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BY T-G Hilt ON 12/19/96

Standard Aircraft Characteristics

NAVY MODEL AV-8A AIRCRAFT

(TITLE UNCLASSIFIED)

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**PUBLISHED BY DIRECTION OF THE
COMMANDER OF THE NAVAL AIR SYSTEMS COMMAND**

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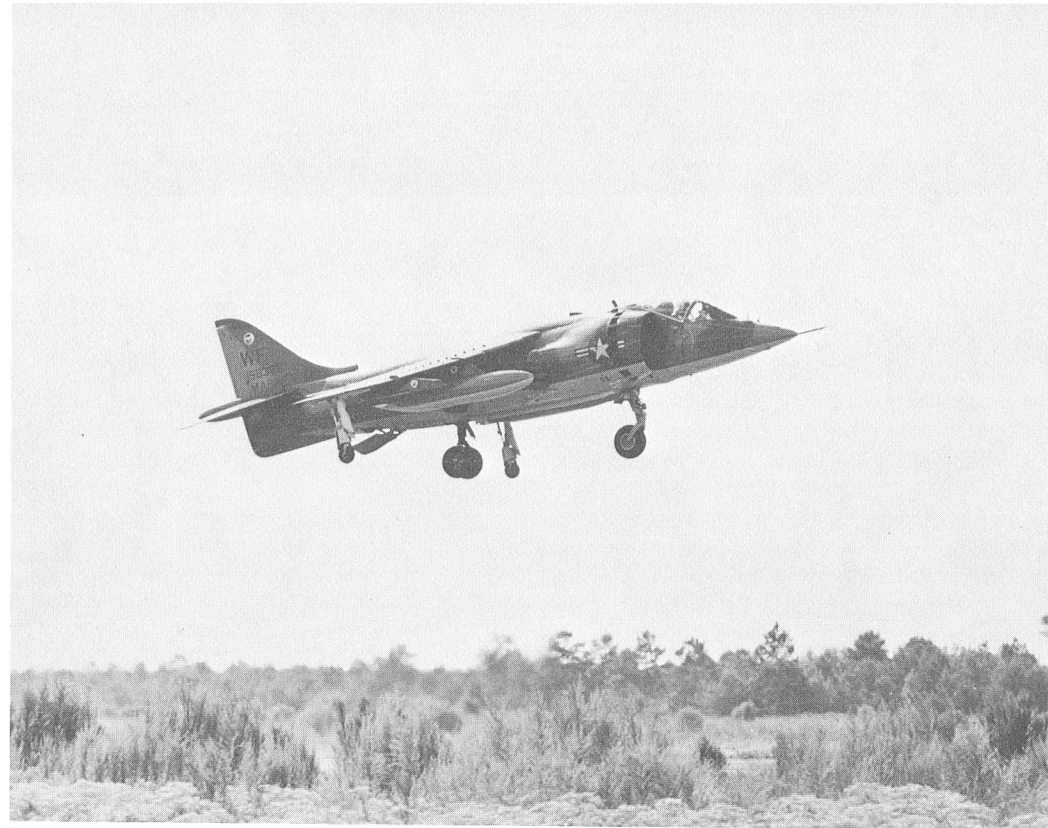
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SERVICE



