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PERFORM DATA 11

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NAVAIR 01-45HHD-1A

GROUP 4 DOCUMENT
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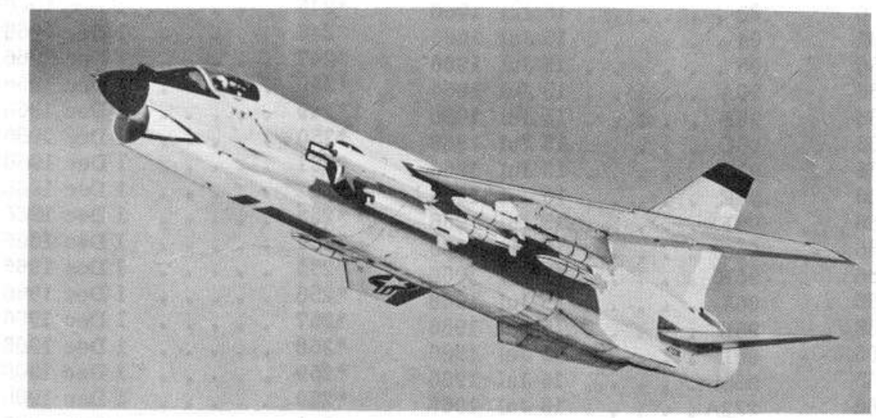
DOD DIR 5200.10

Supplemental NATOPS Flight Manual

NAVY MODEL
F-8D, F-8E
AIRCRAFT

(Title Unclassified)

THIS PUBLICATION SUPPLEMENTS NAVAIR 01-45HHD-1, NATOPS FLIGHT MANUAL FOR MODELS F-8D, F-8E AIRCRAFT.



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1 May 1965

Changed 1 December 1966

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NAVWEPS 01-45HHD-1A
16 SEPTEMBER 1965

FLIGHT MANUAL INTERIM CHANGE No. 14

Navy Model F-8E Aircraft

PUBLISHED BY DIRECTION OF THE CHIEF OF THE BUREAU OF NAVAL WEAPONS

Of paramount interest to pilots. To be read by all pilots operating these aircraft

1. CANCELLATION. This interim change cancels message Interim Changes No. 10 of 9 June 1965 (091835Z), No. 11 of 2 July 1965 (022038Z), No. 12 of 13 July 1965 (131447Z), and No. 13 of 25 August 1965 (252041Z).

2. PURPOSE. To set forth in the Flight Manual the limitations contained in the Interim Changes cancelled by paragraph 1. above and an additional external stores limitation.

3. The following change is made to the Supplemental NATOPS Flight Manual, NAVWEPS 01-45HHD-1A of 1 May 1965, for Navy Model F-8D,-8E Aircraft.

a. Section I, Part 4, pages 11 and 12, Figure 1-5 (Sheets 1 and 2) entitled EXTERNAL STORES LIMITATIONS:

(1) Delete the Aero 6A,6A-1,6A-2, and LAU-32/A Rocket Pack on Aero 7A-1 Bomb Rack and its associated limitations from the figure.

(2) Under MAXIMUM INDICATED AIRSPEED-CARRYING for the Mk 76 Mod 4/5 and Mk 106 Mod 2/3 Practice Bombs in Aero 8A-1 PBC, delete "Figure 1-1 Sheet 3" and substitute "550 KIAS and Figure 1-1 Sheet 3".

(3) Under STORES for the Mk 24 Mod 2A Parachute Flare on A/A37B-3 PMBR with AAC 396 Incorp., change to read "Mk 24 Mod 2A/3 Parachute Flare on A/A37B-3 PMBR with AAC 396 Incorp.".

(4) Under REMARKS for the Mk 24 Mod 2A/3 Parachute Flare on A/A37B-3 PMBR with AAC 396 Incorp. add "Carriage of flares on inboard stations of the PMBR is not permitted due to possible flare/airplane collisions after release".

(5) Add the following stores to the figure:

Store..................Aero 6A,6A-1,6A-2, and LAU-32A/A Rocket Pack on Aero 7A-1 Bomb Rack

Station...............Left and Right Wing

Maximum Indicated Airspeed or
Mach Whichever Is Less
Carrying........550 KIAS or 0.95 IMN
Firing..........500 KIAS or 0.95 IMN

Normal Acceleration
Carrying........Figure 1-1 Sheet 3 and Figure 1-3
Firing.........+0.5 to +4.5g
Jettison.......+1.0g

Remarks...............The Aero 6A series rocket packs should have the KMU-52/A single fire intervalometer installed when used for training. Jettisoning of Aero 6A and 6A-1 rocket packs is not recommended. Rocket pack will fail under ejection force. Jettison Aero 6A-2 and LAU-32A/A rocket packs, empty or full, between 200 and 500 KIAS, but less than 0.9 IMN, with landing gear UP, wing down.

Store..................Mk 81 Snakeye I or Mk 82 Snakeye I on A/A37B-1 MBR

Station................Left and Right Wing

Maximum Indicated Airspeed or
Mach Whichever Is Less
 Carrying........550 KIAS or 0.95 IMN
 Dropping........500 KIAS or 0.95 IMN

Normal Acceleration
 Carrying........-1.0g to +4.5g
 Dropping........ +1.0g to +4.5g

Remarks...............Airspeed limitations are for electrically fuzed bombs only. See Note 3 for airspeed limitations for mechanically fuzed bombs. Carriage of Mk 81 or Mk 82 Snakeye I on inboard stations of the MBR is not permitted. Compliance with AAB 357 and 358 is mandatory prior to carriage of Snakeye. Following high speed, low altitude Snakeye I bomb (high drag mode) releases, the airplane may undergo a moderate lateral oscillation, which is not objectionable if anticipated. MBR's may be jettisoned with or without bombs in level flight at airspeeds less than 0.95 IMN.

Store.................500-lb GP AN-M64A1 on Aero 7A-1 Bomb Rack

Station...............Left and Right Wing

Maximum Indicated Airspeed or
Mach Whichever Is Less
 Carrying........450 KIAS or 0.80 IMN
 Dropping........450 KIAS or 0.80 IMN

Normal Acceleration
 Carrying.......+1.0g to +4.5g
 Dropping.......+1.0g to +4.5g

Remarks...............Conical fin assembly is required. See Note 3.

END

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NAVWEPS 01-45HHD-1A
3 MARCH 1966

FLIGHT MANUAL INTERIM CHANGE NO. 18

F-8E Aircraft

PUBLISHED BY DIRECTION OF THE CHIEF OF THE BUREAU OF NAVAL WEAPONS

Of paramount interest to pilots. To be read by all pilots operating these aircraft.

1. CANCELLATION. This interim change cancels message Interim Changes No. 15 of 13 December 1965 (132216Z), No. 16 of 25 January 1966 (251502Z), and No. 17 of 3 February 1966 (031925Z).

2. PURPOSE. To set forth in the Flight Manual the limitations contained in the Interim Changes cancelled by paragraph 1. above and additional external stores limitations to be observed during operation of the F-8E aircraft.

3. The following changes are made to the Supplemental NATOPS Flight Manual, NAVWEPS 01-45HHD-1A of 1 May 1965, for Navy Model F-8D, -8E Aircraft.

a. Section I, Part 4, page 3, paragraph entitled EXTERNAL STORES LIMITATIONS, add the following WARNING:

"Ordnance shall be jettisoned above the minimum fragmentation clearance altitude when possible, even though jettison safe is selected."

b. Section I, Part 4, page 11, Figure 1-5(Sheet 1) entitled EXTERNAL ARMAMENT LIMITATIONS, under the Stores column delete "Aero 6A, 6A-1, 6A-2, and LAU-32A/A Rocket Pack on Aero 7A-1 Bomb Rack" and substitute "Aero 6A, 6A-1, 6A-2, LAU-32A/A, and LAU-32B/A Rocket Pack on Aero 7A-1 Bomb Rack."

c. Section I, Part 4, page 12, Figure 1-5(Sheet 2) entitled EXTERNAL ARMAMENT LIMITATIONS;

(1) Make the following changes for the Mk 81, Mk 82, Mk 83 and Mk 84 Bombs or Mk 86, Mk 87, and Mk 88 Practice Bombs on Aero 7A-1 Single or A/A37B-1 Multiple Bomb Racks:

(a) Under Normal Acceleration - Firing or Dropping delete "0.5g - 4.5g" and substitute the following:

"From Aero 7A-1: +0.5g to +4.5g
From A/A37B-1: +1.0g to +4.5g"

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(b) Under Remarks add the following:

"Maximum dive angle for release of bombs is 40°. For all bomb releases from multiple racks, set the MBR release mode selector switch on singles."

(2) Under the Stores column delete "Mk 77 Fire Bomb on Aero 7A-1 Bomb Rack" and substitute "Mk 77 Mod 1/2 Fire Bomb on Aero 7A-1 Bomb Rack."

(3) Under remarks for the Mk 77 Mod 1/2 and Mk 79 Fire Bomb on Aero 7A-1 Bomb Rack add the following:

"Maximum dive angle for release of bombs is 10°."

(4) Under Stores column delete "Mk 106 Mod 2/3", where appearing, and substitute "Mk 106 Mod 2/3/4."

(5) Under remarks for the 250-lb GP AN-M57A-1, 260-lb Frag AN-M81, 220-lb Frag AN-M88 Banded Lug Bombs on A/A37B-1 Multiple Bomb Rack add the following:

"Maximum dive angle for release of bombs is 40°. For all bomb releases from multiple racks set the MBR release mode selector switch on singles."

(6) Under remarks for the Mk 81 Snakeye I or Mk 82 Snakeye I on A/A37B-1 MBR, as added by Flight Manual Interim Change No. 14 of 16 September 1965, add the following:

"Maximum dive angle for release of bombs is 40°. For all bomb releases from multiple racks, set the MBR release mode selector switch on singles."

(7) Under remarks for the 500-lb GP AN-M64A1 on Aero 7A-1 Bomb Rack, as added by Flight Manual Interim Change No. 14 of 16 September 1965, add the following:

"Maximum dive angle for release of bombs is 40°."

END

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NAVWEPS 01-45HHD-1A
22 MARCH 1966

FLIGHT MANUAL INTERIM CHANGE NO. 19

Navy Model F-8E Aircraft

PUBLISHED BY DIRECTION OF THE CHIEF OF THE BUREAU OF NAVAL WEAPONS

Of paramount interest to pilots. To be read by all pilots operating these aircraft.

1. CANCELLATION. None.

2. PURPOSE. To set forth additional external stores limitations to be observed during operation of the F-8E aircraft.

3. The following changes are made to the supplemental NATOPS Flight Manual, NAVWEPS 01-45HHD-1A of 1 May 1965, for Navy Model F-8D, -8E aircraft.

a. Section I, Part 4, page 12, Figure 1-5 (sheet 2) entitled EXTERNAL ARMAMENT LIMITATIONS;

(1) Under REMARKS for the MK 77 Mod 1/2 Fire Bomb on Aero 7A-1 Bomb Rack, delete "Maximum Dive Angle for release of bombs is 10°", as added by Flight Manual Interim Change No. 18 of 3 March 1966, and substitute the following:

"Maximum Dive Angle for release of bombs is 45°".

(2) Under REMARKS for the 250-lb GP AN-M57A1, 260-lb Frag AN-M81, 220-lb Frag AN-M88 Banded Lug Bombs on the A/A37B-1 Multiple Bomb Rack, add the following:

"Conical fin assembly is required".

(3) Add the following authorized store to the figure:

Store . . . . 500-lb GP AN-M64A1 on Aero 7A-1 Bomb Rack
Station . . . . Left and Right Wing
Maximum Indicated Airspeed or Mach (Whichever Is Less):
Carrying. . . . . 350 KIAS* or 0.80 IMN
Dropping. . . . . 450 KIAS or 0.80 IMN
Normal Acceleration
Carrying. . . . . +1.0G to +4.5G

Dropping.	+1.0G to +4.5G
Remarks	Limitations shown are for the box fin assembly. See Note 3. *Maximum sustained carriage airspeed. 350-450 KIAS is permitted in the delivery maneuver only. Box fins should be limited to one flight.

END

CONFIDENTIAL

NAVWEPS 01-45HHD-1A
10 MAY 1966

FLIGHT MANUAL INTERIM CHANGE NO. 20

Navy Model F-8E Aircraft

PUBLISHED BY DIRECTION OF THE CHIEF OF THE BUREAU OF NAVAL WEAPONS

Of paramount interest to pilots. To be read by all pilots operating these aircraft.

1. CANCELLATION. None.

2. PURPOSE. To set forth additional external stores limitations to be observed during operation of the F-8E aircraft.

3. The following changes are made to the supplemental NATOPS Flight Manual, NAVWEPS 01-45HHD-1A of 1 May 1965, for Navy Model F-8E aircraft.

a. Section I, Part 4, page 12, Figure 1-5 (sheet 2) entitled EXTERNAL ARMAMENT LIMITATIONS:

(1) Under remarks for the Mk 81 Snakeye I or Mk 82 Snakeye I on A/A37B-1 MBR, as added by Flight Manual Interim Change No. 14 of 16 September 1965, add the following:

"The maximum release speed for the Mk 81 Snakeye I bombs when equipped with Mk 14 Mod 1 bomb fins is restricted to 350 KIAS when releasing in the high drag (retarded) mode".

(2) Add the following authorized stores to the figure:

Store . . . . 250-lb GP AN-M57A1, 260-lb Frag AN-M81, 220-lb Frag AN-M88 Banded Lug Bombs with Snakeye Tails on the A/A37B-1 Multiple Bomb Rack

Station. . . . . Left and Right Wing

Maximum Indicated Airspeed or Mach Whichever Is Less:

Carrying . . . . 475 KIAS or 0.80 IMN

Dropping . . . . 475 KIAS or 0.80 IMN

Normal Acceleration:

Carrying	Figure 1-1 sheet 3 and Figure 1-3
Dropping	+1.0G to +4.5G
Remarks	Carriage of bombs on inboard stations of the multiple bomb rack is not permitted. Maximum dive angle for release of bombs is 40°. Do not vary "G" during release as bomb-to-bomb collision may occur. For all bomb releases from multiple racks set the MBR release mode selector switch on singles. Multiple bomb racks may be jettisoned with bombs in level flight at airspeeds less than 0.80 IMN and without bombs in level flight at airspeeds less than 0.95 IMN. See Note 3.

WARNING

Release of bombs is permitted in the unretarded mode only.

END

N°7 149

20 MARS 1967

NAVAIR 01-45HHD-1A
7 JULY 1966

FLIGHT MANUAL INTERIM CHANGE NO. 21

Navy Model F-8E Aircraft

Published by direction of the Commander of the Naval Air Systems Command

Of paramount interest to pilots. To be read by all pilots operating these aircraft.

1. CANCELLATION. None

2. PURPOSE. To set forth an external store limitation to be observed during operation of the F-8E aircraft.

3. The following change is made to the Supplemental NATOPS Flight Manual, NAVWEPS 01-45HHD-1A of 1 May 1965, for Navy Model F-8E Aircraft:

a. Delete paragraph 3.a.(1) of Flight Manual Interim Change No. 20 of 10 May 1966 and substitute the following:

> "The maximum release speed for the MK 81 SNAKEYE I bombs when equipped with MK 14 Mod 1 bomb fins is restricted to 350 KIAS when releasing in the high drag (retarded) mode and 500 KIAS when releasing in the low drag (unretarded) mode."

END

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, D. C. 20350

LETTER OF PROMULGATION

1. The Naval Air Training and Operating Procedures Standardization Program (NATOPS) is a positive approach towards improving combat readiness and achieving a substantial reduction in the aircraft accident rate. Standardization, based on professional knowledge and experience provides the basis for development of an efficient and sound operational procedure. The standardization program is not planned to stifle individual initiative but rather, it will aid the Commanding Officer in increasing his unit's combat potential without reducing his command prestige or responsibility.

2. This Manual is published for the purpose of standardizing ground and flight procedures, and does not include tactical doctrine. Compliance with the stipulated manual procedure is mandatory. However, to remain effective this manual must be dynamic. It must stimulate rather than stifle individual thinking. Since aviation is a continuing progressive profession, it is both desirable and necessary that new ideas and new techniques be expeditiously formulated and incorporated. It is a user's publication, prepared by and for users, and kept current by the users in order to achieve maximum readiness and safety in the most efficient and economical manner. Should conflict exist between the training and operating procedures found in this manual and those found in other publications, this manual will govern.

3. Checklists and other pertinent extracts from this publication necessary to normal operations and training should be made and may be carried in Naval aircraft for use therein. It is forbidden to make copies of this entire publication or major portions thereof without specific authority of the Chief of Naval Operations.

Paul H. Ramsey

PAUL H. RAMSEY
Vice Admiral, USN
Deputy Chief of Naval Operations (Air)

INTERIM CHANGE SUMMARY

CHANGE NUMBER	CHANGE DATE	PAGES AFFECTED	PURPOSE
1 through 17			Previously incorporated or cancelled
18	3-3-66	11, 12, 13	Adds external stores and store limitations
19*	3-22-66	12, 13	Adds external store limitations
20	5-10-66	12, 13	Adds external stores and store limitations

*Incorporated as amended by NASC.

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Section IV — FLIGHT PROCEDURES AND CHARACTERISTICS 13

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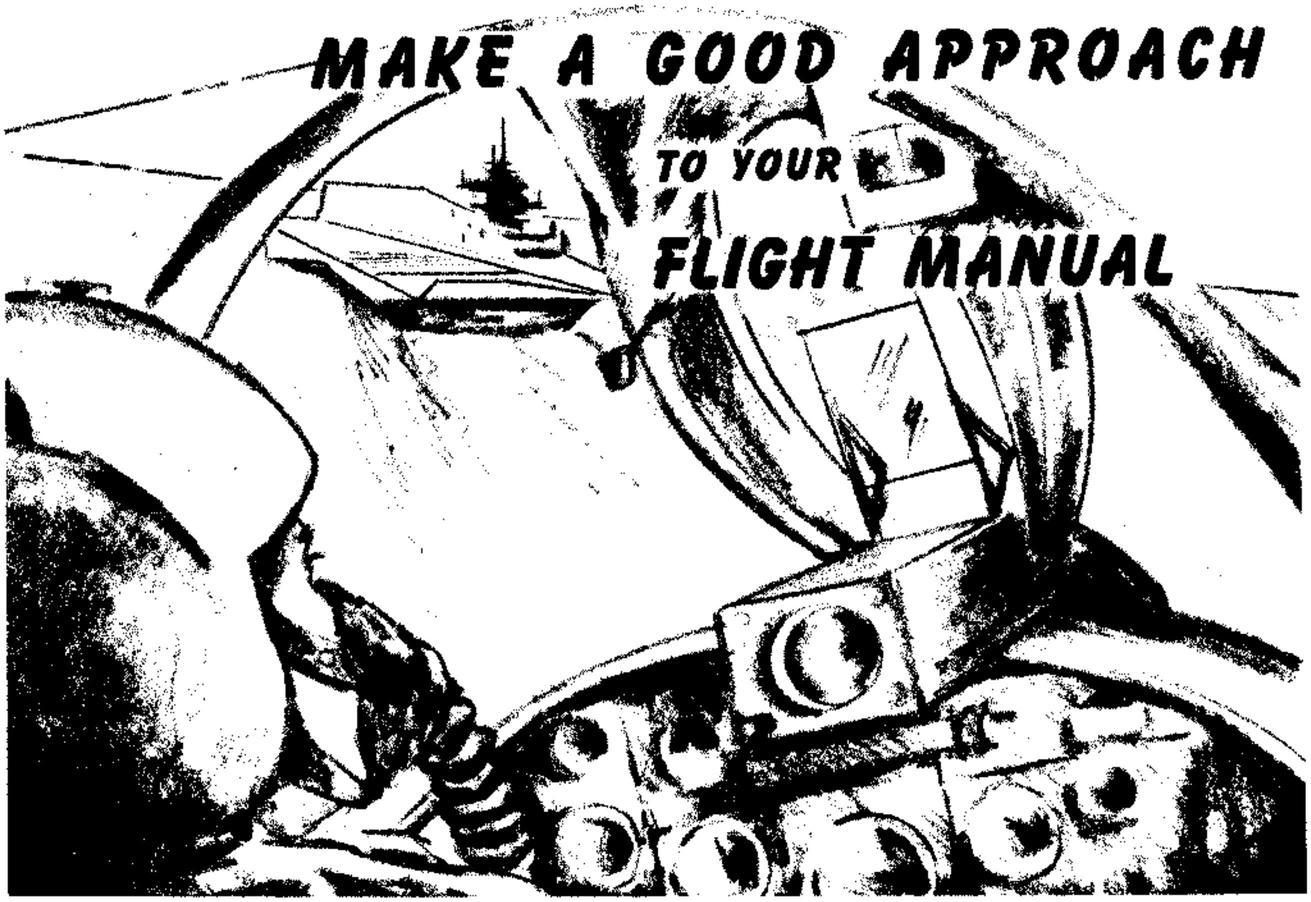
Part 1 — Introduction

Part 2 — Performance Charts



This publication contains classified materials supplementing the unclassified F-8D, F-8E NATOPS Flight Manual. The section and part headings of the unclassified manual have been retained to facilitate cross-referencing between publications.

It is essential for you to understand that section I, part 4 is the only authorized source of operating limitations for the F-8D and F-8E and that changes will be published only in the form of regular or interim changes of this supplement.

SERVICE CHANGE SUMMARY

Following is a list of service changes which apply to this manual but which may not be incorporated in the aircraft. The service change is briefly described and, where applicable, information is given for visual determination of incorporation.

Service Change (Type Change and Change Number)	*Description*	*Visual Identification*
Aircraft Service Changes:		
388	Installs infrared detection system	Infrared receiver in front of windshield
395	Improves radar detection with larger, IP626APQ94 radar indicator	Larger radar indicator
Airframe Changes:		
447	Provides an auxiliary track lamp next to the sight unit for use in the GARO (guns automatic ranging only) mode of radar operation	Auxiliary track lamp on the RH side of the sight unit reflector plate
451	Provides for continuous operation of the aircraft engine ignitor during missile firing or jettisoning operations	Toggle switch on throttle quadrant decaled CONT IGN
488	Adds MER/TER capability	Presence of a MER/TER jettison switch on the cockpit armament panel.
Avionics Changes:		
133, 148	Adds GARO (guns automatic ranging only) mode of radar operation	

section I
aircraft

CONTENTS

PART 1—AIRCRAFT AND ENGINE*

PART 2—SYSTEMS*

PART 3—AIRCRAFT SERVICING*

PART 4—AIRCRAFT OPERATING LIMITATIONS

Introduction 2

Airspeed Limitations 2

Power Control Hydraulic System 2

Trim and Stabilization System 2

Maneuvers 2

Acceleration Limitations 3

Engine Limitations 3

External Stores Limitations 3

*Refer to unclassified NATOPS Flight Manual

PART 4 — AIRCRAFT OPERATING LIMITATIONS

INTRODUCTION

This section contains classified limitations that must be observed during normal operation of F-8D and F-8E aircraft. They are derived from actual flight tests and demonstrations.

Limitations which are merely associated with a certain technique or specialized phase of operation are discussed appropriately in sections III, IV, and V and other parts of this section.

AIRSPEED LIMITATIONS

Note

Refer to NATOPS Flight Manual for additional limitations.

The maximum permissible indicated airspeeds in smooth or moderately turbulent air are as follows:

With arresting hook, landing gear, speed brake, and wing leading edge droop retracted and wing down . . . . . . As shown in figure 1–1

Carrying Sidewinder 1A missile with MK 8 Warhead . . . . . . Refer to figure 1–4

POWER CONTROL HYDRAULIC SYSTEM

Note

Refer to NATOPS Flight Manual for additional limitations.

With one power control hydraulic system inoperative, operation is restricted to the following limits:

Maximum acceleration — (PC 1 out) 4.0 g
— (PC 2 out) same as "yaw stab inoperative" (figure 1–1)

TRIM AND STABILIZATION SYSTEM

Note

Refer to NATOPS Flight Manual for additional limitations.

In the clean condition, with only the roll stabilization system inoperative, restrictions are not changed from basic aircraft restrictions. With yaw stabilization and rudder-aileron interconnect systems inoperative, the following restriction applies:

Maximum permissible load factors — See figure 1–1.

MANEUVERS

The following maneuvers are permitted if the restrictions of figures 1–1 through 1–3 are observed:

Loop
Chandelle
Immelmann turn
Aileron rolls

Note

Aileron rolls shall not be initiated at less than 1.0 g. During rolls, the stick shall not be moved forward of the level flight longitudinal stick position for the entry airspeed used.

The following maneuvers are not permitted:

Without wing stores — Rolls in excess of 360° bank angle change

With wing stores — Full aileron rolls in excess of 180° bank angle change. Clean condition stops aileron rolls in excess of 360° bank angle change.

Intentional spins

ACCELERATION LIMITATIONS

The maximum accelerations permitted for symmetrical and asymmetrical flight in smooth air or light turbulence are shown in figures 1–1 through 1–3. When flying in conditions of moderate turbulence, it is essential that accelerations from deliberate maneuvers be reduced 2.0 g below that shown in figures 1–2 and 1–3. This is to minimize the possibility of overstressing the aircraft as a result of the combined effects of gust and maneuvering loads.

The maximum negative acceleration for symmetrical flight is 2.4 g up to 725 KIAS and 0 g above 725 KIAS for aircraft without wing stores. With wing stores the maximum negative acceleration for symmetrical flight is 2.0 g.

Note

Refer to section IV, part 2, for flight characteristics and erroneous accelerometer indications during rolling pullouts near acceleration limits.

With inflight refueling probe extended, the permissible acceleration range is –1.0 g to 3.0 g.

Permissible range in the landing configuration is 0 to 2.0 g.

The use of landing droop during spin recovery is permitted. Following spin recovery, with wing down and landing droop extended, the permissible acceleration range is 0 to 3.5 g.

With leading edge droop unlocked (barberpole indication), the permissible acceleration range is 0 to 3.5 g.

ENGINE LIMITATIONS

Note

Refer to NATOPS Flight Manual for additional limitations.

ENGINE OPERATION

Turbojet engines should be operated at the lowest thrust conditions compatible with mission and flight requirements and maintained within the specified military rating and maximum rating time limits whenever practicable. However, if the mission or flight conditions absolutely necessitate operation at these ratings for longer than 30 minutes military or 15 minutes maximum, the thrust should not be reduced for only a short interval in adherence to these limits but operation continued at the high thrust level until conditions permit a reduction in thrust.

Continuous negative g operation is limited to 10 seconds.

EXTERNAL STORES LIMITATIONS

EXTERNAL ARMAMENT LIMITATIONS

WARNING

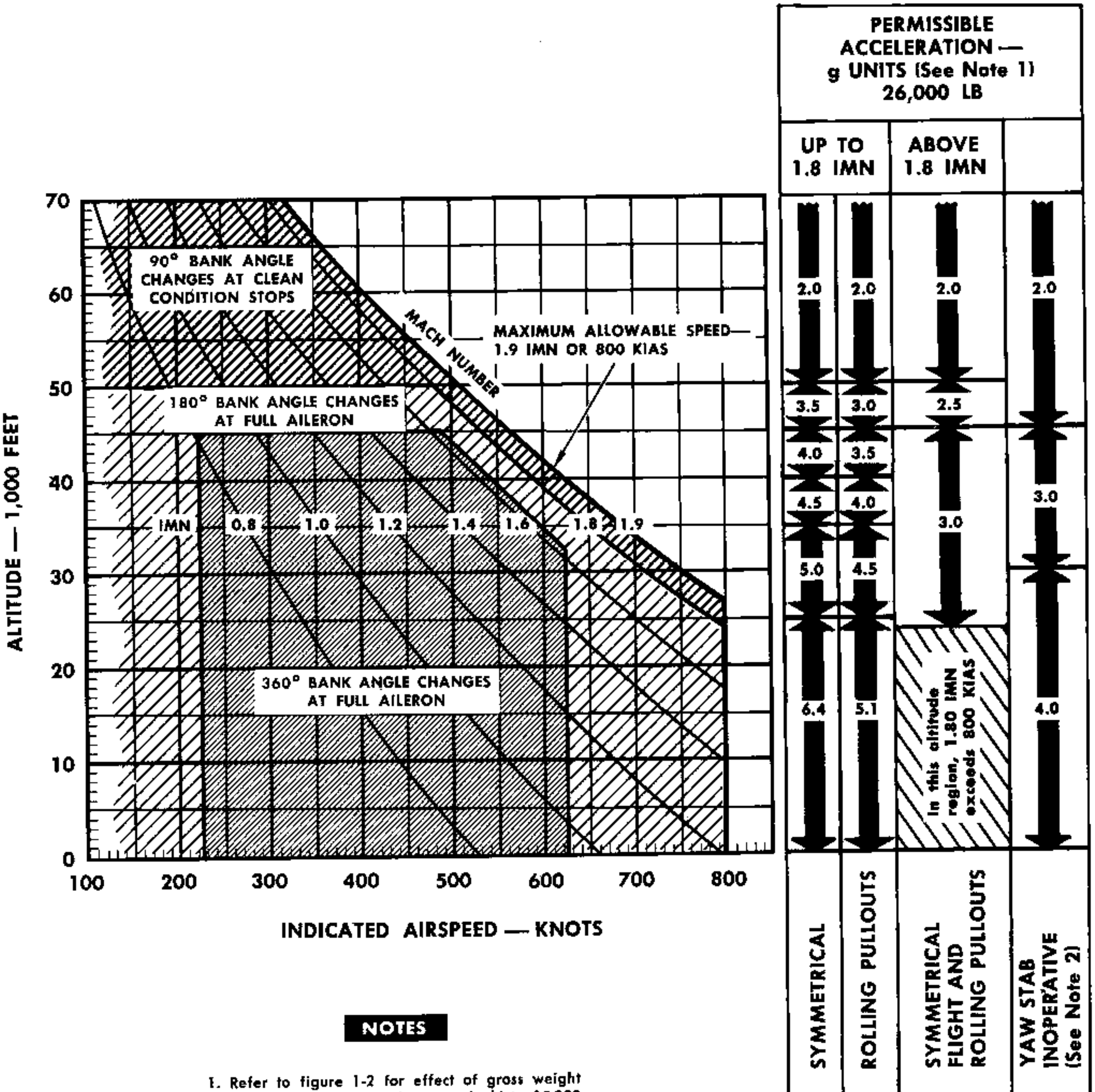
Ordnance shall be jettisoned above the minimum fragmentation clearance altitude when possible, even though jettison safe is selected.

Only the external armament stores shown in figure 1–5 and figure 1–5A may be carried and released singly or in combination to the limits shown. When carrying stores in combination, the more restrictive limits apply.

FLIGHT OPERATING LIMITATIONS

F-8D

BASIS AIRPLANE, TWO OR FOUR SIDEWINDER CONFIGURATION, TWO OR FOUR FUSELAGE ZUNI PACKS (SEE NOTE 3)



NOTES

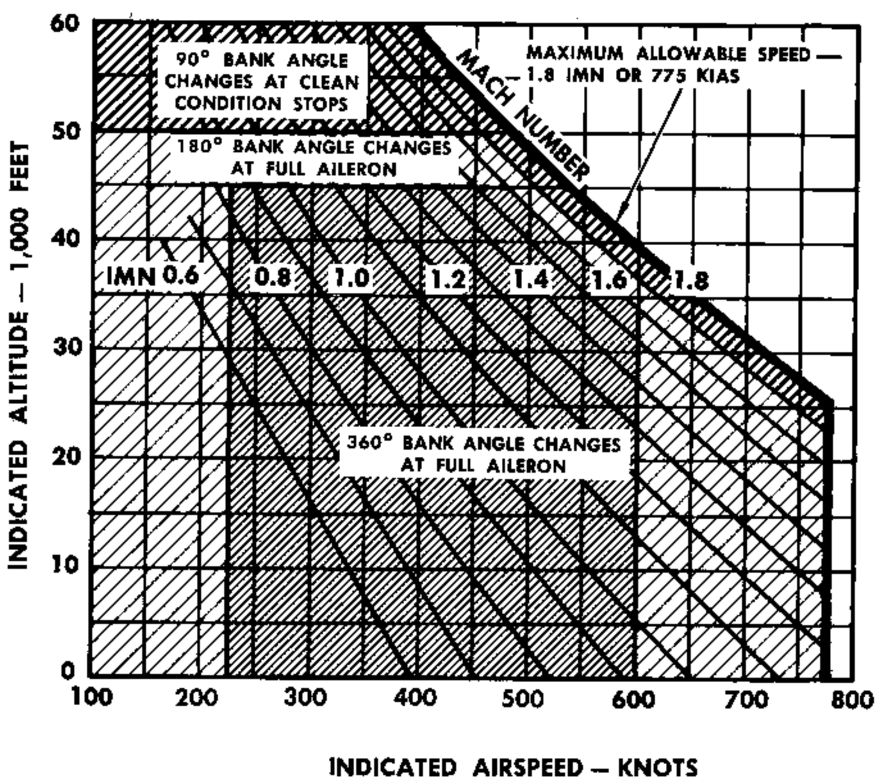
1. Refer to figure 1-2 for effect of gross weight on acceleration limits from sea level to 25,000 feet.
2. Refer to section IV, NATOPS Flight Manual, for effects of yaw stabilization failure on flight characteristics.
3. Refer to figure 1-4 for additional limitations when carrying Sidewinder 1A missile with MK-8 warhead.

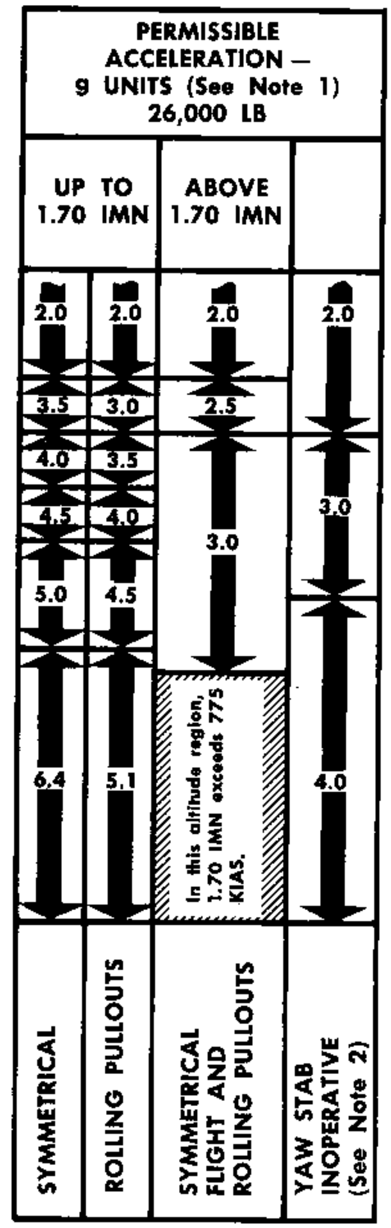
63802-5-2(1)NA

Figure 1–1 (Sheet 1)

FLIGHT OPERATING LIMITATIONS
F-8E

BASIC AIRPLANE, TWO OR FOUR SIDEWINDER CONFIGURATION, TWO OR FOUR FUSELAGE ZUNI PACKS; WITH OR WITHOUT WING PYLONS AND AERO 7A-1 BOMB RACKS (SEE NOTE 3)





NOTES

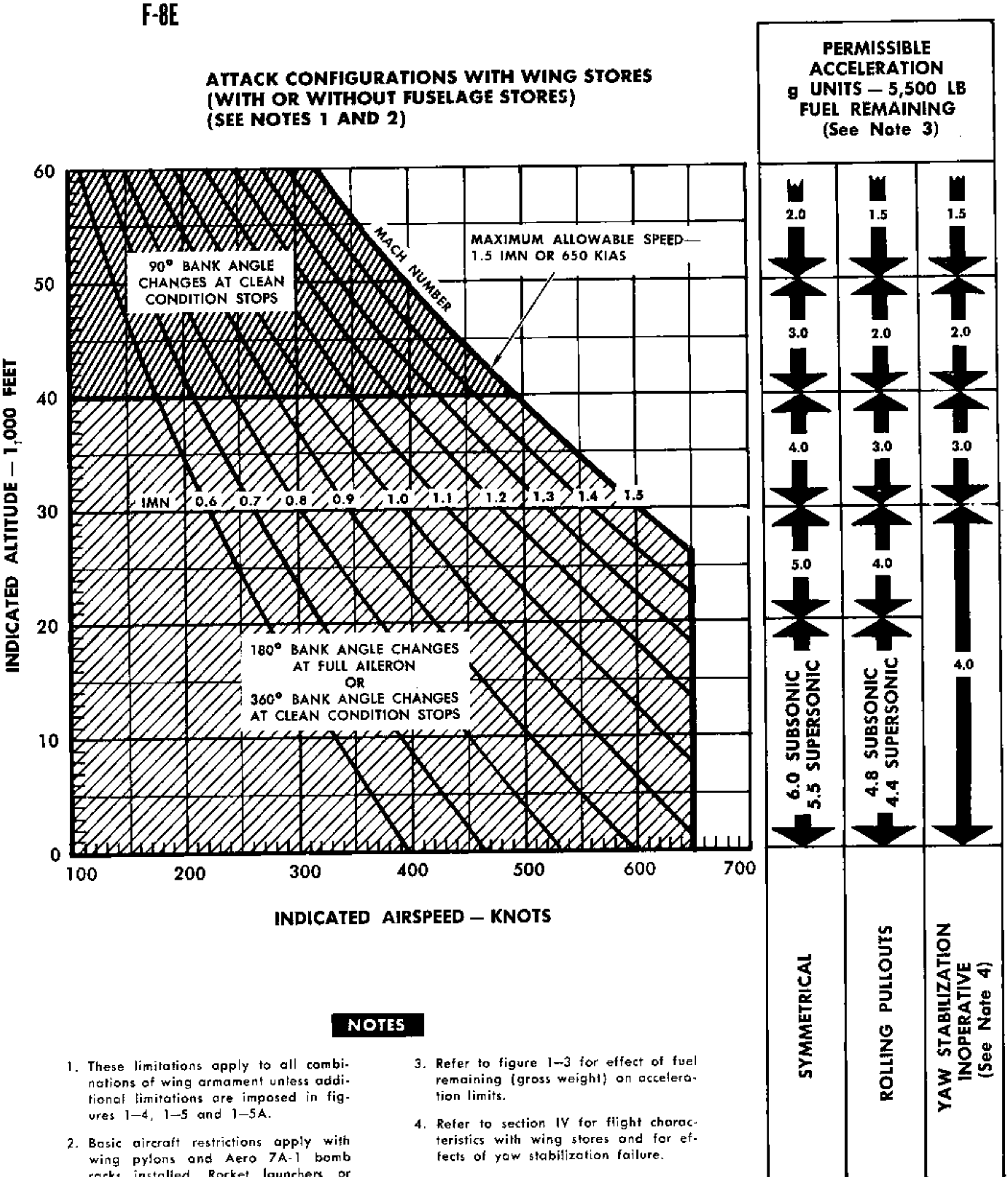
1. Refer to figure 1-2 for effect of gross weight on acceleration limits from sea level to 25,000 feet.
2. Refer to section IV, NATOPS Flight Manual, for effects of yaw stabilization failure on flight characteristics.
3. Refer to figure 1-4 for additional limitations when carrying Sidewinder 1A missile with MK-8 warhead.

63802-5 — 4NA

Figure 1—1 (Sheet 2)

FLIGHT OPERATING LIMITATIONS

F-8E



NOTES

1. These limitations apply to all combinations of wing armament unless additional limitations are imposed in figures 1–4, 1–5 and 1–5A.
2. Basic aircraft restrictions apply with wing pylons and Aero 7A-1 bomb racks installed. Rocket launchers or packs, multiple bomb racks, multiple ejector racks and triple ejector racks are considered to be wing stores.
3. Refer to figure 1–3 for effect of fuel remaining (gross weight) on acceleration limits.
4. Refer to section IV for flight characteristics with wing stores and for effects of yaw stabilization failure.

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Figure 1–1 (Sheet 3)

ACCELERATION LIMITS VERSUS GROSS WEIGHT

F-8D; F-8E WITH NO BOMBS OR WING ZUNI (LAU-10/A) LAUNCHERS (WITH OR WITHOUT FUSELAGE STORES)

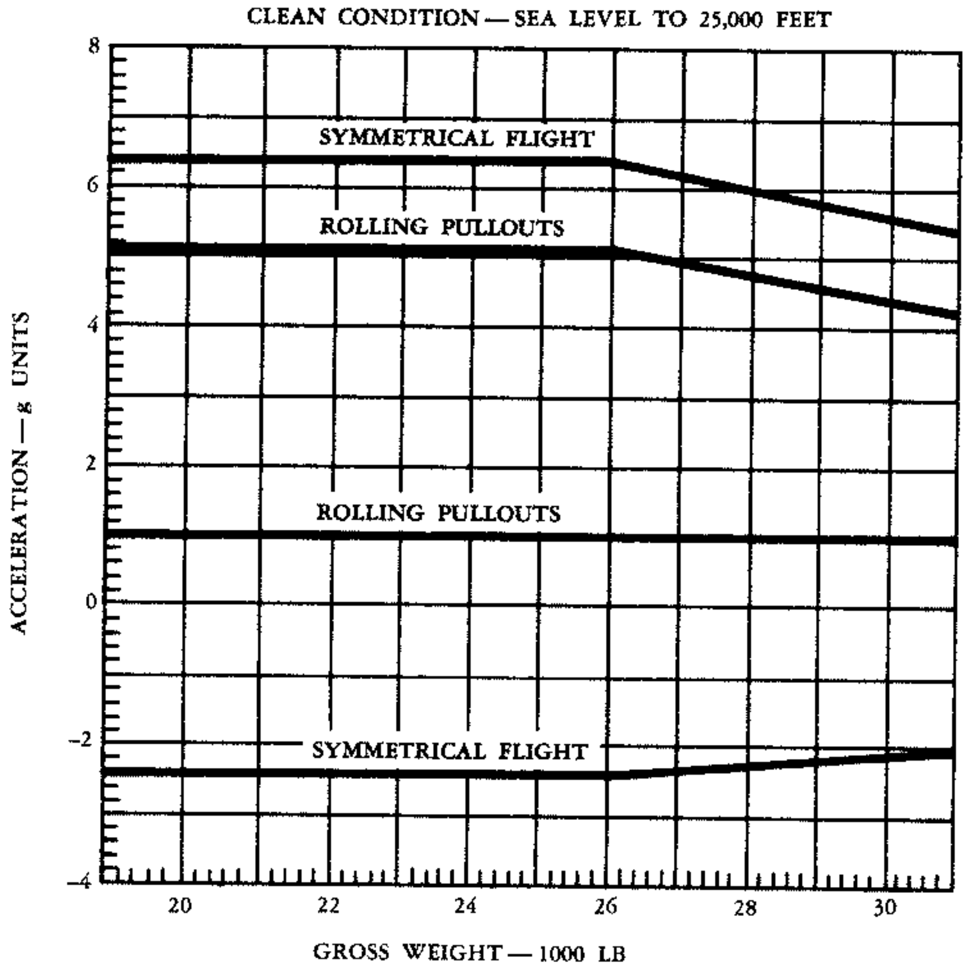
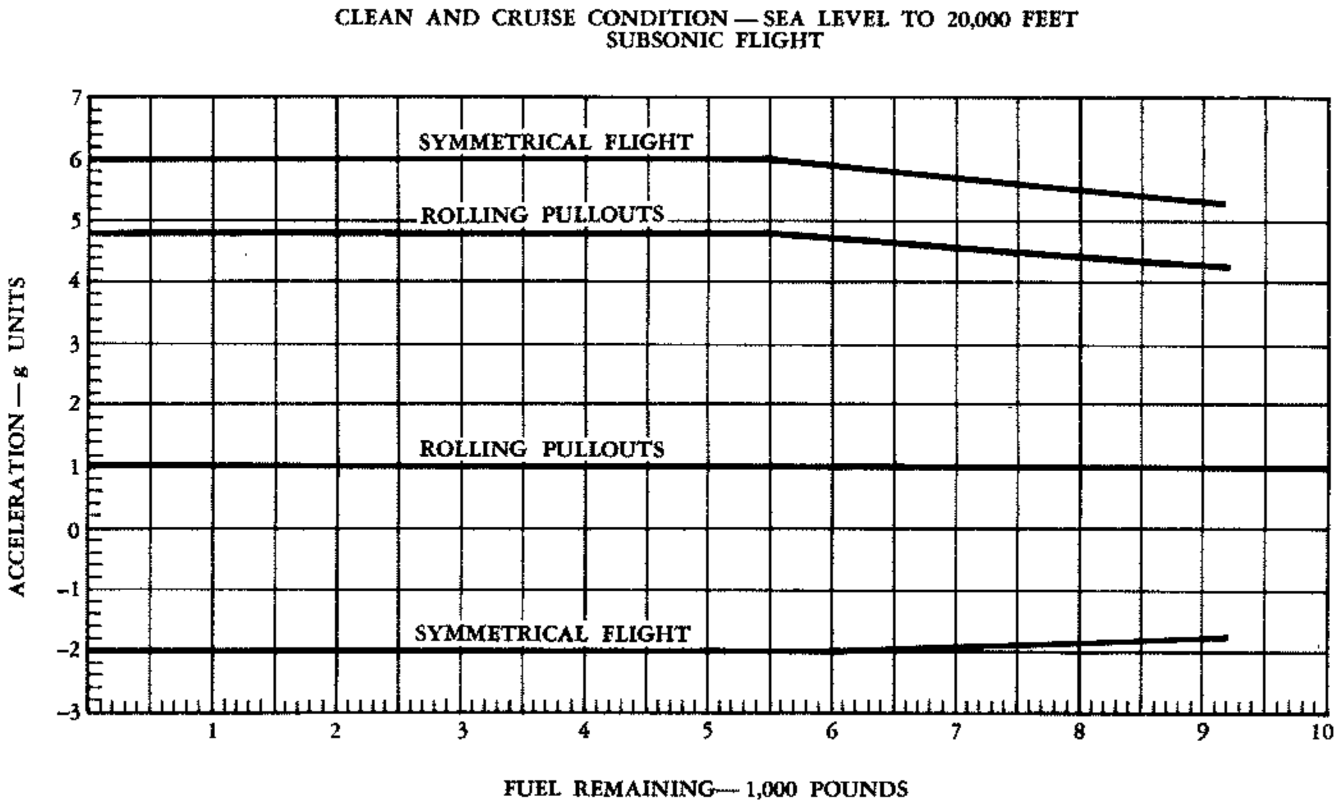


Figure 1–2

ACCELERATION LIMITS VERSUS FUEL REMAINING

F-8E — ATTACK CONFIGURATIONS WITH WING STORES (WITH OR WITHOUT FUSELAGE STORES)



NOTE

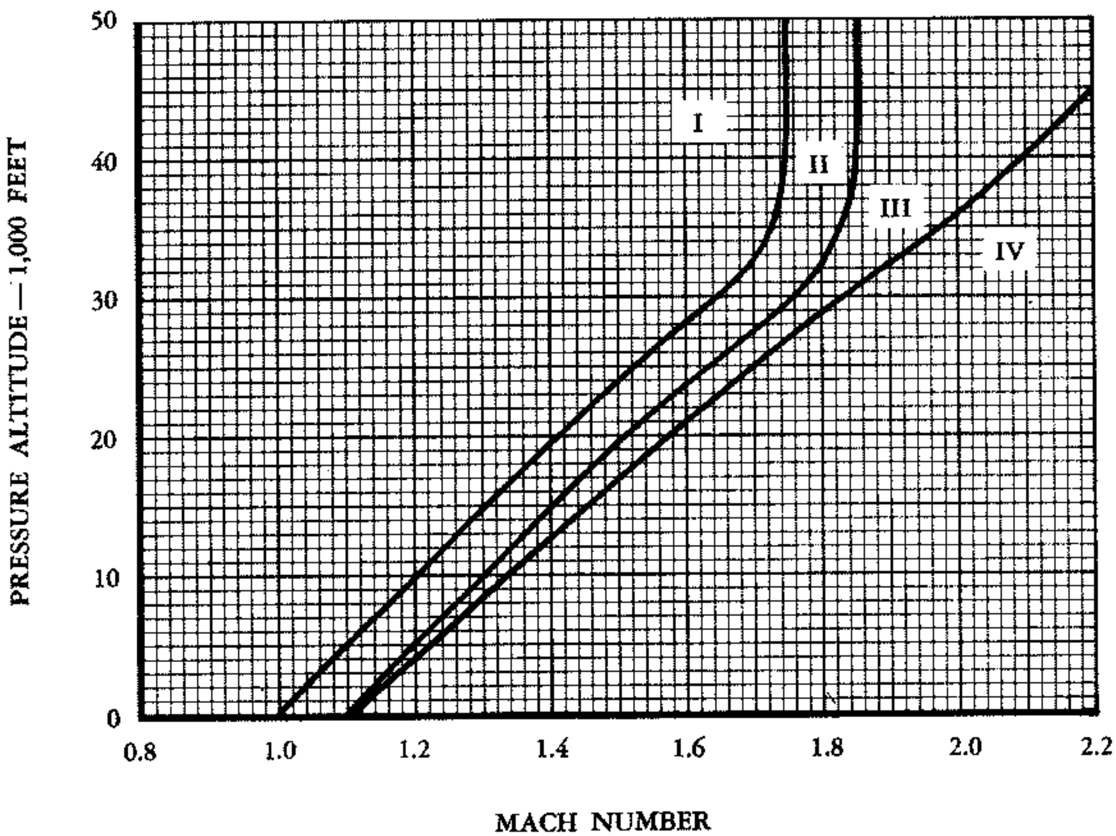
Aileron rolls shall not be initiated at less than 1.0g. During rolls the stick shall not be moved forward of the level flight longitudinal stick position for the entry airspeed used.

63802-5-10

Figure 1–3

AIRSPEED LIMITATIONS

AIRCRAFT CARRYING SIDEWINDER 1A WITH MK 8 MOD 0/1/2 WARHEAD
STANDARD DAY—59°F (15°C) AT SEA LEVEL



LIMITATIONS

ZONE I:	No Restrictions
ZONE II:	Repeated excursions of no more than 10 minutes each permissible
ZONE III:	Repeated excursions of no more than 5 minutes each permissible; inspection of warheads recommended after each excursion into Zones II and III.
ZONE IV:	Avoid

NOTES

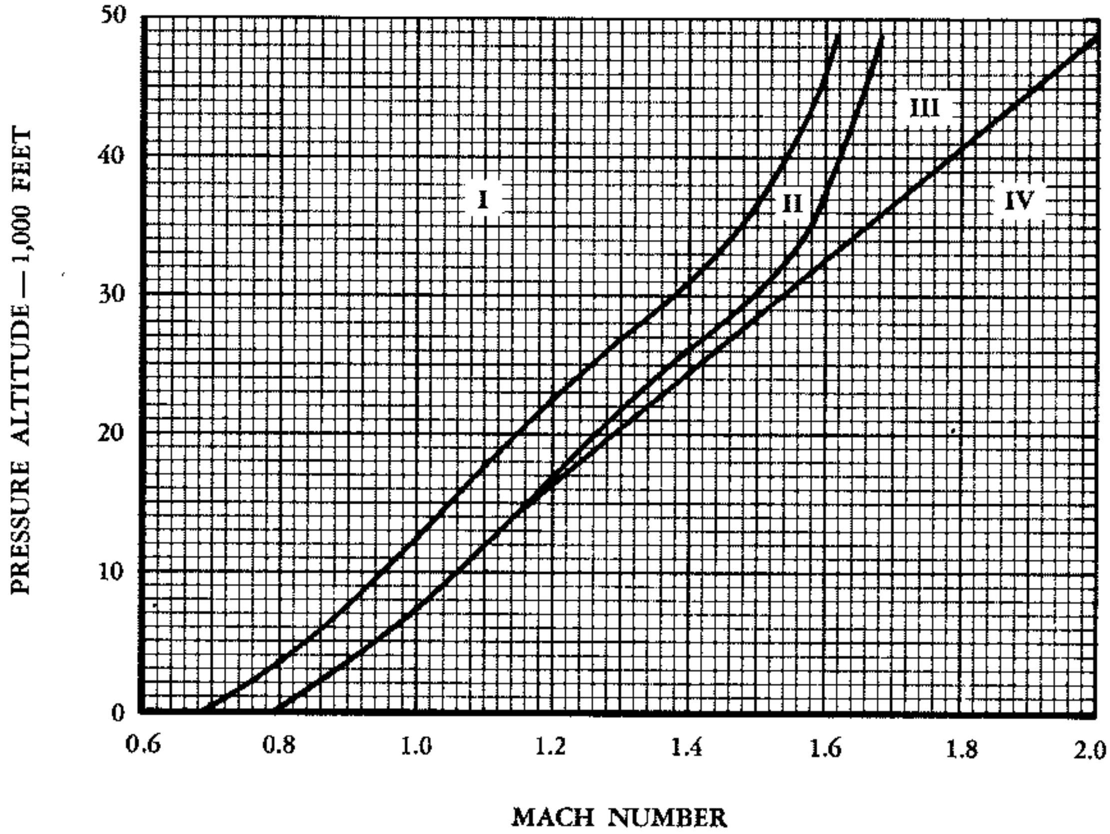
1. Limitations do not apply to aircraft climb schedules.
2. If limitations of Zones II, III and IV are violated, the warhead should be destroyed by jettisoning the missile, if possible. If not possible, landing on the carrier or airstrip can be made with low order risk.
3. Limitations apply only to the Mk 8 Mod 0/1/2 warhead. The Mk 8 Mod 3 warhead is unrestricted.

63802-5-18NB

Figure 1-4 (Sheet 1)

AIRSPEED LIMITATIONS

AIRCRAFT CARRYING SIDEWINDER 1A WITH MK 8 MOD 0/1/2 WARHEAD HOT DAY—103°F (39.5°C) AT SEA LEVEL



LIMITATIONS

ZONE I:	No Restrictions
ZONE II:	Repeated excursions of no more than 10 minutes each permissible
ZONE III:	Repeated excursions of no more than 5 minutes each permissible; inspection of warheads recommended after each excursion into Zones II and III.
ZONE IV:	Avoid

NOTES

1. Limitations do not apply to aircraft climb schedules.
2. If limitations of Zones II, III and IV are violated, the warhead should be destroyed by jettisoning the missile, if possible. If not possible, landing on carrier or airstrip can be made with low order risk.
3. Limitations apply only to the Mk 8 Mod 0/1/2 warhead. The Mk 8 Mod 3 warhead is unrestricted.

63802-5-19NB

Figure 1-4 (Sheet 2)

EXTERNAL ARMAMENT LIMITATIONS

STORES	STATIONS (NOTE 1)								MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2)			NORMAL ACCELERATION (NOTE 2)		JETTISONING ACCELERATION AND AIRSPEED (NOTE 10)	REMARKS
	WING (NOTE 3)		FUSELAGE												
			DUAL PYLONS				SINGLE PYLONS		CARRYING	FIRING OR DROPPING (NOTE 9)		CARRYING	FIRING OR DROPPING (NOTE 9)		
	Left	Right	Upper Left	Lower Left	Upper Right	Lower Right	Left	Right		KIAS	IMN				
AIM-9B/C/D MISSILES			√	√	√	√	√	√	Figure 1-4 Sheets 1 & 2 (See Note 3) Figure 1-1 Sheets 1 & 2	Airplane Limits		Figure 1-1 Sheets 1 & 2 and Figure 1-2	0g to +2.0g	Same as Firing	Do not fire above 65,000 feet. Use military rated thrust for firing above 60,000 feet. The minimum airspeed for firing above 50,000 feet is 180 KIAS. When firing above 55,000 feet or jettisoning above 15,000 feet, place the continuous engine ignition switch ON (or manually depress the ignite micro-switch) at least 10 seconds before firing to prevent possible engine flameout. Firing of SW-1C missiles from upper right dual pylon station is only permitted for operational necessity, because of excessive paint erosion.
ZUNI ROCKETS (IN TWO-ROUND ZUNI PACKS)			√	√	√	√	√	√	Figure 1-1 Sheets 1 & 2	—	0.95		+0.5g to +1.5g		Do not fire above 50,000 feet. Above 15,000 feet, place the continuous engine ignition switch ON (or manually depress the ignite microswitch) at least 10 seconds before firing to prevent possible engine flameout.
ZUNI ROCKETS (IN FOUR-ROUND LAU-10/A LAUNCHERS)	√	√							550 KIAS and Figure 1-1 Sheet 3	550		Figure 1-1 Sheet 3 and Figure 1-3		+1.0g 300 – 400 KIAS below 0.95 IMN	LAU-10/A rocket launcher firing prohibited with tail fairing (due to damage to rocket motor seals).
AERO 7D ROCKET PACK ON AERO 7A-1 BOMB RACK	√	√							Figure 1-1 Sheet 3	500					
LAU-3A/A ROCKET PACK ON AERO 7A-1 BOMB RACK	√	√													
AERO 6A, 6A-1, 6A-2, LAU-32A/A, AND LAU-32B/A ROCKET PACK ON AERO 7A-1 BOMB RACK	√	√							550 KIAS or 0.95 IMN				+0.5g to +4.5g	Areo 6A-2, LAU – 32 A/A: +1.0g 200 – 500 KIAS below 0.90 IMN	The Aero 6A series rocket packs should have the KMU-52/A single fire intervalometer installed when used for training. Jettisoning of Aero 6A and 6A-1 rocket packs is not recommended. Rocket pack will fail under ejection force. Jettison Aero 6A-2 and LAU-32A/A rocket packs, with landing gear UP, wing down.

NOTE

All notes are presented on the last sheet of this illustration.

63802—5—16(1)NB

Figure 1–5 (Sheet 1)

EXTERNAL ARMAMENT LIMITATIONS

STORES	STATIONS (NOTE 1) WING Left	WING Right	FUSELAGE DUAL PYLONS Upper Left	Lower Left	Upper Right	Lower Right	SINGLE PYLONS Left	Right	MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2) CARRYING	FIRING OR DROPPING (NOTE 9) KIAS	IMN	NORMAL ACCELERATION (NOTE 2) CARRYING	FIRING OR DROPPING (NOTE 9)	JETTISONING ACCELERATION AND AIRSPEED (NOTE 10)	REMARKS
MK 81, MK 82 MK 83 AND MK 84 BOMBS OR MK 86, MK 87 AND MK 88 PRACTICE BOMBS ON AERO 7A-1 SINGLE OR A/A37B-1 MULTIPLE BOMB RACKS	√	√							Figure 1-1 Sheet 3	—	0.95		From Aero 7A-1: 0.0g to +4.5g From MBR: +1.0g to 4.5g (See Note 8)	Same as Dropping 1.0g below 0.95 IMN	Airspeed limitations are for electrically-fused bombs only. See Note 4 for airspeed limitations for mechanically-fused bombs. Carriage of bombs on inboard stations of the MBR is not permitted. MK 86 and MK 87 practice bombs may be carried only on stations 1 and 2 of the MBR due to tail fin interference. The MK 83, MK 84 and MK 88 may be carried in the Aero 7A-1 ejector bomb rack only. See Note 6.
MK 77 MOD ½ FIRE BOMB ON AERO 7A-1 BOMB RACK	√	√							475 KIAS and Figure 1-1 Sheet 3	450	—	Figure 1-1 Sheet 3 and Figure 1-3	+0.5g to +2.5g	Same as Dropping	No sideslipping during release. Release at greater than 250 KIAS. See Notes 4 and 5. Maximum dive angle for release of bombs is 45°.
MK 79 FIRE BOMB ON AERO 7A-1 BOMB RACK	√	√													See Notes 4, 5 and 7.
MK 76 MOD 4/5 MK 106 MOD 2/3/4 PRACTICE BOMBS IN AERO 8A-1 PBC	√	√							550 KIAS and Figure 1-1 Sheet 3	550	—		+0.5g to +4.5g	Not Recommended	Do not open PBC doors at airspeeds in excess of 500 KIAS. See Note 4.
MK 76 MOD 4/5 MK 89 MOD 0/1 PRACTICE BOMBS ON THE A/A37B-3 PMBR	√	√							Figure 1-1 Sheet 3	—	0.95				MK 89 MOD 0/1 practice bombs will fit only on stations 2, 3, and 4 of A/A37B-3 PMBR. See Note 4.
250-LB. G.P. AN-M57A1, 260-LB. FRAG AN-M81, 220-LB. FRAG. AN-M88 BANDED LUG BOMBS WITH CONICAL FINS ON THE A/A37B-1 MULTIPLE BOMB RACK	√	√							450 KIAS or 0.80 IMN	450	0.80	0.0g to +4.5g	+1.0g to +4.5g (See Note 8)	+1.0g See REMARKS	Carriage of bombs on inboard stations of the multiple bomb rack is not permitted. Conical fin assembly is required. Multiple racks may be jettisoned with bombs at airspeeds less than 0.80 IMN and without bombs at airspeeds less than 0.95 IMN. Maximum dive angle for release of bombs is 40°. Do not vary g during release from MBR as bomb-to-bomb collision may occur. For all bomb releases from multiple racks set the MBR release mode selector switch on singles. See Note 4.
MK 24 MOD 2A/3 PARACHUTE FLARE ON A/A37B-3 PMBR WITH AAC NO. 396 INCORP.	√	√							400 KIAS or 0.80 IMN	350-400	—	Figure 1-1 Sheet 3 and Figure 1-3	+1.0g to +3.0g (See Note 8)	Not Recommended	To assure adequate separation, the wing leading edge cruise droop must be extended. The minimum airspeed for release is 350 KIAS. Compliance with Interim Aviation Armament Bulletin No. 347 and amendments thereto is mandatory prior to carriage of any parachute flare. Carriage of flares on inboard stations of the PMBR is not permitted due to possible flare/airplane collisions after release.

NOTE

All notes are presented on the last sheet of this illustration.

63802-5-16(2)NB

Figure 1-5 (Sheet 2)

EXTERNAL ARMAMENT LIMITATIONS

STORES	STATIONS (NOTE 1) WING Left	WING Right	FUSELAGE DUAL PYLONS Upper Left	DUAL PYLONS Lower Left	DUAL PYLONS Upper Right	DUAL PYLONS Lower Right	SINGLE PYLONS Left	SINGLE PYLONS Right	MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2) CARRYING	FIRING OR DROPPING (NOTE 9) KIAS	FIRING OR DROPPING (NOTE 9) IMN	NORMAL ACCELERATION (NOTE 2) CARRYING	FIRING OR DROPPING (NOTE 9)	JETTISONING ACCELERATION AND AIRSPEED (NOTE 10)	REMARKS
MK 81 SNAKEYE I OR MK 82 SNAKEYE I ON A/A37B-1 MBR	√	√							550 KIAS or 0.95 IMN	500	0.95	Figure 1-1 Sheet 3 and Figure 1-3	+1.0 g to +4.5 g (See Note 8)	+1.0 g below 0.95 IMN	Airspeed limitations are for electrically fuzed bombs only. See Note 4 for airspeed limitations for mechanically fuzed bombs. Carriage of bombs on inboard stations of the MBR is not permitted. Compliance with AAB 357 and 358 is mandatory prior to carriage of Snakeye. Following high speed, low altitude Snakeye I bomb (high drag mode) releases, the airplane may undergo a moderate lateral oscillation, which is not objectionable if anticipated. Maximum dive angle for release of bombs is forty degrees. For all bomb releases from multiple racks, set the MBR release mode selector switch on SINGLES. The maximum release speed for the MK 81 Snakeye I bombs when equipped with MK 14 Mod 1 bomb fins is restricted to 350 KIAS when releasing in the high drag (retarded) mode and 500 KIAS when releasing in the low drag (unretarded) mode.
500-LB GP AN-M64A1 CONICAL FIN BOMB ON AERO 7A-1 BOMB RACK	√	√							450 KIAS or 0.80 IMN				0.0 g to +4.5 g	Same as Dropping	Maximum dive angle for the release of bombs is 70°. See Note 4.
500-LB GP AN-M64A1 BOX FIN BOMB ON AERO 7A-1 BOMB RACK	√	√							350 KIAS or 0.80 IMN	450					The maximum sustained carriage airspeed is 350 KIAS. 350-450 KIAS is permitted in the delivery maneuver only. Box fins should be limited to one flight. Maximum dive angle for the release of bombs is 70°. See Note 4.
250-LB GP AN-M57A1, 260-LB FRAG AN-M81, 220-LB FRAG AN-M88, BANDED LUG BOMBS WITH SNAKEYE FINS ON THE A/A37B-1 MBR.	√	√							475 KIAS or 0.80 IMN	475	0.80		+1.0 g to +4.5 g (See Note 8)	+1.0 g See REMARKS	Carriage of bombs on inboard stations of the multiple bomb rack is not permitted. Maximum dive angle for release of bombs is 40°. Do not vary g during release as bomb-to-bomb collision may occur. For all bomb releases from the multiple racks set the MBR release mode selector switch on singles. Multiple bomb racks may be jettisoned with bombs at airspeeds less than 0.80 IMN and without bombs at airspeeds less than 0.95 IMN. See Note 4. WARNING: Release of bombs is permitted in the unretarded mode only.

NOTE

All notes are presented on the last sheet of this illustration.

63802—5—16(3)NB

Figure 1–5 (Sheet 3)

EXTERNAL ARMAMENT LIMITATIONS

STORES	STATIONS (NOTE 1) WING		FUSELAGE DUAL PYLONS				FUSELAGE SINGLE PYLONS		MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2)			NORMAL ACCELERATION (NOTE 2)		JETTISONING ACCELERATION AND AIRSPEED (NOTE 10)	REMARKS
	Left	Right	Upper Left	Lower Left	Upper Right	Lower Right	Left	Right	CARRYING	FIRING OR DROPPING (NOTE 9) KIAS	FIRING OR DROPPING (NOTE 9) IMN	CARRYING	FIRING OR DROPPING (NOTE 9)		
MK 81, 82, 83, 84, LDGP; AN-M81, — M88 FRAG; AN-M57A1, — M64A1, — M65A1, — M66A2 G. P. BOMBS WITH CONICAL FINS AND M-1 BOMB FUZE EXTENSIONS ON AERO 7A-1 RACK.	√	√							450 KIAS or 0.80 IMN			0.0 g to +3.0 g		Same as Dropping	Limitations shown are for bombs employing 18- or 36-inch bomb fuze extensions. Maximum dive angle for release of bombs is 70°. See Note 4.
MK 81, 82 LDGP; AN-M81, — M88 FRAG; AN-M57A1 G.P. BOMBS WITH SNAKEYE OR CONICAL FINS AND M-1 BOMB FUZE EXTENSIONS ON A/A 37 B-1 MBR.	√	√										0.0 g to +3.0 g	+1.0 g to +3.0 g (See Note 8)	+1.0 g See Remarks	Limitations shown are for bombs employing 18- or 36-inch M-1 bomb fuze extensions. MBR must be configured for 500-lb bombs when employing the M-1 extensions. To prevent bomb-to-bomb collisions at release, do not load the inboard shoulder stations of the MBR. MK 81, AN-M81, AN-M88, and AN-M57A1 bombs with 18-inch extensions can be loaded in tandem on the MBR. MK 82 bombs with 18-inch extensions cannot be loaded in tandem on the MBR due to insufficient clearance between forward bomb fin and rear bomb fuze. None of the bombs with the 36-inch extension can be loaded in tandem on the MBR for the same reason previously stated. It is permissible to load bombs with the 36-inch extension on forward MBR stations and the same type bombs with the 18-inch extension on the aft MBR stations. Maximum dive angle for release of bombs is 40°. Do not vary g during release as bomb-to-bomb collisions may occur. For all bomb releases set the MBR release mode selector switch on singles. Multiple bomb racks may be jettisoned with bombs at airspeeds less than 0.80 IMN and without bombs at airspeeds less than 0.95 IMN. See Note 4. WARNING: Release of AN-M81, AN-M88, and AN-M57A1 G.P. bombs with Snakeye fins is permitted in the unretarded mode only.

NOTES

1. A check (√) indicates station occupancy. Refer to figure 1-57, NATOPS Flight Manual, for limitations on station weight and configuration compatibility.
2. When carrying stores in combination, the more restrictive limits apply.
3. Figure 1-4 lists additional airspeed limitations when carrying AIM-9B missiles with the MK-8 warhead.
4. Refer to BUWEPS Instruction 08024.18 of 19 June 1963 for World War II bomb fuze limitations.
5. Once a fire bomb is filled, it must be used or destroyed. All fire bombs not expended shall be jettisoned prior to landing afloat or ashore.
6. Maximum dive angle for release of these bombs is 70° from the Aero 7A-1 and 40° from the MBR. Maximum airspeed for release at dive angles between 40° and 70° is 475 KIAS. Do not vary g during release from the MBR as bomb-to-bomb collision may occur. For all bomb releases from multiple racks, set the MBR release mode selector switch on SINGLES.
7. Maximum dive angle for release of these bombs is 10°.
8. Meant to prohibit store drops during push over from straight uncurved flight. At the maximum permissible dive angle, straight uncurved flight will result in slightly less than 1.0g. Minimum acceleration should be as near 1.0g as possible, but need not be greater than that corresponding to the dive angle.
9. Speeds and accelerations listed in the FIRING OR DROPPING columns are applicable to firing or dropping the store from its suspension equipment.
10. Speeds and accelerations listed in the JETTISONING column are applicable to jettisoning the suspension equipment, with or without attached stores, except as noted.

63802—5—16(4)NB

Figure 1–5 (Sheet 4)

EXTERNAL ARMAMENT LIMITATION—WING STORES ON MER/TER

STORES	NO. OF STORES ON EACH WING (NOTE 1)		MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2)			NORMAL ACCELERATION (NOTE 2)		MAXIMUM PERMISSIBLE DIVE ANGLE	JETTISONING ACCELERATION AND AIRSPEED (NOTE 4)	REMARKS
	TER	MER	CARRYING KIAS/IMN)	FIRING OR DROPPING (NOTE 3) KIAS	FIRING OR DROPPING (NOTE 3) IMN	CARRYING	FIRING OR DROPPING (NOTE 3)			
MK 83 LDGP BOMBS WITH CONICAL FINS	2	2	Figure 1–1 Sheet 3	—	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	70°	See Note 8	Load forward-center and aft-outboard MER station. Load center and outboard TER stations. Maximum airspeed for release at dive angles between 40 and 70 degrees is 475 KIAS. Do not vary "g" during release and use only MER or TER single release mode to prevent probable bomb-to-bomb collision between bombs from the same rack. (See note 7.)
MK 81 LDGP BOMBS WITH CONICAL FINS	2 (See Note 5)	4 (See Note 5)	Figure 1–1 Sheet 3	—	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	70°	See Note 8	Maximum airspeed for release at dive angles between 40 and 70 degrees is 475 KIAS. Do not vary "g" during release as bomb-to-bomb collision may occur. For unretarded releases, single or salvo release mode of MER or TER may be used. Simultaneous unretarded release from left and right wing stations is permitted in either the single or salvo mode. For retarded releases, use only the MER or TER single release mode to prevent probable bomb-to-bomb collision between bombs from the same rack. Compliance with AAB357 and AAB358 is mandatory prior to carriage of bombs with Snakeye tails. Following high speed, low altitude, high drag releases, the aircraft may undergo a moderate lateral oscillation, which is not objectionable if anticipated. The maximum release speed for Snakeye bombs when equipped with MK 14 Mod 1 bomb fin is restricted to 350 KIAS when releasing in the high drag (retarded) mode and 500 KIAS when releasing the low drag (unretarded) mode. (See note 7.)
MK 82 LDGP BOMBS WITH CONICAL FINS	2 (See Note 5)	4	Figure 1–1 Sheet 3	—	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	70°	See Note 8	
MK 81 LDGP BOMBS WITH SNAKEYE FINS	2 (See Note 5)	4 (See Note 5)	550/0.95	(Unretarded) 550/0.95 (Retarded) 500/0.95		Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	(Unretarded) 70° (Retarded) 40°	See Note 8	
MK 82 LDGP BOMBS WITH SNAKEYE FINS	2 (See Note 5)	4	550/0.95	(Unretarded) 550/0.95 (Retarded) 500/0.95		Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	(Unretarded) 70° (Retarded) 40°	See Note 8	
AN-M57A1 GP, AN-M81 FRAG, AND AN-M88 FRAG BOMBS WITH CONICAL OR SNAKEYE FINS	2 (See Note 5)	4 (See Note 5)	475/0.85	475/0.85		Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	70°	See Note 8	Do not vary "g" during release as bomb-to-bomb collision may occur. Single or salvo release mode of MER or TER may be used. Simultaneous release from left and right wing stations is permitted in either the single or salvo mode. Release of these stores in the retarded mode is prohibited. (See note 7.)
MK 77 MOD 1/2 FIRE BOMBS	1	2	475/0.85	450	0.80	Figure 1–1 Sheet 3 and Figure 1–3	+ 1.0g to + 2.5g (See Note 6)	45°	See Note 8	Load MER or TER center stations only. Once a fire bomb is filled, it must be used or destroyed. All fire bombs not expended shall be jettisoned prior to landing afloat or ashore.

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Figure 1–5A (Sheet 1)

EXTERNAL ARMAMENT LIMITATION—WING STORES ON MER/TER

STORES	NO. OF STORES ON EACH WING (NOTE 1)		MAXIMUM INDICATED AIRSPEED OR MACH NUMBER (WHICHEVER IS LESS) (NOTE 2)			NORMAL ACCELERATION (NOTE 2)		MAXIMUM PERMISSIBLE DIVE ANGLE	JETTISONING ACCELERATION AND AIRSPEED (NOTE 4)	REMARKS
	TER	MER	CARRYING KIAS/IMN)	FIRING OR DROPPING (NOTE 3) KIAS	FIRING OR DROPPING (NOTE 3) IMN	CARRYING	FIRING OR DROPPING (NOTE 3)			
LAU-10/A ROCKET PACK	2	2	550 KIAS and Figure 1–1 Sheet 3	550	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 1.5g	No Limit	(Packs — full or empty) + 1.0g between 300 and 400 KIAS	Load the forward-center and forward-outboard MER stations and center and outboard TER stations. Rocket packs cannot be jettisoned safely from the inboard MER or TER stations. Nose fairings fail at speeds greater than 450 KIAS resulting in increased drag and fuel consumption. After firing or attempting to fire these rocket packs (except LAU-32B/A), they must be jettisoned prior to an arrested landing.
LAU-3A/A ROCKET PACK	2	2	Figure 1–1 Sheet 3	500	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 1.5g	No Limit	See Note 8	
LAU-32A/A, LAU-32B/A, AND LAU-56/A ROCKET PACKS	2	2	550/0.95	500	0.95	Figure 1–1 Sheet 3 and Figure 1–3	+ 0.5g to + 4.5g	No Limit	(Packs — full or empty) + 1.0g between 200 and 500 KIAS Less than 0.95 See Note 8	

NOTES

1. Refer to figure 1–57, NATOPS Flight Manual, for limitations on station weight.
2. When carrying stores in combination, the more restrictive limits apply. Unless otherwise noted, mixed loads of different stores on the same MER or TER are not permitted. Figure 1–4 lists additional airspeed limitations when carrying fuselage AIM-9B missiles with the MK 8 warhead. Avoid sideslip and/or abrupt pushover at stores release. World War II mechanical fuze limitations apply. Refer to BuWeps Instruction 08024.1B of 19 June 1963.
3. Speeds and accelerations listed in the FIRING or DROPPING columns are applicable to firing or dropping the store from its suspension equipment.
4. Speeds and accelerations listed in the JETTISONING column are applicable to jettisoning the suspension equipment, with or without attached stores, except as noted.
5. The limitations shown in the table are applicable for stores carried on the outboard and bottom MER/TER stations. However, these stores may also be carried on and released (Snakeye in unretarded mode only) from the inboard MER/TER stations within the same limitations, except that the maximum dive angle at release is 45 degrees and the minimum acceleration at release is ± 0.7g. If inboard MER/TER stations are to be loaded (3 500-lb or 3 250-lb bombs on TER, 6 250-lb bombs on MER) and dual fuselage pylons are installed on the fuselage, the lower fuselage launchers must not be installed. If the lower fuselage launchers are installed and loaded, the inboard station of the TER or the forward-inboard station of the MER must not be loaded.
6. Meant to prohibit store drops during pushover from straight uncurved flight. At the maximum permissible dive angle, straight uncurved flight will result in slightly less than 1.0g. Minimum acceleration should be as near 1.0g as possible, but need not be greater than that corresponding to the dive angle.
7. When these stores are equipped with M-1 fuze extensions, observe the following additional limitations:
   (a) MK 81, AN-M81, AN-M88 and AN-M57A1 bombs with 18-inch extensions can be loaded in tandem on MER. MK 82 bombs with 18-inch extensions and all bombs with 36-inch extensions cannot be loaded in tandem on MER due to insufficient clearance between forward bomb fin and rear bomb fuze. It is permissible to load MK 81, AN-M81, AN-M88 or AN-M57A1 bombs with 36-inch extensions on forward MER stations and the same type bomb with 18-inch extensions on the aft MER stations.
   (b) Maximum airspeed for carrying and dropping is 450 KIAS/0.80 IMN.
   (c) Normal acceleration for carrying is 0.0g to + 3.0g.
   (d) Normal acceleration for releasing is + 0.5g to + 3.0g.
8. Tests have not been conducted to determine safe jettisoning envelopes for the MER and TER. However, because the MER and TER are similar to the MBR, jettisoning the rack with or without bombs appears safe (jettisoning with rocket packs not recommended pending tests). If necessary to jettison MER or TER, assume level flight attitude and jettison in the following speed range:
   With bombs — Below 0.80 IMN
   Without bombs — Below 0.95 IMN

63802–8–55(2)–11–66

Figure 1–5A (Sheet 2)

section IV
flight procedures and characteristics

CONTENTS

PART 1—FLIGHT PROCEDURES*

PART 2—FLIGHT CHARACTERISTICS

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*Refer to unclassified NATOPS Flight Manual

PART 2 — FLIGHT CHARACTERISTICS

INTRODUCTION

Note

Refer to NATOPS Flight Manual for additional information.

