

## PART 5

## Chapter 2 — OPERATING DATA

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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	Negligible					+0.015	+0.03	+0.13
With drop tank or rocket launcher	Sea level	+0.02	+0.03	+0.03	+0.05				
	40000 feet	Negligible		+0.02	+0.04				

(c) *Altimeter pressure error corrections:*

(i) The altimeter pressure error corrections at approach speeds, clean or with drop tanks, are negligible.

(ii) The following are the PECS, in feet, at the higher speeds:

<i>With a Port Outboard Drop Tank or Rocket Launcher</i>									
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

<i>Without a Port Outboard Drop Tank or Rocket Launcher</i>									
Mach No	Sea Level	5000 ft	10000 ft	15000 ft	20000 ft	25000 ft	30000 ft	35000 ft	40000 ft
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 conditions are given below. They apply specifically to the 4 × 100 gallon configuration:

<i>Height</i>	7100 RPM	7300 RPM	7500 RPM	7700 RPM	7900 RPM	8100 RPM
Sea level	65	85	100	125	145	165
10000 ft	50	65	85	100	120	125
20000 ft	40	55	65	75	90	95
30000 ft	—	40	50	55	65	70
35000 ft	—	—	40	45	55	55

## 3 Take-off distances

The following are the approximate sea level take-off distances, in feet, for various configurations, wind and temperature conditions.

(a) *Clean aircraft (AUW 17250 lb)*

		- 15°C	0°C	+ 15°C	+ 30°C	+ 45°C
Zero wind	Ground run	1770	2040	2340	2730	3180
	Distance to 50 feet	2910	3240	3630	4170	4680
30 knot headwind	Ground run	1050	1200	1410	1650	1920
	Distance to 50 feet	1980	2190	2460	2790	3120

(b) *With 2 × 100 gallon drop tanks (AUW 19250 lb)*

		- 15°C	0°C	+ 15°C	+ 30°C	+ 45°C
Zero wind	Ground run	2160	2490	2850	3360	3870
	Distance to 50 feet	3480	3900	4350	4980	5610
30 knot headwind	Ground run	1320	1530	1770	2070	2400
	Distance to 50 feet	2400	2700	2970	3420	3780

(c) *With 4 × 100 gallon drop tanks (AUW 21150 lb)*

		- 15°C	0°C	+ 15°C	+ 30°C	+ 45°C
Zero wind	Ground run	2700	3120	3600	4230	4890
	Distance to 50 feet	4200	4710	5250	6000	6750
30 knot headwind	Ground run	1740	1980	2310	2700	3150
	Distance to 50 feet	2970	3270	3660	4140	4650

**4 Landing distances**

The figures quoted are the average ground run in feet.

(a) *Dry runway (AUW 16000 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) Dry runway (AUW 17000 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) Dry runway (AUW 18500 lb)

		- 15°C	0°C	+ 15°C	+ 30°C	+ 45°C
Zero wind	With parachute	2685	2895	3090	3300	3495
	Without parachute					
30 knot headwind	With parachute	1440	1545	1635	1740	1830
	Without parachute					

(d) Wet runway (AUW 16000 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) Wet runway (AUW 17000 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) *Wet runway (AUW 18500 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 maximum indicated airspeed at which maximum continuous braking may be applied on a dry runway at sea level is:

Temperature °C	Max brake speed (knots)	
	18000 lb	20000 lb
+15	128	116
+30	124	112
+45	120	108

**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 is from engine start; the time to altitude is 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 the 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 FRCs. The times have been reduced by 5% as a safety measure and are to the point at which the 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 AND CRUISE DATA** — *overleaf*

## 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

<i>From</i>	<i>To</i>	<i>Fuel lb</i>	<i>Time mins</i>	<i>Distance nm</i>
Sea level	10000 ft	350	3	11
	20000 ft	520	4½	29
	30000 ft	700	6¾	46
	40000 ft	900	10	72
	45000 ft	1050	14	99

NOTE: Fuel used is from engine start; time to height is from wheels rolling.