STANDARD AIRCRAFT CHARACTERISTICS

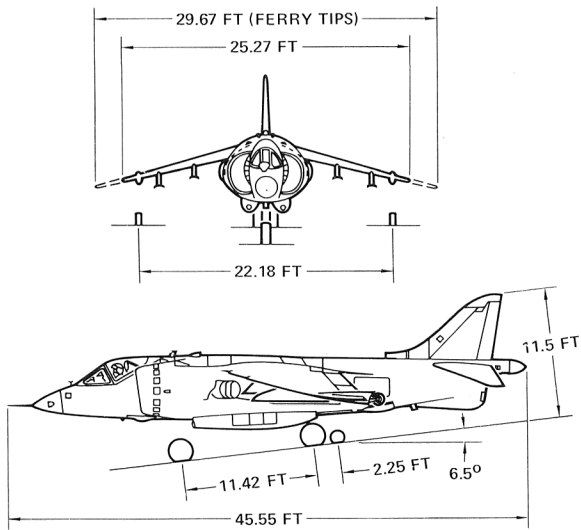
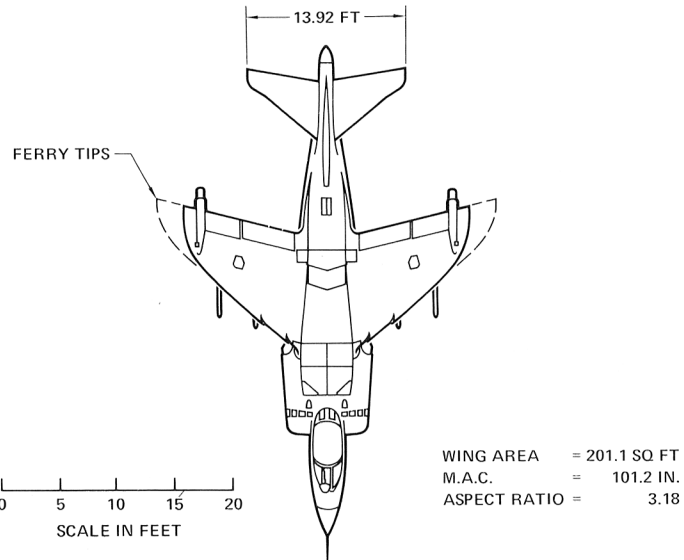
AV-8A HARRIER
HAWKER-SIDDELEY

NOVEMBER 1972

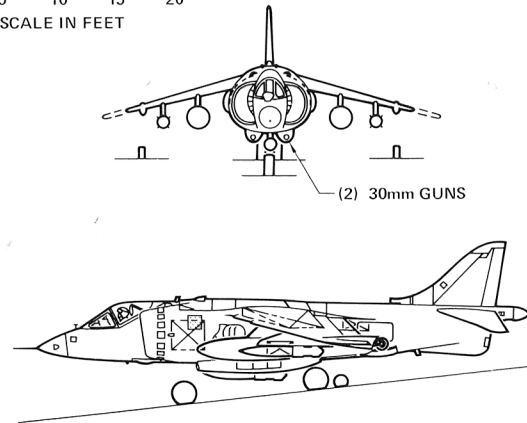
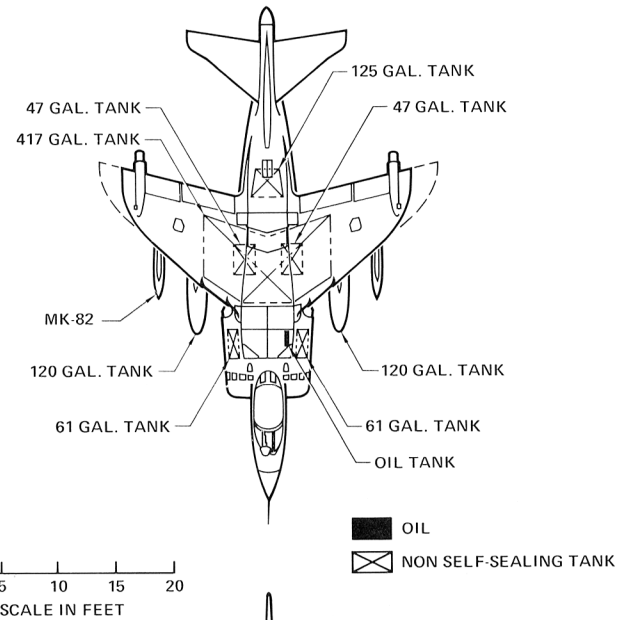
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AV-8A

