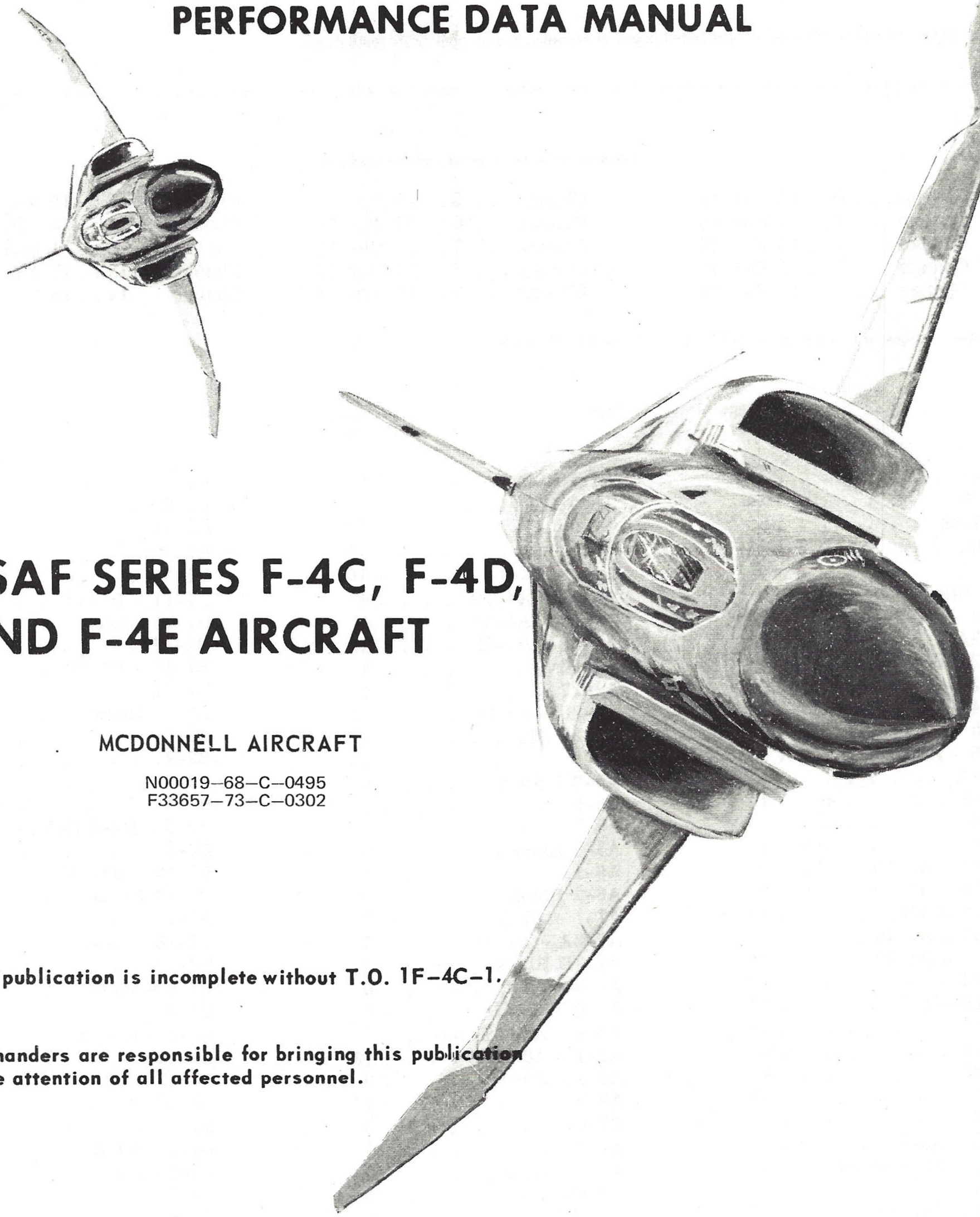
#72

Roy Downey EAFB

T.O. 1F-4C-1-1

PERFORMANCE DATA MANUAL



USAF SERIES F-4C, F-4D, AND F-4E AIRCRAFT

MCDONNELL AIRCRAFT

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Published under authority of the Secretary of the Air Force.

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Change . . 6 . . 30 Jun 71
Change . . 7 . . 15 Mar 72
Change . . 8 . . 15 May 72
Change . . 9 . . 21 Jun 72
Change . .10 . . 15 Aug 72
Change . .11 . . 4 Jan 73
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Change . .13 . . 15 Aug 73
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PART 1 INTRODUCTION

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DRAG INDEX SYSTEM

Most of the charts utilize the drag index system to effectively present the many combinations of weight/drag effects on performance. The Airplane Loading chart (figure A1-1) contains the drag number and weight of each externally carried store and its associated suspension equipment. The drag index for a specific configuration may be found by multiplying the number of stores carried by its drag number, and adding the drag number of the applicable suspension equipment. The total drag index may then be used to enter the planning data charts. Charts applicable for all loads and configurations are labeled ALL DRAG INDEXES. Charts labeled INDIVIDUAL DRAG INDEXES contain data for a range of drag numbers; i.e., individual curves/columns for a specific drag number. Supersonic data is not compatible to the drag index system; therefore, each chart is labeled for a specific configuration.

Sample Problem

Configuration 6 - MK 81 general purpose bombs on station 1 & 9 (3 each station)

6 - MK81 general purpose bombs on station 5

6 - LAU-3/A rocket launchers with nose and tail cones (full) on stations 2 & 8 (3 each station)

A. MK81 drag number	0.8 x 12 =	9.6
B. MK81 suspension equipment		
station 1 & 9	10.1 x 2 =	20.2
station 5	10.0 x 1 =	10.0
C. LAU-3/A drag number	4.2 x 6 =	25.2
D. LAU-3/A suspension equipment		
station 2 & 8	6.8 x 2 =	13.6
E. Total drag index		78.6

STABILITY INDEX SYSTEM

With the many possible external loading configurations and their resulting aerodynamic effects, it is possible to load the airplane past the aft CG limit. Adding wing-mounted stores tends to shift the aerodynamic center forward toward the CG of the aircraft, thereby reducing the longitudinal maneuvering stability of the aircraft. To assure an acceptable static margin, it is necessary to consider stability effects in conjunction with CG location. Each wing-mounted store and its associated suspension equipment is assigned a unit stability number (A1-2) corresponding to its aerodynamic effect. Each stability index (sum of stability numbers) has a corresponding aft CG limit. After the loading configuration has been determined, refer to the Stability Numbers chart (figure A1-2) and determine the airplane stability index. Enter the Aft CG Limits chart (figure A1-3) with the airplane stability index to obtain maximum allowable aft CG location at engine start. The CG location is determined by using Weight and Balance Clearance Form F in conjunction with the Handbook of Weight and Balance Data, T.O. 1-1B-40.

Note

- In some cases where the originally desired configuration is not within the allowable envelope, an acceptable static margin may be achieved through rearrangement of wing-mounted stores.
- Unit stability numbers are assigned for single mounted and cluster mounted weapons. The cluster mounted unit stability number will be used when at least two weapons are mounted abreast of each other on the same rack, with each weapon being assigned this number. Tandem-mounted weapons count as a single weapon.
- Fuselage-mounted stores are not used in determining airplane stability index but they are used in computing takeoff CG location.

Sample Problem

Note

The following example is based on the aircraft (F4C) operating weight plus a full internal fuel load (42,300 pounds). The external loading is the same as used in determining the drag index.

A. MK81 (cluster mounted - stations 1 & 9)	2.4 x 4 = 9.6
B. MK81 (suspension equipment)	11.4 x 2 = 22.8

AIRSPEED CONVERSION

The Airspeed Conversion chart (figure A1-10) provides a means of converting calibrated airspeed to true Mach number and true airspeed.

INDICATED AIRSPEED

Indicated airspeed (IAS) is the uncorrected airspeed read directly from the indicator should the air data computer system become inoperative.

CALIBRATED AIRSPEED

Calibrated airspeed (CAS) is indicated airspeed corrected for static source error. The air data computer continuously compensates for this error, and calibrated airspeed may be read directly from the indicator.

EQUIVALENT AIRSPEED

Equivalent airspeed (EAS) is calibrated airspeed corrected for compressibility. There is no provision made for reading equivalent airspeed; however, it may be obtained by multiplying the TAS by the square root of the density ratio.

TRUE AIRSPEED

True airspeed (TAS) is equivalent airspeed corrected for density altitude. Refer to the Airspeed Conversion charts (figure A1-10).

AIRSPEED POSITION ERROR CORRECTION

Under normal conditions, the air data computer system compensates for the static source position error. If an air data computer malfunction occurs, the cockpit indications for airspeed and Mach number reverts to indicated airspeed and indicated Mach number respectively. These indications may be corrected to calibrated airspeed and true Mach number by utilizing the Airspeed Position Error Correction charts (figures A1-11 thru A1-14).

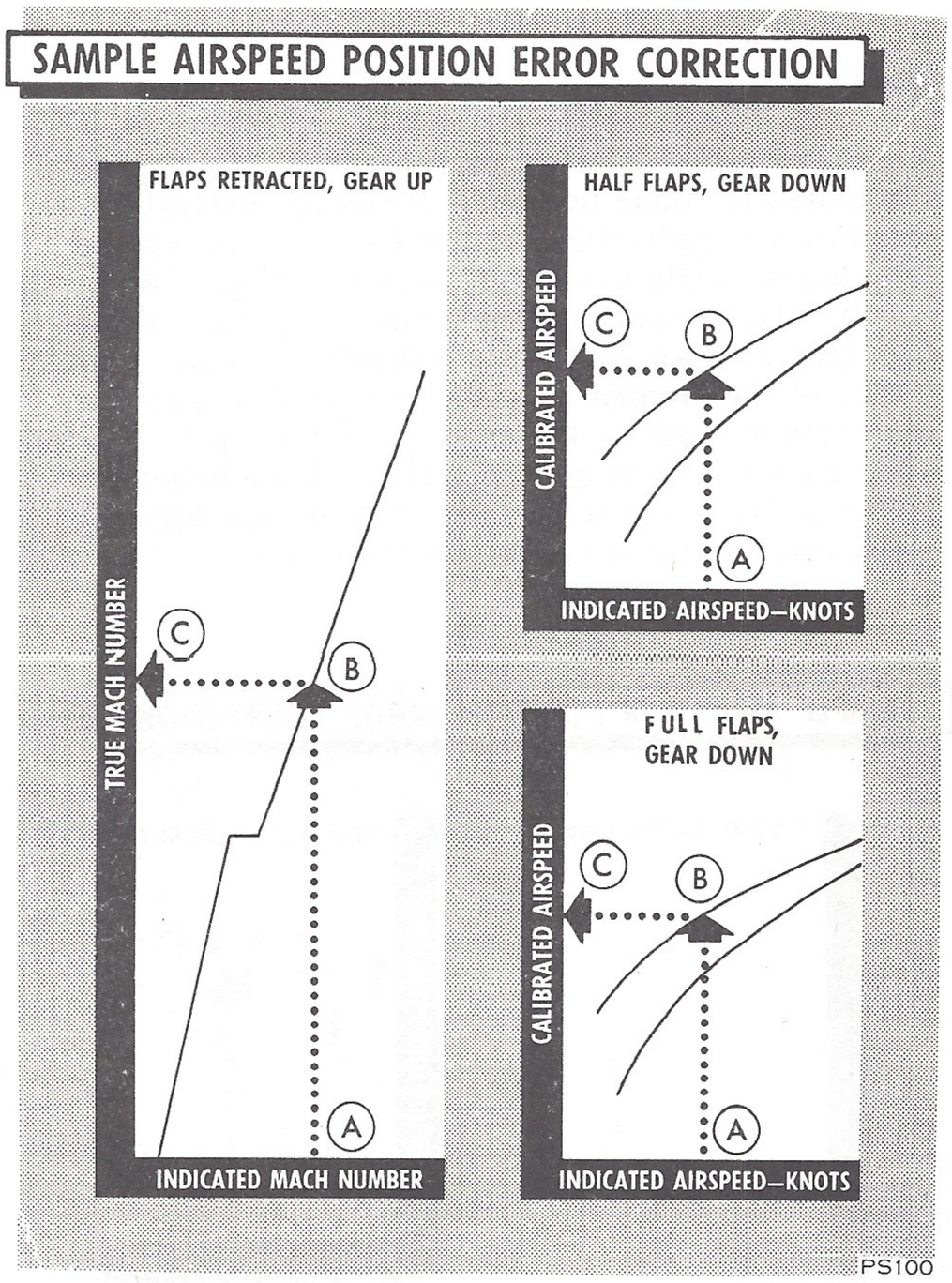
Sample Problem

Configuration: Full Flaps, Gear Down (F-4D)

A. Indicated airspeed	180 Kts.
B. Gross weight reflector line	40,000 Lbs.
C. Calibrated airspeed	175 Kts.

Configuration: Flaps Up, Gear Up (F-4D)

A. Indicated Mach number	1.4
B. 40,000-foot reflector line	
C. True Mach number	1.33



WIND COMPONENTS CHART

A standard Wind Components chart (figure A1-20) is included. It is used primarily for breaking a forecast wind down into crosswind and headwind components for takeoff computations. It may, however, be used whenever wind component information is desired. It is not to be used as a ground controllability chart.

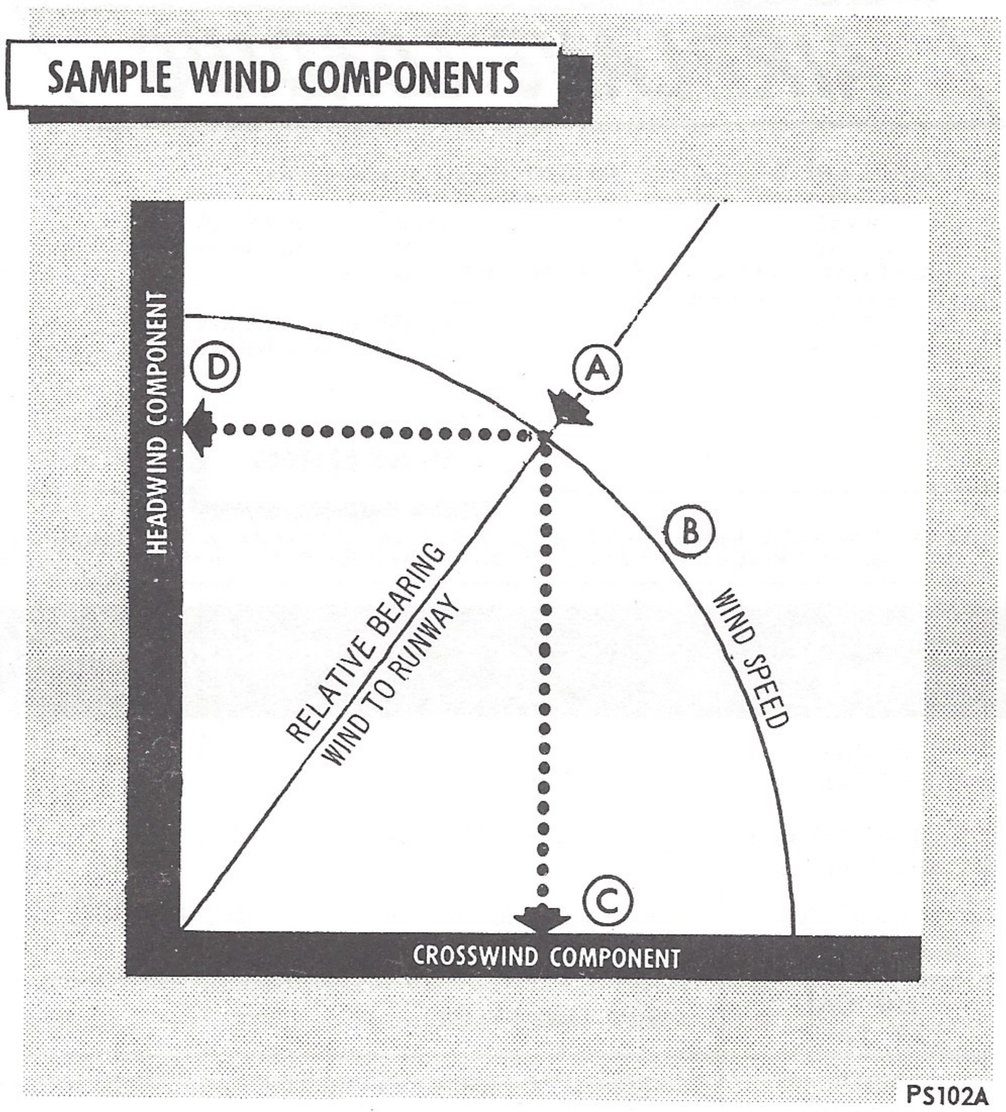
USE

Determine the effective wind velocity by adding one-half the gust velocity (incremental wind factor) to the steady state velocity; e.g., reported wind 050/20 G30, effective wind is 050/25. Reduce the reported wind direction to a relative bearing by determining the wind direction and runway heading. Enter the chart with the relative bearing. Move along the relative bearing to intercept the effective wind speed arc. From this point, descend vertically downward to read the crosswind component. From the intersection of bearing and wind speed, project horizontally to the left to read headwind component.

Sample Problem

Reported wind 050/35, runway heading 030.

A.	Relative bearing	20°
B.	Intersect windspeed arc	35 Kts.
C.	Crosswind component	12 Kts.
D.	Headwind component	33 Kts.



F-4CD

STORE	WEIGHT PER STORE (POUNDS)	DRAG PER STORE
SGT FLETCHER 370–GAL EXT TANK WITH PYLON UNUSABLE FUEL	308	6.4
SGT FLETCHER 370–GAL EXT TANK WITH FULL FUEL	2713	6.4
MAC 600–GAL EXT TANK WITH UNUSABLE FUEL	249	9.6
MAC 600–GAL EXT TANK WITH FULL FUEL	4149	9.6
ROYAL JET 600–GAL EXT TANK WITH UNUSABLE FULL	304	9.6
ROYAL JET 600–GAL EXT TANK WITH FULL FUEL	4204	9.6
A/A 37U–15 TOW TARGET SYSTEM (WITH TOW TARGET)	793 (988)	N/E
AAVS TYPE IV CAMERA POD	N/E	N/E
AGM–12B MISSILE (LIQUID PROPELLANT)	580	1.1
AGM–12B MISSILE (SOLID PROPELLANT)	567	1.1
AGM–12C, –12E MISSILE	1779/1714	4.7
AGM–45A, –45B OR ATM–45 TRAINING MISSILE	400	2.3
AGM–65A MISSILE	463	2.8
AGM–65A EMPTY MISSILE LAUNCHER AND ADAPTER	480	11.1
AIM–4D MISSILE	134	1.5
AIM–4D EMPTY MISSILE LAUNCHER L–41/42 SIDE MOUNT, L–43 BOTTOM MOUNT	136/60	N/E
AIM–7D, –7E, –7E–2 MISSILE	402/455/435	1.3
AIM–9B, –9E, –9J MISSILE	164	1.3
ALE–38 CHAFF DISPENSER	F–536 E–223	N/E
ALQ–71	242	2.0
ALQ–71(V)–3	350	WING – 2.0 FUS. – 1.3
ALQ–72	237	2.4
ALQ–87	300	2.1
ALQ–101	232	WING – 1.8 FUS. – 1.1
ALQ–101(V)–3, (V)–4, (V)–6, (V)–8	393/470/490/NE	WING – 2.0 FUS. – 1.3
ALQ–119(V)–1, (V)–4, (V)–7, (V)–10	575	2.1
ALQ–119(V)–2, (V)–3	327/402	2.1
AN/AWG–16 MONITOR CONTROL SET	168	N/E
ASID COIN NO. 1	REFER TO T.O.1F–4D–2–31 FOR STORE WEIGHT AND DRAG NUMBER	
ASID TC–425		
B28EX, B28RE SPECIAL STORE	2027/2170	4.1
B43 SPECIAL STORE WITH MOD 0 NOSE	2060	4.1
B43 SPECIAL STORE WITH MOD 1 NOSE	2120	4.1
B57 SPECIAL STORE	500	2.2
B61 SPECIAL STORE	708	2.2
BDU–33 A/B OR –33B/B PRACTICE BOMB	25	0.16
BLU–1/B OR BLU–1/B FIRE BOMB (UNFINNED)/(FINNED)	865/874	3.4/3.8
BLU–27/B, –27A/B FIRE BOMB (UNFINNED)/(FINNED)	850/868	3.4/3.8
BLU–31/B LAND MINE	800	4.0
BLU–52/B BOMB	375	3.8
BLU–76/B FIRE BOMB	2600	N/E
CBU–1/A OR CBU–1A/A DISPENSER	F–779 E–151	3.3
CBU–2/A DISPENSER	F–779 E–151	3.3
CBU–2A/A DISPENSER	F–858 E–151	3.3

N/E – NOT ESTABLISHED F–FULL E–EMPTY

4C–1–1–(407–2) A

Figure A1-1 (Sheet 2 of 4)

F-4C D

STORE	WEIGHT PER STORE (POUNDS)	DRAG PER STORE
MC–1 GAS BOMB	720	3.0
MGGB DATA LINK POD	326	N/E
MGGB MODULAR GUIDED GLIDE BOMB	2845 TO 2890	N/E
MK1 MOD 0 GUIDED WEAPON	1108	3.6
MK 36 MOD 0 DESTRUCTOR	560	2.4
MK 81 GENERAL PURPOSE BOMB	260	0.8
MK 82 GENERAL PURPOSE BOMB	531	1.1
MK 82 LASER GUIDED BOMB (KMU–388) (GBU–12/B)	650	N/E
MK 82 SNAKEYE 1 BOMB	560	2.4
MK 83 GENERAL PURPOSE BOMB	985	1.8
MK 84 GENERAL PURPOSE BOMB	1970	3.4
MK 84 EO GUIDED BOMB (KMU–353) (GBU–8/B)	2286	N/E
MK 84 LASER GUIDED BOMB (KMU–351B/B) (GBU–10/B)	2052	4.6
MLU–32/B99 BRITEYE FLARE	154	1.9
NUCLEAR WALLEYE MK 6 MOD 0	N/E	N/E
PAU–10/A PESTICIDE DISSEMINATOR	F–745 E–230	2.7
PAVE KNIFE POD	1188	N/E
PAVE SPIKE POD	395	N/E
QRC–513 ECM POD	566	N/E
RMU–8/A REEL LAUNCHER	900	6.4
RMU–8/A REEL LAUNCHER WITH TDU–22 TARGET AND TOW CABLE	1866	N/E
ROCKEYE II MK 20 MOD 2, 3 OR 4	476	2.9
SUU–16/A GUN POD (50 ROUNDS AMMO)/(FULLY LOADED)	1042/1702	8.1
SUU–20/A, –20A/A PRACTICE BOMB ROCKET DISPENSER	F–451 E–240	F–3.1 E–3.7
SUU–21/A PRACTICE BOMB DISPENSER WITH SIX BDU–33/B, –33A/B OR –33B/B	F–622 E–470	3.3
SUU–21/A PRACTICE BOMB DISPENSER WITH SIX MK 106	F–500 E–470	3.3
SUU–23/A GUN POD (50 ROUNDS AMMO)/(FULLY LOADED)	1080/1739	8.1
SUU–25/A FLARE DISPENSER	F–315 E–125	10.0
SUU–25A/A, –25B/A, –25C/A FLARE DISPENSER	F–360 E–157	10.0
SUU–42/A DISPENSER WITH 16 MK 24 FLARES	F–821 E–383	6.5
SUU–42A/A DISPENSER	REFER TO T.O.1F–4C–34–1–3 FOR STORE WEIGHT AND DRAG NUMBER	
SUU–41B/A DISPENSER		
TDU–11/B TARGET ROCKET (HVAR)	215	N/E
TMU–28/B SPRAY TANK	F–1923 E–567	4.9

N/E – NOT ESTABLISHED F–FULL E–EMPTY

4C–1–1–(407–4)A

Figure A1-1 (Sheet 4 of 4)

F-4C D

CRUISE SUMMARY

ONE ENGINE OPERATING

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

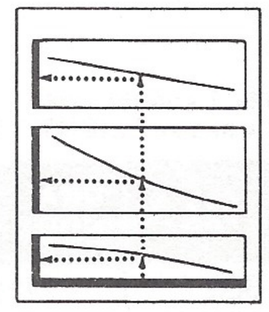
REMARKS

ENGINE(S): (2) J79–GE–15
ICAO STANDARD DAY
INOPERATIVE ENGINE WINDMILLING

NOTE

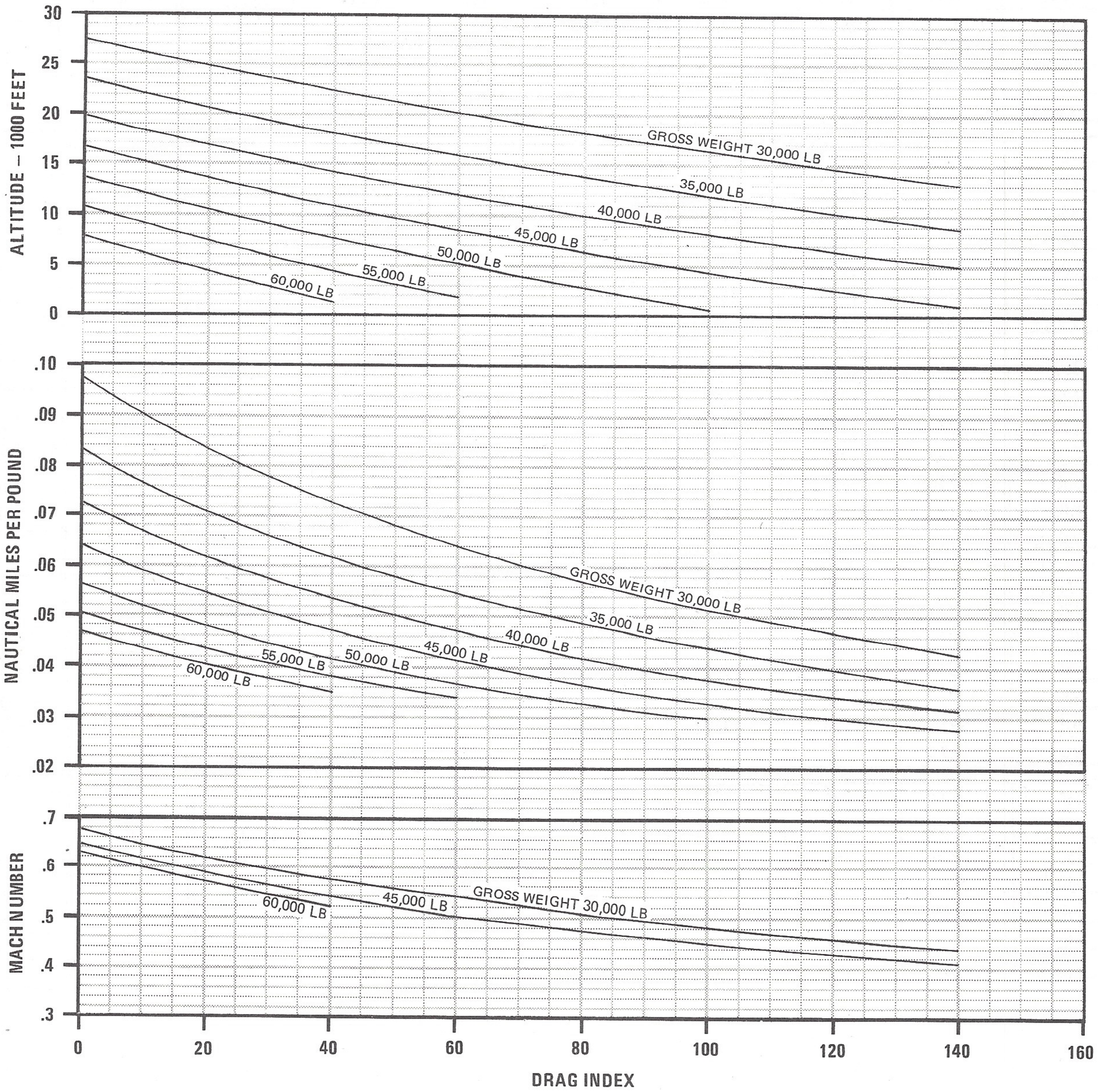
IF INOPERATIVE ENGINE IS NOT WINDMILLING, INCREASE DRAG INDEX BY 53 ADDITIONAL UNITS.

