



**THE WORLD'S  
MISSILE  
SYSTEMS**

## FOREWORD

This is the Seventh Edition of the WORLD'S MISSILE SYSTEMS, designed as a reference compendium of the world's currently used or produced guided missiles. It is published by the Pomona Division of General Dynamics Corporation for use by its personnel, and for the use the free world military.

This edition is similar in content, but somewhat differently organized, than the previous editions. The main body of text is composed of two facing sheets for each missile program; the left page a data sheet, the right page provides illustrations of the missile and associated equipment. But, instead of being organized by mission, all missiles are listed alphabetically, either by their proper names, or lacking same, by their designation. Mission perspective is provided by the Table of Contents, which lists the mission and the producing country, as well as the page number. Also the data sheet has been redesigned to provide a quick-scan perspective of mission, trajectory, launch platform, target, and required after-launch action. And, this year, we give all dimensions in both Metric and English units.

For the Seventh Edition, a much more strict definition of guided missile was adopted. To be considered as a guided missile, two criteria must be satisfied:

- a. the projectile must provide propulsive impulse after leaving the launcher.
- b. during flight, the projectile must generate or receive, and respond to course correction signals.

The use of this definition has eliminated a few previous entries such as Walleye and Copperhead. The only exceptions taken were for the Soviet Frog series of battlefield rockets, which are usual-

## ABBREVIATIONS

Some commonly used abbreviations are defined.

AAM	Air-to-air missile	RV	Reentry vehicle
A/C	Aircraft	SAL	Semi-Active Laser
AEC	Atomic Energy Commission	SAM	Surface-to-air missile
ASM	Air-to-surface missile	SAR	Semi-Active Radar
B	Booster	SAT	Societe Anonyme de Telecommunications
BAe	British Aerospace Dynamics Group	sec	Second
CEP	Circular Error of Probability	SFENA	Societe Francaise D'Equipements Pour La Navigation Aerie
cm	Centimeter	SINS	Shipboard Inertial Navigation System
DOE	Dept. of Energy	SNIA	Societe Nationale Industrielle Aerospatiale
ECM	Electronic countermeasures	SNPE	Societe Nationale des Poudres et Explosifs
GWS	Guided Weapon System	SSM	Surface-to-surface missile
IAI	Israel Aircraft Industries	TIR	Target Illumination Radar
ICBM	Inter Continental Ballistic Missile	TV	Television
IFF	Identification, Friend or Foe	UK	United Kingdom
IMI	Imperial Metal Industries	USA	United States of America
IR	Infrared	USSR	Union Soviet Socialist Republics
kg	Kilograms	W/H	Warhead
kt	Kilo-ton (weapon yield)	W/S	Weapon System
LOS	Line Of Sight	'	Foot
m	Meter	"	Inch
M	Missile	#	Pound
MBB	Messerschmitt-Boelkow-Blohm		
mi	Mile		
MIRV	Multiple, Independently-targetable Reentry Vehicle		
MK	Mark		
mm	Millimeter		
MOU	Memorandum Of Understanding		
mph	Miles per hour		
MRV	Multiple Reentry Vehicles		
mt	Megaton (weapon yield)		
NOL	Naval Ordnance Laboratory		
NWS	Naval Weapon Station		
RF	Radio frequency		

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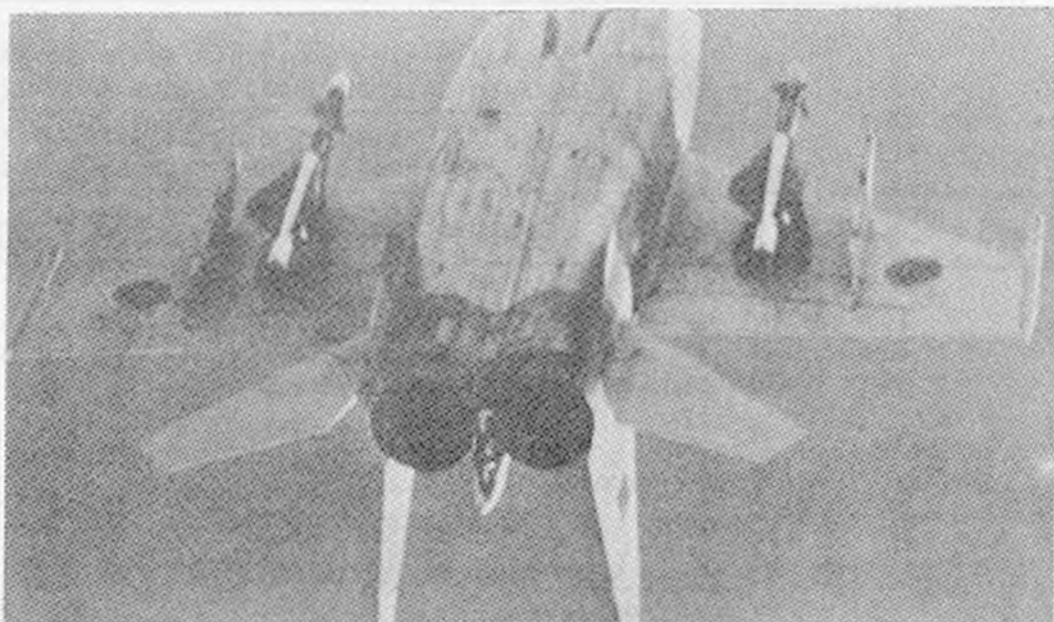
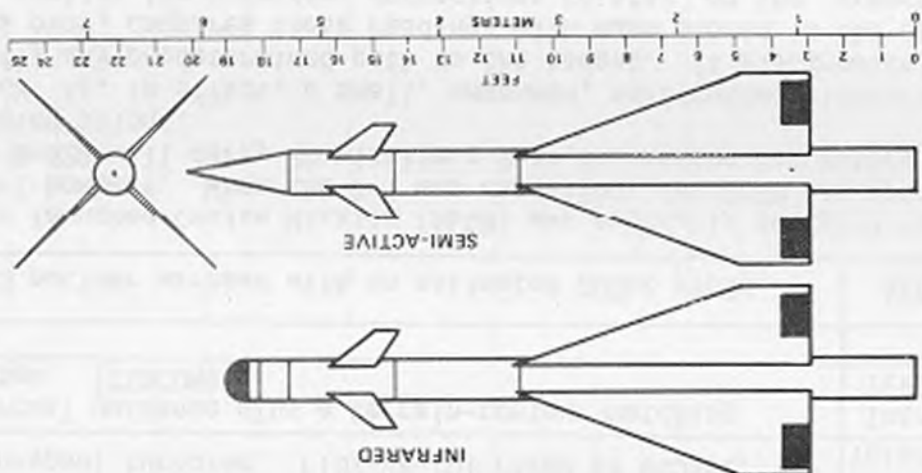
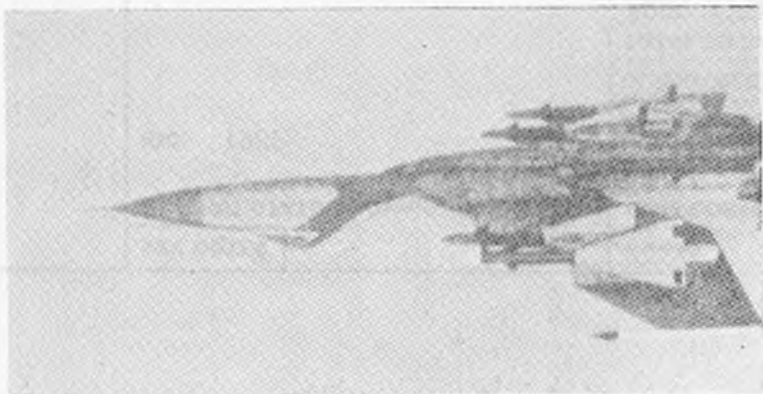
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# ACRID

NAME <u>ACRID</u>		DEVELOPER _____	
DESIGNATION <u>AA-6</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____
CHARACTERISTICS		PERFORMANCE	
Estimated: LENGTH: SAR 6.3 (20.6') IR 5.9m (19.4') DIAMETER: 40cm (1.3') SPAN: 2.25 (7.4') WEIGHT: SAR 850kg (1870#) IR 650kg (1430#) OTHER: _____		RANGE: SAR 50km (31 mi) IR 20km (12.5m) ALTITUDE: Aircraft altitude SPEED: 2.2 Mach (Some say as high as 4.5 Mach) OTHER: _____	BASIS FOR LAUNCH <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Long range tactical air-to-air missile system.		USSR
AIRFRAME	Cylindrical body with pointed nose (SAR), rounded nose (IR), Cruciform small delta canards forward and large delta wings aft of midbody		USSR
PROPULSION	Solid propellant rocket motor - one stage.		USSR
GUIDANCE	Two versions: 1) semi-active radar, 2) passive IR homing. Canard plus elevon/aileron control.		USSR
FUZING	Proximity.		USSR
WARHEAD	To about 100kg (220#) high explosive fragmentation.		USSR
REMARKS			
First observed mounted on the MIG-2 Fox bat aircraft (4 per A/C) and has been reported installed on the SU-19 aircraft. On the MIG-25, 4 Acrid missiles are carried; 2 IR inboard and two SAR outboard. The SAR targets are illuminated with CW antenna in slim wing tip pods. The large wings are designed to provide high altitude maneuverability. (This missile was originally designed to kill high altitude bombers). The SAR receiver antenna is larger than that of the Sparrow and closely approximates the Phoenix antenna.			
USERS	KEY DATES	COSTS	
USSR	PRESENT STATUS: Operational	UNIT COSTS:	
	IOC: First observed in late 1975	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE:	



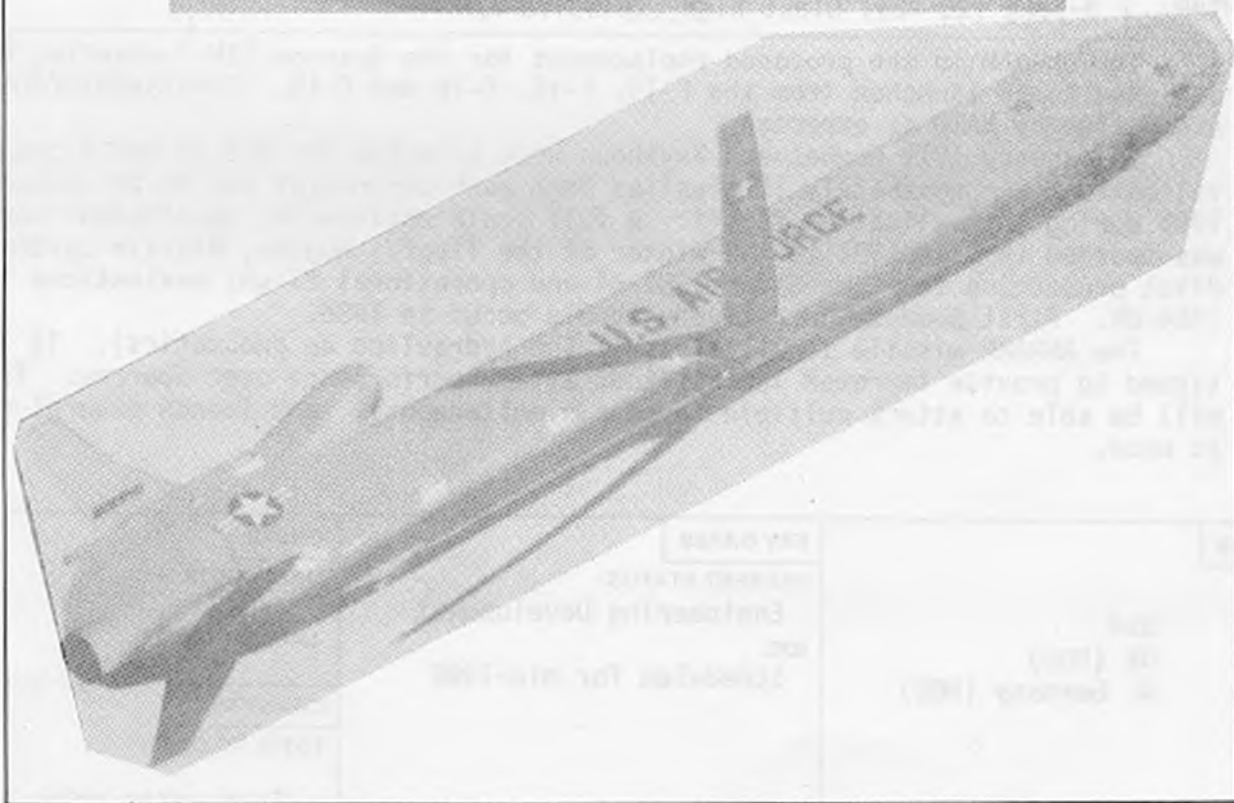
OTHER INFORMATION:

**ACRID**

THE W. R. D. S.  
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NAME <u>ALCM</u>		<b>ALCM</b>		DEVELOPER <u>Boeing</u>			
DESIGNATION <u>AGM-86B</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Air Force</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic targets.			
<b>CHARACTERISTICS</b> LENGTH: 6.3m (20.8') DIAMETER: 60cm (2.0') SPAN: 3.66m (12.0') WEIGHT: 1364kg (3000#) OTHER:			<b>PERFORMANCE</b> RANGE: 2400km (1500mi) ALTITUDE: 0-12,200m (0-40,000') SPEED: Subsonic OTHER:				
<b>BASIS FOR LAUNCH</b> Missile activated. Target and trajectory data input.			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION				CONTRACTOR		
OVERALL SYSTEM	Air-launched, medium range, cruise missile for use against strategic targets.				Boeing		
AIRFRAME	Roughly square cross-section body with long, short-chord wings midships & A/C type tail assembly aft. Inlet on top near tail				Boeing		
PROPULSION	Twin-spool turbofan. F107-WR-101 rated at 600#st.				Williams Teledyne-2nd source		
GUIDANCE	Inertial guidance plus a terrain-contour matching system. (TERCOM)				Inertial-Litton TERCOM-McDon. Doug.		
FUZING							
WARHEAD	W-80 nuclear warhead with an estimated 200kt yield.				AEC		
REMARKS	<p>The Air launched Cruise Missile (ALCM) was originally designed for use by the B-52 and B-1 bombers. When the B-1 was cancelled, the ALCM was optimized for the B-52. The B-52G will carry 20 missiles; 8 in the weapon bay rotary launcher and another 12 on wing pylons.</p> <p>The ALCM is, in effect, a small, unmanned, self-guided aircraft. It can be programmed to fly any predetermined path to the target. It electronically reads the terrain it flies over, compares these readings with maps stored in the on-board computer, and applies the necessary corrections to stay on the programmed path.</p>						
USERS	KEY DATES		COSTS				
USA	PRESENT STATUS: Production		UNIT COSTS: \$1.3M in '81 \$s.				
	IOC: 1982		LAUNCH UNIT:				
			QUANTITIES				
			TOTAL TO DATE:				
			Approximately 300 thru 1981.				

OTHER INFORMATION:

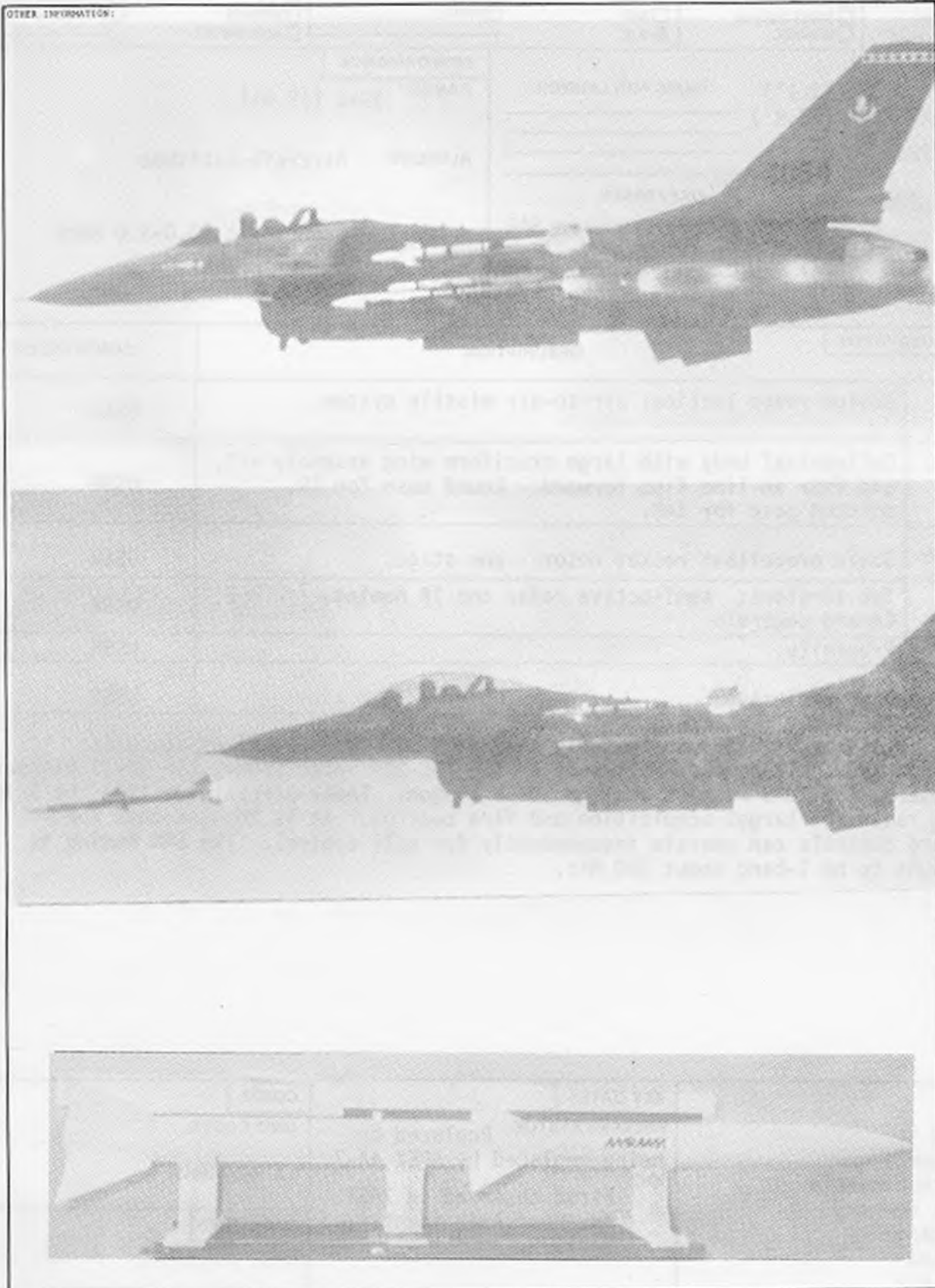


# AMRAAM

NAME <u>AMRAAM</u>		<b>AMRAAM</b>		DEVELOPER <u>Raytheon/Hughes</u>	
DESIGNATION _____				COUNTRY <u>USA</u>	
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b> LENGTH: 3.5m (12.0') final)		Estimated (Configuration not final) BASIS FOR LAUNCH		<b>PERFORMANCE</b> RANGE: 72km (45mi) Min: 0.8km (0.5mi)	
DIAMETER: 17.5cm (0.6')		Aircraft target acquisitional within range		ALTITUDE: All aircraft altitudes	
SPAN: 83cm (2.7')		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		SPEED: Mach 4.0	
WEIGHT: 135kg (300#)				OTHER:	
OTHER:				OTHER:	
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Medium range air-to-air missile designed for dogfight engagements.		Hughes	
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose. Four cruciform midway fins and four triangular control fins at rear.		Hughes	
<b>PROPULSION</b>		Ducted rocket motor.		United Technology	
<b>GUIDANCE</b>		Inertial midcourse plus active RF seeker for terminal guidance.			
<b>FUZING</b>		Guidance plus impact fuze		Hughes	
<b>WARHEAD</b>		9-18kg (20-40#) blast high explosive W/H			
<b>REMARKS</b>		<p>The AMRAAM is the proposed replacement for the Sparrow AIM-7 missile; being designed to be launched from the F-14, F-15, F-16 and E-18. Co-assembly/dual production by NATO is expected.</p> <p>In January 1979 Hughes and Raytheon were selected for the 33 month competitive validation. Approximately 10 missiles from each contractor are to be launched in 1981 during the validation flyoff. A full scale engineering development contract was awarded in late 1981 to the winner of the flyoff, Hughes, Missile Systems Group. Pilot production is planned for 1983-84 and operational flight evaluations in 1984-85. First production delivery should occur in 1985.</p> <p>The AMRAAM missile is all electric (no hydraulics or pneumatics). It is designed to provide improved low altitude attack performance over Sparrow. The pilot will be able to attack multiple targets simultaneously, and launch several missiles at once.</p>			
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA UK (MOU) W. Germany (MOU)		PRESENT STATUS: Engineering Development IOC: Scheduled for mid-1986		UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE:  Test units only	

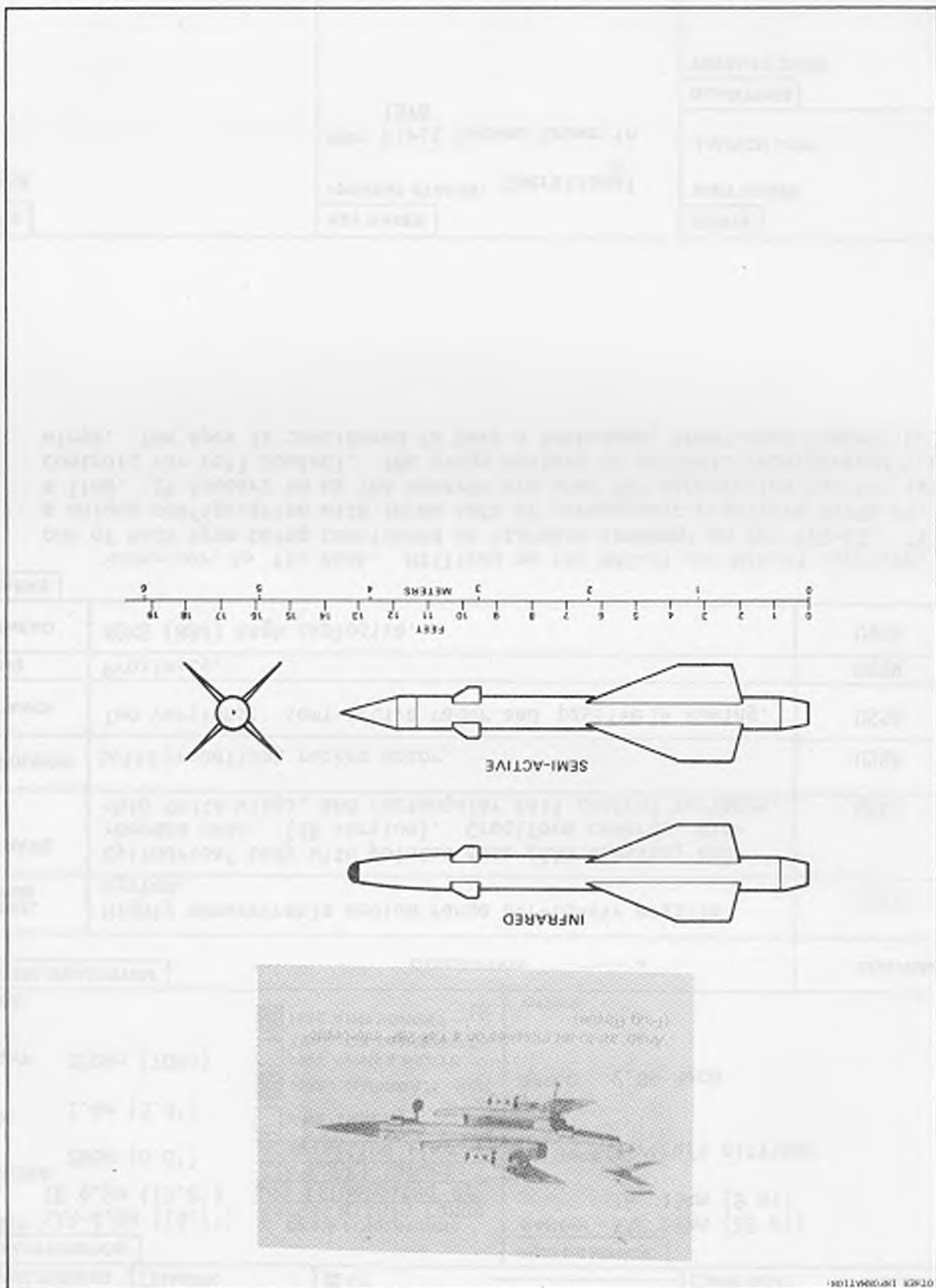
## AMRAAM

OTHER INFORMATION:



## ANAB

NAME <u>ANAB</u>		DEVELOPER _____	
DESIGNATION <u>AA-3</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____
CHARACTERISTICS		PERFORMANCE	
LENGTH: IR 4.0m (13.1') SAR 4.1m (13.4') DIAMETER: 28cm (0.9') SPAN: 1.30m (4.3') WEIGHT: 275kg (605#) OTHER: _____		RANGE: 19km (12 mi) ALTITUDE: Aircraft altitude SPEED: Supersonic, 3.0-5.0 Mach OTHER: _____	
BASIS FOR LAUNCH			
<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE SAR <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET IR			
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Medium range tactical air-to-air missile system.		USSR
AIRFRAME	Cylindrical body with large cruciform wing assembly aft, and four in-line fins forward. Round nose for IR, pointed nose for SAR.		USSR
PROPULSION	Solid propellant rocket motor - one stage.		USSR
GUIDANCE	Two versions: semi-active radar and IR homing. Canard controls.		USSR
FUZING	Proximity.		USSR
WARHEAD	High explosive		USSR
REMARKS			
This missile has undoubtedly been upgraded several times since its introduction. It has been observed on the YAK-28P interceptor, the SU-11 Fishpot fighters, the SU-9 Fishpot and the SU-15 Flagon. These aircraft utilize the Skip Spin radar for target acquisition and fire control. It is thought that the 4 canard controls can operate independently for roll control. The SAR homing is thought to be I-band about 880 MHz.			
USERS	KEY DATES	COSTS	
USSR Bulgaria Czechoslovakia East Germany Hungary Poland Romania	PRESENT STATUS: Replaced or being replaced by APEX AA-7. IOC: First observed in 1961, Advanced Anab identified in 1972.	UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE:	



ANAB

THE WORLD'S  
MISSILE  
SYSTEMS

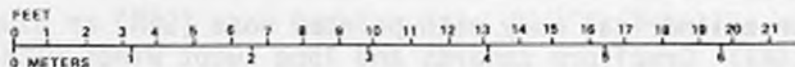
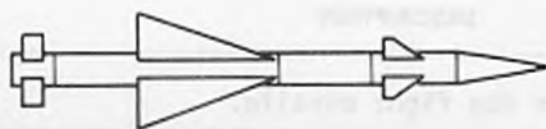
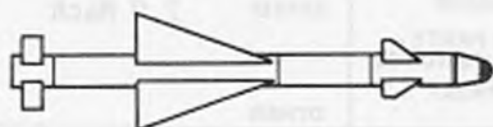


0783 18094108

# APEX

NAME <u>APEX</u>		DESIGNATION <u>AA-7</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Air Force</u>					
MISSION		TRAJECTORY		LAUNCHED FROM		MOBILE LAUNCHER		TARGETS					
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____			
CHARACTERISTICS				PERFORMANCE									
LENGTH: SAR 4.5m (14.7') IR 4.2m (13.8') DIAMETER: 26cm (0.8') SPAN: 1.4m (3.4') WEIGHT: 320kg (705#) OTHER:				BASIS FOR LAUNCH Target within range and illuminated by TIR (SAR) Target acquisition (IR) <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE SAR <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET IR				RANGE: SAR 53km (22 mi) IR 15km (9 mi) ALTITUDE: Aircraft altitude SPEED: 2.0+ Mach OTHER:					
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Highly maneuverable medium range air-to-air missile system.						USSR					
AIRFRAME		Cylindrical body with pointed nose (SAR version) and rounded nose. (IR version). Cruciform canards, mid-ship delta wings, and rectangular tail control surfaces.						USSR					
PROPULSION		Solid propellant rocket motor.						USSR					
GUIDANCE		Two versions: semi-active radar and passive IR homing.						USSR					
FUZING		Proximity.						USSR					
WARHEAD		40KG (88#) high explosive.						USSR					
REMARKS		Successor to the Anah. Utilized on the MIG-21 and MIG-23 aircraft, with one of each type being considered as standard armament on the MIG-23. It has a unique configuration with three sets of aerodynamic cruciform surfaces, all in a line. It appears to us the canards are used for maneuvering and the tail controls for roll control. The wings contain no controls incorporated into the wings. The Apex is considered to have a look-down, shoot-down capability.											
USERS		KEY DATES				COSTS							
USSR		PRESENT STATUS: Operational				UNIT COSTS:							
		IOC: First became known in 1976				LAUNCH UNIT:							
						QUANTITIES							
						TOTAL TO DATE:							

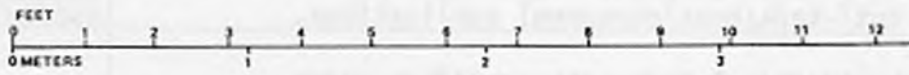
OTHER INFORMATION:



NAME <u>APHID</u>		<b>APHID</b>		DEVELOPER _____	
DESIGNATION <u>AA-8</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>		<b>BASIS FOR LAUNCH</b>		<b>TARGETS</b>	
LENGTH: SAR 2.15m (7.1') IR 2.00m (6.6') DIAMETER: 13cm (0.4') SPAN: 52cm (1.7') WEIGHT: 55kg (121#) OTHER:		<u>Target within range and illuminated by TIR (SAR). Target acquisition (IR).</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
				<b>PERFORMANCE</b>	
				RANGE: 14.5kg (9 mi) SAR 6.5kg (4 mi) IR ALTITUDE: Depends upon A/C altitude SPEED: 2.0 Mach OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Short range air-to-air dog fight missile.		USSR		
AIRFRAME	Slender cylindrical body with pointed nose (SAR) or blunt nose (IR). Cruciform canards and long swept wings with ailerons/elevons(?).		USSR		
PROPULSION	Single stage solid propellant rocket motor.		USSR		
GUIDANCE	Two versions, semi-active radar homing and IR homing.		USSR		
FUZING	Proximity.		USSR		
WARHEAD	High explosive 6kg (13.2#).		USSR		
<b>REMARKS</b>					
<p>The Aphid is probably derived from and replaces the AA-2 Atoll missile. It is designed primarily as a short range dog-fight missile with high acceleration and high g maneuverability. For these reasons, it is believed that the canards act independently rather than paired and that control is assisted by elevons/ailerons on the wing's trailing edge.</p> <p>The Aphid is known to be carried by both the MIG-21 and MIG-23 fighters, with possibly as many as 4 missiles mounted on the wings.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USSR		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: About 1975		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE:	

# APHID

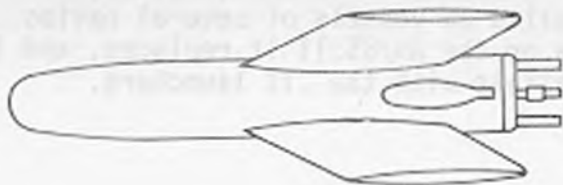
OTHER INFORMATION:



## AS.11/SS.11

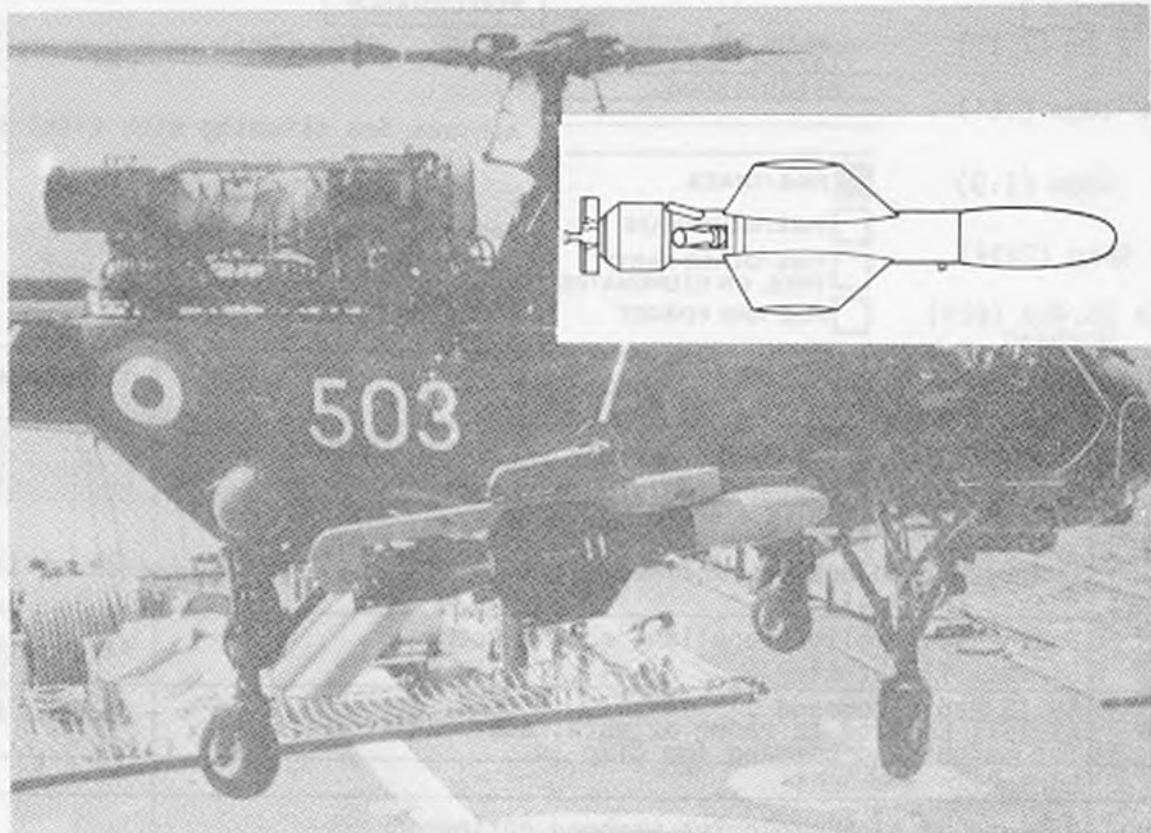
NAME AS. 11/SS.11		DESIGNATION Nord 5210, AGM-22A		DEVELOPER Aerospatiale		COUNTRY France		SERVICE Army, Navy			
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS					
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> SHIPS small <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
CHARACTERISTICS				PERFORMANCE							
LENGTH: 1.2m (3.9')				BASIS FOR LAUNCH Sight on target.		RANGE: 3km (1.8mi)					
DIAMETER: 16.5cm (0.5')						ALTITUDE: Line of sight - depends upon launch.					
SPAN: 50cm (1.6')				<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		SPEED: Subsonic					
WEIGHT: 30kg (66#)						OTHER:					
OTHER:											
SYSTEM/SUBSYSTEM		DESCRIPTION					CONTRACTOR				
OVERALL SYSTEM		Short range, multi-purpose, lightweight ASM and SSM for anti-tank/boat/personnel applications.					Societe Nationale Industrielle Aero-spatiale				
AIRFRAME		Shortened cylindrical body with cruciform wings providing both lift and rotation.					Aerospatiale				
PROPULSION		Dual stage solid propellant rocket motor. 1.2 sec boost and 20 sec sustain.					SNPE				
GUIDANCE		Wire command to line of sight.					Aerospatiale				
FUZING		Impact.					?				
WARHEAD		Three optional warheads: anti-tank, blast high explosive, and fragmentation.					?				
REMARKS											
<p>The AS/SS.11, since its introduction in 1962, has been adapted to a variety of launcher platforms including ship, surface fixed, surface mobile, and helicopters. Using a stabilized optical sight, the operator acquires the missile by sighting on tracer tail mounted flares. Using the control stick, he transmits command signals to the missile via wire. By aligning the missile line of sight with the target line of sight, he achieves a hit.</p>											
USERS		Greece		Netherlands		KEY DATES		COSTS			
France		India		Norway		PRESENT STATUS: Operational		UNIT COSTS:			
Abu Dhabi		Iran		Peru		for some applications.		LAUNCH UNIT:			
Argentina		Iraq		Portugal		Generally being replaced.		QUANTITIES			
Belgium		Israel		Saudi Ara		loc: 1962		TOTAL TO DATE:			
Brazil		Italy		Senegal		Users Cont.		~ 200,000			
Canada		Kuwait		S. Africa		Tunisia USA					
Denmark		Lebanon		Spain		Turkey Uganda					
Finland		Libya		Sweden		UK Venezuela					
Germany		Malaysia		Switz							

OTHER INFORMATION:

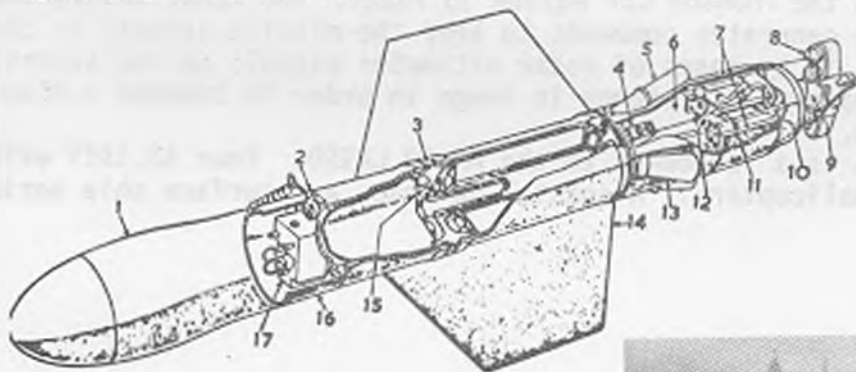


NAME AS/SS.12, SS.12M		<b>AS.12/SS.12</b>		DEVELOPER <u>Aerospatiale</u>	
DESIGNATION _____				COUNTRY <u>France</u>	
				SERVICE <u>Navy</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 1.86m (6.1') DIAMETER: 21cm (.7') SPAN: 64cm (2.1') WEIGHT: 75kg (165#) 28.6kg (63#) OTHER: Warhead			<b>BASIS FOR LAUNCH</b> Sight on target. _____ _____ <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
			RANGE: Max: 6km (4.0mi) Min: 0.6km (0.4mi) ALTITUDE: Line of sight. SPEED: Subsonic OTHER:		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Short range, wire guided general purpose ASM/SSM for use against hard targets.		Societe Nationale Industrielle Aero-spatiale	
AIRFRAME		Cylindrical body with bulbous nose. Cruciform trapezoidal wings midbody.		Aerospatiale	
PROPULSION		Dual thrust, boost and sustain, solid propellant rocket motor		Aerospatiale	
GUIDANCE		Automatic wire command to line of sight. Control by varying thrust of two sustainer jets on each side.			
FUZING		Contact.			
WARHEAD		High explosive warhead options; OP.36 armor piercing, shaped charge and fragmentation.			
<b>REMARKS</b>					
<p>This missile has been employed in land, sea and air launched roles including the Atlantic and Nimrod aircraft and the Wasp, Wessex and Lynx helicopters.</p> <p>The operator picks up the missile after launch by sighting on tail mounted flares. By means of a control stick, he generates automatic commands to direct the missile line of sight onto the target line of sight. Commands are transmitted through a trailing wire.</p> <p>The marine version, SS.12M, was first demonstrated in 1966 and has been installed on vessels of several navies. This missile has more than twice the range or the AS/SS.11 it replaces, and its warhead is 4 times as powerful. It is compatible with the .11 launchers.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
France Abu Dhabi Argentina Brazil Brunei Germany Iraq Iran		Italy Ivory Coast Libya Malaysia Netherlands Norway Spain Tunisia Turkey United Kingdom		PRESENT STATUS: Operational IOC: Early 1960s	
				UNIT COSTS: LAUNCH UNIT:	
				<b>QUANTITIES</b> TOTAL TO DATE:	

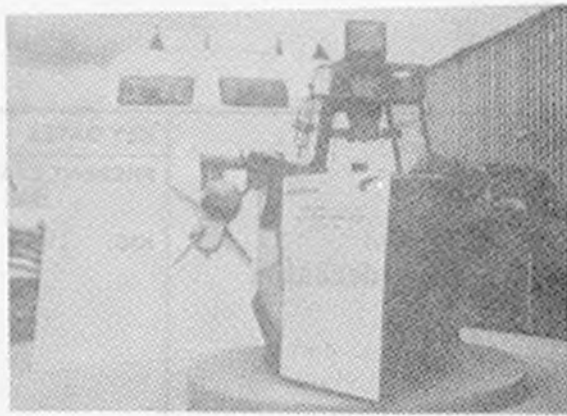
OTHER INFORMATION:



Cutaway of the Nord SS.12(M), showing: 1, warhead; 2, forward attachment; 3, motor head; 4, test sockets; 5, trace flares; 6, vent chamber; 7, cable bobbin; 8, signal wire connection; 9, junction box; 10, decoder; 11, gyroscopic distributor; 12, motor igniter connection; 13, booster nozzle (2); 14, wings (4); 15, sustainer igniter; 16, warhead junction ring; 17, mechanical fuse



This turret, designated SFB.1, with launchers for SS.11 and SS.12M guided missiles was developed by Nord-Aviation for operation from light naval vessels. This turret, which incorporates an APX Bézu 260 gyro stabilized sight and a T 10M guidance station for the gunners was described in *Interavia International Defense Review* 11/66. In the photograph on the left, can be seen an SS.12M, and, right, two SS.11s.



# AS.15, AS.15TT

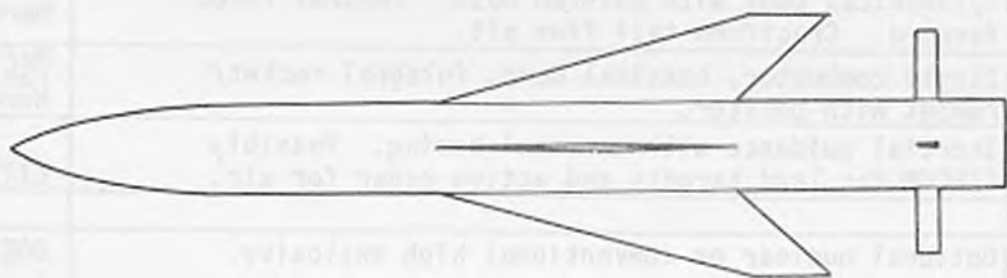
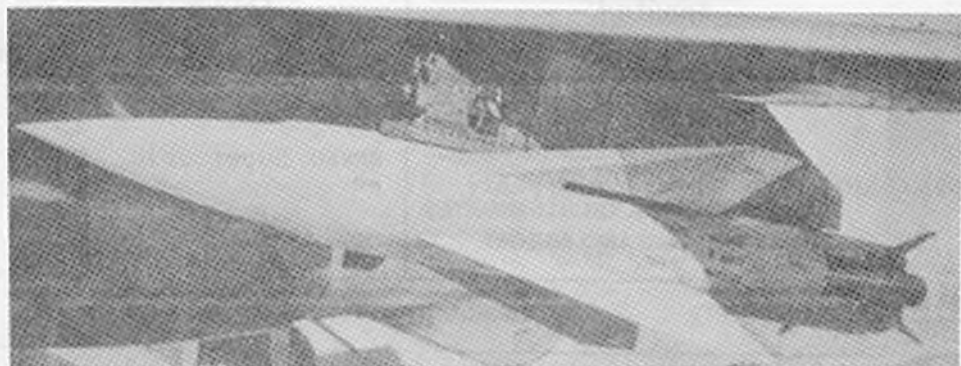
NAME <u>AS.15, AS.15TT</u>		<b>AS.15, AS.15TT</b>		DEVELOPER <u>Aerospatiale</u>					
DESIGNATION _____				COUNTRY <u>France</u>		SERVICE <u>Air Force, Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Helicopters		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____ <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b> LENGTH: 2.2m (7.1') DIAMETER: 18cm (.6') SPAN: 58cm (1.9) WEIGHT: 96kg (211#) OTHER: To 28.4kg (62#) Warhead			<b>BASIS FOR LAUNCH</b> <u>Target data established.</u>		<b>PERFORMANCE</b> RANGE: 15km (9mi) ALTITUDE: Sea skimming with final dive-in. SPEED: Subsonic OTHER:				
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Daylight (AS.15) and all weather anti-ship missile for use by helicopters and slow aircraft.				Societe Nationale Industrielle Aerospatiale			
<b>AIRFRAME</b>		Configuration not yet defined.				Aerospatiale			
<b>PROPULSION</b>		Dual thrust solid propellant rocket motor 54 sec. flight time.				Aerospatiale			
<b>GUIDANCE</b>		AS.15 Radio command AS.15TT Command to radar azimuth, radar altimeter for height and command for dive-in.				Thomson CSF			
<b>FUZING</b>		Contact							
<b>WARHEAD</b>		Variety of high explosive warhead options.							
<b>REMARKS</b>   The AS.15 is the daylight, the AS.15TT is all weather. The latter is used in conjunction with the Thomson CSF Agrion 15 radar. The radar tracks the missile (via beacon in tail) and generates commands to keep the missile azimuth on the target azimuth. Height control is by means of radar altimeter signals to the autopilot. The Agrion tracking radar measures difference in range in order to command a dive final attack for the last 300m. The AS.15 series is a follow-on to the AM-10 LASSO. Four AS.15TT will be carried by the Dauphin helicopters. A coastal defense, and surface ship variants are under consideration.									
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>					
France - Planned Germany - Consideration		PRESENT STATUS:		UNIT COSTS: Unknown					
		IOC: 1984		LAUNCH UNIT:					
				<b>QUANTITIES</b>					
				TOTAL TO DATE: None					

OTHER INFORMATION:

DESCRIPTION	COMMENTS	REMARKS
	<p>No photographs available</p>	
<p>DATE</p> <p>TIME</p> <p>LOCATION</p> <p>OPERATOR</p>	<p>DATE</p> <p>TIME</p> <p>LOCATION</p> <p>OPERATOR</p>	<p>REMARKS</p>

NAME AS.30/AS.30 AL		AS.30/AS.30AL		DEVELOPER Aerospatiale			
DESIGNATION --				COUNTRY France			
				SERVICE Navy, Air Force			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL			
				<input type="checkbox"/> SOFT. INSTALL. <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 3.90m (12.8') DIAMETER: 34cm (1.1') SPAN: 1.0m (3.3') WEIGHT: 520kg (1144#) OTHER:			<b>PERFORMANCE</b> RANGE: 10-12km (6-7.5 miles) ALTITUDE: Depends on launch altitude. SPEED: 1.5+ Mach OTHER:				
<b>BASIS FOR LAUNCH</b> <input checked="" type="checkbox"/> Visual sighting of target, AS.30. <input checked="" type="checkbox"/> Laser illumination of target AS.30 AL. <input checked="" type="checkbox"/> FIRE/TRACK AS.30 <input checked="" type="checkbox"/> FIRE/ILLUMINATE AS.30 AL <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM	Short to medium range air to surface missile developed to provide a limited standoff capability with accurate CEP.		Societe Nationale Industrielle Aero-		spatiale		
AIRFRAME	Cylindrical body with pointed nose. Swept cruciform long-chord wings midbody. Small cruciform tail fins.		Aerospatiale				
PROPULSION	Dual stage solid propellant rocket. Composite for boost and double based cast for sustain.		SNPE				
GUIDANCE	AS.30: Radio command directed by (1) control stick or (2) IR tracker. AS.30 AL: Autopilot initial semi-active laser homing.		Command-Aerospatiale		Laser-Thomson CSF		
FUZING	Impact or delayed impact.						
WARHEAD	AS.30 - 230kg (500#) high explosive. AS.30 AL - 240 - 250kg (525-550#) high explosive.						
REMARKS	<p>The AS.30 weapons were developed to meet a specification calling for a minimum launch range of 10km, a standoff distance of at least 3.0km, and a CPE of 10m or less. The initial radio command guidance continuously transmitted pitch and yaw signals, based upon movement of the control stick, with optical tracking used on IR tracker in the aircraft to develop the control signals. The laser guided version uses a Thomson CSF quiet homing head on the missile and the Atlis laser target designation pad on the aircraft.</p> <p>The AS.30 weapons are compatible with a variety of modern single and multiple seat aircraft including the French Jaguar, Mirage III and Etendard, the British Buccaneer and Canberra, and the German F-104G.</p>						
<b>USERS</b> France Germany India Peru South Africa Switzerland United Kingdom		<b>KEY DATES</b> <b>PRESENT STATUS:</b> IOC: AS.30 - 1973 AS.30 AL - 1981		<b>COSTS</b> <b>UNIT COSTS:</b> <b>LAUNCH UNIT:</b> <b>QUANTITIES</b> <b>TOTAL TO DATE:</b> About 4000 AS.30			

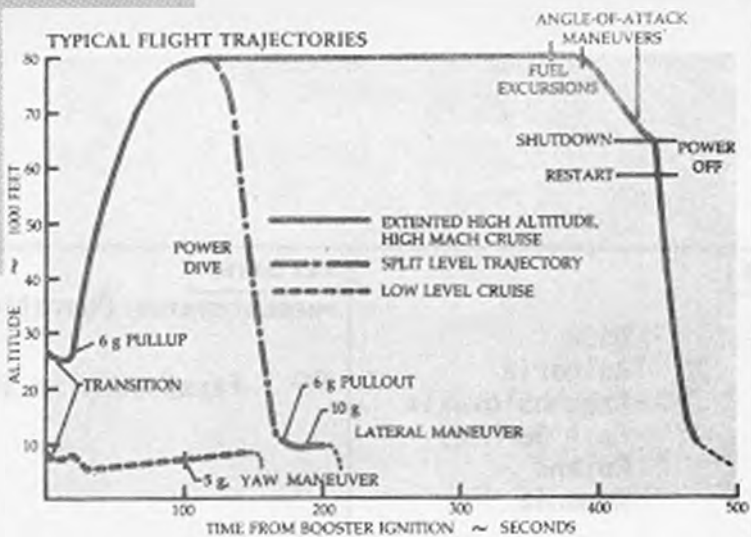
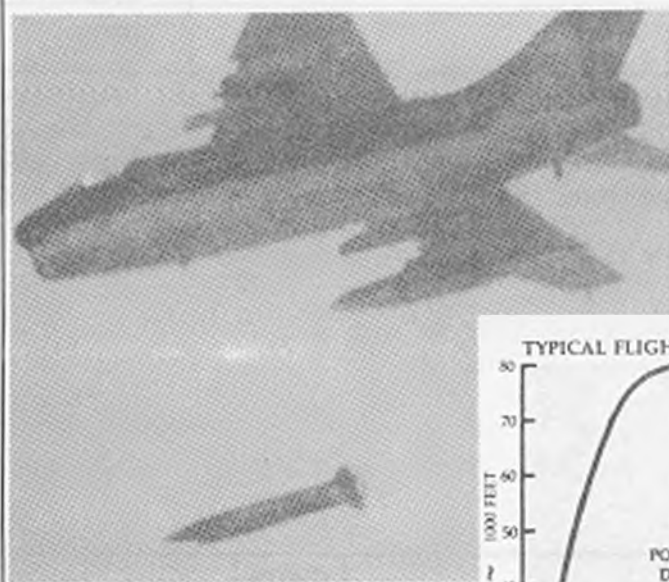
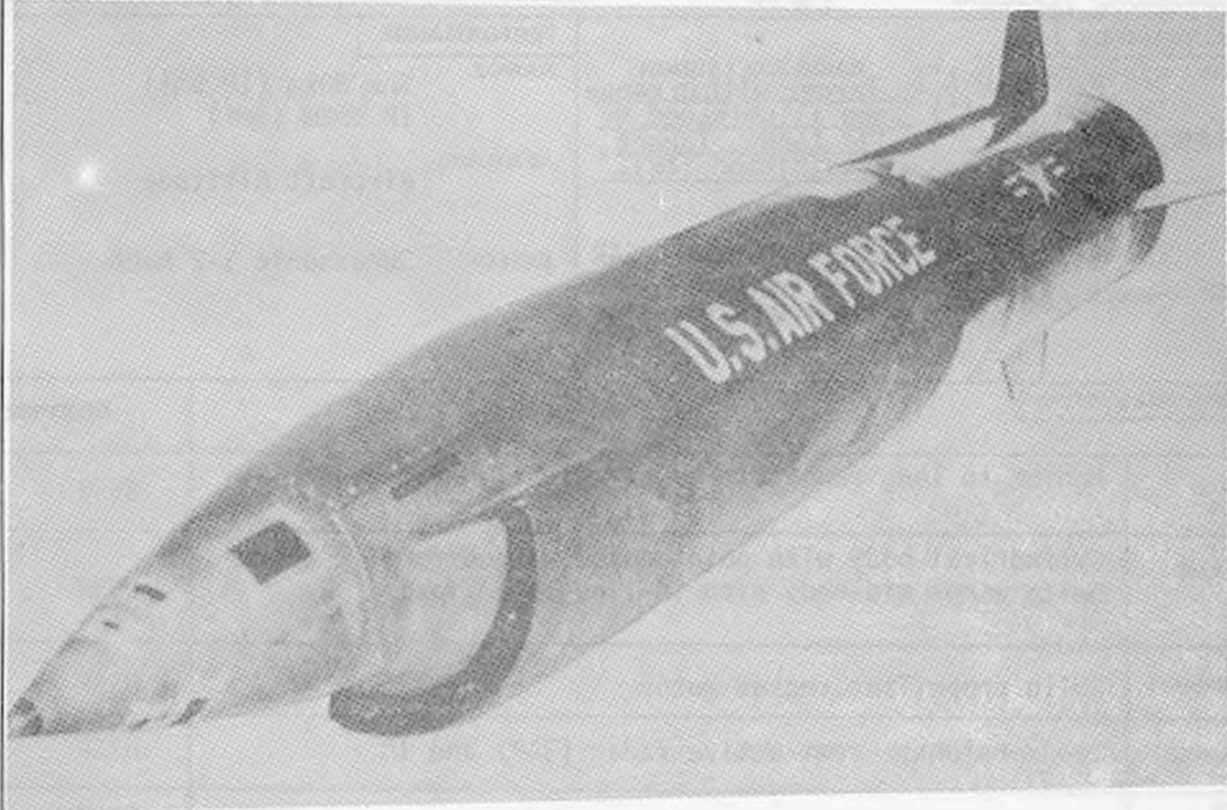
OTHER INFORMATION:



## ASALM

NAME ASALM		DEVELOPER Martin Marietta	
DESIGNATION		COUNTRY USA	
MISSION		SERVICE Air Force	
<input checked="" type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		TRAJECTORY <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	
LAUNCHED FROM <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Other		TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C SOJ <input checked="" type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Penetration	
CHARACTERISTICS		PERFORMANCE	
LENGTH: 4.27m (14.0') DIAMETER: 64cm (2.1') SPAN: 91cm (3.0') WEIGHT: 1090kg (2400#) OTHER:		RANGE: 8000-16000km (500-1000 mi) Estimated ALTITUDE: To 24.4km (80,000') SPEED: Supersonic OTHER:	
BASIS FOR LAUNCH Target position inputted		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM		DESCRIPTION	
CONTRACTOR			
OVERALL SYSTEM	Advanced long range, air launched missile to support bomber penetration.		Martin Marietta
AIRFRAME	Cylindrical body with pointed nose. Ventral inlet forward. Cruciform tail fins aft.		Martin Marietta
PROPULSION	Single combustor, coaxial dump, integral rocket/ramjet with booster.		Marquardt-rocket/ramjet Hercules - booster
GUIDANCE	Inertial guidance with terminal homing. Possibly TERCOM for land targets and active radar for air.		LITTON - inertial
FUZING			
WARHEAD	Optional nuclear or conventional high explosive.		DOE - nuclear
REMARKS			
<p>The purpose of the Advanced Strategic Air Launched Missile (ASALM) propulsion technology validation program has been to demonstrate and validate the integral rocket/ramjet propulsion concept as applied to an air-launched strategic missile. This missile is initially boosted by a solid propellant rocket. After the booster grain burns out, the booster nozzle is ejected and the booster case serves as the solid fuel ramjet combustion chamber.</p> <p>ASALM, although primarily a technology validation program, is envisioned as a possible replacement for SRAM in the late 1980s. It would be launched from bomber, and possibly transport aircraft against air (AWACS aircraft, for instance) and ground targets.</p>			
USERS		KEY DATES	
COSTS		PRESENT STATUS: Study/demonstration	
UNIT COSTS:		IOC: 1985-1986 possible if missile is developed.	
LAUNCH UNIT:			
QUANTITIES			
TOTAL TO DATE: Test vehicles only.			

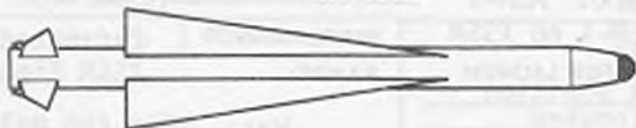
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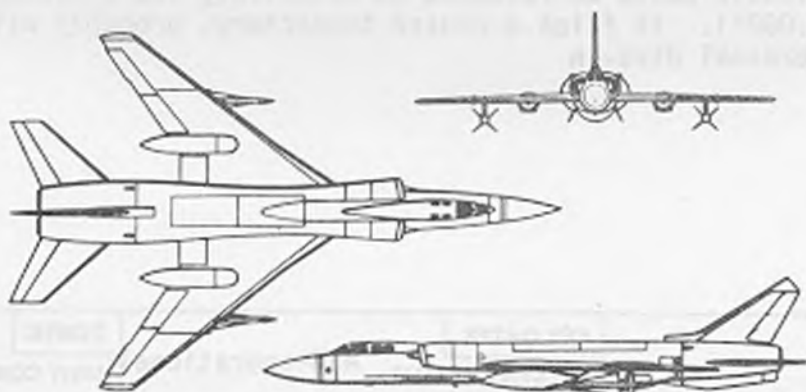
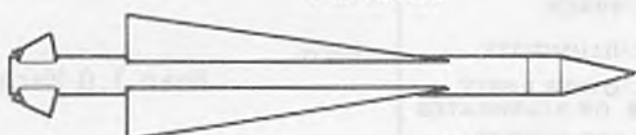
NAME <u>ASH</u>		<b>ASH</b>		DEVELOPER _____	
DESIGNATION <u>AA-5</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL. <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: SAR 5.5m (18.1') IR 5.2m (17.1') DIAMETER: 30cm (1.0') SPAN: 1.30m (4.3') WEIGHT: 200kg (440#) OTHER:			RANGE: SAR 30km (18.5mi) IR 15km (9mi) ALTITUDE: Aircraft Altitude SPEED: Supersonic 1-2 Mach OTHER:		
BASIS FOR LAUNCH <u>Target within range and illuminated by TIR (SAR). Target acquisition (IR).</u>			<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE SAR <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET IR		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Medium to long range air-to-air missile system.		USSR		
AIRFRAME	Cylindrical body with pointed nose. Cruciform long chord delta wings mid-body with in-line tail fins.		USSR		
PROPULSION	Solid propellant rocket motor.		USSR		
GUIDANCE	Two versions: semi-active radar (SAR) and IR.		USSR		
FUZING			USSR		
WARHEAD	High explosive		USSR		
<b>REMARKS</b>					
Standard armament for the Tupolev TU-28 Fiddler interceptor. Four are normally carried; two SAR missiles on the wing outer pylon and two IR missiles on the inner pylons. The SAR version uses the Big Nose radar of the TU-25 for target illumination. The IR version uses cassegrainian optics behind a small nose window.					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USSR Bulgaria Czechoslovakia East Germany Poland Romania		PRESENT STATUS: Operational IOC: First seen in 1961.		UNIT COSTS: LAUNCH UNIT:	
				<b>QUANTITIES</b> TOTAL TO DATE:	
				Thousands	

OTHER INFORMATION:

INFRARED



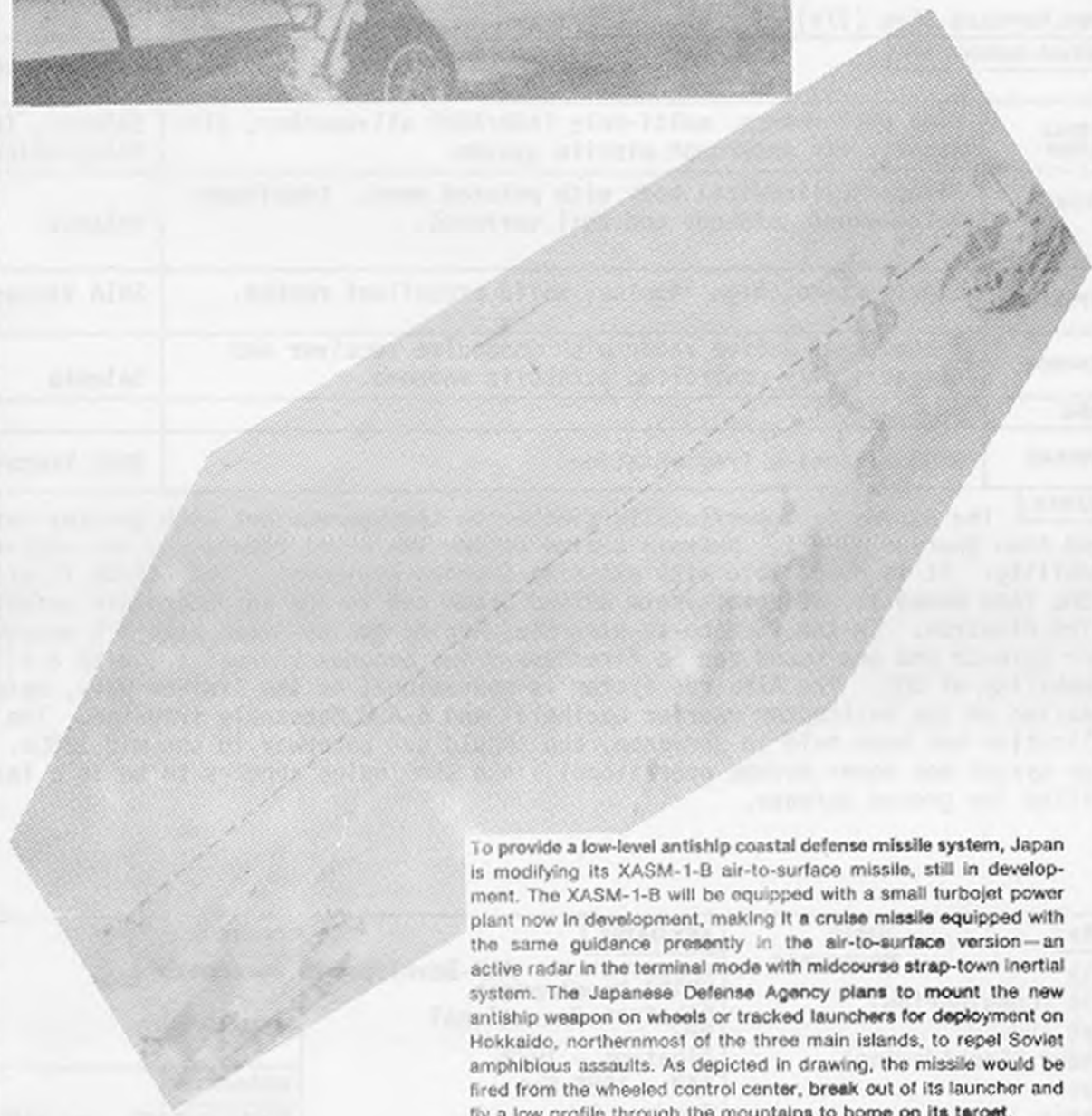
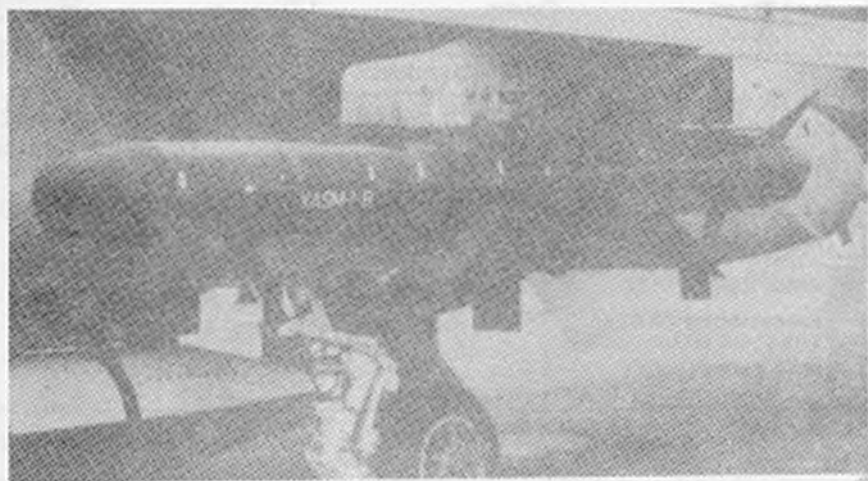
SEMI-ACTIVE



# ASM-1/XSSM

NAME <u>ASM-1/XSSM</u>		<b>ASM-1/XSSM</b>		DEVELOPER <u>Mitsubishi</u>	
DESIGNATION _____				COUNTRY <u>Japan</u>	
				SERVICE <u>Army, Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM		TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE ASM <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE XSSM	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP XSSM <input checked="" type="checkbox"/> A/C ASM-1	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	<input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
CHARACTERISTICS		PERFORMANCE			
Estimated for ASM-1 no XSSM figures available LENGTH: 4.0m (13.1') DIAMETER: 33.5cm (1.1') SPAN: 1.19m (3.9') WEIGHT: 609kg (1340#) OTHER:		Estimated for ASM-1, No XSSM Figures Available RANGE: Max: 80km (50 miles) ALTITUDE: Depends on launch A/C altitude. Believed to be sea skimmer. SPEED: Near 1.0 Mach OTHER:			
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		BASIS FOR LAUNCH <u>Target position</u> <u>data inputed</u>			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Tactical air launched, antiship missile. Ground or ship versions planned-XSSM.		Mitsubishi Heavy Industries		
AIRFRAME	Cylindrical body with blunt nose. Cruciform triangular tail control surfaces and mid-body wings.		Mitsubishi		
PROPULSION	ASM-2 stage solid propellant boost and sustain. XSSM-solid propellant booster, jet engine sustainer.		NM/MHI		
GUIDANCE	Inertial midcourse and active radar terminal homing. Radar altimeter altitude control.		MEC/JAE		
FUZING					
WARHEAD	High explosive armor piercing. 200kg (440#)				
REMARKS	<p>The ASM-1 has been developed to be used with the F-1 close support aircraft and the P3C aircraft as an antiship weapon. A land/ship launched version would use a lightweight turbojet in place of the solid propellant rocket sustainer. This version was originally termed the ASM-1B, and later given the designation XSSM.</p> <p>The missile would be released at relatively low altitudes, probably less than 3000m (10,000'). It flies a cruise trajectory, probably with a sea skimming option and a terminal dive-in</p>				
USERS	KEY DATES		COSTS		
Japan	PRESENT STATUS: ASM-operational SSM - Development IOC: ASM - 1981 SSM - 1983		UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: About 75 - ASM		

OTHER INFORMATION:

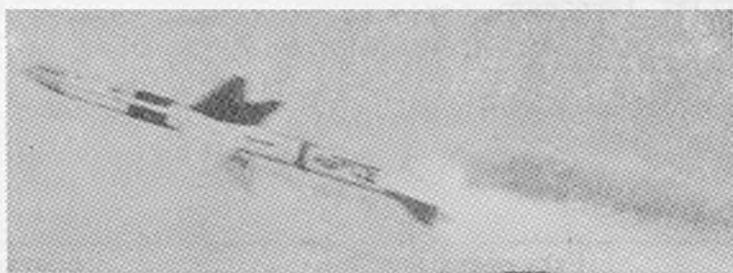
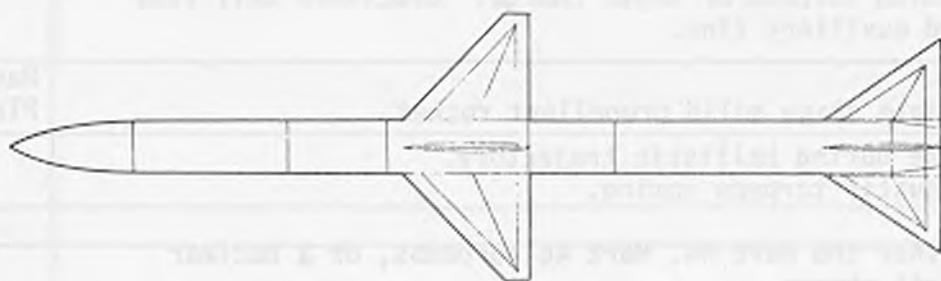


To provide a low-level antiship coastal defense missile system, Japan is modifying its XASM-1-B air-to-surface missile, still in development. The XASM-1-B will be equipped with a small turbojet power plant now in development, making it a cruise missile equipped with the same guidance presently in the air-to-surface version—an active radar in the terminal mode with midcourse strap-town inertial system. The Japanese Defense Agency plans to mount the new antiship weapon on wheels or tracked launchers for deployment on Hokkaido, northernmost of the three main islands, to repel Soviet amphibious assaults. As depicted in drawing, the missile would be fired from the wheeled control center, break out of its launcher and fly a low profile through the mountains to home on its target.

NAME <u>ASPIDE</u>		<b>ASPIDE</b>		DEVELOPER <u>Selenia</u>	
DESIGNATION <u>Spada, Albatros</u>				COUNTRY <u>Italy</u>	
				SERVICE <u>Army, Navy, Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 3.7m (12.1') DIAMETER: 20.3cm (.7') SPAN: AAM 1.0m (3.3') SAM 80cm (2.6') WEIGHT: 220kg (484#) OTHER: Warhead 35kg (77#)			<b>BASIS FOR LAUNCH</b> <u>Missile activated,</u> <u>tracking radar on</u> <u>target.</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
RANGE: AAM: Depends on launch alt and speed. To 32km (20 mi). SAM: 19km (12 mi). ALTITUDE: AAM: 8000m (26,000') above launch. SAM: 6000m + (20,000') SPEED: AAM: To 4.0 Mach SAM: 2.5 Mach OTHER:					
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		High performance, multi-role (AAM/SAM) all-weather, all- aspect, air intercept missile system.		Selenia, Industrie Elettroniche Assoc.	
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose. Cruciform delta wings, midbody and tail surfaces.		Selenia	
<b>PROPULSION</b>		Single stage, high impulse, solid propellant rocket.		SNIA Viscosa	
<b>GUIDANCE</b>		I band semi-active radar with monopulse receiver and hydraulically controlled parabolic antenna.		Selenia	
<b>FUZING</b>		Proximity.			
<b>WARHEAD</b>		High explosive fragmentation.		SNIA Viscosa	
<b>REMARKS</b>					
<p>The Aspide is superficially similar to the Sparrow but with greater range and speed than Sparrow AIM-7E. Selenia claims better low level capability and snap-down capability. It is compatible with existing Sparrow equipment. The Aspide is also used in the land based air defense system called Spada and in the shipboard air defense system called Albatros. In the surface-to-air role, Aspide can be fired within 5 seconds of power turn-on and one round can be fired every two seconds thereafter, with a kill probability of 80%. The Albatros system is operational in the Italian Navy, being installed on the helicopter carrier Garibaldi and 6 ASW Maestrale frigates. The AAM application has been held in abeyance, and should get underway in the mid 1980s. The Spada system may never become operational since the Indigo appears to be in a favored position for ground defense.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
Spain Venezuela Italy Chile (Considering) Egypt Ecuador (Considering) Greece Nigeria Peru S. Africa (Considering)		PRESENT STATUS: AAM-Development SPADA-Development Albatros-Operational 100% Albatros - 1978 AAM - 1985 Est. Spada - ?		UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: ~ 1400	

## ASPIDE

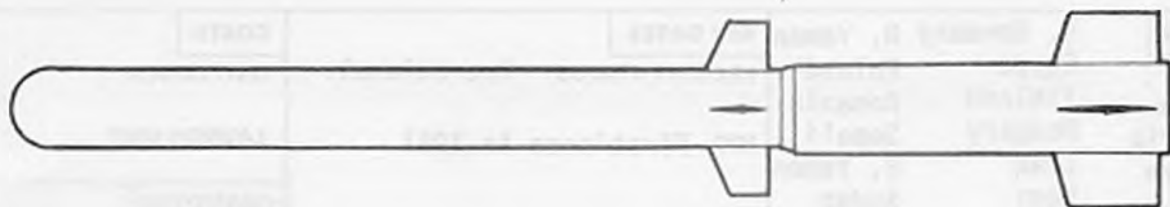
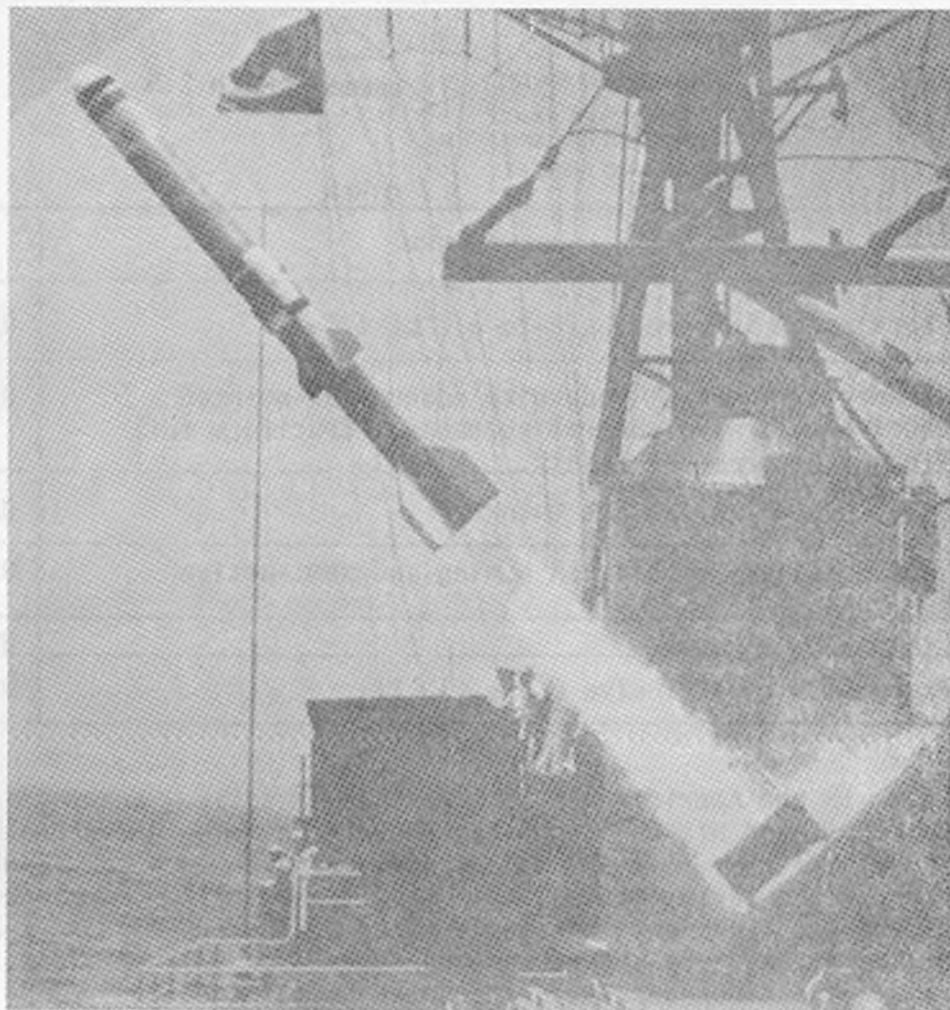
OTHER INFORMATION:



## ASROC

NAME ASROC		DESIGNATION _____		DEVELOPER Honeywell		COUNTRY USA		SERVICE Navy			
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS					
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____			
CHARACTERISTICS				PERFORMANCE							
LENGTH: 4.6m (15.0')		DIAMETER: 32.5cm (1.0')		SPAN: 84.5 cm (2.8')		WEIGHT: MK 44 453kg (1000#) MK 46 285kg		OTHER: (570#)		RANGE: 1.6-9km (1-6 mi)  ALTITUDE: Ballistic for range.  SPEED: Ballistic for range.  OTHER:	
		BASIS FOR LAUNCH Target position <input type="checkbox"/> (predicted) <input type="checkbox"/> input.		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR			
OVERALL SYSTEM		Ship launched anti-submarine weapons system.						Honeywell			
AIRFRAME		Cylindrical body serving as a carrier rocket for a homing torpedo or depth charge. Cruciform tail fins and auxiliary fins.									
PROPULSION		Single stage solid propellant rocket.						Navy Propulsion Plant			
GUIDANCE		None during ballistic trajectory. Acoustic torpedo homing.									
FUZING											
WARHEAD		Either the Mark 44, Mark 46 torpedos, or a nuclear depth charge.									
REMARKS		When fired, the ASROC carries either a torpedo or depth charge to an area in which a hostile submarine has been located. At a predetermined point in the trajectory, the booster is jettisoned and the payload lowered by parachute. After impact, the torpedo's acoustic homing device locks on the target and guides the vehicle along a spiral descent to it. When a depth charge is used, it impacts without the parachute and descends to a predetermined depth before detonating. An atomic version having a large radius of destruction was tested during the 1962 nuclear tests. The ASROC can also be launched from the Terrier launcher.									
USERS		KEY DATES		PRESENT STATUS:		COSTS		UNIT COSTS:			
USA Canada Greece Indonesia Italy Japan Taiwan		Turkey W. Germany		Outdated and superceded		LAUNCH UNIT:					
		IOC: 1961				QUANTITIES		TOTAL TO DATE: Hundreds			

OTHER INFORMATION:



# ATOLL

NAME <u>ATOLL</u>		<b>ATOLL</b>		DEVELOPER _____	
DESIGNATION <u>AA-2, 5B06, K13A</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Air Force</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	

CHARACTERISTICS		BASIS FOR LAUNCH		PERFORMANCE	
LENGTH: IR 2.8m (9.2') SAR 3.3m (10.7') DIAMETER: 12.0cm (0.4')  SPAN: 536m (1.8')  WEIGHT: 70kg (154#)  OTHER: _____		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		RANGE: 6.6km (4mi)  ALTITUDE: Aircraft altitude  SPEED: Mach 2.5  OTHER: _____	

SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Short range infrared, air-to-air missile.	USSR
AIRFRAME	Slender cylindrical body with rounded or pointed cruciform forward control surfaces. Cruciform tail fins with gyroscope insets.	USSR
PROPULSION	Solid propellant rocket motor.	USSR
GUIDANCE	Two versions: passive IR homing and semi-active radar.	USSR
FUZING	Proximity.	USSR
WARHEAD	Fragment high explosive 6.0kg (13.2#)	USSR

**REMARKS**

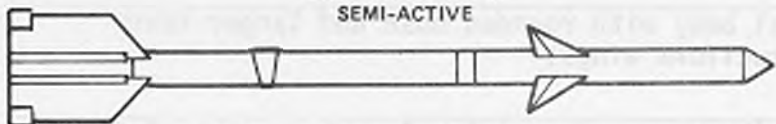
Very similar to the American AIM-9B Sidewinder missile. Known to have been carried by the MIG-17 and MIG-21. An advanced version using RF guidance, probably semiactive homing, has been rumored. Widely deployed on the MIG-21 Fishbed. Since its introduction in the early sixties, this missile has, like Sidewinder, been upgraded considerably. Versions introduced since 1967 are termed AA-2-2 or Advanced Atoll by NATO. Both the early and advance subtypes come in 2 versions, IR with a rounded nose and semiactive radar with a pointed nose. The IR versions are externally cooled.

Hindustan Aeronautics (India) has been producing the Atoll under license since 1970.

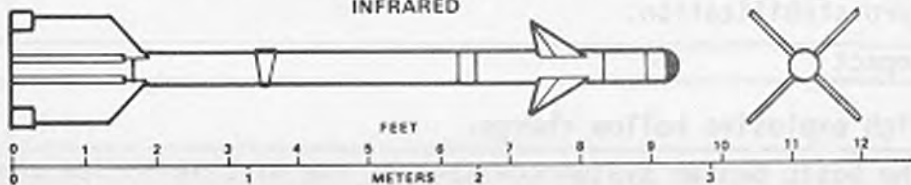
USERS	E. Germany N. Yemen USSR Egypt Poland Afgan. Finland Romania Algeria Hungary Somali Angora Iraq S. Yemen Bang. Laos Sudan Bulgaria Libya Syria China Mozamb. Cuba N. Korea Czech. N. Vietnam	KEY DATES	COSTS
		PRESENT STATUS: Operational.	UNIT COSTS:
		IOC: First seen in 1961	LAUNCH UNIT:
			QUANTITIES
			TOTAL TO DATE:



ADVANCED ATOLL  
SEMI-ACTIVE



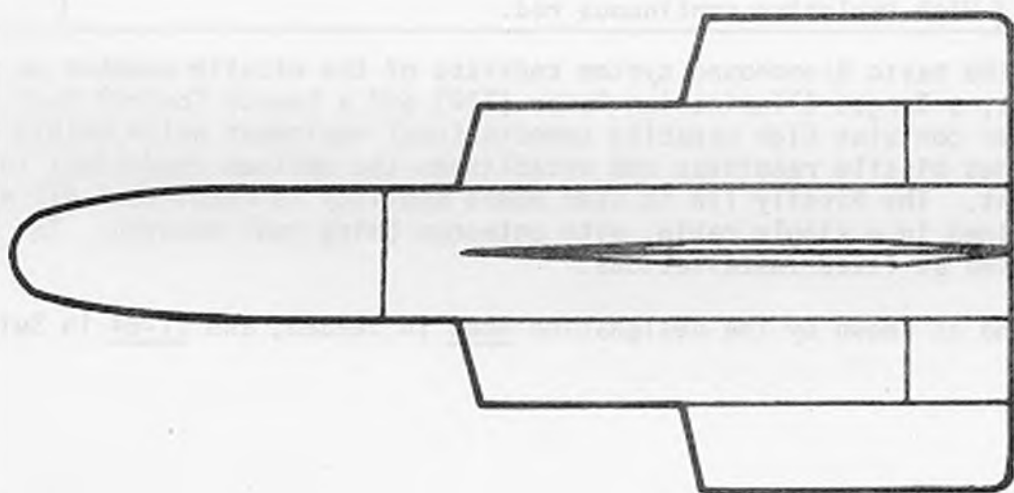
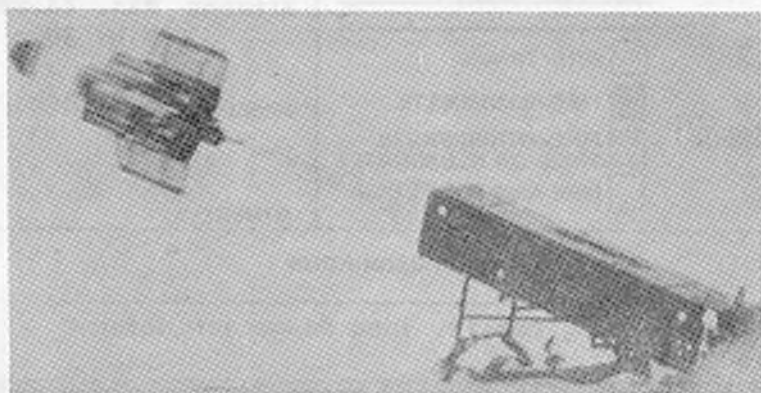
BASIC ATOLL  
INFRARED



# BANTAM

NAME <u>BANTAM</u>		<b>BANTAM</b>		DEVELOPER <u>Bofors</u>							
DESIGNATION <u>RB53</u>				COUNTRY <u>Sweden</u>		SERVICE <u>Army</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 85cm (2.8') DIAMETER: 11cm (0.35') SPAN: 40cm (1.3') WEIGHT: 7.6kg (16.7#) OTHER: Warhead 1.9kg(4.2)				<b>PERFORMANCE</b> RANGE: Max. 2000m (1.25 miles) Min. 250m (0.16 miles) ALTITUDE: Line of sight SPEED: Subsonic OTHER:		<b>BASIS FOR LAUNCH</b> Missile setup on <u>launcher. Sight on</u> <u>target.</u>					
<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET											
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		Short-range, wire guided, surface-to-surface anti-tank missile with air-to-surface capability.				AB Bofors					
<b>AIRFRAME</b>		Cylindrical body with rounded nose and larger rear mounted cruciform wings.				Bofors					
<b>PROPULSION</b>		Two stage (booster and sustainer) rocket motor. 1.2 sec. boost.				Bofors					
<b>GUIDANCE</b>		Wire command to line-of-sight with visual sight and gyro stabilization.				Bofors					
<b>FUZING</b>		Impact									
<b>WARHEAD</b>		High explosive hollow charge.									
<b>REMARKS</b> The basic Bantam system consists of the missile in its combined transport/launcher container, a control unit and interconnecting cable. Time for setup is less than one minute. The container is positioned on the ground pointing in the direction of interest, and connected to the control unit which would be positioned 20-120m away. When the missile is launched from the container, the folding wings open. The operator keeps his sight on target and moves the missile onto the target LOS by means of joystick controls. Tail mounted tracer flares provide sighting visibility.											
Three different launch and applications have been proven: 1. As an individual infantry soldier-weapon (as described above). 2. Launch from a jeep type vehicle such as the Puch-Haplinger or Land Rover - typically six launch units. 3. Aircraft launch from fixed wing or helicopter aircraft.											
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>							
Sweden Switzerland		PRESENT STATUS: Operational		UNIT COSTS:							
		IOC: 1963 Swedish Army 1967 Swiss Army		LAUNCH UNIT:							
				<b>QUANTITIES</b>							
				TOTAL TO DATE:		Over 30,000					

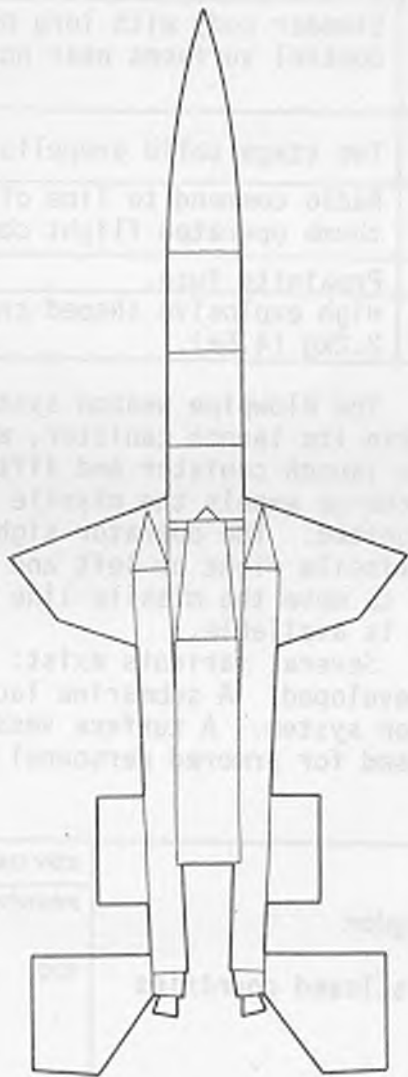
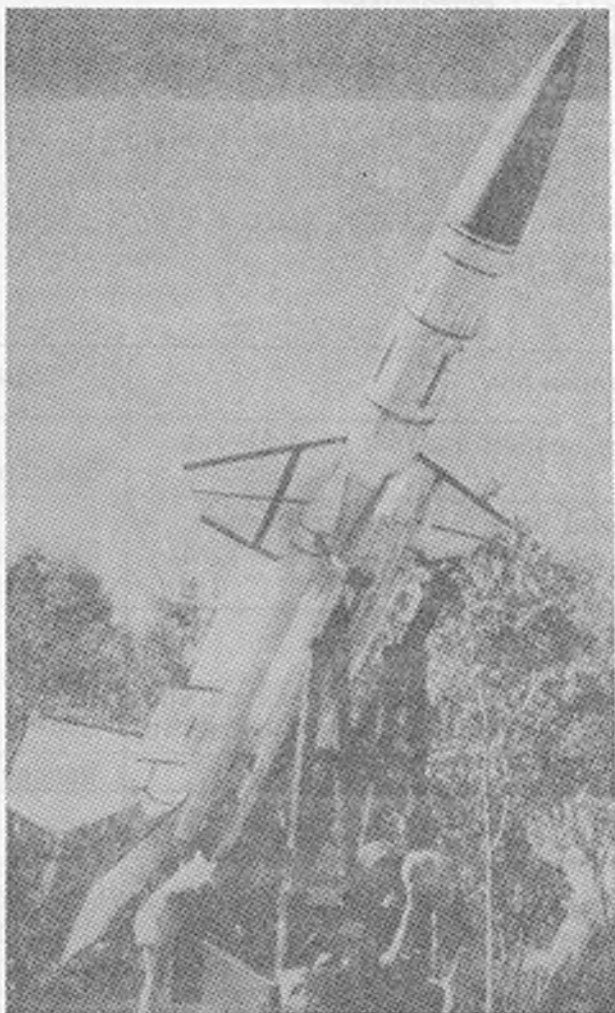
OTHER INFORMATION:



NAME <u>BLOODHOUND</u>		<b>BLOODHOUND</b>		DEVELOPER <u>British Aerospace</u>	
DESIGNATION <u>Mark 2</u>				COUNTRY <u>Great Britain</u>	
				SERVICE <u>Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 7.77m (25.5') DIAMETER: 55cm (1.8') SPAN: 2.83m (9.3') WEIGHT: 2300kg (5060#) OTHER:			RANGE: 200km (125 miles) ALTITUDE: Max. 23,000m (75,000') Min. 300m (1,000') SPEED: 2.0 Mach OTHER:		
			<b>BASIS FOR LAUNCH</b> <u>Missile readied.</u> <u>Target illuminated</u> <u>by TIR radar.</u>		
			<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Second generation, mobile, long range air defense missile system.		British Aerospace, Dynamics Group		
AIRFRAME	Cylindrical body with pointed nose. Pivoted wings midbody in line with fixed horizontal tail surfaces. Two Ramjet motors near tail. Four strap-on rocket boosters, each with fin.		British Aerospace, Dynamics Group		
PROPULSION	4 solid propellant rocket boosters plus 2 Odin ramjet sustainers.		Rocket - Bristol Ramjet - Rolls Royce		
GUIDANCE	Semiactive CW radar. Target illuminated by Firelight or Scorpion radars.				
FUZING	Proximity		EMI		
WARHEAD	High explosive continuous rod.				
<b>REMARKS</b>					
<p>The basic Bloodhound system consists of the missile mounted on portable launchers, a Target Illumination Radar (TIR) and a Launch Control Post (LCP). The latter contains high capacity computational equipment which maintains and establishes missile readiness and establishes the optimum conditions for target engagement. The Firefly TIR is used where mobility is required. All equipment is contained in a single cabin, with antennas being roof mounted. The Scorpion TIR is used at fixed installations.</p> <p>Bloodhound is known by the designation <u>Rb68</u> in Sweden, and <u>B1-84</u> in Switzerland.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
United Kingdom Australia Singapore Sweden Switzerland		PRESENT STATUS: Operational IOC: 1964		UNIT COSTS: LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: About 600	

## BLOODHOUND

OTHER INFORMATION:

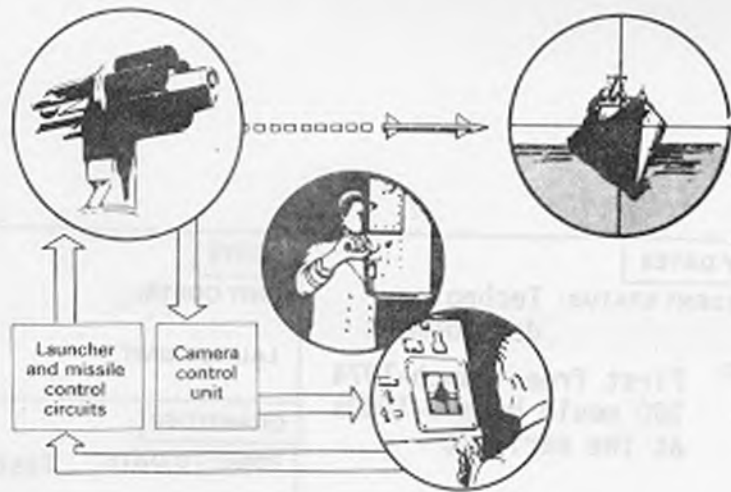
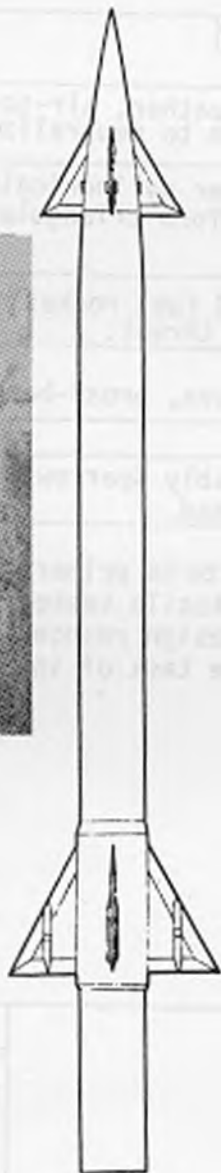


# BLOWPIPE

NAME <u>BLOWPIPE</u>		<b>BLOWPIPE</b>		DEVELOPER <u>Short Bros.</u>	
DESIGNATION <u>SLAM</u>				COUNTRY <u>United Kingdom</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
CHARACTERISTICS		L-D for cannistered missile		PERFORMANCE	
LENGTH: 1.39m (4.6')		BASIS FOR LAUNCH Sight on target.		RANGE: 6.5km (4 miles)	
DIAMETER: 19.6cm (.65')				ALTITUDE: Line of sight	
SPAN: 26.7cm (.9')		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		SPEED: 1.5 Mach	
WEIGHT: Miss. 12.7kg (28#) Syst. Wt. 20.3kg (44.5#) OTHER: Add 1.4kg (3#) IFF				OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Manportable unit air defense weapon against low flying aircraft.		Short Brothers		
AIRFRAME	Slender body with long pointed nose. Delta cruciform control surfaces near nose. Delta cruciform tail fins.		Short Brothers		
PROPULSION	Two stage solid prepellant rocket motor.		IMI - 1st stage Royal Ord Fact-2nd		
GUIDANCE	Radio command to line of sight with optical tracking and thumb operated flight control - after automatic gathering.		Short Brothers		
FUZING	Proximity fuze.		Marconi		
WARHEAD	High explosive shaped charge. 2.2kg (4.5#).				
REMARKS					
<p>The Blowpipe weapon system consists of 2 main components: the missile contained within its launch canister, and the aiming unit. The operator clips the aiming unit to the launch canister and lifts the complete unit to his shoulder. At launch, an explosive charge expels the missile from the container. At a safe distance, the sustainer motor is ignited. The operator sights the tail flares through his monocular sight, and moves the missile right or left and up or down by means of the thumb operated flight controller to move the missile line of sight coincident with the target LOS. An IFF attachment is available.</p> <p>Several variants exist: A TV vidicon unit providing semi-automatic guidance has been developed. A submarine launched version, SLAM, uses 6 Blowpipes centered around a TV vidicon system. A surface vessel system uses 2-10 launchers. Blowpipe has also been proposed for armored personnel carrier or for a towed trailer.</p>					
USERS		KEY DATES		COSTS	
United Kingdom Canada Other undisclosed countries		PRESENT STATUS: Operations		UNIT COSTS:	
		IOC: 1975		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: About 6500	

# BLOWPIPE

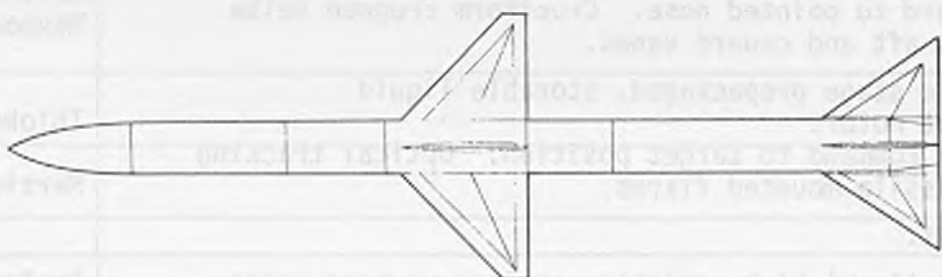
OTHER INFORMATION:



NAME <u>BRAZO</u>		<b>BRAZO</b>		DEVELOPER <u>Hughes</u>	
DESIGNATION <u>PAVE ARM-USAF</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Navy/Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <u>Fighter</u> <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>		<b>BASIS FOR LAUNCH</b>		<b>TARGETS</b>	
LENGTH: 3.7m (12.0') DIAMETER: 20cm (0.7') SPAN: 1.0m (3.3') WEIGHT: 227kg (500#) OTHER:		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
				<b>PERFORMANCE</b>	
				Estimates - no data available RANGE: 48-96km (30-60 mi) depending upon launch altitude ALTITUDE: All aircraft altitudes SPEED: 4.0 Mach OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
<b>OVERALL SYSTEM</b>		All weather, air-to-air, anti-radiation missile system to neutralize enemy emitters.		Hughes	
<b>AIRFRAME</b>		Slender cylindrical body w/pointed nose. Cruciform triangular wings mid-body and tail fins.		Hughes	
<b>PROPULSION</b>		Solid fuel rocket motor. Mark-38. Dual thrust.		Hercules/Aerojet	
<b>GUIDANCE</b>		Passive, broad-band, RF homing.		US Navy Electronic Ctr	
<b>FUZING</b>					
<b>WARHEAD</b>		Probably Sparrow 40kg (88#) continuous rod warhead.			
<b>REMARKS</b>					
BRAZO is primarily a technology program aimed at the development of anti-radiation missile seeker heads suitable for air-to-air combat. The USN Electronic Center has the design responsibility for the anti-radiation homing head; Hughes has been assigned the task of integrating the seeker with existing Sparrow missiles.					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA		PRESENT STATUS: Technology development IOC: First free launch-1974 IOC would be mid-1980s at the earliest		UNIT COSTS: LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: Test Vehicles only	

**BRAZO**

OTHER INFORMATION:

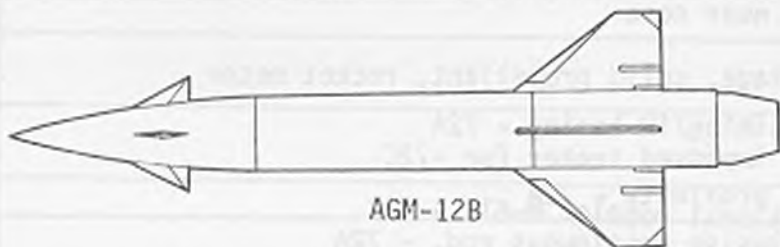


# BULLPUP

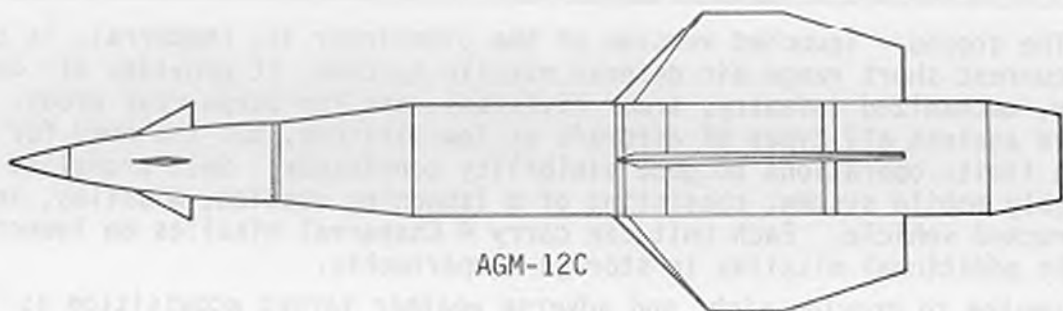
NAME <u>BULLPUP</u>		<b>BULLPUP</b>		DEVELOPER <u>Martin-Marietta</u>	
DESIGNATION <u>AGM-12 B/C</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Navy/Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input checked="" type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Tactical</u>	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 4.1m (13.6') DIAMETER: 46cm (1.5') SPAN: 1.2m (4.0') WEIGHT: 810kg (1785 #) OTHER: W/H to 450kg (1K #)			Data for 12C BASIS FOR LAUNCH <u>Pilot sights target within range.</u> RANGE: 16km (10 mi) ALTITUDE: Aircraft altitude SPEED: 2.0 Mach OTHER:		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Tactical air-to-surface missile system with alternate nuclear capability.		Martin Marietta	
<b>AIRFRAME</b>		Cylindrical body with taper aft and double taper forward to pointed nose. Cruciform cropped delta wings aft and canard vanes.		Martin Marietta Maxson-2nd source	
<b>PROPULSION</b>		Single stage prepackaged, storable liquid rocket motor.		Thiokol	
<b>GUIDANCE</b>		Radio command to target position. Optical tracking of missile mounted flares.		Martin	
<b>FUZING</b>		Impact.			
<b>WARHEAD</b>		Conventional high explosive; nuclear warhead option.		Nuclear-AEC	
<b>REMARKS</b>					
<p>The Bullpup series missile was designed to attack land or sea tactical targets. Development was initiated by the USN and later supported by the USAF.</p> <p>Bullpup is launched on appropriate line-of-sight from the aircraft to the target. It is visually picked up by the pilot and tracked by means of two tail mounted high intensity flares. The pilot transmits steering signals by radio command.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA Australia Denmark Norway-European License Turkey UK		PRESENT STATUS:  IOC: 1959-12B 1965-12C  Final production-1969		UNIT COSTS:  LAUNCH UNIT:  <b>QUANTITIES</b> TOTAL TO DATE:	

## BULLPUP

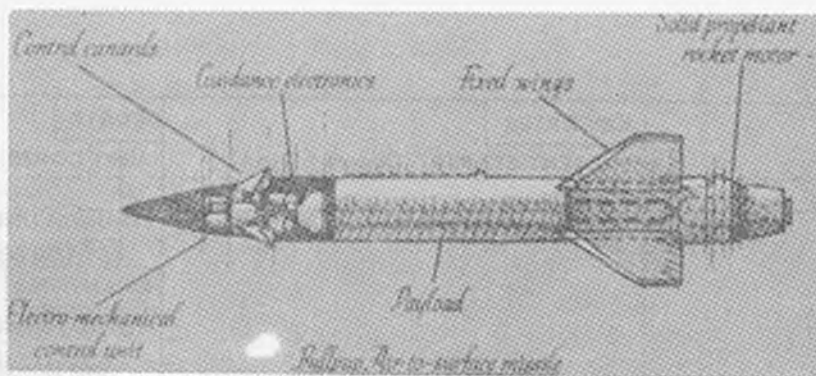
OTHER INFORMATION:



AGM-12B



AGM-12C

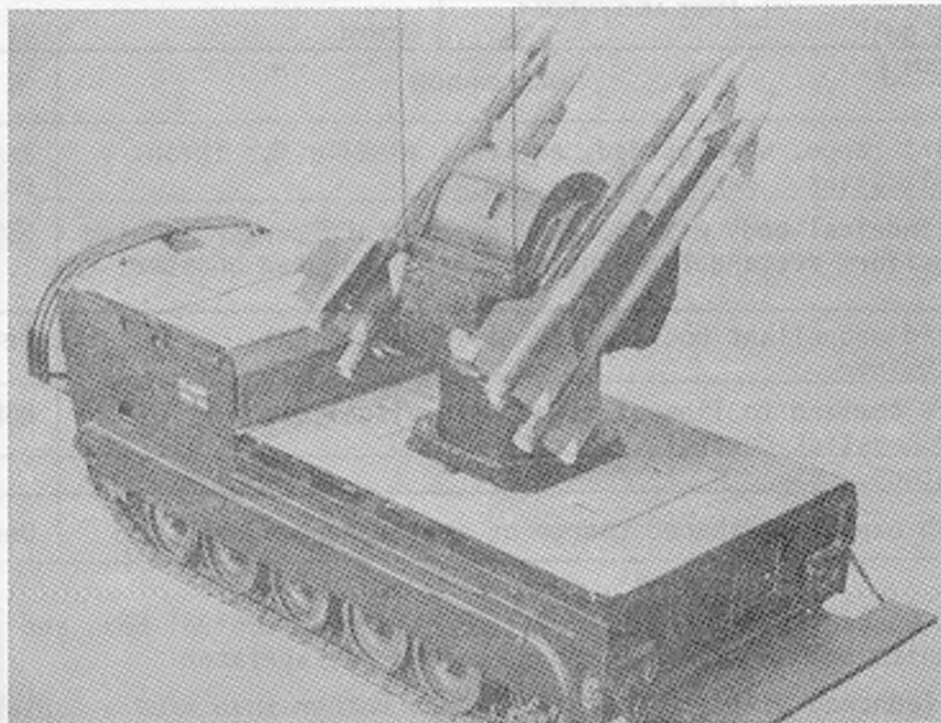


# CHAPARRAL IMP. CHAPARRAL

NAME: <u>CHAPARRAL/IMP. CHAPARRAL</u>		DEVELOPER: <u>Ford</u>	
DESIGNATION: <u>MIM-72A/MIM-72C/F</u>		COUNTRY: <u>USA</u>	
		SERVICE: <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 2.91m (9.5') DIAMETER: 12.7cm (0.42') SPAN: 64cm (2.1')-72A 70.1 cm(2.3')-72C WEIGHT: 84.1kg (185#)-72A 86.4kg (190#)-72C OTHER:		RANGE: 18km (11 miles) ALTITUDE: Approximately 3000m (10,000') limit. SPEED: Supersonic OTHER:	
		BASIS FOR LAUNCH <u>Optical sighting of target</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Ground-launched version of the Sidewinder IC used to provide low altitude air defense.		Ford Aerospace
AIRFRAME	Slender cylindrical body with large trapezoidal cruciform tail fins and four delta-shaped control surfaces near nose		Ford/GE/Raytheon
PROPULSION	Single stage, solid propellant, rocket motor		Hercules/Bermite/Atlantic
GUIDANCE	Optical aiming/IR homing - 72A AN/DAW-1 improved seeker for -72C		Ford/Raytheon
FUZING	IR or HF proximity - 72A RF directional doppler M-817 - 72C		USA Diamond Lab
WARHEAD	High explosive continuous rod. - 72A High explosive blast fragmentation (M-250) -72C		Picatinny Arsenal
REMARKS			
<p>The ground - launched version of the Sidewinder IC, Chaparral, is the U.S. Army's current short range air defense missile systems; it provides air defense for infantry, mechanized infantry, armor divisions, and for Corps rear areas. It is effective against all types of aircraft at low altitude, but the need for visual sighting limits operations to good visibility conditions. Self propelled Chaparral is a highly mobile system, consisting of a launching station, missiles, and an M-730 tracked vehicle. Each unit can carry 4 Chaparral missiles on launch rails, and eight additional missiles in storage compartments.</p> <p>A FLIR device to provide night and adverse weather target acquisition is in production. A rosette IR scanner is being considered to improve acquisition.</p>			
USERS	KEY DATES	COSTS	
United States Israel Morocco Taiwan Tunisia	PRESENT STATUS: Operational  IOC: 1977	UNIT COSTS: \$45,000  LAUNCH UNIT: \$600,000 Estimated	
		QUANTITIES	
		TOTAL TO DATE: Over 5,000 thru 1980	

## CHAPARRAL IMP. CHAPARRAL

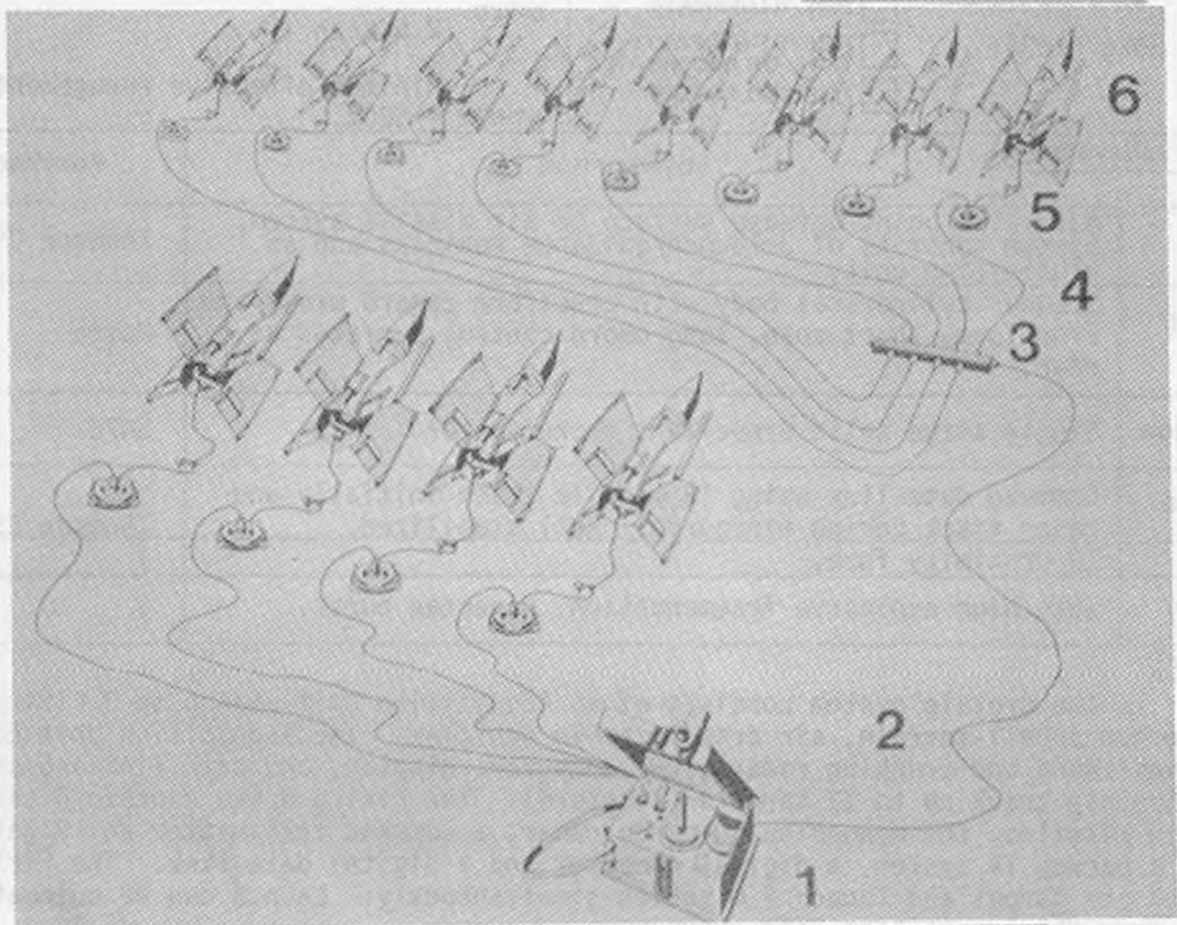
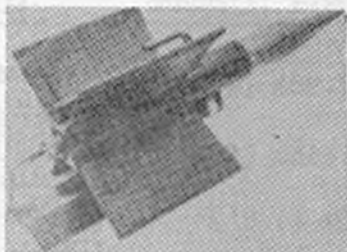
OTHER INFORMATION:



# COBRA

NAME <u>COBRA 2000</u>		DESIGNATION <u>80 810</u>		DEVELOPER <u>MBB</u>		COUNTRY <u>W. Germany</u>		SERVICE <u>Army</u>					
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS							
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CHARACTERISTICS				PERFORMANCE									
LENGTH: 95.5cm (3.1')				DIAMETER: 10cm (0.3')				RANGE: Max: 2000m (1.25mi) Min: 400m (0.3mi)		ALTITUDE: Line of sight		SPEED: 85m/sec (289 ft /sec)	
SPAN: 48cm (1.6')				WEIGHT: 10.3kg (23#)				OTHER: Warhead 2.5kg (5.5#)		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Short range, wire guided, antitank missile for infantry application. Manportable.						Messerschmitt-Bolkow-Blohm (MBB)					
AIRFRAME		Cylindrical body with pointed nose. Large, rear mounted cruciform rectangular wings. Ventral mounted booster.						MBB					
PROPULSION		Solid propellant booster and solid propellant sustainer.						Oerlikon-Buhle					
GUIDANCE		Wire command to line-of-sight with visual sight and joystick control.						MBB					
FUZING		Contact.											
WARHEAD		High explosive shaped charge or antitank shrapnel.						Oerlikon-Buhle					
REMARKS													
<p>The basic Cobra system consists of the missile, a control box, and interconnect wiring. The units are manportable and need only one operator.</p> <p>Cobra is launched directly from the ground rather than from a container, the downward-deflected motor nozzle "jumping" the missile clear of obstructions after launch. A plate is laid on the surface beneath the motor exhaust to prevent dust being produced on ignition. Up to eight missiles can be launched by one operator up to 120m away.</p> <p>After launch, the operator keeps his sight on target, gathers the missile into the sight, and moves the missile line of sight onto the target by means of a joystick control.</p> <p>A launch frame has been developed to mount on infantry vehicles to permit a from-the-vehicle launch.</p>													
USERS			KEY DATES			COSTS							
Spain Turkey - License W. Germany Argentina Brazil - License Denmark Greece Israel Italy - License Pakistan - License			PRESENT STATUS: Operational.  IOC: 1960 Production halted 1980			UNIT COSTS: <\$1,000  LAUNCH UNIT:							
						QUANTITIES							
						TOTAL TO DATE:			>180,000				

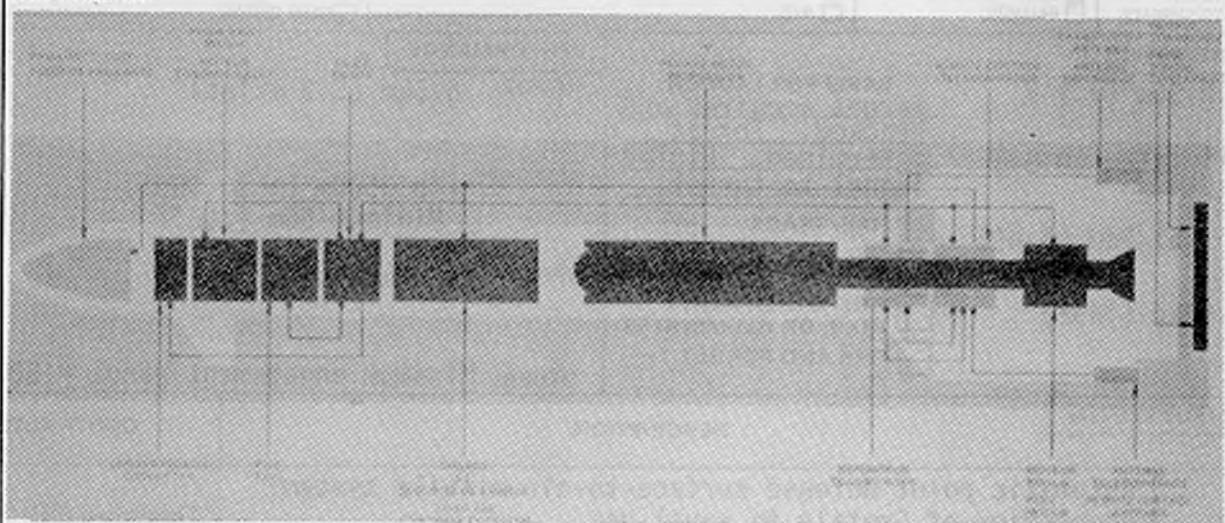
OTHER INFORMATION:



# CROTALE

NAME <u>CROTALE</u>		DEVELOPER <u>Thomson/Matra</u>	
DESIGNATION <u>R440</u>		COUNTRY <u>France</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER
		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE	
LENGTH: 2.90m (9.5') DIAMETER: 15cm (0.5') SPAN: 54cm (1.8') WEIGHT: 83kg (183#) OTHER:		RANGE: Crotale Cactus 8.5km (5.3 miles) Shahine 11km (6.9 miles) ALTITUDE: 3,000m (~ 10,000 feet) SPEED: 2.5 Mach Minimum effective engagement range OTHER: = 500m.	
		BASIS FOR LAUNCH <u>Acquisition locates and tracks target, determines threat, signals firing unit.</u> <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Automatic point defense surface to air missile system. System consists of 3 launch/guidance vehicles and an acquisition unit.		Thomson CSF
AIRFRAME	Slender cylindrical body with cruciform canard wings and cruciform, short span, long chord control surfaces at rear.		Matra
PROPULSION	Single stage solid prepellant rocket motor.		SNPE
GUIDANCE	Command data link using IR missile track initially and radar track during midcourse. Roll stabilized.		Thomson CSF
FUZING	IR proximity fuze.		?
WARHEAD	15kg high explosive fragmentation, directed burst.		?
REMARKS			
<p>The Crotale system consists of an Acquisition Unit and up to 3 Firing Units, each mounted on all-terrain, air transportable vehicles. The Acquisition Unit contains the surveillance and tracking radars, IFF computer, display, and data link and can simultaneously track up to 12 targets (1 meter<sup>2</sup>). The Firing Units contain 4 canister-contained missiles, the monopulse guidance radar, a command transmitter an IR gathering system, a backup TV system, a digital computer and a digital data link. The Firing Units can track one target and launch 2 missiles simultaneously. Launch can be automatic via signals from the Acquisition Unit.</p> <p>The Cactus is a Crotale variation produced under license by South Africa. The Shahine is a variation produced especially for Saudi Arabia. It differs principally in that 6 Crotale missiles each are mounted on up to 7, tracked Firing Units. (See also Crotale-Naval).</p>			
USERS	KEY DATES	COSTS	
France Abu Dhabi Egypt Libya Kuwait Pakistan Saudi Arabia South Africa Spain	PRESENT STATUS: Operational  IOC: 1972	UNIT COSTS: Estimated at \$30-50,000 LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: Over 2,700 missiles by France and South Africa.	

