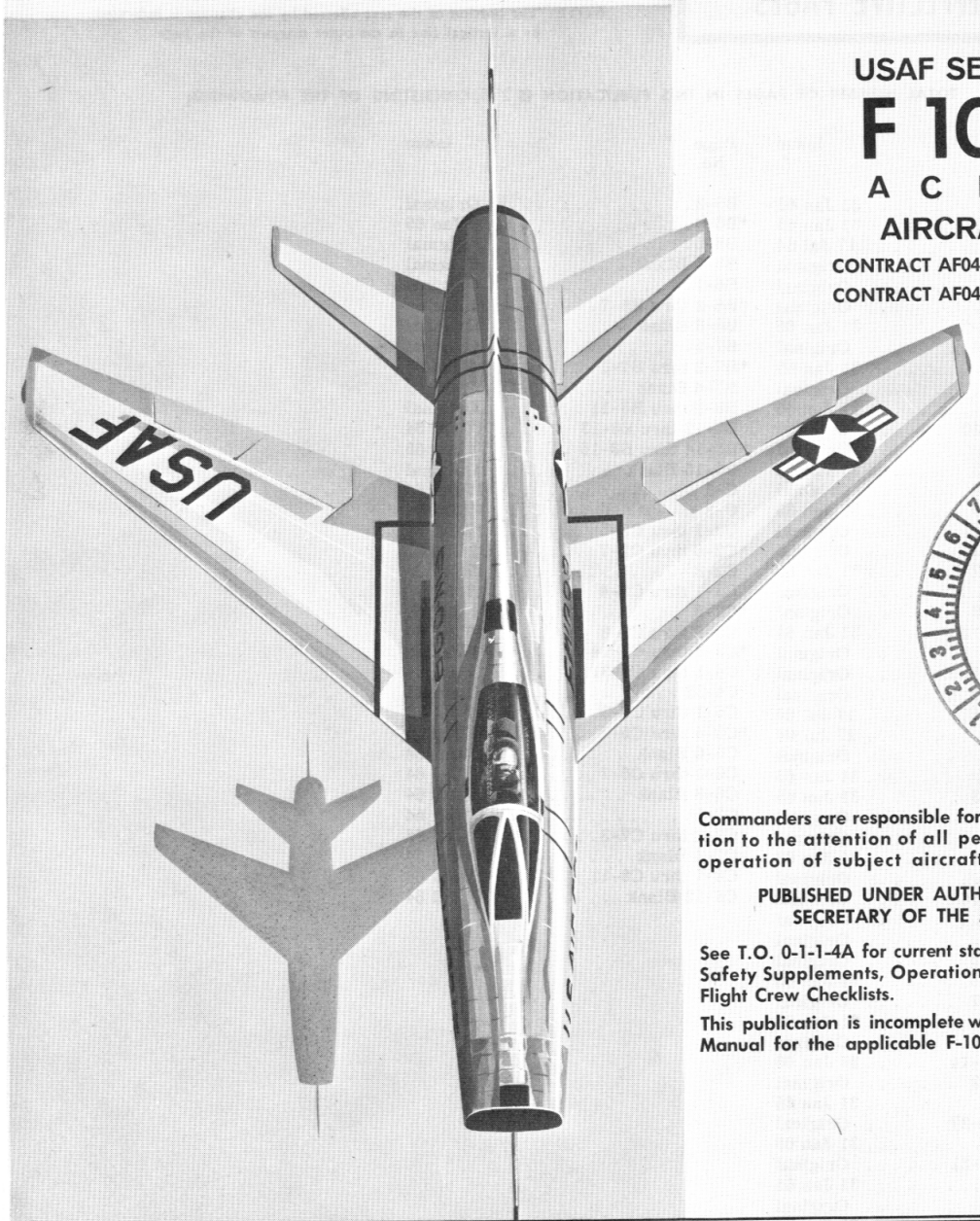
FLIGHT MANUAL PERFORMANCE DATA



USAF SERIES
F 100
A C D F
AIRCRAFT

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See T.O. 0-1-1-4A for current status of Flight Manuals, Safety Supplements, Operational Supplements, and Flight Crew Checklists.

This publication is incomplete without the basic Flight Manual for the applicable F-100 Model Aircraft.

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F-100-1-00-2B

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Page No.	Issue
*Title	31 Jan 65
*A	31 Jan 65
i	17 Jul 64
ii Blank	Original
A-1	Original
A-2 Blank	Original
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A1-3 thru A1-4	Original
*A1-5	31 Jan 65
A1-6	Original
*A1-7	31 Jan 65
A1-8 thru A1-10	Original
A2-1	Original
*A2-2 thru A2-3	31 Jan 65
A2-4 thru A2-7	Original
*A2-8 thru A2-9	31 Jan 65
A2-10	Original
A3-1 thru A3-3	Original
*A3-4 thru A3-7	31 Jan 65
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*A4-6 thru A4-12	31 Jan 65
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A5-6 Blank	17 Jul 64
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*A6-2	31 Jan 65
*A7-1 thru A7-3	31 Jan 65
A7-4 Blank	Original
A8-1	Original
*A8-2 thru A8-3	31 Jan 65
A8-4 Blank	Original
A9-1 thru A9-16	Original
B-1	Original
B-2 Blank	Original
B2-1 thru B2-5	Original
*B2-6 thru B2-8	31 Jan 65
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*B3-8	31 Jan 65
B3-9	Original
*B3-10 thru B3-14	31 Jan 65
B4-1 thru B4-9	Original
*B4-10	31 Jan 65
B4-11 thru B4-27	Original
*B4-28	31 Jan 65
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*B4-32	31 Jan 65
B5-1	Original
*B5-2	31 Jan 65
B5-3	Original
*B5-4	31 Jan 65
B5-5	Original
B5-6 Blank	Original
B6-1	Original
*B6-2 thru B6-7	31 Jan 65
B6-8 Blank	Original
B7-1	Original
*B7-2 thru B7-3	31 Jan 65
B7-4 Blank	Original
B8-1 thru B8-11	Original
B8-12 thru B8-13	17 Jul 64
*B8-14 thru B8-15	31 Jan 65
B8-16 Blank	Original
C-1	17 Jul 64
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C2-1 thru C2-5	17 Jul 64
*C2-6 thru C2-7	31 Jan 65
C2-8	17 Jul 64
C3-1 thru C3-4	17 Jul 64
*C3-5	31 Jan 65
C3-6 thru C3-8	17 Jul 64
*C3-9 thru C3-14	31 Jan 65
C4-1 thru C4-31	17 Jul 64
C4-32	Original
C5-1 thru C5-3	17 Jul 64
*C5-4 thru C5-5	31 Jan 65
C5-6 Blank	17 Jul 64
C6-1 thru C6-7	17 Jul 64
C6-8 Blank	17 Jul 64
C7-1	17 Jul 64
*C7-2 thru C7-3	31 Jan 65
C7-4 Blank	17 Jul 64
C8-1 thru C8-11	17 Jul 64
C8-12 Blank	17 Jul 64

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PART 3	CLIMB
PART 4	RANGE
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F-100-1-0-1A

SECTION I

F-100 SERIES PERFORMANCE DATA

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SCOPE AND ARRANGEMENT.

This manual is divided into three sections: Section I, F-100 Series Performance Data; Section II, F-100D & F Performance Data; and Section III, F-100A & C Performance Data. A "part-type" arrangement within each section groups the material as needed for planning general phases of each flight. Section I contains descriptive text and sample problems for each type of chart. A mission-planning part, at the end of Section I, shows how the individual performance charts for each part of a flight can be combined for over-all planning purposes. Sections II and III contain performance charts only, for the applicable airplane model.

The flight performance charts in this manual provide data for accurate preflight planning. The external loading capabilities of this airplane, coupled with the large variety of individual stores that may be carried, make it impractical to list flight performance data for each external configuration; consequently, the performance is presented in a "drag factor" method.

PART 1–GENERAL

TABLE OF CONTENTS

Titles CAPITALIZED denote charts

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DESCRIPTION OF PERFORMANCE PRESENTATION.

The clean airplane (without external stores) is considered the basic configuration and the various external stores as increments of drag to the clean airplane. A store drag number has been assigned to each external store, and by totaling the store numbers for the particular configuration, the configuration drag index number is obtained. Figure A1-1 shows the list of external stores with their weight and store drag number.

NOTE Although store weights are approximate, they are adequate for mission planning.

Select the configuration drag index number nearest to the sum obtained and use this number for flight planning. The configuration drag index numbers are divided so that the use of the one nearest to the sum will result in flight planning accurate to within 5 percent. If maximum accuracy is desired and the totaled configuration drag index number falls between two of the configuration drag index numbers, linear interpolation between the two can be accomplished. Basically, mission planning involves nothing more than the determination of each leg of the mission and the summarizing of these legs to determine the time, fuel, distance, etc. Suppose the configuration to be flown is one 275-gallon tank, plus two 200-gallon tanks, plus one special store. Add the applicable external store drag numbers from figure A1-1 to obtain the configuration drag index number:

One 275-gallon tank	20.0
Two 200-gallon tanks (2 x 9.0)	18.0
One special store	33.5
Three pylons (3 x 6.0)	18.0

DRAG COMPUTATION

EXTERNAL STORES, WEIGHTS, AND STORE DRAG NUMBERS

STORE (Less Pylon Where Applicable)	WEIGHT (APPROX)	DRAG NO.
200-gallon Tank	102	9.0
275-gallon Tank (with integral pylon)	210	20.0*
335-gallon Tank (with integral pylon)	261	22.0*
450-gallon Tank	261	21.5*
CBU-1A/A Dispenser	750	10.0
CBU-2A/A Dispenser	830	10.0
SUU-7A/A (empty CBU dispenser - nose faired or unfaired)	120	10.0
MN-1A Dispenser (with six M-76 bombs)	638	20.0
BLU-1/B Fire Bomb	694	5.5
M-64A-1 Bomb	586	10.0
M-65A-1 Bomb	1205	10.0
M116A2 Napalm Bomb	690	5.5
M-117 Bomb	785	5.0
M129E1 Leaflet Bomb	200	10.0
MC-1 Toxic Bomb	750	5.0
MLU-10/B Land Mine or BLU-14/B Skip Bomb	660	14.5
LAU-3/A Launcher (with nose cone and 19 rockets)	428	8.0*
LAU-3/A Launcher (empty and without nose cone)	77	10.0
MA-3 Launcher (adapter, three launchers, 21 rockets)	513	31.0
MA-3 Launcher (adapter, three launchers, empty)	125	34.0
AF/B37K-1 Adapter (with four M-76 bombs)	186	34.5*
Special Store (MK-7 or equivalent practice shape)	†	33.5
Special Store (MK-28 Series or equivalent practice shapes)	†	29.0
Special Store (MK-43 or equivalent practice shape)	†	29.0
AGM-12B	583	14.0*
AIM-9B (with rollerons)	155	5.5*
QRC-160-1 (T) ECM Pod	200	5.0
QRC-160-2 (T) ECM Pod	185	5.0
MA-3 Adapter (with supports)	54	7.0
A/A37U-15 Tow-target System	825	‡
MA-2A Launcher (with two rockets)	63	8.0
Pylon (F-100A Type I MOD I)	140	11.0*
Pylon (F-100C Types I and III Series)	140	11.0*
Pylon (F-100 D/F Types I and III Series)	140	6.0*
Pylon (Types IV and V)	140	11.0*
Pylon (Type VII Series)	140	6.0*
Pylon (Type VIII Series)	205	6.0*
Pylon (Type IX Series)	159	17.0*
Pylon (Type VI launcher adapter plus two Aero 3B launchers)	172	14.0
Pylon Adapter	69	4.5
Type X Launcher	116	6.0*

Approximate airplane gross weight:
F-100A - 25,400 pounds (full internal load and pilot)
F-100C - 28,800 pounds (full internal load and pilot)
F-100D - 30,425 pounds (full internal load and pilot)
F-100F - 30,750 pounds (full internal load and two crew members)

* Based on flight test.
† Refer to T.O. 1F-100D-25 Series.
‡ Not available.

NOTE

This data is valid for all authorized airplane modifications. Any modification which appreciably affects drag will include a drag number.

When any combination of drop tanks, or special store and drop tanks, is carried at adjacent wing stations, the drag number is reduced by 7 for each pair of adjacent stores. Therefore, when a configuration drag index number is derived, the sum must be reduced by 7 for each pair of adjacent drop tanks, or special store and drop tanks, to obtain the proper configuration drag index number. This reduction also would apply to other stores of similiar size and shape, such as napalms and the MN-1 dispenser. It does not apply to small or irregularly shaped stores such as blunt GP bombs, practice bomb racks, rockets, and dart target reel. There is no drag reduction between the two inboard stores and the centerline store, because the centerline store is below the area of turbulence created by the inboard stores. F-100-1-93-609A

Figure A1-1

Adjacent station pairs of stores (2 x 7.0)	-14.0
Configuration drag index number	75.5

If all the tanks are dropped from this configuration, the configuration drag index number drops to 51.5. For example:

One special store	33.5
Three pylons (3 x 6.0)	18.0
Configuration drag index number	51.5

In the case of the first configuration, configuration index drag number 80 would be used. No appreciable loss in accuracy is experienced in selecting the closest configuration drag index number, since the maximum difference between the two given configurations is equal to, or less than, 5 percent.

PERFORMANCE DATA BASIS.

Flight planning information shown is based on flight tests with and without external stores. The material is supplemented, where necessary, with estimated aerodynamic data. All charts are based on what is believed to be normal engine performance characteristics, under NASA (NACA) Standard Day atmospheric conditions; however, corrections for nonstandard atmospheric conditions and subnormal engine performance have been included on the charts.

AIRSPEED CORRECTIONS.

IAS - Indicated airspeed is the reading taken from the airspeed indicator.

CAS - Calibrated airspeed is indicated airspeed corrected for installation effects.

EAS - Equivalent airspeed is calibrated airspeed corrected for compressibility effects.

TAS - True airspeed is equivalent airspeed corrected for atmospheric density.

TGS - True ground speed is true airspeed corrected for wind.

INSTALLATION CORRECTION.

Because of the position of the airspeed static-pressure source, an airspeed correction must be applied to the CAS to obtain IAS. This correction should be made by use of the chart in figure A1-2. Subtract the correction given from calibrated airspeed (CAS) to obtain indicated airspeed (IAS).

NOTE The CAS scale may be used as an IAS scale; however, the airspeed correction error must then be added to the IAS to obtain CAS.

COMPRESSIBILITY CORRECTION.

Equivalent airspeed (EAS) is calibrated airspeed (CAS) corrected for the effects of compressibility. Though the difference between EAS and CAS is negligible at low speeds and low altitudes, impact pressures upon the pitot tube at high speeds cause the airspeed indicator to show values above normal. The correction shown in the compressibility correction chart (figure A1-2) should be added to equivalent airspeed to determine calibrated airspeed.

AIRSPEED CONVERSION.

An airspeed conversion chart (figure A1-2) is used to convert calibrated airspeed (CAS) directly to true airspeed (TAS). Indicated airspeed (IAS) must be converted to CAS before entering the chart. The chart shows true airspeed for an NASA (NACA) Standard Day only. TAS (which is EAS corrected for atmospheric density) can be computed for nonstandard days by use of the navigation computer or the AN5834-1 dead-reckoning computer (formerly the E6B) when Mach number and outside air temperature are known.

MACH NUMBER CORRECTION.

To convert true Mach number to indicated Mach number, use the Mach number correction chart shown in figure A1-2. The difference between indicated Mach number and true Mach number at speeds below .30 Mach and above 1.02 Mach is negligible.

ALTIMETER CORRECTION.

A correction applied to the true (calibrated) pressure altitude to obtain indicated pressure altitude is given on the chart in figure A1-2. Instrument error is the only difference between calibrated pressure altitude and true pressure altitude. Since this chart does not consider instrument error, true pressure altitude and calibrated pressure altitude may be considered the same. Subtract the altitude error correction given on figure A1-2 from the calibrated pressure altitude to obtain indicated pressure altitude.

A set of altimeter correction cards is on the left forward canopy frame. The card set is calibrated for, and must only be used with, the particular airplane and altimeter installation as indicated on the cards. Each card in the set is for an average

AIRSPEED AND ALTITUDE CONVERSION DATA

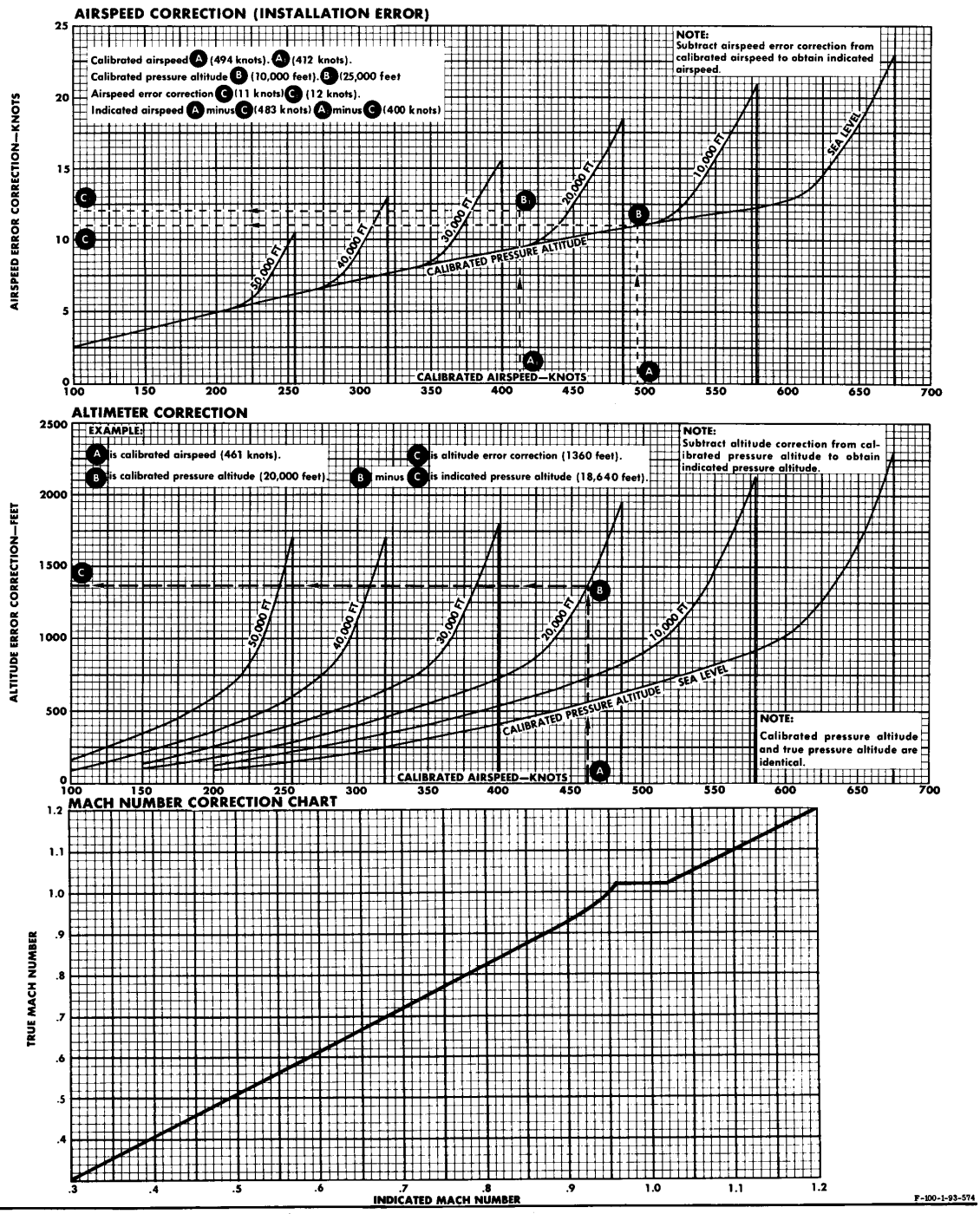


Figure A1-2 (Sheet 1 of 2)

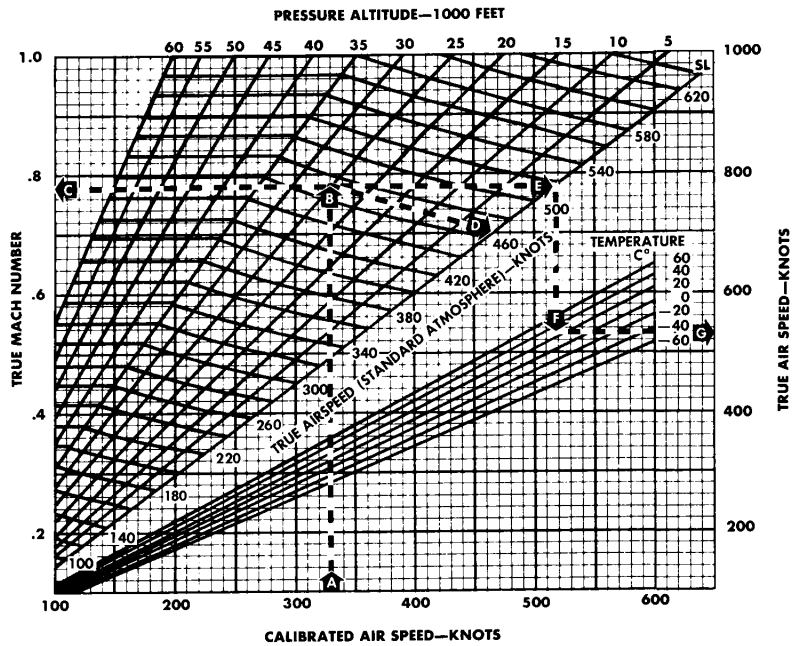
AIRSPEED CONVERSION

HOW TO USE CHART

Enter with CAS (A), move vertically to altitude (B) to find true Mach number (C) and Standard Day true airspeed (D). Move horizontally along true Mach number to sea level altitude (E) and drop vertically to actual temperature (F) to find Non-standard Day true airspeed (G).

EXAMPLE

330 knots CAS at 25,000 feet is .78 true Mach number and 470 knots TAS on an NACA Standard Day or 530 knots TAS on a 30°C day.



COMPRESSIBILITY CORRECTION

(STANDARD DAY)

EXAMPLE:

(A) is equivalent airspeed (EAS) = 360 knots.

(B) is pressure altitude (35,000 feet).

(C) is compressibility correction (40 knots).

(A) plus (C) is calibrated airspeed (CAS) = 400 knots.

NOTE:
Add correction to equivalent airspeed to obtain calibrated airspeed.

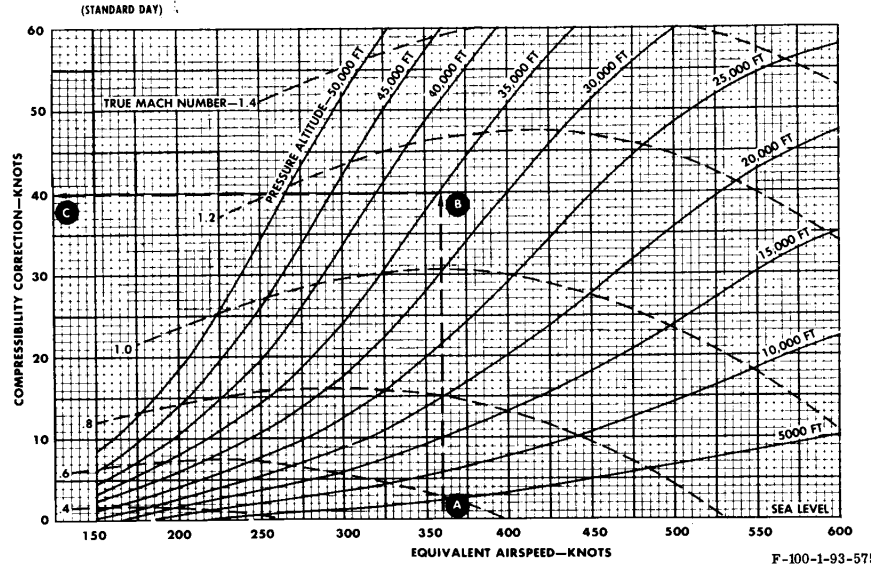


Figure A1-2 (Sheet 2 of 2)

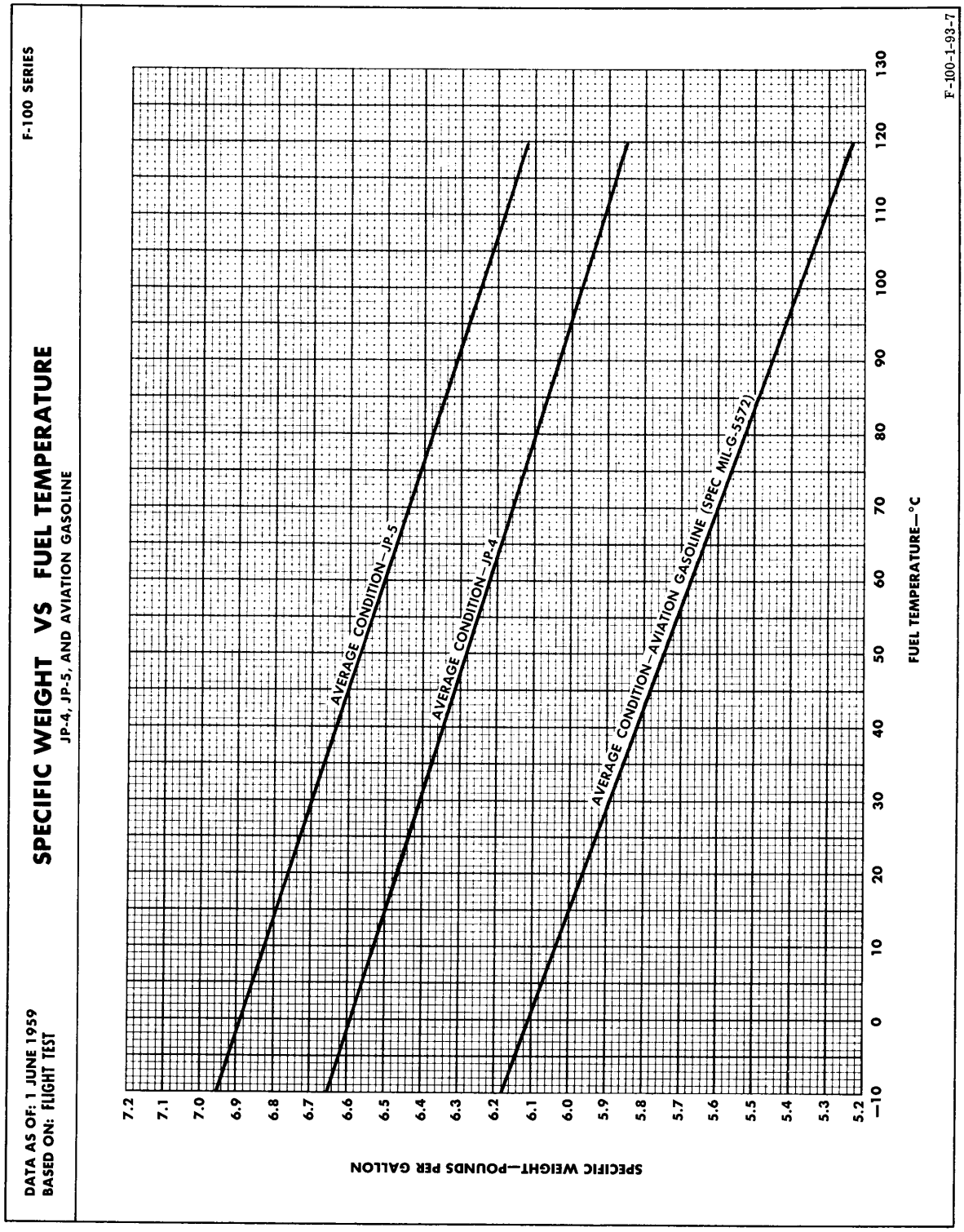

F-100 SERIES
SPECIFIC WEIGHT VS FUEL TEMPERATURE
JP-4, JP-5, AND AVIATION GASOLINE
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST
AVERAGE CONDITION—JP-5
AVERAGE CONDITION—JP-4
AVERAGE CONDITION—AVIATION GASOLINE (SPEC MIL-G-5572)
SPECIFIC WEIGHT—POUNDS PER GALLON
FUEL TEMPERATURE—°C
F-100-1-93-7

Figure A1-3

gross weight and specific configuration drag index number. Changing of configuration drag index number during flight requires use of the corresponding card. To use the card set, select the appropriate card for the airplane configuration drag index number, locate the assigned altitude, and maintain its indicated altitude as determined in the appropriate airspeed column.

FUEL SPECIFIC WEIGHT.

All data given in this section is based on the use of JP-4 fuel. JP-5 is the alternate fuel, and the emergency fuel is aviation gasoline. The basic weight of the fuels will vary with refining process as well as with fuel temperature. In precise mission planning, the specific weight of fuel must be considered. A chart is included (figure A1-3) which shows the variations in fuel specific weight with fuel temperature. To use the chart, determine the basic specific weight for the particular refining process, and assume a variation with fuel temperature parallel to that shown on the chart for the fuel being used.

NOTE The specific fuel consumption of JP-5 and aviation gasoline is the same as that of JP-4. Therefore, a slight increase in range will be noted when using JP-5, due to the increased weight per gallon, and a slight decrease in range will be noted when using aviation gasoline, due to the reduced weight per gallon.

STANDARD ATMOSPHERE TABLE.

The standard atmosphere table (figure A1-4) provides the Standard Day conditions at various altitudes for density ratio, $1/\sqrt{\theta}$ temperature, speed of sound in knots, and pressure in inches of mercury and pressure ratio. To find the value of any item on a Standard Day, read the figure to the right of the altitude in the appropriate column.

NONSTANDARD DAY TEMPERATURE.

When the free air temperature is higher than standard (occurring on hot days), the airplane will perform as if it weighs more than it actually does. When the free air temperature is lower than standard (occurring on cold days), the airplane will perform as if it weighs less than it actually does. Where cruise is performed at the cruise ceiling (limited by Maximum Continuous Thrust) on a hot day, the altitude will be decreased because at any particular thrust setting, the thrust is decreased. If cruise is performed below the cruise ceiling, the maximum cruise thrust is not being used. Actually, an excess of thrust is available on a Standard Day. The thrust loss due to an increase in ambient temperature has only the effect of requiring a higher cruise engine speed and a slightly higher specific fuel consumption. Use of temperature correction grids permits utilization of charts under nonstandard temperature conditions.

RUNWAY CONDITION READING.

When other than dry conditions exist on active runways, a correction must be applied to the ground roll distance obtained from the charts. This correction is obtained by using the runway condition grid included on all refusal speed and landing distance charts. The relative slickness of the runway will be transmitted as part of the teletype weather sequence, appearing as the RCR number. Examples are provided to show how this correction is applied.

NOTE RCR information should be requested from the tower. If no RCR number is available, use RCR 12 for wet runways, and RCR 5 for icy runways.

SUBNORMAL ENGINE PERFORMANCE (INTENTIONAL ENGINE DOWN-TRIM).

Subnormal engine performance, while not invalidating data in the manual, does impose certain limitations. The degree to which thrust is controlled operationally should depend upon how critical the combat mission is considered within the particular command. Subnormal engine performance, such as may occur during hot days, reduces the climb performance and cruise ceiling. Known subnormal engine performance (intentional down-trim) can be accounted for by applying an equivalent weight. When engines are intentionally down-trimmed: For each inch of mercury the turbine discharge pressure (P_{t7}) is down-trimmed, add 1000 pounds to the climb gross weight. This is in addition to the correction for ambient temperature deviation from NASA (NACA) Standard Day conditions.

NOTE As a rule of thumb, examination of cruise altitudes 3000 feet below the cruise ceiling will cover the extreme range of subnormal engine performance.

DRAG.

Subsonically, the resistance of the airplane to forward motion is the sum of the induced drag and parasite drag.

INDUCED DRAG.

Induced drag is the component of the resultant sum of lifting forces which is parallel to the relative wind. This drag will vary with the angle of attack and airspeed.

PARASITE DRAG.

Parts of the airplane, such as the fuselage, landing gear, and landing gear doors, offer considerable resistance to forward motion through air without producing lift. Therefore, these parts must depend entirely on wing lift to sustain flight. The sum of induced drag and parasite drag constitutes the total drag of the airplane. This total

STANDARD ATMOSPHERE TABLE

STANDARD S L CONDITIONS:

TEMPERATURE 15°C (59°F)
PRESSURE 29.921 IN. Hg 2116.216 LB/SQ FT
DENSITY .0023769 SLUGS/CU FT
SPEED OF SOUND 1116.89 FT/SEC 661.7 KNOTS

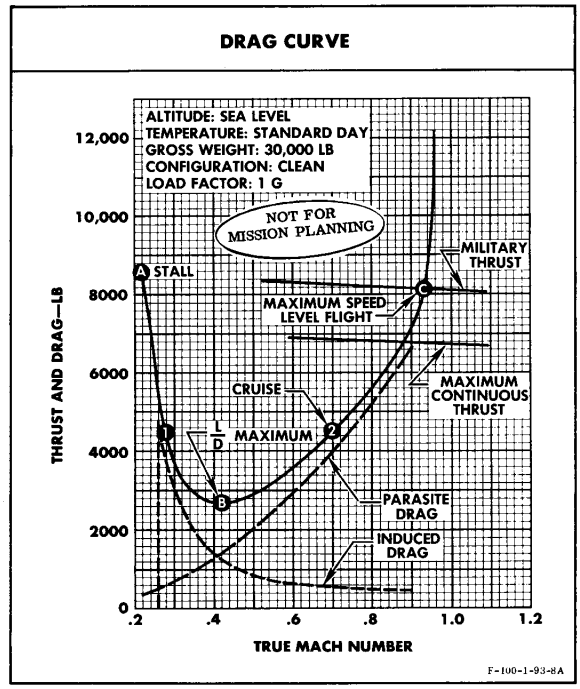
CONVERSION FACTORS:

1 IN. Hg 70.727 LB/SQ FT
1 IN. Hg 0.49116 LB/SQ IN
1 KNOT 1.151 MPH
1 KNOT 1.688 FT/SEC

ALTITUDE FEET	DENSITY RATIO σ	$\frac{1}{\sqrt{\sigma}}$	TEMPERATURE °C	TEMPERATURE °F	SPEED OF SOUND (KNOTS)	PRESSURE IN. Hg	PRESSURE RATIO P/PO
0	1.0000	1.000	15.0	59.0	661.7	29.92	1.0000
1,000	.9711	1.015	13.0	55.4	659.5	28.86	.9644
2,000	.9428	1.030	11.0	51.9	657.2	27.82	.9298
3,000	.9151	1.045	9.0	48.3	654.9	26.82	.8963
4,000	.8881	1.061	7.1	44.7	652.6	25.84	.8637
5,000	.8617	1.077	5.1	41.2	650.3	24.90	.8321
6,000	.8359	1.094	3.1	37.6	648.7	23.98	.8014
7,000	.8107	1.111	1.1	34.1	645.6	23.09	.7717
8,000	.7860	1.128	-0.8	30.5	643.3	22.23	.7429
9,000	.7620	1.146	-2.8	26.9	640.9	21.39	.7149
10,000	.7385	1.164	-4.8	23.4	638.6	20.58	.6878
11,000	.7156	1.182	-6.8	19.8	636.2	19.80	.6616
12,000	.6933	1.201	-8.8	16.3	633.9	19.04	.6362
13,000	.6715	1.220	-10.8	12.7	631.5	18.30	.6115
14,000	.6502	1.240	-12.7	9.1	629.0	17.58	.5877
15,000	.6294	1.260	-14.7	5.6	626.6	16.89	.5646
16,000	.6092	1.281	-16.7	2.0	624.2	16.23	.5423
17,000	.5894	1.303	-18.6	-1.5	621.8	15.58	.5206
18,000	.5702	1.324	-20.6	-5.1	619.4	14.95	.4997
19,000	.5514	1.347	-22.6	-8.7	617.0	14.35	.4795
20,000	.5331	1.370	-24.6	-12.2	614.6	13.76	.4599
21,000	.5153	1.393	-26.6	-15.8	612.1	13.20	.4410
22,000	.4980	1.417	-28.5	-19.3	609.6	12.65	.4228
23,000	.4811	1.442	-30.5	-22.9	607.1	12.12	.4051
24,000	.4646	1.467	-32.5	-26.5	604.6	11.61	.3881
25,000	.4486	1.493	-34.5	-30.0	602.1	11.12	.3716
26,000	.4330	1.520	-36.5	-33.6	599.6	10.64	.3557
27,000	.4178	1.547	-38.4	-37.1	597.1	10.18	.3404
28,000	.4031	1.575	-40.4	-40.7	594.6	9.742	.3256
29,000	.3887	1.604	-42.4	-44.3	592.1	9.315	.3113
30,000	.3747	1.634	-44.4	-47.8	589.5	8.904	.2976
31,000	.3612	1.664	-46.4	-51.4	586.9	8.507	.2843
32,000	.3480	1.695	-48.3	-54.9	584.4	8.125	.2715
33,000	.3351	1.727	-50.3	-58.5	581.8	7.757	.2592
34,000	.3227	1.760	-52.4	-62.1	579.2	7.402	.2474
35,000	.3106	1.794	-54.3	-65.6	576.6	7.061	.2360
36,000	.2989	1.829	-56.2	-69.2	574.0	7.733	.2250
37,000	.3853	1.872	-56.5	-69.7	573.7	6.418	.2145
38,000	.2719	1.918	-56.5	-69.7	573.7	6.118	.2045
39,000	.2592	1.964	-56.5	-69.7	573.7	5.832	.1949
40,000	.2471	2.012	-56.5	-69.7	573.7	5.559	.1858
41,000	.2356	2.019	-56.5	-69.7	573.7	5.299	.1771
42,000	.2245	2.110	-56.5	-69.7	573.7	5.051	.1681
43,000	.2140	2.161	-56.5	-69.7	573.7	4.815	.1609
44,000	.2040	2.214	-56.5	-69.7	573.7	4.590	.1534
45,000	.1945	2.267	-56.5	-69.7	573.7	4.376	.1462
46,000	.1854	2.322	-56.5	-69.7	573.7	4.171	.1394
47,000	.1768	2.379	-56.5	-69.7	573.7	2.976	.1329
48,000	.1685	2.436	-56.5	-69.7	573.7	3.791	.1267
49,000	.1606	2.495	-56.5	-69.7	573.7	3.614	.1208
50,000	.1531	2.556	-56.5	-69.7	573.7	3.445	.1151
51,000	.1460	2.617	-56.5	-69.7	573.7	3.284	.1098
52,000	.1392	2.681	-56.5	-69.7	573.7	3.131	.1046
53,000	.1327	2.746	-56.5	-69.7	573.7	2.984	.0997
54,000	.1265	2.812	-56.5	-69.7	573.7	2.845	.0951
55,000	.1206	2.880	-56.5	-69.7	573.7	2.712	.0906

F-100-1-93-550

Figure A1-4



drag is the resistance that must be balanced by engine thrust in order to maintain forward motion.

Lift and drag vary directly with air density, wing area, angle of attack, and the square of the velocity. The "steady-state flight" implies that (1) lift equals weight, (2) thrust equals drag, and (3) the airplane is trimmed at a specific Mach number. The "Drag Curve" represents a plot of Mach number versus the thrust required (steady-state flight) in the case of the jet airplane. Drag curves for all models and types of aircraft have the same characteristic shape and basic fundamentals as noted:

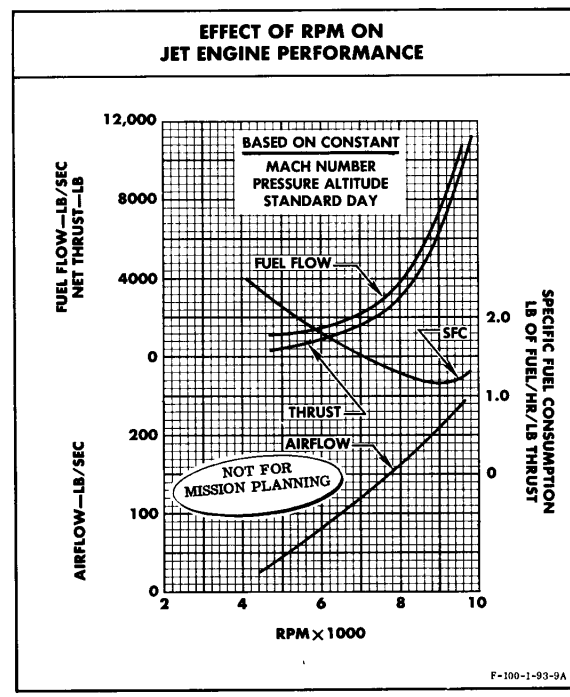
a. Near the stalling speed, a high thrust setting is required.

b. At maximum speed, the maximum thrust is required.

c. In between these two points, there is a speed where a relatively low thrust setting will keep the airplane in straight and level flight.

As shown on the graph, point A is the thrust setting required at the stalling speed; point B is the minimum thrust setting which will maintain straight and level flight; and point C is the thrust setting required for maximum Mach number in level flight, respectively. Note the legend. This specifies that the curve represents the total drag acting on the airplane at a specific altitude, gross weight, and air temperature. It further specifies that the airplane is in straight and level flight, neither gaining nor losing altitude nor turning in any direction. Examination shows an interesting situation by choosing at random a Mach number somewhere between point A and point B (point 1) and noting the thrust required to maintain this Mach number. With this same thrust setting, the airplane will also maintain a higher Mach number (point 2). The reason for this is the shape of the drag curve, which is the result of induced and parasite drag. Induced drag reaches a maximum at the stalling speed of the airplane and is at least 75 percent of the total drag at this point. In our present-day high-performance airplanes, the induced drag is less than 10 percent at maximum speed. Parasite drag, on the other hand, operates just opposite to this. Induced drag predominates at the low speeds, and parasite drag predominates at the high speeds.

When an attempt is made to fly at the same Mach number at high altitudes as at sea level, the angle of attack must be increased to obtain the greater lift coefficient to offset the decrease in density. The larger angle of attack will mean an increased drag coefficient, and correspondingly, the induced drag will have a more pronounced effect in the medium-to-high Mach number range. From the cockpit, the condition is observed as a reduction in usable Mach number between stall and maximum speed as altitude is increased.

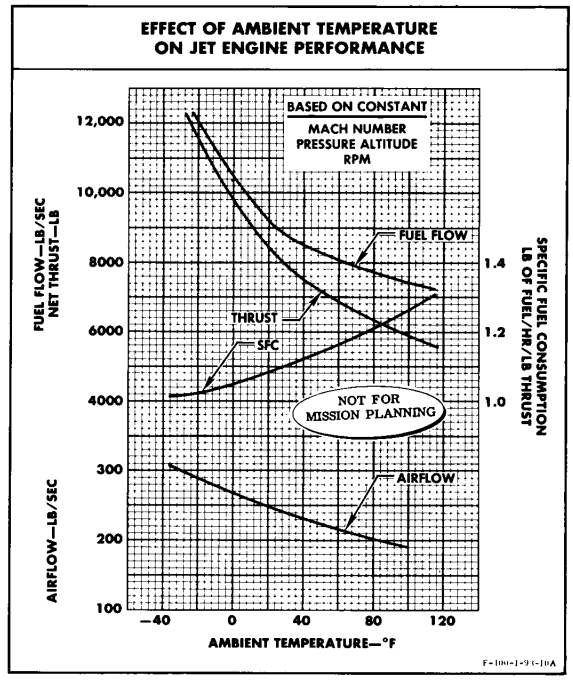


THRUST VS RANGE.

The effect of rpm on jet-engine performance, as shown in the accompanying graph, reveals that although the thrust is increasing very rapidly, there is a substantial reduction in the specific fuel consumption. Mach number and rpm effects cause a definite flatness in a plot of specific range versus Mach number. In the conduct of a mission, these engine characteristics provide flexibility in that it is not a requirement to precisely maintain a cruise Mach number, and the adverse effects of wind can be minimized. Altitude, however, has the effect of reducing both the thrust and specific fuel consumption. While the Mach number and rpm effects produce an optimum range Mach number at a specific altitude, the effect of altitude on jet performance will produce an altitude for optimum range.

THRUST VS TEMPERATURE.

Before one can plan missions around nonstandard atmospheric conditions, it is necessary to understand the effects of ambient temperature on jet-engine performance as shown in the accompanying graph. For a specific thrust setting, Mach number, and pressure altitude, there is a drastic change in thrust with changes in ambient temperature. Note also that the specific fuel consumption also varies. A pilot observes this effect by a requirement for increased thrust to maintain Mach number when passing through a hot-air mass, or if limited by thrust, Maximum Continuous Thrust for example, altitude decreases when maintaining Mach number.



PART 2–TAKE-OFF

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TAKE-OFF PLANNING.

This part covers the information necessary to familiarize the pilot with the charts used to obtain take-off speeds and distances. Take-off performance is affected by a large number of variables, i.e., temperature, altitude, gross weight, and wind, as well as runway surface, use of brakes for directional controls, and engine condition. Increases in any of these variables except wind tend to increase take-off ground roll to a point where, on a take-off in which normal techniques are used, the take-off may not be successfully made in the available runway length. When computing take-off performance, the type of arresting gear available may have an effect on the required computations. If arresting gear compatible with the airplane is available, successful barrier engagements may be anticipated at all times. Therefore, at any speed below take-off speed, the take-off may be aborted. This allows the elimination of computing abort data. However, if arresting gear compatible with the airplane is not available, the use of refusal speed is dictated. In addition, the critical afterburner failure speed must be determined and used in conjunction with the refusal speed when planning abort criteria.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of the anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the take-off charts. To compensate for the use of these systems an equivalent increment of weight for each system in operation must be added to the gross weight of the airplane before using the take-off charts. Refer to the applicable section to obtain the equivalent weights.

TAKE-OFF AND LANDING DATA CARD

Before take-off the pilot will compute all data required to complete the take-off and landing data card, or a like comparable card. A reproduction of this card appears in the applicable abbreviated checklist. The card should be filled out so that the information the card provides will be available as needed. The required data is computed from the appropriate charts in this manual. Interpretation of the data entered on the card is subject to a number of variables with which the pilot should be familiar. For example, rapid changes in weather may produce marked variations between precomputed performance and actual performance. Such factors as braking during take-off, late afterburner light-up, runway surface conditions, etc, can seriously affect the performance which is precomputed and entered on the card. However, the card is very useful as a general guide to expected airplane performance, and will contribute substantially to flight safety when properly used. This example is provided as a guide for completion of the card.

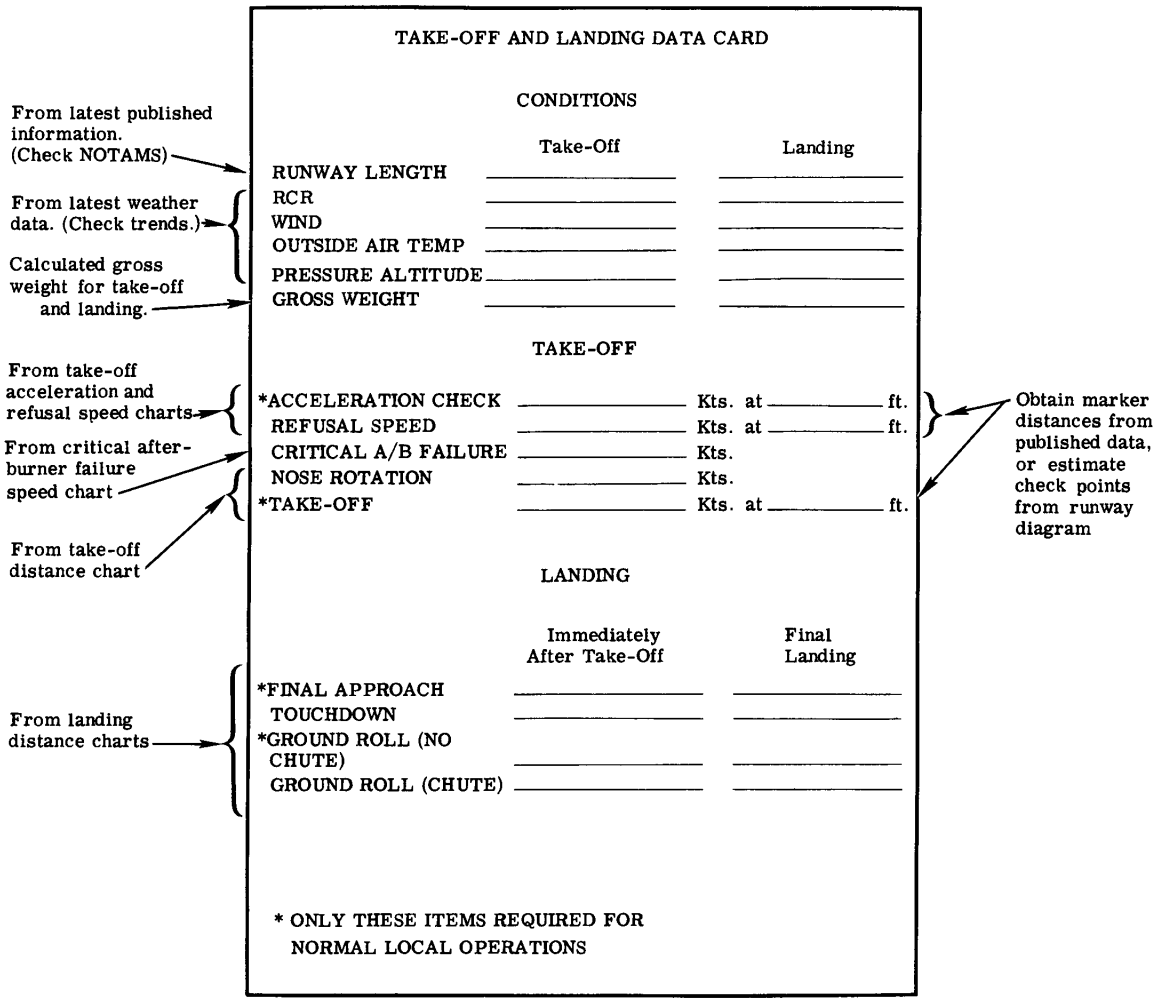


Figure A2-1

GROSS WEIGHT ADJUSTMENT.

When the throttle is intentionally retarded to obtain a 1% rpm reduction, add 1000 pounds to the static gross weight of the airplane before entering the take-off performance charts.

RUNWAY DISTANCE MARKING SYSTEM.

The numbering and placement of runway distance markers reflects the distance remaining to the end of the runway in 1000-foot increments. These markers are placed alongside the runway, and the appropriate markers become the acceleration check distance marker. In accordance with the marker system on a runway length in excess of the 1000-foot interval (10, 500), one half the length over the exact thousands of feet [1/2 (10, 500 - 10, 000)] must be added to the distances shown on the markers to determine the actual distance remaining; i.e., at marker No. 6, the distance remaining would be 6250 feet.

WIND COMPONENT.

The wind component chart (figure A2-2) is used to obtain the equivalent head wind for cross winds from 0 to 60 knots and up to 90 degrees from airplane heading. The equivalent head wind is used in the take-off and landing charts to determine distances with wind. Use of the chart is explained by a "chase-through" sample problem.

TAKE-OFF DISTANCES.

Ground-run distances and total distances to clear a 50-foot obstacle with Maximum and Military Thrust are plotted in the take-off distance charts. The distances shown are for normal take-off technique on a dry, hard-surface runway and may be used for any configuration if the gross weight at take-off is considered. The indicated airspeeds (IAS) for take-off at various gross weights are also shown. Use of the charts is explained by a "chase-through" sample problem given in figure A2-3.

NOTE It is difficult to obtain accurate results with an accumulative error of less than 300 feet when computing take-off and landing distances. Therefore, follow the grid and guidelines carefully to keep the error to a minimum.

TAKE-OFF ACCELERATION.

The Maximum and Military Thrust take-off acceleration charts give ground-roll distances required to accelerate to any desired indicated airspeed, and conversely, the indicated airspeed at any desired check-point distance. The distances and airspeeds are based on normal take-off techniques and do not take into account substandard engine performance or excessive use of brakes for directional control. If the take-off is made under conditions of subnormal acceleration, an allowable acceleration tolerance of 10 knots IAS is the maximum speed deficiency that is acceptable at any check-point distance.

NOTE When computing take-off performance, the 10-knot IAS speed tolerance should be projected for the entire take-off ground roll to ascertain that adequate runway is available to complete the take-off under subnormal acceleration conditions.

If acceleration is deficient to the extent that the speed tolerance is exceeded at any check-point distance, a serious malfunction of the airplane is indicated and the take-off should be aborted even if excess runway is available. Use of the charts is explained by a "chase-through" sample problem given on figure A2-4.

REFUSAL SPEEDS.

The highest indicated airspeed to which the airplane can accelerate and then stop in the available runway length is the refusal speed. The refusal speed chart is based on a Maximum or Military Thrust acceleration to the refusal speed, and then heavy braking to stop on a dry, hard-surface runway, without use of drag chute or speed brake. For other than dry runways, an RCR grid is also included. The drag chute reduces the distance required to stop and should be used if possible. The ground-roll distance required to accelerate to refusal speed can be found on the take-off acceleration charts. Use of the charts is explained by a "chase-through" sample problem given in figure A2-5.

CRITICAL AFTERBURNER FAILURE SPEED.

The critical afterburner failure speed may be defined as the minimum speed at which the afterburner may fail (all following events being normal) and the take-off may be completed at Military Thrust in the remaining runway at the existing weight. The critical afterburner failure speed should be used in conjunction with refusal speed when abort criteria are computed. Regardless of the critical afterburner failure speed, if the afterburner fails before refusal speed, the take-off should be aborted. If the afterburner fails above refusal speed and critical afterburner failure speed, the take-off should be continued. Since the critical afterburner failure speed in inversely proportional to the refusal speed, that is, the shorter the runway, the higher the critical afterburner failure speed, the spread between refusal speed and

critical afterburner failure speed becomes greater as the runway length becomes shorter. Under these conditions, it is necessary to consider jettisoning external stores and recomputing the refusal speed and critical afterburner failure speed at the reduced gross weight. Use of the chart is explained by the following sample problem.

Problem:

Determine the critical afterburner failure speed for a take-off at 6000 feet pressure altitude, on a 40°C day with a gross weight of 33,000 pounds, 3000 pounds of which is jettisonable. Runway available for take-off is 7500 feet.

Solution:

Refer to "chase-through" sample problem given in figure A2-6.

Step 1:

- Ⓐ is gross weight (33,000 pounds).
- Ⓑ is runway temperature (40°C).
- Ⓒ is pressure altitude baseline.
- Ⓓ is pressure altitude (6000 feet).
- Ⓔ is wind baseline.
- Ⓕ is critical afterburner failure speed baseline.
- Ⓖ is runway available (7500 feet).
- Ⓗ is intersection of following guideline from critical afterburner failure speed baseline and runway available.
- Ⓙ is critical afterburner failure speed (178 knots IAS).

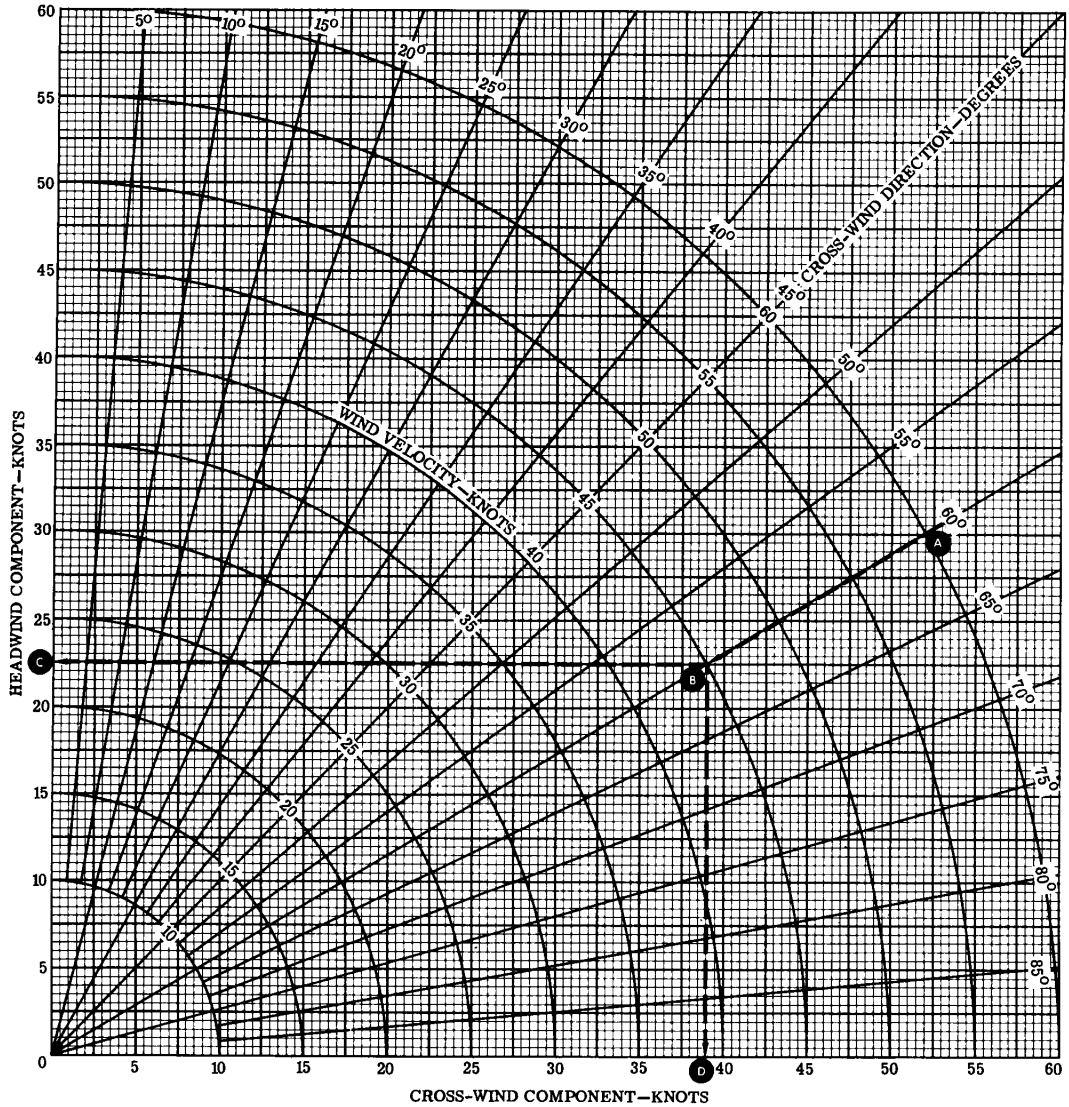
The refusal speed for these conditions (see figure A2-5) is 118 knots IAS. The spread between refusal speed and critical afterburner failure speed is 60 knots IAS; therefore, consideration should be given to jettisoning the 3000 pounds of external load and computing refusal speed and critical afterburner failure speed at the new weight.

Step 2:

- Ⓚ is new gross weight (30,000 pounds).
- Ⓛ is runway temperature (40°C).
- Ⓜ is pressure altitude baseline.
- Ⓝ is pressure altitude (6000 feet).
- Ⓟ is wind baseline.
- Ⓠ is critical afterburner failure speed baseline.
- Ⓖ is runway available (7500 feet).
- Ⓡ is intersection of following guideline from critical afterburner failure speed baseline and runway available.
- Ⓢ is critical afterburner failure speed at reduced weight (155 knots IAS).

The refusal speed for the new weight (see figure A2-5) is 119 knots IAS. The spread between refusal speed and critical afterburner failure speed is now 36 knots IAS. It can be seen that, when operating during marginal conditions, the ability to continue a take-off with an afterburner failure, occurring after refusal speed, is greatly limited. However, as runway available for take-off is increased, the ability to successfully complete a take-off with an afterburner failure at either the existing weight or the weight after external stores are jettisoned is greatly increased.

WIND COMPONENT



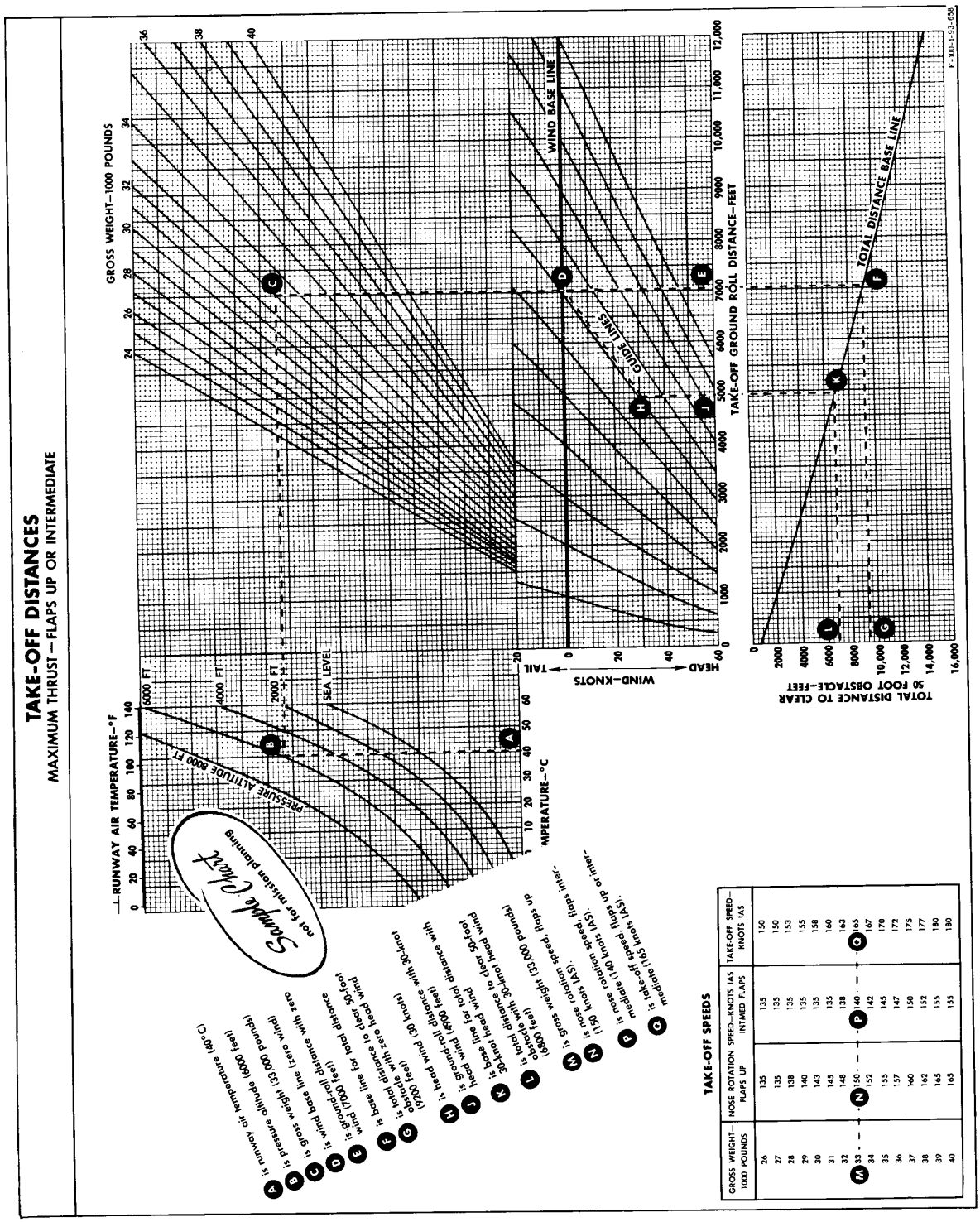
NOTE:
To obtain tail-wind components, enter chart with direction of wind taken from reciprocal heading of airplane.

EXAMPLE:

- (A) is cross-wind direction, from airplane heading (60 degrees).
- (B) is wind velocity (45 knots).
- (C) is effective head wind (22.5 knots).
- (D) is effective 90-degree cross wind (39 knots).

F-100-1-93-18A

Figure A2-2



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS FLAPS UP	INTMED FLAPS	TAKE-OFF SPEED—KNOTS IAS
26	135	135	150
27	135	135	150
28	138	135	153
29	140	135	155
30	143	135	158
31	145	135	160
32	148	138	163
M 33	N 150	P 140	Q 165
34	152	142	167
35	155	145	170
36	157	147	172
37	160	150	175
38	162	152	177
39	165	155	180
40	165	155	180

Figure A2-3

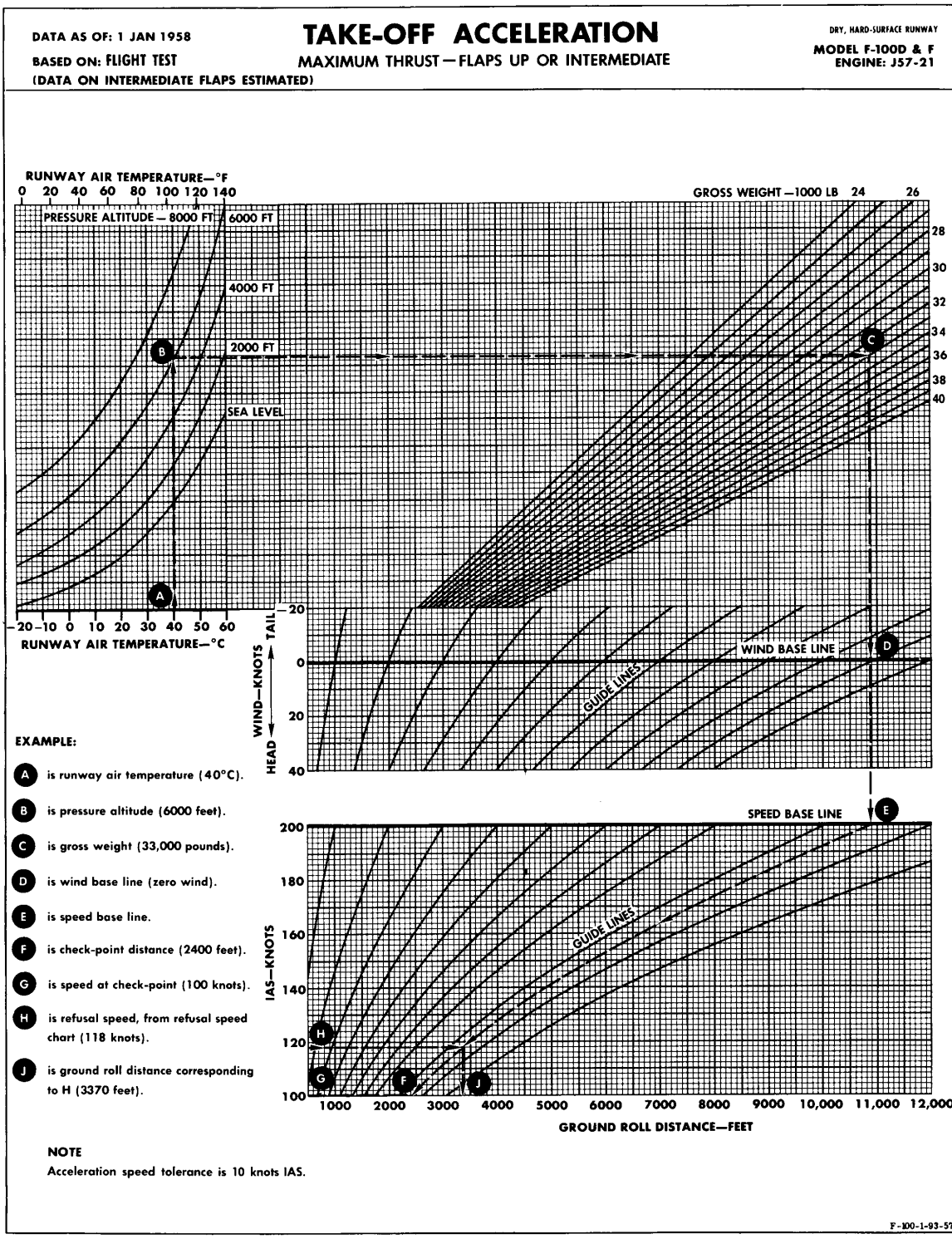

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)
TAKE-OFF ACCELERATION
MAXIMUM THRUST — FLAPS UP OR INTERMEDIATE
DRY, HARD-SURFACE RUNWAY
MODEL F-100D & F
ENGINE: J57-21
RUNWAY AIR TEMPERATURE—°F
0 20 40 60 80 100 120 140
PRESSURE ALTITUDE — 8000 FT
6000 FT
4000 FT
2000 FT
SEA LEVEL
A
B
−20 −10 0 10 20 30 40 50 60
RUNWAY AIR TEMPERATURE—°C
GROSS WEIGHT —1000 LB
24
26
28
30
32
34
36
38
40
C
WIND—KNOTS
TAIL
HEAD
−20
0
20
40
WIND BASE LINE
D
GUIDE LINES
SPEED BASE LINE
E
IAS—KNOTS
200
180
160
140
120
100
GUIDE LINES
H
G
F
J
1000 2000 3000 4000 5000 6000 7000 8000 9000 10,000 11,000 12,000
GROUND ROLL DISTANCE—FEET
EXAMPLE:
A is runway air temperature (40°C).
B is pressure altitude (6000 feet).
C is gross weight (33,000 pounds).
D is wind base line (zero wind).
E is speed base line.
F is check-point distance (2400 feet).
G is speed at check-point (100 knots).
H is refusal speed, from refusal speed chart (118 knots).
J is ground roll distance corresponding to H (3370 feet).
NOTE
Acceleration speed tolerance is 10 knots IAS.
F-100-1-93-571

Figure A2-4

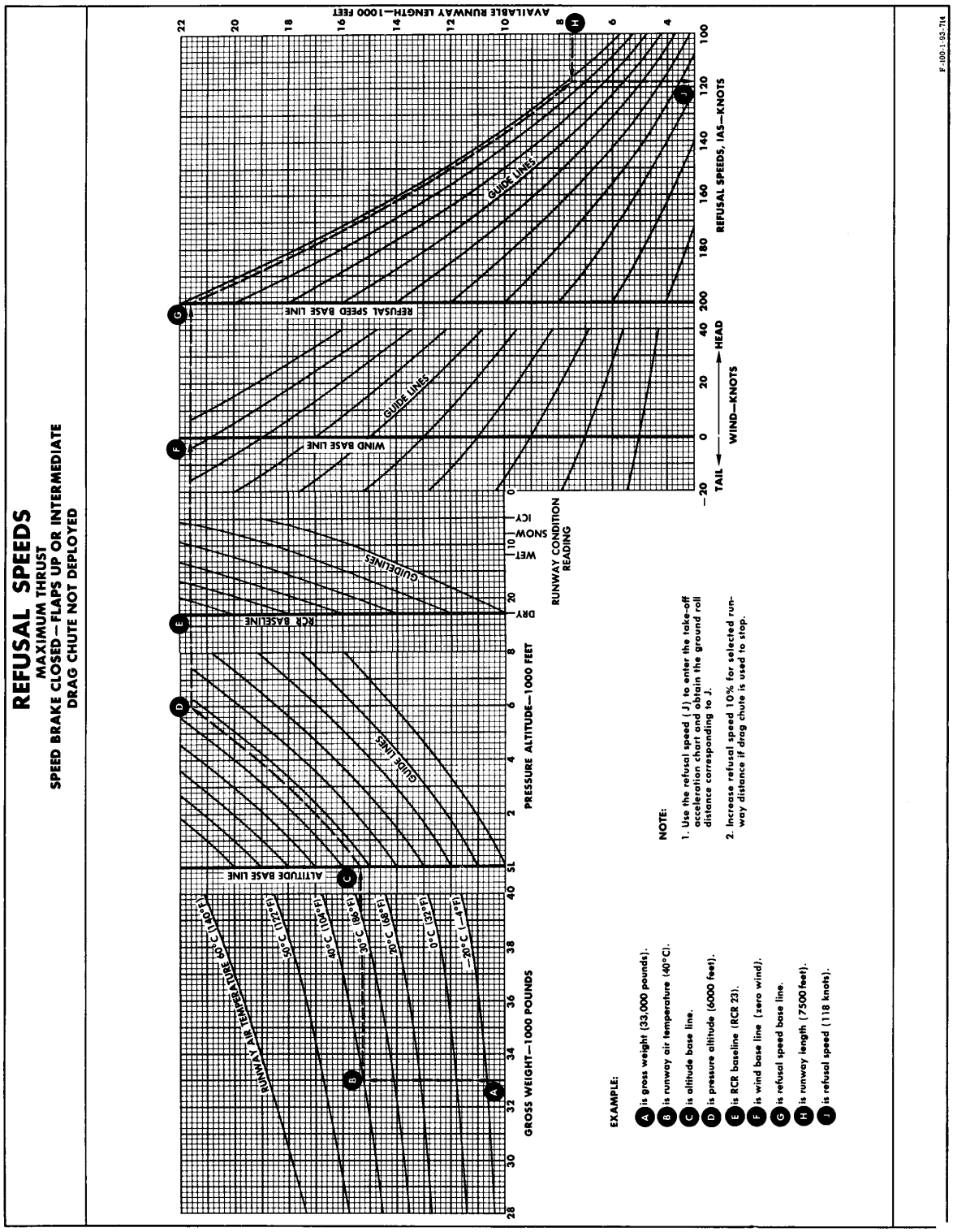

REFUSAL SPEEDS
MAXIMUM THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEEDS, IAS—KNOTS
GUIDE LINES
REFUSAL SPEED BASE LINE
WIND—KNOTS
TAIL
HEAD
WIND BASE LINE
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
RCR BASELINE
PRESSURE ALTITUDE—1000 FEET
ALTITUDE BASE LINE
RUNWAY AIR TEMPERATURE
GROSS WEIGHT—1000 POUNDS
EXAMPLE:
A is gross weight (33,000 pounds).
B is runway air temperature (40°C).
C is altitude base line.
D is pressure altitude (6000 feet).
E is RCR baseline (RCR 23).
F is wind base line (zero wind).
G is refusal speed base line.
H is runway length (7500 feet).
J is refusal speed (118 knots).
NOTE:
1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.
F-100-1-93-7A

Figure A2-5

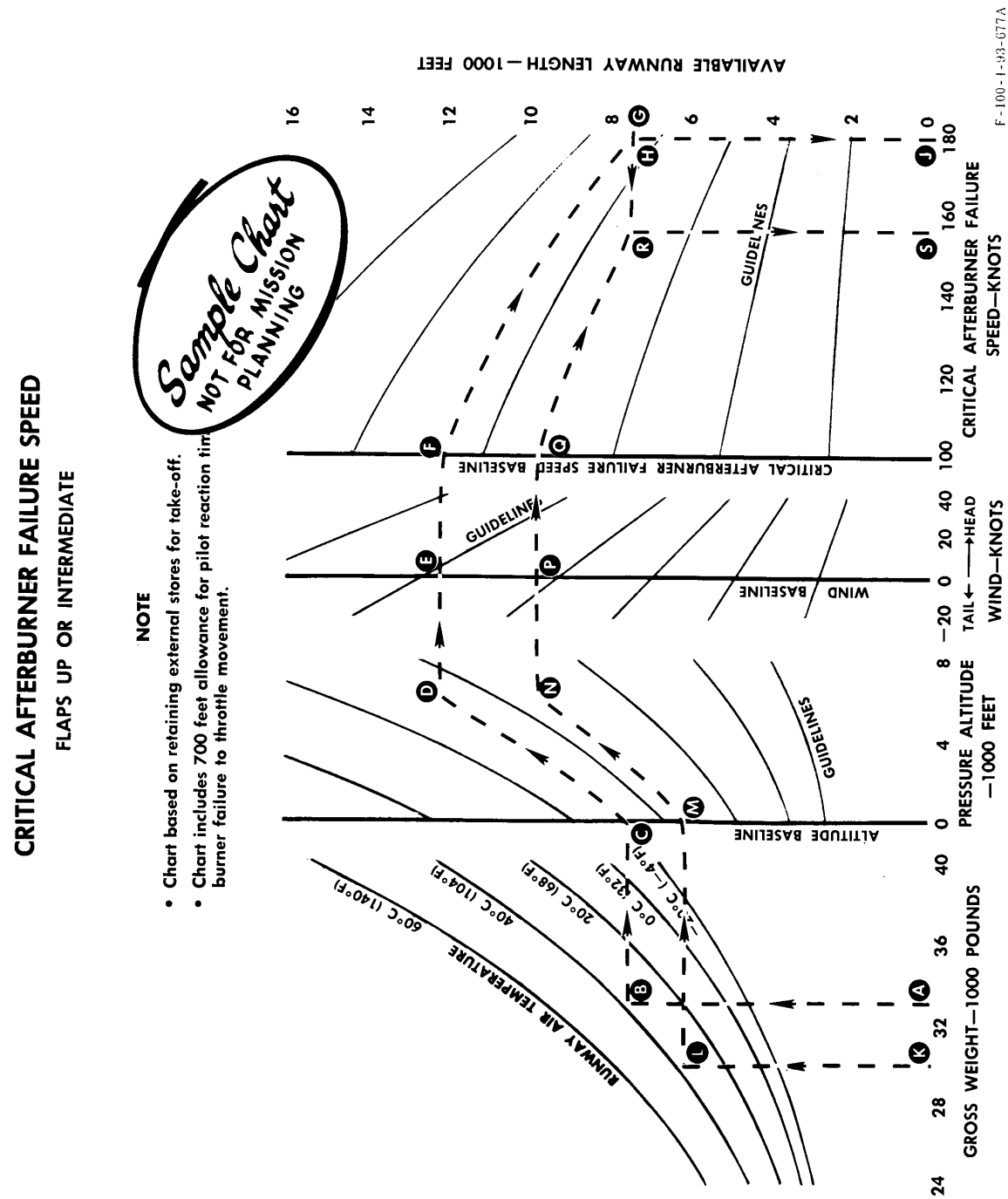
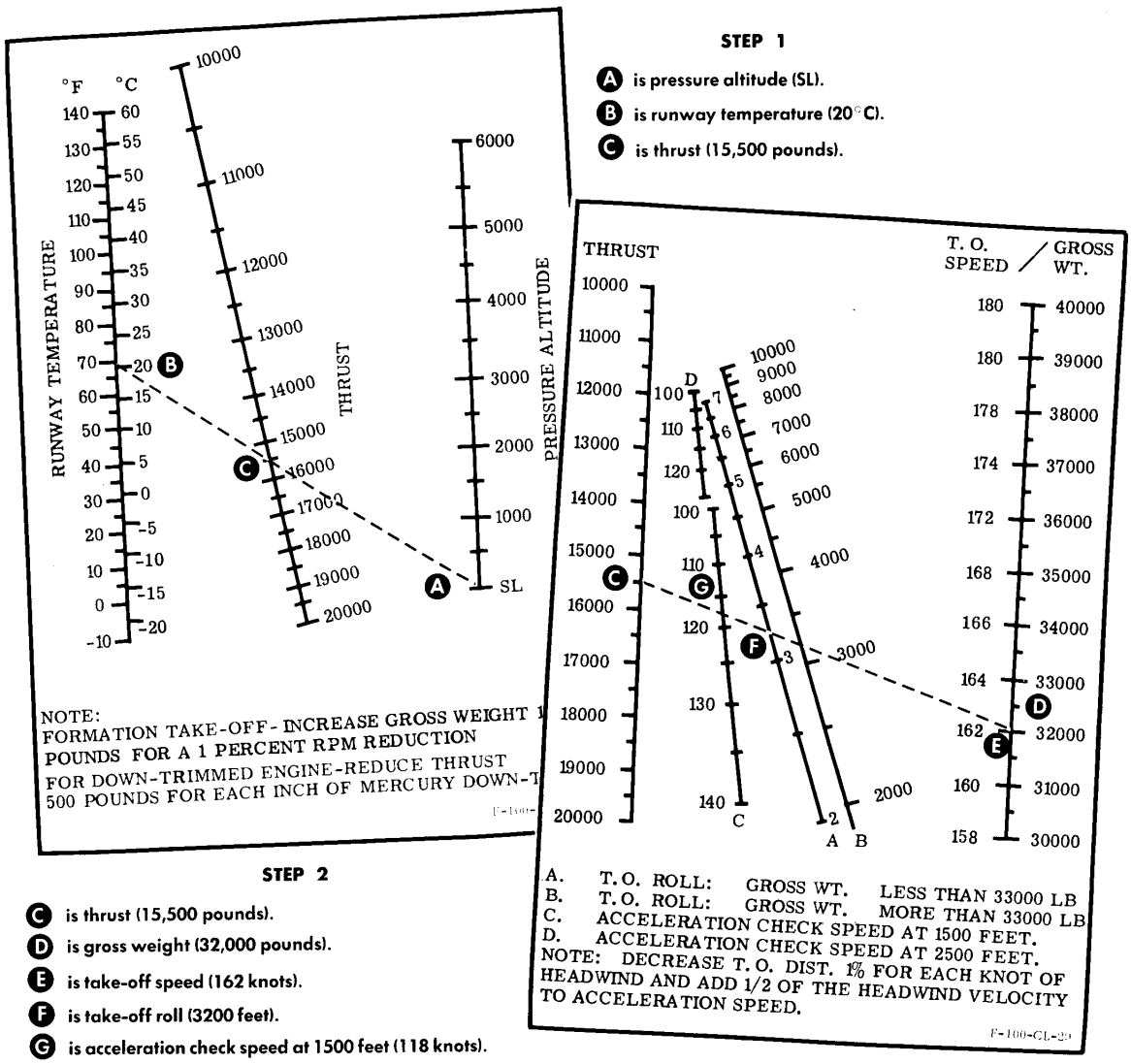

CRITICAL AFTERBURNER FAILURE SPEED
FLAPS UP OR INTERMEDIATE
NOTE
• Chart based on retaining external stores for take-off.
• Chart includes 700 feet allowance for pilot reaction tim
burner failure to throttle movement.
Sample Chart
NOT FOR MISSION PLANNING
AVAILABLE RUNWAY LENGTH — 1000 FEET
16
14
12
10
8
6
4
2
0
CRITICAL AFTERBURNER FAILURE SPEED BASELINE
GUIDELINES
CRITICAL AFTERBURNER FAILURE SPEED—KNOTS
100
120
140
160
180
GUIDELINE
WIND BASELINE
TAIL ← —→ HEAD
WIND—KNOTS
−20
0
20
40
GUIDELINES
ALTITUDE BASELINE
PRESSURE ALTITUDE —1000 FEET
0
4
8
RUNWAY AIR TEMPERATURE
60°C (140°F)
40°C (104°F)
20°C (68°F)
0°C (32°F)
−20°C (−4°F)
GROSS WEIGHT—1000 POUNDS
24
28
32
36
40
F-100-1-93-677A

Figure A2-6

TAKE-OFF NOMOGRAMS

This data is a reproduction of cards that appear in the applicable abbreviated checklist. These cards are provided for your convenience. However, they should not be used for precise mission planning. Use of the charts is shown in the following sample problem:



STEP 1

- **A** is pressure altitude (SL).
- **B** is runway temperature (20°C).
- **C** is thrust (15,500 pounds).

STEP 2

- **C** is thrust (15,500 pounds).
- **D** is gross weight (32,000 pounds).
- **E** is take-off speed (162 knots).
- **F** is take-off roll (3200 feet).
- **G** is acceleration check speed at 1500 feet (118 knots).

F-100-1-93-678

Figure A2-7

PART 3-CLIMB

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Titles CAPITALIZED denote charts.

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Cruise-Climb Altitude	A3-1
Combat Ceiling	A3-2
CLIMB - SAMPLE	A3-4
CRUISE-CLIMB - SAMPLE	A3-6
COMBAT CEILING - SAMPLE	A3-7

CLIMB PERFORMANCE.

This part contains the information necessary to familiarize the pilot with the charts used to obtain climb performance.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEMS OPERATION.

When compressor bleed air is extracted by operation of anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the climb charts. To compensate for the use of these systems, an equivalent increment of weight for each system in operation must be added to the gross weight of the airplane before using the climb charts. Refer to the applicable section to obtain the equivalent weights.

GROSS WEIGHT ADJUSTMENTS.

Fuel used during take-off, intentional down-trimming of the engine, and intentional rpm reduction will all affect climb performance. The following adjustments are to be made to the gross weight before entering the climb charts.

1. When climb is initiated immediately after take-off: subtract 1000 pounds of fuel from static gross weight for start, taxi, take-off, and acceleration to climb speed.

2. When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to gross weight derived from step 1.

3. When throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to gross weight derived from step 1 or from steps 1 and 2.

MAXIMUM AND MILITARY THRUST CLIMBS.

Time elapsed, distance traveled, and fuel used for either Maximum Thrust or Military Thrust climbs, at either the basic climb schedule or the alternate climb schedule (350 knots IAS or .8 indicated Mach number), may be determined from the climb charts. Use of the charts is explained by a "chase-through" sample problem given in figure A3-1.

CRUISE-CLIMB ALTITUDE.

Two types of charts are provided which enable the pilot to determine the altitude at which to establish cruise-climb. The chart labeled

"CRUISE-CLIMB ALTITUDE FROM SEA LEVEL" is entered with the gross weight at the start of climb from sea level, and the altitude at which to terminate the climb and initiate cruise-climb is read directly. Since the amount of fuel used in the climb determines the gross weight at altitude, and therefore the cruise-climb altitude, a chart is provided for either of the Military Thrust climb schedules. When the cruise-climb altitude has been determined, the appropriate Military Thrust climb schedule chart must be referred to in order to obtain time elapsed, distance traveled, and fuel used during the climb.

The chart labeled "CRUISE-CLIMB ALTITUDE" enables the pilot to determine the cruise-climb altitude for a given gross weight at that altitude. This chart is used when the cruise-climb altitude is being determined for a climb from other than sea-level altitudes. To use the chart, estimate a gross weight at altitude and determine a preliminary cruise-climb altitude. The desired climb schedule chart is referred to, and the fuel used to climb to the preliminary cruise-climb altitude is determined. The gross weight of the airplane is adjusted for this fuel burn-off, and the cruise-climb altitude is rechecked using the new gross weight. It may be necessary to repeat this procedure several times until the cruise-climb altitude for the computed gross weight is determined. Use of the chart is explained by a "chase-through" sample problem given in figure A3-2.

COMBAT CEILING.

The combat ceiling (500 fpm rate of climb) for either of the climb schedules at Maximum Thrust or Military Thrust may be determined from the combat ceiling charts. The charts are based on gross weight at altitude and are used in the same manner as the cruise-climb chart. The gross weight is estimated, a preliminary combat ceiling determined, the appropriate climb schedule chart referred to for the fuel used in climb, the gross weight of the airplane adjusted for this fuel burn-off, and the combat ceiling rechecked. Use of the charts is explained by a "chase-through" sample problem given in figure A3-3.

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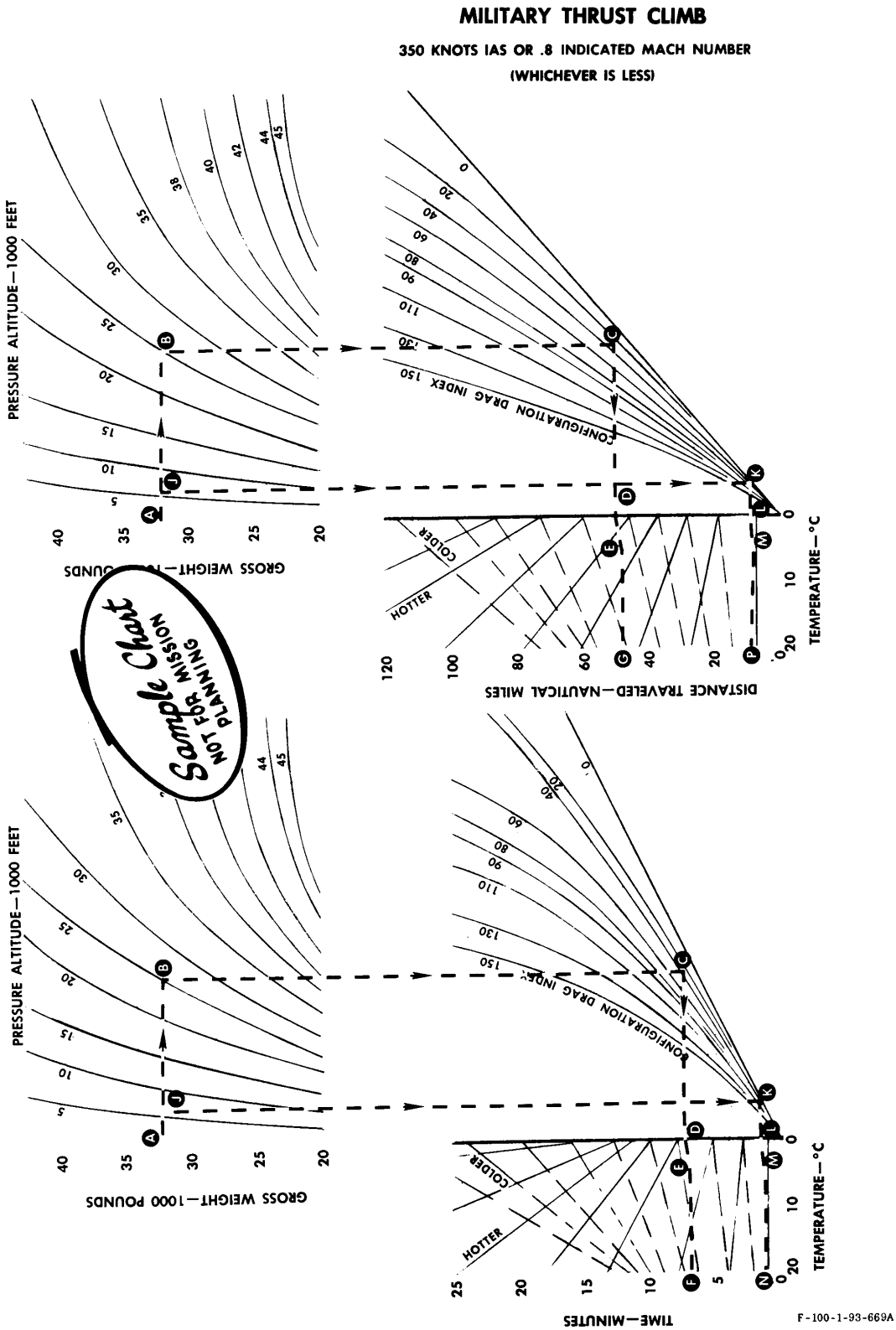


Figure A3-1 (Sheet 1 of 2)

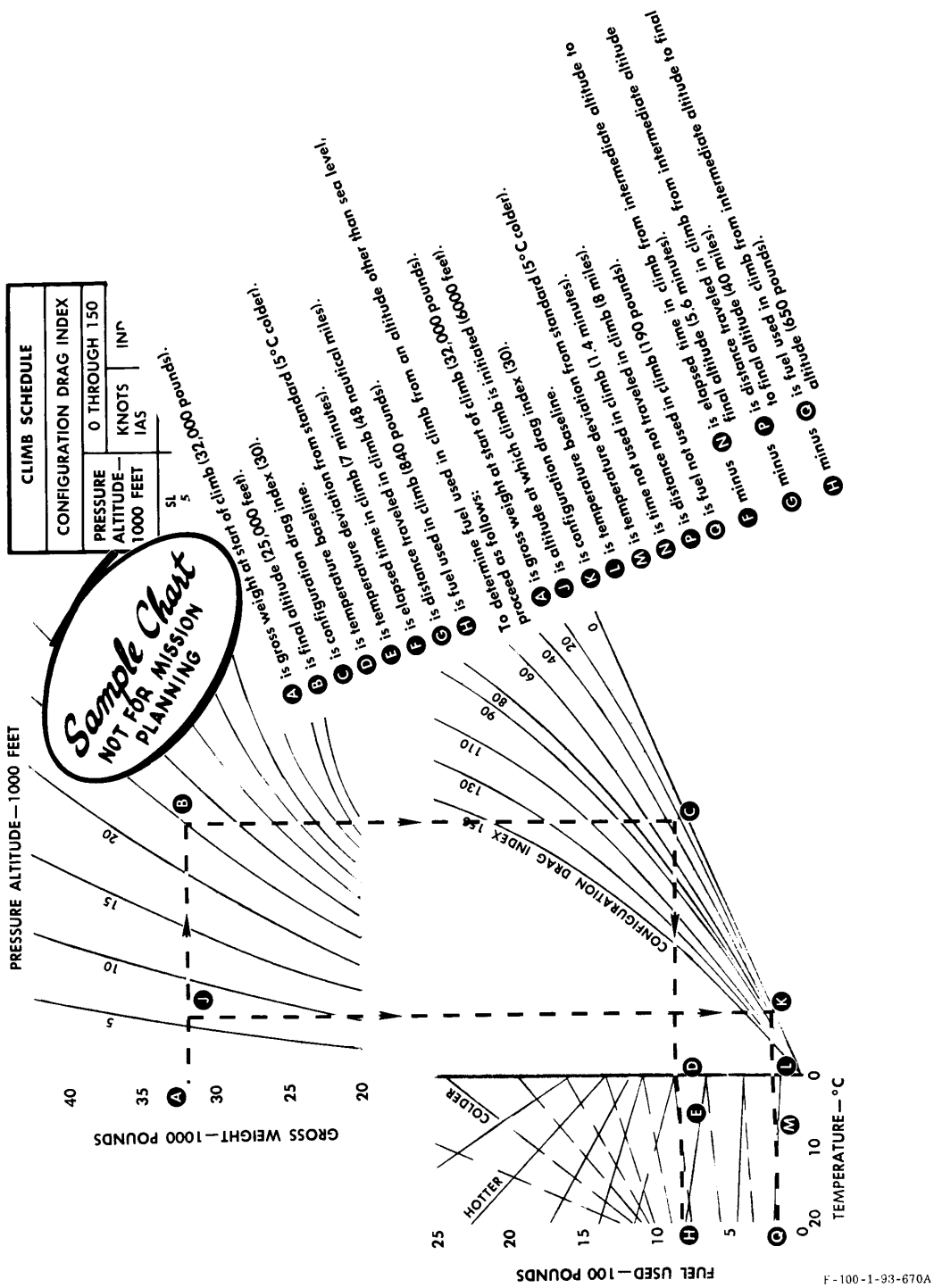
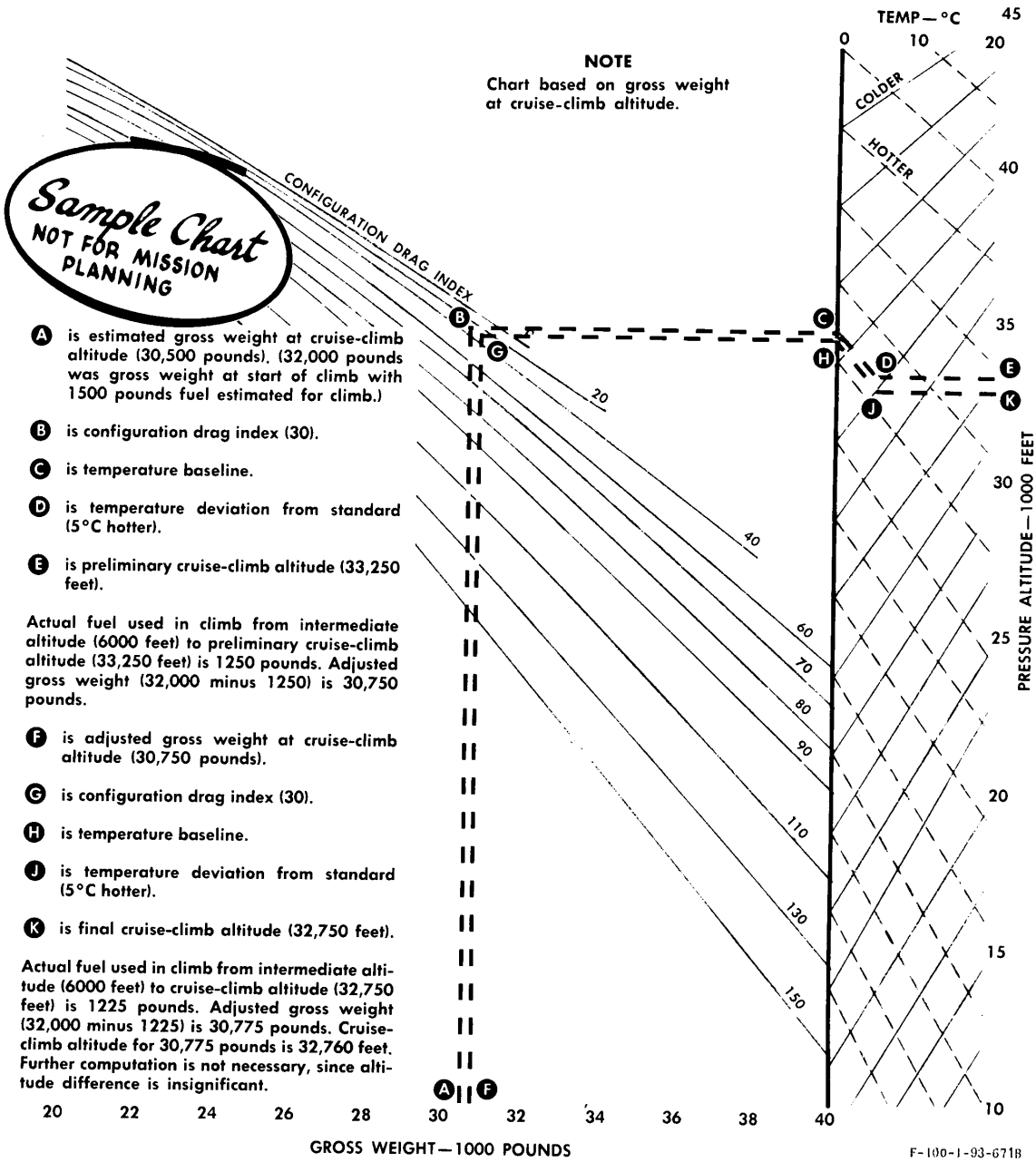


Figure A3-1 (Sheet 2 of 2)

CRUISE-CLIMB ALTITUDE



Ⓐ is estimated gross weight at cruise-climb altitude (30,500 pounds). (32,000 pounds was gross weight at start of climb with 1500 pounds fuel estimated for climb.)

Ⓑ is configuration drag index (30).

Ⓒ is temperature baseline.

Ⓓ is temperature deviation from standard (5°C hotter).

Ⓔ is preliminary cruise-climb altitude (33,250 feet).

Actual fuel used in climb from intermediate altitude (6000 feet) to preliminary cruise-climb altitude (33,250 feet) is 1250 pounds. Adjusted gross weight (32,000 minus 1250) is 30,750 pounds.

Ⓕ is adjusted gross weight at cruise-climb altitude (30,750 pounds).

Ⓖ is configuration drag index (30).

Ⓗ is temperature baseline.

Ⓙ is temperature deviation from standard (5°C hotter).

Ⓚ is final cruise-climb altitude (32,750 feet).

Actual fuel used in climb from intermediate altitude (6000 feet) to cruise-climb altitude (32,750 feet) is 1225 pounds. Adjusted gross weight (32,000 minus 1225) is 30,775 pounds. Cruise-climb altitude for 30,775 pounds is 32,760 feet. Further computation is not necessary, since altitude difference is insignificant.

Figure A3-2

COMBAT CEILING

350 KNOTS IAS OR .8 INDICATED MACH NUMBER
(WHICHEVER IS LESS)

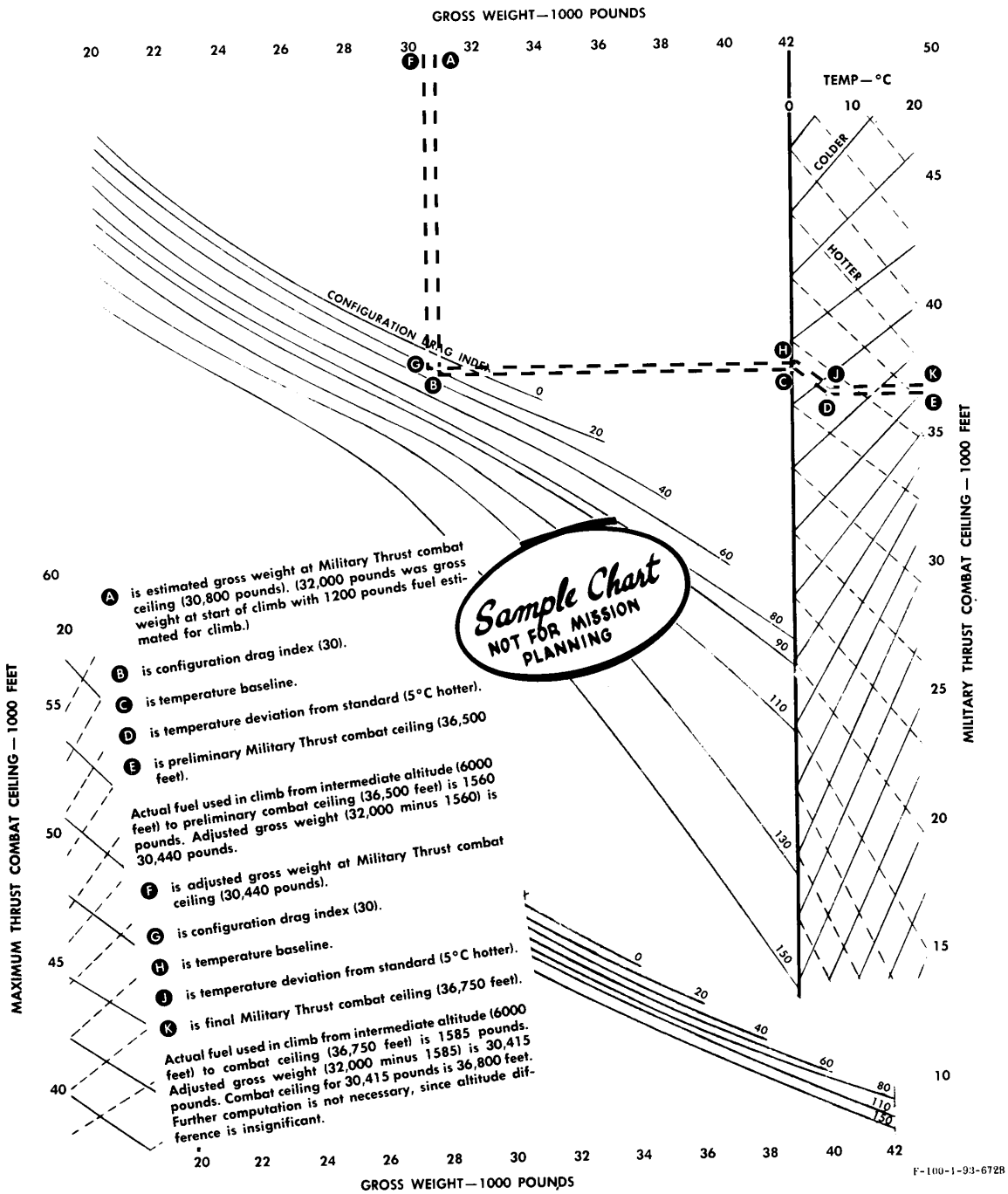


Figure A3-3

PART 4 – RANGE

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Titles CAPITALIZED denote charts

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RANGE.

As engine performance is affected by Mach number, rpm, and altitude, the drag curve indicates flexibility in both the optimum cruise Mach number and altitude. Therefore, there is a definite range or span of Mach and altitude that will produce near maximum range. From the drag curves and engine performance, specific range at different Mach numbers can be computed. The maximum specific range remains relatively constant for a broad range of Mach numbers, which means that without compromising range, wind effects can be optimized (by using a slow airspeed for tail winds, and a high airspeed for head winds). Computing specific range versus Mach number for various altitudes, the same characteristics hold true. If these maximum specific ranges are then plotted versus altitude, it is seen that there is also a considerable altitude band where maximum range can be achieved. It is further noted that the heavier the gross weight of the airplane, the broader the altitude band. For the operational pilot who is plagued with poor engine performance or traffic control problems, these bands of Mach and altitude provide the luxury of still being capable of performing an optimum combat mission, or, more expressively, maximum operational effectiveness. Variations of ambient temperature can have an important effect on the long-range cruise performance. If, for example, cruise is being performed at 20,000 feet and Mach .68, the maximum cruise thrust is not being used. The Maximum Thrust at which an airplane can cruise is Maximum Continuous Thrust. At this altitude, the thrust loss due to an increase in ambient temperature has only the small effect of requiring a higher cruise engine speed and perhaps a slightly higher specific fuel consumption. However, increased ambient temperature also increases the true airspeed at a constant Mach number; consequently, specific range is not seriously affected. Remember that Mach number is the choice parameter for precise cruise control. If the cruise were to be performed at the optimum cruise altitude and the optimum altitude were thrust-limited on a Standard Day, then ambient temperature above standard would certainly reduce the range by reducing the altitude for cruise. If the optimum cruise altitude is thrust-limited on a Standard Day, there may be a hot-day speed and altitude reduction and an associated loss in specific range along the optimum long-range path. Fortunately, most present-day high-performance airplanes are not compromised in cruise by thrust limitations. However, the addition of external stores does to some extent limit the cruise because of thrust.

NAUTICAL-MILES-PER-POUND-OF-FUEL CHARTS.

Cruise data (zero wind) throughout the speed range from maximum endurance to Military Thrust are shown in the nautical-miles-per-pound-of-fuel charts. Each chart includes specific range (nautical miles per pound), fuel flow, true Mach number, and true airspeed. Also included are curves of recommended cruise, maximum endurance, and Maximum Continuous and Military Thrust. Airplane cruising range is the product of specific range multiplied by pounds of fuel available for cruise.

$$\text{Range} = \frac{\text{Naut Mi}}{\text{Lb}} \text{ X Lb of Fuel}$$

For greatest accuracy in determining cruising range, consider small amounts of fuel at a time rather than the total fuel available. By this method, the total cruising range is the sum of the individual ranges obtained for each amount of fuel.

When there is a wind to be considered, multiply specific range by the range factor (ground speed divided by true airspeed) to obtain the specific range for wind. To obtain cruising range, multiply specific range by amount of fuel.

The 99% optimum-range line on the nautical-miles-per-pound-of-fuel charts is a baseline, and when range is being computed for other than 99% optimum range, the guidelines are followed from this baseline to the desired point. In this manner, range may be computed for maximum endurance, optimum range, Maximum Continuous Thrust, Military Thrust, or for a desired true Mach number or true airspeed. Use of the charts is explained by the following problem.

Problem:

Airplane gross weight at start of cruise is 31,000 pounds. Find cruise data for a constant 400-knot true airspeed cruise at 25,000 feet altitude, temperature -45°C, using 6000 pounds of fuel.

Solution:

Refer to "chase-through" sample problem given in figure A4-1.

Step 1:

Compute cruise data for first 2000 pounds of fuel.

Ⓐ is average gross weight for first leg [31,000 - (2000 ÷ 2)], 30,000 pounds.
Ⓑ is pressure altitude (25,000 feet).
Ⓒ is 99% optimum-range baseline.
Ⓓ is desired true airspeed (400 knots).
Ⓔ is temperature (-45°C).
Ⓕ is intersection of following guideline from 99% optimum-range baseline and vertical line from temperature.
Ⓖ is true Mach number (.674).
Ⓗ is transfer scale number (2.64). (See sheet 2, figure A4-1, and enter with transfer scale number and true airspeed.)
Ⓙ is pressure altitude (25,000 feet).
Ⓚ is nautical miles per pound of fuel (0.135).
Ⓛ is fuel flow (2990 pounds/hour).

0.135 times 2000 equals nautical miles traveled in first leg (270.0). Time to travel 270 nautical miles [(270 ÷ 400) x 60], 40.5 minutes.

Step 2:

Compute cruise data for second 2000 pounds of fuel.

Ⓐ is average gross weight for second leg [(29,000 - (2000 ÷ 2)], 28,000 pounds.
Ⓑ is pressure altitude (25,000 feet).
Ⓒ is 99% optimum-range baseline.
Ⓓ is true airspeed (400 knots).
Ⓔ is temperature (-45°C).
Ⓕ is intersection of following guideline from 99% optimum baseline and vertical line from temperature.
Ⓖ is true Mach number (.674).
Ⓗ is transfer scale number (2.95). (See sheet 2, figure A4-1, and enter with transfer scale number and true airspeed.)
Ⓙ is pressure altitude (25,000 feet).
Ⓚ is nautical miles per pound of fuel (0.144).
Ⓛ is fuel flow (2800 pounds/hour).

0.144 times 2000 equals nautical miles traveled in second leg (288.0). Time to travel 288 nautical miles [(288 ÷ 400) x 60], 43.2 minutes.

Step 3:

Compute cruise data for third 2000 pounds of fuel.

Ⓐ is average gross weight for third leg [(27,000 - 2000 ÷ 2)], 26,000 pounds.
Ⓑ is pressure altitude (25,000 feet).
Ⓒ is 99% optimum-range baseline.
Ⓓ is desired true airspeed (400 knots).
Ⓔ is temperature (-45°C).
Ⓕ is intersection of following guideline from 99% optimum-range baseline and vertical line from temperature.
Ⓖ is true Mach number (.674).
Ⓗ is transfer scale number (3.1). (See sheet 2, figure A4-1, and enter with transfer scale number and true airspeed.)
Ⓙ is pressure altitude (25,000 feet).
Ⓚ is nautical miles per pound of fuel (0.148).
Ⓛ is fuel flow (2700 pounds/hour).

0.148 times 2000 equals nautical miles traveled in the third leg (296.0). Time to travel 296 nautical miles [(296 ÷ 400) x 60], 44.4 minutes.

Step 4:

Total cruise data for 6000 pounds of fuel. Distance traveled for three legs (270 + 288 + 296), 854.0 nautical miles. Time elapsed for three legs (40.5 + 43.2 + 44.4), 128.1 minutes (2.1 hours).

CONSTANT-ALTITUDE CRUISE.

Cruise data for a 99% range cruise is obtained from the constant-altitude cruise chart.

NOTE The optimum altitude for a constant-altitude cruise is the same altitude where cruise-climb is established and may, therefore, be determined from the cruise-climb altitude charts.

For greatest accuracy in determining cruising range, consider small amounts of fuel at a time rather than the total fuel to be used. The chart is then entered with the average gross weight for each leg being considered. Use of the chart is explained by the following sample problems.

Problem:

Airplane gross weight at start of cruise is 31,000 pounds. Determine cruise data for a constant-altitude cruise - 99% range, at 25,000 feet altitude, using 6000 pounds of fuel. Average outside air temperature is 30°C with a 25-knot head wind.

Solution:

Refer to "chase-through" sample problem given in figure A4-2.

Step 1:

Compute cruise data for first 2000 pounds of fuel.

- (A) is average gross weight for first leg [31,000 - (2000 ÷ 2)], 30,000 pounds.
- (B) is pressure altitude (25,000 feet).
- (C) is configuration drag index (30).
- (D) is true Mach number (.81).
- (E) is temperature baseline.
- (F) is temperature deviation from Standard Day (5°C hotter).
- (G) is pressure altitude (25,000 feet).
- (H) is true airspeed (497 knots). (See sheet 2, figure A4-2, for continuation of problem.)
- (J) is average gross weight for first leg (3000 pounds).
- (K) is pressure altitude (25,000 feet).
- (L) is configuration drag index (30).
- (M) is true airspeed from (H) (497 knots).
- (N) is fuel used (2000 pounds).
- (P) is time elapsed during first 2000-pound fuel burn-off (32 minutes). (See sheet 1, of figure A4-2, for completion of problem.)
- (Q) is wind baseline.
- (R) is head wind (25 knots).
- (S) is time from (P) 32 minutes.
- (T) is distance traveled during 32-minute burn-off at first 2000 pounds of fuel (250 nautical miles).

Step 2:

Compute cruise data for second 2000 pounds of fuel.

- (A) is average gross weight for second leg [29,000 - (2000 ÷ 2)], 28,000 pounds.
- (B) is pressure altitude (25,000 feet).
- (C) is configuration drag index (30).
- (D) is true Mach number (.79).
- (E) is temperature baseline.
- (F) is temperature deviation from Standard Day (5°C hotter).
- (G) is pressure altitude (25,000 feet).
- (H) is true airspeed (467 knots). (See sheet 2, figure A4-2, for continuation of problem.)
- (J) is average gross weight (28,000 pounds).
- (K) is pressure altitude (25,000 feet).
- (L) is configuration drag index (30).
- (M) is true airspeed from (H) (467 knots).
- (N) is fuel used (2000 pounds).
- (P) is time elapsed during second 2000-pounds fuel burn-off (37 minutes). (See sheet 1, figure A4-2, for completion of problem.)
- (Q) is wind baseline.
- (R) is head wind (25 knots).
- (S) is time from (P) (37 minutes).
- (T) is distance traveled during 37-minute burn-off of second 2000 pounds of fuel (280 nautical miles).

Step 3:

Compute cruise data for third 2000 pounds of fuel.

- (A) is average gross weight for third leg [27,000 - (2000 ÷ 2)] 26,000 pounds.
- (B) is pressure altitude (25,000 pounds).
- (C) is configuration drag index (30).
- (D) is true Mach number (.77).
- (E) is temperature baseline.
- (F) is temperature deviation from Standard Day (5°C hotter).
- (G) is pressure altitude.
- (H) is true airspeed (457 knots). (See sheet 2, figure A4-2, for continuation of problem.,
- (J) is average gross weight (26,000 pounds).
- (K) is pressure altitude (25,000 feet).
- (L) is configuration drag index (30).
- (M) is true airspeed from (H) (457 knots).
- (N) is fuel used (2000 pounds).
- (P) is time elapsed during third 2000 pounds fuel burn-off (40 minutes). (See sheet 1, figure A4-2, for completion of problem.)
- (Q) is wind baseline.
- (R) is head wind (25 knots).
- (S) is time from (P) (40 minutes).
- (T) is distance traveled during 40-minute burn-off of third 2000 pounds of fuel (300 nautical miles).

Step 4:

Total time and distance from three legs. Total distance traveled during 6000-pound fuel burn-off (250 plus 280 plus 300) is 830 nautical miles. Total time elapsed during 6000-pound fuel burn-off to travel 830 nautical miles (32 plus 37 plus 40) is 109 minutes (one hour 49 minutes).

CONSTANT-ALTITUDE CRUISE SETTINGS.

Fuel-flow settings to make good the time and distance during a constant-altitude cruise - 99% range is obtained from the constant-altitude cruise setting chart. The chart indicates the fuel-flow setting for a given gross weight, taking into account other factors, such as altitude, configuration, drag, etc. The gross weight at start of cruise (rather than an average gross weight) is used and is recomputed for increments of weight depending on the desired accuracy. In addition to the fuel-flow settings, nautical miles per 1000 pounds of fuel and true airspeed may be obtained from the chart. Use of the chart is explained by the following sample problems.

Problem:
Airplane gross weight at start of cruise is 31,000 pounds. Determine cruise settings for a constant-altitude cruise - 99% range, at 25,000 feet altitude, with an average air temperature of 30°C.

Solution:

Refer to "chase-through" sample problem given in figure A4-3.

Step 1:

Compute for 1000-pound fuel burn-off.

Ⓐ is pressure altitude (25,000 feet).
Ⓑ is gross weight (31,000 pounds).
Ⓒ is configuration drag index (30).
Ⓓ is temperature baseline.
Ⓔ is temperature deviation from Standard Day (5° hotter).
Ⓕ is pressure altitude (25,000 feet).
Ⓖ is true airspeed (515 knots).
Ⓗ is pressure altitude (25,000 feet).
Ⓙ is gross weight (31,000 pounds).
Ⓚ is configuration drag index (30).
Ⓛ is nautical miles per 1000 pounds of fuel (130).
Ⓜ is true airspeed from Ⓖ (515 knots).
Ⓝ is fuel-flow setting (3950 pounds).

Step 2:

Recompute for 1000-pound fuel burn-off.

Ⓐ is pressure altitude (25,000 feet).
Ⓑ is gross weight (30,000 pounds).
Ⓒ is configuration drag index (30).
Ⓓ is temperature baseline.
Ⓔ is temperature deviation from Standard Day (5°C hotter).
Ⓕ is pressure altitude (25,000 feet).
Ⓖ is true airspeed (505 knots).
Ⓗ is pressure altitude (25,000 feet).
Ⓙ is gross weight (30,000 pounds).
Ⓚ is configuration drag (30).
Ⓛ is nautical miles per 1000 pounds at fuel (133).
Ⓜ is true airspeed from Ⓖ (505 knots).
Ⓝ is fuel-flow setting (3800 pounds).

Step 3:

The procedure is repeated as many times as necessary to achieve the desired results. The increments of gross weight may be altered, depending on the desired accuracy.

CRUISE-CLIMB.

The cruise-climb - 99% range enables the pilot to determine the fuel used, distance traveled, and time elapsed during a cruise-climb condition. The gross weight and cruise-climb altitude are determined by using the cruise-climb altitude charts. (Refer to "Cruise-Climb Altitude" in Part 3, Section I, of this manual.) The cruise-climb - 99% range chart is entered with this gross weight, and range may be determined for a given fuel used, or fuel required for a given range. By subtracting the fuel used from the gross weight and re-entering the chart with the new gross weight, the altitude at the end of the cruise-climb may be determined. The range increment is added to the distance traveled for a tail wind, and subtracted from the distance traveled for a head wind. For an over-all picture of the cruise-climb performance, the chart should be entered with increments of fuel used or distance traveled, rather than the total of either. Use of the chart is explained by the following problem.

Problem:

Determine range data for cruise-climb with a 31,000-pound gross weight airplane, using 6000 pounds of fuel. Average temperature deviation is 5°C hotter with a 25-knot head wind.

Solution:

Refer to "chase-through" sample problem given in figure A4-4.

Step 1:

Compute range data for first 2000 pounds of fuel.

Ⓐ is gross weight at cruise-climb altitude (31,000 pounds).
Ⓑ is configuration drag index (30).
Ⓒ is fuel used (2000 pounds).
Ⓓ is distance traveled (290 nautical miles).

Ⓔ is initial cruise-climb pressure altitude (34, 400 feet).
Ⓕ is configuration drag index (30).
Ⓖ is true Mach number (.858).
Ⓗ is distance traveled (290 nautical miles).
Ⓙ is temperature baseline.
Ⓚ is temperature deviation from Standard Day (5°C hotter).
Ⓛ is head wind (25 knots).
Ⓜ is range increment (15 nautical miles).

Distance traveled Ⓓ minus head-wind range increment Ⓜ is total distance traveled in first leg (275 nautical miles).

Step 2:

Compute range data for second 2000 pounds of fuel.

Ⓐ is gross weight at end of first leg (31, 000 - 2000) 29, 000 pounds.
Ⓑ is configuration drag index (30).
Ⓒ is fuel used (2000 pounds).
Ⓓ is distance traveled (315 nautical miles).
Ⓔ is pressure altitude at start of second leg (36, 000 feet).
Ⓕ is configuration drag index (30).
Ⓖ is true Mach number (.86).
Ⓗ is distance traveled (315 nautical miles).
Ⓙ is temperature baseline.
Ⓚ is temperature deviation from Standard Day (5°C hotter).
Ⓛ is head wind (25 knots).
Ⓜ is range increment (17 nautical miles).

Distance traveled Ⓓ minus head-wind range increment Ⓜ is total distance traveled in second leg (298 nautical miles).

Step 3:

Compute range data for third 2000 pounds of fuel.

🅐 is gross weight at end of second leg (29, 000 - 2000), 27, 000 pounds.
🅑 is configuration drag index (30).
Ⓒ is fuel used (2000 pounds).
🅓 is distance traveled (350 nautical miles).
🅔 is pressure altitude at start of third leg (37, 600 feet).
🅕 is configuration drag index (30).
Ⓖ is true Mach number (.865).
🅗 is distance traveled (350 nautical miles).
Ⓙ is temperature baseline.
🅚 is temperature deviation from Standard Day (5°C hotter).
🅛 is head wind (25 knots).
🅜 is range increment (20 nautical miles).

Distance traveled 🅓 minus head-wind range increment 🅜 is total distance traveled in third leg (330 nautical miles).

Step 4:

Total cruise data for 6000 pounds of fuel and determine final altitude. Distance traveled for three legs (275 + 298 + 330), 903 nautical miles.

Ⓝ is gross weight at end of third leg (31, 000 - 6000) 25, 000 pounds.
Ⓟ is configuration drag index (30).
Ⓠ is final pressure altitude (38, 200 feet).

SUMMARY.

Check your flight plan during the actual flight to determine what deviations there are. These deviations should be used in calculating the fuel reserve expected at the destination. The most important factors to consider are:

a. Fuel used during start, taxi, take-off, and acceleration to climb speed.

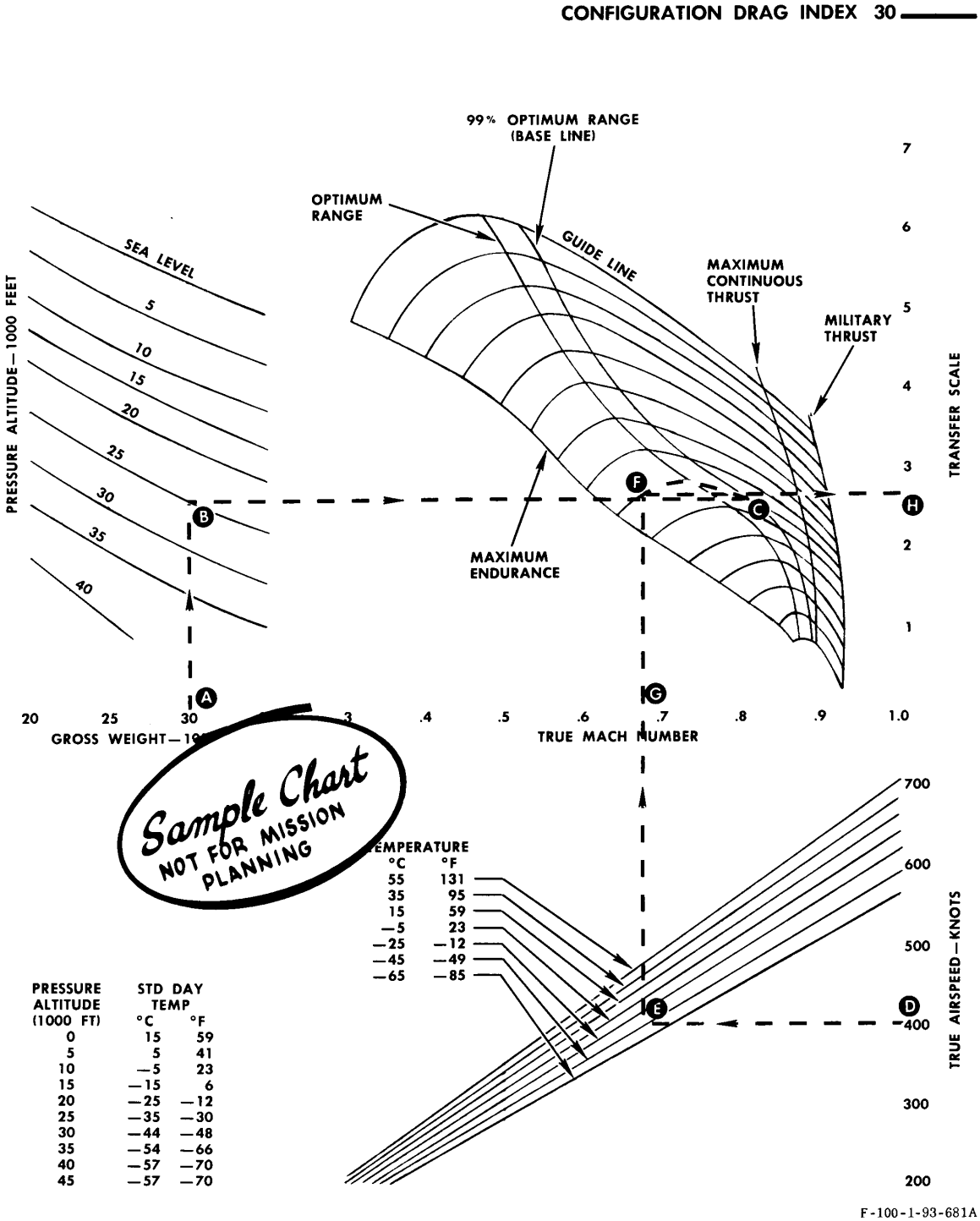
b. Wind effect.

c. Deviation from the recommended climb schedule.

d. Deviation from the recommended cruise settings.

e. Variation in engine performance.

f. Navigational errors, formation flight, and fuel actually aboard at take-off.



