PERFORMANCE DATA
appendix I

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PART 1 – INTRODUCTION

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The symbol * indicates an illustration

SCOPE AND ARRANGEMENT

The charts contained in this Appendix present the performance of the Ⓐ and Ⓑ airplanes in a graphical form. They are based on ICAO standard atmospheric conditions; however, nomograms are provided to allow corrections for non-standard conditions as necessary. The charts are arranged in a logical sequence in seven basic divisions for planning general phases of each flight.

PART 1 – INTRODUCTION

PART 2 – ENGINE DATA

PART 3 – TAKEOFF

PART 4 – CLIMB

PART 5 – CRUISE

PART 6 – APPROACH AND LANDING

PART 7 – MISSION PLANNING

Descriptive text in each part discusses and explains the use of the charts provided. A sample problem at the end of the Appendix shows how the individual performance charts for each phase of a flight can be combined for flight planning purposes.

GLOSSARY OF TERMS AND ABBREVIATIONS

ABSOLUTE CEILING—Maximum altitude at which level flight can be maintained with zero feet per minute rate of climb.

ACCELERATION CHECK SPEED, TIME/ DISTANCE—A means of checking airplane acceleration during takeoff roll using time or distance. The acceleration time check provides the most accurate check of acceleration. With this method, an even 10 knot increment not less than 5 and not more than 15 knots below refusal speed will normally be used as an acceleration check speed. As a secondary procedure, on marked runways the acceleration check may be made at a distance marker. For this method, the acceleration check point will normally be the first 1000 foot marker at least 500 feet but no more than 1500 feet prior to the refusal distance.

AIRSPEED

IAS—Indicated airspeed; observed airspeed corrected for instrument error.

CAS—Calibrated airspeed; IAS corrected for installation error in the pitot system.

EAS—Equivalent airspeed; CAS corrected for compressibility error. For all practical purposes at altitudes below 15,000 feet, the compressibility factor is negligible for this airplane.

TAS—True airspeed; EAS corrected for relative density.

$$TAS = EAS \times \frac{1}{\sqrt{\sigma}}$$

BEST CLIMB SPEED—The airspeed which results in the best angle of climb (climb gradient). Except

when minimum control speed is involved, the best climb speed for obstacle clearance is 1.2 stall speed for the gross weight and wing flat setting.

BHP—Brake horsepower.

CAT—Carburetor air temperature.

CRITICAL ALTITUDE—The altitude at which full throttle is required to maintain a given BHP at a set RPM.

CRITICAL ENGINE FAILURE SPEED (Vcrit)—The speed at which failure of one engine permits acceleration to takeoff in the same distance that the airplane may be decelerated to a stop using brakes only.

CRITICAL FIELD LENGTH—The total length of runway required to accelerate on all engines to the critical engine failure speed, lose one engine, and then continue takeoff, or stop.

CRUISE CEILING—Maximum altitude at which a rate of climb of 300 feet per minute can be maintained with METO power.

DENSITY ALTITUDE—Pressure altitude corrected for temperature. When conditions are standard, pressure altitude and density altitude are the same. Consequently, if the temperature is above standard, the density altitude will be higher than the pressure altitude. If the temperature is below standard, the density altitude will be lower than the pressure altitude.

DEWPOINT—The temperature at which, under ordinary conditions, condensation begins in a cooling mass of air. This temperature is used as the basis for calculating the effect produced by humidity on the power output of the engines.

EXPECTED TORQUE PRESSURE—The torque pressure which the engine may be expected to develop when the effects of altitude and atmospheric conditions are considered.

LANDING GROUND ROLL—Distance from touchdown to complete stop, utilizing brakes only, on a dry hard surface with propellers windmilling.

MAP—Engine absolute manifold pressure (in. Hg).

MAXIMUM DRY POWER—The maximum power permissible from the engine when the water injection system is not used; limited to five minutes.

MAXIMUM WET POWER—The maximum power permissible from the engine utilizing the water injection system; limited to five minutes.

METO (MAXIMUM EXCEPT TAKEOFF) POWER— The maximum power at which the engine can be operated continuously without damage.

MILITARY POWER—The same as maximum dry power except that the time limit is 30 minutes. An airplane engine can actually be run continuously under overload conditions of power and speed for much longer periods than those permitted by the ratings. However, the period of reliable operation is thereby reduced to an impractically short time. By imposing a time limit on maximum and military power ratings, the cumulative effect of the overloads is distributed evenly over the period between overhauls and the useful life of the engine accordingly lengthened. When use of military power is absolutely required for longer than 30 minutes, a notation must be made on Form 781.

MINIMUM CONTROL SPEED (Vmc)—Speed required to provide sufficient control to enable the airplane to fly a straight flight path over the ground with takeoff configuration, one engine windmilling, maximum power on other engine and no more than 5° bank angle away from the failed engine.

MINIMUM PERFORMANCE TORQUE PRESSURE— 95% of expected torque pressure.

MINIMUM SAFE SINGLE-ENGINE SPEED—Speed that will permit the airplane to maintain a minimum 100 fpm rate of climb in clean configuration (sea level, standard atmosphere) with the propeller on the inoperative engine feathered and maximum power on the operating engine.

OAT (FAT)—Outside or free air temperature; denoted as runway air temperature when observed at the runway.

PRESSURE ALTITUDE—The height or vertical distance from the standard datum plane. This is a theoretical plane where air pressure is equal to 29.92 in. Hg at 15°C (59°F).

REFUSAL SPEED (VR)—The maximum speed to which the airplane can be accelerated and still be stopped on the remaining runway using brakes only.

RUNWAY HEADWIND COMPONENT—Resultant headwind parallel to runway, as a result of wind direction and velocity.

SIGMA (σ) = Density ratio (ρ/ρ_0). The ratio between ambient density and standard sea level density. $\frac{1}{\sqrt{\sigma}}$ is the correction factor for air density applied to EAS to obtain TAS. Sigma is commonly known as "smoe."

SERVICE CEILING—Maximum altitude at which a rate of climb of 100 feet per minute can be maintained.

STALL SPEED (Vstall)—Speed at which the airplane starts to drop because of separation of airflow over the wings due to insufficient airspeed or excessive angle of attack.

STANDARD ATMOSPHERE—An arbitrary variation of air density, pressure, and temperature with

altitude used for comparing engine and airplane performance. Standard air at sea level is represented by a barometric pressure of 29.92 in. Hg at 59°F (15°C).

TAKEOFF DISTANCE—Distance from start of takeoff to takeoff speed with both engines operating.

TAKEOFF SPEED—Speed at which main wheels leave the ground.

TORQUE PRESSURE (TPSI)—An indication of power being delivered to the propeller shaft by the engine.

WIND ACCOUNTABILITY—The wind correction nomograms on the charts are calculated on the basis of 100% wind accountability. Reported headwinds should be used at 50% of their value and reported tailwinds should be used at 150% of their value if the wind is measured at a source other than the runway.

DISCUSSION OF STANDARD CHARTS

The standard charts (figures 1A1-1 through 1A1-7) are provided for ready reference in determining standard and non-standard atmospheric conditions, and in determining compressibility and position error corrections to airspeed readings. For all normal flight planning compressibility effect on airspeed and altitude indication is negligible. Nevertheless, the airplane commander should study the standard charts and their limitations and be ready to apply them as necessary to satisfy any specific detail problem.

DENSITY ALTITUDE CHART

Density altitude may be found from this chart (figure 1A1-1), for a given temperature and pressure altitude condition.

EXAMPLE

    a. Outside air temperature = 25°C.

    b. Pressure altitude = 3500 feet.

    c. $\dfrac{1}{\sqrt{\sigma}}$ = 1.083.

    d. Density altitude = 5400 feet.

This chart also provided a $\dfrac{1}{\sqrt{\sigma}}$ value necessary to change equivalent airspeed to true airspeed. Enter the chart with the given temperature condition, proceed vertically to the pressure altitude, and read horizontally to the right to obtain the $\dfrac{1}{\sqrt{\sigma}}$ value.

True airspeed (TAS) may then be obtained from equivalent airspeed (EAS) by multiplying the given EAS by the $\dfrac{1}{\sqrt{\sigma}}$ value.

DENSITY ALTITUDE VERSUS $\dfrac{1}{\sqrt{\sigma}}$

This chart (figure 1A1-2) gives values of $\dfrac{1}{\sqrt{\sigma}}$ accurately for every 100-foot increment in density altitude.

STANDARD ALTITUDE TABLE

A Standard Altitude Table (figure 1A1-3) shows standard atmospheric values as defined by ICAO. The standard atmosphere defined by ICAO represents an approximation to the average atmosphere of the world. The ICAO assumes a temperature of 15°C (59°F) and a pressure of 29.92 in. Hg for sea level conditions. The temperature variation with height is approximately uniform from 15°C (59°F) at sea level to -56.5°C (-69.7°F) at 36,089 feet. This altitude is assumed to be the beginning of the isothermal region or stratosphere. For all practical purposes the temperature will remain constant as altitude is increased above 36,089 feet. The corresponding pressures and densities are shown on the Standard Altitude Table. ICAO standard atmosphere values have been used in preparation of all performance charts in this Appendix. Data for non-standard conditions are shown as variations from the ICAO standard atmosphere.

PRESSURE ALTITUDE TABLE

The Pressure Altitude Table (figure 1A1-4) provides the necessary corrections to field elevation to obtain pressure altitude from the altimeter setting. To determine pressure altitude, find the altitude correction (Δ ALT) for the given altimeter setting. Add this correction algebraically to the field elevation to obtain pressure altitude.

TEMPERATURE CONVERSION CHART

The Temperature Conversion Chart (figure 1A1-5) is presented in degrees centigrade versus degrees Fahrenheit to facilitate the conversion of given temperatures as desired.

AIRSPEED CALIBRATION

Airspeed Calibration (figure 1A1-6) for the airspeed system shows indicated airspeed versus calibrated airspeed to account for the location of the static pressure pickup. The effects of airplane attitude are negligible to the position error in terms of wing flap setting, landing gear position, and gross weight.
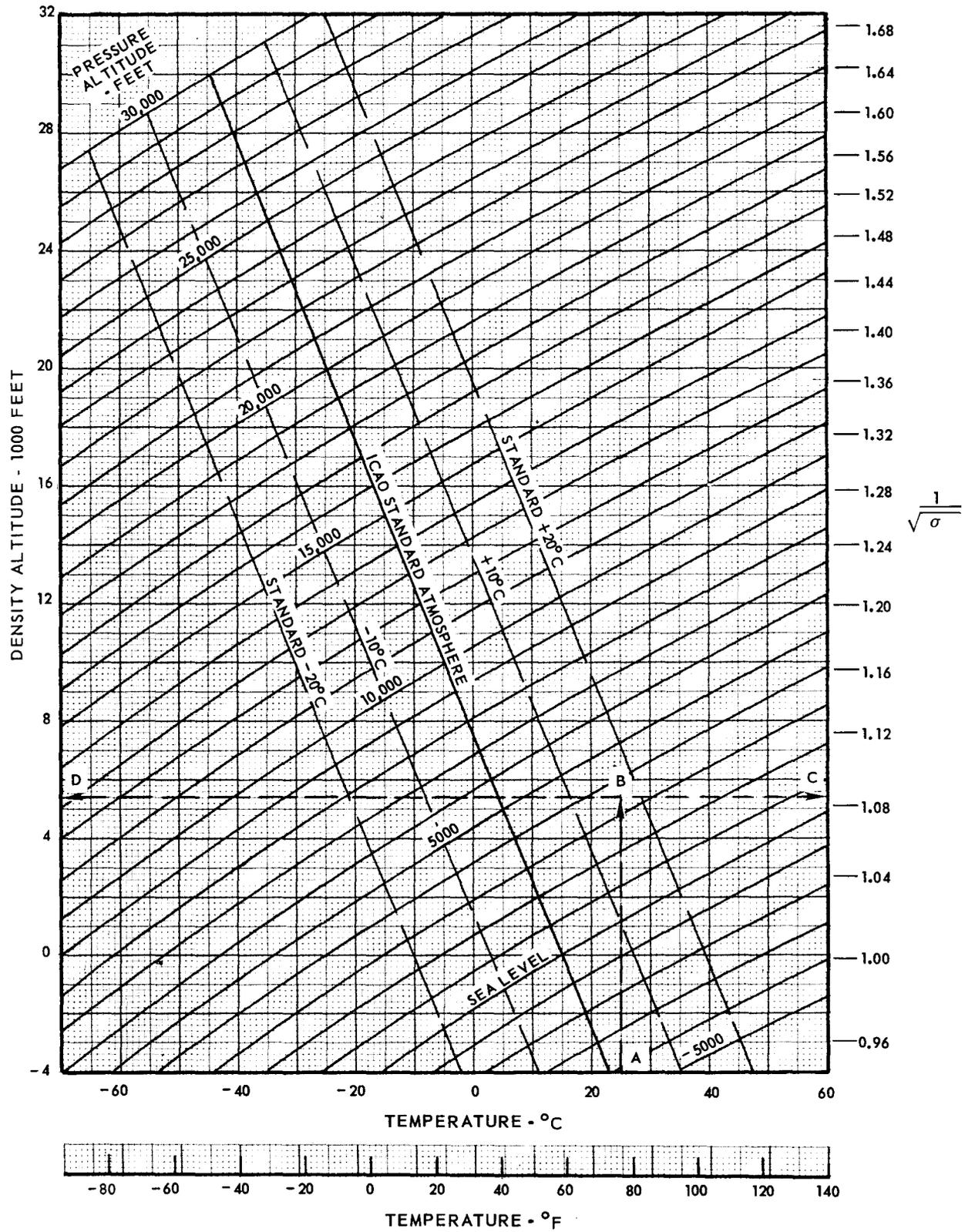
AIRSPEED COMPRESSIBILITY CORRECTION CHART

This chart (figure 1A1-7) presents calibrated airspeed versus equivalent airspeed to account for the compressibility of the atmosphere.

ALTIMETER POSITION ERROR CORRECTION

Altimeter errors due to static port location are negligible and no correction is necessary.

DENSITY ALTITUDE CHART

Figure 1A1-1

DENSITY ALTITUDE VS $\dfrac{1}{\sqrt{\sigma}}$

TRUE AIRSPEED = EQUIVALENT AIRSPEED × $\dfrac{1}{\sqrt{\sigma}}$

DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$	DENSITY ALTITUDE (FEET)	$\frac{1}{\sqrt{\sigma}}$
100	1.0014	3300	1.0501	6500	1.1023	9700	1.1582	12900	1.2186	16100	1.2837	19300	1.3541	22400	1.4277
200	1.0029	3400	1.0516	6600	1.1039	9800	1.1600	13000	1.2206	16200	1.2858	19400	1.3564	22500	1.4302
300	1.0044	3500	1.0531	6700	1.1056	9900	1.1618	13100	1.2225	16300	1.2879	19500	1.3587	22600	1.4327
400	1.0059	3600	1.0548	6800	1.1073	10000	1.1637	13200	1.2245	16400	1.2901	19600	1.3609	22700	1.4351
500	1.0074	3700	1.0563	6900	1.1090	10100	1.1655	13300	1.2265	16500	1.2922	19700	1.3632	22800	1.4376
600	1.0088	3800	1.0579	7000	1.1107	10200	1.1674	13400	1.2285	16600	1.2943	19800	1.3655	22900	1.4401
700	1.0103	3900	1.0595	7100	1.1124	10300	1.1692	13500	1.2305	16700	1.2965	19900	1.3678	23000	1.4426
800	1.0118	4000	1.0611	7200	1.1141	10400	1.1711	13600	1.2324	16800	1.2986	20000	1.3701	23100	1.4451
900	1.0133	4100	1.0627	7300	1.1158	10500	1.1729	13700	1.2337	16900	1.3007	20100	1.3724	23200	1.4477
1000	1.0148	4200	1.0643	7400	1.1176	10600	1.1748	13800	1.2364	17000	1.3029	20200	1.3748	23300	1.4502
1100	1.0163	4300	1.0659	7500	1.1193	10700	1.1766	13900	1.2385	17100	1.3050	20300	1.3771	23400	1.4528
1200	1.0178	4400	1.0675	7600	1.1210	10800	1.1785	14000	1.2404	17200	1.3072	20400	1.3795	23500	1.4553
1300	1.0193	4500	1.0692	7700	1.1228	10900	1.1803	14100	1.2424	17300	1.3094	20500	1.3819	23600	1.4579
1400	1.0208	4600	1.0707	7800	1.1245	11000	1.1822	14200	1.2444	17400	1.3116	20600	1.3842	23700	1.4604
1500	1.0223	4700	1.0724	7900	1.1262	11100	1.1841	14300	1.2465	17500	1.3138	20700	1.3866	23800	1.4630
1600	1.0238	4800	1.0704	8000	1.1280	11200	1.1860	14400	1.2485	17600	1.3159	20800	1.3889	23900	1.4656
1700	1.0253	4900	1.0756	8100	1.1297	11300	1.1879	14500	1.2506	17700	1.3181	20900	1.3913	24000	1.4681
1800	1.0268	5000	1.0773	8200	1.1315	11400	1.1893	14600	1.2526	17800	1.3203	21000	1.3937	24100	1.4706
1900	1.0283	5100	1.0789	8300	1.1332	11500	1.1917	14700	1.2546	17900	1.3225	21100	1.3961	24200	1.4732
2000	1.0299	5200	1.0806	8400	1.1350	11600	1.1926	14800	1.2567	18000	1.3247	21200	1.3985	24300	1.4758
2100	1.0314	5300	1.0822	8500	1.1368	11700	1.1955	14900	1.2587	18100	1.3267	21300	1.4009	24400	1.4784
2200	1.0329	5400	1.0839	8600	1.1385	11800	1.1974	15000	1.2608	18200	1.3292	21400	1.4033	24500	1.4810
2300	1.0344	5500	1.0855	8700	1.1403	11900	1.1993	15100	1.2628	18300	1.3314	21500	1.4068	24600	1.4836
2400	1.0360	5600	1.0872	8800	1.1420	12000	1.2012	15200	1.2649	18400	1.3337	21600	1.4082	24700	1.4862
2500	1.0375	5700	1.0888	8900	1.1438	12100	1.2031	15300	1.2670	18500	1.3360	21700	1.4106	24800	1.4888
2600	1.0390	5800	1.0905	9000	1.1456	12200	1.2050	15400	1.2691	18600	1.3382	21800	1.4130	24900	1.4914
2700	1.0406	5900	1.0921	9100	1.1474	12300	1.2070	15500	1.2712	18700	1.3405	21900	1.4154	25000	1.4940
2800	1.0421	6000	1.0936	9200	1.1492	12400	1.2089	15600	1.2732	18800	1.3427	22000	1.4179		
2900	1.0436	6100	1.0954	9300	1.1510	12500	1.2109	15700	1.2753	18900	1.3450	22100	1.4203		
3000	1.0454	6200	1.0971	9400	1.1528	12600	1.2128	15800	1.2774	19000	1.3473	22200	1.4228		
3100	1.0469	6300	1.0988	9500	1.1546	12700	1.2147	15900	1.2795	19100	1.3493	22300	1.4253		
3200	1.0485	6400	1.1005	9600	1.1564	12800	1.2167	16000	1.2816	19200	1.3518				

46,256

Figure 1A1-2

Standard Altitude Table

Standard Sea Level Air:
T = 15° C. W = .07651 lb/cu. ft. ρ_o = .002378 slugs/cu. ft.
P = 29.921 in. of Hg. 1" of Hg. = 70.732 lb/sq. ft. = 0.4912 lb/sq. in.
This table is based on NACA Technical Report No. 218 a_o - 1116 ft./sec.

Altitude feet	Density Ratio ρ/ρ_o	$\frac{1}{\sqrt{\sigma}}$	Temperature Deg. C	Temperature Deg. F	Speed of Sound Ratio a/a_o	Pressure In. of Hg.	Pressure Ratio P/P_o
0	1.0000	1.0000	15.000	59.000	1.0000	29.92	1.0000
1000	.9710	1.0148	13.019	55.434	.997	28.86	.9644
2000	.9428	1.0299	11.038	51.868	.993	27.82	.9298
3000	.9151	1.0454	9.056	48.301	.990	26.81	.8962
4000	.8881	1.0611	7.075	44.735	.986	25.84	.8636
5000	.8616	1.0773	5.094	41.169	.983	24.89	.8320
6000	.8358	1.0938	3.113	37.603	.979	23.98	.8013
7000	.8106	1.1107	1.132	34.037	.976	23.09	.7716
8000	.7859	1.1280	-0.850	30.471	.972	22.22	.7427
9000	.7619	1.1456	-2.831	26.904	.968	21.38	.7147
10000	.7384	1.1637	-4.812	23.338	.965	20.58	.6876
11000	.7154	1.1822	-6.793	19.772	.962	19.79	.6614
12000	.6931	1.2012	-8.774	16.206	.958	19.03	.6359
13000	.6712	1.2206	-10.756	12.640	.954	18.29	.6112
14000	.6499	1.2404	-12.737	9.074	.950	17.57	.5873
15000	.6291	1.2608	-14.718	5.507	.947	16.88	.5642
16000	.6088	1.2816	-16.699	1.941	.943	16.21	.5418
17000	.5891	1.3029	-18.680	-1.625	.940	15.56	.5202
18000	.5698	1.3247	-20.662	-5.191	.936	14.94	.4992
19000	.5509	1.3473	-22.643	-8.757	.932	14.33	.4790
20000	.5327	1.3701	-24.624	-12.323	.929	13.75	.4594
21000	.5148	1.3937	-26.605	-15.890	.925	13.18	.4405
22000	.4974	1.4179	-28.586	-19.456	.922	12.63	.4222
23000	.4805	1.4426	-30.568	-23.022	.917	12.10	.4045
24000	.4640	1.4681	-32.549	-26.588	.914	11.59	.3874
25000	.4480	1.4940	-34.530	-30.154	.910	11.10	.3709
26000	.4323	1.5209	-36.511	-33.720	.906	10.62	.3550
27000	.4171	1.5484	-38.493	-37.287	.903	10.16	.3397
28000	.4023	1.5768	-40.474	-40.853	.899	9.720	.3248
29000	.3879	1.6056	-42.455	-44.419	.895	9.293	.3106
30000	.3740	1.6352	-44.436	-47.985	.891	8.880	.2968
31000	.3603	1.6659	-46.417	-51.551	.887	8.483	.2834
32000	.3472	1.6971	-48.399	-55.117	.883	8.101	.2707
33000	.3343	1.7295	-50.379	-58.684	.879	7.732	.2583
34000	.3218	1.7628	-52.361	-62.250	.875	7.377	.2465
35000	.3098	1.7966	-54.342	-65.816	.871	7.036	.2352
36000	.2962	1.8374	-55.000	-67.000	.870	6.708	.2242
37000	.2824	1.8818	-55.000	-67.000	.870	6.395	.2137
38000	.2692	1.9273	-55.000	-67.000	.870	6.096	.2037
39000	.2566	1.9738	-55.000	-67.000	.870	5.812	.1943
40000	.2447	2.0215	-55.000	-67.000	.870	5.541	.1852
41000	.2332	2.0707	-55.000	-67.000	.870	5.283	.1765
42000	.2224	2.1207	-55.000	-67.000	.870	5.036	.1683
43000	.2120	2.1719	-55.000	-67.000	.870	4.802	.1605
44000	.2021	2.2244	-55.000	-67.000	.870	4.578	.1530
45000	.1926	2.2785	-55.000	-67.000	.870	4.364	.1458
46000	.1837	2.3332	-55.000	-67.000	.870	4.160	.1391
47000	.1751	2.3893	-55.000	-67.000	.870	3.966	.1325
48000	.1669	2.4478	-55.000	-67.000	.870	3.781	.1264
49000	.1591	2.5071	-55.000	-67.000	.870	3.604	.1205
50000	.1517	2.5675	-55.000	-67.000	.870	3.436	.1149

25,750A

Figure 1A1-3

PRESSURE ALTITUDE TABLE

PRESSURE ALTITUDE = FIELD ELEVATION + △ ALTITUDE

ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT	ALTI-METER SETTING IN. HG	△ ALT FT
28.00	1824	28.50	1340	29.00	863	29.50	392	30.00	−73	30.50	−531	31.00	−983
.01	1814	.51	1330	.01	853	.51	382	.01	−82	.51	−540	.01	−992
.02	1805	.52	1321	.02	844	.52	373	.02	−91	.52	−549	.02	−1001
.03	1795	.53	1311	.03	834	.53	364	.03	−100	.53	−558	.03	−1010
.04	1785	.54	1302	.04	825	.54	354	.04	−110	.54	−567	.04	−1019
.05	1776	.55	1292	.05	815	.55	345	.05	−119	.55	−576	.05	−1028
.06	1766	.56	1282	.06	806	.56	336	.06	−128	.56	−585	.06	−1037
.07	1756	.57	1273	.07	796	.57	326	.07	−137	.57	−594	.07	−1046
.08	1746	.58	1263	.08	787	.58	318	.08	−146	.58	−604	.08	−1055
.09	1737	.59	1254	.09	777	.59	308	.09	−156	.59	−613	.09	−1064
28.10	1727	28.60	1244	29.10	768	29.60	298	30.10	−165	30.60	−622	32.00	−1073
.11	1717	.61	1234	.11	758	.61	289	.11	−174	.61	−631		
.12	1707	.62	1225	.12	749	.62	280	.12	−183	.62	−640		
.13	1698	.63	1215	.13	739	.63	270	.13	−192	.63	−649		
.14	1688	.64	1206	.14	730	.64	261	.14	−202	.64	−658		
.15	1678	.65	1196	.15	721	.65	252	.15	−211	.65	−667		
.16	1668	.66	1186	.16	711	.66	242	.16	−220	.66	−676		
.17	1659	.67	1177	.17	702	.67	233	.17	−229	.67	−685		
.18	1649	.68	1167	.18	692	.68	224	.18	−238	.68	−694		
.19	1639	.69	1158	.19	683	.69	215	.19	−248	.69	−703		
28.20	1630	28.70	1148	29.20	673	29.70	205	30.20	−257	30.70	−712		
.21	1620	.71	1139	.21	664	.71	196	.21	−266	.71	−721		
.22	1610	.72	1129	.22	655	.72	187	.22	−275	.72	−730		
.23	1601	.73	1120	.23	645	.73	177	.23	−284	.73	−740		
.24	1591	.74	1110	.24	636	.74	168	.24	−293	.74	−749		
.25	1581	.75	1100	.25	626	.75	159	.25	−303	.75	−758		
.26	1572	.76	1091	.26	617	.76	149	.26	−312	.76	−767		
.27	1562	.77	1081	.27	607	.77	140	.27	−321	.77	−776		
.28	1552	.78	1072	.28	598	.78	131	.28	−330	.78	−785		
.29	1542	.79	1062	.29	589	.79	122	.29	−339	.79	−794		
28.30	1533	28.80	1053	29.30	579	29.80	112	30.30	−348	30.80	−803		
.31	1523	.81	1043	.31	570	.81	103	.31	−358	.81	−812		
.32	1513	.82	1034	.32	560	.82	94	.32	−367	.82	−821		
.33	1504	.83	1024	.33	551	.83	85	.33	−376	.83	−830		
.34	1494	.84	1015	.34	542	.84	75	.34	−385	.84	−839		
.35	1484	.85	1005	.35	532	.85	66	.35	−394	.85	−848		
.36	1475	.86	995	.36	523	.86	57	.36	−403	.86	−857		
.37	1465	.87	986	.37	514	.87	47	.37	−412	.87	−866		
.38	1456	.88	976	.38	504	.88	38	.38	−421	.88	−875		
.39	1446	.89	967	.39	495	.89	29	.39	−431	.89	−884		
28.40	1436	28.90	957	29.40	485	29.90	20	30.40	−440	30.90	−893		
.41	1427	.91	948	.41	476	.91	10	.41	−449	.91	−902		
.42	1417	.92	938	.42	467	.92	1	.42	−458	.92	−911		
.43	1407	.93	929	.43	457	.93	−8	.43	−467	.93	−920		
.44	1398	.94	919	.44	448	.94	−17	.44	−476	.94	−929		
.45	1388	.95	910	.45	439	.95	−26	.45	−485	.95	−938		
.46	1378	.96	900	.46	429	.96	−36	.46	−494	.96	−947		
.47	1369	.97	891	.47	420	.97	−45	.47	−504	.97	−956		
.48	1359	.98	881	.48	410	.98	−54	.48	−513	.98	−965		
.49	1350	.99	872	.49	401	.99	−63	.49	−522	.99	−974		

46,257

Figure 1A1-4

TEMPERATURE
CONVERSION CHART

TEMPERATURE CONVERSION:
CENTIGRADE = 5/9 (F – 32)
FAHRENHEIT = 9/5 C + 32

46,258A
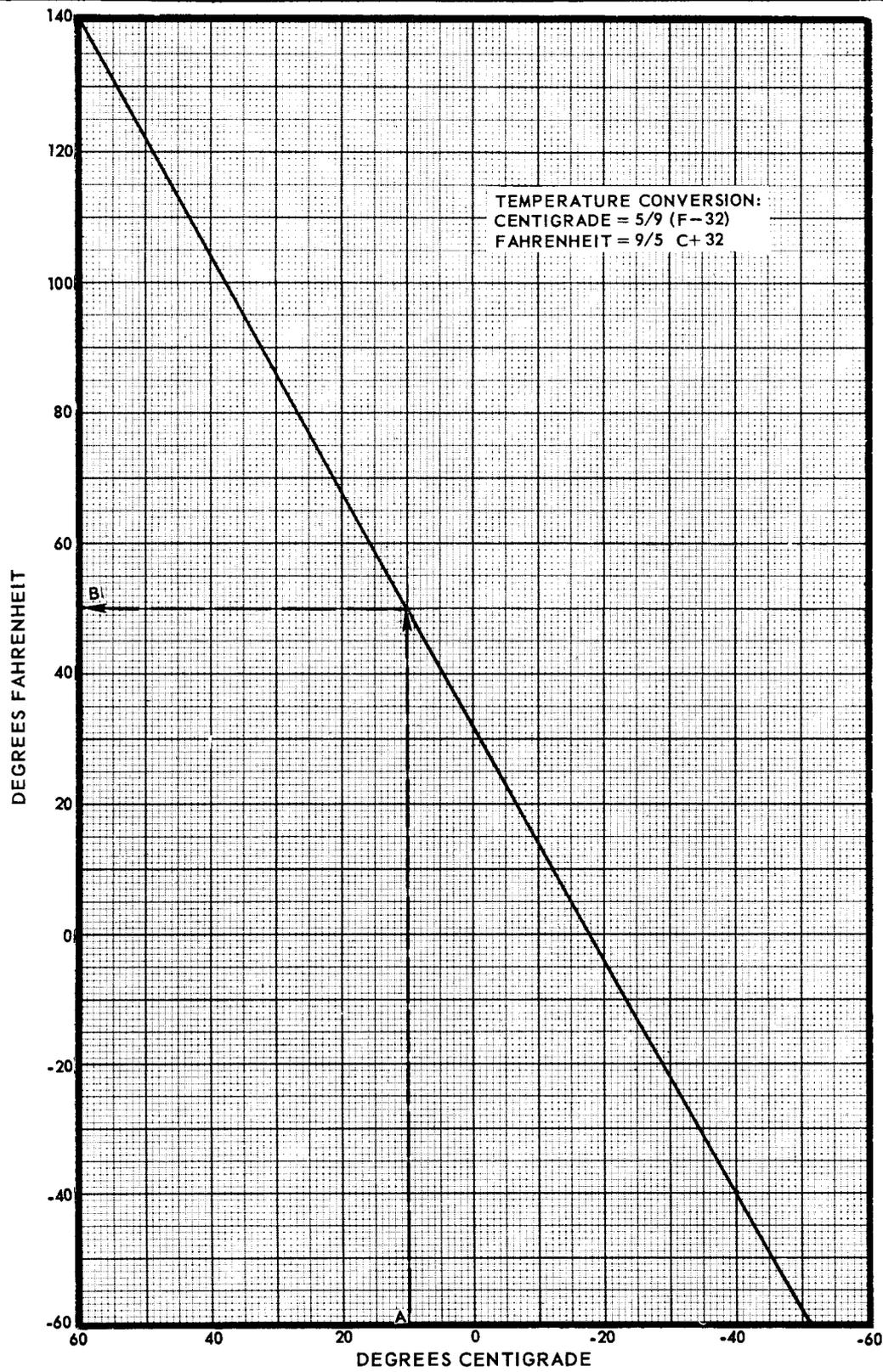
Figure 1A1-5

MODEL: **T-29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

AIRSPEED CALIBRATION

ENGINES: R2800-97

NOTE:
THIS CALIBRATION FOR ALL FLAP POSITIONS.

GEAR RETRACTED

GEAR EXTENDED

CALIBRATED AIRSPEED - KNOTS

INDICATED AIRSPEED - KNOTS
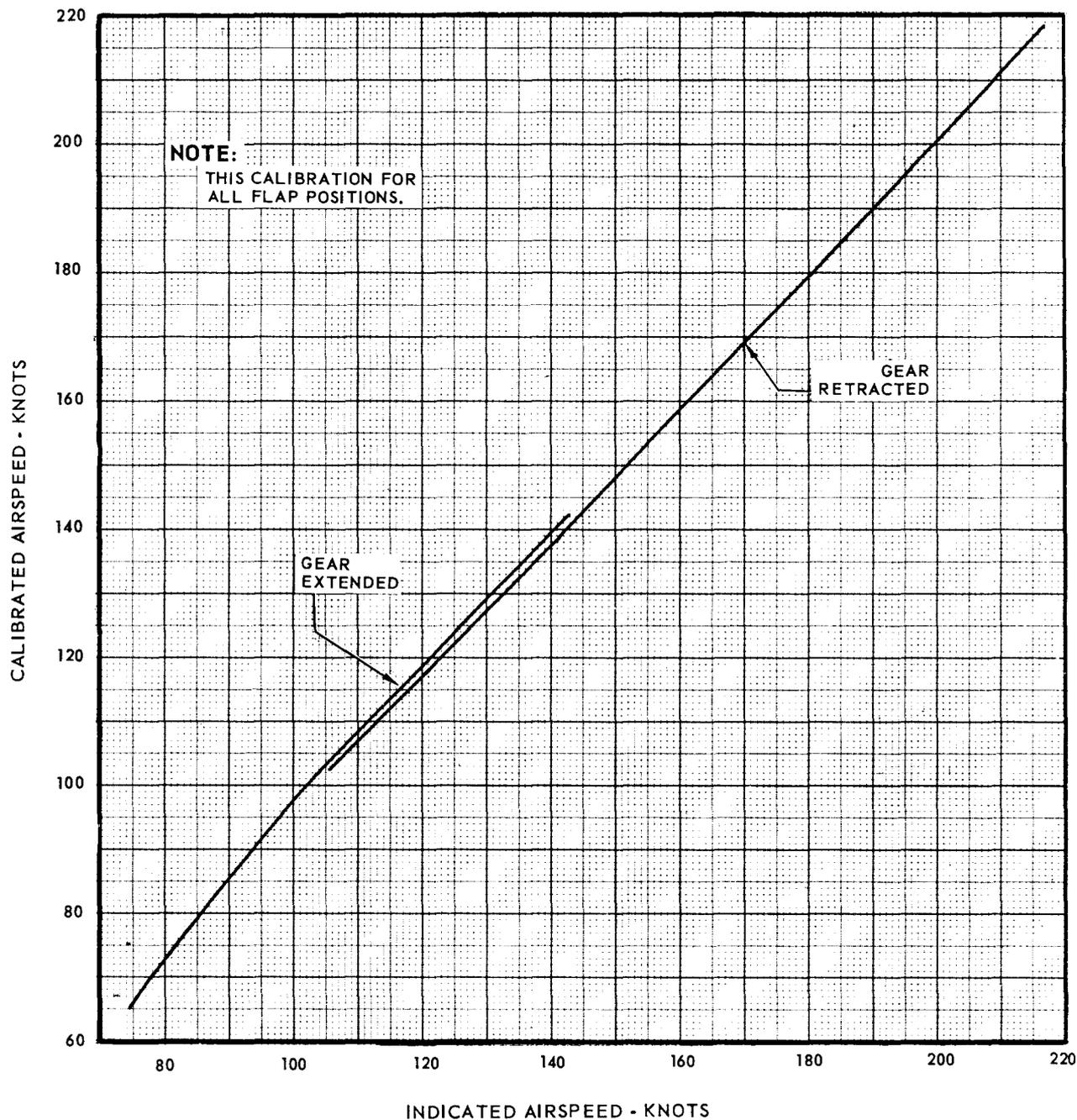
10,701A

Figure 1A1-6

AIRSPEED COMPRESSIBILITY CORRECTION
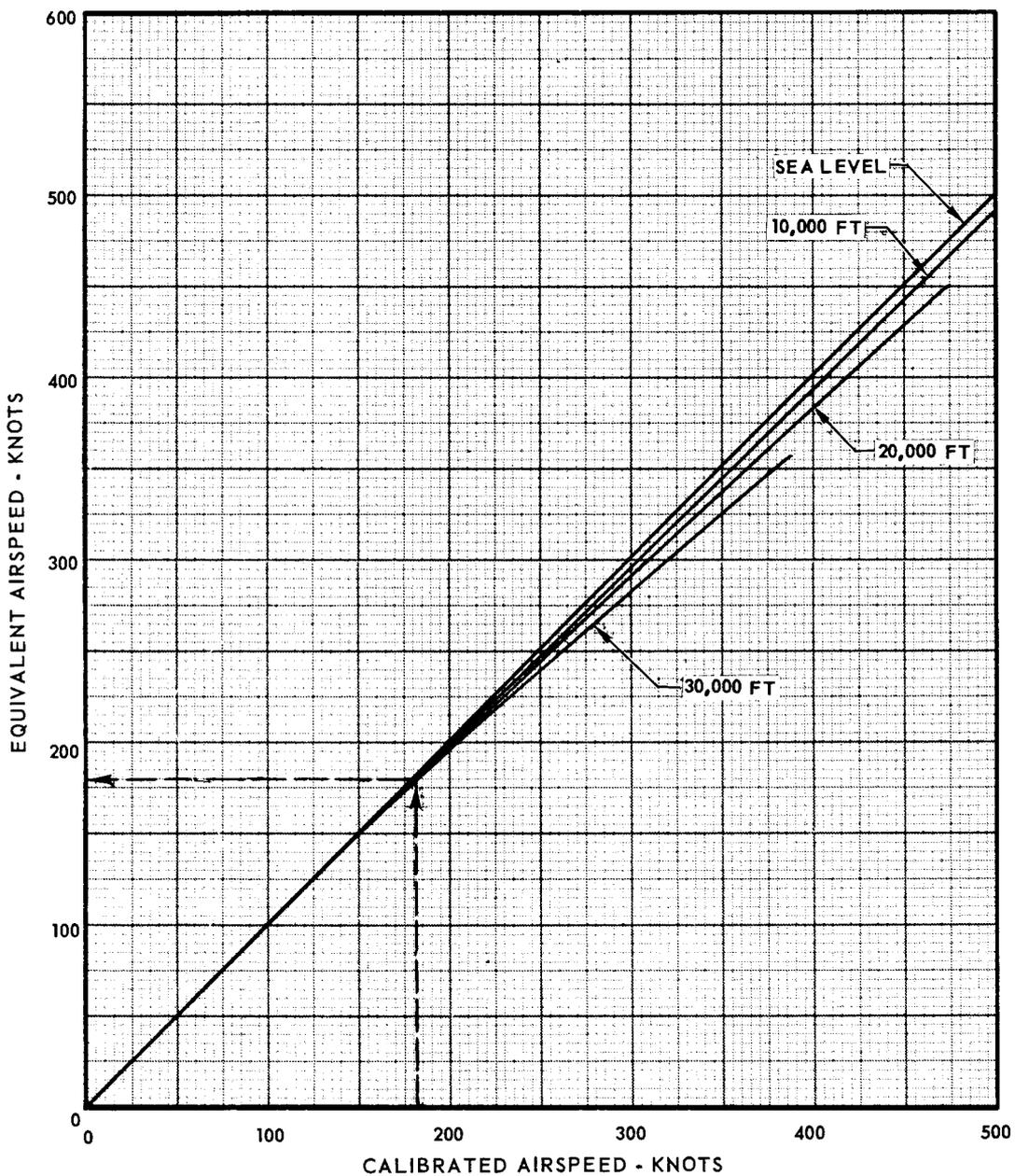
45,502C

Figure 1A1-7

PART 2 — ENGINE DATA

Ⓐ Ⓑ

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ENGINE DATA

ENGINE POWER TIME LIMITATIONS

The engines are approved by the manufacturer for five minutes of operation at maximum wet power, five minutes at maximum dry power, and 30 minutes at MILITARY power. There is no time limit for operation at METO power or less. Maximum power is determined during the normal preflight planning by reference to the maximum power available curves.

ENGINE RATINGS, LIMITS, AND THE CONTROL OF POWER

The standard engine ratings are Maximum Wet, Maximum Dry, Military, and METO. Each is expressed in terms of power (bhp), engine speed (rpm) and pressure altitude (ft above sea level). The operating limits which apply to each rating include such variables as spark advance, mixture strength, manifold pressure, torque pressure, carburetor air temperature, cylinder head temperature, oil inlet temperature, oil pressure and fuel pressure. These limits must be observed individually and collectively to stay within the envelope of conditions which determines reliable engine performance, and

to avoid malfunction. For power settings below the engine ratings, such as those used for climb and cruise flight, the operating limits are conservative from the viewpoint of engine reliability and are set to achieve long engine life and economical maintenance. The control of power is established primarily by setting rpm and manifold pressure. Power available curves and power charts show the rpm and manifold pressure required for the full range of engine performance under specific operating conditions. The charts show a range of carburetor air temperature and the manifold pressure required to obtain a selected power corrected to the observed temperature conditions. This correction for nonstandard conditions of carburetor air temperature amounts to an increase in manifold pressure of approximately 1.0 percent for each 5.5°C that the temperature exceeds standard altitude temperature (15°C at sea level). If the carburetor air temperature is colder than standard, a corresponding decrease in manifold pressure is shown for accurate power setting. The rules for application of this manifold pressure correction vary depending on the power level and on the operating condition. The maximum manifold pressure specified in Section V ▮

for each of the engine ratings is regarded as a never-exceed limit under all operating conditions, except for the allowable manifold pressure increase to partially offset the loss of power due to humidity. These limits appear in Section V and on the power available charts. This means that no upward correction to manifold pressure is allowed at any of the standard engine ratings to compensate for power loss due to hotter than standard temperature conditions. However, an upward correction to manifold pressure to compensate for power loss due to high humidity is allowed, provided the increase is in accordance with the correction graphs on the power charts. For takeoff in colder than standard conditions (with carburetor air temperatures below 15°C) and particularly under extremely cold arctic conditions, it is desirable to avoid overpowering the engine beyond its ratings. Two alternate procedures for adjusting power at the engine ratings are suggested under cold weather conditions: (1) Reduce the takeoff manifold pressure (approximately 1.0 inch Hg for each 10°C below standard carburetor air temperature (15°C at sea level). (2) Observe both manifold pressure and torque pressure as a limit, adjusting the throttle to whichever limit occurs first. The torque pressure limit established should account for normal tolerances of accuracy to torquemeter instrumentation and should make allowance for engine accessory power requirements by subtracting this amount (four psi for right engine) from the maximum allowable torque pressure. At lower power levels, below the engine ratings, such as at climb and cruise power settings, manifold pressure has been corrected either up or down for variation of carburetor air temperature from standard altitude air temperature in accordance with the methods outlines above. Once the correct manifold pressure is established, it is usually regarded as a maximum operating limit to avoid the possibility of overboosting a malfunctioning engine. At these power settings, torque pressure can also be used as a limit in conjunction with manifold pressure.

RECOMMENDED CONTINUOUS CRUISE OPERATION

It is permissible to use up to METO power for continuous cruise operation; however, this procedure yields range values that are considerably less than maximum. A detailed study of the power charts and the endurance summary chart reveals that optimum cruise performance requires a gradual increase in cruise altitude as the flight progresses. The optimum cruise profile can be attained by using altitude and airspeed as the most important cruise parameters, while using the MAP, TPSI, rpm, and fuel flow indication only to monitor the engine operation. For best airplane performance at a given altitude, engine controls must be adjusted so that a gradual decrease in power is accomplished. If the predetermined BHP, as defined by the cruise charts, does not give the recommended cruise airspeed, then the MAP should be adjusted until the correct airspeed is obtained. Do not exceed engine operating limits in making this adjustment.

DISCUSSION OF CHARTS

MAXIMUM POWER AVAILABLE

The Maximum Power Available Charts (figures 1A2-1 and 1A2-2) include nomograms correcting

engine delivered power to non-standard conditions both with and without water-alcohol injection (wet or dry) for normal fuel grade 115/145 or alternate fuel grade 100/130. The charts show the maximum power available for given conditions of pressure altitude, CAT., and dew point temperature. An expected TPSI scale is included and a minimum performance TPSI scale which incorporates a 5% margin for operational use. The maximum power available charts are based upon operation at 2800 rpm and full throttle except where manifold pressure (MAP) is limited by the engine manufacturer's recommendations. In operation at higher elevations, use all available power but do not exceed limits.

> **CAUTION**
>
> For takeoff in colder than standard conditions (with carburetor air temperature below 15°C sea level) avoid overboosting the engines beyond their ratings. Observe torque pressure limits during takeoff and reduce manifold pressure approximately 0.5 in. Hg for each 5° below standard CAT (15°C sea level). A nomogram above the maximum power limit on each chart provides the necessary correction to expected manifold pressure for colder than standard conditions.

To partially offset the loss of power due to humidity, the expected MAP for takeoff powers as provided in the applicable power available chart may be increased due to the existing water vapor pressure up to a maximum of 1.5 inches Hg. This correction may only be made when the combination of pressure altitude and carburetor air temperature indicate that takeoff power may be developed with less than full throttle setting. The maximum power available curves are to be used to determine the minimum performance TPSI for computing takeoff performance. These computations are to be accomplished as a part of the preflight planning.

EXAMPLE

Given:

CAT (OAT + 1°C) = 20°C

Pressure altitude = 3500 feet.

Dew Point = 55°F.

Power condition = Wet, 2800 rpm, AUTO RICH.

Note

The values of OAT should be obtained whenever possible from the tower. Incicated OAT is less desirable because of radiation effects when the airplane is on the ground.

Select the proper power available curve (figure 1A2-1). Enter the chart at pressure altitude of 3500 feet (A) and read up to CAT of 20°C (B). Note manifold pressure 49 in. Hg at full throttle. Read across

to dew point base line and parallel guide line to
55 °F, corrected for altitude (C). Read across to
find expected TPSI 105.5 (D); and minimum per-
formance TPSI 100 (E).

Note

• If the BHP obtained by the chart is
greater than the limiting BHP because
of CAT below standard conditions,
proceed horizontally to the MAP cor-
rection nomogram (A). Parallel the
guide lines to the limiting BHP and
TPSI (B), then vertically to read
MAP correction for low CAT (C).

• When operating at part throttle, a
manifold pressure increase may be
allowable due to humidity. Determine
allowable manifold pressure increase
on the separate graph. Proceed hori-
zontally to the correction nomogram
baseline (A), parallel the guide lines
to the allowable correction (B), then
proceed horizontally to BHP and
torque pressure.

METO POWER AVAILABLE Ⓐ
The METO power available chart (figure 1A2-3) pre-
sents METO power (2600 rpm) for normal fuel grade
115/145 or alternate fuel grade 100/130. This chart
is similar to the maximum power available chart but
is extended to show low and high blower operation.

MANIFOLD PRESSURE LIMITS
A manifold pressure limits curve (figure 1A2-4) is
presented to determine the limiting manifold pres-
sure that can be used with any given rpm on a stand-
ard day. Curves for auto lean and auto rich operation
in high or low blower at various rpm and pressure
altitude values are provided. Engine operation above
indicated MAP/rpm combinations may result in ex-
ceeding torque pressure limits on a standard day.
This chart may be used to cross-check MAP settings
when power settings are changed during climb or
cruise.

CLIMB POWER SCHEDULES
Four climb power schedules (figures 1A2-5 through
1A2-8) are presented for use in establishing power
for two engine operational climb at 1400 BHP/ENG,
2300 rpm or 2400 rpm, and METO power. The
METO power climb schedules are presented in two
charts (figures 1A2-7 and 1A2-8): 2600 rpm for Ⓐ
airplanes and 2700 rpm for Ⓑ airplanes. The climb
power tables are based on operation with AUTO
RICH mixture.

Note

For Ⓑ airplanes equipped with 43E60-
533 propellers, the 2500 to 2700 rpm
range is restricted (at 30 in. Hg MAP
and above) except to pass through this
range. METO power is 2700 rpm in
low blower and 2500 rpm in high
blower.

WARNING

On Ⓑ airplanes, high power (30 in. Hg MAP and
above) engine operation at speeds between 2500 and
2700 rpm may cause propeller blade fatigue failure
induced by resonant vibration stresses.

POWER SCHEDULES
Power schedules (figures 1A2-9 through 1A2-29) are
presented in tabular form for a range of cruise
powers from 500 BHP to 1700 BHP. Each schedule
presents the manifold pressure, blower setting, and
rpm necessary to maintain a constant BHP under
various conditions of pressure altitude and carbu-
retor air temperature. In addition, the schedules
provide the TPSI and fuel flow which should be ob-
tained when the mixture is leaned at cruise power
settings of 1200 BHP (low blower) and below. For
cruise power settings at 1200 BHP in high blower
and above, fuel flow figures represent the fuel flow
with the mixture in AUTO RICH.

Note

In cases where appreciable power losses
are encountered due to carburetors run-
ning too rich, the mixture may be manu-
ally adjusted to correct the power de-
ficiency. If the mixture is manually
adjusted to correct such a power defi-
ciency, the resulting fuel flow must
never be less than the applicable mini-
mum fuel flow at the designated power
setting.

The power schedules are based upon operating both
engines at the same rpm and MAP. On Ⓑ airplanes
this procedure results in slightly different horse-
power being delivered to each propeller, and a little
less than maximum performance from the airplane,
because of the unbalanced accessory loads in the
engines. The right engine carries the additional load
of the cabin compressor. These effects are small,
however, and are not likely to cause a noticeable
difference in control or performance. Since any
particular combination of blower setting and rpm
may be associated with many different manifold
pressure values (depending on pressure altitude and
carburetor air temperature), a broken line across
the table separates the HIGH and LOW blower posi-
tions and light lines are used to separate the differ-
ent rpm values. To use the schedules, enter the
table at the pressure altitude and read the manifold
pressure horizontally to the right under the appro-
priate carburetor air temperature. Then follow the
rpm lines and read the blower position, rpm, TPSI,
and fuel flow to the right in the same rpm channel.