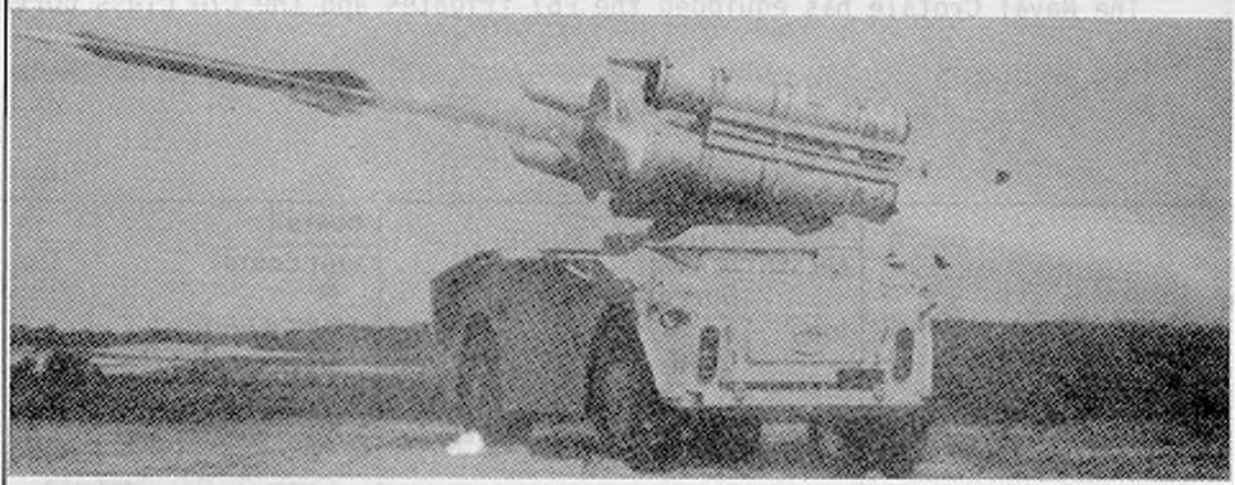
OTHER INFORMATION:



Unité de tir CROTALE.  
CROTALE firing unit.



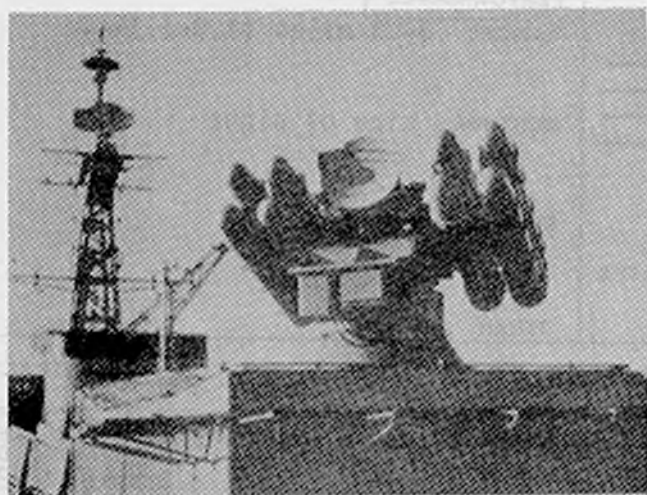
Unité d'acquisition CROTALE.  
CROTALE acquisition unit.  
Tir d'un missile CROTALE.  
CROTALE missile firing.



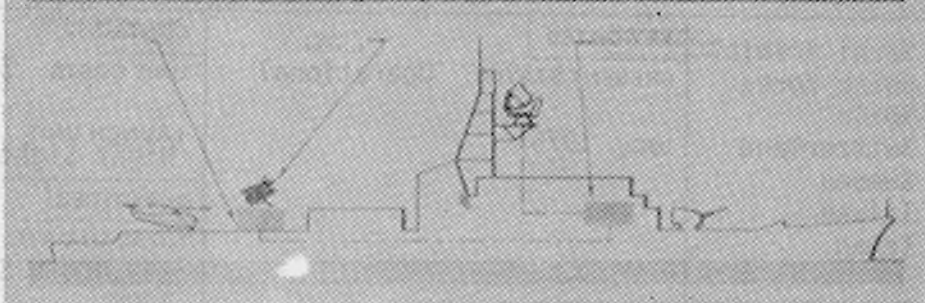
NAME <u>CROTALE-NAVAL</u>		<b>CROTALE-NAVAL</b>		DEVELOPER <u>Thomson/Matra</u>			
DESIGNATION <u>R440</u>				COUNTRY <u>France</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL			
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 2.90m (9.5') DIAMETER: 15cm (0.5') SPAN: 51.5cm (1.6') WEIGHT: 83kg (183#) OTHER:		<b>BASIS FOR LAUNCH</b> <u>Target acquired and tracked. Threat determined. Firing signal to turret.</u> <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: 8.5km (5.3 miles) ALTITUDE: To 3500m (~ 10,000') Minimum 50m (160') SPEED: 2.5 Mach OTHER: Minimum engagement range = 500m			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>		Automatic point defense surface-to-air missile system. Adaptation of Crotale to naval use.			Thomson-CSF		
<b>AIRFRAME</b>		Slender cylindrical body with cruciform canard wings and cruciform, short-span, long-chord control surfaces aft.			Matra		
<b>PROPULSION</b>		Single stage solid propellant rocket motor.			SNPE		
<b>GUIDANCE</b>		Command data link using IR missile track initially and radar track during midcourse.			Thomson-CSF		
<b>FUZING</b>		IR proximity fuze.					
<b>WARHEAD</b>		15kg (33#) high explosive fragmentation w/ directed burst.					
<b>REMARKS</b>							
<p>The Naval Crotale weapon system consists of the same equipment as for the Crotale, but arranged somewhat differently. A turret mounted topside contains those elements of the firing units, except that 8 rather than 4 missiles are mounted in containers on ramps. The elements of the Acquisition unit are mounted below decks in a Crotale control room, except for antennas. Control linkage with the ship's operations center is established to check missile readiness and transmit fire commands. The missiles can be fired singly or in salvos of 2.</p> <p>The Naval Crotale has equipped the F67 frigates and the C70 class Corvettes.</p>							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
France		PRESENT STATUS: Operational		UNIT COSTS: ?			
		IOC: 1980		LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE: Over 2,700 Crotale			

## CROTALE-NAVAL

OTHER INFORMATION:



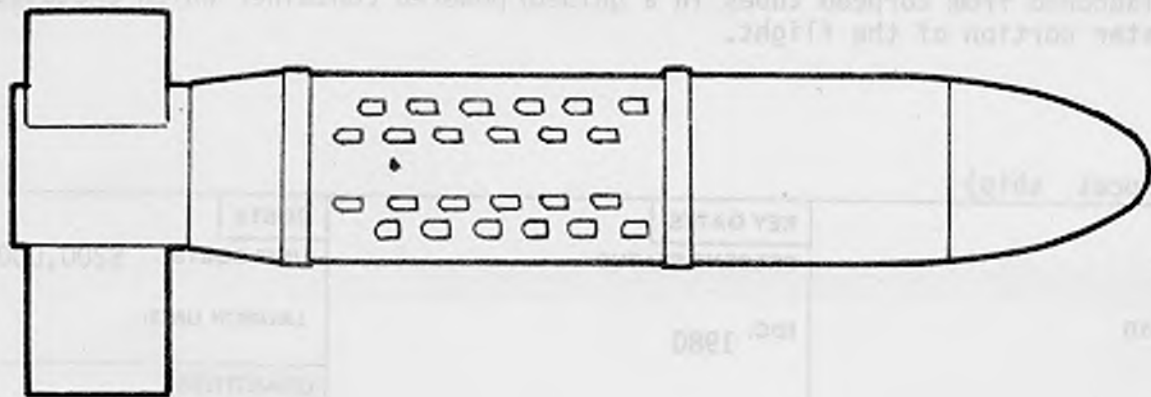
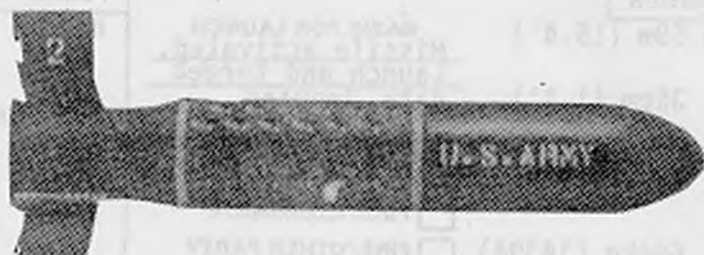
Typical Installation on Board a Ship : Corvette C70 GEORGES LEYGUES



# DRAGON

NAME <b>DRAGON</b>		<b>DRAGON</b>		DEVELOPER <b>McDonnell Douglas</b>	
DESIGNATION <b>M-47, FGM/FTM-77A</b>				COUNTRY <b>USA</b>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 1.12m (3.5')  DIAMETER: .25m (.8')  SPAN: .34m (1.1')  WEIGHT: 12.25kg (27#) 2.5kg (5.4#) OTHER: Warhead		RANGE: .6-.7 miles (1.0-1.1km)  ALTITUDE: Line of sight  SPEED: Subsonic  OTHER:		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL  <input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
BASIS FOR LAUNCH Sight on target.		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Shoulder launched, wire guided, antitank assault weapon. Consists of missile, tracker and launcher.		McDonnell Douglas Raytheon (became prime in 1976)		
AIRFRAME	Cylindrical body with larger diameter rear section. Three curved foldout fins at rear.		McDonnell Douglas/Raytheon		
PROPULSION	Ejected from launcher by gas generator. Sixty small solid sustainers fire on demand.		Raytheon Hercules		
GUIDANCE	Wire guided, command to line of sight, IR tracker establishes missile position.		Texas Instruments Kollman		
FUZING	Impact		K.C.I.		
WARHEAD	Shaped armor-piercing high explosive charge, designated M224.		Firestone		
REMARKS	The Army considers Dragon powerful enough to destroy any known enemy armor or field fortification and describe it as: 1. Superior in range, accuracy and lethality to the 90mm recoilless rifle it is replacing. The missile is prepackaged in a smooth bore fiberglass launcher. The tracker is attached. The gunner sights his target and fires. He holds his sight on target while the IR tracker tracks the missile. The tracker provides command signals zeroing the missile line-of-sight to the target line-of-sight through the unwinding wire. Firing of the multiple rocket motors provide course correction. The launcher is discarded, the tracker is reusable. McDonnell Douglas has developed an improved range version which has not yet been approved for production.				
USERS	Saudi Arabia USA South Korea Australia Spain Iran Switzerland Israel Sweden Jordan Taiwan Morocco Yemen Netherlands		KEY DATES PRESENT STATUS: Operational  IOC: 1975		COSTS UNIT COSTS: \$4500 - FY 1978  LAUNCH UNIT: Night Sight \$30,000  QUANTITIES TOTAL TO DATE: 140,000 U.S. and export by 1980.

OTHER INFORMATION:





# EXOCET (AIR)

NAME <u>Exocet (AIR)</u>	<b>EXOCET (AIR)</b>	DEVELOPER <u>Aerospatiale</u>
DESIGNATION <u>AM39/SM39</u>		COUNTRY <u>France</u>
		SERVICE <u>Navy/Air Force</u>

MISSION	TRAJECTORY	LAUNCHED FROM	MOBILE LAUNCHER	TARGETS	SOFT INSTALL
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	<input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER

<b>CHARACTERISTICS</b> LENGTH: 4.69m (15.4') DIAMETER: 35cm (1.1') SPAN: 1.00m (3.3') WEIGHT: 654kg (1439#) OTHER: Warhead 165kg (363#)	<b>BASIS FOR LAUNCH</b> <u>Missile activated.</u> <u>Launch and target</u> <u>data inputted.</u>	<b>PERFORMANCE</b> RANGE: 50-70 (31-43 miles) Depending on altitude and speed. ALTITUDE: Aircraft altitude. SPEED: 0.93 Mach - cruise OTHER:
--	---	---

SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Air to surface version of the all weather, tactical Exocet anti-shiping missile.	Societe Nationale Industrielle Aerospatiale
AIRFRAME	Cylindrical body with pointed nose. Cruciform long chord wings at midsection and cruciform tail surfaces.	Aerospatiale
PROPULSION	Two stage solid propellant rocket motor booster - 2 sec. burn. Sustainer - 105 sec. burn	Aerospatiale SNPE
GUIDANCE	Inertial (similar to Komoran) with radar altimeter and terminal active homing (AD&C).	EMD - Homing TRT - Altimeter
FUZING	Contact with delay plus overflight proximity backup.	
WARHEAD	High explosive.	SERAT

**REMARKS** Air launched version of the ship to ship Exocet. Designed for launch from attack or helicopter type aircraft, it has been installed on the Super-Frelon Helicopters and the Super-Etendard aircraft. The exocet is released from the helicopter inert and the rocket ignited 1.5 seconds later. The missile descends to sea-skimming under control of the inertial system and the radar altimeter, proceeds until radar acquisition, then homes directly on target.

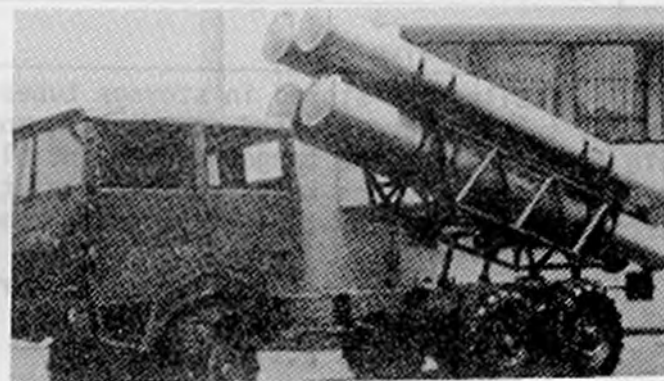
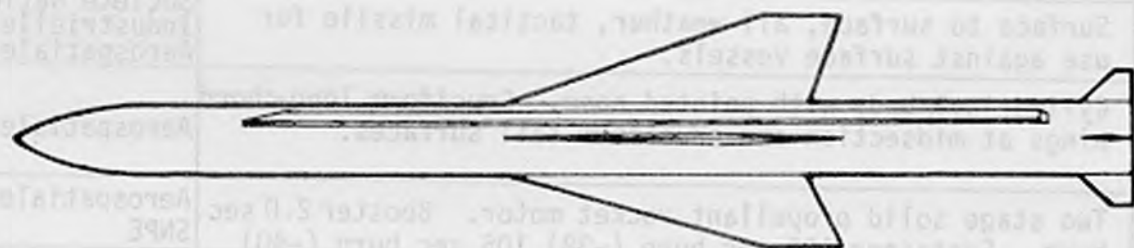
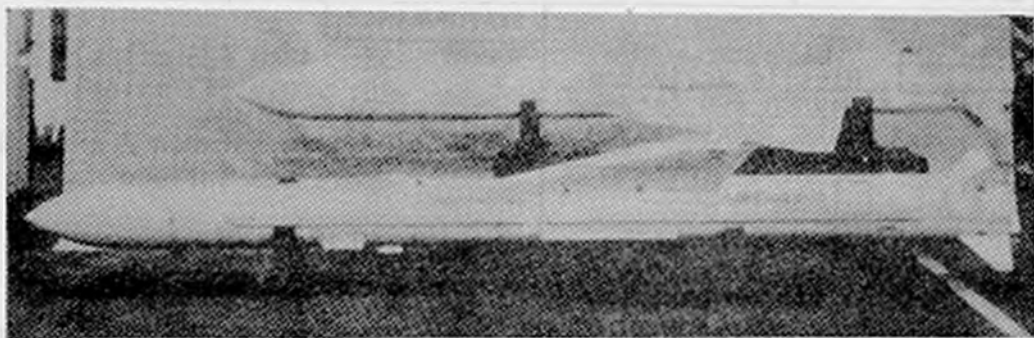
A submarine launched version of the 39 Exocet is now under development (SM39) It is launched from torpedo tubes in a guided/powered container which executes the underwater portion of the flight.

(See Exocet ship)

<b>USERS</b>	<b>KEY DATES</b>	<b>COSTS</b>
France Iraq Pakistan Peru Syria	<b>PRESENT STATUS:</b>  IOC: 1980	<b>UNIT COSTS:</b> \$200,000 - 1980  <b>LAUNCH UNIT:</b>
		<b>QUANTITIES</b> <b>TOTAL TO DATE:</b> 7100

**EXOCET (AIR)**

OTHER INFORMATION:

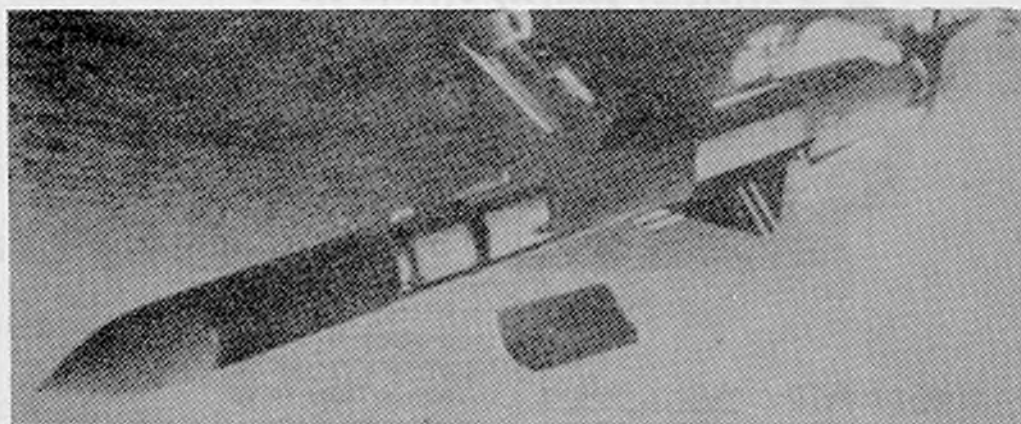
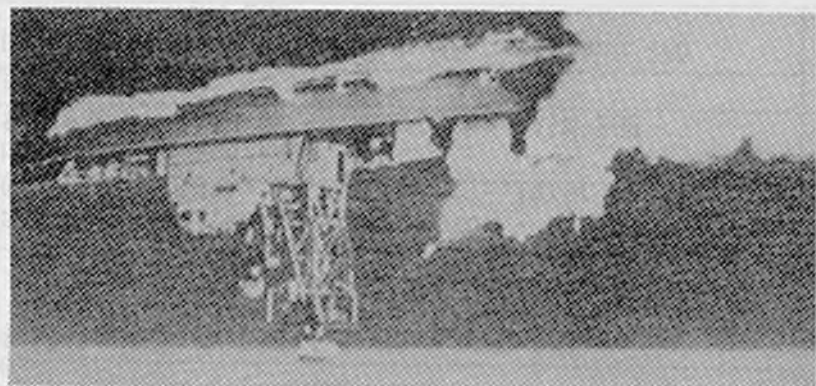


An airborne launch of the Exocet is operational with 3 Hawker.

(2) Exocet (Air)

UNIT COST	LAUNCH UNIT	QUANTITIES	KEY DATES	PRESENT STATUS	UNIT COST
2500,000 - 980			1974 - 1978 1981 - 1982	Operational	

NAME <u>Exocet (ship)</u>		<b>EXOCET (SHIP)</b>		DEVELOPER <u>Aerospatiale</u>			
DESIGNATION <u>MM38/MM40</u>				COUNTRY <u>France</u>			
				SERVICE <u>Navy, Air Force</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: -38 5.2m (17.0') -40 5.65m (18.5') DIAMETER: 35cm (1.1') SPAN: 1.00m (3.3') WEIGHT: -38 735kg (1617#) -40 835kg (1837#) OTHER: Warhead 165kg (363#)			<b>PERFORMANCE</b> RANGE: -38: 42km (26 miles) -40: >70km (43 miles) ALTITUDE: Cruises between 2 and 3 meters above sea surface SPEED: .93 Mach OTHER: Min. range about 5km (3 miles)			<b>LAUNCH BASIS</b> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
<b>CHARACTERISTICS</b> LENGTH: -38 5.2m (17.0') -40 5.65m (18.5') DIAMETER: 35cm (1.1') SPAN: 1.00m (3.3') WEIGHT: -38 735kg (1617#) -40 835kg (1837#) OTHER: Warhead 165kg (363#)		<b>PERFORMANCE</b> RANGE: -38: 42km (26 miles) -40: >70km (43 miles) ALTITUDE: Cruises between 2 and 3 meters above sea surface SPEED: .93 Mach OTHER: Min. range about 5km (3 miles)		<b>LAUNCH BASIS</b> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Surface to surface, all weather, tactical missile for use against surface vessels.		Societe Nationale Industrielle Aerospatiale			
<b>AIRFRAME</b>		Cylindrical body with pointed nose. Cruciform long-chord wings at midsection and cruciform tail surfaces.		Aerospatiale			
<b>PROPULSION</b>		Two stage solid propellant rocket motor. Booster 2.0 sec burn. Sustainer 105 sec burn (-38) 105 sec burn (-40)		Aerospatiale SNPE			
<b>GUIDANCE</b>		Inertial (similar to Kromoran) with radar altimeter and terminal active radar homing (ADAC).		EMD- Homing TAT Altimeter			
<b>FUZING</b>		Contact with delay plus overflight proximity backup.					
<b>WARHEAD</b>		High explosive		SERAT			
<b>REMARKS</b>							
<p>The missiles are stored in storage tubes which also serve as a launch tube. The tubes, in turn, are mounted on rotating mounts on deck. After launch the missile flies towards the target under control of the inertial guidance system and the radar altimeter which keeps the missile at a few meters above sea level. When the target is acquired by the active radar homing system, it assumes guidance control.</p> <p>Exocet has been fitted to wide range warships and in coastal defense batteries. The MM40 differs from the MM38 principally in its larger sustainer motor and wider search angle of its active radar.</p> <p>An airborne launch of the Exocet is operational with 3 Navies.</p> <p>(See Exocet (Air) )</p>							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
Libya France Bahrain Belgium Brazil Chile Ecuador W. Germany Greece		Malaysia Morocco Oman Peru United Arabian Emirates United Kingdom		PRESENT STATUS: Operational IOC: 1974 - MM38 1981 - MM40			
				UNIT COSTS: \$2000,000 - 1980 LAUNCH UNIT:			
				<b>QUANTITIES</b> TOTAL TO DATE:			
				Over 2000			



OTHER INFORMATION

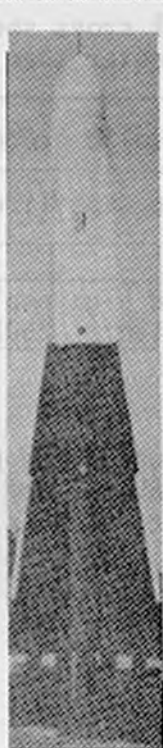
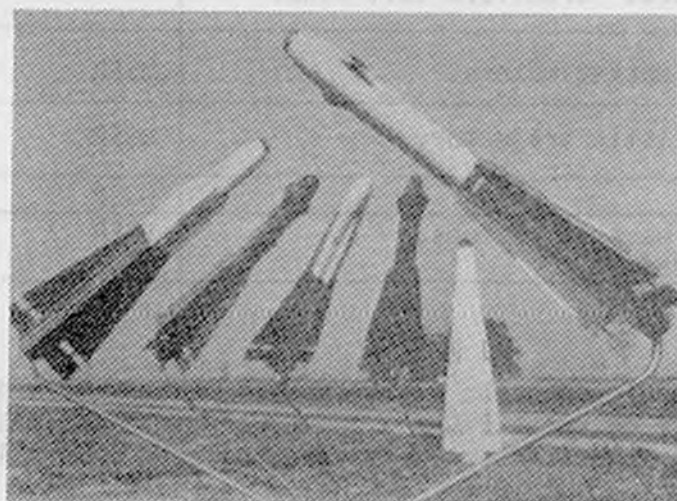
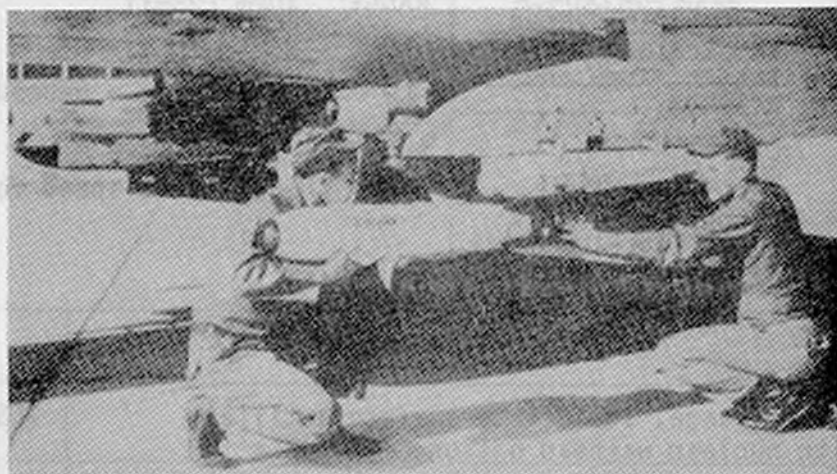
**EXOCET (SHIP)**

THE WORLD'S  
MISSILE  
SYSTEMS

# FALCON

NAME <u>FALCON</u>		<b>FALCON</b>		DEVELOPER <u>Hughes</u>																																																								
DESIGNATION <u>AIM-4A-G -26A/B</u>				COUNTRY <u>USA</u>		SERVICE <u>Air Force</u>																																																						
MISSION		TRAJECTORY		LAUNCHED FROM																																																								
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C																																																								
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER																																																								
CHARACTERISTICS		PERFORMANCE		TARGETS																																																								
Average-See Table "Remarks" LENGTH: 2.1m (6.8') DIAMETER: -4: 16.5cm (0.5') -26: 28.5cm (0.9') SPAN: 61cm (2.0') WEIGHT: -4: 58kg (130#) -26: 105kg (233#) OTHER:		RANGE: Max. 7-11km (5-7mi)  ALTITUDE: ?  SPEED: 2.0-4.0 Mach.  OTHER:		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL  <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER																																																								
BASIS FOR LAUNCH <u>Pilot notification</u> <u>of missile lock-on</u> <u>of target.</u>		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <u>Radar seeker</u> <input type="checkbox"/> FIRE/OTHER PARTY <u>TRKS. OR ILLUMINATES</u> <input checked="" type="checkbox"/> FIRE AND FORGET <u>IR Seeker</u>																																																										
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR																																																							
OVERALL SYSTEM	Lightweight air-to-air missile designed initially as an IR homing missile; later upgraded with semi-active guidance.			Hughes																																																								
AIRFRAME	Cylindrical body with rounded nose, cruciform slender delta wings with 4 control surfaces near tail			Hughes																																																								
PROPULSION	Single stage, solid fuel, rocket motor - early models. Dual stage, solid fuel, rocket motor - later models			Lockheed and Thiokol																																																								
GUIDANCE	IR homing - AIM-4D and -4G Semiactive radar - AIM-4F, AIM-26A, and AIM 26B			Hughes																																																								
FUZING	Proximity fuze			?																																																								
WARHEAD	High explosive warhead - AIM-4D, -4F, -4G, and 26B Nuclear warhead - AIM-26A			?																																																								
REMARKS	The Falcon was the first USAF operational missile to become operational, and the first AAM to contain a nuclear warhead. It has been carried by the F-101, F-102, F-106, F-4J, Draken, and Mirage III-S as air-intercept armament. Though largely superseded by Sidewinder, Sparrow, and other similar missiles, Falcons still are in the inventory of several Air Forces. A perspective on various models is shown:																																																											
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Designation</th> <th>Guidance</th> <th>Length</th> <th>Diameter</th> <th>Launch wt.</th> </tr> </thead> <tbody> <tr> <td>AIM-4</td> <td>Radar</td> <td>77.8 in (1.98 m)</td> <td>6.4 in (163 mm)</td> <td>110 lb (50 kg)</td> </tr> <tr> <td>AIM-4A</td> <td>Radar</td> <td>78.0 in (1.98 m)</td> <td>6.4 in (163 mm)</td> <td>120 lb (54 kg)</td> </tr> <tr> <td>AIM-4B</td> <td>IR</td> <td>79.5 in (2.02 m)</td> <td>6.4 in (163 mm)</td> <td>130 lb (59 kg)</td> </tr> <tr> <td>AIM-4C</td> <td>IR</td> <td>79.5 in (2.02 m)</td> <td>6.4 in (163 mm)</td> <td>134 lb (61 kg)</td> </tr> <tr> <td>AIM-4D</td> <td>IR</td> <td>79.5 in (2.02 m)</td> <td>6.4 in (163 mm)</td> <td>134 lb (61 kg)</td> </tr> <tr> <td>AIM-4E</td> <td>Radar</td> <td>86.0 in (2.18 m)</td> <td>6.6 in (168 mm)</td> <td>150 lb (68 kg)</td> </tr> <tr> <td>AIM-4F</td> <td>Radar</td> <td>86.0 in (2.18 m)</td> <td>6.6 in (168 mm)</td> <td>150 lb (68 kg)</td> </tr> <tr> <td>AIM-4G</td> <td>IR</td> <td>81.0 in (2.06 m)</td> <td>6.6 in (168 mm)</td> <td>145 lb (66 kg)</td> </tr> <tr> <td>AIM-26A</td> <td>Radar</td> <td>84.25 in (2.14 m)</td> <td>11.0 in (279 mm)</td> <td>203 lb (92 kg)</td> </tr> <tr> <td>AIM-26B</td> <td>Radar</td> <td>81.5 in (2.07 m)</td> <td>11.4 in (290 mm)</td> <td>262 lb (119 kg)</td> </tr> </tbody> </table>						Designation	Guidance	Length	Diameter	Launch wt.	AIM-4	Radar	77.8 in (1.98 m)	6.4 in (163 mm)	110 lb (50 kg)	AIM-4A	Radar	78.0 in (1.98 m)	6.4 in (163 mm)	120 lb (54 kg)	AIM-4B	IR	79.5 in (2.02 m)	6.4 in (163 mm)	130 lb (59 kg)	AIM-4C	IR	79.5 in (2.02 m)	6.4 in (163 mm)	134 lb (61 kg)	AIM-4D	IR	79.5 in (2.02 m)	6.4 in (163 mm)	134 lb (61 kg)	AIM-4E	Radar	86.0 in (2.18 m)	6.6 in (168 mm)	150 lb (68 kg)	AIM-4F	Radar	86.0 in (2.18 m)	6.6 in (168 mm)	150 lb (68 kg)	AIM-4G	IR	81.0 in (2.06 m)	6.6 in (168 mm)	145 lb (66 kg)	AIM-26A	Radar	84.25 in (2.14 m)	11.0 in (279 mm)	203 lb (92 kg)	AIM-26B	Radar	81.5 in (2.07 m)	11.4 in (290 mm)	262 lb (119 kg)
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USERS		KEY DATES		COSTS																																																								
USA Canada Finland - Rb-28 Greece Japan Sweden - Rb-27 Switzerland - HM-55/58 Taiwan Turkey		PRESENT STATUS: Largely re-placed-some models in inventory IOC: -4A 1955 -4E 1958 -4F 1960 -26 1960		UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: Over 50,000 AIM-4's Over 2500 AIM-26's																																																								

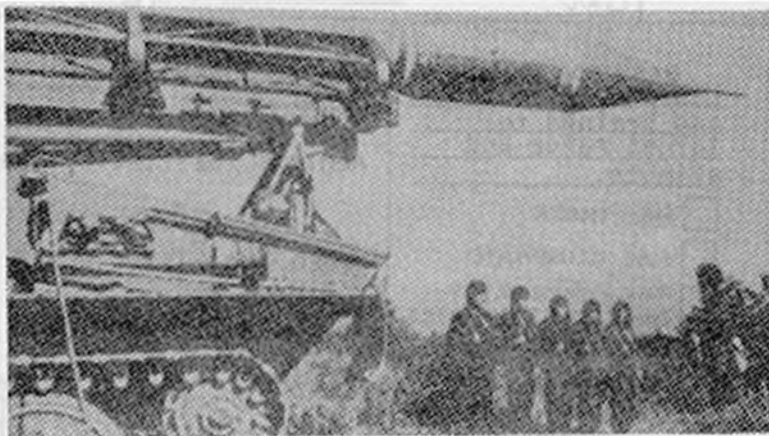
OVER INFORMATION:



# FROG-3

NAME <u>FROG-3</u>		<b>FROG-3</b>		DEVELOPER _____	
DESIGNATION <u>None</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: <u>10.5m (34.5')</u> DIAMETER: <u>40cm (1.3')</u> Body <u>55cm (2.2')</u> W/H SPAN: <u>About 1.2m (4')</u> WEIGHT: <u>2,250kg (4,950#)</u> OTHER: _____		RANGE: <u>40km (25mi)</u> ALTITUDE: <u>Ballistic - depends upon range</u> SPEED: <u>Ballistic speed for range</u> OTHER: _____		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL <input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
		BASIS FOR LAUNCH <u>Launcher elevated</u> <u>and trained for</u> <u>target range and</u> <u>azimuth.</u>			
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Tactical short range, surface to surface artillery missile with nuclear warhead option.		USSR	
AIRFRAME		Cylindrical cross section body with conical nose. Nose larger diameter than boosters. Cruciform tail fins.		USSR	
PROPULSION		Two stage solid propellant rocket motors.		USSR	
GUIDANCE		None. Spin stabilized ballistic trajectory.		USSR	
FUZING				USSR	
WARHEAD		Nuclear and high explosive warhead options. Warhead weight: 250kg (550#).		USSR	
REMARKS					
The Frog 3 is mounted one per vehicle upon the PT-76 chassis, which gives it road speed of about 35km/hr and a range of about 240km. The Frog 3 is used strictly as an artillery rocket, much as is the MLRS. After boost, the trajectory is ballistic.					
USERS		KEY DATES		COSTS	
USSR Egypt Warsaw Pact Countries		PRESENT STATUS: <u>Obsolescent or being phased out</u> IOC: <u>Introduced about 1960</u>		UNIT COSTS:  LAUNCH UNIT:	
				QUANTITIES TOTAL TO DATE:	

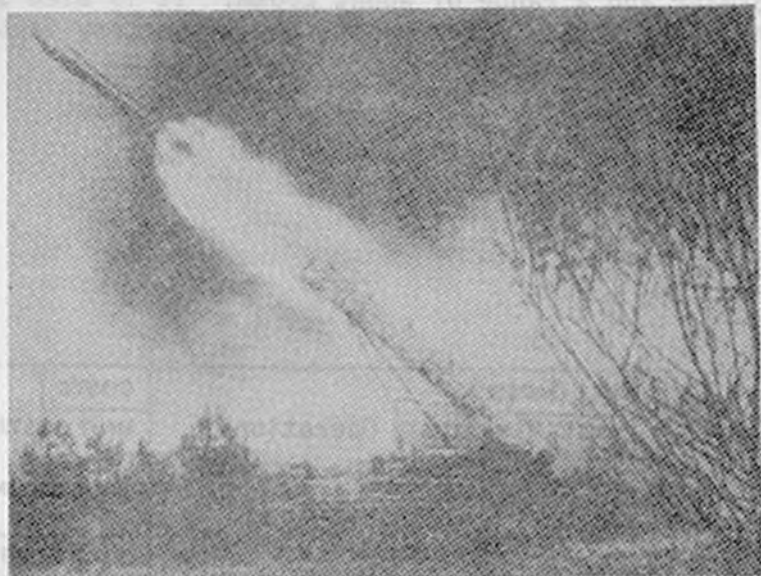
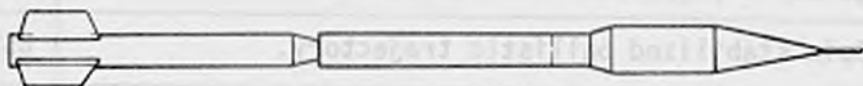
OTHER INFORMATION:



LOOKING  
FWD



LOOKING  
AFT



# FROG-4

NAME <u>FROG-4</u>		<b>FROG-4</b>		DEVELOPER _____	
DESIGNATION <u>None</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILE <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
				<input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS				PERFORMANCE	
LENGTH: <u>10.2m (33.5')</u> DIAMETER: <u>40cm (1.3')</u> SPAN: <u>About 1.2m (4')</u> WEIGHT: <u>2,000kg (4,400#)</u> OTHER: _____				RANGE: <u>55km (34mi)</u>  ALTITUDE: <u>Ballistic - depends upon range</u>  SPEED: <u>Ballistic speed for range</u>  OTHER: _____	
BASIS FOR LAUNCH <u>Launcher elevated and trained to target range and azimuth.</u>					
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Tactical short range surface to surface artillery missile with nuclear warhead option.		USSR	
AIRFRAME		Cylindrical body with conical nose. Cruciform tail fins.		USSR	
PROPULSION		Two stage solid propellant rocket motors.		USSR	
GUIDANCE		None. Spin stabilized ballistic trajectory.		USSR	
FUZING				USSR	
WARHEAD		Nuclear and high explosive warhead options. Warhead weight 250kg (550#).		USSR	
REMARKS					
The Frog 4 is mounted one per vehicle upon the PT-76 chassis, which gives it a road speed of about 35km/hr and a range of about 250km. It is used strictly as an artillery rocket, much as the MLRS. After boost, the trajectory is ballistic.					
USERS		KEY DATES		COSTS	
USSR Cuba Warsaw Pact Countries		PRESENT STATUS: <u>Operational</u>		UNIT COSTS:	
		IOC:		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE:	

OTHER INFORMATION:

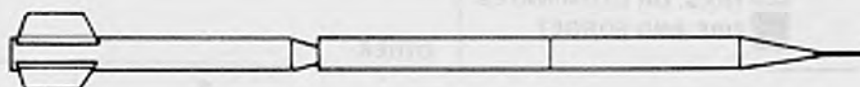
**FROG 4**



LOOKING  
FWD



LOOKING  
AFT



# FROG-5

NAME <u>FROG-5</u>		<b>FROG-5</b>		DEVELOPER _____	
DESIGNATION _____				COUNTRY <u>USSR</u>	
				SERVICE <u>Army</u>	

<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	<input checked="" type="checkbox"/> SOFT. INSTALL. <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____
<b>CHARACTERISTICS</b> LENGTH: 10.2m (33.6') DIAMETER: 39cm (1.3') SPAN: 1.05m (3.6') WEIGHT: 2,000kg (4,400#) OTHER: _____			<b>PERFORMANCE</b> RANGE: 48km (30mi) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic speed for range OTHER: _____		

BASIS FOR LAUNCH  
Launcher trained  
and elevated for  
target range and  
azimuth.

FIRE/TRACK  
 FIRE/ILLUMINATE  
 FIRE/OTHER PARTY TRKS. OR ILLUMINATES  
 FIRE AND FORGET

SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Tactical short range surface to surface artillery missile with nuclear warhead option.	USSR
AIRFRAME	Slender cylindrical body with sharp conical nose. Rear mounted booster with cruciform fins.	USSR
PROPULSION	Two stage solid propellant rocket motor.	USSR
GUIDANCE	None. Spin stabilized.	USSR
FUZING		USSR
WARHEAD	Nuclear and high explosive warhead options.	USSR

**REMARKS**

The Frog 5 is mounted one per vehicle upon the PT-76 chassis, which gives it a road speed of about 35km/hr and a range of about 240km. It is used strictly as an artillery rocket, much as the MLRS. After boost, the trajectory is ballistic.

<b>USERS</b>	<b>KEY DATES</b>	<b>COSTS</b>
USSR North Korea	PRESENT STATUS: Operational	UNIT COSTS:
	IOC:	LAUNCH UNIT:
		<b>QUANTITIES</b>
		TOTAL TO DATE:

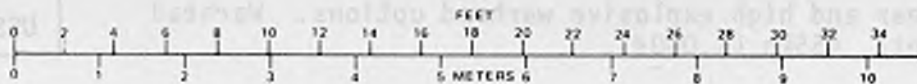
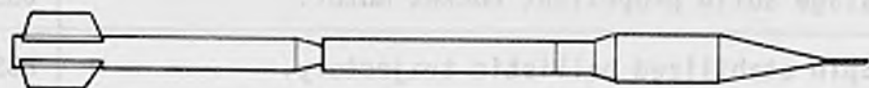
OTHER INFORMATION:



LOOKING  
FWD



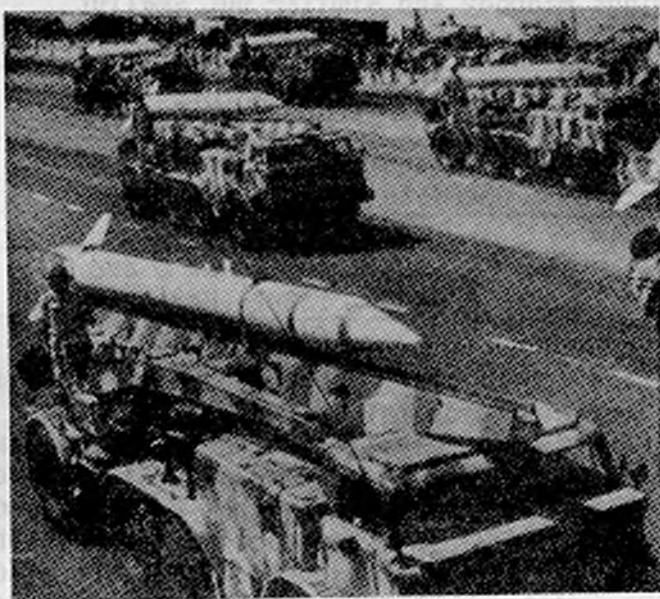
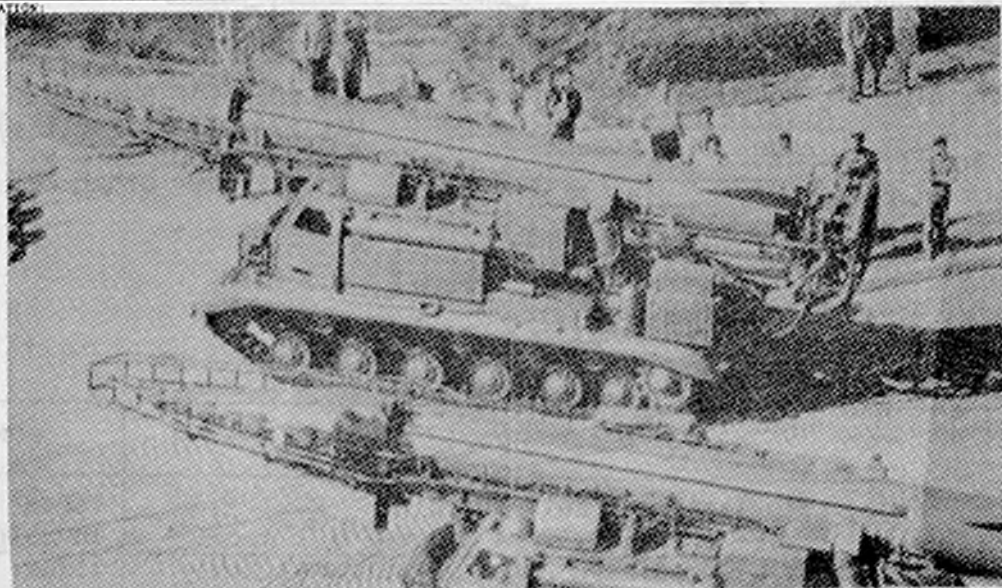
LOOKING  
AFT



# FROG-7

NAME <u>FROG-7</u>		<b>FROG-7</b>		DEVELOPER _____	
DESIGNATION _____				COUNTRY <u>USSR</u>	
				SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL		
CHARACTERISTICS			PERFORMANCE		
LENGTH: 9.0m (29.5')		BASIS FOR LAUNCH <u>Launcher trained and elevated for target range and azimuth.</u>		RANGE: 60km (37mi)	
DIAMETER: 61cm (2.0')				ALTITUDE: Ballistic - depends upon range.	
SPAN: About 1.8m (6.0')		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		SPEED: Ballistic speed for range.	
WEIGHT: 5,727kg (12,600#)		OTHER:		OTHER:	
OTHER:					
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Tactical short range surface to surface artillery missile with nuclear warhead option.		USSR	
AIRFRAME		Slender cylindrical body with pointed nose. Cruciform trapezoidal tail fins.		USSR	
PROPULSION		Single stage solid propellant rocket motor.		USSR	
GUIDANCE		None. Spin stabilized ballistic trajectory.		USSR	
FUZING				USSR	
WARHEAD		Nuclear and high explosive warhead options. Warhead weight: 455kg (1,000#).		USSR	
REMARKS					
<p>The Frog 7 is mounted upon and launched from a modern wheeled, erector launcher, ZIL-135. The main nozzle is surrounded by a ring of much smaller nozzles, suggesting the possibility of some sort of guidance update. The configuration is a considerable improvement over early Frogs.</p> <p>The Frog 7 is used strictly as an artillery rocket. If any trajectory correction is made after launch, it will begin during boost. After boost, the trajectory is ballistic.</p>					
USERS		KEY DATES		COSTS	
USSR Bulgaria Czechoslovakia East Germany Egypt Hungary Iraq Libya		N. Korea Poland Rumania Syria		PRESENT STATUS: <u>Operational</u>  IOC: <u>First shown in 1967</u>	
				UNIT COSTS:	
				LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE:	

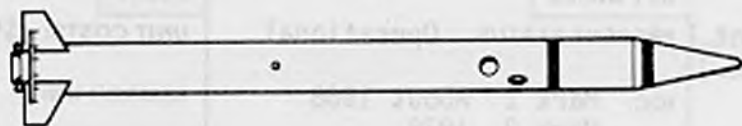
OTHER INFORMATION



LOOKING  
FWD



LOOKING  
AFT



# GABRIEL

NAME <u>GABRIEL</u>		<b>GABRIEL</b>		DEVELOPER <u>Israel A/C Ind.</u>	
DESIGNATION <u>MARK 1, 2 and 3</u>				COUNTRY <u>Israel</u>	
				SERVICE <u>Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				TARGETS <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	

CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.35m (11.0') DIAMETER: MK1 32.5cm (1.1') MK2 35cm (1.2') SPAN: 1.38m (4.5') WEIGHT: MK1 418kg(920#) MK2 500kg(1100#) OTHER:		BASIS FOR LAUNCH <u>Missile readied.</u> <u>Target data inputed.</u> <input checked="" type="checkbox"/> FIRE/TRACK Command <input checked="" type="checkbox"/> FIRE/ILLUMINATE SAR <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
		RANGE: MK1 20km (12.5 miles) MKs 2/3 35km (22 miles) ALTITUDE: Sea skimmer under 20m (65') SPEED: 0.7 Mach OTHER:	

SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Short range, ship launched, anti-shipping missile.	Israel Aircraft Industries
AIRFRAME	Cylindrical body with pointed nose. Cruciform rectangular wings midbody and similar but smaller tail surfaces.	Israel Aircraft Industries
PROPULSION	Dual thrust, solid propellant rocket motor. Boost and sustain.	
GUIDANCE	Programmed autopilot with radar altimeter and command steering corrections. Semi-active radar homing.	Israel Aircraft Industries
FUZING	Impact delay.	
WARHEAD	High explosive. W/H WT. = 180kg (396#) MK 1 and 2 150kg (330#) MK3	

**REMARKS**

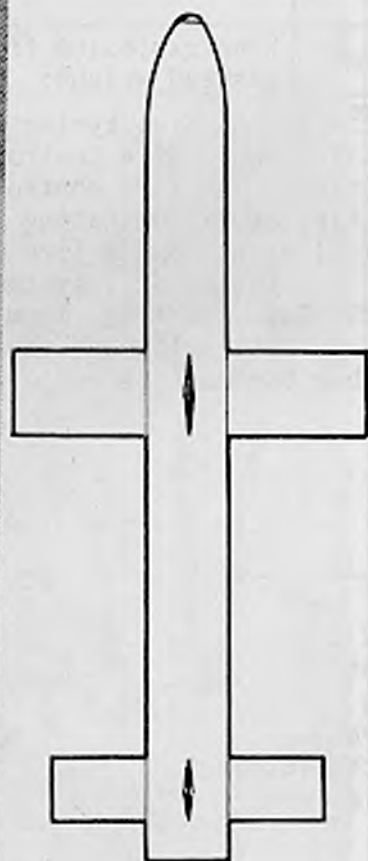
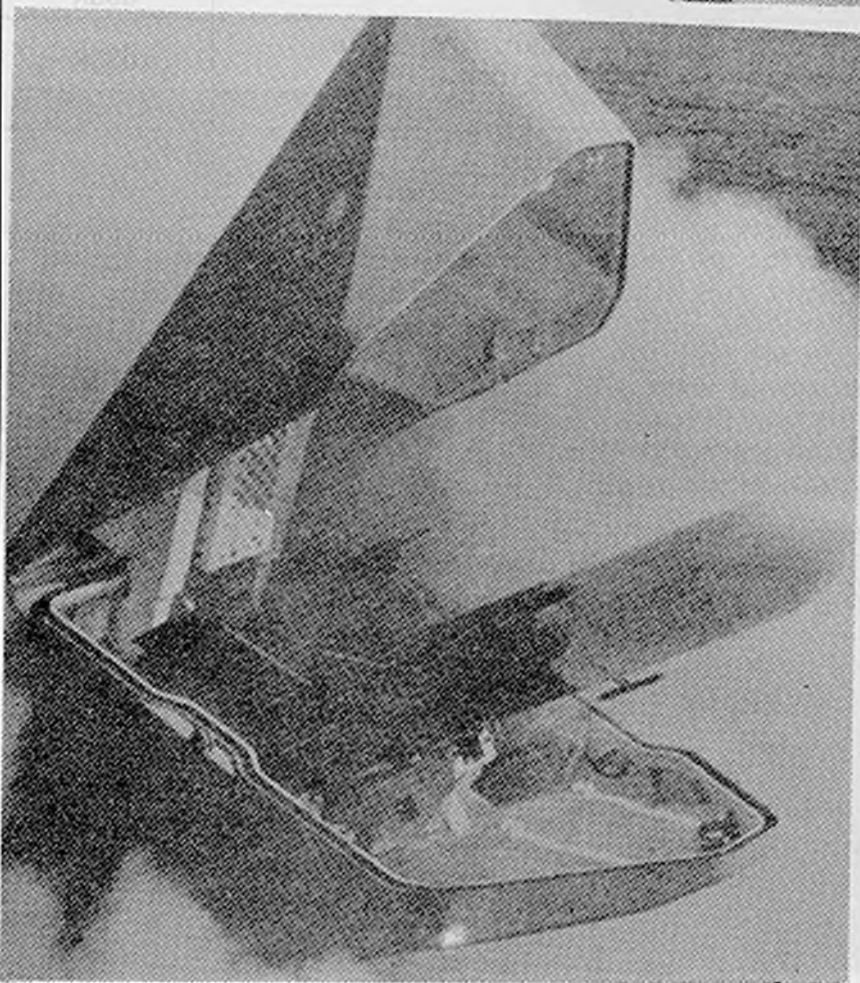
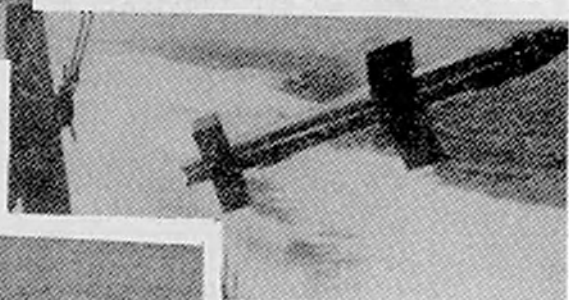
The Gabriel, ready for firing, is housed in a fiberglass container which in turn is mounted on a rotating pedestal, three containers per pedestal. There are two versions, MK1 and MK2. The missile reaches a maximum height of 260' after launch, then descending to below 165' for cruise and 7-14', depending on the sea state, for attack. There are some indications that alternate homing heads have been installed on the Mark 1 and 2, including active radar and home-on-jam. A Mark 3 version has been developed and is expected to be operational in 1981. It has an active radar homer and is about 40kg heavier and 35cm longer, but fits the Mark 2 launchers.

The Gabriel is said to be fitted to 12 Sa'ar class attack boats and 15 Reschef class missile boats in the Israel Navy.

<b>USERS</b> Israel Argentina Kenya Malaysia Singapore South Africa Taiwan Thailand		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: Mark 1 About 1968 Mark 2 1978 Mark 3 1981-1983		<b>COSTS</b> UNIT COSTS: \$93,000/missile LAUNCH UNIT:	
				<b>QUANTITIES</b> TOTAL TO DATE: About 2500	

# GABRIEL

STOCK INFORMATION:



# GAINFUL

NAME GAINFUL  
 DESIGNATION SA-6, SA-NX-6(Naval)

DEVELOPER \_\_\_\_\_  
 COUNTRY USSR  
 SERVICE Army

<b>MISSION</b>	<b>TRAJECTORY</b>	<b>LAUNCHED FROM</b>	<input checked="" type="checkbox"/> MOBILE LAUNCHER	<b>TARGETS</b>	<input type="checkbox"/> SOFT. INSTALL.
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL.	<input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____

<b>CHARACTERISTICS</b>	<b>PERFORMANCE</b>
LENGTH: 6.2m (20.3') DIAMETER: 33.5cm (1.1') SPAN: About 1.24m (4.1') WEIGHT: 55kg (1212#) OTHER: _____	RANGE: High Alt.: 60km (37mi) Low Alt.: 30km (18mi) ALTITUDE: 18,000m (60,000') SPEED: 1.5 Mach boost 2.8 Mach cruise OTHER: _____
<b>BASIS FOR LAUNCH</b> Target acquired, and tracked or illuminated.	
<input checked="" type="checkbox"/> FIRE/TRACK Midcourse <input checked="" type="checkbox"/> FIRE/ILLUMINATE Homing <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	

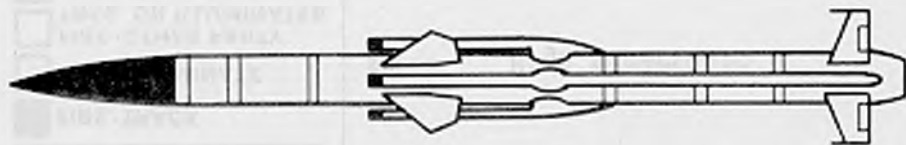
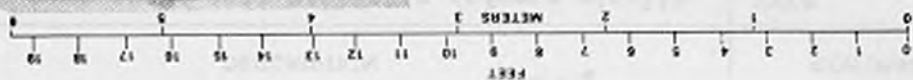
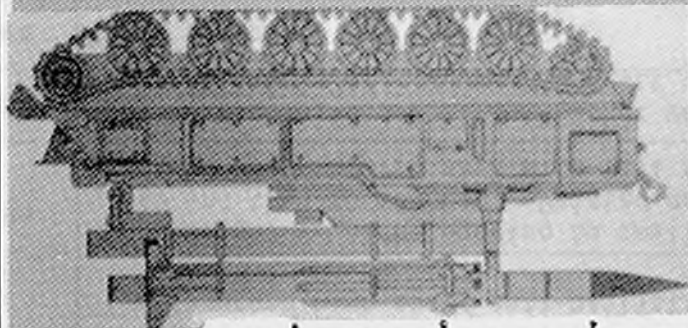
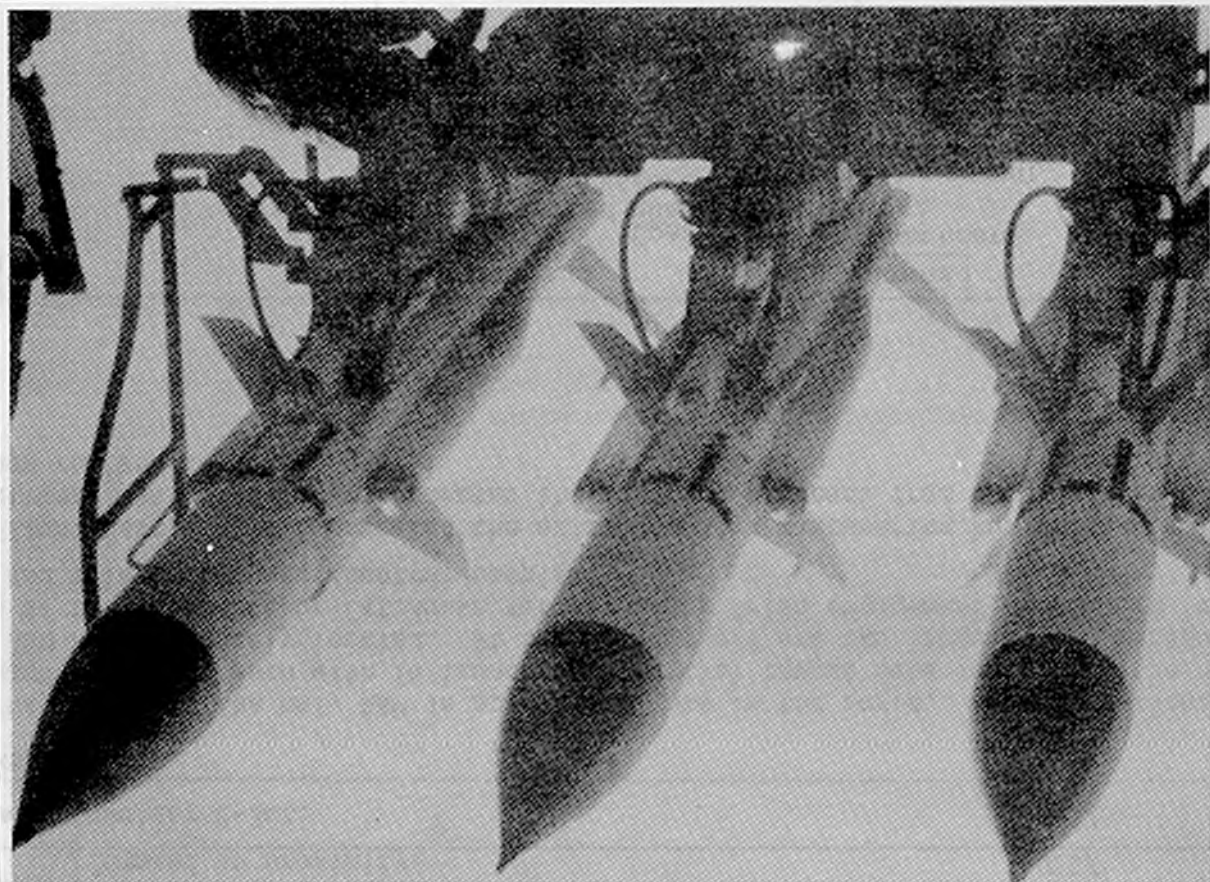
SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Surface to air tactical, mobile, anti-aircraft missile.	USSR
AIRFRAME	Slender cylindrical body with pointed nose. Cruciform wings (midbody) and tail fins. Four inlet ducts between wings.	USSR
PROPULSION	Solid propellant booster, air breathing solid propellant integral ramjet sustainer.	USSR
GUIDANCE	Radio command with CW semi-active radar. Possible active radar or passive IR homing versions.	USSR
FUZING		
WARHEAD	High explosive fragmentation with IR fuze. Warhead weight: 80kg (176#).	USSR

**REMARKS** The Gainful system consists of a missile launcher carrying three ready-to-fire missiles and a fire control unit, both mounted on separate amphibious tracked vehicles. The fire control unit contains a search and acquisition radar, a target tracking and illuminating (Straight Flush) radar, a command link, possibly a backup optical sight, and a fire control computer.

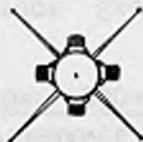
The Gainful system proved very effective when utilized by Egypt in the 1973 Middle East conflict; showing exceptional capability against maneuvering targets.

After launch, the booster nozzle (tail cone) is jettisoned and the rocket chamber becomes the ramjet combustion chamber.

<b>USERS</b>	<b>KEY DATES</b>	<b>COSTS</b>
USSR Egypt Iraq Libya North Vietnam Syria	PRESENT STATUS: Operational  IOC: First shown in 1967	UNIT COSTS:  LAUNCH UNIT:
		<b>QUANTITIES</b> TOTAL TO DATE:



ADDITIONAL DATA:  
 WARHEAD  
 BODY FRAGMENTATION: 88 LBS - 40 KG  
 - EXPLOSIVE CHARGE: 88 LBS - 40 KG



OTHER INFORMATION

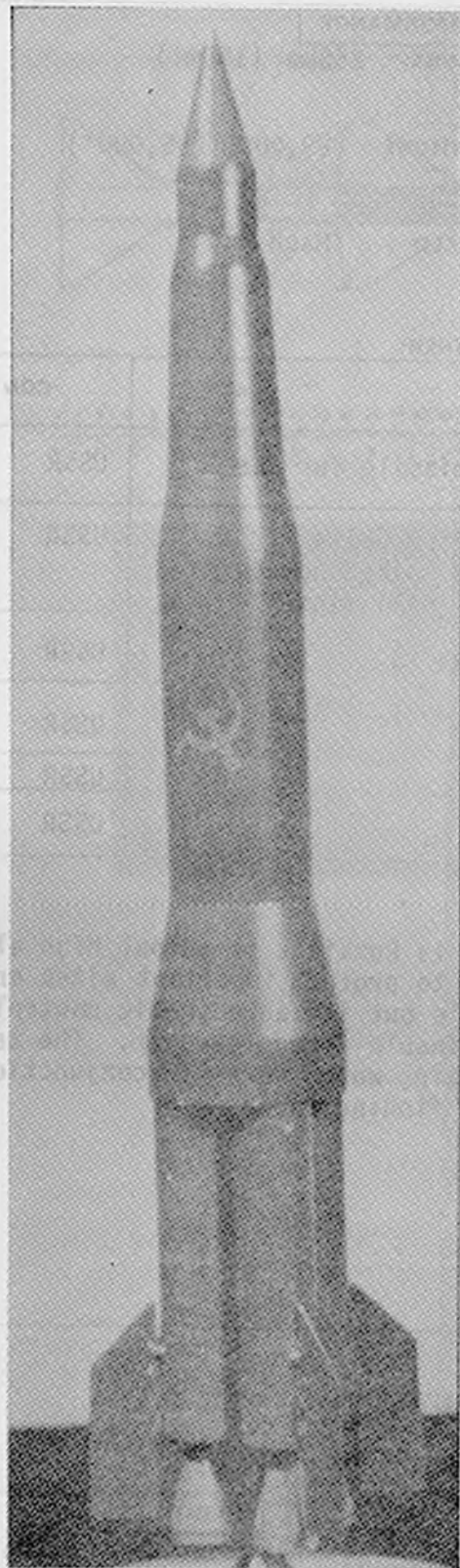
GAINFUL

THE WARD'S  
 MISSILE  
 SYSTEMS

# GALOSH

NAME <u>GALOSH</u>		<b>GALOSH</b>		DEVELOPER _____	
DESIGNATION <u>ABM-1B</u>				COUNTRY <u>USSR</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input type="checkbox"/> MOBILE LAUNCHER	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES Ballistic <input type="checkbox"/> HARD INSTALL	
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>19.8m (65.0')</u> <u>Fins folded</u> DIAMETER: <u>2.6m (8.4')</u>  SPAN: <u>Unknown</u>  WEIGHT: <u>32,700kg</u> <u>(72,000#)</u>  OTHER: _____			RANGE: <u>300+km (186+mi)</u>  ALTITUDE: <u>Exoatmospheric</u>  SPEED: <u>High supersonic</u>  OTHER: _____		
			BASIS FOR LAUNCH <u>Radar on target.</u>		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Silo launched high speed anti-ballistic defense missile.		USSR	
AIRFRAME		Three stages -- each tapering to smaller diameter next stage and then to warhead. Pointed nose. 1st stage composed of 4 motors, each with tail fin.		USSR	
PROPULSION		Three stage solid propellant rocket motors. First stage is bundle of 4 separate rocket units.		USSR	
GUIDANCE		Radio command.		USSR	
FUZING		Command or proximity.		USSR	
WARHEAD		Nuclear 2-3mt.		USSR	
REMARKS					
<p>The Galosh is the only ABM in operational use in the world. Four operational sites are known to exist, each with 16 launchers. Initial target data comes from the Hen House ABM radar remotely located. At the site itself are two large battle management radars of the Dog House or Cat House variety, four Triad engagement radars, 16 launch silos and a large computer/control complex.</p> <p>Flight tests in 1976 revealed the existence of a maneuvering bus which can loiter at altitude, while the radar separates the incoming warheads from the chaff and decoys, and then restart to make the kill.</p>					
USERS		KEY DATES		COSTS	
USSR		PRESENT STATUS: <u>Operational, but in limited quantities. Largely for research purposes.</u> <u>loc.</u> <u>First seen in 1964</u> <u>Operational in 1968</u>		UNIT COSTS: LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: <u>Four sites with 16 launchers each are known</u>	

OTHER INFORMATION:



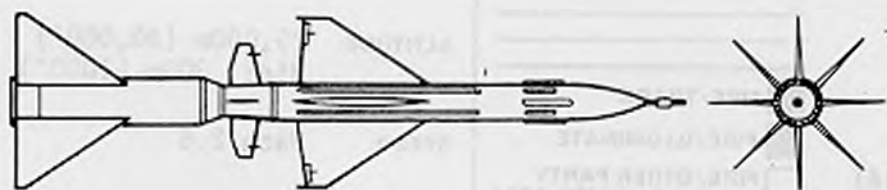
...one of the largest SAM ever built...  
 air defense missile. It is deployed in numbers...  
 it is said to have some capability against ICBM...  
 that regional. The missile is mounted on a...  
 tracking and missile guidance radar is spare...  
 back the surveillance radar and side Net radar...

KEY DATE:  
 PRESENT STATUS:  
 1960: First shot  
 1961: About 1

# GAMMON

NAME <u>GAMMON (GRIFFON)</u>		<b>DEVELOPER</b> <b>COUNTRY</b> <u>USSR</u> <b>SERVICE</b> <u>Air Force</u>	
DESIGNATION <u>SA-5</u>			
<b>MISSION</b>	<b>TRAJECTORY</b>	<b>LAUNCHED FROM</b>	<b>TARGETS</b>
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C <input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
<b>CHARACTERISTICS</b>		<b>PERFORMANCE</b>	
LENGTH: 16.5m (54.1')	DIAMETER: 1.1m (3.6')	SPAN: 3.65m (12.0')	WEIGHT: 10,000kg (22,000#)
OTHER:	BASIS FOR LAUNCH <u>Radar on target.</u> <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	RANGE: 250km (150mi)	ALTITUDE: 29,000m (95,000')
OTHER:	SPEED: Mach 3.5	OTHER:	
<b>SYSTEM/SUBSYSTEM</b>	<b>DESCRIPTION</b>		<b>CONTRACTOR</b>
<b>OVERALL SYSTEM</b>	Fixed site, long range, air defense missile for use against aircraft and missile targets.		USSR
<b>AIRFRAME</b>	Cylindrical booster with large cruciform delta wings. Smaller diameter missile with pointed spiked nose, cruciform large delta wings and small tail fins.		USSR
<b>PROPULSION</b>	Dual stage solid propellant rocket motors.		USSR
<b>GUIDANCE</b>	Radio command midcourse with active radar homing.		USSR
<b>FUZING</b>	Proximity.		USSR
<b>WARHEAD</b>	High explosive or nuclear.		USSR
<b>REMARKS</b>			
<p>Gammon, one of the largest SAM ever built, is Russia's principal high altitude air defense missile. It is deployed in numbers to protect important sites and cities. It is said to have some capability against ICBM's but its aerodynamic controls make that marginal. The missile is mounted on a trainable fixed launcher. The target tracking and missile guidance radar is Square Pair, which works in conjunction with Back Net surveillance radar and Side Net height finding radar.</p>			
<b>USERS</b>	<b>KEY DATES</b>	<b>COSTS</b>	
USSR	PRESENT STATUS: Operational	UNIT COSTS:	
	IOC: First seen in 1963 IOC about 1967	LAUNCH UNIT:	
		<b>QUANTITIES</b>	
		TOTAL TO DATE: About 1200 launchers are thought to be operational	

OTHER INFORMATION:



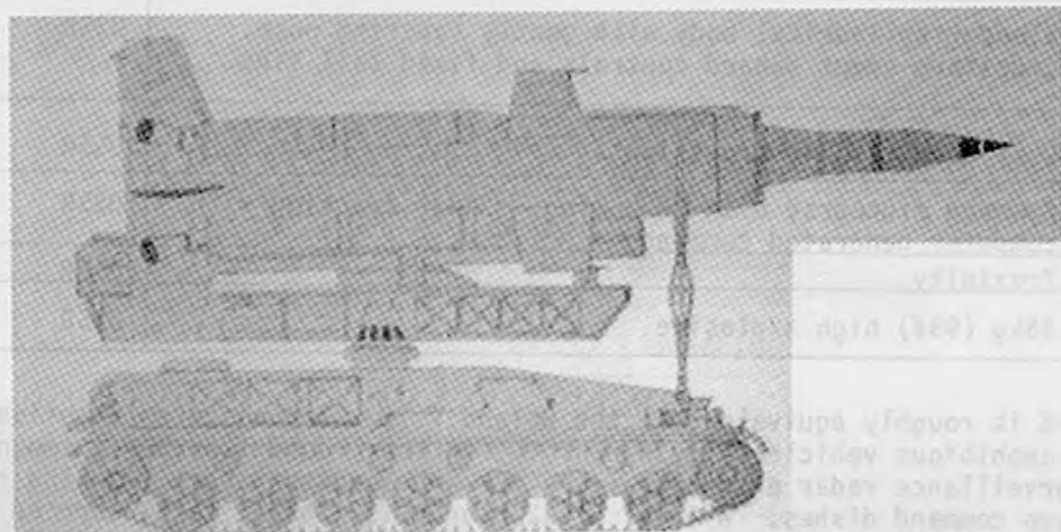
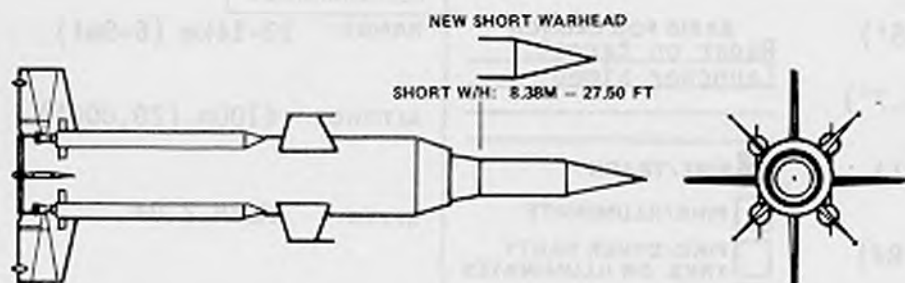
The GAMMON missile is carried in pairs on truck-mounted transport-launcher vehicles. The launcher is 3000 cradles and also provides the necessary structure. The launcher vehicle, complete with 2 missiles, is air-transportable in the A-119 heavy transport. Air control support is provided by the base (long range support) and the base (short range support). Reloading is by means of a mobile crane. The radar systems and dials mounted at the end of each wing.

It has been suggested that the GAMMON can also be used in a surface-to-surface

# GANEF

NAME <u>GANEF</u>		DESIGNATION <u>SA-4</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Army</u>		
MISSION <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		TRAJECTORY <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		LAUNCHED FROM <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____		
CHARACTERISTICS				PERFORMANCE						
LENGTH: 9.0m (29.5')				BASIS FOR LAUNCH <u>Radar on target.</u>		RANGE: 70km (43mi)				
DIAMETER: 80cm (26')						ALTITUDE: 25,000m (80,000')				
SPAN: 26m (85')						Min: 300m (1000')				
WEIGHT: 1800kg (3960#)				<input checked="" type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		SPEED: Mach 2.5				
OTHER: _____				OTHER: _____						
SYSTEM/SUBSYSTEM		DESCRIPTION					CONTRACTOR			
OVERALL SYSTEM		Mobile, tactical, long range battlefield air defense missile system.					USSR			
AIRFRAME		Cylindrical cross section. Payload and guidance carried in ramjet inlet spike. Cruciform small wings (midbody) and larger tail surfaces.					USSR			
PROPULSION		Four solid propellant boosters with canted nozzles and ramjet sustainer, kerosene fueled.					USSR			
GUIDANCE		Radio command midcourse with semi-active radar homing.					USSR			
FUZING										
WARHEAD		High explosive warhead.					USSR			
REMARKS		<p>Ganef is carried in pairs on tracked armored transporter-launcher vehicles. The launch mount is 360° trainable and also provides the necessary elevation. The launch vehicle, complete with 2 missiles, is air-transportable in the AN-22 heavy freighter. Fire control support is provided by the Long Track long range acquisition radar and the Pat Hand acquisition radar. Reloading is by means of a mobile crane. The missiles radar antenna are dipoles mounted at the end of each wing.</p> <p>It has been suggested that the Ganef can also be used in a surface-to-surface role.</p>								
USERS		KEY DATES			COSTS					
USSR Czechoslovakia East Germany Egypt		PRESENT STATUS: Operational			UNIT COSTS:					
		IOC: First shown in 1964			LAUNCH UNIT:					
					QUANTITIES					
					TOTAL TO DATE:					

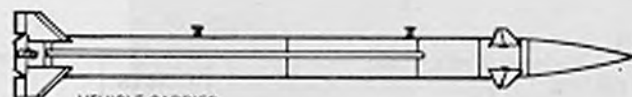
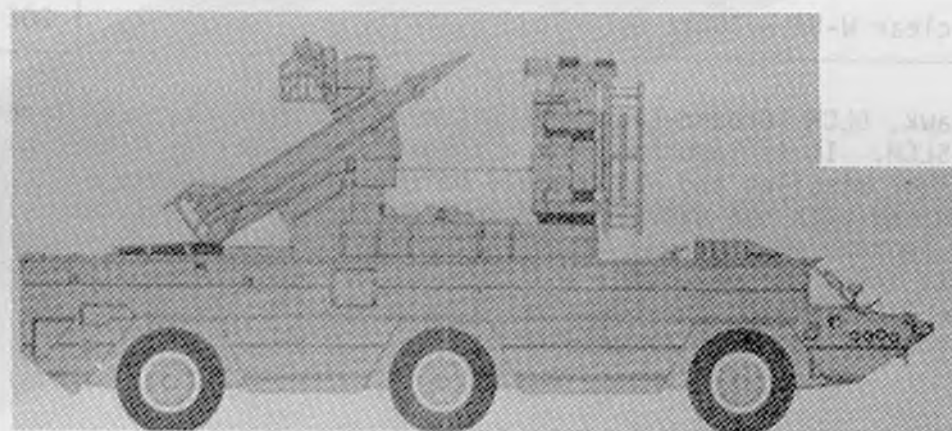
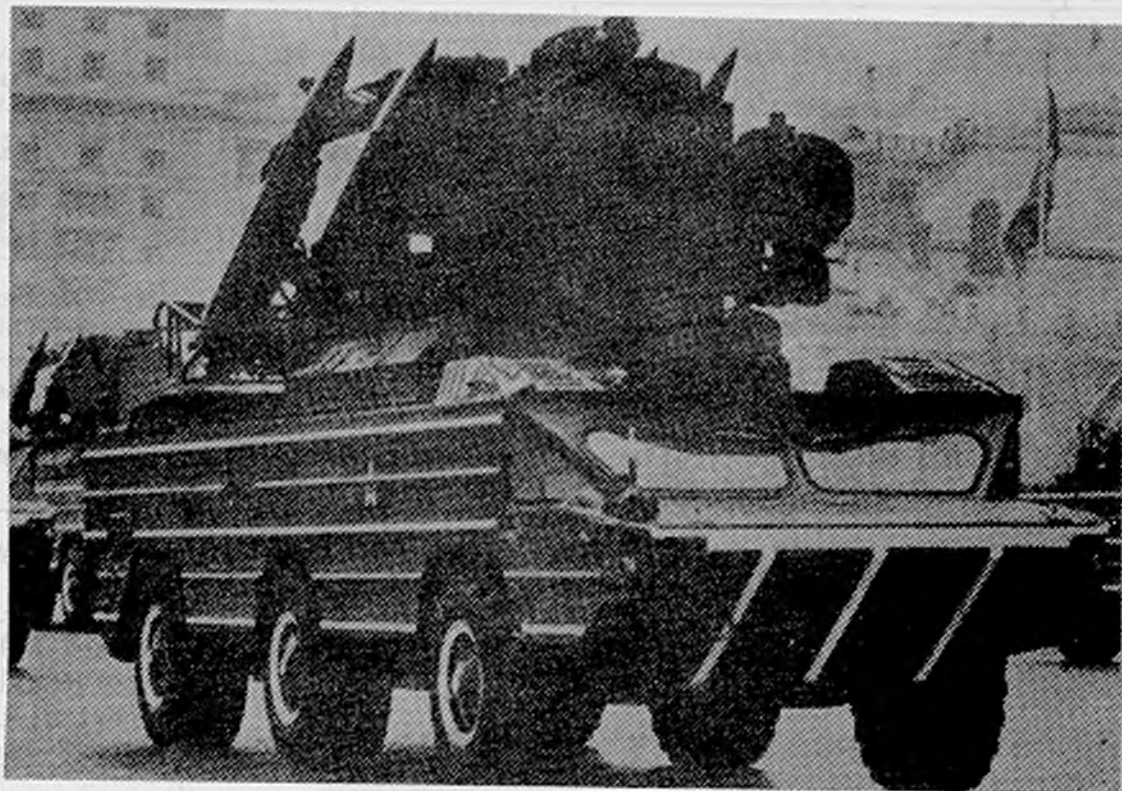
OTHER INFORMATION:



# GECKO

NAME <u>GECKO</u>		DEVELOPER _____	
DESIGNATION <u>SA-8, SA-N-4</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <u>SA-N-4</u> <input type="checkbox"/> A/C	<input checked="" type="checkbox"/> MOBILE LAUNCHER SA-8 <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____
CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.2m (10.5') DIAMETER: 21cm (0.7') SPAN: 64cm (2.1') WEIGHT: 190kg (418#) OTHER: _____		RANGE: 10-14km (6-9mi) ALTITUDE: 6100m (20,000') SPEED: Mach 2.0+ OTHER: _____	
		BASIS FOR LAUNCH <u>Radar on target.</u> <u>Launcher aimed.</u> _____ <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Highly mobile forward surface-to-air anti-aircraft missile.		USSR
AIRFRAME	Slender cylindrical body with gently tapering nose. Cruciform swept canard controls and fixed tail fins.		USSR
PROPULSION	Dual thrust solid propellant.		USSR
GUIDANCE	Command midcourse with IR homing. Radar tracking with computer generated command.		USSR
FUZING	Proximity.		USSR
WARHEAD	45kg (99#) high explosive.		USSR
REMARKS			
<p>The SA-8 is roughly equivalent to the Roland. The weapon system comprises a new six-wheeled amphibious vehicle carrying a rotating four round launcher surmounted by a folding surveillance radar antenna, with a forward mounted target tracking radar flanked by two command dishes. A total of 12 rounds is thought to be carried by each vehicle. Two missiles can be launched at the same target, using different frequencies for the command link. A low-light TV camera mounted on top of the tracking/command assembly is used for optical target tracking and probably for automatic missile "gathering". The SA-N-4 is the naval version. Vehicle radar can track out to 12-15 miles.</p>			
USERS	KEY DATES	COSTS	
USSR	PRESENT STATUS: Operational	UNIT COSTS:	
	IOC: First seen in 1975	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE:	

OTHER INFORMATION:



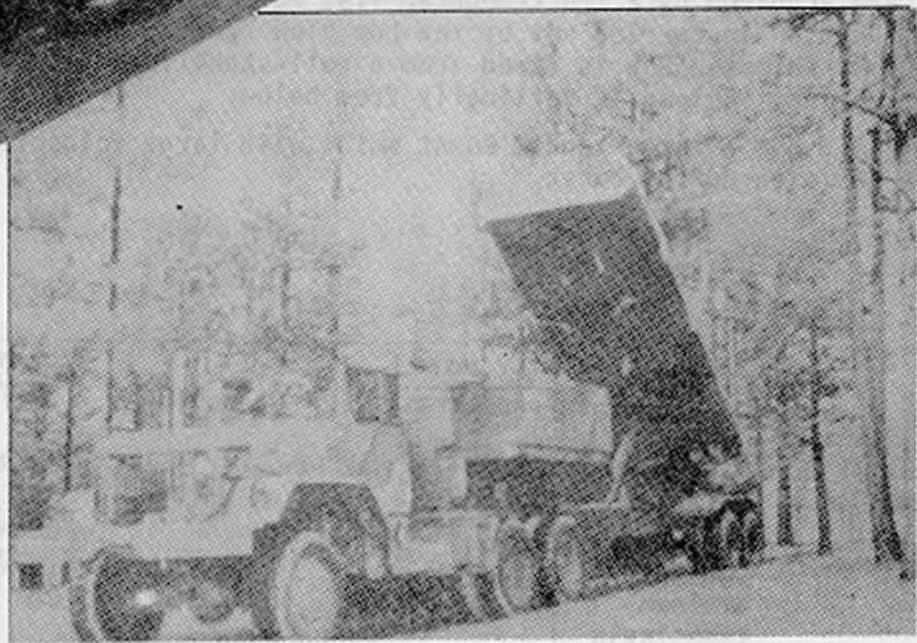
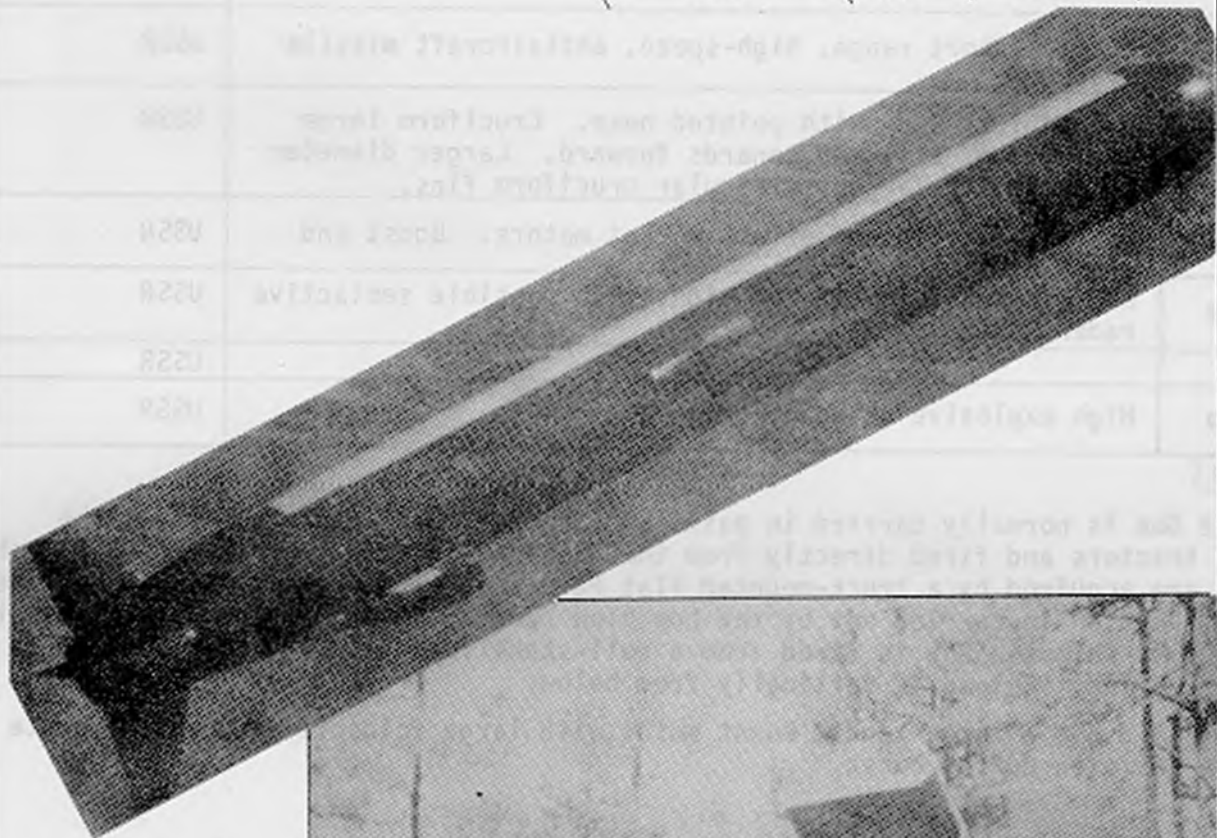
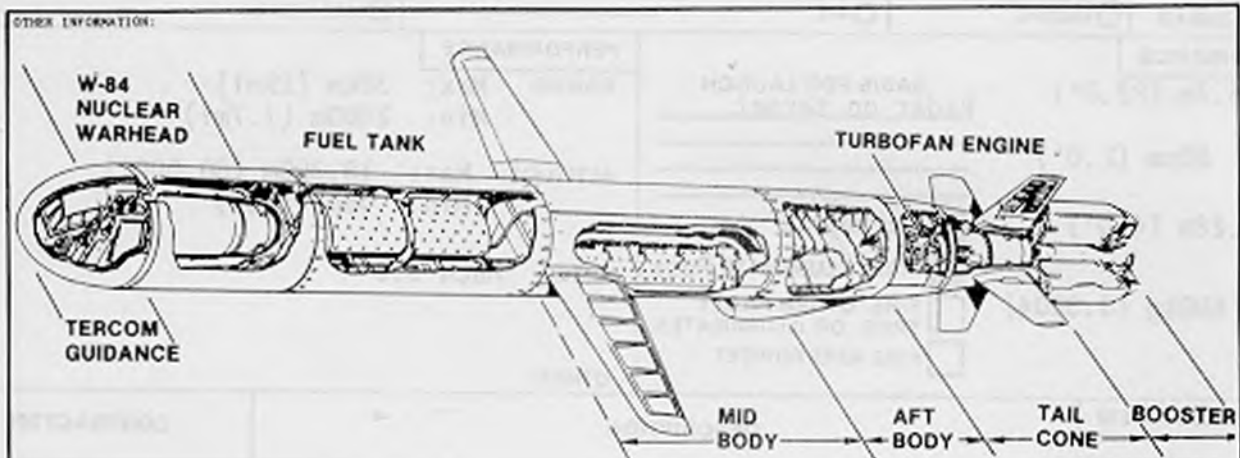
VEHICLE CARRIES:

- TRACKING RADAR - I-BAND, 13 TO 15 GHz  
RANGE 25 TO 25 KM/10.8 TO 13.5 NMI
- BEACON RECEIVER - I-BAND, 13 TO 15 GHz
- SURVEILLANCE RADAR - G-H-BAND 4 TO 8 GHz,  
ESTD RANGE 30 KM/16.20 NMI
- COMMAND RECEIVER 2x2, POSSIBLE COUPLED  
WITH BEACON RECEIVER AS ECCM
- OPTICAL TARGET TRACKER



## GLCM

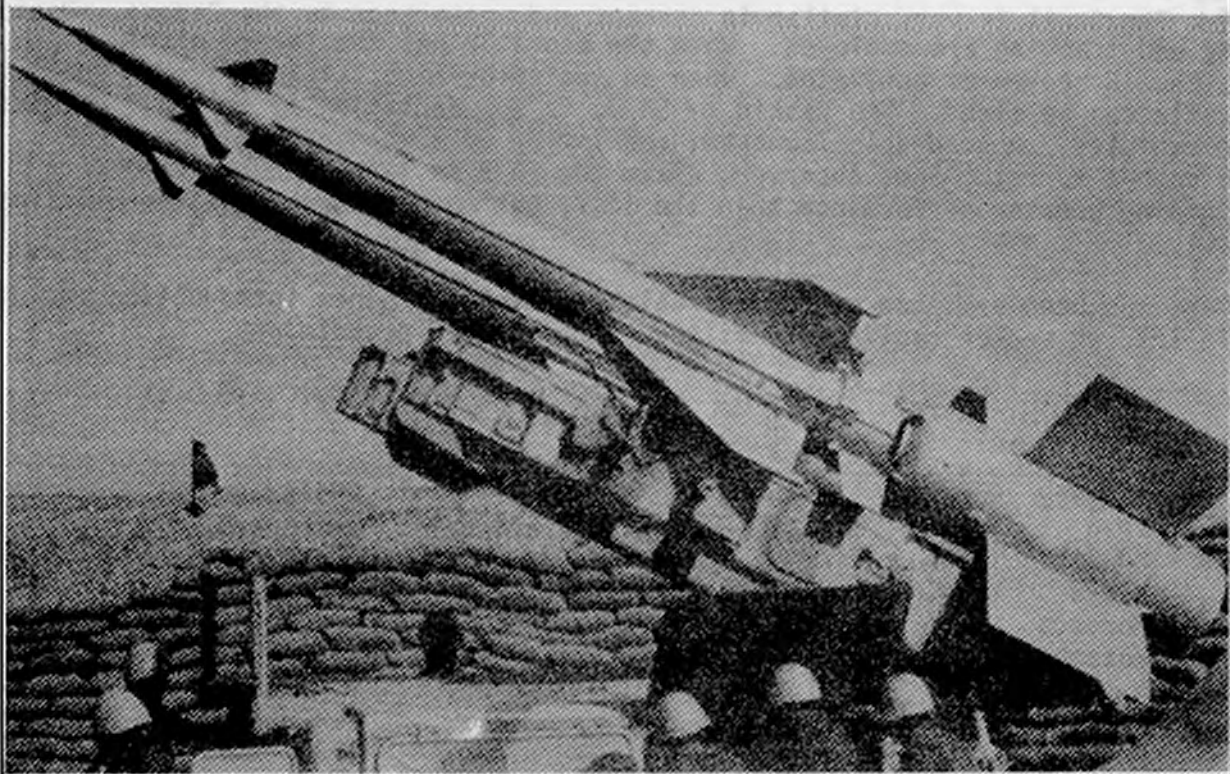
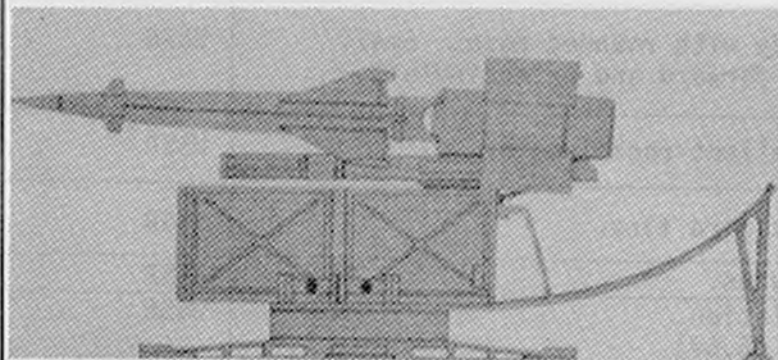
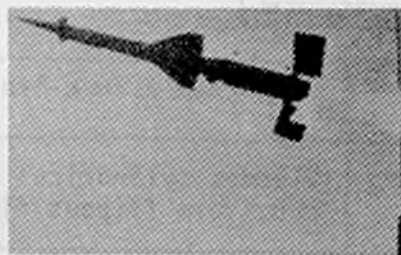
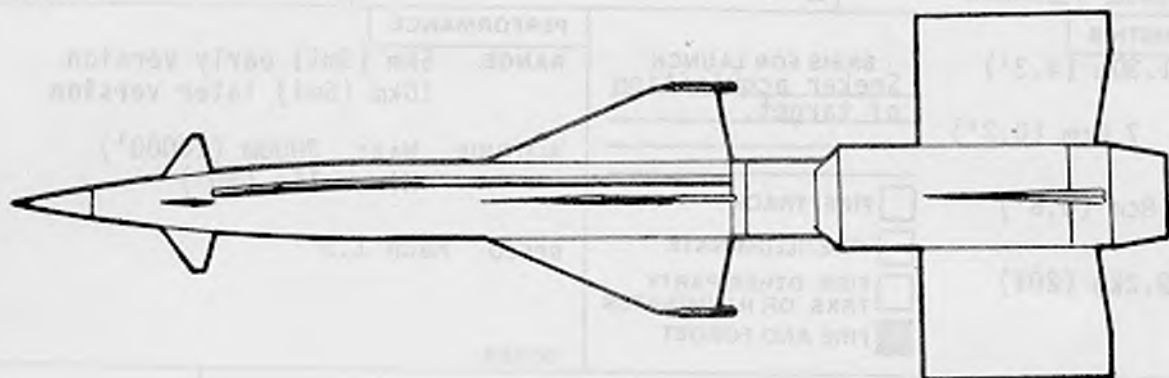
NAME <u>GLCM (Tomahawk)</u>		DEVELOPER <u>General Dynamics</u>	
DESIGNATION <u>BGM-109G</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 5.55m (18.2') DIAMETER: 0.53m (1.76') SPAN: Max. 2.62m (8.6') WEIGHT: 1204.5kg (2650#) OTHER: Length 6.25m (20.5') w/booster		RANGE: 2500km (1550mi) ALTITUDE: Low level, down to few meters. SPEED: High subsonic OTHER:	
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		BASIS FOR LAUNCH <u>Missile inoperated with terrain data and target location.</u>	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Air Force tactical application of Tomahawk cruise missile. Launches from mobile transporter/launcher. Designed for deep interdiction targets.		General Dynamics/Convair
AIRFRAME	Tubular shaped body with extendible cruciform tail fins, 2 midbody wings, and engine inlet underneath near tail.		General Dynamics
PROPULSION	Solid propellant rocket booster - 7000# thrust, vane control; turbofan engine - 600# thrust.		Rocket-Atlantic Res Engine-Williams Int
GUIDANCE	Terrain comparison aided inertial system.		Inertial-Litton Tercom-MacDac
FUZING	Air burst.		
WARHEAD	Nuclear W-84 w/200kt estimated yield		DOE
REMARKS	<p>The Tomahawk, GLCM (Ground-Launched Cruise Missile) is the land launched version of the Tomahawk, SLCM. It is launched from a combined transporter - erector-launcher which carries four missiles and which would be deployed from hardened shelters. The missile is launched with the same booster used for submarine launches. Initial control is by means of booster mounted jet tabs. After boost, the tail fins are extended, the wings and engine inlet are deployed, and the booster jettisoned. The turbofan ignites, cruise altitude is attained, and the missile flies to the target under control of the terrain comparison-aided inertial guidance.</p>		
*See also Tomahawk, SLCM and MRASM			
USERS	KEY DATES	COSTS	
USA	PRESENT STATUS: Engineering Development/Production IOC: 1983	UNIT COSTS: Estimated \$1 million average cost in 1982 \$ S. LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: 11	



## GOA

NAME GOA		DEVELOPER	
DESIGNATION SA-3, SA-N-1		COUNTRY USSR	
		SERVICE Army/Navy	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 6.7m (22.0') DIAMETER: 60cm (2.0') SPAN: 1.22m (4.0') WEIGHT: 600kg (1,320#) OTHER:		RANGE: Max: 30km (19mi) Min: 2800m (1.7mi) ALTITUDE: Max: 18,300m (60,000') Min: 45m (150') SPEED: Mach 3.5 OTHER:	
		BASIS FOR LAUNCH Radar on target.	
		<input checked="" type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE POSS. <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Mobile, short range, high-speed, anti-aircraft missile system.		USSR
AIRFRAME	Cylindrical body with pointed nose. Cruciform large delta wings aft, and canards forward. Larger diameter booster with large rectangular cruciform fins.		USSR
PROPULSION	Two stage solid propellant rocket motors. Boost and sustain.		USSR
GUIDANCE	Radio command to line of sight with possible semiactive radar homing.		USSR
FUZING			USSR
WARHEAD	High explosive warhead.		USSR
REMARKS			
<p>The Goa is normally carried in pairs on its wheeled transport vehicle, the ZIL-157 tractors and fired directly from that vehicle or from trainable twin launchers. Targets are acquired by a truck-mounted Flat Face surveillance radar while the fire control function is carried out by the Low Blow radar. SA-N-1 is the Naval variant of Goa. Aboard ship the Goa is fired from a roll-stabilized twin launcher mounted on top of the magazine. Reload is vertically from below.</p> <p>The SA-3 has a large tandem boost motor with large foldable fins which rotate 90° into position during boost.</p>			
USERS	KEY DATES	COSTS	
USSR	Libya	UNIT COSTS:	
Cuba	N. Vietnam	LAUNCH UNIT:	
Czechoslovakia	Peru	QUANTITIES	
E. Germany	Poland	TOTAL TO DATE:	
Egypt	Russia		
Finland	Syria		
Hungary	Uganda		
India	Vietnam		
Iraq	Yugoslavia		
	PRESENT STATUS: Operational.		
	IOC: 1961		

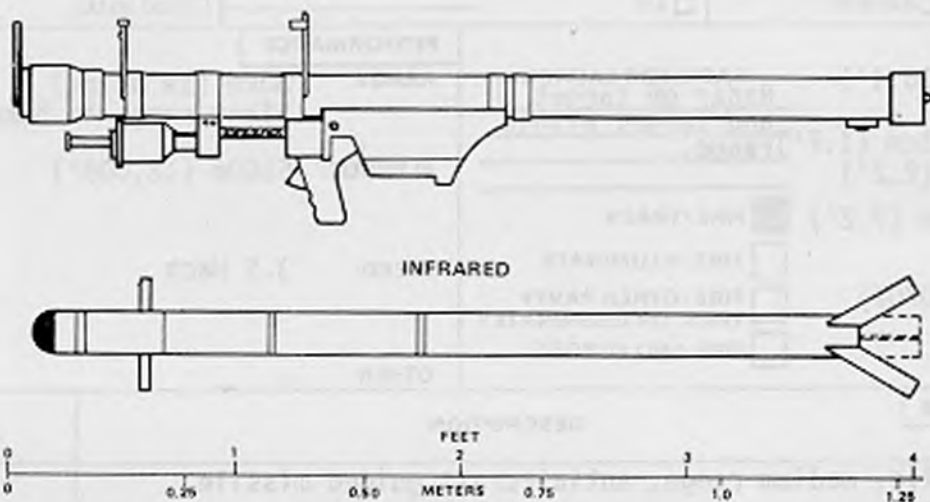
OTHER INFORMATION:



# GRAIL

NAME <u>GRAIL (Gaskin)</u>		<b>GRAIL</b>		DEVELOPER _____	
DESIGNATION <u>SA-7, -9, SA-N-7</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Army/Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <u>Gaskin</u> <input checked="" type="checkbox"/> MAN- <u>Grail</u> <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>1.30m (4.3')</u> DIAMETER: <u>7.0cm (0.2')</u> SPAN: <u>16.8cm (0.6')</u> WEIGHT: <u>9.2kg (20#)</u> OTHER: _____			RANGE: <u>5km (3mi) early version</u> <u>10km (6mi) later version</u> ALTITUDE: Max: <u>3000m (10000')</u> Min: <u>15m (50')</u> SPEED: <u>Mach 1.5</u> OTHER: _____		
			BASIS FOR LAUNCH <u>Seeker acquisition of target.</u>		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Manportable, tube-launched, anti-aircraft missile system.		USSR	
AIRFRAME		Slender cylindrical body with rounded nose. Small cruciform flipout fins forward and extending aft.		USSR	
PROPULSION		Dual-thrust, solid propellant rocket motor.		USSR	
GUIDANCE		IR homing, steered by canard fins.		USSR	
FUZING		Proximity and impact fuzes.		USSR	
WARHEAD		High explosive fragmentation. Warhead weight: <u>2.5kg (5.5#)</u> .		USSR	
REMARKS					
<p>The Grail is very similar in concept and appearance to the Redeye. Optical sighting and tracking are employed. When the operator has the target within his sights, the IR seeker is activated. When an indicator light signals seeker acquisition, the missile can be fired. The Gaskin, or SA-9, is an adaptation of the SA-7 mounted upon armored vehicles. A quadruple launcher, consisting of 4 rectangular launch boxes, is mounted upon a turret. Some observers claim the SA-9 is larger and heavier with corresponding greater performance than the SA-7, but most believe that the missiles are identical.</p> <p>There has been evidence of considerable improvements since introduction including possible IFF, IR seeker cooling, IR filter, and improved propulsion.</p>					
USERS		KEY DATES		COSTS	
Hungary USSR Angola Bulgaria China Cuba Czech. E. Germany Egypt Ethiopia		Romania Syria Yemen Yugo.		PRESENT STATUS: <u>Operational</u> IOC: <u>Preceded Redeye</u> <u>Early 1960s.</u> <u>Updated version - 1972</u>	
				UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: <u>50,000 estimated</u>	

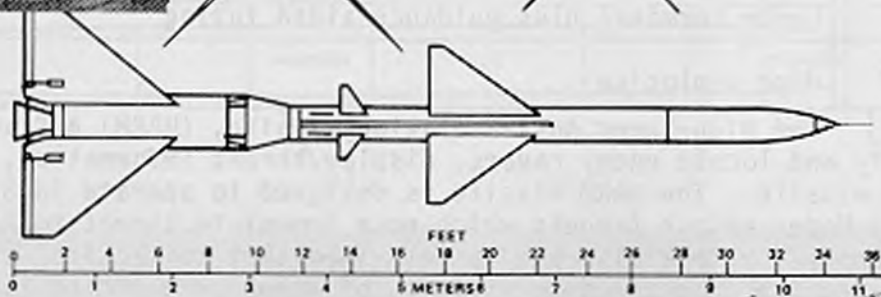
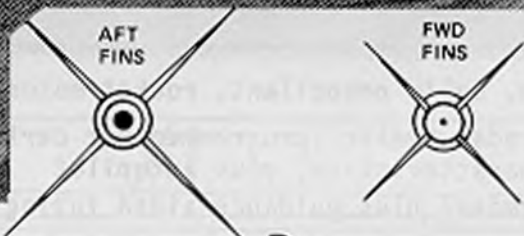
OTHER INFORMATION



# GUIDELINE

NAME <u>Guideline</u>		<b>GUIDELINE</b>		DEVELOPER _____	
DESIGNATION <u>SA-2, SA-N-2</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Army/Navy</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 10.7m (35.1') DIAMETER: Miss. 51cm (1.7') Booster 70cm (2.2') SPAN: About 2.2m (7.2') WEIGHT: 2300kg (5070#) OTHER: _____			RANGE: 30km (19 miles) Slant range to 50km (31 miles) ALTITUDE: 5500m (18,000') SPEED: 3.5 Mach OTHER: _____		
			<b>BASIS FOR LAUNCH</b> <u>Radar on target</u> <u>and target within</u> <u>range.</u>		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Mobile, medium range, antiaircraft guided missile system.		USSR	
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose and flared tail. Cruciform wings (midbody), tail fins, and nose tabs. Larger diameter booster rear with large cruciform fins.		USSR	
<b>PROPULSION</b>		Two stage, solid propellant rocket booster and liquid propellant sustainer rocket.		USSR	
<b>GUIDANCE</b>		Radio command guidance with semiactive radar homing on later versions.		USSR	
<b>FUZING</b>		Contact, proximity and command fuzes.		USSR	
<b>WARHEAD</b>		High explosive. Weight: 130kg (286#)		USSR	
<b>REMARKS</b>		The Guideline (Soviet designation V750vk) system includes the FAN SONG radar, fire control units and power supplies, is mounted on the ZIL 157 cross country, semitrailer, transporter/erector. The radar feeds a computer, which generates steering commands to the missile via a UHF command link. The SA-N-2 is the naval version of the Guideline, which is known to be used on only one ship, the Dzerzhinski. A somewhat larger version of the Guideline seen in 1967 has been thought to carry a nuclear warhead.			
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
E. Germany USSR Afgan. Albania Algeria Bulgaria China Cuba Czech.		Poland Romania Syria N. Vietnam Yugoslavia		PRESENT STATUS: Operational but being replaced. IOC: About 1958 Nuclear W/H version - 1967	
				UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE:	

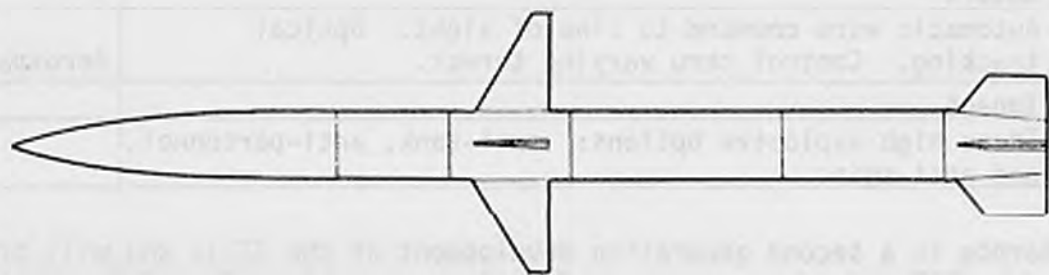
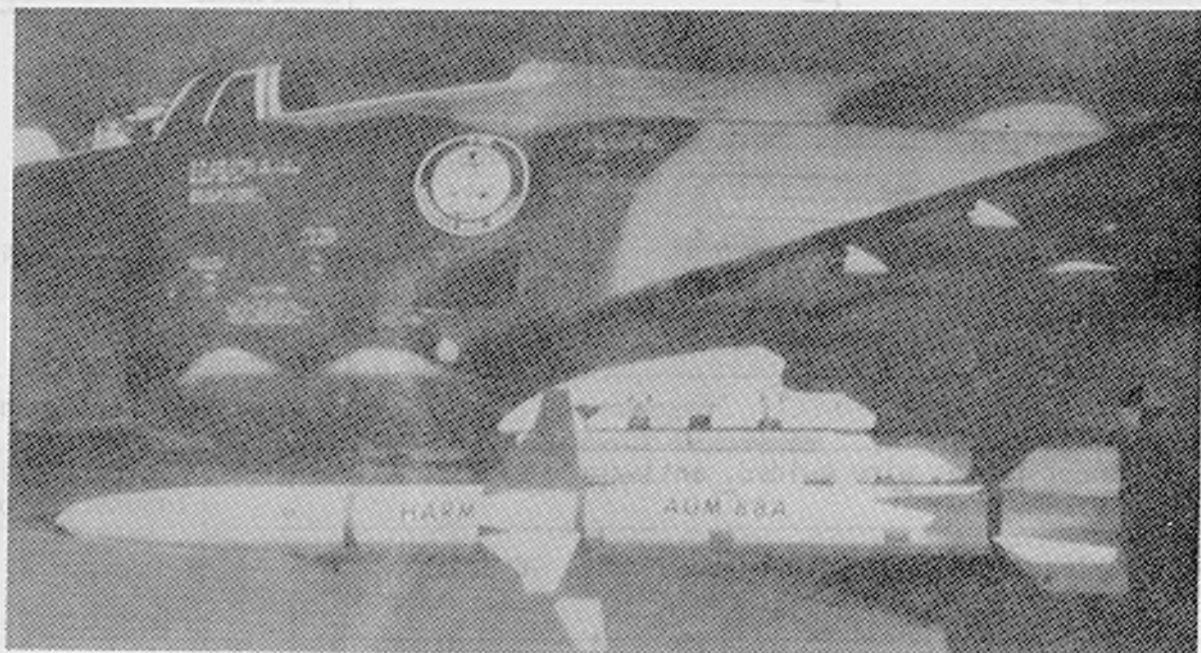
OTHER INFORMATION:



# HARM

NAME <b>HARM</b>		<b>HARM</b>		DEVELOPER <b>Texas Instruments</b>	
DESIGNATION <b>AGM-88A</b>				COUNTRY <b>USA</b>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS				TARGETS	
LENGTH: 41.8m (13.7') DIAMETER: 26cm (0.9) SPAN: 1.13m (3.7') WEIGHT: 362kg (796#) OTHER: 66.4kg (146#) warhead		BASIS FOR LAUNCH <u>At pilot's disposition, lock-on not required</u>		<input checked="" type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <b>Radar</b> <b>A/C installation</b>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		PERFORMANCE RANGE: Max: About 40km (25mi) ALTITUDE: A/C Altitude SPEED: Supersonic OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	High speed, anti-radiation, defense suppression missile		Texas Instruments		
AIRFRAME	Long cylindrical body with cruciform tail control surfaces and cruciform mid body wings.		Texas Instruments		
PROPULSION	Two stage, solid propellant, rocket motor		Thiokol		
GUIDANCE	Passive radar seeker (programmed for certain target characteristics) plus autopilot		Seeker - TI Autopilot-		
FUZING	Laser terminal plus guidance aided fuzing		Laser - Motorola		
WARHEAD	High explosive				
REMARKS	<p>The High-Speed Anti-Radiation Missile, (HARM) A/C avionics will detect, identify and locate enemy radars, display threat information, and pass target parameters to the missile. The HARM missile is designed to operate in 3 basic modes: (1) Self Protect Mode - attack targets which pose immediate threat to A/C, (2) Target of Opportunity - attack discrete targets important to tactical situation, (3) Pre-Brief Mode - missile programmed to vicinity of known or expected targets, and to attack when lock-on is achieved.</p> <p>Launch A/C considered for Harm are the A-7E, A-6F, F-4G and F/A-18 aircraft.</p>				
USERS	KEY DATES		COSTS		
USA	PRESENT STATUS: Engineering Development IOC: Mid 1983		UNIT COSTS: \$250,000-\$500,000 LAUNCH UNIT:		
			QUANTITIES TOTAL TO DATE: 150 test units total inventory of over 10,000 planned		

OTHER INFORMATION:

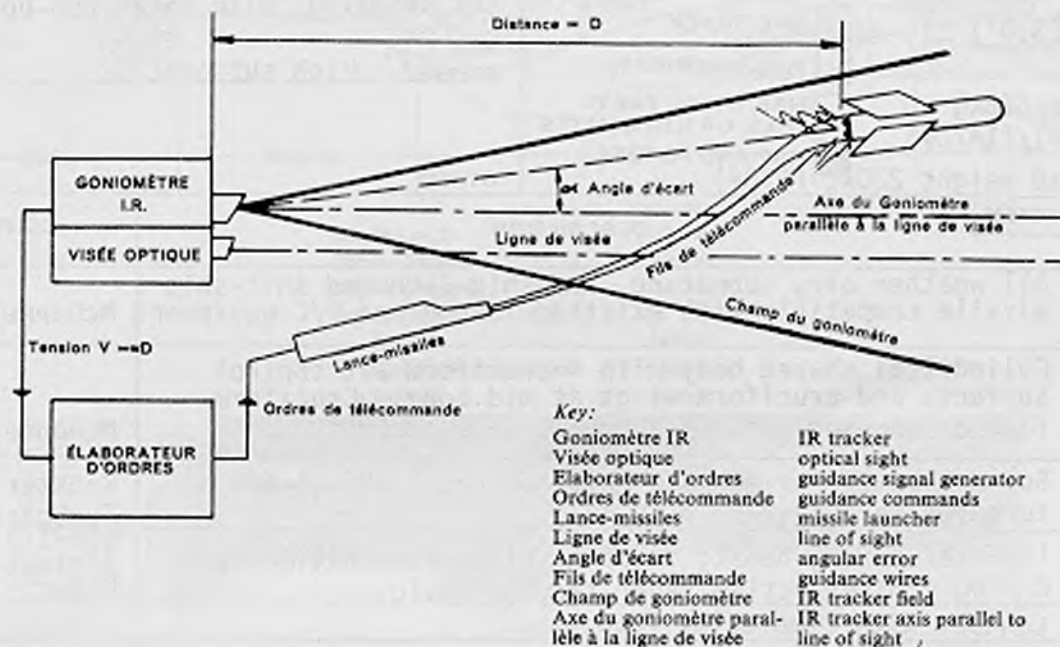


# HARPON

NAME <u>HARPON</u>		<b>HARPON</b>		DEVELOPER <u>Aerospatiale</u>	
DESIGNATION _____				COUNTRY <u>France</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS			PERFORMANCE		
LENGTH: 1.22m (4.0') DIAMETER: 16.5 (0.5') SPAN: 50cm (1.6') WEIGHT: 30.4kg (67#) OTHER: 6kg (13#) w/h			RANGE: 2.9km (1.8 mi) ALTITUDE: Line of sight SPEED: Subsonic to 190 m/s (625fps) OTHER: 1m ± LOS accuracy claimed.		
			BASIS FOR LAUNCH <u>Optical sight on target</u>		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Short range, wire guided, anti-armor missile system.		Societe National Indust. Aerospatiale	
AIRFRAME		Cylindrical body with rounded nose. Cruciform large wings aft.		Aerospatiale	
PROPULSION		Two stage solid propellant rocket motors		SNPE	
GUIDANCE		Automatic wire command to line of sight. Optical tracking. Control thru varying thrust.		Aerospatiale	
FUZING		Impact.			
WARHEAD		Three high explosive options: anti-tank, anti-personnel, and anti-ship.			
REMARKS					
The Harpon is a second generation development of the SS.11 and will probably be replaced by HOT. Harpon uses an inexpensive, semiautomatic guidance system which is also used in the Milan and HOT antitank weapons and the Roland short range surface-to-air system. The launch process is as follows: Gunner aims at the target with the optical sighting device. Missile, which has aft-mounted tracer flares radiating chiefly in the IR spectrum is acquired by a precision goniometer reacting to IR radiation. Reference axis of the goniometer is parallel to the optical axis of the sight. Angular deviation voltages supplied by this device enable a computer to form signals to the missile to return it to the line of sight. Signals to be given to the missile are tied to the metric rather than angular range and also makes other minor adjustments which have to be compensated for. Steering signals are transmitted to the missile by wire.					
USERS		KEY DATES		COSTS	
France Saudi Arabia W. Germany		PRESENT STATUS: Operational but being replaced. IOC:		UNIT COSTS:  LAUNCH UNIT:	
				QUANTITIES TOTAL TO DATE:	

OTHER INFORMATION:

The guidance system developed for the *Harpon*, *Hot* and *Milan* missiles simplifies the task of guiding the missile in flight, as the aimer has only to keep his sight bearing on the target. The missile is then retained within 1 metre of the line of sight during its flight. The missile carries sighting flares at the rear which are tracked by an IR sensor, guidance corrections are then passed via the wire link to the missile. This system provides a high degree of accuracy and only a small number of rounds need be fired during training.