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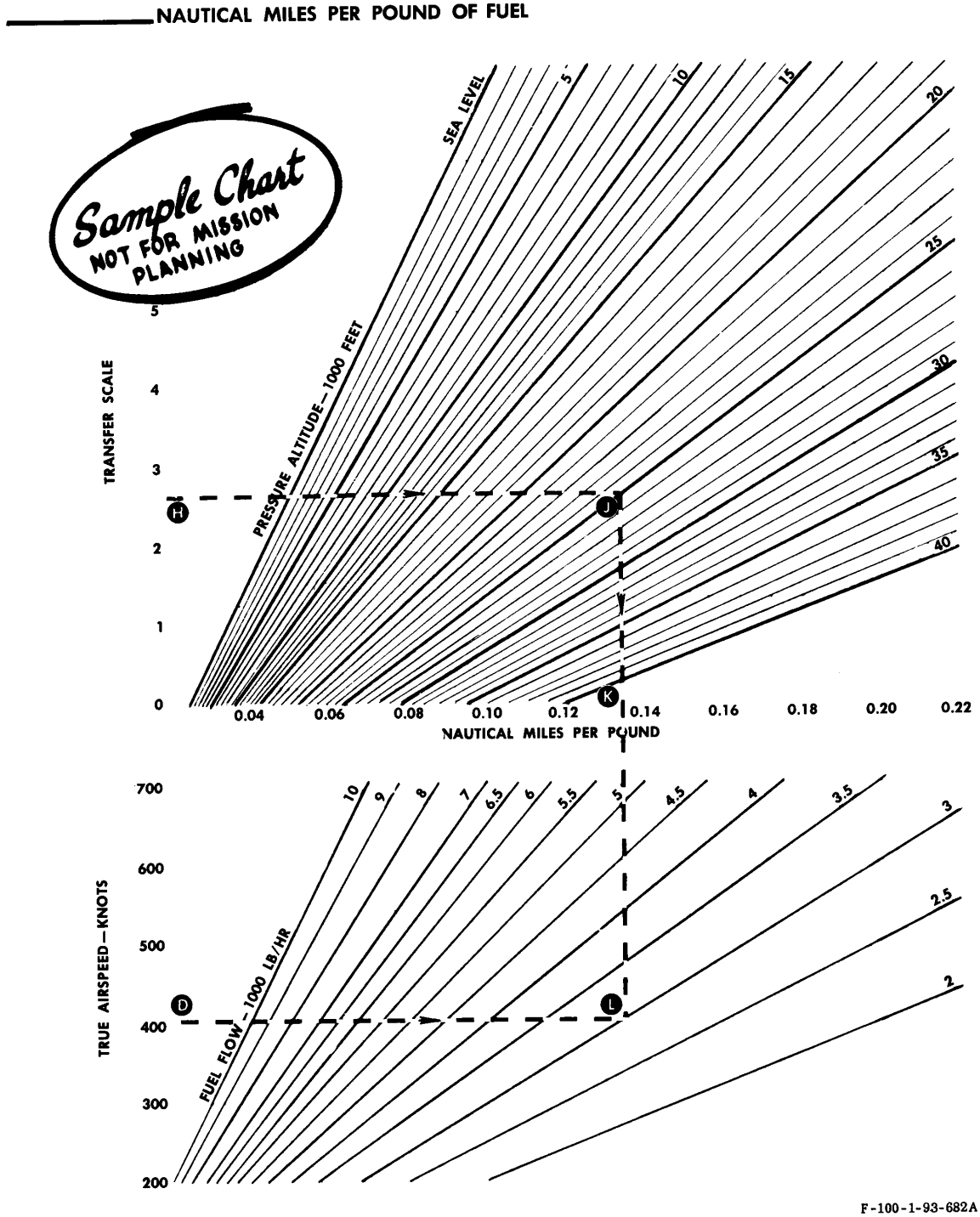
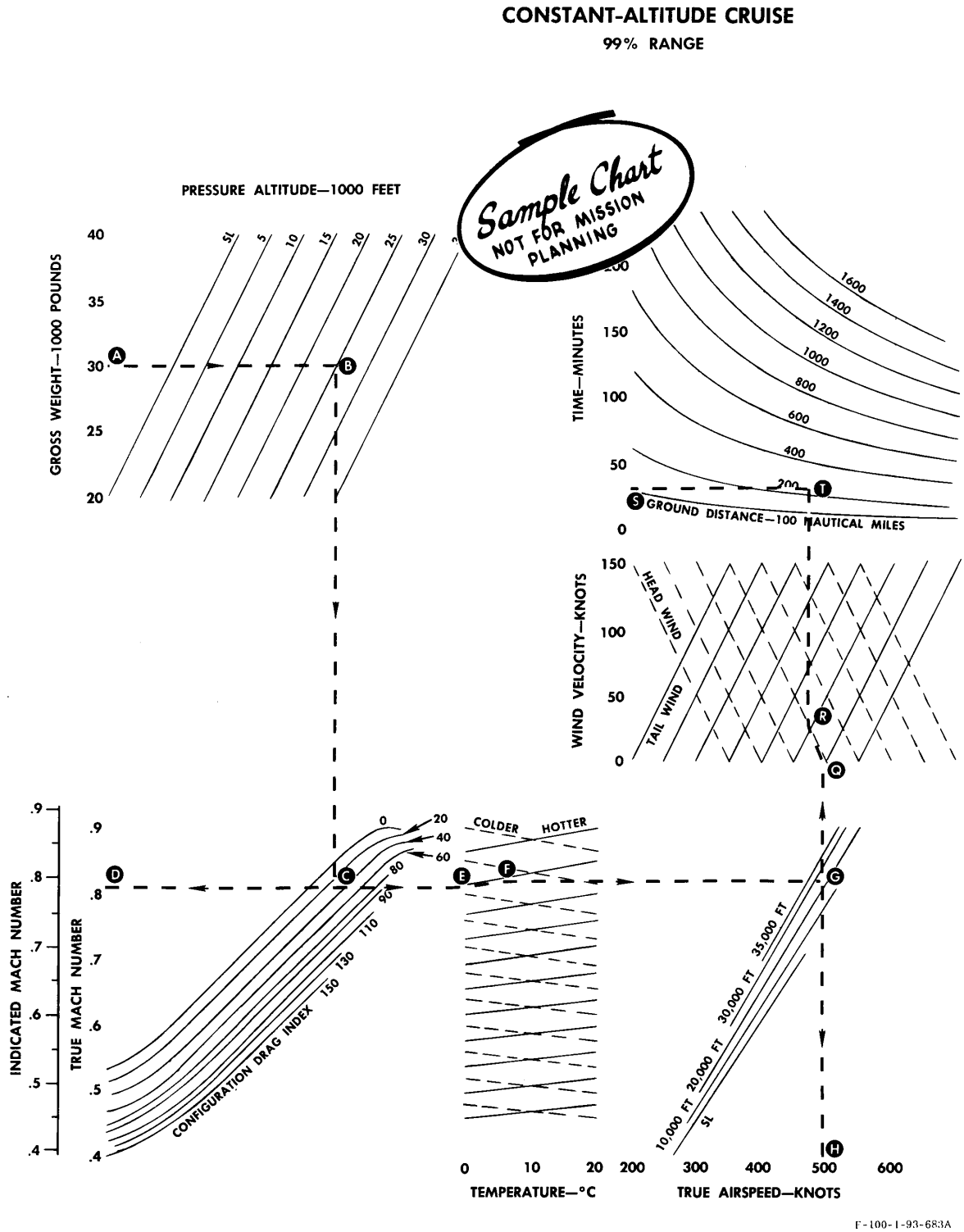


Figure A4-1 (Sheet 2 of 2)



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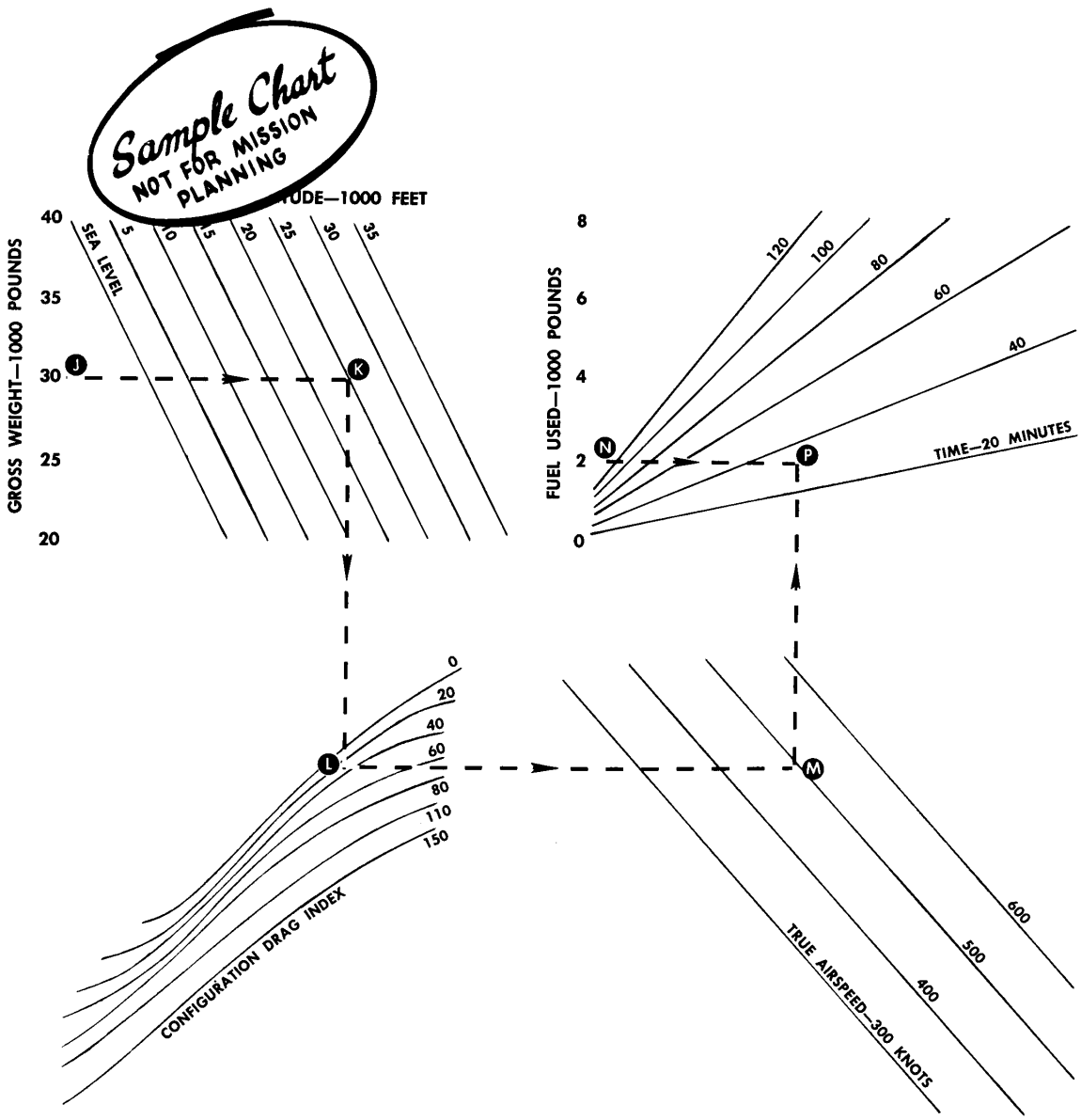


Figure A4-2 (Sheet 2 of 2)

CONSTANT-ALTITUDE CRUISE SETTINGS

99% RANGE

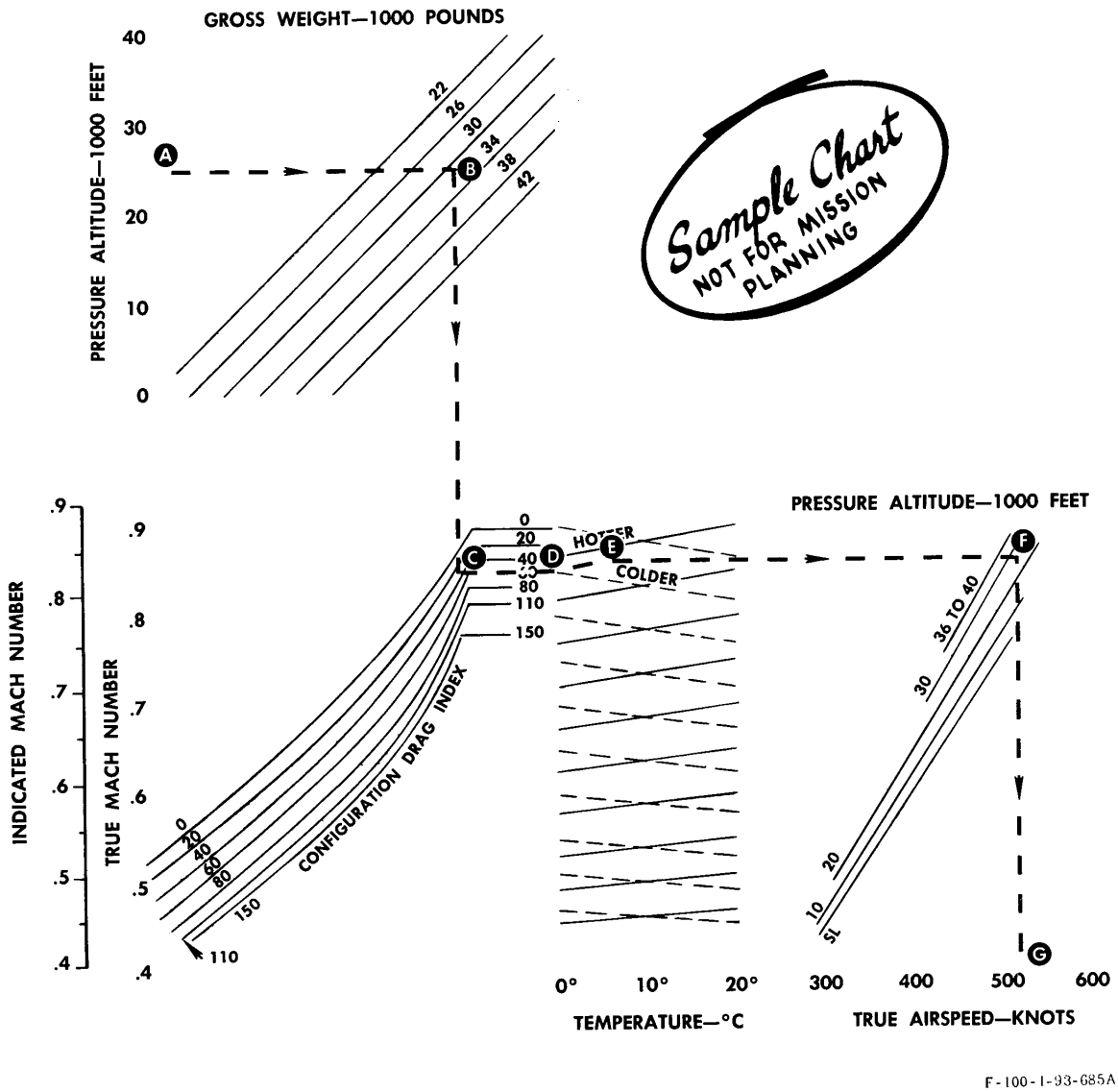


Figure A4-3 (Sheet 1 of 2)

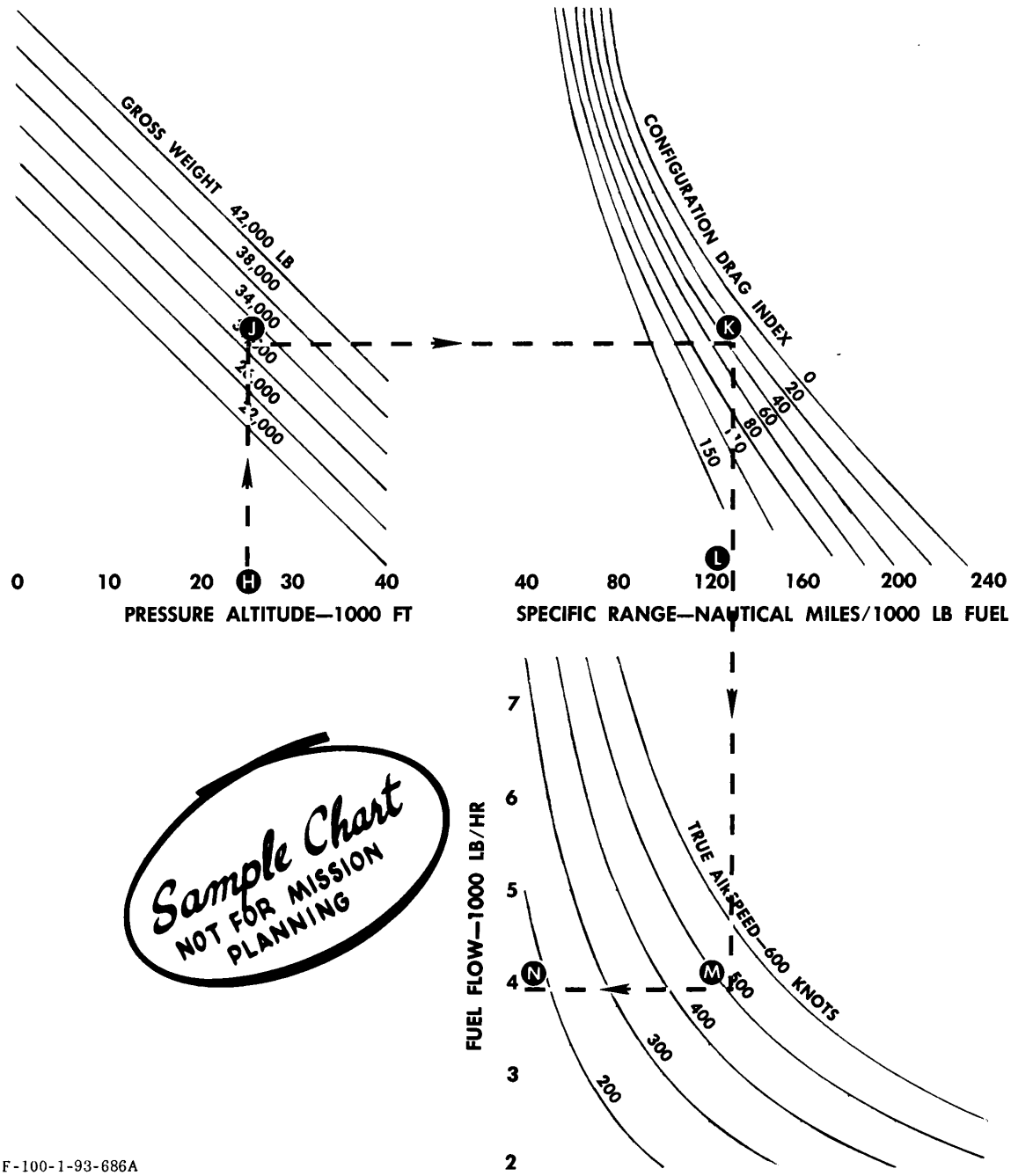


Figure A4-3 (Sheet 2 of 2)

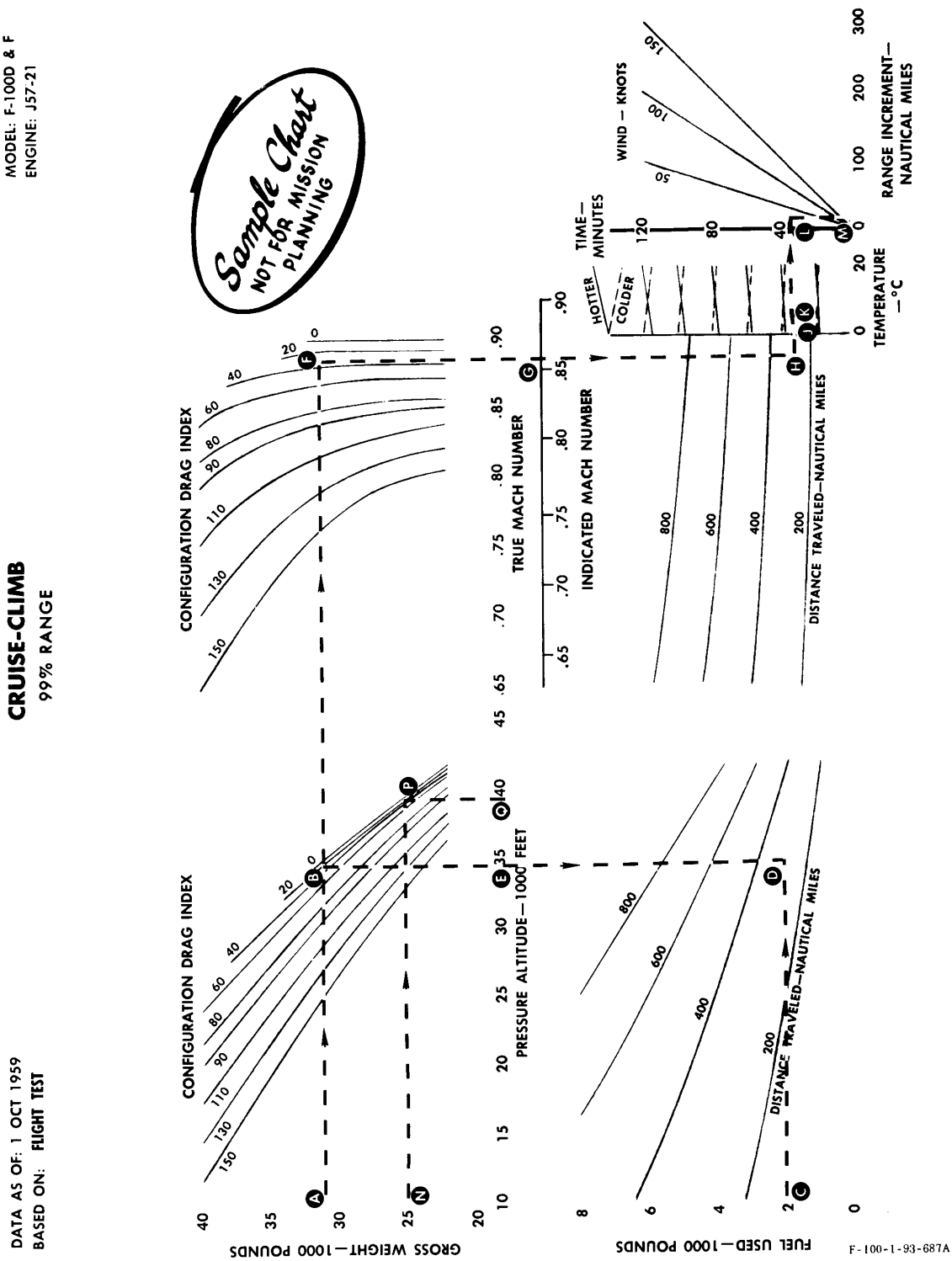
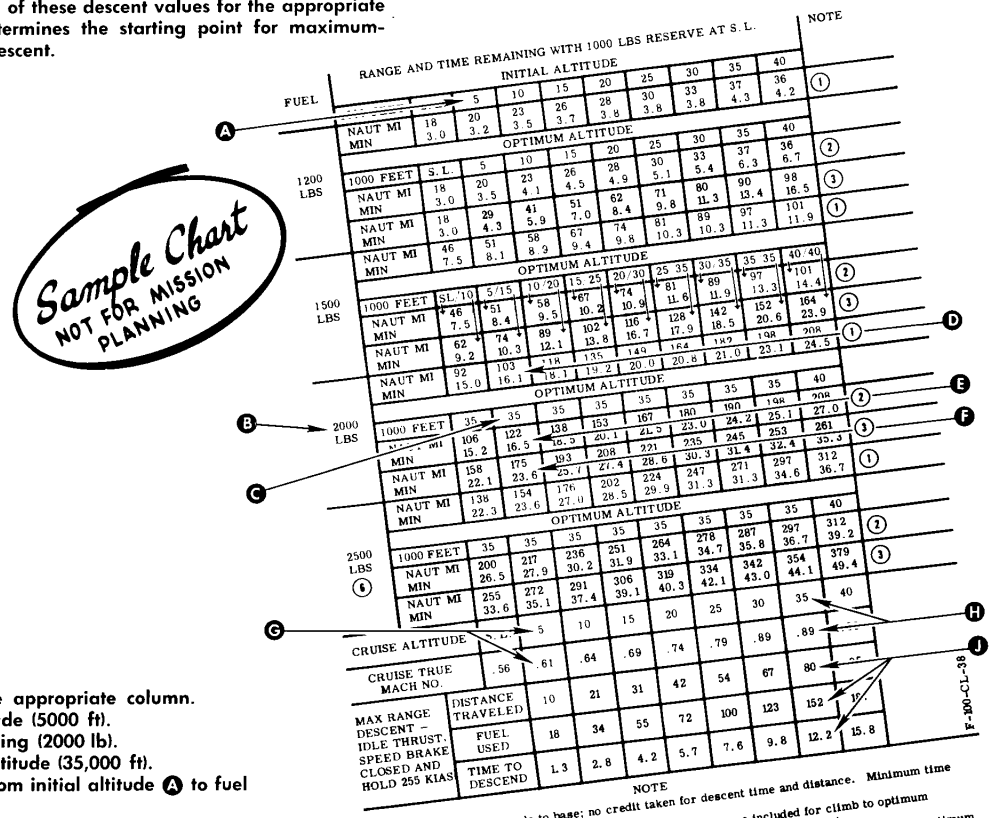

MODEL: F-100D & F
ENGINE: J57-21
CRUISE-CLIMB
99% RANGE
DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
Sample Chart
NOT FOR MISSION PLANNING
CONFIGURATION DRAG INDEX
GROSS WEIGHT—1000 POUNDS
PRESSURE ALTITUDE—1000 FEET
TRUE MACH NUMBER
INDICATED MACH NUMBER
FUEL USED—1000 POUNDS
DISTANCE TRAVELED—NAUTICAL MILES
TIME—MINUTES
HOTTER
COLDER
TEMPERATURE —°C
WIND — KNOTS
RANGE INCREMENT—NAUTICAL MILES
F-100-1-93-687A

Figure A4-4

DIVERSION RANGE SUMMARY

Diversion range summary charts for several airplane configurations are contained in the applicable pilot's checklist. These charts enable determination of range and time remaining when fuel quantity is 2500 pounds or less. Data is provided for three separate conditions. The first is the range and time for cruise only at the initial altitude. The second is for climb to, and cruise at, optimum altitude. In this condition, time for descent is included; however, no credit is provided for distance. The third set of values is for maximum conditions. These values include range and time to climb to, and cruise at, initial altitude plus range and time for a maximum-range, on-course descent to sea level. A maximum-range descent table is on each chart. Application of any of these descent values for the appropriate cruise altitude determines the starting point for maximum-range on-course descent.

It must be noted that with 1200 pounds of fuel remaining, the initial altitude is also the optimum altitude, as the fuel required to climb is better used for cruise. With 1500 pounds of fuel remaining, an advantage can be obtained in climbing, but only when a maximum-range descent is made from the optimum altitude. The charts in the 1500-pound area present split or divided optimum altitude boxes. The first altitude is the initial altitude, and the guide arrow indicates the range and time to be used. The second altitude is the optimum altitude, with the guide arrow again indicating the proper values to be used.



NOTE

(1) Cruise at initial altitude to base; no credit taken for descent time and distance. Minimum time descent used.
(2) Use optimum altitude until over base; time fuel and distance included for climb to optimum altitude. No credit taken for descent distance. Use minimum time descent.
(3) Use optimum altitude and descend on course; time fuel and distance included for climb to optimum altitude and for descent on course to S. L. destination. Maximum range descent used.
(4) Climb at 350 KIAS or .80 1MN with Military Thrust
(5) Schedules provide for arrival at S. L. with 1000 lb. reserve for approach, landing and one normal pattern go-around.
(6) With more than 2500 lbs fuel aboard, cruise at recommended cruise altitude and Mach number.

STEP 1. Determine appropriate column.

- **A** is initial altitude (5000 ft).
- **B** is fuel remaining (2000 lb).
- **C** is optimum altitude (35,000 ft).

Read down from initial altitude **A** to fuel remaining **B**

STEP 2. Determine cruise and descent by comparison.

- **D** is range (103 naut mi) and elapsed time (16.1 min). Conditions for cruise and descent are obtained from NOTE (1).
- **E** is range (122 naut mi) and elapsed time (16.5 min). Conditions for cruise and descent are obtained from NOTE (2).
- **F** is range (175 naut mi) and elapsed time (23.6 min). Conditions for cruise and descent are obtained from NOTE (3).

STEP 3. Determine cruise speed.

- **G** is cruise speed (.61 true Mach No.) for initial altitude (5000 ft).
- **H** is cruise speed (.89 true Mach No.) for optimum altitude (35,000 ft).

STEP 4. Determine point from destination at which maximum-range descent is started.

- **J** is distance traveled from optimum altitude to destination (80 naut mi), fuel used (152 lb), and elapsed time (12.2 min) for a maximum-range descent.

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Figure A4-5

PART 5-ENDURANCE

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
Maximum Endurance (Loiter)	A5-1
MAXIMUM ENDURANCE - SAMPLE	A5-3

MAXIMUM ENDURANCE(LOITER).

The requirement to stay aloft and "hold" because of weather, traffic control, or adverse runway conditions necessitates remaining air-borne for long periods on a limited amount of fuel, which requires that the airplane be flown at a minimum rate of fuel consumption. From the drag curve, it was learned that at certain altitudes with the throttle wide open, for airspeeds below maximum, the thrust required for steady-state flight is less than the thrust available. If level flight is desired, the thrust setting is reduced until the thrust equals the drag. However, as the velocity is decreased from the maximum, a certain speed will be reached where it will be found that, on decreasing the speed further, more thrust is required, i.e., the thrust setting will have to be increased again. The speed for Minimum Thrust will be, for all practical purposes, the speed for minimum fuel consumption, and therefore, maximum endurance. Two types of charts are provided for maximum endurance: constant-altitude maximum endurance and optimum maximum endurance. Constant-altitude maximum endurance is somewhat less than optimum endurance, since it is based on a constant altitude which is not necessarily the optimum altitude for the airplane gross weight and configuration. Generally it is a requirement that the "hold" be accomplished in turning flight rather than in level flight. Steady-state flight, turning or level, requires a balance of weight with lift, and drag with thrust. When an airplane is banked, the lift force is acting at an angle to the vertical. The vertical component of the lift must equal the weight. In banked flight, greater lift is required than in level flight, and because of this increased lift, drag is also increased. This means that more thrust is required. The charts are provided with a load factor plot which enables the pilot to determine the effective gross weight of the airplane during turning flight. The plot is entered with the bank angle of the turn and a load factor determined. The gross weight of the airplane is multiplied by this load factor, which produces an effective gross weight. The endurance chart is then entered with this effective weight. When the maximum endurance is being performed during level flight, the gross weight and the effective weight are the same. Use of the charts is explained by the following problem.

Problem:

Determine altitude and fuel required for a 35-minute optimum maximum endurance "hold" on a Standard Day for a 25,000-pound gross weight airplane.

Solution:

Refer to the "chase-through" sample problem given in figure A5-1.

Step 1:

Ⓐ is bank angle (20 degrees).
Ⓑ is load factor baseline.
Ⓒ is load factor (1.3).

Ⓓ is effective gross weight (25, 000 x 1.3) 32, 500 pounds.
Ⓔ is configuration drag index (30).
Ⓕ is pressure altitude for optimum maximum endurance (25, 000 feet).
Ⓖ is configuration drag index (30).
Ⓗ is true Mach number (0. 684).
Ⓙ is effective gross weight (32, 500 pounds).
Ⓚ is configuration drag index (30).
Ⓛ is time to "hold" (35 minutes).
Ⓜ is temperature baseline.
Ⓝ is fuel used (2000 pounds).

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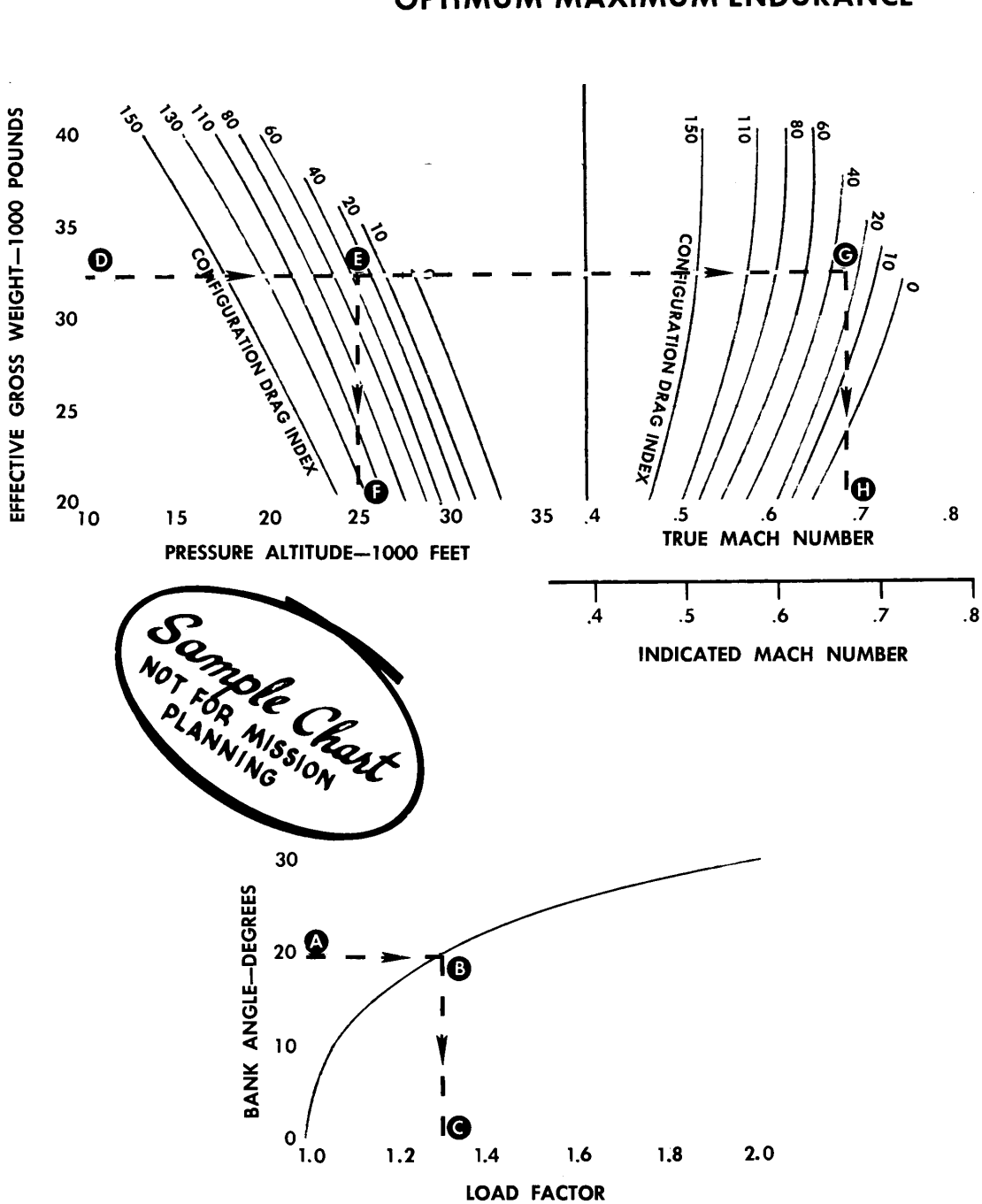


Figure A5-1 (Sheet 1 of 2)

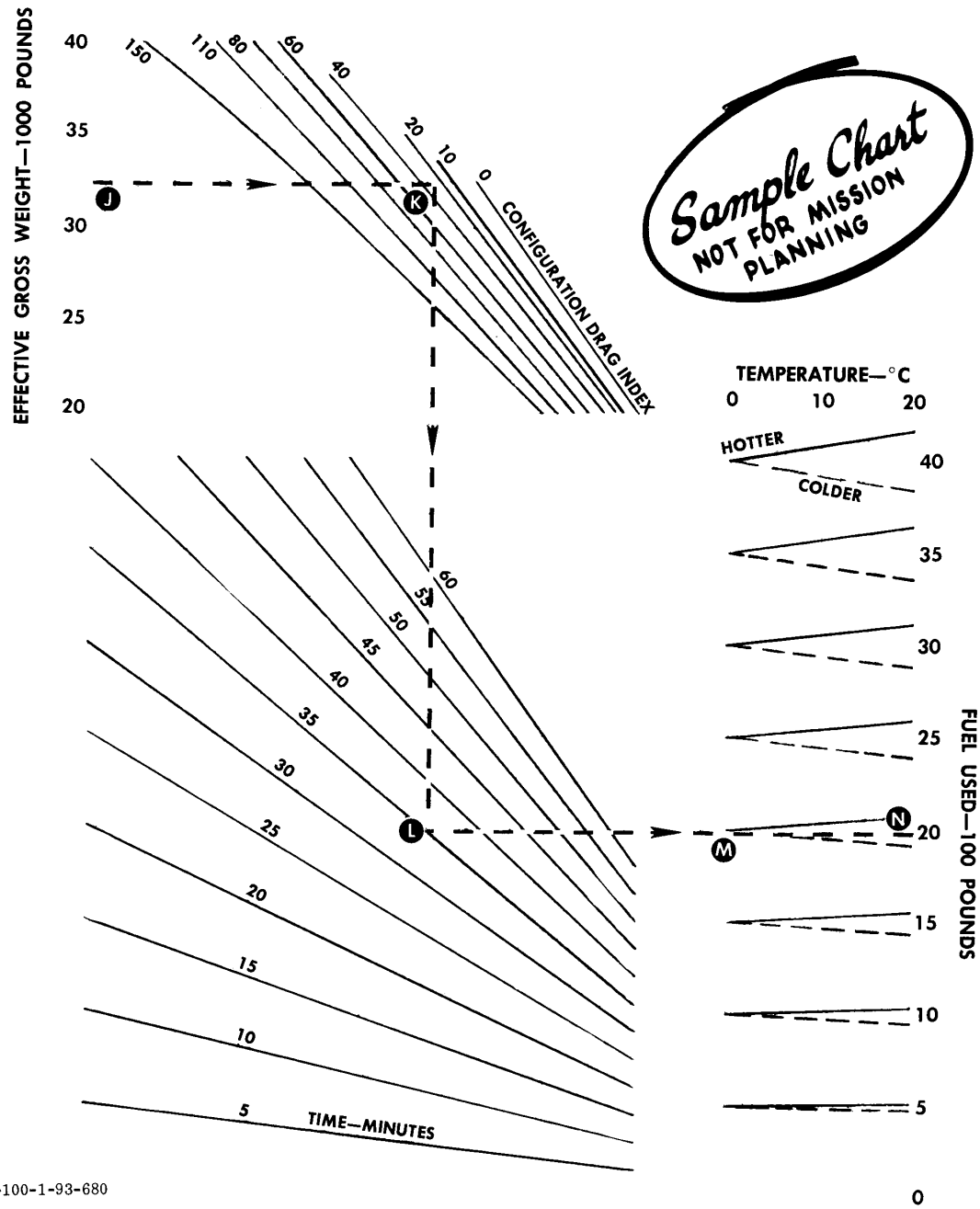


Figure A5-1 (Sheet 2 of 2)

PART 6–DESCENT

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
Descent	A6-1
DESCENT - SAMPLE	A6-2

DESCENT.

Charts are provided which enable the pilot to determine the distance traveled, time elapsed, and fuel used for either power-off or power-on descents. Use of the charts is explained by a "chase-through" sample problem given in figure A6-1.

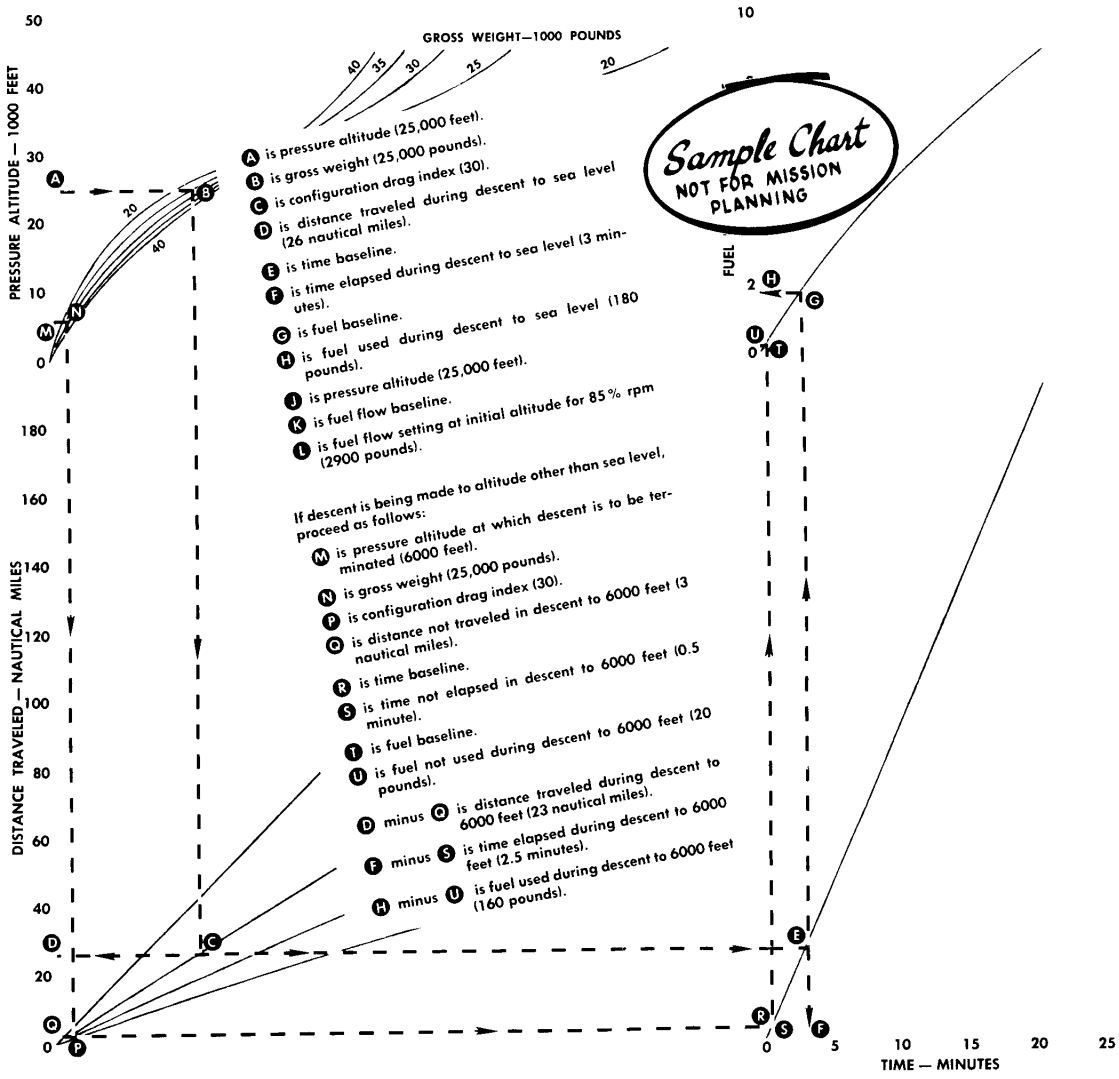
Maximum descent distance, power-off, is achieved by maintaining the flattest possible glide angle. It is independent of weight; i.e., an airplane will have the same optimum gliding angle whether empty, partly loaded, or fully loaded. Because of this, distance traveled will be the same regardless of gross weight. To achieve optimum angle of attack for maximum glide distance, increased weight requires higher airspeed. Inasmuch as the glide angle is fixed, the higher airspeed gives increased sink rates and shorter descent time, but the same glide distance. The maximum range descent speed, power-off, is established by gradually reducing thrust. At the reduced thrust setting, the airplane will decelerate and stabilize at a lower speed. Continuing the process, a speed will be reached where any further reduction in speed requires increased thrust to stabilize. Reduce throttle to Idle Thrust, nose over, and maintain the descent speed constant.

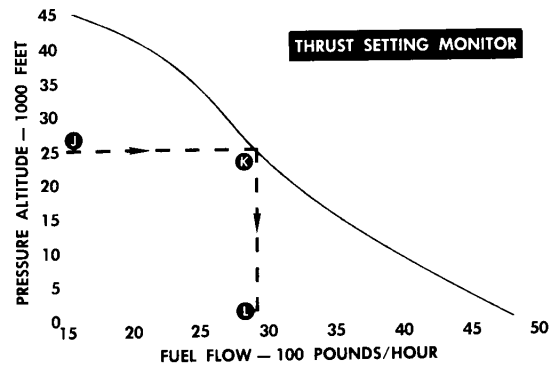
Whereas power-off descents require only a knowledge of airplane drag characteristics, power-on descents require an understanding of the engine performance as well. Tactically, it is a requirement to consistently make good the time-distance-fuel in a power-on descent. Because thrust is a critical factor in descent, it is mandatory that the thrust be accurately established in flight by accounting for the factors which affect thrust; namely, Mach number, altitude, and ambient temperature. Fuel flow is a satisfactory means of establishing thrust for the power-on descent. The power-on descent is initiated by reducing the thrust to a specific fuel flow setting. Maintain the altitude until the airplane has decelerated to the desired descent speed (Mach number). At this point, the thrust setting is established and there is no need to bother again with the throttle until the descent is complete. At the desired speed, push over and concentrate only on maintaining the descent speed. An interesting feature of the power-on descent is that initially at high altitudes, the rate of descent is relatively low, building up to a rather high rate just before termination at low altitudes.

In the discussion on engine performance characteristics, it was learned that at a specific rpm, thrust varies drastically with ambient temperature; consequently, rpm should not be used to monitor thrust. Remember, time, fuel, and distance in descent can be consistently achieved only by means of engine fuel flow.

• 9 INDICATED MACH NUMBER DESCENT

85% RPM—SPEED BRAKE CLOSED





NOTE

- Establish the descent by setting fuel flow at the altitude where the descent is to be initiated and maintain constant throttle setting and airspeed.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

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Figure A6-1

PART 7–LANDING

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Titles CAPITALIZED denote charts.

TITLE	PAGE
Landing Distances	A7-1
LANDING DISTANCES - SAMPLE PROBLEM	A7-3

LANDING DISTANCES.

NOTE See figure A2-2 for wind component data.

Landing ground-roll distances with or without the drag chute deployed are provided for the recommended landing configuration of flaps down and speed brake closed. A note is added to cover alternate conditions of speed brake and flaps. Temperature, altitude, gross weight, wind, and runway condition compensation are included. A landing speed versus gross weight table is given on the chart; also, a percentage factor is included for increased landing-roll distances due to variations in touchdown speeds above the recommended speeds given. Use of the charts is explained by a "chase-through" sample problem given in figure A7-1.

The association of braking technique with landing ground-roll distance is made through use of the braking scale on the chart. This braking scale (light, moderate, heavy) indicates the degree (percentage) of braking as compared with maximum or heavy braking. The braking base line on the chart gives distances obtained with moderate braking.

NOTE Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

To properly interpret the braking portion of the landing distance chart, the pilot must first be able to associate the "percent braking" of the chart with the degree of braking used in actual landings. To obtain this association, it is recommended that the following test be made:

1. Make several landings at recommended touchdown speed and observe ground-roll distance required to stop the airplane.

NOTE It is important that the pilot duplicate his landing technique (drag chute deployment, brake application) as closely as possible in each landing being made to check "percent braking."

- For landing without flaps:

  a. Increase ground roll distance 18 percent.

  b. Increase landing speeds 10 percent.

2. Enter landing distance chart with the test results and determine the "percent braking" for that particular landing. An example follows.

Dry runway test results:

Gross weight	24,000 lb
Touchdown speed	145 knots
Air temperature	27°C
Field elevation	2000 ft
Touchdown point (drag chute deployed) at nose-wheel touchdown	1500 ft down runway
Wind	20 kn head wind
Stopping point	6000 ft down runway
Actual ground-roll distance (6000 - 1500)	4500 ft

Calculate "percent braking":

a. Recommended touchdown speed for landing weight (from landing speed table) . . . . . 141 kn

b. Difference between charted ground-roll distance and actual distance, due to touchdown speed greater than recommended, see Note 1 on figure A7-1 (2.5 percent X 4 knots). . . . . 10.0 percent

c. Actual ground-roll distance, corrected to recommended touchdown speed (4500 X 90.0 percent) . . . . . 4050 ft

d. Enter wind section of landing distance chart with corrected ground-roll distance (4050 feet) and move up to a 20-knot head wind.

e. Follow guide lines to wind base line for zero-wind distance. . . . . 5150 ft

f. With air temperature 27°C, pressure altitude 2000 feet, and gross weight 24,000 pounds, project through chart to braking base line.

g. Follow guide lines from braking base line to intersection of corrected ground-roll distance with wind (5150 feet) to obtain percent braking (39 percent).

Another example of the use of the braking scale is to obtain a point which represents the minimum distance required to stop in case of drag chute failure or landing overshoot conditions. By comparing this minimum distance with the available runway length, the runway distance marker can be established where 100 percent braking (without drag chute) would be necessary in order to stop without overrun.

Strange-field landings can be evaluated through the use of the landing distance charts, by using the available runway length to govern the percentage of braking necessary to land safely. Landing distances based on 70 percent braking should be used as maximum for all operational flight planning.

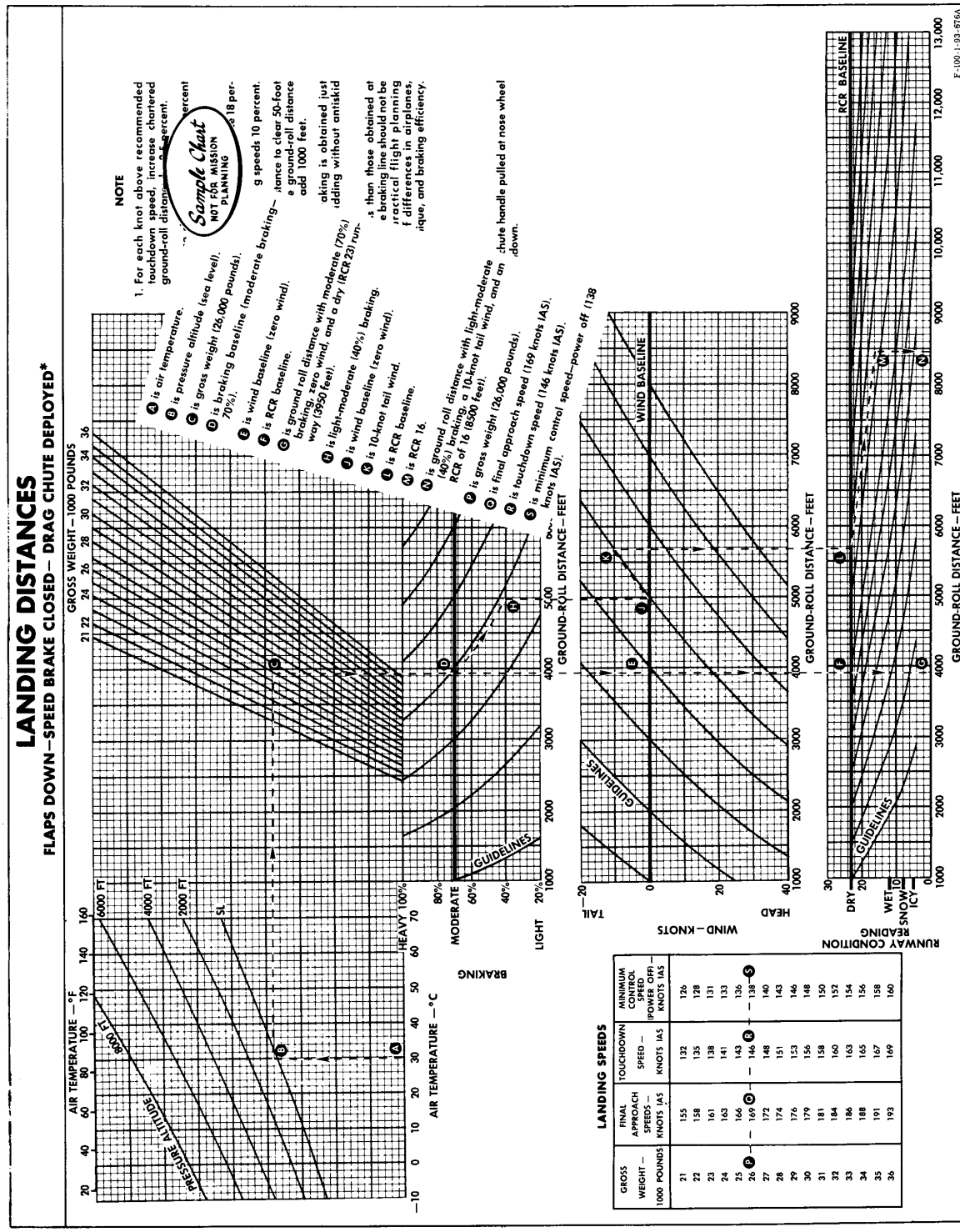
LANDING DISTANCES
FLAPS DOWN—SPEED BRAKE CLOSED— DRAG CHUTE DEPLOYED*
NOTE
1. For each knot above recommended touchdown speed, increase chartered ground-roll distance
Sample Chart
NOT FOR MISSION PLANNING
g speeds 10 percent.
stance to clear 50-foot e ground-roll distance add 1000 feet.
aking is obtained just dding without antiskid
s than those obtained at e braking line should not be ractical flight planning f differences in airplanes, ique, and braking efficiency.
chute handle pulled at nose wheel down.
GROSS WEIGHT — 1000 POUNDS
AIR TEMPERATURE — °F
AIR TEMPERATURE — °C
PRESSURE ALTITUDE
BRAKING
HEAVY 100%
MODERATE 60%
LIGHT 20%
GUIDELINES
GROUND-ROLL DISTANCE — FEET
WIND — KNOTS
TAIL
HEAD
WIND BASELINE
RCR BASELINE
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
F-100-1-93-676A
LANDING SPEEDS
GROSS WEIGHT — 1000 POUNDS
FINAL APPROACH SPEEDS — KNOTS IAS
TOUCHDOWN SPEED — KNOTS IAS
MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS

Figure A7-1

PART 8 – COMBAT PERFORMANCE

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
Combat	A8-1
Level-flight Acceleration	A8-1
Combat Allowance	A8-1
LEVEL-FLIGHT ACCELERATION - SAMPLE	A8-2
COMBAT ALLOWANCE - SAMPLE	A8-3

COMBAT.

The climax of all mission planning, whether it be air superiority interdictation or fighter-bomber, is with the successful accomplishment of combat. An understanding of the performance capabilities of the airplane and an honest evaluation of the combat phase of the mission will certainly be key factors in the over-all success of the combat mission.

Although the maximum Mach Number remains the same from day to day, the fuel flow does not. On cold days, for example, the fuel flow is high; on hot days, the fuel flow is relatively low, but the Mach number is the same. Combat fuel allowance can be readily determined from the nautical-miles-per-pound chart for the particular configuration and combat altitude. Inspection of the chart shows that for a Standard Day, using Military Thrust, there is a marked reduction in specific range. It also shows that the specific range can be increased, without a serious compromise in Mach number, by reducing the thrust setting. From the discussions to this point, it is obvious that with Military Thrust the airplane is approaching the drag rise and it is uneconomical to use Military Thrust when nearly the same Mach number can be achieved in Maximum Continuous Thrust. The fuel consumption in Maximum Continuous Thrust is considerably less. Note that conducting the combat at a specific fuel flow eliminates the problem of high fuel consumption, when the throttle is arbitrarily advanced on a cold day. Improper combat fuel assessment and management can result in an unsuccessful combat mission. The best solution to the problem is to know the airplane performance characteristics under various ambient conditions.

LEVEL-FLIGHT ACCELERATION.

Elapsed time, distance traveled, and fuel used during level-flight acceleration from a minimum indicated Mach number of .53 to a range of higher Mach numbers may be determined from the level-flight acceleration charts. Charts are provided for several altitudes and configuration drag index numbers for Maximum Thrust and Military Thrust. Use of the charts is explained by a "chase-through" sample problem given in figure A8-1.

COMBAT ALLOWANCE.

Charts are provided which enable the pilot to determine combat allowance for Maximum Thrust, Military Thrust, and Maximum Continuous Thrust. The charts may be entered with a combat altitude and fuel allowance to determine the combat time, or with a combat altitude and time to determine the fuel required. Use of the charts is explained by a "chase-through" sample problem given in figure A8-2.

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

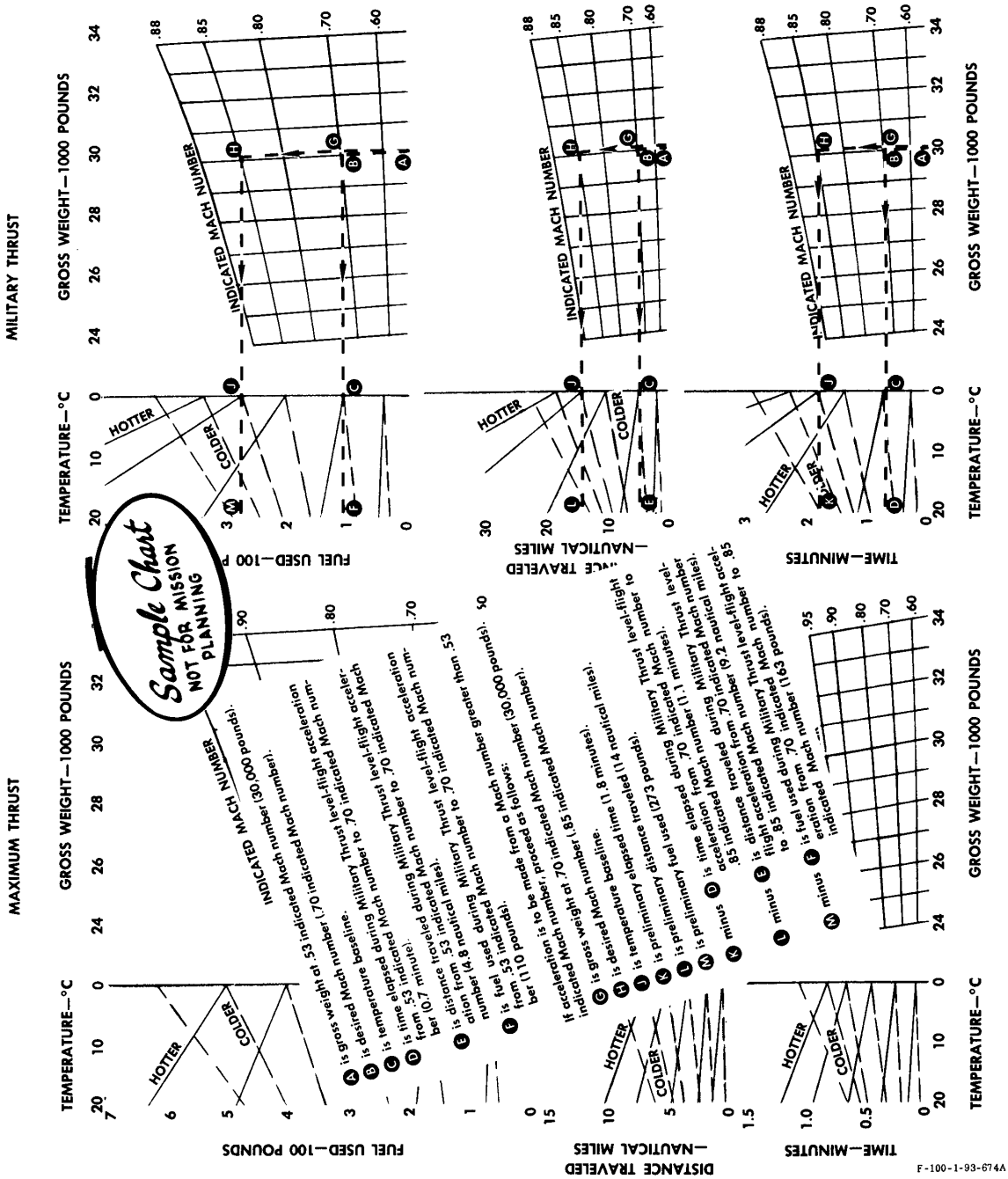

Figure A8-1

COMBAT ALLOWANCE–
MAXIMUM CONTINUOUS THRUST

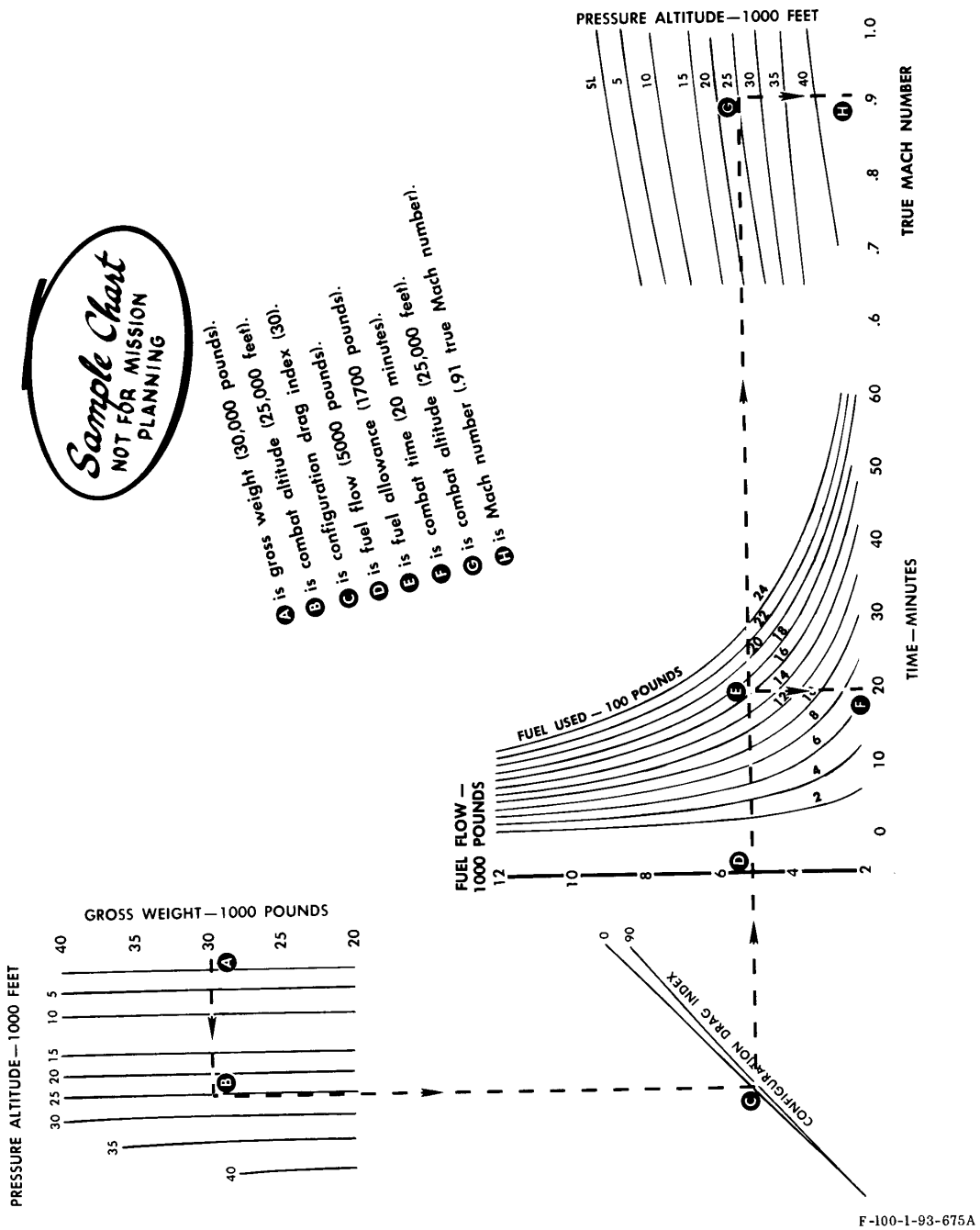

Figure A8-2

PART 9–MISSION PLANNING

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Titles CAPITALIZED denote charts.

TITLE	PAGE
Mission Planning	A9-1
Sample Problem No. 1 (Lo-Lo-Hi Mission)	A9-2
LO-LO-HI MISSION	A9-3
Sample Problem No. 2 (Lo-Lo-Lo Mission)	A9-6
LO-LO-LO MISSION	A9-7
Sample Problem No. 3 (Hi-Lo-Hi Mission)	A9-10
HI-LO-HI MISSION	A9-11

MISSION PLANNING.

By actually working through a precise combat mission, a more thorough understanding of the applicable charts and graphs will be attained. Figures A9-1 through A9-3 show the combined use of the performance charts for mission planning.

IN-FLIGHT RULES OF THUMB.

Airplane performance is critically affected by variations in thrust and drag; namely, those performance items which describe limits, i. e., maximum speed, ceiling, etc. Experience has shown that logistics and maintenance play an important part in the extent to which an engine can be kept up to standard. As a rule, the pilot is not readily able to evaluate the level of engine performance before flight. Consequently, an additional burden is placed on the pilot in that he must anticipate and prepare for subnormal engine performance. Again, these additional hardships are only imposed on the pilot who is concerned with getting maximum performance. Suspected subnormal engine performance requires that altitudes below the optimum cruise altitude be investigated. Note that the optimum altitudes are representative of normal engine performance. An examination of cruise altitudes 3000 feet below the optimum altitude will cover the extreme range of subnormal engine performance. This additional step will provide the luxury of accomplishing an optimum combat mission with a subnormal engine.

How is in-flight subnormal engine performance recognized, and when is the climb to be terminated? In the cruise discussion, we find that generally the optimum cruise altitude is limited by Maximum Continuous Thrust. For the J57 engine, Maximum Continuous Thrust is defined as approximately 3% rpm below indicated Military Thrust rpm. The difference between Military Thrust and Maximum Continuous Thrust can be described in terms of rate of climb. Generally, the climb should be discontinued when the vertical speed just begins to fall below 300 fpm at Military Thrust. For all practical purposes, this technique will establish the cruise altitude, regardless of what factors are affecting the engine thrust. A difference between the expected cruise altitude and actual cruise altitude (300 fpm vertical speed) indicates the level of subnormal engine performance. Only if a deviation in cruise altitude is anticipated and accounted for will the mission initiate and progress in an optimum manner.

Anticipated subnormal engine performance can be reckoned with for the precise plan by the following rules of thumb:

a. Examine airplane performance 3000 feet below the optimum cruise altitude.

b. Discontinue the climb when the vertical speed just falls below 300 fpm.

Optimum cruise control is conducted by establishing Mach number (optimized for wind, etc) and by monitoring engine fuel flow. Failures in the gage may hamper the conduct of a mission. Consequently, an alternate means of establishing initial cruise is as follows: For the particular case where cruise is accomplished at the optimum cruise altitude (300 fpm rate of climb), accelerate or decelerate to the optimum cruise Mach number. When the desired cruise Mach number is reached, reduce thrust to that required to maintain the speed and approximate altitude by reducing the rpm 3% below the indicated Military Thrust rpm. (Altitude should be considered only as a secondary item.) The airplane will stabilize at the desired speed, and additional throttle adjustment can be made, if necessary, to stabilize at exact altitude. This procedure may also be used for establishing cruise at intermediate altitudes where optimum cruise thrust settings are below that for Maximum Continuous Thrust. For this airplane, the sea-level optimum cruise thrust setting is approximately 6% below the indicated Military Thrust rpm. Thrust settings for optimum cruise at altitudes between sea level and optimum cruise altitude may be determined from a linear interpolation.

Recognition and use of these in-flight rules of thumb will provide the link between the preflight plan and the successful accomplishment of the combat mission and should prove invaluable in increasing the combat effectiveness of the airplane.

SAMPLE PROBLEM NO. 1 (LO-LO-HI MISSION).

A combat mission is to be flown carrying drop tanks and a bomb. (See figure A9-1.) The drop tanks are to be jettisoned when empty. Prepare a flight plan for a target 450 nautical miles from the air base.

MISSION PLANNING DATA.

a. CONFIGURATION — Two 200-gallon drop tanks plus one 275-gallon drop tank plus one bomb.

b. GROSS WEIGHT.

Clean airplane (full internal load and pilot)	30,425 lb
Drop tank fuel	4,426 lb
Two 200-gallon drop tanks (empty)	204 lb
One 275-gallon drop tank (empty)	210 lb
One bomb	1,000 lb
Three pylons (3 x 140)	420 lb
Total gross weight	36,685 lb

c. INITIAL CONFIGURATION DRAG INDEX NUMBER.

See figure A1-1.

Two 200-gallon drop tanks (2 x 9)	18.0
One 275-gallon drop tank (with integral pylon)	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
	66.0
Pairs of adjacent stores (1 x 7) ... minus	7.0
Initial configuration drag index number	59.0

NOTE A new configuration drag index number must be calculated whenever external stores, tanks, or pylons are dropped.

d. WEATHER CONDITIONS.

Standard Day, no wind.

Use a Maximum Thrust take-off, acceleration, and climb to 1500 feet; optimize cruise at 1500 feet; perform a 50-nautical-mile run-in at .85 true Mach No.; perform a LABS maneuver and recover at 10,000 feet; return to base at optimized cruise; and allow a fuel reserve for landing.

STEP 1. TAKE-OFF.

Assume that 1000 pounds of fuel and one minute are used for take-off, acceleration, and climb to 1500 feet. To determine time, fuel, and distance for inbound legs, perform steps 2 through 8.

STEP 2. INBOUND CRUISE (FIRST LEG).

a. Use remaining fuel in outboard 200-gallon tank (1300 minus 1000) ..... 300 lb

b. Average weight for first leg [36,685 minus 1000 minus (300 ÷ 2)] ..... 35,535 lb

NOTE 36,685 pounds is the initial airplane gross weight. The 1000 pounds is the fuel used in start, taxi, take-off, acceleration, and climb to 1500 feet. The (300 ÷ 2) is the average fuel weight in the outboard drop tank.

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 60 with the average weight, read the following:

Nautical mi/1000 lb of fuel ... 71.0 naut mi
Cruise speed ... 370 kn TAS (.56 true Mach No.)

LO-LO-HI MISSION

INITIAL CONFIGURATION
TWO 200 - GALLON DROP TANKS PLUS ONE
275 - GALLON DROP TANK PLUS ONE BOMB

STEP NO.	OPERATION	CONFIGURATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMULATIVE FUEL (LB)	FUEL REMAINING (LB)	WEIGHT AT END OF STEP (LB)	ALTITUDE AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMULATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMULATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	59.0	—	—	12,116	36,685	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, ACCELERATION, AND CLIMB	59.0	1000	1000	11,116	35,685	1500	1.0	1.0	—	—
2	INBOUND CRUISE (USING OUTBOARD 200 GAL TANK)	59.0	300	1300	10,816	35,385	1500	3.4	4.4	21.3	21.3
3	* OUTBOARD 200 GAL TANK DROPPED	50.0	—	—	—	35,270	1500	—	—	—	—
4	INBOUND CRUISE (CON' T) (USING INBOARD 200 GAL TANK)	50.0	1300	2600	9516	33,970	1500	14.9	19.3	93.6	114.9
5	* INBOARD 200 GAL TANK DROPPED	48.0	—	—	—	33,855	1500	—	—	—	—
6	INBOUND CRUISE (CON' T) (USING 275 GAL TANK)	48.0	1787	4387	7729	32,068	1500	21.1	40.4	130.4	245.3
7	275 GAL TANK DROPPED	28.0	—	—	—	31,845	1500	—	—	—	—
8	INBOUND CRUISE (TO ACCELERATION POINT FOR RUN IN)	28.0	1749	6136	5980	30,096	1500	22.2	62.6	141.7	387.0
9	ACCELERATE TO .85 TRUE INDICATED MACH NO.	28.0	250	6386	5730	29,846	1500	1.6	64.2	13.0	400.0
10	RUN-IN. (.85 TRUE MACH NO.) (50 NAUTICAL MILES-MILITARY THRUST)	28.0	781	7167	4949	29,065	1500	5.3	69.5	50.0	450.0
11	LABS MANEUVER AND RECOVERY	18.0	500	7667	4449	27,565	10,000	1.0	70.5	—	—
12	MILITARY THRUST CLIMB	18.0	800	8467	3649	26,765	38,000	8.5	79.0	76.0	526.0
13	OUTBOUND CRUISE	18.0	2033	10,500	1616	24,732	38,000	44.0	123.0	374.0	900.0
14	RESERVE	18.0	—	—	1616	—	—	—	—	—	—

*PYLON RETAINED

F-100-1-93-689

Figure A9-1

d. Distance traveled using the 300 lb of fuel
[(300 ÷ 1000) x 71.0] ..... 21.3 naut mi

e. Time required to travel 21.3 naut mi
[(21.3 ÷ 370) x 60]..... 3.4 min (0.057 hr)

STEP 3. OUTBOARD 200-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop
(35,385 minus 115) ..... 35,270 lb

b. New configuration drag index number (shows a chart change is necessary):

One 200-gallon drop tank	9.0
One 275-gallon drop tank	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
	57.0
Pair of adjacent stores	minus 7.0
New configuration drag index number	50.0

STEP 4. INBOUND CRUISE (SECOND LEG).

a. Continue inbound cruise, using the 1300 pounds of fuel in the inboard 200-gallon drop tank.

b. Average weight for second leg
[35,270 minus (1300 ÷ 2)] ..... 34,620 lb

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 50 with the average weight, read the following:

Nautical mi/1000 lb of fuel ... 72.0 naut mi
Cruise speed.... 378 kn TAS (.57 true Mach No.)

d. Distance traveled, using 1300 pounds of fuel from the inboard 200-gallon drop tank
[(1300 + 1000) x 72.0] ..... 93.6 naut mi

e. Time required to travel 93.6 naut mi
[(93.6 + 378) x 60]..... 14.9 min (0.248 hr)

STEP 5. INBOARD 200-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop
(33,970 minus 115) ..... 33,855 lb

b. New configuration drag index number (shows no chart change is necessary):

One 275-gallon drop tank	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
New configuration drag index number	48.0

NOTE There are no pairs of adjacent stores remaining.

STEP 6. INBOUND CRUISE (THIRD LEG).

a. Continue inbound cruise, using the 1787 pounds of fuel in the 275-gallon drop tank.

b. Average weight for third leg
[33,855 minus (1787 ÷ 2)] ..... 32,961 lb

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 50 with the average weight, read the following:

Nautical mi/1000 lb of fuel ... 73.0 naut mi
Cruise speed....370 kn TAS (.56 true Mach No.)

d. Distance traveled, using 1787 pounds of fuel from the 275-gallon drop tank
[(1787 ÷ 1000) x 73.0]..... 130.4 naut mi

e. Time required to travel 130.4 naut mi
[(130.4 ÷ 370) x 60] ... 21.1 min (0.351 hr)

STEP 7. 275-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop
(32,068 minus 223) ..... 31,845 lb

b. New configuration drag index number (shows a chart change is necessary):

One bomb	10.0
Three pylons (3 x 6)	18.0
Configuration drag index number ...	28.0

STEP 8. INBOUND CRUISE (FOURTH LEG).

a. Determine the average weight in cruise during fourth leg by finding approximate fuel required to complete the inbound cruise.

b. Distance remaining to point of run-in:
450 naut mi is total distance to target
245.3 naut mi is distance traveled in three legs
50 naut mi is the run-in distance
[450 minus (245.3 + 50)] ..... 154.7 naut mi

c. Using the airplane gross weight from step 7 (31,845 pounds), enter nautical-miles-per-pound-of-fuel chart for configuration drag index 30 and read the following:

Nautical mi/1000 lb of fuel ... 80.0 naut mi

d. Determine appropriate fuel required to cruise
[(154.7 ÷ 80.0) x 1000] ..... 1934 lb

e. Compute approximate airplane gross weight at point of run-in
(31,845 minus 1934) ..... 29,911 lb

f. Entering level-flight acceleration chart for configuration drag index 30 at 2000 feet altitude with the gross weight from preceding step e., read the distance traveled to accelerate from .56 true Mach number (.55 indicated Mach number) to .85 true Mach number (.83 indicated Mach number) using Military Thrust.
Distance traveled ..... 13 naut mi

g. Compute actual distance remaining to start of acceleration to run-in speed
(154.7 minus 13.0) ..... 141.7 naut mi

h. Average airplane gross weight for remaining 141.7-nautical-mile cruise
[31,845 minus (1934 ÷ 2)]..... 30,878 lb

i. Re-enter the nautical-miles-per-pound-of-fuel chart for configuration drag index 30 with the average weight, and read the following:

Nautical mi/1000 lb of fuel ... 81.0 naut mi
Cruise speed....380 kn TAS (.57 true Mach No.)

j. Recalculate for actual fuel and time required
[(141.7 ÷ 81.0) x 1000]..... 1749 lb
[(141.7 ÷ 380) x 60]..... 22.2 min (0.37 hr)

STEP 9. LEVEL-FLIGHT ACCELERATION TO RUN-IN SPEED (.85 TRUE MACH NO.).

a. Gross weight at start of acceleration
(31,845 minus 1749) ..... 30,096 lb

b. Entering level-flight acceleration chart for configuration drag index 30 at 2000 feet altitude with gross weight from preceding step a., read the following to accelerate from .57 true Mach number to .85 true Mach number using **Military** Thrust.

Time ..... 1.6 min
Distance traveled ..... 13 naut mi
Fuel used ..... 250 lb

STEP 10. RUN-IN (50 NAUTICAL MILES AT .85 TRUE MACH NO.).

a. Assume that 1000 pounds of fuel will be required for run-in, and find average airplane gross weight
[29,846 minus (1000 ÷ 2)] ..... 29,346 lb

b. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 30 with average airplane gross weight and .85 true Mach No., read the following:

Nautical mi/1000 lb of fuel ... 64.0 naut mi
True airspeed ..... 560 kn

c. Recalculate for actual fuel and time required:
[(50 ÷ 64.0) x 1000]..... 781 lb
Airplane gross weight
(29,846 minus 781) ..... 29,065 lb
Distance ÷ TAS
[(50 ÷ 560) x 60] ..... 5.3 min (0.089 hr)

STEP 11. LABS MANEUVER (BOMB DELIVERY).

Allow approximately 500 pounds of fuel and one minute with a recovery to 10,000 feet for this maneuver.

a. Corrected airplane gross weight due to fuel used and bomb delivery
(29,065 minus 1500) ..... 27,565 lb

b. New configuration drag index number after bomb delivery:

Three pylons (3 x 6) 18
New configuration drag index number 18

STEP 12. MILITARY THRUST CLIMB TO OUTBOUND CRUISE ALTITUDE.

a. Climb from 10,000 feet to Standard Day cruise ceiling. Use Military Thrust climb chart and cruise-climb altitude charts.

Gross weight at start of climb	27,565 lb
Standard Day cruise ceiling (300 feet per minute rate of climb)	38,000 ft
Time for climb, 10,000 feet to 38,000 feet	8.5 min
Fuel used in climb	800 lb
Distance covered in climb	76.0 naut mi

STEP 13. OUTBOUND CRUISE.

Determine the average airplane gross weight during outbound cruise by finding approximate fuel required to complete outbound cruise.

a. Distance remaining to cruise (450 minus 76) ..... 374 naut mi

b. Airplane gross weight at start of outbound cruise (27,565 minus 800) ..... 26,765 lb

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 20 with airplane gross weight from preceding step b., read the following:

Nautical mi/1000 lb of fuel .. 177.0 naut mi

d. Determine appropriate fuel required to cruise 374 nautical miles [(374 ÷ 177) x 1000] ..... 2113 lb

e. Average airplane gross weight for remaining 374-nautical-mile cruise [26,765 minus (2113 ÷ 2)] ..... 25,708 lb

f. Re-entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 20 with average airplane gross weight from preceding step e., read the following:

Nautical mi/1000 lb of fuel ... 184.0 naut mi
Cruise speed ... 510 kn TAS (.885 true Mach No.)

g. Recalculate for actual fuel and time required:
[(374 ÷ 184) x 1000] ..... 2033 lb
[(374 ÷ 510) x 60] ..... 44 min

STEP 14. END OF CRUISE OVER AIR BASE.

a. Altitude ..... 38,000 ft

b. Airplane gross weight ..... 24,732 lb

c. Fuel reserve ..... 1,616 lb

d. Total elapsed time ..... 2.05 hr

SAMPLE PROBLEM NO. 2 (LO-LO-LO MISSION).

A combat mission is to be flown carrying drop tanks and a bomb. (See figure A9-2.) The drop tanks are to be jettisoned before combat. Inbound cruise, run-in, and outbound cruise will be performed at 1500 feet pressure altitude. A flight plan is to be prepared for a target 350 nautical miles from the air base.

MISSION PLANNING DATA.

a. CONFIGURATION — Two 200-gallon drop tanks plus one 275-gallon drop tank plus one bomb.

b. GROSS WEIGHT.

Clean airplane (full internal load and pilot)	30,425 lb
Drop tank fuel	4,426 lb
Two 200-gallon drop tanks (empty)	204 lb
One 275-gallon drop tank (empty)	210 lb
One bomb	1,000 lb
Three pylons (3 x 140)	420 lb
Total gross weight	36,685 lb

c. INITIAL CONFIGURATION DRAG INDEX NUMBER.

See figure A1-1.

Two 200-gallon drop tanks (2 x 9)	18.0
One 275-gallon drop tank (with integral pylon)	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
	66.0
Pairs of adjacent stores (1x7) ... minus	7.0
Initial configuration drag index number	59.0

NOTE A new configuration drag index number must be calculated whenever external stores, tanks, or pylons are dropped.

d. WEATHER CONDITIONS.

Standard Day, no wind.

LO-LO-LO MISSION

INITIAL CONFIGURATION
TWO 200-GALLON DROP TANKS PLUS
ONE 275-GALLON DROP TANK PLUS ONE BOMB

STEP NO.	OPERATION	CONFIGURATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMULATIVE FUEL USED (LB)	FUEL REMAINING (LB)	WEIGHT AT END OF STEP (LB)	ALTITUDE AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMULATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMULATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	59.0	—	—	12,116	36,685	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, ACCELERATION, AND CLIMB	59.0	1000	1000	11,116	35,685	1500	1.0	1.0	—	—
2	INBOUND CRUISE (USING OUTBOARD 200 GAL TANK)	59.0	300	1300	10,816	35,385	1500	3.5	4.5	21.3	21.3
3	*OUTBOARD 200 GAL TANK DROPPED	50.0	—	—	—	35,270	1500	—	—	—	—
4	INBOUND CRUISE (CON'T) (USING INBOARD 200 GAL TANK)	50.0	1300	2600	9516	33,970	1500	14.9	19.4	93.6	114.9
5	*INBOARD 200 GAL TANK DROPPED	48.0	—	—	—	33,855	1500	—	—	—	—
6	INBOUND CRUISE (CON'T) (USING 275 GAL TANK)	48.0	1787	4387	7729	32,068	1500	21.1	40.5	130.4	245.3
7	275 GAL TANK DROPPED	28.0	—	—	—	31,845	1500	—	—	—	—
8	INBOUND CRUISE (TO ACCELERATION POINT FOR RUN-IN)	28.0	496	4883	7233	31,349	1500	6.0	46.5	40.7	286.0
9	ACCELERATE TO .85 TRUE MACH NUMBER	28.0	260	5143	6973	31,089	1500	1.6	48.1	14.0	300.0
10	RUN-IN (.85 MACH NO.) (50 NAUTICAL MILES - MILITARY THRUST)	28.0	781	5924	6192	30,308	1500	5.4	53.5	50.0	350.0
11	LABS MANEUVER	18.0	500	6424	5692	28,808	1500	—	—	—	—
12	OUTBOUND CRUISE	18.0	3977	10,401	1715	24,831	1500	56.8	110.3	350.0	700.0
13	RESERVE	18.0	—	—	1715	—	—	—	—	—	—

*PYLON RETAINED

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Figure A9-2

Use a Maximum Thrust take-off, acceleration, and climb to 1500 feet; optimize cruise at 1500 feet; perform a 50-nautical-mile run-in at .85 true Mach No.; perform a LABS maneuver and recover at 1500 feet; optimize outbound cruise at 1500 feet; and allow a fuel reserve for landing.

STEP 1. TAKE-OFF.

Assume that 1000 pounds of fuel and one minute are used for take-off, acceleration, and climb to 1500 feet. To determine time, fuel, and distance for inbound legs, perform steps 2 through 8.

STEP 2. INBOUND CRUISE (FIRST LEG).

a. Use remaining fuel in outboard 200-gallon tank (1300 minus 1000) ..... 300 lb

b. Average weight for first leg [36,685 minus 1000 minus (300 ÷ 2)] ..... 35,535 lb

NOTE 36,685 pounds is the initial airplane gross weight. The 1000 pounds is the fuel used in start, taxi, take-off, acceleration, and climb to 1500 feet. The (300 ÷ 2) is the average weight in the outboard drop tank.

c. Entering nautical-miles-per-pound-of-fuel chart for configuration drag index 60 with the average gross weight, read the following:

Nautical mi/1000 lb of fuel ... 71.0 naut mi
Cruise speed.... 370 kn TAS (.56 true Mach No.)

d. Distance traveled, using 300 pounds of fuel [(300 ÷ 1000) x 71.0]..... 21.3 naut mi

e. Time required to travel 19 naut mi [(21.3 ÷ 370) x 60]..... 3.5 min (0.058 hr)

STEP 3. OUTBOARD 200-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop (35,385 minus 115) ..... 35,270 lb

b. New configuration drag index number (shows a chart change is necessary):

One 200-gallon drop tank	9.0
One 275-gallon drop tank	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
	57.0
One pair of adjacent stores ..... minus	7.0
New configuration drag index number	50.0

STEP 4. INBOUND CRUISE (SECOND LEG).

a. Continue inbound cruise, using 1300 pounds of fuel from inboard 200-gallon drop tank.

b. Average weight for second leg [35,270 minus (1300 ÷ 2)] ..... 34,620 lb

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 50 with the average gross weight, read the following:

Nautical mi/1000 lb of fuel ... 72.0 naut mi
Cruise speed.... 378 kn TAS (.57 true Mach No.)

d. Distance traveled, using 1300 pounds of fuel from the inboard 200-gallon drop tank [(1300 ÷ 1000) x 72.0]..... 93.6 naut mi

e. Time required to travel 88 naut mi [(93.6 ÷ 378) x 60]..... 14.9 min (0.248 hr)

STEP 5. INBOARD 200-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop (33,970 minus 115) ..... 33,855 lb

b. New configuration drag index number (shows no chart change is necessary):

One 275-gallon drop tank	20.0
One bomb	10.0
Three pylons (3 x 6)	18.0
New configuration drag index number	48.0

NOTE There are no pairs of adjacent stores remaining.

STEP 6. INBOUND CRUISE (THIRD LEG).

a. Continue inbound cruise, using the 1787 pounds of fuel in the 275-gallon drop tank.

b. Average weight for third leg
[33,855 minus (1787 ÷ 2)] ..... 32,961 lb

c. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 50 with the average weight, read the following:

Nautical mi/1000 lb of fuel ... 73.0 naut mi
Cruise speed....370 kn TAS (.56 true Mach No.)

d. Distance traveled, using 1787 pounds of fuel from the 275-gallon drop tank
[(1787 ÷ 1000) x 73.0]..... 130.4 naut mi

e. Time required to travel 130.4 naut mi
[(130.4 ÷ 370) x 60].....21.1 min (0.351 hr)

STEP 7. 275-GALLON DROP TANK DROPPED.

a. Corrected airplane gross weight due to tank drop
(32,068 minus 223) ..... 31,845 lb

b. New configuration drag index number (shows a chart change is necessary):

One bomb	10.0
Three pylons (3 x 6)	18.0
New configuration drag index number	28.0

STEP 8. INBOUND CRUISE (FOURTH LEG).

a. Distance to start of 50-mile run-in point
(300 minus 245.3) ..... 54.7 naut mi

b. Estimated fuel required for 54.7 naut mi ..... 950 lb

c. Estimated average airplane gross weight
[31,845 minus (950 ÷ 2)] ..... 31,370 lb

d. Entering level-flight acceleration chart for configuration drag index 30 at 2000 feet altitude with the gross weight from preceding step c., read the distance traveled to accelerate from .57 true Mach number (.56 indicated Mach number) to .85 true Mach number (.83 indicated Mach number) using Military Thrust
Distance traveled..... 14 naut mi

e. Actual distance remaining to start of acceleration to run-in speed
(54.7 minus 14) ..... 40.7 naut mi

f. Estimate average airplane gross weight to acceleration run-in point
[31,845 minus (750 ÷ 2)] ..... 31,470 lb

g. Entering nautical-miles-per-pound-of-fuel chart for configuration drag index 30 with the average weight, read the following:

Nautical mi/1000 lb of fuel ... 82.0 naut mi
Cruise speed....375 kn TAS (.58 true Mach No.)

NOTE Estimating the fuel used in this phase shortens the method of calculation. Generally, this method will produce results very close to the method used in sample problem No. 3.

h. Actual fuel used for 40.7 naut mi
[(40.7 ÷ 82.0) x 1000] ..... 496 lb

i. Time required to travel 40.7 naut mi
[(40.7 ÷ 385) x 60].....6.0 min (0.10 hr)

STEP 9. LEVEL-FLIGHT ACCELERATION TO RUN-IN SPEED (.85 TRUE MACH NO.).

a. Gross weight at start of acceleration
(31,845 minus 496) ..... 31,349 lb

b. Entering level-flight acceleration chart for configuration drag index 30 at 2000 feet altitude with gross weight from preceding step a., read the following to accelerate from .57 true Mach number to .85 true Mach number using Military Thrust

Time	1.6 min
Distance traveled	14 naut mi
Fuel used	260 lb

STEP 10. RUN-IN (50 NAUTICAL MILES AT .85 TRUE MACH NO.).

a. Assuming that 1000 pounds of fuel will be required for run-in, and find the average airplane gross weight
[31,089 minus (1000 ÷ 2)] ..... 30,589 lb

b. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 30 with average gross weight and .85 true Mach number, read the following:

Nautical mi/1000 lb of fuel ... 64.0 naut mi
Run-in speed....555 kn TAS (.85 true Mach No.)

c. Actual fuel used for run-in
[(50 ÷ 64) x 1000] ..... 781 lb

d. Time required for run-in
[(50 ÷ 555) x 60] ..... 5.4 min (0.09 hr)

STEP 11. LABS MANEUVER (BOMB DELIVERY).

Allow approximately 500 pounds of fuel for this maneuver, but no time allowance.

a. Corrected airplane gross weight due to bomb delivery and fuel used
[30,308 minus (1000 + 500)] ..... 28,808 lb

b. New configuration drag index number after bomb delivery:

Three pylons (3 x 6)	18.0
New configuration drag index number	18.0

STEP 12. OUTBOUND CRUISE.

a. Estimate average gross weight for 350 miles return flight by assuming 4000 pounds of fuel to be used.
[28,808 minus (4000 ÷ 2)] ..... 26,808 lb

b. Entering nautical-miles-per-pound-of-fuel chart for configuration drag index 20 with the average gross weight, read the following:

Nautical mi/1000 lb of fuel ... 88.0 naut mi
True airspeed .. 370 kn TAS (0.57 true Mach No.)

c. Calculate the actual fuel used for 350 naut mi
[(350 ÷ 88) x 1000] ..... 3977 lb

d. Calculate the actual time required for 350 naut mi
[(350 ÷ 370) x 60] ..... 56.8 min (0.946 hr)

STEP 13. END OF CRUISE OVER AIR BASE.

a. Altitude ..... 1,500 ft

b. Airplane gross weight ..... 24,831 lb

c. Fuel reserve ..... 1,715 lb

d. Total elapsed time ..... 1.84 hr

SAMPLE PROBLEM NO. 3 (HI-LO-HI MISSION).

A combat mission is to be flown carrying drop tanks and bombs. The drop tanks are to be jettisoned when empty. Prepare a flight plan for a target 500 nautical miles from the air base.

MISSION PLANNING DATA

a. CONFIGURATION — Two 275-gallon drop tanks plus two 1000-pound bombs.

b. SPECIFIC WEIGHT OF FUEL.

Enter the specific weight vs fuel temperature curve (figure A1-3) at local ambient temperature, 5°C, and read 6.56 pounds per gallon.

c. GROSS WEIGHT.

Clean airplane (full internal load and pilot)	30,497 lb
Drop tank fuel	3,634 lb
Two 275-gallon drop tanks (empty)...	420 lb
Two 1000-pound bombs	2,000 lb
Two pylons	280 lb
Total gross weight	36,831 lb

d. INITIAL CONFIGURATION DRAG INDEX NUMBER.

See figure A1-1.

Two 275-gallon drop tanks (2 x 20)	40.0
Two 1000-pound bombs (2 x 10)	20.0
Two pylons (2 x 6)	12.0
Initial configuration drag index number	72.0

NOTE A new configuration drag index number must be calculated whenever external stores, tanks, or pylons are dropped.

e. WEATHER CONDITIONS.

PRESS. ALT (FT)	LOCAL TEMP INBOUND	WIND (ON COURSE) INBOUND
SL	+50°C	10 kn head wind
5,000	-4°C	
10,000	-13°C	20 kn head wind
15,000	-23°C	
20,000	-33°C	25 kn head wind
25,000	-42°C	32 kn head wind
30,000	-52°C	40 kn head wind
35,000	-62°C	50 kn head wind
		177 kn head wind

Average Wind (177 ÷ 6)
= 29 knots head wind (inbound).

HI-LO-HI MISSION

INITIAL CONFIGURATION
TWO 275-GALLON DROP TANKS
PLUS TWO BOMBS

STEP	OPERATION	CONFIG-URATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMU-LATIVE FUEL USED (LB)	FUEL REMAIN-ING (LB)	WEIGHT AT END OF STEP (LB)	ALT AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMU-LATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMU-LATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	72.0	—	—	11,408	36,831	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, AND ACCELERATION	72.0	1000	1000	10,408	35,831	SL	1.0	1.0	—	—
2	MILITARY THRUST CLIMB	72.0	1660	2660	8748	34,171	29,000	14.0	15.0	86.2	86.2
3	INBOUND CRUISE 1ST LEG (USING 275 GAL TANKS)	72.0	948	3608	7800	33,223	29,000	13.8	28.8	101.0	187.2
4	275 GAL TANKS DROPPED	32.0	—	—	7800	32,777	29,000	—	—	—	—
5	INBOUND CRUISE (CON' T) 2ND LEG	32.0	1587	5195	6213	31,190	29,000	27.3	56.1	200.0	387.2
6	INBOUND CRUISE (CON' T) 3RD LEG	32.0	221	5416	5992	30,969	29,000	3.8	59.9	27.8	415.0
7	DESCENT TO TARGET (.80 INDICATED MACH NO.)	32.0	625	6041	5367	30,344	2500	11.0	70.9	85.0	500.0
8	TARGET SEARCH AND BOMB DELIVERY	12.0	1000	7041	4367	27,344	10,000	3.0	73.9	—	—
9	MILITARY THRUST CLIMB	12.0	850	7891	3517	26,494	38,000	12.1	86.0	104.0	604.0
10	OUTBOUND CRUISE	12.0	1932	9823	1585	24,562	38,000	43.7	129.7	396.0	1000.0
11	RESERVE	12.0	—	—	1585	—	—	—	—	—	—

Figure A9-3

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PRESS. ALT (FT)	LOCAL TEMP OUTBOUND	WIND (ON COURSE) OUTBOUND
SL	+25°C	0 kn tail wind
5,000	+15°C	
10,000	+5°C	20 kn tail wind
15,000	-5°C	
20,000	-15°C	30 kn tail wind
25,000	-25°C	
30,000	-35°C	35 kn tail wind
35,000	-45°C	
40,000	-55°C	35 kn tail wind
		120 kn tail wind

Average Wind (120 ÷ 5)
= 24 knots tail wind (outbound).

MISSION DESCRIPTION.

Maximum Thrust take-off; Military Thrust climb to optimum cruise altitude; optimized cruise; 80 indicated Mach No. letdown to 2500 feet; identify target area; low-altitude bomb delivery (LABS); recovery at 10,000 feet; Military Thrust climb to optimum cruise altitude; optimized cruise; reserve fuel for landing.

STEP 1. ALLOWANCE.

Allow 1000 pounds of fuel, and one minute for start, taxi, take-off, and acceleration to reach the climb speed schedule.

STEP 2. CLIMB.

a. EFFECTS OF AMBIENT TEMPERATURE.

Evaluate effects of ambient temperature on climb performance, by comparing actual temperature versus standard temperature. Determine average temperature difference through climb.

PRESS. ALT (FT)	STD TEMP	ACT. TEMP (INBOUND)	ACT. TEMP (OUTBOUND)	TEMP DIFFERENCE (INBOUND)	TEMP DIFFERENCE (OUTBOUND)
SL	+15°C	+5°C	+25°C	-10°C	+10°C
5,000	+5°C	-4°C	+15°C	-9°C	+10°C
10,000	-5°C	-13°C	+5°C	-8°C	+10°C
15,000	-15°C	-23°C	-5°C	-8°C	+10°C
20,000	-25°C	-33°C	-15°C	-8°C	+10°C
25,000	-35°C	-42°C	-25°C	-7°C	+10°C
30,000	-45°C	-52°C	-35°C	-7°C	+10°C
35,000	-55°C	-62°C	-45°C	-7°C	+10°C
40,000	-55°C		-55°C		0
				-64°C	+80°C

Average temperature difference:

Inbound: -64 ÷ 8 = -8°C (colder than standard)

Outbound: +80 ÷ 9 = +9°C (hotter than standard)

b. INITIAL CLIMB.

(1) Gross weight at start of climb (36,831 minus 1000) ..... 35,831 lb

(2) From the cruise-climb altitude chart (basic climb schedule), read the optimum cruise altitude ..... 29,300 ft

(3) From the Military Thrust climb chart, read the fuel used to climb to 29,300 feet ..... 1660 lb

(4) Compute gross weight at termination of climb (35,831 minus 1660) ..... 34,171 lb

c. FINALIZING CLIMB.

NOTE Before climb can be finalized, it is necessary to determine step 3.a.

Using the gross weight of 35,831 pounds, find the time, fuel, and distance to climb to optimum cruise altitude, using Military Thrust.

Time ..... 14.0 min
Fuel ..... 1660 lb
Distance (no wind) ..... 92 naut mi
Distance (wind)
[92 minus (25 ÷ 60 x 14)] ... 86.2 naut mi
Gross weight at 29,000 feet
(35,831 minus 1660) ..... 34,171 lb

STEP 3. INBOUND CRUISE (FIRST LEG).

a. CRUISE ALTITUDE.

The cruise altitude was found to be 29,300 feet. Determine whether this altitude is truly the optimum cruise altitude when accounting for wind and altitude effect on specific range. To determine optimum cruise altitude requires that factors such as: additional climb, specific range versus altitude, ambient temperature, wind, tactical requirements, etc, be considered. Specific range at various altitudes (accounting for all factors) is found from the nautical-miles-per-pound-of-fuel charts for configuration drag indexes 70 and 80. Use estimated gross weight, 34,000 pounds, and cruise speed from the optimum range curve to determine best altitude for cruise.

Configuration Drag Index 70:

ALTITUDE (FEET)	SPECIFIC RANGE (NO WIND)	WIND FACTOR	SPECIFIC RANGE (WITH WIND)
25,000	109 naut mi/1000 lb of fuel	0.932	102 naut mi/1000 lb of fuel
29,000	116 naut mi/1000 lb of fuel	0.917	106 naut mi/1000 lb of fuel
29,300	116 naut mi/1000 lb of fuel	0.917	106 naut mi/1000 lb of fuel

Configuration Drag Index 80:

ALTITUDE (FEET)	SPECIFIC RANGE (NO WIND)	WIND FACTOR	SPECIFIC RANGE (WITH WIND)
25,000	106 naut mi/1000 lb of fuel	0.932	99 naut mi/1000 lb of fuel
29,000	114 naut mi/1000 lb of fuel	0.916	104 naut mi/1000 lb of fuel
29,300	114 naut mi/1000 lb of fuel	0.916	104 naut mi/1000 lb of fuel

NOTE Wind factor = ground speed ÷ true airspeed

By analyzing the specific range (corrected for wind) for all three altitudes, it is obvious that both 29,000 and 29,300 feet give the same range. In this example, 29,000 feet will be used as the optimum cruise altitude.

b. INBOUND CRUISE (FIRST LEG).

Once the initial cruise altitude is established, it must be determined whether to cruise-climb or cruise at constant altitude. Generally it will be found that initially (heavy-weights) there is no advantage in the cruise-climb unless altitude is desired for tactical reasons. Refer to the cruise-climb (99% range) chart, and considering that the optimum range (100% range) cruise-climb path will parallel the data described on the chart, it is seen that the advantage in cruise-climb is negligible; consequently, cruise will be conducted at constant altitude.

Determine the fuel remaining in the two 275-gallon drop tanks (3608 minus 2660) ..... 948 lb

Average weight for cruise [34,171 minus (948 ÷ 2)] ..... 33,697 lb

Entering the nautical-miles-per-pound-of-fuel charts for configuration drag indexes 70 and 80 at the average gross weight, and using optimum range, read the following.

Configuration Drag Index 70:
Nautical mi/1000 lb of fuel .... 117 naut mi
Cruise speed... 480 kn TAS (.825 true Mach No.)

Determine specific range with wind
Wind factor 0.917
Nautical mi/1000 lb of fuel (with wind) ..... 107 naut mi

Configuration Drag Index 80:
Nautical mi/1000 lb of fuel .... 115 naut mi
Cruise speed.... 472 kn TAS (.82 true Mach No.)

Determine specific range with wind
Wind factor 0.930
Nautical mi/1000 lb of fuel .... 107 naut mi

Configuration Drag Index 72 (by interpolation):
Nautical mi/1000 lb of fuel (with wind) ..... 107 naut mi
Cruise speed... 478 kn TAS (.821 true Mach No.)

Distance traveled using 948 pounds of fuel
[948 x (107 ÷ 1000)] ..... 101 naut mi
Time elapsed to travel 101 nautical miles
[101 ÷ (478 - 40) x 60] .. 13.8 min (0.231 hr)

STEP 4. 275-GALLON TANKS DROPPED.

Account for weight and drag reduction due to dropping 275-gallon tanks.

New gross weight
(33,223 minus 446) ..... 32,777 lb

New configuration drag number:
Two 1000-pound bombs (2 x 10) 20
Two pylons (2 x 6) 12
Configuration drag index number 32

STEP 5. INBOUND CRUISE (SECOND LEG).

a. CRUISE ALTITUDE.

The cruise-climb altitude chart indicates that if 270 pounds of fuel is allowed for climb, the optimum altitude for an airplane gross weight of 33,500 pounds is 33,000 feet. Determine if a change of cruise altitude is necessary because of reduced drag and weight.

b. FINALIZING INBOUND CRUISE (SECOND LEG).

The approximate distance traveled during the descent must be established so that the distance remaining to cruise may be computed. A check of the descent chart shows that using the existing gross weight for a no-wind condition, the distance traveled during a descent to 2500 feet will be approximately 87 nautical miles. Since there is an average head wind of 29 knots, 83 nautical miles will be the approximate distance traveled during the descent.
Distance remaining to cruise
[500 minus (187 + 83)] ..... 230 naut mi

Determine the average gross weight in cruise by finding the approximate fuel required to cruise 200 nautical miles.
Estimated fuel required (with wind
[(200 ÷ 127) x 1000] ..... 1574 lb
Average gross weight
[32,777 minus (1574 ÷ 2)] ..... 31,990 lb

Entering the nautical-miles-per-pound-of-fuel charts for configuration drag indexes 30 and 40 at the average gross weight, and using optimum range, read the following.

Configuration Drag Index 30:
Nautical mi/1000 lb of fuel .... 142 naut mi
Cruise speed ... 482 kn TAS (.832 true Mach No.)

Determine specific range with wind
Wind factor 0.917
Nautical mi/1000 lb of fuel (with wind) ..... 130 naut mi

Configuration Drag Index 40:
Nautical mi/1000 lb of fuel .... 122 naut mi
Cruise speed .... 493 kn TAS (.85 true Mach No.)

Determine specific range with wind
Wind factor 0.919
Nautical mi/1000 lb of fuel (with wind) ..... 112 naut mi

Configuration Drag Index 30:

ALTITUDE (FEET)	SPECIFIC RANGE (NO WIND)	WIND FACTOR	SPECIFIC RANGE (WITH WIND)
29,000	138 naut mi/1000 lb of fuel	0.918	127 naut mi/1000 lb of fuel
33,000	144 naut mi/1000 lb of fuel	0.909	131 naut mi/1000 lb of fuel

Configuration Drag Index 40:

ALTITUDE (FEET)	SPECIFIC RANGE (NO WIND)	WIND FACTOR	SPECIFIC RANGE (WITH WIND)
29,000	120 naut mi/1000 lb of fuel	0.920	110 naut mi/1000 lb of fuel
33,000	124 naut mi/1000 lb of fuel	0.909	113 naut mi/1000 lb of fuel

It can be seen by interpolating that there is little advantage in climbing to 33,000 feet for cruise; therefore, cruise will continue at 29,000 feet.

Configuration Drag Index 32 (by interpolation):
Nautical mi/1000 lb of fuel (with wind) ..... 126 naut mi
Cruise speed...480 kn TAS (.836 true Mach No.)
Fuel used to travel 200 nautical miles
[(200 ÷ 126) x 1000] ..... 1587 lb
Time elapsed to travel 200 nautical miles
[200 ÷ (480 - 40) x 60] .. 27.3 min (0.455 hr)

STEP 6. INBOUND CRUISE (THIRD LEG).

NOTE Before cruise can be finalized, step 7 must be calculated.

Distance remaining to cruise
[500 minus (387.2 + 85)] ..... 27.8 naut mi

Using TAS of 480 kn and a specific range of 126 nautical mi/1000 pound of fuel, determine fuel used and time elapsed to cruise 14.8 nautical miles.
Fuel used
[(27.8 ÷ 126) x 1000] ..... 221 lb
Time elapsed
[27.8 ÷ (480 - 40) x 60] ....3.8 min (.063 hr)

STEP 7. DESCENT.

Refer to descent chart for data on descent from 29,000 feet to 2500 feet at .80 indicated Mach No.

Time (11.5 minus 0.5) ..... 11.0 min
Fuel (650 minus 25) ..... 625 lb
Distance (94 minus 4) ..... 90 mi
Correcting for wind, the descent distance is
[90 minus (11.0 ÷ 60 x 29)] .... 85 naut mi

STEP 8. TARGET SEARCH AND BOMB DELIVERY.

Refer to combat allowance Military Thrust chart.

a. 3-minute search, Military Thrust.

b. 500 pounds of fuel for weapon delivery.

c. Fuel consumed in 3 minutes ..... 500 lb

d. Total combat fuel
(500 + 500) ..... 1000 lb

e. Gross weight at end of operation
30,344 minus (2000 + 1000) ..... 27,344 lb

f. New configuration drag index number
Two pylons (2 x 6) 12

STEP 9. CLIMB-OUT.

NOTE The altitude after bomb delivery is 10,000 feet.

a. Entering the cruise-climb altitude chart with the gross weight from step 8. e., and adjusting this gross weight as necessary for the fuel burn-off as determined from the Military Thrust climb chart, the optimum cruise altitude is found to be 38,000 feet. Since winds and temperature are relatively the same between 35,000 and 40,000 feet, further computation to determine whether 38,000 feet is the optimum altitude will not be necessary.

b. Entering the Military Thrust climb chart with 27,344 gross weight, read the following to climb from 10,000 feet to 38,000 feet.
Time elapsed
(16 minus 3.9) ..... 12.1 min
Distance traveled
(120 minus 21) ..... 99 naut mi
Fuel used
(1500 minus 650) ..... 850 lb
Correcting for wind, the distance traveled during the climb
[99 + (12.1 + 60 x 24)] ..... 104 naut mi

c. Gross weight at end of climb
(27,344 minus 850) ..... 26,494 lb

STEP 10. OUTBOUND CRUISE.

a. Determine the average gross weight in cruise by finding the approximate fuel required to complete the outbound cruise. Entering the nautical-miles-per-pound-of-fuel chart for configuration drag index 10 with 26,494 gross weight, read the following.

Nautical mi/1000 lb of fuel .... 180 naut mi

b. Ground distance remaining
(500 minus 104) ..... 396 naut mi

c. Approximate fuel required
[(396 ÷ 180) x 1000] ..... 2200 lb

d. Average gross weight
[26,494 minus (2200 ÷ 2)] ..... 25,394 lb

e. Entering the nautical-miles-per-pound-of-fuel charts for configuration drag indexes 10 and 20 with the average gross weight, read the following.

Configuration Drag Index 10:
Nautical mi/1000 lb of fuel
(no wind) ..... 193 naut mi
Cruise
speed... 508 kn TAS (. 875 true Mach No.)
Wind factor 1.069
Nautical mi/1000 lb of fuel
(with wind) ..... 206 naut mi

Configuration Drag Index 20:
Nautical mi/1000 lb of fuel
(no wind) ..... 186 naut mi
Cruise
speed... 508 kn TAS (. 875 true Mach No.)
Wind factor 1.069
Nautical mi/1000 lb of fuel
(with wind) ..... 199 naut mi

Configuration Drag Index 12 (by interpolation):
Nautical mi/1000 lb of fuel
(with wind) ..... 205 naut mi

Cruise
speed... 508 kn TAS (. 875 true Mach No.)
Fuel required to cruise 396
nautical miles
[(396 ÷ 205) x 1000] ..... 1932 lb
Time required to cruise
397 nautical miles
[396 ÷ (508 + 35) x 60] .. 43.7 min (0.729 hr)

STEP 11. END OF CRUISE OVER AIR BASE.

a. Altitude ..... 38,000 ft

b. Airplane gross weight ..... 24,562 lb

c. Fuel reserve ..... 1585 lb

d. Total elapsed time ..... 2.16 hr

SECTION II

F-100D & F PERFORMANCE DATA

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PART 6	DESCENT	B6-1
PART 7	LANDING	B7-1
PART 8	COMBAT ALLOWANCE	B8-1
PART 9	MISSION PLANNING	*

F-100-1-0-3

* Refer to applicable part in Section I

PERFORMANCE PRESENTATION.

This section contains performance data for F-100D and F-100F Airplanes presented in a "part-type" arrangement which groups the material as needed for planning general phases of each flight.

PART 2–TAKE-OFF

TABLE OF CONTENTS

Titles CAPITALIZED denote charts

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TAKE-OFF ACCELERATION - MAXIMUM THRUST	B2-4
TAKE-OFF ACCELERATION - MILITARY THRUST	B2-5
REFUSAL SPEEDS - MAXIMUM THRUST	B2-6
REFUSAL SPEEDS - MILITARY THRUST	B2-7
CRITICAL AFTERBURNER FAILURE SPEED	B2-8

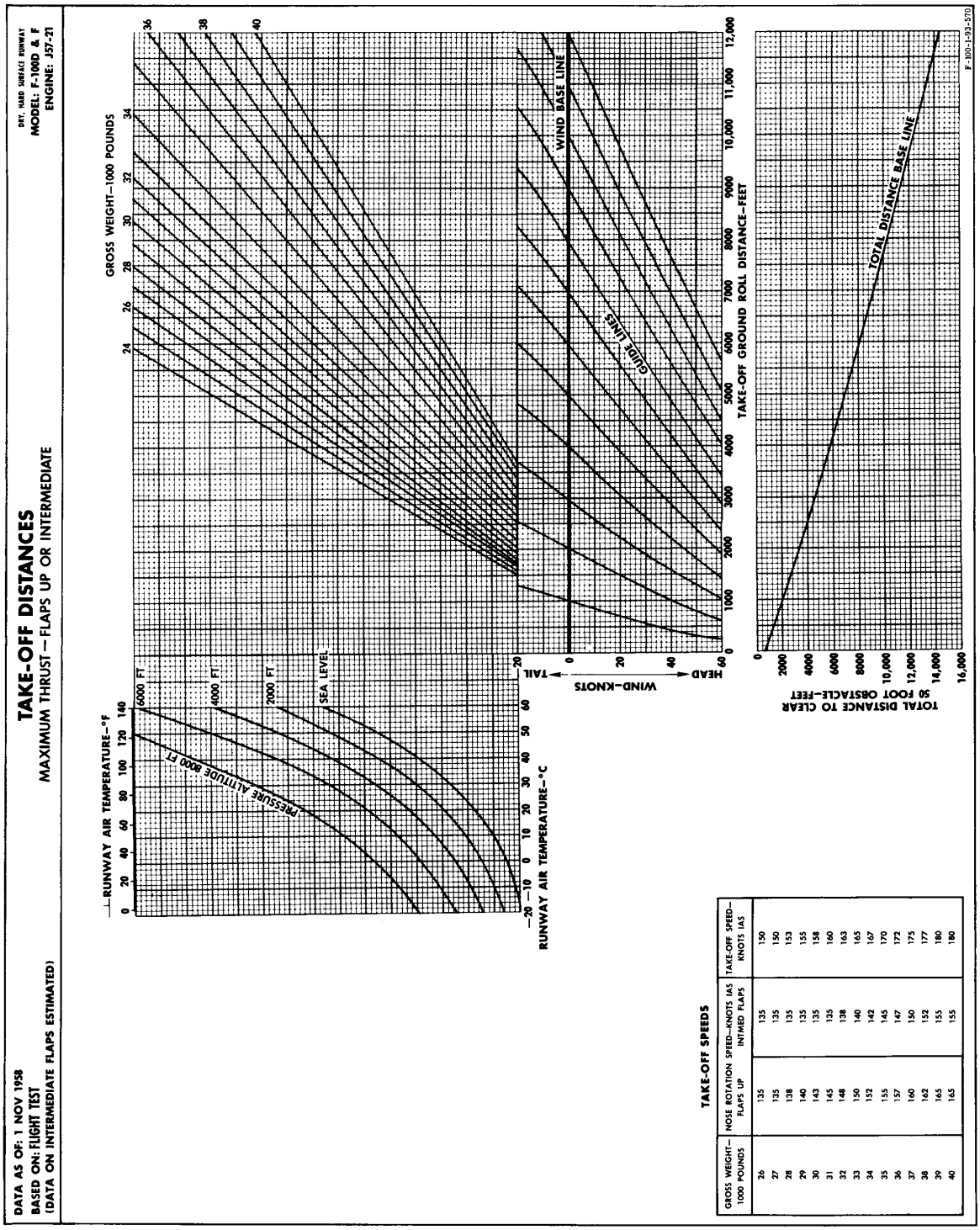
NOTE For wind component data, see figure A2-3.

- For sample problems and descriptive text, refer to Part 2, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of the anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the take-off performance charts. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before using the take-off performance charts.

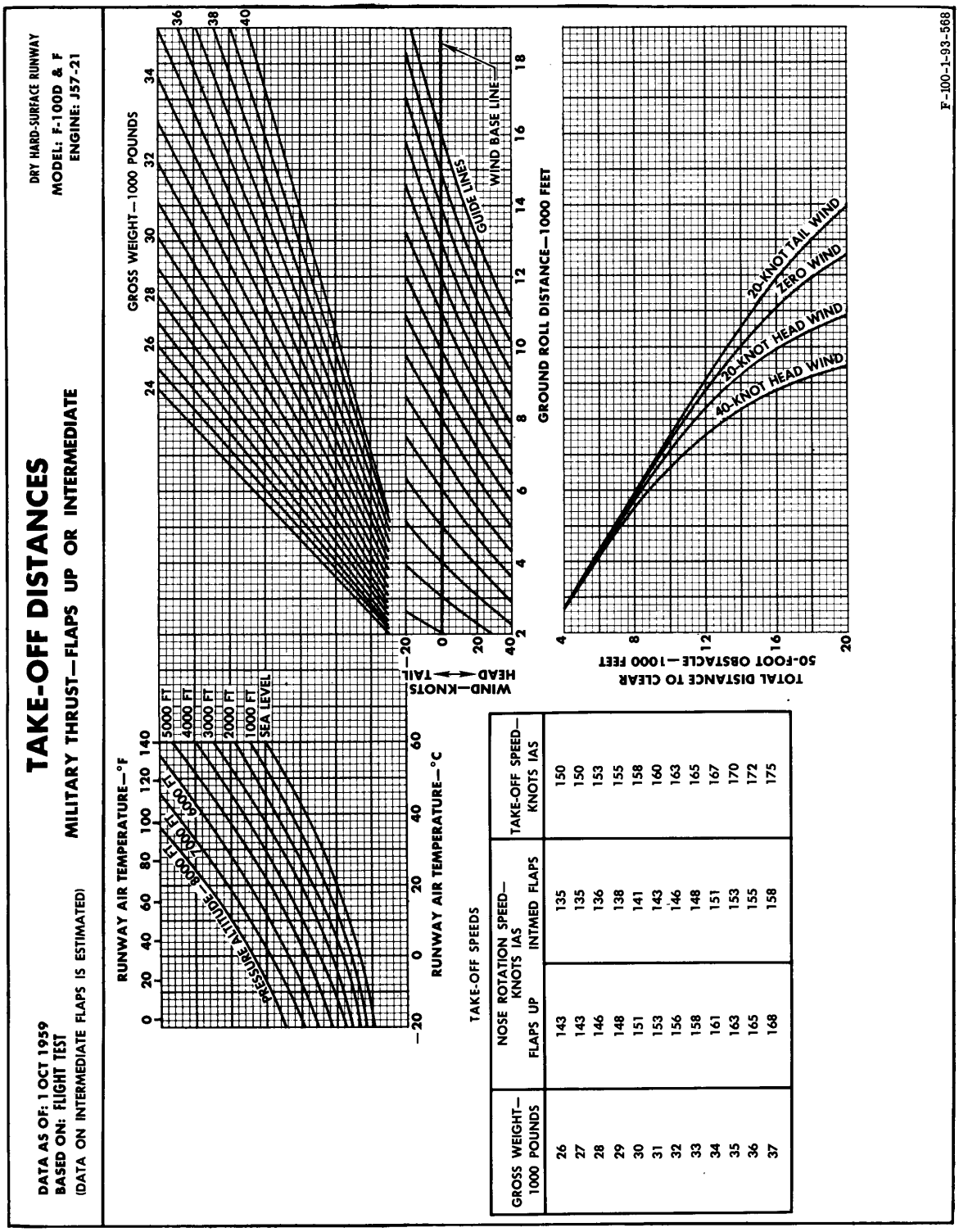
SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	800 lb	600 lb



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS FLAPS UP	NOSE ROTATION SPEED—KNOTS IAS INTMED FLAPS	TAKE-OFF SPEED—KNOTS IAS
26	135	135	150
27	135	135	150
28	138	135	153
29	140	135	155
30	143	135	158
31	145	135	160
32	148	138	163
33	150	140	165
34	152	142	167
35	155	145	170
36	157	147	172
37	160	150	175
38	162	152	177
39	165	155	180
40	165	155	180

Figure B2-1



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS		TAKE-OFF SPEED—KNOTS IAS
	FLAPS UP	INTMED FLAPS	
26	143	135	150
27	143	135	150
28	146	136	153
29	148	138	155
30	151	141	158
31	153	143	160
32	156	146	163
33	158	148	165
34	161	151	167
35	163	153	170
36	165	155	172
37	168	158	175

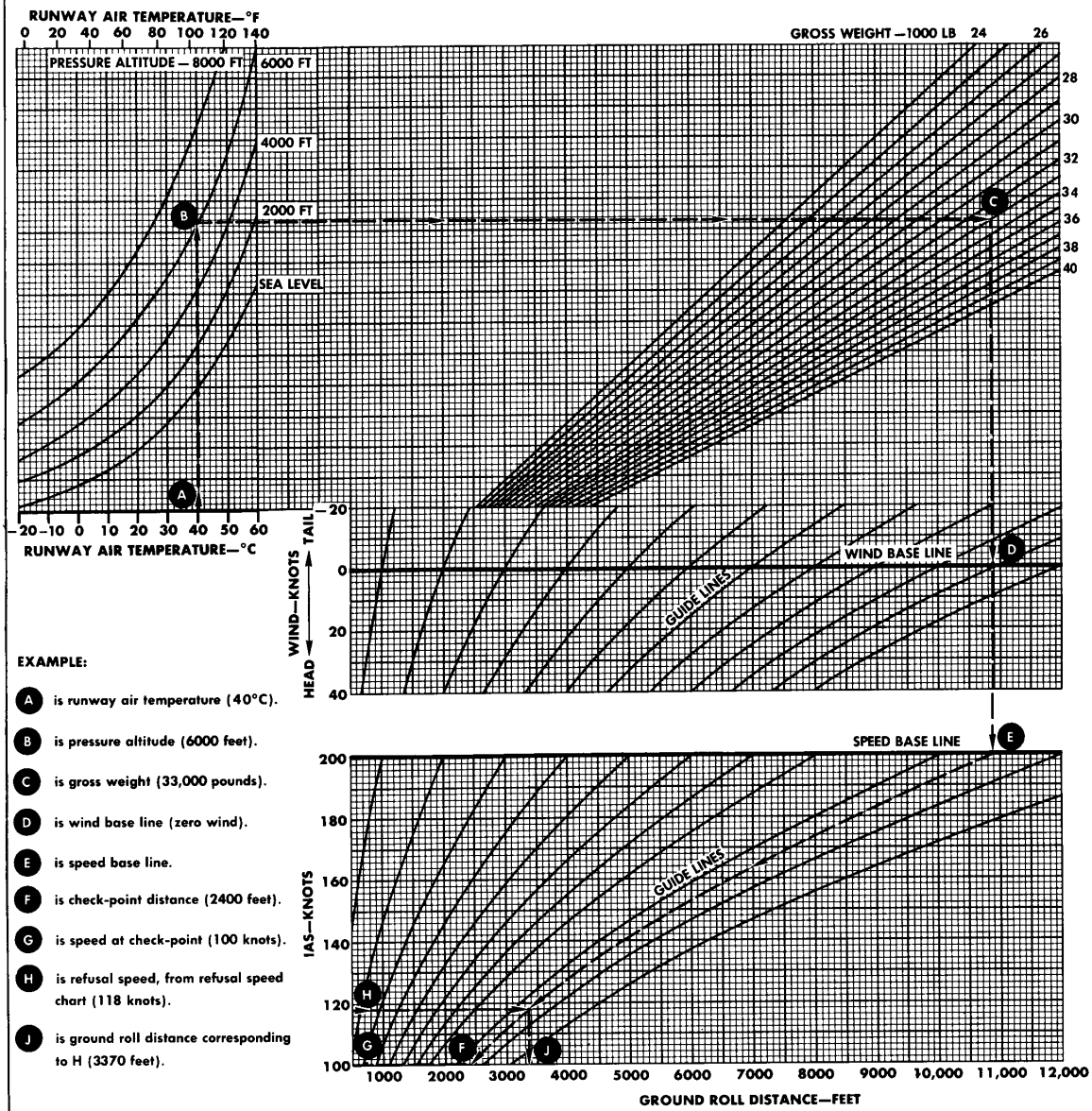
Figure B2-2

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)

TAKE-OFF ACCELERATION

MAXIMUM THRUST — FLAPS UP OR INTERMEDIATE

DRY, HARD-SURFACE RUNWAY
MODEL F-100D & F
ENGINE: J57-21



EXAMPLE:

- (A) is runway air temperature (40°C).
- (B) is pressure altitude (6000 feet).
- (C) is gross weight (33,000 pounds).
- (D) is wind base line (zero wind).
- (E) is speed base line.
- (F) is check-point distance (2400 feet).
- (G) is speed at check-point (100 knots).
- (H) is refusal speed, from refusal speed chart (118 knots).
- (J) is ground roll distance corresponding to H (3370 feet).

NOTE
Acceleration speed tolerance is 10 knots IAS.

F-100-1-93-571

Figure B2-3

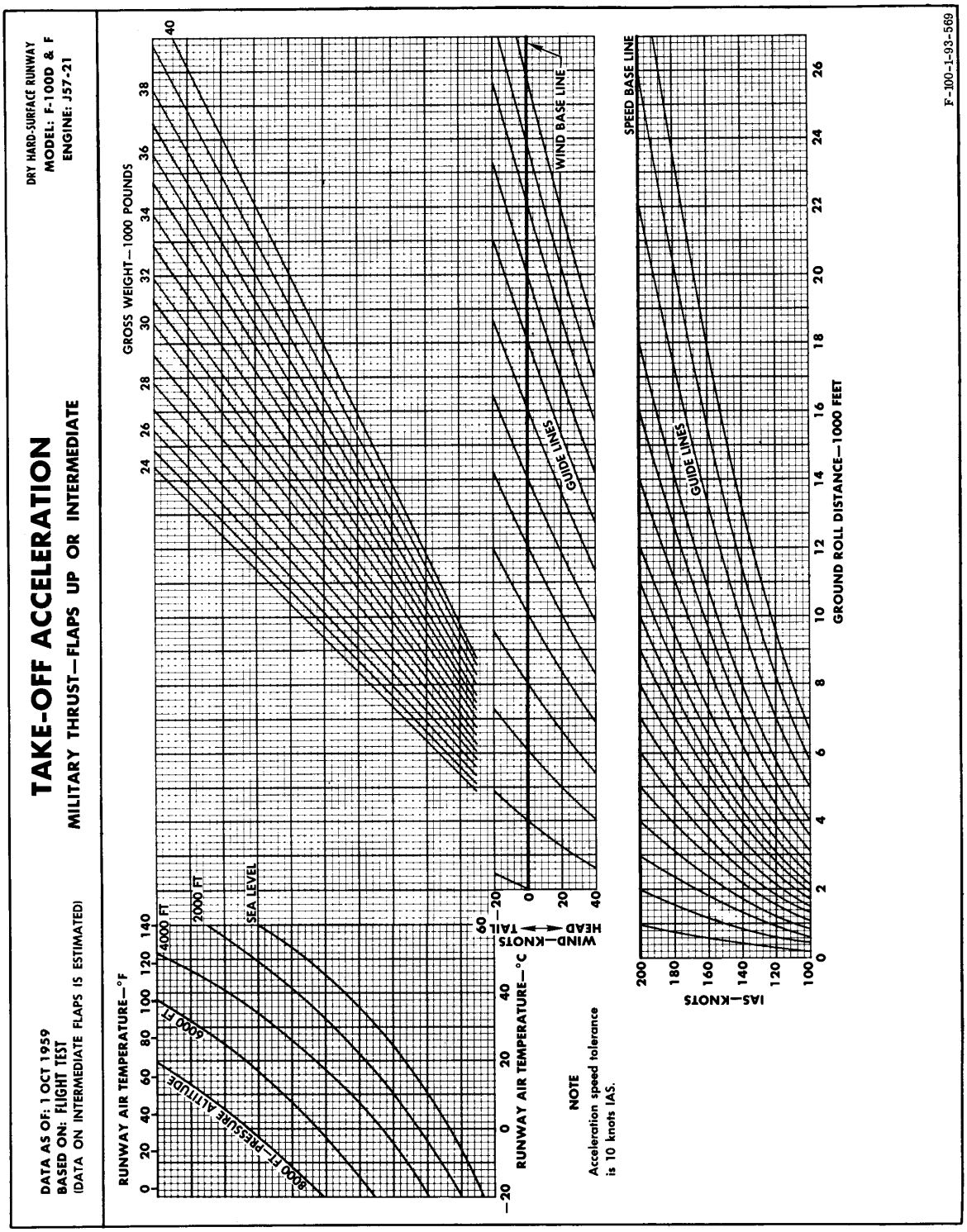

TAKE-OFF ACCELERATION
MILITARY THRUST—FLAPS UP OR INTERMEDIATE
DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS IS ESTIMATED)
DRY HARD-SURFACE RUNWAY
MODEL: F-100D & F
ENGINE: J57-21
RUNWAY AIR TEMPERATURE—°F
RUNWAY AIR TEMPERATURE—°C
GROSS WEIGHT—1000 POUNDS
8000 FT—PRESSURE ALTITUDE
6000 FT
4000 FT
2000 FT
SEA LEVEL
WIND—KNOTS
HEAD ◄► TAIL
GUIDE LINES
WIND BASE LINE
NOTE
Acceleration speed tolerance is 10 knots IAS.
SPEED BASE LINE
GUIDE LINES
IAS—KNOTS
GROUND ROLL DISTANCE—1000 FEET
F-100-1-93-569

Figure B2-4

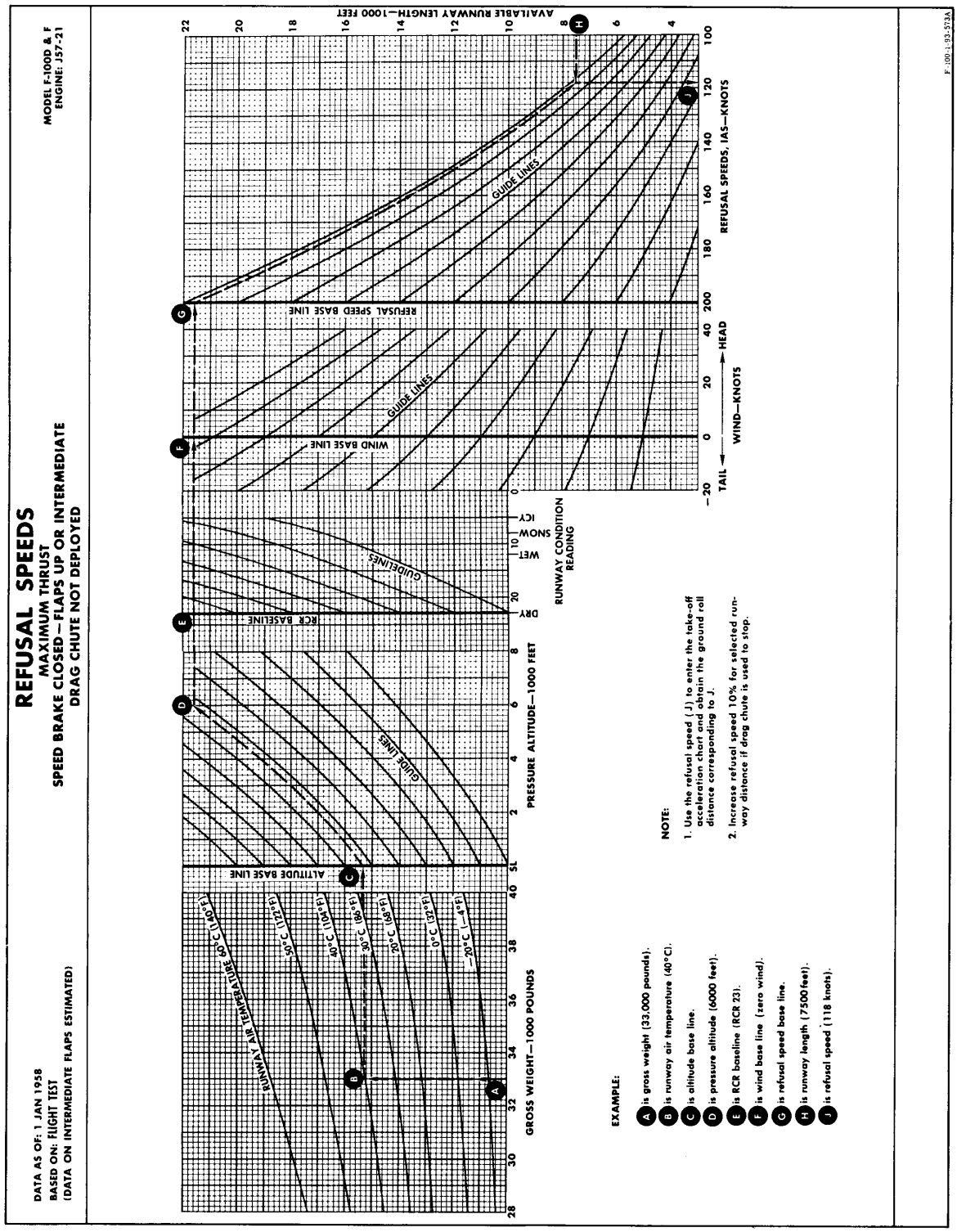

REFUSAL SPEEDS
MAXIMUM THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED
DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)
MODEL F-100D & F
ENGINE: J57-21
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEEDS, IAS—KNOTS
WIND—KNOTS
TAIL
HEAD
WIND BASE LINE
REFUSAL SPEED BASE LINE
GUIDE LINES
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
RCR BASELINE
PRESSURE ALTITUDE—1000 FEET
ALTITUDE BASE LINE
RUNWAY AIR TEMPERATURE
GROSS WEIGHT—1000 POUNDS
EXAMPLE:
A is gross weight (33,000 pounds).
B is runway air temperature (40°C).
C is altitude base line.
D is pressure altitude (6000 feet).
E is RCR baseline (RCR 23).
F is wind base line (zero wind).
G is refusal speed base line.
H is runway length (7500 feet).
J is refusal speed (118 knots).
NOTE:
1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.
F-100-1-193-573A

Figure B2-5

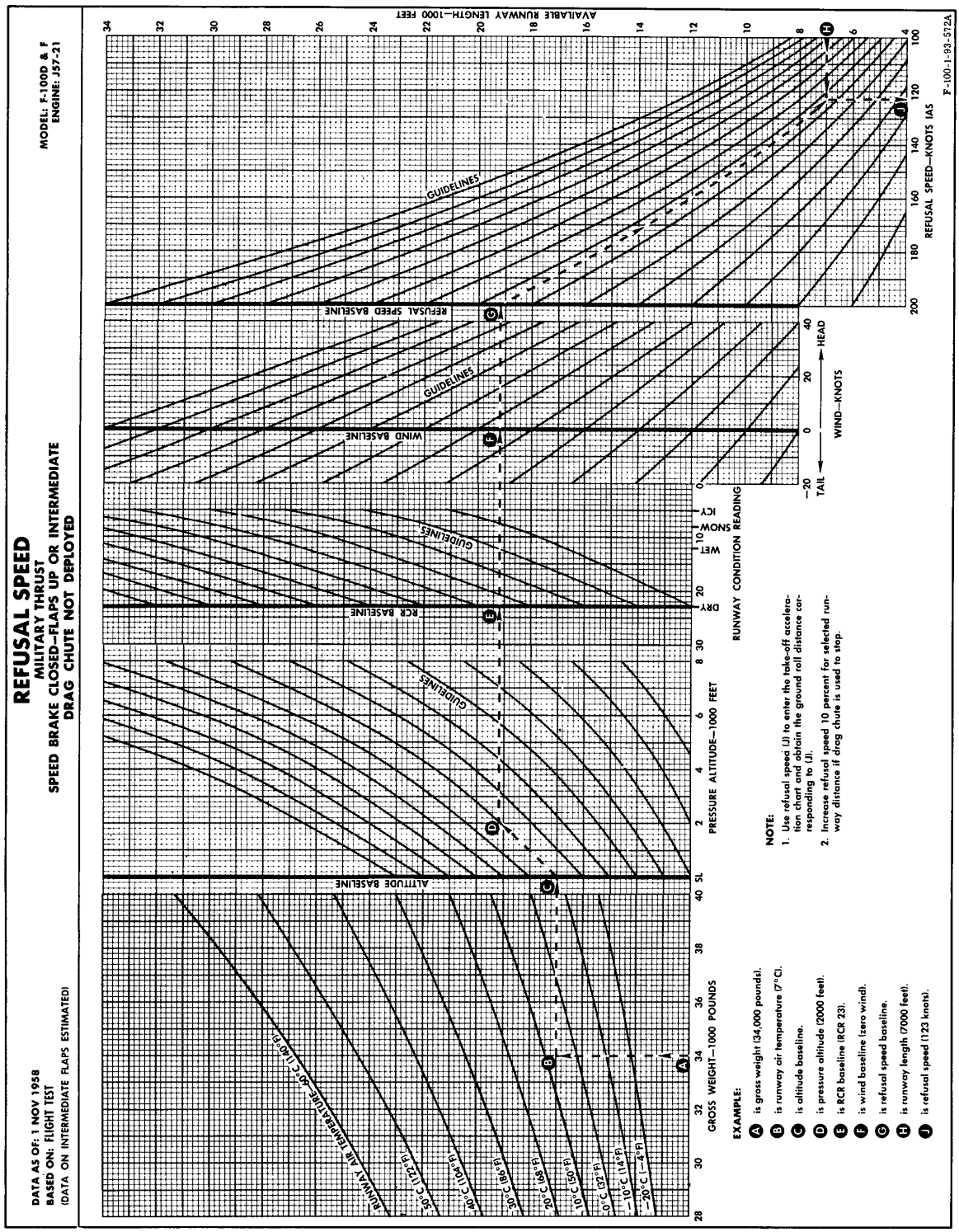

REFUSAL SPEED
MILITARY THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED
DATA AS OF: 1 NOV 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)
MODEL: F-100D & F
ENGINE: J57-21
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEED—KNOTS IAS
F-100-1-93-572A
GUIDELINES
REFUSAL SPEED BASELINE
WIND BASELINE
RCR BASELINE
ALTITUDE BASELINE
RUNWAY AIR TEMPERATURE
PRESSURE ALTITUDE—1000 FEET
GROSS WEIGHT—1000 POUNDS
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
WIND—KNOTS
HEAD
TAIL
EXAMPLE:
A is gross weight (34,000 pounds).
B is runway air temperature (7°C).
C is altitude baseline.
D is pressure altitude (2000 feet).
E is RCR baseline (RCR 23).
F is wind baseline (zero wind).
G is refusal speed baseline.
H is runway length (7000 feet).
J is refusal speed (123 knots).
NOTE:
1. Use refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to (J).
2. Increase refusal speed 10 percent for selected runway distance if drag chute is used to stop.