GUIDE



DATE: 1 NOVEMBER 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(59)

Figure A4-3

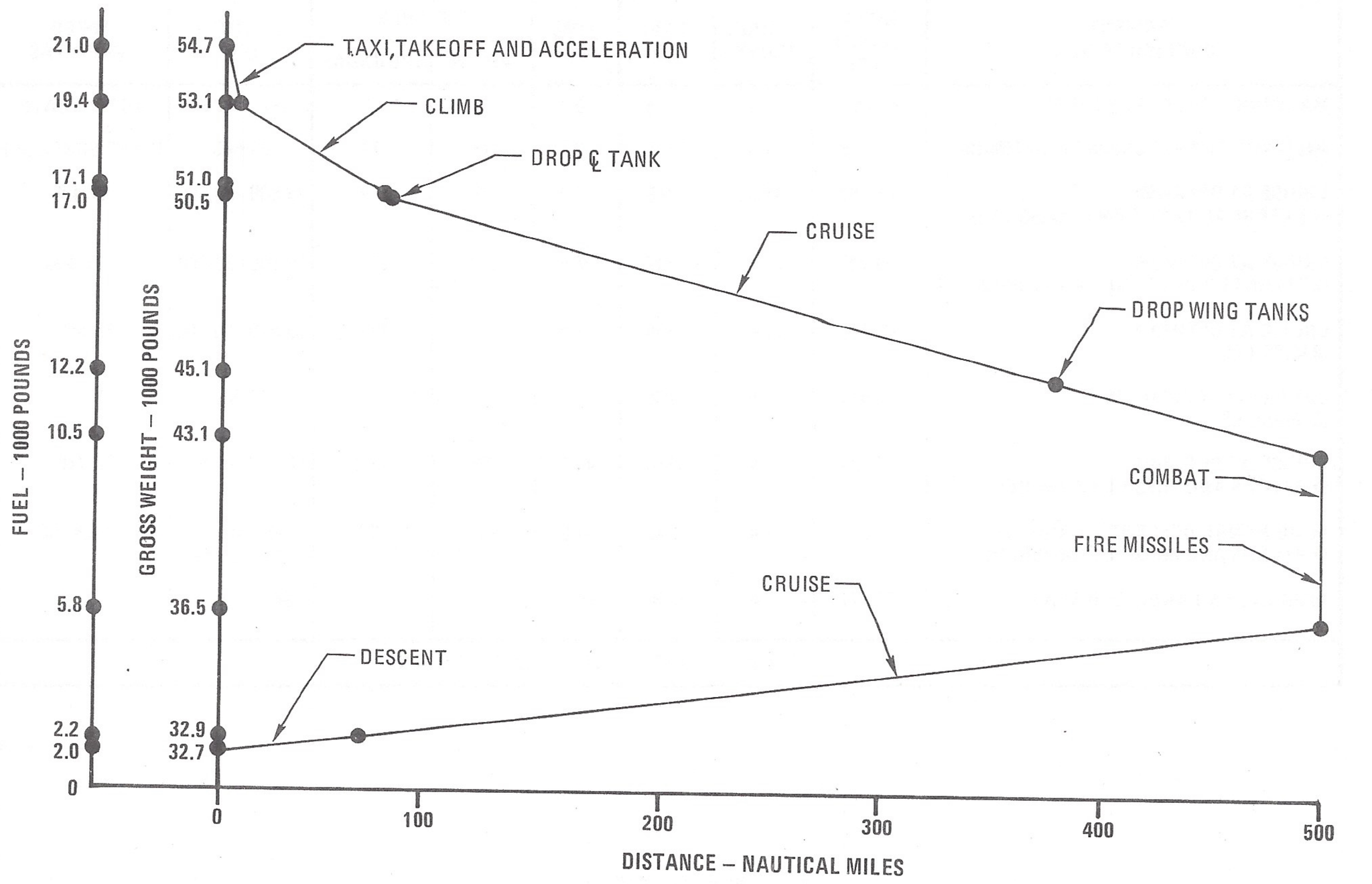


Figure A10-6

POST COMBAT CLIMB - CONTINGENCY

In the event combat was completed at a lower altitude, climb fuel needed to reach return cruise altitude must be conserved by terminating combat earlier. Assuming that combat was completed at 10,000 feet altitude, use the climb charts (Part 3) to establish the climb fuel and distance needed to reach the return cruise altitude of 37,900 feet.

Military Thrust Climb

A.	Gross weight	35,557 Lb
B.	Cruise altitude	37,900 Ft
C.	Start climb altitude	10,000 Ft
D.	Drag index	7.4
E.	Temperature deviation	0.0
F.	Fuel required (to reach B)	1,100 Lb
G.	Fuel required (to reach C)	300 Lb
H.	Distance (to B)	46 NM
I.	Distance (to C)	11 NM
J.	Fuel needed to climb (F-G)	800 Lb
K.	Distance during climb (H-I)	35 NM

Since cruise fuel consumption (previously computed) for this leg was .111 NMPP we can calculate the extra fuel needed by this change in the mission. Fuel required during the return cruise leg is 316 lb (35 NM/.111 NMPP). The revised return leg will require 484 lb (800 lb - 316 lb) of additional fuel. Combat must be terminated 0.6 Min earlier (484/825) than originally planned to allow for this contingency.

MISSION PLANNING SUMMARY

A breakdown of the entire flight is shown in the Sample Mission Profile (figure A10-6), and Sample Mission Summary (figure A10-7). Any deviations from the planned mission factors (changes in headwind, excess combat time, and availability of air refueling) must be considered as the flight progresses to insure successful mission accomplishment.

PART 1 INTRODUCTION

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Wind Components B1-21

Note

This appendix presents performance data for F-4E aircraft without leading edge slats (before T.O. 1F-4E-566). Performance data for F-4E aircraft with leading edge slats is located in appendix C.

DRAG INDEX SYSTEM

Most of the charts utilize the drag index system to effectively present the many combinations of weight/drag effects on performance. The Airplane Loading chart (figure B1-1) contains the drag number and weight of each externally carried store and its associated suspension equipment. The drag index for a specific configuration may be found by multiplying the number of stores carried by its drag number, and adding the drag number of the applicable suspension equipment. The total drag index may then be used to enter the planning data charts. Charts applicable for all loads and configurations are labeled ALL DRAG INDEXES. Charts labeled INDIVIDUAL DRAG INDEXES contain data for a range of drag numbers; i.e., individual curves/columns for a specific drag number. Supersonic data is not compatible to the drag index system; therefore, each chart is labeled for a specific configuration.

Sample Problem

Configuration: 6 - MK81 general purpose bombs on station 1 & 9 (3 each station)

6 - MK81 general purpose bombs on station 5

6 - LAU-3/A rocket launchers with nose and tail cones (full) on stations 2 & 8 (3 each station)

A. MK81 drag number	0.8 x 12 = 9.6
B. MK81 suspension equipment station 1 & 9	10.1 x 2 = 20.2
station 5	10.0 x 1 = 10.0
C. LAU-3/A drag number	4.2 x 6 = 25.2
D. LAU-3/A suspension equipment station 2 & 8	6.8 x 2 = 13.6
E. Total drag index	78.6

STABILITY INDEX SYSTEM

With the many possible external loading configurations and their resulting aerodynamic effects, it is possible to load the airplane past the aft CG limit. Adding wing-mounted stores tends to shift the aerodynamic center forward toward the CG of the aircraft, thereby reducing the longitudinal maneuvering stability of the aircraft. To assure an acceptable static margin, it is necessary to consider stability effects in conjunction with CG location. Each wing-mounted store and its associated suspension equipment is assigned a unit stability number (B1-2) corresponding to its aerodynamic effect. Each stability index (sum of stability numbers) has a corresponding aft CG limit. After the loading configuration has been determined, refer to the Stability Numbers chart (figure B1-2) and determine the airplane stability index. Enter the Aft CG Limits chart (figure B1-3) with the airplane stability index to obtain maximum allowable aft CG location at engine start. The CG location is determined by using Weight and Balance Clearance Form F in conjunction with the Handbook of Weight and Balance Data, T.O. 1-1B-40.

Note

- In some cases where the originally desired configuration is not within the allowable envelope, an acceptable static margin may be achieved through rearrangement of wing-mounted stores.
- Unit stability numbers are assigned for single mounted and cluster mounted weapons. The cluster mounted unit stability number will be used when at least two weapons are mounted abreast of each other on the same rack, with each weapon being assigned this number. Tandem-mounted weapons count as a single weapon.
- Fuselage-mounted stores are not used in determining airplane stability index but they are used in computing takeoff CG location.

Sample Problem

Note

The following example is based on the aircraft operating weight plus a full internal fuel load (44, 150 pounds). The external loading is the same as used in determining the drag index.

A. MK81 (cluster mounted - stations 1 & 9)	2.4 x 4 = 9.6
B. MK81 (suspension equipment)	11.4 x 2 = 22.8

AIRSPEED POSITION ERROR CORRECTION

These charts (figures B1-9 and B1-10) provide the means to correct indicated airspeed and Mach number to calibrated and true values respectively.

Sample Problem

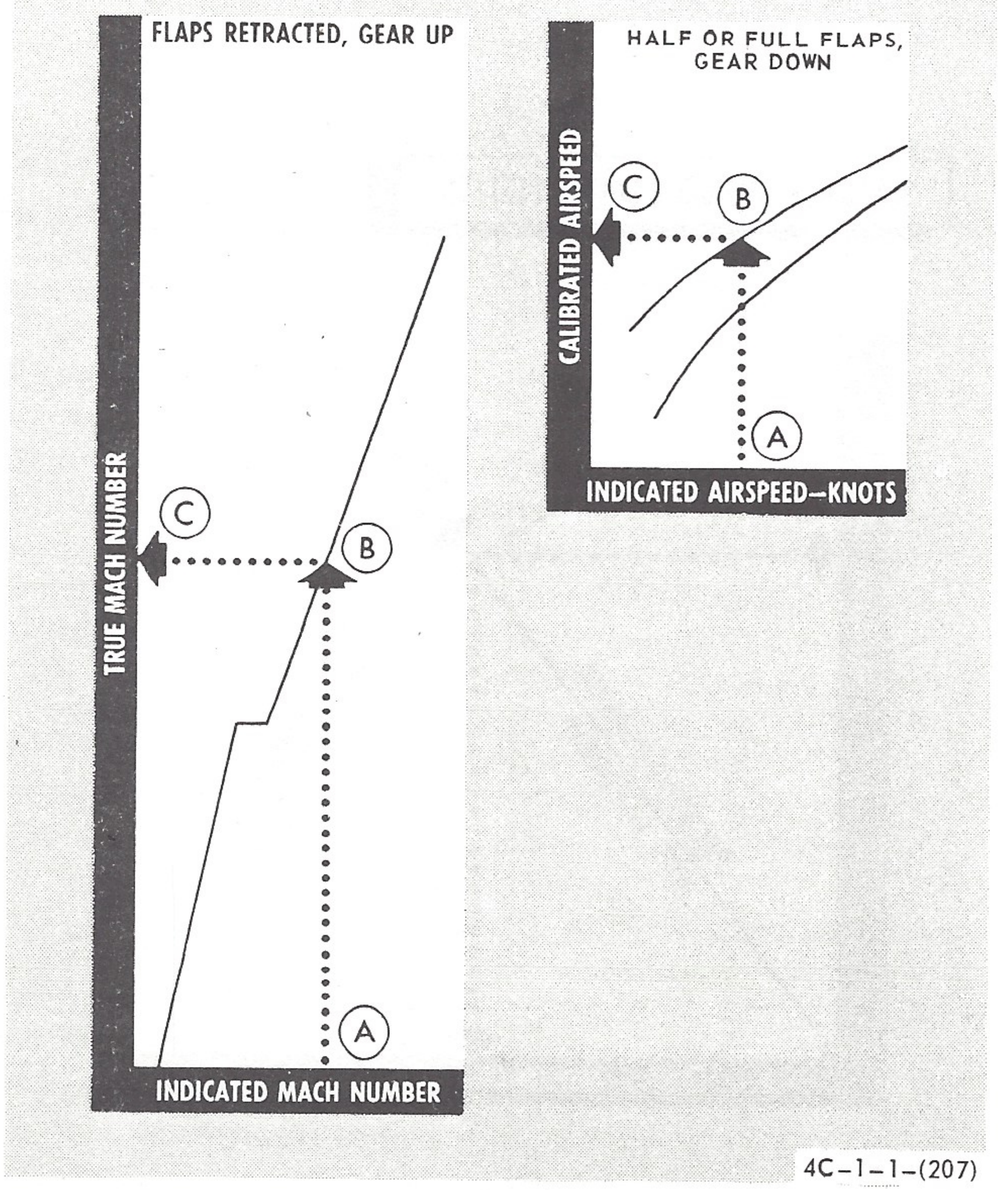
Configuration: Full Flaps, Gear Down

A.	Indicated airspeed	180 Kt
B.	Gross weight reflector line	40,000 Lb
C.	Calibrated airspeed	178 Kt

Configuration: Flaps Up, Gear Up

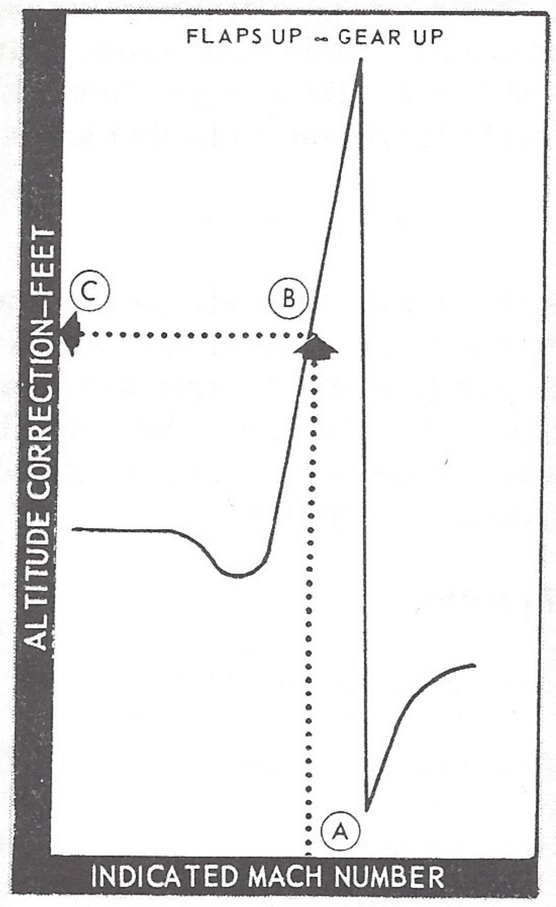
A.	Indicated Mach number	1.1
B.	40,000-foot reflector line	
C.	True Mach number	1.08

SAMPLE AIRSPEED POSITION ERROR CORRECTION



4C-1-1-(207)

SAMPLE ALTIMETER POSITION ERROR CORRECTION



4C-1-1-(208)

ALTIMETER POSITION ERROR CORRECTION

This chart (figure B1-11) provides altimeter error corrections for given Mach numbers at various altitudes. An altitude correction factor is included for landing configurations.

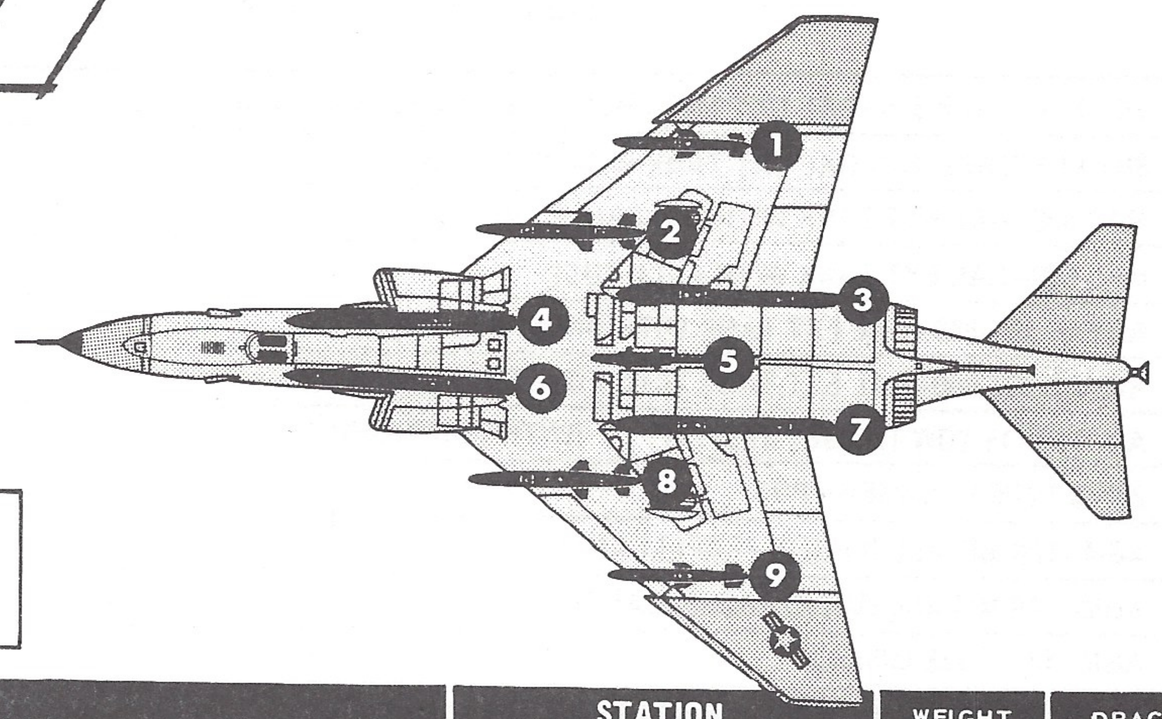
Sample Problem

Flaps Retracted, Gear up

A.	Indicated Mach number	1.4
B.	Assigned altitude	40,000 Ft
C.	Δ H correction	75 Ft.
D.	Indicated altitude necessary to maintain assigned altitude (B+C)	40,075 Ft

AIRPLANE LOADING

AIRPLANE OPERATING WEIGHT (Basic airplane plus weight of oil, and two crew members)
.... 31,250 pounds (Block 38 aircraft)
31,930 pounds (Block 41 aircraft)
AIRPLANE BASIC TAKEOFF WEIGHT (Airplanes operating weight plus full internal fuel load)
.... 44,150 pounds (Block 38 aircraft)
43,990 pounds (Block 41 aircraft)



WARNING

FOR PRECISE BASIC WEIGHT, EXTERNAL STORE AND ATTACHMENT INFORMATION, REFER TO CHARTS C AND E OF THE WEIGHT AND BALANCE DATA HANDBOOK (T.O. 1–1B– 40) FOR THE PARTICULAR AIRPLANE.

TYPICAL STORE	SUSPENSION EQUIPMENT	STATION 1	2	3	4	5	6	7	8	9	WEIGHT PER STATION	DRAG PER STATION
600–GAL EXT. TANK SUU–21/A DISPENSER, SPL WPN, RMU–8/A MK 84 LDGP BOMB, M118 GP BOMB	AERO 27A EJECTOR RACK					X					51	N/A
	BRU–5/A (MODIFIED AERO 27A EJECTOR RACK)					X					45	N/A
370–GAL EXT. TANK	WING TANK PYLON	X								X	SEE SHEET 2	SEE SHEET 2
AIM–9 MISSILES	INBOARD ARMAMENT PYLON AND TWO LAU–7A/A OR AERO 3B MISSILE LAUNCHERS		X						X		403	3.4
AGM–12B MISSILES	OUTBOARD ARMAMENT PYLON AND LAU–34/A MISSILE LAUNCHER	X								X	276	3.4
	INBOARD ARMAMENT PYLON AND LAU–34/A MISSILE LAUNCHER		X						X		350	4.0
AGM–12C AND –12E MISSILES, B57 SPECIAL WPN, MK 1 MOD 0 WPN SUU–21/A DISPENSER ECM PODS	INBOARD ARMAMENT PYLON (WITH MAU–12B/A EJECTOR)		X						X		264	2.6
	INBOARD ARMAMENT PYLON (WITH MAU–12C/A EJECTOR)		X						X		273	2.6
AGM–65A MISSILES	INBOARD PYLON AND LAU–88/A MISSILE LAUNCHER		X						X		463	11.1
AGM–45 MISSILES	OUTBOARD ARMAMENT PYLON AND LAU–34/A MISSILE LAUNCHER	X								X	276	3.4
	INBOARD PYLON AND LAU–34/A MISSILE LAUNCHER		X						X		350	4.0
SUU–16/A AND SUU–23/A GUN POD	AERO 27A EJECTOR RACK, CENTERLINE MER ADAPTER, AND SWAYBRACE ADAPTERS					X					122	3.9
	OUTBOARD ARMAMENT PYLON	X								X	190	2.1
CONVENTIONAL WEAPONS	OUTBOARD ARMAMENT PYLON AND OUTBOARD MER	X								X	405	10.1
	INBOARD ARMAMENT PYLON AND TER		X						X		359	6.8
	AERO 27A EJECTOR RACK AND CENTERLINE MER WITH ADAPTER					X					321	10.0
MK 1 MOD 0 WPN TMU–28/A SPRAY TANK	OUTBOARD ARMAMENT PYLON (WITH MAU–12B/A EJECTOR)	X								X	190	2.1
	OUTBOARD ARMAMENT PYLON (WITH MAU–12C/A EJECTOR)	X								X	199	2.1
AIM–4D MISSILES	INBOARD ARMAMENT PYLON AND INBOARD LAUNCHER		X						X		356	3.2
	INBOARD ARMAMENT PYLON AND INBOARD AND LOWER LAUNCHERS		X						X		416	3.7
A/A37U–15 TOW TARGET	OUTBOARD ARMAMENT PYLON AND ADAPTER	X									333	N/E
ECM PODS	OUTBOARD ARMAMENT PYLON (WITH MAU–12B/A)	X								X	190	2.1

NOTES:
- ARMAMENT PYLON WEIGHTS ARE BASED MAU–12B/A. FOR MAU–12C/A, ADD 9 POUNDS.
- CENTERLINE STATION (5) WEIGHTS ARE BASED ON AERO 27A. FOR BRU–5/A, SUBTRACT 6 POUNDS.
- IF NITROGEN BOTTLE IS INSTALLED IN LAU–7A/A MISSILE LAUNCHER, ADD 17.5 POUNDS.