Nord-aviation has produced this turret, designation N.A2, for launching guided missiles from vehicles. The turret can be installed without modification on all vehicles with the standard NATO 800 mm. diameter circular mounting including the M.113 armoured personnel carrier. The turret was developed specially for operation of the *Harpon* missile which has semi-automatic infrared guidance, but it can also be used for missiles of the SS.12 type (on the gun-mount outrigger on the left hand photo is a *Harpon* missile and right an SS.12 rocket). The lightly armoured turret is equipped with a Type IR No.825902 infrared sighting device which Nord-aviation has produced in co-operation with Bölkow. The complete system weighs, together with two missiles, around 1,100 lb. The development of the N.A2 turret was funded by the Italian Army and adaptation of the system to the M.113 was undertaken by the Italian army arsenal in Bologna.

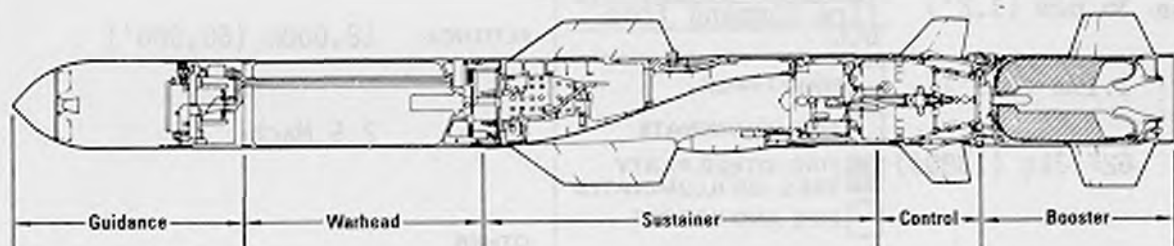


# HARPOON

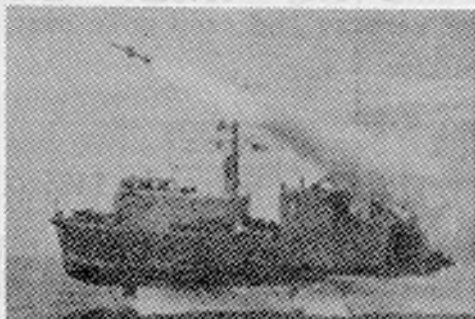
NAME <u>Harpoon</u>		<b>HARPOON</b>		DEVELOPER <u>McDonnell Douglas</u>	
DESIGNATION <u>AGM/RGM-84A</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Navy</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Submarine</u>	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
CHARACTERISTICS	PERFORMANCE				
LENGTH: <u>3.84m (12.6')</u> <u>4.57m (15.0')</u> DIAMETER: <u>34cm (13.5')</u>  SPAN: <u>92cm (3.0')</u>  WEIGHT: <u>531kg/668kg (1168#)/(1470#)</u> OTHER: Warhead weight <u>230kg (570#)</u>	RANGE: Air: <u>160km (100mi)max.</u> Ship: <u>55km (35mi)max.</u>  ALTITUDE: Various (ballistic initial, then sea skimming, with final pop-up attack).  SPEED: High subsonic  OTHER:	BASIS FOR LAUNCH <u>Target position and velocity data input to missile</u>			
	<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION			CONTRACTOR	
OVERALL SYSTEM	All weather air, submarine, and ship-launched anti-ship missile compatible with existing launch and F/C equipment			McDonnell Douglas	
AIRFRAME	Cylindrical shaped body with 4 cruciform aft control surfaces and cruciform wings at mid body. Cruciform fire or booster.			McDonnell Douglas	
PROPULSION	Solid booster for sub and ship launch. J402-CA-400 turbojet for cruise			Booster - Aerojet Turbojet - Teledyne	
GUIDANCE	Inertial during boost; inertial plus radar altimeter during cruise; active radar terminal guid.			Inertial - Lear/Nor. Altimeter - Honeywell Radar - TI	
FUZING	Contact with time delay fuze.				
WARHEAD	High explosive, blast penetration			NWC/China Lake	
REMARKS	Harpoon has been designed to be adaptable to existing launch and fire control systems. It can utilize Tartar, ASROC, or canister launchers for surface launch. The main body of the missile is common to all applications. The aerodynamic surfaces come in several forms for various launchers and are designed for quick attachment. A solid propellant booster is used for all surface launches. The booster propels the missile on a ballistic trajectory until separation. The missile then descends to a low cruise altitude, determined by the altimeter, and cruises to target. Terminal homing is provided by an active radar seeker.  The Navy S-3 Viking, the P3 Orion patrol A/C, and the A-6 and A-7 attack have been used as airborne launch platforms.				
USERS	Saudi Arabia Spain Turkey UK	KEY DATES	PRESENT STATUS: Operational	COSTS	UNIT COSTS:
USA Australia Denmark W. Germany Greece Israel Japan Netherlands South Korea		IOC: 1978 - Ships 1979 - A/C, patrol, sea 1981 - Attack A/C		LAUNCH UNIT: ---	
				QUANTITIES	TOTAL TO DATE: 1800 - U.S. 1300+ Ordered by other countries.

# HARPOON

OTHER INFORMATION:



	Air Launch	Ship Launch
Missile Length	151.2 in.	182.2 in.
Missile Diameter	13.5 in.	13.5 in.
Missile Wingspan	36.0 in.	36.0 in.
Missile Weight	1168 lb.	
• ASROC		1470 lb.
• Canister, Encapsulated		1530 lb.
• TARTAR		1530 lb.

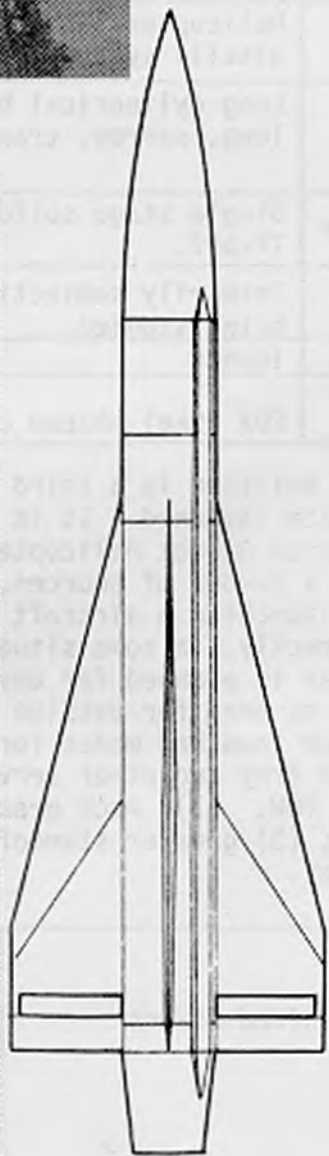


# HAWK, IMP.

NAME <u>HAWK, Improved</u>		<b>HAWK, IMP.</b>		DEVELOPER <u>Raytheon</u>							
DESIGNATION <u>MIM-23B</u>				COUNTRY <u>USA</u>		SERVICE <u>Army</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 5.03cm (16.5') DIAMETER: 36.6cm (1.2') SPAN: 1.19m (3.9') WEIGHT: 627.3kg (1380#) OTHER:				<b>PERFORMANCE</b> RANGE: 40km (25 miles) ALTITUDE: 18,000m (60,000') SPEED: 2.5 Mach OTHER:							
<b>OTHER:</b> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input checked="" type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				<b>BASIS FOR LAUNCH</b> <u>Illuminator lock-on, launcher aimed, and fire command from BCC.</u>							
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		All weather low to medium altitude air defense missile system.				Raytheon					
<b>AIRFRAME</b>		Slender cylindrical body with slight taper at tail and pointed nose. Cruciform long chord cropped delta wings with control surfaces at trailing edge.				Raytheon					
<b>PROPULSION</b>		Two stage solid propellant rocket motor. XM 112.				Aerojet					
<b>GUIDANCE</b>		CW semiactive radar homing on signal provided by illuminator.				Raytheon					
<b>FUZING</b>		Proximity fuze.									
<b>WARHEAD</b>		High explosive blast fragmentation, 73kg (160#).									
<b>REMARKS</b>		<p>The improved HAWK has a new guidance package, a larger warhead, improved solid propellant rocket motor, increased ECM protection, solid state electronics, and missiles that are "certified" factory sealed. A French-German-American consortium of Thomson CSF, Messerschmitt-Boelkow Blohm and Raytheon conducts the HAWK improvement program in Europe.</p> <p>The improved HAWK battery has two acquisition radars (one for medium and high altitudes and another for low altitudes), a special radar to provide range information in an enemy initiated jamming environment, a Battery Control Central that houses tactical displays and controls, a data processor and either two or three firing platoons depending on the desired configuration. Each platoon has a tracking radar and three launchers containing a total of nine ready missiles. The HAWK missile carries a large, proximity fuzed, high explosive warhead and need only pass near the target to destroy it.</p>									
<b>USERS</b>		Italy Sweden USA Japan Taiwan Belgium Jordan Thailand Denmark Kuwait France Nether. Germany Philippines Greece Saudi Arabia Iran S. Korea Israel Spain		<b>KEY DATES</b>		<b>COSTS</b>					
				PRESENT STATUS: Operational		UNIT COSTS: \$155,000 FY'80 \$'s					
				IOC: Improved Hawk - 1972 Product Improved Hawk - 1979		LAUNCH UNIT: Total system about \$12,500,000					
						<b>QUANTITIES</b>					
						TOTAL TO DATE: Over 17,000					

## HAWK, IMP.

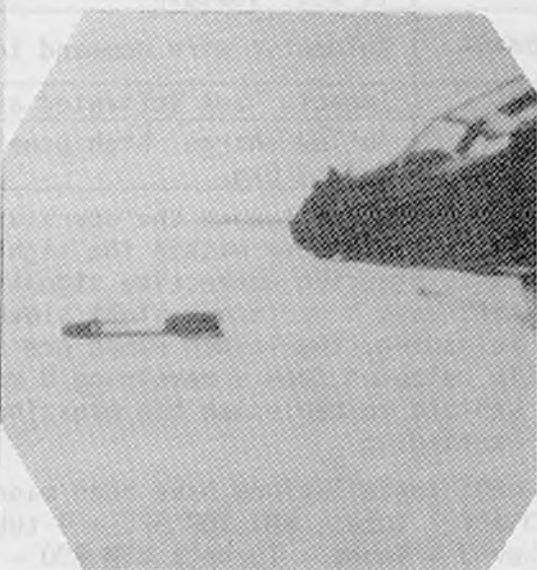
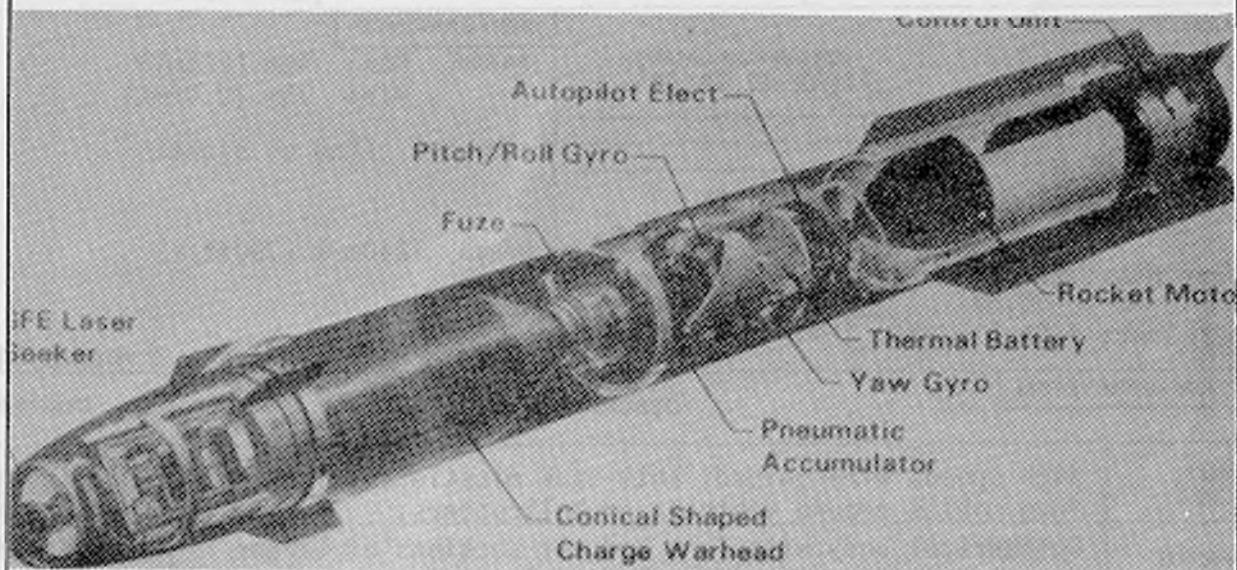
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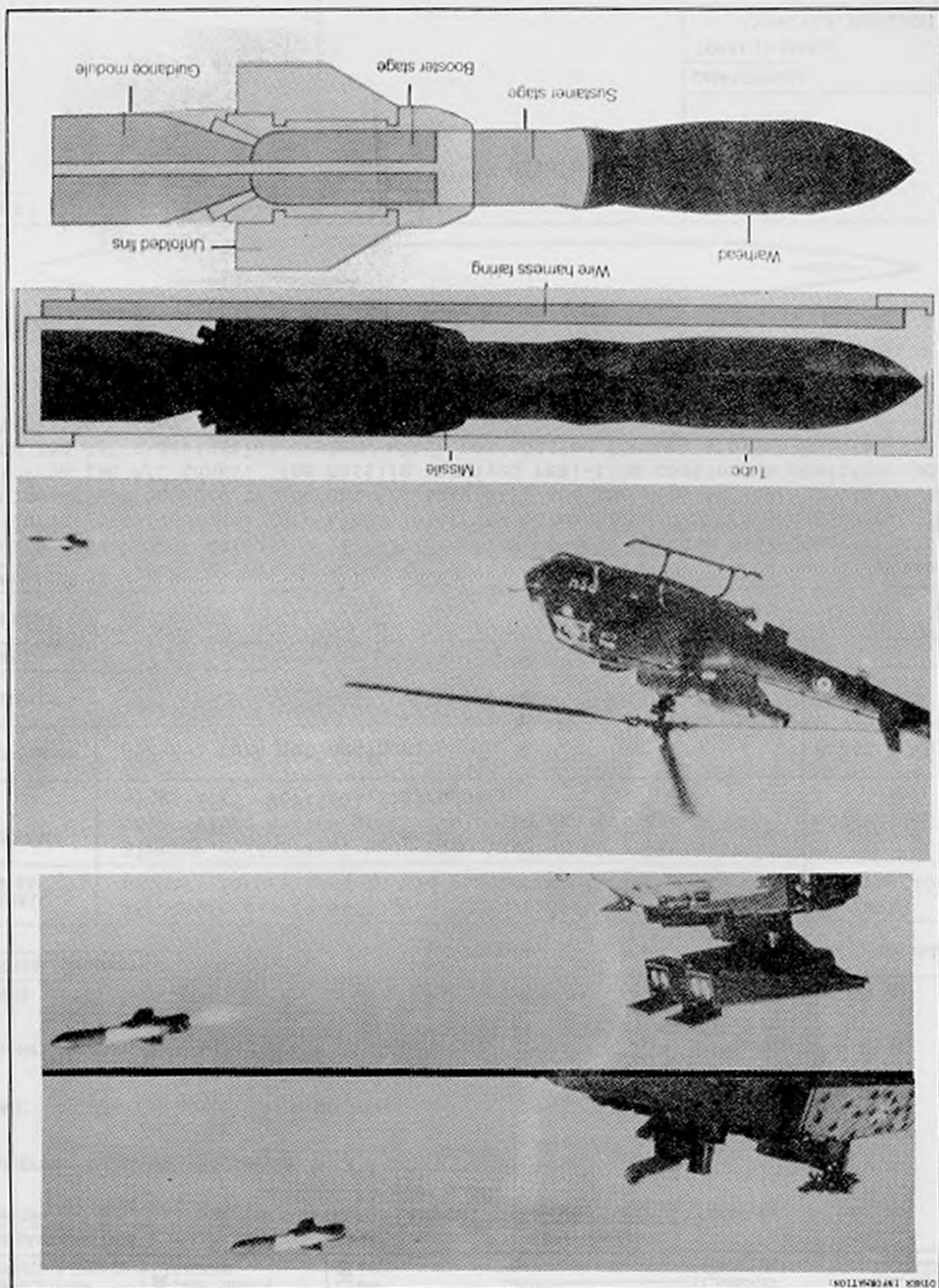
# HELLFIRE

NAME <u>HELLFIRE (HMMS)</u>		<b>HELLFIRE</b>		DEVELOPER <u>Rockwell Int'l</u>	
DESIGNATION <u>None</u>				COUNTRY <u>USA</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Helicopter	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <u>Study</u> <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 1.65m (5.4') DIAMETER: 17.78cm (0.6') SPAN: 33.5cm (1.1') WEIGHT: 44.8kg (98.5#) OTHER:		RANGE: 7km (4.3 miles) ALTITUDE: Aircraft altitude SPEED: Supersonic OTHER:		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		BASIS FOR LAUNCH <u>Target designated.</u> <u>Missile aimed in</u> <u>general target di-</u> <u>rection.</u>		<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input checked="" type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Helicopter-launched, short range, anti-armor modular missile system. Poss. gd. launch variants.			Rockwell Int'l	
AIRFRAME	Long cylindrical body with blunt rounded ogive and long, narrow, trapezoidal tail fins			Rockwell Int'l	
PROPULSION	Single stage solid propellant rocket motor TX-657.			Thiokol	
GUIDANCE	Primarily semiactive laser. RF/IR and IIR systems being studied.			Laser-Martin Marietta IIR-Computer Scienc.	
FUZING	Impact				
WARHEAD	20# (9kg) shaped charge high explosive				
REMARKS	<p>Hellfire is a third generation antiarmor weapon that can be air or surface launched. It is presently intended for use as the main armament of the Advanced Attack Helicopter. Hellfire homes on a laser spot that can be projected from a number of sources, including ground observers and other aircraft as well as the launching a aircraft itself. This enables the AAH to launch its missiles indirectly, in some situations, without even seeing the target. One follow-on seeker is planned for development that will allow the missile to find its target with no need for outside designation. The AAH can carry up to 16 Hellfire missiles. Ground launched modes for Hellfire are also under consideration, as are uses on other Army and other service aircraft. Hellfire provides significant improvement over TOW: (1) much greater lethality, (2) increased firing rates, rapid or ripple fire; (3) greater standoff range, (4) greater versatility, and (5) less time of flight.</p>				
USERS	KEY DATES		COSTS		
United States	PRESENT STATUS: Engineering Development IOC: About 1984		UNIT COSTS: Estimated \$40,000 each LAUNCH UNIT:		
			QUANTITIES		
			TOTAL TO DATE: About 250 Limited production in late 1981		

OTHER INFORMATION:



NAME <u>HOT</u>		<b>HOT</b>		DEVELOPER <u>Euromissile</u>			
DESIGNATION <u>--</u>				COUNTRY <u>France/West Germany</u>			
				SERVICE <u>Army</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Helicopters		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES Tank <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: <u>1.27m (4.2')</u> DIAMETER: M: <u>13.6cm (0.4')</u> W/H: <u>17.5cm (0.6')</u> SPAN: <u>31cm (1.0')</u> WEIGHT: Miss: <u>23.0kg (50.6#)</u> Container: <u>9.0kg (19.8#)</u> OTHER:			<b>PERFORMANCE</b> RANGE: Max: <u>4km (2.5mi)</u> Min: <u>75m (0.05mi)</u> ALTITUDE: <u>Line of sight.</u> SPEED: <u>240m/s (790ft/s)</u> OTHER: <u>Rate of Fire - 3 rounds/min.</u>				
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>		High speed, wire-guided, anti-tank missile for launch from mobile ground vehicles or helicopters.			Euromissile Consort. Aerospatiale/MBB		
<b>AIRFRAME</b>		Cylindrical body with fore and aft sections of larger diameter. Pointed nose. Cruciform folding wings aft of center.			Aerospatiale		
<b>PROPULSION</b>		Dual thrust solid propellant. 0.9 sec. boost and 17 sec. sustain.			SNIAS		
<b>GUIDANCE</b>		Automatic wire command to line of sight.			MBB		
<b>FUZING</b>		Impact. S-A activated at about 50m.			MBB		
<b>WARHEAD</b>		Hollow charge, high penetration, high explosive. Weight 6kg.			MBB		
<b>REMARKS</b> After launch the operator merely keeps his sight on target until impact. A precision goniometer within the sight picks the missile tail flares and automatically transmits steering corrective signals. The HOT K3S automatic launcher used on armored vehicles uses a periscope sight slaved in elevation and azimuth to the launch ramps. For reloading, the launch ramps are retracted into the vehicle where they are automatically reloaded from a revolving 8 round magazine. Up to 12 missiles can be stored in the vehicle to replenish the magazine. For helicopter application, up to 8 launch tubes are carried.  HOT installations have been made in the following vehicles: <u>Tracked vehicles</u> M-13 APC-2 tubes, AMX 10P APC - 4 tubes, Panhard M3B APC - 4 tubes, Raketenjagd - Panzer 3 - tubes. <u>Turrets</u> UTM 800 - 4 in turret, HCT - 24 in turret. <u>Helicopters</u> Bolkow B0105 - 6 tubes, Gazelle SA 341/342L - 4-6 tubes, Alouette II - 4 tubes, Dauphin SA361H - 8 tubes, and Lynx - 8 tubes.							
<b>USERS</b> France W. Germany China (agreement) Egypt Iraq Kuwait Saudi Arabia S. Africa		<b>KEY DATES</b> PRESENT STATUS: <u>Operational</u>  IOC: <u>1978</u>		<b>COSTS</b> UNIT COSTS:  LAUNCH UNIT:  <b>QUANTITIES</b> TOTAL TO DATE: <u>~50,000</u>			



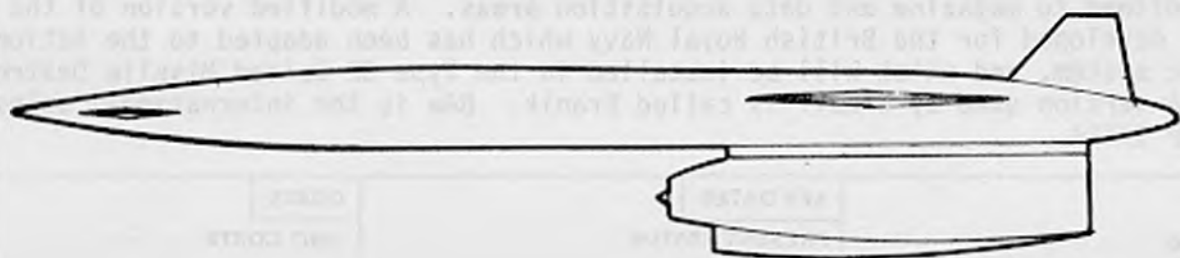
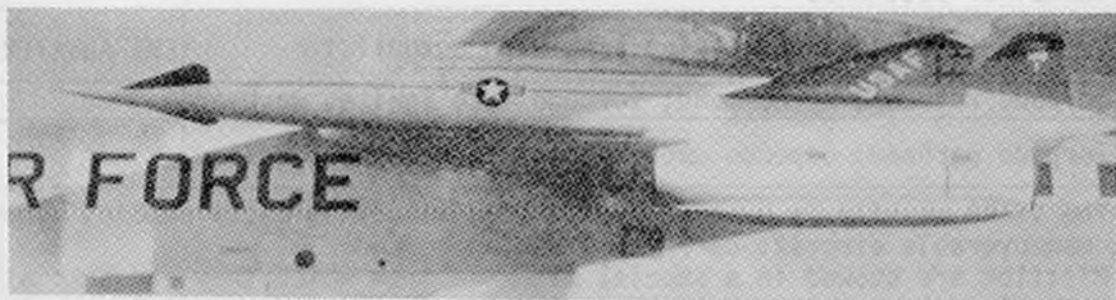
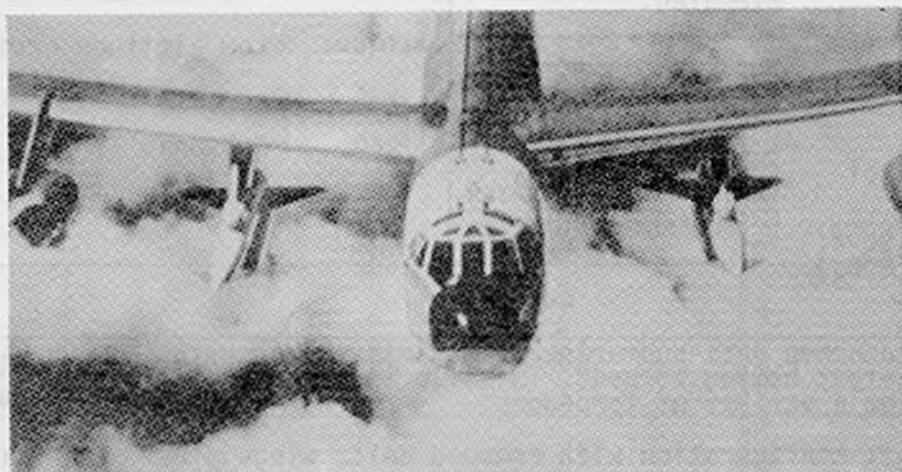
HOT

SWELLS  
 MISSILE  
 SYSTEMS

# HOUND DOG

NAME <u>HOUND DOG</u>		DEVELOPER <u>Rockwell</u>	
DESIGNATION <u>AGM-28B</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Defences &amp; strategic tar.</u>
CHARACTERISTICS		PERFORMANCE	
LENGTH: 12.95m (42.5') DIAMETER: 71cm (2.33') SPAN: 3.66m (12.0') WEIGHT: 4500kg (10000#) OTHER:		RANGE: 960km (600mi) ALTITUDE: 15,000m (49,000') SPEED: 2.0 Mach OTHER:	
		BASIS FOR LAUNCH <u>Launch aircraft and target position input.</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Strategic air-to-surface missile system to attack primary targets and to aid bomber penetration.		Rockwell International
AIRFRAME	Slender cylindrical body with tapered nose and tail under slung engine aft. Two delta canards and delta wings aft. Vertical fin/rudder.		Rockwell
PROPULSION	J52-P-3 turbojet engine.		Pratt & Whitney
GUIDANCE	Inertial with stellar correction system in pylon.		Rockwell
FUZING			
WARHEAD	Nuclear - 1 MT.		AEC/DOC
REMARKS	Hound Dog was designed to serve the role of the B-52 standoff weapon, and to suppress bomber defenses. It was developed solely for the B-52 bomber: this tailoring resulted in a remarkable interplay between the missile and bomber. The missile engines could be used to augment A/C take off, and the missile tanks could be topped off from the A/C tanks. The missile received real-time continuous position updating from the A/C's navigation system, which was updated through a pylon-mounted stellar navigation system.		
USERS	KEY DATES	COSTS	
USA	PRESENT STATUS: <u>Obsolescent</u>	UNIT COSTS:	
	IOC: <u>1961</u>	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE:	<u>Several hundred</u>

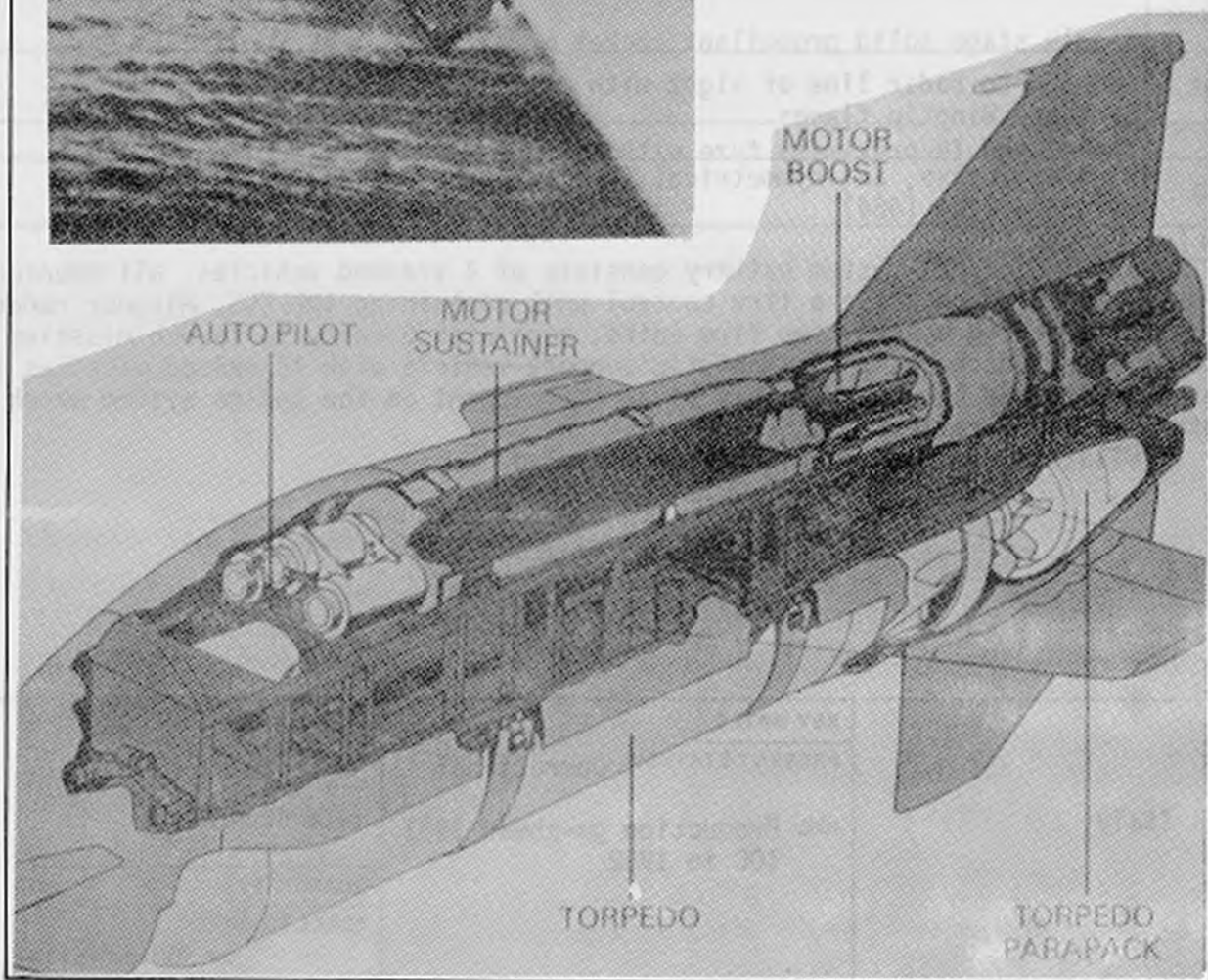
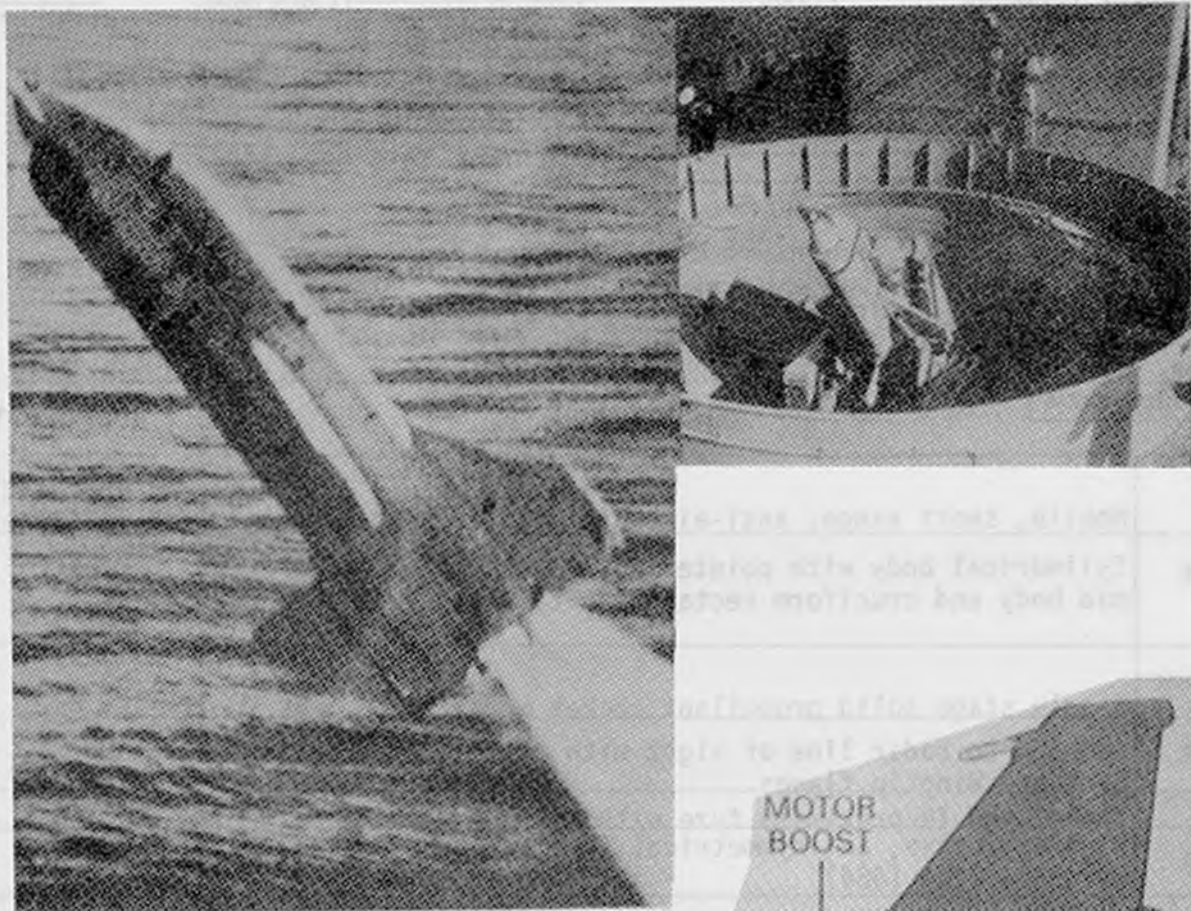
OTHER INFORMATION:



# IKARA

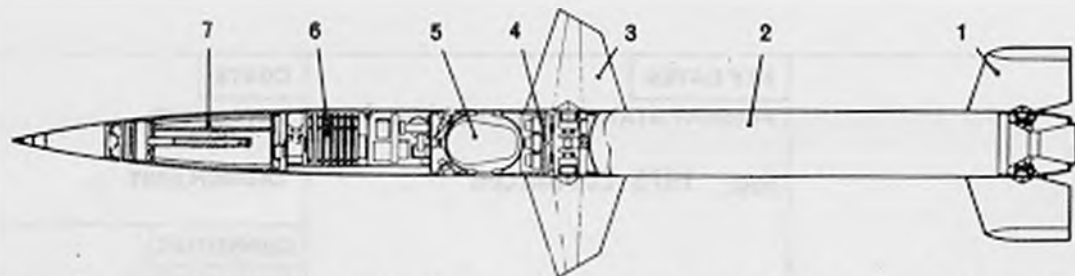
NAME <u>IKARA</u>		<b>IKARA</b>		DEVELOPER <u>Gov't and Industry</u>	
DESIGNATION _____				COUNTRY <u>Australia</u>	
				SERVICE <u>Navy</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Submarine</u>	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 3.4cm (11.2') DIAMETER: 35cm (1.2') SPAN: 1.5m (5.0') WEIGHT: 550kg (incl payload) Missile: 310kg (683#) Payload: 240kg (530#)			RANGE: 16+km (10+ miles) estimated "to maximum sonar detection range" ALTITUDE: Low altitude cruise SPEED: Subsonic OTHER:		
BASIS FOR LAUNCH <u>Launcher aimed and elevated.</u>			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Ship launched anti-submarine guided missile carrying lightweight homing torpedo. Missile is capable of carrying a variety of torpedoes.		Aust. Govt Dept. of Industry & Commerce	
<b>AIRFRAME</b>		Aircraft configuration with cropped delta wings plus dorsal and ventral fins. Torpedo carried in ventral position.		Aust. Govt A/C Factories	
<b>PROPULSION</b>		Solid propellant rocket motor containing boost and sustainer sections.		Aust. Govt Explosives & Ordnance Factories	
<b>GUIDANCE</b>		Command guidance and tracking link with autopilot.		EMI Aust/UK	
<b>FUZING</b>		Torpedo released by command; torpedo fuze ignites warhead.			
<b>WARHEAD</b>		Torpedo warhead; depends upon type of torpedo carried.			
<b>REMARKS</b>					
The IKARA missile is a rocket-propelled, aerodynamically stable, remote controlled, maneuverable aircraft carrying a homing torpedo. Missiles are stowed in a special magazine from which they are automatically loaded on to the launcher, which trains and elevates to the desired firing angles. Immediately after launch, the IKARA is acquired by a broad beam gather aerial and is thereafter continuously tracked by a narrow beam tracking aerial. Sonar, ship and missile data is continuously updated and processed and the torpedo is released on command to parachute to the optimum water entry point. The variants of the IKARA system in service with three navies are essentially the same with major differences being confined to magazine and data acquisition areas. A modified version of the IKARA has been developed for the British Royal Navy which has been adapted to the Action Data Automatic system, and which will be installed in the Type 82 Guided Missile Destroyers. The IKARA version used by Brazil is called Branik. BAe is the international sales agent for IKARA.					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
Australia Brazil United Kingdom		PRESENT STATUS:  ioc: ~1972		UNIT COSTS: --  LAUNCH UNIT: \$1.5M (FY'80) per ship system	
				<b>QUANTITIES</b>	
				TOTAL TO DATE:  About 1200	

OTHER INFORMATION:



NAME <u>INDIGO/MEI</u>		INDIGO/MEI		DEVELOPER <u>Sistel</u>							
DESIGNATION <u>None</u>				COUNTRY <u>Italy</u>							
				SERVICE <u>Army</u>							
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 3.3m (10.9') DIAMETER: 19.5cm (0.6') SPAN: 81cm (2.7') WEIGHT: 120kg (264#) OTHER:				<b>BASIS FOR LAUNCH</b> <u>Radar or optical</u> <u>sight on target.</u>				<b>PERFORMANCE</b> RANGE: Max.10km, (6.2 miles) Min.1km (.6 miles) ALTITUDE: To 5,000m (16,400') SPEED: 2.5 Mach OTHER:			
<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET											
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR			
OVERALL SYSTEM		Mobile, short range, anti-aircraft missile system.						Sistemi Elettronici SpA (SISTEL)			
AIRFRAME		Cylindrical body with pointed nose. Cruciform wings at mid body and cruciform rectangular tail fins.						SISTEL			
PROPULSION		Single stage solid propellant rocket motor.						IMI			
GUIDANCE		Command to radar line of sight with optical IR tracking backup. Wingtip flares.						Galileo			
FUZING		Impact and IR proximity fuze with self destruct.									
WARHEAD		High explosive, axi-symmetrical fragmentation. Weight - 21kg (46#)									
REMARKS		<p>The Indigo/MEI system battery consists of 4 tracked vehicles, all mounted on an M548 self propelled chassis; a fire control unit containing the FCS, Mirador radars, and an optical tracking system, two fire units, each with 6 ready to launch missiles in sealed containers/launchers, and a logistic support vehicle with 12 reload missiles in their sealed container launchers. This is an improvement on the Indigo system which was mounted in towed trailers.</p> <p>Missiles can be fired singly or in salvo.</p>									
USERS		KEY DATES				COSTS					
Italy		PRESENT STATUS: Operational				UNIT COSTS:					
		IOC: Production go-ahead 1981 IOC in 1982				LAUNCH UNIT:					
						QUANTITIES					
						TOTAL TO DATE:		> 300 missiles			

OTHER INFORMATION

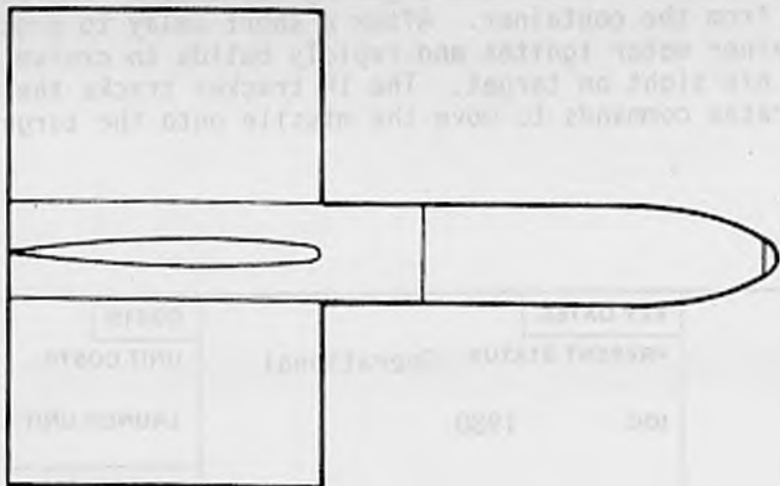
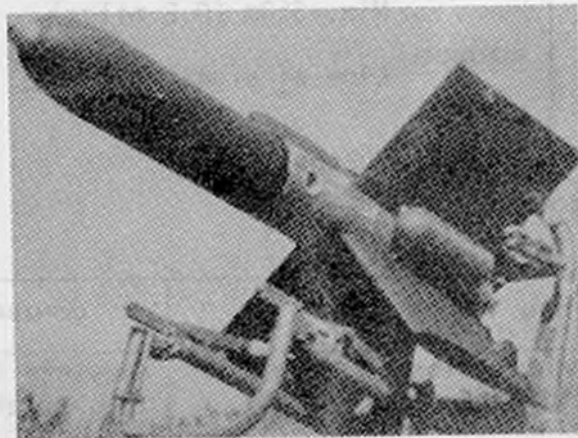


Sectional drawing of a *Sea Indigo* missile. Key: 1 — tail unit and fins; 2 — propulsion unit; 3 — control wings; 4 — control unit; 5 — power pack with gas generator; 6 — guidance section; 7 — warhead and fuze.

# KAM-3D

NAME <u>KAM-3D</u>		<b>KAM-3D</b>		DEVELOPER <u>Kawasaki</u>	
DESIGNATION <u>Type 64</u>				COUNTRY <u>Japan</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Helicopter	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 1.00m (3.3') DIAMETER: 12cm (0.4') SPAN: 60cm (2.0') WEIGHT: 15.7 (34.5#) OTHER: Warhead: 3.0 (6.6#)		RANGE: Max. 1,800m (1.2 miles) Min. 350m (0.2 miles) ALTITUDE: Line of sight SPEED: Subsonic OTHER:		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
		BASIS FOR LAUNCH <u>Missile on launcher</u> <u>Sight on target.</u>			
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Short range, wire command to line of sight anti-tank missile.		Kawasaki Heavy Industries	
AIRFRAME		Cylindrical body with gently pointed nose. Large rectangular cruciform tail fins.		Kawasaki	
PROPULSION		Two stage solid propellant rocket motors. Boost 0.8 sec.		Daicel Nippon Oil and Fats	
GUIDANCE		Wire command to line of sight with visual tracking. Missile gyro stabilized.		Fujikura/NEC	
FUZING		Impact.			
WARHEAD		High explosive, hollow charge, armor piercing warhead.		Daikin Kogyo	
REMARKS					
<p>The KAM-3D can be launched from a portable launcher (2 operators required), land vehicle mounted launchers, and helicopters. The booster stage accelerates the missile out of the tube, at which time the sustainer ignites to sustain velocity. The operator uses a control box and a visual sight. The operator guides the missile to the target by keeping his crosshairs on the target, and using the control box to move the missile onto the line of sight. His visual reference to missile position is provided by a tail mounted flare by day and the rocket exhaust by night. A gyro stabilization system is embodied into the missile.</p> <p>The KAM-3D will continue in production until the early 1980's after which it will be systematically replaced by the KAM-9.</p>					
USERS		KEY DATES		COSTS	
Japan		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: 1975 Estimated		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: Over 8,000 10 Infantry Division Equipped	

OTHER INFORMATION:



NAME <u>KAM-9</u>		<b>KAM-9</b>		DEVELOPER <u>Kawasaki</u>	
DESIGNATION <u>TYPE 79</u>				COUNTRY <u>Japan</u>	
				SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	TARGETS	<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <u>Tanks</u> <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>1.5m (4.9')</u>	DIAMETER: <u>15.2cm (0.5')</u>	SPAN: <u>33cm (1.1')</u>	WEIGHT: Launch: <u>19.9 (44#)</u> minus booster: <u>15.7(345#)</u>	OTHER:	
	BASIS FOR LAUNCH <u>Missile in launcher -</u> <u>sight on target.</u>	<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY <input type="checkbox"/> TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	RANGE: Max. <u>4,000m (2.5 miles)</u> Min. <u>350m (0.2 miles)</u>	ALTITUDE: <u>Line of sight</u>	SPEED: <u>Subsonic</u>
OTHER:			OTHER:		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Extended range, higher performance version of the KAM-3D. Wire command to line of sight anti-tank missile.	Kawasaki Heavy Industries			
AIRFRAME	Cylindrical body with pointed nose. Cruciform folding small rectangular fins near tail.	Kawasaki			
PROPULSION	Two stage solid propellant rocket motors.	Daicel Niffon Oil and Fats			
GUIDANCE	Wire command to line of sight using optical aiming and automatic IR tracking of missile.	Kawasaki			
FUZING	Impact				
WARHEAD	High explosive, hollow charge, armor piercing warhead; 4.2kg (9#)				
REMARKS					
<p>The KAM-9 system consists of the missile in its tubular container, which also serves as a launch tube, and the launch and sighting mechanism, which consists of the firing mechanism, sight, and checkout device. The missile container is placed upon the launch and sighting mechanism. The booster motor ejects the missile from the container. After a short delay to protect the operator, the sustainer motor ignites and rapidly builds to cruise speed. The operator keeps his sight on target. The IR tracker tracks the missile and automatically generates commands to move the missile onto the target's line of sight.</p>					
USERS		KEY DATES		COSTS	
Japan		PRESENT STATUS: <u>Operational</u>		UNIT COSTS:	
		IOC: <u>1980</u>		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: <u>Over 800</u>	

OTHER INFORMATION:

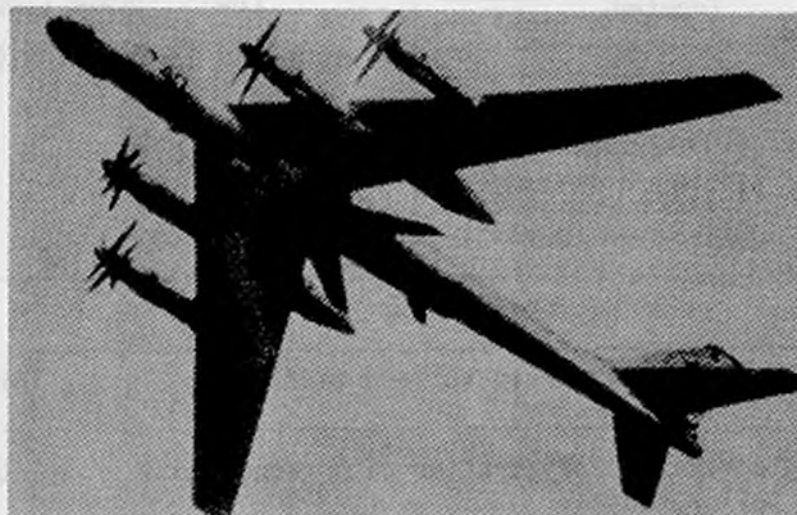
No photographs available

# KANGAROO

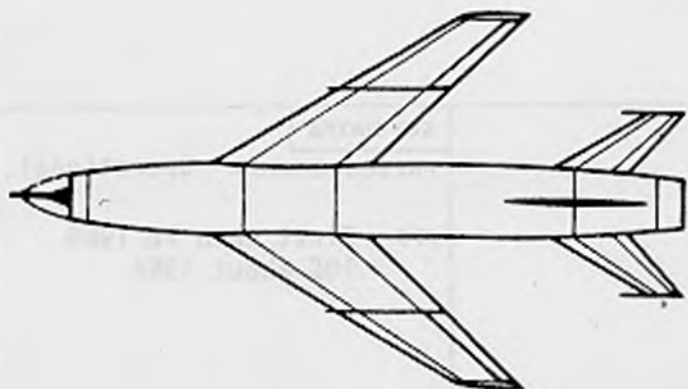
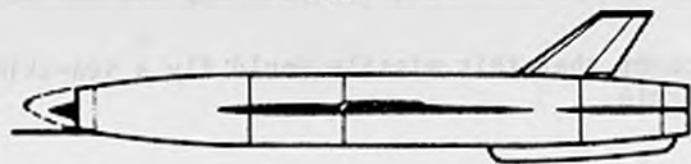
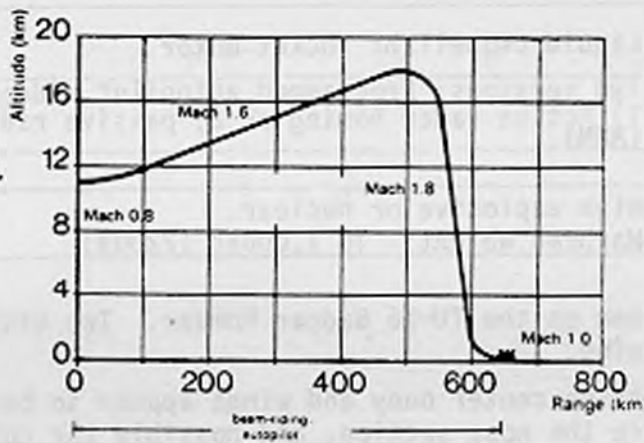
NAME <u>KANGAROO</u>		<b>KANGAROO</b>		DEVELOPER _____	
DESIGNATION <u>AS-3</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
CHARACTERISTICS				TARGETS	
LENGTH: <u>14.9m (49.0')</u> DIAMETER: Body <u>1.9m (6.1')</u> SPAN: <u>91.5m (30.0')</u> WEIGHT: <u>11,000kg (24,200#)</u> OTHER: _____		BASIS FOR LAUNCH Target data <u>inputed.</u>		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input checked="" type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>	
PERFORMANCE				OTHER: _____	
RANGE: <u>To 650km (400mi)</u>		ALTITUDE: <u>To 18,000m (60,000')</u>		SPEED: <u>Mach 2.0</u>	
OTHER: _____					
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Strategic, long range, standoff air-to-surface missile for the TU-95 Bear bomber.		USSR	
AIRFRAME		Similar to swept wing fighter aircraft with swept tail surfaces and rear dorsal air scoop.		USSR	
PROPULSION		Turbojet engine with afterburner. Possibly the Tumansky R-11.		USSR	
GUIDANCE		Programmed autopilot with beam riding or radio command terminal.		USSR	
FUZING				USSR	
WARHEAD		High explosive or thermonuclear. Weight to 2300kg (5060#).		USSR	
REMARKS					
The Kangaroo is the largest of the Soviet standoff missiles. Designed for use with the TU-95 Bear bomber against area targets since its guidance could not be adequate for point or burdened targets. Aerodynamically it is similar to the M2 fighter of the 1950s.					
USERS		KEY DATES		COSTS	
USSR		PRESENT STATUS: Possibly a few still operational		UNIT COSTS:	
		IOC: First shown in 1961		LAUNCH UNIT:	
		IOC about 1963		QUANTITIES	
				TOTAL TO DATE:	

# KANGAROO

OTHER INFORMATION:

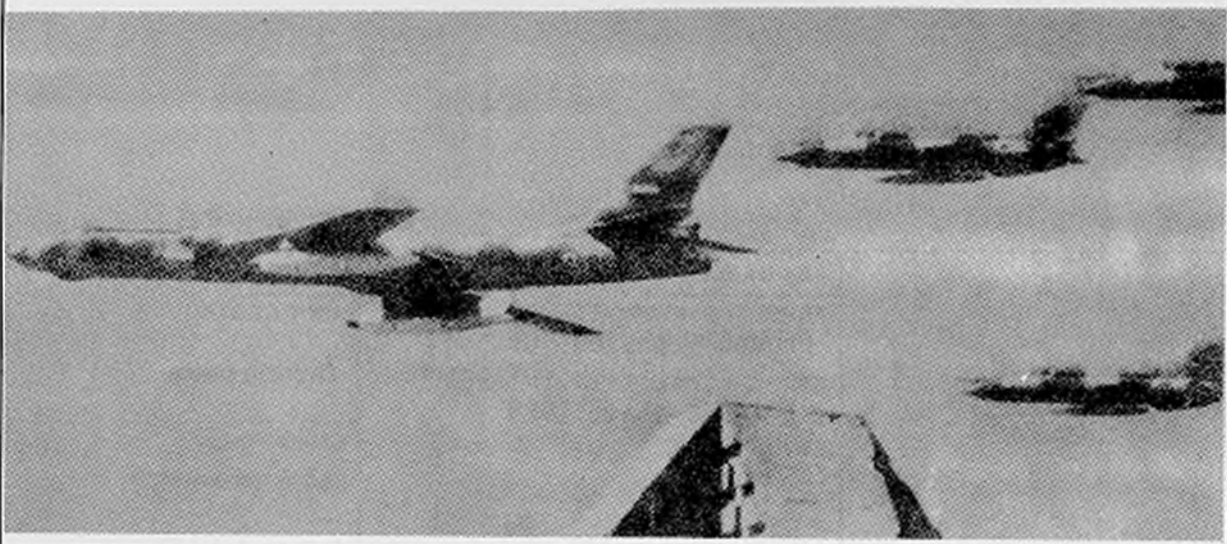
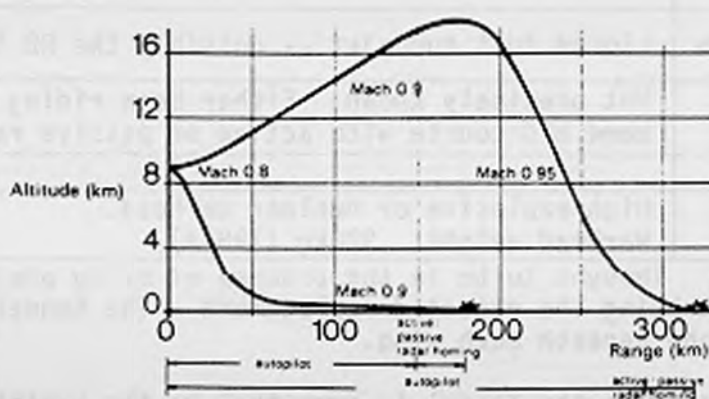
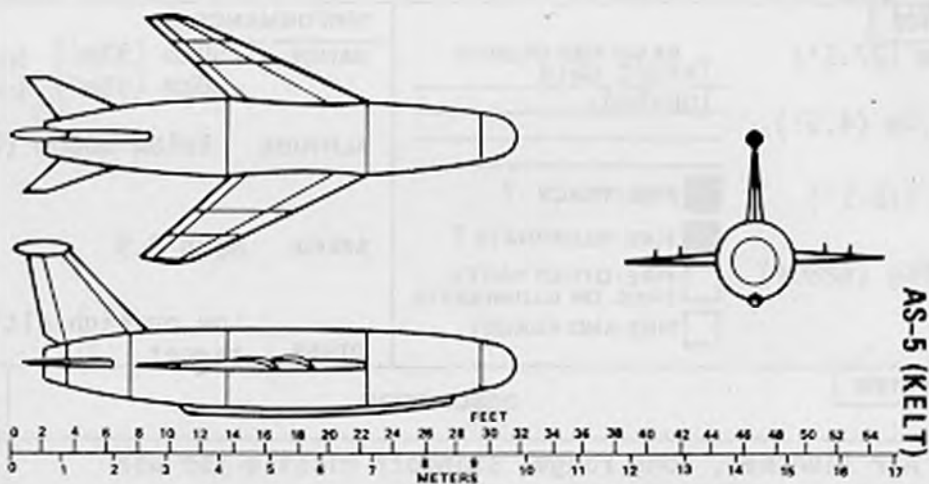


AS-3 Kangaroo



NAME <u>KELT</u>		<b>KELT</b>		DEVELOPER			
DESIGNATION <u>AS-5</u>				COUNTRY <u>USSR</u>			
				SERVICE <u>Air Force/Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Radar, Cities</u>			
<b>CHARACTERISTICS</b> LENGTH: 9.5m (31.2') DIAMETER: 90cm (2.95') SPAN: 4.6m (15') WEIGHT: 3500kg (7700#) OTHER:			<b>PERFORMANCE</b> RANGE: High: 320km (200mi) Low: 160km (100mi) ALTITUDE: To 18,000m (60,000') SPEED: Mach 0.95 OTHER:				
			<b>BASIS FOR LAUNCH</b> Target data input.				
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Long range, standoff, air to surface missile.		USSR			
AIRFRAME		Swept wing aircraft configuration with radome nose and swept tail surfaces.		USSR			
PROPULSION		Liquid propellant rocket motor.		USSR			
GUIDANCE		Two versions: Programmed autopilot midcourse plus 1) Active radar homing or 2) passive radiation terminal (ARM).		USSR			
FUZING				USSR			
WARHEAD		High explosive or nuclear. Warhead weight: To 1,000kg (2200#)		USSR			
<b>REMARKS</b>							
<p>First seen on the TU-16 Badger bomber. Two missiles are carried per aircraft, one on each wing.</p> <p>The fuselage center body and wings appear to be the same as those of the Kennel missile, while the nose section, and possibly the contained guidance, of the STYX is employed.</p> <p>It is thought that this missile would fly a sea-skimming trajectory for its anti-shipping role.</p>							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
USSR Egypt		PRESENT STATUS: Operational.		UNIT COSTS:			
		IOC: First seen in 1968 IOC about 1966		LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE: Deliveries had exceeded 1,000 by early 1970s			

OTHER INFORMATION:

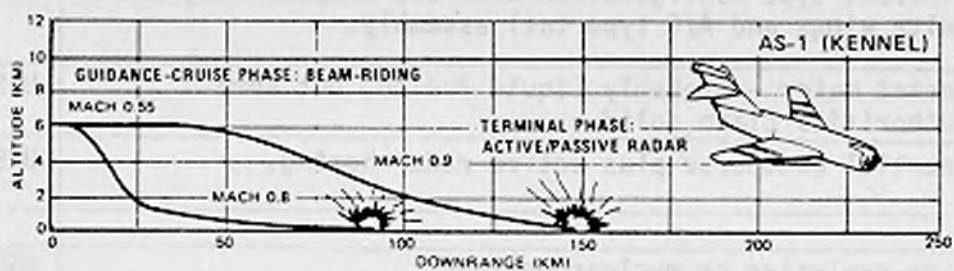
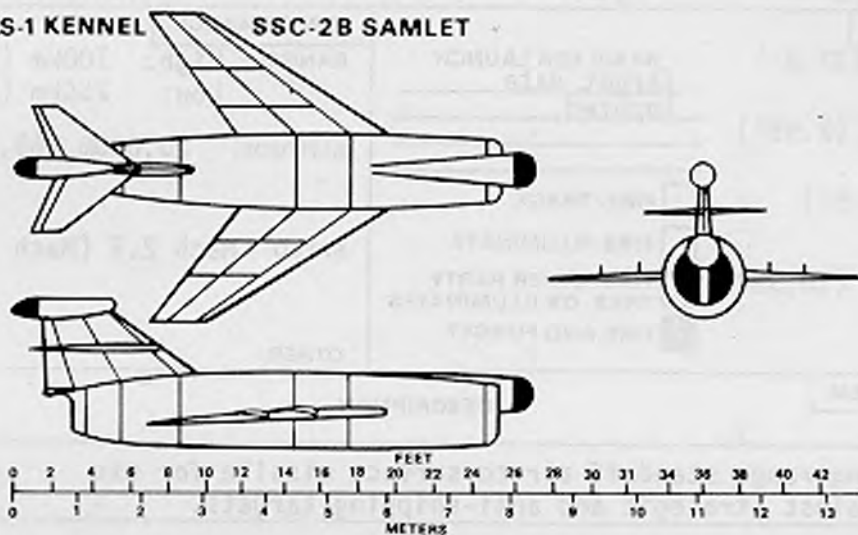


## KENNEL

NAME <u>KENNEL</u>		DESIGNATION <u>AS-1, Salish, Samlet</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Air Force, Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS			
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Area target?</u>	
CHARACTERISTICS				PERFORMANCE					
LENGTH: 8.3m (27.1') DIAMETER: 1.4m (4.5') SPAN: 4.9m (16.1') WEIGHT: 2850kg (6280#) OTHER:				BASIS FOR LAUNCH <u>Target data</u> <u>input.</u>		RANGE: 150km (93mi) High profile 90km (56mi) Low profile ALTITUDE: Below 6000m (20,000') SPEED: Mach 0.9 OTHER: Low or high altitude approach to target.			
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR			
OVERALL SYSTEM		Air launched, long range, standoff missile for use against surface targets.				USSR			
AIRFRAME		Appearance of a scaled down Mig-15 fighter with front inlet and swept wings and tail surfaces.				USSR			
PROPULSION		Liquid fuel turbojet -- possibly the RD 500.				USSR			
GUIDANCE		Not precisely known. Either beam riding or radio command mid-course with active or passive radar homing.				USSR			
FUZING									
WARHEAD		High explosive or nuclear warhead. Warhead weight: 900kg (1984#).				USSR			
REMARKS		Thought to be in the process of being phased out of the operational inventory, with Kelt being the expected replacement. The Kennel is carried by the TU-16 Badger bomber, one beneath each wing.  Externally the Kennel is identical to the Samlet SSC-2B and the Salish SSC-2A land based missiles. It is presumed that the Salish is an early model Kennel, and the Samlet is a later model.							
USERS		KEY DATES				COSTS			
USSR Egypt Indonesia		PRESENT STATUS: Probably phased out. IOC: First seen in 1961 IOC about 1963				UNIT COSTS:  LAUNCH UNIT:			
						QUANTITIES TOTAL TO DATE:			

OTHER INFORMATION:

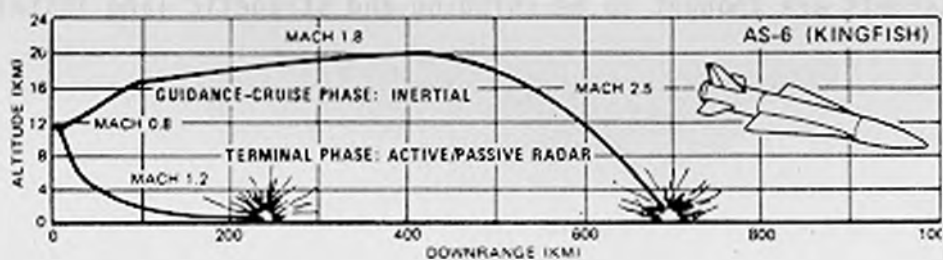
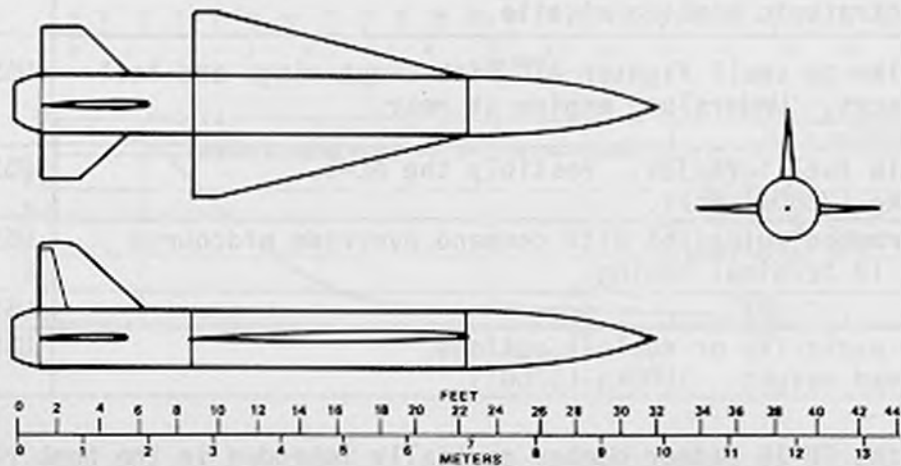
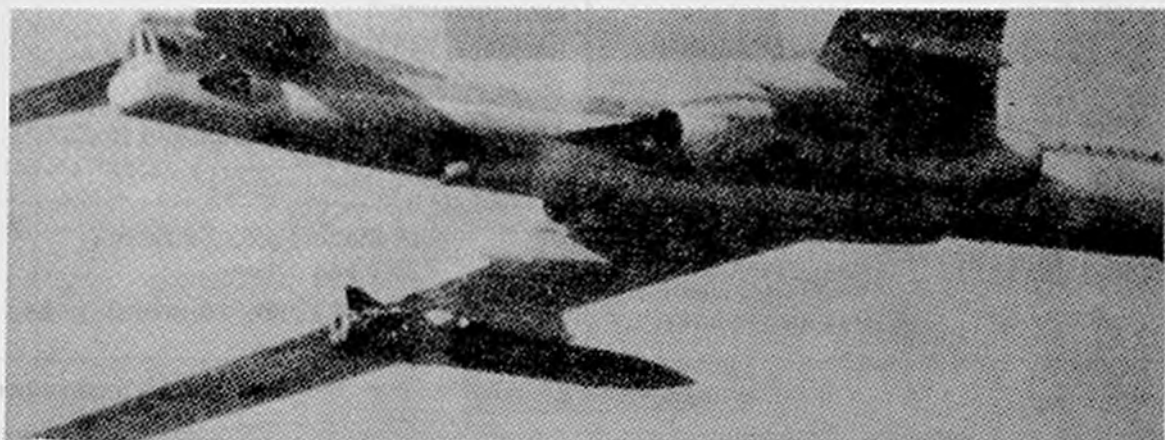
**AS-1 KENNEL SSC-2B SAMLET**




# KINGFISH

NAME <u>KINGFISH</u>		<b>KINGFISH</b>		DEVELOPER _____	
DESIGNATION <u>AS-6</u>				COUNTRY <u>USSR</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>		<b>PERFORMANCE</b>		<b>TARGETS</b>	
LENGTH: <u>10.0m (32.8')</u> DIAMETER: <u>90cm (2.95')</u> SPAN: <u>2.9m (9.5')</u> WEIGHT: <u>4,800kg (10,580#)</u> OTHER: _____		RANGE: High: <u>700km (435mi)</u> Low: <u>250km (155mi)</u> ALTITUDE: <u>20,000m (65,000')</u> SPEED: <u>Mach 2.5 (Mach 3.0 reported)</u> OTHER: _____		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Area targets</u>	
		BASIS FOR LAUNCH <u>Target data</u> <u>input.</u>			
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Long range standoff air to surface missile for use against strategic and anti-shipping targets.		USSR	
<b>AIRFRAME</b>		Aircraft type configuration with short span, long chord delta wings and A/C type tail assembly.		USSR	
<b>PROPULSION</b>		Rocket motor - probably liquid fueled, but some authorities claim solid.		USSR	
<b>GUIDANCE</b>		Inertial midcourse plus active radar homing.		USSR	
<b>FUZING</b>					
<b>WARHEAD</b>		High explosive or nuclear options. Weight 1000kg (2200#) 200kt nuclear.		USSR	
<b>REMARKS</b>					
The AS-6 is a high performance, second generation, standoff ASM. It is the principal standoff armament of the TU-16 Badger, the TU-22 Blinder, and the TU-26 Backfire bombers. Because of its similar appearance, it may be a derivative of the AS-2 or AS-4 missile. It is understood to serve an anti-shipping role, being able to attack from either a high altitude or low altitude cruising flight.					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USSR		PRESENT STATUS: <u>Operational.</u>		UNIT COSTS:	
		IOC: <u>First seen in 1975</u> <u>IOC about 1976.</u>		LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE:	

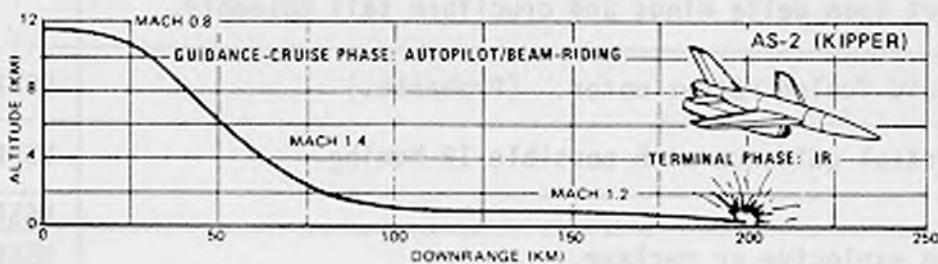
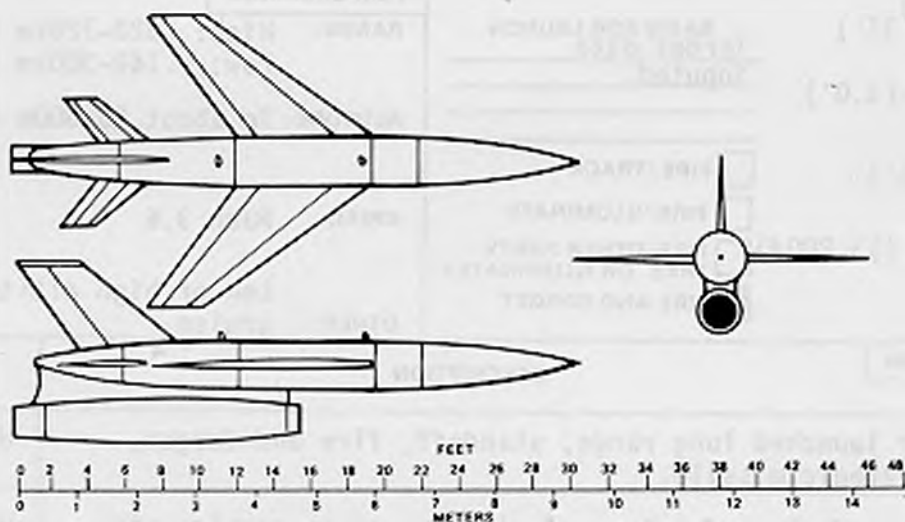
OTHER INFORMATION:



# KIPPER

NAME <u>KIPPER</u>		<b>KIPPER</b>		DEVELOPER _____	
DESIGNATION <u>AS-2</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 9.5m (31') DIAMETER: 90cm (2.9') SPAN: 4.9m (16') WEIGHT: 4200kg (9259#) OTHER:		RANGE: To 210km (130mi) ALTITUDE: Max: About 3000m (10,000') SPEED: 1.4 Mach Max. Cruise 2.0 Mach Dive OTHER: Low altitude terminal phase at 1.2 Mach.		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		BASIS FOR LAUNCH Target data input.		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets.</u>	
		<input checked="" type="checkbox"/> FIRE/TRACK w/command override <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Air launched, long range, standoff anti-shiping and strategic bombing missile.		USSR	
AIRFRAME		Similar to small fighter A/C with swept wings and tail surfaces. Underslung engine at rear.		USSR	
PROPULSION		Liquid fuel turbojet. Possibly the AL-5. 1300kg (2860#) fuel.		USSR	
GUIDANCE		Programmed autopilot with command override midcourse with IR terminal homing.		USSR	
FUZING				USSR	
WARHEAD		High explosive or nuclear options. Warhead weight: 1000kg (2200#)		USSR	
REMARKS					
<p>Carried by the TU-16 Badger bomber partially imbedded in the bomb bay. Missile appears very similar to the USA Hound Dog missile, and is undoubtedly used in a similar role. Targets are thought to be shipping and stragetice land installations.</p> 					
USERS		KEY DATES		COSTS	
USSR		PRESENT STATUS: Operational but being replaced. IOC: First seen in 1961 IOC about 1965		UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE:	

OTHER INFORMATION:

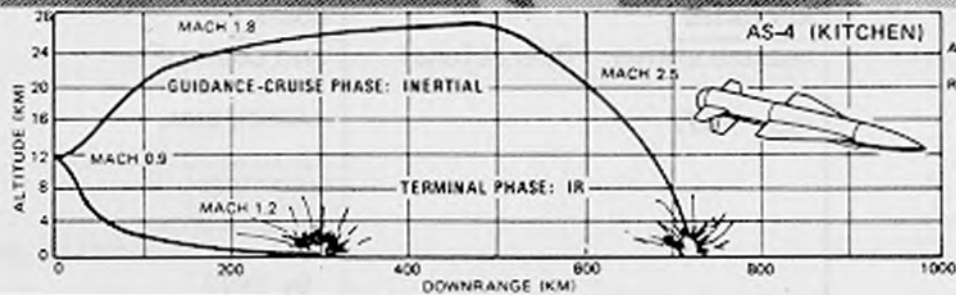
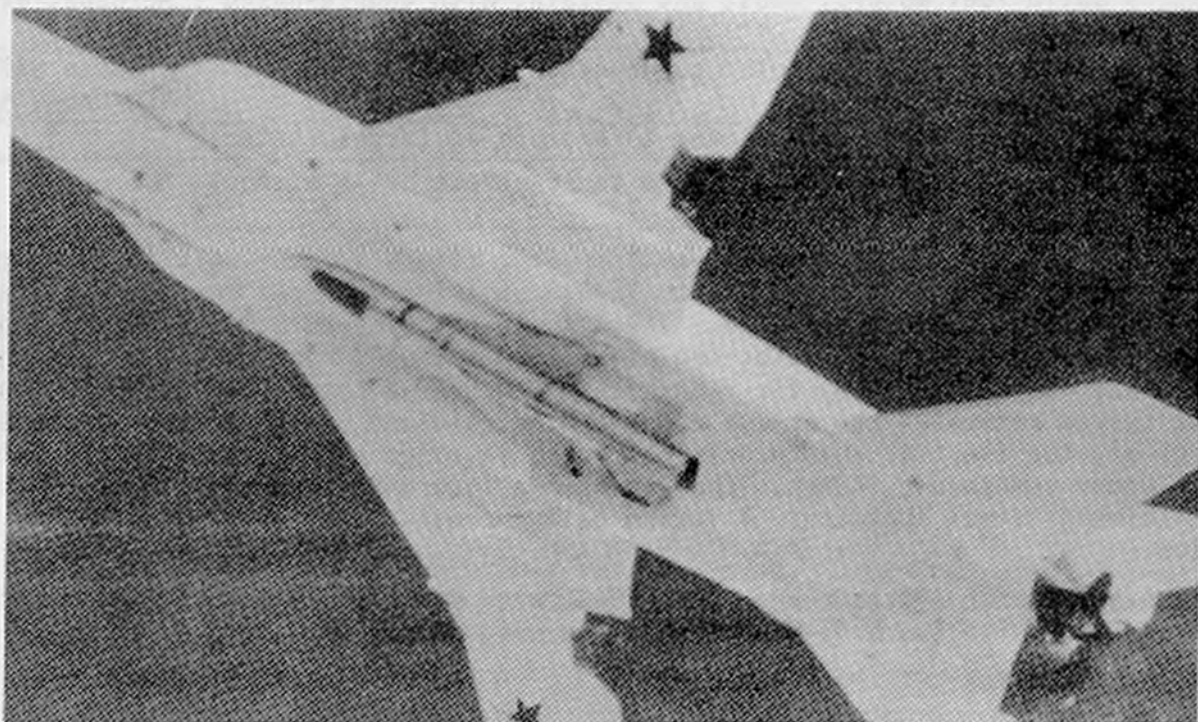
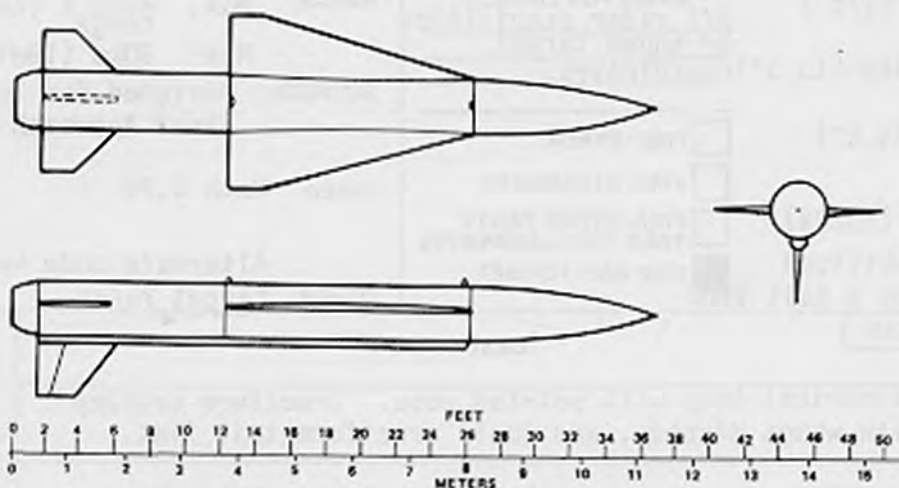


# KITCHEN

NAME <u>KITCHEN</u>		DESIGNATION <u>AS-4</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Air Force/Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <b>Strategic Targets</b>	
<b>CHARACTERISTICS</b> LENGTH: <u>11.3m (37')</u> DIAMETER: <u>91cm (3.0')</u> SPAN: <u>2.9m (9.5')</u> WEIGHT: <u>6000kg (13,200#)</u> OTHER: _____				<b>BASIS FOR LAUNCH</b> <u>Target data</u> <u>inputed.</u>		<b>PERFORMANCE</b> RANGE: High: <u>320-720km (200-450mi)</u> Low: <u>160-300km (100-190mi)</u> ALTITUDE: <u>To about 25,000m (82,000')</u> SPEED: <u>Mach 3.6</u> OTHER: <u>Low or high altitude midcourse cruise.</u>					
SYSTEM/SUBSYSTEM		DESCRIPTION					CONTRACTOR				
OVERALL SYSTEM		Air launched long range, standoff, fire and forget, strategic missile.					USSR				
AIRFRAME		Aircraft type fuselage of circular cross section with short span delta wings and cruciform tail assembly.					USSR				
PROPULSION		Liquid fueled rocket motor. (Probable.)					USSR				
GUIDANCE		Inertial guidance with possible IR homing.					USSR				
FUZING							USSR				
WARHEAD		High explosive or nuclear. Warhead weight: <u>1000kg (2200#)</u>					USSR				
<b>REMARKS</b> <p>The Kitchen missile has been observed on the TU-22, Blinder, the TU-95 Bear, and the TU-26 Backfire bombers. The missile is carried semi-submerged in the bomb bay on the Blinder and under the wings on the Bear and Backfire.</p>											
USERS			KEY DATES			COSTS					
USSR			PRESENT STATUS: <u>Operational</u>			UNIT COSTS:					
			IOC: <u>First shown in 1961</u> <u>IOC about 1967</u>			LAUNCH UNIT:					
						QUANTITIES					
						TOTAL TO DATE:					

# KITCHEN

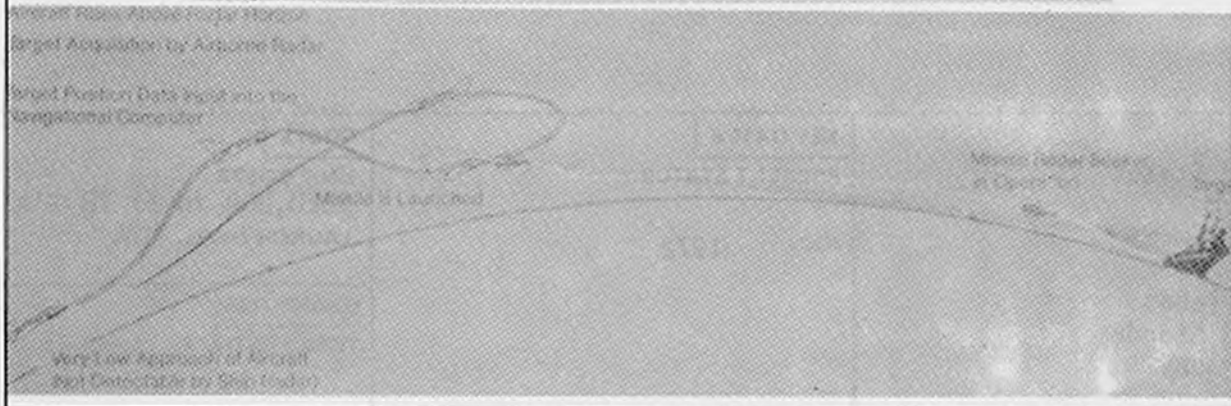
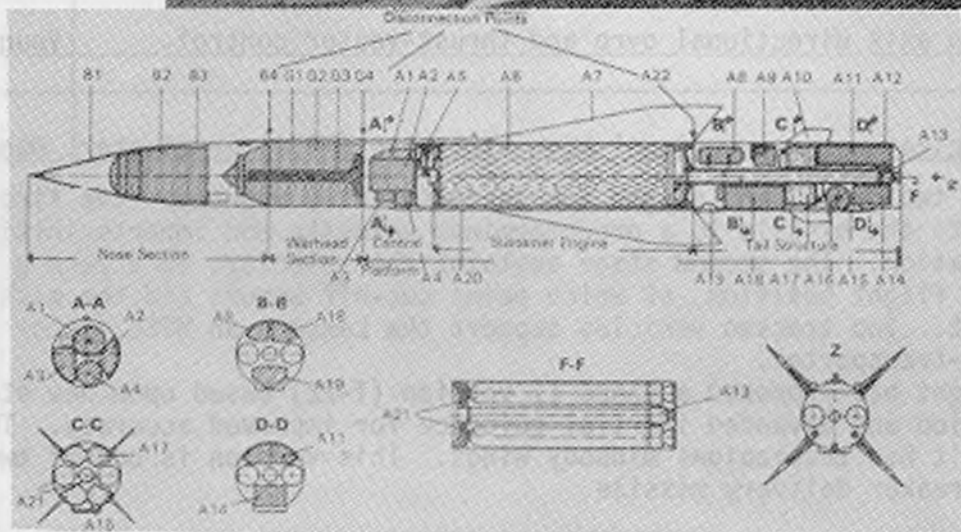
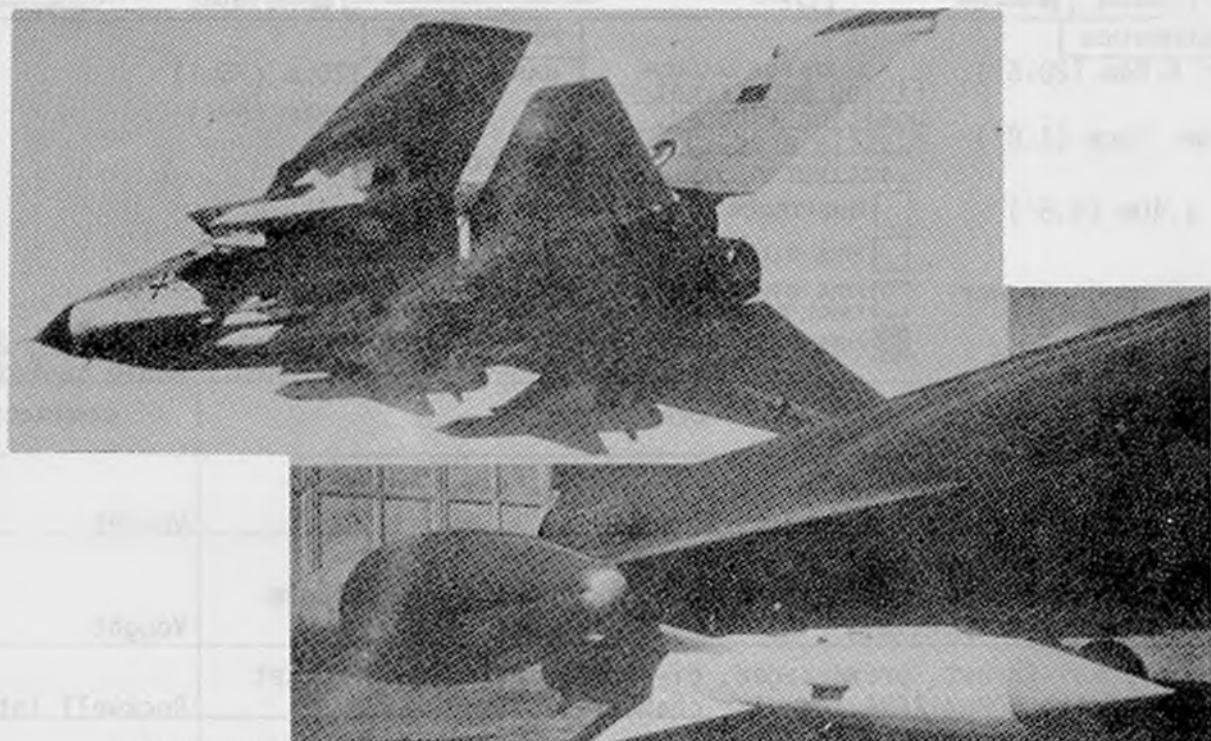
OTHER INFORMATION:



AIRCRAFT TU-22 BLINDER,  
TU-26 BACKFIRE  
RADAR SHORT HORN (EST)  
J-BAND  
DOWN BEAT

NAME <b>KORMORAN</b>		<b>KORMORAN</b>		DEVELOPER <b>MBB</b>			
DESIGNATION <b>AS.34</b>				COUNTRY <b>Germany</b>			
				SERVICE <b>Navy</b>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
<b>CHARACTERISTICS</b> LENGTH: 440cm (175") DIAMETER: 34.4cm (13.5") SPAN: 100cm (39.4") WEIGHT: 600kg (1320#) Roll stabilized OTHER: Steered by 4 tail fins		<b>PERFORMANCE</b> RANGE: Max: 40km + (25mi) aerodynamic range. Max: 30km (18mi) effective range ALTITUDE: Designed for low altitude attack Final Approach sea-skimming SPEED: Mach 0.95 Alternate mode homes on OTHER: target radar		<b>OTHER</b> <input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Cylindrical body with pointed nose. Cruciform cropped delta wings midbody, and small cruciform tail fins.		Messerschmitt Bolkow-Blom GmbH			
<b>AIRFRAME</b>		Cruciform, broad chord wings aft of midpoint. Four in-line tail fins.		MBB			
<b>PROPULSION</b>		Solid fuel motors; boost and sustain, with double-based propellants.		Aerospatiale/SNPE			
<b>GUIDANCE</b>		Inertial/radar altimeter guidance until active radar homing locks on.		Thomson CSF-radar BGG-Comp. & Inert.			
<b>FUZING</b>		Impact delay fuze, designed to explode at target center.					
<b>WARHEAD</b>		160kg (352#) warhead designed to penetrate hulls without damage. Triple ignition.		MBB			
<b>REMARKS</b>		<p>The aircraft makes a low-level approach, climbs if necessary to determine target position, and then maneuvers into launch position. Target position is transmitted to the missile by the A/C nav system. The missile descends to its programmed approach altitude. During initial approach, the missile is guided directionally by its inertial guidance; and, in altitude, by its radar altimeter. At a prescribed distance, the inertial system activates the active radar homing guidance, which commences to search. Upon lock-on, the inertial guidance is corrected in range and azimuth and the flight proceeds under combined guidance. Shortly before intercept, the missile descends to a surface-skimming final approach. A fuze delay permits hull penetration before explosion.</p> <p>Principal launch aircraft are the F-104G, with one missile mounted below each wing, and the Tornado, with two body-mounted and two wing-mounted missiles.</p>					
<b>USERS</b> W. Germany Italy		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: 1977		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: 350 units initial production in 1977			

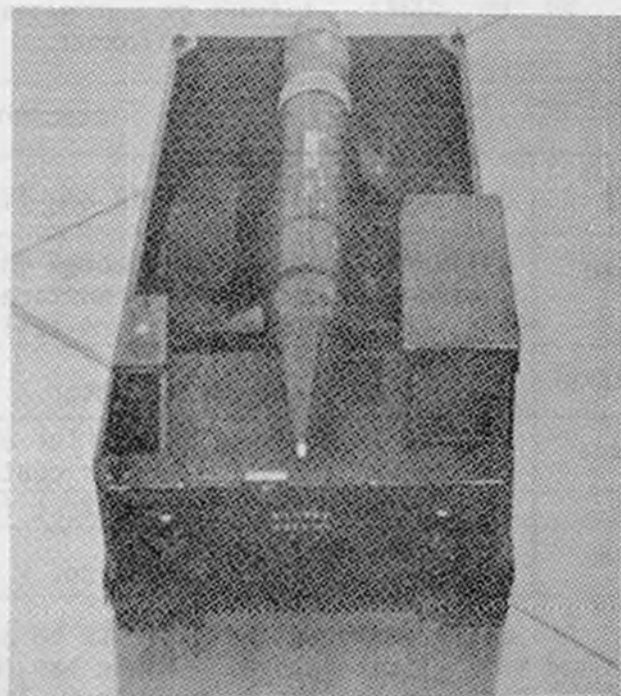
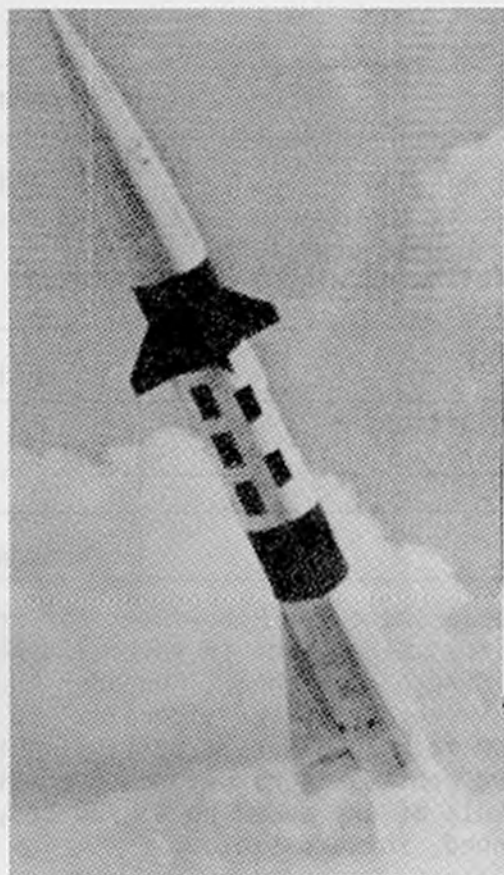
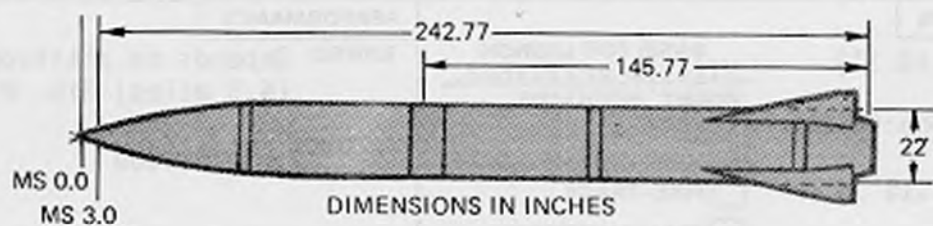
OTHER INFORMATION



# LANCE

NAME <u>LANCE</u>		<b>LANCE</b>		DEVELOPER <u>Vought Corp.</u>	
DESIGNATION <u>MGM-52 (T-22)</u>				COUNTRY <u>USA</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C <input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 6.24m (20.5') DIAMETER: 56cm (1.8') SPAN: 1.40m (4.6') WEIGHT: Depends on war-head 1318-1557kg OTHER: (2900-3425#)		RANGE: Max: 120km (75mi) Min: 8km (5mi) ALTITUDE: Ballistic SPEED: Supersonic OTHER: 1st stage 43,000# thrust, 2nd stage 0-4400# throttleable sustainer		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL <input checked="" type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
BASIS FOR LAUNCH <u>Firing and target position input.</u> <u>Missile erected</u> <u>activated.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Surface-to-surface missile to provide battlefield fire support for an Army Corps.		Vought	
AIRFRAME		Cylindrical body with sharp ogival nose and cruciform delta tail fins.		Vought	
PROPULSION		Dual-thrust, prepackaged, bi-propellant, liquid rocket using UDMH/IRFNA, Annular chambers.		Rockwell Int'l.	
GUIDANCE		Two axis directional gyro and thrust-vector control.		Vought	
FUZING					
WARHEAD		Nuclear, or conventional high explosive (M251) or cluster.		Honeywell	
REMARKS		The two propellant stages are concentrically mounted. The first stage (outer section) boosts the missile to a predetermined velocity and imparts initial spin for the spin stabilization. The second stage sustains the velocity, in a zero g flight, to a predetermined flight position, at which point cut-off occurs and the missile continues in free flight. Two tracked vehicles support the Lance: an M752 vector - launcher and a M688 loader-transporter. Vought has proposed a Lance II version (T-22) based upon new state-of-the-art solid propulsion and advanced inertial guidance for improved accuracy. The T-22 differs also in that it has trapezoidal midbody wings. This version is one of two contenders as the Assault Breaker delivery missile.			
USERS		KEY DATES		COSTS	
United States Belgium Israel Italy Netherlands United Kingdom W. Germany		PRESENT STATUS:  IOC: 1972		UNIT COSTS: \$220,000 in FY 78 \$'s LAUNCH UNIT: N/A	
				QUANTITIES	
				TOTAL TO DATE: 3000	

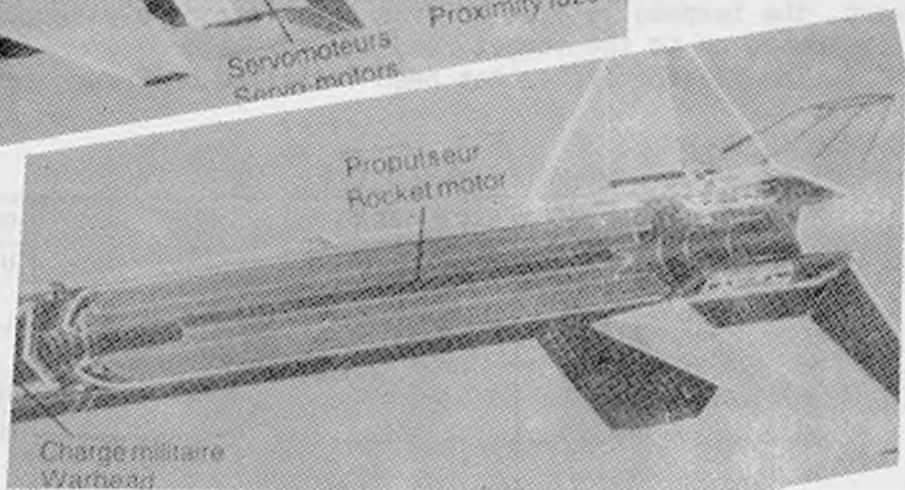
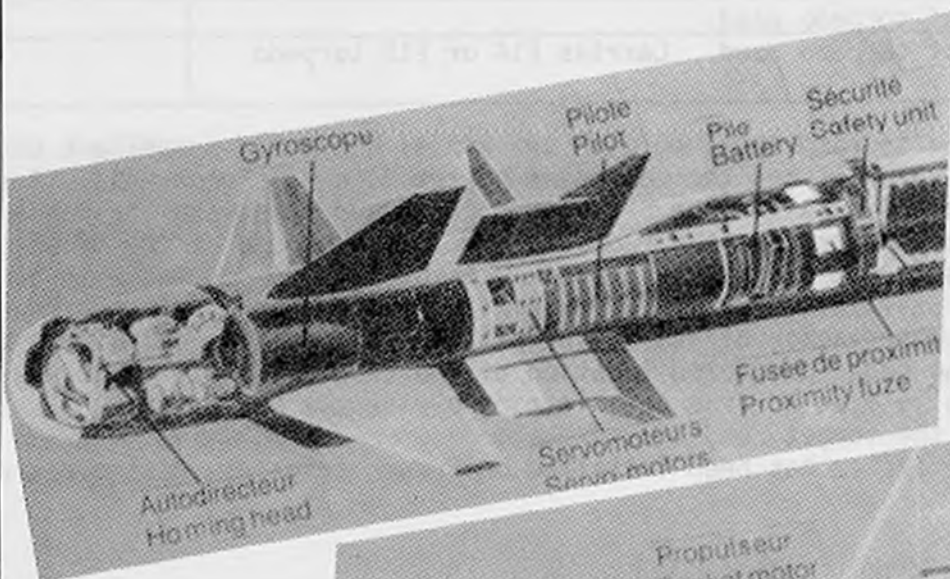
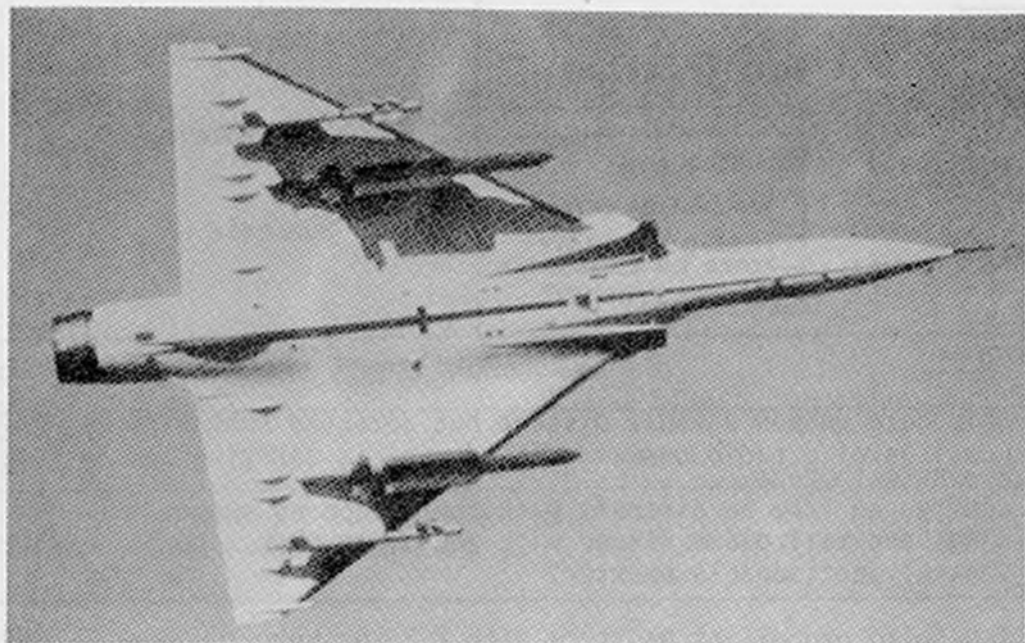
OTHER INFORMATION:



# MAGIC

NAME <u>MAGIC</u>		<b>MAGIC</b>		DEVELOPER <u>Matra</u>	
DESIGNATION <u>R550</u>				COUNTRY <u>France</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
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				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 2.8m (9.1') DIAMETER: 15.5cm (.51') SPAN: 66cm (2.15') WEIGHT: 90.7kg (200#) OTHER: 12.7kg(28#) Warhead		BASIS FOR LAUNCH <u>Missile activated</u> <u>Homer acquires</u> <u>target.</u>		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Short range air-to-air IR dog fight missile.			SA Engins Matra	
AIRFRAME	Cylindrical body with rounded nose. Double cruciform canard surfaces (control surfaces following wings) and large rectangular cruciform tail fins.			Matra	
PROPULSION	Solid propellant rocket motor.			Hotchkiss Brandt	
GUIDANCE	Passive IR homer with scan for acquisition. Cooled by gas from launcher container.			SAT	
FUZING	IR proximity fuze plus contact fuze.				
WARHEAD	High explosive fragmentation.			Thomson Brandt	
REMARKS	Matra designed the Magic to be a replacement for Sidewinder for French Air Force and Naval interceptors. (Magic has replaced Sidewinder in several other Air Forces). Designed for use on the Mirage III, Mirage F1, Jaguar, Crusader and Super Etendard, Magic has since been adapted for use with many other aircraft. It is also designed for severe maneuvers: it can be fired from an aircraft pulling up to 8Gs, and is stressed for 50Gs. The unique double canard provides a highly maneuverable control. It can be fired singly or at one second intervals at any speed up to 700 kts, and at any target within its wide, automatically-scanned, forward sector.				
USERS	KEY DATES		COSTS		
France	Libya	PRESENT STATUS	Operational		UNIT COSTS: \$75,000 est.
Australia	Morocco	IOC:	1975		FY 1982 \$\$
Equador	Oman			LAUNCH UNIT:	
Egypt	Pakistan			QUANTITIES	
Greece	Saudi Arabia			TOTAL TO DATE: 7,000+	
India	So. Africa				
Iraq	Spain				
Kuwait	Syria				
	United Arab Emirates				

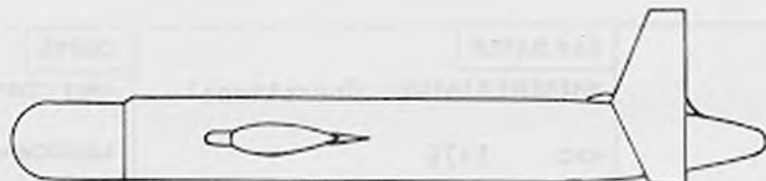
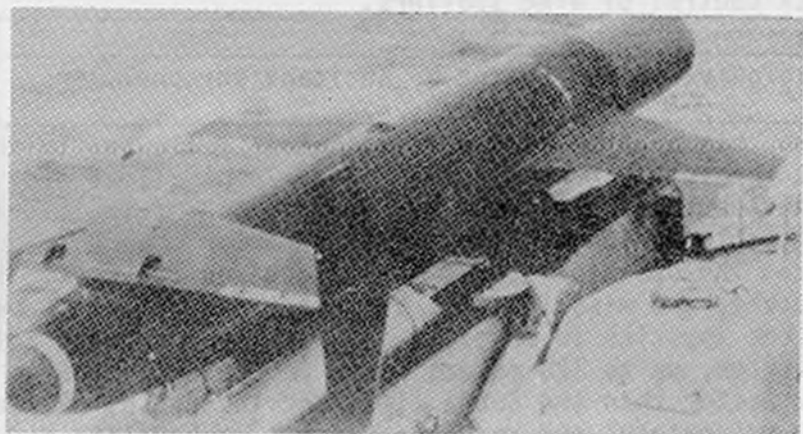
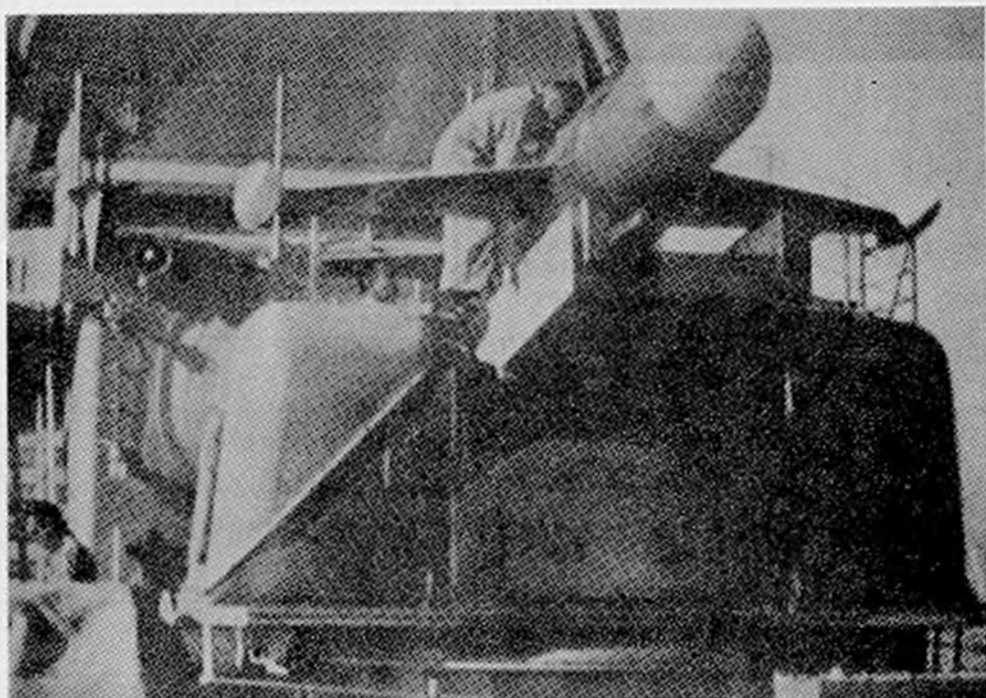
OTHER INFORMATION:



## MALAFON

NAME <u>MALAFON</u>		DEVELOPER <u>SILAT</u>	
DESIGNATION <u>MQ1-MD3</u>		COUNTRY <u>France</u>	
		SERVICE <u>Navy</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 6.15m (20.2') DIAMETER: 65cm (2.1') SPAN: 3.3m (10.8') WEIGHT: 1500kg (3300#) OTHER:		RANGE: 13km (8 miles) ALTITUDE: Sea skimming SPEED: Subsonic OTHER:	
		BASIS FOR LAUNCH <u>Target on sonar.</u> <u>Missile readied.</u>	
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Shipboard weapon against distant but detected submarines. Consists of a radio command winged vehicle carrying an acoustic torpedo.		Societe Industrielle d'Aviation Latecoere
AIRFRAME	Configured like an aircraft with short tapered swept wings and tail plane fitted with end plate fins. Dual ventral jettisonable booster.		SILAT
PROPULSION	Two solid propellant boosters with 2.8 sec burn.		SNPE
GUIDANCE	Radio command with autopilot, and radar altimeter for altitude control. Acoustic (torpedo) homing.		SFENA/Thomson-CS
FUZING	Function of torpedo used.		
WARHEAD	Function of torpedo used. Carries E14 or E15 torpedo.		
REMARKS			
<p>The Malafon is ramp launched with the aid of two solid propellant boosters. These jettison after burn-out and the remainder of the flight is unpowered. A constant altitude above the water is maintained by a radio altimeter, the wing incidence being increased progressively to provide the required lift as the speed of the missile falls off. During this phase, the missile is guided by a command system, fed with data from the ship's sonar and utilizes a "twist-and-steer" control system. Wing tip tracking flares assist visual observation of its flight path. At a position compatible with torpedo range from the sonar predicted location of the target, a tail parachute is streamed, the torpedo is ejected from the airframe by inertia and enters the water, finally homing on to the target.</p> <p>The Malafon system has been installed on French frigates, destroyers and corvettes.</p>			
USERS	KEY DATES	COSTS	
France	PRESENT STATUS:	UNIT COSTS:	
	IOC:	LAUNCH UNIT:	
	About 1966	QUANTITIES	
		TOTAL TO DATE:	

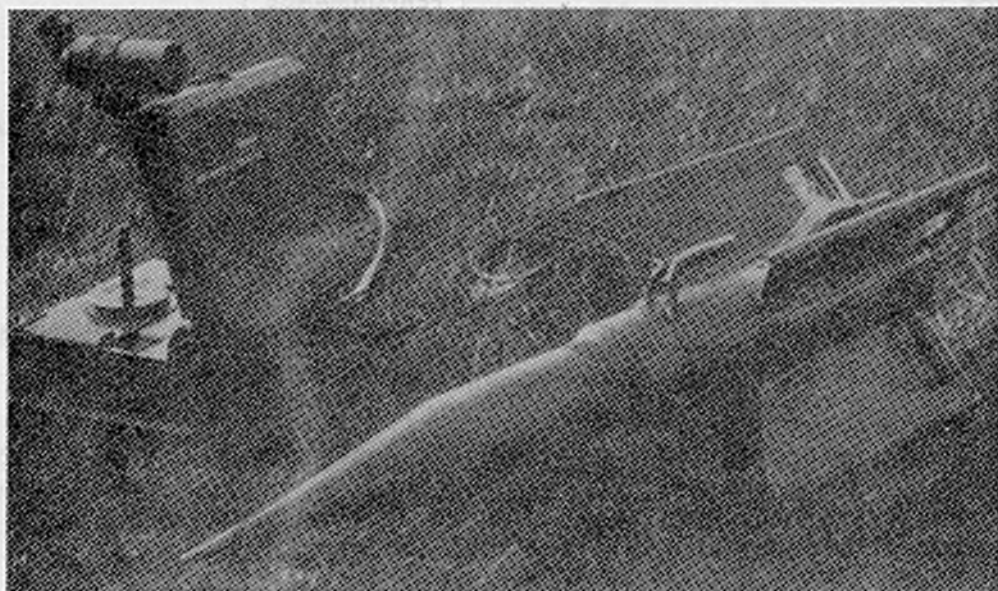
OTHER INFORMATION



# MAMBA

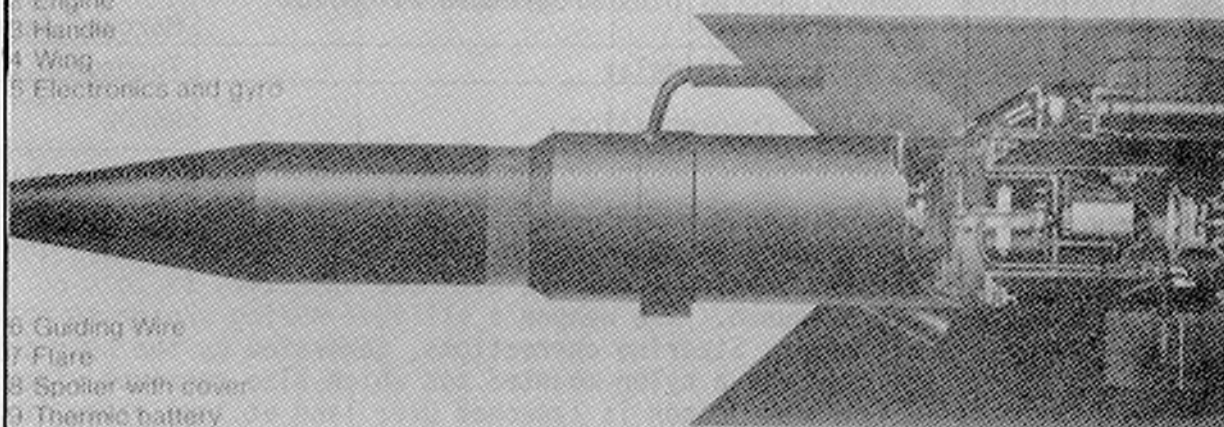
NAME <u>MAMBA</u>		<b>DEVELOPER</b> <u>MBB</u> <b>COUNTRY</b> <u>W. Germany</u> <b>SERVICE</b> <u>Army</u>	
DESIGNATION <u>--</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	
<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Ground</u>	
<b>CHARACTERISTICS</b> LENGTH: 95.5cm (3.1') DIAMETER: M: 12cm (0.4') W/H: 10cm (0.3') SPAN: 40cm (1.3') WEIGHT: 11.2kg (24.7#) Warhead OTHER: 2.7kg (6#)		<b>PERFORMANCE</b> RANGE: Max: 2000m (1.25mi) Min: 300m (0.2 mi) ALTITUDE: Line of sight. SPEED: 140m/sec. (425 ft./sec.) OTHER:	
<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 95.5cm (3.1') DIAMETER: M: 12cm (0.4') W/H: 10cm (0.3') SPAN: 40cm (1.3') WEIGHT: 11.2kg (24.7#) Warhead OTHER: 2.7kg (6#)		<b>PERFORMANCE</b> RANGE: Max: 2000m (1.25mi) Min: 300m (0.2 mi) ALTITUDE: Line of sight. SPEED: 140m/sec. (425 ft./sec.) OTHER:	
<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>	
<b>OVERALL SYSTEM</b>		Short range, wire guided, spin stabilized, anti-tank missile for infantry application.	
<b>AIRFRAME</b>		Cylindrical cross section with smaller diameter forward.	
<b>PROPULSION</b>		Dual thrust solid propellant rocket motor - oblique thrust.	
<b>GUIDANCE</b>		Wire command to line of sight with visual sight and joystick control of wing spoilers.	
<b>FUZING</b>		Contact.	
<b>WARHEAD</b>		High explosive shaped charge or antitank shrapnel.	
<b>REMARKS</b>		The Mamba has been developed as a logical follow-on to the Cobra: it uses the same jump-start concept, can be used with Cobra controllers and vehicle mounted launchers, with modification. The Mamba system consists of the missile, control unit and interconnecting cables. The missile is designed for ground launch; it is laid down resting on its fins. The operator sights the target and launches. Because of the obliquely direct nozzle, the missile jumps off the ground. The operator keeps the sight on target and uses the joystick to move the missile line of sight onto that of the target. Twelve missiles, up to 120 meters away, can be connected to the same control unit. The Mamba is faster than the Cobra (140m/sec instead of 85m/sec) and is said to be easier to direct accurately, and has improved hit probability for short to medium ranges.  Launch installations have been developed for trucks, trailers, reconn. vehicles, and tanks (such as the M41).	
<b>USERS</b>		<b>KEY DATES</b>	
W. Germany		PRESENT STATUS: Operational  IOC: 1978	
		<b>COSTS</b>	
		UNIT COSTS: <\$1,000 1980 \$s LAUNCH UNIT:	
		<b>QUANTITIES</b>	
		TOTAL TO DATE: Over 20,000	

OTHER INFORMATION:



- 1 Inter-changeable Warhead
- 2 Engine
- 3 Handle
- 4 Wing
- 5 Electronics and gyro

