

**PART 5****CHAPTER 2 — OPERATING DATA****Contents**

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**1 Pressure Error Corrections**

Note: The pressure head is positioned on the port wing tip and is affected by the port outboard drop tank or rocket launcher.

*(a) ASI Sea Level Pressure Error Corrections:*

Port Outer Pylon	IAS (knots)				
	200	300	400	500	600
Without drop tank or rocket launcher	+1	+3	+4	+3	0
With drop tank or rocket launcher	0	+4	+6	+9	+12

*(b) Machmeter Pressure Error Corrections:*

Port Outer Pylon	Height	IMN							
		0.70	0.80	0.85	0.90	0.94	0.985	1.0	1.1
Without drop tank or rocket launcher	All							+ 0.015	+ 0.03
With drop tank or rocket launcher	Sea level	+ 0.02	+ 0.03	+ 0.03	+ 0.05				
	40,000 feet	Negligible		+ 0.02	+ 0.04				

### (c) Altimeter Pressure Error Corrections

- (i) The altimeter pressure error corrections at approach speeds, clean or with stores, are negligible.
- (ii) The following are the PEC in feet at the higher speeds with no PECU operative:

#### *With a Port Outboard Drop Tank or Rocket Launcher*

Mach No	Sea Level	5000 ft	10000 ft	15000 ft	20000 ft	25000 ft	30000 ft	35000 ft	40000 ft
0.70	+400	+370	+320	+260	+200	+120	+40	-80	-200
0.80	+670	+670	+540	+460	+390	+300	+200	+80	-40
0.85	+1000	+920	+820	+720	+620	+520	+400	+270	+140
0.87	+1200	+1120	+1020	+920	+800	+690	+560	+430	+300
0.88	+1320	+1240	+1160	+1060	+950	+860	+760	+640	+520

#### *Without a Port Outboard Drop Tank or Rocket Launcher*

0.70	+190	+170	+150	+120	+90	+60	+20	-20	-60
0.80	+200	+170	+130	+90	+60	+10	-20	-50	-90
0.85	+180	+140	+100	+50	0	-30	-60	-100	-140
0.90	+40	+50	+50	-40	-50	-80	-110	-160	-200

## 2 Fuel Consumption

The approximate fuel consumption in lb/min for various RPM and altitudes at ISA temperature are given below. They apply specifically to the  $4 \times 100$  gallon configuration:

Height	7100 RPM	7300 RPM	7500 RPM	7700 RPM	7900 RPM	8100 RPM
Sea level	65	85	100	125	145	165
10,000 ft	50	65	85	100	120	125
20,000 ft	40	55	65	75	90	95
30,000 ft	—	40	50	55	65	70
35,000 ft	—	—	40	45	55	55

## 3 Take-Off Data

The following tables give approximate sea level take-off distances, in feet, for various configurations and conditions. Stop speeds (VSTOP) at 20,000 lb AUW for a 7500 feet runway with zero wind and zero slope are also given.

Note: The stop speed is the highest indicated airspeed from which the aircraft can be safely brought to rest in the remaining distance available. It is assumed that maximum braking is developed either 5 seconds after attaining that speed or at the maximum braking speed (see para 4(g)) if this occurs later.

<i>(a) Take-Off Distances, Clean Aircraft, AUW 17,250 lb</i>	
CG (landing gear down)	1 inch AOD
Nosewheel unstick ...	130 knots
Aircraft unstick ...	145 knots

		−15°C	0°C	+15°C	+30°C	+45°C
Zero wind	Ground run	2200	2250	2950	3450	4000
	Distance to 50 feet	3800	4250	4750	5450	6150
30 knot headwind	Ground run	1350	1550	1800	2100	2450
	Distance to 50 feet	2600	2950	3300	3800	4250

<i>(b) Take-Off Distances, 2 × 100 Gallon Drop Tanks, AUW 19,250 lb</i>	
CG (landing gear down)	1.9 inches AOD
Nosewheel unstick ...	125 to 130 knots
Aircraft unstick ...	140 to 145 knots