## CRUISE DATA — CLEAN

ISA

Sea level		Fuel — lb	3032*	2500	2000	1500	1000
		Range — nm	220	180	135	85	35
ANM/100 lb	— 9·6	10000 ft	290	235	170	100	<b>35</b>
lb/min	— 57	20000 ft	345	275	190	<b>110</b>	—
Best range speed	— 330 knots	30000 ft	385	305	200	100	—
95% range speed	— 430 knots	40000 ft	430	<b>330</b>	<b>205</b>	80	—
		45000 ft	<b>430</b>	325	195	—	—
10000 ft		Fuel — lb		2500	2000	1500	1000
		Range — nm		245	180	115	<b>45</b>
ANM/100 lb	— 13·4	20000 ft	295	210	<b>125</b>	40	—
lb/min	— 47·8	30000 ft	330	225	120	—	—
Best range speed	— 310 knots	40000 ft	360	<b>235</b>	110	—	—
95% range speed	— 370 knots	45000 ft	<b>365</b>	230	95	—	—
20000 ft		Fuel — lb		2500	2000	1500	1000
		Range — nm		305	220	135	<b>50</b>
ANM/100 lb	— 16·8	30000 ft	345	245	<b>140</b>	35	—
lb/min	— 37·8	40000 ft	385	260	135	—	—
Best range speed	— 290 knots	45000 ft	<b>390</b>	<b>260</b>	125	—	—
95% range speed	— 0·75M						
30000 ft		Fuel — lb		2500	2000	1500	1000
		Range — nm		370	265	160	<b>60</b>
ANM/100 lb	— 20·7	40000 ft	415	<b>290</b>	<b>165</b>	40	—
lb/min	— 34·5	45000 ft	<b>420</b>	285	155	—	—
Best range speed	— 0·70M						
95% range speed	— 0·82M						
40000 ft		Fuel — lb		2500	2000	1500	1000
		Range — nm		440	<b>315</b>	<b>190</b>	<b>65</b>
ANM/100 lb	— 25·1	45000 ft	<b>445</b>	310	180	50	—
lb/min	— 30·8						
Best range speed	— 0·81M						
95% range speed	— 0·87M						
45000 ft		Fuel — lb		2500	2000	1500	1000
		Range — nm		<b>455</b>	<b>325</b>	<b>195</b>	<b>60</b>
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 × 100 GALL DROP TANKS**      **ISA**

Fuel contents    ...    ...    ...    4912 lb (AVTUR 8·0 lb/gall)  
 Start-up and taxi 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	10000 ft	400	3¼	14
	20000 ft	600	5½	32
	30000 ft	800	8	51
	40000 ft	1000	12½	80

NOTE: Fuel used is from engine start; time to height is from wheels rolling.

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

		Fuel — lb	4612*	3312	2500	2000	1500	1000
<b>Sea level</b>								
		Range — nm	370	245	175	130	85	<b>35</b>
ANM/100 lb — 9.4 lb/min — 52 Best range speed — 310 knots 95% range speed — 380 knots	10000 ft	450	295	210	150	90	30	
	20000 ft	570	370	260	180	<b>100</b>	—	
	30000 ft	665	420	285	185	85	—	
	40000 ft	<b>780</b>	<b>480</b>	<b>310</b>	<b>190</b>	—	—	

		Fuel — lb		3312	2500	2000	1500	1000
<b>10000 ft</b>								
		Range — nm		305	225	165	105	40
ANM/100 lb — 12.2 lb/min — 46.8 Best range speed — 300 knots 95% range speed — 380 knots	20000 ft		390	280	200	<b>120</b>	<b>40</b>	
	30000 ft		440	310	215	115	—	
	40000 ft		<b>515</b>	<b>350</b>	<b>225</b>	105	—	

		Fuel — lb		3312	2500	2000	1500	1000
<b>20000 ft</b>								
		Range — nm		400	290	210	130	<b>50</b>
ANM/100 lb — 16.1 lb/min — 37.6 Best range speed — 275 knots 95% range speed — 0.70M	30000 ft		465	330	230	130	35	
	40000 ft		<b>550</b>	<b>375</b>	<b>250</b>	<b>130</b>	—	

		Fuel — lb		3312	2500	2000	1500	1000
<b>30000 ft</b>								
		Range — nm		490	355	255	160	<b>60</b>
ANM/100 lb — 19.7 lb/min — 35 Best range speed — 0.70M 95% range speed — 0.80M	40000 ft		<b>580</b>	<b>410</b>	<b>290</b>	<b>165</b>	45	

		Fuel — lb		3312	2500	2000	1500	1000
<b>40000 ft</b>								
		Range — nm		<b>600</b>	<b>430</b>	<b>310</b>	<b>185</b>	<b>65</b>
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 × 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	10000 ft	470	4	18
	20000 ft	700	6½	37
	30000 ft	930	9¾	59
	35000 ft	1050	12	74

NOTE: Fuel used is from engine start; time to height is from wheels rolling.