4C–1–1–(210–1)

Figure B1-1 (Sheet 1)

F-4E

STORE		WEIGHT PER STORE (POUNDS)	DRAG PER STORE
CBU–9/A DISPENSER		F–688 E–158	3.3
CBU–12/A DISPENSER		F–650 E–158	3.3
CBU–24A/B OR CBU–29A/B DISPENSER		825	4.2
CBU–24/B OR CBU–29/B DISPENSER		811	4.2
CBU–24B/B OR CBU–29B/B DISPENSER		832	4.6
CBU–24C/B, –49C/B DISPENSERS		802/810	4.6
CBU–28/A DISPENSER (UNFINNED)		F–450 E–157	F–4.4 E–6.9
CBU–30/A DISPENSER (UNFINNED)		F–385 E–157	F–4.4 E–6.9
CBU–33/A DISPENSER (FINNED)		F–848 E–228	F–3.3 E–5.6
CBU–34/A, –42/A DISPENSER (FINNED)		F–919 E–247	F–3.3 E–5.6
CBU–38/A DISPENSER (UNFINNED)		F–702 E–157	F–4.4 E–6.9
CBU–39/A, –40/A DISPENSERS		N/E	N/E
CBU–46/A DISPENSER		F–890 E–158	3.3
CBU–49/B DISPENSER		818	4.2
CBU–49A/B DISPENSER		823	4.2
CBU–49B/B, –52A/B, DISPENSERS		839	4.6
CBU–52/B DISPENSER		692	4.6
CBU–52B/B DISPENSER		777	4.6
CBU–58/B, –71/B DISPENSER		840	N/E
CBU–70/B DISPENSER		718	N/E
COMBAT DOCUMENTATION CAMERAS		16	3.7 (PAIR)
CTU–1/A SUPPLY CONTAINER		E–215	4.9
LAU–3/A ROCKET POD	WITH NOSE AND TAIL CONE	427	4.1
	WITH NOSE AND WITHOUT TAIL CONE	425	5.4
	WITHOUT NOSE AND TAIL CONE (FULL)	423	13.6
	WITHOUT NOSE AND TAIL CONE (EMPTY)	71	5.8
LAU–32A/A, LAU–32B/A, LAU–59/A ROCKET PODS	WITH NOSE AND TAIL CONE	173	1.6
	WITH NOSE AND WITHOUT TAIL CONE	171	2.1
	WITHOUT NOSE AND TAIL CONE (FULL)	169	5.4
	WITHOUT NOSE AND TAIL CONE (EMPTY)	49	2.5
LAU–68/A, LAU–68A/A, LAU–68B/A ROCKET PODS	WITH NOSE AND TAIL CONE	211	N/E
	WITH NOSE AND WITHOUT TAIL CONE	209	N/E
	WITHOUT NOSE AND TAIL CONE (FULL)	207	N/E
	WITHOUT NOSE AND TAIL CONE (EMPTY)	67	N/E
M30E2 (MJU–4B) CHAFF FILLED		459 TO 476	N/E
M36E2 INCENDIARY CLUSTER BOMB		F–975 E–880	4.7
M117 GENERAL PURPOSE BOMB WITH M131A1 FIN		820	3.0
M117 GENERAL PURPOSE BOMB WITH MAU–103/B FIN OR MAU–103A/B FIN		806	3.2
M117 LASER GUIDED BOMB		900	N/E
M117 (RETARDED) GENERAL PURPOSE BOMB OR M117D (DESTRUCTOR)		880	4.2
M118 GENERAL PURPOSE BOMB		3020	10.1
M118 LASER GUIDED BOMB (KMU–370) (GBU–11/B)		3065	8.2
M118 EO GUIDED (KMU–390) (GBU–9/B)		3450	N/E
M129E1 LEAFLET BOMB		200	3.0
MC–1 GAS BOMB		720	3.0
MGGB DATA LINK POD		326	N/E

N/E – NOT ESTABLISHED F–FULL E–EMPTY

4C–1–1–(210–3)A

Figure B1-1 (Sheet 3)

STABILITY NUMBERS F-4E

WING MOUNTED WEAPONS WING STATION 1, 2, 8 or 9					
STORE	SINGLE MOUNTED (One weapon at a station)	CLUSTER MOUNTED (Two or more weapons at a station)	STORE	SINGLE MOUNTED (One weapon at a station)	CLUSTER MOUNTED (Two or more weapons at a station)
	UNIT STABILITY NUMBER			UNIT STABILITY NUMBER	
A/A 37U–15 TOW TARGET	N/E	N/A	CTU–1/A CONTAINER	N/E	N/A
AAVS CAMERA POD	N/E	N/E			
AGM–12B MISSILE	5.8	N/A	FINNED CBU–33/A, –34/A, OR –42/A		
AGM–12C OR AGM–12E MISSILE	12.3	N/A	● STATION 1 & 9	14	14
AGM–45A, B OR ATM–45 MISSILE	2.7	N/A	● STATION 2 & 8:		
AGM–65A MISSILE			(WITH STA. 1 & 9 EMPTY)	14	14
● INSTALLED ON INBOARD RAIL	4.0	N/A	(WITH STA. 1 & 9 LOADED)	28	28
● INSTALLED ON BOTTOM RAIL	10.0	N/A	UNFINNED CBU–7/A, –7A/A,		
● INSTALLED ON OUTBOARD RAIL	16.5	N/A	–28/A, –30/A OR –38/A		
AIM–4D MISSILE	2.0	2.0	● STATION 1 & 9	13	13
AIM–7D/E, AIM–7E–2 MISSILE	2.7	N/A	● STATION 2 & 8:		
AIM–9B, AIM–9E, AIM–9J MISSILE	1.0	1.4	(WITH STA. 1 & 9 EMPTY)	13	13
ALE–38 CHAFF DISPENSER	N/E	N/A	(WITH STA. 1 & 9 LOADED)	26	26
ALQ–: 71; 71(V)–3; 72; 87; 101; 101(V)–3, (V)–4, (V)–6, (V)–8; 119(V)–1, (V)–2, (V)–3, (V)–4, (V)–7, (V)–10. ECM POD	4.4	N/A	LAU–3/A ROCKET POD	10.1	13.5
			LAU–32A/A, –59/A OR –32B/A ROCKET POD	3.9	5.2
			LAU–68/A, –68A/A, OR –68B/A ROCKET POD	N/E	N/E
AN/AWG–16 MONITOR CONTROL SET	N/E	N/A	M30E2 CHAFF FILLED	7.4	N/E
			M36E2 INCENDIARY CLUSTER BOMB	7.4	N/E
B28 BOMB	11.2	N/A	M117 GP, RE BOMB, OR M117D	7.3	9.7
B43 BOMB	9.2	N/A	M117 GP BOMB, MAU–103/B FIN OR MAU–103A/B FIN)	7.5	10.0
B57 BOMB	4.9	N/A	M117 LASER GUIDED BOMB	N/E	N/A
B61 BOMB	2.5	N/A	M118 EO GUIDED BOMB (GBU–9/B)	N/E	N/E
			M118 EO GUIDED BOMB (GBU–11/B)	N/E	N/A
BDU–33A/B, B/B PRACTICE BOMB	0.6	0.8	M129E1 LEAFLET BOMB	7.3	9.7
BLU–1/B, –1B/B, –27/B –27A/A OR –52/B FIRE BOMB	14.0	18.7	MC–1 GAS BOMB	7.3	9.7
BLU–31/B LAND MINE	2.9	3.9	MGGB DATA LINK POD	N/E	N/A
BLU–76/B FIRE BOMB	N/E	N/A	MGGB MODULAR GUIDED GLIDE BOMB	N/E	N/A
CBU–1/A, –1A/A, –2/A, –2A/A, –2B/A, –2C/A, –9/A, –12/A OR –46/A DISPENSER	10.0	13.3	MK 1 MOD 0 GUIDED WEAPON	9.2	N/A
			MK 36 MOD 0 DESTRUCTOR	2.8	3.7
CBU–24A/B, –24B/B, –24C/B, –24B, –29A/B, –29B/B, –29/B, –49B, –49A/B, –49B/B, –49C/B, –52/B, –52A/B, –53/B, –54/B, –58/B OR –71/B DISPENSER	7.4	9.9	MK 81 GP BOMB	1.8	2.4
			MK 82 GP, (LD) OR SNAKEYE BOMB	2.8	3.7
CBU–39/A, –40/A OR –70/B DISPENSER	N/E	N/E	MK 82 LGB LASER GUIDED BOMB (GBU–12/B)	N/E	N/A
			MK 83 GP BOMB	4.6	6.1
			MK 84 GP BOMB	7.2	N/A
			MK 84 EO GUIDED BOMB (GBU–8/B)	N/E	N/A

Notes: 1. TANDEM–MOUNTED WEAPONS COUNT AS A SINGLE WEAPON.
2. N/E – NOT ESTABLISHED
N/A – NOT APPLICABLE

4C–1–1–(211–1)A

Figure B1-2 (Sheet 1)

PART 1 INTRODUCTION

TABLE OF CONTENTS

Charts

Airplane Loading C1-5
Stability Numbers C1-9
Aft CG Limits. C1-11
Drag Due to Asymmetric Loading C1-12
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Airspeed Position Error Correction. . . . C1-19
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Altimeter Lag. C1-21
Wind Components C1-23

Note

This appendix presents performance data for F-4E aircraft with leading edge slats (after T.O. 1F-4E-566). Performance data for F-4E aircraft without leading edge slats is located in appendix B.

DRAG INDEX SYSTEM

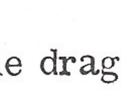
Most of the charts utilize the drag index system to effectively present the many combinations of weight/drag effects on performance. The Airplane Loading chart (figure C1-1) contains the drag number and weight of each externally carried store and its associated suspension equipment. The drag index for a specific configuration may be found by multiplying the number of stores carried by its drag number, and adding the drag number of the applicable suspension equipment. The total drag index may then be used to enter the planning data charts. Charts applicable for all loads and configurations are labeled ALL DRAG INDEXES. Charts labeled INDIVIDUAL DRAG INDEXES contain data for a range of drag numbers; i.e., individual curves/columns for a specific drag number. Supersonic data is not compatible to the drag index system; therefore, each chart is labeled for a specific configuration.

Sample Problem

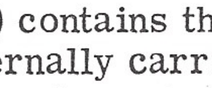
Configuration: 6 - MK81 general purpose bombs on station 1 & 9 (3 each station)



6 - MK81 general purpose bombs on station 5



6 - LAU-3/A rocket launchers with nose and tail cones (full) on stations 2 & 8 (3 each station)



A.	MK81 drag number	0.8 x 12 = 9.6
B.	MK81 suspension equipment station 1 & 9	10.1 x 2 = 20.2
	station 5	10.0 x 1 = 10.0
C.	LAU-3/A drag number	4.2 x 6 = 25.2
D.	LAU-3/A suspension equipment station 2 & 8	6.8 x 2 = 13.6
E.	Total drag index	78.6

STABILITY INDEX SYSTEM

With the many possible external loading configurations and their resulting aerodynamic effects, it is possible to load the airplane past the aft CG limit. Adding wing-mounted stores tends to shift the aerodynamic center forward toward the CG of the aircraft, thereby reducing the longitudinal maneuvering stability of the aircraft. To assure an acceptable static margin, it is necessary to consider stability effects in conjunction with CG location. Each wing-mounted store and its associated suspension equipment is assigned a unit stability number corresponding to its aerodynamic effect. Each stability index (sum of stability numbers) has a corresponding aft CG limit. After the loading configuration has been determined, refer to the Stability Numbers chart (figure C1-2) and determine the airplane stability index. Enter the Aft CG Limits chart (figure C1-3) with the airplane stability index to obtain maximum allowable aft CG location at engine start. The CG location is determined by using Weight and Balance Clearance Form F in conjunction with the Handbook of Weight and Balance Data, T.O.1-1B-40.

Note

- In some cases where the originally desired configuration is not within the allowable envelope, an acceptable static margin may be achieved through rearrangement of wing-mounted stores.

- Unit stability numbers are assigned for single mounted and cluster mounted weapons. The cluster mounted unit stability number will be used when at least two weapons are mounted abreast of each other on the same rack, with each weapon being assigned this number. Tandem-mounted weapons count as a single weapon.

- Fuselage-mounted stores are not used in determining airplane stability index but they are used in computing takeoff CG location.

Sample Problem

Note

The following example is based on the aircraft operating weight plus a full internal fuel load (45,160 pounds). The external loading is the same as used in determining the drag index.

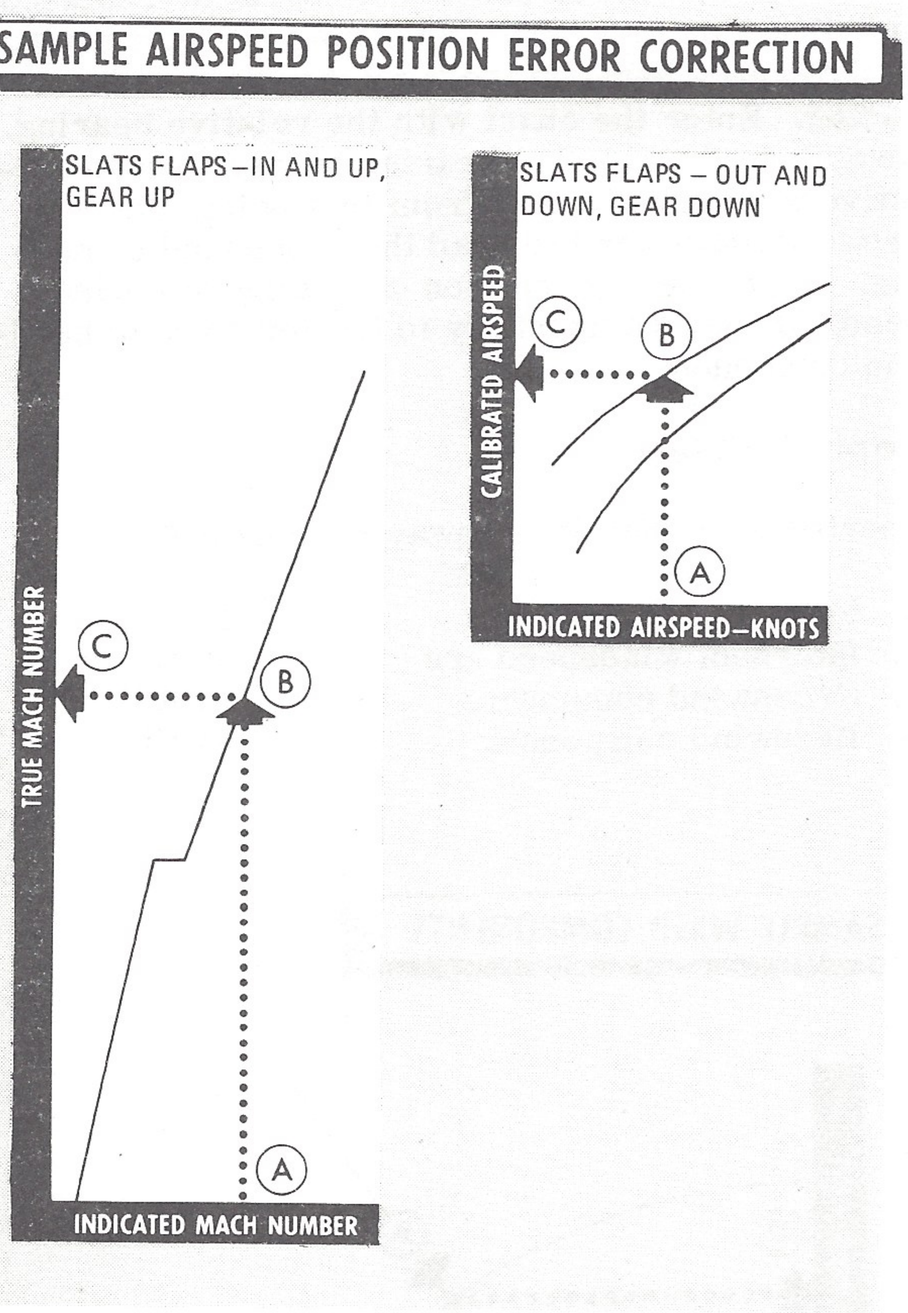
EQUIVALENT AIRSPEED

Equivalent airspeed (EAS) is calibrated airspeed corrected for compressibility. There is no provision made for reading equivalent airspeed.

TRUE AIRSPEED

True airspeed (TAS) is equivalent airspeed corrected for density altitude. Refer to the Airspeed Conversion charts (figure C1-8).

SAMPLE AIRSPEED POSITION ERROR CORRECTION



4C–1–1–(586)

AIRSPEED POSITION ERROR CORRECTION

These charts (figures C1-9 and C1-10) provide the means to correct indicated airspeed and Mach number to calibrated and true values respectively.

Sample Problem

Configuration: Slats Out, Flaps Down, Gear Down

A.	Indicated airspeed	180 Kt
B.	Gross weight refelector line	40, 000 Lb
C.	Calibrated airspeed	178 Kt

Configuration: Slats In, Flaps Up, Gear Up

A.	Indicated Mach number	1.1
B.	Reflector curve	
C.	True Mach number	1.08

ALTIMETER POSITION ERROR CORRECTION

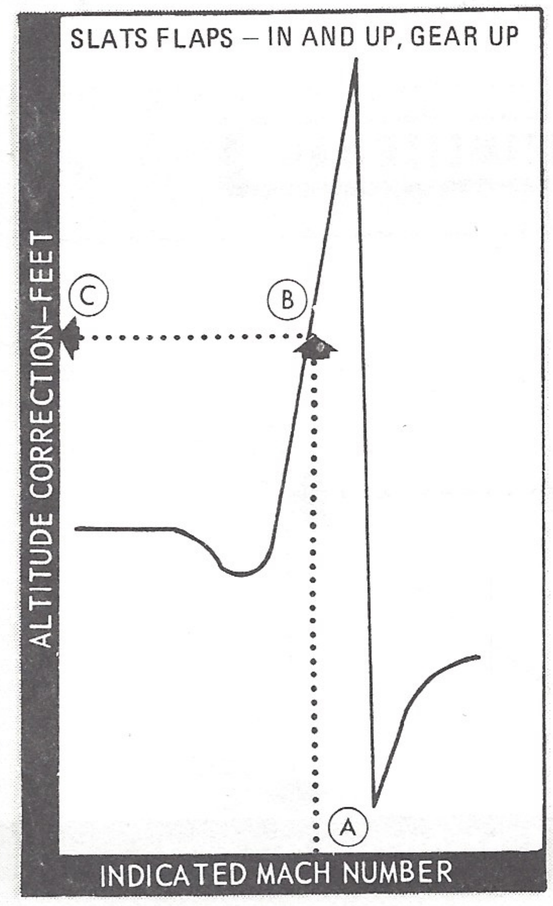
This chart (figure C1-11) provides altimeter error corrections for given Mach numbers at various altitudes. An altitude correction factor is included for landing configurations.

Sample Problem

Slats In, Flaps Up, Gear Up

A.	Indicated Mach number	1.4
B.	Assigned altitude	40, 000 Ft
C.	Δ H correction	+75 Ft
D.	Indicated altitude necessary to maintain assigned altitude (B+C).	40, 075 Ft

SAMPLE ALTIMETER POSITION ERROR CORRECTION

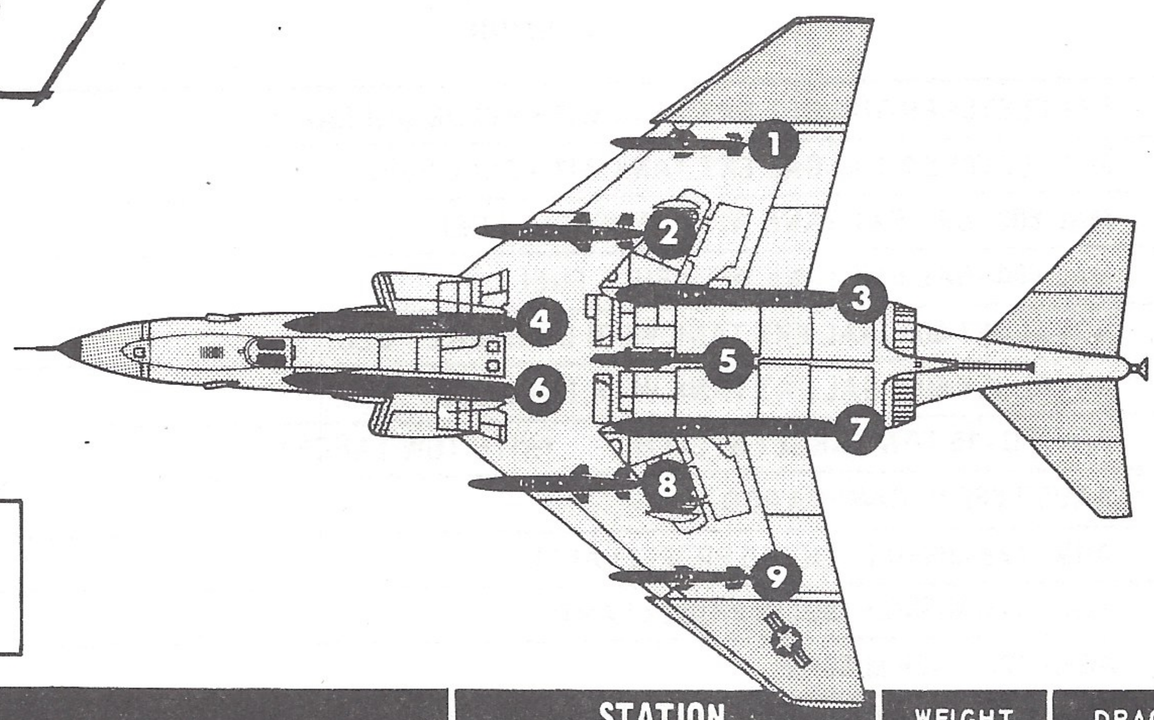


4C–1–1–(587)

F-4E

AIRPLANE LOADING

AIRPLANE OPERATING WEIGHT (Basic airplane plus weight of oil, and two crew members) . . . . 33,100 pounds (Block 51 aircraft)
AIRPLANE BASIC TAKEOFF WEIGHT (Airplanes operating weight plus full internal fuel load) . . . . 45,160 pounds (Block 51 aircraft)



WARNING

FOR PRECISE BASIC WEIGHT, EXTERNAL STORE AND ATTACHMENT INFORMATION, REFER TO CHARTS C AND E OF THE WEIGHT AND BALANCE DATA HANDBOOK (T.O. 1-1B-40) FOR THE PARTICULAR AIRPLANE.

TYPICAL STORE	SUSPENSION EQUIPMENT	STATION 1	2	3	4	5	6	7	8	9	WEIGHT PER STATION	DRAG PER STATION
600-GAL EXT. TANK SUU-21/A DISPENSER, SPL WPN, RMU-8/A MK 84 LDGP BOMB, M118 GP BOMB	AERO 27A EJECTOR RACK					X					51	N/A
	BRU-5/A (MODIFIED AERO 27A EJECTOR RACK)					X					45	N/A
370-GAL EXT. TANK	WING TANK PYLON	X								X	SEE SHEET 2	SEE SHEET 2
AIM-9 MISSILES	INBOARD ARMAMENT PYLON AND TWO LAU-7A/A OR AERO 3B MISSILE LAUNCHERS		X						X		403	3.4
AGM-12B MISSILES	OUTBOARD ARMAMENT PYLON AND LAU-34/A MISSILE LAUNCHER	X								X	276	3.4
	INBOARD ARMAMENT PYLON AND LAU-34/A MISSILE LAUNCHER		X						X		350	4.0
AGM-12C AND -12E MISSILES, B57 SPECIAL WPN, MK 1 MOD 0 WPN SUU-21/A DISPENSER ECM PODS	INBOARD ARMAMENT PYLON (WITH MAU-12B/A EJECTOR) INBOARD ARMAMENT PYLON (WITH MAU-12C/A EJECTOR)		X X						X X		264 273	2.6 2.6
AGM-65A MISSILES	INBOARD PYLON AND LAU-88/A MISSILE LAUNCHER		X						X		463	11.1
AGM-45 MISSILES	OUTBOARD ARMAMENT PYLON AND LAU-34/A MISSILE LAUNCHER	X								X	276	3.4
	INBOARD PYLON AND LAU-34/A MISSILE LAUNCHER		X						X		350	4.0
SUU-16/A AND SUU-23/A GUN POD	AERO 27A EJECTOR RACK, CENTERLINE MER ADAPTER, AND SWAYBRACE ADAPTERS					X					122	3.9
	OUTBOARD ARMAMENT PYLON	X								X	190	2.1
CONVENTIONAL WEAPONS	OUTBOARD ARMAMENT PYLON AND OUTBOARD MER	X								X	405	10.1
	INBOARD ARMAMENT PYLON AND TER		X						X		359	6.8
	AERO 27A EJECTOR RACK AND CENTERLINE MER WITH ADAPTER					X					321	10.0
MK 1 MOD 0 WPN TMU-28/A SPRAY TANK	OUTBOARD ARMAMENT PYLON (WITH MAU-12B/A EJECTOR) OUTBOARD ARMAMENT PYLON (WITH MAU-12C/A EJECTOR)	X X								X X	190 199	2.1 2.1
AIM-4D MISSILES	INBOARD ARMAMENT PYLON AND INBOARD LAUNCHER		X						X		356	3.2
	INBOARD ARMAMENT PYLON AND INBOARD AND LOWER LAUNCHERS		X						X		416	3.7
A/A37U-15 TOW TARGET	OUTBOARD ARMAMENT PYLON AND ADAPTER	X									333	N/E
ECM POD	OUTBOARD ARMAMENT PYLON (WITH MAU-12B/A)									X	190	2.1

NOTES:
- ARMAMENT PYLON WEIGHTS ARE BASED MAU-12B/A. FOR MAU-12C/A, ADD 9 POUNDS.
- CENTERLINE STATION (5) WEIGHTS ARE BASED ON AERO 27A. FOR BRU-5/A, SUBTRACT 6 POUNDS.
- IF NITROGEN BOTTLE IS INSTALLED IN LAU-7A/A MISSILE LAUNCHER, ADD 17.5 POUNDS.

