermeasures and support systems.

- Syria acquired a mixture of Russian and some Western Ground Forces Intercept and Jamming Equipment. In the 1980's Syria purchased, from Italy, five Selenia ESS-2 Electronic Surveillance systems that gather electronic intelligence against ground based radars operating in the D to J Bands

- Airborne jamming and intercept equipment is primarily Russian designed, which operate in the I and J bands as well as against Terrain Following Radars and Side Looking Airborne Radars (SLAR).

- Presently Syria has a dense ground based electronic warfare reconnaissance system. The bulk of which is fielded near the Golan Heights and on the Lebanese borders.

- Syria does not have any Integrated Airborne Electronic Warfare and C4I Platforms. It only has 8 MiG-25R high altitude reconnaissance aircraft.

- Syria does not produce any sophisticated ECM or Reconnaissance & Intelligence gathering equipment.

- Syria has a major weakness in Early Warning, Air Battle Management, Signal Intelligence, And Weapons Targeting, which are all critical in controlling the combat arena of modern air warfare.

- Syrian Air Defenses are still centralized and dependent on dedicated HF and VHF communication Networks, which make them vulnerable.

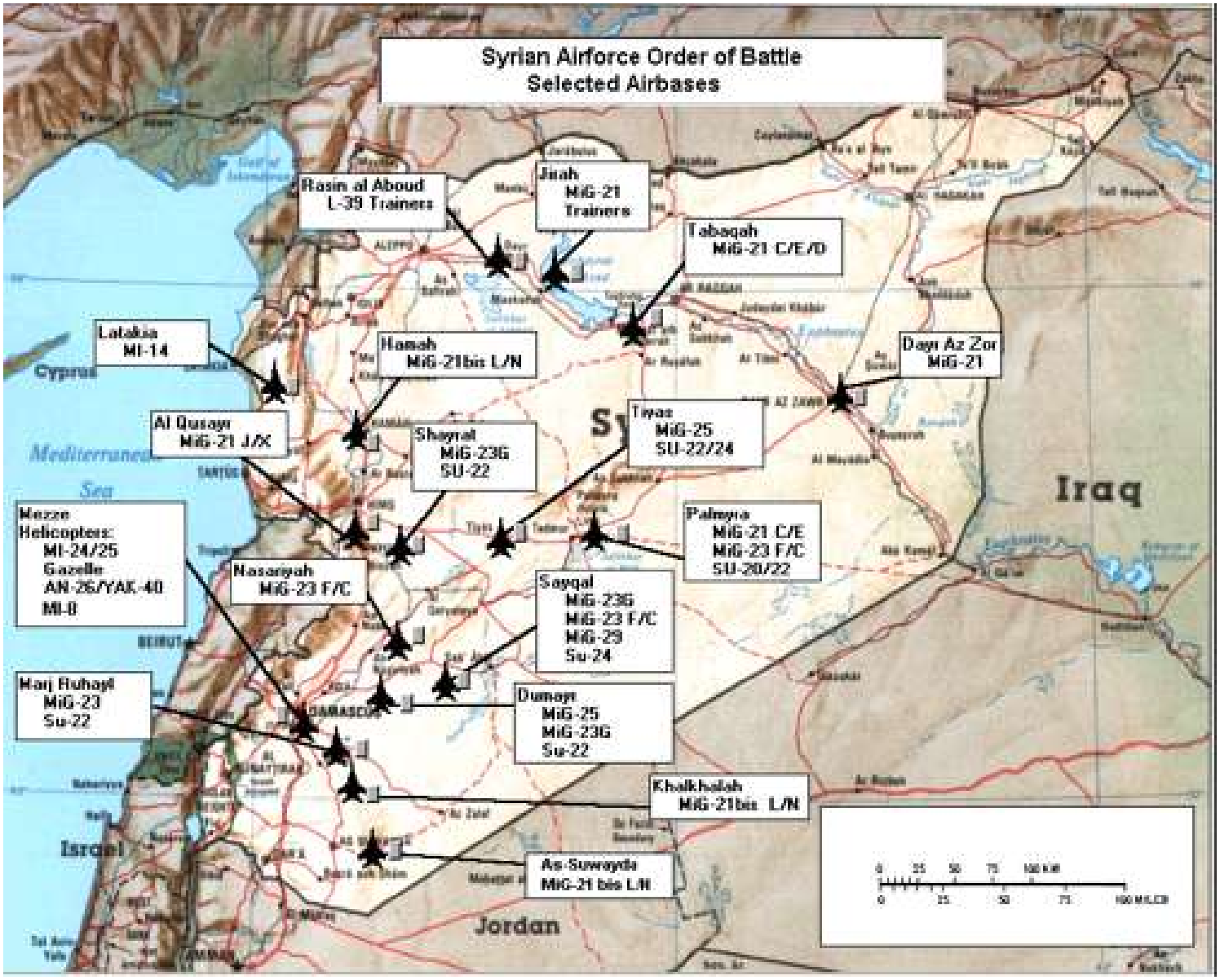
Syria

Airforce

- Airforce consists of 2 divisions.

- The two divisions make up for 17 Interceptor Squadrons and 9 Ground Attack Squadrons.

Interceptor Squadrons	A/C	Airbase
	MiG-21 bis : 219	Khalkalah, Al-Qusayr, Hamah, Tabaqah, Dayr az Zor, Jirah, As-Suwayda
	MiG-29A : 68	Sayqal
	MiG 23ML/MF: 90	Abu ad Duhr, Shayrat, Marj Ruhayl, Dumayr
	MiG-25 : 40	Tiyas, Dumayr
Ground Attack Squadrons		
	Su-24 : 20	Sayqal
	Su-20/22 : 50	Marj Ruhayl, Shayrat, Tiyas, Dumayr
	MiG-23 U/BN: 56	Sayqal, An-Nassiriah


Syrian Airforce Order of Battle
Selected Airbases
Rasin al Aboud
L-39 Trainers
Jirah
MiG-21
Trainers
Tabaqah
MiG-21 C/E/D
Latakia
MI-14
Hamah
MiG-21bis L/N
Dayr Az Zor
MiG-21
Al Qusayr
MiG-21 J/X
Shayrat
MiG-23G
SU-22
Tiyas
MiG-25
SU-22/24
Mezze
Helicopters:
MI-24/25
Gazelle
AN-26/YAK-40
MI-8
Nasariyah
MiG-23 F/C
Palmyra
MiG-21 C/E
MiG-23 F/C
SU-20/22
Sayqal
MiG-23G
MiG-23 F/C
MiG-29
Su-24
Marj Ruhayl
MiG-23
Su-22
Dumayr
MiG-25
MiG-23G
Su-22
Khalkhalah
MiG-21bis L/N
As-Suwayda
MiG-21 bis L/N
Cyprus
Mediterranean
Sea
Iraq
Israel
Jordan
BEIRUT
DAMASCUS

31

- In calculating the Operational Readiness Rate (Full Mission Capable), it is assumed that a conflict can initiate with relatively short warning.

- Under such conditions, it can be further assumed that an Airforce would not have sufficient time to boost Operational Readiness rate of its combat force much higher than normal peacetime or training operations.

- Hence, peace time sorties per month is a clear indicator whereby an Operational Readiness Rate can be extrapolated.

- The average monthly Syrian peace time sorties is about 550, whereas the average Israeli sorties is about 2250, giving Israel a 4 to 1 ratio over Syria.

Average Sustained Sortie Rate Comparison
12 Hours Operations Day
18 Hours Maintenance day

Syria

	Mission Time (hr)		
	1.5	1	0.5
Ground Time (Hr)	Sustained Sortie Rate		
0.75	1.6	2.1	2.8
1	1.5	1.9	2.5
1.5	1.4	1.8	2.1
2	1.1	1.4	1.8

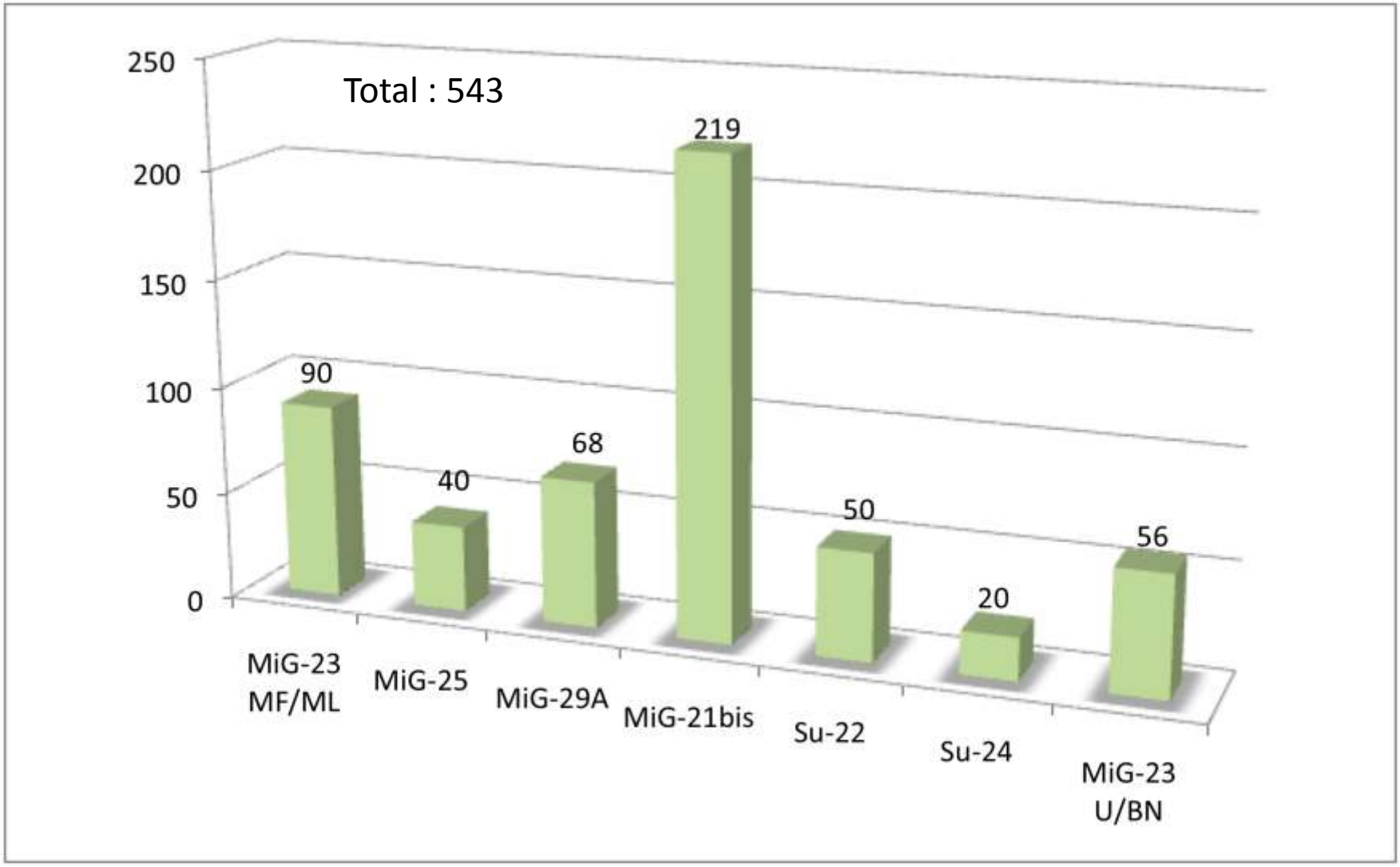
Israel

	Mission Time (hr)		
	1.5	1	0.5
Ground Time (Hr)	Sustained Sortie Rate		
0.75	2.9	3.1	3.7
1	2.5	1.9	3.4
1.5	2.4	2.7	3
2	2.1	2.4	2.7