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

Sea level	<i>Fuel — lb</i>	6182*	4912	3312	2500	2000	1500	1000
	<i>Range — nm</i>	470	355	225	165	120	75	35
ANM/100 lb — 8·65	10000 ft	665	460	280	202	145	85	30
lb/min — 58·4	20000 ft	790	545	325	225	155	85	—
Best range speed — 295 knots	30000 ft	935	630	360	245	160	75	—
95% range speed — 365 knots	35000 ft	1010	385	385	255	160	—	—

10000 ft	<i>Fuel — lb</i>		4912	3312	2500	2000	1500	1000
	<i>Range — nm</i>		470	290	215	155	100	40
ANM/100 lb — 11·6	20000 ft		555	340	240	170	100	30
lb/min — 45	30000 ft		650	385	265	180	95	—
Best range speed — 280 knots	35000 ft		705	410	280	185	90	—
95% range speed — 325 knots								

20000 ft	<i>Fuel — lb</i>		4912	3312	2500	2000	1500	1000
	<i>Range — nm</i>		570	355	255	185	115	45
ANM/100 lb — 14·1	30000 ft		670	405	290	205	115	30
lb/min — 40·7	35000 ft		730	440	310	215	120	—
Best range speed — 260 knots								
95% range speed — 320 knots								

30000 ft	<i>Fuel — lb</i>		4912	3312	2500	2000	1500	1000
	<i>Range — nm</i>		685	425	305	220	135	50
ANM/100 lb — 17·2	35000 ft		745	455	325	230	135	40
lb/min — 38·7								
Best range speed — 260 knots								
95% range speed — 0·80M								

35000 ft	<i>Fuel — lb</i>		4912	3312	2500	2000	1500	1000
	<i>Range — nm</i>		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.