4C-1-1-(574-1)A

Figure C1-1 (Sheet 1 of 4)

F-4E

STORE		WEIGHT PER STORE (POUNDS)	DRAG PER STORE
CBU–9/A DISPENSER		F–688 E–158	3.3
CBU–12/A DISPENSER		F–650 E–158	3.3
CBU–24A/B OR CBU–29A/B DISPENSER		825	4.2
CBU–24/B OR CBU–29/B DISPENSER		811	4.2
CBU–24B/B OR CBU–29B/B DISPENSER		832	4.6
CBU–24C/B, –49C/B DISPENSERS		802/810	4.6
CBU–28/A DISPENSER (UNFINNED)		F–450 E–157	F–4.4 E–6.9
CBU–30/A DISPENSER (UNFINNED)		F–385 E–157	F–4.4 E–6.9
CBU–33/A DISPENSER (FINNED)		F–848 E–228	F–3.3 E–5.6
CBU–34/A, –42/A DISPENSER (FINNED)		F–919 E–247	F–3.3 E–5.6
CBU–38/A DISPENSER (UNFINNED)		F–702 E–157	F–4.4 E–6.9
CBU–39/A, –40/A DISPENSERS		N/E	N/E
CBU–46/A DISPENSER		F–890 E–158	3.3
CBU–49/B DISPENSER		818	4.2
CBU–49A/B DISPENSER		823	4.2
CBU–49B/B, –52A/B DISPENSERS		839	4.6
CBU–52/B DISPENSER		692	4.6
CBU–52B/B DISPENSER		777	N/E
CBU–58/B, –71/B DISPENSER		840	N/E
CBU–70/B DISPENSER		718	N/E
COMBAT DOCUMENTATION CAMERAS		16	3.7 (PAIR)
CTU–1/A SUPPLY CONTAINER		E–215	4.9
LAU–3/A ROCKET POD	WITH NOSE AND TAIL CONE	427	4.1
	WITH NOSE AND WITHOUT TAIL CONE	425	5.4
	WITHOUT NOSE AND TAIL CONE (FULL)	423	13.6
	WITHOUT NOSE AND TAIL CONE (EMPTY)	71	5.8
LAU–32A/A, LAU–32B/A, LAU–59/A ROCKET PODS	WITH NOSE AND TAIL CONE	173	1.6
	WITH NOSE AND WITHOUT TAIL CONE	171	2.1
	WITHOUT NOSE AND TAIL CONE (FULL)	169	5.4
	WITHOUT NOSE AND TAIL CONE (EMPTY)	49	2.5
LAU–68/A, LAU–68A/A, LAU–68B/A ROCKET PODS	WITH NOSE AND TAIL CONE	211	N/E
	WITH NOSE AND WITHOUT TAIL CONE	209	N/E
	WITHOUT NOSE AND TAIL CONE (FULL)	207	N/E
	WITHOUT NOSE AND TAIL CONE (EMPTY)	67	N/E
M30E2 (MJU–4B) CHAFF FILLED		459 TO 476	N/E
M36E2 INCENDIARY CLUSTER BOMB		F–975 E–880	4.7
M129E1 LEAFLET BOMB		200	3.0
M117 GENERAL PURPOSE BOMB WITH M131A1 FIN		820	3.0
M117 GENERAL PURPOSE BOMB WITH MAU–103/B FIN OR MAU–103A/B FIN		806	3.2
M117 LASER GUIDED BOMB		900	N/E
M117 (RETARDED) GENERAL PURPOSE BOMB OR M117D (DESTRUCTOR)		880	4.2
M118 GENERAL PURPOSE BOMB		3020	10.1
M118 LASER GUIDED BOMB (KMU–370) (GBU–11/B)		3065	8.2
M118 EO GUIDED (KMU–390) (GBU–9/B)		3450	N/E
M129E1 LEAFLET BOMB		200	N/E
MC–1 GAS BOMB		720	3.0

N/E–NOT ESTABLISHED F–FULL E–EMPTY

4C–1–1–(574–3)A

Figure C1-1 (Sheet 3 of 4)

STABILITY NUMBERS

F-4E

WING MOUNTED WEAPONS — WING STATION 1, 2, 8 or 9		
STORE	SINGLE MOUNTED (One weapon at a station)	CLUSTER MOUNTED (Two or more weapons at a station)
	UNIT STABILITY NUMBER	
A/A 37U–15 TOW TARGET	N/E	N/A
AAVS CAMERA POD	N/E	N/E
AGM–12B MISSILE	5.8	N/A
AGM–12C OR AGM–12E MISSILE	12.3	N/A
AGM–45A, B OR ATM–45 MISSILE	2.7	N/A
AGM–65A MISSILE		
● INSTALLED ON INBOARD RAIL	4.0	N/A
● INSTALLED ON BOTTOM RAIL	10.0	N/A
● INSTALLED ON OUTBOARD RAIL	16.5	N/A
AIM–4D MISSILE	2.0	2.0
AIM–7D/E, AIM–7E–2 MISSILE	2.7	N/A
AIM–9B, AIM–9E, AIM–9J MISSILE	1.0	1.4
ALE–38 CHAFF DISPENSER	N/E	N/A
ALQ–: 71; 71(V)–3; 72; 87; 101; 101(V)–3; (V)–4, (V)–6, (V)–8; 119(V)–1, (V)–2, (V)–3, (V)–4, (V)–7, (V)–10 ECM POD	4.4	N/A
AN/AWG–16 MONITOR CONTROL SET	N/E	N/A
B28 BOMB	11.2	N/A
B43 BOMB	9.2	N/A
B57 BOMB	4.9	N/A
B61 BOMB	2.5	N/A
BDU–33A/B, B/B PRACTICE BOMB	0.6	0.8
BLU–1/B, –1B/B, –27/B, –27A/A OR –52/B FIRE BOMB	14.0	18.7
BLU–31/B LAND MINE	2.9	3.9
BLU–76/B FIRE BOMB	N/E	N/A
CBU–1/A, –1A/A, –2/A, –2A/A, –2B/A, –2C/A, –9/A, –12/A OR –46/A DISPENSER	10.0	13.3
CBU–24A/B, –24B/B, –24C/B, –24/B, –29A/B, –29B/B, –29/B, –49/B, –49A/B, –49B/B, –49C/B, –52/B, –52A/B, –53/B, –54/B, –58/B OR –71/B DISPENSER	7.4	9.9
CBU–39/A, –40/A OR –70/B DISPENSER	N/E	N/E
CTU–1/A CONTAINER	N/E	N/A
FINNED CBU–33/A, –34/A, OR –42/A		
● STATION 1 & 9	14	14
● STATION 2 & 8:		
(WITH STA. 1 & 9 EMPTY)	14	14
(WITH STA. 1 & 9 LOADED)	28	28
UNFINNED CBU–7/A, –7A/A, –28/A, –30/A OR –38/A		
● STATION 1 & 9	13	13
● STATION 2 & 8:		
(WITH STA. 1 & 9 EMPTY)	13	13
(WITH STA. 1 & 9 LOADED)	26	26
LAU–3/A ROCKET POD	10.1	13.5
LAU–32A/A, –59/A OR –32B/A ROCKET POD	3.9	5.2
LAU–68/A, –68A/A, OR –68B/A ROCKET POD	N/E	N/E
M30E2 CHAFF FILLED	7.4	N/E
M36E2 INCENDIARY CLUSTER BOMB	7.4	N/E
M117 GP, RE BOMB, OR M117D	7.3	9.7
M117 GP BOMB, MAU–103/B FIN OR MAU–103A/B FIN)	7.5	10.0
M117 LASER GUIDED BOMB	N/E	N/A
M118 EO GUIDED BOMB (GBU–9/B)	N/E	N/E
M118 LASER GUIDED BOMB (GBU–11/B)	N/E	N/A
M129E1 LEAFLET BOMB	7.3	9.7
MC–1 GAS BOMB	7.3	9.7
MGGB DATA LINK POD	N/E	N/A
MGGB MODULAR GUIDED GLIDE BOMB	N/E	N/A
MK 1 MOD 0 GUIDED WEAPON	9.2	N/A
MK 36 MOD 0 DESTRUCTOR	2.8	3.7
MK 81 GP BOMB	1.8	2.4
MK 82 GP, (LD) OR SNAKEYE BOMB	2.8	3.7
MK 82 LGB LASER GUIDED BOMB (GBU–12/B)	N/E	N/A
MK 83 GP BOMB	4.6	6.1
MK 84 GP BOMB	7.2	N/A
MK 84 EO GUIDED BOMB (GBU–8/B)	N/E	N/A

Notes: 1. TANDEM–MOUNTED WEAPONS COUNT AS A SINGLE WEAPON

2. N/E – NOT ESTABLISHED N/A–NOT APPLICABLE

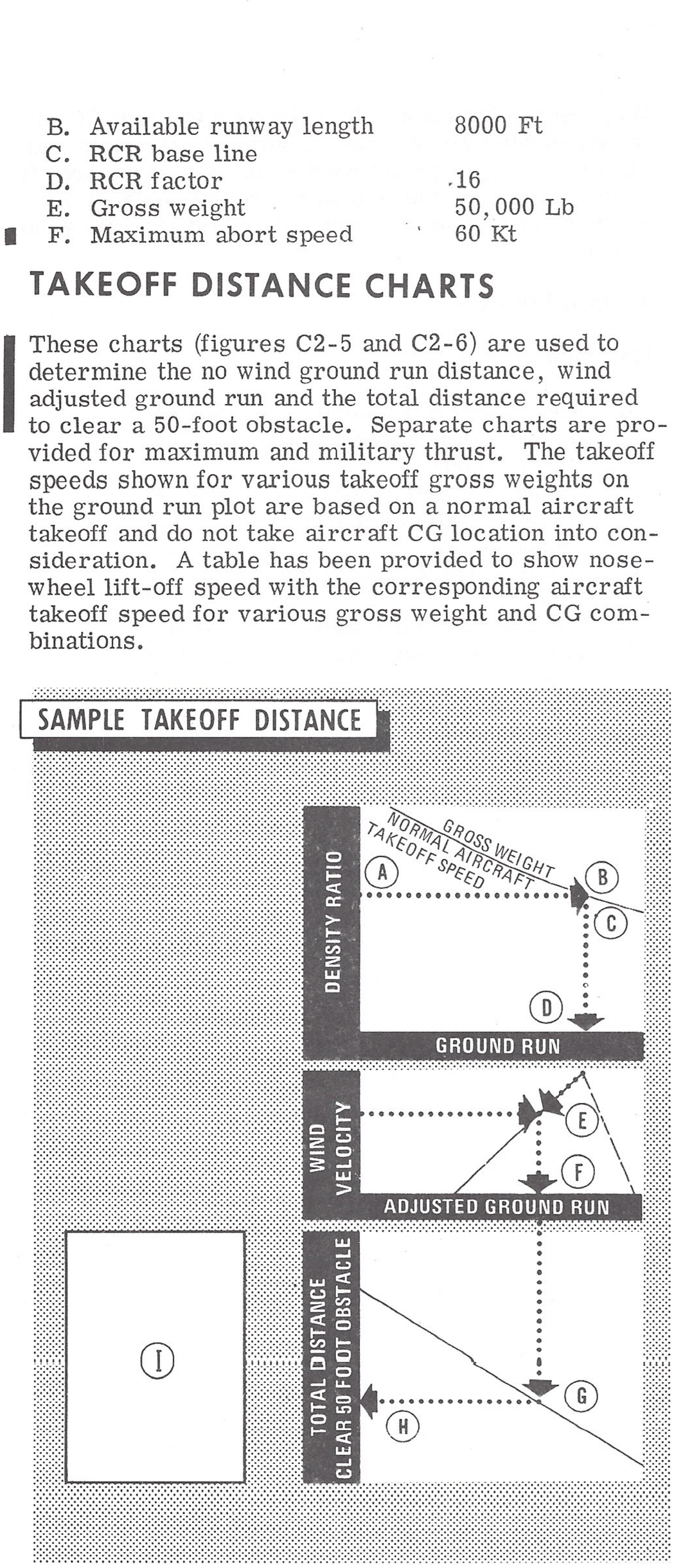
4C–1–1–(575–1)

Figure C1-2 (Sheet 1 of 2)

B.	Available runway length	8000 Ft
C.	RCR base line	
D.	RCR factor	.16
E.	Gross weight	50,000 Lb
F.	Maximum abort speed	60 Kt

TAKEOFF DISTANCE CHARTS

These charts (figures C2-5 and C2-6) are used to determine the no wind ground run distance, wind adjusted ground run and the total distance required to clear a 50-foot obstacle. Separate charts are provided for maximum and military thrust. The takeoff speeds shown for various takeoff gross weights on the ground run plot are based on a normal aircraft takeoff and do not take aircraft CG location into consideration. A table has been provided to show nosewheel lift-off speed with the corresponding aircraft takeoff speed for various gross weight and CG combinations.



4C-1-1-(446)A

USE

Enter the chart with the applicable density ratio, and proceed horizontally to the right and intersect the takeoff weight line (note normal aircraft takeoff speed). Then descend vertically to read no wind ground run distance. Parallel the appropriate wind guide line (headwind or tailwind) to intersect the takeoff wind velocity. From this point project vertically down to read the ground run adjusted for wind effects. To find the total distance required to clear a 50-foot obstacle, continue downward to the reflector line and project horizontally to the left scale. If the takeoff speed shown in the table is approximately 10 knots higher than the normal takeoff speed, refer to the Velocity During Takeoff Ground Run chart to adjust the takeoff ground run for CG effects.

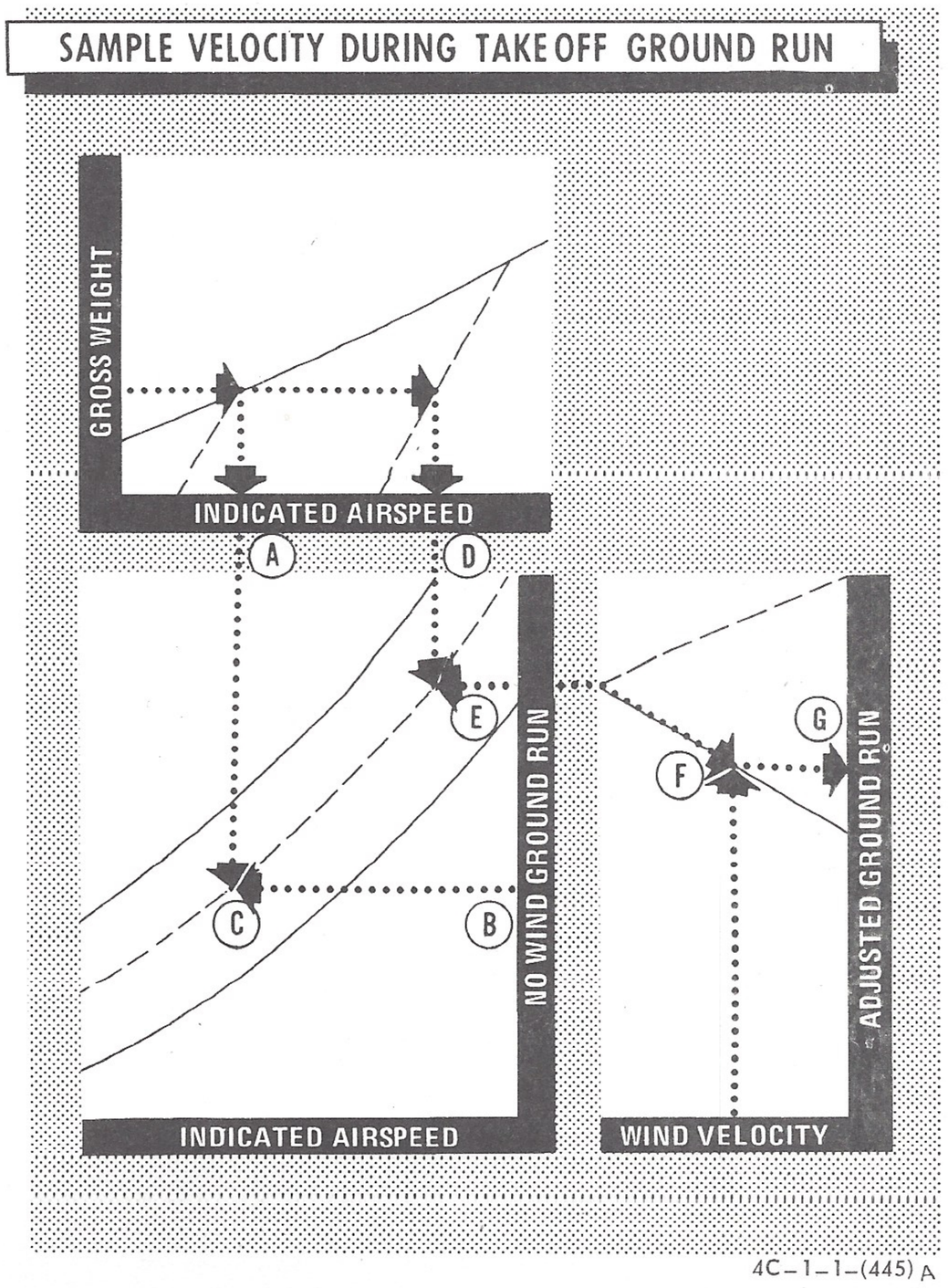
Sample Problem

Maximum Thrust.

A.	Density Ratio	0.98
B.	Gross weight	42,000 Lb
C.	Normal aircraft takeoff speed	148 Kt
D.	No wind Ground run distance	1650 Ft
E.	Effective headwind	10 Kt
F.	Ground run (wind corrected)	1400 Ft
G.	Intersect reflector line	
H.	Total distance required to clear 50-foot obstacle	2600 Ft
I.	Nosewheel lift-off speed for CG of 27 MAC (from table)	131 Kt
	Takeoff Speed (from table)	162 Kt

VELOCITY DURING TAKEOFF GROUND RUN CHARTS

These charts (figures C2-7 and C2-8) provide takeoff speeds for various gross weights and CG locations, and are used primarily to adjust takeoff distances



4C-1-1-(445)A

F-4E

MAXIMUM ABORT SPEED
MAXIMUM THRUST

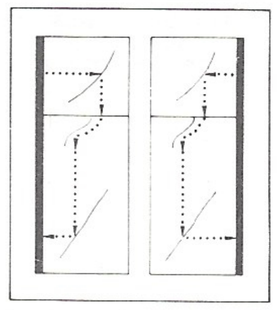
AIRPLANE CONFIGURATION

ALL DRAG INDEXES
SLATS OUT
FLAPS DOWN

REMARKS

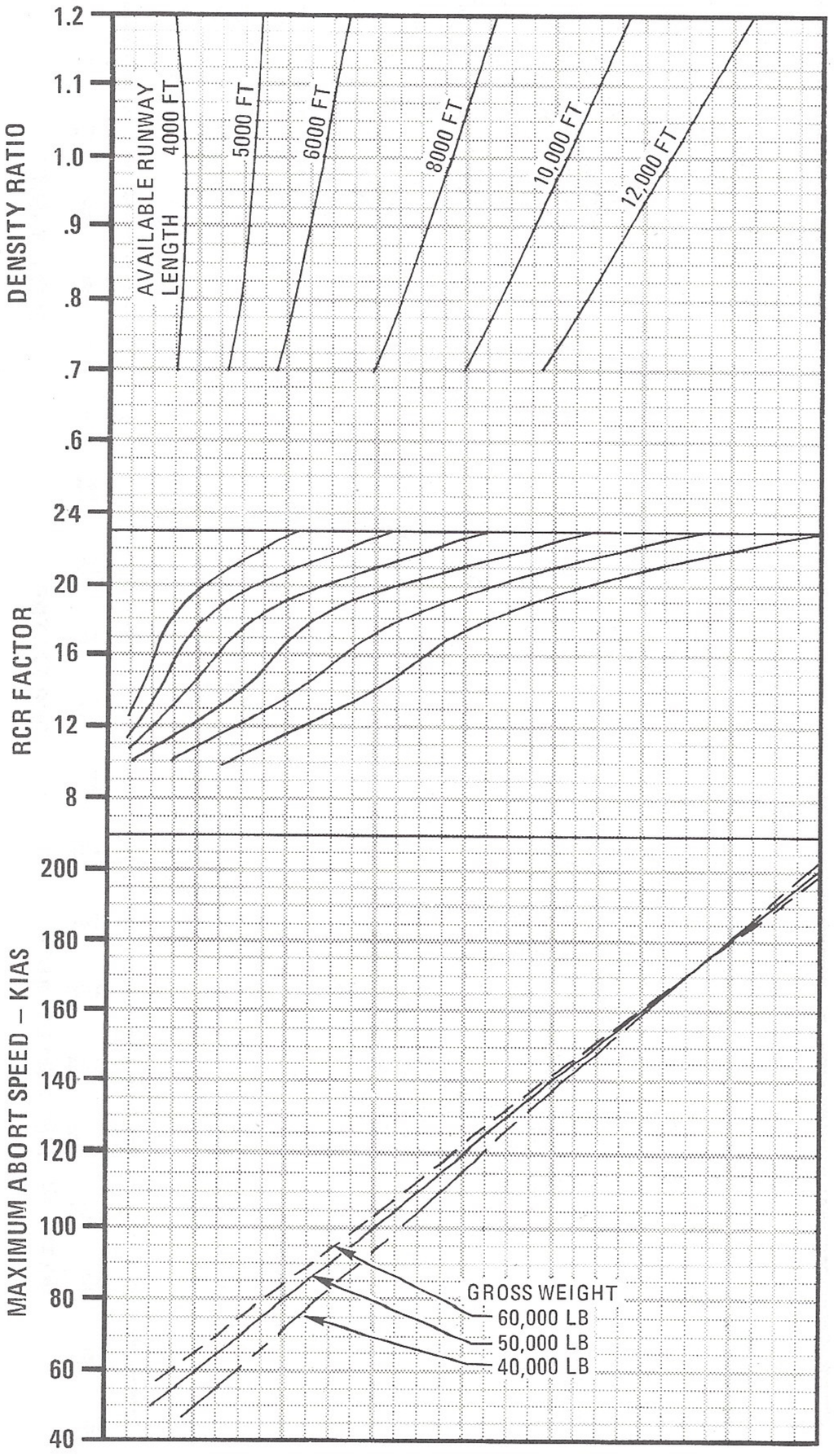
ENGINE(S): (2)J79–GE–17

GUIDE

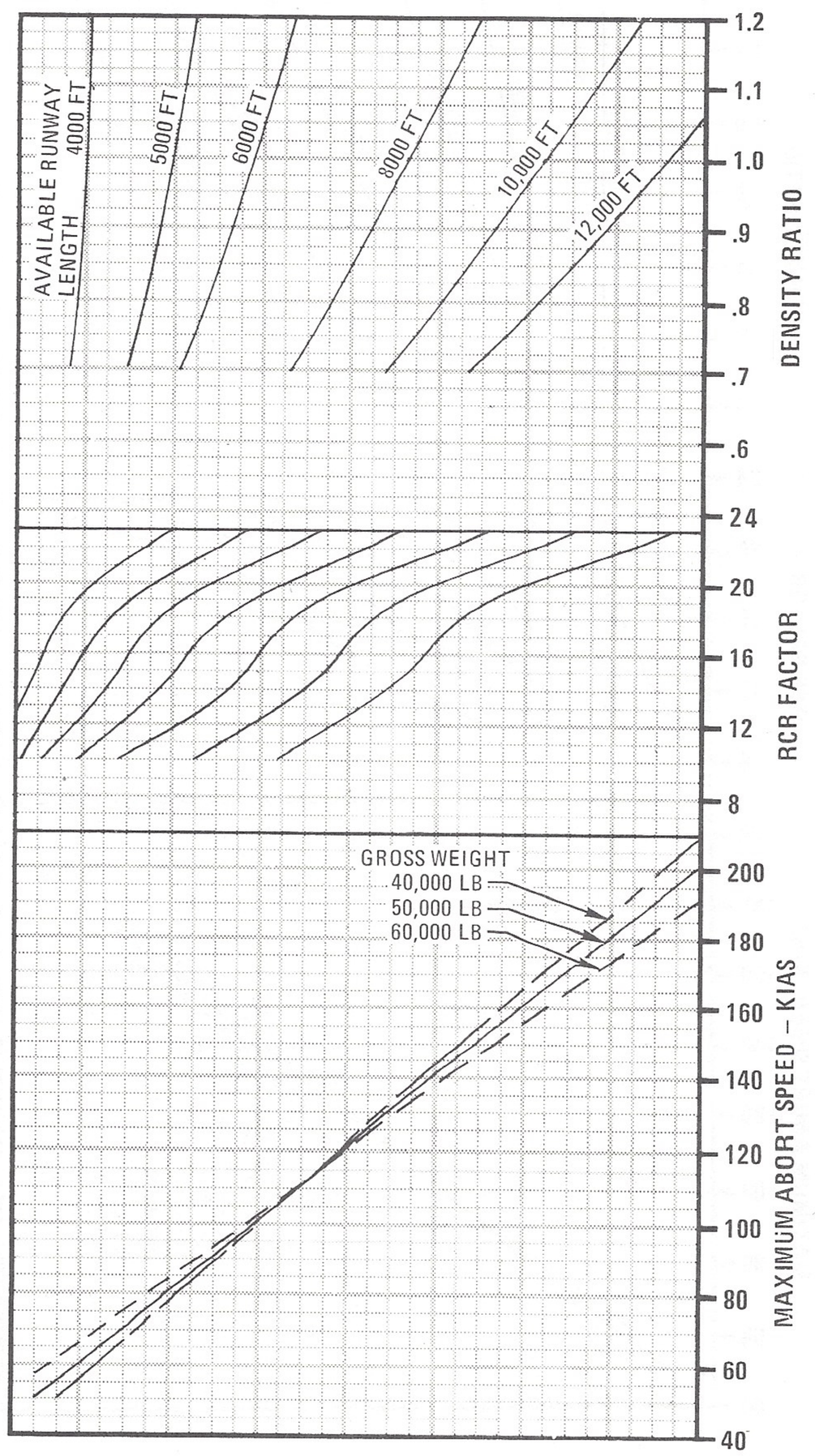


DATE: 1 NOVEMBER 1973
DATA BASIS: FLIGHT TEST

WITHOUT DRAG CHUTE



WITH DRAG CHUTE



4C–1–1–(443)