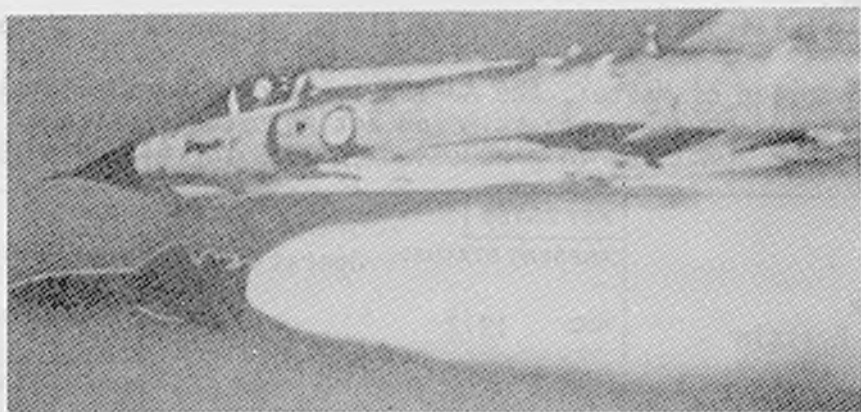
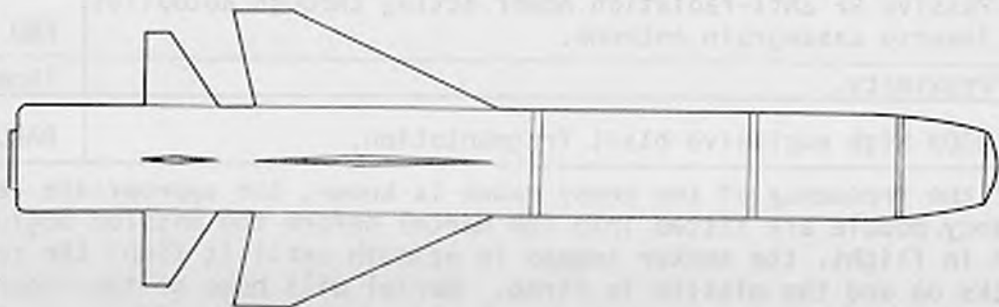
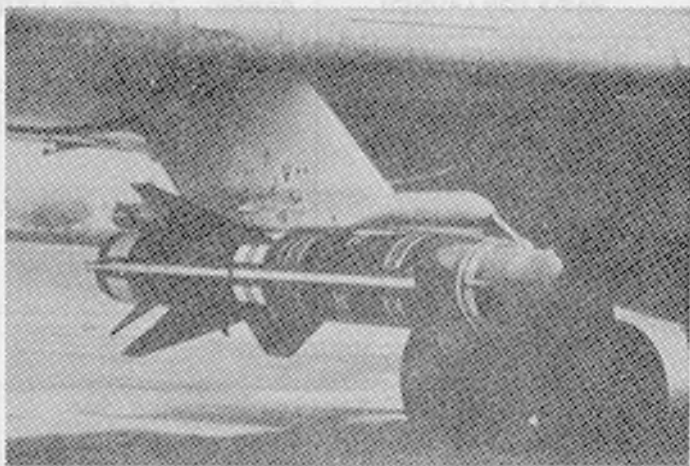
- 6 Guiding Wire
- 7 Flare
- 8 Spoiler with cover
- 9 Thermic battery
- 10 Cover with starting cable



# MARTEL AJ168

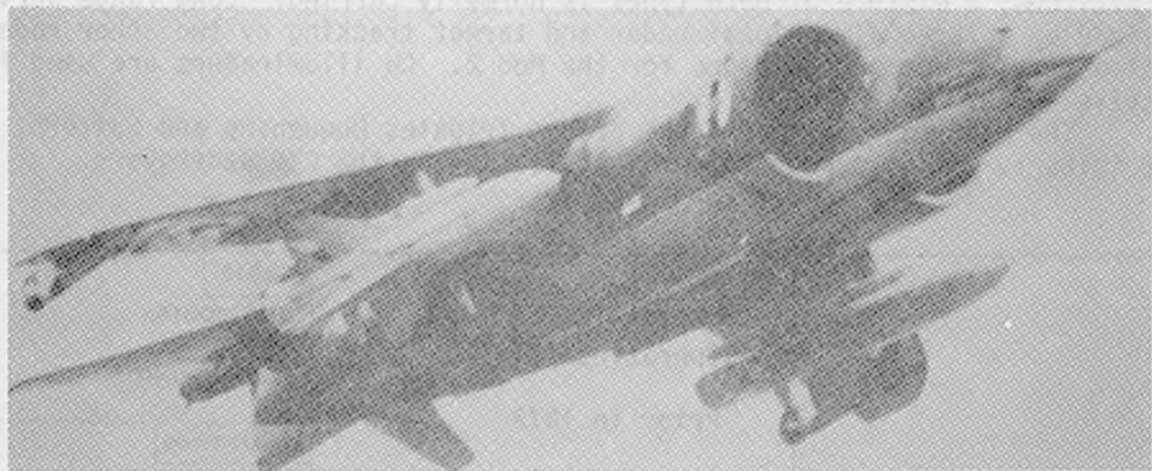
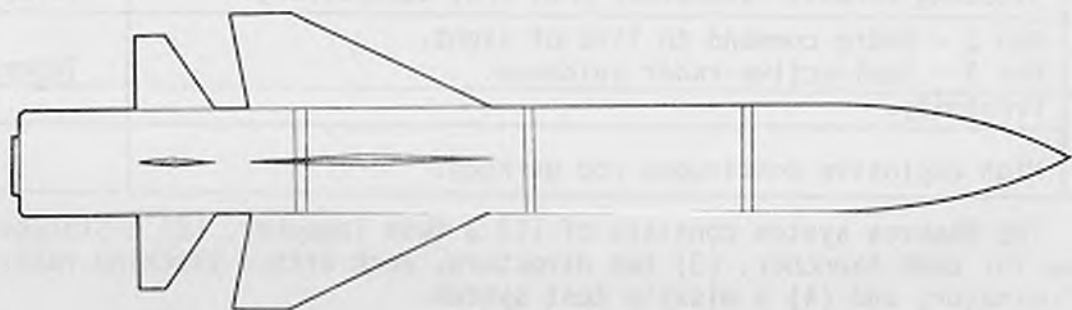
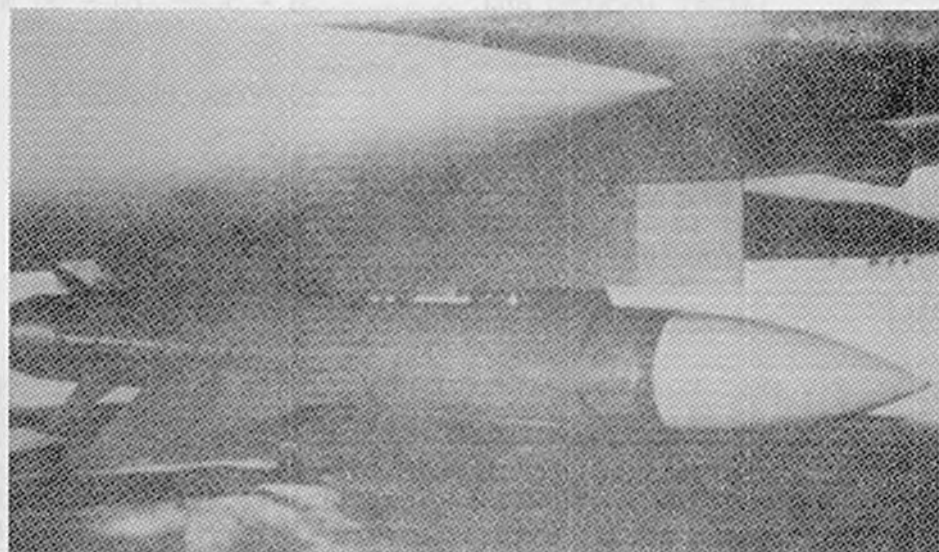
NAME <u>MARTEL</u>		DEVELOPER <u>Brit Aero/Matra</u>	
DESIGNATION <u>AJ 168</u>		COUNTRY <u>Great Britain/France</u>	
SERVICE <u>Navy, Air Force</u>			
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILE <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.87m (12.7') DIAMETER: 40cm (1.3') SPAN: 1.19m (3.9') WEIGHT: 550kg (1212#) OTHER: 150kg (330#) Warhead		RANGE: To 60km (37 miles) ALTITUDE: Maximum 2000+m (7000') Minimum 15m (50') SPEED: Subsonic OTHER: Normally launched at low altitude	
BASIS FOR LAUNCH <u>Target located</u> <u>Missile activated</u> <u>Target data inputed</u>		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Air to surface anti-shipping missile designed for high ECM environments.		British Aerospace, Dynamics
AIRFRAME	Cylindrical body with rounded nose. Swept cruciform wings at midbody and tail surfaces shortly behind wings.		British Aerospace/Matra
PROPULSION	Dual thrust composite solid propellant rocket motor-boost and sustain.		Hotchkiss Brandt/Aerospatiale
GUIDANCE	Television command control plus programmed autopilot and barometric altimeter		Marconi Avionics
FUZING	Proximity plus impact with delay		Thomson - CSF
WARHEAD	High explosive blast fragmentation.		RARDE
REMARKS	<p>The Aj-168 is command guided by an operator, on whose television display is shown the view seen by a camera in the missile's nose. The operator pans the camera to search for a target, placing a reticle over the objective to lock on the television seeker before launch. The weapon's altitude during cruise is maintained by a barometric altimeter. Steering corrections, generated by the operator's control stick, are transmitted via a nylon-mounted pod which also receives video signals from the missile. If the weapon is launched over land at long range it is steered over a series of landmarks until the target comes into view of the TV camera. The operator then takes complete control and guides the missile to the target. A new version of MARTEL with an EMI, Ltd homing head and a Marconi active radar is under development at British aerospace. This missile is known as the "active-radar sea-skimming MARTEL" (ARSSM). (See Sea Eagle).</p>		
USERS	KEY DATES	COSTS	
Great Britain	PRESENT STATUS:	UNIT COSTS:	
	IOC: 1972	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: About 1,000	

OTHER INFORMATION:



NAME <u>MARTEL</u>		<b>MARTEL AS37</b>		DEVELOPER <u>Br. Aero/Matra</u>	
DESIGNATION <u>AS37</u>				COUNTRY <u>Great Britain/France</u>	
				SERVICE <u>Navy and Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>		<b>BASIS FOR LAUNCH</b>		<b>TARGETS</b>	
LENGTH: 4.12cm (13.5')  DIAMETER: 40cm (1.3')  SPAN: 1.19m (3.9')  WEIGHT: 532kg (1170#) 150kg (330#) OTHER: Warhead		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<u>Missile activated.</u> <u>Homer lock-on to</u> <u>target radiations.</u>		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Radar</u>	
				<b>PERFORMANCE</b>	
				RANGE: To 60km (37mi) depending on launch, altitude and speed  ALTITUDE: Maximum: 14,000m (46,000') Minimum: 15m (50')  SPEED: High subsonic  OTHER: Range 27km (17mi) for low level launch	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
<b>OVERALL SYSTEM</b>		Air launched anti-radiation missile designed for heavy ECM environments.		Matra	
<b>AIRFRAME</b>		Cylindrical body with pointed nose. Swept cruciform wings at mid-body and tail surfaces shortly behind wings.		British Aerospace/Matra	
<b>PROPULSION</b>		Dual thrust, composite solid propellant rocket (2.4 sec. boost and 22.2 sec. sustain).		Hotchkiss Brandt/Aerospatiale	
<b>GUIDANCE</b>		Passive RF anti-radiation homer acting through autopilot. Inverse cassegrain antenna.		END	
<b>FUZING</b>		Proximity.		Thomson-CSF	
<b>WARHEAD</b>		330# high explosive blast fragmentation.		RARDE	
<b>REMARKS</b>		<p>If the frequency of the enemy radar is known, the appropriate aerial and high frequency module are fitted into the Martel before the mission begins. When switched on in flight, the seeker sweeps in azimuth until it finds the radar, whereupon it locks on and the missile is fired. Martel will home on the radar emissions even if the frequency changes, as long as it remains within the preselected band. If the approximate position of the radar is known, but not the frequency, the seeker will search within a preset frequency band. Once it locks-on it sweeps through 90 degrees in azimuth to locate the transmitter. The missile can then be fired and will home on the transmitter.</p> <p>The Martel is used on the Mirage III E, Jaguar, Atlantic and Buccaneer aircraft.</p> <p>A TV version of Martel, the AJ-168 is described immediately proceeding. An active radar, ramjet-powered, sea-skimming antishipping version of Martel called Sea Eagle (P3T) was committed to production in 1979 for mid 80's IOC.</p>			
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
France Great Britain		PRESENT STATUS: Operational		UNIT COSTS: ?	
		IOC: 1972		LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: Over 3,000	

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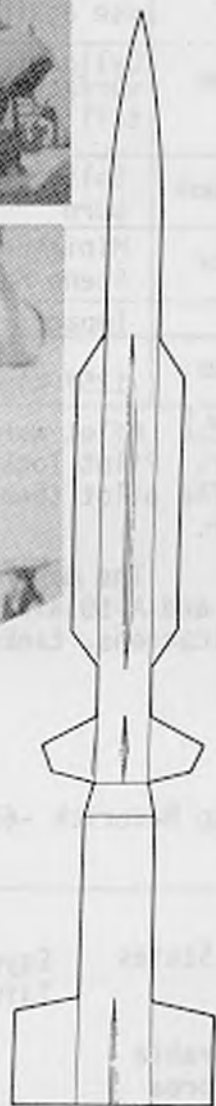
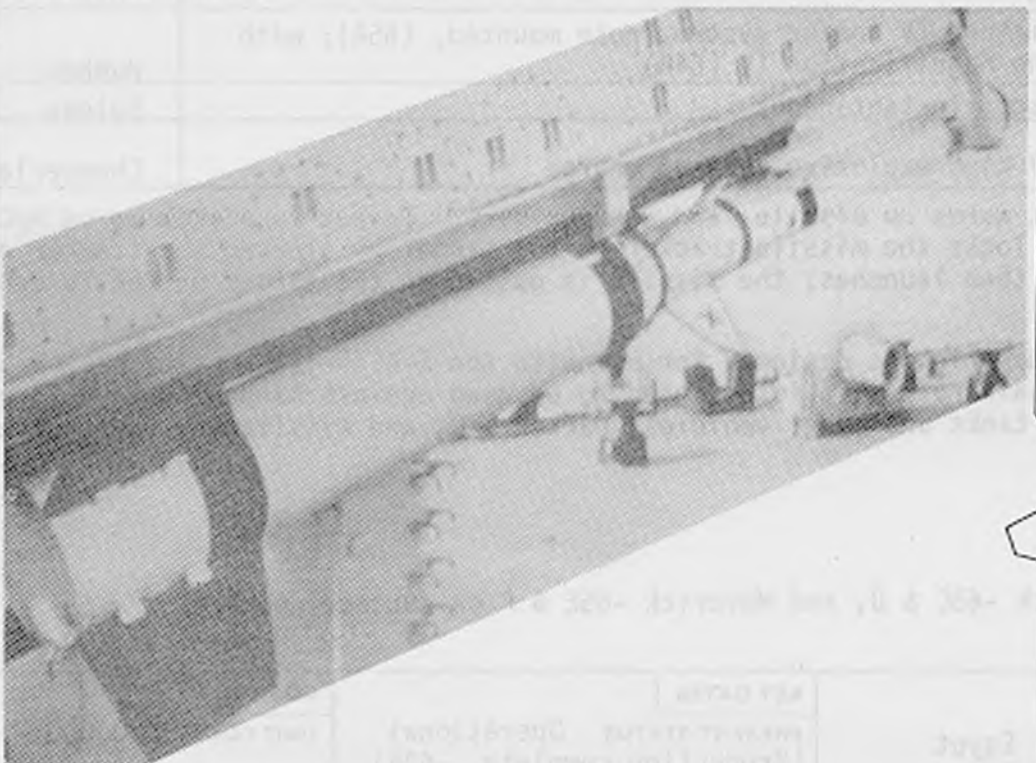
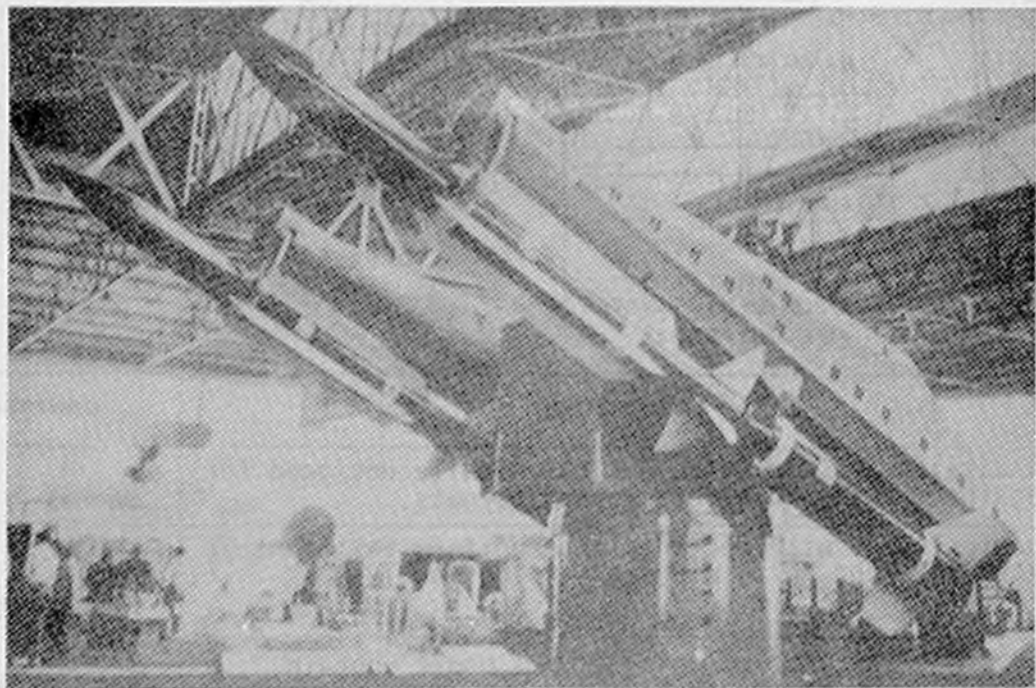


# MASURCA

NAME <u>MASURCA</u>		DEVELOPER <u>Ecan Ruelle</u>	
DESIGNATION <u>MQ2-MD3</u>		COUNTRY <u>France</u>	
		SERVICE <u>Navy</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____
CHARACTERISTICS		PERFORMANCE	
LENGTH: 8.6m (28.2') w/o boosters: 5.3m (17.3') DIAMETER: 41cm (1.3') SPAN: 1.5m (4.9') WEIGHT: Mod 2 1989kg (4386#) Mod 3 2080kg (4585#) OTHER: Booster 1010kg		RANGE: 30 - 50km (20 - 30 miles) ALTITUDE: 20,000m (86,000') SPEED: 3.0 Mach OTHER:	
		BASIS FOR LAUNCH <u>Target located and tracked or illuminated.</u> <input checked="" type="checkbox"/> FIRE/TRACK Mod-2 <input checked="" type="checkbox"/> FIRE/ILLUMINATE Mod-3 <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM		DESCRIPTION	
OVERALL SYSTEM	Long range, ship launched, air defense missile system.		CONTRACTOR Naval Arsenal at Ruelle/Matra
AIRFRAME	Missile: Cylindrical body with pointed nose. Long chord short span cruciform wings midbody and fins at tail. Booster: Larger diameter with cruciform tail fins.		Direction Technique des Constructions Navales
PROPULSION	Two stage solid propellant rocket motor. Booster 34,000kg thrust. Sustainer (Mod 2/3) 2080/2170kg.		SNPE/Ecan Ruelle
GUIDANCE	Mod 2 - Radio command to line of sight. Mod 3 - Semi-active radar guidance.		Thomson-CSF
FUZING	Proximity.		
WARHEAD	High explosive continuous rod warhead.		
REMARKS	<p>The Masurca system consists of (1) a twin launcher, (2) a storage and handling system for each launcher, (3) two directors, each with a tracking radar and a target illuminator, and (4) a missile test system.</p> <p>Masurca is intended to attack aircraft which have evaded the fighter screen from aircraft carriers. The command guided Mod 2 version is cheaper and less sensitive to ECM, whereas the semi-active homing Mod 3 has a longer range and is more effective at low altitude; a mixture of both types is normally carried. Long range surveillance is provided by a three dimensional radar and target tracking by two other radars which also provide command guidance for the Mod 2. CW illuminators are used for the semi-active Mod 3.</p> <p>The Masurca system arms the French frigates Duquensne and Suffern, and the cruiser Colbert. It is scheduled for installation in the C70 destroyers.</p>		
USERS	KEY DATES	COSTS	
France	PRESENT STATUS: Operational IOC: Prior to 1973	UNIT COSTS:  LAUNCH UNIT:	
		QUANTITIES TOTAL TO DATE:	

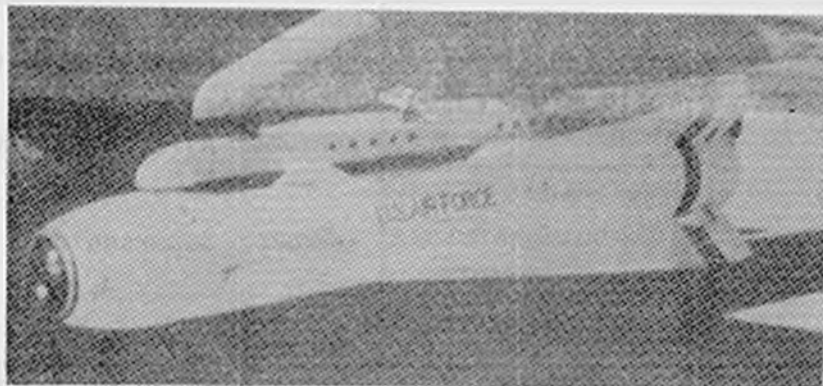
## MASURCA

OTHER INFORMATION:

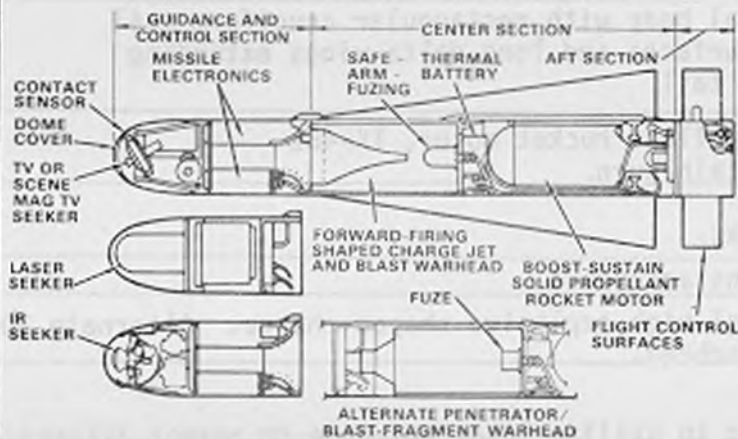


NAME <b>MAVERICK</b>		<b>MAVERICK 65A/B</b>		DEVELOPER <b>Hughes</b>			
DESIGNATION <b>AGM-65A/B</b>				COUNTRY <b>USA</b>			
				SERVICE <b>Air Force</b>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER			
				<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <b>Radar and missile sites</b>			
<b>CHARACTERISTICS</b> LENGTH: 2.5m (8.2') DIAMETER: 30cm (1.0') SPAN: .72m (2.4') WEIGHT: 210kg (462#) OTHER:			<b>PERFORMANCE</b> RANGE: 10-13km (6-8mi) ALTITUDE: Aircraft Altitude SPEED: Supersonic OTHER:				
			<b>BASIS FOR LAUNCH</b> <u>Pilot effects</u> <u>missile warmup and</u> <u>lock-on.</u>				
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM	Small air-launched, electro-optical missile designed for use against hard or discrete ground targets.		Hughes				
AIRFRAME	Cylindrical body with rectangular cruciform tail control surfaces and long delta wings extending nearly to tail		Hughes/ Ametek-Straza				
PROPULSION	Solid propellant rocket motor TX-481 boost sustain burn		Thiokol/Aerojet				
GUIDANCE	Miniature TV homing system, nose mounted, (65A); with Scene Magnification TV (64B)		Hughes				
FUZING	Impact, instantaneous		Bulova				
WARHEAD	125# high explosive, shaped charge		Chamberlain				
<b>REMARKS</b> Pilot warms up missile and uncages gyro. Target is picked up on A/C TV monitor. Pilot locks the missile tracker to the target by slewing the tracker on A/C. The pilot then launches; the missile is guided to the target by the TV centroid tracker.  The Maverick is designed for use with the F-4, F-111F, F-16, A-7, F-5, A-4, AJ-37, and A-10 aircraft. It is designed to be used against hardpoint targets such as fortifications, tanks and other vehicles, parked A/C, and missile and radar sites.							
See also Maverick -65C & D, and Maverick -65E & F on succeeding pages.							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
United States Iran Israel Saudi Arabia South Korea Sweden Turkey Greece		Egypt Taiwan		UNIT COSTS: \$60,000 - Fy 1982  LAUNCH UNIT:			
		PRESENT STATUS: Operational (Production complete, -63A) IOC: -65A - 1972 -65B - 1976		QUANTITIES			
				TOTAL TO DATE: AGM-65A - 17,000+ AGM-65B - About 11,000			

OTHER INFORMATION:



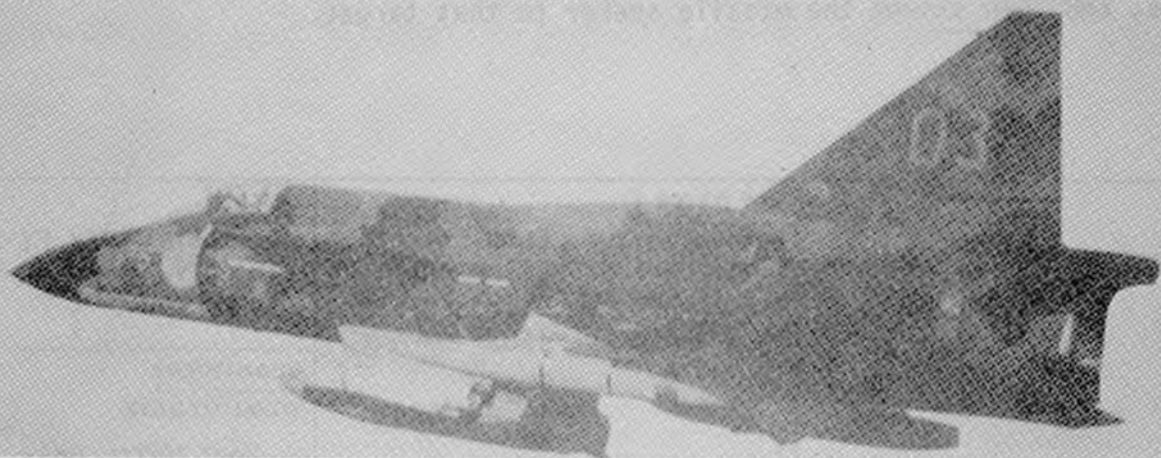
MAVERICK MISSILE ARRANGEMENT



STATISTICS

LENGTH	99 IN (249 CM)
DIAMETER	12 IN (30 CM)
WING SPAN	28.5 IN (72 CM)
WEIGHT	462 LB* (210 KG)

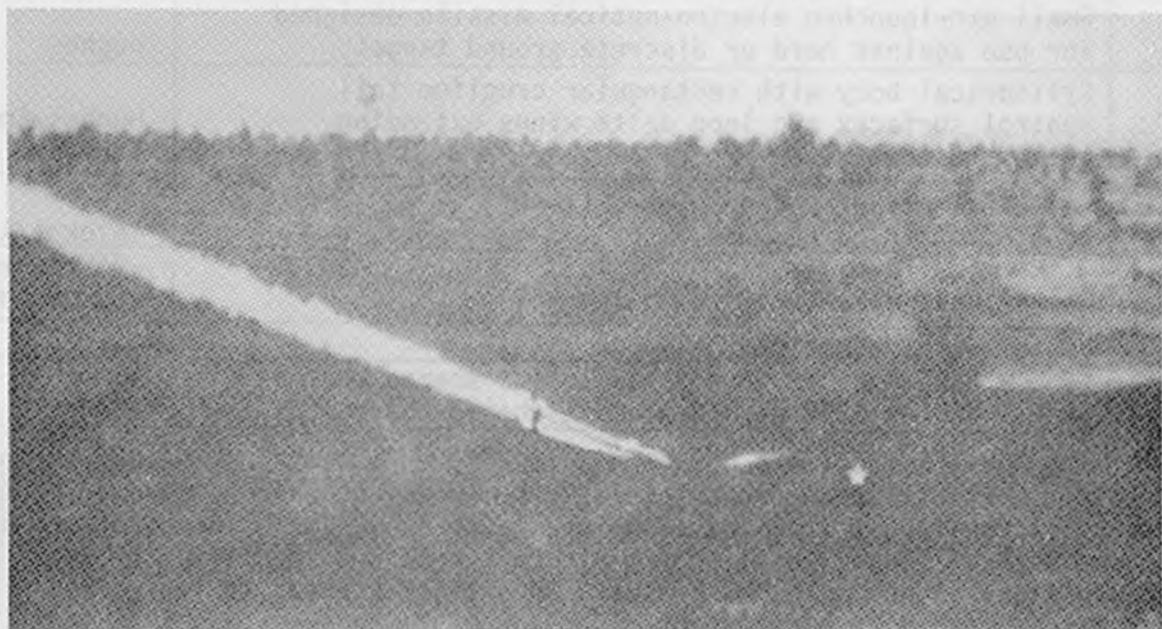
\* 637 LB (289 KG) WITH ALTERNATE WARHEAD



# MAVERICK 65C/D

NAME <u>MAVERICK</u>		DEVELOPER <u>Hughes</u>	
DESIGNATION <u>AGM-65C/D</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Radar and missile sites</u>
CHARACTERISTICS		PERFORMANCE	
LENGTH: 2.5m (8.2') DIAMETER: 30cm (1.0') SPAN: .73m (2.4') WEIGHT: 225kg (496#) OTHER:		RANGE: Mac. 16-19km (10-12mi) ALTITUDE: Aircraft altitude SPEED: Supersonic OTHER:	
		BASIS FOR LAUNCH <u>Pilot effects</u> <u>missile warmup and</u> <u>lock-on</u>	
		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Small air-launched, electro-optical missile designed for use against hard or discrete ground targets.		Hughes
AIRFRAME	Cylindrical body with rectangular cruciform tail control surfaces and long delta wings extending nearly to tail.		Hughes/Ametek-Straza
PROPULSION	Solid propellant rocket motor, TX-481 Boost-sustain burn.		Thiokol/Aerojet
GUIDANCE	See Remarks.		-65C Rockwell -65D Raytheon
FUZING	Impact, instantaneous.		Bulova
WARHEAD	125# (57kg) high explosive shaped charge. Alternate 300# (136kg) warhead.		Hughes
REMARKS			
<p>-AGM-65C was designed to utilize laser guidance to permit attacks against low contrast targets. It would require the use of an airborne or ground laser designator to define the target. The laser seeker is the tri-service seeker used in the laser Hellfire and GBU-15 bomb. The -65C has not yet, and may not, enter full scale production. For practical purposes, it has been succeeded by the -65E.</p> <p>-AGM-65D utilizes imaging infrared guidance to provide a day/night Maverick delivery capability. As with the TV versions, the pilot picks up the target using his aircraft systems, and then slaves the missile seeker to that target.</p>			
USERS	KEY DATES	COSTS	
USA	PRESENT STATUS: Completing Engineering Development IOC: -65C - Discontinued -65D - 1983	UNIT COSTS: \$75K FY 81 LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: Test units only	

OTHER INFORMATION:



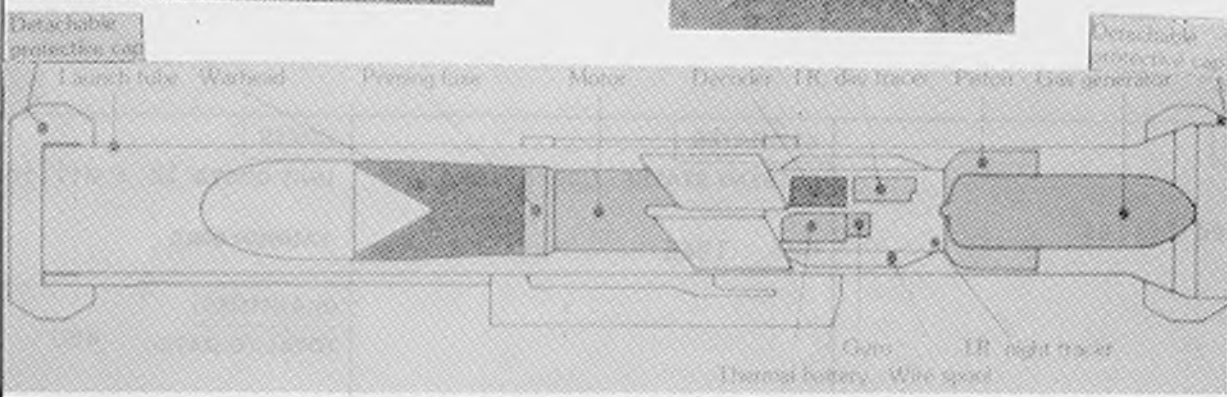
NAME <b>MAVERICK</b>		<b>MAVERICK 65E/F</b>		DEVELOPER <b>Hughes</b>			
DESIGNATION <b>AGM-65E/F</b>				COUNTRY <b>USA</b>			
				SERVICE <b>Navy, Marines</b>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL.	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT. INSTALL. <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 2.5m (8.2') DIAMETER: 30cm (1.0') SPAN: .73m (2.4') WEIGHT: 210kg (462#) OTHER: 288kg (637#) w/large warhead			<b>PERFORMANCE</b> RANGE: Max. 16-19km (10-12 mi) ALTITUDE: Aircraft Altitude SPEED: Supersonic OTHER:				
			<b>BASIS FOR LAUNCH</b> <u>Pilot effects</u> <u>missile warmup</u> <u>and lock-on</u>				
			<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE 65E <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET 65F				
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR		
OVERALL SYSTEM	Small air-launched electro-optical missile designed for use against hard or discrete ground targets			Hughes			
AIRFRAME	Cylindrical body with rectangular cruciform tail control surfaces and long delta wings extending nearly to tail			Hughes/Ametek-Straza			
PROPULSION	Solid propellant rocket motor, TX-481 Boost-sustain burn			Thiokol/Aerojet			
GUIDANCE	See Remarks			-65E Rockwell -65F Hughes			
FUZING	Impact with selectable delays			Raymond			
WARHEAD	-65E - USMC - 250-300# high explosive shaped charge -65F - USN - 125# high explosive shaped charge			Avco			
<b>REMARKS</b> <p>The AGM-65E model was designed primarily as a U. S. Marine Corps close-support weapon. It utilizes a scanning laser homer which searches for, and automatically locks on the target illuminated by the laser designator, which can be either ground or airborne. Thus, the attacking aircraft need not identify the target and can withdraw after launch. The -65E uses a 300# class warhead to increase its effectiveness against very hard targets.</p> <p>The AGM-65F was initially designed for the U. S. Navy. It combines the heavy warhead of the -65E with the imaging IR seeker of the -65D. Selectable fuzing enables it to be effective against both ship and shore targets.</p>							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
USA		PRESENT STATUS: Development		UNIT COSTS: \$75K - FY 81			
		IOC: 1983+		LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE: Test units only			



## MILAN

NAME <u>MILAN</u>		DEVELOPER <u>Euromissile</u>	
DESIGNATION <u>-</u>		COUNTRY <u>France/W. Germany</u>	
		SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES Tanks <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 75cm (2.5')  DIAMETER: 11.5cm (14') Missile Section SPAN: 26.5cm (0.9')  WEIGHT: 11.4kg (25#) Missile Plus Container Msl. weight OTHER: 6.6kg (14.7#)		RANGE: Max: 2000m (1.25mi) Min: 25m (<0.1mi)  ALTITUDE: Line of sight.  SPEED: Subsonic.  OTHER:	
		BASIS FOR LAUNCH <u>Sight on target</u> <u>End cap removed</u>	
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Second generation, manportable, short range wire guided anti-tank missile system.		Euromissile: Aerospatiale and MBB
AIRFRAME	Circular cross section body with larger diameter fore and aft ends. Folding cruciform wings near rear.		Aerospatiale
PROPULSION	Dual thrust solid propellant. Sequence is boost/eject (via gas generator), delay, sustain (about 12 sec thrust). Differential thrust steering.		MBB/SNIAS
GUIDANCE	Automatic command wire guidance with IR tracking.		Auto Command IR Tracking SAT/ ELTRO
FUZING	Impact.		
WARHEAD	3kg (6.6#) high explosive hollow charge.		
REMARKS	<p>The Milan system comprises; a missile in a container which serves as a launch tube, a launch and control unit, and a tripod mounting. The system is designed for daylight, dawn, and dusk operations normally. However, a special CMT/photoconductors night sight has been developed for full-dark operations.</p> <p>The two man firing team consists of a launch operator and a loader who carries two rounds. The operator puts his sight on the target, fires, and continues tracking the target until impact. The IR guidance system tracks the missile by means of the tail-mounted tail flares, and automatically generates signals to move the missile onto the target line-of-sight. Upon firing, the launch tube is thrown to the rear of the launcher, which is then ready for reloading. The pop-out wings provide a slow spin.</p> <p>Euromissile has recently developed the Milan Compact Turret (MCT) for installation on any armored vehicle. It contains all of the equipment necessary to fire the missile, and tandem mounted, trainable, launch tubes.</p> <p>In over 2000 firings, over 90% direct hits are claimed.</p>		
USERS	KEY DATES	COSTS	
France W. Germany Belgium Greece Italy Turkey UK	PRESENT STATUS: Operational.  IOC: About 1972	UNIT COSTS:  LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: About 120,000 with over 200,000 expected.	

OTHER INFORMATION:

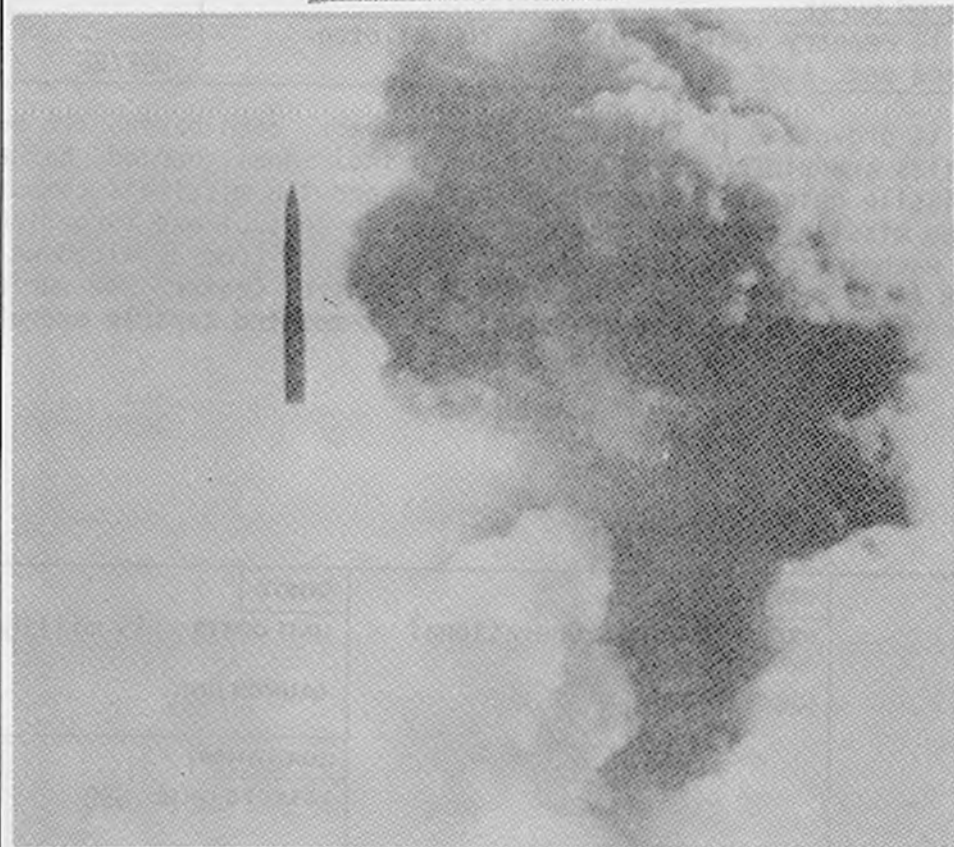
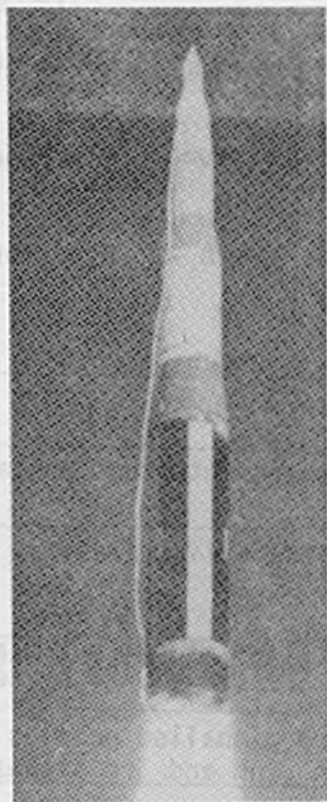


# MINUTEMAN II

NAME <u>Minuteman II</u>		DEVELOPER <u>Boeing</u>	
DESIGNATION <u>IGM-30F</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____ <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>
CHARACTERISTICS		PERFORMANCE	
LENGTH: 18.2m (59.8') DIAMETER: 1.8m (6.1') SPAN: No wings or fins. WEIGHT: 31,750kg (70,000#) OTHER:		RANGE: 11,300km+ (7000+) ALTITUDE: Exospheric SPEED: Hypersonic - ballistic OTHER:	
		BASIS FOR LAUNCH <u>Guidance warm. Target data pre-set</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Land based, silo-launched, strategic intercontinental ballistic missile.		Boeing/TRW
AIRFRAME	Three stage (diminishing diameter) cylindrical ballistic body without fins. Flared 1st stage skirt.		Boeing
PROPULSION	Three state solid propellant. 1st state Thiokol TU-122, 2nd Aerojet SR-19, 3rd state Hercules M57A.		Thiokol Aerojet Hercules
GUIDANCE	Inertial guidance. Control through gimballed nozzles (1st-3rd stages) and liquid injection (2nd state).		Rockwell Int'l/ Honeywell/GTE
FUZING	Air or ground burst		
WARHEAD	Thermonuclear 2 megaton or 3 x 170 kilotons. Avco reentry body with penetration aids		AEC/AVCO
REMARKS	<p>Minuteman is organized in flights of 10 launchers, each having its own launch center. Missiles are stored ready to launch in individual, buried, hardened, launch silos. The missile guidance is on continuously, and the missile's computer regularly confirms the missile's launch readiness. Launch control and targeting can be effected from each individual launch control center, or from an airborne launch control system (ALCS or AABNCP). The individual Control Centers are buried, 15m (50') beneath the surface in a blast-resistant, shock-mounted capsule operated by 2 SAC officers.</p>		
USERS	KEY DATES	COSTS	
United States	PRESENT STATUS: Operational	UNIT COSTS: \$8 + million	
	IOC: 1965	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: 450	

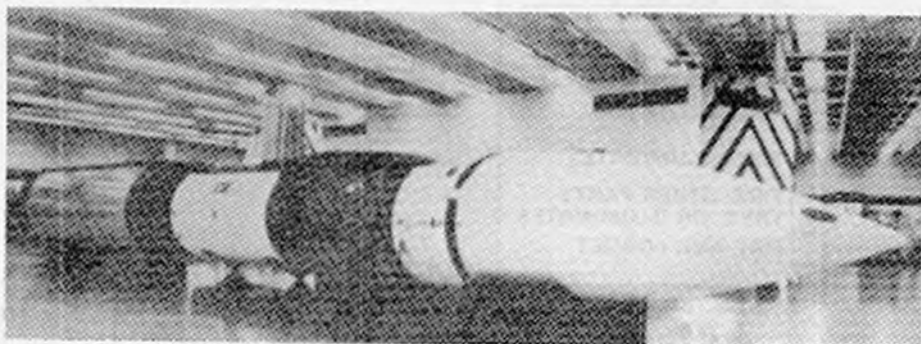
## MINUTEMAN II

OTHER INFORMATION:

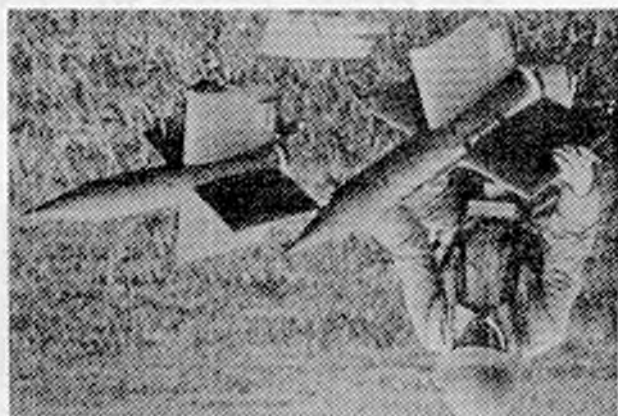
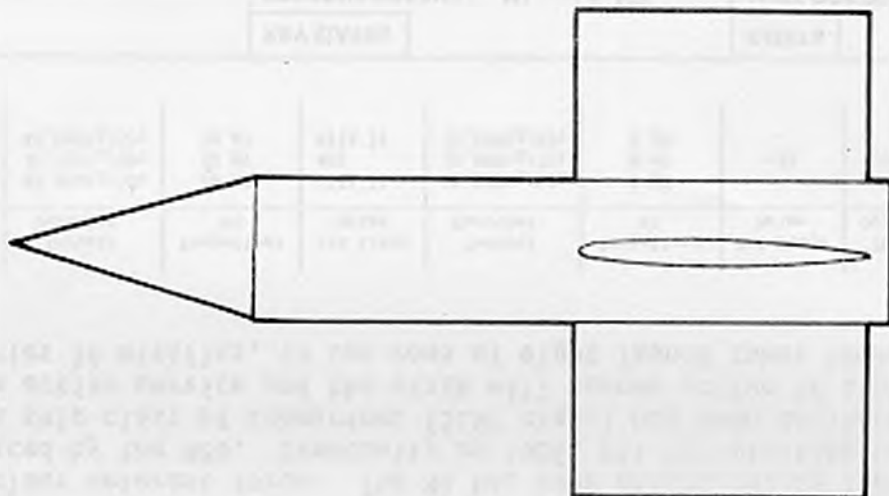


NAME <u>Minuteman III</u>		<b>MINUTEMAN III</b>		DEVELOPER <u>Boeing</u>			
DESIGNATION <u>LGM-30G</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Air Force</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>	
<b>CHARACTERISTICS</b> LENGTH: <u>18.2m (59.8')</u> DIAMETER: <u>1.8m (6.1')</u> SPAN: <u>No wings or fins.</u> WEIGHT: <u>34,475kg (76,000#)</u> OTHER:		<b>BASIS FOR LAUNCH</b> <u>Target info preset</u> <u>Guidance warn.</u> <u>Launch signal from</u> <u>land or airborne.</u> <input type="checkbox"/> Launch control cent. <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: <u>13,000km<sup>+</sup> (8000 mi<sup>+</sup>)</u> ALTITUDE: <u>Exospheric</u> SPEED: <u>Hypersonic - ballistic</u> OTHER:			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>		Land based silo-launched, strategic intercontinental ballistic missile			Boeing/TRS		
<b>AIRFRAME</b>		Three stage (diminishing diameter) cylindrical ballistic body without fins.			Boeing		
<b>PROPULSION</b>		Three stage solid propellant. 1st stage Thiokol M55, 2nd stage SR19 by Aerojet, and 3rd stage SR73 by Aerojet and Thiokol			Thiokol Aerojet		
<b>GUIDANCE</b>		Inertial guidance. Control thru gimballed nozzles (1st stage) and fluid injection (2nd and 3rd stages)			Rockwell/Honeywell GTE		
<b>FUZING</b>		Air or ground burst					
<b>WARHEAD</b>		MIRV Mark 12 reentry vehicle with 3 x 200 kiloton warheads and pen. aids			DOE/GE		
<b>REMARKS</b>		<p>Minuteman is organized in flights of 10 launchers, each having its own launch center. Missiles are stored ready to launch in individual, buried, hardened, launch silos. The missile guidance is on continuously, and the missile's computer regularly confirms the missile's launch readiness. Launch control and targeting can be effected from each individual launch control center, of from an airborne launch control system (ALCS or AABNCP). The individual Control Centers are buried 15m (50') beneath the surface in a blast-resistant, shock-mounted capsule operated by 2 SAC officers.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
United States		PRESENT STATUS: Operational		UNIT COSTS: \$9 million			
		IOC: 1970		LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE: 550			

OTHER INFORMATION:



NAME <u>MOSQUITO</u>		<b>MOSQUITO</b>		DEVELOPER <u>Contraves</u>	
DESIGNATION <u>—</u>				COUNTRY <u>Italy</u>	
				SERVICE <u>Army</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
<b>CHARACTERISTICS</b>		<b>PERFORMANCE</b>			
LENGTH: 1.11m (3.7') DIAMETER: 12cm (0.4') SPAN: 60cm (2.0') WEIGHT: 14.1kg (31#) OTHER:		<b>BASIS FOR LAUNCH</b> <u>Sight on target</u> <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		RANGE: Max: 2300m (7800') Min: 360m (1200') ALTITUDE: Line of sight SPEED: OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
<b>OVERALL SYSTEM</b>		Man-transportable, anti-tank, short range missile system.		Contraves Italiana	
<b>AIRFRAME</b>		Cylindrical body with pointed nose. Large rectangular, cruciform, folding wings aft.		Contraves	
<b>PROPULSION</b>		Two stage solid propellant rocket motors.			
<b>GUIDANCE</b>		Wire command to line of sight. Optical sight and manual control.			
<b>FUZING</b>		Impact			
<b>WARHEAD</b>		4kg (9#) high explosive, hollow charge or fragmentation.			
<b>REMARKS</b>					
<p>Mosquito is built with a fiberglass body and folding wings of sandwich construction. It has been mounted on the Puch-Haflinger cross country vehicle and the Agusta Bell 47 helicopters, or it can be sight up in the field and launched by individual infantrymen.</p> <p>Mosquito can be transported and fired by one man, using a joystick-operated control box. In flight, the missile is controlled by the usual vibrating spoilers on the trailing edge of each wing. The missile is roll stabilized by a power-driven gyro.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
Italy		PRESENT STATUS: Believed operational in limited loc. quantities		UNIT COSTS:	
				LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE:	



**MOSQUITO**

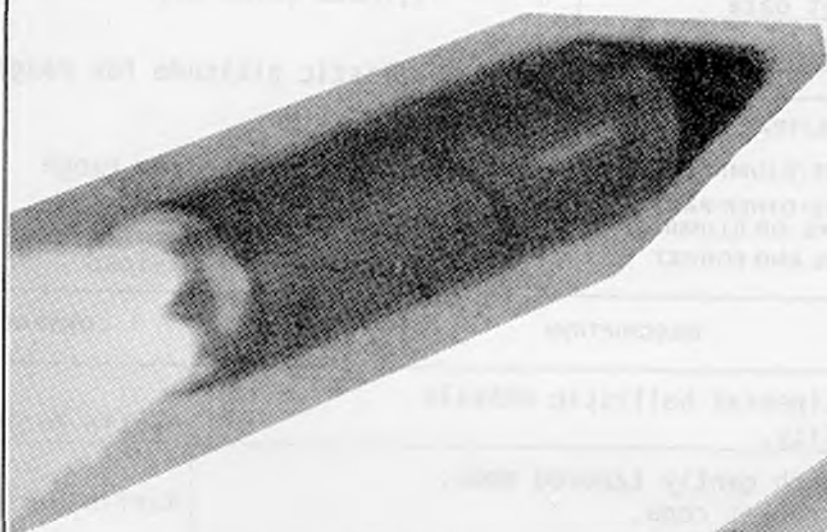
WORLD'S  
 MISSILE  
 SYSTEMS



## MSBS

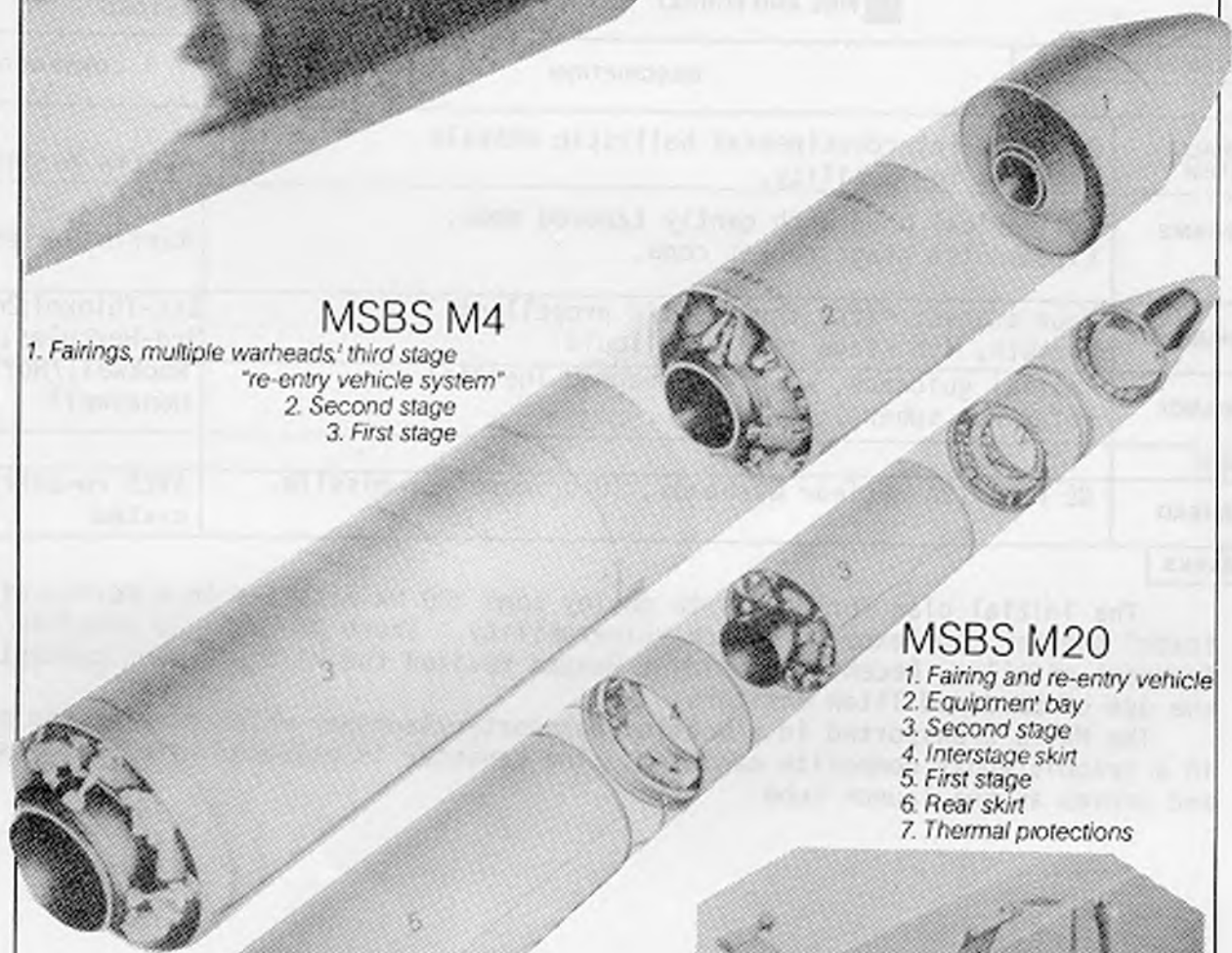
NAME <u>MSBS</u>		DEVELOPER <u>Aerospatiale</u>							
DESIGNATION <u>M1, 2, 20, &amp; 4</u>		COUNTRY <u>France</u>							
		SERVICE <u>Navy</u>							
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS						
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		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>						
CHARACTERISTICS		PERFORMANCE							
LENGTH: M4: 11.5m (37.7') M1, M2, M20: 10.4m (34.1')		RANGE: M1 = 2500km (1550mi) M20 = 3000km (1850mi) M4 = 4000km (2500mi)							
DIAMETER: M4: 1.9m (6.6') M1, M2, M20: 1.5m (4.9')		ALTITUDE: Ballistic-depends upon target range							
SPAN: Same as diameter		SPEED: Hypersonic							
WEIGHT: M1 = 18mt (16.3T) M2 = 20mt (18.1T) M20 = 20mt (18.1T) M4 = 35mt (31.8T)		OTHER:							
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET									
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR						
OVERALL SYSTEM	Medium range submarine launched strategic ballistic missile.		Div. des Sys. Balis. et Spat. Aerospatiale						
AIRFRAME	Cylindrical body with tapered, rounded nose.		Aerospatiale						
PROPULSION	Two stage solid propellant, M1, M2, M20. Three stage solid propellant, M4. (See table below)		GZP (SEP & SNPE)						
GUIDANCE	Inertial with Sagittaire digital computer.		SAGEM/EMD						
FUZING									
WARHEAD	Nuclear: M2 = 1 x 500kt, M4 = 6-7 MIRVs of 150kt/ea. M20 = 1 x 1mt.		Commissariat a l'Energie Atomique						
REMARKS	The MSBS (MER-SOL Ballistique Strategique) constitutes a major element of the French nuclear deterrent force. The M1 has been phased out by the M2, which in turn has been replaced by the M20. Eventually by 1986, all M20 missiles will be replaced by the M4. A six ship class of submarines (SLNE class) has been designed to launch the MSBS; 5 are in active service and the sixth will become active in the late 1980's. Each submarine carries 16 missiles, in two rows of eight launch tubes immediately aft of the sail.								
	1st Stage Motor	Thrust/Duration	Propellant Wt	2nd Stage Motor	Thrust/Duration	Propellant Wt	3rd Stage Motor	Thrust/Duration	Propellant Wt
	M 2 SEP 904	45,000kg/50s	10 MT	RITA II	31,000kg/52s	6 MT	-	-	-
	M 4 401	70,000kg/60s	20 MT	402	30,000kg/75s	8 MT	403	7,000kg/45s	1.5 MT
	M 20 SEP 905	45,000kg/50s	10 MT	RITA II	32,000kg/52s	6 MT	-	-	-
USERS	KEY DATES		COSTS						
France	PRESENT STATUS: M1 and M2 phased out of operations, M20 operational, M4 developm. loc: M1 1972 M2 1974 M20 1977 M4 about 1985		UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: 60 - M1 60 - M2 100-M20						

OTHER INFORMATION:



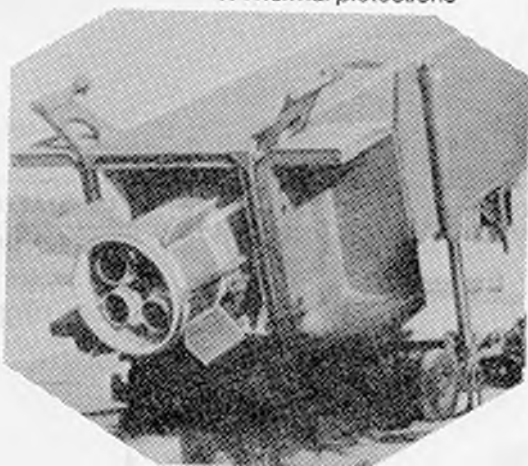
### MSBS M4

1. Fairings, multiple warheads, third stage "re-entry vehicle system"
2. Second stage
3. First stage



### MSBS M20

1. Fairing and re-entry vehicle
2. Equipment bay
3. Second stage
4. Interstage skirt
5. First stage
6. Rear skirt
7. Thermal protections

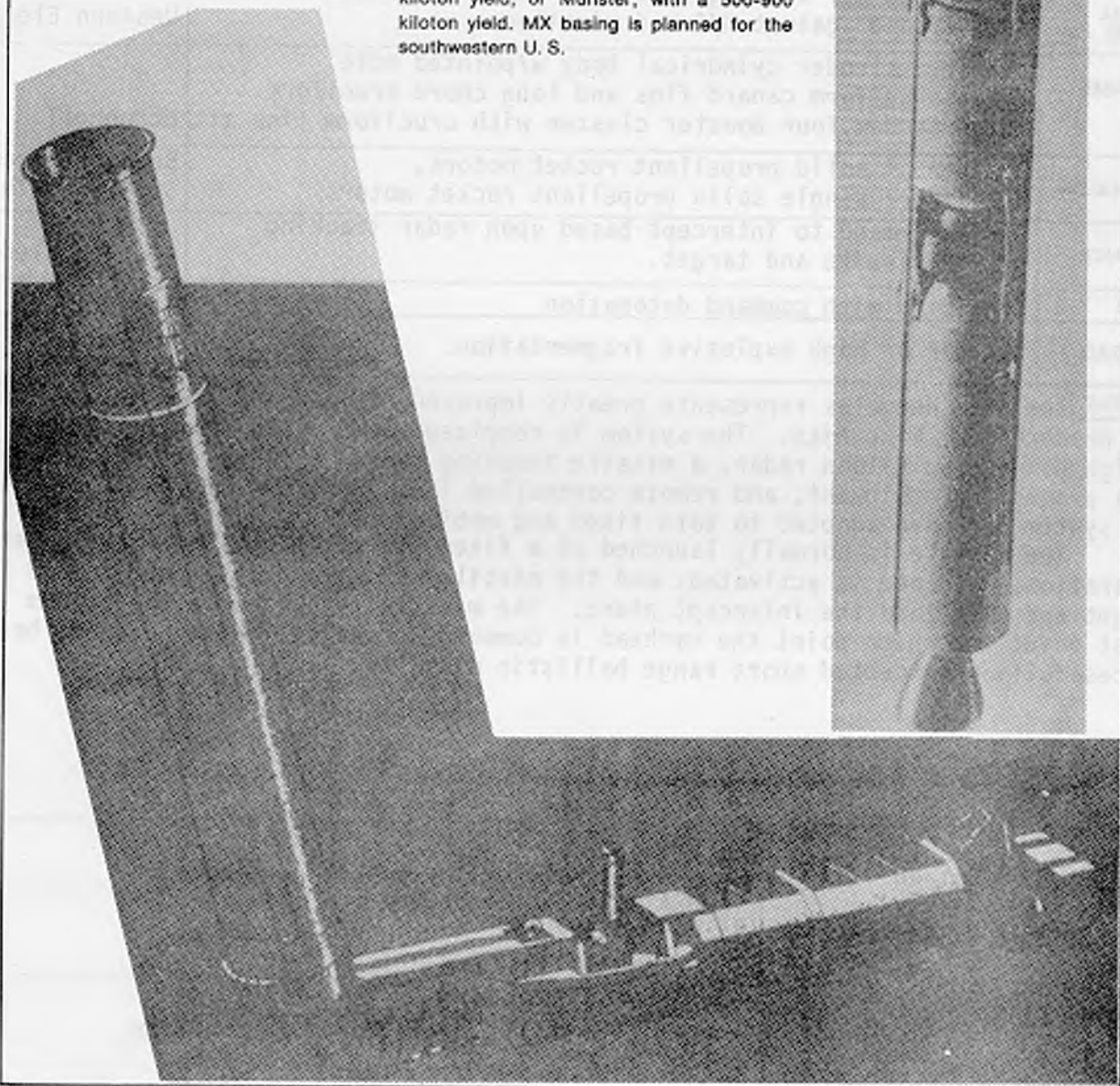


## MX

NAME <u>MX</u>		DESIGNATION _____		DEVELOPER <u>Martin Marietta</u>		COUNTRY <u>USA</u>		SERVICE <u>Air Force</u>					
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS							
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CHARACTERISTICS				PERFORMANCE									
LENGTH: 21.6m (71')				DIAMETER: 2.33 (7.7')				SPAN: No wings or fins				WEIGHT: 86,200 (189,600)	
OTHER:				BASIS FOR LAUNCH <u>Target data</u> <u>input.</u>				RANGE: 11,100km (6900 mi)				ALTITUDE: Ballistic altitude for range	
				<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				SPEED: Ballistic speed for range				OTHER: 3580kg (7880#) payload	
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Advanced intercontinental ballistic missile designed for mobility.						Martin Marietta					
AIRFRAME		Cylindrical body with gently tapered nose. Exposed 1st stage rocket cone.						Martin Marietta					
PROPULSION		Four stages; first three solid propellant rockets, 4th stage storable liquid.						1st-Thiokol; 2nd-Aero. 3rd-Hercules; 4th-RI					
GUIDANCE		Initial guidance, with an advanced inertial reference sphere.						Rockwell/Northrop/Honeywell					
FUZING													
WARHEAD		GE Mark 12A nuclear warheads, 10 or more per missile.						AVCO re-entry system					
REMARKS													
<p>The initial plan for MX was to deploy some 200 MX missiles in a series of "race track" shelter complexes to reduce vulnerability. There would be 23 possible shelters for each missile. Recently President Reagan revised the MX deployment concept to the use of hardened Titan shelters.</p> <p>The MX is transported in a mobile transporter/launcher which carries the missile in a graphic/epoxy composite canister. The canister is elevated with the missile and serves as the launch tube.</p>													
USERS				KEY DATES				COSTS					
USA				PRESENT STATUS:				UNIT COSTS:					
				IOC: 1986-1987				LAUNCH UNIT:					
								QUANTITIES					
								TOTAL TO DATE: 200 planned					

OTHER INFORMATION:

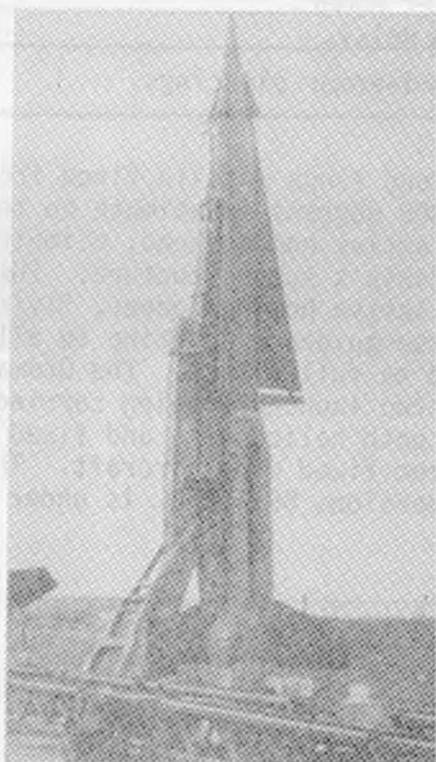
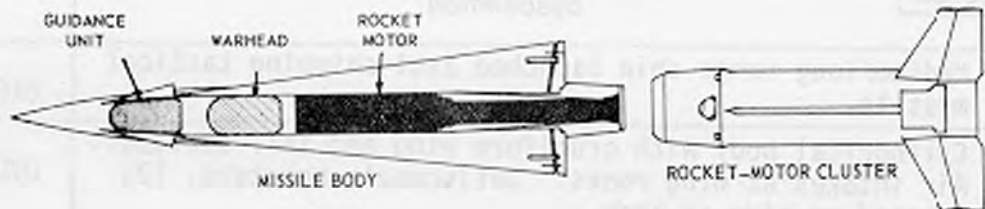
USAF/Martin Marietta MX advanced ICBM, shown in the boost phase in the artist's rendering above, is a four-stage, solid-fueled ballistic missile capable of carrying at least 10 nuclear-armed warheads in its 7,900-lb. payload. Note the reentry vehicles housed inside the fourth stage bus. The missile will be 71 ft. long, 92 in. in diameter and will weigh 190,000 lb. Thiokol Chemical Corp. will build the first stage and Aerojet Solid Propulsion Co. will build the second stage. Hercules will build the third stage and Rockwell International the fourth. Now in full-scale development, MX is scheduled for first flight tests in 1983. The weapon will be equipped with the Mk. 12A reentry vehicle or with Almendro, a warhead with a 285-500 kiloton yield, or Munster, with a 500-900 kiloton yield. MX basing is planned for the southwestern U. S.



NAME <b>NIKE HERCULES</b>		<b>NIKE HERCULES</b>		DEVELOPER <b>Western Electric</b>			
DESIGNATION <b>MHM -14B, M-6</b>				COUNTRY <b>USA</b>			
				SERVICE <b>Army</b>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 12.5m (41.0') DIAMETER: 80m (2.6') SPAN: 2.13m (7.0') WEIGHT: 4500kg (10,000#) OTHER:		<b>BASIS FOR LAUNCH</b> Acquisition radar on target		<b>PERFORMANCE</b> RANGE: 120-160km (75-100mi) ALTITUDE: 45,700m (150,000') SPEED: 3.3 Mach OTHER:			
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM	Surface to air strategic defense missile system for defense against A/C and missiles.		Western Electric				
AIRFRAME	Missile: slender cylindrical body w/pointed nose. Small cruciform canard fins and long chord cruciform wings tandem. Four booster cluster with cruciform fins aft.		McDonnell				
PROPULSION	Booster: 4 solid propellant rocket motors. Sustainer: single solid propellant rocket motors.		Booster-Hercules Sustainer-Thiokol				
GUIDANCE	Radio command to intercept based upon radar tracking of the missile and target.		Western Electric				
FUZING	Proximity with command detonation.						
WARHEAD	Nuclear or high explosive fragmentation.		Nuclear-AEC				
REMARKS	<p>The Nike Hercules represents greatly improved payload and performance over its predecessor, Nike Ajax. The system is composed of a low power acquisition radar, a high power acquisition radar, a missile tracking radar, a target tracking radar, data processing equipment, and remote controlled launchers in addition to the missiles. The system has been adapted to both fixed and mobile use.</p> <p>The missile is normally launched at a fixed elevation angle. After booster separation, guidance is activated, and the missile is commanded to roll toward the target and dive into the intercept plane. The missile is guided to the optimum burst point, at which point the warhead is command detonated. Nike Hercules has successfully intercepted short range ballistic missiles.</p>						
<b>USERS</b> USA Belgium Denmark Greece Italy Japan Netherlands Norway S. Korea		<b>KEY DATES</b> PRESENT STATUS: Largely replaced in USA. Some units operational elsewhere. IOC: Nike Ajax - 1953 Nike Hercules - about 1961		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE:			

## NIKE HERCULES

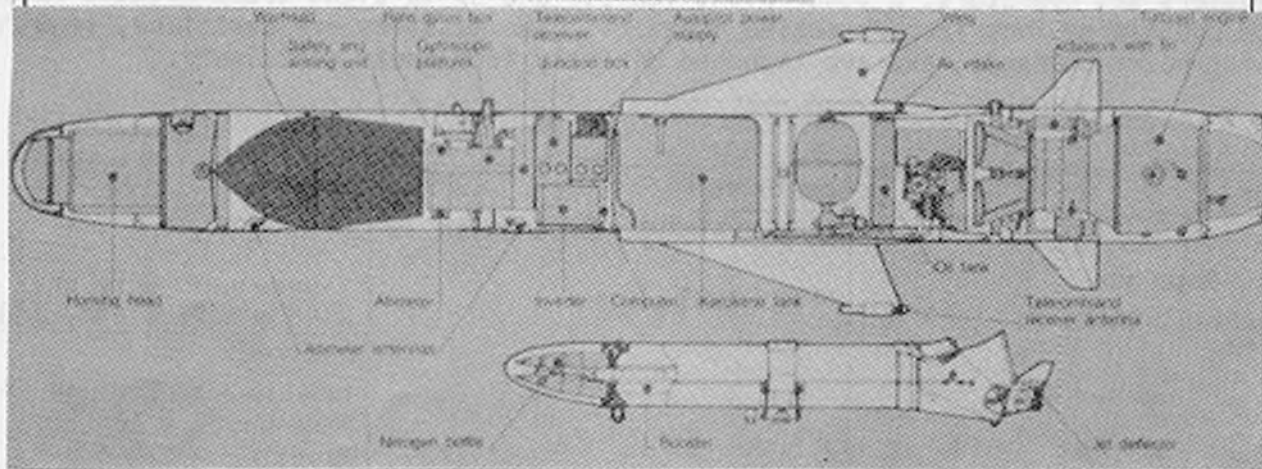
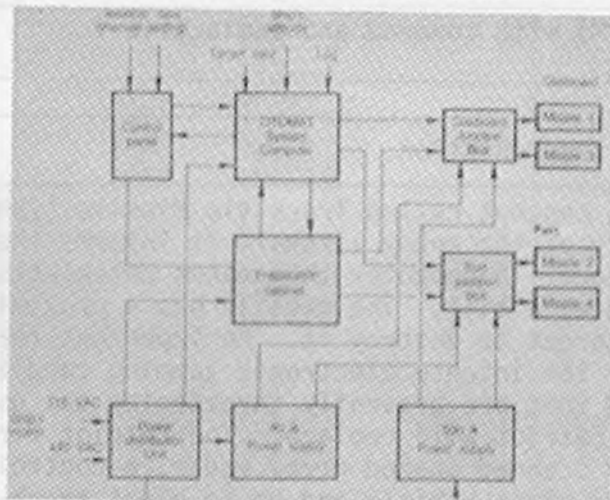
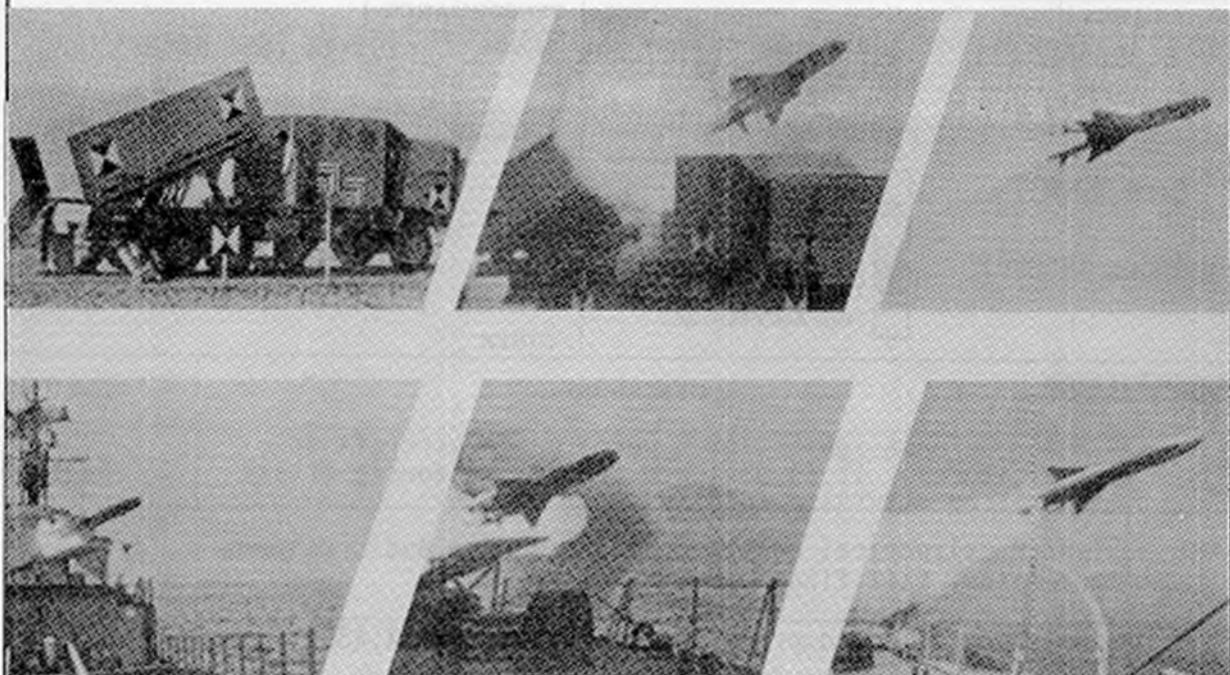
OTHER INFORMATION:



# OTOMAT

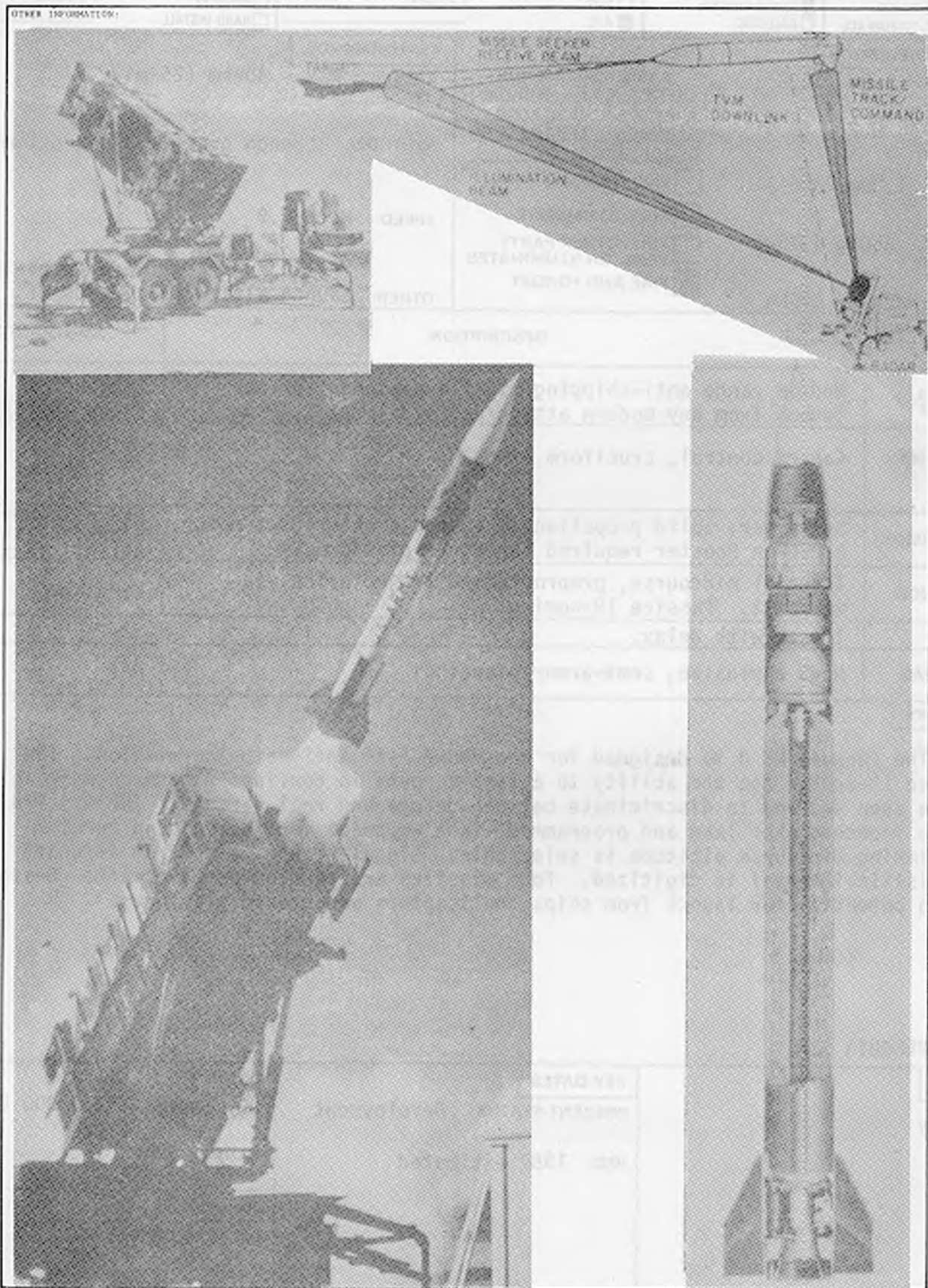
NAME <u>OTOMAT</u>		<b>OTOMAT</b>		DEVELOPER <u>OTO MELARA/Matra</u>	
DESIGNATION <u>Mark 1, Mark 2</u>				COUNTRY <u>France/Italy</u>	
				SERVICE <u>Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 4.66m (15.3') DIAMETER: 46cm (1.5') SPAN: 1.2m (3.9') WEIGHT: 780kg (1716#) OTHER: Warhead 209kg (460#)		RANGE: To 180km (112 miles) Minimum: 6km (3.7 miles) ALTITUDE: 900m (3000') initial cruise 20m (65') final cruise SPEED: High subsonic 300m/s (670 mph) OTHER:		<input type="checkbox"/> SOFT INSTALL. <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
		BASIS FOR LAUNCH <u>Target data</u> <u>inputted. Missile</u> <u>readied.</u>			
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input checked="" type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Medium/long range ship launched anti-shipping tactical missile.		OTO MELARA/Matra	
AIRFRAME		Cylindrical body with cruciform wing and tail surfaces. Air intakes at wing roots. Jetisonable boosters, (2) mounted on side of body.		OTO MELARA/Matra	
PROPULSION		Two solid propellant boosters; Turbomeca Arbizon III B turbojet sustainer.		Hotchkiss/SNPE Turbomeca	
GUIDANCE		Programmed autopilot plus radar altimeter with active radar seeker homer.		Thomson CSF Seeker	
FUZING		Contact fuze with delay.			
WARHEAD		High explosive semi-armor piercing.			
REMARKS					
The Otomat is a long range missile fired from fixed launchers/containers, and able to maneuver through 300 degrees in azimuth on to the target bearing. The Mark 1 uses a Thomson-CSF two axis active homing head, climbing to 60' above sea level for a diving attack on the target ship's superstructure. The Mark 2, known in Italy as TESEO, uses a SMA single axis active homing seeker, flying as a sea skimmer for attack. There is provision for midcourse guidance updating to allow the long range conferred by turbojet propulsion to be used to full effect. The Otomat is also being installed as a coastal defense weapon with two launchers being carried on a tracked vehicle. Air launched has been tested from both helicopters and fixed wing aircraft. The boosters are not required for launch from fixed wing aircraft. This version is said to have about 62 miles range. A new version, BRIAEREO, is under development with a range between 125-250 miles.					
USERS		KEY DATES		COSTS	
Italy Egypt Libya Nigeria Peru Philippines Saudi Arabia Venezuela		PRESENT STATUS: Operational  IOC: 1977		UNIT COSTS: Estimated at \$650,000 - FY 1980 LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: > 500 Over 450 orders from foreign customers	

OTHER INFORMATION:



# PATRIOT

NAME <u>PATRIOT (EX-SAM-D)</u>		DESIGNATION <u>XMIM-104</u>		DEVELOPER <u>Raytheon</u>		COUNTRY <u>USA</u>		SERVICE <u>Army</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 5.30m (17.4') DIAMETER: 41cm (1.6') SPAN: 87cm (2.9') WEIGHT: 906kg (2000#) OTHER:				<b>PERFORMANCE</b> RANGE: 105+km (65+ miles) ALTITUDE: Over 18,300m (60,000') SPEED: Supersonic OTHER:				<b>BASIS FOR LAUNCH</b> <u>Target acquisition</u> <u>by Phased Array</u> <u>Radar. Missile</u> <u>elevated.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input checked="" type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		SAM for defense against high performance aircraft at all altitudes. It is designed to simultaneously attack and destroy several aircraft.				Raytheon					
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose and cruciform trapezoidal tail fins.				Martin					
<b>PROPULSION</b>		Single stage, solid propellant rocket motor TX 486.				Thiokol					
<b>GUIDANCE</b>		Track Via Missile (TVM) with command and semiactive homing.				Raytheon					
<b>FUZING</b>		Proximity									
<b>WARHEAD</b>		High explosive blast fragmentation.									
<b>REMARKS</b>		Patriot employs a new concept called Track Via Missile (TVM) guidance. As the missile reaches the vicinity of the enemy aircraft it informs the radar of its location in relation to its target. A computer then makes calculations and directs the missile on a path that insures a kill. The missile has a proximity fuzed warhead, so it need only pass near the target to destroy it. An important feature of the system is its ability to operate under the intense electronic jamming conditions that will be a part of future combat, and that are presently threatening the usefulness of Nike Hercules and HAWK, the systems Patriot will replace. The Patriot fire unit consists of a truck-mounted, electronically scanned phased array radar, a control unit housing the computers and operators, a power plant vehicle and up to eight truck-mounted launchers, each containing four factory-sealed missiles. The missiles are certified, require almost no maintenance, and are launched directly from their containers.									
<b>USERS</b>		<b>KEY DATES</b>				<b>COSTS</b>					
USA NATO-interest Japan-interest		PRESENT STATUS: Production				UNIT COSTS:					
		IOC: 1983				LAUNCH UNIT: Fire unit cost w/48 missiles est. \$50M ea.					
						<b>QUANTITIES</b>					
						TOTAL TO DATE: Through FY 1982 Fire units - 19 Missiles - 423					



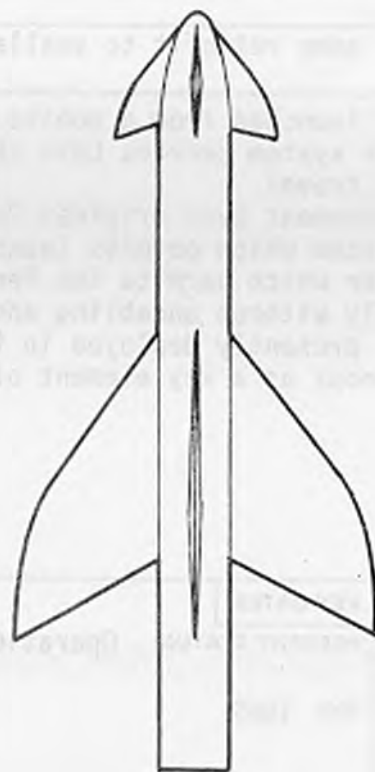
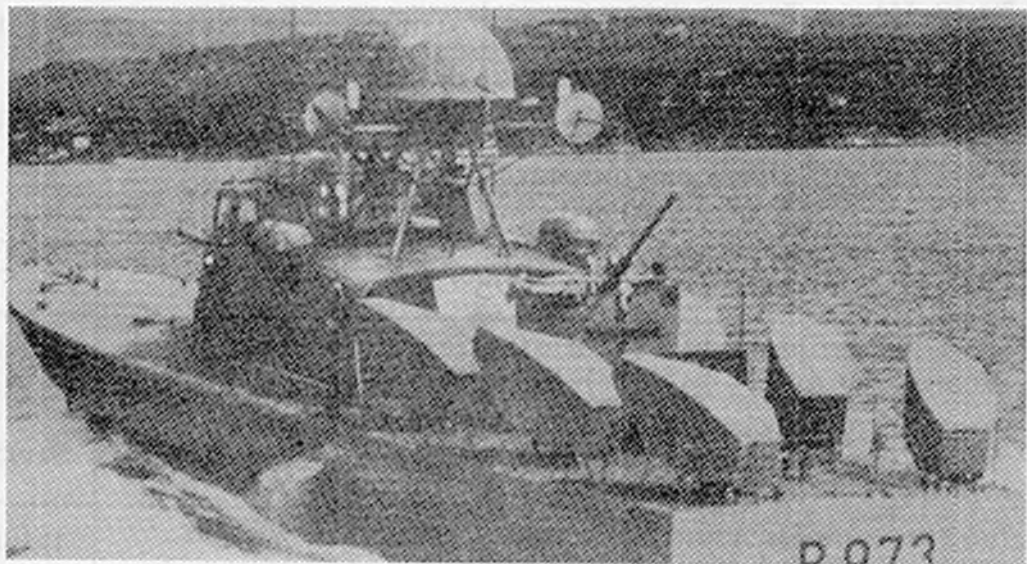
# PENGUIN ASM

NAME <u>PENGUIN ASM</u>		<b>PENGUIN ASM</b>		DEVELOPER <u>Kongsberg</u>							
DESIGNATION <u>MK 3</u>				COUNTRY <u>Norway</u>		SERVICE <u>Air Force</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 3.2m (10.5') DIAMETER: 0.28m (0.9') SPAN: 1.00m (3.3') WEIGHT: 350kg (770#) OTHER: Warhead 120kg				<b>PERFORMANCE</b> RANGE: Max: 40+km (25+mi) ALTITUDE: Launch over land/sea skimming. SPEED: Mach 0.9 OTHER: Launch altitude: Sea level to 30,000 ft.							
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
OVERALL SYSTEM		Medium range anti-shipping missile designed for air-launch from any modern attack/patrol aircraft.				Kongsberg Vapenfabrikk					
AIRFRAME		Canard control, cruciform wings.				Kongsberg					
PROPULSION		Sustainer, solid propellant, reduced smoke rocket motor. Strap-on booster required for other platforms.				Raufoss Ammunisjonsfabrikk/Atlantic Research					
GUIDANCE		Inertial midcourse, preprogrammed trajectories via waypoint. Passive IR-homing.				Kongsberg					
FUZING		Impact with delay.									
WARHEAD		High explosive, semi-armor piercing.				RAF					
<b>REMARKS</b> <p>The Penguin MK 3 is designed for the RNoAF F-16 anti-shipping mission. The passive IR-seeker has the ability to attack targets in confined waters as well as on the open sea and to discriminate between decoys and real targets. The missile can be launched over land and programmed via a waypoint for descent and turn. Seaskimming midcourse altitude is selectable. Signal transmission from aircraft and missile-internal is digitized. Four missiles are carried per aircraft. Designed-in growth potential for launch from ships, helicopters and ground platforms.</p> <p>(SEE PENGUIN SSM)</p>											
<b>USERS</b> Norway		<b>KEY DATES</b> PRESENT STATUS: Development IOC: 1987 estimated				<b>COSTS</b> UNIT COSTS: <\$350,000 USD, FY82 LAUNCH UNIT:					
						<b>QUANTITIES</b> TOTAL TO DATE:					



NAME PENGUIN SSM		PENGUIN SSM		DEVELOPER NDRE & Kongsberg			
DESIGNATION MK1 and 2				COUNTRY Norway			
				SERVICE Navy			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 3.0m (9.8') DIAMETER: 28cm (0.9') SPAN: 1.4m (4.6') WEIGHT: 340kg (750#) OTHER: Warhead 120kg (264#)			<b>PERFORMANCE</b> RANGE: MK1 20km (12.4mi) MK2 30km (18.6mi) ALTITUDE: 60-100m (200-300') SPEED: Mach 0.8 OTHER:				
			<b>BASIS FOR LAUNCH</b> Target data inputed. Inertial guidance slaved. Trajectory programmed.				
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION				CONTRACTOR		
OVERALL SYSTEM	Short range anti-shipping missile designed for use by small fast naval craft.				Kongsberg Vapenfabrikk		
AIRFRAME	Cylindrical body with tapered nose. Cruciform control surfaces at nose and cruciform swept wings at mid-body.				Kongsberg		
PROPULSION	Two stage solid propellant rocket motor.				Raufoss Ammunisjonsfabrikk		
GUIDANCE	Inertial midcourse guidance-programmable. Passive IR homing.				Kongsberg		
FUZING	Impact with delay.						
WARHEAD	High explosive semi-armor piercing. (Bullpup ASM-N-7A)				Raufoss		
REMARKS	<p>The Penguin system consists of a ship radar/electro-optical installation and a missile/launcher installation. The missile is mounted on a simple launcher which is built into a weatherproof container and is delivered as a complete unit to the ship. The unit is attached to a prepared foundation, the umbilical connected, and the missile is ready for firing. A dogleg course to the intercept point can be programmed so that the launch craft could be protected by islands. An improved Penguin Mk 2 partially financed by Sweden has been developed. It is delivered to the Swedish Navy's Hugin-class patrol boats, Norwegian Navy's "HAUK"-class and Greek Navy's "COMBATTANTE"-class.</p> <p>Several coastal defence variants of the Penguin are being studied. A Mark 3 version has been selected by Norway to arm its F-16's with 2 being carried per aircraft. The ASM version does not require the booster, and has a longer range, min. 40km at sea level launch.</p>						
(See PENGUIN ASM)							
<b>USERS</b> Norway Sweden Greece Turkey USA (being evaluated)		<b>KEY DATES</b> PRESENT STATUS: MK2 Operational IOC: MK1 1972 MK2 1979		<b>COSTS</b> UNIT COSTS: \$275,000 USD, FY82 LAUNCH UNIT: \$70,000 USD, FY82			
				<b>QUANTITIES</b> TOTAL TO DATE:			

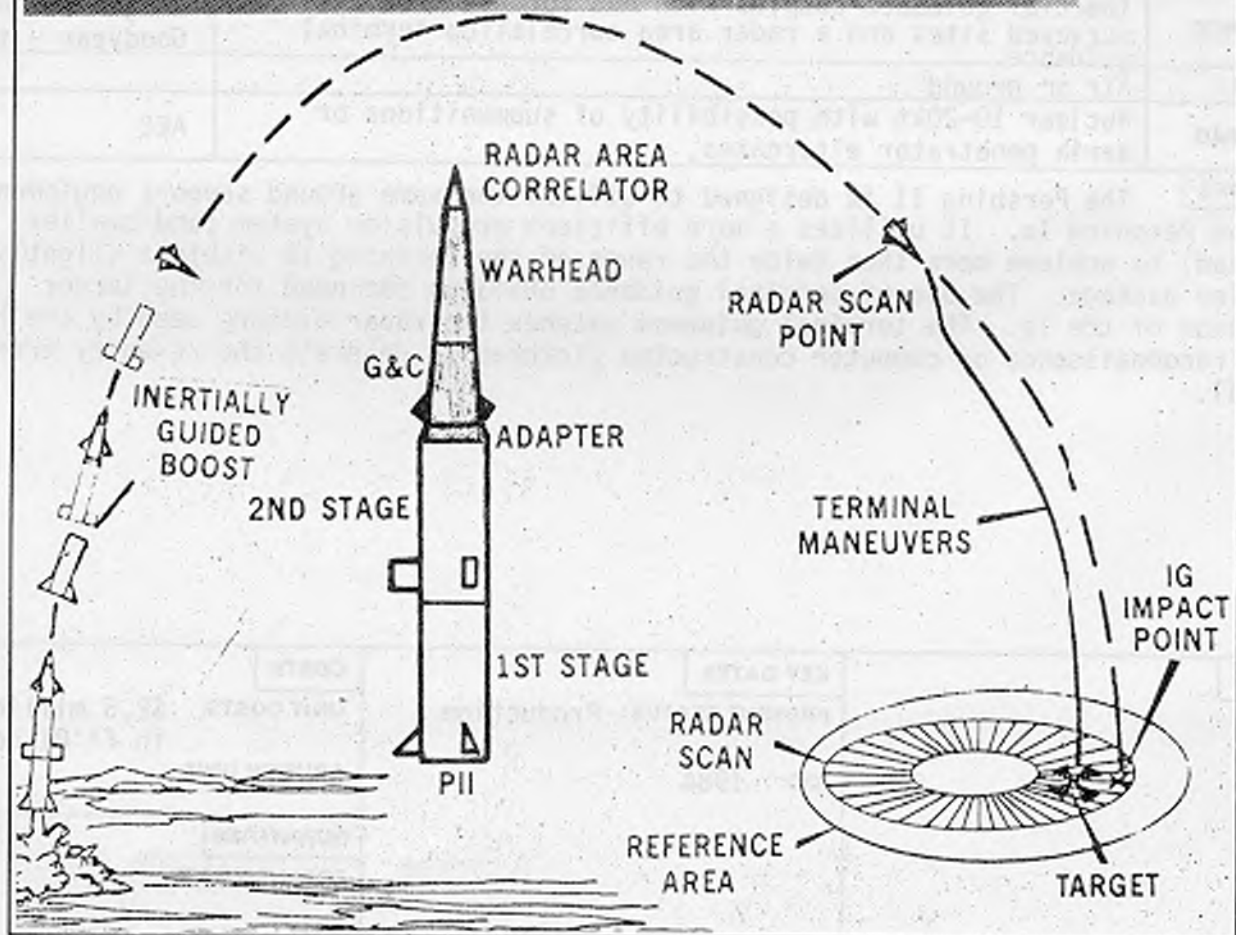
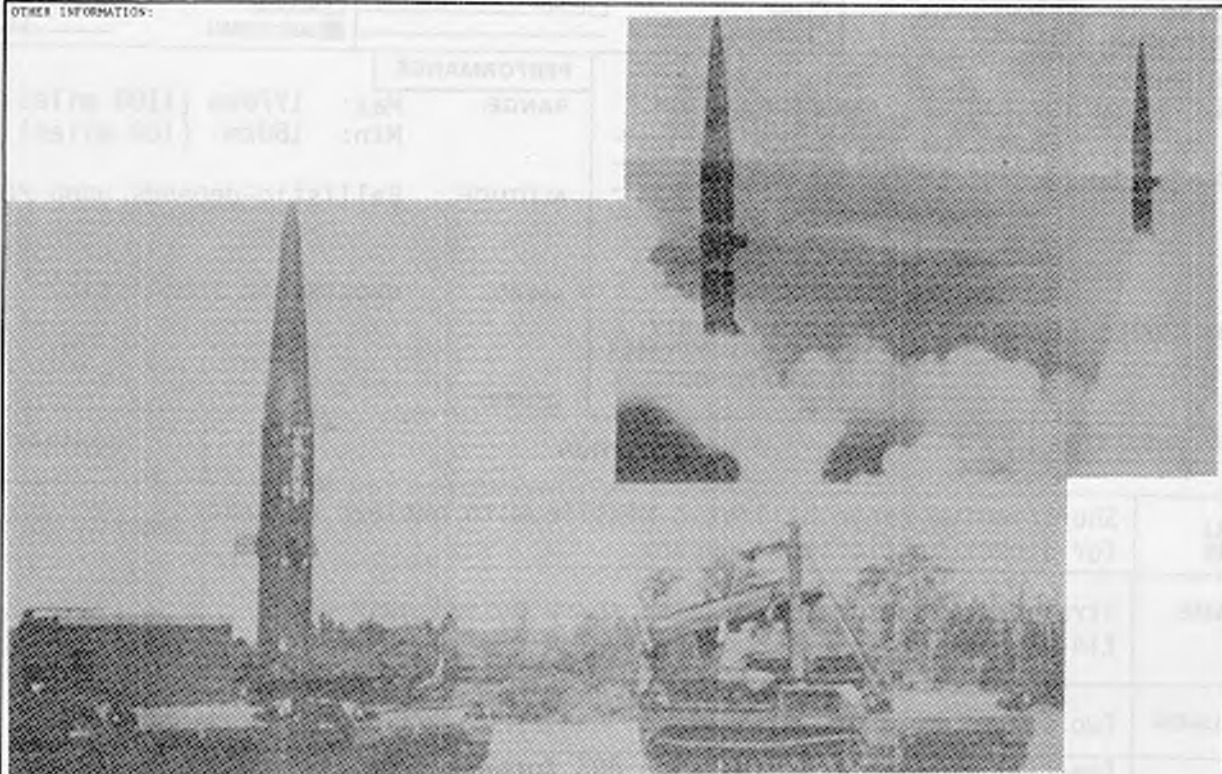
OTHER INFORMATION:



NAME <u>PERSHING Ia</u>		<b>PERSHING IA</b>		DEVELOPER <u>Martin Marietta</u>	
DESIGNATION <u>MGM-31A</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Army</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>		<b>PERFORMANCE</b>		<b>TARGETS</b>	
LENGTH: 10.5m (34.4') DIAMETER: 1.0m (3.3') SPAN: WEIGHT: 480kg (10,200#) OTHER:		RANGE: Max: 740km (460 miles) Min: 185km (115 miles) ALTITUDE: Ballistic-depends upon range. SPEED: Hypersonic (ballistic) OTHER:		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL <input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Battlefield targets</u>	
		BASIS FOR LAUNCH <u>Missile erected and activated.</u> <u>Target data input.</u>			
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
<b>OVERALL SYSTEM</b>		Short/medium range ballistic missile with nuclear warhead for direct battlefield support.		Martin Marietta	
<b>AIRFRAME</b>		Straight cylindrical body with sharp conical nose, triangular tail fins at rear of 1st stage; rectangular fins at rear of 2nd stage.		Martin Marietta	
<b>PROPULSION</b>		Two stage, solid propellant rocket motors; XM105-1st stage, XM106-2nd stage.		Thiokol	
<b>GUIDANCE</b>		Inertial guidance coupled with Automatic Reference System (ARS).		Bendix	
<b>FUZING</b>		Air or ground.			
<b>WARHEAD</b>		Nuclear 400KT with some retrofit to smaller 40-60KT warheads.		AEC	
<b>REMARKS</b>		<p>The Pershing Ia is launched from a mobile erector/launcher based upon the MG56 5-ton wheeled truck. The system carries both the missile and the warhead, and is capable of paved and off-road travel.</p> <p>A significant improvement over original Pershing utility has been provided by:</p> <ol style="list-style-type: none"> <li>1. An Automatic Reference System which permits launch from unsurveyed sites; and</li> <li>2. A Sequential Launch Adapter which permits the Pershing Commander to launch up to three missiles sequentially without uncabing and recabing.</li> </ol> <p>The Pershing Ia is presently deployed in the Federal Republic of Germany with combined U.S. and FRG troops as a key element of the NATO deterrent forces.</p>			
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA Germany		PRESENT STATUS: Operational  IOC: 1969		UNIT COSTS: \$2.2 million  LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: 575	

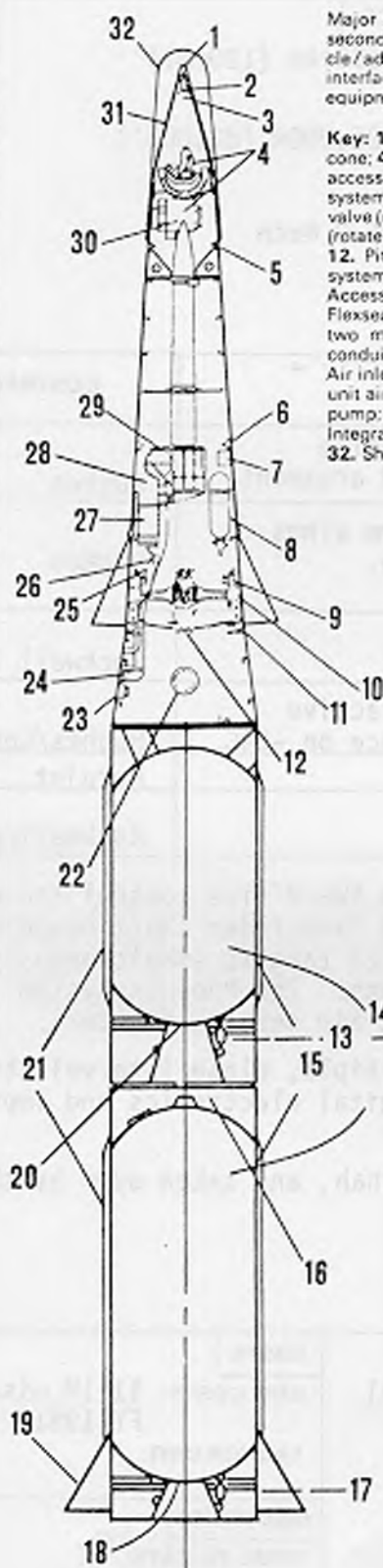
PERSHING IA

OTHER INFORMATION:



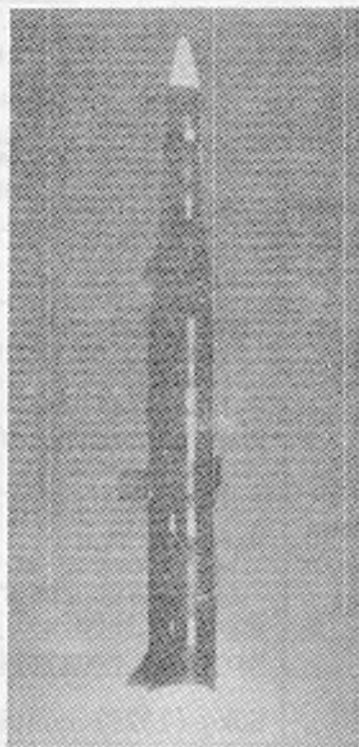
NAME <u>PERSHING II</u>		<b>PERSHING II</b>		DEVELOPER <u>Martin Marietta</u>							
DESIGNATION _____				COUNTRY <u>USA</u>							
				SERVICE <u>Army</u>							
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL		<input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Battlefield targets</u>	
<b>CHARACTERISTICS</b> LENGTH: 10.0m (32.9') DIAMETER: 1.0m (3.3') SPAN: WEIGHT: 7200kg (15,840#) OTHER:				<b>PERFORMANCE</b> RANGE: Max: 1770km (1100 miles) Min: 160km (100 miles) ALTITUDE: Ballistic-depends upon range. SPEED: Hypersonic (ballistic) OTHER:							
<b>BASIS FOR LAUNCH</b> <u>Missile erected and activated.</u> <u>Target data input.</u>				<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR					
OVERALL SYSTEM		Short/medium range ballistic missile with nuclear warhead for direct battlefield support.				Martin Marietta					
AIRFRAME		Straight cylindrical body with sharp ogival nose and fin at rear of each stage and the re-entry body.				Martin Marietta					
PROPULSION		Two stage solid propellant				Hercules					
GUIDANCE		Inertial guidance coupled with ARS for use from un-surveyed sites and a radar area correlation terminal guidance.				Singer - inertial Goodyear - terminal					
FUZING		Air or ground									
WARHEAD		Nuclear 10-20kt with possibility of submunitions or earth penetrator alternates.				AEC					
<b>REMARKS</b> The Pershing II is designed to utilize the same ground support equipment as the Pershing Ia. It utilizes a more efficient propulsion system (and smaller warhead) to achieve more than twice the range of the Pershing Ia within a slightly smaller package. The use of terminal guidance obviates the need for the larger warheads of the Ia. The terminal guidance matches the radar picture seen by the RV with reconnaissance or computer constructed pictures to generate the re-entry error signal.											
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>							
USA		PRESENT STATUS: Production		UNIT COSTS: \$2.5 million plus in FY'81 dollars							
		IOC: 1984		LAUNCH UNIT:							
				QUANTITIES							
				TOTAL TO DATE:							

OTHER INFORMATION:

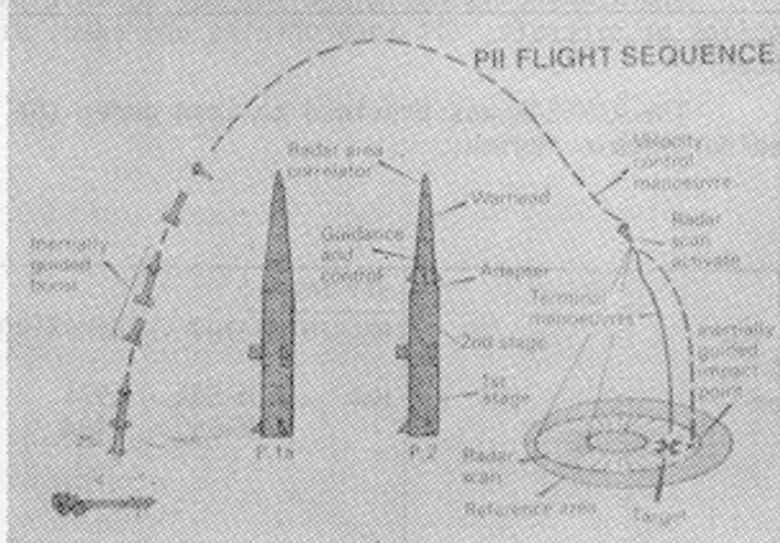


Major sections of the *Pershing II* are the first and second propulsion stages and the re-entry vehicle/adapter. Two tail-plug connections provide all interfaces between the missile and its ground support equipment.

**Key:** 1. Nose cap; 2. Impact fuze assembly; 3. Horn cone; 4. Radar unit; 5. Quick-access splice; 6. Quick-access splice; 7. Rate gyro; 8. Reaction control system pressure vessel; 9. Vane actuator and servo valve (rotated 45°); 10. Vane-vane pad controls ring (rotated 45°); 11. Separation system (rotated 90°); 12. Pitch and yaw thrusters; 13. Nozzle actuation system; 14. HTPB propellant; 15. Kevlar case; 16. Access doors; 17. Nozzle actuation system; 18. Flexseal nozzle; 19. Vanes (rotated 45°), two fixed, two movable; 20. Flexseal nozzle; 21. Electrical conduits top and bottom; 22. Access door (two); 23. Air inlet; 24. Air exhaust; 25. Integrated electronics unit air duct; 26. Turbine exhaust duct; 27. Turbine pump; 28. Gas generator and accumulator; 29. Integrated electronics unit; 30. Battery; 31. Radome; 32. Shroud.



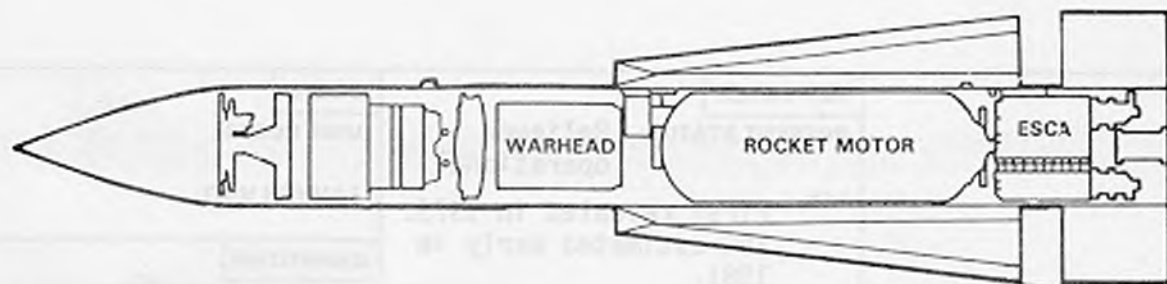
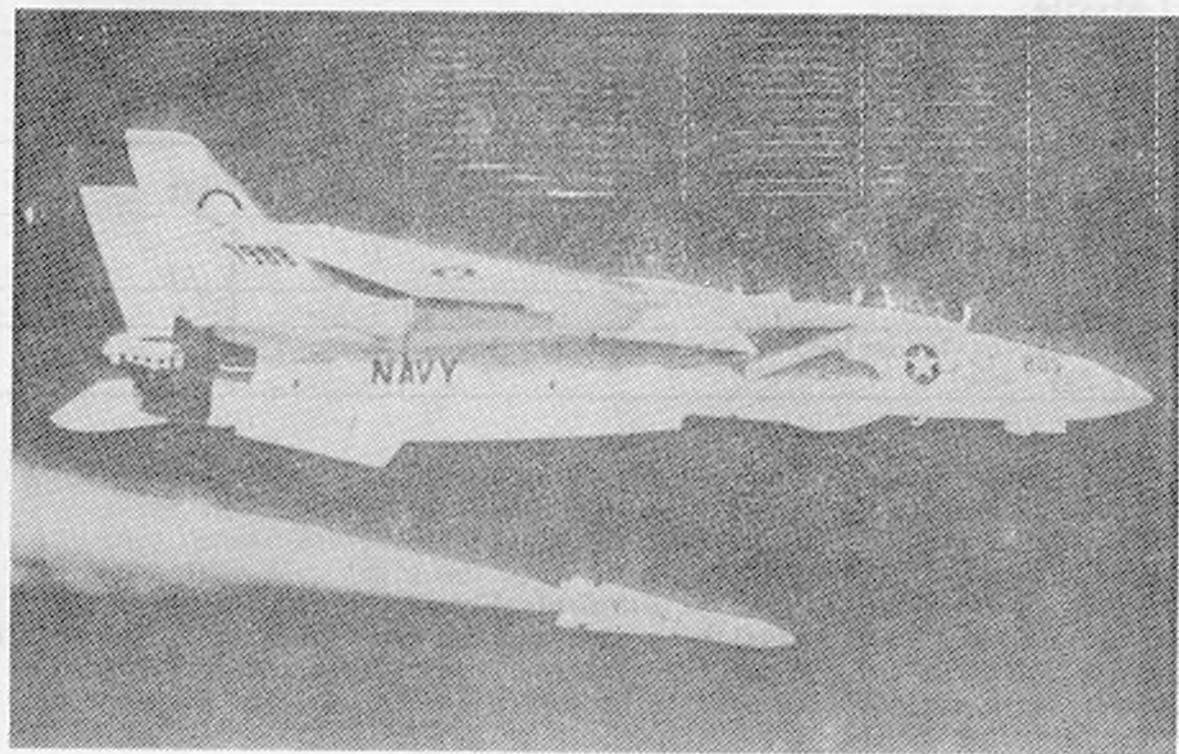
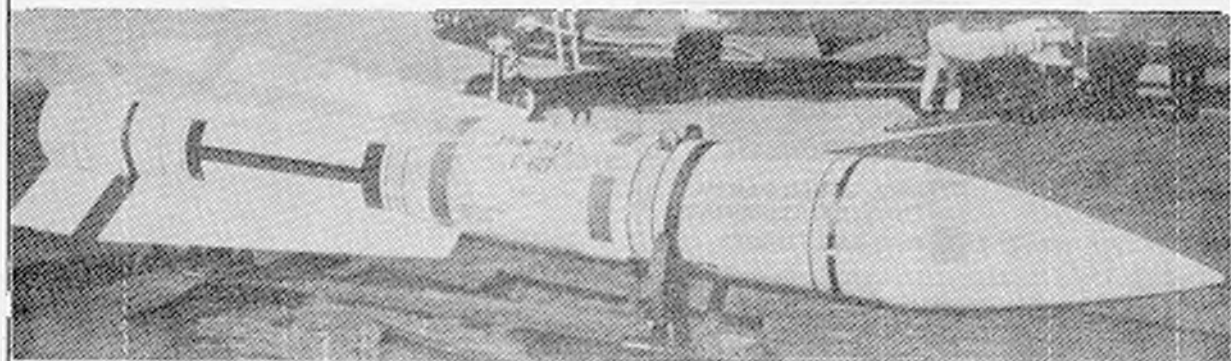
This photo shows one of five test flights of Martin Marietta Pershing 2 doing advanced development which was completed in May 1978 (see story of development over theater nuclear weapons, p. 158). New re-entry vehicle is distinguishable by control fins which enable it to maneuver in response to commands from the radar terminal guidance system, and by ceramic nose cone. The missile uses the same first- and second-stage propulsion units as the currently deployed Pershing 1a, but has a range of 1,800 km.