		−15°C	0°C	+15°C	+30°C	+45°C
Zero wind	Ground run	2450	2800	3250	3800	4450
	Distance to 50 feet	3950	4400	4950	5650	6400
30 knot headwind	Ground run	1550	1800	2050	2400	2800
	Distance to 50 feet	2750	3100	3450	3950	4450

<i>(c) Take-Off Distances, 4 × 100 Gallon Drop Tanks, AUW 21,150 lb</i>	
CG (landing gear down)	8.2 inches AOD
Nosewheel unstick ...	115 to 120 knots
Aircraft unstick ...	130 to 135 knots

		−15°C	0°C	+15°C	+30°C	+45°C
Zero wind	Ground run	2550	2950	3400	3950	4650
	Distance to 50 feet	3950	4450	5000	5700	6450
30 knot headwind	Ground run	1600	1900	2150	2550	2950
	Distance to 50 feet	2750	3100	3450	3950	4450

Note 1: For every 1000 feet increase in pressure altitude, increase the ground run by 10% and the distance to 50 feet by 9%.

Note 2: For every 5 knots increase in unstick speed, increase all distances by 8%.

(d) Stop Speeds, 7500 feet Runway, Zero Wind, Zero Slope, AUW 20,000 lb

Temperature	With Parachute		Without Parachute	
	Dry	Wet	Dry	Wet
0°C	149	143	118	112
+15°C	142	135	114	109
+30°C	134	128	109	104

#### 4 Landing Data

The following tables give the ground run, in feet, for various configurations and conditions which can be achieved using the median recommended touchdown speed (threshold speed minus 7.5 knots) and maximum continuous braking. For planning purposes, a factor of 1.3 should be applied. Maximum braking speeds are also given.

(a) *Ground Run, Dry Runway, AUW 16,000 lb*

		Ground Run, Dry Runway, AUW 16,000 lb				
		-15°C 0°C +15°C +30°C +45°C				
Zero wind	With parachute	2310	2460	2610	2760	2910
	Without parachute	2985	3180	3375	3570	3750
30 knot headwind	With parachute	1200	1290	1365	1455	1530
	Without parachute	1665	1770	1875	1980	2070

(b) *Ground Run, Dry Runway, AUW 17,000 lb*

		Ground Run, Dry Runway, AUW 17,000 lb				
		-15°C 0°C +15°C +30°C +45°C				
Zero wind	With parachute	2445	2610	2760	2925	3060
	Without parachute	3180	3390	3585	3795	3990
30 knot headwind	With parachute	1320	1425	1515	1620	1695
	Without parachute	1695	1815	1935	2055	2160

(c) *Ground Run, Dry Runway, AUW 18,500 lb*

		Ground Run, Dry Runway, AUW 18,500 lb				
		-15°C 0°C +15°C +30°C +45°C				
Zero wind	With parachute	2685	2895	3090	3300	3495
	Without parachute	1440	1545	1635	1740	1830

(d) *Ground Run, Wet Runway, AUW 16,000 lb*

		0°C	+15°C	+30°C	+45°C
Zero wind	With parachute	3585	3810	4050	4275
	Without parachute	5175	5490	5805	6120
30 knot headwind	With parachute	1935	2070	2205	2340
	Without parachute	2835	3000	3180	3345

(e) *Ground Run, Wet Runway, AUW 17,000 lb*

		0°C	+15°C	+30°C	+45°C
Zero wind	With parachute	3795	4035	4275	4515
	Without parachute	5430	5775	6105	6435
30 knot headwind	With parachute	2040	2190	2340	2475
	Without parachute	2940	3135	3315	3495

(f) *Ground Run, Wet Runway, AUW 18,500 lb*

		0°C	+15°C	+30°C	+45°C
Zero wind	With parachute	4140	4410	4680	4920
30 knot headwind	With parachute	2250	2400	2550	2685

(g) *Maximum Braking Speeds*

◀ The following table gives the maximum braking speeds at 18,000 lb and 20,000 lb AUW with zero wind, zero slope and without the brake parachute. If the brake parachute is used, the maximum braking speed exceeds the unstick and touchdown speeds.