EFFECT OF RAM. In flight, at a given indicated
airspeed, an effective boost is given to the quantity
of air received by the induction system. This in-
crease is commonly referred to as ram. The effect

is the same as an increase to whatever supercharging is produced by the engine blower. The engine manufacturer's data used in preparing the power schedules do not include the effects of ram. The full throttle settings given in the tables will not be at the full throttle position under flight conditions due to the effect of ram. At a given altitude, rpm and full throttle position, the BHP developed will be increased in proportion to the amount of ram. Also if the BHP is held constant the effect of ram will increase the altitude at which this power can be developed at the full throttle position.

FUEL FLOW PER ENGINE

Fuel flow per engine charts (figures 1A2-30 and 1A2-31) are presented to determine fuel flow, corresponding to any selected brake horsepower.

Curves for auto-rich or auto-lean operation in high or low blower at various rpm values are provided.

EXAMPLE

Given:

BHP per engine = 800 bhp.

RPM = 1800.

Blower = LOW.

Enter chart (figure 1A2-30) at 800 bhp (A) and read up to rpm 1800 (B). Read across to the left and read fuel flow 360 pph (C). Note that mixture is in AUTO LEAN.

MAXIMUM WET POWER AVAILABLE

MODEL: **T-29 A/B**
DATE: 14 JULY 1961
DATA BASIS: **FLIGHT TEST**

FUEL GRADE 100/130 OR 115/145

LOW BLOWER   2800 RPM   AUTO RICH

ENGINE: **R2800-97**
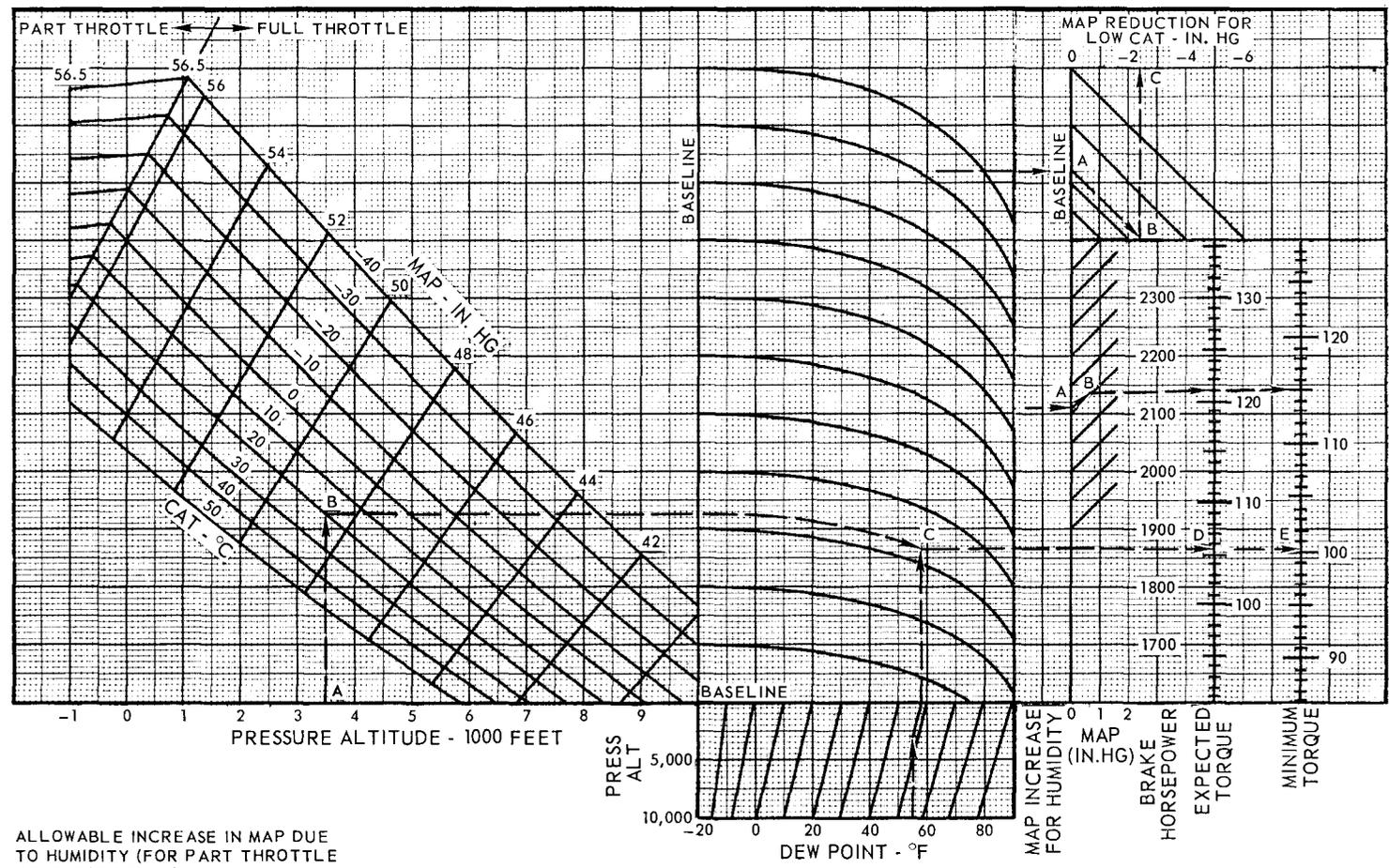
PART THROTTLE ◄──►► FULL THROTTLE

MAP REDUCTION FOR LOW CAT - IN. HG

MAP - IN. HG

CAT - °C

BASELINE

PRESSURE ALTITUDE - 1000 FEET

PRESS ALT

DEW POINT - °F

MAP INCREASE FOR HUMIDITY

MAP (IN.HG)

BRAKE HORSEPOWER

EXPECTED TORQUE

MINIMUM TORQUE

ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY (FOR PART THROTTLE OPERATION ONLY).

MAP (INCHES HG)

DEW POINT (°F)

10,702B
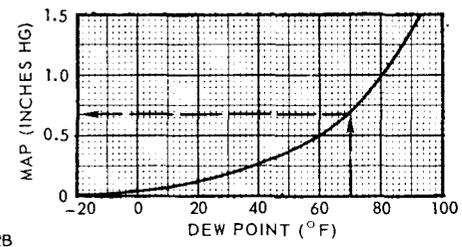
NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN OPERATING CABIN PRESSURIZATION (T-29B) TORQUE PRESSURE FOR RIGHT ENGINE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT EXCEED MAP LIMITS DURING TAKEOFF.

(4) FUEL FLOW IS (0.62 x BHP) LB/HR/ENG (APPROXIMATE).

MAXIMUM DRY POWER AVAILABLE
FUEL GRADE 100/130 OR 115/145
LOW BLOWER   2800 RPM   AUTO RICH

MODEL: T-29 A/B
DATE: 14 JULY 1961
DATA BASIS: FLIGHT TEST

ENGINE: R2800-97
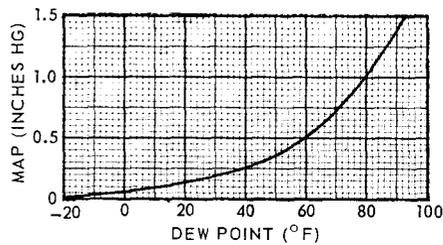
NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN OPERATING CABIN PRESSURIZATION, (T-29B) TORQUE PRESSURE FOR RIGHT ENGINE WILL BE 4.0 PSI LOWER.

(3) CHART BASED ON ZERO AIRSPEED. DO NOT EXCEED MAP LIMITS DURING TAKEOFF.

(4) FUEL FLOW IS (0.84 x BHP) LB/HR/ENG (APPROXIMATE).

ALLOWABLE INCREASE IN MAP DUE TO HUMIDITY (FOR PART THROTTLE OPERATION ONLY).

10,703B

METO POWER AVAILABLE

MODEL: **T-29A**
DATE: 14 JULY 1961
DATA BASIS: ENGINE MANUFACTURER'S DATA

FUEL GRADE 100/130 OR 115/145   2600 RPM   AUTO-RICH

A

ENGINES: **R2800-97**
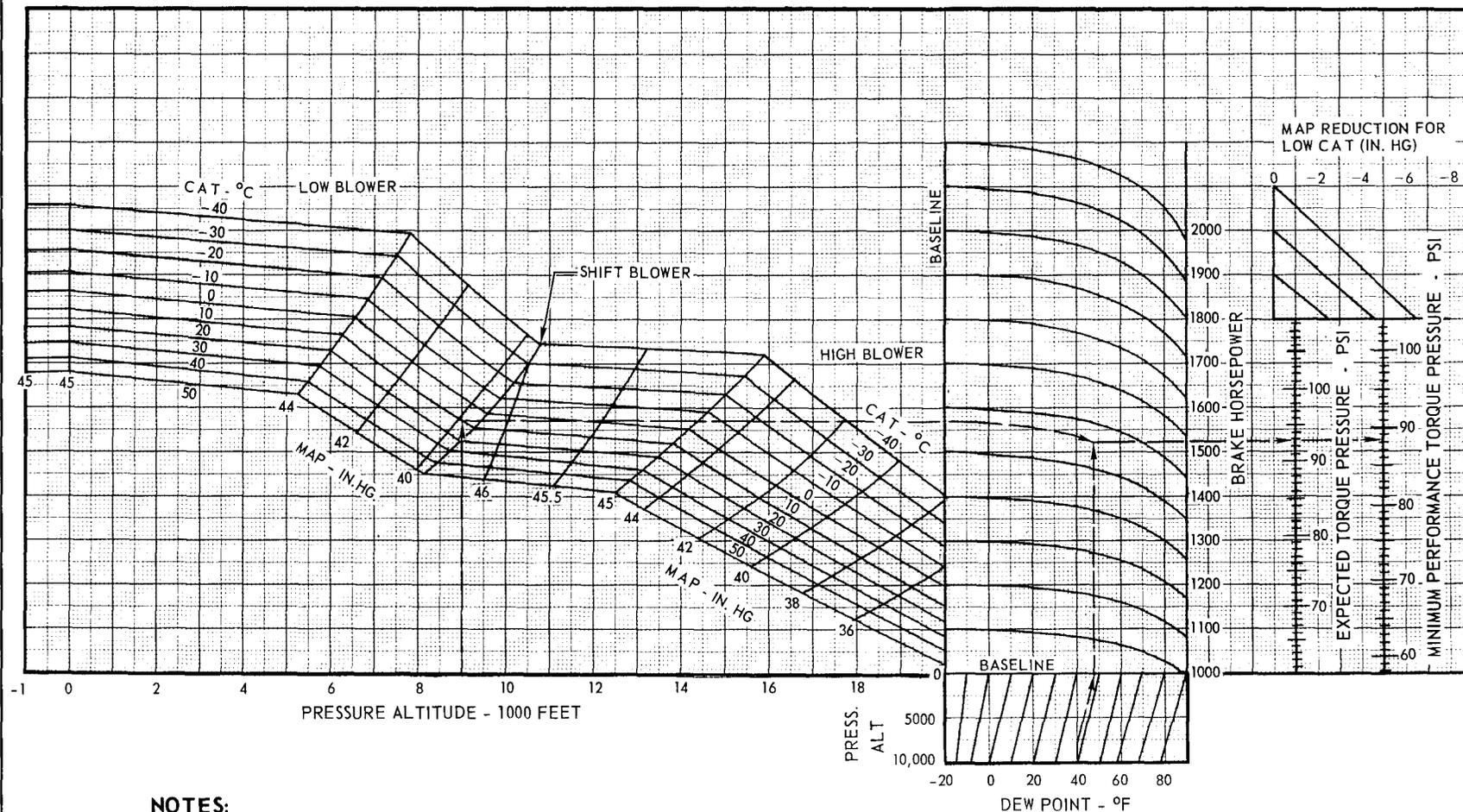
NOTES:

(1) CAT EQUALS OAT + 1°C.

(2) WHEN DEW POINT IS UNKNOWN IN FLIGHT, READ STRAIGHT THROUGH DEW POINT CORRECTION GRAPH.

10,709

MANIFOLD PRESSURE LIMITS

MODEL: T-29A/B
DATE: 5 DECEMBER 1967 FUEL GRADE 115/145 OR 100/130 STANDARD ATMOSPHERE
DATA BASIS: ENGINE MANUFACTURER'S DATA
ENGINES: R2800-97
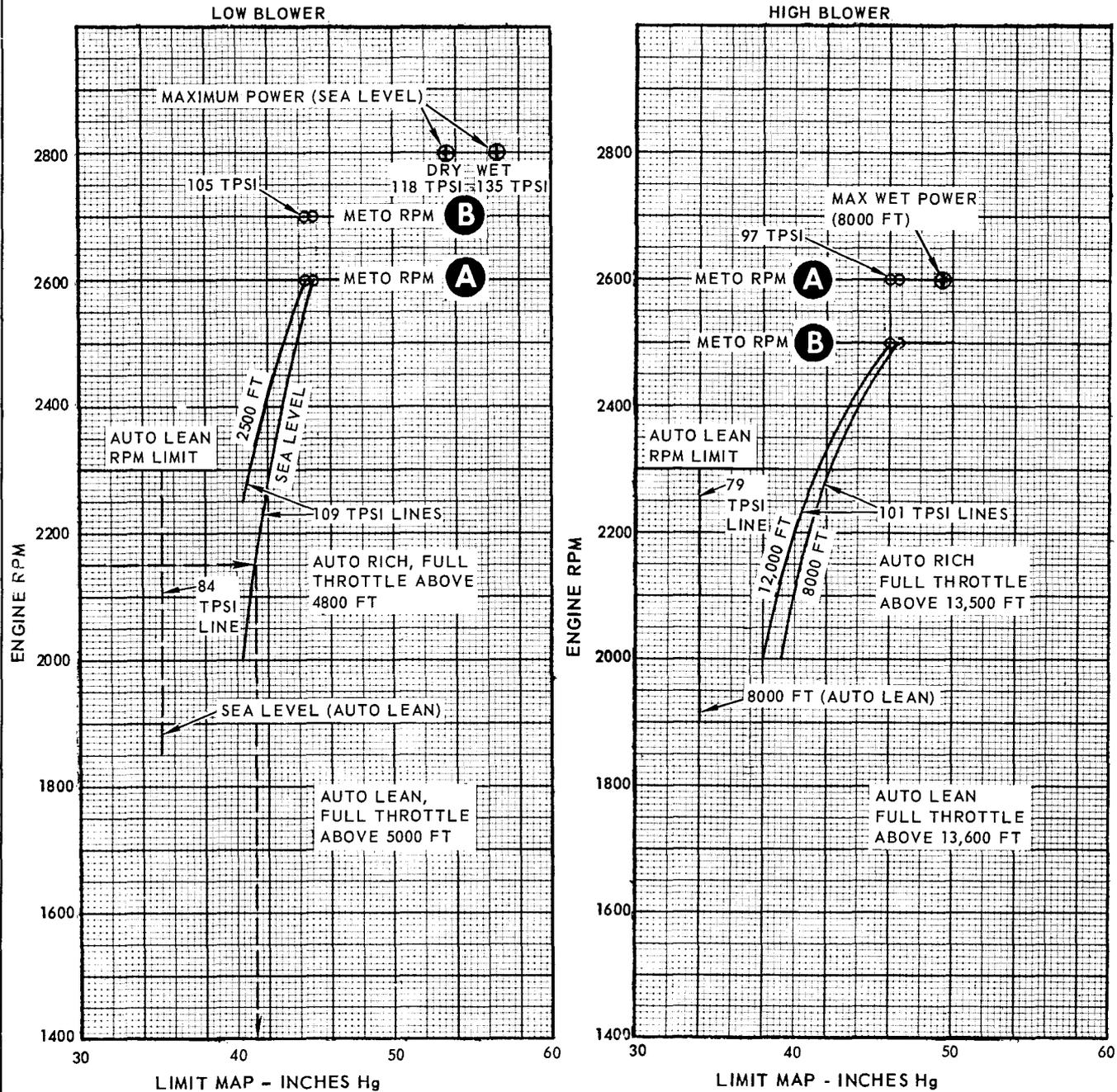
NOTES:

1. IN AUTO LEAN, ADD ½ INCH MAP FOR EACH 10°C ABOVE STANDARD TEMPERATURE AND SUBTRACT ½ INCH MAP FOR EACH 10°C BELOW STANDARD, EXCEPT DO NOT EXCEED MAXIMUM MAP LIMIT.

2. IN AUTO RICH, ADD 1 INCH MAP FOR EACH 10°C ABOVE STANDARD TEMPERATURE AND SUBTRACT 1 INCH MAP FOR EACH 10°C BELOW STANDARD, EXCEPT DO NOT EXCEED MAXIMUM POWER AND METO POWER MAP LIMITS.

3. ENGINE OPERATION ABOVE INDICATED MAP/RPM COMBINATIONS MAY RESULT IN EXCEEDING TORQUE PRESSURE LIMITS ON A STANDARD DAY.

10,757E

Figure 1A2-4

CLIMB POWER SCHEDULE

MODEL: **T-29A/B**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

1400 BHP / 2300 RPM
MIXTURE AUTO RICH

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
20,000												
19,000	38.2											
18,000	37.8	39.0										
17,000	37.9	38.6	39.7	40.4								
16,000	37.7	38.4	39.4	40.4	41.1							
15,000	37.7	38.5	39.3	40.3	41.2	41.9		(3)	2600	AR	1078	85
14,000	37.8	38.5	39.3	40.1	41.2	41.9			2500	AR	1008	89
13,000	37.9	38.6	39.4	40.1	40.9	41.9						
12,000	38.0	38.7	39.5	40.2	40.9	41.6			2400	AR	900	92
11,000	38.1	38.8	39.6	40.3	41.0	41.7						
10,000	34.3	38.9	39.7	40.4	41.1	41.8						
9,000	34.4	35.0	35.7	40.5	41.2	41.9			2300	AR	840	96.2
8,000	34.5	35.1	35.8	36.5	41.3	42.0		(2)				
7,000	34.6	35.2	35.9	36.6	37.3	37.9		(1)				
6,000	34.7	35.3	36.0	36.7	37.4	38.0	38.7	39.3				
5,000	34.8	35.4	36.1	36.8	37.5	38.1	38.8	39.4				
4,000	34.9	35.5	36.2	36.9	37.6	38.2	38.9	39.5	2300	AR	867	96.2
3,000	35.0	35.6	36.3	37.0	37.7	38.3	39.0	39.6				
2,000	35.1	35.7	36.4	37.1	37.8	38.4	39.1	39.7				
1,000	35.2	35.8	36.5	37.2	37.9	38.5	39.2	39.8				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15°C IN HIGH BLOWER.

(3) 2600 RPM APPLICABLE TO T-29A AIRPLANES ONLY. T-29B AIRPLANES LIMITED TO 2500 RPM IN HIGH BLOWER.

(4) NO CABIN PRESSURIZATION LOAD.

10,772C

Figure 1A2-5

	CLIMB POWER SCHEDULE	
MODEL: **T-29 A/B**	**CLIMB POWER SCHEDULE**	
DATE: 14 JULY 1961	1400 BHP/ENG	
DATA BASIS: ENGINE MANUFACTURER'S DATA	2400 RPM	ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN.HG) FOR CAT (°C)								RPM	MIXTURE	FUEL FLOW (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
19,000	38.2											
18,000	37.8	39.0										
17,000	37.9	38.6	39.7	40.4								
16,000	37.9	38.6	39.4	40.4	41.1							
15,000	37.8	38.5	39.3	40.3	41.2	41.9		(3)	2600	AR	1078	85
14,000	37.6	38.4	39.2	39.9	41.2	41.9			2500	AR	1008	89
13,000	37.6	38.4	39.1	39.8	40.5	41.9						
12,000	33.8	38.3	39.0	39.8	40.5	41.2						
11,000	33.6	34.2	38.9	39.6	40.4	41.0						
10,000	33.9	34.5	35.2	39.4	40.1	40.8			2400	AR	896	92
9,000	33.9	34.6	35.3	35.9	40.1	40.8						
8,000	34.0	34.7	35.3	36.0	36.7	37.3		(2)				
7,000	34.1	34.8	35.4	36.1	36.8	37.4	38.0	(1)				
6,000	34.2	34.9	35.5	36.2	36.9	37.5	38.2	38.8				
5,000	34.3	35.0	35.7	36.3	37.0	37.7	38.3	38.9				
4,000	34.4	35.1	35.8	36.4	37.1	37.8	38.4	39.0				
3,000	34.5	35.1	35.8	36.5	37.2	37.8	38.5	39.1	2400	AR	791	92
2,000	34.6	35.3	36.0	36.7	37.3	38.0	38.6	39.3				
1,000	34.7	35.4	36.1	36.8	37.4	38.1	38.8	39.4				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15° C IN HIGH BLOWER

(3) 2600 RPM APPLICABLE TO T-29A AIRPLANES ONLY. T-29B AIRPLANES LIMITED TO 2500 RPM IN HIGH BLOWER.

(4) NO CABIN PRESSURIZATION LOAD.

10,704A

Figure 1A2-6

CLIMB POWER SCHEDULE
METO POWER - 2600 RPM
MIXTURE AUTO RICH

MODEL: **T-29A**
DATE: 14 JULY 1961
DATA BASIS: ENGINE MANUFACTURER'S DATA

A

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN.HG.) FOR CAT (°C)							BLOWER	BHP	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30°C	-20°C	-10°C	0°C	+10°C	+15°C					
20,000	36.3	34.4	35.1								
19,000	38.7	36.9	37.6	35.7	36.3						
18,000	38.6	39.4	37.6	38.3	36.2	36.6		HIGH	1200	950	73
17,000	41.0	39.3	40.0	38.2	38.9	39.2		HIGH	1300	1010	79
16,000	43.5	41.7	40.0	40.7	38.8	39.2					
15,000	43.5	44.4	42.4	43.2	41.4	41.7		HIGH	1400	1078	85
14,000	43.6	44.4	42.4	43.2	44.0	41.7					
13,000	43.6	44.5	45.4	43.2	44.0	44.4					
12,000	43.6	44.5	45.4	43.2	44.0	44.4					
11,000	43.7	44.6	45.5	43.2	44.0	44.4					
10,000	43.8	44.6	45.5	43.2	44.0	44.4		HIGH	1500	1150	91
9,000	41.1	44.7	45.6	43.2	44.0	44.4					
8,000	41.2	42.0	45.6	46.5	44.0	44.4					
7,000	41.2	42.0	42.9	46.5	44.0	44.4					
6,000	41.3	42.1	42.9	43.7							
5,000	41.3	42.1	42.9	43.7							
4,000	41.3	42.1	42.9	43.7							
3,000	41.3	42.1	42.9	43.7	44.5			HIGH	1600	1230	97
2,000	41.3	42.1	42.9	43.7	44.5						
1,000	41.3	42.1	42.9	43.7	44.5						
S L	41.3	42.1	42.9	43.7	44.5	44.9		LOW	1800	1355	109

NOTES:

(1) MAXIMUM MAP IN LOW BLOWER IS 45 IN.HG (S.L.) AT CAT GREATER THAN THOSE FOR WHICH MAP IS SHOWN, MAINTAIN LIMITING MAP WITH RESULTING DECREASE IN BHP

(2) MAXIMUM CAT IN HIGH BLOWER IS 15°C.

10,773C

Figure 1A2-7

	CLIMB POWER SCHEDULE										

MODEL: **T - 29B**
DATE: 1 OCTOBER 1962
DATA BASIS: ENGINE MANUFACTURER'S DATA

METO POWER
MIXTURE AUTO RICH

B

ENGINES: **R2800 - 97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN. HG.) AT C.A.T. (°C)							RPM	BHP	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+15					
20,000	35.4	36.2	34.8	35.3							
19,000	35.5	36.3	34.9	35.4	36.0						
18,000	37.8	36.4	37.2	35.5	36.1	36.7					
17,000	37.9	38.6	37.3	37.9	36.1	36.8					
16,000	40.2	38.4	39.4	38.0	38.6	36.9		2500	1200	875	76
15,000	40.3	41.1	41.9	40.3	38.8	39.3		2500	1300	943	82
14,000	40.3	41.1	42.0	42.8	41.2	41.8		2500	1400	1008	89
13,000	43.6	41.2	42.0	42.9	43.6	41.8					
12,000	43.6	44.5	45.3	42.9	43.7	44.3					
11,000	40.5	44.5	45.3	46.1	43.7	44.4		2500	1500	1064	95
10,000	40.7	41.5	45.3	46.2	47.0	44.4					
9,000	40.9	41.6	42.4	46.2	47.0	47.7					
8,000	40.9	41.8	42.5	43.2	47.2	47.7		2500	1600	1220	101
7,000	41.0	41.8	42.6	43.3	44.1	44.4					
6,000	41.0	41.8	42.7	43.4	44.2	44.5					
5,000	41.0	41.9	42.7	43.5	44.2	44.5					
4,000	41.1	41.9	42.7	43.5	44.3	44.5					
3,000	41.1	41.9	42.8	43.5	44.3	44.6		2700	1800	1365	105
2,000	41.1	42.0	42.8	43.6	44.3	44.6					
1,000	41.2	42.0	42.8	43.6	44.4	44.7					

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD

10,732A

Figure 1A2-8

MODEL **T - 29 A/B**			
DATE: 15 FEBRUARY 1958			
DATA BASIS: ENGINE MANUFACTURER'S DATA			

POWER SCHEDULE

500 BHP
MIXTURE AUTO LEAN

ENGINES: **R2800 - 97**

PRESSURE ALTITUDE (FEET)	MAP (IN HG.) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
20,000												
19,000												
18,000												
17,000	22.0											
16,000	20.6	22.8										
15,000	20.9	21.3	21.7	24.0					1500	AL	280	53
14,000	21.3	21.6	22.0	22.4	22.8							
13,000	21.9	22.4	22.3	22.7	23.1	23.5	25.9	26.3				
12,000	22.2	22.7	23.2	23.6	23.4	23.8	24.2	24.6	1500	AL	267	53
11,000	22.5	23.0	23.5	23.9	24.3	24.7	24.5	24.9				
10,000	22.9	23.4	23.8	24.3	24.6	25.0	25.7	26.1				
9,000	23.2	23.7	24.2	24.6	25.0	25.4	26.1	26.5				
8,000	23.5	24.0	24.5	24.9	25.3	25.7	26.4	26.8				
7,000	23.9	24.3	24.8	25.3	25.7	26.0	26.7	27.1				
6,000	24.2	24.7	25.2	25.6	26.0	26.4	27.0	27.4	1400	AL	262	57
5,000	24.5	25.0	25.5	25.9	26.3	26.7	27.4	27.8				
4,000	24.9	25.3	25.8	26.3	26.6	27.0	27.7	28.1				
3,000	25.2	25.6	26.2	26.6	27.0	27.3	28.0	28.4				
2,000	25.5	26.0	26.5	26.9	27.3	27.7	28.3	28.7				
1,000	25.9	26.3	26.8	27.3	27.7	28.0	28.6	29.1				

NOTE:

(1) OPERATION BELOW THE BROKEN LINE IS IN LOW BLOWER, ABOVE IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,759B

Figure 1A2-9

POWER SCHEDULE
600 BHP
MIXTURE AUTO LEAN

MODEL: **T-29 A/B**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN HG.) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
25,000												
24,000												
23,000												
22,000												
21,000	22.3											
20,000	22.4	23.0										
19,000	22.6	23.1	23.6	24.0								
18,000	20.6	21.0	23.8	24.2	24.7							
17,000	20.9	21.2	21.6	24.3	24.9	25.4	25.9	26.3				
16,000	21.6	22.0	21.9	22.3	22.7	25.5	26.1	26.5	1800	AL	305	53
15,000	21.9	22.2	22.7	23.1	22.9	23.4	23.7	24.1				
14,000	22.8	22.4	22.9	23.3	23.8	23.6	23.9	24.3	1800	AL	305	53
13,000	23.1	23.5	24.0	23.6	24.0	24.4	24.8	25.2				
12,000	24.0	23.8	24.3	24.7	24.3	24.6	25.1	25.5				
11,000	24.3	24.7	24.5	25.0	25.4	25.9	25.3	25.7	1700	AL	302	56
10,000	24.6	25.0	25.5	26.1	25.7	26.1	26.7	27.1				
9,000	25.5	26.0	25.8	26.4	26.9	27.3	26.9	27.3	1600	AL	298	59
8,000	25.8	26.4	26.9	26.7	27.2	27.6	28.1	28.6				
7,000	26.1	26.7	27.3	27.8	28.3	27.9	28.4	28.9	1500	AL	291	63
6,000	26.5	27.0	27.6	28.2	28.6	29.0	29.7	29.3				
5,000	26.8	27.3	27.9	28.5	28.9	29.4	30.0	30.5				
4,000	27.1	27.7	28.2	28.8	29.3	29.7	30.3	30.8				
3,000	27.5	28.0	28.6	29.1	29.6	30.0	30.6	31.1				
2,000	27.8	28.3	28.9	29.5	29.9	30.4	31.0	31.5				
1,000	28.1	28.7	29.2	29.8	30.2	30.7	31.3	31.8	1400	AL	285	68

NOTE:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,760B

Figure 1A2-10

POWER SCHEDULE

MODEL: **T-29A/B**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

700 BHP
MIXTURE AUTO LEAN

ENGINES: R2800-97

PRESSURE ALTITUDE (FEET)	MAP (IN HG) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
25,000	22.4	22.8	23.3									
24,000	22.9	23.4	23.5	23.9	24.3							
23,000	23.0	23.5	24.0	24.0	24.4	24.8						
22,000	20.7	23.7	24.2	24.6	24.5	25.0	25.4	25.8				
21,000	20.9	21.2	21.6	24.7	25.2	25.6	25.5	25.9	2200	AL	350	50
20,000	21.1	21.6	21.8	22.2	25.4	25.8	26.2	26.6				
19,000	21.6	21.7	22.1	22.5	22.7	23.1	26.3	26.7	2100	AL	345	53
18,000	21.7	22.1	22.3	22.7	23.1	23.2	23.6	24.0	2200	AL	368	50
17,000	22.5	22.3	22.9	23.2	23.2	23.6	24.0	24.4				
16,000	22.7	23.1	23.6	23.4	23.8	24.2	24.2	24.6	2100	AL	359	53
15,000	23.4	23.9	23.8	24.2	24.0	24.4	24.8	25.2				
14,000	23.6	24.1	24.6	24.4	24.9	25.2	25.0	25.4	2000	AL	349	55
13,000	24.6	24.3	24.9	25.3	25.7	25.4	25.8	26.2				
12,000	24.8	25.3	25.8	25.6	25.9	26.5	26.0	26.4	1900	AL	341	58
11,000	25.1	25.5	26.1	26.5	26.2	26.7	27.1	27.5				
10,000	25.9	26.5	26.3	26.8	27.3	27.7	27.3	27.7	1800	AL	332	62
9,000	26.2	26.8	27.3	27.8	27.5	28.0	28.4	28.8				
8,000	27.2	27.7	27.6	28.0	28.7	28.2	28.6	29.1	1700	AL	327	65
7,000	27.5	28.0	28.6	28.3	29.0	29.4	29.9	29.3				
6,000	28.8	28.3	28.9	29.5	30.1	29.7	30.2	30.7	1600	AL	323	69
5,000	29.1	29.7	30.2	29.8	30.4	31.8	31.4	30.8				
4,000	29.5	30.0	30.6	31.2	30.7	31.1	31.7	32.2				
3,000	29.8	30.4	30.9	31.5	32.0	32.6	31.9	32.4	1500	AL	317	74
2,000	30.1	30.7	31.2	31.8	32.3	32.9	33.4	33.9				
1,000	30.5	31.0	31.6	32.2	32.7	33.2	33.8	34.3	1400	AL	311	79

NOTE: (1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,761B

Figure 1A2-11

MODEL: **T-29 A/B**				**POWER SCHEDULE**								
DATE: 15 FEBRUARY 1958				800 BHP								
DATA BASIS: ENGINE MANUFACTURER'S DATA				MIXTURE AUTO LEAN						ENGINES: **R2800-97**		

PRESSURE ALTITUDE (FEET)	MAP (IN HG.) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
25,000	24.5	25.0										
24,000	24.7	25.1	25.7									
23,000	24.9	25.4	25.9	26.2								
22,000	25.2	25.5	26.0	26.5	26.8	27.3						
21,000	22.6	23.0	26.3	26.6	27.1	27.4	27.9	28.3	2300	AL	400	55
20,000	22.7	23.1	23.5	27.0	27.2	27.7	28.1	28.5				
19,000	22.8	23.4	23.6	24.1	24.5	27.8	28.2	28.7	2200	AL	388	58
18,000	23.3	23.5	24.0	24.3	24.6	25.0	28.9	29.4	2100	AL	382	60
17,000	23.4	23.9	24.4	24.5	24.9	25.1	25.6	26.0	2300	AL	406	55
16,000	24.2	24.0	24.6	25.0	25.0	25.5	26.0	26.4				
15,000	24.4	24.9	25.4	25.2	25.5	25.9	26.1	26.5	2200	AL	396	58
14,000	24.8	25.3	25.5	26.0	25.7	26.1	26.5	26.9				
13,000	25.0	25.5	26.0	26.1	26.6	27.1	26.6	27.0	2100	AL	386	60
12,000	26.2	26.7	26.2	26.8	27.2	27.2	27.7	28.1	2000	AL	375	63
11,000	26.4	26.9	27.4	27.0	27.4	27.9	28.3	28.8				
10,000	27.5	27.1	27.6	28.1	28.6	28.1	28.5	29.0	1900	AL	368	67
9,000	27.8	28.3	27.8	28.4	28.9	29.4	29.8	29.4				
8,000	28.0	28.6	29.2	29.8	29.1	29.6	30.0	30.5				
7,000	29.2	28.8	29.4	30.0	30.5	29.8	30.2	30.7	1800	AL	359	70
6,000	29.4	30.0	30.6	30.3	30.7	31.3	31.7	30.9				
5,000	30.5	30.3	30.9	31.4	32.0	31.5	31.9	32.4				
4,000	30.8	31.5	31.2	31.7	32.3	32.9	32.2	32.7	1700	AL	354	75
3,000	31.2	31.8	32.4	33.0	32.6	33.2	33.7	34.2				
2,000	31.5	32.1	32.7	33.3	33.9	34.5	34.0	34.5	1600	AL	349	79
1,000	31.8	32.4	33.0	33.6	34.2	34.8	35.4	36.6	1500	AL	344	84

NOTE: (1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,762B

Figure 1A2-12

POWER SCHEDULE
900 BHP
MIXTURE AUTO LEAN

MODEL: T-29 A/B
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: R2800-97

PRESSURE ALTITUDE (FEET)	MAP (IN HG.) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	- 30	- 20	- 10	0	+ 10	+ 20	+ 30	+ 40				
25,000												
24,000												
23,000	27.1											
22,000	27.1	27.7	28.2									
21,000	27.3	27.8	28.3	28.8								
20,000	27.4	28.0	28.5	28.9	29.5	29.9						
19,000	24.6	28.1	28.6	29.1	29.7	30.0	30.6	31.1				
18,000	24.7	25.2	28.7	29.3	29.8	30.3	30.7	31.2	2300	AL	441	62
17,000	24.9	25.3	25.7	29.4	30.0	30.5	31.0	31.5				
16,000	25.6	25.6	26.1	26.4	26.8	30.6	31.1	31.6	2200	AL	430	65
15,000	25.8	26.3	26.3	26.8	27.2	27.4	27.9	28.3				
14,000	26.6	26.5	27.0	27.0	27.3	27.9	28.0	28.4	2300	AL	436	62
13,000	26.8	27.3	27.2	27.2	28.1	28.0	28.5	28.9	2200	AL	426	65
12,000	27.6	27.5	28.0	27.3	28.2	28.8	29.2	29.1				
11,000	27.8	28.3	28.2	28.8	29.2	28.9	29.4	29.9	2100	AL	414	69
10,000	28.0	28.5	29.1	29.6	29.4	30.0	30.4	30.9				
9,000	28.9	29.5	29.3	29.8	30.4	30.2	30.6	31.1	2000	AL	404	71
8,000	29.2	29.7	30.3	30.8	30.6	31.1	31.7	31.3				
7,000	30.2	29.9	30.5	31.0	31.7	31.3	31.9	32.4	1900	AL	397	75
6,000	30.5	31.1	31.8	31.3	31.9	32.4	33.0	32.6				
5,000	30.7	31.4	32.1	32.6	32.1	32.6	33.2	33.7				
4,000	31.0	31.6	32.3	32.9	33.5	34.0	33.4	33.9	1800	AL	389	79
3,000	31.2	31.9	32.6	33.1	33.8	34.3	34.9	35.4				
2,000	31.5	32.1	32.8	33.4	34.0	34.5	35.1	35.6				
1,000	31.7	32.4	33.1	33.6	34.3	34.8	35.4	36.0	1700	AL	382	84

NOTE: (1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,763B

Figure 1A2-13

POWER SCHEDULE
950 BHP / ENG
MIXTURE AUTO LEAN

MODEL: **T - 29 A/B**
DATE: 14 JULY 1961
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800 - 97**

PRESSURE ALTITUDE (FEET)	MAP (IN.HG) FOR CAT (°C)								RPM	MIXTURE	FUEL FLOW (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
23,000	FT											
22,000	28.0	FT										
21,000	28.3	28.8	FT	FT								
20,000	28.4	29.0	29.4	29.9	FT							
19,000	28.5	29.0	29.6	30.0	30.5	FT						
18,000	25.7	29.1	29.7	30.2	30.8	31.1	FT	FT				
17,000	25.8	26.4	29.7	30.3	30.8	31.4	31.7	32.2	2300	AL	465	65
16,000	26.1	26.6	27.1	30.4	30.9	31.5	32.0	32.2				
15,000	26.7	26.7	27.3	27.7	31.0	31.5	32.1	32.6				
14,000	26.9	27.5	27.4	27.9	28.2	28.7	32.2	32.7	2200	AL	454	68
13,000	27.8	27.6	28.2	28.1	28.6	28.9	29.4	32.8				
12,000	27.9	28.5	28.4	28.9	28.7	29.3	29.8	29.9	2300	AL	437	65
11,000	28.8	28.7	29.3	29.1	29.6	30.1	29.9	30.4	2200	AL	427	68
10,000	29.0	29.6	29.4	30.0	29.8	30.3	30.8	30.6				
9,000	30.0	29.7	30.3	30.1	30.7	31.2	31.0	31.5				
8,000	30.2	30.8	30.5	31.1	31.6	31.4	32.0	31.7	2100	AL	416	72
7,000	30.4	31.0	31.7	31.5	32.1	32.7	32.2	31.9				
6,000	30.6	31.2	31.8	32.4	33.0	32.7	32.0	32.9	2000	AL	407	75
5,000	30.8	31.5	32.1	32.7	33.3	33.9	34.5	34.0				
4,000	31.1	31.7	32.3	33.0	33.5	34.1	34.7	34.3	1900	AL	398	79
3,000	31.3	31.9	32.5	33.2	33.8	34.3	34.9	35.5				
2,000	31.5	32.2	32.8	33.4	34.0	34.6	35.2	35.8	1800	AL	392	84
1,000	31.8	32.4	33.1	33.7	34.3	34.9	35.5	36.1				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,705

Figure 1A2-14

POWER SCHEDULE
1000 BHP
MIXTURE AUTO LEAN

MODEL: **T-29A/B**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN HG.) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
25,000												
24,000												
23,000												
22,000												
21,000	29.4											
20,000	29.5	30.1	30.7									
19,000	29.7	30.2	30.8	31.3								
18,000	29.8	30.3	31.0	31.4	32.0	32.5						
17,000	29.9	30.5	31.1	31.7	32.2	32.6	33.2	33.7				
16,000	25.8	27.3	31.2	31.8	32.4	32.8	33.3	33.8	2300	AL	484	69
15,000	27.1	27.4	27.9	32.0	32.5	32.9	33.5	34.0				
14,000	27.2	27.8	28.3	28.6	29.0	33.1	33.7	34.2	2200	AL	474	72
13,000	27.8	28.4	28.5	29.0	29.1	29.7	30.2	30.7				
12,000	28.0	28.5	29.1	29.1	29.7	30.1	30.3	30.8	2300	AL	470	69
11,000	29.0	28.7	29.3	29.8	30.3	30.3	30.8	31.3				
10,000	29.2	29.8	30.3	30.0	30.4	31.0	30.9	31.4	2200	AL	458	72
9,000	30.2	30.0	30.5	31.1	30.6	31.2	31.6	32.1				
8,000	30.4	31.1	31.7	31.3	31.9	32.4	31.8	32.3	2100	AL	446	75
7,000	30.6	31.3	31.9	32.4	33.1	32.6	33.1	33.6				
6,000	30.8	31.5	32.1	32.6	33.2	33.8	33.3	33.8	2000	AL	436	79
5,000	31.0	31.7	32.3	32.8	33.4	34.0	34.5	35.4				
4,000	31.2	31.9	32.5	33.0	33.7	34.2	34.7	35.3				
3,000	31.4	32.1	32.7	33.2	33.9	34.4	34.9	35.4				
2,000	31.6	32.3	32.9	33.4	34.1	34.6	35.1	35.6				
1,000	31.8	32.5	33.1	33.6	34.3	34.8	35.3	35.9	1900	AL	428	83

NOTE: (1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

10,764B

Figure 1A2-15

MODEL: **T-29 A/B**	POWER SCHEDULE	
DATE: 14 JULY 1961	1050 BHP - ENG	
DATA BASIS: ENGINE MANUFACTURER'S DATA	MIXTURE AUTO LEAN	ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN.HG) FOR CAT (°C)								RPM	MIXTURE	FUEL FLOW (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
21,000	FT	FT										
20,000	30.5	31.1	FT									
19,000	30.7	31.1	31.7	FT								
18,000	30.8	31.4	31.8	32.3	FT							
17,000	31.2	31.4	32.0	32.4	33.0	FT	FT					
16,000	27.7	31.9	32.2	32.8	33.4	33.6	34.1	FT	2300	AL	507	72
15,000	27.8	28.3	32.6	33.2	33.3	33.9	34.2	34.7				
14,000	28.2	28.8	29.0	33.3	33.9	33.9	34.5	35.0	2200	AL	495	75
13,000	28.9	28.9	29.5	29.6	30.2	34.6	34.5	35.0				
12,000	29.0	29.6	29.7	30.2	30.3	30.8	35.2	35.8	2100	AL	488	79
11,000	29.1	29.7	30.3	30.3	30.9	31.0	31.5	32.0	2300	AL	484	72
10,000	30.2	30.8	30.5	31.0	31.0	31.6	32.1	32.2				
9,000	30.4	31.0	31.6	31.2	31.8	32.4	32.3	32.8	2200	AL	471	75
8,000	30.6	31.2	31.9	32.4	32.0	32.5	33.1	33.0				
7,000	30.8	31.4	32.0	32.6	33.2	32.7	33.2	33.8	2100	AL	459	79
6,000	31.0	31.7	32.3	32.9	33.5	34.1	34.6	34.0				
5,000	31.2	31.9	32.5	33.1	33.7	34.3	34.9	35.4	2000	AL	449	83
4,000	31.4	32.0	32.6	33.3	33.9	34.5	35.1	35.6				
3,000	31.5	32.1	32.8	33.4	34.0	34.6	35.2	35.8				
2,000	31.8	32.4	33.1	33.7	34.3	34.9	35.5	36.1				
1,000	32.0	32.8	33.4	34.0	34.6	35.2	35.8	36.4				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

(3) DO NOT EXCEED LIMITATIONS IN SECTION V.

10,706B

Figure 1A2-16

POWER SCHEDULE
1100 BHP
MIXTURE AUTO LEAN

MODEL: **T-29 A/B**
DATE: 21 FEBRUARY 1966
DATA BASIS: **ENGINE MANUFACTURER'S DATA**

ENGINES: R2800-97

PRESSURE ALTITUDE (FEET)	MAP (IN. HG) AT CAT (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	− 30	− 20	− 10	0	+ 10	+ 20	+ 30	+ 40				
25,000												
24,000												
23,000												
22,000												
21,000												
20,000	31.3											
19,000	31.4	32.1										
18,000	31.5	32.2	32.9									
17,000	31.6	32.2	33.0	33.5	34.1							
16,000	31.7	32.3	33.1	33.8	34.2	34.9						
15,000	28.6	32.5	33.2	33.9	34.4	35.0	35.6	36.1	2300	AL	531	75
14,000	28.7	29.4	33.3	33.9	34.5	35.1	35.7	36.2				
13,000	29.1	29.5	30.1	30.7	34.6	35.2	35.8	36.3	2200	AL	519	79
12,000	29.7	29.9	30.3	30.8	31.3	31.8	35.9	36.4				
11,000	29.9	30.5	30.5	31.0	31.4	31.9	32.5	33.0				
10,000	30.0	30.6	31.2	31.8	31.8	32.4	32.6	33.1	2300	AL	512	75
9,000	30.2	30.8	31.4	32.0	32.5	32.5	33.0	33.5				
8,000	30.3	30.9	31.5	32.1	32.7	33.3	33.9	33.6	2200	AL	498	79
7,000	30.5	31.1	31.7	32.3	32.8	33.4	34.0	34.5				
6,000	30.6	31.2	31.8	32.4	33.0	33.6	34.2	34.7				
5,000	30.8	31.4	32.0	32.6	33.2	33.7	34.3	34.8				
4,000	30.9	31.5	32.1	32.7	33.3	33.9	34.5	35.0				
3,000	31.1	31.7	32.3	32.9	33.5	34.0	34.6	35.1				
2,000	31.2	31.8	32.4	33.0	33.6	34.2	34.8	35.3				
1,000	31.4	32.0	32.6	33.2	33.8	34.3	34.9	35.5	2100	AL	483	83

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

(3) DO NOT EXCEED LIMITATIONS IN SECTION V.

10,765D

Figure 1A2-17

POWER SCHEDULE

MODEL: **T-29 A/B**
DATE: 21 FEBRUARY 1966
DATA BASIS: **ENGINE MANUFACTURER'S DATA**

1150 BPH/ENG
MIXTURE AUTO LEAN

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	MAP (IN.HG) FOR CAT (°C)								RPM	MIXTURE	FUEL FLOW (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
20,000	FT											
19,000	32.4	FT										
18,000	32.4	33.0	FT									
17,000	32.4	33.0	33.6	FT								
16,000	32.5	33.1	33.6	34.2	FT	FT						
15,000	32.5	33.1	33.7	34.2	34.9	35.5	FT					
14,000	29.4	33.2	33.7	34.3	35.0	35.6	36.1	FT				
13,000	29.9	30.1	30.7	34.3	35.0	35.6	36.1	36.7				
12,000	30.0	30.6	30.8	31.4	35.1	35.7	36.2	36.8	2300	AL	556	79
11,000	30.1	30.7	31.3	31.4	32.0	35.8	36.3	36.9				
10,000	30.2	30.8	31.4	32.0	32.6	32.7	33.2	37.0				
9,000	30.3	30.9	31.4	32.1	32.7	33.3	33.3	33.9	2300	AL	533	79
8,000	30.4	31.0	31.6	32.2	32.8	33.4	34.0	34.5				
7,000	30.6	31.2	31.8	32.4	33.0	33.6	34.2	34.7				
6,000	30.8	31.4	32.0	32.6	33.2	33.8	34.4	34.9				
5,000	30.9	31.6	32.2	32.8	33.4	34.0	34.6	35.1	2200	AL	520	83
4,000	31.2	31.8	32.4	33.0	33.6	34.2	34.8	35.3				
3,000	31.3	31.9	32.5	33.2	33.8	34.3	34.9	35.5				
2,000	31.5	32.1	32.7	33.4	34.0	34.6	35.1	35.7				
1,000	31.6	32.2	32.9	33.5	34.1	34.7	35.3	35.9				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD.

(3) DO NOT EXCEED LIMITATIONS IN SECTION V.

10,707B

Figure 1A2-18

POWER SCHEDULE
1200 BHP

MODEL: **T-29A/B**
DATE 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	-30	-20	-10	0	+10	+20	+30	+40				
25,000												
24,000												
23,000												
22,000	33.7											
21,000	33.4	34.4	35.0									
20,000	33.1	34.1	35.0	35.7								
19,000	33.2	33.9	34.9	35.7	36.5							
18,000	33.1	33.6	34.7	35.5	36.1	37.1						
17,000	33.0	33.7	34.4	35.4	36.1	36.9	37.7	38.3	(2) 2600	AR	950	73
16,000	33.1	33.8	34.5	35.2	36.1	36.7	37.4	38.0	2500	AR	875	76
15,000	33.2	34.0	34.6	35.2	36.0	36.6	37.4	38.0	2400	AR	805	79
14,000	33.4	34.2	34.8	35.3	36.0	36.7	37.3	37.9	2300	AR	750	83
13,000	30.2	34.3	34.9	35.6	36.1	36.8	37.3	37.9				
12,000	30.3	31.0	31.6	35.7	36.3	37.0	37.4	38.0	2200	AR	710	86
11,000	30.4	31.1	31.7	32.2	36.5	37.2	37.7	38.3				
10,000	30.5	31.2	31.8	32.3	32.9	33.5	37.9	38.5	2100	AR	680	90
9,000	30.6	31.3	31.9	32.4	33.0	33.6	34.1	34.6	(1)			
8,000	30.7	31.4	32.0	32.5	33.1	33.7	34.2	34.7				
7,000	30.8	31.5	32.1	32.6	33.2	33.8	34.3	34.8				
6,000	30.9	31.6	32.2	32.7	33.3	33.9	34.4	34.9				
5,000	31.0	31.7	32.3	32.8	33.4	34.0	34.5	35.0				
4,000	31.1	31.8	32.4	32.9	33.5	34.1	34.6	35.1				
3,000	31.2	31.9	32.5	33.0	33.6	34.2	34.7	35.2				
2,000	31.3	32.0	32.6	33.1	33.7	34.3	34.8	35.3				
1,000	31.4	32.1	32.7	33.2	33.8	34.4	34.9	35.5	2300	AL	582	83

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) 2600 RPM APPLICABLE TO T-29A AIRPLANES ONLY. T-29B AIRPLANES LIMITED TO 2500 RPM IN HIGH BLOWER.

(3) NO CABIN PRESSURIZATION LOAD.