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DESCRIPTIVE ARRANGEMENT



ARMAMENT AND TANKAGE

POWER PLANT		MISSION AND DESCRIPTION		WEIGHTS																																																																							
Number and model (1) F402-RR-401 Manufacturer Rolls-Royce Specifications: Rolls-Royce Spec. No. 301 Type Axial flow, non-mixed, vectored fan, turbofan Augmentation Water injection Length (including nozzles) 137.2 in. Diameter 48.05 in. Dry weight 3653 lb Nozzle rotation angles Front 0° to 98.5° Rear 0° to 98.5°		The AV-8A Harrier is a single-seat, transonic, light-attack aircraft with a vertical/short takeoff and landing capability that enables operation from either advanced airfields or small sea based carriers (LPH, LPD). The aircraft's primary mission is close air support with the capability to operate from austere bases in the battlefield area, a mission generally involving ground loiter, short radii and limited take-off and landing area preparation. V/STOL capability, an essential ingredient of the Sea Control Ship concept, permits Harrier adaptation to sea based ships with alternate mission capabilities of air and surface intercept and combat air patrol. The AV-8A is powered by a Rolls Royce Bristol Pegasus fanjet engine and is distinguished by a shoulder-mounted swept wing and an all-movable, swept stabilator, both with marked negative dihedral; a single vertical fin and rudder; and two large shoulder-side inlets and four rotatable engine thrust nozzles, one inlet and two nozzles on each side of the fuselage. Conventional aerodynamic controls are used in wing-borne flight and engine bleed air reaction controls are used in jet-borne flight with a mix of the two systems used when transitioning between modes of flight. Plain trailing-edge inboard flaps are provided for the high-lift configuration. The AV-8A has four wing pylon stations and one fuselage pylon station for external stores, carries two external fuselage mounted 30 mm guns, and is equipped with an inertial navigation and weapon-aiming system (INAS) and a head-up display (HUD). The landing gear consists of a nose gear and a single main gear in bicycle or tandem arrangement and two outrigger gears, one near each wing tip. A hydraulically operated speedbrake is located on the lower fuselage surface immediately aft of the main landing gear. Other features include a self-contained start capability and a Martin-Baker MK-9A ejection seat for emergency egress.		<table border="1"> <thead> <tr> <th>LOADING</th> <th>LB</th> <th>L.F.</th> </tr> </thead> <tbody> <tr> <td>Empty</td> <td>11,966</td> <td></td> </tr> <tr> <td>Basic</td> <td>12,098</td> <td></td> </tr> <tr> <td>Design</td> <td>20,300</td> <td rowspan="2">Subsonic 7.5 Supersonic 4.5</td> </tr> <tr> <td>Combat</td> <td>19,469</td> </tr> <tr> <td>Maximum takeoff</td> <td></td> <td></td> </tr> <tr> <td>STO</td> <td>24,600</td> <td></td> </tr> <tr> <td>VTO</td> <td>17,500</td> <td></td> </tr> <tr> <td>Maximum landing</td> <td></td> <td></td> </tr> <tr> <td>VL</td> <td>16,900 @ -12 fps</td> <td></td> </tr> </tbody> </table>		LOADING	LB	L.F.	Empty	11,966		Basic	12,098		Design	20,300	Subsonic 7.5 Supersonic 4.5	Combat	19,469	Maximum takeoff			STO	24,600		VTO	17,500		Maximum landing			VL	16,900 @ -12 fps																																										
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PERFORMANCE SUMMARY							