The Crusader's operating regime covers an extremely wide band of flight conditions ranging from the low speeds required for carrier operations, through the speeds required for long-range cruising flight, to high speed flight at low and high altitudes. Flight stabilization, stick variable gain, a two-position wing, and fixed ventral fins are utilized to permit satisfactory operation throughout the flight envelope.

UNIT HORIZONTAL TAIL

Longitudinal stick forces (figure 4–1) are light and are determined by stick position away from trim, rate of stick motion, g load, and pitch acceleration.

SPEED BRAKE

Note

Refer to the NATOPS Flight Manual for additional information.

As the speed brake extends, it causes a nose-up trim change under all flight conditions. At subsonic speeds, this trim change is so small as to be negligible, but at

STICK FORCES

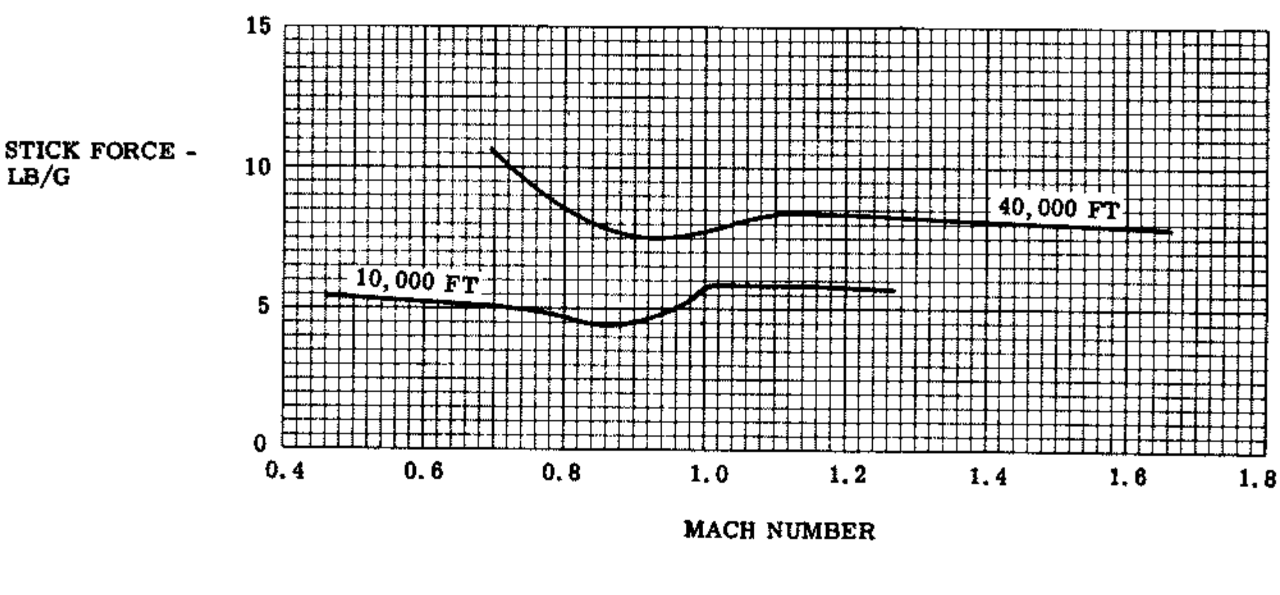


Figure 4–1

supersonic speeds the magnitude increases gradually until, at 1.50 IMN, about 15 pounds of push force is required to offset the trim change.

LEVEL FLIGHT

MAXIMUM SPEED

Figures 4–2, 4–3, and 4–4 illustrate the maximum speed capabilities of F-8D and F-8E aircraft for military and maximum thrust in level flight with and without external stores. Do not expect to achieve the speeds shown under all operating conditions. Actual speed achieved in any flight may exceed or fail to reach the values shown, depending upon gross weight differences, atmospheric conditions, and the status of engine trim.

MANEUVERING FLIGHT

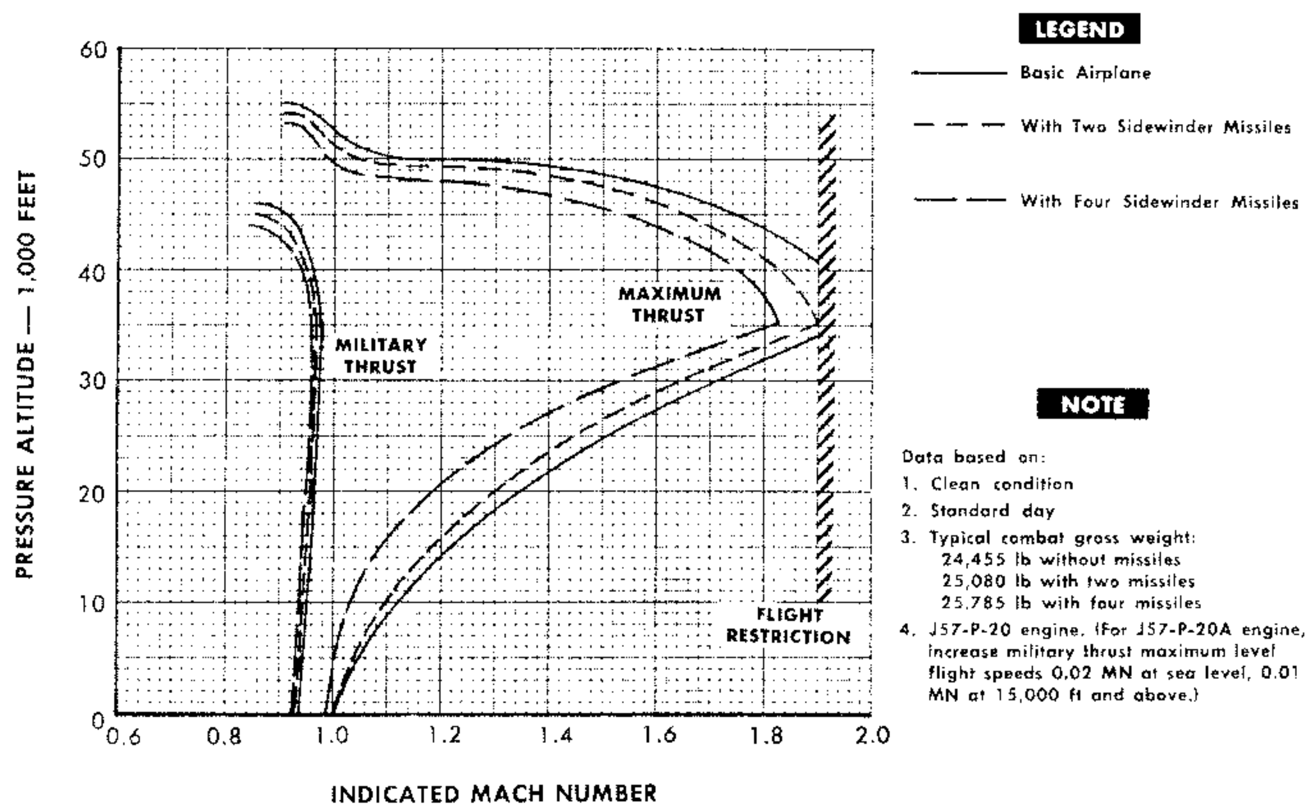
SYMMETRICAL PULLOUTS

Symmetrical pullouts may be performed in dive recoveries, steady-state turns, tail chases, "rat races," etc. Figure 4–1 indicates the stick force per g required for maneuvering flight at 10,000 and 40,000 feet. These curves show that the stick force per g required for low-altitude maneuvering is less than that required at higher altitudes. Between 0.80 IMN and 1.00 IMN at low altitudes, the stick force per g is approximately one-half that needed for pullouts at higher altitudes.

Horizontal tail effectiveness at high speeds and low altitudes is sufficient to inadvertently exceed the structural limits of the aircraft in abrupt pullups. Be particularly alert to this possibility during high-speed

MAXIMUM SPEED–LEVEL FLIGHT

F-8D—FIGHTER CONFIGURATIONS



NOTE

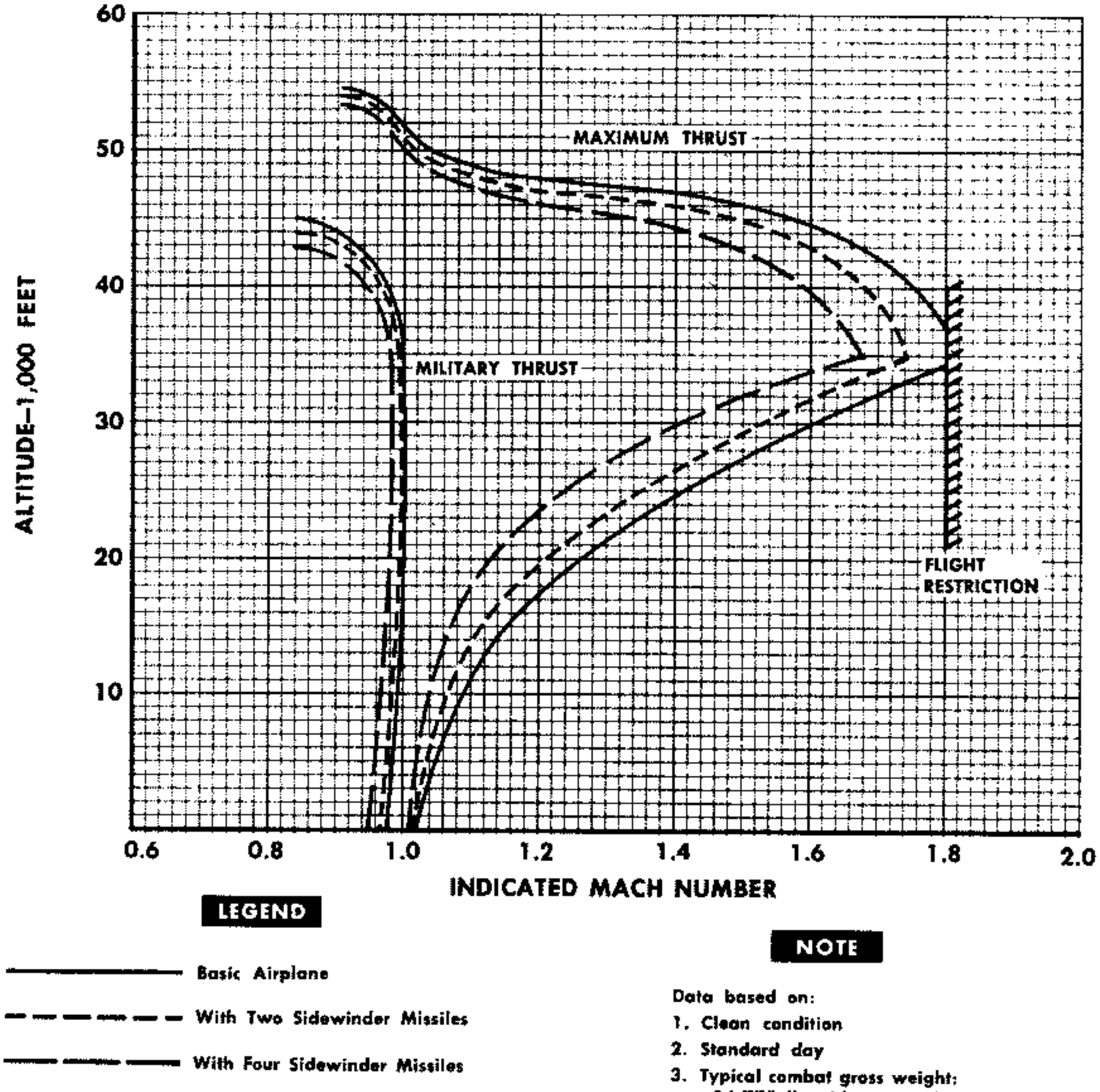
Data based on:

1. Clean condition
2. Standard day
3. Typical combat gross weight:
   24,455 lb without missiles
   25,080 lb with two missiles
   25,785 lb with four missiles
4. J57-P-20 engine. (For J57-P-20A engine, increase military thrust maximum level flight speeds 0.02 MN at sea level, 0.01 MN at 15,000 ft and above.)

Figure 4–2

MAXIMUM SPEED—LEVEL FLIGHT

F-8E—FIGHTER CONFIGURATIONS



NOTE

Data based on:

1. Clean condition
2. Standard day
3. Typical combat gross weight:
   24,775 lb without missiles
   25,390 lb with two missiles
   26,095 lb with four missiles
4. J57-P-20A engine. (For J57-P-20 engine, decrease military thrust maximum level flight speeds 0.02 MN at sea level, 0.01 MN at 15,000 ft and above.)

63802-6-14NA

Figure 4–3

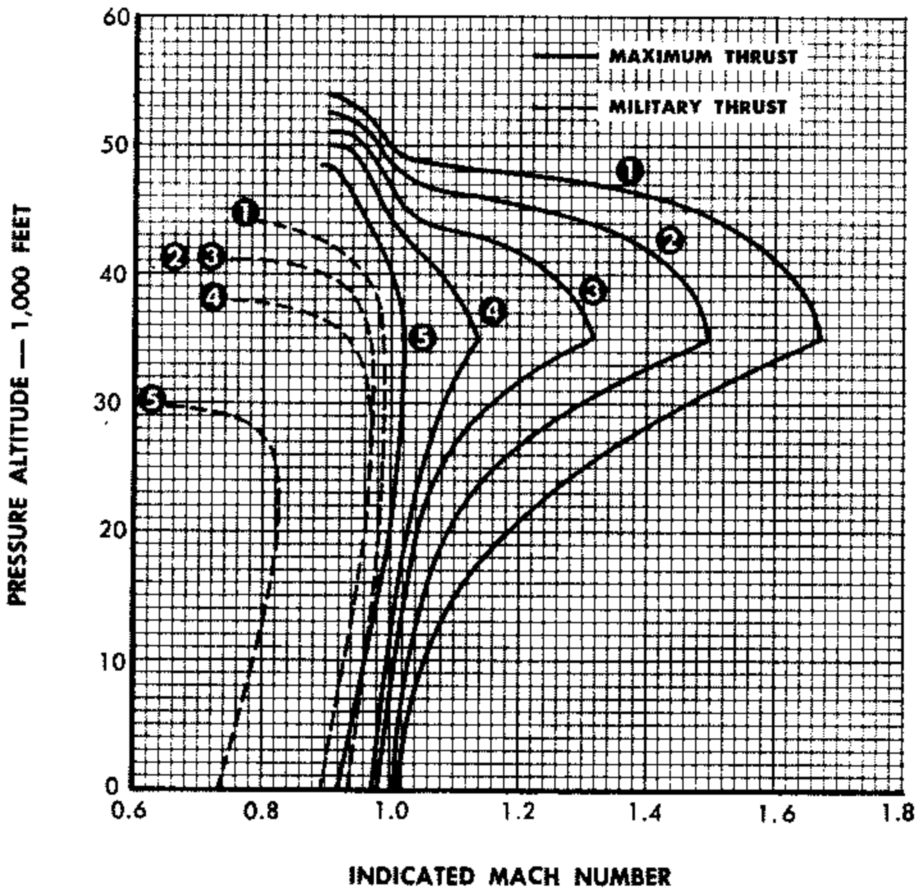
maneuvering at low altitudes, and avoid abrupt control applications. Pitch control is more sensitive with the aft center-of-gravity positions which occur with 1,000 pounds or less fuel in the main system, and caution must be exercised to avoid overcontrolling.

For normal operation at all altitudes, particularly below 20,000 feet, the aircraft should be flown as nearly "in trim" as possible. The control system is least sensitive when operated near trim where action of the variable-gain linkage results in relatively large stick deflections per unit deflection of the horizontal tail.

F-8E attack missions require high-speed, low-altitude pullouts at high gross weights. Exercise special care to prevent overstressing the aircraft in these pullouts, since horizontal tail effectiveness is very great and

MAXIMUM SPEED — LEVEL FLIGHT

F-8E—ATTACK CONFIGURATIONS



LEGEND

1. Two Zuni packs (four Zuni rockets) on single fuselage pylons
2. Four Zuni packs (eight Zuni rockets) on dual fuselage pylons
3. Two 2,000-lb bombs on wing pylons
4. Two 2,000-lb bombs on wing pylons, two Zuni packs (four Zuni rockets) on single fuselage pylons
5. Eight 500-lb bombs on wing pylons and multiple bomb racks, four Zuni packs (eight Zuni rockets) on dual fuselage pylons

NOTES

Data Based On:

1. Clean condition
2. Standard day
3. MK 24 MOD O heads (short nose) on Zuni rockets
4. Typical combat gross weight:
   - ① 25,505 lb
   - ② 26,323 lb
   - ③ 29,169 lb
   - ④ 29,899 lb
   - ⑤ 31,303 lb
5. J57-P-20A engine (for J57-P-20 engine, decrease military thrust maximum level flight speeds 0.03 MN at sea level and 15,000 feet, 0.02 MN at 25,000 feet and above.)

63802-6-15NA

Figure 4–4

allowable load factor (g) with wing stores is reduced. As might be expected, wing heaviness is noticeable during pullouts with asymmetrical store loadings, or with symmetrical store loadings as the stores on one side are released with lateral trim near zero. Full lateral stick displacement may be required with the heavier asymmetrical wing store loadings at low altitude near maximum allowable airspeed (650 KIAS) and limit load factor. (Refer to section I, part 4 ACCELERATION LIMITATIONS.)

Because of the rapidity with which flight conditions change at low altitudes with combat thrust, precise trimming is difficult. Recommend minimum trimming be attempted during a combat thrust climb below 20,000 feet until familiar with the trimming characteristics in this flight regime.

Be aware of the acceleration and deceleration resulting from using afterburner or speed brake at low altitudes and the consequent possibility of overcontrolling. Any oscillation resulting from overcontrolling will be satisfactorily damped by releasing the control stick. Supersonic pullouts are buffet free, and limit loads can be imposed on the aircraft even at the higher altitudes. It is recommended that the Crusader pilot become thoroughly familiar with the differences of stick force g required at all altitudes before utilizing the aircraft to its maximum capabilities.

ROLLING PULLOUT REGIMES

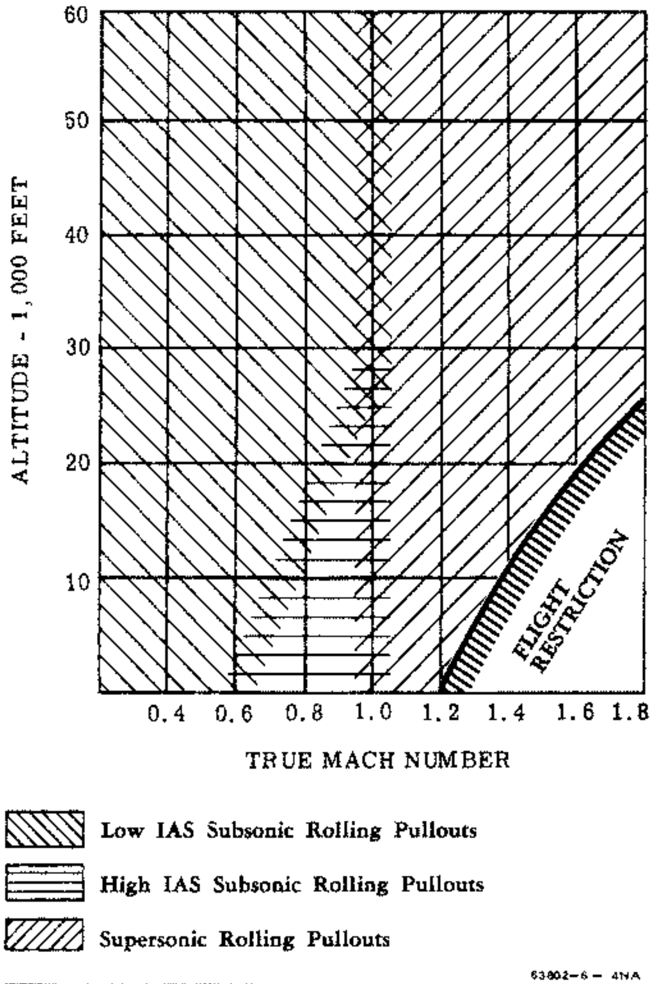


Figure 4–5

ROLLS

Roll stability is positive throughout the flight envelope. At medium and high altitudes, satisfactory roll rates are available throughout the flight envelope. During rolls, the basic aerodynamic characteristics of the aircraft are such that adverse yaw develops at subsonic, transonic, and low supersonic speeds. The aileron-rudder interconnect coordinates rolls by opposing the tendency for buildup of favorable yaw at supersonic speeds and high altitudes. The interconnect is programmed with altitude to introduce maximum adverse yaw above 45,000 feet and minimum below 13,000 feet. However, at very high Mach numbers, favorable yaw continues to buildup during rolls, making it necessary to restrict permissible roll angles and aileron deflections in order to avoid roll coupling. Except at very low airspeeds, rolls are well coordinated in all parts of the flight envelope defined by the speed, bank angle and stick deflection restrictions in section I, part 4.

At low altitudes above 600 KIAS roll rates decrease with increasing speed but are adequate throughout the flight envelope. Avoid large bank angles which may require excessive time to roll back to level flight when flying at high speeds at low altitude. Roll rate can be significantly improved in this flight area by reducing speed and by applying rudder in the direction of roll.

Due to the increased inertia of wing stores, the F-8E attack aircraft has somewhat greater roll overshoot when stopping high rates of roll than does the fighter aircraft. When loaded asymmetrically, the attack aircraft rolls faster into (and slowly away from) the more heavily loaded side. This effect is most noticeable during rolling pullouts.

ROLLING PULLOUTS

The characteristics of Crusader rolling pullouts (rolling while pulling g, as in breaking off a gunnery run) fall roughly into the following categories: low KIAS subsonic; high KIAS subsonic; and supersonic. These categories occur about as shown in figure 4–5, but the dividing lines are not as sharp as shown.

Because the accelerometer is located above the aircraft roll axis, the instrument indicates less than the true load factor during rolls. This erroneous indication is a function of the square of roll rate and the error may be as large as –1.0 g for full aileron rolls in the high IKAS subsonic region. Therefore, the acceleration limits of section I, part 4, can be exceeded without a verifying cockpit indication.

WARNING

To prevent exceeding rolling pullout acceleration limits at high KIAS and low altitude when rolling at load factors in excess of 3.0 g:

- Avoid rapid lateral stick movement which might lead to inadvertent aft stick movement.
- Do not exceed moderate rates of roll. Erroneous cockpit accelerometer indications and the aircraft pitching tendency while rolling both increase with an increase in rate of roll.

Low KIAS Subsonic Rolling Pullouts

Rolling pullouts at low g are fairly smooth and the rate of roll is quite high if full aileron is used. Some adverse yaw may be noticed. This adverse yaw decreases the rate of roll and tends to make the roll somewhat unsteady. If sufficient g's are pulled to cause buffeting during the rolling pullout, the adverse yaw increases markedly, further reducing the rate of roll. Further increase in g causes further reduction in rate of roll to the point where the aircraft may abruptly stop rolling or even start to roll in the opposite direction. Immediately recover from this condition by neutralizing controls. Failure to do so may precipitate a snap roll maneuver possibly followed by spin entry.

In this flight region it appears most efficient and tactically advantageous to perform rolling pullouts at low g to avoid buffeting, thereby taking advantage of higher rates of roll and maintaining a wide margin with respect to the point where snap maneuvers may be encountered.

High KIAS Subsonic Rolling Pullouts

Rolling pullouts in this region are affected by the same factors that prevail at low KIAS. However, at high KIAS the buffet boundary is so high that the structural limit of the aircraft is obtained before buffeting or adverse yaw become major factors. For this reason, rolling pullouts will be smoother and generally will be buffet free.

An increase in positive load factor (g), without additional aft stick is also characteristic of rolling pullouts in this regime. This effect is slightly greater with wing stores (F-8E attack aircraft) and load factor can increase as much as 1.0 g during full aileron rolls.

Supersonic Rolling Pullout

Supersonic rolling pullouts are extremely smooth and are accompanied by adverse yaw. No buffeting will be encountered at any speed or altitude within the g limits.

When loaded asymmetrically with a heavy wing store, the F-8E attack aircraft rolls satisfactorily into the store at low altitudes near maximum allowable airspeed (650 KIAS) and limit load factor. (Refer to section I, part 4, ACCELERATION LIMITATIONS.) However, very low roll rates will be encountered when rolling away from the store. These low roll rates will improve with reduced airspeed or reduced load factor.

CLIMBS

When an afterburner climb is made following takeoff, establish the climb attitude approximately 0.05 Mach number short of the desired climb schedule in order to avoid overshooting the schedule. Acceleration to climb schedule is rapid, and the climb attitude is very steep. This attitude will flatten somewhat at altitude, and with experience the pilot will learn to anticipate this flattening in order to hold a more constant climb schedule. Extend cruise droop in a climb as airspeed drops below 300 KIAS. Lead the level-off altitude by a few thousand feet except at extremely high altitudes.

Due to the rapid acceleration from brake release to climb schedule (approximately 1 minute) when in afterburner, very little time is available to thoroughly check the aircraft before obtaining high speeds. Accordingly, do not attempt afterburner climbs following takeoff until familiar with the aircraft.

Military thrust climbs following takeoff are comparable to maximum performance climbs in subsonic aircraft. Extend cruise droop in the climb as airspeed drops below 300 KIAS. Due to airspeed and attitude changes during climbs, a small amount of directional and lateral retrimming is required.

ZOOM CLIMBS *(See figure 4–6.)*

A zoom climb permits the high kinetic energy level of supersonic flight to be used to attain altitudes far in excess of those attainable in steady-state climbs. Generally speaking, initiate zooms from Mach numbers greater than 1.50 and at altitudes of at least 40,000 feet. Under certain atmospheric conditions, elevated Mach numbers can be achieved at 45,000 to 50,000 feet. However, it has been found that the apparent advantage of initiating a zoom climb from 50,000 feet decreases because of the increased UHT deflections required to obtain 2.0 g at this altitude. It is recommended that maximum altitude zooms be started between 40,000 and 45,000 feet at maximum speed.

Prior to initiation of a zoom climb, set the VGI to zero to establish the correct climb angle. Place the continuous engine ignition switch ON. Smoothly apply a load factor of 2.0 g and hold it until 30° climb angle is reached. Hold this climb angle until airspeed drops to 220 KIAS, then begin 0.5 g pushover over the top. To preclude afterburner blowout and possible subsequent engine instability, move the throttle to the MILITARY position at 60,000 feet or 200 KIAS, whichever occurs first.

TYPICAL ZOOM CLIMB

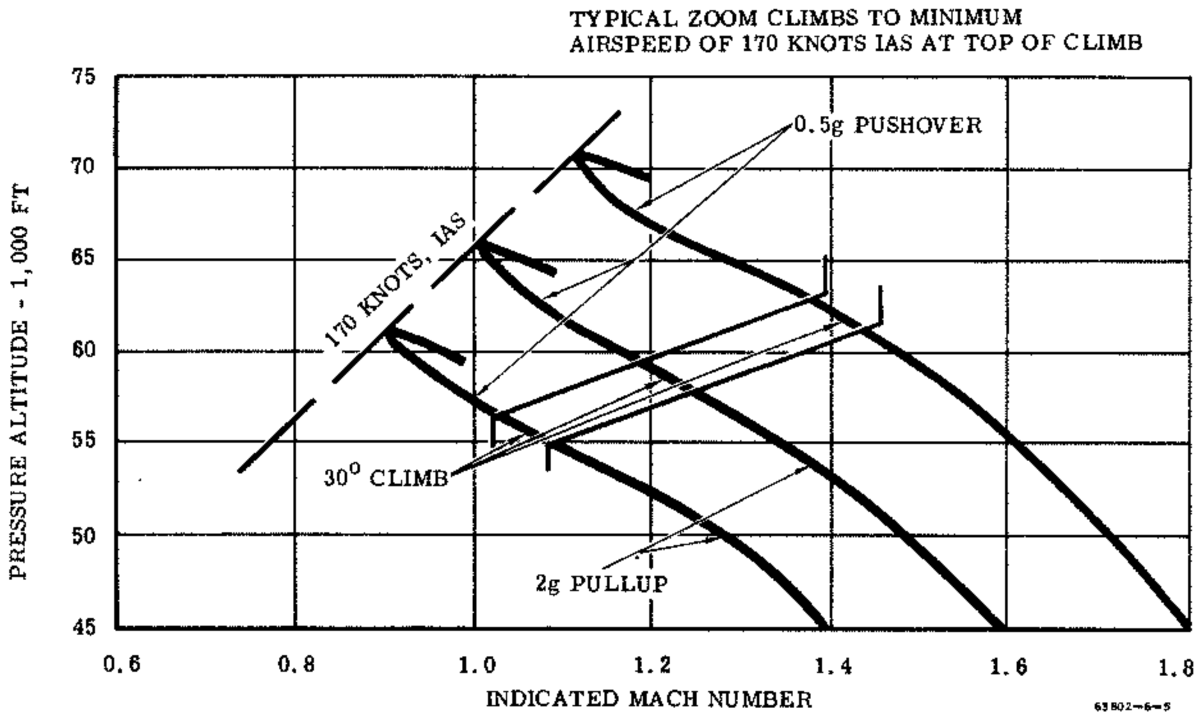


Figure 4-6

During zoom climb maneuvers above 50,000 feet, a minimum oil pressure of 30 psi is permissible.

The principal advantage to be gained through use of the "zoom" maneuver is to achieve supersonic speed at an altitude higher than that at which the aircraft can normally become supersonic by first climbing and then accelerating.

DIVES *(See figure 4-7.)*

Below 20,000 feet aileron effectiveness deteriorates at speeds near the extremes of the permissible flight envelope. Considerable retrimming of rudder and ailerons is usually necessary in high-speed dives. Unusual sounds, variously described as those produced by rapidly shooting a gun alongside the cockpit, the close passage of artillery shells, or the mooing of a cow may be encountered in this area. These sounds have proved to be of no consequence.

ARMAMENT

SIDEWINDER MISSILE FIRING

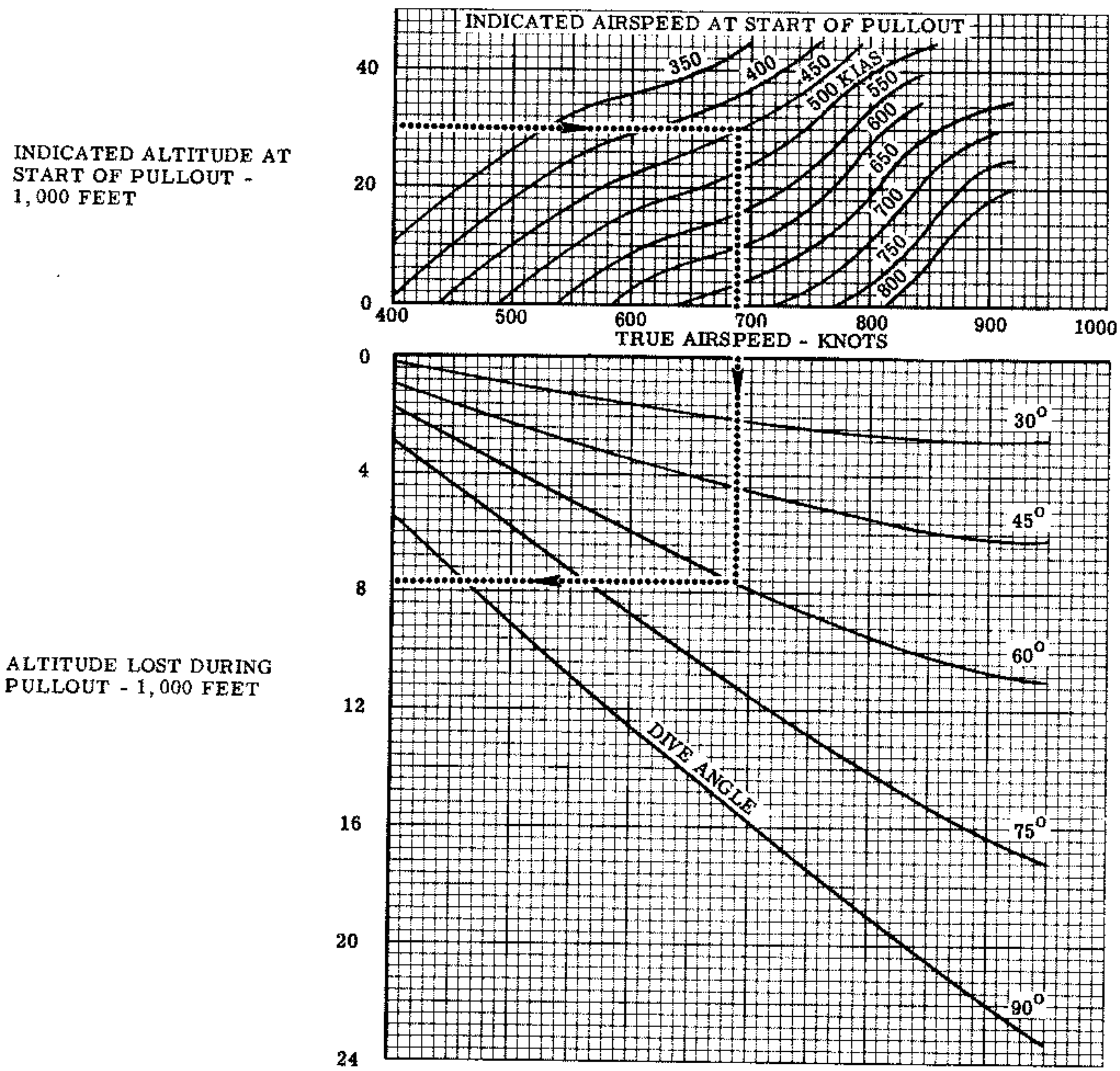
The missiles light off and depart from the aircraft with a dull explosive sound. At high speeds the aircraft will yaw slightly away from the missile after it leaves the launcher. At extreme altitudes and low speeds, engine flameout may occur if the restrictions in section I, part 4 are not observed.

If the aircraft is being maneuvered so as to cut sharply across the missile wake in firing runs at moderate altitudes and low speeds, a loud bang may emanate from the engine as a result of momentary compressor stall. This momentary stall is of no consequence, and in most cases engine instruments will not reflect any change, because of the extreme brevity of the condition.

ANGLE OF ATTACK *(See figure 4-8.)*

DIVE RECOVERY

CONSTANT 4-G PULLOUT



NOTE

Refer to the Flight Operating Limitations chart in section I, part 4 for "G" limits.

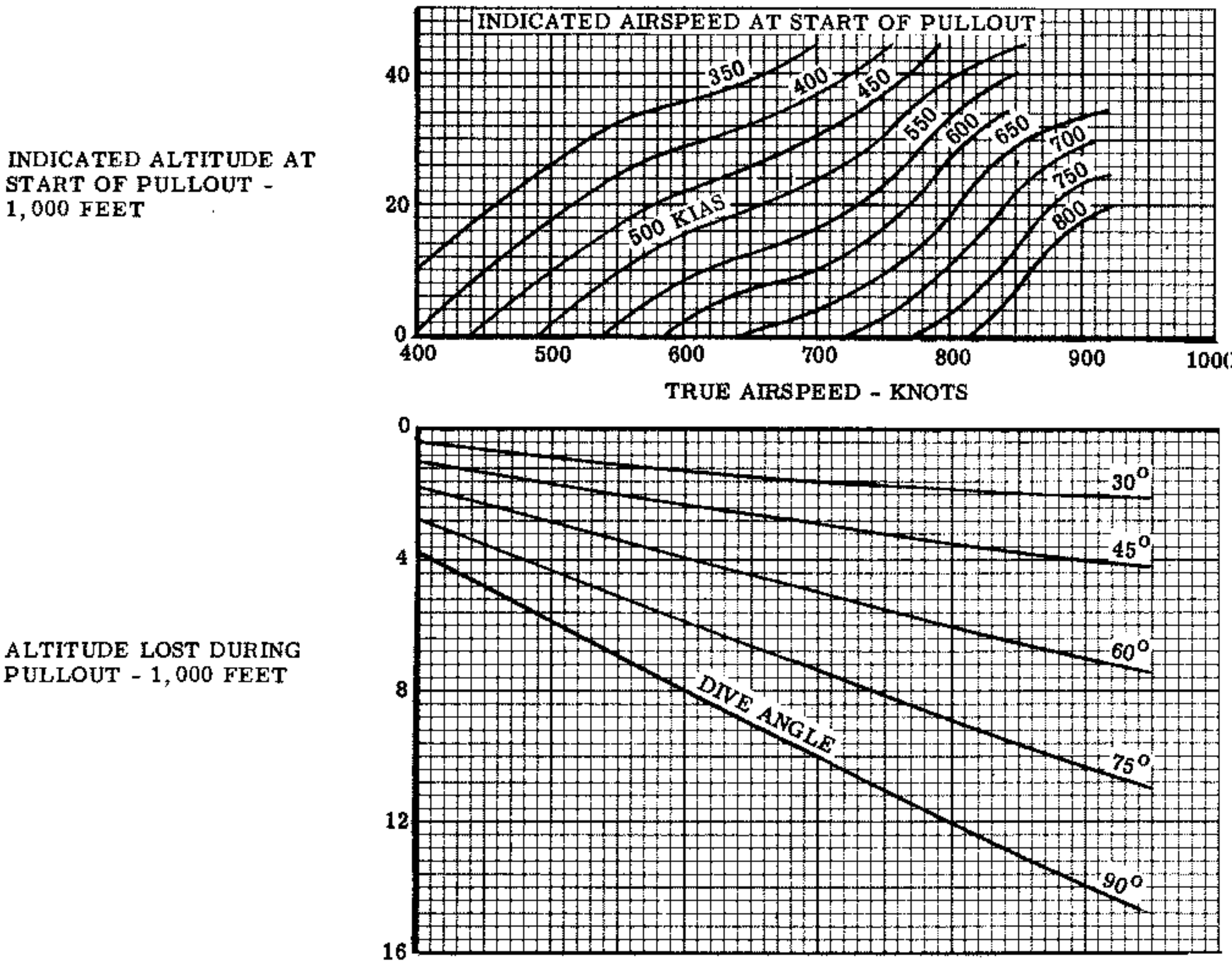
DATA BASED ON: ESTIMATES
DATA AS OF: MARCH 1960

63802-6-11

Figure 4-7 (Sheet 1)

DIVE RECOVERY

CONSTANT 6-G PULLOUT



NOTE

Refer to the Flight Operating Limitations chart in section I, part 4 for "G" limits.

DATA BASED ON: ESTIMATES
DATA AS OF: MARCH 1960

63802-6-12

Figure 4-7 (Sheet 2)

ANGLE-OF-ATTACK RELATIONSHIP

EXAMPLE: Known - Alt, CAS, Wt, Load Factor

Sheet 1			
	A	Calibrated Air Speed	400 Knots
	B	Pressure Altitude	20,000 Ft
	B-C	Mach Number	0.84
	D	Equivalent Air Speed	380 Knots
Sheet 2			
	E	Gross Weight	20,000 Lbs
	F	Load Factor	2 G
	G	Equivalent Air Speed	380 Knots
	H	Coefficient of Lift	0.21
Sheet 3			
	J	Coefficient of Lift	0.21
	K	Mach Number	0.84
	L	Equivalent Air Speed	380 Knots
	M	Correct Angle of Attack	4.0 Deg (71.1 Mils)

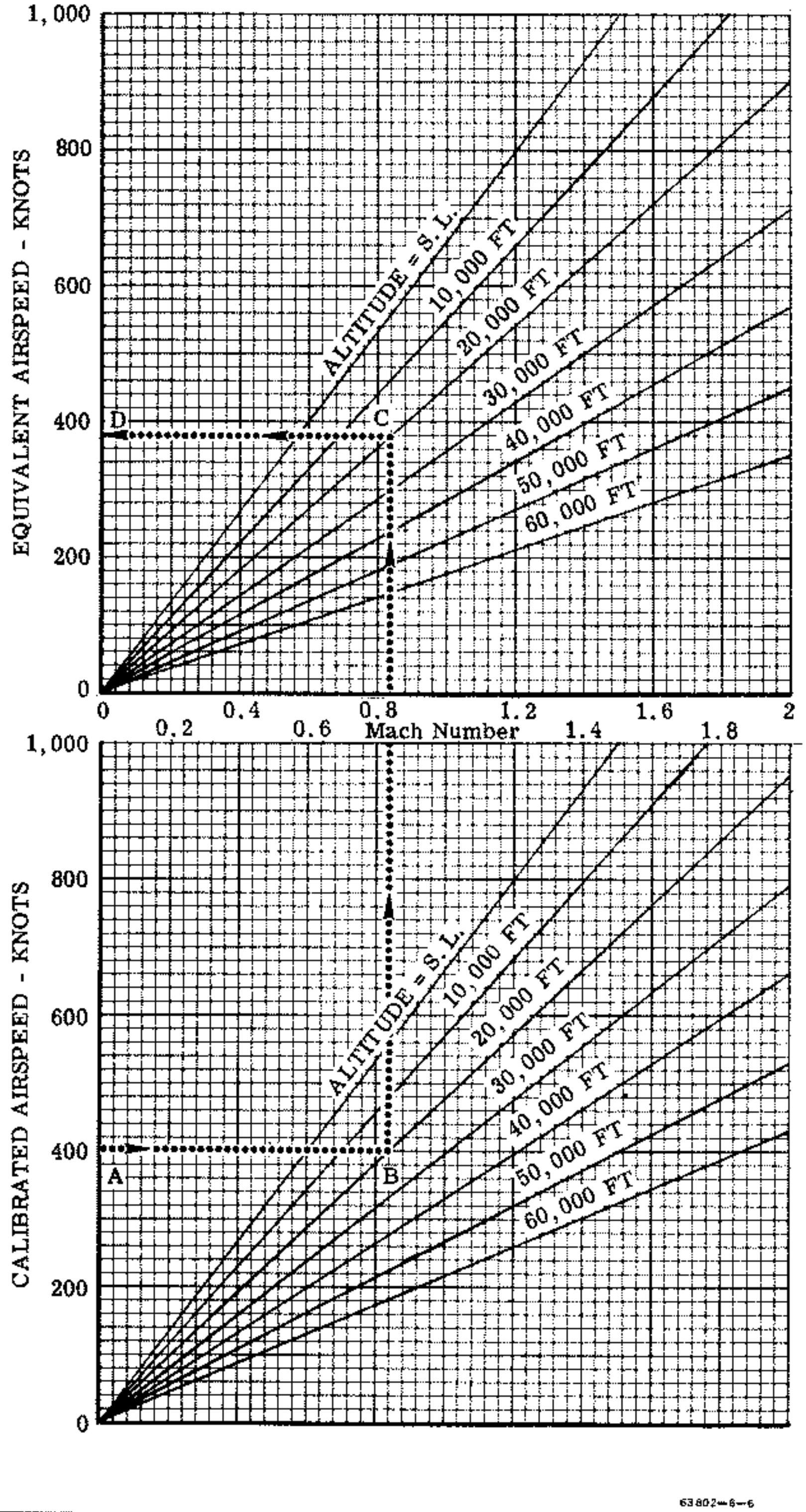


Figure 4-8 (Sheet 1)

ANGLE-OF-ATTACK RELATIONSHIP

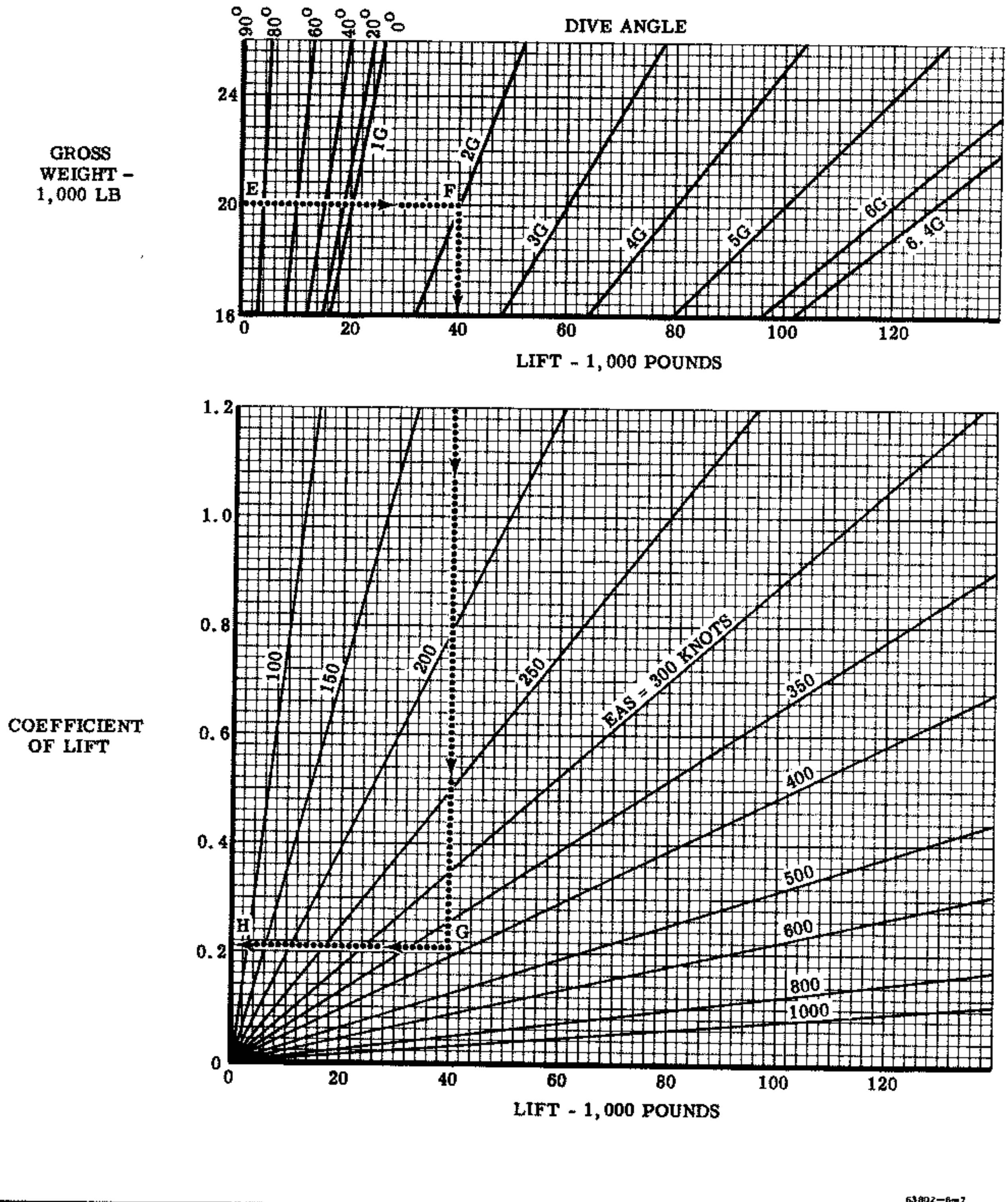


Figure 4-8 (Sheet 2)

ANGLE-OF-ATTACK RELATIONSHIP

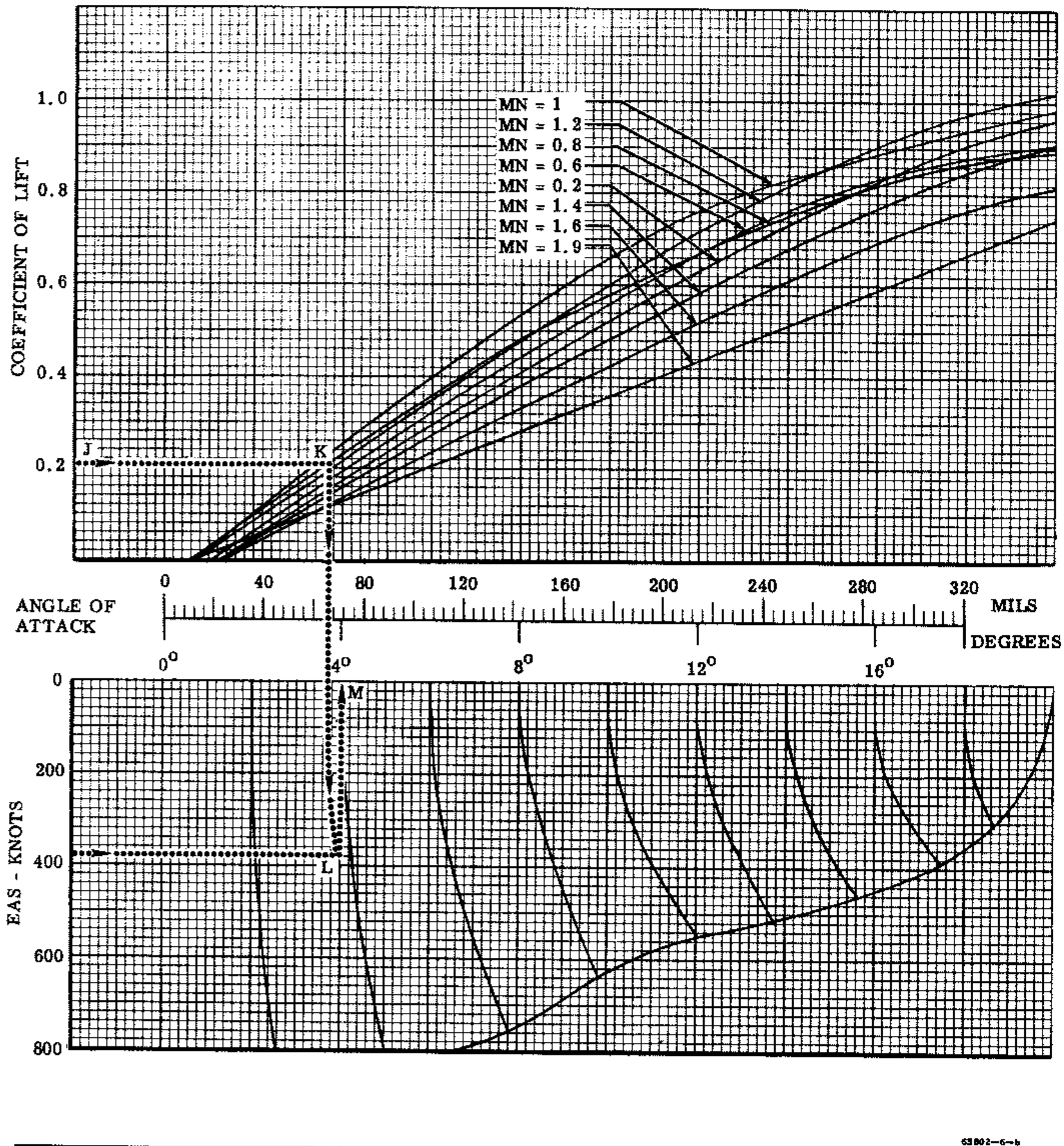


Figure 4–8 (Sheet 3)

section VIII
weapon systems

CONTENTS

Fire Control System AN/AWG-4 27

Infrared Detecting System 34

Armament Systems 35

FIRE CONTROL SYSTEM AN/AWG-4

Note

Refer to NATOPS Flight Manual for additional information.

RADAR

Description

Except where differences are noted, the following discussion applies to both the AN/APQ-83 and AN/APQ-94 radar sets.

In normal operation, the radar sequences from the search mode through the acquisition mode to the track mode. Except for automatic switching from acquisition to track mode, the sequence is controlled by signals from the pilot's hand controls (Radar and IR Controls). In addition to the three modes of operation, the set is equipped for ARO (automatic range only), HOJ (home-on-jamming) and GARO (guns automatic ranging only*), operation. Some radar sets are also equipped for infrared operation (refer to INFRARED DETECTING SYSTEM) and missile lead computation.

The antenna search pattern encompasses an area 45° to the left and 45° to the right of the aircraft boresight line in azimuth and an area 45° above to 30° below the boresight line in elevation. If the pilot desires to restrict azimuth scanning to a particular area, he can select left or right scan, or, with the AN/APQ-94 radar, center sector scan. The elevation angle of the antenna sweep is controllable, and its position with respect to the boresight line of the aircraft is indicated by a tilt mark on the right-hand side of the radarscope.

*AN/APQ-83A (AN/APQ-83 with Avionics Change No. 148) and AN/APQ-94 with Avionics Change No. 133.

RADAR AND IR CONTROLS

Nomenclature	*Function*
*Range selector switch (2A, figure 8-1, sheet 2)	NORMAL — selects radar detection, acquisition, and track modes at normal range (0 to 20 nautical miles). 10/30 — selects radar detection only at extended range (10 to 30 nautical miles).
†Range selector switch (2A, figure 8-1, sheet 3)	20 MILES or 40 MILES — selects radar detection, acquisition, and track modes of operation (acquisition and track limited to 25 miles in 40-mile mode). 60 MILES — selects radar ground-mapping (search) mode only.
Radar control grip (14, figure 8-1)	In radar search mode, controls acquisition circle or bar in range and azimuth. In radar acquisition mode, controls antenna (positions narrow B scan on the display) in azimuth and range strobe position in distance. In IR search mode, controls azimuth reference cursor in azimuth. In IR acquisition mode, controls antenna and IR receiver head in azimuth to spotlight target for maximum target spike (on the display) and tone.
Antenna elevation control knob (tilt thumbwheel) (15, figure 8-1)	In radar search mode, controls center elevation of search scan pattern and center position of tilt mark. In radar acquisition mode, controls actual elevation of antenna and tilt mark position. In IR search mode, controls elevation of search scan pattern. In IR acquisition mode, controls actual elevation of IR receiver head to spotlight target for maximum target spike in elevation and to light the IR lamp.
Acquisition switch (action button) (19, figure 8-1)	RADAR — Places set in acquisition mode when depressed. Held depressed until tracking mode automatically engages at target lock-on. Released before lock-on, returns radar to search mode. Depressed and released after lock-on, returns radar to search mode. IR — Places set in acquisition mode when depressed. Switches set to tracking mode when released. Must be depressed and released to return set from track to search mode.
Radar power switch (27, figure 8-1)	STBY — applies power to maintain radar and IR operation in standby condition. NOR — places radar and IR sets in operation in search mode. HOJ — places radar set in operation in search mode with provision for automatically switching to home-on-jamming operation if jammed while tracking.
FTC (clutter limiting) switch (28, figure 8-1)	FTC — Limits the amount of ground clutter indicated on the radarscope when in search mode. Automatically engaged when in acquisition or tracking mode. NOR — Allows all echoes to be indicated on the radarscope.
Mode switch (29, figure 8-1)	RADAR, NOR — radar set energized for normal operation. RADAR, ARO — radar antenna restricted in elevation to scan along boresight of aircraft. Also used to initiate GARO mode** with armament selector switch in GUNS. IR — Allows IR detecting set to provide target detection, lock-on tracking; disables radar transmitter.
‡Scan switch (31, figure 8-1, sheet 1)	NOR — Selects antenna azimuth scan 45° each side of centerline. LEFT — Selects antenna azimuth scan from 45° left to 10° right. RIGHT — Selects antenna azimuth scan from 45° right to 10° left.
§Sector scan switch (14A, figure 8-1, sheet 2)	CENTER — radar control grip vertical and sector scan switch depressed selects antenna azimuth scan 20° each side of centerline. LEFT — radar control grip to left and sector scan switch depressed selects antenna azimuth scan from 45° left to 10° right. RIGHT — radar control grip to right and sector scan switch depressed selects antenna azimuth scan from 45° right to 10° left. NORMAL — when making any one of the above selections, a second actuation of the switch results in a normal sector scan of 45° either side of centerline.
Horizon control (30, figure 8-1)	Positions the attitude horizon bar vertically on the radarscope.

*F-8E aircraft without ASC 395.
†F-8E aircraft BuNo. 150284 and subsequent, and those with ASC 395.
‡F-8D aircraft.
§F-8E aircraft.
**F-8E aircraft with Avionics Change No. 133. F-8D aircraft with Avionics Change No. 148.

RADAR AND IR CONTROLS *(Continued)*

Nomenclature	*Function*
Test switch (33, figure 8–1)	When pressed, provides artificial targets on radarscope to allow inflight check of radar set operation.
‖IR volume control (26A, figure 8–1)	Controls loudness of IR detection tone in pilot's headset.
‖IR null control (26A, figure 8–1)	Nulls out IR detection tone when no IR target is present. Best response is obtained when control is positioned as far clockwise as possible with tone nulled.

‖Aircraft BuNo. 150326 and subsequent, and those with ASC 388.

The AN/APQ-83 radar set is capable of searching, acquiring, and tracking through a range of 20 miles. Range capabilities of the AN/APQ-94 radar set depend upon whether a large (IP-626/APQ-94) or small (IP-479/APQ-83) viewing scope is installed. With the small scope the AN/APQ-94 is capable of search operation up to a range of 30 miles and acquisition and tracking up to a range of 20 miles. The AN/APQ-94 incorporates a large antenna, improved tracking and extended range scales. With the AN/APQ-94 range selector switch in the "10/30" position, the extended range lamp is illuminated and the acquisition and track modes of operation cannot be initiated. In this mode, the range display covers 10 to 30 miles. Targets at ranges of 0 to 10 miles are not displayed.

The larger viewing scope for the AN/APQ-94 set is installed on aircraft BuNo. 150284 and subsequent, and those with ASC 395. With this scope, the 0- to 20-mile range provides complete radar operation. Acquisition, lock-on, and track capabilities are limited to 25 miles when the 0- to 40-mile range is selected (extended range lamp is on with 0- to 40-mile range selected). The 0- to 60-mile range provides a ground mapping capability. With the 0- to 60-mile range selected, the radar operates in search mode only, with no range strobe and no acquisition capability. The antenna spin and nod are stopped during mapping. A gap in the aiming circle indicates range rate when in the track mode.

In the ARO (automatic range only) search mode, the elevation knob is inoperative and the elevation of the search mode scan is centered on the aircraft boresight line. The azimuth control is also inoperative, and the acquisition mark remains centered in azimuth on the scope display. The range control will position the acquisition mark in range. To acquire the target maneuver the interceptor to locate the target on or near the azimuth centerline of the scope. The ARO track function is the same as the radar track mode during NORMAL operation except the breakaway display will not appear.

The GARO (guns automatic ranging only) mode provides for rapid detection and automatic lock-on of gunfire targets located approximately straight ahead and within 600 to 2,100 yards of the attacking aircraft.

The GARO display is a narrow B scan that remains centered in azimuth and 4.0° down in elevation for both target acquisition and trade modes. The narrow B scan represents the radar beam, approximately 10.8° in diameter for F-8E aircraft, and 10.5° in diameter for F-8D aircraft. When the target appears as a blip of increased intensity within the B scan (600 to 2,100 yards range) the radar set automatically locks on the target and switches to track mode. Lock-on will be maintained as long as the target is within the radar beam. This mode of operation is selected by placing the armament selector switch (5, figure 8–1) in GUNS and the mode switch (29, figure 8–1) in ARO.

The HOJ (home-on-jamming) capability permits homing on the source of CW and noise-modulated CW jamming signals. If the jamming signal appears while in the track mode (with the power switch in HOJ), the J lamp, located on the scope face, will illuminate and the radar will track the jamming signal in azimuth and elevation. If the jamming signal appears while in the search mode, place the mode switch in HOJ position and reduce the gain of the radar until only a band of the jamming signal is displayed on the scope. Place the acquisition bar in this band and depress the acquisition switch to acquire the jamming signal. The J lamp will light and the radar will track the signal in azimuth and elevation. Range information may not be valid during HOJ operation.

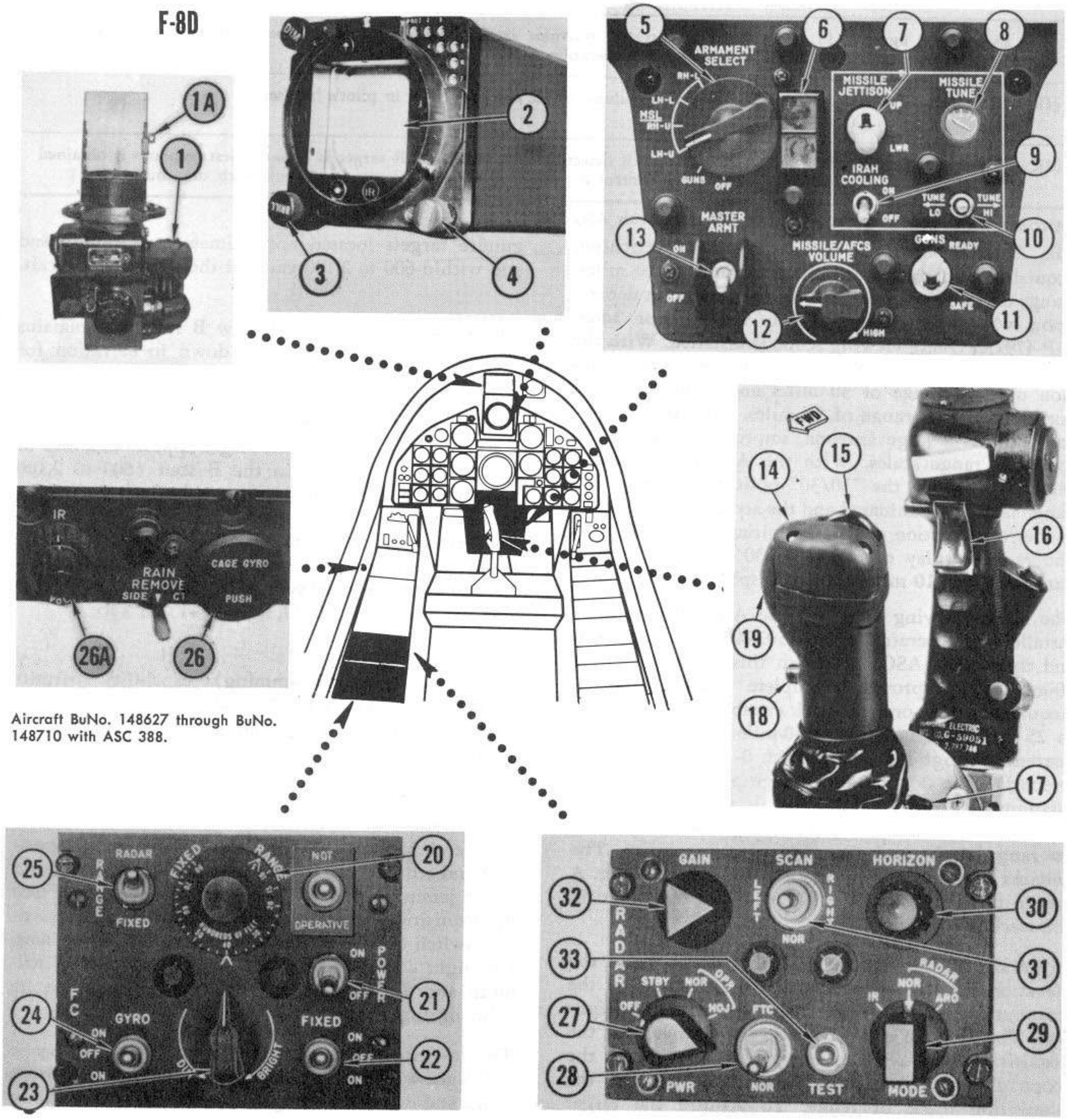
The in-envelope lamp at the lower left of the scope will light when the attacking aircraft is within missile range and is not exceeding missile launch g limitations.

Operation

Scope displays showing the various modes of radar operation are presented in figure 8–2. Scope displays for the AN/APQ-83 are not presented since the displays are basically the same as AN/APQ-94 small scope

WEAPON SYSTEMS CONTROLS

F-8D



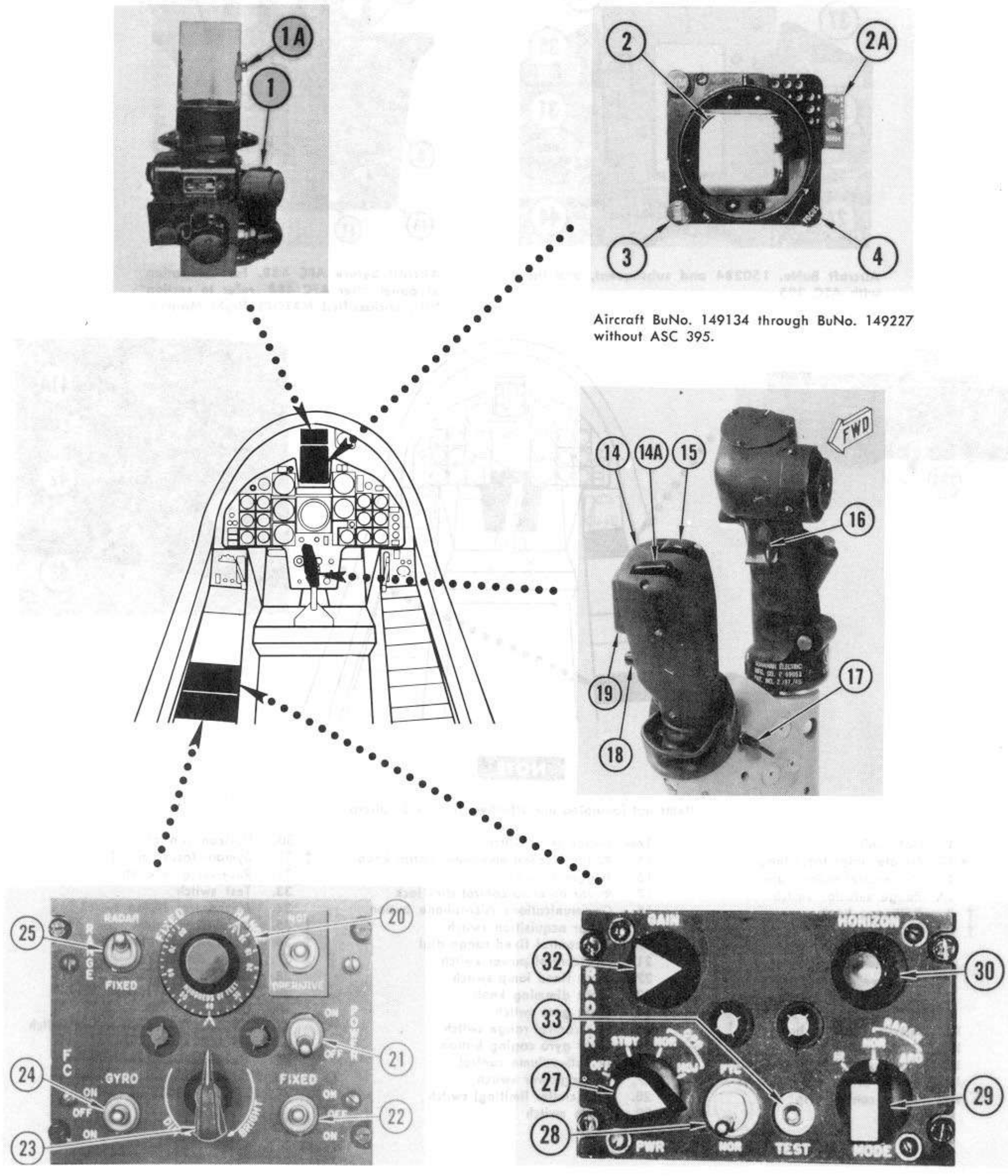
1. Sight unit
1A. Remote radar track lamp*
2. Fire control radar scope
3. Brilliance knob
4. Focus knob
5. Armament selector switch
6. Missile selected light
7. Missile jettison switch
8. Missile tuning meter
9. IR missile cooling switch
10. Missile tuning switch
11. Guns arming switch
12. Missile/AFCS volume knob
13. Master armament switch
14. Radar control grip
15. Radar antenna elevation control knob
16. Trigger switch
17. Radar antenna control stick lock
18. Communications microphone button
19. Radar acquisition switch
20. Fire control fixed range dial
21. Fire control power switch
22. Sight fixed lamp switch
23. Sight dimming knob
24. Sight gyro switch
25. Fire control range switch
26. Sight gyro caging button
26A. IR null-volume control
27. Radar power switch
28. FTC (Clutter limiting) switch
29. Mode switch
30. Horizon control
31. Scan switch
32. Receiver gain knob
33. Test switch

* Aircraft with Airframe Change No. 447.

63802-4-1NA

Figure 8–1 (Sheet 1)

WEAPON SYSTEMS CONTROLS
F-8E

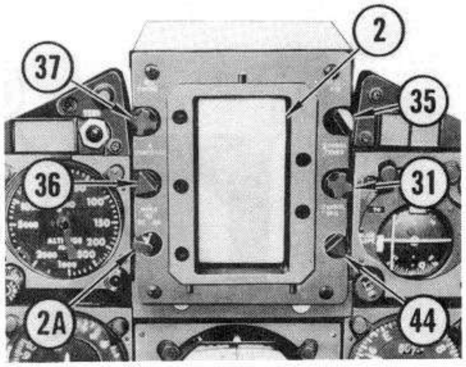


Aircraft BuNo. 149134 through BuNo. 149227 without ASC 395.

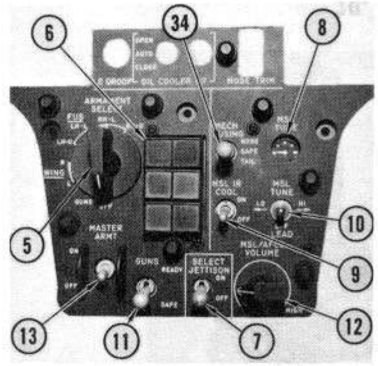
63802-4-2-11-66

Figure 8–1 (Sheet 2)

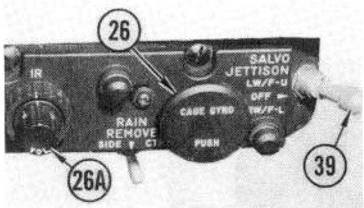
WEAPON SYSTEMS CONTROLS
F-8E

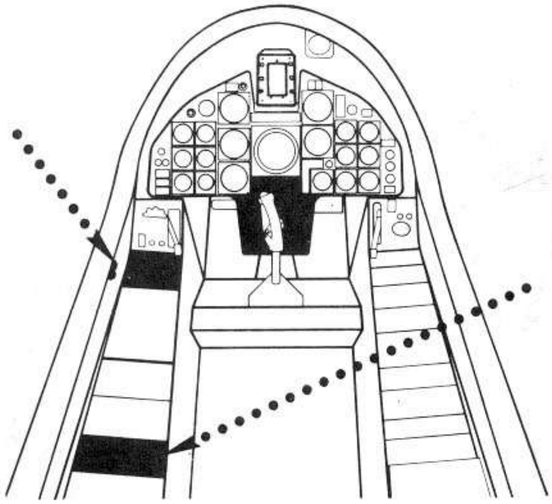


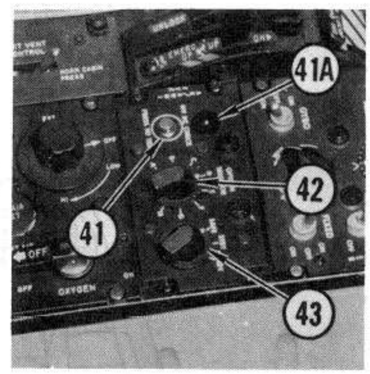
Aircraft BuNo. 150284 and subsequent, and those with ASC 395.



Aircraft before AFC 488. For illustration of panel after AFC 488, refer to section VIII, unclassified NATOPS Flight Manual.







NOTE

Items not footnoted are effective on all F-8E aircraft

1. Sight unit
* 1A. Remote radar track lamp
2. Fire control radar scope
2A. Range selector switch
† 3. Brilliance knob
† 4. Focus knob
5. Armament selector switch
6. Armament panel lights
7. Selective jettison switch
8. Missile tuning meter
9. IR Missile cooling switch
10. Missile tuning switch
11. Guns arming switch
12. Missile/AFCS volume knob
13. Master armament switch
14. Radar control grip
14A. Sector scan switch
15. Radar antenna elevation control knob
16. Trigger switch
17. Radar antenna control stick lock
18. Communications microphone button
19. Radar acquisition switch
20. Fire control fixed range dial
21. Fire control power switch
22. Sight fixed lamp switch
23. Sight dimming knob
24. Sight gyro switch
25. Fire control range switch
26. Sight gyro caging button
26A. IR null–volume control
27. Radar power switch
28. FTC (clutter limiting) switch
29. Mode switch
30. Horizon control
‡ 31. Symbol focus control
32. Receiver gain knob
33. Test switch
34. Mechanical fusing switch
‡ 35. Bezel dim control
‡ 36. Contrast control
‡ 37. Focus control
38. Deleted
39. Salvo jettison switch
40. Deleted
41. HV D.C. light press-to-test switch
41A. HV D.C. light
42. Option selector switch
43. Safe-standby-ready switch
44. Symbol brilliance control

* Aircraft with Airframe Change No. 447.
† Aircraft without ASC 395.
‡ Aircraft BuNo. 150284 and subsequent, and those with ASC 395.

63802-4-3-11-66

Figure 8–1 (Sheet 3)

displays (minor differences are described in the text which follows).

Note

Provisions are included with the large scope AN/APQ-94 radar set for the installation of a CP-742/APQ-94 Deviated Pursuit (Lead Launch) Computer. With this computer installed, a lead angle is computed to enable the pilot to employ a lead pursuit attack with missiles. Refer to SIDEWINDER MISSILE for additional information.

In the search and acquisition modes of operation, movement of the elevation control knob (15, figure 8–1) on the radar antenna control grip (14, figure 8–1) raises and lowers the search scan pattern, and side-to-side movement of the radar antenna control grip moves the acquisition bar (circle on the AN/APQ-83 radar) laterally on the radarscope. Fore-and-aft movement of the radar antenna control grip moves the acquisition mark in range in the search mode and locates the starting position of the range strobe during the acquisition mode. When the set is in the search mode depress and hold the acquisition switch (19, figure 8–1) to enter the acquisition mode. When the target is properly acquired, the set automatically enters the track mode and the acquisition switch may be released. If the target is lost, press and release the acquisition switch to return the set to the search mode (the AN/APQ-94 radar will return to search automatically after approximately 6 seconds if the target is lost).

When a target is selected for tracking, place the acquisition bar directly below the target (AN/APQ-83, the acquisition circle is positioned over the target). When the acquisition switch is pressed, the display will switch from search to acquisition. The antenna will move to the azimuth position of the azimuth control and the elevation position of the antenna elevation control. Illumination of the target can be further refined by adjustment of the azimuth and antenna elevation controls. The radar will automatically switch to the track mode of operation when the range strobe encounters the target.

In the radar track mode, the pilot's hand controls (except the acquisition switch which may be used to reenter the search mode) have no effect on the display or operation of the set. On the track display of the small scope, the narrow B scan is offset to the left of the scope and presents range information only. With the large scope in track, the B scan and the steering circle are together. The range strobe position represents the range of the target being tracked, and the missile maximum range mark on the lower left-hand side of the radarscope represents the computed maximum range capability of the missile. An aiming circle is positioned on the display to indicate the azimuth and elevation angles of the target with respect to the aircraft boresight line. A calibrated vertical line, indicating the depth of the missile launch envelope, extends from near the center of the aiming circle perpendicular to the A-H bar. When the target is 9° or less from the boresight line, an aiming dot appears on the display.