Figure B2-6

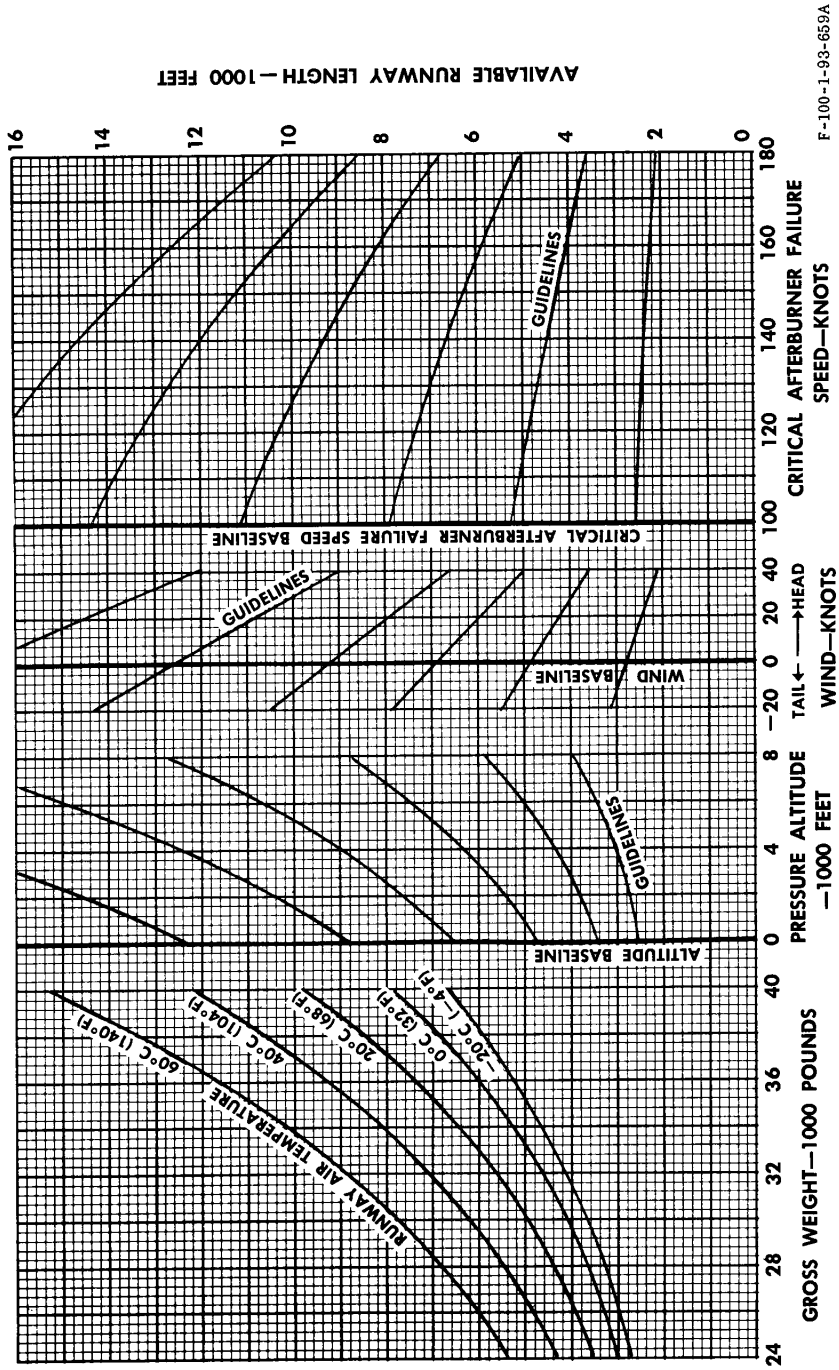
MODEL: F-100D & F
ENGINE: J57-21

CRITICAL AFTERBURNER FAILURE SPEED

FLAPS UP OR INTERMEDIATE

NOTE

- Chart based on retaining external stores for take-off.
- Chart includes 700 feet allowance for pilot reaction time from afterburner failure to throttle movement.



DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)

Figure B2-7

PART 3–CLIMB

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
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MAXIMUM THRUST CLIMB - 350 KNOTS IAS OR .8 INDICATED MACH	B3-4
MILITARY THRUST CLIMB	B3-6
MILITARY THRUST CLIMB - 350 KNOTS IAS OR .8 INDICATED MACH	B3-8
CRUISE-CLIMB ALTITUDE - FROM SEA LEVEL	B3-10
CRUISE-CLIMB ALTITUDE	B3-12
COMBAT CEILING	B3-13
COMBAT CEILING - 350 KNOTS IAS OR .8 INDICATED MACH	B3-14

NOTE For sample problems and descriptive text, refer to Part 3, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the climb charts. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before using the climb charts.

SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	800 lb	600 lb

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

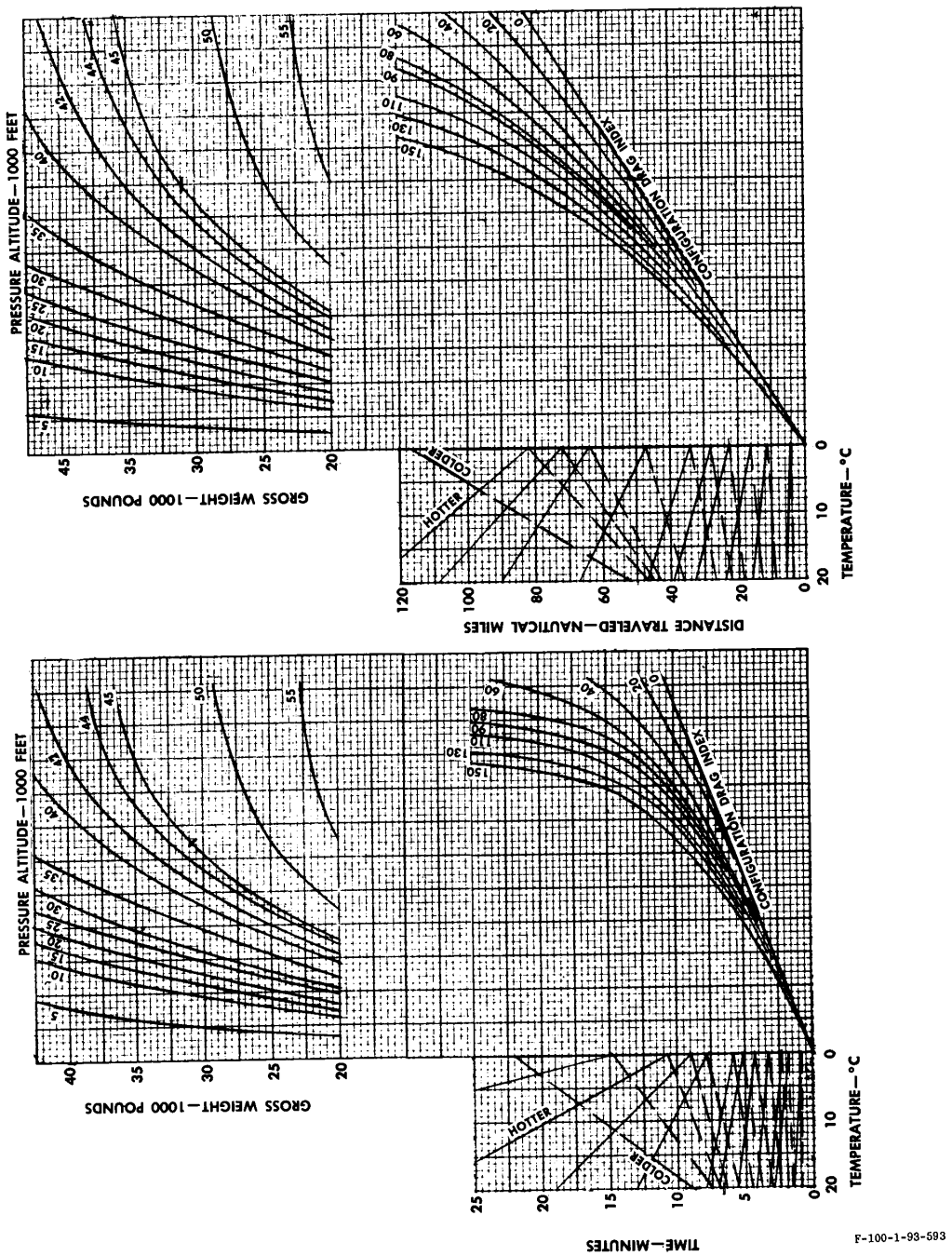


Figure B3-1 (Sheet 1 of 2)

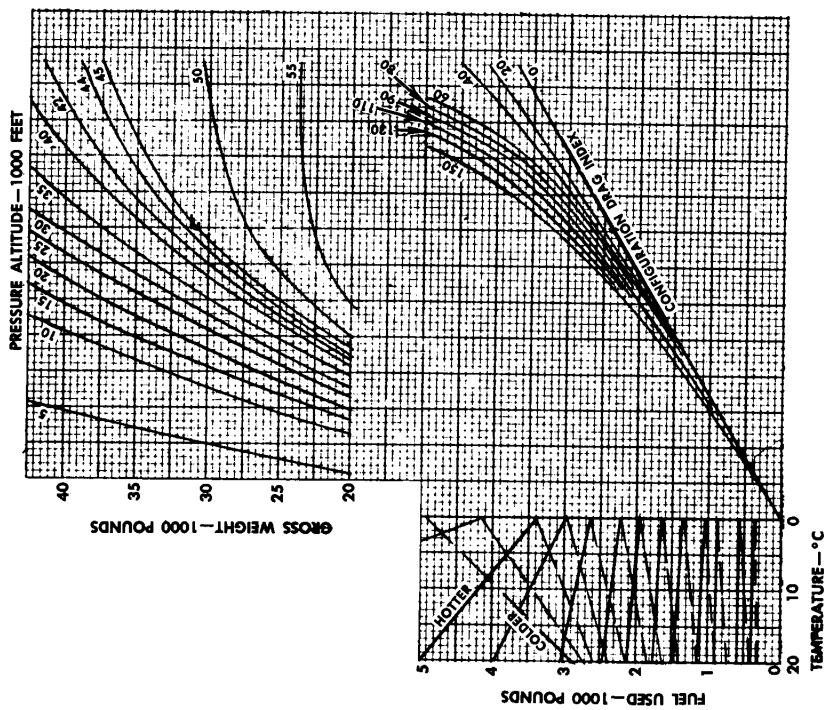
MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE

CONFIGURATION DRAG INDEX

PRESSURE ALTITUDE —1000 FEET	0,10		20,30		40,50,60	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30
5	368	.61	363	.60	350	.58
10	513	.91	498	.88	491	.87
15	464	.90	454	.88	450	.87
20	422	.90	413	.88	409	.87
25	384	.90	376	.88	372	.87
30	346	.90	340	.88	340	.88
35	311	.90	304	.88	304	.88
40	273	.89	271	.88	269	.88
45	245	.89	242	.88	242	.88
50	217	.89	215	.88	215	.88
55	214	.89	192	.88	192	.88
60	172	.89	170	.88	170	.88

PRESSURE ALTITUDE —1000 FEET	70,80,90		110		130		150	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30	194	.30
5	340	.56	339	.56	331	.55	327	.54
10	480	.85	462	.82	451	.80	441	.78
15	440	.85	428	.83	418	.81	408	.79
20	405	.86	390	.83	384	.82	380	.81
25	367	.86	358	.84	353	.83	350	.82
30	331	.86	326	.85	322	.84	322	.84
35	301	.86	296	.86	294	.85	294	.85
40	267	.87	264	.86	260	.85	260	.85
45	239	.87	235	.86	233	.85	233	.85
50	212	.87	210	.86	207	.85	207	.85
55	189	.87	186	.86	184	.85	184	.85
60	167	.87	166	.86	163	.85	163	.85



NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

F-100-1-93-594

Figure B3-1 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

350 KNOTS IAS OR .8 INDICATED MACH NUMBER
(WHICHEVER IS LESS)

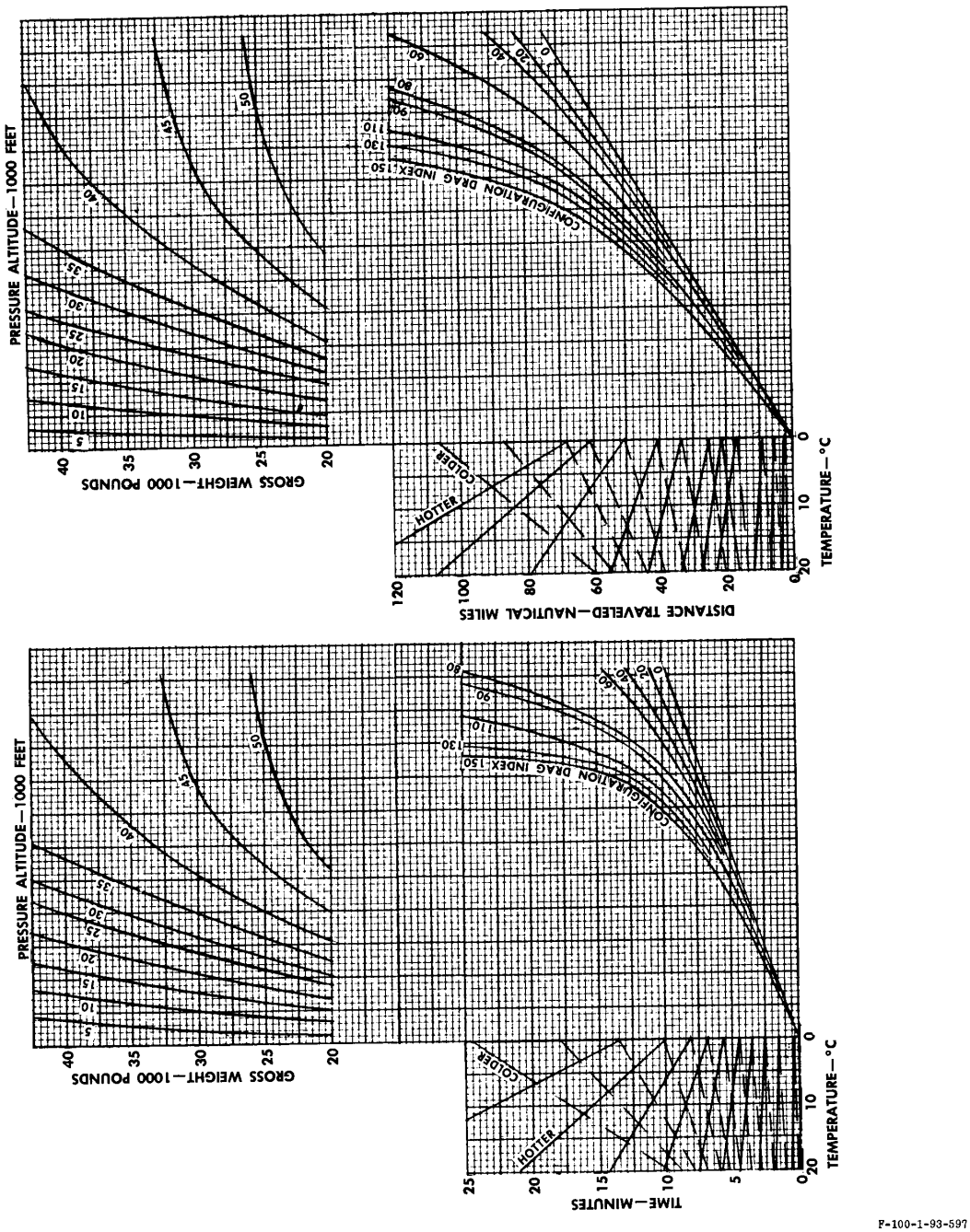


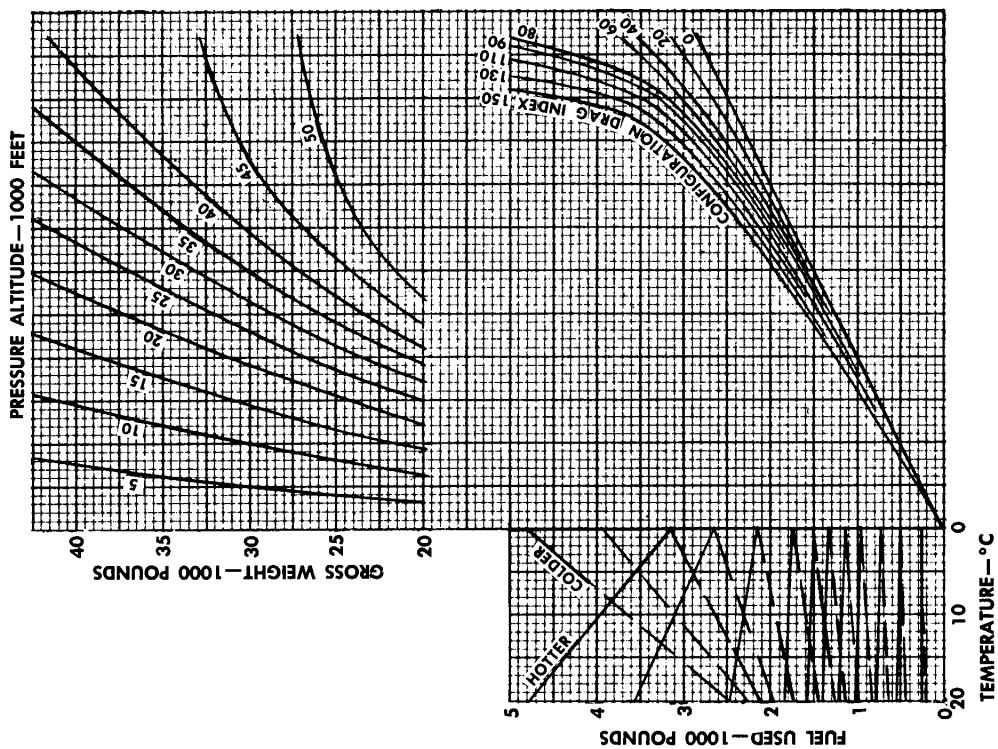
Figure B3-2 (Sheet 1 of 2)

MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE—1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	275	.80
40	245	.80
45	219	.80
50	195	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-598

Figure B3-2 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959

BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB

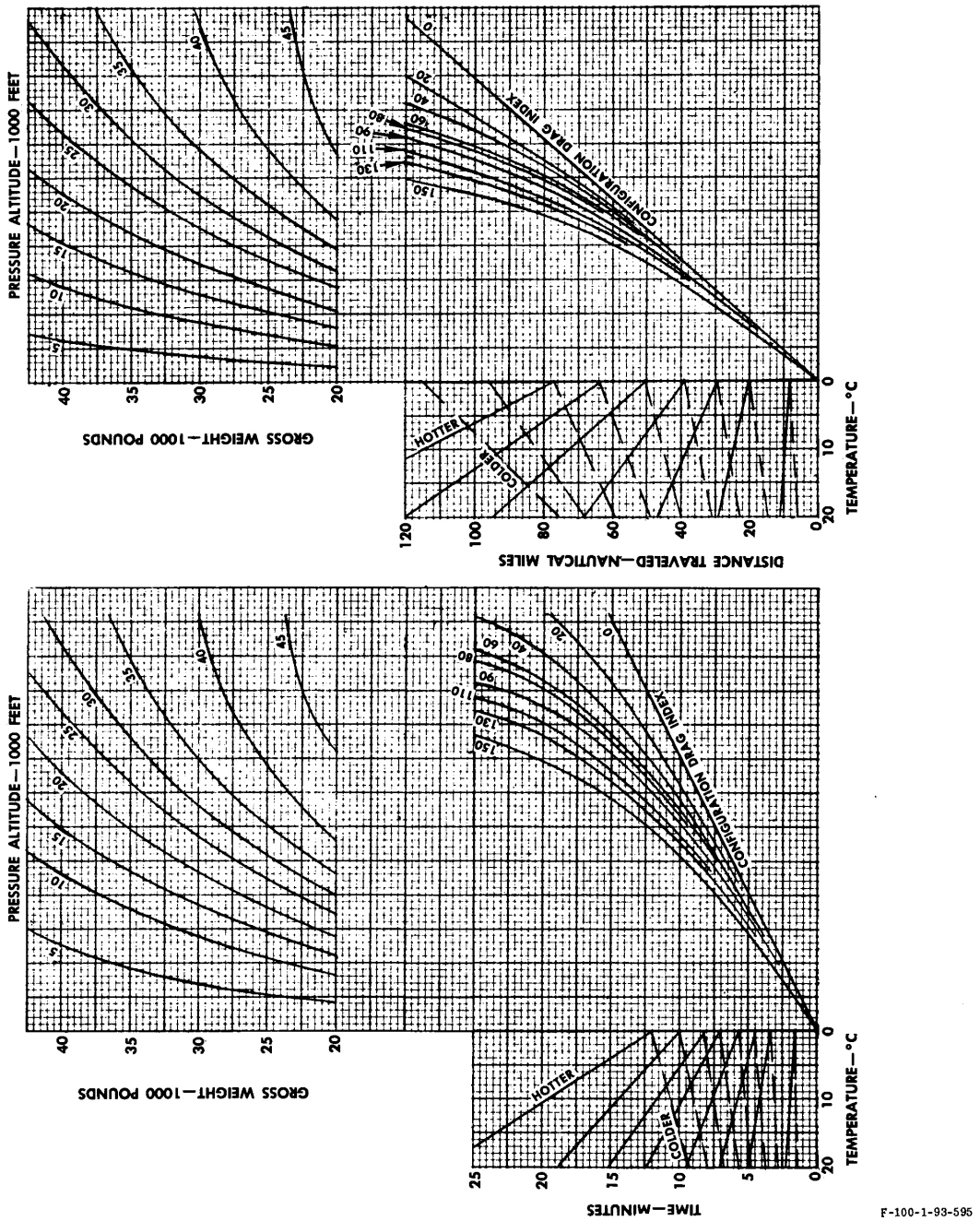


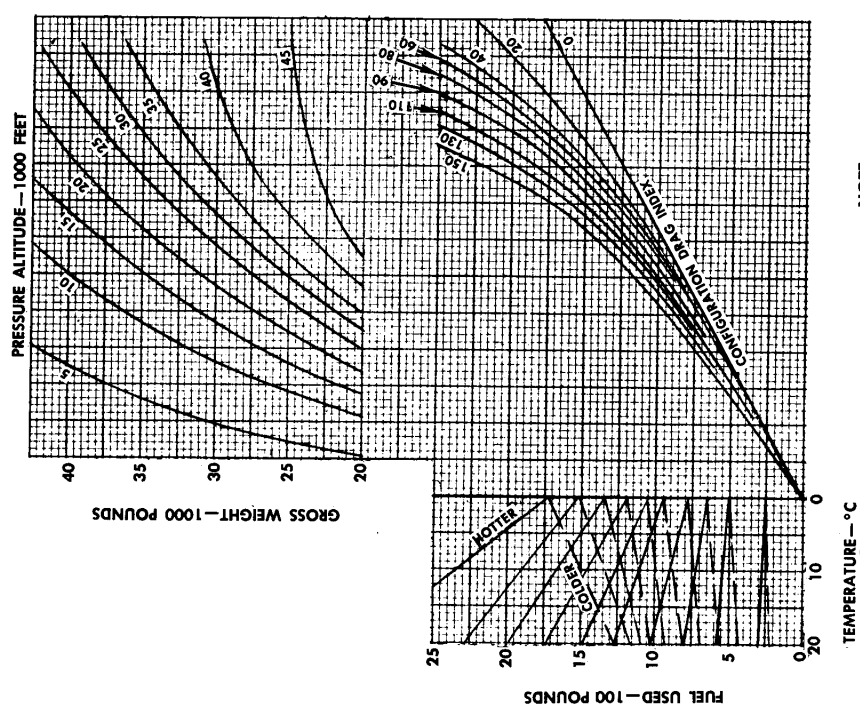
Figure B3-3 (Sheet 1 of 2)

MODEL: F-100D & F

ENGINE: J57-21

CLIMB SCHEDULE

CONFIGURATION DRAG INDEX									
PRESSURE ALTITUDE —1000 FEET	0,10		20,30		40,50,60,70		80,90 110		130,150	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30	194	.30	194	.30
5	314	.52	307	.50	279	.46	267	.44	260	.43
10	412	.73	401	.71	348	.63	326	.59	309	.56
15	402	.78	390	.76	348	.68	333	.65	312	.62
20	390	.83	380	.81	345	.74	331	.71	316	.68
25	376	.88	367	.87	340	.80	327	.77	313	.74
30	340	.88	335	.87	331	.86	322	.84	309	.81
35	303	.88	301	.87	297	.86	288	.84	277	.81
40	269	.88	269	.87	264	.86	256	.84	246	.81
45	242	.88	239	.87	235	.86	229	.84	220	.81
50	215	.88	212	.87	210	.86	204	.84	196	.81



NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

F-100-1-93-596

Figure B3-3 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB

350 KNOTS IAS OR .8 INDICATED MACH NUMBER
(WHICHEVER IS LESS)

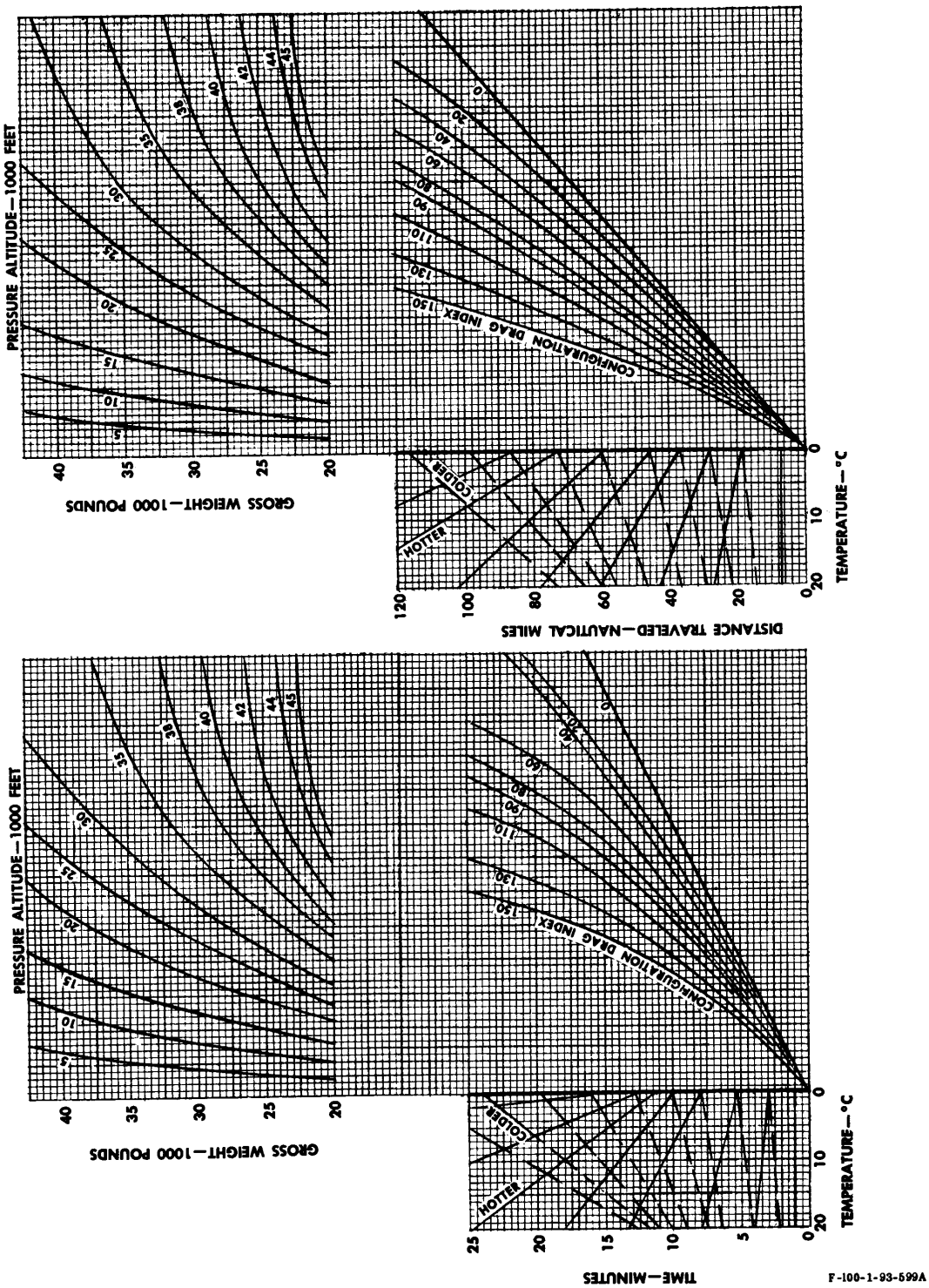


Figure B3-4 (Sheet 1 of 2)

MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE—1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	275	.80
40	245	.80
45	219	.80
50	195	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

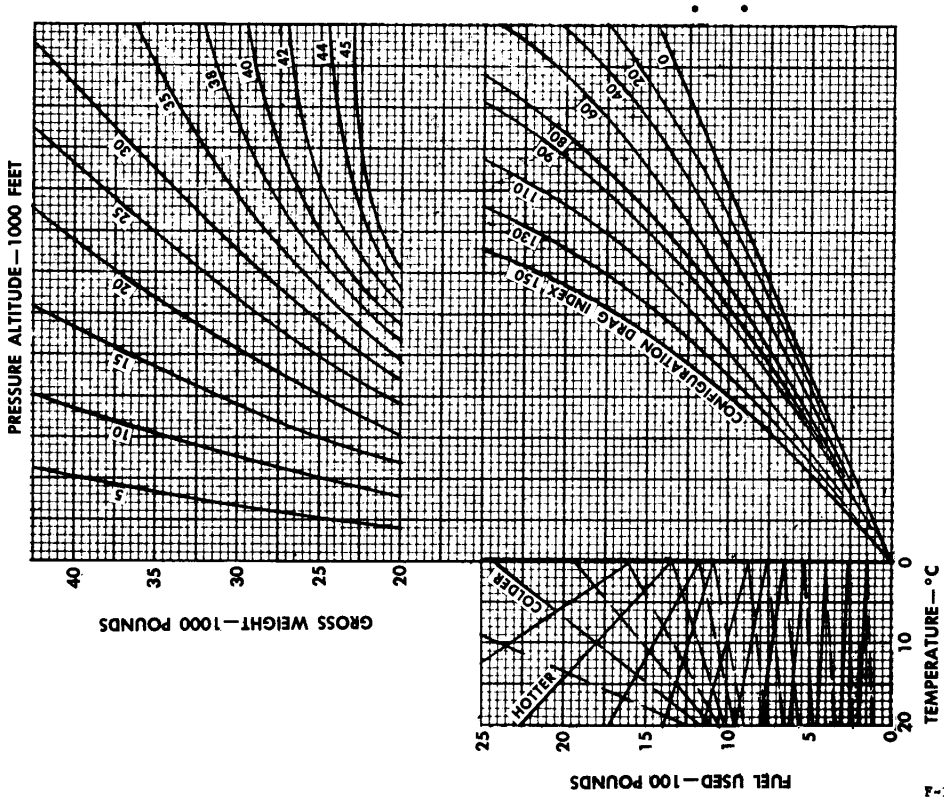


Figure B3-4 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

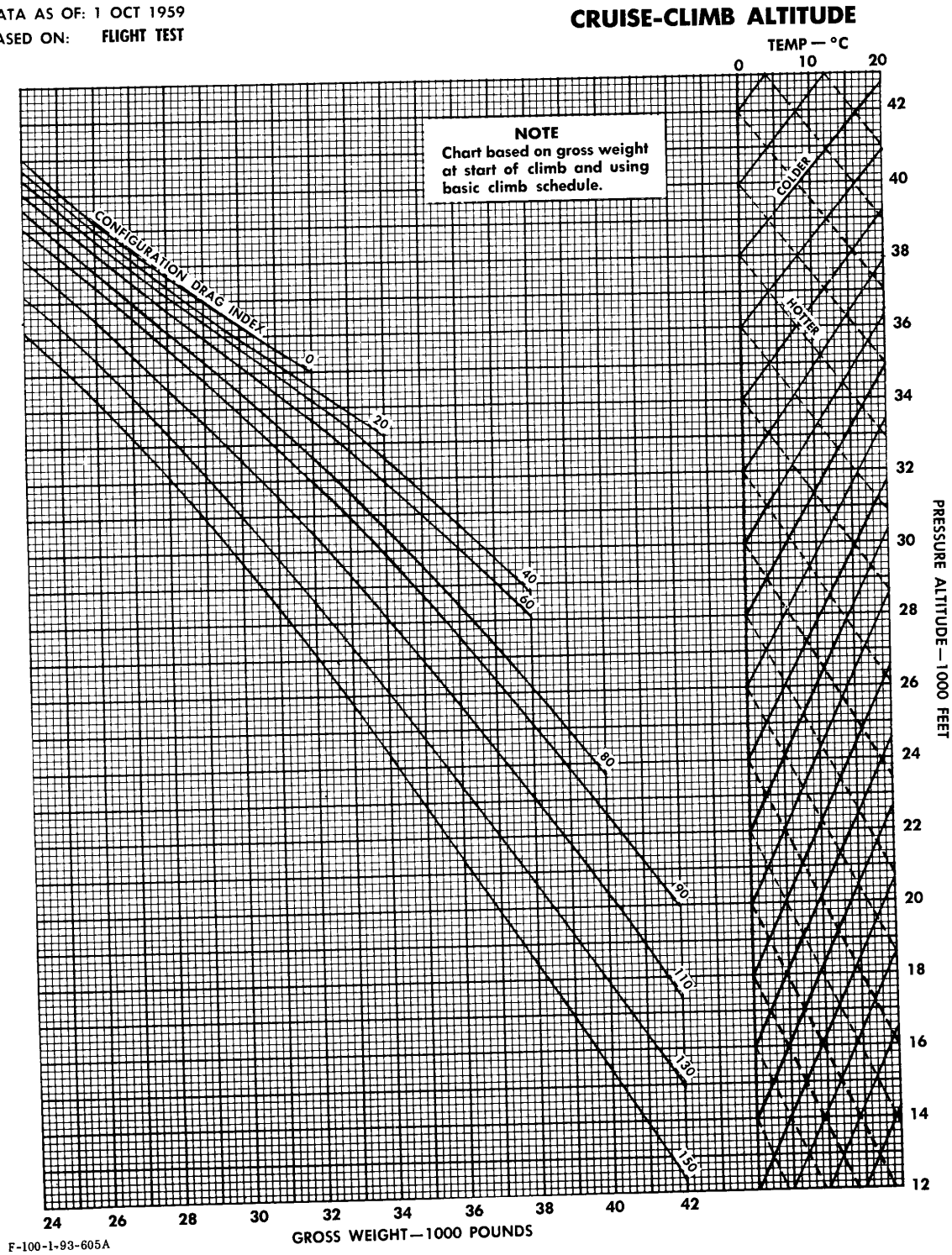


Figure B3-5 (Sheet 1 of 2)

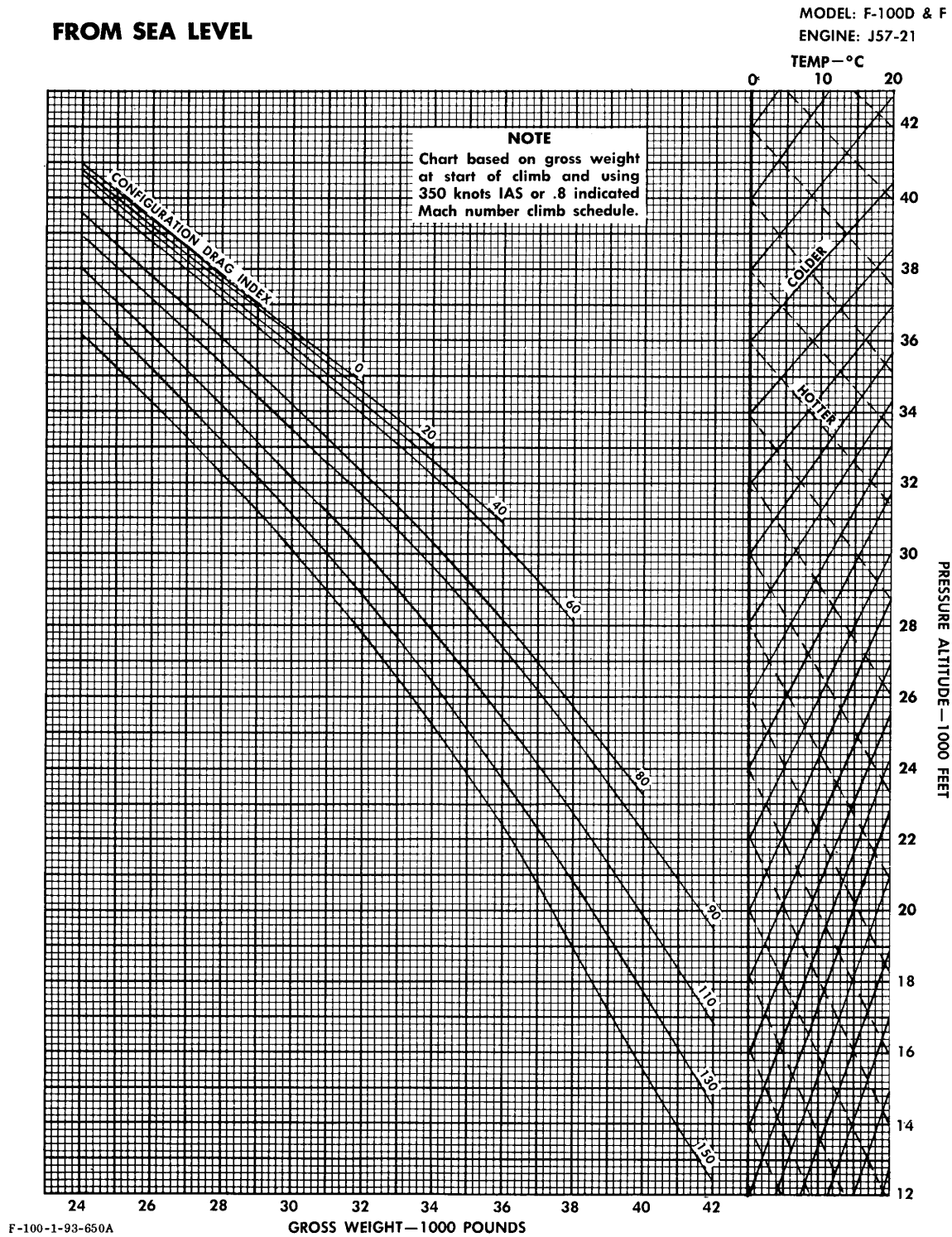


Figure B3-5 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CRUISE-CLIMB ALTITUDE

MODEL: F-100D & F
ENGINE: J57-21

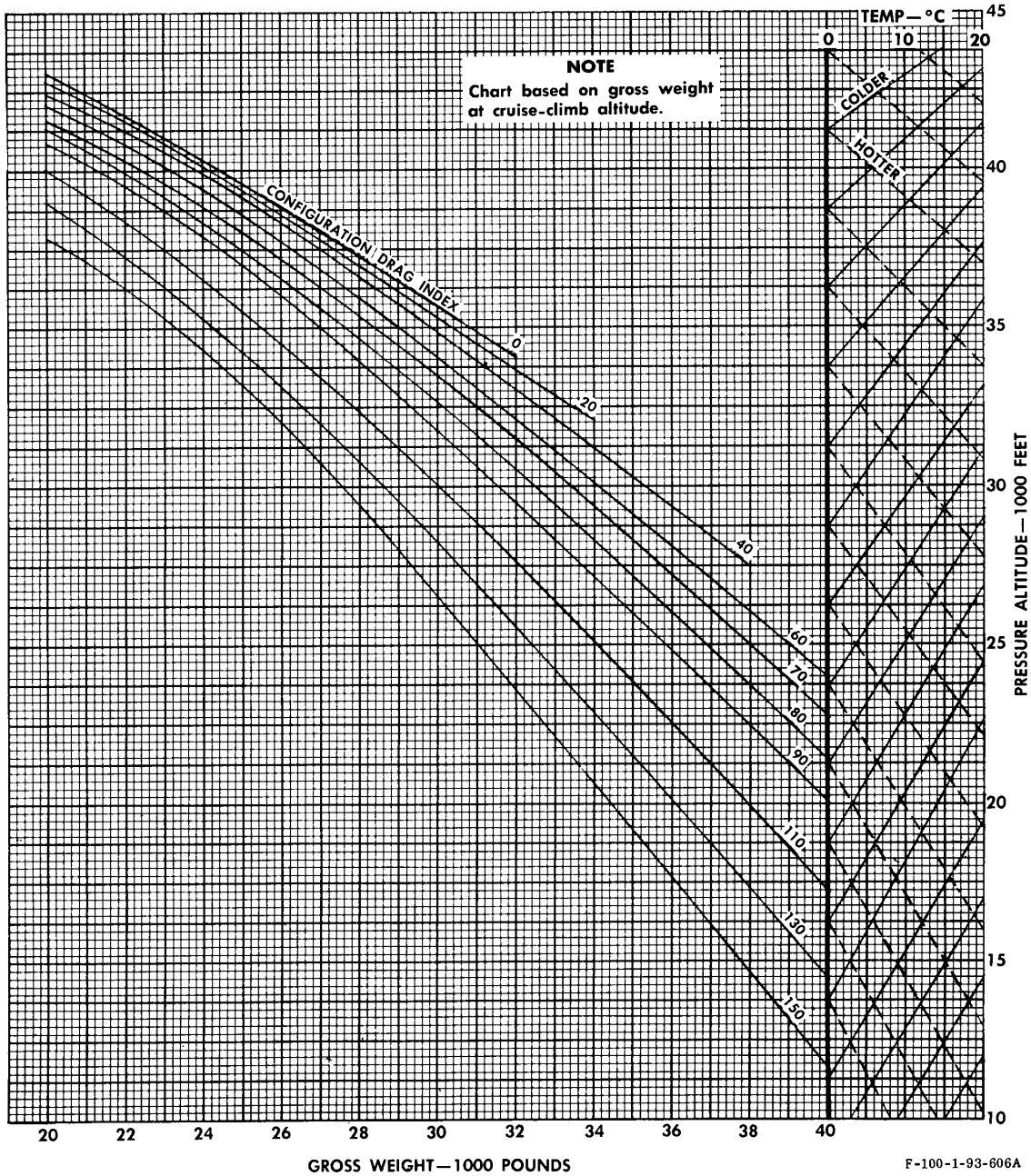


Figure B3-6

DATA AS OF: 1 OCT 1959
BASED ON: **FLIGHT TEST**

COMBAT CEILING

MODEL: F-100D & F
ENGINE: J57-21

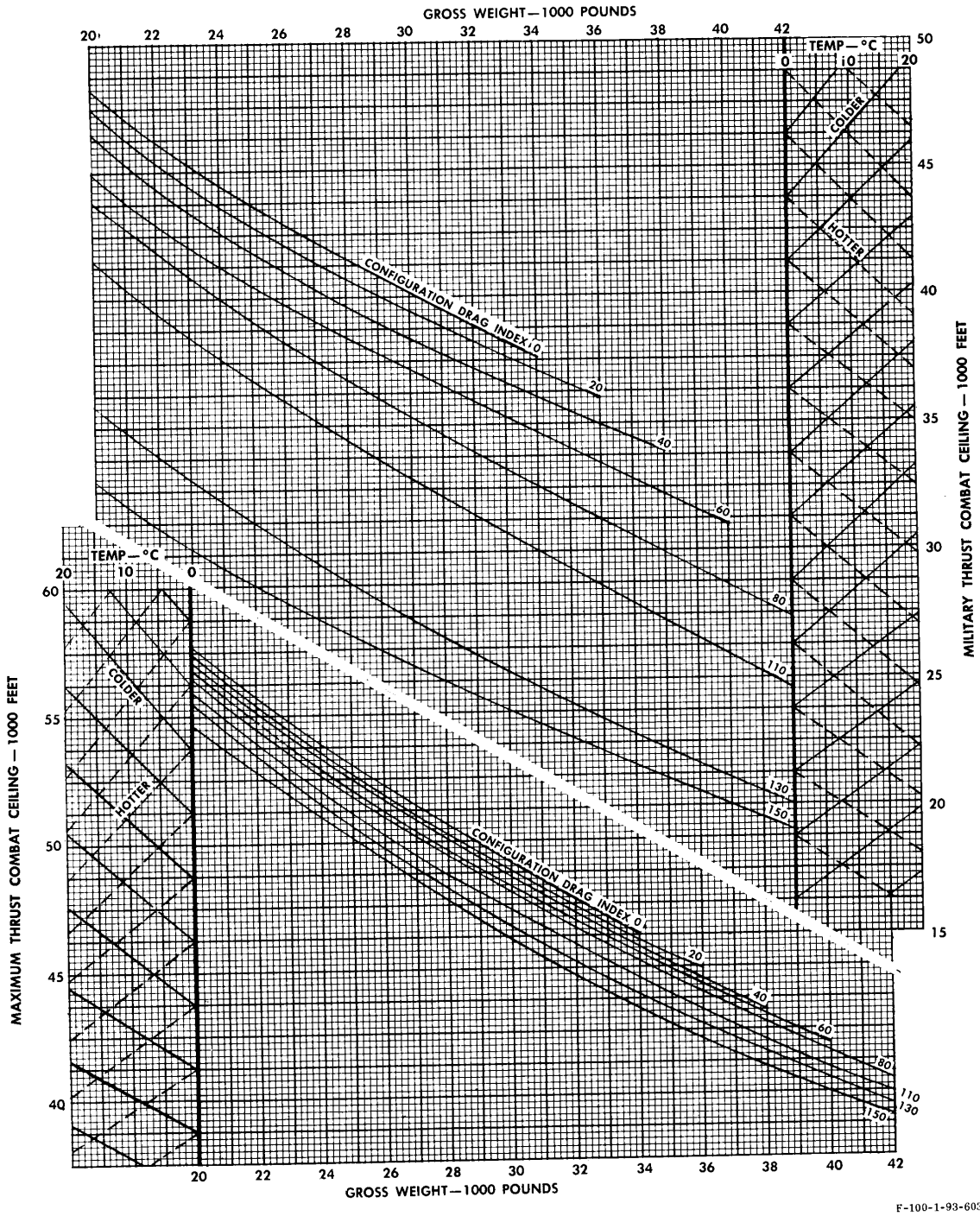


Figure B3-7

DATA AS OF: 1 OCT 1959
BASED ON: **FLIGHT TEST**

COMBAT CEILING

350 KNOTS IAS OR .8 INDICATED MACH NUMBER
(WHICHEVER IS LESS)

MODEL: F-100D & F
ENGINE: J57-21

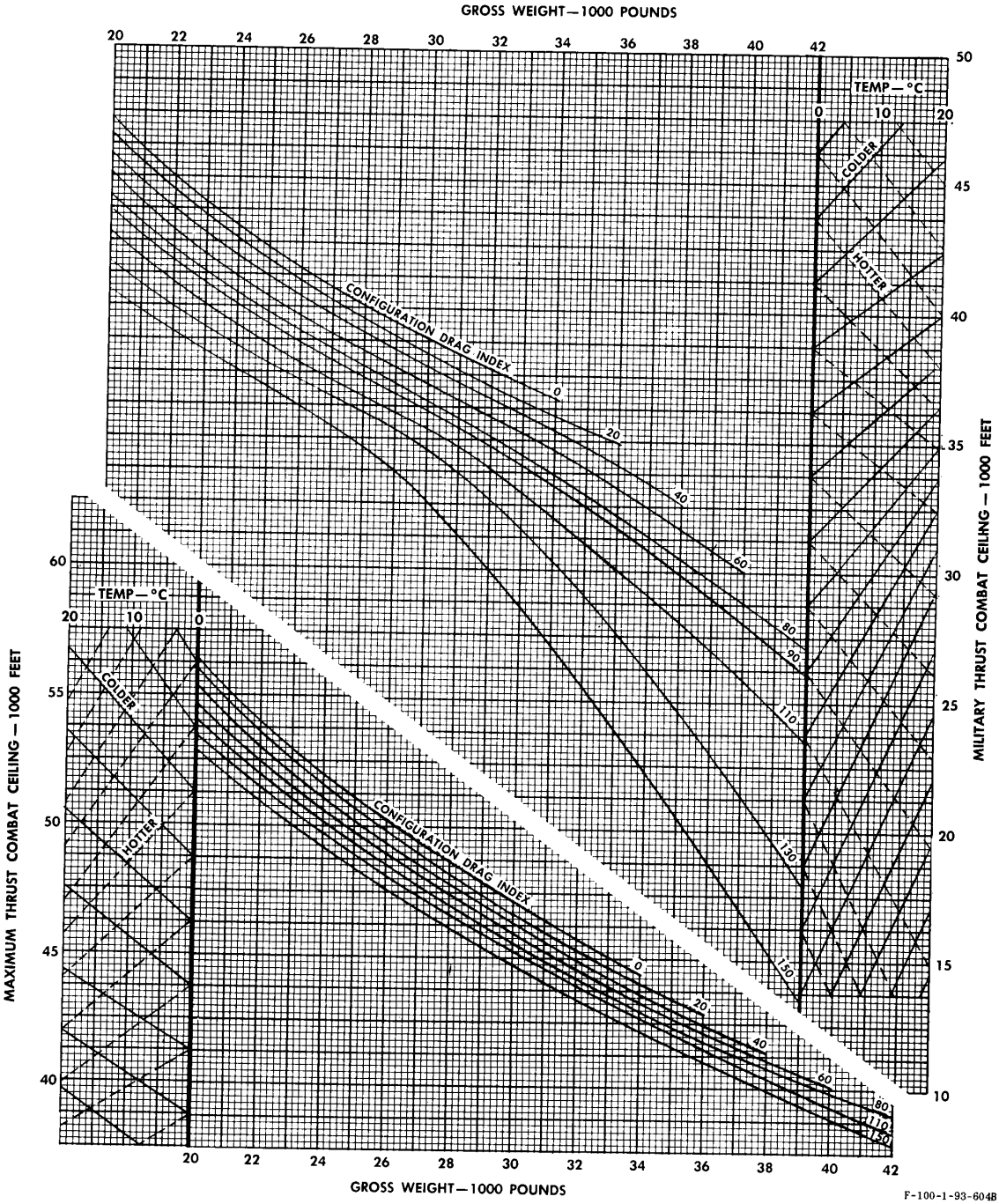


Figure B3-8

PART 4–RANGE

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Titles CAPITALIZED denote charts.

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CONFIGURATION DRAG INDEX 10	B4-4
CONFIGURATION DRAG INDEX 20	B4-6
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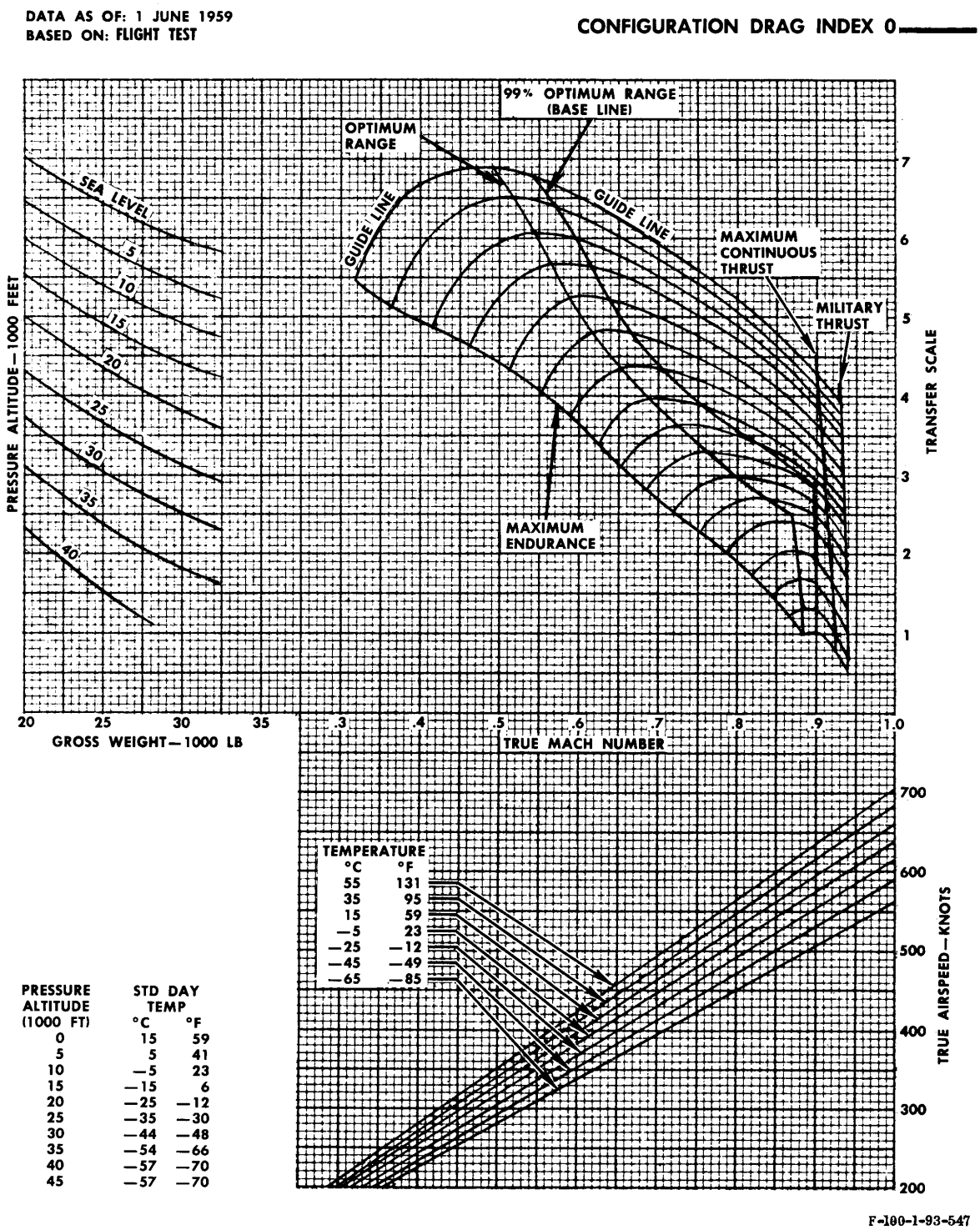
NOTE For sample problems and descriptive text, refer to Part 4, Section I, of this manual.



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-1 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

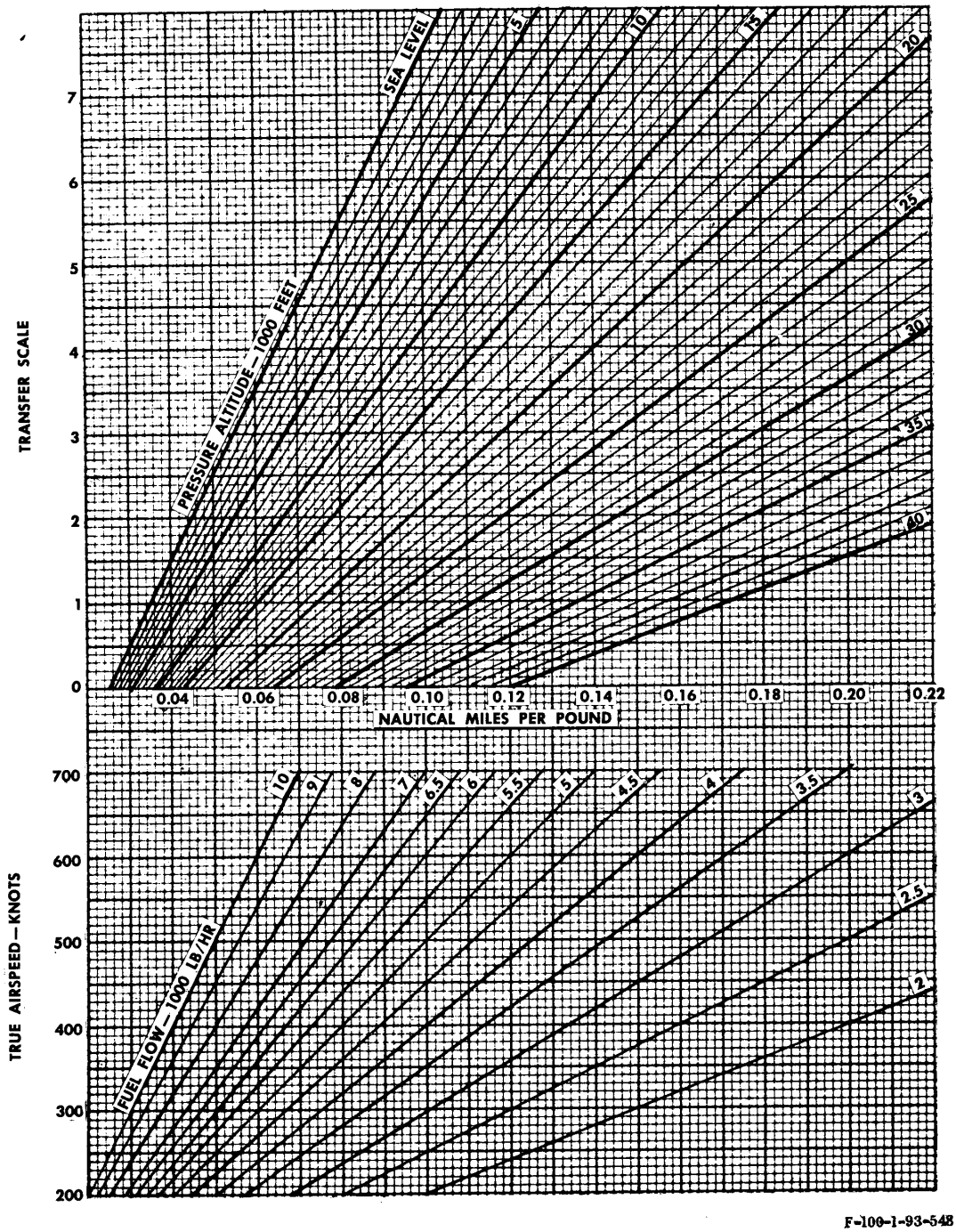
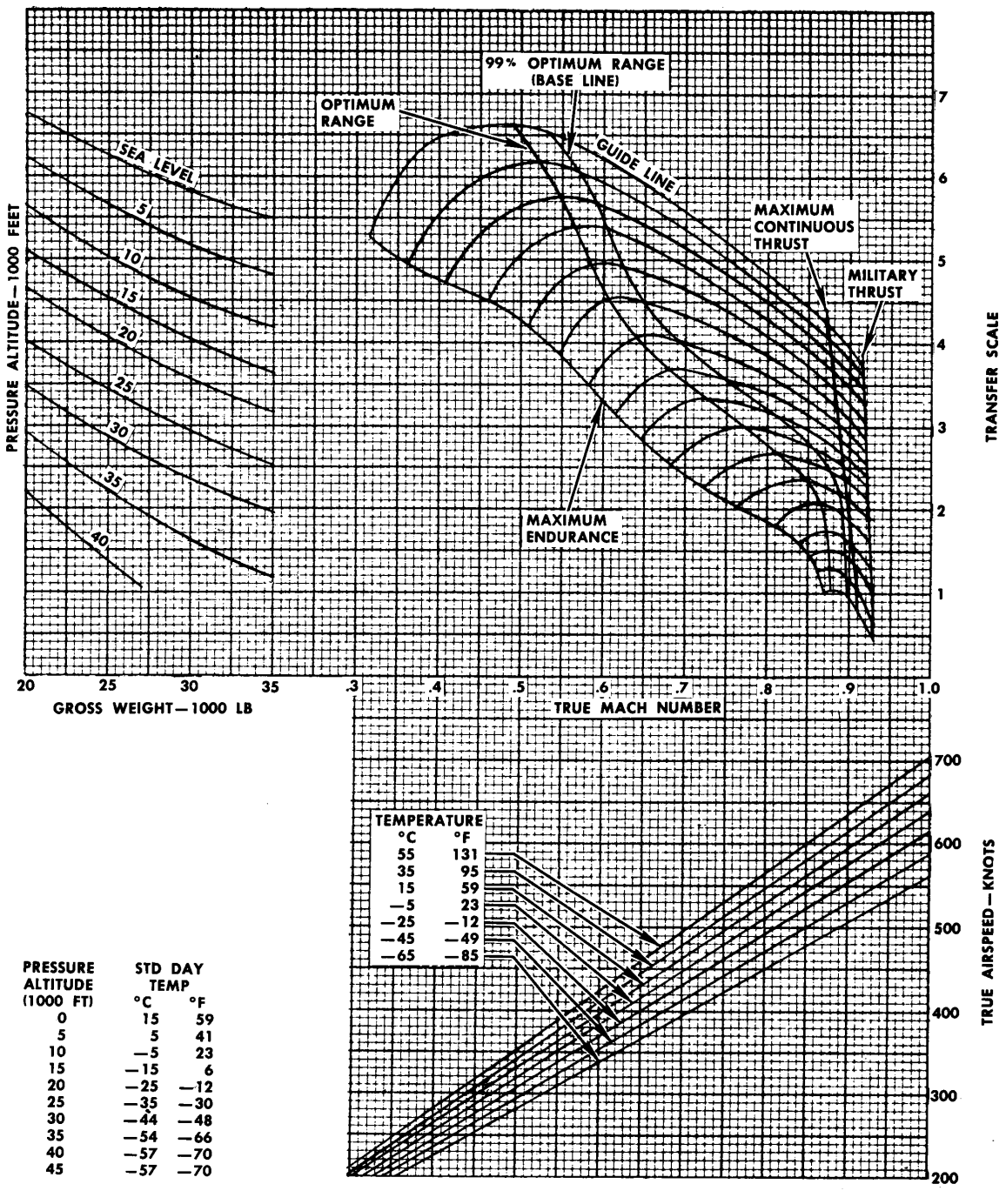


Figure B4-1 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 10



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-2 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D &F
Engine: J57-21

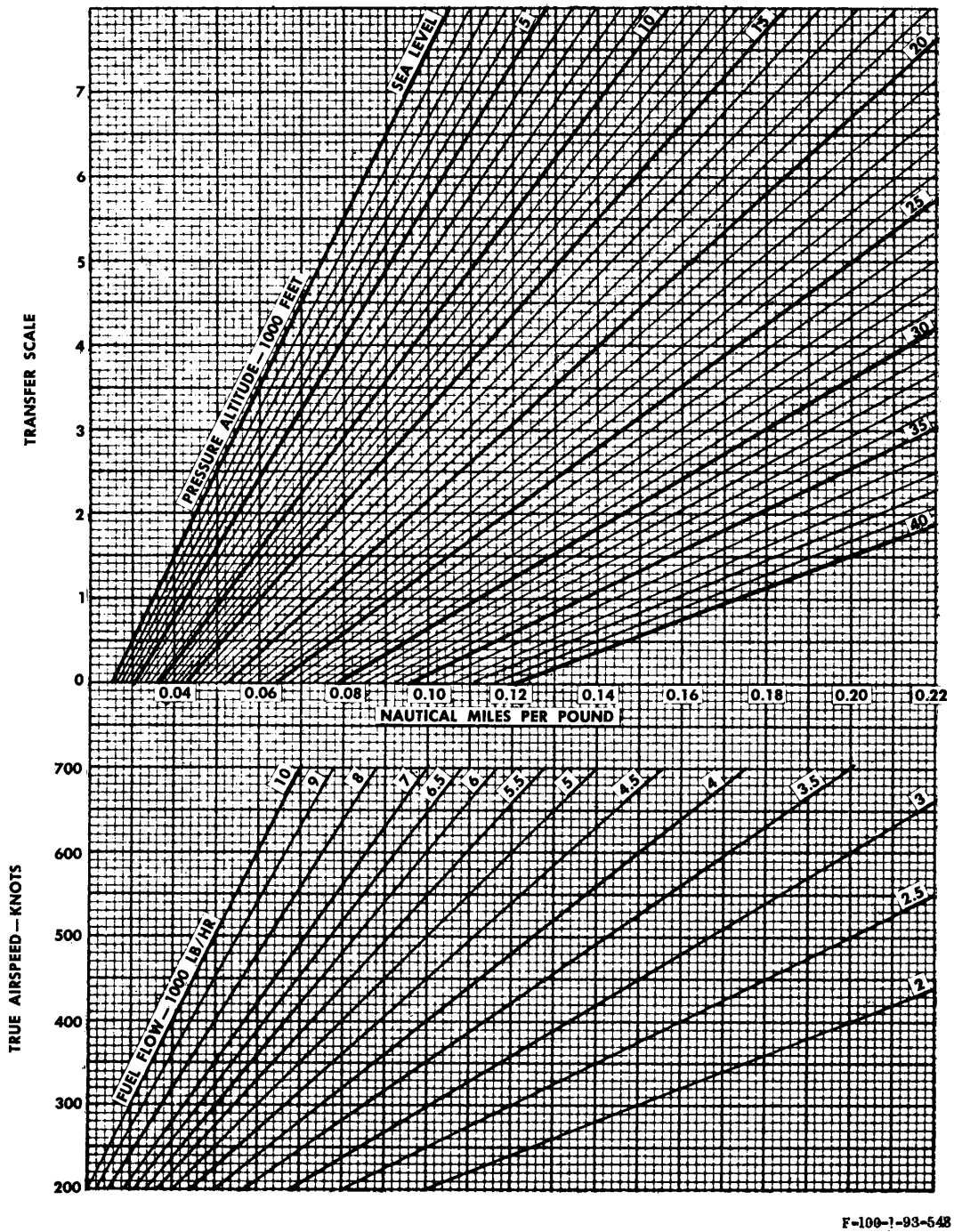


Figure B4-2 (Sheet 2 of 2)

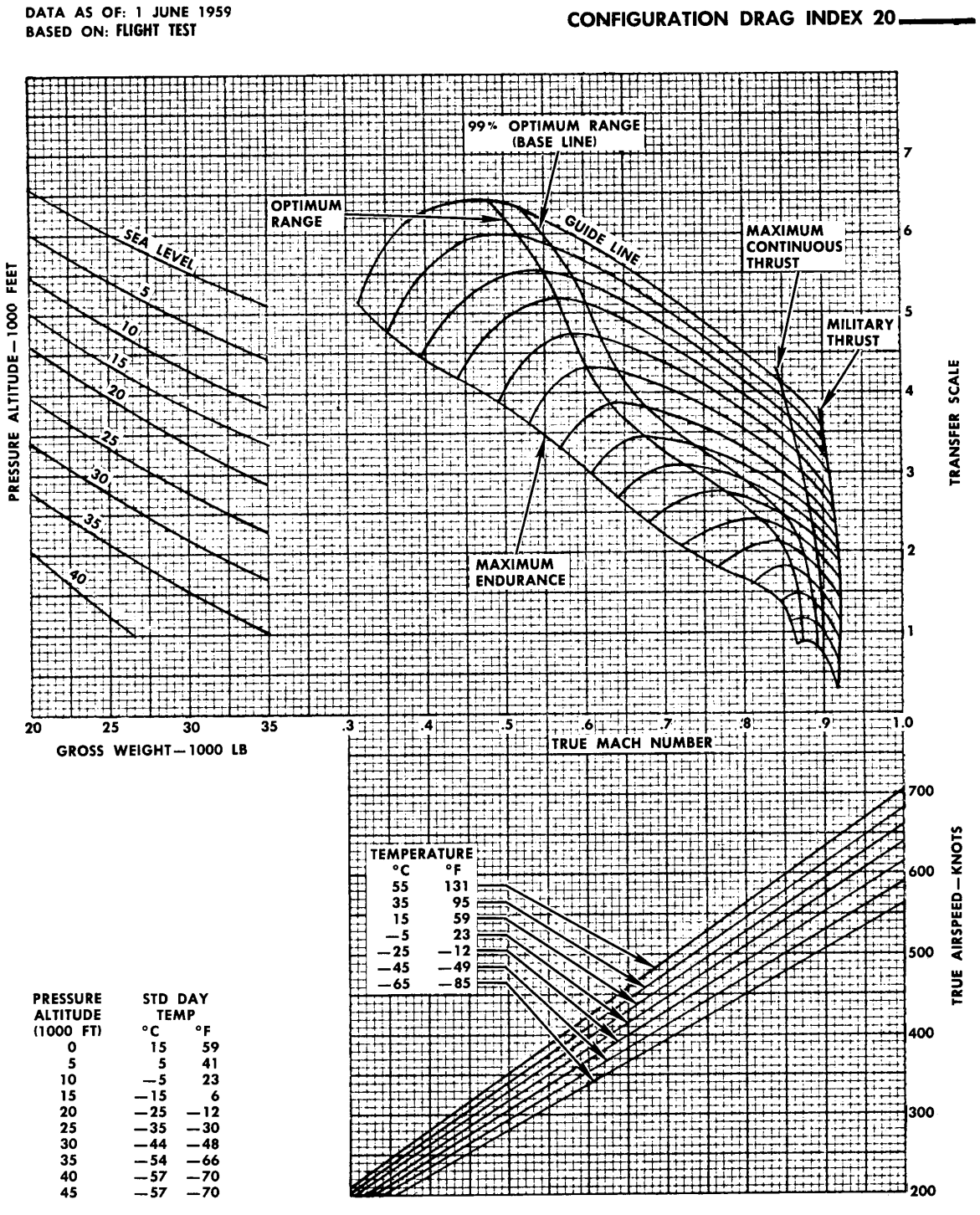


Figure B4-3 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D &F
Engine: J57-21

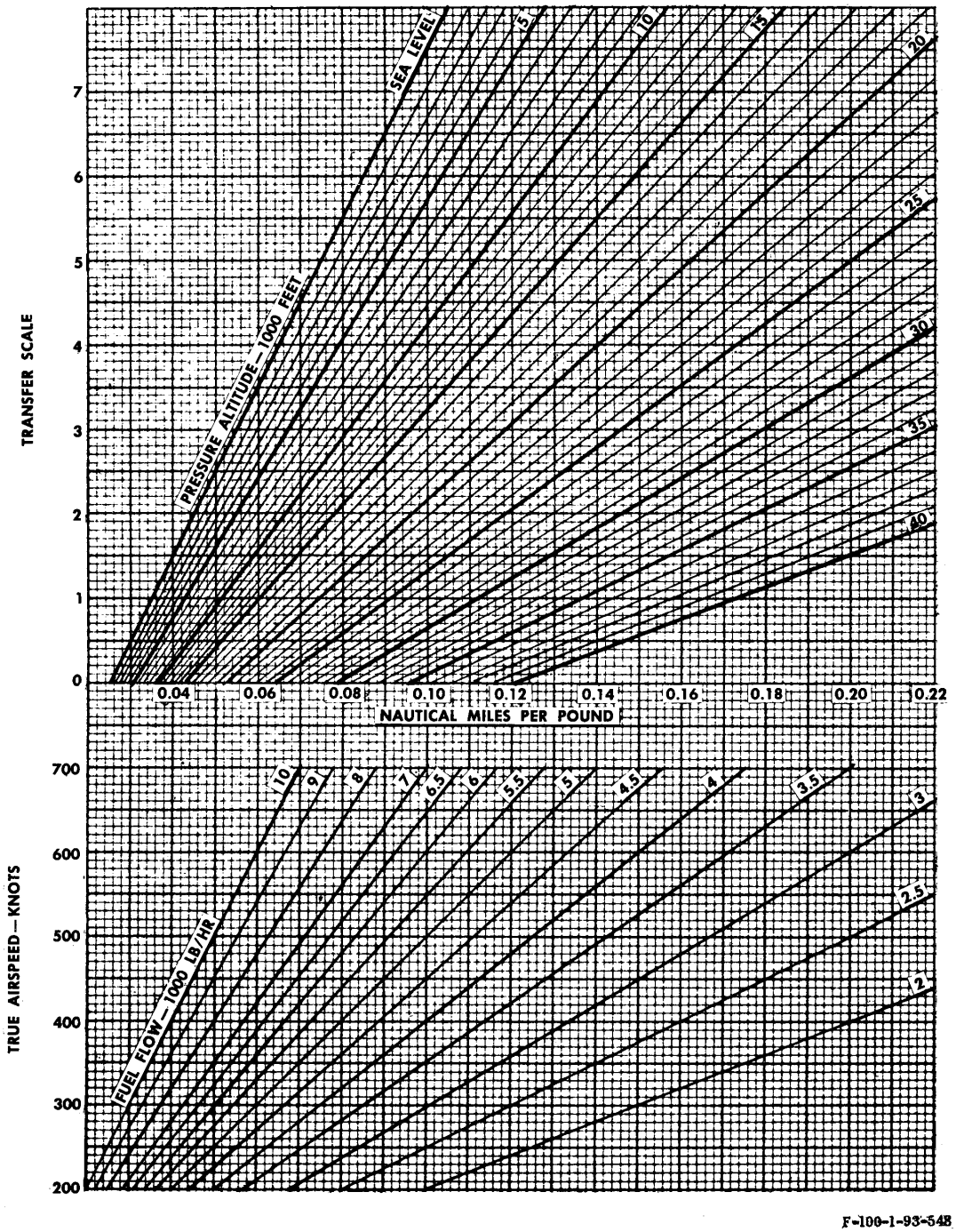


Figure B4-3 (Sheet 2 of 2)

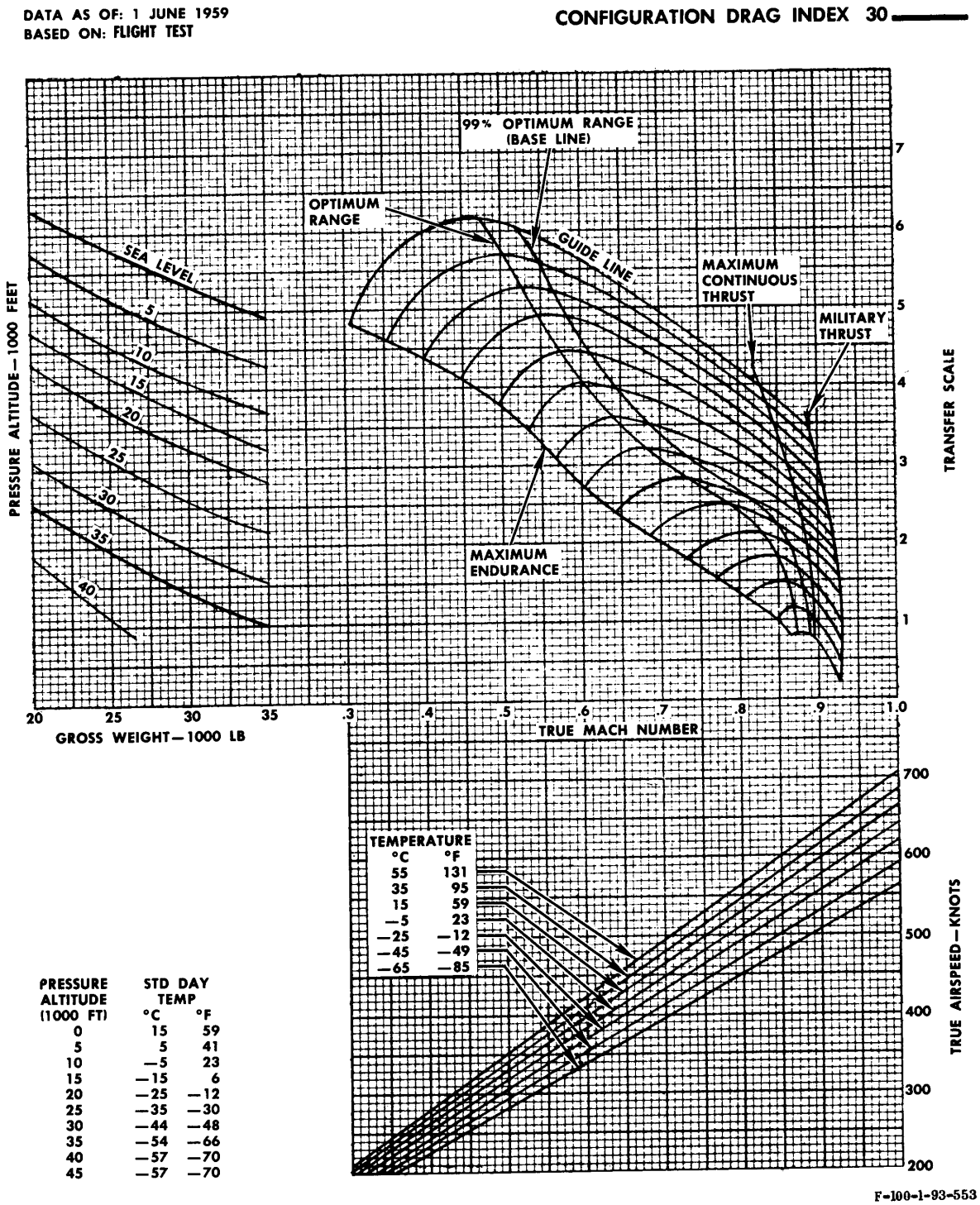


Figure B4-4 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

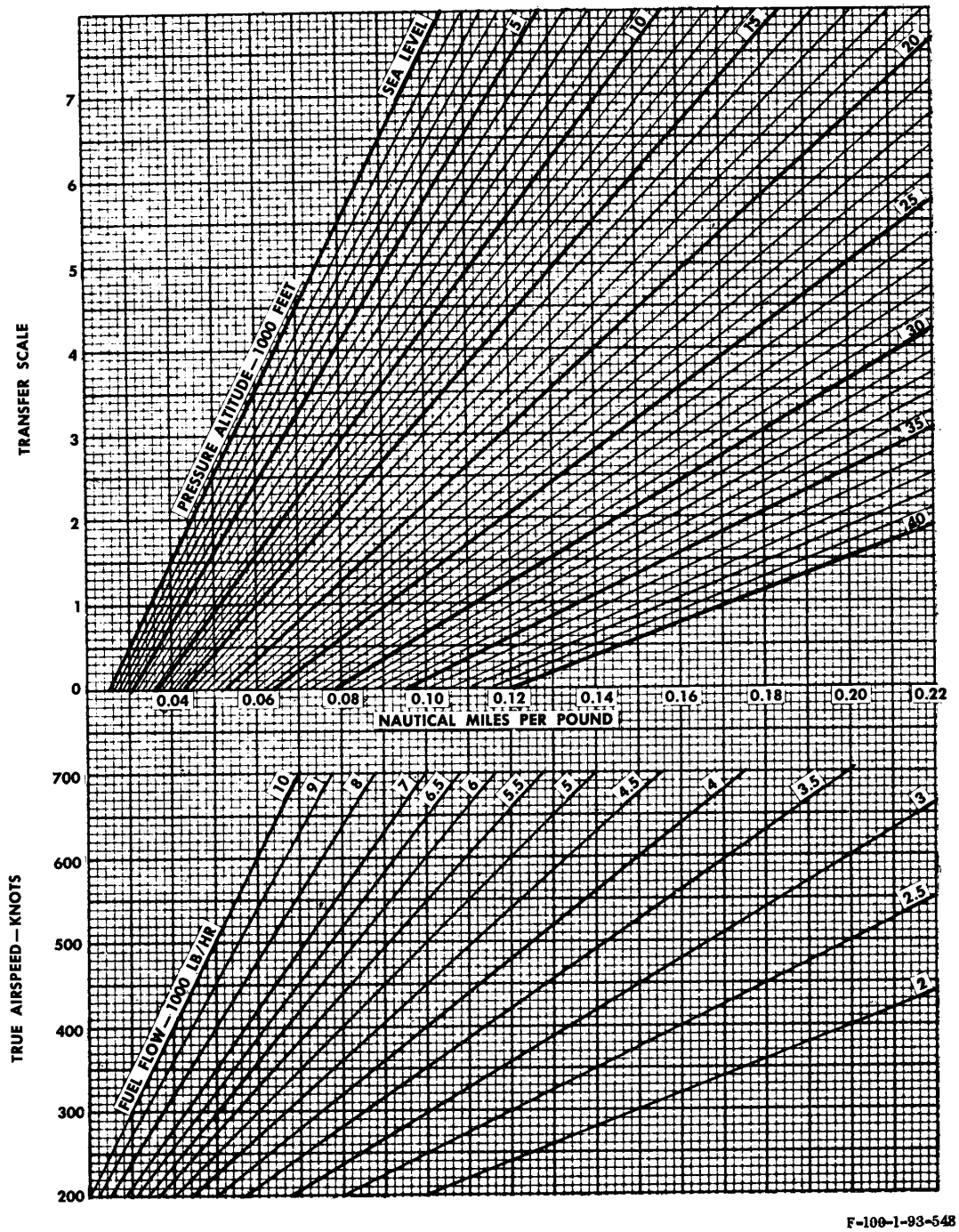
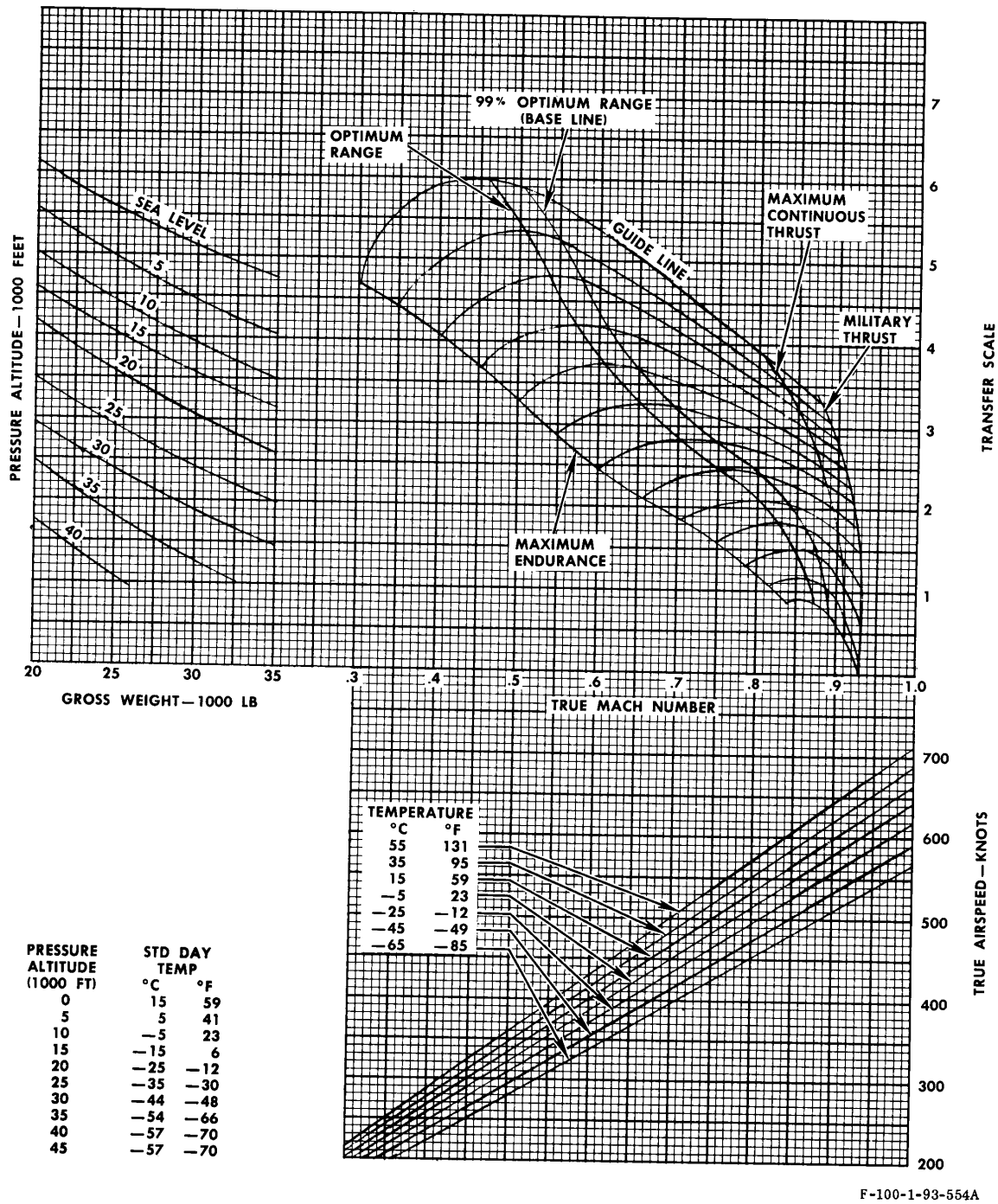


Figure B4-4 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 40



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-5 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

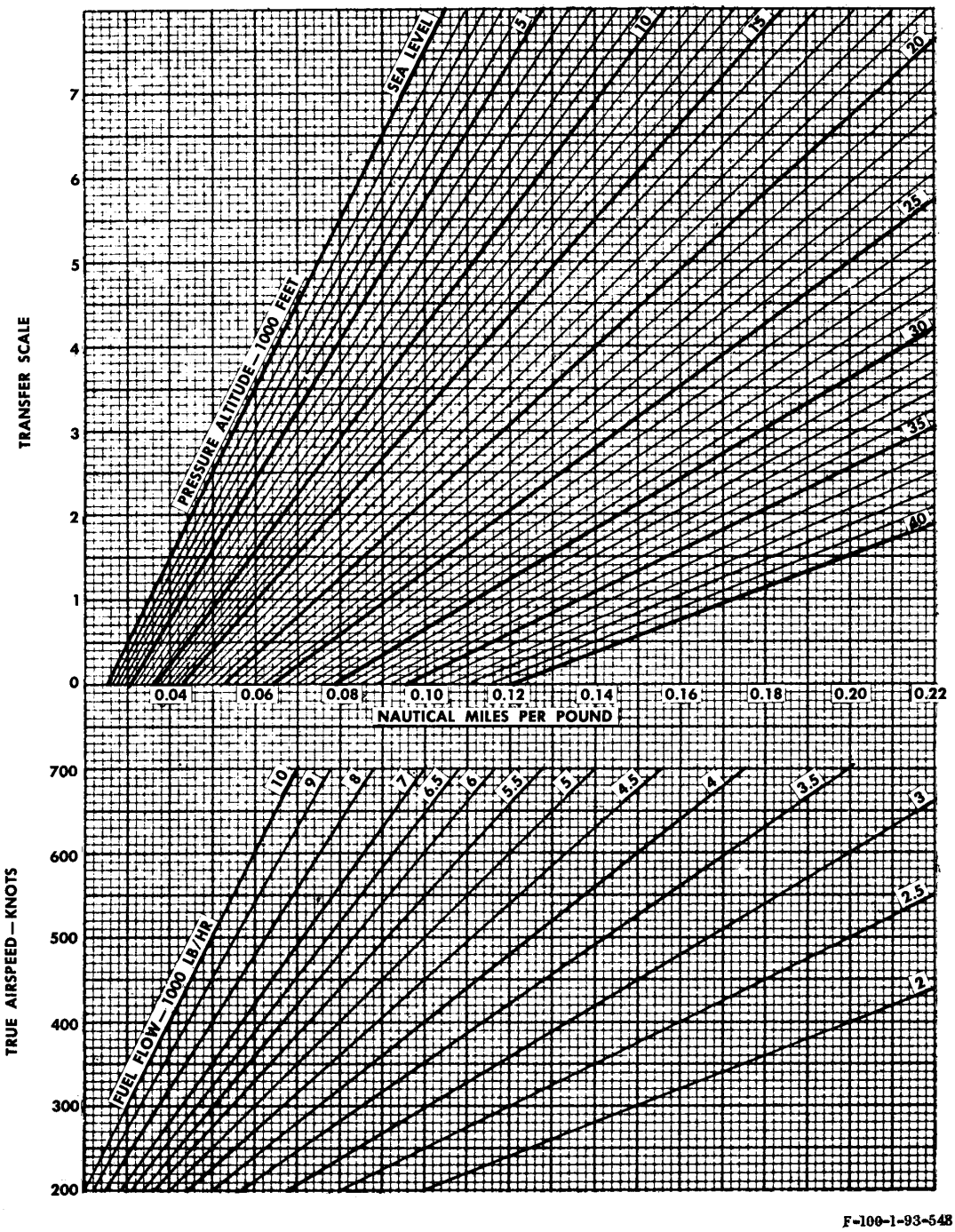
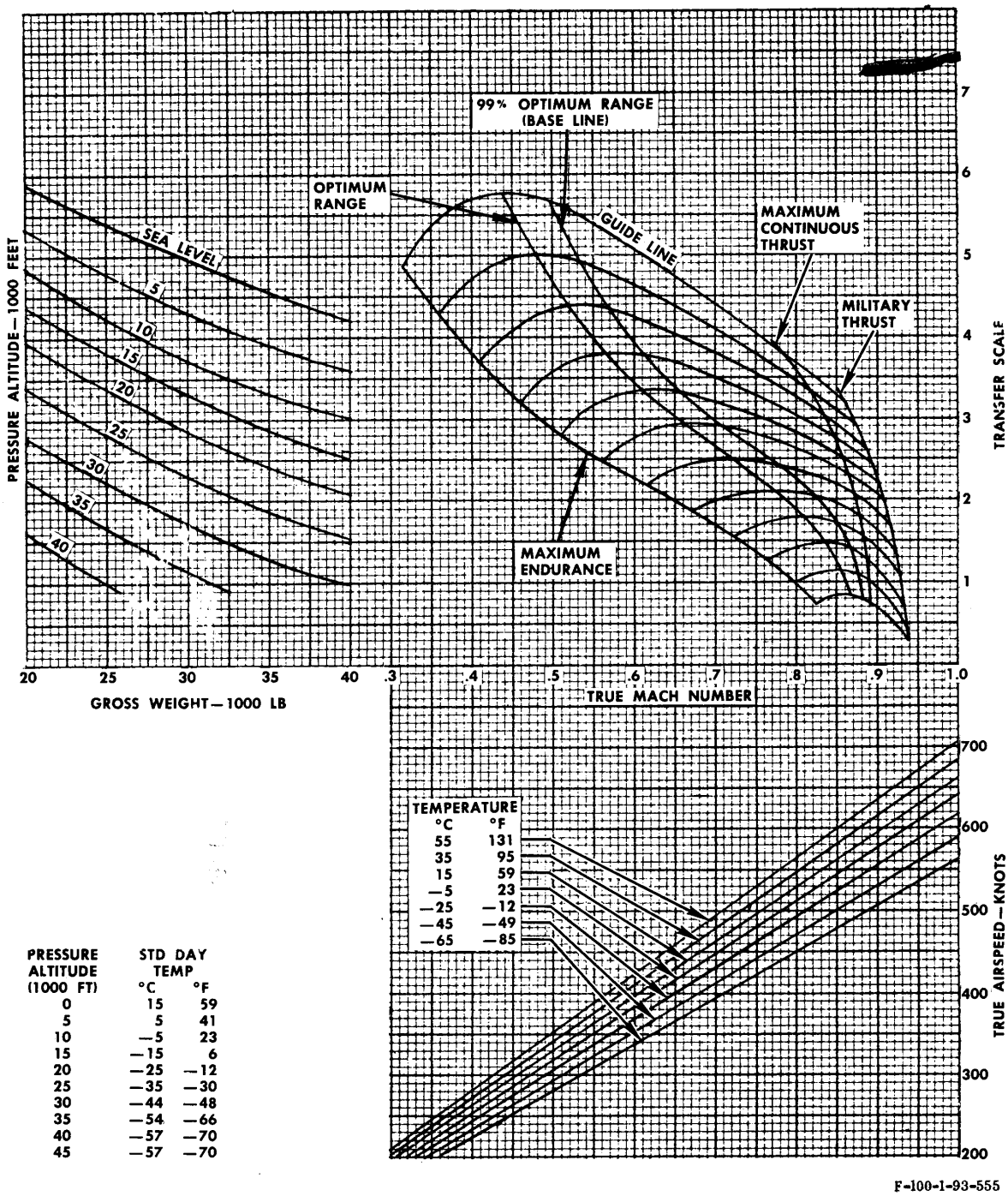


Figure B4-5 (Sheet 2 of 2)

DATA AS OF 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 50



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-6 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model. F-100D & F
Engine: J57-21

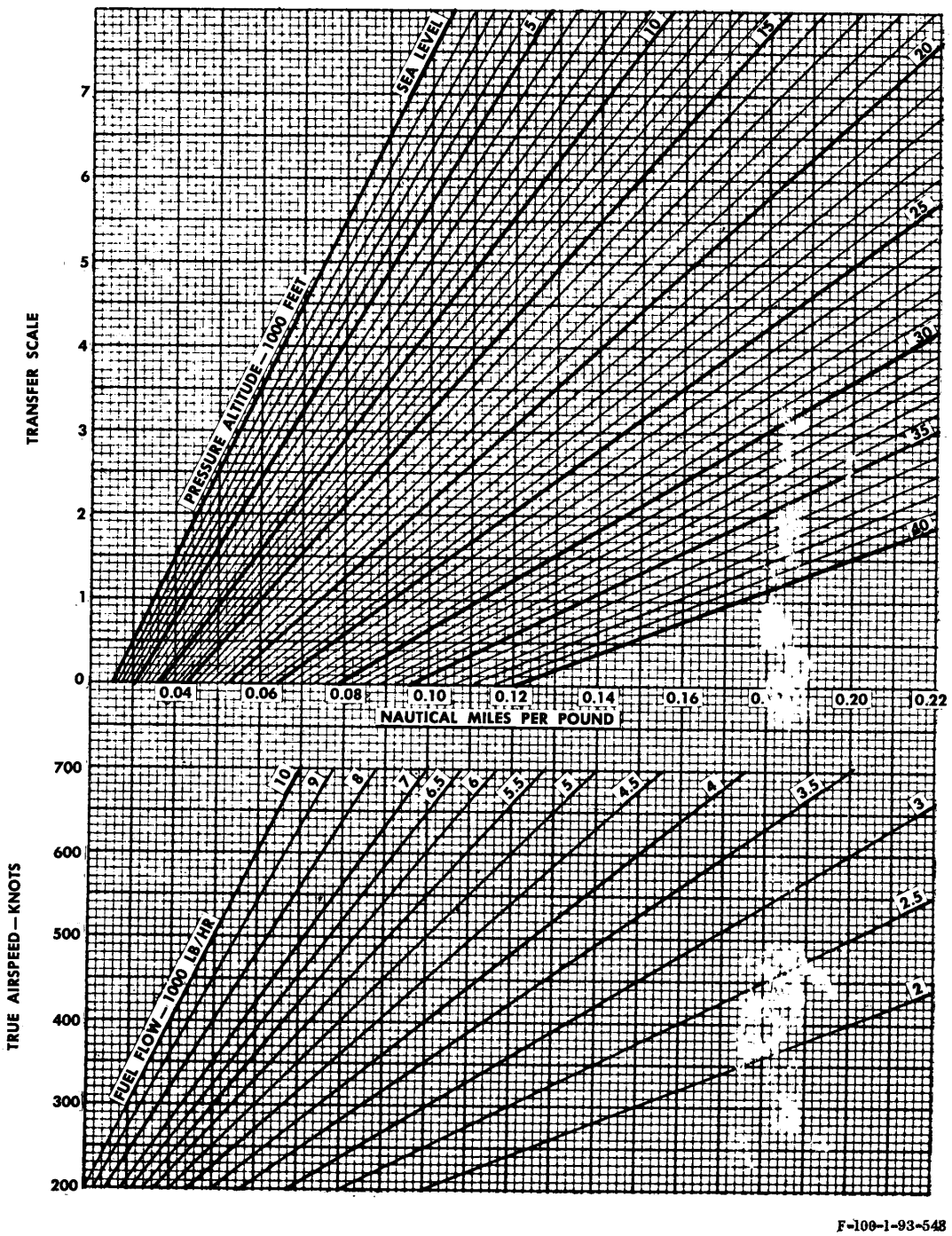
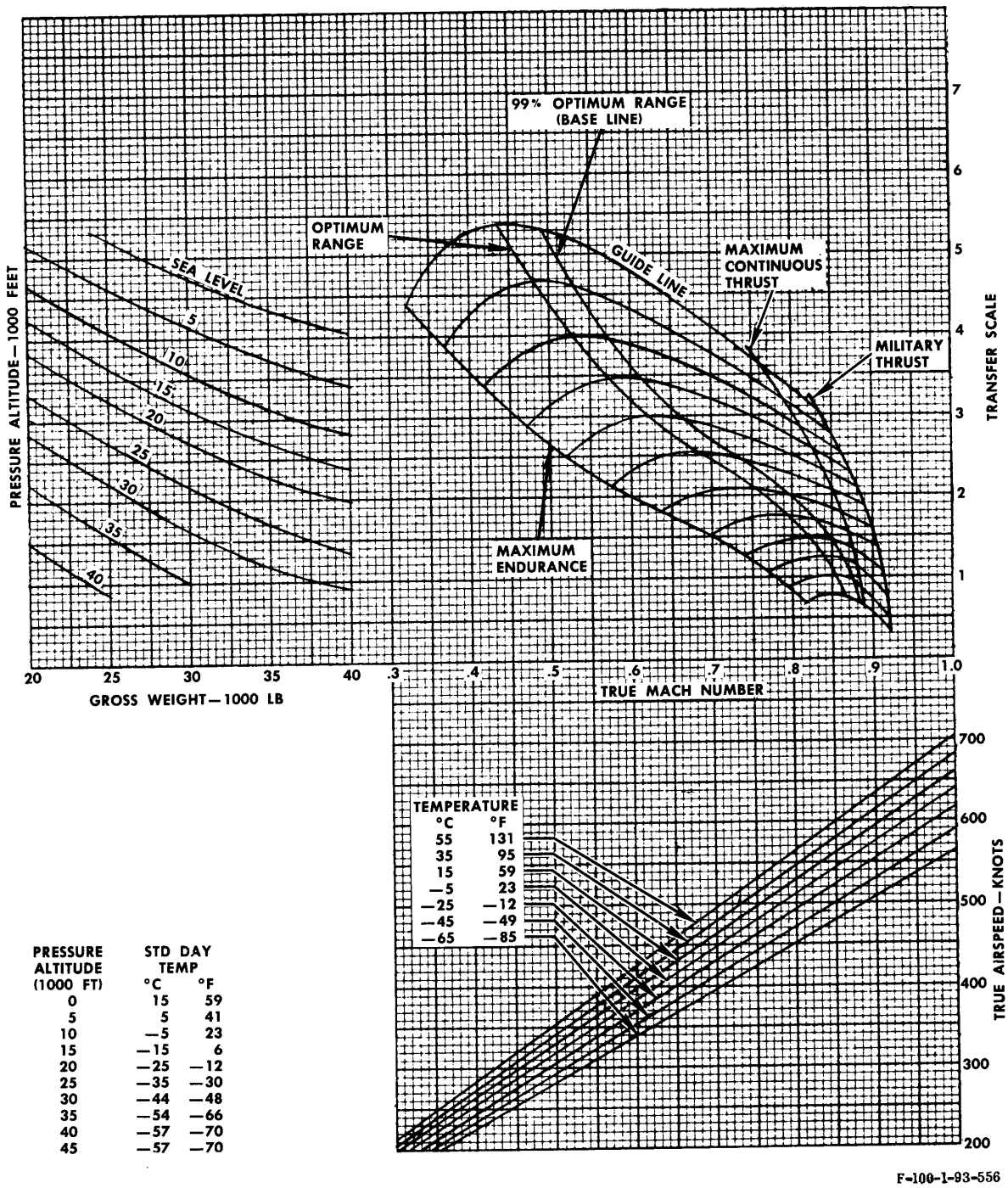


Figure B4-6 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 60



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-556

Figure B4-7 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

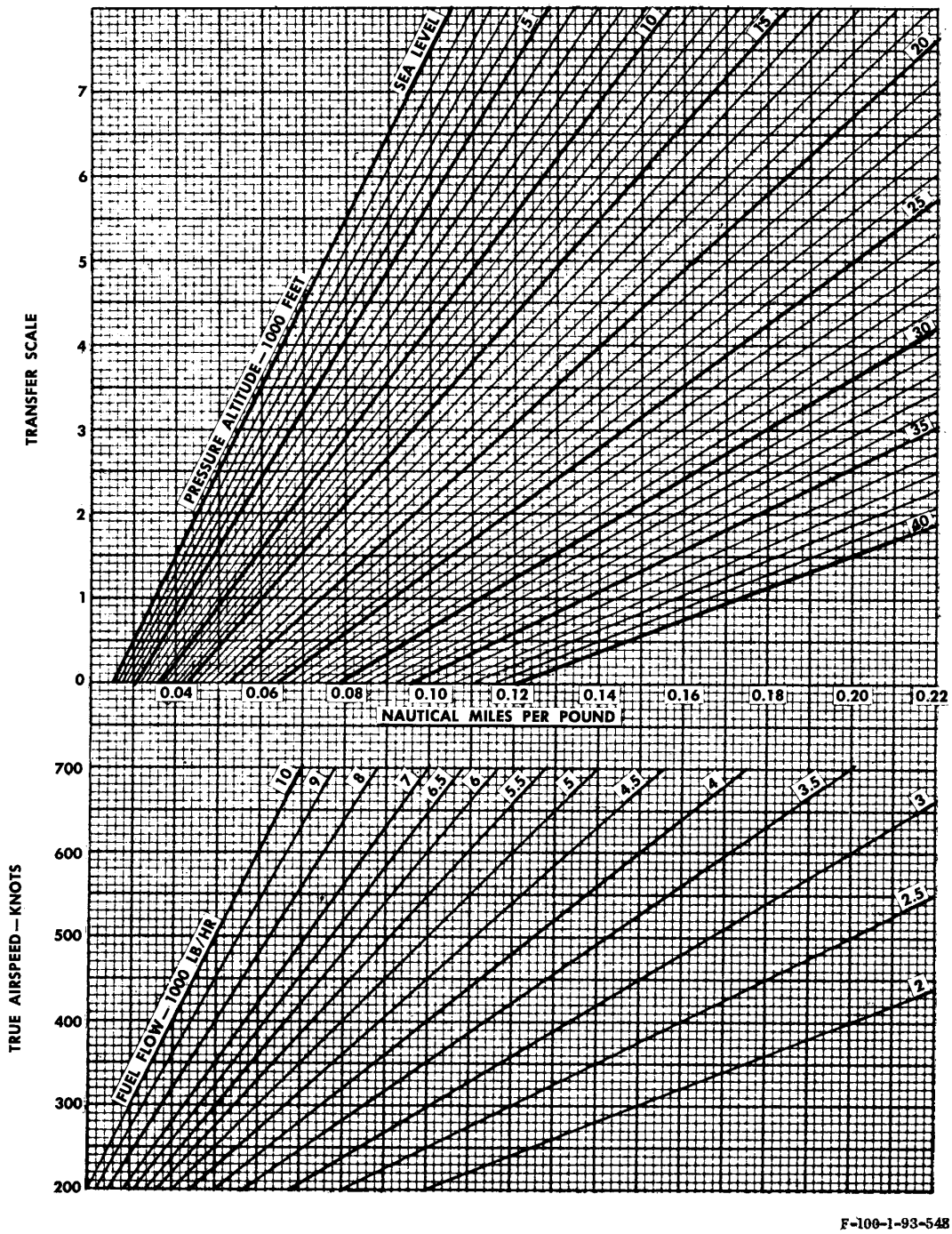
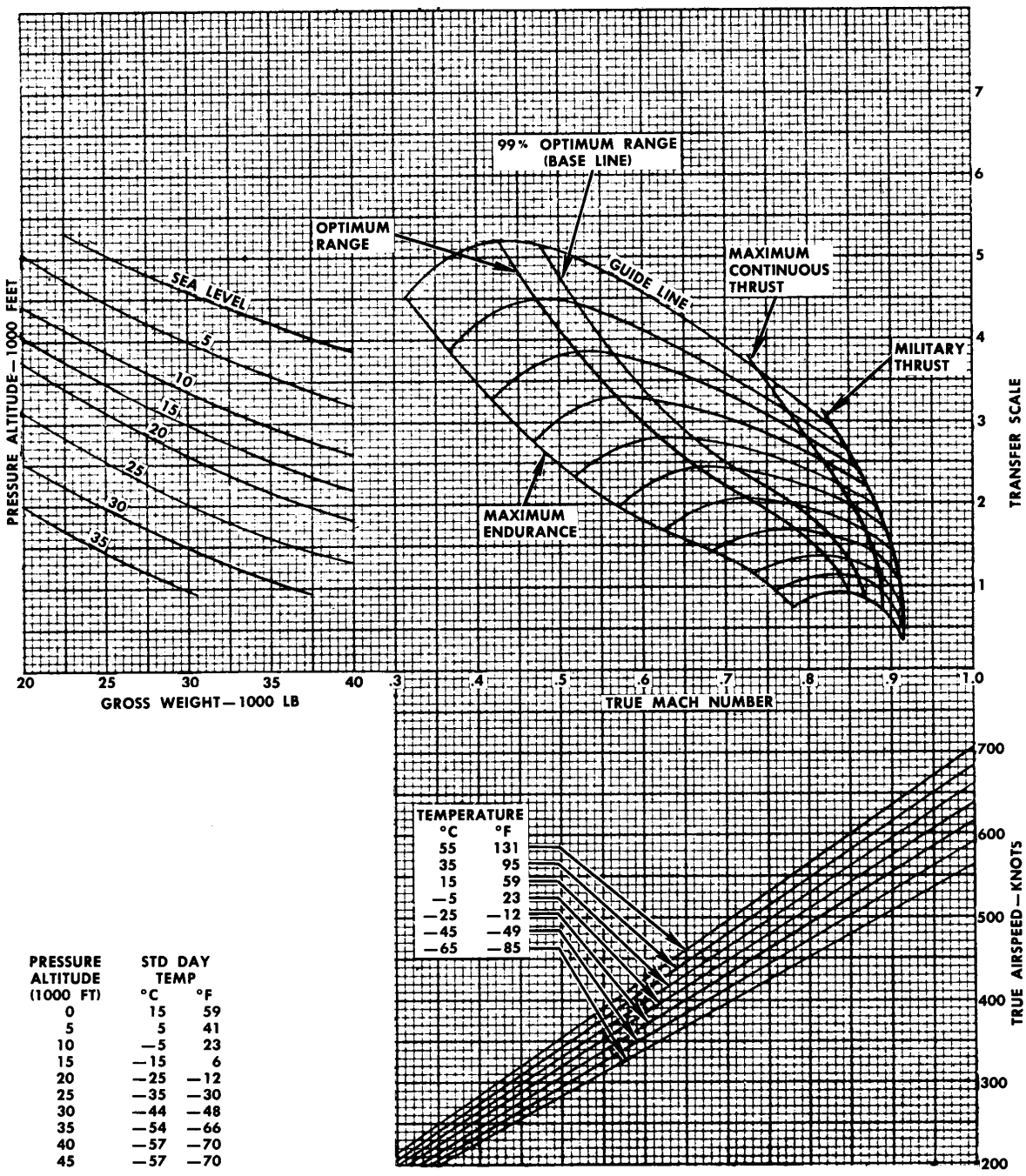


Figure B4-7 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 70



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-557

Figure B4-8 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D &F
Engine: J57-21

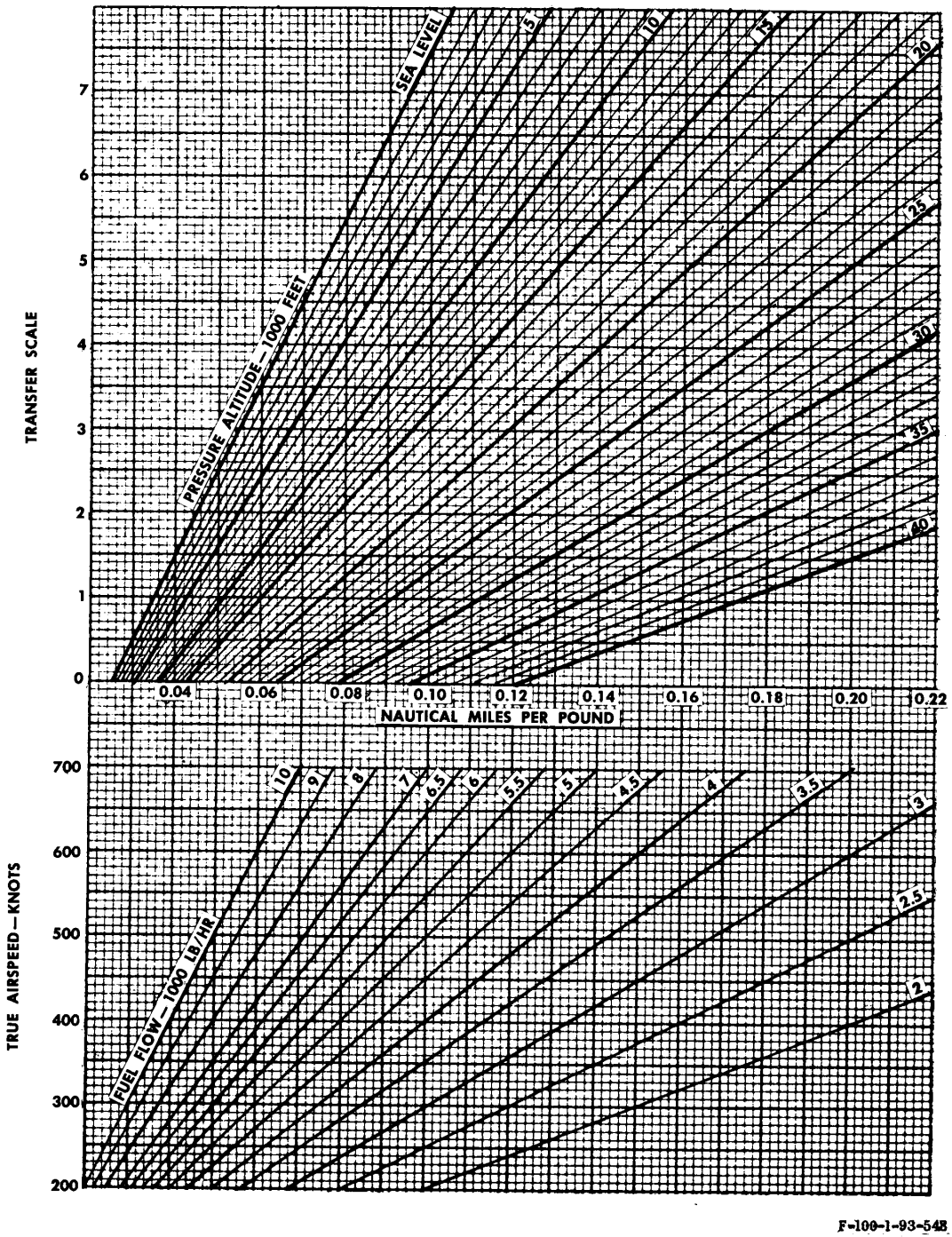
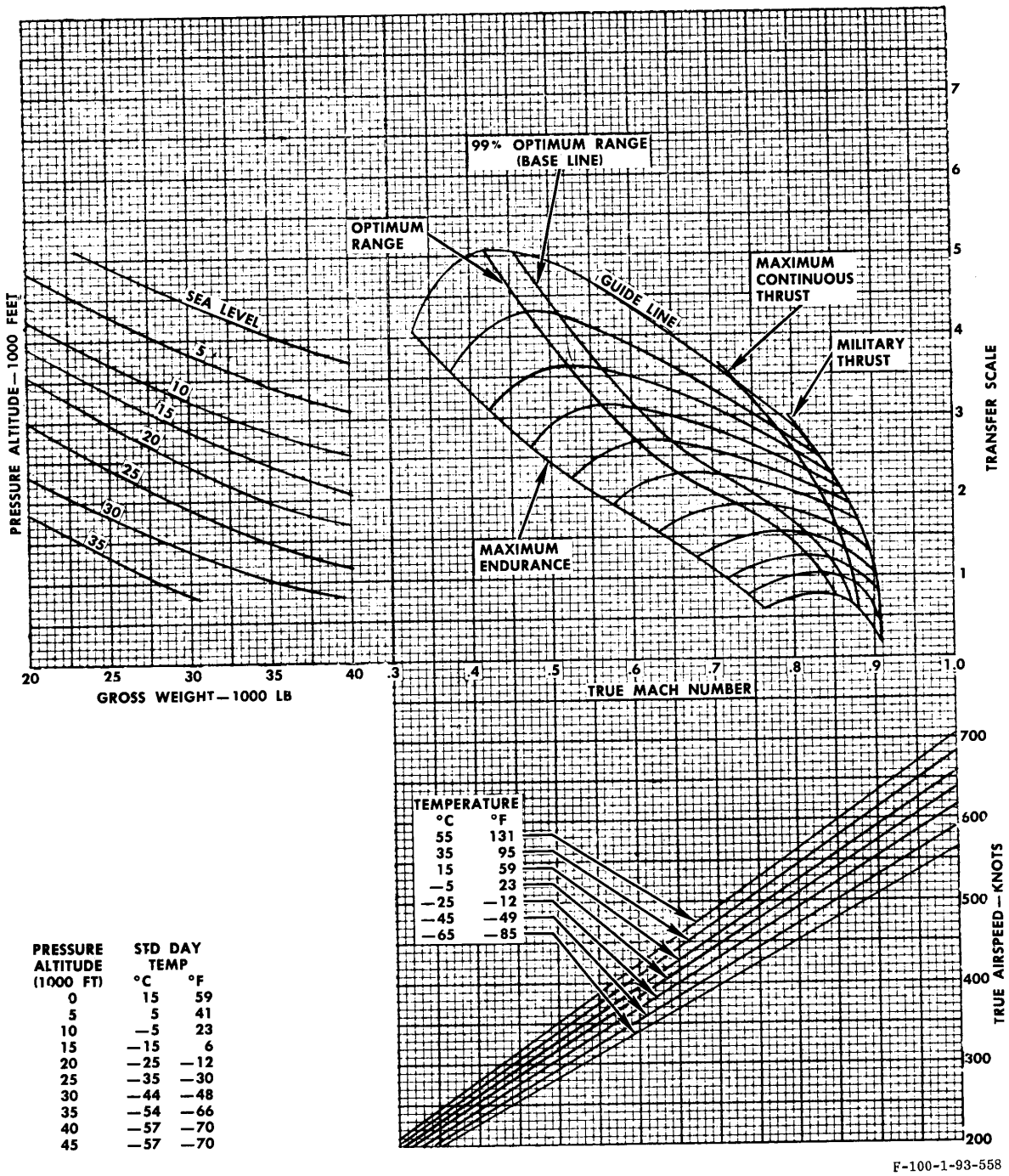


Figure B4-8 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 80 —



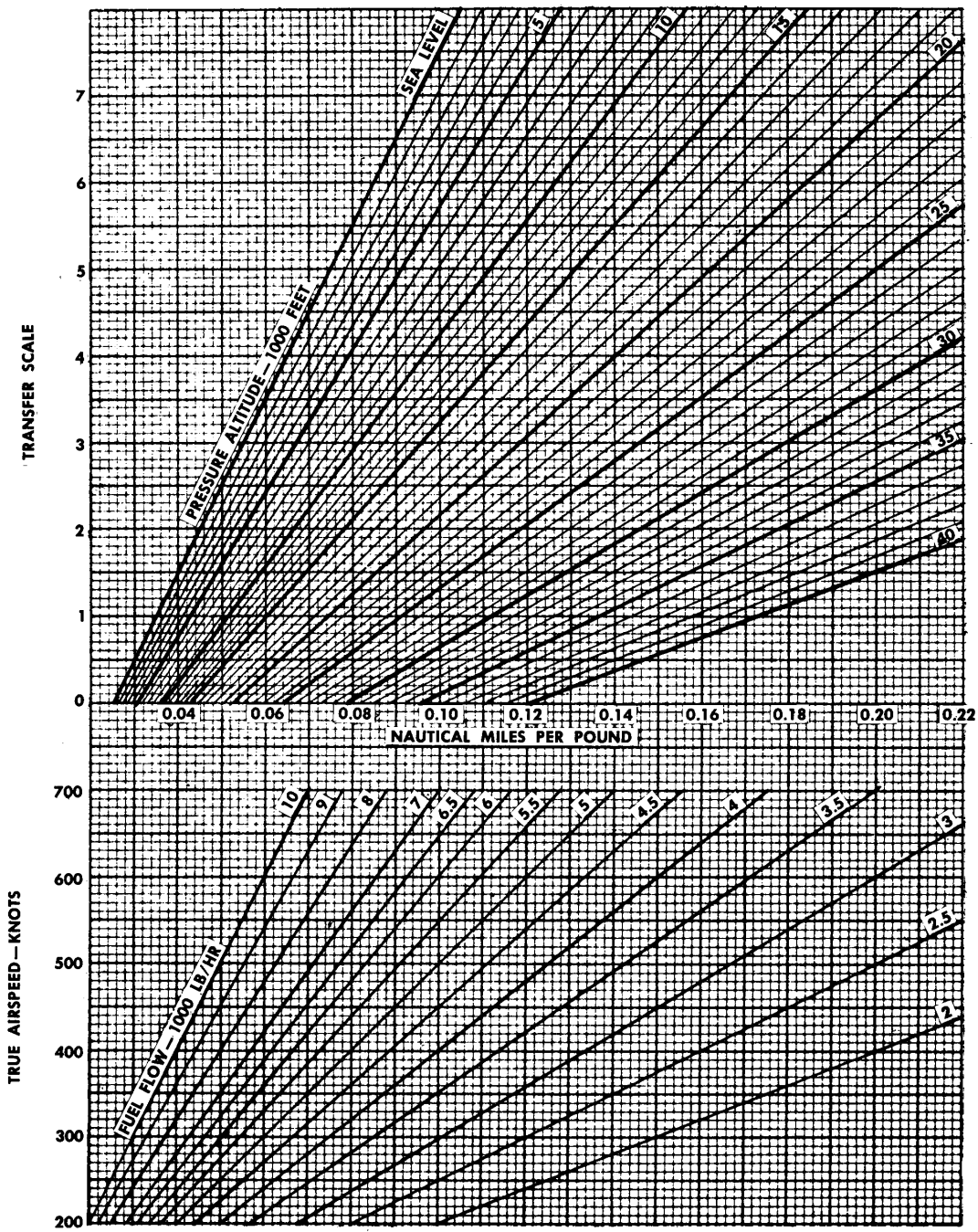
PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-558

Figure B4-9 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

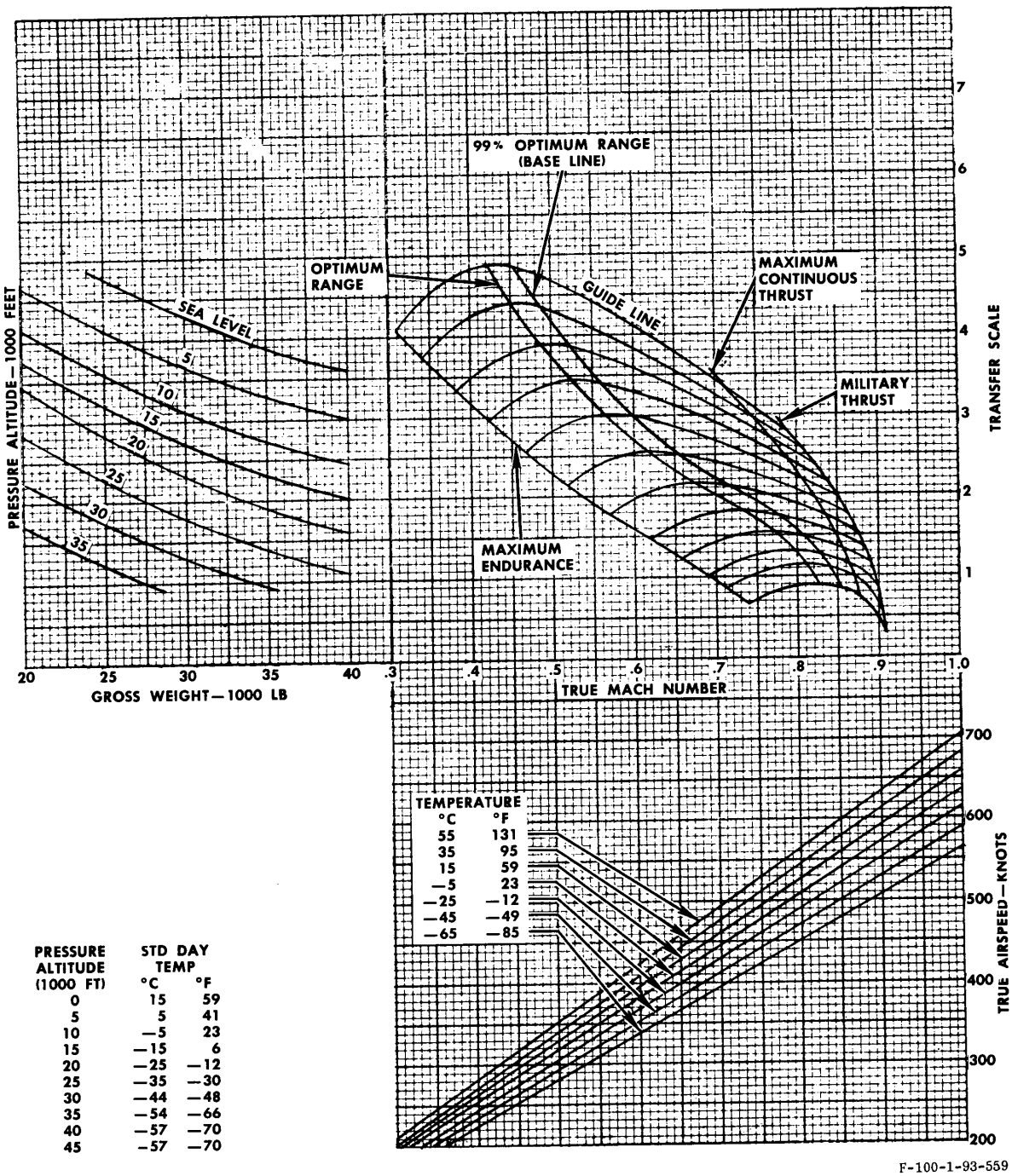


F-100-1-93-548

Figure B4-9 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 90



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-10 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D &F
Engine: J57-21

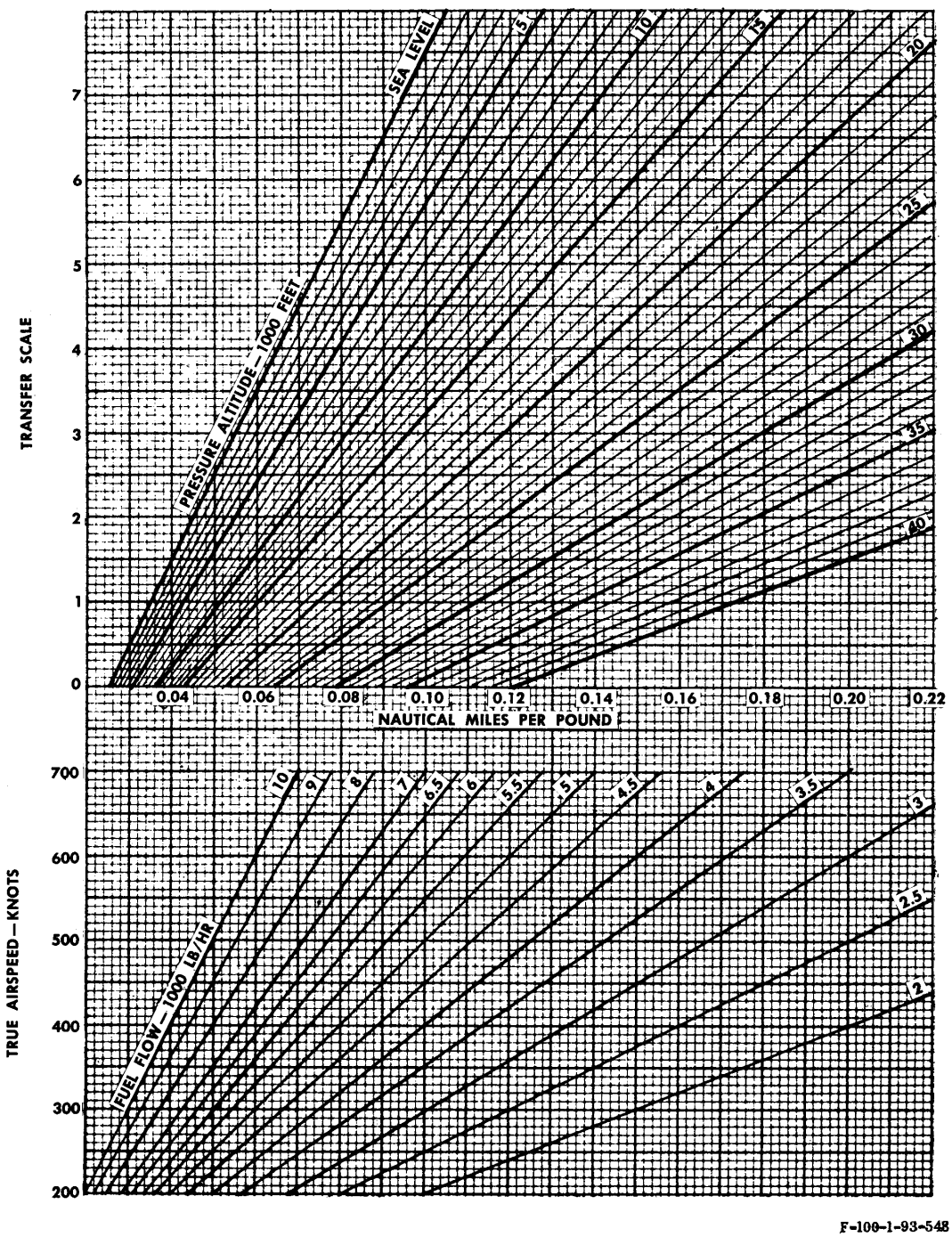
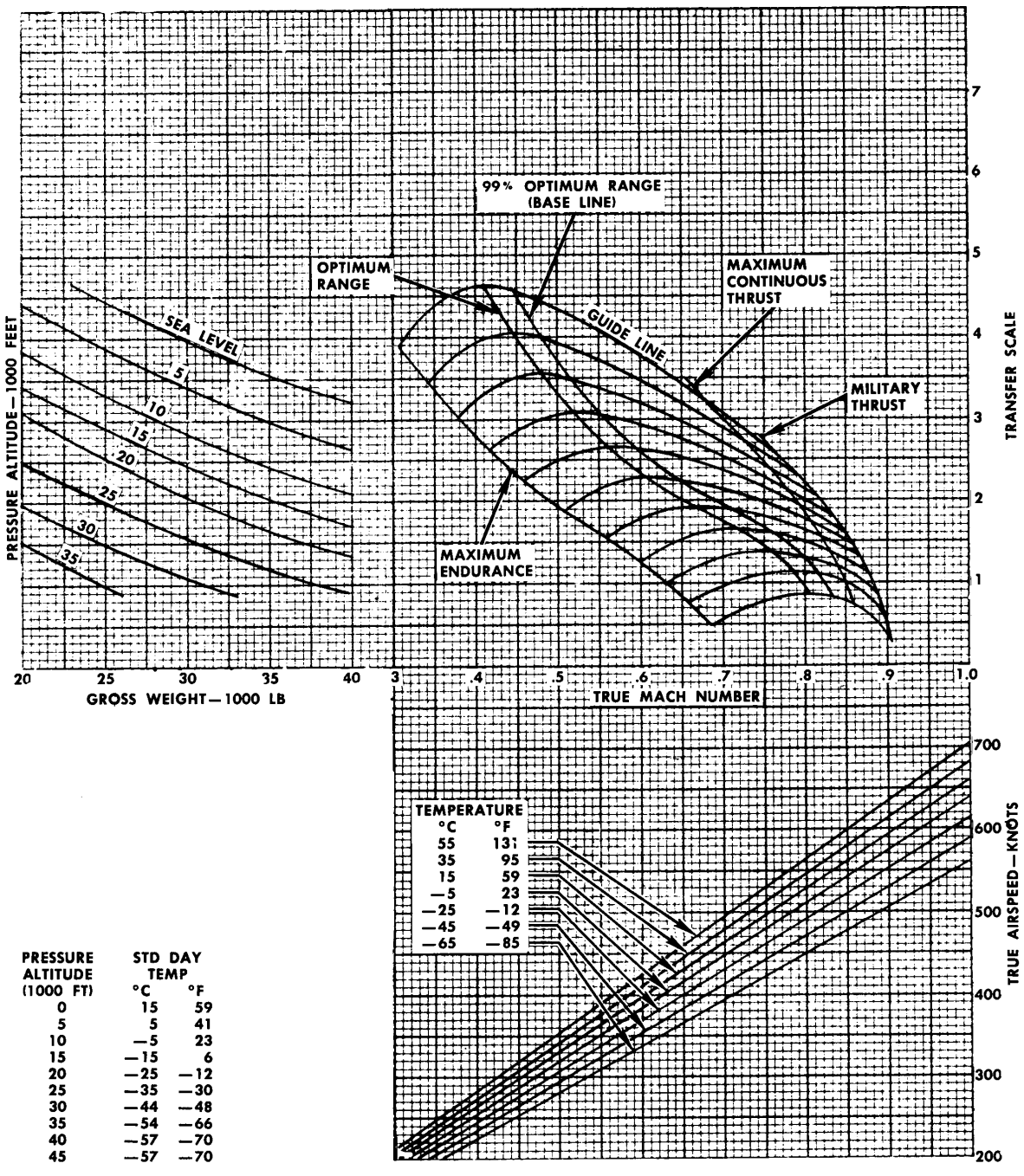