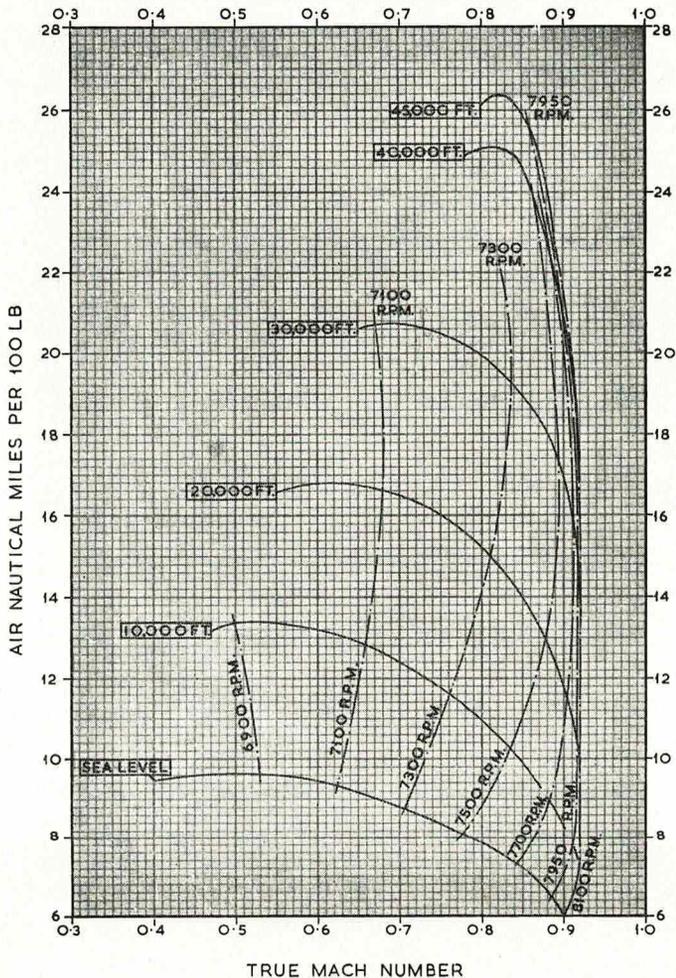
## DESCENT DATA — INSTRUMENT

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

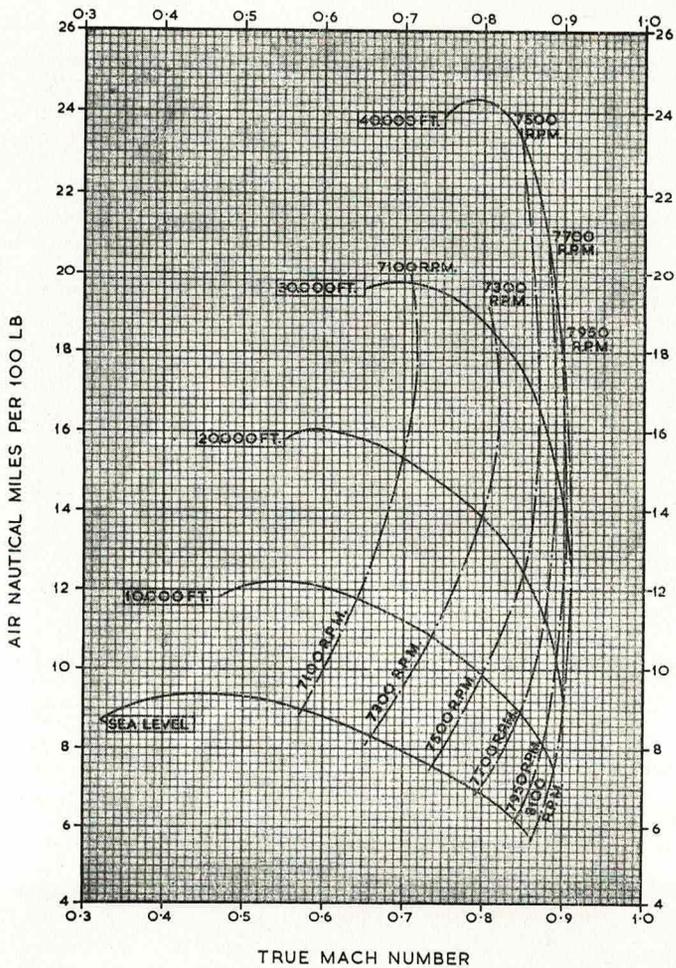
<i>From</i>	<i>To</i>	<i>Fuel lb</i>	<i>Time mins</i>	<i>Distance nm</i>
45000 ft	Sea level	150	7½	35
30000 ft		100	5½	23
20000 ft		70	4½	16
10000 ft		40	2¾	8