With the aiming dot in the aiming circle, the in-envelope lamp lighted, the range strobe within the missile maximum range mark, the calibrated vertical line touching the A-H bar, and the pilot receiving the missile acquisition tone, the necessary conditions exist for missile firing. This is the attack mode.

A breakaway display appears during the attack mode when the target range becomes less than the minimum range capability of the missile being used. If the small scope is being used, this display consists of a centered aiming circle and dot and a breakaway cross. The large scope breakaway display is similar, except that the circle and dot continue to provide steering information after breakaway. With either scope, the in-envelope light goes out when the breakaway display appears.

Operation (GARO)

Place the range selector switch (2A, figure 8–1, sheets 2 and 3) in NORMAL (F-8E, small scope) or 20 MILES or 40 MILES (F-8E, large scope). Select the GARO mode by placing the mode switch (29, figure 8–1) in ARO and the armament selector switch (5, figure 8–1) in GUNS. This places the radar set in the acquisition mode with the radar antenna locked at 0° azimuth and 4° down elevation (with reference to the aircraft boresight line). In the acquisition mode, the range strobe (range gate) sweeps from approximately 600 to 2,100 yards and locks on any target within this range. There is no target search in azimuth or elevation.

Target lock-on will be indicated by illumination of the radarscope target lamp and the remote radar track lamp* on the sight unit. Target angle tracking is unavailable since the radar angle tracking function is disabled. Maintain the target approximately straight ahead to retain lock-on. The aiming circle, aiming dot and breakaway display are not provided in the GARO mode. The AH bar and antenna tilt mark, however, are displayed. The tilt mark is positioned slightly below the scope scribe mark due to the down elevation of the antenna. To unlock from a target, press and release the acquisition switch (19, figure 8–1).

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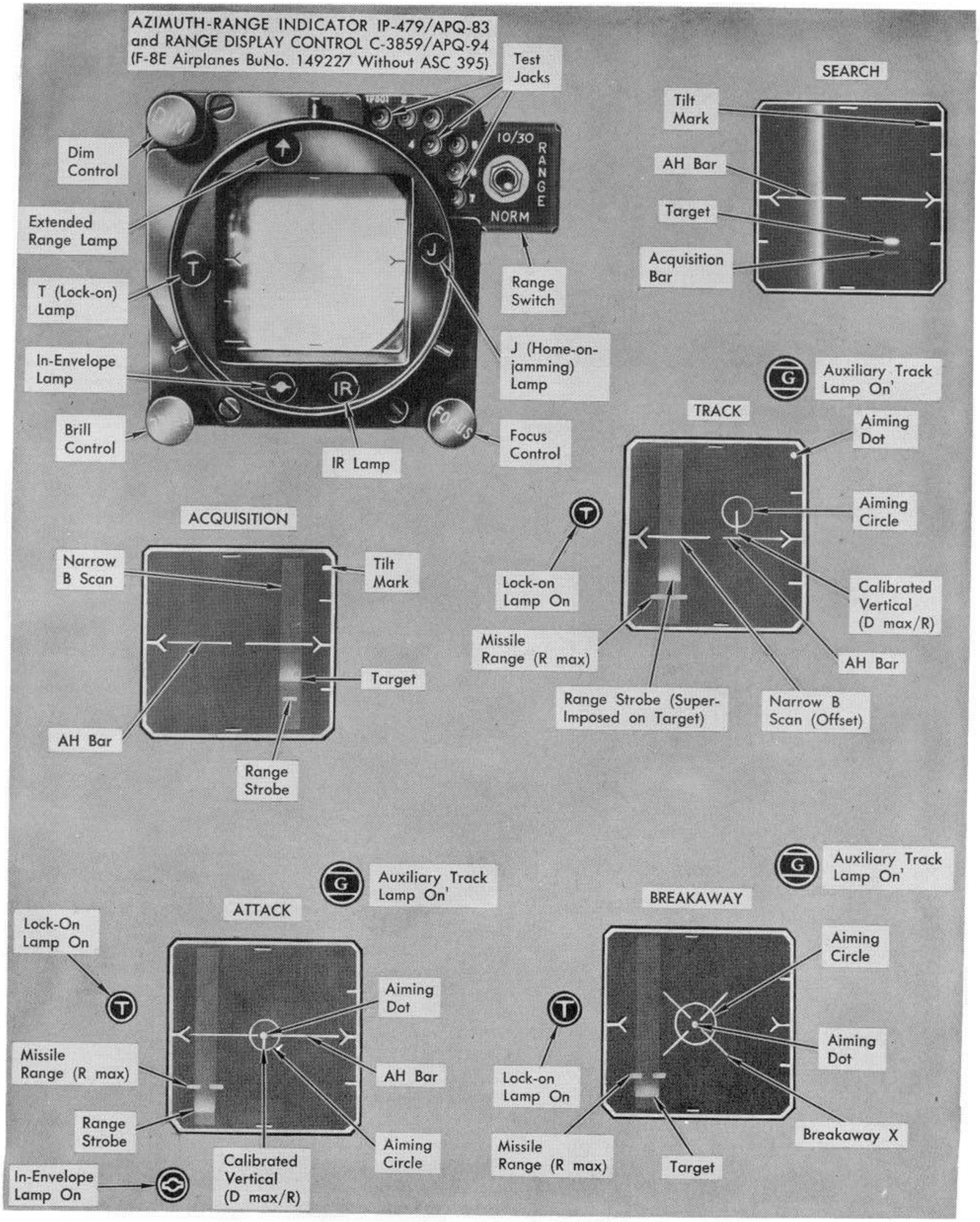
*Aircraft with Airframe Change No. 447.

RADAR DISPLAYS

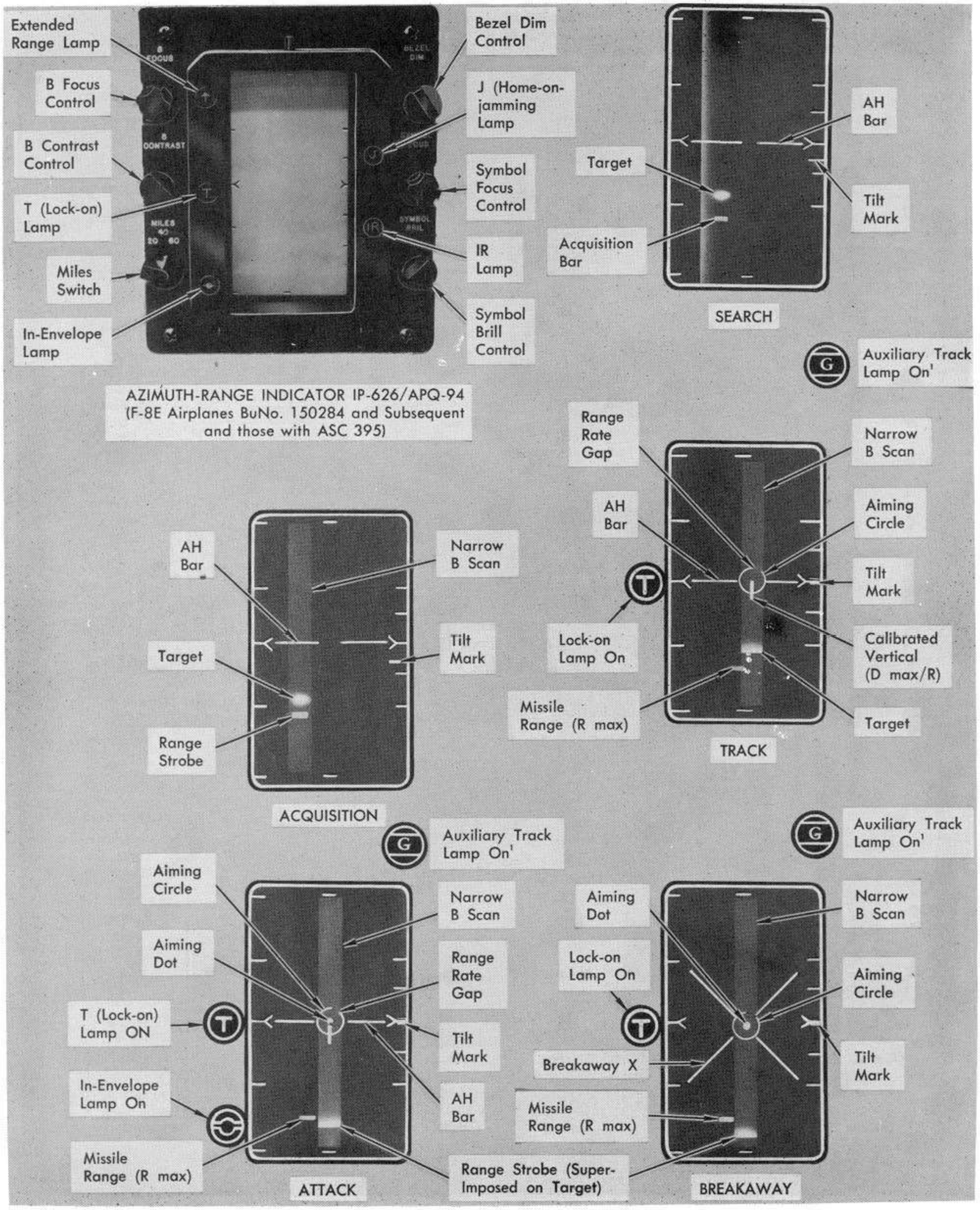


'Installed on gunsight in F-8E airplanes with F-8D/E Airframe Change No. 447.

63802—8—1(1)NB

Figure 8–2 (Sheet 1)

RADAR DISPLAYS



[1]Installed on gunsight in F-8E airplanes with F-8D/E Airframe Change No. 447.

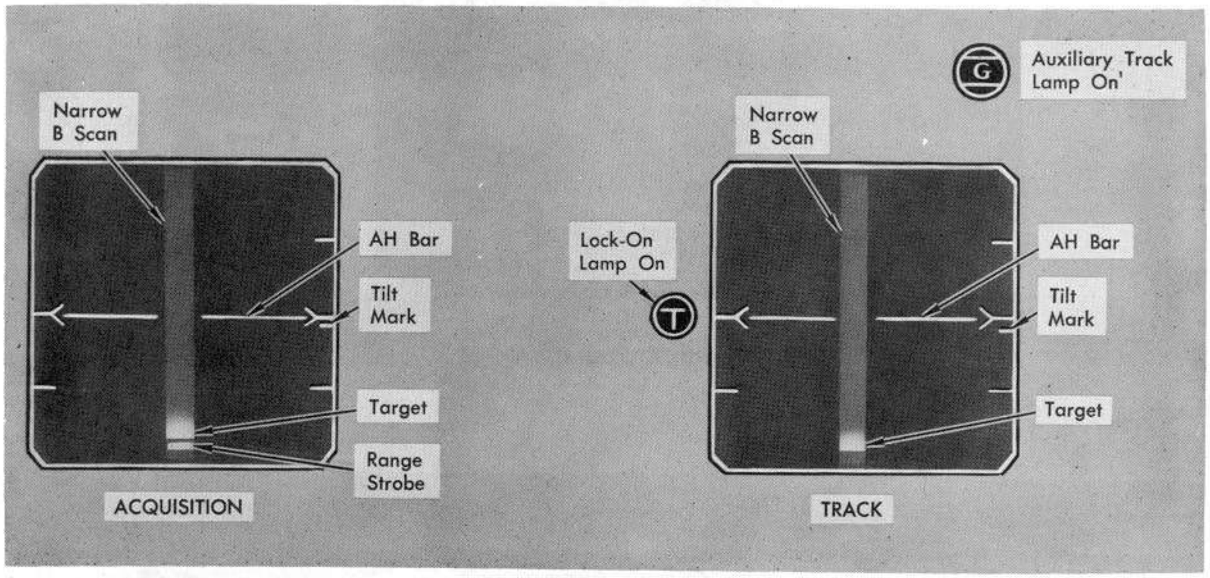
63802-8-1(2)NB

Figure 8-2 (Sheet 2)

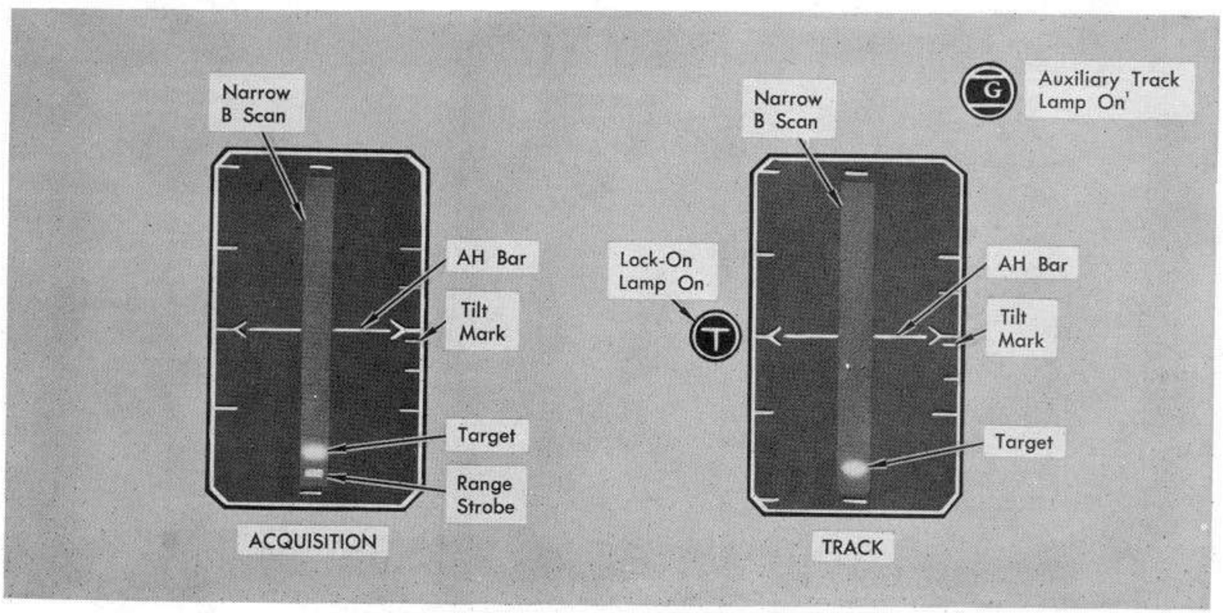
RADAR DISPLAYS

GUNS AUTOMATIC RANGING ONLY

Radar Sets with Avionics Change No. 133



IP-479/APQ-83 INDICATOR



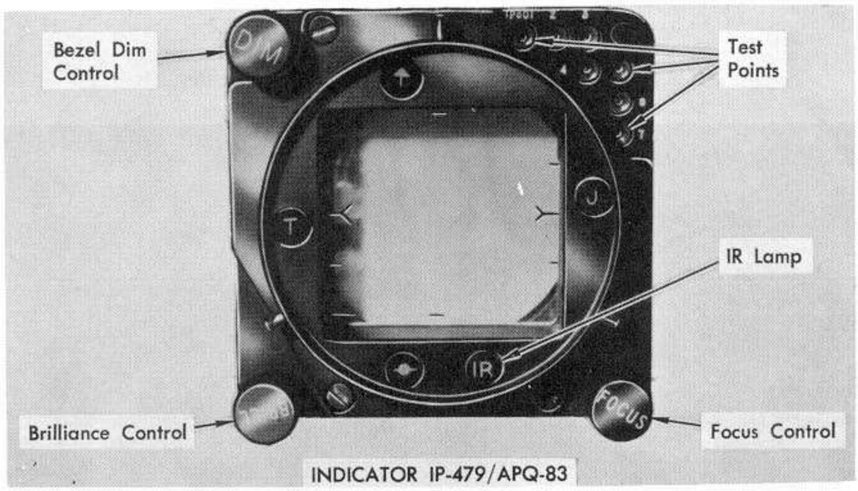
IP-626/APQ-94 INDICATOR

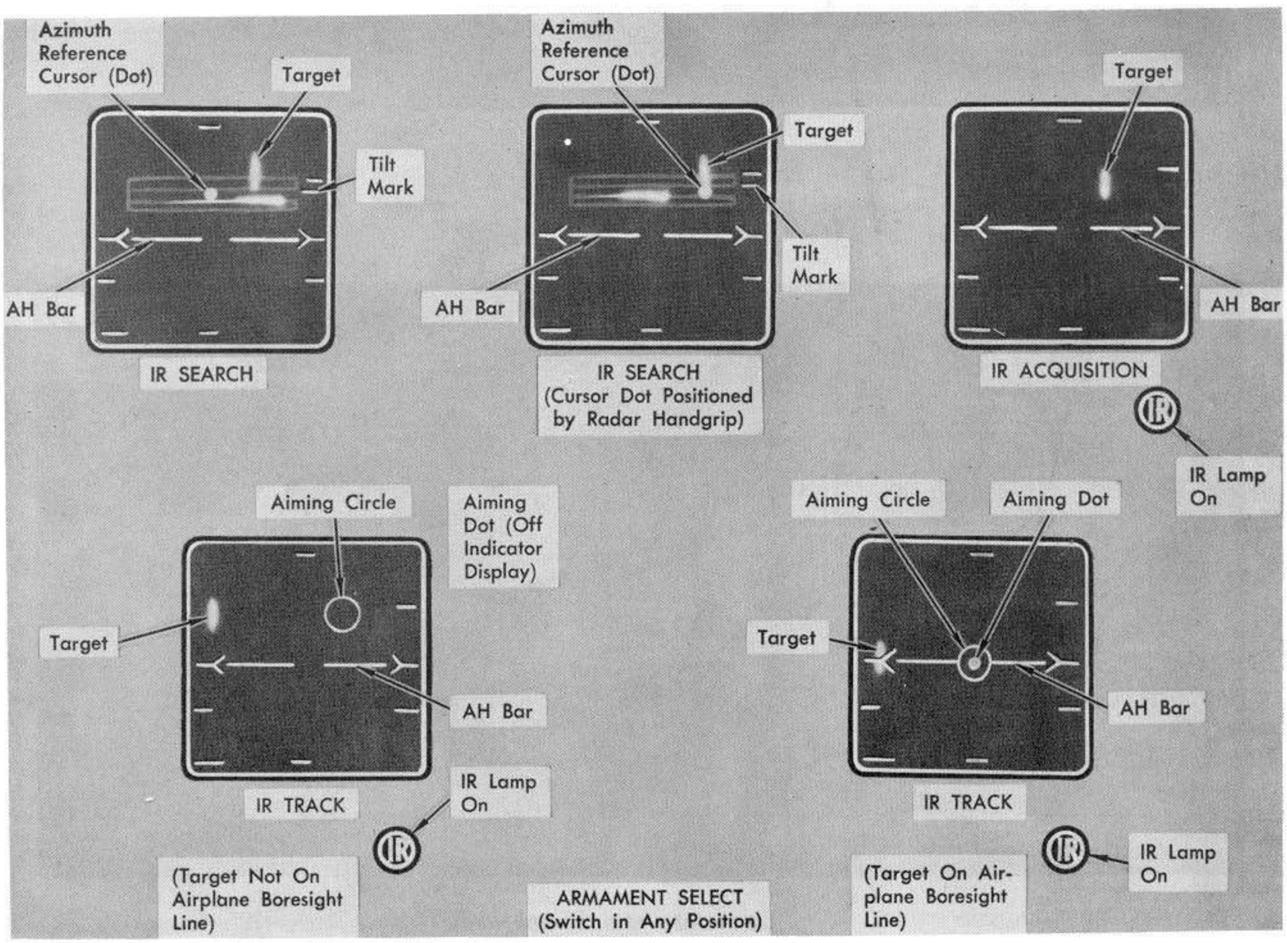
[1]Installed on gunsight in airplanes with Airframe Change No. 447.

63802-8-1(3)NB

Figure 8-2 (Sheet 3)

INFRARED DISPLAYS





63802-8-2(1)NB

Figure 8-3 (Sheet 1)

INFRARED DISPLAYS

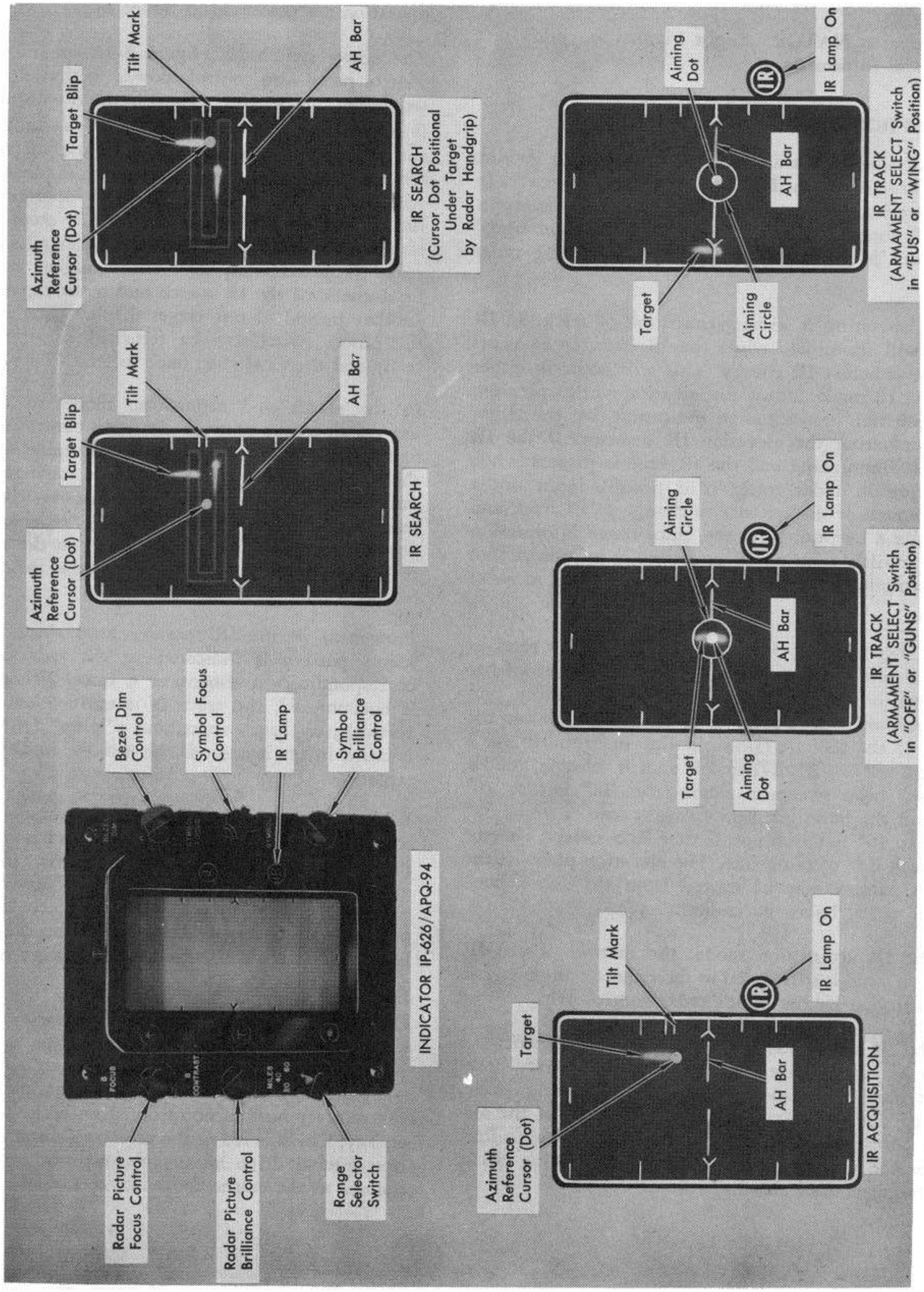


Figure 8–3 (Sheet 2)

INFRARED DETECTING SYSTEM

Note

Refer to NATOPS Flight Manual for additional information.

DESCRIPTION

The infrared detecting set operates in three modes. These are IR search, IR acquisition, and IR track. In these modes, IR data is displayed on the radarscope. The IR tone (200 to 2,000 cps depending on signal strength) is available in all modes, including radar modes.

While operating in either acquisition or track, an IR lamp will illuminate when the IR detector elements receive sufficient IR energy. This will occur in either radar or IR mode. Steady illumination while operating in acquisition or track is an indication that the target is illuminating the elevation IR detector. If the IR lamp is illuminated and the IR tone is present when operating in radar track, it is possible (but not a requirement of the system) to change to IR track and maintain a lock-on. However, since range information is not available during IR operation, a lock-on cannot be maintained when changing from IR track to radar track.

In IR search mode, the infrared detecting set receiver head is slaved to the radar antenna and searches a 4-bar scan pattern ahead of the aircraft. The search pattern encompasses an area 38° to the left and 38° to the right of the aircraft boresight line in azimuth and a vertical arc of 7.9°. When left scan is selected, the IR receiver head sweeps a sector from 38° left to 10° right of the boresight line. In right scan, a sector 38° right to 10° left is swept. Center scan sweeps a sector 20° each side of centerline. The elevation plane of the search pattern may be moved from 45° above horizontal to 30° below horizontal.

In the IR acquisition mode, the motion of the IR receiver head is still slaved to the radar set antenna and is controlled by the pilot's radar control grip.

In the IR track mode, the scope display presents the position of the target relative to the aircraft boresight line. The display consists of an aiming circle, aiming dot (when the target is within 9° of the aircraft boresight line), and a target signal strength line. When the aiming dot is centered in the aiming circle, the target is dead ahead.

OPERATION

Scope displays showing the various modes of infrared operation are presented in figure 8–3.

The power switch (27, figure 8–1) on the radar set control panel also controls power to the IR detecting set. When the switch is placed in STBY, warmup power is supplied to the set and the nitrogen tank is pressurized to cool the detector cells to their operating temperature. When the power switch is placed in NOR with the mode switch in IR, search operation is initiated. For approximately 60 to 120 seconds a test target will appear on the lower right-hand side of the scope (approximately 20° below center) to allow a brief check of the IR search and track capabilities. If another period of test target display time is desired, the power switch can be returned to STBY momentarily and then switched back to NOR.

In the search and acquisition modes of operation, movement of the antenna elevation control knob (15, figure 8–1) on the radar control grip raises and lowers the search scan pattern. Side to side movement of the radar control grip (14, figure 8–1) moves the azimuth reference cursor laterally on the radarscope. The acquisition switch (19, figure 8–1) on the radar control grip switches the set through the various modes of operation.

Movement of the IR receiver head along the 4-bar search pattern is indicated on the radarscope by a corresponding movement of a trace. When a target is encountered, the trace is intensified and deflected vertically to form a spike, and a "ping" (the IR tone) is heard in the headset as the receiver head crosses the target.

When the acquisition switch is depressed, the search scan will stop and the IR receiver head is controllable in azimuth and elevation by use of the radar control grip and the elevation control knob. When it is desired to switch the set to the track mode, the acquisition switch must be released. Whether the target has or has not been acquired, the set will change from acquisition to track.

Once the acquisition switch is depressed, acquire the target and release the acquisition switch as rapidly as possible. The error signal system accumulates electrical energy during acquisition when the mechanical axis of the receiver head is not aligned with the target. This energy, which is fed to the receiver azimuth and elevation gimbal drive motors to keep the receiver head pointed at the target, can become excessive. When the acquisition switch is released and the receiver head is not precisely aligned with the target, the drive motors may reposition the receiver head with a force sufficient to drive it through and off the target and break the lock-on.

The following are indications that tracking has not been initiated upon release of the acquisition switch:

- Vertical signal-strength line collapses to a dot.
- IR tone frequency drops.
- Steering circle drifts aimlessly.
- IR lamp extinguishes.

Depress and release the acquisition switch if it is desired to return the set to the search mode. The search scan may be noisy for a short time after returning to search mode until the optical system stops rotating.

To be able to use the IR system with an AN/APQ-94 radar, the crystal oscillator BuOrd 2155846-1, -2, -3, or -4 must be installed in the electrical (missile) synchronizer SN-253/APQ-83. Check for installation of the crystal oscillator (silver can through a glass window located in the top of the synchronizer in (aft end of the right-hand console).

TRACK AND SEARCH PROCEDURES

1. Search scan pattern — POSITION
   - Adjust elevation of scan pattern to search desired area.
   - When a target is encountered, position the scan pattern in elevation so that the target spike appears on the second or third bar. If the tilt mark is below the middle range mark, the IR system may detect ground targets.
2. Azimuth reference cursor — POSITION
   - Move the azimuth reference cursor to the same azimuth position as the target.
3. Acquisition switch — DEPRESS
   - When the IR trace is sweeping the bar that provides the target spike, depress the acquisition switch.
   - The search scan will stop, and the IR receiver head will point in a direction corresponding to the position of the azimuth reference cursor.
4. Elevation — ADJUST
   - Adjust elevation until IR lamp is on steady, indicating that the target is being detected in elevation.
5. Azimuth — ADJUST
   - Sweep target in azimut huntil the spike exhibits maximum amplitude and brightness and the highest pitched IR tone is heard.
6. Acquisition switch — RELEASE
   - The acquisition switch must be released to switch the set to the track mode.
   - Monitor the scope closely to ascertain that the desired target is being tracked. The steering information should move to the desired area, the IR lamp should remain on steady, and the IR tone should remain at a high pitch level.
   - As the target signal strength increases, the IR tone will increase in pitch. When it reaches the upper end of the frequency range, the target is in close proximity.

RANGE BURST FEATURE

The Range Burst feature* provides the AWG-4 Weapons System with radar range information for utilization during IR mode. When tracking an IR target, position the MODE switch on the Radar Control Panel briefly (3 to 5 seconds) to RADAR-NOR position. The radar will enter the Acquisition mode. Radar target range and azimuth information will be displayed on the radarscope. The radar target may be acquired if desired at this time by placing the acquisition bar below the target, or it may be re-acquired in IR mode by returning the Radar Mode switch to IR.

ARMAMENT SYSTEMS

Note

Refer to NATOPS Flight Manual for additional information.

GUN SYSTEM

This system consists of four fixed MK 12 Mod 0 20-millimeter guns which are fired at the same time. Normal ammunition load is 125 rounds per gun and maximum load is 144 rounds per gun.

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*F-8E aircraft with Airframe Change No. 456 when Avionics Change No. 219 has been installed in Radar Set AN/APQ-94, and F-8D aircraft with Airframe Change No. 458 when Avionics Change No. 232 has been installed in Radar Set AN/APQ-83A.

AIM-9 (SIDEWINDER) MISSILE SYSTEM

AIM-9B/C/D Missiles

Major sections of the missiles are guidance-control, warhead with both influence and contact fuzes, and solid propellant rocket motor with four rear fixed wings on the body. Four movable control fins are mounted on the guidance-control section.

Infrared AIM-9B/D missiles are intended to be carried by high-speed fighter aircraft in tail-chase attack primarily against jet aircraft or piston aircraft having unshielded engines. The radar-guided AIM-9C is intended primarily for head-on attack against enemy aircraft and has all-weather capability.

With the AIM-9B/C/D missiles align the aircraft boresight on the target or lock-on the target with aircraft radar. The missile tracking system will acquire the target and provide a distinctive tone to the headset. When the IN-ENVELOPE light is on, fire the missile by squeezing the control stick trigger. The missile continuously tracks the target and makes corrections to maintain a collision course. With the AIM-9B/D, it is not necessary to track the target after launching; evasive action or further attack with other armament may be made. After firing an AIM-9C, continue to illuminate the target with the aircraft radar until missile intercept (40 seconds maximum).

For additional detailed information concerning the AIM-9B/C/D missiles, refer to NAVWEPS OP 2309, Revision 2, NAVWEPS OP 3351, Guided Missile AIM-9C, Sidewinder 1C-SAR Description, Operation and Handling, NAVWEPS OP 3352, AIM-9D Guided Missile (Sidewinder 1C-1R) Description, Operation, and Handling, and NAVWEPS OP 3353, Pilot's Handbook for Sidewinder 1C (AIM-9C and AIM-9D) Air-to-Air Guided Missiles.

Deviated Pursuit (Lead Launch) Computer

The CP-742/APQ-94 Deviated Pursuit (Lead Launch) Computer computes a 9° or 20° lead angle which enables the pilot to employ a lead pursuit attack on enemy targets. A 20° lead angle provides an enlarged aerodynamic missile launch envelope; a 9° lead angle is used for attack with an AIM-9C on a launcher station shadowed by the aircraft's nose. Provisions for the computer are included in aircraft equipped with the AN/APQ-94 radar set with the large viewing scope. The computed lead is displayed on the radar scope by offset of the circle and dot steering information; the pilot places the aircraft in a lead pursuit attack by flying the aircraft to center the steering circle and dot.

The lead launch computer also provides angular slaving information for the AIM-9C missile antenna. In the radar track mode, the AIM-9C antenna is slaved to the radar antenna so the missile can see the target when the aircraft is flying the lead pursuit course. When the missile is fired, the missile guidance system steers the missile to maintain zero angular rate between the missile body and the missile antenna. This places the missile in a lead collision course with the target.

The seekers of the AIM-9B/D missiles cannot be slaved; however, using lead pursuit outside the launch envelope enables the pilot to enter the launch envelope at a point that affords a greater kill probability. The computer supplies a 20° lead angle until the aircraft has closed to missile maximum range plus 2 miles when the lead is automatically removed for infrared missiles and the pilot must initiate a pure pursuit attack. This is necessary to place the target in the field of view of the infrared seeker head since the infrared seekers remain boresighted to the interceptor armament data line (ADL) until after launching.

Lead computation is selected by placing the missile tuning switch (10 figure 8–1) in the LEAD (down) position.

Note

> The marking for the LEAD-NO LEAD switch is very confusing. Select lead by placing the switch in the *down* position. It is recommended that squadrons paint over the word OFF below this switch.

A deviated pursuit attack is initiated by automatic or pilot command. The deviated pursuit computer can automatically switch the radar into 20° lead if the sight line rate exceeds 0.4 degrees per second. The pilot can point his aircraft at least 15° ahead of the target's position prior to radar lock-on, and the computer will cause the indicator to display the lead as soon as the radar completes the lock-on sequencing. The computer is mechanized to provide 20° lead for the AIM-9B/C/D missiles until the radar range to the target is approximately R_{max} plus 2 miles. At this point the radar is returned automatically to pure pursuit with an infrared missile or no missile on the selected launcher station. At this point with an AIM-9C selected the lead remains at 20° or switches automatically to 9° if the missile is shadowed by the nose of the aircraft.

The radar set can display lead information only when the following conditions are satisfied:

a. The cockpit switch is placed in the LEAD (down) position by the pilot.

b. The radar is locked on and tracking a target.

c. The Armament Selector Switch is positioned for one of the four missile stations (station may be empty).

d. The radar range to the target is greater than missile maximum range plus 2 miles for infrared missile or empty pylon, or at any range to target for a radar missile.

When a radar missile is launched with lead, there are two possibilities: if the armament selector switch steps to radar missile, the lead will return; if the armament selector switch steps to an infrared missile, the system returns to pure pursuit display and allows a successive attack without switch manipulation by the pilot.

If conditions are such that the need for leading the target or the proper direction of lead is not readily apparent, leave the cockpit switch in the NO-LEAD position until after the steering circle and dot are centered on the indicator and the pure pursuit approach is in progress. Place the switch in the LEAD position, and if the sight line rate exceeds 0.4 degrees per second, the computer will automatically switch to the proper lead direction.

If the pilot wishes to track a target at angles off the boresight greater than 15° but does not want a lead condition, the cockpit switch must be in a NO-LEAD position.

Once the computer has been switched to a lead condition, the lead cannot be removed or reversed except by the pilot. To remove the lead, place the switch in the NO-LEAD (center) position. If the wrong sense of lead should be inadvertently selected, the pilot may reverse the lead sense by flying the aircraft to place the armament data line of the aircraft at least 15° ahead of the target in the proper lead direction.

Sidewinder Radar Attack

Radar will be in the search mode, with the scope displaying an artificial horizon (A-H) bar), the antenna tilt mark, the B scan, and the acquisition circle. The antenna will be sweeping to 45° each side of the aircraft boresight line. The tilt knob on top of the radar control grip controls the elevation of the antenna from 45° above centerline to 30° below.

When a target is displayed on the scope, place the acquisition circle over the blip (place the acquisition bar of the AN/APQ-94 radar under the blip). With the acquisition circle or bar in the proper position, depress and hold the acquisition switch on the radar control grip to transfer the radar to the acquisition mode. The radar antenna will move to the position indicated by the acquisition circle or bar.

In the acquisition mode, the scope presentation changes to a vertical "jizzled B" scan which displays the target blip and the range mark. Control the antenna in azimuth with the radar control grip to maintain the "jizzled B" scan over the target blip. Move the control grip fore and aft to cover the target blip with the range strobe to obtain a lock-on. The acquisition switch must be held depressed during this mode.

Radar range lock-on is indicated by the lock-on lamp on the upper left-hand side of the scope panel and by a change in scope presentation. Release the acquisition switch when these indications are obtained. The radar control grip is not used during the track mode of operation.

In the track mode, automatic range and angle tracking of the fire control system are in effect. The antenna will move to track the target. The scope presentation is now a "jizzled B" scan fixed at the extreme left of the scope with both target and missile range marks in the "jizzled B" scan, and target position information in the form of a coarse steering circle and a fine steering dot. A calibrated vertical line extends from the coarse steering circle toward the A-H bar. The vertical line represents the vertical dimension of the missile launching envelope.

Maneuver the aircraft to center the coarse steering circle. The fine steering dot will move toward the scope center at a rate approximately five times faster than the coarse steering circle. The optimum firing condition is reached when the fine steering dot is in the middle of the coarse steering circle. The missile may be fired at any time the vertical line extending from the coarse steering circle is touching the A-H bar and the missile acquisition tone is received in the headset, provided other missile launching requirements have been met.

Firing range during the tracking mode is indicated by the target mark in the "jizzled B" scan. When the target mark moves below the missile range mark in the scan, the missile is within range. If the maximum launching g limit of the missile is not being exceeded, the IN ENVELOPE light in the lower left-hand corner of the scope mount will light to indicate that the missile is ready for firing.

A rise in missile acquisition tone occurs as the coarse steering circle nears the center of the scope, indicating that the missile can "see" the target. A null in the tone indicates that the missile "sight" is centered on the target.

With the infrared AIM-9B/D missiles, a rise in pilot tone occurs as the coarse steering circle nears the center of the scope to indicate that the missile sees the target, and a null in the tone indicates that the missile is centered on the target. With the radar AIM-9C, a steady continuous tone indicates that the missile has acquired the target. A breakaway signal presented on the scope as a cross, appears when the aircraft range closes to the minimum missile firing range.

Technique for launching the AIM-9C is the same as that used with AIM-9B/D except that it is necessary to maintain a tracking course to illuminate the target until missile intercept.

Sidewinder Launching Procedure

When tracking a target either with the sight unit or with radar, proceed as follows to fire a Sidewinder missile:

1. Master armament switch — ON
2. Armament selector switch — MSL or FUS
   - Place selector switch at desired station.
3. IR-RADAR light — CHECK
   - Check for type missile on selected station.
4. Trigger switch — SQUEEZE
   - When tracking requirements for radar or visual attack have been met, fire the missile by squeezing the trigger switch to the second detent.
   - Above 55,000 feet, place the continuous engine ignition switch ON (or manually depress the ignite microswitch) at least 10 seconds before firing to prevent possible engine flameout. Since the continuous ignition circuit supplies ignition for a period of 4½ to 5½ minutes (30 to 40 seconds is available from the normal ignition circuit), it can be turned on earlier if desired.
   - If using the Aero 3A launcher, hold the trigger switch depressed for approximately 1 second to ensure firing. This is not necessary when using the LAU-7/A launcher.
   - To fire more than one missile, release the trigger switch, then squeeze it again if the missile tone is present. The armament selector switch automatically steps to the next clockwise switch position after the trigger is released.

When firing Sidewinder 1A or 1C MK 29 missiles, perform a breakaway maneuver as soon as the missile is launched. With 1C MK 30 missiles, continue to track the target until the missile strikes.

Firing the Sidewinder 1C missile from the upper right-hand pylon station will, under some conditions, result in corrosion of the wing, wing pylon, or fuselage surfaces. Therefore, it is not permitted except for operational necessity.

JETTISONING

Note

Refer to EXTERNAL ARMAMENT LIMITATIONS, section I, part 4 for jettisoning restrictions.

section XI
performance data

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PART 1 — INTRODUCTION

SCOPE

This section contains data from which performance of the aircraft can be predicted for all types of missions. The information is not only useful for flight planning but also serves to illustrate the effects of many of the variables which affect the aircraft's performance.

The text includes examples that illustrate the use of individual data charts. These examples consist of assumed flight conditions for which typical performance data items are read from sample charts. The sample charts are overprinted in red with instructions showing the derivation of flight data.

Planning problems covering typical missions are also included. These sample mission plans make use of data from most of the charts published in the manual. Knowledge of the chart forms gained by studying the sample charts will prove helpful in use of the mission planning problems.

The *conditions* of landing gear, wing, and wing leading edge extension used to qualify various charts are listed below:

Condition	*Description*
Clean	Landing gear retracted, wing down, wing leading edge retracted.
Cruise	Landing gear retracted, wing down, wing leading edge in cruise droop position.
Landing	Landing gear extended, wing up, wing leading edge in landing droop position.

ARRANGEMENT

Part 1 contains aircraft configuration data, airspeed conversion data, and standard atmosphere data (with discussions, sample problems, and charts).

Part 2 contains discussions and sample problems to aid in using the performance charts and REST computer; performance charts common to all configurations, and performance charts common to specific aerodynamic configurations.

The data common to all configurations include takeoff, combat allowance, range and endurance decision, descent, and landing charts.

The remaining performance data are arranged in eleven configurations, with climb, cruise (profile) and specific range charts grouped together for each configuration. The external stores loadings which fall into each configuration are shown in figure 11–1. The performance for all loadings within a configuration falls within 5% of the data shown.

ABBREVIATIONS AND SYMBOLS

CAS	Calibrated airspeed
EAS	Equivalent airspeed
EPR	Engine pressure ratio
FT	Feet
GS	Ground speed
HW	Headwind
KIAS	Knots indicated airspeed
LB	Pound(s)
MN	Mach number
NAUT MI	Nautical miles
SL	Sea level
TAS	True airspeed
TW	Tailwind
$1/\sqrt{\sigma}$	Inverse of the square root of density ratio

AIRSPEED CONVERSION

INTRODUCTION

The primary use of the airspeed conversion charts is for changing from one type of airspeed notation to another. The relationships between types of airspeed notations are as follows:

IAS = indicator reading corrected for instrument error

CAS = IAS corrected for position error (figure 11–2)

TAS = CAS corrected for altitude and temperature (figure 11–3)

EAS = TAS corrected for atmospheric density effects (figure 11–4)

Except that angle-of-attack-relationship (figure 4–8) may have to be employed, the primary conversion necessary will be IAS, CAS, and TAS conversions using figures 11–2 and 11–3.

POSITION ERROR CORRECTION

This chart (figure 11–2) presents the corrections that must be added to indicated airspeed, altitude, and Mach number to obtain calibrated airspeed, pressure altitude, and true Mach number. For example, assume an indicated airspeed of 400 knots at an indicated altitude of 50,000 feet with the airplane in the clean condition. Enter the clean condition altitude correction chart (sheet 1) at the 400-knot indicated airspeed line and project vertically to the 50,000-foot indicated altitude curve. From this intersection, project horizontally to the left to obtain an altimeter correction of 500 feet. Add 500 to 50,000 to obtain a true pressure altitude of 50,500 feet. Using the 400-knot indicated airspeed and the pressure altitude of 50,500 feet, enter the airspeed correction chart (sheet 2) in a similar manner to obtain an airspeed correction of approximately –9 knots. Add –9 to 400 to obtain a calibrated airspeed of 391 knots. Mach number corrections and landing condition altitude and airspeed corrections are obtained by reading the appropriate charts in a similar manner.

Sheets 5 and 6 of the position error correction charts present correction data in a convenient combined form for reading equivalent airspeed and altitude when indicated values are known. Using sheet 5, for example, assume flight at 500 knots indicated airspeed at 25,000 feet indicated altitude. (Indicated airspeed and altitude include *instrument* error corrections.) Enter the chart at the intersection of the dashed 500-knot INDICATED AIRSPEED curve and the 25,000-foot INDICATED ALTITUDE line, then read downward to the EQUIVALENT AIRSPEED scale, to find 457 knots EAS, and left to the TRUE PRESSURE ALTITUDE scale, to find 25,250 feet.

AIRSPEED — MACH NUMBER CONVERSION

This chart (figure 11–3) gives the true Mach number, calibrated airspeed, and true airspeed for standard and nonstandard atmospheric temperatures. For example, assume a CAS of 425 knots at an altitude of 40,000 feet with a free air temperature of –35°C. Enter the chart at the 425-knot CAS line and project vertically to the 40,000-foot TRUE PRESSURE ALTITUDE curve. At this intersection, project horizontally to the left to obtain a true Mach number of 1.31. Following the TRUE AIRSPEED curve from the CAS and altitude intersection to the right and downward will give a standard atmosphere TAS of 753 knots. If the temperature is not standard for the altitude (figure 11–5), project horizontally to the right, from the CAS and altitude intersection, to the sea level curve, then downward to the –35°C FREE AIR TEMPERATURE curve and horizontally to the right to obtain a corrected TAS of 785 knots.

AIRCRAFT CONFIGURATIONS

Performance charts for climb, cruise (profile) or specific range are arranged into configurations according to aerodynamic drag. To find which configuration fits a given store loading, use one of the methods which follow.

SYMMETRICAL LOADINGS

To determine the configuration number for any symmetrical loading of live stores, refer to figure 11–1, sheet 1, and proceed as follows: Select the desired wing stores (total wing stores on both pylons) and the desired fuselage stores (total stores on all fuselage pylons) and project to an intersection. The intersection of the two choices will fall within a closed area containing a Roman numeral. This numeral is the configuration number for the selected loading.

The configuration number for symmetrical loadings of practice stores is found in figure 11–1, sheet 2, by simply projecting to the right of the desired store.

The "index numbers" in figure 11–1 are used in conjunction with asymmetric loadings and can be disregarded here.

ASYMMETRICAL LOADINGS

A table listing all possible asymmetrical loadings would be too lengthy to include in the manual. Therefore, a system is used whereby the configuration number for any asymmetrical store loading is calculated by using the "index numbers" in figure 11–1 and adding trim effect. Perform the calculation as outlined under ASYMMETRICAL LOADINGS in figure 11–1, sheet 2.

Example

Assume

An asymmetrical external wing loading of four 500-pound (MK 82) general purpose bombs on one wing and four 220-pound (AN-M88) fragmentation bombs on the other wing. The fuselage is symmetrically loaded with four short nose (MK 24 MOD 0 head) Zuni packs.

Find

The applicable configuration number

Solution

1. The index number for four MK 82 bombs on one wing is determined by finding the index number for a symmetrical loading of eight of these bombs from figure 11–1, sheet 1, and dividing by two ($101 \div 2 = 50.5$). Similarly, the index number for four AN-M88 bombs on the other wing is found to be 40.5. The index number for four short-nose Zuni packs which are symmetrically loaded on the fuselage, two-to-a-side, can be read directly from figure 11–1, sheet 1, as 71.0.
2. Station weights of 2,494 pounds for four MK 82 bombs on one wing and 1,310 pounds for four AN-M88 bombs on the other wing are found in the External Armament Weight and Compatibility table in section I, part 4, of the (unclassified) NATOPS Flight Manual. The difference between these two weights, 1,184 pounds, is the unbalanced wing store weight. (If fuselage stores were loaded asymmetrically, the same method would be used to determine the unbalanced fuselage store weight.)
3. The index number for the effect of trim due to unbalanced wing store weight and drag is determined by using 8 index numbers per 1,000 pounds of unbalanced wing store weight ($1.184 \times 8 = 9.472 = 9.5$). (If asymmetrical fuselage stores were loaded, 4 index numbers would be used per 1,000 pounds of unbalanced fuselage store weight.)
4. All index numbers are added to find the total index number ($50.5 + 40.5 + 9.5 + 71.0 = 171.5$).
5. Referring to the Configuration — Index Number Table in figure 11–1, sheet 2, it is seen that the total index number of 171.5 falls within the range of index numbers for configuration VIII.

AIRCRAFT CONFIGURATIONS

AIRCRAFT CONFIGURATIONS — SYMMETRICAL LOADINGS – LIVE STORES

TOTAL WING STORES	INDEX NO.	NONE (0)	SINGLE PYLONS AND LAUNCHERS (5)	TWO SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D (15)	DUAL PYLONS AND LAUNCHERS (15)	TWO EMPTY ZUNI PACKS (20)	TWO ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS (23)	TWO ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS (32)	FOUR SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D (33)	FOUR EMPTY ZUNI PACKS (42)	FOUR ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS (49)	FOUR ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS (71)
NONE	0	I			II			III		IV		V
TWO PYLONS	21											
TWO AERO 6A, LAU-32A/A, LAU-32B/B, OR LAU-56/A FFAR ROCKET PODS	23											
TWO AERO 7D OR LAU-3A/A FFAR ROCKET PODS	25											
TWO 250-LB. (MK 81) LOW DRAG G.P. BOMBS	26											
TWO 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS	26											
TWO 500-LB. (MK 77 MOD 1) FIRE BOMBS	27	III										
TWO 500-LB. (MK 82) LOW DRAG G.P. BOMBS	27					IV						
TWO 250-LB. (AN-M57A-1) G.P. BOMBS	28											VI
TWO 250-LB. (MK 81) SNAKEYE G.P. BOMBS	28											
TWO 500-LB. (AN-M64A-1) G.P. BOMBS	29											
TWO 500-LB. (MK 82) SNAKEYE G.P. BOMBS	29											
TWO 1000-LB. (MK 83) LOW DRAG G.P. BOMBS	29											
TWO 500-LB. (MK 77 MOD 2) FIRE BOMBS	30											
TWO EMPTY AERO 6A, LAU-32A/A, LAU-32B/B, OR LAU-56/A FFAR ROCKET PODS	31											
TWO 2000-LB. (MK 84) LOW DRAG G.P. BOMBS	33								†		*	*
TWO 1000-LB. (MK 79 MOD 1) FIRE BOMBS	34											
TWO FAIRED NOSE LAU-10/A ZUNI ROCKET PODS	34											
TWO PYLONS AND TER'S	41											
TWO EMPTY LAU-10/A ZUNI ROCKET PODS	41											
FOUR LAU-32A/A, LAU-32B/B, OR LAU-56/A FFAR ROCKET PODS ON TER'S	46											
TWO PYLONS AND MBR'S OR MER'S	46						V					
TWO EMPTY AERO 7D OR LAU-3A/A FFAR ROCKET PODS	47											
FOUR LAU-32A/A, LAU-32B/B, OR LAU-56/A FFAR ROCKET PODS ON MER'S	51											
FOUR LAU-3A/A FFAR ROCKET PODS ON TER'S	51											
TWO UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS MK 32 MOD 0 (LONG NOSE) HEADS	52											VII
FOUR LAU-3A/A FFAR ROCKET PODS ON MER'S	56											
FOUR 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON TER'S	58									VI		
FOUR 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMB ON TER'S	58											
FOUR 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON MBR'S OR MER'S	63											
FOUR 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	63											
FOUR 250-LB. (AN-M57A-1) G.P. BOMBS ON TER'S	65											
SIX 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON TER'S	67											VIII

*Configuration may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS and EXTERNAL STORE LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

†AIM-9B, AIM-9C or AIM-9D Sidewinder may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

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Figure 11–1 (Sheet 1)

AIRCRAFT CONFIGURATIONS

AIRCRAFT CONFIGURATIONS — TOTAL WING STORES	INDEX NO.	NONE	SINGLE PYLONS AND LAUNCHERS	TWO SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D	DUAL PYLONS AND LAUNCHERS	TWO EMPTY ZUNI PACKS	TWO ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS	TWO ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS	FOUR SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D	FOUR EMPTY ZUNI PACKS	FOUR ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS	FOUR ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS
SYMMETRICAL LOADINGS – LIVE STORES (TOTAL FUSELAGE STORES) — INDEX NO.		0	5	15	15	20	23	32	33	42	49	71
FOUR 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON TER'S	67											
SIX 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON TER'S	68											
FOUR 500-LB. (MK 82) LOW DRAG G.P. BOMBS ON TER'S	69											
FOUR 250-LB. (AN-M57A-1) G.P. BOMBS ON MBR'S OR MER'S	70											
FOUR 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	72											
SIX 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON MBR'S OR MER'S	72											
TWO UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS MK 24 MOD 0 (SHORT NOSE) HEADS	73	V										
SIX 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	73											
FOUR 500-LB. (MK 77 MOD 1) FIRE BOMBS ON MER'S	74											
FOUR FAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON TER'S	74											
FOUR 500-LB. (MK 82) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	74											
FOUR 500-LB. (MK 82) SNAKEYE G.P. BOMBS ON TER'S	75											
FOUR 1000-LB. (MK 83) LOW DRAG G.P. BOMBS ON TER'S	78								*		*	*
FOUR FAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON MER'S	79				VI							
SIX 250-LB. (AN-M57A-1) G.P. BOMBS ON TER'S	79											
FOUR 500-LB. (MK 82) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	80											
SIX 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON TER'S	80											
EIGHT 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON MBR'S OR MER'S	81											
EIGHT 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	81											
FOUR 1000-LB. (MK 83) LOW DRAG G.P. BOMBS ON MER'S	83						*	*	*	*	*	*
SIX 500-LB. (MK 82) LOW DRAG G.P. BOMBS ON TER'S	83											
FOUR 500-LB. (MK 77 MOD 2) FIRE BOMBS ON MER'S	84											
SIX 250-LB. (AN-M57A-1) G.P. BOMBS ON MBR'S OR MER'S	84											
SIX 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	85											
EIGHT MK 24 MOD 2A/3 PARACHUTE FLARES	86								VII			
SIX 500-LB. (MK 82) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	88										*	*
TEN 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON MER'S	89											
FOUR EMPTY LAU-10/A ZUNI ROCKET PODS ON TER'S	91										VIII	
TEN 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON MER'S	93											
EIGHT 250-LB. (AN-M57A-1) G.P. BOMBS ON MBR'S OR MER'S	94											
SIX 500-LB. (MK 82) SNAKEYE G.P. BOMBS ON TER'S	94										*	*
EIGHT 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	95											
FOUR EMPTY LAU-10/A ZUNI ROCKET PODS ON MER'S	96											
TWELVE 260-LB. (AN-M81) OR 220-LB. (AN-M88) FRAG. BOMBS ON MER'S	98								†		*	*
SIX 500-LB. (MK 82) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	99								†		*	*

*Configuration may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS and EXTERNAL STORE LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

†AIM-9B, AIM-9C or AIM-9D Sidewinder may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

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Figure 11-1 (Sheet 2)

AIRCRAFT CONFIGURATIONS

AIRCRAFT CONFIGURATIONS — SYMMETRICAL LOADINGS – LIVE STORES

TOTAL WING STORES	INDEX NO.	NONE	SINGLE PYLONS AND LAUNCHERS	TWO SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D	DUAL PYLONS AND LAUNCHERS	TWO EMPTY ZUNI PACKS	TWO ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS	TWO ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS	FOUR SIDEWINDERS AIM-9B, AIM-9C OR AIM-9D	FOUR EMPTY ZUNI PACKS	FOUR ZUNI PACKS MK 32 MOD 0 (LONG NOSE) HEADS	FOUR ZUNI PACKS MK 24 MOD 0 (SHORT NOSE) HEADS
TOTAL FUSELAGE STORES INDEX NO.		0	5	15	15	20	23	32	33	42	49	71
EIGHT 500-LB. (MK 82) LOW DRAG G.P. BOMBS ON MBR'S OR MER'S	101	VI		*			*	*	*	*	*	*
TWELVE 250-LB. (MK 81) LOW DRAG G.P. BOMBS ON MER'S	103										*	*
TEN 250-LB. (AN-M57A-1) G. P. BOMBS ON MER'S	109				VII							
TEN 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON MER'S	111											
EIGHT 500-LB. (MK 82) SNAKEYE G.P. BOMBS ON MBR'S OR MER'S	116		*	*	*	*	*	*	*	*	*	*
FOUR UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON TER'S MK 32 MOD 0 (LONG NOSE) HEADS	119											IX
TWELVE 250-LB. (AN-M57A-1) G.P. BOMBS ON MER'S	122						VIII		†		*	*
FOUR UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON MER'S MK 32 MOD 0 (LONG NOSE) HEADS	124											
TWELVE 250-LB. (MK 81) SNAKEYE G.P. BOMBS ON MER'S	125								*		*	*
FOUR UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON TER'S MK 24 MOD 0 (SHORT NOSE) HEADS	171	VIII			IX				X			XI
FOUR UNFAIRED NOSE LAU-10/A ZUNI ROCKET PODS ON MER'S MK 24 MOD 0 (SHORT NOSE) HEADS	176											

*Configuration may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS and EXTERNAL STORE LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

†AIM-9B, AIM-9C or AIM-9D Sidewinder may exceed maximum allowable takeoff gross weight. Refer to WEIGHT LIMITATIONS, Section I, Part 4, NATOPS Flight Manual.

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Figure 11–1 (Sheet 3)

AIRCRAFT CONFIGURATIONS

SYMMETRICAL LOADINGS — PRACTICE STORES

WING STORES	INDEX NUMBER	CONFIGURATION
TWO 250-LB. (MK 86) PRACTICE BOMBS	25	
TWO 500-LB. (MK 87) PRACTICE BOMBS	26	III
TWO 1000-LB. (MK 88) PRACTICE BOMBS	28	
TWO AERO 8A-1 PRACTICE BOMB CONTAINERS	32	
TWO A/A37B-3 PRACTICE MULTIPLE BOMB RACKS	36	
FOUR 56-LB. (MK 89 MOD 0/1) PRACTICE BOMBS	39	
SIX 56-LB. (MK 89 MOD 0/1) PRACTICE BOMBS	40	
FOUR 25-LB. (MK 76 MOD 4/5) PRACTICE BOMBS	42	IV
SIX 25-LB. (MK 76 MOD 4/5) PRACTICE BOMBS	45	
EIGHT 25-LB. (MK 76 MOD 4/5) PRACTICE BOMBS	48	
TEN 25-LB. (MK 76 MOD 4/5) PRACTICE BOMBS	51	
TWELVE 25-LB. (MK 76 MOD 4/5) PRACTICE BOMBS	53	
FOUR 250-LB. (MK 86). PRACTICE BOMBS	62	
FOUR 500-LB. (MK 87) PRACTICE BOMBS	72	V

ASYMMETRICAL STORE CALCULATION

1. Determine the index number of each wing and fuselage station loading. The index number for a wing or fuselage station loading is one-half the value shown in the symmetrical loading chart, figure 11–1, sheet 1 (this sheet for practice stores).
2. Determine the unbalanced external store weight using the External Armament Weight and Compatibility Table, section I, part 4, of the (unclassified) NATOPS Flight Manual. Refer to "Weight Limitations" and "External Store Limitations" in section I, part 4, of the unclassified manual to ensure that operating limitations for asymmetrical stores are not being exceeded.
3. Determine the effect of trim due to unbalanced external store weight and drag from:
   - For asymmetrical wing stores — 8 index numbers per 1,000 pounds of unbalanced wing store weight
   - For asymmetric fuselage stores — 4 index numbers per 1,000 pounds of unbalanced fuselage store weight
4. Sum the index numbers of the wing and fuselage station loadings and the index number for trim effect.
5. Refer to the Configuration — Index Number Table (below) to find the applicable configuration number.

See text under AIRCRAFT CONFIGURATION, ASYMMETRICAL LOADINGS for an example.

CONFIGURATION — INDEX NUMBER TABLE

CONFIGURATION	I	II	III	IV	V	VI	VII	VIII	IX
INDEX NUMBER RANGE	0–5	6–20	21–34	35–60	61–83	84–109	110–136	137–172	173–199
CONFIGURATION	X	XI							
INDEX NUMBER RANGE	200–225	226–251							

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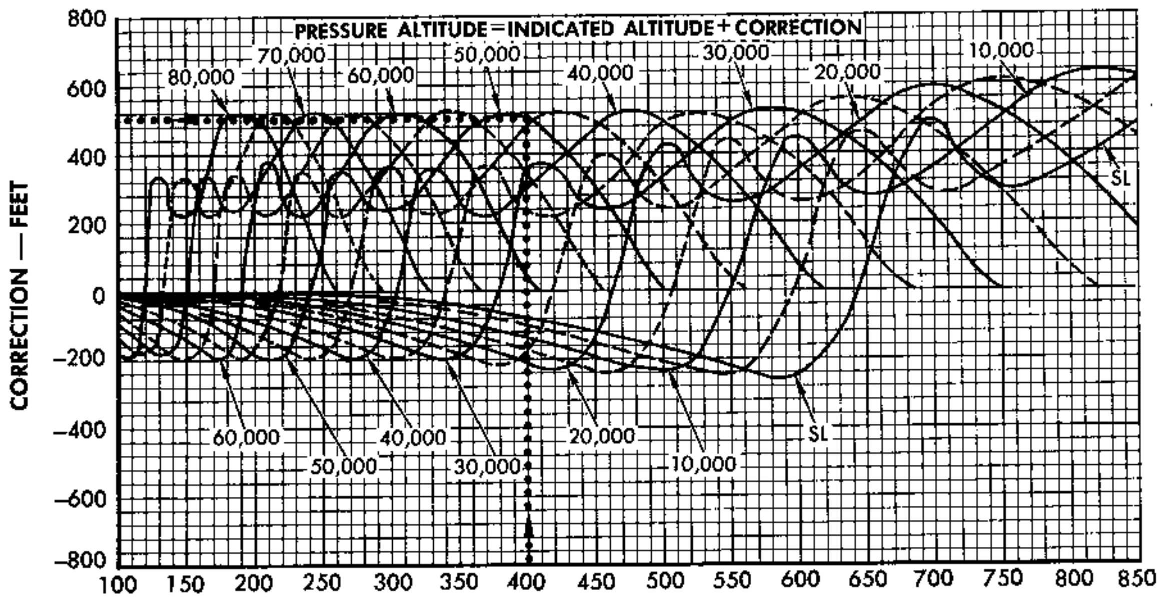
Figure 11–1 (Sheet 4)

POSITION ERROR CORRECTION

MODEL: F-8D
DATA BASIS: Flight Tests
DATE: March 1960

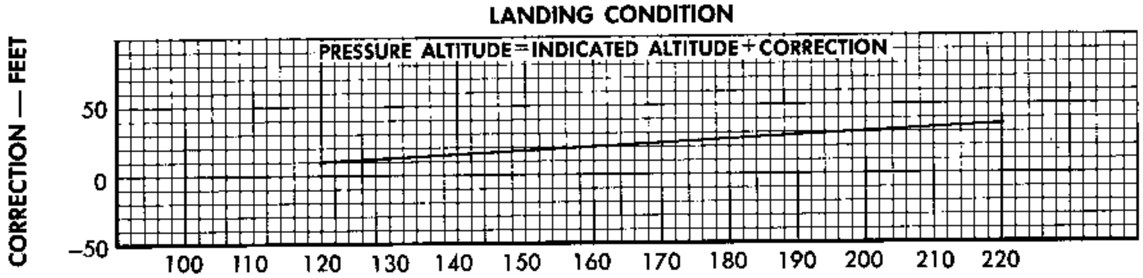
ALTITUDE CORRECTION

CLEAN CONDITION



INDICATED AIRSPEED — KNOTS

LANDING CONDITION



INDICATED AIRSPEED — KNOTS

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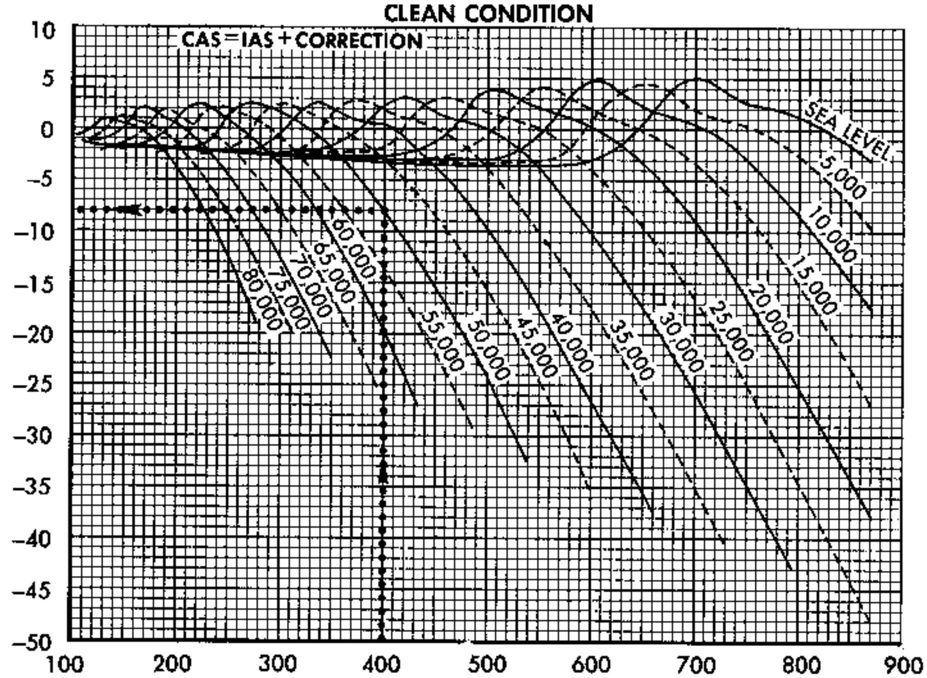
Figure 11–2 (Sheet 1)

POSITION ERROR CORRECTION

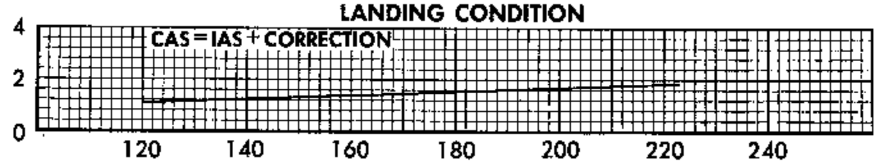
MODEL: F-8D
DATA BASIS: Flight Tests
DATE: March 1960

AIRSPEED CORRECTION

CLEAN CONDITION



LANDING CONDITION



MACH NUMBER CORRECTION

CLEAN CONDITION

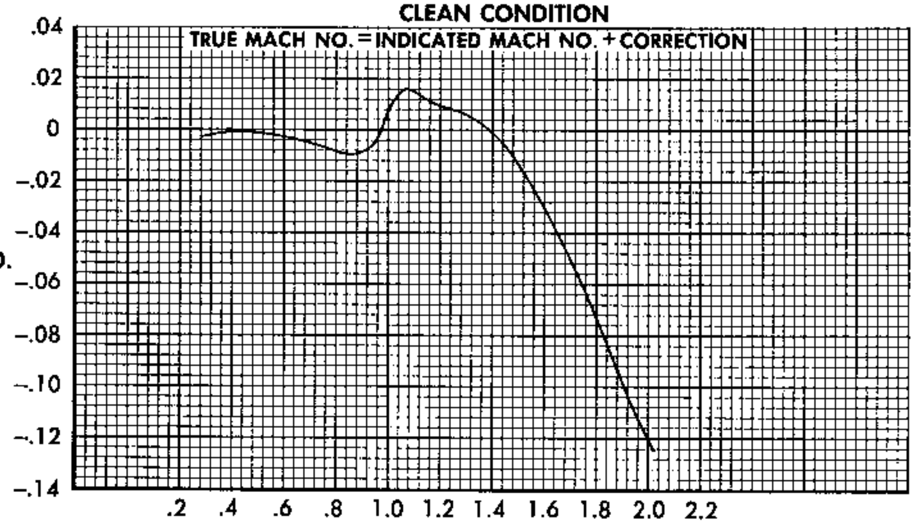


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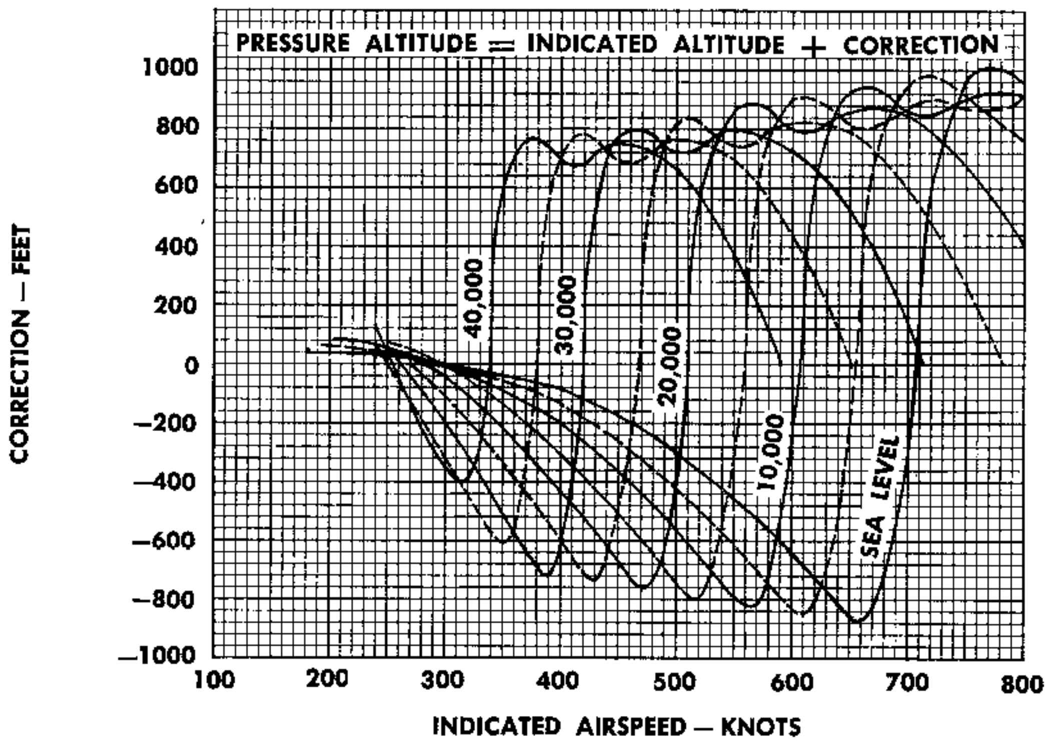
Figure 11-2 (Sheet 2)

POSITION ERROR CORRECTION

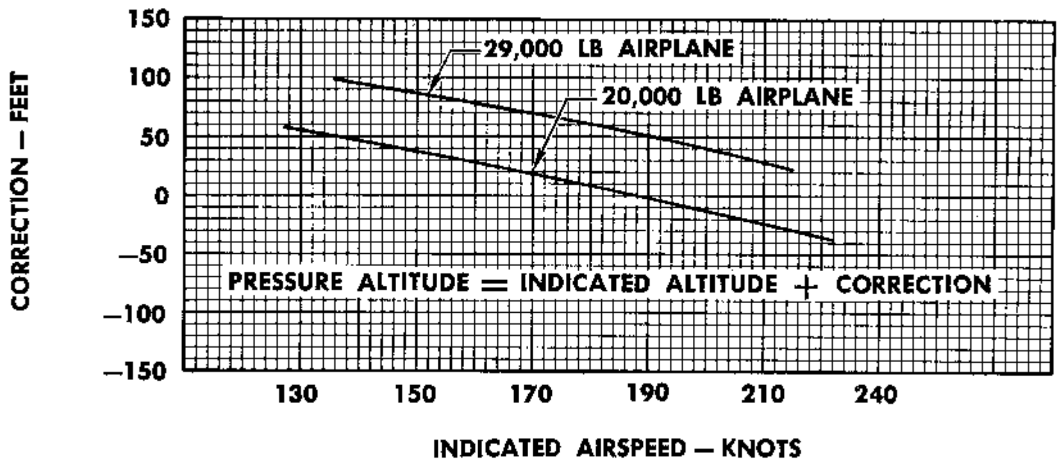
MODEL: F-8E
DATA BASIS: Flight Tests
DATE: March 1962

ALTITUDE CORRECTION

CLEAN CONDITION



LANDING CONDITION



63802-A-86

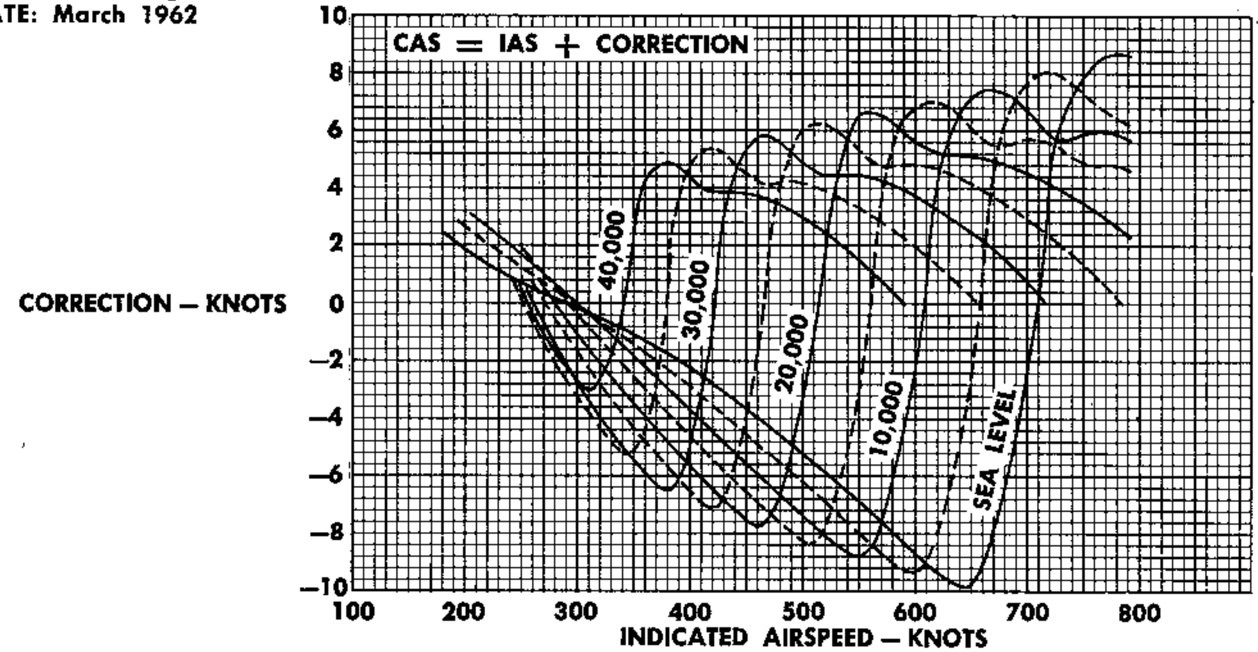
Figure 11–2 (Sheet 3)

POSITION ERROR CORRECTION

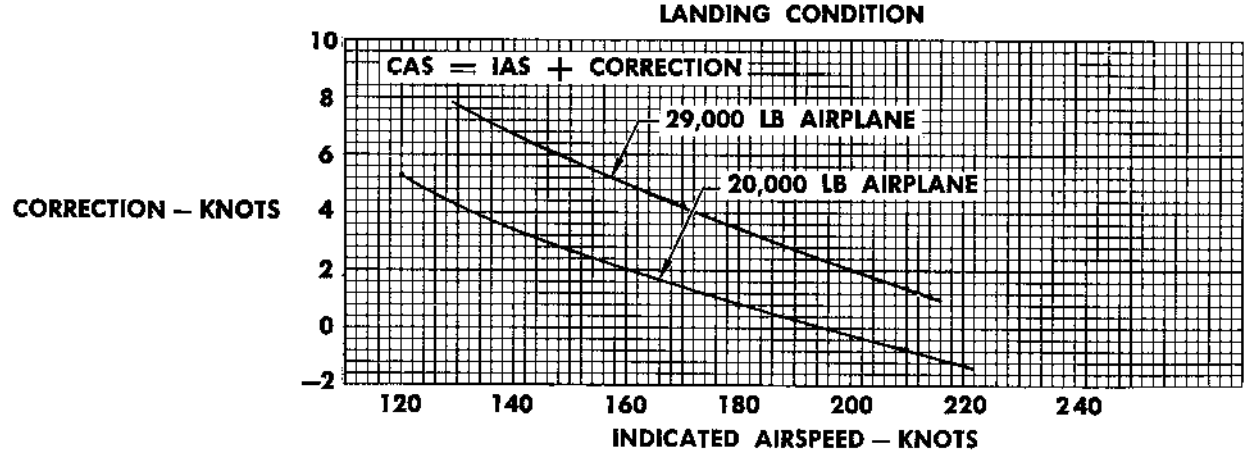
MODEL: F-8E
DATA BASIS: Flight Tests
DATE: March 1962