Figure B4-10 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 110

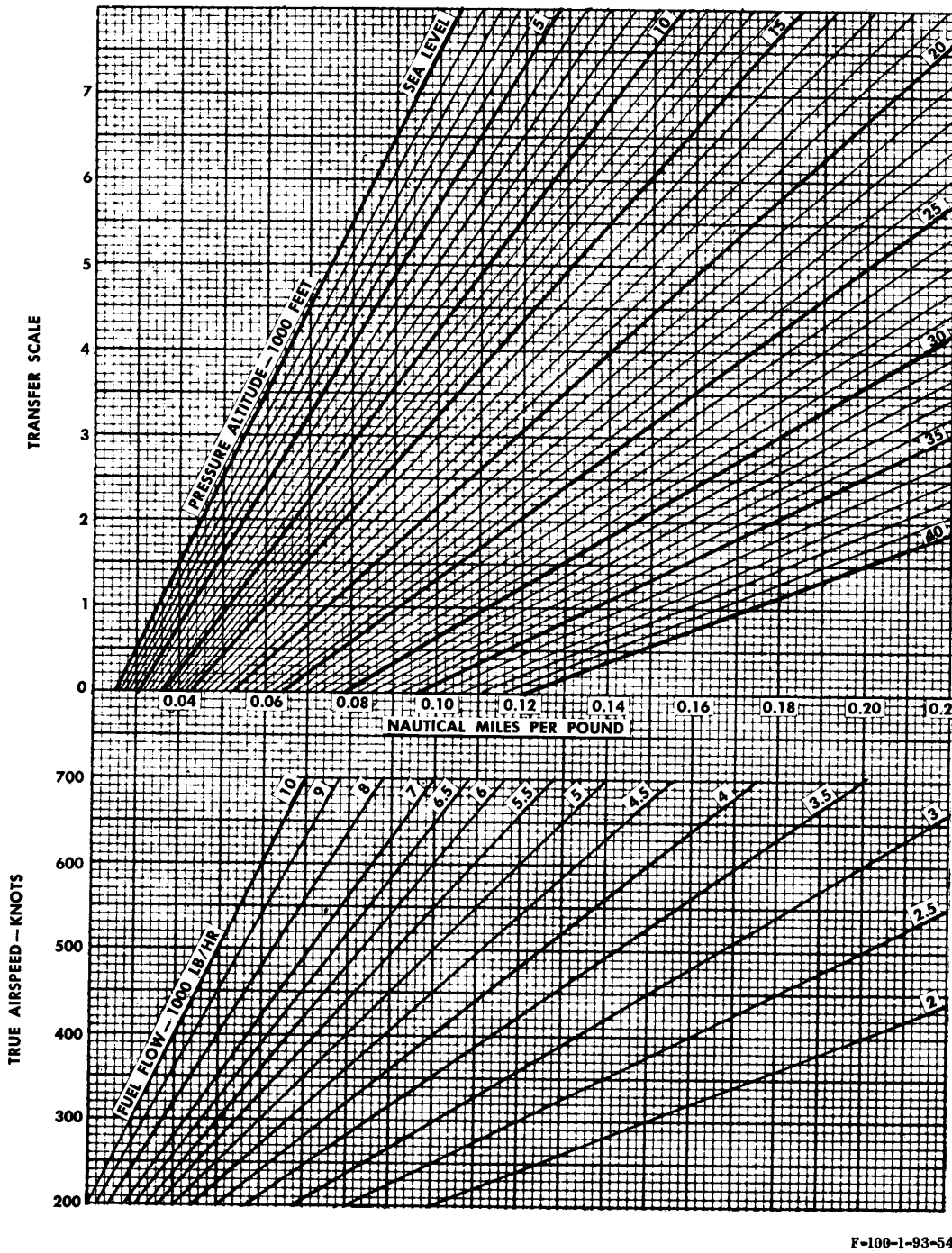


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-11 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

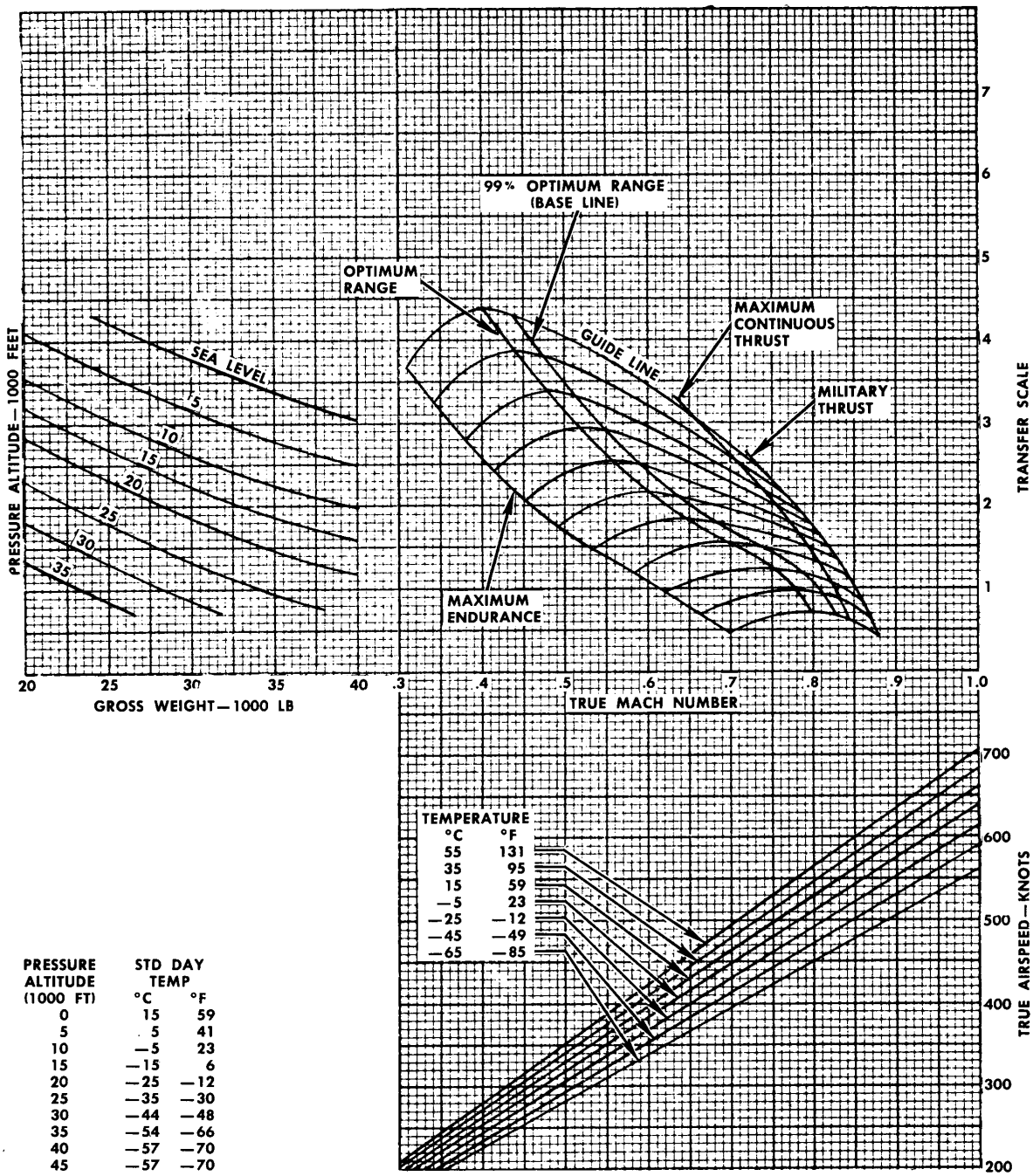


F-100-1-93-548

Figure B4-11 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 130



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	−5	23
15	−15	6
20	−25	−12
25	−35	−30
30	−44	−48
35	−54	−66
40	−57	−70
45	−57	−70

Figure B4-12 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

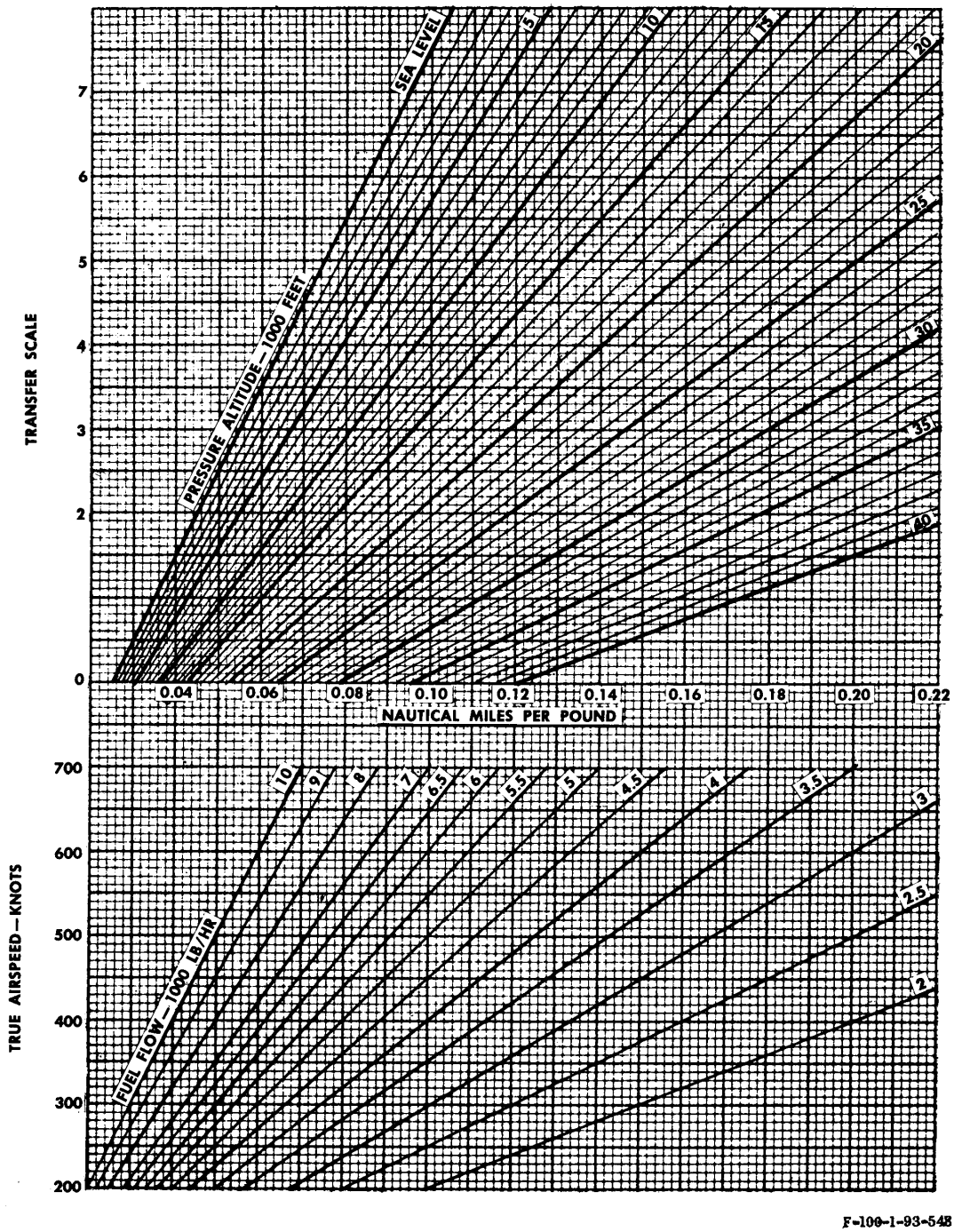
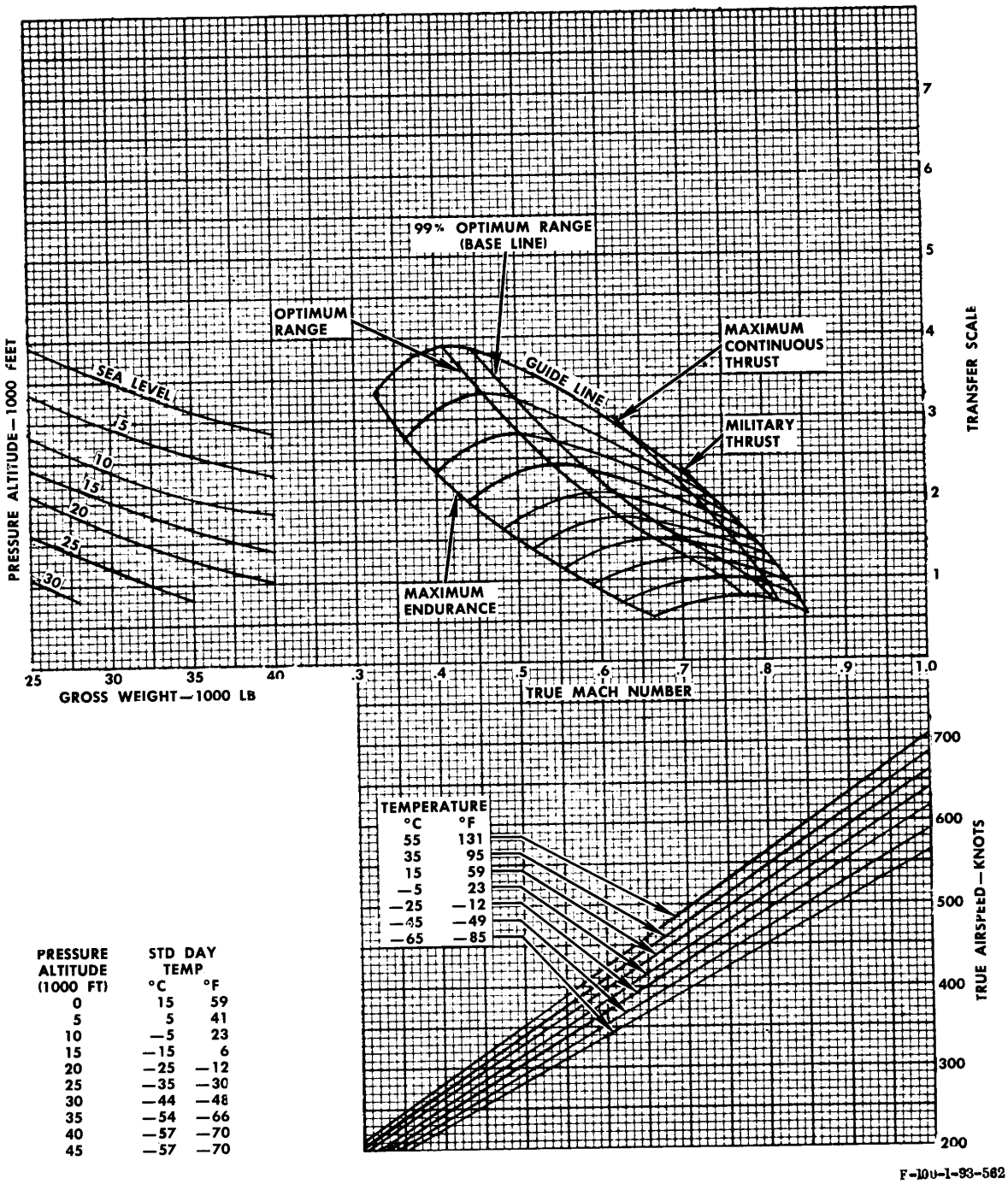


Figure B4-12 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 150



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

Figure B4-13 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

Model: F-100D & F
Engine: J57-21

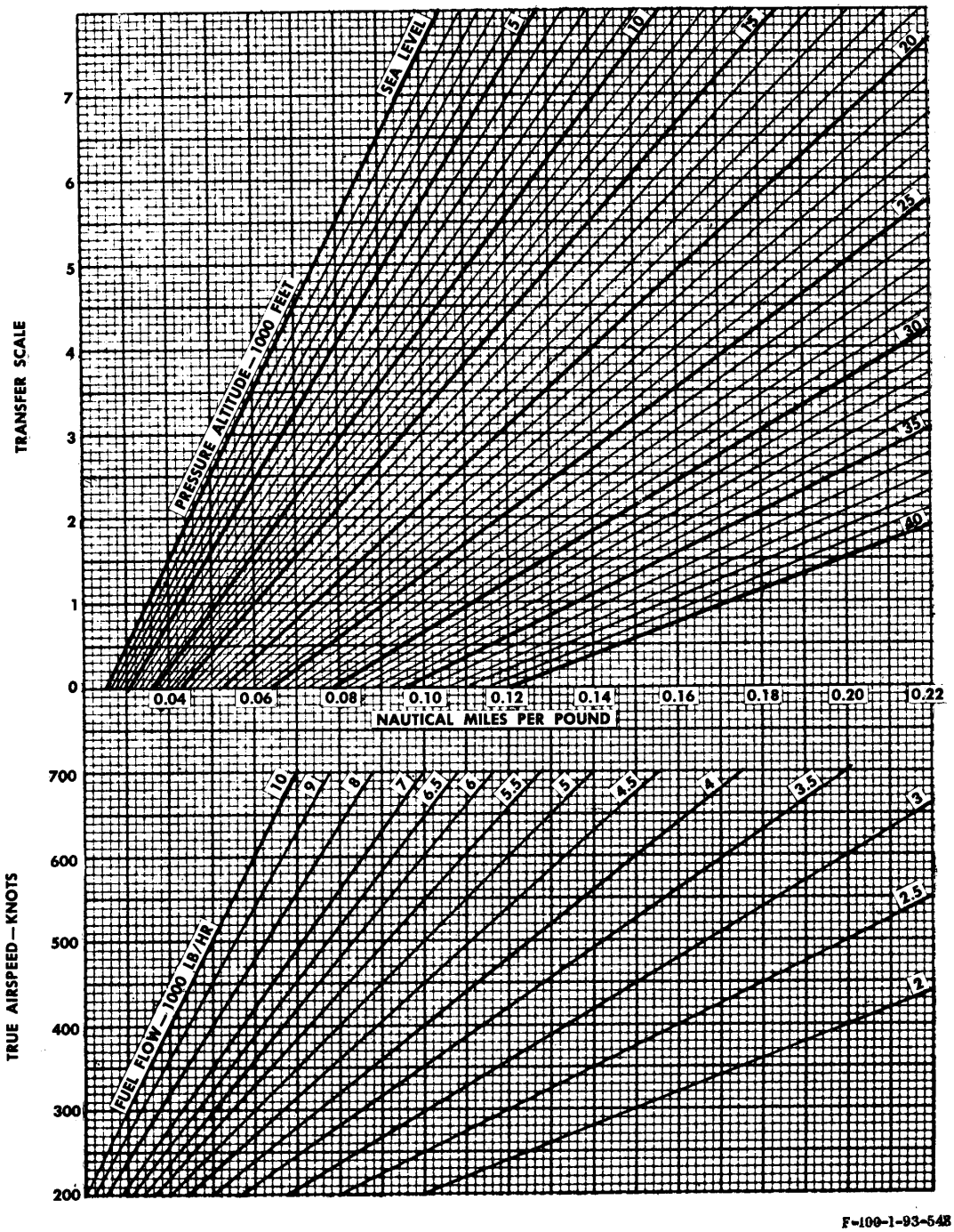
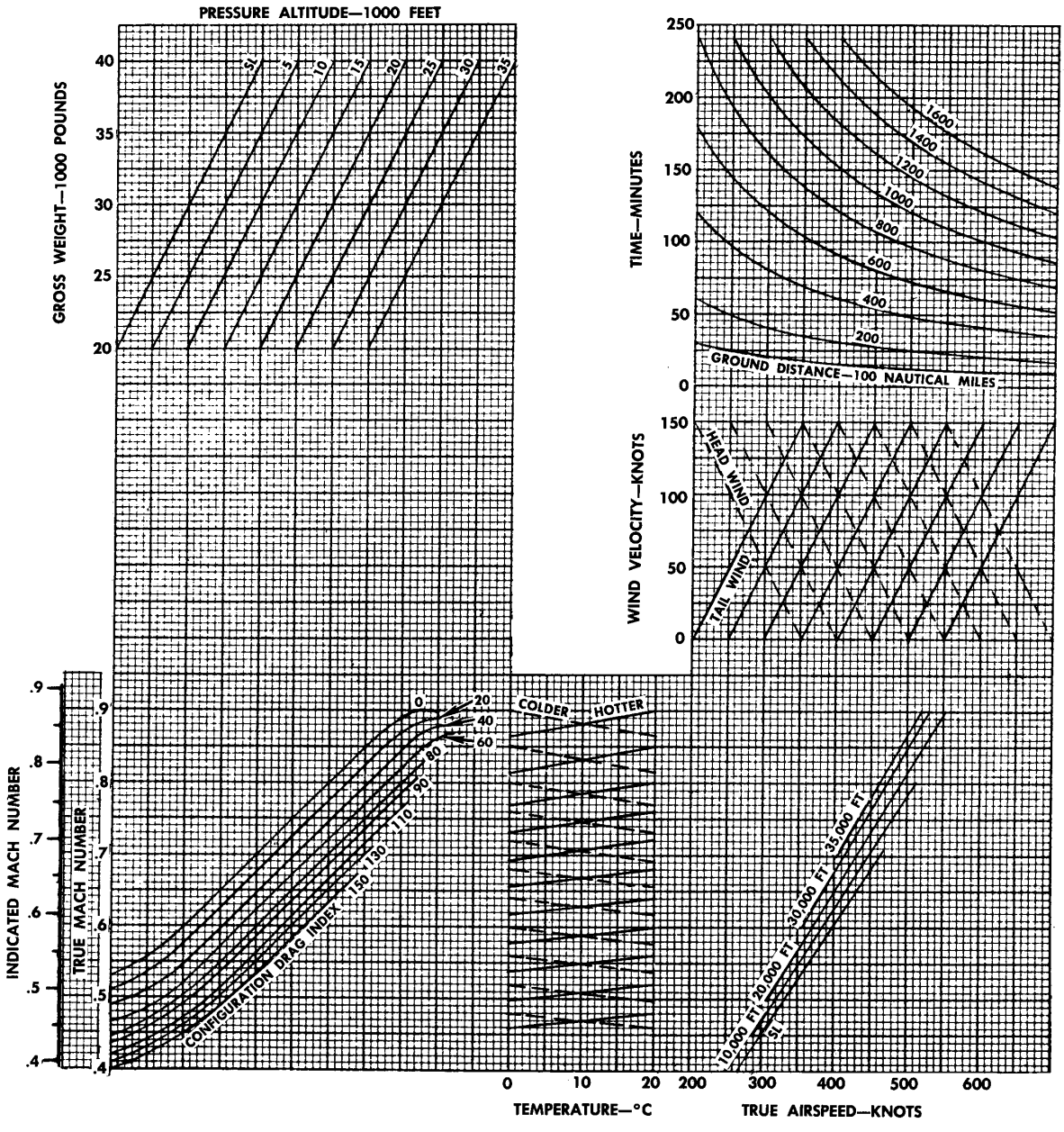


Figure B4-13 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONSTANT-ALTITUDE CRUISE

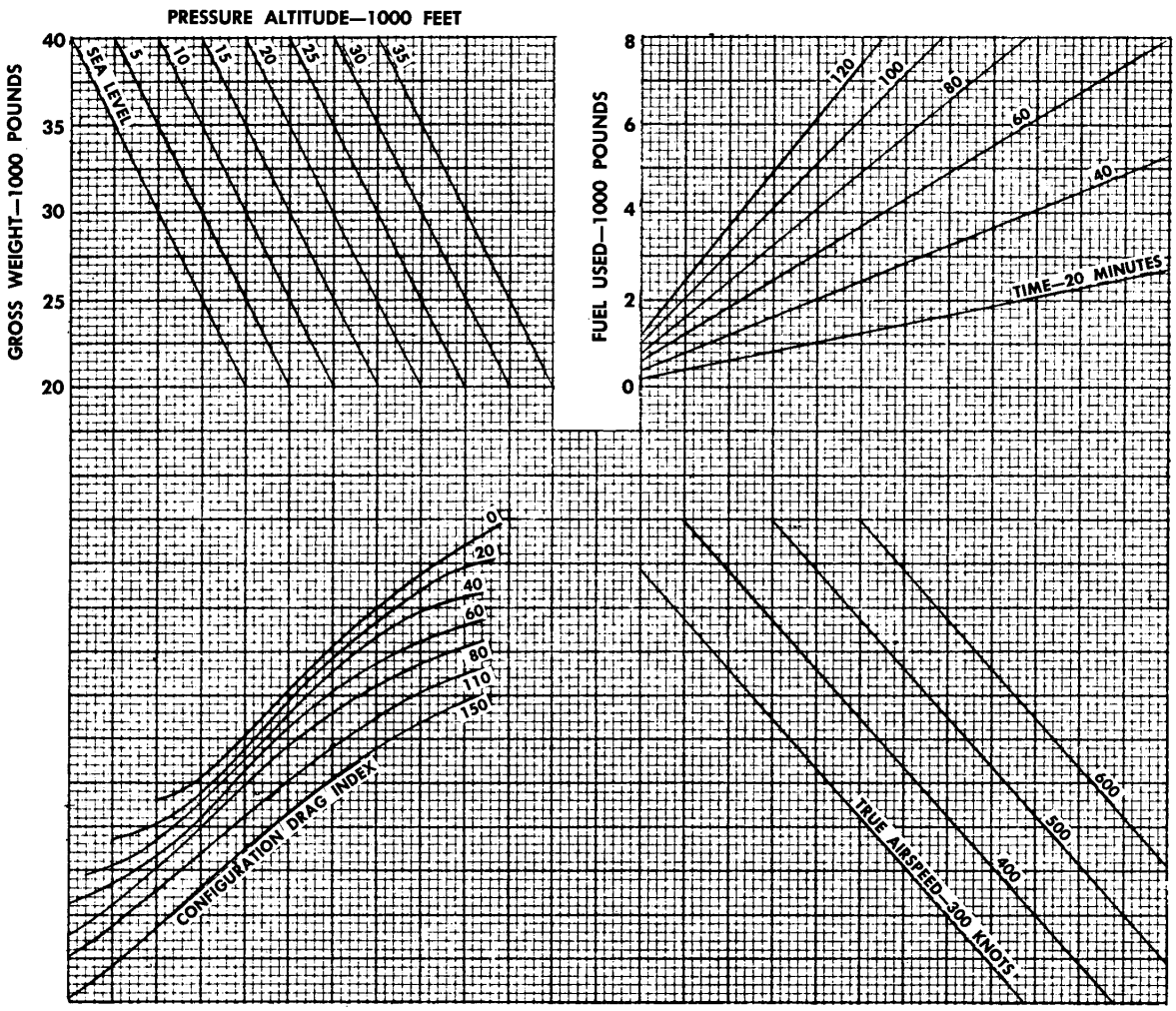
99% RANGE



F-100-1-93-665 A

Figure B4-14 (Sheet 1 of 2)

MODEL: F-100D & F
ENGINE: J57-21



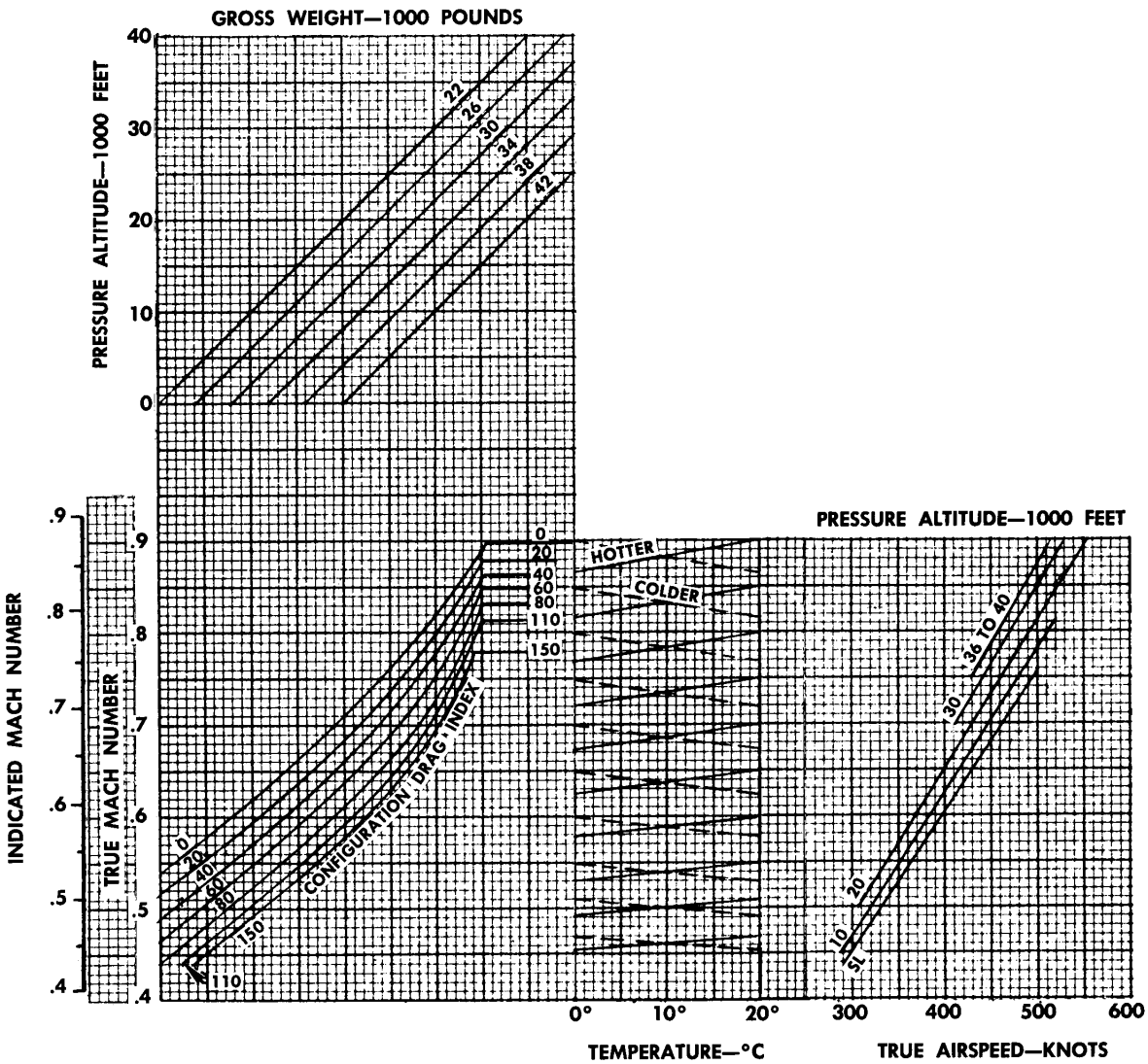
F-100-1-93-666

Figure B4-14 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONSTANT-ALTITUDE CRUISE SETTINGS

99% RANGE



F-100-1-93-667

Figure B4-15 (Sheet 1 of 2)

MODEL: F-100F & D
ENGINE: J57-21

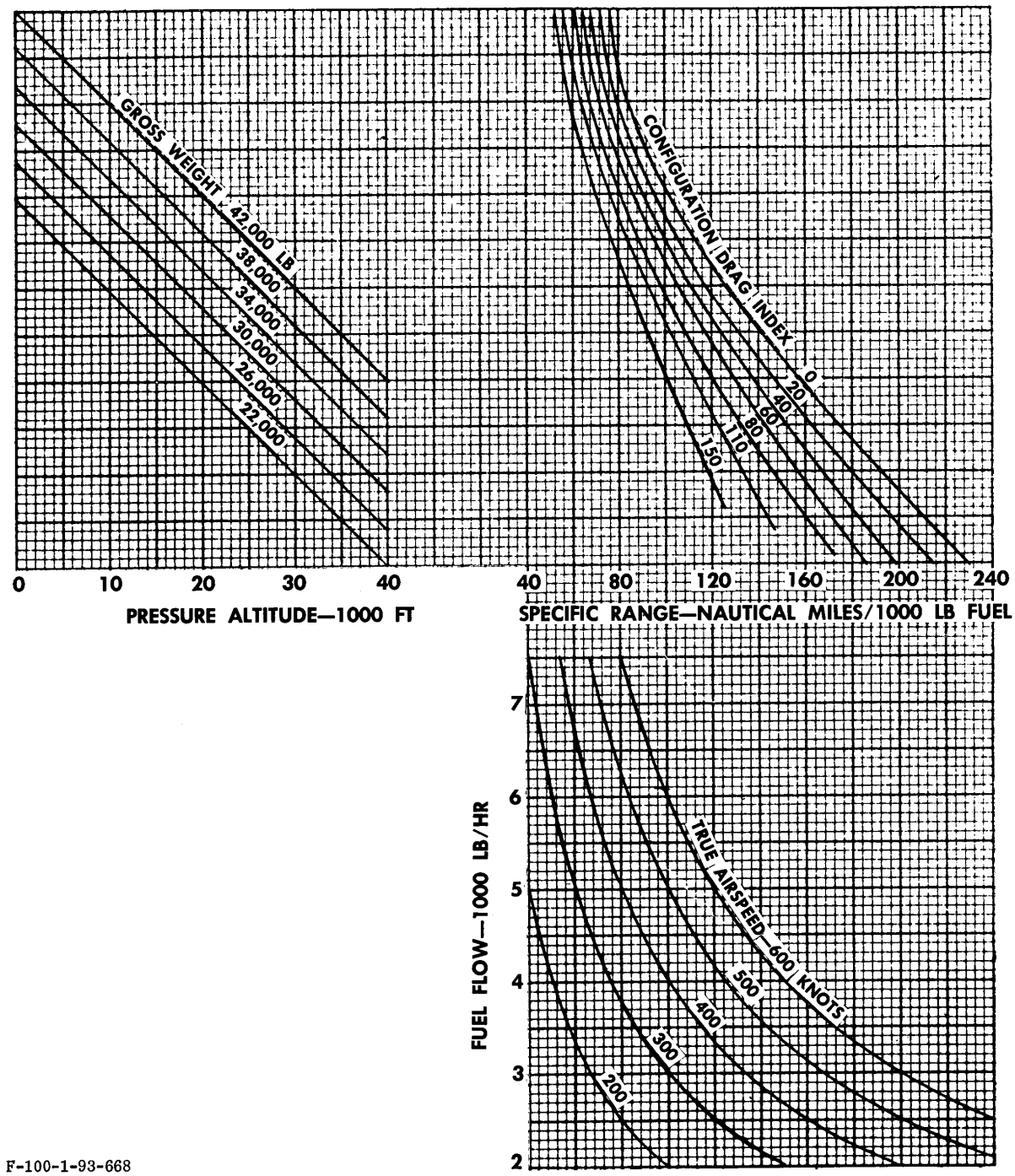


Figure B4-15 (Sheet 2 of 2)

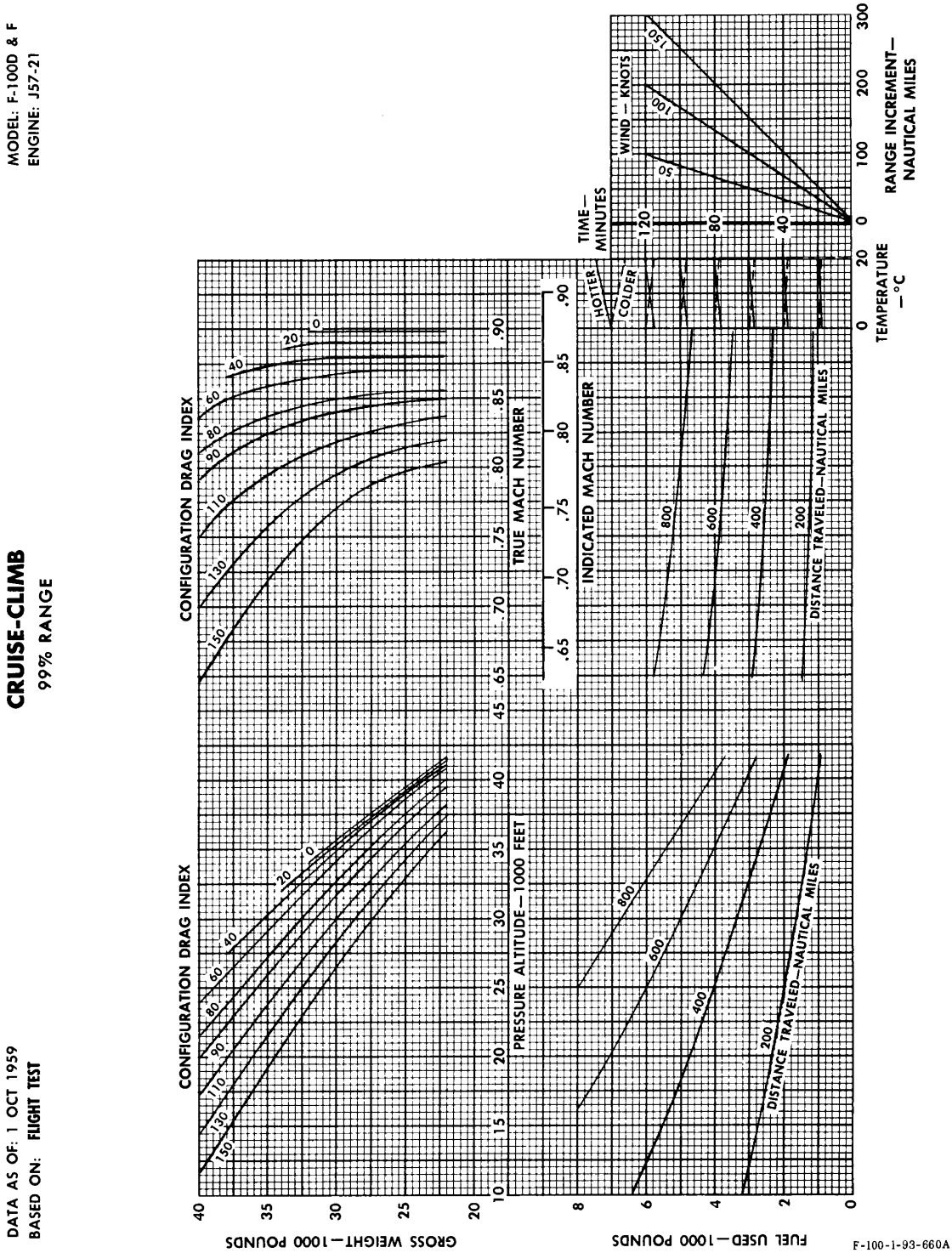

MODEL: F-100D & F
ENGINE: J57-21
CRUISE-CLIMB
99% RANGE
DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
CONFIGURATION DRAG INDEX
0
20
40
60
80
90
110
130
150
GROSS WEIGHT—1000 POUNDS
PRESSURE ALTITUDE—1000 FEET
TRUE MACH NUMBER
INDICATED MACH NUMBER
TIME—MINUTES
WIND—KNOTS
HOTTER
COLDER
TEMPERATURE—°C
RANGE INCREMENT—NAUTICAL MILES
FUEL USED—1000 POUNDS
DISTANCE TRAVELED—NAUTICAL MILES
F-100-1-93-660A

Figure B4-16

PART 5–ENDURANCE

TABLE OF CONTENTS

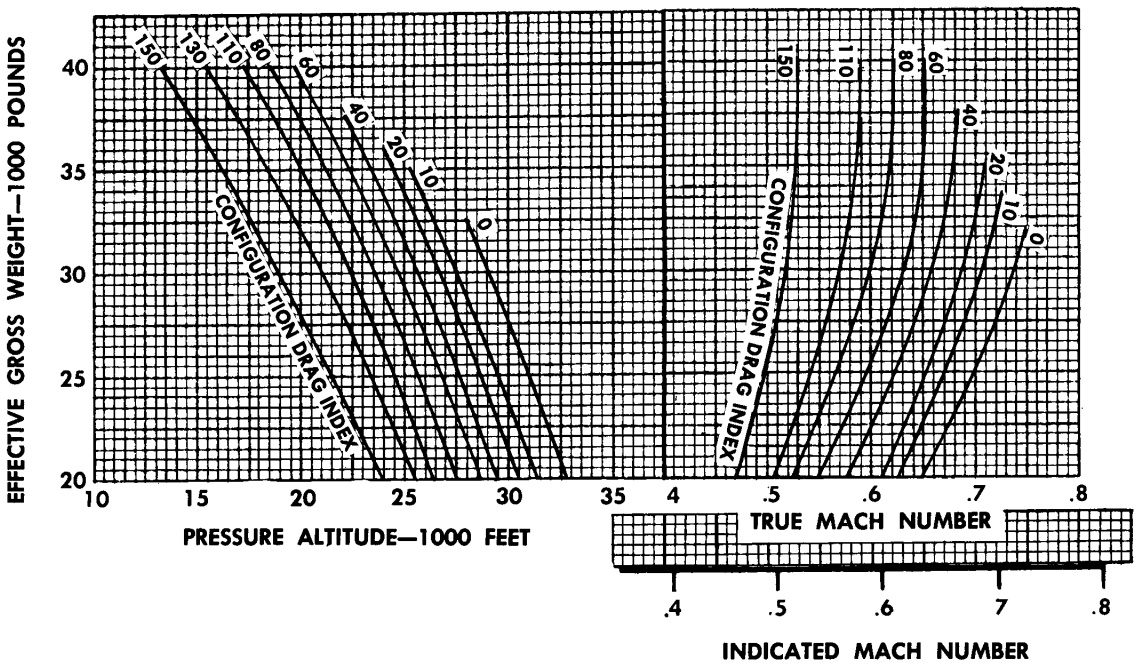
Titles CAPITALIZED denote charts.

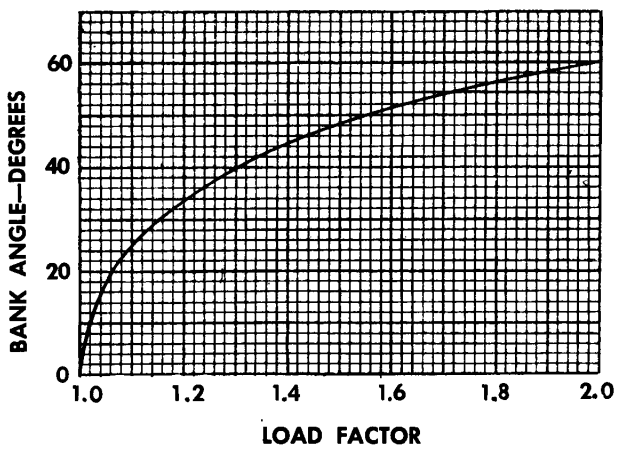
TITLE	PAGE
OPTIMUM MAXIMUM ENDURANCE	B5-2
CONSTANT-ALTITUDE MAXIMUM ENDURANCE	B5-4

NOTE For sample problem and descriptive text, refer to Part 5, Section I, of this manual.

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

OPTIMUM MAXIMUM ENDURANCE





F-100-1-93-663A

Figure B5-1 (Sheet 1 of 2)

MODEL: F-100D & F
ENGINE: J57-21

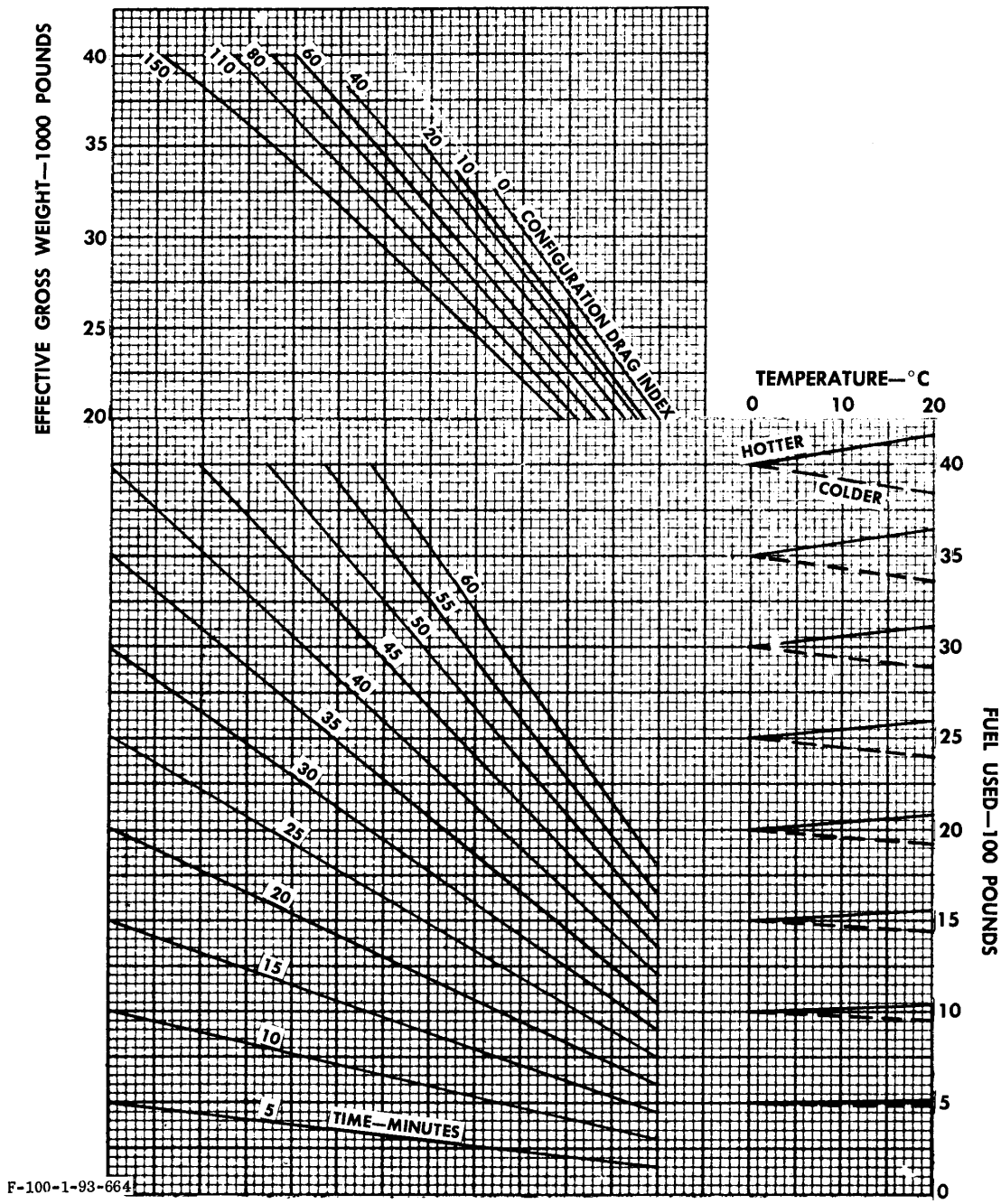


Figure B5-1 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONSTANT ALTITUDE MAXIMUM ENDURANCE

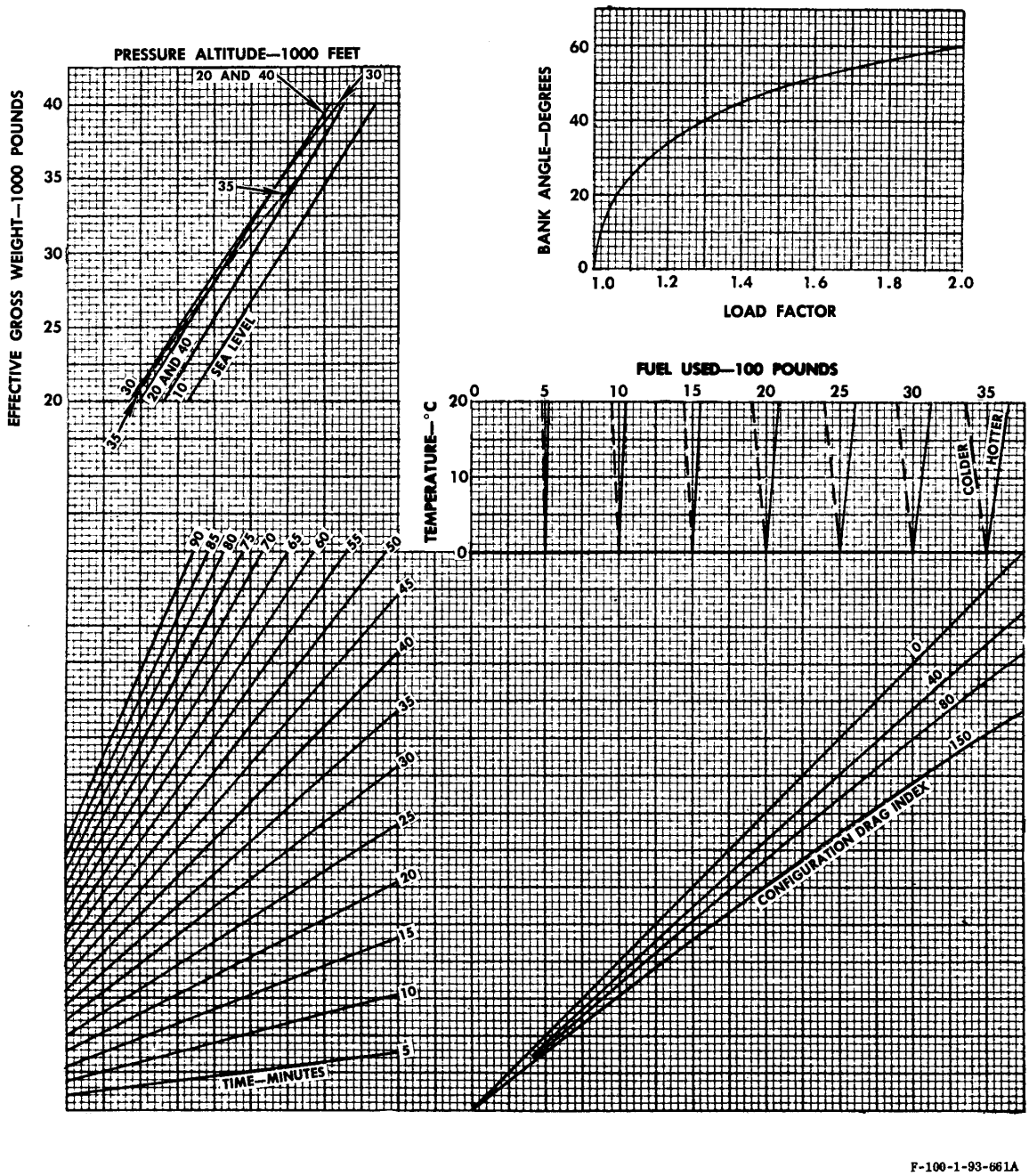


Figure B5-2 (Sheet 1 of 2)

MODEL: F-100D & F

ENGINE: J57-21

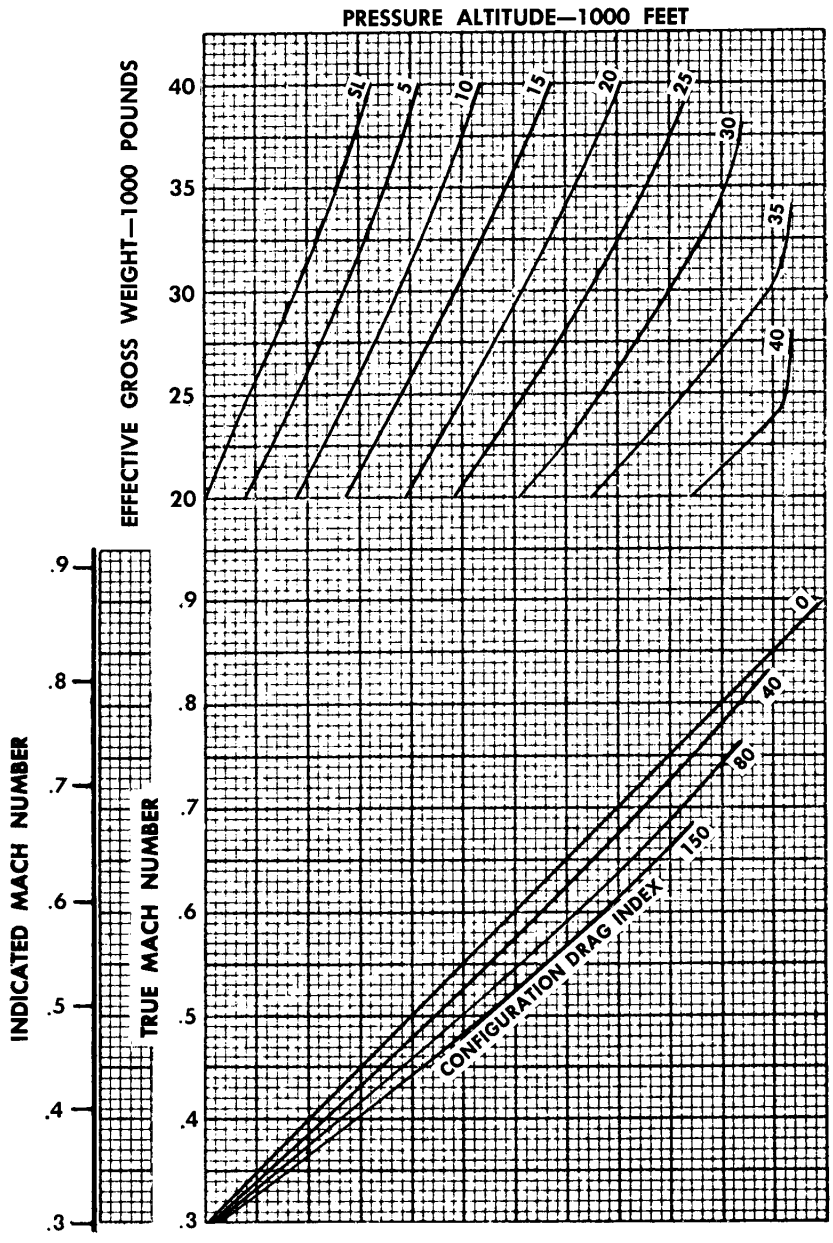


Figure B5-2 (Sheet 2 of 2)

PART 6–DESCENTS

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
MINIMUM-TIME DESCENT	B6-2
.8 INDICATED MACH NUMBER OR 400 KNOTS IAS DESCENT	B6-3
MAXIMUM RANGE DESCENT	B6-4
PENETRATION DESCENT	B6-5
.8 INDICATED MACH NUMBER DESCENT	B6-6
.9 INDICATED MACH NUMBER DESCENT	B6-7

NOTE For sample problems and descriptive text, refer to Part 6, Section I, of this manual.

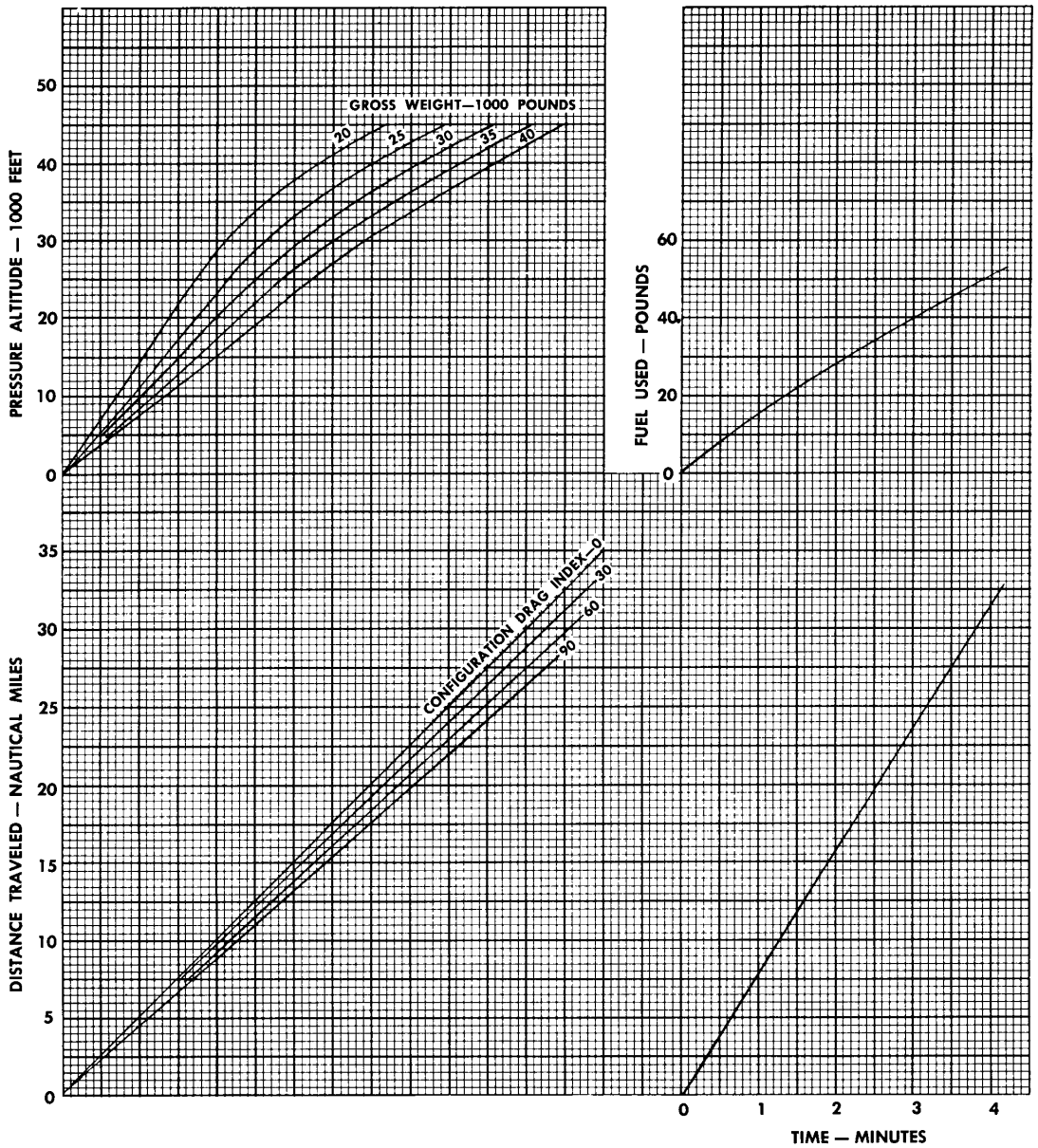
MINIMUM-TIME DESCENT

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

.8 INDICATED MACH NUMBER OR 400 KNOTS IAS (WHICHEVER IS LESS)

IDLE THRUST—SPEED BRAKE OPEN

MODEL: F-100D & F
ENGINE: J57-21



NOTE

- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-566 A

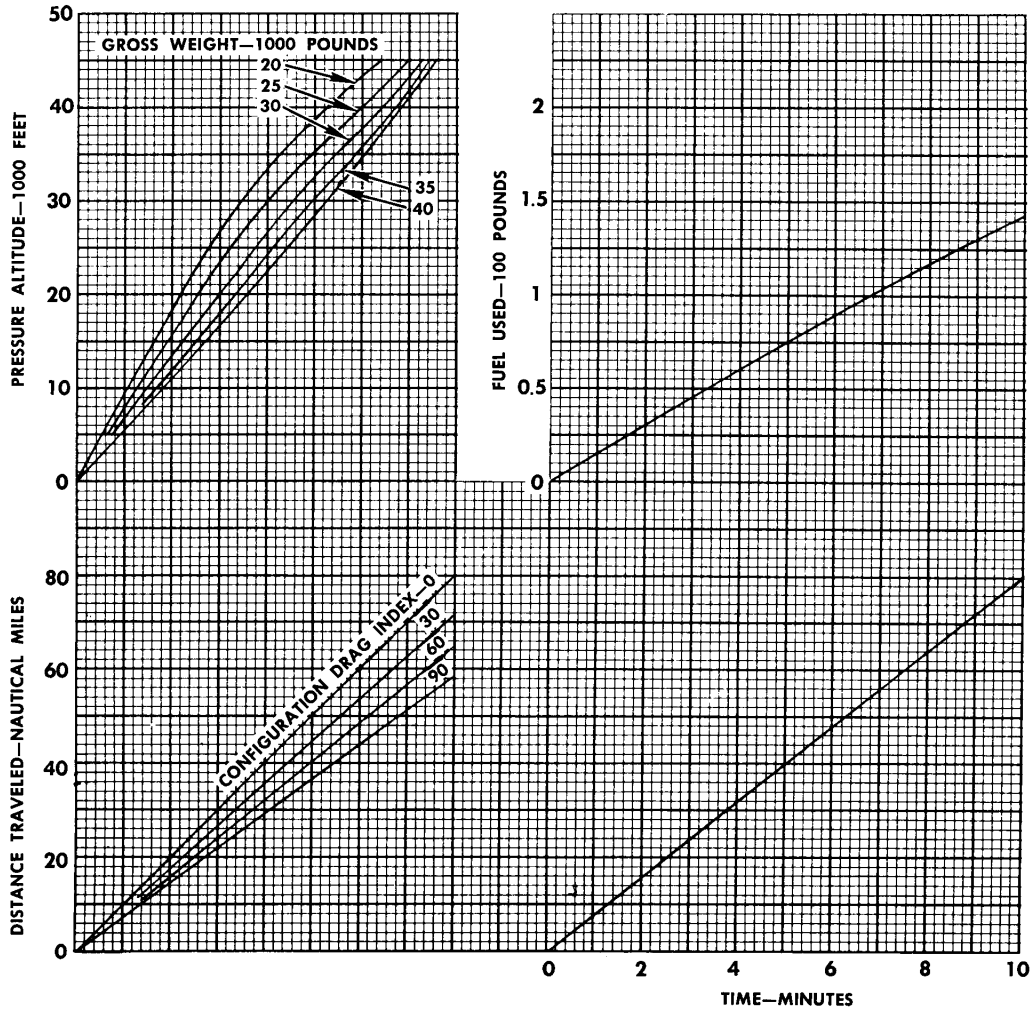
Figure B6-1

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

.8 INDICATED MACH NUMBER OR 400 KNOTS IAS DESCENT (WHICHEVER IS LESS)

IDLE THRUST—SPEED BRAKE CLOSED

MODEL: F-100D & F
ENGINE: J57-21



NOTE

- **If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.**
- **Effect of ambient temperature change on descent data is insignificant.**

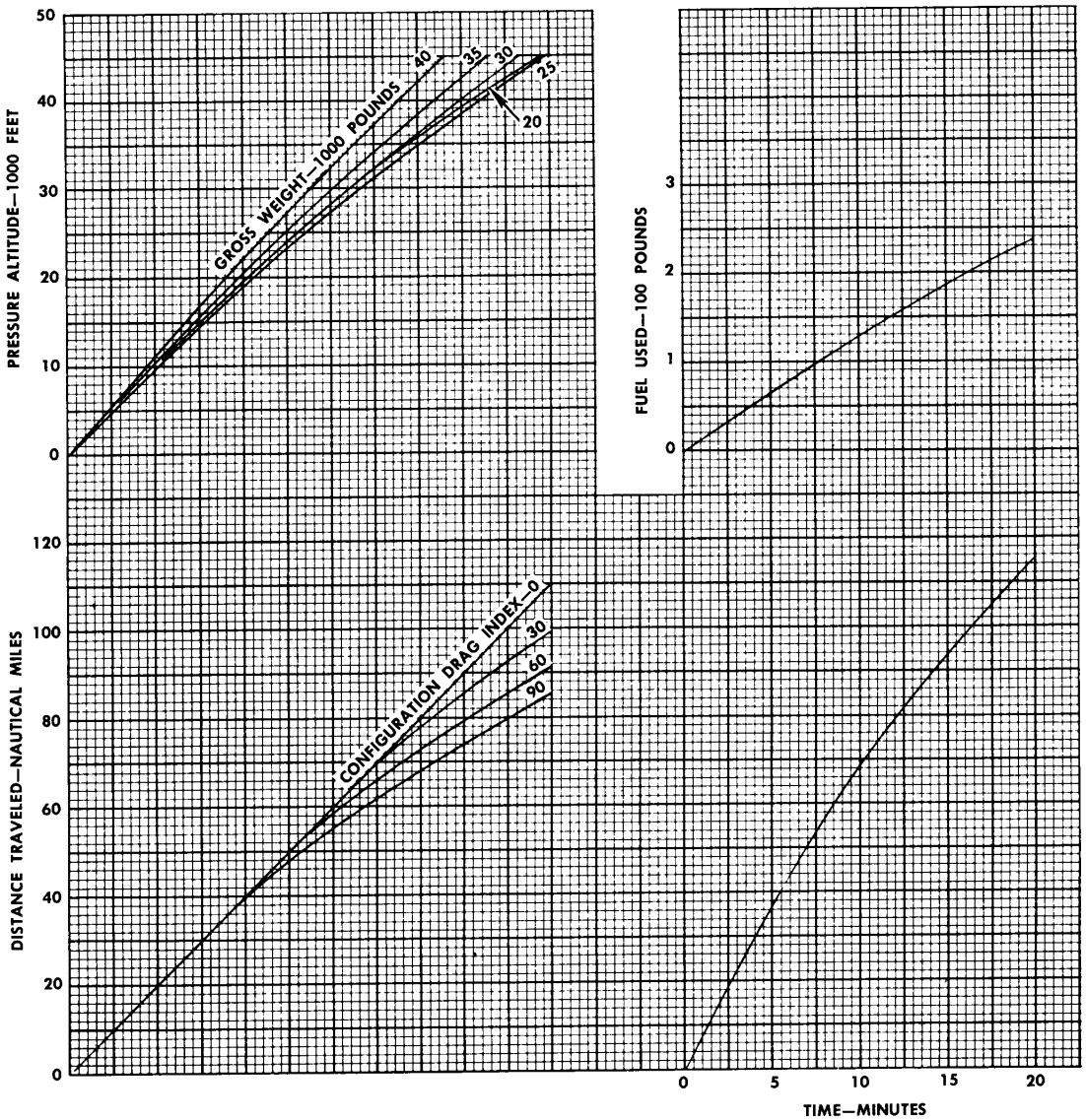
F-100-1-93-567 A

Figure B6-2

MAXIMUM-RANGE DESCENT
255 KNOTS IAS
IDLE THRUST—SPEED BRAKE CLOSED

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

MODEL: F-100D & F
ENGINE: J57-21



NOTE

- **If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.**
- **Effect of ambient temperature change on descent data is insignificant.**

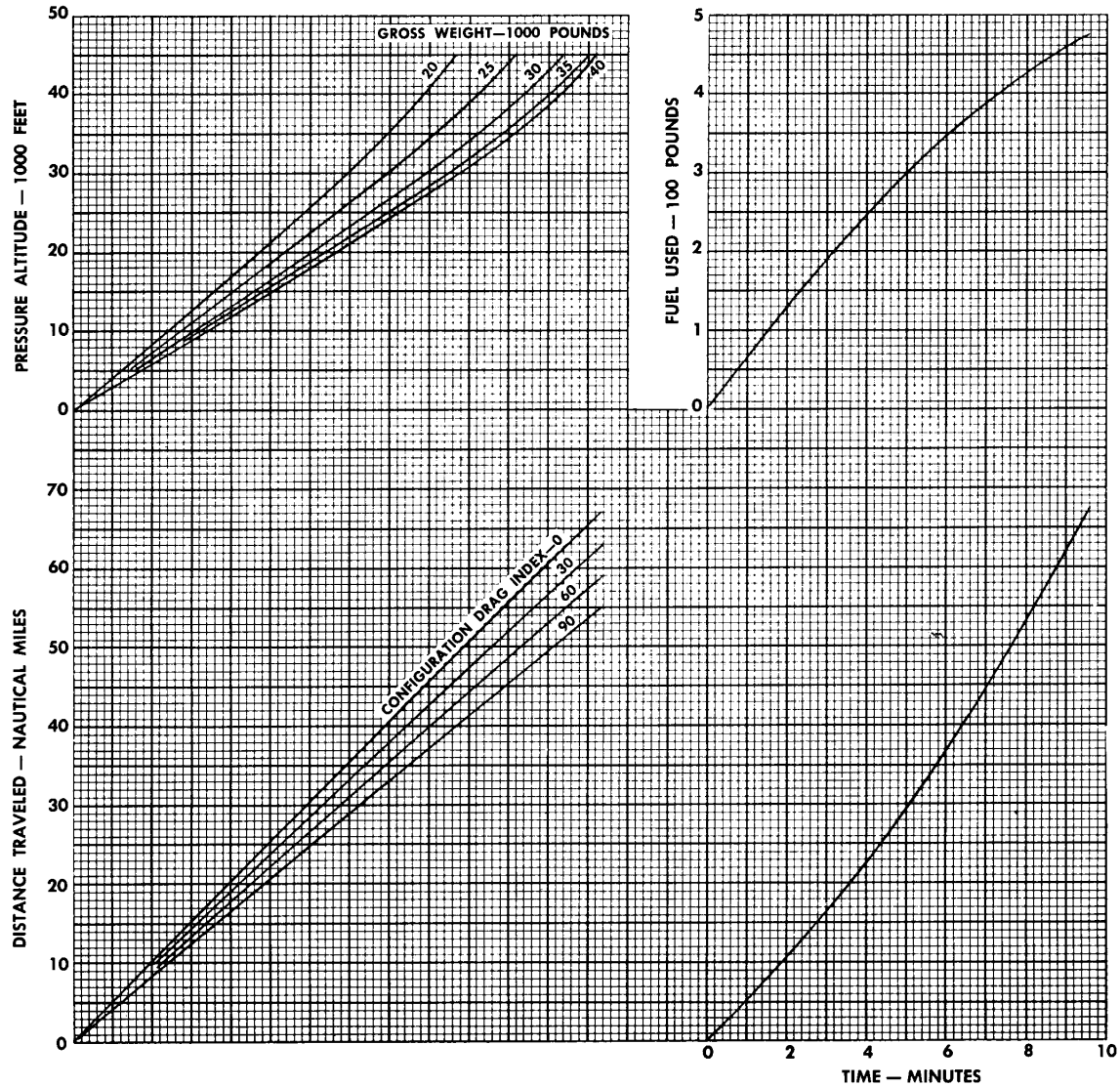
F-100-1-93-565B

Figure B6-3

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

PENETRATION DESCENT
300 KNOTS IAS
85% RPM—SPEED BRAKE OPEN

MODEL: F-100D & F
ENGINE: J57-21



NOTE

- Maintain 85% rpm setting for descent.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

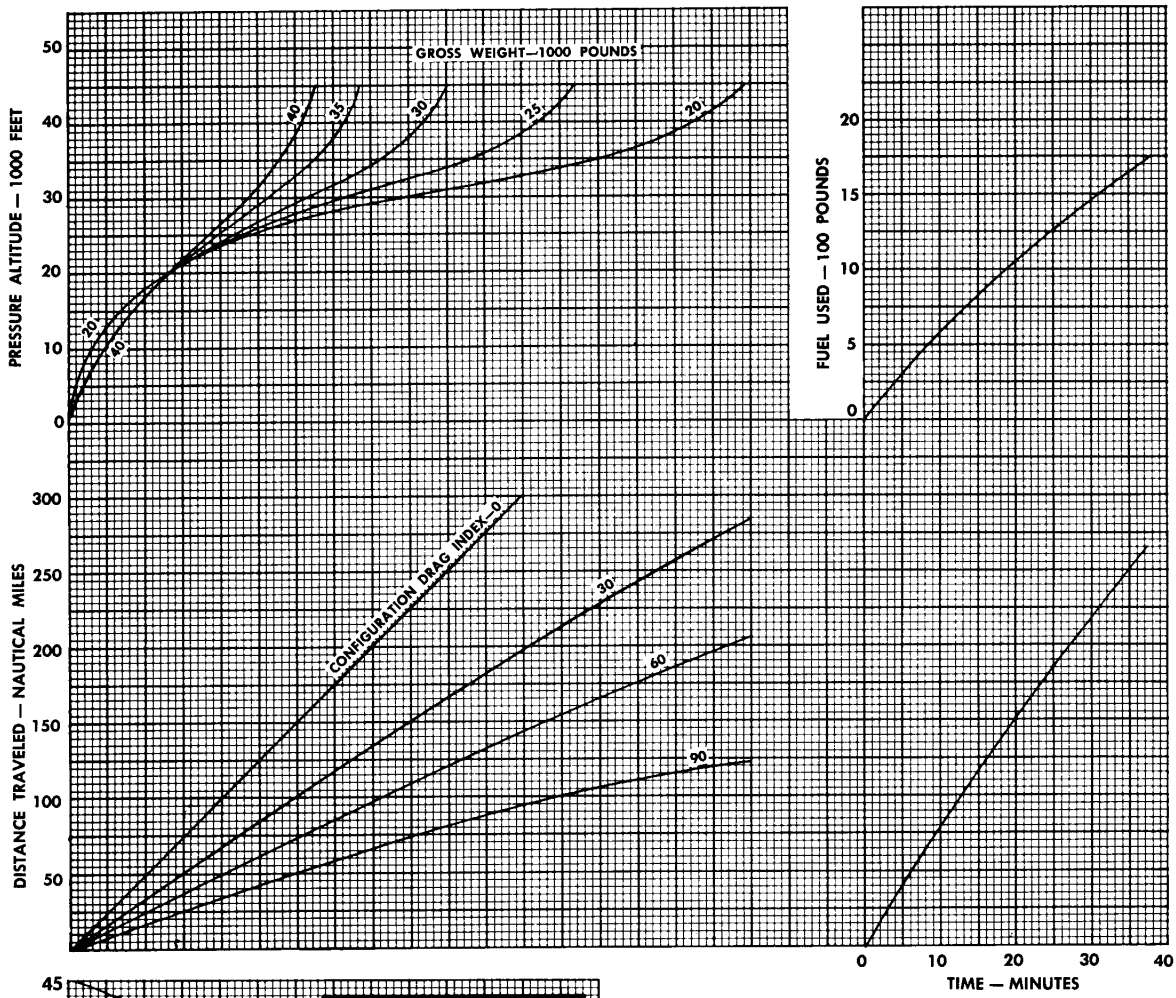
F-100-1-93-564 A

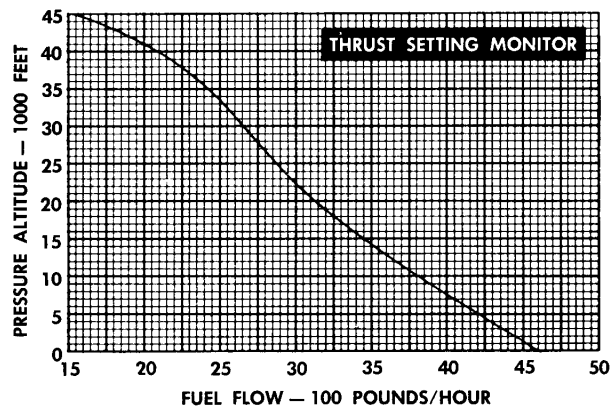
Figure B6-4

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

.8 INDICATED MACH NUMBER DESCENT
85% RPM—SPEED BRAKE CLOSED

MODEL: F-100D & F
ENGINE: J57-21





NOTE

- Establish the descent by setting fuel flow at the altitude where the descent is to be initiated and maintain constant throttle setting and airspeed.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-592B

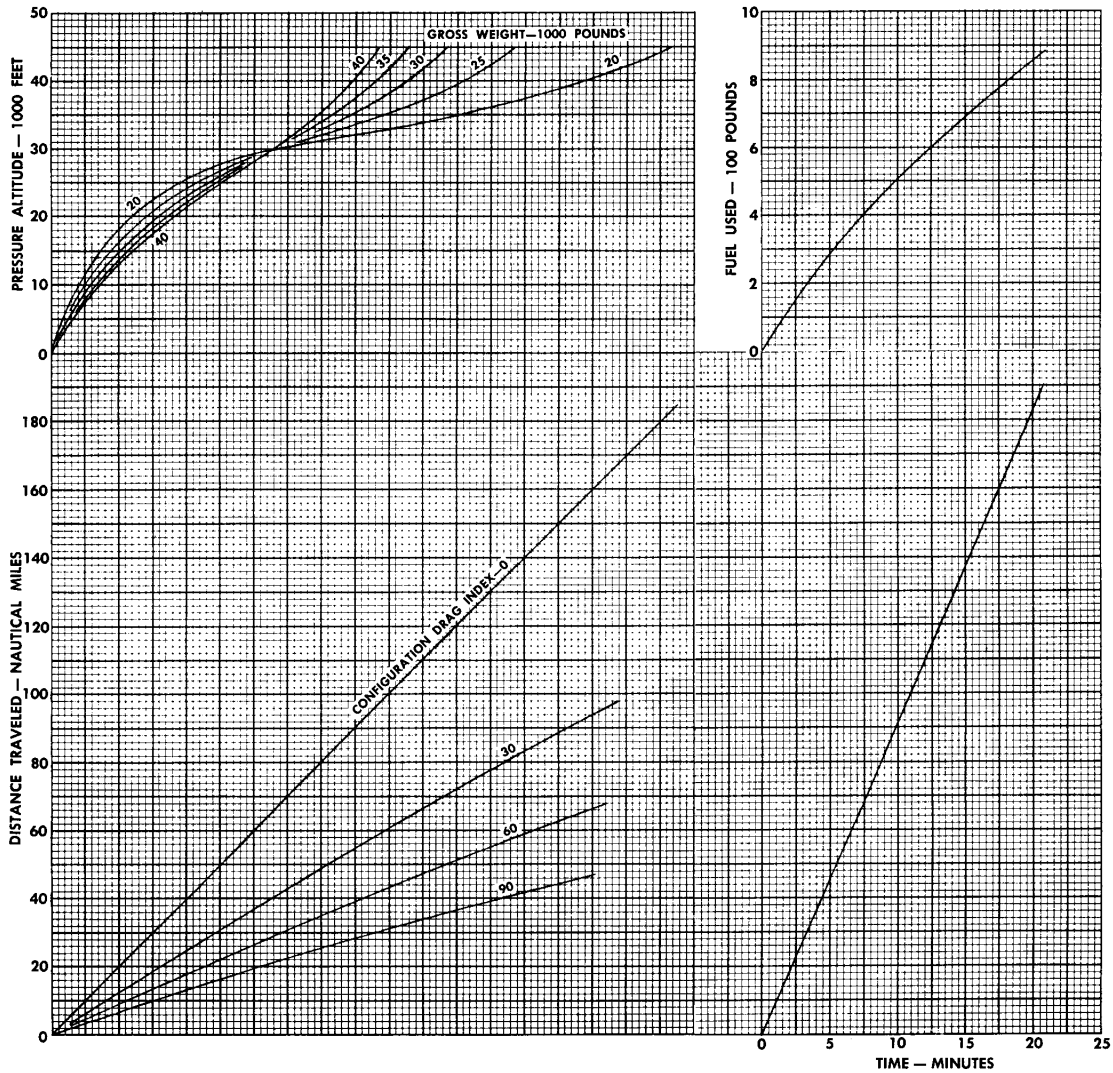
Figure B6-5

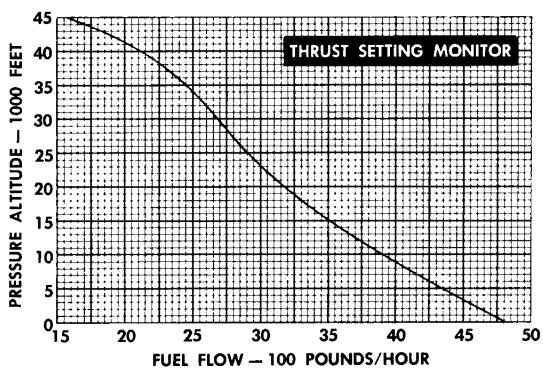
DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

• 9 INDICATED MACH NUMBER DESCENT

85% RPM—SPEED BRAKE CLOSED

MODEL: F-100D & F
ENGINE: J57-21





NOTE

- Establish the descent by setting fuel flow at the altitude where the descent is to be initiated and maintain constant throttle setting and airspeed.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-5638

Figure B6-6

PART 7-LANDING

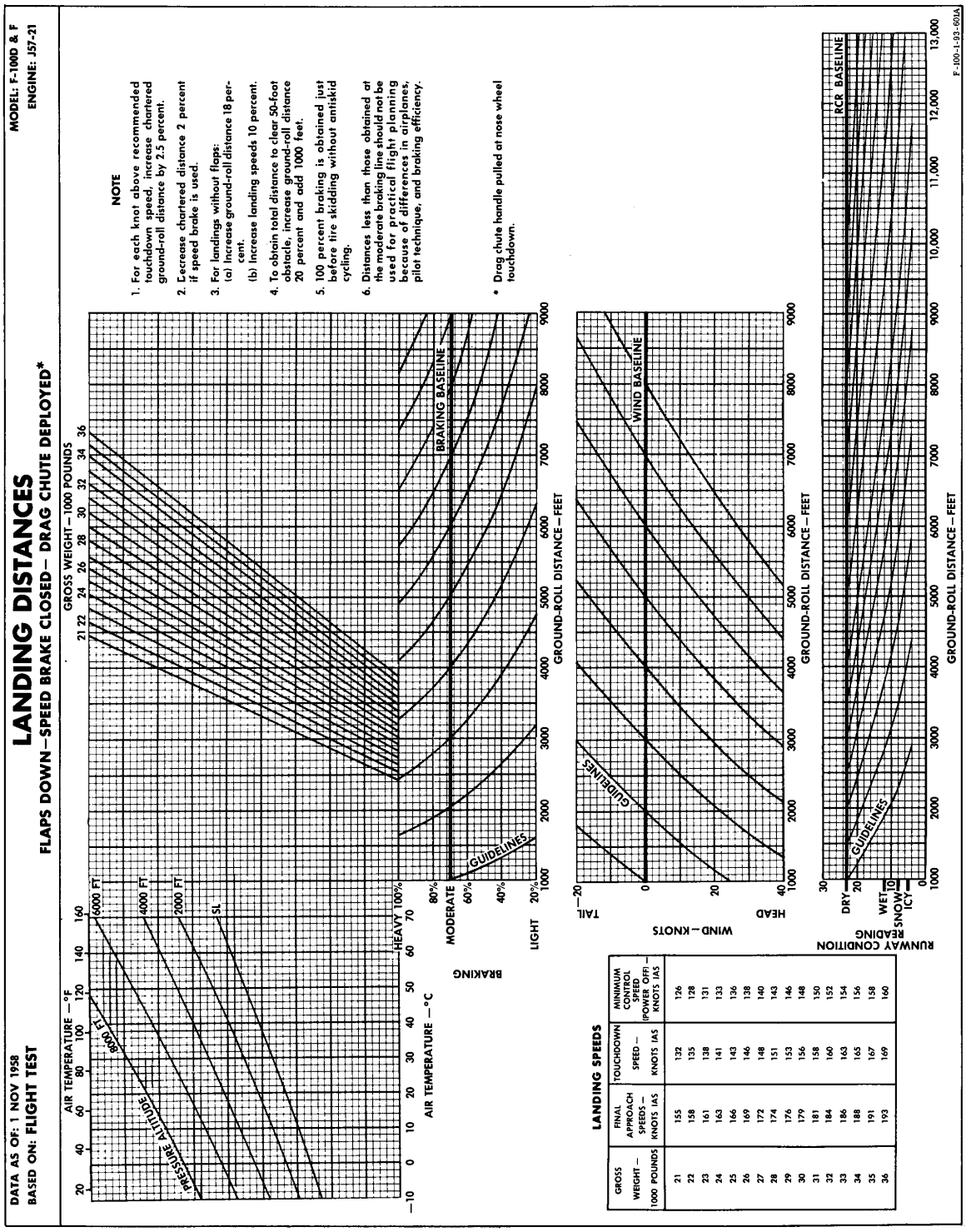
TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
LANDING DISTANCES - DRAG CHUTE DEPLOYED	B7-2
LANDING DISTANCES - DRAG CHUTE NOT DEPLOYED	B7-3

NOTE For wind component data, see figure A2-2.

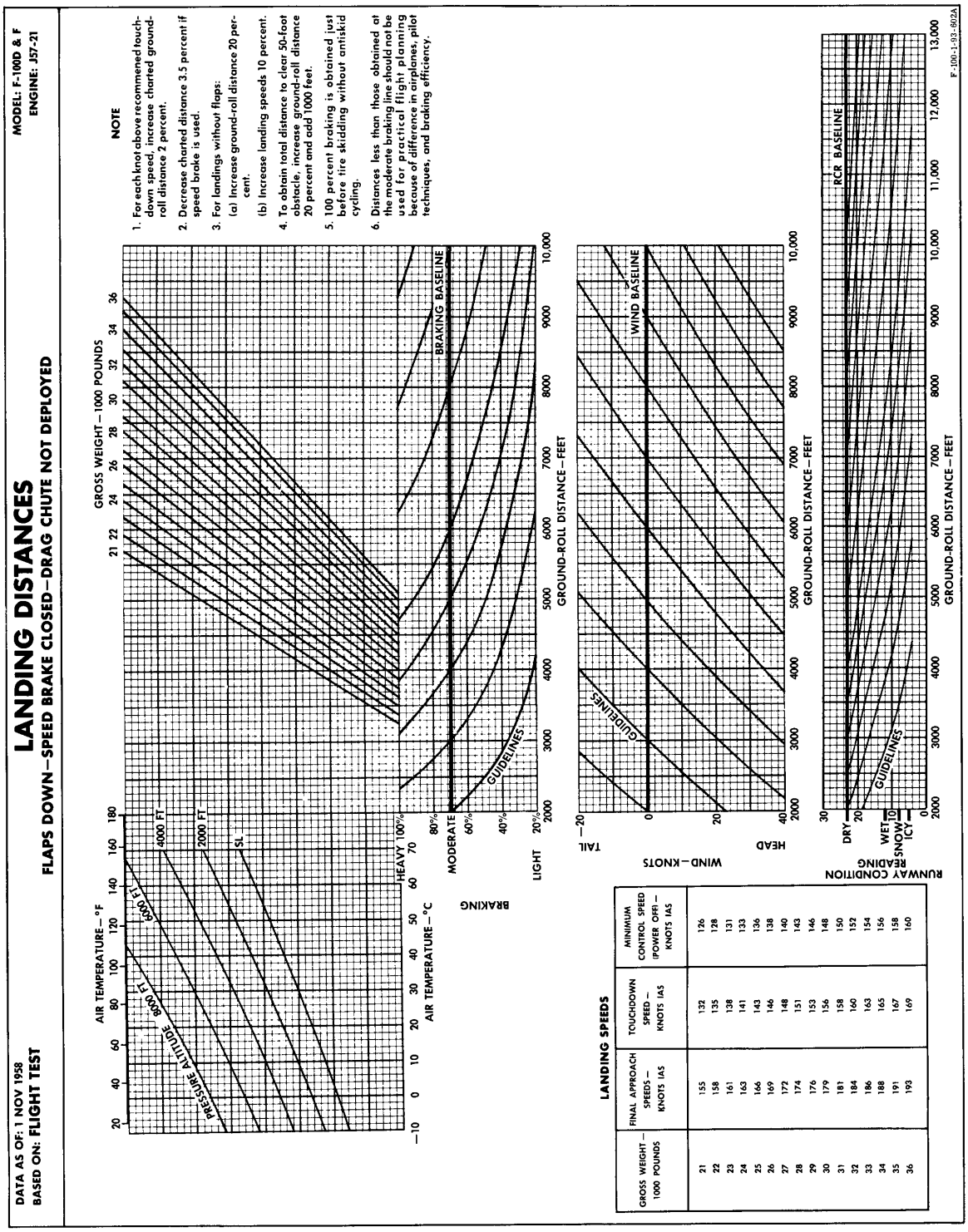
- For sample problems and descriptive text, refer to Part 7, Section I, of this manual.



LANDING SPEEDS

GROSS WEIGHT — 1000 POUNDS	FINAL APPROACH SPEEDS — KNOTS IAS	TOUCHDOWN SPEED — KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS
21	155	132	126
22	158	135	128
23	161	138	131
24	163	141	133
25	166	143	136
26	169	146	138
27	172	148	140
28	174	151	143
29	176	153	146
30	179	156	148
31	181	158	150
32	184	160	152
33	186	163	154
34	188	165	156
35	191	167	158
36	193	169	160

Figure B7-1



LANDING SPEEDS

GROSS WEIGHT — 1000 POUNDS	FINAL APPROACH SPEEDS — KNOTS IAS	TOUCHDOWN SPEED — KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS
21	155	132	126
22	158	135	128
23	161	138	131
24	163	141	133
25	166	143	136
26	169	146	138
27	172	148	140
28	174	151	143
29	176	153	146
30	179	156	148
31	181	158	150
32	184	160	152
33	186	163	154
34	188	165	156
35	191	167	158
36	193	169	160

Figure B7-2

PART 8 – COMBAT PERFORMANCE

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
Effect of Anti-icing and Defrosting System Operation	B8-1
Level-flight Acceleration Charts	
CONFIGURATION DRAG INDEX 30 - SEA LEVEL	B8-2
CONFIGURATION DRAG INDEX 30 - 2000 FEET	B8-3
CONFIGURATION DRAG INDEX 30 - 4000 FEET	B8-4
CONFIGURATION DRAG INDEX 50 - SEA LEVEL	B8-5
CONFIGURATION DRAG INDEX 50 - 2000 FEET	B8-6
CONFIGURATION DRAG INDEX 50 - 4000 FEET	B8-7
CONFIGURATION DRAG INDEX 80 - SEA LEVEL	B8-8
CONFIGURATION DRAG INDEX 80 - 2000 FEET	B8-9
CONFIGURATION DRAG INDEX 80 - 4000 FEET	B8-10
COMBAT ALLOWANCE - MAXIMUM THRUST	B8-12
COMBAT ALLOWANCE - MILITARY THRUST	B8-14
COMBAT ALLOWANCE - MAXIMUM CONTINUOUS THRUST	B8-15

NOTE For sample problems and descriptive text, refer to Part 8, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown for Maximum and Military Thrust. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before computing combat performance, using Maximum or Military Thrust.

SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	800 lb	600 lb

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—SEA LEVEL

MODEL: F-100D & F
ENGINE: J57-21

(FROM .53 INDICATED MACH NUMBER)

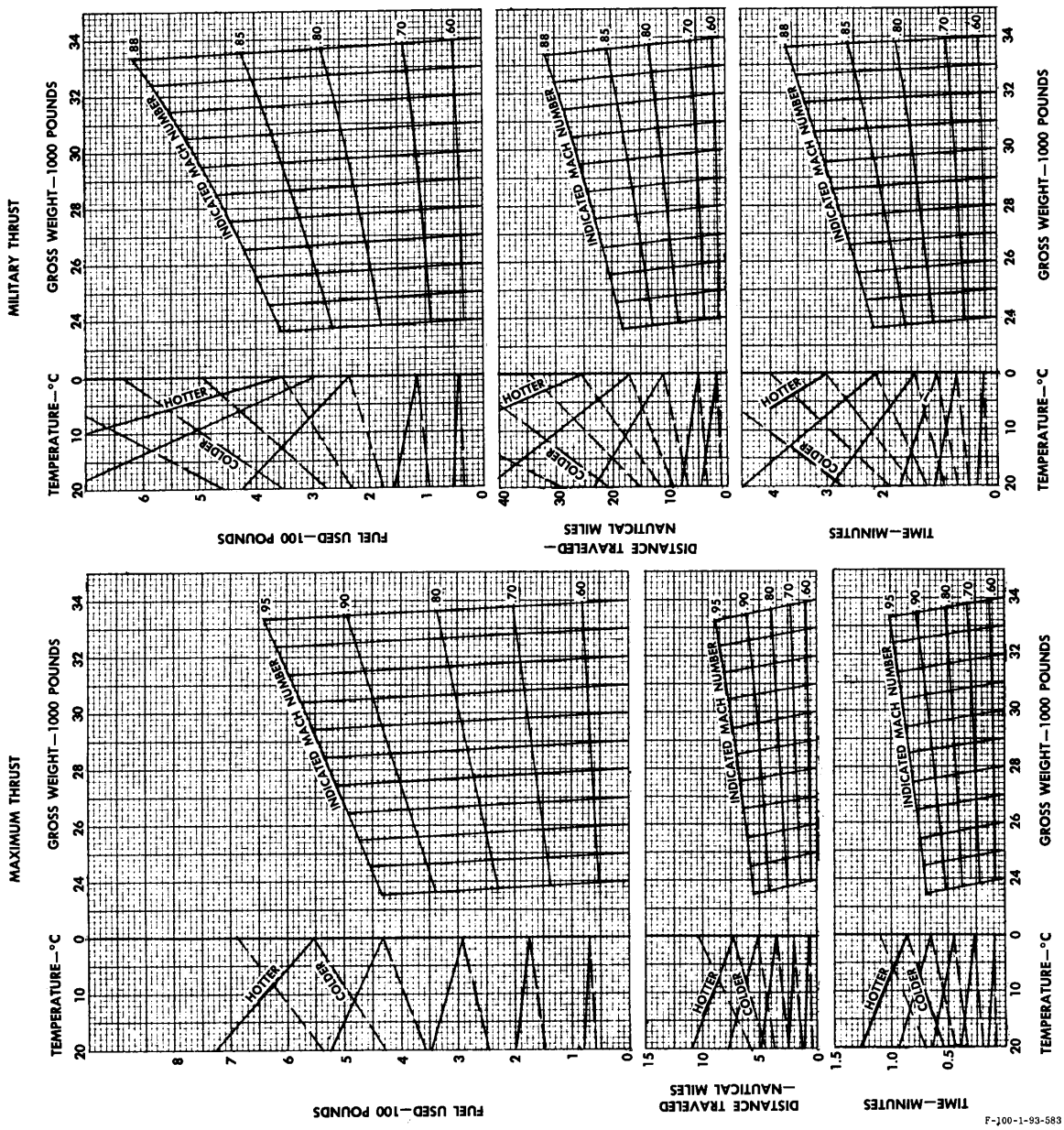


Figure B8-1

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

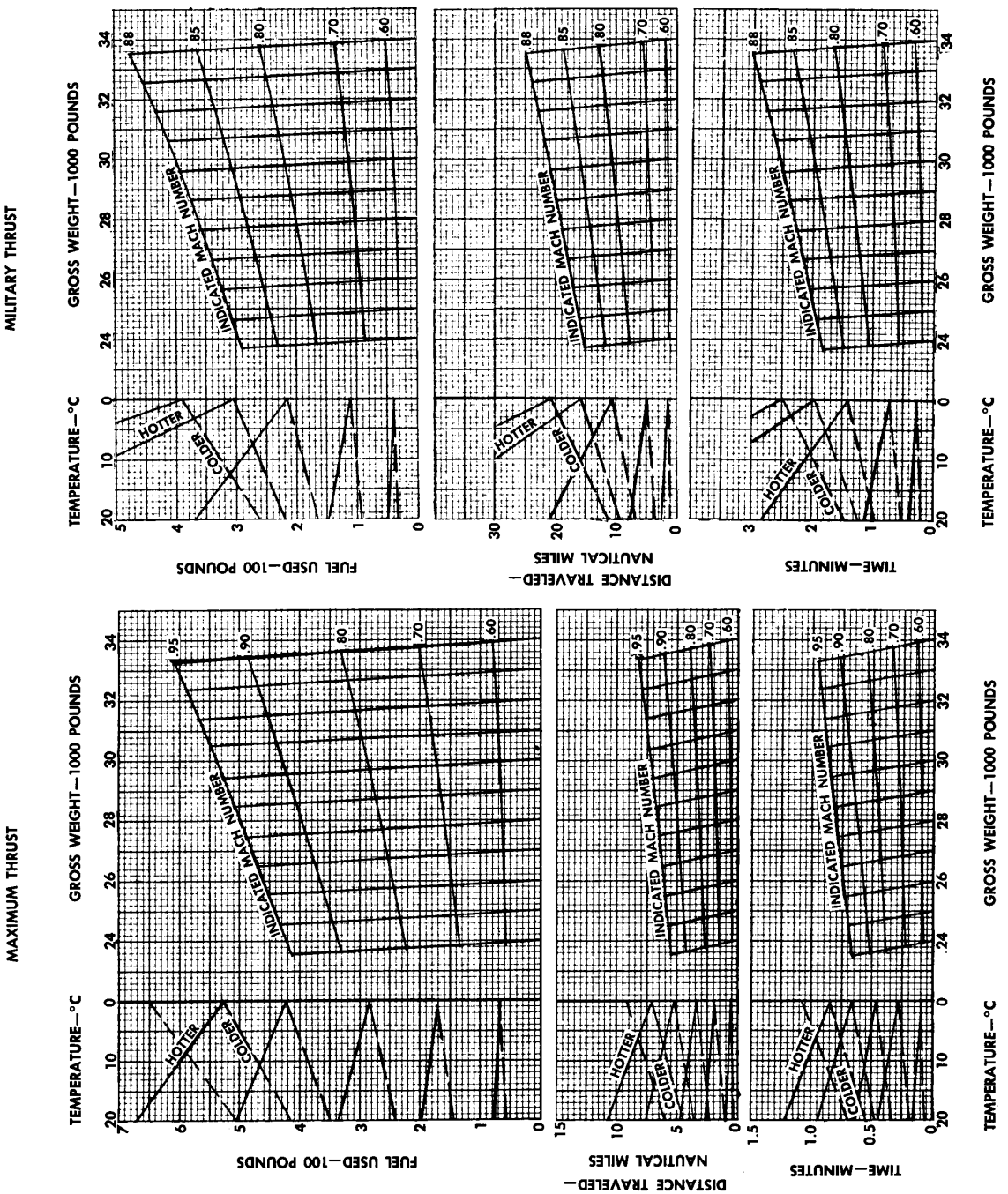


Figure B8-2

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

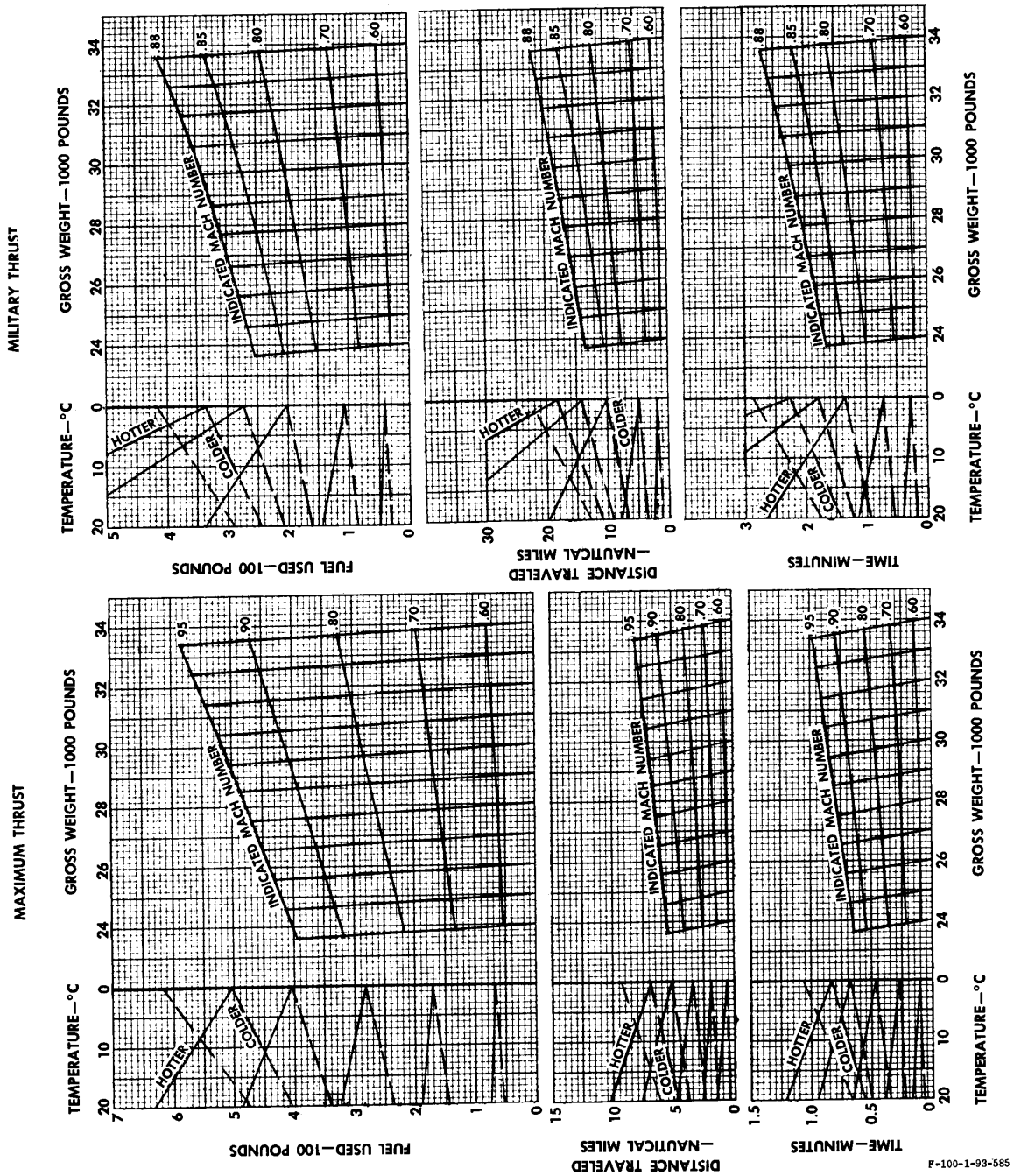


Figure B8-3

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—SEA LEVEL

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

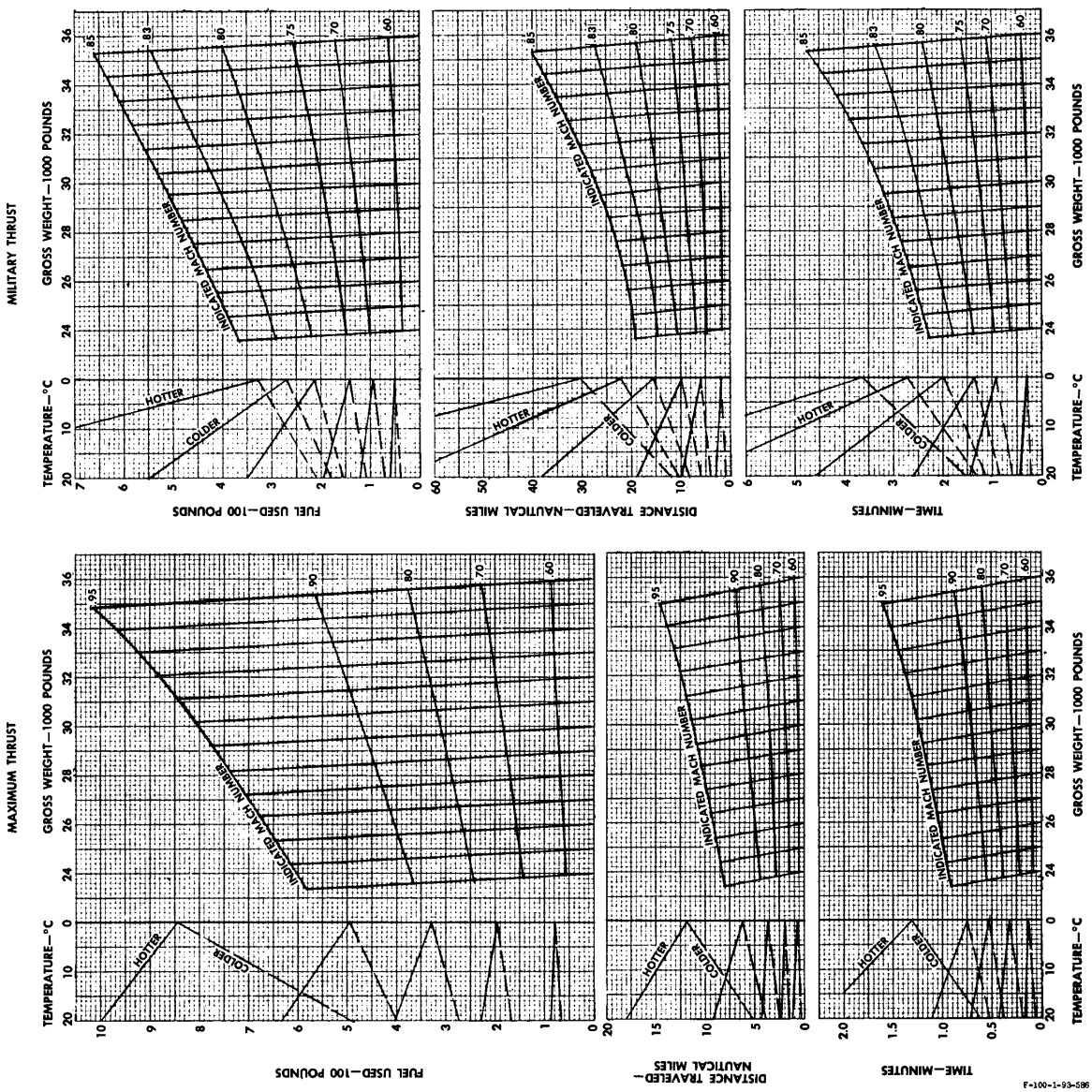


Figure B8-4

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

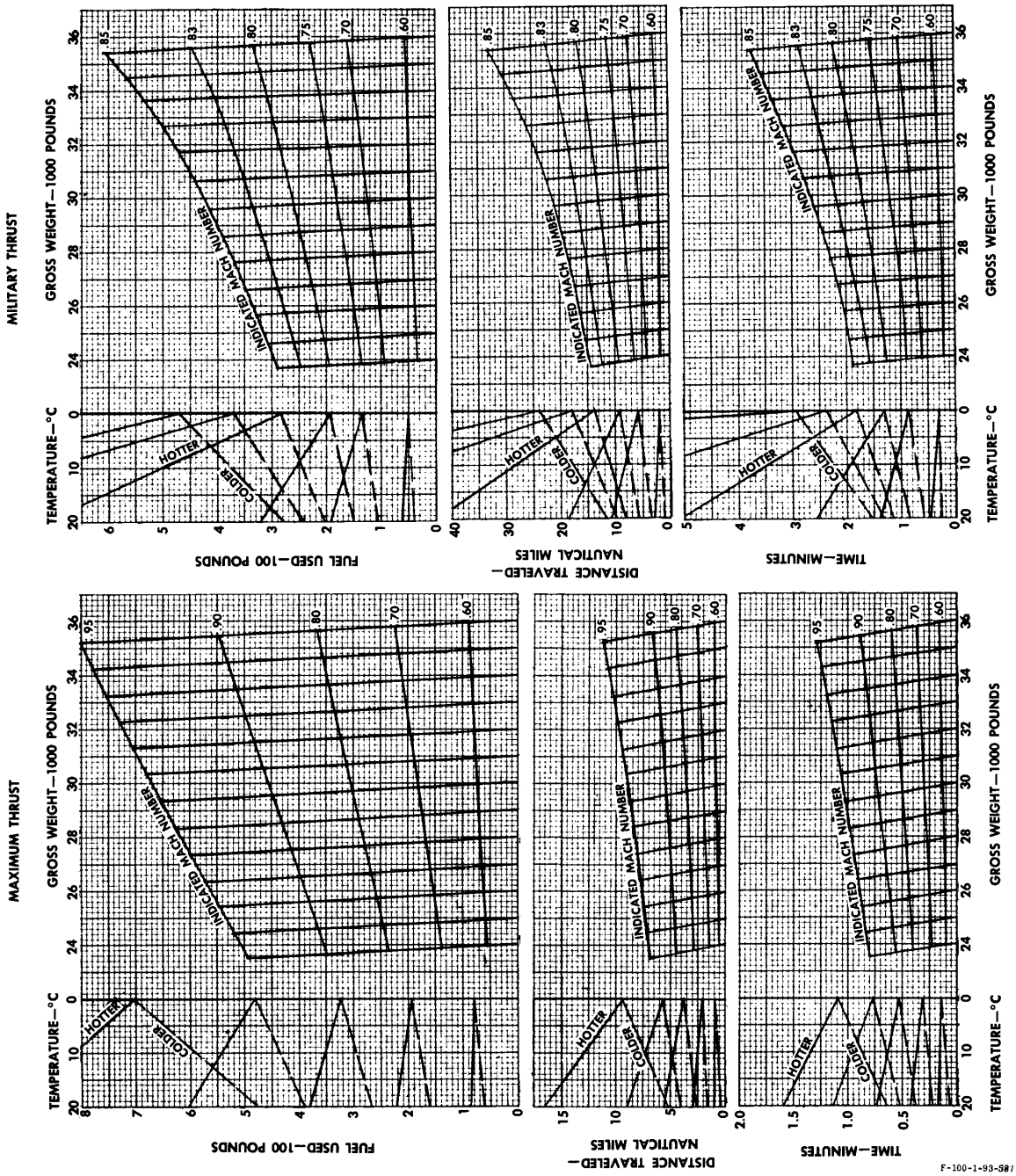


Figure B8-5

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

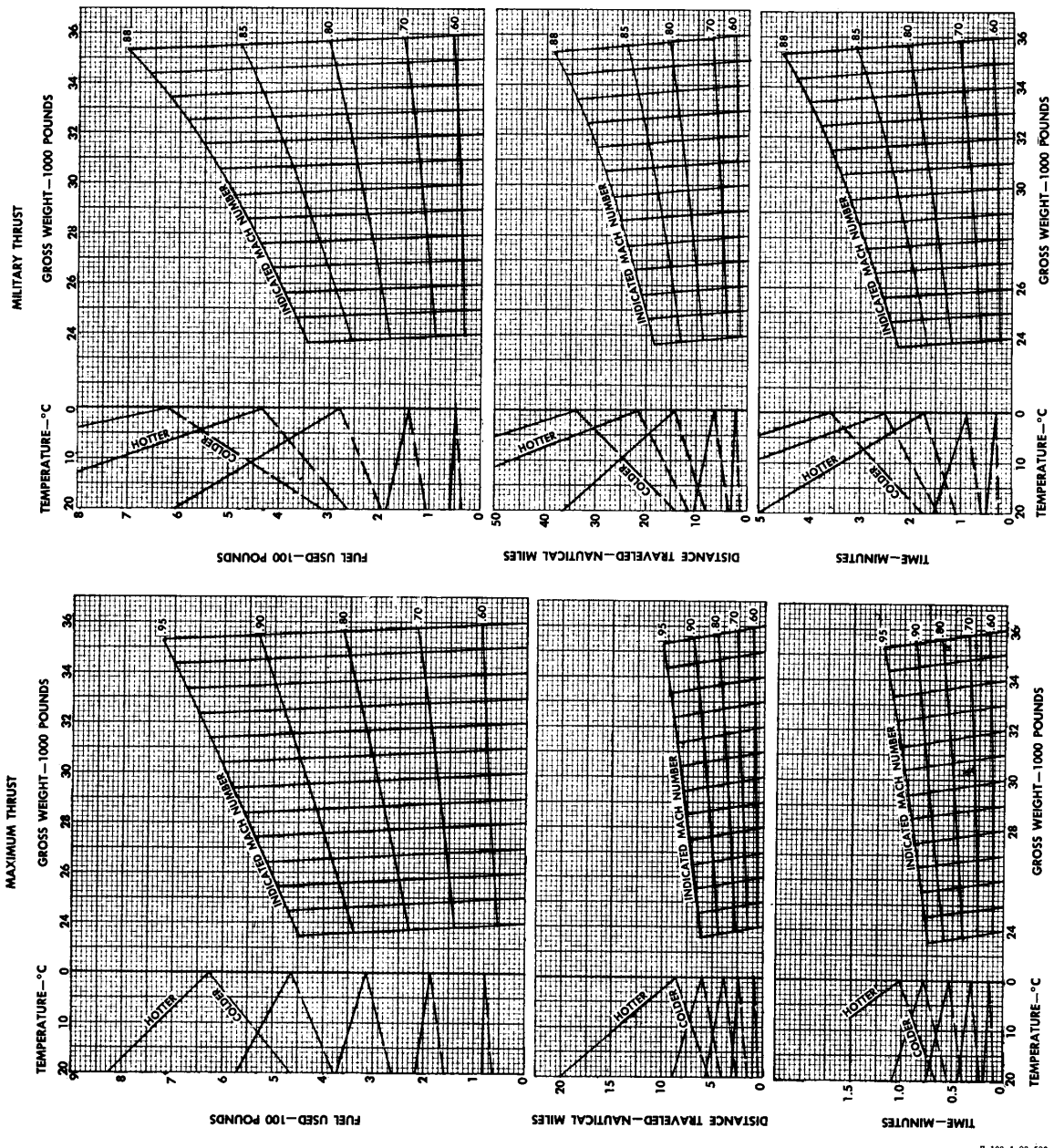


Figure B8-6

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

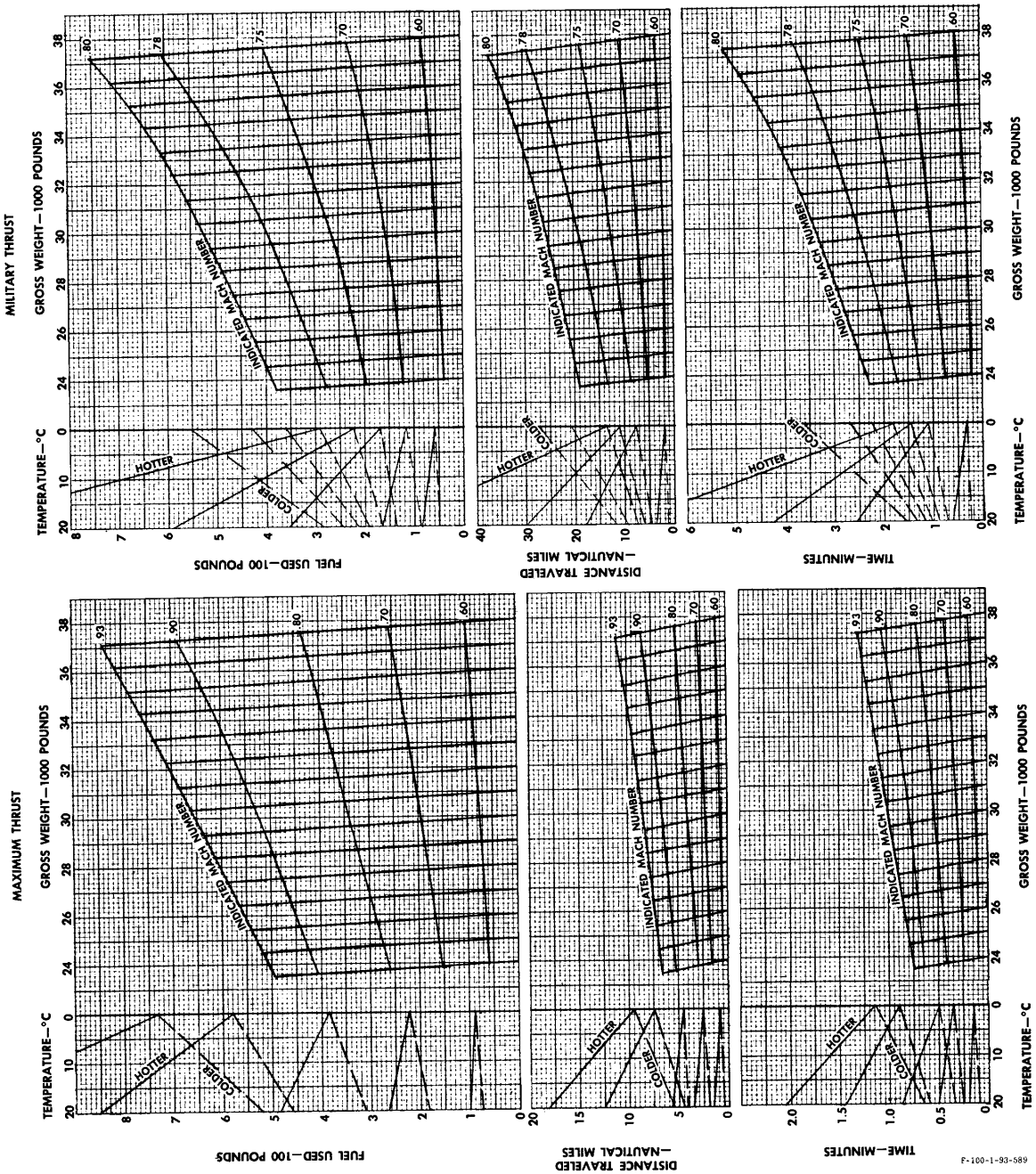


Figure B8-7

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—2000 FEET

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

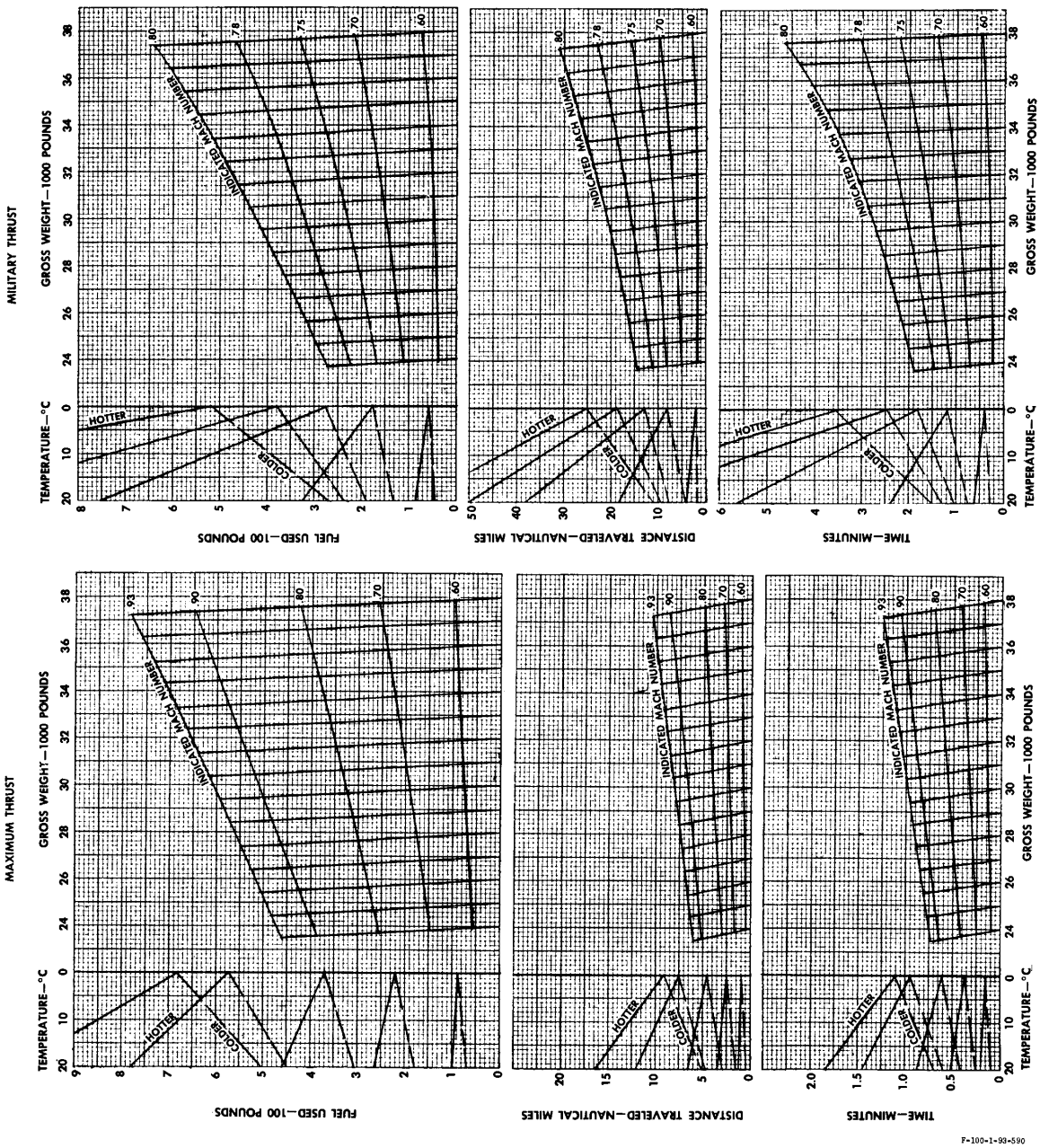


Figure B8-8

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

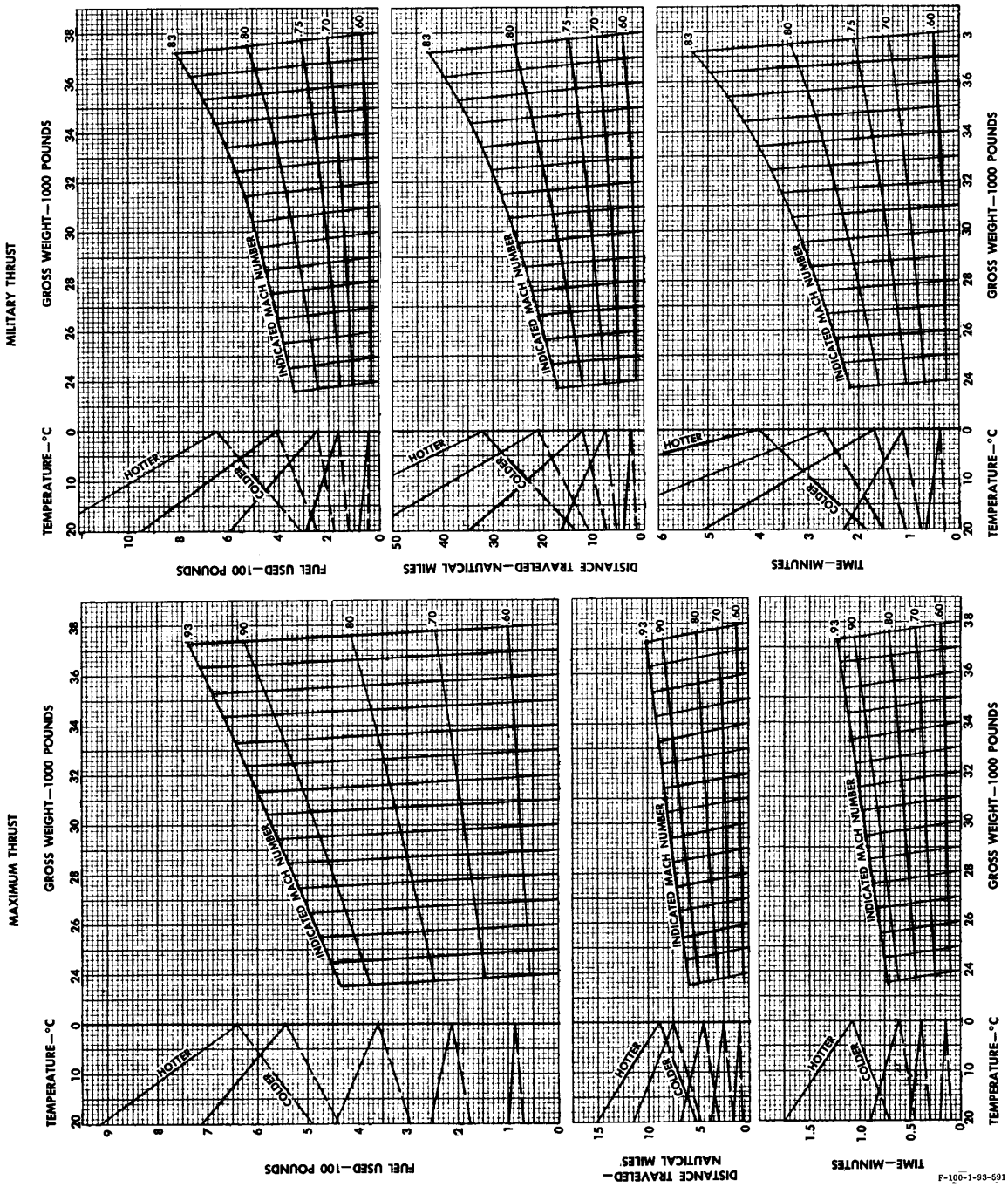


Figure B8-9

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DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

COMBAT ALLOWANCE—

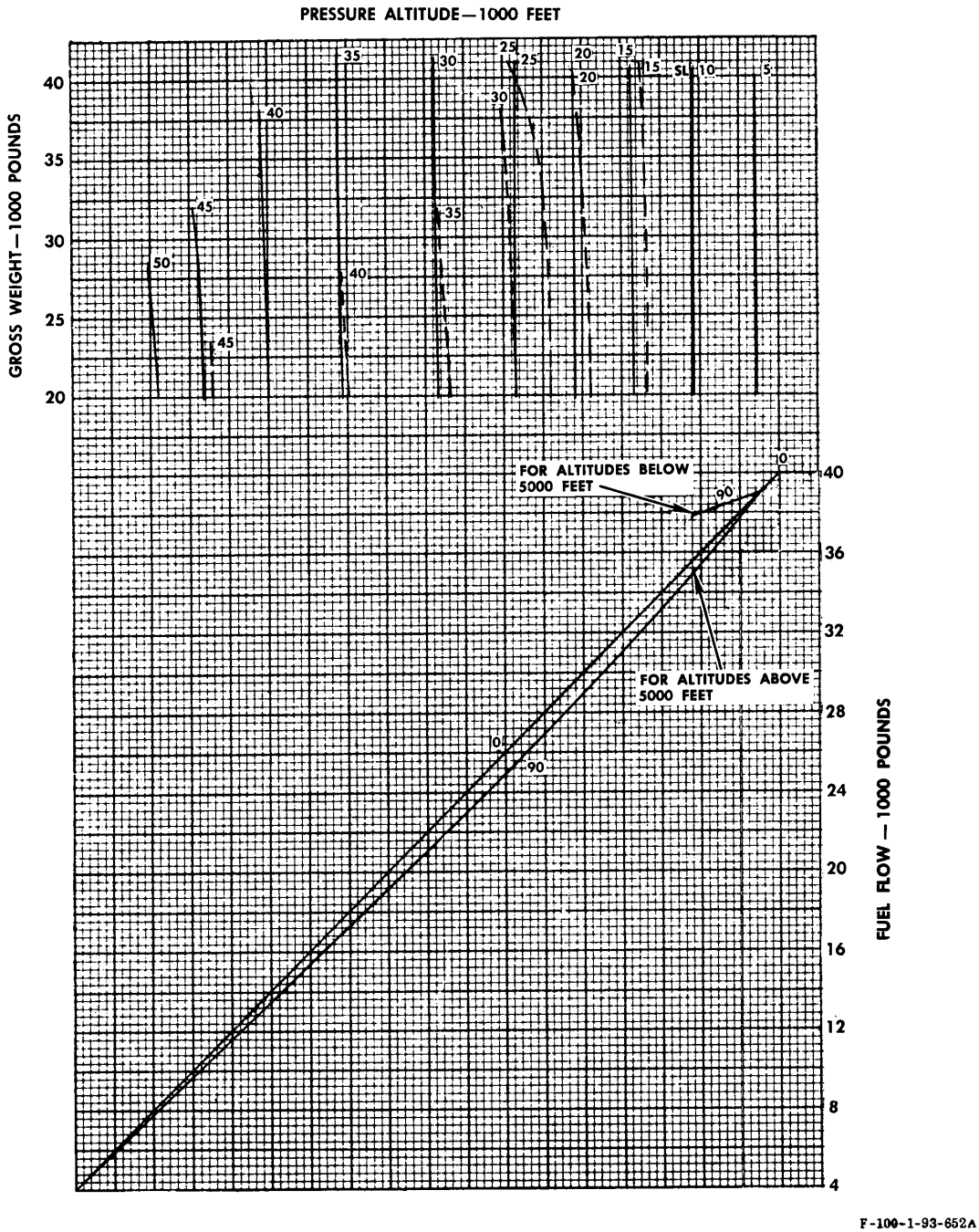


Figure B8-10 (Sheet 1 of 2)

MODEL: F-100D & F
ENGINE: J57-21

MAXIMUM THRUST

NOTE
Solid altitude lines represent subsonic speed at that altitude. Broken altitude lines represent supersonic speed at that altitude for clean airplane only.