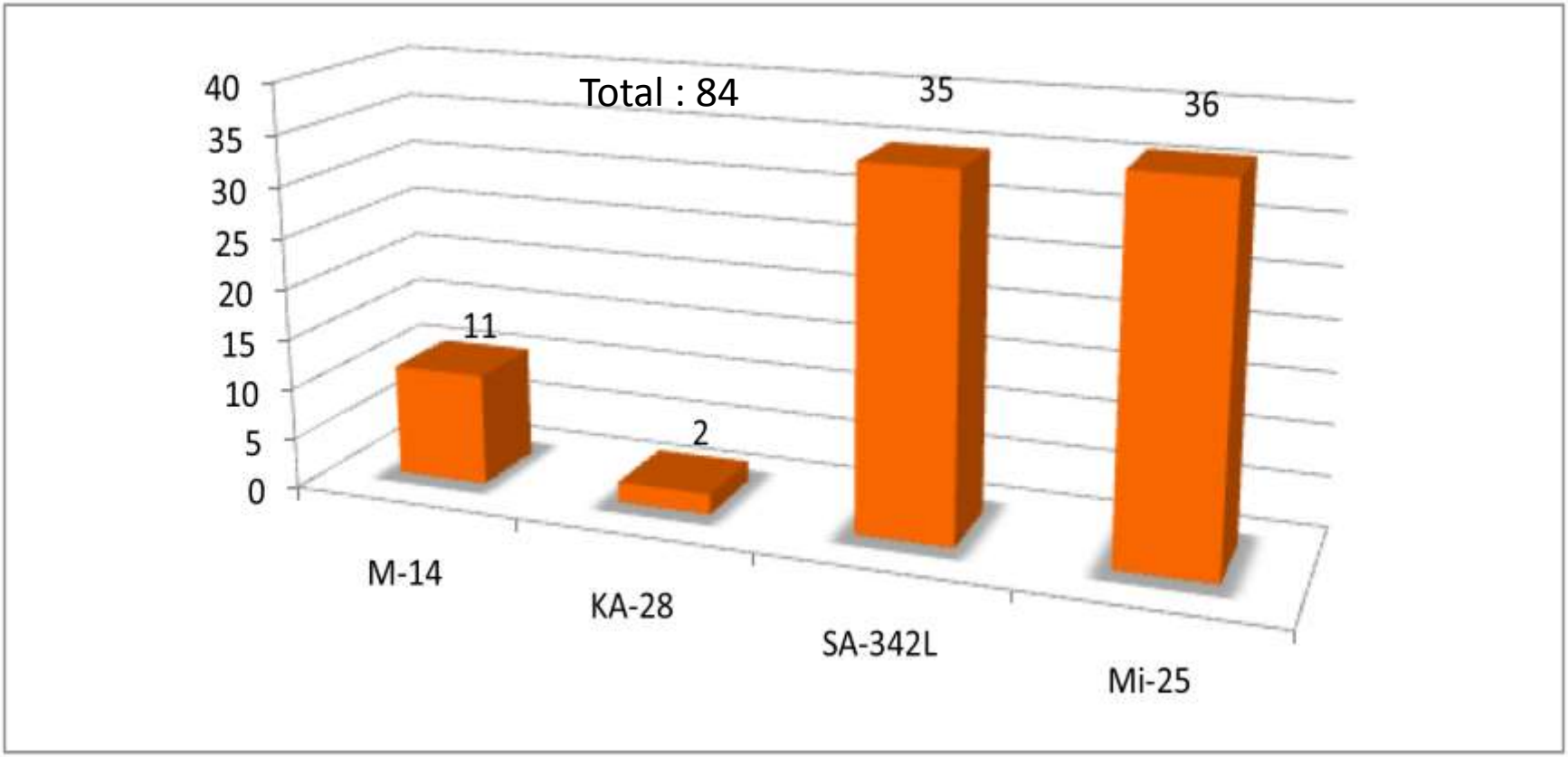
Scramble Launch
Ground Time to Takeoff
Strip Alert
(seconds)

	MiG-21	MiG-23	MiG-29	F-16C	M2000
Engine Start	60	60	40	32	32
Navigation Set Alignment	40	40	20	18	18
Taxi to Takeoff Position	20	20	10	10	10
Total Scramble Time	120	120	70	60	60

Syrian Airforce Order of Battle - 2008



Syrian Armed Helicopter Order of Battle - 2008



Syrian Airforce Tactical Fighter Postulated Employment

Type	No	Sortie per Ac per Day	Operational Readiness (%)	Force Available	Total Sortie Per Day	Postulated Employment
MiG-23 MF/ML	90	2	60	54	108	Air Defense/BAS
MiG-25	40	2	60	24	48	Air Defense/FS
MiG-29A	68	2	60	41	82	Air Defense/Escort/FS/BAS
MiG-21 bis	219	2	60	131	262	CAS/Escort/DS
Su-22	50	2	60	30	60	CAS/BI/Deep Strike
SU-24	20	2	60	12	24	CAS/BI/Deep Strike
MiG-23 U/BN	56	2	60	34	68	CAS/BI/Deep Strike/DS
Total	543			326	652	

BAS: Battlefield Air Superiority
CAS: Close Air Suport
BI: Battlefield Interdiction
DS: Defense Suppression
FS: Fighter Sweep

Sustained Conditions : 12 hr Operational Day
18 hr Maintenance Day

Syrian Combat Aircraft Basic Characteristics

	MiG-21 bis	MiG-23 MI/MF	MiG-25	MiG-29	SU-24
Wing Area (ft sq)	247	372	652	409	594
Empty Weight (lbs)	12,227	23,517	34,000	24,030	49,207
Internal Fuel (lbs)	5,071	9,620	25,000	7,868	21,670
Max External Fuel (lbs)	3,056	4,397		7,313	36,460
Combat Weight (lbs)	18,926	34,020	62,000	33,600	79,000
Max A/B Thrust at S/L (lbs)	15,646	27,966	49,200	37,498	49,384
Max Mil Power at S/L (lbs)	9,037	19,355	38,800	27,098	34,392
Combat Thrust/Weight Ratio	0.83	0.82	0.79	1.12	0.63
Combat Wing Loading (lbs/ft sq)	76	91.45	95.1	82	133
Max TOGW (lbs)	23,148	43,165	82,200	40,785	87,237
Load Factor (g's)	7.5	8.5	6.5	9	6

Syrian Combat Aircraft Air To Ground Ranges

Aircraft	Bombs Loading	Mission Type HI-LO-HI nmi	HI-LO-LO-HI nmi	LO-LO-LO nmi
MiG-23 U/BN	(4) 250 Kg	310	210	150
	(4) 250 kg (1) 800 Litre Tank	380	270	170
	(4) 500 kg	280	190	140
MiG-21 bis Fishbed L/N	(6) 250 kg	140	120	100
	(5) 250 kg (1) 800 Litre Tank	230	180	140
	(5) 500 kg	130	100	90
Su-22	(4) 500 kg	485	410	145
Su-24	(4) 500 kg	590	555	190

Syrian Combat Aircraft Radars

Aircraft	Radar	Range (nmi)	Search Scanning Azimuth +/- Degrees
MiG-23 MF	Saphir 23 (High Lark)	Search: 35 nmi Track: 25 nmi	30
MiG-21 bis	ALMAZ-23 (Jay Bird)	Search: 16 nmi Track: 11 nmi	30
MiG-29A	Saphir 29 (Slot Back)	Search: 54 nmi Track: 38	67
F-16A	Westinghouse APG-66	Search: 38 Track: 29	60
F-16C	Westinghouse IAPG-66	Search: 50 Track: 45	60
Mirage 2000	Thomson RDM	Search: 50 Track: 35	60

Russian Air To Air Missiles on Syrian Aircraft

Missile Designation	Guidance System	Range (km)	Platform
K-13 / AA-2D	Infra Red	7.5	AIM-9 Equivalent
R-40TD / AA-6	Semi Active Radar Homing	50	MiG-25 / 31
K-23 / AA-7	Semi Active Radar Homing	50	MiG-23 ML
R-60 / AA-8	Infra Red	10	MiG -23/29/31 SU-24 / 27
K-60 / AA-10	Semi Active Radar Homing	80	MiG-29, Su-27/35
R-73 / AA-11	Infra Red	30	Replacement of the current AA-2. on MiG-23ML/MiG-29/Su-27

Russian Air To Surface Missiles

Missile Designation	Guidance System	Range (km)	Platform
Zvezda / AA-7	Radio Command	10	MiG-23
Raduga / AS-9	Anti-Radiation Homing (Anti – Radar)	120	Su-24
Zvezda / AS-10	Radio Command / Anti Radiation Homing	20	MiG-23 / Su-24M
Raduga / AS-11	Anti-Radiation Homing	120	MiG-23 / Su-24M
Zvezda Kh-27 / AS-12	Anti-Radiation Homing	60	MiG-23
Molinya / AS-14	Semi Active Laser Guidance / Electro Optical	10	MiG-23 / Su-24M

Aircraft Maneuverability/Agility Comparison Table

	MiG21 bis			MiG23			F-16C			M2000		
Alt (ft)	Inst	Sust.	Max G	Inst	Sust	MaxG	Inst	Sust	MaxG	Inst	Sust	MaxG
S/L	21.6	14.8	7.0	17.0	13.6	6.5	25	20.3	9	29.1	19.3	8.5
5,000	19.5	13.0	6.3	15.9	11.8	6.0	23.5	18.7	9	26.6	18.0	8.5
10,000	18.5	11.0	5.7	15.0	10.0	5.3	21.7	15.8	7.5	24.7	15.5	8.0
15,000	16.8	9.5	4.6	13.0	8.5	4.5	20.0	14.2	7.0	22.5	13.5	7.0
20,000	15.5	7.9	4.0	11.5	7.0	3.7	18.0	12.5	6.2	20.7	11.4	5.25
25,000	13.9	6.5	3.4	9.2	5.9	3.1	16.9	10.2	5.1	19.0	9.4	4.5
30,000	12.8	5.4	2.7	7.5	4.9	2.6	15.5	8.5	4.2	18.1	7.6	3.8
40,000	8.3	3.0	1.6	4.4	3.0	2.0	11.3	5.2	2.7	13.0	4.0	2.25

All at Maximum Power, 50% Fuel, and 2 Air to Air Missiles
MiG-23 ML/MF: 45 degree Wing Sweep
Instantaneous Turn Rate (degrees per sec) at Corner Speed
Sustained Turn Rate (degrees per second) at max G

The “Agility Table” demonstrates the ability of an aircraft to quickly point it’s nose at the enemy aircraft while maintaining the ability to turn rapidly.