AIRSPEED CORRECTION

CLEAN CONDITION

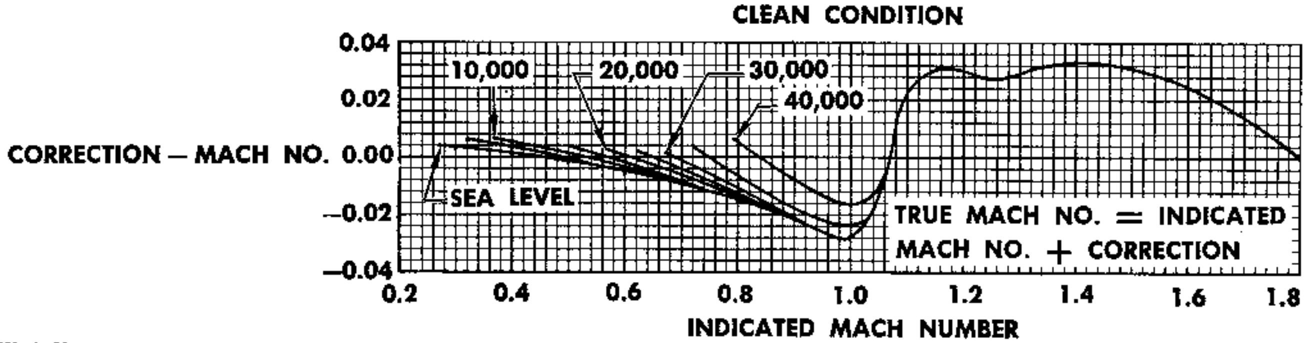


LANDING CONDITION



MACH NUMBER CORRECTION

CLEAN CONDITION



63802—A—87

Figure 11–2 (Sheet 4)

POSITION ERROR CORRECTION

MODEL: F-8D
DATA BASIS: Flight Tests
DATE: March 1960

COMBINED CORRECTIONS

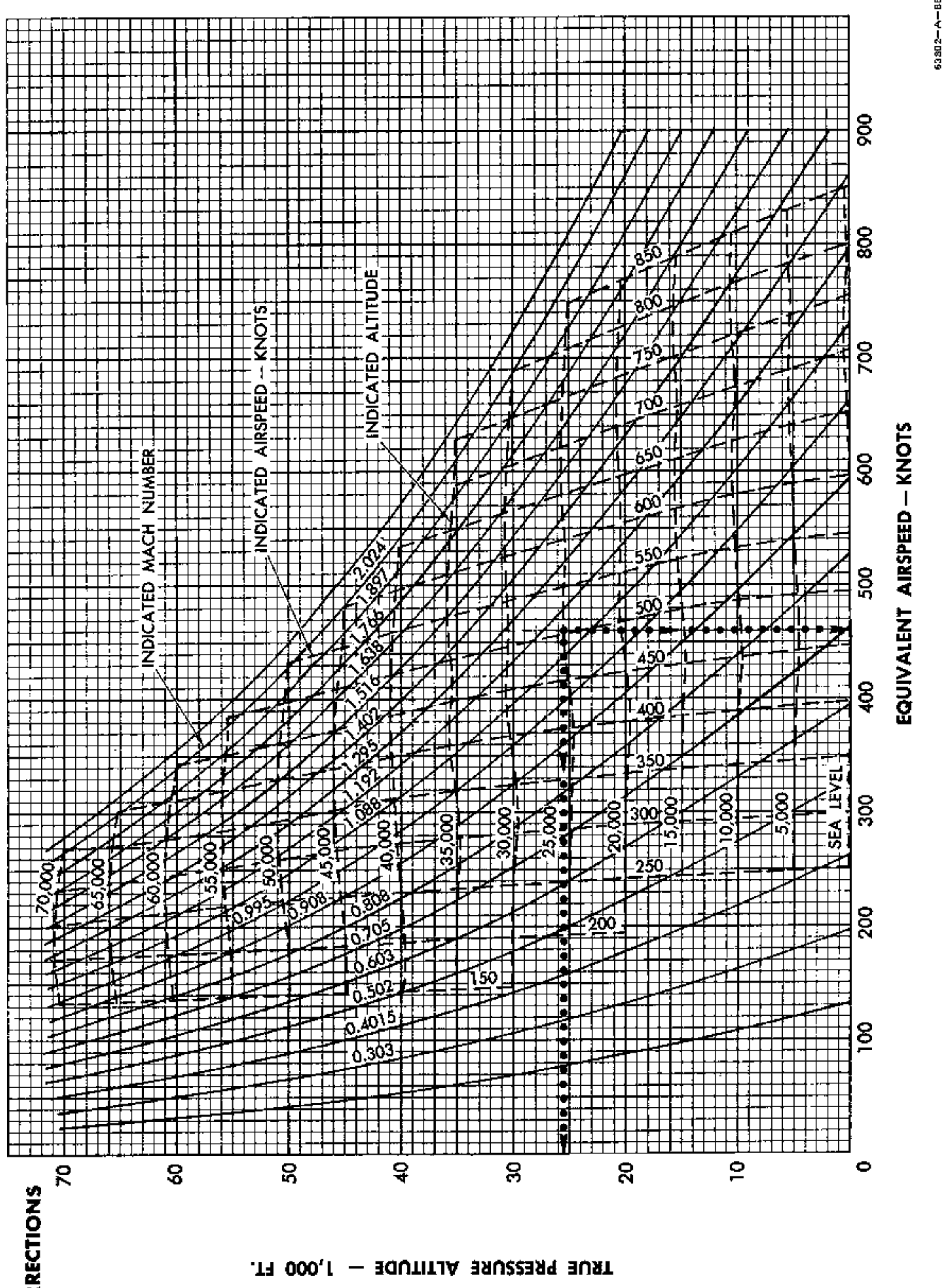


Figure 11–2 (Sheet 5)

POSITION ERROR CORRECTION

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: March 1962

COMBINED CORRECTIONS

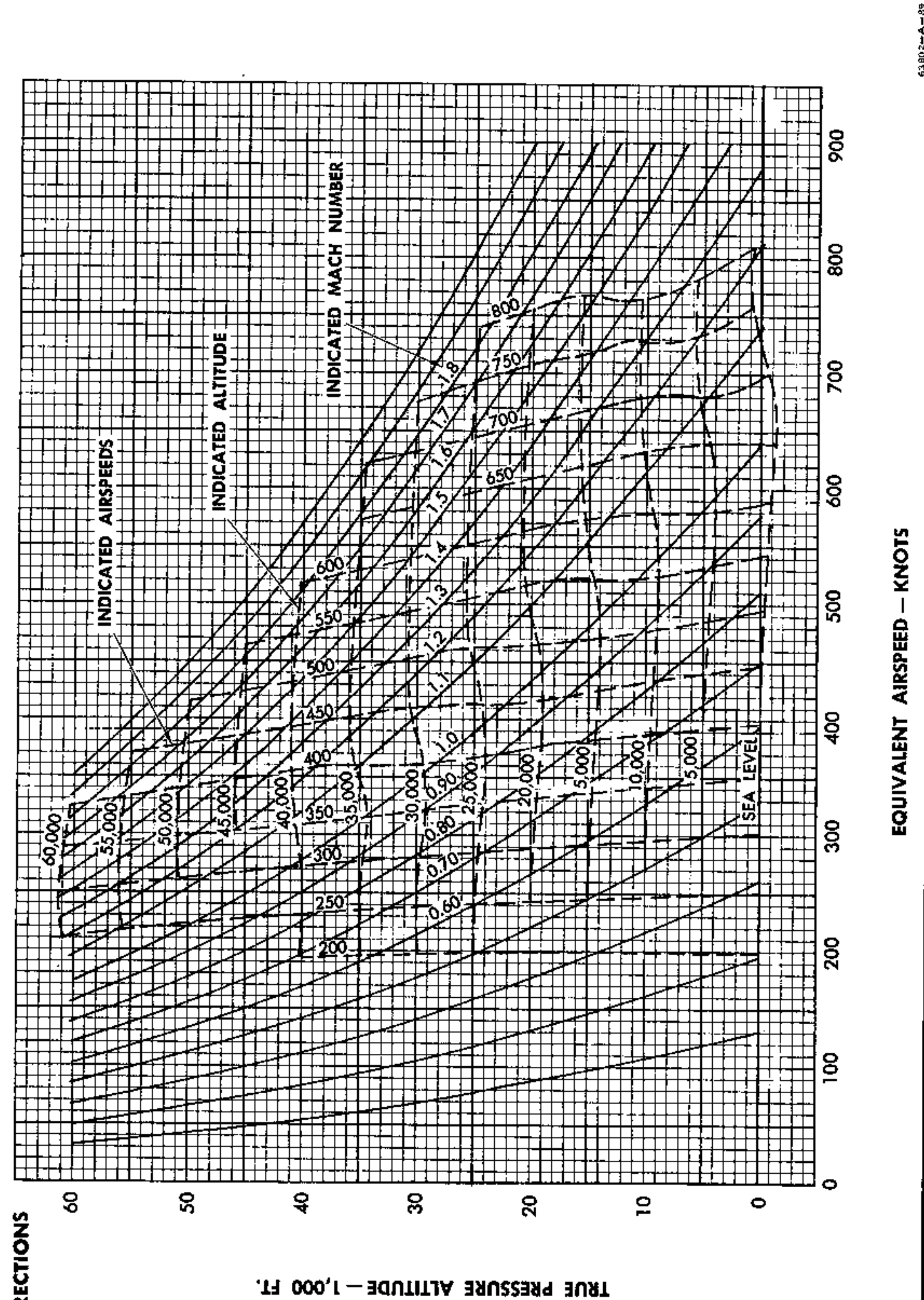


Figure 11-2 (Sheet 6)

AIRSPEED–MACH NUMBER CONVERSION

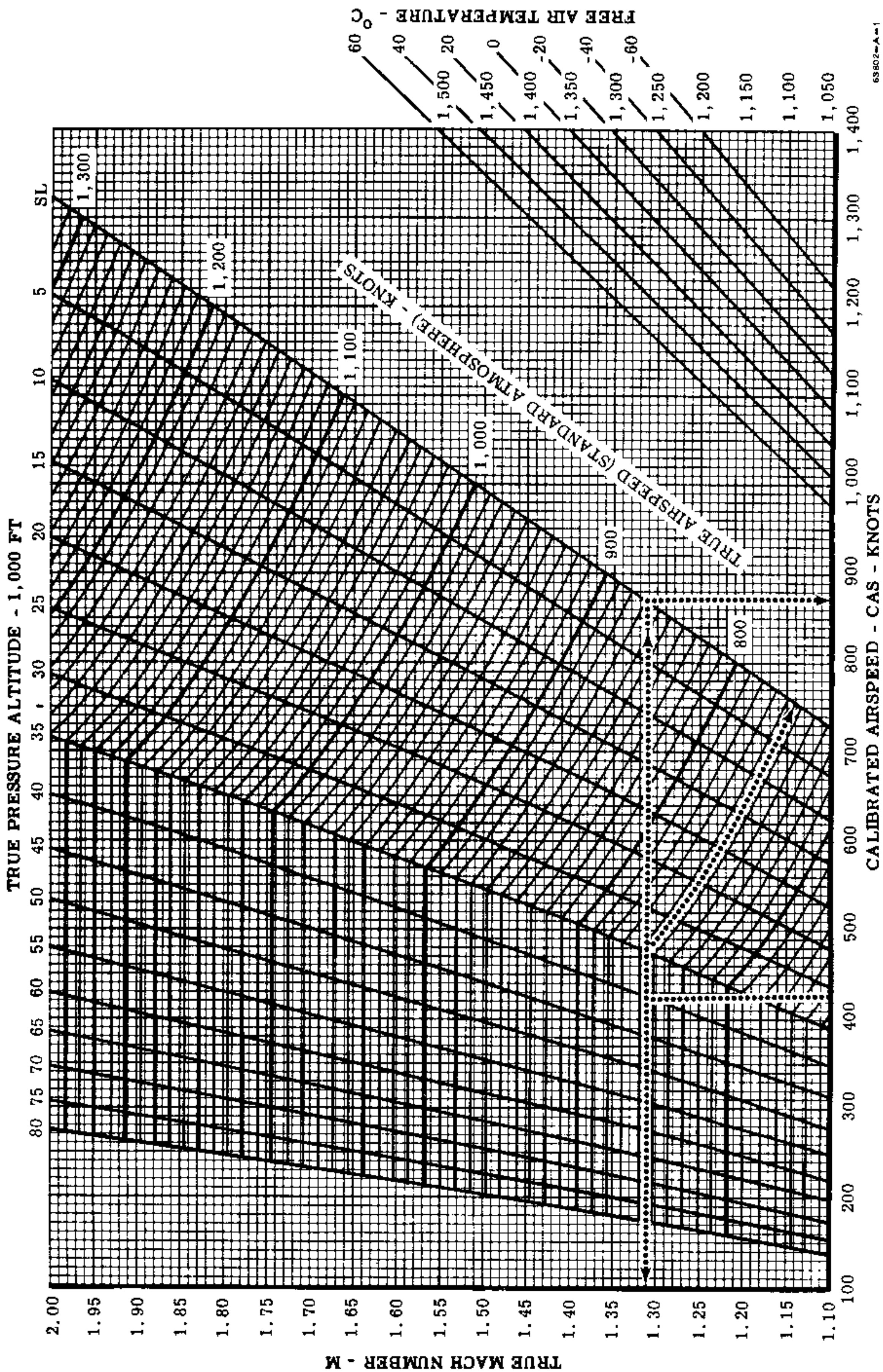
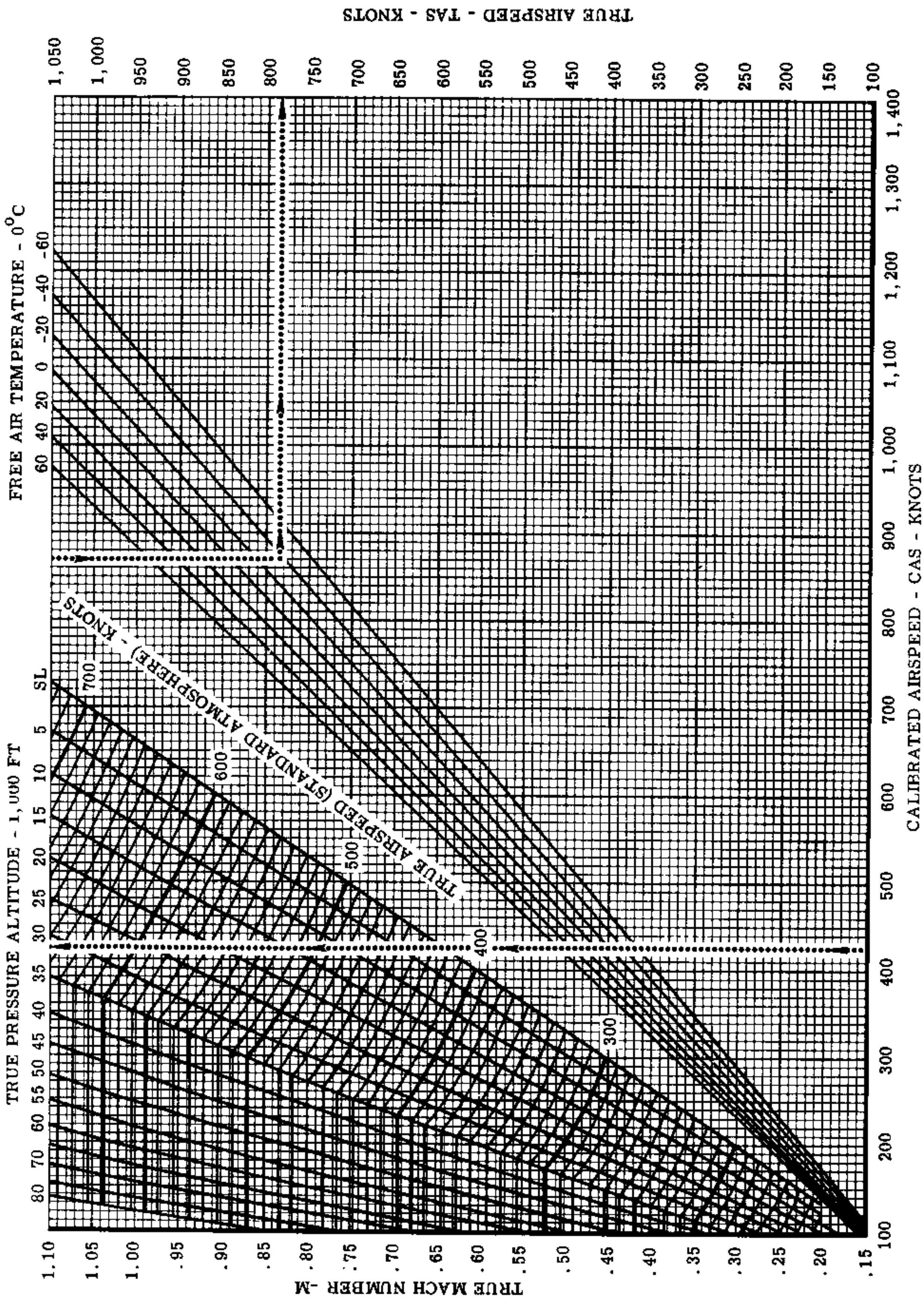


Figure 11–3 (Sheet 1)



63502-A-2

Figure 11-3 (Sheet 2)

STANDARD DATA

INTRODUCTION

These charts contain standard atmosphere data applicable to all flight operations. They consist of a standard conversion for atmospheric density effects, a tabulation of standard altitude characteristics, a tabulation of range factors for computing effects of winds aloft, and a wind vector diagram.

DENSITY ALTITUDE CHART

This chart (figure 11–4) is used to obtain $1/\sqrt{\sigma}$ (factor used to convert true airspeed to equivalent airspeed) and the density altitude when the pressure altitude and ambient temperature are known. The standard day temperature-altitude relationship is shown by the line from 25° at the bottom of the chart to –57° at the pressure altitude of 37,000 feet, then vertical to the top of the chart. To use the chart, enter at the known temperature, project vertically to known pressure altitude and ready density altitude to the left of this intersection or the $1/\sqrt{\sigma}$ to the right. For example, assume a pressure altitude of 30,000 feet and an ambient temperature of –30°C. Enter chart at the –30°C line and project vertically to the 30,000-foot PRESSURE ALTITUDE curve. Reading to the left of this intersection gives a density altitude of 31,800 ft, and to the right gives a value of 1.67 for $1/\sqrt{\sigma}$. Dividing TAS by $1/\sqrt{\sigma}$ gives EAS.

STANDARD ATMOSPHERE TABLE

This table (figure 11–5) gives the standard day conditions at various altitudes for density ratio, $1/\sqrt{\sigma}$, temperature, speed-of-sound ratio, atmospheric pressure and pressure ratio. To find the value of any item on a standard day, read figure to the right of the altitude in the appropriate column.

RANGE FACTORS CHART

The flight profile charts do not include wind effects and for this reason it is necessary in flight planning to modify the profile data for the effects of expected winds aloft. The range factors chart (figure 11–6) provides factors, for various relative winds and true airspeeds, that permit adjustment of range, time and fuel information read from the profile. The chart takes into account wind from any direction relative to the course of the airplane. Winds from either side have the same effect on range as long as they are of the same velocity and are at the same relative angle.

Assume that the profile charts have been consulted to obtain the distance that can be attained with a specified amount of fuel under no-wind conditions, but that there is an expected headwind or tailwind. Enter the range factors chart at the proper relative wind angle and velocity and read the range factor for the planned true airspeed. Multiply the no-wind range by the range factor to obtain the increased or decreased range (depending upon whether there is a tailwind or headwind) attainable with the same amount of fuel.

When a known distance is to be traversed and it is desired to find the fuel and time required using the profile charts and considering wind effects, it is first necessary to find a "factor distance" with which to enter the no-wind profile charts. The known distance is *divided* by the appropriate range factor to obtain the factor distance, which has no use other than as a device for entering the profile charts to read fuel and time.

When using the combat radius profile, it is not necessary to consider headwind or tailwind as long as the true wind is constant during both the outbound and inbound portions of the flight. If the winds outbound and inbound are different, is is necessary to average the range factors for the relative winds outbound and inbound. With a direct crosswind, range will be reduced somewhat and wind must be considered.

CROSSWIND CHART

This chart (figure 11–7) permits determination of runway headwind and crosswind components when local wind conditions are known. For instance, assume that the local wind-over-the-runway is 40 knots from 35° relative to the runway and it is desired to find the headwind component for use in reading the take-off distance chart. Read up to 35° radius line to the 40-knot wind line. From this point, project horizontally to the RUNWAY COMPONENT scale to obtain 32.5 knots. The chart is read in the same manner to find tailwind component by using the angle between the reciprocal of runway heading and the local wind.

DENSITY ALTITUDE CHART

ICAO STANDARD DAY

STANDARD DATA

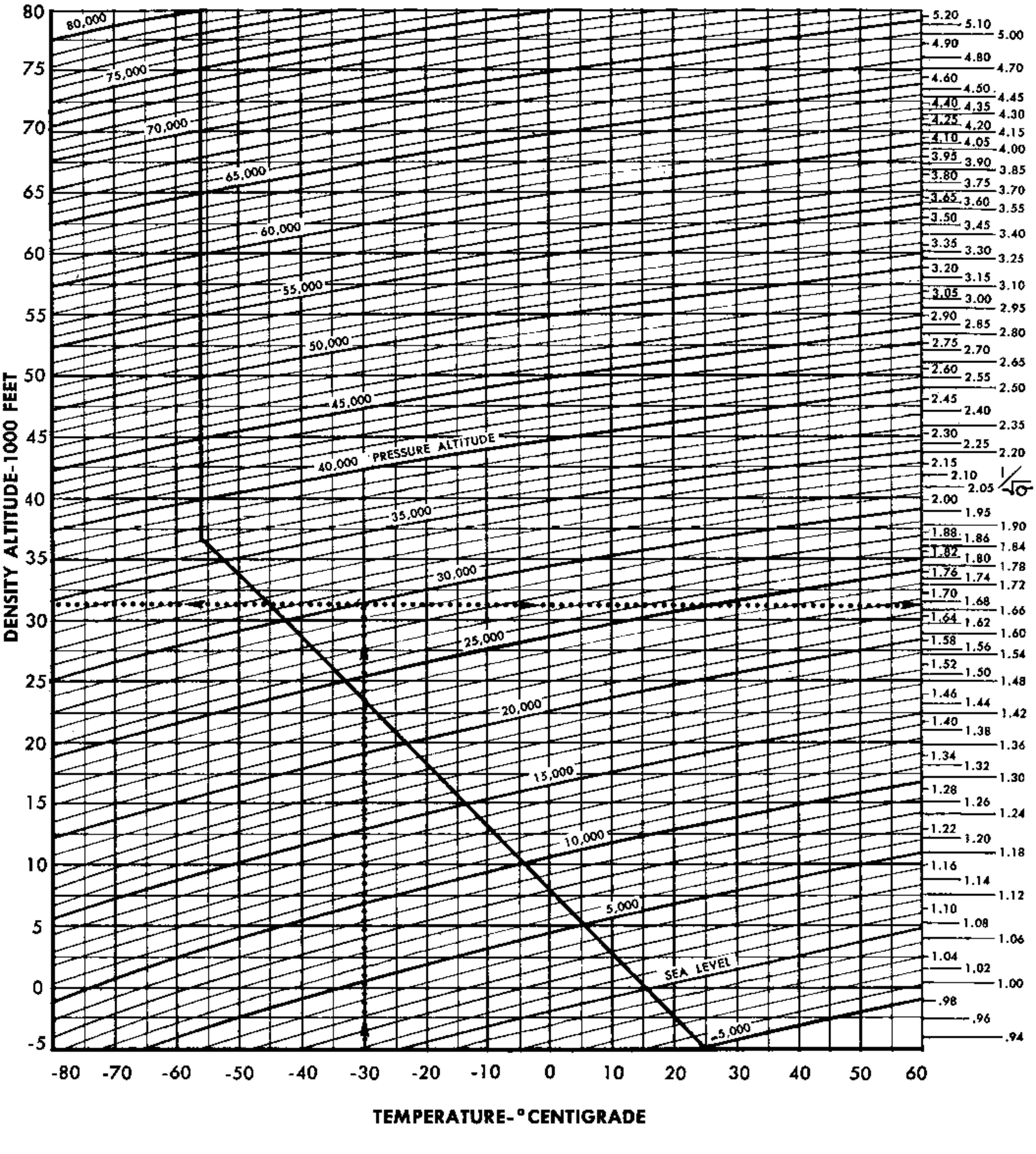


Figure 11–4

STANDARD ATMOSPHERE

ICAO STANDARD DAY

STANDARD SL 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 M.P.H.
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 δ
0	1.000	1.0000	15.000	59.000	661.7	29.921	1.0000
1,000	.9711	1.0148	13.019	55.434	659.5	28.856	.9644
2,000	.9428	1.0299	11.038	51.868	657.2	27.821	.9298
3,000	.9151	1.0454	9.056	48.302	654.9	26.817	.8962
4,000	.8881	1.0611	7.076	44.735	652.6	25.842	.8637
5,000	.8617	1.0773	5.094	41.169	650.3	24.896	.8320
6,000	.8359	1.0938	3.113	37.603	648.7	23.978	.8014
7,000	.8106	1.1107	1.132	34.037	645.6	23.088	.7716
8,000	.7860	1.1279	-0.850	30.471	643.3	22.225	.7428
9,000	.7620	1.1456	-2.831	26.905	640.9	21.388	.7148
10,000	.7385	1.1637	-4.812	23.338	638.6	20.577	.6877
11,000	.7155	1.1822	-6.793	19.772	636.2	19.791	.6614
12,000	.6932	1.2011	-8.774	16.206	633.9	19.029	.6360
13,000	.6713	1.2205	-10.756	12.640	631.5	18.292	.6113
14,000	.6500	1.2403	-12.737	9.074	629.0	17.577	.5875
15,000	.6292	1.2606	-14.718	5.508	626.6	16.886	.5643
16,000	.6090	1.2815	-16.699	1.941	624.2	16.216	.5420
17,000	.5892	1.3028	-18.680	-1.625	621.8	15.569	.5203
18,000	.5699	1.3246	-20.662	-5.191	619.4	14.942	.4994
19,000	.5511	1.3470	-22.643	-8.757	617.0	14.336	.4791
20,000	.5328	1.3700	-24.624	-12.323	614.6	13.750	.4595
21,000	.5150	1.3935	-26.605	-15.889	612.1	13.184	.4406
22,000	.4976	1.4176	-28.587	-19.456	609.6	12.636	.4223
23,000	.4806	1.4424	-30.568	-23.022	607.1	12.107	.4046
24,000	.4642	1.4678	-22.549	-26.588	604.6	11.597	.3876
25,000	.4481	1.4938	-34.530	-30.154	602.1	11.103	.3711
26,000	.4325	1.5206	-36.511	-33.720	599.6	10.627	.3552
27,000	.4173	1.5480	-38.492	-37.286	597.1	10.168	.3398
28,000	.4025	1.5762	-40.474	-40.852	594.6	9.725	.3250
29,000	.3881	1.6052	-42.455	-44.419	592.1	9.297	.3107
30,000	.3741	1.6349	-44.436	-47.985	589.5	8.885	.2970
31,000	.3605	1.6654	-46.417	-51.551	586.9	8.488	.2837
32,000	.3473	1.6968	-48.398	-55.117	584.4	8.106	.2709
33,000	.3345	1.7291	-50.379	-58.683	581.8	7.737	.2586
34,000	.3220	1.7623	-52.361	-62.249	579.2	7.382	.2467
35,000	.3099	1.7964	-54.342	-65.816	576.6	7.041	.2353
36,000	.2981	1.8315	-56.323	-69.382	574.0	6.712	.2243
36,089	.2971	1.8347	-56.500	-69.700	573.7	6.683	.2234
37,000	.2843	1.8753				6.397	.2138
38,000	.2710	1.9209				6.097	.2038
39,000	.2583	1.9677				5.811	.1942
40,000	.2462	2.0155				5.538	.1851

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Figure 11–5 (Sheet 1)

STANDARD ATMOSPHERE

STANDARD DATA

ICAO STANDARD DAY

STANDARD SL 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 M.P.H.
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 δ
41,000	.2346	2.0645	-56.500	-69.700	573.7	5.278	.1764
42,000	.2236	2.1148				5.030	.1681
43,000	.2131	2.1662				4.794	.1602
44,000	.2031	2.2189				4.569	.1527
45,000	.1936	2.2728				4.355	.1455
46,000	.1845	2.3281				4.151	.1387
47,000	.1758	2.3848				3.956	.1322
48,000	.1676	2.4428				3.770	.1260
49,000	.1597	2.5022				3.593	.1201
50,000	.1522	2.5630				3.425	.1145
51,000	.1451	2.6254				3.264	.1091
52,000	.1383	2.6892				3.111	.1040
53,000	.1318	2.7546				2.965	.09909
54,000	.1256	2.8216				2.826	.09444
55,000	.1197	2.8903				2.693	.09001
56,000	.1141	2.9606				2.567	.08578
57,000	.1087	3.0326				2.446	.08176
58,000	.1036	3.1063				2.331	.07792
59,000	.09877	3.1819				2.222	.07426
60,000	.09414	3.2593				2.118	.07078
61,000	.08972	3.3386	-56.500	-69.700	573.7	2.018	.06746
62,000	.08551	3.4198				1.924	.06429
63,000	.08150	3.5029				1.833	.06127
64,000	.07767	3.5881				1.747	.05840
65,000	.07403	3.6754				1.665	.05566
66,000	.07055	3.7649				1.587	.05305
67,000	.06724	3.8564				1.513	.05056
68,000	.06409	3.9502				1.442	.04819
69,000	.06108	4.0463				1.374	.04592
70,000	.05821	4.1447				1.310	.04377
71,000	.05548	4.2456				1.248	.04171
72,000	.05288	4.3488				1.190	.03976
73,000	.05040	4.4545				1.134	.03789
74,000	.04803	4.5633				1.081	.03611
75,000	.04578	4.6738				1.030	.03442
76,000	.04363	4.7874				0.982	.03280
77,000	.04158	4.9039				0.935	.03126
78,000	.03963	5.0231				0.892	.02980
79,000	.03777	5.1454				0.850	.02840
80,000	.03600	5.2706				0.810	.02707

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Figure 11-5 (Sheet 2)

RANGE FACTORS

Relative Wind Angle (Degrees)	TAS	Wind Velocity (Knots)				
		40	60	80	100	120
0°	350	0.886	0.829	0.772	0.714	0.657
	400	0.900	0.850	0.800	0.750	0.700
	450	0.911	0.867	0.822	0.778	0.733
	500	0.920	0.880	0.844	0.800	0.760
	550	0.927	0.891	0.855	0.818	0.782
30°	350	0.899	0.848	0.796	0.742	0.688
	400	0.912	0.867	0.822	0.776	0.729
	450	0.922	0.882	0.842	0.801	0.760
	500	0.930	0.894	0.858	0.822	0.785
	550	0.936	0.904	0.871	0.839	0.805
60°	350	0.938	0.903	0.866	0.824	0.784
	400	0.946	0.917	0.885	0.852	0.816
	450	0.953	0.927	0.889	0.870	0.840
	500	0.958	0.935	0.910	0.885	0.858
	550	0.962	0.941	0.919	0.897	0.873
90°	350	0.994	0.985	0.974	0.959	0.941
	400	0.995	0.989	0.980	0.969	0.955
	450	0.996	0.991	0.984	0.975	0.964
	500	0.997	0.992	0.987	0.980	0.971
	550	0.997	0.994	0.989	0.984	0.976
120°	350	1.052	1.075	1.094	1.110	1.127
	400	1.046	1.066	1.085	1.101	1.116
	450	1.041	1.059	1.076	1.092	1.106
	500	1.037	1.054	1.070	1.085	1.098
	550	1.034	1.050	1.064	1.079	1.091
150°	350	1.097	1.146	1.191	1.237	1.282
	400	1.085	1.127	1.168	1.208	1.248
	450	1.076	1.113	1.149	1.186	1.226
	500	1.068	1.102	1.135	1.168	1.200
	550	1.062	1.093	1.123	1.154	1.183
180°	350	1.114	1.172	1.228	1.286	1.343
	400	1.100	1.150	1.200	1.250	1.300
	450	1.089	1.133	1.178	1.222	1.267
	500	1.080	1.120	1.160	1.200	1.240
	550	1.073	1.109	1.146	1.182	1.218

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Figure 11–6

CROSSWIND

STANDARD DATA

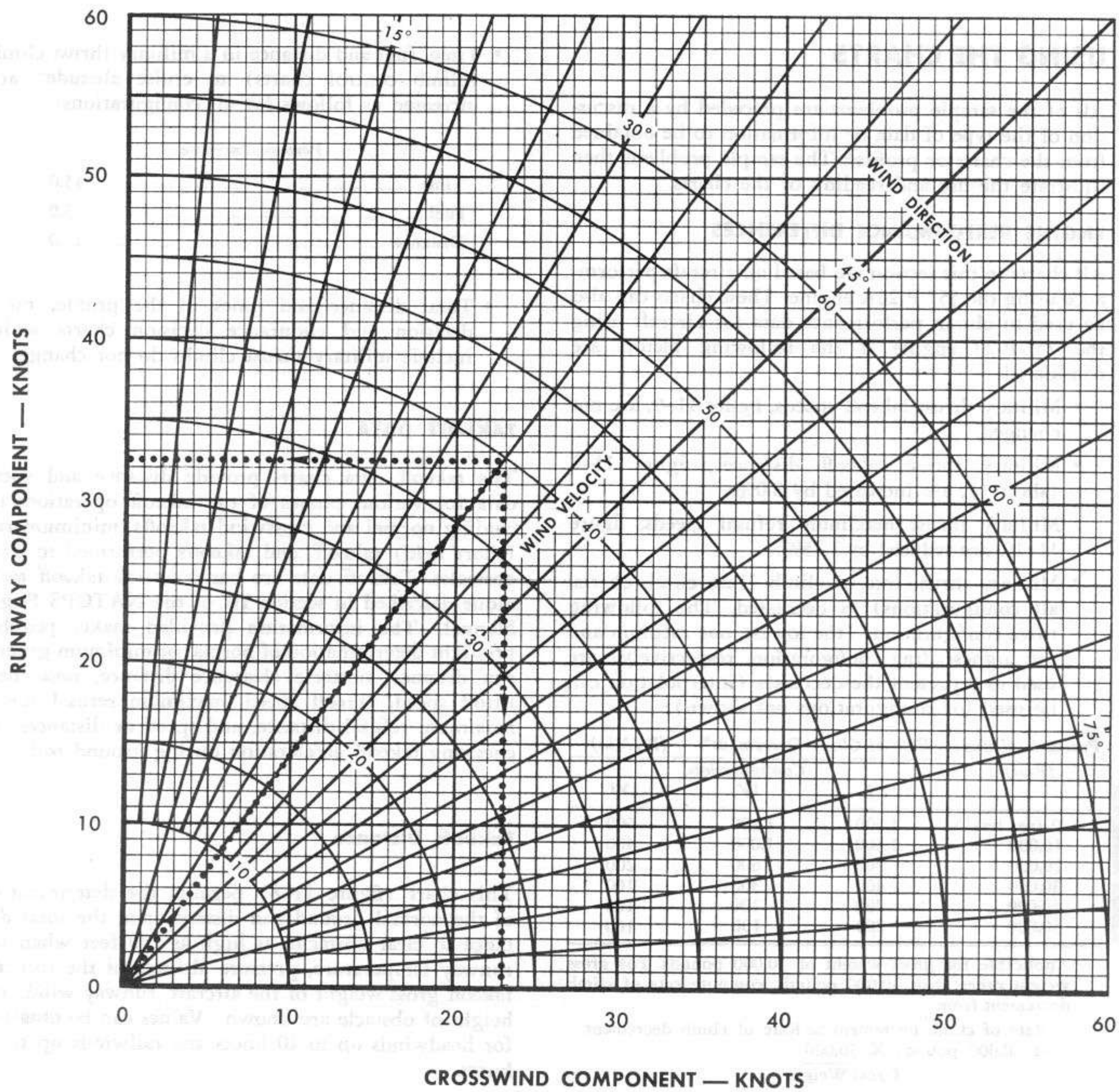


Figure 11–7

PART 2 — PERFORMANCE CHARTS

USING THE CHARTS

All of the sample problems are preceded by a discussion of the type of data or information to be obtained from the charts or profiles. The sample problems then illustrate the use and reading of the charts.

ENGINE PERFORMANCE DIFFERENCES

All charts in this section are based on aircraft performance using the J57-P-20A engine. These charts can also be used to obtain performance data for aircraft using the J57-P-20 engine if the following factors are considered:

- Military thrust takeoff speeds, figure 11–9, are not changed.
- Military thrust takeoff distances, figure 11–8 (sheet 1), are increased by 8.0%.
- Military thrust maximum refusal speeds, figure 11–10, are reduced by 1.25%.
- Military thrust rate of climb (best climb charts, all configurations) is decreased. The following three configurations (the lowest, one medium and the highest drag configuration, respectively) are used to represent the decreases (interpolation can be used for configurations not shown):

Pressure Altitude (Feet)	*Rate of Climb Decrement* (Ft/Min)* Configuration I	IV	XI
0 (sea level)	1,500	1,200	600
10,000	1,300	1,000	400
20,000	700	600	200
30,000	400	300	100
40,000	200	100	100
50,000	200	100	100

*Applicable for gross weight of 30,000 pounds. For gross weight other than 30,000 pounds, compute rate of climb decrement from:

$$\text{Rate of climb decrement} = \text{Rate of climb decrement at 30,000 pounds} \times \frac{30{,}000}{\text{Gross Weight}}$$

- Time, fuel and distance in a military thrust climb (climb control charts) to cruise altitude† are increased as follows for all configurations:

Percent Increase

Time	15.0
Fuel	5.0
Distance	15.0

- Total distance and times in the profile, range decision and endurance decision charts which include military thrust climbs do not change.

†Cruise altitudes do not change.

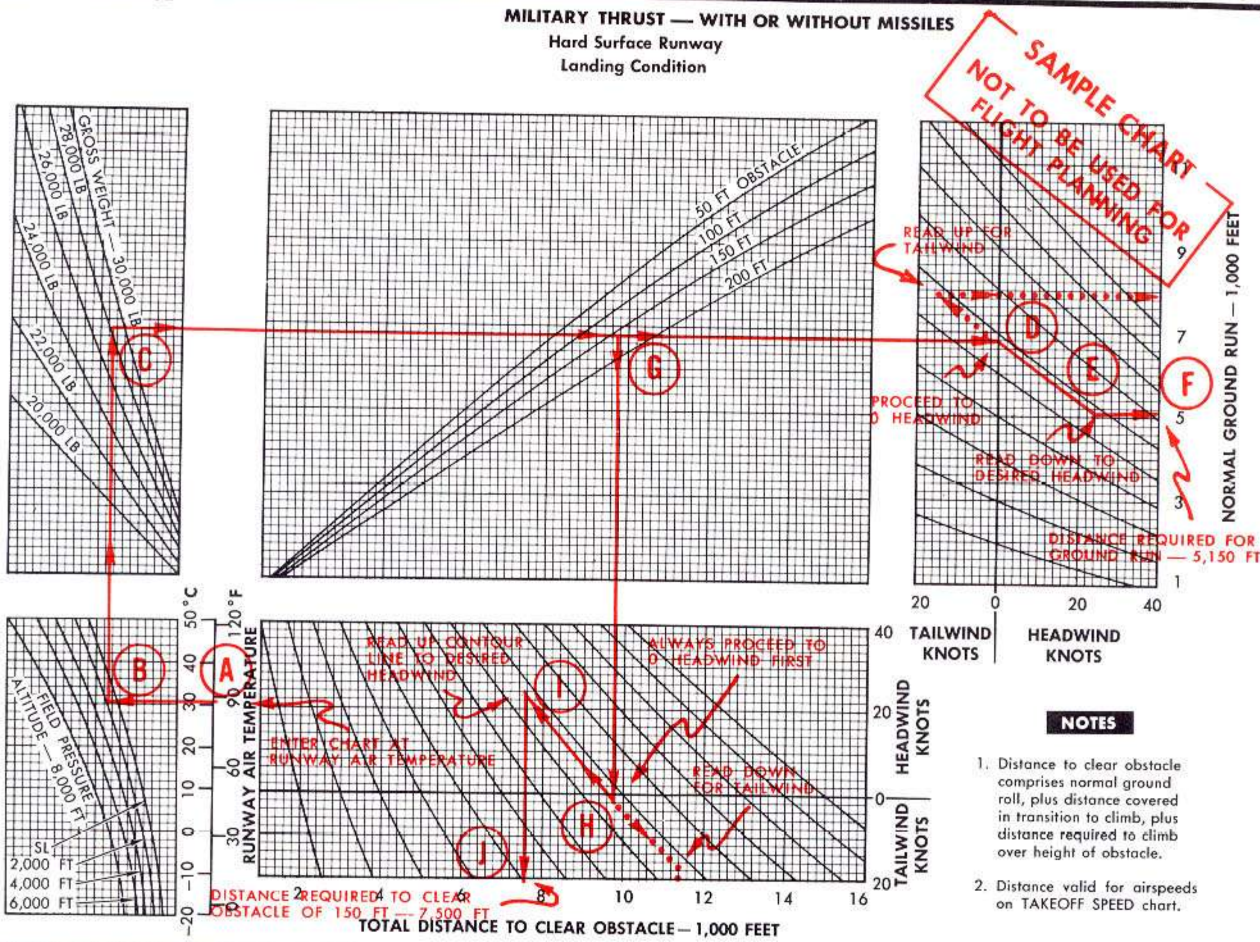
TAKEOFF DATA

The takeoff data charts provide distance and speed data for various phases of the takeoff operation, including normal and crosswind takeoffs, minimum run (short field) takeoff, and takeoffs performed to clear obstacles. Takeoff data are based on the takeoff technique described in section III of the NATOPS Flight Manual. The information provided makes possible preflight determination of normal or minimum ground run distance, obstacle clearance distance, nosewheel liftoff speed, takeoff speed, maximum refusal speed, maximum refusal distance, and speed or distances for checking takeoff acceleration during ground roll.

Takeoff Distance

This chart (figure 11–8) permits the determination of the normal ground run distance and the total distance to clear obstacles as high as 200 feet when the runway temperature, pressure altitude of the runway, takeoff gross weight of the aircraft, runway wind, and height of obstacle are known. Values can be obtained for headwinds up to 40 knots and tailwinds up to 20 knots.

TAKEOFF DISTANCE



NOTES

1. Distance to clear obstacle comprises normal ground roll, plus distance covered in transition to climb, plus distance required to climb over height of obstacle.
2. Distance valid for airspeeds on TAKEOFF SPEED chart.

Takeoff Speed

This chart (figure 11–9) permits the determination of the normal and the short field (minimum run) takeoff speeds when the airplane gross weight and takeoff thrust are known. Both combat and military thrust takeoff airspeeds may be determined. A separate chart is provided to show maximum crosswind conditions under which takeoff is recommended.

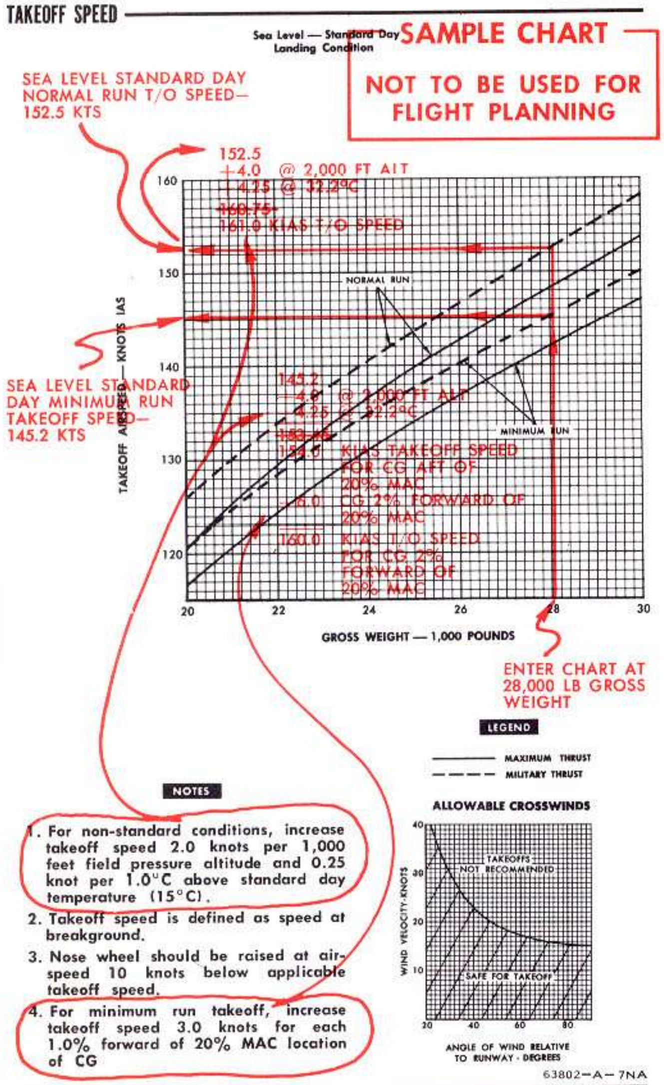
Maximum Refusal Speed

This chart (figure 11–10) permits the determination of the maximum refusal speed when the aircraft gross weight, field pressure altitude, runway air temperature, and usable runway length are known. The refusal speed is the maximum speed to which the aircraft can accelerate and then stop in the available runway length.

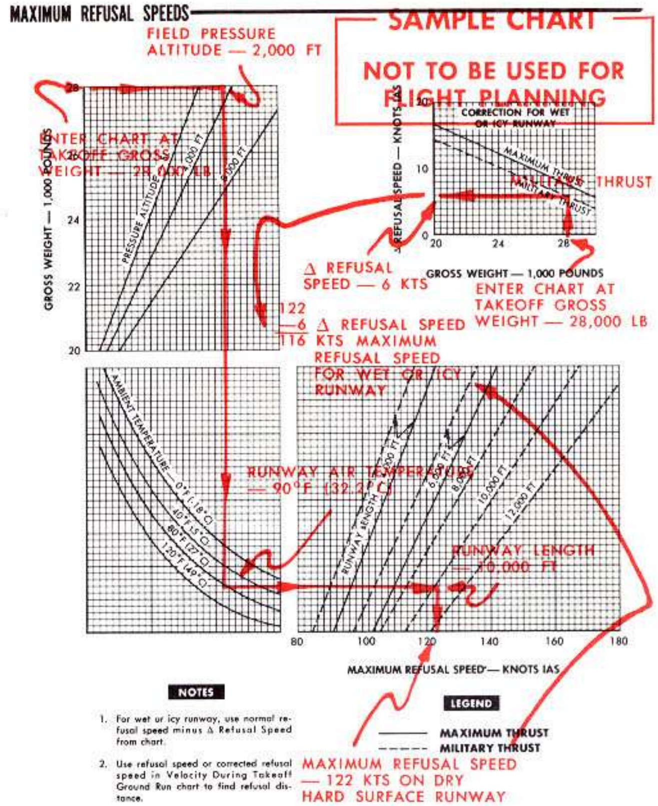
Velocity During Takeoff Ground Run

This chart (figure 11–11) permits the determination of the airspeed that should be attained at any predetermined distance during the takeoff ground run, or the distance that should be attained at any given airspeed during the takeoff ground run, when the takeoff airspeed and the normal takeoff distance are known. In using this chart, no allowance need be made for headwinds or tailwinds since the chart is entered with normal takeoff distances that are already corrected for wind effects.

TAKEOFF SPEED



MAXIMUM REFUSAL SPEEDS



TAKEOFF PLANNING

Example

Assume

Military thrust takeoff
Gross weight — 28,000 pounds
Runway air temperature — 90°F (32.2°C)
Field pressure altitude — 2,000 feet
Headwind component — 25 knots
Runway length — 10,000 feet
Obstacle 150 feet high 8,500 feet from takeoff end of runway
Acceleration check distance — 2,000-foot marker

Find

Normal ground run
Obstacle clearance distance
Normal run takeoff speed
Maximum refusal speed
Refusal distance
Acceleration check speed
Minimum run takeoff speed
Minimum ground run

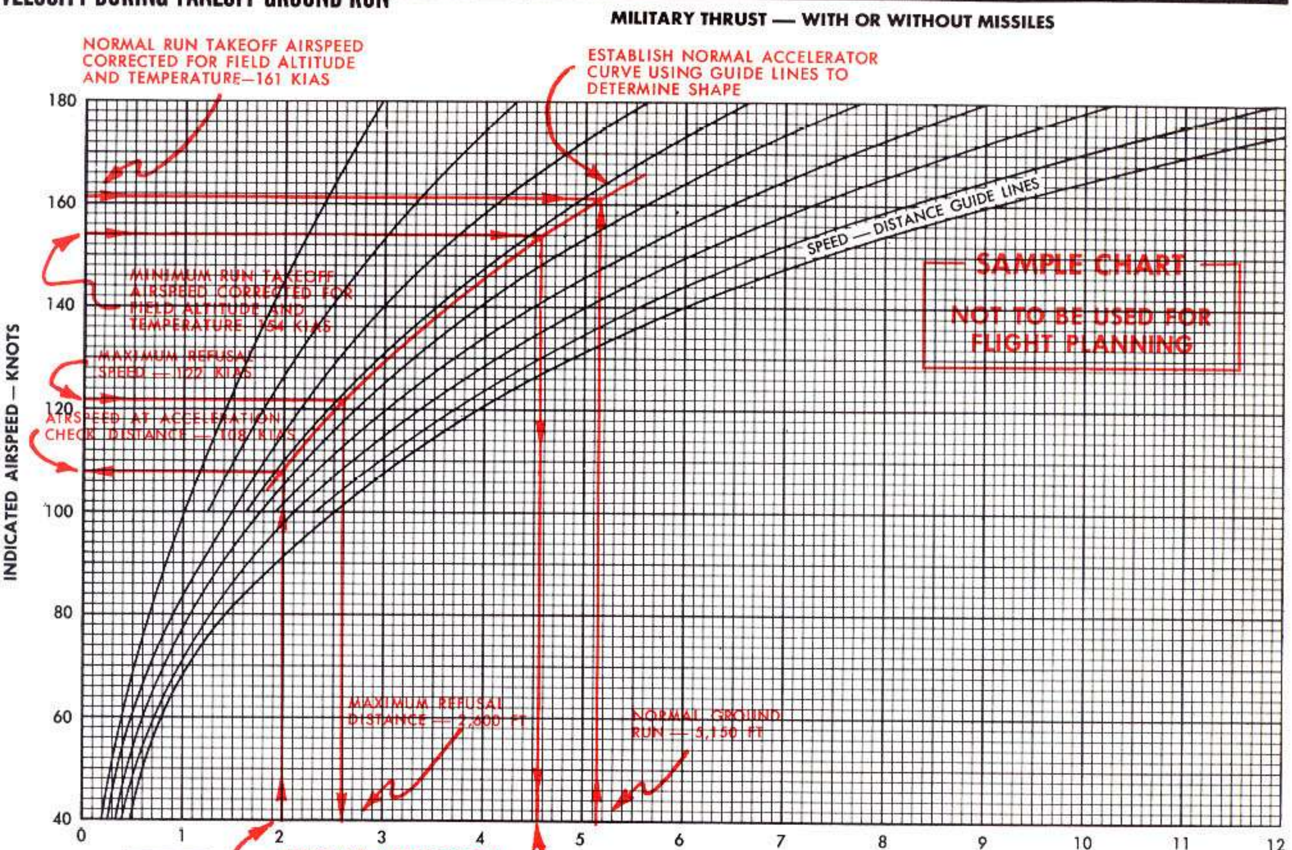
1. To find the normal ground run, enter the sample takeoff distance chart at the RUNWAY AIR TEMPERATURE scale A and read the chart as shown in steps B through F of the sample chart to obtain normal ground distance .... 5,150 feet

2. To find the total distance to clear an obstacle of 150 feet, proceed as in the steps above through point C on the GROSS WEIGHT curve, then read the chart from point C through point J to obtain obstacle clearance distance .... 7,500 feet

   Since the obstacle clearance distance obtained from the chart is less than the distance to the known obstacle, it is safe to proceed with the takeoff.

3. To find the normal run takeoff airspeed, enter the takeoff speed chart on the GROSS WEIGHT scale and read the chart as shown in the sample to obtain a sea level, standard day normal run takeoff speed of 152.5 KIAS. Add factors for field altitude and temperature to obtain corrected takeoff speed .... 161 KIAS

VELOCITY DURING TAKEOFF GROUND RUN



NOTE

Chart applicable for non-standard conditions if airspeed used to enter chart is corrected for ambient temperature and field pressure altitude.

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4. To establish the NORMAL ACCELERATION CURVE on the Velocity During Takeoff Ground Run chart, draw a curve passing through the intersection of the normal run takeoff airspeed from step 3 and the normal ground run from step 1, using the guidelines to establish the proper shape as shown in the sample Velocity During Takeoff Ground Run chart.

5. To find the maximum refusal speed, enter the sample refusal speed chart at the takeoff gross weight and read as shown to obtain maximum speed on a dry, hard-surfaced runway .... 122 KIAS

   If a wet or icy runway surface were being considered, it would be necessary to enter the △ refusal speed chart and read as shown in the sample problem to obtain corrected maximum refusal speed .... 116 KIAS

6. To find the refusal distance, enter the Velocity During Ground Roll chart at the refusal speed and read as shown in the sample problem to obtain distance .... 2,600 feet

   To find the refusal distance when a wet or icy runway surface is considered, enter the Velocity During Ground Roll chart with the corrected maximum refusal speed.

7. To find the acceleration check speed, enter the Velocity During Takeoff Ground Roll chart at the intersection of the 2,000-foot GROUND RUN DISTANCE line and the previously established NORMAL ACCELERATION CURVE, as shown on the sample chart. Read to the INDICATED AIRSPEED scale to obtain acceleration check speed .... 108 KIAS

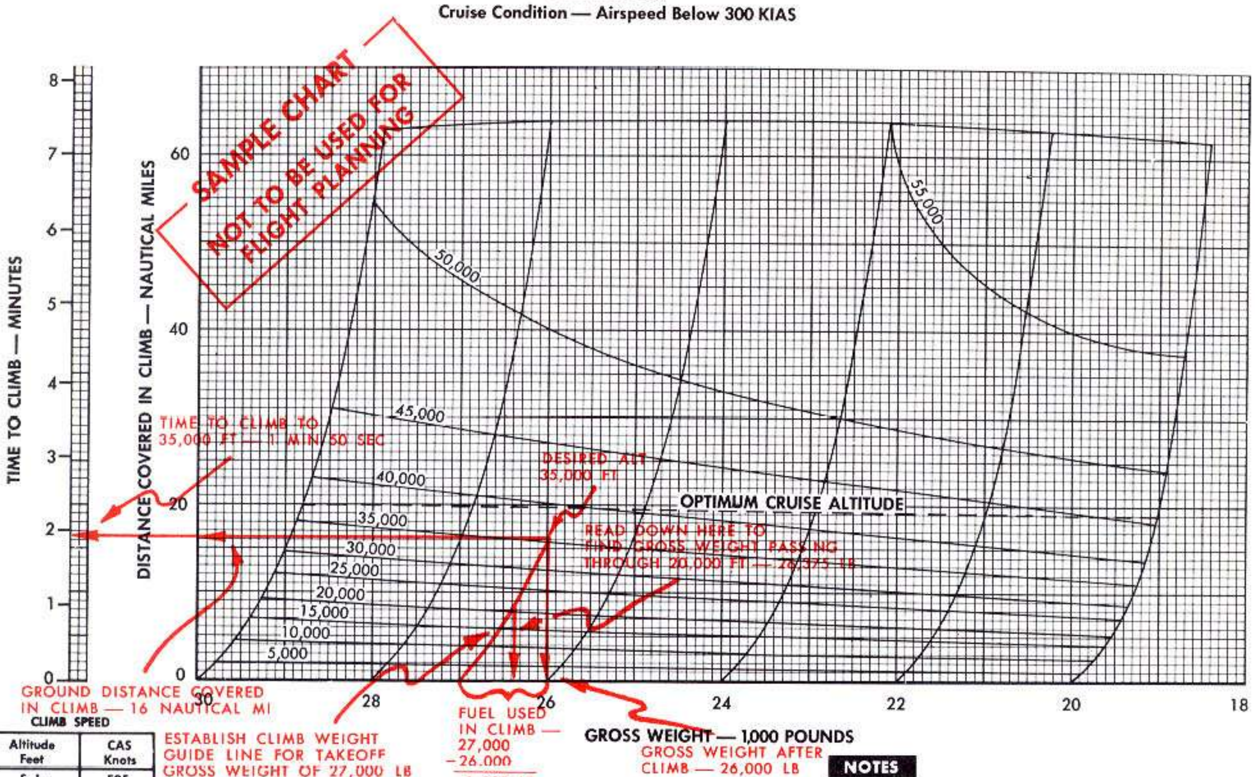
8. To find the minimum run takeoff airspeed, enter the takeoff speed chart on the GROSS WEIGHT scale and read the chart as shown in

CLIMB CONTROL

MAXIMUM THRUST — WITHOUT MISSILES

Standard Day

Cruise Condition — Airspeed Below 300 KIAS



CLIMB SPEED

Altitude Feet	CAS Knots
S. L.	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195
60,000	175

NOTES

1. For each 1°C above standard day temperature increase value obtained as follows:
   - Distance — 2%
   - Time — 2.5%
   - Fuel — 1%
2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 35,000 feet.
4. For field takeoff add 1.0 min. and 500 lb. for time and fuel from release of brakes.

the sample to obtain a sea level, standard day minimum run takeoff speed of 145.2 KIAS. Add factors for field altitude and temperature to obtain corrected takeoff speed.............154 KIAS

If a C. G. position 2% forward of 20% M.A.C. were being considered, correct the minimum run takeoff airspeed using Note 4 of the takeoff speed chart.............160 KIAS

9. To find the minimum run ground distance, enter the Velocity During Ground Run chart at the minimum run takeoff airspeed and proceed to the previously established NORMAL ACCELERATION CURVE, as shown on the sample chart. Read to the GROUND RUN scale to obtain the minimum run ground distance for a C. G. location aft of 20% M.A.C.............4,570 feet

   For a C. G. location forward of 20% M.A.C., use the corrected minimum run takeoff speed as shown in step 8.

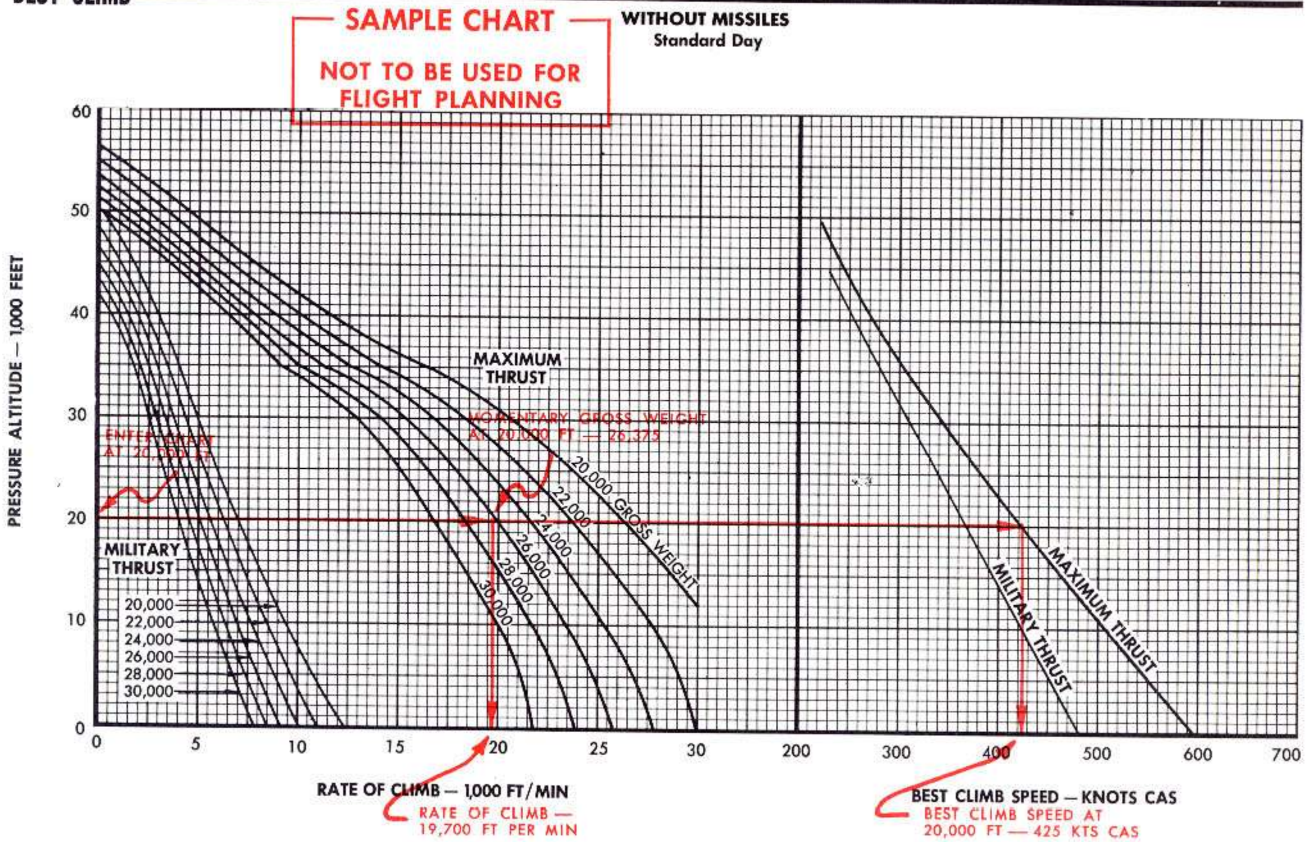
CLIMB DATA

The climb charts present data for determining best climb speed, rate of climb, time-to-climb, and ground distance covered during climb for climbs performed with either military or maximum thrust. The military thrust climb is performed to a varying speed schedule for best performance, while maximum thrust climb performance is best if flown at constant Mach number.

Climb Control

These charts permit the determination of time to climb, distance covered, and fuel used during the climb to a designated altitude when the gross weight is known for start of climb. Climb figures may be determined for both maximum and military thrust with and without missiles. Distance covered is for a no-wind condition and suitable correction must be made for the effects of winds aloft.

BEST CLIMB



Best Climb

This chart permits not only determination of the climb speed schedule, but also the rate of climb for any pressure altitude when aircraft gross weight is known. Both maximum and military thrust airspeeds and rates of climb may be determined.

CLIMB PLANNING

Example

Assume

Maximum thrust takeoff
Desired altitude — 35,000 feet
Gross weight — 27,000 pounds
Configuration — without missiles

Find

Time to climb to 35,000 feet
Distance covered in climb
Gross weight after climb
Fuel used during climb
Best rate of climb and airspeed at 20,000 feet

1. To find the time and the distance covered in a maximum thrust climb to 35,000 feet, enter the sample climb control chart at 27,000 pounds on GROSS WEIGHT curve and read chart as shown in the sample problem to obtain distance covered in the climb .... 16 nautical miles
   Time to climb .... 1 minute, 50 seconds
   Gross weight at 35,000 feet .... 26,000 pounds
   To find the fuel used during the climb, subtract the gross weight at 35,000 feet from the takeoff gross weight to obtain .... 1,000 pounds

2. To find the best climb rate and speed at 20,000 feet, it is first necessary to find the gross weight at 20,000 feet. Enter the climb control chart at 27,000 pounds on GROSS WEIGHT curve and read up to the 20,000-foot ALTITUDE line then down to GROSS WEIGHT scale to obtain gross weight .... 26,375 pounds

3. To find best climbing speed and best rate of climb at 20,000 feet when climbing with maximum thrust, enter the best climb chart at 20,000 feet on the ALTITUDE scale and read the chart for the gross weight obtained in step 2 as shown in the sample problem to obtain rate of climb .... 19,700 feet-per-minute
   Best climb airspeed .... 425 knots CAS

CRUISE DATA

The cruise data charts detail the range and endurance performance characteristics of the aircraft. The convenient profile chart presentation supplemented by illustrated examples provides for both speed and accuracy in flight planning. The ease of flight planning achieved using profile charts is accomplished through elimination of much of the computation required in handling data read from the detailed charts for individual phases of flight operation. The relationships of fuel, time, and distance are presented pictorially on the profiles for all altitude up to the optimum cruising altitude. Also included in the cruise data presentation are the combat allowance charts, which permit determination of time available and fuel required for various altitudes and Mach numbers using constant military or maximum thrust settings. Tables of range and endurance limits are included to furnish quick-decision data for low fuel load under fouled-deck conditions.

Level Flight Cruise

The recommended level flight cruise speeds are tabulated on the profile charts. At the end of the initial climb, the recommended cruise speed for the desired altitude should be exceeded slightly before thrust is reduced to ensure maintaining adequate speed until stable cruise conditions are established. The recommended calibrated airspeed and a constant pressure altitude should be maintained throughout cruising flight. As fuel is used, the required thrust should be reduced to maintain the prescribed airspeed. The effect of nonstandard free air temperature on level flight cruise performance is negligible if the recommended calibrated airspeed or true Mach number is maintained at the desired pressure altitude. To maintain the recommended speed with nonstandard temperatures, higher thrust settings (engine pressure ratios) are required on hot days and lower settings on cold days, with resultant increased or decreased fuel flows. The changes in fuel flow, however, are compensated by increased or decreased TAS so that the fuel economy remains practically unchanged. Flight time will vary with the resulting change in ground speed.

Cruise-Climb Procedure

To achieve absolute maximum range, the flight should be conducted at a continually varying optimum altitude for cruising flight (cruise-climb) for each momentary gross weight. The optimum altitude for cruising flight increases as fuel is consumed and gross weight reduced, necessitating a continuous but gentle climb to achieve maximum range. The optimum altitude for cruise-climb flight will vary from day to day as the temperature varies. So, also, will climb performance change with temperature. If the cruise is to be initiated after making a climb to altitude, this change in climb performance can be used as a guide in determining the altitude at which to initiate cruise-climb. The proper altitude to initiate the cruise-climb procedure can be obtained by climbing at the recommended climb speed schedule until the rate of climb reaches the standard day value determined from the best climb chart for the applicable aircraft gross weight and thrust setting. At this altitude, cruising flight should be initiated at the recommended true Mach number and the aircraft will seek the proper altitude for cruise-climb, maximum range flight.

Effect of Wind on Cruise Performance

For the purpose of cruise control, all winds may be expressed by considering the head or tailwind component, regardless of the total wind with respect to the aircraft course for the time required to complete the mission. One method of determining the effect of wind upon time, fuel, and distance, is to compute the average true airspeed (no wind) and apply wind to the average TAS to obtain the average ground speed. A table of Range Factors is provided in this appendix for computing wind effects, and the use of these factors is illustrated in the examples for the profile charts.

COMBAT RADIUS PROFILE

This chart gives the maximum radius of action that can be attained with either optimum altitude cruise (cruise-climb) or constant altitude cruise with a given amount of fuel allocated for combat use at maximum radius. The data is based upon an optimum climb schedule to altitude, maximum range cruise outbound and return, and a maximum range descent. The distances traveled in climbing can be obtained as well as distance at which descent should be initiated. This profile chart must be used in conjunction with the combat allowance charts to determine time for combat with a given amount of fuel.

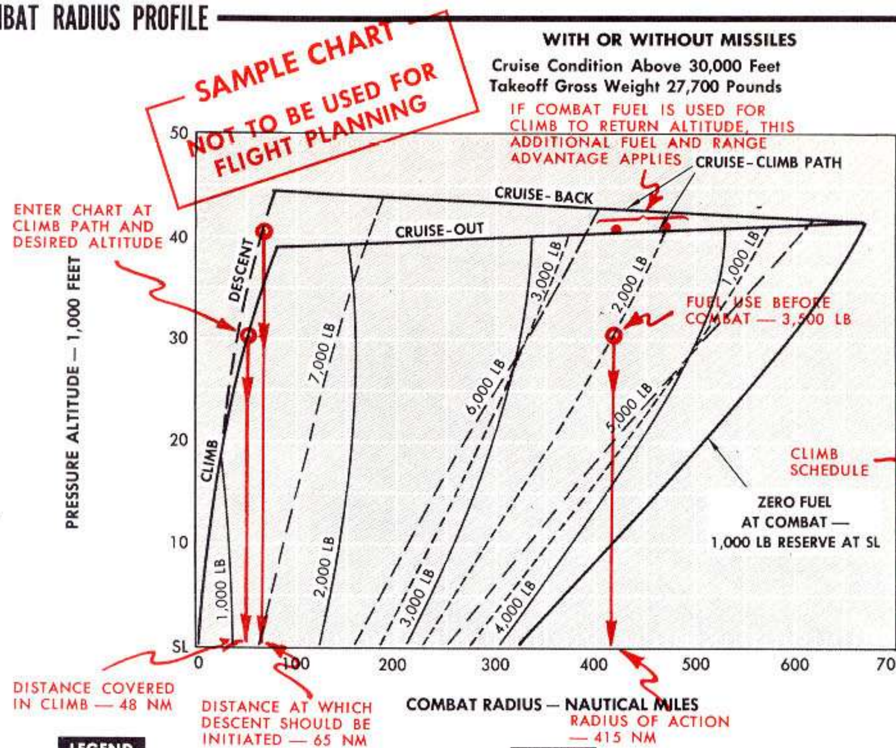
Example

Assume

A practice combat mission is to be flown in which cruise out will be made at a constant altitude of 30,000 feet allowing for 2,000 pounds of fuel for simulated

COMBAT RADIUS PROFILE

WITH OR WITHOUT MISSILES
Cruise Condition Above 30,000 Feet
Takeoff Gross Weight 27,700 Pounds



MILITARY THRUST CLIMB

ALT — 1,000 FT.	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

IDLE THRUST DESCENT — CONSTANT 240 KNOTS CAS

LEGEND

- CLIMB AND CRUISE-CLIMB PATHS
- DESCENT PATH
- COMBAT FUEL AVAILABLE
- TOTAL FUEL USED — CRUISE OUT
- TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 500 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for ICAO standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000 (CRUISE-BACK)	0.86	264
30,000 (CRUISE-OUT)	0.79	300
20,000	0.71	326
10,000	0.64	354
SL	0.59	387

combat at maximum radius of action. The return flight is to be made at 40,000 feet.

Find

Distance covered in climb to 30,000 feet

Maximum radius of action

Fuel remaining after combat

Distance at which descent is initiated

1. Enter the sample combat radius profile chart at the intersection of the 30,000-foot ALTITUDE line with the CLIMB curve and read as shown to obtain the distance covered in climb (no wind) .... 48 nautical miles

2. To find the radius of action with constant altitude cruise, again enter the chart at the intersection of the 30,000-foot ALTITUDE line and the 2,000-pound COMBAT FUEL line and read the chart for distance .... 415 nautical miles

   For *maximum attainable* radius, cruise-climb procedure would be employed and the chart would be read at points along the CRUISE-CLIMB lines for cruise-out and cruise-back.

3. To find the fuel remaining after combat, first interpolate between the cruise-out fuel lines, as shown, to read fuel used for all operations conducted prior to combat .... 3,500 pounds

   Add combat fuel to find total fuel used prior to beginning the return flight (2,000 + 3,500) .... 5,500 pounds

   Subtract fuel used from initial fuel load to obtain fuel remaining (8,657 − 5,500) .... 3,157 pounds

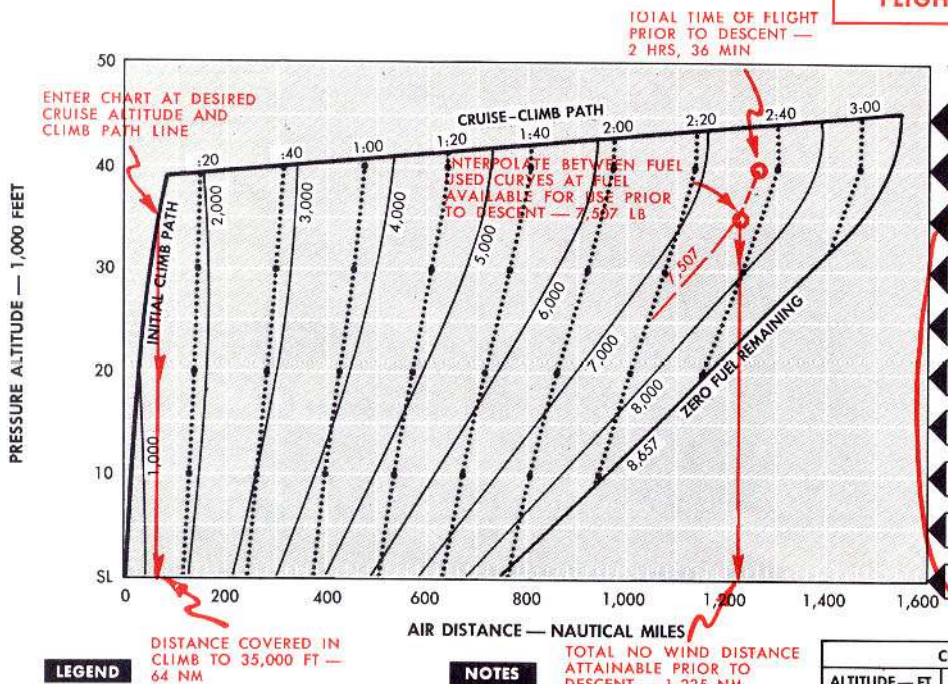
4. To find the distance, from the point of destination, at which the descent should be initiated, read as shown from the intersection of the 40,000-foot altitude line and the CONSTANT-SPEED DESCENT line to obtain .... 65 nautical miles

The chart is based on 1,000 pounds of fuel remaining at destination. Radius of action considering larger or smaller amounts of reserve fuel can be obtained by entering the combat radius profile chart with a combat fuel figure that is either increased or decreased by the amount of the change in reserve fuel. If a reserve of only 500 pounds were desired in the preceding example, the profile chart would be entered with 1,500 pounds instead of 2,000 pounds (the amount used considering a fuel reserve of 1,000 pounds).

MISSION PROFILE

WITH OR WITHOUT MISSILES
Cruise Condition Above 30,000 Feet
Takeoff Gross Weight — 27,700 Pounds

SAMPLE CHART
NOT TO BE USED FOR FLIGHT PLANNING



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

CLIMB SCHEDULE

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.71	326
10,000	0.64	354
SL	0.59	387

CRUISE SCHEDULE (INTERPOLATE)

LEGEND

——— FLIGHT PATH
•••••• TIME TO CLIMB AND CRUISE
——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for ICAO standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

MISSION PROFILE

This chart presents the relationships between time, fuel, distance, and altitude at all ranges, out to the maximum range of the aircraft. The relationship is based on a no-wind condition and considers a military thrust climb from sea level. A climb speed schedule of calibrated airspeed and Mach number ranging from sea level to the optimum cruise altitude is also included. Range and cruising time data may be determined for either constant altitude cruise or for maximum range cruise at optimum altitude. To determine the overall range capabilities including descent, data from the mission profile is supplemented with data read from the descent charts as shown in the following example.

Example

Assume

A maximum range flight is to be made under the following conditions:

Desired cruise altitude — 35,000 feet
Military rated thrust climb from sea level
Expected winds aloft — 30° relative at 80 knots
Temperature at altitude — 54°C (standard day)

Find

Distance covered in climb to 35,000 feet

Maximum range attainable and time required for entire flight including a constant speed descent to sea level with 1,000 pounds fuel reserve.