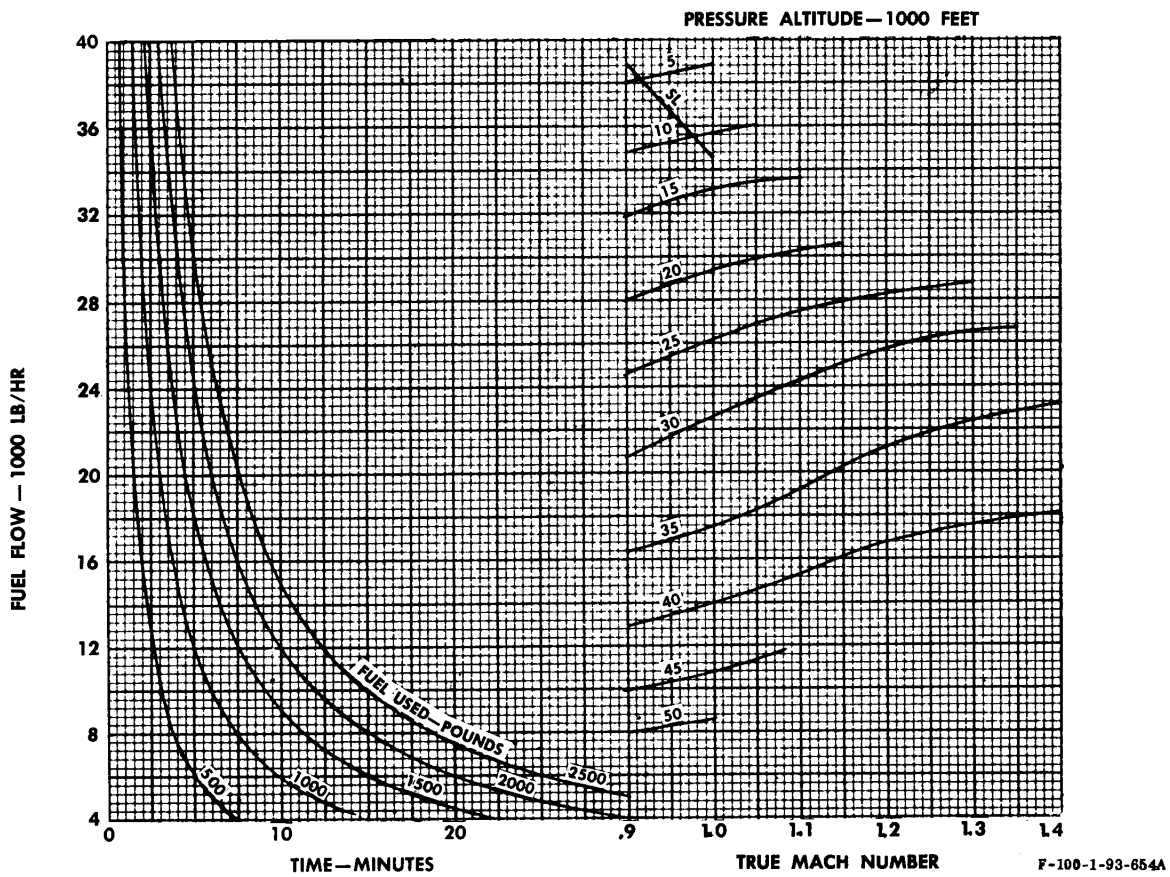
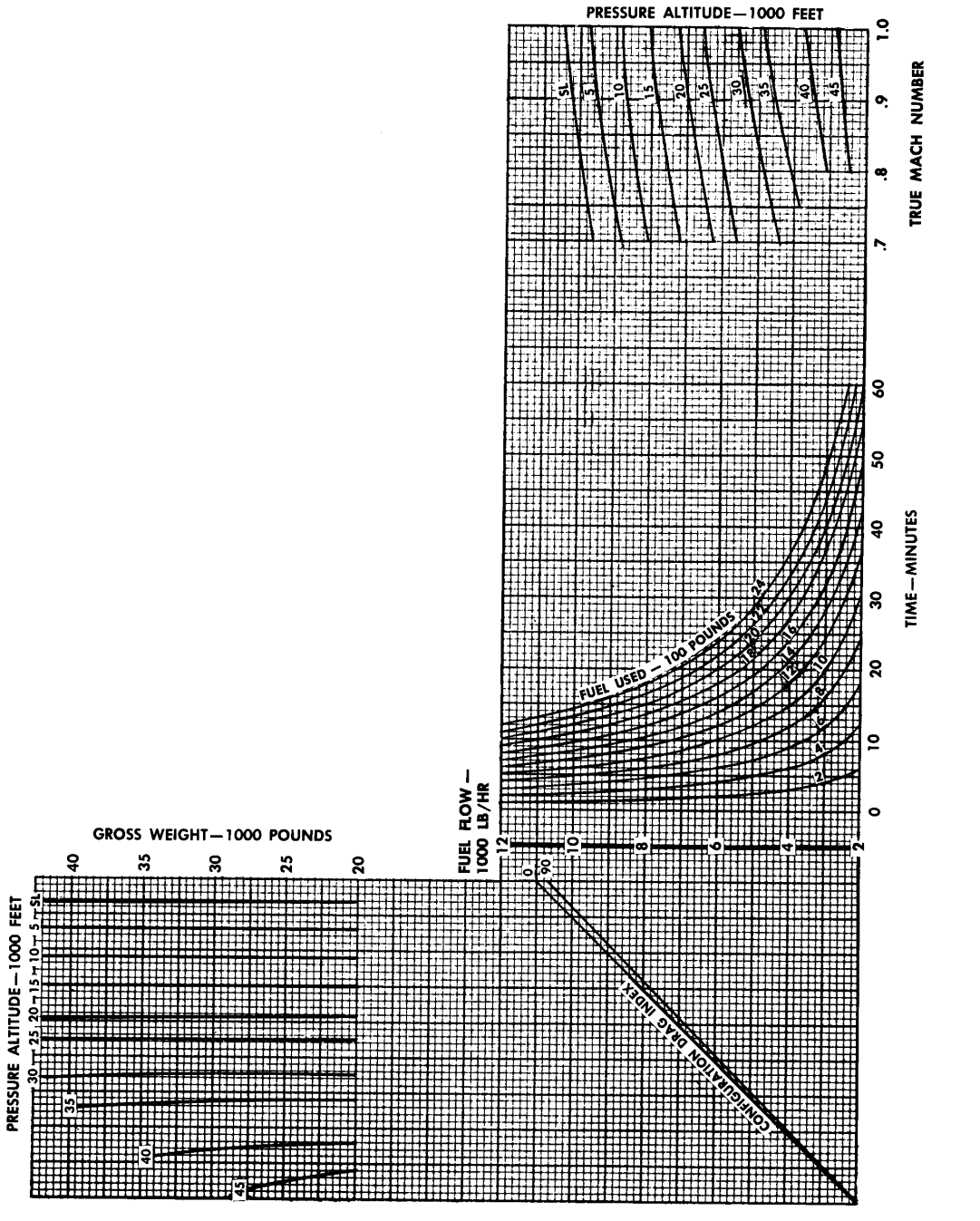


Figure B8-10 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

COMBAT ALLOWANCE— MILITARY THRUST

MODEL: F-100D & F
ENGINE: J57-21



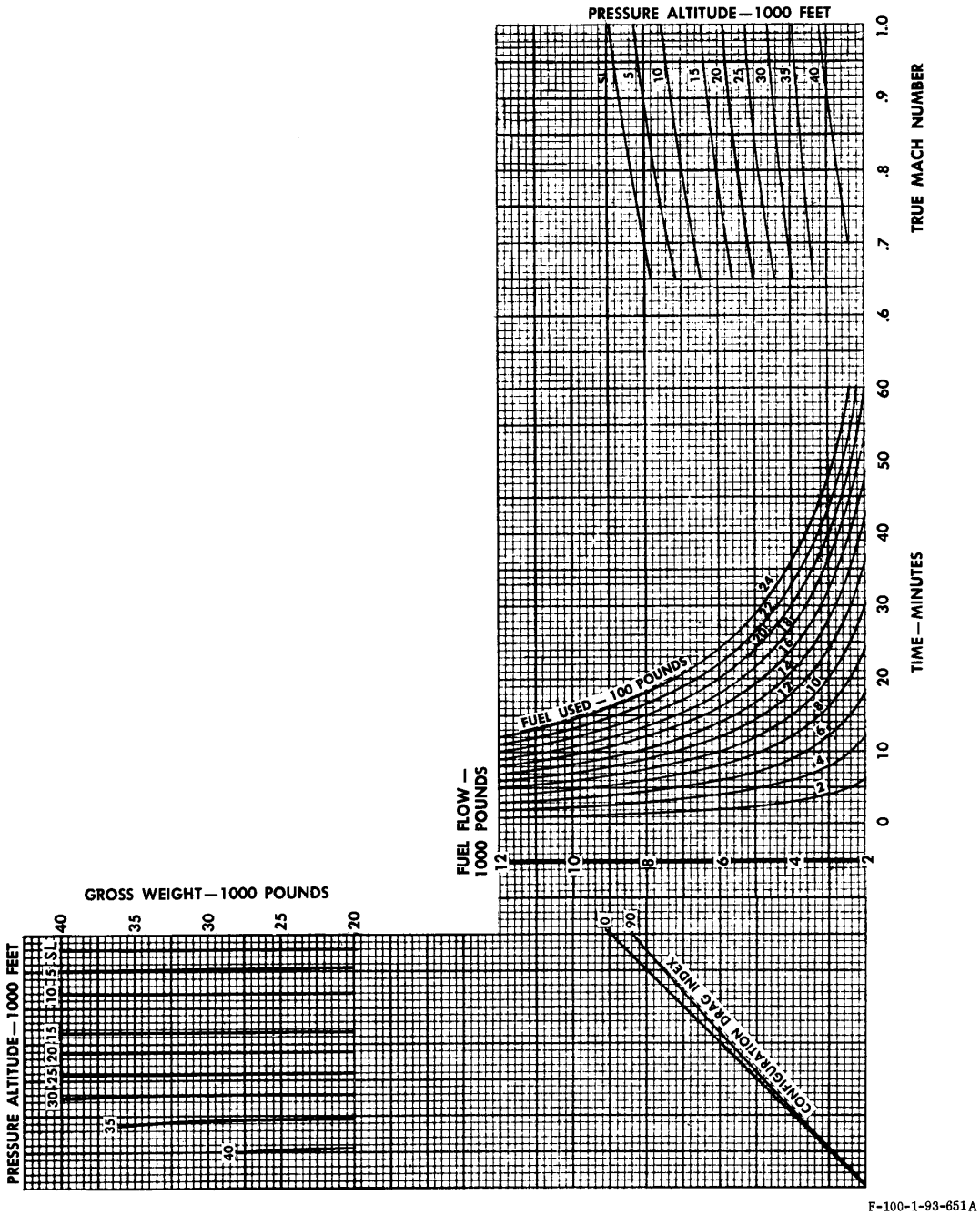
F-100-1-93-653 A

Figure B8-11

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

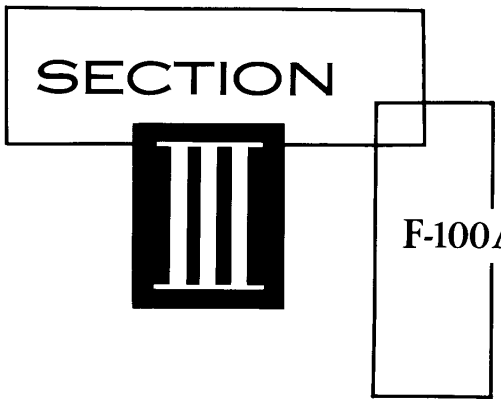
COMBAT ALLOWANCE— MAXIMUM CONTINUOUS THRUST

MODEL: F-100D & F
ENGINE: J57-21



F-100-1-93-651A

Figure B8-12



F-100A & C PERFORMANCE DATA

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PART 4	RANGE	C4-1
PART 5	ENDURANCE	C5-1
PART 6	DESCENT	C6-1
PART 7	LANDING	C7-1
PART 8	COMBAT ALLOWANCE	C8-1
PART 9	MISSION PLANNING	*

F-100-1-0-4

* Refer to applicable part in Section I

PERFORMANCE PRESENTATION.

This section contains performance data for F-100A and F-100C Airplanes presented in a "part-type" arrangement which groups the material as needed for planning general phases of each flight.

PART 2–TAKE-OFF

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Titles CAPITALIZED denote charts.

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TAKE-OFF DISTANCES - MILITARY THRUST	C2-3
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TAKE-OFF ACCELERATION - MILITARY THRUST	C2-5
REFUSAL SPEEDS - MAXIMUM THRUST	C2-6
REFUSAL SPEEDS - MILITARY THRUST	C2-7
CRITICAL AFTERBURNER FAILURE SPEED	C2-8

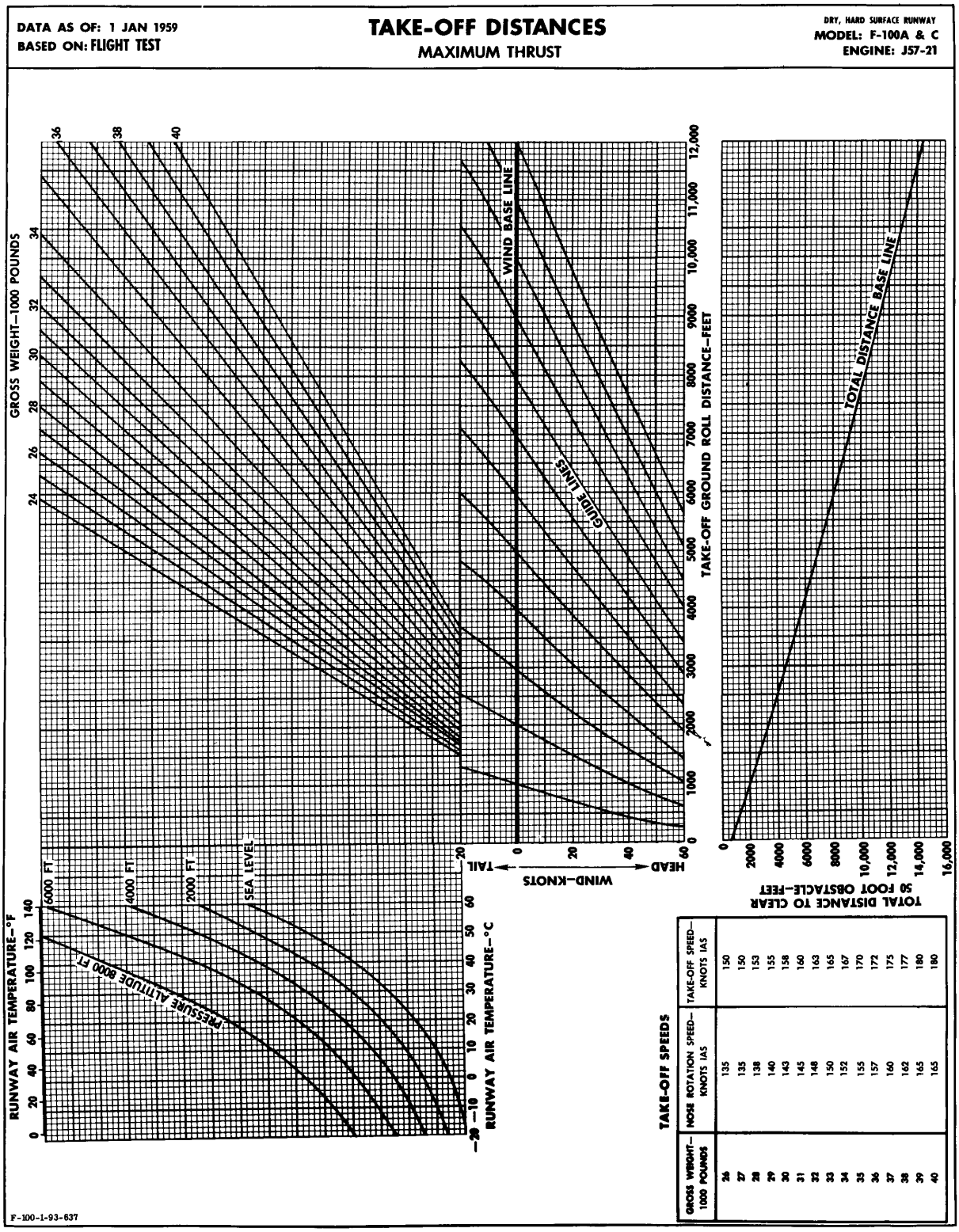
NOTE For wind component data, see figure A2-2.

- For sample problems and descriptive text, refer to Part 2, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

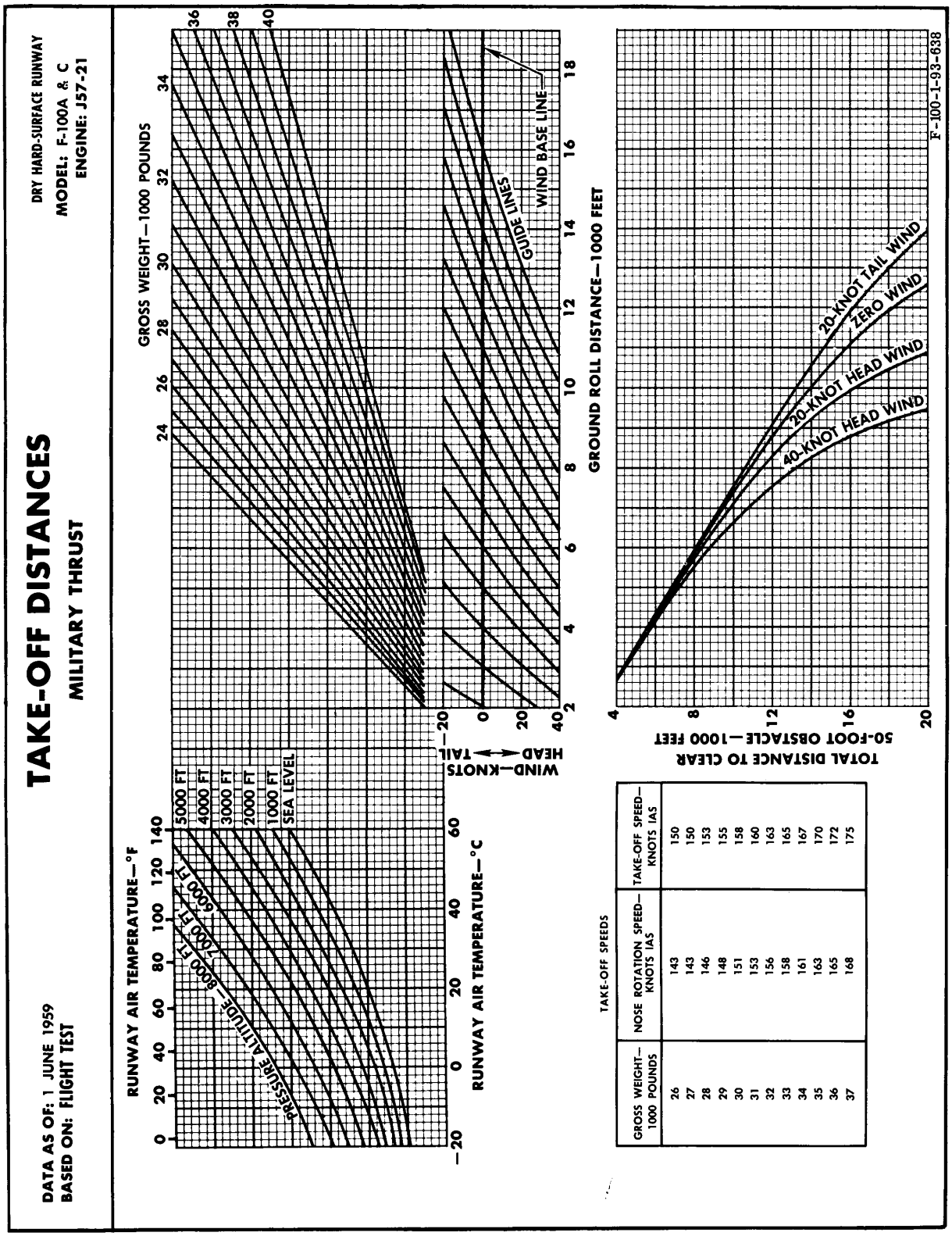
When compressor bleed air is extracted by operation of anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the take-off performance charts. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before using the take-off performance charts.

SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	700 lb	500 lb



GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS	TAKE-OFF SPEED—KNOTS IAS
26	135	150
27	135	150
28	138	153
29	140	155
30	143	158
31	145	160
32	148	163
33	150	165
34	152	167
35	155	170
36	157	172
37	160	175
38	162	177
39	165	180
40	165	180

Figure C2-1



TAKE-OFF SPEEDS

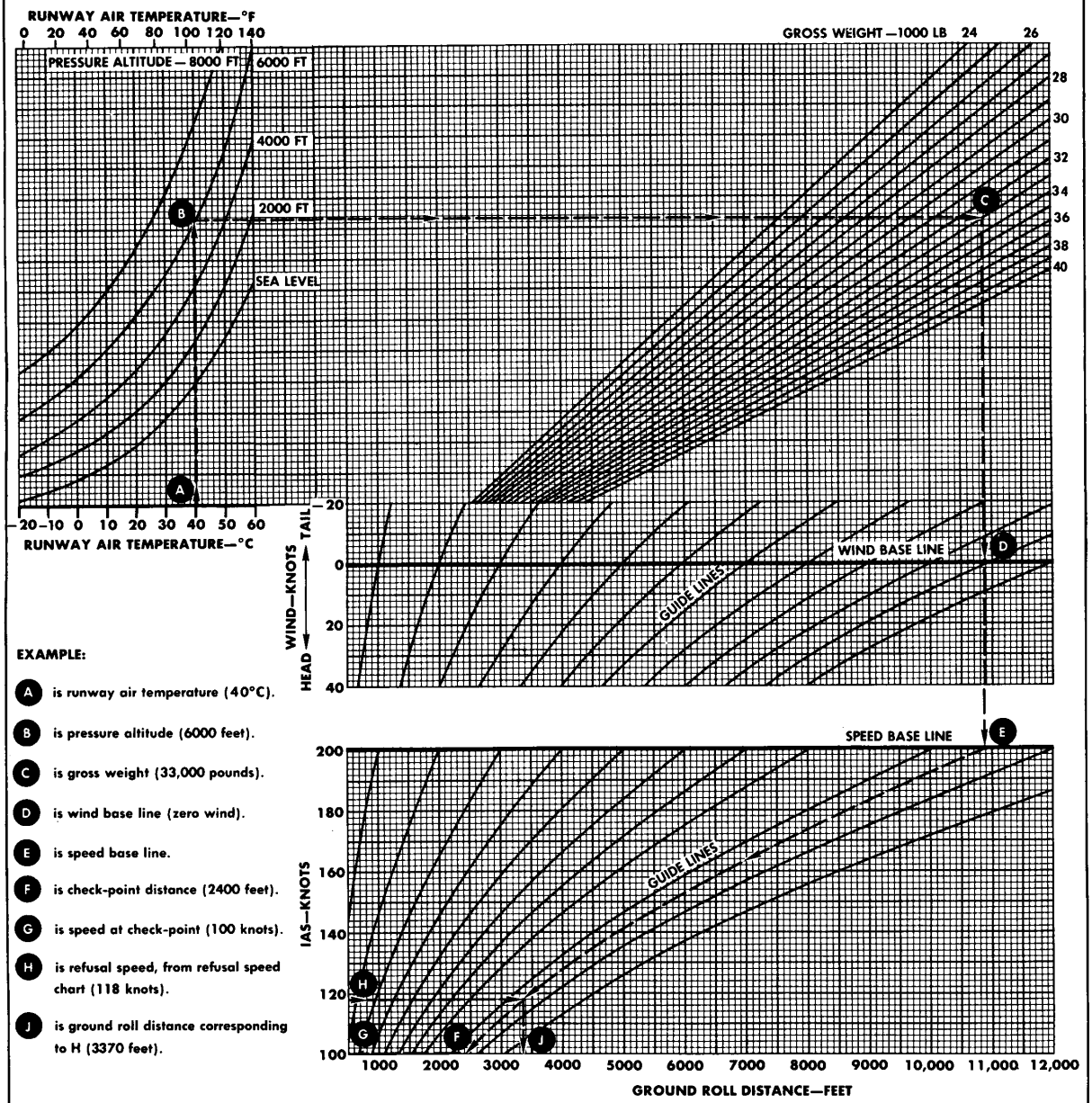
GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS	TAKE-OFF SPEED—KNOTS IAS
26	143	150
27	143	150
28	146	153
29	148	155
30	151	158
31	153	160
32	156	163
33	158	165
34	161	167
35	163	170
36	165	172
37	168	175

Figure C2-2

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST

TAKE-OFF ACCELERATION
MAXIMUM THRUST

DRY, HARD-SURFACE RUNWAY
MODEL F-100A & C
ENGINE: J57-21



EXAMPLE:

- (A) is runway air temperature (40°C).
- (B) is pressure altitude (6000 feet).
- (C) is gross weight (33,000 pounds).
- (D) is wind base line (zero wind).
- (E) is speed base line.
- (F) is check-point distance (2400 feet).
- (G) is speed at check-point (100 knots).
- (H) is refusal speed, from refusal speed chart (118 knots).
- (J) is ground roll distance corresponding to H (3370 feet).

NOTE

Acceleration speed tolerance is 10 knots IAS.

F-100-1-93-639

Figure C2-3

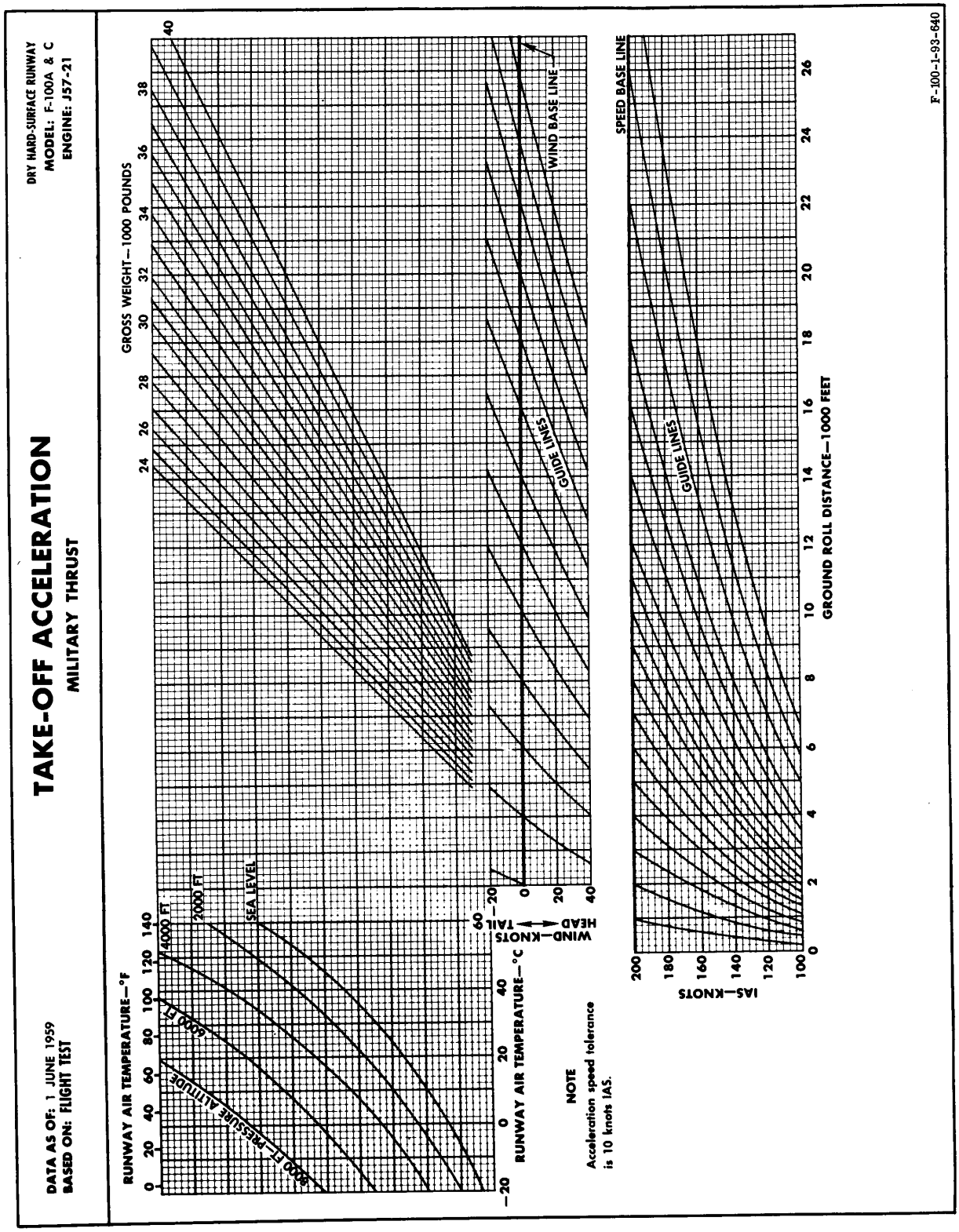

TAKE-OFF ACCELERATION
MILITARY THRUST
DRY HARD-SURFACE RUNWAY
MODEL: F-100A & C
ENGINE: J57-21
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST
RUNWAY AIR TEMPERATURE—°F
RUNWAY AIR TEMPERATURE—°C
6000 FT—PRESSURE ALTITUDE
4000 FT
2000 FT
SEA LEVEL
GROSS WEIGHT—1000 POUNDS
WIND—KNOTS
HEAD ⟷ TAIL
WIND BASE LINE
GUIDE LINES
NOTE
Acceleration speed tolerance is 10 knots IAS.
SPEED BASE LINE
GUIDE LINES
IAS—KNOTS
GROUND ROLL DISTANCE—1000 FEET
F-100-1-93-640

Figure C2-4

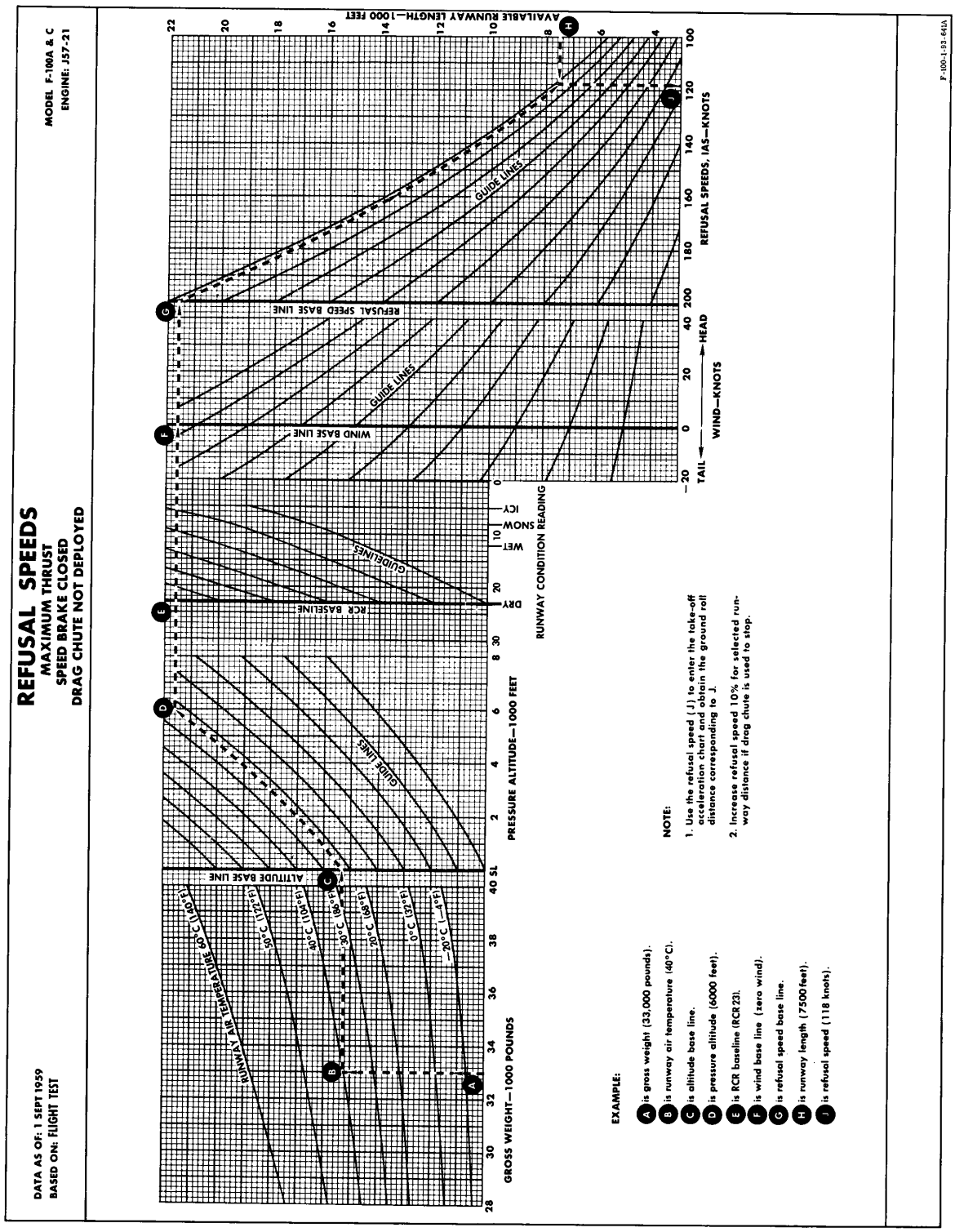

REFUSAL SPEEDS
MAXIMUM THRUST
SPEED BRAKE CLOSED
DRAG CHUTE NOT DEPLOYED
MODEL F-100A & C
ENGINE: J57-21
DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST
GROSS WEIGHT—1000 POUNDS
PRESSURE ALTITUDE—1000 FEET
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
RCR BASELINE
GUIDELINES
ALTITUDE BASE LINE
RUNWAY TEMPERATURE °C (°F)
WIND BASE LINE
REFUSAL SPEED BASE LINE
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEEDS, IAS—KNOTS
WIND—KNOTS
TAIL
HEAD
EXAMPLE:
A is gross weight (33,000 pounds).
B is runway air temperature (40°C).
C is altitude base line.
D is pressure altitude (6000 feet).
E is RCR baseline (RCR 23).
F is wind base line (zero wind).
G is refusal speed base line.
H is runway length (7500 feet).
J is refusal speed (118 knots).
NOTE:
1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.
F-100-1-93-64(A

Figure C2-5

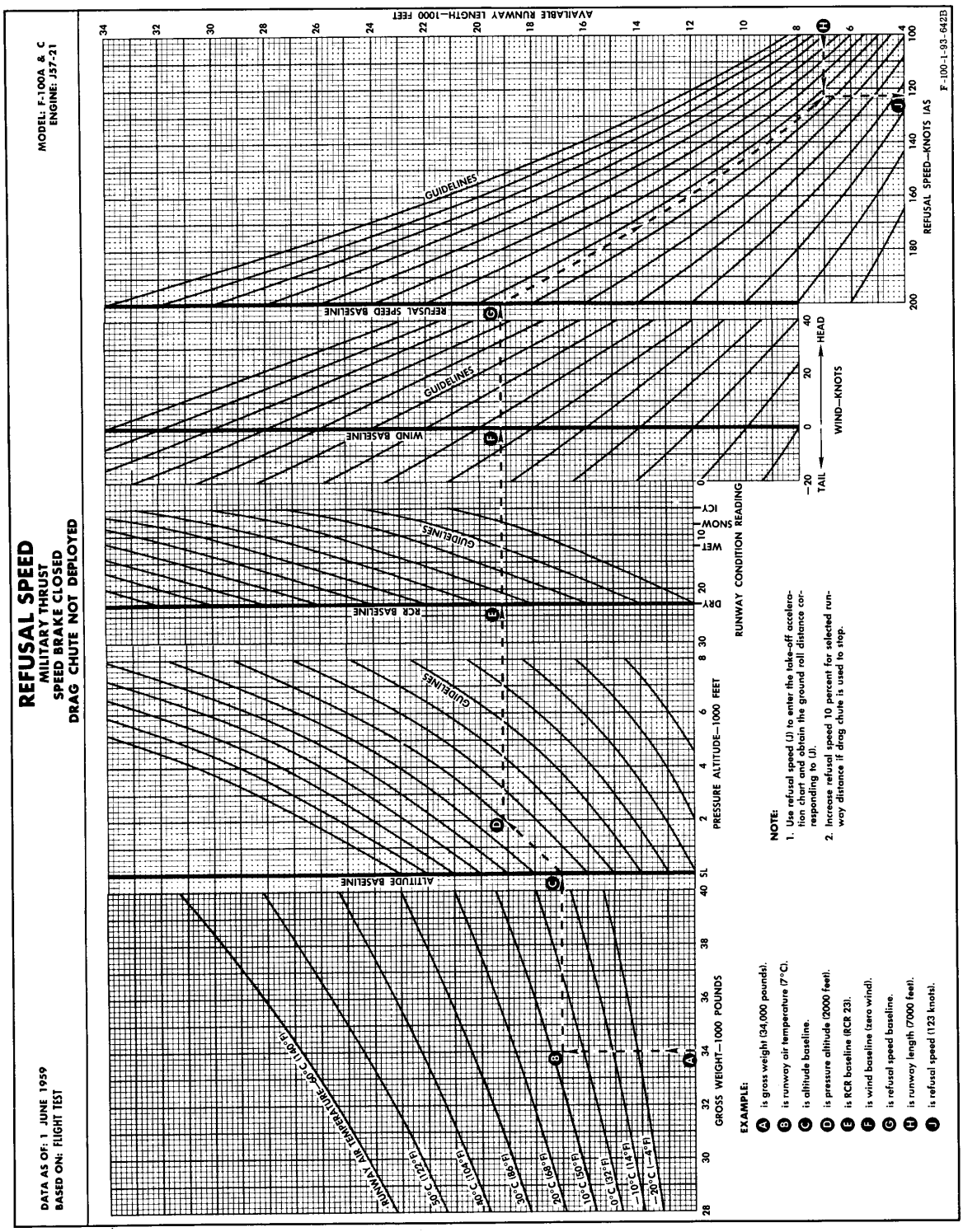

REFUSAL SPEED
MILITARY THRUST
SPEED BRAKE CLOSED
DRAG CHUTE NOT DEPLOYED
MODEL: F-100A & C
ENGINE: J57-21
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEED—KNOTS IAS
GUIDELINES
REFUSAL SPEED BASELINE
WIND BASELINE
RCR BASELINE
ALTITUDE BASELINE
RUNWAY AIR TEMPERATURE
50°C (122°F)
40°C (104°F)
30°C (86°F)
20°C (68°F)
10°C (50°F)
0°C (32°F)
−10°C (14°F)
−20°C (−4°F)
PRESSURE ALTITUDE—1000 FEET
GROSS WEIGHT—1000 POUNDS
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
WIND—KNOTS
HEAD
TAIL
F-100-1-93-6423
EXAMPLE:
A is gross weight (34,000 pounds).
B is runway air temperature (7°C).
C is altitude baseline.
D is pressure altitude (2000 feet).
E is RCR baseline (RCR 23).
F is wind baseline (zero wind).
G is refusal speed baseline.
H is runway length (7000 feet).
J is refusal speed (123 knots).
NOTE:
1. Use refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to (J).
2. Increase refusal speed 10 percent for selected runway distance if drag chute is used to stop.

Figure C2-6

MODEL: F-100A & C
ENGINE: J57-21

CRITICAL AFTERBURNER FAILURE SPEED

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

NOTE

- Chart based on retaining external stores for take-off.
- Chart includes 700 feet allowance for pilot reaction time from afterburner failure to throttle movement.

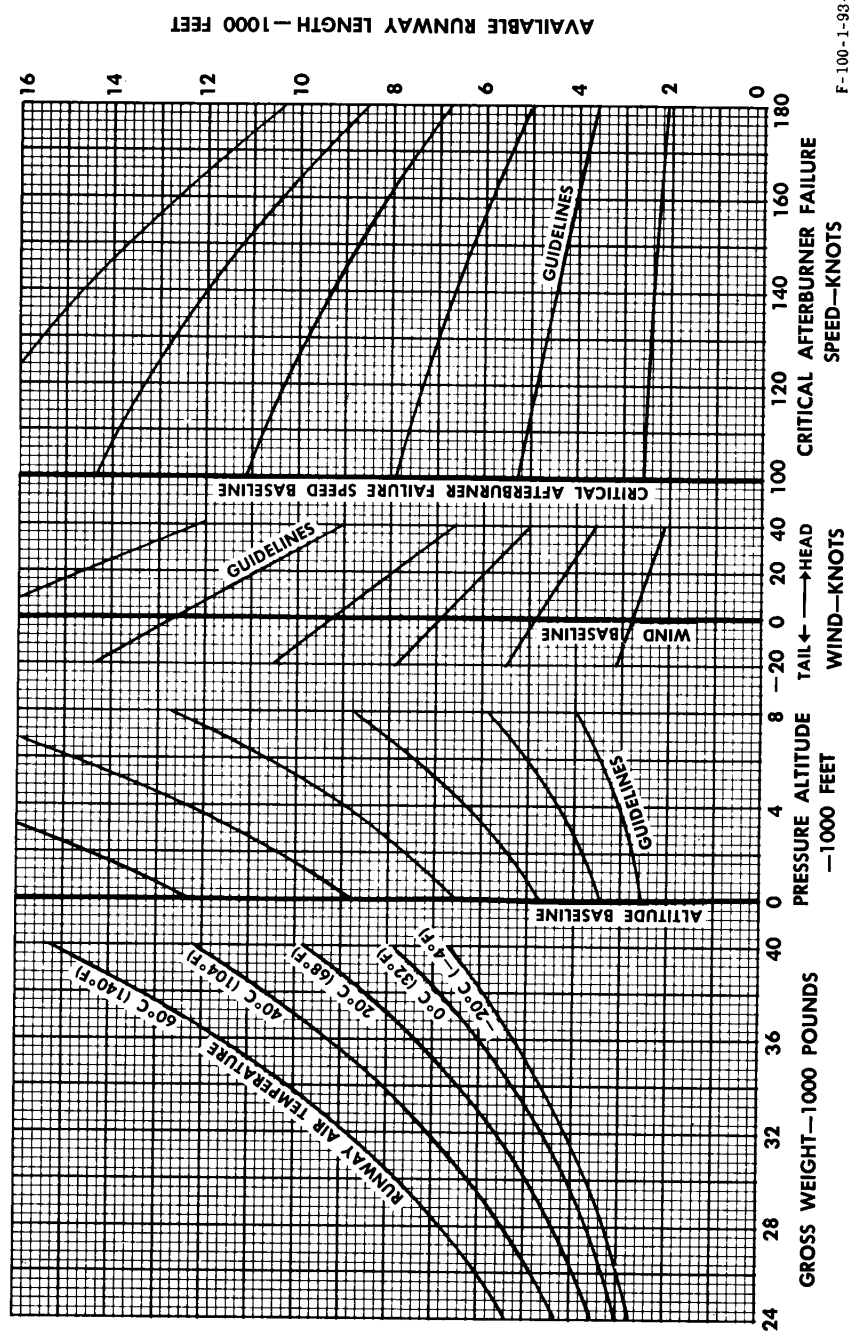


Figure C2-7

PART 3-CLIMB

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Titles CAPITALIZED denote charts.

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Effect of Anti-icing and Defrosting System Operation	C3-1
MAXIMUM THRUST CLIMB	C3-2
MAXIMUM THRUST CLIMB - 350 KNOTS IAS OR .8 INDICATED MACH NUMBER	C3-4
MILITARY THRUST CLIMB	C3-6
MILITARY THRUST CLIMB - 350 KNOTS IAS OR .8 INDICATED MACH NUMBER	C3-8
CRUISE-CLIMB ALTITUDE - FROM SEA LEVEL	C3-10
CRUISE-CLIMB ALTITUDE	C3-12
COMBAT CEILING	C3-13
COMBAT CEILING - 350 KNOTS IAS OR .8 INDICATED MACH NUMBER	C3-14

NOTE For sample problems and descriptive text, refer to Part 3, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of the anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown on the climb charts. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before using the climb charts.

SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	700 lb	500 lb

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

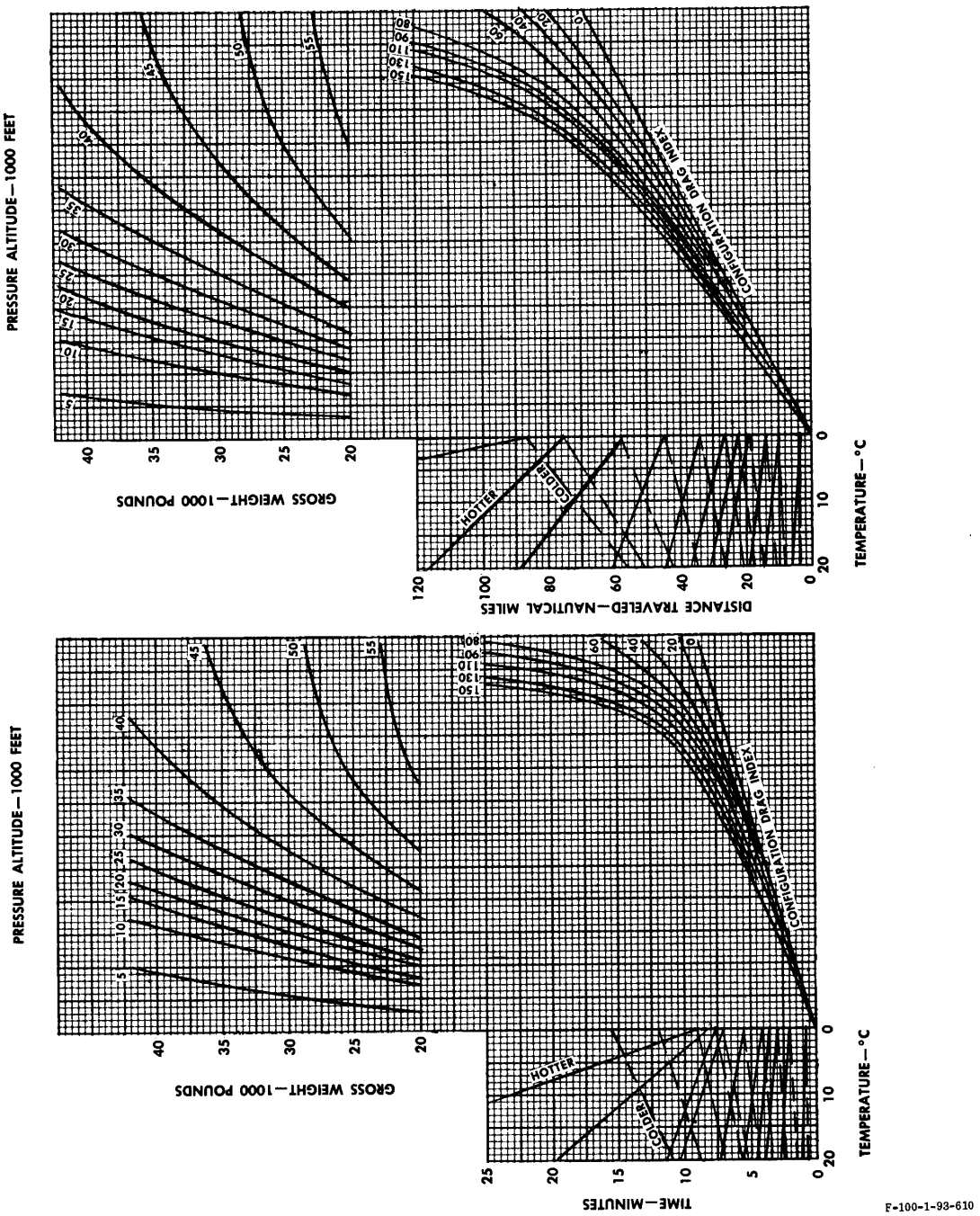


Figure C3-1 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

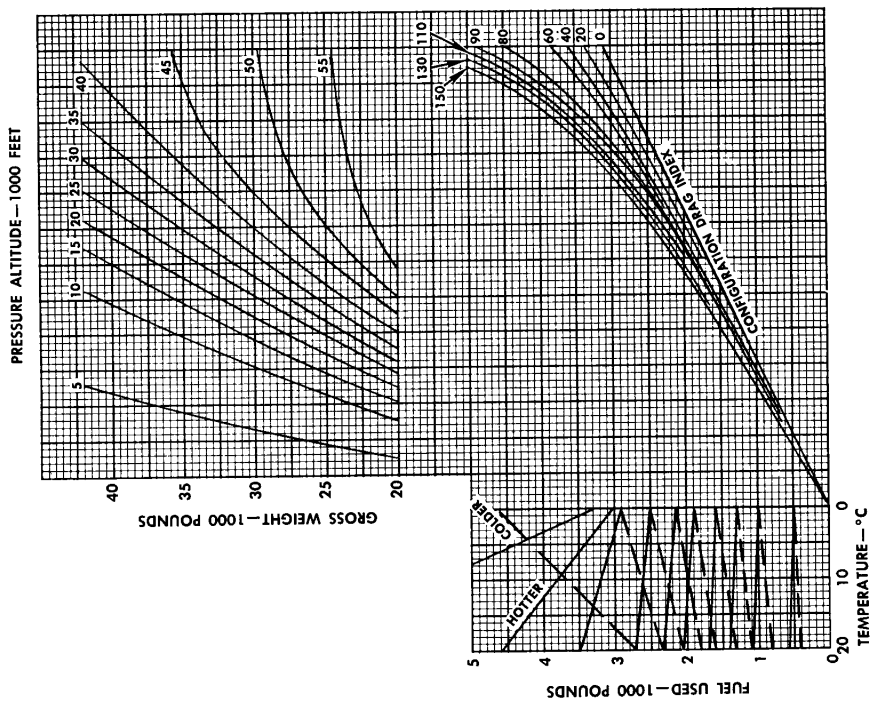
CLIMB SCHEDULE

PRESSURE ALTITUDE —1000 FEET	CONFIGURATION DRAG INDEX 0,10,20 KNOTS IAS	0,10,20 IND MACH	30,40,50,60 KNOTS IAS	30,40,50,60 IND MACH	70,80,90 KNOTS IAS	70,80,90 IND MACH
SL	196	.30	196	.30	196	.30
5	366	.60	353	.58	344	.56
10	502	.88	488	.86	474	.84
15	462	.88	449	.86	437	.84
20	421	.88	410	.86	402	.85
25	381	.88	374	.87	366	.85
30	344	.88	338	.87	333	.86
35	309	.88	305	.88	302	.87
40	276	.88	272	.88	269	.87
45	246	.88	243	.88	240	.87
50	219	.88	217	.88	214	.87

PRESSURE ALTITUDE —1000 FEET	110 KNOTS IAS	110 IND MACH	130 KNOTS IAS	130 IND MACH	150 KNOTS IAS	150 IND MACH
SL	196	.30	196	.30	196	.30
5	330	.54	334	.55	325	.54
10	450	.80	453	.80	439	.78
15	421	.81	418	.81	407	.79
20	385	.82	385	.82	376	.80
25	354	.83	352	.82	345	.81
30	324	.84	321	.83	316	.82
35	295	.85	291	.84	288	.83
40	264	.85	261	.84	258	.84
45	235	.85	232	.84	229	.84
50	209	.85	207	.84	204	.84

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



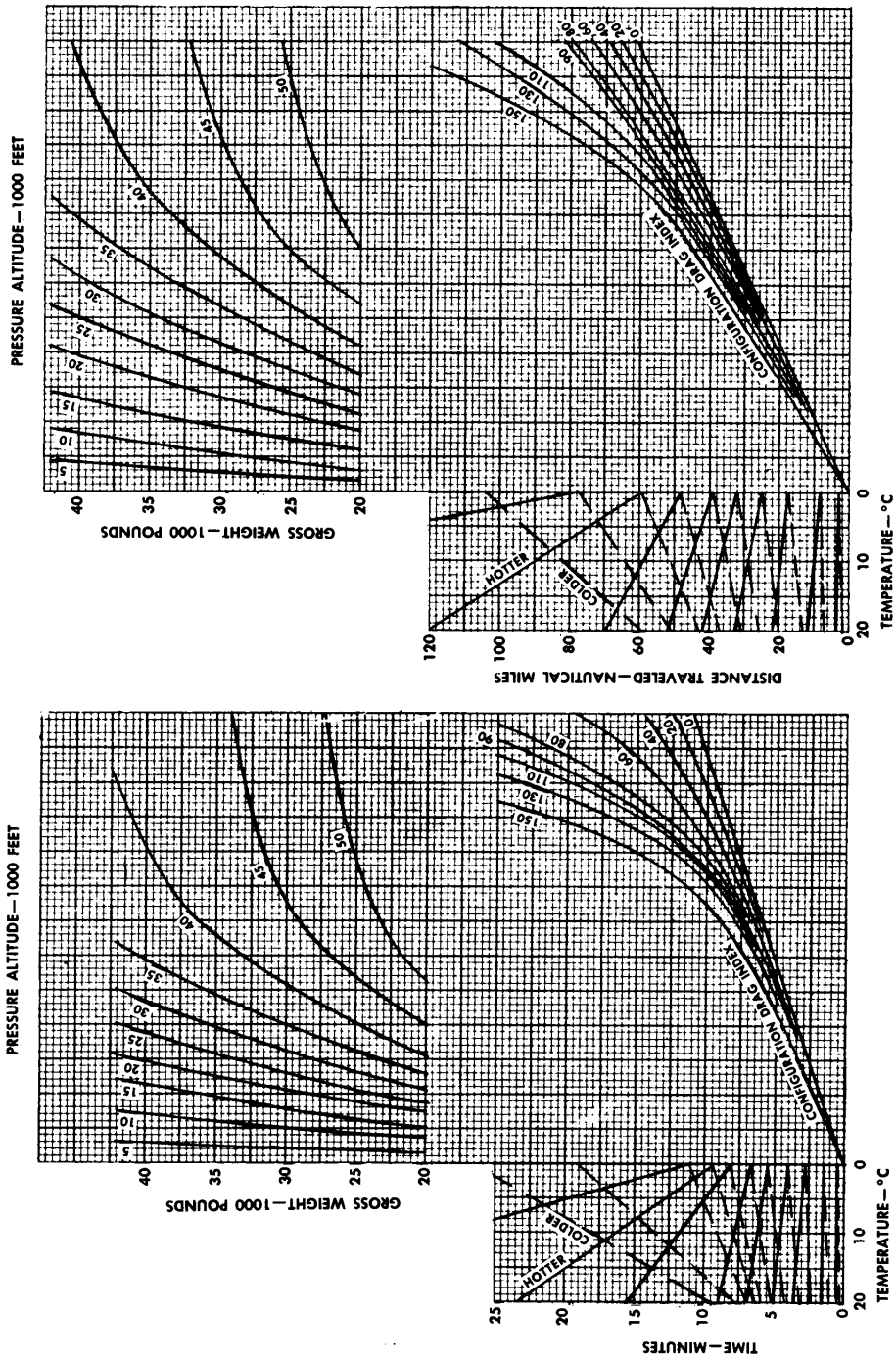
F-100-1-93-611A

Figure C3-1 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

350 KNOTS IAS OR .8 MACH NUMBER
(WHICHEVER IS LESS)



F-100-1-93-622

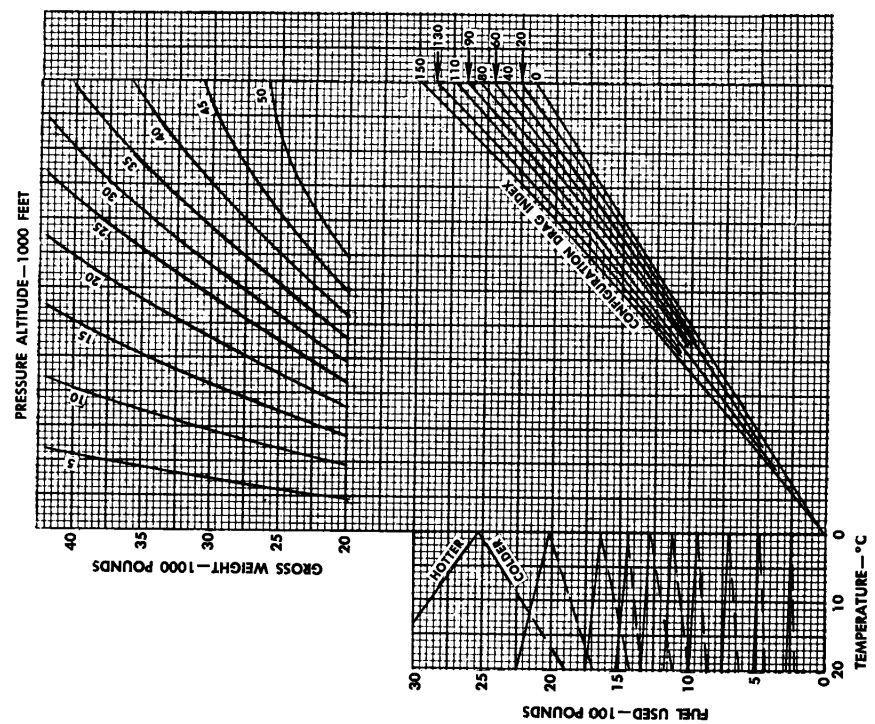
Figure C3-2 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE 1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	279	.80
40	250	.80
45	220	.80
50	196	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

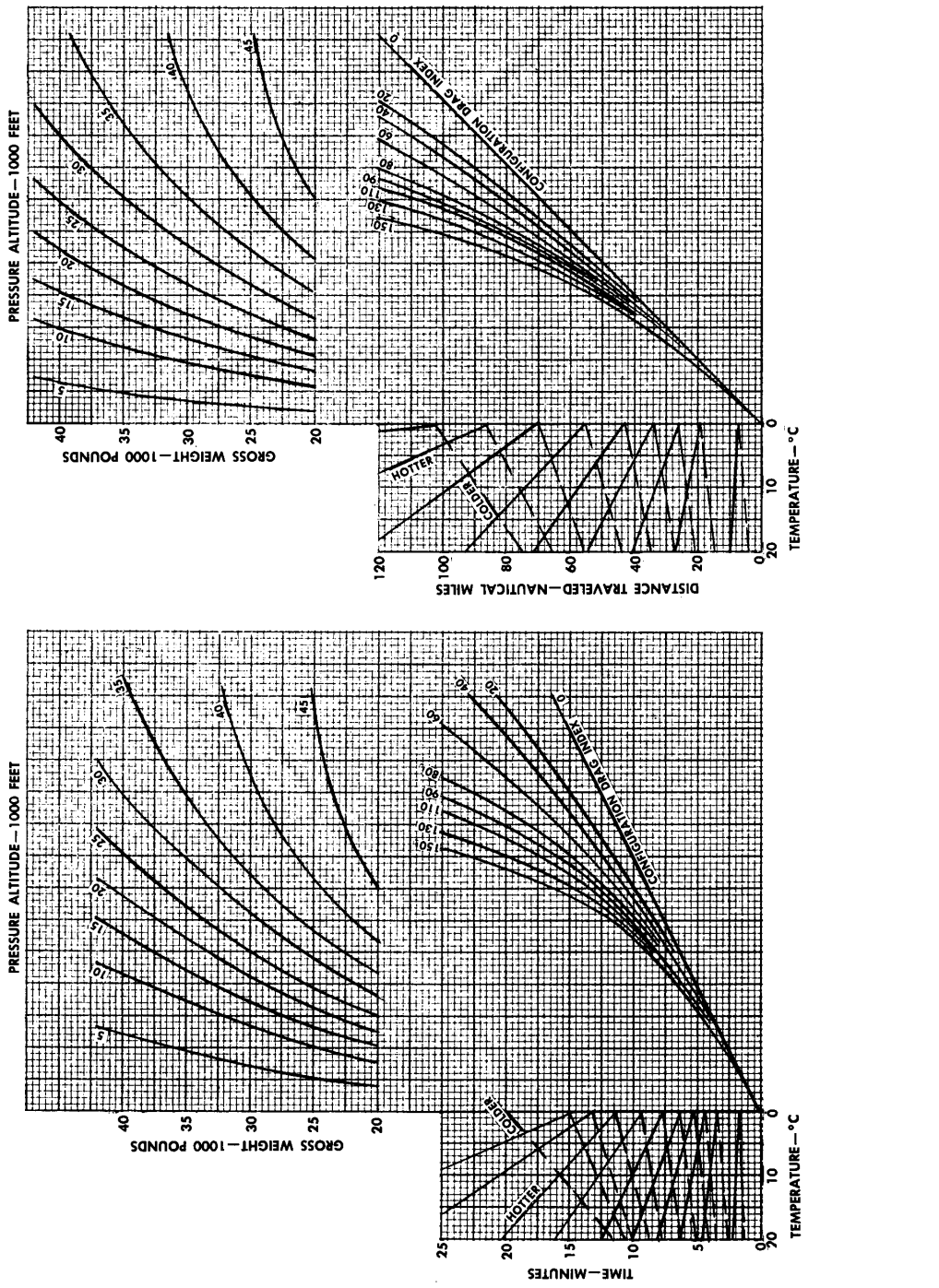


F-100-1-93-623A

Figure C3-2 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB



F-100-1-93-612

Figure C3-3 (Sheet 1 of 2)

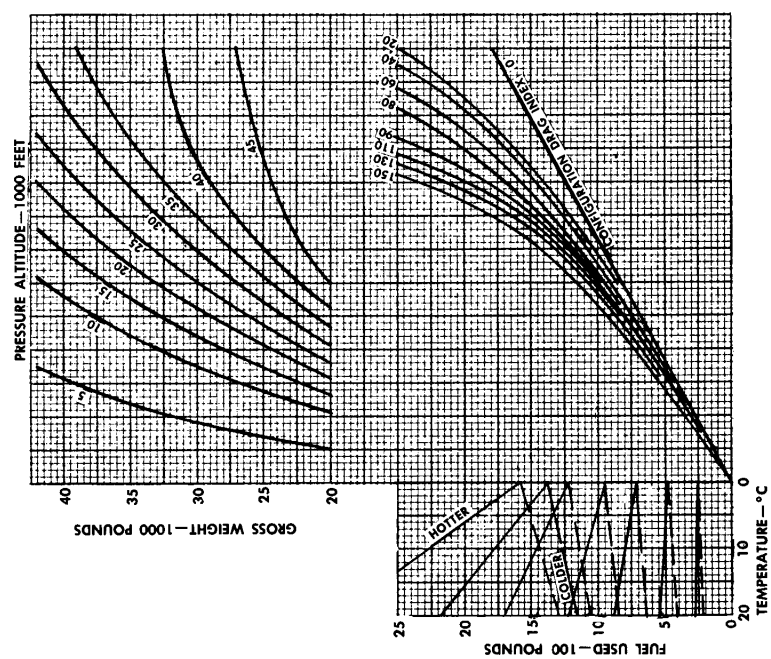
MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE

PRESSURE ALTITUDE—1000 FEET	CONFIGURATION DRAG INDEX 0, 10, 20 KNOTS IAS	0, 10, 20 IND MACH	30, 40, 50 KNOTS IAS	30, 40, 50 IND MACH	60, 70, 80, 90 KNOTS IAS	60, 70, 80, 90 IND MACH	110, 130, 150 KNOTS IAS	110, 130, 150 IND MACH
SL	196	.30	196	.30	196	.30	196	.30
5	311	.51	292	.47	278	.46	256	.41
10	413	.73	374	.67	348	.62	311	.56
15	391	.76	359	.70	338	.66	306	.60
20	368	.78	345	.74	329	.71	302	.65
25	345	.81	329	.77	317	.75	296	.70
30	324	.84	312	.81	304	.79	288	.75
35	302	.87	295	.85	291	.84	278	.81
40	269	.87	264	.85	261	.84	248	.81
45	240	.87	235	.85	232	.84	222	.81
50	214	.87	209	.85	207	.84	197	.81

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-613

Figure C3-3 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB

350 KNOTS IAS OR .8 MACH NUMBER
(WHICHEVER IS LESS)

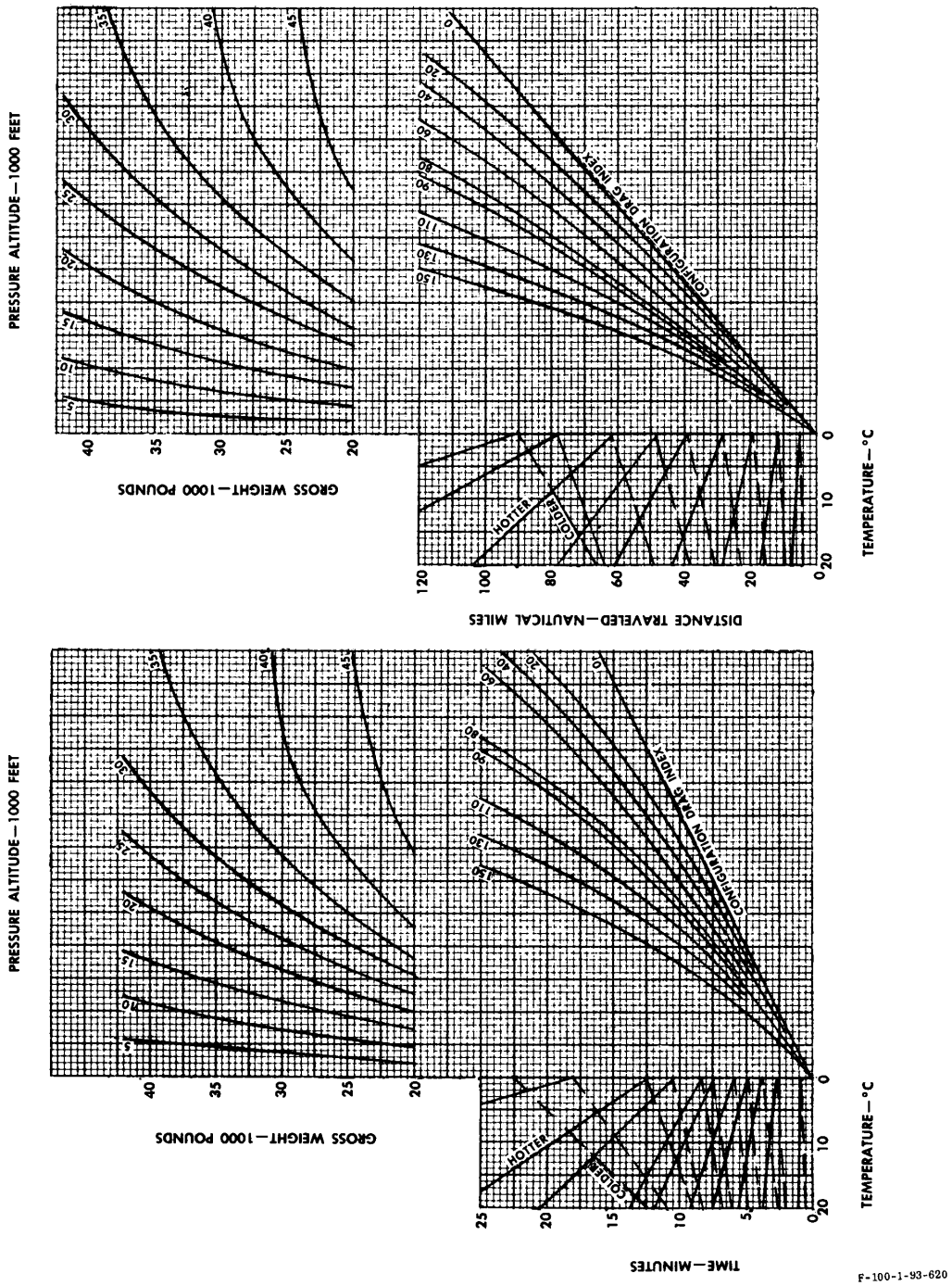


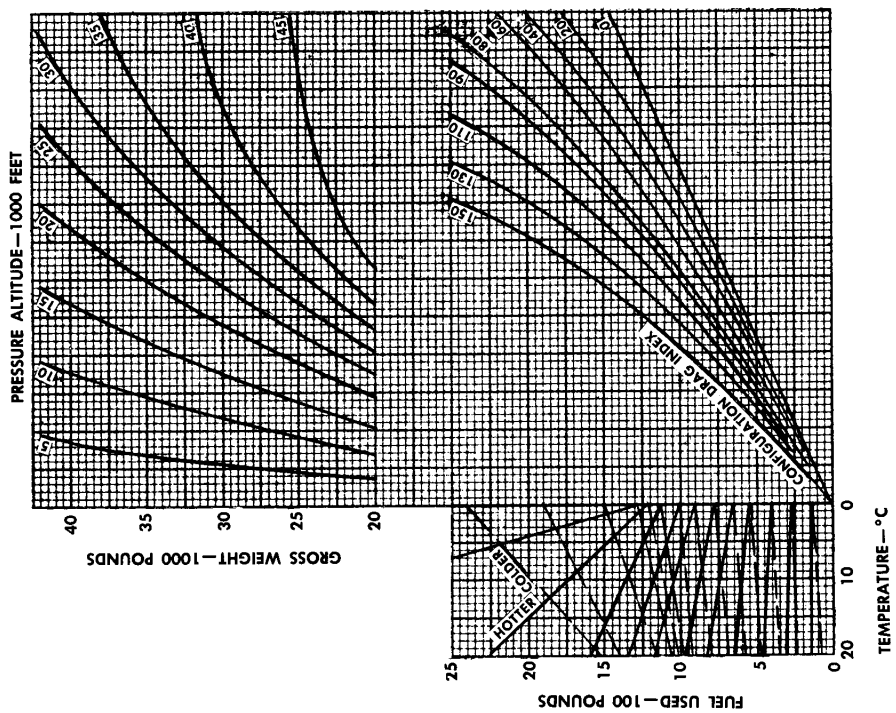
Figure C3-4 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE —1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	279	.80
40	250	.80
45	220	.80
50	196	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-621A

Figure C3-4 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

CRUISE-CLIMB ALTITUDE

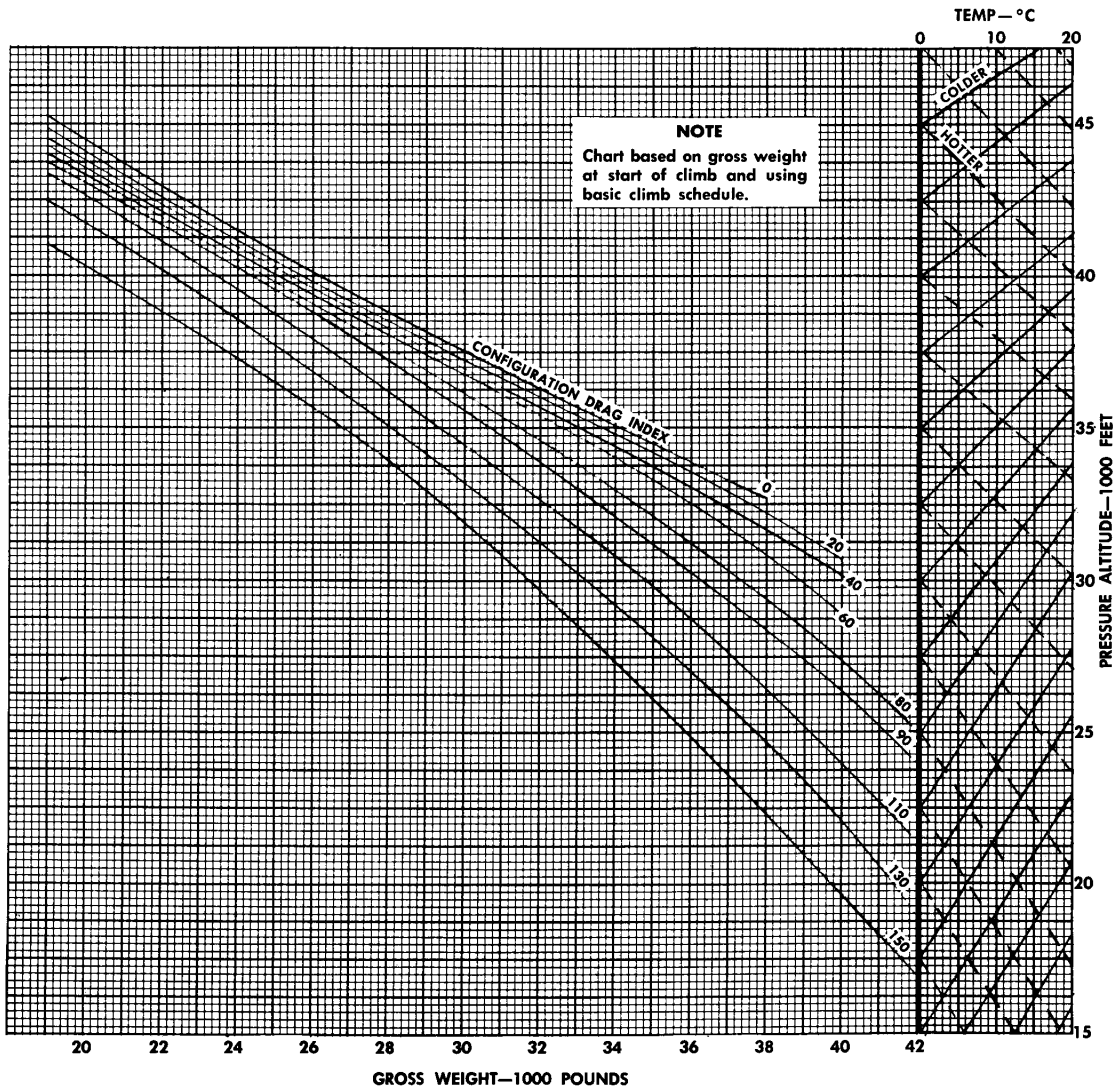


Figure C3-5 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

FROM SEA LEVEL

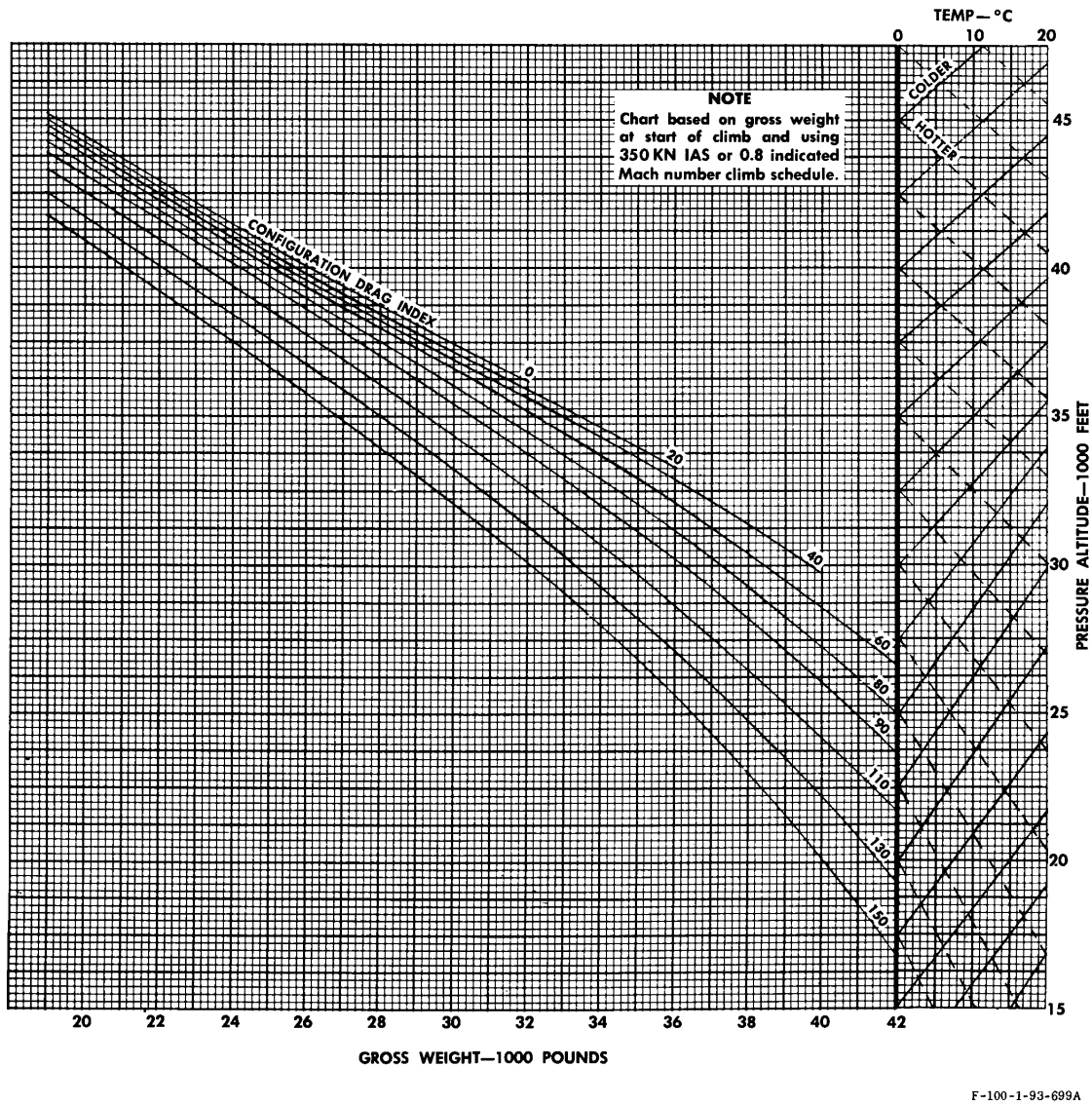


Figure C3-5 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

CRUISE-CLIMB ALTITUDE

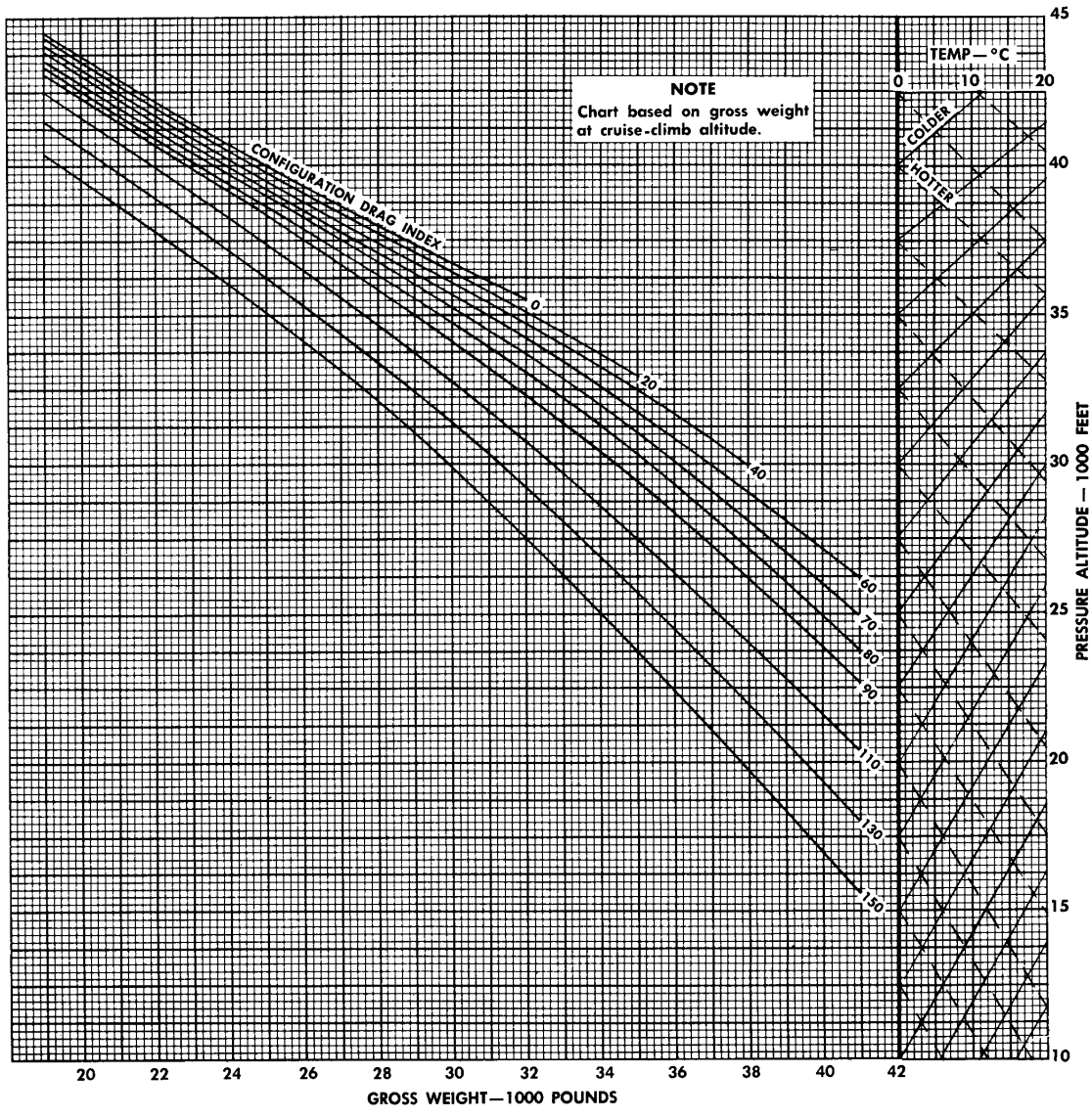
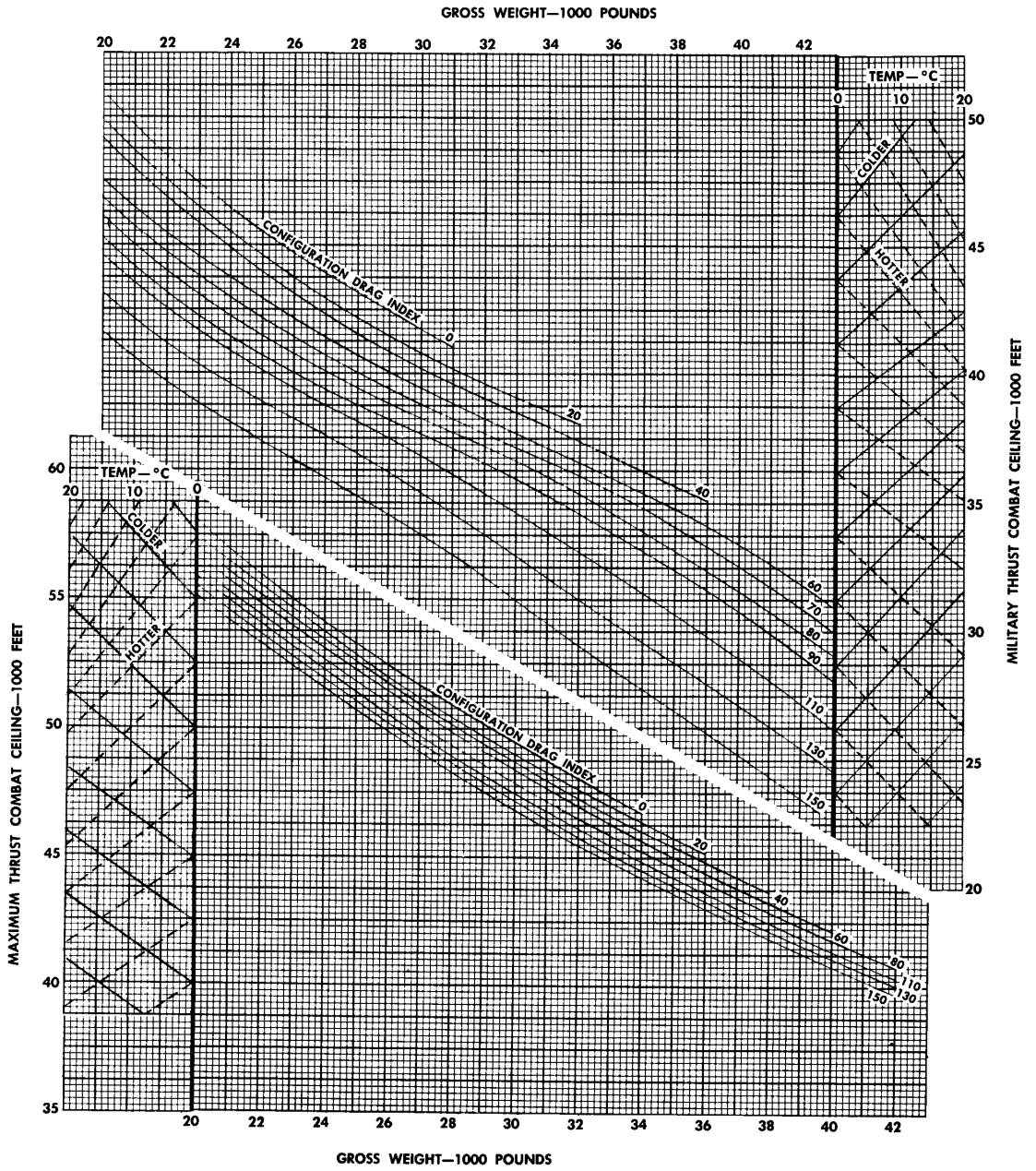


Figure C3-6

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

COMBAT CEILING

MODEL: F-100A & C
ENGINE: J57-21



F-100-1-93-702A

Figure C3-7

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

COMBAT CEILING

350 KNOTS IAS OR .8 INDICATED MACH NUMBER
(WHICHEVER IS LESS)

MODEL: F-100A & C
ENGINE: J57-21

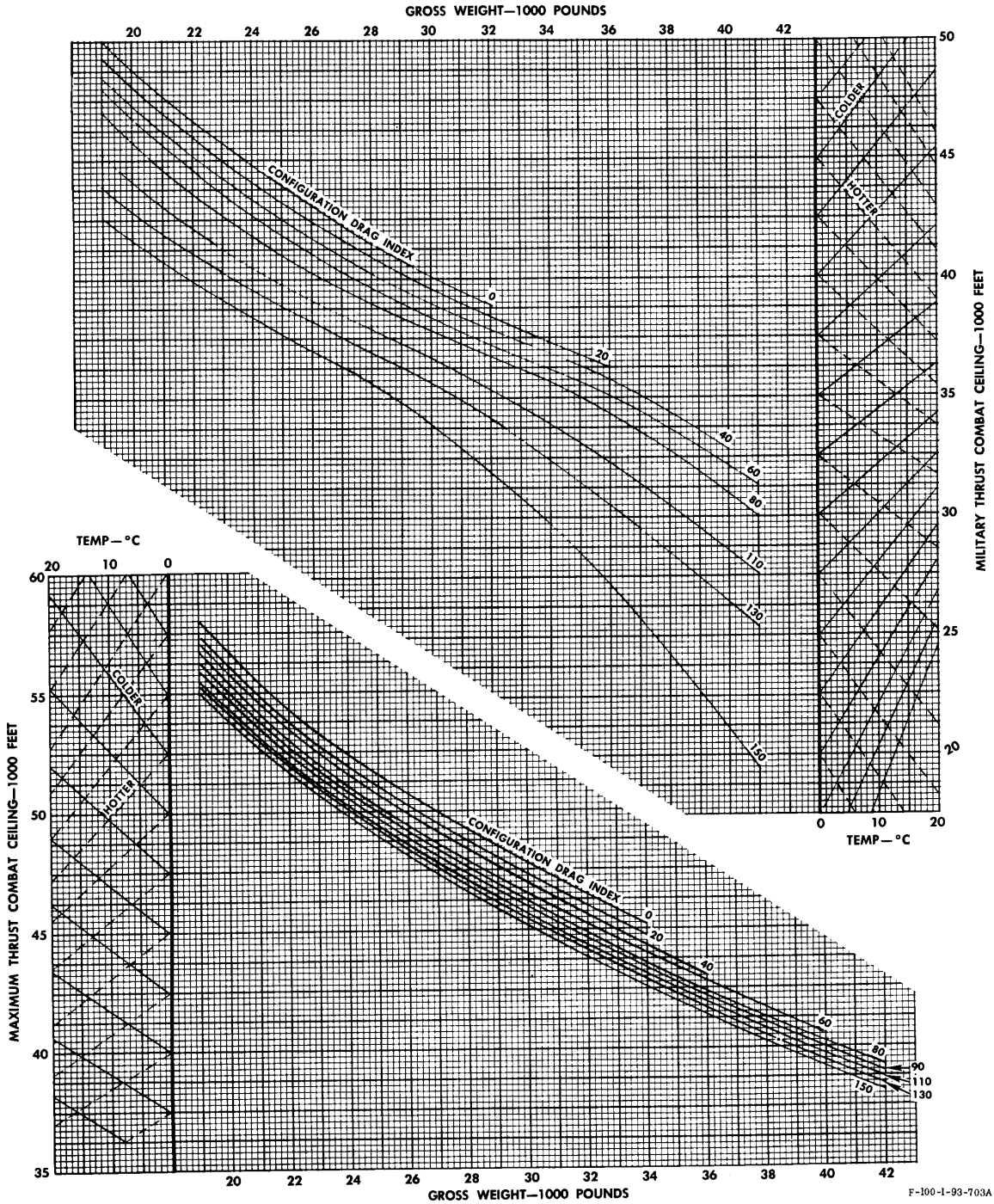


Figure C3-8

PART 4–RANGE

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Titles CAPITALIZED denote charts.

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CONFIGURATION DRAG INDEX 20	C4-6
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CONFIGURATION DRAG INDEX 90	C4-20
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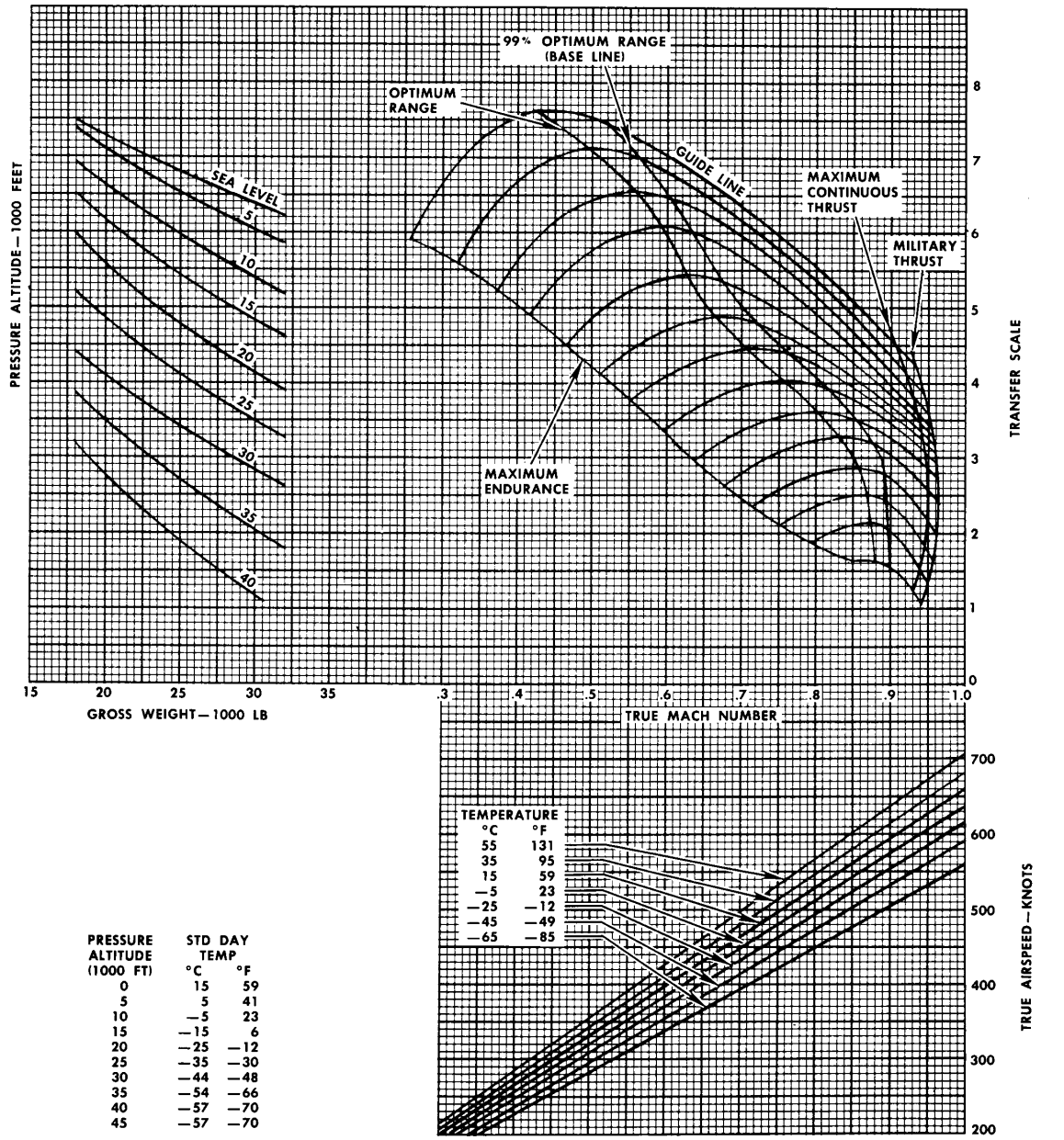
NOTE For sample problems and descriptive text, refer to Part 4, Section I, of this manual.

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 0 _____



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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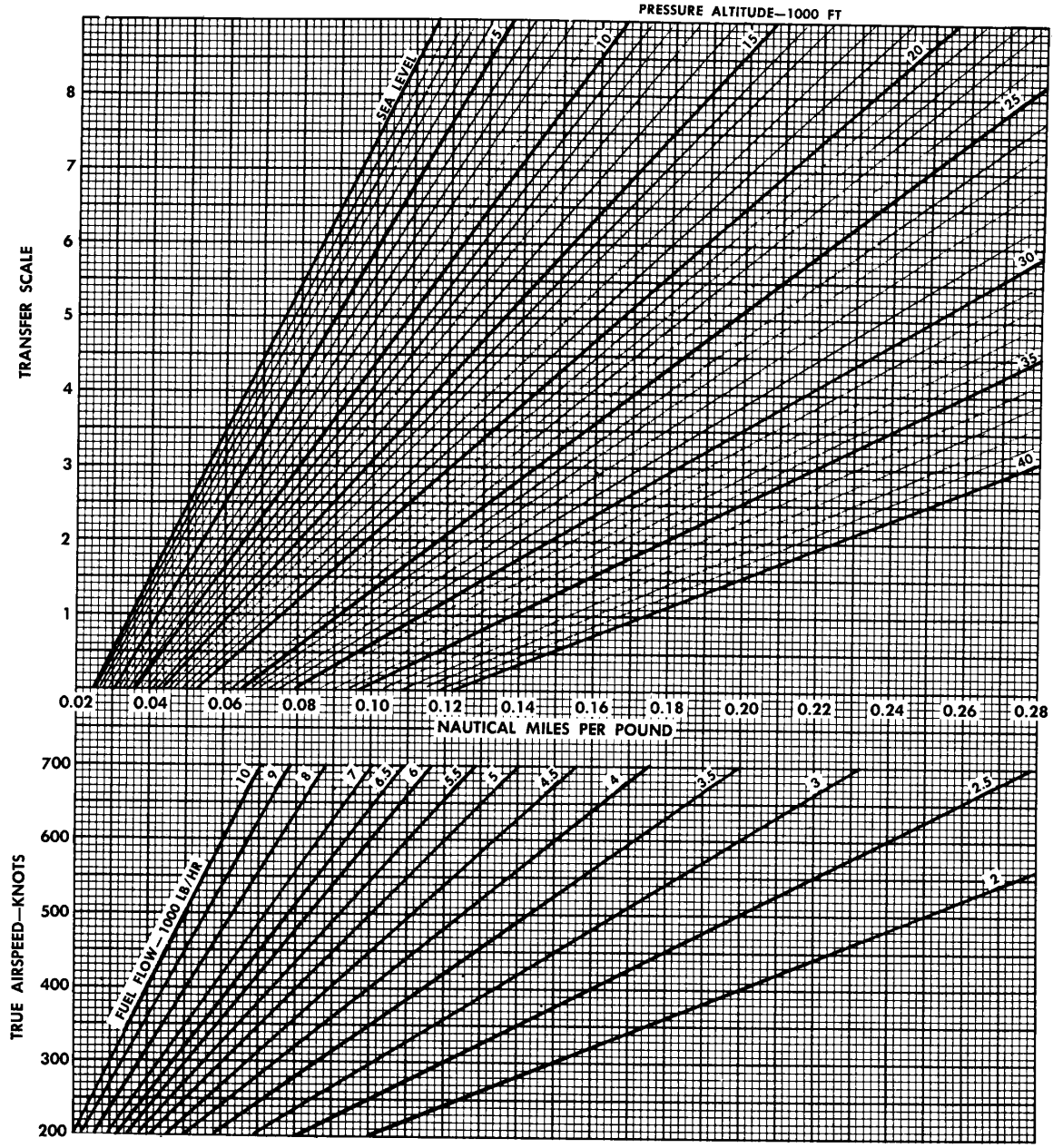
5	5	41
10	−5	23
15	−15	6
20	−25	−12
25	−35	−30
30	−44	−48
35	−54	−66
40	−57	−70
45	−57	−70

F-100-1-93-624

Figure C4-1 (Sheet 1 of 2)

NAUTICAL MILES PER POUND OF FUEL

MODEL: F-100A & C
ENGINE: J57-21

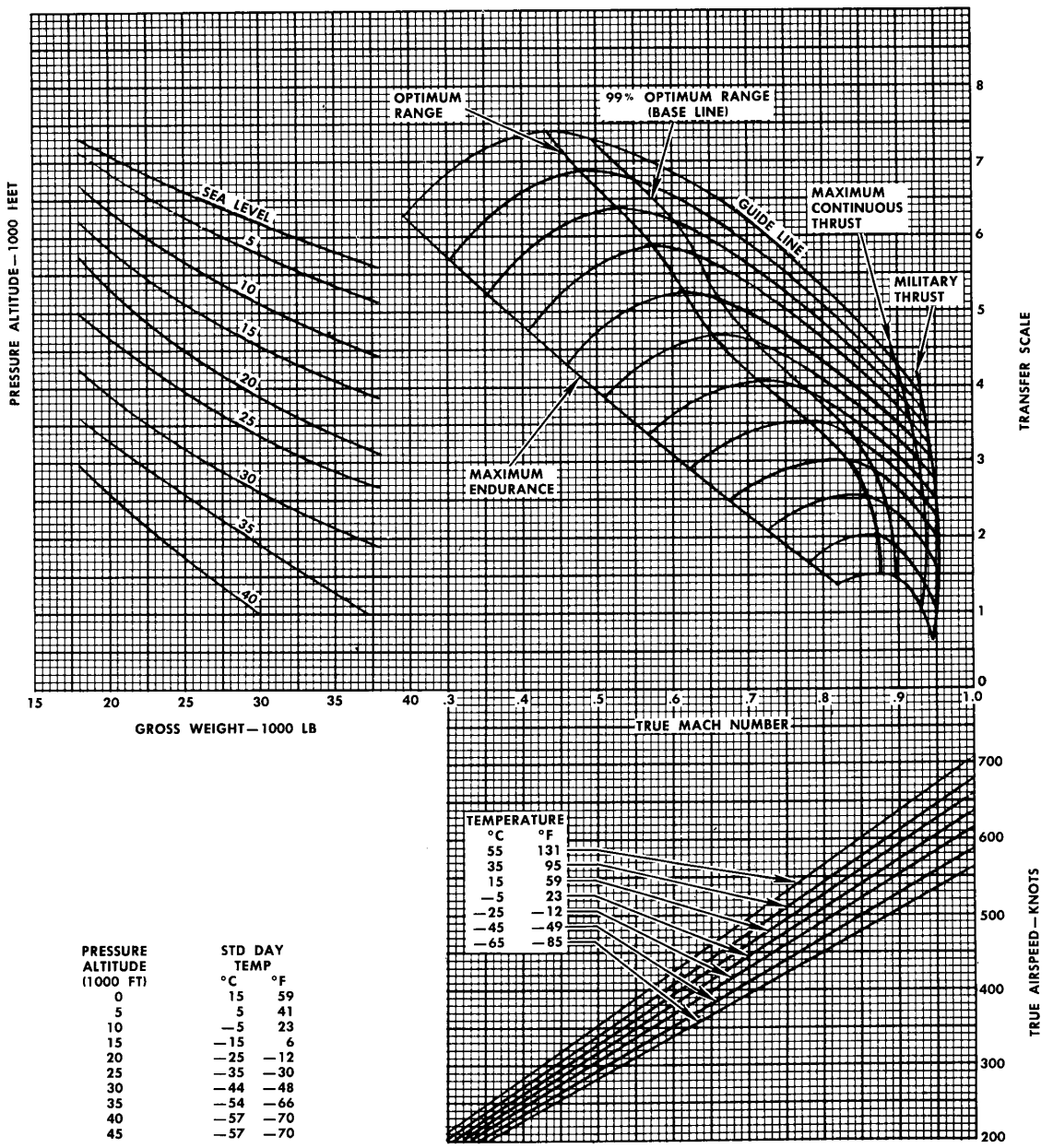


F-100-1-93-697

Figure C4-1 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 10

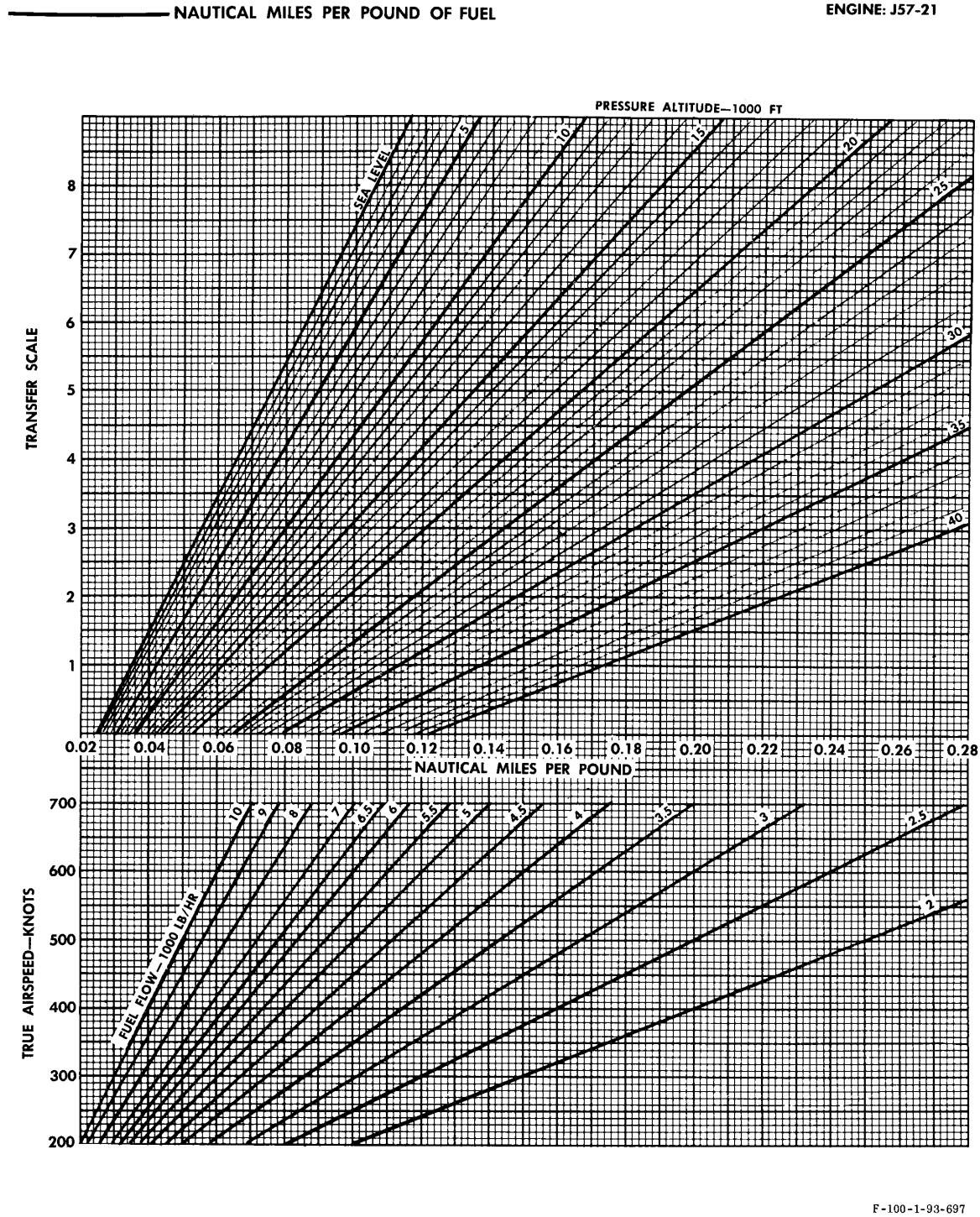


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-625

Figure C4-2 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

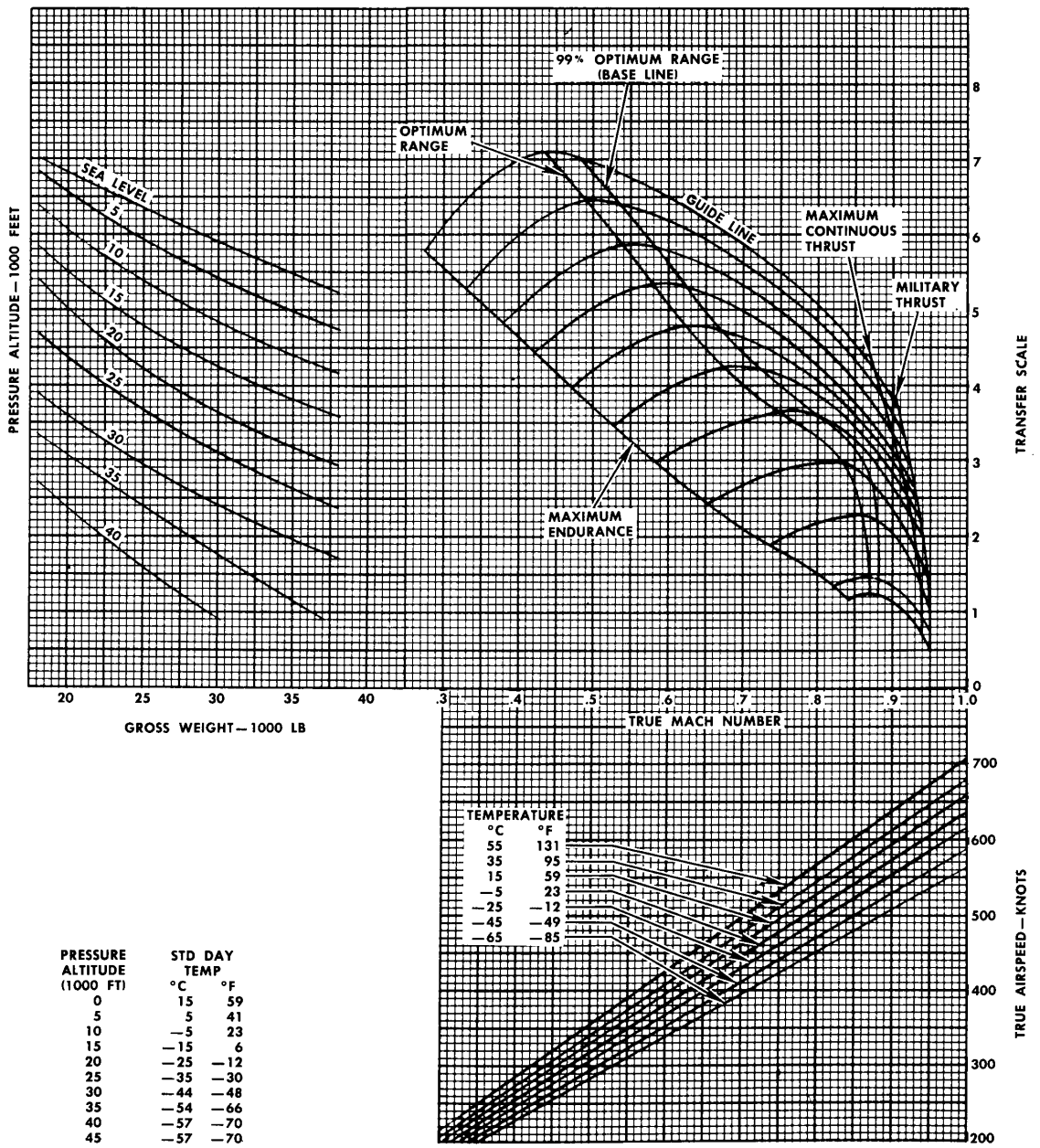


F-100-1-93-697

Figure C4-2 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 20



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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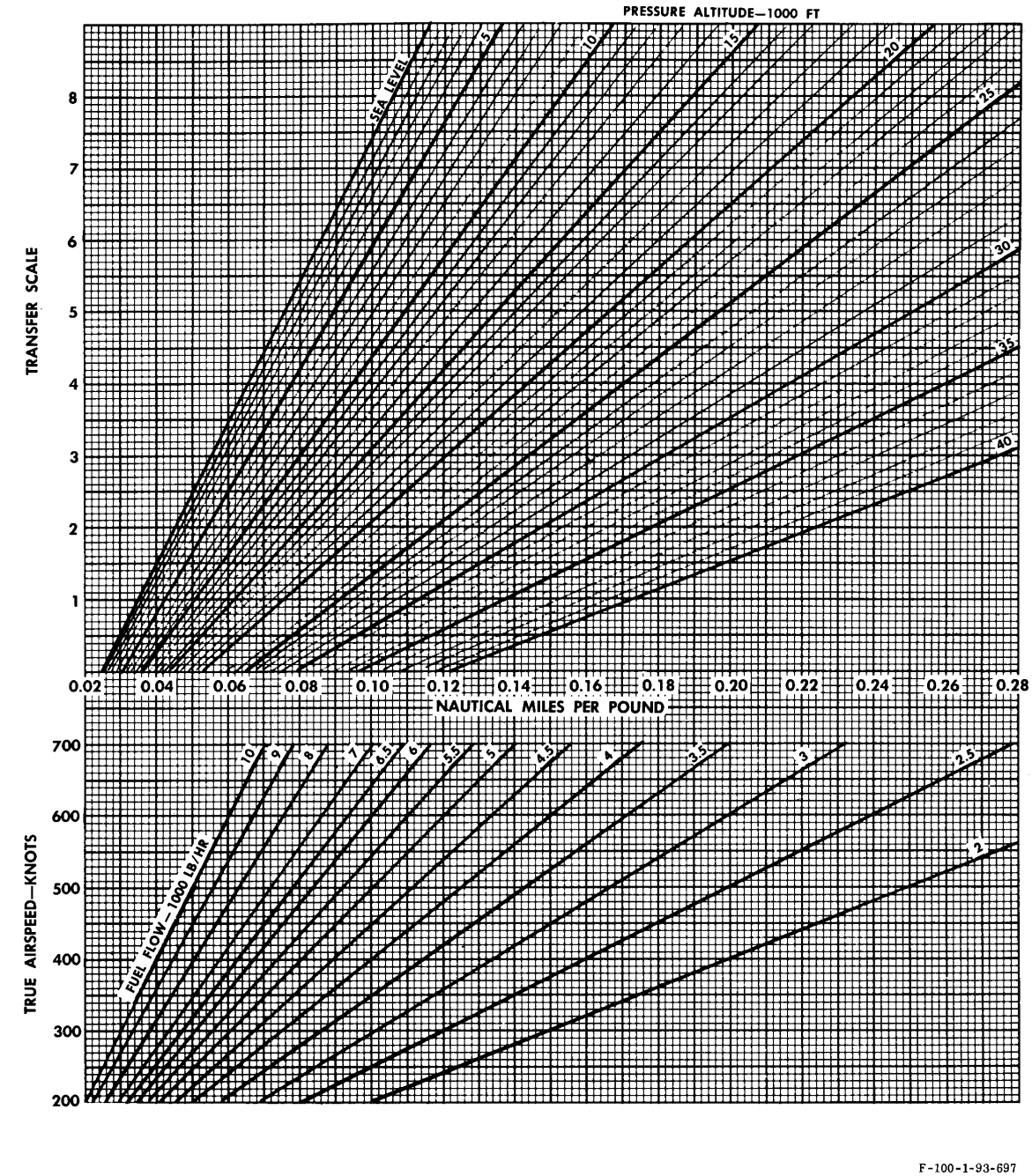
5	5	41
10	−5	23
15	−15	6
20	−25	−12
25	−35	−30
30	−44	−48
35	−54	−66
40	−57	−70
45	−57	−70

F-100-1-93-626

Figure C4-3 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

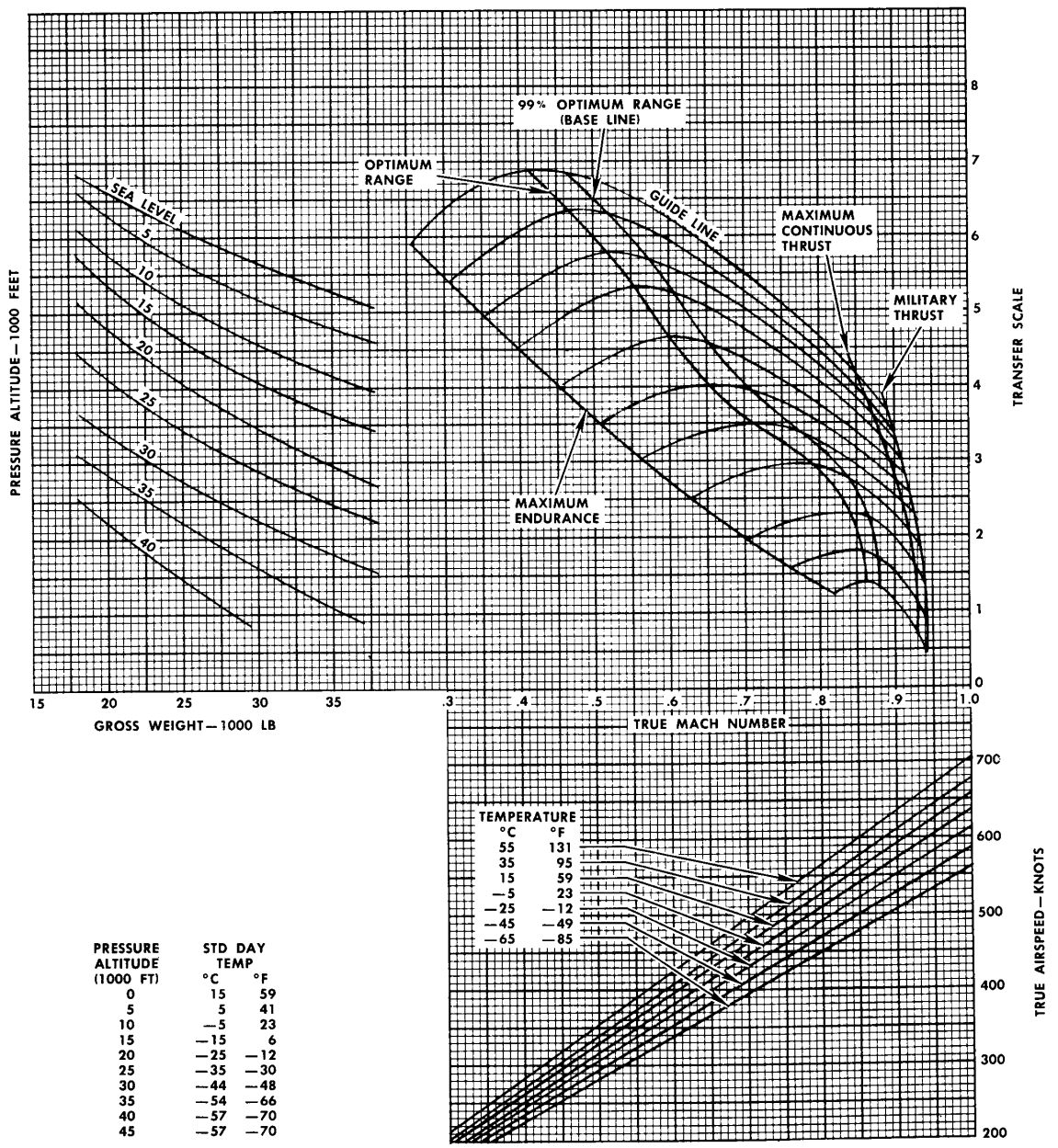


F-100-1-93-697

Figure C4-3 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 30 _____

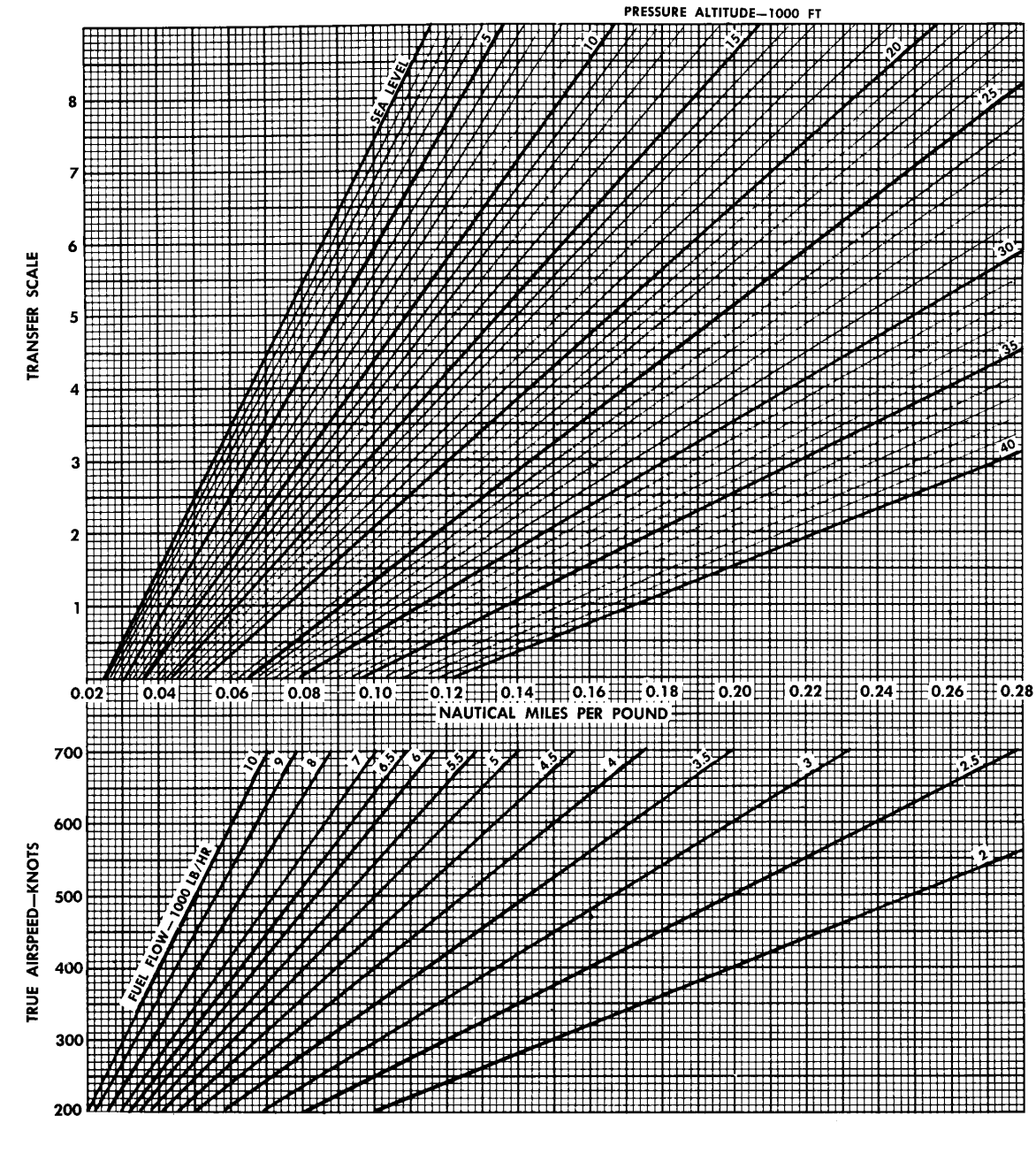


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-627

Figure C4-4 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

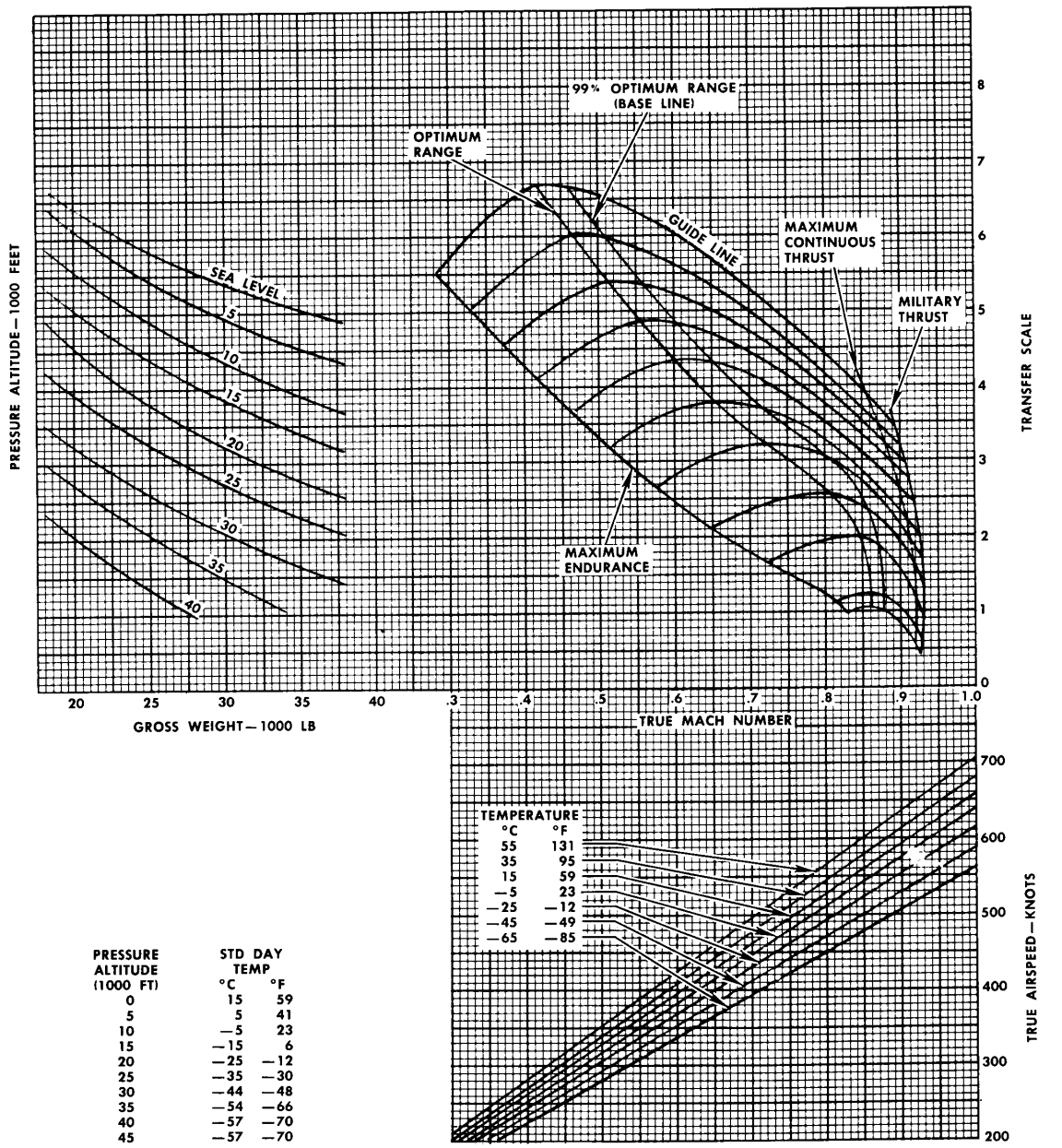


F-100-1-93-697

Figure C4-4 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 40



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-628

Figure C4-5 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

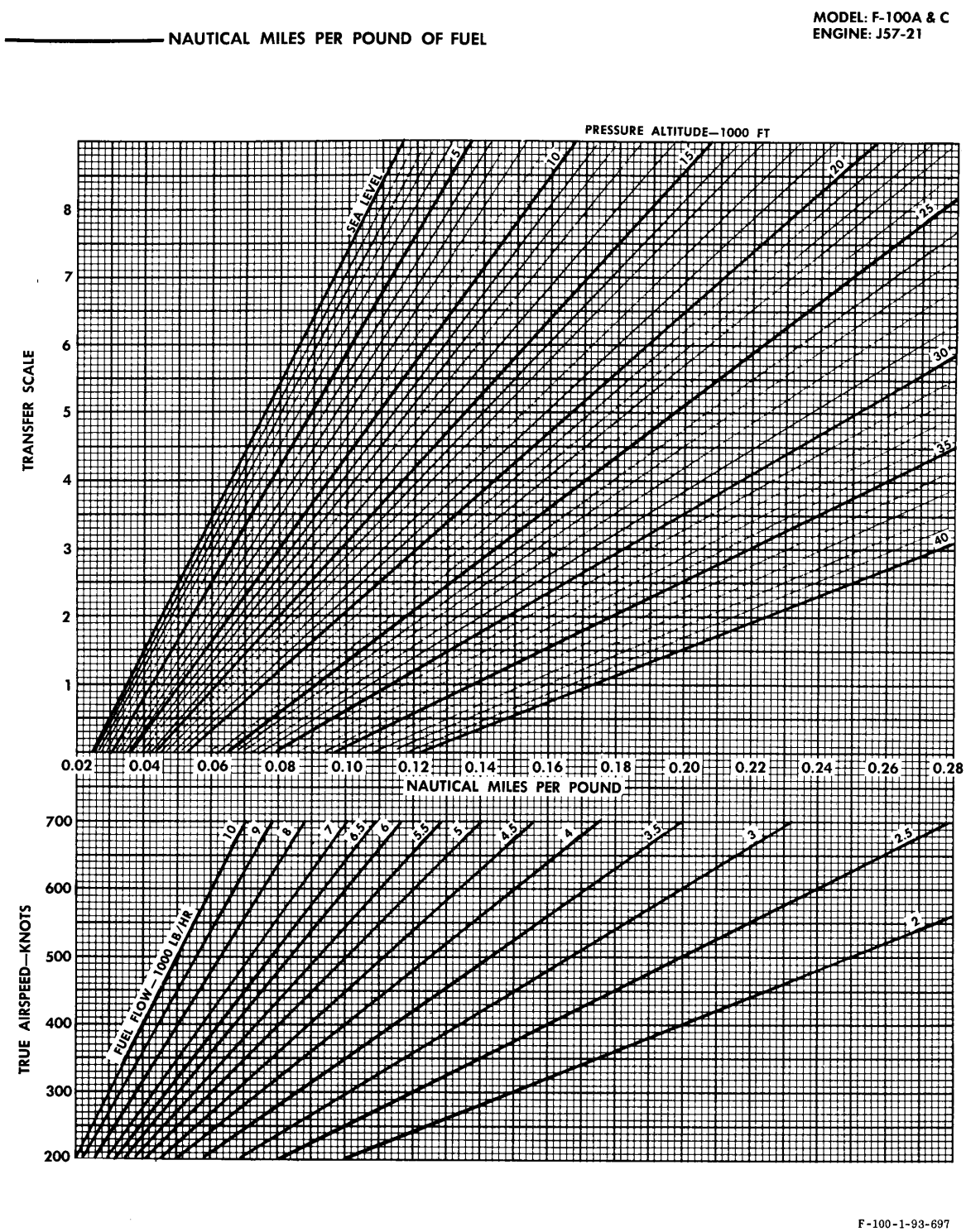
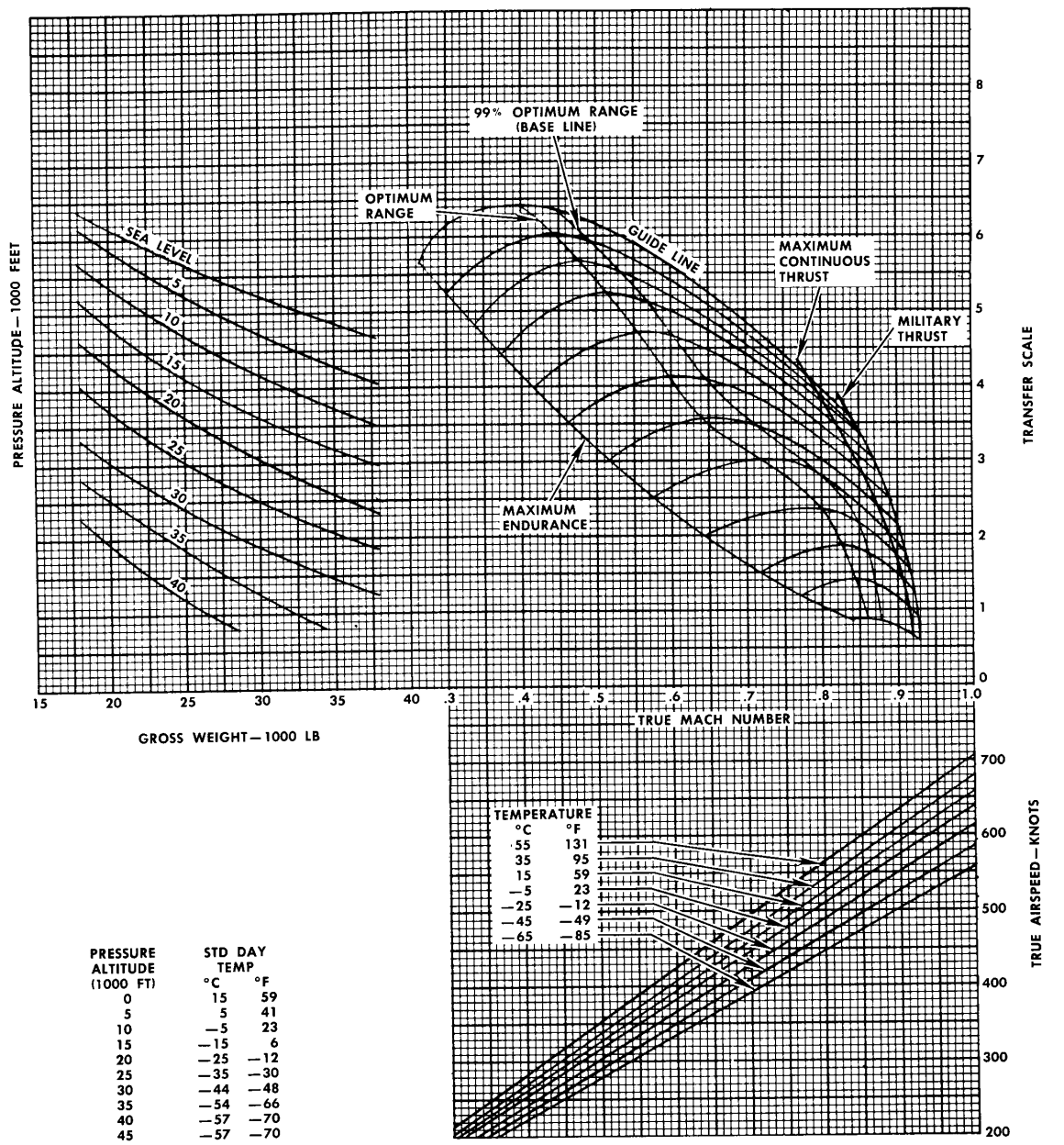