Sustained Turn Rate degrees/sec

- Long Duration Maneuvers.
- Positioning or Stern Conversion

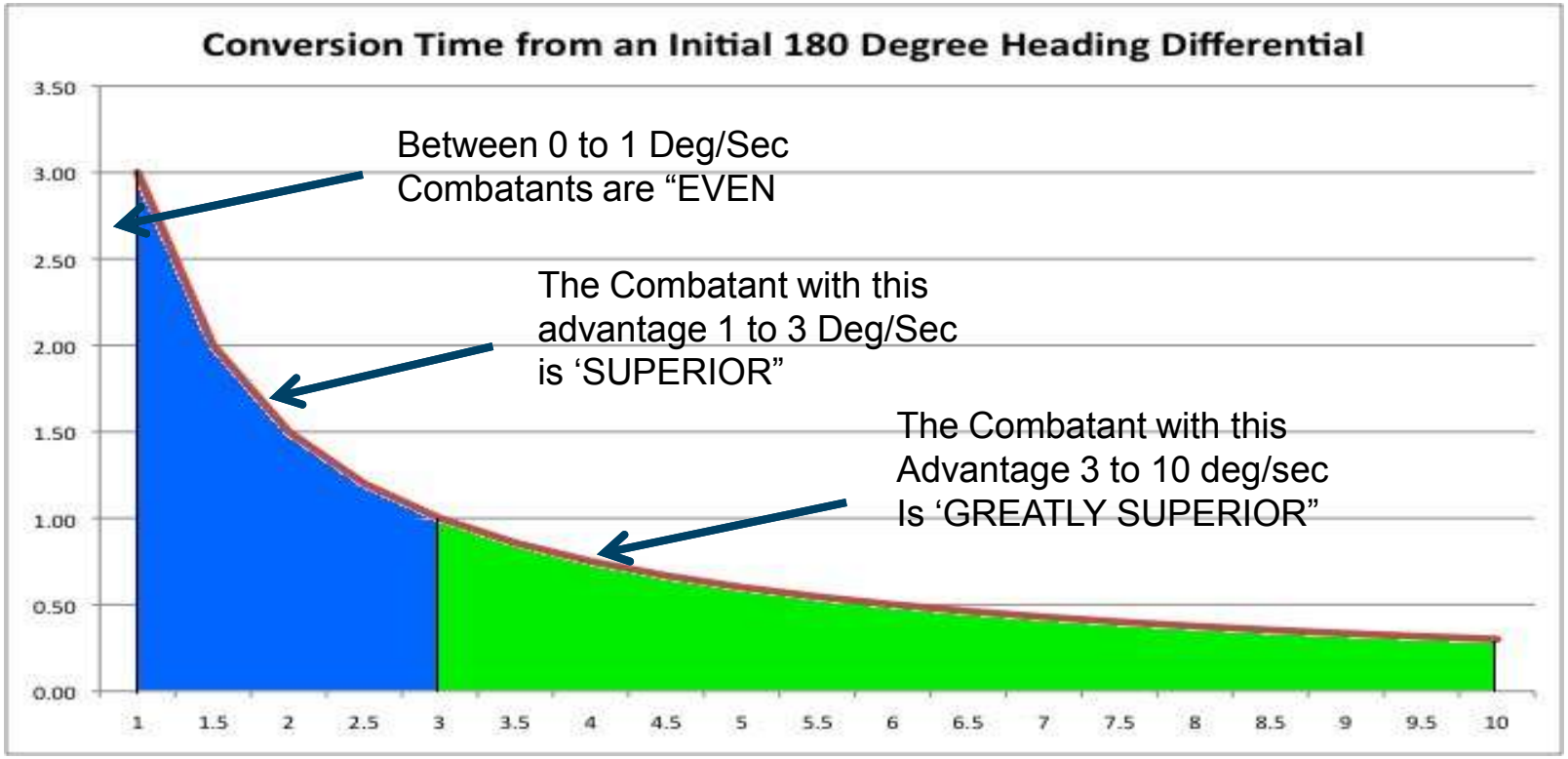
Instantaneous Turn Rate degrees/sec

- Short Duration Maneuvers
- Point and Shoot
- Relates to A/C holding a Firing Position or Escaping from one.

Specific Excess Power feet/sec

- Ability to Regain Energy after a Maneuver

Delta Difference	Even	Superior	Greatly Superior	Relative Importance
Sustained Turn Rate	0 to 1	1 to 3	3 to 5	40%
Instantaneous Turn Rate	0 to 1	1 to 2	2 to 3	40%
Specific Excess Power	0 to 100	100 to 200	200 to 300	20%



From the tables of the previous slide we find for Sustained Turn Rates:

(F-16 – Mirage 2000) Turn Rates = 1.0 deg/sec. Therefore F-16 and Mirage2000 A/C are "EVEN"

(F-16 – MiG23) Turn Rates > 3 deg/sec. Therefore F-16 is "GREATLY SUPERIOR" to MiG-23 MF/ML

(F-16 – MiG21) bis Turn Rates > 3 deg/sec Therefore F-16 is "GREATLY SUPERIOR" to MiG-21 bis

F-16 is Far Superior to both MiG-23 MF/ML and MiG-21 bis

F-16	MiG-23 ML	MiG-21 bis
Maneuverability	**Maneuverability**	**Maneuverability**
9g	7g	7g
23.5 Deg/Sec Instantaneous Turn Rate (5000 ft)	15.9 Deg/Sec Instantaneous Turn Rate (5000 ft)	19.5 Deg/Sec Instantaneous Turn Rate (5000 ft)
18.7 Deg/Sec Sustained Turn Rate (5000 ft)	11.8 Deg/Sec Sustained Turn Rate (5000 ft)	13.0 Deg/Sec Sustained Turn Rate (5000 ft)
Fire Power	**Fire Power**	**Fire Power**
All Aspect Heat Missiles – AIM 9L	All Aspect Radar Missiles Stern Aspect Heat Missiles	Stern Aspect Heat Missiles Only
Guns	Guns	Guns
Shoot Single Targets	Shoot Single Targets	Shoot Single Targets

Air Superiority Mission Comparison

Aircraft	Configuration	Mission Radius (nmi)
MiG-23 ML Tanks Dropped Prior Combat	(2) APEX AAM (2) APHID AAM (3) 800 Liter Tanks	450
F-16 Tank Dropped Prior Combat	(4) AIM-9 AAM (2) 300 Gal Tank	700

F-16 Average Loss Exchange Ratio in Closing/BVR and Visual Engagement Environments (dependent on Aircraft Maneuverability and Aircraft Weapons System):

F-16	MiG-21	MiG-23
1	5	3.5

This means:
For a Loss of 1 F16 there is a Loss of 5 MiG-21
For a Loss of 2 F-16 there is a loss of 7 MiG-23

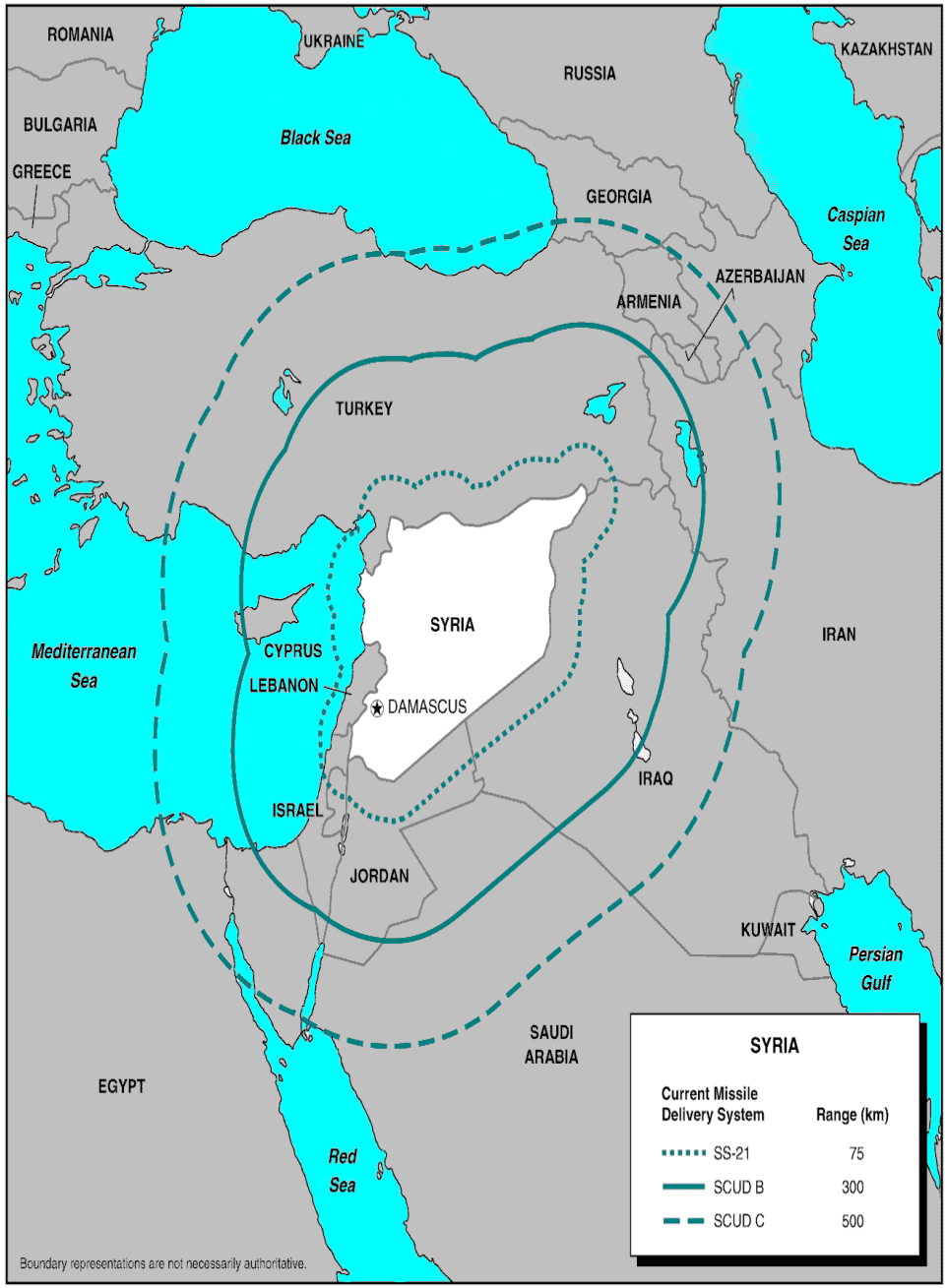
Weakness in the Operational Performance of the Syrian Airforce

- ❑ Long C4I Early Warning delay time due to antiquated System, semi-automated man in the loop.
- ❑ Long Response / Scramble Time by Combat Aircraft
- ❑ Low Operational Readiness Rate of Combat Aircraft
  - o Need Improvement in maintenance operations
  - o Need Improvement in supply of spare parts
- ❑ Low Combat Aircraft Sortie Rates, Sustained and Surge.
- ❑ High Loss Exchange Ratio in a Closing / BVR Environment and Visual Engagement Environment.
- ❑ Centralized Battle Management

Syrian Surface To Surface Missiles

SSM	Tels/Missiles	Single Warhead (kg)	Range (km)
SS-1c Scud B	18/200	985	300
SS-1d Scud C	8/120	500	500
SS-1e Scud D	+	NA	700
SS-21b Scarab (Improved Version)	18	482	120
Frog 7b	18	200 to 457	68

Estimated Ranges of Current Syrian Ballistic Missiles

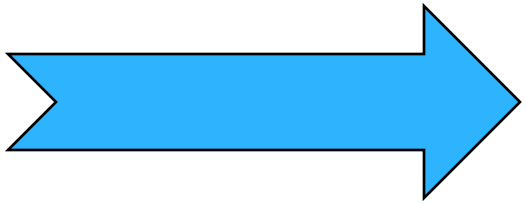


Syria's missiles allow it to threaten all of Israel.

Projected Modernization of the Syrian Airforce & Air Defense Order of Battle

Projected Syrian Air Order of Battle Modernization

MG-23 MF/ML : 90
MiG-25 : 40
MiG-29A : 68
MiG-21 bis : 219
Su-22 : 50
Su-24 : 20
MiG-23 U/BN : 56



MiG-29A : 200
Su-24 MK : 100
Su-27SK : 50
MiG-31: 20
MiG-25 : 40

- Increase of MiG-29 all weather air superiority with upgraded Radar and Avionics.
- Increase of Su-24MK all weather, day night, low level air to ground attack.
- Su-27SK Single seat all weather air superiority and ground attack.
- MiG-31 Two seat interceptor to counter low altitude strike aircraft and missiles.

Syrian Airforce Projected Tactical Fighter Employment

Type	No	Sortie per Ac per Day	Operational Readiness (%)	Force Available	Total Sortie Per Day	Postulated Employment
MiG-31	20	3	70	14	42	Air Defense/FS
MiG-25	40	3	70	28	84	Air Defense/FS
MiG-29A	200	3	70	140	420	Air Defense/Escort/FS/BAS
Su-27 SK	50	3	70	35	105	Air Defense/Escort/FS/BI
Su-24 MK	100	3	70	70	210	CAS/BI/Deep Strike
Total	410			287	861	

BAS: Battlefield Air Superiority
CAS: Close Air Suport
BI: Battlefield Interdiction
DS: Defense Suppression
FS: Fighter Sweep

Sustained Conditions : 12 hr Operational Day
18 hr Maintenance Day

Projected Syrian Air Defense Upgrade
The Russian Antey-2500 Mobile SAM System

The Russian Antey-2500 Mobile SAM system is considered as the progressive development of the S-300V (SA-12, Giant) long range SAM system. It was designed to protect against air-strikes, including combat aircraft and ballistic missiles of short and medium range.