1. To find the distance covered in the climb, enter the sample chart at the intersection of the CLIMB-PATH and the 35,000-foot ALTITUDE line read as shown to obtain distance .... 64 nautical miles

2. To find maximum range with 1,000-pound fuel reserve upon return to sea level, it is first necessary to enter the constant speed descent chart (figure 11–14) for descent from 35,000 feet to sea level to obtain descent speed .... 240 knots
Distance covered in descent .... 55 nautical miles
Time for descent .... 10.5 minutes
Fuel required for descent and reserve (1,000 + 150) .... 1,150 pounds

3. Reenter the mission profile chart at the intersection of the 35,000-foot ALTITUDE line and the fuel available for use prior to descent (8,657 – 1,150 = 7,507) and read as shown in the sample problem to obtain
Total time aloft .... 2 hours, 36 minutes
No-wind distance .... 1,225 nautical miles

4. To obtain the range under the specific wind conditions, first convert the recommended cruise speed (282 knots, CAS) to TAS by the Airspeed-Mach Number Conversion table to obtain standard day TAS .... 480 knots

5. Next, enter the range factor chart (figure 11–6) with relative wind angle of 30°, TAS of 480 knots, and wind velocity of 80 knots to obtain range factor 0.851

6. Subtract the distance covered in the climb from the total no-wind distance to obtain no-wind range at altitude (1,225 –64) ..... 1,161 nautical miles

7. Multiply the known no-wind distance by the range factor to obtain cruising range at constant altitude (with wind) (1,161 × 0.851) .... 988 nautical miles

8. Find maximum range attainable at constant altitude including climb, cruise, and descent (64 + 988 + 55) .... 1,107 nautical miles
Find total time for flight including climb, cruise and descent (2 hours, 36 minutes + 11 minutes) .... 2 hours, 47 minutes

9. Observe the cruise and climb schedules noted on the charts. The mission profile chart can also be used to find fuel and time required for flight over a specified distance by entering the chart with cruising altitude and cruise distance (specified distance minus distance for descent). When wind effects must be considered in this type of problem, it is necessary to compute an air distance (factor distance) with which to enter the chart, as illustrated in the example for the optimum return profile chart.

The maximum attainable range is achieved when cruise-climb procedure is employed. In this case, the mission profile chart is entered at the intersection of the CRUISE-CLIMB PATH with the appropriate fuel curve. In inflight refueling missions, the mission profile chart may be used to establish the distance at which initial refueling rendezvous must be made. In the example above, for instance, distance and fuel data from the air refueling rendezvous chart would be substituted for the constant-speed descent data.

OPTIMUM RETURN PROFILE

This chart presents time, fuel and distance data for return flights on which maximum range is obtained by cruising at optimum cruise altitude (cruise-climb). The chart considers a military thrust climb from initial altitude to the optimum cruise altitude except for zones, close-in to the destination, in which maximum range is attained by cruising either at the initial altitude or at some intermediate altitude. For problems in which constant altitude return flight is to be considered for a certain fuel remaining, the desired data can be read from the inflight refueling profile. To determine the overall return capabilities including descent, data from the profile may be supplemented with data read from the descent charts as shown in the example for the mission profile chart.

Example

Assume

A complicated tactical mission is to be flown in which the return flight must be made under conditions sufficiently different from those that existed for cruise-out as to preclude use of the mission radius profile. The following conditions apply:

Distance to base — 550 nautical miles

Fuel remaining — 3,650 pounds

Initial altitude — 20,000 feet

Desired fuel reserve — 800 pounds

Expected winds aloft — 150° relative at 60 knots

Find

Initial cruise altitude

Time of flight for return over base (descent not included)

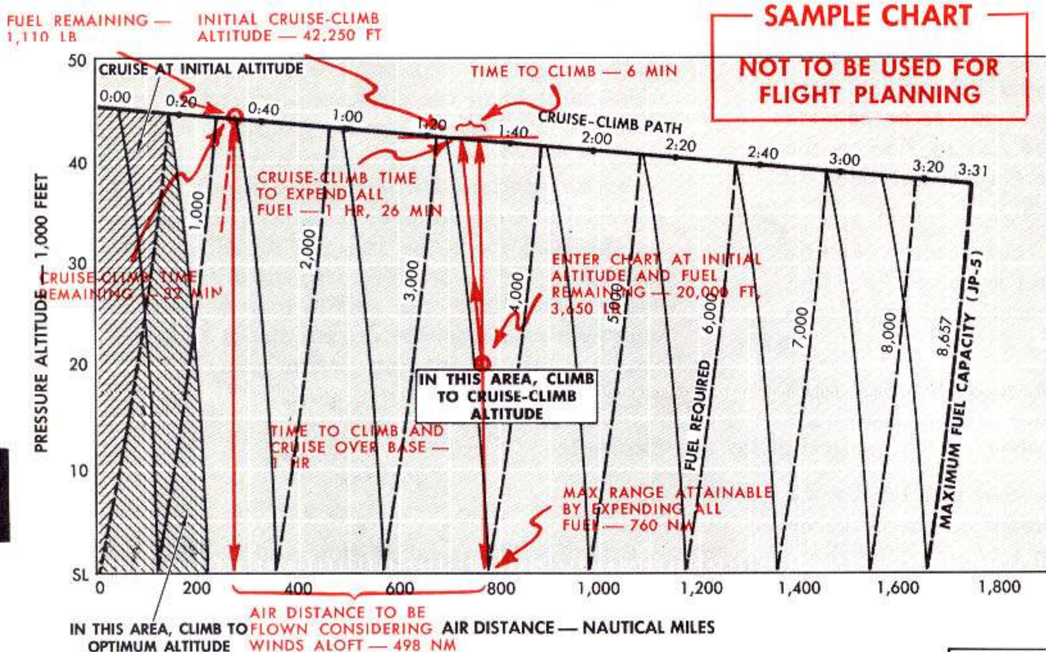
Fuel remaining over base

1. Enter the sample optimum return profile at 20,000 feet and 3,650 pounds of fuel remaining and read the following:
Maximum range attainable by expending all fuel (no wind) .... 760 nautical miles
Initial cruise-climb altitude .... 42,250 feet
Cruise-climb time to expend all fuel .... 1 hour, 26 minutes
Time to climb to cruise-climb altitude .... 6 minutes
Time to climb and cruise until all fuel is expended (no wind) (1 hour, 26 minutes + 6 minutes) .... 1 hour, 32 minutes

OPTIMUM RETURN PROFILE

WITH OR WITHOUT MISSILES

Cruise Condition Above 30,000 Feet
Initial Gross Weight 27,700 Pounds



CLIMB SCHEDULE

MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

CRUISE SCHEDULE

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.71	326
10,000	0.64	354
SL	0.59	387

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

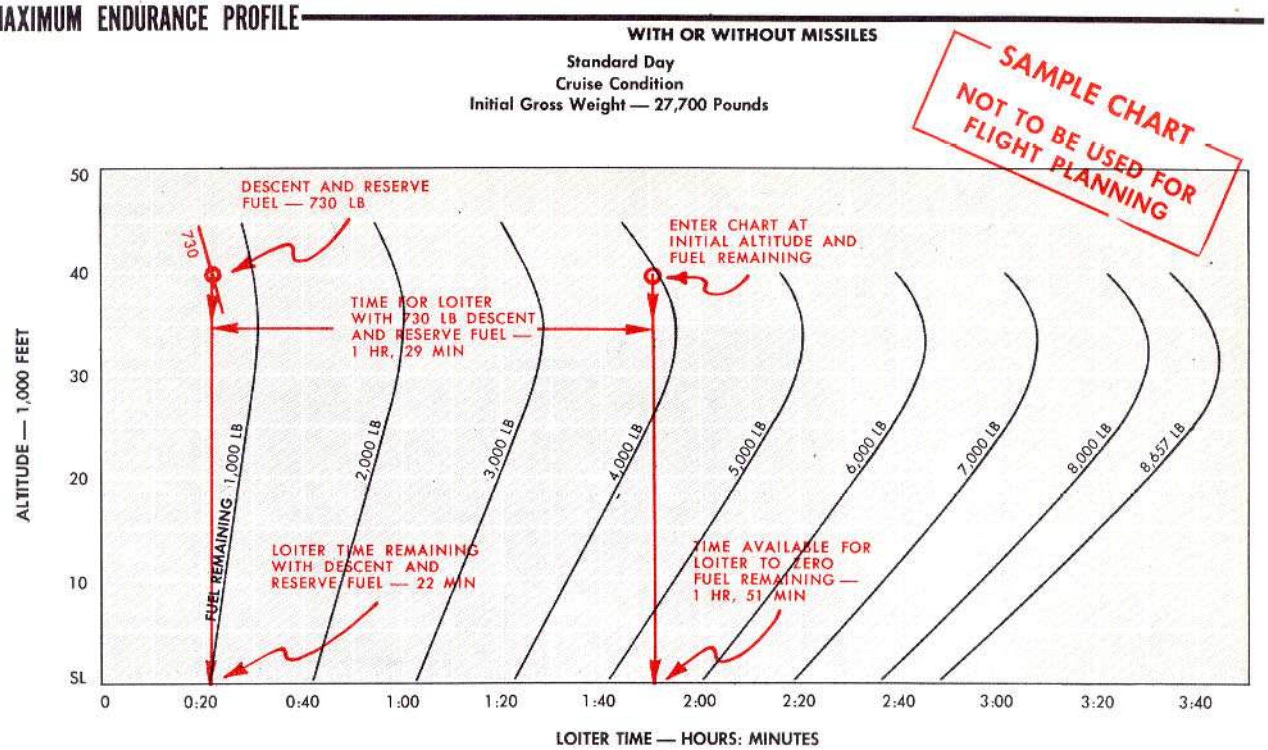
NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for ICAO standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

2. As a means of reading the chart to include wind effects, it is first necessary to obtain an "air distance" using the range factor chart (figure 11–6).
   Range factor for 150° relative wind at 60 knots, average TAS for cruise 495 knots 1.103
   Air distance to be flown (550 ÷ 1.103) .... 498 nautical miles
3. Subtract the air distance from the maximum range attainable to obtain the point at which to reenter the chart considering headwind (760 – 498) .... 262 nautical miles
4. Again enter the profile at the CRUISE-CLIMB PATH and the air distance to obtain
   Cruise-climb time remaining .... 32 minutes
   Fuel remaining over base .... 1,110 pounds
   Comparison of fuel remaining over base with 800-pound reserve desired shows 310 pounds available for descent, which is adequate, as can be determined from the descent charts.
5. Total time of flight for return over base is found as follows:
   Cruise time (1 hour, 26 minutes – 32 minutes) .... 54 minutes
   Total time (54 minutes + 6 minutes) .... 1 hour
6. Observe the cruise and climb schedules noted on the chart.

   If the initial altitude and fuel remaining fall within the zone for which "climb to optimum altitude" is indicated, read upward, parallel to the climb path guidelines, to the LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT to obtain the optimum altitude for return.

MAXIMUM ENDURANCE PROFILE



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

LOITER SPEED

OPTIMUM LOITER SPEED ALL ALTITUDES — 240 KNOTS CAS

MAXIMUM ENDURANCE PROFILE

This chart is used to determine the maximum endurance (loiter time) for constant altitude cruise at any initial altitude when the amount of fuel remaining is known. Maximum endurance is attained by flying at the recommended loiter airspeed for desired altitude. The chart represents the conditions which give the lowest rate of fuel consumption for cruise at a given altitude. No allowance is made for climb or descent performance or for reserve fuel.

Example

Assume

A mission is being planned in which a maximum attainable period of loiter is desired at the initial altitude of 40,000 feet with 4,000 pounds fuel remaining.

Find

Maximum endurance with loiter at initial altitude, if it is desired to have fuel reserve of 500 pounds at sea level

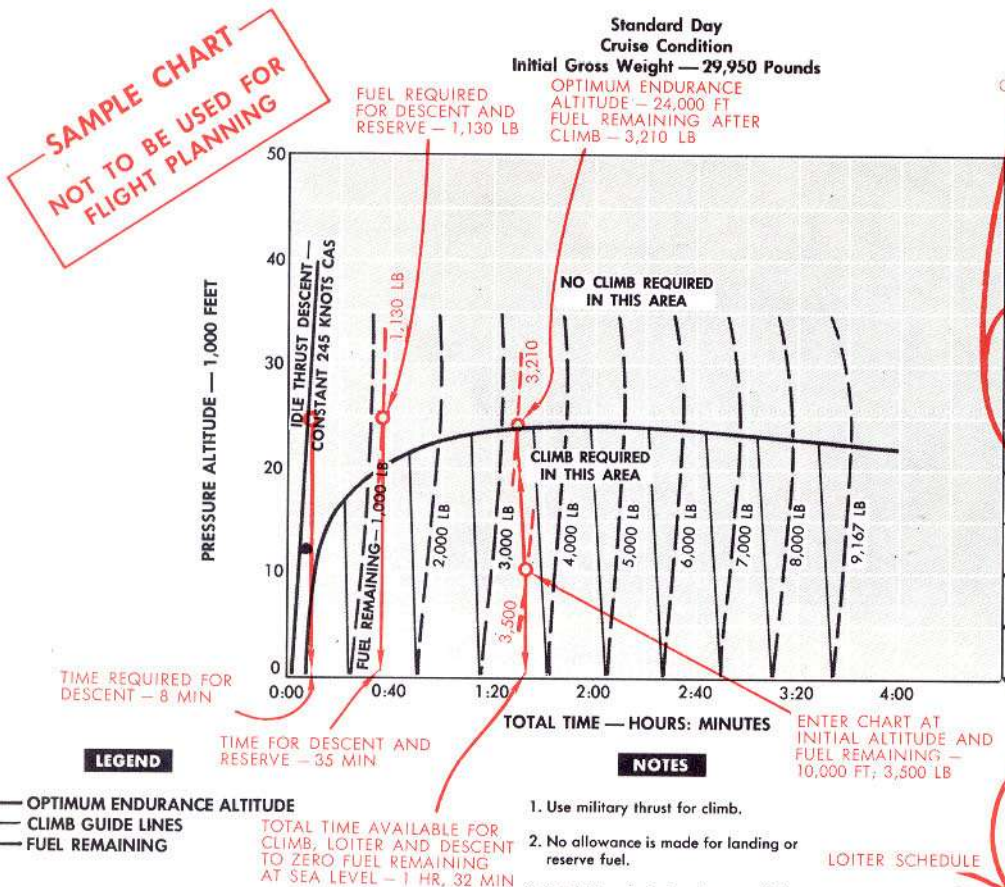
Fuel required for loiter

1. Enter the sample maximum endurance profile chart at the intersection of the 40,000-foot ALTITUDE line and the 4,000-pound FUEL REMAINING line and read as shown to obtain time to zero fuel remaining .... 1 hour, 51 minutes
2. Enter the maximum range descent chart at 40,000 feet on the ALTITUDE scale and read to obtain
   Time to descend .... 19 minutes
   Fuel to descend .... 230 pounds
3. Find fuel for descent plus 500 pounds of fuel reserve (230 + 500) .... 730 pounds

OPTIMUM ENDURANCE PROFILE

CONFIGURATION IV

Standard Day
Cruise Condition
Initial Gross Weight — 29,950 Pounds



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	262	.77
30	284	.75
25	308	.73
20	332	.72
15	360	.71
10	388	.69
5	415	.68
SL	442	.67

OPTIMUM LOITER SPEED

ALTITUDE-FT	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

4. Next, reenter the maximum endurance profile chart at the intersection of the 40,000-foot ALTITUDE line and the 730-pound FUEL REMAINING curve and read as shown in the sample problem to obtain time remaining........22 minutes

5. To find fuel required for loiter at the designated altitude, subtract fuel for descent and reserve from initial fuel remaining (4,000 − 730) ....3,270 pounds

6. To find time available for loiter at initial altitude, subtract time remaining prior to descent from the initial time for cruise to zero fuel remaining, (1 hour, 51 minutes − 22 minutes) ....1 hour, 29 minutes

7. To find time aloft (endurance) add descent time to time for loiter (19 minutes + 1 hour, 29 minutes) ....1 hour, 48 minutes

OPTIMUM ENDURANCE PROFILE

This chart permits determination of maximum endurance (loiter time) for any quantity of fuel remaining based on loitering at optimum altitude considering fuel used for climb and descent. The area above the OPTIMUM ENDURANCE ALTITUDE line on the chart represents the conditions of altitude and fuel load for which the flight should be continued at the initial altitude to obtain maximum endurance. The area under this line indicates the altitudes and fuel loads at which a military thrust climb should be made to the optimum endurance altitude. Curves showing fuel remaining are based upon a military thrust climb to the optimum altitude (if necessary), loiter at altitude until fuel level reaches descent allowance, then a descent to sea level (zero fuel remaining). No allowance is made for landing or reserve fuel. However, calculations for reserve fuel are easily made as shown in the example. Climb path guidelines permit determination of climb time and fuel for climb to the optimum endurance altitude.

Example

Assume

A mission is being planned in which the maximum attainable period of loiter (optimum endurance) is desired considering an initial altitude of 10,000 feet and with 3,500 pounds of fuel remaining.

Find

Altitude for optimum endurance

Fuel remaining after climb to optimum endurance altitude

Fuel used in climb to optimum endurance altitude

Optimum endurance (time aloft) if descent is made for fuel reserve of 1,000 pounds at sea level

Fuel required for descent

1. Enter the sample optimum endurance profile chart at the intersection of the 10,000-foot PRESSURE ALTITUDE line and the 3,500-pound FUEL REMAINING curve and read as shown in the sample problem to obtain
   Optimum endurance altitude..................24,000 feet
   Fuel remaining after climb..................3,210 pounds
   Fuel used during climb (3,500 – 3,210)..................290 pounds
   Total time available for flight to zero fuel remaining at sea level..................1 hour, 32 minutes
2. From the maximum range descent chart (figure 11–14, sheet 1), find the fuel required to descend from 24,000 feet, the optimum endurance altitude..................130 pounds
   Find fuel required for descent and reserve (130 + 1,000) ....1,130 pounds
3. Again enter the profile chart at the intersection of the optimum endurance altitude and the 1,130-pound fuel remaining line to obtain the time for descent and reserve..................35 minutes
4. From the intersection of the optimum endurance altitude and the CONSTANT-SPEED DESCENT curve, obtain the time required for descent to sea level..................8 minutes
5. Since descent time is included in (3), subtract descent time from (4) to find reserve time (35 minutes – 8 minutes) ....27 minutes
6. Find the optimum endurance (time aloft) by subtracting reserve time from total time (1 hour, 32 minutes – 27 minutes)....1 hour, 5 minutes
7. Follow the climb, loiter and descent schedules tabulated on the profile chart.

AIR REFUELING PROFILE

This chart illustrates the relationships of time, fuel, and distance in a convenient form for planning cruise operations in which the aircraft is refueled in flight. Data is provided for both constant-altitude cruise and for maximum range cruise (cruise-climb) considering refueling operations conducted at any altitude. The chart contains climb path guidelines to show military thrust climb performance from rendezvous altitude to desired cruise altitude. Lines for zero fuel remaining show the maximum ranges that can be attained by cruising at various altitudes after refueling. To determine the overall range capabilities including descent, data from the air refueling profile must be supplemented with data read from the descent charts as illustrated in the example for the mission profile chart.

Example

Assume

The aircraft has just been refueled to full fuel capacity in rendezvous with a tanker at 15,000 feet and that it is desired to find the ***maximum*** no-wind distance at which a second refueling operation could be conducted, allowing for a 1,000-pound fuel reserve at optimum cruise altitude.

1. Enter the sample air refueling profile at the 15,000-foot ALTITUDE line and the CRUISE-CLIMB zero fuel remaining line, then follow the climb path guidelines to the CRUISE-CLIMB PATH curve to obtain
   Distance attainable in cruise to zero fuel remaining, considering climb........1,505 nautical miles
   Time to cruise to zero fuel remaining..................3 hours, 2 minutes
   Fuel remaining after climb..................approximately 8,900 pounds
   Initial cruise climb altitude..................34,000 feet
2. Again enter the profile at the intersection of the 1,000-pound fuel remaining line and the CRUISE-CLIMB PATH line to obtain

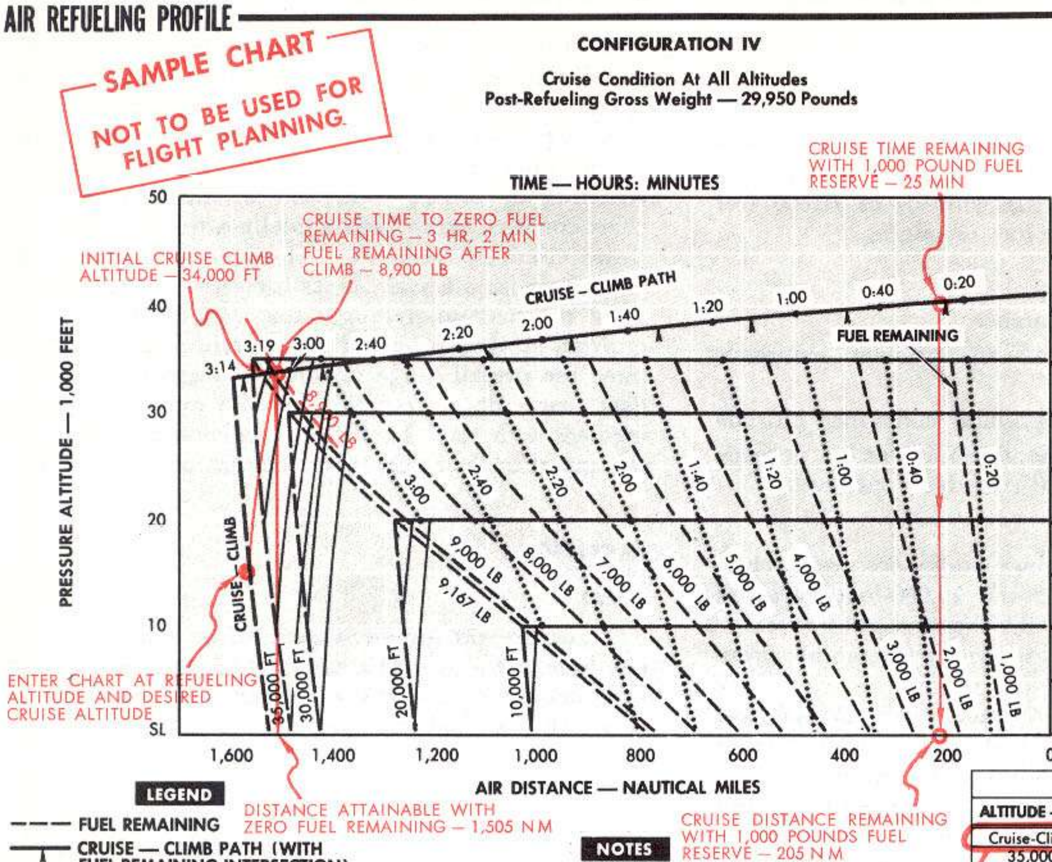
   Cruise-climb distance remaining..205 nautical miles
   Cruise-climb time remaining..................25 minutes
3. By subtracting the time and distance available with 1,000 pounds fuel remaining from the initial values for cruise to zero fuel remaining, obtain

   Distance to next refueling point (descent not considered, 1,505 – 205)..................1,300 nautical miles
   Cruise-climb time (3 hours, 2 minutes –25 minutes) ....2 hours, 37 minutes

AIR REFUELING PROFILE

CONFIGURATION IV

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 29,950 Pounds



CLIMB SCHEDULE

MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	262	.77
30	284	.75
25	308	.73
20	332	.72
15	360	.71
10	388	.69
5	415	.68
SL	442	.67

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
35,000	0.85	288
30,000	0.78	296
25,000	0.72	301
20,000	0.67	305
15,000	0.61	311
10,000	0.58	320
5,000	0.54	330
SL	0.52	342

CRUISE SCHEDULE

LEGEND

- FUEL REMAINING
- CRUISE — CLIMB PATH (WITH FUEL REMAINING INTERSECTION)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

4. Observe the cruise and climb schedules noted on the chart. To obtain total time for climb and cruise, consult the military thrust climb chart for time to climb, which must be added to cruise time. Wind effects may be computed as illustrated in the examples for the mission and optimum return profiles. To find the fuel required and distance covered in descending for next inflight refueling operation, refer to the Air Refueling Rendezvous chart.

RANGE AND ENDURANCE DECISION

These charts (figures 11–17 and 11–18) present maximum endurance and maximum range data in convenient form for rapid reading in making decisions concerning the diversion of aircraft to alternate destinations. Data are presented in tabulations of endurance and range at either initial altitude or optimum altitude for a representative range under conditions of fuel remaining and initial altitude. A minimum practical fuel reserve of 600 pounds has been considered in preparing the data, but approximate readings for greater or smaller amounts of reserve fuel can be made by decreasing or increasing the fuel remaining figure by the desired change in reserve fuel. The data include time and distance for a maximum range descent to sea level. Climb performance is included for cases in which climb to optimum altitude is required.

For instance, assume that it is desired to determine for what period an aircraft loaded with two Sidewinder missiles can loiter in the vicinity of a carrier while the flight deck is cleared of an obstruction. Consider that flight is at 20,000 feet with 1,600 pounds fuel remaining. The desired fuel reserve is 1,000 pounds instead of the 600-pound allowance included in the table. Enter the endurance decision chart (figure 11–18, sheet 1) on the IF YOU ARE AT 20,000 FEET block, at the adjusted fuel remaining of 1,200 pounds (actual fuel remaining minus 400 pounds additional reserve fuel desired). The endurance at 20,000 feet with descent to sea level is 23 minutes. The optimum altitude is 23,000 feet, and the endurance at optimum altitude with descent to sea level is 23.5 minutes. Descent should be initiated when fuel remaining is 720 pounds.

EMERGENCY RANGE AND ENDURANCE DECISION

These charts (figures 11–18A through 11–18H) present maximum range and endurance data to cover all possible airplane malfunctions involving wing, droops, landing gear, and emergency power package.

To use the charts, first enter figure 11–18A to find the range or endurance index number for the applicable configuration. Then proceed to figure 11–18B for emergency range, or to figure 11–18C for emergency endurance. These charts provide notes which serve as a guide to the other charts which must be used to obtain the desired information.

Example

Solve two emergency range and endurance problems; one involving an airplane at sea level, the other involving an airplane at 20,000 feet. Figure 11–7A presents answers to the problems in tabular form.

Assume (for both problems)

Configuration — Wing up, landing droop extended, landing gear down, EPP extended, no stores
Fuel on board — 2,000 pounds
Fuel reserve desired — 600 pounds

Find (for both problems)

Emergency Range
- Range at initial altitude
- Optimum altitude
- Range at optimum altitude
- Fuel quantity at start of descent
- Distance covered in descent
- Time for descent
- MRT climb speed
- Cruise speed
- Descent speed

Emergency Endurance
- Endurance at initial altitude
- Optimum altitude
- Endurance at optimum altitude
- Fuel quantity at start of descent
- Distance covered in descent
- Time for descent
- MRT climb speed
- Loiter and descent speed

Emergency range — initial altitude sea level

1. From figure 11–18A, the range index number is 6.9.
2. From figure 11–18B, sheet 1, the range obtainable by remaining at sea level is 56 nautical miles.
3. Optimum altitude is found to be 22,500 feet from the OPTIMUM RANGE ALTITUDE chart in figure 11–18D.
4. If maximum range is required, it is necessary to climb to optimum altitude (22,500 feet). Maximum range obtainable at 22,500 feet is determined by reading up to the RANGE AT OPTIMUM ALTITUDE curve in figure 11–18B, sheet 1. The answer is 76 nautical miles. This range includes distance for MRT climb from sea level and idle thrust descent to sea level.
5. The descent is initiated when the fuel level reaches reserve (600 pounds) plus fuel used in the descent. By reading up to an interpolated 22,500-foot curve, fuel used in descent is found to be 75 pounds. Start descent when fuel remaining is 600 + 75 = 675 pounds.
6. Distance and time for descent are found by reading up to the other curves in figure 11–18H and are found to be 22 nautical miles, and 6 minutes, respectively.
7. MRT climb speed varies with altitude. From figure 11–18E, it is seen that it is necessary to decrease airspeed from 180 KCAS at sea level, to 162.5 KCAS at 22,500 feet.
8. Cruise speed from figure 11–18F is 198 KCAS at sea level and 177 KCAS at 22,500 feet.
9. Descent speed, from figure 11–18G, is a constant 154 KCAS.

Emergency range — initial altitude 20,000 feet

1. From figure 11–18A, the range index number is 6.9.
2. Range obtainable by remaining at 20,000 feet is the range at sea level (56 nautical miles) plus an incremental range of 50 nautical miles from the INCREMENTAL RANGE FOR CRUISE AT INITIAL ALTITUDE curve in figure 11–18B, sheet 2; or 106 nautical miles.

3. Optimum altitude is found to be 24,500 feet from the OPTIMUM RANGE ALTITUDE curve in figure 11–18D. Note that the fuel weight curve used is 2,500 pounds, vice 2,000 pounds, for the reason given in note 1 of the figure.
4. Range at optimum altitude is determined by taking the range at optimum altitude for an initial altitude of sea level from figure 11–18B (sheet 1), 76 nautical miles, and adding the INCREMENTAL RANGE FOR CRUISE AT OPTIMUM ALTITUDE from sheet 2, 32 nautical miles. The answer is 108 nautical miles.
5. The descent from optimum altitude is initiated when the fuel level reaches reserve (600 pounds) plus fuel used in the descent. By reading up to an interpolated 24,500-foot curve, fuel used in the descent is found to be 80 pounds. Start descent when fuel remaining is 600 + 80 = 680 pounds.
6. Distance and time for descent are found by reading up to the other curves in figure 11–18H, and are found to be 24 nautical miles, and 6.5 minutes respectively.
7. MRT climb speed varies with altitude between 163 KCAS at 20,000 feet to approximately 162 KCAS at 24,500 feet, from figure 11–18E.
8. Cruise speed, from figure 11–18F, is 180 KCAS at 20,000 feet, and approximately 175 KCAS at 24,500 feet.
9. Descent speed, from figure 11–18G, is a constant 154 KCAS.

Emergency endurance — initial altitude sea level

1. From figure 11–18A, the endurance index number is 5.3 and the range index number is 6.9 (the range index number is needed for obtaining descent information).
2. From the ENDURANCE AT SEA LEVEL curve in figure 11–18C, sheet 1, the sea level endurance is 20.5 minutes.
3. Optimum altitude is found to be 12,500 feet from the OPTIMUM ENDURANCE ALTITUDE curve in figure 11–18D.
4. If maximum endurance is required, it is necessary to climb to optimum altitude (12,500 feet). Maximum endurance obtainable at 12,500 feet is seen to be 22.5 minutes from the ENDURANCE AT OPTIMUM ALTITUDE curve of figure 11–18C, sheet 1.
5. The descent is initiated when the fuel level reaches reserve (600 pounds) plus fuel used in the descent. By reading up to an interpolated 12,500-foot curve, fuel used in the descent is found to be 50 pounds. Start descent when fuel remaining is 600 + 50 = 650 pounds. Note that the *range* index number is used when entering the descent curves, rather than the endurance index number.
6. Distance and time for the descent are found by reading up to the other curves in figure 11–18H, and are found to be 12 nautical miles, and 3.5 minutes, respectively.
7. MRT climb speed varies with altitude between 180 KCAS at sea level to approximately 167 KCAS at 12,500 feet, from figure 11–18E.
8. Loiter and descent speed, from figure 11–18G, is a constant 154 KCAS.

Emergency endurance — initial altitude 20,000 feet

1. From figure 11–18A, the endurance index number is 5.3 and the range index number is 6.9 (the range index number is needed for obtaining descent information).
2. Endurance obtainable by remaining at 20,000 feet is the endurance at sea level (20.5 minutes) plus an incremental endurance of 7.5 minutes from the INCREMENTAL ENDURANCE FOR LOITER AT INITIAL ALTITUDE curve in figure 11–18C, sheet 2; or, 28 minutes.
3. From figure 11–18D, it is seen that 14,000 feet is the computed optimum altitude. (Note that the 2,500-pound curve is used because of note 1.) However, because of note 3, initial altitude (20,000 feet) is maintained rather than descending to the lower computed optimum altitude.
4. The descent is initiated when the fuel level reaches reserve (600 pounds) plus fuel used in the descent. By reading up to the 20,000-foot curve, fuel used in the descent is found to be 70 pounds. Start descent when fuel remaining is 600 + 70 = 670 pounds. Note that the *range* index number is used when entering the descent curves, rather than the endurance index number.
5. Distance and time for descent are found by reading up to the other curves in figure 11–18H, and are found to be 20 nautical miles, and 5.5 minutes, respectively.
6. Loiter and descent speed, from figure 11–18G, is a constant 154 KCAS.

EMERGENCY RANGE AND ENDURANCE SAMPLE PROBLEMS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ENGINES: J57-P-20, -P-20A

NOTE

Refer to text for sample problem conditions

EMERGENCY RANGE

INITIAL ALTITUDE 1000 FT	FUEL ON BOARD LB	RANGE AT INITIAL ALT — NMI (FROM FIG. 11-18B)	OPT ALT 1000 FT (FROM FIG. 11-18D)	RANGE AT OPT ALT NMI (FROM FIG. 11-18B)	START DESCENT WHEN FUEL REACHES (FROM FIG. 11-18H)	DESCENT DISTANCE (FROM FIG. 11-18H)	TIME FOR DESCENT (FROM FIG. 11-18H)
SEA LEVEL	2,000	56.0 (FROM SHEET 1)	22.5	76.0 (FROM SHEET 1)	675	22	6
20	2,000	106.0 (FROM SHEET 2)	24.5	108.0 (FROM SHEET 2)	680	24	6.5

SPEEDS

ALTITUDE 1000 FT	MRT CLIMB — KCAS (FROM FIG. 11-18E)	CRUISE — KCAS (FROM FIG. 11-18F)	DESCENT — KCAS (FROM FIG. 11-18G)
SEA LEVEL	180	198	154
10	168	192	154
20	163	180	154
25	162	170	154

EMERGENCY ENDURANCE

INITIAL ALTITUDE 1000 FT	FUEL ON BOARD LB	ENDURANCE AT INITIAL ALT — MIN (FROM FIG. 11-18C)	OPT ALT 1000 FT (FROM FIG. 11-18D)	ENDURANCE AT OPT ALT — MIN (FROM FIG. 11-18C)	START DESCENT WHEN FUEL REACHES (FROM FIG. 11-18H)	DESCENT DISTANCE (FROM FIG. 11-18H)	TIME FOR DESCENT (FROM FIG. 11-18H)
SEA LEVEL	2,000	20.5 (FROM SHEET 1)	12.5	22.5	650	12	3.5
20	2,000	28.0 (FROM SHEET 2)	20.0	—	670	20	5.5

SPEEDS

ALTITUDE 1000 FT	MRT CLIMB — KCAS (FROM FIG. 11-18E)	LOITER AND DESCENT — KCAS (FROM FIG. 11-18G)
SEA LEVEL	180	154
10	168	154
20	163	154

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Figure 11-7A

COMBAT ALLOWANCE DATA

The combat allowance charts present the fuel consumption and time for combat at various altitudes and Mach numbers for either full military thrust or maximum thrust. Generally, it is necessary to use estimates of the average Mach number and average altitude expected for a planned mission. The greatest variation in fuel consumption occurs with changes in altitudes, but a significant variation also is encountered with wide differences in speed for a given thrust setting.

For example, assume an altitude of 55,000 feet at a maximum thrust Mach number of 1.3 with 1,500 pounds of fuel available for combat. Enter the chart for maximum thrust (figure 11–13) at Mach 1.3 on the MACH NUMBER scale and project horizontally to the 55,000-foot altitude curve. At this intersection project downward to the 1,500-pound available-fuel curve, then horizontally to the left to the MINUTES scale to obtain a combat time of approximately 9 minutes. To obtain fuel required for a desired Mach 1.0 combat time of 13 minutes at 55,000 feet, enter the chart at the assumed Mach number of 1.0 and project horizontally to the assumed altitude curve of 55,000 feet, then project downward. Enter the chart again at the assumed combat time desired, 13 minutes, and project horizontally until the two lines intersect each other. Interpolate between the fuel curves to obtain fuel required, 1,675 pounds.

DESCENT DATA

The descent data charts (figure 11–14) permit determination of fuel, distance, time, airspeed, and rate-of-descent information for descents initiated at any altitude. Information is presented for a maximum range descent employing a varying speed schedule and for a descent at constant calibrated airspeed. For example, assume that it is desired to find time and fuel required and distance covered in a constant-speed descent to sea level from 35,000 feet for Configuration III. Enter the sample descent chart at the PRESSURE ALTITUDE scale and read the chart as shown to obtain

Time required	10 minutes
Fuel used in descent	150 pounds
Distance covered in descent	55 nautical miles
Airspeed during descent (constant)	240 knots CAS
Rate of descent (constant)	3,600 feet per minute

DESCENT DATA INTERPOLATION

To determine descent information for configurations between III and XI, it is necessary to interpolate between the given data. This is done by algebraically subtracting a percentage of the *difference* between the two points. The percentages to be used are determined from the engineering data not shown on descent curves. They are as follows:

Configuration	Percentage of the difference to be subtracted from Configuration III
IV	15%
V	26%
VI	40%
VII	53%
VIII	66%
IX	77%
X	90%

Example

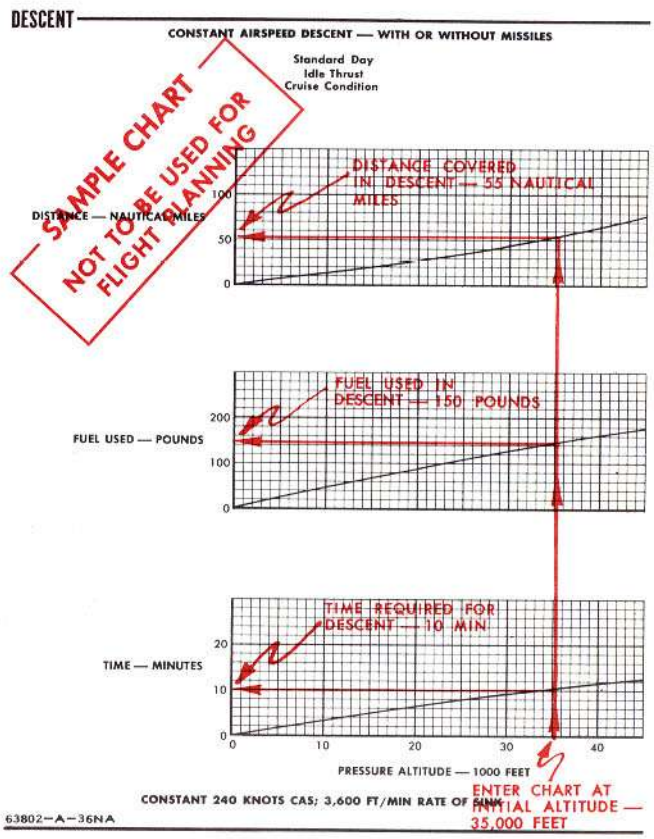
Determine maximum range descent at idle thrust for F-8E attack aircraft with stores which place it in configuration V.

Assume

Idle thrust
Altitude — 35,000 feet
Configuration V

Find

Distance — NM
Fuel used
Time in minutes
Rate of descent
Descent airspeed



The interpolation is made using the descent chart for configurations III and XI (figure 11–14, sheet 1).

1. To find the distance covered in descending from 35,000 feet with configurations III and XI use DISTANCE — NAUTICAL MILES chart . . . 70 and 33 nautical miles, respectively. Next find the fuel used in pounds from the FUEL USED — POUNDS chart . . . 180 lb for configuration III, and 90 lb for configuration XI. The TIME — MINUTES chart will give the descent time for configurations III and XI . . . 13.7 minutes and 7 minutes, respectively. Rate of descent is found in the RATE OF DESCENT chart . . . 3,700 feet per minute for configuration III and 6,800 feet per minute for configuration XI. Find calibrated airspeed for configurations III and XI in the CAS KNOTS chart . . . 246 knots and 254 knots, respectively.

   For configuration V to determine distance covered in descent:

Configuration III distance covered in descent	70 nautical miles
Configuration XI distance covered in descent	33 nautical miles
Difference	+37 nautical miles

   Determine 26% of the difference (+37 x 0.26) . . . 9.6 (Use 10 nautical miles).

   Algebraically subtract percentage of the difference from the distance covered in descent for configuration III (70–10) . . . 60 nautical miles covered in descent for configuration V.

2. For configuration V to determine fuel used:

Configuration III fuel used in descent	180 pounds
Configuration XI fuel used in descent	90 pounds
Difference	+90 pounds

   Determine 26% of the difference (+90 x 0.26) . . . 23.4 (Use 23 pounds).

   Algebraically subtract percentage of the difference from the fuel used in descent for configuration III (180 lb–23 lb) . . . 157 pounds fuel used during descent for configuration V.

   For configuration V to determine time of descent in minutes:

Configuration III time of descent	13.7 minutes
Configuration XI time of descent	7 minutes
Difference	+6.7 minutes
Determine 26% of the difference (+6.7 x 0.26)	1.70 minutes

   Algebraically subtract percentage of the difference from the time of descent for configuration III (13.7 minutes, –1.70 minutes . . . 12.0 minutes, time of descent for configuration V.

   For configuration V to determine rate of descent:

Configuration III rate of descent	3,700 feet per minute
Configuration XI rate of descent	6,800 feet per minute
Difference	–3,100 feet per minute
Determine 26% of the difference (–3,100 x 0.26)	–806 feet per minute

   Algebraically subtract percentage of the difference from the rate of descent for configuration III (3,700 feet per minute +806 feet per minute) . . . 4,506 feet per minute rate of descent for configuration V.

   For configuration V to determine calibrated airspeed during descent:

Configuration III calibrated airspeed	246 knots CAS
Configuration XI calibrated airspeed	254 knots CAS
Difference	–8 knots CAS

   Determine 26% of the difference (–8 x 0.26) . . . –2.1 knots (Use –2 knots).

   Algebraically subtract percentage of the difference from the calibrated airspeed for configuration III (246 knots CAS +2 knots CAS) . . . 248 knots calibrated airspeed during descent for configuration V.

LANDING DATA

The landing data charts (figures 11–15 and 11–16) provide for the determination of recommended approach speed, initial stall warning speed, touchdown speed, maximum speed for brake application, and ground roll distance when landing gross weight, field pressure altitude, runway air temperature and runway wind are known. Distances derived from the ground roll distance chart are dependent upon the touchdown and brake application speeds shown on the charts. Initial stall warning speed is shown on the chart to illustrate the margin of safety that is considered in the recommended touchdown and approach speeds. Under some operating conditions, fuselage attitudes at which tail scrape occurs will be encountered before initial stall warning speed is reached. However, at the recommended touchdown speeds there is no danger of tail scraping.

Example

Assume

Runway air temperature — 95°F (35°C)

Field pressure altitude — 3,000 feet

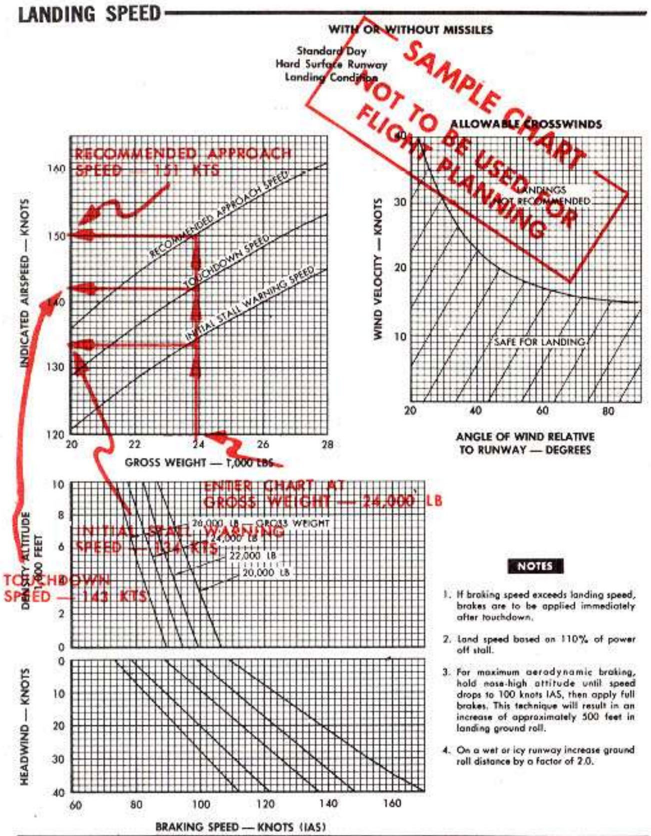
Landing gross weight — 24,000 pounds

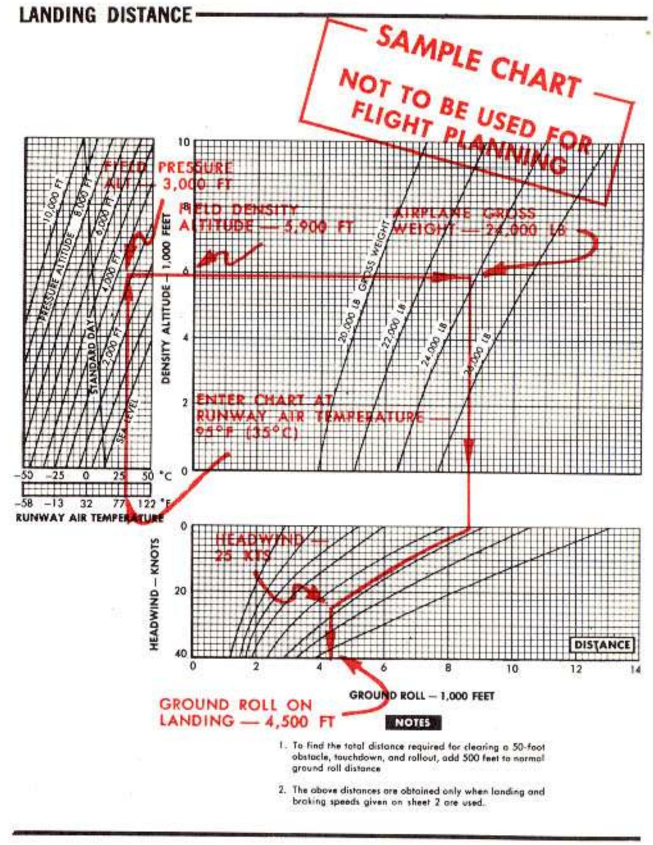
Runway headwind — 25 knots

Find

Landing ground roll distance

Landing speed, recommended approach speed, initial stall warning speed





Recommended braking speed

1. To find the landing ground roll distance, enter the sample landing distance chart at the RUNWAY AIR TEMPERATURE scale and read the chart as shown to obtain

   Landing roll of........4,500 feet
   Field density altitude........5,900 feet

   If the landing is made over a 50-foot obstacle or on other than a hard-surfaced runway, the landing distance read from the chart must be modified by applying the factors shown in the notes on the chart.

2. To find the touchdown speed, enter the sample speed chart at the landing gross weight and read as shown to obtain

   Recommended approach speed........151 knots
   Initial stall warning speed........134 knots
   Touchdown speed........143 knots

3. To find the recommended braking speed, enter the chart for maximum speed for brake application at the FIELD DENSITY ALTITUDE scale and read as in the sample problem to obtain speed ....112 knots

SPECIFIC RANGE DATA

Nautical Miles Per 1,000 Pounds Fuel

These specific range charts give the nautical miles obtained per 1,000 pounds of fuel (specific range) and the fuel consumption rate for various altitudes, airspeeds, and gross weights for each configuration.

Using configuration I, for example, assume an average cruise weight (initial cruise gross weight minus one-half of cruise fuel) of 26,000 pounds, cruise fuel of 4,000 pounds, and an altitude of 35,000 feet. To obtain optimum range, enter the 35,000-foot chart for this configuration (figure 11–27, sheet 4) at the intersection of the MAXIMUM RANGE SPEED curve and the 26,000-pound gross weight curve. From this intersection, projecting horizontally to the left gives approximately 196 nautical miles per 1,000 pounds of fuel. Multiplying 196 by 4 (4,000 pounds of cruise fuel) gives a cruise range of 784 nautical miles. Projecting downward from the intersection of the MAXIMUM RANGE SPEED and gross weight curves to the airspeed scales gives approximately 0.87 true Mach number, 500 knots TAS, and 298 knots CAS.

To find the rate of fuel consumption, interpolate between the consumption rate lines to obtain approximately 2,550 pounds per hour.

Specific range, airspeeds, and rate of fuel flow for maximum endurance are obtained in a similar manner and are as follows for the case given here (reading from the intersection of the MAXIMUM ENDURANCE curve and the 26,000-pound gross weight curve): specific range of 178 nautical miles per 1,000 pounds of fuel, endurance range of (178 × 4) 712 nautical miles, true Mach number of 0.73, TAS of 422 knots, CAS of 250 knots, a fuel consumption of 2,400 pounds per hour.

REST COMPUTER

DESCRIPTION

The Universal REST (U-REST) Computer, a cruise control computer, is available for use with these aircraft. The computer is a take-apart, three-disc, hand-held device, which computes level flight Range, Endurance, Speed, and Time (REST) on the front face and tabulates climb, descent, and emergency range and endurance on the back face. The insert disc (middle disc) of the computer is the only disc which contains data specifically for the F-8. The insert disc is removable and can be replaced or exchanged for insert discs of other loadings or configurations. The top and bottom discs of the computer form the housing for the insert disc and are applicable to any turbojet (type TWD-4 housing) airplane.

The Naval Air Test Center (NATC) delivers the insert discs to training and operational commands approximately one month from the time data curves are available at NATC. Insert discs are revised if a significant data change (±5%) is realized. Insert discs are identified by an insert disc number which includes the airplane designation, capital letters denoting airplane loadings, and the date of the computer. The capital letters denoting airplane loadings may refer to a certain range of airplane gross weights as well as external loading and configuration. Once a particular letter has been used for a specific airplane loading or configuration on an insert disc, the letter is not used for different loadings on subsequent discs for the same airplane. Numerical subscripts to the loading code letters show the number of times the data for that particular loading have been revised. Supersonic cruise data are treated as a separate loading.

Instructions for U-REST Computer operation and additional specific information on computer data are included in the U-REST packet when insert discs accompany the U-REST housings. Instructions are issued for the first insert disc for each new airplane. New instructions are issued if that first insert disc is revised. Therefore, for any given airplane there is only one set of applicable instructions and sample problems.

REQUISITION

The initial distribution of insert discs is 120% of the number of airplanes in an activity. The latest issue of the confidential OPNAV "Allowances and Location of Navy Aircraft" is used to determine the number of airplanes in each activity. The insert discs are automatically mailed to the squadrons having custody of the aircraft. Squadrons receiving aircraft later may obtain computers by memorandum request addressed to the Commander, Naval Air Test Center (FT2125), Patuxent River, Maryland. Computers should be ordered by insert disc numbers given in the following list. U-REST housings are forwarded, one each, with the first insert discs sent to an addressee. Subsequent orders are filled with only the specific insert discs unless extra housings are specifically requested. To prevent depleting the small stock of insert discs, squadrons should request only the number of discs needed. Note that NATC is the only source of supply of U-REST Computers; Naval Supply Centers and other facilities will stock none.

The following list includes all insert discs presently available for the F-8D and F-8E aircraft. Insert disc revision dates and numerical subscripts are not included to avoid the necessity of constantly updating this list. When ordering, it will be sufficient to request the latest revision to the desired insert disc number.

Airplane	*Insert Disc. No.*	*Airplane Loading or Configuration*	*Security Classification*
F-8D	F-8D, AB	TRAINING MISSION A = 2 Sidewinders (2 single pylons) Going Out B = Same as loading A Return	Confidential
F-8D	F-8D, CD	C = 2 dual pylons + 4 Sidewinders + 4 LAU-7A launchers Going Out D = 2 dual pylons + 4 LAU-7A launchers Return	Confidential
F-8D	F-8D, EF	FERRY MISSION E = 2 dual pylons + 4 LAU-7A launchers F = 2 single pylons + 2 LAU-7A launchers	Confidential
F-8E	F-8E, AB	FERRY MISSION A = 2 wing pylons + 2 MBR B =2 wing pylons	Confidential
F-8E	F-8E, CD	C = 2 2,000-lb bombs Going Out D = 2 wing pylons Return	Confidential
F-8E	F-8E, EF	TRAINING MISSION E = 4 Zuni packs 2 MK 83 Going Out F = 4 Zuni packs 2 wing pylons Return	Confidential
F-8E	F-8E, GF	TRAINING MISSION G = 4 Zuni packs 2 unfaired Zuni pods Going Out F = 4 Zuni packs 2 wing pylons Return	Confidential
F-8E	F-8E, HI	TRAINING MISSION H = 12 250-lb bombs Going Out I = 2 wing pylons 2 MBR Return	Confidential
F-8E	F-8E, JF	TRAINING MISSION J = 2 Bullpups 4 fuselage Zuni packs Going Out F = 2 wing pylons 4 fuselage Zuni packs Return	Confidential
F-8E	F-8E, KL	TRAINING MISSION K = 4 Zuni packs 12 MK 81 Going Out L =4 Zuni packs 2 MBR	Confidential

MISSION PLANNING

Performance characteristics of the aircraft permit operation over a wide range of speeds and altitudes at considerable distances from the point of origin. The high rates of fuel consumption encountered in various phases of operation make mission planning a necessity. When actual flight performance is checked against a mission plan in terms of fuel used, the pilot will be constantly informed of deviations which can be charged against the fuel reserve expected at destination. Early detection of excessive depletion of reserve fuel will permit diversion to alternate bases with safe fuel states.

Best use of the operating data charts in this appendix depends upon the type of mission to be flown. Basically, there are two procedures. Missions involving frequent changes of heading to fly on cruise legs over various checkpoints require leg-to-leg tabulation of performance considering changes in wind components. This type of mission is planned using the detailed performance charts as shown by sample mission plan No. 1. When temperatures and wind effects are small enough to be disregarded, values for each cruise leg may be read from the mission profile chart.

In planning missions flown for long distances under constant wind conditions or in rapid planning of combat missions, the flight profile charts may be employed to advantage. Sample mission plan No. 2 exemplifies the use of the mission, optimum endurance, and optimum return profiles to plan a typical simulated combat mission. Sample mission plan No. 3 describes use of the combat radius profile to plan a typical carrier-based airstrike.

SAMPLE MISSION PLAN NO. 1

This sample mission plan illustrates use of the performance data charts in planning a complex tactical flight in which several cruise legs are flown on different headings and in which combat is conducted both at altitude and at sea level. For each phase of operation shown in the sample, reference is made to the charts from which the data has been determined. Work through the sample by reading each chart for the values shown.

Assume

An F-8E aircraft equipped with a J57-P-20A engine, gross weight 18,980 pounds (less fuel, ammunition, pylons and stores).

A standard day and 20 knots headwind at time of takeoff on a hard surfaced runway.

The aircraft has a fuel load of 9,167 pounds of JP-5 fuel and a total expendable armament (500 rounds of 20 mm ammunition and 2 external Sidewinder missiles) weight of 971 pounds, accounting for the aircraft takeoff gross weight of 29,118 pounds. Use charts for Configuration II.

Fuel reserve of 1,000 pounds at landing.

Takeoff at MAXIMUM thrust and an assumed weight of 28,868 pounds (29,118 less 250 pounds for taxiing).

Climb to 40,000 feet at MILITARY thrust and cruise at recommended airspeed to an area 250 nautical miles from base.

Descend to 35,000 feet and loiter on station at best endurance airspeed until contact with enemy aircraft is achieved. (Assume total loiter time amounts to 15 minutes.)

Combat at MAXIMUM thrust at 1.30 MN for 3 minutes and at MILITARY thrust at 0.93 MN for 7 minutes at an average altitude of 35,000 feet. Expend both Sidewinder missiles and a small portion of 20 mm ammunition.

Desend to sea level for targets of opportunity (Configuration I charts). Assume the possibility of penetrating an additional 100 nautical miles into enemy territory (350 nautical miles from base). Expend remaining portion of 20 mm ammunition.

Climb to 40,000 feet at MILITARY thrust and cruise back at recommended airspeed and, when within range, make a maximum range descent at IDLE thrust.

Note

Based on meteorological estimates, the following relative winds are predicted to be encountered:

At sea level over enemy territory — 40 knots at 60°

On course, sea level to 40,000 feet — No wind

On course, above 40,000 feet — 60 knots from 150°

TAKEOFF (Figure 11–8, Sheet 2, and Figure 11–9)

Fuel available (less reserve and taxiing)	7,917 pounds
Takeoff weight	28,868 pounds
Field elevation	Sea level
Runway air temperature	59°F
Headwind	20 knots
Throttle setting	MAXIMUM
Lift-off speed, IAS	151 knots
Ground roll distance	2,000 feet
Total distance to clear 50-foot obstacle	3,000 feet
Fuel used for takeoff and acceleration to climb speed (figure 11–29, sheet 2)	500 pounds
Time for takeoff and acceleration	1.0 minutes
Fuel remaining (less reserve)	7,417 pounds

CLIMB — With Two Sidewinders (Figure 11–29, Sheet 1)

Fuel available (less reserve)	7,417 pounds
Weight (at start of climb)	28,368 pounds
Throttle setting	MILITARY
Climb speed	(See climb speed table*)
Distance covered during climb	86 naut mi
Time to climb (sea level to 40,000 feet)	10.8 minutes
Fuel used for climb	1,008 pounds
Fuel remaining (less reserve)	6,220 pounds

CRUISE OUT — With Two Sidewinders (Figure 11–36, Sheet 5)

Fuel available (less reserve)	6,409 pounds
Cruise weight (at start of cruise)	27,360 pounds
Cruise altitude	40,000 feet
Throttle setting (recommended airspeed)	As required
Mach number	0.87
Cruise droop	Extended
Cruise speed (CAS*)	268 knots
TAS	500 knots
Specific range	184 naut mi/1,000 pounds fuel
Distance to cruise (250 less 86 less 11; refer to CLIMB and DESCENT)	153 naut mi
Time to cruise (distance/TAS)	18.4 minutes
Fuel used for cruise out	830 pounds
Fuel remaining (less reserve)	5,579 pounds

DESCENT — Constant Speed (Figure 11–14, Sheet 2)

Fuel available (less reserve)	5,579 pounds
Throttle setting	IDLE
Descent speed (CAS*)	240 knots
Time to descend (40,000 to 35,000 feet)	1.4 minutes
Rate of descent (average)	3,600 fpm
Fuel used for descent	18 pounds
Distance covered during descent	11 naut mi
Fuel remaining (less reserve)	5,561 pounds

LOITER — With Two Sidewinders (Figure 11–33)

Fuel available (less reserve)	5,561 pounds
Weight (at start of loiter)	26,512 pounds
Total fuel on board	6,561 pounds
Loiter time	15.0 minutes
Throttle setting (best loiter speed)	As required
Altitude	35,000 feet
Loiter speed (CAS*)	235 knots
Fuel used during loiter	710 pounds
Fuel remaining (less reserve)	4,851 pounds
Net distance covered during loiter.	0 miles

COMBAT — (Figures 11–12 and 11–13)

Fuel available (less reserve)	4,851 pounds
Weight (at start of combat)	25,802 pounds
Combat altitude (average)	35,000 feet
Time	10.0 minutes
Fuel used for 3 minutes (MAXIMUM thrust)	1,250 pounds
Fuel used for 7 minutes (MILITARY thrust)	530 pounds
Both Sidewinder missiles (410 pounds) and part ammunition (33 pounds) expended	443 pounds
Fuel remaining (less reserve)	3,071 pounds

DESCENT — Constant Speed (Figure 11–14, Sheet 2)

Fuel available (less reserve)	3,071 pounds
Throttle setting	IDLE
Descent speed (CAS*)	240 knots
Time to descend (35,000 feet to sea level)	10 minutes
Rate of descent (average)	3,600 fpm
Fuel used for descent	150 pounds
Distance covered during descent	55 naut mi
Fuel remaining (less reserve)	2,921 pounds

CRUISE — With Two Single Pylons and Launchers (Figures 11–27, Sheet 1, and 11–6)

Fuel available (less reserve)	2,921 pounds
Cruise weight (at start of cruise)	23,429 pounds
Cruise altitude	Sea level
Throttle setting (recommended airspeed)	As required
Mach number	0.51
Cruise droop	Retracted
Wind conditions	40 knots from 60°
Cruise speed (CAS*)	340 knots
TAS	340 knots
Specific range	93 naut mi/1,000 pounds fuel
Distance to cruise (100 less 55)	45 naut mi
Range factor	0.937
Factor distance (45/0.939)	48 naut mi
Time to cruise (factor distance/TAS)	8.5 minutes
Fuel used for cruise	516 pounds
Remainder of 20mm ammunition expended	130 pounds
Fuel remaining (less reserve)	2,405 pounds

CLIMB — With Two Single Pylons and Launchers (Figure 11–20, Sheet 1)

Fuel available (less reserve)	2,405 pounds
Weight (at start of climb)	22,783 pounds
Throttle setting	MILITARY
Climb speed	(See climb speed table*)
Distance covered during climb	52 naut mi
Time to climb (sea level to 40,000 feet)	6.3 minutes
Fuel used for climb	623 pounds
Fuel remaining (less reserve)	1,782 pounds

*Convert CAS to IAS by using "Position Error Correction" (figure 11–2).

CRUISE BACK — With Two Single Pylons and Launchers (Figure 11–27, Sheet 5)

Fuel available (less reserve)	1,782 pounds
Cruise weight (at start of cruise)	22,160 pounds
Cruise altitude	40,000 feet
Throttle setting (recommended)	As required
Mach number	0.87
Cruise droop	Extended
Cruise speed (CAS*)	267 knots
TAS	500 knots
Specific range	.235 naut mi/1,000 pounds fuel
Distance to cruise (350 less 52 less 79; refer to CLIMB and DESCENT)	219 naut mi
Time to cruise (distance/TAS)	26.3 minutes
Fuel used to cruise back	932 pounds
Fuel remaining (less reserve)	850 pounds

DESCENT — Maximum Range (Figure 11–14, Sheet 1)

Fuel available (less reserve)	850 pounds
Throttle setting	IDLE
Average descent speed (CAS*)	242 knots
Time to descend (40,000 feet to sea level)	14 minutes
Rate of descent (average)	2,875 fpm
Fuel used for descent	195 pounds
Distance covered during descent	79 naut mi
Fuel remaining (less reserve)	655 pounds

LANDING — (Figures 11–15 and 11–16)

Fuel available (with reserve)	1,655 pounds
Landing weight	21,033 pounds
Field elevation	Sea level
Wind	20 knots
Runway air temperature	59°F
Touchdown speed, IAS	129 knots
Braking speed, IAS	128 knots
Rollout distance	2,500 feet
Total distance to clear 50-foot obstacle	3,000 feet

SAMPLE MISSION PLAN NO. 2

This sample mission plan illustrates the way in which several of the flight profile charts may be used in sequence to form a flight plan for a typical tactical training mission. Since the treatment of temperature and wind effects has been described in the examples for individual profile charts, these effects are not included in this sample.

Assume

Configuration II (with two Sidewinder missiles).

Military thrust takeoff and climb to cruise-climb altitude; cruise to a point 250 nautical miles from base.

Constant speed on-course descent from cruise-climb altitude to 20,000 feet.

Simulated combat at military thrust, average speed Mach 0.9, at 20,000 feet for 10 minutes.

Loiter at optimum altitude for 30 minutes.

Return to base at optimum altitude.

1. Enter the mission profile (figure 11–31) at the desired range (250 nautical miles) and the cruise-climb path line and read the following values:

Recommended cruise speed	Mach 0.86
Time aloft	32 minutes
Fuel used	2,400 pounds
Fuel remaining (9,167 – 2,400)	6,767 pounds

2. From the constant-speed descent chart (sheet 2, figure 11–14), determine the performance in a descent from cruise-climb altitude (approximately 39,000 feet) to 20,000 feet.

Time to descend	5 minutes
Distance traveled in descent	34 naut mi
Fuel used	70 pounds
Fuel remaining (6,767 – 70)	6,697 pounds

3. From the combat allowance chart (figure 11–12), find the fuel required for the simulated combat portion of the mission.

Fuel used	1,150 pounds
Fuel remaining (6,697 –1,150)	5,547 pounds

4. Enter the optimum endurance profile (figure 11–34) at the altitude at which simulated combat is performed and find the optimum performance for prescribed loiter (5,547 pounds fuel remaining) as follows:

Optimum altitude	27,000 feet
Recommended loiter speed	230 knots, CAS
Time for climb and loiter (30 + 1)	31 minutes
Fuel remaining after loiter	4,290 pounds

5. From the optimum return profile chart (figure 11–32), determine return cruise performance for the initial altitude of 27,000 feet and 4,290 pounds fuel remaining.

Distance to travel (cruise out and descent) (250 + 34)	284 naut mi
Distance available in flight to zero fuel remaining	920 naut mi
Time available for climb and cruise to zero fuel remaining	1 hour, 51 minutes
Initial cruise-climb altitude	41,500 feet
Fuel remaining over base	2,800 pounds
Time remaining upon return over base	1 hour, 15 minutes
Time for cruise-back (1 hour, 51 minutes – 1 hour 15 minutes)	36 minutes
Altitude upon return over base	42,750 feet

*Convert CAS to IAS by using "Position Error Correction" (figure 11–2).

ALL CONFIGURATIONS

TAKEOFF, COMBAT ALLOWANCE, DESCENT, LANDING RANGE DECISION AND ENDURANCE DECISION DATA CHARTS

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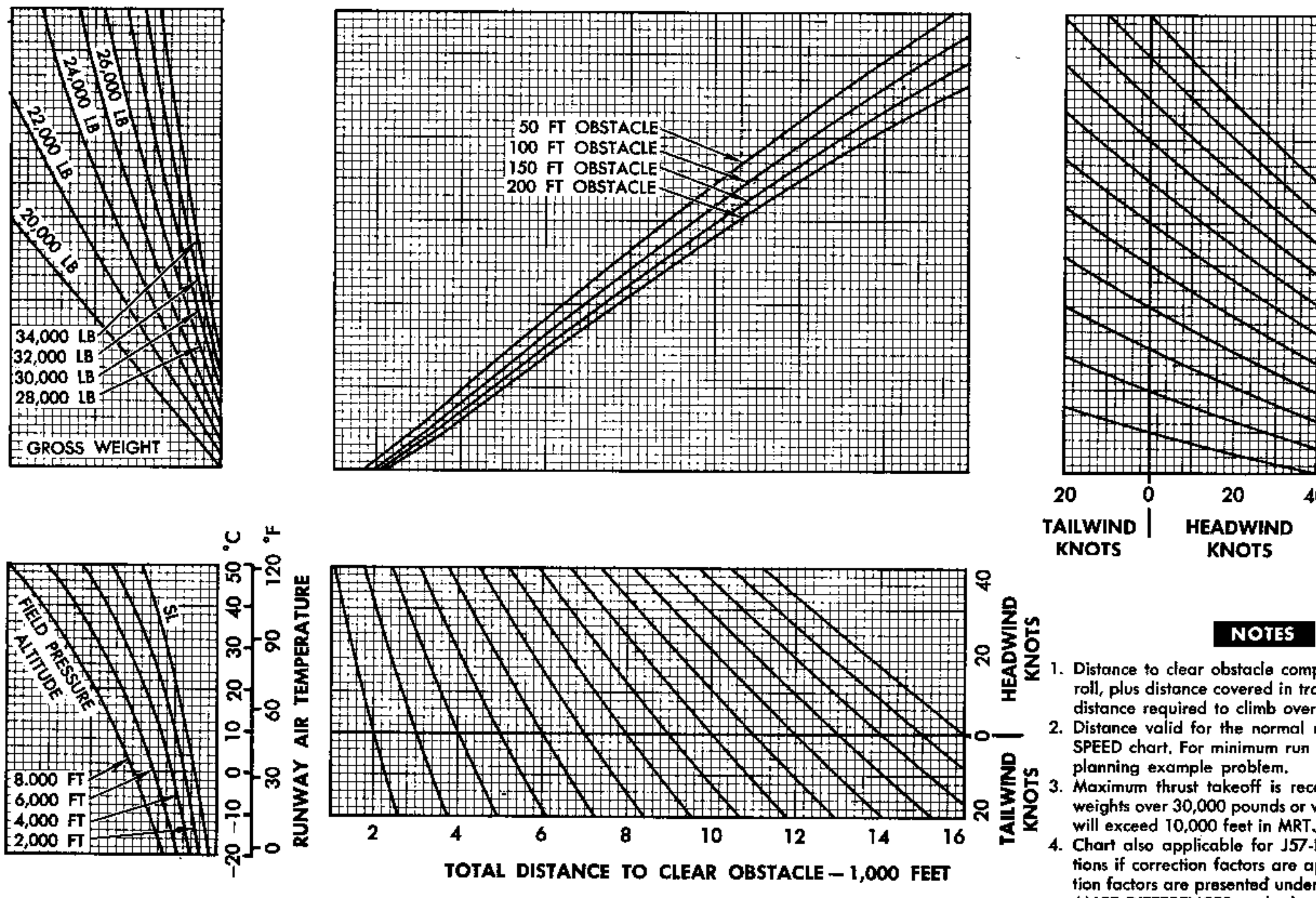
Emergency Range and Endurance Loiter and Descent Speeds 96L
Emergency Range and Endurance Descent 96M

TAKEOFF DISTANCE

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

MILITARY THRUST — ALL CONFIGURATIONS
Hard Surface Runway
Landing Condition

ENGINE: J57-P-20A (SEE NOTE 4)



NOTES

1. Distance to clear obstacle comprises normal ground roll, plus distance covered in transition to climb, plus distance required to climb over height of obstacle.
2. Distance valid for the normal run on the TAKEOFF SPEED chart. For minimum run distance, see takeoff planning example problem.
3. Maximum thrust takeoff is recommended for gross weights over 30,000 pounds or when takeoff distance will exceed 10,000 feet in MRT.
4. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-80NA

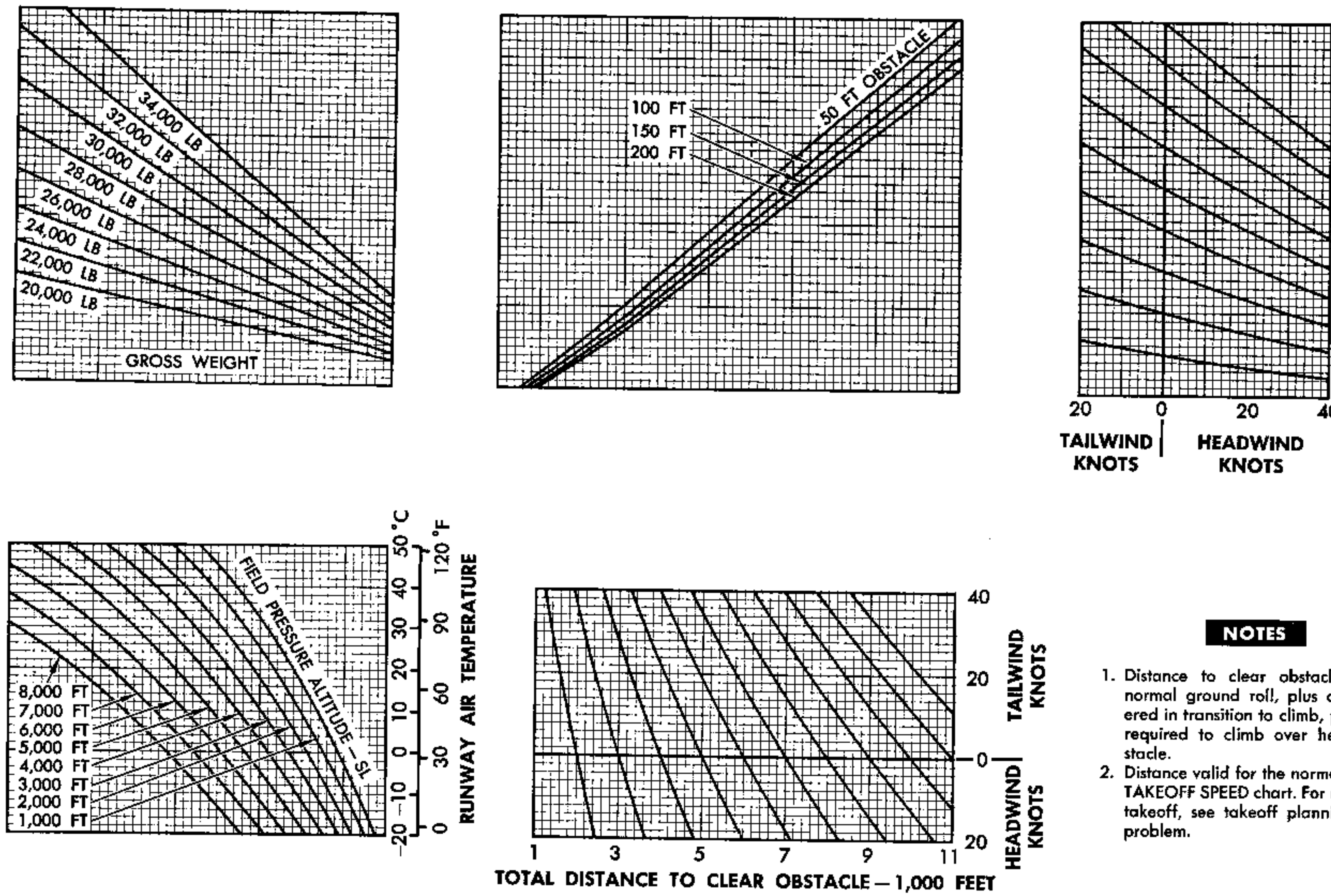
Figure 11–8 (Sheet 1)

TAKEOFF DISTANCE

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

MAXIMUM THRUST — ALL CONFIGURATIONS
Hard Surface Runway
Landing Condition

ENGINE: J57-P-20, -P-20A



NOTES

1. Distance to clear obstacle comprises normal ground roll, plus distance covered in transition to climb, plus distance required to climb over height of obstacle.
2. Distance valid for the normal run on the TAKEOFF SPEED chart. For minimum run takeoff, see takeoff planning example problem.

63802—A—81NA

Figure 11–8 (Sheet 2)

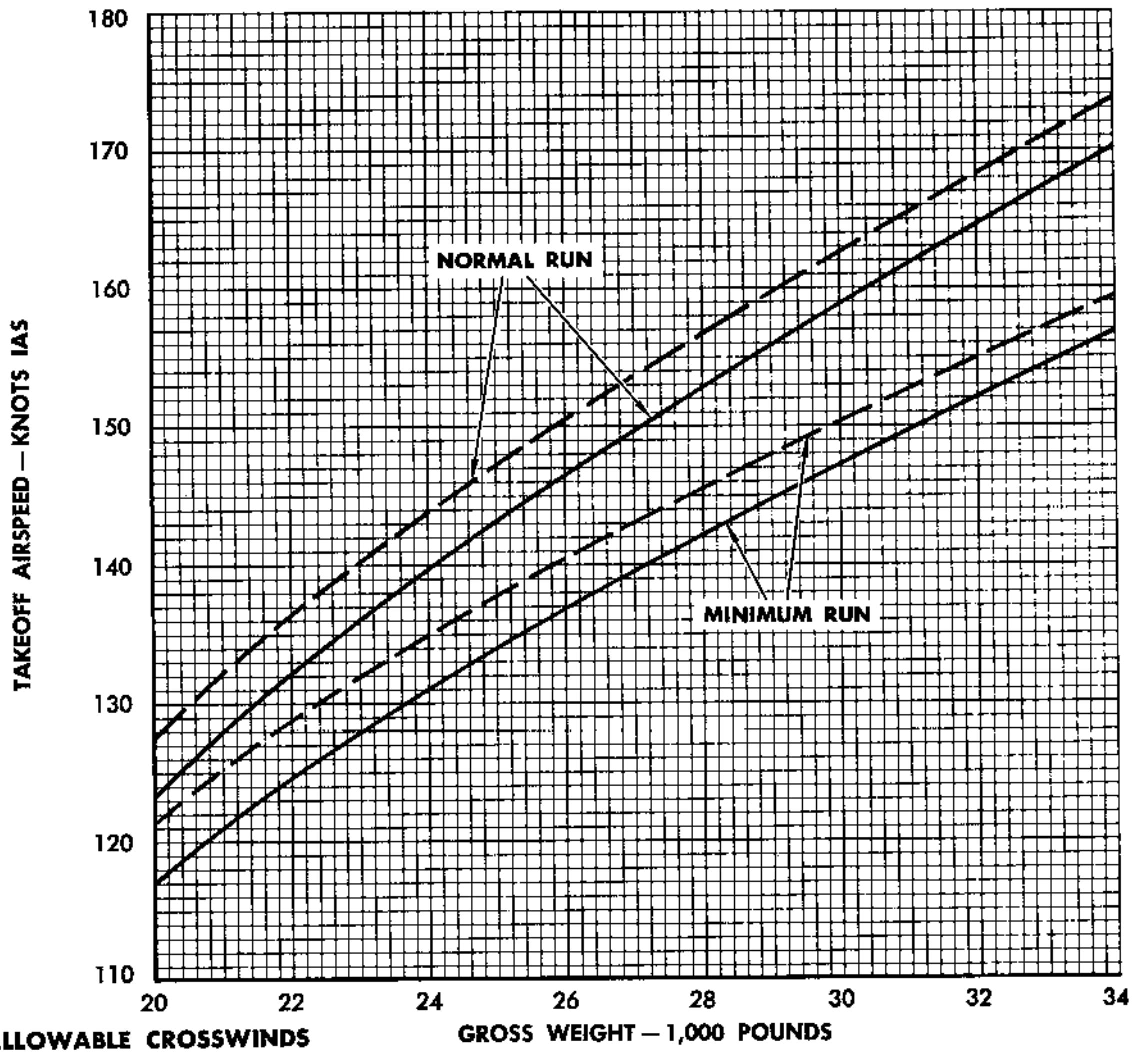
TAKEOFF SPEED

ALL CONFIGURATIONS

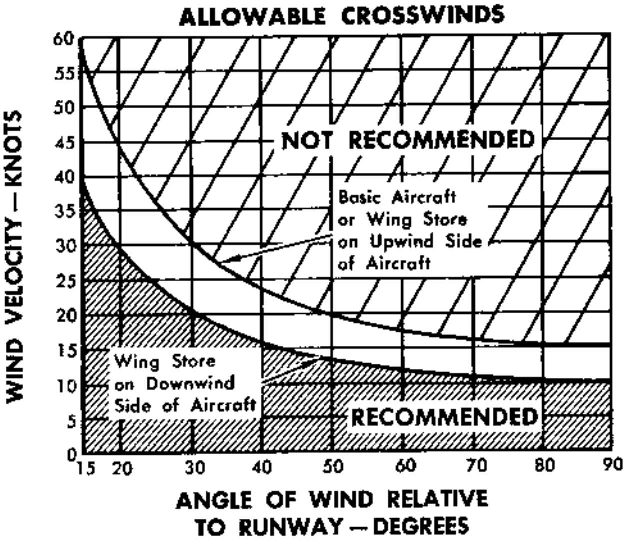
MODEL: F-8D, -8E (See Note 5)
DATA BASIS: Estimates
DATE: February 1964

Sea Level — Standard Day
Landing Condition

ENGINES: J57-P-20, -P-20A



ALLOWABLE CROSSWINDS



NOTES

1. For non-standard conditions, increase takeoff speed 0.6 knot per 1,000 feet field pressure altitude and 0.1 knot per 1.0°C above sea level standard day temperature (15°C).
2. Takeoff speed is defined as speed at breakground.
3. Nose wheel should be raised at airspeed 10 knots below applicable takeoff speed.
4. For minimum run takeoff, increase takeoff speed 3.0 knots for each 1.0% forward of 20% M.A.C. location of C.G.
5. For F-8E, decrease takeoff speed 4.0 knots IAS to correct for airspeed position error difference.