Figure C4-5 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 50



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-629

Figure C4-6 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

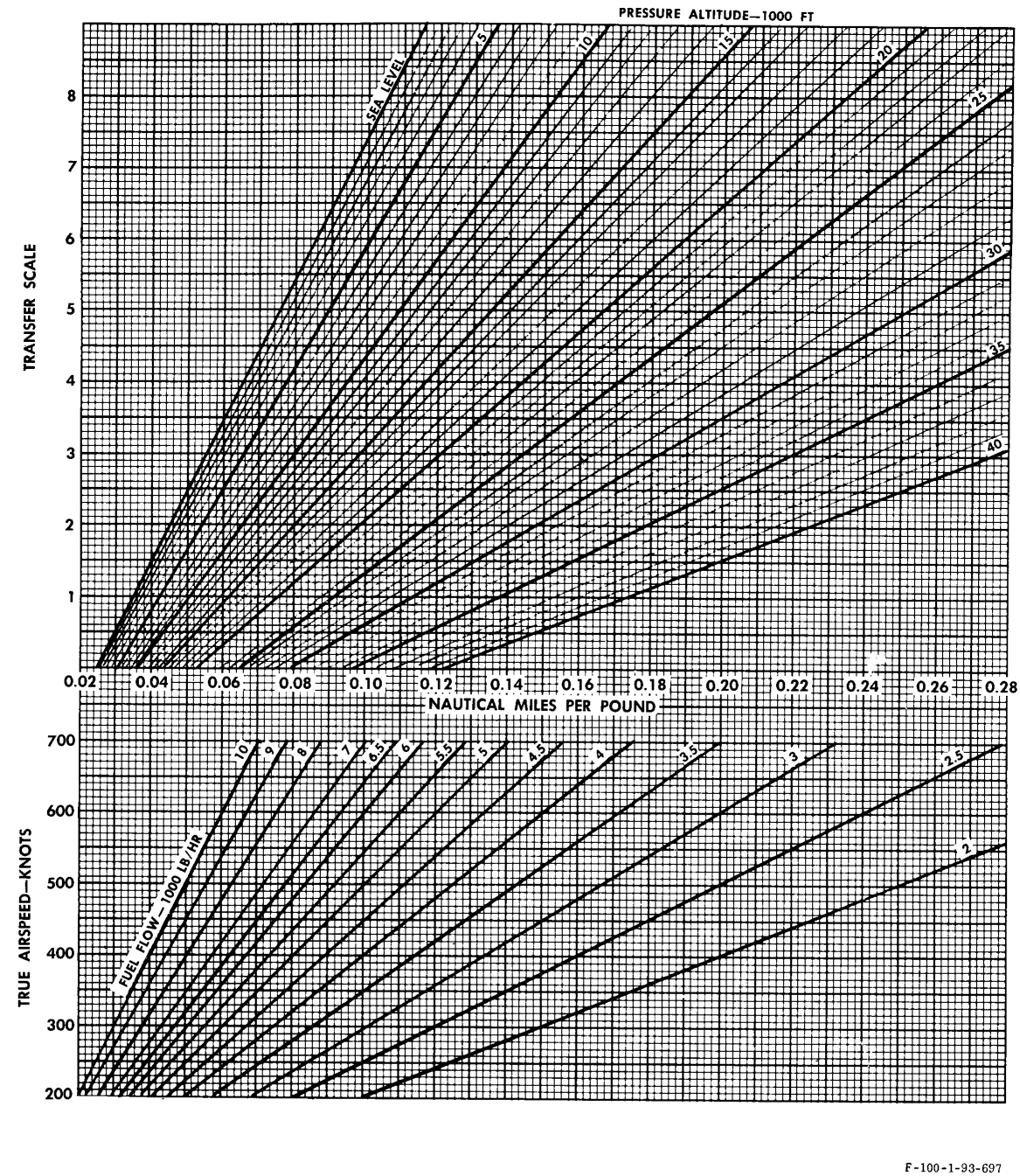
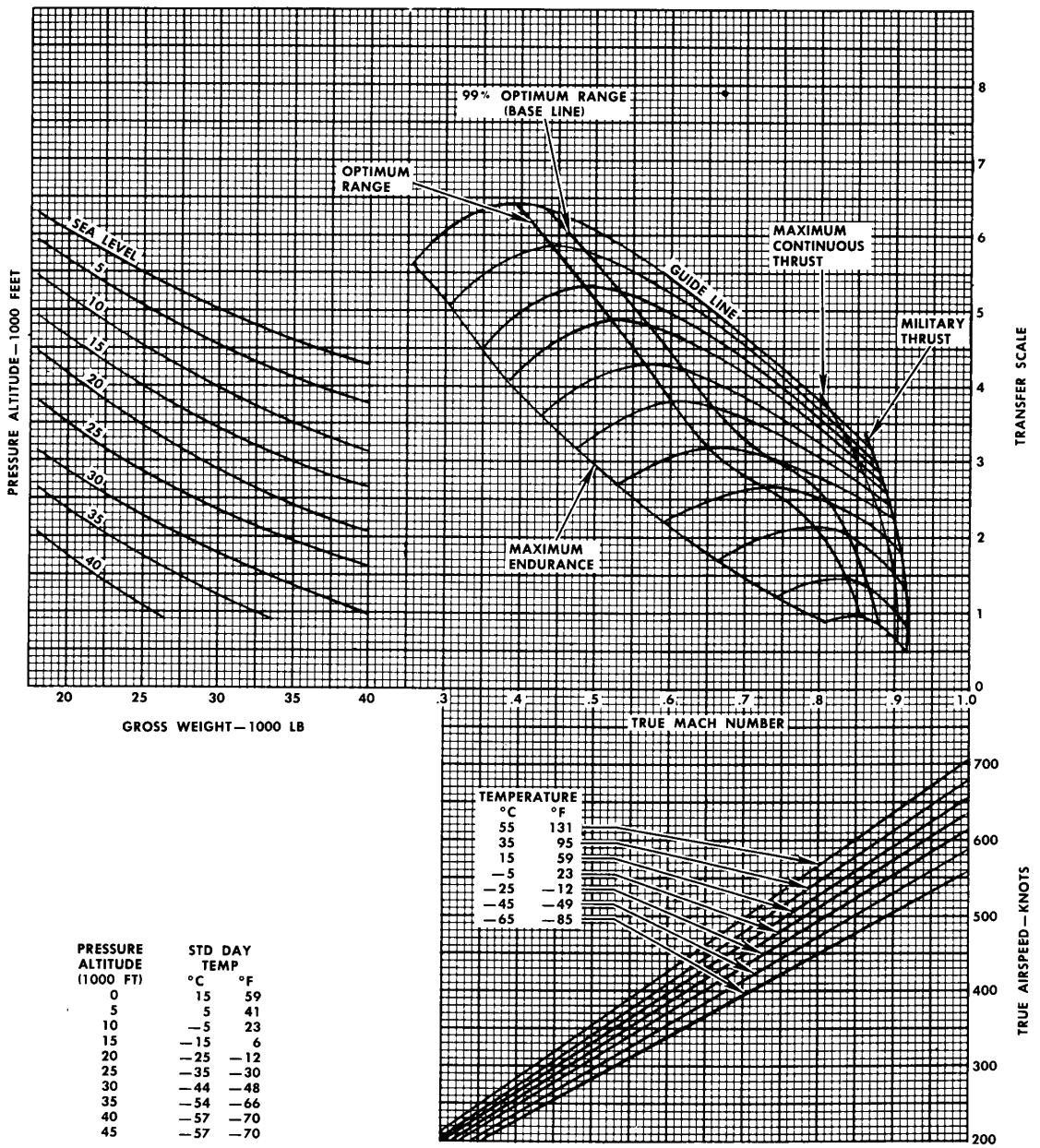


Figure C4-6 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 60 _____



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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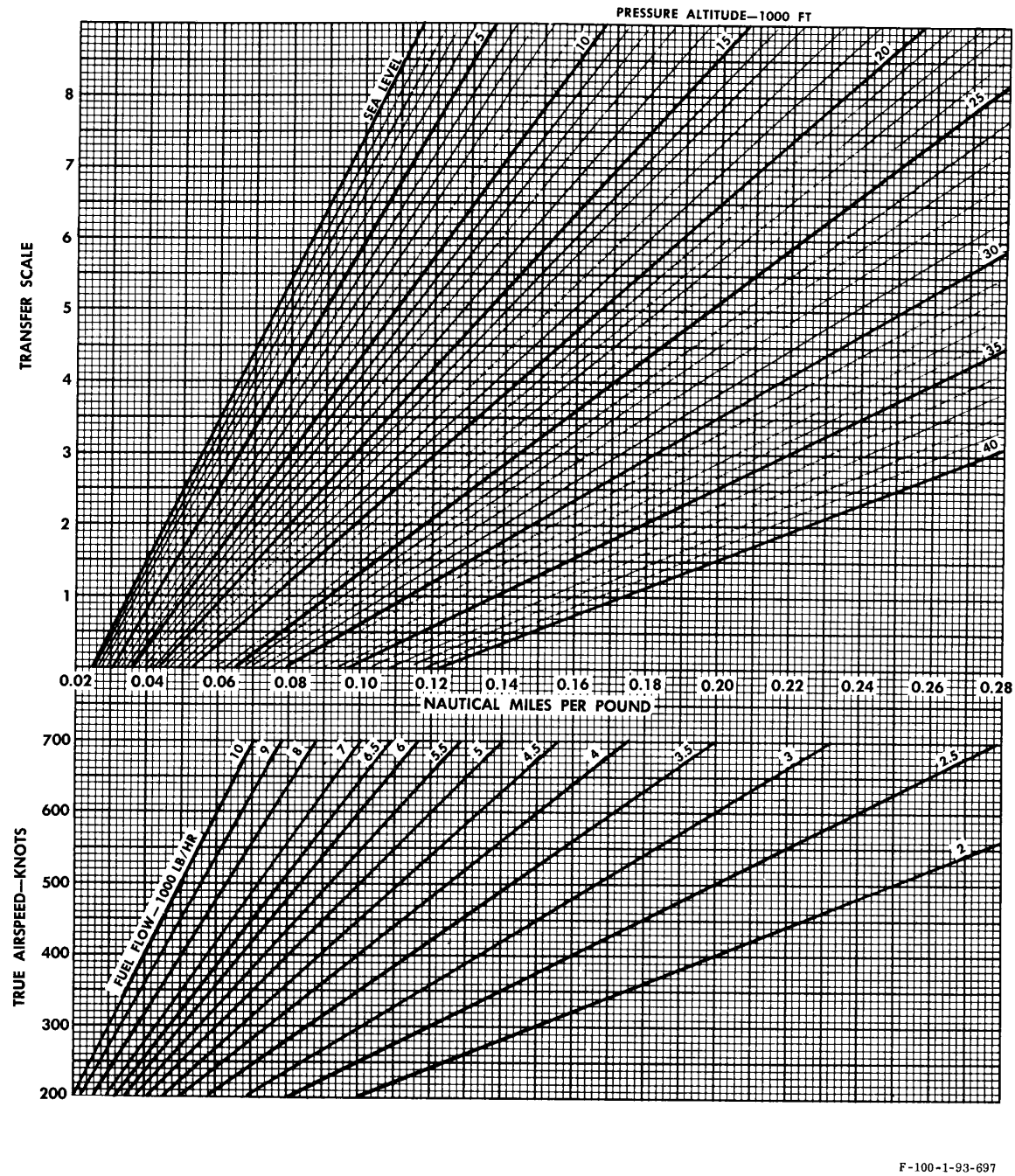
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-630

Figure C4-7 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

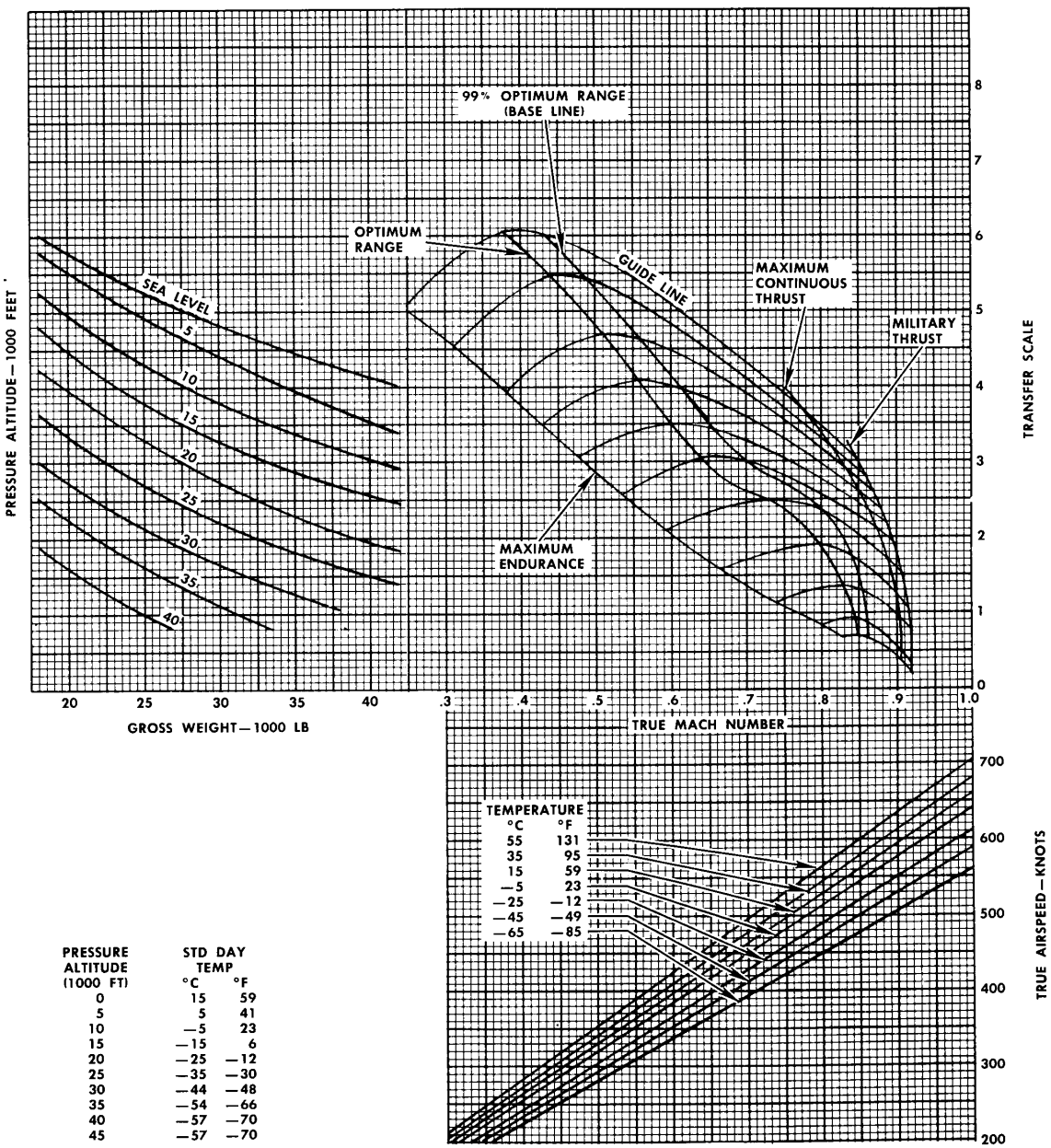


F-100-1-93-697

Figure C4-7 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 70



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-631

Figure C4-8 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

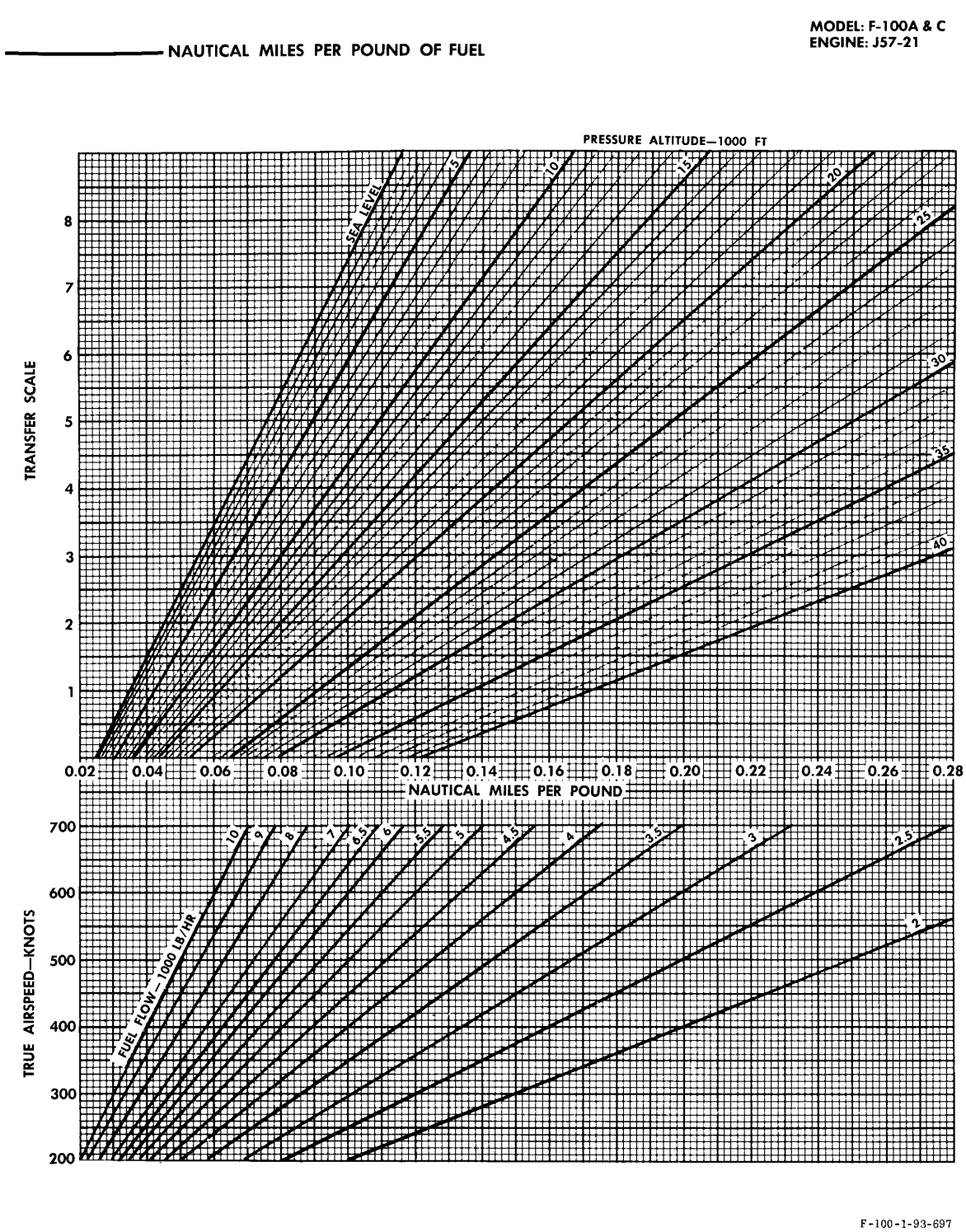
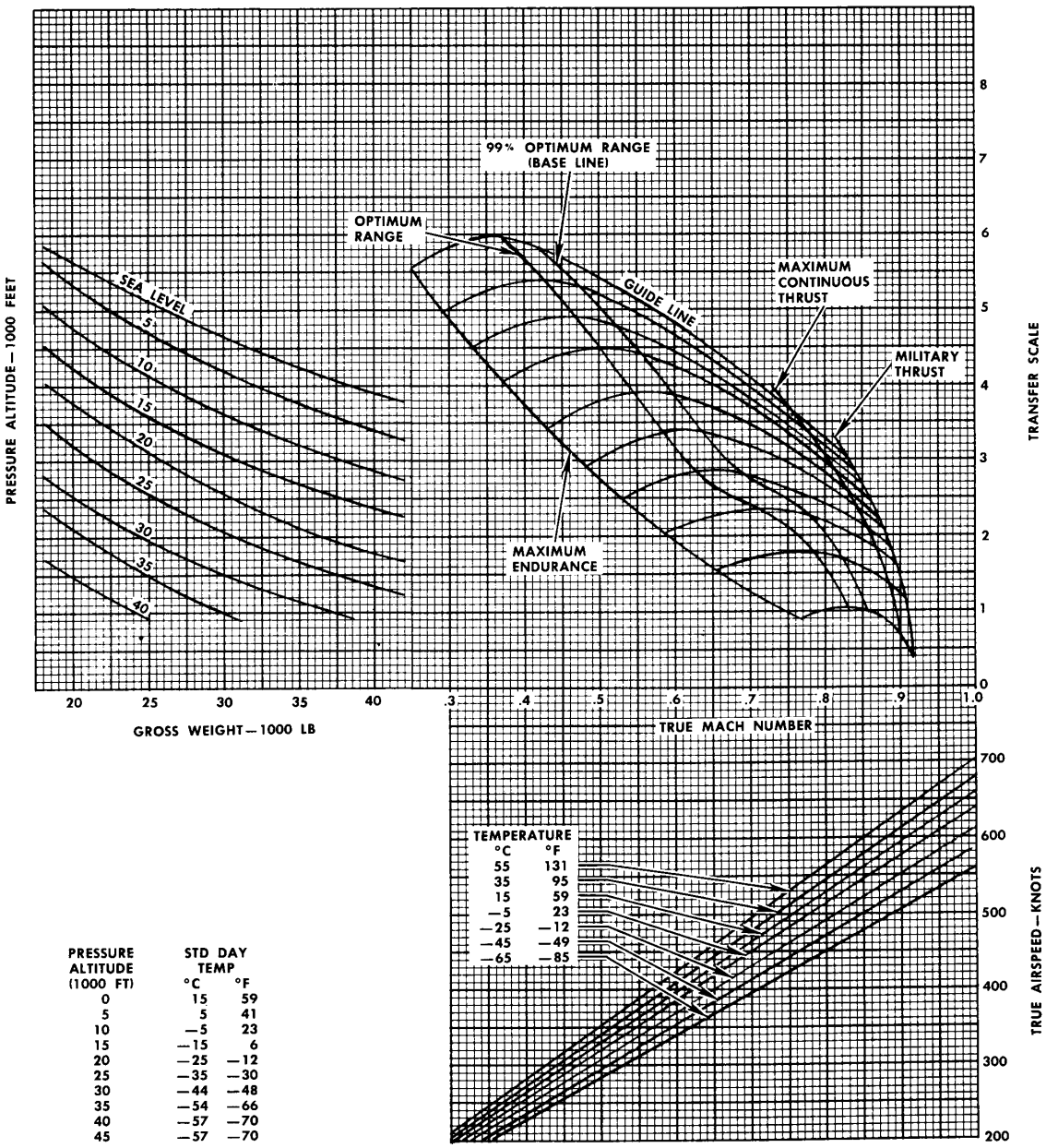


Figure C4-8 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 80

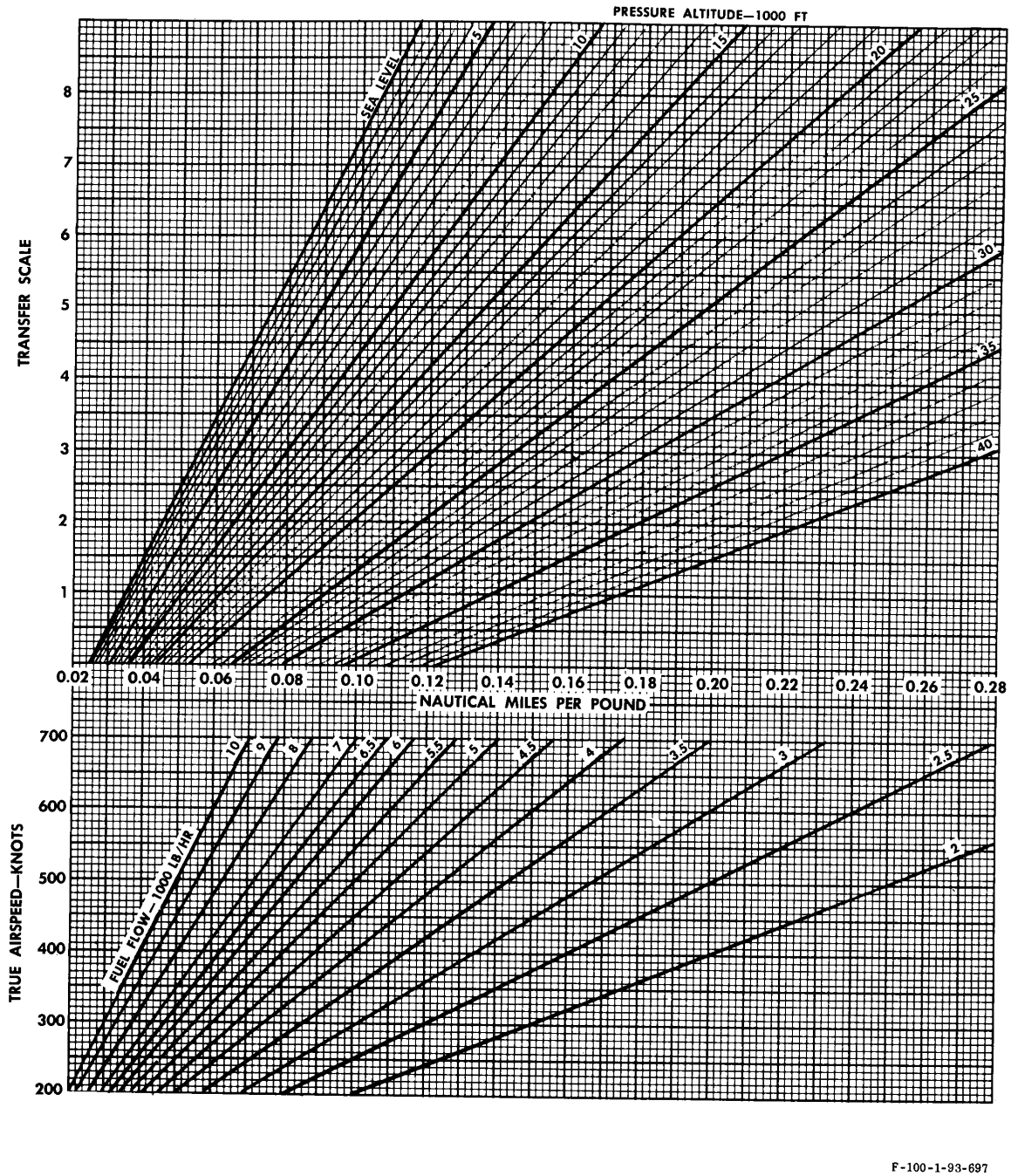


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	−5	23
15	−15	6
20	−25	−12
25	−35	−30
30	−44	−48
35	−54	−66
40	−57	−70
45	−57	−70

F-100-1-93-632

Figure C4-9 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

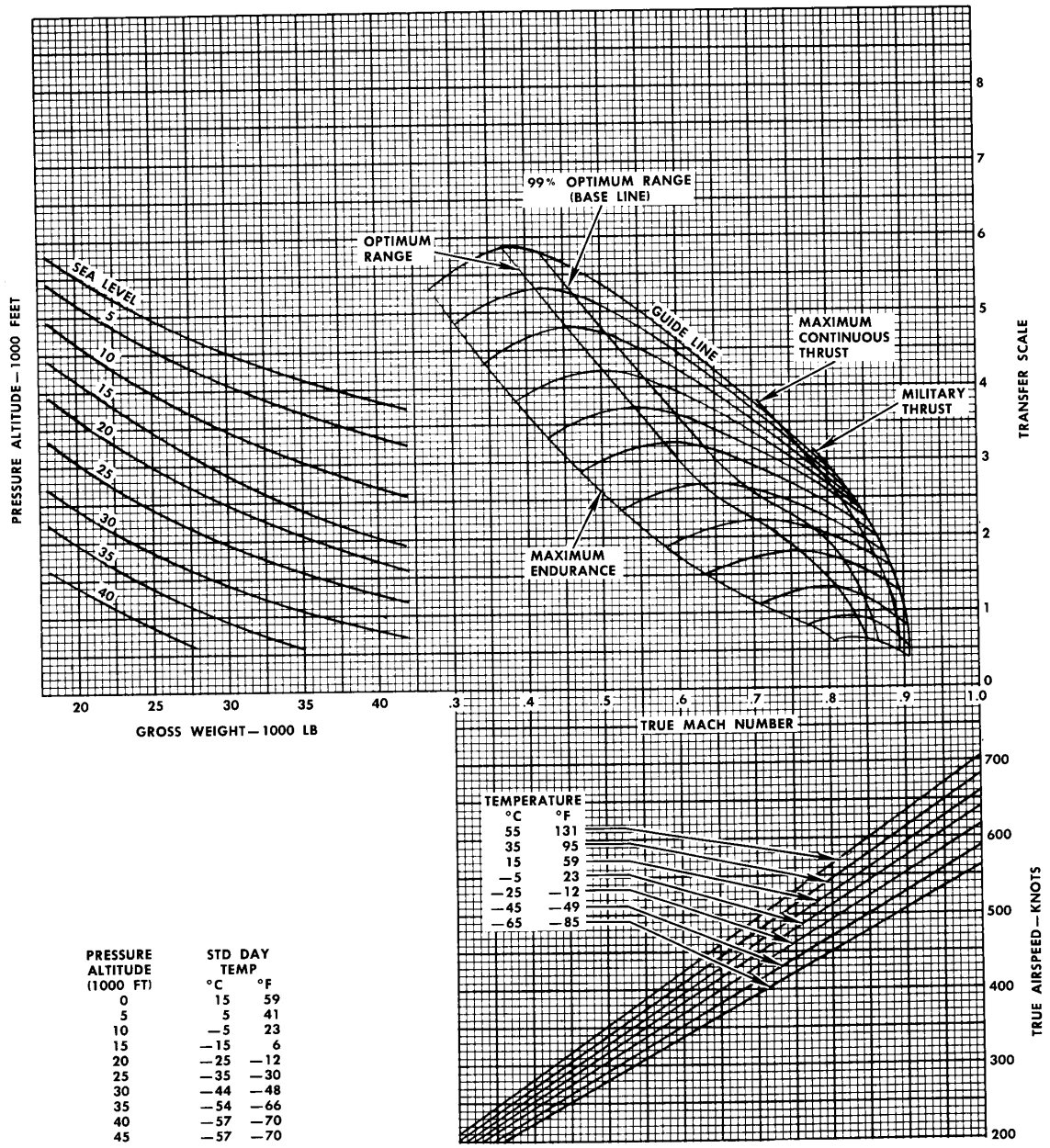


F-100-1-93-697

Figure C4-9 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 90

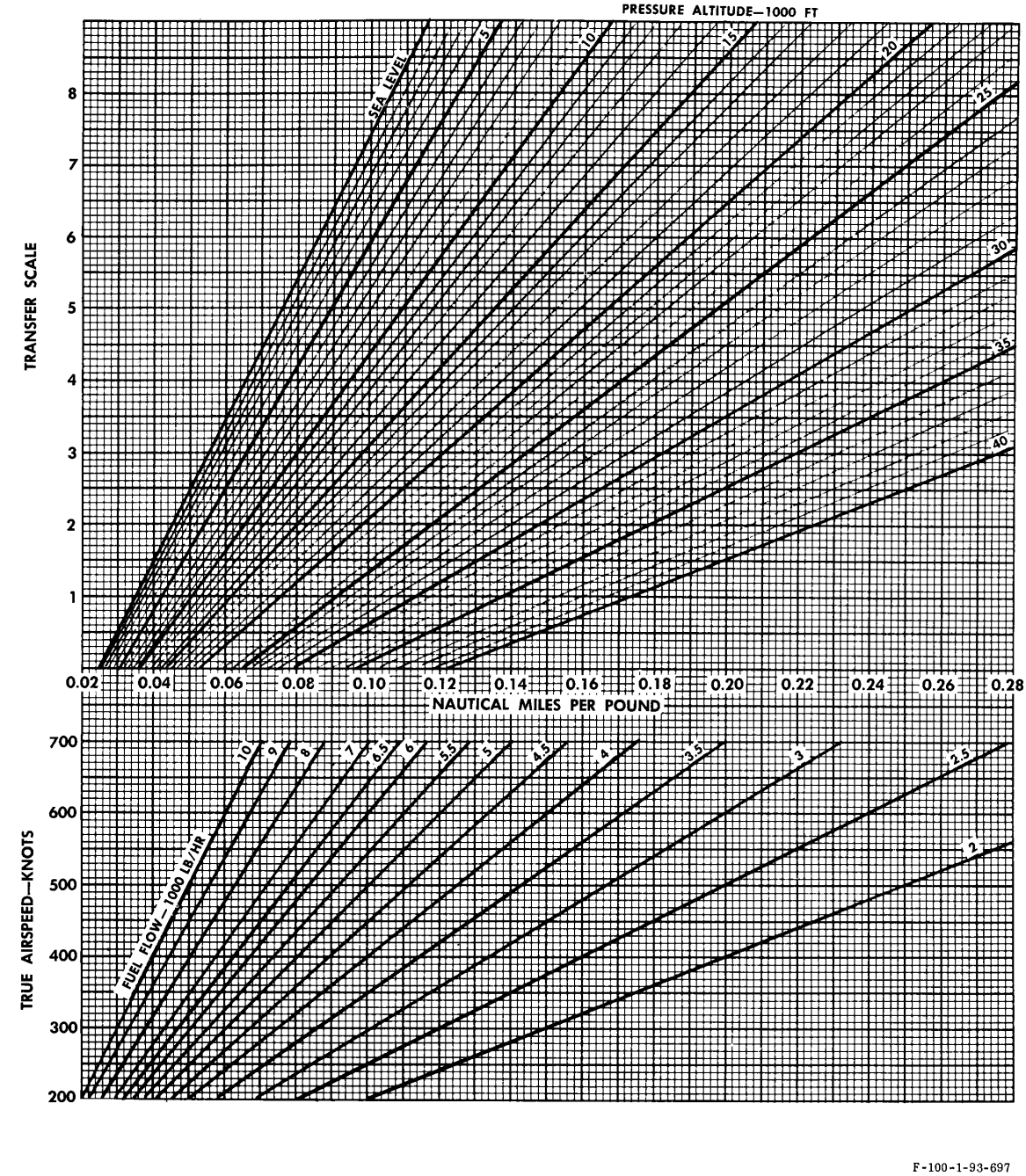


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-633

Figure C4-10 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

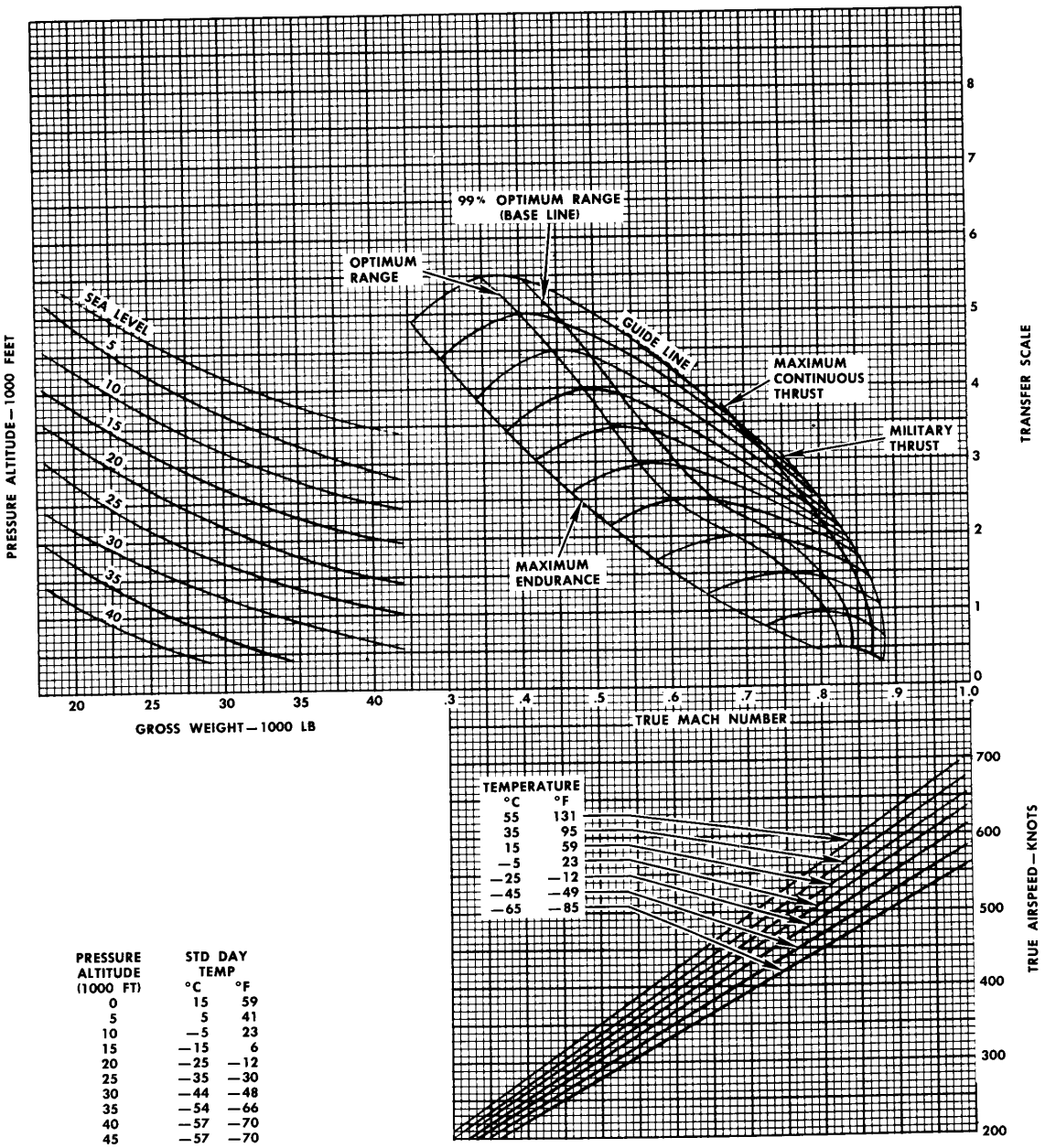


F-100-1-93-697

Figure C4-10 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 110 ———————

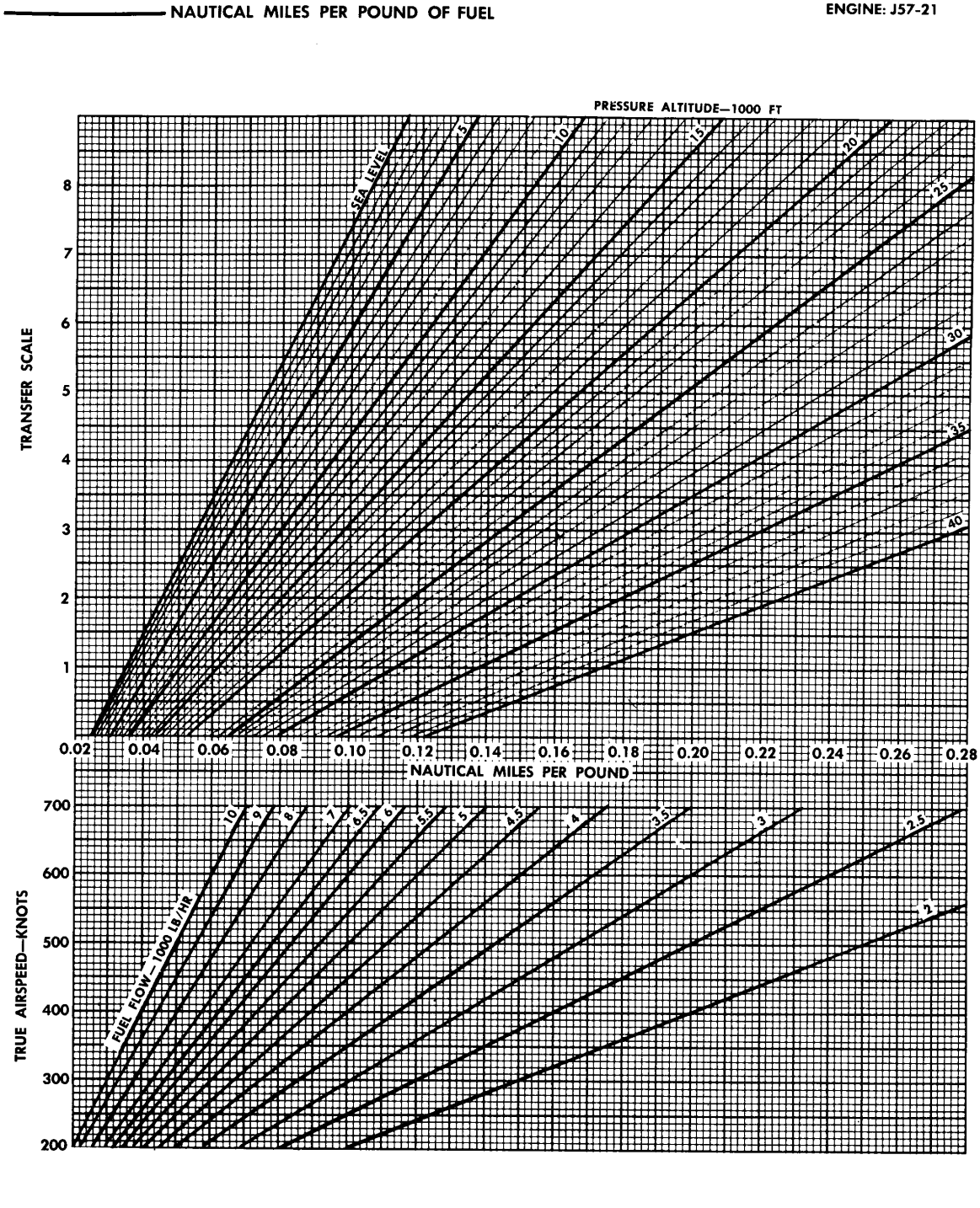


PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
0	15	59
5	5	41
10	−5	23
15	−15	6
20	−25	−12
25	−35	−30
30	−44	−48
35	−54	−66
40	−57	−70
45	−57	−70

F-100-1-93-634

Figure C4-11 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

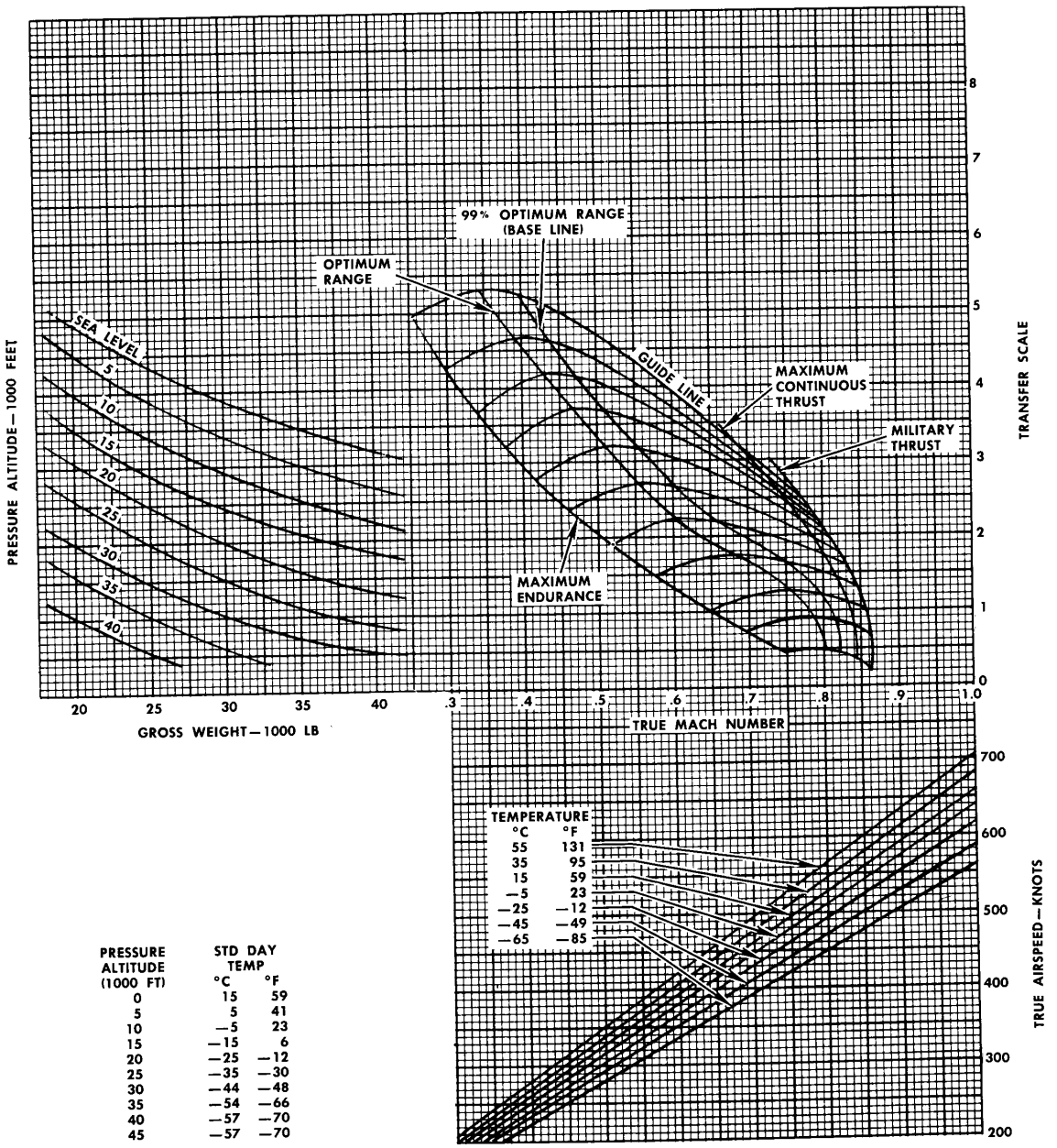


F-100-1-93-697

Figure C4-11 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 130 _____



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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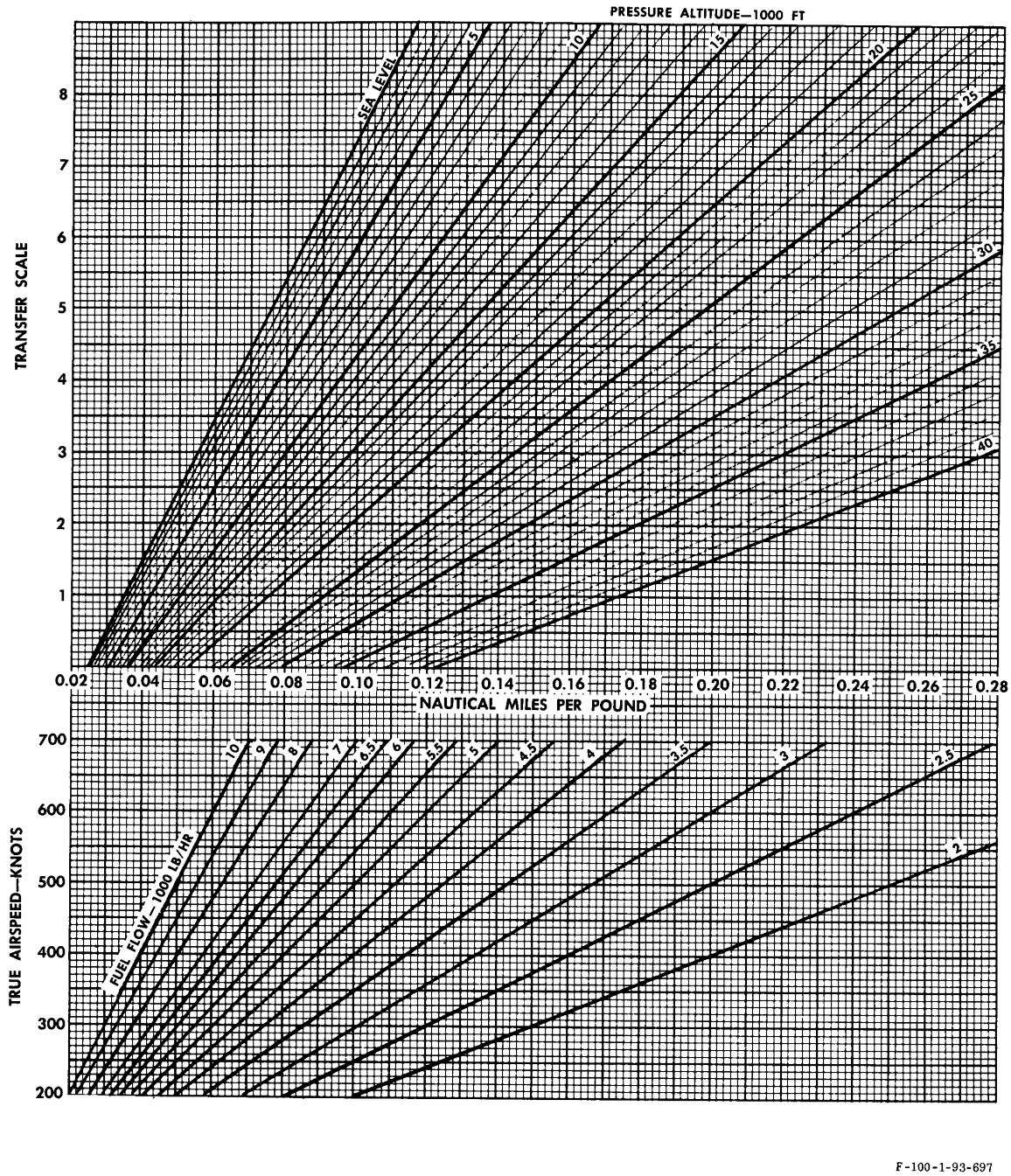
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-635

Figure C4-12 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

NAUTICAL MILES PER POUND OF FUEL

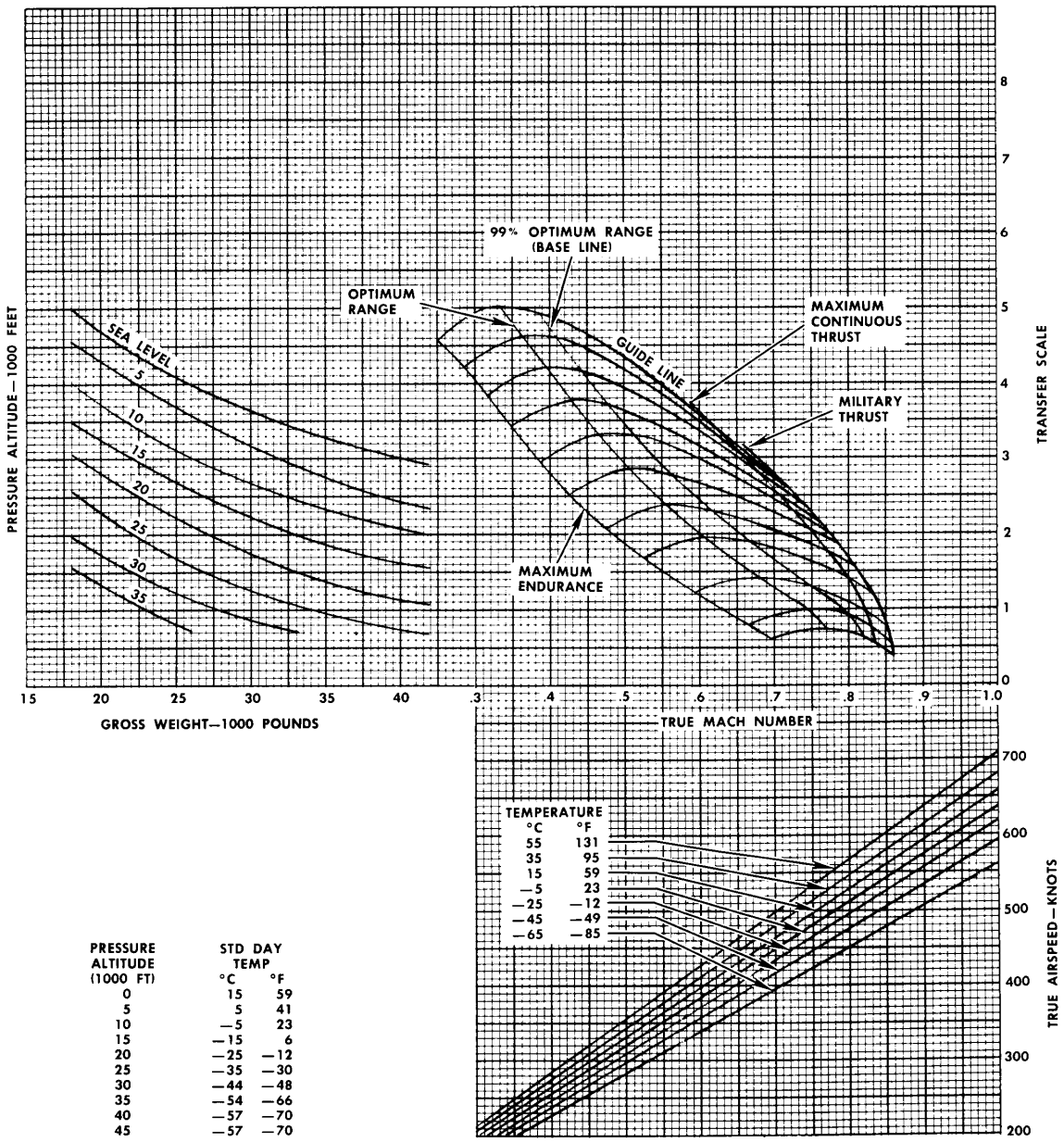


F-100-1-93-697

Figure C4-12 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONFIGURATION DRAG INDEX 150 _____



PRESSURE ALTITUDE (1000 FT)	STD DAY TEMP °C	°F
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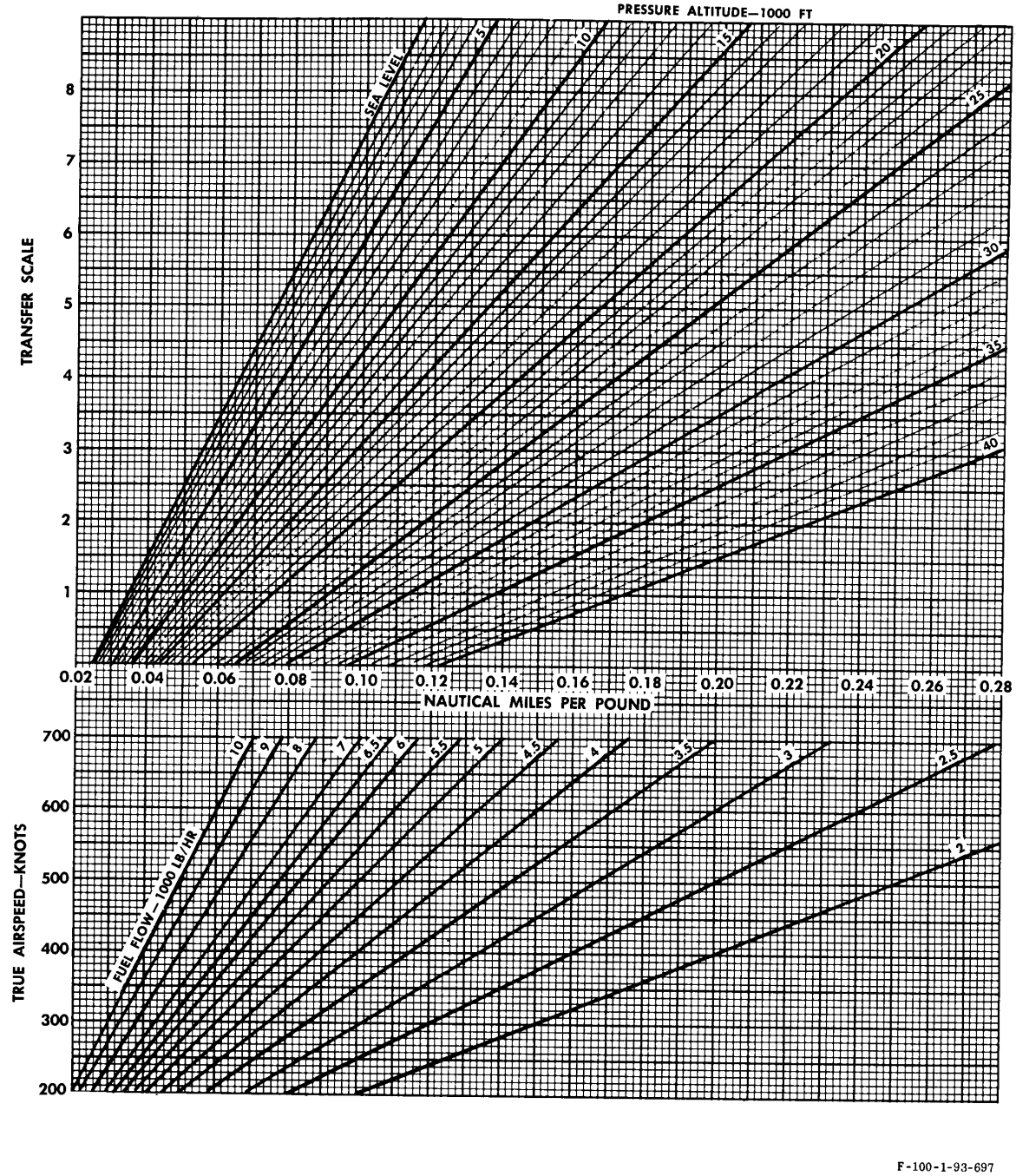
10	—5	23
15	—15	6
20	—25	—12
25	—35	—30
30	—44	—48
35	—54	—66
40	—57	—70
45	—57	—70

F-100-1-93-636

Figure C4-13 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21



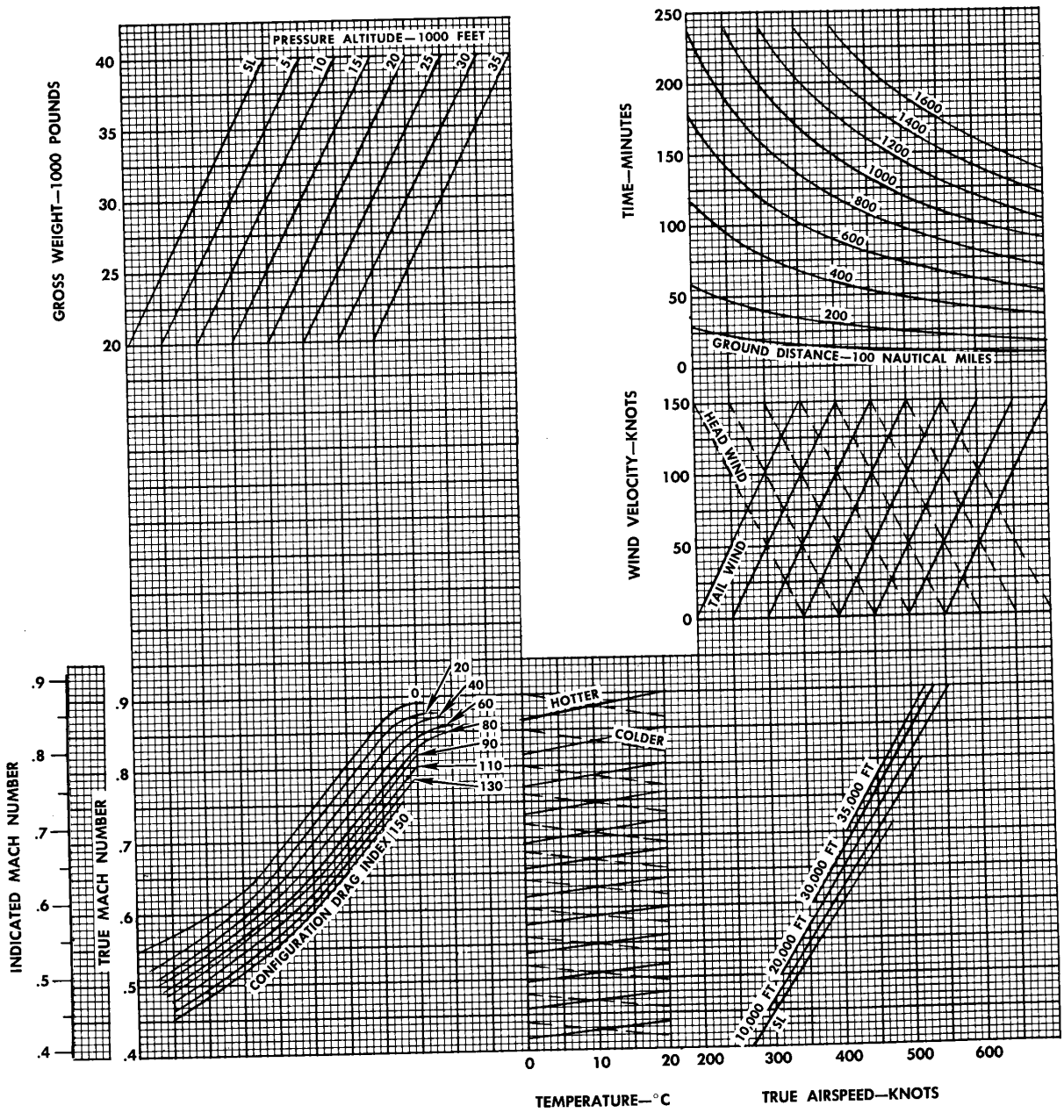
F-100-1-93-697

Figure C4-13 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONSTANT-ALTITUDE CRUISE

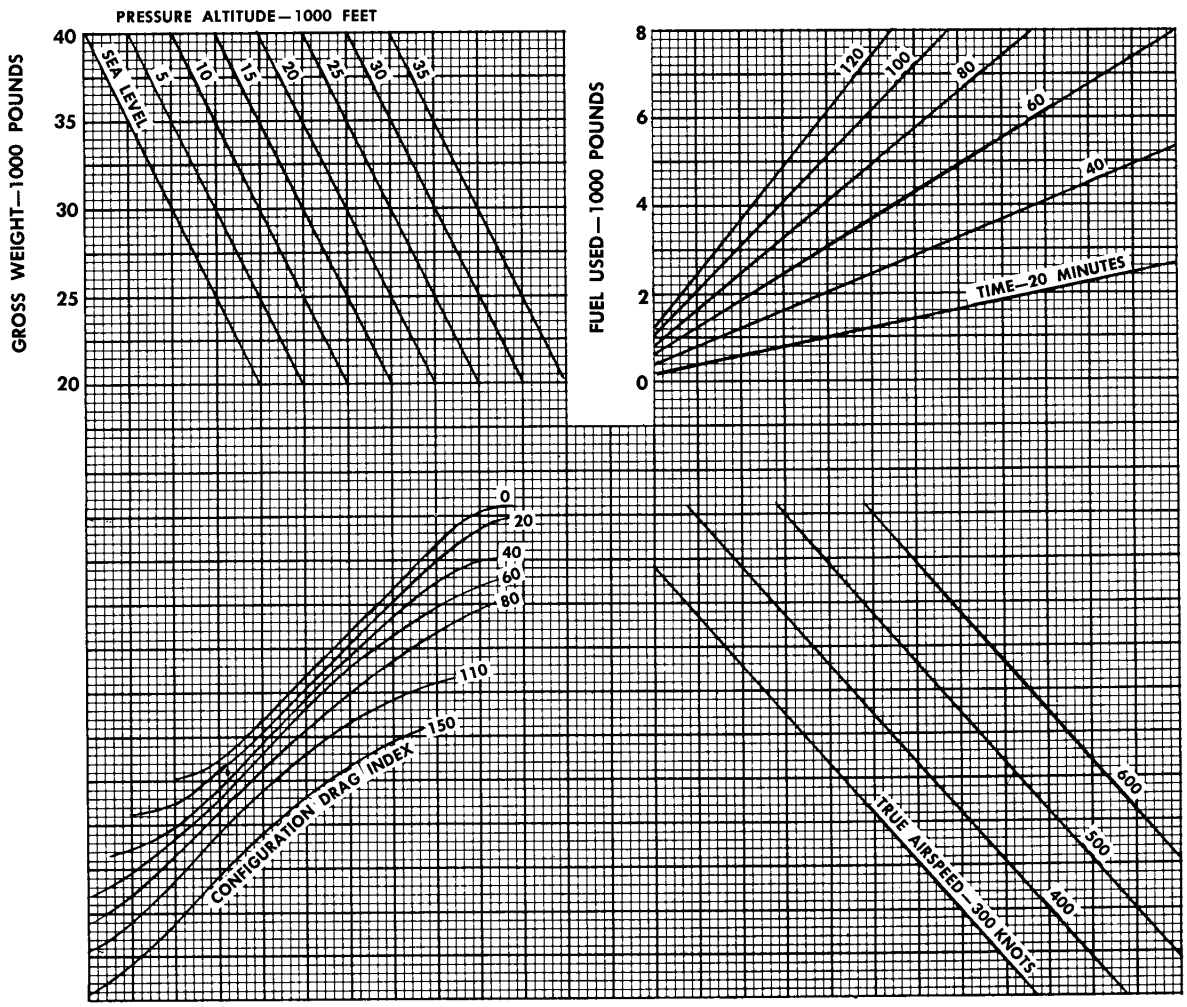
99% RANGE



F-100-1-93-692

Figure C4-14 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21



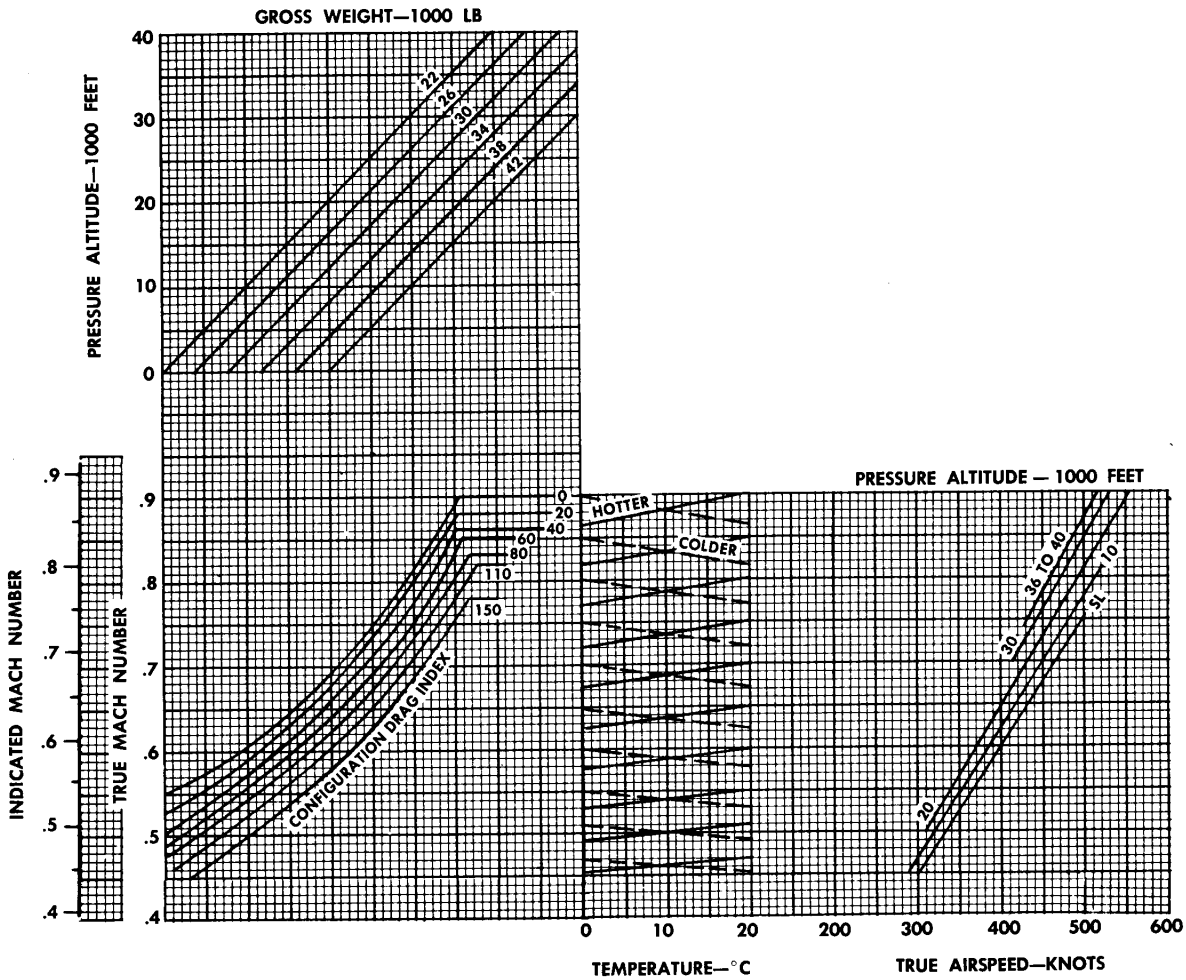
F-100-1-93-693

Figure C4-14 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CONSTANT-ALTITUDE CRUISE SETTINGS

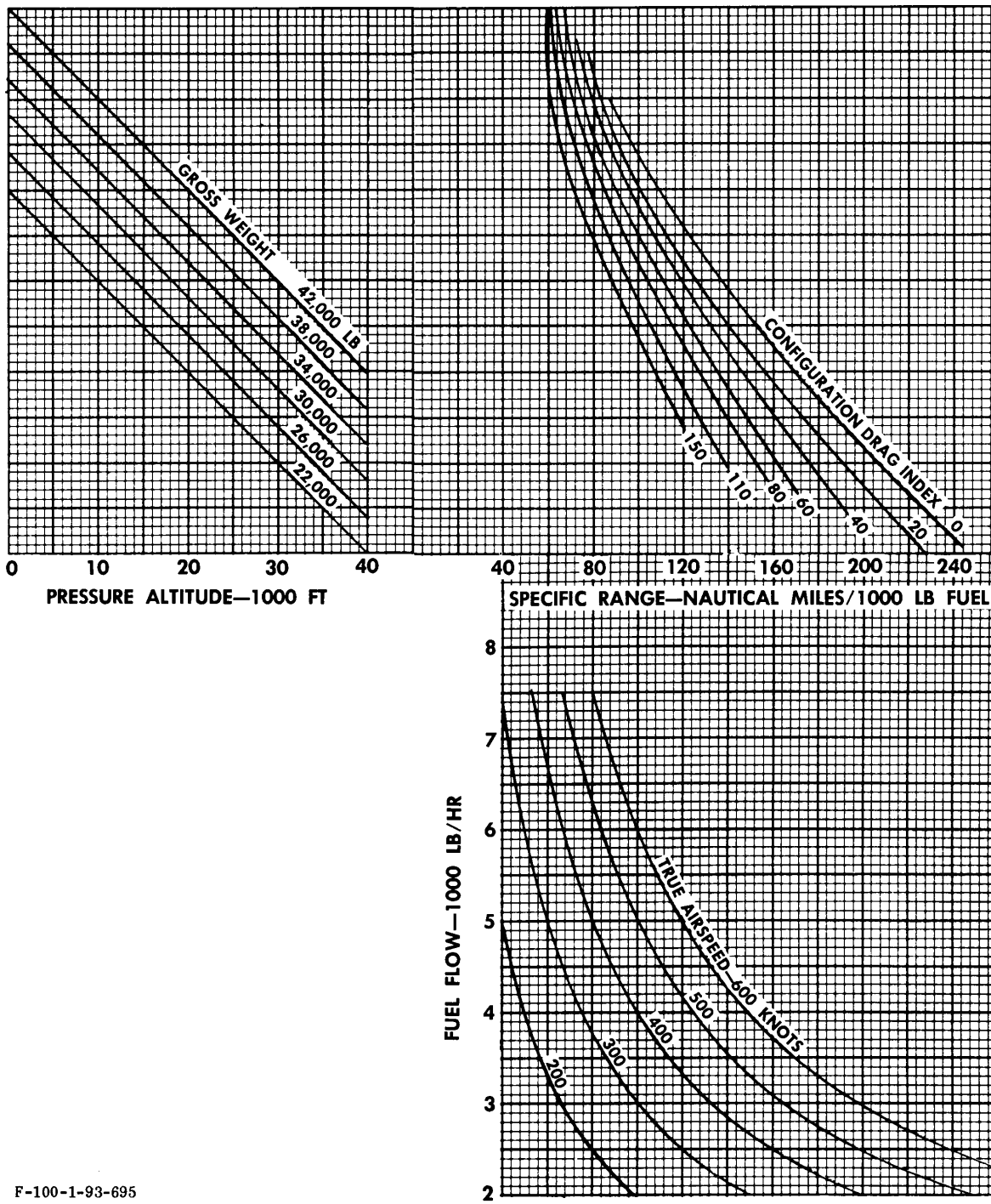
99% RANGE



F-100-1-93-694

Figure C4-15 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21



F-100-1-93-695

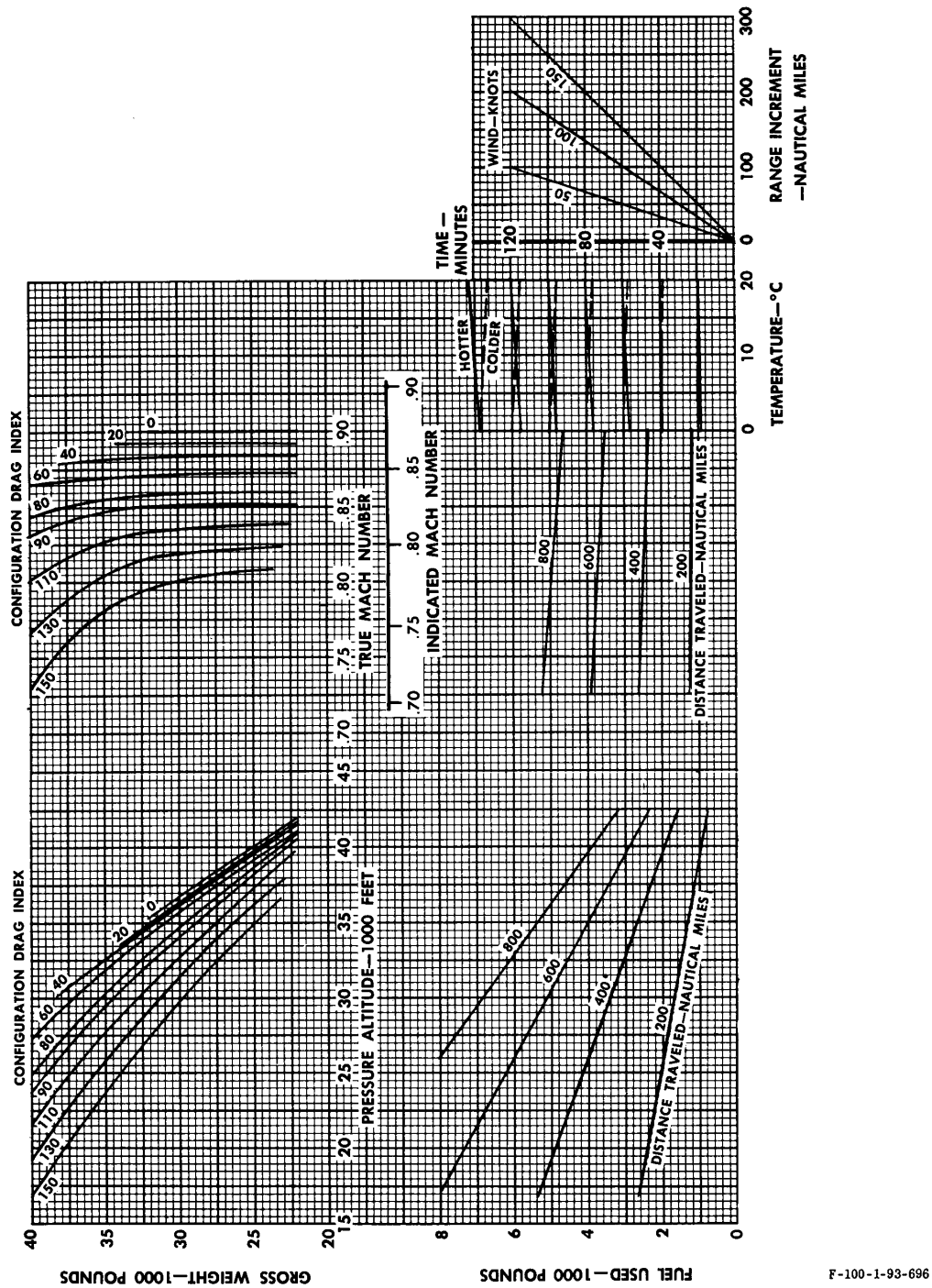
Figure C4-15 (Sheet 2 of 2)

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

CRUISE-CLIMB

99% RANGE

MODEL: F-100A & C
ENGINE: J57-21



F-100-1-93-696

Figure C4-16

PART 5–ENDURANCE

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Titles CAPITALIZED denote charts.

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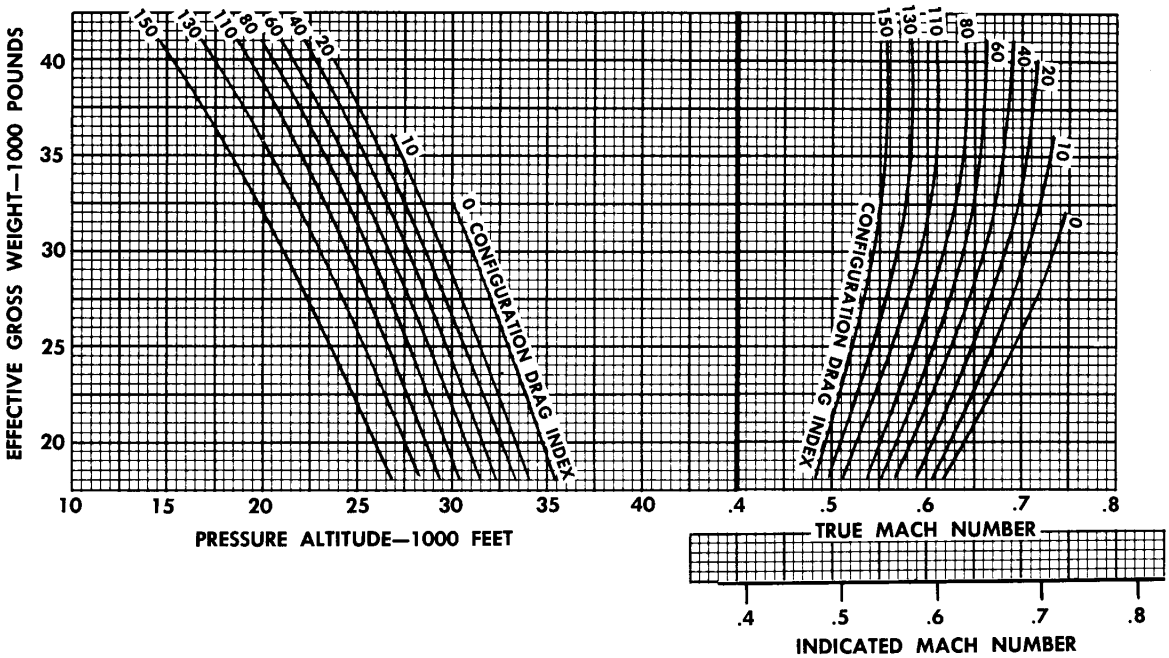
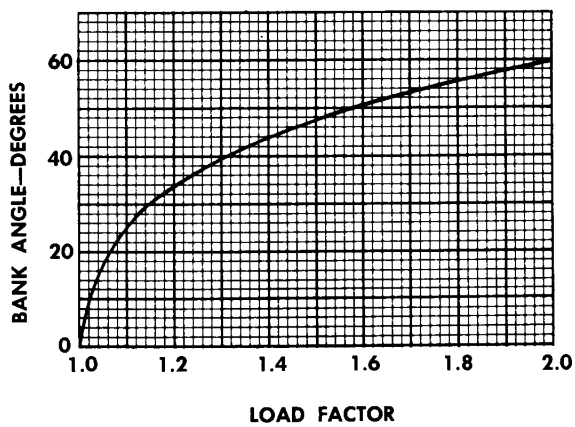
OPTIMUM MAXIMUM ENDURANCE	C5-2
CONSTANT-ALTITUDE MAXIMUM ENDURANCE	C5-4

NOTE For sample problems and descriptive text, refer to Part 5, Section I, of this manual.

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

OPTIMUM MAXIMUM ENDURANCE

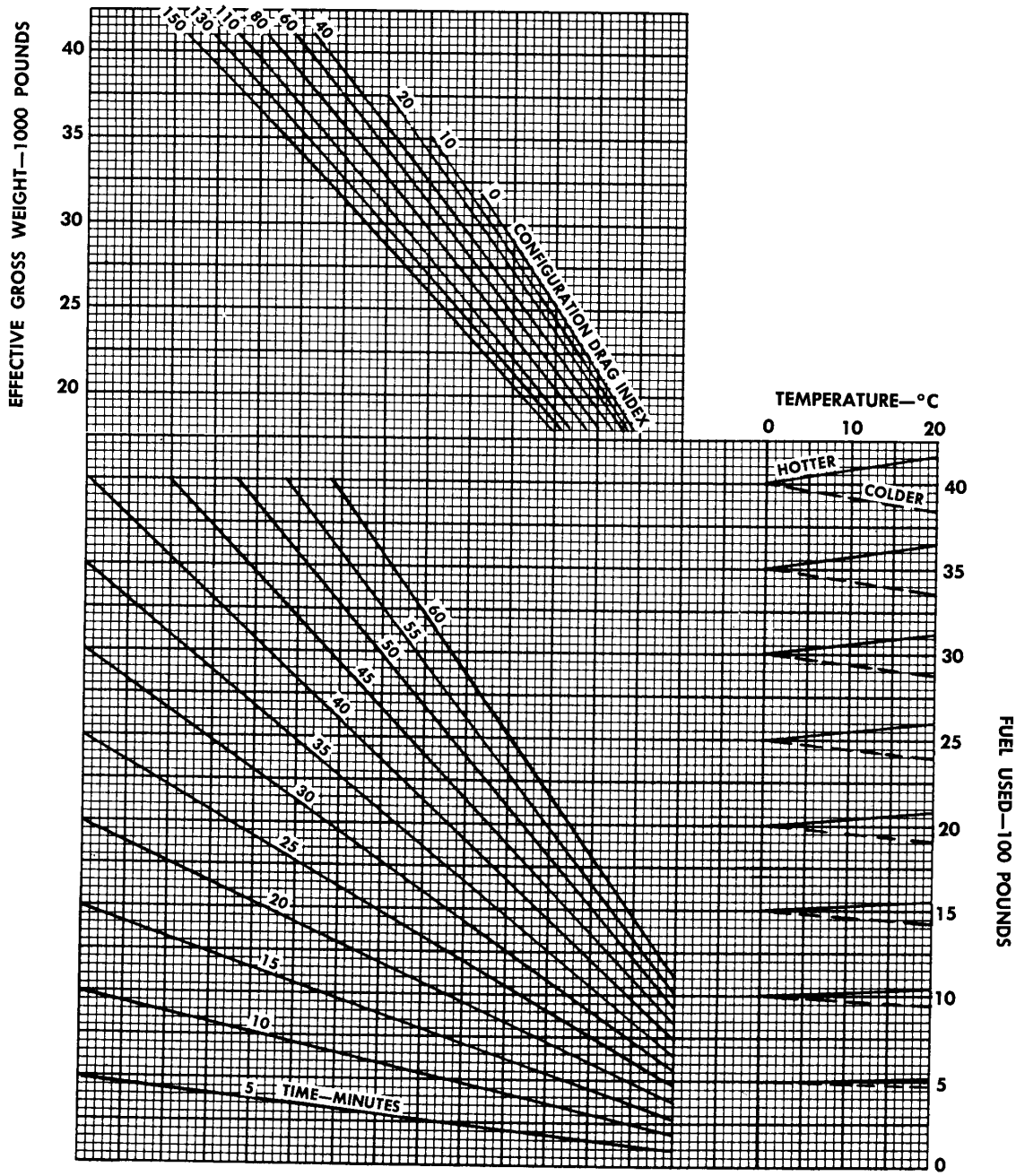




F-100-1-93-704

Figure C5-1 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

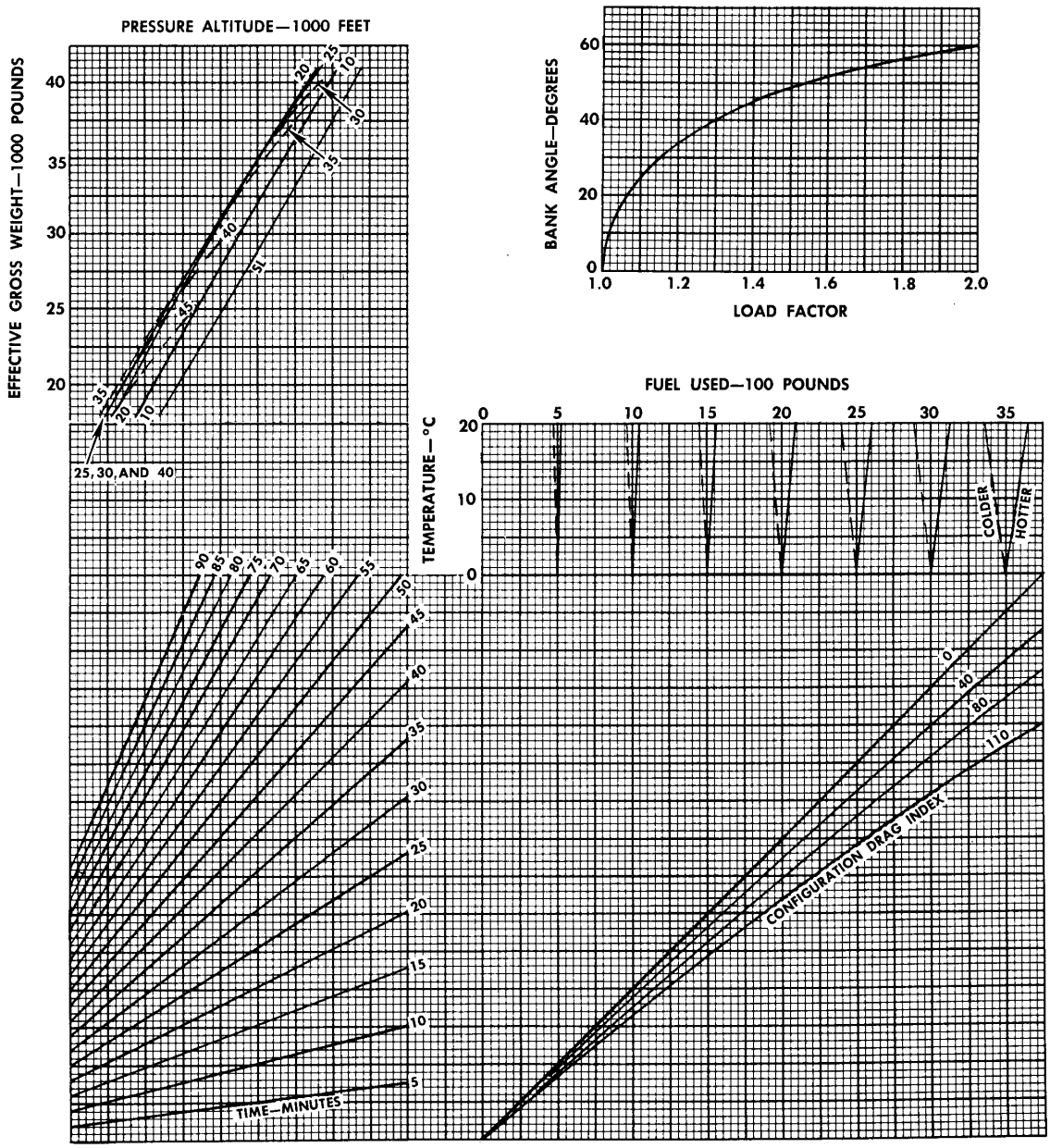


F-100-1-93-705

Figure C5-1 (Sheet 2 of 2)

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CONSTANT-ALTITUDE MAXIMUM ENDURANCE



F-100-1-93-707

Figure C5-2 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

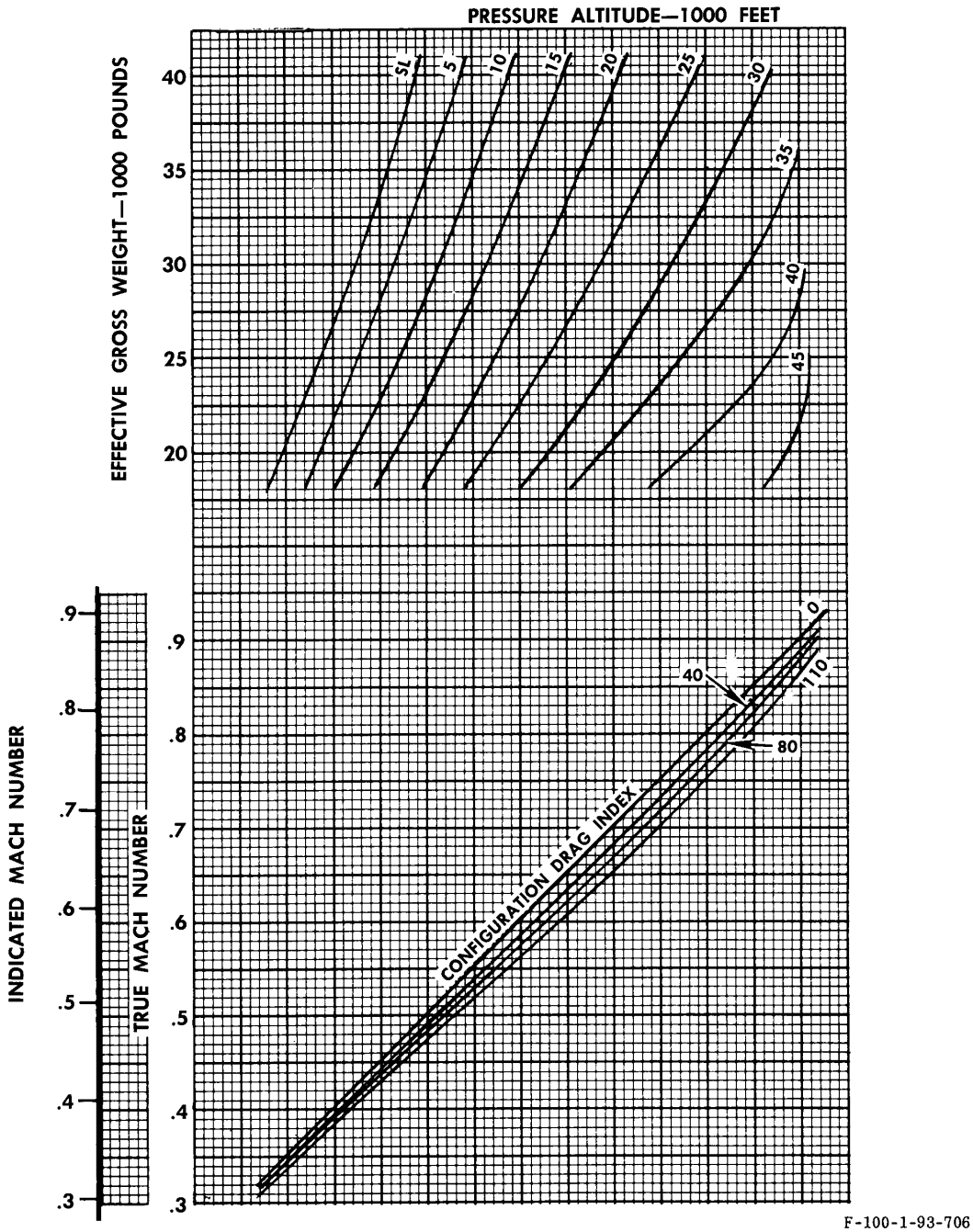


Figure C5-2 (Sheet 2 of 2)

PART 6–DESCENTS

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
MINIMUM-TIME DESCENT	C6-2
.8 INDICATED MACH NUMBER OR 400 KNOTS IAS DESCENT	C6-3
MAXIMUM RANGE DESCENT	C6-4
PENETRATION DESCENT	C6-5
.8 INDICATED MACH NUMBER DESCENT	C6-6
.9 INDICATED MACH NUMBER DESCENT	C6-7

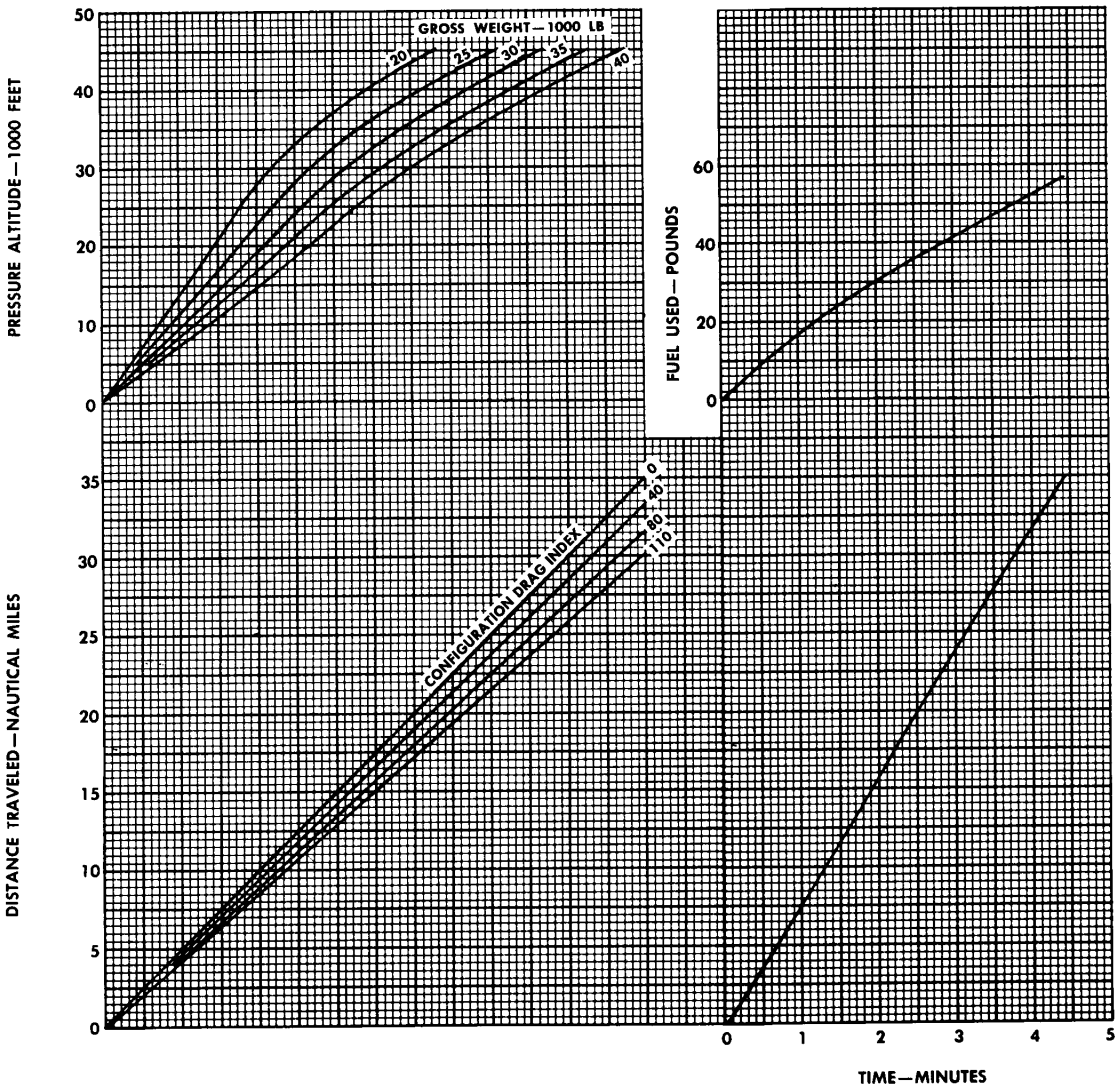
NOTE For sample problems and descriptive text, refer to Part 6, Section I, of this manual.

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

MINIMUM-TIME DESCENT

.8 INDICATED MACH NUMBER OR 400 KNOTS IAS
(WHICHEVER IS LESS)
IDLE THRUST—SPEED BRAKE OPEN



NOTE

- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-644

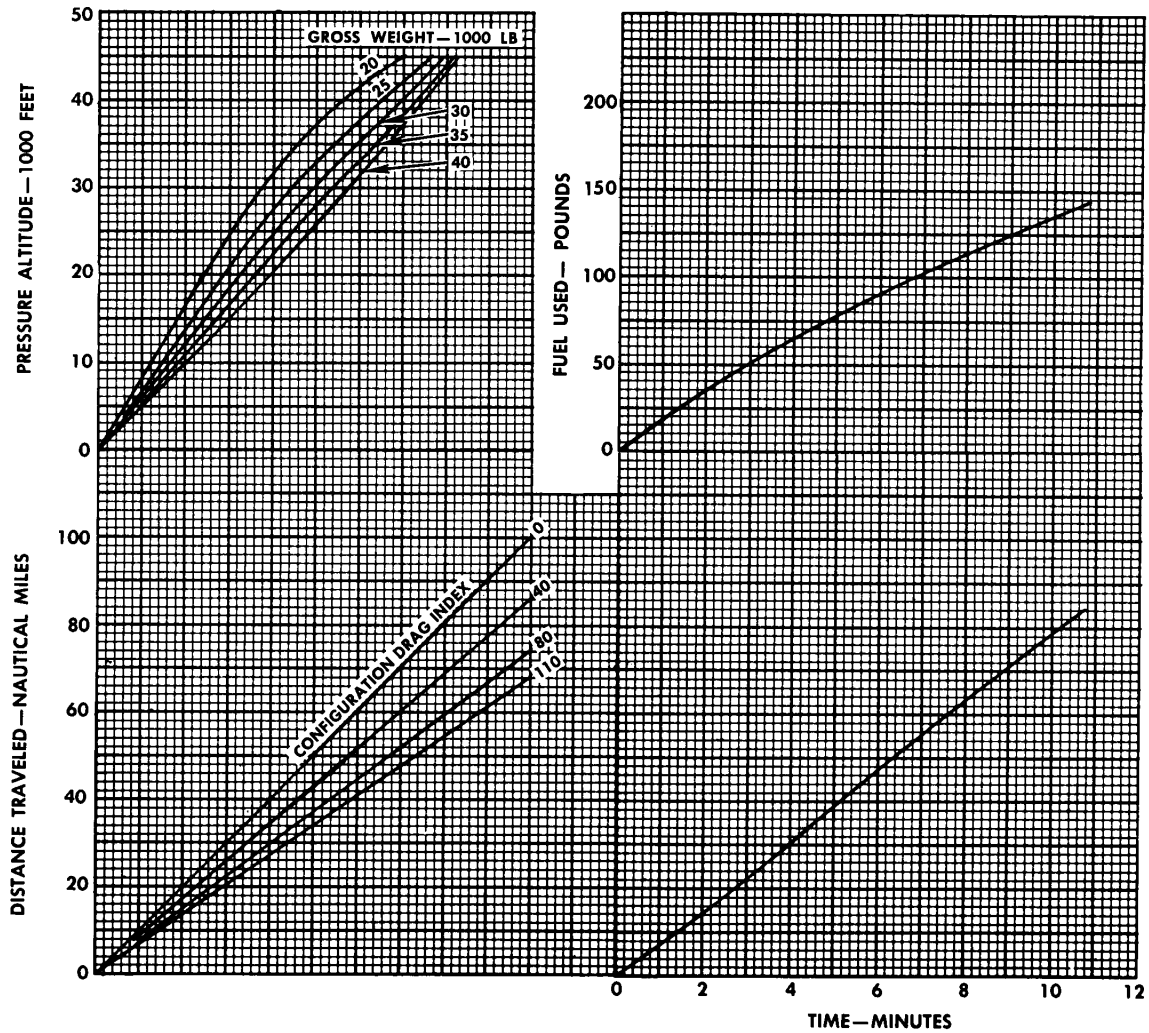
Figure C6-1

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

.8 INDICATED MACH NUMBER OR 400 KNOTS IAS DESCENT
(WHICHEVER IS LESS)

IDLE THRUST—SPEED BRAKE CLOSED

MODEL: F-100A & C
ENGINE: J57-21



NOTE

- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-645

Figure C6-2

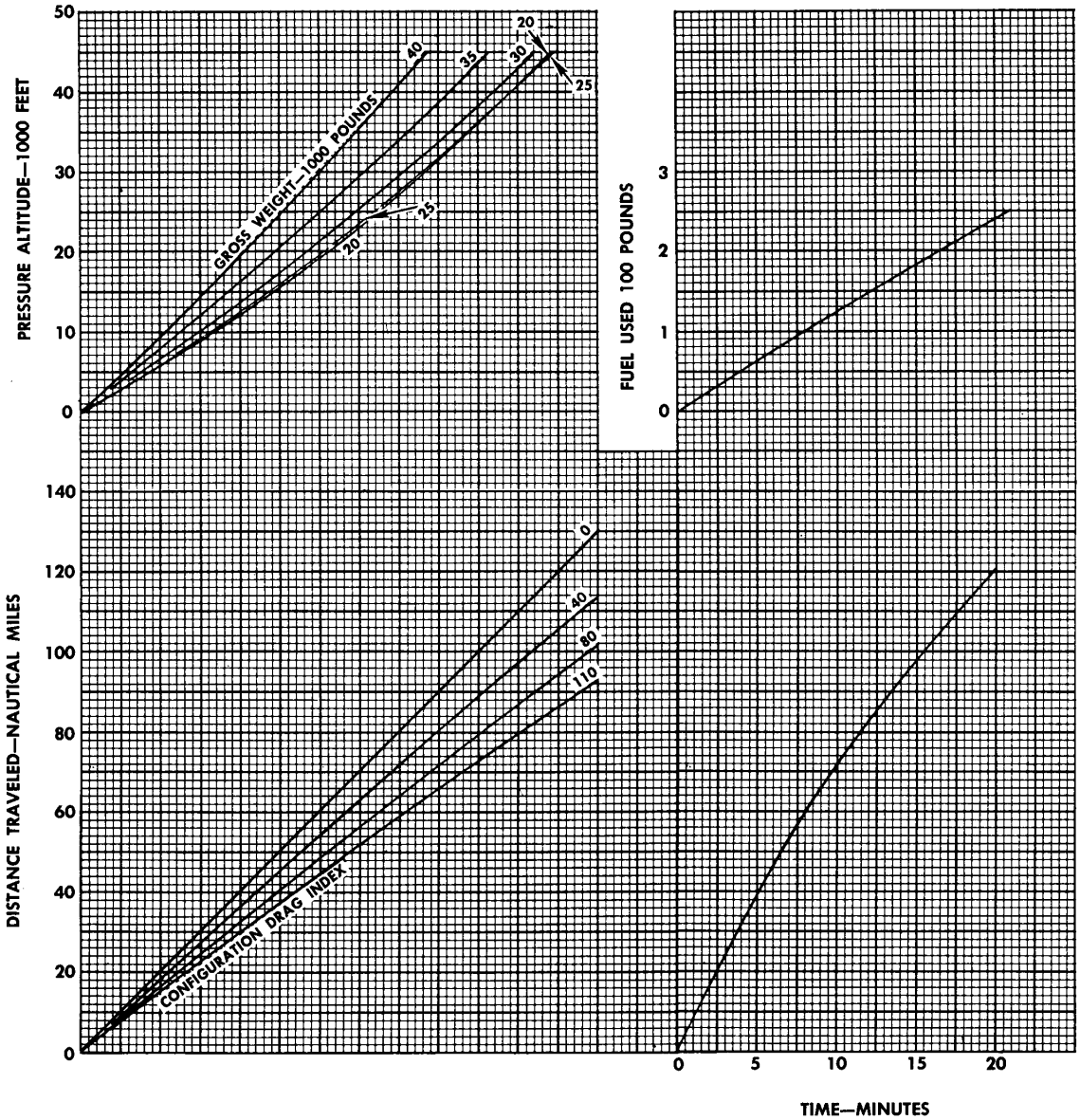
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

MAXIMUM RANGE DESCENT

250 KNOTS IAS

IDLE THRUST—SPEED BRAKE CLOSED



NOTE

- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-646

Figure C6-3

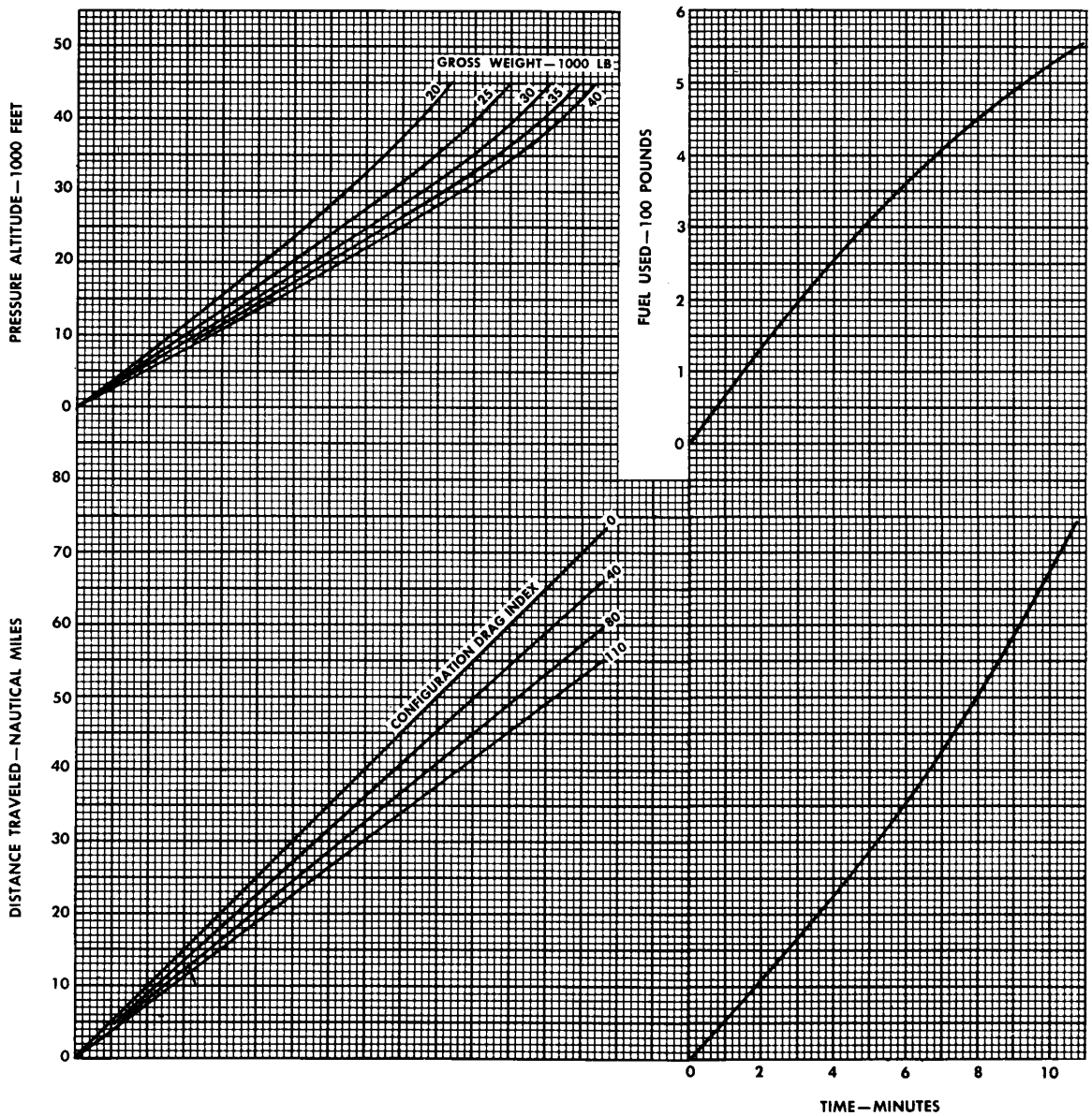
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

PENETRATION DESCENT

300 KNOTS IAS

85% RPM—SPEED BRAKE OPEN



NOTE

- Maintain 85% rpm setting descent.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-647

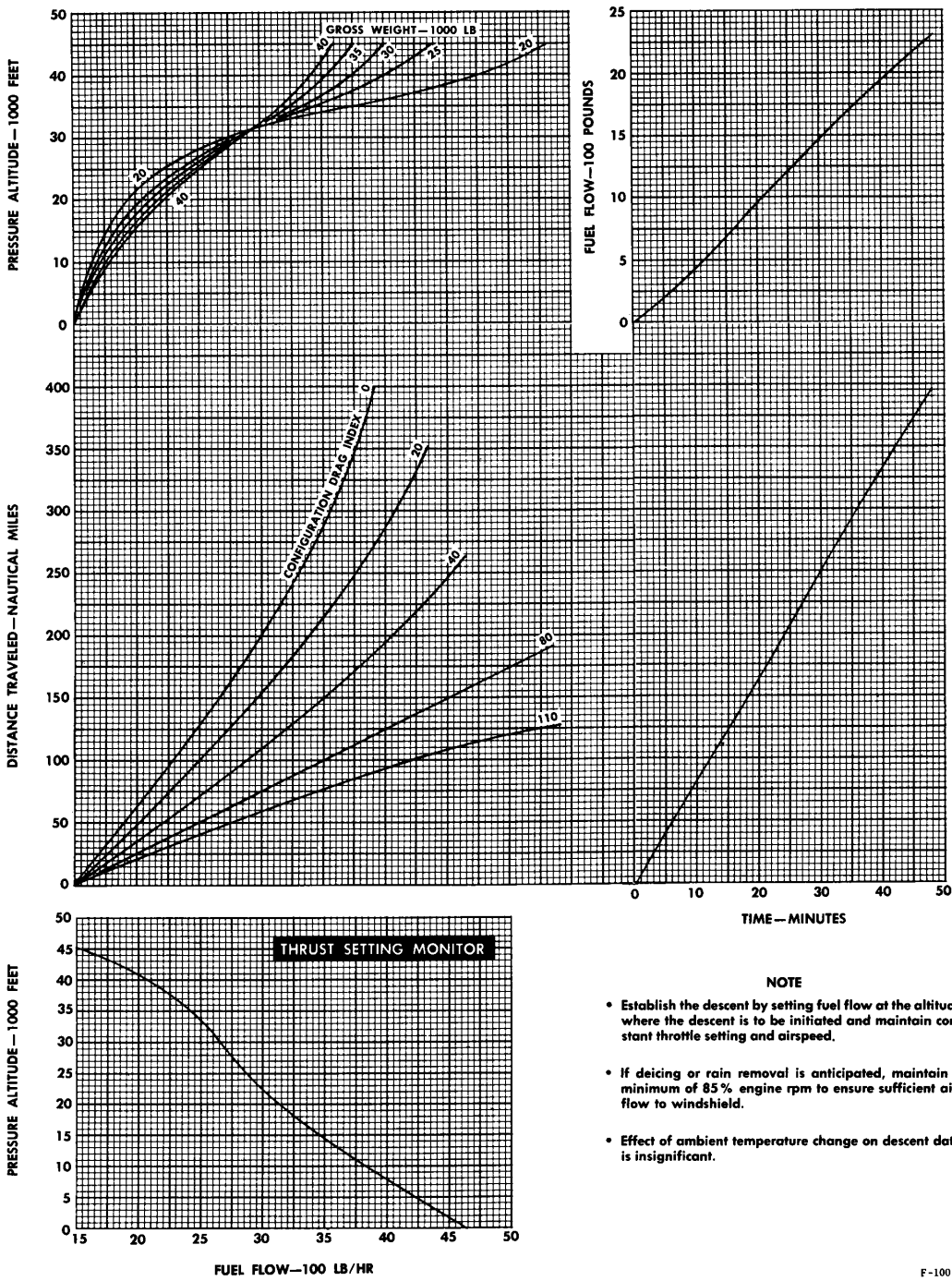
Figure C6-4

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

.8 INDICATED MACH NUMBER DESCENT

85% RPM—SPEED BRAKE CLOSED

MODEL: F-100A & C
ENGINE: J57-21



NOTE

- Establish the descent by setting fuel flow at the altitude where the descent is to be initiated and maintain constant throttle setting and airspeed.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-648

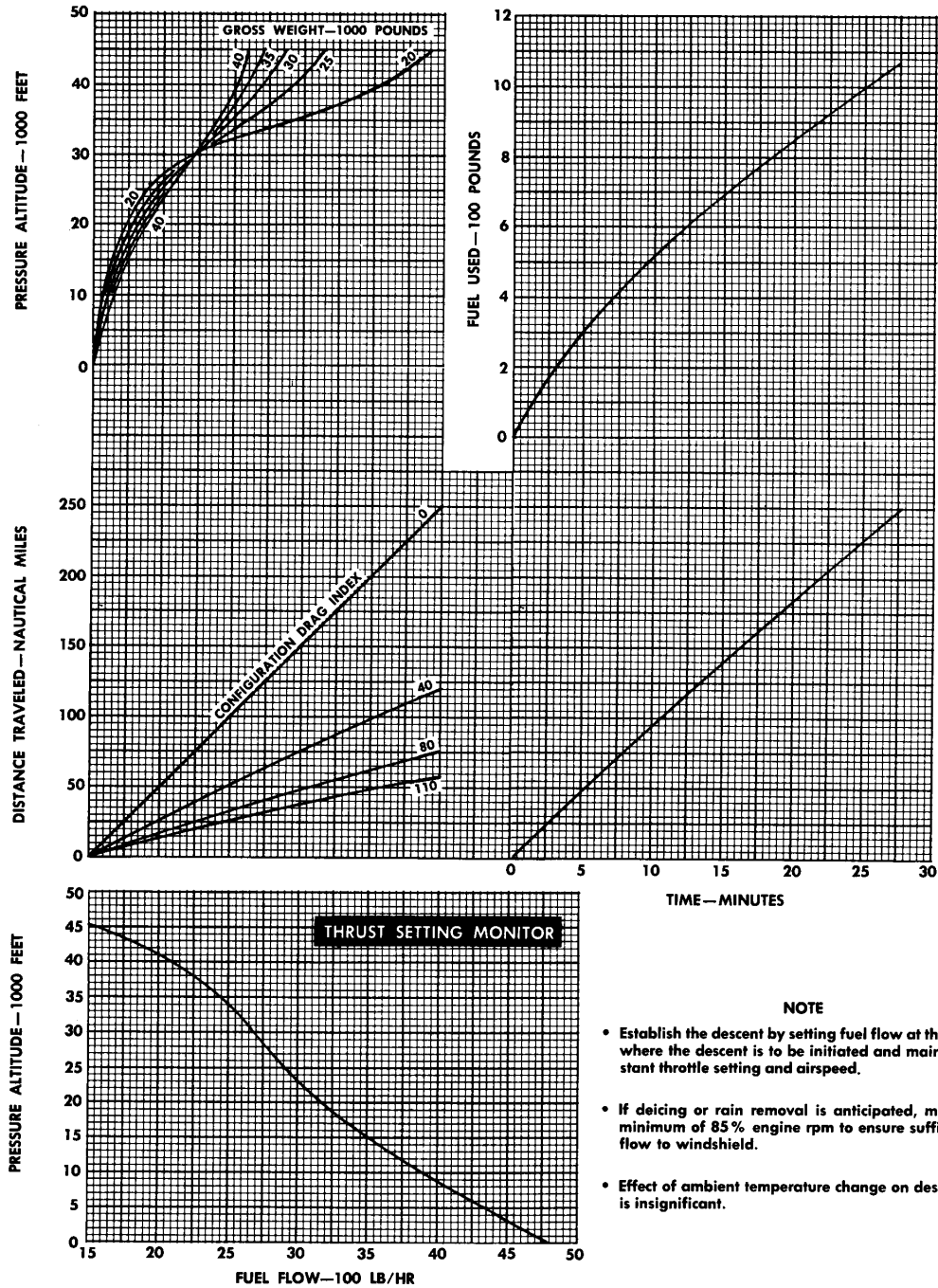
Figure C6-5

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

.9 INDICATED MACH NUMBER DESCENT

85% RPM—SPEED BRAKE CLOSED

MODEL: F-100A & C
ENGINE: J57-21



NOTE

- Establish the descent by setting fuel flow at the altitude where the descent is to be initiated and maintain constant throttle setting and airspeed.
- If deicing or rain removal is anticipated, maintain a minimum of 85% engine rpm to ensure sufficient airflow to windshield.
- Effect of ambient temperature change on descent data is insignificant.

F-100-1-93-649

Figure C6-6

PART 7–LANDING

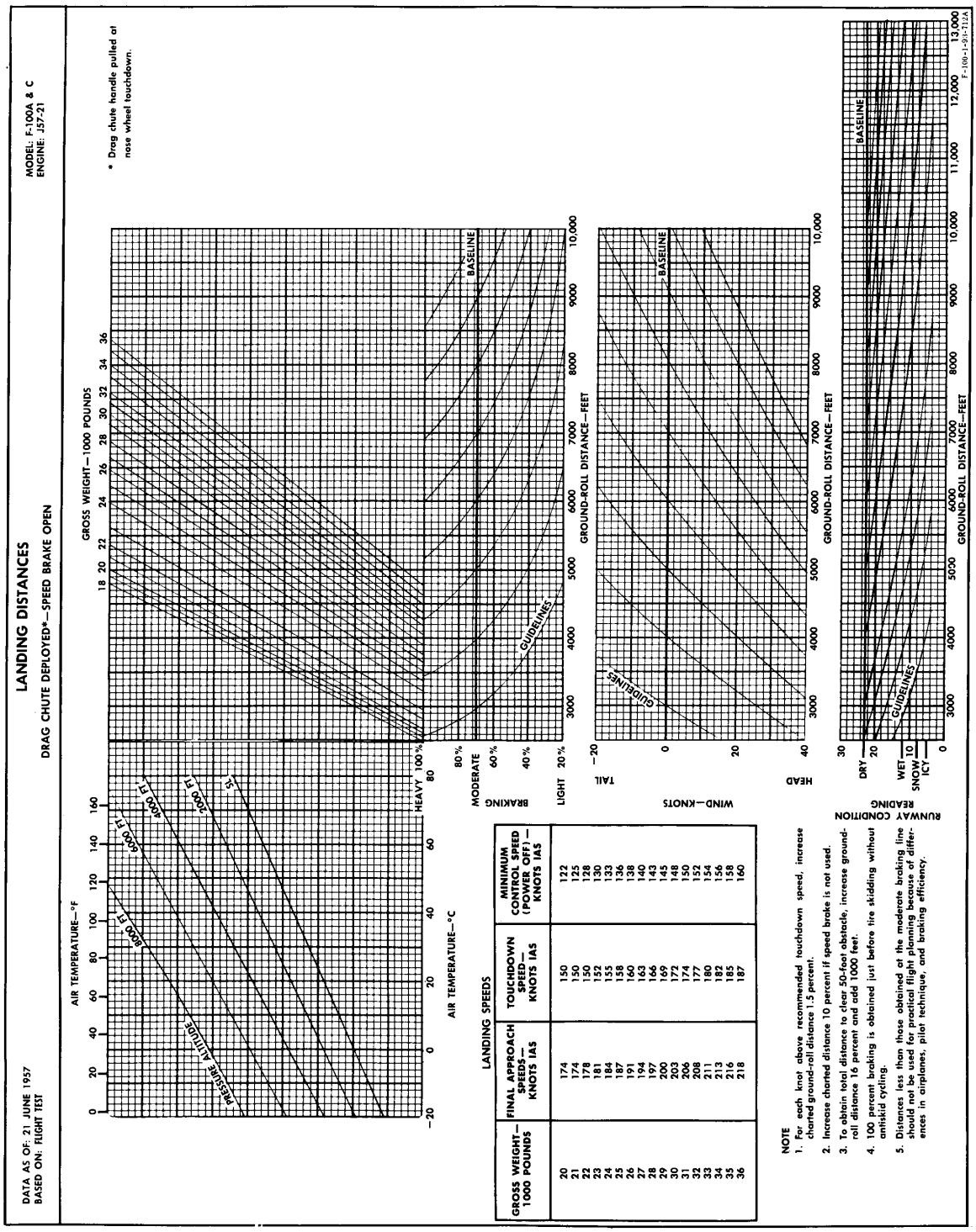
TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
LANDING DISTANCES - DRAG CHUTE DEPLOYED	C7-2
LANDING DISTANCES - DRAG CHUTE NOT DEPLOYED	C7-3

NOTE For wind component data, see figure A2-2.

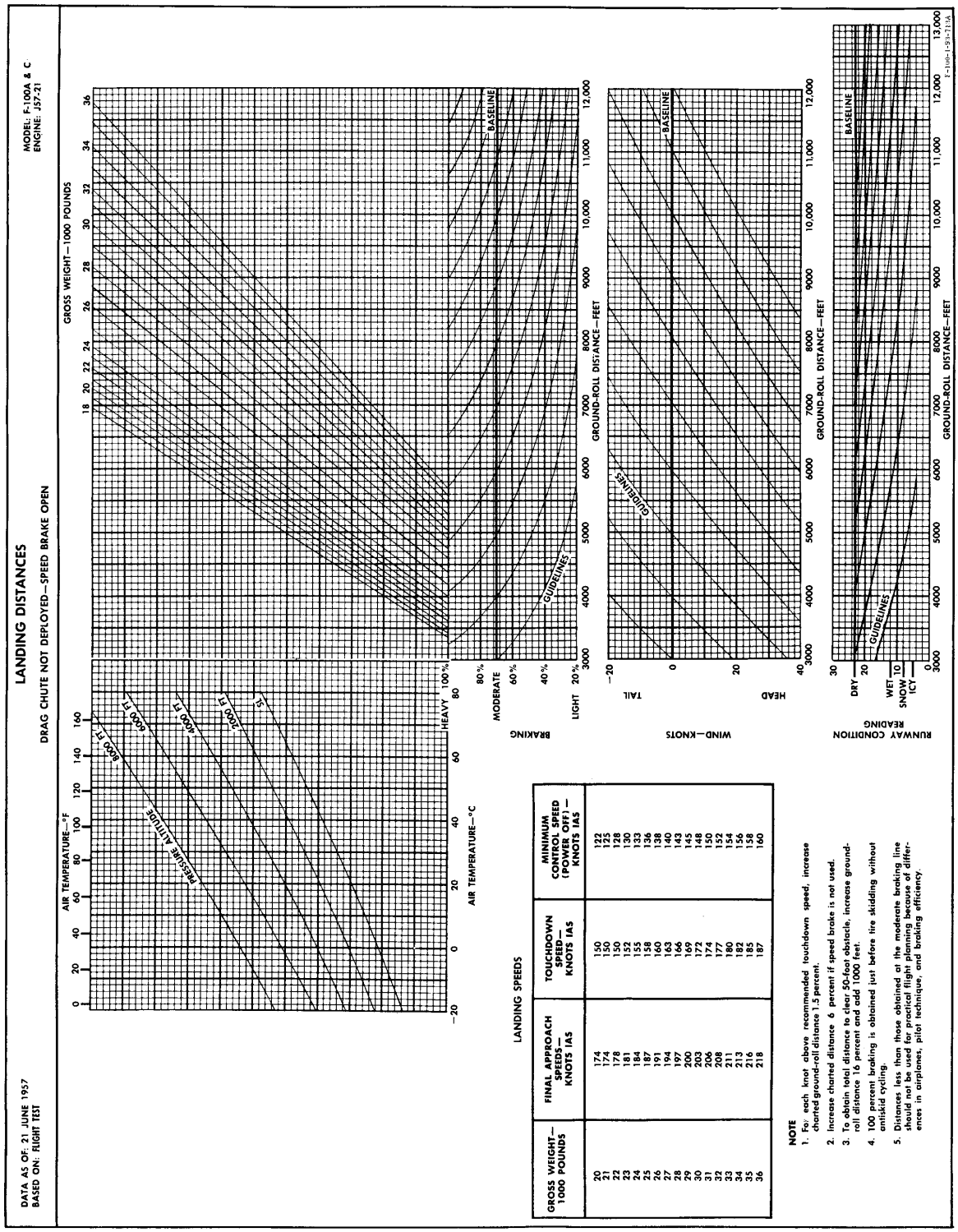
- For sample problems and descriptive text, refer to Part 7, Section I, of this manual.



GROSS WEIGHT—1000 POUNDS	FINAL APPROACH SPEEDS—KNOTS IAS	TOUCHDOWN SPEED—KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF)—KNOTS IAS
	LANDING SPEEDS		
20	174	150	122
21	174	150	125
22	178	150	128
23	181	152	130
24	184	153	133
25	187	158	136
26	191	160	138
27	194	163	140
28	197	166	143
29	200	169	145
30	203	172	148
31	206	174	150
32	208	177	152
33	211	180	154
34	213	182	156
35	216	185	158
36	218	187	160

NOTE
1. For each knot above recommended touchdown speed, increase charted ground-roll distance 1.5 percent.
2. Increase charted distance 10 percent if speed brake is not used.
3. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 16 percent and add 1000 feet.
4. 100 percent braking is obtained just before tire skidding without antiskid cycling.
5. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

Figure C7-1



LANDING SPEEDS

GROSS WEIGHT—1000 POUNDS	FINAL APPROACH SPEEDS—KNOTS IAS	TOUCHDOWN SPEED—KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF)—KNOTS IAS
20	174	150	122
21	174	150	125
22	178	150	128
23	181	152	130
24	184	155	133
25	187	158	136
26	191	160	138
27	194	163	140
28	197	166	143
29	200	169	145
30	203	172	148
31	206	174	150
32	208	177	152
33	211	180	154
34	213	182	156
35	216	185	158
36	218	187	160

NOTE

1. For each knot above recommended touchdown speed, increase charted ground-roll distance 1.5 percent.
2. Increase charted distance 6 percent if speed brake is not used.
3. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 16 percent and add 1000 feet.
4. 100 percent braking is obtained just before tire skidding without antiskid cycling.
5. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

Figure C7-2

PART 8–COMBAT PERFORMANCE

TABLE OF CONTENTS

Titles CAPITALIZED denote charts.

TITLE	PAGE
Effect of Anti-icing and Defrosting System Operation	C8-1
Level-flight Acceleration Charts	
CONFIGURATION DRAG INDEX 40 - SEA LEVEL	C8-2
CONFIGURATION DRAG INDEX 40 - 2000 FEET	C8-3
CONFIGURATION DRAG INDEX 40 - 4000 FEET	C8-4
CONFIGURATION DRAG INDEX 70 - SEA LEVEL	C8-5
CONFIGURATION DRAG INDEX 70 - 2000 FEET	C8-6
CONFIGURATION DRAG INDEX 70 - 4000 FEET	C8-7
COMBAT ALLOWANCE - MAXIMUM THRUST	C8-8
COMBAT ALLOWANCE - MILITARY THRUST	C8-10
COMBAT ALLOWANCE - MAXIMUM CONTINUOUS THRUST	C8-11

NOTE For sample problems and descriptive text, refer to Part 8, Section I, of this manual.

EFFECT OF ANTI-ICING AND DEFROSTING SYSTEM OPERATION.

When compressor bleed air is extracted by operation of anti-icing and defrosting systems, engine thrust will be reduced and performance will be less than that shown for Maximum and Military Thrust. To compensate for the use of these systems, add the following equivalent increment of weight for each system in operation to the gross weight of the airplane before computing combat performance, using Maximum or Military Thrust.