# PHOENIX

NAME <u>PHOENIX</u>		<b>PHOENIX</b>		DEVELOPER <u>Hughes</u>	
DESIGNATION <u>AIM-54A,C</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS				TARGETS	
LENGTH: 3.96 (13.0) DIAMETER: 38cm (1.3) SPAN: 92cm (3.0') WEIGHT: 447.7kg (985#) OTHER: -54C - 458kg (1008#)		BASIS FOR LAUNCH <u>Target detected</u> <u>and within</u> <u>intercept range</u>		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
				PERFORMANCE	
				RANGE: 193+km (120+mi) ALTITUDE: 25,000m (82,000') SPEED: 5.0 Mach OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR
OVERALL SYSTEM	Long range, high performance, air-to-air missile system to go with the AWG-9 fire control and armament system.			Hughes	
AIRFRAME	Cylindrical body with slender delta cruciform wings. Four control surfaces at tail. Pointed nose.			Hughes	
PROPULSION	Two stage, solid fuel rocket motor Mark 47, Mod 0.			Rockwell Int'l.	
GUIDANCE	Semi-active radar homing, sample data, with active doppler terminal guidance. Inertial reference on -54C.			Hughes/Control Data	
FUZING	Mark 334 proximity/impact fuze.			Aerojet	
WARHEAD	60kg (132#) continuous rod high explosive.			Rockwell/Bendix	
REMARKS	<p>The complete Phoenix systems consists of the AWG-9 fire control and armament system, the Phoenix long range missile, the Sparrow and Sidewinder short range missiles, and the Vulcan 20mm cannon. The AWG-9 can track up to 24 targets simultaneously and launch 6 missiles simultaneously against separate targets. The Phoenix system is designed for use with the USN F-14A air superiority/fleet air defense fighters.</p> <p>The AIM-54C is optimized for use against multiple, close interval streams of missiles or aircraft. It incorporates upgraded, digital electronics and improved guidance.</p> <p>The AIM-54A was provided to Iran under the Shah, and taken over by the succeeding Islamic regime.</p>				
USERS	KEY DATES			COSTS	
USA Iran	PRESENT STATUS: Operational			UNIT COSTS: \$1.1M missile FY 1981	
	IOC: AIM-54A - 1974 AIM-54C - 1984			LAUNCH UNIT:	
			QUANTITIES		
			TOTAL TO DATE: Over 2500		

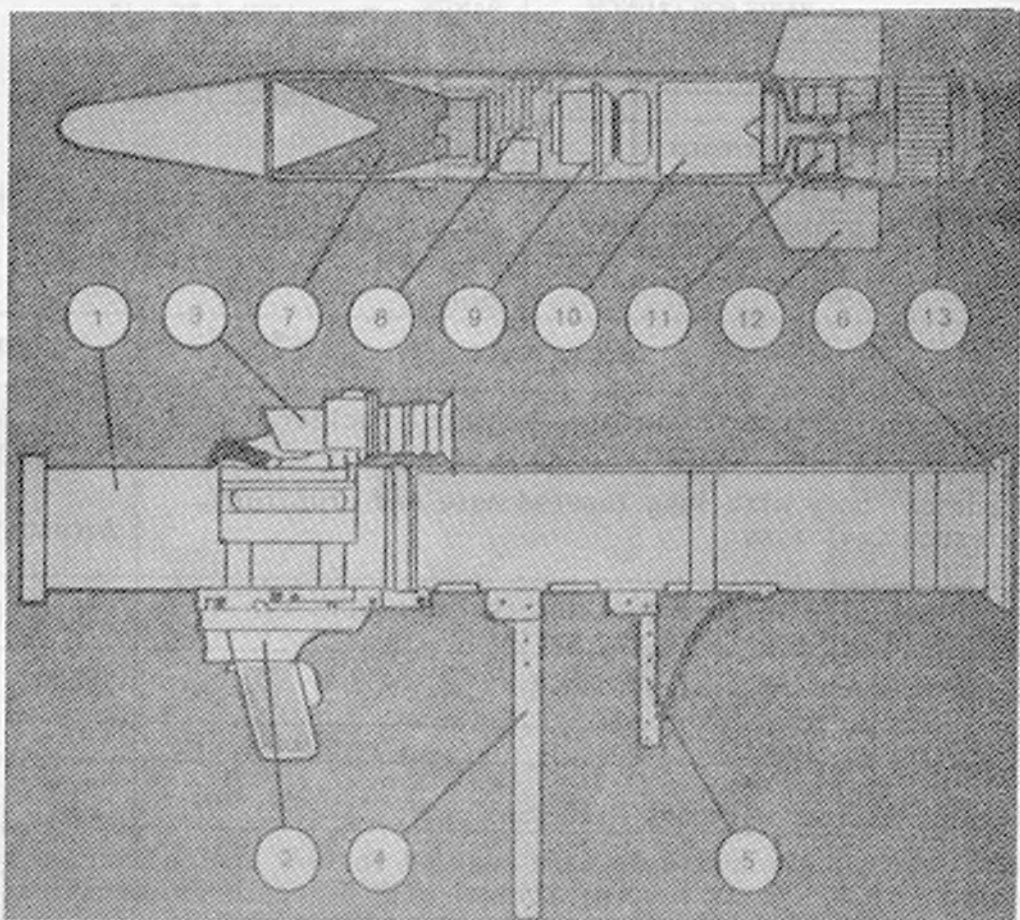
OTHER INFORMATION



# PICKET

NAME <u>PICKET</u>		<b>PICKET</b>		DEVELOPER <u>Israel A/C Ind.</u>	
DESIGNATION <u>None</u>				COUNTRY <u>Israel</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
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				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				TARGETS <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL. <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
CHARACTERISTICS			PERFORMANCE		
LENGTH: 72cm (2.4') DIAMETER: 8cm (0.3') SPAN: 18cm (0.6') WEIGHT: 4.2kg (9#) OTHER: Launcher weight 1.8kg (4#)			RANGE: 500+m (1640 ft) ALTITUDE: Line of sight SPEED: Supersonic OTHER:		
			BASIS FOR LAUNCH Sight on target.		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Shoulder launched, high speed, short range, anti-armor missile.		Israel Aircraft Industries	
AIRFRAME		Cylindrical body with tapered nose. Three cropped delta fins aft.		IAI	
PROPULSION		Two stage solid propellant rocket motors; boost/ejection and sustain.		IAI	
GUIDANCE		Optically sighted gyro stabilized to the line-of-sight.		IAI	
FUZING		Impact.			
WARHEAD		High explosive derived from 81mm HEAT. 1kg (2.2#)			
REMARKS					
<p>This system has been designed around a 6kg (13.2#) total system weight so that it could be transported by one man in addition to his pack and rifle. The Picket round is sealed in a disposable fiberglass launch tube. The operator clips on a trigger/sighting unit, puts the sight on target and fires. The missile gyro is fired up and uncaged automatically on the trigger pull. The boost motor is fired and as the missile is ejected from the launch tube, the folding fins spring out. After a short coast the sustainer motor fires and accelerates missile to supersonic speeds. The missile is controlled to the line of sight by exhaust vanes, directed by the gyro.</p>					
USERS		KEY DATES		COSTS	
Israel		PRESENT STATUS: Believed operational		UNIT COSTS:	
		IOC: First revealed in 1979. IOC estimated early in 1981.		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: Estimated 2000	

OTHER INFORMATION:

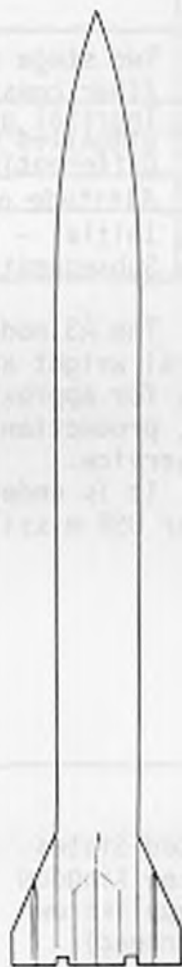
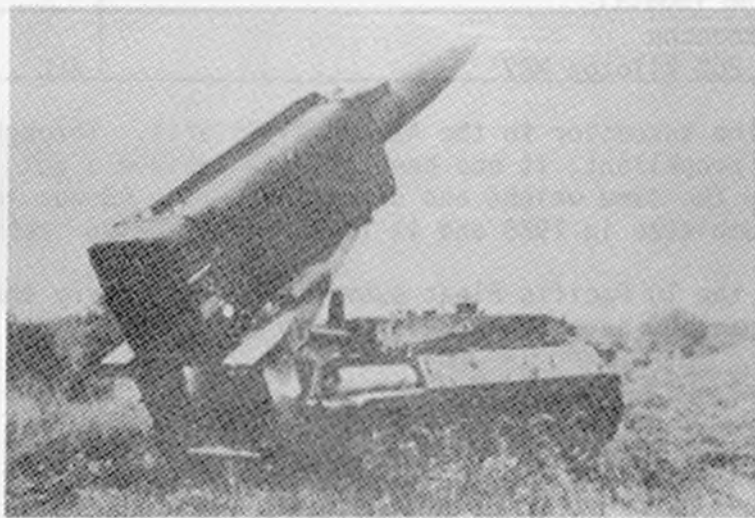
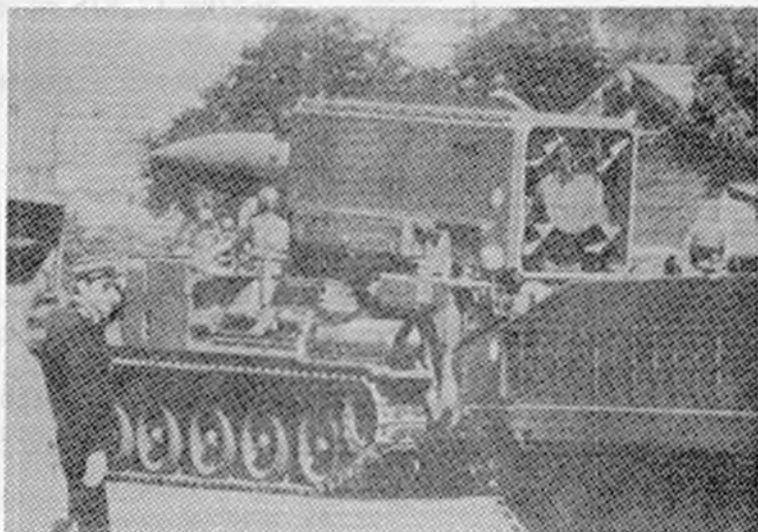


# PLUTON/HADES

NAME <u>Pluton/Hades</u>		<b>PLUTON/HADES</b>		DEVELOPER <u>Aerospatiale</u>	
DESIGNATION <u>-</u>				COUNTRY <u>France</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SRD <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 7.59m (24.9') DIAMETER: 65cm (2.1') SPAN: 1.41m (4.6') WEIGHT: 2423KG (5330#) OTHER:		RANGE: Max. 120km 75 miles Min. 10km 6 miles ALTITUDE: Ballistic Trajectory SPEED: Depends on range - generally supersonic OTHER:		<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Tactical targets</u>	
		BASIS FOR LAUNCH <u>Target and launch position inputed.</u>			
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Land mobile, surface to surface, tactical nuclear ballistic missile.		Societe Nationale Industrielle Aerospatiale	
AIRFRAME		Cylindrical body with long tapered nose and cruciform, short-span tail fins.		Aerospatiale	
PROPULSION		Dual thrust STYX solid propellant rocket motor: 120KG, 5-10 sec boost, 18 sec sustain.		SEP/SNPE	
GUIDANCE		Semi-strap-down inertial guidance.		SFENA	
FUZING		Air or surface burst.			
WARHEAD		Alternate nuclear warheads - 10-25KT		CEA	
REMARKS		<p>Initial production contracts were awarded in 1972 and deliveries to the French army commenced in 1974. It is now operational with 5 French regiments, with each Regiment having 6 launchers plus the appropriate support and resupply equipment. In addition to the launching vehicle, the system includes command vehicles containing data processing equipment organized around the IRIS 35M computer of the Plan Calcul Militaire.</p> <p>The missiles are carried on the AMX 30 tank chassis, one per vehicle. Launch is from a pre-surveyed site. The missile container acts as the launch ramp.</p> <p>A planned follow-on development, Hades, will provide doubled range at a considerable reduction in weight, and can utilize unsurveyed launch sites.</p>			
USERS		KEY DATES		COSTS	
France		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: 1974 - Pluton 1985 - Hades Estimated		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: About 100	

## PLUTON/HADES

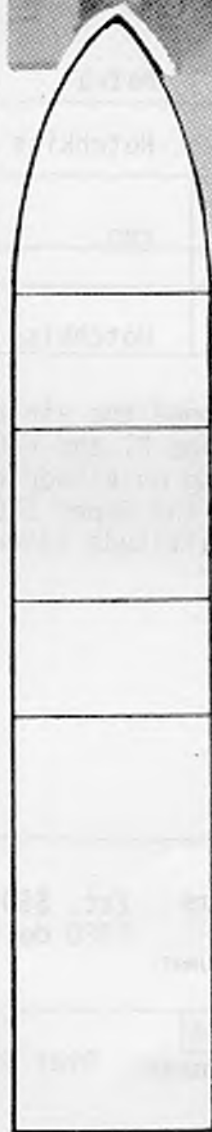
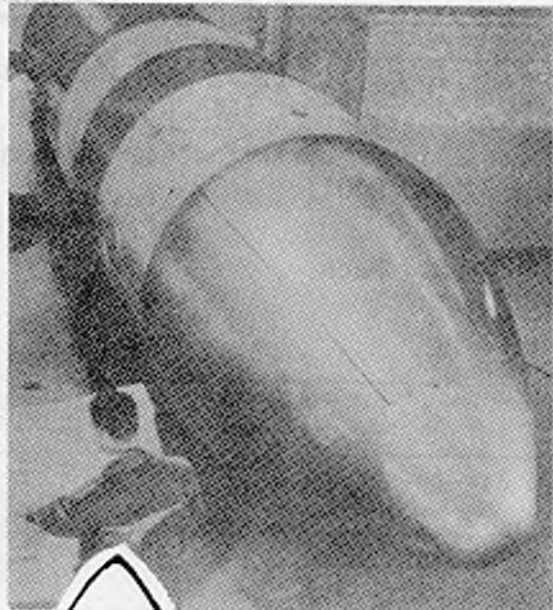
OTHER INFORMATION:



## POLARIS A3

NAME <u>POLARIS A3</u>		DEVELOPER <u>Lockheed</u>	
DESIGNATION <u>HGM-276</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Navy</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
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CHARACTERISTICS		PERFORMANCE	
LENGTH: 9.86m (32.3') DIAMETER: 1.37m (4.5') SPAN: No wings or fins WEIGHT: 15,900kg (35,000#) OTHER:		RANGE: 4627km (2,875 miles) ALTITUDE: Exospheric - depends upon range SPEED: Supersonic OTHER:	
BASIS FOR LAUNCH <u>Missile systems activated. Position and target data input.</u>		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Submerged submarine launched, medium range, strategic missile.		Lockheed Missiles & Space
AIRFRAME	Cylindrical body with ogive nose.		Lockheed
PROPULSION	Two stage solid propellant rocket motor - glass fiber construction.		Aerojet - 1st stage Hercules - 2nd stage
GUIDANCE	Inertial guidance input by SINS and acting through gimballed nozzles (1st stage) and differential thrust (2nd stage)		GE/Hughes/MIT
FUZING	Altitude or ground impact.		
WARHEAD	Initial - 1 x 1 megaton Subsequent - 3 x 200 kiloton MRV		AEC
REMARKS	<p>The A3 model is the successor to the A2 and A1 Polaris. Through reduction structural weight and new propellant, it has been able to achieve a 60% increase in range for approximately the same weight and dimensions. The A3 was introduced in 1960, production was completed in 1968 and it is currently being retired from active service.</p> <p>It is understood the 10 Pacific Fleet submarines still carry the Polaris, all other USA missile submarines have been converted to Poseiden.</p>		
USERS	KEY DATES	COSTS	
United States United Kingdom (supplies own warhead)	PRESENT STATUS: Operational	UNIT COSTS: Estimated \$7-8 million life cycle cost	
	IOC: 1960	LAUNCH UNIT:	
	Production completed 1968	QUANTITIES	
		TOTAL TO DATE:	
		1400 - A1, A2 and A3	

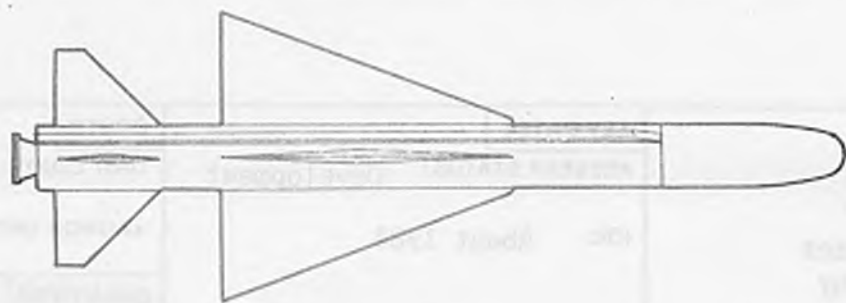
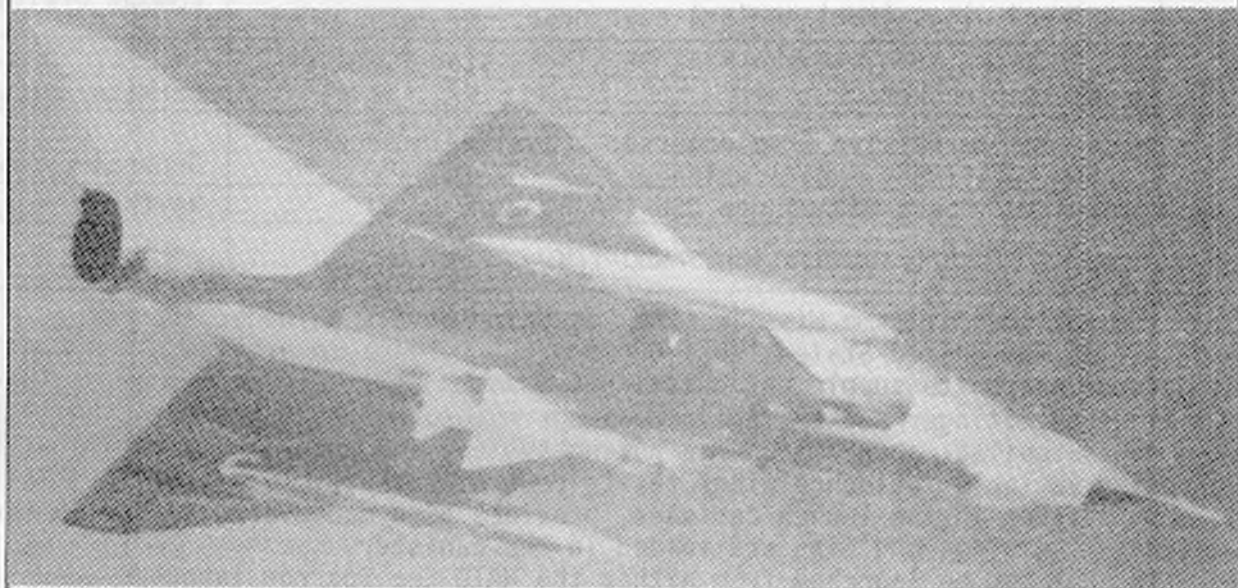
OTHER INFORMATION



## R530

NAME <u>R.530</u>		DEVELOPER <u>Matra</u>	
DESIGNATION <u>R.530</u>		COUNTRY <u>France</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
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		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.29m (10.8')	DIAMETER: 0.26m (0.85')	RANGE: 18km (11 miles) max, depending on altitude of launch	
SPAN: 1.10m (3.6')	WEIGHT: 195kg (430#)	ALTITUDE: Aircraft altitude to 21,500m (70,000')	
OTHER: Warhead 25kg (60#)	BASIS FOR LAUNCH <u>Missile activated</u> <u>Target acquired</u>	SPEED: 2.7 Mach	
	<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE SAR <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET IR	OTHER:	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	All weather, all aspect, short range air-to-air missile.		SA Engins Matra
AIRFRAME	Cylindrical body with slight taper to a blunt nose. Cruciform large delta wings midbody--one pair with elevons. In line cruciform tail control surfaces.		Matra
PROPULSION	Two stage solid propellant rocket motor.		Hotchkiss Brandt
GUIDANCE	Interchangeable guidance heads: IR all-aspect passive homer and semi-active radar (I band).		EMD
FUZING			
WARHEAD	Interchangeable warheads. High explosive fragmentation and high explosive continuous rod warheads.		Hotchkiss Brands
REMARKS			
<p>Since 1963 when series production began, the R530 has equipped the air arms of over 14 countries. It has been used with the Mirage III, Mirage F1 and F-8F aircraft. The IR head is said to be all aspect, capable of homing on either engine exhaust or aerodynamic hot spots. The R530 is being replaced by the Super 530, a second generation weapon designed for higher speed and higher altitude intercepts.</p>			
USERS		KEY DATES	COSTS
France	Saudi Arabia	PRESENT STATUS: Being phased out of operations.	UNIT COSTS: Est. \$50,000
Argentina	South Africa	ioc: 1963	1980 dollars
Australia	Venezuela		LAUNCH UNIT:
Brazil			QUANTITIES
Columbia			TOTAL TO DATE: Over 5,000
Iraq			
Lebanon			
Pakistan			

OTHER INFORMATION:



NAME		DESIGNATION		MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS			
RAM		RIM-116A		<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
DEVELOPER		COUNTRY		SERVICE		CHARACTERISTICS		BASIS FOR LAUNCH		PERFORMANCE			
General Dynamics		USA/W. Ger./Denmark		Navy		LENGTH: 2.79m (9.2') DIAMETER: 12.7cm (.42') SPAN: 42.7 (1.4') WEIGHT: 70.7kg (156#) OTHER: Tube launched		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		RANGE: (Performance data not yet released) ALTITUDE: SPEED: Supersonic OTHER:			
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Quick-reaction, point defense, fire and forget shipboard missile system with high maneuvering capability.						General Dynamics Pomona Division					
AIRFRAME		Slender cylindrical body with blunt nose. Cruciform fins near tail. Cruciform arrangement of movable (triangular) and fixed wings (rectangular) near nose.						General Dynamics Pomona Division					
PROPULSION		Modification of Sidewinder Mark 36 single stage, solid propellant rocket.						Bermite/Hercules					
GUIDANCE		Band-tunable passive RF-midcourse. Passive IR seeker-terminal (Stinger modification).						General Dynamics					
FUZING		Proximity/impact-Sidewinder DSU-15A/B.						Raytheon					
WARHEAD		Focused blast/fragmentation. WDU-17B.											
REMARKS		<p>The Rolling Airframe Missile (RAM) is being developed under the joint sponsorship of the United States, West Germany and Denmark to provide a low cost, point defense weapon to supplement existing shipboard self-defense systems. The RAM utilizes the Stinger seeker, the Sidewinder motor, warhead, and fuze, but has added a new autopilot, an RF midcourse homing system, and a rolling airframe with two opposing variable incidence wings to its control package. The roll, initially induced by rifling in the launch canister, provides high maneuverability with minimum weight. The wings and fins are folded in the canister.</p> <p>The RAM can be launched from either the NATO Sea Sparrow launcher where five RAM missiles would be loaded in each of the two inboard cells, or the new 24 round EX-144 launcher which has significant commonality with the Phalanx point-defense gun system.</p>											
USERS		KEY DATES		COSTS									
Proposed: United States West Germany Denmark		PRESENT STATUS: Development  IOC: About 1984		UNIT COSTS:  LAUNCH UNIT:									
				QUANTITIES TOTAL TO DATE: None									

OTHER INFORMATION:

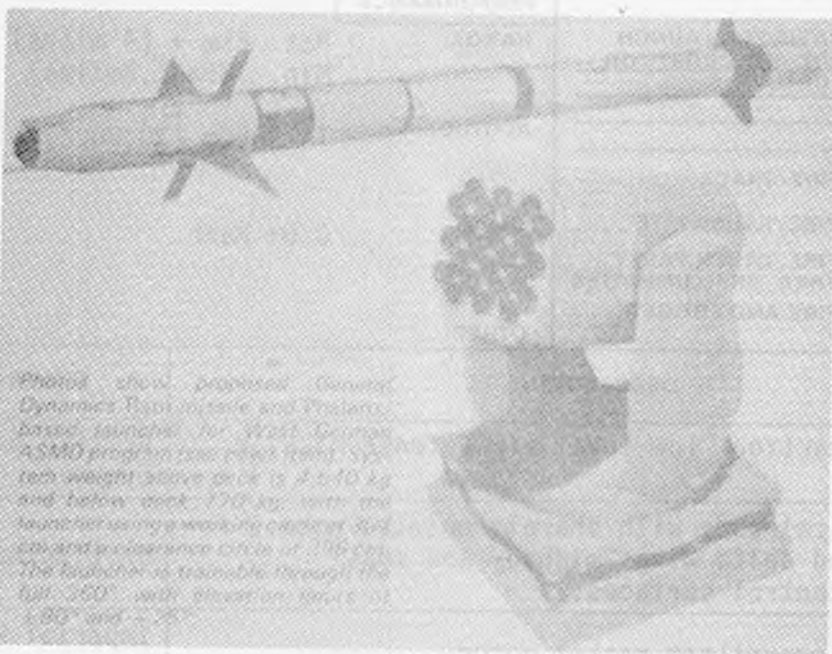
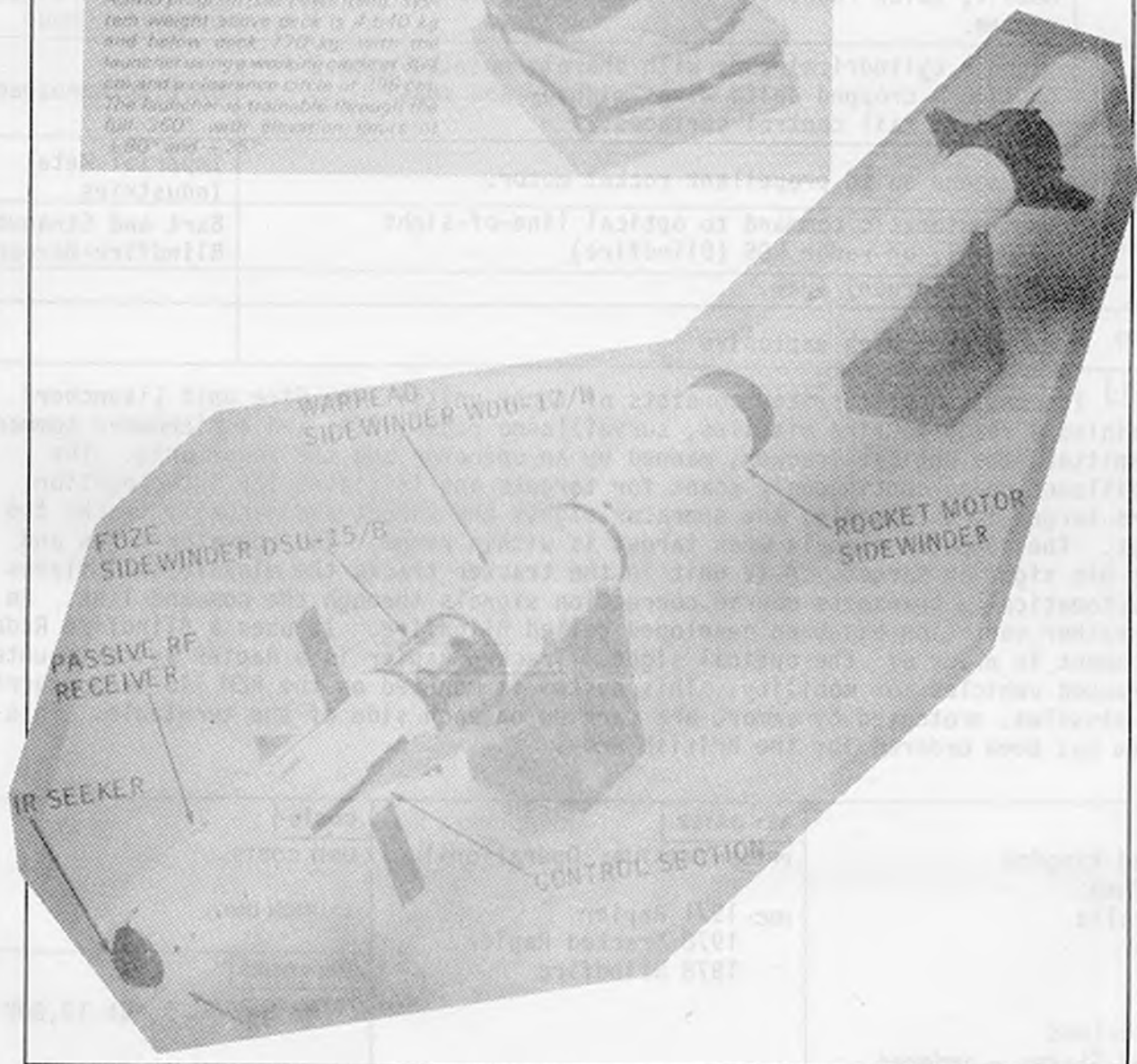


Photo shows Sidewinder (General Dynamics) missile and its launch rail (General Dynamics Air West) on a RAM program rail. Sidewinder System weight above rail is 4,540 lb and below rail 770 lb. The launcher is trainable through the rail 50° with elevation limits of +30° and -20°.

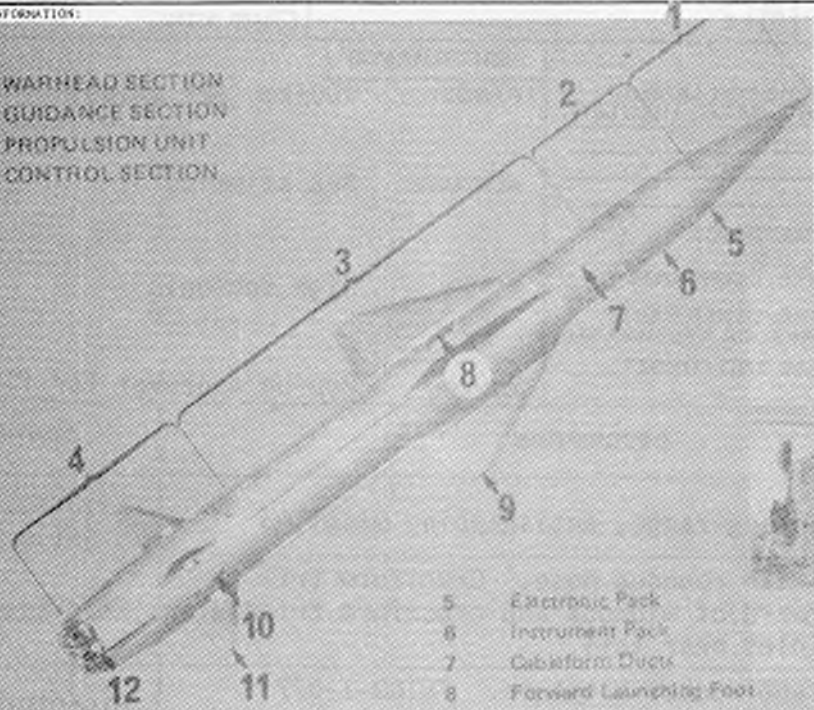


# RAPIER

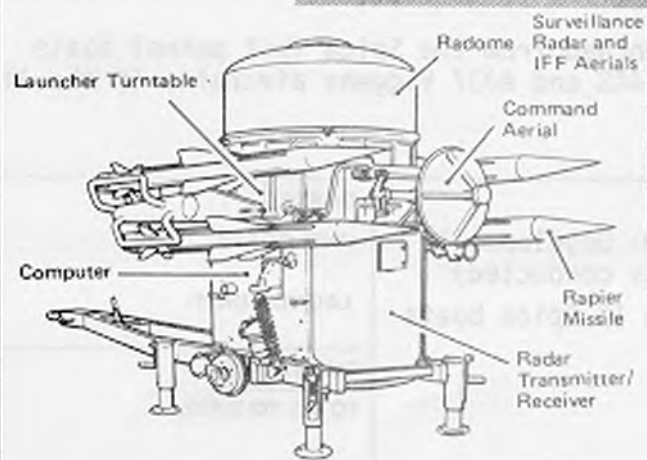
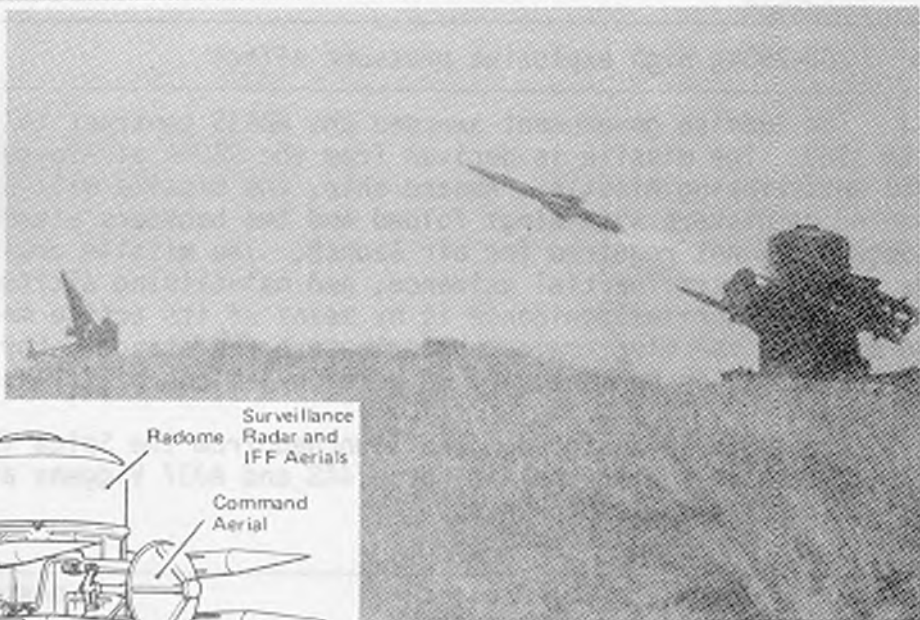
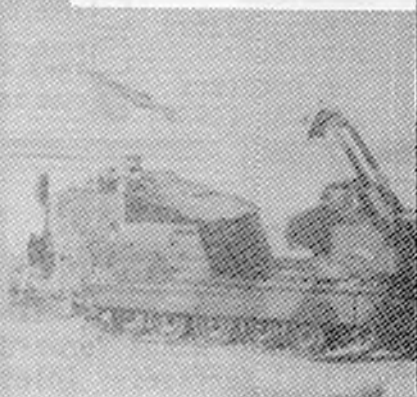
NAME <u>RAPIER, TRACKED RAPIER</u>		<b>RAPIER</b>		DEVELOPER <u>British Aerospace</u>	
DESIGNATION _____				COUNTRY <u>United Kingdom</u>	
				SERVICE <u>Army, Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	MOBILE LAUNCHER	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS			PERFORMANCE		
LENGTH: 2.25 & .4' DIAMETER: 12.7cm (.4') SPAN: 38cm (1.25') WEIGHT: 43.6kg (96#) OTHER: _____		BASIS FOR LAUNCH <u>Sight or radar on target.</u> _____ <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		RANGE: Max. 6km + (4 miles) Min. .8km (.5miles) ALTITUDE: To 3000m (10,000') SPEED: 2.0+ Mach OTHER: _____	
SYSTEM/SUBSYSTEM	DESCRIPTION			CONTRACTOR	
OVERALL SYSTEM	Mobile, quick reaction, low level air defense missile system.			British Aerospace, Dynamics Group	
AIRFRAME	Slender cylindrical body with sharply pointed nose. Cruciform cropped delta wings midbody and small cruciform tail control surfaces.			British Aerospace	
PROPULSION	Two stage solid propellant rocket motor.			Imperial Metal Industries	
GUIDANCE	Semi-automatic command to optical line-of-sight (Rapier), or radar LOS (Blindfire)			Bart and Straoud Blindfire-Marconi	
FUZING	Contact (crush) fuze.				
WARHEAD	2.7kg (6#) high explosive				
REMARKS	<p>The basic Rapier system consists of three units: The Fire unit (launcher) containing 4 ready to fire missiles, surveillance radar, IFF, and a microwave command transmitter, the Optical Tracker, manned by an operator and the Power unit. The surveillance radar continuously scans for targets and initiates IFF interrogation. If the target is unfriendly, the operator sights the target and manually tracks the target. The computer signals when target is within range. The operator fires and keeps his sight on target. A TV unit in the tracker tracks the missile tail flares and automatically transmits course correction signals through the command link. An all weather variation has been developed called Blindfire. It uses a Blindfire Radar attachment in place of the optical sight. <u>Tracked Rapier</u> is a Rapier system mounted on tracked vehicles for mobility. This system is mounted on the RCM 743 cargo carrier. Four missiles, protected by armor, are carried on each side of the turntable. This system has been ordered for the British Army.</p>				
USERS		KEY DATES		COSTS	
United Kingdom Abu Dhabi Australia Brunei Iran Oman Switzerland United States - ordered Zambia		PRESENT STATUS: Operational  ioc: 1971 Rapier 1978 Tracked Rapier 1978 Blindfire		UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: About 13,000	

**OTHER INFORMATION:**

- 1 WARHEAD SECTION
- 2 GUIDANCE SECTION
- 3 PROPULSION UNIT
- 4 CONTROL SECTION



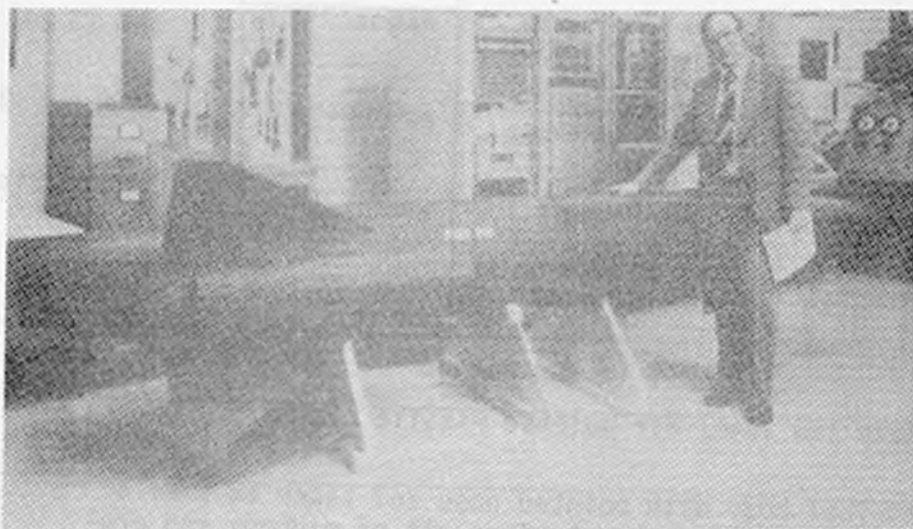
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- 6 Instrument Pack
- 7 Canard Ducts
- 8 Forward Launching Foot
- 9 Wings
- 10 Rear Launching Foot
- 11 Control Surfaces
- 12 Tracking Fines



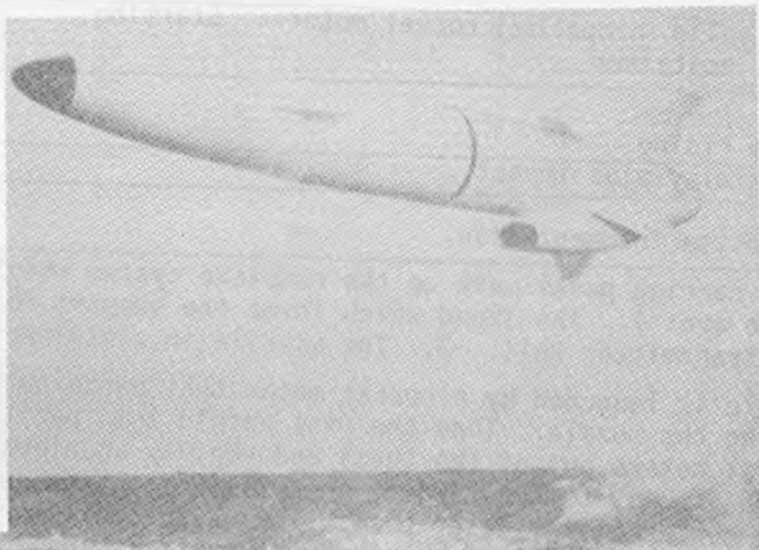
# RBS15

NAME: <u>RBS15</u>		<b>RBS15</b>		DEVELOPER: <u>Saab-Scania</u>							
DESIGNATION: <u>RBS15</u>				COUNTRY: <u>Sweden</u>		SERVICE: <u>Navy</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 4.35m (14.3') DIAMETER: 50cm (1.6') SPAN: 1.4m (5.2') unfolded WEIGHT: 598kg (1316#) missile Two boosters OTHER: at 70kg (153#)				<b>PERFORMANCE</b> RANGE: 100+km (62+ miles) ALTITUDE: Sea skimming SPEED: High subsonic OTHER: Pop-up maneuver for final attack		<b>BASIS FOR LAUNCH</b> Target data inputed.		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR					
OVERALL SYSTEM		Surface launched, long range, antishipping missile.				Saab Bofors Missile Corp.					
AIRFRAME		Cylindrical body with rounded nose. Cruciform triangular wings forward of midbody and cruciform triangular tail surfaces. Inlet near tail.				Saab-Scania					
PROPULSION		Two solid propellant rocket boosters. TR160-1-077 turbojet-cruise.				Microturbo					
GUIDANCE		Inertial midcourse with altimeter. Active radar seeker terminal guidance with frequency agility.				Philips					
FUZING		Contact									
WARHEAD		200-250kg high explosive pressure effect.				Forenade Fabriksverken					
REMARKS		<p>The Swedish government awarded the RBS15 contract in 1979, design was frozen in 1980. The missile is derived from the RB05A air-to-surface missile and the RB04B antishipping missile. Aboard ship, the missile will be carried in closed, deck-mounted cannisters with wings folded and two boosters attached. It is believed that boosters are not required for air launch. The missile cruises at sea skimming altitude guided by its inertial guidance, and maintaining altitude by means of its radar altimeter. Terminal guidance is by means of its active monopulse radar which has been designed for electronic countermeasure resistance. For the final attack, the missile executes a pop-up maneuver. A home-on-jam capability has been incorporated into the design.</p> <p>The RBS15 is designed to be launched from the Spica fast patrol boats (8/boat) and possibly with the Air Force JAS and AJ37 Viggen aircraft, if the Air Force air-launch option is picked up.</p>									
USERS		KEY DATES		COSTS							
Sweden - Planned		PRESENT STATUS: Development (test flights conducted) IOC: 1985 on 12 Spica boats		UNIT COSTS:  LAUNCH UNIT:							
				QUANTITIES							
				TOTAL TO DATE:							

OTHER INFORMATION



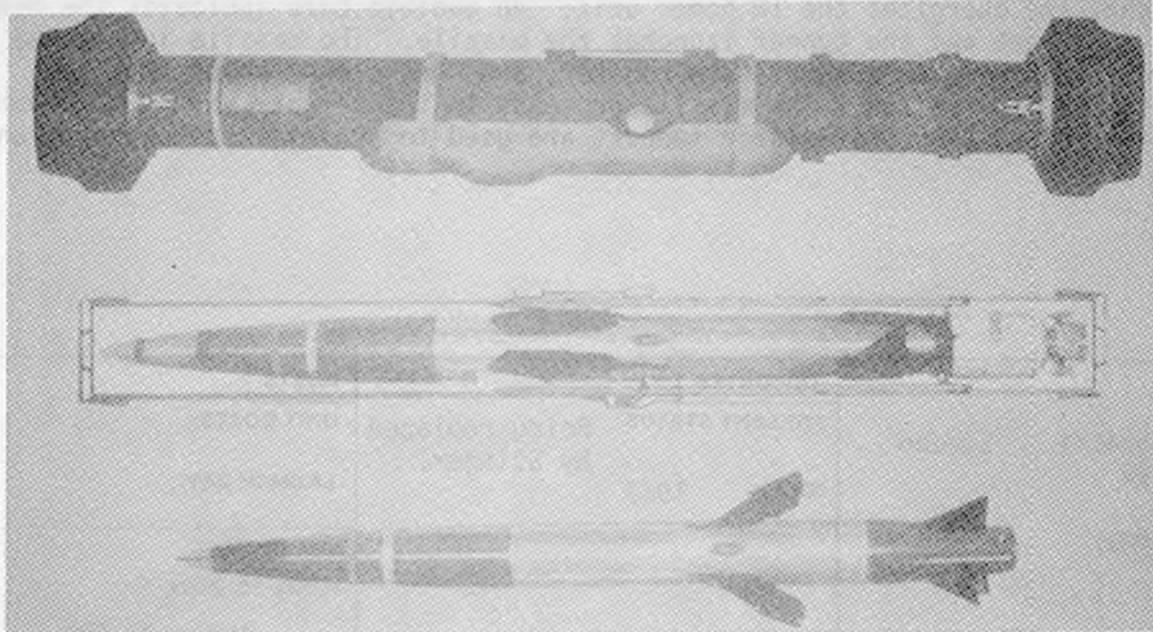
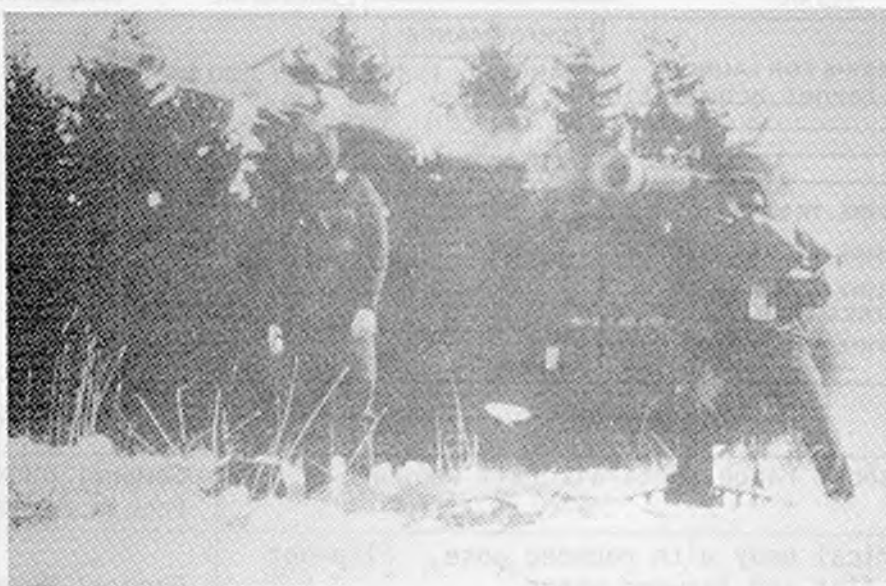
First missile developed by Saab-Bofors is this RB.15 antishipping weapon with 62-mi. range.



## RBS70

NAME <u>RBS 70</u>		DESIGNATION _____		DEVELOPER <u>Bofors</u>		COUNTRY <u>Sweden</u>		SERVICE <u>Army</u>					
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS							
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SLD <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____			
CHARACTERISTICS				PERFORMANCE									
LENGTH: 1.32m (4.3') (mssl. w/o booster) DIAMETER: 10.6cm (0.4') SPAN: 32cm (1.5) WEIGHT: 13kg (28.6#) Ms1 + Cont = 25kg OTHER: 1.75m long, 15.2cm diameter				BASIS FOR LAUNCH System assembled. <u>Sight/laser on</u> <u>target.</u>				RANGE: 5km (3 mi) ALTITUDE: 3000 m (9840') SPEED: Supersonic		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		OTHER: _____	
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Portable low level air defense missile system.						Bofors					
AIRFRAME		Cylindrical body with pointed nose and taper to smaller diameter. Cruciform swept wings aft of midbody and cruciform delta tail fins.						Bofors					
PROPULSION		Two stage solid propellant rocket motors. Starting motor plus sustainer						Booster-Bofors Sustainer-IMI					
GUIDANCE		Laser beam riding						Bofors					
FUZING		Laser proximity plus impact.											
WARHEAD		High explosive fragmentation.						Bofors					
REMARKS		<p>Three man carried packs make up the complete system which can be assembled in 30-seconds. These are: 1. The stand which forms the support for the sight. 2. The sight and laser transmitter unit. 3. The missile in container.</p> <p>The missile is launched by a rocket motor that burns out in the tube and drops off upon exiting the muzzle. Then the fins unfold into position, the sustainer motor ignites (several meters out of the tube) and rapidly accelerates the missile to supersonic speed. On its way to the target, the missile continuously senses its position relative to the center of the laser beam. The deviation is processed by an on-board computer which sends signals to move the rear control fins.</p> <p>The RBS-70 system has been installed in a number of land vehicle installations: the Land Rover RB570, which receives target data from a search radar, and the Armored Personnel Carrier M.13, both in single and turret launch configurations.</p>											
USERS		KEY DATES				COSTS							
Sweden Dubai Ireland Norway Singapore Switzerland Tunisia		PRESENT STATUS: Operational  IOC: 1978				UNIT COSTS:  LAUNCH UNIT: Single unit 2/missile \$165,000 (1980 \$s)		QUANTITIES  TOTAL TO DATE: Over 10,000					

OTHER INFORMATION:



# REDEYE

NAME <u>REDEYE</u>		<b>REDEYE</b>		DEVELOPER <u>General Dynamics</u>	
DESIGNATION <u>FIM-43, Rb69, FLF-1</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Army</u>	

<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
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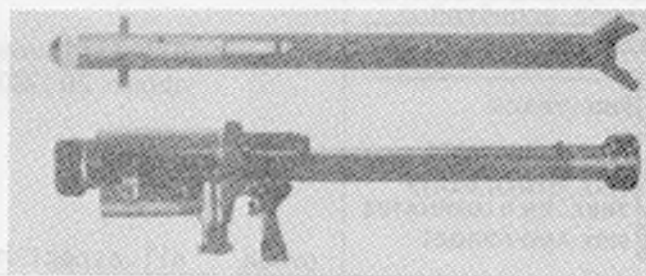
CHARACTERISTICS	PERFORMANCE	SYSTEM/SUBSYSTEM														
LENGTH: 1.20m (4.0') DIAMETER: 7cm (0.2') SPAN: 14.0cm (0.5') WEIGHT: 8.2kg (18#) OTHER:	RANGE: 1-3km (.6-1.9mi) ALTITUDE: Max: 2400m (8,000') SPEED: Supersonic OTHER:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">DESCRIPTION</th> <th style="width: 70%;">CONTRACTOR</th> </tr> </thead> <tbody> <tr> <td>Man-portable, short range, anti-aircraft weapon.</td> <td>General Dynamics Pomona Division</td> </tr> <tr> <td>Slender cylindrical body with rounded nose. Flip-out cruciform tail fins and forward wings.</td> <td>General Dynamics</td> </tr> <tr> <td>Two stage solid propellant rocket. Short boost, longer sustain.</td> <td>Atlantic Research</td> </tr> <tr> <td>Passive IR homing, proportional navigation.</td> <td>General Dynamics</td> </tr> <tr> <td>Contact.</td> <td>Magnavox</td> </tr> <tr> <td>High explosive.</td> <td>Picatinny Arsenal</td> </tr> </tbody> </table>	DESCRIPTION	CONTRACTOR	Man-portable, short range, anti-aircraft weapon.	General Dynamics Pomona Division	Slender cylindrical body with rounded nose. Flip-out cruciform tail fins and forward wings.	General Dynamics	Two stage solid propellant rocket. Short boost, longer sustain.	Atlantic Research	Passive IR homing, proportional navigation.	General Dynamics	Contact.	Magnavox	High explosive.	Picatinny Arsenal
DESCRIPTION	CONTRACTOR															
Man-portable, short range, anti-aircraft weapon.	General Dynamics Pomona Division															
Slender cylindrical body with rounded nose. Flip-out cruciform tail fins and forward wings.	General Dynamics															
Two stage solid propellant rocket. Short boost, longer sustain.	Atlantic Research															
Passive IR homing, proportional navigation.	General Dynamics															
Contact.	Magnavox															
High explosive.	Picatinny Arsenal															

**REMARKS**

The Redeye system consists of a missile sealed in a lightweight launch tube and a launcher mounted control mechanism with an optical sight. Upon seeing a target, the gunner captures the target in his optical sight, and energizes the IR homer unit. An audible buzz indicates the homer is on target and the gunner launches the missile. The missile is ejected from the tube with a short term booster, and when clear, about 20', the sustainer is ignited. The missile proceeds to the target via a pursuit course. Trainers and target simulator support are used to achieve Redeye proficiency.

<b>USERS</b> United States      Sweden Australia Denmark W. Germany Greece Israel Jordan Saudi Arabia	<b>KEY DATES</b> PRESENT STATUS: Being replaced by Stinger. IOC: 1967	<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <hr/> <b>QUANTITIES</b> TOTAL TO DATE: About 33,000
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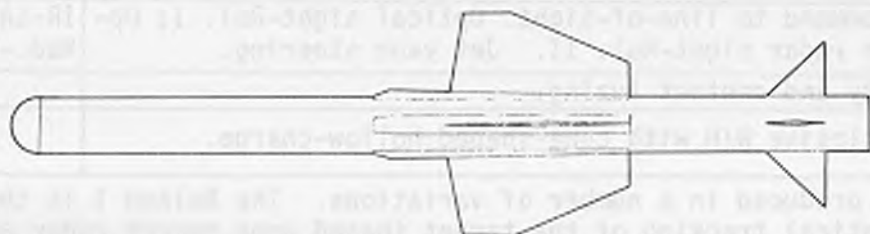
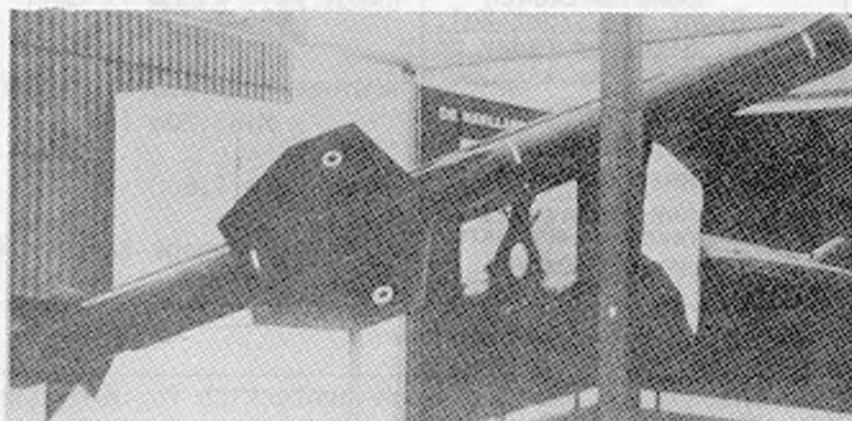
OTHER INFORMATION:



# REDTOP

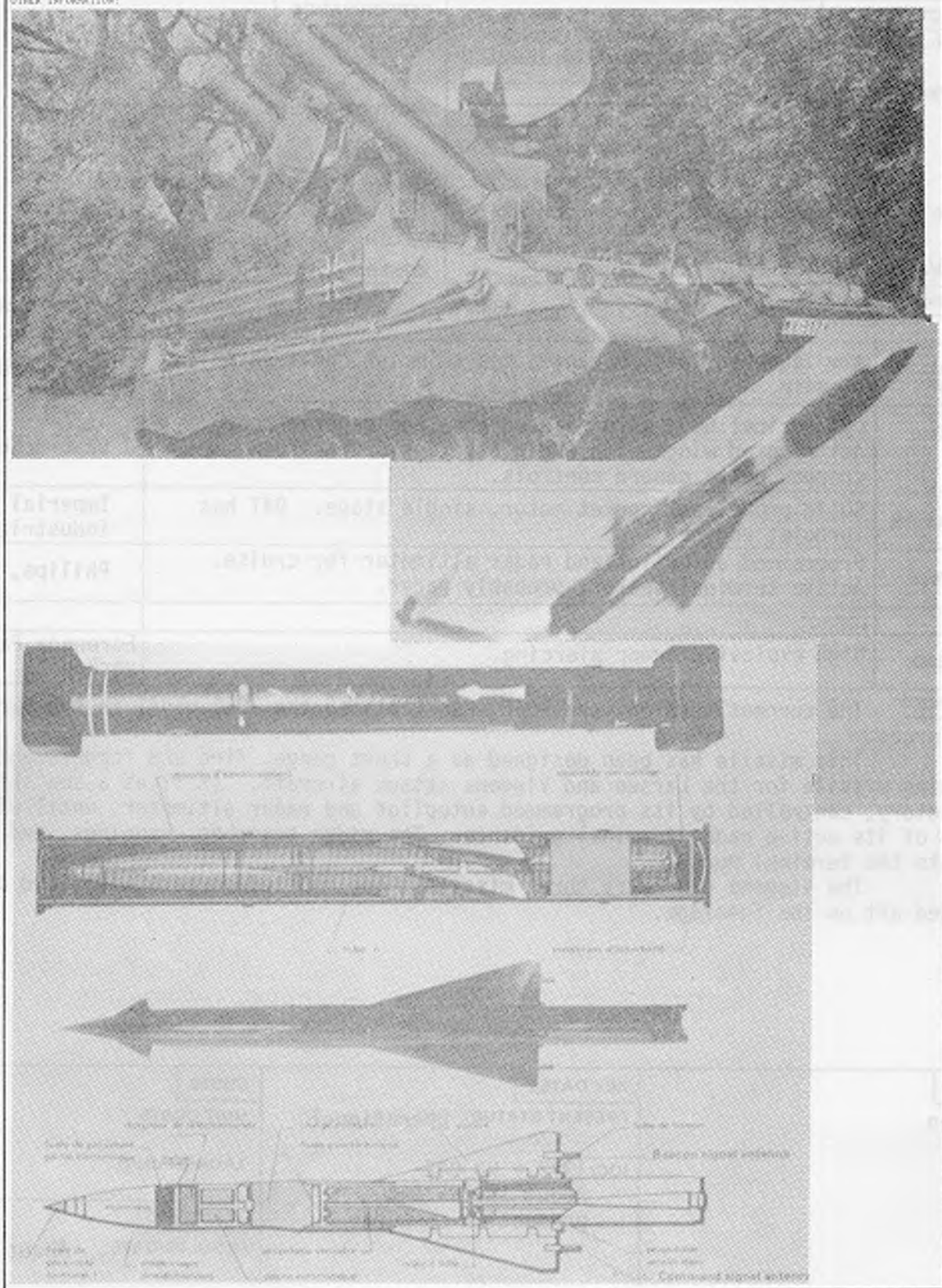
NAME <u>REDTOP</u>		<b>REDTOP</b>		DEVELOPER <u>British Aerospace</u>	
DESIGNATION <u>Firestreak MkIV</u>				COUNTRY <u>United Kingdom</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input type="checkbox"/> MOBILE LAUNCHER	TARGETS	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>3.27m (10.7')</u>	BASIS FOR LAUNCH <u>Missile activated.</u>		RANGE: <u>12km (7.5mi)</u>		
DIAMETER: <u>22.2cm (0.7')</u>	<u>Target acquired by missile.</u>		ALTITUDE: <u>All altitude interception about 20,000m (65,000')</u>		
SPAN: <u>90.8cm (3.0')</u>	<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		SPEED: <u>3.0 Mach</u>		
WEIGHT: <u>150kg (330#) Est</u>	OTHER:		OTHER: <u>All aspect homing system</u>		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	All altitude, all aspect, IR homing, air-to-air missile for use both sub and supersonic aircraft.				British Aerospace, Dynamics Group
AIRFRAME	Cylindrical body with rounded nose. Large cruciform wings mounted midbody and cruciform triangular control surfaces mounted near tail.				British Aerospace
PROPULSION	Single stage solid propellant rocket motor.				
GUIDANCE	IR homing.				
FUZING	Proximity.				
WARHEAD	31KG (68#) high explosive warhead.				
REMARKS					
<p>Redtop is a development taken from the Firestreak with a capability of operating over a greater speed and altitude range. Redtop has a larger warhead and increased sensitivity plus a wider look angle to allow for head-on launch. The Redtop is in service with the RAF Lighting and is used with similar aircraft by the Kuwaiti and Saudi Arabian air forces.</p> <p>Redtop is available as an aircraft kit which contains associated control systems, electronics, and supplies, and which permits installation in a wide-range of aircraft types.</p>					
USERS		KEY DATES		COSTS	
United Kingdom Kuwait Saudi Arabia		PRESENT STATUS: <u>Operational</u>  ioc: <u>Early 1960s</u>		UNIT COSTS:  LAUNCH UNIT:	
				QUANTITIES  TOTAL TO DATE:	

OTHER INFORMATION:



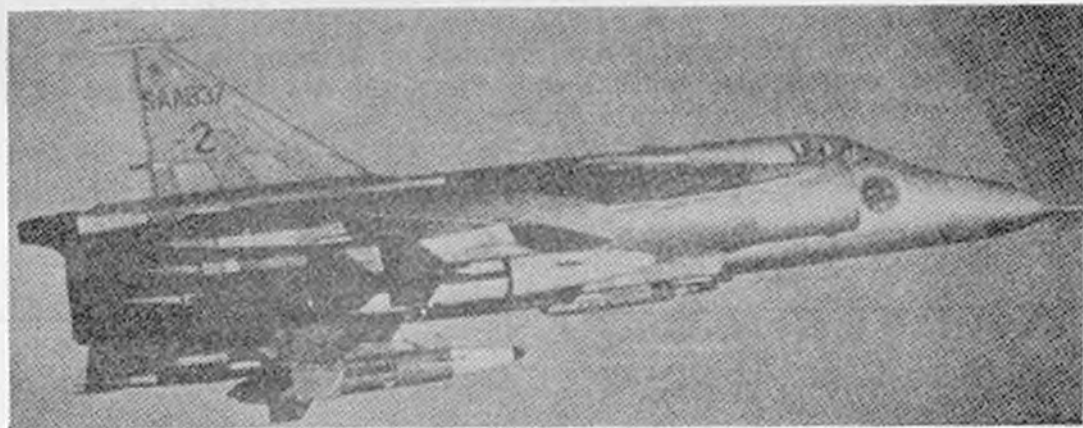
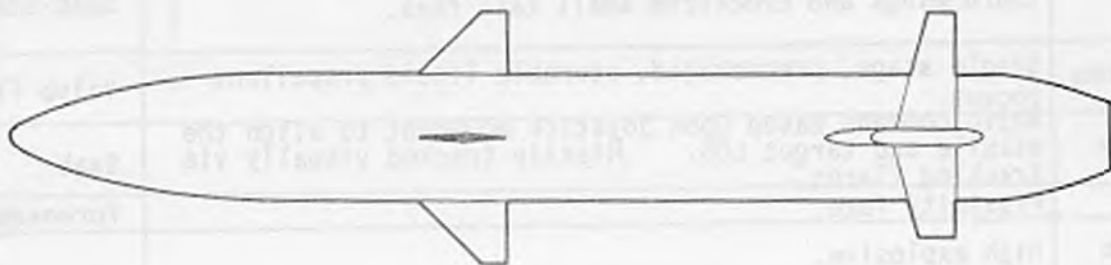
NAME <u>ROLAND (European)</u>		<b>ROLAND</b>		DEVELOPER <u>Euromissile</u>			
DESIGNATION <u>I, II, or IIS</u>				COUNTRY <u>France, W. Germany</u>			
				SERVICE <u>Army</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 2.4m (7.9') DIAMETER: 16cm (0.5') SPAN: 50cm (1.6') WEIGHT: 66.5kg (146#) Warhead OTHER: 6.5kg (14.3#)			<b>PERFORMANCE</b> RANGE: Max: 6300m (3.9mi) Min: 500m (0.3mi) ALTITUDE: Max: 5500m (18,000') Min: 20m (65') SPEED: Mach 1.6 OTHER: Can engage targets flying at up to Mach 1.2.			<b>BASIS FOR LAUNCH</b> <u>Sight on target-Rol. I, Sight or radar on target-Rol. II.</u>	
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR	
OVERALL SYSTEM		Air defense missile system to provide protection for Army field units from low-flying aircraft attack.				Euromissile	
AIRFRAME		Slender cylindrical body with cruciform delta wings aft of center, and cruciform fore planes near pointed nose.				Aerospatiale	
PROPULSION		Two stage solid propellant rocket motors. Booster-14kg, 1.7sec burn; sustainer-15.1kg, 13 sec burn.				MBB/SNIAS	
GUIDANCE		Radio command to line-of-sight. Optical sight-Rol. I; Optical or radar sight-Rol. II. Jet vane steering.				IR-SAT/SAGEM Rad.-Thomson/Siemen	
FUZING		Proximity and contact fuzing.					
WARHEAD		High explosive W/H with cone-shaped hollow-charge.					
<b>REMARKS</b> Roland is produced in a number of variations. The Roland I is the clear-weather model which uses optical tracking of the target (based upon search radar acquisition) and IR tracking of the missile. Roland II, the all-weather system, can use either optical sight or the tracking radar to track the target and missile; modes may be changed in mid-flight. The Roland IIS is a fixed-installation version which uses the Roland II missile and fire unit, the optical sight, and the Crotaie acquisition unit. Hughes and Boeing jointly held the US license to build a slightly modified version of the Roland II. (This program was recently cancelled after limited production.) A tri-lateral improvement program was initiated to counter future threats.							
In all variations, the operating principle is the same. The tracking unit tracks the target and missile, and generates automatic steering signals to the missile which are transmitted via microwave. Steering is by jet-van control. The Roland has been mounted on the French AMX-30R, the German SPZ Marder, and the US M109 chassis. Two shelter versions for mobile or stationary use have also been developed.							
<b>USERS</b> France W. Germany Brazil Belgium Iraq Turkey		<b>KEY DATES</b> US Version USA Norway Sweden		<b>PRESENT STATUS:</b> Operational IOC: 1973		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: Over 6000 to date.	

OTHER INFORMATION:



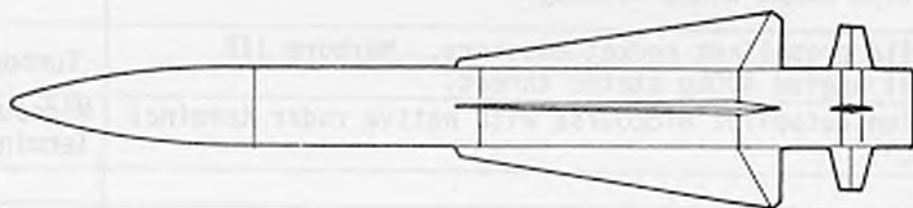
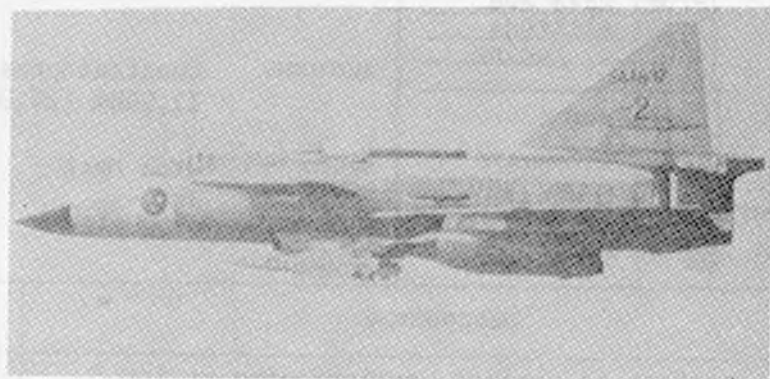
NAME <u>RB 04E</u>		DESIGNATION <u>RB 04E, Robot 304</u>		COUNTRY <u>Sweden</u>	SERVICE <u>Air Force</u>
MISSION <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		TRAJECTORY <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC		LAUNCHED FROM <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		TARGETS <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
CHARACTERISTICS LENGTH: 4.45m (14.6') DIAMETER: 50cm (1.6') SPAN: 2.0m (6.6') WEIGHT: 600kg (1320#) OTHER: Warhead 300kg (600#)			PERFORMANCE RANGE: 20km (12.5 miles) ALTITUDE: Sea skimming SPEED: High subsonic OTHER:		
			BASIS FOR LAUNCH <u>Target data imputed to missile.</u>		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR
OVERALL SYSTEM	Air launched, medium range, sea skimming, anti-shipping missile.			Saab-Scania	
AIRFRAME	Cylindrical body with pointed nose and tapered rear. Aft mounted wings with end-plate fins. Cruciform cropped delta canard controls.			Saab-Scania	
PROPULSION	Solid propellant rocket motor, single stage. 04T has turbojet engine.			Imperial Metal Industries	
GUIDANCE	Programmed autopilot and radar altimeter for cruise. Active terminal seeker, probably radar.			Philips, Sweden	
FUZING	Impact				
WARHEAD	High explosive armor piercing.			Forenade Fabriks-verken	
REMARKS	<p>The current version, the -04E, has replaced the -04D model in the Swedish Air Forces.</p> <p>This missile has been designed as a short range, fire and forget, anti-shipping missile for the Larsen and Viggens attack aircraft. It flies a sea skimming trajectory, controlled by its programmed autopilot and radar altimeter, until within range of its active radar terminal guidance. The radar searches, acquires, and directs the terminal pursuit.</p> <p>The Viggens can carry three missiles; one mounted on each wing, and one mounted aft on the fuselage.</p>				
USERS	KEY DATES		COSTS		
Sweden	PRESENT STATUS: Operational		UNIT COSTS:		
	ioc: 1972 - RB 04E About 1977 - 04E production complete		LAUNCH UNIT:		
			QUANTITIES		
			TOTAL TO DATE: About 400		

OTHER INFORMATION:



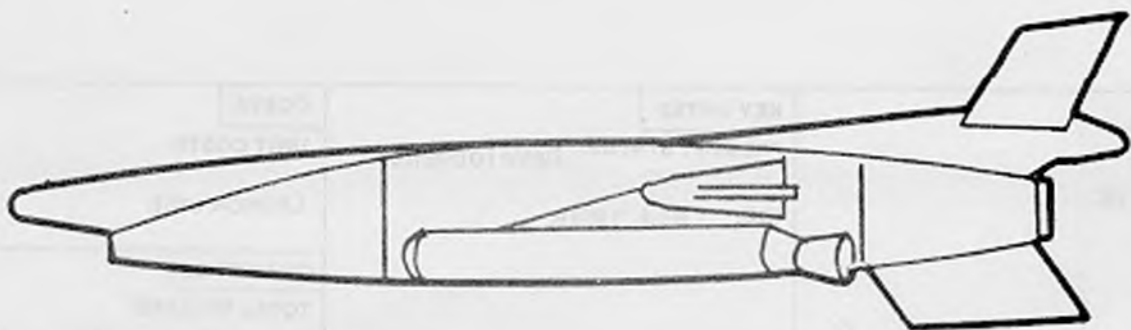
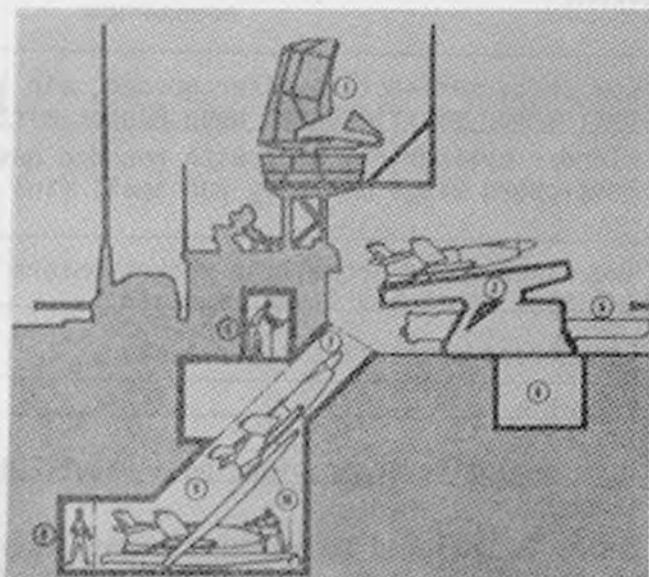
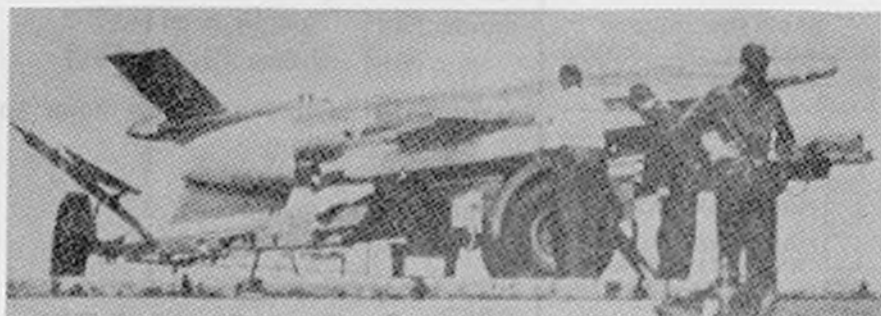
NAME SAAB 05A		SAAB 05A		DEVELOPER SAAB-Scania			
DESIGNATION RB05A				COUNTRY Sweden			
				SERVICE Air Force			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST-SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Land targets			
<b>CHARACTERISTICS</b> LENGTH: 3.60m (11.9') DIAMETER: 30cm (1.0') SPAN: 80cm (2.7') WEIGHT: 305kg (675#) OTHER:			<b>PERFORMANCE</b> RANGE: 8+km (5+ miles) ALTITUDE: Line of sight, depends on launch altitude. SPEED: Supersonic OTHER:				
<b>BASIS FOR LAUNCH</b> <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			Missile readied. Target sighted.				
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Short range tactical air-to-surface missile for use against shipping and land targets.		Saab-Scania			
AIRFRAME		Cylindrical body with pointed nose. Cruciform long chord wings and cruciform small tail fins.		Saab-Scania			
PROPULSION		Single stage, prepackaged, storable liquid propellant rocket.		Volvo Flygmotor AB			
GUIDANCE		Radio command based upon joystick movement to align the missile and target LOS. Missile tracked visually via tracking flares.		Saab			
FUZING		Proximity fuze.		Forenade			
WARHEAD		High explosive.					
<b>REMARKS</b> Air-to-surface armament for the AJ37 Viggen and the SK 60B/C versions of the SAAB IOS aircraft. The RB05A typical attack begins with the aircraft approaching at low level (60'-165') and at high speed. The aircraft navigation system then commands the pilot to climb to 1000'-1500', horizontal flight being resumed by switching in the autopilot altitude and attitude hold. As soon as the target is sighted, the pilot fires the missile, which positions itself, within 1½ seconds of launch, in front of the aircraft. The pilot then takes over manual control and steers the missile by means of a joystick, commands being transmitted over a radio link.							
<b>USERS</b> Sweden		<b>KEY DATES</b> PRESENT STATUS: Operational  ioc: Early 1970's Production completed in 1977.		<b>COSTS</b> UNIT COSTS:  LAUNCH UNIT:  <b>QUANTITIES</b> TOTAL TO DATE:			

OTHER INFORMATION:



NAME SAAB 08A		SAAB 08A		DEVELOPER SAAB-Scania				
DESIGNATION RB08A				COUNTRY Sweden				
				SERVICE Navy				
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER		
<b>CHARACTERISTICS</b> LENGTH: 5.70m (18.7') DIAMETER: 66cm (2.2') SPAN: 3.01m (9.9') WEIGHT: 900kg (1980#) Without boosters Booster Weight OTHER: 315kg (693#)			<b>PERFORMANCE</b> RANGE: 180km (110 miles) ALTITUDE: Constant preset altitude, 11,900m (39,000') maximum. SPEED: 0.85 Mach OTHER:					
<b>SYSTEM/SUBSYSTEM</b>			<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>			Long range, surface-to-surface, antishipping cruise missile for land or ship launch.			Saab-Scania		
<b>AIRFRAME</b>			Cylindrical cross section tapered fore and aft. Aircraft type swept wings midbody.			Aerospatiale		
<b>PROPULSION</b>			Two solid propellant rocket boosters. Marbore IID turbojet engine 400kg static thrust.			Turbomeca		
<b>GUIDANCE</b>			Precision autopilot midcourse with active radar terminal homing.			Midcourse-Aerospat. Terminal-Thomson CSF		
<b>FUZING</b>								
<b>WARHEAD</b>			250kg (550#) high explosive.					
<b>REMARKS</b> The RB08A missile system is an adaptation of the Nord CT20 target drone. The complete system consists of the missile, the fire control system, the starting box and the launchers. Targets may be detected by various means and is processed by the fire control system which give direction to the launchers. The missile is launched by twin solid rocket boosters which separate when expended. The missile climbs to cruise altitude and levels off under control of the precision autopilot. At an appropriate range, the active radar terminal seeker searches for the target. After target detection, control is taken over by the terminal guidance. Both shipboard and land based installations have been developed. The RB08A is expected to be replaced in the mid-1980's by the RBS15 antishipping missile.								
<b>USERS</b> Sweden			<b>KEY DATES</b> <b>PRESENT STATUS:</b> IOC: 1967 Production ceased in 1970.			<b>COSTS</b> <b>UNIT COSTS:</b> <b>LAUNCH UNIT:</b> <b>QUANTITIES</b> <b>TOTAL TO DATE:</b> About 100		

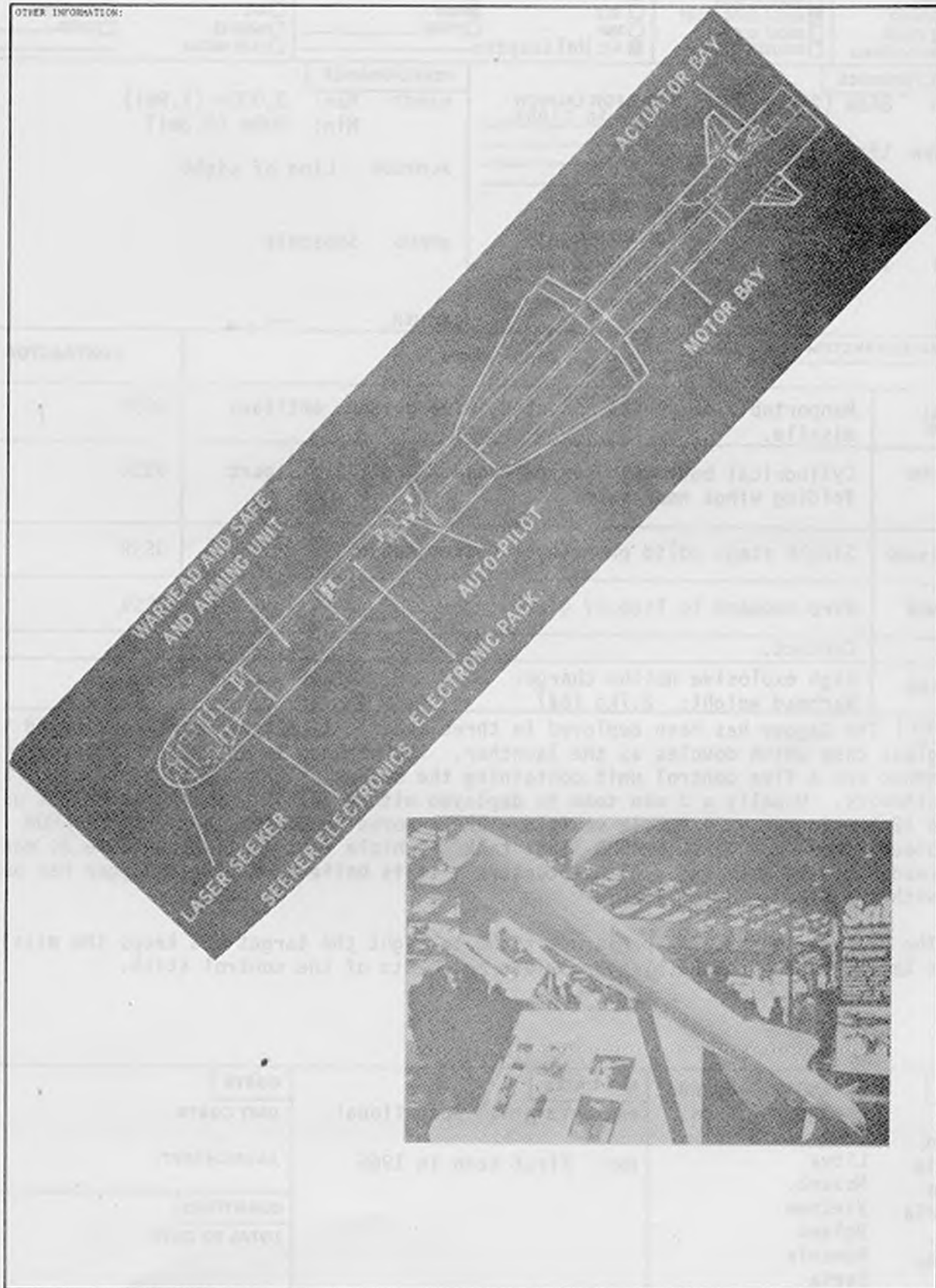
OTHER INFORMATION



# SABRE

NAME <u>SABRE</u>		<b>SABRE</b>		DEVELOPER <u>British Aerospace</u>							
DESIGNATION <u>-</u>				COUNTRY <u>UK</u>		SERVICE <u>Air Force</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input checked="" type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b> LENGTH: 3.0m (8.2') DIAMETER: 15.5cm (0.5') SPAN: 40.4cm (1.3') WEIGHT: About 65kg (143#) OTHER:			<b>PERFORMANCE</b> RANGE: Max: 7km (4.3 miles) Min: 0.6km (0.4 miles) ALTITUDE: Aircraft altitude down to 30m (100') SPEED: 1.5+ Mach OTHER:			<b>BASIS FOR LAUNCH</b> <u>Designator on target</u> <u>and missile acquisition (?)</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET					
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		Low cost, semi-active laser guided, air launched, anti-armor missile based upon Rapier airframe.				British Aerospace Dynamics Group					
<b>AIRFRAME</b>		Slender cylindrical body with rounded nose. Cruciform long-chord wings mid body and small fins aft.				British Aerospace					
<b>PROPULSION</b>		Two stage solid propellant rocket motors 1.5 sec. boost and 6 sec. sustain.				IMI					
<b>GUIDANCE</b>		Copperhead semiactive laser seeker.				Martin Marietta					
<b>FUZING</b>		Impact.									
<b>WARHEAD</b>		High explosive armor piercing - about 20kg (44#)									
<b>REMARKS</b>											
<p>Sabre is designed to answer the antiarmor needs of low flying attack aircraft thru the '90s. It is based upon the use of proven components; the Rapier missile with the Copperhead laser seeker. Sabre development is in response to the Air Staff Target 1277 requirement.</p>											
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>							
UK		PRESENT STATUS: Development		UNIT COSTS:							
		IOC: Mid 1980s		LAUNCH UNIT:							
				<b>QUANTITIES</b>							
				TOTAL TO DATE: Test units only.							

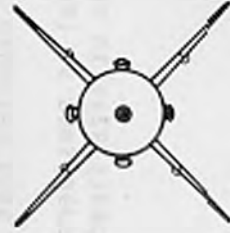
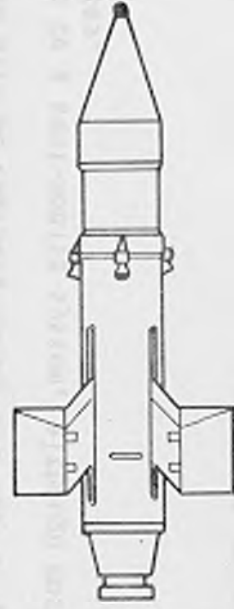
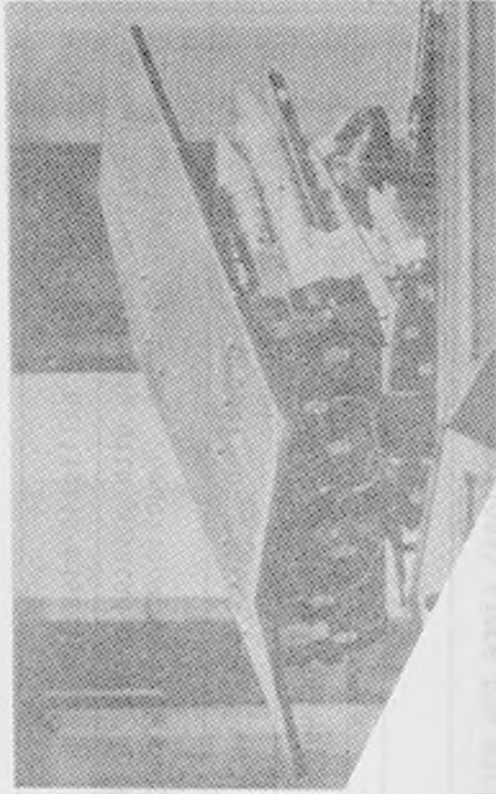
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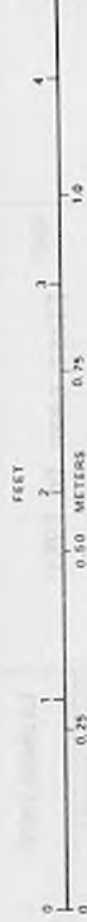
# SAGGER

NAME <u>SAGGER</u>		<b>SAGGER</b>		DEVELOPER _____	
DESIGNATION <u>AT-3, Miliutka</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C Helicopter	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: <u>86cm (2.8')</u> DIAMETER: <u>12cm (0.4')</u> SPAN: <u>47cm (1.5')</u> WEIGHT: <u>11.3kg (25#)</u> OTHER: _____		RANGE: Max: <u>3,000m (1.9mi)</u> Min: <u>500m (0.3mi)</u> ALTITUDE: <u>Line of sight</u> SPEED: <u>Subsonic</u> OTHER: _____		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
		BASIS FOR LAUNCH <u>Target in sight.</u>			
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Manportable or vehicle mounted, wire guided, antitank missile.			USSR	
AIRFRAME	Cylindrical body with conical nose. Cruciform 2 part folding wings near rear.			USSR	
PROPULSION	Single stage solid propellant rocket motor.			USSR	
GUIDANCE	Wire command to line of sight.			USSR	
FUZING	Contact.			USSR	
WARHEAD	High explosive hollow charge. Warhead weight: <u>2.7kg (6#)</u>			USSR	
REMARKS	The Sagger has been deployed in three modes: 1) Manpack missile carried in a fiberglass case which doubles as the launcher. The warhead is separate. Other components are a fire control unit containing the optical sight and control stick, and the batteries. Usually a 3 man team is deployed with 4 missiles which can be set up within 12-15 minutes. 2) Mobile vehicle - BMP armored personnel carrier, the BRDM amphibious reconn car, and the BMD light tank. Vehicle installations include as many as 8 ready-to-fire missiles. 3) Helicopters - it is believed that the Sagger has been used with the MI-24 Hind helicopter.				
The operator uses a 10X periscope sight to sight the target and keeps the missile on the target line of sight by appropriate movements of the control stick.					
USERS	Ethiopia	Uganda	KEY DATES	COSTS	
USSR	Hungary	Yugo.	PRESENT STATUS: Operational	UNIT COSTS:	
Afghan.	Iran		IOC: First seen in 1965	LAUNCH UNIT:	
Algeria	Libya			QUANTITIES	
Angola	Mozamb.			TOTAL TO DATE:	
Bulgaria	Vietnam				
Czech.	Poland				
Germany	Romania				
Egypt	Syria				

OTHER INFORMATION:

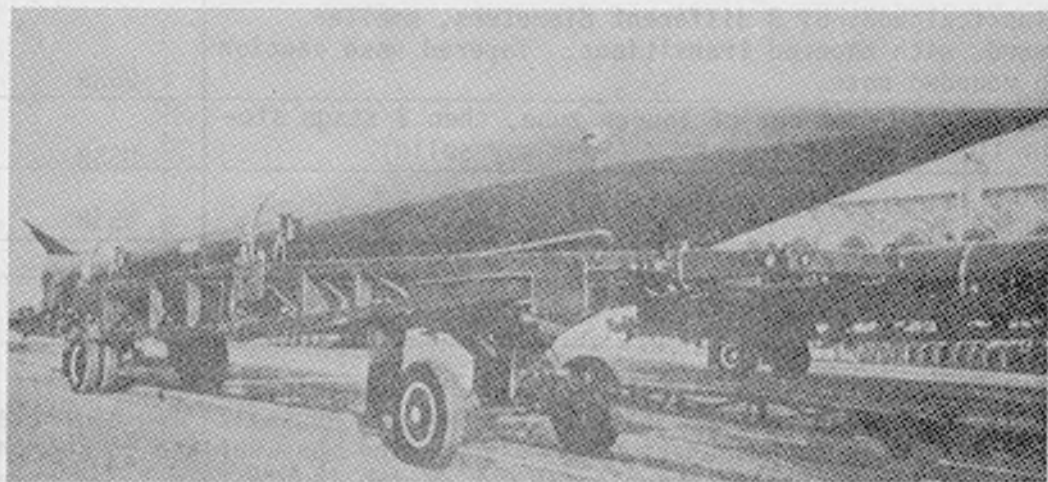


AT-3 (SAGGER)



NAME SANDAL		<b>SANDAL</b>		DEVELOPER _____			
DESIGNATION SS-4				COUNTRY USSR			
				SERVICE Air Force			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets			
<b>CHARACTERISTICS</b> LENGTH: 22m (72') DIAMETER: 1.65m (5.4') SPAN: Unknown WEIGHT: 28,000kg (61,700#) OTHER:			<b>PERFORMANCE</b> RANGE: 1800km (1,120 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: Estimated CEP 1.9km (1.2 miles)				
<b>BASIS FOR LAUNCH</b> Missile readied. Target and launch position inputed.			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Medium range strategic ballistic missile.		USSR			
AIRFRAME		Slender cylindrical body with pointed nose. Tail flared to large diameter. Cruciform small triangular tail fins.		USSR			
PROPULSION		Single stage liquid propellant rocket engine. Nitric acid/kerosene fuel.		USSR			
GUIDANCE		Early versions radio command. Inertial guidance since 1962. Jet vane steering.		USSR			
FUZING							
WARHEAD		Nuclear 1mt.		USSR			
<b>REMARKS</b> The Sandal MRBM has been operational since the early 1960's when it began to replace the Shyster, SS-3, missile. It was the first Soviet missile to use storable liquid propellants. The engine has four fixed thrust chambers fed by a common turbopump, and is a close relative of the Cosmos satellite first stage, booster engine. The weapon system includes some 12 vehicles and a 20 man launch crew. Most of the known Sandals are now deployed in Central Asia as a threat to China. It is expected that these will be replaced in the mid-1980's by the SS-20 missiles. The Sandal is considered to be a semi-mobile system, although most deployed missiles utilize fixed sites.							
<b>USERS</b> USSR		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: First seen in 1961		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE: Over 500 deployed in Central Asia			

OTHER INFORMATION:

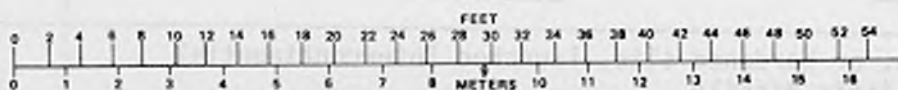


SS-4

# SARK

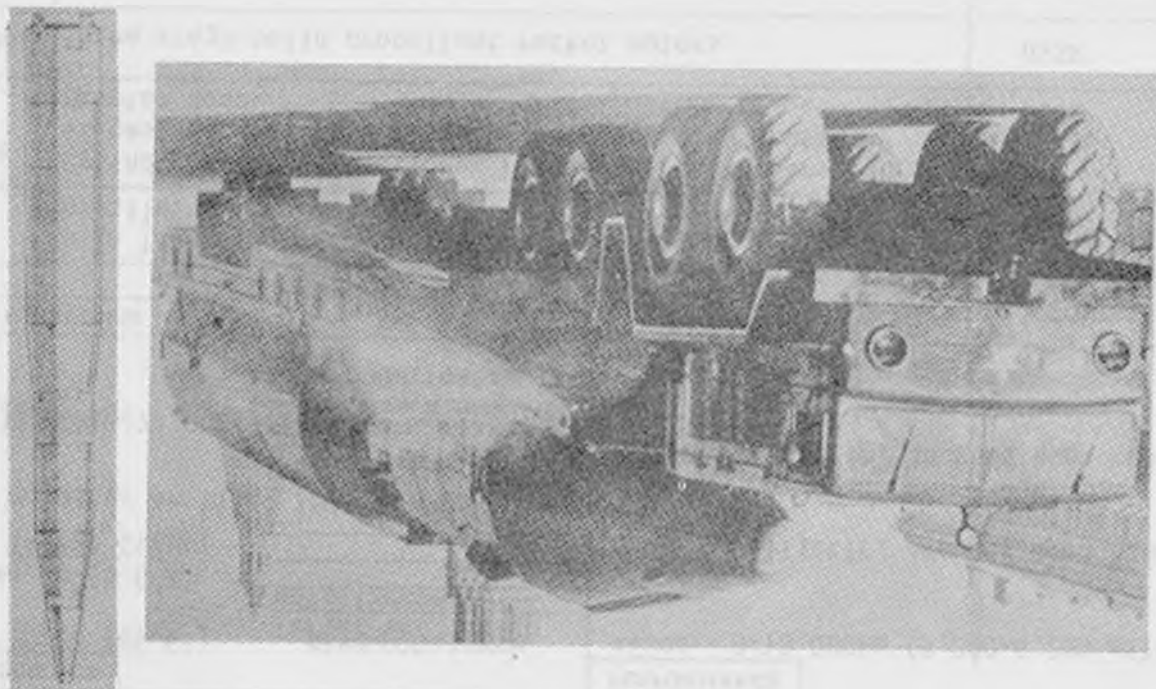
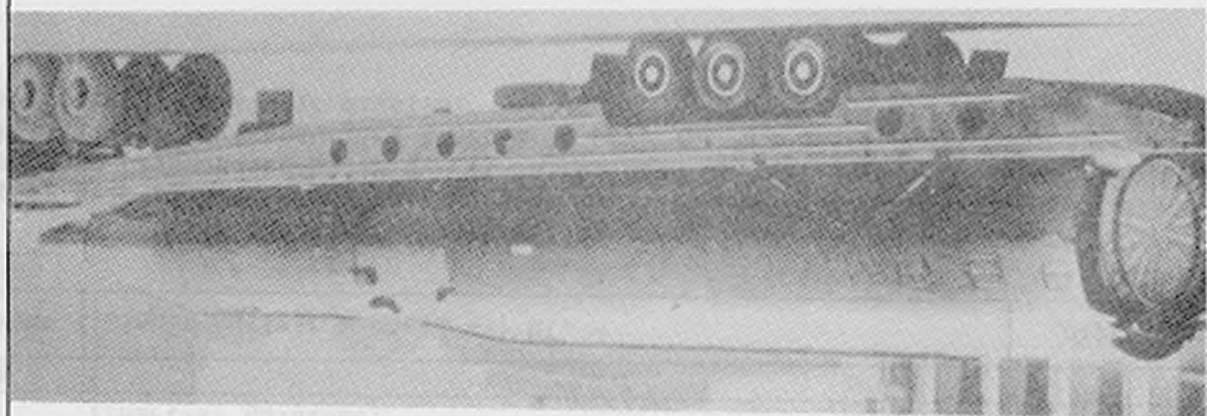
NAME <u>SARK</u>		<b>SARK</b>		DEVELOPER _____	
DESIGNATION <u>SS-N-4</u>				COUNTRY <u>USSR</u>	
MISSION	TRAJECTORY	LAUNCHED FROM		TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <b>Strategic targets</b>
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>15.0m (49.2')</u>		BASIS FOR LAUNCH <u>Target position</u> <u>inputed.</u>		RANGE: <u>600km (370 miles)</u>	
DIAMETER: <u>1.8m (5.9')</u>				ALTITUDE: <u>Ballistic - depends on range</u>	
SPAN: <u>No wings or fins</u>		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		SPEED: <u>Ballistic to 5.0 Mach</u>	
WEIGHT: <u>19,000-20,000kg</u> <u>(41,800-44,000#)</u>		OTHER: _____		OTHER: _____	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	First Soviet submarine - launched strategic missile.		USSR		
AIRFRAME	Cylindrical body of 3 different diameters, smaller forward, with tapered transitions. Tapered nose section with rounded nose.		USSR		
PROPULSION	Solid charge boost out of launch tube, then 2 stage storable liquid rocket engines. (Some say solid).		USSR		
GUIDANCE	Inertial guidance.		USSR		
FUZZING					
WARHEAD	Nuclear warhead, 1mt.		USSR		
REMARKS					
<p>Sark has been fitted into Z, G-1, H-1 and Z-V submarines. The missiles are fitted vertically and extend from the keel to the top of the sail. Two or three missiles were installed in each submarine. The submarine must surface to launch Sark. Six solid charges propelled the missile out of the launch tube. The base was then jettisoned and the two-stage motors fired in succession.</p>					
USERS		KEY DATES		COSTS	
USSR China		PRESENT STATUS: <u>Obsolete with a few operational installations ioc. possible.</u>  <u>About 1962</u>		UNIT COSTS:	
				LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: <u>At minimum--38 subs were equipped with 3 missiles each</u>	

OTHER INFORMATION:



# SASIN

NAME <u>SASIN</u>		<b>SASIN</b>		DEVELOPER _____			
DESIGNATION <u>SS-8</u>				COUNTRY <u>USSR</u>		SERVICE <u>Air Force</u>	
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C <input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic Targets</u>	
<b>CHARACTERISTICS</b> LENGTH: 24.4m (80.0') DIAMETER: 2.75m (9.0') SPAN: No wings or fins WEIGHT: 63,600kg (140,000#) OTHER: _____			<b>PERFORMANCE</b> RANGE: 10,500km (C500mi) ALTITUDE: Ballistic for range SPEED: Supersonic, Ballistic speed for range OTHER: _____		<b>BASIS FOR LAUNCH</b> <u>Target position input.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>		Silo, or hardened site, launched Intercontinental Ballistic Missile.			USSR		
<b>AIRFRAME</b>		Cylindrical body with sharply tapered nose. Forward third tapers to smaller diameter.			USSR		
<b>PROPULSION</b>		Two-stage, storable liquid, rocket motors.			USSR		
<b>GUIDANCE</b>		Inertial.			USSR		
<b>FUZING</b>							
<b>WARHEAD</b>		Nuclear, one 5 - 10mt.			USSR		
<b>REMARKS</b>							
Some Sasins are emplaced in underground silos, others harden installations, It is likely that all Sasins have been replaced the SS-16 through SS-20 series missiles.							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
USSR		PRESENT STATUS: Obsolete		UNIT COSTS:			
		IOC: First shown in 1964		LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE: Over 200 combined Saddler and Sasin.			



OTHER INFORMATION

SASIN

SWELCAS  
MISSILE  
S.O.T.M.

# SAVAGE

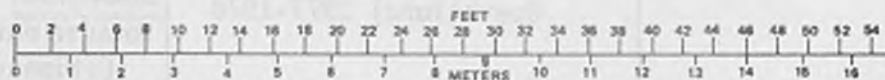
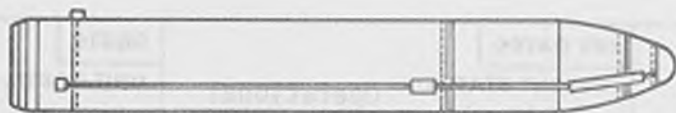
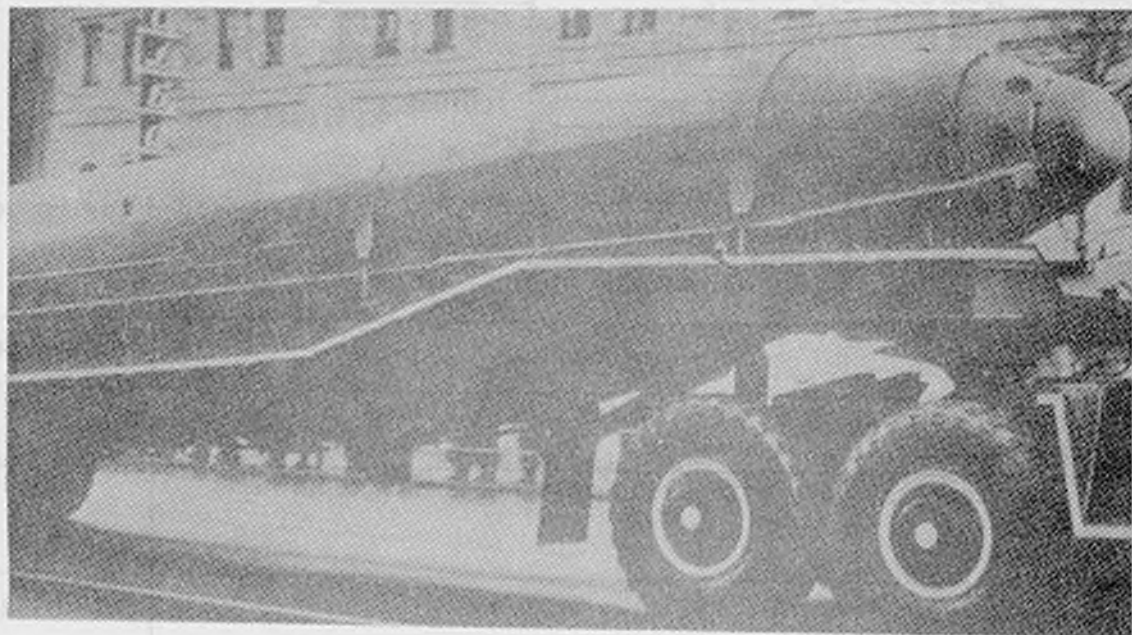
NAME <u>SAVAGE</u>		DEVELOPER _____	
DESIGNATION <u>SS-13</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____
		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>	
CHARACTERISTICS		PERFORMANCE	
LENGTH: 20.0m (65.6') DIAMETER: 1.7m (5.6') (First Stage) SPAN: No wings or fins WEIGHT: 35,000kg (77,000#) OTHER:		RANGE: 8-10,000km (5,000-6,200 miles) ALTITUDE: Ballistic, depends upon range. SPEED: Ballistic, depends upon range. OTHER:	
		BASIS FOR LAUNCH Target and launch data inputed.	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM		DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	Silo launched intercontinental ballistic missile.		USSR
AIRFRAME	Cylindrical cross section. Flared skirt at rear. Three stages, each of less diameter, connected by trusses. Pointed nose.		USSR
PROPULSION	Three stage solid propellant rocket motors.		USSR
GUIDANCE	Inertial guidance.		USSR
FUZING			
WARHEAD	Single nuclear warhead - 1 MT.		USSR
REMARKS			
Savage is the first Soviet solid fueled ICBM, and is considered to be roughly akin to Minuteman. Although 60 missiles have been deployed, development appears to have ceased by 1970. It is replaced by the SS-16. The upper two stages, with a different warhead, are thought to comprise the SS-14 Scapegoat, intermediate range, mobile, ballistic missile.			
USERS		KEY DATES	COSTS
USSR		PRESENT STATUS: Being phased out. IOC: 1968 First shown in 1965	UNIT COSTS: LAUNCH UNIT:
			QUANTITIES TOTAL TO DATE: About 60 known deployments.

OTHER INFORMATION:



NAME <u>SAWFLY (MOD 1-2)</u>		<b>SAWFLY MOD. 1/2</b>		DEVELOPER _____			
DESIGNATION <u>SS-N-6</u>				COUNTRY <u>USSR</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP Submarine <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets			
<b>CHARACTERISTICS</b> LENGTH: 13.0m (42.7') DIAMETER: 1.80m (5.9') SPAN: No wings or fins WEIGHT: 19,000kg(41,890#) OTHER:		Data for latest Mod. BASIS FOR LAUNCH <u>Target data inputed.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: 3,000km (1,860 miles) ALTITUDE: Ballistic- depends upon range SPEED: Ballistic-depends upon range OTHER:			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Medium range, submarine launched, strategic missile.		USSR			
AIRFRAME		Cylindrical body with tapered to round nose. No wings or fins.		USSR			
PROPULSION		Two stage, storable liquid propulsion rocket engines.		USSR			
GUIDANCE		Inertial guidance. Accuracy is thought insufficient for hard targets.		USSR			
FUZING							
WARHEAD		Single nuclear warhead on the Mod 1 and Mod 2 Sawfllys. Three MIRV's on Mod 3.		USSR			
<b>REMARKS</b> <p>The Sawfly missile system has apparently been designed specifically for the nuclear Yankee class submarines. Some 34 Yankee class submarines have been built; each containing 16 vertical Sawfly launch tubes. The missiles are apparently ejected by means of an integral submarine gas system. The first stage which comprises about 75% of the total missile weight incorporates 4 canted nozzles. The propellants are thought to be N<sub>2</sub>O<sub>4</sub>/UDMH.</p>							
<b>USERS</b> USSR		<b>KEY DATES</b> PRESENT STATUS: Operational but being replaced by the SS-N-8 IOC: Entered service in 1968 - Mod 1 1974 - Mod 2 1974-75 - Mod 3		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: About 1,000			

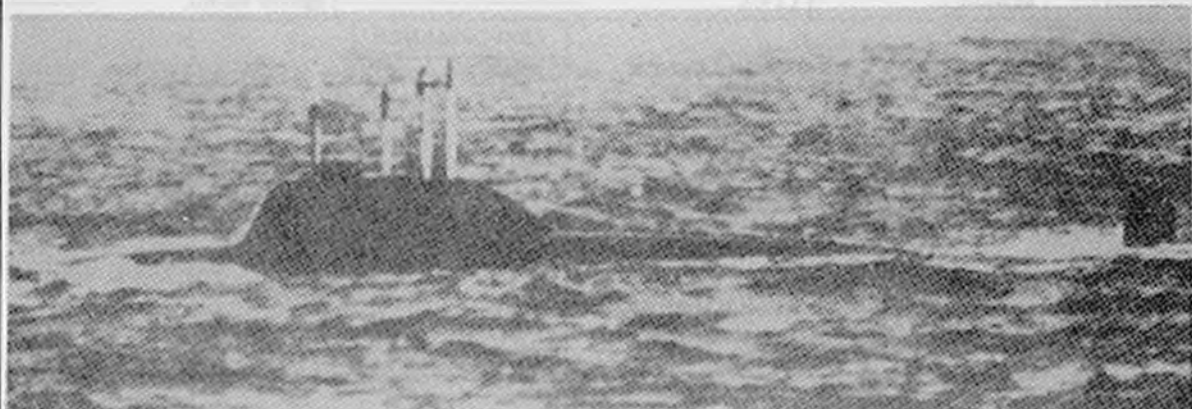
OTHER INFORMATION:



## SAWFLY MOD. 3

NAME <u>SAWFLY, MOD 3</u>		DESIGNATION <u>SS-N-8</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Navy</u>					
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS							
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Submarine</u>		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic Targets</u>			
CHARACTERISTICS				PERFORMANCE									
Sources vary widely LENGTH: (14-17m)(46-56') DIAMETER: 1.65 - 2.0m (5.4 - 6.6') SPAN: No wings or fins WEIGHT: 23,000-40,000kg (50,000-88,000#) OTHER:				BASIS FOR LAUNCH <u>Submarine and target position imputed.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				RANGE: 6760 - 9170km (4200 - 5700mi) ALTITUDE: Ballistic for range SPEED: Ballistic speed for range OTHER: CEP about 400m (1300')					
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Long range, submarine-launched, ballistic missile.						USSR					
AIRFRAME		Cylindrical body with blunt nose and small taper aft.						USSR					
PROPULSION		Two stage, liquid propellant rocket engines.						USSR					
GUIDANCE		Stellar inertial guidance with three MIRVs.						USSR					
FUZING								USSR					
WARHEAD		Nuclear, believed to carry three MIRVs of megaton yield.						USSR					
REMARKS		<p>In the mid-seventies, the then Chairman of the USA Joint Chiefs of Staff cited the Sawfly, Mod. 3 as exceeding by 3,000km (186mi) the range of any SLBM existing elsewhere. Since that time, the Sawfly has demonstrated ranges of at least 9,000km (5600mi). This range, combined with its exceptional accuracy, makes it a most formidable weapon.</p> <p>The Sawfly is carried by the Delta submarine as shown:</p> <p style="margin-left: 40px;">Delta I - 18 boats - 12 missiles/boat          Delta II - &gt;8 boats - 16 missiles/boat          Delta III - several - 20 - 24 missiles/boat</p> <p>Even with the extremely large diameter of the Delta boat (the largest submarine built), the missile length extends into the sail.</p>											
USERS		KEY DATES		COSTS									
USSR		PRESENT STATUS: Operational		UNIT COSTS:									
		IOC:		LAUNCH UNIT:									
		First tests 1971 Operational 1977-1978		QUANTITIES									
				TOTAL TO DATE:									
				Estimate ~ 500									

OTHER INFORMATION:



One of four Delta 2 ballistic missile submarines in the Soviet fleet is shown (Above) under way. The Delta 2 boats are each equipped with 16 launch tubes for the SS-N-8 SLBM, which carries a single reentry body with a 0.8-megaton yield and CEP of 0.84 naut. mi. at a range of approximately 5,000 naut. mi.



NAME <u>SCALEBOARD</u>		<b>SCALEBOARD</b>		DEVELOPER _____	
DESIGNATION <u>SS-12</u>				COUNTRY <u>USSR</u>	
				SERVICE <u>Army</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input checked="" type="checkbox"/> HARD INSTALL.	
				<input checked="" type="checkbox"/> SOFT. INSTALL. <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 11.0m (36.0') DIAMETER: 1.00m (3.3') SPAN: No wings or fins WEIGHT: 7,000-8,000kg (15,400-17,600#) OTHER: _____			RANGE: 800km (500 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: _____		
			<b>BASIS FOR LAUNCH</b> <u>Missile readied.</u> <u>Target and launch</u> <u>position inputed.</u>		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Land mobile, short to medium range ballistic missile.		USSR	
<b>AIRFRAME</b>		Cylindrical body with pointed nose. No wings or fins.		USSR	
<b>PROPULSION</b>		Single stage storable liquid - possibly RFNA/UDMH.		USSR	
<b>GUIDANCE</b>		Strapdown inertial guidance for correction of ballistic course.		USSR	
<b>FUZING</b>					
<b>WARHEAD</b>		Nuclear/thermonuclear. Megaton range.		USSR	
<b>REMARKS</b>					
As with the Scud B and C, the Scaleboard is installed on the 8 wheeled MAZ-543 transporter/launcher. But, unlike the Scud, the Scaleboard is enclosed in a ribbed, split casing which is elevated with the missile.					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USSR		PRESENT STATUS: Operational. Still being produced in 1977. IOC: First reported in 1967.		UNIT COSTS: LAUNCH UNIT:	
				<b>QUANTITIES</b> TOTAL TO DATE:	

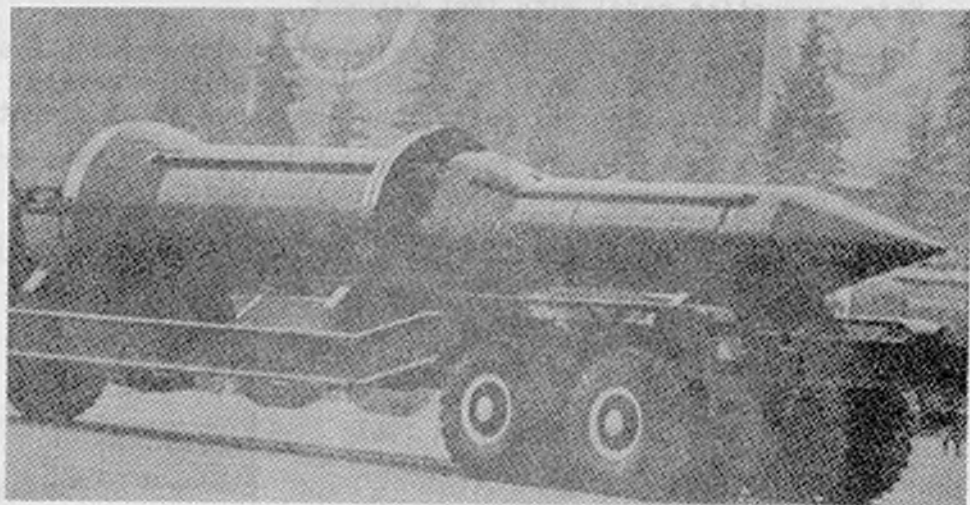
OTHER INFORMATION:



NAME <u>SCAPEGOAT/SCAMP</u>		<b>SCAPEGOAT/SCAMP</b>		DEVELOPER _____							
DESIGNATION <u>SS-14</u>				COUNTRY <u>USSR</u>							
				SERVICE <u>Air Force</u>							
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic targets	
<b>CHARACTERISTICS</b> LENGTH: 10.8m (35.4') DIAMETER: Max. 1.4m (4.6') SPAN: No wings or fins WEIGHT: 12,000kg (26,500#) OTHER: _____				<b>PERFORMANCE</b> RANGE: 4,000km (2,500 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: CEP 2.0km (1.2 miles)							
<b>CHARACTERISTICS</b> BASIS FOR LAUNCH <u>Missile elevated and readied. Target and launch position data inputted.</u>		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET									
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR					
OVERALL SYSTEM		Mobile intermediate range, ballistic missile				USSR					
AIRFRAME		Cylindrical 1st stage tapering to large diameter at tail, and to smaller diameter 2nd stage. Pointed nose. Truss connection of 1st and 2nd stages.				USSR					
PROPULSION		Two stage solid propellant rocket engines.				USSR					
GUIDANCE		Inertial.				USSR					
FUZING											
WARHEAD		May be the same IMT warhead used in SS-13, though some suggest a smaller size.				USSR					
<b>REMARKS</b> Scapegoat is the NATO name assigned to the SS-14; Scamp is assigned to the total mobile weapon system. The SS-14 is carried inside split container on a modified IS-3 tank chassis with 8 road wheels forward and aft. For launch, the missile, in its container, is jacked to a vertical position, the container is opened, and then lowered back to the chassis leaving the missile ready to launch. This missile is said to be largely deployed in the eastern regions of the Soviet Union.											
<b>USERS</b> USSR		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: First seen in 1967		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE: Over 100 units deployed.							