Figure C2-3

F-4E

COMBAT CEILING

ONE ENGINE OPERATING

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

ICAO STANDARD DAY	
ALT. FT.	TEMP. °C
S.L.	15.0
5000	5.1
10,000	-4.8
15,000	-14.7
20,000	-24.6
25,000	-34.5
30,000	-44.4
35,000	-54.3
40,000	-56.5
45,000	-56.5
50,000	-56.5

DATE: 1 JANUARY 1973
DATA BASIS: FLIGHT TEST

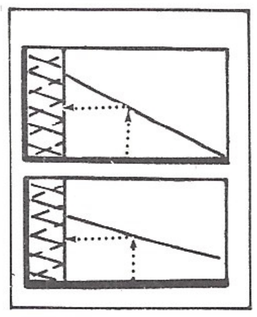
REMARKS

ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY
INOPERATIVE ENGINE WINDMILLING

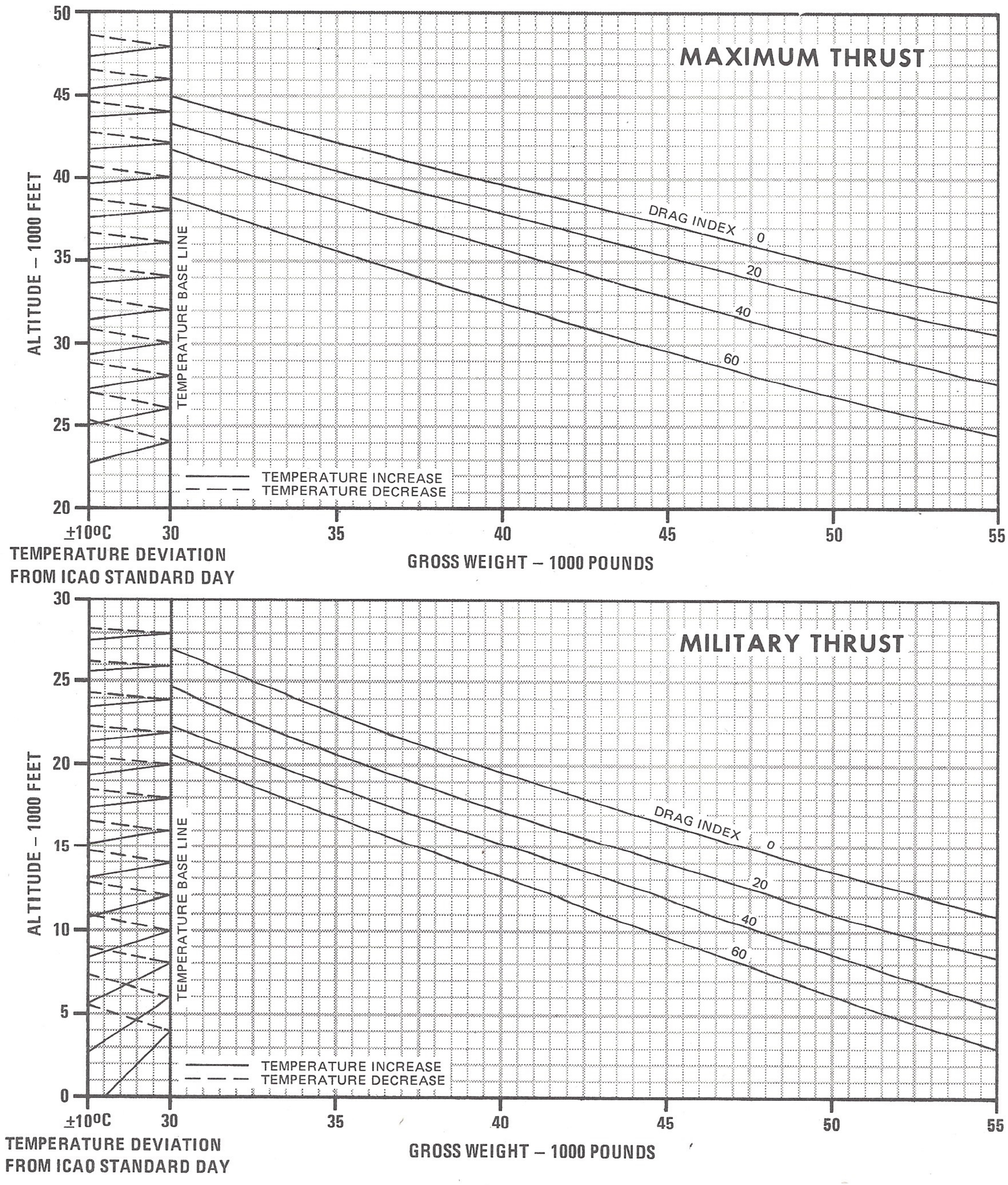
NOTE

- COMBAT CEILING IS THE PRESSURE ALTITUDE AT WHICH THE AIRCRAFT CAN CLIMB AT A MAXIMUM RATE OF 500 FEET PER MINUTE.
- IF INOPERATIVE ENGINE IS NOT WINDMILLING, INCREASE DRAG INDEX BY 53 ADDITIONAL UNITS.

GUIDE



FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(465)

Figure C3-5

F-4E

OPTIMUM CRUISE SUMMARY

ONE ENGINE OPERATING

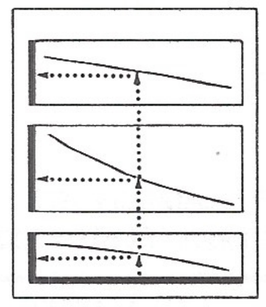
AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

REMARKS
ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY
INOPERATIVE ENGINE WINDMILLING

NOTE

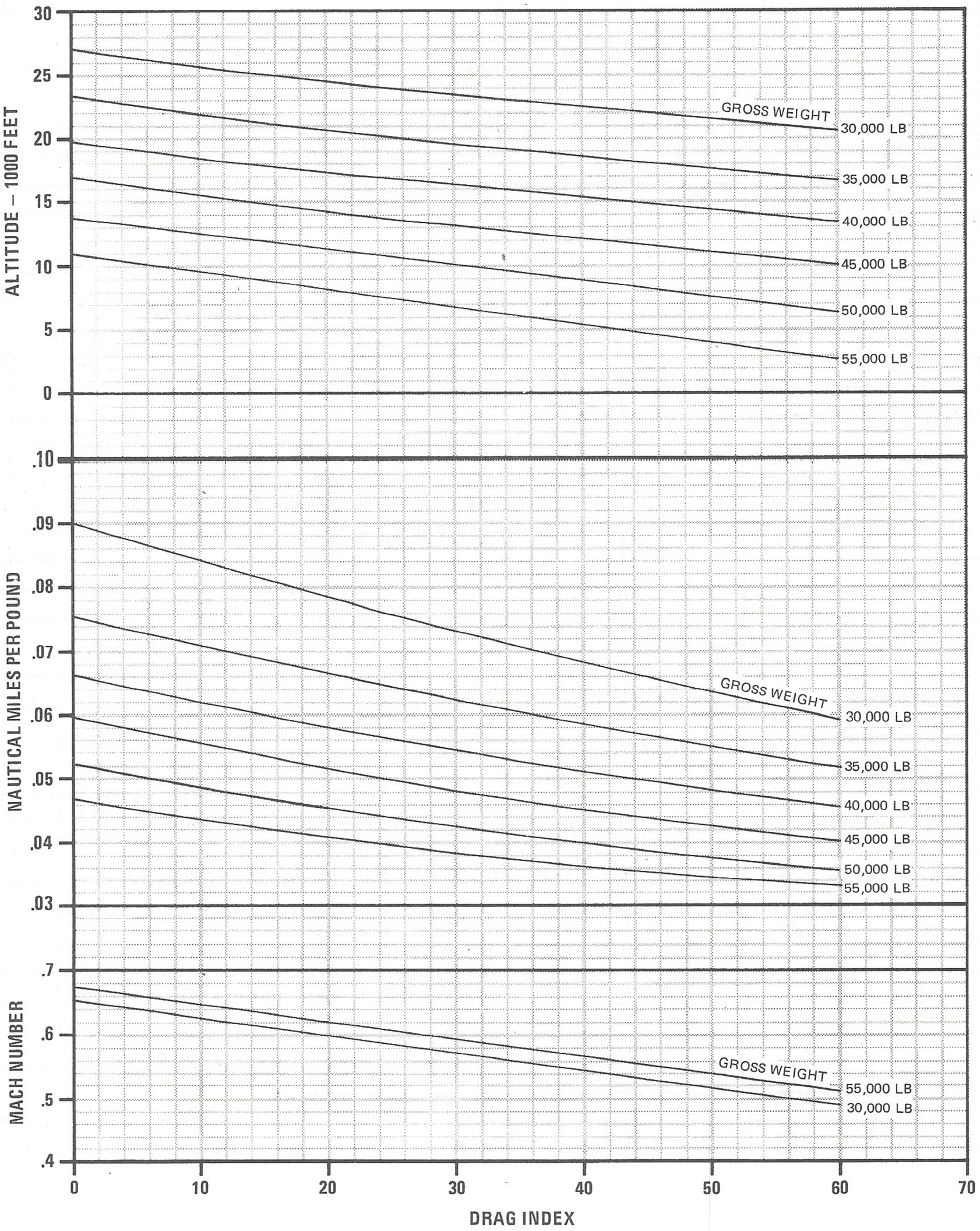
IF INOPERATIVE ENGINE IS NOT WINDMILLING, INCREASE DRAG INDEX BY 53 ADDITIONAL UNITS.

GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: FLIGHT TEST

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(463)

Figure C4-3

F-4E

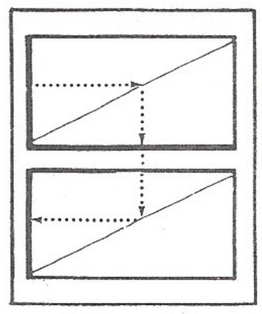
CONSTANT ALTITUDE CRUISE

LONG RANGE SPEED
TRUE AIRSPEED AND FUEL FLOW

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

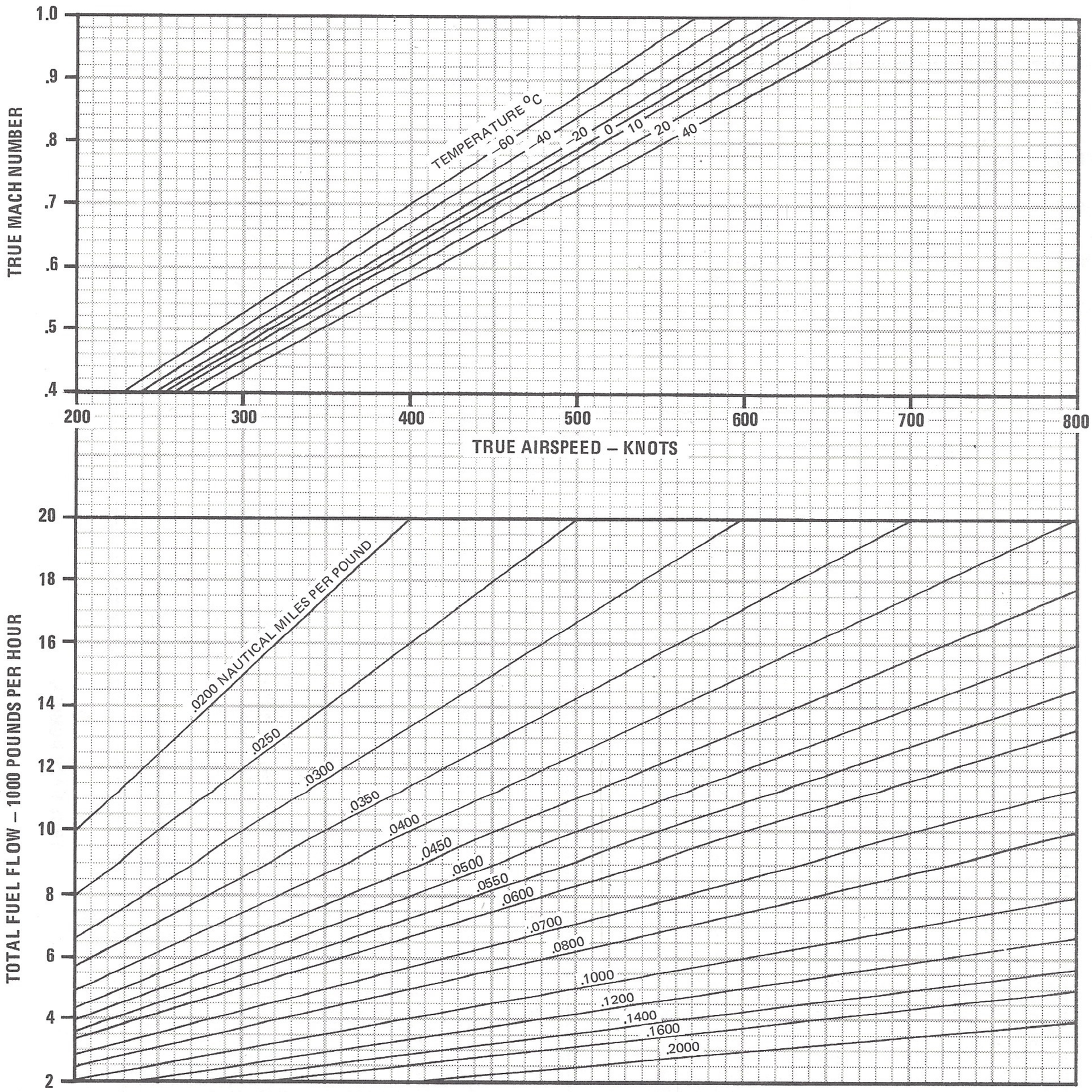
REMARKS
ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY

GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(490–2)

Figure C4-22 (Sheet 2 of 2)

F-4E

CONSTANT ALTITUDE CRUISE

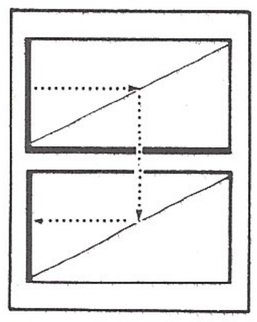
LONG RANGE SPEED
TRUE AIRSPEED AND FUEL FLOW
ONE ENGINE OPERATING

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

REMARKS
ENGINE(S): (2) J79–GE–17
INOPERATIVE ENGINE WINDMILLING
ICAO STANDARD DAY

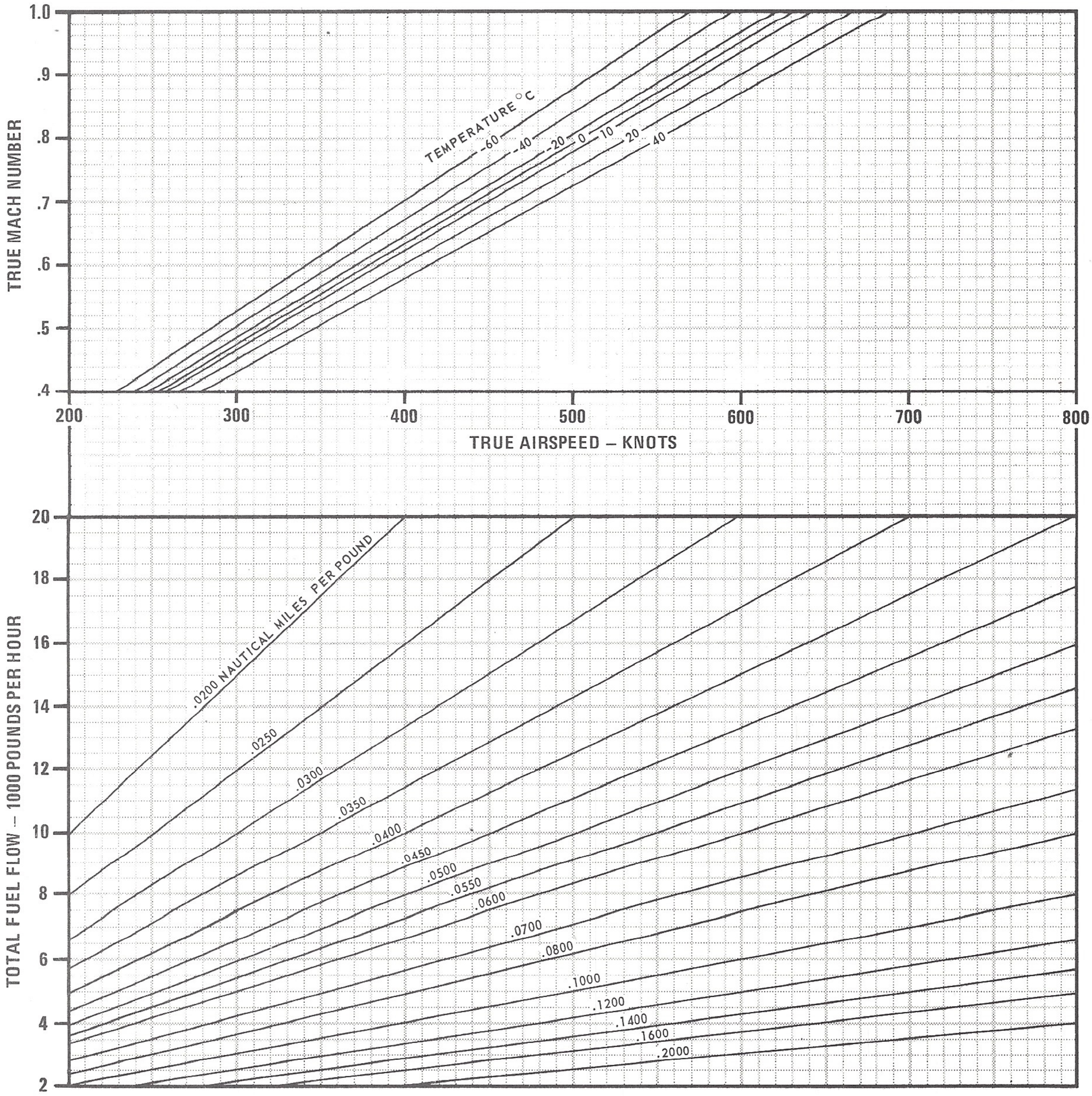
NOTE
IF INOPERATIVE ENGINE IS NOT WINDMILLING, INCREASE DRAG INDEX BY 53 ADDITIONAL UNITS

GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(488–2)

Figure C4-23 (Sheet 2 of 2)

F-4E

MAXIMUM ENDURANCE

ALTITUDE AND BANK ANGLE
ONE ENGINE OPERATING

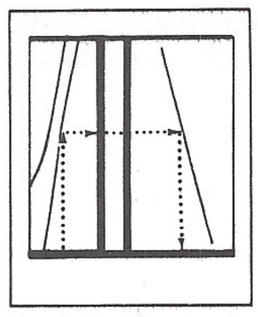
AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

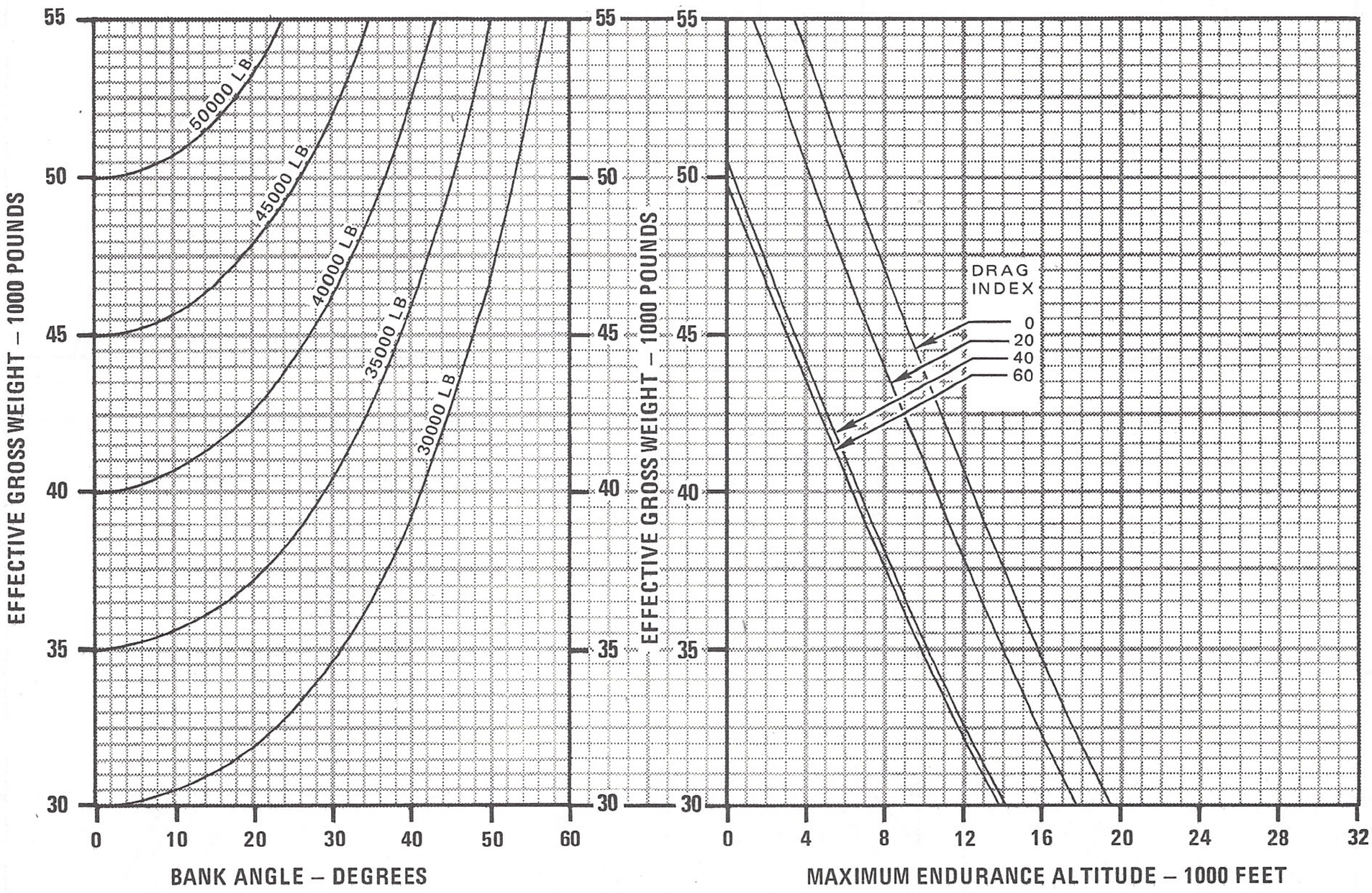
REMARKS
ENGINE (S): (2) J79–GE–17
INOPERATIVE ENGINE WINDMILLING
ICAO STANDARD DAY

NOTE
IF INOPERATIVE ENGINE IS NOT WINDMILLING, INCREASE DRAG INDEX BY 53 ADDITIONAL UNITS.