Radar Detection Unit:

- Range of up to 320 km.
- Targets with speed 4500 km/sec.
- Tracking the trajectories of up to 70 destructive prioritized targets.

The Antey-2500 can operate either under the Command and Control of higher level command post or autonomously.

Area protected by one fire unit against:

Medium range Ballistic Missiles with 2500 km range: 1000-1750 square km
Theater Ballistic Missiles with 1100 km range : 2000-2500 square km
Tactical Ballistic Missiles with 600 km range: 2500 square km
Piloted air strike up to: 12,500 square km

Number of Targets simultaneously engaged by one fire unit: 6
Number of missiles guided at one target:

- One launcher fires: up to 2
- Number of launchers firing: up to 4
- Launching rate from one launcher: 1.5 sec.

The standard combat crew of an Antey-2500 SAM battalion consisting of four SAM sites (6 launchers, 3 loader/launchers) is 139 personnel. The full crew complement for a SAM battalion is 180.

Command Post of Antey-2500 SAM System

The Command Post provides for the Command and Control of all combat Assets of the SAM system. It also prioritizes and distributes the targets among the SAM batteries.

Number of targets processed : 200
Number of target trajectories tracked simultaneously : 70
Number of target designations simultaneously transmitted to fire units: 24

Launcher Vehicle

Number of missiles on a launcher : 4
Pre-launch preparation of SAM : 7.5 sec
Interval between launched : 1.5 sec
Weight with missile : 47.5 tons
Crew : 2 to 3

Surface-To-Air Missiles

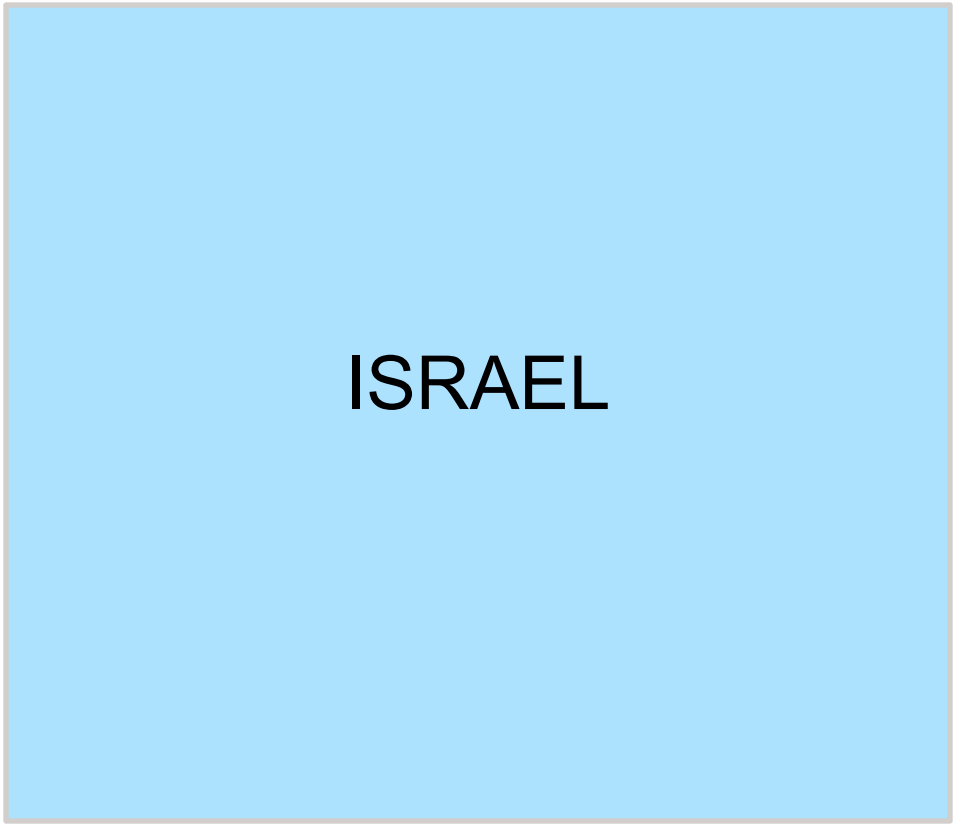
The 9M83ME SAM is designed for destroying aerodynamic targets, including low-flying ones, and those maneuvering up to 12-g loads, in addition to intercepting aero-ballistic and tactical missiles in a heavy ECM environment.

The 9M82ME SAM is designed for destroying of medium range, theater, tactical and aero-ballistic missiles, as well as all aircraft types operating at ranges of up to 200 km.

The design of both missiles is highly unified, and they differ only in the starting boosters (initial firing stage).

Type of engine: solid propellant
Launching mode: vertical
Weight of missile 9M83ME: 2345 kg
Weight of warhead: 150kgType of warhead: HEF with direct blast
Type of fuse: proximity, semi-active radar
Maximum speed:

9M83ME SAM: 1700m/sec
9M82ME SAM: 2600m/sec


ISRAEL

ISRAEL'S NATIONAL SECURITY POLICY AND DOCTRINE

- Israel is not accepted by major part of the Arab World (Syria, Iran...)
- Islamic Movements
- Basic elements of Asymmetry / Basic Security Concept - Demography - Geography - Economic Resources - Structure of Armed Forces and Society

- Israel has to prepare against an Arab coalition - Israel has structural vulnerability and disparities vs adversaries

- Israel perceives that its qualitative edge is eroding i.e. advanced technology weapon systems are entering the Arab World. Not in favor of Israel as it used to be.

Geography :

- Long borders vs small size of territory
- Lack of strategic depth (width of borders vs strategic depth)
- Short distance from source of threat
- High density of population along the coast
- High dependency on Sea and Air Lanes
- The aerial threat to Israel via Jordan, from Syria, Saudi Arabia and Iraq. (7 to 14 minutes).
- The Ballistic Missile threat to Israel, warheads are no longer just conventional, but more non-conventional (Biological, Chemical and Nuclear).

As a conclusion, Israel concludes that it has a great need for EARLY WARNING CAPABILITY

The Operational Level:

- Israel cannot afford to lose a single war
- If war breaks out to determine the outcome of war quickly and decisively

Defensive Strategy -Offensive Tactics

❑ Prepare for Defense

- A small standing army with an early warning capability, regular air force and navy.
- An efficient reserve mobilization and transportation system.

❑ Move to Counter-Attack

- Multi-arm coordination.
- Transferring the battle to enemy's territory quickly
- Quick attainment of war objectives.

❑ Capabilities

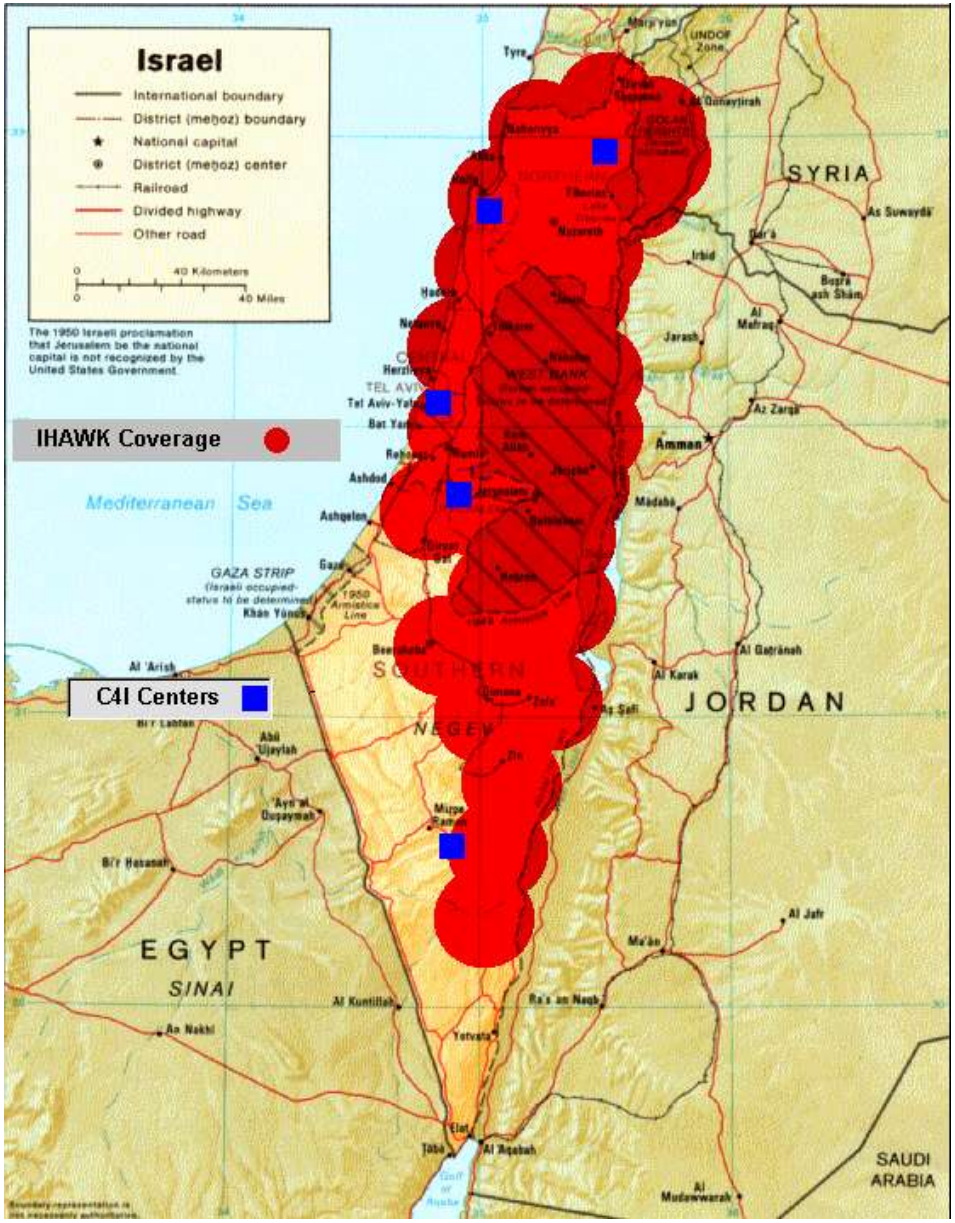
- Intelligence
- High capability to destroy mobile targets
- Long-range capabilities
- Anti-missile defense
- All-weather and low-visibility capabilities
- Advanced training systems

❑ Main Areas of Activity

- Continuous high state of readiness for war
- Anti-terrorist warfare
- Building the armed forces for the future battlefield

ISRAEL

Air Defense



Israel SAM Order of Battle & IHAWK Coverage

Missile Launchers:

MIM-23 IHAWK Batteries: 23

Patriot PAC-2: 48

Air Force Intelligence forces utilize the latest technology for gathering signals and information. Israel has managed to develop the required technology. One example is the Mini RPV (remotely piloted vehicle).

Ground based radars and airborne control aircraft such as the E2C Hawkeye exchange data such that the commanders can control the Theater of Operations and the rapidly developing combat situation.

- Patriot Advanced Capability – 3 (PAC-3) part of US Ballistic Missile Defense System, Terminal Phase Interceptor

- Land-based air transportable launcher, single stage Extended Range Interceptor (ERINT) missile armed with explosive warhead, Phased array radar and engagement control station (ECS).

- Most technologically mature BMD system, in US Army service Since 2003; a total of 712 missiles to be in US inventory at End of 2008.

Israel Ballistic Missile Defense System (ARROW)

- The Israeli-US Arrow Weapon System (AWS) is the most technologically mature of the USA's collaborative missile defense development programs.

- The AWS was initially designed and developed to track and destroy ballistic missiles, such as The SCUD series, in the terminal phase of their flight trajectory.

- The Arrow 2 interceptor missile, is equipped with both infra-red and active radar sensors and a blast-fragmentation warhead.

- Israel currently deploys two Arrow 2 batteries, one located at an airbase near Tel Aviv and the other in the North of Israel. And is apparently intending to augment this deployment with more Arrow-2 batteries in northern Israel.

- Each Arrow battery consists of 4 to 8 launchers, One Green Pine Multifunction phased-array radar, and one Citron Tree fire-control center, a launch-control center and approximately 50 Arrow 2 Interceptor missiles.