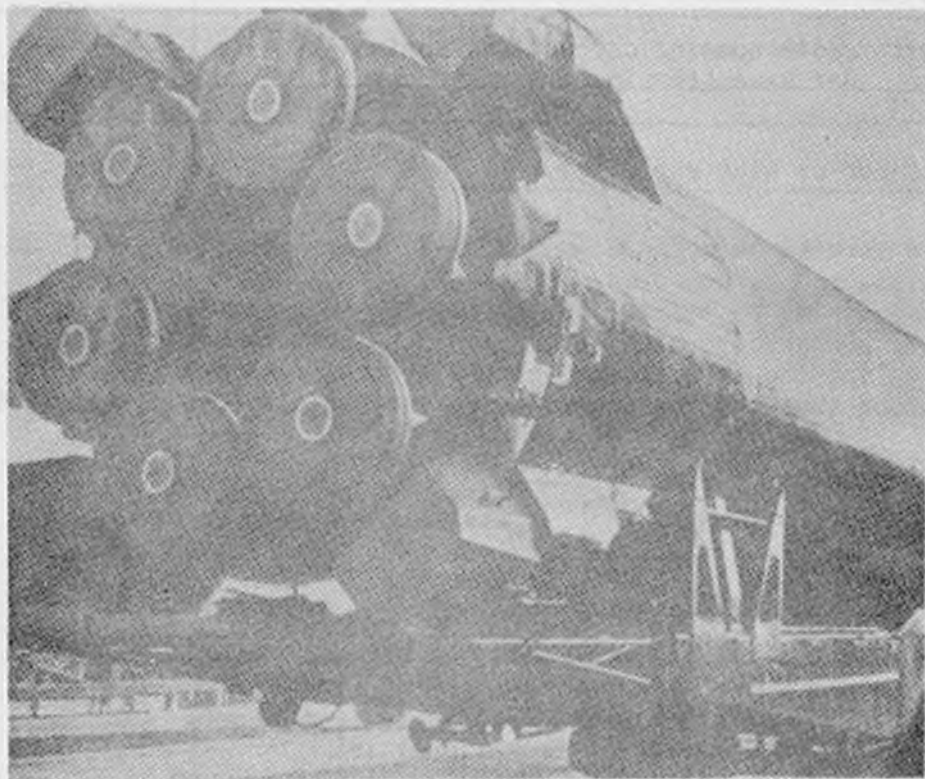
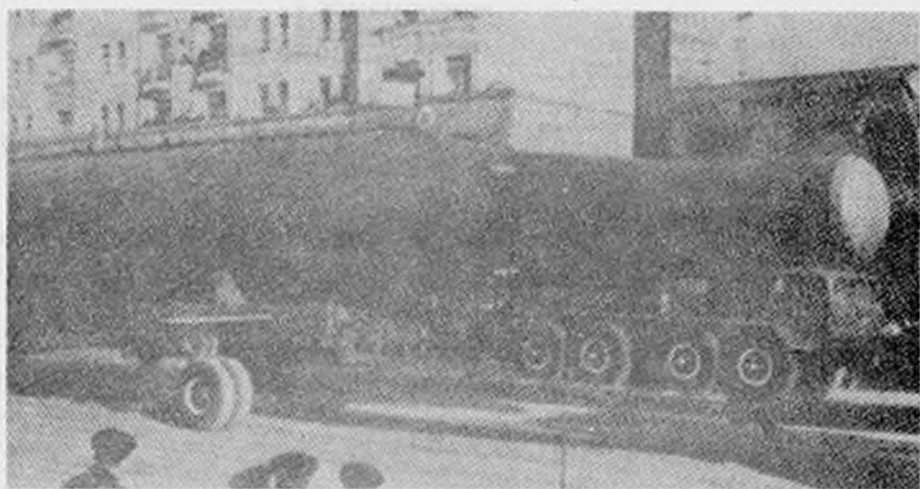
## SCAPEGOAT/SCAMP

OTHER INFORMATION:



NAME SCARP		SCARP		DEVELOPER USSR			
DESIGNATION SS-9, Mods 1-5				COUNTRY USSR			
				SERVICE Air Force			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets	
<b>CHARACTERISTICS</b> LENGTH: 36m (118.1') DIAMETER: 3.2m (10.1') SPAN: No wings or fins WEIGHT: 190,000kg (419,000#) OTHER:		Data for Mod 2 - See Remarks BASIS FOR LAUNCH <u>Missile readied.</u> <u>Target and launch</u> <u>Position inputed.</u>		<b>PERFORMANCE</b> RANGE: 12,000km (7,450 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: CEP 1km (.6 miles)			
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM	DESCRIPTION				CONTRACTOR		
OVERALL SYSTEM	Silo launched, intercontinental ballistic missile.				USSR		
AIRFRAME	Cylindrical body with nose tapering to smaller diameter, then rounded.				USSR		
PROPULSION	Three stage liquid rocket engines.				USSR		
GUIDANCE	Inertial				USSR		
FUZING							
WARHEAD	Nuclear: Mod 1 (20-25mt), Mod 2 (18mt), Mod 3 (unknown) Mod 4 (3 - 5 mt). MRV's Mod 5-Antisatellite				USSR		
REMARKS	<p>Although the SCARP was first shown to the public in 1967, development of the underground silos commenced in 1965, and monitored flight tests in 1963 implied outstanding performance. Five SCARP modifications are known.</p> <p>Mod 1 - Original missile with 20mt warhead.</p> <p>Mod 2 - Main production model with 18mt warhead.</p> <p>Mod 3 - Depressed trajectory and Fractional Orbital Bombardment System model to reduce radar warning time. Apparently primarily developed for testing purposes; none are known to be operational.</p> <p>Mod 4 - Apparently a test vehicle for a three MRV missile. None are known to be deployed.</p> <p>Mod 5 - Used for an antisatellite test role.</p>						
USERS	KEY DATES		COSTS				
USSR	PRESENT STATUS: Some operational but being replaced by the SS-18. IOC:		UNIT COSTS: LAUNCH UNIT:				
	First shown in 1967		QUANTITIES TOTAL TO DATE: Maximum of about 300 deployed.				

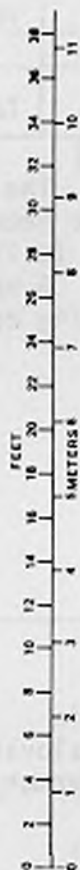
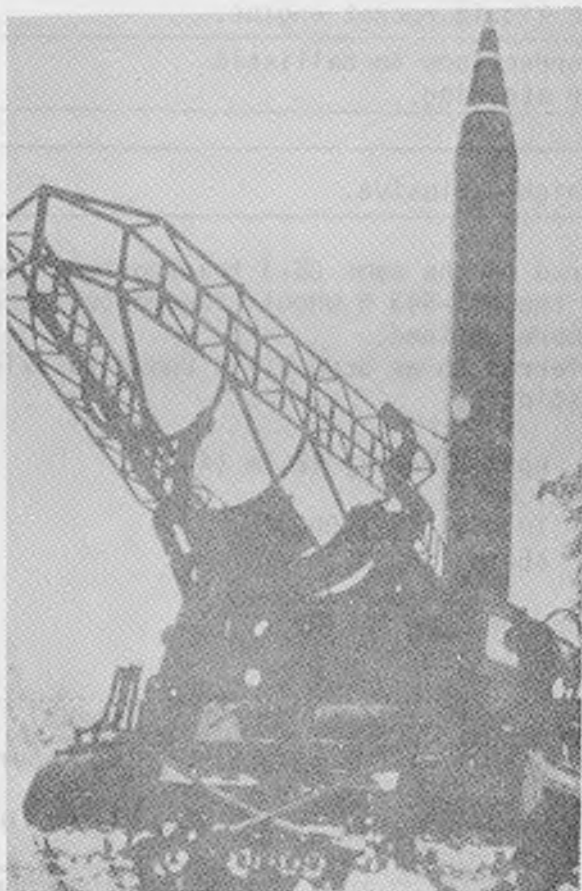
OTHER INFORMATION:



SS-9

NAME SCUD A		DESIGNATION SS-1B		SCUD A		DEVELOPER		COUNTRY USSR		SERVICE Army	
MISSION		TRAJECTORY		LAUNCHED FROM		MOBILE LAUNCHER		TARGETS		SOFT INSTALL	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Artillery targets	
CHARACTERISTICS				PERFORMANCE							
LENGTH: 10.8m (35.0')				RANGE: 130km (80 mi)							
DIAMETER: 85cm (2.8')				(up to twice above range has been claimed)							
SPAN: 2.08m (6.8')				ALTITUDE: Ballistic - depends upon range							
WEIGHT: 4500kg (10,000#)				SPEED: Ballistic - depends upon range							
OTHER:				OTHER:							
<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> Command Corrections <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET with less accuracy											
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR			
OVERALL SYSTEM		Battlefield mobile surface artillery missile						USSR			
AIRFRAME		Slender cylindrical body with pointed nose. Cruciform swept, cropped, tail fins						USSR			
PROPULSION		Single stage storable liquid rocket engine.						USSR			
GUIDANCE		Ballistic with radio command corrections during the launch phase. Jet vane steering.						USSR			
FUZING											
WARHEAD		Tactical nuclear or high explosive.						USSR			
REMARKS											
<p>The Scud A is carried on a fired from a JS-3 tracked vehicle. Each JS-3 carries a single missile, and is equipped with an elevating cradle to raise the missile to the vertical firing position. Soviet reports suggest that at least one hour is required to prepare the missile for firing--the time being spend in surveying the site, fueling the missile, and generally preparing for launch.</p> <p>It is understood that the launcher/transporter vehicles can be reloaded in the field.</p>											
USERS				KEY DATES				COSTS			
USSR				PRESENT STATUS: Superseded in USSR service. Operational in some satellite countries.				UNIT COSTS:			
Poland				10C				LAUNCH UNIT:			
Bulgaria				First seen in 1957.				QUANTITIES			
Czechoslovakia				10C about 1959				TOTAL TO DATE:			
East Germany											
Egypt											
Hungary											
Iraq											
Libya											

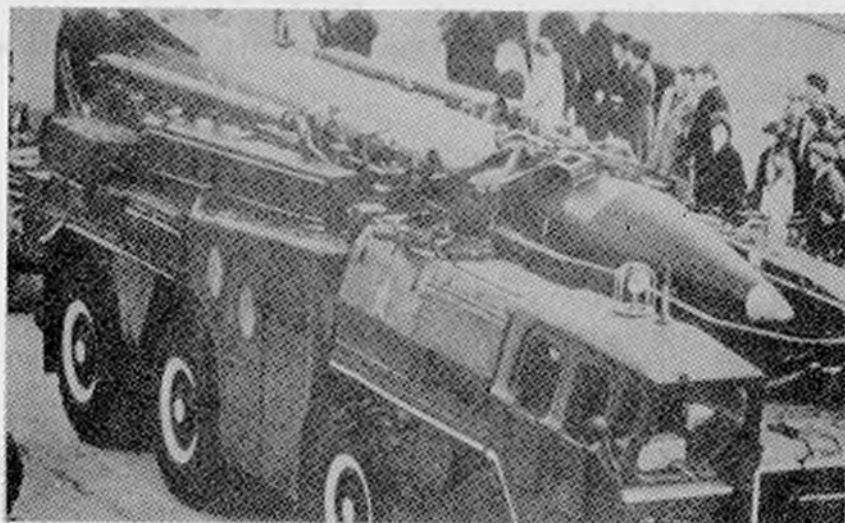
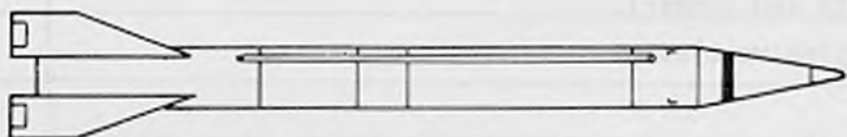
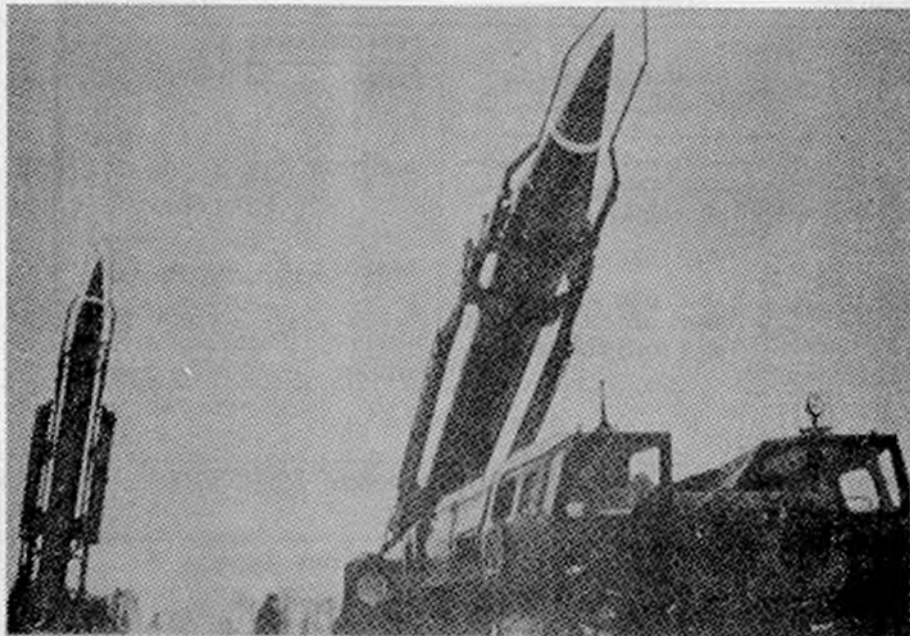
OTHER INFORMATION:



# SCUD B/C

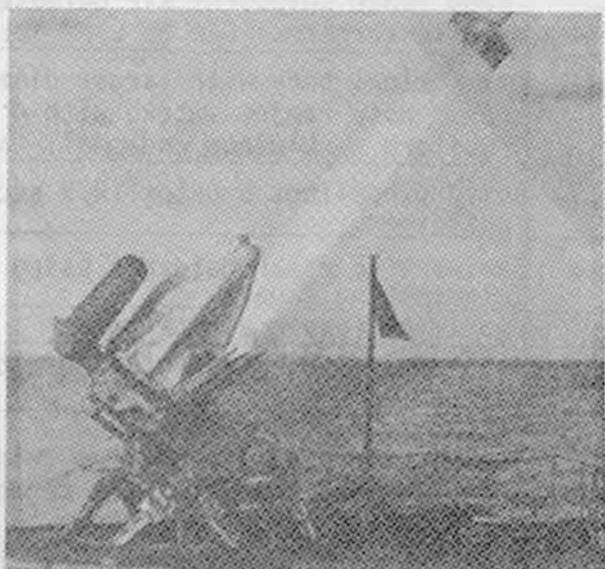
NAME <u>SCUD B/C</u>		DESIGNATION <u>SS-1C/SS-1C Mod</u>		DEVELOPER _____		COUNTRY <u>USSR</u>		SERVICE <u>Army</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input checked="" type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input checked="" type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Artillery</u> <u>Targets</u>	
<b>CHARACTERISTICS</b> LENGTH: 11.25m (37.0') DIAMETER: 85cm (2.8') SPAN: 2.08m (6.8') WEIGHT: 6300kg (13888#) OTHER: _____				<b>BASIS FOR LAUNCH</b> <u>Missile readied.</u> <u>Target and launch</u> <u>position inputed.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY <input type="checkbox"/> TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				<b>PERFORMANCE</b> RANGE: 290km (180 mi) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: _____			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>						<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Battlefield mobile surface-to-surface artillery missile.						USSR			
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose. Cruciform swept, cropped tail fins.						USSR			
<b>PROPULSION</b>		Single stage storable liquid rocket engine.						USSR			
<b>GUIDANCE</b>		Strapdown inertial corrections to ballistic trajectory. Jet vane steering.						USSR			
<b>FUZING</b>											
<b>WARHEAD</b>		Tactical nuclear or high explosive.						USSR			
<b>REMARKS</b> The Scud B first appeared on the same JS-3 transporter/launcher, but in 1965 it became identified with the MAZ-543 8 wheel transporter/launcher. The latter is lighter, faster and more refined. A variant of Scud B referred to as Scud C, is known to exist with the following estimated characteristics: <div style="margin-left: 40px;">           Length = Approximately 12.2m (40')            Diameter = 1.0m (3.3')            Weight = 10,000kg (22,000#)            Range = 450km (280 mi)         </div>											
<b>USERS</b>				<b>KEY DATES</b>				<b>COSTS</b>			
USSR Bulgaria Czechoslovakia East Germany Egypt Hungary Iraq Libya Poland				Romania Syria				PRESENT STATUS: Operational IOC: First seen in 1962		UNIT COSTS: LAUNCH UNIT:	
								<b>QUANTITIES</b> TOTAL TO DATE:			

OTHER INFORMATION



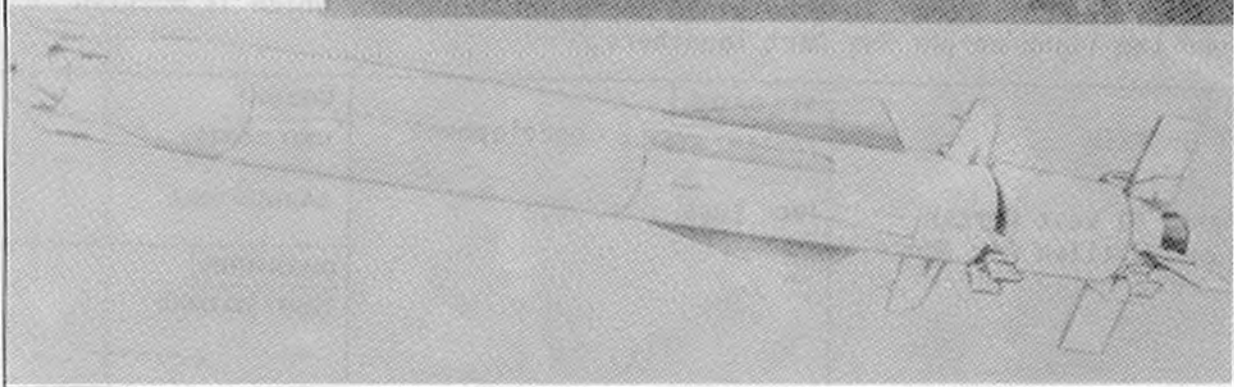
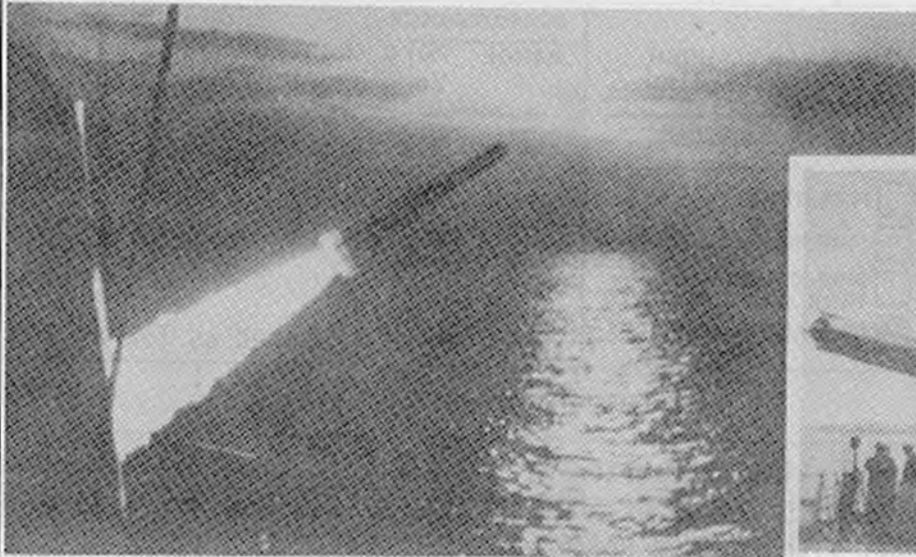
NAME SEACAT/TIGERCAT		SEACAT/TIGERCAT		DEVELOPER Short Brothers	
DESIGNATION GWS-20				COUNTRY United Kingdom	
				SERVICE Navy, Army, Air Force	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 1.48m (4.9') DIAMETER: 19cm (.6') SPAN: 65cm (2.1') WEIGHT: 63kg (139#) OTHER:		RANGE: 5.2km (3.25 miles) ALTITUDE: To 4600m (15,000') Min. 2m SPEED: High subsonic OTHER:		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
		BASIS FOR LAUNCH Sight on target.		<input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Shipboard (and land based) point defense SAM/SSM missile system.		Short Brothers, N. Ireland		
AIRFRAME	Generally cylindrical with flattened sides toward a pointed nose. Cruciform swept wings midbody and rectangular tail fins.		Short Brothers		
PROPULSION	Dual thrust solid propellant.		Imperial Metal Industries		
GUIDANCE	Radio command to line of sight using (1) Direct optical (2) TV optical or (3) Radar tracking. Height control available.		Short-Optical, Several Radars, Marconi, TV-FMI		
FUZING	Proximity and contact.				
WARHEAD	High explosive blast.				
REMARKS					
<p>The Seacat system was initially developed with a binocular optical sight and an operator's joystick to generate missile commands. Subsequently semi-automatic variations have been developed using various radars including Sperry, Contraves, San Giorgio, Signaal and Marconi. The launcher, initially 4-missile, has been redesigned as a 3-missile for use on the smaller naval vessels. The latest modification incorporates a height control device to permit use of the missile in the surface to surface role or against sea-skimming targets. The land-based variant Tigercat, which utilizes the same missile, has been modernized to permit integration with radar as a button-on system.</p>					
USERS		KEY DATES		COSTS	
U.K. Argentina Australia Brazil Chile W. Germany India Iran Jordan		Libya Malaysia New Zealand Nigeria Qatar Sweden Thailand Venezuela		PRESENT STATUS: Operational IOC: Seacat 1964 Tigercat 1973	
				UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: About 4,000	

OTHER INFORMATION:



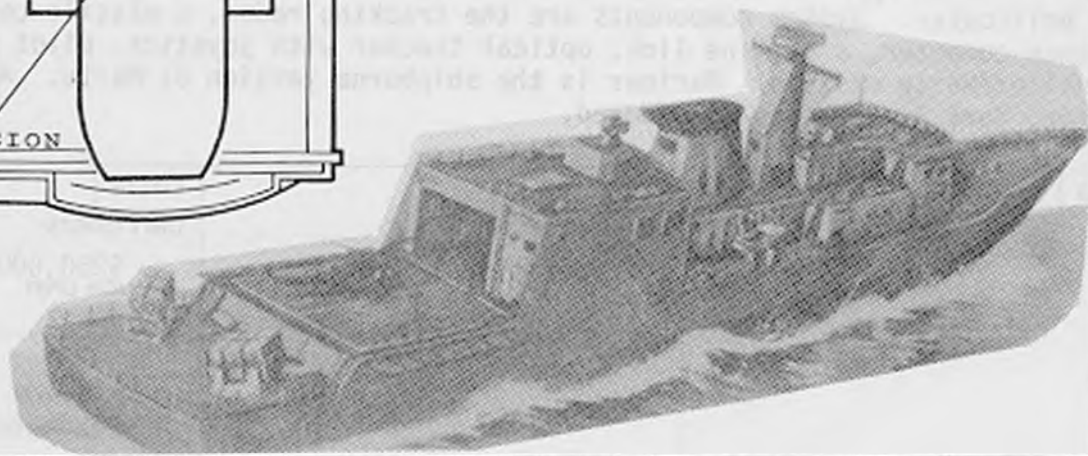
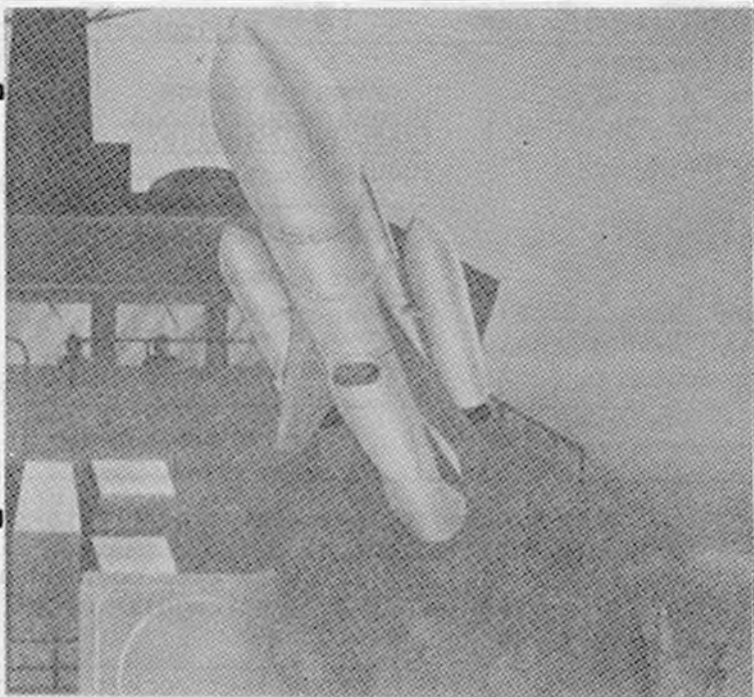
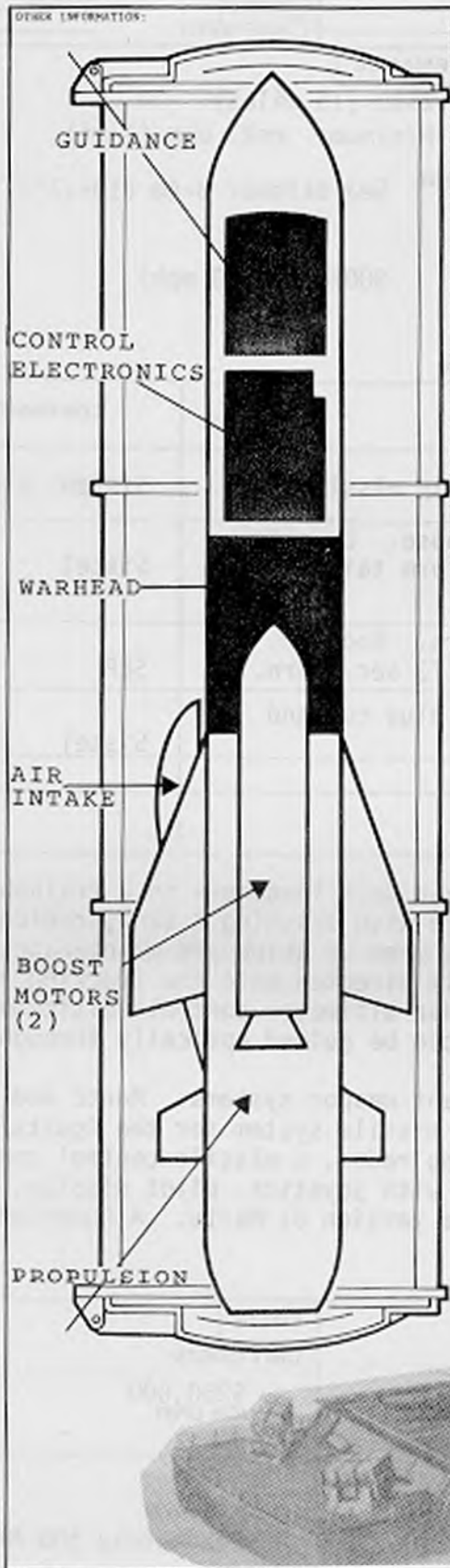
NAME <u>SEA DART/LAND DART</u>		<b>SEA DART LAND DART</b>		DEVELOPER <u>British Aerospace</u>			
DESIGNATION <u>GWS 30, MK 1-2</u>				COUNTRY <u>Great Britain</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C <input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 4.36m (14.3') DIAMETER: 42cm (1.4') SPAN: 91cm (3.0') WEIGHT: 550kg (1210#) OTHER:			<b>PERFORMANCE</b> RANGE: Max. 80km (50 miles) Depends on altitude Min. 32km (20 miles) ALTITUDE: Max. 25,000m (82,000') Min. 30m (98') SPEED: 3.0 Mach OTHER:		<b>BASIS FOR LAUNCH</b> <u>Target designation, and TIR on target.</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR		
OVERALL SYSTEM		Long range shipborne air defense missile for aircraft and missile targets. Can be used for ship targets.			British Aerospace, Dynamics Group		
AIRFRAME		Cylindrical body with larger diameter booster motor at rear. Nose ramjet intake with 4 antennas on rim. Cruciform stub wings and small tail fins (missile)			British Aerospace		
PROPULSION		Solid propellant booster (2.5 sec. burn). Odin ramjet sustainer.			Booster - IMI Ramjet-Rolls Royce		
GUIDANCE		Semi-active radar guidance using type 909 Target Illuminating Radar.			Marconi-TIR, IMI Ramjet, Sperry-co		
FUZING		Proximity fuze - air targets.					
WARHEAD		High explosive, fragmentation with externally grooved casing					
<b>REMARKS</b> <p>The missile is launched from twin deck launchers with fully automatic magazine handling and loading. The target is detected by the ships surveillance radar and layed-off to the target illumination radar. After launch, guidance is by means of semi-active CW homing (K band) which is relatively weather resistant. The missile utilizes a proportional navigation intercept and responds quickly to small changes in target position.</p> <p>British Aerospace and Marconi Radar Systems are jointly offering a light-weight canister launched version as a multirole weapon against aircraft, missiles and ship targets (4 canisters/missiles on ready for launcher).</p> <p>The Sea Dart is installed on the type 42 and 82 British destroyers and the type 42 Argentinean destroyers.</p>							
<b>USERS</b> Great Britain Argentina		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: 1968 Mark I 1982 Mark 2			<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE: About 1,000		

OTHER INFORMATION:



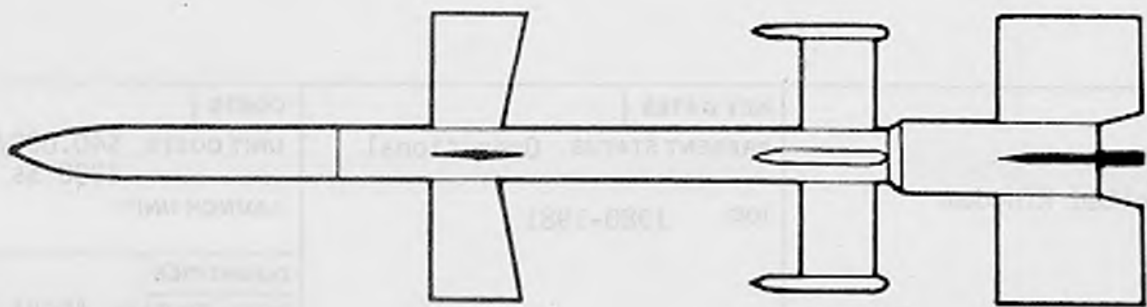
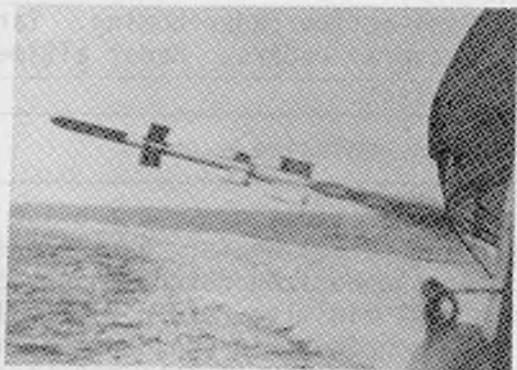
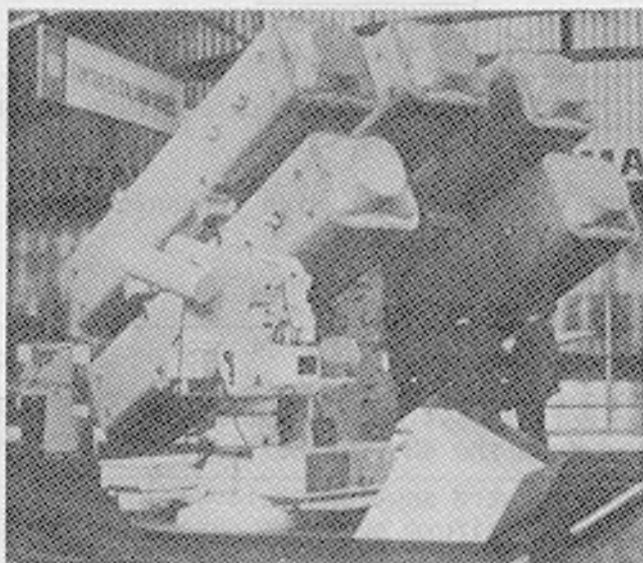
## SEA EAGLE

NAME <u>SEA EAGLE</u>		DEVELOPER <u>British Aerospace</u>	
DESIGNATION <u>P3T/P5T</u>		COUNTRY <u>Great Britain</u>	
		SERVICE <u>Navy and Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <u>P3T</u> <input type="checkbox"/> SURFACE-TO-AIR <u>P5T</u> <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> <del>BOOST</del> SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <u>P5T</u> <input checked="" type="checkbox"/> A/C <u>P3T</u>	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 4.0m (13.1') DIAMETER: 40cm (1.3') SPAN: 1.19m (3.9') WEIGHT: 830kg (1826#) OTHER: 200kg (440#) warhead		RANGE: More than 100kg (62 miles) Very short minimum range ALTITUDE: Sea skimming SPEED: 0.4-0.9 Mach at sea level OTHER: Can be launched as low as 30m altitude	
		BASIS FOR LAUNCH <u>Missile activated.</u> <u>Target relative</u> <u>position input.</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM		DESCRIPTION	
OVERALL SYSTEM		Active radar, sea skimming version of the ASM Martel for A/C launch (P3T), or ship launch (P5T).	
AIRFRAME		Cylindrical body with rounded nose. Swept cruciform wings at midbody and tail surfaces slightly behind wings.	
PROPULSION		P3T - no boosters. TRI 60 turbojet. P5T - 2 solid propellant boosters	
GUIDANCE		Inertial guidance and radar altimeter midcourse active radar terminal.	
FUZING		Impact.	
WARHEAD		High explosive (aluminized RDX-TNT) in advanced alloy case.	
REMARKS		Missile is designed to be launched by the Buccaneer, Sea Harrier and Tornado aircraft. The missile is dropped from the aircraft prior to ignition; ram air pressure revs up the turbojet for ignition. The Sea Eagle then descends to sea skimming height for cruise at about Mach 0.85. Minimum range is limited only by the time required for the guidance to settle down and the warhead to arm. Advanced signal processing techniques of the radar altimeter outputs permit cruising at just above the spray. The missile may be programmed to fly a dogleg approach to improve deception. During the last 15km or so, the missile is guided by its active radar (a momentary popup to altitude may be used earlier to provide a terminal guidance update to the inertial system). The missile is designed to hit near the waterline; a dished front face to the warhead ensures penetration at shallow grazing angles. The P5T is the ship-launched version of Sea Eagle. It utilizes two side-mounted boosters to provide the speed for ramjet ignition. It comes in a combined container/launcher, which is mounted in groups of 4 on the light-weight Sea Dart launchers.	
USERS		KEY DATES	
Great Britain		PRESENT STATUS: Development	
(Offered to West German Navy and Italian Air Force)		IOC: 1984	
		COSTS	
		UNIT COSTS:	
		LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE:	
		-----	



NAME <u>SEA KILLER</u>		DESIGNATION <u>Mark 2, 3</u>		DEVELOPER <u>Sistel</u>		COUNTRY <u>Italy</u>		SERVICE <u>Navy</u>			
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>		<b>TARGETS</b>		<b>OTHER</b>			
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C <u>Helicopter</u>		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>				<b>PERFORMANCE</b>							
LENGTH: <u>Mark 2</u> <u>4.70m (15.4')</u> DIAMETER: <u>20.6cm (.7')</u>  SPAN: <u>1.01m (3.3')</u>  WEIGHT: <u>300kg (660#)</u>  OTHER: <u>W/H 70kg (154#)</u>				<b>BASIS FOR LAUNCH</b> <u>Target acquired and tracked. Missile readied.</u>  <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				RANGE: <u>25km (15 miles)</u> Minimum: <u>est. 6km (4 mi)</u>  ALTITUDE: <u>Sea skimmer 3-4m (10-13')</u>  SPEED: <u>900km/h (560 mph)</u>  OTHER:			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		Medium range ship-to-ship and air-to-ship missile.				Sistemi Electronic					
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose. Cruciform wings at midbody and rectangular cruciform tail surfaces.				Sistel					
<b>PROPULSION</b>		Two stage solid propellant rocket motors. Booster (SEP299) 1.6 sec burn; sust. (SEP 300) 73 sec. burn.				SEP					
<b>GUIDANCE</b>		Radar beam riding with radar altimeter plus command if required. Backup optical guidance.				Sistel					
<b>FUZING</b>		Contact and proximity.									
<b>WARHEAD</b>		High explosive semi-armor piercing.									
<b>REMARKS</b>											
<p>The Sea Killer can be launched from fixed deck launchers on a trainable, 5 round, multiple launcher. It is designed to operate with existing X band, conical scan, tracking radars and shipboard computers. No launch crew or shipboard maintenance is required. After launch the missile is automatically directed onto the tracking radar centerline and rides the beam to the target. A radar altimeter controls altitude to 2-5 meters. In heavy ECM conditions, the missile can be guided optically through radio link commands.</p> <p>Sea Killer is the basis for two important weapon systems: Marte and Mariner. Marte is a helicopter launched stand-off anti-ship missile system for the Agusta/Sikorski SH3D helicopter. System components are the tracking radar, a missile control console, guidance computer, a command link, optical tracker with joystick, pilot display, and the Sea Killer/Marte missile. Mariner is the shipborne version of Marte. A supersonic version, Mark 3, is being considered.</p>											
<b>USERS</b>			<b>KEY DATES</b>			<b>COSTS</b>					
Italy Iran			<b>PRESENT STATUS:</b> Operational <b>IOC:</b> Approximately 1974-MK 2			<b>UNIT COSTS:</b> \$250,000 <b>LAUNCH UNIT:</b>					
						<b>QUANTITIES</b>					
						<b>TOTAL TO DATE:</b> Approximately 500 MK 1-2s					

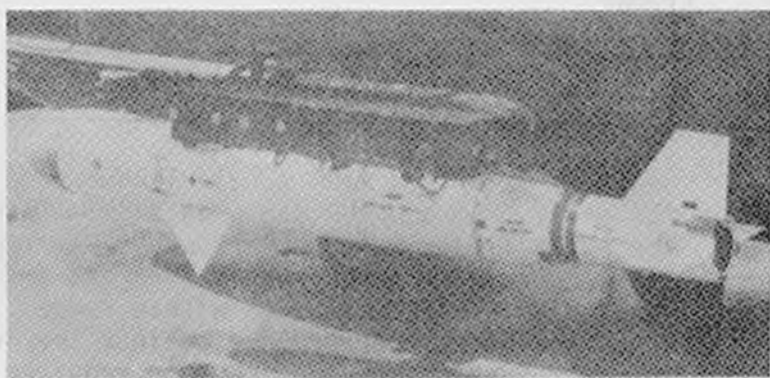
OTHER INFORMATION:



NAME: SEA SKUA		DESIGNATION:		DEVELOPER: British Aerospace COUNTRY: United Kingdom SERVICE: Navy			
MISSION		TRAJECTORY				LAUNCHED FROM	
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CHARACTERISTICS		BASIS FOR LAUNCH		PERFORMANCE			
LENGTH: 2.50m (8.2')		Target illuminated		RANGE: 24km (15mi) Min. 3.4km (2mi)			
DIAMETER: 28cm (0.9')				ALTITUDE: Launch altitude to sea skimming			
SPAN: 61cm (2.0')		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		SPEED: High subsonic			
WEIGHT: 204.5kg (450#)				OTHER:			
OTHER: Warhead about 30 (66#)							
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Frigate long range, self defense system against missile carrying boats. Launched from the RN Lynx helicopter.		British Aerospace, Dynamics Group.			
AIRFRAME		Long cylindrical body with forward section of larger diameter and rounded nose. Cruciform surfaces near nose and at tail.		British Aerospace			
PROPULSION		Two stage solid propellant rocket motor, booster and sustainer.		IMI			
GUIDANCE		Semi-active radar homing. Target illuminated by Seaspray radars. Radar altimeter for altitude control.		Marconi-Homer Cerepti-TIR TRT-Altimeter			
FUZING		Contact.					
WARHEAD		High explosive.					
REMARKS: Sea Skua is designed to provide naval formations with self defense against missile carrying patrol boats. By the use of its naval Lynx helicopter, the formation will have over-the-horizon detection capability, and be able to provide standoff launch ranges which will minimize return fire. Target detection is carried out by visual, radar or ESM techniques in conjunction with the Decca TANS tactical navigation system. The pilot will then switch to the tracking mode and select one of four sea skimming altitudes based upon sea state, a pre-programmed or radio command instruction will establish the terminal guidance maneuver.							
USERS		KEY DATES		COSTS			
United Kingdom		PRESENT STATUS: Operational		UNIT COSTS: \$40,000/round 1980 \$s			
		IOC: 1980-1981		LAUNCH UNIT:			
				QUANTITIES			
				TOTAL TO DATE: About 250			

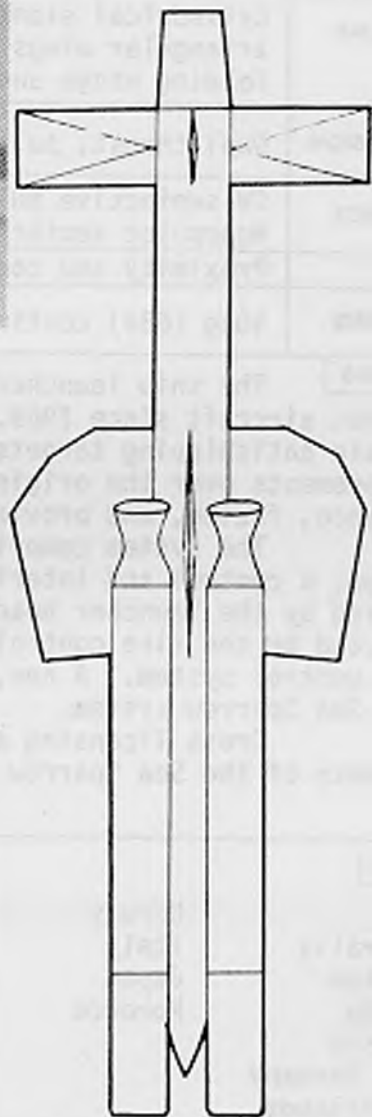
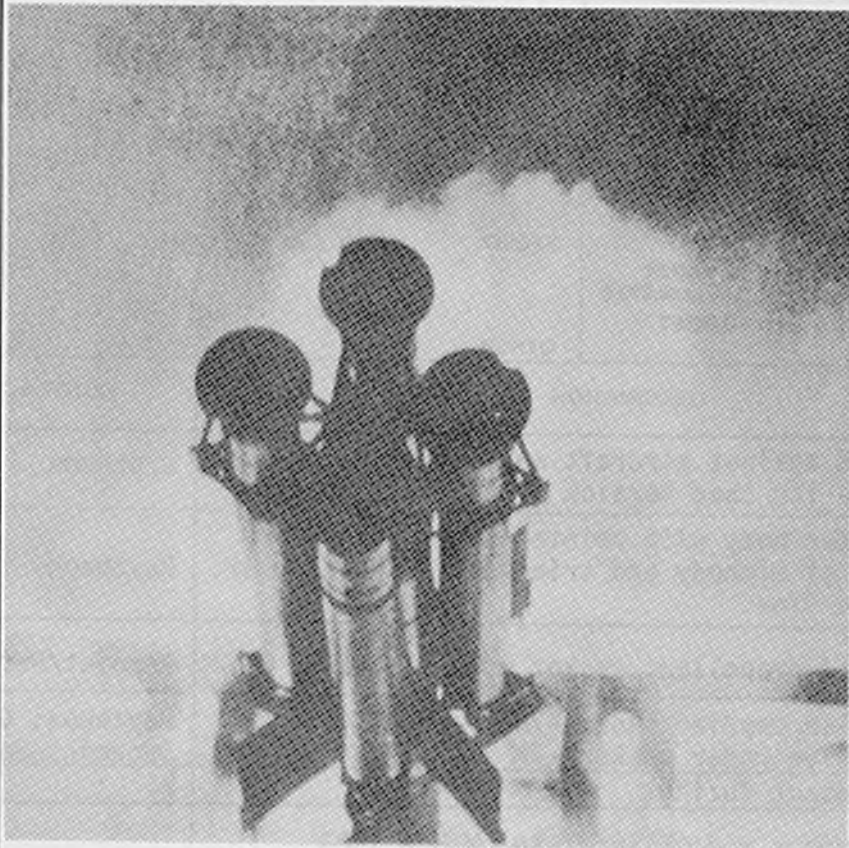
## SEA SKUA

OTHER INFORMATION:



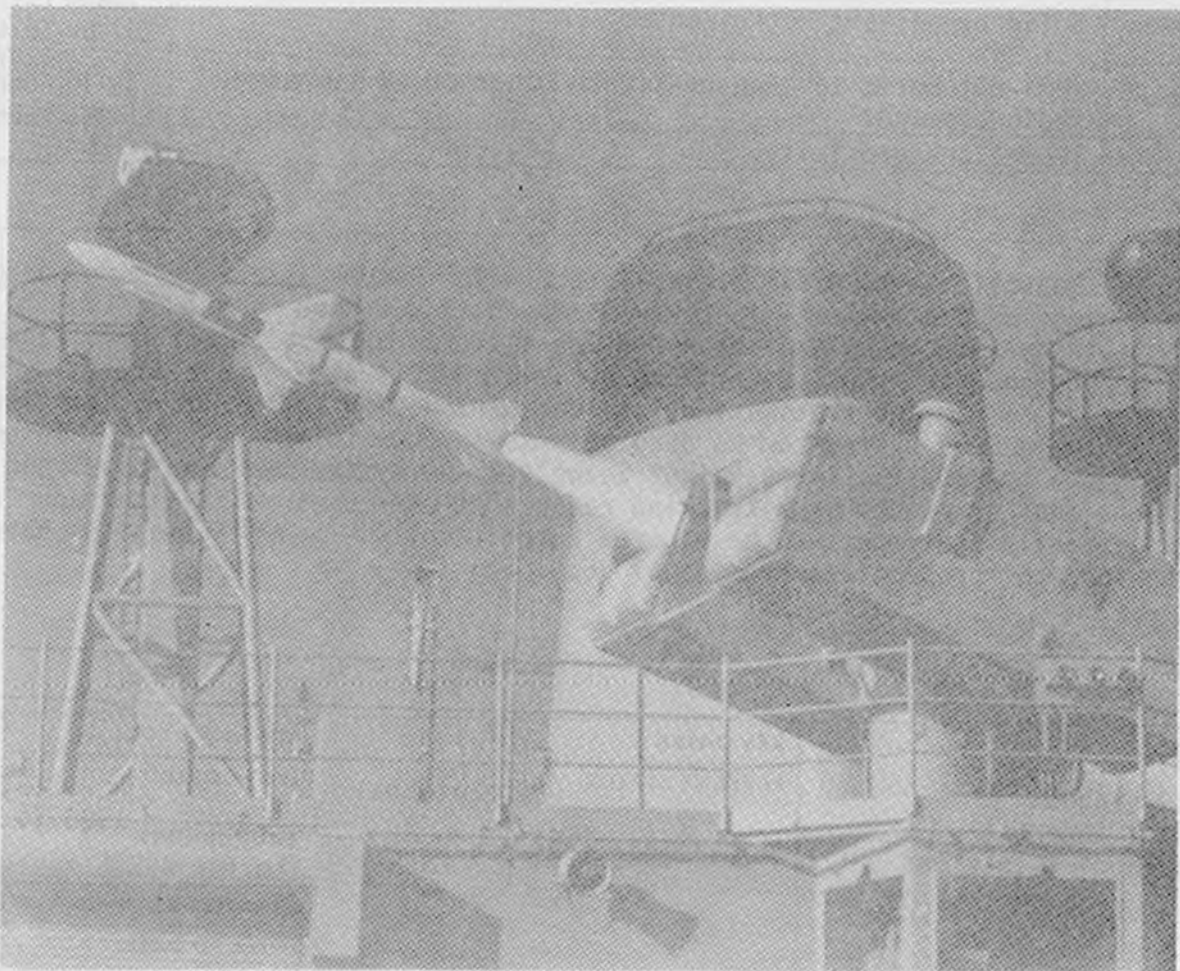
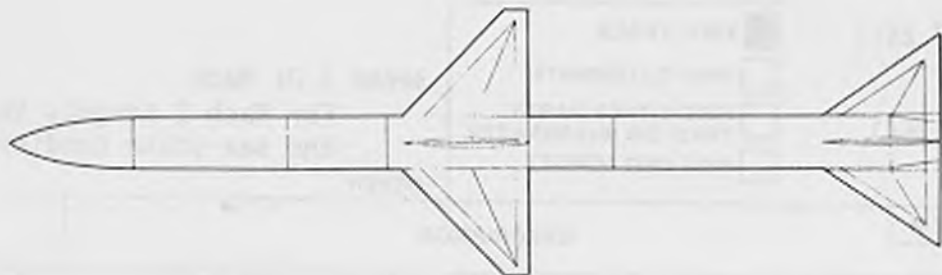
NAME SEASLUG		SEASLUG		DEVELOPER British Aerospace			
DESIGNATION MK 1 & 2				COUNTRY United Kingdom			
				SERVICE Navy			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL			
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 6.0m (19.7') DIAMETER: 41cm (1.3') SPAN: 1.44m (4.7') WEIGHT: Warhead: OTHER: 135kg (297#)			<b>PERFORMANCE</b> RANGE: 45km (28mi) ALTITUDE: 15,000m (50,000') SPEED: Supersonic OTHER:				
<b>BASIS FOR LAUNCH</b> Tracking radar on target.			<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION				CONTRACTOR		
OVERALL SYSTEM	Long range, beam riding, ship air-defense missile.				British Aerospace Dynamics Group		
AIRFRAME	Cylindrical body with pointed nose. Cruciform wings and tail surfaces. Four jettisonable strap-on boosters attached to forebody.				British Aerospace		
PROPULSION	Four solid propellant jettisonable boosters. Single stage solid propellant sustainer				Booster IMI Sustainer ICI		
GUIDANCE	Radar beam riding. Type 901 tracking and illumination radar.				GE/Sperry		
FUZING	Proximity.				EMI		
WARHEAD	High explosive with proximity fuze.						
<b>REMARKS</b> Seaslugs are fired from a twin launch ramp launcher which is fed automatically from a below deck magazine. Targets are detected at long ranges by the surveillance radars (RN Type 967 is typical) and transferred to the tracking radar which tracks the target and aims the launcher. The missile is fired when the target comes within range. The Mark 2 Seaslug has longer range and better performance against low level targets. No modifications to the Mark 1 shipboard equipment is required for the Mk 2.							
<b>USERS</b> United Kingdom		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: 1961 Mark 1 ? Mark 2		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE:			

OTHER INFORMATION:



NAME <u>SEA SPARROW</u>		<b>SEA SPARROW</b>		DEVELOPER <u>Raytheon</u>			
DESIGNATION <u>RIM-7H/M</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 3.65m (12.0') DIAMETER: 20cm (.66') SPAN: 1.0m (3.3') WEIGHT: 228kg (503#) OTHER:		<b>PERFORMANCE</b> RANGE: 22.5km (14 miles) ALTITUDE: 15,250m (50,000') SPEED: 2.5 Mach OTHER:		<b>BASIS FOR LAUNCH</b> Ship's radar acquires target. Predicted position input to missile. <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Point defense SAM against aircraft and antishipping missiles. Surface launched version of AIM-7E/M Sparrow.		Raytheon			
AIRFRAME		Cylindrical slender body with pointed nose. Cruciform triangular wings at midbody and triangular fins at rear. Folding wings and fins.		Raytheon			
PROPULSION		Dual thrust, solid propellant rocket motor, Mark 52		Aerojet/Hercules			
GUIDANCE		CW semiactive pulse doppler radar -7H Monopulse semiactive radar seeker -7M		Raytheon; General Dynamics-2nd source			
FUZING		Proximity and contact fuzing.					
WARHEAD		40kg (88#) continuous rod; blast-frag. W/H - 1983					
<b>REMARKS</b> <p>The ship launched Sea Sparrow has been used as a point defense missile against aircraft since 1969. Since that time it has additionally been designated for certain antishipping targets. The NATO Sea Sparrow Missile System represents several improvements over the original point defense system; namely relative to low altitude guidance, fuzing, and providing of greater effectiveness in an ECM environment.</p> <p>The system comprises four subsystems: a launching system, a fire control system, a control and interface system, and the Sparrow missile. Eight missiles are carried by the launcher head which rotates around the horizontal and vertical axes as directed by the fire control system. Firing and loading are also controlled by the fire control system. A new, lightweight, vertical launcher is being developed for the NATO Sea Sparrow system.</p> <p>Cross licensing agreements are in effect with several NATO countries for elements of the Sea Sparrow system.</p>							
<b>USERS</b> USA Australia Belgium Canada Denmark West Germany Netherlands New Zealand		<b>KEY DATES</b> PRESENT STATUS: Sea Sparrow operational, NSSM -7H operational, -7M development IOC: 1969 Basic Sea Sparrow About 1975 NSSM -7H About 1982 NSSM -7M		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE: Over 3,000			

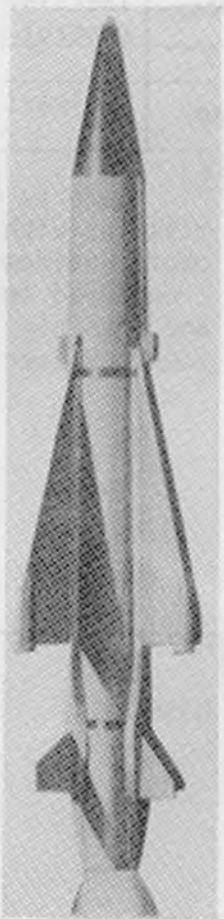
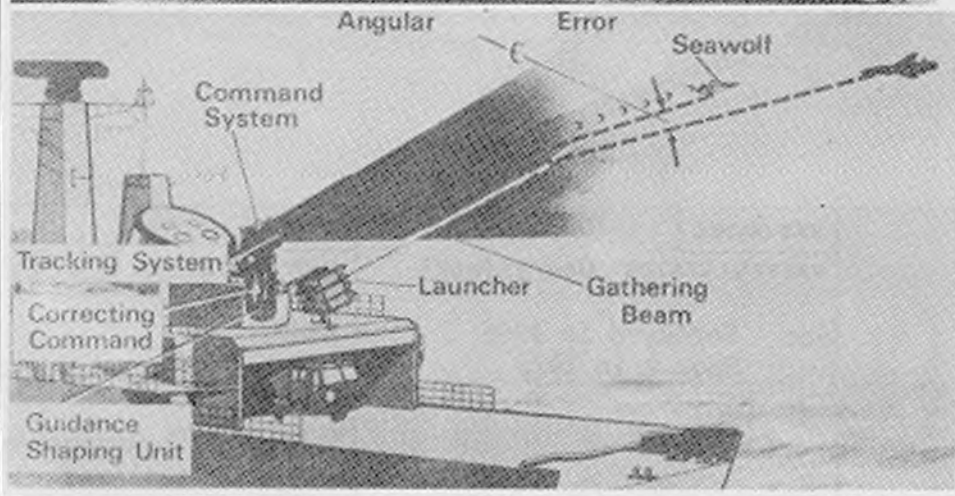
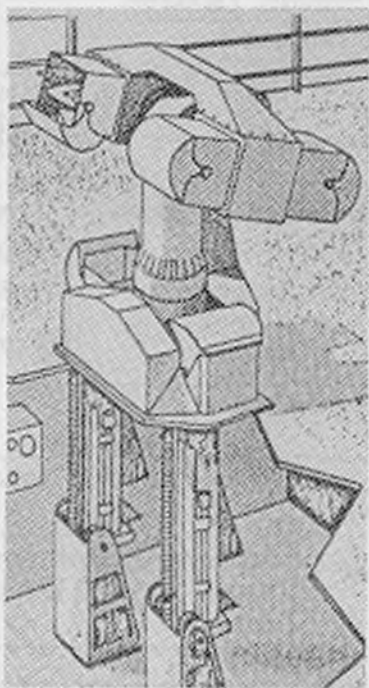
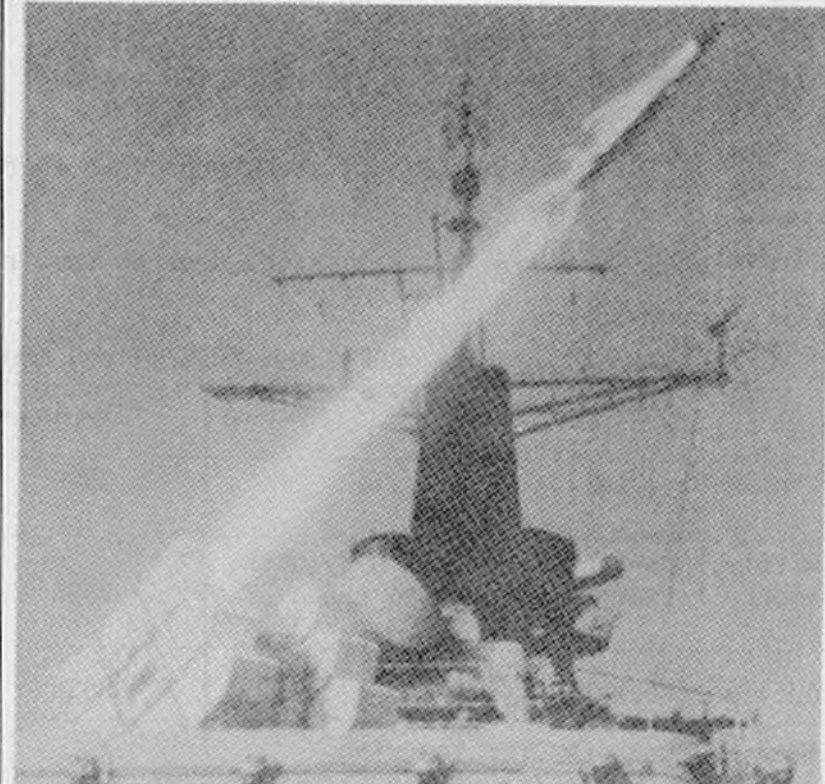
OTHER INFORMATION:



NAME <u>SEAWOLF</u>		<b>SEAWOLF</b>		DEVELOPER <u>British Aerospace</u>			
DESIGNATION <u>GWS-25</u>				COUNTRY <u>United Kingdom</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL			
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 1.98m (6.5') DIAMETER: 18.0cm (0.6') SPAN: 68.6cm (2.25') WEIGHT: 80kg (176#) OTHER:			<b>PERFORMANCE</b> RANGE: 5.6km (3.5 miles) ALTITUDE: - SPEED: 2.0+ Mach For Mach 2 targets in severe weather and sea state conditions. OTHER:				
			<b>BASIS FOR LAUNCH</b> Radar on target <u>within range.</u>				
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION				CONTRACTOR		
OVERALL SYSTEM	Short-range, rapid-response, all-weather, ship self-defense missile system. A/C, missile, & proj. target.				British Aerospace Dynamics Group		
AIRFRAME	Cylindrical body with conical nose. Cruciform delta shaped wings (midbody) and tail surfaces aft.				British Aerospace		
PROPULSION	Solid propellant rocket motor.				Imperial Metal Industries		
GUIDANCE	Semi-automatic to line-of-sight. Radar or TV sighting. Radio command.				Tr. Radar - Marconi TV Marconi Computer-Ferranti		
FUZING	Impact and proximity.				EMI		
WARHEAD	14kg (31.3#) high explosive fragmentation.						
REMARKS	Seawolf is the missile used in the Royal Navy's shipboard point defense system, Guided Weapon System - 25 (GWS-25) which is now operational on Type 22 frigates. The complete system consists of high and low altitude surveillance radars, tracking radar, a TV sight for manual operation, a six-barrel launcher trainable in azimuth and elevation, a command transmitter, and data processing equipment in addition to the missile. The GWS-25 system can be used on vessels down to about 3000T. For smaller vessels (down to 900T), a light-weight Seawolf VM-40 system has been developed. It utilizes a dual-frequency band tracking radar that overcomes multi-path radar reflections enabling low-flying targets to be engaged automatically. Seawolf missiles have intercepted 4.5" projectiles from naval guns.						
<b>USERS</b> United Kingdom Canada - Interest Netherlands - Interest		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: 1980-1981		<b>COSTS</b> UNIT COSTS: < \$130,000/round 1980 \$\$ LAUNCH UNIT: 11m for GWS25 system			
				<b>QUANTITIES</b> TOTAL TO DATE: About 1,200			

## SEAWOLF

OTHER INFORMATION:



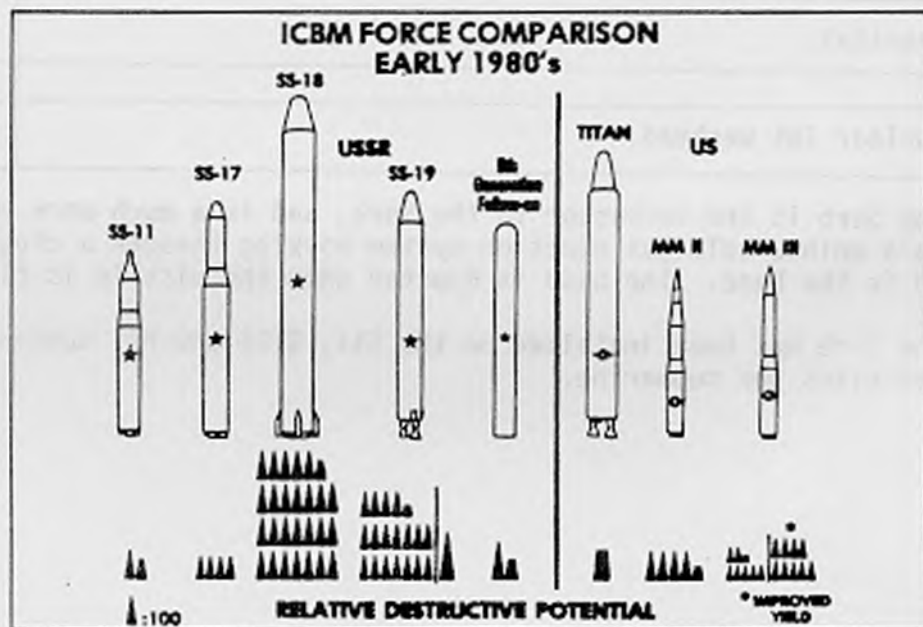
## SEGO

NAME <u>Sego</u>		DEVELOPER _____	
DESIGNATION <u>SS-11</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY GUID <input type="checkbox"/> BOOST BOOST GUID <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic targets
CHARACTERISTICS		PERFORMANCE	
LENGTH: 19m (62.3') DIAMETER: 2.4m (7.9') SPAN: No wings or fins WEIGHT: 48,000kg (106,000#) OTHER:		RANGE: 10,500km (6,500 miles) ALTITUDE: Ballistic, depends upon range SPEED: Ballistic, depends upon range OTHER: CEP 0.8km (0.5 miles) Mod 3	
		BASIS FOR LAUNCH Missile readied. Target & launch date inputed.	
		<input type="checkbox"/> FIRE TRACK <input type="checkbox"/> FIRE ILLUMINATE <input type="checkbox"/> FIRE OTHER PARTY TRKS OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Silo launched intercontinental ballistic missile		USSR.
AIRFRAME	Appearance not definitely known. Cylindrical body with taper to smaller diameter forward. Pointed to round nose.		USSR
PROPULSION	Two stage liquid propellant rocket motors.		USSR
GUIDANCE	Inertial with gimballed chambers (4) for steering control		USSR
FUZING			
WARHEAD	Nuclear: Mod 1 and 2 1-2 MT, Mod 3 3 x 100-300kt MRV's.		USSR
REMARKS	Sego is the most widely-developed of the Soviet intercontinental ballistic missiles with approximately 1,000 missiles known to be emplaced. Three modifications of the missile have been identified: Mod 1, deployed in 1966; Mod 2 deployed in 1973 (same as Mod 1 except for the addition of penetration aids and possibly improved accuracy), and Mod 3 with 3 MRV's and definitely improved accuracy over the Mod 1.		
USERS	KEY DATES	COSTS	
USSR	PRESENT STATUS: Operational	UNIT COSTS:	
	IOC: Deployed in 1966 Mod. 2 in 1973	LAUNCH UNIT:	
		QUANTITIES	
		TOTAL TO DATE: Approximately 1,000 deployed	

OTHER INFORMATION:



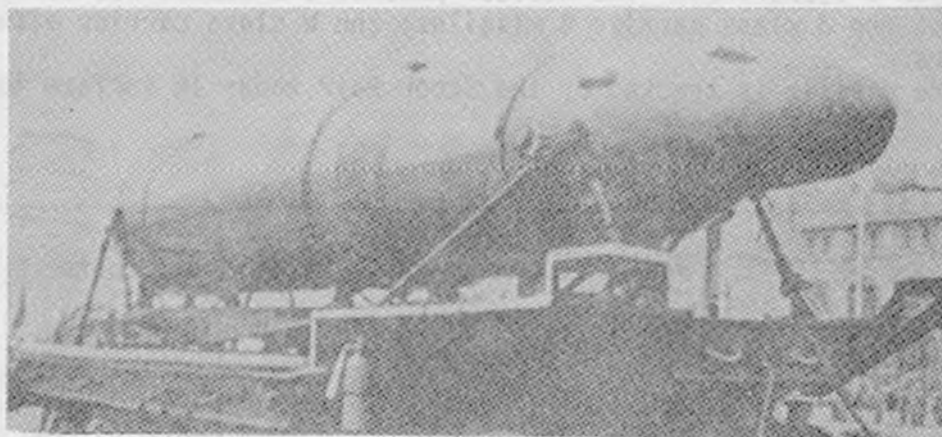
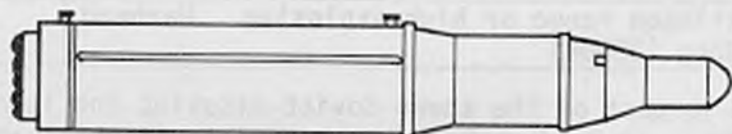
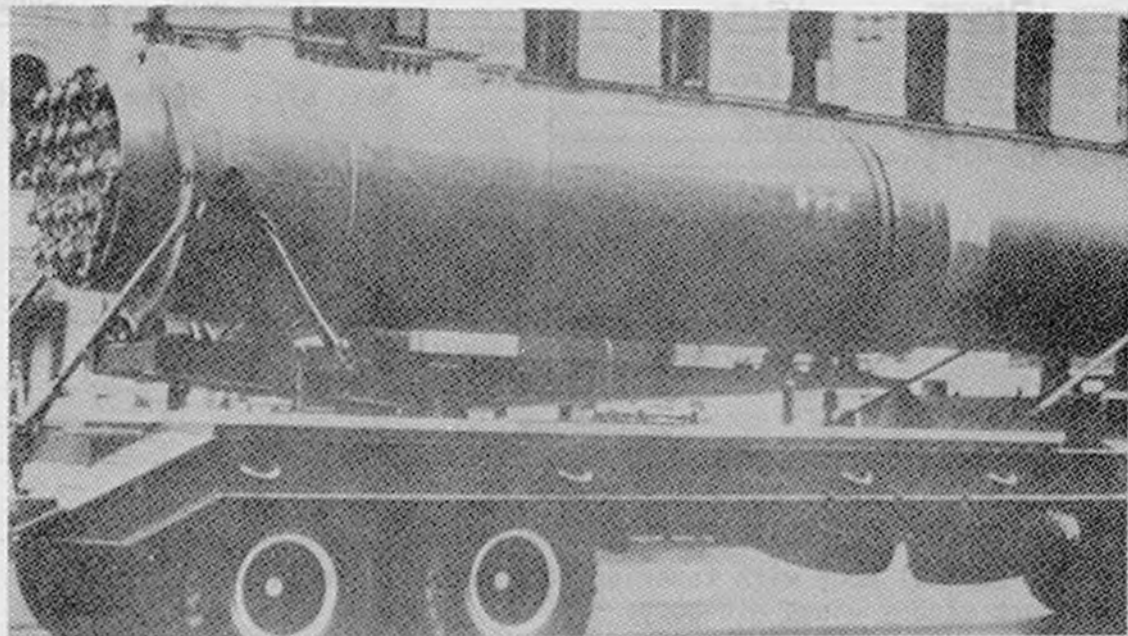
SS-11



# SERB

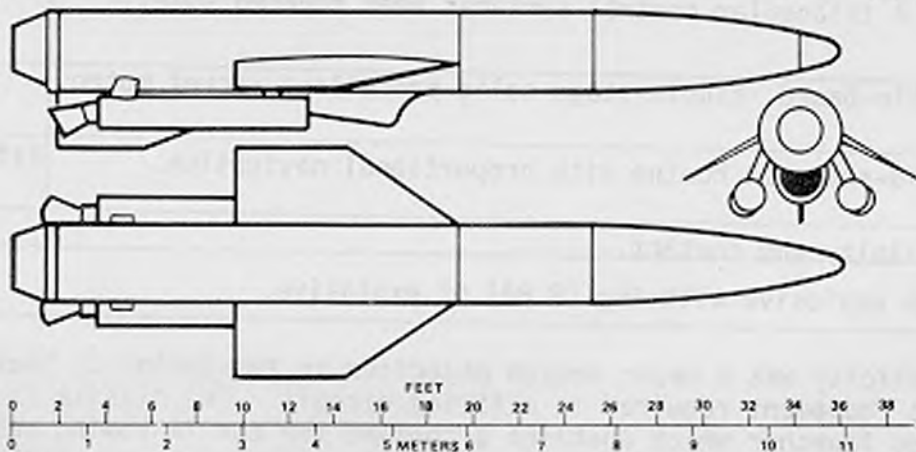
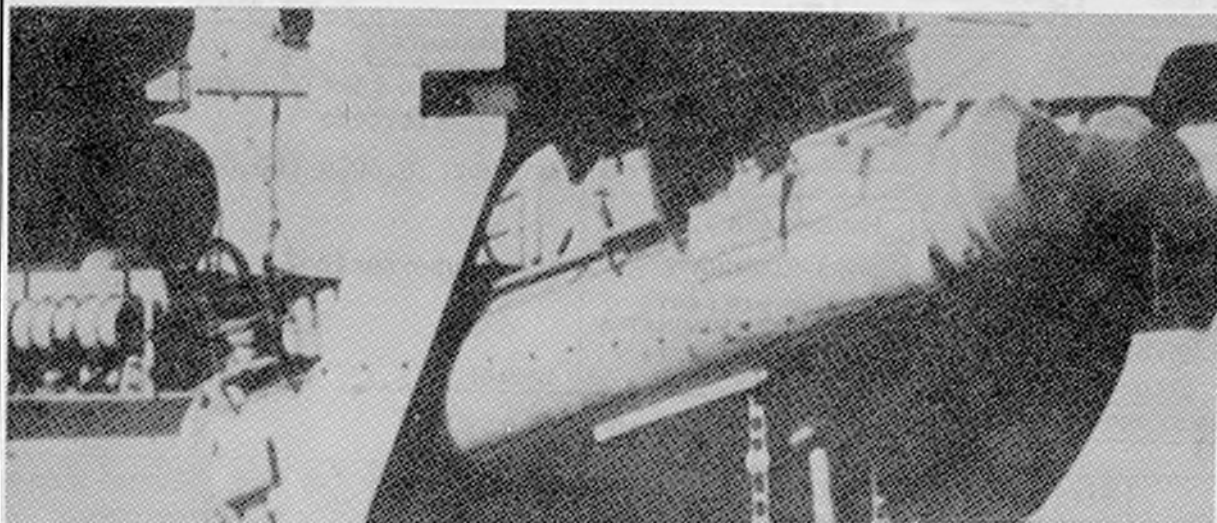
NAME <u>Serb</u>		<b>SERB</b>		DEVELOPER _____	
DESIGNATION <u>SS-N-5</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <u>Submarine</u> <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: <u>10.7m (35.0')</u> DIAMETER: <u>1.5m (5.0')</u> SPAN: <u>No wings or fins</u> WEIGHT: <u>16.500kg (36.300#)</u> OTHER: _____		RANGE: <u>1600km (1,000 miles)</u> ALTITUDE: <u>Ballistic - depends upon range</u> SPEED: <u>Ballistic speed for range</u> OTHER: _____		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		BASIS FOR LAUNCH <u>Target data</u> <u>input.</u>		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strate</u> <u>targets</u>	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Second generation submarine launched ballistic, strategic missile.		USSR	
AIRFRAME		Three diameters, increasing towards rear, with cylindrical cross section and rounded nose.		USSR	
PROPULSION		Two stage solid propellant (some say storable liquid) rocket motors. Gas ejection system.		USSR	
GUIDANCE		Inertial.		USSR	
FUZING				USSR	
WARHEAD		Nuclear Int warhead.		USSR	
REMARKS		<p>The Serb is the successor to the Sark, and is a much more compact missile. It uses a unique cold gas ejection system working through a cluster of 18 nozzles mounted in the base. The base is ejected when the missile is clear of the launch tube.</p> <p>The Serb has been installed on the GII, GIII and HII submarines, with three missiles per submarine.</p>			
USERS		KEY DATES		COSTS	
USSR		PRESENT STATUS: <u>Limited use.</u>		UNIT COSTS:	
		IOC: <u>First deployed in 1964.</u>		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE:	

OTHER INFORMATION:



NAME <u>Shaddock</u>		<b>SHADDOCK</b>		DEVELOPER _____			
DESIGNATION <u>SS-N-3A/B</u>				COUNTRY <u>USSR</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Selected Land Targets</u>			
<b>CHARACTERISTICS</b> LENGTH: 11.4m (37.5') DIAMETER: 91cm (3.0) SPAN: 3.0m (10.0) WEIGHT: 12,000kg (26,500#) OTHER:		<b>PERFORMANCE</b> RANGE: Max. of ~ 800km (500 miles) ALTITUDE: Surface skimming SPEED: 1.2 Mach OTHER:					
		<b>BASIS FOR LAUNCH</b> <u>Target position input.</u>					
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM	DESCRIPTION			CONTRACTOR			
OVERALL SYSTEM	Ship or submarine launched, long range cruise missile system for anti-shipping or land attack.			USSR			
AIRFRAME	Cylindrical body with tapering nose and tail section. Short stubby wings mid-body.			USSR			
PROPULSION	Two solid propellant booster motors. Turbojet or ramjet sustainer.			USSR			
GUIDANCE	Programmed autopilot radar altimeter midcourse with command update. Terminal IR homing or active radar.			USSR			
FUZING	Options including delay for anti-shipping			USSR			
WARHEAD	Nuclear in the kiloton range or high explosive. Warhead weight about 1000kg (2200#)			USSR			
REMARKS	<p>Shaddock is the largest of the known Soviet missiles and is noted for its versatile applications. It is launched from a variety of ships and submarines, and apparently there is also a coastal defense version. Variations upon a "standard" configuration exists for different applications; the ship launched version differs from the submarine launched version. Jane's, in the mid 1970's reported approximately 400 launchers known on ships or submarines. Launchers are installed on the Kresta and Kynda guided missile cruisers, and on the E-1, E-2, J and W submarines. The nuclear powered E-2 submarines carry 8 missiles in pairs; the J class carries 4 missiles; the W class carries either 4 or 2 launchers.</p> <p>The missile is tracked by the Scoop Pair radar in surface installations.</p>						
USERS	USSR		KEY DATES	COSTS			
			PRESENT STATUS: Operational	UNIT COSTS:			
			IOC: Deployed in 1958	LAUNCH UNIT:			
				QUANTITIES			
				TOTAL TO DATE:			
				Over 3000 active inventory			

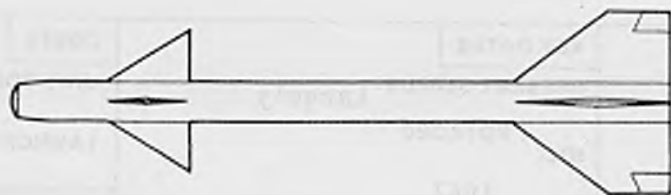
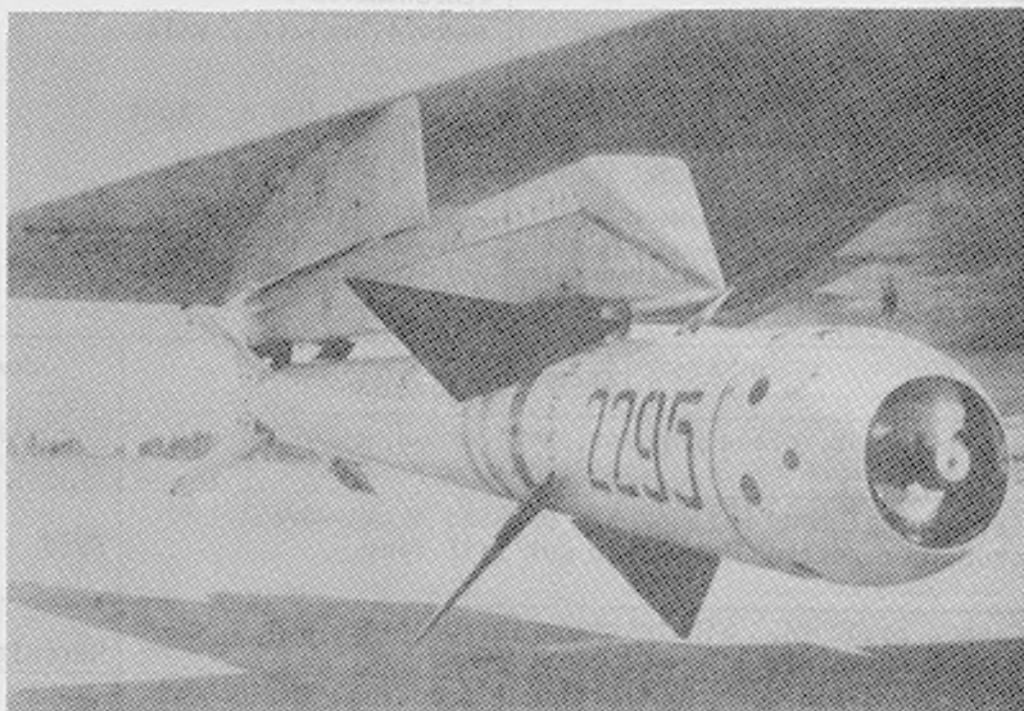
OTHER INFORMATION:



# SHAFRIR

NAME <u>SHAFRIR</u>		DEVELOPER <u>Rafael (RADA)</u>	
DESIGNATION <u>Mk. 1, 2, &amp; 3.</u>		COUNTRY <u>Israel</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILD <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 2.50m (8.2') DIAMETER: 16cm (0.5') SPAN: 52cm (1.7') WEIGHT: 93kg (205#) Warhead: OTHER: 11kg (24.3#)		RANGE: 5km (3mi). Depends upon launch altitude ALTITUDE: 18,000m (60,000') SPEED: Supersonic OTHER:	
		BASIS FOR LAUNCH <u>Homer on target.</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Air-to-air, all-aspect, infrared homing missile for use against high performance aircraft.		Rafael Armament Development Authority
AIRFRAME	Slender cylindrical body with cruciform wings at tail and 4 triangular control surfaces near rounded nose.		Rafael
PROPULSION	Double-based, single-stage solid propellant rocket motro.		
GUIDANCE	Solid-state IR homing with proportional navigation.		Rafael
FUZING	Proximity and contact.		
WARHEAD	High explosive with 4kg (8.8#) of explosive.		
REMARKS			
<p>Simplicity was a major design objective in the design of Shafirir. The only aircraft equipment required in a firing circuit. The missile is attached to a wing-mounted launcher which contains a coolant for the IR homing head. The pilot aims the aircraft at the target. When the missile's homer picks up the target, he receives both an audio and visual signal. He may fire at any time.</p> <p>The Mark 3, which became operational in 1981, can provide an all-aspect angle attack and has an extended firing envelope and greater maneuverability.</p>			
USERS	KEY DATES	COSTS	
Israel Argentina Chile Peru South Africa Taiwan	PRESENT STATUS: Operational.  IOC: Mark 2 - about 1972 Mark 3 - 1981	UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: About 10,000	

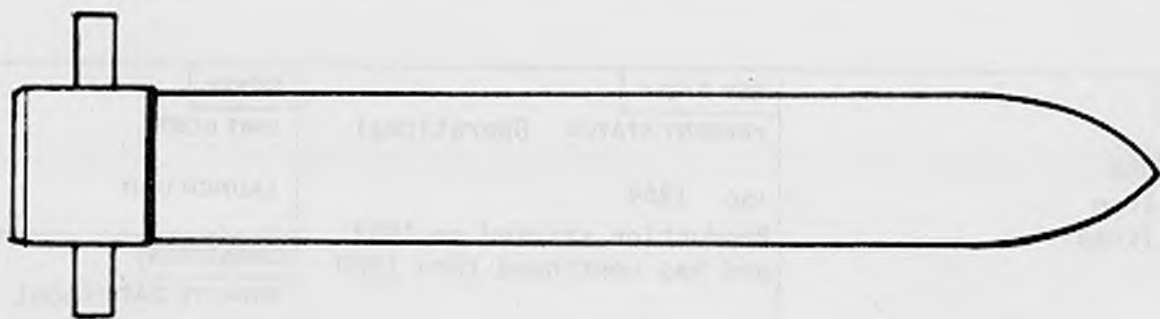
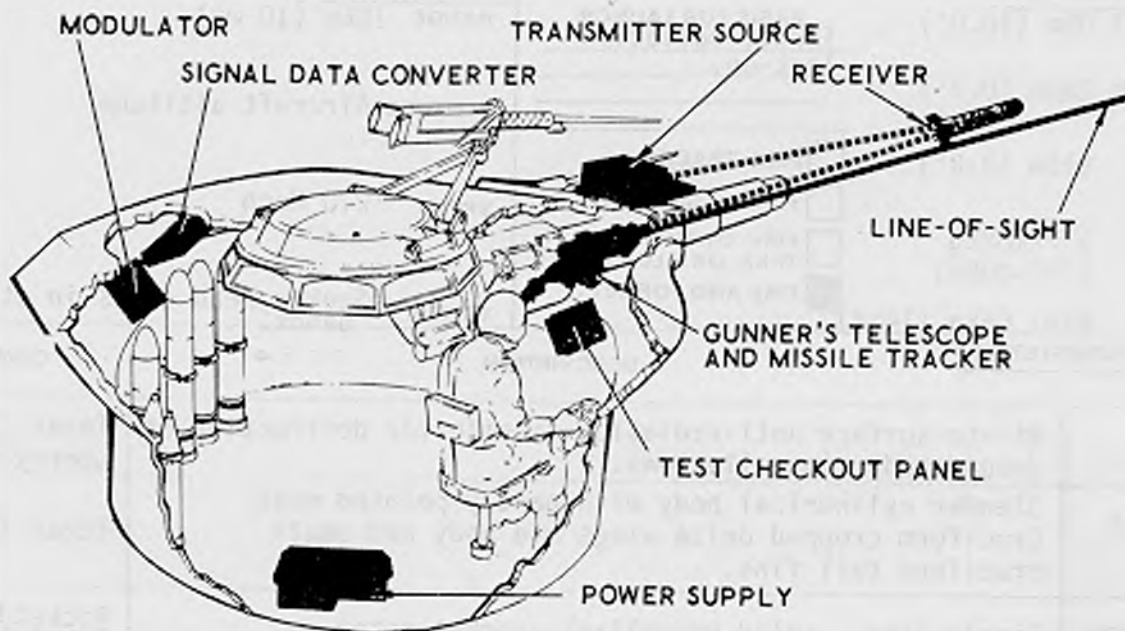
OTHER INFORMATION:



# SHILLELAGH

NAME <u>SHILLELAGH</u>		DEVELOPER <u>Ford Aerospace</u>	
DESIGNATION <u>M-13, MGM-SK</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C <u>Helicopter</u>	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL
		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input checked="" type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: <u>1.14m (3.8')</u>	BASIS FOR LAUNCH <u>Sight on target</u>	RANGE: <u>4.5km+ (2.8 miles +)</u>	
DIAMETER: <u>15.2cm (0.5')</u>		ALTITUDE: <u>Line of sight</u>	
SPAN: <u>29.2cm (1.0#)</u>	<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	SPEED: <u>Supersonic</u>	
WEIGHT: <u>27kg (60#)</u>		OTHER:	
OTHER: <u>Warhead 6.8kg (15#)</u>			
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Light weight, close support, anti armor, missile system.		Ford Aerospace Martin 2nd Source
AIRFRAME	Cylindrical body with gently pointed nose. Small cruciform rectangular, flip out tail fins.		Ford
PROPULSION	Cannon launched. Single stage solid propellant rocket sustainer.		Hercules
GUIDANCE	Command to line of sight. Visual tracking, IR command, jet reaction controls.		Ford
FUZING	Impact.		
WARHEAD	High explosive shaped charge.		
REMARKS	<p>Shillelagh is the main armament of the General Sherman lightweight reconnaissance vehicle and has been used on the M60 Main Battle Tank. It is fired from a combined 152mm dual purpose gun and missile launcher which essentially provides boost, after which the sustainer motor is ignited. The gunner keeps his telescopic sight on target. A missile tracker element of the sight tracks the missile and generates steering command signals which are transmitted via an IR transmitter.</p> <p>A laser guided version of Shillelagh has been studied. Helicopter-launched applications have been tested.</p>		
USERS	KEY DATES	COSTS	
USA	PRESENT STATUS: <u>Largely replaced</u>	UNIT COSTS:	
	IOC: <u>1967</u>	LAUNCH UNIT:	
	<u>Production stopped 1970</u>	QUANTITIES	
		TOTAL TO DATE:	

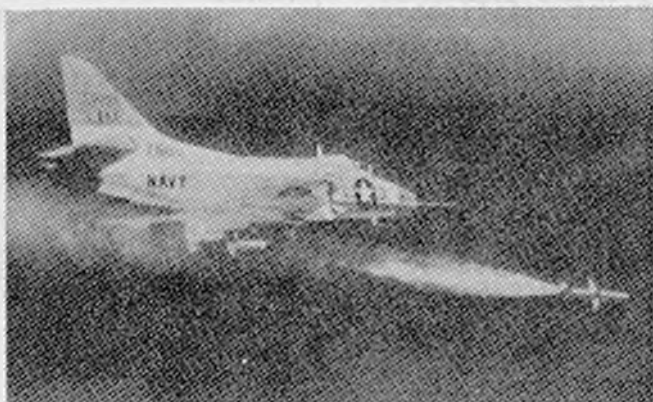
OTHER INFORMATION:



## SHRIKE

NAME <u>SHRIKE</u>		DEVELOPER <u>Texas Inst.</u>	
DESIGNATION <u>AGM-45A/B</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Navy/Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER <input type="checkbox"/> LAND INSTALL SOFT <input type="checkbox"/> SILE <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Radar Installations</u>
CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.05m (10.0') DIAMETER: 20cm (0.7') SPAN: 91cm (3.0') WEIGHT: 177-182kg (390-400#) OTHER: W/H: 66kg (145#)		RANGE: 16km (10 mi) ALTITUDE: Aircraft altitude SPEED: 2.0 Mach OTHER: Seeker head comes in at least 13 bands.	
		BASIS FOR LAUNCH <u>Target radiation lock-on.</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET.	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Air-to-surface anti-radiation missile for destruction of ground radar installations.		Texas Instruments Sperry-2nd Source
AIRFRAME	Slender cylindrical body with gently pointed nose. Cruciform cropped delta wings mid body and small cruciform tail fins.		Texas Instruments
PROPULSION	Single stage, solid propellant, rocket motor.		Rocketdyne/Aerojet
GUIDANCE	Passive RF seeker; separate head for each of 13 bands.		Texas Instruments
FUZING			
WARHEAD	High explosive fragmentation.		
REMARKS			
Detection of the target is initially achieved by A/C ECM equipment. The pilot directs the plane to the target and switches on the appropriate seeker head. When the missile seeker has acquired the target, the missile is launched and flies to intercept. The USAF has used Shrike on the F105 and the F-4. The USN employs it on the F-4, F-6 and F-7 aircraft.			
USERS	KEY DATES	COSTS	
USA Iran Israel	PRESENT STATUS: Operational  ioc: 1964 Production started on 1963 and has continued thru 1980	UNIT COSTS:  LAUNCH UNIT:	
		QUANTITIES TOTAL TO DATE: About 25,000	

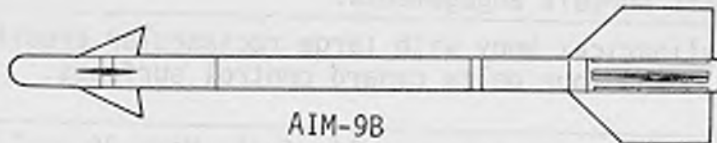
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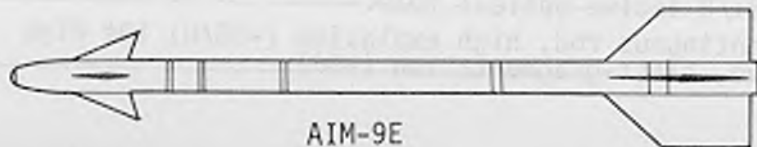
NAME <b>SIDEWINDER</b>		<b>SIDEWINDER B/C/D/E</b>		DEVELOPER <b>Ford/Raytheon</b>			
DESIGNATION <b>AIM-9B/C/D/E</b>				COUNTRY <b>USA</b>			
				SERVICE <b>Air Force, Navy</b>			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> DATA FOR -9D LENGTH: 2.87m (9.4') DIAMETER: 12.7cm (0.4') SPAN: 63cm (2.1') WEIGHT: 88.6kg (195#) OTHER:			<b>PERFORMANCE</b> RANGE: 3-18km (2-11 miles) ALTITUDE: 15,000-18,000m (50,000-80,000') SPEED: 2.5-3.0Mach-(Mach 2 above A/C speed.) OTHER: -9B: short range, hi-alt. targets -9C: extended range, hi-alt. targets -9D: extended range, hi-alt. targets -9E: short range, lo-alt. manuev. tar				
<b>DATA FOR -9D</b> BASIS FOR LAUNCH Pilot notification of missile target acquisition. <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE -9C <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET -9B/D/E							
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM	Short to medium range air-to-air missile designed for aircraft pursuit engagements		Ford Aerospace-B/D/E Raytheon - C				
AIRFRAME	Slender cylindrical body with large rectangular cruciform tail fins and four delta canard control surfaces.		Ford/Raytheon				
PROPULSION	Single stage, solid fuel, Mark 36 or Mark 17 motor or SR116 with reduced smoke		Hercules/Aerojet-Thiokol/Rocketdyne				
GUIDANCE	9B/D/E Infra-red homing seeker 9C Semiactive radar homing		Ford/Motorola/Raytheon				
FUZING	Mark 15 influence fuze plus Mk 304 or 704 contact fuze		NOL Crane Ind				
WARHEAD	High explosive, Mk 8 HBX		NOL Crane Ind				
REMARKS	Sidewinder can be considered as a universal missile; being used by all U.S., Canadian and NATO fighter aircraft. The AIM-9B was licensed to a European consortium headed by Bodenseewerk Geratetchnik, a West German firm which has produced more than 9000 Sidewinders. That company also developed an improved guidance unit, designated the FGW, Mod 2. Most of the American AIM-9B missiles have been upgraded, through a conversion program, to the standard AIM-9E configuration, and more recently, to the AIM-9J standard. Sidewinder C and D were developed specifically for the U.S. Navy.						
USERS	Greece	Pakistan	KEY DATES		COSTS		
USA	Iran	Philip.	PRESENT STATUS: -9BCD out of service or upgraded to -9E-P.		UNIT COSTS:		
Austral.	Israel	Port. Taiwan	IOC: -9B - 1956		LAUNCH UNIT:		
Belgium	Italy	S. Arabia	-9C/D - 1965		QUANTITIES		
Brazil	Japan	Singapore	-9E - 1957		TOTAL TO DATE: Approximately 100,000 units produced of -9B/C/D/E		
Canada	Kuwait	S. Africa					
Chile	Morocco	S. Korea					
Denmark	Namsa	S. Viet.					
France	Nether.	Spain Turkey					
W. Ger.	Norway	Sweden UK, Vene.					

# SIDEWINDER B/C/D/E

OTHER INFORMATION:



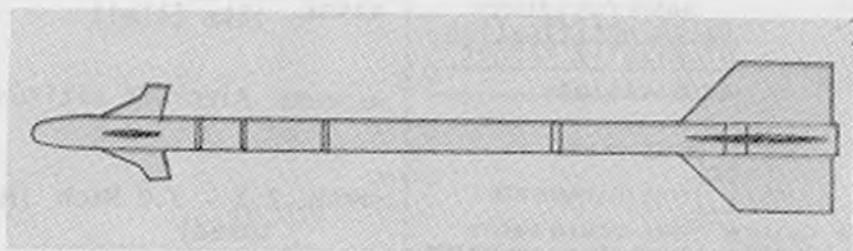
AIM-9B



AIM-9E

NAME <u>SIDEWINDER</u>		<b>SIDEWINDER G/H/J</b>		DEVELOPER <u>Ford/Raytheon</u>			
DESIGNATION <u>AIM-9G/H/J</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Air Force, Navy</u>			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 2.84-3.07m (9.3-10.1') DIAMETER: 12.7cm (0.4')  SPAN: 56-63.6cm (1.9-2.1') WEIGHT: 78.2-88.6kg (172-195#)  OTHER:		<b>BASIS FOR LAUNCH</b> <u>Pilot notification of missile target acquisition</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
				<b>PERFORMANCE</b> RANGE: To 18km (11mi)  ALTITUDE: All aircraft altitudes  SPEED: Mach 2.5-3.0 (Mach 2 above A/C speed.)  OTHER:			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Short to medium range air-to-air missile designed for aircraft pursuit engagements.		Raytheon-9G/H Ford-9H/J			
AIRFRAME		Slender cylindrical body with large rectangular cruciform tail fins, and four delta canard control surfaces.		Ford/Raytheon			
PROPULSION		Reduced smoke, single stage, solid fuel, Mark 36 or 17 motor, or SR 116 reduced smoke motor.		Hercules/Aerojet Rocketdyne			
GUIDANCE		IR homing with cooled PbS detector; with SEAM (Sidewinder Expanded Acquisition Mode) -9J imp. homer.		Ford/Raytheon			
FUZING		MK 303 MOD 2, 3, 4 influence fuze + MK 304 contact fuze or DSU 21/R active optical fuze.		Hughes, SBRC, NOL, Crane			
WARHEAD		22.4# continuous rod, high explosive (-9G/H) 10# high explosive, blast-fragmentation (-9J)		NOL, Crane			
REMARKS							
<p>The AIM-9G was developed for the U.S. Navy as an update of the -9B. The -9H is the U.S. Navy's solid state version of the -9G; it provides for decreased minimum range, faster tracking rates, and off-boresight acquisition and launch capability. The AIM-9J was developed for the USAF as the solid state electronics version of the -9E; providing the same advantages provided by the -9H, and includes an improved seeker and servo response.</p>							
USERS		KEY DATES		COSTS			
United States Egypt Greece Kuwait Netherlands Singapore UK		PRESENT STATUS: Operational  IOC: -9G = 1970 -9H = 1970 -9J = 1970		UNIT COSTS:  LAUNCH UNIT:  QUANTITIES TOTAL TO DATE: Over 10,000. Over 8,000 -9J still in inventory in 1981			

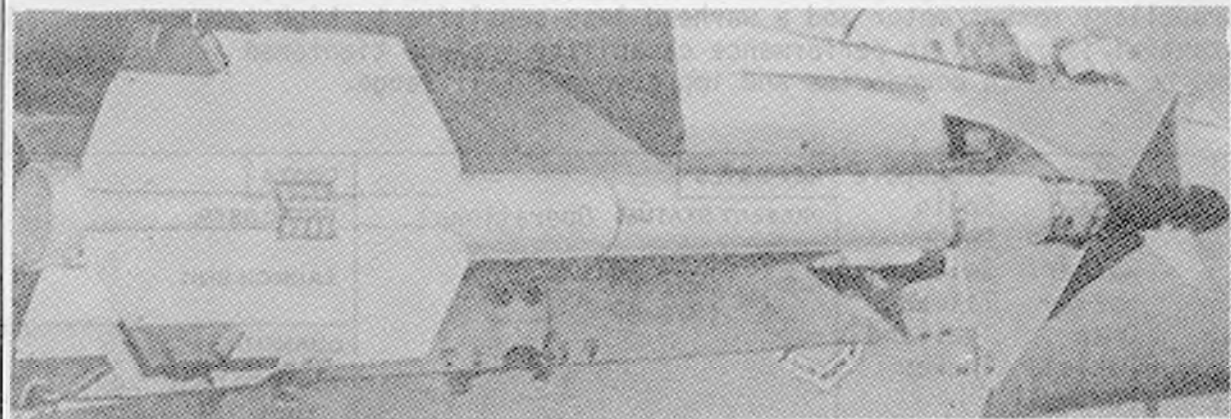
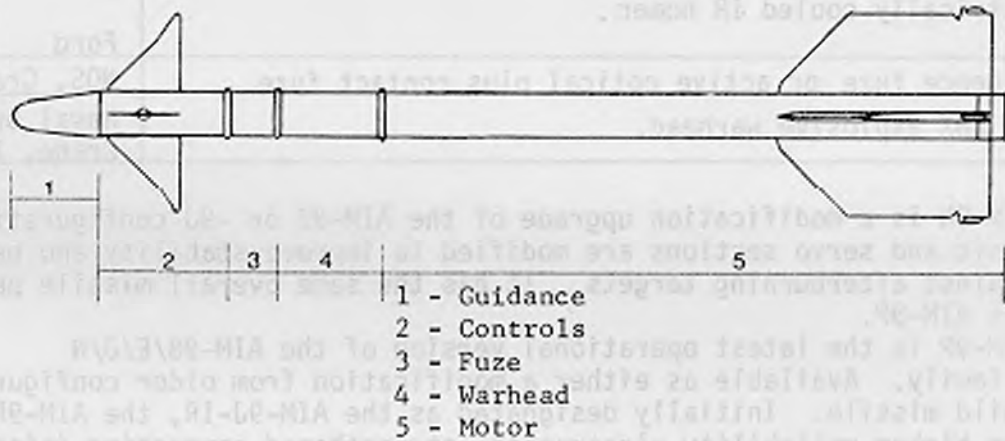
OTHER INFORMATION:



NAME: <u>SIDEWINDER</u>		<b>SIDEWINDER L/M</b>		DEVELOPER <u>Raytheon/Ford</u>			
DESIGNATION <u>AIM-9L/M</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Air Force/Navy</u>			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 287cm (9.4') DIAMETER: 12.7cm (0.4') SPAN: 64cm (2.1') WEIGHT: 85.2kg (187.5#)USM 86.8kg (191.0#)USAF OTHER:			<b>PERFORMANCE</b> RANGE: 18km (11mi) ALTITUDE: Aircraft altitude SPEED: 2.5 - 3.0 Mach (Mach 2 above A/C speed) OTHER:				
<b>OTHER:</b> BASIS FOR LAUNCH <u>Pilot notification</u> <u>of missile target</u> <u>acquisition</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Short to medium range, fire & forget air-to-air missile designed for dogfight engagements		Raytheon/Ford			
AIRFRAME		Slender cylindrical body with large rectangular cruciform tail fins and four double delta canard controls		Raytheon/Ford			
PROPULSION		Mark 36 reduced smoke, single stage, solid fuel rocket motor		Bermite, Hercules, & Aerojet			
GUIDANCE		New IR homing head, cooled, with AIM/FM conical scan developed from the Dornier Viper IR unit		Raytheon/Ford			
FUZING		Active optical laser fuze		Hughes/Raytheon			
WARHEAD		Annular blast fragmentation high explosive MDU-17B		NOL/Crane			
<b>REMARKS</b> The AIM-9L and -9M is the third generation of this highly popular missile; differing from previous generations in having an all-aspect attack capability. An internal coolant bottle has been provided for the USAF version, the USM utilizes a launcher contained coolant. The Sidewinder is currently utilized on the American F-14, F-15, F-16, F-18, F-4, F-5, and the AV-8B aircraft. Nearly 40,000 (all models) have been delivered to other countries through Foreign Military Sales or Military Assistance programs. A European consortium headed by Bodenseewerk Geratetechnik will build the -9L version under license.							
<b>USERS</b> United States    United King. Australia Canada W. Germany Italy Israel Japan Norway		<b>KEY DATES</b> PRESENT STATUS: Operational IOC-9L    About 1978 -9M    About 1982		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: -9L    \$10,000 -9M    >1000			

**SIDEWINDER L/M**

OTHER INFORMATION:

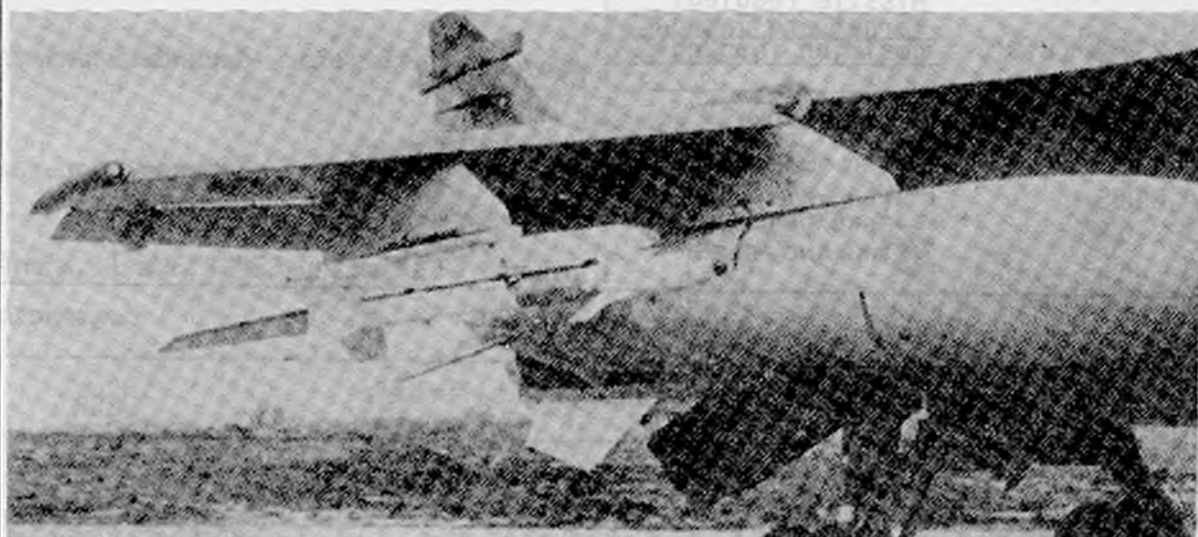


NAME <u>SIDEWINDER</u>		<b>SIDEWINDER N/P</b>		DEVELOPER <u>Ford Aerospace</u>	
DESIGNATION <u>AIM-9N/P</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Air Force</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C -Fighter	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>		<b>PERFORMANCE</b>			
LENGTH: 3.0/3.1m (10.0/10.1') DIAMETER: 12.7cm (0.4') SPAN: 56cm (1.8') WEIGHT: 81/86kg (178/190#) OTHER:		BASIS FOR LAUNCH <u>Pilot notification of target acquisition</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		RANGE: 18km (11mi) ALTITUDE: Aircraft SPEED: 2.5-3.0 Mach OTHER: Maneuvering, high g afterburning fighter targets	
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Supersonic, short range, fire and forget, guided dog-fight missile.		Ford Aerospace	
<b>AIRFRAME</b>		Slender cylindrical body with large rectangular cruciform wings and double delta control canards.		Ford	
<b>PROPULSION</b>		Single stage, solid propellant MK 17 rocket motor or the SR 116 with reduced smoke, higher impulse.		Hercules, Aerojet, Rocketdyne	
<b>GUIDANCE</b>		Electrically cooled IR homer.		Ford	
<b>FUZING</b>		Influence fuze or active optical plus contact fuze.		NOS, Crane, SBRC	
<b>WARHEAD</b>		MK 8 HBX explosive warhead.		Naval Ordnance Sta. Crane, Indiana	
<b>REMARKS</b>					
<p>The AIM-9N is a modification upgrade of the AIM-9B or -9J configurations. The electronic and servo sections are modified to improve stability and performance against afterburning targets. It has the same overall missile performance as the AIM-9P.</p> <p>The AIM-9P is the latest operational version of the AIM-9B/E/J/N Sidewinder family. Available as either a modification from older configurations or a new build missile. Initially designated as the AIM-9J-IR, the AIM-9P incorporates higher reliability electronics, strengthened connecting joints required for new high performance aircraft, Ga As laser fuze, reduced smoke propellant rocket motor and a warhead less sensitive to high temperatures. Substantial increases in performance capability include tightened and extended inner and outer launch boundaries and improved off-tail range.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
Kenya Chile Belgium Denmark Egypt Greece Indonesia Israel Japan Jordan		Singapore Spain Sweden Switzerland Taiwan Thailand Turkey		PRESENT STATUS: Operational Loc: 1977-9N 1978-9P	
				UNIT COSTS: LAUNCH UNIT: QUANTITIES	
				TOTAL TO DATE: -9N, ~ 8,000 in 1981 inventory -9P, ~ 12,500 produced by 1981	



**SIDEWINDER N/P**

OTHER INFORMATION:



1952	Probably an SR-71 (two rocket engines) Probably test: RAN/Resonance.
1954	Initial guidance.
1954	Wider - in the weapon range.

It has been noted that this missile is still primarily in western USM inventory and undoubtedly aimed at European targets. The SR-71 carrier with SR-71 retractor 2nd stage has served as a first stage booster for the SR-71 retractor.

KEY DATE	PROJECT STATUS	OPERATIONAL
1952	1954	1954
1954	1954	1954
1954	1954	1954

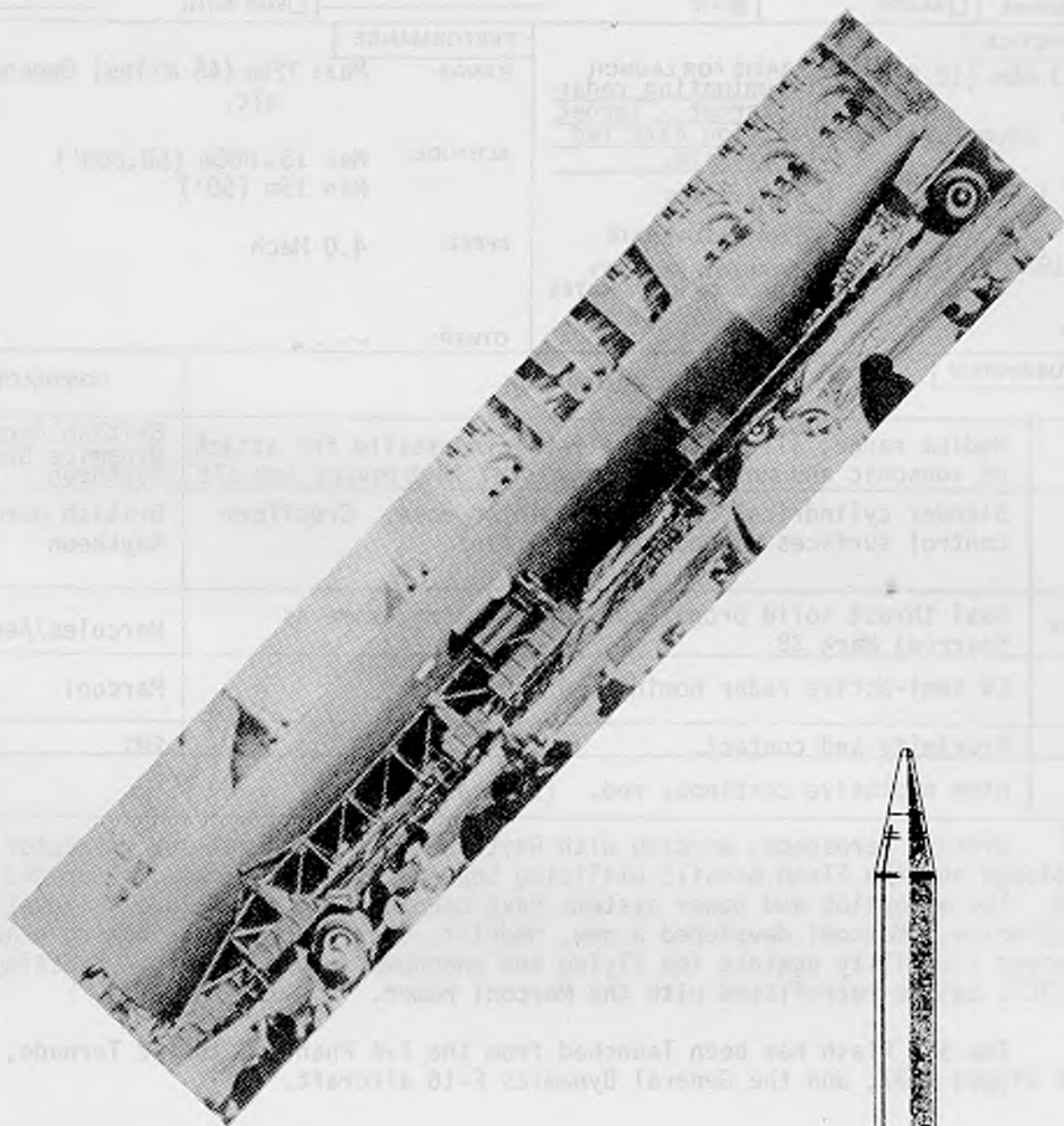
# SKEAN

NAME <u>SKEAN</u>		DEVELOPER _____	
DESIGNATION <u>SS-5</u>		COUNTRY <u>USSR</u>	
		SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILD <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____
CHARACTERISTICS		PERFORMANCE	
LENGTH: 25.0m (82') DIAMETER: 2.44m (8.0') SPAN: No wings of fins WEIGHT: 60,000kg (132,00#) OTHER:		RANGE: 3,500km (2,175 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range OTHER: Estimated CEP 2.8km (1.8 miles)	
		BASIS FOR LAUNCH <u>Missile readied.</u> <u>Target and launch</u> <u>position inputed.</u>	
		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	Silo launched medium range, strategic, ballistic missile.		USSR
AIRFRAME	Slender cylindrical body with pointed nose but blunted tip. No wings or fins.		USSR
PROPULSION	Probably to GDL RD-216 liquid fuel rocket engines. Probable fuel: RFNA/kerosene.		USSR
GUIDANCE	Inertial guidance.		USSR
FUZING			
WARHEAD	Nuclear - in the megaton range.		USSR
REMARKS			
Films show this missile in silos, principally in western IRBM complexes and undoubtedly aimed at European targets. The SS-5 motor unit, with a restartable 2nd stage, has served as a first stage booster for Cosmos military satellites.			
USERS	KEY DATES		COSTS
USSR	PRESENT STATUS: Operational		UNIT COSTS:
	IOC: First observed in 1964 Operational since 1961		LAUNCH UNIT:
			QUANTITIES
			TOTAL TO DATE: About 100 deployed.