10,766C

Figure 1A2-19

POWER SCHEDULE
1300 BHP
MIXTURE AUTO RICH

Ⓐ

MODEL: **T-29A**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	− 30	− 20	− 10	0	+ 10	+ 20	+ 30	+40				
25,000												
24,000												
23,000												
22,000												
21,000	36.0											
20,000	36.0	36.7										
19,000	35.5	36.7	37.4									
18,000	35.4	36.4	37.2	38.2								
17,000	35.5	36.2	37.3	37.9	38.8							
16,000	31.2	36.3	37.0	37.7	38.6	39.5			2600	AR	1010	79
15,000	31.2	31.8	37.0	37.8	38.3	39.4			2500	AR	943	82
14,000	31.3	32.0	32.6	33.1	38.4	39.2						
13,000	31.6	32.1	32.6	33.1	33.6	39.3			2400	AR	855	86
12,000	31.7	32.4	33.0	33.2	33.6	34.2	34.8					
11,000	32.3	32.8	33.1	33.7	33.9	34.4	34.8	35.4	2600	AR	975	79
10,000	32.8	32.9	33.6	33.8	34.5	35.0	35.0	35.6	2500	AR	890	82
9,000	32.9	33.5	34.2	34.4	34.9	35.1	35.7	36.3				
8,000	33.5	33.6	34.4	35.0	35.0	35.7	35.7	36.3	2400	AR	836	86
7,000	33.6	34.2	34.9	35.2	35.7	36.3	36.4	37.0	2300	AR	790	89
6,000	33.8	34.4	35.1	35.8	36.4	36.5	37.1	37.7				
5,000	33.9	34.5	35.2	35.9	36.5	37.3	37.2	37.8	2200	AR	742	93
4,000	34.1	34.7	35.4	36.1	36.7	37.4	38.0	38.6				
3,000	34.2	34.8	35.5	36.2	36.8	37.6	38.2	38.8				
2,000	34.4	35.0	35.7	36.4	37.0	37.7	38.3	38.9				
1,000	34.5	35.1	35.8	36.5	37.2	37.9	38.5	39.1	2100	AR	705	98

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15°C IN HIGH BLOWER.

10,767C

Figure 1A2-20

MODEL: **T-29B**				POWER SCHEDULE					**B**			ENGINES: **R2800-97**
DATE: 1 OCTOBER 1962				1300 BHP								
DATA BASIS: ENGINE MANUFACTURER'S DATA				MIXTURE AUTO RICH								

| PRESSURE ALTITUDE (FEET) | M.A.P. (IN. HG.) AT C.A.T. (°C) | | | | | | | | RPM | MIXTURE | FUEL FLOW PER ENGINE (LB/HR) | TORQUE PRESSURE (PSI) |
	−30	−20	−10	0	+10	+20	+30	+40				
22,000												
21,000	F.T.											
20,000	35.4	F.T.										
19,000	35.5	36.3	F.T.									
18,000	35.4	36.4	37.2	F.T.								
17,000	35.5	36.2	37.3	37.9	F.T.							
16,000	35.6	36.3	37.0	37.7	38.6	F.T.						
15,000	35.7	36.4	37.0	37.8	38.3	39.4			2500	AR	943	82
14,000	31.3	32.0	37.2	37.9	38.4	39.2						
13,000	31.6	32.1	32.6	38.0	38.5	39.3						
12,000	31.7	32.4	33.0	33.2	38.6	39.4			2400	AR	855	86
11,000	32.3	32.8	33.1	33.7	33.9	34.4						
10,000	32.8	32.9	33.6	33.8	34.5	35.0	35.0	35.6	2500	AR	890	82
9,000	32.9	33.5	34.2	34.4	34.9	35.1	35.7	36.3				
8,000	33.5	33.6	34.4	35.0	35.0	35.7	35.7	36.3	2400	AR	836	86
7,000	33.6	34.2	34.9	35.2	35.7	36.3	36.4	37.0	2300	AR	790	89
6,000	33.8	34.4	35.1	35.8	36.4	36.5	37.1	37.7				
5,000	33.9	34.5	35.2	35.9	36.5	37.3	37.2	37.8	2200	AR	742	93
4,000	34.1	34.7	35.4	36.1	36.7	37.4	38.0	38.6				
3,000	34.2	34.8	35.5	36.2	36.8	37.6	38.2	38.8				
2,000	34.4	35.0	35.7	36.4	37.0	37.7	38.3	38.9				
1,000	34.5	35.1	35.8	36.5	37.2	37.9	38.5	39.1	2100	AR	705	98

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.
(2) MAXIMUM C A T 15° IN HIGH BLOWER.
(3) F.T. INDICATES FULL THROTTLE.
(4) NO CABIN PRESSURIZATION LOAD.

10,733

Figure 1A2-21

POWER SCHEDULE
1400 BHP
MIXTURE AUTO RICH

MODEL: **T-29A**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

A

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
20,000												
19,000	38.2											
18,000	37.8	39.0										
17,000	37.9	38.6	39.7	40.4								
16,000	37.7	38.4	39.4	40.4	41.1							
15,000	33.2	38.5	39.3	40.3	41.2	41.9			2600	AR	1078	85
14,000	33.2	33.8	39.4	40.1	41.2	41.9						
13,000	33.2	33.9	34.5	40.2	40.9	41.9			2500	AR	1008	89
12,000	33.7	33.9	34.6	35.2	35.8	41.6						
11,000	33.8	34.5	34.7	35.3	35.8	36.5			2400	AR	900	92
10,000	34.3	34.5	35.2	35.3	35.9	36.5	37.1	37.7	2600	AR	1030	85
9,000	34.4	35.0	35.7	36.0	36.0	36.6	37.2	37.8				
8,000	35.0	35.6	35.8	36.5	36.8	37.4	37.3	37.9	2500	AR	960	89
7,000	35.3	35.8	36.4	36.6	37.3	38.0	38.2	38.8	2400	AR	912	92
6,000	35.5	36.2	36.6	37.3	38.0	38.1	38.7	39.3				
5,000	35.6	36.3	37.1	37.8	38.1	38.8	38.8	39.4	2300	AR	867	96
4,000	35.8	36.5	37.2	37.9	38.6	38.9	39.6	40.2	2200	AR	825	101
3,000	35.9	36.6	37.4	38.1	38.8	39.5	40.2	40.8				
2,000	36.1	36.8	37.5	38.2	38.9	39.7	40.4	41.0				
1,000	36.2	36.9	37.7	38.4	39.1	39.8	40.5	41.1	2100	AR	790	105

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15°C IN HIGH BLOWER.

Figure 1A2-22

MODEL: **T-29B**	**POWER SCHEDULE**		**B**
DATE: 1 OCTOBER 1962	1400 BHP		
DATA BASIS: ENGINE MANUFACTURER'S DATA	MIXTURE AUTO RICH		ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN. HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
20,000												
19,000	37.7											
18,000	37.8	38.5										
17,000	37.9	38.6	39.3	F.T.								
16,000	37.7	38.4	39.4	40.3	F.T.							
15,000	37.8	38.5	39.3	40.3	41.2	F.T.						
14,000	37.9	38.6	39.4	40.1	41.2	41.9						
13,000	33.2	38.7	39.5	40.2	40.9	41.9			2500	AR	1008	89
12,000	33.7	33.9	34.6	40.3	41.0	41.6						
11,000	33.8	34.5	34.7	35.3	41.2	36.5			2400	AR	900	92
10,000	34.3	34.5	35.2	35.3	35.9	36.5						
9,000	34.4	35.0	35.7	36.0	36.0	36.6	37.2	37.8				
8,000	35.0	35.6	35.8	36.5	36.8	37.4	37.3	37.9	2500	AR	960	89
7,000	35.3	35.8	36.4	36.6	37.3	38.0	38.2	38.8	2400	AR	912	92
6,000	35.5	36.2	36.6	37.3	38.0	38.1	38.7	39.3				
5,000	35.6	36.3	37.1	37.8	38.1	38.8	38.8	39.4	2300	AR	867	96
4,000	35.8	36.5	37.2	37.9	38.6	38.9	39.6	40.2	2200	AR	825	101
3,000	35.9	36.6	37.4	38.1	38.8	39.5	40.2	40.8				
2,000	36.1	36.8	37.5	38.2	38.9	39.7	40.4	41.0				
1,000	36.2	36.9	37.7	38.4	39.1	39.8	40.5	41.1	2100	AR	790	105

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) F.T. INDICATES FULL THROTTLE.

(3) MAXIMUM C.A.T. 15°C IN HIGH BLOWER.

(4) NO CABIN PRESSURIZATION LOAD.

10,734

Figure 1A2-23

POWER SCHEDULE
1500 BHP
MIXTURE AUTO RICH

A

MODEL: **T-29 A**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
20,000												
19,000												
18,000	40.5											
17,000	40.5	41.3										
16,000	40.2	41.4	42.2									
15,000	40.3	41.1	41.9	43.0								
14,000	40.3	41.1	42.0	42.8	43.8							
13,000	35.0	41.2	42.0	42.9	43.6	44.6			2600	AR	1150	91
12,000	35.1	35.7	36.4	42.9	43.7	44.4						
11,000	35.2	35.9	36.4	37.2	43.7	44.5						
10,000	35.7	35.9	36.6	37.2	37.9	44.5			2500	AR	1064	95
9,000	35.7	36.4	37.1	37.3	38.0	38.6	39.3	39.9				
8,000	36.4	36.5	37.2	37.9	38.0	38.8	39.3	39.9	2600	AR	1100	91
7,000	36.8	37.2	37.8	37.9	38.6	38.8	39.5	40.1	2500	AR	1042	95
6,000	36.9	37.8	37.9	38.7	38.7	39.4	40.0	40.6				
5,000	37.1	37.9	38.7	38.8	39.5	40.2	40.1	40.7	2400	AR	990	99
4,000	37.2	38.0	38.8	39.5	40.2	40.3	41.0	41.7				
3,000	37.3	38.1	38.9	39.7	40.4	41.0	41.6	41.8	2300	AR	950	103
2,000	37.5	38.3	39.1	39.8	40.5	41.1	41.7	42.3				
1,000	37.6	38.4	39.2	39.9	40.6	41.2	41.9	42.6	2200	AR	910	108

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15°C IN HIGH BLOWER.

10,769C

Figure 1A2-24

POWER SCHEDULE

MODEL: **T-29B**
DATE: 1 OCTOBER 1962
DATA BASIS: ENGINE MANUFACTURER'S DATA

1500 BHP
MIXTURE AUTO RICH

B

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN. HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
19,000												
18,000												
17,000	F.T.											
16,000	40.2	F.T.	F.T.									
15,000	40.3	41.1	41.9	F.T.								
14,000	40.3	41.1	42.0	42.8	F.T.							
13,000	40.4	41.2	42.0	42.9	43.6	F.T.						
12,000	35.1	41.3	42.1	42.9	43.7	44.4						
11,000	35.2	35.9	42.2	43.0	43.7	44.5						
10,000	35.7	35.9	36.6	43.1	43.8	44.5			2500	AR	1064	95
9,000	35.7	36.4	37.1	37.3	38.0	44.6						
8,000	36.4	36.5	37.2	37.9	38.0	38.8						
7,000	36.8	37.2	37.8	37.9	38.6	38.8	39.5	40.1	2500	AR	1042	95
6,000	36.9	37.8	37.9	38.7	38.7	39.4	40.0	40.6				
5,000	37.1	37.9	38.7	38.8	39.5	40.2	40.1	40.7	2400	AR	990	99
4,000	37.2	38.0	38.8	39.5	40.2	40.3	41.0	41.7	2300	AR	950	103
3,000	37.3	38.1	38.9	39.7	40.4	41.0	41.6	41.8				
2,000	37.5	38.3	39.1	39.8	40.5	41.1	41.7	42.3				
1,000	37.6	38.4	39.2	39.9	40.6	41.2	41.9	42.6	2200	AR	910	108

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) F.T. INDICATES FULL THROTTLE

(3) MAXIMUM C.A.T. 15°C IN HIGH BLOWER

(4) NO CABIN PRESSURIZATION LOAD

10,735

Figure 1A2-25

POWER SCHEDULE
1600 BHP
MIXTURE AUTO RICH

MODEL: **T-29A**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

A

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	− 30	− 20	− 10	0	+ 10	+ 20	+ 30	+ 40				
20,000												
19,000												
18,000												
17,000												
16,000	43.2											
15,000	43.2	44.1										
14,000	43.3	44.1	45.9	45,7								
13,000	43.3	44.1	45.0	45.8	46.6							
12,000	36.8	44.2	45.0	45.8	46.6	47.5			2600	AR	1230	97
11,000	36.8	37.6	45.0	45.8	46.7	47.5						
10,000	37.1	37.6	38.4	45.9	46.7	47.5						
9,000	37.2	37.9	38.6	39.1	39.8	47.5						
8,000	37.5	38.3	38.6	39.3	39.8	40.6	41.3	42.0	2600	AR	1230	97
7,000	37.6	38.4	39.1	39.4	40.1	40.6	41.3	42.0				
6,000	37.7	38.5	39.2	40.0	40.2	40.9	41.6	42.3	2500	AR	1125	101
5,000	37.7	38.5	39.3	40.0	40.8	41.4	41.7	42.4				
4,000	37.8	38.6	39.4	40.1	40.8	41.5	42.1	42.8	2400	AR	1072	105
3,000	37.9	38.7	39.4	40.2	40.9	41.6	42.2	42.8				
2,000	38.0	38.8	39.5	40.3	41.0	41.7	42.3	42.9				
1,000	38.0	38.8	39.6	40.4	41.1	41.8	42.4	43.1				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM CAT 15°C IN HIGH BLOWER.

10,770C

Figure 1A2-26

POWER SCHEDULE
1600 BHP
MIXTURE AUTO RICH

B

MODEL: **T-29B**
DATE: 1 OCTOBER 1962
DATA BASIS: ENGINE MANUFACTURER'S DATA

ENGINES: **R2800-97**

PRESSURE ALTITUDE (FEET)	M.A.P. (IN. HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB./HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
17,000												
16,000	43.5											
15,000	43.5	44.4										
14,000	43.6	44.4	45.2	46.0								
13,000	43.6	44.4	45.3	46.1	46.9							
12,000	36.5	44.5	45.3	46.1	46.9	47.8						
11,000	36.5	37.3	45.3	46.1	47.0	47.8			2500	AR	1220	101
10,000	37.1	37.3	38.2	46.2	47.0	47.8						
9,000	37.2	37.9	38.6	38.9	39.5	47.8						
8,000	37.5	38.3	38.6	39.3	39.5	40.3	41.0	41.7	2700	AR	1238	93
7,000	37.6	38.4	39.1	39.4	40.1	40.3	41.0	41.7				
6,000	37.7	38.5	39.2	40.0	40.2	40.9	41.6	42.3	2500	AR	1125	101
5,000	37.7	38.5	39.3	40.0	40.8	41.4	41,7	42.4				
4,000	37.8	38.6	39.4	40.1	40.8	41.5	42.1	42.8				
3,000	37.9	38.7	39.4	40.2	40.9	41.6	42.2	42.8	2400	AR	1072	105
2,000	38.0	38.8	39.5	40.3	41.0	41.7	42.3	42.9				
1,000	38.0	38.8	39.6	40.4	41.1	41.8	42.4	43.1				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) MAXIMUM C.A.T. 15°C IN HIGH BLOWER

(3) NO CABIN PRESSURIZATION LOAD

10,736

Figure 1A2-27

PRESSURE ALTITUDE (FEET)	M.A.P. (IN HG.) AT C.A.T.(°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	− 30	− 20	− 10	0	+ 10	+ 20	+ 30	+ 40				
15,000												
14,000												
13,000												
12,000												
11,000												
10,000	38.7											
9,000	39.2	39.6	40.4									
8,000	39.3	40.0	40.4	41.2								
7,000	39.3	40.1	40.8	41.2	41.9							
6,000	39.4	40.1	40.9	41.6	42.4	42.7	43.4	44.1	2600	AR	1270	103
5,000	39.4	40.2	40.9	41.7	42.5	43.2	43.4	44.1				
4,000	39.5	40.2	41.0	41.7	42.5	43.3	44.0	44.7				
3,000	39.5	40.3	41.0	41.8	42.6	43.3	44.1	44.8	2500	AR	1208	108
2,000	39.6	40.3	41.1	41.8	42.6	43.4	44.1	44.8				
1,000	39.6	40.4	41.1	41.9	42.7	43.4	44.2	44.9				

POWER SCHEDULE

A

MODEL: **T-29A**
DATE: 15 FEBRUARY 1958
DATA BASIS: ENGINE MANUFACTURER'S DATA

1700 BHP
MIXTURE AUTO RICH

ENGINES: **R2800-97**

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

10,771C

Figure 1A2-28

| MODEL: **T-29B**
DATE: 1 OCTOBER 1962
DATA BASIS: ENGINE MANUFACTURER'S DATA | **POWER SCHEDULE**
1700 BHP
MIXTURE AUTO RICH | **B** | ENGINES: **R2800-97** |

PRESSURE ALTITUDE (FEET)	M.A.P. (IN. HG.) AT C.A.T. (°C)								RPM	MIXTURE	FUEL FLOW PER ENGINE (LB/HR)	TORQUE PRESSURE (PSI)
	−30	−20	−10	0	+10	+20	+30	+40				
11,000												
10,000	38.2											
9,000	39.2	39.2	40.0									
8,000	39.3	40.0	40.0	40.8								
7,000	39.3	40.1	40.8	40.8	41.4							
6,000	39.4	40.1	40.9	41.6	42.4	42.2	42.8	43.5				
5,000	39.4	40.2	40.9	41.7	42.5	43.2	42.8	43.5	2700	AR	1278	98
4,000	39.5	40.2	41.0	41.7	42.5	43.3	44.0	44.7				
3,000	39.5	40.3	41.0	41.8	42.6	43.3	44.1	44.8				
2,000	39.6	40.3	41.1	41.8	42.6	43.4	44.1	44.8	2500	AR	1208	108
1,000	39.6	40.4	41.1	41.9	42.7	43.4	44.2	44.9				

NOTES:

(1) OPERATION BELOW BROKEN LINE IS IN LOW BLOWER, ABOVE IS IN HIGH BLOWER.

(2) NO CABIN PRESSURIZATION LOAD

10,737

Figure 1A2-29

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: ESTIMATED

FUEL FLOW PER ENGINE
LOW BLOWER

ENGINES: **R2800-97**

FUEL FLOW – POUNDS PER HOUR

FUEL FLOW – POUNDS PER HOUR

AUTO LEAN
READ LEFT
HAND SCALE

ENGINE RPM

ENGINE RPM

AUTO RICH
READ RIGHT
HAND SCALE

2300
2200
2000
1800
1600
1400
2700
2600
2500
2400
2300

A
B
C

BRAKE HORSE POWER PER ENGINE
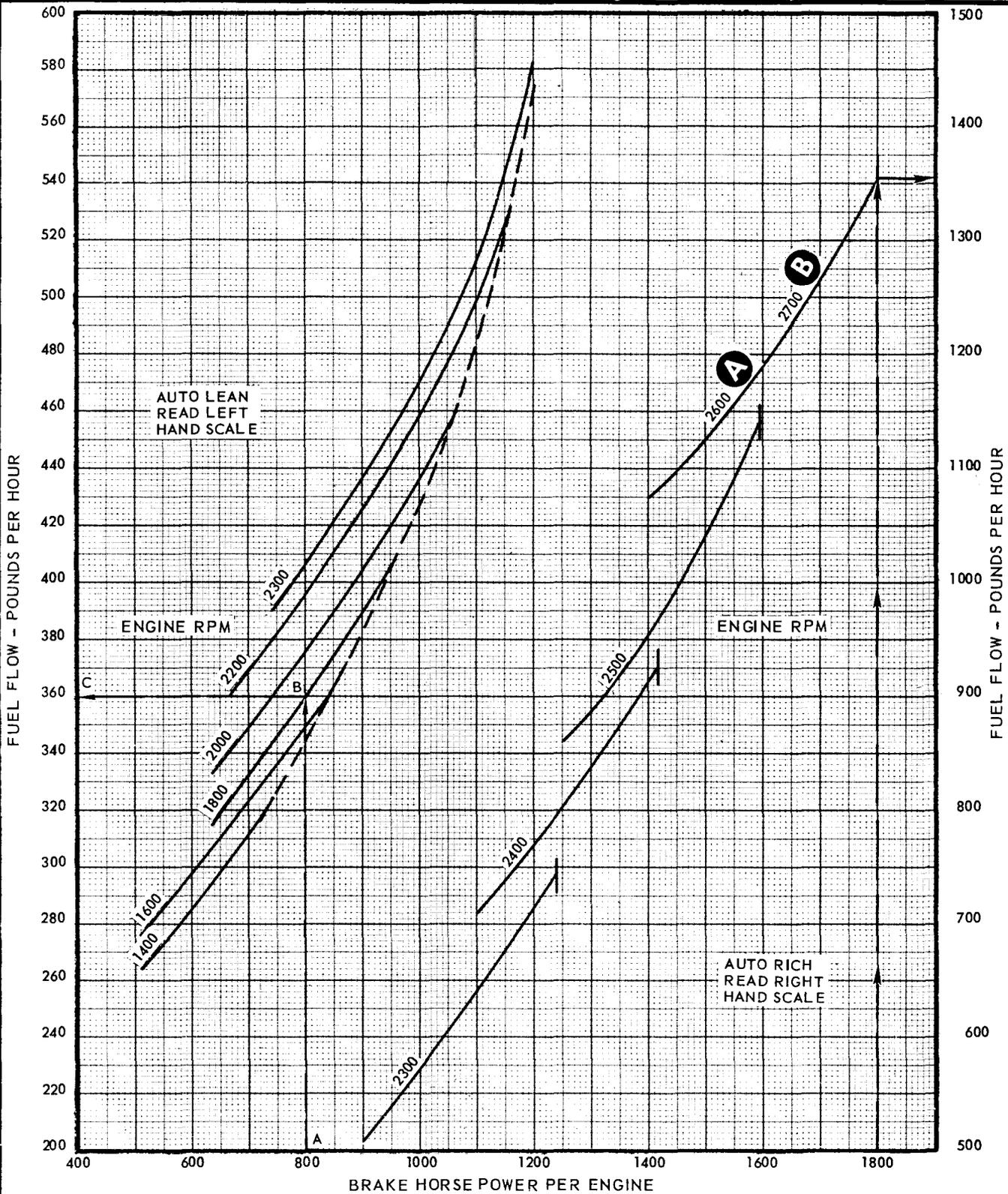
10,716B

MODEL: **T-29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

FUEL FLOW PER ENGINE
HIGH BLOWER

ENGINES: **R2800-97**

FUEL FLOW - POUNDS PER HOUR

AUTO LEAN
READ LEFT
HAND SCALE

ENGINE RPM

2300
2200
2300
2600
2500
2400
1800
1600
2000
1400
2300

Ⓐ

Ⓑ

ENGINE RPM

AUTO RICH
READ RIGHT
HAND SCALE

FUEL FLOW - POUNDS PER HOUR

BRAKE HORSEPOWER PER ENGINE
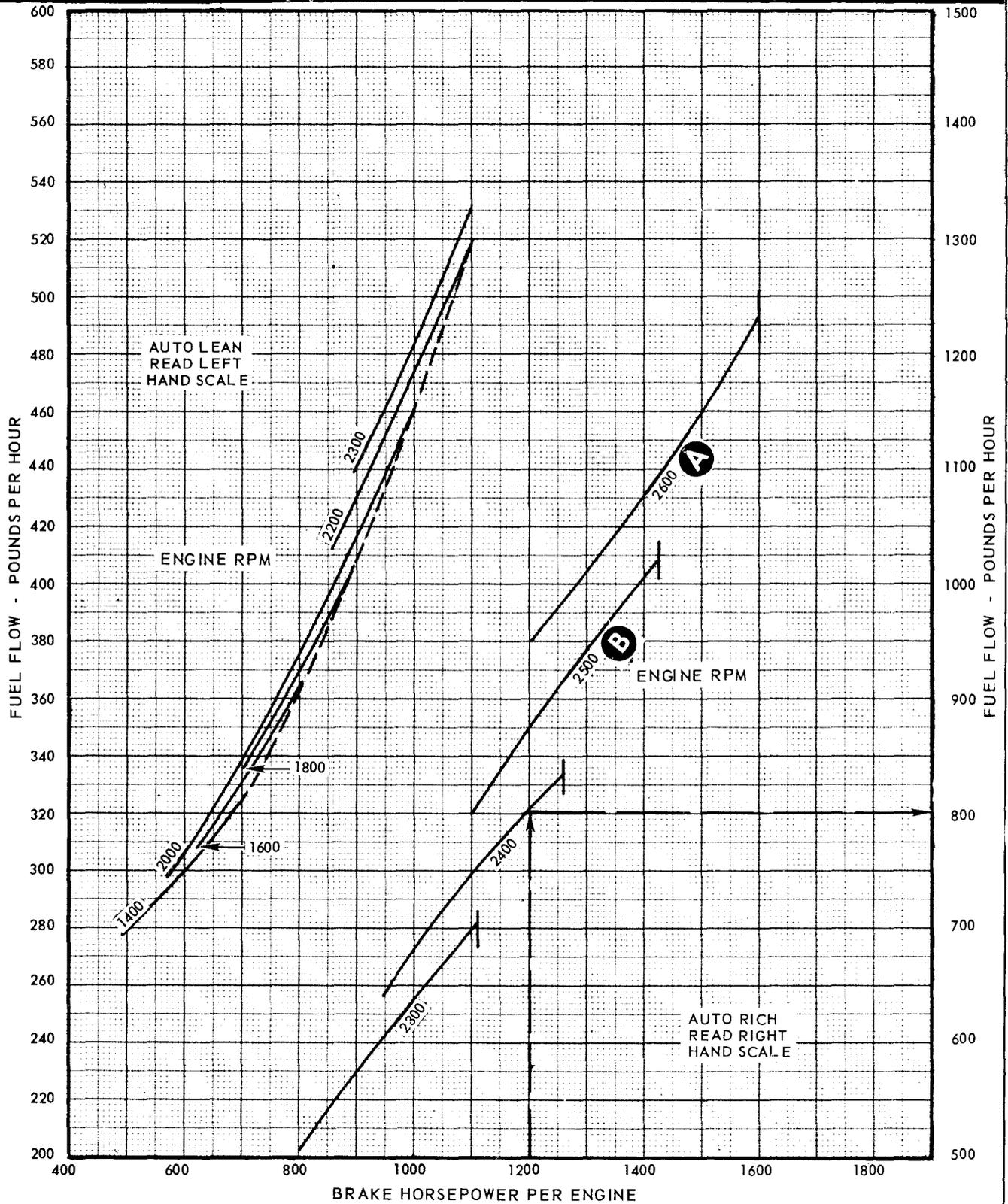
10,717B

Figure 1A2-31

PART 3 – TAKEOFF

Ⓐ   Ⓑ

TABLE OF CONTENTS

The symbol * indicates an illustration

TAKEOFF

DISCUSSION OF TAKEOFF TERMS

The relationship of takeoff terms (figure 1A3-1) illustrates the relationship of the terms used in the takeoff charts. The upper chart represents the sum of the distance required to accelerate on two engines to critical engine failure speed, experience an engine failure and either continue to accelerate on one engine to takeoff speed or stop, using brakes only, in the same distance. On the lower chart Curve A shows the two engine acceleration to takeoff speed and the distance traversed is the ground run.

Curves B and D show that from the critical engine failure speed point the distance to accelerate on one engine to takeoff speed and the distance to stop are the same. This distance added to the distance required to reach critical engine failure speed is called the critical field length. Curve C shows that the refusal speed is the highest speed from which the takeoff may be aborted and the aircraft brought to a stop within the remaining runway length. The acceleration check point is a predetermined point, based on time or distance, at which the acceleration check speed must be attained. If runway length and critical field length were equal, Curves C and D

would coincide and the refusal speed would be the same as the critical engine failure speed. In this case, the acceleration check speed will be lower than the critical engine failure speed.

Ground Effect

Ground effect, in general, refers to a reduction in the overall drag of an airplane when operated near the ground. The degree of drag reduction will vary with distance of the wing or supporting surface from the ground, being greatest when the wing is at ground level, and will have disappeared, for all practical purposes, when the wing is one-half its span above the ground. The reduction in drag is also greatest at low velocities and becomes less as velocity increases. All of the takeoff charts pertaining to the ground run consider the reduction in drag due to ground effect.

MAXIMUM TAKEOFF GROSS WEIGHT

Safe operation of the aircraft requires that takeoffs not be attempted at gross weights for which acceleration, rate of climb, or obstacle clearance capability are marginal. There are four primary factors which must be considered when determining a safe limit for the takeoff gross weight.

1. The ability of the structure to withstand taxiing loads and inflight maneuvering loads is shown as design takeoff gross weights on the Gross Weight Limitation Chart in Section V.

2. The ability to takeoff or stop within the available runway is shown on the Critical Field Length Charts (figures 1A3-8, 1A3-11, 1A3-14, and 1A3-17).

3. The ability to have adequate rate of climb when airborne is shown on the Gross Weight Limited by One-Engine Climb Performance Chart (figure 1A3-3).

4. The ability to clear obstacles within the takeoff corridor is determined by the Climbout Factor Charts and the Climbout Flight Path Charts (figures 1A3-21 through 1A3-32).

For a given set of takeoff conditions, each of these four considerations will permit a different gross weight. Any one of the four weights may be the lowest, depending on the conditions. For this reason, all four factors must be considered for each takeoff, even though in many cases one or more of them may be eliminated after cursory examination. The lowest weight determined by these factors will be the maximum takeoff gross weight.

TAKEOFF PLANNING

An engine failure, while admittedly rare, remains a possibility, especially under takeoff (high power) conditions. If an engine should fail during the early part of a takeoff run, there is no problem — cut the remaining engine and stop. However, under certain conditions of weight, speed, and runway length it is desirable to continue the takeoff. One of the purposes of the normal takeoff charts is to provide the neces-

sary information to determine a desirable loading and wing flap setting and then to determine the amount of runway required and the rate of climb expected if an engine should fail during a late phase of the takeoff. In flight planning, the larger wing flap setting should be considered first. This is because the greater wing flap extensions result in reduced takeoff speed and required field length. The flap setting will be considered acceptable of (1) the rate of climb on the gross weight limited by climb chart is acceptable, and (2) if the critical field length found is equal to or less than the runway field length under consideration. If the rate of climb is too low, a lesser wing flap setting will then require a re-evaluation of the takeoff field length. If, after choosing the smallest recommended wing flap setting to obtain an acceptable initial rate of climb, it is found that the actual available runway field length is less than that shown on the chart, a reduction in gross weight is desirable. It is recommended that the airplane not be loaded so that the critical field length exceeds the available runway length. From the definition it can be seen that critical engine failure speed is required only when critical field length is equal to the available runway length, and since critical engine failure speed and refusal speed are equal in this case, then refusal speed is the only speed that need be monitored to determine whether or not to abort when encountering engine failure during takeoff. When the available field length is so much greater than the critical field length that the refusal speed is higher than takeoff speed, then the only speed that need be monitored during takeoff run is takeoff speed, and the decision to abort or continue the takeoff is determined by whether or not the airplane is airborne. The wind correction nomograms on the charts are calculated on the basis of 100% wind accountability. It is realized that wind differential ordinarily exists between the runway and the top of the control tower or building where the wind velocity reading is taken, the wind usually being a greater velocity at the higher altitude. Therefore headwinds reported by the tower should be used at one-half their value and tailwinds at one and one-half times their value for takeoff, and at full value for conditions after takeoff. Exception: always apply 100% of wind component to acceleration check speed and ground run distance.

TAKEOFF WITH ALLOWANCE FOR ENGINE FAILURE

Normal takeoff planning procedure allows for the possibility of an engine failure during takeoff. There are two methods for which data is provided herein.

Critical Field Length Method

When critical field length equals runway available, utilize data from the critical field length charts. When using this method, if an engine fails before the critical engine failure speed is reached, the aircraft must be stopped. If an engine fails after the critical engine failure speed is reached, the takeoff is continued. Takeoff speeds are the same as those shown in figure 1A3-7. Climbout flight path data is determined from the one engine climbout flight path charts, figures 1A3-26 through 1A3-30.

RELATIONSHIP OF TAKEOFF TERMS

TAKEOFF SPEED

CRITICAL ENG FAIL. SPEED

AIRSPEED →

RUNWAY DISTANCE →

TAKEOFF
DISTANCE

CRITICAL
FIELD LENGTH

RUNWAY
LENGTH

———————— TWO-ENGINE ACCELERATION
— — — —— SINGLE-ENGINE ACCELERATION
—·—·—·— BRAKING DECELERATION (PROPS WINDMILLING)

TAKEOFF SPEED

CURVE A   CURVE B

REFUSAL SPEED

ACCELERATION
CHECK SPEED

CRITICAL ENGINE
FAILURE SPEED

CURVE C

CURVE D

AIRSPEED →

RUNWAY DISTANCE →

ACCELERATION
CHECK POINT

GROUND
RUN

CRITICAL
FIELD LENGTH

RUNWAY
LENGTH

46,353B

Figure 1A3-1

Refusal Speed Method

The refusal speed method will be used when the available runway is longer than the critical field length. This method utilizes data from tne ground run charts, refusal speed charts and the velocity during takeoff ground run chart. When using this method, an acceleration check speed, time and/or distance will be determined to validate proper acceleration prior to reaching refusal speed. If an engine fails, or the acceleration check speed is low at the designated acceleration check point, the aircraft is stopped. If an engine fails between the acceleration check speed and refusal speed, the aircraft is also stopped. If an engine fails after reaching refusal speed, the takeoff should be continued. The following steps summarize what action should be taken when using the refusal speed method.

1. Stop (abort takeoff).

   a. If an acceleration check speed is not attained by the time the acceleration check speed time and/or distance is reached.

   b. If engine failure occurs before acceleration check speed is attained.

   c. If an engine failure occurs between the acceleration check speed and refusal speed.

2. Go (continue takeoff). If an engine failure occurs after reaching refusal speed.

DISCUSSION OF CHARTS

TAKEOFF AND LANDING CROSSWIND CHART

A Takeoff and Landing Crosswind Chart (figure 1A3-2) is provided to determine the runway head-wind component from a given combination of wind direction and velocity.

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB

These charts (figures 1A3-3 and 1A3-5) present initial climb performance with one engine inoperative and its propeller feathered, and with continuous two-engine operation. Data are shown for approach flap settings as well as their basic takeoff flap settings. Single-engine rate of climb and two-engine rate of climb with landing gear retracted can be determined with any variable of wing flap setting, gross weight, TPSI, altitude, and temperature. The single-engine chart should be used for preflight planning to assure adequate rate of climb if an engine should fail during takeoff.

EXAMPLE

   Given:

   Density altitude = 1800 feet.

   Desired rate of climb = 300 fpm.

   TPSI = 128 psi.

   Gross weight = 44,000 pounds.

To find the takeoff flap setting, enter the chart (figure 1A3-3) at density altitude of 1800 feet (A). Read across to 300 fpm rate of climb (B). Parallel guide lines to the sea level base line and then read up to TPSI, 128 psi (C). Parallel the guide lines to the base line and read up to the takeoff gross weight (D). Read across to find takeoff flap setting of 0° (E).

Note

- For practical operations, limit the take-off flap settings to either 12°, 6°, or 0° Intermediate positions should be used only when one of these flap positions will not provide the required rate of climb and runway length combination.

- If the takeoff flap setting should come out as less than 0° under existing conditions, off-load as necessary to reduce the takeoff weight to that which allows the desired rate of climb. If the take-off weight cannot be reduced, work backwards from the weight and minimum flap setting to determine the rate of climb.

INITIAL RATE OF CLIMB CORRECTION

This chart (figure 1A3-4) may be used to determine the initial takeoff rate of climb before the landing gear is retracted. The decrease in rate of climb obtained is due to the landing gear drag at takeoff. When takeoff conditions are critical, the rate of climb correction is applied to the takeoff gross weight limited by climb (figures 1A3-3 and 1A3-5) to re-evaluate the allowable gross weight and/or desired rate of climb.

WARNING

This correction applies only during the initial takeoff until the landing gear is retracted. Landing gear retraction after takeoff is a normal requirement and is imperative with one engine inoperative, high temperatures, or high ground elevation. Refer to ENGINE FAILURE, Section III.

EXAMPLE

   Given:

   Gross weight = 44,000 pounds.

   Takeoff flap setting = 0°.

   Density altitude = 1800 feet.

   Desired rate of climb (landing gear up)=300 fpm.

Enter the chart at gross weight of 44,000 pounds (A). Proceed vertically to 0° flap line (B), then across to the base line of density altitude. Parallel the guide lines to density altitude 1800 feet (C), then across to read decrease in rate of climb, -335 feet

(D). This value, when subtracted from 300 fpm rate of climb used in determining gross weight limited by climb, results in a -35 feet rate of climb with the landing gear down. To assure a safe takeoff with one engine inoperative, it will be necessary to re-compute the allowable gross weight. Re-enter the takeoff gross weight limited by climb chart (figure 1A3-3) at desired rate of climb of 335 feet (300 + 35) and with the same conditions of density altitude, torque pressure, and flap setting find the adjusted gross weight of 43,000 pounds.

VELOCITY DURING TAKEOFF GROUND RUN

Figure 1A3-6 shows the relationship between distance, time, and speed during the takeoff acceleration. It is based on acceleration from brake release on a dry, hard surface runway with two engines operating. Airspeeds used to enter the chart are indicated airspeeds corrected for 100% of reported headwinds and tailwinds. If actual winds during the takeoff run exceed these values, the time to accelerate to a given checkpoint, and the speed at the checkpoint will be correspondingly higher for headwinds and lower for tailwinds than those computed from the chart. The refusal speed distance, acceleration check speed and checkpoint may be determined from this chart. To do this, it is necessary first to obtain the ground run for the flap setting used (figures 1A3-10, 1A3-13, 1A3-16, or 1A3-19) and indicated takeoff speed (figure 1A3-7). The ground run should be corrected for wind and runway slope. By entering the chart with takeoff speed and takeoff ground run corrected for wind, a contour line is established which is then used to determine the acceleration check speed, time, and distance. From the applicable refusal speed chart (figures 1A3-9, 1A3-12, 1A3-15, or 1A3-18), determine the indicated refusal speed corrected for wind for the available runway and again correct for wind before entering the chart. Following the corrected refusal speed to the contour line previously established will determine the refusal distance. Acceleration speed/time is then determined at the intersection of the contour line and the acceleration checkpoint time/distance. This speed is then corrected for wind velocity. Distance, speed, and time relationships for other speeds can also be determined.

The acceleration time check is the most accurate means of checking acceleration. With this method, an even 10 knot increment, not less than 5 and not more than 15 knots below refusal speed, will normally be used as an acceleration check speed. As a secondary procedure, on marked runways the acceleration check may be made at a distance marker. For this method, the acceleration checkpoint will normally be the first 1000 foot marker at least 500 feet but not more than 1500 feet prior to the refusal distance.

EXAMPLE

Given:

Wind (100% of reported headwind) = 10 knots.

Ground run (corrected for headwind and slope) = 3600 feet.

Takeoff speed = 119 knots IAS.

Refusal speed (corrected for headwind) = 115 knots IAS.

Density altitude = 5600 feet.

Subtract headwind from takeoff speed to obtain corrected takeoff speed (119 - 10 = 109 knots IAS). Enter chart (figure 1A3-6) with corrected takeoff speed of 109 knots IAS (A) and read up to ground run of 3600 feet (B) and establish a contour line by following the guide lines.

Subtract headwind from the refusal speed to obtain the corrected refusal speed (115 - 10 = 105 knots IAS). Enter the chart with corrected refusal speed of 105 knots IAS (C) and read up to the intersection of contour line (D) to find the refusal distance of 3250 feet.

Enter the chart at the nearest 1000 foot marker at least 500 feet below the refusal distance to determine acceleration check distance of 2000 feet (E). Read across to the intersection of the contour line to find time to accelerate of 29 seconds (F), and read down to find uncorrected acceleration check speed of 88 knots IAS (G).

Correct acceleration check speed by adding headwind velocity (88 + 10 = 98 knots IAS).

Determine $1/\sqrt{\sigma}$ of 1.087 from the Density Altitude vs $1/\sqrt{\sigma}$ chart (figure 1A1-2) for 5600 feet density altitude. Correct time to accelerate by dividing by by this figure. Actual time at the marker will be 29 ÷ 1.087 = 27 seconds.

Note

Since the contour (acceleration) line has been established for the given conditions, time to any speed or distance can be readily determined.

TAKEOFF AND MINIMUM CONTROL SPEEDS

The Takeoff and Minimum Control Speed Chart (figure 1A3-7 is provided to show takeoff speeds and 1.1 minimum control speeds. Takeoff speed is based on 120 percent of power-off stall speed or 110 percent of minimum control speed, whichever is greater. At low gross weights and larger flap settings, the minimum control speed becomes greater than the takeoff speed.

EXAMPLE

Given:

Gross weight = 42,000 pounds.

Flap setting = 12°.

Find takeoff speed by entering chart at gross weight of 42,000 pounds (A), and reading up to flap deflection of 12° (B). Read across to find speed of 114 knots (C).

CRITICAL FIELD LENGTH

The critical field length is defined as the distance required to accelerate with two engines from brake release to the critical engine failure speed, experience an engine failure, and then either continue accelerating with one engine to takeoff speed or decelerate to a stop in the same distance. Critical engine failure speed is determined by entering the refusal speed chart using critical field length for the runway length and computing speed in the same manner as for refusal speed.

The stopping distance portion of the critical field length has been determined by the use of brakes only. This data also includes a three second reaction time/distance after reaching critical engine failure speed before the remaining engine is cut and brakes are applied. To determine critical field length, refer to figures 1A3-8, 1A3-11, 1A3-14, and 1A3-17.

EXAMPLE

Given:

Density altitude = 1800 feet.

TPSI = 126 psi.

Gross weight = 44,000 pounds.

Runway slope = 1 percent up.

1/2 reported headwind = 10 knots.

Flap setting = 12°.

Select chart for 12° flap (figure 1A3-11). Enter chart at density altitude 1800 feet (A). Read up guide line to the 126 TPSI line(B). Read across to 44,000 pounds gross weight (C), and then down into the runway slope chart and follow the uphill curve to one percent (D). Read down and into the wind velocity chart. Follow the headwind curve to 10 knots (E), and read down to find the critical field length of 4300 feet (F). For the conditions given above, critical field length, uncorrected for wind, would be 4800 feet. Applying correction for headwind, corrected critical field length would be 4300 feet (F).

REFUSAL SPEED

The Refusal Speed Charts (figures 1A3-9, 1A3-12, 1A3-15, and 1A3-18) provide a means of determining the refusal speed for various conditions of gross weight, density altitude, TPSI, and wind. Refusal speed is the maximum speed at which takeoff may be aborted and the airplane brought to a complete stop within the remaining runway length, using brakes only. If the critical field length and runway available are the same, then refusal speed and critical engine failure speed are identical. If, however, the runway length is greater than critical field length, then the refusal speed may be considerably higher than the critical engine failure speed. For this reason, the refusal speed is of primary

importance during takeoff operation. It must be remembered that the validity of the refusal speed is dependent on a normal two engine acceleration of the aircraft. If the acceleration is low, the aircraft will have used more runway than predicted in reaching the refusal speed, and insufficient runway will remain in which to stop the airplane. For this reason, use of acceleration check speed, time and/or distance is necessary to insure safe takeoff. When corrected refusal speed exceeds takeoff speed, use takeoff speed as refusal speed.

EXAMPLE

Given:

Density altitude = 1800 feet.

TPSI = 126 psi.

Gross weight = 44,000 pounds.

Runway length = 5000 feet.

Reported headwind = 10 knots.

Flap setting = 12°.

Select chart for 12° flap (figure 1A3-12). Enter chart at runway length 5000 feet (A) and read across to reported headwind 10 knots (B). Follow guide line to base line and read across to 126 TPSI (C). Follow guide line to base line and read across to 1800 feet density altitude (D). Follow guide line to base line and read across to intersection of gross weight line from 44,000 pounds (D). Read refusal speed 109 knots IAS (F).

TAKEOFF GROUND RUN

Charts (figures 1A3-10, 1A3-13, 1A3-16, and 1A3-19) are provided to determine the ground run distance required from brake release to the point of takeoff for various conditions of gross weight, density altitude, wind, and TPSI for each takeoff flap setting. Under certain conditions where runway length is not critical but obstacle clearance is, takeoff with zero degrees flap may be utilized.

EXAMPLE

Given:

Density altitude = 1800 feet

TPSI = 126 psi.

Gross weight = 44,000 pounds.

Runway slope = 1 percent up.

Reported headwind = 10 knots.

Flap setting = 12°.

Select chart for 12° flap (figure 1A3-13). Enter chart at density altitude 1800 feet (A). Read up guide line to the 126 TPSI line (B). Read across to 44,000 pounds gross weight (C), and then down into the runway slope chart and follow the uphill curve to 1 per-

cent (D). Read down and into the wind velocity chart. Follow the headwind curve to 10 knots (E), and read down to find corrected ground run of 2900 feet (F).

RUNWAY CONDITION READING (RCR)

Stopping distance depends upon tire-to-runway co-efficient of friction, which varies with condition of the runway surface. Runway surface condition will be reported as a Runway Condition Reading (RCR). The RCR is a measure of the coefficient of friction between the tire and the runway surface, as determined by an inspection decelerometer. All charts involving stopping distance are based on dry concrete or asphalt friction coefficients corresponding to an RCR of 23. Slippery runway surfaces will increase stopping distance; increased distances are accounted for by correction charts as a function of RCR. RCR is reported as a whole number varying from 02 to 23. Many airfields will continue to report braking action in accordance with ICAO documents. This is the GOOD, MEDIUM, and POOR classification of braking action on unusual runway surface condition. In order to relate their classifications to an RCR, or when RCR values are not available, the following relationship will be used:

RUNWAY CONDITION	ICAO REPORT	RCR
Dry	Good	23
Wet	Medium	12
Icy	Poor	05

EXAMPLE

Given:

Gross weight = 40,000 pounds.

Critical field length = 4300 feet.

Refusal speed = 109 KIAS.

Runway condition = Icy.

Enter chart (figure 1A3-20) with a Runway Condition Reading (RCR) of 5 (obtained from base weather) for an icy runway (A). Read across to gross weight in refusal speed portion of chart (B) and read down to find refusal speed correction factor K_{RS} 0.81 (C). Multiply refusal speed by K_{RS} factor to obtain refusal speed for runway condition. Follow same procedure to correct critical field length using the K_{CFL} factor.

RUNWAY SURFACE COVERING (RSC)

Also reported will be Runway Surface Covering (RSC), which will be the average runway surface covering given in depth and type, such as slush, water, or snow. The depth of this covering can cause a significant reduction in takeoff performance due to the retarding effect of the tires displacing the covering, plus the additional drag effect of this material being sprayed and consequently striking the aircraft surfaces. The retarding effect of slush and water puddles increases as the speed increases.

However, the retarding effect will vary considerably with varying slush and water depths encountered on the runway due to surface contour. The retarding effect of slush and water puddles will decrease when the aircraft reaches hydroplaning speed. Hydroplaning occurs because the pressure between the fluid on the runway and the tires increases until the tires are entirely supported on top of the fluid. The speed at which this occurs is called hydroplaning speed and is usually lower than end acceleration check speed. Due to the number of unpredictable conditions which affect acceleration with various types of runway covering, the acceleration check will not be an accurate indication of performance when takeoff is attempted in a measurable depth of slush, snow, or water.

CAUTION

As there are no corrections given for RSC, the pilot should exercise extreme caution during takeoff planning and ground run on water, slush, or snow covered runways.

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH

Figures 1A3-21 and 1A3-31 will provide climbout factors for use with the climbout flight path charts. Figure 1A3-21 should be used to determine the climbout factor for use with the takeoff power (2800 rpm) climbout flight path charts, and figure 1A3-31 should be used to determine the climbout factor for use with the METO power climbout flight path chart. The climbout factor chart for takeoff power has engine power correction lines in terms of torque pressure. However, power corrections in the climbout factor chart for METO power is in terms of bhp, thus making it possible to use the chart for a range of engine rpm.

WARNING

The METO power climbout factor chart was constructed for use with engine rpm's from 2500 to 2700. The charts become excessively inaccurate at rpm's outside this range.

EXAMPLE (for takeoff power settings)
Given:

Gross weight = 44,000 pounds.

Density altitude = 1800 feet.

TPSI = 126 psi.

Enter the climbout factor chart (figure 1A3-21) at gross weight of 44,000 pounds (A) and read up to density altitude of 1800 feet (B). Read across to 136 psi in the torque pressure curves (D). This factor can be used in any of the takeoff power (2800 rpm) climbout flight path charts, figures 1A3-22 through 1A3-30.

A climbout factor for use in the METO power climb-
out flight path chart can be determined in the same
manner by using figure 1A3-31. In this case, the bhp
for the corresponding pressure altitude must first
be obtained from the METO power climb schedule
and then applied at the appropriate spot in the climb-
out factor chart.

WARNING

The climbout factors obtained for take-
off power and the factors for METO
power are not interchangeable. Do not
use a takeoff power climbout factor on
the METO power flight path chart or
vice versa.

CLIMBOUT FLIGHT PATH

Climbout flight path charts, figures 1A3-22 through
1A3-30, and 1A3-32 are provided to determine the
distance required to clear a given obstacle. Figures
1A3-22 through 1A3-26 and 1A3-28 through 1A3-30
provide all the information needed to determine
obstacle clearance capability within the first 11,000
feet horizontal distance or 600 feet altitude after
takeoff. Figures 1A3-27 and 1A3-32 are needed to
determine extended flight path information beyond
11,000 feet horizontal distance or 600 feet vertical
altitude. In this case, the vertical and horizontal
distances must be determined in increments, then
the increments, or segments, must be added to-
gether to complete the climbout flight path analysis.

Individual charts provide data for two-engine or one-
engine operation and for takeoff flap settings of 0, 6,
12, or 24 degrees. All climbout flight path charts
are based on a speed of 1.2 stall speed for the par-
ticular flap setting.

WARNING

The climbout factor to be applied must
be obtained from the appropriate climb-
out factor chart depending on the flight
path chart to be used.

EXAMPLE

Given:

Obstacle Height = 6900 feet.

Obstacle distance = 105,000 feet (from brake
release).

Takeoff gross weight = 44,000 pounds.

Engines Operating = 2.

Torque pressure = 126 psi.

Takeoff flap setting = 6°.

Takeoff ground run = 3675.

Flap retraction altitude = 500 feet.

Takeoff density altitude = 1800 feet.

OAT = 15°C.

1/2 reported headwind = 10 knots.

Determine initial climbout factor of 6 from figure
1A3-21 for takeoff weight, density altitude, and
torque pressure. Enter climbout flight path chart
for two-engine, 6° flap operation (figure 1A3-23).

Follow factor line 6 to 500 feet altitude, apply cor-
rection for 1/2 the reported headwind and record
distance of 4700 feet.

At this point, 500 feet, we will assume that IAS is
increased to 1.2 stall speed for 0° flaps, flaps are
retracted to 0°, and power is reduced to METO.