- In 2007, the Israel Missile Defense Organization (IMDO) conducted the first flight tests of the Arrow-3 interceptor missile.

- The upgraded missile is designed to intercept target missiles at higher altitudes and longer ranges, so that the debris from possible nuclear, biological and chemical warheads will fall farther away from Israeli territory.

- In addition, the tests also employed the improved Green Pine radar with higher resolution for the purpose of identifying decoys and other penetration aids that Iran is assumed to have developed for the purpose of defeating missile defenses.

- Israel is currently studying a new exoatmospheric (outside the atmosphere) interceptor missile – designated Arrow 3 – capable of defending against attacks by ballistic missiles with ranges in excess of 2000 kilometers and possibly carrying WMD warheads.

- The Israel BMD architecture is currently designed to incorporate the Arrow-3/2 and PAC-3 Systems.

- There apparently is interest in Israel in developing a system capable of intercepting Artillery Rockets and Short Range Ballistic Missiles (SRBMs).

- Israel is currently developing a system known as Iron Dome, to counter and intercept short-range rockets and missiles such as the 122mm Katyusha Artillery Rockets.

- In addition, an Israel-US consortium is developing a new SRMD system which is known as David's Sling, to counter threats from the Iranian produced Fajr and Zelzal SRBMs deployed by Hezbollah forces in the South of Lebanon.

Source: SIPRI 2008 Yearbook. A survey of US Ballistic Missile defense programmes

- Israel has designed the Nautilus laser system for rocket defense in a joint project with the United States. It has developed into the Theater High Energy Laser. The project has recently been expanded to include interception of not only short-range rockets and artillery, but also medium-range Scuds and longer-range missiles such as Iran's Shahab series.

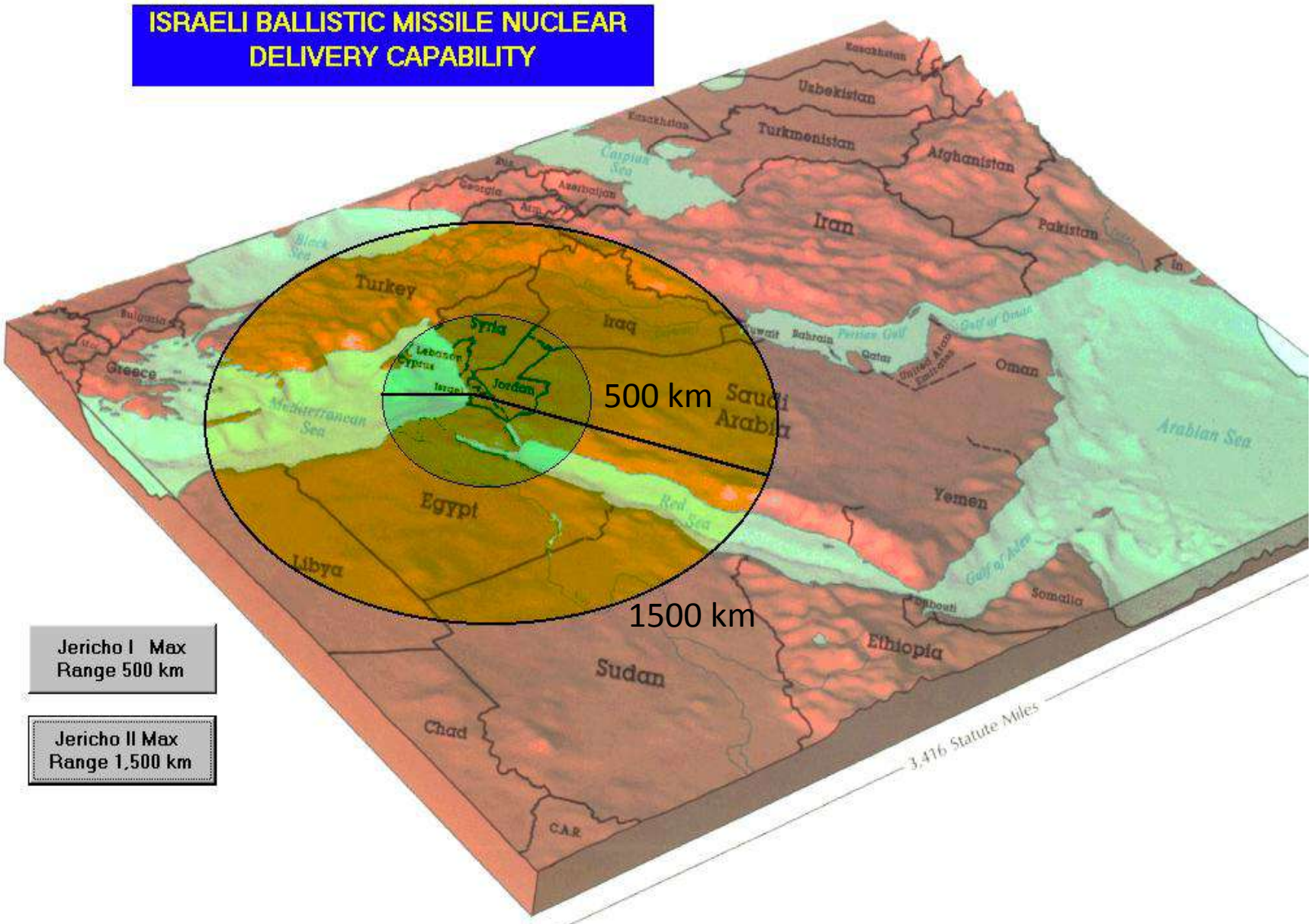
- Israel is examining the possibility of boost-phase defenses. The Rafael Moab UAV forms part of the Israeli Boost-Phase Intercept System. This is intended to engage ballistic missiles soon after launch, using weapons fired from a UAV. Moab would launch an improved Rafael Python 4 air-to-air missile. Range is stated as 80-100 km depending on the altitude of release.

Source: Israeli Weapons of Mass Destruction. An Overview
Anthony H. Cordesman, CSIS, June 2008

Israel Ballistic Missiles

System	Class	Payload	Warhead	Range (km)	Status
Jericho I	Short Range Ballistic Missile (SRBM)	Single Warhead	450 kg; Nuclear 20KT; HE	500 km	Obsolete
Jericho II	Medium Range Ballistic Missiles (MRBM)	Single Warhead	Nuclear 1MT; HE	1500 km	Operational since 1990
Jericho II	Intercontinental Range Ballistic Missile	Single Warhead	750 Kg	4800 – 6500 km	Development Stage, Expected Service 2008

Source: Israeli Weapons of Mass Destruction. An Overview
Anthony H. Cordesman, CSIS, June 2008



❑ Israel Has carried out the successful test launch of a long-range, ballistic missile capable of carrying a nuclear warhead. Israel has begun a program to extend the range of its existng Jericho-II SSM.

❑ The Jericho-III is planned to have a range of 4,800 km to 6,500 km which brings all of Iran and the GCC countries within range.

Israel

Airforce

Israel
Air Order of Battle

F-16I "Soufa"

F-16 C/D "Barak"

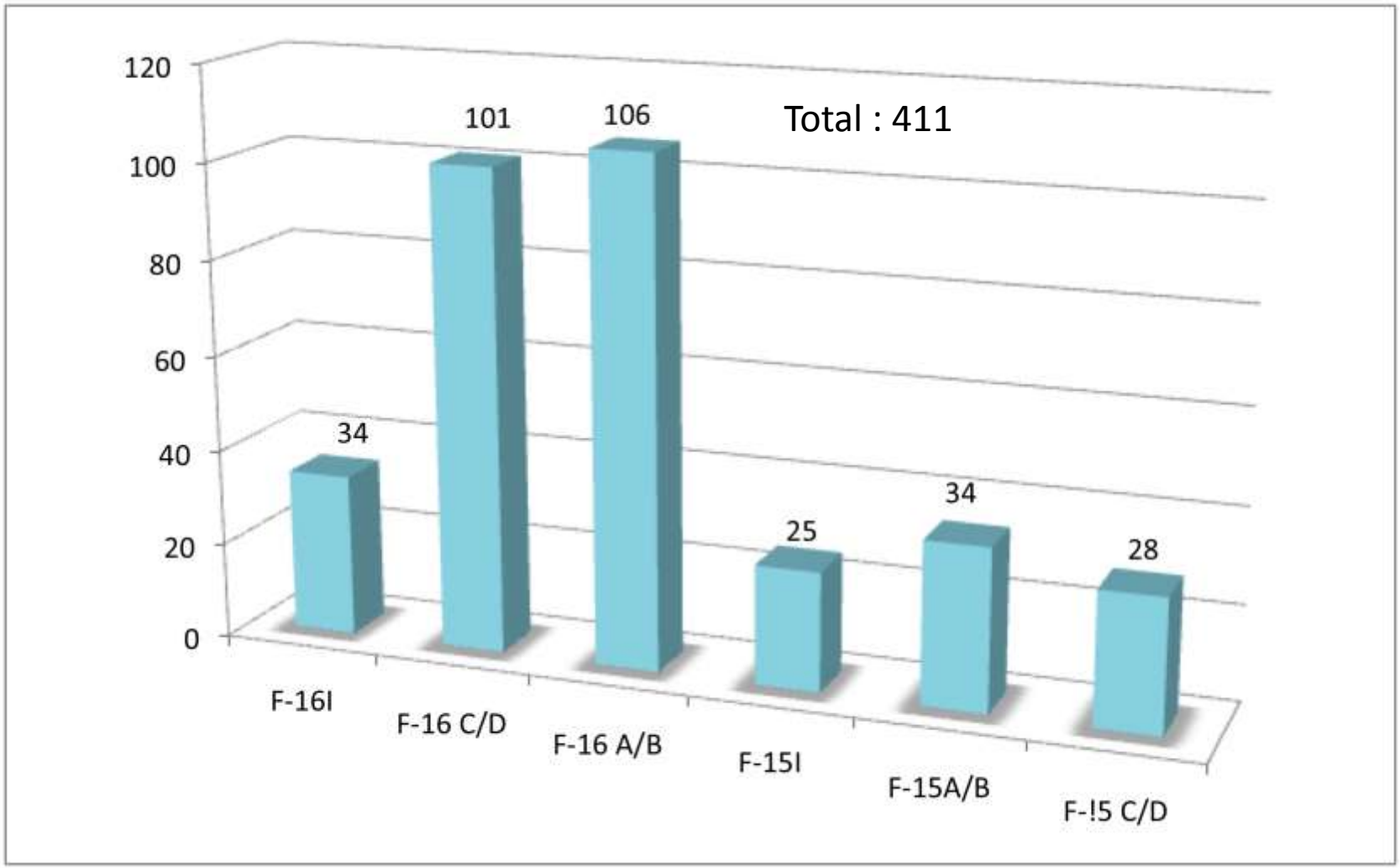
F-16 A/B "Netz"

F-15I "Ra'am"