SYSTEM IN OPERATION	EQUIV WT	
	MAX THRUST	MIL. THRUST
Engine guide vane anti-icing	1400 lb	1000 lb
Windshield anti-icing	1000 lb	700 lb
Canopy and windshield defrosting	700 lb	500 lb

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 40—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

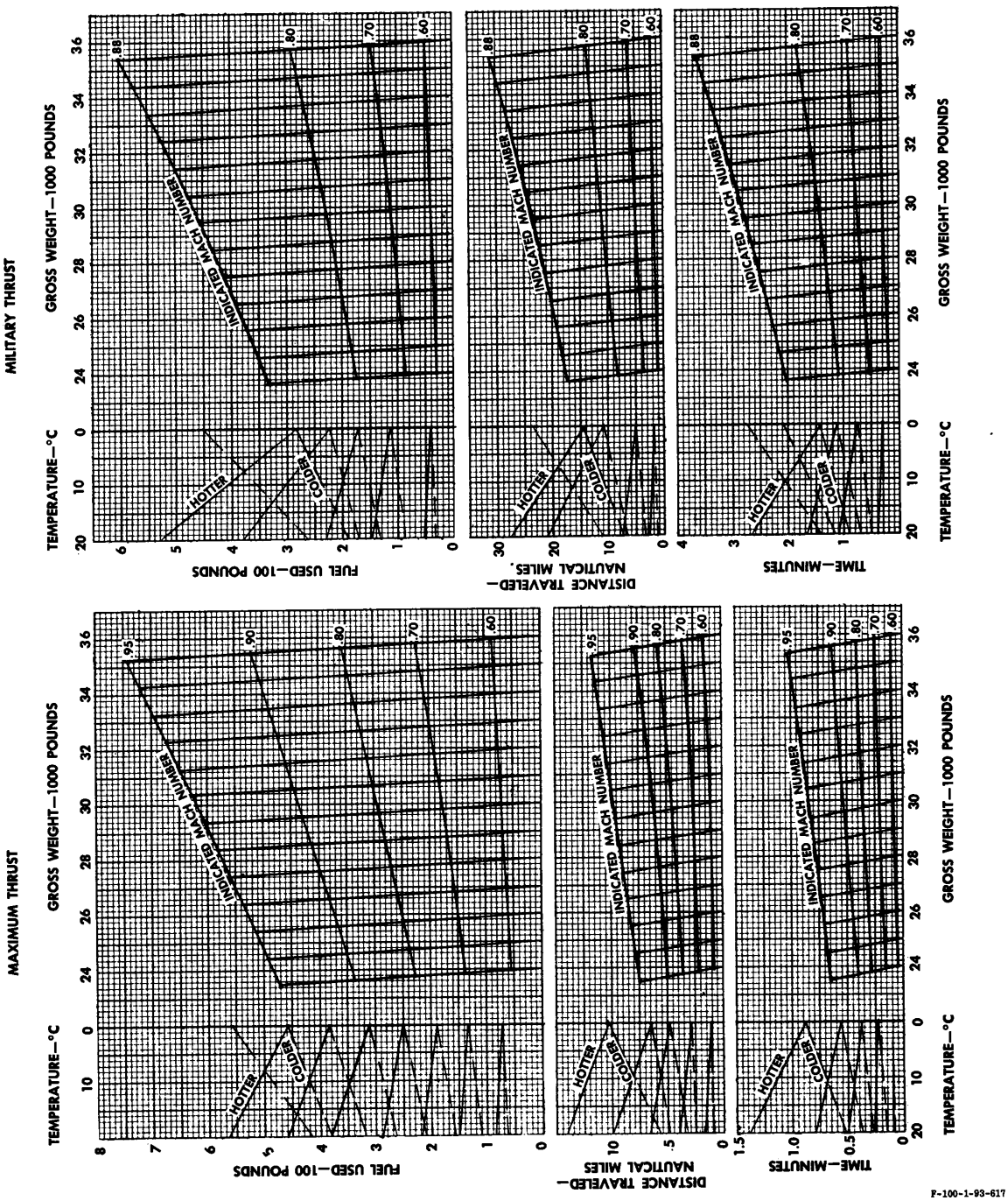


Figure C8-1

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 40—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

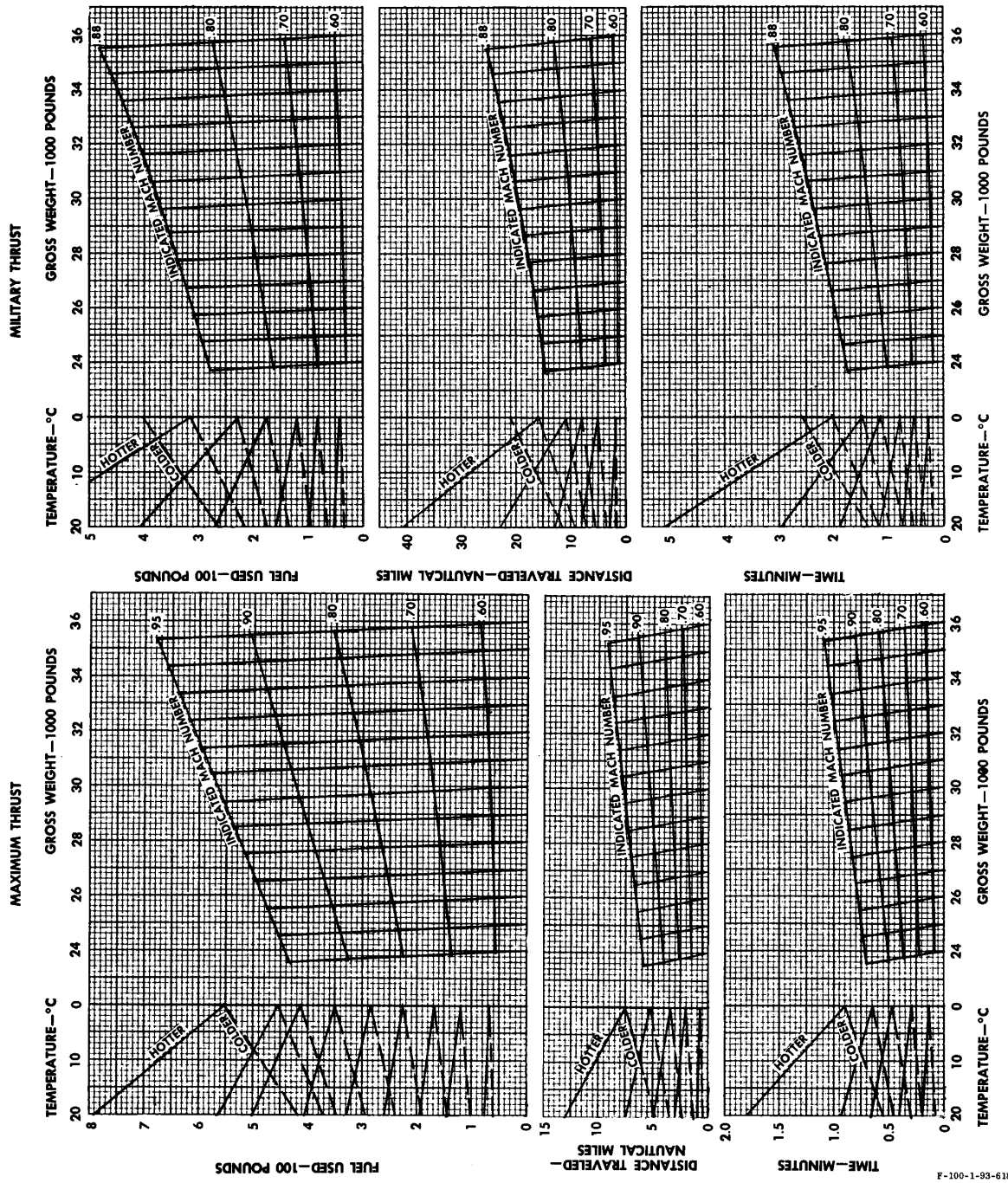


Figure C8-2

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

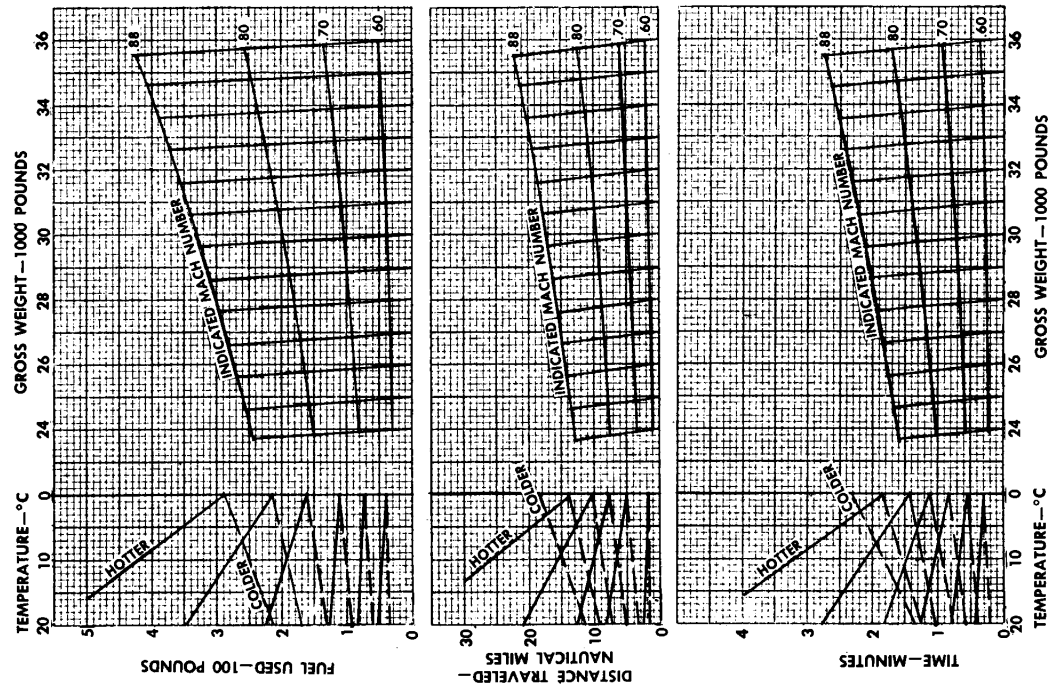
LEVEL-FLIGHT ACCELERATION

MODEL: F-100A & C
ENGINE: J57-21

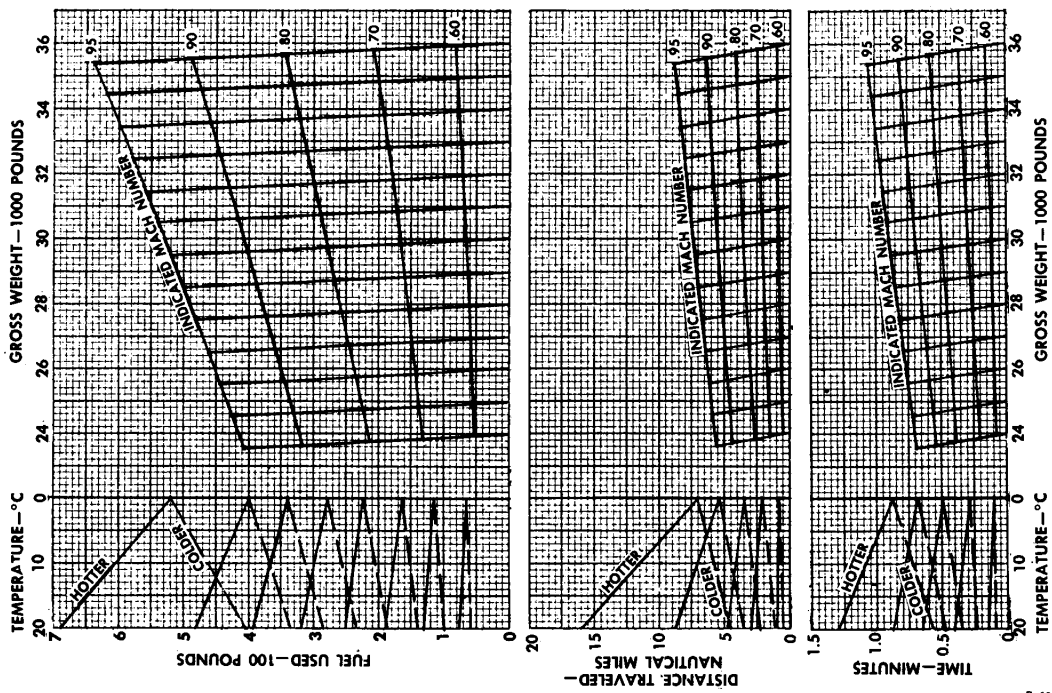
CONFIGURATION DRAG INDEX 40—4000 FEET

(FROM .53 INDICATED MACH NUMBER)

MILITARY THRUST



MAXIMUM THRUST



F-100-193-619

Figure C8-3

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

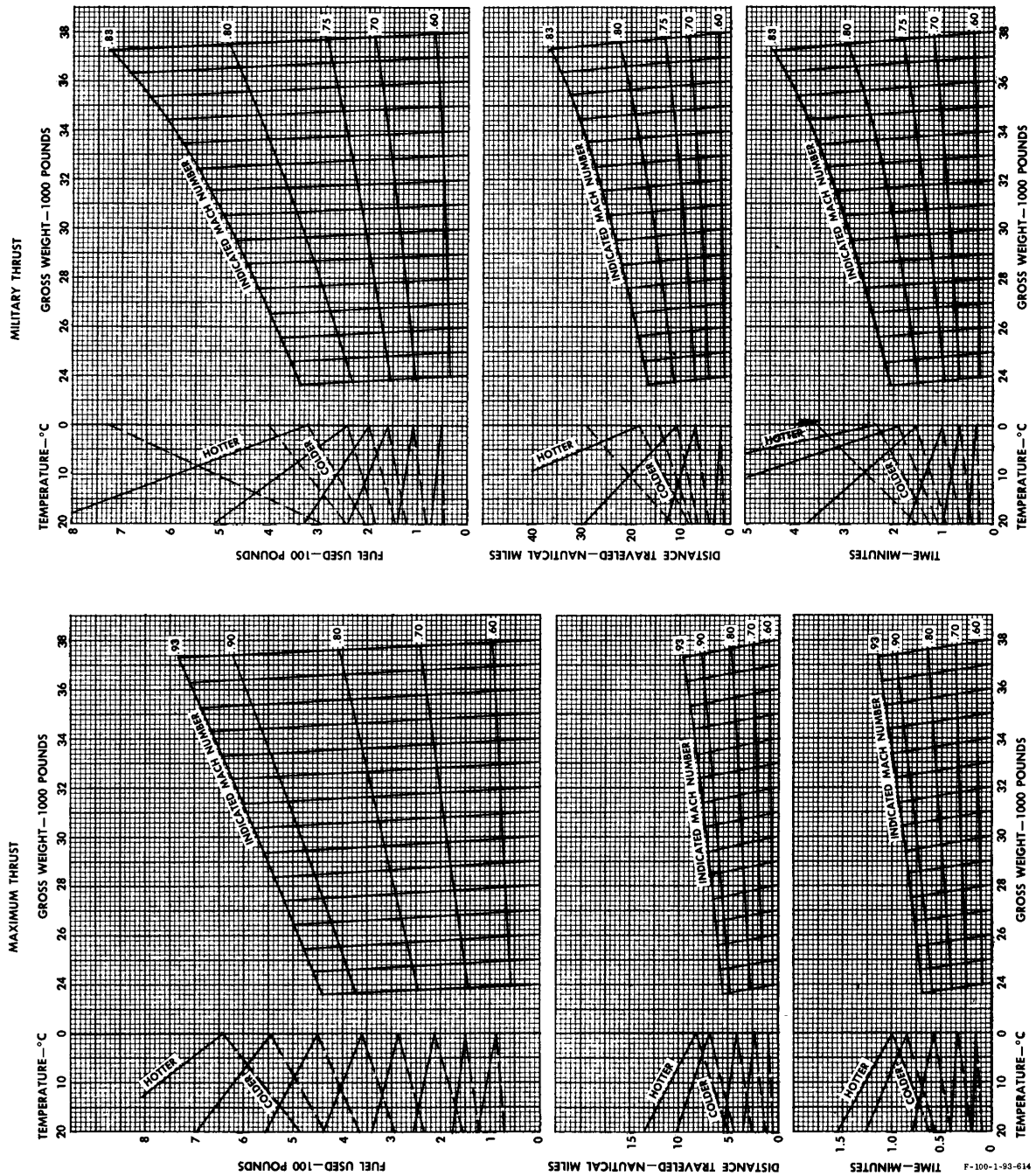


Figure C8-4

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

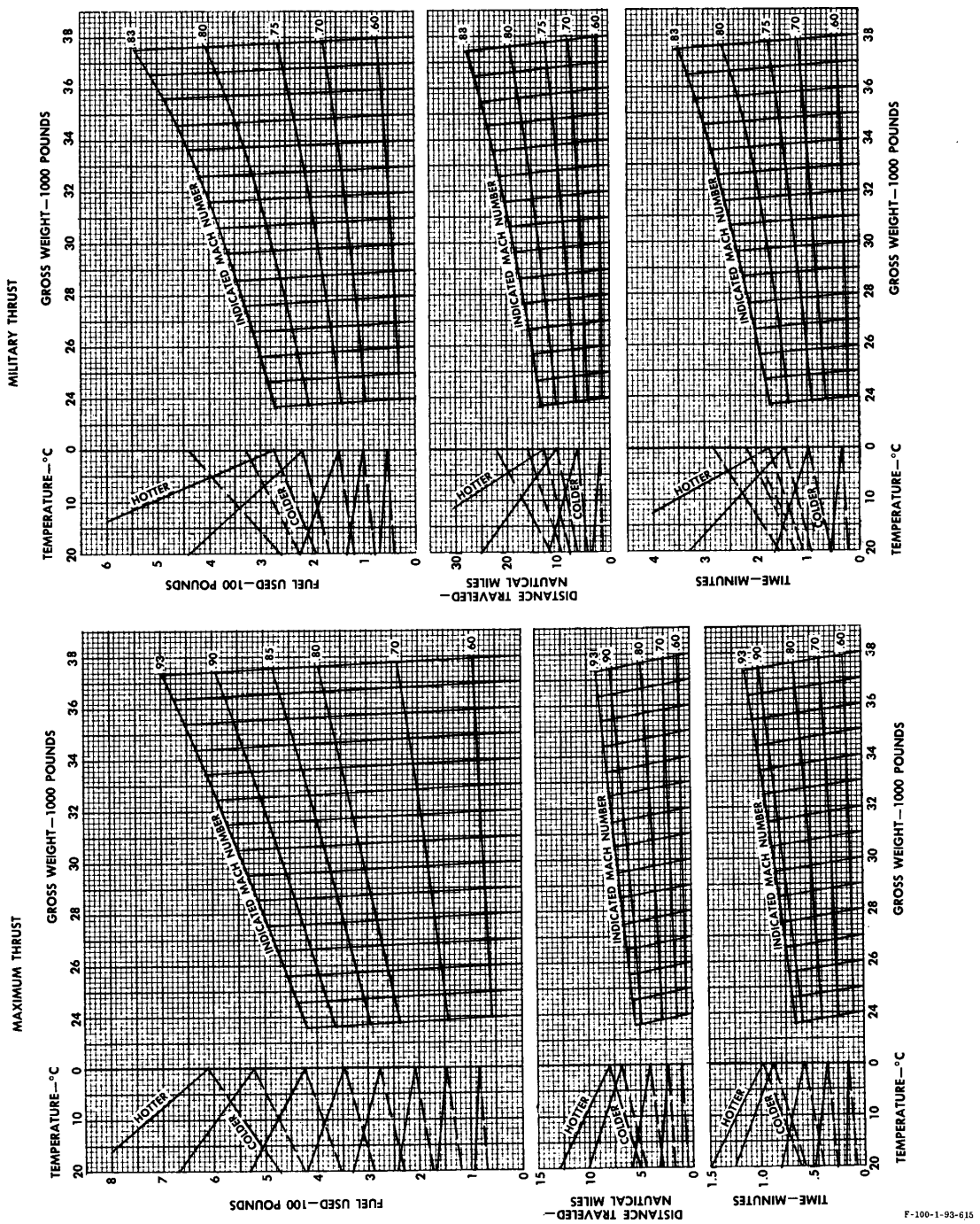


Figure C8-5

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—4000 FEET

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

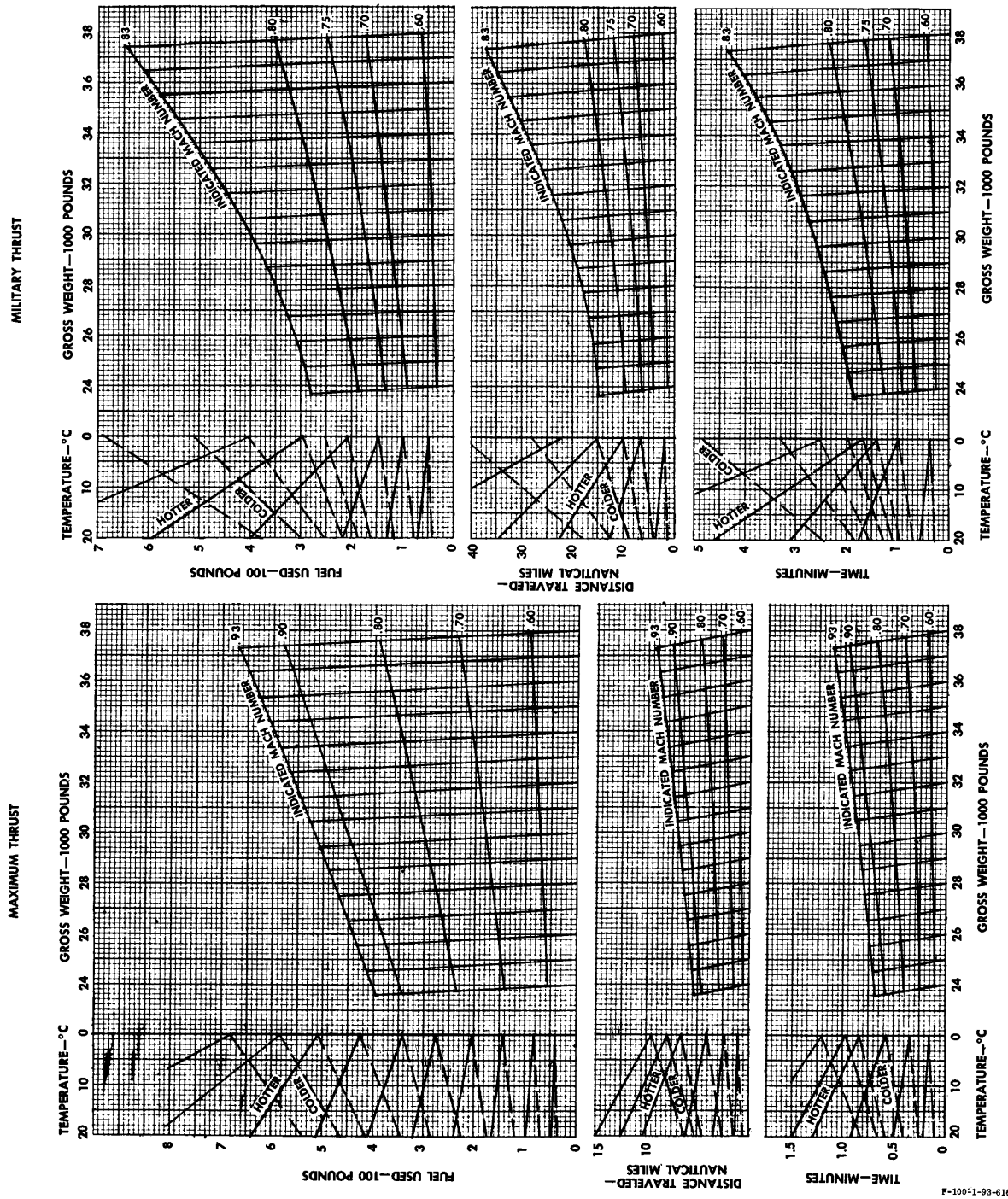


Figure C8-6

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

COMBAT ALLOWANCE—

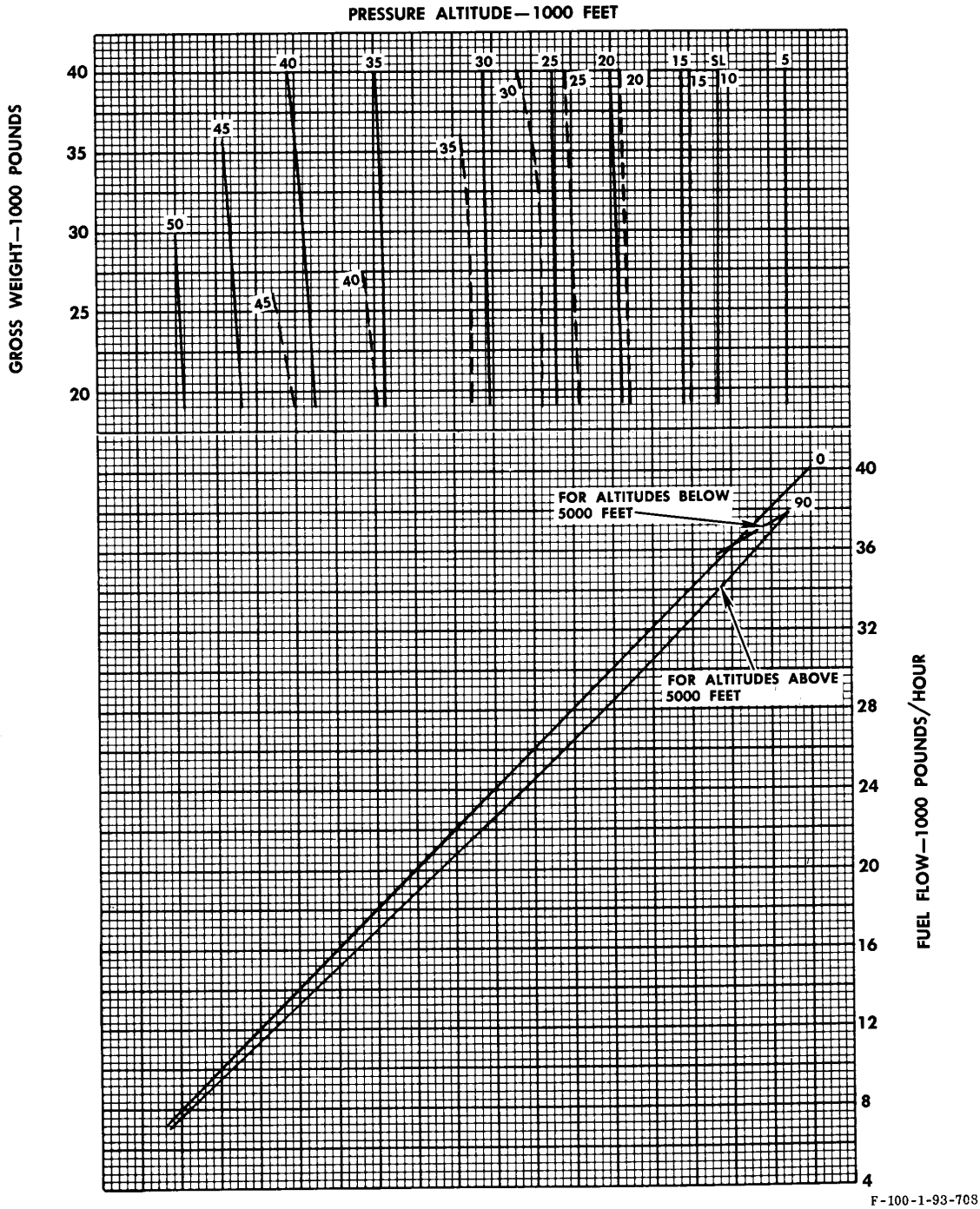


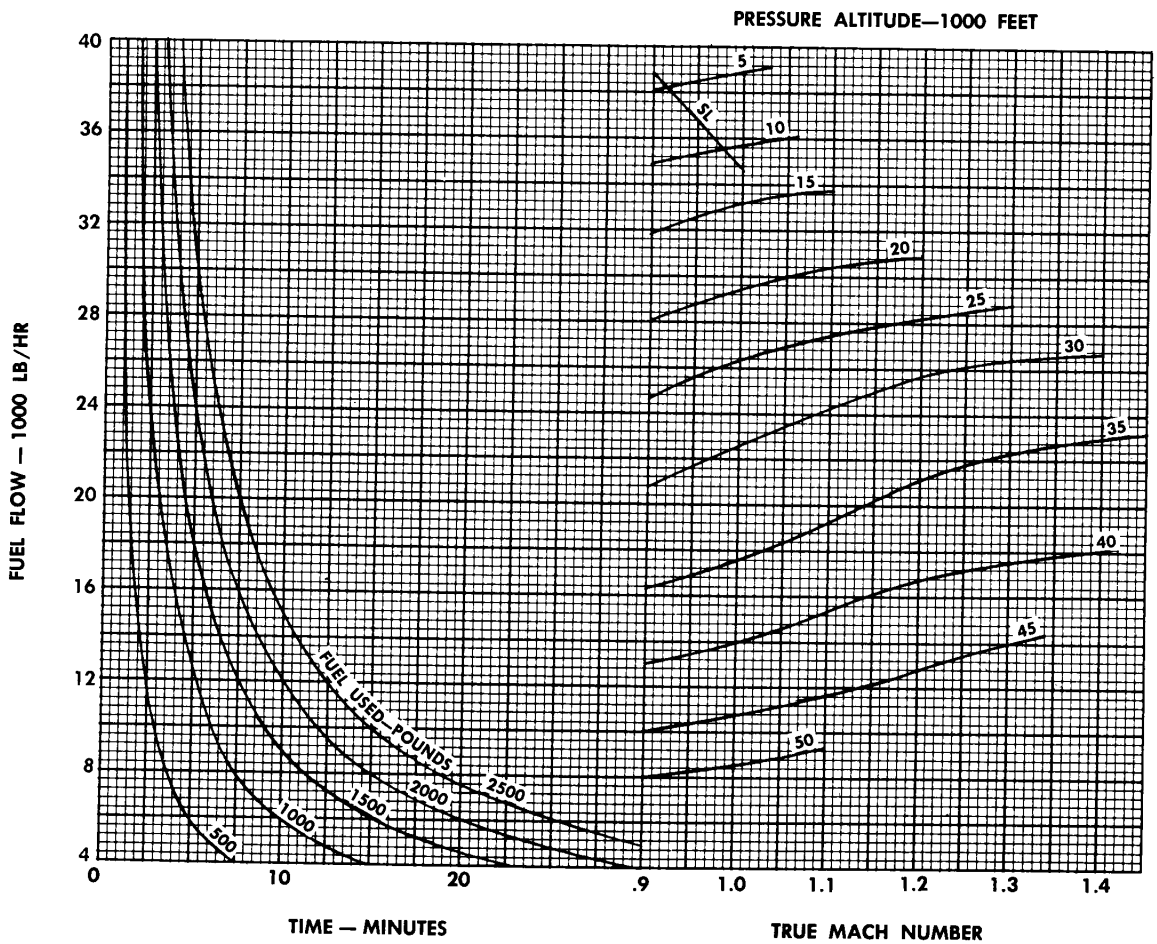
Figure C8-7 (Sheet 1 of 2)

MAXIMUM THRUST

MODEL: F-100A & C
ENGINE: J57-21

NOTE

Solid altitude lines represent subsonic speed at that altitude. Broken altitude lines represent supersonic speed at that altitude for clean airplane only.



F-100-1-93-709

Figure C8-7 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

COMBAT ALLOWANCE— MILITARY THRUST

MODEL: F-100A & C
ENGINE: J57-21

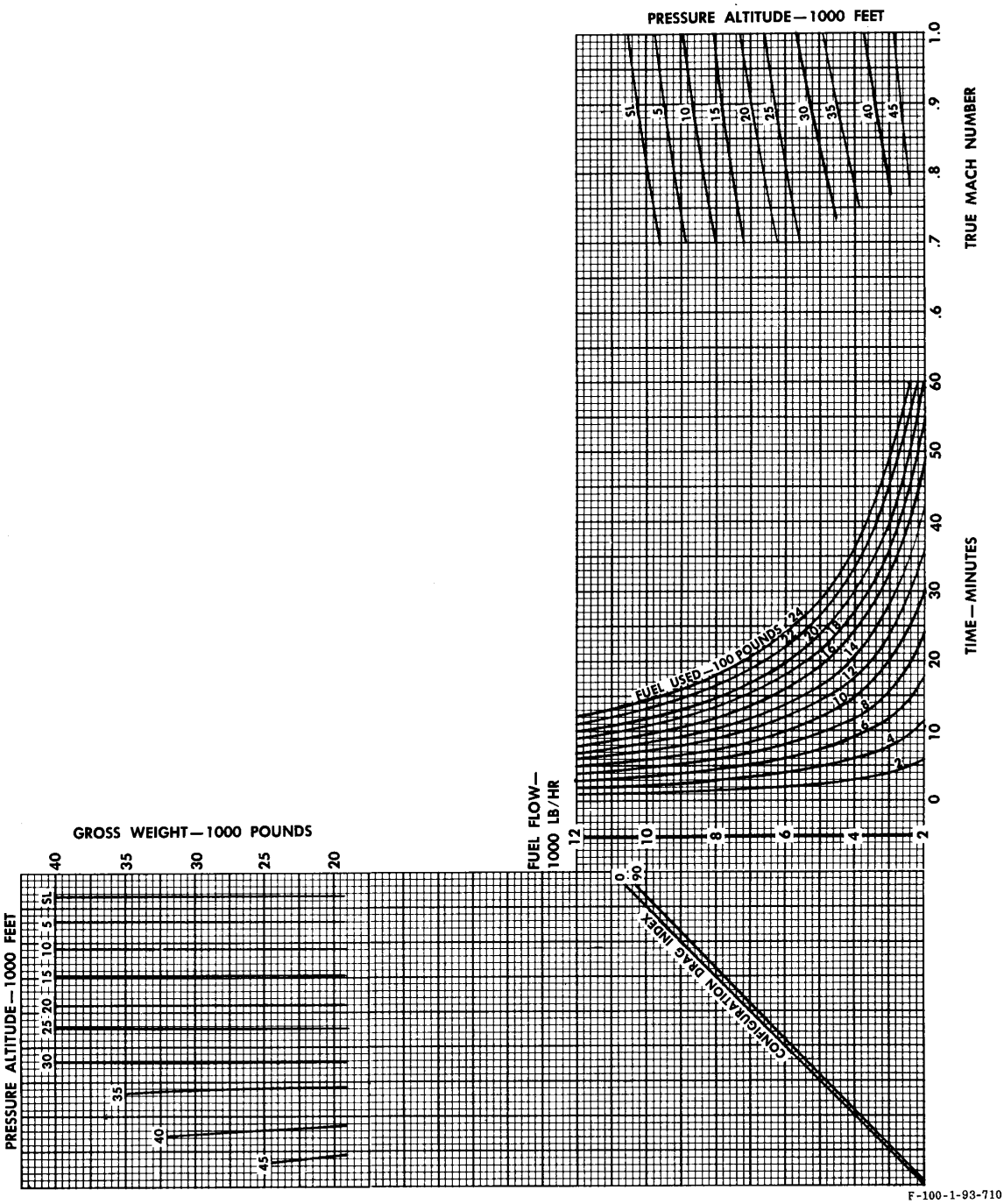
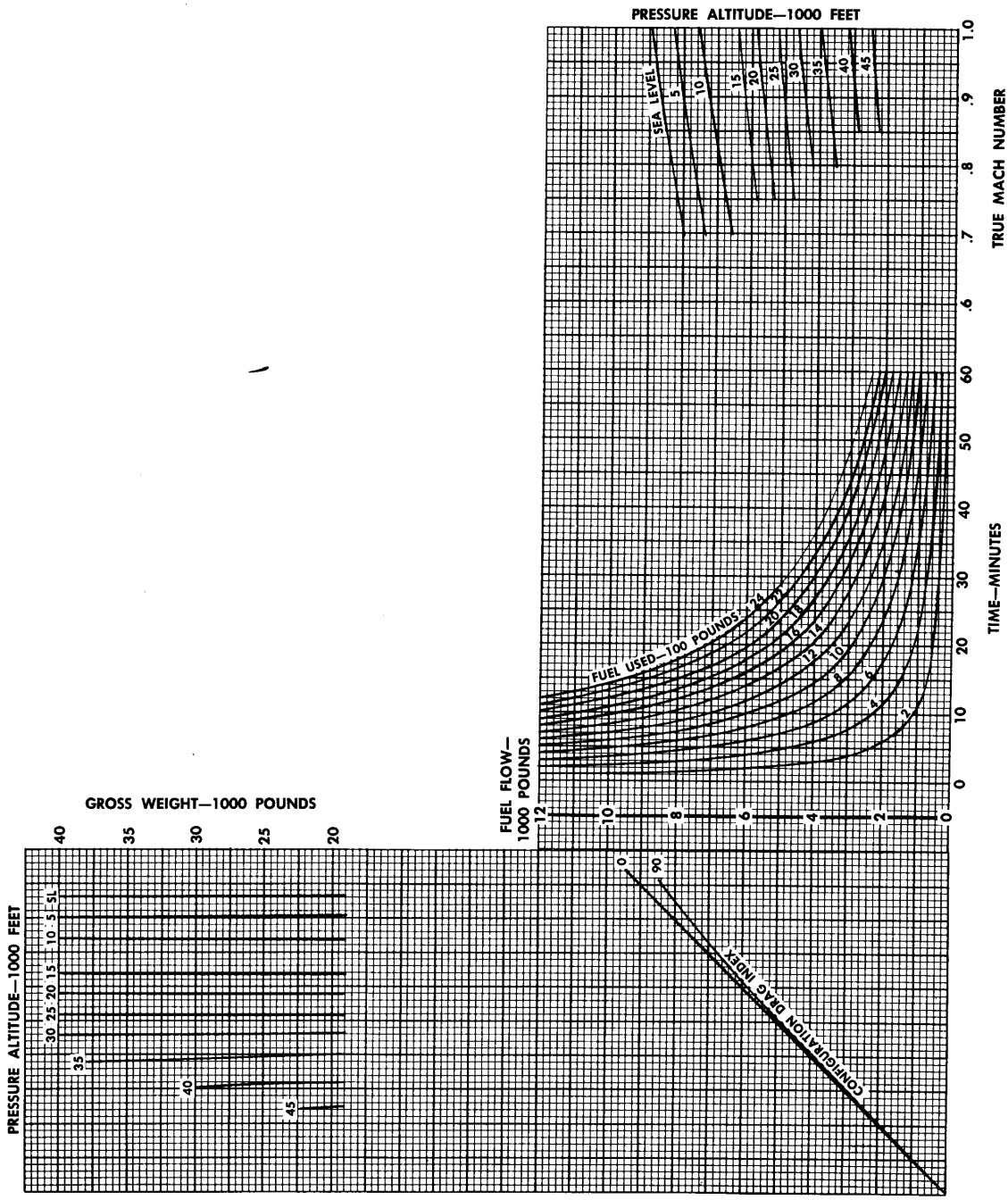


Figure C8-8

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

COMBAT ALLOWANCE—
MAXIMUM CONTINUOUS THRUST

MODEL: F-100A & C
ENGINE: J57-21



F-100-1-93-711

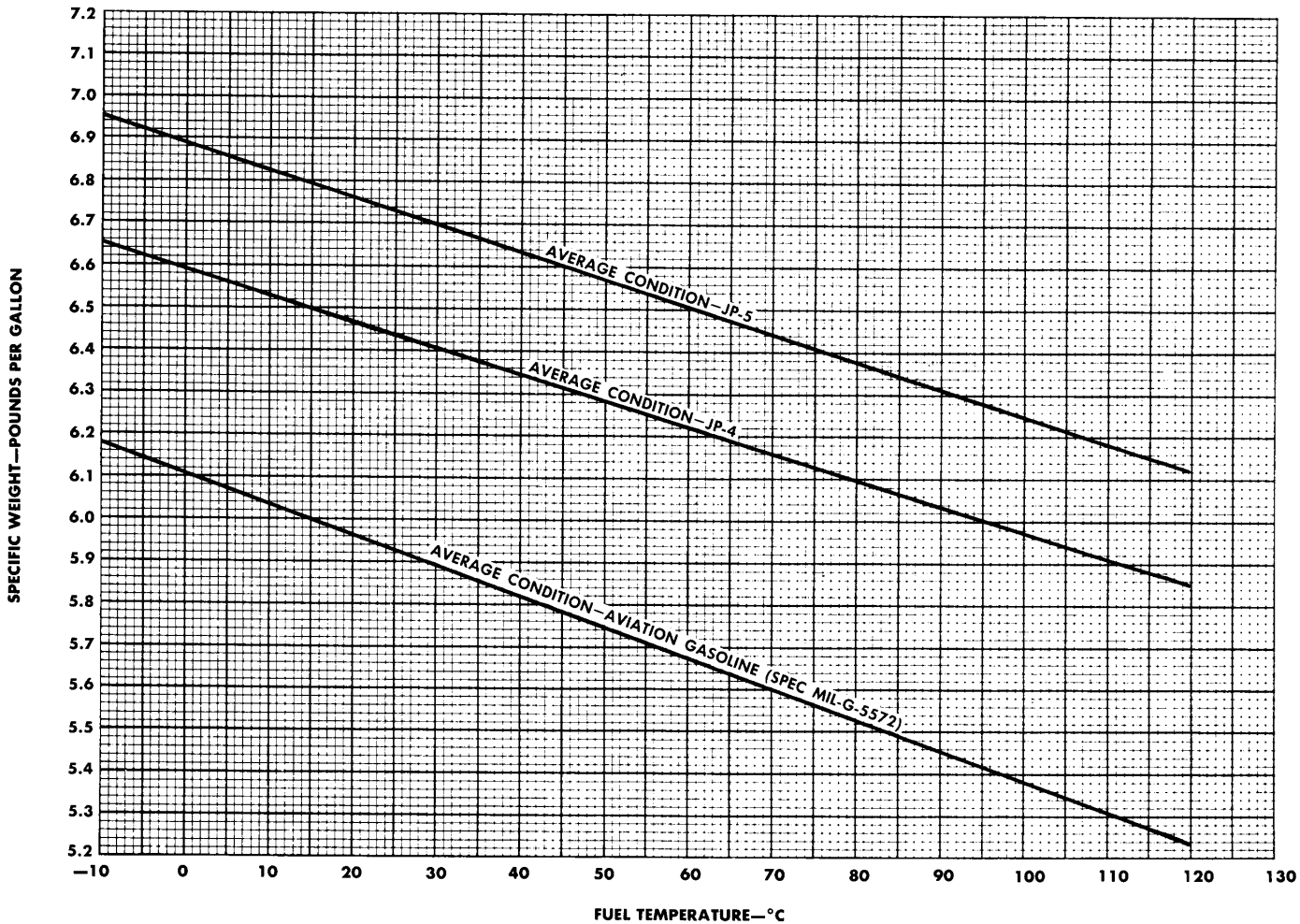
Figure C8-9

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

SPECIFIC WEIGHT VS FUEL TEMPERATURE

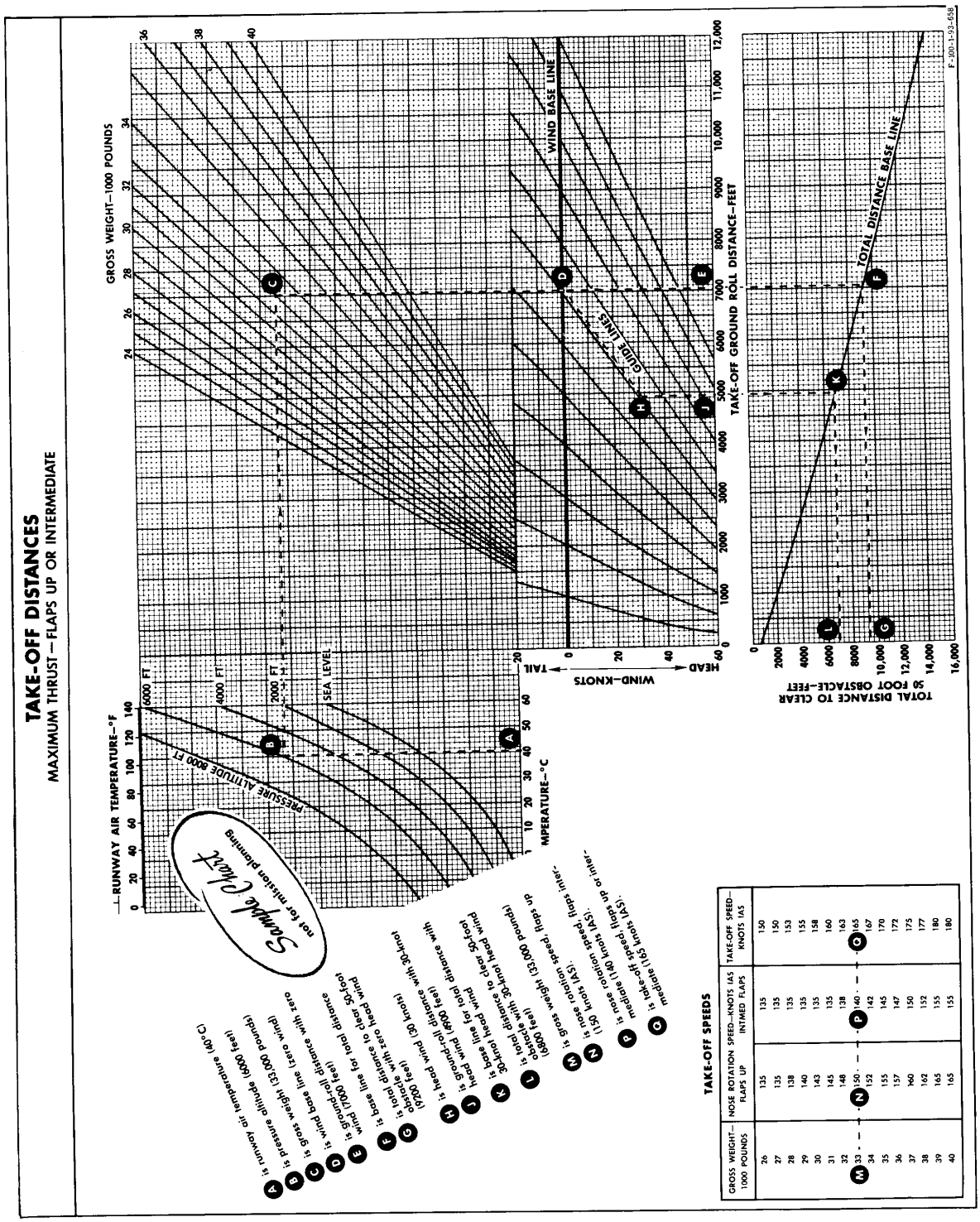
JP-4, JP-5, AND AVIATION GASOLINE

F-100 SERIES



F-100-1-93-7

Figure A1-3



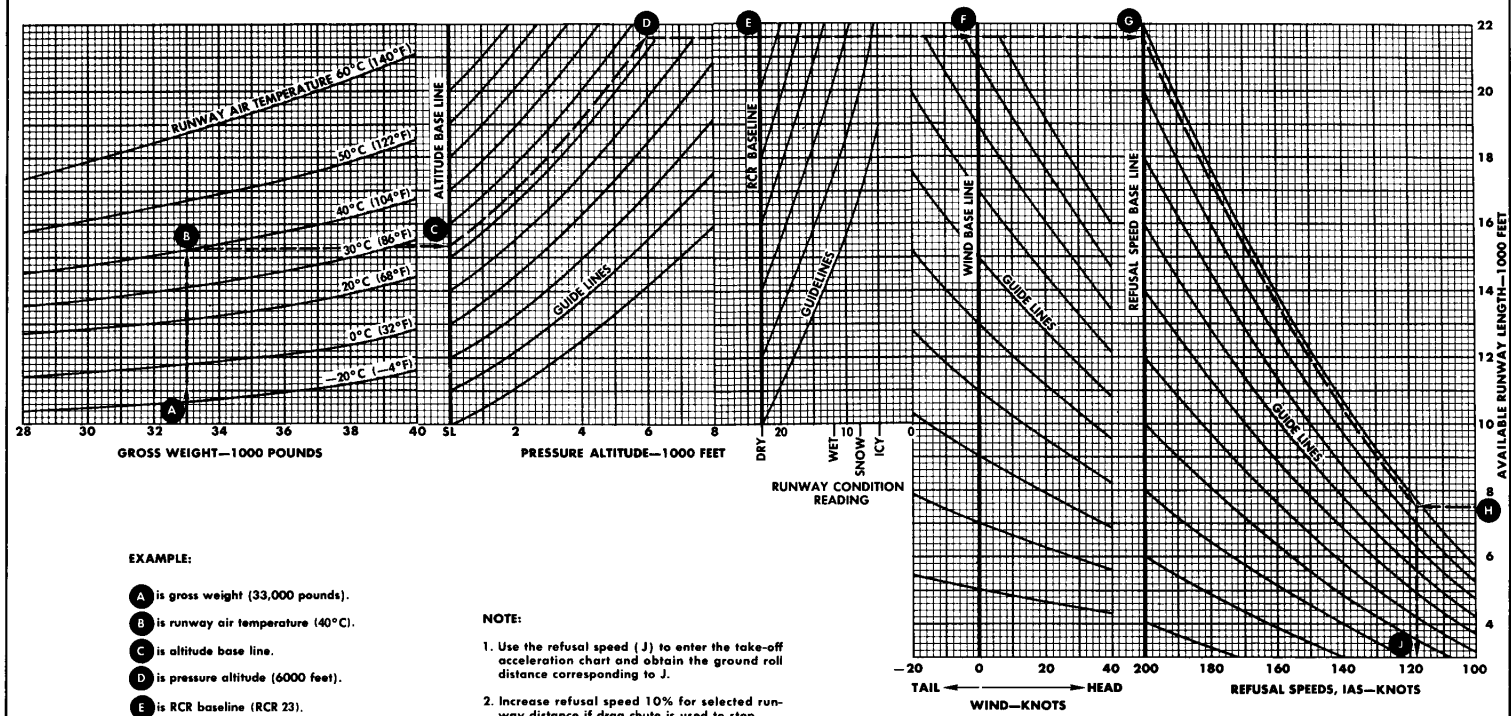
TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS FLAPS UP	INTMED FLAPS	TAKE-OFF SPEED—KNOTS IAS
26	135	135	150
27	135	135	150
28	138	135	153
29	140	135	155
30	143	135	158
31	145	135	160
32	148	138	163
M 33	N 150	P 140	Q 165
34	152	142	167
35	155	145	170
36	157	147	172
37	160	150	175
38	162	152	177
39	165	155	180
40	165	155	180

Figure A2-3

REFUSAL SPEEDS

MAXIMUM THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED



EXAMPLE:

- (A) is gross weight (33,000 pounds).
- (B) is runway air temperature (40°C).
- (C) is altitude base line.
- (D) is pressure altitude (6000 feet).
- (E) is RCR baseline (RCR 23).
- (F) is wind base line (zero wind).
- (G) is refusal speed base line.
- (H) is runway length (7500 feet).
- (J) is refusal speed (118 knots).

NOTE:

1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.

F-100-1-93-714

Figure A2-5

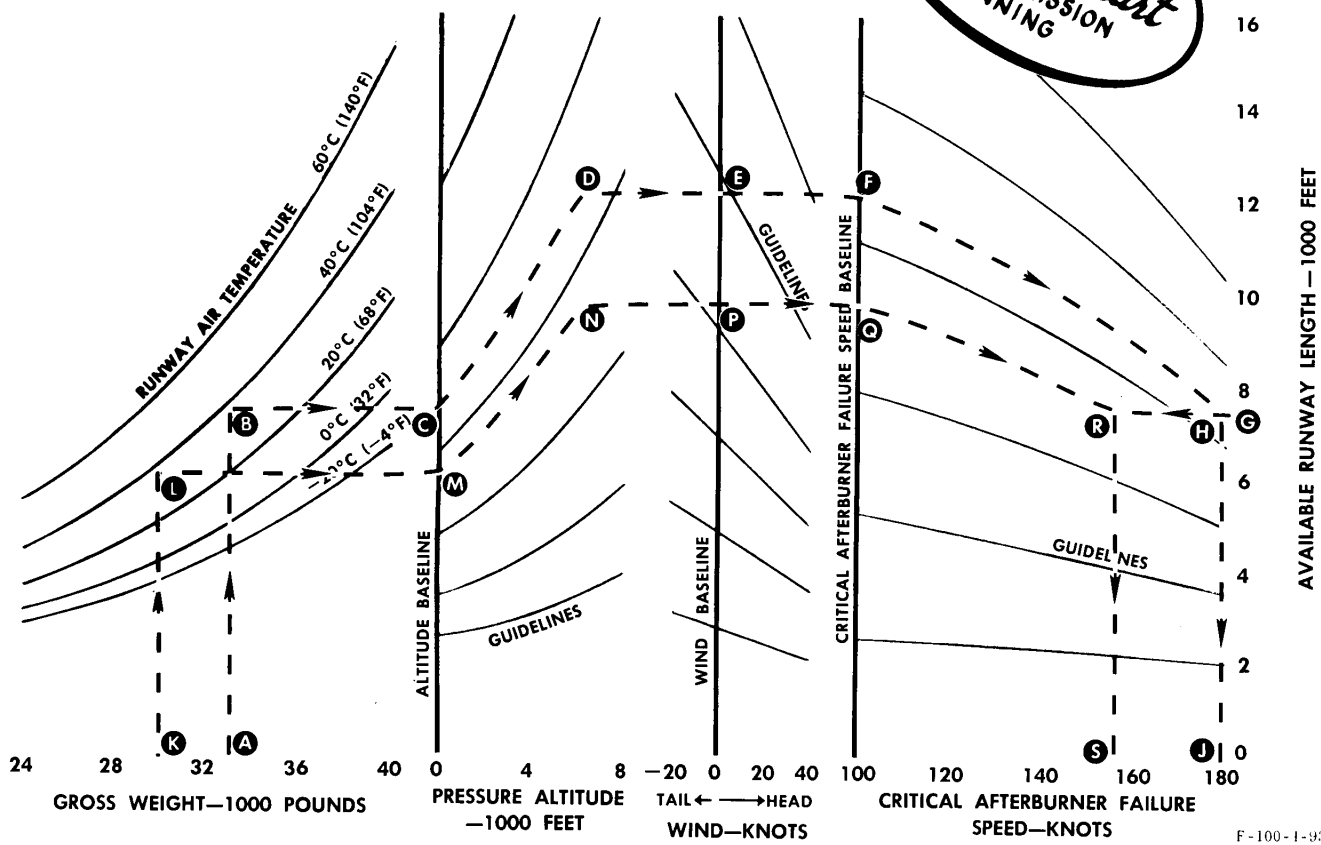
CRITICAL AFTERBURNER FAILURE SPEED

FLAPS UP OR INTERMEDIATE

NOTE

- Chart based on retaining external stores for take-off.
- Chart includes 700 feet allowance for pilot reaction tim
  burner failure to throttle movement.

Sample Chart
NOT FOR MISSION PLANNING



F-100-1-93-677A

Figure A2-6

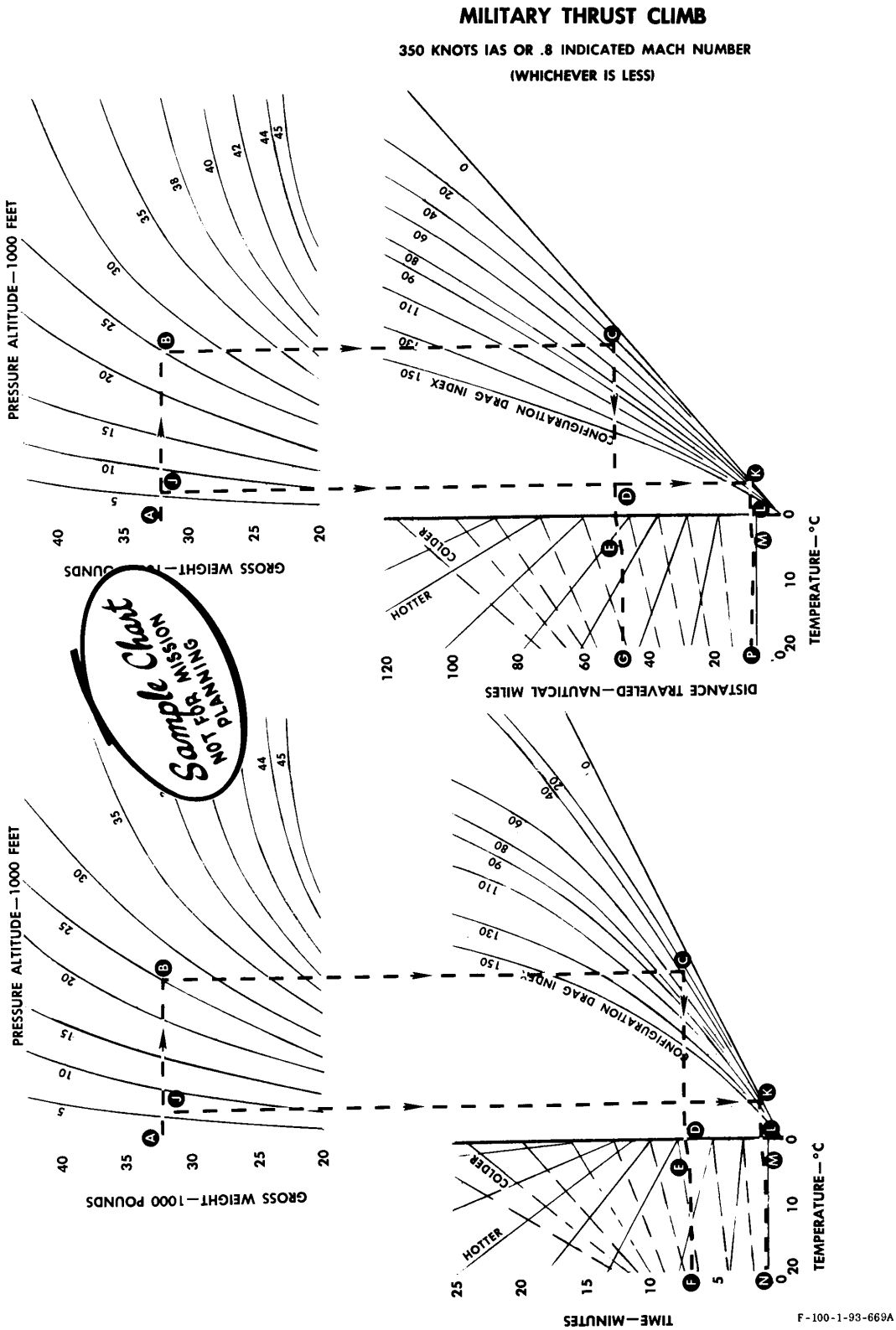


Figure A3-1 (Sheet 1 of 2)

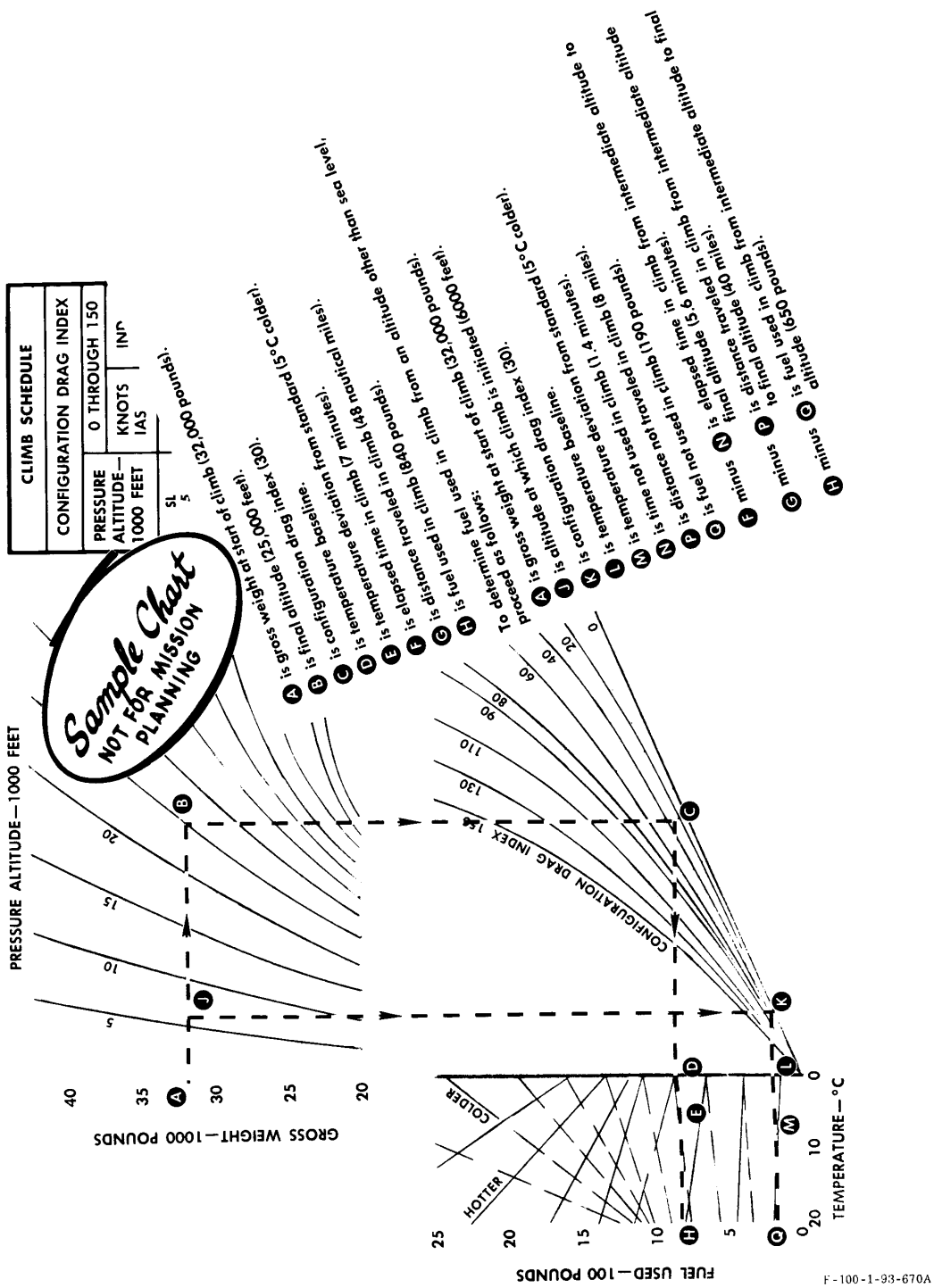


Figure A3-1 (Sheet 2 of 2)

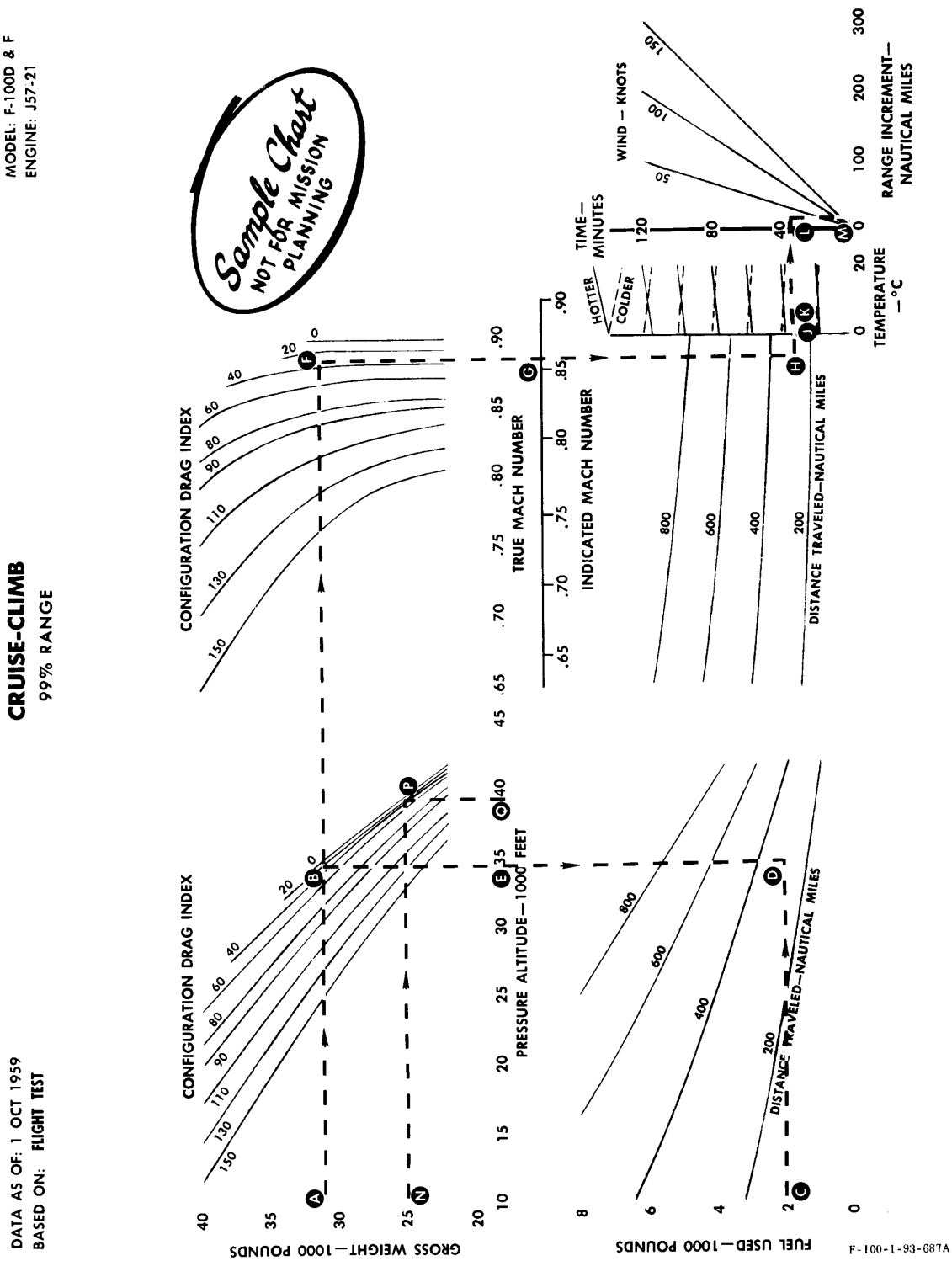
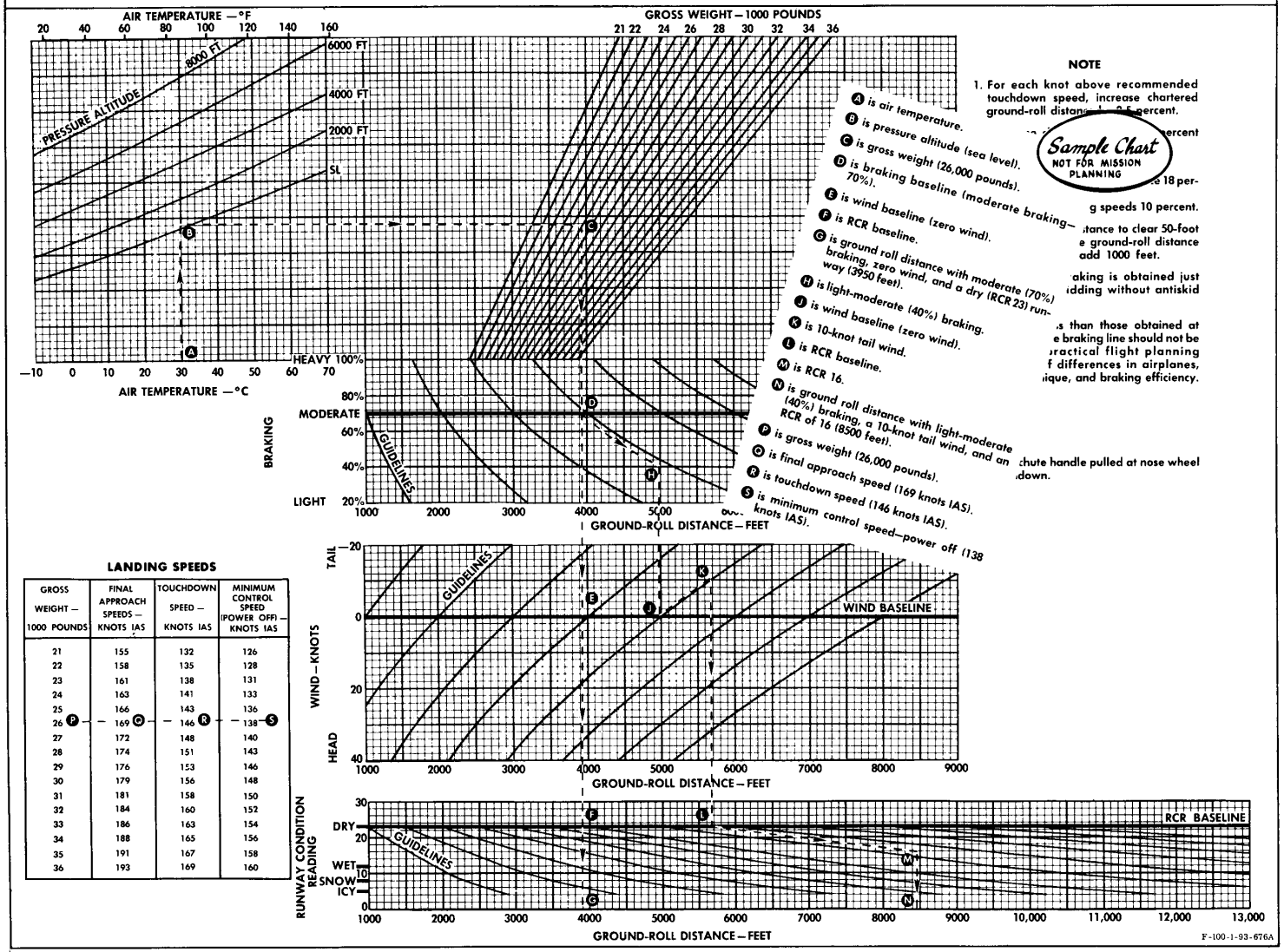

MODEL: F-100D & F
ENGINE: J57-21
CRUISE-CLIMB
99% RANGE
DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
Sample Chart
NOT FOR MISSION PLANNING
CONFIGURATION DRAG INDEX
GROSS WEIGHT—1000 POUNDS
PRESSURE ALTITUDE—1000 FEET
TRUE MACH NUMBER
INDICATED MACH NUMBER
FUEL USED—1000 POUNDS
DISTANCE TRAVELED—NAUTICAL MILES
TIME—MINUTES
HOTTER
COLDER
TEMPERATURE —°C
WIND — KNOTS
RANGE INCREMENT—NAUTICAL MILES
F-100-1-93-687A

Figure A4-4

LANDING DISTANCES

FLAPS DOWN—SPEED BRAKE CLOSED— DRAG CHUTE DEPLOYED*



NOTE

1. For each knot above recommended touchdown speed, increase chartered ground-roll distance [illegible] percent.

Sample Chart
NOT FOR MISSION PLANNING

[illegible] percent

[illegible] 18 per-

g speeds 10 percent.

[illegible]stance to clear 50-foot
e ground-roll distance
add 1000 feet.

[illegible]aking is obtained just
[illegible]dding without antiskid

[illegible]s than those obtained at
e braking line should not be
[illegible]ractical flight planning
f differences in airplanes,
[illegible]ique, and braking efficiency.

[illegible] chute handle pulled at nose wheel
[illegible]down.

Ⓐ is air temperature.
Ⓑ is pressure altitude (sea level).
Ⓒ is gross weight (26,000 pounds).
Ⓓ is braking baseline (moderate braking—70%).
Ⓔ is wind baseline (zero wind).
Ⓕ is RCR baseline.
Ⓖ is ground roll distance with moderate (70%) braking, zero wind, and a dry (RCR 23) runway (3950 feet).
Ⓗ is light-moderate (40%) braking.
Ⓙ is wind baseline (zero wind).
Ⓚ is 10-knot tail wind.
Ⓛ is RCR baseline.
Ⓜ is RCR 16.
Ⓝ is ground roll distance with light-moderate (40%) braking, a 10-knot tail wind, and an RCR of 16 (8500 feet).
Ⓟ is gross weight (26,000 pounds).
Ⓠ is final approach speed (169 knots IAS).
Ⓡ is touchdown speed (146 knots IAS).
Ⓢ is minimum control speed—power off (138 knots IAS).

LANDING SPEEDS

GROSS WEIGHT — 1000 POUNDS	FINAL APPROACH SPEEDS — KNOTS IAS	TOUCHDOWN SPEED — KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS
21	155	132	126
22	158	135	128
23	161	138	131
24	163	141	133
25	166	143	136
26 Ⓟ	169 Ⓠ	146 Ⓡ	138 Ⓢ
27	172	148	140
28	174	151	143
29	176	153	146
30	179	156	148
31	181	158	150
32	184	160	152
33	186	163	154
34	188	165	156
35	191	167	158
36	193	169	160

Figure A7-1

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

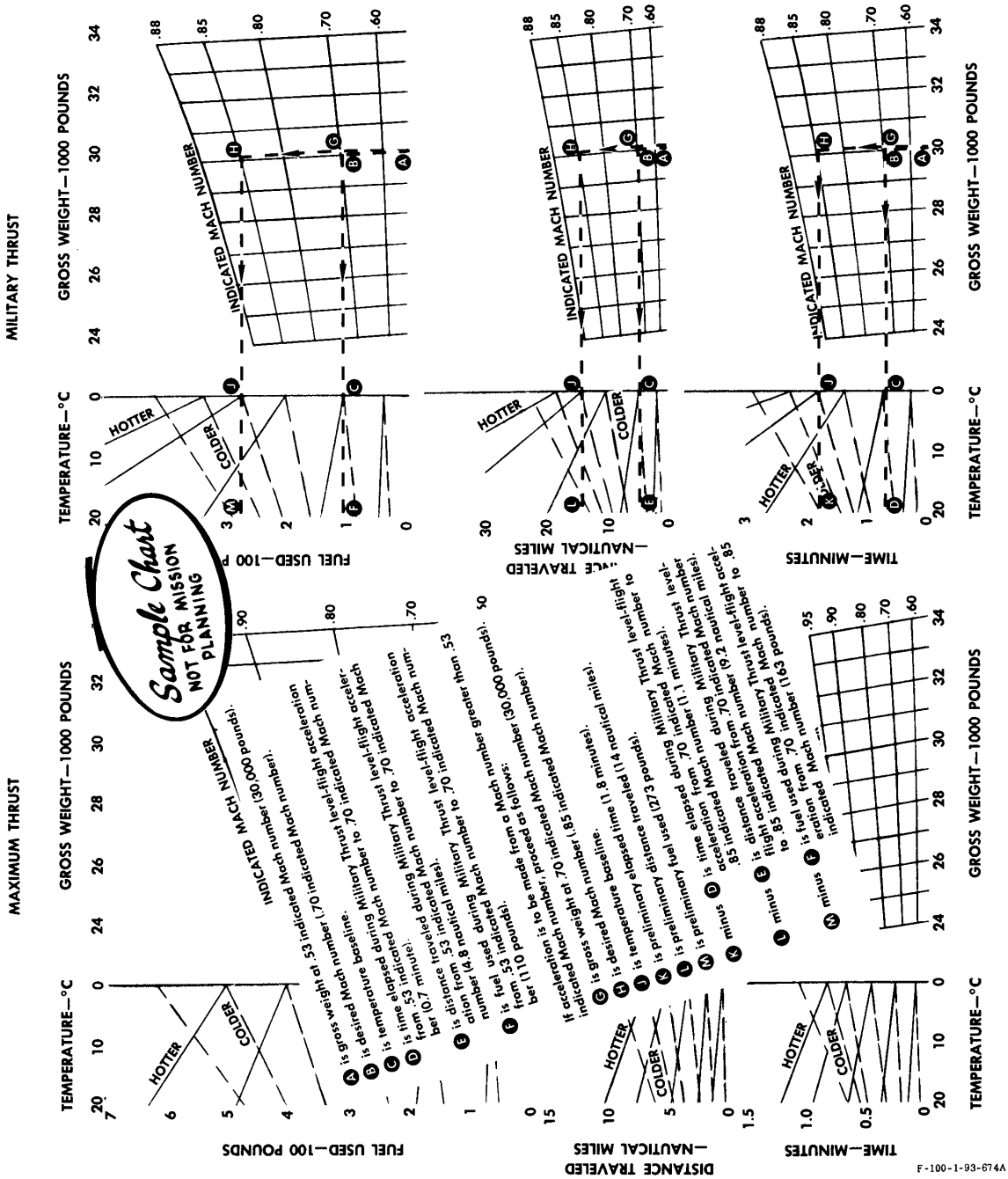


Figure A8-1

COMBAT ALLOWANCE–
MAXIMUM CONTINUOUS THRUST

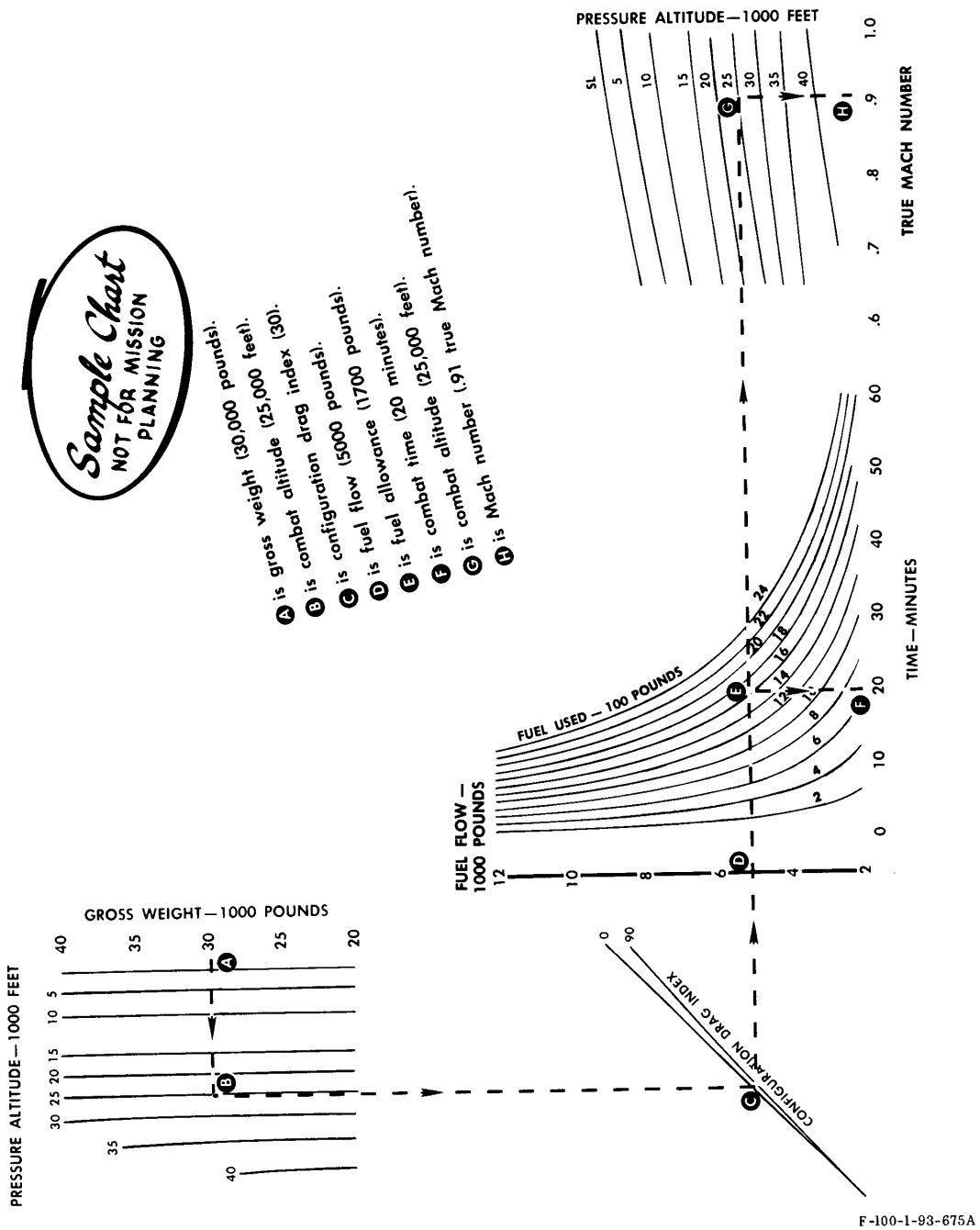


Figure A8-2

LO-LO-HI MISSION

INITIAL CONFIGURATION
TWO 200 - GALLON DROP TANKS PLUS ONE
275 - GALLON DROP TANK PLUS ONE BOMB

STEP NO.	OPERATION	CONFIGURATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMULATIVE FUEL (LB)	FUEL REMAINING (LB)	WEIGHT AT END OF STEP (LB)	ALTITUDE AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMULATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMULATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	59.0	—	—	12,116	36,685	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, ACCELERATION, AND CLIMB	59.0	1000	1000	11,116	35,685	1500	1.0	1.0	—	—
2	INBOUND CRUISE (USING OUTBOARD 200 GAL TANK)	59.0	300	1300	10,816	35,385	1500	3.4	4.4	21.3	21.3
3	* OUTBOARD 200 GAL TANK DROPPED	50.0	—	—	—	35,270	1500	—	—	—	—
4	INBOUND CRUISE (CON' T) (USING INBOARD 200 GAL TANK)	50.0	1300	2600	9516	33,970	1500	14.9	19.3	93.6	114.9
5	* INBOARD 200 GAL TANK DROPPED	48.0	—	—	—	33,855	1500	—	—	—	—
6	INBOUND CRUISE (CON' T) (USING 275 GAL TANK)	48.0	1787	4387	7729	32,068	1500	21.1	40.4	130.4	245.3
7	275 GAL TANK DROPPED	28.0	—	—	—	31,845	1500	—	—	—	—
8	INBOUND CRUISE (TO ACCELERATION POINT FOR RUN IN)	28.0	1749	6136	5980	30,096	1500	22.2	62.6	141.7	387.0
9	ACCELERATE TO .85 TRUE INDICATED MACH NO.	28.0	250	6386	5730	29,846	1500	1.6	64.2	13.0	400.0
10	RUN-IN. (.85 TRUE MACH NO.) (50 NAUTICAL MILES-MILITARY THRUST)	28.0	781	7167	4949	29,065	1500	5.3	69.5	50.0	450.0
11	LABS MANEUVER AND RECOVERY	18.0	500	7667	4449	27,565	10,000	1.0	70.5	—	—
12	MILITARY THRUST CLIMB	18.0	800	8467	3649	26,765	38,000	8.5	79.0	76.0	526.0
13	OUTBOUND CRUISE	18.0	2033	10,500	1616	24,732	38,000	44.0	123.0	374.0	900.0
14	RESERVE	18.0	—	—	1616	—	—	—	—	—	—

*PYLON RETAINED

F-100-1-93-689

Figure A9-1

LO-LO-LO MISSION

INITIAL CONFIGURATION
TWO 200-GALLON DROP TANKS PLUS
ONE 275-GALLON DROP TANK PLUS ONE BOMB

STEP NO.	OPERATION	CONFIGURATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMULATIVE FUEL USED (LB)	FUEL REMAINING (LB)	WEIGHT AT END OF STEP (LB)	ALTITUDE AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMULATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMULATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	59.0	—	—	12,116	36,685	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, ACCELERATION, AND CLIMB	59.0	1000	1000	11,116	35,685	1500	1.0	1.0	—	—
2	INBOUND CRUISE (USING OUTBOARD 200 GAL TANK)	59.0	300	1300	10,816	35,385	1500	3.5	4.5	21.3	21.3
3	*OUTBOARD 200 GAL TANK DROPPED	50.0	—	—	—	35,270	1500	—	—	—	—
4	INBOUND CRUISE (CON'T) (USING INBOARD 200 GAL TANK)	50.0	1300	2600	9516	33,970	1500	14.9	19.4	93.6	114.9
5	*INBOARD 200 GAL TANK DROPPED	48.0	—	—	—	33,855	1500	—	—	—	—
6	INBOUND CRUISE (CON'T) (USING 275 GAL TANK)	48.0	1787	4387	7729	32,068	1500	21.1	40.5	130.4	245.3
7	275 GAL TANK DROPPED	28.0	—	—	—	31,845	1500	—	—	—	—
8	INBOUND CRUISE (TO ACCELERATION POINT FOR RUN-IN)	28.0	496	4883	7233	31,349	1500	6.0	46.5	40.7	286.0
9	ACCELERATE TO .85 TRUE MACH NUMBER	28.0	260	5143	6973	31,089	1500	1.6	48.1	14.0	300.0
10	RUN-IN (.85 MACH NO.) (50 NAUTICAL MILES - MILITARY THRUST)	28.0	781	5924	6192	30,308	1500	5.4	53.5	50.0	350.0
11	LABS MANEUVER	18.0	500	6424	5692	28,808	1500	—	—	—	—
12	OUTBOUND CRUISE	18.0	3977	10,401	1715	24,831	1500	56.8	110.3	350.0	700.0
13	RESERVE	18.0	—	—	1715	—	—	—	—	—	—

*PYLON RETAINED

F-100-1-93-690

Figure A9-2

HI-LO-HI MISSION

INITIAL CONFIGURATION
TWO 275-GALLON DROP TANKS
PLUS TWO BOMBS

STEP	OPERATION	CONFIG-URATION DRAG INDEX NO.	FUEL USED PER STEP (LB)	CUMU-LATIVE FUEL USED (LB)	FUEL REMAIN-ING (LB)	WEIGHT AT END OF STEP (LB)	ALT AT END OF STEP (FT)	TIME PER STEP (MIN)	CUMU-LATIVE TIME (MIN)	DISTANCE PER STEP (NAUT MI)	CUMU-LATIVE DISTANCE (NAUT MI)
	INITIAL CONFIGURATION	72.0	—	—	11,408	36,831	SL	—	—	—	—
1	START, TAXI, TAKE-OFF, AND ACCELERATION	72.0	1000	1000	10,408	35,831	SL	1.0	1.0	—	—
2	MILITARY THRUST CLIMB	72.0	1660	2660	8748	34,171	29,000	14.0	15.0	86.2	86.2
3	INBOUND CRUISE 1ST LEG (USING 275 GAL TANKS)	72.0	948	3608	7800	33,223	29,000	13.8	28.8	101.0	187.2
4	275 GAL TANKS DROPPED	32.0	—	—	7800	32,777	29,000	—	—	—	—
5	INBOUND CRUISE (CON' T) 2ND LEG	32.0	1587	5195	6213	31,190	29,000	27.3	56.1	200.0	387.2
6	INBOUND CRUISE (CON' T) 3RD LEG	32.0	221	5416	5992	30,969	29,000	3.8	59.9	27.8	415.0
7	DESCENT TO TARGET (.80 INDICATED MACH NO.)	32.0	625	6041	5367	30,344	2500	11.0	70.9	85.0	500.0
8	TARGET SEARCH AND BOMB DELIVERY	12.0	1000	7041	4367	27,344	10,000	3.0	73.9	—	—
9	MILITARY THRUST CLIMB	12.0	850	7891	3517	26,494	38,000	12.1	86.0	104.0	604.0
10	OUTBOUND CRUISE	12.0	1932	9823	1585	24,562	38,000	43.7	129.7	396.0	1000.0
11	RESERVE	12.0	—	—	1585	—	—	—	—	—	—

Figure A9-3

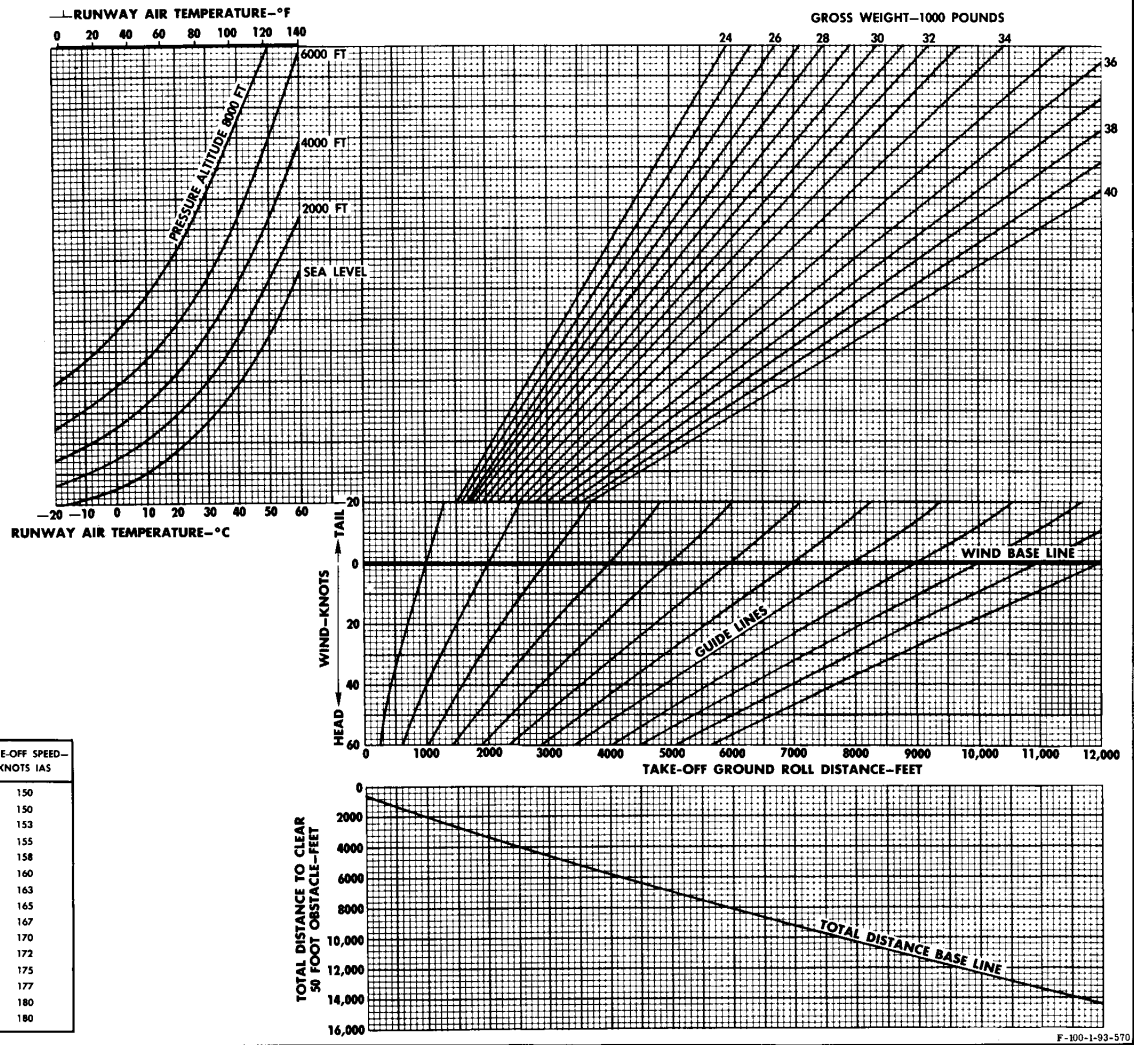
F-100-1-93-691

DATA AS OF: 1 NOV 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)

TAKE-OFF DISTANCES

MAXIMUM THRUST — FLAPS UP OR INTERMEDIATE

DRY, HARD SURFACE RUNWAY
MODEL: F-100D & F
ENGINE: J57-21



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS FLAPS UP	NOSE ROTATION SPEED—KNOTS IAS INTMED FLAPS	TAKE-OFF SPEED—KNOTS IAS
26	135	135	150
27	135	135	150
28	138	135	153
29	140	135	155
30	143	135	158
31	145	135	160
32	148	138	163
33	150	140	165
34	152	142	167
35	155	145	170
36	157	147	172
37	160	150	175
38	162	152	177
39	165	155	180
40	165	155	180

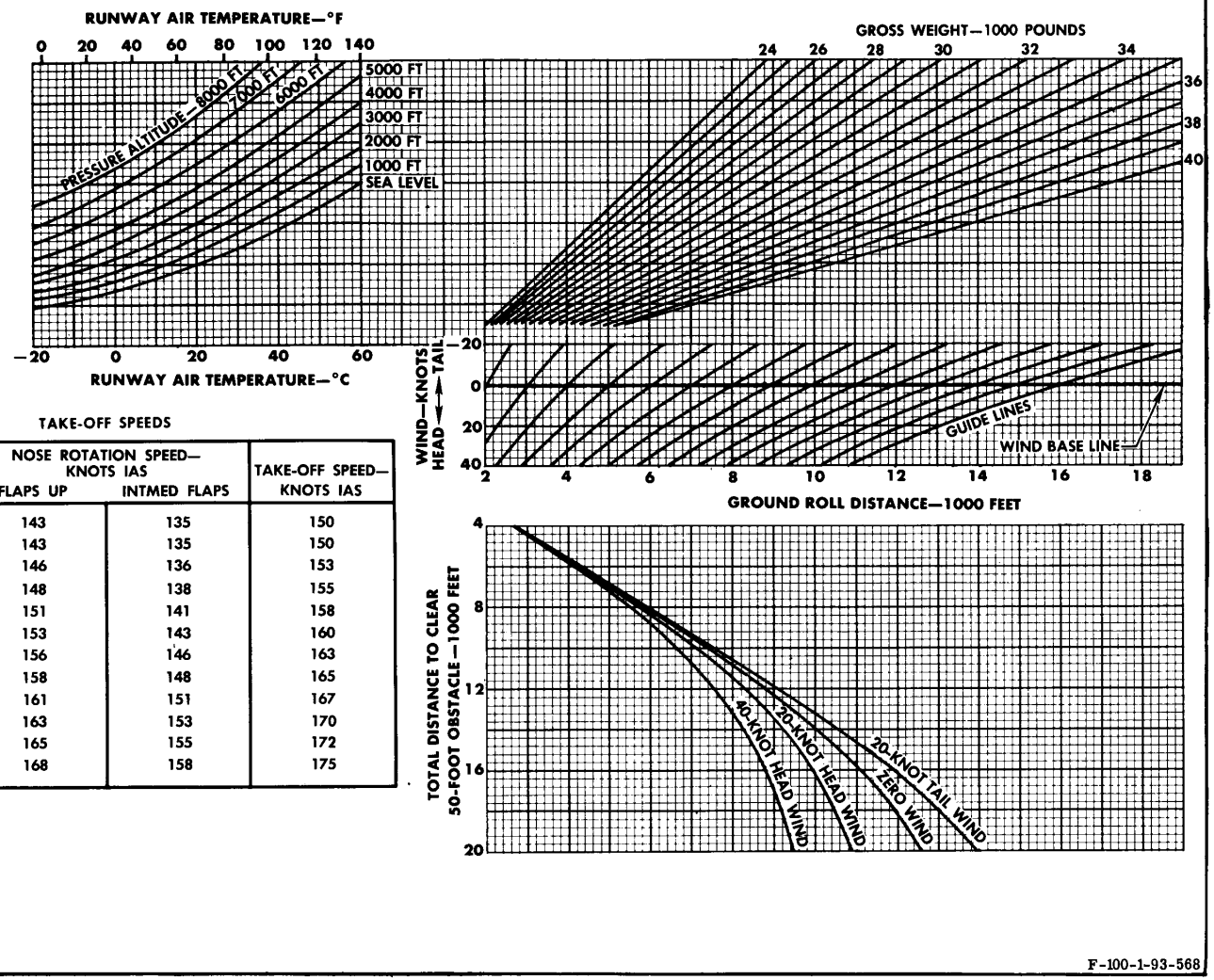
Figure B2-1

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS IS ESTIMATED)

TAKE-OFF DISTANCES

MILITARY THRUST—FLAPS UP OR INTERMEDIATE

DRY HARD-SURFACE RUNWAY
MODEL: F-100D & F
ENGINE: J57-21



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS		TAKE-OFF SPEED—KNOTS IAS
	FLAPS UP	INTMED FLAPS	
26	143	135	150
27	143	135	150
28	146	136	153
29	148	138	155
30	151	141	158
31	153	143	160
32	156	146	163
33	158	148	165
34	161	151	167
35	163	153	170
36	165	155	172
37	168	158	175

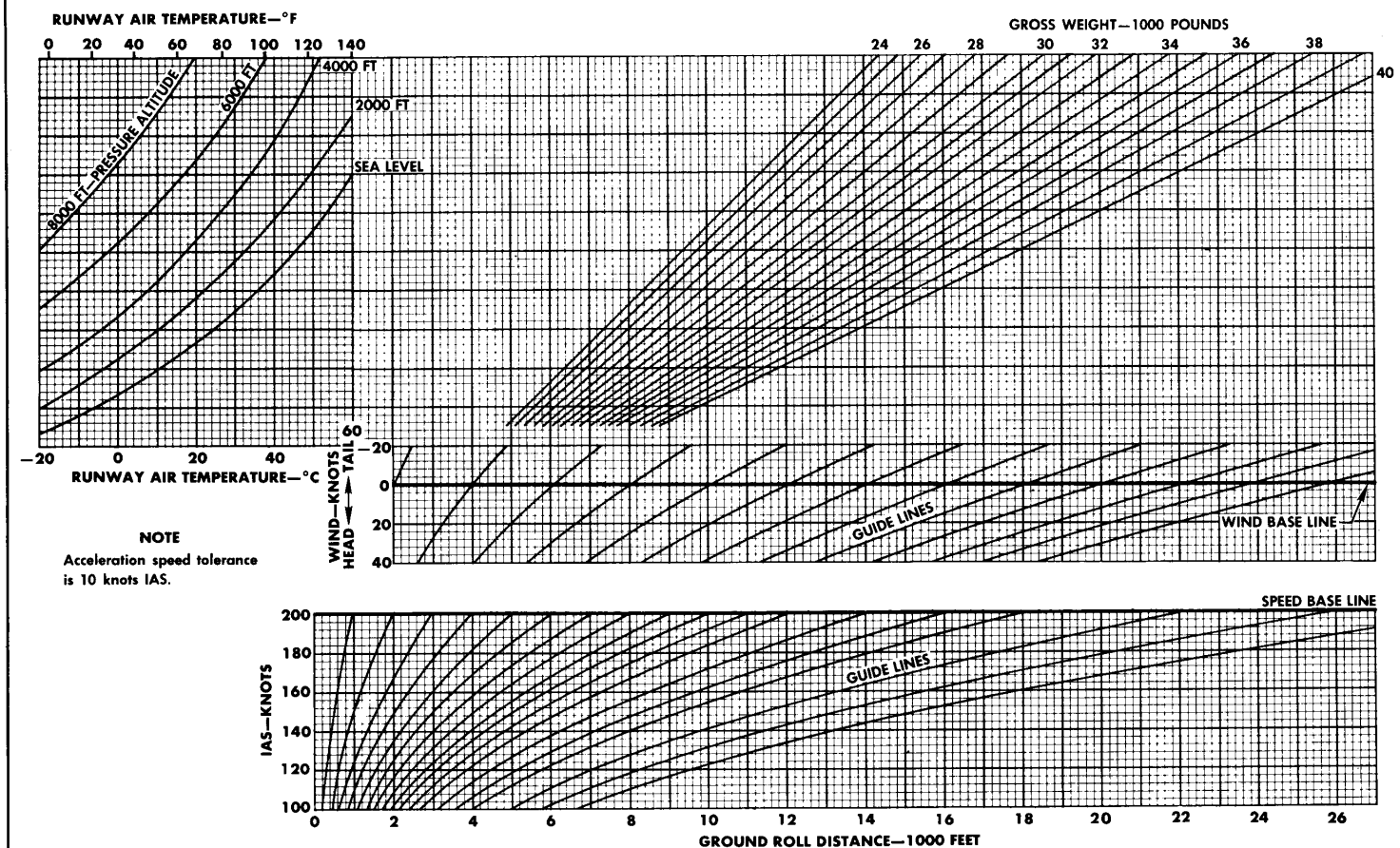
Figure B2-2

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS IS ESTIMATED)

TAKE-OFF ACCELERATION

MILITARY THRUST—FLAPS UP OR INTERMEDIATE

DRY HARD-SURFACE RUNWAY
MODEL: F-100D & F
ENGINE: J57-21



NOTE

Acceleration speed tolerance is 10 knots IAS.

F-100-1-93-569

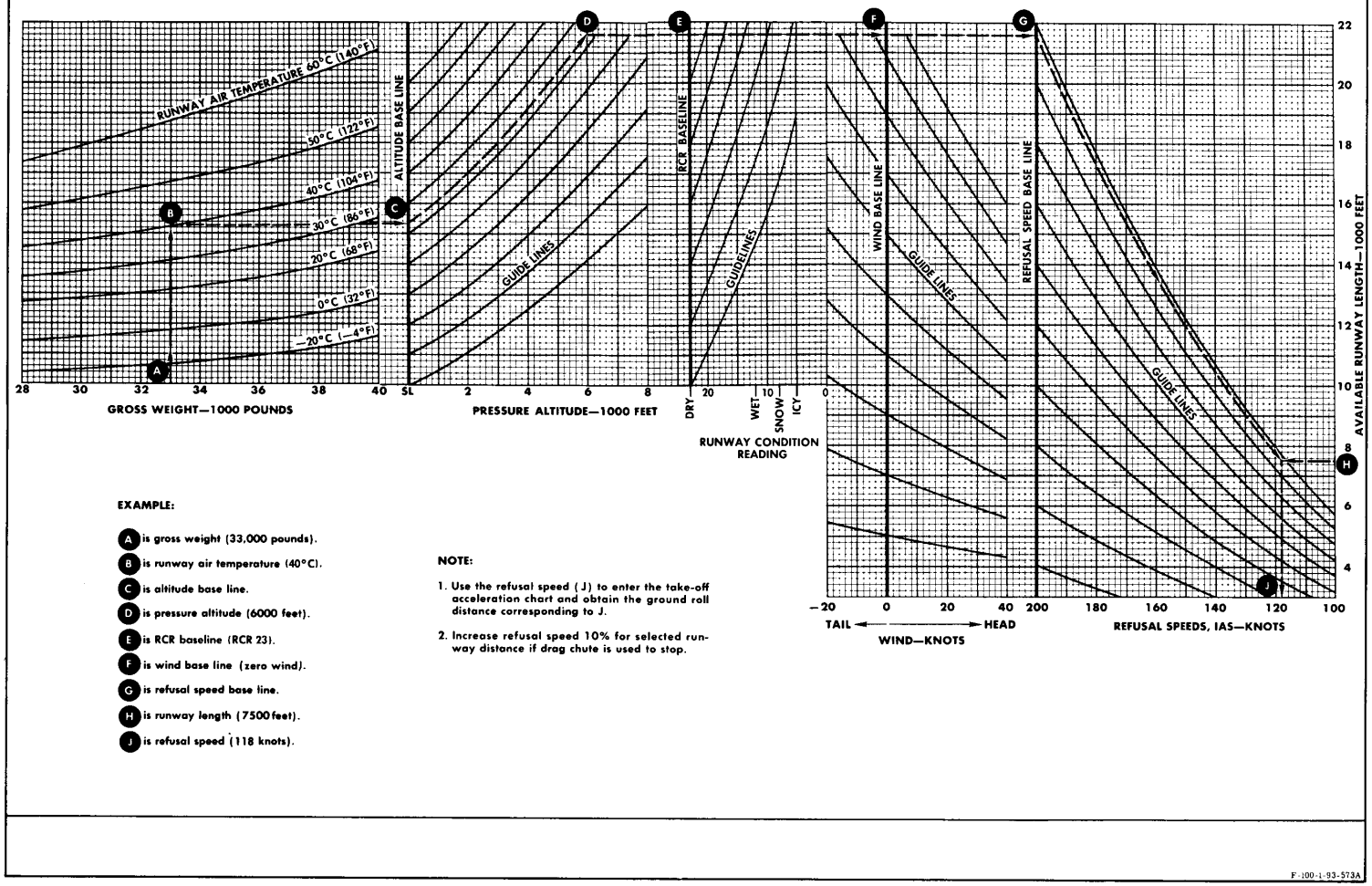
Figure B2-4

DATA AS OF: 1 JAN 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)

REFUSAL SPEEDS

MAXIMUM THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED

MODEL F-100D & F
ENGINE: J57-21



EXAMPLE:

- A is gross weight (33,000 pounds).
- B is runway air temperature (40°C).
- C is altitude base line.
- D is pressure altitude (6000 feet).
- E is RCR baseline (RCR 23).
- F is wind base line (zero wind).
- G is refusal speed base line.
- H is runway length (7500 feet).
- J is refusal speed (118 knots).

NOTE:

1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.

F-100-1-93-573A

Figure B2-5

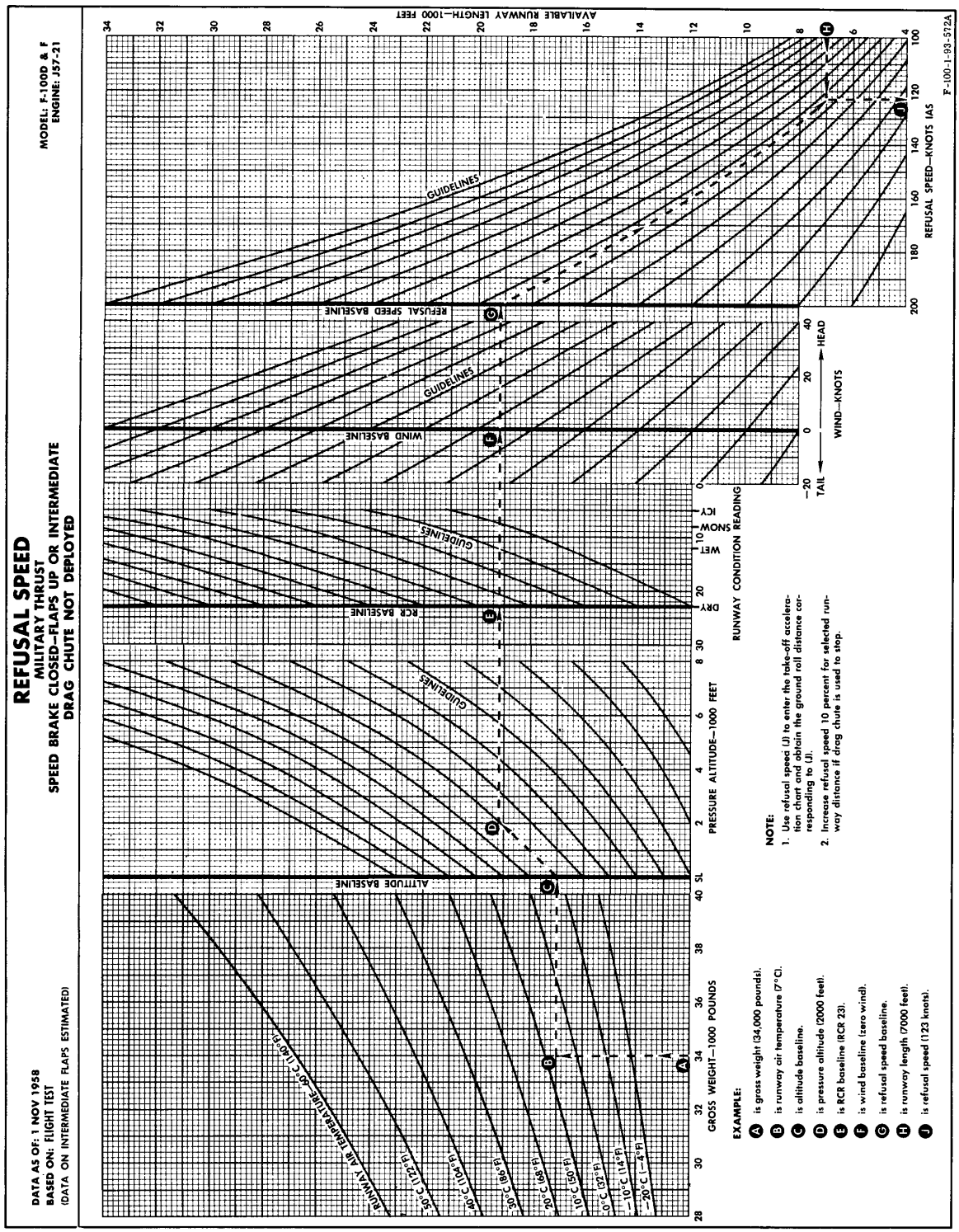

REFUSAL SPEED
MILITARY THRUST
SPEED BRAKE CLOSED—FLAPS UP OR INTERMEDIATE
DRAG CHUTE NOT DEPLOYED
DATA AS OF: 1 NOV 1958
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)
MODEL: F-100D & F
ENGINE: J57-21
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEED—KNOTS IAS
F-100-1-93-572A
GUIDELINES
REFUSAL SPEED BASELINE
WIND BASELINE
RCR BASELINE
ALTITUDE BASELINE
RUNWAY AIR TEMPERATURE
PRESSURE ALTITUDE—1000 FEET
GROSS WEIGHT—1000 POUNDS
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
WIND—KNOTS
HEAD
TAIL
EXAMPLE:
A is gross weight (34,000 pounds).
B is runway air temperature (7°C).
C is altitude baseline.
D is pressure altitude (2000 feet).
E is RCR baseline (RCR 23).
F is wind baseline (zero wind).
G is refusal speed baseline.
H is runway length (7000 feet).
J is refusal speed (123 knots).
NOTE:
1. Use refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to (J).
2. Increase refusal speed 10 percent for selected runway distance if drag chute is used to stop.

Figure B2-6

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
(DATA ON INTERMEDIATE FLAPS ESTIMATED)

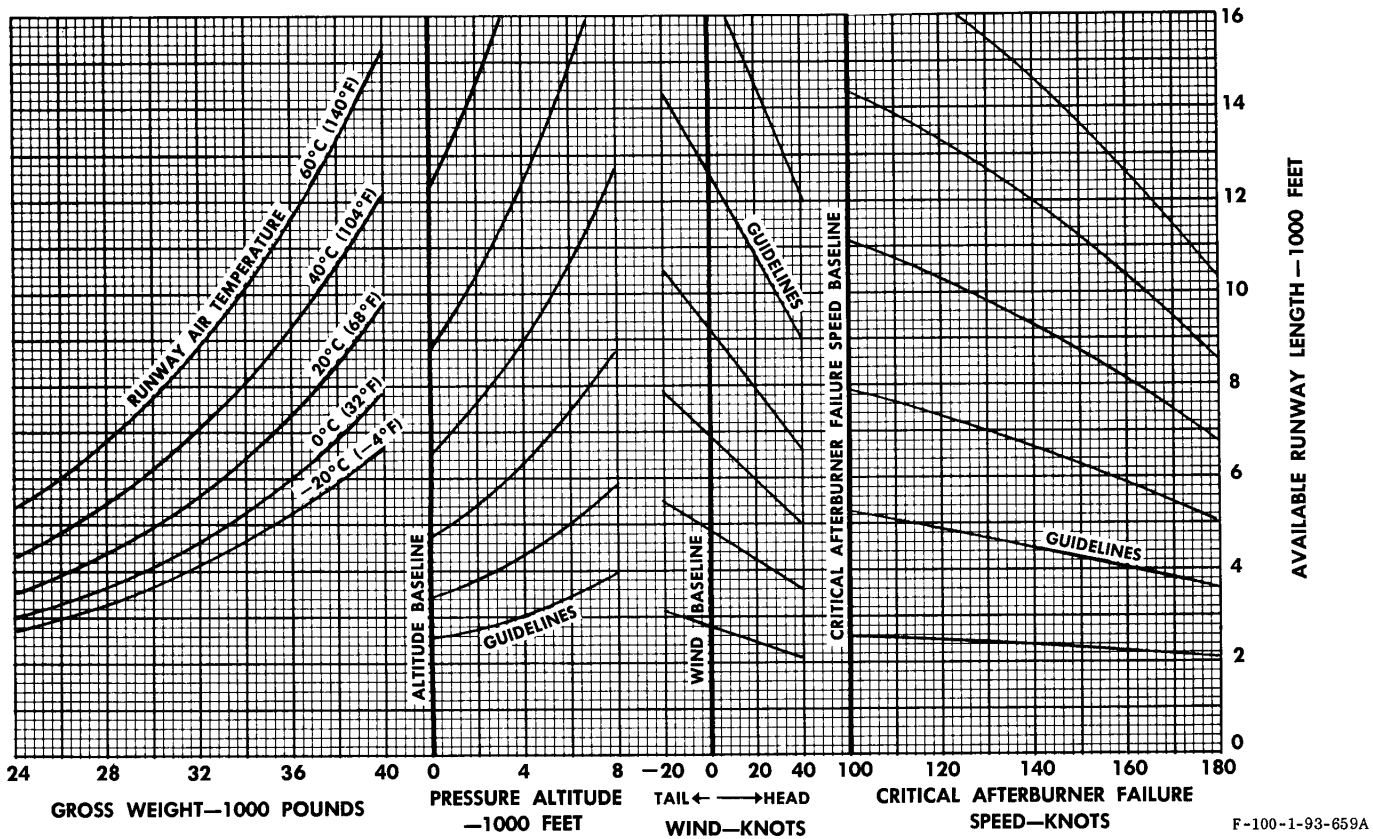
CRITICAL AFTERBURNER FAILURE SPEED

FLAPS UP OR INTERMEDIATE

MODEL: F-100D & F
ENGINE: J57-21

NOTE

- Chart based on retaining external stores for take-off.
- Chart includes 700 feet allowance for pilot reaction time from afterburner failure to throttle movement.



F-100-1-93-659A

Figure B2-7

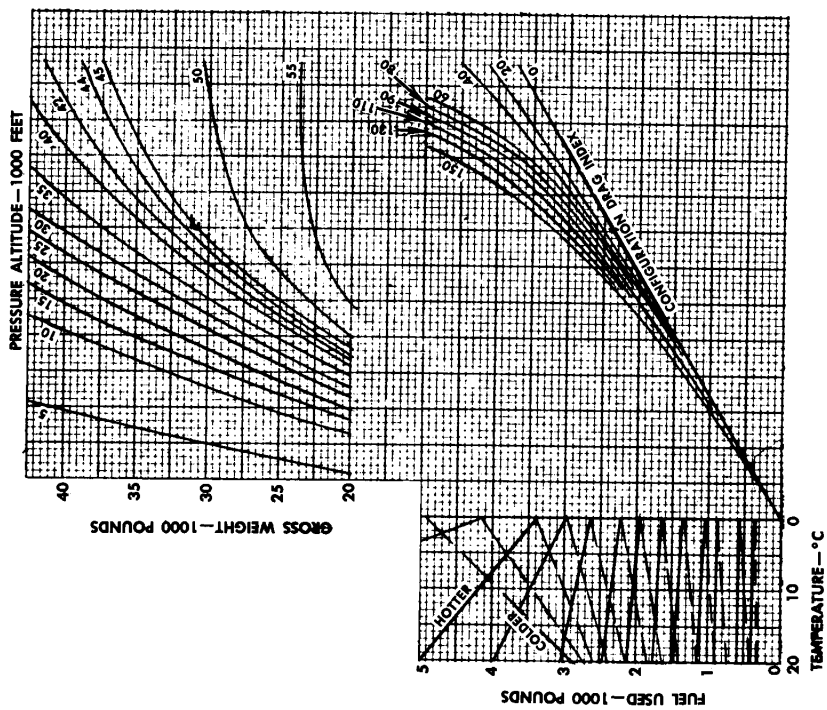
MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE

CONFIGURATION DRAG INDEX

PRESSURE ALTITUDE —1000 FEET	0,10		20,30		40,50,60	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30
5	368	.61	363	.60	350	.58
10	513	.91	498	.88	491	.87
15	464	.90	454	.88	450	.87
20	422	.90	413	.88	409	.87
25	384	.90	376	.88	372	.87
30	346	.90	340	.88	340	.88
35	311	.90	304	.88	304	.88
40	273	.89	271	.88	269	.88
45	245	.89	242	.88	242	.88
50	217	.89	215	.88	215	.88
55	214	.89	192	.88	192	.88
60	172	.89	170	.88	170	.88

PRESSURE ALTITUDE —1000 FEET	70,80,90		110		130		150	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30	194	.30
5	340	.56	339	.56	331	.55	327	.54
10	480	.85	462	.82	451	.80	441	.78
15	440	.85	428	.83	418	.81	408	.79
20	405	.86	390	.83	384	.82	380	.81
25	367	.86	358	.84	353	.83	350	.82
30	331	.86	326	.85	322	.84	322	.84
35	301	.86	296	.86	294	.85	294	.85
40	267	.87	264	.86	260	.85	260	.85
45	239	.87	235	.86	233	.85	233	.85
50	212	.87	210	.86	207	.85	207	.85
55	189	.87	186	.86	184	.85	184	.85
60	167	.87	166	.86	163	.85	163	.85



NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

F-100-1-93-594

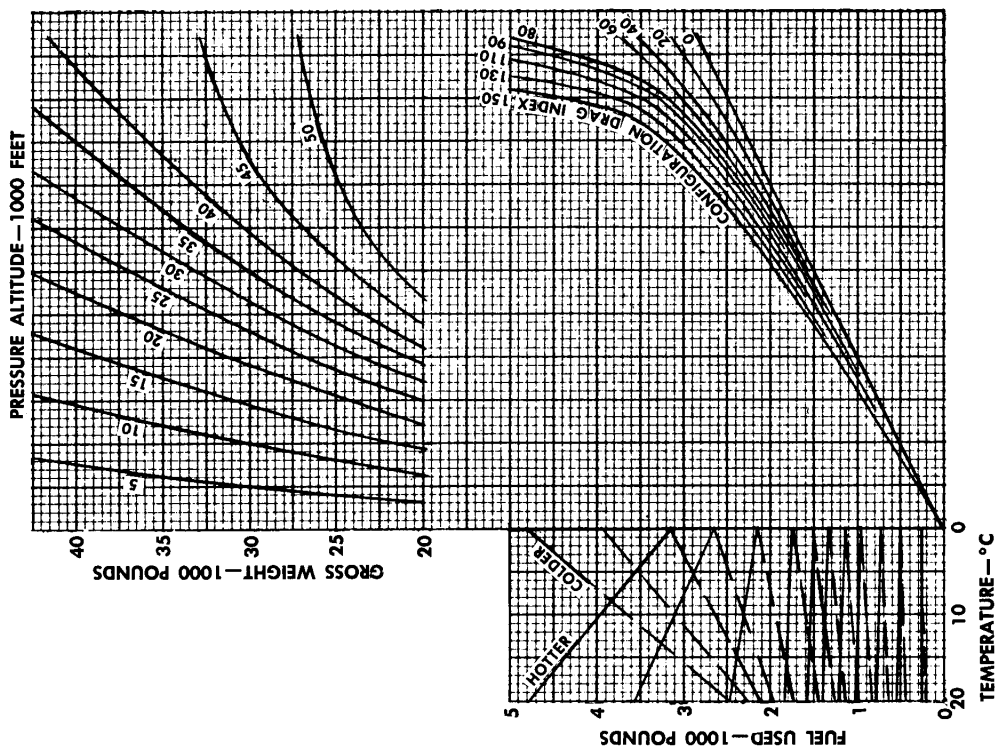
Figure B3-1 (Sheet 2 of 2)

MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE—1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	275	.80
40	245	.80
45	219	.80
50	195	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-598

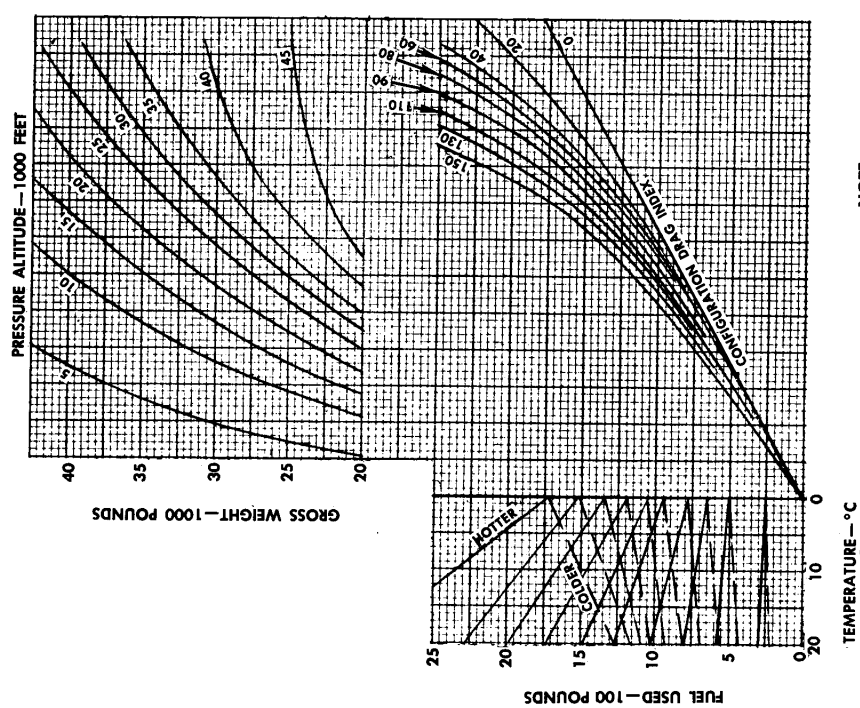
Figure B3-2 (Sheet 2 of 2)

MODEL: F-100D & F

ENGINE: J57-21

CLIMB SCHEDULE

CONFIGURATION DRAG INDEX									
PRESSURE ALTITUDE —1000 FEET	0,10		20,30		40,50,60,70		80,90 110		130,150	
	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH	KNOTS IAS	IND MACH
SL	194	.30	194	.30	194	.30	194	.30	194	.30
5	314	.52	307	.50	279	.46	267	.44	260	.43
10	412	.73	401	.71	348	.63	326	.59	309	.56
15	402	.78	390	.76	348	.68	333	.65	312	.62
20	390	.83	380	.81	345	.74	331	.71	316	.68
25	376	.88	367	.87	340	.80	327	.77	313	.74
30	340	.88	335	.87	331	.86	322	.84	309	.81
35	303	.88	301	.87	297	.86	288	.84	277	.81
40	269	.88	269	.87	264	.86	256	.84	246	.81
45	242	.88	239	.87	235	.86	229	.84	220	.81
50	215	.88	212	.87	210	.86	204	.84	196	.81



NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

F-100-1-93-596

Figure B3-3 (Sheet 2 of 2)

MODEL: F-100D & F
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE—1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	275	.80
40	245	.80
45	219	.80
50	195	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

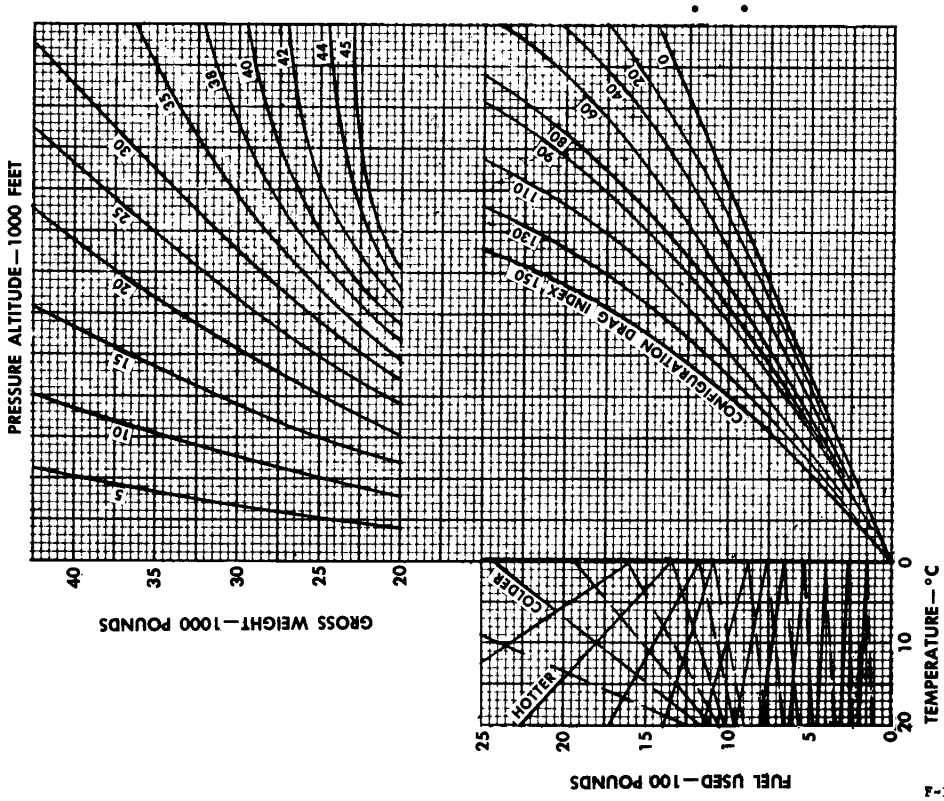


Figure B3-4 (Sheet 2 of 2)

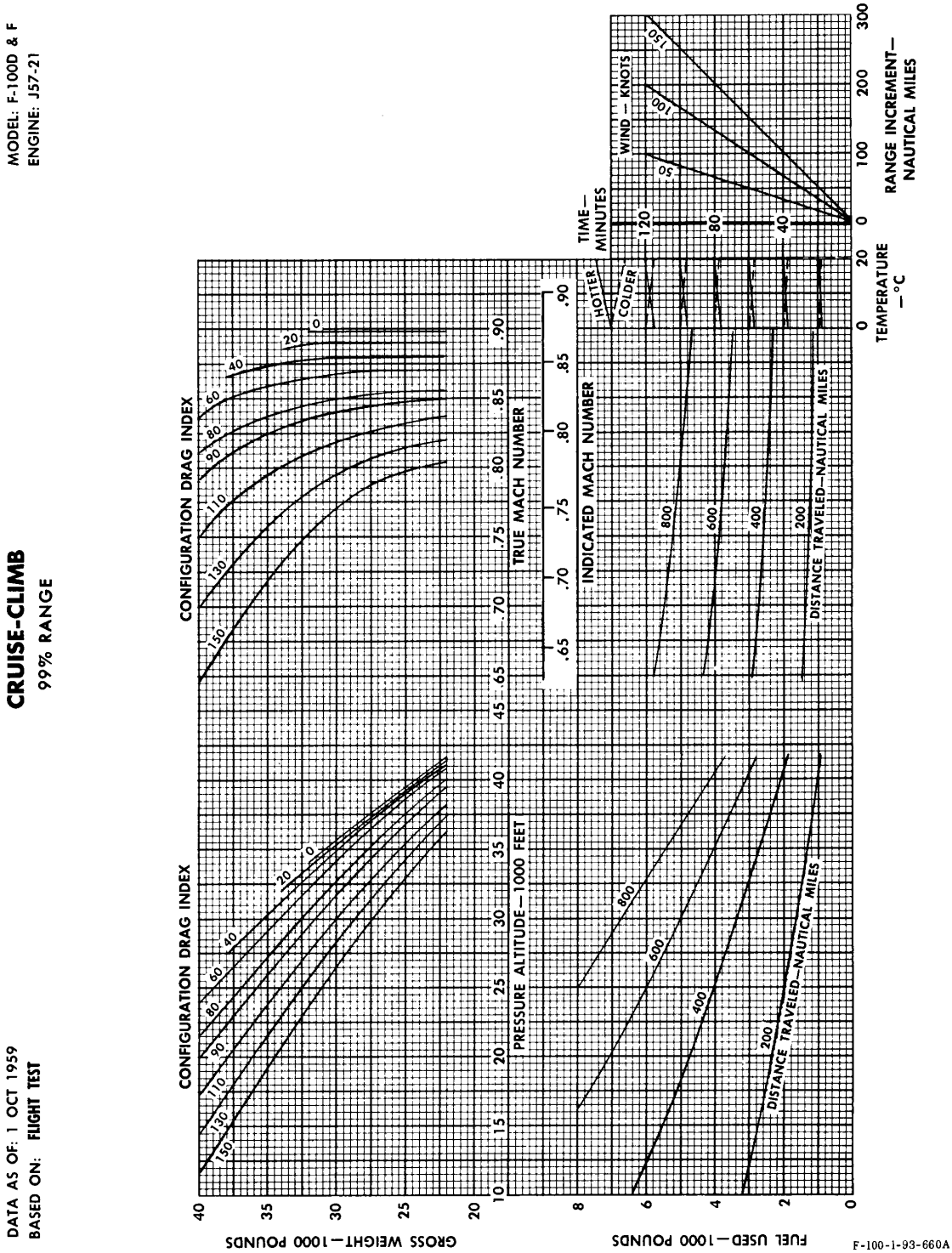

MODEL: F-100D & F
ENGINE: J57-21
CRUISE-CLIMB
99% RANGE
DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST
CONFIGURATION DRAG INDEX
0
20
40
60
80
90
110
130
150
GROSS WEIGHT—1000 POUNDS
PRESSURE ALTITUDE—1000 FEET
TRUE MACH NUMBER
INDICATED MACH NUMBER
TIME—MINUTES
WIND—KNOTS
HOTTER
COLDER
TEMPERATURE—°C
RANGE INCREMENT—NAUTICAL MILES
FUEL USED—1000 POUNDS
DISTANCE TRAVELED—NAUTICAL MILES
F-100-1-93-660A

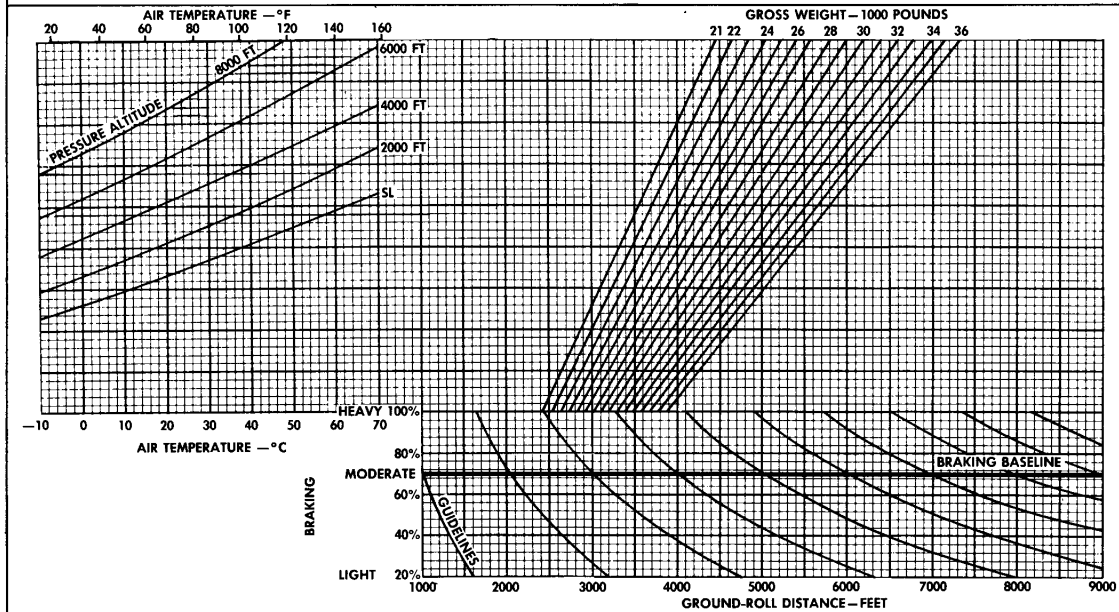
Figure B4-16

DATA AS OF: 1 NOV 1958
BASED ON: FLIGHT TEST

LANDING DISTANCES

FLAPS DOWN—SPEED BRAKE CLOSED— DRAG CHUTE DEPLOYED*

MODEL: F-100D & F
ENGINE: J57-21



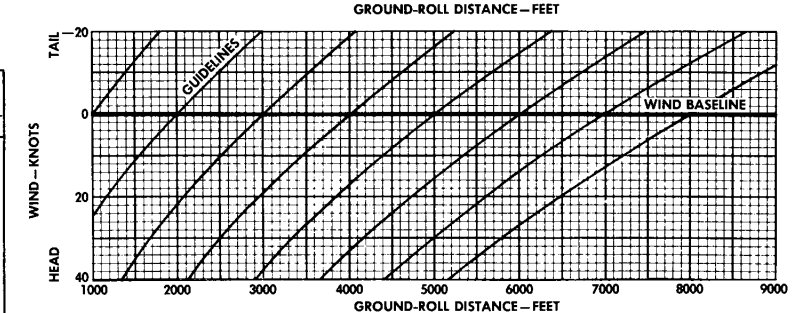
NOTE

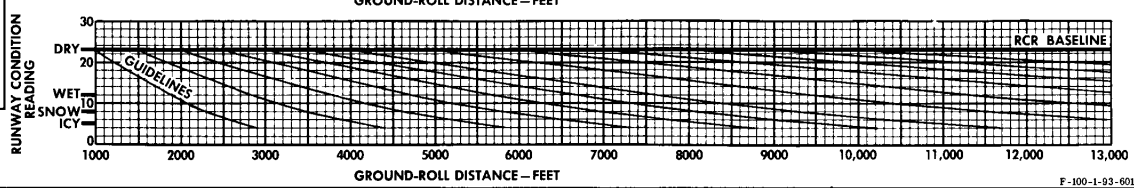
1. For each knot above recommended touchdown speed, increase chartered ground-roll distance by 2.5 percent.
2. Decrease chartered distance 2 percent if speed brake is used.
3. For landings without flaps:
   (a) Increase ground-roll distance 18 percent.
   (b) Increase landing speeds 10 percent.
4. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 20 percent and add 1000 feet.
5. 100 percent braking is obtained just before tire skidding without antiskid cycling.
6. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

* Drag chute handle pulled at nose wheel touchdown.