Note

The flap retraction, power reduction
point is not dictated by any specific
requirement. It may be a function of
operating policy, immediate obstacle
clearance requirement, or simply
pilot preference.

Convert density altitude (1800 + 500 = 2300) to pres-
sure altitude (approximately 1900 feet) and deter-
mine bhp (1800) from the METO power climb sched-
ule (figure 1A2-8). Note that 1800 bhp can be held
for approximately 6100 feet of climb (from 1900 feet
pressure altitude) and then METO power drops to
1600 bhp for the next 4000 feet.

Enter METO power climbout factor chart (figure
1A3-31) with 44,000 pounds (ignore fuel usage),
2300 feet density altitude, and 1800 bhp to obtain
climbout factor of 6.6. Also obtain factor of 8.1 for
8400 feet and 1600 bhp.

Enter METO power climbout flight path chart (fig-
ure 1A3-32) and follow estimated 6.6 climbout fac-
tor line to 6100 feet, apply correction for 1/2 the
reported headwind (10 knots), and record distance
of 62,500 feet.

Note

If winds aloft are available, use 1/2
their reported value rather than using
field elevation winds for making distance
corrections.

At this point, compute the remaining distance to
obstacle. 105,000 feet (total distance) - 3675 feet
(takeoff run) - 4700 feet (initial climb segment) -
62,500 feet (extended climb segment) = 34,125 feet
remaining.

Enter METO power climbout flight path chart (figure
1A3-32) with remaining distance (34,125 feet), re-
move correction for 1/2 the reported headwind

(giving a distance of 37,500 feet), and move verti-
cally to intersect the 8.1 factor line. Read altitude
of 2250 feet.

Add this altitude to previous altitude segments
(500 + 6100 + 2250 = 8850 feet). Since this altitude
is greater than the obstacle height, the obstacle can
be cleared.

MAXIMUM EFFORT

For maximum effort planning, the two-engine take-
off gross weight limited by climb, takeoff ground
run, and METO power climb charts are used. These
data represent maximum possible airplane perform-
ance regardless of the risks involved. The takeoff
ground run and respective operational gross weights
are predicated on the continued operation of both
engines. When planning a takeoff using this informa-
tion, consider the use of the lowest of the flap set-
tings first.

Note

This procedure is the reverse of normal
flight planning in which the highest flap
setting is considered first. In maximum
effort planning it is desirable to obtain
the best performance (even though it is
substandard) within the runway length
available.

This setting will be acceptable if the takeoff ground
run distance found on the chart is equal to or less
than the length of the runway under consideration.
If the required runway length is greater than the
distance available, a greater wing flap setting will
have to be considered. If, after checking all takeoff
flap settings, the available takeoff runway is still
too short, the gross weight will have to be reduced
in order to operate from the field. A takeoff distance
obtained from these charts is the distance from re-
lease of brakes to takeoff. In addition, each of the
takeoff ground run charts has a correction factor
that can be used to determine the distance required
to clear a 50-foot obstacle.

MODEL: T-29A/B
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

TAKEOFF AND LANDING CROSSWIND CHART

ENGINES: R2800-97
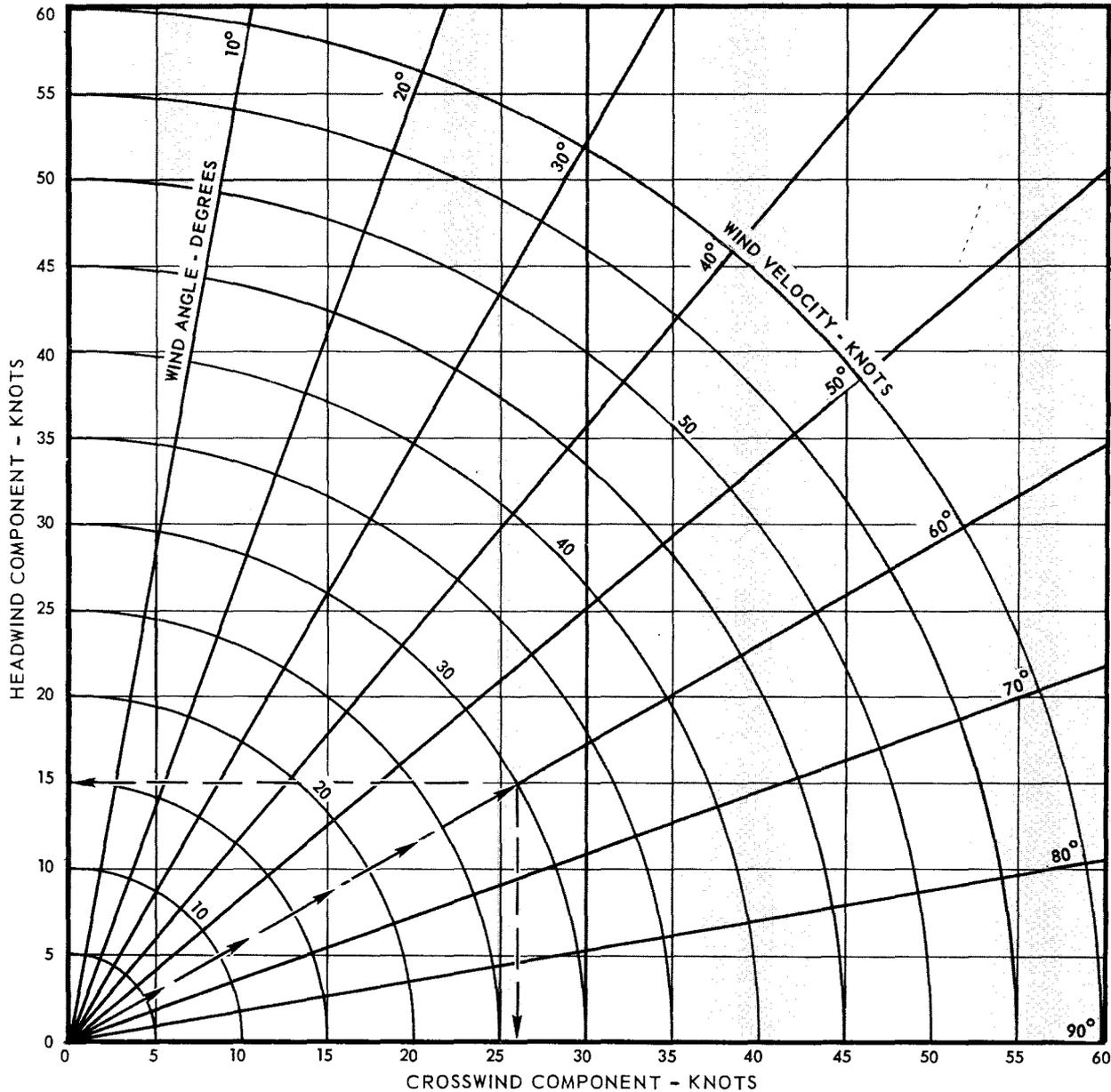
EXAMPLE:

GIVEN: TAKEOFF RUNWAY - 01
         WIND - 070°/30 KNOTS

FIND: HEADWIND AND CROSSWIND
         COMPONENTS.

NOTE:

ENTER CHART WITH MAXIMUM GUST VELOCITY TO
DETERMINE CROSSWIND OR TAILWIND COMPONENT.

ENTER CHART WITH MAXIMUM STEADY WIND VELOCITY
TO DETERMINE HEADWIND COMPONENT.

24188B

SOLUTION:

1. RUNWAY WIND ANGLE 070° – 010° = 060°

2. WITH RUNWAY ANGLE OF 060° AND A WIND
   VELOCITY OF 30 KNOTS FIND CROSSWIND
   COMPONENT OF 26 KNOTS AND HEADWIND
   COMPONENT OF 15 KNOTS.

RECOMMENDED

NOT RECOMMENDED

Figure 1A3-2

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB
IF ONE ENGINE FAILS DURING TAKEOFF
LANDING GEAR UP   2800 RPM

ENGINES: R2800-97

REMARKS:

(1) INOPERATIVE
     PROPELLER
     FEATHERED

(2) LANDING
     GEAR
     RETRACTED

(3) NACELLE
     FLAPS
     OPEN TO
     MID-POSITION

(4) CLIMB SPEED -
     TAKEOFF
     SPEED
     (REFER TO
     TAKEOFF
     CURVES)
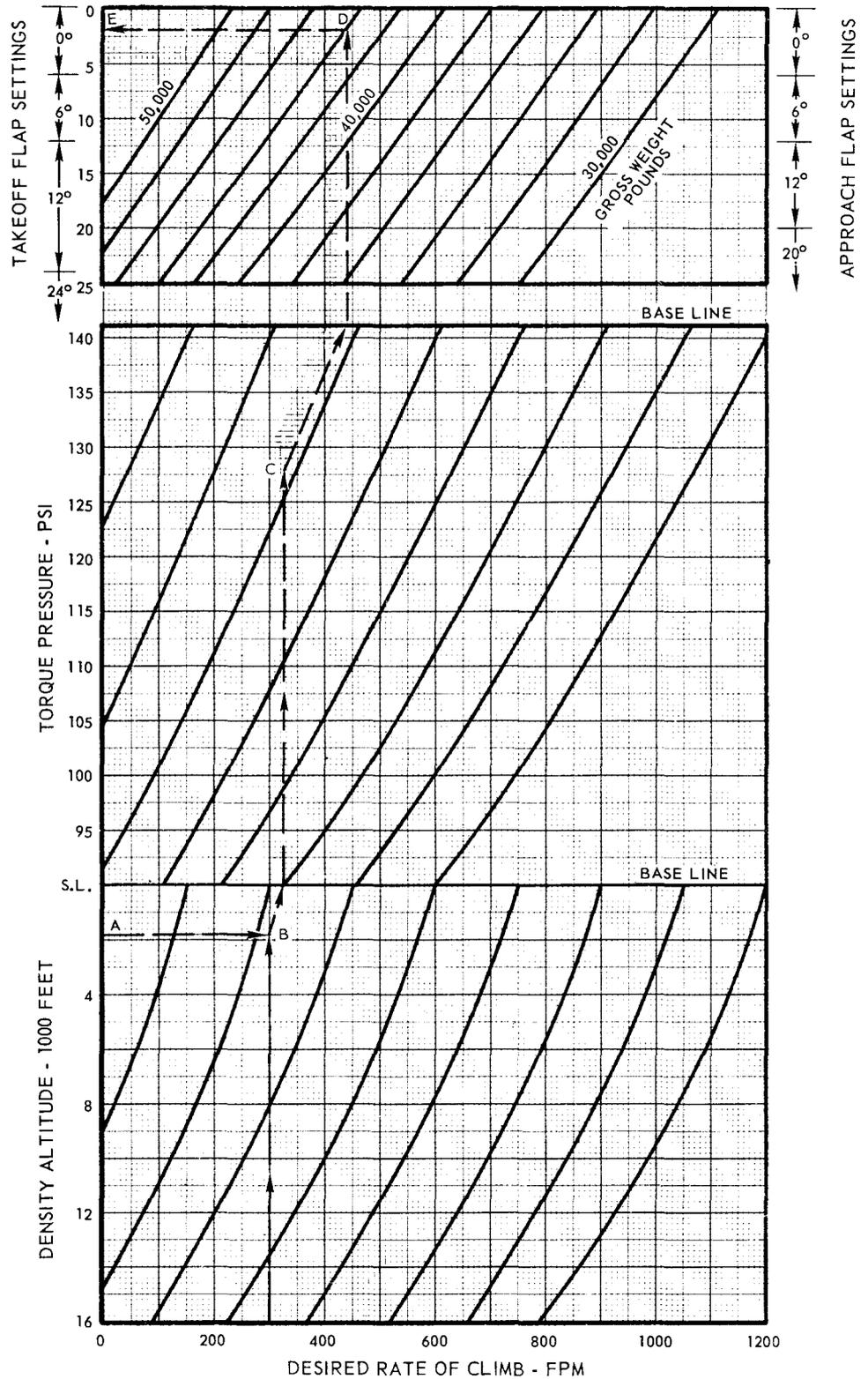
45,971E

Figure 1A3-3

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INITIAL RATE OF CLIMB CORRECTION

LANDING GEAR DOWN   2800 RPM

ENGINES: **R2800-97**

GROSS WEIGHT - 1000 POUNDS

DENSITY ALTITUDE - 1000 FEET

DECREASE IN RATE OF CLIMB - FPM
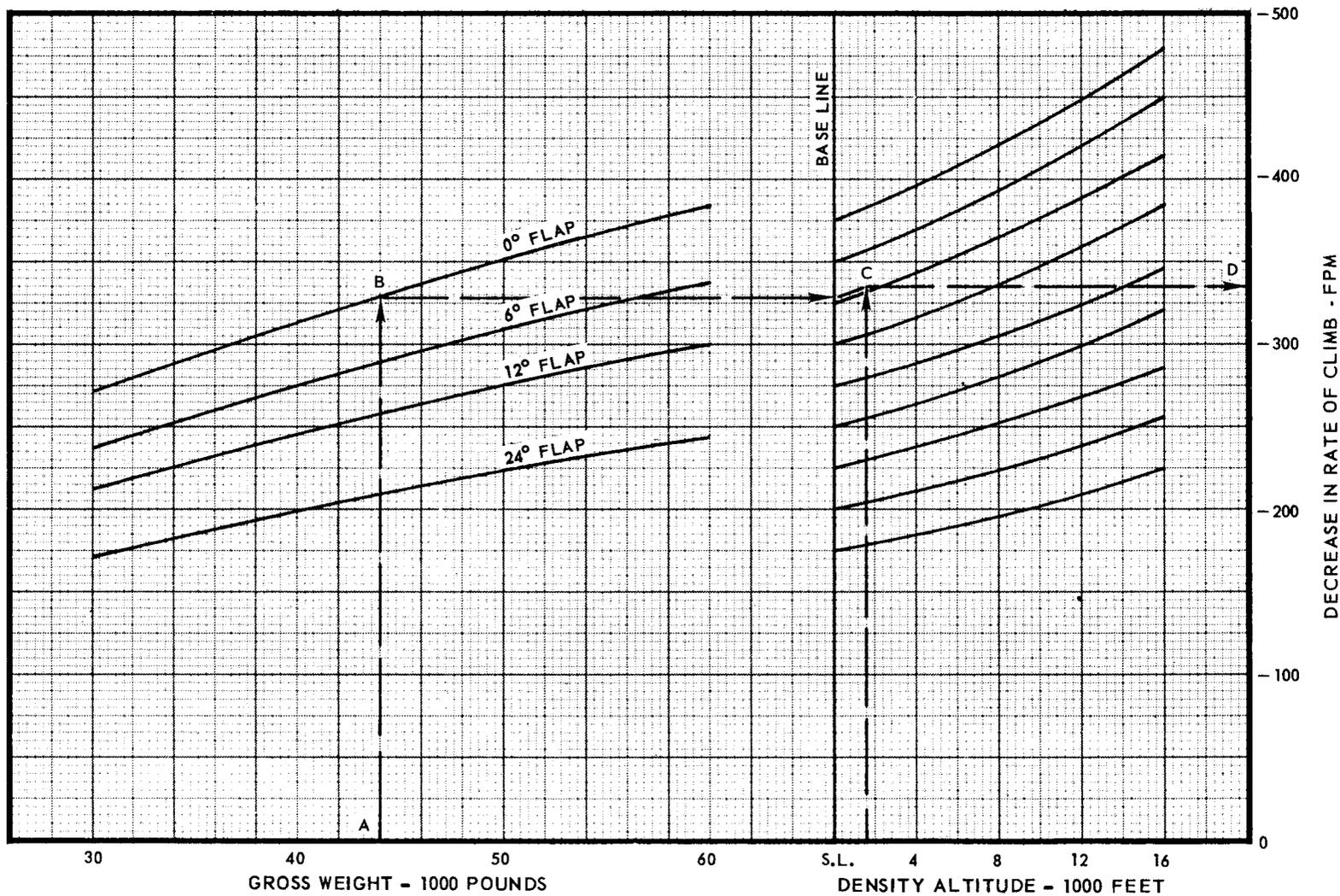
NOTE:

THE DECREASE IN RATE OF CLIMB IS DUE TO LANDING GEAR DRAG AT TAKEOFF.
THE CORRECTION IS APPLICABLE TO THE RATE OF CLIMB FROM THE GROSS WEIGHT
LIMITED BY CLIMB CHARTS, SINGLE ENGINE AND TWO ENGINE.

45,454

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TAKEOFF GROSS WEIGHT LIMITED BY CLIMB
CONTINUOUS TWO ENGINE OPERATION   2800 RPM
LANDING GEAR UP

ENGINES: **R2800-97**
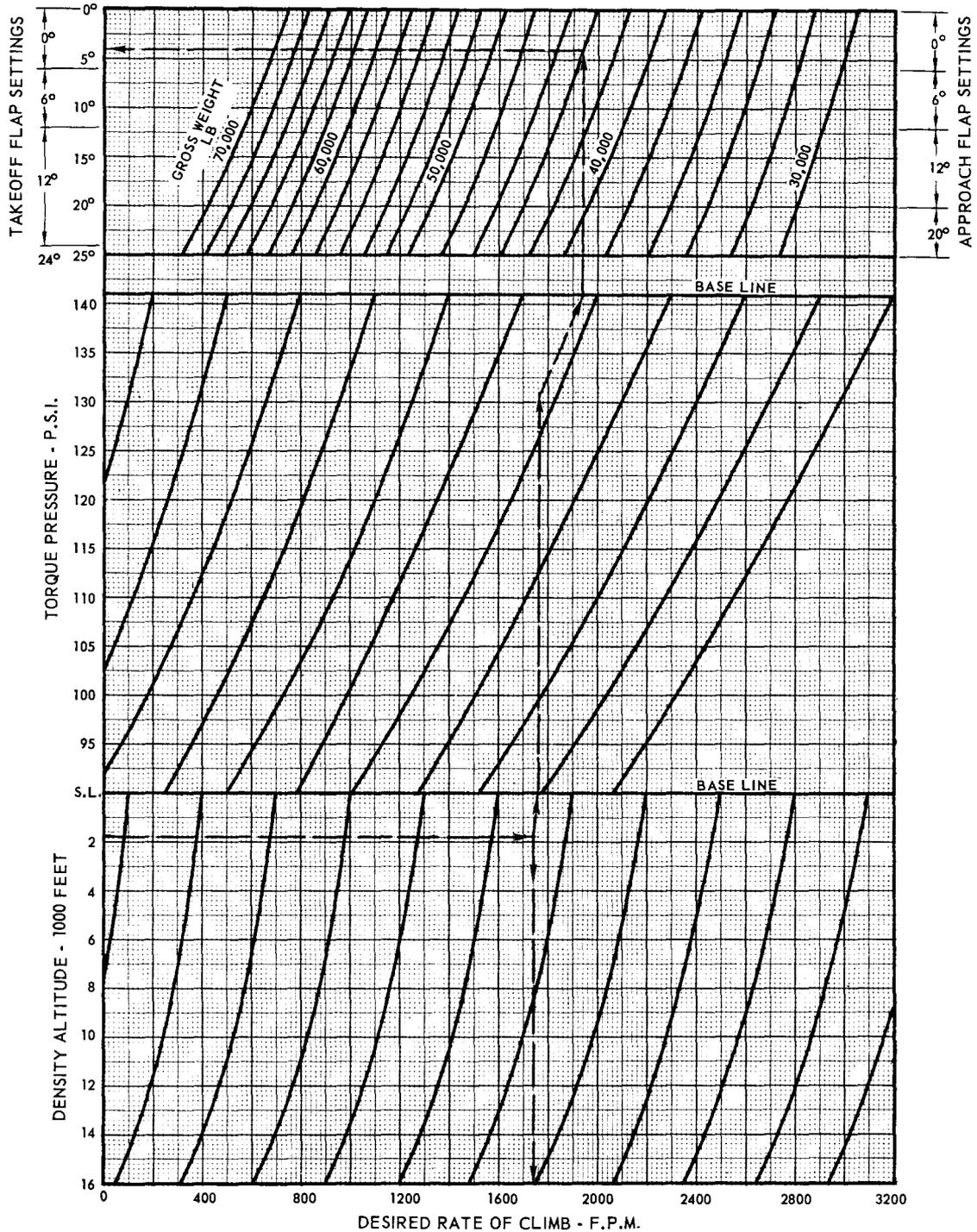
CONDITIONS:
(1) LANDING GEAR RETRACTED
(2) NACELLE FLAPS OPEN TO MIDPOSITION
(3) CLIMB SPEED = TAKEOFF SPEED
    (REFER TO TAKEOFF CURVES)

45,437B

Figure 1A3-5

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

VELOCITY DURING TAKEOFF GROUND RUN
(FOR ALL WEIGHTS AND FLAP SETTINGS)
2800 RPM

ENGINES: R2800-97

$T \times \frac{1}{\sqrt{\sigma}}$ (SECONDS)

GROUND RUN - 1000 FEET

INDICATED AIRSPEED, MINUS HEADWIND
COMPONENT OR PLUS TAILWIND COMPONENT - KNOTS
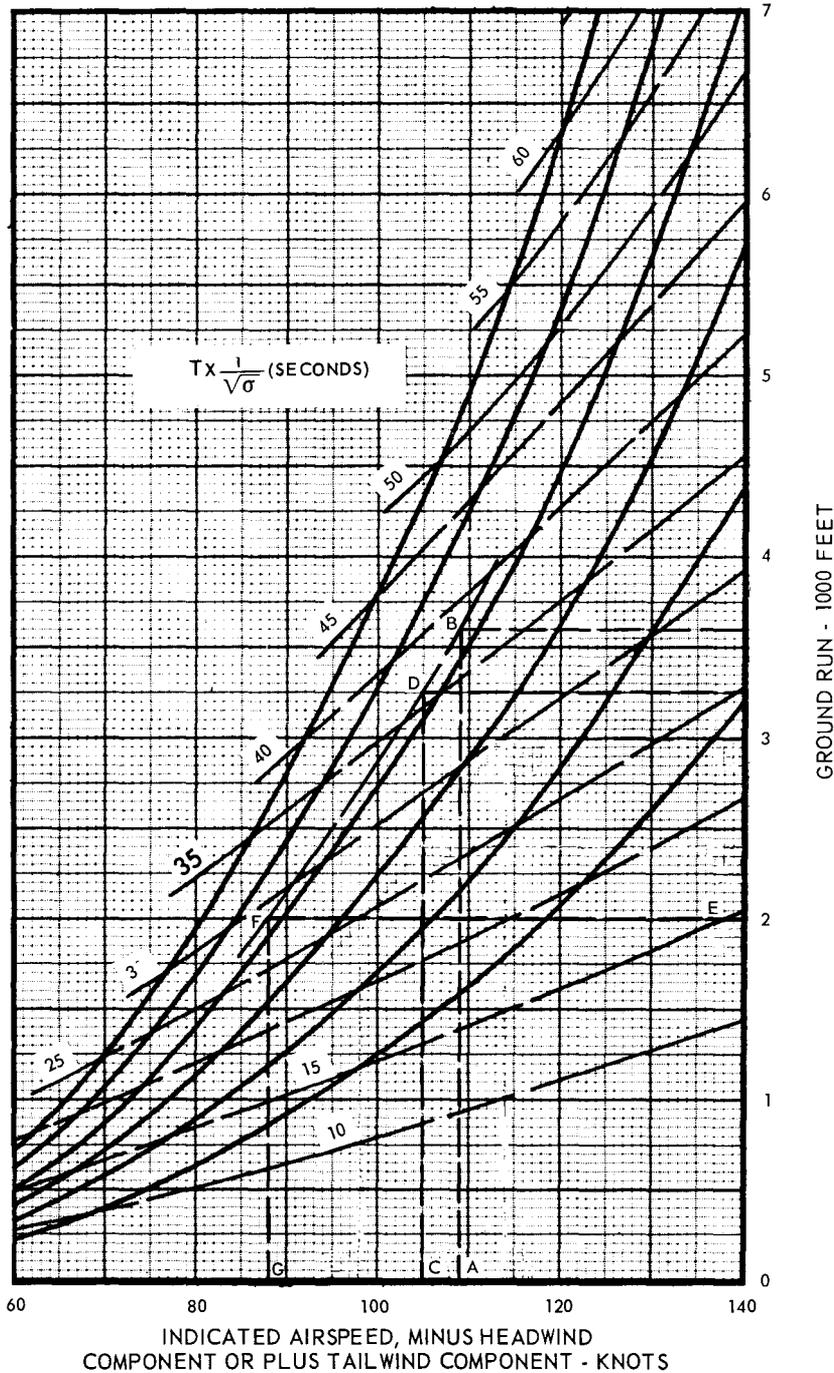
NOTES:

1. 100% WIND ACCOUNTABILITY.
2. TIME LINES ARE FOR SEA LEVEL. STANDARD CONDITIONS. TO OBTAIN TRUE TIME AT DENSITY ALTITUDE, DIVIDE $T \times \frac{1}{\sqrt{\sigma}}$ BY $\frac{1}{\sqrt{\sigma}}$.

45,456A

Figure 1A3-6

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

TAKEOFF AND MINIMUM CONTROL SPEEDS
LANDING GEAR RETRACTED

ENGINES: **R2800-97**

TAKEOFF SPEED — KNOTS (IAS)

0° FLAPS
6° FLAPS
12° FLAPS
20° FLAPS
24° FLAPS

1.2 POWER-OFF STALL SPEED

1.1 MINIMUM CONTROL SPEED

DENSITY
ALTITUDE
FEET

S.L.
2000
4000
6000
8000

GROSS WEIGHT — 1000 POUNDS
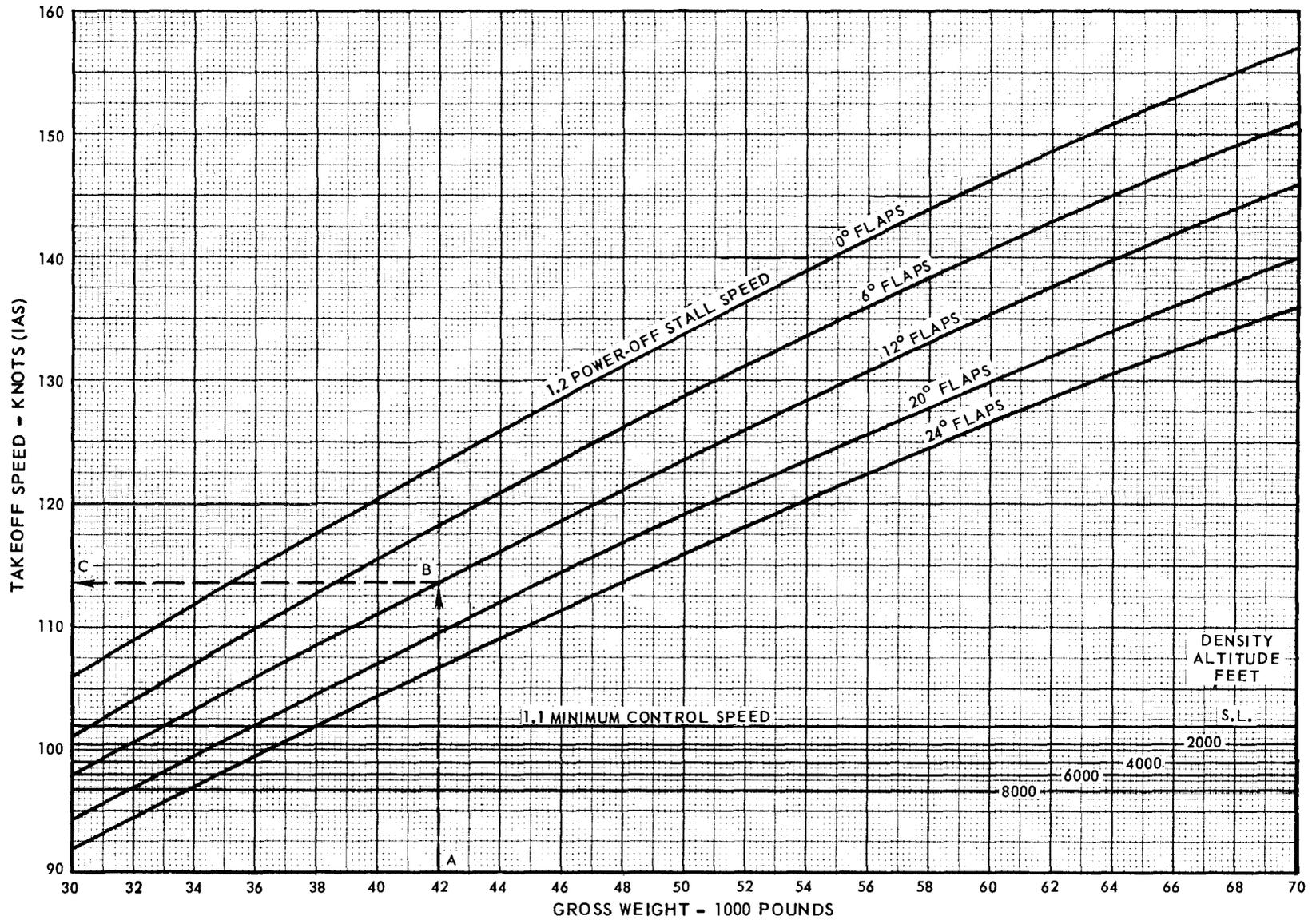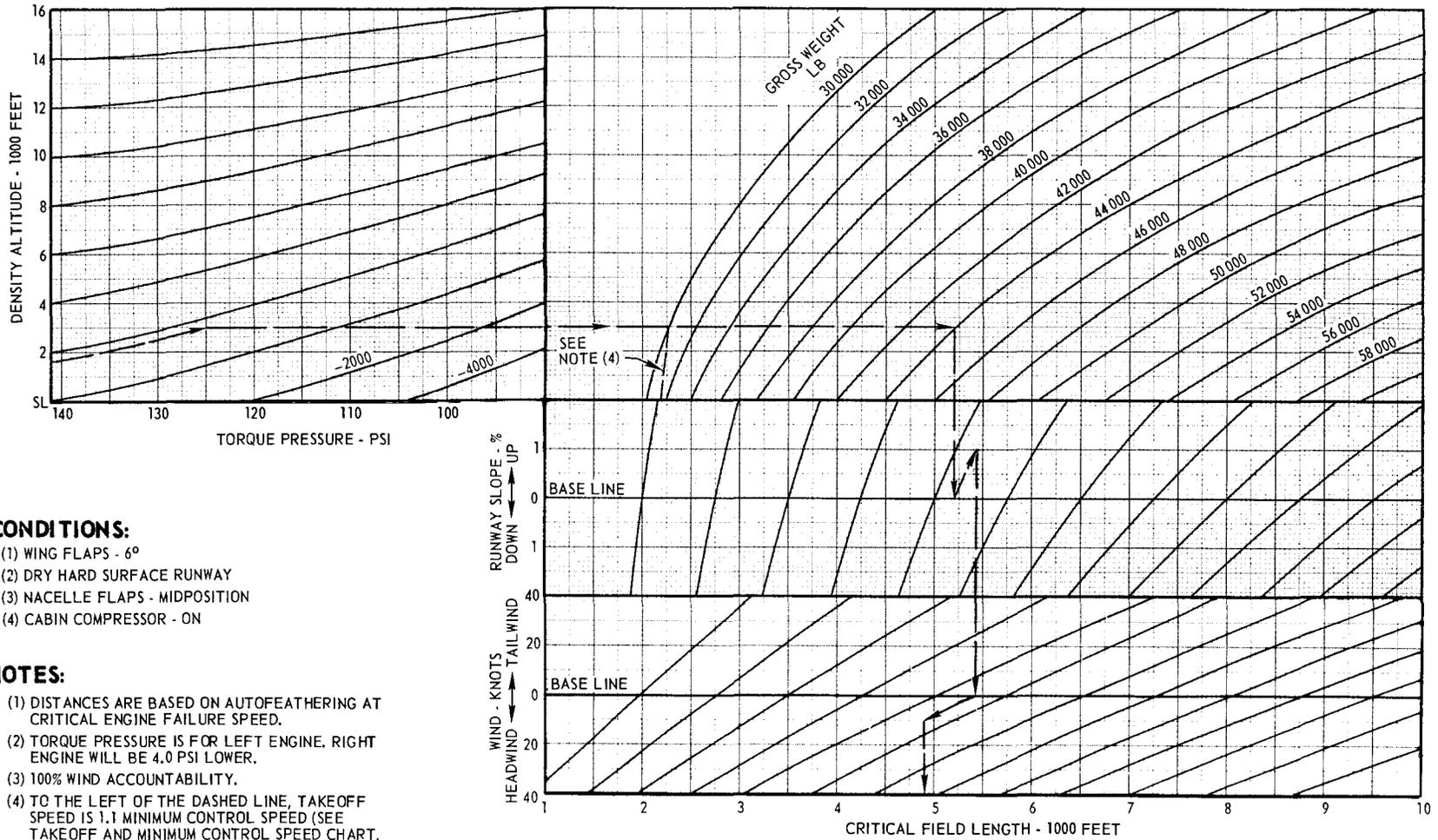
10,708B

CRITICAL FIELD LENGTH (24° FLAP)

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

2800 RPM

ENGINES: **R 2800-97**
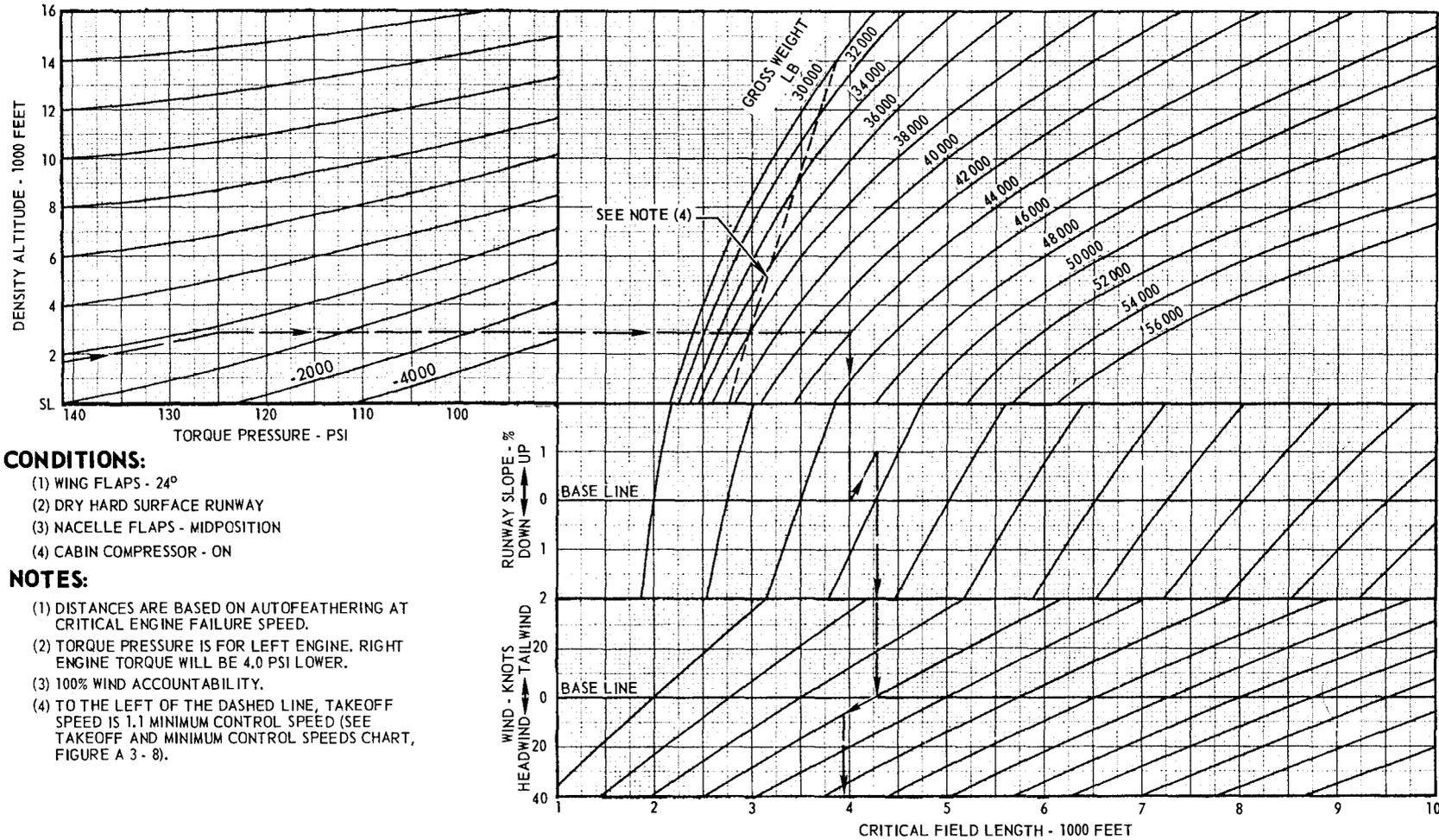
CONDITIONS:

(1) WING FLAPS - 24°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS - MIDPOSITION
(4) CABIN COMPRESSOR - ON

NOTES:

(1) DISTANCES ARE BASED ON AUTOFEATHERING AT CRITICAL ENGINE FAILURE SPEED.
(2) TORQUE PRESSURE IS FOR LEFT ENGINE. RIGHT ENGINE TORQUE WILL BE 4.0 PSI LOWER.
(3) 100% WIND ACCOUNTABILITY.
(4) TO THE LEFT OF THE DASHED LINE, TAKEOFF SPEED IS 1.1 MINIMUM CONTROL SPEED (SEE TAKEOFF AND MINIMUM CONTROL SPEEDS CHART, FIGURE A 3 - 8).
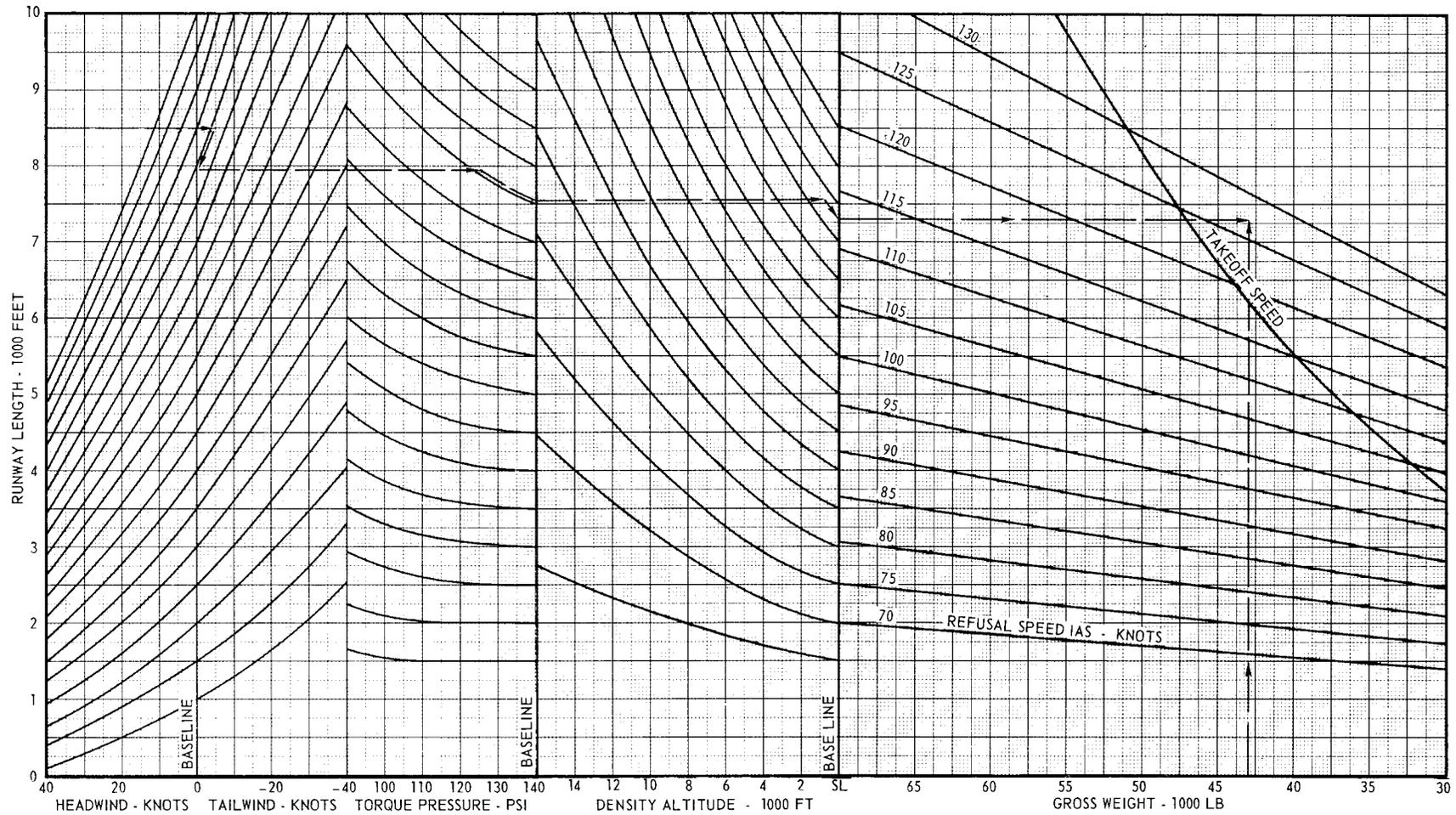
45,439C

MODEL: **T29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

REFUSAL SPEED (24° FLAP)

ENGINES: **R2800-97**

RUNWAY LENGTH - 1000 FEET

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FEET   GROSS WEIGHT - 1000 POUNDS
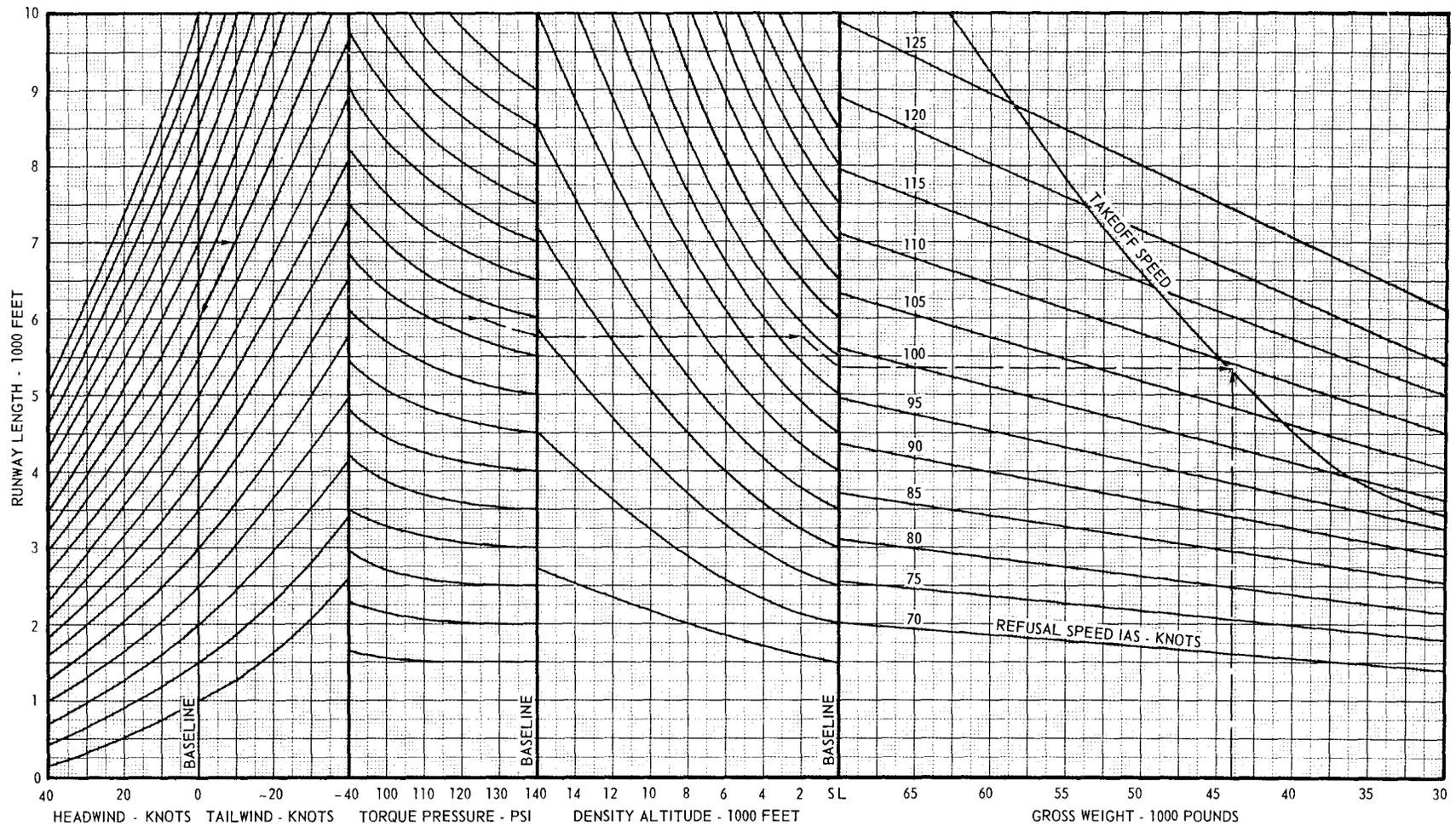
CONDITIONS:
(1) WING FLAPS AT 24°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES:
(1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL
BE 4.0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
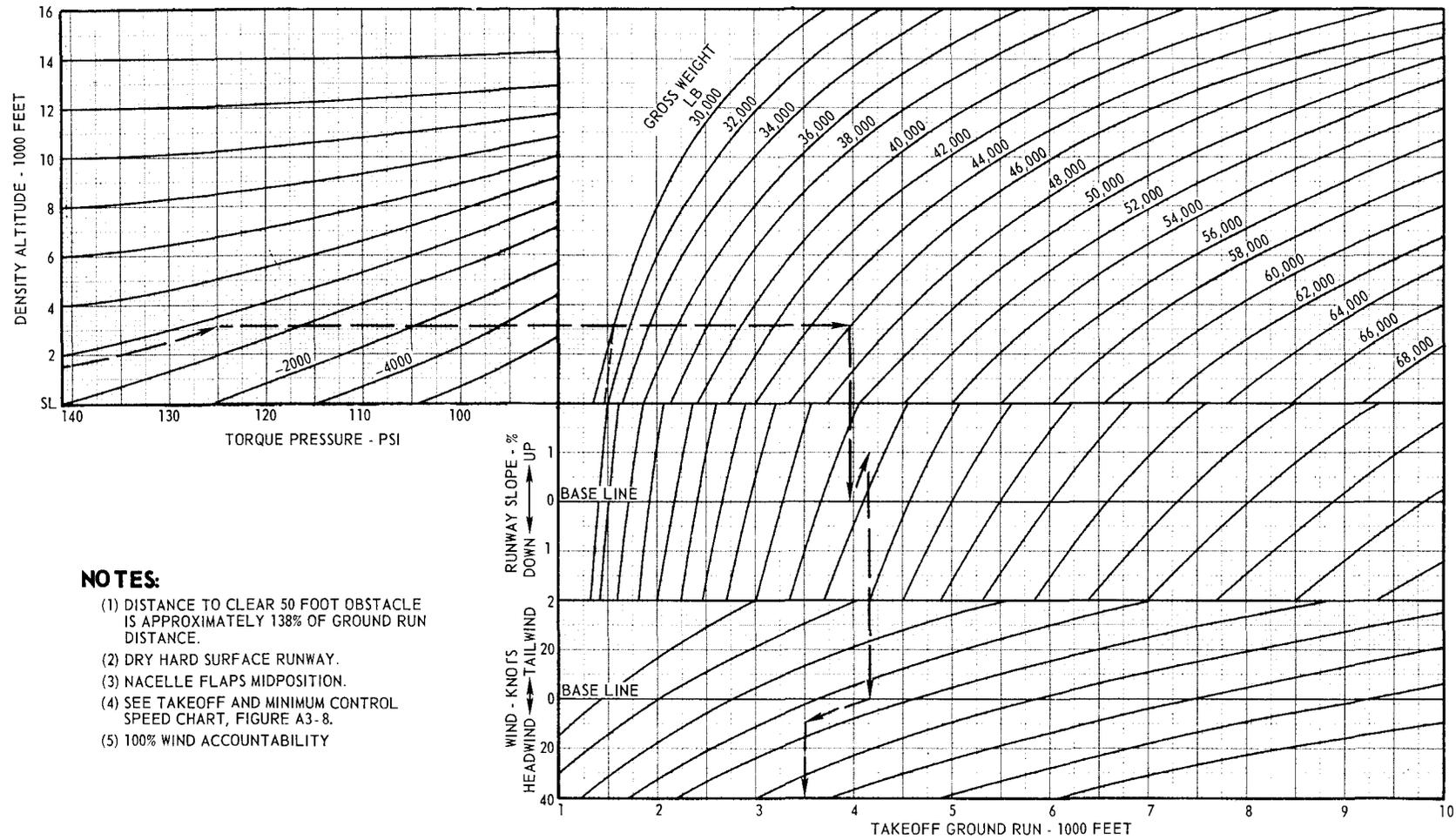(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,438D

TAKEOFF GROUND RUN (24° FLAP)

CONTINUOUS TWO ENGINE OPERATION

2800 RPM

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES. R2800-97

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

GROSS WEIGHT LB

SEE NOTE (4)

BASE LINE

RUNWAY SLOPE - % UP DOWN

WIND - KNOTS HEADWIND TAILWIND

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET
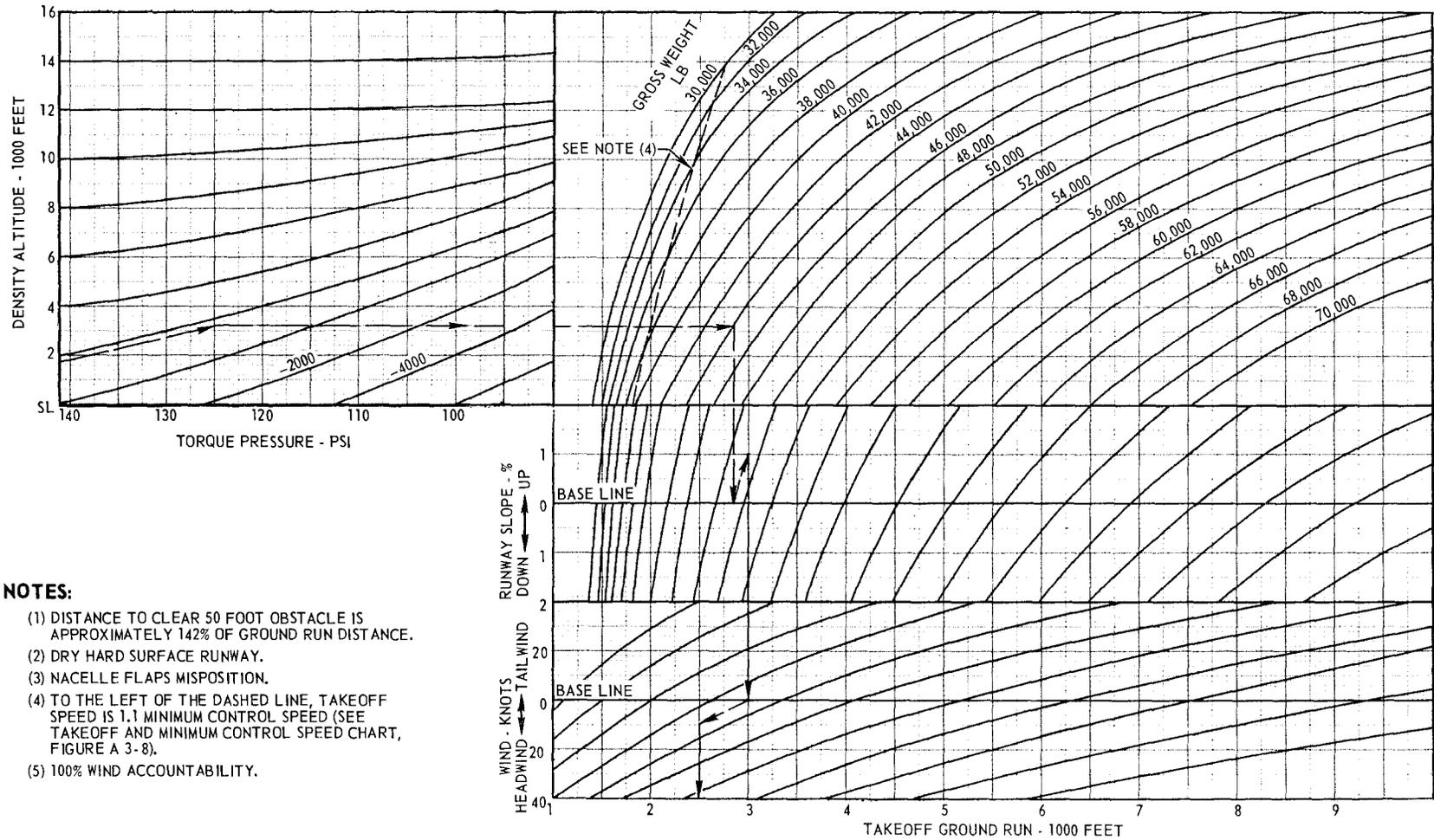
NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS
APPROXIMATELY 142% OF GROUND RUN DISTANCE.