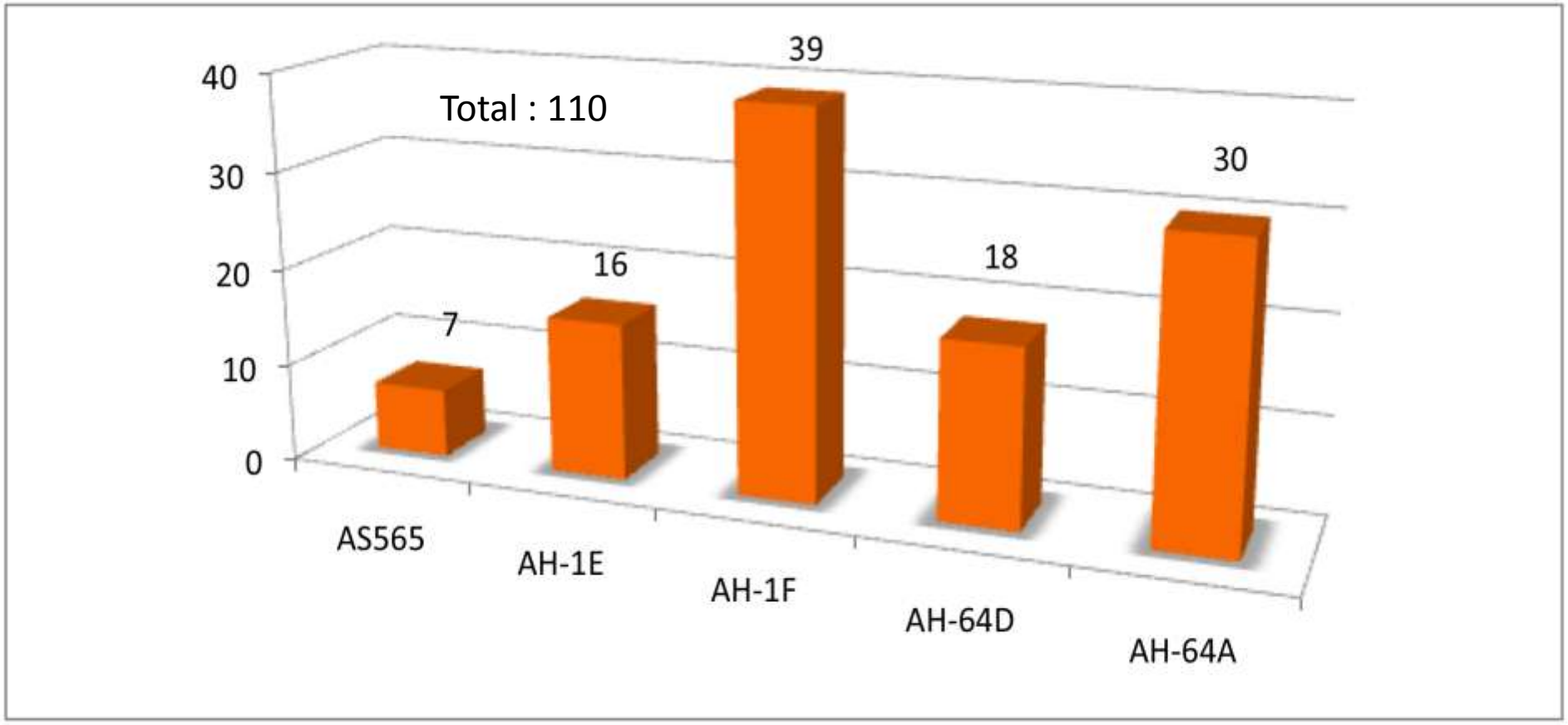
F-15 A/B "Baz"

F-15 C/D "Baz"

Israeli Airforce Order of Battle 2008



Israeli Armed Helicopters Order of Battle - 2008



Israel Combat Aircraft Basic Characteristics

	F-16C	F-15E	F-15C	Mirage 2000
Wing Area (ft sq)	300	608	608	441
Empty Weight (lbs)	18,600	31,700	28,600	17,200
Internal Fuel (lbs)	7,163	13,123	13,123	7,055
Max External Fuel (gallons)	1,500	1,830	1,830	1,240
Combat Weight (lbs)	20,440	44,630	44,630	20,900
Max A/B Thrust at S/L (lbs)	27,000	58,800	47,660	22,046
Max Mil Power at S/L (lbs)	17,800	35,600	29,340	14,400
Combat Thrust/Weight Ratio	1.06	1.32	1.07	1.05
Combat Wing Loading (lbs/ft sq)	68	73.4	73.4	47.4
Max TOGW (lbs)	42,307	81,000	68,000	37,500
Load Factor (g's)	9	6	9	9

Israeli Airforce Tactical Fighter Capabilities - 2008

Type	Order of Battle	Operational Ready %	Force Available	Sustained Sortie Rate	Sorties per Day	Postulated Employment
F-15I	25	75	19	3.0	57	Deep Strike
F-15C/D	28	75	21	3.0	63	FS, BAS, AD, Escort
F-15A/B	34	75	25	3.0	75	FS, BAS, AD, Escort
F-16C/D	101	75	76	3.0	228	FS, BAS, AD, Escort, CAS, BI, SEAD
F-16A/B	106	75	80	3.0	240	BAS, AD, Escort, CAS, BI
F-16I	34	75	25	3.0	75	Deep Strike
Total	328		246		738	

FS: Fighter Sweep, BAS: Battlefield Air Superiority, AD: Air Defense,
CAS: Close Air Support (Air to Ground Role), BI: Battle Field Interdiction (Air to Ground Role)
SEAD: Suppression of Enemy Air Defense

Sustained Conditions : 12 hr Operational Day
18 hr Maintenance Day

F-16 vs Mirage 2000

Mission	F-16 Configuration	Mirage 2000 Configuration	F-16	Mirage 2000
Long Distance Intercept. M1.8 / 40,000 ft (Tanks Dropped)	2 AIM 9 2 AMRAAM 2 370 gal. tanks	2 MAGIC 2 Super 530 2 1700 liter tanks	Range: 803 nmi	Range: 750 nmi
Combat Air Patrol Hi-Hi 40,000 ft (Tanks Dropped)	2 AIM 9 2 AMRAAM 2 370 gal tanks	2 MAGIC 2 Super 530 2 2000 liter tanks	Dash Time: 3.4 min Loiter Time 3.6 hr	Dash Time 3.4 min Loiter Time 2.8 hr
Air Superiority Hi Hi M 0.8 / 30,000ft 5 min Combat (Tanks Dropped)	2 AIM 9 2 600 gal tanks 1 300 gal tank	2 MAGIC 2 1700 liter tanks 1 1300 liter tank	Range: 1125 nmi	Range: 910 nmi
Hi-Lo-Lo-Hi Interdiction 50 nmi dash (Tanks Dropped)	2 AIM 9 4000 lb payload 2 600 gal tanks	2 MAGIC 4000 lb payload 2 1700 liter tanks	Range: 877 nmi	Range: 620 nmi
Lo-Lo-Lo-Lo Interdiction 500 ft Altitude 50 nmi dash (Tanks Dropped)	2 AIM 9 4000 lb payload 2 600 gal tanks	2 MAGIC 4000 lb payload 2 1700 liter tanks	Range: 466 nmi	Range: 340 nmi

F-15A Air to Ground Ranges
(External Fuel Tanks Dropped)

Payload	Hi-Lo-Lo-Hi Range (nmi)
8 x 500 lb Bombs	760
4 x 500 lb Bombs	1020

Payload	Lo-Lo-Lo (nmi)
8 x 500lb Bombs	450
4 x 500 lb Bombs	520

F-15I

- F-15I is the Israeli version of the F-15E Strike Eagle, optimized for Air to Ground Deep Strike missions

- With Conformal Tanks (CFTs) + 2 External Drop Tanks the radius of Action is estimated to be 920 nmi (1700 km) with a Payload of 4 x 2000lb bombs.

- The F15I has a sophisticated built in EW and Counter-Measures System.
- Targeting Systems (Pods): LANTIRN and LITENING.

- Can Carry AIM-120 AMRAAM, AIM 9, Python 4 Air to Air Missiles.

F-16I

- F-16I block 52/60 variant was produced specifically for the Israeli Deep Strike Air to Ground Mission Requirement.

- With CFTs + External Drop Fuel Tanks the Radius of Action is estimated to be 810nmi to 1135 nmi with a payload of 2 x 2000 lb bombs.

- Equiped with the same targeting systems as in the F-15I. LANTIRN and LITENING Pods.

- Can also carry AIM-120 AMRAAM, AIM 9, Python 4 Air to Air Missiles.

Israeli Combat Aircraft Missile Industry
RAFAEL Military Industry

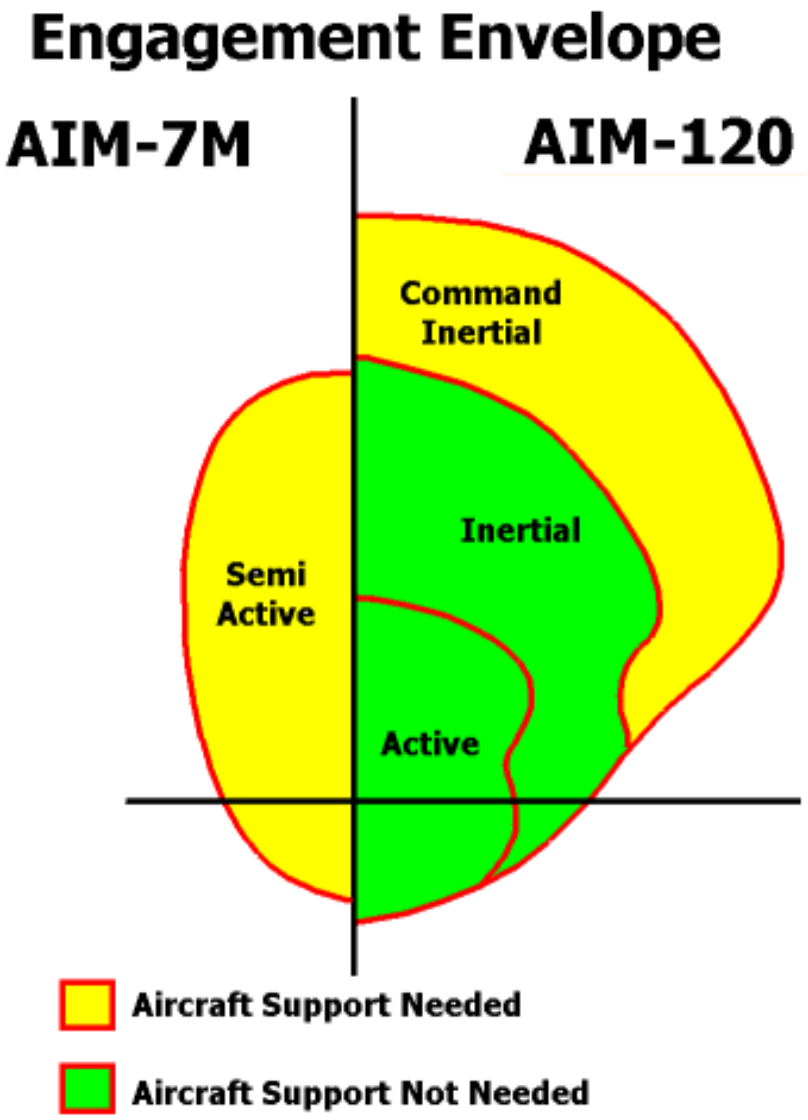
Mission	System
Interceptor Missiles	• Beyond Visual Range Air-to-Air Missiles DERBY • Full sphere IR Air-to-Air Missile PYTHON 5 • Short Range Air Defense System SPYDER • Navel Point Defense Missile System BARAK
Strike Weapons	• Air-to-Surface Stand-Off Missile HAVE LITE • Precision Weapon Guidance Kit SPICE • Air-to-Surface Stand-Off Missile POPEYE • Extended Range Multi-Purpose Missile SPIKE ER

Air to Air Missiles on Israeli Aircraft

Missile	Guidance System	Range (km)	Platform
AIM-9L Sidewinder (U.S.A)	Infra-Red All Aspect Seeker	18.5	F-14/F-15/F-16/F-18
AIM-7F Sparrow (U.S.A)	Semi-Active Radar (SAR) Homing	40	F-15/F-16/F-18
Python 3/4 (Israel)	Infra-Red Homing 4 is All Aspect Seeker	15	F-15/F-16
Derby (Israel)	Active Radar	50	F-15/F-16
AMRAAM-120B (U.S.A)	Active Radar Terminal Guidance/Inertial Midcourse	50	F-15/F-16/F-18

Head On Encounter M 0.9/10,000 ft

	Relative Missile Range at Launch
AIM-9L	0.17
AIM-7E	1.0
AIM-7F	1.46
AMRAAM-120	1.72



Source: http://www.fas.org

Air to Ground Missiles on Israeli Aircraft

Missile	Guidance System	Range (km)	Platform
AGM-78D Standard ARM	Anti-Radar Missile (ARM)	120	F-4E
AGM-65 A/B MAVERICK	A: TV Electro Optical B: Imaging Infra-Red	30	F-16
AGM-45 A/B SHRIKE	Anti-Radar Missile (ARM)	A : 15 B : 30	F-15/F-16