LANDING SPEEDS

GROSS WEIGHT — 1000 POUNDS	FINAL APPROACH SPEEDS — KNOTS IAS	TOUCHDOWN SPEED — KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS
21	155	132	126
22	158	135	128
23	161	138	131
24	163	141	133
25	166	143	136
26	169	146	138
27	172	148	140
28	174	151	143
29	176	153	146
30	179	156	148
31	181	158	150
32	184	160	152
33	186	163	154
34	188	165	156
35	191	167	158
36	193	169	160





F-100-1-93-601A

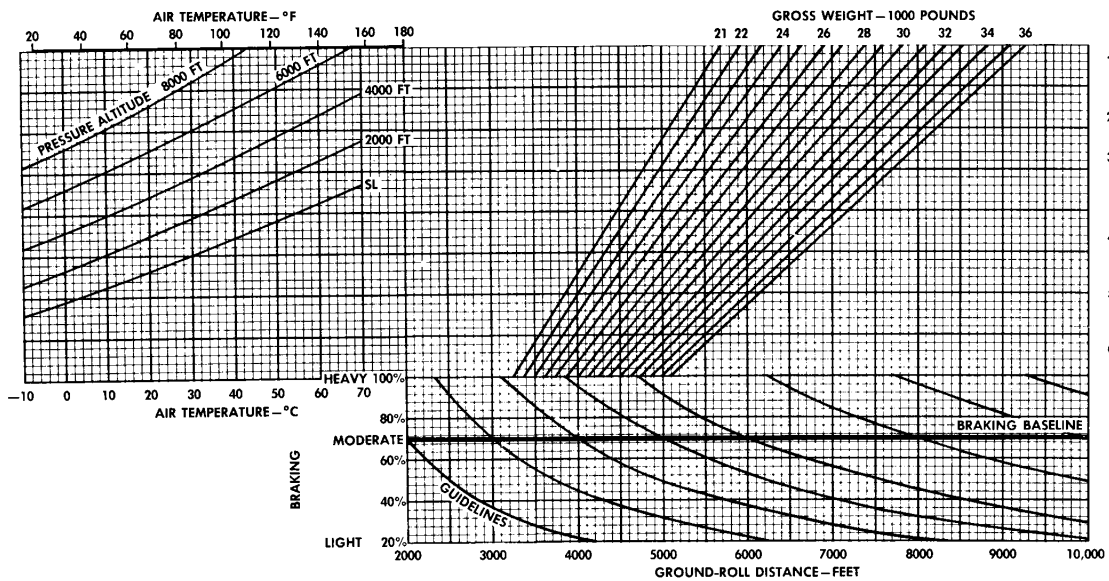
Figure B7-1

DATA AS OF: 1 NOV 1958
BASED ON: **FLIGHT TEST**

LANDING DISTANCES

FLAPS DOWN—SPEED BRAKE CLOSED—DRAG CHUTE NOT DEPLOYED

MODEL: F-100D & F
ENGINE: J57-21

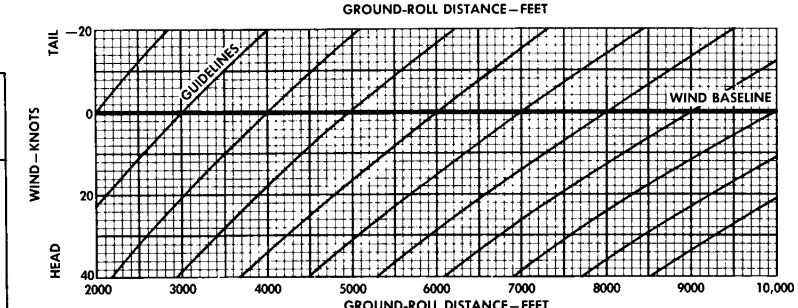


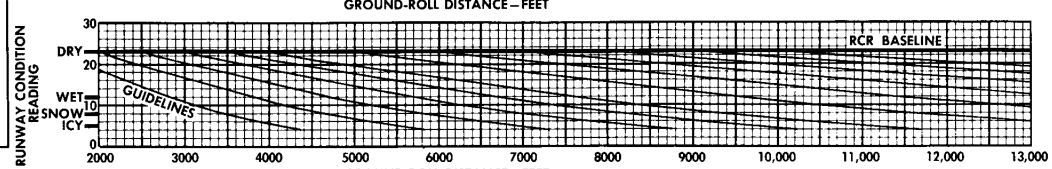
NOTE

1. For each knot above recommened touchdown speed, increase charted ground-roll distance 2 percent.
2. Decrease charted distance 3.5 percent if speed brake is used.
3. For landings without flaps:
   (a) Increase ground-roll distance 20 percent.
   (b) Increase landing speeds 10 percent.
4. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 20 percent and add 1000 feet.
5. 100 percent braking is obtained just before tire skidding without antiskid cycling.
6. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of difference in airplanes, pilot techniques, and braking efficiency.

LANDING SPEEDS

GROSS WEIGHT — 1000 POUNDS	FINAL APPROACH SPEEDS — KNOTS IAS	TOUCHDOWN SPEED — KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF) — KNOTS IAS
21	155	132	126
22	158	135	128
23	161	138	131
24	163	141	133
25	166	143	136
26	169	146	138
27	172	148	140
28	174	151	143
29	176	153	146
30	179	156	148
31	181	158	150
32	184	160	152
33	186	163	154
34	188	165	156
35	191	167	158
36	193	169	160





F-100-1-93-602A

Figure B7-2

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—SEA LEVEL

MODEL: F-100D & F
ENGINE: J57-21

(FROM .53 INDICATED MACH NUMBER)

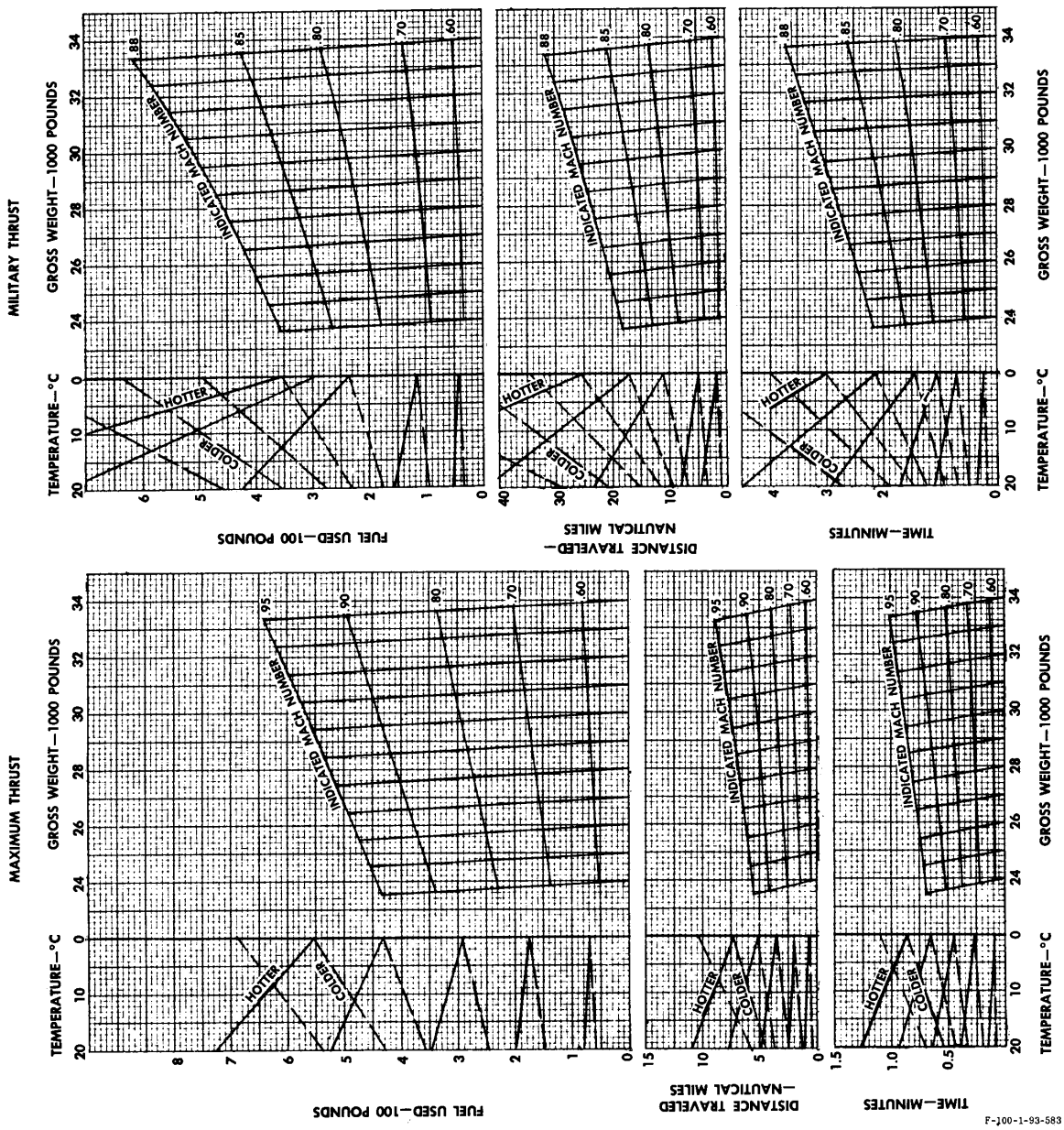


Figure B8-1

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

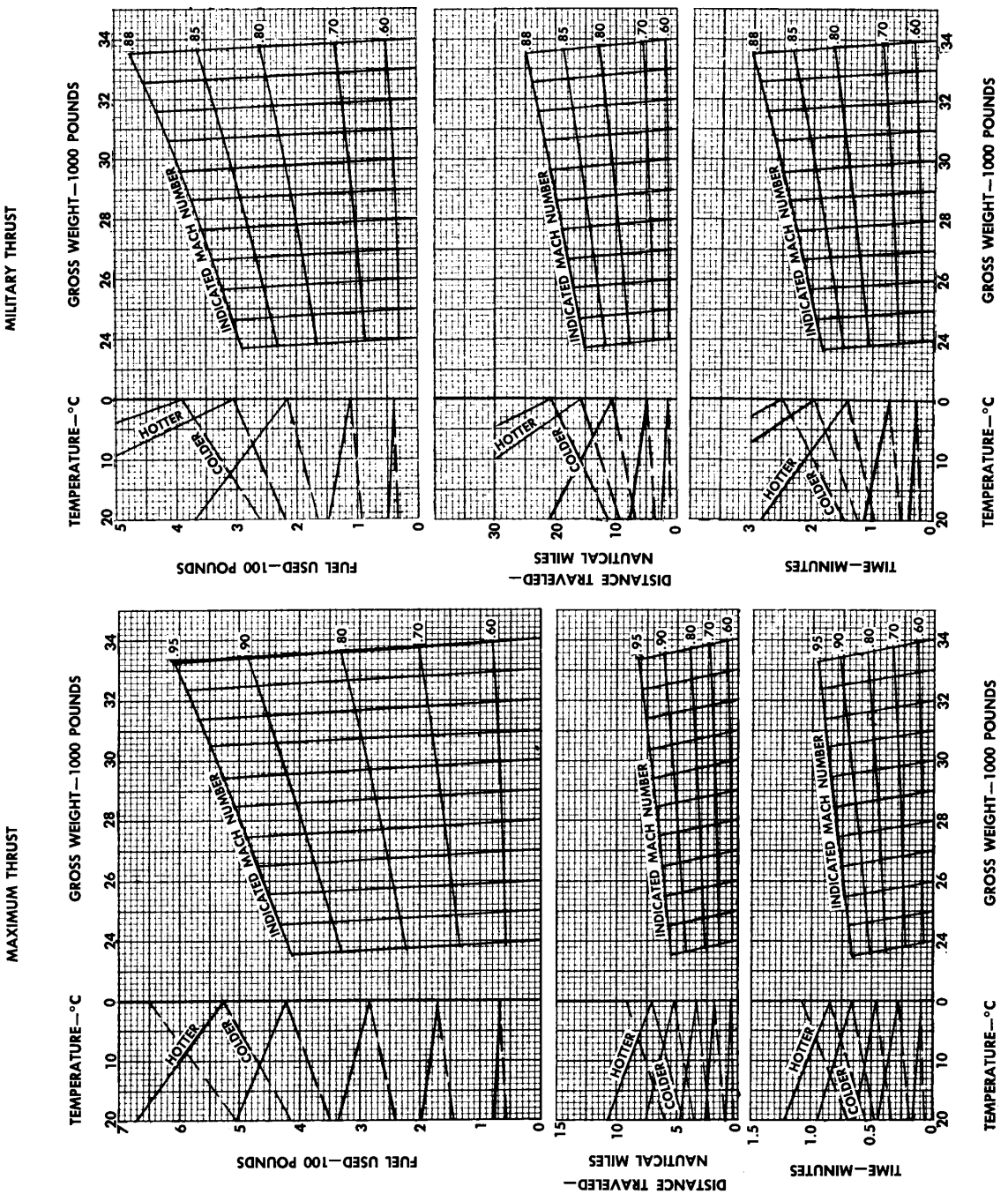


Figure B8-2

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 30—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

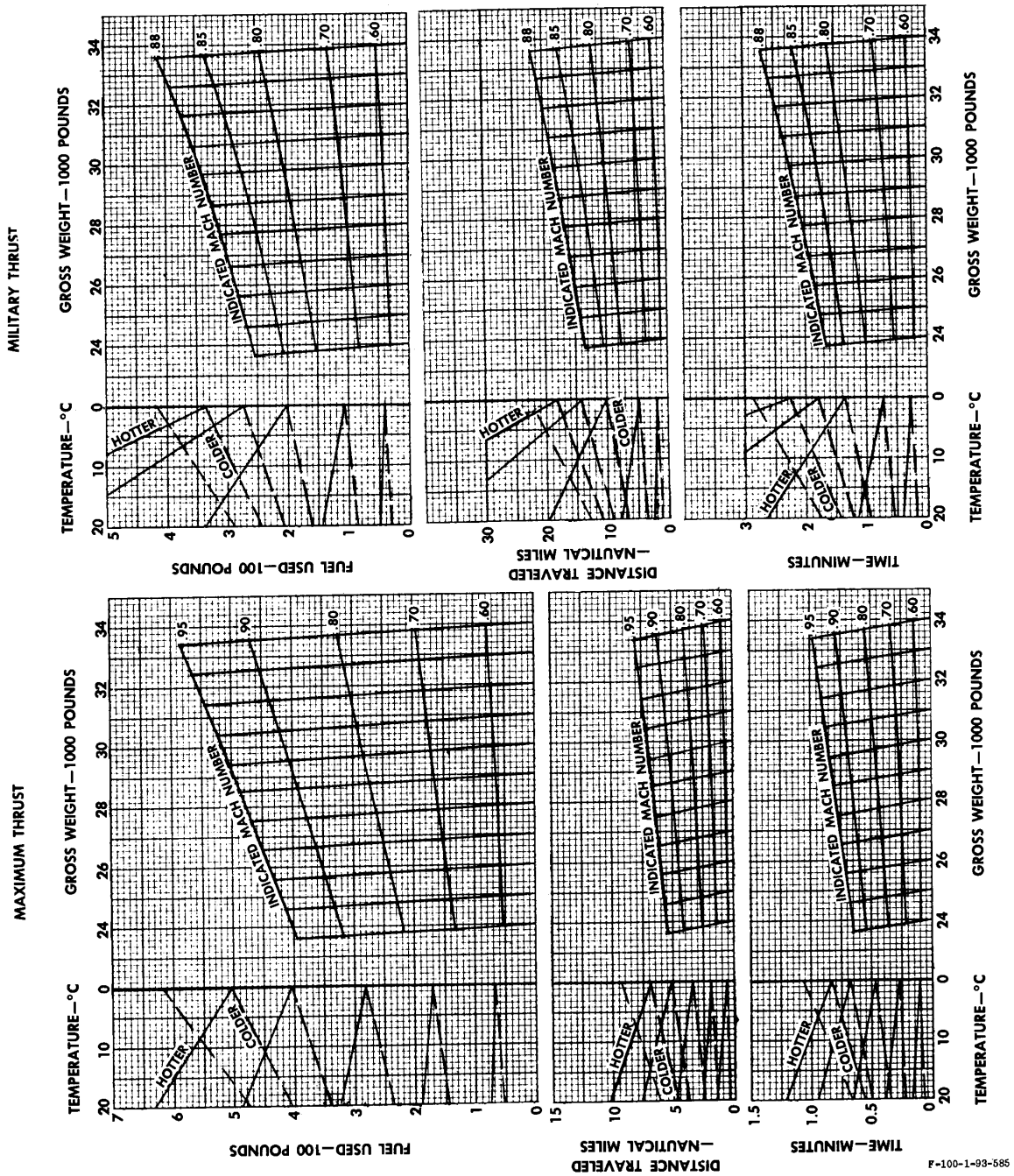


Figure B8-3

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—SEA LEVEL

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

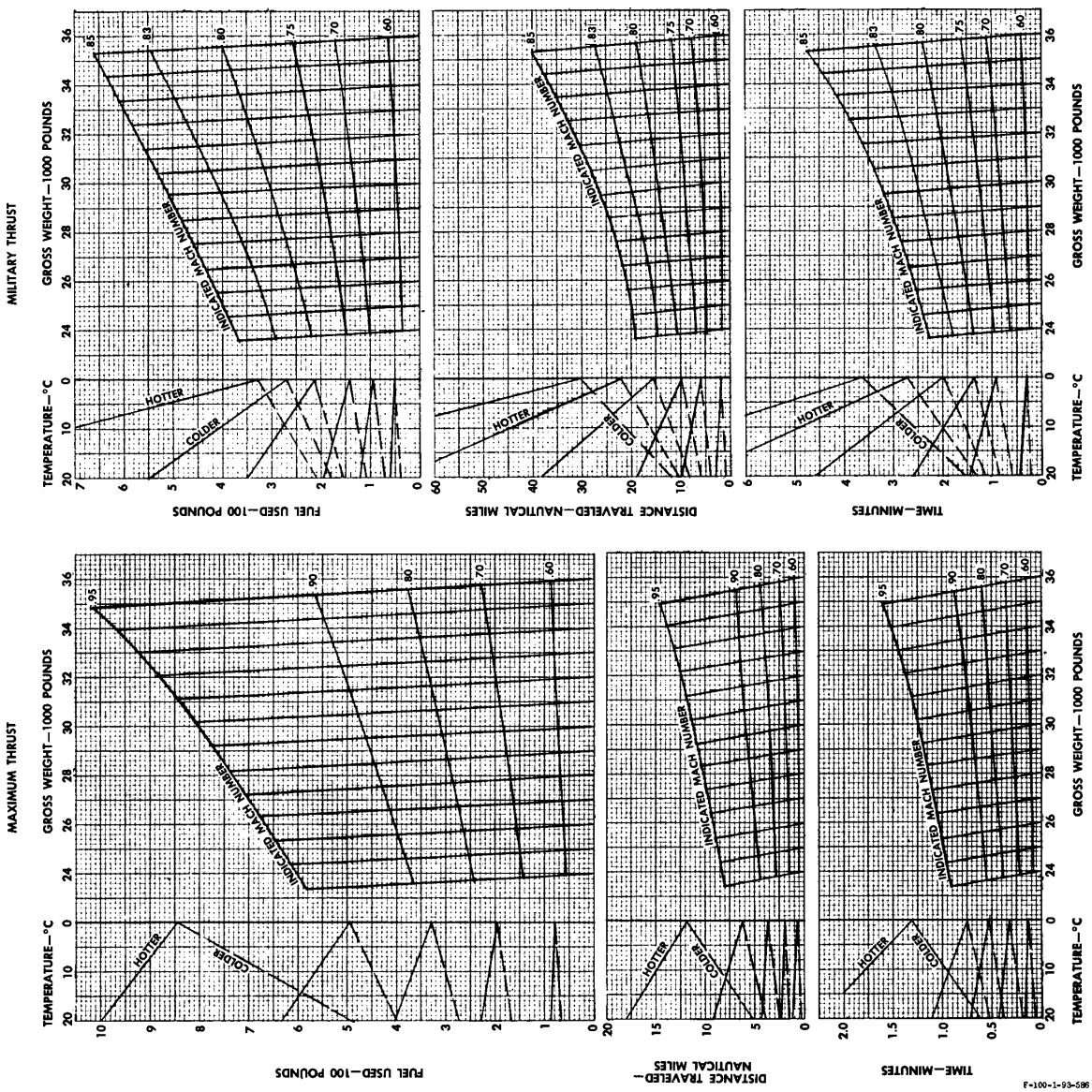


Figure B8-4

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

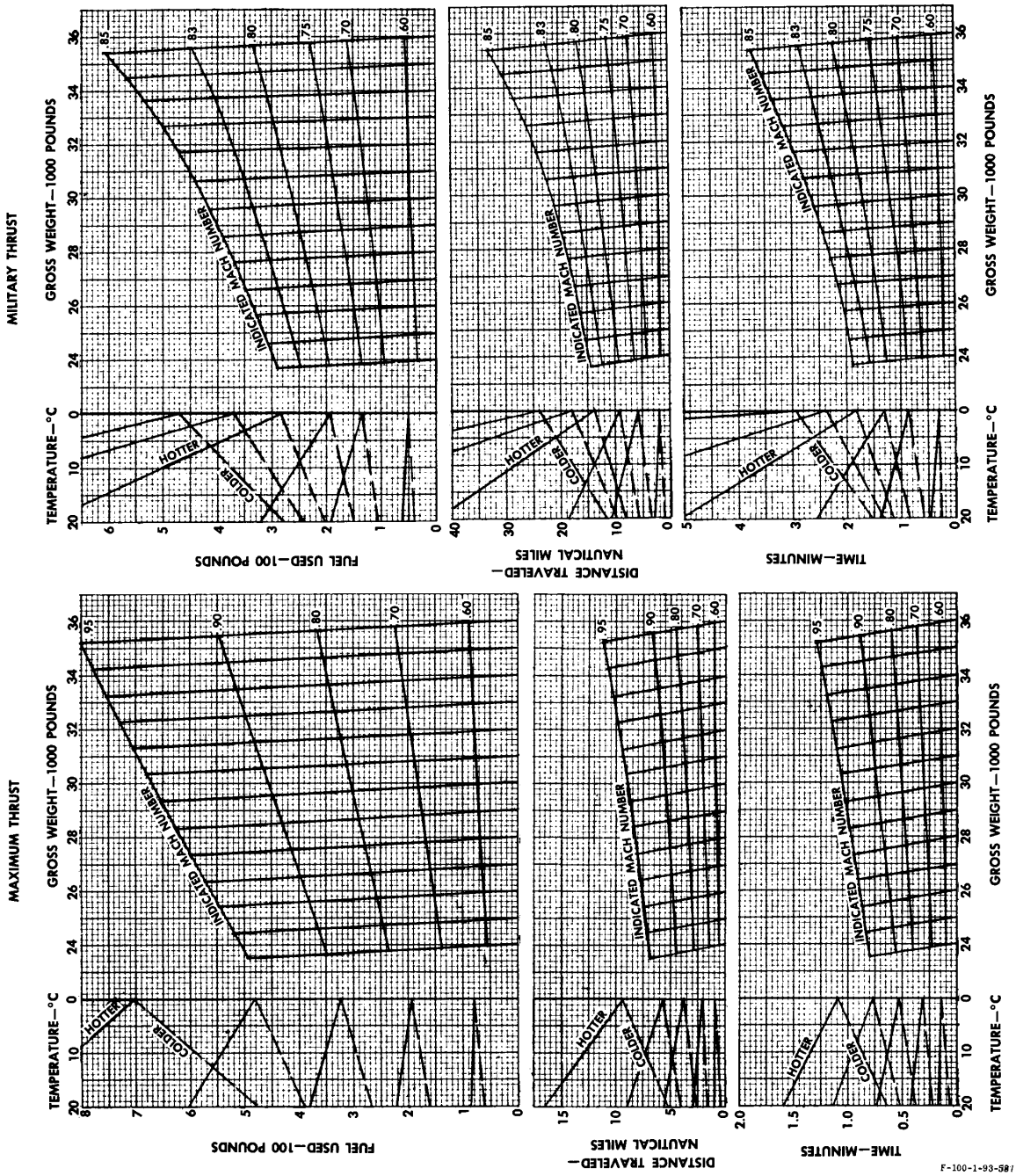


Figure B8-5

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 50—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

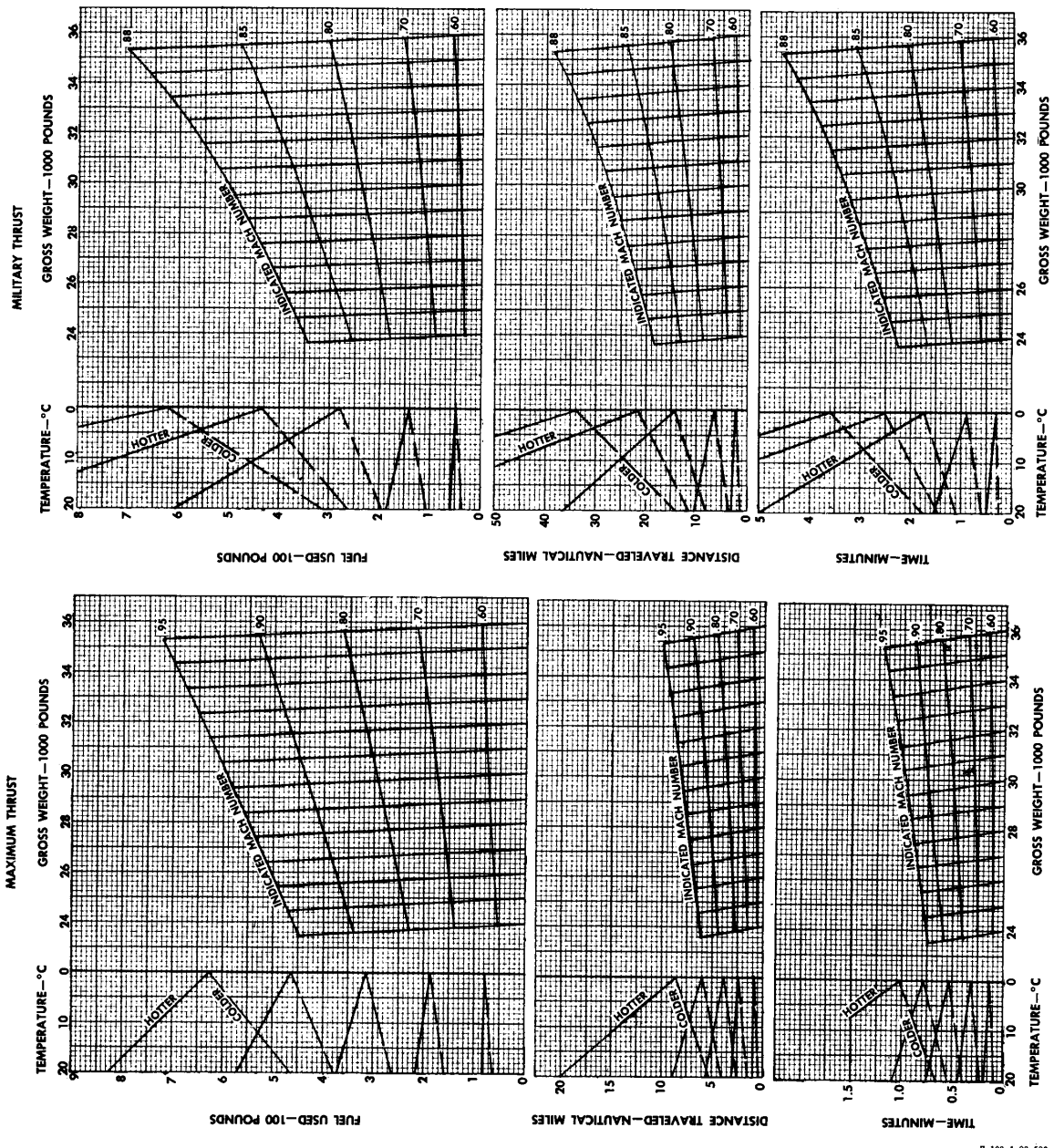


Figure B8-6

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

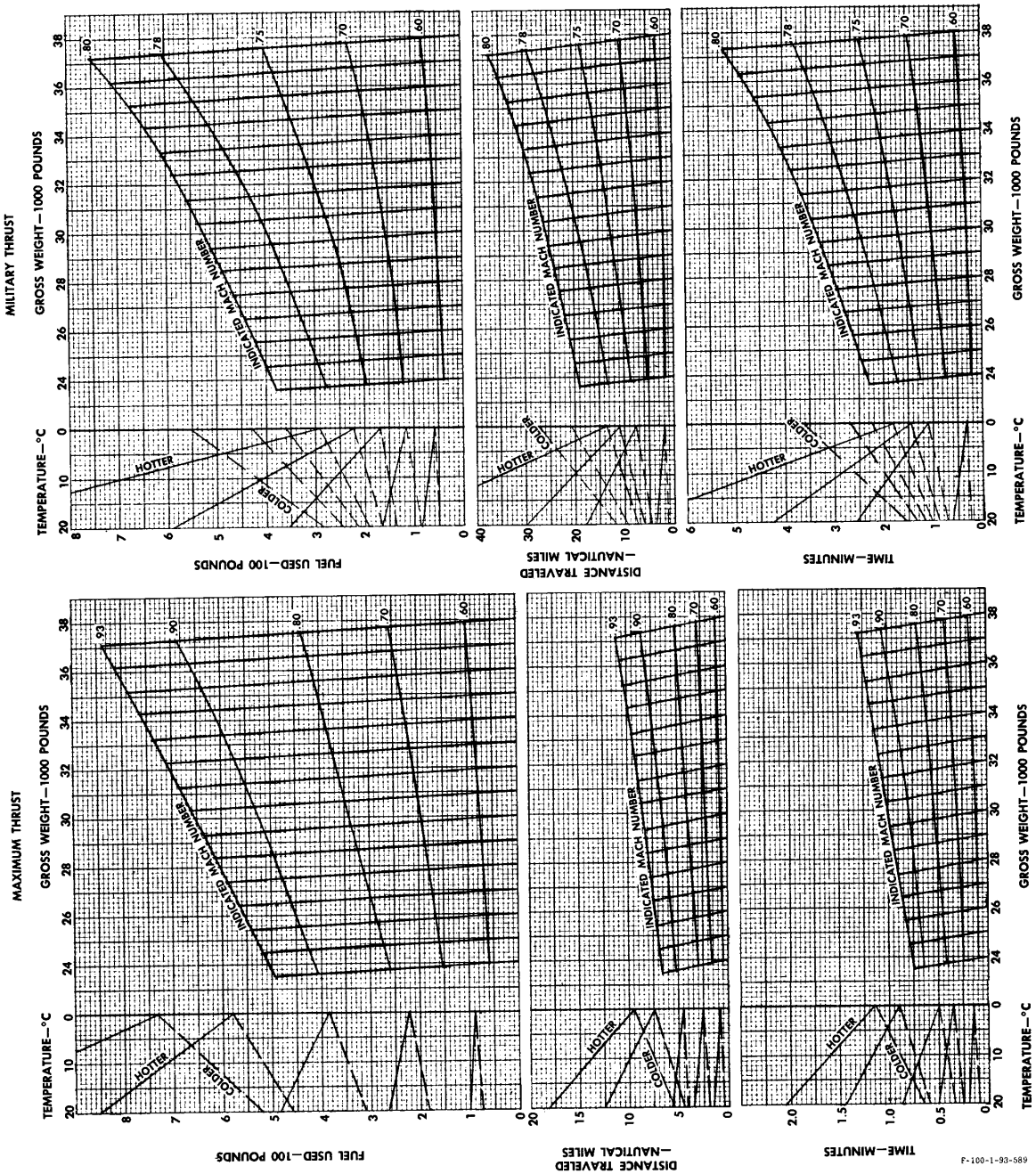


Figure B8-7

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—2000 FEET

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

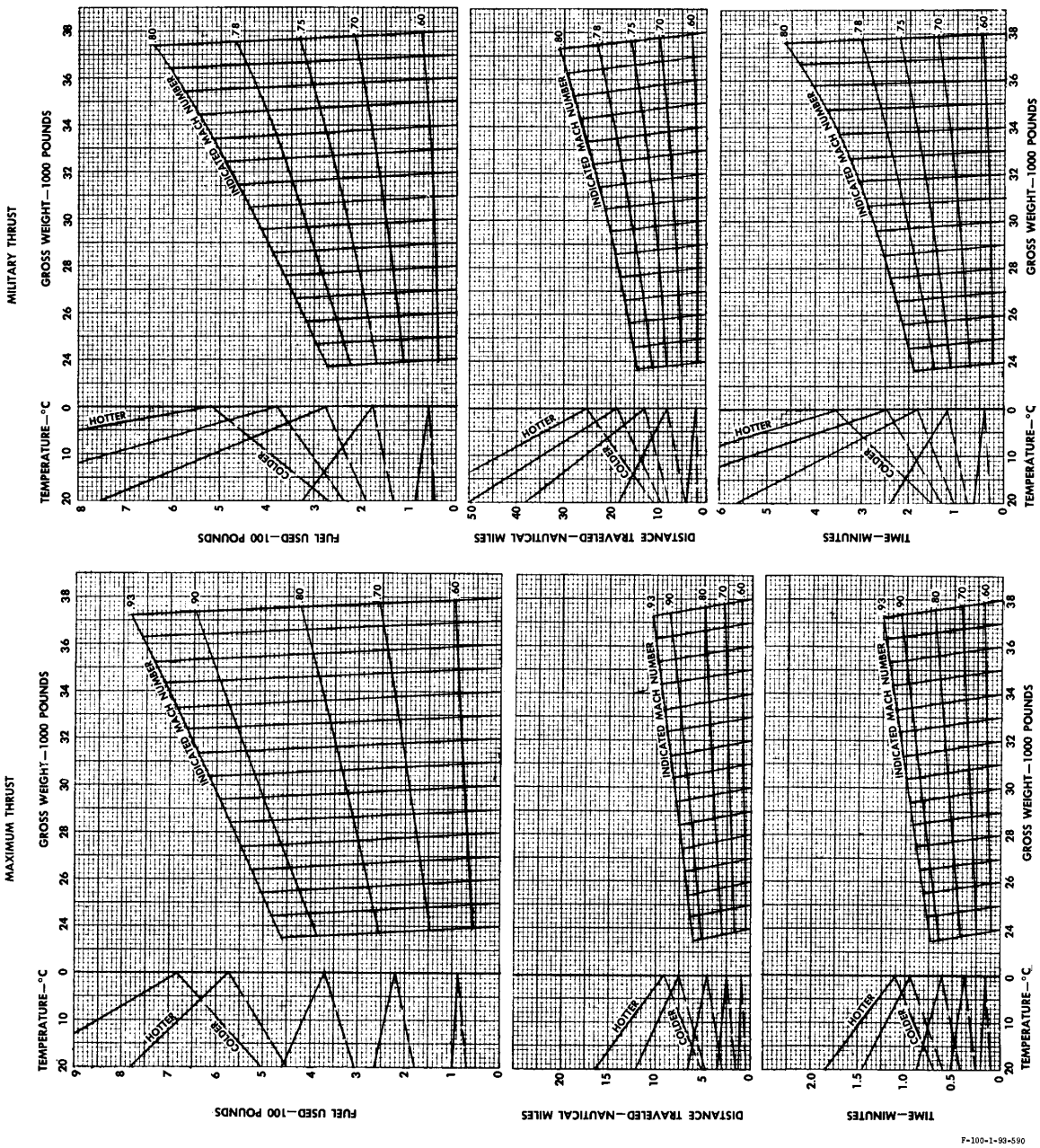


Figure B8-8

DATA AS OF: 1 OCT 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 80—4000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100D & F
ENGINE: J57-21

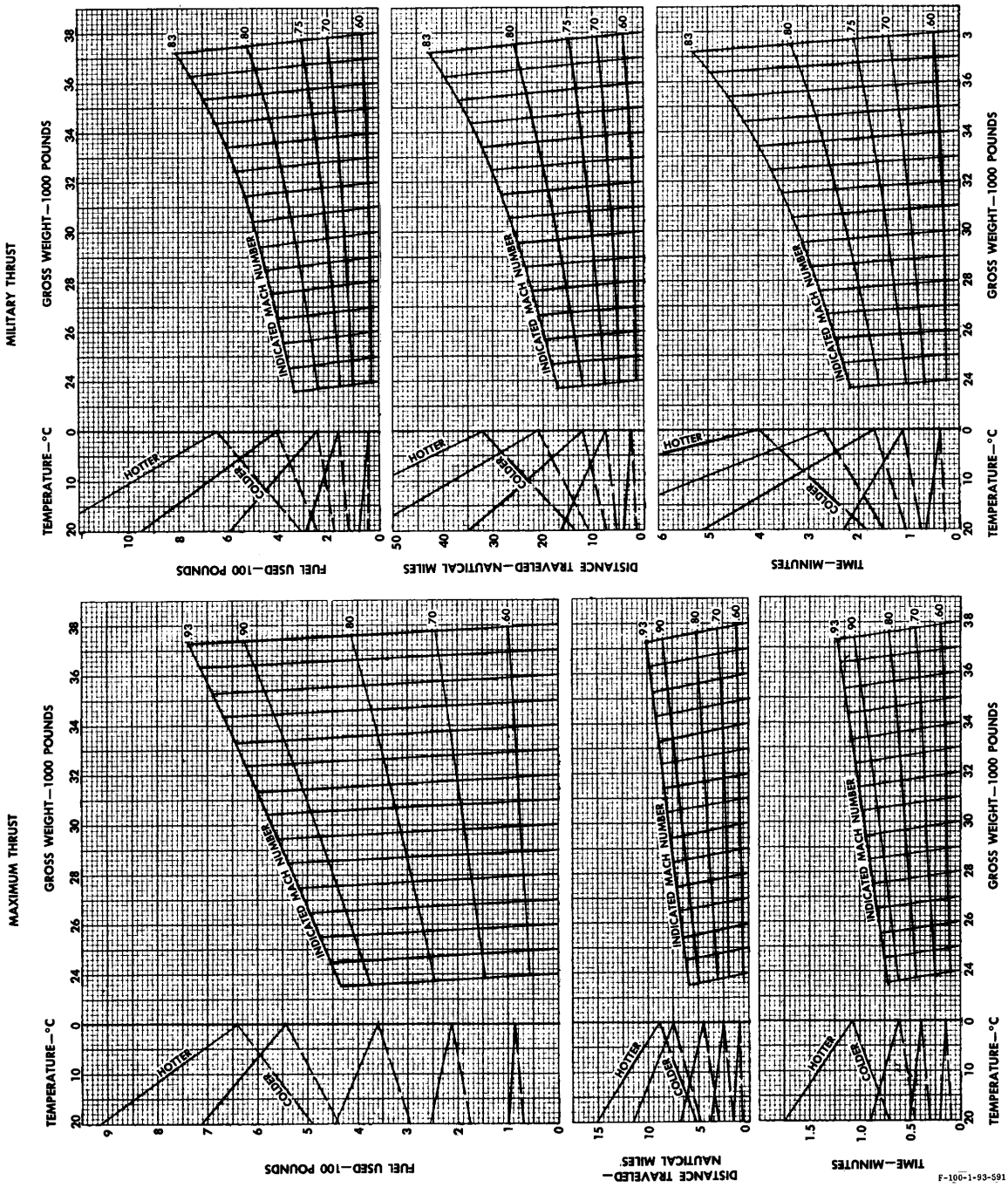
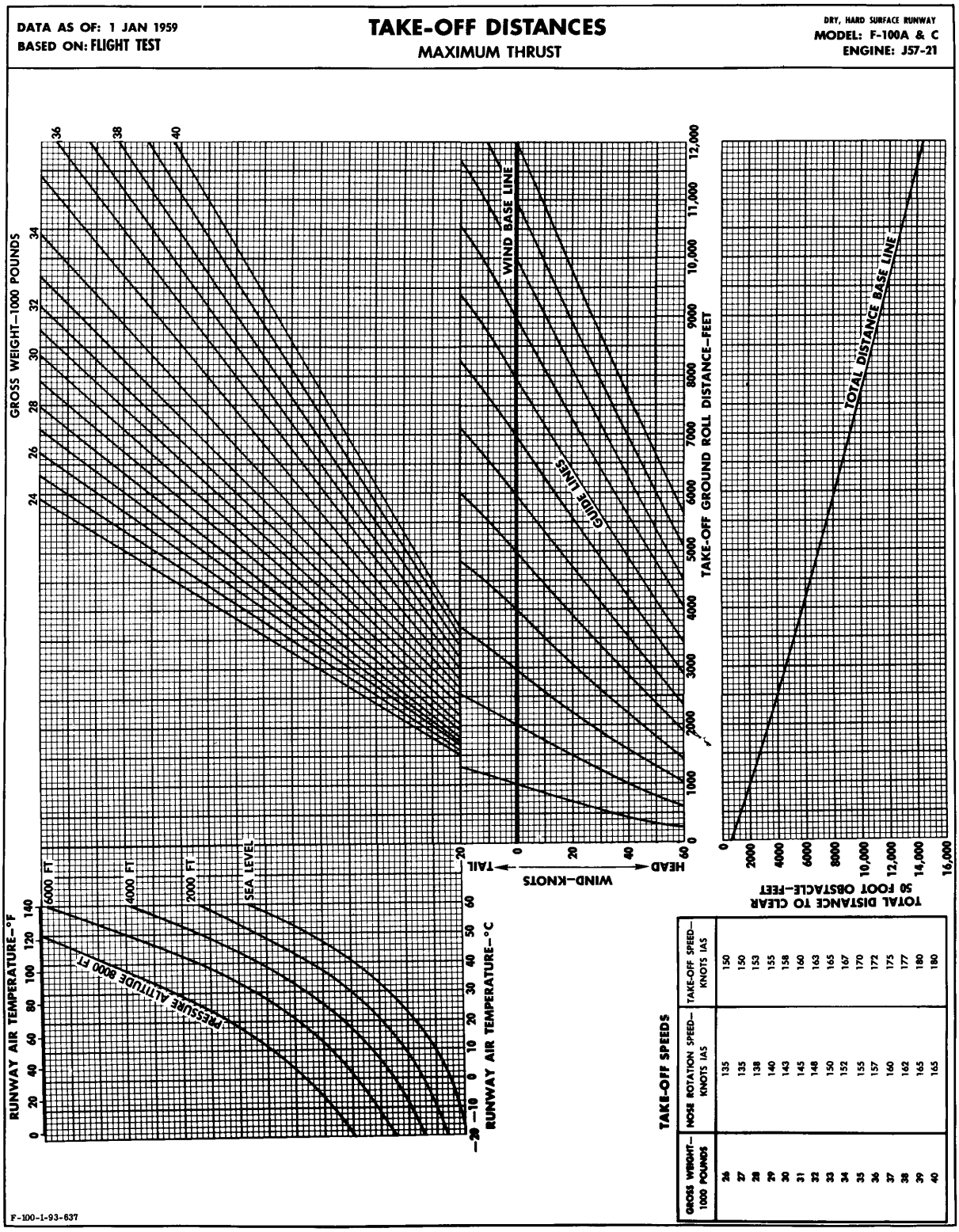


Figure B8-9



GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS	TAKE-OFF SPEED—KNOTS IAS
26	135	150
27	135	150
28	138	153
29	140	155
30	143	158
31	145	160
32	148	163
33	150	165
34	152	167
35	155	170
36	157	172
37	160	175
38	162	177
39	165	180
40	165	180

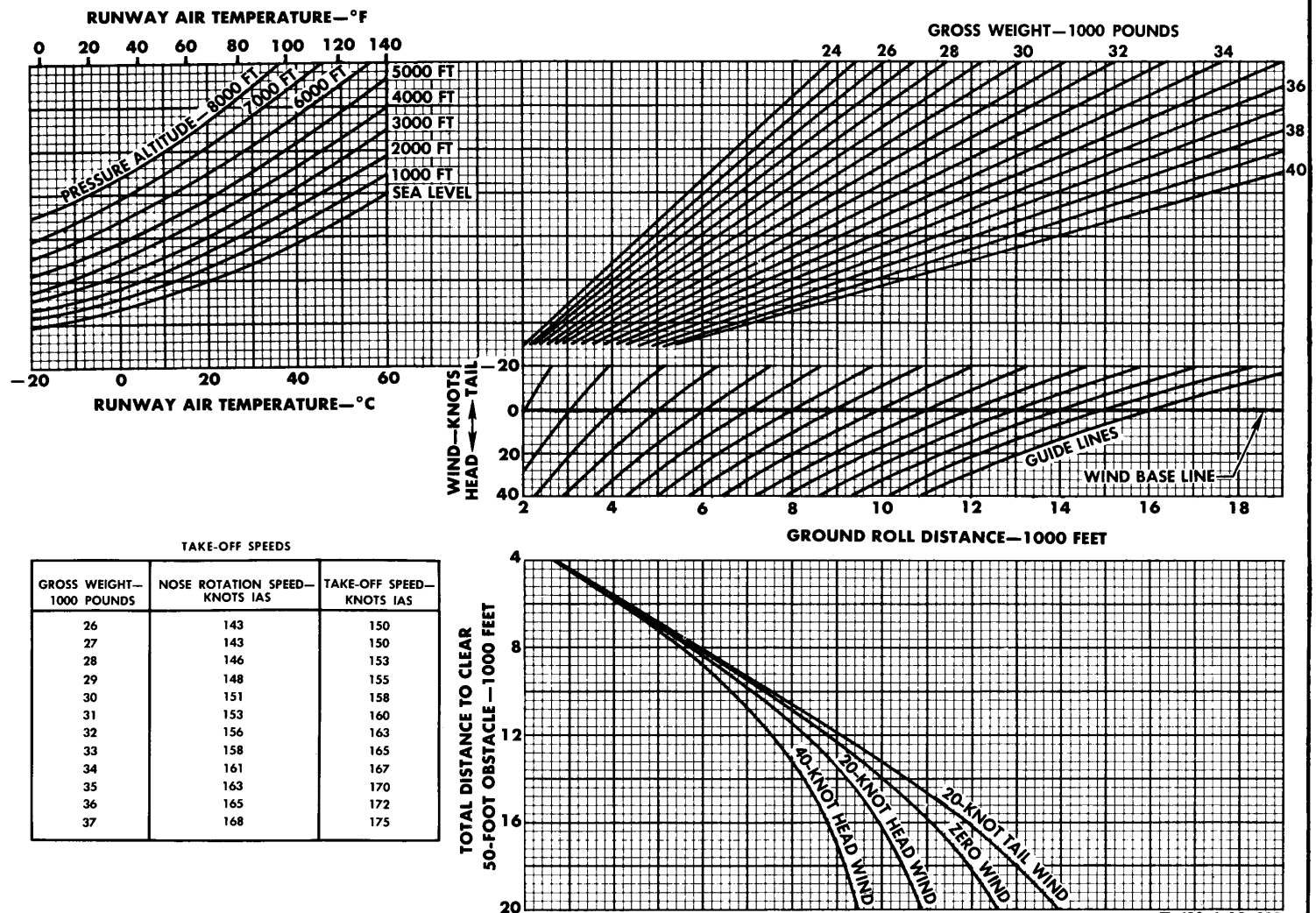
Figure C2-1

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

TAKE-OFF DISTANCES

MILITARY THRUST

DRY HARD-SURFACE RUNWAY
MODEL: F-100A & C
ENGINE: J57-21



TAKE-OFF SPEEDS

GROSS WEIGHT—1000 POUNDS	NOSE ROTATION SPEED—KNOTS IAS	TAKE-OFF SPEED—KNOTS IAS
26	143	150
27	143	150
28	146	153
29	148	155
30	151	158
31	153	160
32	156	163
33	158	165
34	161	167
35	163	170
36	165	172
37	168	175

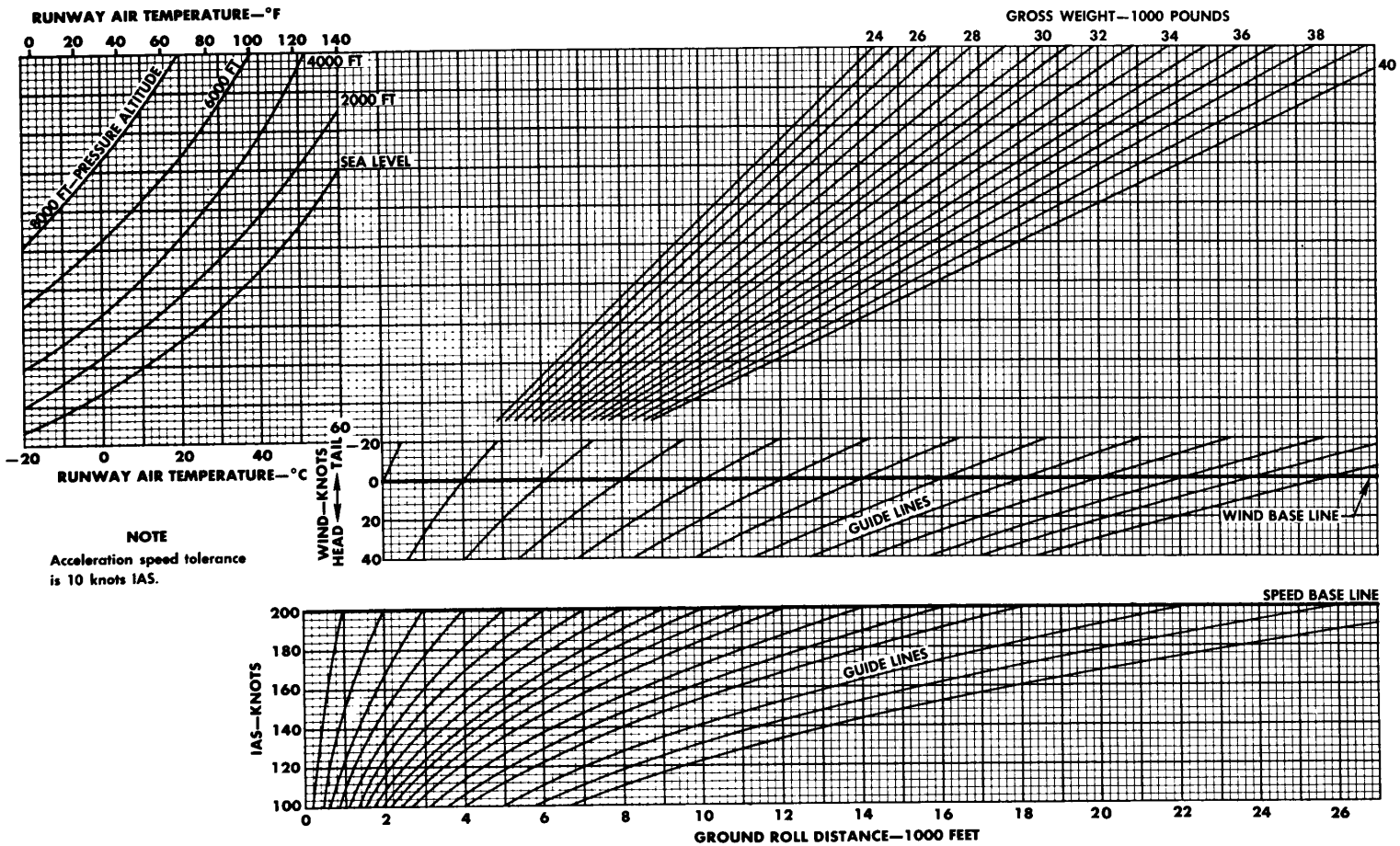
Figure C2-2

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

TAKE-OFF ACCELERATION

MILITARY THRUST

DRY HARD-SURFACE RUNWAY
MODEL: F-100A & C
ENGINE: J57-21



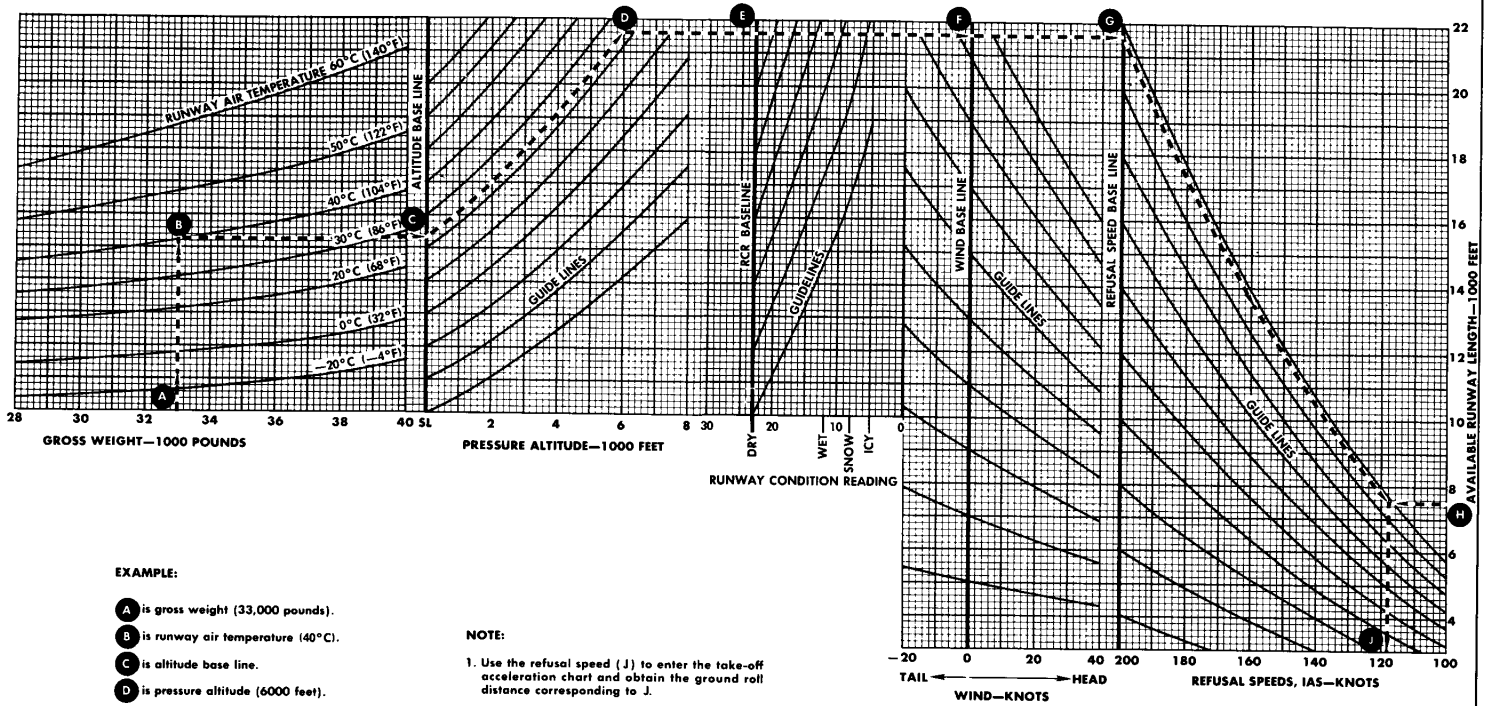
NOTE
Acceleration speed tolerance is 10 knots IAS.

F-100-1-93-640

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

REFUSAL SPEEDS
MAXIMUM THRUST
SPEED BRAKE CLOSED
DRAG CHUTE NOT DEPLOYED

MODEL F-100A & C
ENGINE: J57-21



EXAMPLE:

- (A) is gross weight (33,000 pounds).
- (B) is runway air temperature (40°C).
- (C) is altitude base line.
- (D) is pressure altitude (6000 feet).
- (E) is RCR baseline (RCR 23).
- (F) is wind base line (zero wind).
- (G) is refusal speed base line.
- (H) is runway length (7500 feet).
- (J) is refusal speed (118 knots).

NOTE:

1. Use the refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to J.
2. Increase refusal speed 10% for selected runway distance if drag chute is used to stop.

F-100-1-93-64IA

Figure C2-5

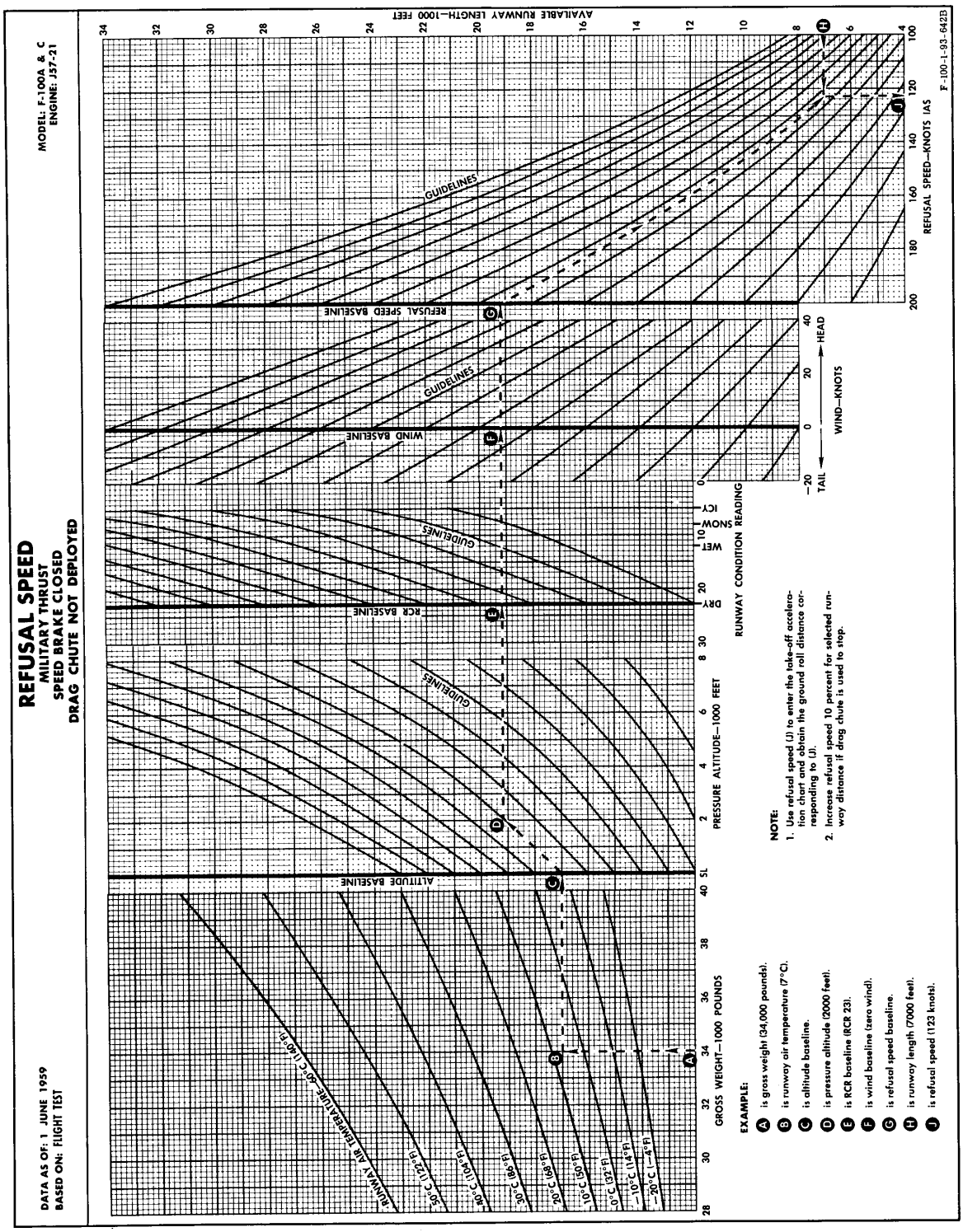

REFUSAL SPEED
MILITARY THRUST
SPEED BRAKE CLOSED
DRAG CHUTE NOT DEPLOYED
MODEL: F-100A & C
ENGINE: J57-21
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST
AVAILABLE RUNWAY LENGTH—1000 FEET
REFUSAL SPEED—KNOTS IAS
GUIDELINES
REFUSAL SPEED BASELINE
WIND BASELINE
RCR BASELINE
ALTITUDE BASELINE
RUNWAY AIR TEMPERATURE
50°C (122°F)
40°C (104°F)
30°C (86°F)
20°C (68°F)
10°C (50°F)
0°C (32°F)
−10°C (14°F)
−20°C (−4°F)
PRESSURE ALTITUDE—1000 FEET
GROSS WEIGHT—1000 POUNDS
RUNWAY CONDITION READING
DRY
WET
SNOW
ICY
WIND—KNOTS
HEAD
TAIL
F-100-1-93-6423
EXAMPLE:
A is gross weight (34,000 pounds).
B is runway air temperature (7°C).
C is altitude baseline.
D is pressure altitude (2000 feet).
E is RCR baseline (RCR 23).
F is wind baseline (zero wind).
G is refusal speed baseline.
H is runway length (7000 feet).
J is refusal speed (123 knots).
NOTE:
1. Use refusal speed (J) to enter the take-off acceleration chart and obtain the ground roll distance corresponding to (J).
2. Increase refusal speed 10 percent for selected runway distance if drag chute is used to stop.

Figure C2-6

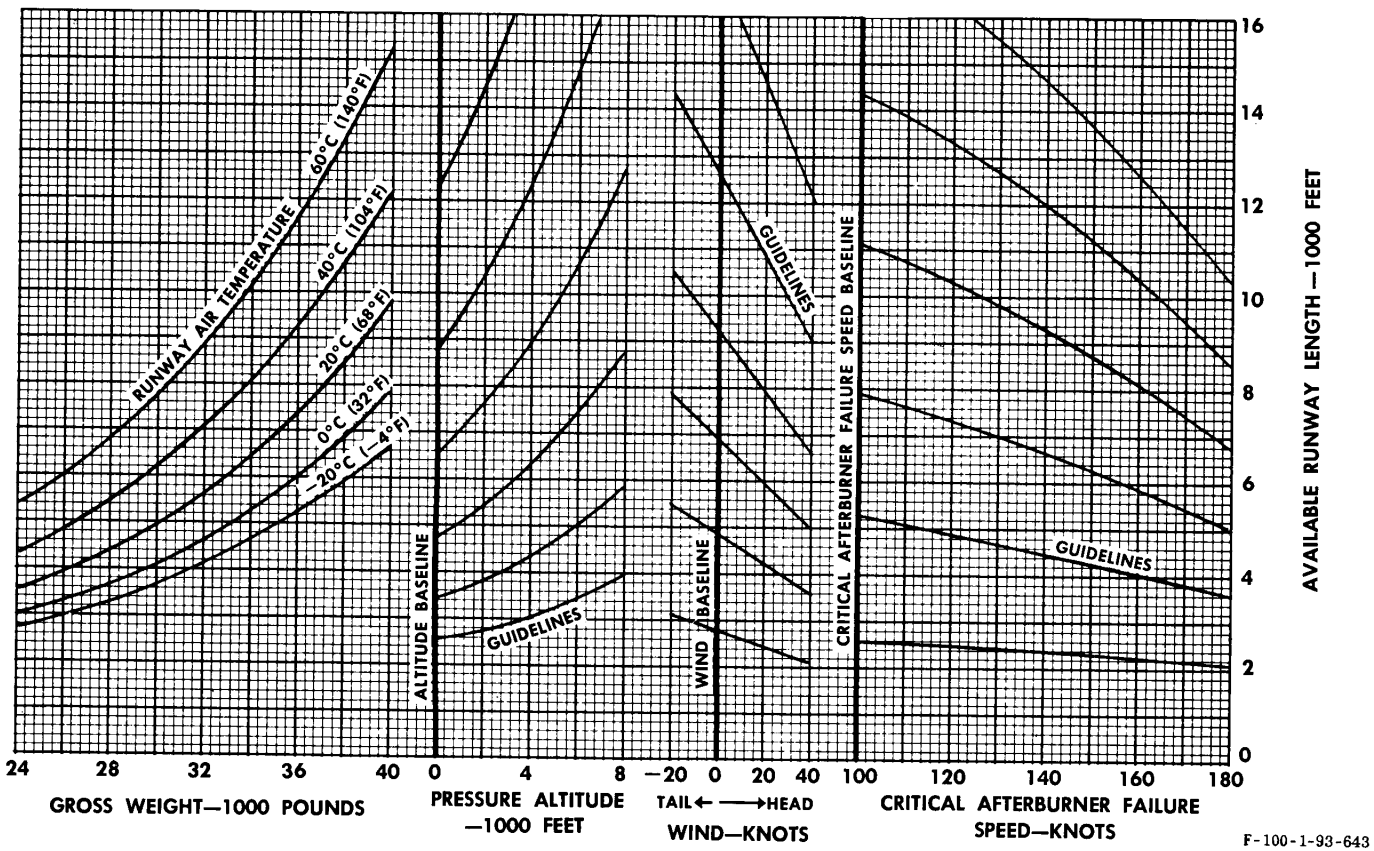
DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

CRITICAL AFTERBURNER FAILURE SPEED

MODEL: F-100A & C
ENGINE: J57-21

NOTE

- Chart based on retaining external stores for take-off.
- Chart includes 700 feet allowance for pilot reaction time from afterburner failure to throttle movement.



F-100-1-93-643

Figure C2-7

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

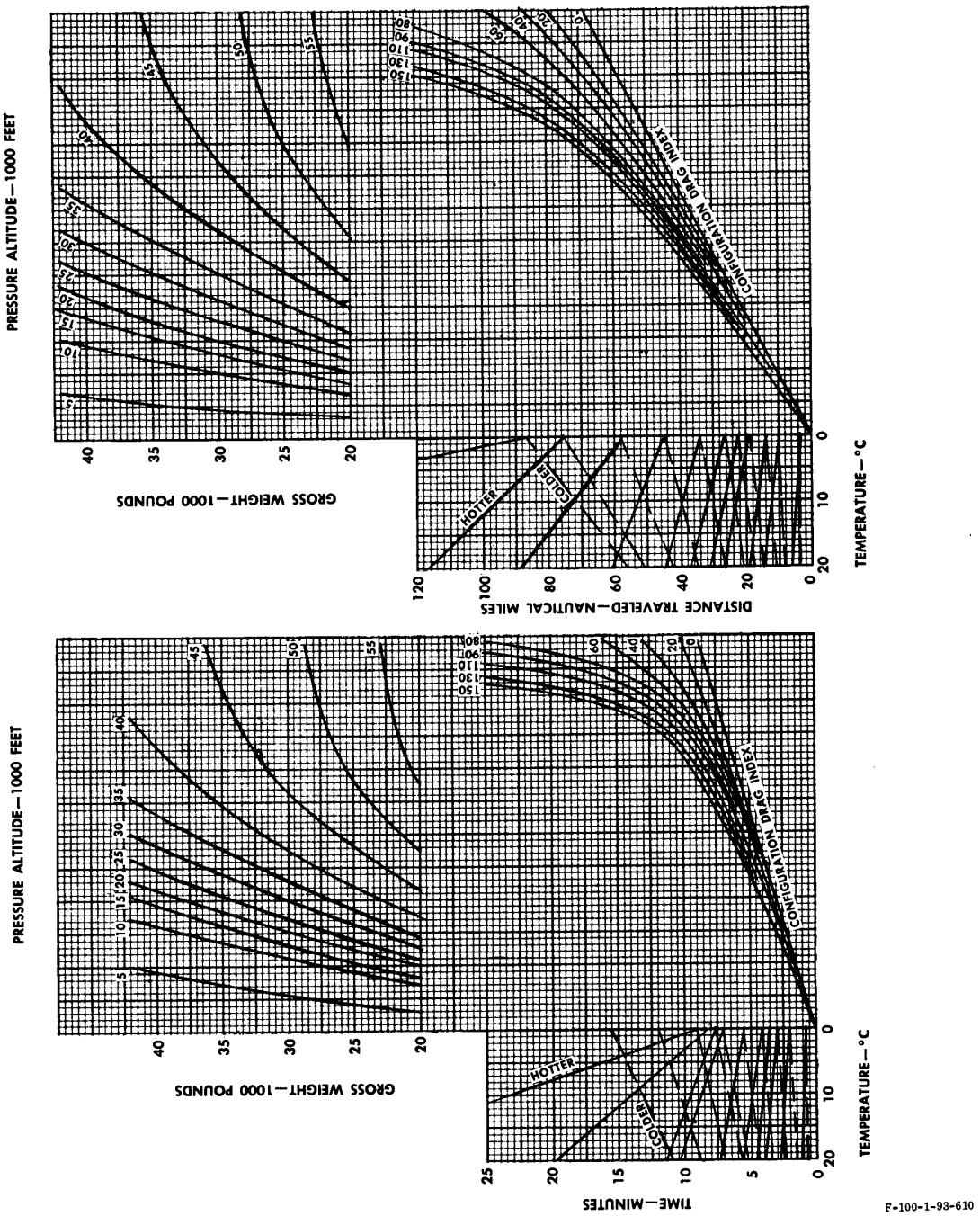


Figure C3-1 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

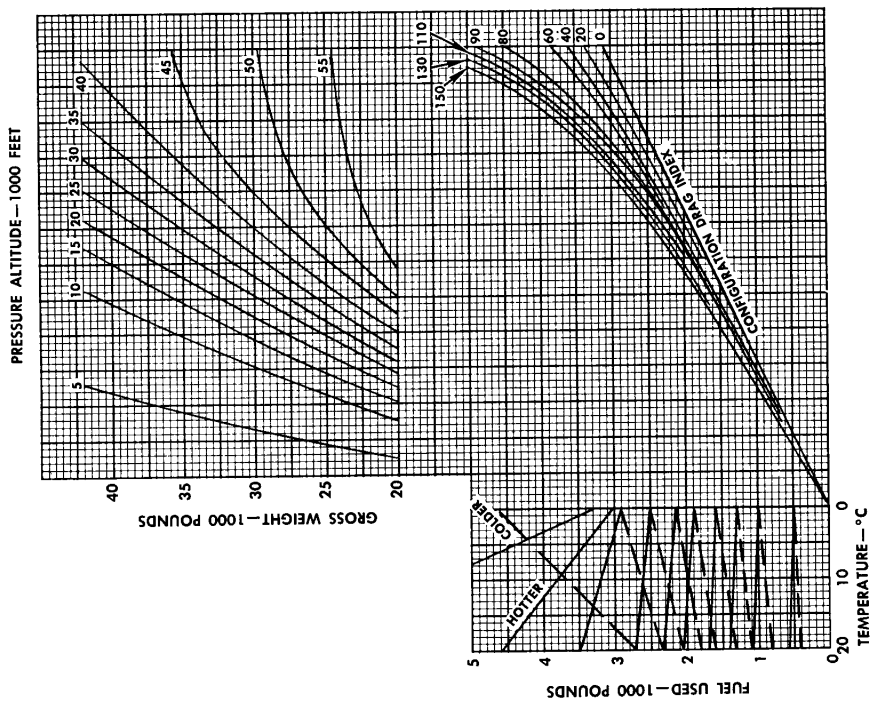
CLIMB SCHEDULE

PRESSURE ALTITUDE —1000 FEET	CONFIGURATION DRAG INDEX 0,10,20 KNOTS IAS	0,10,20 IND MACH	30,40,50,60 KNOTS IAS	30,40,50,60 IND MACH	70,80,90 KNOTS IAS	70,80,90 IND MACH
SL	196	.30	196	.30	196	.30
5	366	.60	353	.58	344	.56
10	502	.88	488	.86	474	.84
15	462	.88	449	.86	437	.84
20	421	.88	410	.86	402	.85
25	381	.88	374	.87	366	.85
30	344	.88	338	.87	333	.86
35	309	.88	305	.88	302	.87
40	276	.88	272	.88	269	.87
45	246	.88	243	.88	240	.87
50	219	.88	217	.88	214	.87

PRESSURE ALTITUDE —1000 FEET	110 KNOTS IAS	110 IND MACH	130 KNOTS IAS	130 IND MACH	150 KNOTS IAS	150 IND MACH
SL	196	.30	196	.30	196	.30
5	330	.54	334	.55	325	.54
10	450	.80	453	.80	439	.78
15	421	.81	418	.81	407	.79
20	385	.82	385	.82	376	.80
25	354	.83	352	.82	345	.81
30	324	.84	321	.83	316	.82
35	295	.85	291	.84	288	.83
40	264	.85	261	.84	258	.84
45	235	.85	232	.84	229	.84
50	209	.85	207	.84	204	.84

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



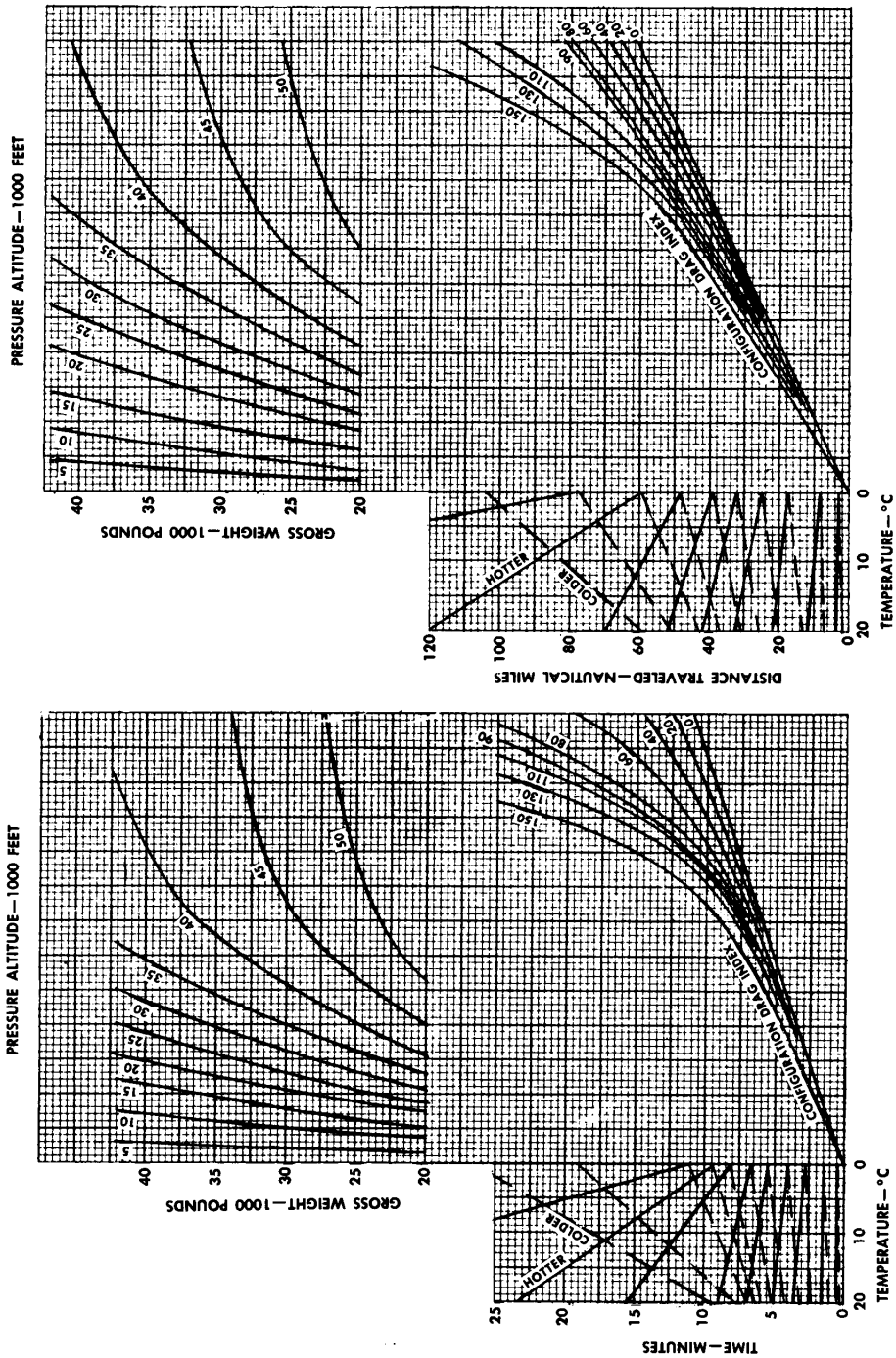
F-100-1-93-611A

Figure C3-1 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MAXIMUM THRUST CLIMB

350 KNOTS IAS OR .8 MACH NUMBER
(WHICHEVER IS LESS)



F-100-1-93-622

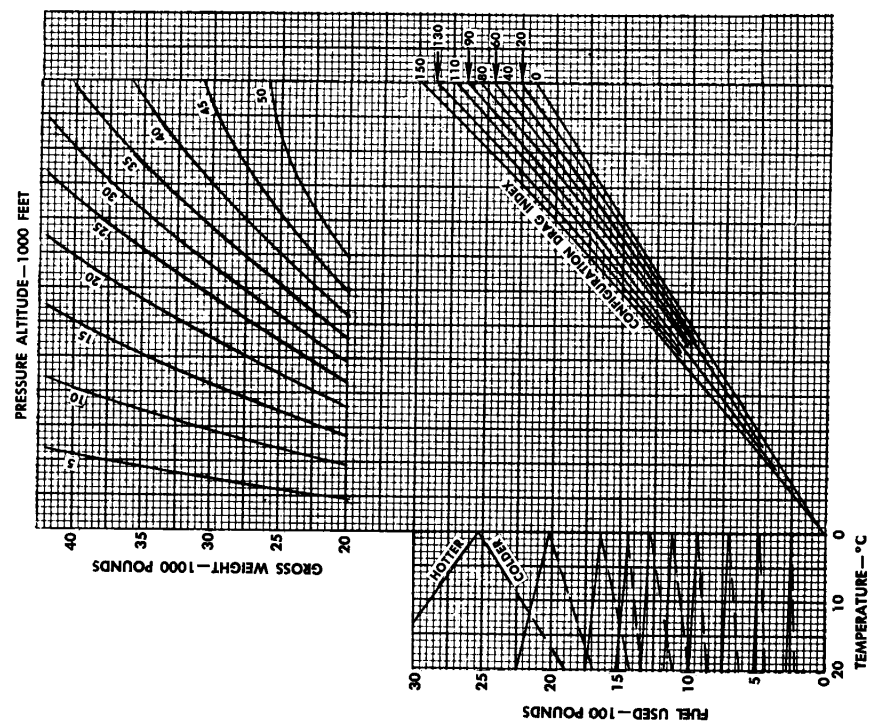
Figure C3-2 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE 1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	279	.80
40	250	.80
45	220	.80
50	196	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.

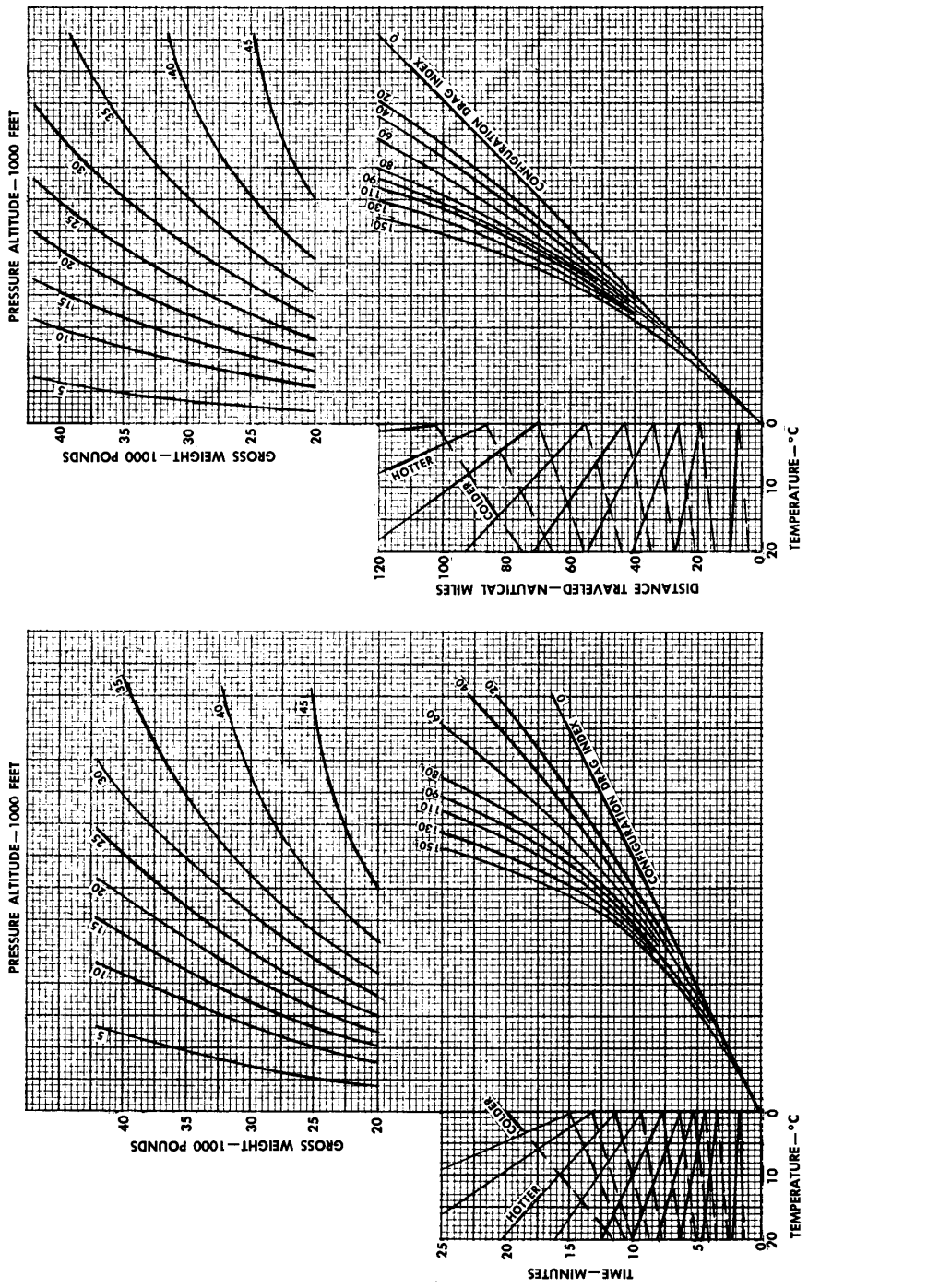


F-100-1-93-623A

Figure C3-2 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB



F-100-1-93-612

Figure C3-3 (Sheet 1 of 2)

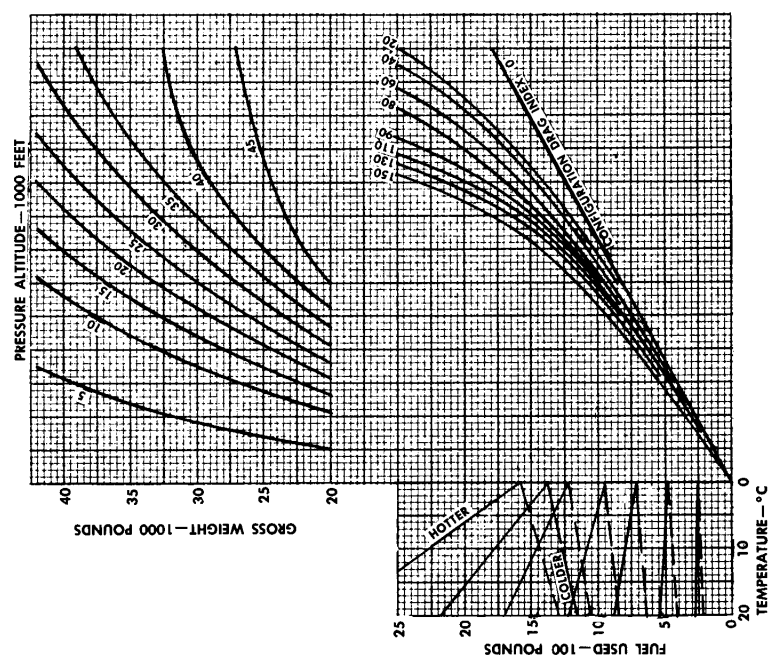
MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE

PRESSURE ALTITUDE—1000 FEET	CONFIGURATION DRAG INDEX 0, 10, 20 KNOTS IAS	0, 10, 20 IND MACH	30, 40, 50 KNOTS IAS	30, 40, 50 IND MACH	60, 70, 80, 90 KNOTS IAS	60, 70, 80, 90 IND MACH	110, 130, 150 KNOTS IAS	110, 130, 150 IND MACH
SL	196	.30	196	.30	196	.30	196	.30
5	311	.51	292	.47	278	.46	256	.41
10	413	.73	374	.67	348	.62	311	.56
15	391	.76	359	.70	338	.66	306	.60
20	368	.78	345	.74	329	.71	302	.65
25	345	.81	329	.77	317	.75	296	.70
30	324	.84	312	.81	304	.79	288	.75
35	302	.87	295	.85	291	.84	278	.81
40	269	.87	264	.85	261	.84	248	.81
45	240	.87	235	.85	232	.84	222	.81
50	214	.87	209	.85	207	.84	197	.81

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-613

Figure C3-3 (Sheet 2 of 2)

DATA AS OF: 1 SEPT 1959
BASED ON: FLIGHT TEST

MILITARY THRUST CLIMB

350 KNOTS IAS OR .8 MACH NUMBER
(WHICHEVER IS LESS)

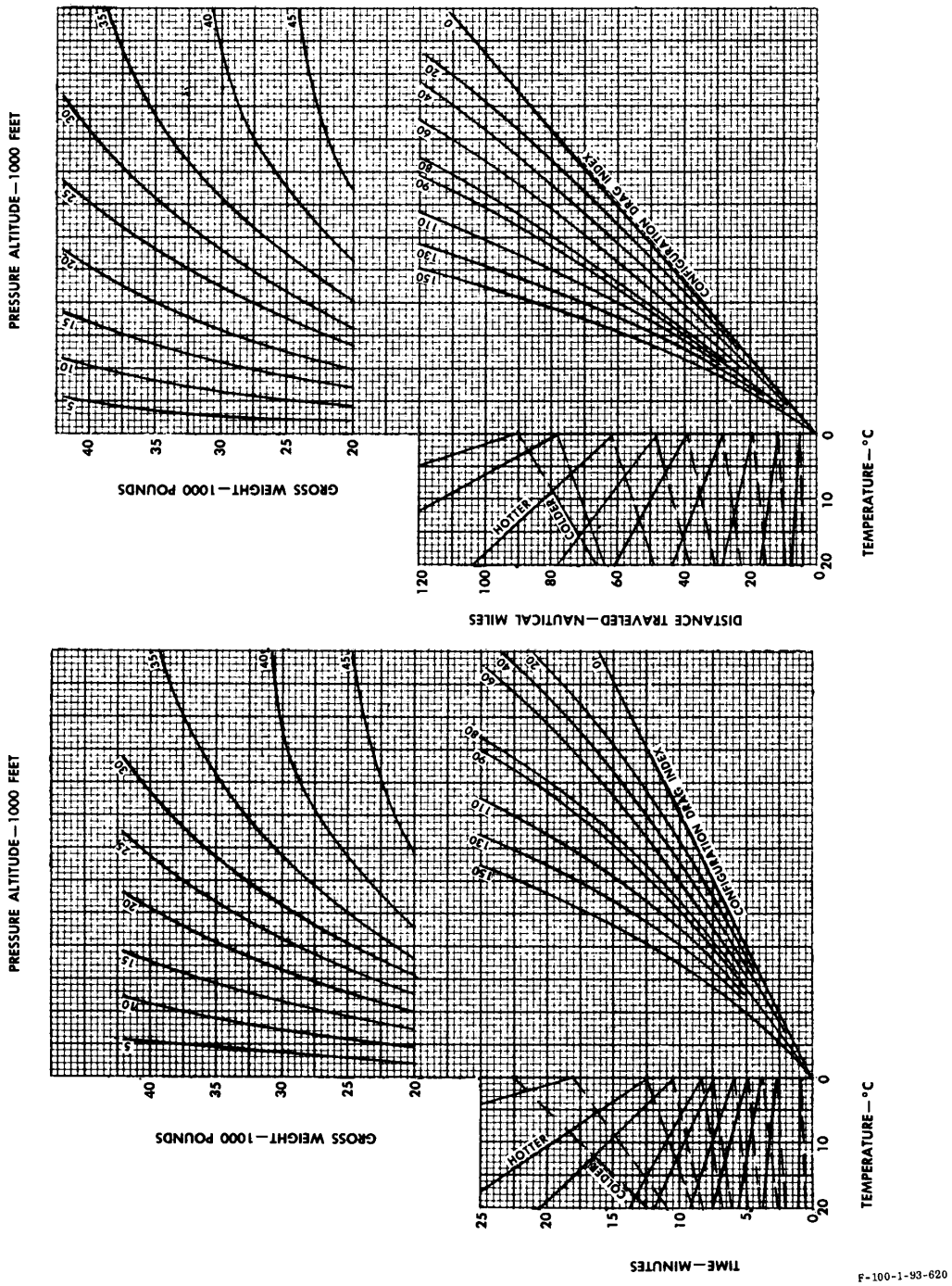


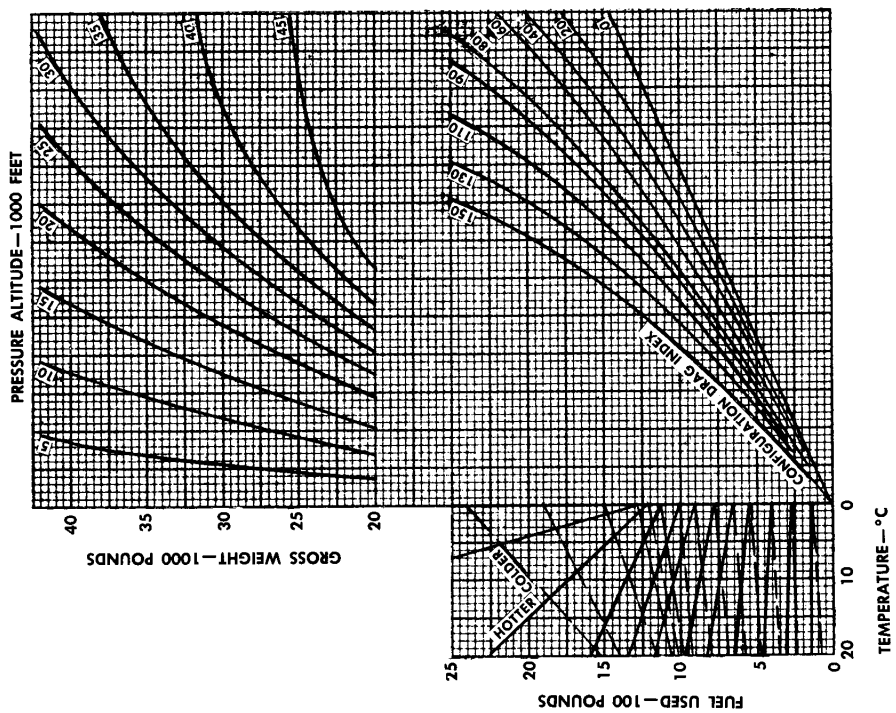
Figure C3-4 (Sheet 1 of 2)

MODEL: F-100A & C
ENGINE: J57-21

CLIMB SCHEDULE		
CONFIGURATION DRAG INDEX	0 THROUGH 150	
PRESSURE ALTITUDE —1000 FEET	KNOTS IAS	IND MACH
SL	350	.53
5	350	.57
10	350	.62
15	350	.68
20	350	.75
25	343	.80
30	307	.80
35	279	.80
40	250	.80
45	220	.80
50	196	.80

NOTE

- When engines are intentionally down-trimmed: for each one inch of mercury, add 1000 pounds to the climb gross weight.
- When the throttle is intentionally retarded to obtain a 1% reduction in rpm: add 2000 pounds to the climb gross weight.



F-100-1-93-621A

Figure C3-4 (Sheet 2 of 2)

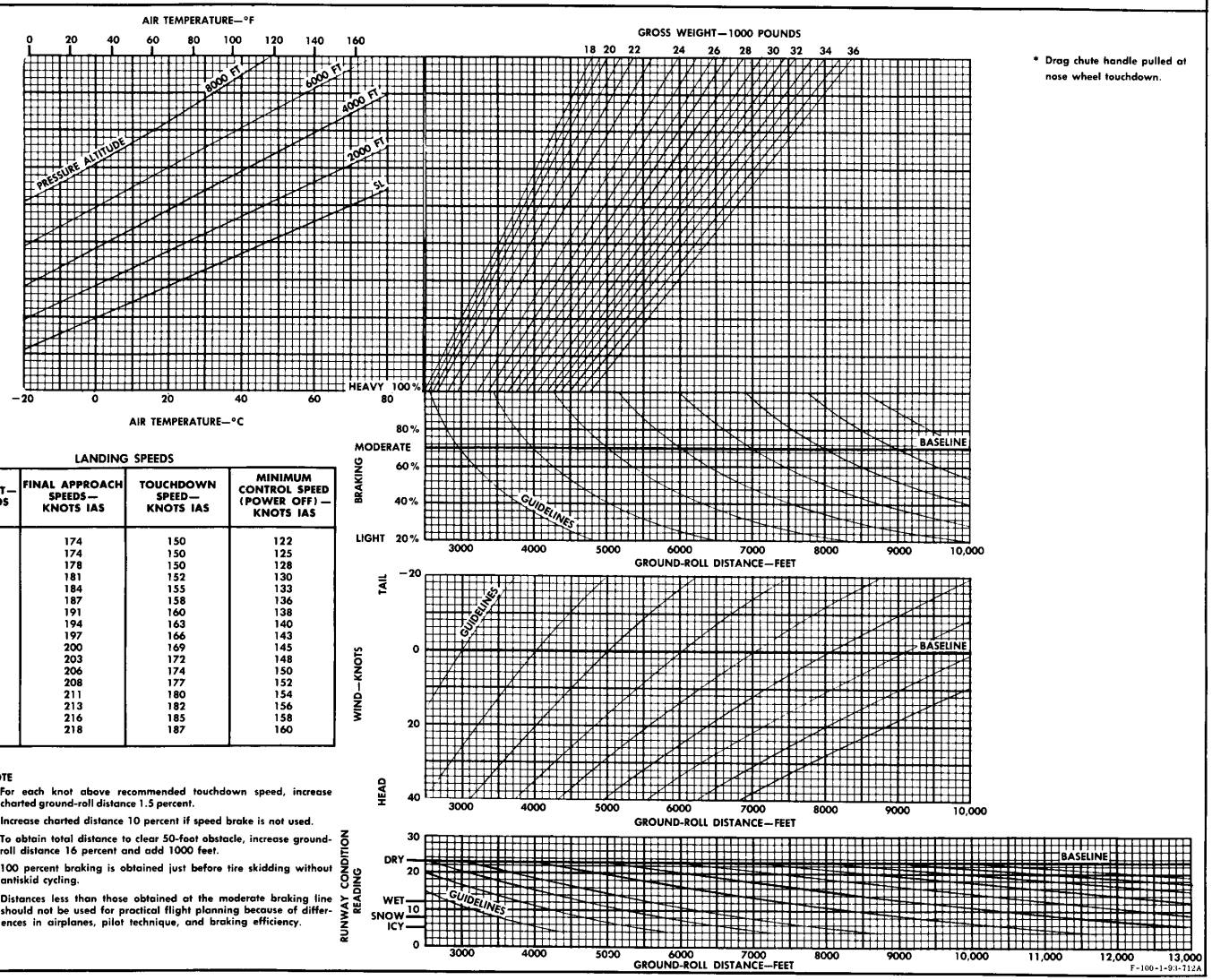
DATA AS OF: 21 JUNE 1957
BASED ON: FLIGHT TEST

LANDING DISTANCES

DRAG CHUTE DEPLOYED*—SPEED BRAKE OPEN

MODEL: F-100A & C
ENGINE: J57-21

* Drag chute handle pulled at nose wheel touchdown.



LANDING SPEEDS

GROSS WEIGHT—1000 POUNDS	FINAL APPROACH SPEEDS—KNOTS IAS	TOUCHDOWN SPEED—KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF)—KNOTS IAS
20	174	150	122
21	174	150	125
22	178	150	128
23	181	152	130
24	184	155	133
25	187	158	136
26	191	160	138
27	194	163	140
28	197	166	143
29	200	169	145
30	203	172	148
31	206	174	150
32	208	177	152
33	211	180	154
34	213	182	156
35	216	185	158
36	218	187	160

NOTE

1. For each knot above recommended touchdown speed, increase charted ground-roll distance 1.5 percent.
2. Increase charted distance 10 percent if speed brake is not used.
3. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 16 percent and add 1000 feet.
4. 100 percent braking is obtained just before tire skidding without antiskid cycling.
5. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

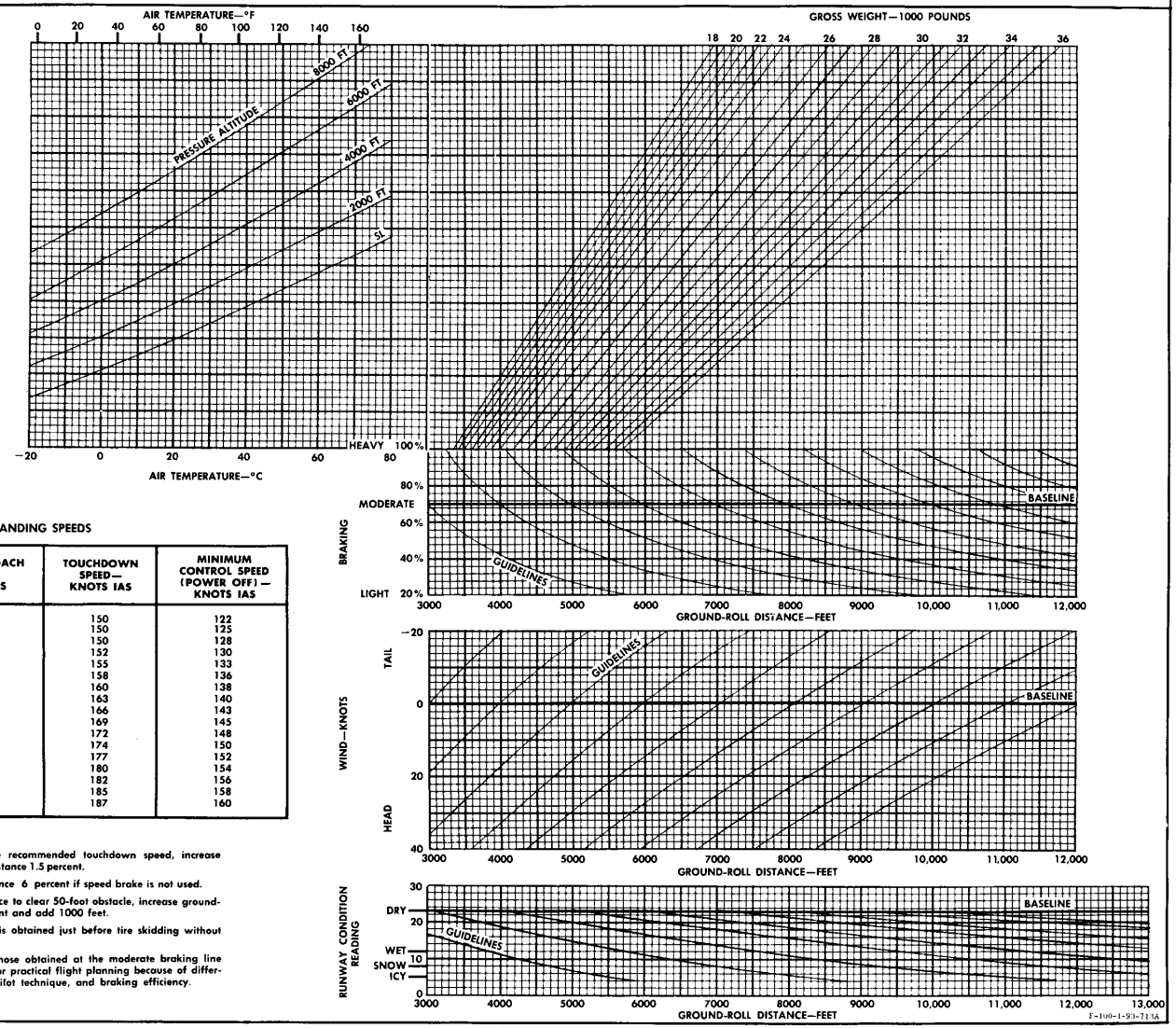
Figure C7-1

DATA AS OF: 21 JUNE 1957
BASED ON: FLIGHT TEST

LANDING DISTANCES

DRAG CHUTE NOT DEPLOYED—SPEED BRAKE OPEN

MODEL: F-100A & C
ENGINE: J57-21



LANDING SPEEDS

GROSS WEIGHT—1000 POUNDS	FINAL APPROACH SPEEDS—KNOTS IAS	TOUCHDOWN SPEED—KNOTS IAS	MINIMUM CONTROL SPEED (POWER OFF)—KNOTS IAS
20	174	150	122
21	174	150	125
22	178	150	128
23	181	152	130
24	184	155	133
25	187	158	136
26	191	160	138
27	194	163	140
28	197	166	143
29	200	169	145
30	203	172	148
31	206	174	150
32	208	177	152
33	211	180	154
34	213	182	156
35	216	185	158
36	218	187	160

NOTE

1. For each knot above recommended touchdown speed, increase charted ground-roll distance 1.5 percent.
2. Increase charted distance 6 percent if speed brake is not used.
3. To obtain total distance to clear 50-foot obstacle, increase ground-roll distance 16 percent and add 1000 feet.
4. 100 percent braking is obtained just before tire skidding without antiskid cycling.
5. Distances less than those obtained at the moderate braking line should not be used for practical flight planning because of differences in airplanes, pilot technique, and braking efficiency.

Figure C7-2

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 40—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

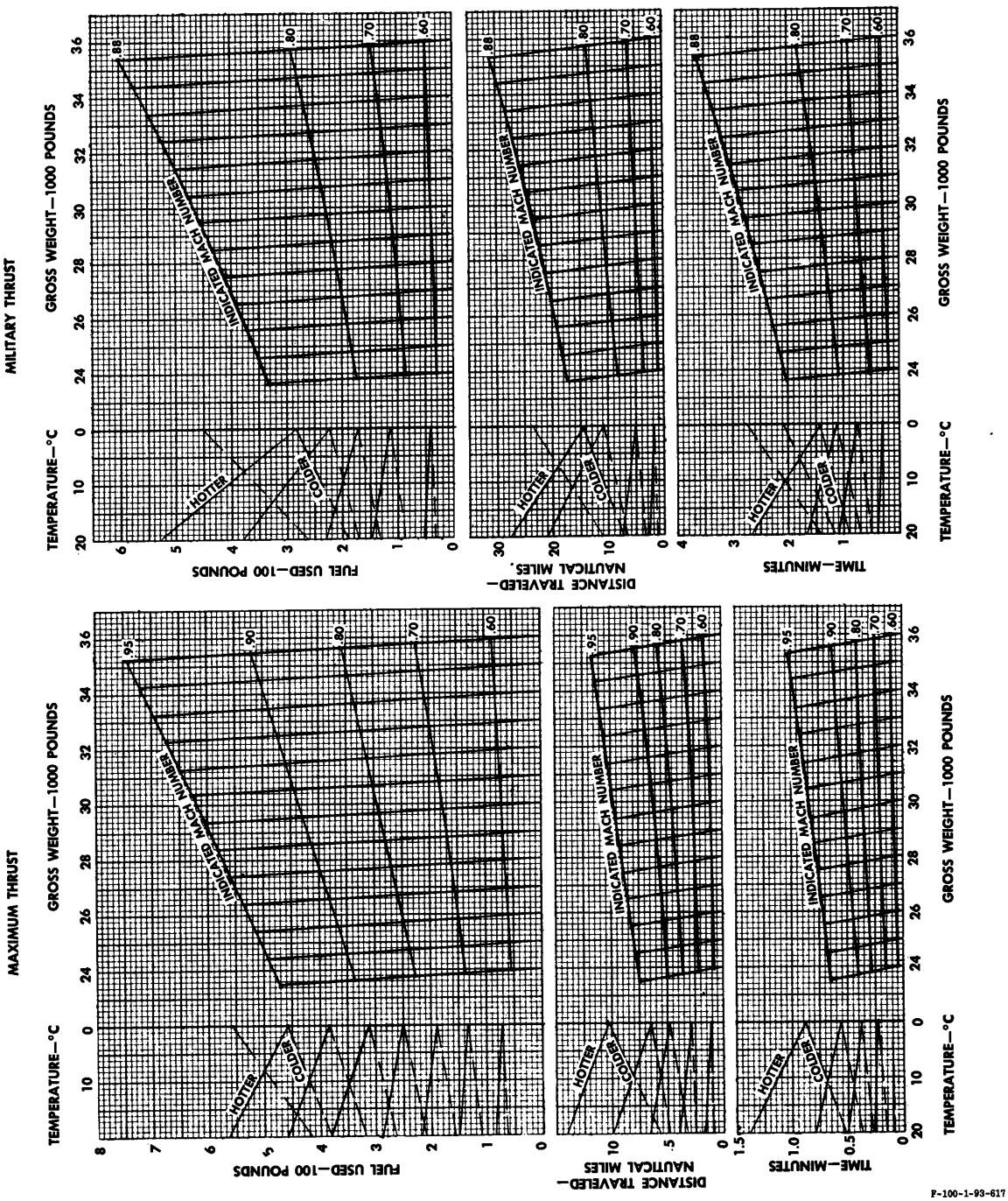


Figure C8-1

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 40—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

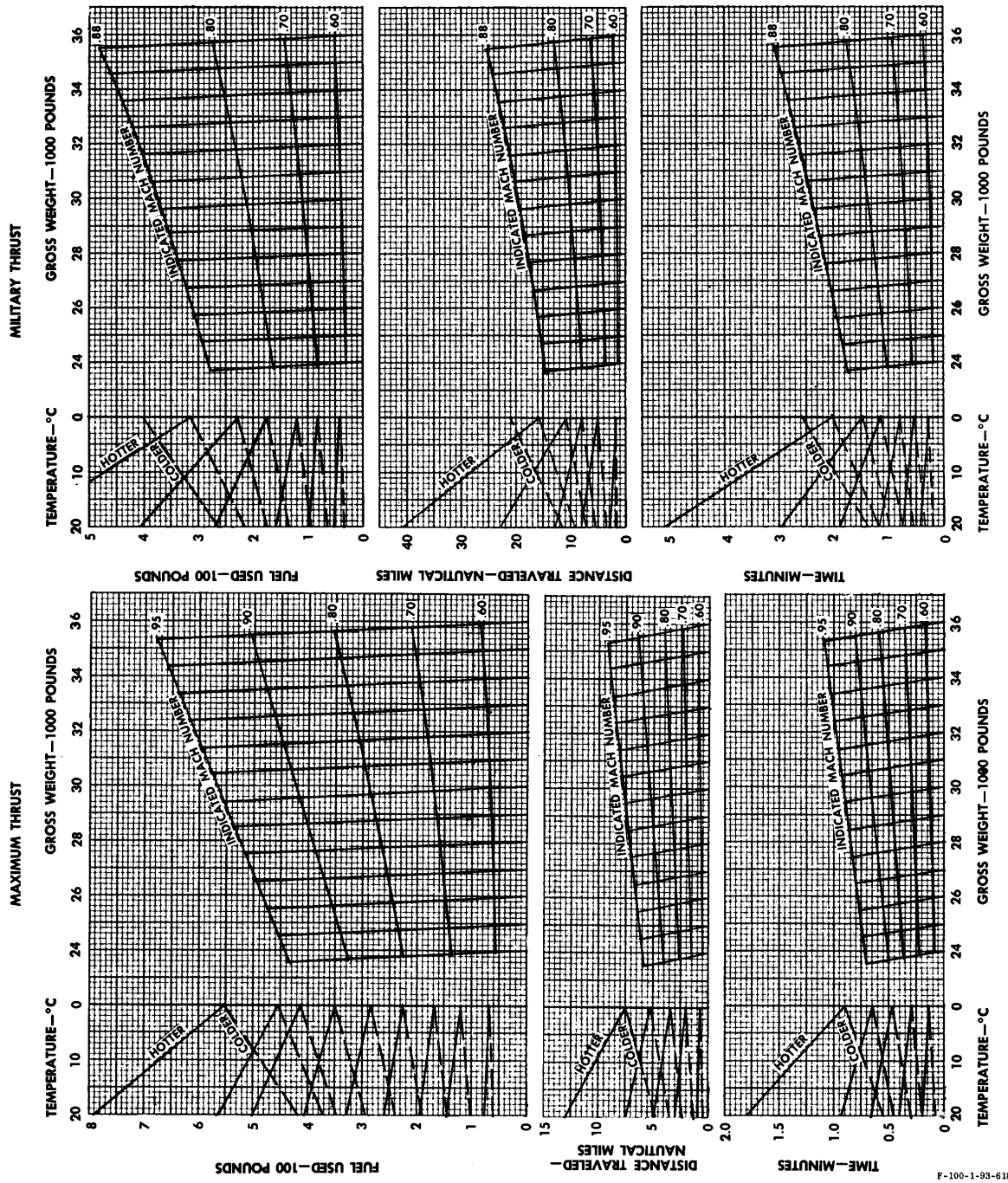


Figure C8-2

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

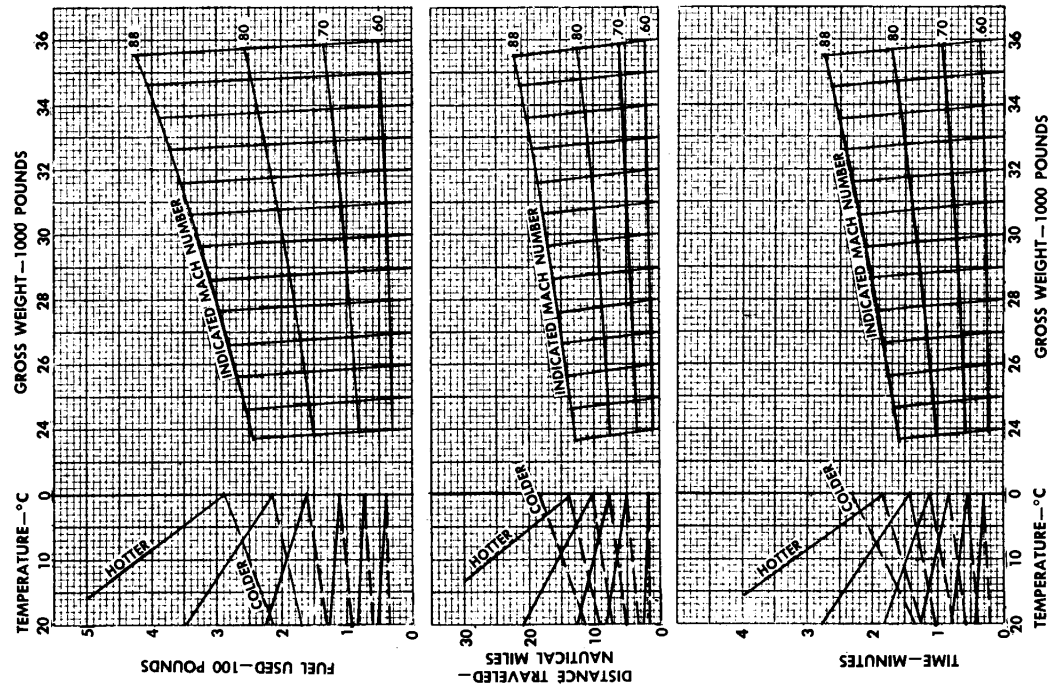
LEVEL-FLIGHT ACCELERATION

MODEL: F-100A & C
ENGINE: J57-21

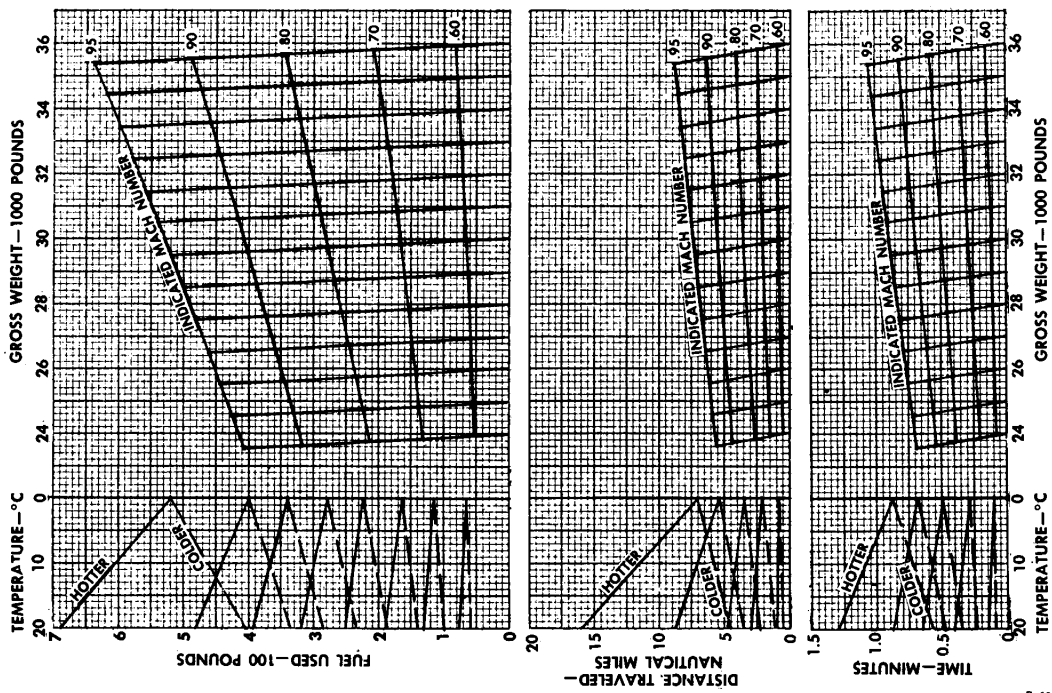
CONFIGURATION DRAG INDEX 40—4000 FEET

(FROM .53 INDICATED MACH NUMBER)

MILITARY THRUST



MAXIMUM THRUST



F-100-193-619

Figure C8-3

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—SEA LEVEL
(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

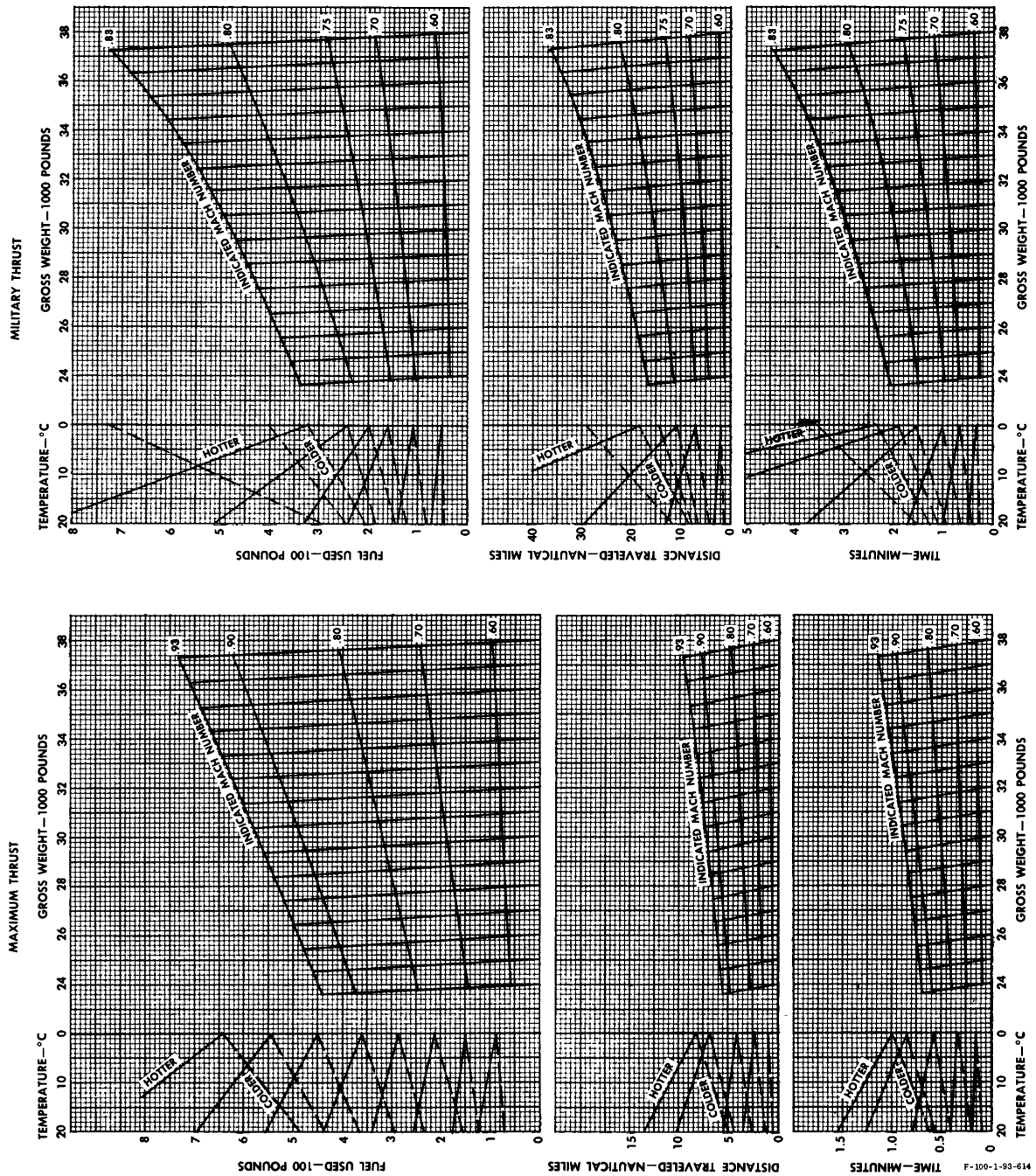


Figure C8-4

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

MODEL: F-100A & C
ENGINE: J57-21

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—2000 FEET
(FROM .53 INDICATED MACH NUMBER)

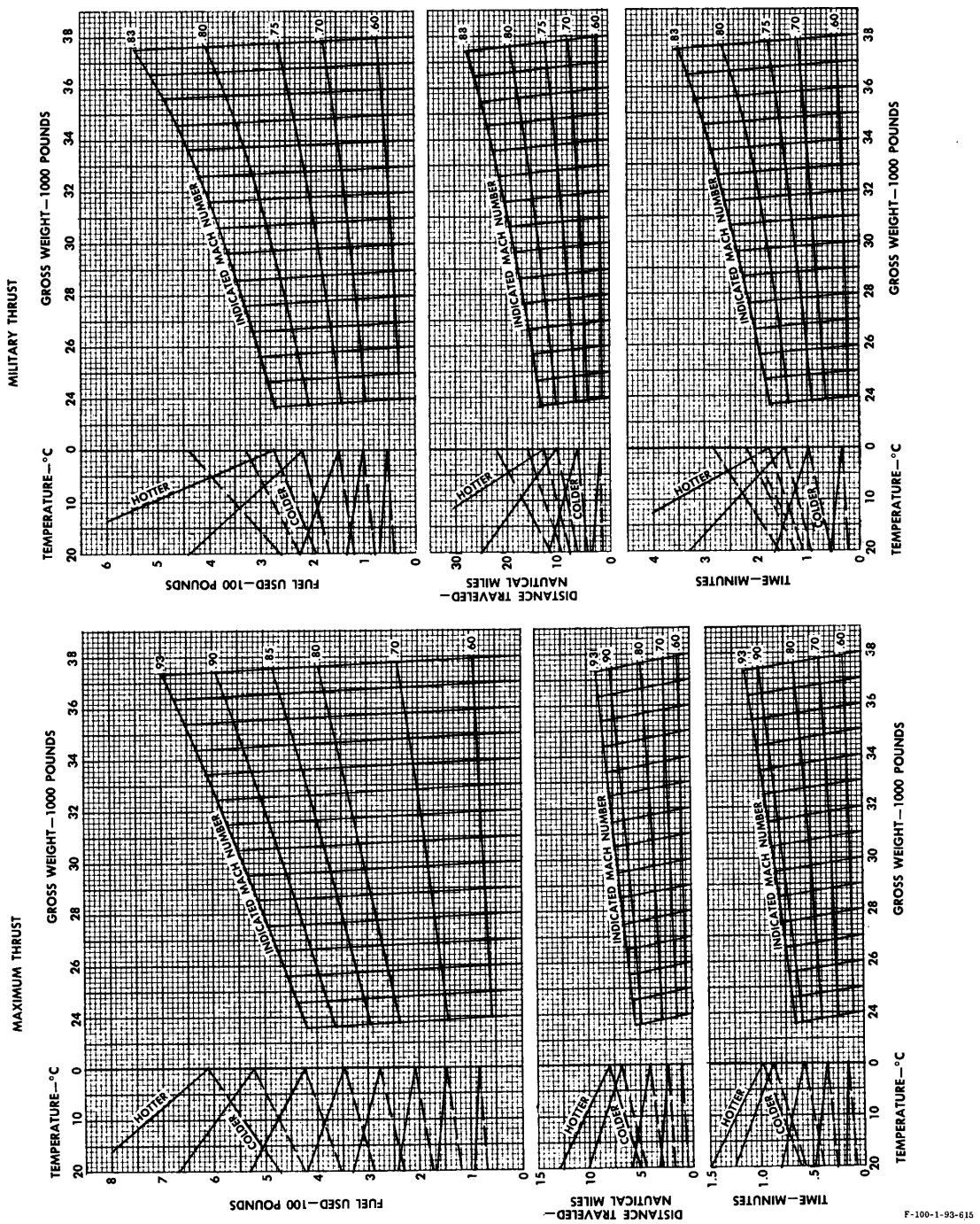


Figure C8-5

DATA AS OF: 1 JUNE 1959
BASED ON: FLIGHT TEST

LEVEL-FLIGHT ACCELERATION
CONFIGURATION DRAG INDEX 70—4000 FEET

(FROM .53 INDICATED MACH NUMBER)

MODEL: F-100A & C
ENGINE: J57-21

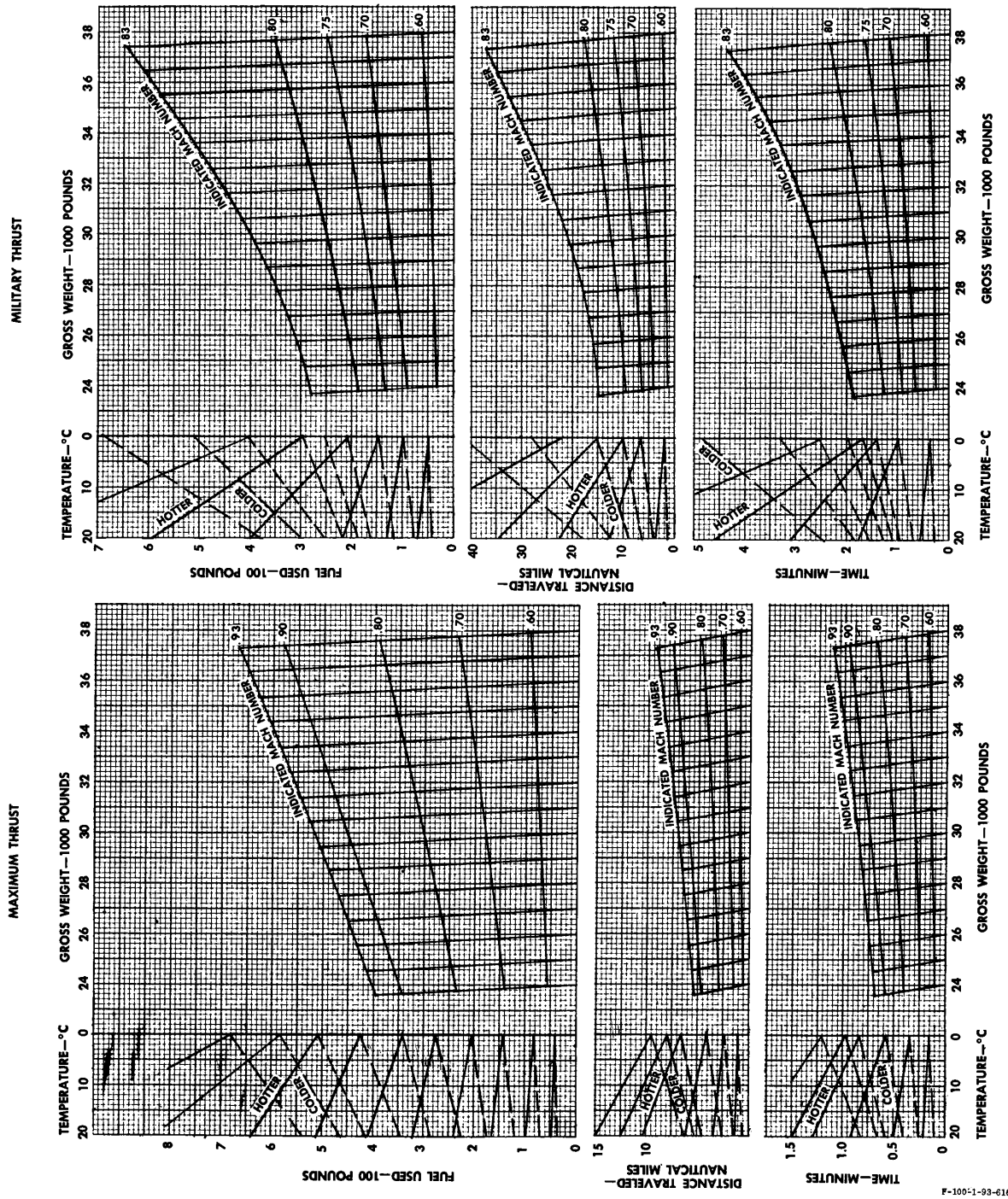


Figure C8-6