TAKEOFF LOADING CONDITION	① HI-HI-HI	③ LO- LO- LO	⑤ HI-LO-HI	⑦ LO- LO- LO	⑨ COMBAT AIR PATROL	⑪ FERRY	
	CLEAN	(5) MK-82 S.E.	(3) MK-82 S.E. (2) MK-83 L.D.G.P.	(3) MK-82 S.E. (2) 120 GAL. TANKS	(2) AIM-9G	(2) 120 GAL. TANKS	
Takeoff weight (D) lb	17,684 (E)	21,729 (F)	22,549 (F)	22,547 (F)	19,475 (F)	20,930 (F)	
Fuel internal/external (JP-5, 6.8 lb/gal.) lb	5,161/-	5,161/-	5,161/-	5,277/1,632	5,161/-	5,277/1,632	
Payload lb	None	2850	3680	1710	394	None	
Wing loading lb/sq ft	87.8	108.0	112.0	112.0	96.8	103.9	
Stall speed - power off kt	152	168.0	172.0	172.0	159.0	165.0	
Takeoff run at S.L. calm (A) ft	60	910	1080	1080	410	735	
Takeoff run at S.L. 25 kt wind (A) ft	50	700	850	850	300	550	
Takeoff to clear 50 ft - calm (A) ft	370	1930	2180	2180	1110	1660	
Maximum speed/altitude (B)kt/ft	594/S.L.	555/S.L.	556/S.L.	552/S.L.	564/S.L.	556/S.L.	
Rate of climb at S.L. (B/C) fpm	17,700/12,700	12,200/8700	11,700/8300	11,500/8150	14,300/10,300	12,800/9100	
Time: S.L. to 20,000 ft (B/C) min	1.39 / 1.87	2.17 / 2.98	2.17 / 3.07	2.30 / 3.12	1.81 / 2.42	2.08 / 2.75	
Time: S.L. to 30,000 ft (B/C) min	2.40 / 3.22	4.12/5.46	4.22/5.76	4.39/5.96	3.48/4.34	3.75/5.05	
Service ceiling (100 fpm) (B/C) ft	44,000/43,000	38,300/37,300	37,500/36,700	37,400/36,400	40,900/40,100	39,100/38,200	
Combat range na mi	823 (I)	268	498 (I)	403/392 (G)	632 (I)	980/920 (G) (I)	
Average cruising speed kt	458	303	450	300	453	447	
Cruising altitude initial ft	38,518	S.L.	33,388	S.L.	36,709	35,000	
Cruising altitude final ft	43,513	S.L.	36,748	S.L.	40,864	41,000	
Combat radius na mi	378 (I)	113	188 (I)	175	100 (I)	-	
Mission time (H) hr	1.95	0.85	0.93	1.26	1.43	-	
Average cruising speed kt	459	296	452	297	453	-	
Loiter time hr	-	-	-	-	0.94	-	
COMBAT LOADING CONDITION	② CLEAN	④ STORES RETAINED	⑥ STORES RETAINED	⑧ STORES RETAINED TANKS DROPPED	⑩ MISSILES RETAINED	⑫ TANKS RETAINED	
Combat weight lb	15,424	19,469	20,289	19,367	17,214	17,970	
Engine power	Military	Military	Military	Military	Maximum	Military	
Fuel lb	3,100	3,100	3,100	4,150	3,100	4,150	
Combat speed/altitude kt/ft	525/40,100	531/S.L.	532/S.L.	533/S.L.	525/35,000	532/S.L.	
Rate of climb at combat altitude (B/C) fpm	4500/3600	11,000/9950	13,800/9800	14,100/10100	4700/3600	15,400/11,000	
Combat ceiling (500 fpm) (B/C) ft	46,100/45,100	40,100/39,000	39,000/37,800	39,900/38,600	43,100/42,100	41,900/40,800	
Rate of climb at S.L. (B/C) fpm	20,600/14,550	14,000/9,950	13,800/9,900	14,100/10,100	16,700/12,400	15,300/11,000	
Maximum speed at S.L. (B/C) kt	595/570	556/531	558/533	556/533	565/540	557/532	
Maximum speed/altitude (B) kt/ft	595/S.L.	556/S.L.	558/S.L.	556/S.L.	565/S.L.	557/S.L.	
Landing weight lb	13,002	14,211	14,211	14,298	14,850	14,645	
Fuel lb	679	718	718	805	737	824	
Stall speed - power off kt	130	136	136	137	139	138	
NOTES: A. Short lift wet, 15 sec rating B. Maximum thrust, 15 min. rating C. Military thrust, 30 min. setting D. Includes 200 pounds of water which is consumed at initial takeoff. E. With strakes, w/o guns, ammo, (4) pylons, and Q rack.				F. All loadings except clean airplane include guns, ammo, (4) pylons and Q rack. Ferry mission with ferry wing tips and inflight refueling probe. G. Tanks dropped when empty/Tanks retained. H. Mission time excludes warm-up, takeoff and reserve times. I. Radii/Range can be increased 5 n. miles if maximum thrust rating is used in climbs. J. Fuel consumption increased 5% for service tolerance.			