LEGEND

———— **MAXIMUM THRUST**
– – – – **MILITARY THRUST**

63802-A-14NA

Figure 11-9

MAXIMUM REFUSAL SPEEDS

ALL CONFIGURATIONS

ENGINE: J57-P-20A (SEE NOTE 3)

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

Hard Surface Runway
Landing Condition

NOTES

1. For wet or icy runway, use normal refusal speed minus Refusal Speed from chart.
2. Use refusal speed or corrected refusal speed in Velocity During Takeoff Ground Run chart to find refusal distance.
3. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

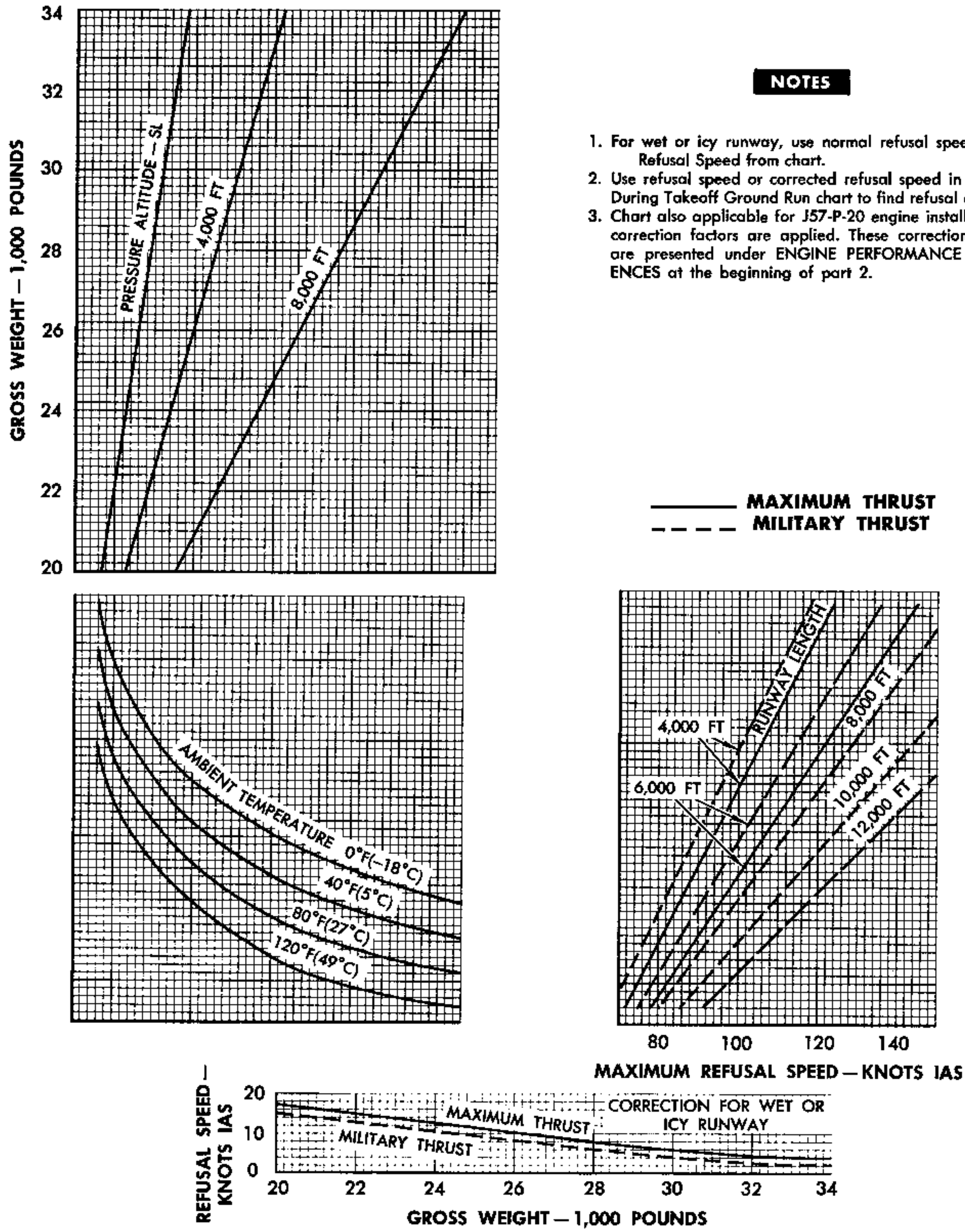


Figure 11–10

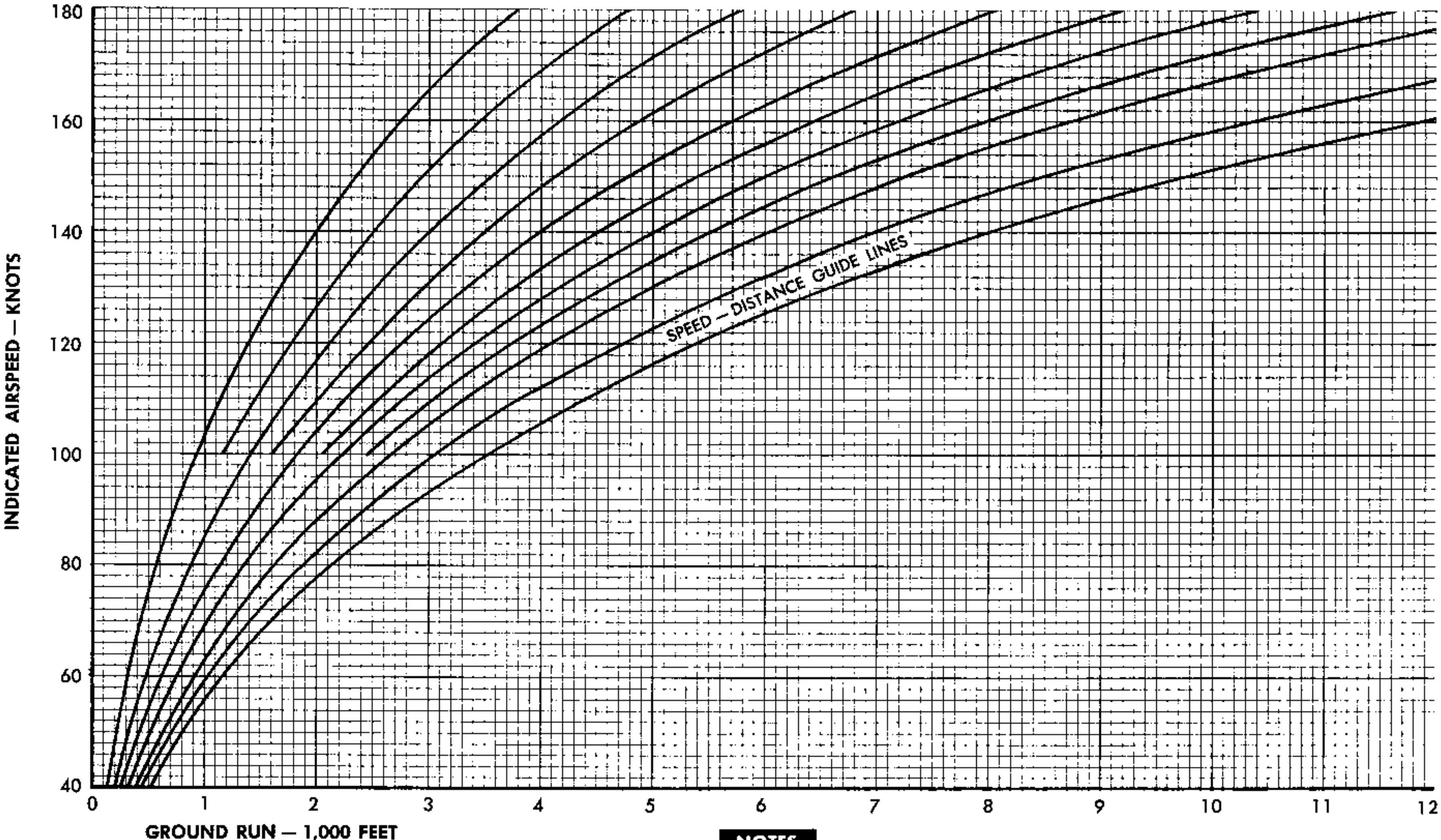
VELOCITY DURING TAKEOFF GROUND RUN

MILITARY THRUST — ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

Hard Surface Runway
Landing Condition

ENGINE: J57-P-20A (SEE NOTE 2)



NOTES

1. Chart applicable for non-standard conditions if airspeed used to enter chart is corrected for ambient temperature and field pressure altitude.
2. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-16NA

Figure 11-11 (Sheet 1)

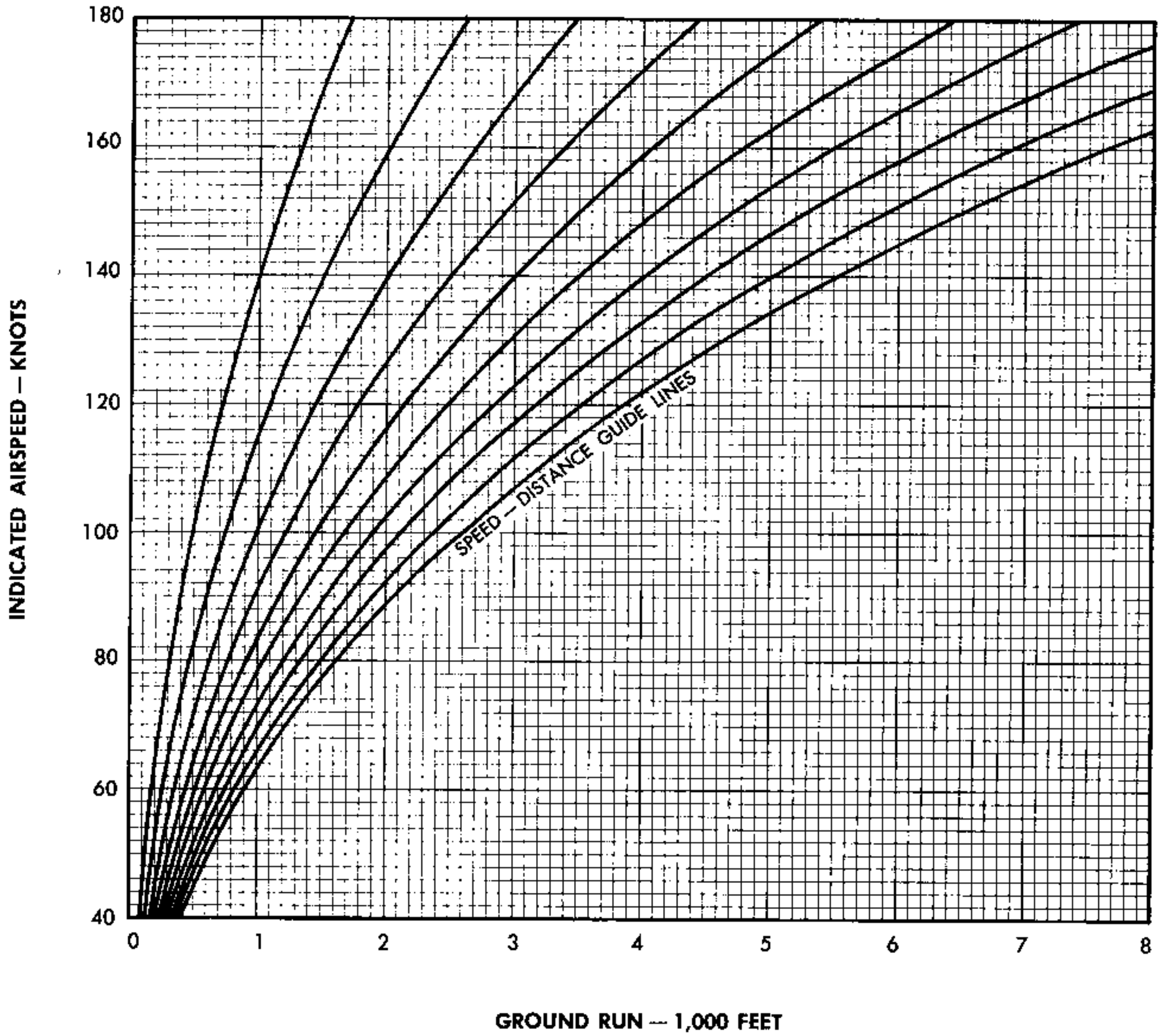
VELOCITY DURING TAKEOFF GROUND RUN

MAXIMUM THRUST — ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

Hard Surface Runway
Landing Condition

ENGINES: J57-P-20, -P-20A



NOTE

Chart applicable for non-standard conditions if airspeed used to enter chart is corrected for ambient temperature and field pressure altitude.

63802-A-17NA

Figure 11–11 (Sheet 2)

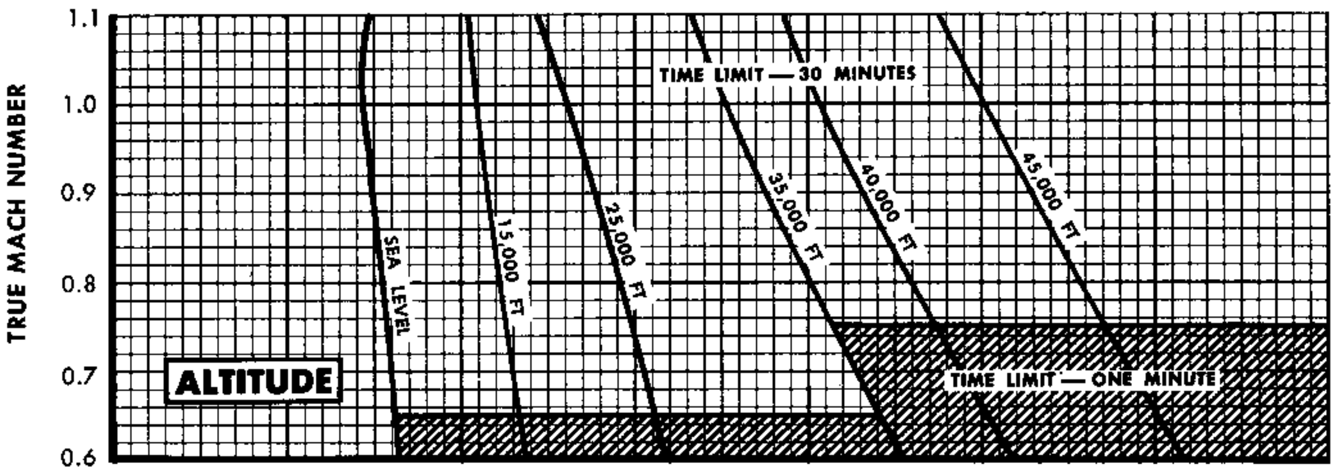
COMBAT ALLOWANCE—MILITARY THRUST

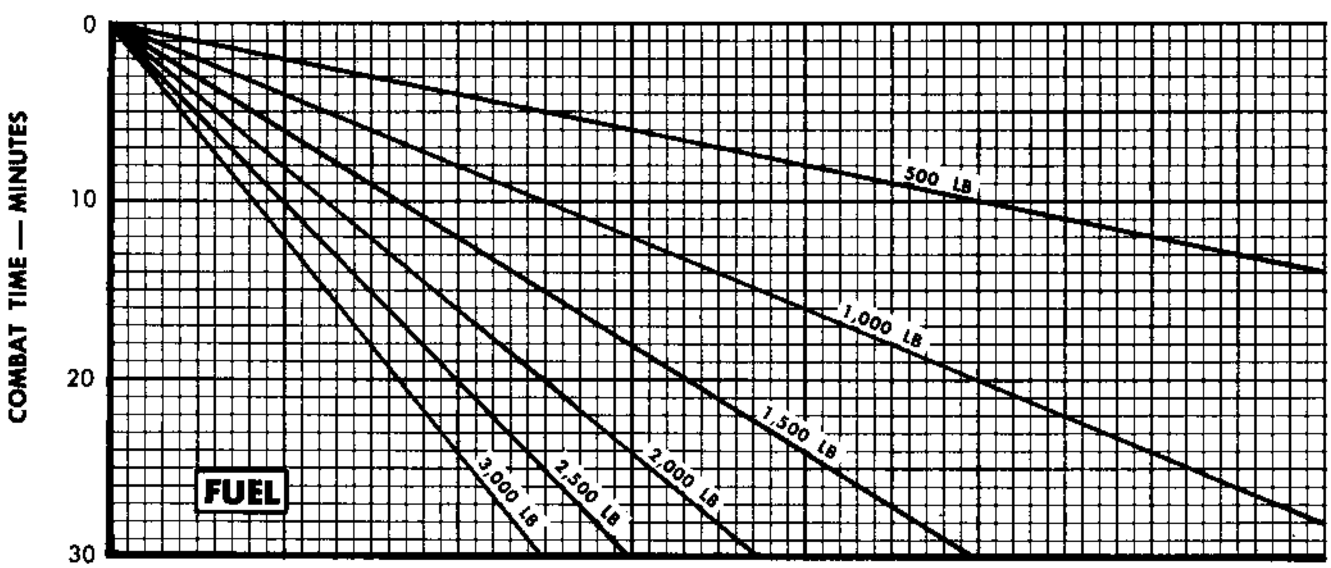
ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Clean Condition

ENGINE: J57-P-20





NOTE

Refer to section I, part 4, NATOPS Flight Manual, for engine exhaust temperature limits.

63802—A—38NA

Figure 11-12 (Sheet 1)

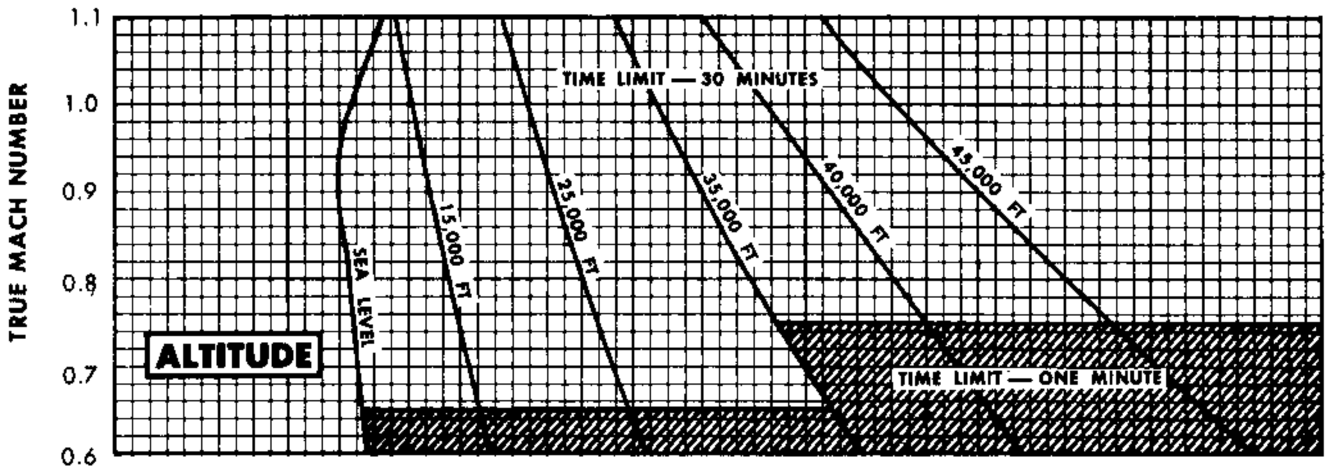
COMBAT ALLOWANCE–MILITARY THRUST

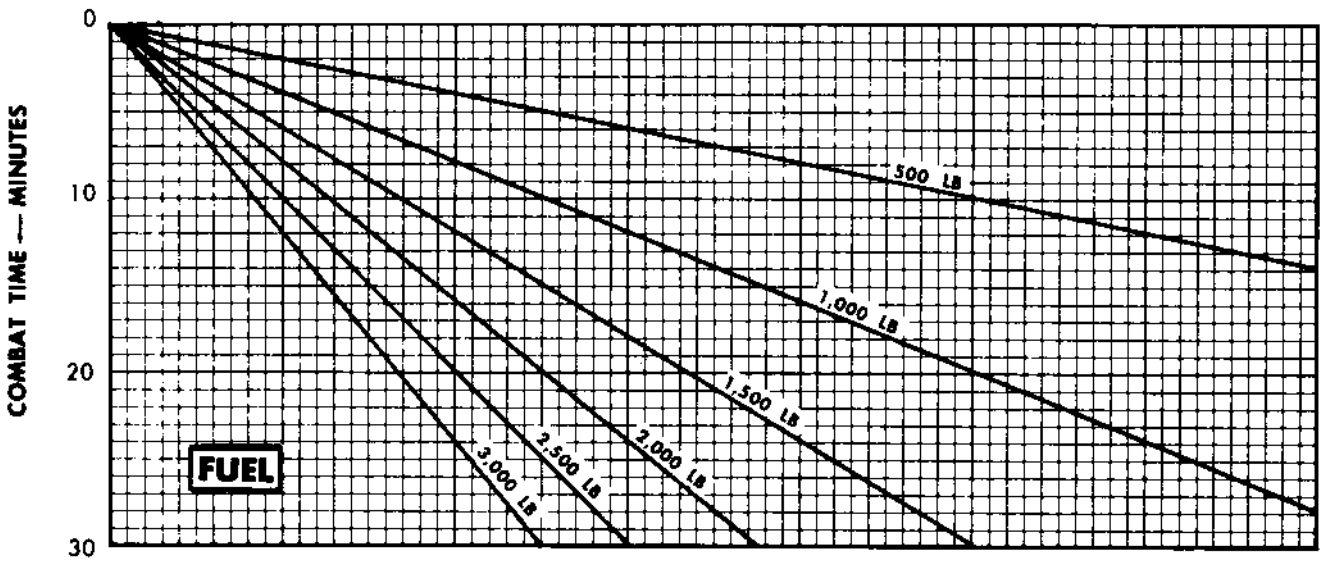
ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Clean Condition

ENGINE: J57-P-20A





NOTE

Refer to section I, part 4, NATOPS Flight Manual, for engine exhaust temperature limits.

63802—A—218NA

Figure 11-12 (Sheet 2)

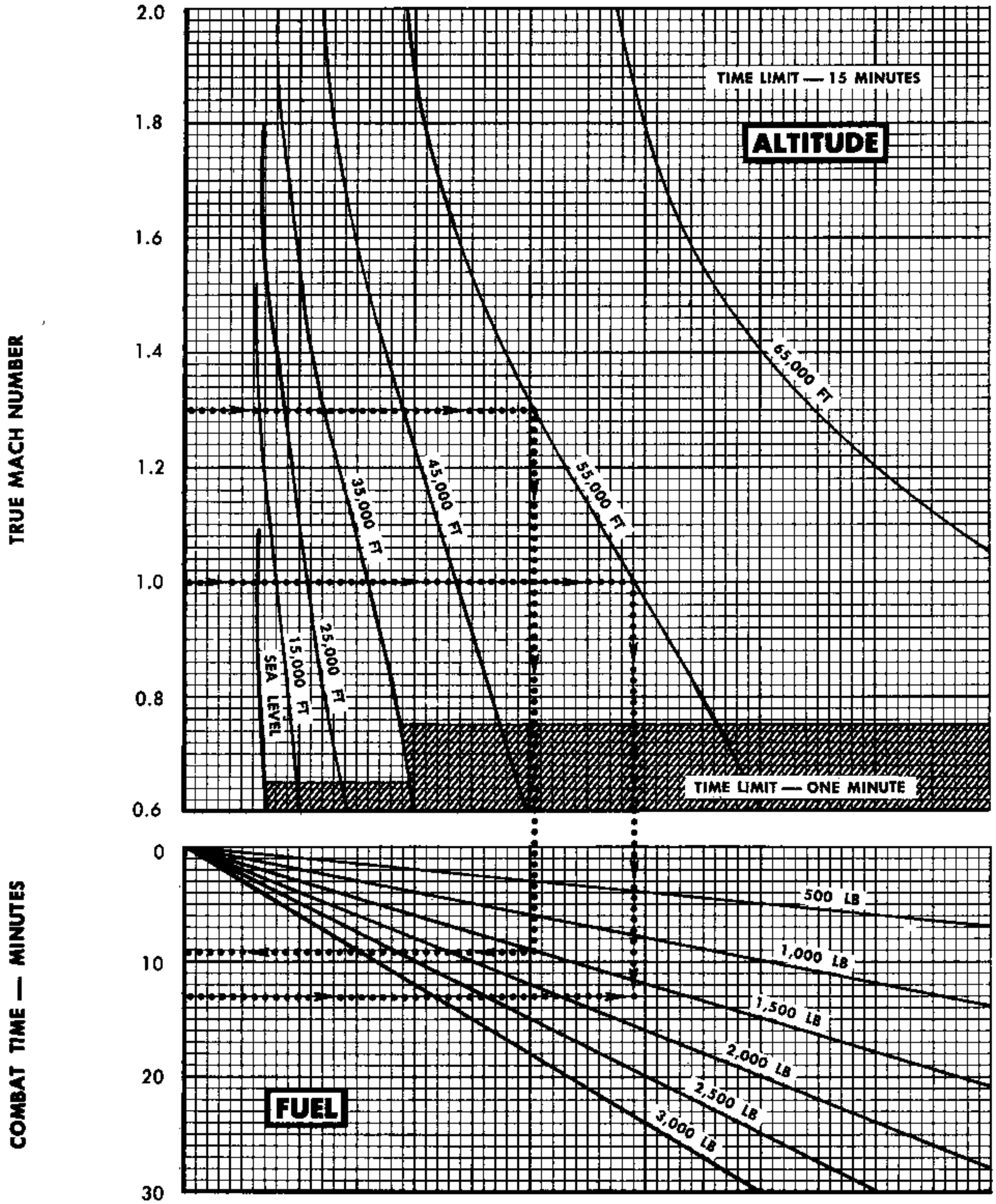
COMBAT ALLOWANCE — MAXIMUM THRUST

ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Clean Condition

ENGINES: J57-P-20, -P-20A



NOTE

Refer to section I, part 4, NATOPS Flight Manual, for engine exhaust temperature limits.

63802—A—37NA

Figure 11–13

DESCENT

MAXIMUM RANGE DESCENT — ALL CONFIGURATIONS

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: June 1966

Standard Day
Idle Thrust
Cruise Condition

ENGINES: J57-P-20, -P-20A

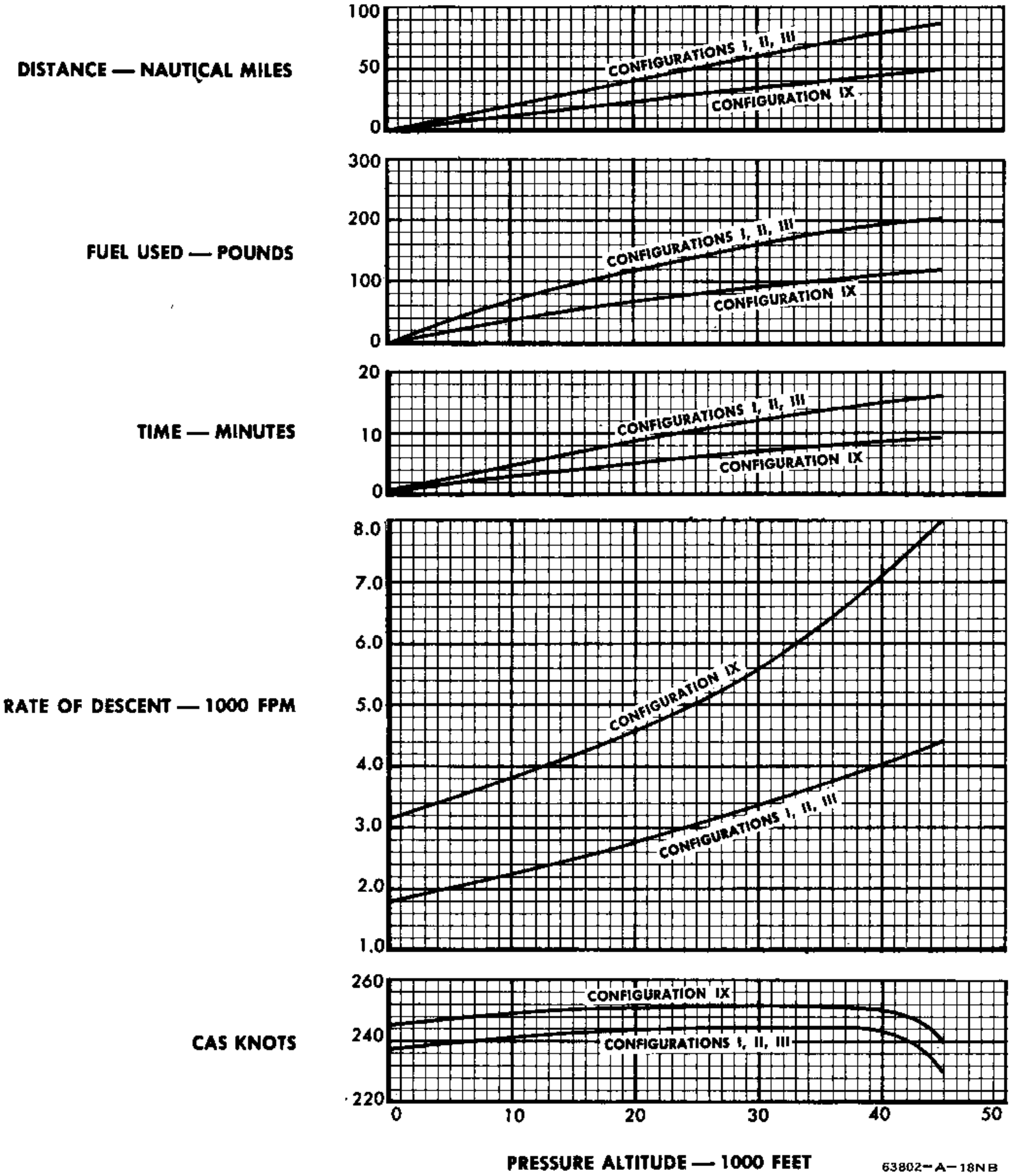


Figure 11-14 (Sheet 1)

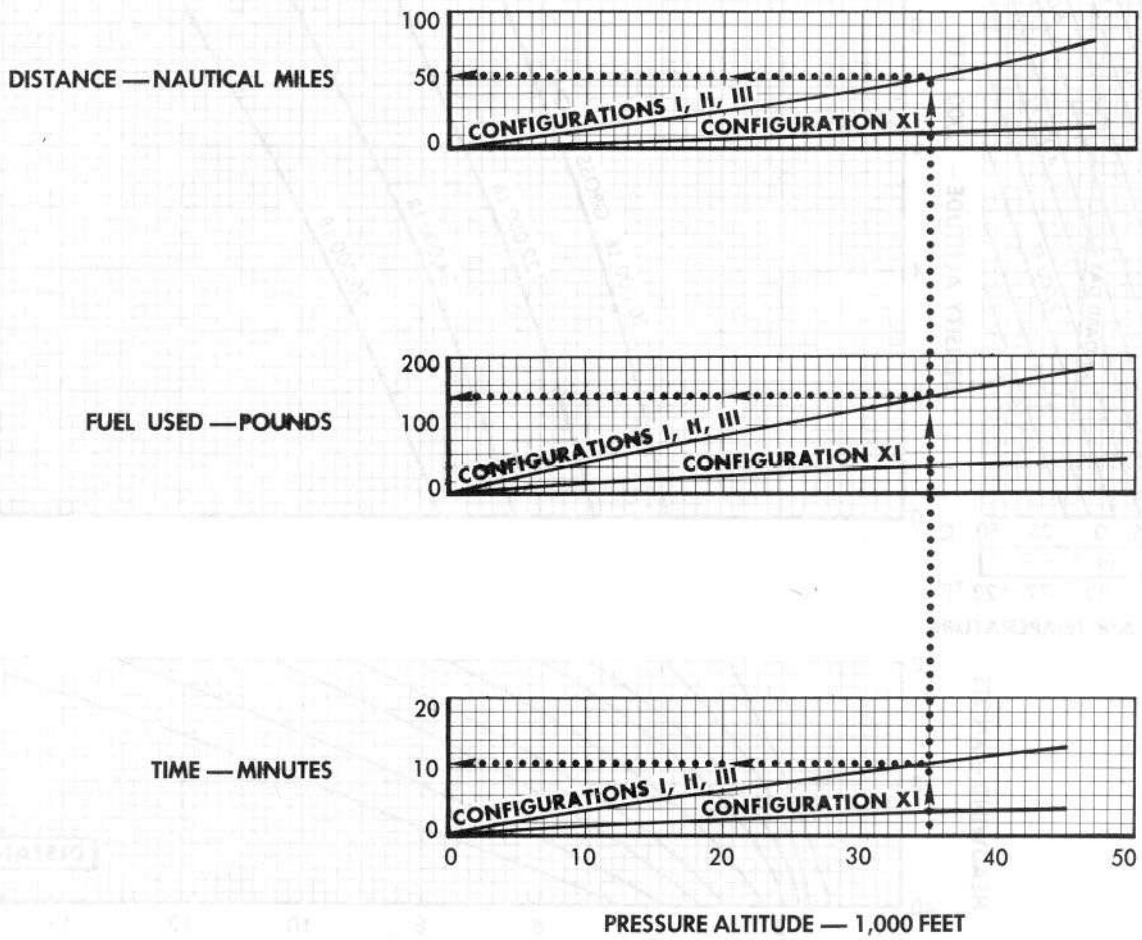
DESCENT

CONSTANT AIRSPEED DESCENT — ALL CONFIGURATIONS

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Idle Thrust Cruise Condition

ENGINES: J57-P-20, -P-20A



CONFIGURATIONS I, II, III: CONSTANT 240 KNOTS CAS; 3,600 FT/MIN RATE OF SINK
CONFIGURATION XI: CONSTANT 254 KNOTS CAS; 7,000 FT/MIN RATE OF SINK

63802—A—19—11—66

Figure 11–14 (Sheet 2)

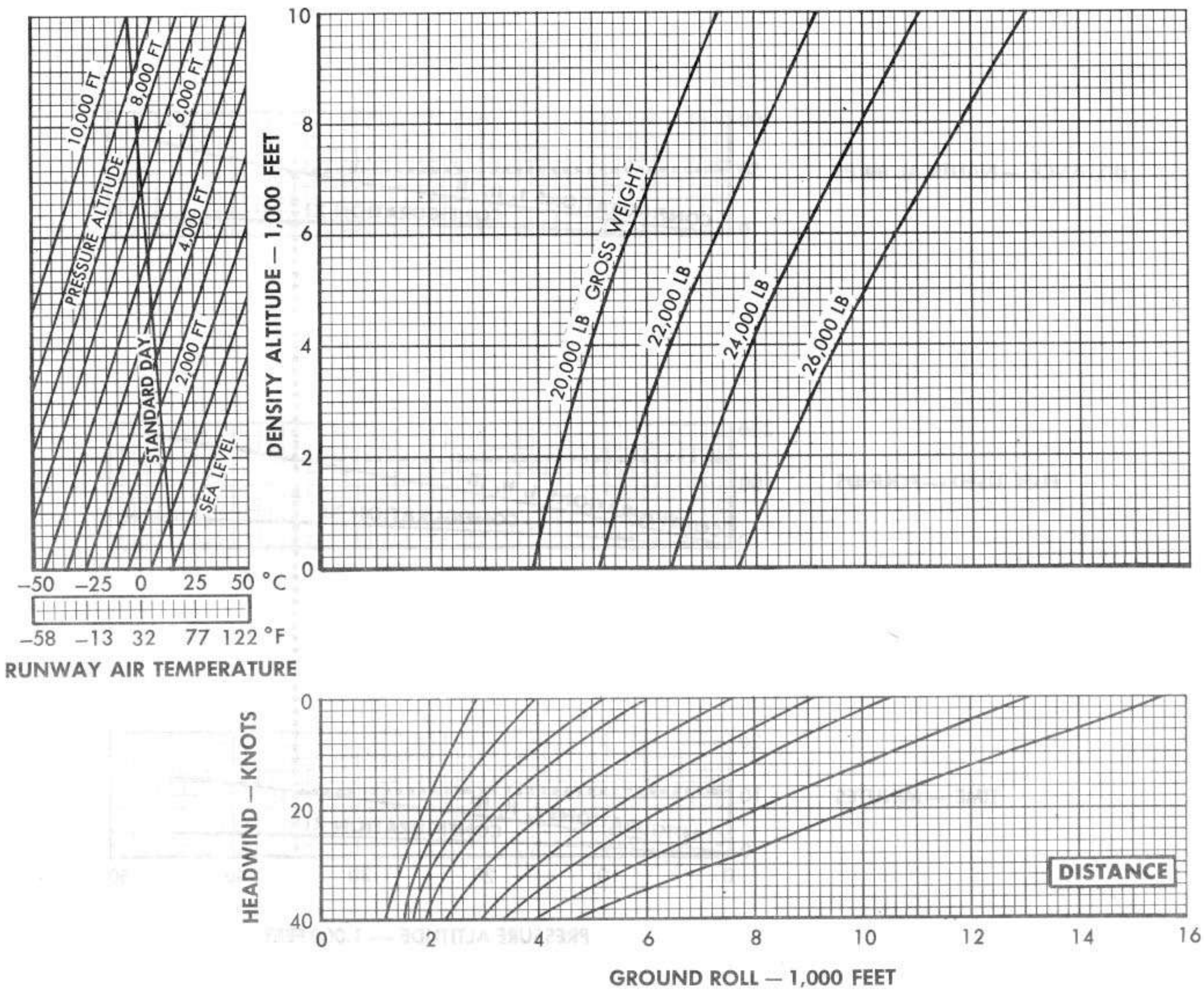
LANDING DISTANCE

ALL CONFIGURATIONS

Hard Surface Runway
Landing Condition

MODEL: F-8D, -8E
DATA BASIS: Estimates
DATE: February 1964

ENGINES: J57-P-20, -P-20A



NOTES

1. To find the total distance required for clearing a 50-foot obstacle, touchdown, and rollout, add 500 feet to normal ground roll distance.
2. The above distances are obtained only when landing and braking speeds given on figure 11-16 are used.

63802-A-20NA

Figure 11–15

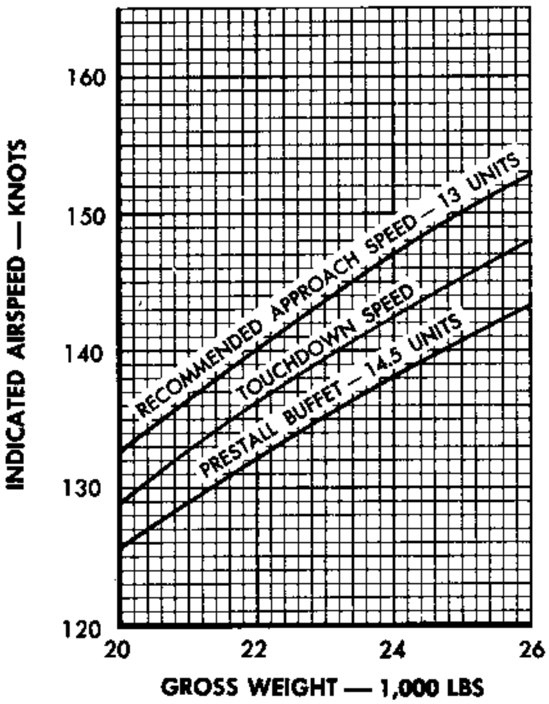
LANDING SPEED

ALL CONFIGURATIONS

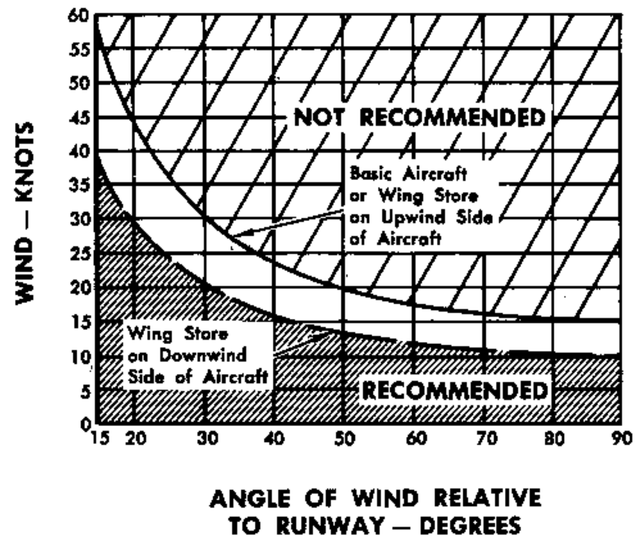
MODEL: F-8D, -8E (See Note 4)
DATA BASIS: Estimates
DATE: February 1964

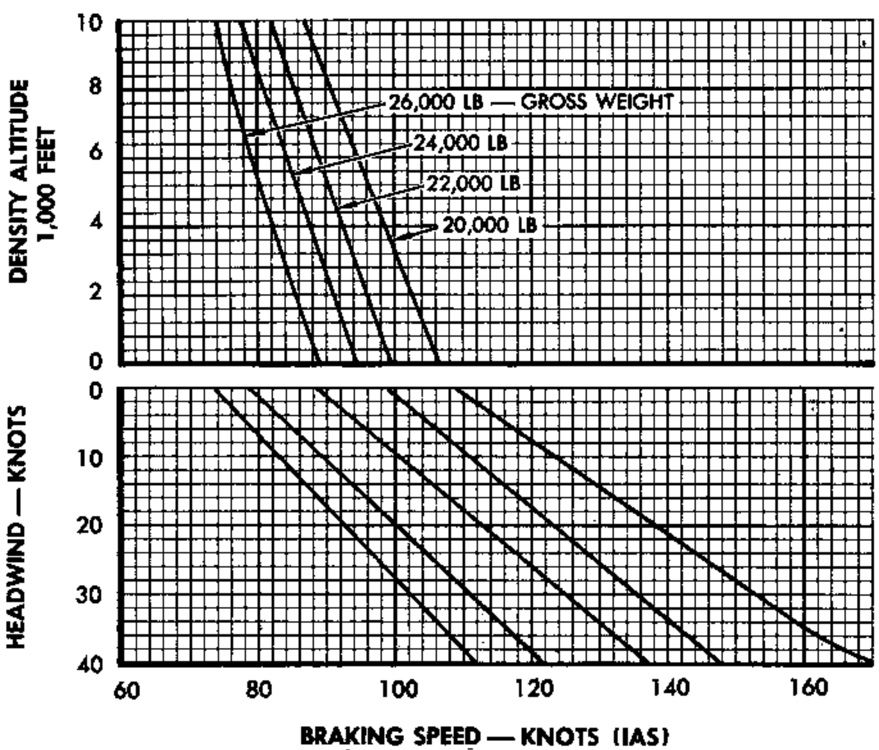
Standard Day
Hard Surface Runway
Landing Condition

ENGINES: J57-P-20, -P-20A



ALLOWABLE CROSSWINDS





NOTES

1. If braking speed exceeds landing speed, brakes are to be applied immediately after touchdown.
2. Land speed based on 110% of power-off stall.
3. If runway conditions are poor, use maximum aerodynamic braking by holding nose-high attitude until 100 knots is obtained. Then use normal braking. This technique will limit the increase in ground roll to approximately 1,500 feet, except when ice is on the runway, ground roll may increase by a factor of 2.0.
4. For F-8E, decrease speeds 3.5 KIAS to correct for airspeed position error difference.

63802-A-21NA

Figure 11-16

RANGE DECISION

WITH TWO SIDEWINDER MISSILES

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

Cruise Condition at All Airspeeds
Range in Nautical Miles

ENGINES: J57-P-20, -P-20A

MILITARY THRUST CLIMB

ALT	IMN	IAS
S.L.	.67	436
10	.70	385
20	.73	336
30	.77	292
35	.80	272
40	.80	244

BEST RANGE SPEED

ALT	IMN	IAS
S.L.	—	301
10	.52	287
20	.61	278
30	.72	271
35	.78	264
40	.83	253

MAXIMUM RANGE DESCENT — IDLE THRUST
ALL ALTITUDES — 236 KIAS

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD — LB	RANGE AT S.L.	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	18	5	22	635
1000	37	14	50	685
1200	55	21	87	715
1600	92	32	171	755
2000	127	38	252	770
2400	164	40	337	775

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD — LB	RANGE AT 10,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	38	15	39	690
1000	62	23	69	720
1200	86	29	111	740
1600	134	36	197	765
2000	181	40	281	775
2400	228	40	367	775

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD — LB	RANGE AT 20,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	54	20	—	710
1000	87	30	88	745
1200	119	34	133	760
1600	180	39	219	775
2000	239	40	304	775
2400	301	40	391	775

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD — LB	RANGE AT 30,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	68	30	—	745
1000	109	35	110	760
1200	146	38	150	770
1600	222	40	238	775
2000	297	40	324	775
2400	372	40	412	775

IF YOU ARE AT 35,000 FEET

FUEL ON BOARD — LB	RANGE AT 35,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	73	35	—	760
1000	117	37	118	770
1200	159	39	161	775
1600	240	40	248	775
2000	321	40	334	775
2400	402	40	425	775

IF YOU ARE AT 40,000 FEET

FUEL ON BOARD — LB	RANGE AT 40,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	80	40	—	775
1000	123	40	—	775
1200	168	40	—	775
1600	254	40	—	775
2000	341	40	—	775
2400	427	40	—	775

NOTES

1. Data is based upon performance with two Sidewinder missiles installed.
2. Range figures include distance for climb to optimum altitude and for descent to sea level.
3. Provides 600 pounds reserve fuel upon return to sea level; for greater fuel reserve, use figures for correspondingly less fuel on board; for smaller fuel reserve, use figures for correspondingly more fuel on board.
4. Use schedules shown for climb, cruise and descent.
5. Distance covered in descent from 40,000 feet is 73 nautical miles.
6. Applicable for non-standard conditions when recommended IAS is maintained.
7. These data applicable for four Sidewinder configuration only when missiles have been jettisoned.

63802—A—59NB

Figure 11–17 (Sheet 1)

RANGE DECISION

WITH WING PYLONS AND FOUR EMPTY FUSELAGE ZUNI PACKS

MODEL: F-8E
DATA BASIS: Flight Test
DATE: May 1966

Cruise Condition At All Airspeeds
Range In Nautical Miles

ENGINES: J57-P-20, -P-20A

MILITARY THRUST CLIMB

ALT	IMN	IAS
S.L.	.58	384
10	.61	340
20	.66	301
30	.72	267
35	.75	253
40	.75	229

BEST RANGE SPEED

ALT	IMN	IAS
S.L.	—	282
10	—	266
20	.57	259
30	.68	254
35	.73	247
40	.77	235

MAXIMUM RANGE DESCENT — IDLE THRUST

ALL ALTITUDES — 225 KIAS

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD – LB	RANGE AT S.L.	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	16	5	20	630
1000	32	11	43	660
1200	48	20	75	695
1600	80	31	141	730
2000	112	36	209	740
2400	144	39	280	750

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD – LB	RANGE AT 10,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	33	14	38	670
1000	55	21	67	700
1200	77	27	99	720
1600	120	35	163	740
2000	161	38	233	745
2400	202	39	307	750

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD – LB	RANGE AT 20,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	47	23	50	705
1000	78	29	82	725
1200	106	33	116	735
1600	160	37	187	745
2000	210	39	258	750
2400	262	39	332	750

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD – LB	RANGE AT 30,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	60	30	—	730
1000	95	33	99	735
1200	128	36	136	740
1600	194	39	205	750
2000	256	39	276	750
2400	320	39	349	750

IF YOU ARE AT 35,000 FEET

FUEL ON BOARD – LB	RANGE AT 35,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	67	35	—	740
1000	103	35	—	740
1200	138	37	144	745
1600	207	39	214	750
2000	275	39	285	750
2400	345	39	358	750

IF YOU ARE AT 39,000 FEET

FUEL ON BOARD – LB	RANGE AT 35,000	OPT ALT	RANGE AT OPT ALT	DESCEND WHEN FUEL REACHES
800	69	39	—	750
1000	107	39	—	750
1200	145	39	—	750
1600	217	39	—	750
2000	289	39	—	750
2400	362	39	—	750

NOTES

1. Data is based upon performance with two wing pylons plus four empty ZUNI packs on dual fuselage pylons.
2. Range figures include distance for climb to optimum altitude and for descent to sea level.
3. Provides 600 pounds reserve fuel upon return to sea level; for greater fuel reserve, use figures for correspondingly less fuel on board; for smaller fuel reserve, use figures for correspondingly more fuel on board.
4. Use schedules shown for climb, cruise and descent.
5. Distance covered in descent from 39,000 feet is 62 nautical miles.
6. Applicable for nonstandard conditions when recommended IAS is maintained.

Figure 11–17 (Sheet 2)

ENDURANCE DECISION

WITH TWO SIDEWINDER MISSILES

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

Cruise Condition
Time in Minutes

ENGINES: J57-P-20, -P-20A

MILITARY THRUST CLIMB

ALT	IMN	IAS
S.L.	.67	436
10	.70	385
20	.73	336
30	.77	242
35	.80	272
40	.80	244

LOITER SPEED, ALL ALTITUDES— 220 KIAS

MAXIMUM RANGE DESCENT — IDLE THRUST

ALL ALTITUDES — 236 KIAS

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD—LB	TIME AT S.L.	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	4.5	6	5.5	640
1000	8.5	13	11	680
1200	13	18	16.5	700
1600	21.5	23	27	720
2000	30 0	25	38.5	730
2400	38.5	27	49.5	735

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD—LB	TIME AT 10,000	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	8	14	8.5	685
1000	13.5	19	14.5	705
1200	18.5	21	20.5	715
1600	28.5	24	31.5	725
2000	38	26	43	730
2400	48	27	54.5	735

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD—LB	TIME AT 20,000	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	11.5	19	—	705
1000	17.5	20	17.5	715
1200	23	23	23.5	720
1600	34	25	35.0	730
2000	44.5	27	46.0	735
2400	55.5	28	57.5	740

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD—LB	TIME AT 30,000	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	13	30	—	745
1000	19.5	30	—	745
1200	25	30	—	745
1600	36.5	30	—	745
2000	47.5	30	—	745
2400	59	30	—	745

IF YOU ARE AT 35,000 FEET

FUEL ON BOARD—LB	TIME AT 35,000	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	14	35	—	760
1000	20	35	—	760
1200	26	35	—	760
1600	37.5	35	—	760
2000	49	35	—	760
2400	60.5	35	—	760

IF YOU ARE AT 40,000 FEET

FUEL ON BOARD—LB	TIME AT 40,000	OPT ALT	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	15	30 — 40	—	775
1000	21	30 — 40	—	775
1200	27	30 — 40	—	775
1600	38.5	30 — 40	—	775
2000	50	30 — 40	—	775
2400	62	30 — 40	—	775

NOTES

1. Endurance figures include time for climb to optimum altitude and for descent to sea level.
2. Provides 600 pounds reserve fuel upon return to sea level; for greater fuel reserve, use figures for correspondingly less fuel on board; for smaller fuel reserve, use figures for correspondingly more fuel on board.
3. Use schedules for climb and descent; loiter at recommended IAS.
4. Time required for descent from 40,000 feet is 14 minutes.
5. These data applicable for four Sidewinder configuration only when missiles have been jettisoned.

62802—A—60NB

Figure 11–18 (Sheet 1)

ENDURANCE DECISION

MODEL: F-8E
DATA BASIS: Flight Test
DATE: May 1966

Cruise Condition
Time in Minutes

ENGINES: J57-P-20, -P-20A

MILITARY THRUST CLIMB

ALT	IMN	IAS
SL	.58	384
10	.61	340
20	.66	301
30	.72	267
35	.75	253
40	.75	229

LOITER SPEED, ALL ALTITUDES 225 KIAS

MAXIMUM RANGE DESCENT — IDLE THRUST

225 KIAS ALL ALTITUDES

IF YOU ARE AT SEA LEVEL

FUEL ON BOARD—LB	TIME AT SL	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	4	4	5	625
1000	8	10	10	655
1200	12	15	15	675
1600	20	20	25	695
2000	28	23	35	705
2400	36	25	45	710

IF YOU ARE AT 30,000 FEET

FUEL ON BOARD—LB	TIME AT 30,000	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	12	30	—	725
1000	17.5	30	—	725
1200	22.5	30	—	725
1600	33.5	30	—	725
2000	43.5	30	—	725
2400	54.5	30	—	725

IF YOU ARE AT 10,000 FEET

FUEL ON BOARD—LB	TIME AT 10,000	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	7.5	12	8.0	665
1000	12	15	13.5	675
1200	17	19	19.0	690
1600	26.5	22	29.0	700
2000	35.5	25	39.0	710
2400	44.5	26	49.0	715

IF YOU ARE AT 35,000 FEET

FUEL ON BOARD—LB	TIME AT 35,000	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	12.5	30–35	—	740
1000	18.5	30–35	—	740
1200	23.5	30–35	—	740
1600	34.5	30–35	—	740
2000	40	30–35	—	740
2400	55.5	30–35	—	740

IF YOU ARE AT 20,000 FEET

FUEL ON BOARD—LB	TIME AT 20,000	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	10	20	—	695
1000	15.5	20	—	695
1200	20.5	21	21	700
1600	31	24	31.5	710
2000	41	25	42	710
2400	51	26	52	715

IF YOU ARE AT 39,000 FEET

FUEL ON BOARD—LB	TIME AT 39,000	OPT ALTITUDE	TIME AT OPT ALT	DESCEND WHEN FUEL REACHES
800	13.5	30–39	—	750
1000	19	30–39	—	750
1200	24.5	30–39	—	750
1600	35	30–39	—	750
2000	45.5	30–39	—	750
2400	56.5	30–39	—	750

NOTES

1. Endurance figures include time for climb to optimum altitude and for descent to sea level.
2. Provides 600 pounds reserve fuel upon return to sea level; for greater fuel reserve, use figures for correspondingly less fuel on board; for smaller fuel reserve, use figures for correspondingly more fuel on board.
3. Use schedules for climb and descent; loiter at recommended IAS.
4. Time required for descent from 39,000 feet is 12.5 minutes.

63802—A—143 NB

Figure 11–18 (Sheet 2)

EMERGENCY RANGE AND ENDURANCE INDEX NUMBERS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ALL POSSIBLE EMERGENCY CONFIGURATIONS

ENGINES: J57-P-20, -P-20A

				WITHOUT STORES		TWO WING PYLONS + FOUR EMPTY FUSELAGE ZUNI PACKS	
WING POSITION	DROOP POSITION	GEAR POSITION	EPP POSITION	RANGE INDEX NUMBER	ENDURANCE INDEX NUMBER	RANGE INDEX NUMBER	ENDURANCE INDEX NUMBER
DOWN (1)	CRUISE	UP	RETRACTED	23.5	11.5	17.5	9.1
			EXTENDED	19.0	9.6	14.3	8.0
		DOWN	RETRACTED	10.3	6.1	9.1	5.5
			EXTENDED	9.4	5.6	8.5	5.2
(2)	CLEAN	UP	RETRACTED	20.9	10.3	15.6	8.4
			EXTENDED	16.9	8.9	13.2	7.5
		DOWN	RETRACTED	9.8	5.8	8.8	5.3
			EXTENDED	9.0	5.4	8.2	5.0
	LANDING CONDITION	UP	RETRACTED	13.7	7.7	11.4	6.7
			EXTENDED	12.0	6.9	10.4	6.1
		DOWN	RETRACTED	8.3	5.1	7.6	4.7
			EXTENDED	7.8	4.8	7.1	4.5
UP	CRUISE	UP	RETRACTED	15.2	8.9	12.3	8.0
			EXTENDED	13.0	8.2	11.0	7.4
		DOWN	RETRACTED	8.7	6.3	7.9	5.9
			EXTENDED	8.1	6.0	7.4	5.6
	CLEAN	UP	RETRACTED	13.8	8.5	11.6	7.7
			EXTENDED	12.1	7.9	10.4	7.2
		DOWN	RETRACTED	8.4	6.1	7.6	5.7
			EXTENDED	7.8	5.8	7.2	5.5
	LANDING CONDITION	UP	RETRACTED	10.7	7.3	9.5	6.7
			EXTENDED	9.8	6.8	8.8	6.3
(3)		DOWN	RETRACTED	7.3	5.6	6.7	5.2
			EXTENDED	6.9	5.3	6.4	5.1

(1) BASIC CRUISE CONDITION
(2) BASIC CLEAN CONDITION
(3) BASIC LANDING CONDITION

63802–A–220NB

Figure 11–18A

EMERGENCY RANGE

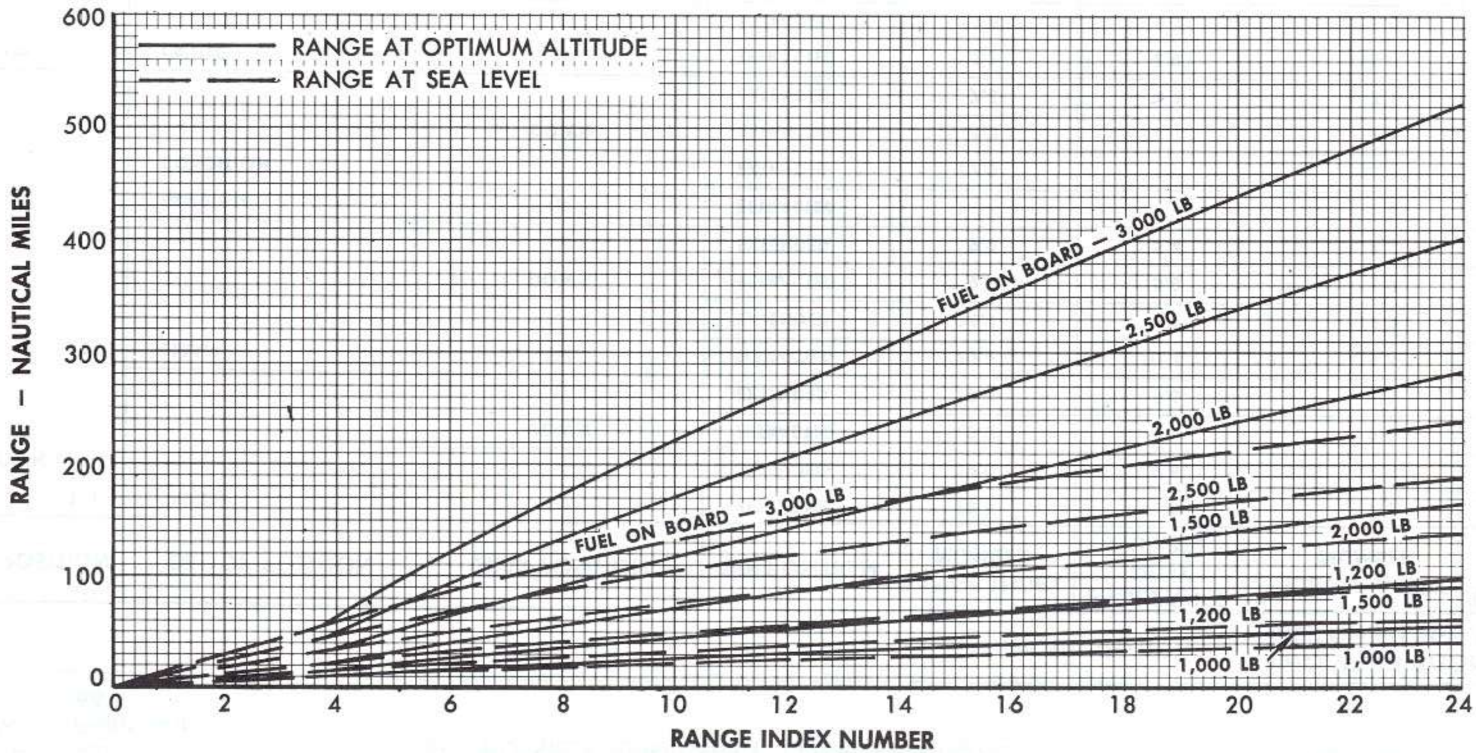
MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

INITIAL ALTITUDE — SEA LEVEL
Standard Day (See Note 9)

ENGINES: J57-P-20,-P-20A

NOTES

1. Range at optimum altitude includes distance for military thrust climb from sea level to optimum altitude and for idle thrust descent to sea level.
2. Provides 600 pounds reserve fuel upon return to sea level; for larger fuel reserve read chart at less fuel on board.
3. For range for initial altitude higher than sea level, add the incremental range from sheet 2 of this figure.
4. Obtain optimum altitude from figure 11–18D.
5. Obtain climb schedule from figure 11–18E.
6. Obtain cruise speed from figure 11–18F.
7. Obtain descent schedule from figure 11–18G.
8. Obtain fuel state at which to start descent to sea level from figure 11–18H.
9. Applicable for nonstandard conditions when recommended IAS is maintained.



63802–A–221 (1) NB

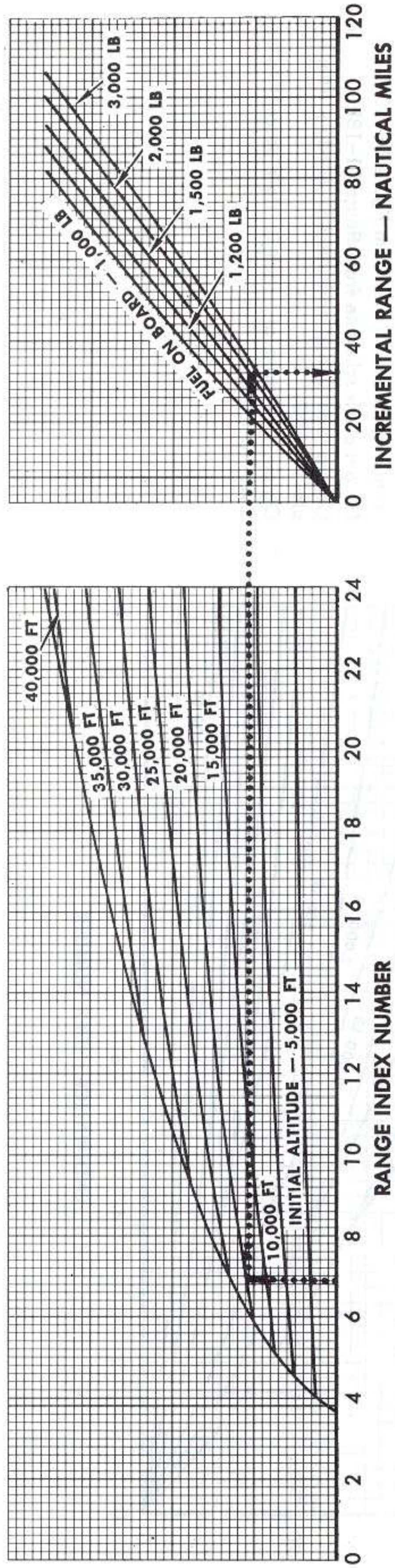
Figure 11–18B (Sheet 1)

EMERGENCY RANGE

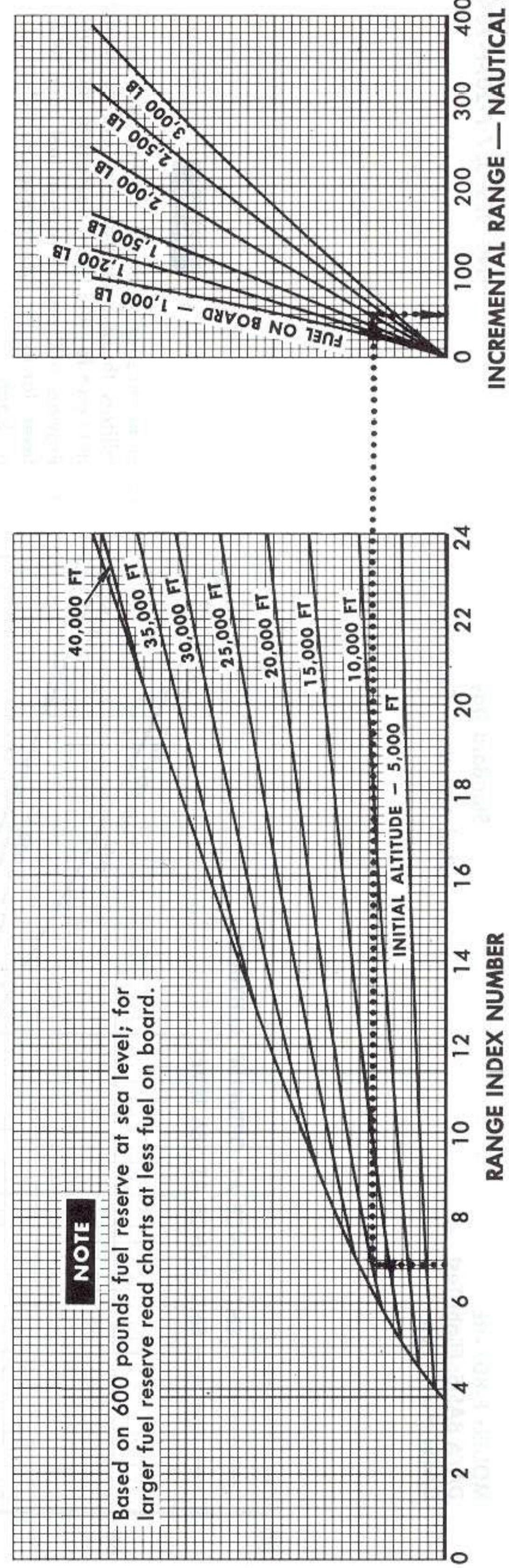
MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ENGINES: J57-P-20, -P-20A

INCREMENTAL RANGE FOR CRUISE AT OPTIMUM ALTITUDE
(Add to Range at Optimum Altitude from Sheet 1 of this Figure)
Standard Day



INCREMENTAL RANGE FOR CRUISE AT INITIAL ALTITUDE
(Add to Range at Sea Level from Sheet 1 of this Figure)



63802-A-221 (2) NB

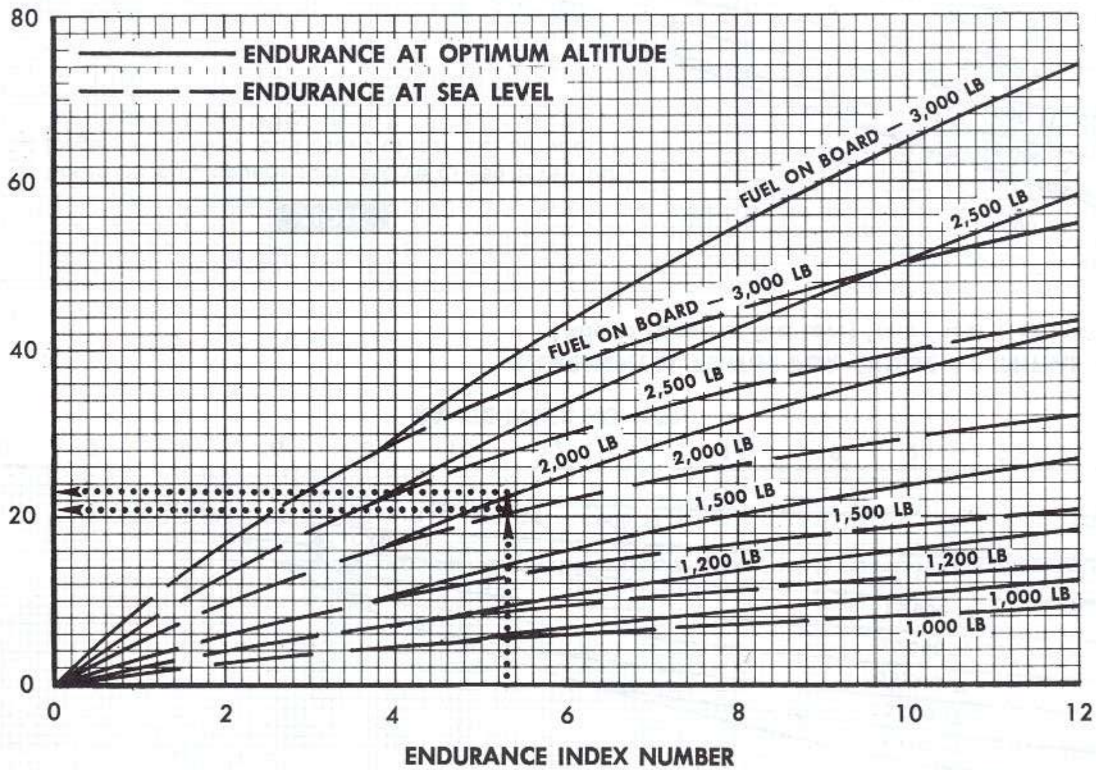
Figure 11-18B (Sheet 2)

EMERGENCY ENDURANCE

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

Standard Day
Initial Altitude — Sea Level

ENGINES: J57-P-20,-P-20A



NOTES

1. Endurance at optimum altitude includes time for military thrust climb from sea level to optimum altitude and for idle thrust descent to sea level.
2. Provides 600 pounds reserve fuel upon return to sea level; for larger fuel reserve read chart at less fuel on board.
3. For endurance for initial altitude higher than sea level, add the incremental endurance from sheet 2 of this figure.
4. Obtain optimum altitude from figure 11–18D.
5. Obtain climb schedule from figure 11–18E.
6. Obtain loiter speed and descent schedule from figure 11–18G.
7. Obtain fuel state at which to start descent to sea level from figure 11–18H.

63802–A–222(1)NB

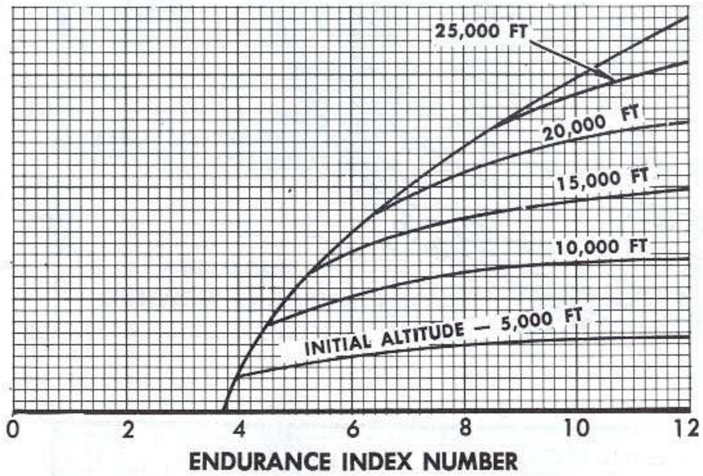
Figure 11–18C (Sheet 1)

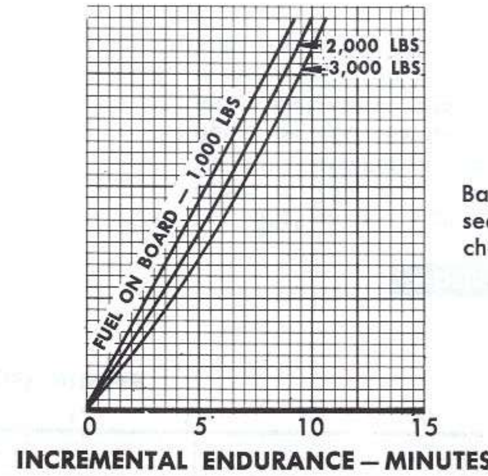
EMERGENCY ENDURANCE

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ENGINES: J57-P-20,-P-20A

INCREMENTAL ENDURANCE FOR LOITER AT OPTIMUM ALTITUDE
(Add to Endurance at Optimum Altitude from Sheet 1 of this Figure)
Standard Day

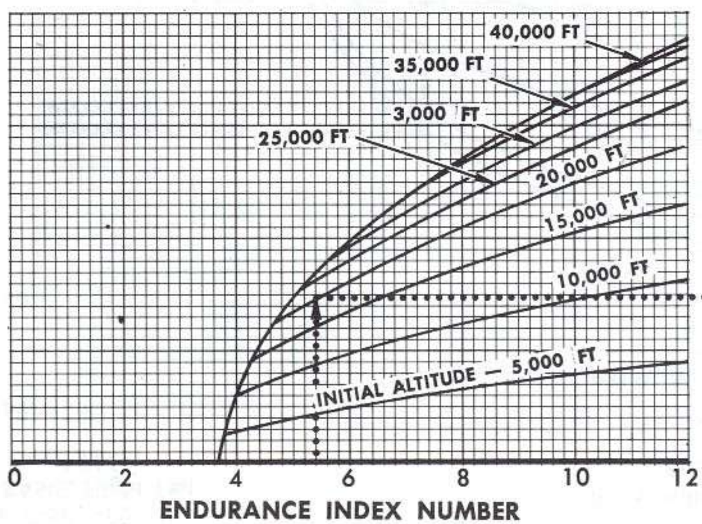


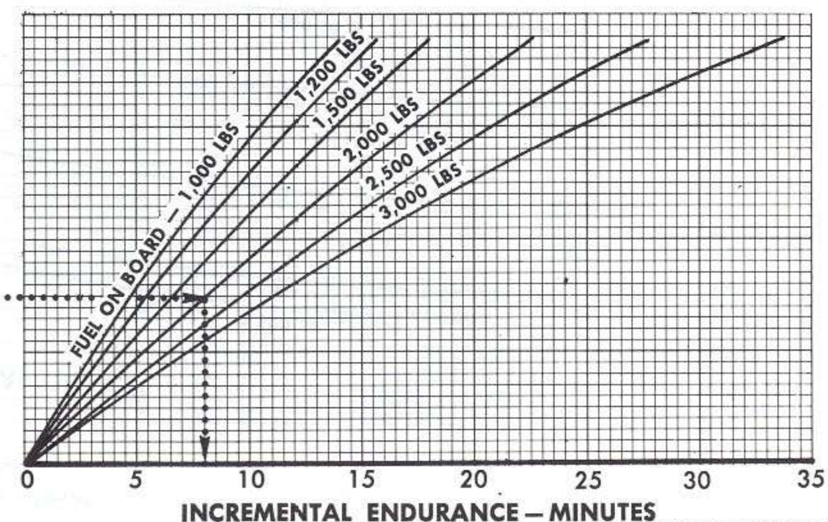


NOTE

Based on 600 pounds fuel reserve at sea level, for larger fuel reserve read charts at less fuel on board.