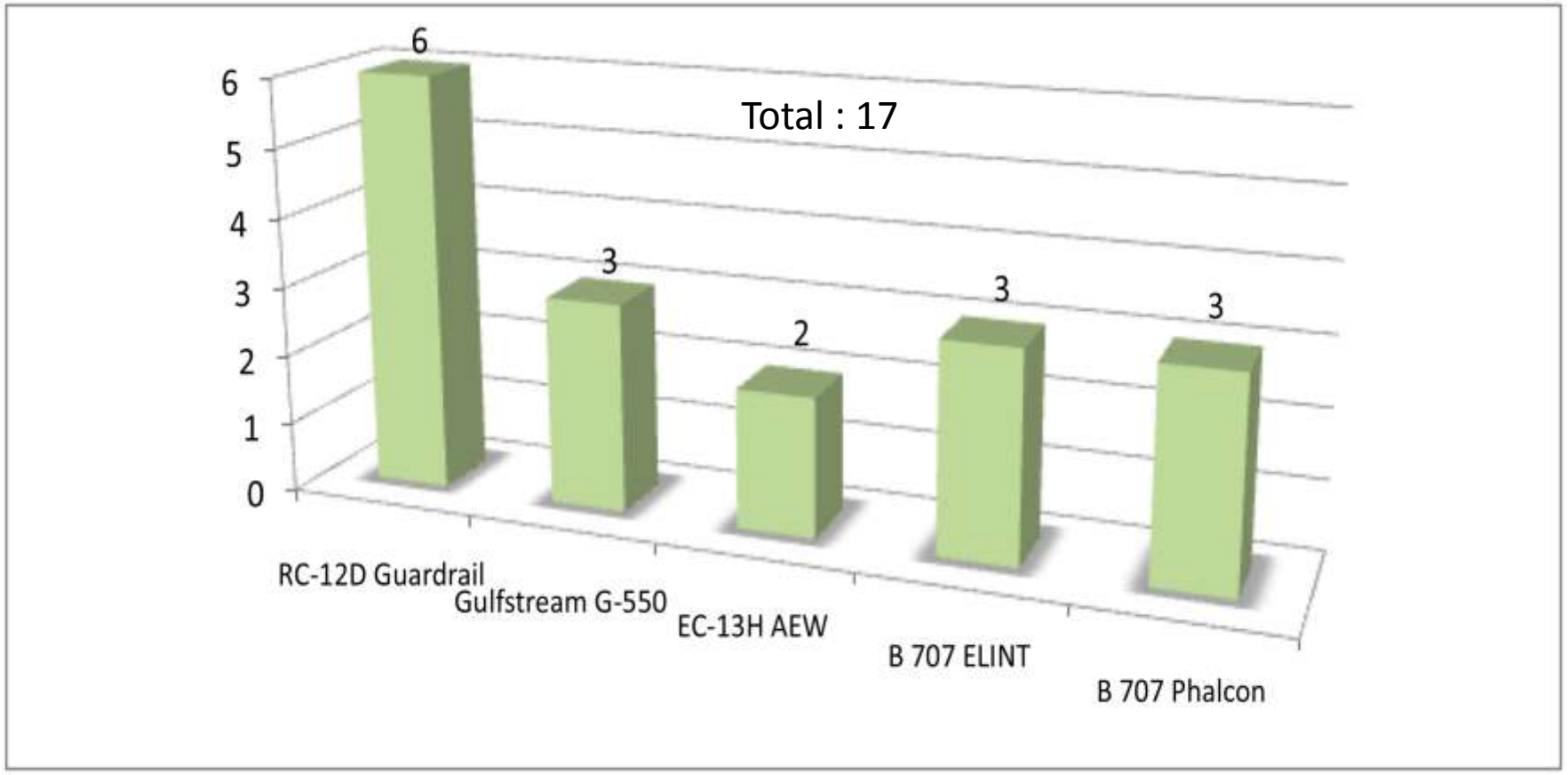
Joint Direct Attack Munition (JDAM) GBU-29/30/31/32
Is a guidance kit that converts existing unguided gravity bombs or “dumb bombs” into all weather “smart” bombs.

Mission: Close Air Support, Interdiction, Offensive Counter Air, Air Defense Suppression.

Guidance Method: GPS/INS with CEP error of 3.o meters

JDAM can be launched from approximately 20 km from target

Israeli EW/ELINT/AWACS/Maritime Patrol, Recce Order of Battle - 2008



Brief Overview of Some Israeli Companies in Defense Electronics

ELISRA Group	Air Deployed: • Defensive Aids Electronic Warfare Suites (DAS) • Radar Warning Receivers (RWR) • Electronic Support Measures (ESM) • Electronic Countermeasures (ECM) • Laser Warning Receivers (LWS) • Self Protection Jammer (SPJ) • Infra-Red Missile Warning System (MWS)
TADIRAN	• C4I Command Control Communications Computing and Intelligence • Divisional Artillery Command & Control Systems (DACCS) • C4I for TBM (Tactical Ballistic Missiles) Defense Systems • PPON VCS Voice Communications System over IP
BAE Systems ROKAR International Ltd	A high technology company which develops, manufactures, markets and supports state-of-the-art aerospace products and systems.
ELTA Systems Group	• Electromagnetic sensors (radar, electronic warfare and communications) and Information Technology (IT) • Airborne Early Warning and Control (AEW&C) Systems • Microwave antennas, transmitters, signal processors. • Special Test Equipment • Data links and SATCOM
Rafael Industry	• Airborne Support Jammer: Sky Shield • RF Fiber Optic Towed Decoy: X-Guard • Missile Warning & Protection System: HELLSTAR • Airborne ELINT/ESM System: TOP-SCAN

ELBIT Systems	• Aircraft and Helicopter Systems and Upgrades • Helmet Mounted Systems (HMS) • Unmanned Air Vehicles (UAV) Systems • C4I and Government Information Systems • Land Vehicle Systems and Upgrade • Electro-Optical (EO) and Countermeasures Systems and Products • Intelligence, Surveillance and Reconnaissance (ISR) • Homeland Security Systems • Training & Simulation • Naval Systems
Israel Aerospace Industries Ltd (IAI)	• Space Systems • Theater Defense • Naval Attack & Defense Systems • Unmanned Air Vehicles (UAV) • MRO and Conversion • Commercial Aircraft • ISR Systems • Military Aircraft & Helicopters Upgrades • Land Systems • Homeland Defense
IAI Groups of Companies	• BEDEK Aviation Group • Commercial Aircraft Group • ELTA Systems Ltd • Military Aircraft Group • Systems Missiles and Space Group

Source: http://www.science.co.il/

Israeli EW usage during the raid on Dayr az-Zawr, Syria, on September, 2007

❑ The Israeli F-15s and F-16s that got through the Syrian air defense radars without being detected is attributed to a Network Attack System, similar to the U.S. "Suter" system.

❑ The technology allows users to invade and hack communication networks, so that enemy sensors see and even take over as systems administrator so sensors can be manipulated into positions so that approaching aircraft can't be seen.

❑ The process involves locating enemy emitters and then directing data streams into them that can include false targets and cause algorithms that allow control over the system.

❑ In essence the elements of the attack included:

- Brute Force jamming
- Network penetration involving both remote air to ground electronic attack and penetration through computer to computer links.

❑ (Aviation Week & Space Technology, Nov 25, 2007):

"Israel's capabilities are similar to the "Suter" network-invasion capability that was developed by the U.S. using the EC-130 Compass Call electronic attack aircraft to shoot data streams, laced with sophisticated algorithms, into enemy antennas. The passive, RC-135 Rivet Joint electronic surveillance aircraft then monitored enemy signals to ensure the data streams were having the intended effect on the target sensors. Israel duplicated the capability when it fielded its two new Gulfstream G550 special missions aircraft designs. Both were modified by Israel Aerospace Industries' Elta Div. in time for the 2006 Lebanon war. The ground surveillance radar version can provide data streams from large active, electronically scanned array radars, while the intelligence version provided the signals surveillance and analyses."

Israeli Space Program

Satellite	Launch Date	Status	Function
Ofeq 1	9/19/1988	Decayed 1/14/1989	Experimental
Ofeq 2	4/3/1990	Decayed 7/9/1990	Communications Experiments
Ofeq 3	4/5/1995	Decayed 10/24/2000	Reconnaissance/Experimental
Ofeq 4 (Eros A)	1/22/1998	Launch failed during 2nd stage burn	Reconnaissance/Commercial Imaging?
Eros A1	12/5/2000	In orbit	Reconnaissance/Commercial Imaging?
Ofeq 5	5/28/2002	In orbit	Reconnaissance
Ofeq 7	6/1/2007	In orbit	Reconnaissance
TecSAR	01/21/2008	In orbit/awaiting final certification	Reconnaissance/Radar Imaging

Note: Chart does not include Israel's commercial communications satellite ventures.

Source: Israeli Weapons of Mass Destruction. An Overview
Anthony H. Cordesman, CSIS, June 2008

Projected Modernization of the Israeli Airforce

❑ U.S. Defense Security Cooperation Agency (DSCA) announced September 29, 2008 that Israel placed the following purchase orders:

- A possible order of 25 F-35 Conventional Take-Off and Landing (CTOL) Joint Strike Fighter (JSF) aircraft.

- An option to purchase an additional 50 CTOL and STOVL (Short Take-off and Vertical Landing) Versions.

APPENDIX

Operational Ready Rate Computations:

The Operational Rate Rate (OR) can be computed by subtracting the number of aircraft that are not operational ready due to maintenance (NORM) and the number of aircraft not operational ready due to supply (NORS) from the total available assets.

The NORM rate can be computed by determining the Aircraft down times due to the scheduled and non-scheduled maintenance.

The NORS rates are determined from the efficiency and equipage of the supply system.

$$OR = 100\% - NORM(\%) – NORS(\%)$$

To Maximize Operational Readiness Syrian Airforce needs to:

- ✓ Minimize NORM(%)
- ✓ Minimize NORS(%)

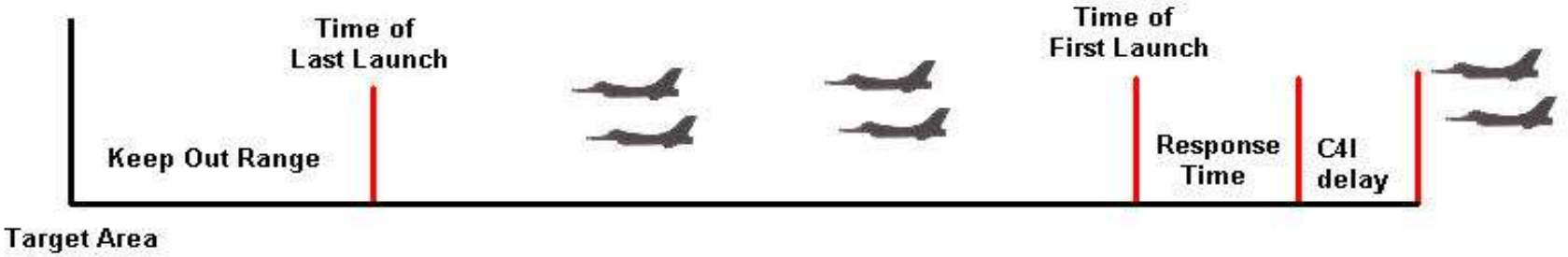
Operational Readiness Rate will determine the Available Combat Aircraft

(Appendix 1)

Maximum Ground Launched Interceptors (GLI)

Time between each Aircraft pair launch (sec):	**30**
Number of Aircraft launched every 30 seconds:	**2**
Target Incoming Speed at 1000 feet altitude 0.85 Mach (km/min):	**16.7**
Keep out Range from Target Area (km):	**20**

Commit Range (km)	C4I Delay (sec)	Response Time (sec)	Time of Last Launch TL (sec)	Max GLI
130	60	60	275	16
130	120	60	215	12
130	60	120	215	8
130	120	120	155	4
130	60	180	155	0
130	180	60	155	8
130	180	120	95	0