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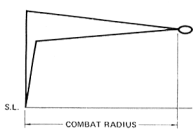
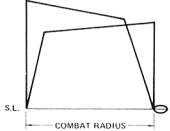
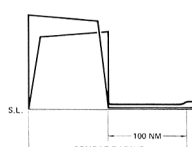

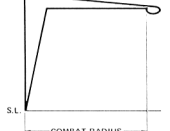
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MISSION SUMMARY - ALTERNATE LOADINGS

		HI-HI-HI		HI-LO-HI		HI-LO-LO-HI		LO-LO-LO		DECK-LAUNCHED INTERCEPT	
											
EXTERNAL STORE LOADING (A)	TOGW	COMBAT RADIUS NM (D)	MISSION TIME HOUR (B)	COMBAT RADIUS NM (D)	MISSION TIME HOUR (B)	COMBAT RADIUS NM (D)	MISSION TIME HOUR (B)	COMBAT RADIUS NM (D)	MISSION TIME HOUR (B)	COMBAT RADIUS NM (D)	MISSION TIME HOUR (B)
③ (5) MK-82 Snakeye	21,729	271	1.28	192	0.94	-	-	113	0.86	249	1.08
⑤ (3) MK-82 Snakeye (2) MK-83	22,549	266	1.26	188	0.93	-	-	113	0.85	247	1.08
⑦ (3) MK-82 Snakeye (2) 120 gal. tank	22,547	405	1.87	323	1.52	203	1.24	175	1.26	363	1.56
⑨ (2) AIM-9 Sidewinder	19,475	308	1.45	221	1.07	-	-	118	0.92	272	1.17
⑬ (5)MK-82	21,489	279	1.32	198	0.97	-	-	115	0.97	254	1.10
<p>Notes:</p> <p>(A) All loadings include guns, ammunition, (4) pylons and Q rack.</p> <p>(B) Mission time excludes warm-up, takeoff and reserve times.</p> <p>(C) Fuel consumption increased 5% for service tolerance.</p> <p>(D) Combat radii can be increased 5 na. mi. by using maximum thrust for climb.</p>											