# SKEAN

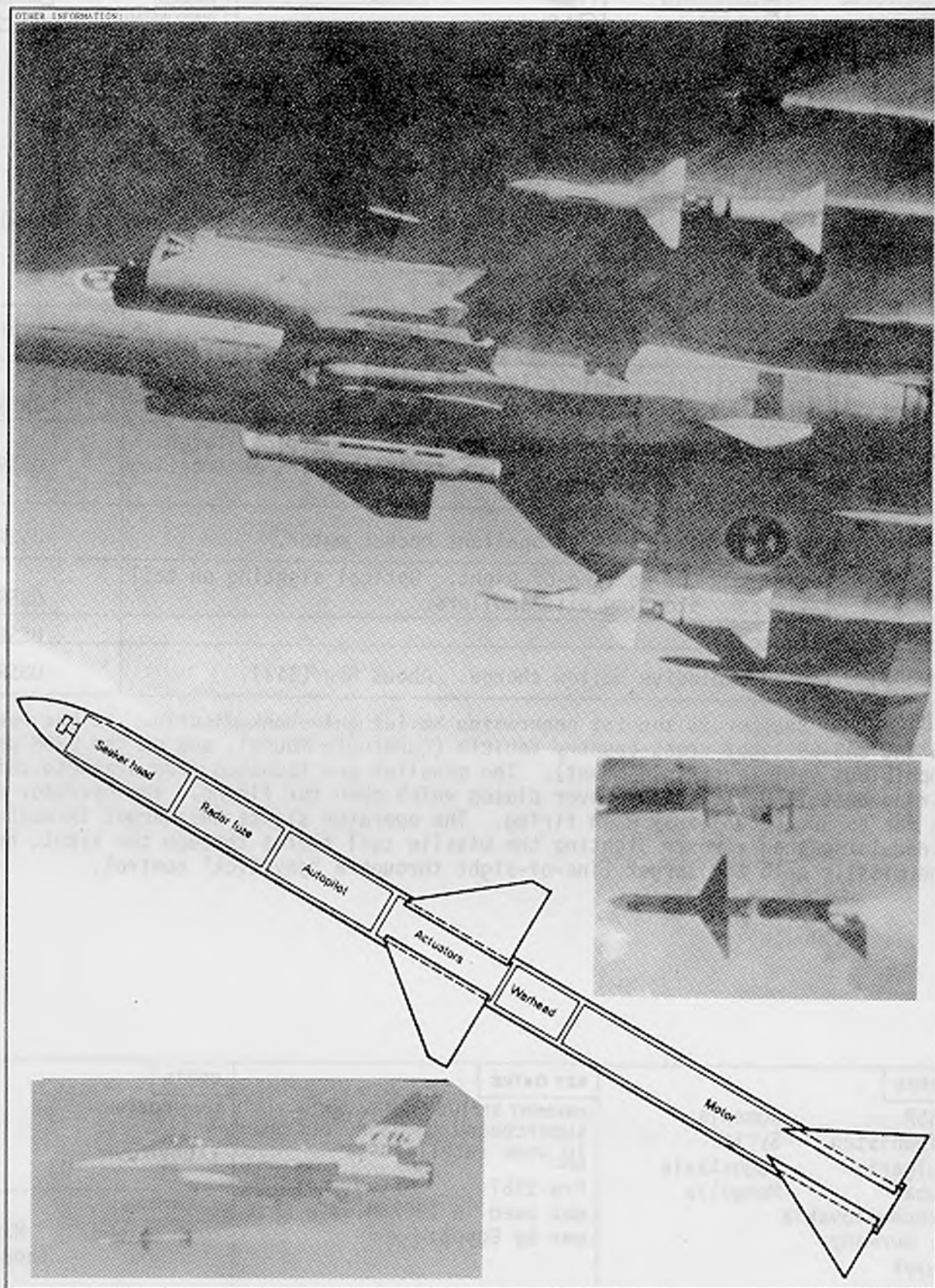
OTHER INFORMATION:



SS-5

NAME Sky Flash		SKY FLASH		DEVELOPER British Aerospace			
DESIGNATION XJ 521				COUNTRY United Kingdom			
				SERVICE Air Force			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 3.66m (12.0') DIAMETER: 20cm (.7') SPAN: 1.00m (3.3') WEIGHT: 193 kg (425#) OTHER:			<b>PERFORMANCE</b> RANGE: Max: 72km (45 miles) Depending on alt. ALTITUDE: Max 15,000m (50,000') Min 15m (50') SPEED: 4.0 Mach OTHER:			<b>BASIS FOR LAUNCH</b> Illuminating radar on target. Target position data fed to missile.	
		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET					
SYSTEM/SUBSYSTEM		DESCRIPTION			CONTRACTOR		
OVERALL SYSTEM		Medium range, all weather, air-to-air missile for attack of subsonic and supersonic targets at high to very low alt.			British Aerospace Dynamics Group/ Raytheon		
AIRFRAME		Slender cylindrical body with pointed nose. Cruciform control surfaces midbody and tail fins.			British Aerospace/ Raytheon		
PROPULSION		Dual thrust solid propellant rocket motor (same as Sparrow) Mark 38.			Hercules/Aerojet		
GUIDANCE		CW semi-active radar homing. J band.			Marconi		
FUZING		Proximity and contact.			EMI		
WARHEAD		High explosive continuous rod. (same as Sparrow)					
<b>REMARKS</b> British Aerospace, working with Raytheon as a principal subcontractor, has developed the Sky Flash missile utilizing Sparrow AIM-7E airframe, motor and warhead. The autopilot and power systems have been updated to include solid state electronics. Marconi developed a new, modular, semi-active radar homing head with improved capability against low flying and snapdown/snapup targets. Existing AIM-7E's can be retrofitted with the Marconi homer.							
The Sky Flash has been launched from the F-4 Phantom, the F2 Tornado, the SAAB Viggen JA37, and the General Dynamics F-16 aircraft.							
<b>USERS</b> United Kingdom Sweden		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: About 1976		<b>COSTS</b> UNIT COSTS: \$130,000 FY 1980 \$s LAUNCH UNIT:			
				<b>QUANTITIES</b> TOTAL TO DATE: About 3000			

## SKY FLASH

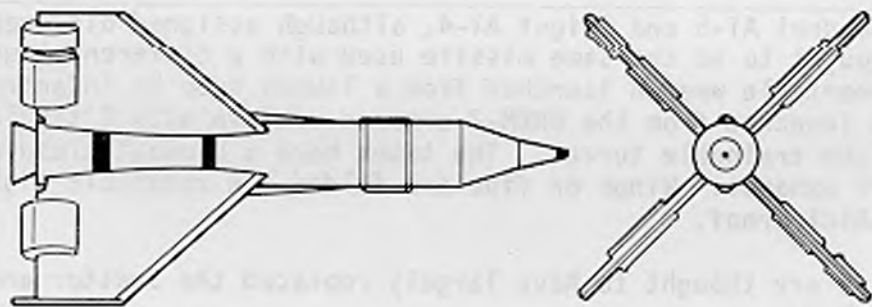
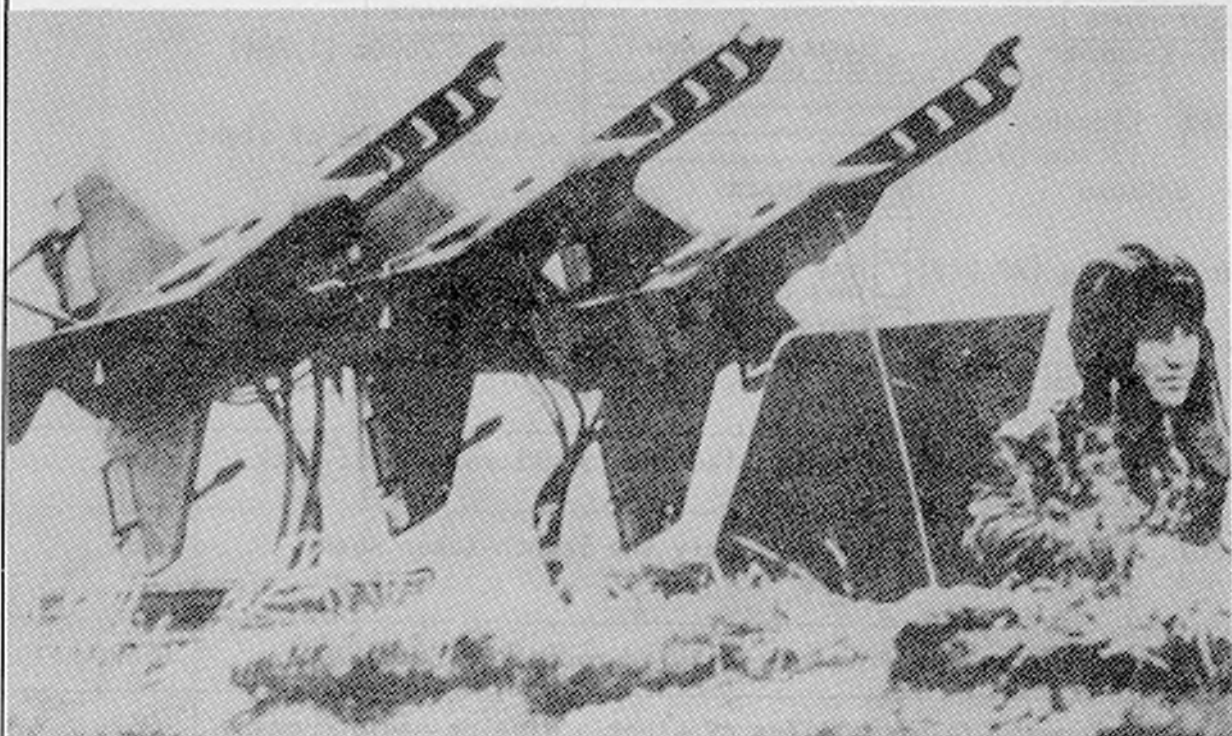


# SNAPPER

NAME <u>SNAPPER (SMELL)</u>		<b>SNAPPER</b>		DEVELOPER _____	
DESIGNATION <u>AT-1, PUR-61</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS			PERFORMANCE		
LENGTH: <u>1.13m (0.7')</u> DIAMETER: <u>14cm (0.46')</u> SPAN: <u>77cm (2.5')</u> WEIGHT: <u>22.3kg (49.1#)</u> OTHER: <u>Fired from rail</u>			RANGE: <u>2300m (1.4mi)</u> ALTITUDE: <u>Line of sight.</u> SPEED: <u>Subsonic 320km/hr (200mph)</u> OTHER: _____		
			BASIS FOR LAUNCH <u>Launcher aimed.</u> <u>Missiles on track.</u> <u>Sight on target.</u>		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Reconnaissance vehicle-launched, short-range, anti-tank missile system.		USSR	
AIRFRAME		Cylindrical body with pointed nose. Cruciform, large, truncated-delta wings aft w/plastic spoilers on trailing edge.		USSR	
PROPULSION		Single stage, solid propellant rocket motor.		USSR	
GUIDANCE		Wire command to line-of-sight. Optical sighting on tail flares. Steering with spoilers.		USSR	
FUZING		Impact		USSR	
WARHEAD		High explosive hollow charge. About 5kg (11#).		USSR	
REMARKS					
Snapper is the 1st generation Soviet anti-tank missile. It has been mounted on the GAS-C9 light cross-country vehicle (quadruple-mount), and on the BRDM armored amphibious vehicle (triple-mount). The missiles are launched from overhead rails. The firing unit is protected by cover plates which open for firing. The operator may be as far as 50m (164') away when firing. The operator sights the target through periscope binoculars; then fires. Sighting the missile tail flares through the sight, he moves the missile onto the target line-of-sight through a "joystick" control.					
USERS		KEY DATES		COSTS	
USSR Afganistan Bulgaria Cuba Czechoslovakia E. Germany Egypt Hungary Poland		Romania Syria Yugoslavia Mongolia		PRESENT STATUS: Believed superceeded in USSR, but used in some satellites. Pre-1967 was used in 1967 Middle East war by Egypt.	
				UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: <u>Many thousands.</u>	

# SNAPPER

OTHER INFORMATION:

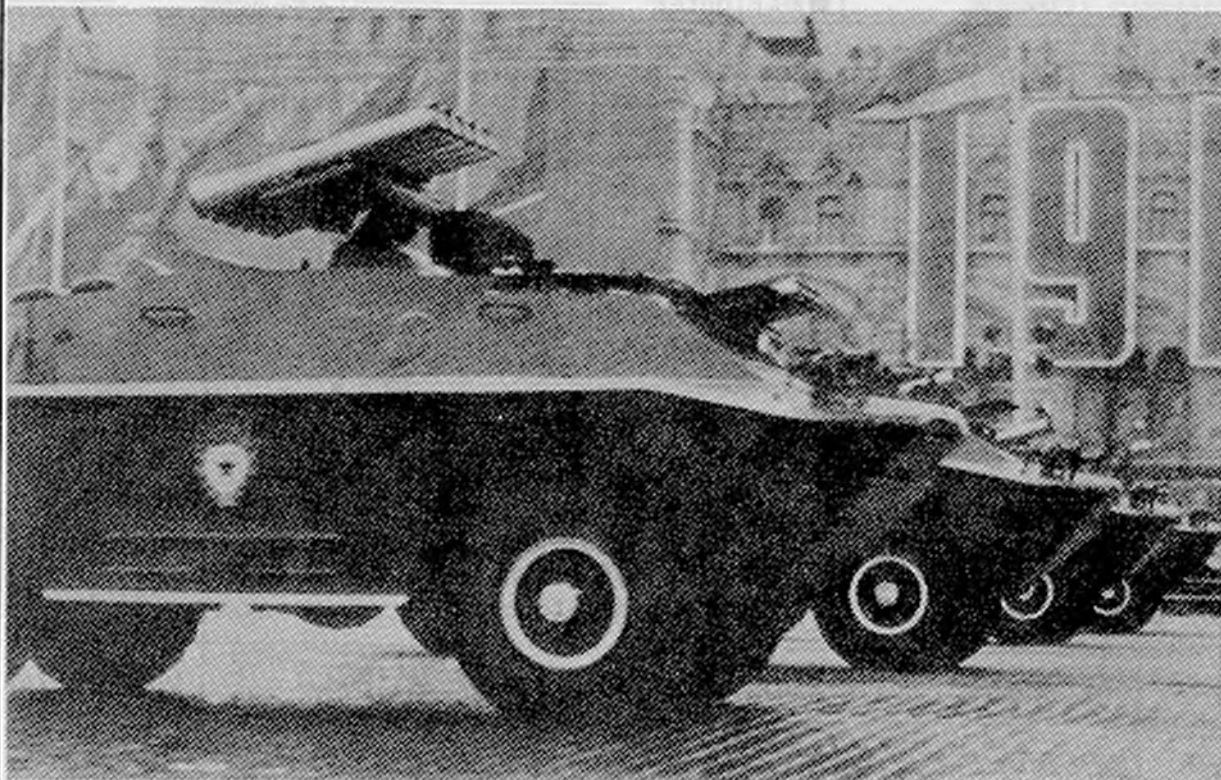


NAME SPANDREL / SPIGOT		SPANDREL / SPIGOT		DEVELOPER	
DESIGNATION AT-5/AT-4				COUNTRY USSR	
				SERVICE Army	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
		<input checked="" type="checkbox"/> MOBILE LAUNCHER AT-5 <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN AT-4 <input type="checkbox"/> OTHER		<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: Launcher 1.2m (3.9')			RANGE: 2000m (1.2mi)		
DIAMETER: Launcher 13.5cm (0.4')			ALTITUDE: Line of sight		
SPAN: Unknown			SPEED: Subsonic		
WEIGHT: 10-12kg (22-26#)			OTHER:		
OTHER:			OTHER:		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Armored vehicle or man launched short range anti-tank missile.		USSR	
<b>AIRFRAME</b>		Configuration unknown, only the launch tubes seen.		USSR	
<b>PROPULSION</b>		Gas ejection from tube. Solid rocket sustainer.		USSR	
<b>GUIDANCE</b>		Command to visual line of sight. Wire or radio command.		USSR	
<b>FUZING</b>		Contact.		USSR	
<b>WARHEAD</b>		High explosive anti-tank.		USSR	
<b>REMARKS</b>					
<p>The Spandrel AT-5 and Spigot AT-4, although assigned different NATO code names, are now thought to be the same missile used with a different launch concept. The AT-4 is a manportable weapon launched from a launch tube by infantrymen much like HOT. The AT-5 is launched from the BRDM-2 armored vehicle with 5 tubular launchers being mounted on the trainable turret. The tubes have a blowout closure and a flared tail for the boost exhaust. Wings or fins are folded. A rotatable sighting head is mounted on the vehicle roof.</p> <p>These missiles are thought to have largely replaced the Swatter and Sagger missiles within the Soviet Union.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USSR		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: First seen in 1977 Operational about 1979		LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE:	

THE WORLD'S  
MISSILE  
SYSTEMS

## SPANDREL/SPIGOT

OTHER INFORMATION:



# SPARROW -7E

NAME <u>SPARROW</u>		<b>SPARROW -7E</b>		DEVELOPER <u>Raytheon</u>	
DESIGNATION <u>AIM-7E/RIM-7H</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Air Force/Navy</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP RIM-7H <input checked="" type="checkbox"/> A/C Fighter	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				TARGETS <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	

CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.65m (12.0') DIAMETER: 20cm (0.7') SPAN: 1m (3.3') WEIGHT: 204.5kg (450#) OTHER:		RANGE: 25-50km (15.5-31 miles) depending upon launch altitude. ALTITUDE: 15,250m (50,000') SPEED: Mach 4.0 OTHER:	
BASIS FOR LAUNCH Aircraft acquires target and inputs prediction to missile.			
<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET			

SYSTEM/SUBSYSTEM	DESCRIPTION	CONTRACTOR
OVERALL SYSTEM	The AIM-7E is an all weather, all altitude semiactive EW radar homing, air-to-air missile with alternate SAM role.	Raytheon
AIRFRAME	Slender cylindrical body with pointed nose. Cruciform triangular wings midbody and fins at tail.	Raytheon
PROPULSION	Dual thrust, solid fuel rocket motor, Mark 38, Mod 4	Hercules/Aerojet
GUIDANCE	CW semiactive radar.	Raytheon
FUZING	Proximity and contact fuze.	
WARHEAD	30kg (66#) rod warhead	

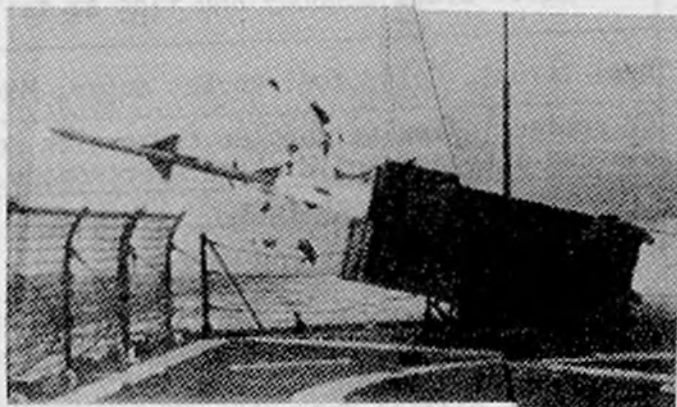
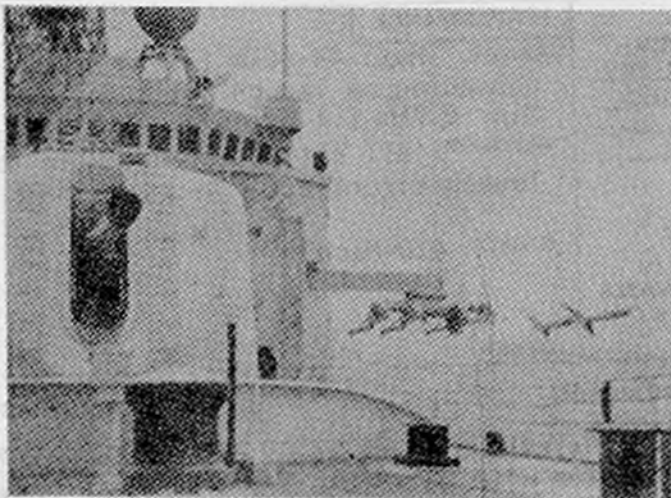
**REMARKS** The AIM-7E Sparrow has been employed by the USAF on the F-4 fighter, and by the USN on the F-4 and F-14 aircraft. Additionally, the RIM-7H, an AIM-7E variant, is employed as a shipboard launched weapon in the basic Point Defense System, and in the NATO Sea Sparrow systems.

<b>USERS</b>	<b>KEY DATES</b>	<b>COSTS</b>
USA Belgium Canada Denmark Germany Greece Israel Italy	Japan S. Korea Netherlands Norway Spain Turkey Egypt Saudi Arabia United Kingdom	UNIT COSTS: No longer in production. LAUNCH UNIT:
	PRESENT STATUS: Replaced by -7F in USA. IOC: Early 1970's	QUANTITIES TOTAL TO DATE: Approximately 24,000 AIM-7E variants.



## SPARROW -7E

OTHER INFORMATION:

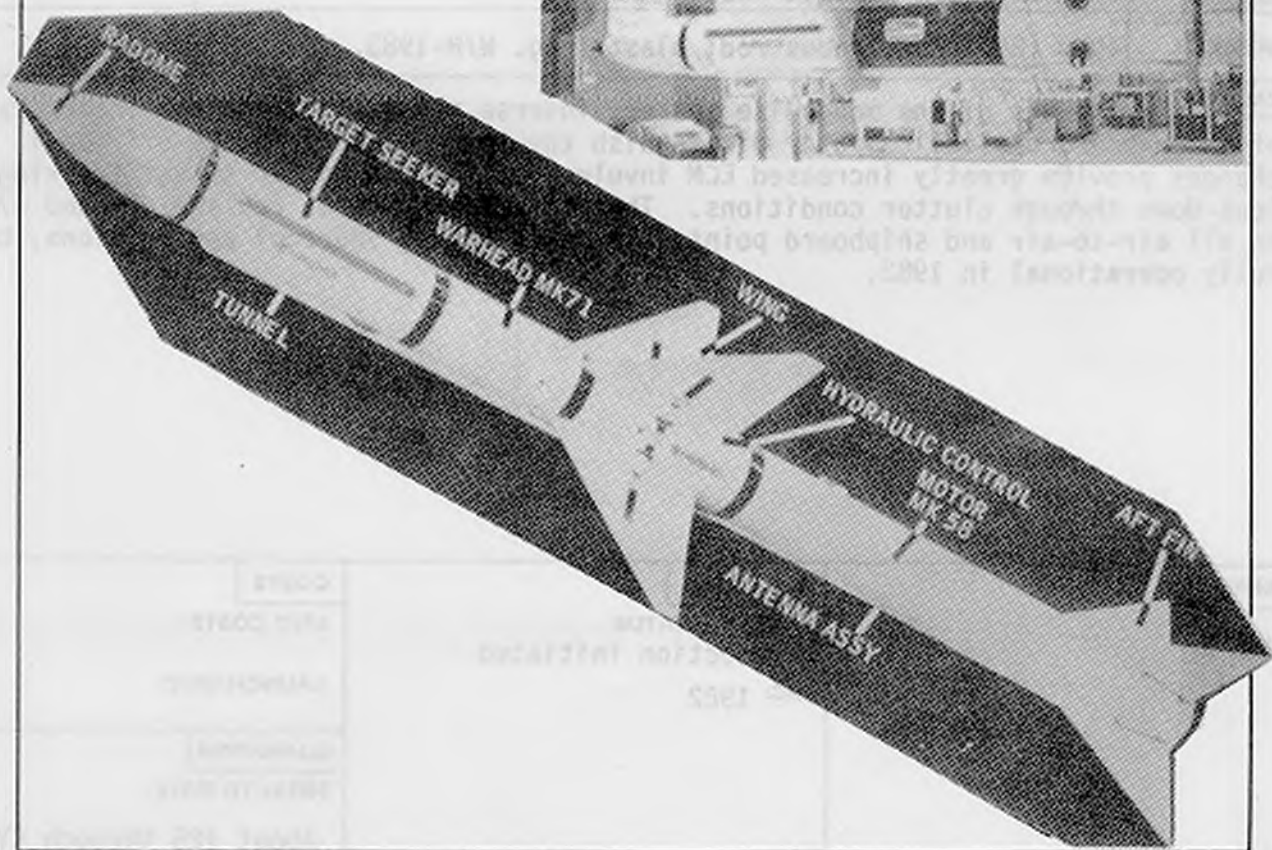
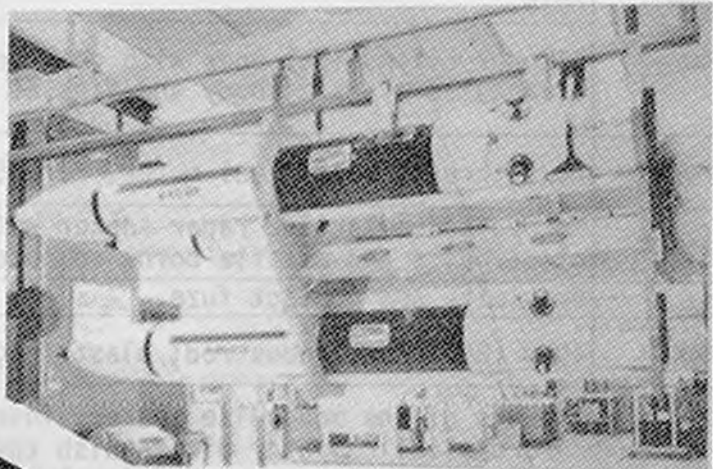
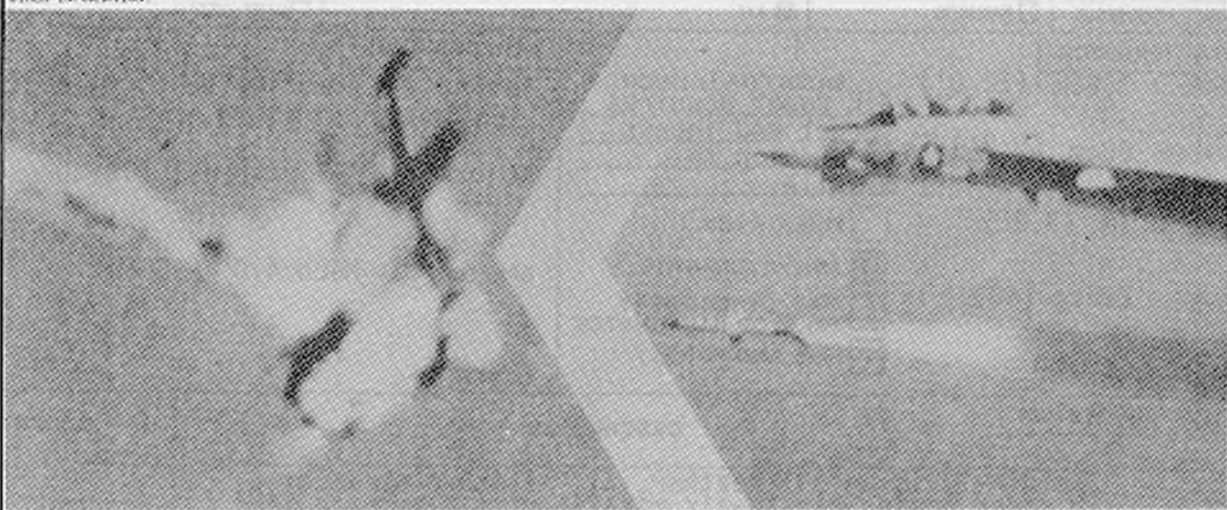


# SPARROW -7F

NAME <u>SPARROW</u>		DEVELOPER <u>Raytheon</u>	
DESIGNATION <u>AIM-7F RIM-7F</u>		COUNTRY <u>USA</u>	
		SERVICE <u>Air Force/Navy</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	TARGETS
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> TANK <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER
CHARACTERISTICS		PERFORMANCE	
LENGTH: 3.65m (12.0') DIAMETER: 20cm (0.7') SPAN: 1m (3.3') WEIGHT: 228kg (503#) .82m (0.9') span for tail fins OTHER:		RANGE: Max: 48-96km (30-60 miles) depending on launch altitude. Min: 0.7km (.4 miles) ALTITUDE: All altitudes available to launch aircraft. SPEED: 4.0 Mach OTHER:	
		BASIS FOR LAUNCH <u>A/C radar acquires target and inputs prediction to missile.</u>	
		<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET	
SYSTEM/SUBSYSTEM	DESCRIPTION		CONTRACTOR
OVERALL SYSTEM	The AIM-7F is an all weather, all altitude semiactive CW radar homing, air-to-air missile with alternate SAM role.		Raytheon - Prime General Dynamics/ Pomona-second source
AIRFRAME	Slender cylindrical body with pointed nose. Cruciform triangular wings midbody and fins at tail.		Raytheon
PROPULSION	Dual thrust, solid fuel rocket motor, Mark 58, Mod 3		Hercules
GUIDANCE	CW semiactive pulse doppler radar with conical scan slotted antenna, solid state electronics.		Raytheon/General Dynamics
FUZING	Proximity and contact fuze.		
WARHEAD	40kg (88#) continuous rod warhead.		
REMARKS	<p>Launch aircraft include the F-4E, F-15, F-4, F-14 and F-18 aircraft. Additionally, the Sparrow AIM-7F has been integrated into the Contraves Skyguard surface-to-air missile system.</p> <p>The AIM-7F differs from the -7E in that it has a larger motor (greater range), larger warhead (greater lethality) and solid state electronics (greater reliability). The AIM-7F also has improved lock-on capability in the presence of look-down clutter.</p>		
USERS	KEY DATES	COSTS	
USA Canada Israel Japan Saudi Arabia Spain	PRESENT STATUS: Full scale production initiated in late 1974; will remain in operation until -7M replaces.  IOC: 1980	UNIT COSTS: Average/\$125K  LAUNCH UNIT: --	
		QUANTITIES	
		TOTAL TO DATE: Approximately 7000 units through 1981.	

## SPARROW -7F

OTHER INFORMATION:

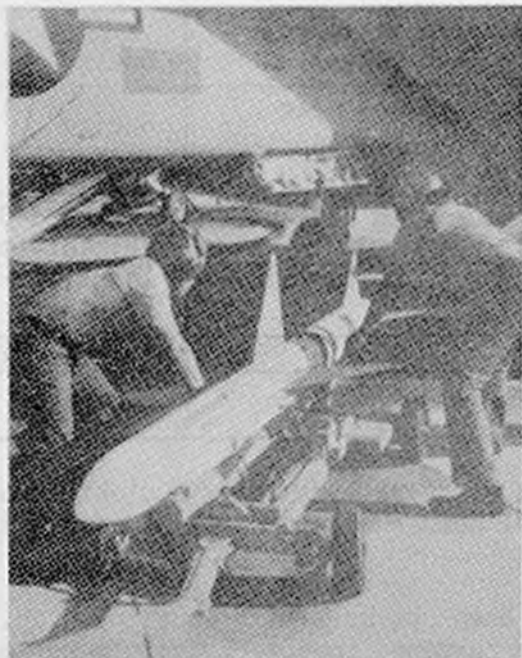
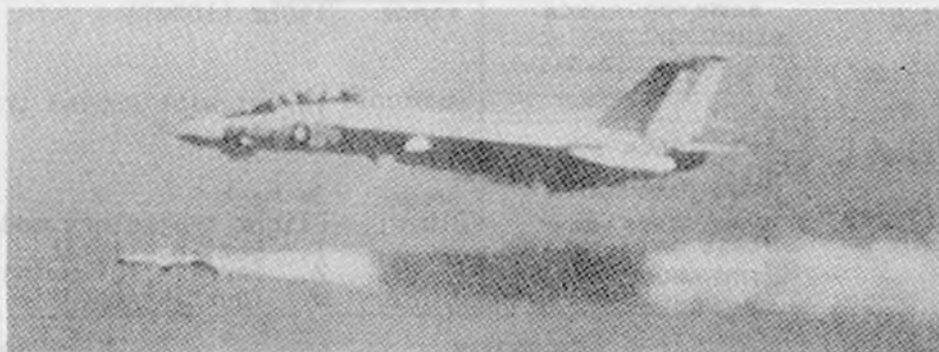


NAME <u>SPARROW</u>		<b>SPARROW -7M</b>		DEVELOPER <u>Raytheon</u>	
DESIGNATION <u>AIM-7 /RIM-7M</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Air Force/Navy</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR RIM <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP RIM <input checked="" type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>				<b>TARGETS</b>	
LENGTH: 3.65m (12.0') DIAMETER: 20cm (0.7') SPAN: 1m (3.3') WEIGHT: 228kg (503#) OTHER:		<b>BASIS FOR LAUNCH</b> <u>A/C radar acquires target and inputs prediction to missile.</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
				<b>PERFORMANCE</b>	
				RANGE: 48-96km (30-60 miles), depending on launch altitude. ALTITUDE: All aircraft altitudes SPEED: Mach 4.0 OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
<b>OVERALL SYSTEM</b>		The AIM-7M is an all weather, all altitude semiactive, CW radar homing air-to-air missile with alternate SAM role.		Raytheon	
<b>AIRFRAME</b>		Slender cylindrical body with pointed nose. Cruciform triangular wings midbody and fins at tail.		Raytheon	
<b>PROPULSION</b>		Dual thrust, solid fuel motor, Mark 58, Mod 3		Hercules	
<b>GUIDANCE</b>		Monopulse semiactive radar seeker with solid state electronics and missile-borne computer.		Raytheon; General Dynamics-2nd sou	
<b>FUZING</b>		Proximity and contact fuze.			
<b>WARHEAD</b>		40kg (88#) continuous rod; blast frag. W/H-1983.			
<b>REMARKS</b>		The use of the monopulse seeker, inverse processing, and the incorporation of an on-board digital computer distinguish the Sparrow -7M from the -7F model. These changes provide greatly increased ECM invulnerability and better target tracking in look-down through clutter conditions. The AIM-7M/RIM-7M will replace -7F and -7M in all air-to-air and shipboard point defense (NATO Sea Sparrow) applications, becoming fully operational in 1982.			
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA		PRESENT STATUS: Production initiated IOC: 1982		UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: About 125 through CY 1981.	

THE WORLD'S  
MISSILE  
SYSTEMS

## SPARROW -7M

OTHER INFORMATION:



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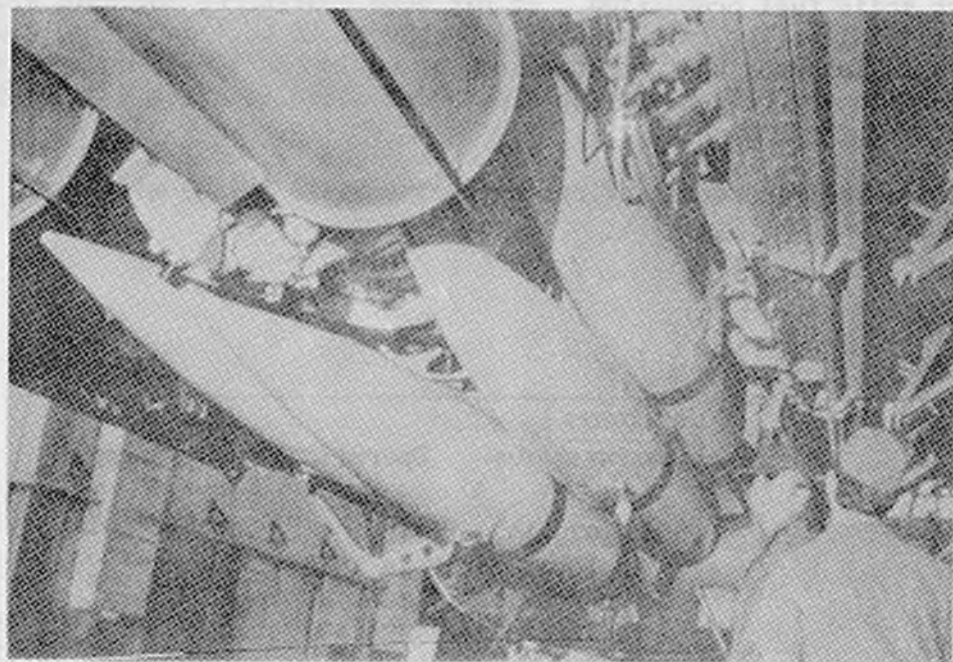
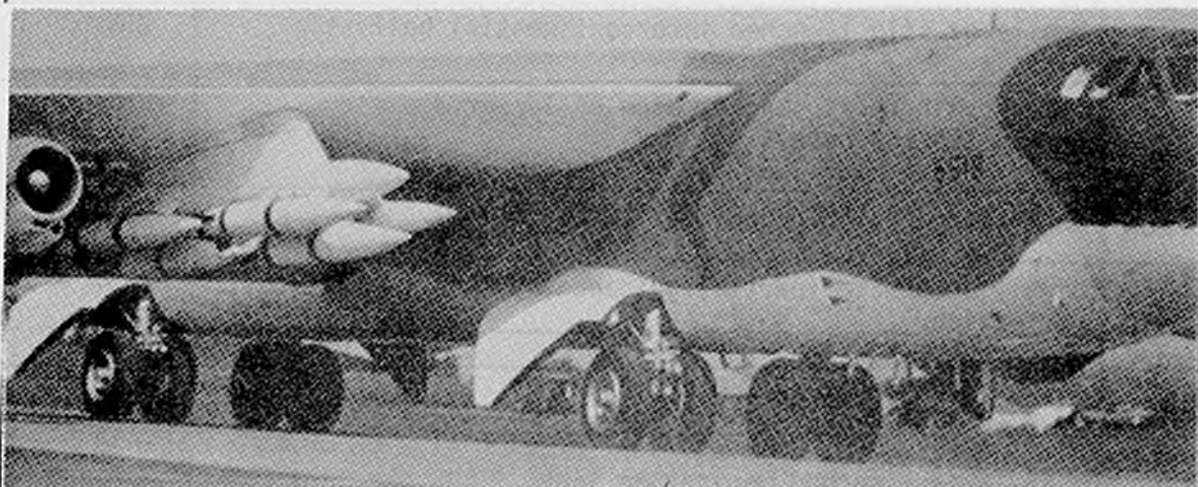
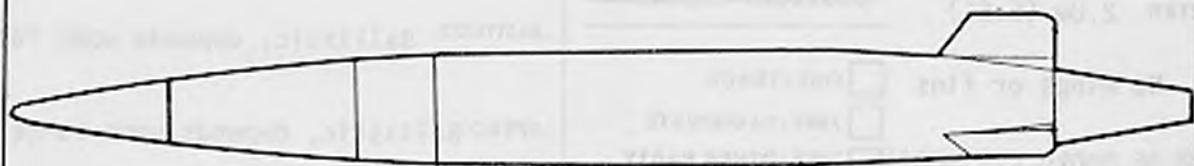
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# SRAM

NAME <u>SRAM</u>		<b>SRAM</b>		DEVELOPER <u>Boeing</u>	
DESIGNATION <u>AGM-69A/B</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Air Force</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic defenses
CHARACTERISTICS		PERFORMANCE			
LENGTH: 4.27m (14.0')	DIAMETER: 44.5cm (1.46')	SPAN: Est. 52cm (1.7')	WEIGHT: 1,010kg (2227#)	RANGE: 160km (100mi)	ALTITUDE: Varies with chosen trajectory. See "other"
OTHER: mid flight trajectory change can be made	BASIS FOR LAUNCH <u>Target and trajectory set into missile.</u> <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET	SPEED: 3+ Mach	Other: Flight trajectory modes:	1. Semi-ballistic	2. Terrain following
		OTHER: 3. Inertial/terrain following			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Supersonic air-to-surface nuclear missile designed to neutralize enemy terminal defense (SAM sites).			Boeing	
AIRFRAME	Cigar shaped body with three control surfaces near tail.			Boeing	
PROPULSION	Two stage solid propellant rocket motor with restart capability.			Lockheed-Original Thiokol-Improved	
GUIDANCE	Inertial guidance with altimeter control and terrain avoidance control.			Inertial - Singer Kearfott	
FUZING	Air burst plus contact fuze.			Universal Match Corp.	
WARHEAD	200KT nuclear. W-69.			DOE	
REMARKS					
<p>The B-52 carries 20 short range attack missiles (SRAM's): 2 clusters of 3 each on each wing and 8 internally. The B-1 bomber was to carry 24 internally and 8 externally.</p> <p>Since production ceased, the SRAM has been upgraded with a new, longer, life rocket motor, a less sensitive warhead, a hardened computer, and new software. A SRAM-B was planned for the B-1, but was canceled when the B-1 was canceled. Boeing has been promoting an SRAM-L as a substitute for the ASALM - with the main improvements being larger range, terminal guidance and radar lock on.</p>					
USERS		KEY DATES		COSTS	
USA		PRESENT STATUS: Operational-production completed 1975.		UNIT COSTS:	
		IOC: 1972		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: 1500	

**SRAM**

OTHER INFORMATION:



## SS-16

NAME (No NATO Name)		DESIGNATION SS-16		DEVELOPER		COUNTRY USSR		SERVICE Air Force					
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS							
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets			
CHARACTERISTICS				PERFORMANCE									
LENGTH: 20m (65.6')				DIAMETER: 2.0m (6.6')				SPAN: No wings or fins				WEIGHT: 36,000kg (79,500#)	
OTHER:				BASIS FOR LAUNCH <u>Target and launch position inputted.</u>				RANGE: 9000km (5600mi)  ALTITUDE: Ballistic, depends upon range.  SPEED: Ballistic, depends upon range.  OTHER: CEP .54km (.33mi)					
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR					
OVERALL SYSTEM		Mobile or silo launched intercontinental ballistic missile.						USSR					
AIRFRAME		Three cylindrical stages, each of lesser diameter. Gently tapered nose.						USSR					
PROPULSION		Three stage solid propellant rocket motor.						USSR					
GUIDANCE		Highly accurate inertial guidance, probably with stellar correction.						USSR					
FUZING								USSR					
WARHEAD		Nuclear 1.5-2.0mt or 3 MIRV.						USSR					
REMARKS													
<p>The SS-16 is a second generation light ICBM, the only Soviet new generation missile with solid fuel propulsion. It has been configured for both silo and mobile applications. Initially, this missile was thought to contain a single warhead. However, test data suggests that it contains, or could contain, a computer-controlled dispensing bus in the post-boost vehicle, which could accurately disperse MIRV s to widely scattered targets.</p> <p>The SS-16 is in the process of replacing the SS-13 Savage missiles.</p>													
USERS			KEY DATES			COSTS							
USSR			PRESENT STATUS: Operational			UNIT COSTS:							
			IOC: 1975-1978			LAUNCH UNIT:							
			Deployed first in 1978, but previously manufactured in large quantities and stored.			QUANTITIES			TOTAL TO DATE: At minimum, is replacing SS-13s in 60 silos.				

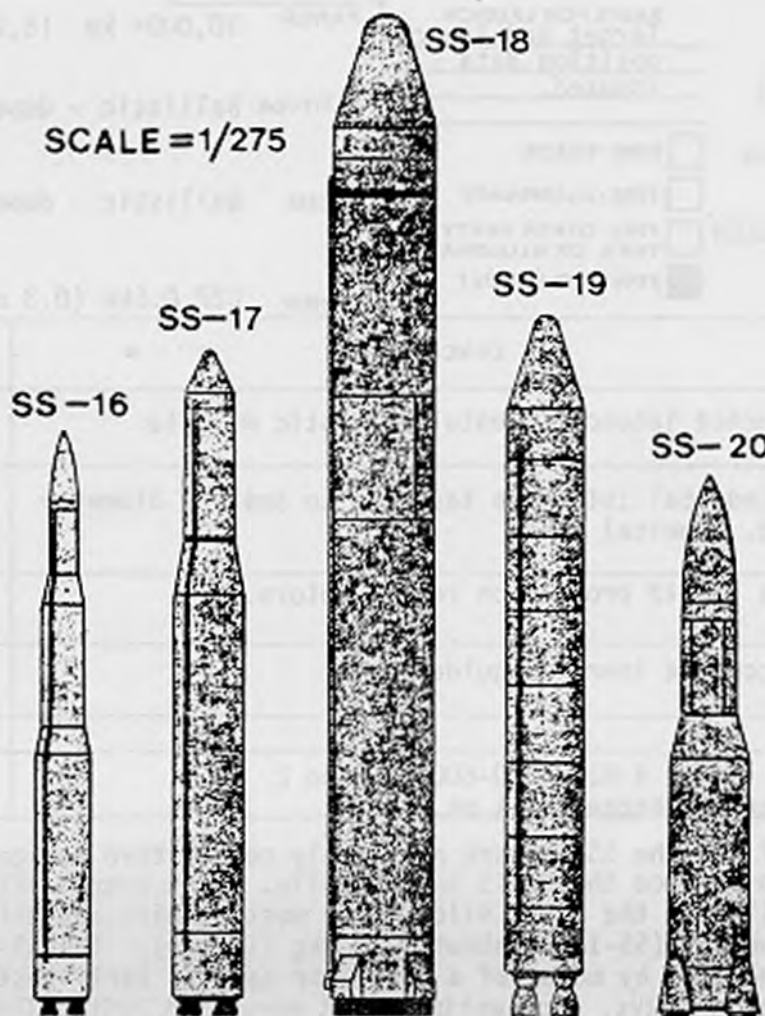


THE WORLD'S  
MISSILE  
SYSTEMS

**SS-16**

OTHER INFORMATION:

SCALE = 1/275

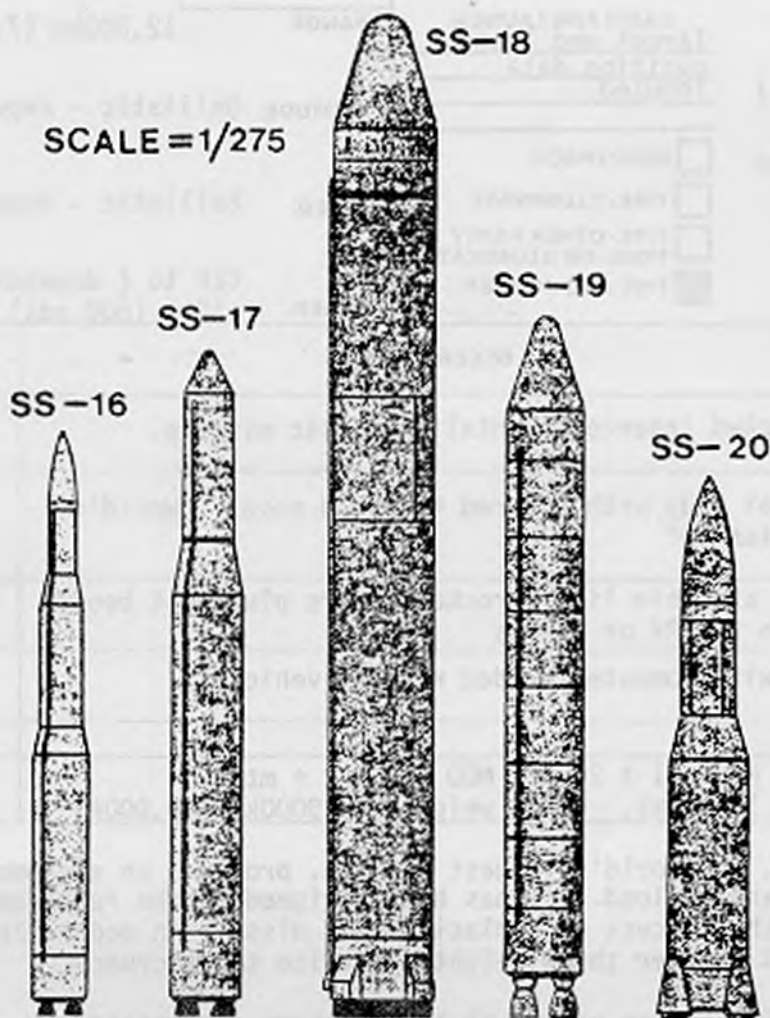


## SS-17

NAME (No NATO Name)		DESIGNATION SS-17		DEVELOPER		COUNTRY USSR		SERVICE Air Force															
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS																	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets													
CHARACTERISTICS				PERFORMANCE																			
LENGTH: 24m (78.7')				DIAMETER: 2.5m (8.2')				SPAN: No wings or fins				WEIGHT: 65,000 (143,000#)				OTHER:							
				BASIS FOR LAUNCH Target and launch position data input.				RANGE: 10,000+ km (6,200+ miles)				ALTITUDE: Ballistic - depends upon range				SPEED: Ballistic - depends upon range				OTHER: CEP 0.5km (0.3 miles)			
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR															
OVERALL SYSTEM		Silo launched intercontinental ballistic missile.						USSR															
AIRFRAME		Long cylindrical 1st stage tapering to smaller diameter 2nd stage. Conical nose.						USSR															
PROPULSION		Two stage liquid propulsion rocket motors.						USSR															
GUIDANCE		Highly accurate inertial guidance.						USSR															
FUZING								USSR															
WARHEAD		Nuclear: Mod 1 4 MIRV 200-600 kt; Mod 2 Single warhead exceeding 1 mt.						USSR															
REMARKS		The SS-17 and the SS-19 were apparently competitive designs for a lightweight accurate ICMB to replace the SS-11 Sego missile. Both proved effective and both are now being installed in the SS-11 silos. The most significant differences are appearance and weight (SS-17 is about 13,000kg lighter). The SS-17 is cold launched from the silo by means of a piston or sabot. Early tests featured 3MIRVs, but the Mod.1 has 4 MIRVs, each estimated at more than 200kt. The Mod 2 has a single warhead of greater than 1mt. The SS-17 has about 4 times the throw weight of the SS-11 it replaces, and considerably more accuracy.																					
USERS		USSR				KEY DATES				COSTS													
						PRESENT STATUS: Operational				UNIT COSTS:													
						IOC: Mod 1-1975				LAUNCH UNIT:													
										QUANTITIES													
										TOTAL TO DATE: Over 70 perational by 1978													

OTHER INFORMATION:

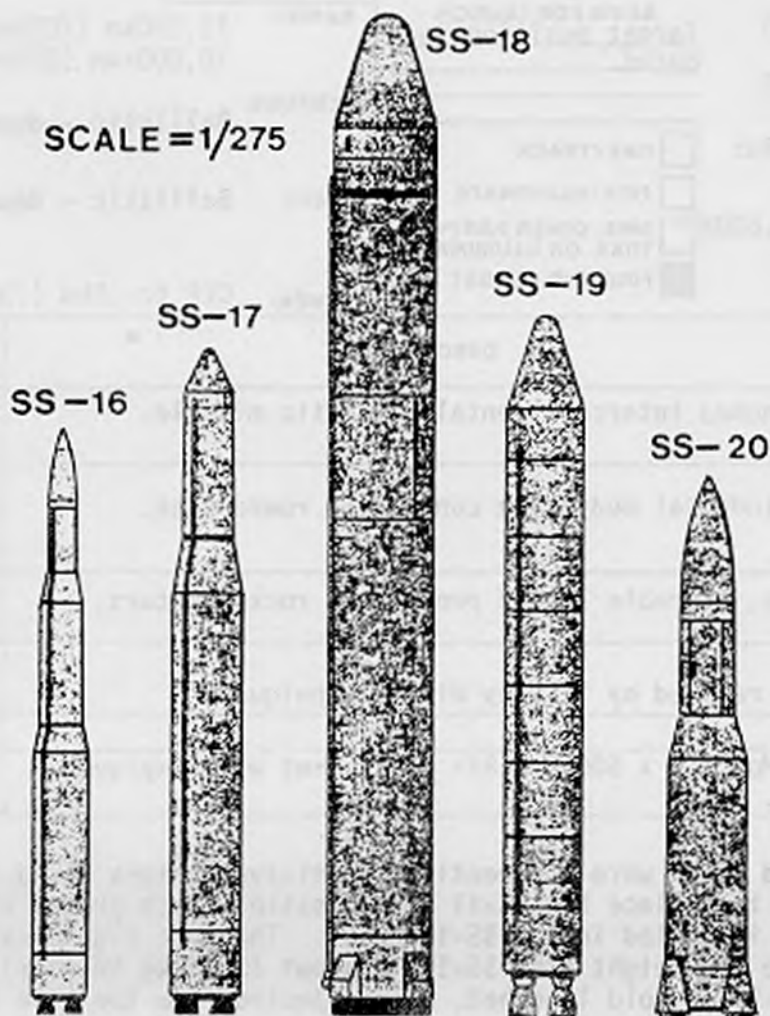
SCALE = 1/275



## SS-18

NAME (No NATO Name)		DESIGNATION SS-18		DEVELOPER		COUNTRY USSR		SERVICE Air Force			
MISSION		TRAJECTORY		LAUNCHED FROM		MOBILE LAUNCHER		TARGETS			
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets	
CHARACTERISTICS				PERFORMANCE							
LENGTH: 37m (121.4') DIAMETER: 3.2m (10.5') SPAN: No wings or fins WEIGHT: 220,000kg (484,000#) OTHER:				RANGE: 12,000km (7,500 miles) ALTITUDE: Ballistic - depends upon range SPEED: Ballistic - depends upon range CEP to (depending on MOD) OTHER: .18km (600 yds)							
BASIS FOR LAUNCH Target and launch position data input.				<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR					
OVERALL SYSTEM		Silo launched intercontinental ballistic missile.				USSR					
AIRFRAME		Cylindrical body with tapered to round nose. "World's largest missile"				USSR					
PROPULSION		Two stage storable liquid rocket motors plus post boost propulsion for RV or MIRV's				USSR					
GUIDANCE		Inertial with computer guided reentry vehicle.				USSR					
FUZING						USSR					
WARHEAD		Nuclear: Mod 1 1 X 20 mt, MOD 2 8 X 2 + mt, Mod 3 1 X 10-15 mt. Throw weights to 9000kg (20,000#)				USSR					
REMARKS		<p>The SS-18, the world's largest missile, provides an awesome combination of range, accuracy, and payload. It has been designed as the replacement for the SS-9 Scarp, and is in the process of replacing that missile in modernized SS-9 silos. The SS-18 provides 30% greater throw weight and twice the accuracy.</p> <p>Three modifications of the SS-18 have been identified:          Mod 1 - 1974 10c, 1 x 20+ mt warhead          Mod 2 - 1976 10c, 8 x 2= mt warhead          Mod 3 - about 1978 10c, 1 x 10-15 mt warhead with improved accuracy.</p> <p>Most of the presently deployed units are considered to be the Mod 2 model.</p>									
USERS		KEY DATES		COSTS							
USSR		PRESENT STATUS: Operational		UNIT COSTS:							
		ioc: Mod 1 1974 Mod 2 1976		LAUNCH UNIT:							
				QUANTITIES							
				TOTAL TO DATE: SALT limitation was 310 SS-18's							

OTHER INFORMATION:

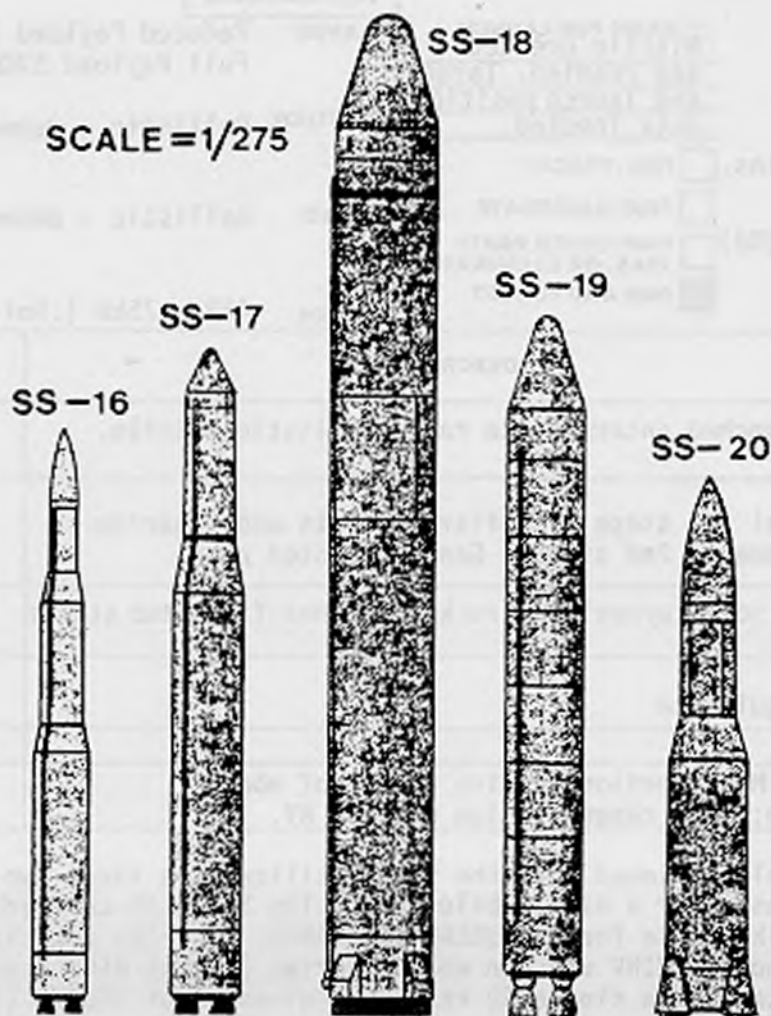


## SS-19

NAME (No NATO Name)		DESIGNATION SS-19		DEVELOPER		COUNTRY USSR		SERVICE Air Force			
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS					
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets	
CHARACTERISTICS				PERFORMANCE							
LENGTH: 27.0m (88.6')				RANGE: 11,250km (7000mi) Mod 1 10,000+km (6200+mi) Mod 2							
DIAMETER: 2.5m (8.2')				ALTITUDE: Ballistic - depends upon range							
SPAN: No wings or fins				SPEED: Ballistic - depends upon range							
WEIGHT: 78,000kg (71,600#)				OTHER: CEP to .5km (.31mi)							
OTHER:											
SYSTEM/SUBSYSTEM		DESCRIPTION						CONTRACTOR			
OVERALL SYSTEM		Silo launched intercontinental ballistic missile.						USSR			
AIRFRAME		Long cylindrical body with conical to round nose.						USSR			
PROPULSION		Two stage, storable liquid propellant rocket motors.						USSR			
GUIDANCE		Inertial refined by "Fly by Wire" techniques.						USSR			
FUZING								USSR			
WARHEAD		Nuclear Mod 1 6 x 500kt MIRV; Mod 2 5+mt with improved accuracy.						USSR			
REMARKS		<p>SS-19 and SS-17 were apparently competitive designs for a light weight accurate ICBM to replace the SS-11 Sego missile. Both proved effective and both are now being installed in the SS-11 silos. The most significant differences are appearance and weight (the SS-19 is about 13,000kg heavier). As with the SS-17, the SS-19 is cold launched, being ejected from the silo by a piston or sabot.</p>									
USERS		KEY DATES				COSTS					
USSR		PRESENT STATUS: Operational				UNIT COSTS:					
		IOC: Mod 1 deployed in 1974 Mod 2 IOC unknown				LAUNCH UNIT:					
						QUANTITIES					
						TOTAL TO DATE: Over 250 Mod 1's in service.					

THE WORLD'S  
MISSILE  
SYSTEMS**SS-19**

OTHER INFORMATION:

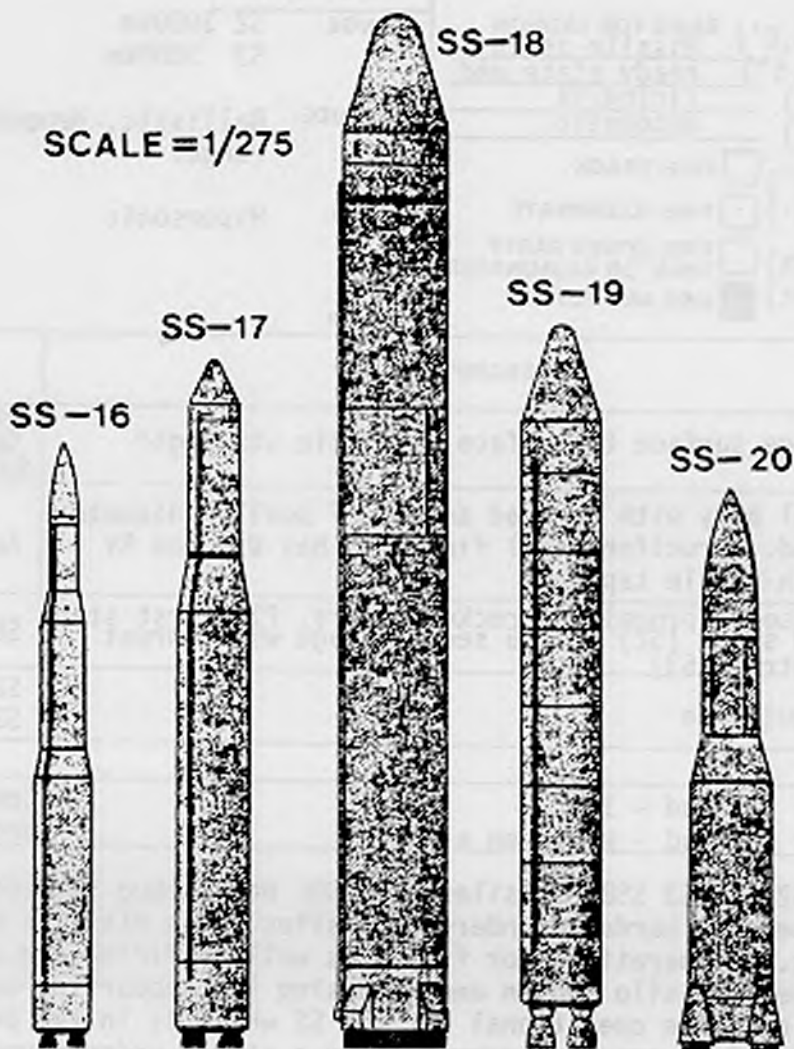


## SS-20

NAME (No NATO Name)		DESIGNATION SS-20		DEVELOPER _____		COUNTRY USSR		SERVICE Air Force		
MISSION		TRAJECTORY		LAUNCHED FROM		MOBILE LAUNCHER		TARGETS		
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER Strategic Targets
CHARACTERISTICS				PERFORMANCE						
LENGTH: 11m (36.1') DIAMETER: 2.0m (6.5') SPAN: No wings or fins. WEIGHT: 13,000kg (28500#) OTHER:				RANGE: Reduced Payload 7500km (4700mi) Full Payload 5700km (3500mi) ALTITUDE: Ballistic - depends upon range. SPEED: Ballistic - depends upon range. OTHER: CEP .75km (.5mi)						
BASIS FOR LAUNCH Missile erected and readied. Target and launch position data inputted.				<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET						
SYSTEM/SUBSYSTEM		DESCRIPTION					CONTRACTOR			
OVERALL SYSTEM		Mobile launched intermediate range ballistic missile.					USSR			
AIRFRAME		Cylindrical 1st stage with flared skirts and tapering to lesser diameter 2nd stage. Gently pointed nose.					USSR			
PROPULSION		Two stage solid propellant rocket engines-first two stages of SS-16.					USSR			
GUIDANCE		Inertial guidance					USSR			
FUZING							USSR			
WARHEAD		Nuclear: MIRV version carries 3 MIRV of about 600kt each; long range version with 50 RV.					USSR			
REMARKS		It is widely believed that the SS-20 utilizes the first two stages of the SS-16 as the basis for a high mobile IRBM. The SS-20 is carried on a tracked vehicle much like those for the SKEAN and SANDAL missiles that it replaces. Two versions are known: MIRV version which carries 3x600kt MIRV s and a long range version which carries a single 50 kt RV and gives about 1800km (1100mi) additional range.								
USERS		KEY DATES			COSTS					
USSR		PRESENT STATUS: Operational			UNIT COSTS:					
		ioc: Initial deployment 1978			LAUNCH UNIT:					
					QUANTITIES					
					TOTAL TO DATE:			300-400 launchers estimated.		

OTHER INFORMATION:

SCALE = 1/275



# SSBS

NAME <u>SSBS</u>		<b>SSBS</b>		DEVELOPER <u>Aerospatiale</u>	
DESIGNATION <u>S2 &amp; S3</u>				COUNTRY <u>France</u>	
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic Targets</u>	
<b>CHARACTERISTICS</b> LENGTH: S2: 14.78m (48.5') S3: 13.87m (45.5') DIAMETER: S2: 1.50 (4.9') S3: 1.50 (4.9') SPAN: S2: 2.62m (8.6') S3: 2.62m (8.6') WEIGHT: S2: 32.0mt (35t) S3: 25.8mt (28t) OTHER:			<b>PERFORMANCE</b> RANGE: S2 3000km S3 3000km ALTITUDE: Ballistic, depends upon target range. SPEED: Hypersonic OTHER:		
BASIS FOR LAUNCH <u>Missile is in ready state and firing is automatic.</u>			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Medium range surface to surface ballistic strategic missile		Division Systems Balistiques et Spatiaux Aerospatiale	
AIRFRAME		Cylindrical body with warhead and RV of smaller diameter at fore end. Cruciform tail fins. S3 has W/H and RV included in gentle taper.		Aerospatiale	
PROPULSION		Two stage solid propellant rocket motors. P16 first stage P10 second stage (S2) and P6 second stage with thrust vector control (S3)		SEP	
GUIDANCE		Inertial guidance		S2 SAGEM/SFENA S3 EMD/SAGEM	
FUZING					
WARHEAD		S2 nuclear warhead - 150 S3 nuclear warhead - with pen aids		Commissariat a l'En-ergie Atomique	
<b>REMARKS</b> <p>Both the S2 and S3 SSBS Missiles (SOL-SOL Balistique Strategique) are launched from dispersed, hardened underground silos. The missiles are in a constant state of readiness. Preparations for firing as well as firing are automatic. Each launch area includes the silo and an annex housing the supporting equipment. Two groups of 9 silos each are operational for the S2 which is in the process of being replaced by the S3. Each group is commanded by a single underground launch control center.</p> <p>The S3 is lighter weight and has somewhat increased range. It uses the same first stage as does the S2, the second stage of MSBS M20, and an advanced re-entry vehicle with a hardened warhead and penetration aides.</p>					
USERS		KEY DATES		COSTS	
France		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: S2 1971 S3 1980		LAUNCH UNIT:	
				QUANTITIES	
				TOTAL TO DATE: S2 about 50 S3 about 15	

THE WORLD'S  
MISSILE  
SYSTEMS

**SSBS**

OTHER INFORMATION:

### S2

Atomic warhead  
903/P 10  
902/P 16

### S3

Thermo-nuclear warhead  
Rea II  
902

SSBS

<p><b>MID 1971</b> 1<sup>st</sup> operational SSBS 1<sup>st</sup> group of 9 operational missiles</p>	<p><b>END 1971</b> 2<sup>nd</sup> group of 9 operational missiles</p>	<p><b>MID 1980</b> 1<sup>st</sup> group of 9 operational S3 missiles 2<sup>nd</sup> group in 1982</p>
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### M1

Atomic warhead  
Rea I P4  
904/P 10

### M2

Rea II P6  
904

### M20

Thermo-nuclear warhead  
Rea II P6  
904

### M4

Multiple RV's  
403  
402  
401

MSBS

<p><b>FIN 1971</b> "Le Redoutable" 16 M1 missiles then M2 and M20</p>	<p><b>FIN 1972</b> "Le Terrible" 16 M1 missiles then M20</p>	<p><b>FIN 1974</b> "Le Foudroyant" 16 M2 missiles then M20</p>	<p><b>1977</b> "L'Indomptable" 16 M20 missiles</p>	<p><b>1980</b> "Le Tonnerre" 16 M20 missiles</p>	<p><b>1985</b> "L'Inflexible" 16 M4 missiles</p>
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1971
1972
1974
1977
1980
1985

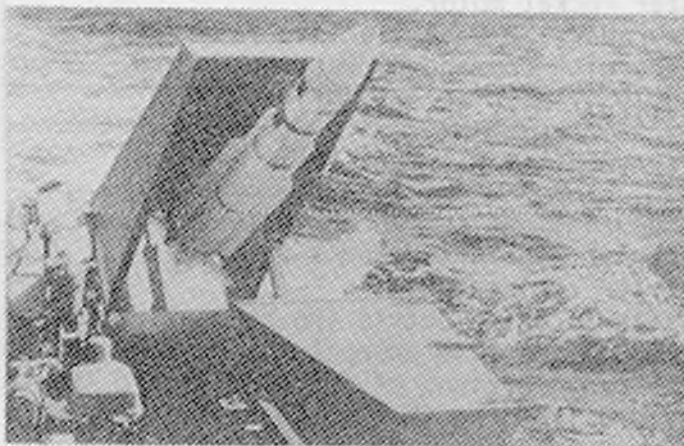
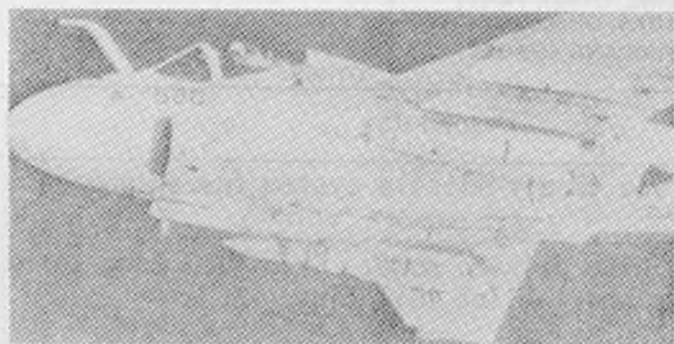
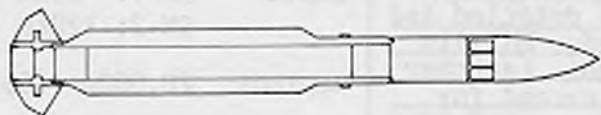
### SSBS S3

1. Fairings and re-entry vehicle
2. Equipment bay
3. Second stage (P 6)
4. Interstage skirt
5. First stage (902)
6. Rear skirt and fins

NAME <u>STANDARD ARM</u>		<b>STANDARD ARM</b>		DEVELOPER <u>General Dynamics</u>			
DESIGNATION _____				COUNTRY <u>USA</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Radar Installations</u>			
<b>CHARACTERISTICS</b> LENGTH: 4.57m (15.0') DIAMETER: 34cm (1.1') SPAN: 98cm (3.0') WEIGHT: 613kg (1350#) OTHER:			<b>PERFORMANCE</b> RANGE: 56km+ (35 miles +) Air Launch 25km+ (15.5 miles +) Ship Launch ALTITUDE: Aircraft altitude SPEED: 2.5 Mach OTHER:				
<b>BASIS FOR LAUNCH</b> <u>Target acquisition and position identification.</u>			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET				
SYSTEM/SUBSYSTEM	DESCRIPTION			CONTRACTOR			
OVERALL SYSTEM	Air to surface and surface to surface anti-radiation missile adapted from Standard missile.			General Dynamics Pomona Division			
AIRFRAME	Cylindrical body with pointed nose. Cruciform long span wings and cruciform tail surfaces.			General Dynamics			
PROPULSION	Dual thrust solid propellant rocket motor.			Aerojet/NOS			
GUIDANCE	Passive RF seeker. Proportional navigation trajectory.			General Dynamics			
FUZING	Proximity						
WARHEAD	High explosive warhead			NOS/NWS			
REMARKS	<p>The Standard ARM system utilizes a missile evolved from the Standard missile and provides aircraft strike capability against radar directed air defense sites. It also has a capability to counter search and ground control intercept radars. The system includes electronic detection equipment to identify and select targets for attack. When automatically or manually instructed, the missile is launched against a target, relying on its broadband passive receiver to seek out and destroy or suppress the target radar. Launch and leave, omni-directional attack from outside the lethal radius of enemy SAMs are inherent characteristics of the system. Standard ARM has been produced in several versions, the latest of which provides highly selective broadband targeting options. Standard ARM is also used in the ship-to-ship role both from patrol vessels and other combatant ships. In the case of the PG installation, the missile is fired from a "bin" launcher and can be fired to its maximum surface-to-surface range of 35 miles, over the horizon at ships that have their radar turned on. Standard ARM has been launched from the A-6, F-105, E-4 aircraft and U.S. missile ships.</p>						
<b>USERS</b> USA South Korea		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: 1969		<b>COSTS</b> UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE: Approximately 700			

## STANDARD ARM

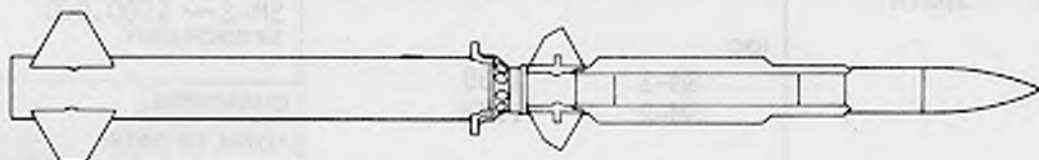
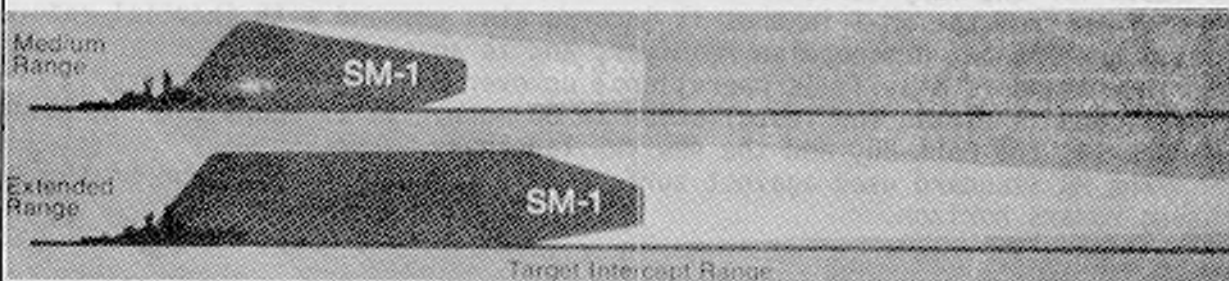
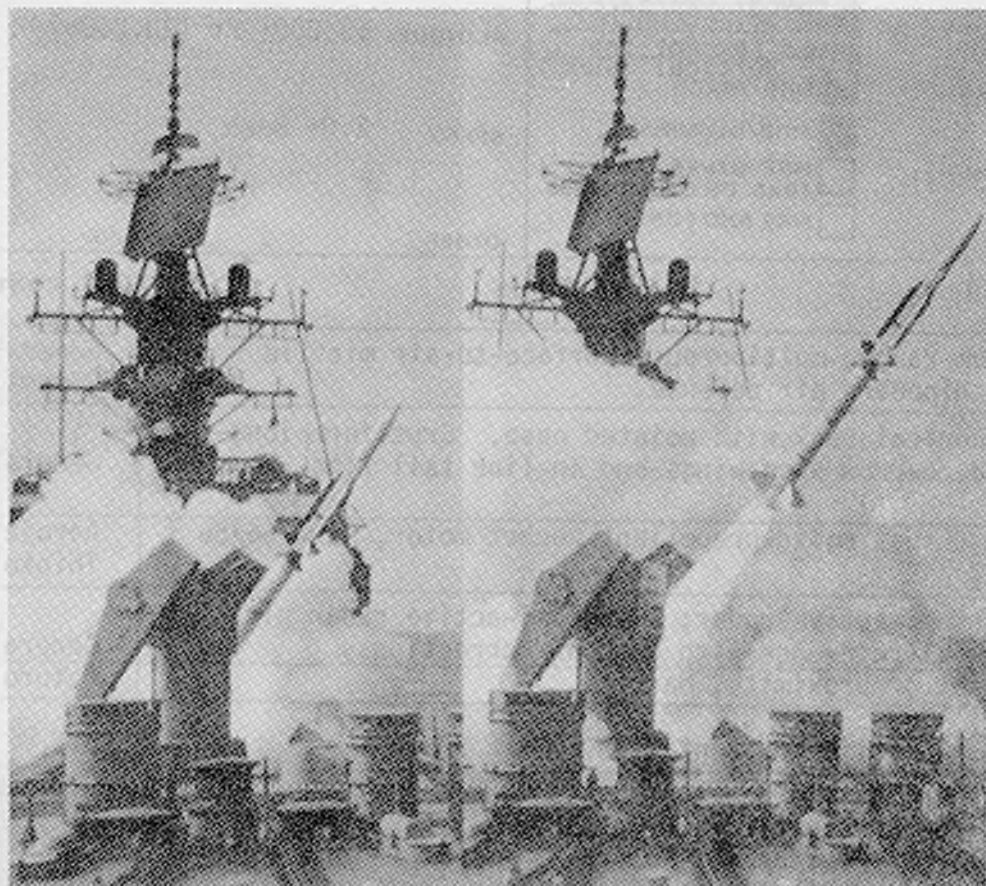
OTHER INFORMATION:



NAME STANDARD SM-1/SM-2 ER		STANDARD ER		DEVELOPER General Dynamics			
DESIGNATION RIM-65A/B				COUNTRY USA			
				SERVICE Navy			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: M+B: 8.2m (27') DIAMETER: M: 34cm (1.1') B: 46cm (1.5') SPAN: M: 1.08m (3.5') B: 1.60m (5.3') WEIGHT: M: 490kg (1080#) M+B: 1325kg (2920#) OTHER:			<b>PERFORMANCE</b> RANGE: SM-1: 65km (40mi) SM-2: 120km (75mi) ALTITUDE: 20,000m+ (65,000'+) SPEED: 2.5+ mach OTHER:				
<b>BASIS FOR LAUNCH</b> <input checked="" type="checkbox"/> Target detected and tracked. Missile readied. Launcher aimed except for VLS SM-2. <input checked="" type="checkbox"/> FIRE/TRACK w/command corr. <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Long range, surface to air missile system for shipboard air defense.		General Dynamics Pomona Division			
AIRFRAME		Cylindrical body with pointed nose. Cruciform long chord narrow span wings and in-line tail fins.		General Dynamics			
PROPULSION		Single burn solid propellant sustainer rocket. Solid propellant booster rocket motor.		S.-Aerojet/Hercules B.-Atlantic Research			
GUIDANCE		SM-1 semi-active radar; SM-2 semi-active radar plus inertial reference with command correction.		General Dynamics			
FUZING		Contact or proximity. Mark 45.		Motorola			
WARHEAD		High explosive fragmentation. Mark 70.		USN			
<b>REMARKS</b> Standard missile development commenced in 1964 in medium and extended ranges as replacement for the Terrier and Tartar SAM's for fleet air defense. The ER versions are designed as Terrier replacements. The Standard missile is all electric (no hydraulics or pneumatics) and uses solid state electronics and an adaptive autopilot. Modular design of subsystems has been the basis for the many versions of the missile and the upgrading of capability. The SM-2 differs from the SM-1 in that it incorporates command with inertial reference midcourse, a new booster, a monopulse receiver, and is adapted to AEGIS. For the ER version, a single burn sustainer is substituted for the MR's dual thrust motor, and a larger diameter booster is mounted in tandem. The Standard missile is in operation on over 80 frigates, destroyers, cruisers, and carriers, and is slated for installation in 80 more. The Standard ER is launched from the Mark 10 Terrier launcher and is compatible with the associated handling equipment.							
<b>USERS</b> United States Italy		<b>KEY DATES</b> PRESENT STATUS: Operational IOC: SM-1 1969 SM-2 1978		<b>COSTS</b> UNIT COSTS: SM-1~\$200,000 FY 82 SM-2~\$500,000 FY 82 LAUNCH UNIT: Procurement			
				<b>QUANTITIES</b> TOTAL TO DATE: Nearly 4,000			

## STANDARD ER

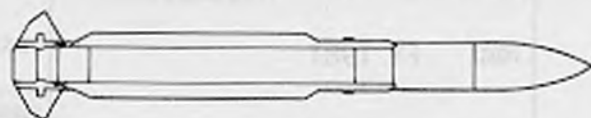
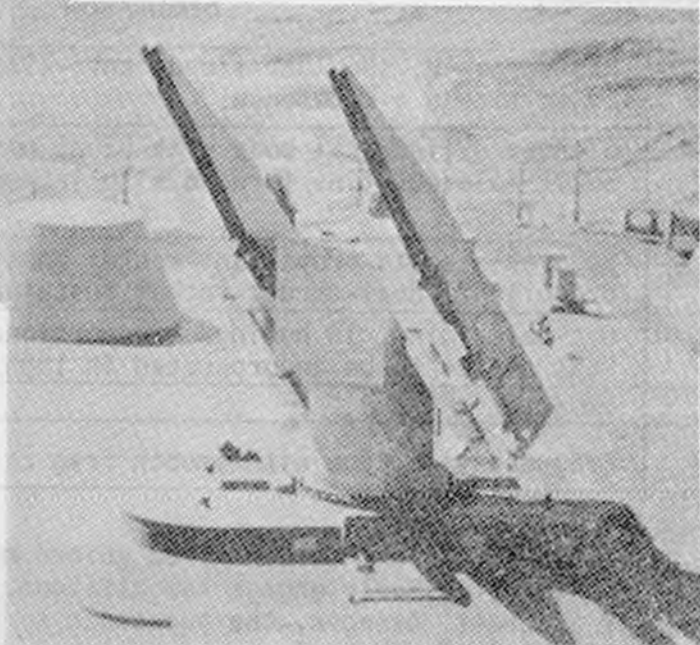
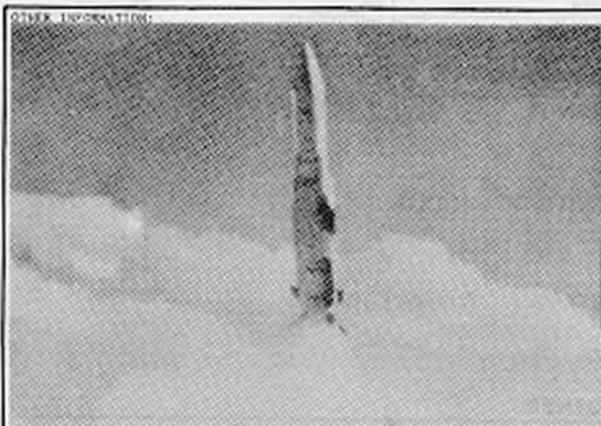
OTHER INFORMATION:



NAME STANDARD SM-1/SM-2 MR		STANDARD MR		DEVELOPER General Dynamics			
DESIGNATION RIM-66B/RIM-66A				COUNTRY USA			
				SERVICE Navy			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input checked="" type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 4.5m (14.7') DIAMETER: 34cm (1.1') SPAN: 91cm (3.0') WEIGHT: 614kg (1350#) OTHER:		<b>BASIS FOR LAUNCH</b> Target detected and tracked. Missile readied. Launcher aimed (except for vertical launch) <input checked="" type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: SM-1 37km (23 mi) SM-2 56km (35 mi) ALTITUDE: 65,000+ ft (20,000m) SPEED: 2.0+ Mach OTHER:			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM	Medium range, multipurpose surface-to-air missile for shipboard air defense.		General Dynamics Pomona Division				
AIRFRAME	Cylindrical body with pointed nose. Cruciform long chord, narrow span wings and in-line tail fins.		General Dynamics				
PROPULSION	Dual thrust solid propellant rocket motor, Mark 56/56 Mod 0.		Aerojet/Hercules/Thiokol				
GUIDANCE	SM-1 semi-active radar; SM-2 semi-active radar plus inertial reference with command corrections.		General Dynamics				
FUZING	Contact or proximity, Mark 45.		Motorola				
WARHEAD	High explosive fragmentation. Mark 90.		USN				
REMARKS	<p>Standard missile development commenced in 1964, in medium and extended ranges, as replacements for the Terrier and Tartar SAM's for fleet air defense. The MR version is the Tartar replacement.</p> <p>The Standard missile is all electric (no hydraulics or pneumatics) and uses solid state electronics and an adaptive autopilot. Modular design of subsystems has been the basis for the many versions of this missile and the upgrading of capability. The SM-2 differs from the SM-1 in that it incorporates command with inertial reference midcourse, a new engine, a monopulse receiver, and is adapted to AEGIS.</p> <p>The Standard missile is operational on over 80 frigates, destroyers, cruisers, and carriers, and is slated for installation in 80 more. It is adaptable for launch from the Mark 13, the Mark 26, and the new VLS launchers.</p> <p>The MR Standard used against surface ship targets within range of the illuminating radars horizon.</p>						
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
United States    Spain		PRESENT STATUS: Operational		UNIT COSTS: SM-1 ~ \$200,000 FY82			
Australia		IOC:		SM-2 ~ \$500,000			
France		SM-1            1969		LAUNCH UNIT:			
Germany		SM-2            1978		<b>QUANTITIES</b>			
Iran				TOTAL TO DATE:			
Italy				Nearly 5,000			
Japan							
Netherlands							

THE WORLD'S  
MISSILE  
SYSTEMS

## STANDARD MR



NAME <u>STINGER</u>		<b>STINGER</b>		DEVELOPER <u>General Dynamics</u>	
DESIGNATION <u>FIM-92A</u>				COUNTRY <u>USA</u>	
				SERVICE <u>Army/Marine Corps</u>	
<b>MISSION</b>		<b>TRAJECTORY</b>		<b>LAUNCHED FROM</b>	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
				<b>TARGETS</b>	
				<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b>			<b>PERFORMANCE</b>		
LENGTH: 1.53m (5') DIAMETER: 70mm (2.75") SPAN: 90mm (3.50") WEIGHT: 15.7kg (34.5#) OTHER:			RANGE: 5.0km (3.1mi) ALTITUDE: 4500m (2.9mi) SPEED: Supersonic OTHER:		
			<b>BASIS FOR LAUNCH</b> <u>Visual sighting of target and IFF interrogation.</u>		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Man-portable, shoulder-fired, anti-aircraft missile for low-altitude air defense.		General Dynamics		
AIRFRAME	Slender cylindrical body with blunt nose. Cruciform small fold-out fins forward with interdigitated fold-out tail fins.		General Dynamics		
PROPULSION	Separable solid propellant rocket booster. Solid propellant, dual-thrust rocket sustainer.		Atlantic Research		
GUIDANCE	Optical aiming, IR homing. Proportional navigation. POST seeker to be incorporated in 1985.		General Dynamics		
FUZING	Impact.		Magnavox		
WARHEAD	Fragmentation type with smooth frag casing.		Picatinny Arsenal		
<b>REMARKS</b>					
<p>A man-portable shoulder fired guided missile system which enables the soldier to effectively engage low altitude jet, propeller driven and helicopter aircraft. Stinger, the successor to the Redeye weapon system, is now operational in the U.S. Army and Marine Corps. Designed for the threat beyond the 1980's, Stinger has all-aspect engagement capability, an IFF system, improved range and maneuverability and significant countermeasures immunity. The POST seeker, currently in engineering development, will be the primary seeker for Stinger after 1984.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA		PRESENT STATUS: Production		UNIT COSTS:	
		IOC: FY 1981		LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE:	
				Over 6500 deliveries thru 1981	

THE WORLD'S  
MISSILE  
SYSTEMS

## STINGER

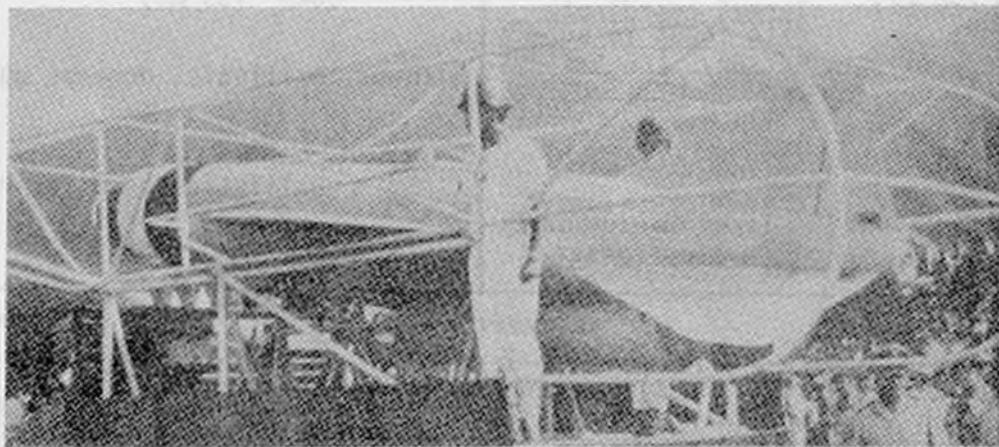
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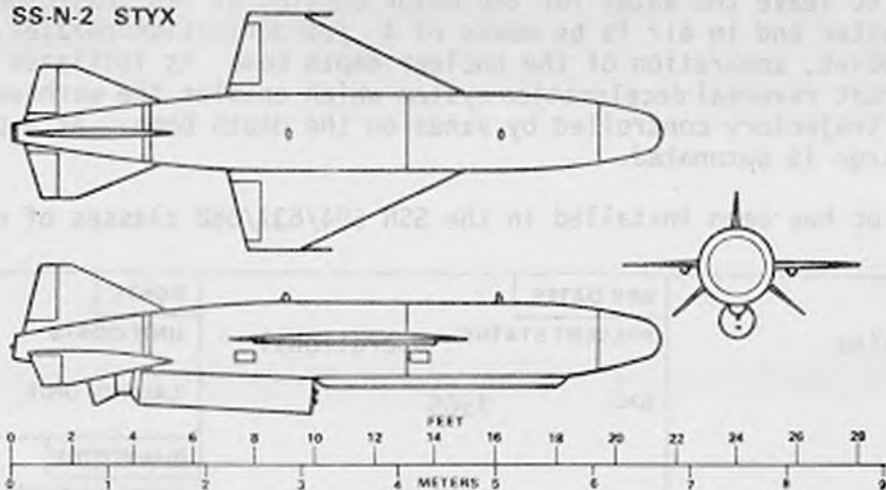


# STYX

OTHER INFORMATION:



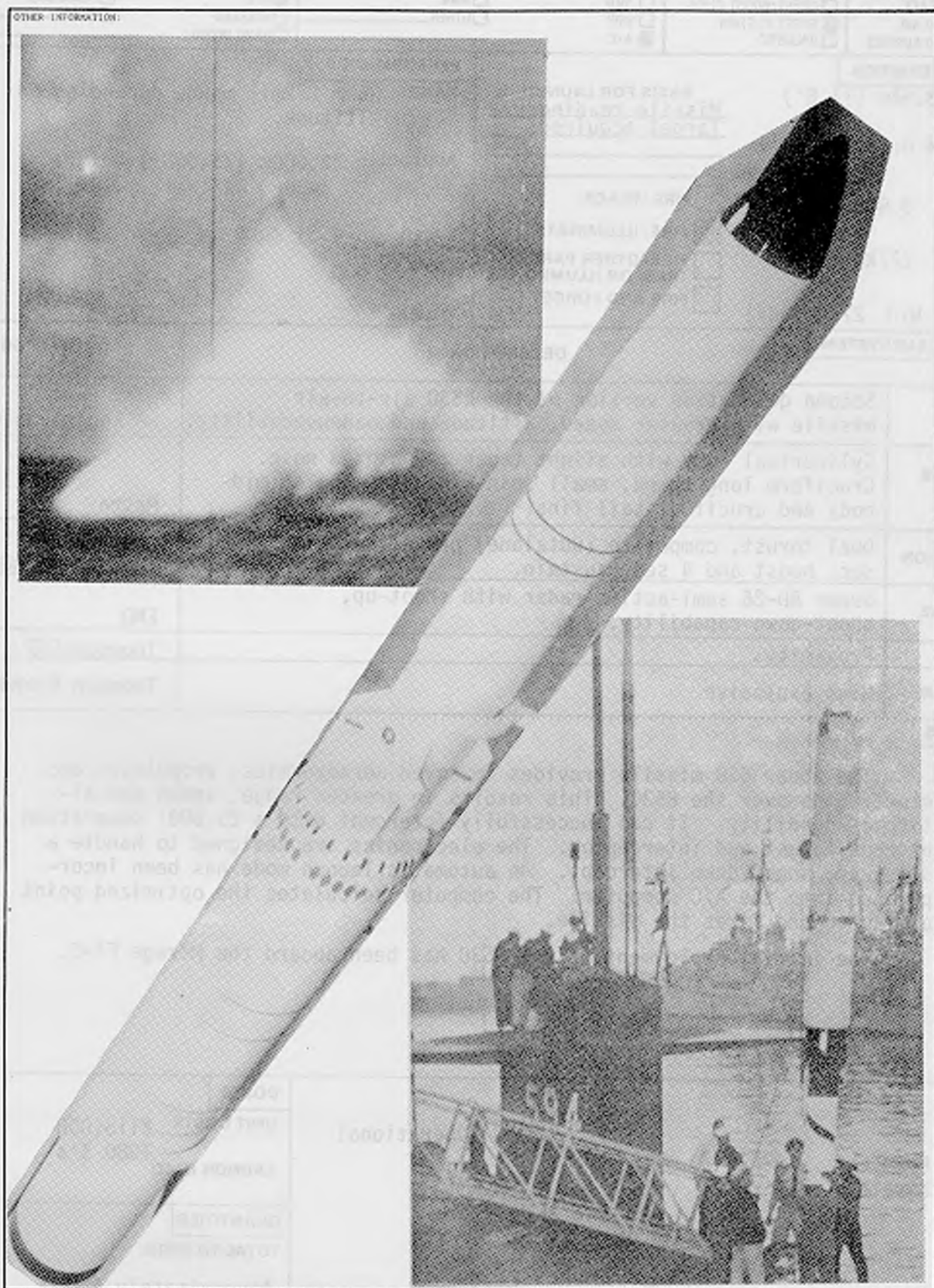
SS-N-2 STYX



# SUBROC

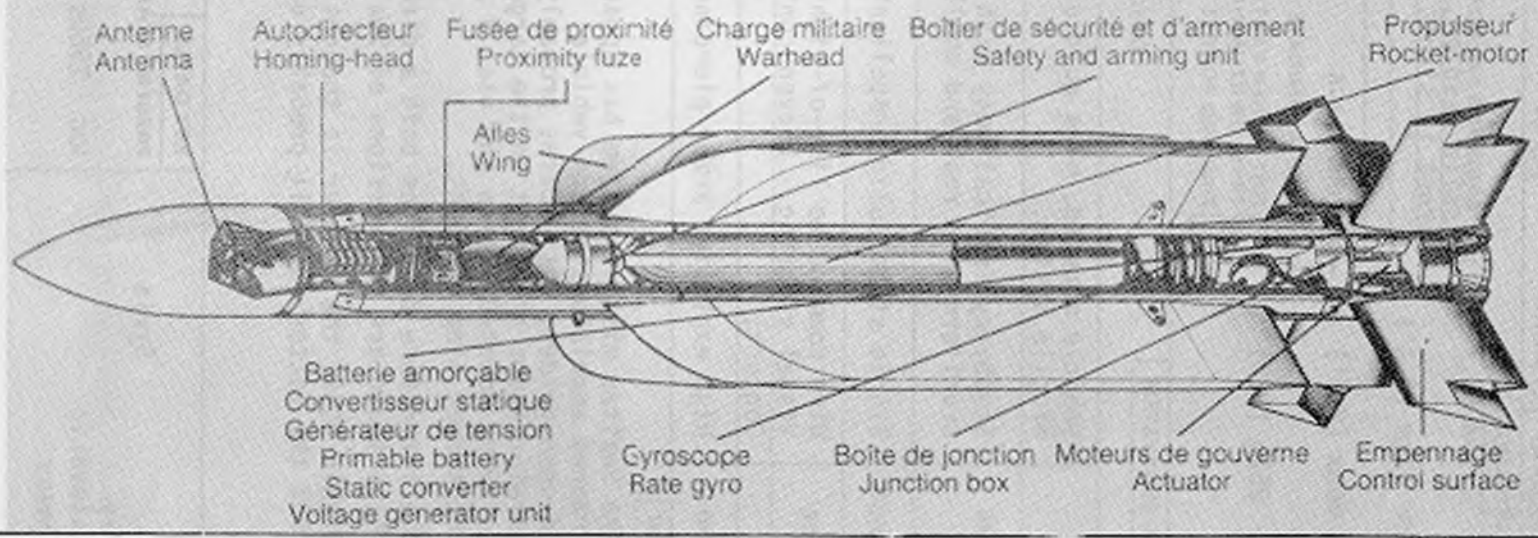
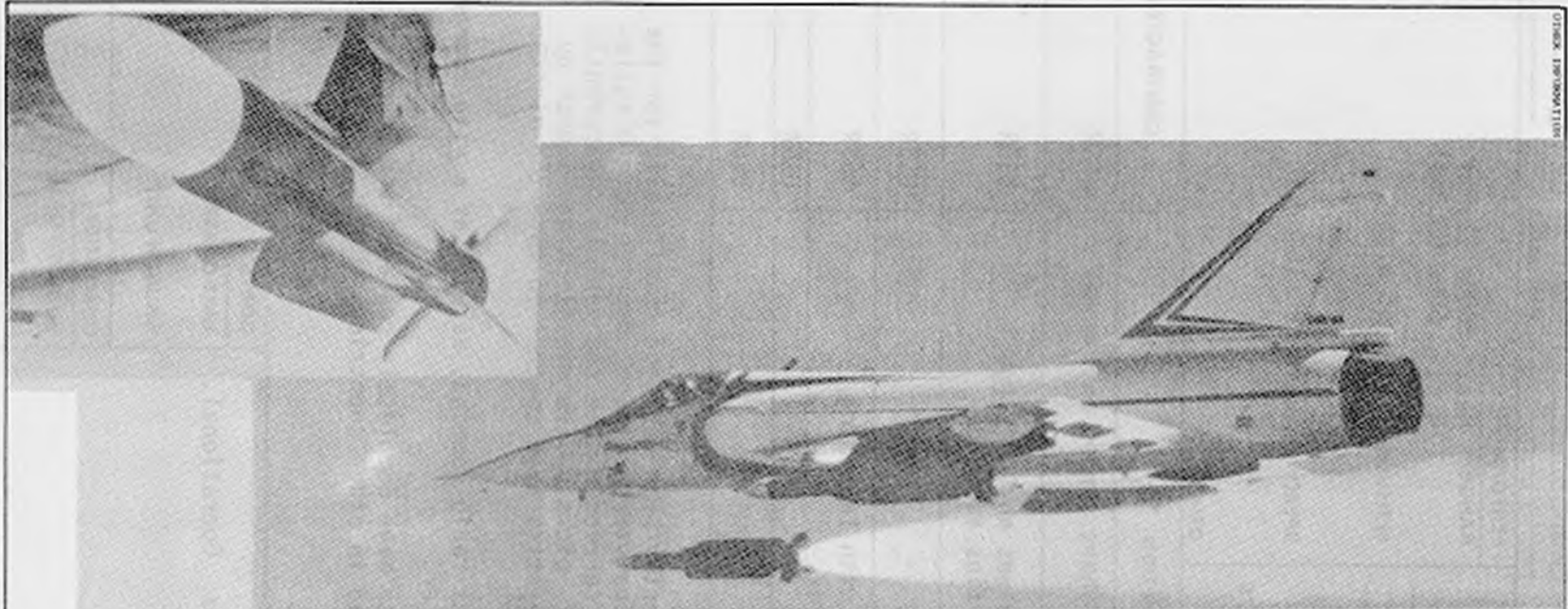
NAME <u>SUBROC</u>		<b>SUBROC</b>		DEVELOPER <u>Goodyear Aerospace</u>	
DESIGNATION <u>UUM-44A</u>				COUNTRY <u>USA</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input checked="" type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C <input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Submarine</u>	
CHARACTERISTICS		PERFORMANCE		TARGETS	
LENGTH: 6.10m (20.5') DIAMETER: 53.3cm (1.75') SPAN: Not applicable WEIGHT: 1900ka (4188#) OTHER:		RANGE: 56km (35 mi) ALTITUDE: Ballistic, depends upon range. SPEED: Ballistic speed for range. OTHER:		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL <input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Submarine</u>	
BASIS FOR LAUNCH Target coordinate data input to sub- marine. F/C systems Ejected from torpedo tube.		<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Submarine (torpedo tube) launched nuclear anti-submarine weapon		Goodyear Aerospace		
AIRFRAME	Two diameter cylindrical body (small diameter top large) with conical nose. Small trapezoidal fins at rear of depth charge.		Goodyear		
PROPULSION	Single stage solid propellant rocket motor.		Thiokol		
GUIDANCE	Inertial guidance working through jet deflectors (boost) or small fins (ballistic reentry).		Singer Kearfott		
FUZING	Depth sensor				
WARHEAD	Nuclear depth charge		DOE		
REMARKS	<p>Subroc forms the offensive element of an advanced anti-submarine weapon system designed for use in nuclear powered attack submarines operating against submarines armed with strategic missiles. The missile is launched horizontally from a standard 21 inch (53.3cm) torpedo tube, by conventional means. At a safe distance the solid-fuel motor is ignited and Subroc follows a short level path before turning upward to leave the water for the major portion of its trajectory. Directional control under water and in air is by means of 4 jet-deflection nozzles. At a predetermined point, separation of the nuclear depth bomb is initiated by explosive bolts and a thrust reversal deceleration system which enables the warhead to continue on a ballistic trajectory controlled by vanes on the depth bomb. At a preset depth, the nuclear charge is detonated.</p> <p>Subroc has been installed in the SSN 594/637/688 classes of nuclear attack submarines.</p>				
USERS	KEY DATES		COSTS		
United States	PRESENT STATUS: Operational		UNIT COSTS: ?		
	IOC: 1965		LAUNCH UNIT:		
			QUANTITIES		
			TOTAL TO DATE: ?		

**SUBROC**



## SUPER 530

NAME <u>SUPER 530</u>		DESIGNATION <u>S530</u>		DEVELOPER <u>Matra</u>		COUNTRY <u>France</u>		SERVICE <u>Air Force</u>			
<b>MISSION</b> <input checked="" type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 3.54m (11.6') DIAMETER: 0.26m (0.85') SPAN: 0.90m (2.95') WEIGHT: 227kg (500#) OTHER: W/H 27kg (60#)				<b>PERFORMANCE</b> RANGE: 36km (22mi) max., depending on altitude. ALTITUDE: 23,000m (75,000+) SPEED: 4.5+ mach OTHER:				<b>BASIS FOR LAUNCH</b> <u>Missile readied.</u> <u>Target acquired.</u>			
<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET											
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>						<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Second generation version of the R530 air-to-air missile with greater speed, altitude and maneuverability.						SA Engins Matra			
<b>AIRFRAME</b>		Cylindrical body with slight taper to pointed nose. Cruciform long chord, small span wing starting at mid-body and cruciform tail fins.						Matra			
<b>PROPULSION</b>		Dual thrust, composite (Butalane) propellant with 2 sec. boost and 4 sec. sustain.						Thomson-Brandt			
<b>GUIDANCE</b>		Super AD-26 semi-active radar with shoot-up, shoot-down capability.						EMD			
<b>FUZING</b>		Proximity.						Thomson-CSF			
<b>WARHEAD</b>		High explosive.						Thomson Brandt			
<b>REMARKS</b>											
<p>The Super 530 missile provides improved aerodynamics, propulsion and electronics over the R530. This results in greater range, speed and altitude capability. It can successfully intercept with a 25,000' separation between target and interceptor. The electronics are designed to handle a shoot-up, shoot-down intercept. An automatic launch mode has been incorporated into the A/C computer. The computer calculates the optimized point of launch and fires the missile.</p> <p>The initial deployment of the S530 has been aboard the Mirage F1-C.</p>											
<b>USERS</b>			<b>KEY DATES</b>			<b>COSTS</b>					
France Kuwait			PRESENT STATUS: Operational			UNIT COSTS: \$115,000 1980 \$'s					
			IOC: 1980			LAUNCH UNIT:					
						<b>QUANTITIES</b>					
						TOTAL TO DATE: Approximately 5,000					



**SUPER 530**

THOMSON  
 MISSILE  
 SYSTEMS

GENERAL DYNAMICS  
 Aerospace Division

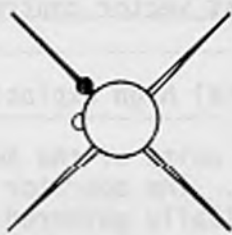
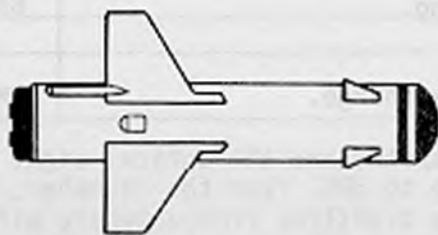
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# SWATTER

NAME <u>SWATTER</u>		<b>SWATTER</b>		DEVELOPER _____	
DESIGNATION <u>AT-2</u>				COUNTRY <u>USSR</u>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	
				TARGETS <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
CHARACTERISTICS			PERFORMANCE		
LENGTH: 1.13m (3.7') DIAMETER: 13cm (0.4') SPAN: 66cm (2.2') WEIGHT: 25kg (55#) OTHER: _____			RANGE: Max: 3000m (1.9m) Min: 500m (0.3mi) ALTITUDE: Line of sight. SPEED: Subsonic (150m/s) OTHER: _____		
			BASIS FOR LAUNCH <u>Missile readied.</u> <u>Target in sight.</u> _____ _____		
			<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Vehicle mounted, wire guided, short range, anti-tank missile system.		USSR	
AIRFRAME		Stubby cylindrical body with blunt nose. Large cruciform wing rear and small fins forward.		USSR	
PROPULSION		Single stage solid propellant.		USSR	
GUIDANCE		Wire command to line-of-sight with IR homing. Visual sighting. Elevon control.		USSR	
FUZING		Contact.		USSR	
WARHEAD		High explosive armor piercing.		USSR	
REMARKS					
<p>The Swatter missile system has apparently been designed specifically for the BRDM armored amphibious recon vehicle. The standard mount carries four missiles mounted upon guides, with spares probably carried within the vehicle. Apparently the operator keeps his sight on the target, picks up the missile after launch by means of wing mounted flares and uses a joystick type control to move the missile onto the target line of sight.</p> <p>The literature describes both a direct radio command, as well as a wire command, so perhaps there are two versions of Swatter.</p> <p>Within USSR, the Swatter is thought to have completely replaced the Snapper AT-1, but the latter is still probably used in other countries.</p>					
USERS		KEY DATES		COSTS	
USSR Bulgaria Czechoslovakia E. Germany Egypt Hungary Poland Romania		Syria PRESENT STATUS: Operational. IOC: 1960s.		UNIT COSTS: LAUNCH UNIT: QUANTITIES TOTAL TO DATE:	

# SWATTER

OTHER INFORMATION:

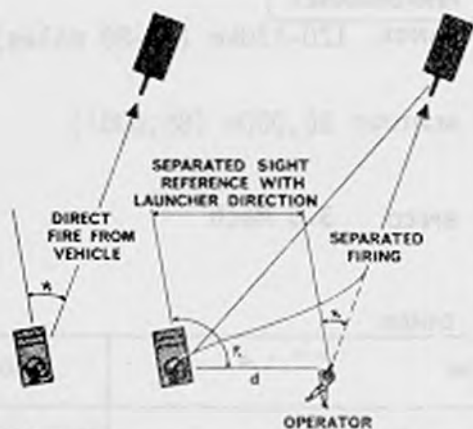


# SWINGFIRE

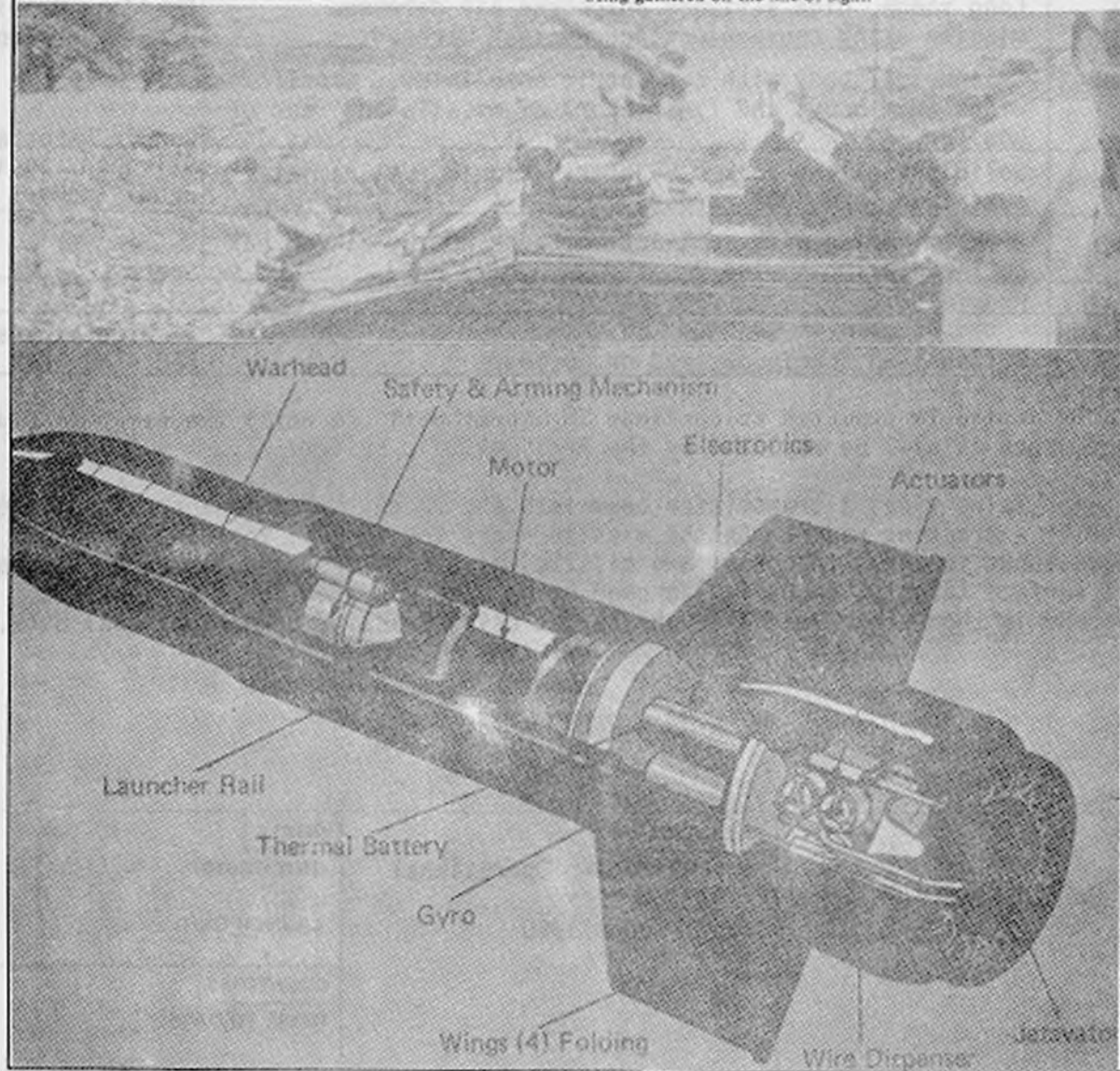
NAME <b>SWINGFIRE</b>		<b>SWINGFIRE</b>		DEVELOPER <b>British Aerospace</b>	
DESIGNATION <b>--</b>				COUNTRY <b>Great Britain</b>	
MISSION		TRAJECTORY		LAUNCHED FROM	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
				<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MAN <input type="checkbox"/> OTHER	
CHARACTERISTICS				TARGETS	
LENGTH: 1.07m (3.5') DIAMETER: 17cm (.56') SPAN: 39cm (1.28') WEIGHT: 2.73kg (60#) OTHER:		BASIS FOR LAUNCH <u>Optical sight</u> <u>on target.</u>		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<input type="checkbox"/> SOFT. INSTALL <input checked="" type="checkbox"/> VEHICLES ARMORED <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
				PERFORMANCE	
				RANGE: 4km (2.5 miles) ALTITUDE: Line of sight SPEED: Subsonic OTHER:	
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM	Long range, command controlled, vehicle mounted, anti-tank weapon capable of destroying heavy armor.		British Aerospace Dynamics Group		
AIRFRAME	Cylindrical body with small diameter forward section. Flipout wings at rear. Ogival nose.		British Aerospace		
PROPULSION	Dual thrust (boost and sustain) solid propellant rocket motor.		Imperial Metal Industries		
GUIDANCE	Wire command to line-of-sight with optical sighting and thrust vector control steering.		British Aerospace Barr and Stroud		
FUZING	Contact				
WARHEAD	6.8kg (15#) high explosive hollow charge.		EMI		
REMARKS	The main units of the Swingfire system are the optical sight unit and the launcher unit. The operator can be up to 325' from the launcher, the missile being automatically gathered on to his sightline from anywhere within an arc of 90 degrees. A launch angle of +35 degrees allows the vehicle to be hidden behind a crest. Infantry Swingfire (BEESWING) is fired from three pairs of launchers mounted on a Land-Rover; the launchers can be removed and the missiles fired from the ground if desired. A manportable version is available.				
USERS	Great Britain Egypt-license agreement Belgium Kenya		KEY DATES		COSTS
			PRESENT STATUS: Operational		UNIT COSTS: Estimated at \$15,000 EA/FY 81 \$s
			IOC: 1969		LAUNCH UNIT:
					QUANTITIES
					TOTAL TO DATE: Over 30,000

## SWINGFIRE

OTHER INFORMATION:



*Left:* For direct fire from the vehicle the sighting unit feeds the angle between the launcher direction and the sight line to the target directly into the programme generator. When using the separated sight it is first harmonised with the launcher direction and the separation distance "d" manually set in the programme generator. After launch the programme generator will automatically gather the missile onto the operator's line of sight. *Above:* By setting the angle of elevation of the hill crest in the programme generator, the missile will automatically clear the crest before being gathered on the line of sight.