Note: The maximum braking speed is the maximum indicated airspeed at which continuous braking can be applied and the aircraft brought safely to rest without the risk of brake fade; it is possible that the brakes may be damaged. ▶

Temperature	AUW 18,000 lb		AUW 20,000 lb	
	Dry	Wet	Dry	Wet
0 °C	134	Exceeds unstick and touchdown speeds	120	148
+15 °C	129		116	140
+30 °C	123		112	132

## 5 Climb

The climb tables give time to various altitudes and also fuel used and distance covered on the climb in ISA conditions. The fuel used and the time to altitude are from wheels rolling.

## 6 Cruise

(a) The cruise tables have been calculated assuming the use of Avtur at 0.8 specific gravity (8.0 lb/gall). If Avtag (7.7 lb/gall) is used the maximum weight of fuel carried is reduced by 3.75%; the maximum range is also reduced by this percentage.

(b) The specific air range values have been reduced by 5% to allow for variations between aircraft.

(c) The range at any altitude is independent of temperature but is governed by AUW and mach number. The RPM required to maintain optimum mach number vary with temperature but the specific air range is not affected unless the RPM fall below about 7550 when the guide vanes depart from the minimum swirl position.

(d) Each separate altitude block in the cruise tables shows:

(i) The speed for maximum range, the specific air range (ANM/100 lb) and the fuel consumption (lb/min) for the particular altitude. In addition a '95%-range speed' is given; this provides a speed band within which at least 95% of the maximum range should be achieved.

- ◀ (ii) The range obtainable for various amounts of fuel when flying at the best range speed for the altitude. The range is given to the point at which a **Rapid Descent** must be initiated, sufficient fuel being retained for the descent plus the standard landing allowance of 620 lb.
- ◀ (iii) The range obtainable for various amounts of fuel, including the distance covered on the climb, if a climb is made to another altitude. The climb must be made at the speed appropriate to the configuration.

*(e) Pre-Flight Planning*

Enter the cruise data table in the sea level block at the fuel state applying after take-off. Select the altitude at which maximum range is available at that fuel state. The distance shown includes distance covered on the climb but not on the descent. Absolute maximum range is obtained by adding on the descent distance for the appropriate altitude.

*(f) In-Flight Planning*

At any stage of flight the available range may be ascertained by applying the fuel state to the level flight range in the particular altitude block. If an increase in range is required or if a climb has to be made the new available range may be obtained by entering the existing altitude block at the particular fuel state and moving vertically down within the column until the new altitude is reached. Figures in heavy type indicate the best altitude for maximum increase in range; above these altitudes no further increase in range is possible. If a descent is required the new range is obtained by moving direct from the existing altitude level flight range for the particular fuel state to the new altitude level flight range.

## 7 Descent

The descent table gives the time taken to descend from various altitudes to sea level; it also gives the fuel consumed and the distance covered during the descent.

## 8 Endurance

The endurance in minutes at various altitudes when flying at the endurance speed is given in the Flight Reference Cards. The times have been reduced by 5% as a safety measure and are to the point at which a **Rapid Descent** must be initiated, sufficient fuel being retained for the descent plus the standard landing allowance of 620 lb. The *maximum* endurance in minutes may be calculated from the fuel consumption figure at the endurance speed at the appropriate altitude.

### CLIMB DATA — CLEAN

ISA

Fuel contents	...	...	3312 lb (Avtur 8.0 lb/gall)	
Start-up and taxi allowance			100 lb	
Take-off to climb speed allowance	...	...	180 lb	
Climb speed	...	...	430 knots/0.85M	

From	To	Fuel lb	Time mins	Distance NM
Sea level	10,000 feet	350	3	11
	20,000 feet	520	4½	29
	30,000 feet	700	6¾	46
	40,000 feet	900	10	72
	45,000 feet	1050	14	99

Note: Fuel used and the time to height are from wheels rolling.