GUIDE



FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(485)

Figure C5-4

F-4E

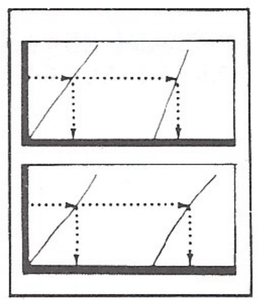
DESCENT

280 KIAS-80% RPM
SPEED BRAKES EXTENDED

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

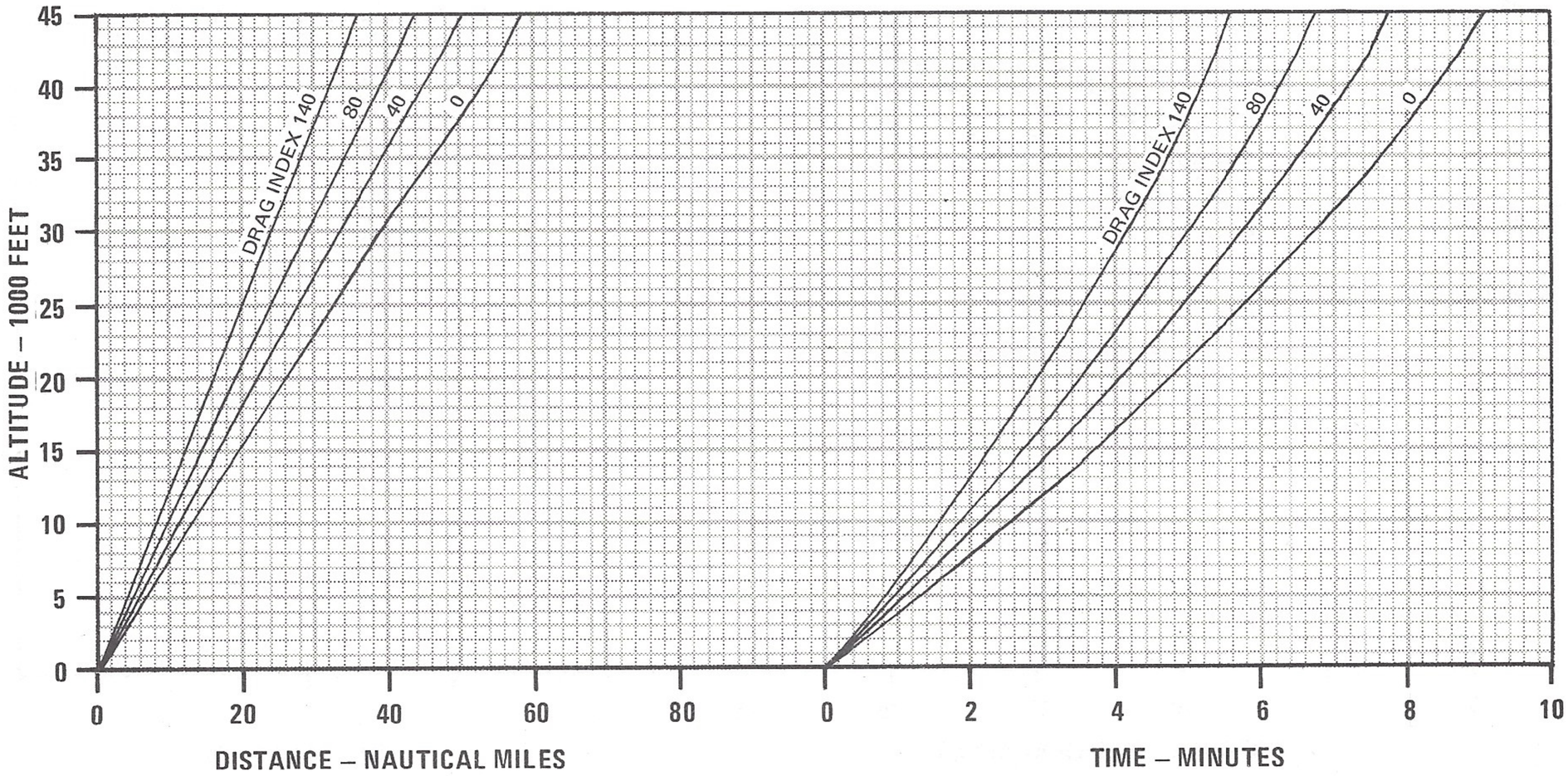
REMARKS
ENGINE(S): (2) J79–GE–17
ALL GROSS WEIGHTS
ICAO STANDARD DAY

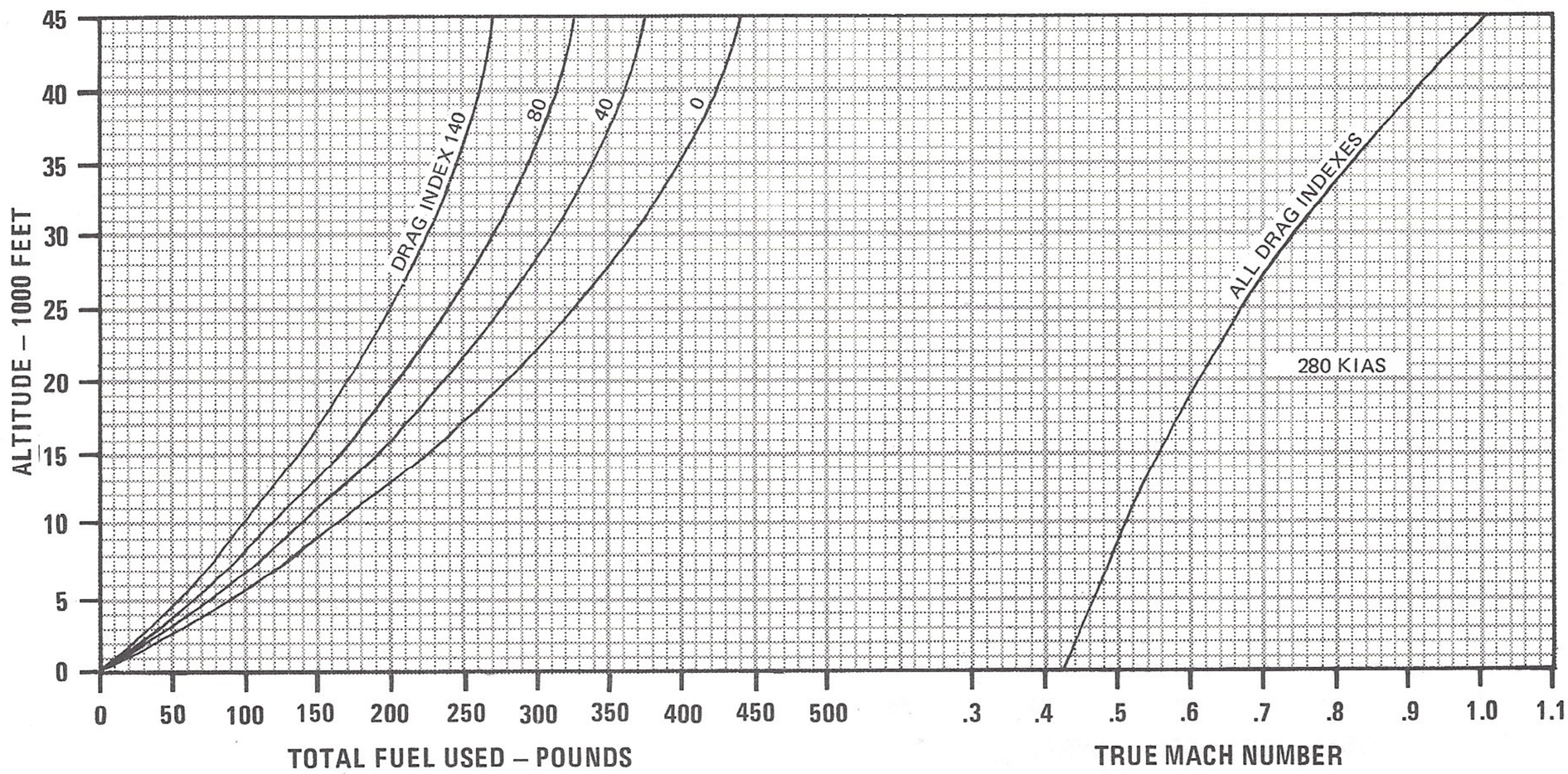
GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL





4C–1–1–(481)

Figure C7-2

F-4E

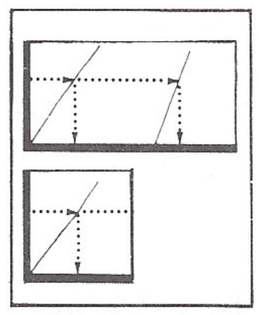
DESCENT

0.8 MACH-IDLE THRUST
SPEED BRAKES RETRACTED

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

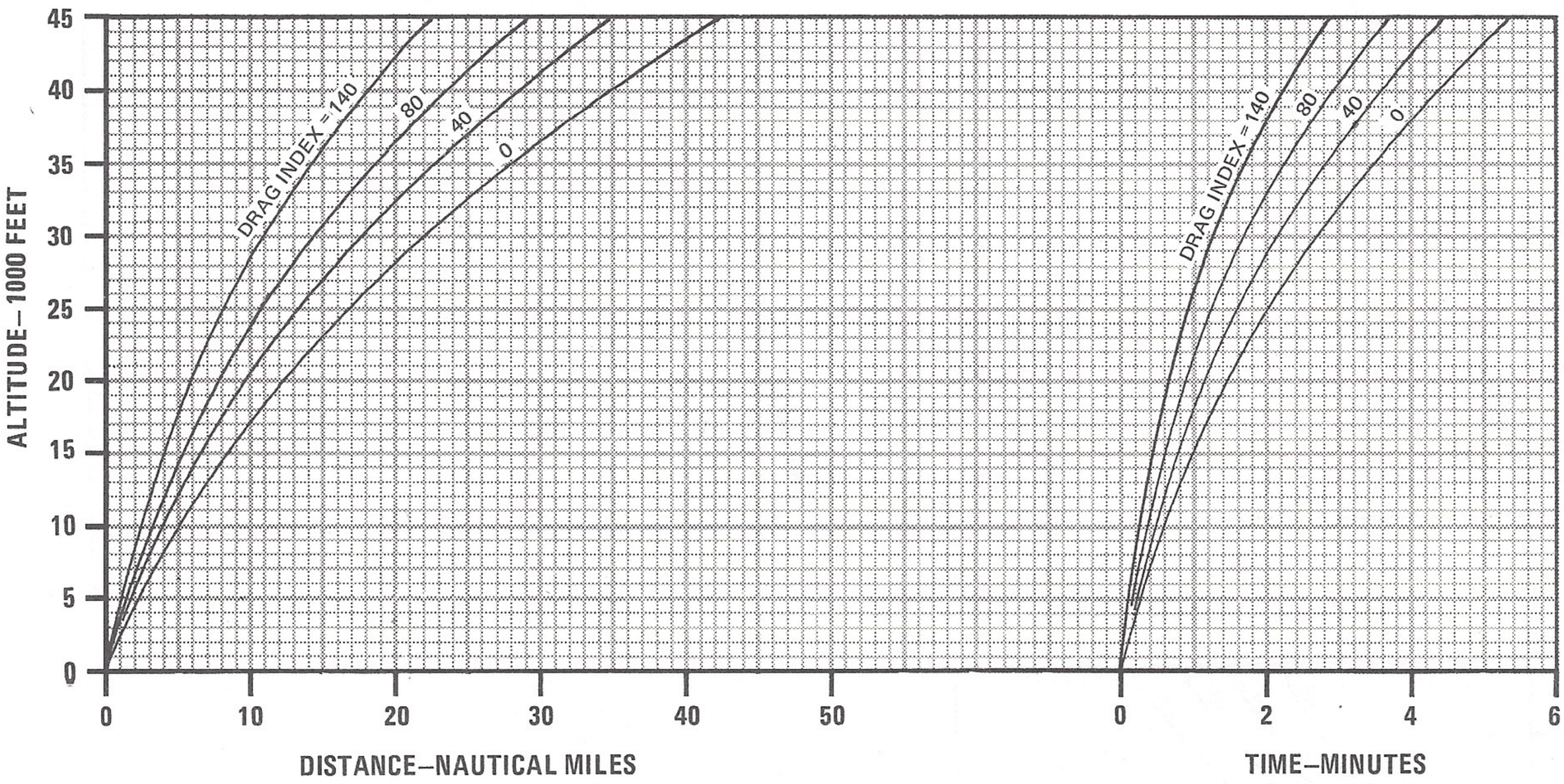
REMARKS
ENGINE(S): (2) J79–GE–17
ALL GROSS WEIGHTS
ICAO STANDARD DAY

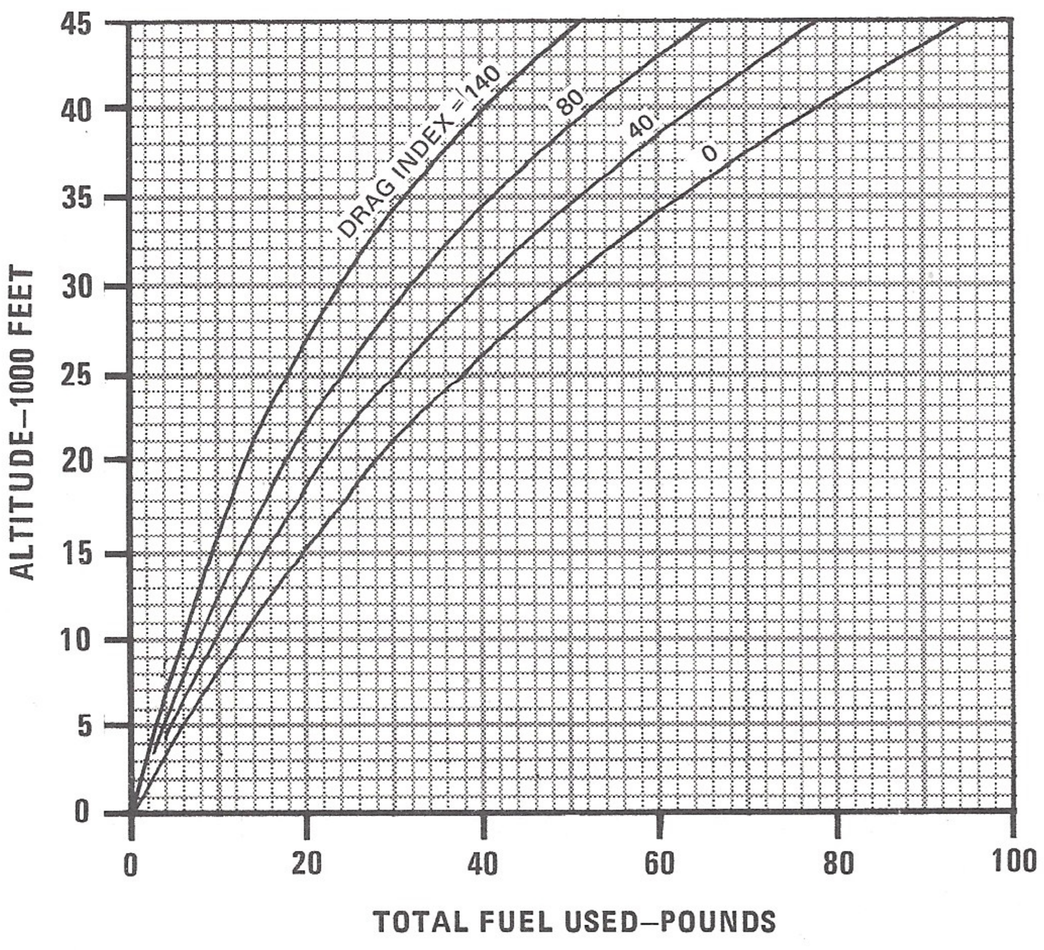
GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL





4C–1–1–(483)

Figure C7-4

F-4E

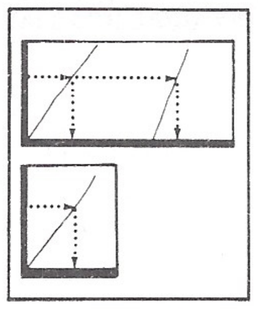
DESCENT

0.8 MACH-80% RPM
SPEED BRAKES RETRACTED

AIRPLANE CONFIGURATION
INDIVIDUAL DRAG INDEXES

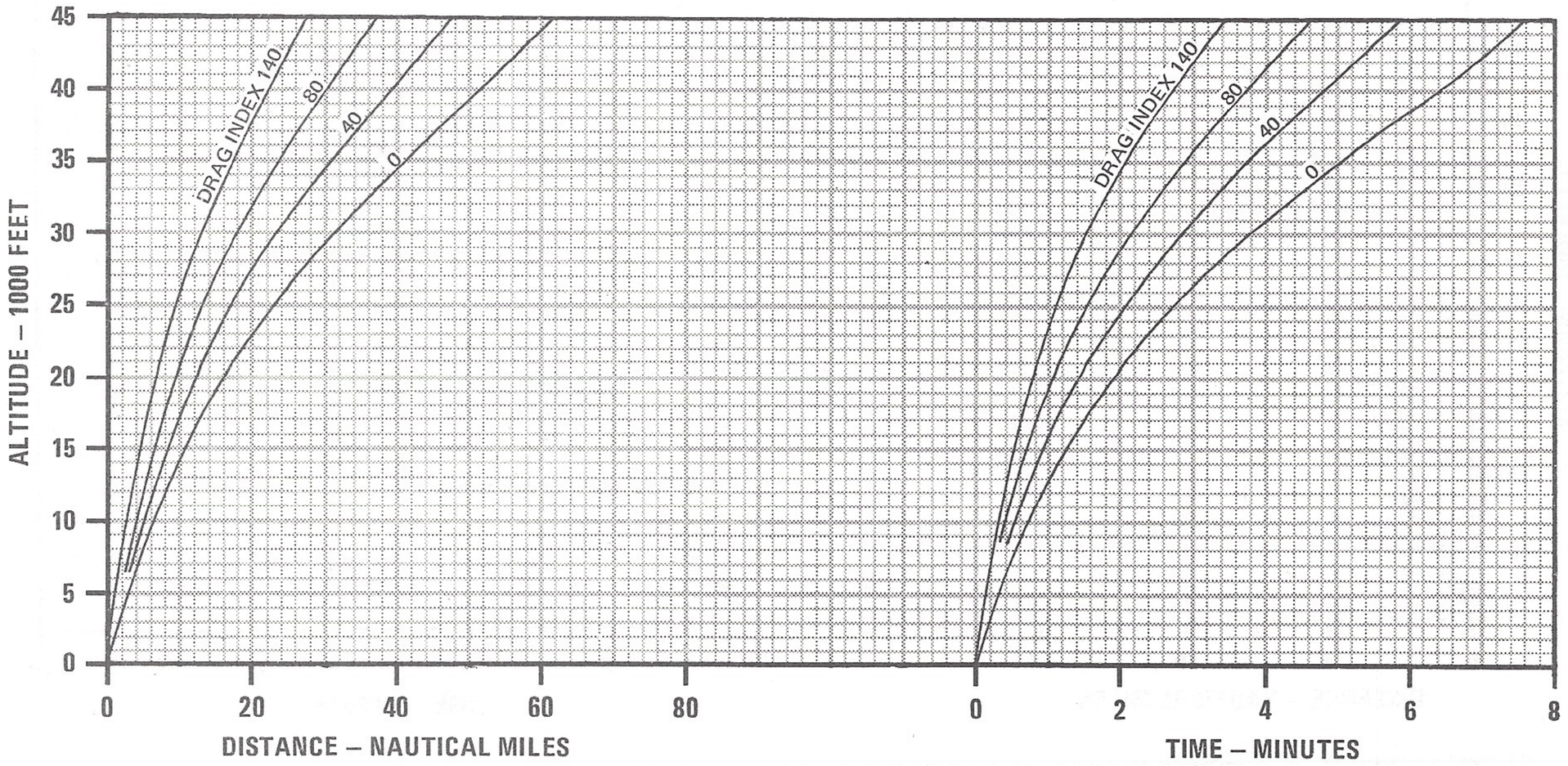
REMARKS
ENGINE(S): (2) J79–GE–17
ALL GROSS WEIGHTS
ICAO STANDARD DAY

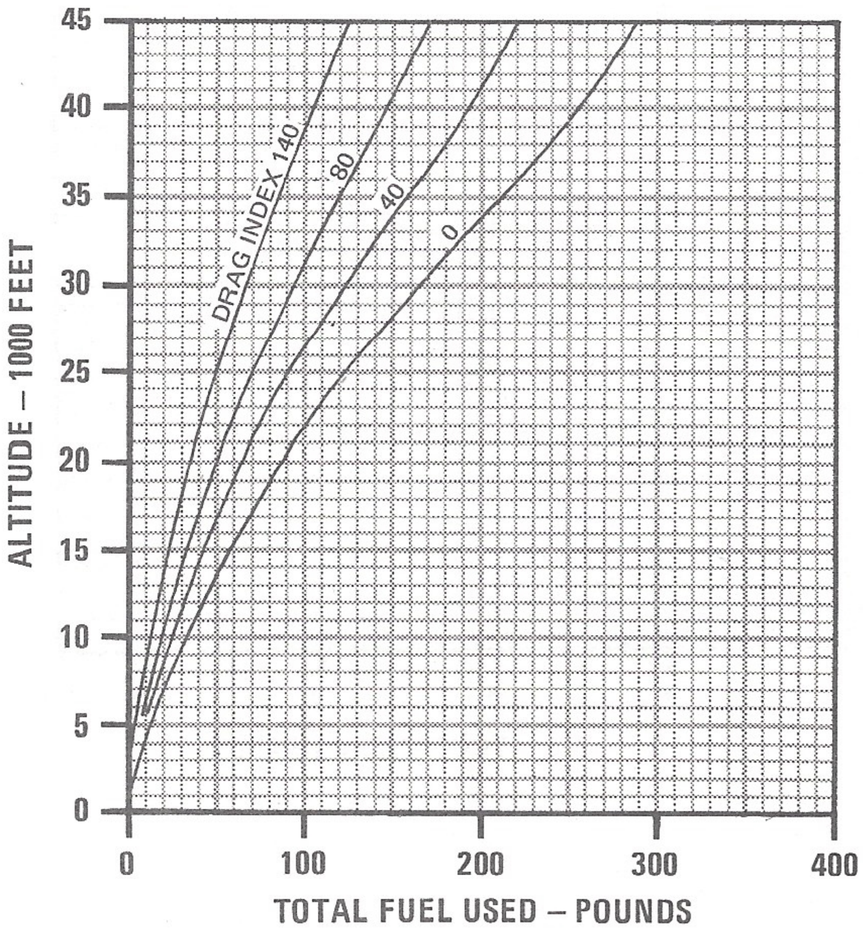
GUIDE



DATE: 1 JANUARY 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL





4C–1–1–(478)

Figure C7-6

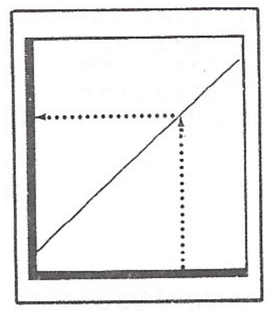
F-4E

FINAL APPROACH SPEEDS

AIRPLANE CONFIGURATION
ALL DRAG INDEXES
FLAPS/SLATS AS NOTED
GEAR DOWN

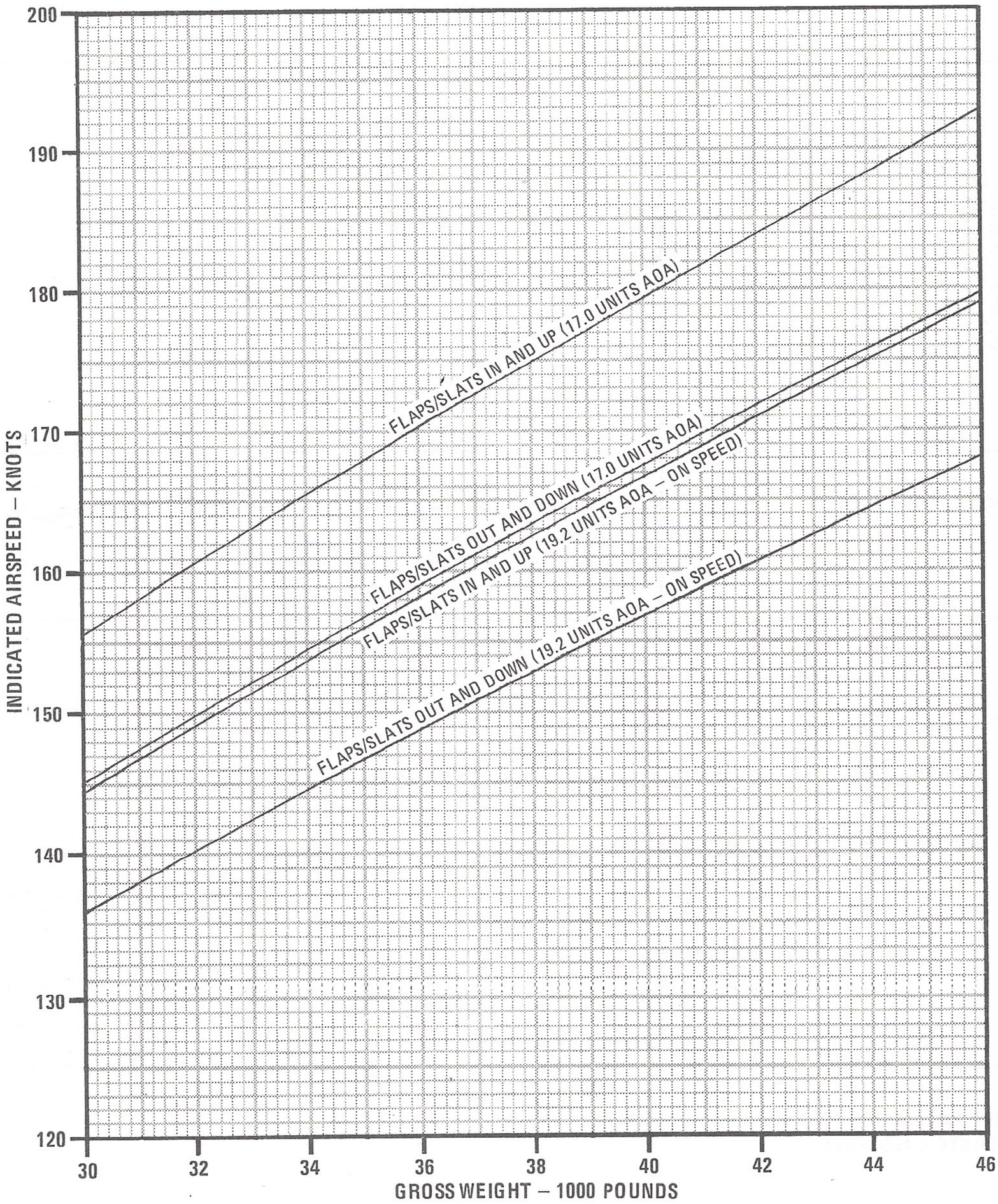
REMARKS
ENGINE(S): (2)J79–GE–17
ICOA STANDARD DAY

GUIDE



FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL

DATE: 1 AUGUST 1973
DATA BASIS: FLIGHT TEST



4C–1–1–(437)

Figure C8-1

PART 9 COMBAT PERFORMANCE

TABLE OF CONTENTS

Charts

Combat Fuel Flow C9-7
Combat Specific Range C9-10
Supersonic Maximum Thrust Climb C9-13
Low Altitude Acceleration C9-18
Maximum Thrust Acceleration Charts . . . C9-30
Military Thrust Acceleration Charts. . . . C9-59
Level Flight Envelope C9-83
V-N Envelope C9-84A
Dive Recovery Charts C9-84E
Temperature Effect on Maximum Speed . . C9-85
Turn Capabilities C9-86
Sustained G Turn Capabilities C9-88

Note

For aircraft with TISEO scope housing (with or without scope) on the left wing and combat documentation cameras, a degradation of combat performance will be noted. Additional information will be supplied when available.