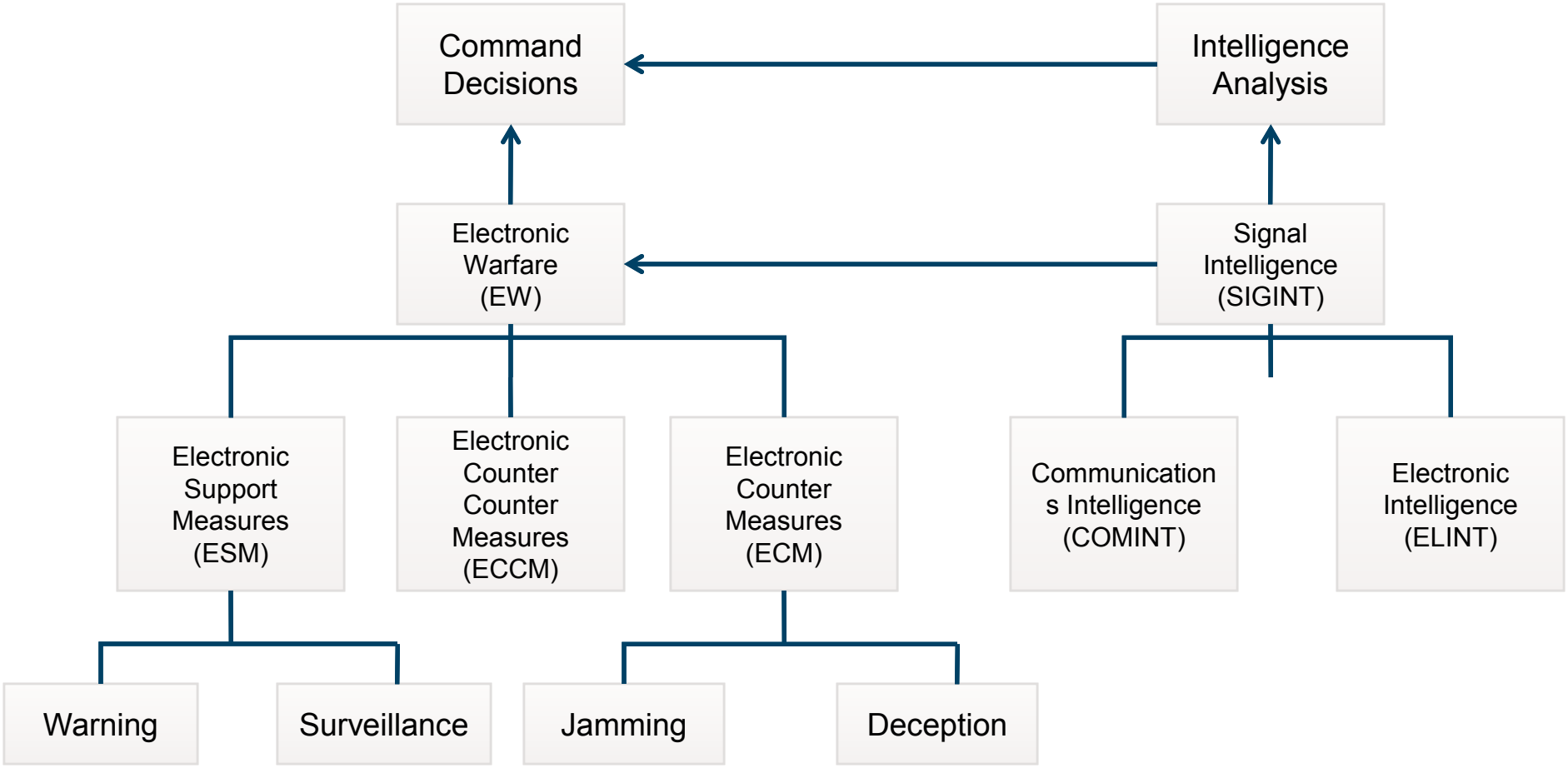


Downrange from Target Area

Response Time : Strip Alert to Wheels Up

(Appendix 2)

Signal Intelligence and Electronic Warfare in Command Decisions



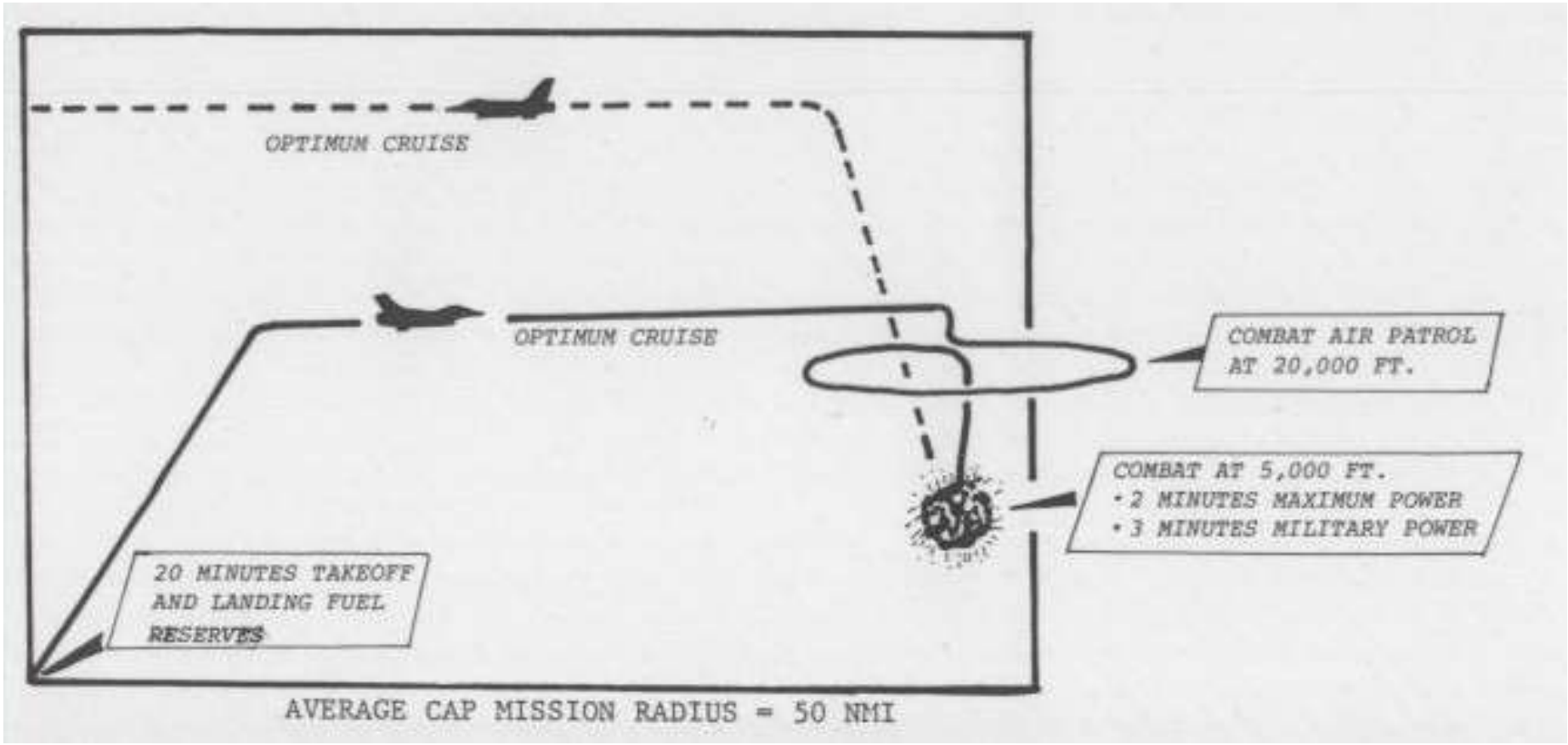
ELINT : Strategic Intelligence
ESM : Real Time Tactical Intelligence

(Appendix 3)

Typical F-16A Mission Profiles

(Appendix 4)

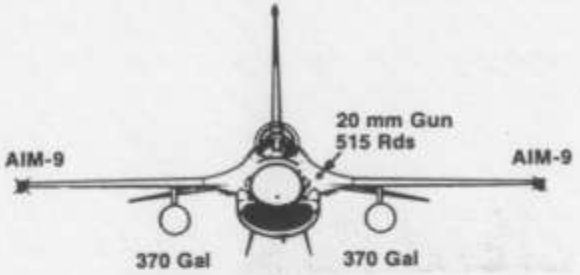
F-16 A/C Combat Air Patrol



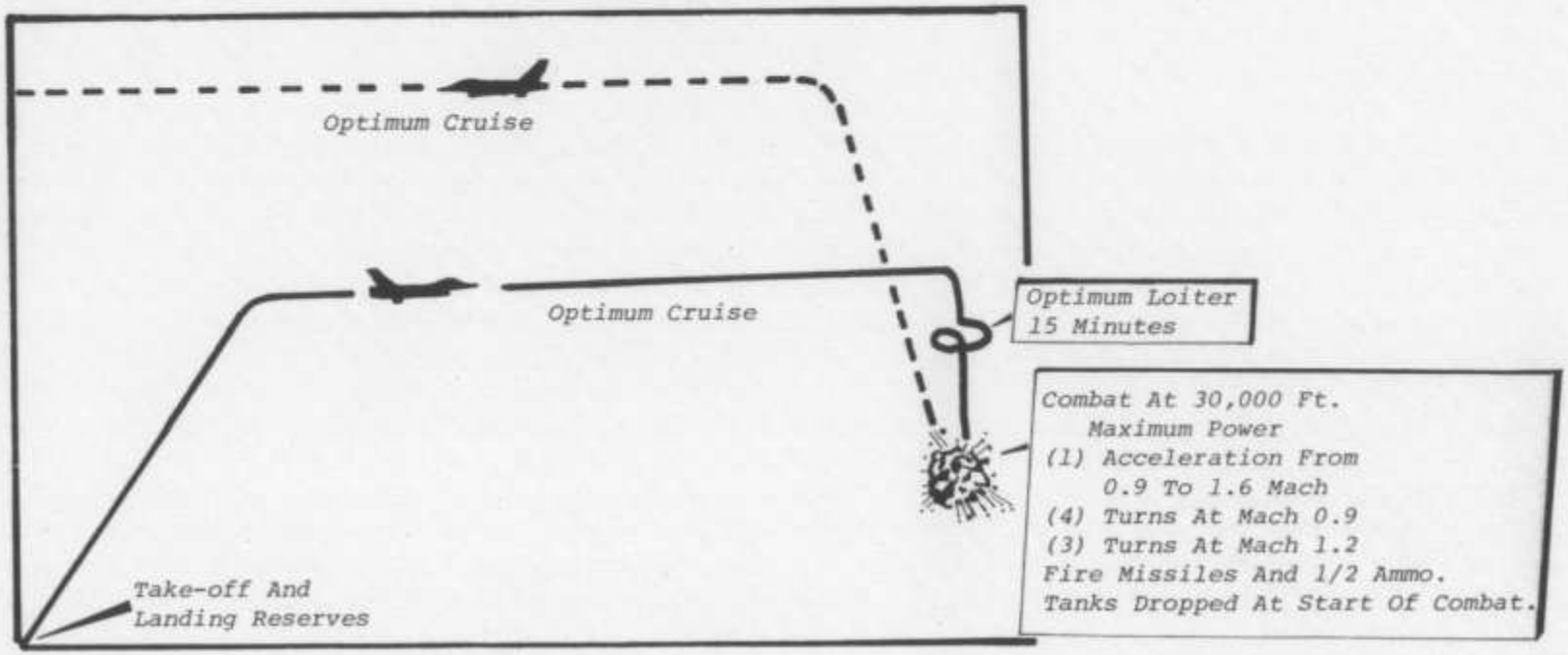
Configuration:
2 AIM – 7F
4 AIM – 9L
3 370 Gallon Fuel Tanks

F-16A

Air-Superiority Mission



(2) AIM-9 Missiles
(2) 370 Gal Tanks



Mission Raduis 700 NMI

F-16A

AIR-TO-SURFACE

(6) MK-82
(1) 300 Gal C_L Tank
Tank Retained