## CRUISE DATA — CLEAN

ISA

Sea level	<i>Fuel — lb</i>	3032*	2500	2000	1500	1000
	<i>Range — NM</i>	220	180	135	85	35
ANM/100 lb	— 9·6	10,000 ft	290	235	170	100
lb/min	— 57	20,000 ft	345	275	190	110
Best range speed	— 330 knots	30,000 ft	385	305	200	100
95% range speed	— 430 knots	40,000 ft	430	330	205	80
		45,000 ft	430	325	195	—
10,000 ft	<i>Fuel — lb</i>		2500	2000	1500	1000
	<i>Range — NM</i>		245	180	115	45
ANM/100 lb	— 13·4	20,000 ft	295	210	125	40
lb/min	— 47·8	30,000 ft	330	225	120	—
Best range speed	— 310 knots	40,000 ft	360	235	110	—
95% range speed	— 370 knots	45,000 ft	365	230	95	—
20,000 ft	<i>Fuel — lb</i>		2500	2000	1500	1000
	<i>Range — NM</i>		305	220	135	50
ANM/100 lb	— 16·8	30,000 ft	345	245	140	35
lb/min	— 37·8	40,000 ft	385	260	135	—
Best range speed	— 290 knots	45,000 ft	390	260	125	—
30,000 ft	<i>Fuel — lb</i>		2500	2000	1500	1000
	<i>Range — NM</i>		370	265	160	60
ANM/100 lb	— 20·7	40,000 ft	415	290	165	40
lb/min	— 34·5	45,000 ft	420	285	155	—
Best range speed	— 0·70M					
95% range speed	— 0·82M					
40,000 ft	<i>Fuel — lb</i>		2500	2000	1500	1000
	<i>Range — NM</i>		440	315	190	65
ANM/100 lb	— 25·1	45,000 ft	445	310	180	50
lb/min	— 30·8					
Best range speed	— 0·81M					
95% range speed	— 0·87M					
45,000 ft	<i>Fuel — lb</i>		2500	2000	1500	1000
	<i>Range — NM</i>		455	325	195	60
ANM/100 lb	— 26·4					
lb/min	— 29·6					
Best range speed	— 0·82M					
95% range speed	— 0·87M					

\* Fuel remaining after engine start, taxi and take-off.  
Note: Range figures are to start of descent.

**CLIMB DATA — 2 x 100 GALL DROP****TANKS****ISA**

Fuel contents ... ... 4912 lb (Avtur 8.0 lb/gall)

Start-up and taxy allowance 100 lb

Take-off to climb speed allowance ... ... 200 lb

Climb speed ... ... 430 knots/0.85M

<i>From</i>	<i>To</i>	<i>Fuel lb</i>	<i>Time mins</i>	<i>Distance NM</i>
Sea level	10,000 feet	400	3 $\frac{1}{4}$	14
	20,000 feet	600	5 $\frac{1}{2}$	32
	30,000 feet	800	8	51
	40,000 feet	1000	12 $\frac{1}{2}$	80

◀ Note: Fuel used and the time to height are from wheels rolling. ▶

## CRUISE DATA — 2 × 100 GALL DROP TANKS ISA

Sea level	Fuel — lb	4612*	3312	2500	2000	1500	1000
	Range — NM	370	245	175	130	85	35
ANM/100 lb	— 9·4	10,000 ft	450	295	210	150	90
lb/min	— 52	20,000 ft	570	370	260	180	100
Best range speed	— 310 knots	30,000 ft	665	420	285	185	85
95% range speed	— 380 knots	40,000 ft	780	480	310	190	—

10,000 ft	Fuel — lb		3312	2500	2000	1500	1000
	Range — NM		305	225	165	105	40
ANM/100 lb	— 12·2	20,000 ft	390	280	200	120	40
lb/min	— 46·8	30,000 ft	440	310	215	115	—
Best range speed	— 300 knots	40,000 ft	515	350	225	105	—
95% range speed	— 380 knots						