COMBAT FUEL FLOW CHARTS

These charts (figures C9-1 thru C9-3) present the specific fuel flow and general thrust setting to maintain a constant Mach number for an ICAO standard day and standard day +10°C at all altitudes between sea level and 50,000 feet. Each chart is plotted for a specific configuration. The fuel flow values are based on a stabilized level flight condition and do not represent the fuel flow required to accelerate to a given Mach number.

USE

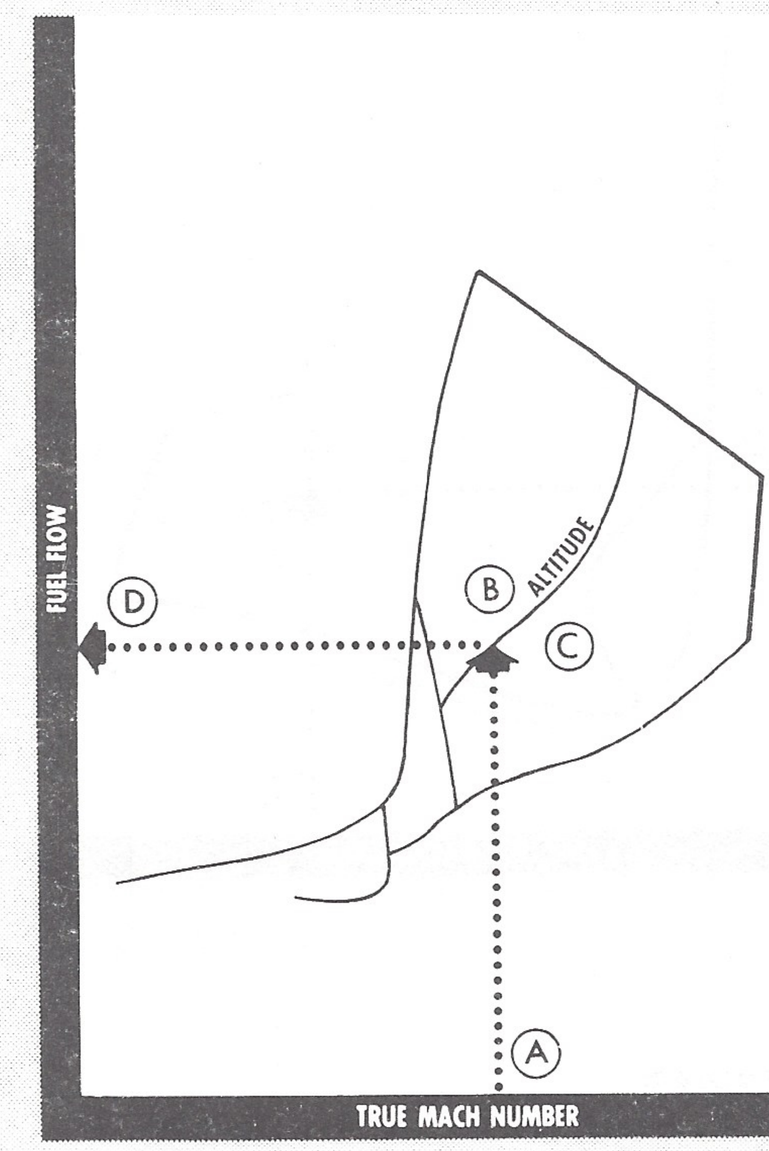
Enter the chart corresponding to the aircraft configuration with the desired Mach number for stabilized level flight. Proceed vertically upward to the selected flight altitude. Note the general thrust settting required, and then project horizontally to the left to read fuel flow.

Sample Problem

Configuration: (4) AIM-7 Missiles

A.	Desired Mach number	1.5
B.	Altitude	25,000 Ft
C.	Power setting required	Modulated Afterburners
D.	Total fuel flow	1010 PPM

SAMPLE COMBAT FUEL FLOW



4C—1—1—(599)

COMBAT SPECIFIC RANGE

These charts (figures C9-4 thru C9-6) present the specific range and the general power settings required to maintain a constant Mach number for an ICAO standard day and standard day +10°C at all altitudes from sea level to 50,000 feet. The specific range values are based on a stabilized level flight condition and do not represent the fuel flow required to accelerate to a given Mach number.

USE

Enter the chart corresponding to the aircraft configuration with the desired Mach number for stabilized level flight. Proceed vertically upward to the selected flight altitude. Note the general thrust setting required, and then project horizontally left to obtain the specific range.

Sample Problem

Configuration: (4) AIM-7

A.	Initial gross weight	40,000 Lb
B.	Initial Mach number	1.2
C.	Time corresponding to initial Mach number	0.7 Min
D.	Distance corresponding to initial Mach number	7.5 Miles
E.	Climb Mach number	1.6
F.	Time at end of acceleration	1.9 Min
G.	Distance at end of acceleration	23.5 Miles
H.	Gross weight at end of acceleration	38,900 Lb
I.	Time required for acceleration (F-C)	1.2 Min
J.	Fuel required for acceleration (A-H)	1100 Lb
K.	Distance required for acceleration (G-D)	16 Miles
L.	Altitude at end of climb	52,000 Ft
M.	Time at end of climb	4.4 Min
N.	Distance at end of climb	61.4 Miles
O.	Gross weight at end of climb	37,500 Lb
P.	Time required for climb (M-F)	2.5 Min
Q.	Distance required for climb (N-G)	37.9 Miles
R.	Fuel required for climb (H-O)	1400 Lb
S.	Total time required to accelerate and climb (I+P)	3.7 Min
T.	Total distance required to accelerate and climb (K+Q)	53.9 Miles
U.	Total fuel required to accelerate and climb (J+R)	2500 Lb

LOW ALTITUDE ACCELERATIONS

These charts (figure C9-12 thru C9-23) present time and fuel required to accelerate from 0.5 to 0.9 Mach at altitudes of Sea Level, 2000, 4000, and 6000 feet. Separate charts are provided for several gross weights and for both maximum and military thrust. The time and fuel values are tabulated for ICAO Standard Day conditions; however, correction factors are given for nonstandard temperatures.

USE

After selecting the applicable chart for thrust, gross weight, and altitude, enter with the Mach number desired at end of acceleration and project horizontally to the applicable drag index column. Read time/fuel required to accelerate from 0.5 Mach.

ACCELERATION CHARTS

These charts (figures C9-24 thru C9-76) show the relationship of time, distance, and fuel required for level flight maximum or military thrust accelerations. The data is presented for various altitudes and configurations.

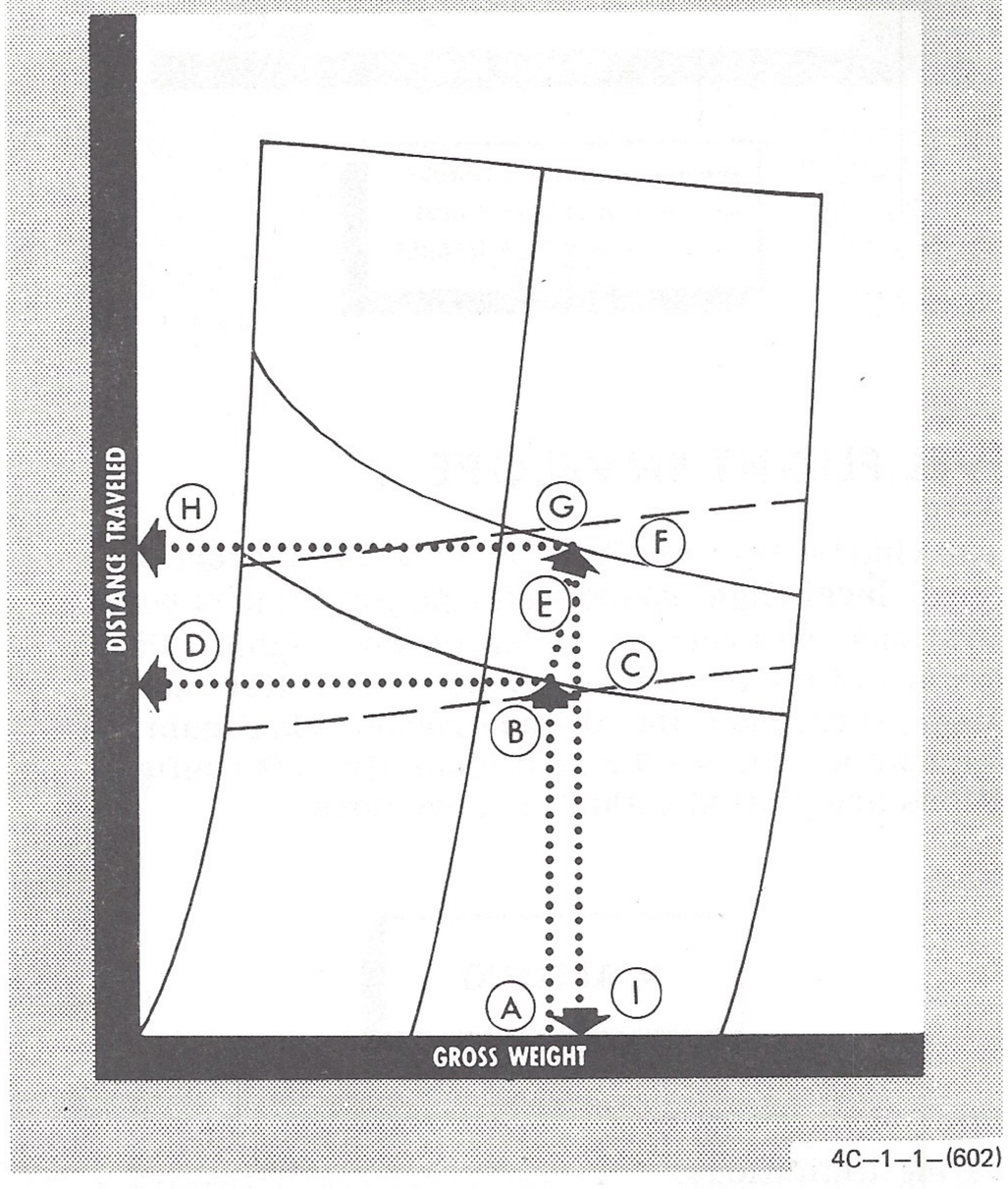
WARNING

Refer to section V for external stores operating limitations.

USE

Enter the applicable chart with the aircraft gross weight. Proceed vertically upward to the initial Mach number and note the time. Project horizontally and note the distance. From the initial Mach number, proceed parallel to the guide lines to the Mach number desired at the end of acceleration. At this point note the time, then project horizontally and vertically and note the distance and gross weight. From this data, subtract the time, distance, and weight corresponding to the initial Mach number to determine the time, distance, and fuel required for acceleration.

SAMPLE ACCELERATION



4C–1–1–(602)

To find the allowable maximum symmetrical performance capability, enter the chart with the indicated airspeed and proceed vertically to the stall boundary (positive or negative G) or the maximum allowable acceleration (upper and lower) as applicable. From these intersections, project horizontally to the left to read the positive and negative G obtainable in the case of the stall boundaries, or the upper and lower maximum allowable G for the selected gross weight. To find the AOA for a given condition of G and airspeed, enter the appropriate chart with these parameters. Project horizontally to the right from the load factor and vertically upward from the airspeed. At the intersection of these two projections, read the indicated angle of attack.

Sample Problem

Altitude 5000 Feet; Gross Weight-37, 500 pounds

A. Speed (IAS)	500 Kt
B. Load factor	6 G
C. Angle-of-attack	12 units

DIVE RECOVERY CHARTS

These charts, (figures C9-78E thru C9-78H) present the airplanes dive recovery capability for various speeds (subsonic and supersonic), altitudes and dive angles at 16 units and 19 units AOA.

USE

Enter the applicable chart at the start of the pull-out, and project horizontally to intersect the Mach number at the start of the pull-out. From this point, descend vertically and intersect the dive angle at the start of pull-out, then proceed horizontally to the left to read altitude lost during pull-out.

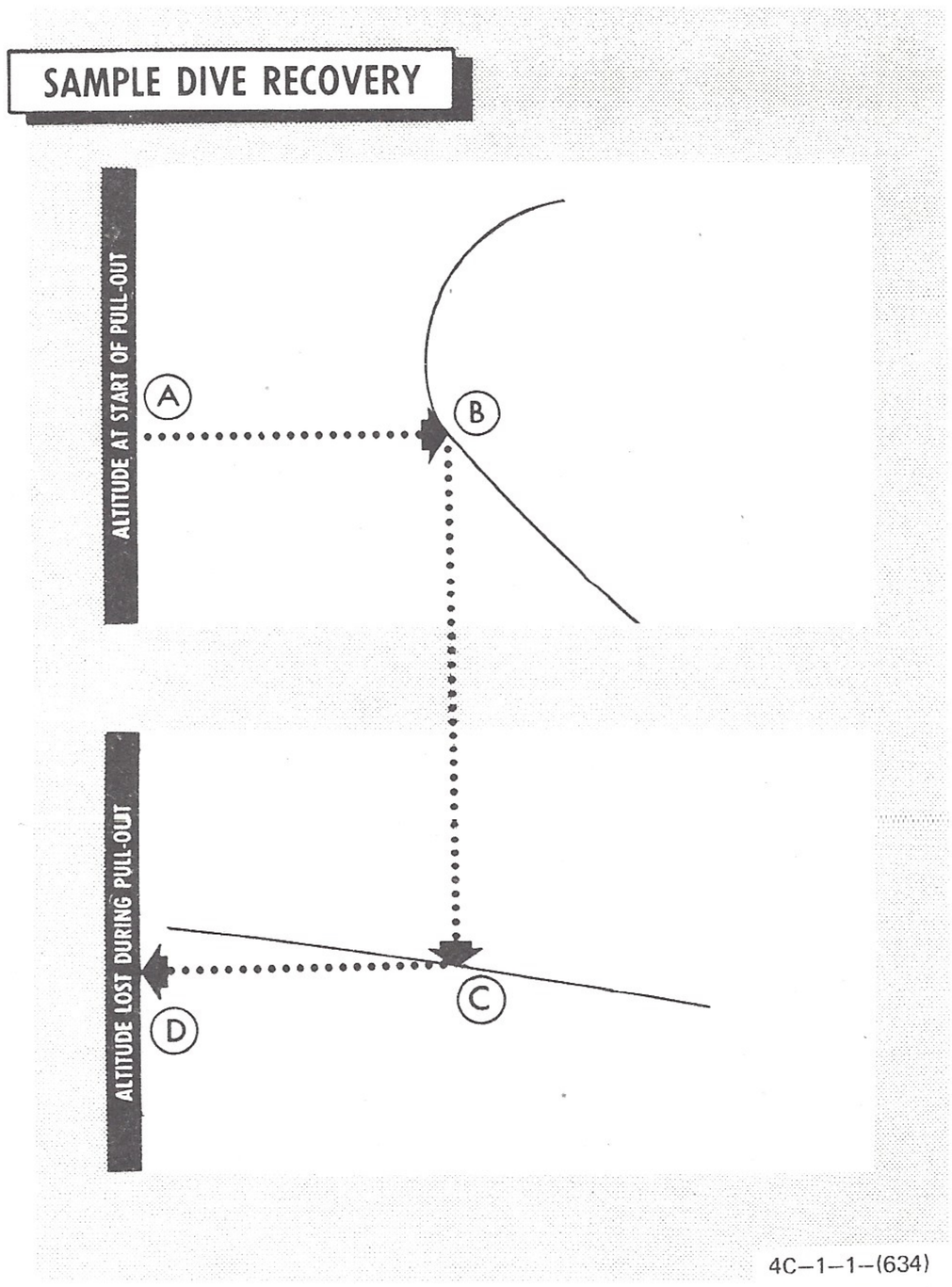
Sample Problem

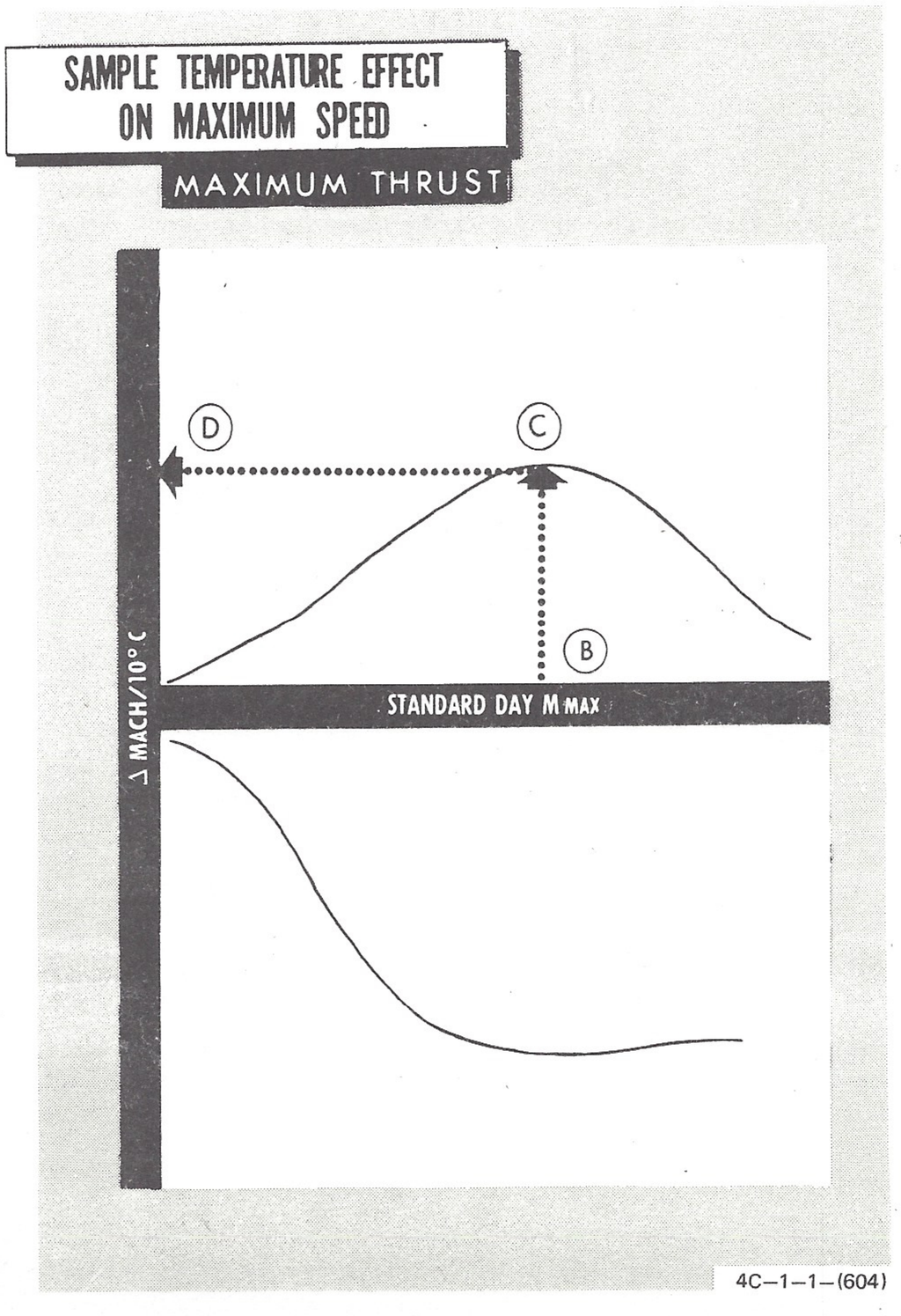
Configuration: (4) AIM-7 Missiles; 16 Units AOA; Supersonic

A. Altitude at start of pull-out	40, 000 Ft
B. Mach number at start of pull-out	1.5
C. Dive angle at start of pull-out	70°
D. Altitude loss during constant 16 unit AOA pull-out	13, 500 Ft

TEMPERATURE EFFECT ON MAXIMUM SPEED

This chart (figure C9-79) shows the effect of non-standard day temperatures on the maximum speed at maximum thrust. The speed variation is read out as the change in Mach number (Δ Mach) for a 10°C variation in temperature (hot or cold) from standard day.