(2) DRY HARD SURFACE RUNWAY.

(3) NACELLE FLAPS MISPOSITION.

(4) TO THE LEFT OF THE DASHED LINE, TAKEOFF
SPEED IS 1.1 MINIMUM CONTROL SPEED (SEE
TAKEOFF AND MINIMUM CONTROL SPEED CHART,
FIGURE A 3-8).

(5) 100% WIND ACCOUNTABILITY.

45.440C

CRITICAL FIELD LENGTH (12° FLAP)

2800 RPM

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-97**

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

-2000   -4000

GROSS WEIGHT LB
30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000 56,000 58,000 60,000

SEE NOTE (4)

RUNWAY SLOPE - % UP / DOWN

BASELINE

WIND - KNOTS HEADWIND / TAILWIND

BASELINE

CRITICAL FIELD LENGTH - 1000 FEET
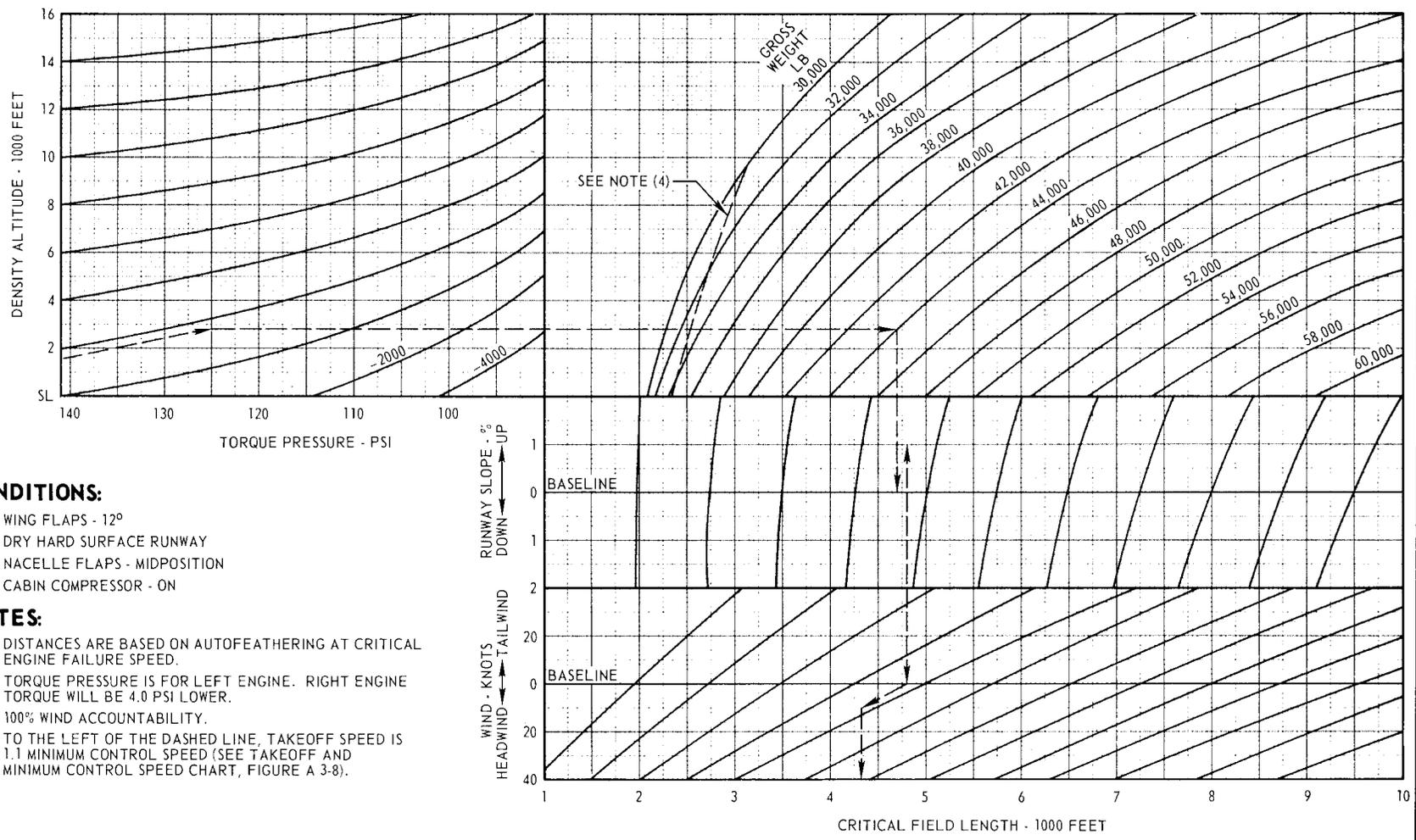
CONDITIONS:

(1) WING FLAPS - 12°
(2) DRY HARD SURFACE RUNWAY
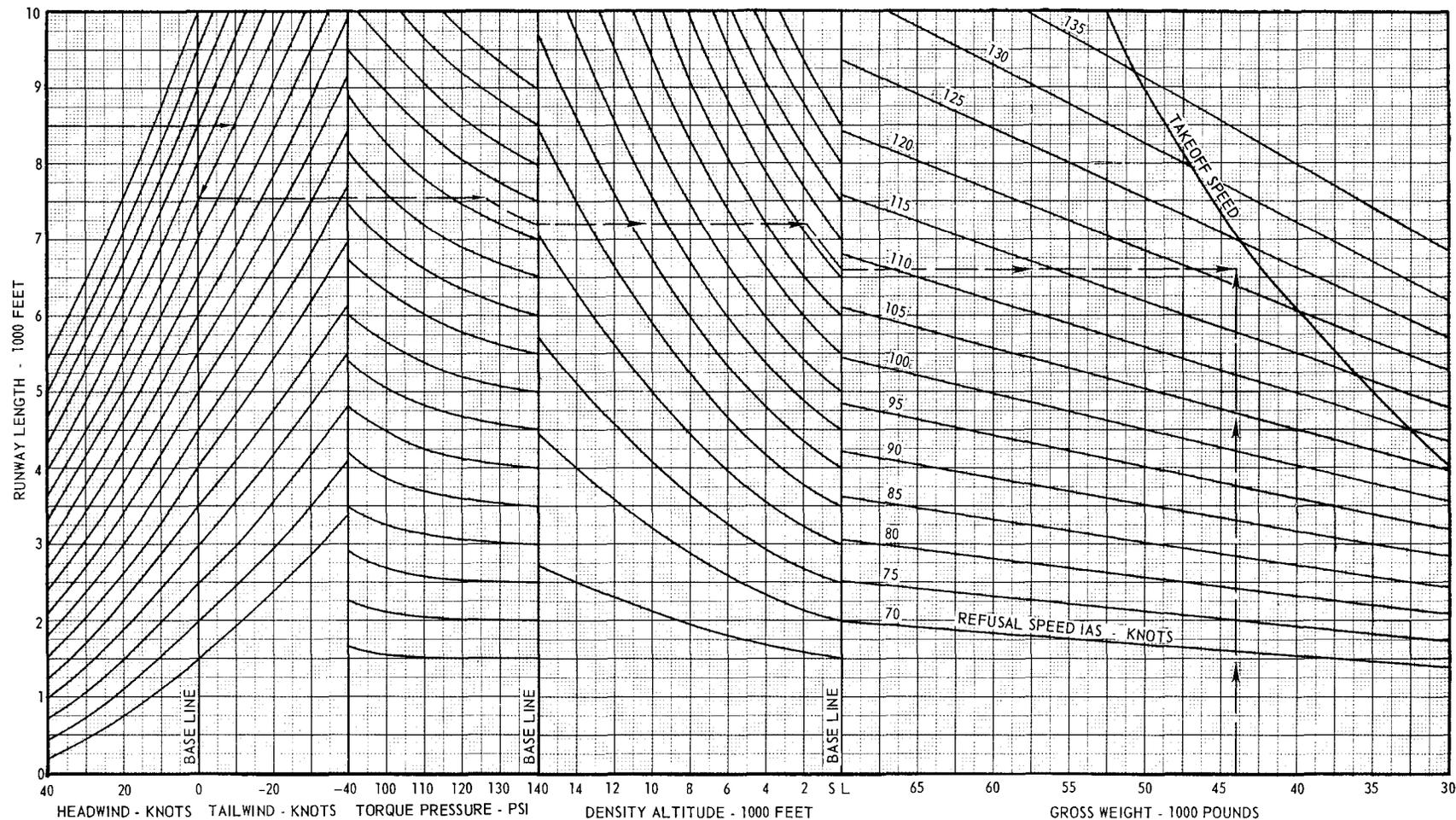(3) NACELLE FLAPS - MIDPOSITION
(4) CABIN COMPRESSOR - ON

NOTES:

(1) DISTANCES ARE BASED ON AUTOFEATHERING AT CRITICAL ENGINE FAILURE SPEED.
(2) TORQUE PRESSURE IS FOR LEFT ENGINE. RIGHT ENGINE TORQUE WILL BE 4.0 PSI LOWER.
(3) 100% WIND ACCOUNTABILITY.
(4) TO THE LEFT OF THE DASHED LINE, TAKEOFF SPEED IS 1.1 MINIMUM CONTROL SPEED (SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A 3-8).

MODEL: **T29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

REFUSAL SPEED (12° FLAP)

ENGINES **R2800 - 97**

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FEET   GROSS WEIGHT - 1000 POUNDS

RUNWAY LENGTH - 1000 FEET

REFUSAL SPEED IAS - KNOTS

TAKEOFF SPEED
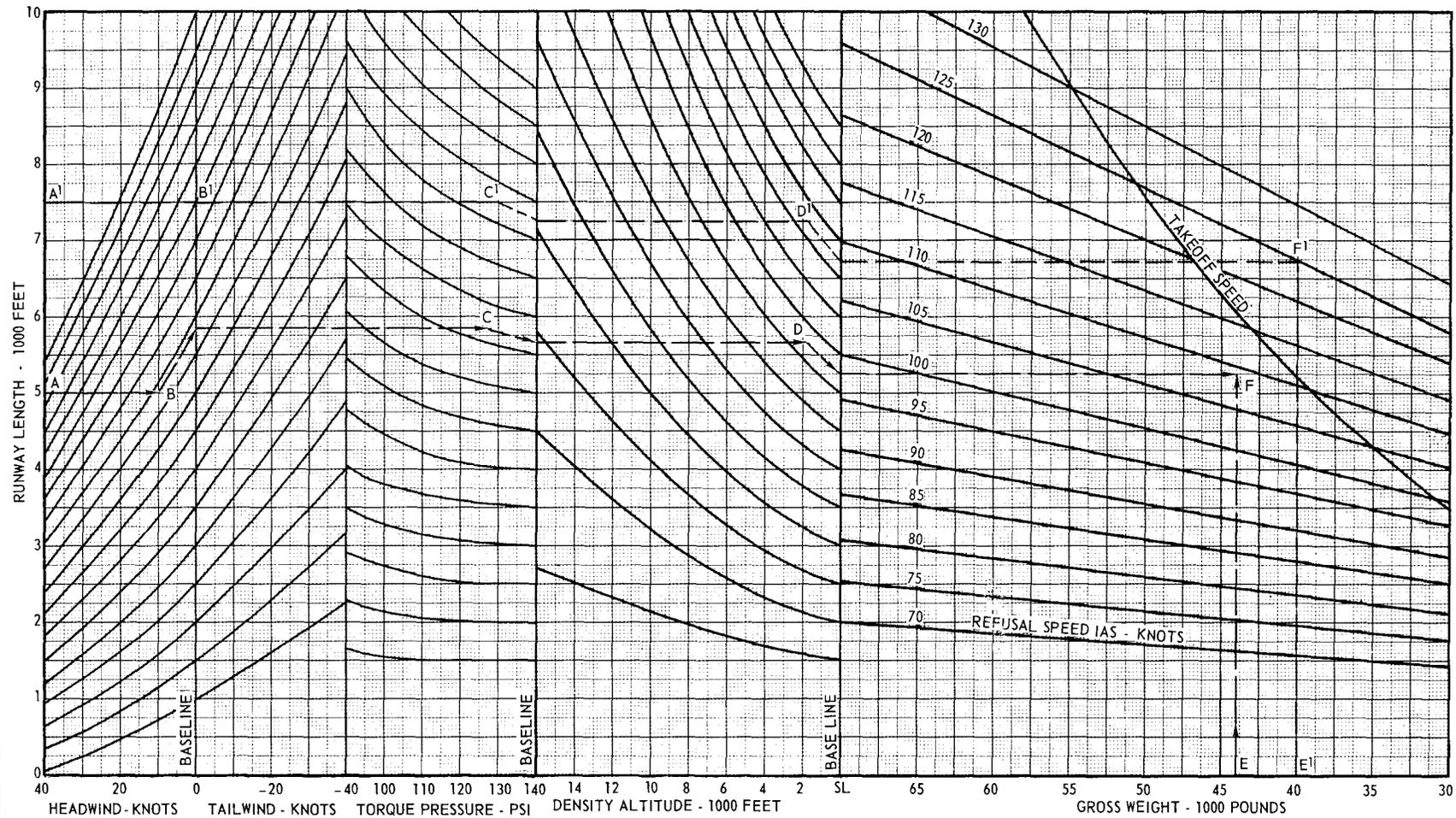
CONDITIONS: (1) WING FLAPS AT 12°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL BE 4.0 PSI
LOWER.
(2) 100% WIND ACCOUNTABILITY
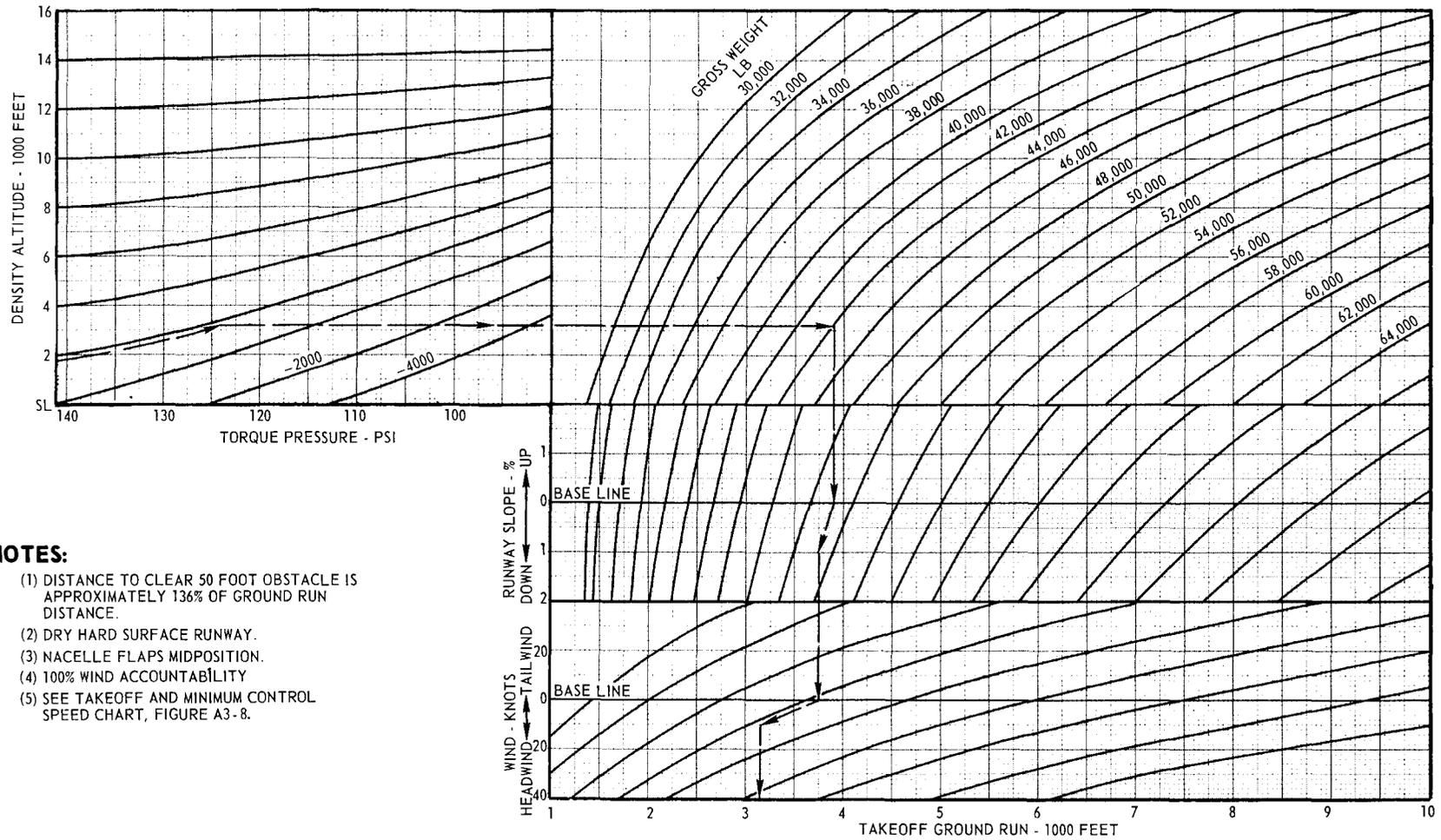(3) BASED ON PILOT REACTION TIME 6 SECONDS.

45,441D

TAKEOFF GROUND RUN (12° FLAP)
CONTINUOUS TWO ENGINE OPERATION
2800 RPM

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-97

DENSITY ALTITUDE - 1000 FEET

GROSS WEIGHT LB

30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000 56,000 58,000 60,000 62,000 64,000 66,000 68,000 70,000

SEE NOTE (4)

2000 4000

TORQUE PRESSURE - PSI

RUNWAY SLOPE - % DOWN ↕ UP

BASE LINE

WIND - KNOTS HEADWIND ↕ TAILWIND

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET
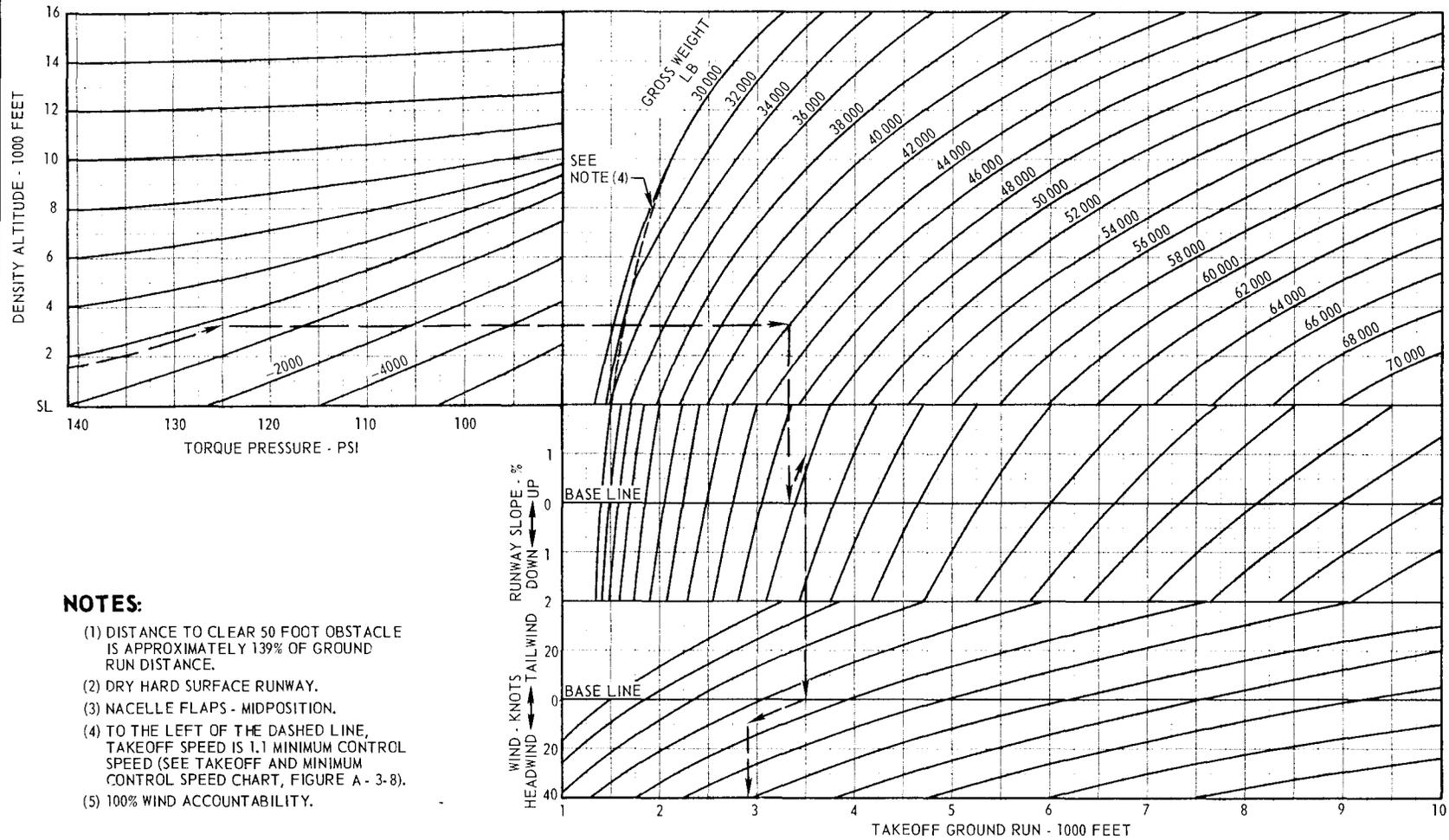
NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 139% OF GROUND RUN DISTANCE.

(2) DRY HARD SURFACE RUNWAY.

(3) NACELLE FLAPS - MIDPOSITION.

(4) TO THE LEFT OF THE DASHED LINE, TAKEOFF SPEED IS 1.1 MINIMUM CONTROL SPEED (SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A - 3-8).

(5) 100% WIND ACCOUNTABILITY.

45.4430

CRITICAL FIELD LENGTH (6° FLAP)

MODEL: T-29A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

2800 RPM

ENGINES: R2800-97

Figure 1A3-14

DENSITY ALTITUDE - 1000 FEET

16
14
12
10
8
6
4
2
SL

140   130   120   110   100

TORQUE PRESSURE - PSI

-2000   -4000

SEE NOTE (4)

GROSS WEIGHT LB
30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000 56,000 58,000

RUNWAY SLOPE - %
UP 1
0
DOWN 1

BASE LINE

WIND - KNOTS
TAILWIND 40 20 0
HEADWIND 20 40

BASE LINE

CRITICAL FIELD LENGTH - 1000 FEET
1   2   3   4   5   6   7   8   9   10

CONDITIONS:

(1) WING FLAPS - 6°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS - MIDPOSITION
(4) CABIN COMPRESSOR - ON

NOTES:

(1) DISTANCES ARE BASED ON AUTOFEATHERING AT CRITICAL ENGINE FAILURE SPEED.
(2) TORQUE PRESSURE IS FOR LEFT ENGINE. RIGHT ENGINE WILL BE 4.0 PSI LOWER.
(3) 100% WIND ACCOUNTABILITY.
(4) TO THE LEFT OF THE DASHED LINE, TAKEOFF SPEED IS 1.1 MINIMUM CONTROL SPEED (SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A 3 - 8).

45,445C

MODEL: **T29A /B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

REFUSAL SPEED (6° FLAP)

ENGINES: **R2800 - 97**

RUNWAY LENGTH - 1000 FEET

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI

DENSITY ALTITUDE - 1000 FT

GROSS WEIGHT - 1000 LB

TAKEOFF SPEED

REFUSAL SPEED IAS - KNOTS

BASELINE

CONDITIONS: (1) WING FLAPS AT 6°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL
BE 4.0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
(3) BASED ON PILOT REACTION TIME 6 SECONDS.

TAKEOFF GROUND RUN (6° FLAP)
CONTINUOUS TWO ENGINE OPERATION
2800 RPM

MODEL: T-29A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R2800-97

DENSITY ALTITUDE - 1000 FEET

TORQUE PRESSURE - PSI

GROSS WEIGHT
LB

RUNWAY SLOPE - % UP / DOWN

WIND - KNOTS — HEADWIND / TAILWIND

BASE LINE

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET

NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 138% OF GROUND RUN DISTANCE.

(2) DRY HARD SURFACE RUNWAY.

(3) NACELLE FLAPS MIDPOSITION.

(4) SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A3-8.

(5) 100% WIND ACCOUNTABILITY

45.446C

CRITICAL FIELD LENGTH (0° FLAP)

MODEL: T-29A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

2800 RPM

ENGINES: R2800-97
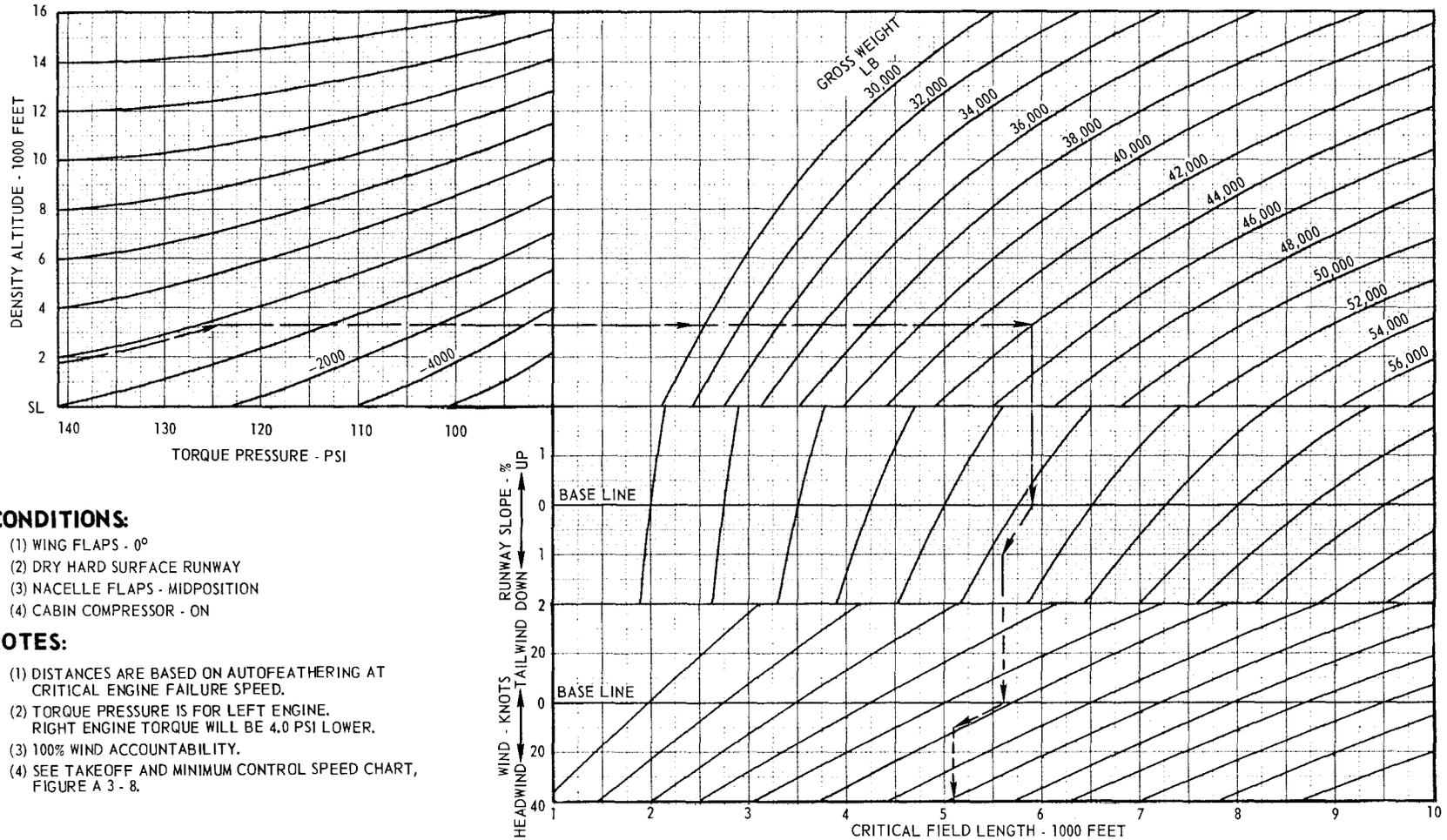
CONDITIONS:
(1) WING FLAPS - 0°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS - MIDPOSITION
(4) CABIN COMPRESSOR - ON

NOTES:
(1) DISTANCES ARE BASED ON AUTOFEATHERING AT CRITICAL ENGINE FAILURE SPEED.
(2) TORQUE PRESSURE IS FOR LEFT ENGINE. RIGHT ENGINE TORQUE WILL BE 4.0 PSI LOWER.
(3) 100% WIND ACCOUNTABILITY.
(4) SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A 3 - 8.

Figure 1A3-17

45,448C

Appendix I
Part 5

REFUSAL SPEED (0° FLAP)

MODEL: **T29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-97**

CONDITIONS: (1) WING FLAPS AT 0°
(2) DRY HARD SURFACE RUNWAY
(3) NACELLE FLAPS MIDPOSITION
(4) CABIN COMPRESSOR ON

NOTES: (1) TORQUE PRESSURE IS FOR LEFT ENGINE.
RIGHT ENGINE TORQUE PRESSURE WILL BE
4.0 PSI LOWER.
(2) 100% WIND ACCOUNTABILITY
(3) BASED ON PILOT REACTION TIME 6 SECONDS.

HEADWIND - KNOTS   TAILWIND - KNOTS   TORQUE PRESSURE - PSI   DENSITY ALTITUDE - 1000 FEET   GROSS WEIGHT - 1000 POUNDS

RUNWAY LENGTH - 1000 FEET

REFUSAL SPEED IAS - KNOTS

TAKEOFF SPEED

45,447D

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-97**

DENSITY ALTITUDE - 1000 FEET

GROSS WEIGHT LB
30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000 56,000 58,000 60,000 62,000 64,000

16 14 12 10 8 6 4 2 SL

140 130 120 110 100

TORQUE PRESSURE - PSI

-2000 -4000

RUNWAY SLOPE - % UP DOWN

BASE LINE

WIND - KNOTS TAIL WIND HEADWIND

BASE LINE

TAKEOFF GROUND RUN - 1000 FEET

1 2 3 4 5 6 7 8 9 10

NOTES:

(1) DISTANCE TO CLEAR 50 FOOT OBSTACLE IS APPROXIMATELY 136% OF GROUND RUN DISTANCE.
(2) DRY HARD SURFACE RUNWAY.
(3) NACELLE FLAPS MIDPOSITION.
(4) 100% WIND ACCOUNTABILITY
(5) SEE TAKEOFF AND MINIMUM CONTROL SPEED CHART, FIGURE A3-8.

Figure 1A3-19

T.O. 1T-29A-1

Appendix I
Part 3

1A3-27

45.449C

EFFECT OF RUNWAY SURFACE CONDITIONS
REFUSAL SPEED AND CRITICAL FIELD LENGTH CORRECTIONS
ALL FLAP SETTINGS

MODEL: **T-29A/B**
DATE: 13 JULY 1964
DATA BASIS: ESTIMATED

ENGINES: **R2800-97**

RUNWAY CONDITION READING (RCR)

DRY

REFUSAL SPEED

CRITICAL FIELD LENGTH

WET

GROSS WEIGHT – LB
30,000
40,000
50,000
60,000

GROSS WEIGHT – LB
30,000
40,000
55,000

A ICY   B   D

C   E

.60 .70 .80 .90 1.0 1.4 1.8 2.2 2.6 3.0

K_{RS}
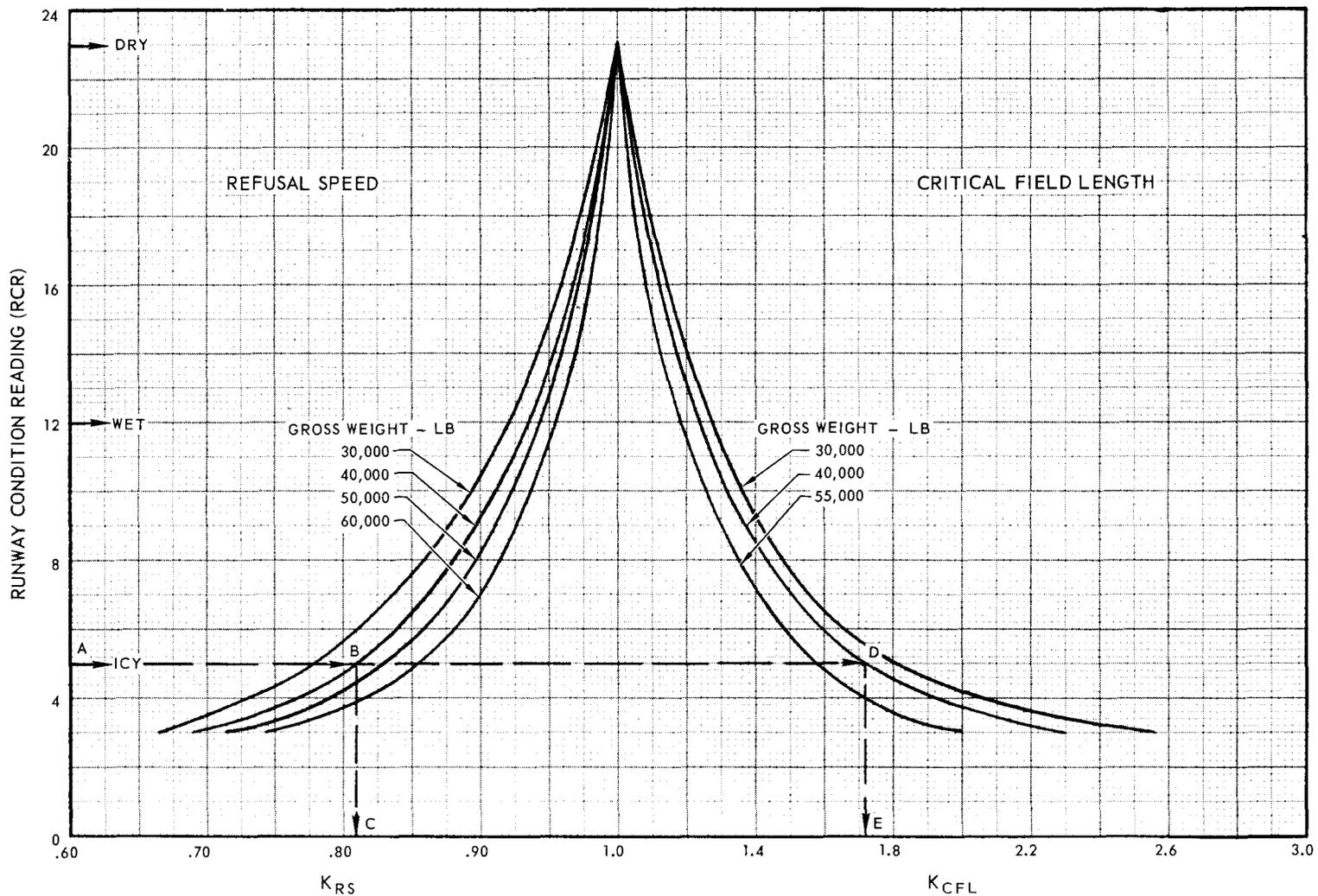
K_{CFL}

CORRECTED REFUSAL SPEED = K_{RS} × REFUSAL SPEED FROM CHARTS

CORRECTED CRITICAL FIELD LENGTH = K_{CFL} × CRITICAL FIELD LENGTH FROM CHARTS

NOTE: IF NO RCR IS AVAILABLE, USE 12 FOR WET RUNWAYS AND 5 FOR ICY RUNWAYS.

45,977B

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH
TWO AND ONE ENGINE OPERATION

FOR ALL FLAP SETTINGS

2800 RPM

ENGINES: R2800-97

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST
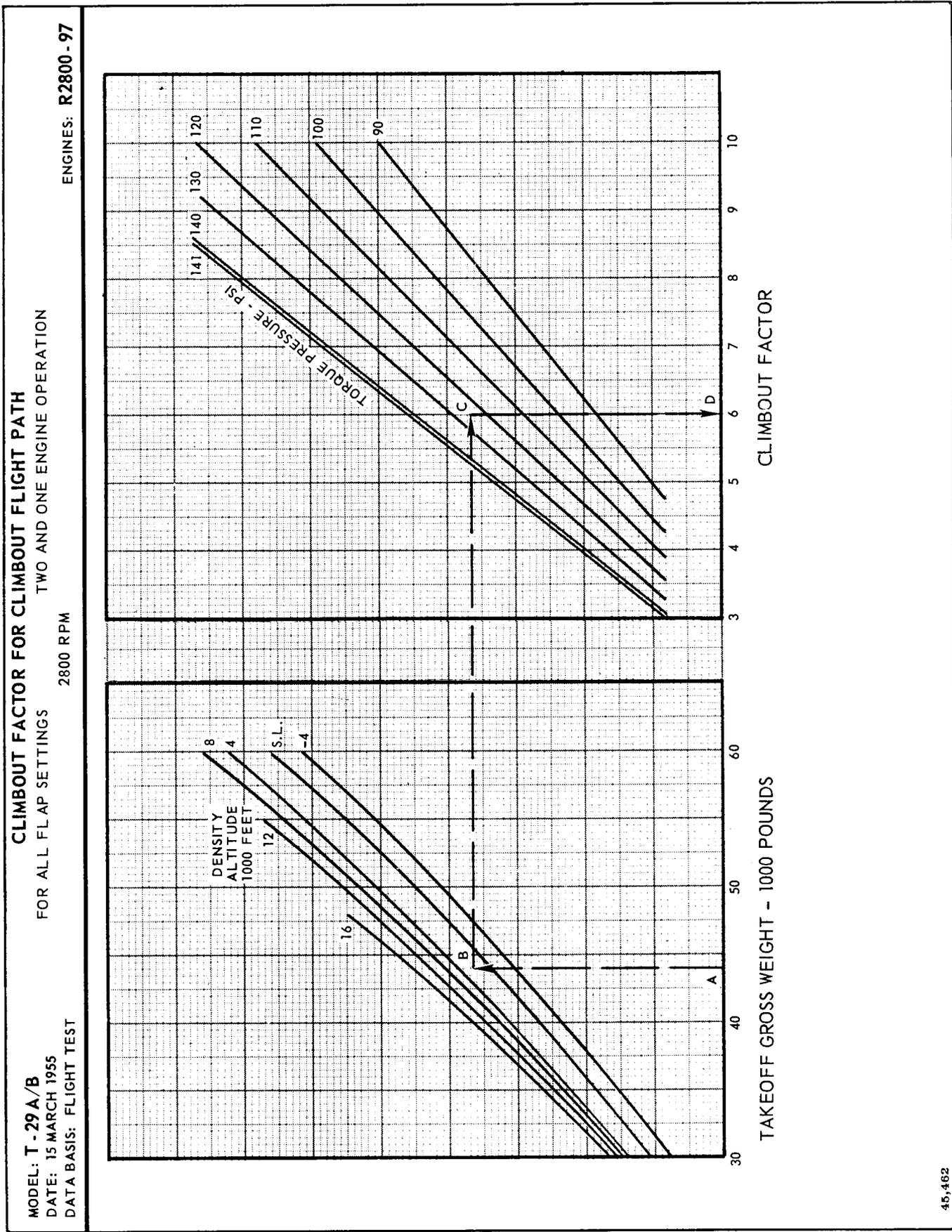
Figure 1A3-21
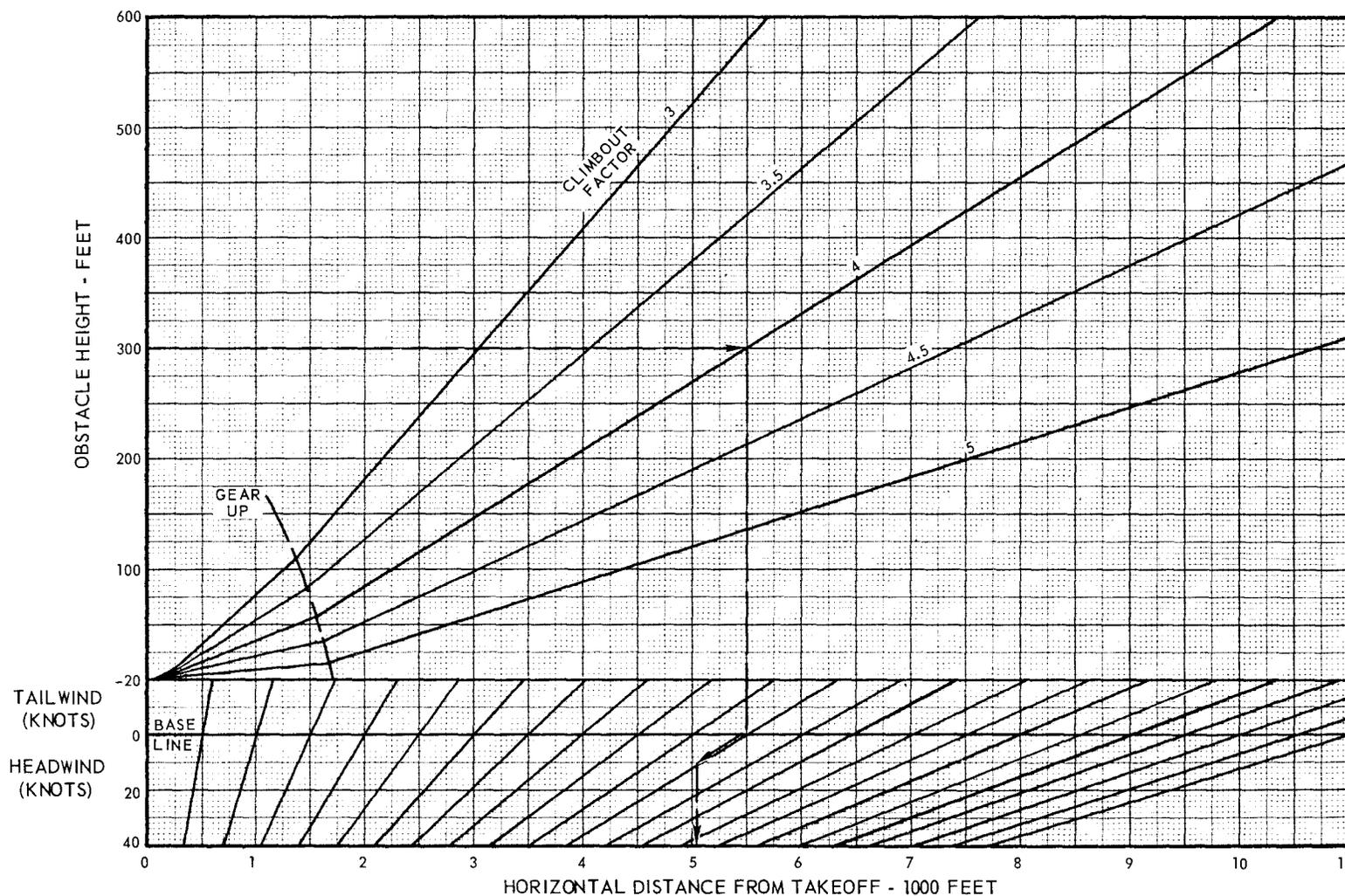
CLIMBOUT FLIGHT PATH - TWO ENGINE - 0° FLAP

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

2800 RPM

OBSTACLE HEIGHT 0 - 600 FEET

ENGINES: **R2800-97**

OBSTACLE HEIGHT - FEET

CLIMBOUT FACTOR

3 4 5 6 7 8 9 10

GEAR UP

TAILWIND (KNOTS)

BASE LINE

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) LANDING GEAR UP IN 6 SECONDS
(2) CLIMB SPEED = TAKEOFF SPEED
(3) 100% WIND ACCOUNTABILITY

45,463

Figure 1A3-22

CLIMBOUT FLIGHT PATH - TWO ENGINE - 6° FLAP

MODEL: **T - 29A⅟B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET

2800 RPM

ENGINES: **R2800 -~~197~~**

NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY

CLIMBOUT FLIGHT PATH - TWO ENGINE - 12° FLAP

MODEL: **T - 29 A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

OBSTACLE HEIGHT 0 - 600 FEET

2800 RPM

ENGINES: **R2800 - 97**

HORIZONTAL DISTANCE FROM TAKEOFF – 1000 FEET

NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY

45,465

CLIMBOUT FLIGHT PATH - TWO ENGINE - 24° FLAP

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 -600 FEET
2800 RPM

ENGINES: **R2800-97**

OBSTACLE HEIGHT – FEET

CLIMBOUT FACTOR

3   4   5   6   7   8   9

GEAR UP

BASE LINE

TAILWIND (KNOTS)

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF – 1000 FEET

NOTES:

(1) LANDING GEAR UP IN 6 SECONDS

(2) CLIMB SPEED = TAKEOFF SPEED

(3) 100% WIND ACCOUNTABILITY

Figure 1A3-25

1A3-33

45,466

T.O. 1T-29A-1

Appendix I
Part 3

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 0° FLAP

INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET
2800 RPM

MODEL: **T-29 A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-97**

Figure 1A3-26

NOTES:

(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

45467A

CLIMBOUT FLIGHT PATH (EXTENDED) -
SINGLE ENGINE - 0° FLAPS
2800 RPM

MODEL: **T-29A/B/C/D**
DATE: 5 DECEMBER 1967
DATA BASIS: **FLIGHT TEST**

ENGINES: **R2800-97/99W**
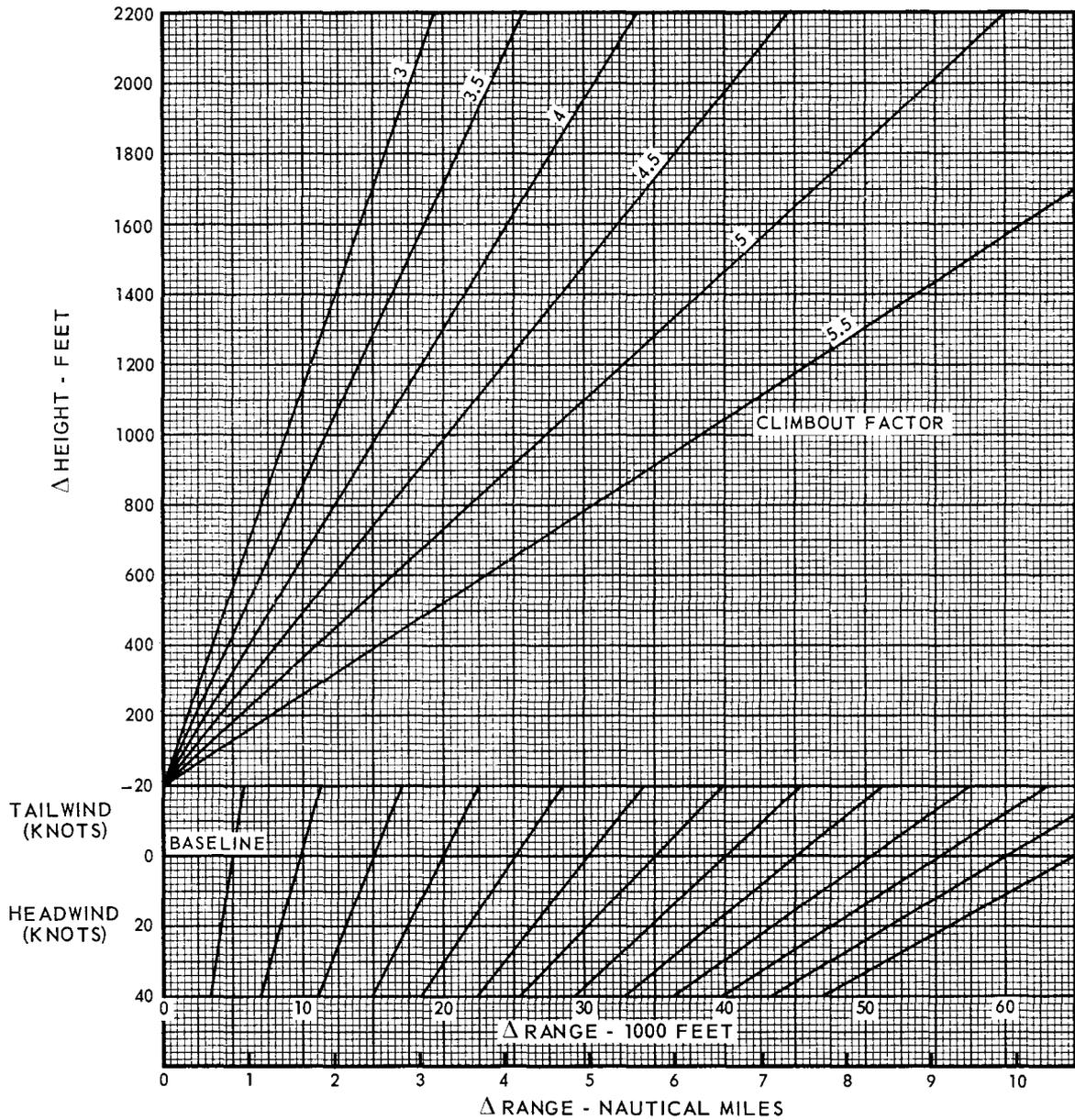
2200

2000

1800

1600

1400

1200

1000

800

600

400

200

−20

Δ HEIGHT - FEET

.3

3.5

.4

4.5

.5

5.5

CLIMBOUT FACTOR

TAILWIND
(KNOTS)

0

BASELINE

HEADWIND
(KNOTS)

20

40

0   10   20   30   40   50   60

Δ RANGE - 1000 FEET

0   1   2   3   4   5   6   7   8   9   10

Δ RANGE - NAUTICAL MILES

NOTES:
(1) CLIMB SPEED EQUALS 1.2 STALL SPEED (0° FLAPS).
(2) 100% WIND ACCOUNTABILITY.
(3) CHART ASSUMES THAT CLIMB PATH AND AIRSPEED HAVE BEEN ESTABLISHED
BEFORE CHART IS ENTERED. USE CHART AS EXTENSION OF BASIC CLIMBOUT
FLIGHT PATH CHARTS WHICH INCLUDE TAKEOFF ACCELERATION DATA.
(4) USE CHART WITH CLIMBOUT FACTOR FROM 2800 RPM CLIMBOUT FACTOR
CHART ONLY.