INCREMENTAL ENDURANCE FOR LOITER AT INITIAL ALTITUDE
(Add to Endurance at Sea Level from Sheet 1 of this Figure)





63802—A—222 (2) NB

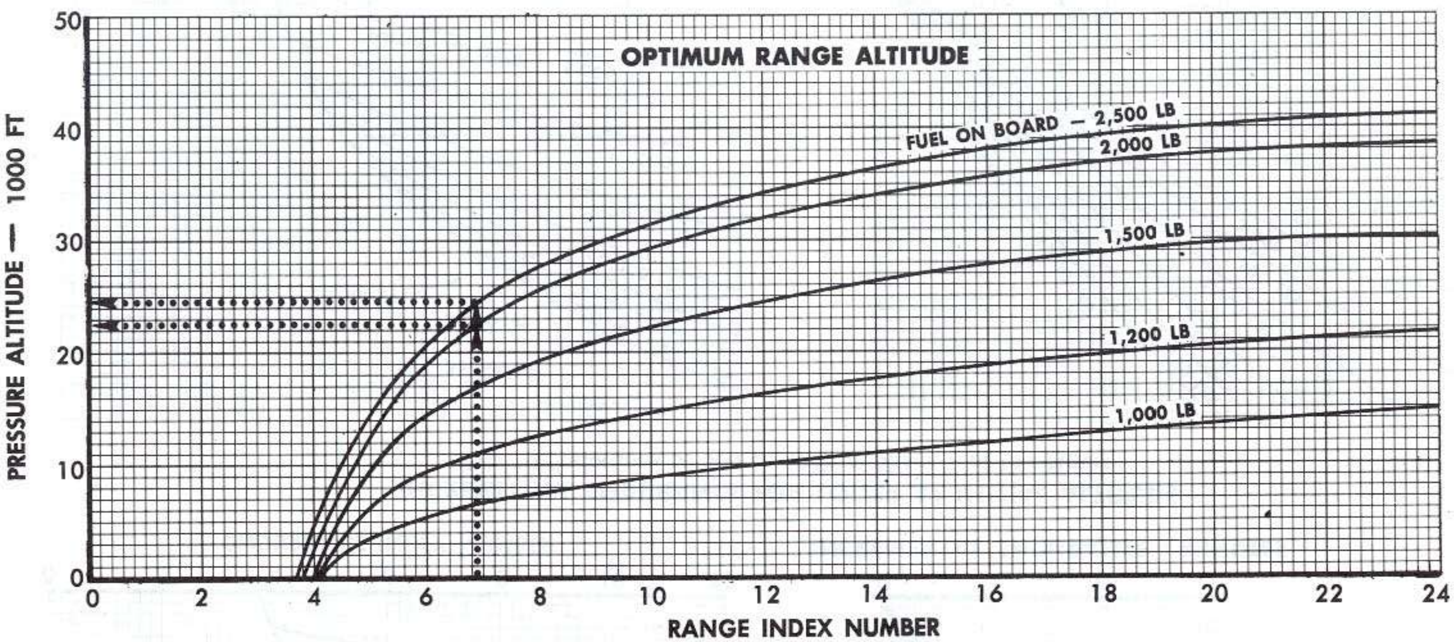
Figure 11–18C (Sheet 2)

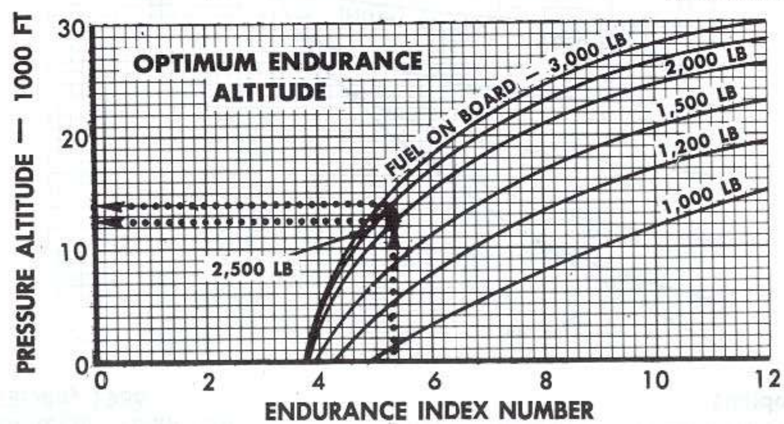
EMERGENCY RANGE AND ENDURANCE ALTITUDES

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ENGINES: J57-P-20, -P-20A

Initial Altitude – Sea Level
Standard Day





NOTES

1. For initial altitude higher than sea level, read the charts at 250 LBS more fuel on board for each 10,000 FT of initial altitude.
2. Based on 600 LBS fuel reserve at sea level; for larger fuel reserve read chart at less fuel on board.
3. If the optimum altitude is less than the initial altitude, stay at the initial altitude.

63802–A–223NB

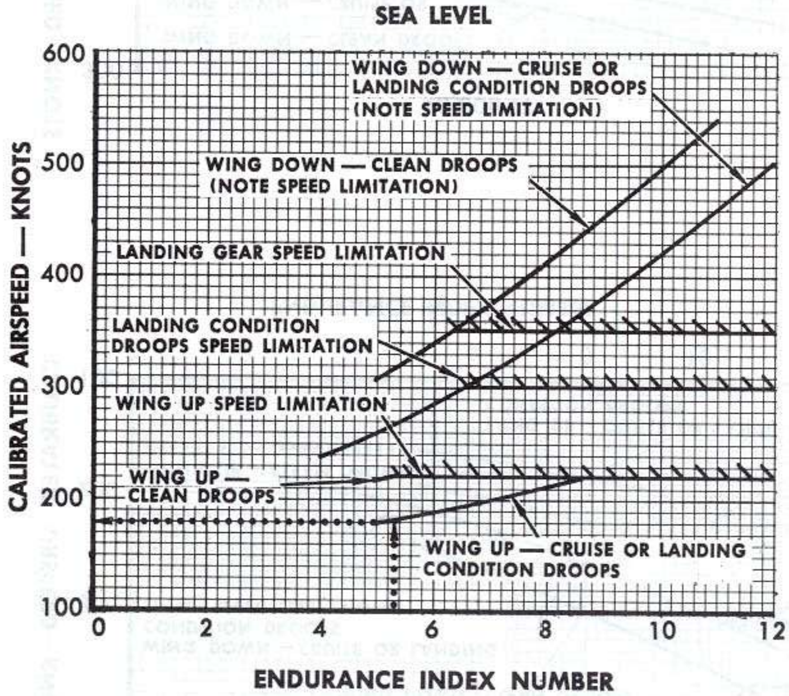
Figure 11–18D

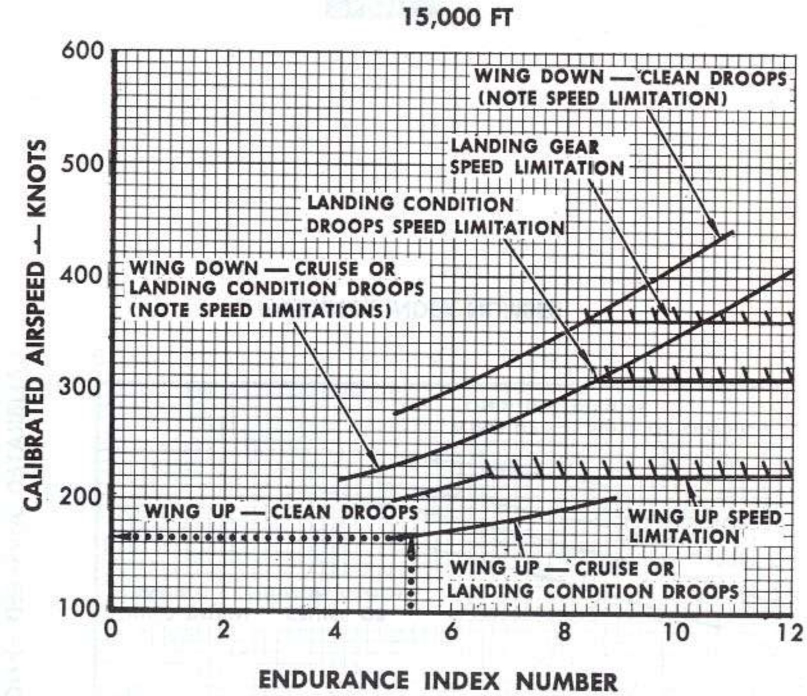
EMERGENCY RANGE AND ENDURANCE CLIMB SPEEDS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

MILITARY THRUST CLIMB SPEED
Standard Day

ENGINES: J57-P-20,-P-20A





NOTE

To obtain climb speeds for use with emergency endurance or range charts, use the endurance index number.

63802—A—224(1)NB

Figure 11–18E (Sheet 1)

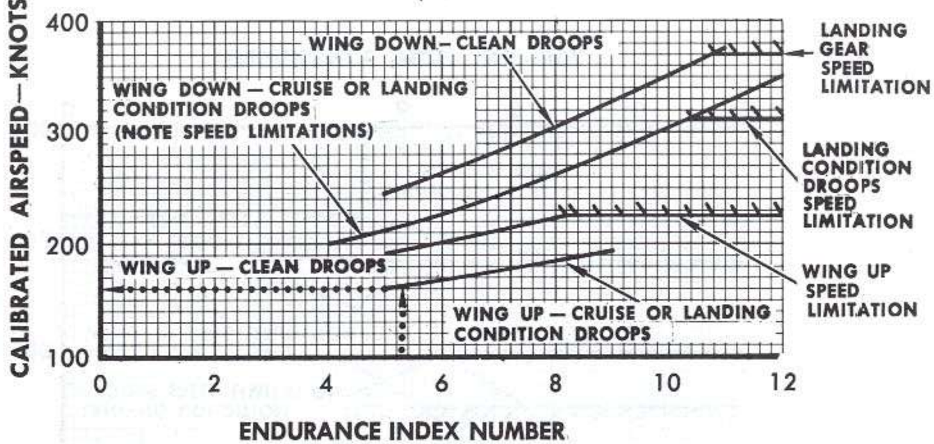
EMERGENCY RANGE AND ENDURANCE CLIMB SPEEDS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

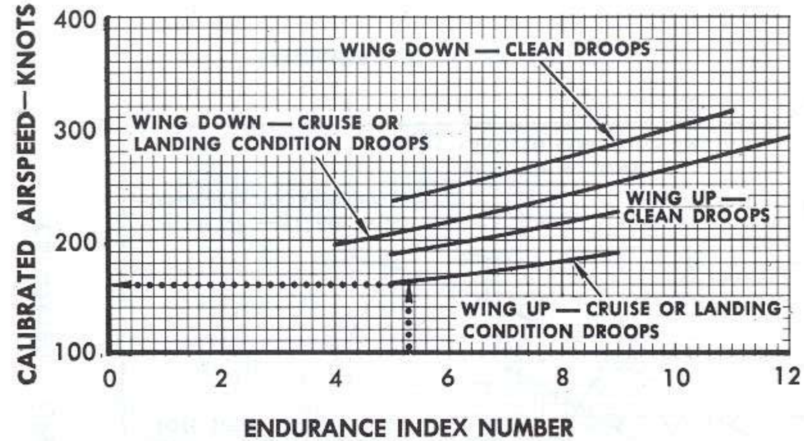
MILITARY THRUST CLIMB SPEED
Standard Day

ENGINES: J57-P-20, -P-20A

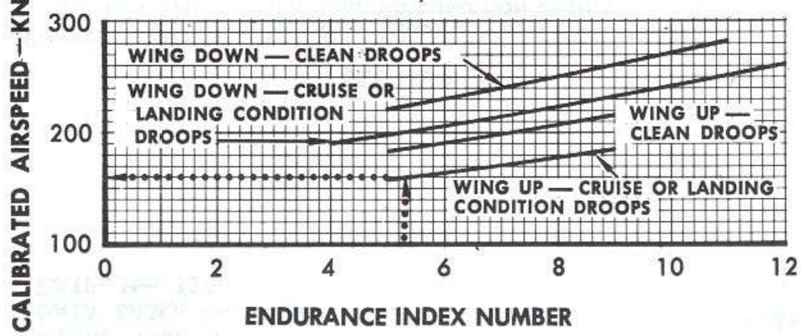
25,000 FT



35,000 FT



40,000 FT



NOTE

To obtain climb speeds for use with emergency endurance or range charts, use the endurance index number.

63802—A—224 (2) NB

Figure 11–18E (Sheet 2)

EMERGENCY RANGE CRUISE SPEEDS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

CRUISE SPEED
Standard Day

ENGINES: J57-P-20, -P-20A

NOTE

For wing up — clean droops, cruise speed is 220 KCAS

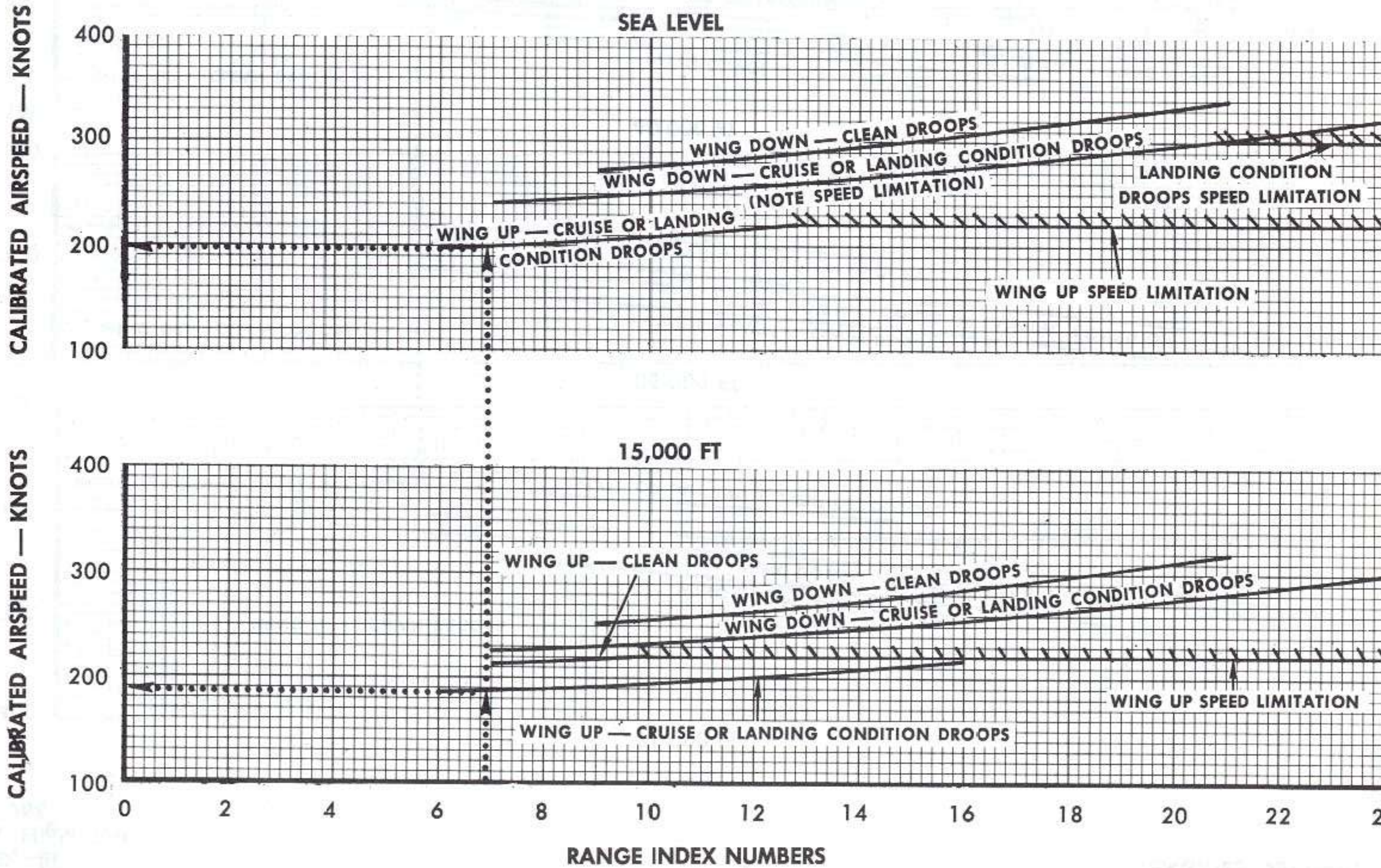
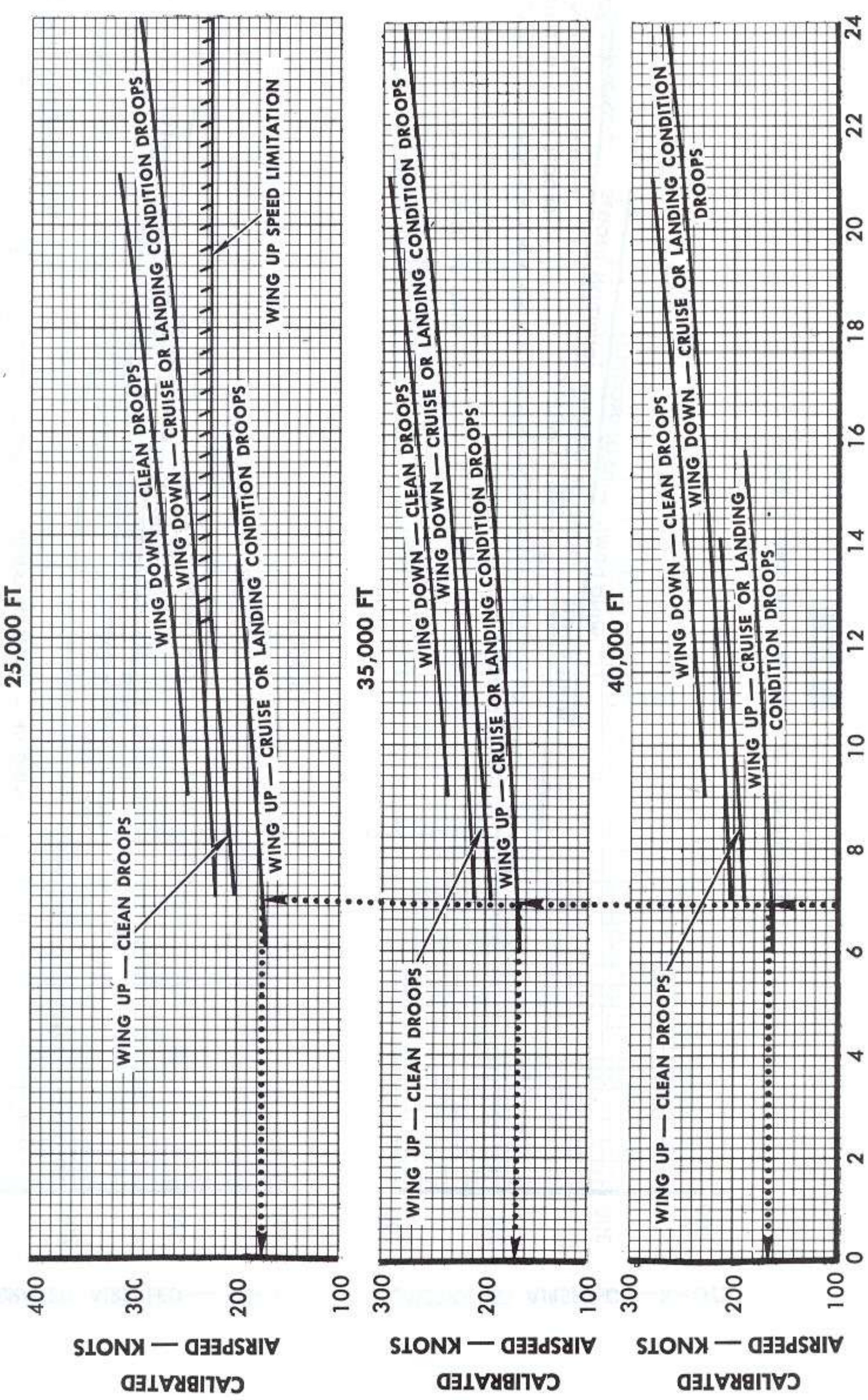


Figure 11–18F (Sheet 1)

EMERGENCY RANGE CRUISE SPEEDS

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

ENGINES: J57-P-20, -P-20A



63802-A-225(2)NB

Figure 11-18F (Sheet 2)

EMERGENCY RANGE AND ENDURANCE LOITER AND DESCENT SPEEDS

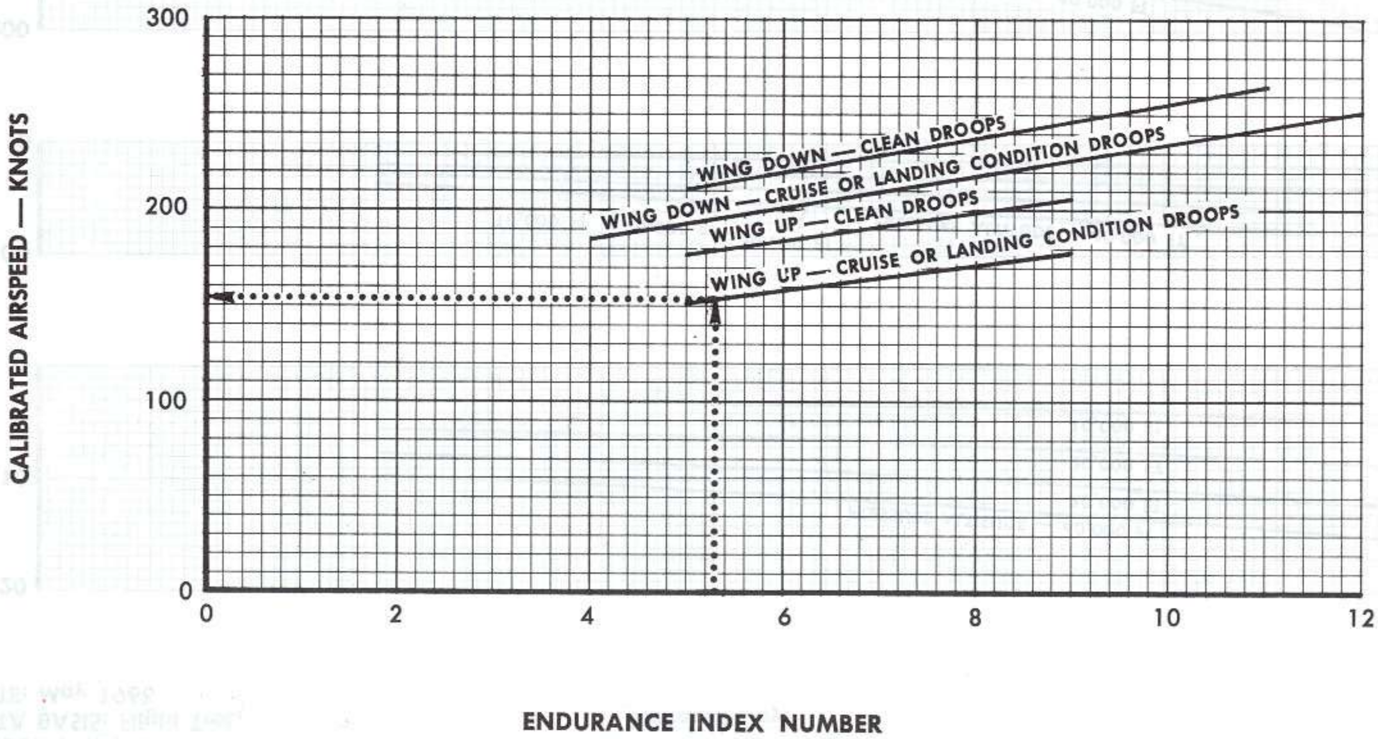
MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

LOITER AND IDLE THRUST DESCENT SPEED
Standard Day

ENGINES: J57-P-20,-20A

NOTE

To obtain loiter and descent speeds for use with emergency endurance or range charts, use the endurance index number.



63802-A-226NB

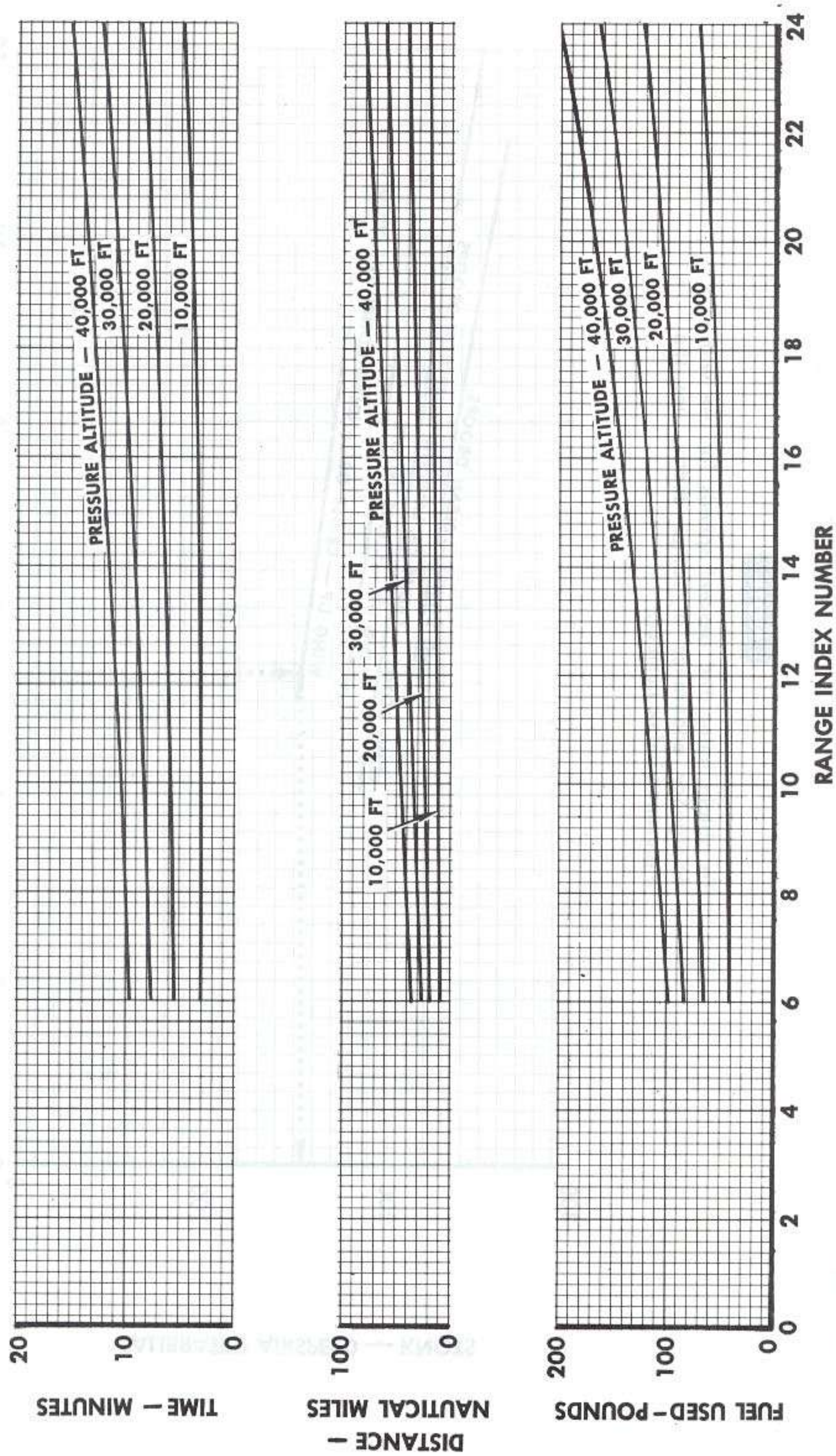
Figure 11-18G

EMERGENCY RANGE AND ENDURANCE DESCENT

MODEL: F-8D, -8E
DATA BASIS: Flight Test
DATE: May 1966

IDLE THRUST DESCENT
Standard Day

ENGINES: J57-P-20,-P-20A



NOTE

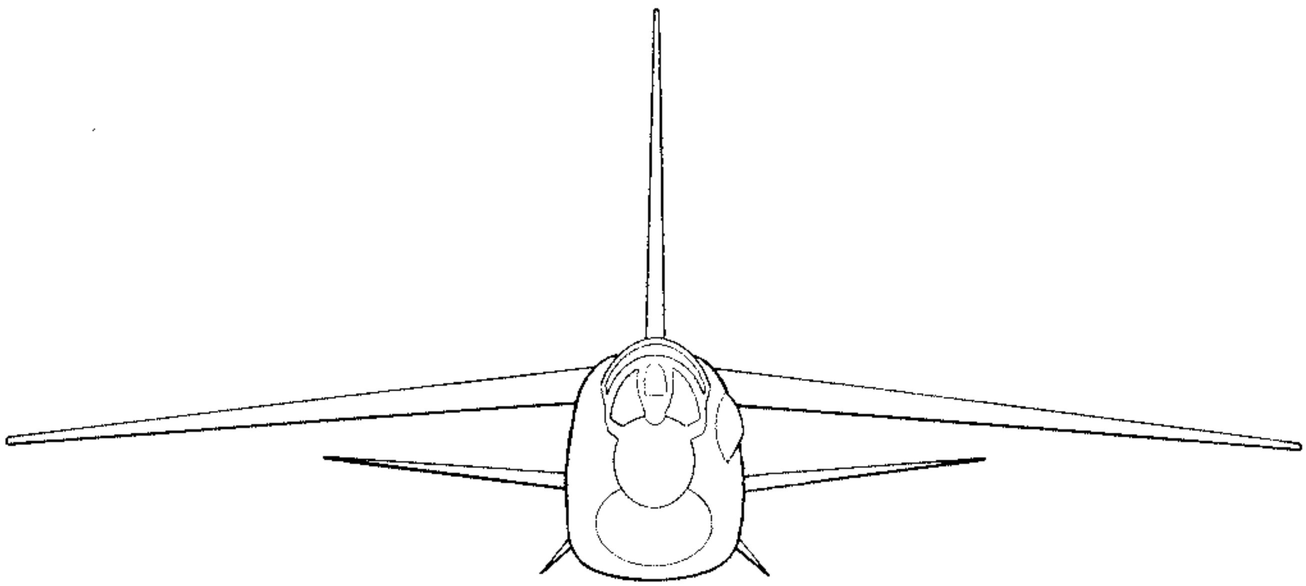
To find fuel state at which to start descent, add fuel reserve to fuel used in descent.

63802—A—227NB

Figure 11–18H

CONFIGURATION I

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Basic aircraft, no stores (typical)

Note

Refer to figure 11–1 for other Configuration I stores arrangements.

CONTENTS

Best Climb 98
Climb Control 99
Combat Radius Profile 101
Mission Profile 102
Optimum Return Profile 103
Maximum Endurance Profile 104
Optimum Endurance Profile 105
Air Refueling Profile 106
Nautical Miles/1,000 Pounds of Fuel 107

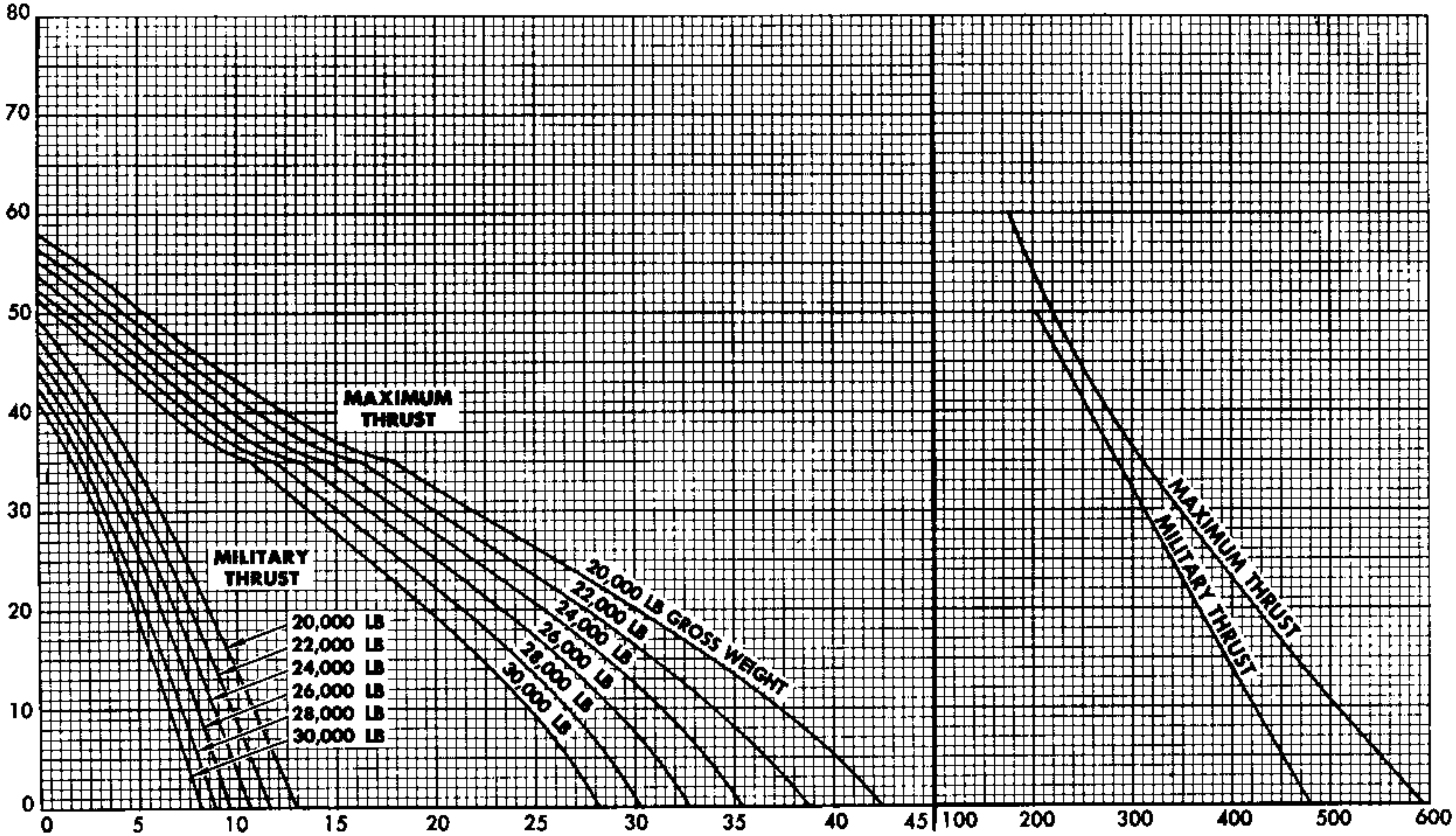
BEST CLIMB

CONFIGURATION I

Standard Day

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63B02-A-52NA

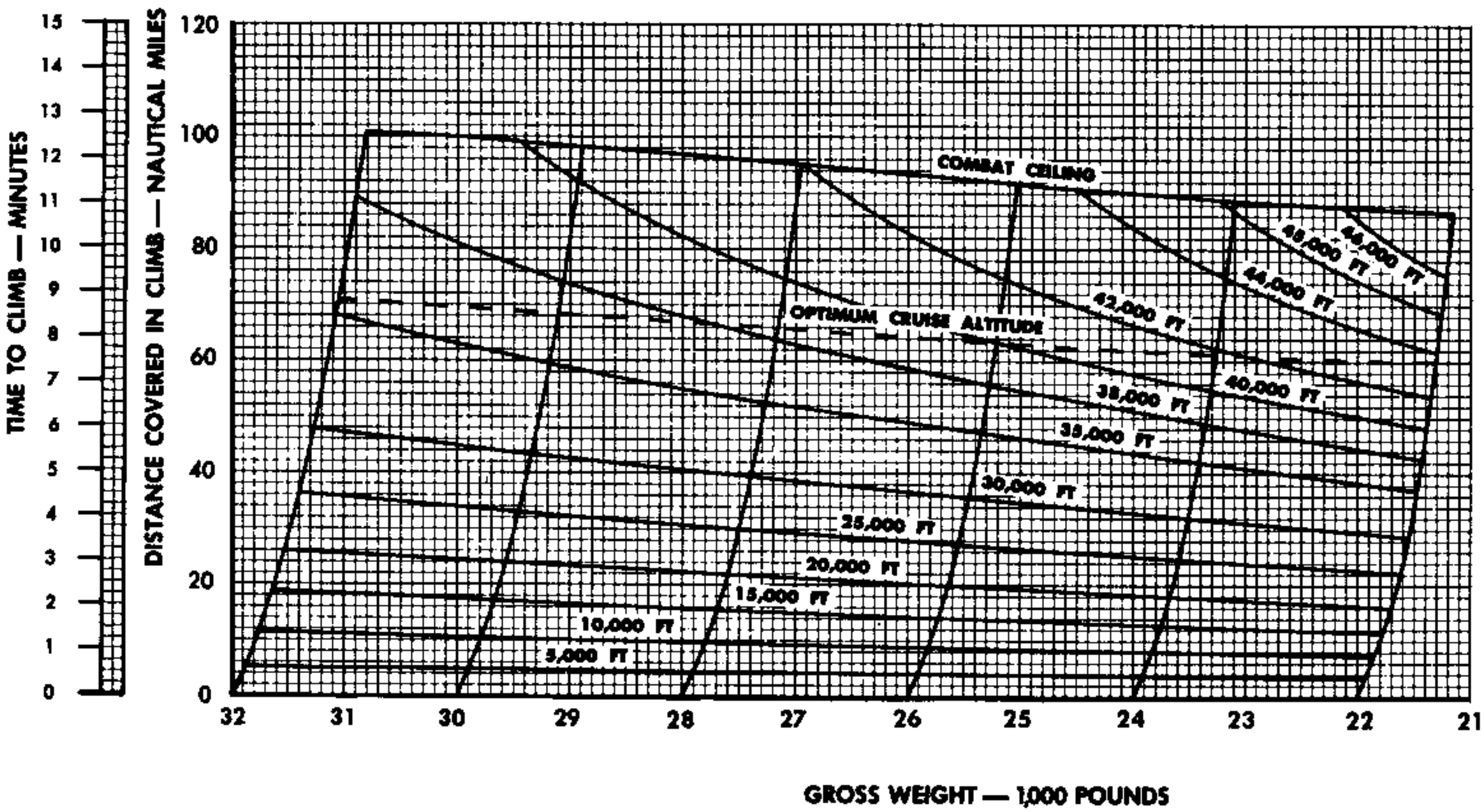
Figure 11-19

CLIMB CONTROL

MILITARY THRUST — CONFIGURATION I
Standard Day
Cruise Condition — Airspeed Below 300 KIAS

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEEDS

Altitude Feet	CAS Knots	Mach No.
S. L.	480	.73
10,000	421	.75
20,000	363	.78
30,000	312	.82
40,000	255	.84
50,000	202	.84

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:
   - Distance — 4%
   - Time — 4%
   - Fuel — 2%
2. Maximum endurance altitude is 30,000 feet.
3. For field takeoff add 2 minutes and 300 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 480 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-48NA

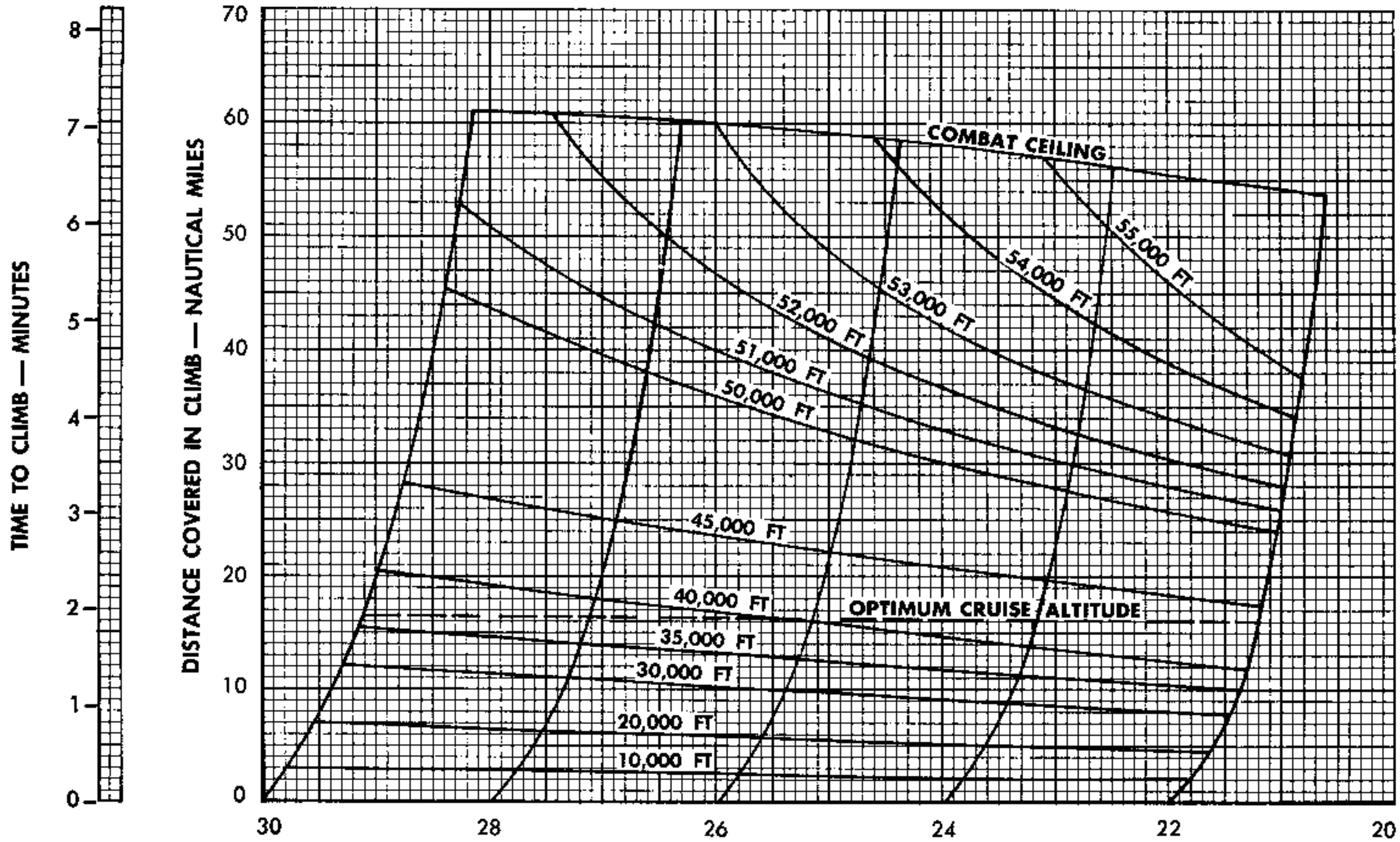
Figure 11-20 (Sheet 1)

CLIMB CONTROL

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

MAXIMUM THRUST — CONFIGURATION I
Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude Feet	CAS Knots
S. L.	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195
60,000	175

NOTES

1. For each 1°C above standard day temperature increase value obtained as follows:
   Distance — 2%
   Time — 2.5%
   Fuel — 1%
2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 30,000 feet.
4. For field takeoff add 1.0 min. and 500 lb. for time and fuel from release of brakes.

63802-A-49NA

Figure 11-20 (Sheet 2)

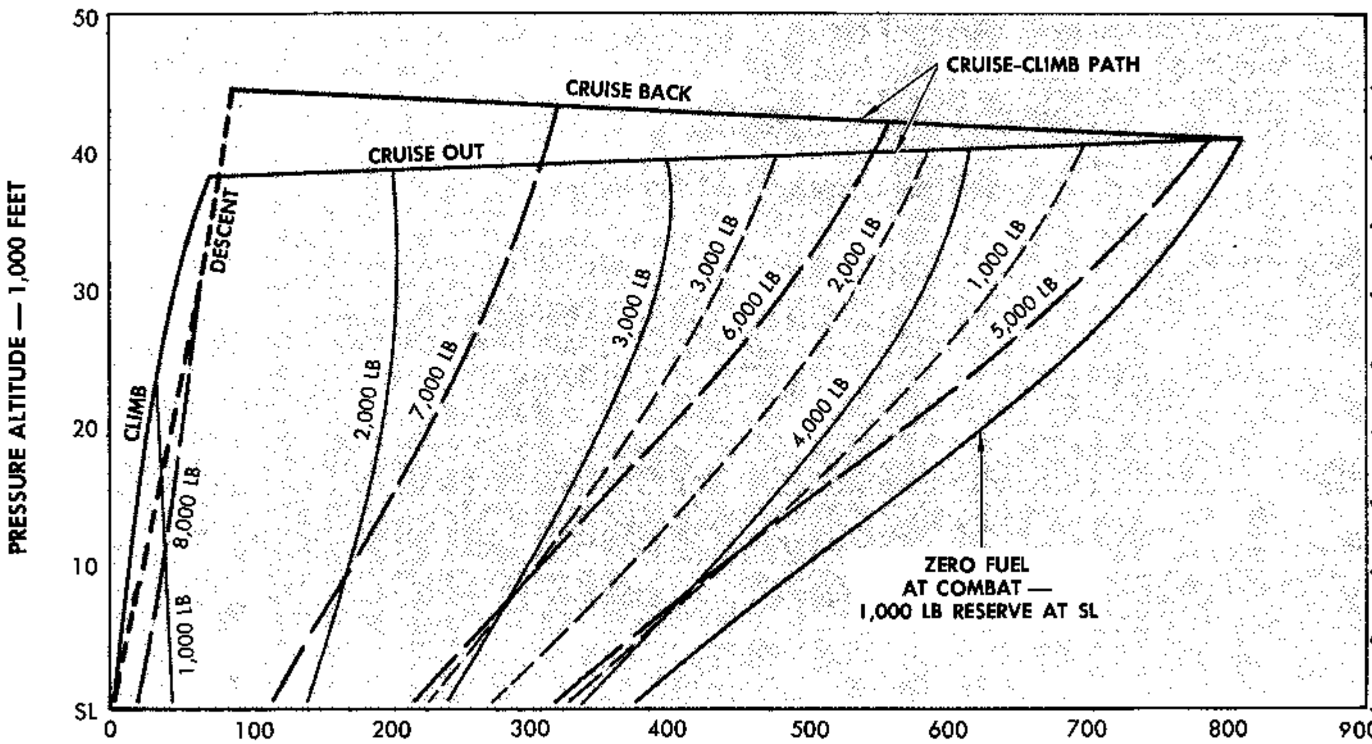
COMBAT RADIUS PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

IDLE THRUST DESCENT — CONSTANT 240 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE–FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.80	305
20,000	0.67	310
10,000	0.58	324
S.L	0.53	350

LEGEND

- ——— CLIMB AND CRUISE–CLIMB PATHS
- – – – – DESCENT PATH
- — — — COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- —— —— TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802–A–78NA

Figure 11–21

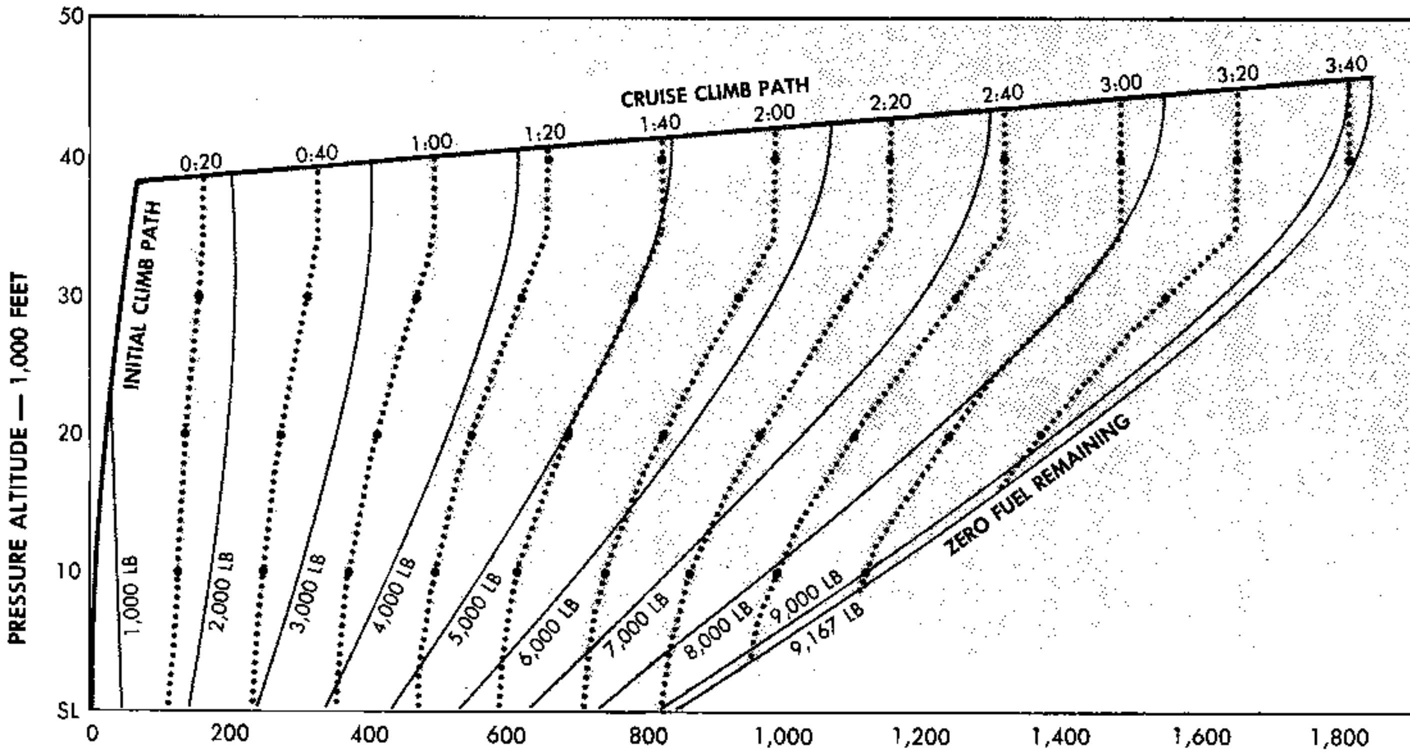
MISSION PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- ——— FLIGHT PATH
- ··•········•·· TIME TO CLIMB AND CRUISE
- ——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, decent, landing, or reserve fuel.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.80	305
20,000	0.67	310
10,000	0.58	324
S L	0.53	350

63802-A-76NA

Figure 11–22

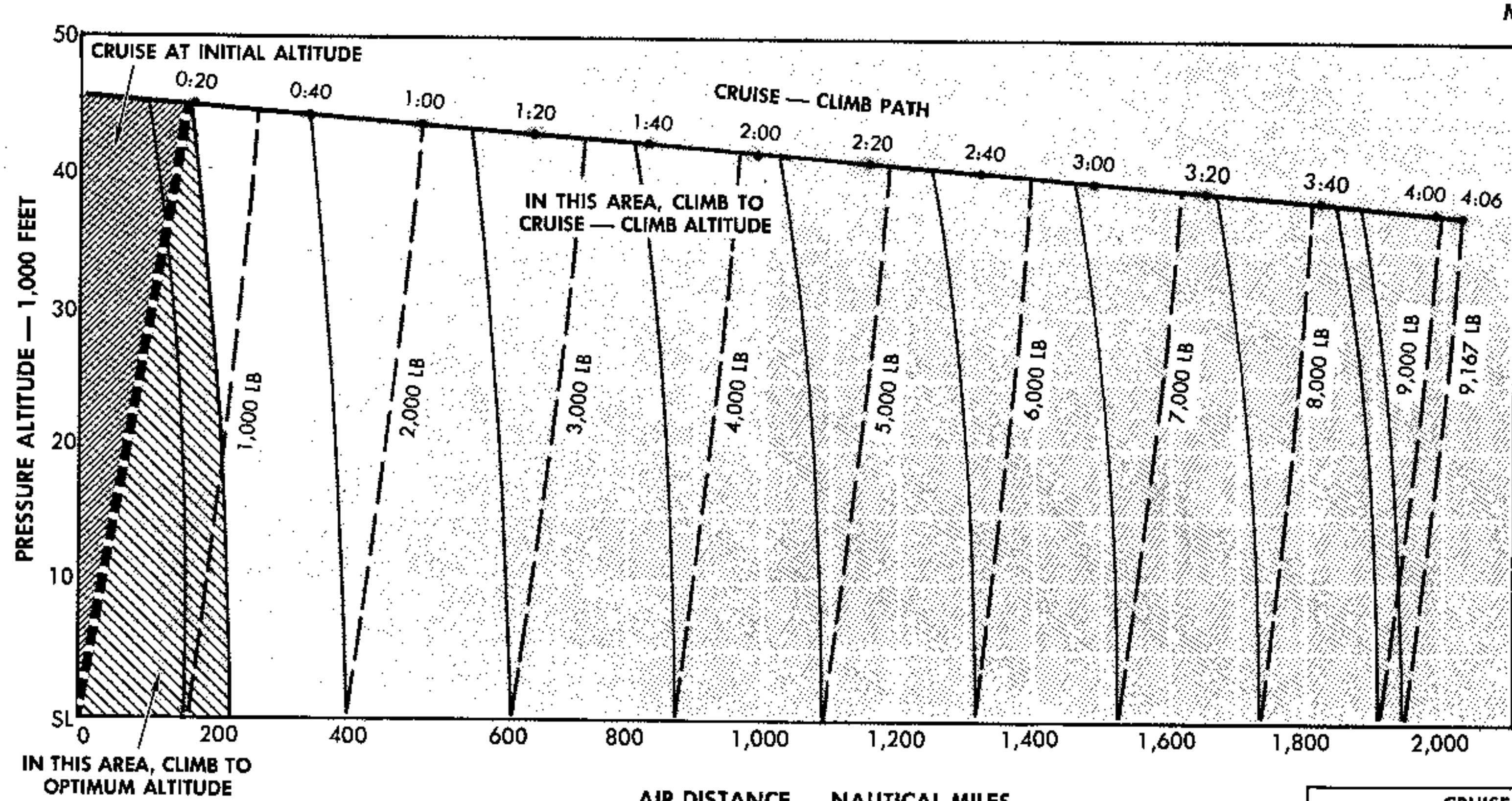
OPTIMUM RETURN PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- CRUISE–CLIMB PATH (WITH TIME AT CRUISE–CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE		
ALTITUDE–FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.80	305
20,000	0.67	310
10,000	0.58	324
S L.	0.53	350

63802–A–72NA

Figure 11–23

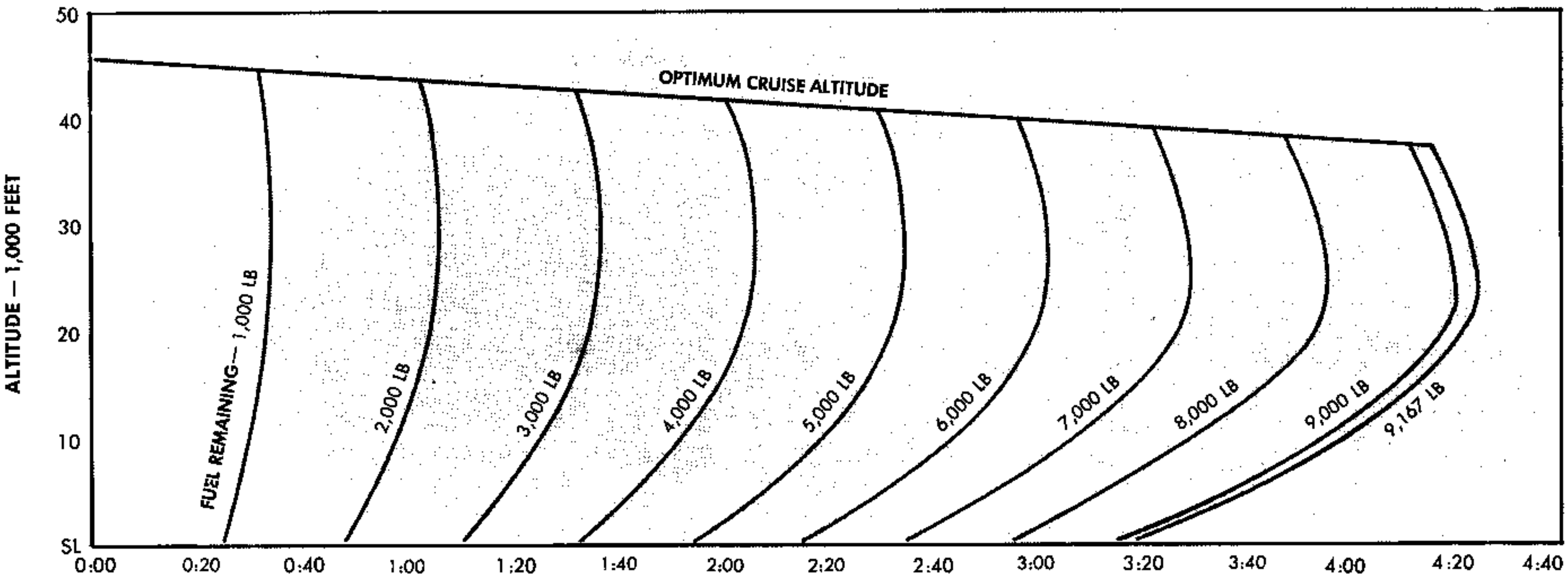
MAXIMUM ENDURANCE PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



OPTIMUM LOITER SPEED	
ALTITUDE	KNOTS CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240
45,000	250

NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

63802-A-74NA

Figure 11–24

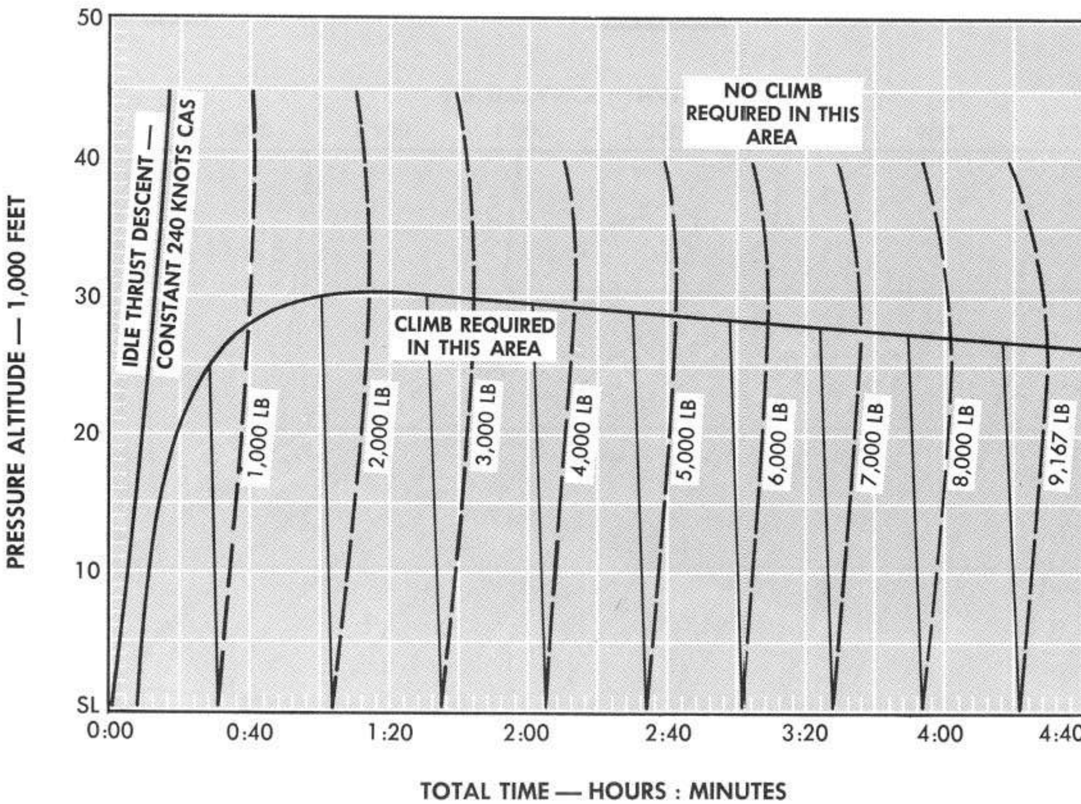
OPTIMUM ENDURANCE PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
50	—	—
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- OPTIMUM ENDURANCE ALTITUDE
- CLIMB GUIDE LINES
- FUEL REMAINING

NOTES

1. Use military thrust for climb
2. Total time includes time to climb, loiter and descend to sea level.
3. No allowance is made for landing or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240
45,000	250

63802—A—70NA

Figure 11–25

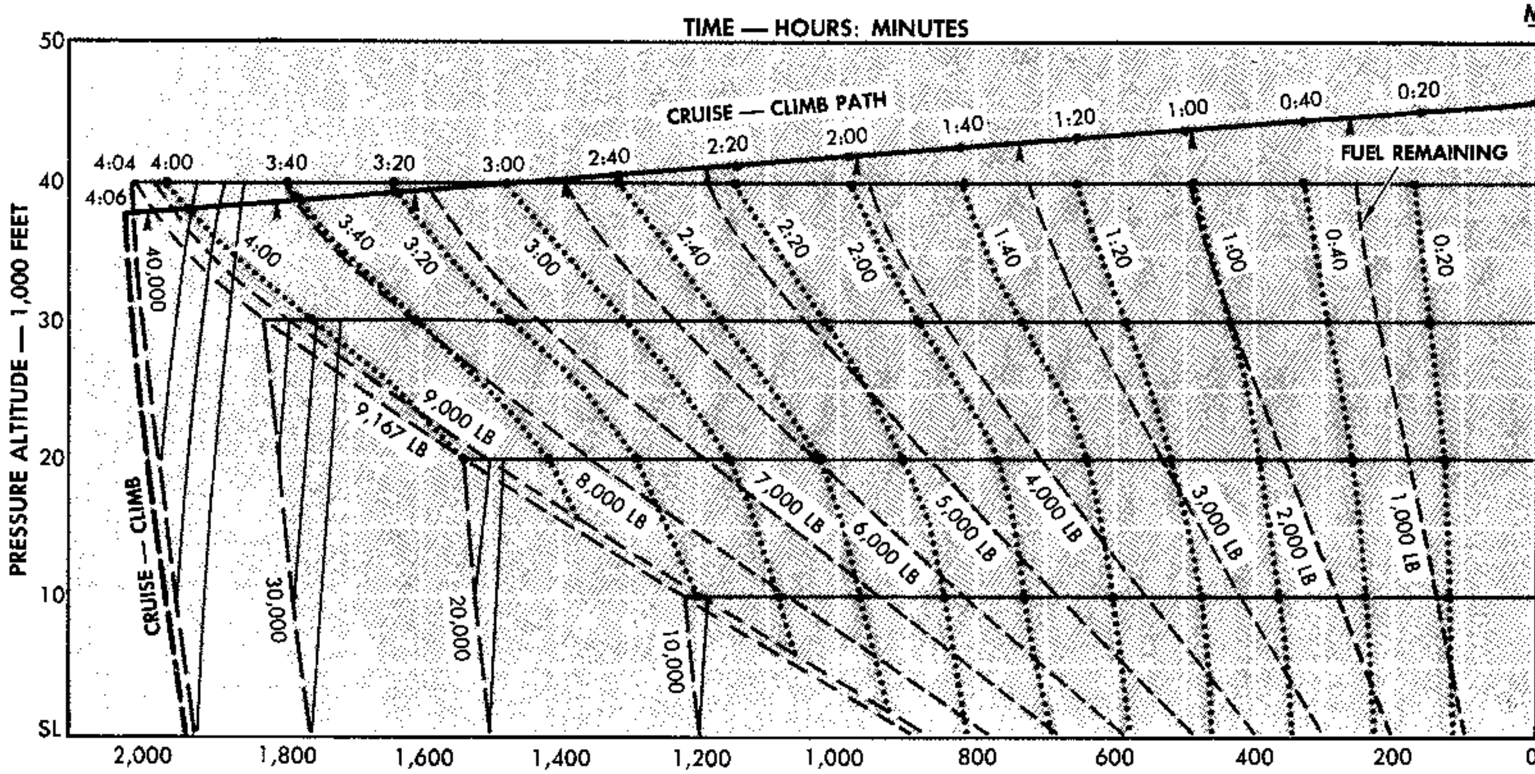
AIR REFUELING PROFILE

CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 28,502 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE

ALTITUDE-FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.80	305
20,000	0.67	310
10,000	0.58	324
S L.	0.53	350

63802-A-68NA

Figure 11–26

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL—CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

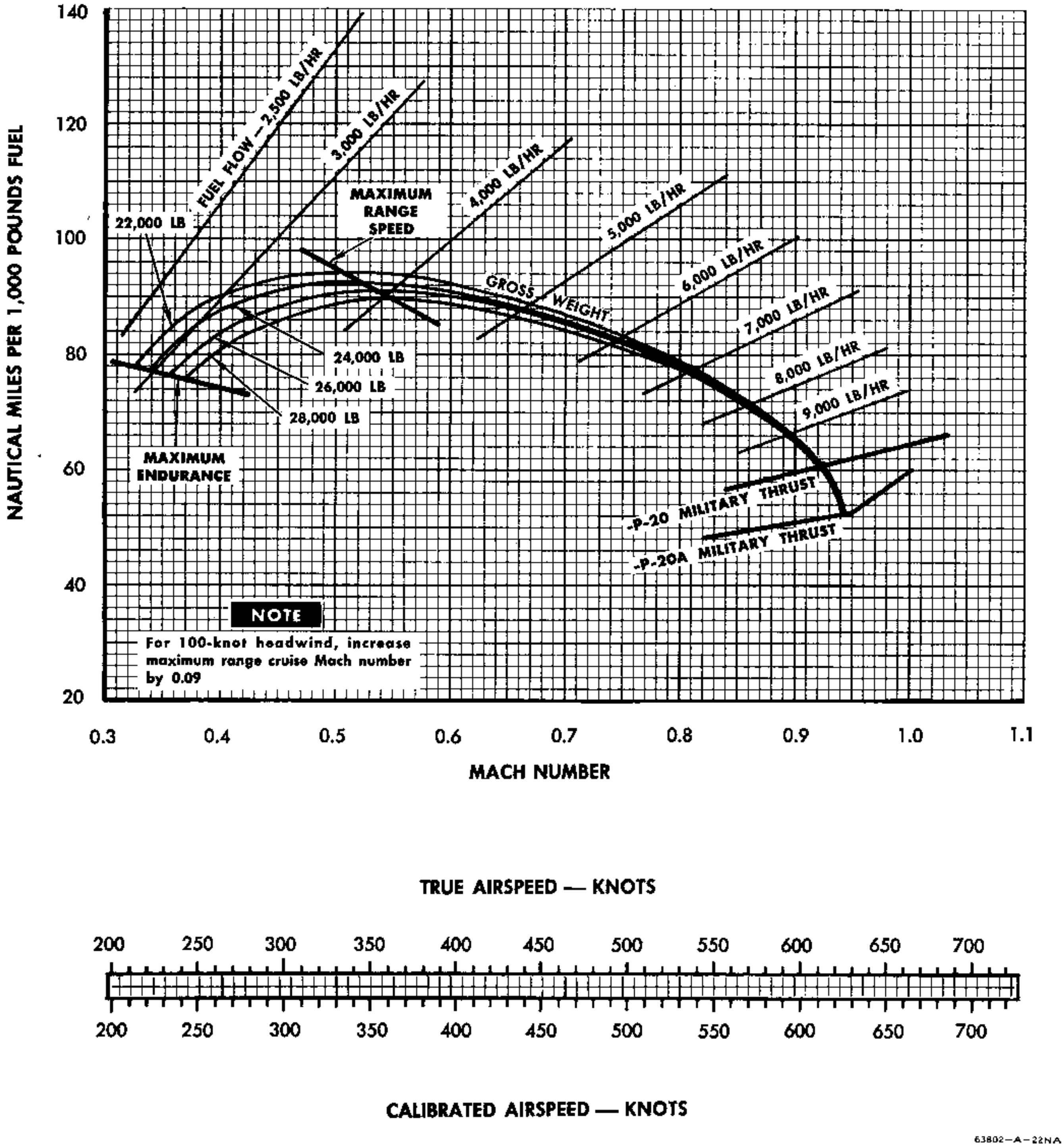


Figure 11-27 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

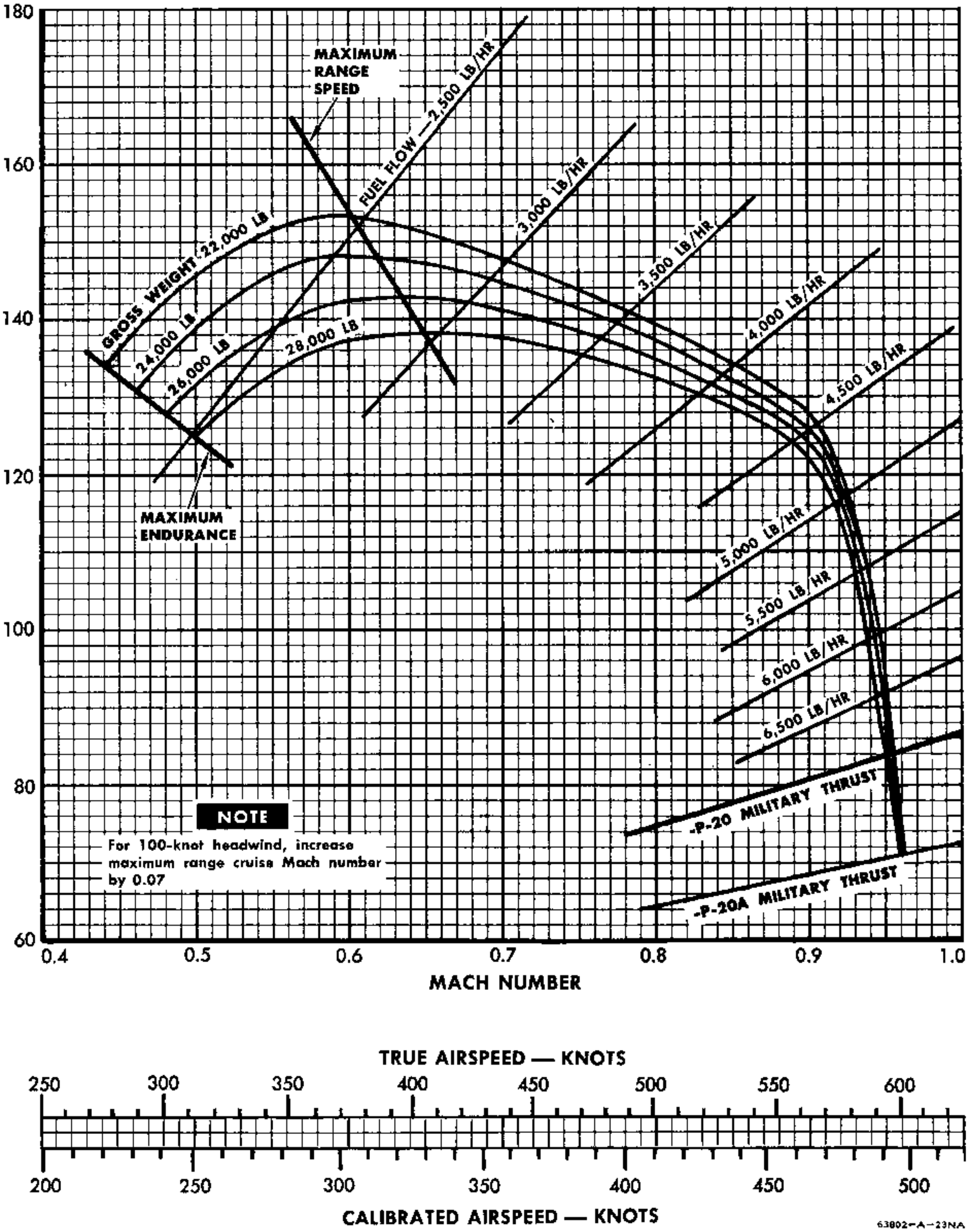


Figure 11–27 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.83 MN

ENGINES: J57-P-20, -P-20A

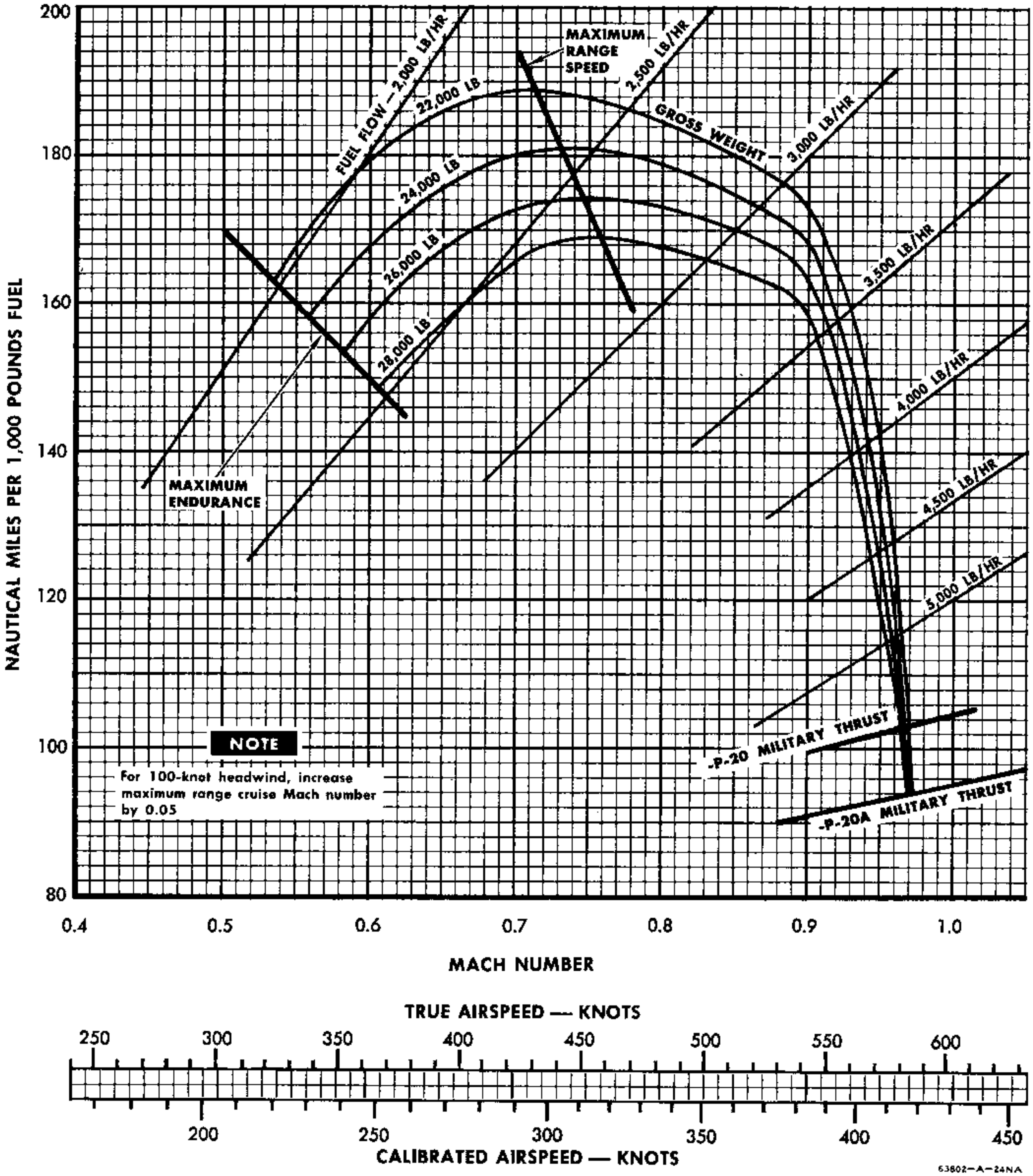


Figure 11–27 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET —CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