20,000 ft	Fuel — lb		3312	2500	2000	1500	1000
	Range — NM		400	290	210	130	50
ANM/100 lb	— 16·1	30,000 ft	465	330	230	130	35
lb/min	— 37·6	40,000 ft	550	375	250	130	—
Best range speed	— 275 knots						
95% range speed	— 0·70M						

30,000 ft	Fuel — lb		3312	2500	2000	1500	1000
	Range — NM		490	355	255	160	60
ANM/100 lb	— 19·7	40,000 ft	580	410	290	165	45
lb/min	— 35						
Best range speed	— 0·70M						
95% range speed	— 0·80M						

40,000 ft	Fuel — lb		3312	2500	2000	1500	1000
	Range — NM		600	430	310	185	65
ANM/100 lb	— 24·3						
lb/min	— 31						
Best range speed	— 0·79M						
95% range speed	— 0·85M						

\* Fuel remaining after engine start, taxi and take-off.

Note: Range figures are to start of descent.

**CLIMB DATA — 4 x 100 GALL DROP****TANKS****ISA**

Fuel contents ... ... 6512 lb (Avtur 8.0 lb/gall)

Start-up and taxi allowance ... ... 100 lb

Take-off to climb speed allowance ... ... 230 lb

Climb speed ... ... 370 knots/0.82M

<i>From</i>	<i>To</i>	<i>Fuel lb</i>	<i>Time mins</i>	<i>Distance NM</i>
Sea level	10,000 feet	470	4	18
	20,000 feet	700	6½	37
	30,000 feet	930	9¾	59
	35,000 feet	1050	12	74

◀ Note: Fuel used and the time to height are from wheels rolling. ▶

## CRUISE DATA — 4 × 100 GALL DROP TANKS ISA

Sea level		Fuel — lb	6182*	4912	3312	2500	2000	1500	1000
		Range — NM	470	355	225	165	120	75	35
ANM/100 lb	— 8.65	10,000 ft	665	460	280	202	145	85	30
lb/min	— 58.4	20,000 ft	790	545	325	225	155	85	—
Best range speed	— 295 knots	30,000 ft	935	630	360	245	160	75	—
95% range speed	— 365 knots	35,000 ft	1010	685	385	255	160	—	—
10,000 ft		Fuel — lb		4912	3312	2500	2000	1500	1000
		Range — NM		470	290	215	155	100	40
ANM/100 lb	— 11.6	20,000 ft		555	340	240	170	100	30
lb/min	— 45	30,000 ft		650	385	265	180	95	—
Best range speed	— 280 knots	35,000 ft		705	410	280	185	90	—
20,000 ft		Fuel — lb		4912	3312	2500	2000	1500	1000
		Range — NM		570	355	255	185	115	45
ANM/100 lb	— 14.1	30,000 ft		670	405	290	205	115	30
lb/min	— 40.7	35,000 ft		730	440	310	215	120	—
Best range speed	— 260 knots								
95% range speed	— 320 knots								
30,000 ft		Fuel — lb		4912	3312	2500	2000	1500	1000
		Range — NM		685	425	305	220	135	50
ANM/100 lb	— 17.2	35,000 ft		745	455	325	230	135	40
lb/min	— 38.7								
Best range speed	— 260 knots								
95% range speed	— 0.80M								
35,000 ft		Fuel — lb		4912	3312	2500	2000	1500	1000
		Range — NM		755	465	335	240	145	50
ANM/100 lb	— 18.9								
lb/min	— 36.5								
Best range speed	— 0.72M								
95% range speed	— 0.83M								

\* Fuel remaining after engine start, taxi and take-off.

Note: Range figures are to start of descent.