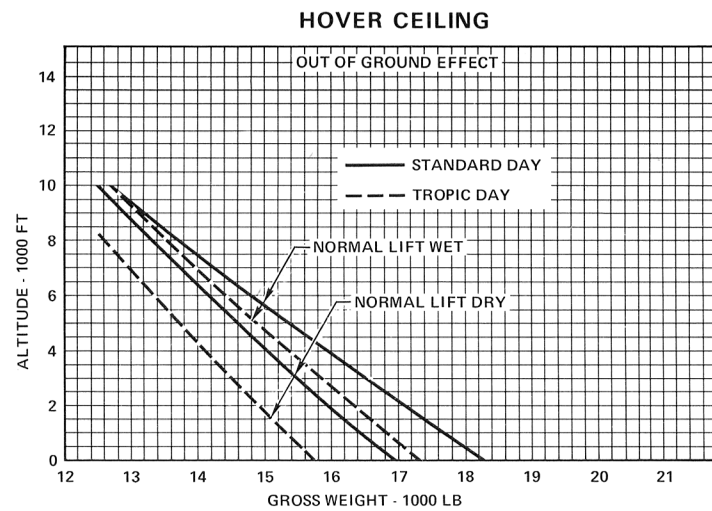
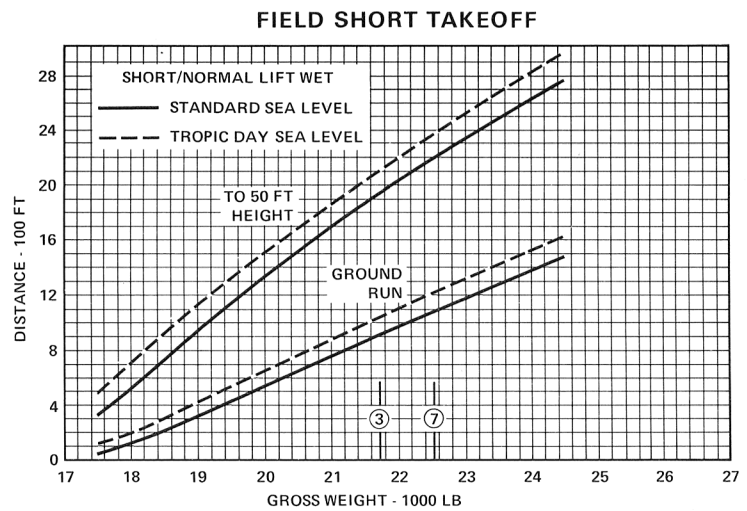
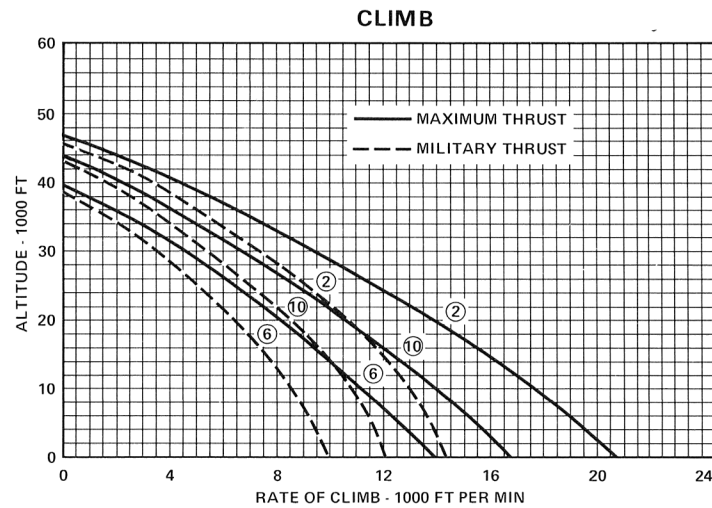
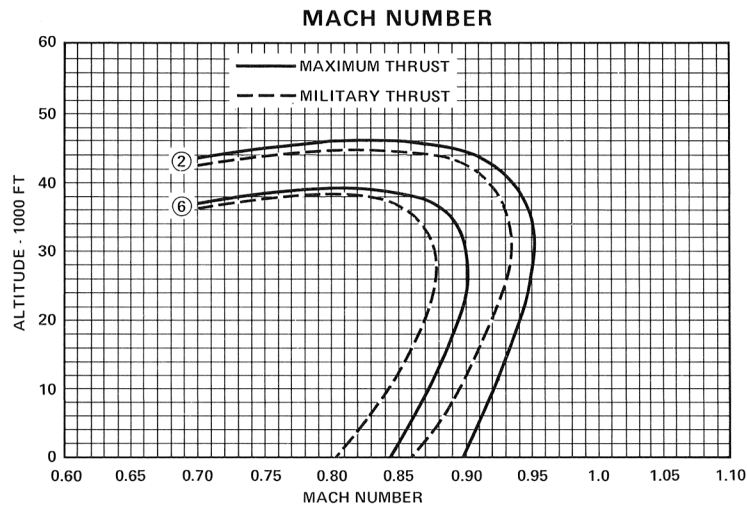
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SERVICE