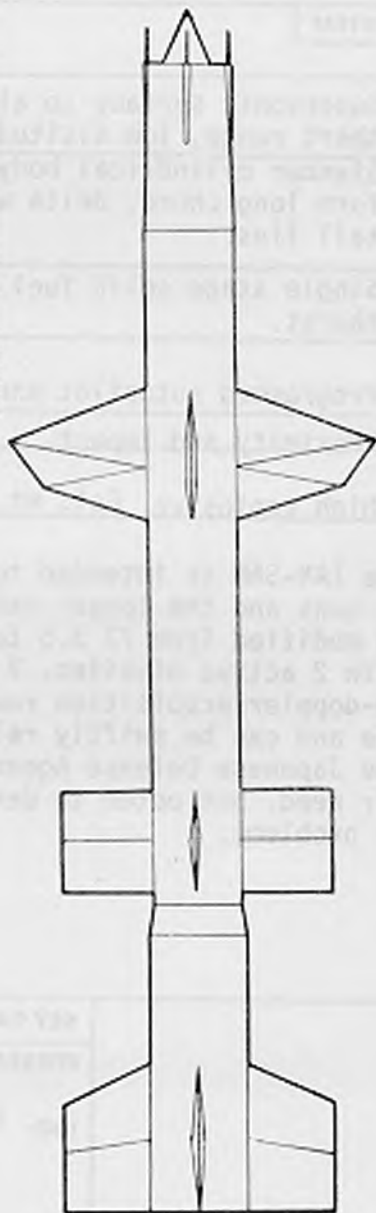
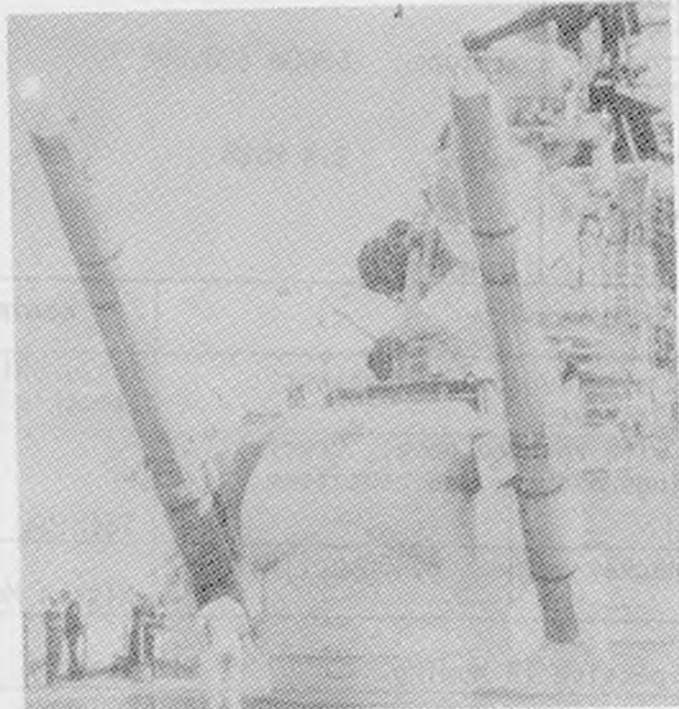


# TALOS

NAME <u>TALOS</u>		DESIGNATION <u>RIM-8A-J</u>		DEVELOPER <u>Bendix</u>		COUNTRY <u>USA</u>		SERVICE <u>Navy</u>							
MISSION		TRAJECTORY		LAUNCHED FROM		TARGETS									
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input checked="" type="checkbox"/> SHIPS <u>later versions</u> <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT. INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER					
CHARACTERISTICS				PERFORMANCE											
LENGTH: 9.53m (31.3')				DIAMETER: .76m (2.5')				SPAN: 2.9m (9.5')				WEIGHT: 3175kg (7000#)			
OTHER:				BASIS FOR LAUNCH <u>Target detected, illuminated and tracked. Missile readied on launcher</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				RANGE: 120-130km (75-80 miles)				ALTITUDE: 26,000m (85,000')			
SPEED: 3.0 Mach				OTHER:											
SYSTEM/SUBSYSTEM			DESCRIPTION					CONTRACTOR							
OVERALL SYSTEM			Long range, high altitude shipborne air defense missile using conventional or nuclear warheads.					APL/John Hopkins W/S Integration							
AIRFRAME			Cylindrical body with concentric nose inlet. Cruciform wings (mid body) and fins (rear) of missile and rear of booster.					Bendix Aerospace							
PROPULSION			Solid propellant rocket booster. Liquid fuel ramjet sustainer - 20,000# thrust.					Allegheny-boosters Bendix-ramjet							
GUIDANCE			RF beam riding with semi-active radar homing RIM-8H has anti-radiation homing.					Sperry							
FUZING			Proximity												
WARHEAD			Optional HE continuous rod or nuclear					?- High Explosive AEC - Nuclear							
REMARKS															
<p>Talos is expected to continue in operational use until the early to mid eighties, when it will be replaced by the Aegis missile system.</p> <p>Talos rides a transmitter beam into the target, which has previously been acquired by a tracking radar. As the missile nears the target, the divergence of the beams tends to zero, the beams and missile being monitored and guided by a computer. Against surface targets, TALOS is launched using memory system for the first six seconds and is then programmed into the target using tracking or navigational data.</p>															
USERS				KEY DATES				COSTS							
United States				PRESENT STATUS: Operational				UNIT COSTS:							
				IOC: About 1960				LAUNCH UNIT:							
								QUANTITIES							
								TOTAL TO DATE:							

# TALOS

OTHER INFORMATION:



# TAN-SAM

NAME <u>TAN-SAM</u>		<b>TAN-SAM</b>		DEVELOPER <u>Toshiba/Kawasaki</u>	
DESIGNATION _____				COUNTRY <u>Japan</u>	
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input checked="" type="checkbox"/> BOOST/BOOST GUIDE <input type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
		<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b> LENGTH: 2.69m (8.8') DIAMETER: 16cm (0.5') SPAN: 58cm (1.9') WEIGHT: 100kg (220#) OTHER: _____		<b>BASIS FOR LAUNCH</b> <input checked="" type="checkbox"/> Missile activated <input type="checkbox"/> Target data inputed.		<b>PERFORMANCE</b> Estimated RANGE: 30km (16 mi) ALTITUDE: 6000m (20,000') SPEED: 2.4 Mach OTHER: _____	
<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET					
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Supersonic surface to air missile for use against short range, low altitude targets.		Tokyo Shibaura Electric Co. Toshiba	
<b>AIRFRAME</b>		Slender cylindrical body with rounded nose. Cruciform long chord, delta wings midbody and cruciform tail fins.		Toshiba	
<b>PROPULSION</b>		Single stage solid fuel rocket motor. 8,400kg (18,500#) thrust.		Nissan Motor Co.	
<b>GUIDANCE</b>		Programmed autopilot and passive IR homing.		Toshiba	
<b>FUZING</b>		Proximity and impact.			
<b>WARHEAD</b>		High explosive. Est. wt. = 8-10kg (17-22#)			
<b>REMARKS</b>					
<p>The TAN-SAM is intended to fill the defense gap between conventional anti-aircraft guns and the longer range Hawk air defense missiles. The system is mounted on a modified Type 73 3.5 ton truck. Each truck is equipped with twin launchers with 2 active missiles, 2 in ready reserve, and 4 in storage. A multi-target pulse-doppler acquisition radar provides the target data. The system is highly mobile and can be swiftly relocated.</p> <p>The Japanese Defense Agency considered Roland, Rapier and Crotales as candidates to fill their need, but opted to develop a domestic missile to minimize cost escalation and delivery problems.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
Japan		PRESENT STATUS: Development		UNIT COSTS: \$220,00 FY 1980	
		IOC: Expected 1982		LAUNCH UNIT: \$7.6M	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: About 200 to date including R&D missiles	



**TAN-SAM**

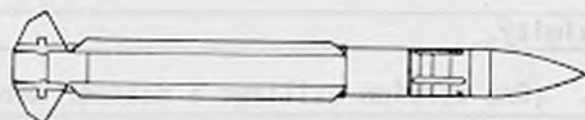
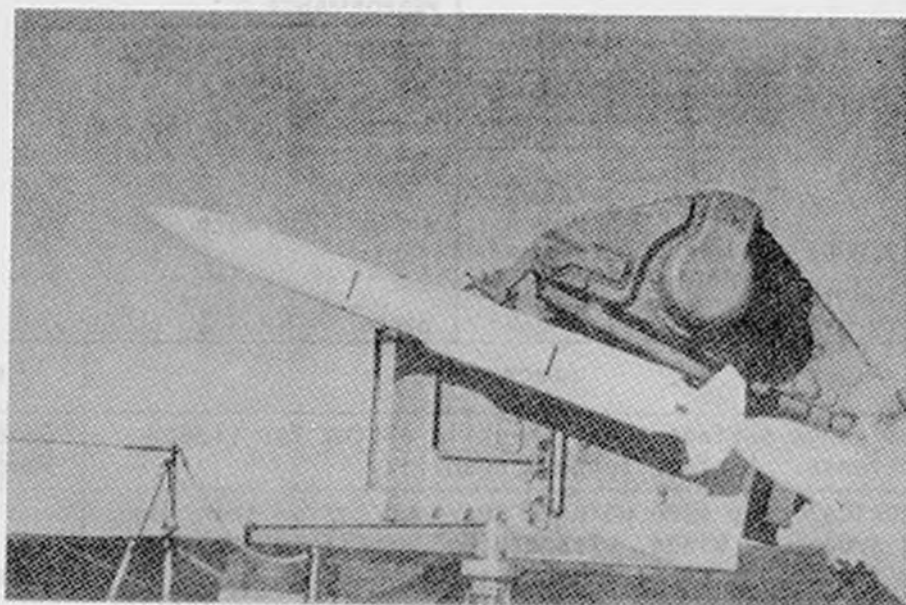
OTHER INFORMATION:

No photographs available

NAME <u>TARTAR</u>		<b>TARTAR</b>		DEVELOPER <u>General Dynamics</u>			
DESIGNATION <u>RIM 24B/C</u>				COUNTRY <u>USA</u>			
				SERVICE <u>Navy</u>			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER			
<b>CHARACTERISTICS</b> LENGTH: 4.57m (15.0') DIAMETER: 34cm (1.1') SPAN: 1.07m (3.5') WEIGHT: 590kg (1300#) OTHER:		<b>BASIS FOR LAUNCH</b> <u>Target detected and illuminated. Missile ready and launcher aimed</u> <input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: 16+km (10+mi) ALTITUDE: 12,000m (40,000') SPEED: 3.0 Mach OTHER:			
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>			
<b>OVERALL SYSTEM</b>		Medium range surface-to-air missile system providing primary air defense for destroyers and secondary air defense for cruisers.		General Dynamics Pomona Division			
<b>AIRFRAME</b>		Cylindrical body with pointed nose. Long chord, narrow span wings, and small trapezoidal tail surfaces.		General Dynamics Pomona Division			
<b>PROPULSION</b>		Dual thrust, solid-propellant rocket motor Mark 27.		Aerojet			
<b>GUIDANCE</b>		RF semi-active radar homing.		General Dynamics			
<b>FUZING</b>		Contact and proximity fuze.		General Dynamics			
<b>WARHEAD</b>		High explosive.					
<b>REMARKS</b>							
<p>Two versions of the Tartar are in service: the -24B Improved Tartar, and the -24C Tartar Retrofit. Both are in the process of being replaced by the Standard MR missiles.</p> <p>Tartar employs fully automatic launcher magazine, and handling and loading system (MK 11, 13, -22). Targets are designated to the system by ship's on-board computer after acquisition by the ship's surveillance radar. The computer also provides the launcher pointing signals, and keeps target illuminated until intercept.</p>							
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>			
United States Australia France Germany Iran Italy Japan Netherlands Spain		PRESENT STATUS: Being phase out of operational use IOC: About 1961		UNIT COSTS: LAUNCH UNIT:			
				<b>QUANTITIES</b>			
				TOTAL TO DATE:			

# TARTAR

OTHER INFORMATION:

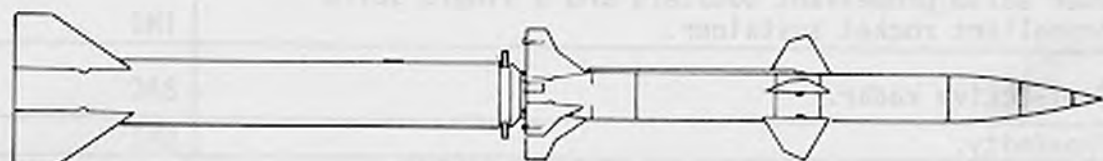
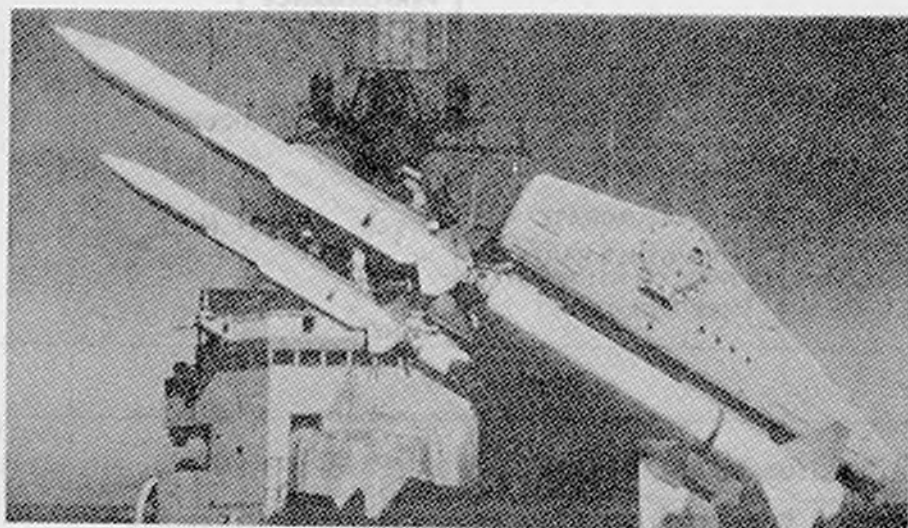


# TERRIER

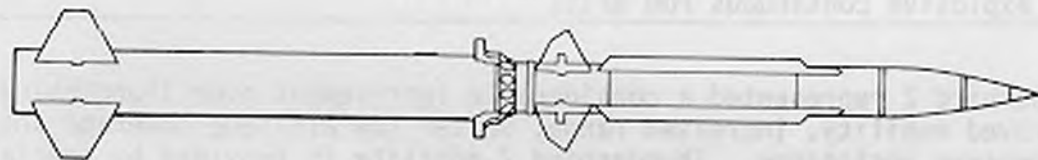
NAME <u>TERRIER</u>		<b>TERRIER</b>		DEVELOPER <u>General Dynamics</u>							
DESIGNATION <u>RIM-2 A-F</u>				COUNTRY <u>USA</u>		SERVICE <u>Navy</u>					
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER	
<b>CHARACTERISTICS</b> LENGTH: 8.02m (26.3') w/booster DIAMETER: M: 34.3cm (1.1') B: 45.7cm (1.5') SPAN: 1.57m (f.2') WEIGHT: 1360kg (3,000#) OTHER: Missile length (3.96m)(13.0')				<b>BASIS FOR LAUNCH</b> <input checked="" type="checkbox"/> Target detected and tracked <input checked="" type="checkbox"/> Missile readied & launcher aimed <input checked="" type="checkbox"/> FIRE/TRACK Midcourse <input checked="" type="checkbox"/> FIRE/ILLUMINATE Homing <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET				<b>PERFORMANCE</b> RANGE: 35km (21.5mi) ALTITUDE: 20,000m (65,000') SPEED: 2.5 mach OTHER:			
<b>SYSTEM/SUBSYSTEM</b>			<b>DESCRIPTION</b>				<b>CONTRACTOR</b>				
<b>OVERALL SYSTEM</b>			Medium range surface-to-air missile system for fleet air defense. Surface target capability.				General Dynamics Pomona Division				
<b>AIRFRAME</b>			Cylindrical body with pointed nose and narrow span long chord cruciform wings. Trapezoidal cruciform tail surfaces for both missile and booster.				General Dynamics				
<b>PROPULSION</b>			Two stage solid propellant rocket-boost and sustain.				Atlantic Research				
<b>GUIDANCE</b>			Beam rider with semi-active radar homing.				General Dynamics				
<b>FUZING</b>			Contact or proximity.								
<b>WARHEAD</b>			High explosive. (One version utilized a nuclear warhead)								
<b>REMARKS</b>			The Terrier is progressively being replaced by the Standard missile.  Terrier is launched from the MK-10 twin rail launcher supported by automatic magazine and loading arrangements.								
<b>USERS</b>			<b>KEY DATES</b>			<b>COSTS</b>					
United States Italy Netherlands			PRESENT STATUS: Being phased out of operational use. IOC: 1956 1963 Advanced Terrier			UNIT COSTS:					
						LAUNCH UNIT:					
						QUANTITIES					
						TOTAL TO DATE:					

# TERRIER

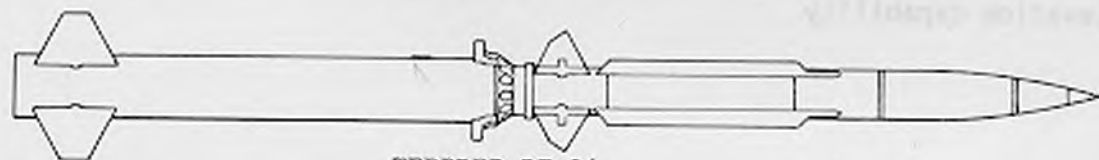
OTHER INFORMATION:



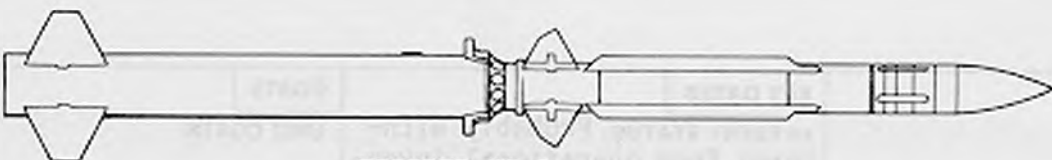
TERRIER BW-1



TERRIER BT-3




TERRIER BT-3A



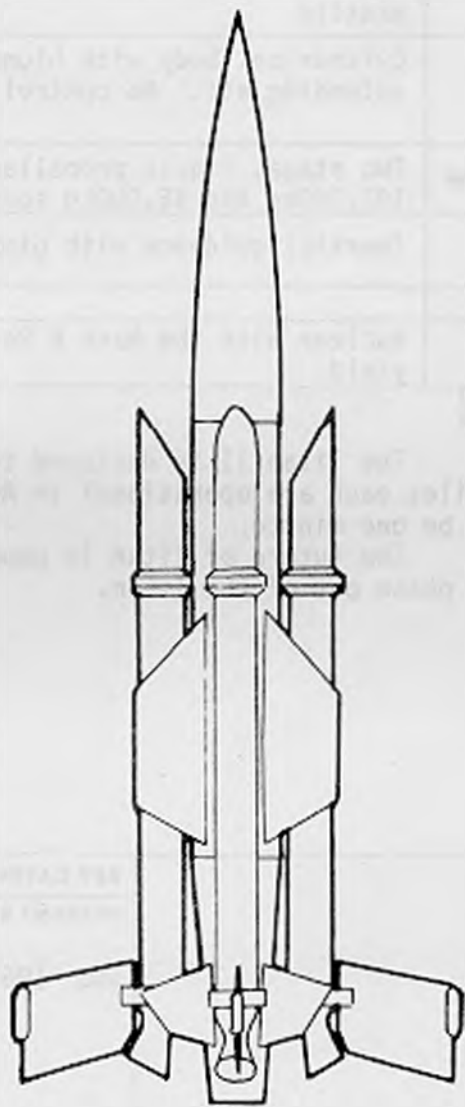
TERRIER HT-3

## THUNDERBIRD 2

NAME <u>THUNDERBIRD 2</u>		<b>THUNDERBIRD 2</b>		DEVELOPER <u>British Aircraft</u>	
DESIGNATION _____				COUNTRY <u>UK</u>	
				SERVICE <u>Army</u>	
MISSION	TRAJECTORY	LAUNCHED FROM	<input checked="" type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____	TARGETS	
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input checked="" type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	<input type="checkbox"/> SHIPS <input checked="" type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		
CHARACTERISTICS LENGTH: 6.35m (20.0')  DIAMETER: 52.7cm (1.7')  SPAN: 1.6m (5.3')  WEIGHT: Classified  OTHER:			PERFORMANCE RANGE: 80km (50 miles)  ALTITUDE: Unknown  SPEED: 2.0+ Mach  OTHER:		
			BASIS FOR LAUNCH <u>Target illuminated by TIR.</u>		
			<input type="checkbox"/> FIRE/TRACK <input checked="" type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET		
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR	
OVERALL SYSTEM		Mobile, medium to high level, air defense system.		British Aircraft Corp - Now BAe	
AIRFRAME		Cylindrical body with pointed nose and cruciform cropped delta wings mid body. Four strap-on boosters, each with a tail fin.		BAC	
PROPULSION		Four solid propellant boosters and a single solid propellant rocket sustainer.		IMI	
GUIDANCE		Semi-active radar.		BAC	
FUZING		Proximity.		EMI	
WARHEAD		High explosive continuous rod W/II.			
REMARKS					
<p>Thunderbird 2 represented a considerable improvement over Thunderbird 1. It provided improved mobility, increased range, better low altitude coverage and greater countermeasure resistance. Thunderbird 2 mobility is provided by specialized truck and trailer. The launcher, mounted on a trailer, provides 360° training and over 90°+ elevation capability.</p> <div style="text-align: center; margin-top: 20px;">  </div>					
USERS		KEY DATES		COSTS	
UK Libya Saudi Arabia (withdrawn)		PRESENT STATUS: Probably withdrawn from operational inventory. Thunderbird 1 - 1960 Thunderbird 2 - 1965		UNIT COSTS:  LAUNCH UNIT:	
				QUANTITIES  TOTAL TO DATE:	

## THUNDERBIRD 2

OTHER INFORMATION:



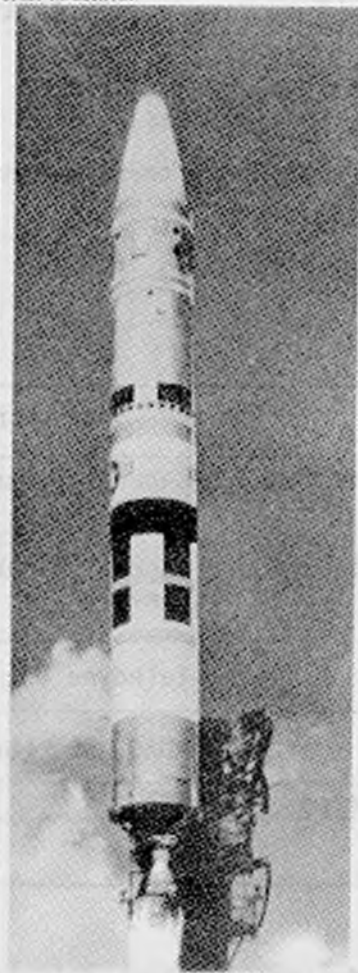
# TITAN II

NAME <u>TITAN II</u>		<b>TITAN II</b>		DEVELOPER <u>Martin-Marietta</u>	
DESIGNATION <u>LGM-25C</u>				COUNTRY <u>USA</u>	
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input checked="" type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>	
<b>CHARACTERISTICS</b> LENGTH: 31.4m (103.0') DIAMETER: 3.05m (10') SPAN: No fins or wings WEIGHT: 149,690kg (330,000#) OTHER:			<b>PERFORMANCE</b> RANGE: 15,000km (9,300 mi) ALTITUDE: Ballistic - depends upon range Maximum about 1,500km (460 mi) SPEED: Ballistic - depends upon range OTHER:		
			<b>BASIS FOR LAUNCH</b> <u>Target data inputed.</u>		
			<input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>		<b>CONTRACTOR</b>	
<b>OVERALL SYSTEM</b>		Silo-launched, liquid-fueled, intercontinental ballistic missile.		Martin Marietta, Denver	
<b>AIRFRAME</b>		Cylindrical body with blunt conical nose. Two nozzles extending aft. No control surfaces.		Martin Marietta	
<b>PROPULSION</b>		Two stage, liquid propellant, rocket motors. 195,000kg and 45,000kg specific thrust.		Aerojet	
<b>GUIDANCE</b>		Inertial guidance with gimballed nozzle control.		General Motors Delco Electronics	
<b>FUZING</b>					
<b>WARHEAD</b>		Nuclear with the Mark 6 Re-entry Vehicle. 5+mt yield.		RV-General Electric W/H - AEC	
<b>REMARKS</b>					
<p>The Titan II is deployed in individual hardened silos. Three wings of 18 missiles each are operational in Arizona, Kansas and Arkansas. Reaction time is said to be one minute.</p> <p>The future of Titan is uncertain. DOD has several times suggested a gradual phase out of the Titan.</p>					
<b>USERS</b>		<b>KEY DATES</b>		<b>COSTS</b>	
USA		PRESENT STATUS: Operational		UNIT COSTS:	
		IOC: 1963		LAUNCH UNIT:	
				<b>QUANTITIES</b>	
				TOTAL TO DATE: 54 deployed	

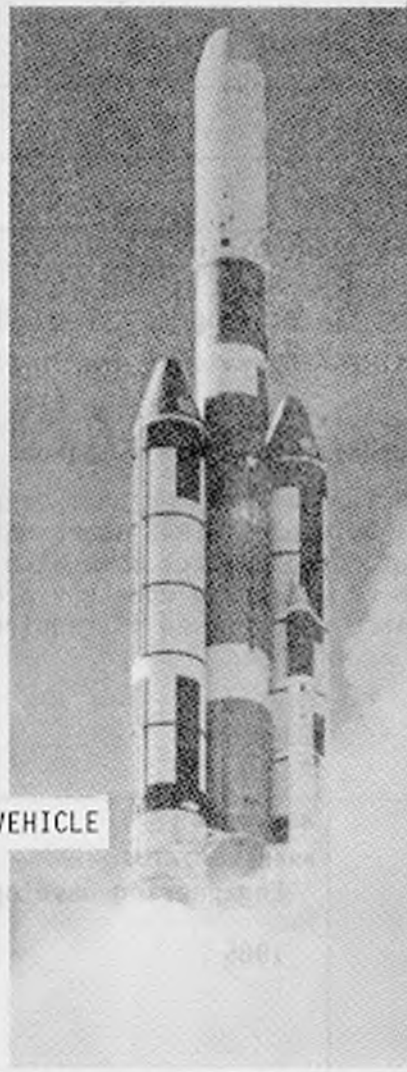
THE WORLD'S  
MISSILE  
SYSTEMS

## TITAN II

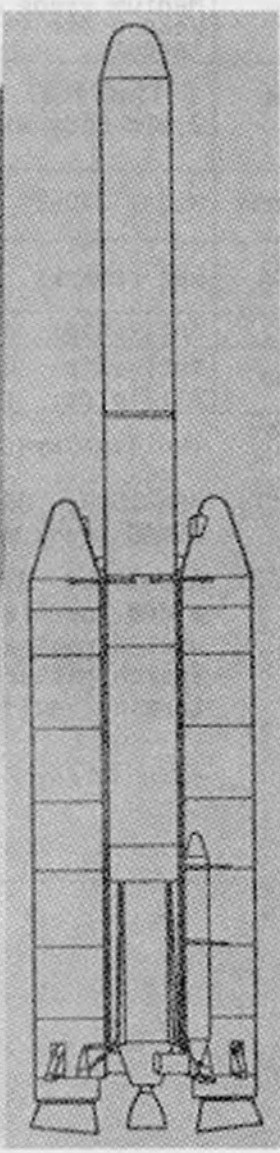
OTHER INFORMATION



TITAN MISSILE



TITAN LAUNCH VEHICLE



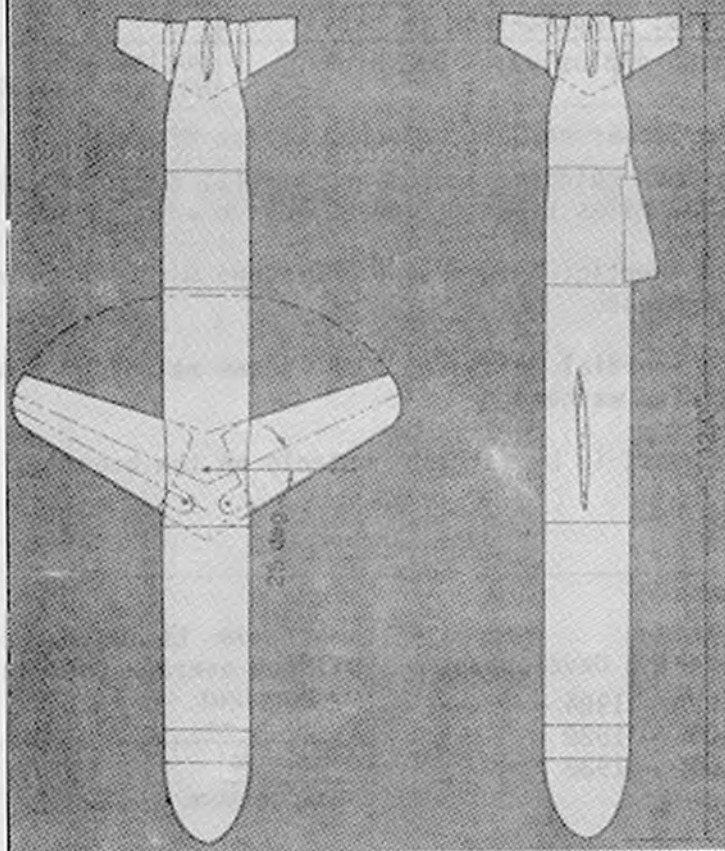
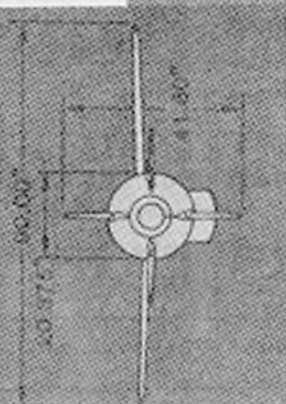
NAME TOMAHAWK II MRASM		TOMAHAWK MRASM		DEVELOPER General Dynamics				
DESIGNATION AGM-109 H/L				COUNTRY USA				
				SERVICE Air Force/Navy				
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input checked="" type="checkbox"/> A/C bomber		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		
				<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input type="checkbox"/> OTHER				
				<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER runways/ taxiways				
<b>CHARACTERISTICS</b> LENGTH: H 5.9m (19.5') L 4.9m (16.0') DIAMETER: H&L 53cm (1.75') SPAN: H 2.6m (8.6') WEIGHT: H 1410kg (3100#) L 1000kg (2200#) OTHER:			<b>PERFORMANCE</b> RANGE: -109H 465km (288mi) -109L 556km (346mi) ALTITUDE: Sea skimming or terrain-contour flying. SPEED: 885km/hr (550mph) OTHER:					
<b>SYSTEM/SUBSYSTEM</b>			<b>DESCRIPTION</b>			<b>CONTRACTOR</b>		
<b>OVERALL SYSTEM</b>			Medium range Air Force & Navy Standoff Conventional Weapon for tactical applications against land & sea targets.			General Dynamics/Convair		
<b>AIRFRAME</b>			Cylindrical body with extendable cruciform tail fins, 2 mid-body wings, and engine inlet.			General Dynamics/Convair		
<b>PROPULSION</b>			Model 370-IT Turbojet.			Teledyne CAE		
<b>GUIDANCE</b>			See remarks.			MDAC, St. Louis		
<b>FUZZING</b>			Anti-ship: delayed impact    Airfields: classified			TBD		
<b>WARHEAD</b>			Anti-ship: unitary, HE Airfields: two stage, shaped charge, HE			TBD		
<b>REMARKS</b>			Two Tomahawk II MRASM variants are in FSED: <ol style="list-style-type: none"> <li>AGM-109H: USAF airfield attack missile. TERCOM-aided inertial guidance, DSMAC scene matching terminal guidance. Runway cratering submunitions.</li> <li>AGM-109L: USN land attack and anti-ship missile. Land attack is TERCOM-aided inertial guidance, DSMAC scene matching terminal guidance. Anti-ship uses direct autonomous attack mode with I<sup>2</sup>R seeker for terminal guidance. Search pattern or midcourse update via data link with I<sup>2</sup>R seeker for terminal guidance can be used if required.</li> </ol>					
<b>USERS</b>			<b>KEY DATES</b>			<b>COSTS</b>		
USA			PRESENT STATUS: Engineering Development IOC: 1985			UNIT COSTS: TBD LAUNCH UNIT:		
						<b>QUANTITIES</b>		
						TOTAL TO DATE: 0		

# TOMAHAWK MRASM

OTHER INFORMATION:

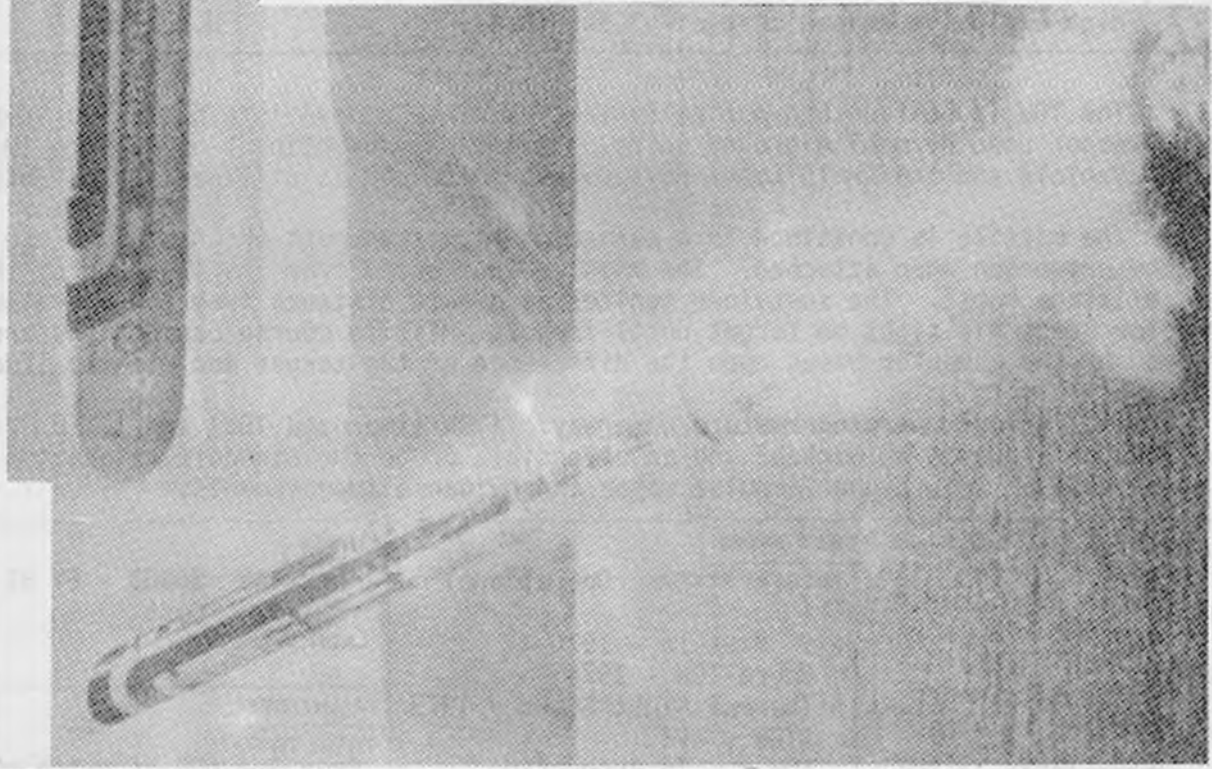
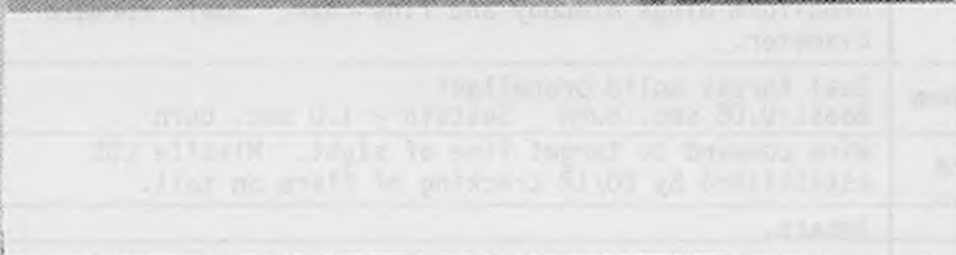
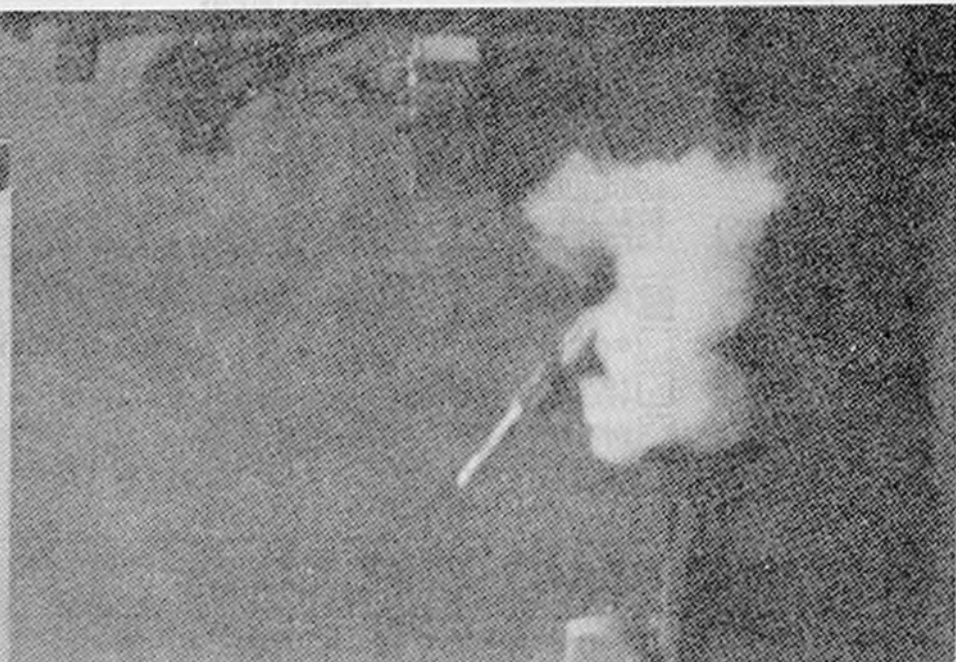
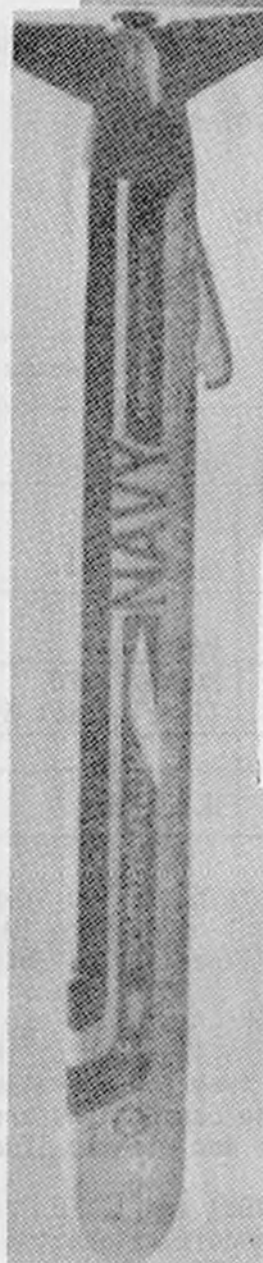
**Data**

Launch weight: 1,295 lb  
Payload weight: 780 lb  
Fuel weight: 233 lb  
Max Mach number:  
(at sea level) 0.83

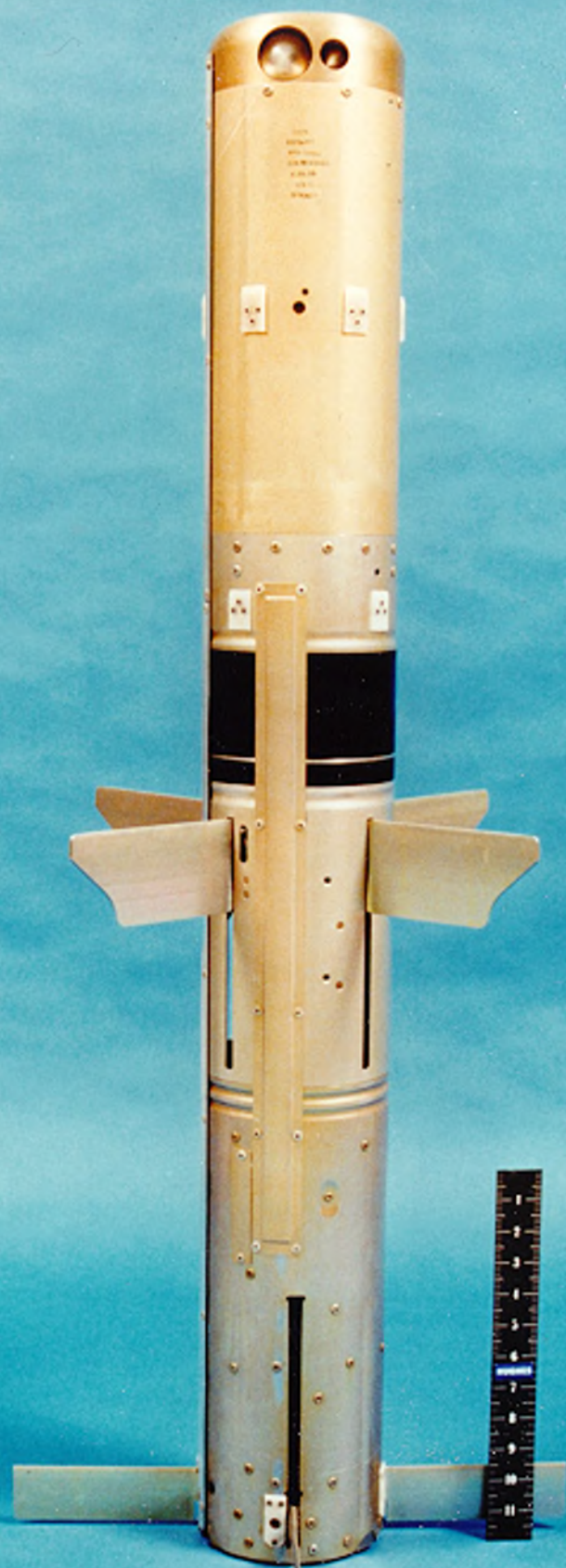


NAME TOMAHAWK, SLCM		TOMAHAWK SLCM		DEVELOPER General Dynamics			
DESIGNATION BGM-109 A/B/C				COUNTRY USA			
				SERVICE Navy			
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input checked="" type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>TARGETS</b> <input checked="" type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	
		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Submarines</u>		<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Land installations</u>			
<b>CHARACTERISTICS</b> LENGTH: 5.55m (18.2') DIAMETER: 0.53m (1.75') SPAN: Max 2.62m (8.6') WEIGHT: -A 1200kg (2650#) -B 1230kg (2700#) -C 1270kg (2800#) OTHER: length 6.25m w/booster		<b>BASIS FOR LAUNCH</b> Missile inputed with terrain data (land) target location and terminal approach data. <input type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS OR ILLUMINATES <input checked="" type="checkbox"/> FIRE AND FORGET		<b>PERFORMANCE</b> RANGE: -109A 2500km (1550mi) -109B 460km (288mi) -109C 1300km (806mi) ALTITUDE: Low level, down to few meters SPEED: 885km/hr (550mph) OTHER:			
SYSTEM/SUBSYSTEM		DESCRIPTION		CONTRACTOR			
OVERALL SYSTEM		Submarine/ship launched cruise missile for strategic and tactical applications against land and sea (ship) targets.		General Dynamics, Convair			
AIRFRAME		Torpedo shaped body with extendable cruciform tail fins, 2 mid-body wings, and engine inlet.		General Dynamics, Convair			
PROPULSION		Solid propellant rocket booster -7000# thrust vane control. Turfopan engine.		Rocket-Atlantic Res. Engine-Williams Res.			
GUIDANCE		See Remarks.		Inertial - Litton Tercom - McD Alt. Honeywell			
FUZING		Delayed impact - ship targets: impact-land targets					
WARHEAD		-109A - nuclear; -109B - high explosive; -109C high explosive shaped charge.		Nuclear-DOE Hi. Explos.-NWC			
REMARKS		There are 3 versions of the Submarine/Ship Launched Cruise Missile: <b>BGM-109B</b> - Ship targets. Modified Harpoon guidance including inertial guidance, radar altimeter, and active homing. About 300 miles range. High explosive w/h. <b>BGM-109A</b> - Land targets. TERCOM-aided inertial guidance, DSMAC scene matching terminal guidance. 1500 mile range. Nuclear warhead. <b>BGM-109C</b> - Land targets. TERCOM-aided inertial guidance, DSMAC scene matching terminal guidance. 800 mile range. High explosive warhead.  For all missiles, control during boost is by jet tab controls on the booster. Air launch has been demonstrated.					
USERS		KEY DATES		COSTS			
USA		PRESENT STATUS: Engineering Development		UNIT COSTS: Estimated \$2 million average cost in 1982			
		IOC: -109A - 1984 -109B - 1982 -109C - 1982		LAUNCH UNIT: \$'s. --			
				QUANTITIES			
				TOTAL TO DATE: ~ 75			

OTHER INFORMATION:

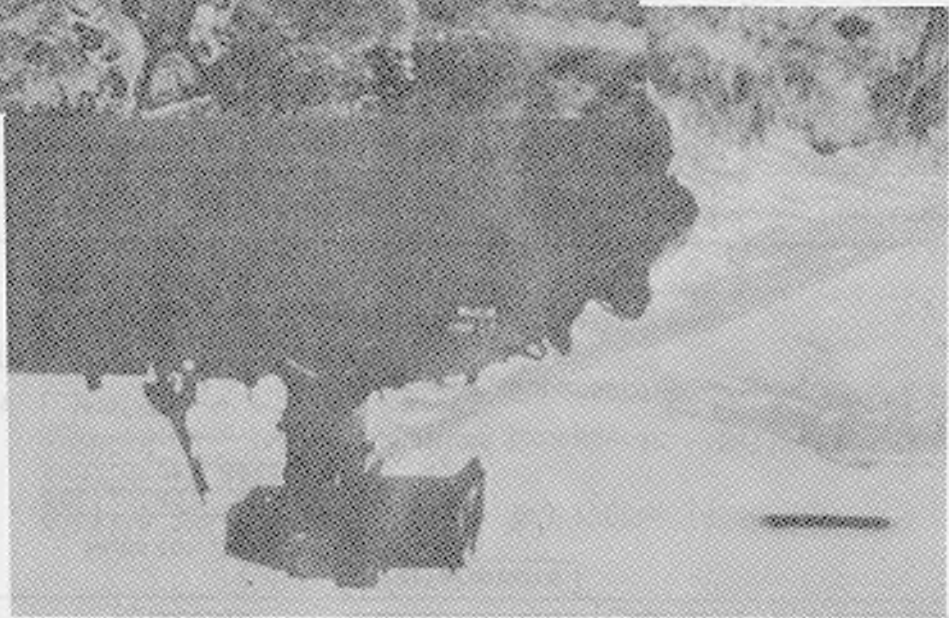
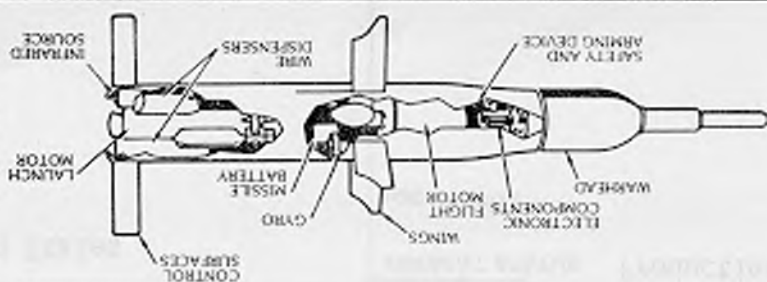


NAME: TOW/IMP. TOW/TOW2		<b>TOW</b>		DEVELOPER: Hughes							
DESIGNATION: BGM-71A				COUNTRY: USA							
				SERVICE: Army							
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input checked="" type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input checked="" type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<b>MOBILE LAUNCHER</b> <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER: Helicopters		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER: Bunkers	
<b>CHARACTERISTICS</b> LENGTH: 1.16m (3.8') DIAMETER: 15.2cm (0.5') SPAN: .34m (1.1') WEIGHT: 24.5kg (54#) OTHER: 3.9kg (8.6#) Warhead				<b>PERFORMANCE</b> RANGE: 3.7km (2.3 mi) - Helicopter Launched ALTITUDE: Target line of sight SPEED: High subsonic OTHER:							
<b>BASIS FOR LAUNCH</b> Load and lock missile, sight target.				<input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET							
SYSTEM/SUBSYSTEM		DESCRIPTION				CONTRACTOR					
OVERALL SYSTEM		Tube launched, optically tracked, wire guided anti-tank missile. Replaces 106mm recoilless rifle.				Hughes					
AIRFRAME		Cylindrical body with rounded nose. Small foldout cruciform wings midbody and fins rear. Small forward diameter.				Hughes					
PROPULSION		Dual thrust solid propellant. Boost-0.05 sec. burn Sustain - 1.0 sec. burn				Hercules					
GUIDANCE		Wire command to target line of sight. Missile LOS established by EO/IR tracking of flare on tail.				Hughes - EO TI - Thermal Sight					
FUZING		Impact.									
WARHEAD		High explosive shaped charge - 3.9kg (8.6#)				U.S. Army					
<b>REMARKS</b> <p>The TOW (tube-launched optically-tracked wire-guided) is a battalion level anti-tank weapon used by mobile ground units, the Infantry Fighting Vehicle, the Improved TOW Vehicle and the AH-15 Cobra helicopter. A tripod is utilized for infantry application.</p> <p>The missile is contained in a sealed storage transport which becomes the launch tube extension when attached. The missile is ejected from the launcher by the short first stage boost. The sustainer ignites at a safe distance from the operator. The operator keeps his sight on target until impact. Missile course connections are established by the computer based upon the difference of the target and missile line of sight.</p> <p>Two improvement programs are underway: ITOW (Improved TOW) and TOW 2. ITOW incorporates an improved 5" warhead and an extensible probe for standoff detonation. TOW 2 involves a 6" W/H, higher impulse motor and guidance improvements.</p>											
<b>USERS</b> Italy USA Austria Canada Denmark Ethiopia Germany Greece Iran Israel		Oman Pakistan S. Arabia S. Korea Spain Sweden Taiwan Turkey UK N. Yemen		<b>KEY DATES</b> PRESENT STATUS: Operational ioc: Missile - 1970 Cobra-TOW - 1975 Thermal Night Sight - 1979 ITOW - 1981 TOW 2 - In Production		<b>COSTS</b> UNIT COSTS: \$6600 - FY 81 Cost LAUNCH UNIT: <b>QUANTITIES</b> TOTAL TO DATE: Over 300,000 of which about 125,000 were export.					



BGM71F TOW2B





OTHER ESTABLISHMENTS

TOW

MISSILE  
 SYSTEMS  
 S&B'S

## TRIDENT I/II

NAME TRIDENT I/II  
 DESIGNATION UGM-96A, C-4

DEVELOPED BY Lockheed  
 COUNTRY USA  
 SERVICE Navy

<b>Mission</b>	<b>Trajectory</b>	<b>Launched from</b>	<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input type="checkbox"/> MAN <input checked="" type="checkbox"/> OTHER <u>Submarines</u>	<b>Targets</b>	<input type="checkbox"/> SOFT INSTALL <input type="checkbox"/> VEHICLES <input type="checkbox"/> PERSONNEL <input checked="" type="checkbox"/> OTHER <u>Strategic targets</u>
<input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE	<input type="checkbox"/> GRAVITY/GLIDE <input type="checkbox"/> BOOST/BOOST GLIDE <input type="checkbox"/> BOOST SUSTAIN <input checked="" type="checkbox"/> BALLISTIC	<input type="checkbox"/> LAND INSTALL <input type="checkbox"/> SHIP <input type="checkbox"/> A/C-FIGHTER <input type="checkbox"/> A/C-OTHER		<input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL	

<b>Characteristics</b>	<b>Performance</b>
<p>LENGTH: 10.4m (34.1')</p> <p>DIAMETER: 1.89m (6.2')</p> <p>SPAN: No wings or fins</p> <p>WEIGHT: 33,200kg(73,000#)</p> <p>OTHER:</p> <p style="text-align: center;">BASIS FOR LAUNCH  <u>Missile systems</u>  <u>activated. Position</u>  <u>and target data</u>  <u>inputed.</u></p> <p><input type="checkbox"/> FIRE/TRACK  <input type="checkbox"/> FIRE/ILLUMINATE  <input type="checkbox"/> FIRE/OTHER PARTY          TRKS. OR ILLUMINATES  <input checked="" type="checkbox"/> FIRE AND FORGET</p>	<p>RANGE: T-J 7700km (4800 mi)</p> <p>ALTITUDE Exospheric - Ballistic</p> <p>SPEED Supersonic</p> <p>OTHER:</p>

System/Subsystem	DESCRIPTION	CONTRACTOR
OVERALL MISSILE SYSTEM	Submerged-submarine-launched, long range strategic missile.	Lockheed
AIRFRAME	Fat cylindrical body with ogive nose and long nose probe.	Lockheed
PROPULSION	Three stage, solid propellant, advanced technology.	Thiokol/Hercules
GUIDANCE	Mark 5 self-contained inertial guidance with stellar sensor for course update.	GD/MIT/Hughes/Raytheon
FUZING	Altitude or ground.	
WARHEAD	Nuclear using both MRV and Evader reentry vehicles and penetration aids.	DOE

**Remarks**

The Trident Strategic Weapon System includes the development of the Trident missile system - tailored to the Trident submarine, but compatible with the Poseiden FBM submarine. Each Trident submarine will carry 24 Trident missiles in Poseiden-sized launch tubes, and the Trident will be retrofitted to the Poseiden submarine. Fire control is effected through the Mk98 fire control system for Trident class and Mk88 for Poseiden class submarines.

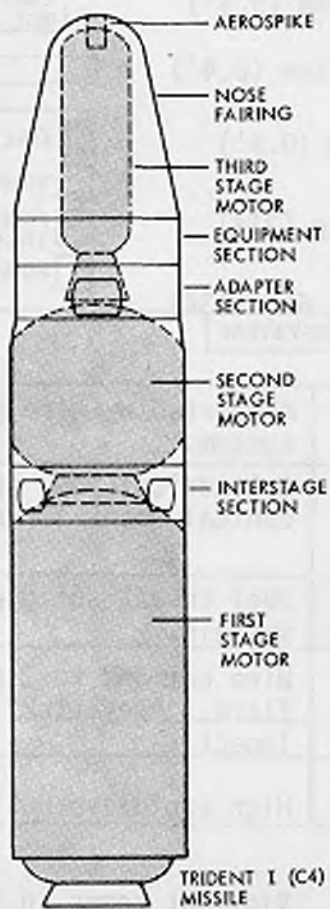
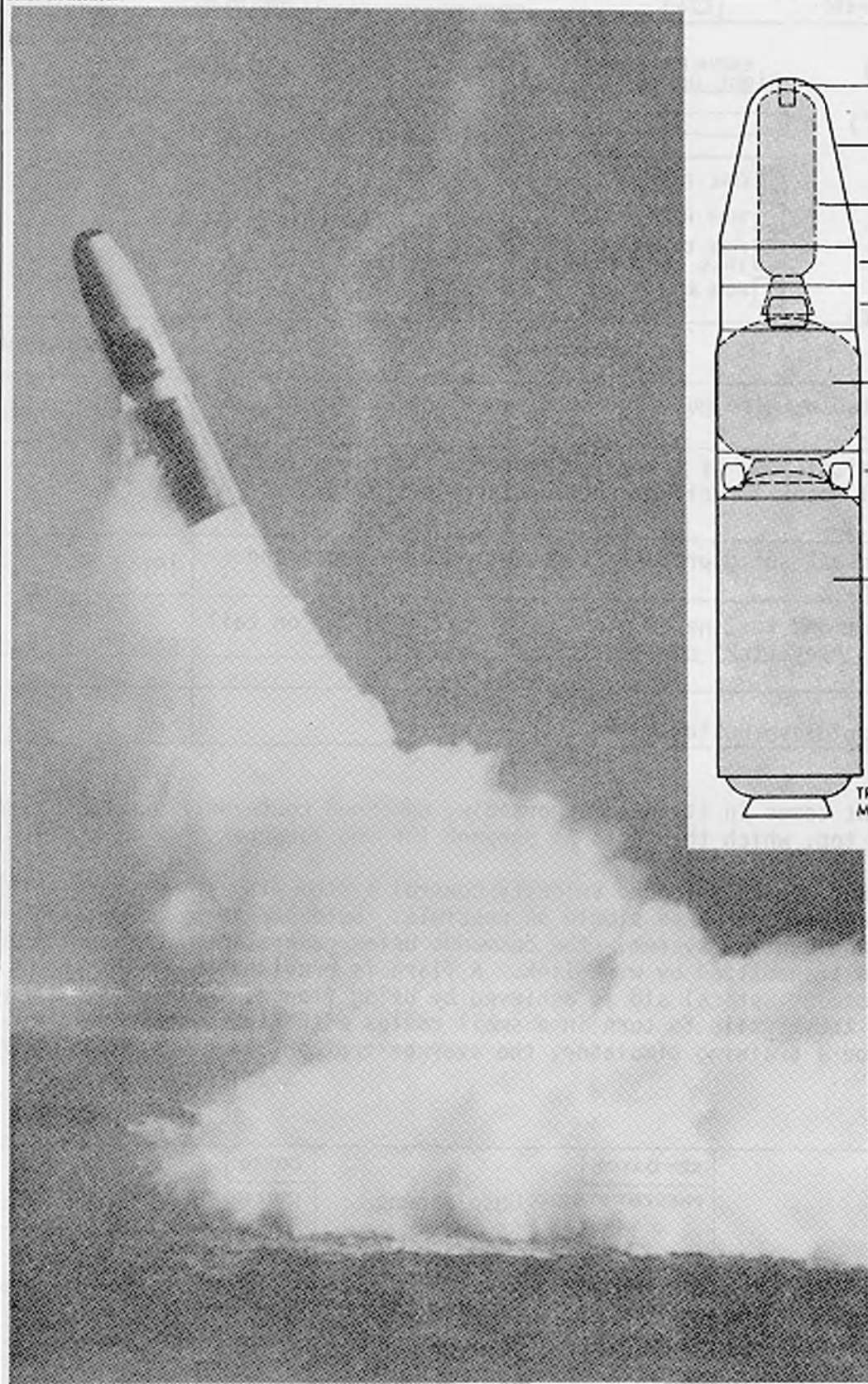
The missile is ejected by the pressure of expanding gas in the launch tube. At a specific distance from the submarine, the first stage ignites. Corrections for errors in launch position and reentry maneuvers may be made in flight by means of the Post-Boost Vehicle (PBV).

A Trident II missile is planned to utilize the full length of the Trident launched tubes for increased range and performance.

<b>Users</b>	<b>Key Dates</b>	<b>Costs</b>
United States	PRESENT STATUS: Production  IOC: 1981	UNIT COSTS: Estimated \$10,500,000  LAUNCH UNIT:
		<b>Quantities</b>
		TOTAL TO DATE: Total of about 900 missiles planned for 20 Trident and 12 Poseiden submarines.

## TRIDENT I/II

OTHER INFORMATION



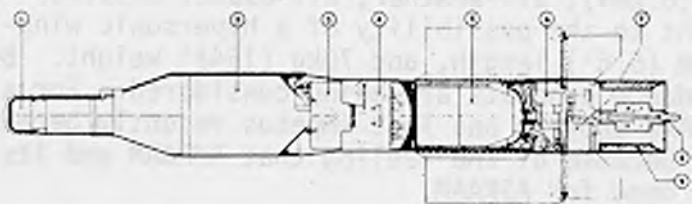
NAME <u>VIGILANT</u>		<b>VIGILANT</b>		DEVELOPER <u>British Aircraft</u>							
DESIGNATION _____				COUNTRY <u>UK</u>							
				SERVICE <u>Army</u>							
<b>MISSION</b> <input type="checkbox"/> AIR-TO-AIR <input type="checkbox"/> AIR-TO-SURFACE <input type="checkbox"/> SURFACE-TO-AIR <input checked="" type="checkbox"/> SURFACE-TO-SURFACE		<b>TRAJECTORY</b> <input type="checkbox"/> GRAVITY/GUIDE <input type="checkbox"/> BOOST/BOOST GUIDE <input checked="" type="checkbox"/> BOOST SUSTAIN <input type="checkbox"/> BALLISTIC		<b>LAUNCHED FROM</b> <input type="checkbox"/> LAND INSTALL-SOFT <input type="checkbox"/> SILO <input type="checkbox"/> SHIP <input type="checkbox"/> A/C		<input type="checkbox"/> MOBILE LAUNCHER <input type="checkbox"/> TANK <input checked="" type="checkbox"/> MANportable <input type="checkbox"/> OTHER _____		<b>TARGETS</b> <input type="checkbox"/> SHIPS <input type="checkbox"/> A/C <input type="checkbox"/> MISSILES <input type="checkbox"/> HARD INSTALL		<input type="checkbox"/> SOFT INSTALL <input checked="" type="checkbox"/> VEHICLES Armored <input type="checkbox"/> PERSONNEL <input type="checkbox"/> OTHER _____	
<b>CHARACTERISTICS</b> LENGTH: 1.07m (3.5') DIAMETER: 11cm (0.4') SPAN: 28cm (0.9') WEIGHT: 14kg (31#) OTHER: W/H: 6kg (13#)				<b>PERFORMANCE</b> RANGE: 1.6km (1.0 miles) ALTITUDE: Line of sight SPEED: Subsonic OTHER: _____							
<b>BASIS FOR LAUNCH</b> <u>Sight on target.</u> _____ _____ <input checked="" type="checkbox"/> FIRE/TRACK <input type="checkbox"/> FIRE/ILLUMINATE <input type="checkbox"/> FIRE/OTHER PARTY TRKS. OR ILLUMINATES <input type="checkbox"/> FIRE AND FORGET											
<b>SYSTEM/SUBSYSTEM</b>		<b>DESCRIPTION</b>				<b>CONTRACTOR</b>					
<b>OVERALL SYSTEM</b>		Manportable, wire guided, short range anti-armor missile system.				British Aircraft Corporation.					
<b>AIRFRAME</b>		Cylindrical body of several diameters. Narrow diameter conical nose. Cruciform rectangular wings aft.				BAC					
<b>PROPULSION</b>		Dual thrust solid propellant rocket motor. Boost and sustain.				IMI					
<b>GUIDANCE</b>		Wire command to line of sight. Optical sighting on tail flare. "Joystick" command.				BAC					
<b>FUZING</b>		Impact.									
<b>WARHEAD</b>		High explosive hollow charge.									
<b>REMARKS</b>											
<p>Vigilant comes in its own manportable, combined container/launcher. The operator opens the top, which then acts as support for the launcher, giving a fixed elevation.</p> <p>Vigilant uses an advanced velocity control system with a twin gyro autopilot, which makes the operator's task as simple as possible. Guidance is by an optical line-of-sight command control system, the commands being generated by the operator's thumb movements and transmitted by wire link. A flare is provided to assist in tracking and a monocular optical aid is achieved by using flap controls rather than spoilers, enabling the missile to turn in a small radius with high maneuverability. After a few hours on a training simulator, the average trainee can hit a target with his first missile.</p>											
<b>USERS</b>				<b>KEY DATES</b>		<b>COSTS</b>					
UK Abu Dhabi Finland Kuwait Libya Saudi Arabia				PRESENT STATUS: Obsolescent limited use. IOC: Early 1960s		UNIT COSTS: LAUNCH UNIT:					
						<b>QUANTITIES</b> TOTAL TO DATE: Thousands					

OTHER INFORMATION:



Cutaway view of BAC's gyrosta-  
bilised *Vigilant*.

Key: 1 - nose probe; 2 - warhead chamber; 3 - warhead fuse; 4 - gyroscope assembly; 5 - propellant chamber; 6 - control surface actuators; 7 - turbo alternator; 8 - motor igniter nozzle and flare; 9 - main wire spool.



## ADVANCED MISSILE SYSTEMS—INTERNATIONAL

**SPARVIERO** Sparviero is a third generation anti-tank missile being developed by Breda Meccanica SpA for the Italian Ministry of Defense. It is a command to line-of-sight missile using an IR guidance system (no wires). Range is projected as 3000m (1.9mi) at supersonic speeds. The missile is estimated at 1.4m (4.6') long, 13cm (4") in diameter, and weighs about 16kg (36#). It is planned to mount the Sparviero on armored vehicles and helicopters.

**ATEM ANTI-TANK EURO-MISSILE** The ATEM is a third generation anti-tank missile being developed by the European Missiles Dynamics Group composed of Aerospatiale, British Aerospace, and MBB. ATEM is planned to be both man-portable, and for use on armored vehicles. Three modes of guidance are being considered: 1. passive homing, 2. laser beam-riding, and 3. automatic command to line-of-sight (IR or millimeter wave). The missile will be supersonic with a range of up to 5000m (3mi). Dimensions are estimated at 1.0m (3.3') long and 10cm (4") diameter, with weight at 9-10kg (20-22#).

**ASSM II ADVANCED SURFACE-TO-SURFACE MISSILES II** The Anti-Ship Euromissile consortium (Aerospatiale, British Aerospace, and MBB) has been developing the ASSM II in response to NATO-PG-16. This missile is conceived as an inertially guided (strap-down) integral rocket/ramjet missile capable of supersonic speeds and a 180km (112mi) range. It is to be capable of both air and surface launch. Dimensions are estimated at 4.5m (14.8') length, and 46cm (1.5') diameter. The weight goal is 850kg (1870#). Late in 1981 the Anti-Ship consortium dissolves, leaving the ASSM a dead issue.

**ASRAAM ADVANCED SHORT RANGE AIR-TO-AIR MISSILE** Under a NATO Memorandum of Understanding, it was agreed that the USA would develop the AMRAAM missile, and the ASRAAM would be developed in Western Europe under the Family-of Weapons concept. British Aerospace and Bodenseewerk Gerate-technik GmbH are the principal developers of ASRAAM. Implicit in the MOU was the support of USA technology. ASRAAM is considered to be a follow-on to the Sidewinder -9M/P variants. Requirements are for a 10 km (6.2mi), all-weather, all-aspect missile. Preliminary indications point to the possibility of a hypersonic wing-less missile of about 2.0m (6.6') length, and 70kg (154#) weight. Both IR and active radar guidance concepts are being considered. For all its potential, the ASRAAM program has lost impetus recently because of funding concerns, and because of the feeling that AMRAAM and its technology might obviate the need for ASRAAM.

**SATCP** SATCP, designed as a short-range anti-aircraft SAM portable by 2 men and operable by one, is under development by Matra for the French Ministry of Defense. It consists of two major components; a

missile of about 17.5kg (38.5#) and a field launcher/sight unit weighing less than 20kg (44#). Guidance will be IR homing using a multi-detector array. Range is estimated at 5.0km (3mi) at supersonic speeds. Dimensions are estimated at 180x9cm (5.9'x3.5"). Warhead weight would be about 3kg (6.6#). IOC is planned for 1985-1986.

AIR-SOL MOYENNE PORTEE ASMP The ASMP is a medium to long range, 75km (47mi) ASM being developed by Aerospatiale. It is being designed as a nuclear defense suppression weapon for the Mirage 2000 and the refurbished Mirage IV aircraft. The aircraft radar will feed guidance information to the missile's inertial navigational system. A liquid-fueled Aerospatiale ramjet will provide propulsion.

ALARM AIR-LAUNCHED ANTI-RADIATION MISSILE British Aerospace has conducted feasibility studies and tests relative to meeting the requirement of Air Staff Target 1228 anti-radiation missile. This missile is conceived as a HARM type missile sufficiently small that 3 rounds could be carried on each of the outboard pylons of the Tornado. The smaller size is achieved through acceptance of less speed, and the penalty of A/C loiter until the attack is completed. ALARM would be launched from a low level flight, pitch up to 12,000m (40,000'), and descend via drogue in order to provide search time. At lock-on, the drogue is dropped, the missile deploys control surfaces, and glides into the target.

SHORT RANGE ASMs (EX ASLL) Aerospatiale is studying a lightweight tactical ASM based upon the Roland airframe. This missile would weigh approximately 80kg (176#). If development approval is received soon, the Thomson CSF Ariel laser seeker would provide guidance; if the program is delayed, imaging IR or millimeter wave guidance would be preferred.

CARCARA Brazil is developing the TV guided Carcara as an short-range, air launched missile to be used against tanks and discrete tactical targets. The missile weighs 45kg (100#), is 1.2m (4.0') in length, and 13cm (0.4') in diameter. And Brazil is developing a man-portable, wire-guided, surface-to-surface anti-tank missile designated MSS-1. It is 1.0m (3.2') long, 11cm (0.32') in diameter.



## ADVANCED MISSILE PROGRAMS - USA

CORP SUPPORT WEAPON SYSTEM (CSWS) This program, formerly called Assault Breaker, is designed by the Army to meet the second echelon threat of a massed armor attack. CSWS consists of an over 200km (125mi) dispensing guided missile, developed from the Patriot (T-16) or the Lance (T-22) missiles, and a variety of submunitions: nuclear, anti-armor, anti-personnel/anti-material, and chemical. The anti-armor weapon would consist of a terminally guided warhead. The targets are detected by a remote-control PAVE MOVER aircraft. The missile is launched, accurately guided into position, where it dispenses the submunitions in a controlled pattern.

RATTLER The Rattler advanced anti-tank missile program combines elements of the Army's Infantry Man-portable Anti-armor Assault Weapon System (IMAAWS) and DARPA's Tanker Breaker programs to develop a replacement for Dragon. Each program will take two contractors into Advanced Development. Late in FY1983, there will be a competitive flyoff between the IMAAWS and the Tank Breaker missiles. The final missile is expected to weigh about 30#, be fire-and-forget, all weather, day or night, and have a range of about 2000m (1.25mi).

ASW STAND-OFF WEAPON Boeing has been awarded a contract to develop a submarine launched missile for defense against advanced submarines. The concept employs an encapsulated missile which would be released underwater from a US submarine. The capsule would rise to the surface, and a solid propellant rocket motor would ignite, propelling the missile out of the capsule. The missile will fly at supersonic speed to a computer-designated reentry point. The missile payload will then separate, reenter the water, and search for and destroy the target.

WASP The WASP is an element of the USAF's Wide Area Anti-armor Munitions (WAAM) program which is designed to provide the USAF with the ability to kill a large number of armored targets per aircraft pass, even at night or in bad weather. The WASP is a mini-missile about the size of Hellfire. It will be carried in a 12 round weapon pod attached at the normal weapon stations on the F-111, A-10, F-16, and several other aircraft. IR and millimeter wave guidance are being considered. Upon dispersal from the pod, each mini-missile will fly a programmed separation course, then search for, and attack armored targets. Range is estimated at 10+km (6+mi). The missile will be about 15cm (6") in diameter, and 1.25m (4.1') long.

CONVENTIONAL STANDOFF WEAPON (CSW) The purpose of the CSW program is to develop an air-launched standoff weapon compatible with the Precision location Strike System (PLSS), the PAVE MOVER engagement system, and the B-52/B-1 Conventional Standoff Capability. The CSW is to be launched from the B-52, B-1, F-111, F-15, F-16, and F-4 aircraft. Range is expected to be 40km (25mi) minimum to provide appropriate standoff; this would be for low-altitude launch. Speed would be supersonic.

**BALLISTIC MISSILE DEFENSE/HOMING INTERCEPT TECHNOLOGY** The US Army Ballistic Missile Defense Systems Command has the overall responsibility for developing an anti-intercontinental ballistic missile-defense missile. The concept covers Low Altitude Defense for point targets, mid-course, and terminal defense, as well as various forms of layered defense. The LoAD program is managed by McDonnell Douglas as system contractor for the endoatmospheric system. Martin Marietta is responsible for the interceptor, Raytheon the radar, and TRW the software. An hypersonic missile with perhaps 80km (50mi) range is envisioned.

## ADVANCED MISSILE SYSTEMS - USSR

AA-X-9 The AA-X-9 is reputed to have achieved success against simulated cruise missiles after a look-down/snap-down launch from a Super MIG-25 interceptor. It utilizes an active terminal seeker, undoubtedly RF, and has an altitude capability of up to 21,300m (70,000'). It is thought that the Super Mig-25 has the capability to handle 4 simultaneous attacks.

AS-7 Kerry The Kerry is thought to be an interim missile since it is not widely utilized. It is similar to the USA Bullpup. The principal launch aircraft is the Su-19, but it could be carried by most close support aircraft. It is said to have a single-stage, solid-propellant rocket motor, radio command guidance, and a conventional high explosive warhead. It can be launched from 300-3000m (1000-10,000') and achieves a maximum of 10km (6.25mi) range. Weight is about 1200kg (2640#).

AS-8 The AS-8 has not yet been assigned a NATO reporting name. It is primarily a helicopter defense-suppression weapon; being used on the Soviet attack helicopters such as the HIND-D version of the Mi-24 and the A-10 gunship. It uses a solid propellant rocket motor for propulsion, and a passive radiation seeker for guidance. It has a range of 8-10km (5-6.2mi) at a speed of about 0.7 Mach, and is a fire-and-forget weapon. The AS-8 was seen in East Germany in the late '70's, and is thought to have had a 1977-1978 IOC.

AS-X-9 This missile is thought to be a long-range anti-radiation missile roughly equivalent to HARM. It is propelled by a solid propellant rocket motor to a range of 80-90km (50-56mi). It utilizes a conventional high-explosive warhead and a passive radiation seeker of unknown sophistication. It is not known whether this missile has achieved operational status.

AS-X-10 This missile is apparently being developed to complement the AS-8. It is a passive electro-optical homing missile with a range of about 10km (6.25mi) at Mach 0.8. It uses a solid propellant rocket motor for propulsion and has a conventional high-explosive warhead.

ATASM The Advanced Tactical ASM (ATASM) is thought to be a larger version of the AS-X-10 with midcourse guidance (probably inertial or command), but using the same electro-optical homing for the last 10 km of its 40km (25mi) range. It is propelled by a solid propellant rocket motor to high subsonic speeds.

AT-6 Spiral The Spiral is thought to be a large laser guided weapon used by the HIND-D helicopter and the laser equipped Soviet battle tanks. It would be roughly akin to Hellfire. It uses a solid propellant rocket motor to achieve high subsonic speeds, and an anti-armor high explosive warhead.

SA-10 The SA-10 is a high-speed, high-performance, anti-cruise missile defense SAM. The literature cites an IOC from 1978-1985, with 1979-1980 being the most probable. Performance is outstanding, with a speed of 5.0-6.0 Mach, high "g" low altitude maneuvering capability, and a range of approximately 50km (31mi). It uses an active radar seeker for terminal guidance, with possibly a command midcourse control. Its operational envelope ranges 0-5000m (0-16,000'). Propulsion is by means of a solid propellant rocket motor. Dimensions are thought to be 7.0m (23') length and 45cm (1.5') diameter.

SA-11 Deployment of the SA-11 has apparently begun. This new surface to air missile system has an altitude coverage of 25-15,250m (80-50,000') and a range of about 20km (12.5mi). Guidance is command midcourse and semi-active terminal. The system operates from either a 3 or 4 launch track vehicle usually in concert with the SA-6 Gainful radar units.

SS-N-7 Siren The Siren is little known in the West. It is apparently launched only from the C class, and possibly the P class, submarines, but not from the torpedo tubes. A separate 8-round launcher is elevated from the foredeck for either underwater or surface launch. The Siren is an anti-shiping cruise missile with a turbofan sustainer and a solid propellant rocket booster. Speed is cited from high subsonic to supersonic, with the former being most probable. Range is 50+ km (31+mi). Length is 7.6m (25'), diameter is undoubtedly larger than the torpedo tube diameter of 53cm (21"), and a large conventional warhead of 500kg (1100#) is carried.

SS-N-9 The SS-N-9 is a surface-to-surface anti-shiping missile carried by the Nanuchka class missile corvette. Six missiles are carried ready to fire from triple launch-boxes located on either side. It is solid rocket propelled at a speed of 0.8 Mach for a range of 100km (62mi). Midcourse guidance is command or inertial, while homing is by means of active radar or passive IR terminal guidance. Length is 9.1m (30') and the warhead weight is 500kg (1100#).

SS-N-10/SS-N-14 This missile was first thought to be an anti-shiping missile, and designated as the SS-N-10. Later it was recognized as a ship-launched ASW weapon with an acoustic torpedo as the warhead, and redesignated as the SS-N-14. It has a range of 48-56km (30-35mi), uses rocket solid propulsion, and is about 7.6m (25') long.

SS-N-11 The SS-N-11 is thought to be a modernized version of the SS-N-2 Styx. This missile is a ship-launched anti-shiping missile. It has always been seen in in a drum launcher with a sloping muzzle door on the Osa II missile boats, the Kildin destroyer, and the Kashin destroyer. The missile has been exported to Finland, India, and Iraq. It weighs 2270kg (5000#), is 6.1m (30') long, and carries a 500kg (1100#) warhead. Its range is thought to be as much as 97km (60mi).

## **APPENDIX A**

### **OUTBOARD PROFILES**

Appendix A consists of a set of four Outboard Profile charts which provide, categorized by mission, a comparison of the sizes of the various missiles. A six-foot man is shown on each chart as an aid in visualization of size. The reader may discover minor discrepancies between the data sheets and this chart in the missiles included, and in the configuration details. In the interest of expediting the Seventh Edition, we have used the Outboard Profile charts directly from the Sixth Edition.

# AIR-TO-AIR

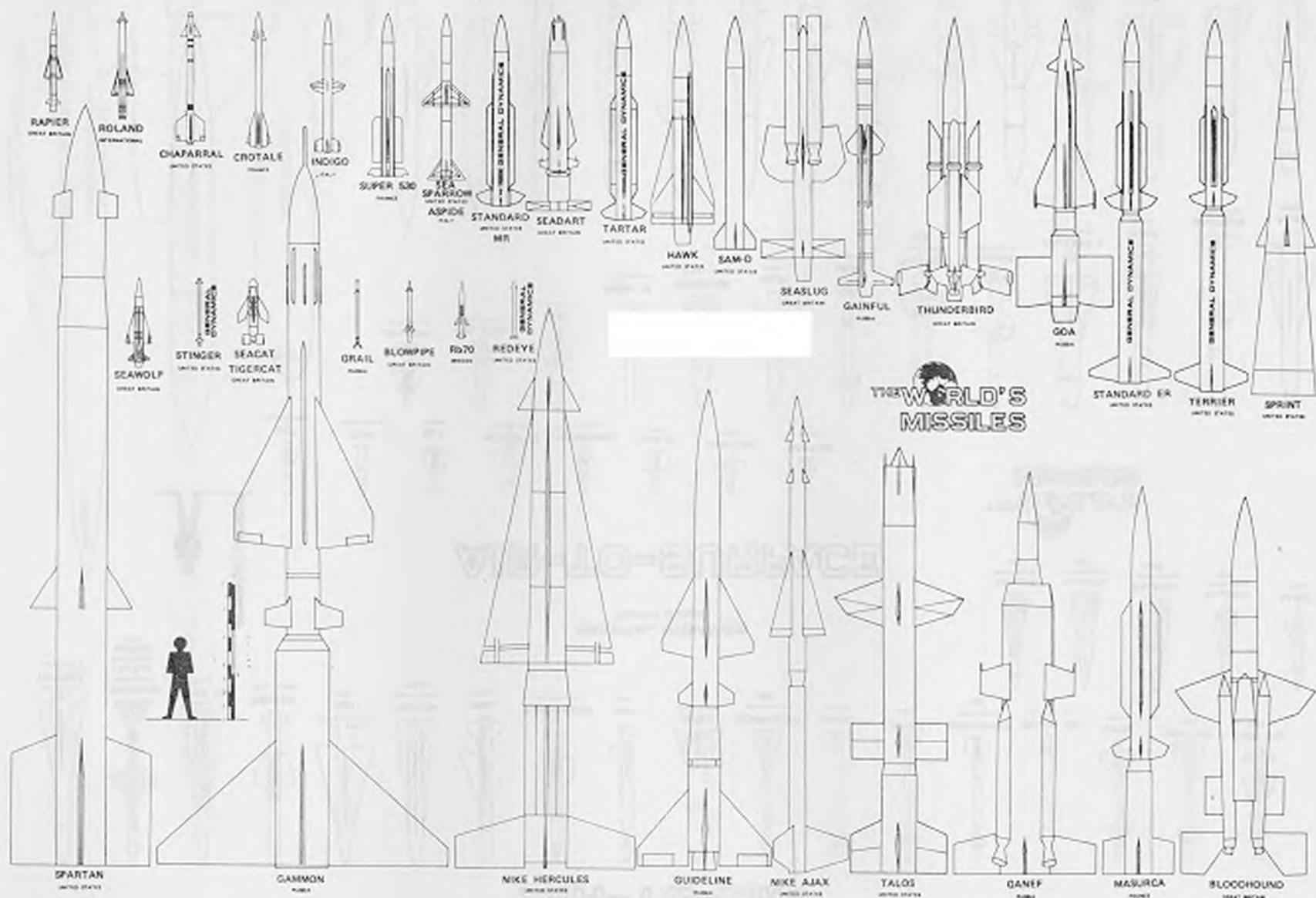


# AIR-TO-SURFACE

THE WORLD'S MISSILES



# SURFACE-TO-AIR



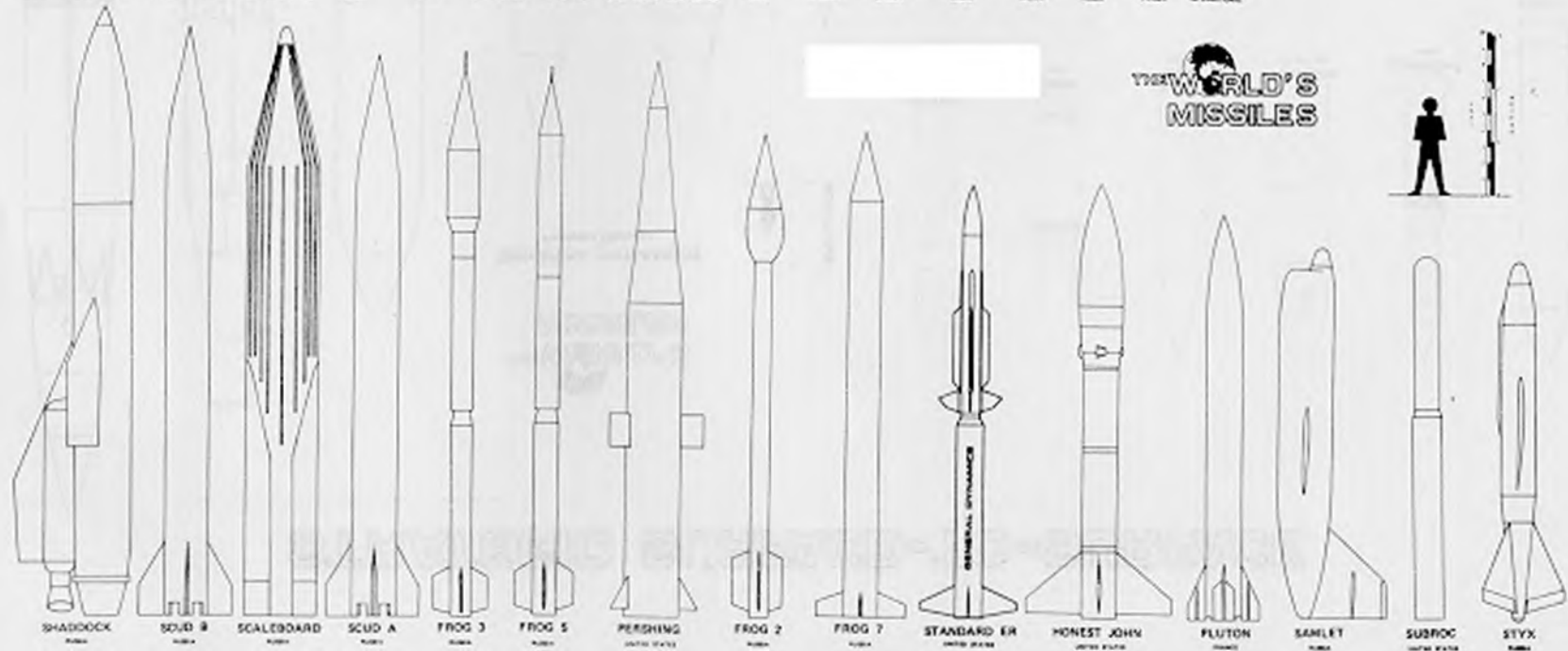
THE WORLD'S  
MISSILES

SWELLS  
ETIENNE  
SYSTEMS

# TACTICAL SURFACE-TO-SURFACE



A3



THE WORLD'S  
MISSILES

THE WORLD'S  
MISSILE  
SYSTEMS

# STRATEGIC SURFACE-TO-SURFACE



SCRAB  
USA



SCARP  
USA



TITAN  
USA



SKEAN  
USA



BASIN  
USA



SANDAL  
USA



SAVAGE  
USA



MINUTEMAN III  
USA



MINUTEMAN II  
USA



MINUTEMAN I  
USA



SARK  
USA



SSG  
USA

THE WORLD'S  
MISSILES



POLARIS  
USA



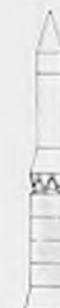
SCRB  
USA



MSBS  
USA



POSIDON  
USSR



SCAFEGOAT  
USSR



SAWFLY  
USSR

THE WORLD'S  
MISSILE  
SYSTEMS

## APPENDIX B

### USERS

The chart of Appendix B is a matrix of all of the missiles covered by the data sheets against all countries of the world using missiles. The matrix is essentially 5 pages by 5 pages in size. The first 5 pages (B1a-B1e) covers the first 1/5 of the missiles, categorized by mission, against all countries, categorized by region. The second 5 pages (B2a-B2e) does the same for the second fifth, etc.. A "X" signifies use; an "XP" indicates possible use or rumored use.

USERS

USERS

Type	Name	NATO															
		BELGIUM	CANADA	DENMARK	FRANCE	W. GERMANY	GREECE	ICELAND	ITALY	LUXEMBURG	NETHERLANDS	NORWAY	PORTUGAL	TURKEY	UNITED KINGDOM	UNITED STATES	
AIR TO AIR	ACRID																
	AMRAAM														X		
	ANAB																
	APEX																
	APHID																
	ASALM														X		
	ASH																
	ASPIDE						X		X								
	ATOLL																
	BRAZO														X		
	FALCON		X				X						X		X		
	MAGIC				X		X										
	PHOENIX														X		
	R530																
REDTOP														X			
SHAFRIR																	
SIDEWINDER	X	X	X	X	X	X		X		X	X	X	X	X	X		
SKY FLASH														X			
SPARROW	X	X	X			X		X		X	X		X	X	X		
SUPER 530				X													
AIR TO SURFACE	ALCM														X		
	AS.11	X	X	X	X	X		X		X	X	X	X	X	X		
	AS.12				X	X		X		X	X		X	X			
	AS.15				X	XP											
	AS.30				X	X											
	ASALM														X		
	ASM-1																
	BULLPUP			X							X		X	X			
	EXOCET (AIR)				X												
	HARM														X		
	HOUND DOG														X		
	KANGAROO																
	KELT																
	KENNEL																
	KINGFISH																
	KIPPER																
KITCHEN																	
KORMORAN					X			X						X			
MARTEL AJ168														X			
MARTEL AS37				X										X			
MAVERICK						X							X	X			

  
**THE WORLD'S  
 MISSILE  
 SYSTEMS**

USERS

USERS

Type	Name	WARSAW PACT						OTHER EUROPEAN COUNTRIES										
		BULGARIA	CZECHOSLOVAKIA	E. GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA				
AIR TO AIR	ACRID							X										
	AMRAAM																	
	ANAB	X	X	X	X	X	X	X										
	APEX							X										
	APHID							X										
	ASALM																	
	ASH	X	X	X		X	X	X										
	ASPIDE										X							
	ATOLL	X	X	X	X	X	X	X		X								
	BRAZO																	
	FALCON									X		X	X					
	MAGIC										X							
	PHOENIX																	
	R530																	
	REDTOP																	
	SHAFRIR																	
	SIDEWINDER										X	X						
	SKY FLASH											X						
	SPARROW										X							
SUPER 530																		
AIR TO SURFACE	ALCM																	
	AS.11									X	X	X	X					
	AS.12										X							
	AS.15																	
	AS.30												X					
	ASALM																	
	ASM-1																	
	BULLPUP																	
	EXOCET (AIR)																	
	HARM																	
	HOUND DOG																	
	KANGAROO								X									
	KELT								X									
	KENNEL								X									
	KINGFISH								X									
KIPPER								X										
KITCHEN								X										
KORMORAN																		
MARTEL AJ168																		
MARTEL AS37																		
MAVERICK											X							

USERS

USERS

Type	Name	LATIN AMERICA										SUB SAHARA AFRICA									
		ARGENTINA	BRAZIL	CHILE	COLOMBIA	CUBA	ECUADOR	EL SALVADOR	NICARAGUA	PERU	VENEZUELA	ANGOLA	ETHIOPIA	IVORY COAST	KENYA	NIGERIA	SENEGAL	SOMALI	SOUTH AFRICA	UGANDA	ZAMBIA
AIR TO AIR	ACRID																				
	AMRAAM																				
	ANAB																				
	APEX																				
	APHID																				
	ASALM																				
	ASH																				
	ASPIDE			XP			XP		X	X					X			XP			
	ATOLL					X					X							X			
	BRAZO																				
	FALCON																				
	MAGIC						X												X		
	PHOENIX																				
	R530	X	X		X						X								X		
	REDTOP																				
	SHAFRIR	X			X				X										X		
SIDEWINDER		X	X							X			X					X			
SKY FLASH																					
SPARROW																					
SUPER 530																					
AIR TO SURFACE	ALCM																				
	AS. 11	X	X						X	X					X			X	X		
	AS. 12											X									
	AS. 15																				
	AS. 30								X									X			
	ASALM																				
	ASM-1																				
	BULLPUP																				
	EXOCET (AIR)								X												
	HARM																				
	HOUND DOG																				
	KANGAROO																				
	KELT																				
	KENNEL																				
	KINGFISH																				
	KIPPER																				
KITCHEN																					
KORMORAN																					
MARTEL AJ168																					
MARTEL AS37																					
MAVERICK																					

USERS

USERS

Type	Name	MID EAST AND MEDITERRANEAN																			
		ABU DHABI	ALGERIA	EGYPT	IRAN	IRAQ	ISRAEL	JORDAN	KUWAIT	LEBANON	LIBYA	MOROCCO	NORTH YEMEN	OMAN	QATAR	SAUDI ARABIA	SOUTH YEMEN	SUDAN	SYRIA	TUNESIA	UNITED ARAB EMIR.
AIR TO AIR	ACRID																				
	AMRAAM																				
	ANAB																				
	APEX																				
	APHID																				
	ASALM																				
	ASH																				
	ASPIDE			X																	
	ATOLL			X		X					X		X				X	X	X		
	BRAZO																				
	FALCON																				
	MAGIC			X		X			X		X	X		X		X			X		X
	PHOENIX				X																
	R530					X				X						X					
	REDTOP								X							X					
	SHAFRIR						X														
	SIDEWINDER			X	X		X	X	X		X		X		X						
SKY FLASH																					
SPARROW			X		X	X									X						
SUPER 530								X													
AIR TO SURFACE	ALCM	X			X	X		X	X	X					X					X	
	AS.11				X	X		X	X	X										X	
	AS.12				X	X				X										X	
	AS.15																				
	AS.30																				
	ASALM																				
	ASM-1																				
	BULLPUP																				
	EXOCET (AIR)																			X	
	HARM																				
	HOUND DOG																				
	KANGAROO																				
	KELT			X																	
	KENNEL			X																	
	KINGFISH																				
	KIPPER																				
	KITCHEN																				
KORMORAN																					
MARTEL AJ168																					
MARTEL AS37																					
MAVERICK			X	X		X										X					

USERS

USERS

Type	Name	ASIA AND AUSTRALASIA																			
		AFGHANISTAN	AUSTRALIA	BANGLADESH	BRUNEI	CHINA	INDIA	INDONESIA	JAPAN	LAOS	MALAYSIA	MONGOLIA	NEW ZEALAND	NORTH KOREA	PAKISTAN	PHILIPPINES	SINGAPORE	SOUTH KOREA	TAIWAN	THAILAND	VIETNAM
AIR TO AIR	ACRID																				
	AMRAAM																				
	ANAB																				
	APEX																				
	APHID																				
	ASALM																				
	ASH																				
	ASPIDE																				
	ATOLL	X		X		X				X				X							
	BRAZO																				
	FALCON																			X	
	MAGIC		X				X								X						
	PHOENIX																				
	R530		X												X						
	REDTOP																				
SHAFRIR																			X		
SIDEWINDER								X	X					X	X	X	X	X	X	X	
SKY FLASH																					
SPARROW								X									X				
SUPER 530																					
AIR TO SURFACE	ALCM																				
	AS.11						X				X										
	AS.12				X						X										
	AS.15																				
	AS.30						X														
	ASALM																				
	ASM-1								X												
	BULLPUP		X																		
	EXOCET (AIR)														X						
	HARM																				
	HOUND DOG																				
	KANGAROO																				
	KELT																				
	KENNEL																				
	KINGFISH							X													
KIPPER																					
KITCHEN																					
KORMORAN																					
MARTEL AJ168																					
MARTEL AS37																					
MAVERICK																		X			



USERS

USERS

Type	Name	WARSAW PACT							OTHER EUROPEAN COUNTRIES					
		BULGARIA	CZECHOSLOVAKIA	E. GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA
AIR TO SURFACE (CONT)	OTOMAT													
	PENGUIN ASM													
	RBS15													
	SAAB 04E/T										X			
	SAAB 05A										X			
	SABRE													
	SEA EAGLE													
	SEA KILLER													
	SEA SKUA													
	SHRIKE													
	SRAM													
	STANDARD ARM													
	TOMAHAWK MRASM													
SURFACE TO AIR - LAND	ASPID										X			
	BLOODHOUND										X	X		
	BLOWPIPE													
	CHAPARRAL													
	CROTALE									X				
	GAINFUL							X						
	GALOSH							X						
	GAMMON							X						
	GANEF		X	X				X						
	GECKO							X						
	GOA		X	X	X	X		X		X			X	
	GRAIL		X	X	X	X	X	X					X	
	GUIDELINE	X	X	X	X	X	X	X	X				X	
	HAWK										X	X		
	INDIGO/MEI													
	NIKE HERCULES													
	PATRIOT													
	RAPIER												X	
	RBS70											X	X	
	REDEYE											X		
SEACAT/TIGERCAT											X			
SEA DART/ LAND DART														
STINGER														
TAN-SAM														
THUNDERBIRD														

USERS

USERS

Type	Name	LATIN AMERICA								SUB SAHARA AFRICA									
		ARGENTINA	BRAZIL	CHILE	COLUMBIA	CUBA	ECUADOR	EL SALVADOR	NICARAGUA	PERU	VENEZUELA	ANGOLA	ETHIOPIA	MOZAMBIQUE	NIGERIA	SENEGAL	SOMALI	SOUTH AFRICA	UGANDA
AIR TO SURFACE (CONT)	OTOMAT								X	X				X					
	PENGUIN ASM																		
	RBS15																		
	SAAB 04E/T																		
	SAAB 05A																		
	SABRE																		
	SEA EAGLE																		
	SEA KILLER																		
	SEA SKUA																		
	SHRIKE																		
SRAM																			
STANDARD ARM																			
TOMAHAWK MRASM																			
SURFACE TO AIR - LAND	ASPIDE			XP			XP		X	X			X				XP		
	BLOODHOUND																		
	BLOWPIPE							X											
	CHAPARRAL																	X	
	CROTALE																		
	GAINFUL																		
	GALOSH																		
	GAMMON																		
	GANEF																		
	GECKO																		
	GOA						X			X								X	
	GRAIL						X			X		X	X	X					
	GUIDELINE						X			X									
	HAWK																		
	INDIGO/MEI																		
	NIKE HERCULES																		
	PATRIOT																		
	RAPIER																		
RBS70																			
REDEYE																			
SEACAT/TIGERCAT	X	X	X						X				X						
SEA DART/ LAND DART	X																		
STINGER																			
TAN-SAM																			
THUNDERBIRD																			

USERS

USERS

Type	Name	MID EAST AND MEDITERRANEAN																				
		ABU DHABI	ALGERIA	EGYPT	IRAN	IRAQ	ISRAEL	JORDAN	KUWAIT	LEBANON	LIBYA	MOROCCO	NORTH YEMEN	OMAN	QATAR	SAUDI ARABIA	SOUTH YEMEN	SYRIA	TUNESIA	UNITED ARAB EMIR.	YEMEN	
AIR TO SURFACE (CONT)	OTOMAT			X						X					X							
	PENGUIN ASM																					
	RBS15																					
	SAAB 04E/T																					
	SAAB 05A																					
	SABRE																					
	SEA EAGLE																					
	SEA KILLER					X																
	SEA SKUA																					
	SHRIKE				X		X															
SRAM																						
STANDARD ARM																						
TOMAHAWK MRASM																						
SURFACE TO AIR - LAND	ASPIDE			X																		
	BLOODHOUND																					
	BLOWPIPE																					
	CHAPARRAL							X			X									X		
	CROTALE	X		X						X					X							
	GAINFUL			X		X				X								X				
	GALOSH																					
	GAMMON																					
	GANEF			X																		
	GECKO																					
	GOA			X		X				X								X				X
	GRAIL			X		X			X		X	X						X				
	GUIDELINE	X		X		X					X							X				
	HAWK				X		X	X	X							X						
	INDIGO/MEI																					
	NIKE HERCULES																					
	PATRIOT																					
	RAPIER	X			X																	
	RBS70																					
	REDEYE						X	X								X					X	
SEACAT/TIGERCAT				X			X			X				X								
SEA DART/ LAND DART																						
STINGER																						
TAN-SAM																						
THUNDERBIRD										X					X							

USERS

USERS

Type	Name	ASIA AND AUSTRALASIA																	
		AFGHANISTAN	AUSTRALIA	BRUNEI	CHINA	INDIA	INDONESIA	JAPAN	MALAYSIA	MONGOLIA	NEW ZEALAND	NORTH KOREA	PAKISTAN	PHILIPPINES	SINGAPORE	SOUTH KOREA	TAIWAN	THAILAND	VIETNAM
AIR TO SURFACE (CONT)	OTOMAT													X					
	PENGUIN ASM																		
	RBS15																		
	SAAB 04E/T																		
	SAAB 05A																		
	SABRE																		
	SEA EAGLE																		
	SEA KILLER																		
	SEA SKUA																		
	SHRIKE																		
SRAM																			
STANDARD ARM															X				
TOMAHAWK MRASM																			
SURFACE TO AIR - LAND	ASPIDE		X												X				
	BLOODHOUND																		
	BLOWPIPE																		
	CHAPARRAL															X			
	CROTALE											X							
	GAINFUL																	X	
	GALOSH																		
	GAMMON																		
	GANEF																		
	GECKO																		X
	GOA					X													X
	GRAIL				X						X								X
	GUIDELINE	X			X	X				X		X							X
	HAWK							X					X		X	X	X		
	INDIGO/MEI																		
	NIKE HERCULES							X							X	X			
	PATRIOT																		
RAPIER		X	X																
RBS70														X					
REDEYE		X																	
SEACAT/TIGERCAT		X			X	X	X	X	X							X			
SEA DART/ LAND DART																			
STINGER																			
TAN-SAM							X												
THUNDERBIRD																			

USERS

USERS

Type	Name	NATO														
		BELGIUM	CANADA	DENMARK	FRANCE	W. GERMANY	GREECE	ICELAND	ITALY	LUXEMBURG	NETHERLANDS	NORWAY	PORTUGAL	TURKEY	UNITED KINGDOM	UNITED STATES
SURFACE TO AIR - SEA	ASPID						X	X						X		
	BLOWPIPE		X													
	CROTALE				X											
	GAINFUL															
	GOA															
	GRAIL															
	GUIDELINE															
	MASURCA				X											
	RAM			X		X									X	
	SEACAT/TIGERCAT					X								X		
	SEA DART/ LAND DART													X		
	SEASLUG													X		
	SEA SPARROW	X	X	X		X		X	X	X				X	X	
	SEAWOLF		XP							XP				X		
	STANDARD ER							X							X	
STANDARD MR				X	X		X	X						X		
TALOS														X		
TARTAR				X	X		X	X						X		
TERRIER							X	X						X		
SSM - LAND	AS. 11/SS. 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	AS. 12/SS. 12				X	X		X	X	X		X	X			
	ASM-1/XSSM															
	GLCM														X	
SSM - SEA	SAAB 08A													X		
	SEA DART/ LAND DART													X		
SSM - SEA	OTOMAT							X								
	AS. 11/SS. 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	AS. 12/SS. 12				X	X		X	X			X	X			
	ASM-1/XSSM															
	ASROC		X			X	X	X					X		X	
	EXOCET (SHIP)	X			X	X	X							X		
	GABRIEL															
	HARPOON			X		X				X	X		X		X	
	IKARA													X		
MALAFON				X												
PENGUIN SSM						X				X		X		XP		
RBS15																
SAAB 08A																

USERS

USERS

Type	Name	WARSAW PACT							OTHER EUROPEAN COUNTRIES						
		BULGARIA	CZECHOSLOVAKIA	E. GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA	
SURFACE TO AIR - SEA	ASPIDE									X					
	BLOWPIPE														
	CROTALE									X					
	GAINFUL						X								
	GOA		X	X	X	X	X	X		X			X		
	GRAIL	X	X	X	X	X	X	X					X		
	GUIDELINE	X	X	X	X	X	X	X					X		
	MASURCA														
	RAM														
	SEACAT/TIGERCAT											X			
SEA DART/ LAND DART															
SEASLUG															
SEA SPARROW															
SEAWOLF															
STANDARD ER															
STANDARD MR										X					
TALOS															
TARTAR										X					
TERRIER															
SSM - LAND	AS.11/SS.11									X	X		X		
	AS.12/SS.12										X				
	ASM-1/XSSM														
SSM - LAND	GLCM														
	SAAB O8A											X			
SSM - LAND	SEA DART/ LAND DART														
SSM - SEA	OTOMAT														
	AS.11/SS.11									X	X		X		
	AS.12/SS.12										X				
	ASM-1/XSSM														
	ASROC														
	EXOCET (SHIP)														
	GABRIEL														
	HARPOON										X				
	IKARA														
	MALAFON														
PENGUIN SSM											X				
RBS15											X				
SAAB O8A											X				

USERS

USERS

Type	Name	LATIN AMERICA								SUB SAHARA AFRICA												
		ARGENTINA	BRAZIL	CHILE	COLUMBIA	CUBA	ECUADOR	NICARAGUA	PERU	VENEZUELA	ANGOLA	ETHIOPIA	IVORY COAST	KENYA	MOZAMBIQUE	NIGERIA	SENEGAL	SOMALI	SOUTH AFRICA	UGANDA	ZAMBIA	
SURFACE TO AIR - SEA	ASPIDE			XP			XP	X	X						X				XP			
	BLOWPIPE																					
	CROTALE																		X			
	GAINFUL																					
	GOA					X			X												X	
	GRAIL					X			X		X	X			X							
	GUIDELINE					X			X													
	MASURCA																					
	RAM																					
	SEACAT/TIGERCAT	X	X	X						X						X						
	SEA DART/ LAND DART	X																				
	SEASLUG																					
	SEA SPARROW																					
SEAWOLF																						
STANDARD ER																						
STANDARD MR																						
TALOS																						
TARTAR																						
TERRIER																						
SSM - LAND	AS.11/SS.11	X	X						X	X						X			X	X		
	AS.12/SS.12	X	X									X										
	ASM-1/XSSM																					
	GLCM																					
SAAB 08A																						
SEA DART/ LAND DART	X																					
SSM - SEA	OTOMAT								X	X					X				X	X		
	AS.11/SS.11	X	X						X	X						X			X	X		
	AS.12/SS.12	X	X									X										
	ASM-1/XSSM																					
	ASROC																					
	EXOCET (SHIP)		X	X			X		X													
	GABRIEL	X			XP								X						X			
	HARPOON																					
	IKARA		X																			
MALAFON																						
PENGUIN SSM																						
RBS15																						
SAAB 08A																						

USERS

USERS

Type	Name	MID EAST AND MEDITERRANEAN																				
		ABU DHABI	ALGERIA	BAHRAIN	EGYPT	IRAN	IRAQ	ISRAEL	JORDAN	KUWAIT	LEBANON	LIBYA	MOROCCO	OMAN	QATAR	SAUDI ARABIA	SOUTH YEMEN	SYRIA	TUNESIA	NORTH YEMEN	UNITED ARAB EMIR.	
SURFACE TO AIR - SEA	ASPIDE				X																	
	BLOWPIPE																					
	CROTALE	X			X					X		X				X						
	GAINFUL				X		X					X						X				
	GOA				X		X					X						X				
	GRAIL				X		X			X		X	X					X				X
	GUIDELINE		X		X		X					X						X				
	MASURCA				X		X					X						X				
	RAM																					
	SEACAT/TIGERCAT					X			X			X			X							
	SEA DART/ LAND DART																					
	SEASLUG																					
	SEA SPARROW												X									
	SEAWOLF																					
STANDARD ER																						
STANDARD MR					X																	
TALOS																						
TARTAR					X																	
TERRIER																						
SSM - LAND	AS.11/SS.11	X				X	X	X		X	X	X			X				X			
	AS.12/SS.12	X				X	X				X								X			
	ASM-1/XSSM																					
	GLCM																					
SSM - SEA	SAAB O8A																					
	SEA DART/ LAND DART																					
SSM - SEA	OTOMAT				X										X							
	AS.11/SS.11	X				X	X	X		X	X	X			X				X			
	AS.12/SS.12	X				X	X				X								X			
	ASM-1/XSSM																					
	ASROC																					
	EXOCET (SHIP)			X								X	X	X							X	
	GABRIEL									X												
	HARPOON					X				X					X							
	IKARA																					
	MALAFON																					
PENGUIN SSM																						
RBS15																						
SAAB O8A																						

USERS

USERS

Type	Name	ASIA AND AUSTRALASIA																	
		AFGHANISTAN	AUSTRALIA	BRUNEI	CHINA	INDIA	INDONESIA	JAPAN	MALAYSIA	MONGOLIA	NEW ZEALAND	NORTH KOREA	PAKISTAN	PHILIPPINES	SINGAPORE	SOUTH KOREA	TAIWAN	THAILAND	VIETNAM
SURFACE TO AIR - SEA	ASPIDE																		
	BLOWPIPE																		
	CROTALE												X						
	GAINFUL																		X
	GOA					X													X
	GRAIL				X							X							X
	GUIDELINE	X			X	X				X		X							X
	MASURCA																		
	RAM																		
	SEACAT/TIGERCAT		X			X			X		X							X	
	SEA DART/ LAND DART																		
	SEASLUG																		
	SEA SPARROW		X					X			X								
	SEAWOLF																		
STANDARD ER																			
STANDARD MR		X						X											
TALOS																			
TARTAR		X						X											
TERRIER																			
SSM - LAND	AS.11/SS.11					X													
	AS.12/SS.12			X															
	ASM-1/XSSM							X											
	GLCM																		
	SAAB 08A																		
SSM - SEA	SEA DART/ LAND DART																		
	OTOMAT													X					
	AS.11/SS.11					X													
	AS.12/SS.12			X															
	ASM-1/XSSM							X											
	ASROC						X	X								X			
	EXOCET (SHIP)								X										
	GABRIEL								X					X		X			X
	HARPOON		X						X						X				
	IKARA		X																
MALAFON																			
PENGUIN SSM																			
RBS15																			
SAAB 08A																			

USERS

USERS

Type	Name	NATO														
		BELGIUM	CANADA	DENMARK	FRANCE	W. GERMANY	GREECE	ICELAND	ITALY	LUXEMBURG	NETHERLANDS	NORWAY	PORTUGAL	TURKEY	UNITED KINGDOM	UNITED STATES
SSM - SEA (CONT)	SEA DART/ LAND DART														X	
	SEA EAGLE					XP			XP						X	
	SEA KILLER								X							
	SHADDOCK															
	STANDARD ARM															X
	STYX															
	TALOS															X
	TARTAR				X	X			X		X					X
TERRIER								X		X					X	
TOMAHAWK-SLCM															X	
BALLISTIC - LAND	FROG 3															
	FROG 4															
	FROG 5															
	FROG 7															
	LANCE	X				X			X		X				X	X
	MINUTEMAN II															X
	MINUTEMAN III															X
	MSBS				X											
	MX															X
	PERSHING Ia					X										X
	PERSHING II															X
	PLUTON/HADES				X											
	SANDAL															
	SASIN															
	SAVAGE															
	SCALEBOARD															
	SCAPEGOAT/SCAMP															
SCARP																
SCUD A																
SCUD B/C																
SEGO																
SKEAN																
SS-16																
SS-17																
SS-18																
SS-19																
SS-20																
TITAN II															X	

USERS

USERS

Type	Name	WARSAW PACT							OTHER EUROPEAN COUNTRIES									
		BULGARIA	CZECHOSLOVAKIA	E. GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA				
SSM - SEA (CONT)	SEA DART/ LAND DART																	
	SEA EAGLE																	
	SEA KILLER																	
	SHADDOCK							X										
	STANDARD ARM																	
	STYX			X		X	X	X		X				X				
	TALOS																	
TARTAR										X								
TERRIER																		
TOMAHAWK-SLCM																		
BALLISTIC - LAND	FROG 3	X	X	X	X	X	X	X										
	FROG 4	X	X	X	X	X	X	X										
	FROG 5																	X
	FROG 7	X	X	X	X	X	X	X										X
	LANCE																	
	MINUTEMAN II																	
	MINUTEMAN III																	
	MSBS																	
	MX																	
	PERSHING Ia																	
	PERSHING II																	
	PLUTON/HADES																	
	SANDAL																	X
	SASIN																	X
	SAVAGE																	X
	SCALEBOARD																	X
	SCAPEGOAT/SCAMP																	X
	SCARP																	X
	SCUD A	X	X	X	X	X	X	X	X									
	SCUD B/C	X	X	X	X	X	X	X	X									
SEGO																	X	
SKEAN																	X	
SS-16																	X	
SS-17																	X	
SS-18																	X	
SS-19																	X	
SS-20																	X	
TITAN II																		

USERS

USERS

Type	Name	LATIN AMERICA								SUB SAHARA AFRICA								
		ARGENTINA	BRAZIL	CHILE	COLOMBIA	CUBA	ECUADOR	EL SALVADOR	NICARAGUA	PERU	VENEZUELA	ANGOLA	ETHIOPIA	NIGERIA	SENEGAL	SOMALIA	SOUTH AFRICA	UGANDA
SSM - SEA (CONT)	SEA DART/ LAND DART	X																
	SEA EAGLE																	
	SEA KILLER																	
	SHADDOCK																	
	STANDARD ARM																	
	STYX					X									X			
	TALOS																	
	TARTAR																	
TERRIER																		
TOMAHAWK-SLCM																		
BALLISTIC - LAND	FROG 3																	
	FROG 4																	
	FROG 5																	
	FROG 7					X												
	LANCE																	
	MINUTEMAN II																	
	MINUTEMAN III																	
	MSBS																	
	MX																	
	PERSHING Ia																	
	PERSHING II																	
	PLUTON/HADES																	
	SANDAL																	
	SASIN																	
	SAVAGE																	
	SCALEBOARD																	
	SCAPEGOAT/SCAMP																	
SCARP																		
SCUD A																		
SCUD B/C																		
SEGO																		
SKEAN																		
SS-16																		
SS-17																		
SS-18																		
SS-19																		
SS-20																		
TITAN II																		

USERS

USERS

Type	Name	MID EAST AND MEDITERRANEAN																		
		ABU DHABI	ALGERIA	EGYPT	IRAN	IRAQ	ISRAEL	JORDAN	KUWAIT	LEBANON	LIBYA	MOROCCO	OMAN	QATAR	SAUDI ARABIA	SOUTH YEMEN	SYRIA	TUNESIA	NORTH YEMEN	UNITED ARAB EMIR.
SSM - SEA (CONT)	SEA DART/ LAND DART																			
	SEA EAGLE																			
	SEA KILLER				X															
	SHADDOCK																			
	STANDARD ARM																			
	STYX		X	X		X					X	X				X	X			
	TALOS																			
TARTAR				X																
TERRIER																				
TOMAHAWK-SLCM																				
BALLISTIC - LAND	FROG 3			X																
	FROG 4																			
	FROG 5																			
	FROG 7			X		X				X						X				
	LANCE						X													
	MINUTEMAN II																			
	MINUTEMAN III																			
	MSBS																			
	MX																			
	PERSHING Ia																			
	PERSHING II																			
	PLUTON/HADES																			
	SANDAL																			
	SASIN																			
	SAVAGE																			
	SCALEBOARD																			
	SCAPEGOAT/SCAMP																			
	SCARP																			
	SCUD A			X		X					X						X			
	SCUD B/C			X		X					X					X				
SEGO																				
SKEAN																				
SS-16																				
SS-17																				
SS-18																				
SS-19																				
SS-20																				
TITAN II																				



USERS

USERS

Type	Name	NATO															
		BELGIUM	CANADA	DENMARK	FRANCE	W. GERMANY	GREECE	ICELAND	ITALY	LUXEMBURG	NETHERLANDS	NORWAY	PORTUGAL	TURKEY	UNITED KINGDOM	UNITED STATES	
BALLISTIC - SEA	POLARIS A3														X	X	
	POSEIDEN C3														X	X	
	SARK																
	SAWFLY MOD. 1/2																
	SAWFLY MOD. 3																
	SERB																
	SSBS					X											
SUBROC															X		
TRIDENT I/II															X		
ANTI-TANK	AS.11/SS.11	X	X	X	X	X	X		X		X	X	X	X	X	X	
	AS.12/SS.12				X	X			X		X	X		X	X		
	BANTAM																
	COBRA			X		X	X		X					X			
	DRAGON										X					X	
	HARPOON																
	HELLFIRE				X	X										X	
	HOT				X	X									X		
	KAM-3D																
	KAM-9																
	MAMBA					X											
	MILAN	X			X	X	X		X					X	X		
	MOSQUITO								X								
	PICKET																
	SABRE														X		
	SAGGER																
	SHILLELAGH															X	
SNAPPER																	
SPANDREL/ SPIGOT																	
SWATTER																	
SWINGFIRE	X													X	X	X	
TOW		X	X			X	X		X	X	X	X		X	X	X	
VIGILANT														X	X	X	

THE WORLD'S  
MISSILE  
SYSTEMS

USERS

USERS

Type	Name	WARSAW PACT						OTHER EUROPEAN COUNTRIES							
		BULGARIA	CZECHOSLOVAKIA	EAST GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	AUSTRIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA
BALLISTIC - SEA	POLARIS A3														
	POSEIDEN C3														
	SARK							X							
	SAWFLY MOD. 1/2							X							
	SAWFLY MOD. 3							X							
	SERB							X							
	SSBS														
SUBROC															
TRIDENT I/II															
ANTI-TANK	AS.11/SS.11									X	X		X		
	AS.12/SS.12										X				
	BANTAM											X	X		
	COBRA										X				
	DRAGON										X	X	X		
	HARPON														
	HELLFIRE														
	HOT														
	KAM-3D														
	KAM-9														
	MAMBA														
	MILAN														
	MOSQUITO														
	PICKET														
	SABRE														
	SAGGER	X	X	X	X	X	X	X							X
	SHILLELAGH														
SNAPPER	X	X	X	X	X	X	X							X	
SPANDREL/ SPIGOT															
SWATTER	X	X	X	X	X	X	X								
SWINGFIRE															
TOW									X		X	X			
VIGILANT										X					

USERS

USERS

Type	Name	NATO															
		BELGIUM	CANADA	DENMARK	FRANCE	W. GERMANY	GREECE	ICELAND	ITALY	LUXEMBURG	NETHERLANDS	NORWAY	PORTUGAL	TURKEY	UNITED KINGDOM	UNITED STATES	
BALLISTIC - SEA	POLARIS A3														X	X	
	POSEIDEN C3														X	X	
	SARK																
	SAWFLY MOD. 1/2																
	SAWFLY MOD. 3																
	SERB																
	SSBS					X											
SUBROC															X		
TRIDENT I/II															X		
ANTI-TANK	AS.11/SS.11	X	X	X	X	X	X		X		X	X	X	X	X	X	
	AS.12/SS.12				X	X			X		X	X		X	X		
	BANTAM																
	COBRA			X		X	X		X					X			
	DRAGON										X					X	
	HARPOON				X	X										X	
	HELLFIRE															X	
	HOT				X	X									X		
	KAM-3D																
	KAM-9																
	MAMBA					X											
	MILAN	X			X	X	X		X					X	X		
	MOSQUITO									X							
	PICKET																
	SABRE														X		
	SAGGER																
	SHILLELAGH															X	
SNAPPER																	
SPANDREL/ SPIGOT																	
SWATTER																	
SWINGFIRE	X													X			
TOW		X	X			X	X		X	X	X	X		X	X	X	
VIGILANT														X			

  
**THE WORLD'S  
MISSILE  
SYSTEMS**

USERS

USERS

Type	Name	WARSAW PACT						OTHER EUROPEAN COUNTRIES							
		BULGARIA	CZECHOSLOVAKIA	EAST GERMANY	HUNGARY	POLAND	ROMANIA	USSR	ALBANIA	AUSTRIA	FINLAND	SPAIN	SWEDEN	SWITZERLAND	YUGOSLAVIA
BALLISTIC - SEA	POLARIS A3														
	POSEIDEN C3														
	SARK							X							
	SAWFLY MOD. 1/2							X							
	SAWFLY MOD. 3							X							
	SERB							X							
	SSBS														
	SUBROC														
TRIDENT I/II															
ANTI-TANK	AS.11/SS.11									X	X		X		
	AS.12/SS.12										X				
	BANTAM											X	X		
	COBRA										X				
	DRAGON										X	X	X		
	HARPON														
	HELLFIRE														
	HOT														
	KAM-3D														
	KAM-9														
	MAMBA														
	MILAN														
	MOSQUITO														
	PICKET														
	SABRE														
SAGGER	X	X	X	X	X	X	X							X	
SHILLELAGH															
SNAPPER	X	X	X	X	X	X	X							X	
SPANDREL/ SPIGOT															
SWATTER	X	X	X	X	X	X	X								
SWINGFIRE															
TOW									X		X	X			
VIGILANT										X					

USERS

USERS

Type	Name	LATIN AMERICA										SUB SAHARA AFRICA								
		ARGENTINA	BRAZIL	CHILE	COLOMBIA	CUBA	ECUADOR	EL SALVADOR	NICARAGUA	PERU	VENEZUELA	ANGOLA	ETHIOPIA	KENYA	MOZAMBIQUE	NIGERIA	SENEGAL	SOMALI	SOUTH AFRICA	UGANDA
BALLISTIC - SEA	POLARIS A3																			
	POSEIDEN C3																			
	SARK																			
	SAWFLY MOD. 1/2																			
	SAWFLY MOD. 3																			
	SERB																			
	SSBS																			
SUBROC																				
TRIDENT I/II																				
ANTI-TANK	AS. 11/SS. 11	X	X							X	X					X		X	X	
	AS. 12/SS. 12	X	X																	
	BANTAM																			
	COBRA	X	X																	
	DRAGON																			
	HARPON																			
	HELLFIRE																			
	HOT																		X	
	KAM-3D																			
	KAM-9																			
	MAMBA																			
	MILAN																			
	MOSQUITO																			
	PICKET																			
	SABRE																			
	SAGGER										X	X		X					X	
	SHILLELAGH																			
SNAPPER					X															
SPANDREL/ SPIGOT																				
SWATTER																				
SWINGFIRE																				
TOW											X		X							
VIGILANT																				

USERS

USERS

Type	Name	MID EAST AND MEDITERRANEAN																		
		ABU DHABI	ALGERIA	EGYPT	IRAN	IRAQ	ISRAEL	JORDAN	KUWAIT	LEBANON	LIBYA	MOROCCO	OMAN	QATAR	SAUDI ARABIA	SOUTH YEMEN	SYRIA	TUNESIA	NORTH YEMEN	UNITED ARAB EMIR.
BALLISTIC - SEA	POLARIS A3																			
	POSEIDEN C3																			
	SARK																			
	SAWFLY MOD. 1/2																			
	SAWFLY MOD. 3																			
	SERB																			
	SSBS																			
SUBROC																				
TRIDENT I/II																				
ANTI - TANK	AS.11/SS.11	X			X	X	X		X	X	X			X			X			
	AS.12/SS.12	X			X	X				X							X			
	BANTAM																			
	COBRA						X													
	DRAGON				X		X	X			X			X					X	
	HARPON													X						
	HELLFIRE													X						
	HOT			X		X			X					X	X					
	KAM-3D																			
	KAM-9																			
	MAMBA																			
	MILAN																			
	MOSQUITO																			
	PICKET						X													
	SABRE																			
	SAGGER		X	X	X						X						X			
	SHILLELAGH																X			
SNAPPER			X																	
SPANDREL/ SPIGOT																				
SWATTER			X												X					
SWINGFIRE			X																	
TOW				X	X		X	X	X		X	X		X				X		
VIGILANT	X							X	X	X				X						

USERS

USERS

Type	Name																		
		AFGHANISTAN	AUSTRALIA	BRUNEI	CHINA	INDIA	INDONESIA	JAPAN	MALAYSIA	MONGOLIA	NEW ZEALAND	NORTH KOREA	PAKISTAN	PHILIPPINES	SINGAPORE	SOUTH KOREA	TAIWAN	THAILAND	VIETNAM
BALLISTIC - SEA	POLARIS A3																		
	POSEIDEN C3																		
	SARK				X														
	SAWFLY MOD. 1/2																		
	SAWFLY MOD. 3																		
	SERB																		
	SSBS																		
SUBROC																			
TRIDENT I/II																			
ANTI-TANK	AS.11/SS.11			X		X		X											
	AS.12/SS.12			X				X											
	BANTAM																		
	COBRA											X							
	DRAGON		X												X	X			
	HARPON																		
	HELLFIRE																		
	HOT				X														
	KAM-3D							X											
	KAM-9							X											
	MAMBA																		
	MILAN																		
	MOSQUITO																		
	PICKET																		
	SABRE																		
	SAGGER	X																	X
SHILLELAGH																			
SNAPPER	X								X										
SPANDREL/ SPIGOT																			
SWATTER																			
SWINGFIRE																			
TOW							X					X		X	X				
VIGILANT																			

## APPENDIX C

### CROSS-REFERENCE INDEX

This Appendix provides an alphabetical cross-reference index, with page numbers, of all missile system names, designations, and acronyms used in the individual data sheets, or in the Advanced Missile Programs descriptions on pages 331-336.

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