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

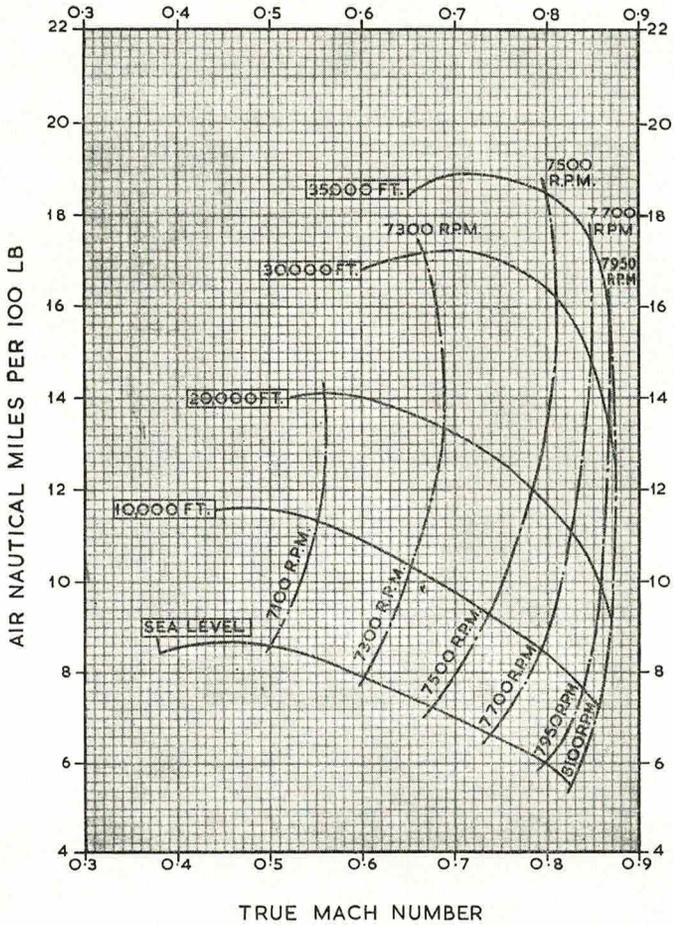
CLEAN AIRCRAFT

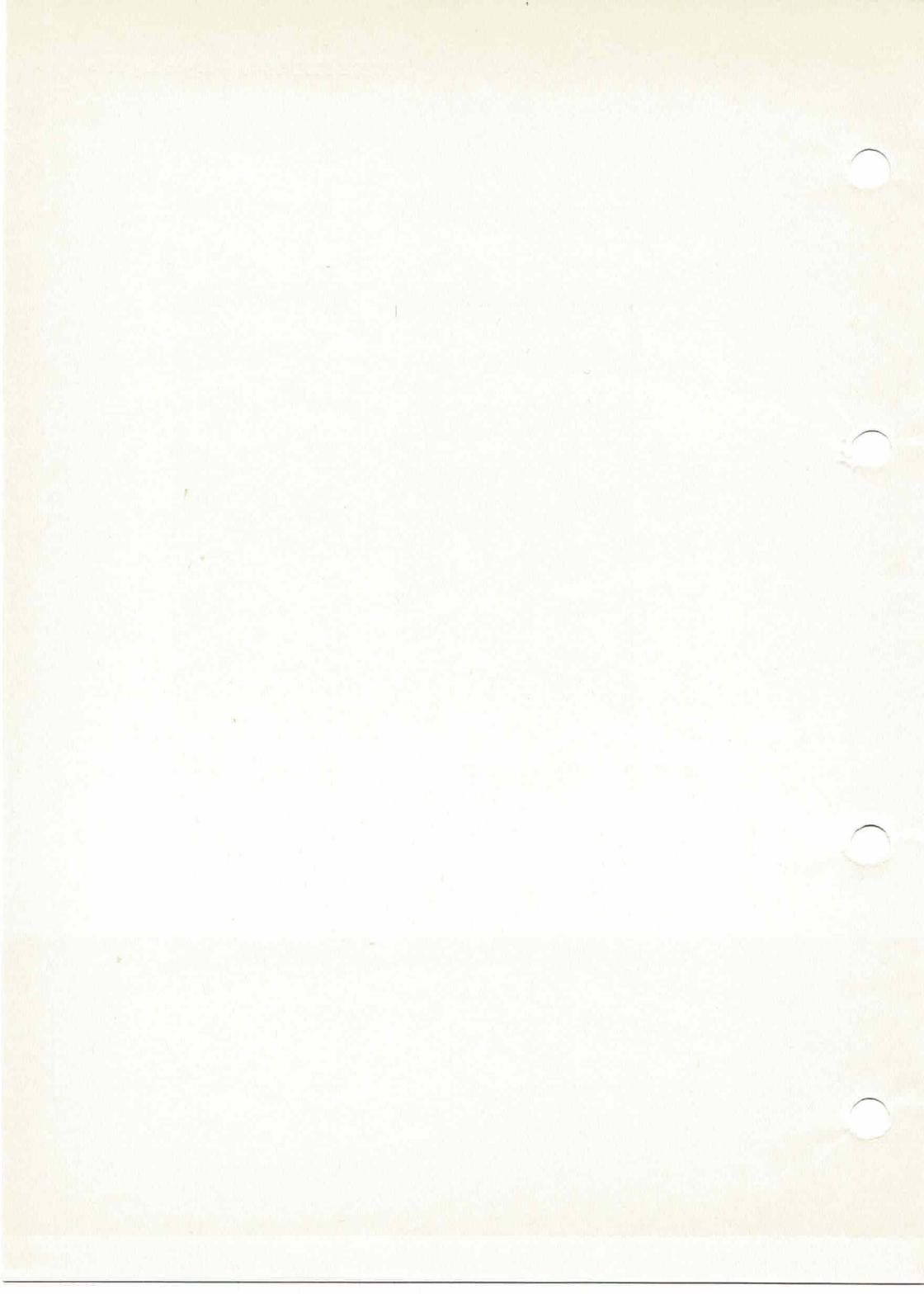


# WITH 2x100 GALLON DROP TANKS



WITH 4x100 GALLON DROP TANKS







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