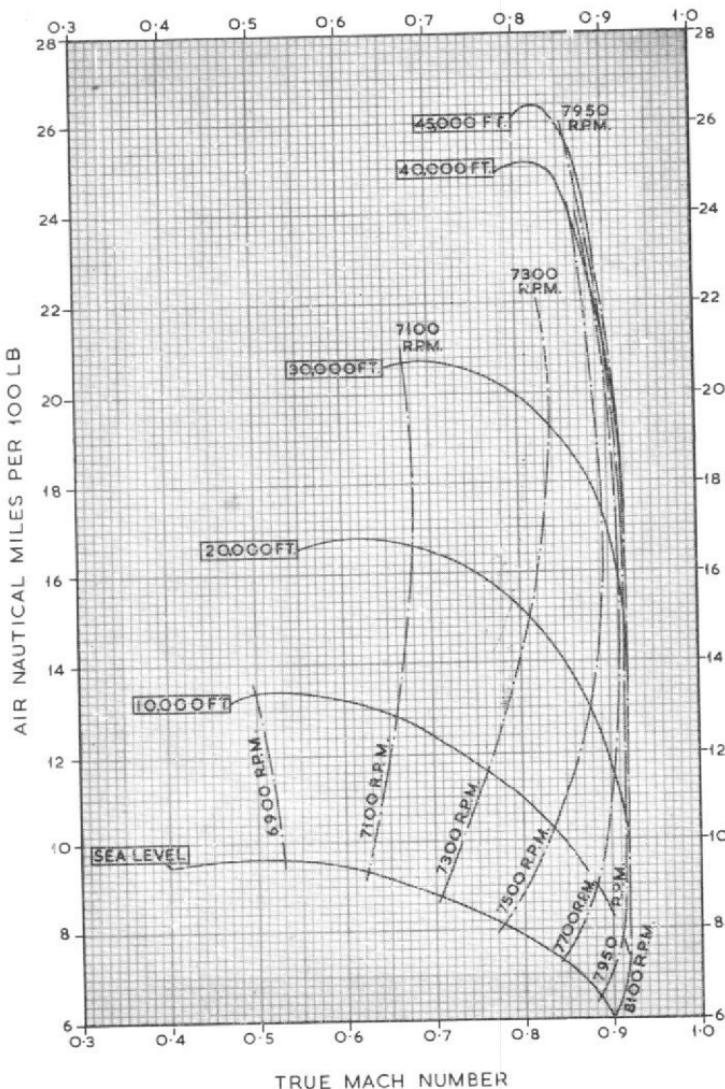
## DESCENT DATA — INSTRUMENT

Speed	...	...	0.90M/300 knots
Airbrake	...	...	Out
Flaps	...	...	23°
Throttle	...	...	6500 RPM

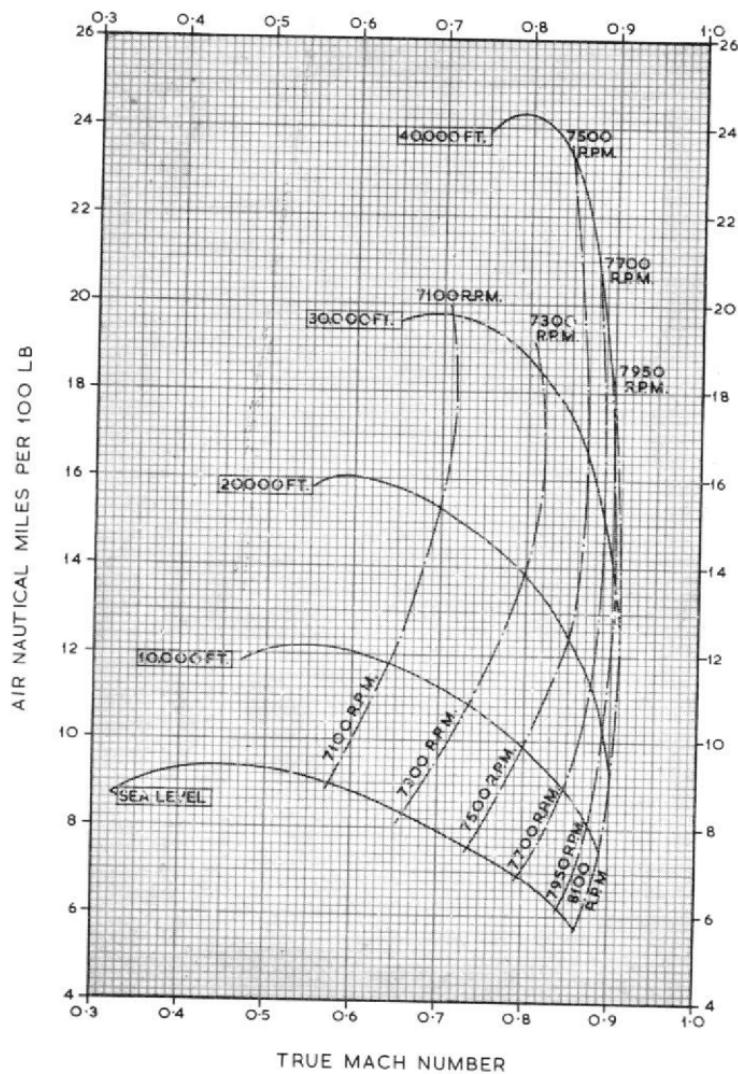
<i>From</i>	<i>To</i>	<i>Fuel lb</i>	<i>Time mins</i>	<i>Distance NM</i>
45,000 feet	Sea level	150	7 $\frac{1}{4}$	35
30,000 feet		100	5 $\frac{1}{4}$	23
20,000 feet		70	4 $\frac{1}{4}$	16
10,000 feet		40	2 $\frac{3}{4}$	8