45,601

Figure 1A3-27

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 6° FLAP

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE   OBSTACLE HEIGHT 0 - 600 FEET
2800 RPM

ENGINES: R2800-97

45468A

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 12° FLAP

MODEL: **T-29 A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

2800 RPM

OBSTACLE HEIGHT 0-600 FEET

ENGINES: **R2800-97**

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

CLIMBOUT FLIGHT PATH - SINGLE ENGINE - 24° FLAP

MODEL: **T-29 A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

INCLUDING FLARE DISTANCE

2800 RPM

OBSTACLE HEIGHT 0 - 600 FEET

ENGINES: **R2800-97**

OBSTACLE HEIGHT - FEET

CLIMBOUT FACTOR 3

3.5

4

GEAR UP

TAILWIND (KNOTS)

BASE LINE

HEADWIND (KNOTS)

HORIZONTAL DISTANCE FROM TAKEOFF - 1000 FEET

NOTES:
(1) INOPERATIVE PROPELLER FEATHERED
(2) LANDING GEAR UP IN 6 SECONDS
(3) CLIMB SPEED = TAKEOFF SPEED
(4) 100% WIND ACCOUNTABILITY

45470A

CLIMBOUT FACTOR FOR CLIMBOUT FLIGHT PATH

MODEL: **T-29 A/B**
DATE: 5 DECEMBER 1967
DATA BASIS: **FLIGHT TEST**

FLAPS RETRACTED

TWO ENGINE OPERATION

METO POWER
(2500 RPM TO 2700 RPM)

ENGINES: **R2800-97**
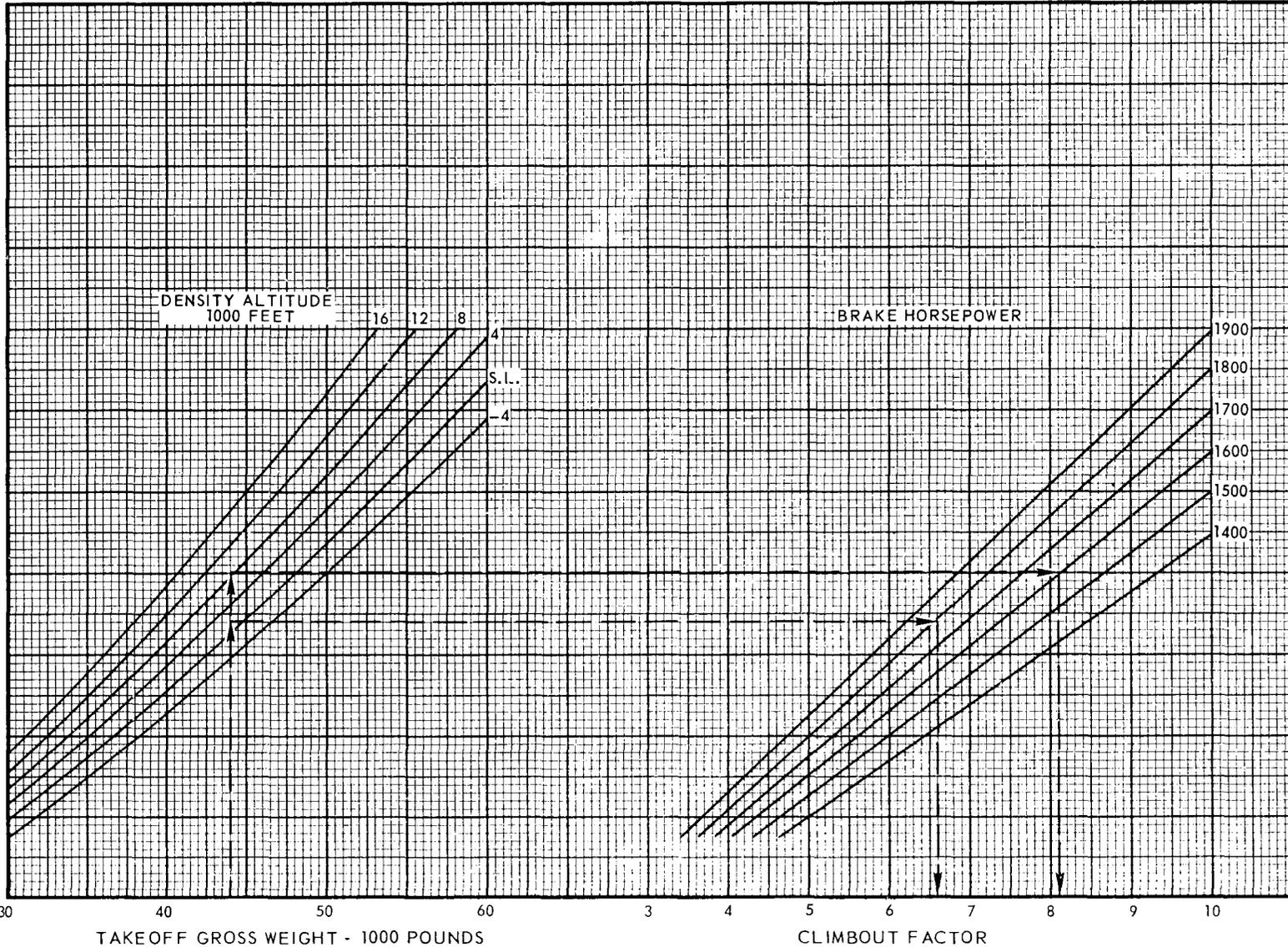
DENSITY ALTITUDE
1000 FEET   16 12 8
4
S.L.
-4

BRAKE HORSEPOWER
1900
1800
1700
1600
1500
1400

TAKEOFF GROSS WEIGHT - 1000 POUNDS

CLIMBOUT FACTOR

MODEL: **T-29A/B**
DATE: 5 DECEMBER 1967
DATA BASIS: **FLIGHT TEST**

CLIMBOUT FLIGHT PATH (EXTENDED)
TWO ENGINE - 0° FLAPS
METO POWER

ENGINES: **R2800-97**
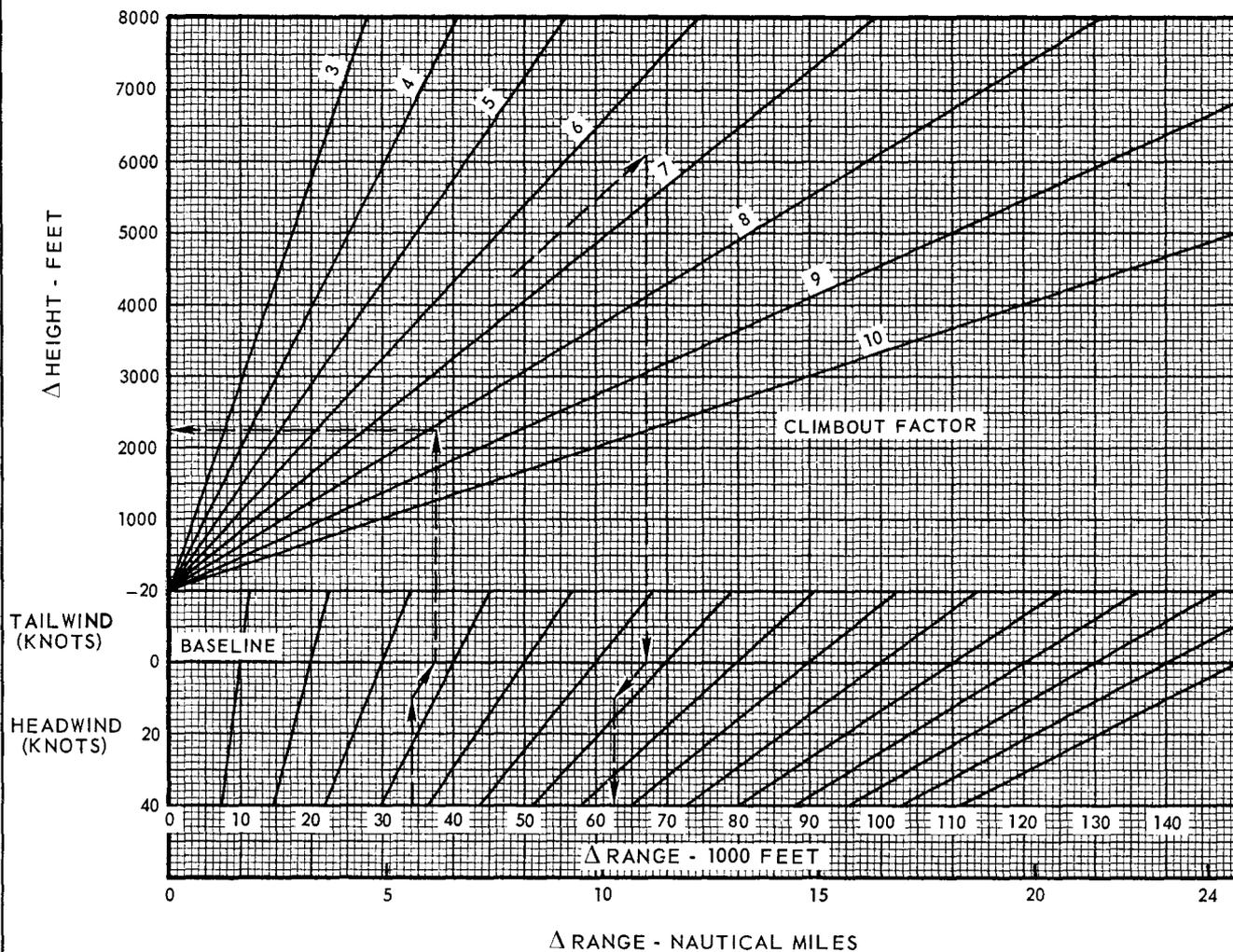
Figure 1A3-32

NOTES:
(1) CLIMB SPEED EQUALS 1.2 STALL SPEED (0° FLAPS).
(2) 100% WIND ACCOUNTABILITY.
(3) CHART ASSUMES THAT CLIMB PATH AND AIRSPEED HAVE BEEN ESTABLISHED BEFORE CHART IS ENTERED. USE CHART AS EXTENSION OF BASIC CLIMBOUT FLIGHT PATH CHARTS WHICH INCLUDE TAKEOFF ACCELERATION DATA.
(4) USE CHART WITH CLIMBOUT FACTOR FROM METO POWER CLIMBOUT FACTOR CHART ONLY.

45,603

PART 4 – CLIMB

Ⓐ Ⓑ

TABLE OF CONTENTS

The symbol * indicates an illustration

OPERATIONAL CLIMB

Operational climb performance is presented in two climb curves for normal two-engine operation (figures 1A4-1 and 1A4-2). One presents time and speed. The other presents distance and fuel consumed. The data are plotted in a convenient form against weight with guide lines representing the weight variation during a steady climb. The data are based upon recommended climb at 1400 BHP/ENG, 2400 rpm is standard atmosphere with flaps and gear up at a constant airspeed. The climb power schedules show power settings to be used. These include manifold pressure, TPSI and blower speed. Fuel flow is based upon operation in the AUTO RICH mixture position. Climb performance in non-standard atmospheric conditions is the same as that in standard atmospheric conditions if standard powers are obtainable. It is only necessary to determine the comparable density altitude and obtain the standard power for that altitude.

Note

The airplane's lift and drag depend primarily upon the density of the air, while the engine power depends upon the pressure of the air, until full throttle is reached. To determine the climb performance under non-

standard conditions, one must determine the fuel, distance and time to climb using density altitudes and obtain the standard power for pressure altitude by adjusting the manifold pressures as required.

If standard powers are not obtainable, a substantial decrease in climb performances can be expected. Speeds shown are those for best rate of climb consistent with engine cooling. Increasing speeds above those shown will decrease the rate of climb and increase time, distance, and fuel consumed in climb. Data are included to show the service (100 fpm rate of climb) and cruise (300 fpm rate of climb) ceilings.

EXAMPLE

For time to climb (figure 1A4-1) enter chart with gross weight and density altitude at start of climb (A). Parallel guide line to density altitude at end of climb (B). Read across to find time to climb in minutes (C). Gross weight at end of climb may be found by reading across from density altitude at end of climb (B) parallel to fuel lines to fuel used in climb (D) and subtracting this weight from gross weight at start of climb. For distance and fuel (figure 1A4-2) follow same procedure as for time to climb and read distance in climb (nautical miles) to the left. Follow guide lines to the right from

density altitude at end of climb and read total fuel used in climb.

METO POWER CLIMB

METO power climb performance is presented in two climb curves (figures 1A4-3 and 1A4-4). One presents time and speed. The other presents distance and fuel consumed. Airspeeds shown (IAS vs density altitude) are the same for both charts. The data are plotted in a convenient form against weight and guide lines representing the weight variation during a steady climb. The data are based upon climb at METO power, standard atmosphere with flaps and gear up. The METO power schedule shows power settings to be used. The charts are used in the same manner as the operational climb charts.

CEILING – ONE ENGINE INOPERATIVE

Absolute and service ceilings of the airplane at various weights with METO power under standard conditions are presented in figure 1A4-5. The chart can be used to find terrain clearance if an engine should fail enroute. Single-engine drift-down altitude can also be determined by these charts. The gross

weight refer to the gross weight of the airplane at the time of engine failure.

DRIFT-DOWN

If an engine fails during flight at altitudes above single-engine ceiling, the airplane will drift down; i.e., lose altitude at a decreasing rate until stabilized flight is attained at the absolute ceiling for the power and instantaneous weight conditions. Drift-down performance is presented in figure 1A4-6. For best results, operate the remaining engine at METO power and fly the airplane at recommended speed for weight shown on the chart. In cases of emergency at lower altitudes, the use of military power (2800 rpm) for a limited time will reduce the altitude loss. To use the chart, enter with the airplane gross weight at the time of engine failure (A). Proceed vertically to the initial altitude (B). Read the distance traveled during drift-down on the right-hand scale (C). From the initial altitude, parallel the guide lines down to the gross weight scale (D) and read the airplane gross weight at the end of drift-down (final gross weight). With this weight, enter the final gross weight scale in the upper left corner (E). Proceed vertically down to the drift-down curve, then horizontally to the final altitude scale (F).
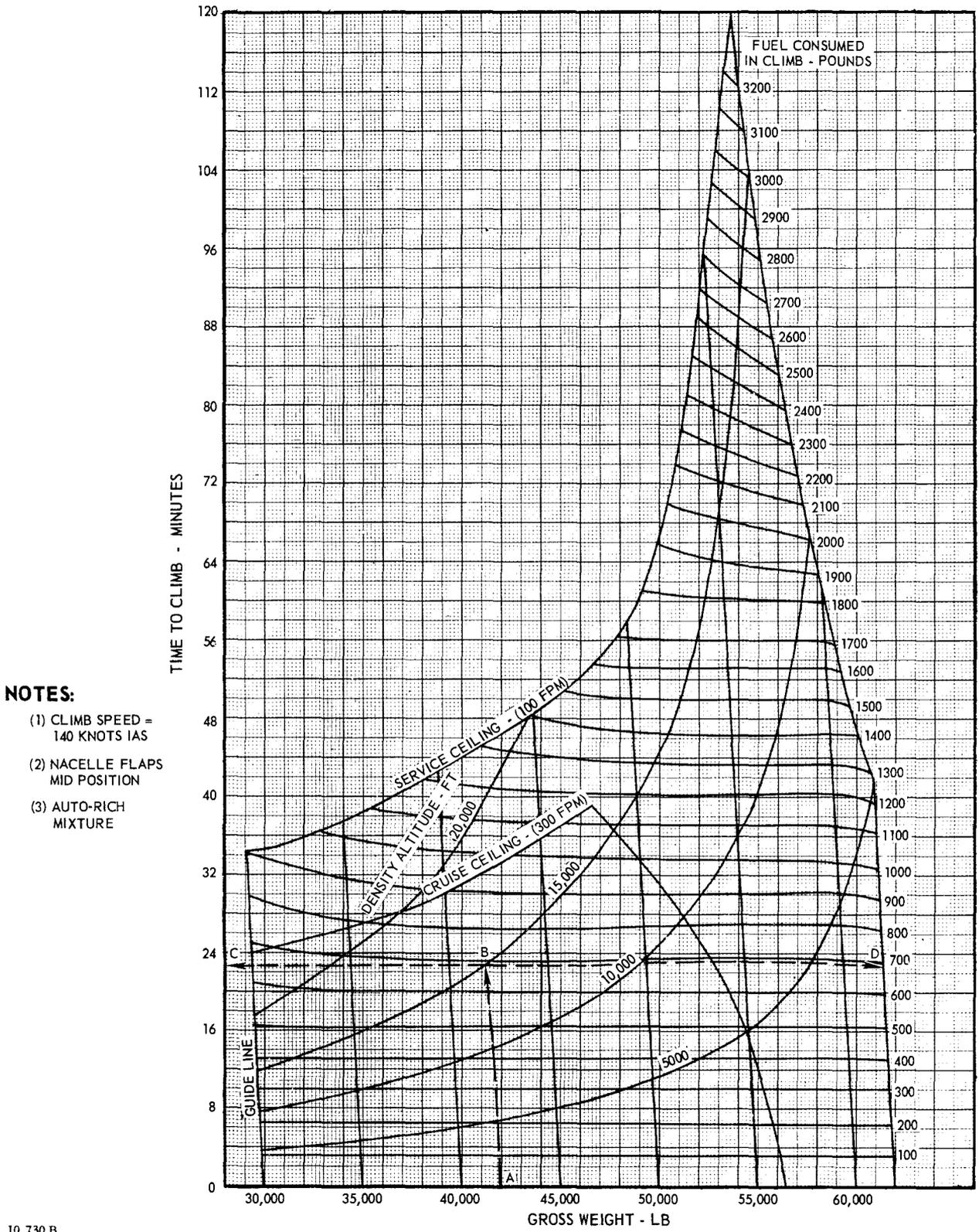
MODEL: **T - 29 A/B**	OPERATIONAL CLIMB - TIME AND SPEED	
DATE: 15 JULY 1955	1400 BHP ENG 2400 RPM	
DATA BASIS: FLIGHT TEST		ENGINES **R2800 - 97**

NOTES:

(1) CLIMB SPEED =
140 KNOTS IAS

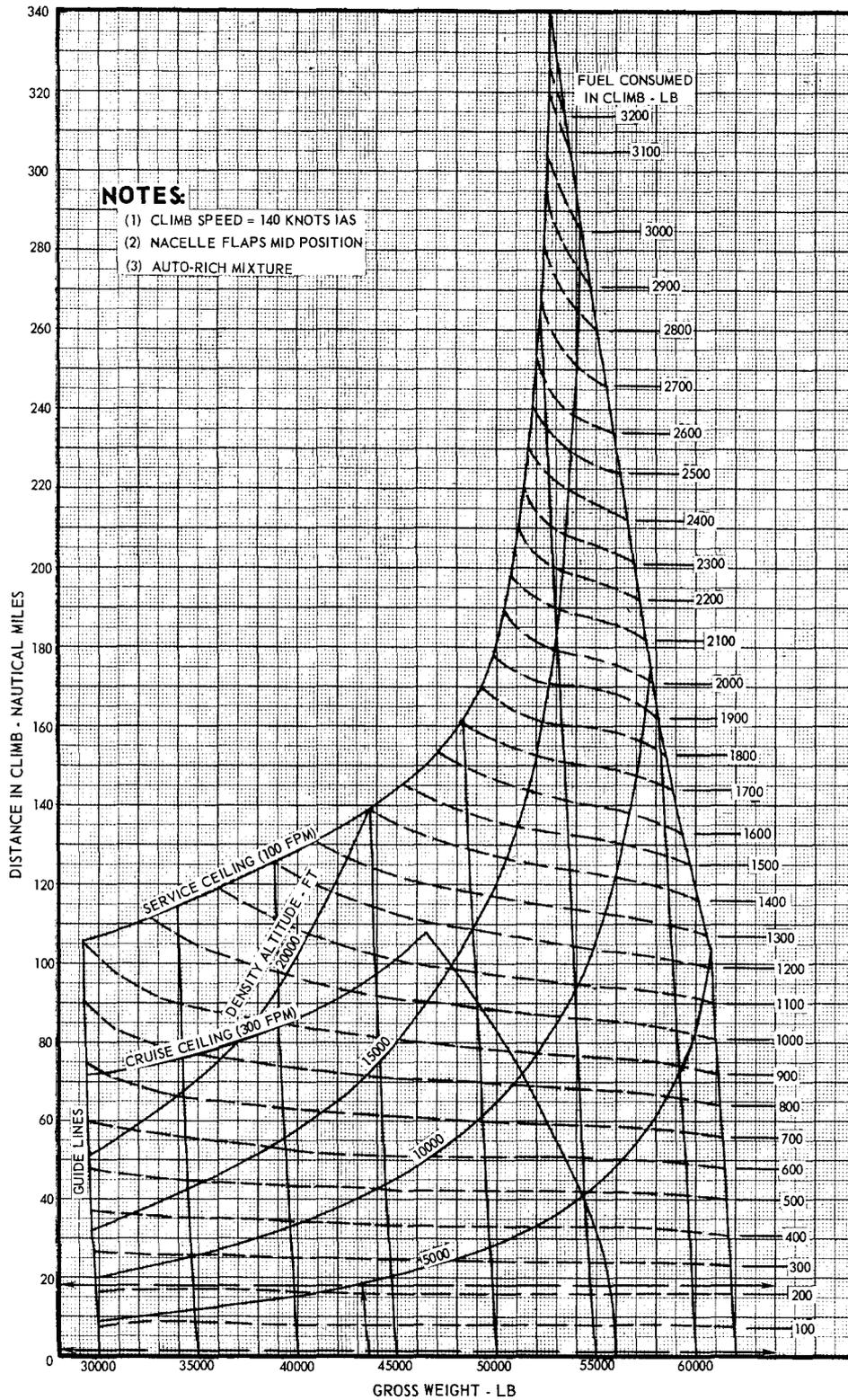(2) NACELLE FLAPS
MID POSITION

(3) AUTO-RICH
MIXTURE

10,730 B

Figure 1A4-1

OPERATIONAL CLIMB - DISTANCE AND FUEL
(1400 BHP/ENG)

MODEL: **T - 29 A/B**
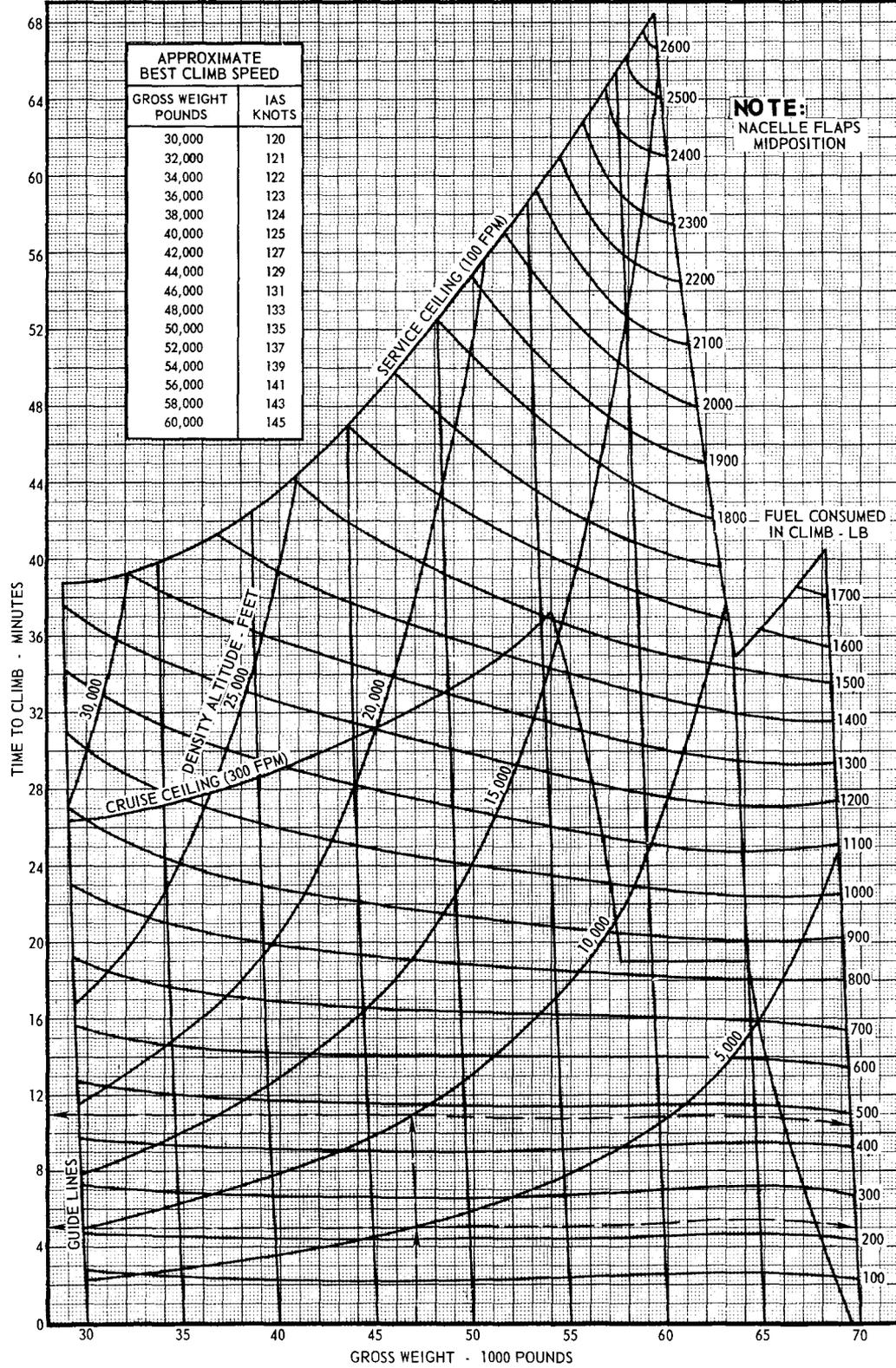DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800 - 97**

NOTES:

(1) CLIMB SPEED = 140 KNOTS IAS

(2) NACELLE FLAPS MID POSITION

(3) AUTO-RICH MIXTURE

10,731A

Figure 1A4-2

METO POWER CLIMB - TIME AND SPEED

MODEL: **T - 29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

CLEAN CONFIGURATION

ENGINES: **R2800-97**

APPROXIMATE BEST CLIMB SPEED	
GROSS WEIGHT POUNDS	IAS KNOTS
30,000	120
32,000	121
34,000	122
36,000	123
38,000	124
40,000	125
42,000	127
44,000	129
46,000	131
48,000	133
50,000	135
52,000	137
54,000	139
56,000	141
58,000	143
60,000	145

NOTE: NACELLE FLAPS MIDPOSITION

Figure 1A4-3

MODEL: **T-29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

METO POWER CLIMB - DISTANCE AND FUEL

CLEAN CONFIGURATION

ENGINES: **R2800-97**

NOTE:
NACELLE FLAPS MID POSITION
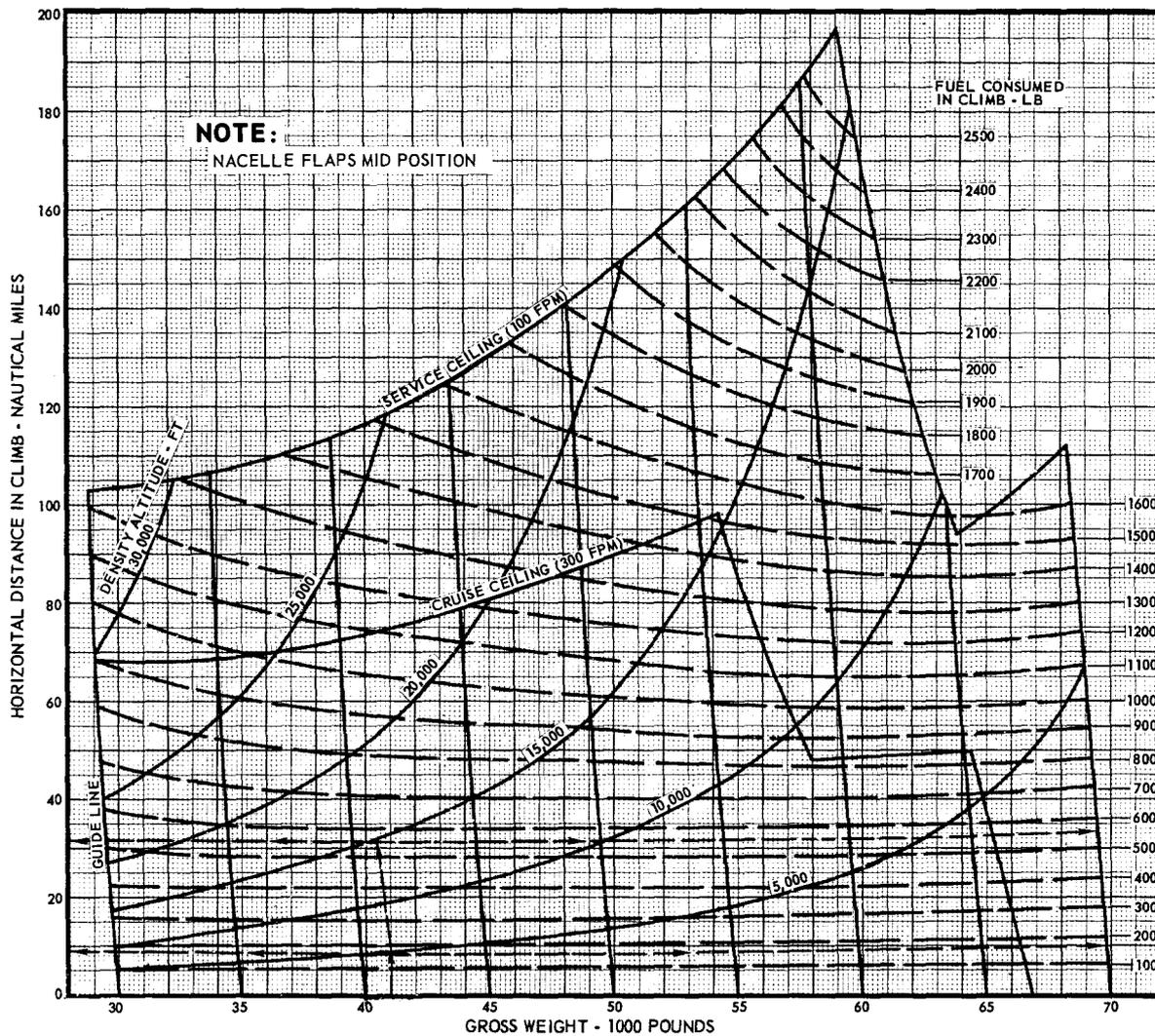
Figure 1A4-4

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

CEILING - ONE ENGINE INOPERATIVE

STANDARD ATMOSPHERE   CLEAN CONFIGURATION
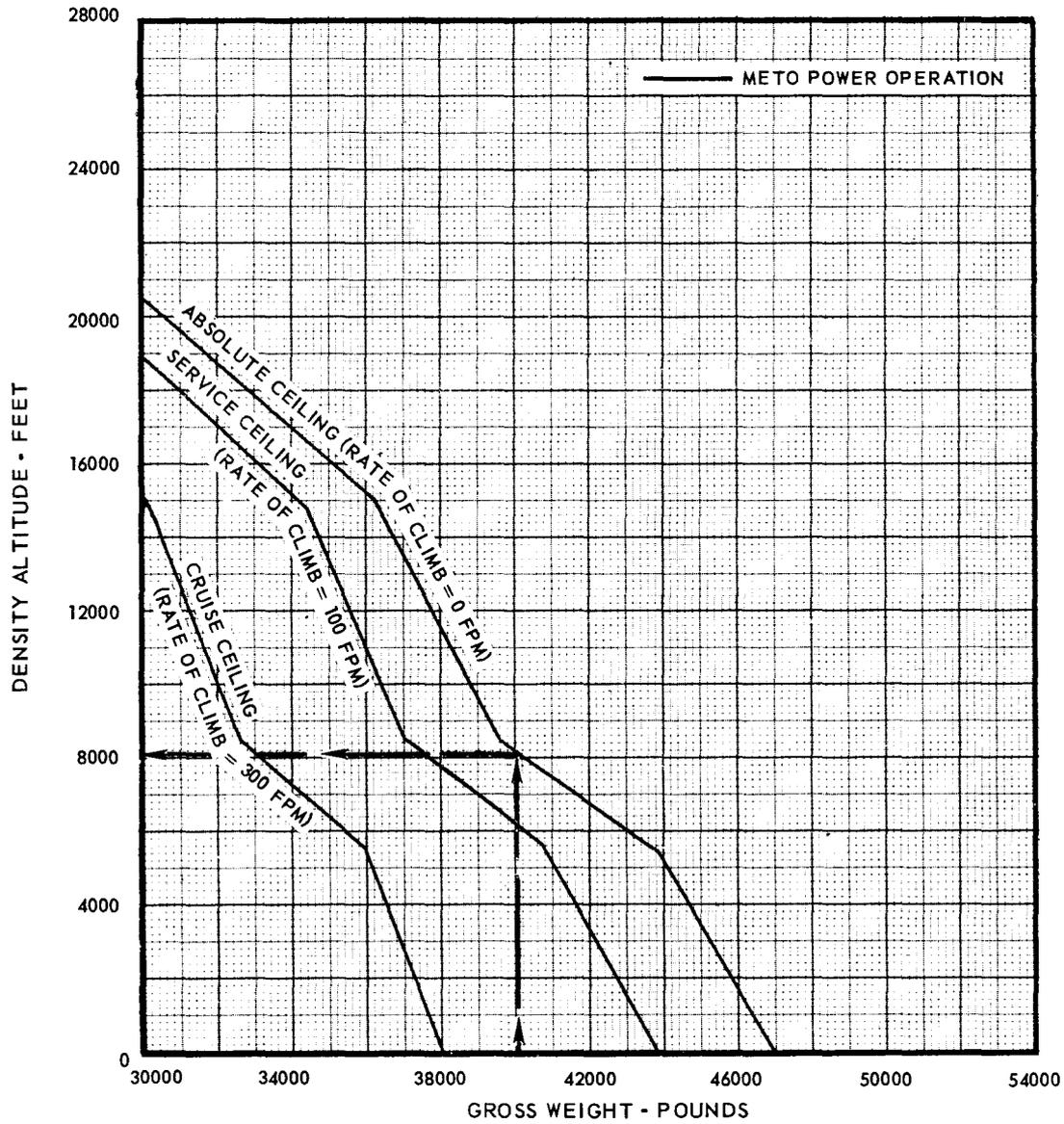
ENGINES: **R2800-97**

Figure 1A4-5

DRIFTDOWN - ONE ENGINE INOPERATIVE

METO POWER

MODEL: T-29 A/B
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: R 2800-97

FINAL GROSS WEIGHT - 1000 POUNDS

FINAL ALTITUDE - 1000 FEET

DISTANCE TRAVELED DURING DRIFTDOWN - KN MILES

GROSS WEIGHT - 1000 POUNDS

DENSITY ALTITUDE FEET

TYPICAL DRIFTDOWN PATHS

GROSS WEIGHT POUNDS	RECOMMENDED CLIMB SPEED IAS
30,000	116
32,000	118
34,000	120
36,000	122
38,000	123
40,000	125
42,000	127
44,000	129
46,000	131
48,000	133
50,000	136

10,758 A

PART 5 – CRUISE

Ⓐ Ⓑ

TABLE OF CONTENTS

The symbol * indicates an illustration

CRUISE CONTROL

Cruise performance as used in this Appendix is de-
fined as being that portion of flight wherein the alti-
tude is held constant, i.e., level flight. The speeds
and powers used are selected to maintain this posi-
tion. Data are shown to determine this relationship
between speed and power throughout the usable range
of the airplane. Power is shown as BHP per engine.
Reference to the power schedules will show the
necessary power settings of MAP, TPSI and rpm
to deliver this BHP per engine.

NAUTICAL MILES PER POUND OF FUEL

Nautical miles per pound of fuel curves (figures
1A5-1 through 1A5-5) are presented for several
density altitudes from sea level to the maximum
usable altitude of the airplane in increments of 5000
feet. The data are based upon fuel flow expected
when mixture controls are in the specified auto-
matic settings. The nautical miles per pound of fuel
curves are applicable in any non-standard conditions
where the powers shown may be obtained. To sim-
plify selections of speed and power for long-range
cruising, three curves are shown to represent the
powers and speeds to be selected for flight in wind
conditions, for 50-knot tailwind, zero wind and
50-knot headwind. Wind values between these lines
can be interpolated. The following examples show
the various methods of using these charts:

EXAMPLE 1. Determine power and speed for long
range cruise.

Given:

Density altitude = 10,000 feet.

Gross weight at start of cruise = 42,000 pounds.

Gross weight at end of cruise = 38,000 pounds.

Enter chart (figure 1A5-3) at weight at start of
cruise 42,000 pounds. Follow weight line to inter-
section of long range line (no wind) and find 1000 bhp
at start of cruise. Proceed vertically to read cali-
brated airspeed of 155 knots at start of cruise.
Repeat the procedure with gross weight at end of
cruise to find 930 bhp and 153 knots CAS at end of
cruise.

Note

This cruise procedure requires changes
in power and airspeed to maintain long-
range conditions. An alternate method
would be to use an average gross weight
for cruise and fly at a constant power
and airspeed for that weight.

EXAMPLE 2. Determine distance, fuel used, and
airspeed for two-hour cruise at 1000 bhp.

Note

Since it is desired to cruise at 1000 bhp
for two hours, a sufficiently accurate
estimate may be made of the fuel flow
by reading nautical miles per pound of
fuel value and a true airspeed value at
an assumed average weight and divid-
ing the true airspeed by the air nautical
miles per pound of fuel (n mi/hr ÷ n mi/
lb = lb/hr).

Using same altitude and weight as Example 1 and
assuming a fuel flow of 900 pounds per hour, then
average weight for two-hour cruise is 42,000 - 900
= 41,100 pounds. Enter chart chart (figure 1A5-3)
at average cruise weight and follow weight lines to
intersection of 1000 bhp. Proceed vertically to find
TAS of 183 knots. Proceed horizontally from weight
and power intersection to find 0.217 air nautical
miles per pound. Then fuel used is 183 ÷ 0.217 = 845
pounds per hour.

Note

The fuel used figure of 845 pounds is
close enough to the assumed value of
900 pounds. If it were substantially
different, another estimate should be
made.

Weight at end of two-hour cruise is 42,000 - 1690 =
40,310 pounds. Distance in two-hour cruise is 183
knots X 2 hours = 366 nautical miles.

EXAMPLE 3. Interpolation for intermediate alti-
tudes.

Given:

Density altitude = 8000 feet.

Gross weight at start of cruise = 42,000 pounds.

Power and speed for long range cruise at 8000 feet
can be determined by interpolation between 5000 feet
and 10,000 feet. In Example 1, the power and speed
for 42,000 pounds and 10,000 feet were found to be
1000 bhp and 155 knots CAS. Using the same proce-
dure with the chart for 5000 feet (figure 1A5-3), the
power and speed are found to be 930 bhp and 159
knots CAS. The difference between 1000 bhp and 930
bhp is 70 bhp for 5000 feet difference in altitude.
Find the difference in BHP for 3000 feet by the
following ratio:

$$\frac{BHP}{70} = \frac{3}{5}$$

$$BHP = \frac{3 \times 70}{5} = 42$$

Then BHP for 8000 feet is 930 + 42 = 972 bhp.
Note that the difference in calibrated airspeed is
approximately 1 knot per 1000 feet. The airspeed
for 8000 feet is 156 knots.

MAXIMUM ENDURANCE

Data from the nautical miles per pound of fuel curves
have been replotted in the Maximum Endurance Chart
(figure 1A5-6) for convenient determination of rec-
ommended minimum power and speed. The data show
BHP/ENG, speed, and resulting fuel flow for gross
weight and density altitude.

LONG RANGE PREDICTION

The long range prediction curves (figures 1A5-7 and
1A5-8) present the distance and time as fuel is used
during cruise.

EXAMPLE

Given:

Weight at start of cruise = 43,300 pounds.

Density altitude = 5000 feet.

Cruise distance = 340 nautical miles.

Enter chart (figure 1A5-7) at gross weight 43,300
pounds (A) and read up to density altitude 5000 feet
(B). Read across to distance and read 2500 nautical
miles (C). Add the cruise distance (2500 + 340 =
2840) and re-enter chart at 2840 nautical miles (D).
Read across to 5000 feet density altitude (E) and
down to find gross weight at end of cruise 41,800
pounds (F). The difference between the weight at
start of cruise and the weight at end of cruise
(43,300 - 41,800 = 1500) is the weight of fuel used
for 340 nautical miles cruise at CAS for long range.
CAS is obtained from the applicable nautical miles
per pound of fuel chart. Determination of time for
cruise is done by the same procedure with the long
range prediction time curve (figure 1A5-8).

Note

These charts can also be used to find the
distance traveled and the elapsed time
for any given amount of fuel used. Enter
the chart at the gross weight at start of
cruise and at end of cruise. Extend lines
from these two points up to the density
altitude line, then across to the distance
at altitude scale. The difference between
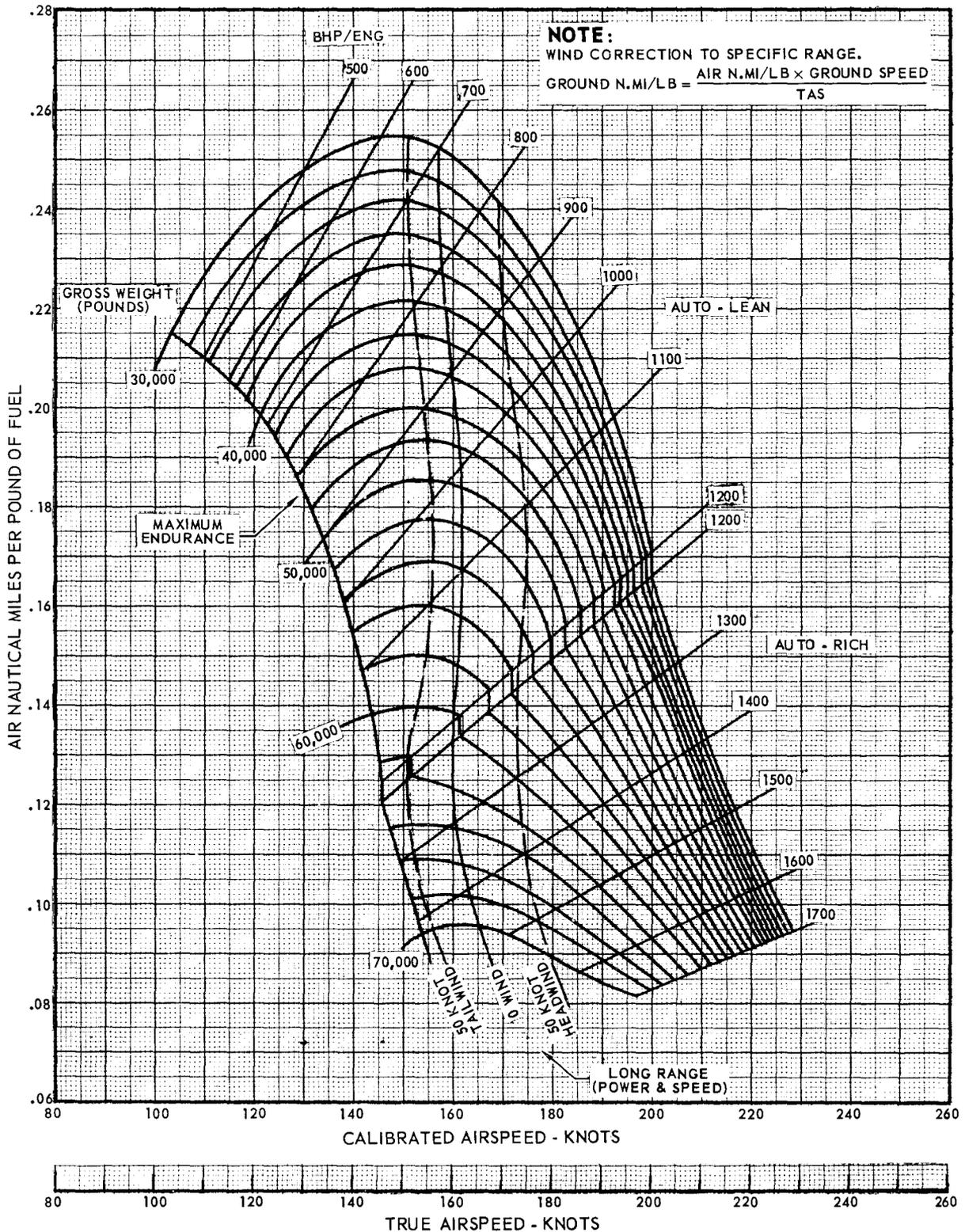the two points of distance is the distance
traveled.

CRUISE CONTROL—ONE ENGINE INOPERATIVE

Nautical miles per pound of fuel data similar to that
presented for normal cruise is presented for cruise
with one engine inoperative, propeller feathered
(figures 1A5-9 through 1A5-12). It is important that
the propeller be feathered; if it is allowed to wind-
mill, a serious reduction in range will result.