NAVAIR 00-110AV8-1



○ LOADING CONDITION COLUMN NUMBER

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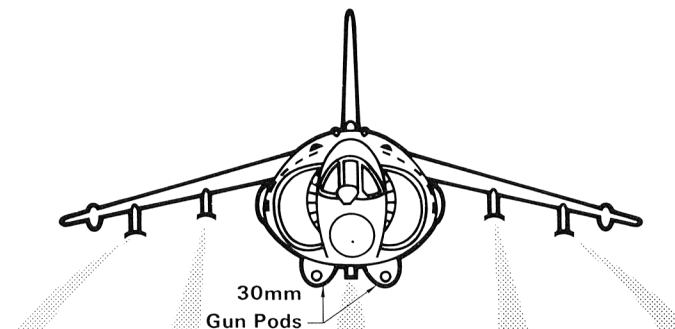
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EXTERNAL STORE LOADING



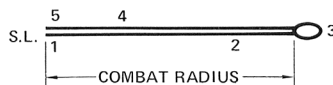
STORE	5	4	3	2	1
GUIDED MISSILES – AIR-TO-AIR (AIM-9G) Sidewinder	1				1
ROCKET LAUNCHERS – AIR-TO-GROUND					
LAU-10A	1	1		1	1
LAU-69A	1	1		1	1
LAU-68A	1	1		1	1
BOMBS					
MK-81	1	1	1	1	1
MK-82	1	1	1	1	1
MK-83		1		1	
MK-81 Snakeye	1	1	1	1	1
MK-82 Snakeye	1	1	1	1	1
MK-77	1	1	1	1	1
MK-20 Rockeye II	1	1		1	1
CBU-24		1		1	
PRACTICE BOMBS					
MK-76	6				6
MK-106	6				6
FLARES					
SUU-40	1				1
FUEL TANKS					
120 U.S. gal. Combat Tanks		1		1	

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NOTES:

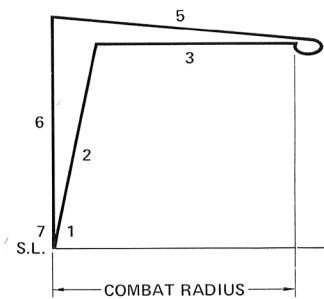
LO-LO-LO MISSION

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CRUISE OUT: At sea level, at speed for maximum range. External tanks dropped when empty.
3. COMBAT FUEL ALLOWANCE: (5) minutes at 30 minute engine setting at sea level. Stores dropped at end of combat.
4. CRUISE BACK: At sea level at speed for maximum range.
5. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



DECK LAUNCHED INTERCEPT MISSION

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to 36,089 feet with 15 minute engine rating.
3. DASH OUT: At 36,089 ft. at 15 minute engine rating.
4. COMBAT FUEL ALLOWANCE: (2) minutes at 15 minute engine rating at 36,089 feet.
5. CRUISE BACK: At altitudes and speeds for maximum range.
6. DESCENT: To sea level. No fuel, time or distance credited.
7. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



PERFORMANCE BASIS:

- (a) Wind tunnel and flight test data by Hawker-Siddeley Aviation.
- (b) Supplemented by estimated drag data.
- (c) Rolls-Royce Engine Specification No. 301 dated 20 March 1970 with fuel consumption increased 5% for service tolerance.

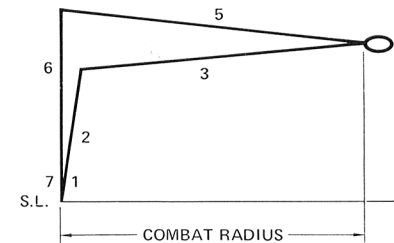
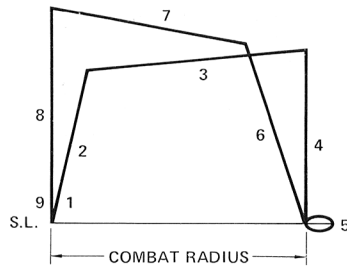
NOTES:

HI-LO-HI MISSION

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
3. CRUISE OUT: At altitudes and speeds for maximum range. External tanks dropped when empty.
4. DESCENT: To sea level. No fuel, time or distance credited.
5. COMBAT FUEL ALLOWANCE: (5) minutes at 30 minute engine setting at sea level. Drop stores after combat.
6. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
7. CRUISE BACK: At altitudes and speeds for maximum range.
8. DESCENT: To sea level. No fuel, time or distance credited.
9. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.