Note: If outboard drop tanks or rocket launchers are carried, observe the appropriate Mach number limitation.

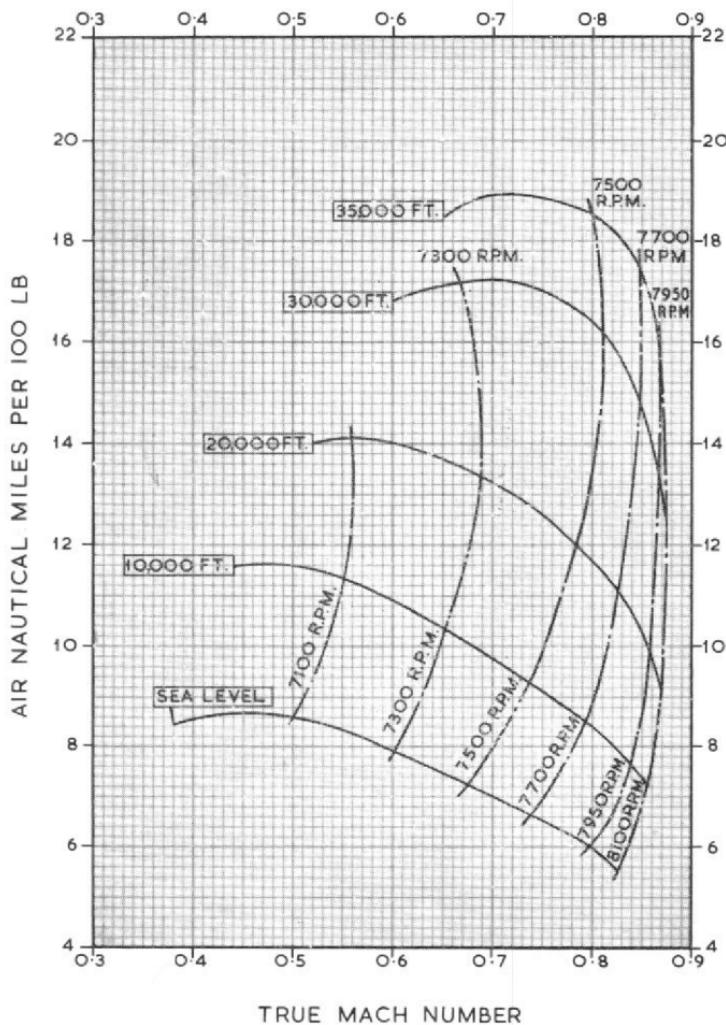