NAUTICAL MILES PER POUND OF FUEL - SEA LEVEL

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   LOW BLOWER   STANDARD ATMOSPHERE

ENGINES: **R2800-97**

NOTE:
WIND CORRECTION TO SPECIFIC RANGE.

$$\text{GROUND N.MI/LB} = \frac{\text{AIR N.MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

Figure 1A5-1

NAUTICAL MILES PER POUND OF FUEL - 5000 FEET

MODEL: **T-29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   LOW BLOWER   STANDARD ATMOSPHERE

ENGINES: R2800-97

NOTE:
WIND CORRECTION TO SPECIFIC RANGE.

$$\text{GROUND N. MI/LB} = \frac{\text{AIR N. MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

Figure 1A5-2

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

NAUTICAL MILES PER POUND OF FUEL - 10,000 FEET
TWO ENGINE CRUISE   LOW BLOWER   STANDARD ATMOSPHERE

ENGINES: **R2800-97**

BHP/ENGINE
600
700
800
900

NOTE:
WIND CORRECTION TO SPECIFIC RANGE.
$$\text{GROUND N. MI/LB} = \frac{\text{AIR N. MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

AUTO-LEAN
1000
1100

GROSS WEIGHT
POUNDS
30,000

1200

40,000

MAXIMUM
ENDURANCE

1200

50,000

1300

AUTO-RICH

1400

1500

60,000

1600 (HIGH BLOWER)

50 KNOT HEADWIND

0 WIND

50 KNOT TAILWIND

LONG RANGE
(POWER AND SPEED)

AIR NAUTICAL MILES PER POUND OF FUEL

.28 .26 .24 .22 .20 .18 .16 .14 .12 .10 .08 .06

CALIBRATED AIRSPEED - KNOTS
80 100 120 140 160 180 200 220 240

100 120 140 160 180 200 220 240 260 280

TRUE AIRSPEED - KNOTS
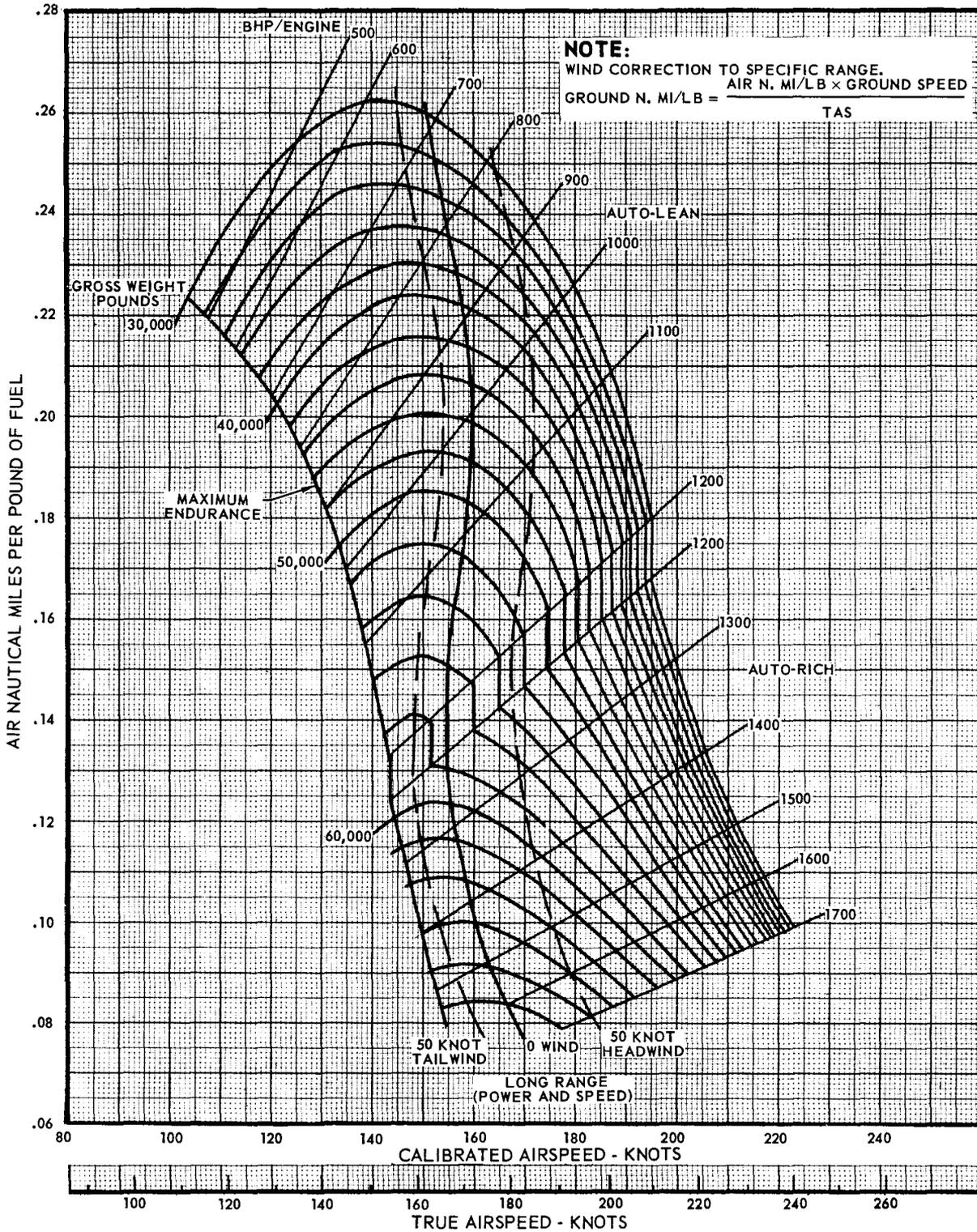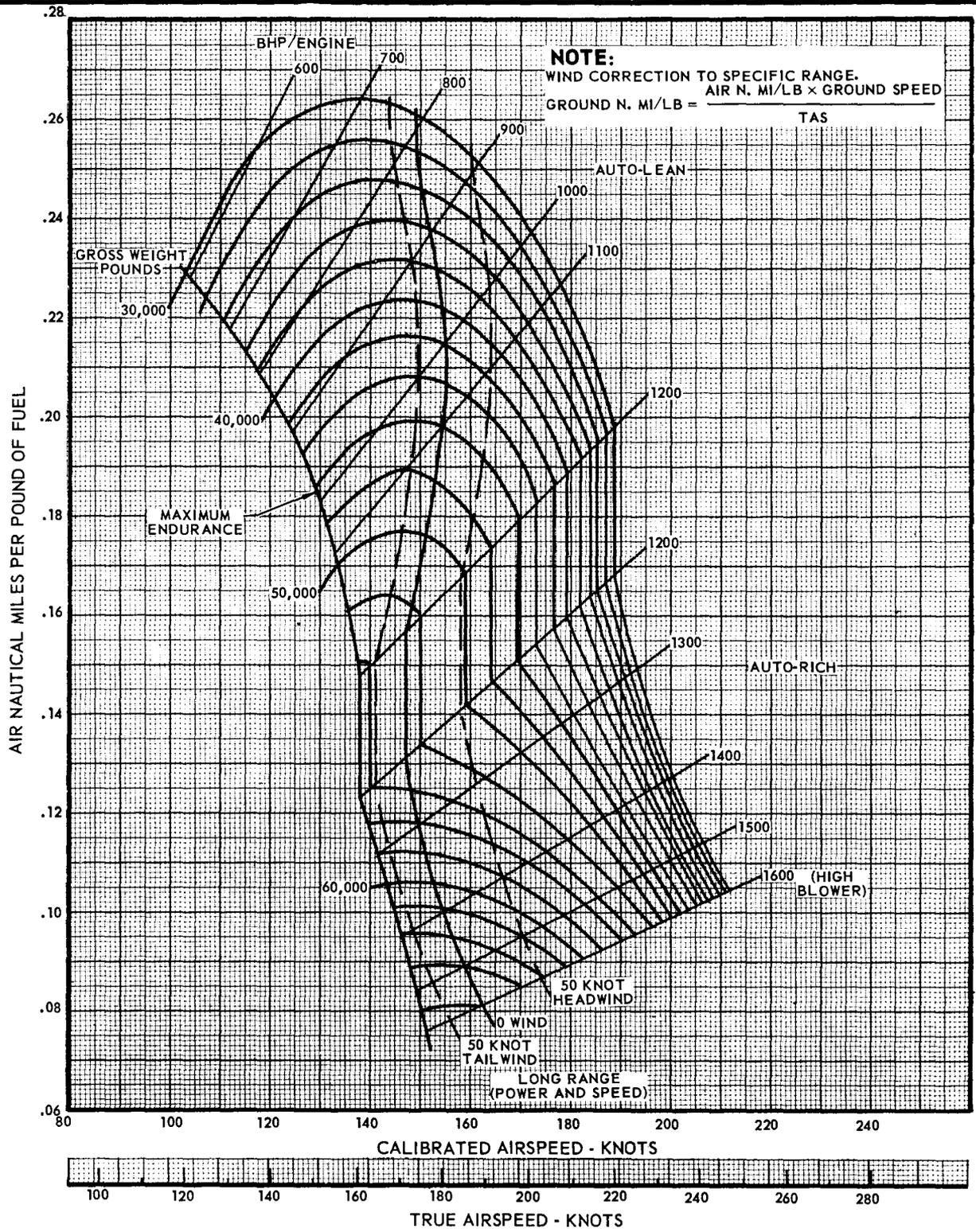
10,776A

Figure 1A5-3

NAUTICAL MILES PER POUND OF FUEL - 15,000 FEET

MODEL: T-29A/B
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   STANDARD ATMOSPHERE

ENGINES: **R2800-97**

NOTE:

WIND CORRECTION TO SPECIFIC RANGE.

$$\text{GROUND N. MI/LB} = \frac{\text{AIR N. MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

LOW BLOWER AUTO-LEAN

HIGH BLOWER

HIGH BLOWER AUTO-RICH

MAXIMUM ENDURANCE

50 KNOT HEADWIND
0 WIND
50 KNOT TAILWIND
LONG RANGE (POWER & SPEED)

GROSS WEIGHT POUNDS

BHP/ENGINE

AIR NAUTICAL MILES PER POUND OF FUEL

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS
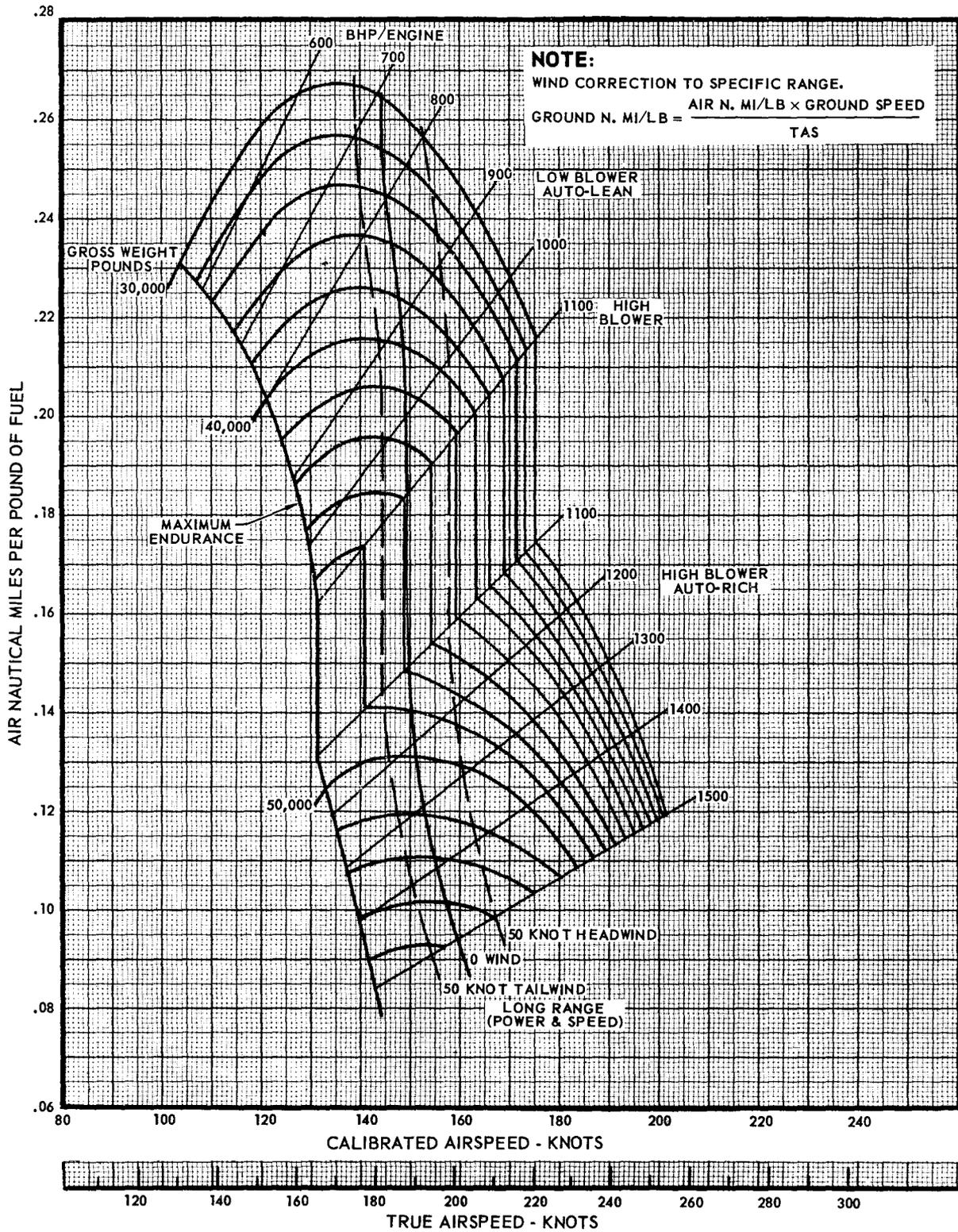
10,777A

Figure 1A5-4

NAUTICAL MILES PER POUND OF FUEL - 20,000 FEET

MODEL: T-29 A/B
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

TWO ENGINE CRUISE   STANDARD ATMOSPHERE

ENGINES: R2800-97

NOTE:
WIND CORRECTION TO SPECIFIC RANGE.

$$\text{GROUND N. MI/LB} = \frac{\text{AIR N. MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$
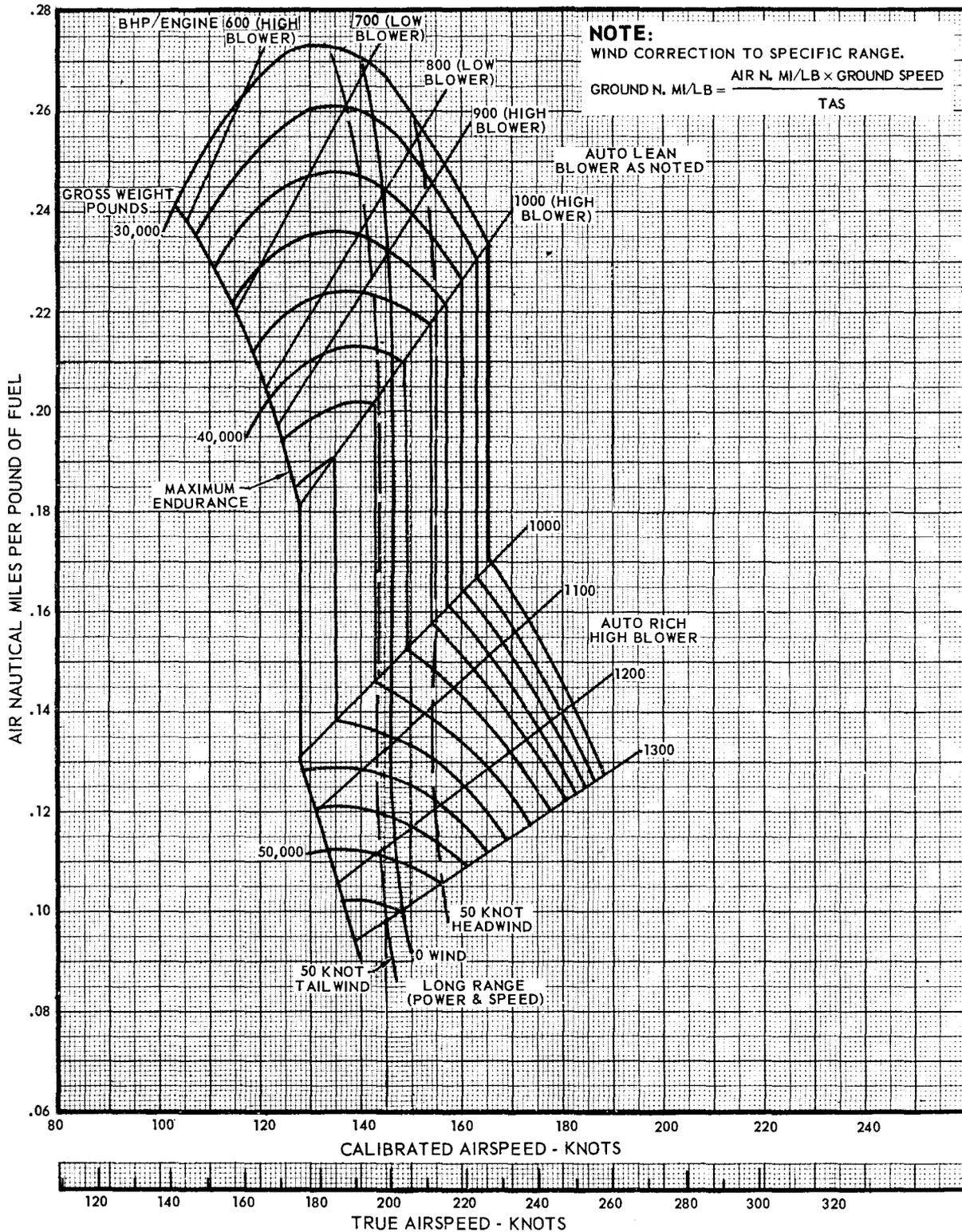
10,778A

Figure 1A5-5

MODEL: **T - 29 A/B**
DATE: 15 JULY 1955
DATA BASIS: **FLIGHT TEST**

MAXIMUM ENDURANCE SUMMARY

TWO ENGINES   STANDARD ATMOSPHERE   CLEAN CONFIGURATION
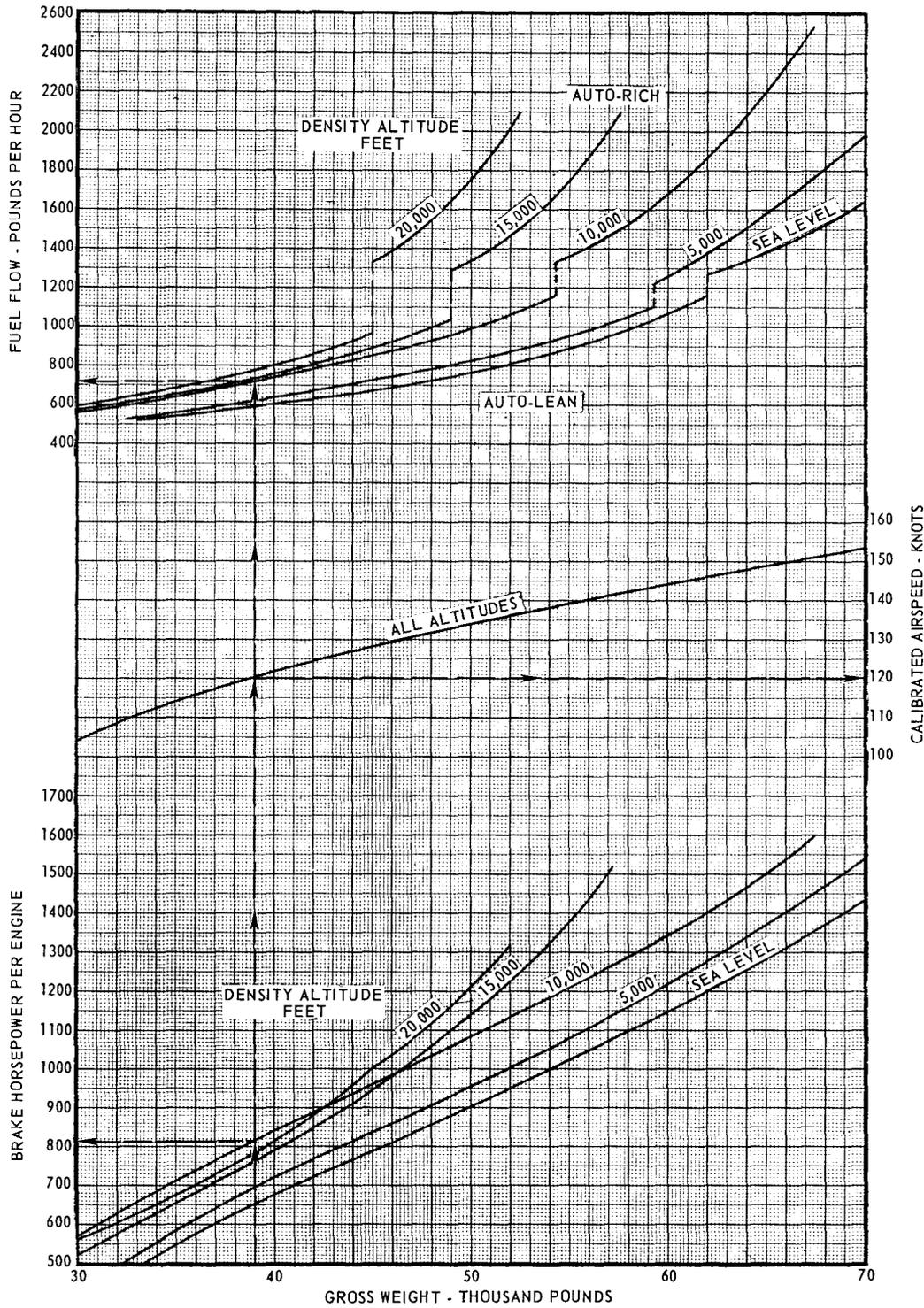
ENGINES: **R2800 - 97**

10,780A

Figure 1A5-6

MODEL: T-29A/B	LONG RANGE PREDICTION - DISTANCE	
DATE: 15 JULY 1955	TWO ENGINE	
DATA BASIS: FLIGHT TEST	STANDARD ATMOSPHERE CLEAN CONFIGURATION	ENGINES: R2800-97

Figure 1A5-7

10,739A

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

LONG RANGE PREDICTION - TIME
TWO ENGINE
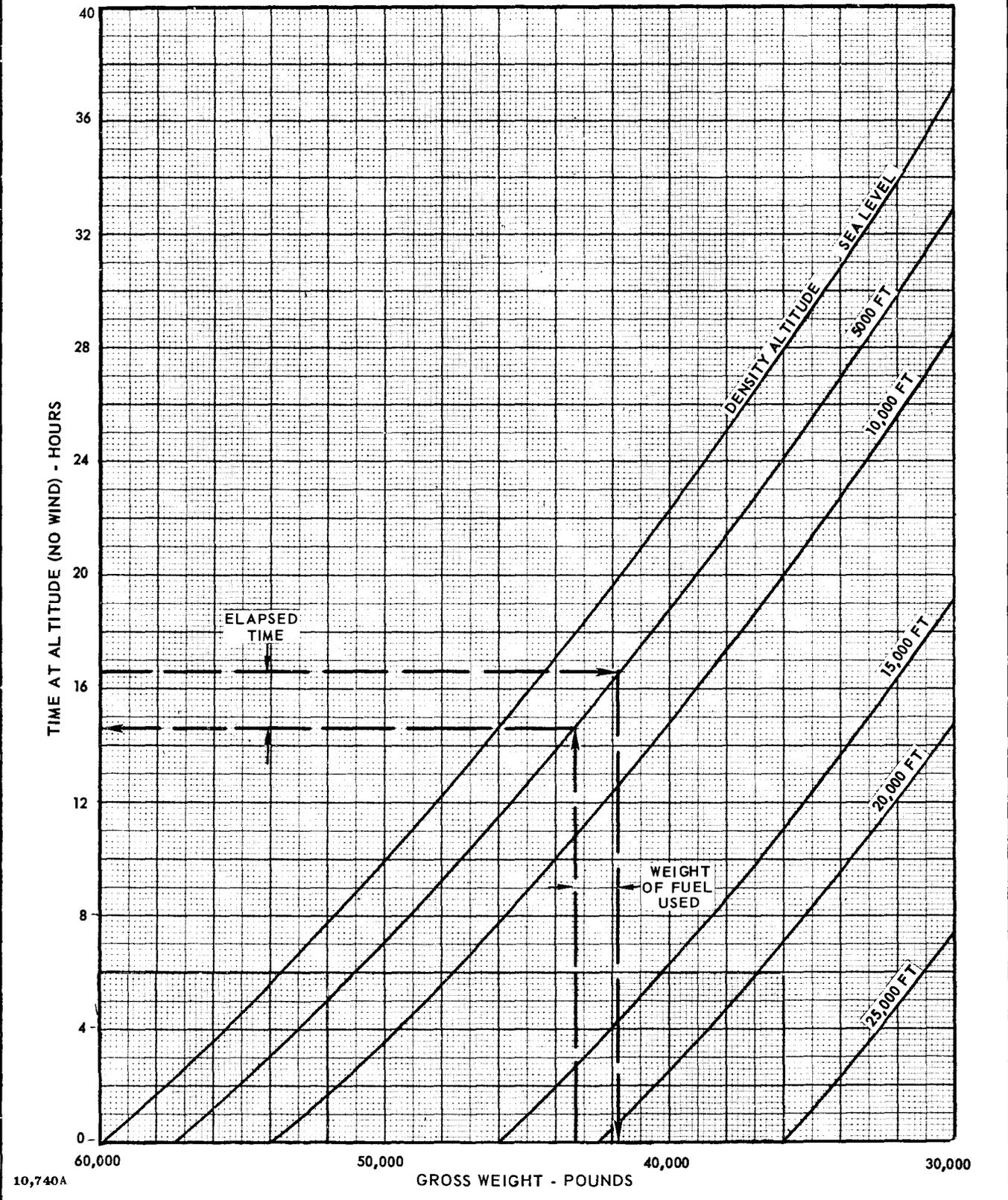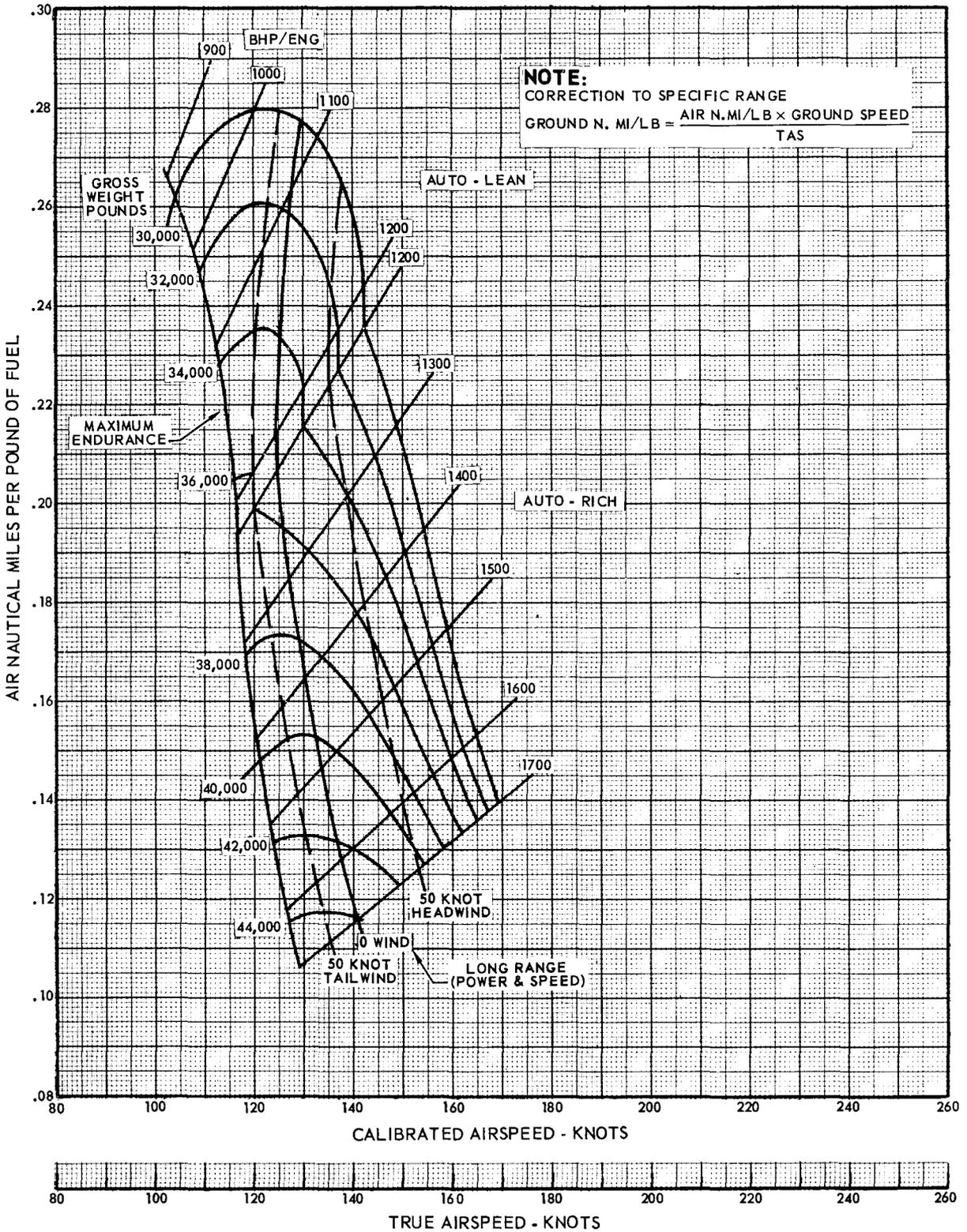STANDARD ATMOSPHERE   CLEAN CONFIGURATION

ENGINES: **R2800-97**

Figure 1A5-8

**NAUTICAL MILES PER POUND OF FUEL -
ONE ENGINE INOPERATIVE - SEA LEVEL**

MODEL: **T - 29 A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

PROPELLER FEATHERED   LOW BLOWER   STANDARD ATMOSPHERE

ENGINES: **R2800 - 97**

NOTE:
CORRECTION TO SPECIFIC RANGE
$$\text{GROUND N. MI/LB} = \frac{\text{AIR N.MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

10,781A

Figure 1A5-9

NAUTICAL MILES PER POUND OF FUEL
ONE ENGINE INOPERATIVE - 5000 FEET

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

PROPELLER FEATHERED   STANDARD ATMOSPHERE   LOW BLOWER   ENGINES: **R2800-97**

NOTE:
WIND CORRECTION TO SPECIFIC RANGE.
GROUND N.MI/LB = AIR N.MI/LB × $\dfrac{\text{GROUND SPEED}}{\text{TAS}}$
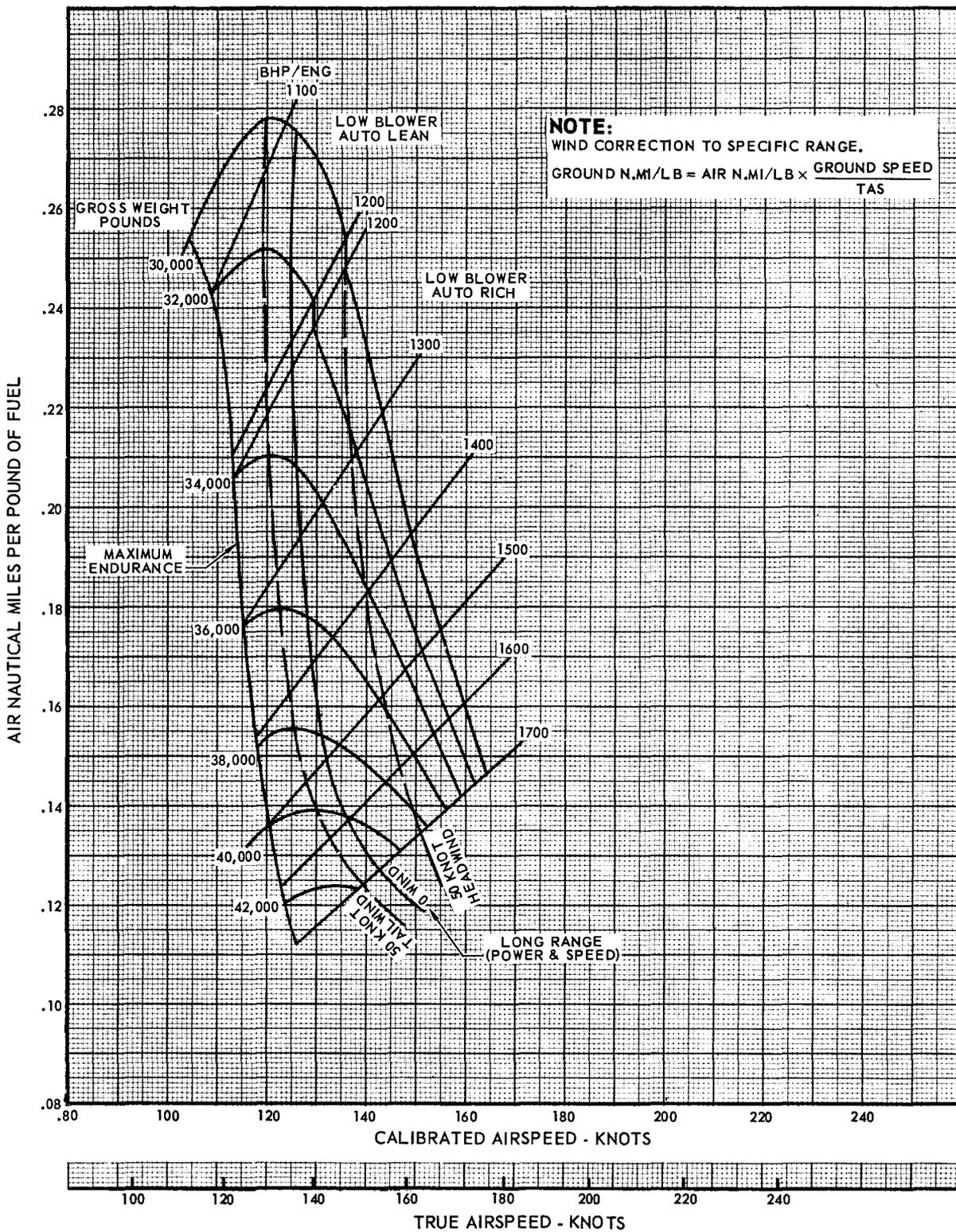
10,782

Figure 1A5-10

NAUTICAL MILES PER POUND OF FUEL ONE ENGINE INOPERATIVE - 10,000 FEET
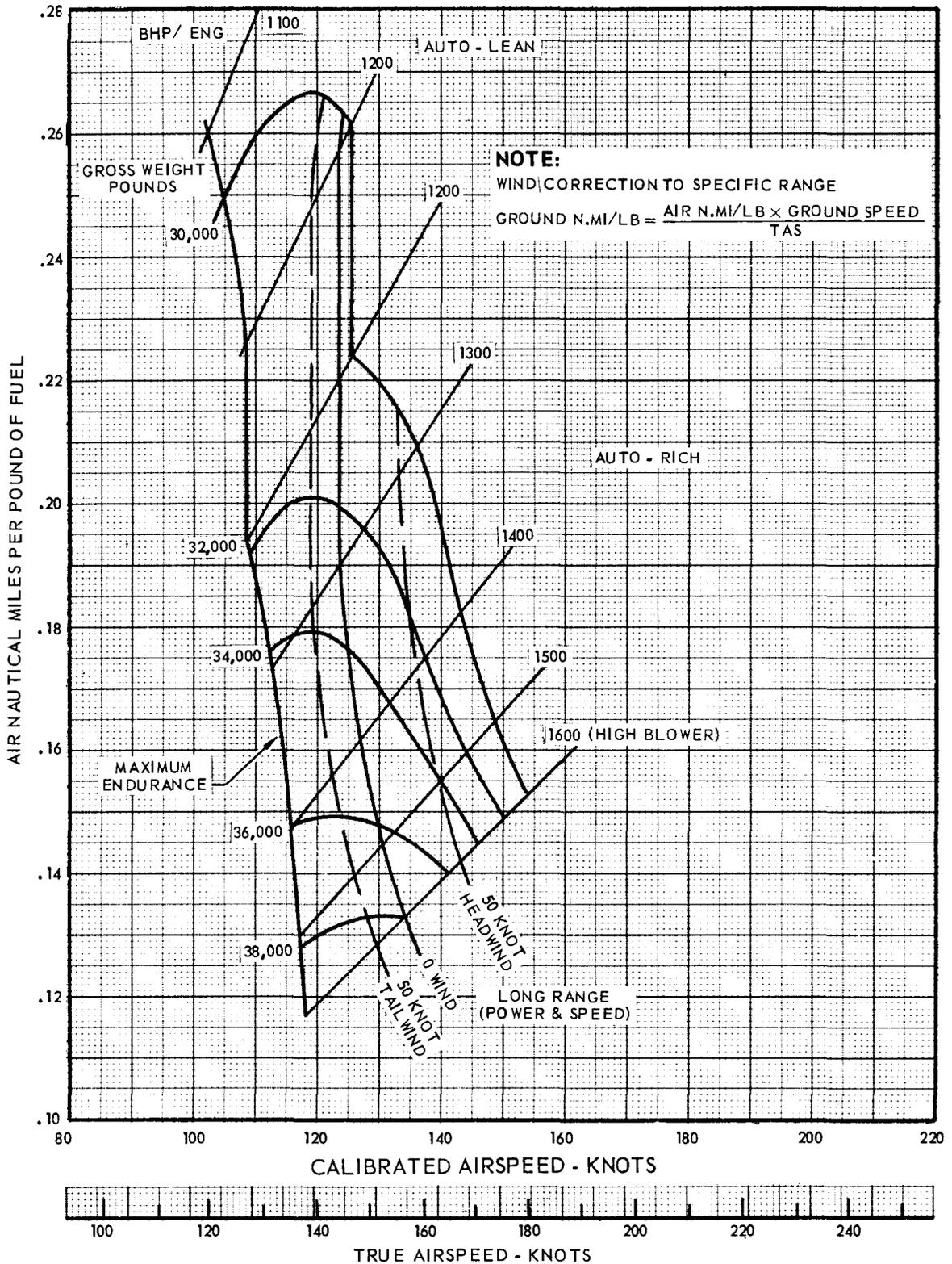
MODEL: **T-29 A/B**   PROPELLER FEATHERED   LOW BLOWER   STANDARD ATMOSPHERE

DATE: 15 JULY 1955

DATA BASIS: FLIGHT TEST
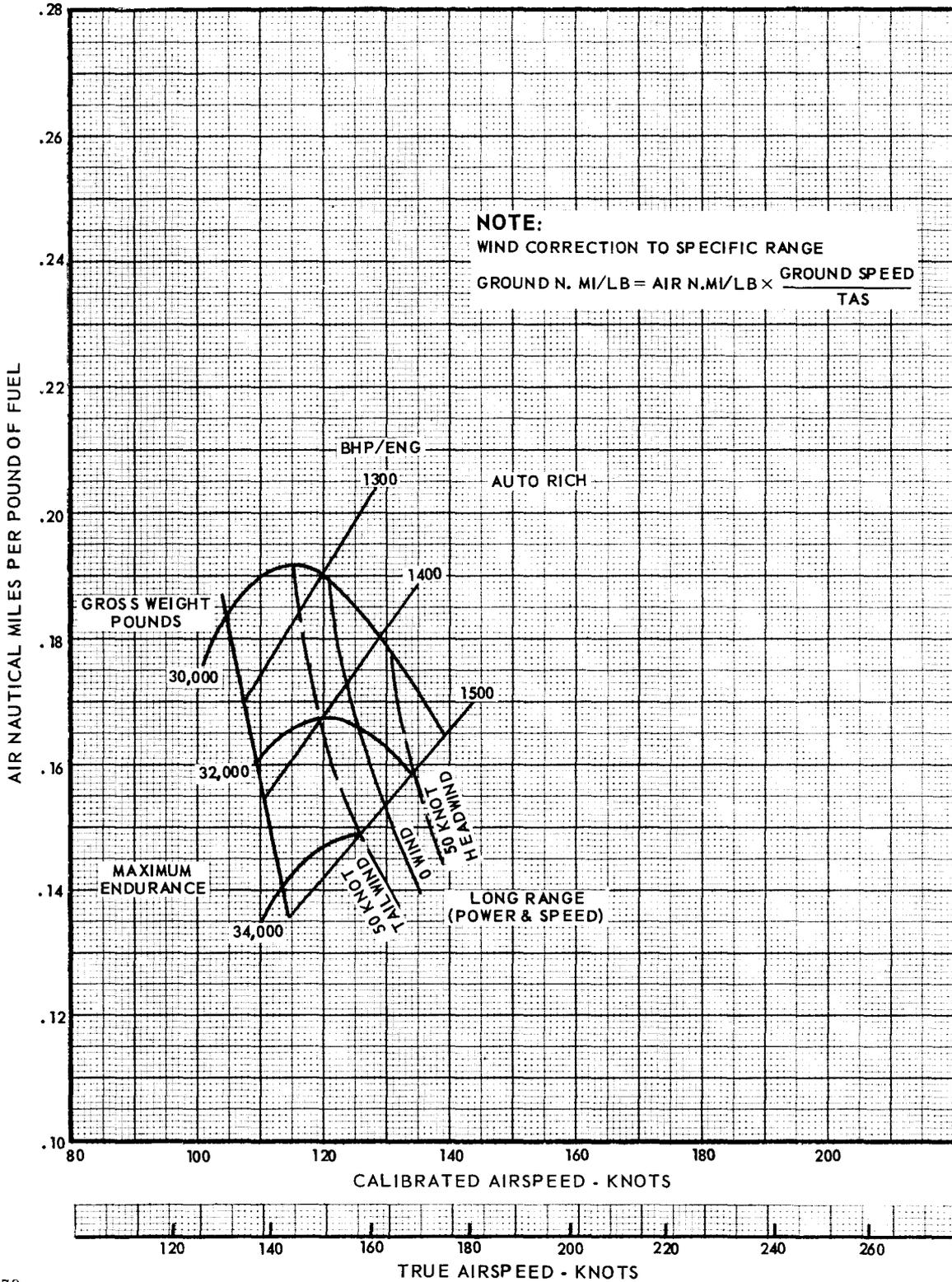
ENGINES: **R2800-97**

NOTE:

WIND CORRECTION TO SPECIFIC RANGE

$$\text{GROUND N.MI/LB} = \frac{\text{AIR N.MI/LB} \times \text{GROUND SPEED}}{\text{TAS}}$$

BHP/ENG

1100

AUTO - LEAN

1200

1200

GROSS WEIGHT POUNDS

30,000

1300

AUTO - RICH

32,000

1400

34,000

1500

1600 (HIGH BLOWER)

MAXIMUM ENDURANCE

36,000

50 KNOT HEADWIND

0 WIND

50 KNOT TAILWIND

38,000

LONG RANGE (POWER & SPEED)

AIR NAUTICAL MILES PER POUND OF FUEL

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

10,783A

Figure 1A5-11

MODEL: **T-29A/B**
DATE: 15 JULY 1955
DATA BASIS: FLIGHT TEST

NAUTICAL MILES PER POUND OF FUEL
ONE ENGINE INOPERATIVE - 15,000 FEET
PROPELLER FEATHERED   STANDARD ATMOSPHERE   HIGH BLOWER   ENGINES: **R2800-97**

NOTE:
WIND CORRECTION TO SPECIFIC RANGE

$$\text{GROUND N. MI/LB} = \text{AIR N.MI/LB} \times \frac{\text{GROUND SPEED}}{\text{TAS}}$$

BHP/ENG
1300
AUTO RICH
1400
GROSS WEIGHT POUNDS
30,000
1500
32,000
MAXIMUM ENDURANCE
34,000
50 KNOT TAILWIND
0 WIND
50 KNOT HEADWIND
LONG RANGE (POWER & SPEED)

AIR NAUTICAL MILES PER POUND OF FUEL

CALIBRATED AIRSPEED - KNOTS

TRUE AIRSPEED - KNOTS

10,779

Figure 1A5-12

PART 6 — APPROACH AND LANDING

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The symbol * indicates an illustration

APPROACH AND LANDING

Extending the flaps decreases the landing speed and decreases the landing field length. Wing flaps should not be extended to the landing position until the landing is assured. In normal flight planning, the greater of the available landing wing flap settings (39°, 28°, 20°, 15° and 0°) should be considered first. Specifically note that for each of the landing flap settings there is a corresponding approach flap setting. The selection of the landing flap setting should be based on the ability of the corresponding approach flap setting to assure adequate single-engine climb performance in the approach configuration in the event of a go-around or the need to lengthen the approach flight path. The recommended approach speeds are based on 130% of power-off stall speeds; touchdown at 110% of stall speed.

Note

The approach speeds shown on the charts are indicated airspeeds. Because of position error in the pitot system at the low speeds being used, the indicated approach speeds do not bear a direct relationship to the indicated stall speeds as shown in the Power-Off Stall Speed Chart in Section VI. To correctly calculate the approach and touchdown speeds, it is necessary to convert the indicated stall speed to calibrated airspeed. Using the Airspeed Calibration Chart, multiply by 1.1 or 1.3, and then reconvert the resultant speed to indicated airspeed.

Benefits derived from the brakes are maximum at the lower speeds and minimum at the higher speeds or just after touchdown. Unnecessary use of the brakes greatly reduces their life. Therefore, the landing distance required, as determined from the Appendix data, should be compared to the available runway length. Only in cases where the landing distance required equals the available field length should a minimum roll landing be made. When the available runway length is greater than the calculated minimum landing distance, as determined from the charts, the airplane can be stopped with less than maximum braking.

DISCUSSION OF CHARTS

Note

See landing pattern diagram, Section II.

APPROACH AND LANDING SPEEDS CHART

The recommended airspeeds for maneuver $(1.4V_{stall})$, approach $(1.3V_{stall})$, and touchdown $(1.1V_{stall})$ with landing gear down may be determined from the Approach and Landing Speeds Chart (figure 1A6-1). The chart is presented for the gross weight and flap setting operating range of the airplane. Power-off stall speeds are included on the chart.

EXAMPLE

Given:

Gross weight = 38,000 pounds.

Flap setting – Approach = 12°.

Flap setting – Touchdown = 28°.

Enter chart at gross weight of 38,000 pounds (A) and read up to flap deflection of 12° (B). Read across to

1.3 stall speed line (approach) (C), and read up to find IAS of 116 knots (D). For 28° flap deflection enter at gross weight of 38,000 pounds (A) and read up to 28° flap deflection (E). Read across to the 1.1 stall speed line (touchdown) (F), and read up for 93 knots IAS (C).

LANDING GROUND ROLL

Landing ground roll is defined as the distance from touchdown to a stop using normal pilot techniques specified in Section II with brakes only (both propellers windmilling). For a minimum roll landing, it is important to initiate wing flap retraction as soon as possible after the airplane is firmly on the ground. Retracting the wing flaps decreases the wing lift and allows more weight to be applied to the main wheels, thus increasing the braking efficiency and shortening the landing roll. Reverse propeller thrust is recommended since it will appreciably shorten the landing roll. The landing ground roll charts (figure 1A6-2 through 1A6-6) present landing distance density altitude, gross weight, and headwind.

EXAMPLE

Given:

Density altitude = 1800 feet.

Gross weight = 36,000 pounds.

Headwind = 5 knots.

Flap setting = 28°.

Select chart for 28° flap (figure 1A6-3). Enter chart at density altitude of 1800 feet (A). Read across to

gross weight of 36,000 pounds (B) and read down to wind velocity curve and follow headwind curve to 5 knots (C) and read down to find distance of 3100 feet (D). To compute for landing distance, multiply landing roll by 1.22 (3100 X 1.22 = 3775 feet).

Effects of Unusual Runway Conditions on Landing Ground Roll

The landing ground roll charts (figures 1A6-2 through 1A6-6) are based on landing on a dry, hard surface. The landing ground roll can be corrected for other surface conditions by multiplying the ground roll distance by the stopping factor from the Stopping Capability Chart (figure 1A6-7). To use the chart, obtain the latest runway condition reading (RCR) from the base weather station.

Note

If no RCR is available, use 12 for a wet runway and 5 for an icy runway.

EXAMPLE

Given:

RCR = 14.

Ground roll distance = 3100 feet.

Enter the Stopping Capability Chart (figure 1A6-7) with RCR of 14 (A). Move horizontally to curve (B), then vertically to obtain stopping factor of 1.27 (C). Multiply the dry, hard surface runway ground roll (3100) by the stopping distance factor (1.27) to determine the ground roll on a slippery runway (3100 X 1.27 = 3937 feet).

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

APPROACH AND LANDING SPEEDS
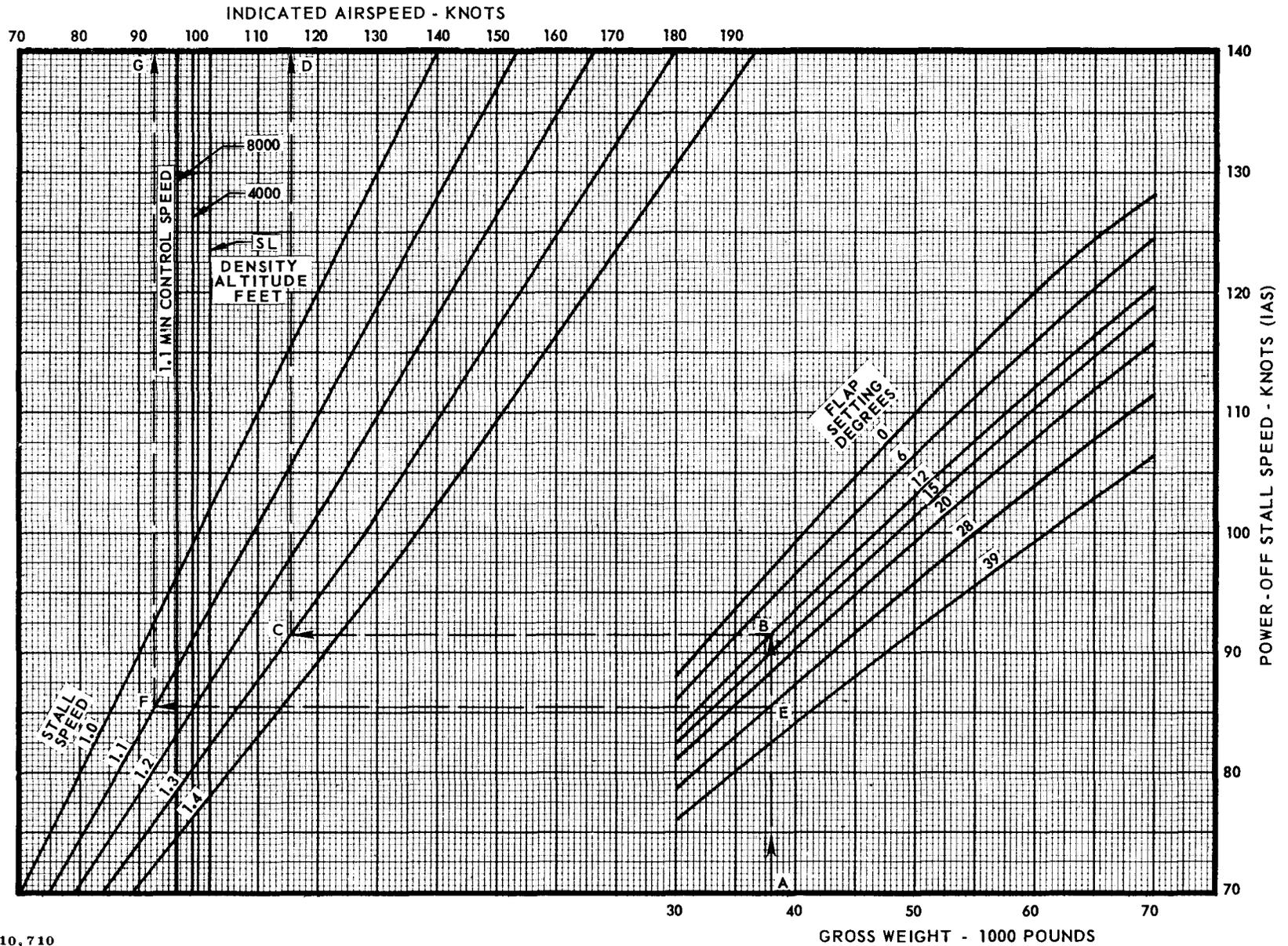
LANDING GEAR DOWN   0° BANK

ENGINES: **R2800-97**

INDICATED AIRSPEED - KNOTS

70   80   90   100   110   120   130   140   150   160   170   180   190

G   D

1.1 MIN CONTROL SPEED

8000

4000

SL

DENSITY
ALTITUDE
FEET

FLAP
SETTING
DEGREES
0
6
12
15
20
28
39

C

B

STALL
SPEED
1.0

F

E

1.1
1.2
1.3
1.4

A

140
130
120
110
100
90
80
70

POWER-OFF STALL SPEED - KNOTS (IAS)

30   40   50   60   70

GROSS WEIGHT - 1000 POUNDS

10,710

LANDING GROUND ROLL (39° FLAP)

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

APPROACH FLAP 20°   BRAKES ONLY
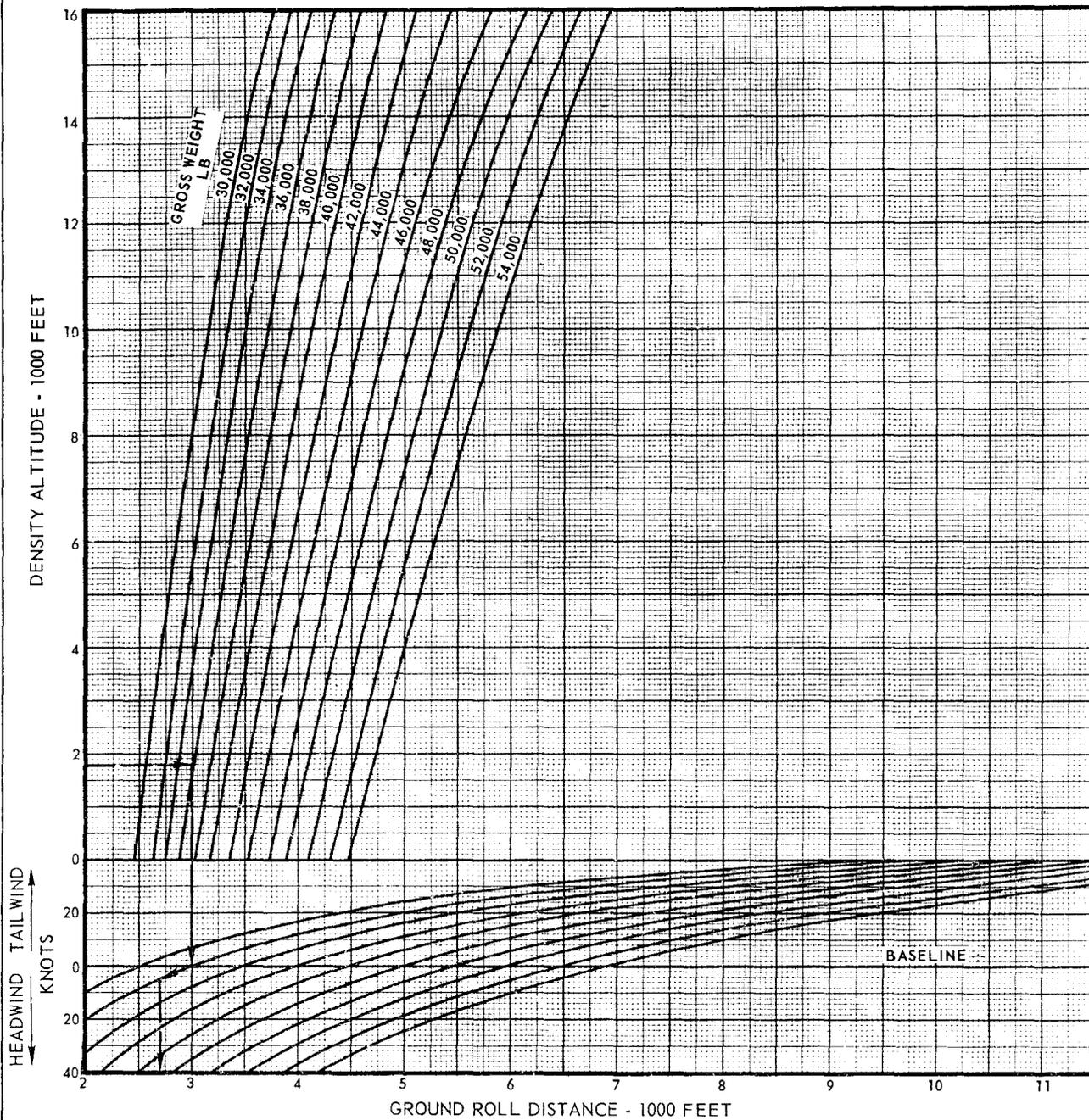
ENGINES: **R2800-97**

DENSITY ALTITUDE - 1000 FEET

GROSS WEIGHT LB
30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000

HEADWIND   TAILWIND
KNOTS

BASELINE

GROUND ROLL DISTANCE - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 20° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.1 POWER OFF STALL SPEED.