HI-HI-HI MISSION

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
3. CRUISE OUT: At altitudes and speeds for maximum range. External tanks dropped when empty.
4. COMBAT FUEL ALLOWANCE: (5) minutes at 30 minute engine setting. Drop stores after combat, when applicable.
5. CRUISE BACK: At altitudes and speeds for maximum range.
6. DESCENT: To sea level. No fuel, time or distance credited.
7. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



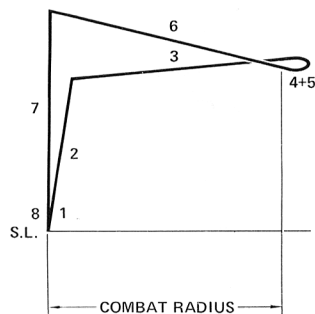
PERFORMANCE BASIS:

- (a) Wind tunnel and flight test data by Hawker-Siddeley Aviation.
- (b) Supplemented by estimated drag data.
- (c) Rolls-Royce Engine Specification No. 301 dated 20 March 1970 with fuel consumption increased 5% for service tolerance.

NOTES:

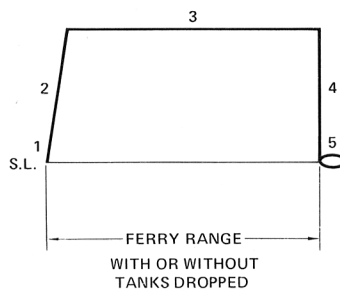
COMBAT AIR PATROL

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
3. CRUISE OUT: 100 nautical miles at altitudes and speeds for maximum range. External tanks dropped when empty.
4. LOITER: On station at altitudes and speeds for maximum endurance.
5. COMBAT FUEL ALLOWANCE: (2) minutes at 15 minute engine rating at 35,000 feet.
6. CRUISE BACK: 100 nautical miles at altitudes and speeds for maximum range.
7. DESCENT: To sea level. No fuel, time or distance credited.
8. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



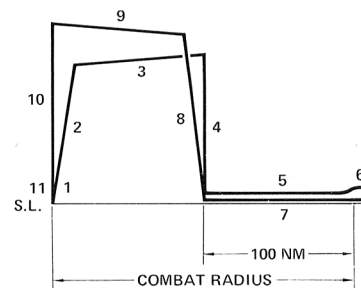
FERRY MISSION

1. WARM-UP, TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
3. CRUISE OUT: At altitudes and speeds for maximum range. External tanks retained/dropped when empty.
4. DESCENT: To sea level. No fuel, time or distance credited.
5. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



HI-LO-LO-HI MISSION

1. WARM-UP TAKEOFF AND ACCELERATE: (3) minutes with maximum continuous thrust.
2. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
3. CRUISE OUT: At altitudes and speeds for maximum range. External tanks dropped when empty.
4. DESCENT: To sea level. No fuel, time or distance credited.
5. CRUISE: 100 nautical miles at sea level, at speed for maximum range.
6. COMBAT FUEL ALLOWANCE: (5) minutes at 30 minute engine setting at sea level. Drop bombs after combat.
7. CRUISE: 100 nautical miles at sea level, at speed for maximum range.
8. CLIMB: On course to optimum cruise altitude with 30 minute engine setting.
9. CRUISE BACK: At altitudes and speeds for maximum range.
10. DESCENT: To sea level. No fuel, time or distance credited.
11. RESERVE: 5% of total initial fuel plus fuel for 10 minutes loiter at sea level at speeds for maximum endurance.



PERFORMANCE BASIS:

- (a) Wind tunnel and flight test data by Hawker-Siddeley Aviation.
- (b) Supplemented by estimated drag data.
- (c) Rolls-Royce Engine Specification No. 301 dated 20 March 1970 with fuel consumption increased 5% for service tolerance.