## CLEAN AIRCRAFT

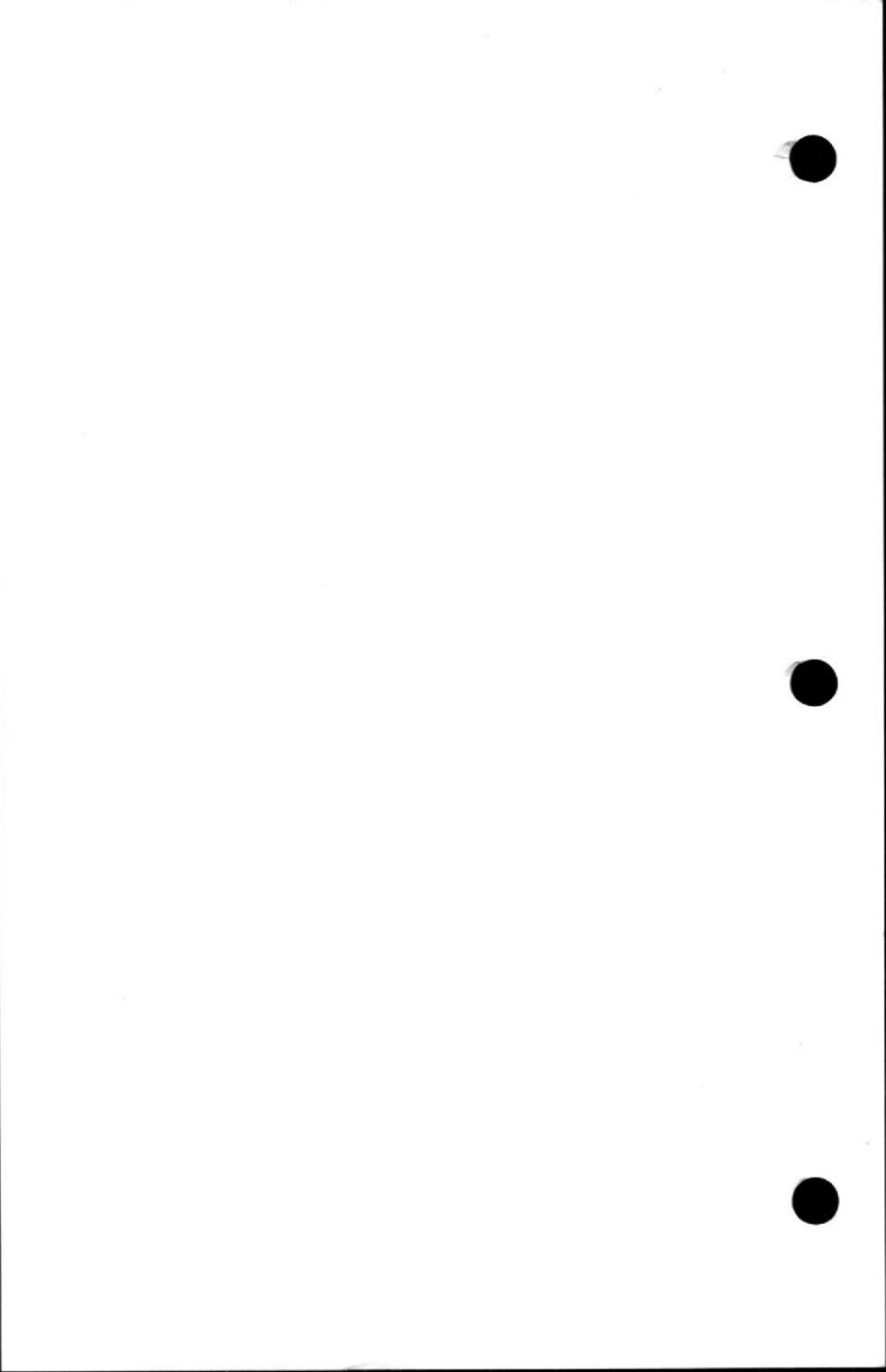


WITH 2x100 GALLON DROP TANKS



## WITH 4X100 GALLON DROP TANKS





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