(5) LANDING FIELD LENGTH FROM 50 FEET HEIGHT IS 122% OF THE GROUND ROLL SHOWN.

(6) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.

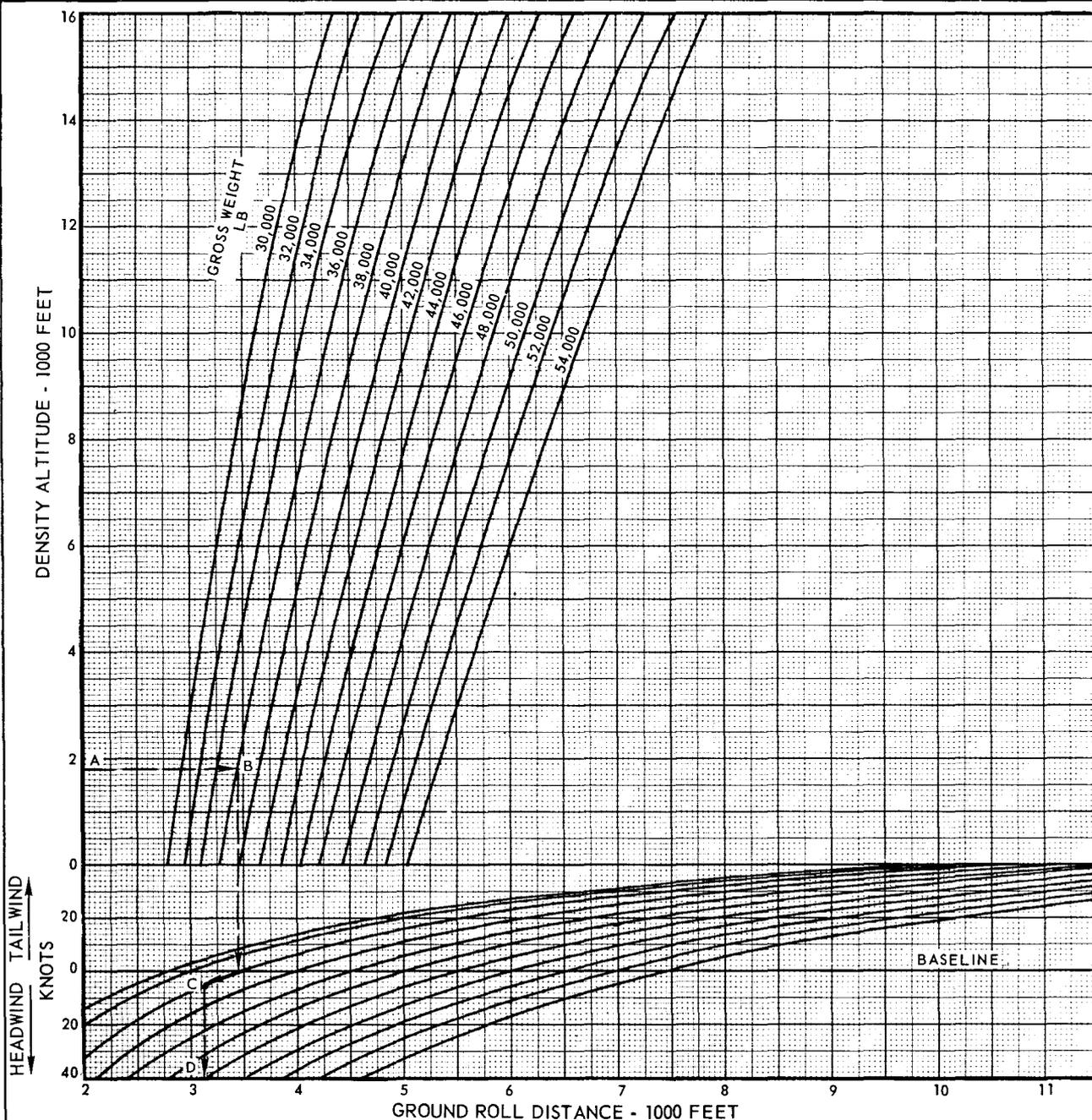(7) 100% WIND ACCOUNTABILITY

45,453C

Figure 1A6-2

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

LANDING GROUND ROLL (28° FLAP)
APPROACH FLAP - 12°   BRAKES ONLY

ENGINES: **R2800-97**

DENSITY ALTITUDE - 1000 FEET

GROSS WEIGHT LB
30,000
32,000
34,000
36,000
38,000
40,000
42,000
44,000
46,000
48,000
50,000
52,000
54,000

A   B

HEADWIND TAILWIND KNOTS

BASELINE

C

D

GROUND ROLL DISTANCE - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 12° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.1 POWER OFF STALL SPEED.

(5) LANDING FIELD LENGTH FROM 50 FT HEIGHT IS 122% OF THE GROUND ROLL SHOWN.

(6) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.
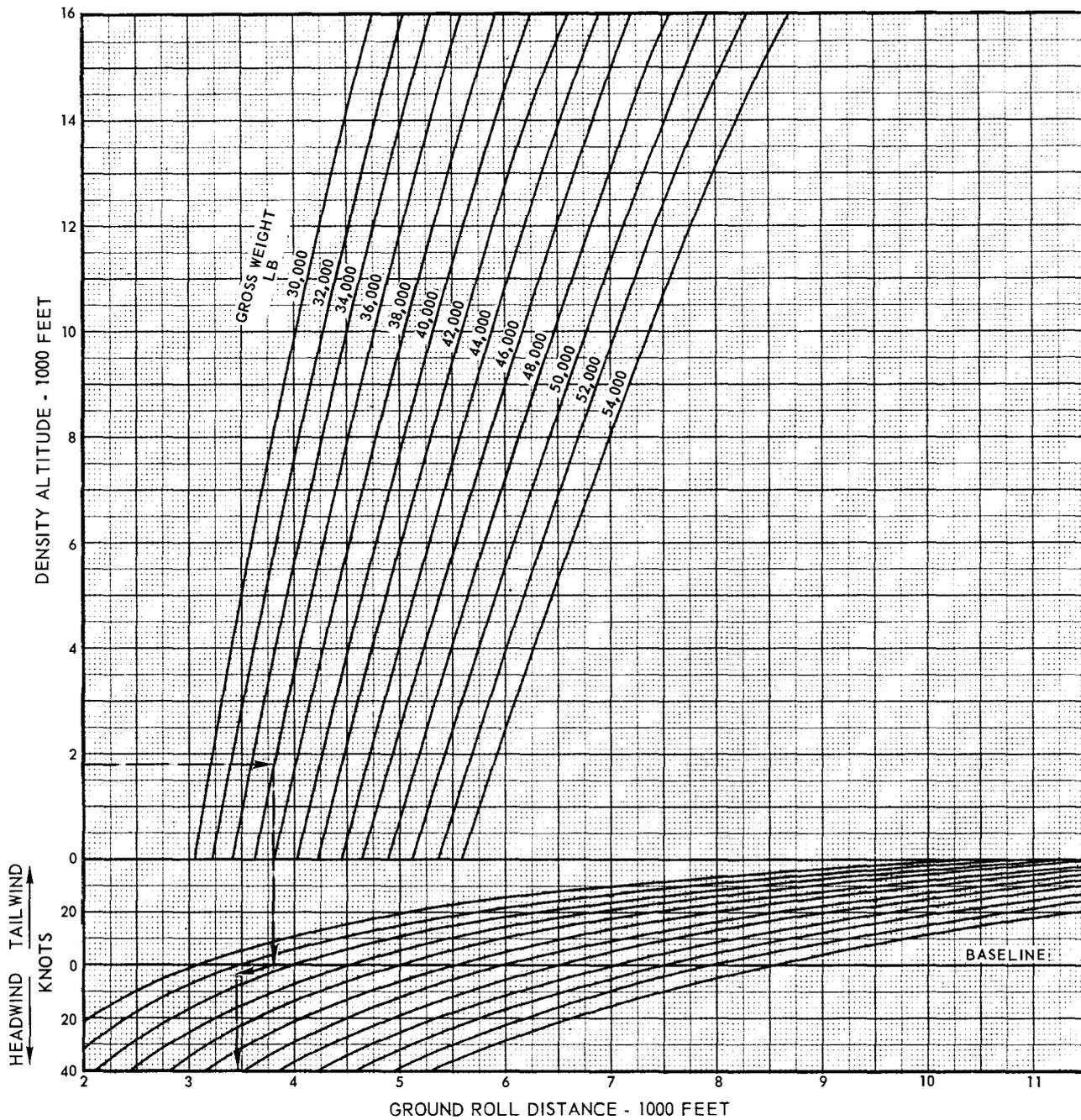
(7) 100% WIND ACCOUNTABILITY.

45,455C

Figure 1A6-3

LANDING GROUND ROLL (20° FLAP)
APPROACH FLAP 6°
BRAKES ONLY

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

ENGINES: **R2800-97**

DENSITY ALTITUDE - 1000 FEET

TAILWIND ← HEADWIND / KNOTS

GROSS WEIGHT LB: 30,000 32,000 34,000 36,000 38,000 40,000 42,000 44,000 46,000 48,000 50,000 52,000 54,000

BASELINE

GROUND ROLL DISTANCE - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 6° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.1 POWER OFF STALL SPEED.

(5) LANDING FIELD LENGTH FROM 50 FT HEIGHT IS 122% OF THE GROUND ROLL SHOWN.

(6) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.

(7) 100% WIND ACCOUNTABILITY.

45,976B

Figure 1A6-4

LANDING GROUND ROLL (15° FLAP)

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

APPROACH FLAP - 0°   BRAKES ONLY

ENGINES: **R2800-97**

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLERS WINDMILLING. MAXIMUM REVERSE WILL REDUCE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON DRY HARD SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) DO NOT EXTEND FLAPS MORE THAN 0° UNTIL LANDING IS ASSURED.

(4) TOUCHDOWN AT 1.1 POWER OFF STALL SPEED.

(5) LANDING FIELD LENGTH FROM 50 FT HEIGHT IS 122% OF THE GROUND ROLL SHOWN.

(6) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.
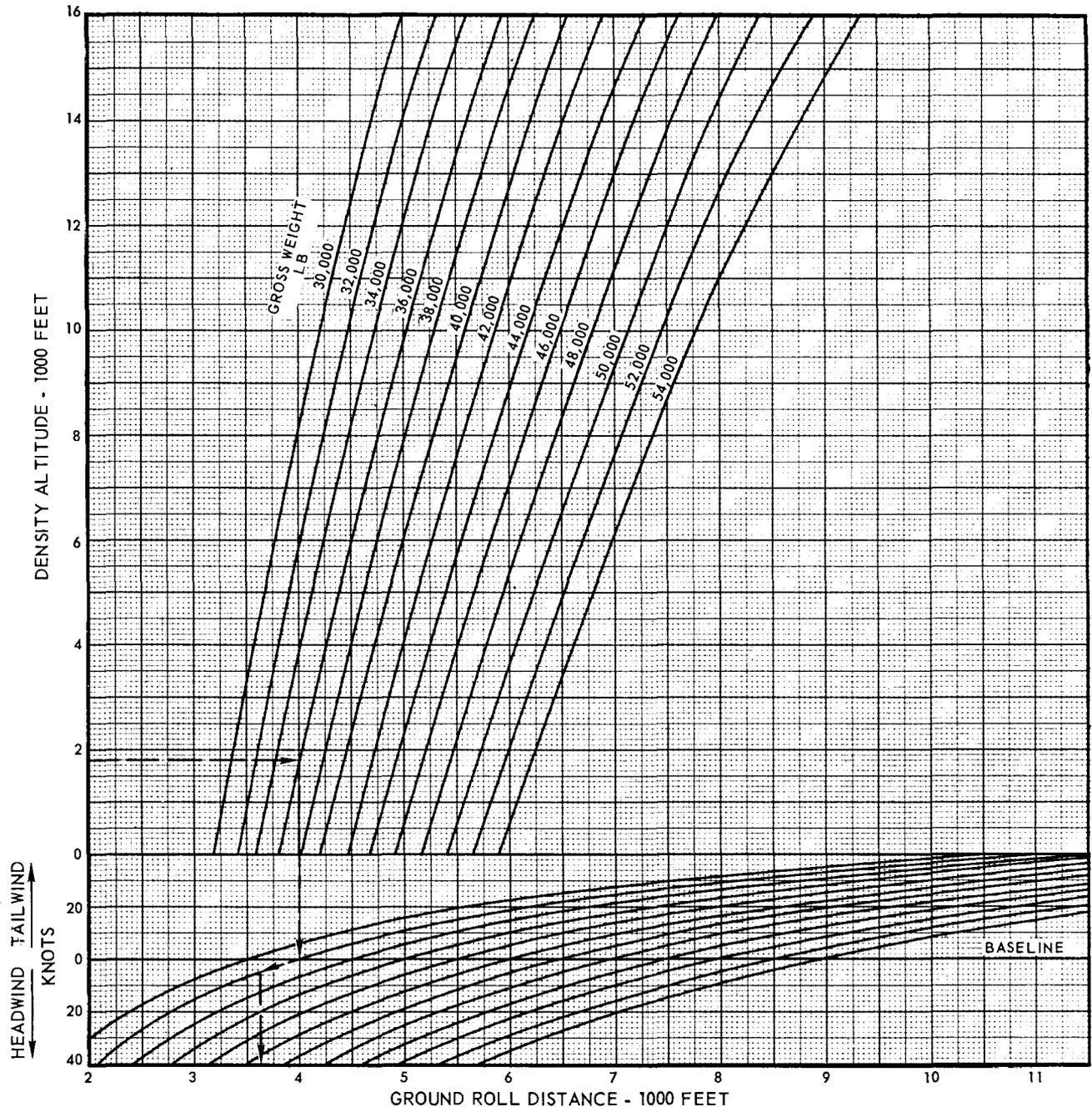
(7) 100% WIND ACCOUNTABILITY.

45,457C

Figure 1A6-5

MODEL: **T-29A/B**
DATE: 15 MARCH 1955
DATA BASIS: FLIGHT TEST

LANDING GROUND ROLL (0° FLAP)

APPROACH FLAP - 0°   BRAKES ONLY

ENGINES: **R2800-97**

GROSS WEIGHT LB: 30,000 / 32,000 / 34,000 / 36,000 / 38,000 / 40,000 / 42,000 / 44,000 / 46,000 / 48,000 / 50,000 / 52,000 / 54,000

DENSITY ALTITUDE - 1000 FEET

HEADWIND / TAILWIND KNOTS

BASELINE

GROUND ROLL DISTANCE - 1000 FEET

NOTES:

(1) GROUND ROLL IS FOR BRAKES ONLY, WITH PROPELLER WINDMILLING. MAXIMUM REVERSE WILL REDUCE THE GROUND ROLL BY 45%.

(2) DISTANCES ARE BASED ON HARD DRY SURFACED RUNWAY WITH FLAP RETRACTION INITIATED AT 0.9 STALL SPEED.

(3) TOUCHDOWN AT 1.1 POWER OFF STALL SPEED.

(4) LANDING FIELD LENGTH FROM 50 FEET HEIGHT IS 122% OF THE GROUND ROLL SHOWN.

(5) MULTIPLY GROUND ROLL DISTANCE BY STOPPING FACTOR FROM STOPPING CAPABILITY CHART.
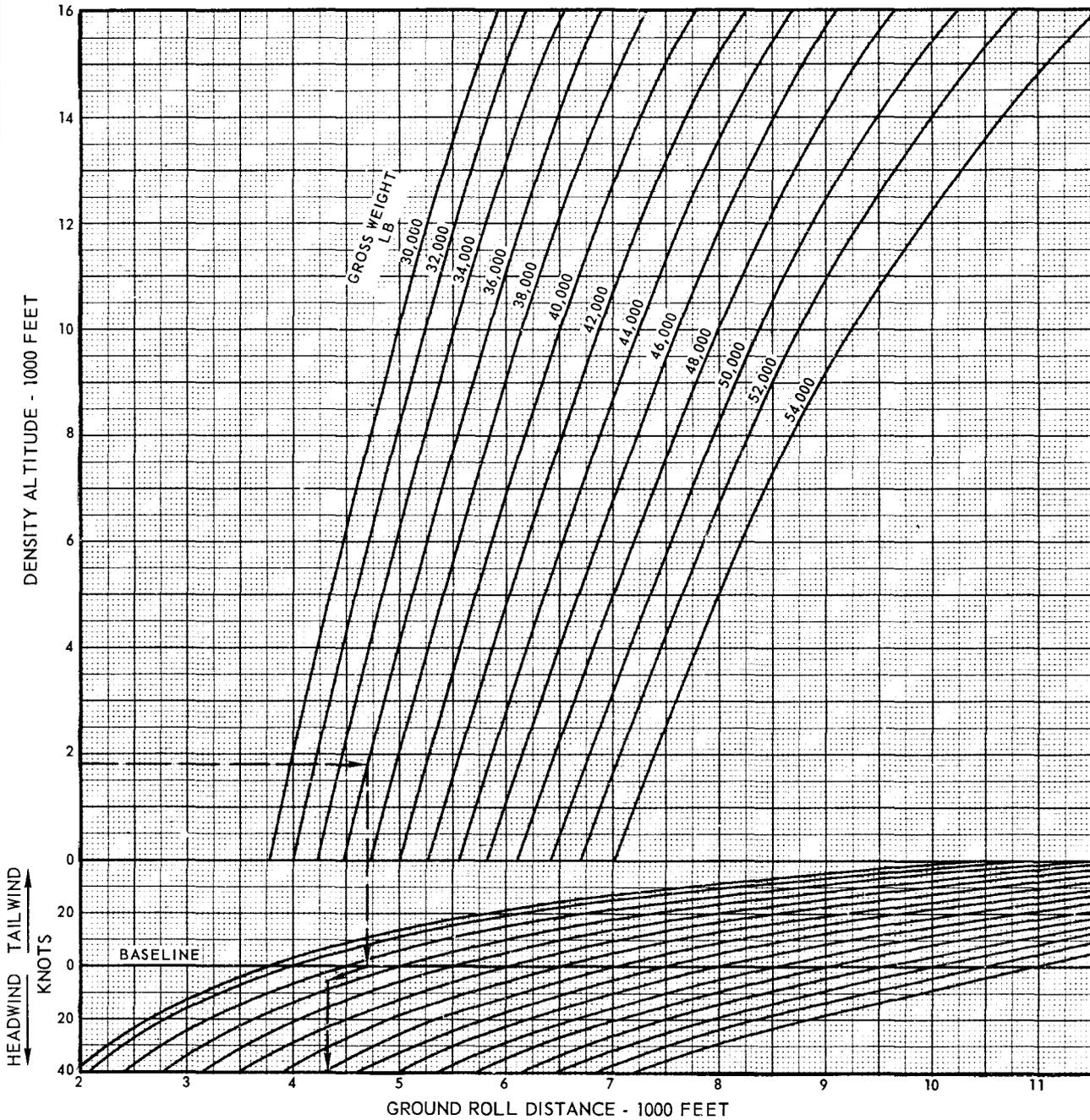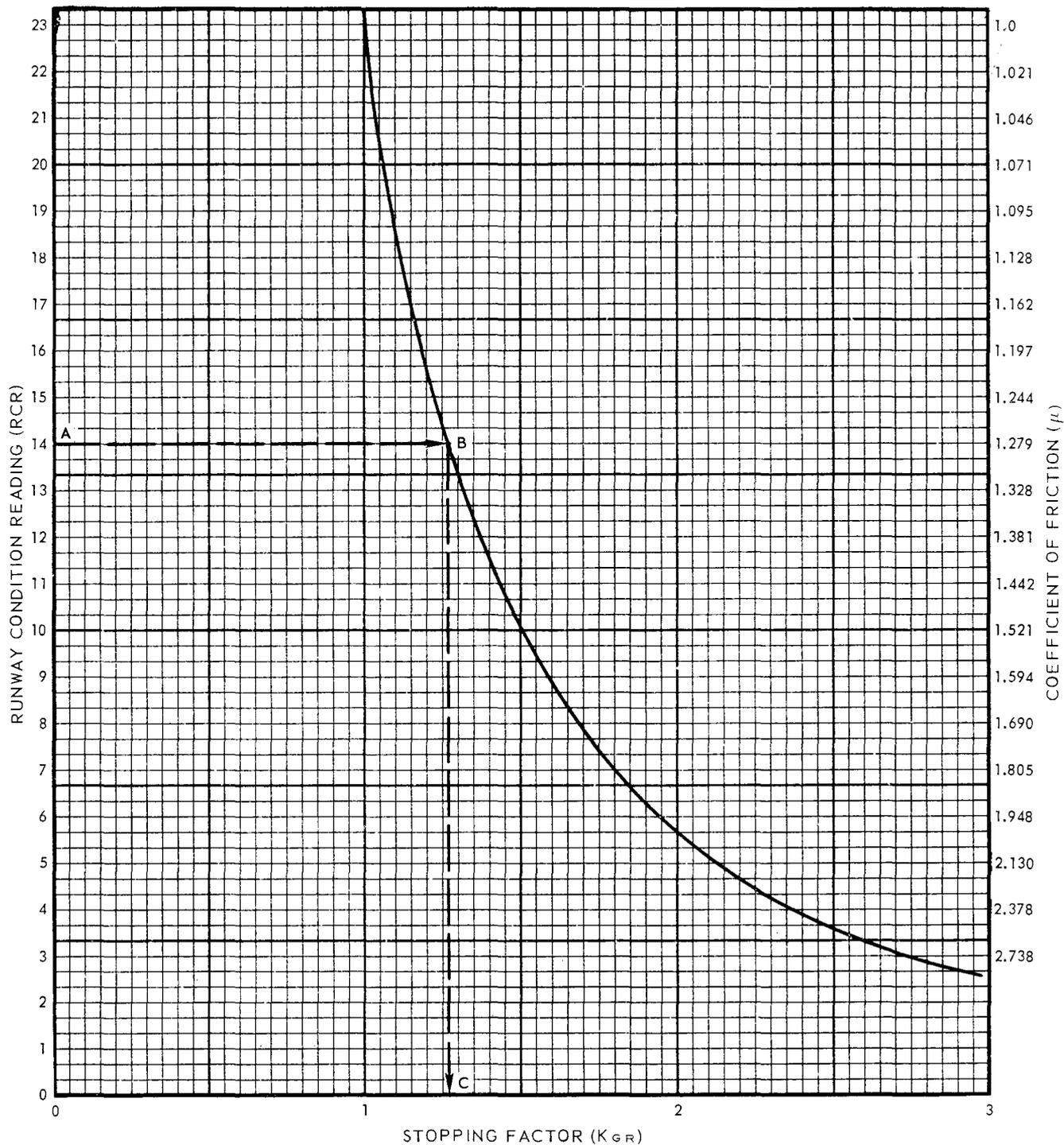
(6) 100% WIND ACCOUNTABILITY

45,459C

Figure 1A6-6

MODEL: **T-29 A/B**
DATE: 5 DECEMBER 1967
DATA BASIS: **ESTIMATED**

STOPPING CAPABILITY CHART

ENGINES: **R-2800-97**

10,784 A

Figure 1A6-7

PART 7 — MISSION PLANNING

Ⓐ   Ⓑ

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MISSION PLANNING

Completion of the Takeoff and Landing Data (TOLD) card (AFTO Form 377) is required for all flights. AFTO Form 377 is available through normal forms distribution channels or may be locally reproduced in emergency situations under provisions of AFM 7-1. Fill out the TOLD card using the operating data in the Appendix or using the precomputed data. To be prepared for an emergency landing immediately after takeoff, complete both the TAKEOFF and LANDING IMMEDIATELY AFTER TAKEOFF portions of the TOLD card using takeoff gross weight. The LANDING portion of the card may be completed at this time or prior to landing at destination.

Note

Acceleration time/distance check data must be computed only when refusal speed is less than takeoff speed.

Adequate planning is an essential part of the successful performance of any mission. The scope of this discussion is limited to considering aircraft performance and associated planning procedures. The procedures suggested by the sample flight problem facilitate safe operation of the aircraft in all phases of the mission. A thorough knowledge of these procedures will provide quicker action in the event of an emergency and will aid in making sound decisions.

CONDITIONS - TAKEOFF - T-29/C-131

FIELD ELEVATION	GROSS WEIGHT	
RUNWAY LENGTH	WIND COMPONENT	
OAT °C	CAT °C	DEW POINT °F
PRESSURE ALTITUDE	DENSITY ALTITUDE	
RCR	SMOE	

TAKEOFF

MANIFOLD PRESSURE	
EXPECTED TPSI BMEP	
MINIMUM TPSI/BMEP	
TAKEOFF FLAP SETTING	
TAKEOFF SPEED (1.2)	
CRITICAL FIELD LENGTH	
REFUSAL SPEED	
TAKEOFF GROUND RUN	
SPEED TIME CHECK	/
DISTANCE/SPEED CHECK	/
SINGLE-ENGINE CLIMB SPEED (1.2 Clean)	
SINGLE-ENGINE ABSOLUTE CEILING (METO)	

LANDING IMMEDIATELY AFTER TAKEOFF

APPROACH FLAPS °	APPROACH SPEED (1.3) KIAS
GO-AROUND SPEED (1.2 - Approach Flaps)	KIAS
LANDING FLAPS	°
LANDING APPROACH SPEED (1.3)	KIAS
LANDING GROUND ROLL DISTANCE	/

AFTO FORM 377 JAN 70   **T-29/C-131 TOLD CARD**

CONDITIONS - LANDING

FIELD ELEVATION	GROSS WEIGHT	
RUNWAY LENGTH	WIND COMPONENT	
OAT °C	RCR	DEW POINT °F
PRESSURE ALTITUDE	DENSITY ALTITUDE	

LANDING

APPROACH FLAPS °	APPROACH SPEED (1.3) KIAS
GO-AROUND SPEED (1.2 - Approach Flaps)	KIAS
GO-AROUND SPEED (1.2 - Clean)	KIAS
LANDING FLAPS	°
LANDING APPROACH SPEED (1.3)	KIAS
LANDING GROUND ROLL/DISTANCE	

T-29 C-131 Takeoff and Landing Data (TOLD) Card

Complete the TOLD card in accordance with the following instructions.

CONDITIONS—TAKEOFF

FIELD ELEVATION. Enter the field elevation.

GROSS WEIGHT. Enter the gross weight at takeoff.

RUNWAY LENGTH. Enter the length of the runway that is available for takeoff.

HEADWIND COMPONENT. Figure 1A3-2, determine the headwind component.

OAT, CAT, DEW POINT. Obtain the outside air temperature (degrees C) and dew point (degrees F) for takeoff time. Carburetor air temperature will be outside air temperature plus one degree C.

PRESSURE ALTITUDE. Obtain the field pressure altitude for takeoff time.

DENSITY ALTITUDE. Figure 1A1-1, determine the density altitude.

TAKEOFF

MANIFOLD PRESSURE, EXPECTED TPSI, MINIMUM TPSI. Figure 1A2-1, determine the manifold pressure to be expected, the expected torque pressure, and the minimum torque pressure. Figure 1A2-2 may be used if dry data is desired.

TAKEOFF FLAP SETTING. Figure 1A3-3, enter at the desired minimum rate of climb and determine the takeoff flap setting. Utilize minimum TPSI (wet) in computations if ADI is available, or use minimum TPSI (dry) if a takeoff without ADI is planned. The approach flap setting may also be determined for landing immediately after takeoff.

TAKEOFF SPEED (1.2). Figure 1A3-7, determine the takeoff speed based on the flap setting to be used. Also determine the single-engine climb speed (clean) and the go-around speed using the 1.2 power-off stall speed line for approach flaps.

CRITICAL FIELD LENGTH. Based on the takeoff flap setting to be used (figures 1A3-8, 1A3-11, 1A3-14, and 1A3-17) determine the critical field length for a dry runway. If necessary, correct the critical field length with RCR correction determined from figure 1A3-20.

REFUSAL SPEED. Based on the takeoff flap setting to be used (figures 1A3-9, 1A3-12, 1A3-15, and 1A3-18) determine the refusal speed for a dry runway. If necessary, correct the refusal speed with the RCR correction determined from figure 1A3-20.

TAKEOFF GROUND RUN. Based on the takeoff flap setting to be used (figures 1A3-10, 1A3-13, 1A3-16, and 1A3-19) determine the takeoff ground roll.

Note

Acceleration time/distance check data is not required when refusal speed is greater than takeoff speed.

ACCELERATION TIME/DISTANCE CHECK. Figure 1A3-6, determine the speed/time data or the distance/speed data for an acceleration check.

SINGLE-ENGINE CLIMB SPEED (1.2 CLEAN). Figure 1A3-7, determine the single-engine climb speed if not previously accomplished.

SINGLE-ENGINE ABSOLUTE CEILING (METO). Figure 1A4-5, determine the absolute ceiling with METO power operation.

LANDING IMMEDIATELY AFTER TAKEOFF

Note

The information for this section will be based on takeoff gross weight.

APPROACH FLAPS. Figure 1A3-3, determine the approach flap setting for landing if not previously accomplished. The landing flap setting may be entered in the LANDING FLAPS space at this time.

APPROACH SPEED (1.3). Figure 1A6-1, determine the 1.3 stall speed for the approach flap setting. The 1.3 stall speed for the landing flap setting may also be determined at this time and entered in LANDING APPROACH SPEED (1.3).

GO-AROUND SPEED (1.2 APPROACH). Figure 1A3-7, determine the go-around speed if not previously accomplished.

LANDING FLAPS. Landing flaps are generally based on the amount of approach flaps used. Consult figures 1A6-2 through 1A6-6 for normal flap pairings.

LANDING APPROACH SPEED (1.3). Figure 1A6-1, determine the approach speed for the landing flap setting if not previously accomplished.

LANDING GROUND ROLL/DISTANCE. Based on the landing flap setting to be used (figures 1A6-2 through 1A6-6) determine the landing ground roll. Determine the landing distance (landing over a 50-foot obstacle) by multiplying the landing ground roll by 1.22. If applicable, correct the landing ground roll according to the RCR stopping factor, figure 1A6-7.

CONDITIONS—LANDING AND LANDING

Note

The landing portion of the card may be completed prior to takeoff if weather at destination is available. All items in this section will be completed as previously discussed for like entries.

Sample Flight Problem

To illustrate the use of the charts in this Appendix, a sample flight problem is presented and solved in the following paragraphs.

Note

This example presents a transport mission. Refer to MISSION PLANNING, Appendix II, for a radius navigational training mission sample problem.

Weather, Field and Trip Information

Field elevation pressure altitude	5000 ft
Outside air temperature	10°C
Dew point	35°F
Headwind	10 knots
Runway length	7500 ft
Runway slope	1% up
Airplane operating weight	29,858 lb
Trip length	720 n mi

Weather and Field Information at Destination

Field elevation pressure altitude	1250 ft
Outside air temperature	20°C
Dew point	50°F
Headwind	15 knots
Runway length	8100 ft

Determine Density Altitude

Using: (Density Altitude Chart, figure 1A1-1)

Enter chart at OAT	10°C
Proceed vertically to pressure altitude line	5000 ft
Proceed horizontally to density altitude scale	
Read density altitude	5600 ft

Determine Cruise Weight Due to Terrain

The range charts and the climb charts are used to determine the fuel required for the mission. For the purpose of this sample problem a minimum enroute altitude of 10,000 feet will be used. This altitude will allow for a vertical terrain clearance of at least 2000 feet at any point along the flight path.

Using: (Ceiling—One Engine Inoperative Chart, figure 1A4-5)

Enter chart on altitude base line at	10,000 ft
Proceed horizontally to interception of Meto power curve at absolute ceiling, then proceed vertically to gross weight scale and read gross weight	38,900 lb

Note

It is important to remember that this weight is the weight of the airplane at start of cruise at 10,000 feet. To this weight will be added the necessary fuel weight for the climb to the cruise altitude.

Determine Takeoff Weight

Note

The airplane's lift and drag depend primarily upon the density of the air, while the engine power depends upon the pressure of the air, until full throttle is reached. To determine the climb performance under non-standard conditions, one must determine the fuel, distance and time to climb using density altitudes and obtain the standard power for that altitude by adjusting the manifold pressures as required.

Using: (Operational Climb—Distance and Fuel, figure 1A4-2)

Note airspeed (IAS)	140 knots
Enter chart at gross weight of	38,900 lb
Proceed vertically to density altitude curve	10,000 ft
Read horizontally to distance	31 n mi
Parallel guide line to fuel consumed in climb scale and read	360 lb
Parallel guide lines to density altitude at start of climb	5600 ft
Read: Distance	15 n mi
Fuel	175 lb

Subtract start-of-climb values from end-of-climb values to determine:

Distance in climb	16 n mi
Fuel consumed in climb	185 lb

1A7-3

Add fuel consumed in climb to
weight at end of climb to
determine:

Takeoff weight	39, 085 lb

Note

This weight represents maximum take-
off weight for safe single-engine oper-
ation for enroute terrain clearance.

Determine Ramp Weight

Ramp weight represents a weight greater than max-
imum takeoff weight. The difference is the fuel that
is used for starting, runup, taxiing, and takeoff.
Allow 300 pounds of fuel for initial starting, runup,
taxiing, and takeoff, and 150 pounds for thru-flight
enroute stops. These figures are based on opera-
tional experience.

Using:	
Initial starting, runup, taxiing, and takeoff fuel	300 lb
Takeoff gross weight	39, 085 lb
Ramp weight	39, 385 lb

Note

Due to the many and varied operational
requirements, these figures may not
meet all situations. Therefore, it may
be necessary to modify these standard
fuel allowances.

Determine Fuel Used in Cruise

Using: (Long Range Prediction–Distance,
figure 1A5-7)

Enter chart at weight at start of cruise	38, 900 lb
Proceed vertically to density altitude line	10, 000 ft
Read distance at start	2900 n mi
Add required cruise distance (720 n mi trip minus 16 n mi used to climb leaves 704 n mi in cruise), find distance index at end of cruise	3604 n mi
Proceed horizontally to density altitude lines	10, 000 ft
Read weight at end of cruise	35, 900 lb
Subtract weight at end of cruise from weight at start of cruise to find approximate fuel used in 704 n mi cruise (38, 900 - 35, 900)	3000 lb

Determine Reserve Fuel Allowance

The reserve fuel allowance should include fuel for
holding at destination and the possibility of being
diverted to an alternate base, and some additional
fuel for contingencies. For the purpose of this
example the reserve fuel allowance is that required
for 30 minutes holding at airspeeds for long range
at sea level and 5% of trip fuel for contingencies.

Using: (Nautical Miles per Pound of Fuel–Sea
Level, figure 1A5-1)

Enter chart with weight at end of cruise	35, 900 lb
Follow weight line to intersec-tion of long range line, then proceed horizontally to air nautical miles per pound of fuel and read	0.238 n mi/lb
Proceed vertically to true air-speed	157 knots
Divide airspeed by n mi/lb (157 ÷ 0.238)	660 lb/hr
Allowance for 30 minutes holding (660 X 0.5)	330 lb
Contingency reserve (3185 X 0.05)	159 lb
Total reserve fuel	489 lb

Determine Payload

Ramp weight	39, 536 lb
Airplane operating weight	29, 858 lb
Total fuel load	4125 lb
Zero fuel weight (39, 536 - 4125)	35, 411 lb
Allowable payload (35, 411 - 29, 858)	5553 lb

TAKEOFF
Determine the Minimum Performance Torque Pressure

Note
If the actual carburetor temperature
rise of the airplane is unknown, use
OAT; it is sufficiently accurate for
preflight planning. A correction should
be made when the actual CAT is known.

Using: (Maximum Wet Power Available,
figure 1A2-1)

Enter chart with airplane pressure altitude	5000 ft
Proceed vertically to CAT (OAT)	10°C
Read MAP	46. 5 in. Hg

Proceed horizontally to base line of dew point chart, then parallel the guide line to dew point corrected for altitude   35 °F

Then, proceed horizontallaly to read:

Expected TPSI   103.5 psi

Minimum Performance TPSI   98.5 psi

Also Note:

Brake horsepower   1830 bhp

Engine speed   2800 rpm

Blower speed   LOW

Water injection   ON

Mixture position   AUTO RICH

In preflight planning, do not exceed the minimum performance TPSI limit shown. In operation, do not exceed the TPSI limit of 135 psi with wet power or 118 psi with dry power. In the event that minimum performance TPSI is unobtainable before reaching refusal speed, the takeoff should be aborted.

Determine the Maximum Allowable Takeoff Flap Setting

For the purpose of this sample problem the desired minimum initial rate of climb is considered to be 150 fpm.

Using: (Takeoff Gross Weight Limited by Climb, figure 1A3-3)

Enter lower left-hand portion of chart with density altitude   5600 ft

Proceed horizontally to desired minimum initial rate of climb   150 fpm

Parallel guide lines to base line at sea level density altitude, then proceed vertically to minimum performance torque pressure   98.5 psi

Parallel guide lines to base line at 141 psi then proceed vertically to takeoff weight   39,085 lb

Read takeoff flap setting   0°

Note

• For practical operation, limit the final selection of takeoff flap setting to either 12°, 6°, or 0°. Intermediate positions should be used only when one of these flap settings will not provide the required initial rate of climb and runway length combination.

• If the takeoff flap setting should come out as less than zero, with the particular takeoff atmospheric conditions available, off-load as necessary to reduce the takeoff weight to that which allows the desired initial rate of climb. Or, if under similar conditions the takeoff weight cannot be reduced, work backward from the weight and minimum flap setting to determine the expected initial rate of climb and thereby judge the desirability of taking off.

Determine Takeoff Speed

Using: (Takeoff and Minimum Control Speeds, figure 1A3-7)

Enter chart at gross weight   39,085 lb

Proceed vertically to 0° flap curve, then proceed horizontally to IAS scale and read   119 knots

Determine Critical Field Length

Using: (Critical Field Length, 0° Flap, figure 1A3-17 and Effect of Runway Conditions, figure 1A3-20)

Enter chart with density altitude   5600 ft

Parallel guide lines to minimum performance torque pressure   98.5 psi

Proceed horizontally to takeoff weight   39,085 lb

Proceed vertically to zero runway slope parallel guide lines to actual runway slope   1% up

Proceed vertically to base line at zero headwind, parallel guide lines to 1/2 reported headwind   5 knots

Proceed vertically to Critical Field Length (dry, hard surface runway)   6600 ft

Note

This field length is that required to accelerate to the critical engine failure speed, two engines operating, have an engine fail, propeller autofeather and either (a) proceed to takeoff or (b) stop. Since the critical field length (dry, hard surface runway) is less than that available, a safe takeoff is possible. For unusual runway conditions, proceed as follows:

Enter Effects of Runway Surface Condition Chart (figure 1A3-20) with RCR obtained from base weather   12

Proceed horizontally to takeoff
weight on critical field length
portion of chart   39,085 lb

Proceed vertically to K_{CFL}
factor   1.25

Corrected critical field length =
K̄_{CFL} X critical field length
from figure 1A3-17   8250 ft

Note

Since the corrected critical field length
is more than that available, a safe take-
off is not possible for an RCR of 12.

Determine Refusal Speed

Using: (Refusal Speed, 0° Flap, figure 1A3-18)

Enter chart with available run-
way length   7500 ft

Proceed horizontally to reported
headwind   10 knots

Parallel guide line to base line,
then proceed horizontally to
torque pressure   98.5 psi

Parallel guide line to base line,
then proceed horizontally to
density altitude   5600 ft

Parallel guide line to base line,
then proceed horizontally to
intersection of vertical line
from gross weight   39,085 lb

Refusal speed (IAS) (dry, hard
surface runway)   115 knots

Note

If the refusal speed should be greater
than the takeoff speed and since re-
fusal speed is limited to takeoff speed,
then only takeoff speed would need to
be monitored. To correct refusal
speed for unusual runway conditions
proceed as follows:

Enter Effects of Runway Conditions
Chart (figure 1A3-20) with RCR
obtained from base weather   12

Proceed horizontally to takeoff
weight on refusal speed portion
of chart   39,085 lb

Proceed vertically to K_{RS} factor   .933

Corrected refusal speed =
K_{RS} X refusal speed from
figure 1A3-18   107 knots

Determine Takeoff Ground Run

Using: (Takeoff Ground Run–0° Flap,
figure 1A3-19)

Enter chart with density
altitude   5600 ft

Parallel guide lines to minimum
performance torque pressure   98.5 psi

Proceed horizontally to takeoff
weight   39,085 lb

Proceed vertically to base line
at zero runway slope, then
parallel guide lines to actual
runway slope   1% up

Proceed vertically to base line
at zero headwind, then parallel
guide lines to reported head-
wind   10 knots

Proceed vertically to ground
run distance   3600 ft

Determine Acceleration Check Speed/Distance/Time

Using: (Velocity During Takeoff Ground Run,
figure 1A3-6)

Enter chart with 100% wind
takeoff ground run   3600 ft

And takeoff speed corrected
for wind (119 - 10)   109 knots

Draw acceleration curve
through the point of intersec-
tion and parallel to the guide
lines

Re-enter the chart at refusal
speed corrected for wind. (If
unusual runway conditions exist
enter at RCR corrected refusal
speed corrected for wind.)
(115 - 10)   105 knots

Proceed vertically to new
acceleration check curve and
then horizontally to refusal
distance   3250 ft

Re-enter chart at 1000 ft marker
from 500 ft to 1500 ft before
refusal distance   2000 ft

Proceed horizontally to new
acceleration check curve and
read sea level acceleration
time   29 seconds

Proceed vertically to IAS scale
and read uncorrected acceler-
ation speed   88 knots

Correct acceleration speed by
adding wind (88 + 10)   98 knots

Find acceleration time for
5600 ft density altitude
(29 ÷ 1/√σ)   27 seconds

Find acceleration check time at
an even 10 knot increment from
5 to 15 knots below refusal speed

Determine desired check speed
(115 - 5) IAS   110 knots

Correct check speed for wind
(110 - 10)   100 knots

Enter chart at 100 on IAS
scale and proceed vertically
to new acceleration curve
and read acceleration time   34 seconds

Summary of Preflight Takeoff Data

Engine speed   2800 rpm

MAP   46.5 in. Hg

Minimum Performance TPSI   98.5 psi

Blower speed   LOW

Mixture position   AUTO RICH

Flap setting   0°

Takeoff speed (IAS)   119 knots

Acceleration check
distance/speed   2000 ft/98 knots

Acceleration check
speed/time   110 knots/34 seconds

Takeoff ground run   3600 ft

CLIMB
Determine Power Settings at Start of Climb

Using: (Climb Power Schedule—1400 BHP/
        2400 RPM, figure 1A2-6)

Enter table with pressure
altitude   5000 ft

Proceed horizontally to CAT 10°C
for MAP of   37 in. Hg

Blower   LOW

Engine speed   2400 rpm

Torque pressure   92 psi

Also note:

Mixture   AUTO RICH

Determine Power Settings at End of Climb

Using: (Climb Power Schedule—1400 BHP, 2400
        RPM, figure 1A2-6)

Re-enter table with pressure
altitude   10,000 ft

Proceed horizontally to CAT   0°C

Read MAP   39.4 in. Hg

Blower   HIGH

Engine speed   2400 rpm

Torque pressure   92 psi

Also note:

Mixture   AUTO RICH

CRUISE

Determine Airspeed and Power Settings for Cruise

Using: (Nautical Miles per Pound of Fuel—
        10,000 Feet, figure 1A5-3)

Enter at weight at start of
cruise   38,900 lb

Follow weight line to inter-
section of long-range line
and read BHP at start of
cruise   950 bhp

Proceed vertically to calibrated
airspeed   154 knots

Re-enter at weight at end of
cruise   35,900 lb

Follow weight line to inter-
section of long-range line
and read BHP at end of
cruise   900 bhp

Proceed vertically to calibrated
airspeed   152 knots

Using: (Power Schedule—950 BHP, figure 1A2-14)

Enter table at pressure
altitude   10,000 ft

Proceed horizontally to CAT   0°C

Read MAP   30 in. Hg

Blower   LOW

Engine speed   2000 rpm

TPSI   75 psi

Also note:

Mixture	AUTO LEAN

Using: (Power Schedule–900 BHP, figure 1A2-13)

Enter table with pressure altitude	10, 000 ft
Proceed horizontally to CAT	0°C
Read MAP	29. 6 in. Hg
Blower	LOW
Engine speed	1900 rpm
TPSI	75 psi

LANDING

Landing Conditions

Field elevation pressure altitude	1250 ft
Outside air temperature	20°C
Dew point	50°F
Headwind	15 knots
Runway length	8100 ft
Landing weight (takeoff weight less fuel for mission, except total reserve)(39, 085 - 3185)	35, 900 lb

Determine Power Settings for Emergency Go-Around (if Necessary)

Using: (Maximum Wet Power Available, figure 1A2-1)

Enter chart with pressure altitude	1250 ft
Proceed vertically to CAT	20°C
Read MAP	52. 5 in. Hg
Proceed horizontally to dew point chart base line then parallel guide line to reported dew point corrected for altitude	50°F
Then horizontally to minimum performance TPSI	112 psi

Also note:

Engine speed	2800 rpm
Blower speed	LOW
Mixture position	AUTO RICH

Determine Density Altitude at Destination

Using: (Density Altitude Chart, figure 1A1-1)

Density altitude	2200 ft

Determine the Approach and Landing Flap Positions

Note

Each approach flap setting has a corresponding landing flap setting. The approach flap setting is felt to be the more important of the two based on the possibility of a single-engine go-around.

Using: (Takeoff Gross Weight Limited by Climb, figure 1A3-3)

Use same procedure as that outlined in determining maximum allowable takeoff flap setting with 150 fpm desired rate of climb. Final selection of approach flap setting	20°

Determine Approach and Go-Around Speeds

Using: (Approach and Landing Speed Chart, figure 1A6-1)

Enter chart with gross weight	35, 900 lb
Proceed vertically to approach flap line	20°
Proceed horizontally to approach speed line (1. 3 stall) then vertically to read approach speed (IAS)	108 knots
Repeat procedure for 39° flap to find approach speed (IAS)	100 knots
and landing speed (1. 1 stall)	88 knots

Using: (Takeoff and Minimum Control Speeds, figure 1A3-7)

Enter chart with gross weight	35, 900 lb
Proceed vertically to 1.2 stall line for approach flaps and then horizontally to read climb speed for go-around (IAS)	102 knots

Determine Landing Ground Roll

Using: (Landing Ground Roll–39° Flap, figure 1A6-2 and Stopping Capability, figure 1A6-7)

Enter chart with density altitude	2200 ft
Proceed horizontally to gross weight curve	35, 900 lb

Proceed vertically to base line at 0 headwind and parallel guide lines to 1/2 of reported headwind	7.5 knots
Proceed vertically to landing ground roll (dry, hard surface runway)	2650 ft
Landing distance from 50 ft altitude (2650 X 1.22)	3233 ft
To correct landing ground roll for unusual runway conditions, enter the Stopping Capability Chart (figure 1A6-7) with RCR (obtained from base weather)	12
Proceed horizontally to curve then vertically to obtain stopping factor	1.38
Corrected landing ground roll = stopping factor X landing ground roll from figure 1A6-12	3655

Summary of Approach and Landing Data

Engine speed	2800 rpm
Minimum performance TPSI	112 psi
MAP	52.5 in. Hg
Blower speed	LOW
Mixture position	AUTO RICH
Approach flap setting	20°
Approach speed (IAS)	108 knots
Landing flap setting	39°
Approach speed (IAS)	100 knots
Go-around speed with approach flaps (IAS)	102 knots

C-45381

PERFORMANCE DATA
appendix II

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