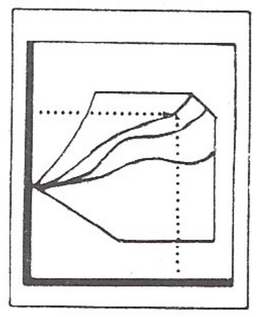
F-4E

V-N ENVELOPE
SYMMETRICAL FLIGHT

AIRPLANE CONFIGURATION
CLEAN OR (4) AIM–7

GROSS WEIGHT – 37,500 POUNDS

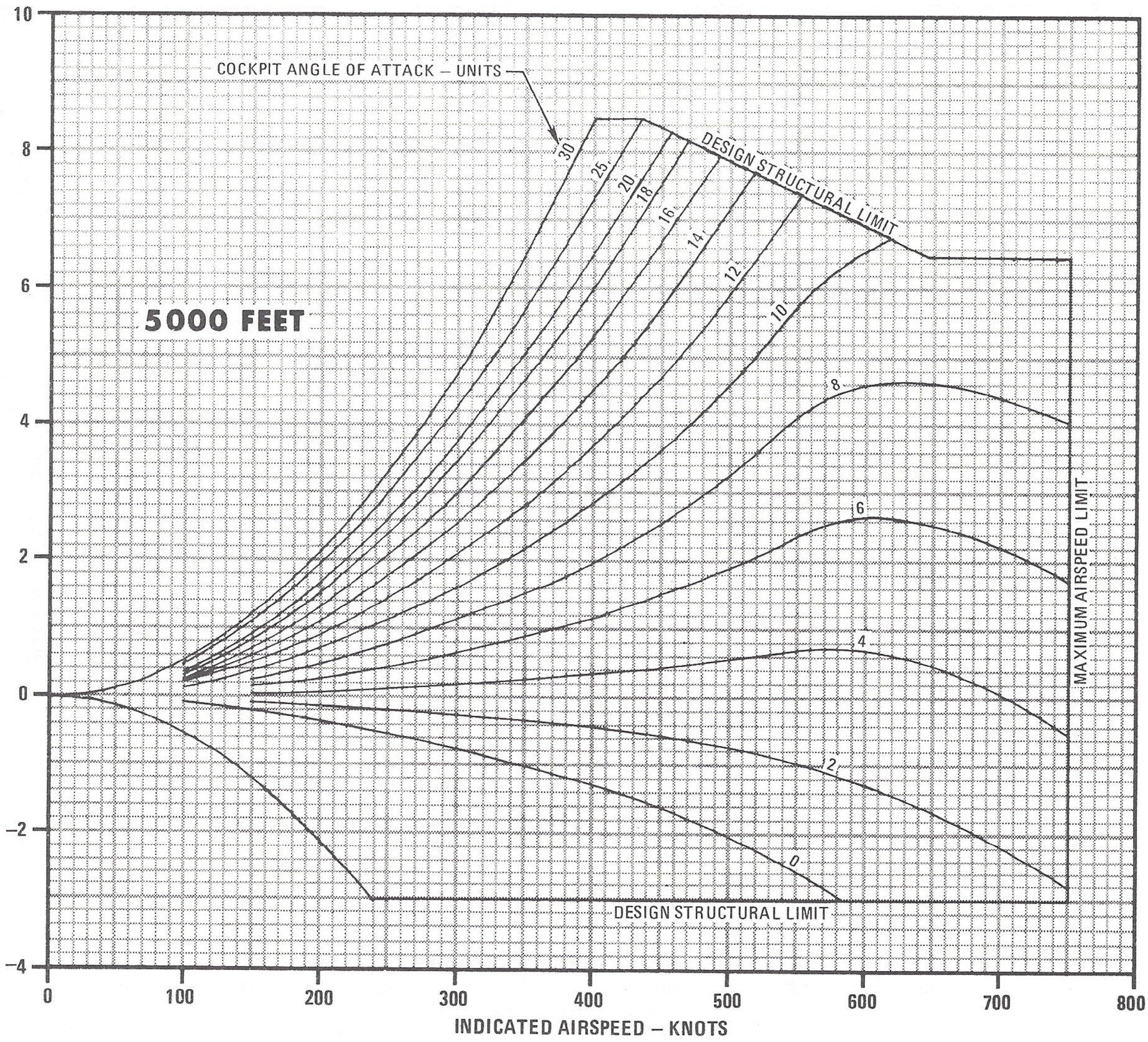
GUIDE



REMARKS
ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY

DATE: 1 NOVEMBER 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(624)

Figure C9-78A

F-4E

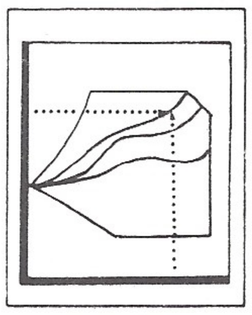
V-N ENVELOPE
SYMMETRICAL FLIGHT

AIRPLANE CONFIGURATION
CLEAN OR (4) AIM–7

GROSS WEIGHT - 37,500 POUNDS

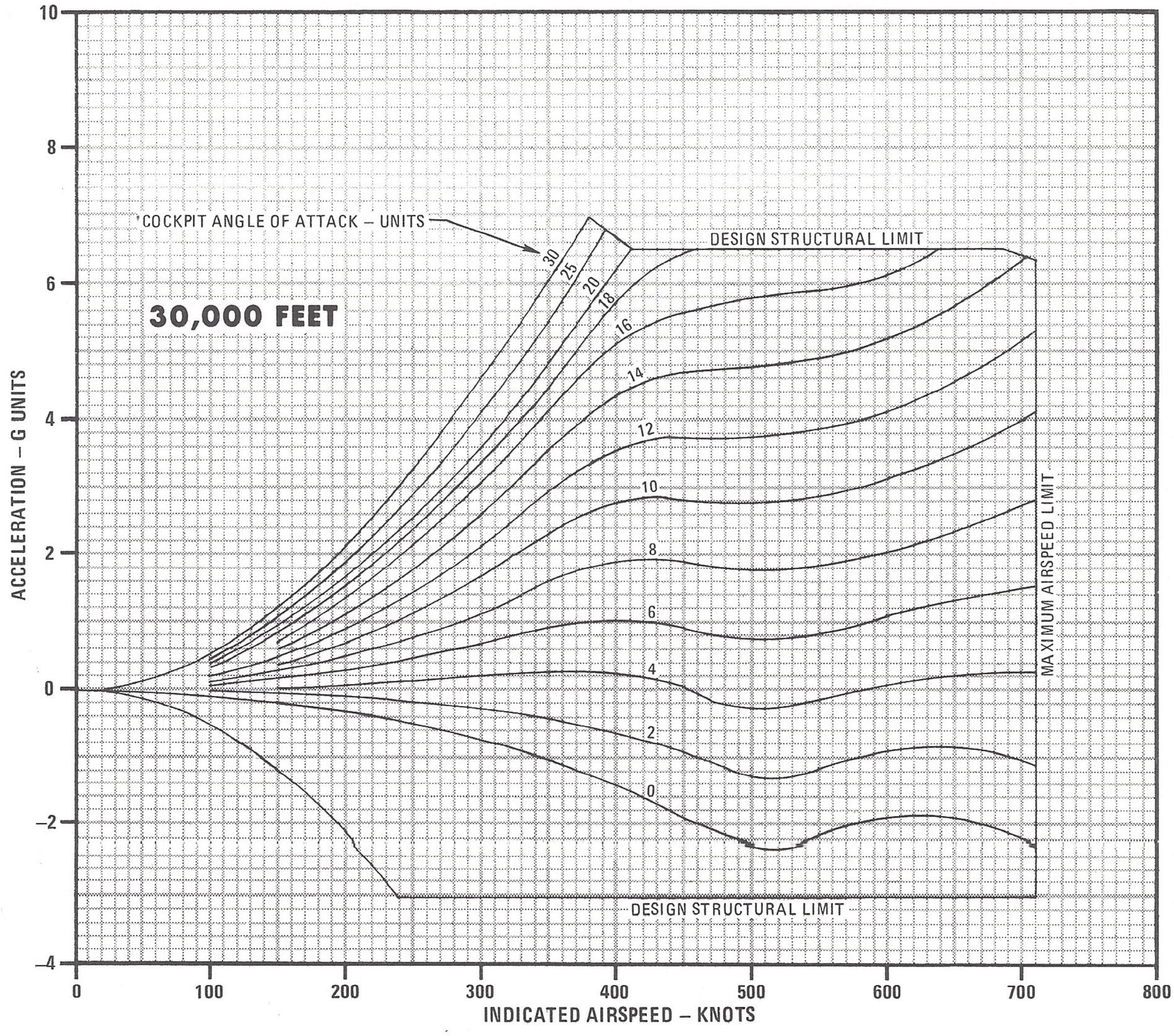
REMARKS
ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY

GUIDE



DATE: 1 NOVEMBER 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(626)

Figure C9-78C

F-4E

DIVE RECOVERY -16 UNITS AOA

SUBSONIC-SPEED BRAKES RETRACTED

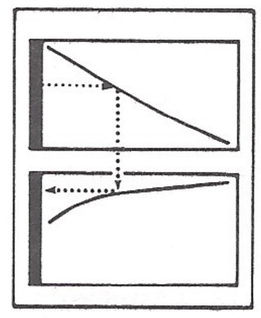
GROSS WEIGHT 40,000 POUNDS

AIRPLANE CONFIGURATION
(4)AIM-7

REMARKS
ENGINE(S): (2) J79-GE- 17
ICAO STANDARD DAY

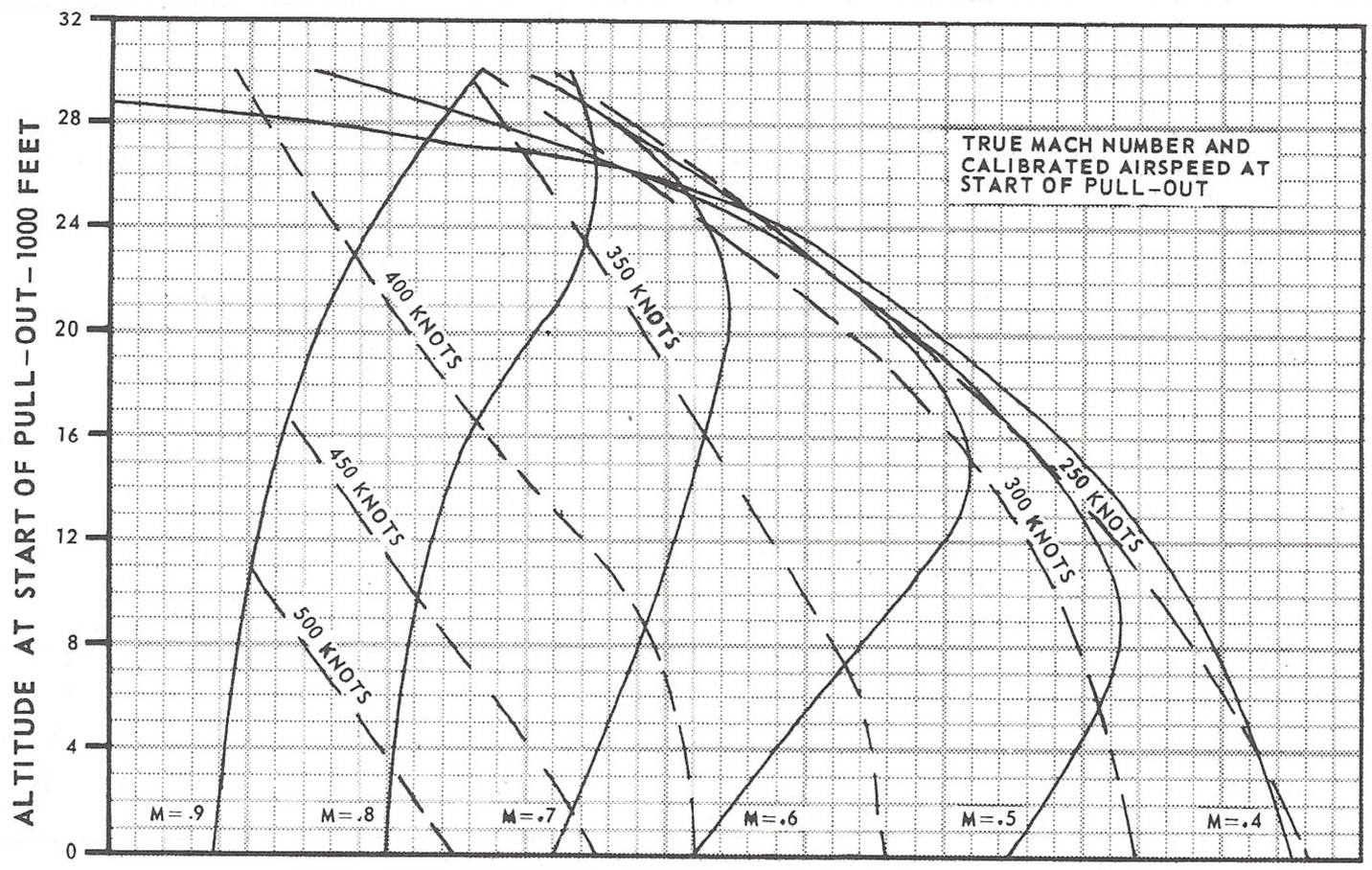
NOTES
1. ALTITUDE LOSS WITH MAXIMUM THRUST IS ESSENTIALLY THE SAME WITH MILITARY THRUST.
2. PULL-OUT BASED ON 1.0G PER SECOND ACCELERATION BUILDUP TO 16 UNITS (AOA), STABILATOR LIMIT OR 6.0G WHICHEVER OCCURS FIRST.

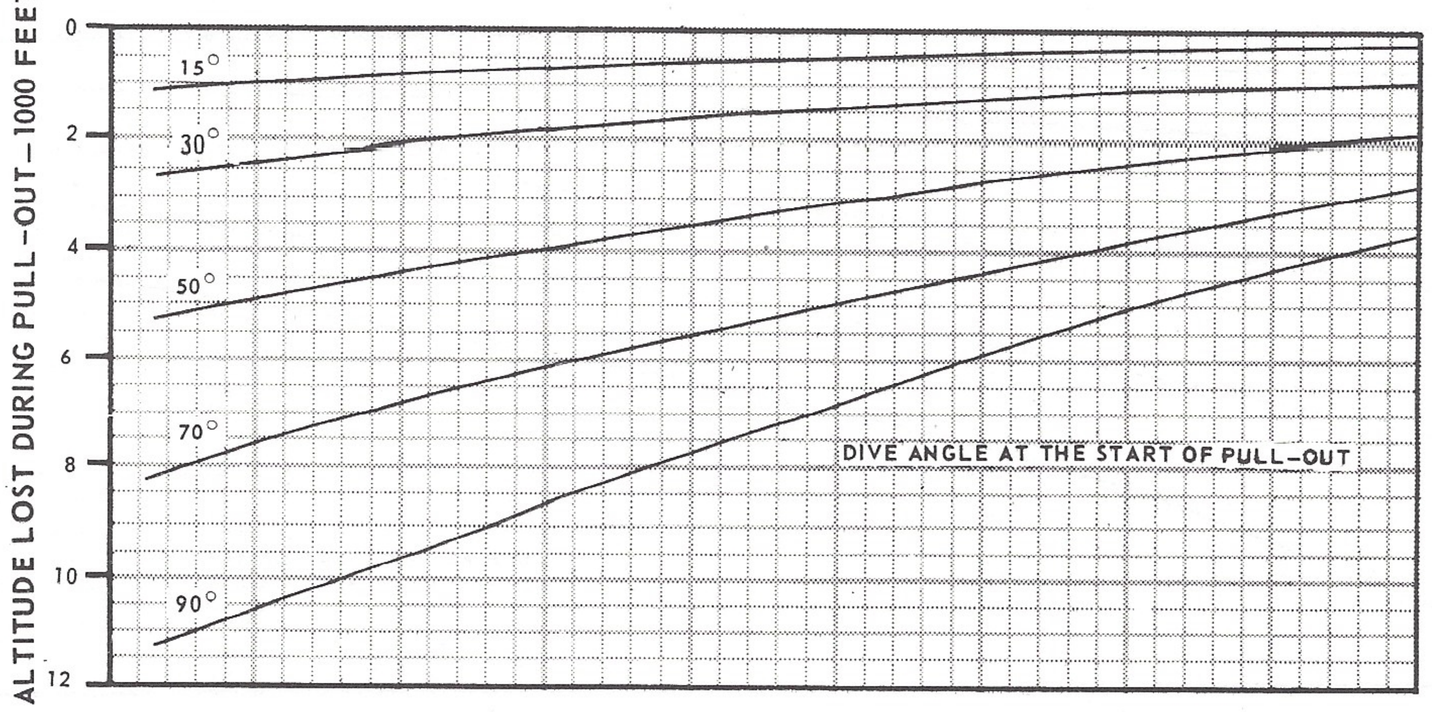
GUIDE



DATE: 1 NOVEMBER 1973
DATA BASIS: FLIGHT TEST

FUEL GRADE: JP-4
FUEL DENSITY: 6.5 LB/GAL





4C-1-1-(628)

Figure C9-78E

F-4E

DIVE RECOVERY-16 UNITS AOA

SUPERSONIC-SPEED BRAKES RETRACTED

AIRPLANE CONFIGURATION
(4) AIM–7

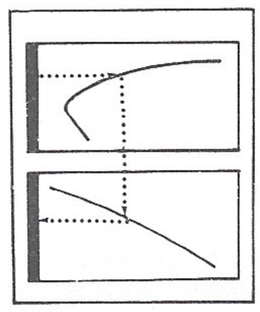
GROSS WEIGHT – 40,000 POUNDS

REMARKS
ENGINE(S): (2) J79–GE–17
ICAO STANDARD DAY

NOTES

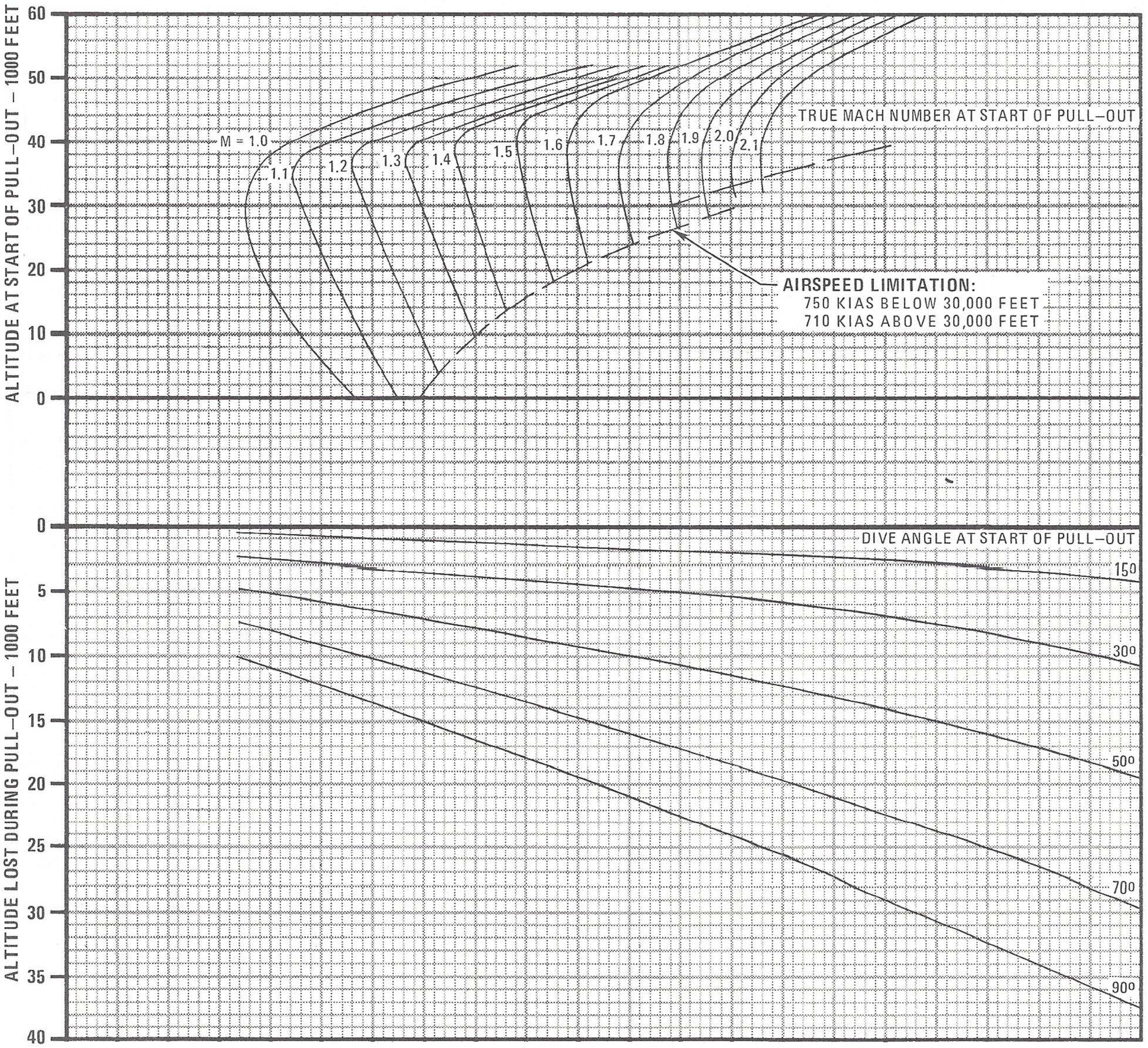
1. ALTITUDE LOSS WITH MAXIMUM THRUST IS ESSENTIALLY THE SAME WITH MILITARY THRUST.
2. PULL–OUT BASED ON 1.0G PER SECOND ACCELERATION BUILDUP TO 19 UNITS (AOA), STABILATOR LIMIT OR 6.0G WHICHEVER OCCURS FIRST.

GUIDE



DATE: 1 NOVEMBER 1973
DATA BASIS: **FLIGHT TEST**

FUEL GRADE: JP–4
FUEL DENSITY: 6.5 LB/GAL



4C–1–1–(630)

Figure C9-78G

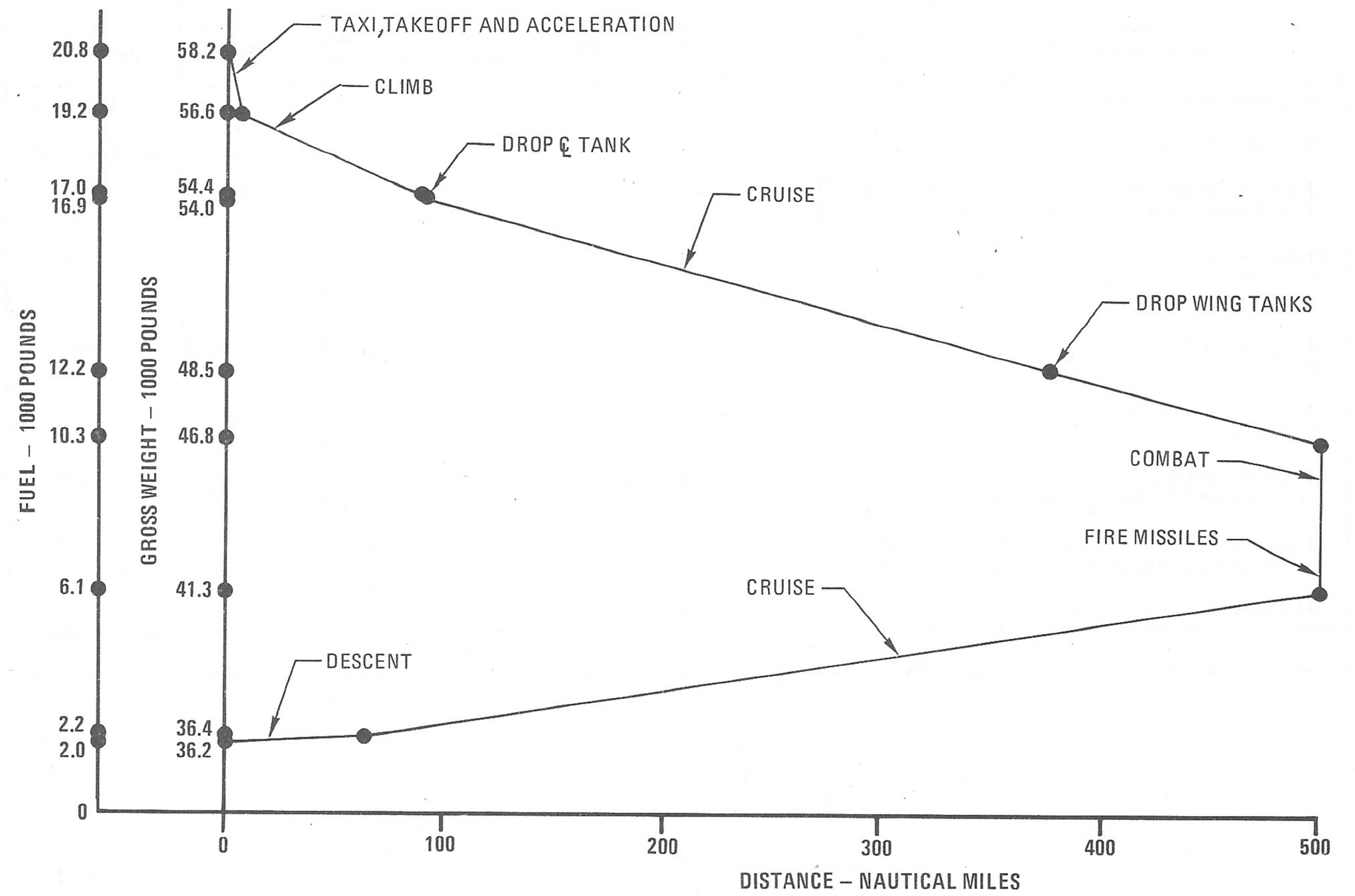


Figure C10-6

POST COMBAT CLIMB - CONTINGENCY

In the event combat was completed at a lower altitude, climb fuel needed to reach return cruise altitude must be conserved by terminating combat earlier. Assuming that combat was completed at 10,000 feet altitude, use the climb charts (Part 3) to establish the climb fuel and distance needed to reach the return cruise altitude of 39,000 feet.

Military Thrust Climb

A.	Gross weight	40,082 Lb
B.	Cruise altitude	39,000 Ft
C.	Start climb altitude	10,000 Ft
D.	Drag index	7.4
E.	Temperature deviation	0.0
F.	Fuel required (to reach B)	1250 Lb
G.	Fuel required (to reach C)	300 Lb
H.	Distance (to B)	55 NM
I.	Distance (to C)	6 NM
J.	Fuel needed to climb (F-G)	950 Lb
K.	Distance during climb (H-I)	49 NM

Since cruise fuel consumption (previously computed) for this leg was .100 NMPP we can calculate the extra fuel needed by this change in the mission. Fuel required during the return cruise leg is 490 lb (49 NM/.100 NMPP). The revised return leg will require 660 lb (1150 lb -490 lb) of additional fuel. Combat must be terminated 0.7 Min earlier (660/920) than originally planned to allow for this contingency.

MISSION PLANNING SUMMARY

A breakdown of the entire flight is shown in the Sample Mission Profile (figure C10-6), and Sample Mission Summary (figure C10-7). Any deviations from the planned mission factors (changes in headwind, excess combat time, and availability of air refueling) must be considered as the flight progresses to insure successful mission accomplishment.

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Note

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Altimeter Lag Chart	A1-4, B1-3, C1-3	A1-26, B1-19, C1-21, C1-22
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