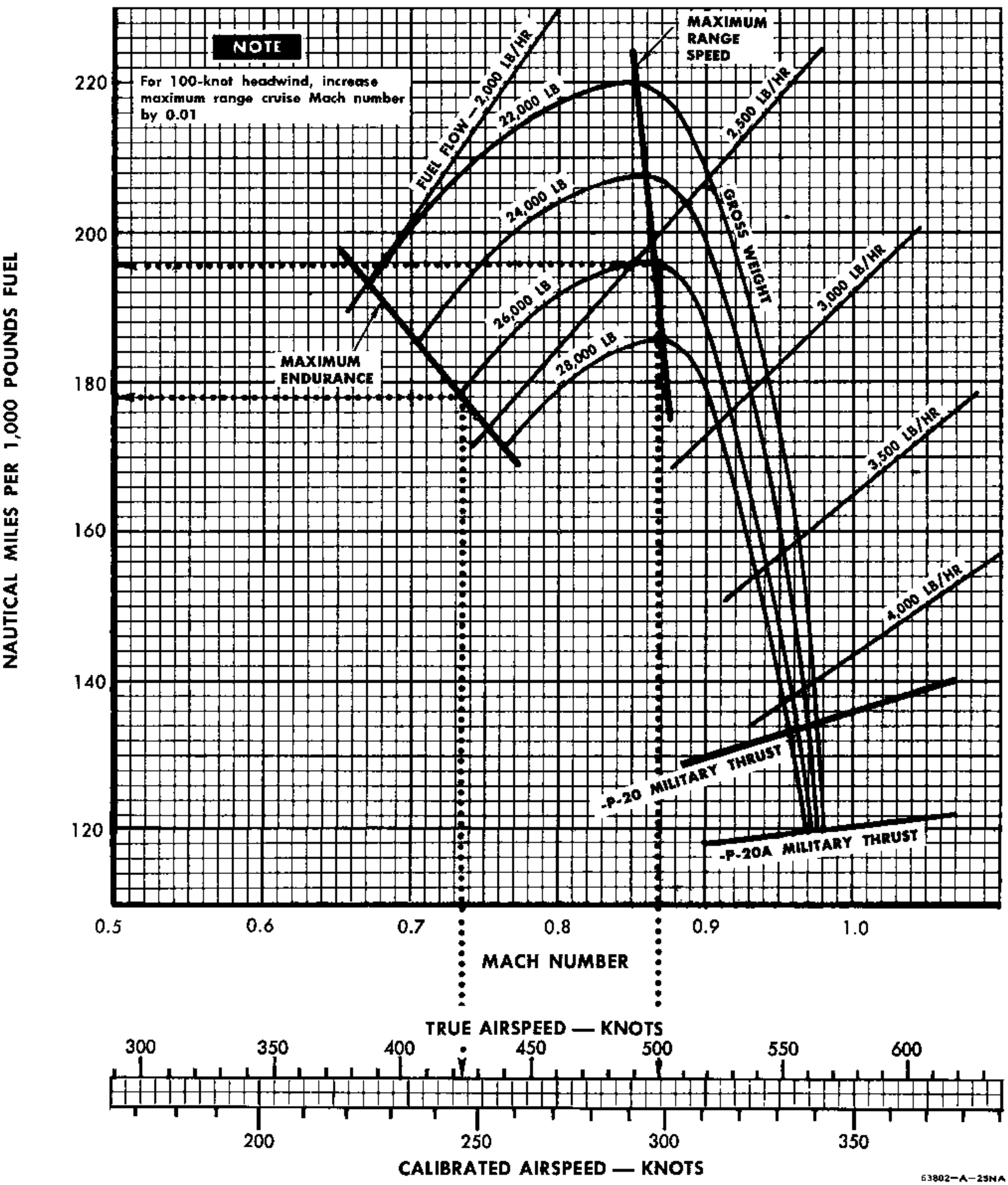


Figure 11–27 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

40,000 FEET—CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.93 MN

ENGINES: J57-P-20, -P-20A

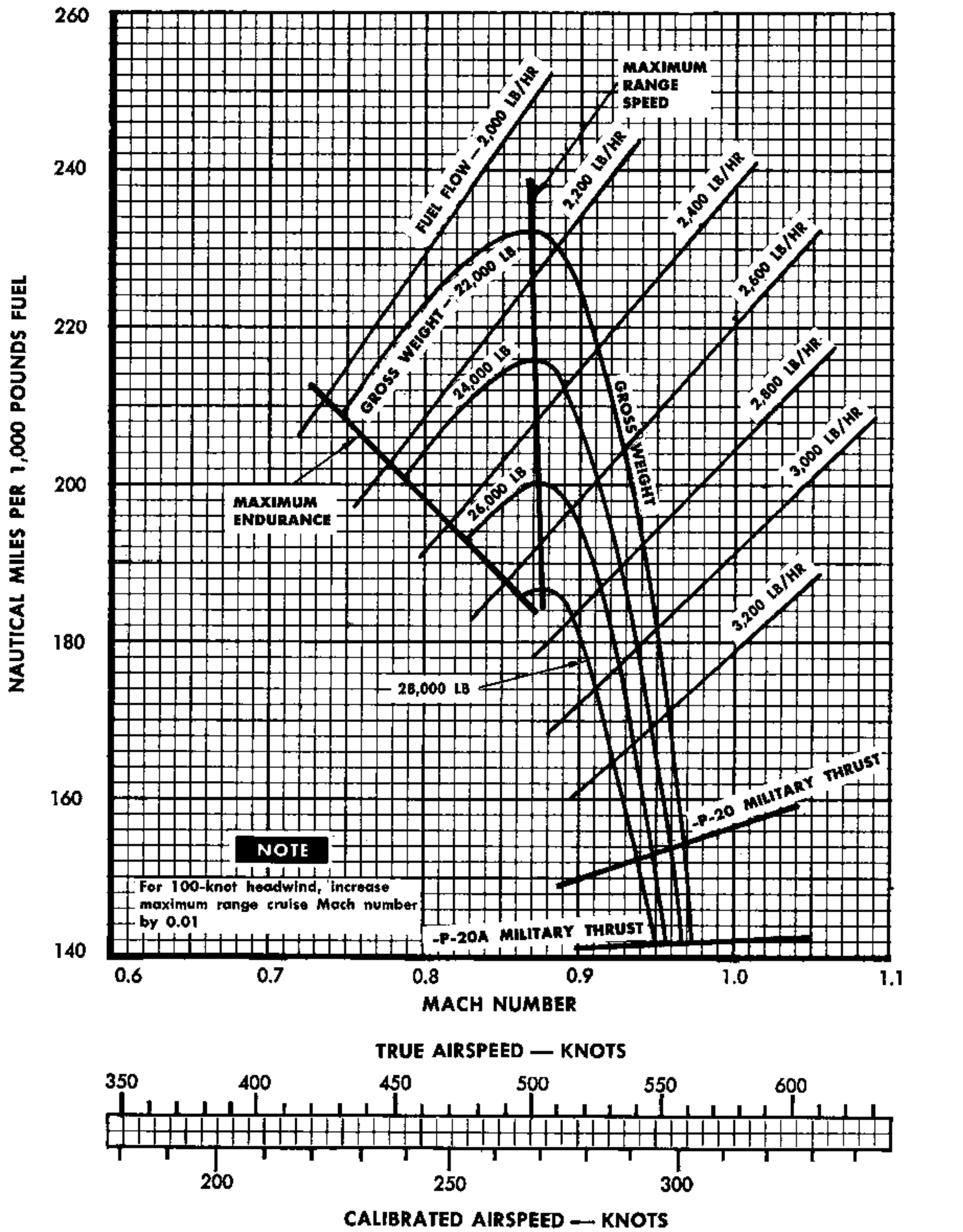


Figure 11–27 (Sheet 5)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

45,000 FEET—CONFIGURATION I

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.94 MN

ENGINES: J57-P-20, -P-20A

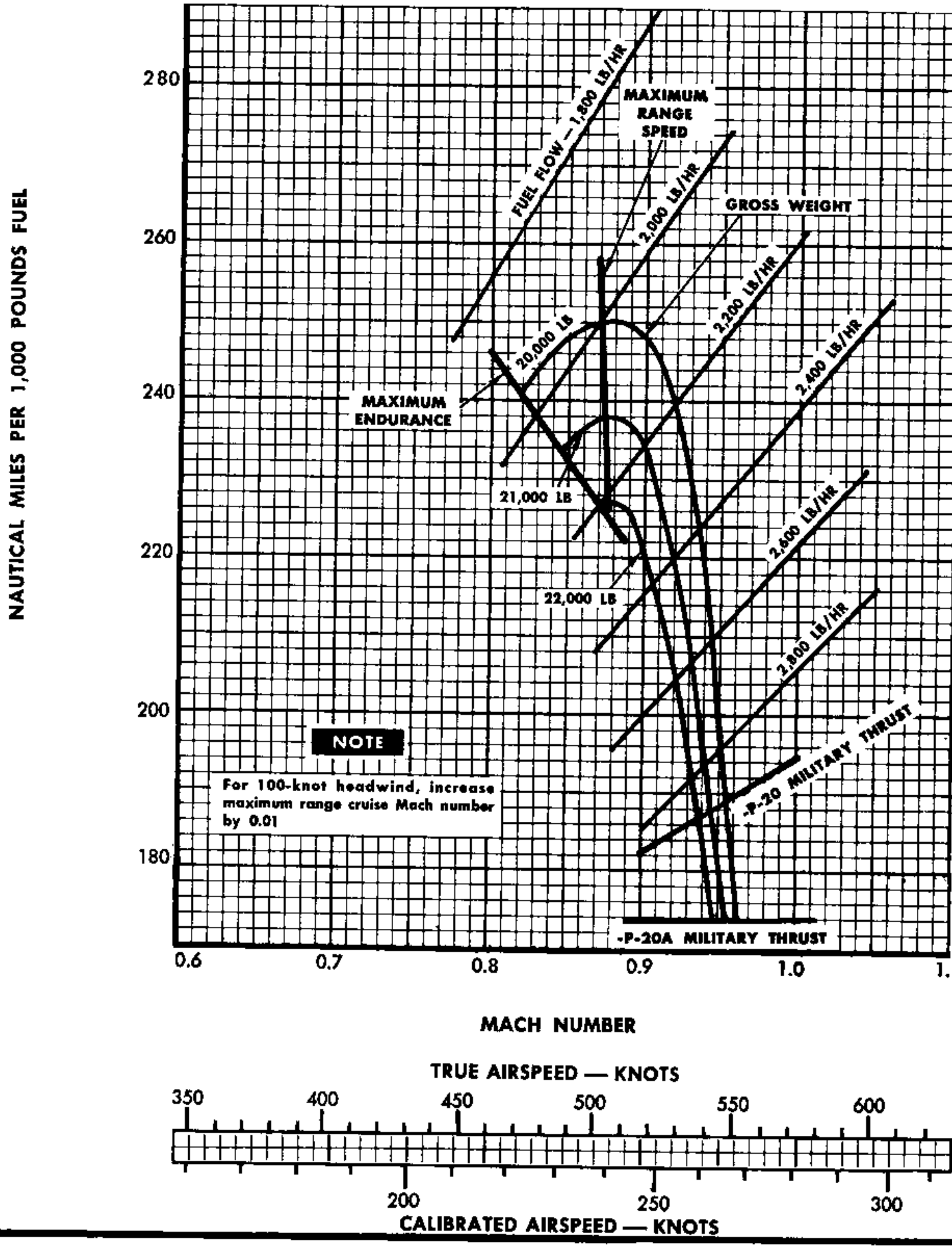
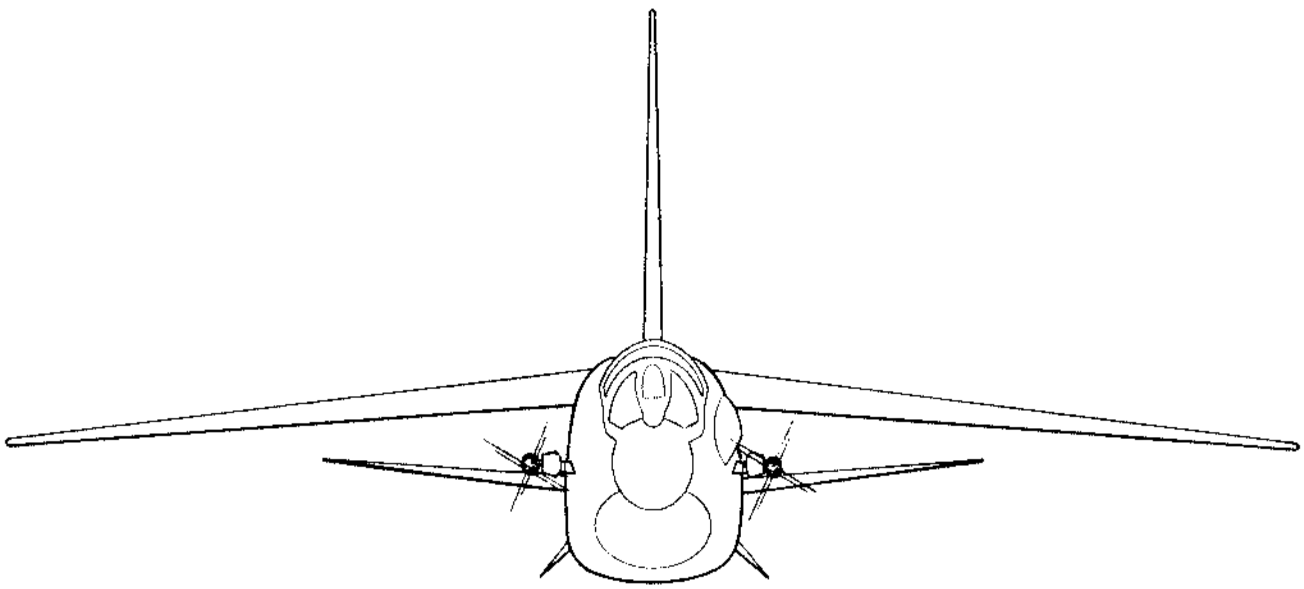


Figure 11-27 (Sheet 6)

CONFIGURATION II

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading – Two Sidewinders

Note

Refer to figure 11–1 for other Configuration II stores arrangements.

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Climb Control 115
Combat Radius Profile 117
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Optimum Return Profile 119
Maximum Endurance Profile 120
Optimum Endurance Profile 121
Air Refueling Profile 122
Nautical Miles/1,000 Pounds of Fuel 123

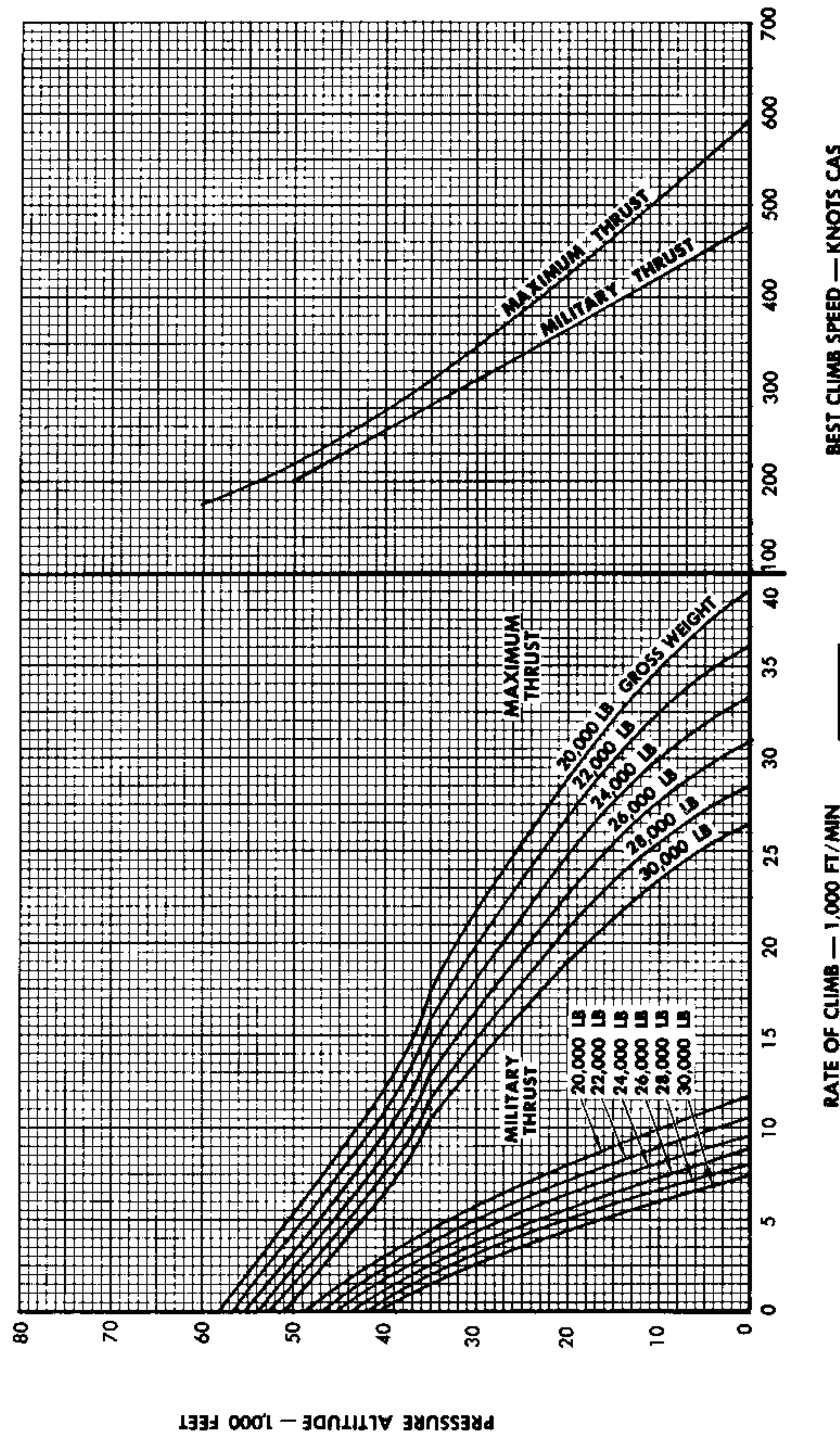
BEST CLIMB

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION II

Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-53NA

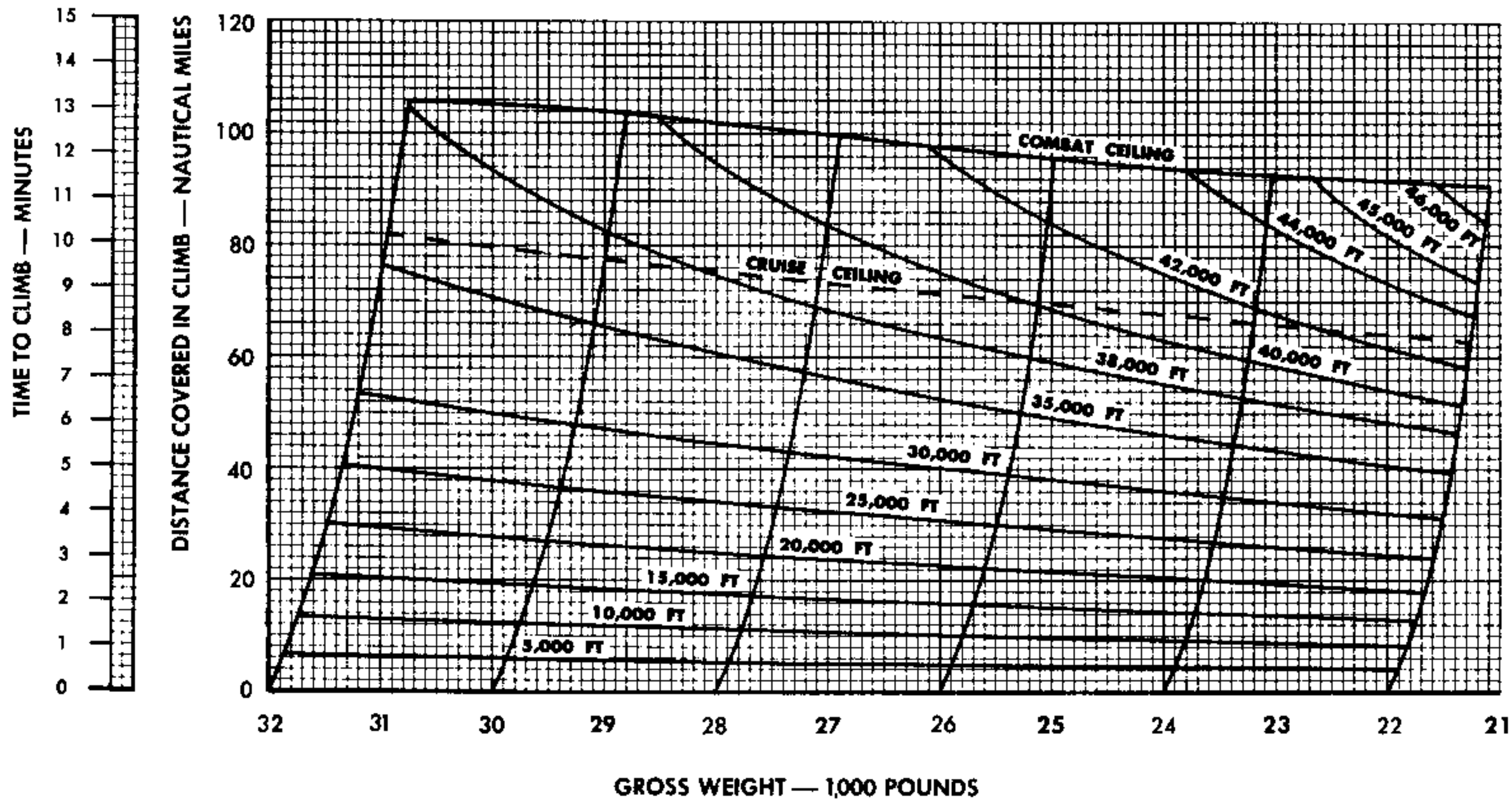
Figure 11-28

CLIMB CONTROL

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

MILITARY THRUST — CONFIGURATION II
Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEEDS

Altitude - Feet	CAS - Knots	Mach No.
S. L.	480	.73
10,000	421	.75
20,000	363	.78
30,000	312	.82
40,000	255	.84
50,000	202	.84

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:
   Distance — 4%
   Time — 4%
   Fuel — 2%
2. Maximum endurance altitude is 30,000 feet.
3. For field takeoff add 2 minutes and 300 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 480 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-50NA

Figure 11–29 (Sheet 1)

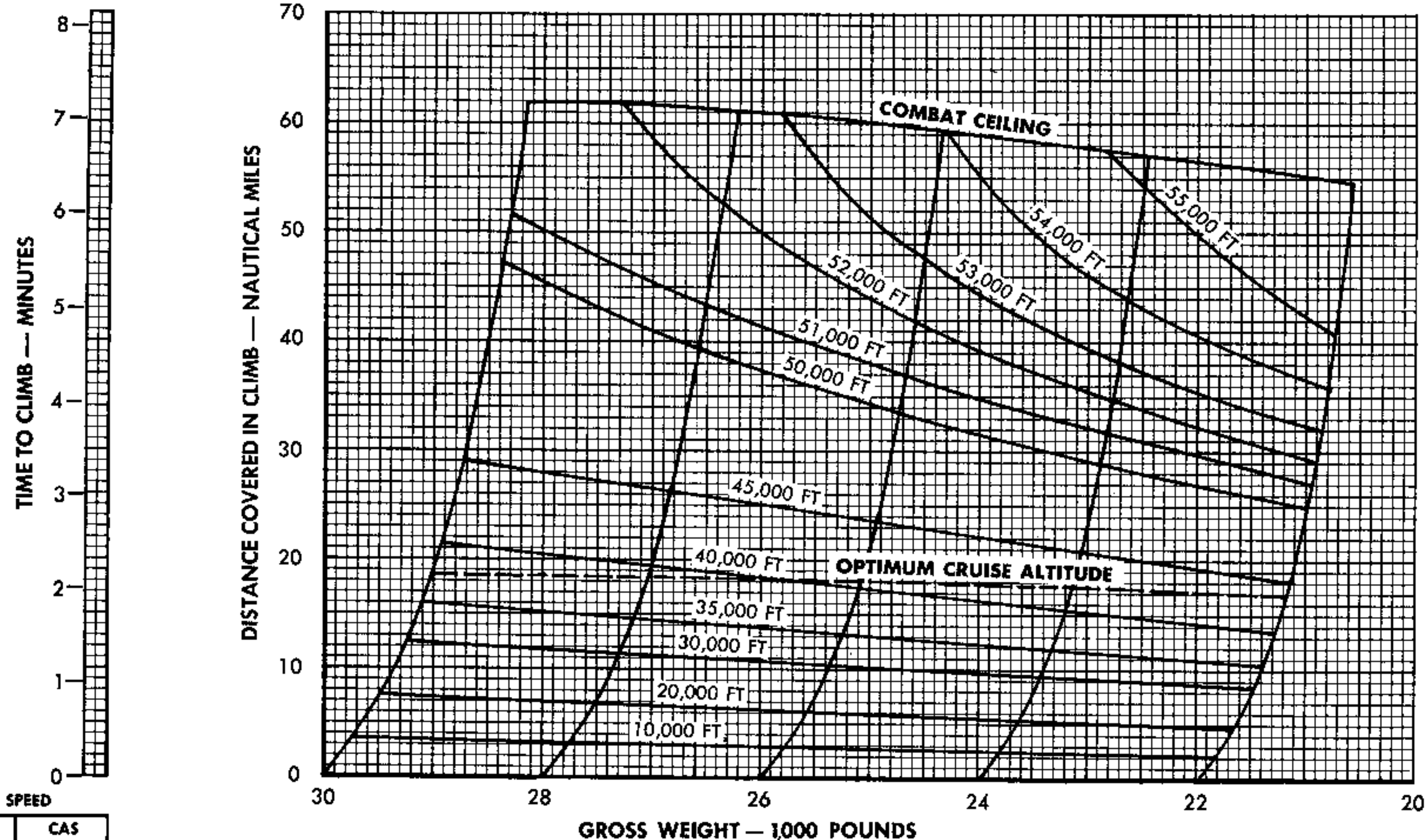
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude Feet	CAS Knots
S. L.	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195
60,000	175

NOTES

1. For each 1°C above standard day temperature increase value obtained as follows:
   Distance — 2%
   Time — 2.5%
   Fuel — 1%
2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 30,000 feet.
4. For field takeoff add 1.0 min. and 500 lb. for time and fuel from release of brakes.

63802-A-51NA

Figure 11-29 (Sheet 2)

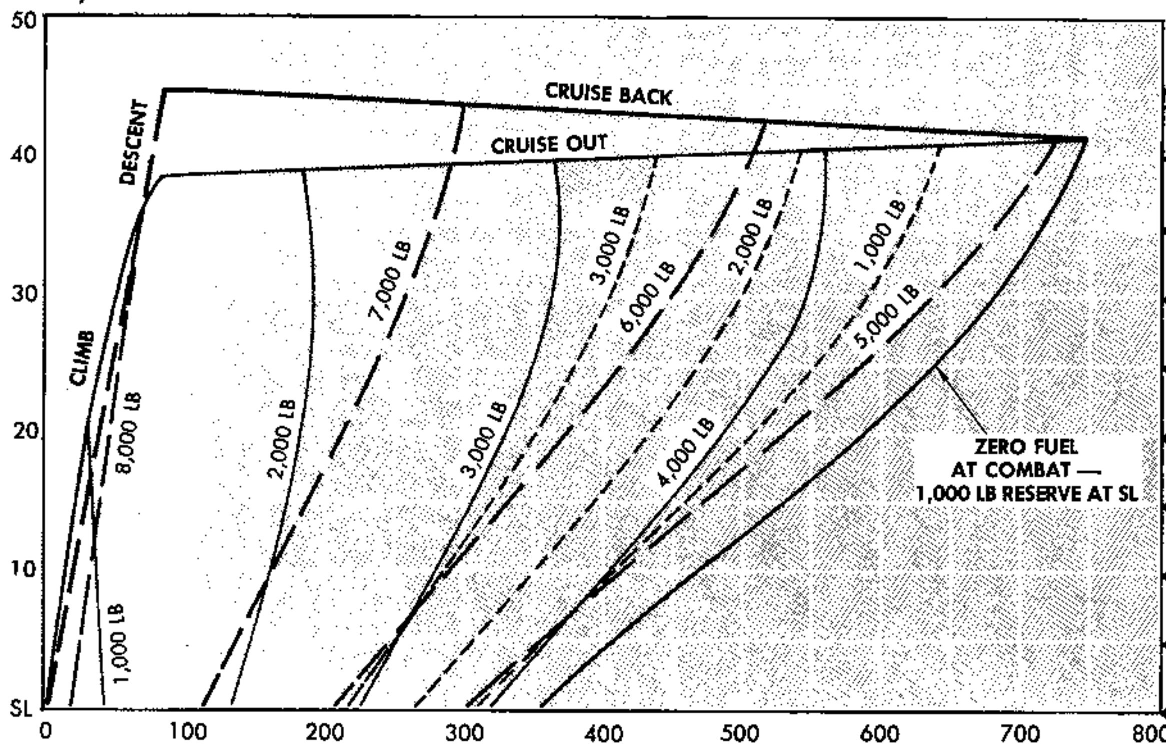
COMBAT RADIUS PROFILE

CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight 29,118 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT.	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

IDLE THRUST DESCENT — CONSTANT 240 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.66	305
10,000	0.57	316
SL	0.52	344

LEGEND

- ——— CLIMB AND CRUISE-CLIMB PATHS
- — — DESCENT PATH
- - - - COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- ——— TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802-A-54NA

Figure 11–30

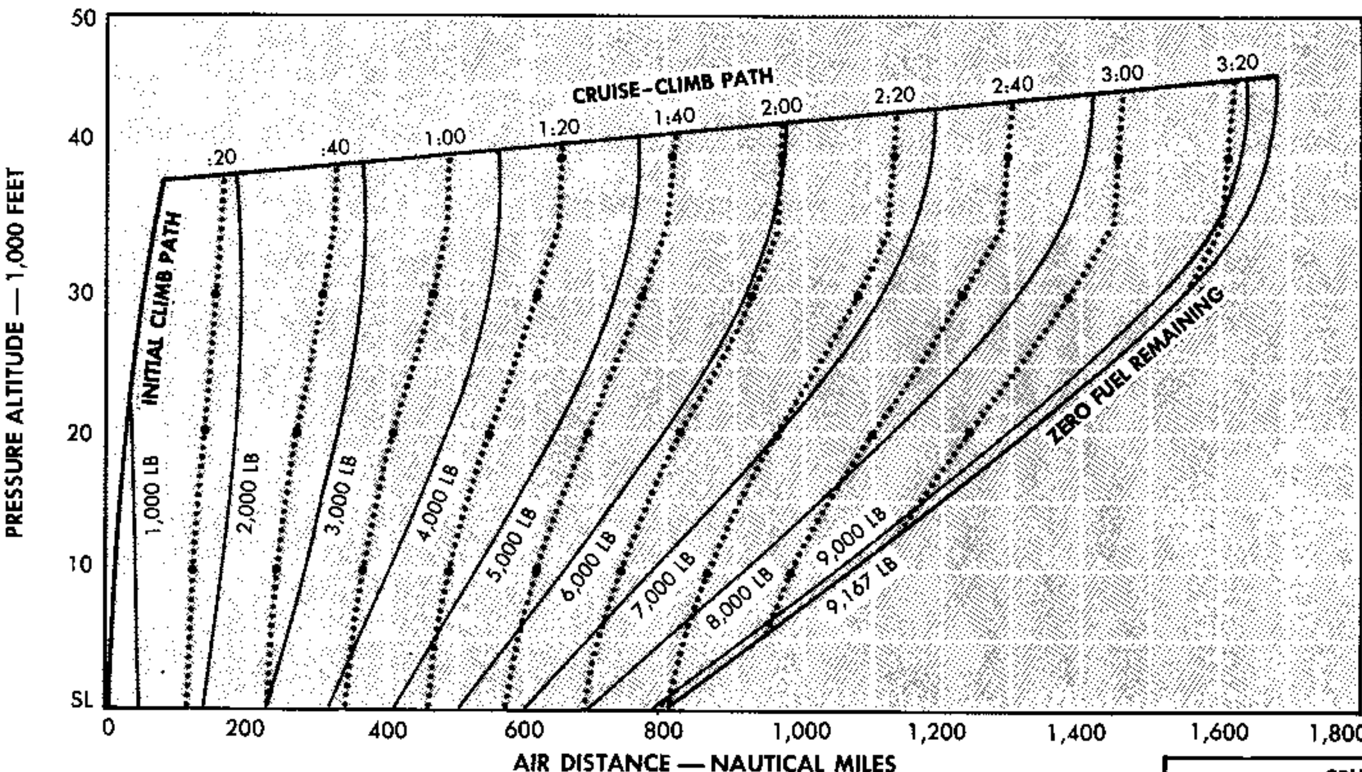
MISSION PROFILE

CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 29,118

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

LEGEND

——— FLIGHT PATH
••••••• TIME TO CLIMB AND CRUISE
——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.66	305
10,000	0.57	316
SL	0.52	344

63802—A—39NA

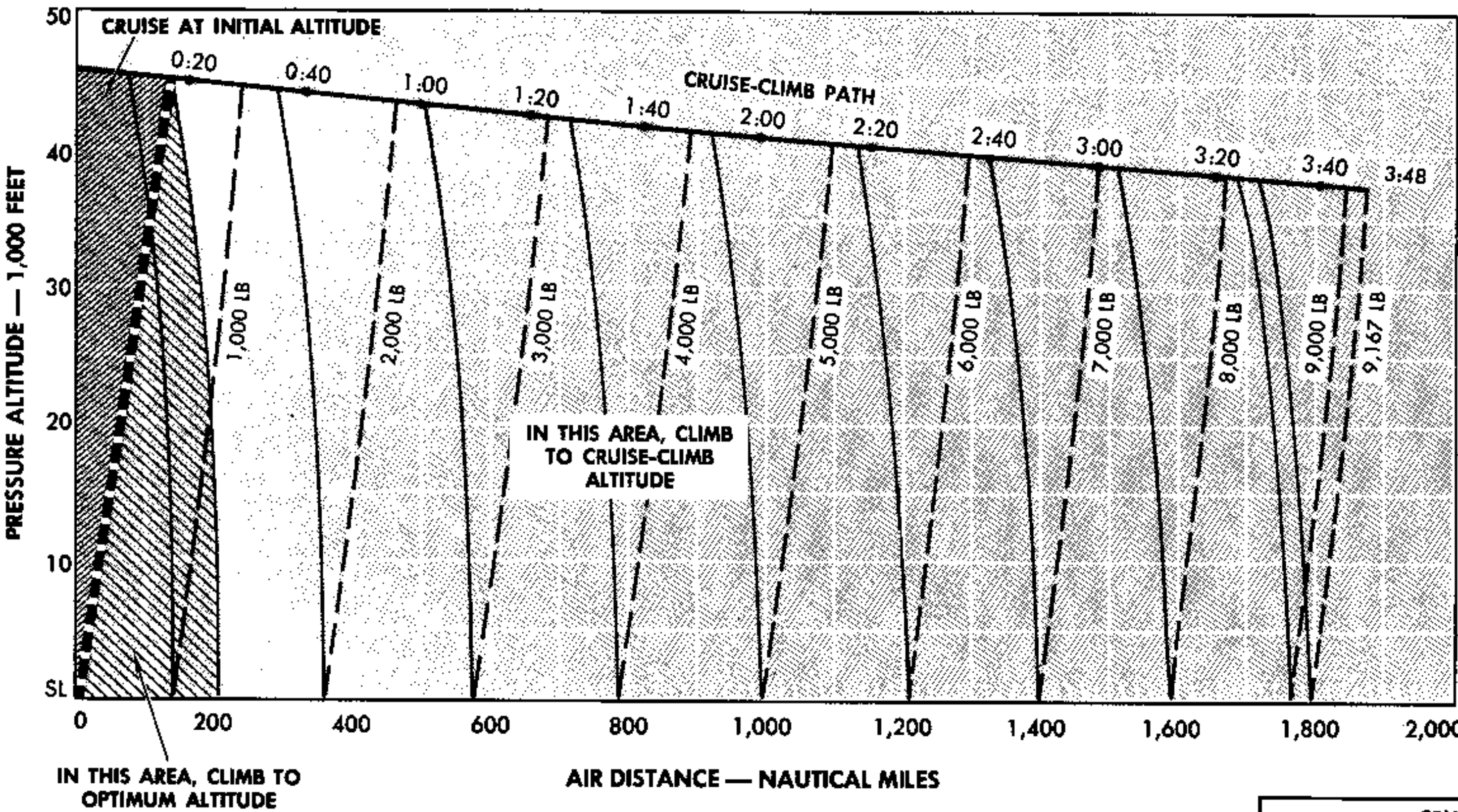
Figure 11–31

OPTIMUM RETURN PROFILE

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION II
Cruise Condition At All Altitudes
Initial Gross Weight 29,118 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.66	305
10,000	0.57	316
SL	0.52	344

63802—A—55NA

Figure 11–32

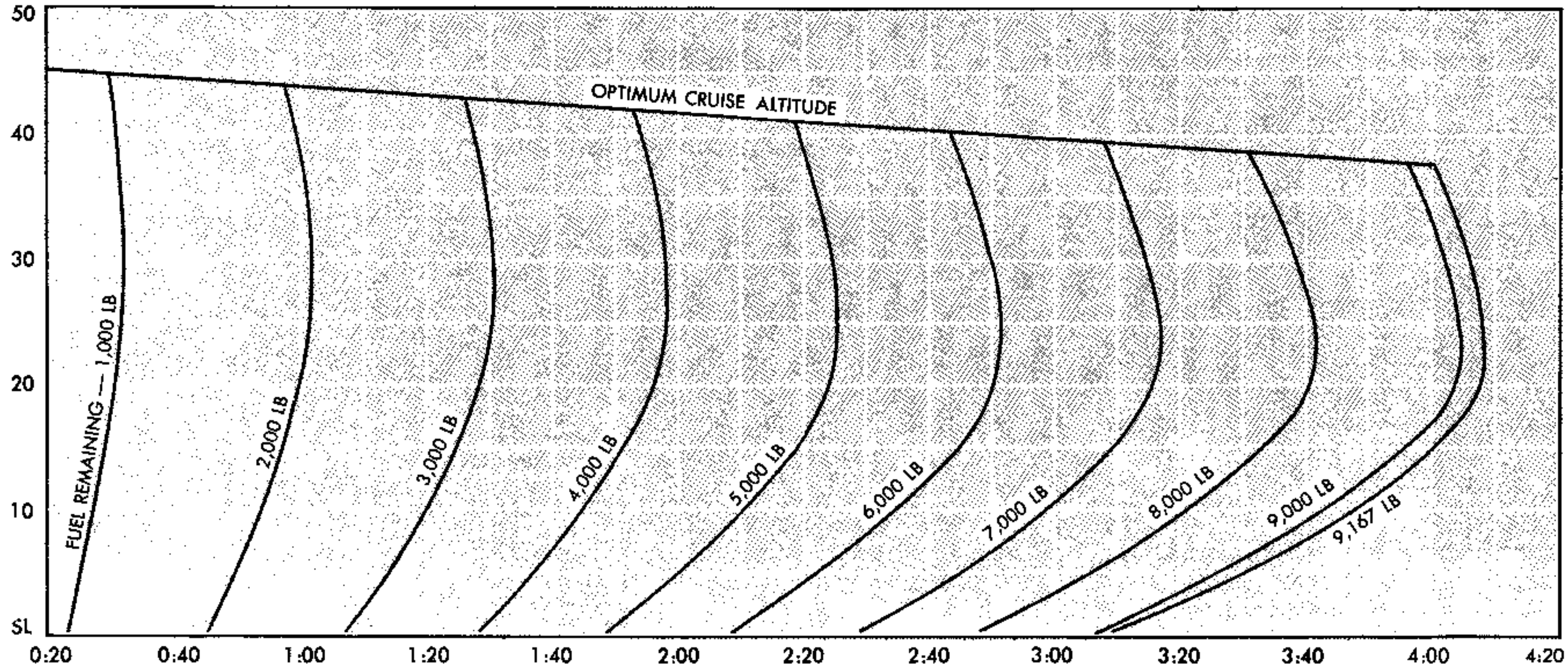
MAXIMUM ENDURANCE PROFILE

CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 29,118 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240
45,000	250

63802-A-56NA

Figure 11–33

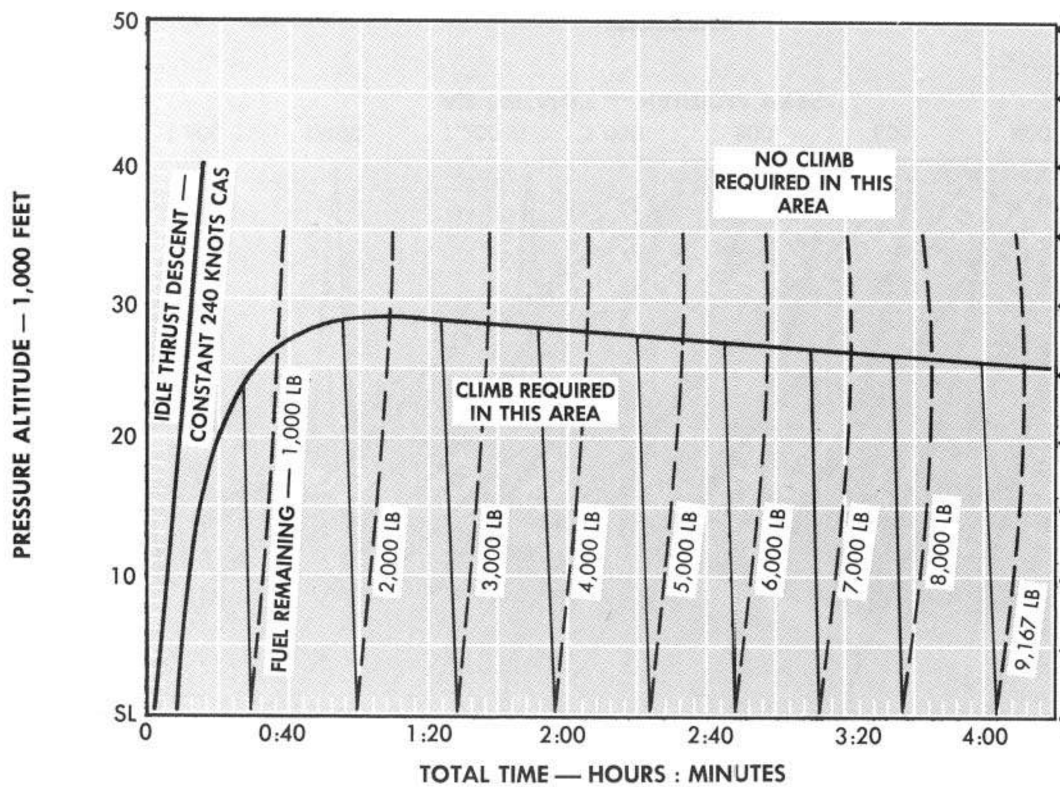
OPTIMUM ENDURANCE PROFILE

CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 29,118 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1000 FT	CAS	MACH NO.
50	—	—
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

LEGEND

——— OPTIMUM ENDURANCE ALTITUDE
——— CLIMB GUIDE LINES
— — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. Total time includes time to climb, loiter and descend to sea level.
3. No allowance is made for landing or reserve fuel.

OPTIMUM LOITER SPEED

ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240
45,000	250

63802—A—57NA

Figure 11–34

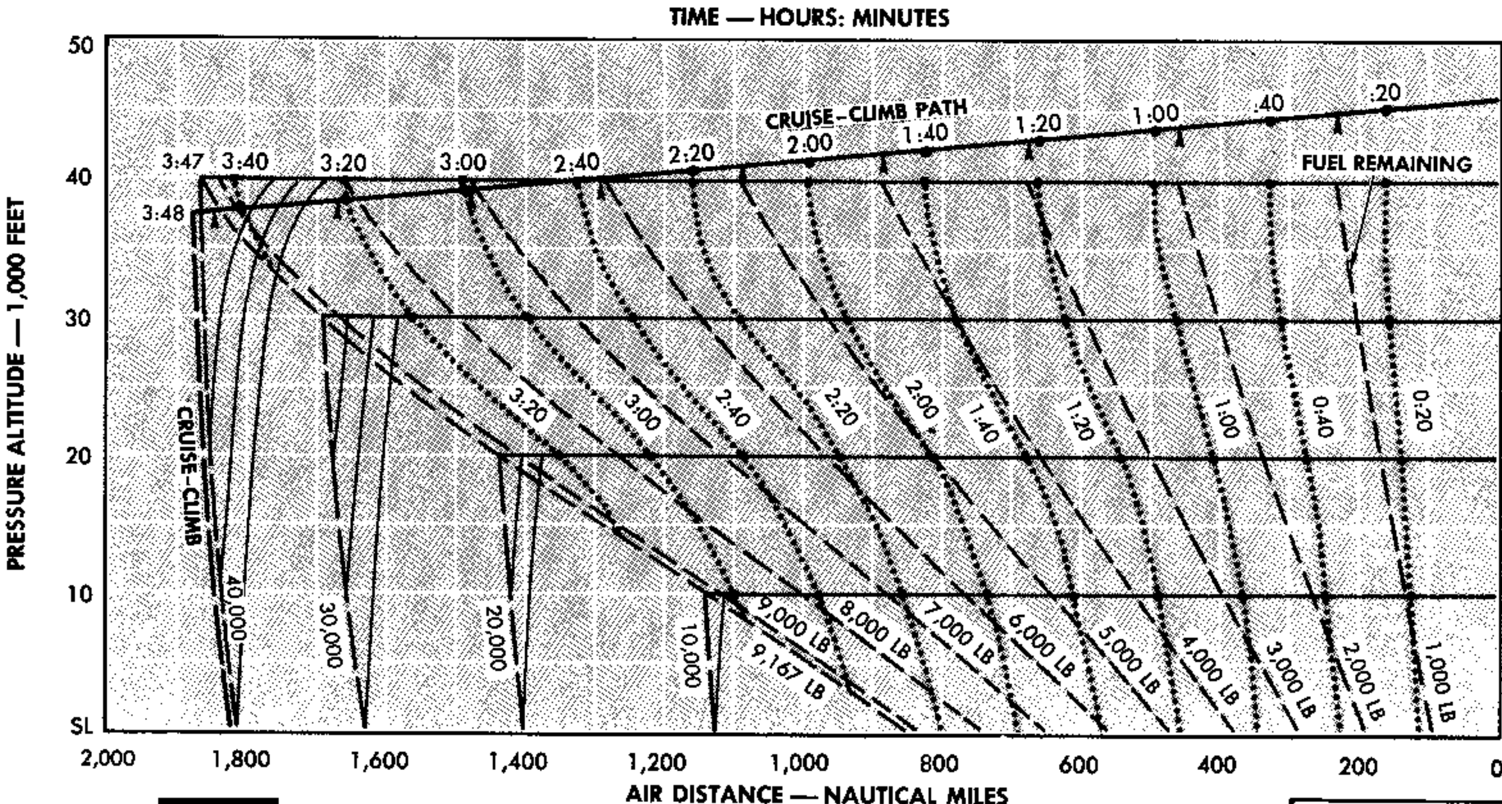
AIR REFUELING PROFILE

CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 29,118 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
SL	480	.73

LEGEND

- — — — FUEL REMAINING
- ——┬— CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- •••••• TIME TO CRUISE
- — — — CRUISE TO ZERO FUEL REMAINING
- ——— CONSTANT ALTITUDE CRUISE PATH
- ——— CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.79	300
20,000	0.66	305
10,000	0.57	316
SL	0.52	344

63802—A—58NA

Figure 11—35

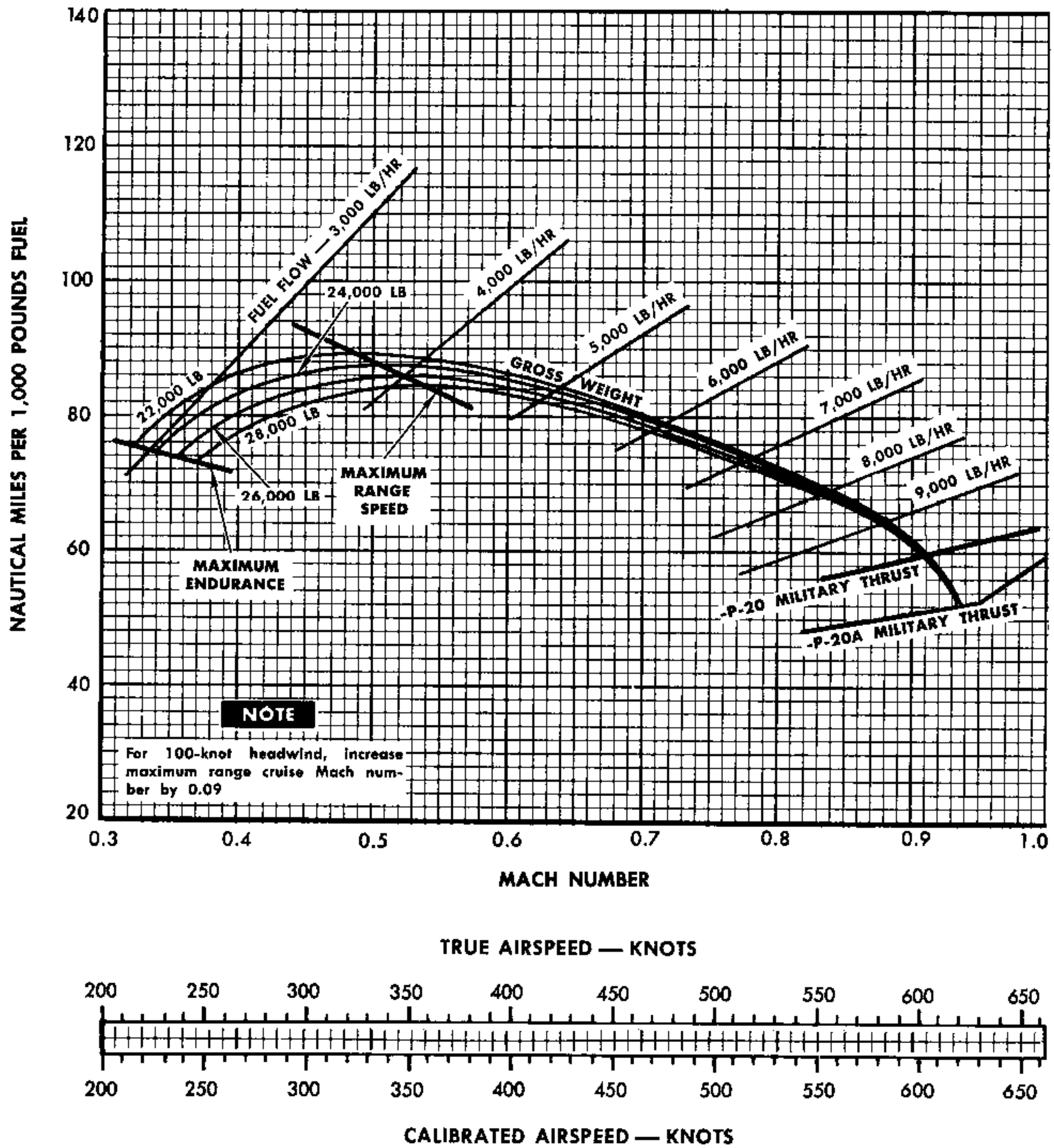
NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50MN

ENGINES: J57-P-20, -P-20A



63802-A-28NA

Figure 11-36 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET—CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

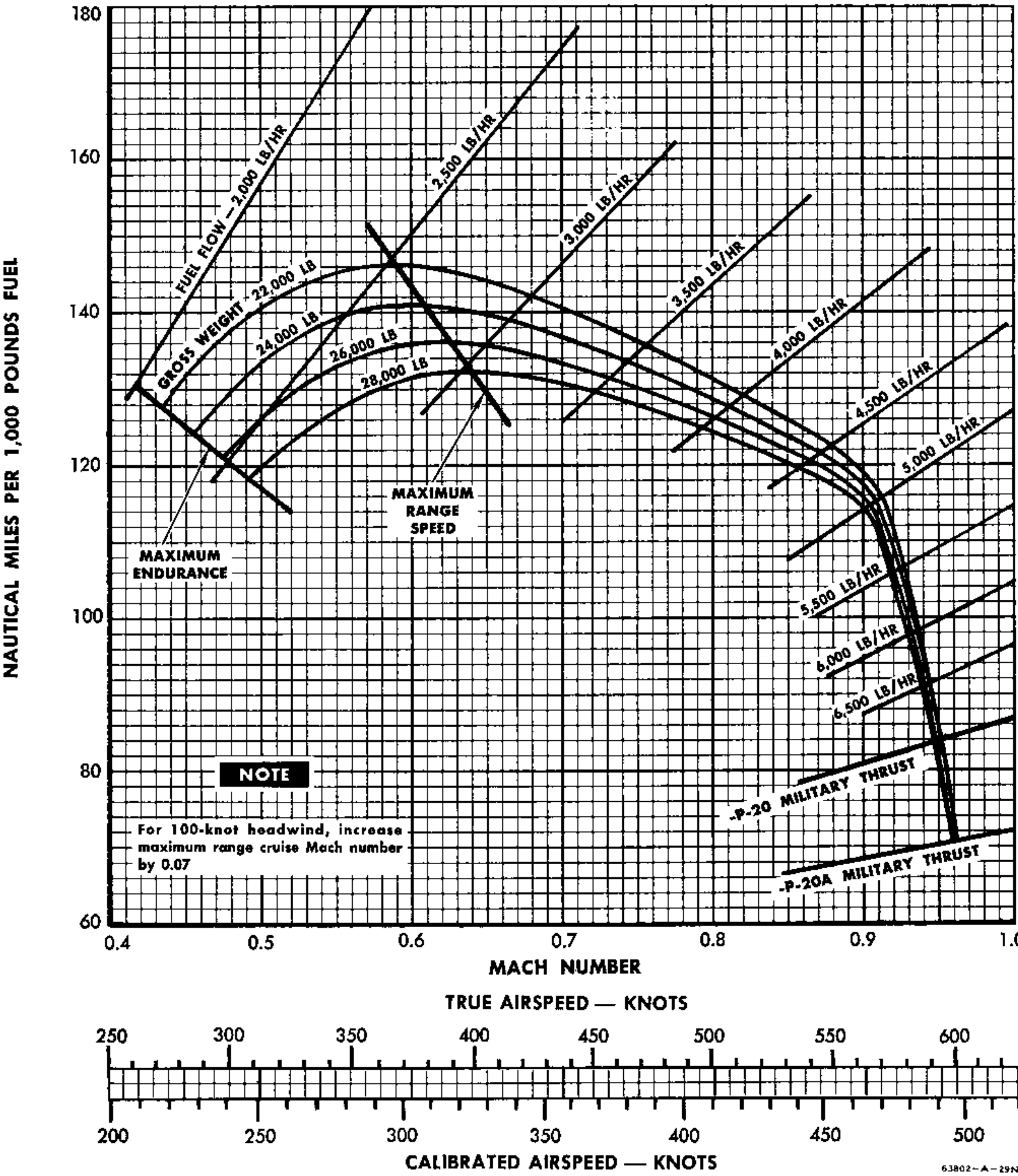


Figure 11–36 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET—CONFIGURATION II

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.89 MN

ENGINES: J57-P-20, -P-20A

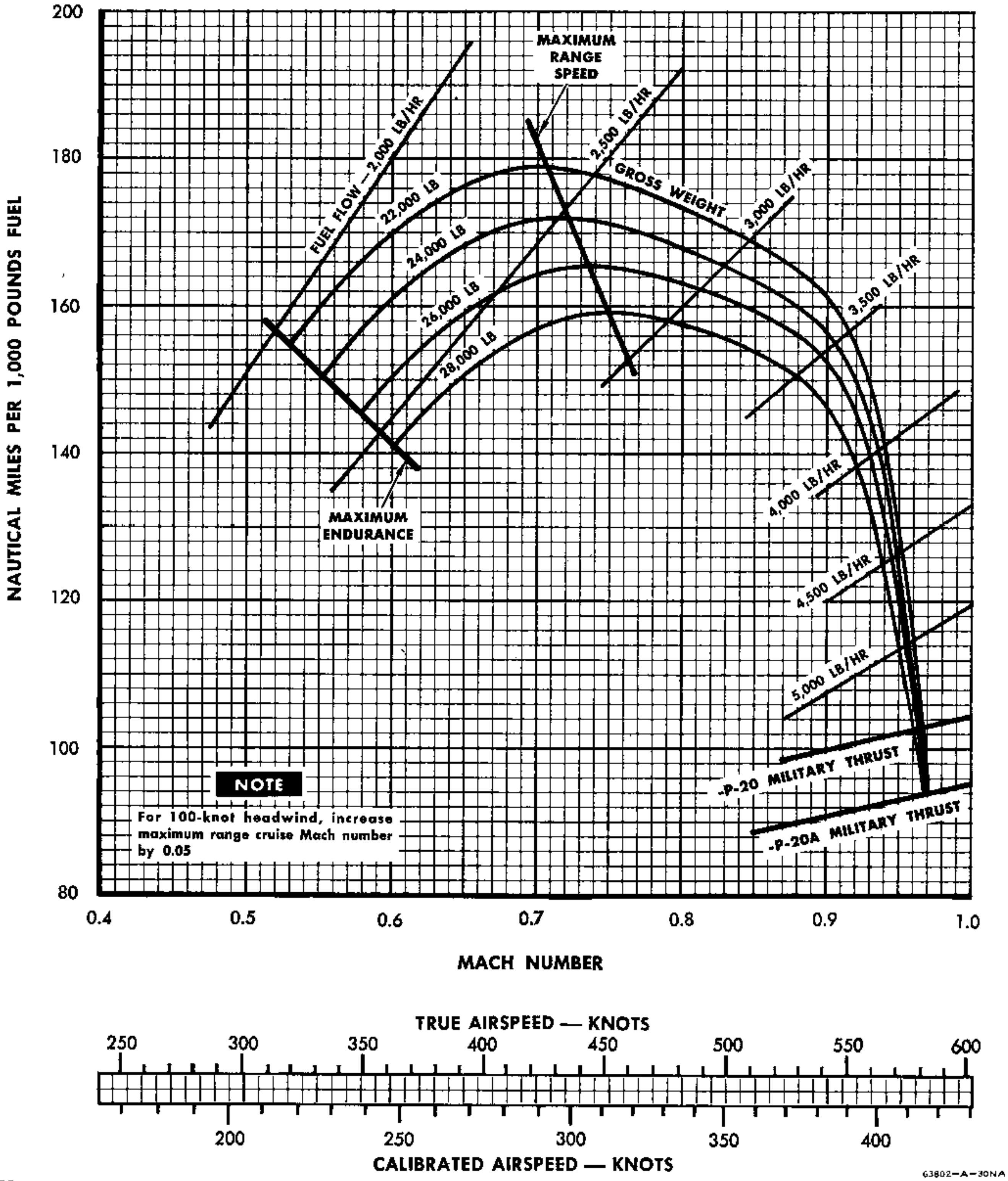


Figure 11–36 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET—CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

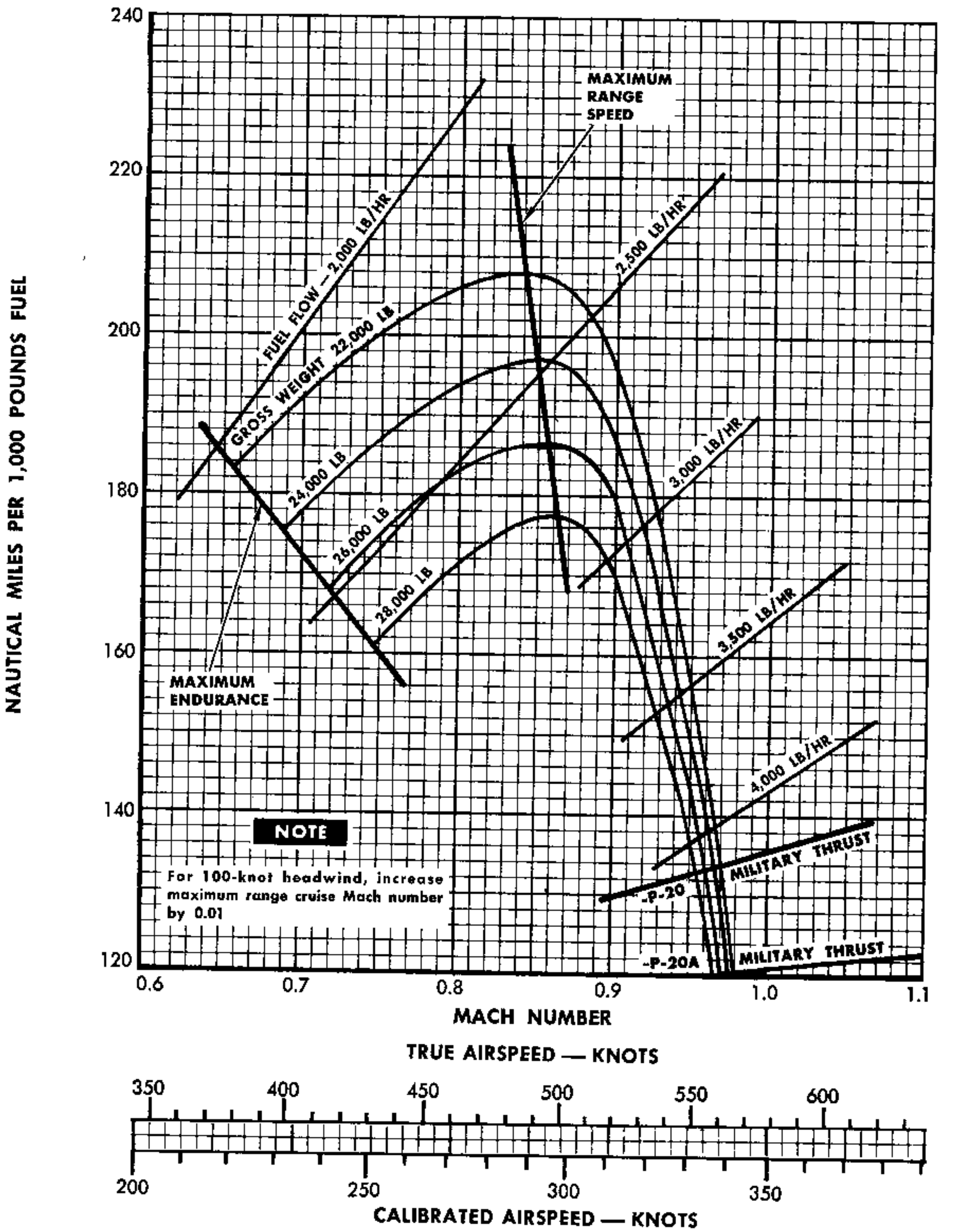


Figure 11–36 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

40,000 FEET — CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.93 MN

ENGINES: J57-P-20, -P-20A

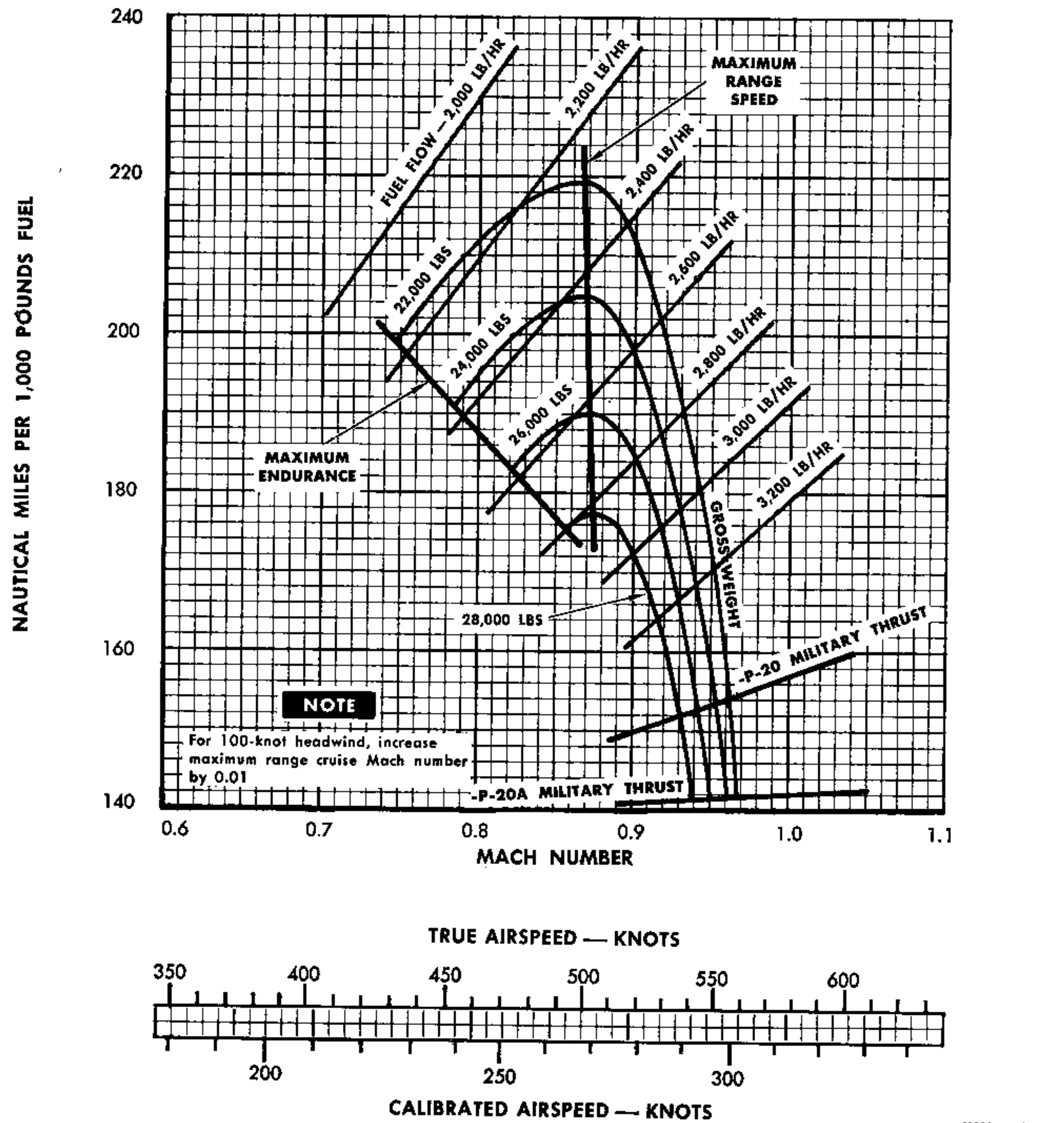


Figure 11–36 (Sheet 5)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

45.000 FEET – CONFIGURATION II

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.94 MN

ENGINES: J57-P-20, -P-20A

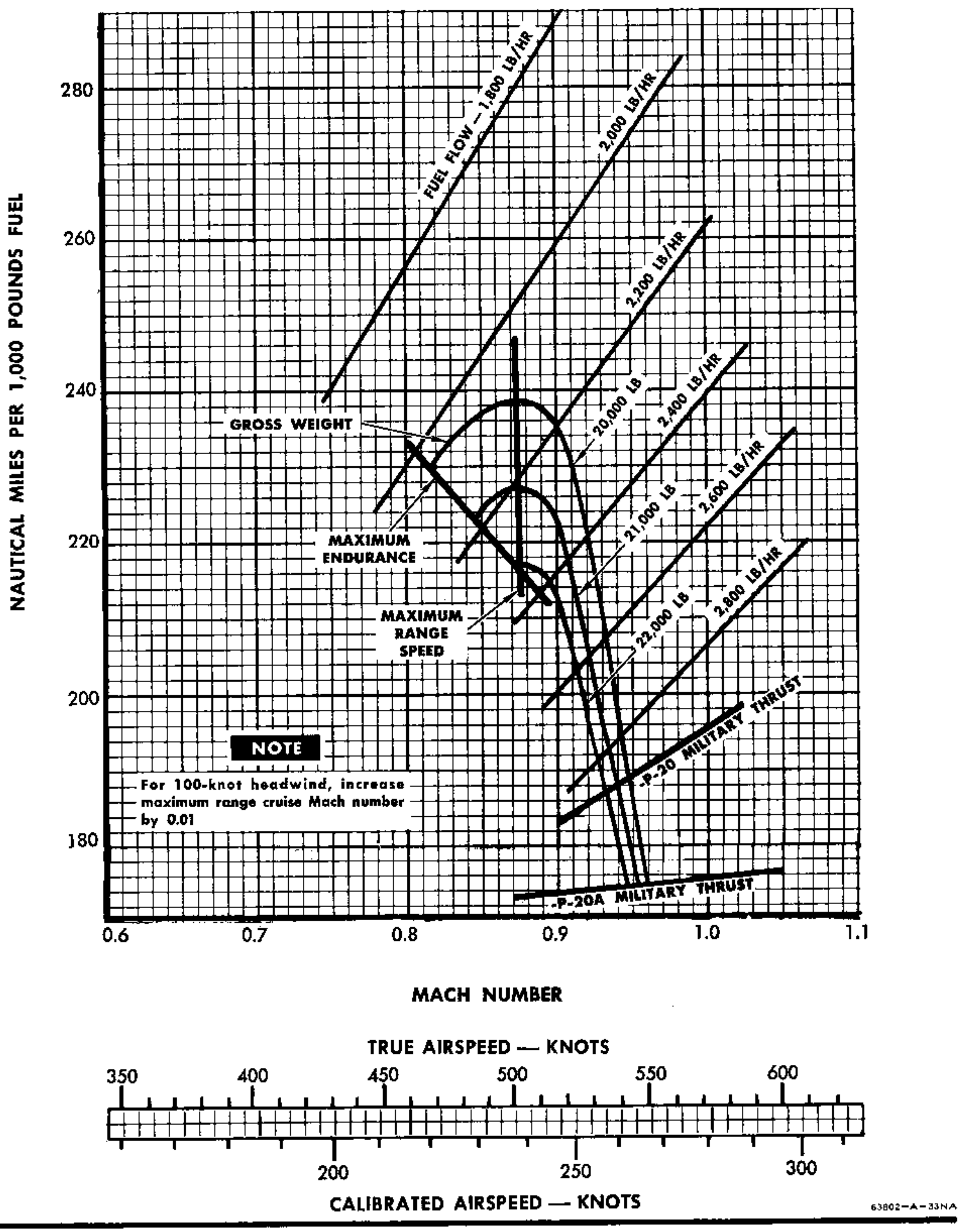
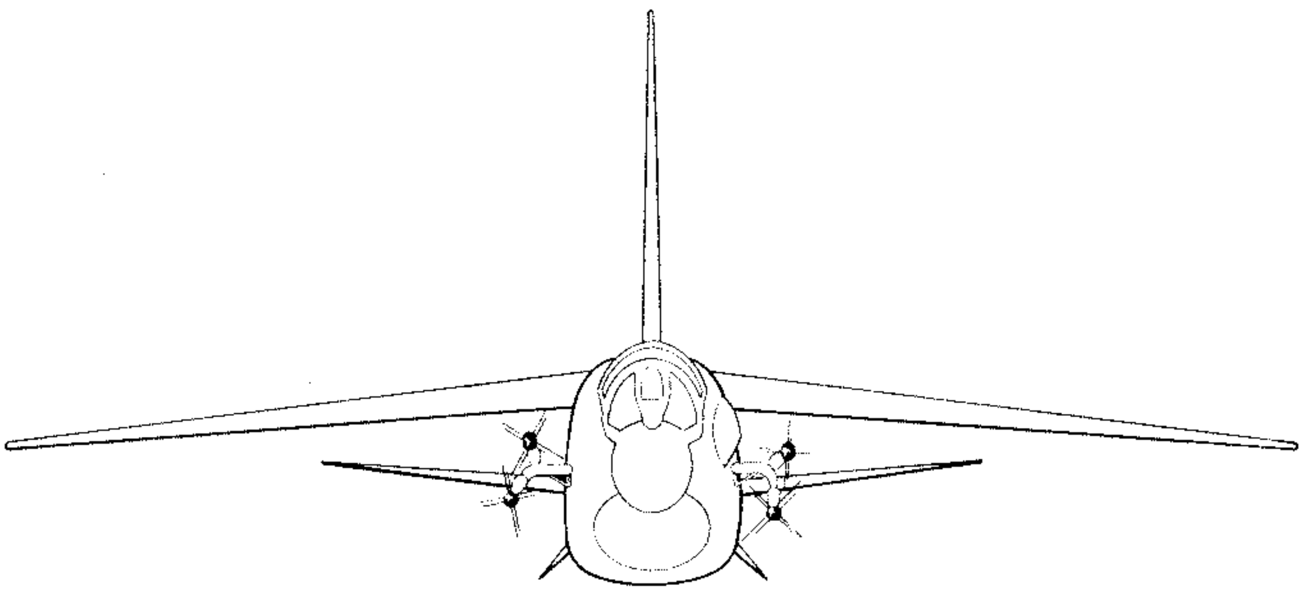


Figure 11–36 (Sheet 6)

CONFIGURATION III

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading — Four Sidewinders

Note

Refer to figure 11–1 for other Configuration III stores arrangements.

CONTENTS

Best Climb 130
Climb Control 131
Combat Radius Profile 133
Mission Profile 134
Optimum Return Profile 135
Maximum Endurance Profile 136
Optimum Endurance Profile 137
Air Refueling Profile 138
Nautical Miles/1,000 Pounds of Fuel 139

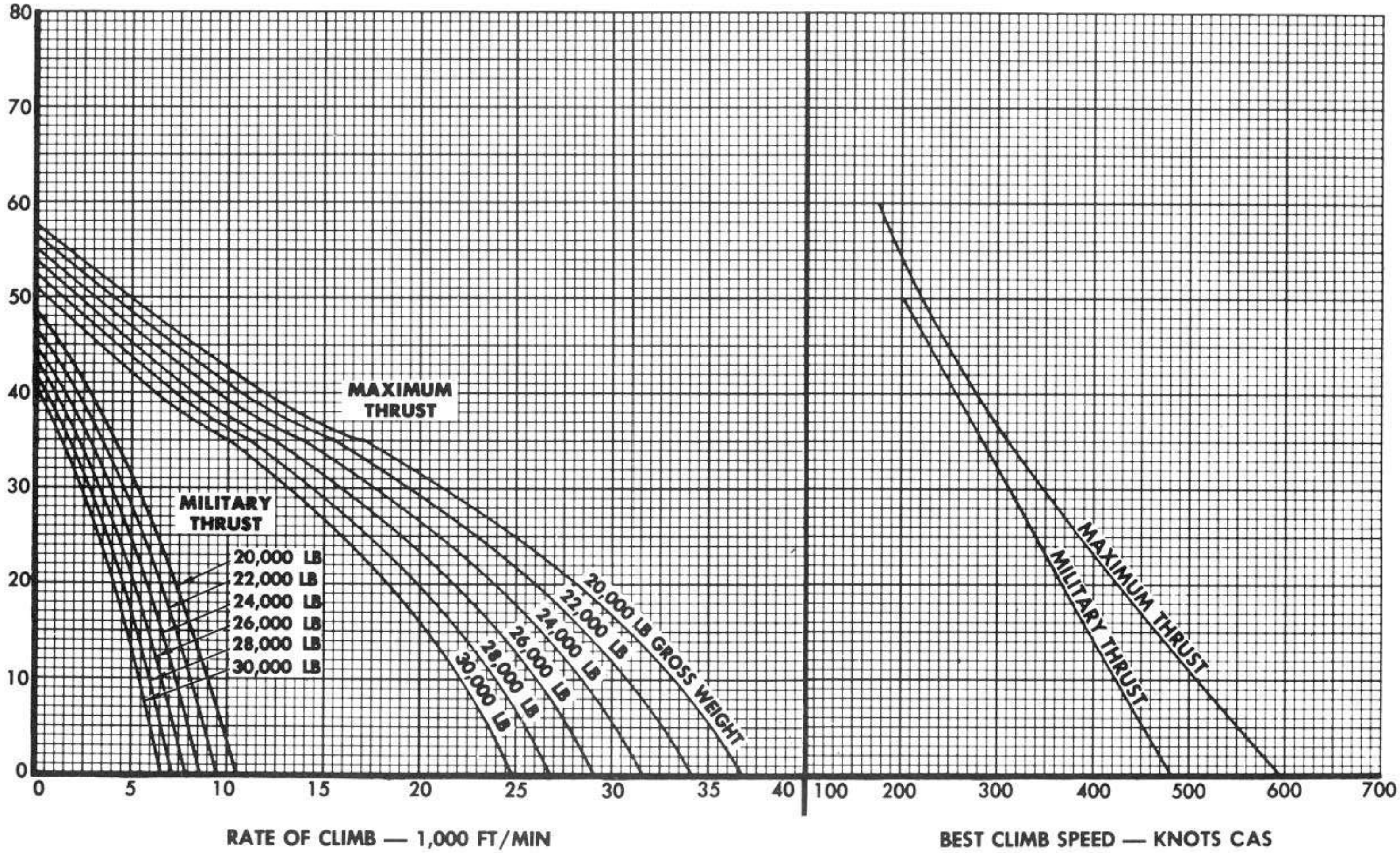
BEST CLIMB

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-61NA

Figure 11–37

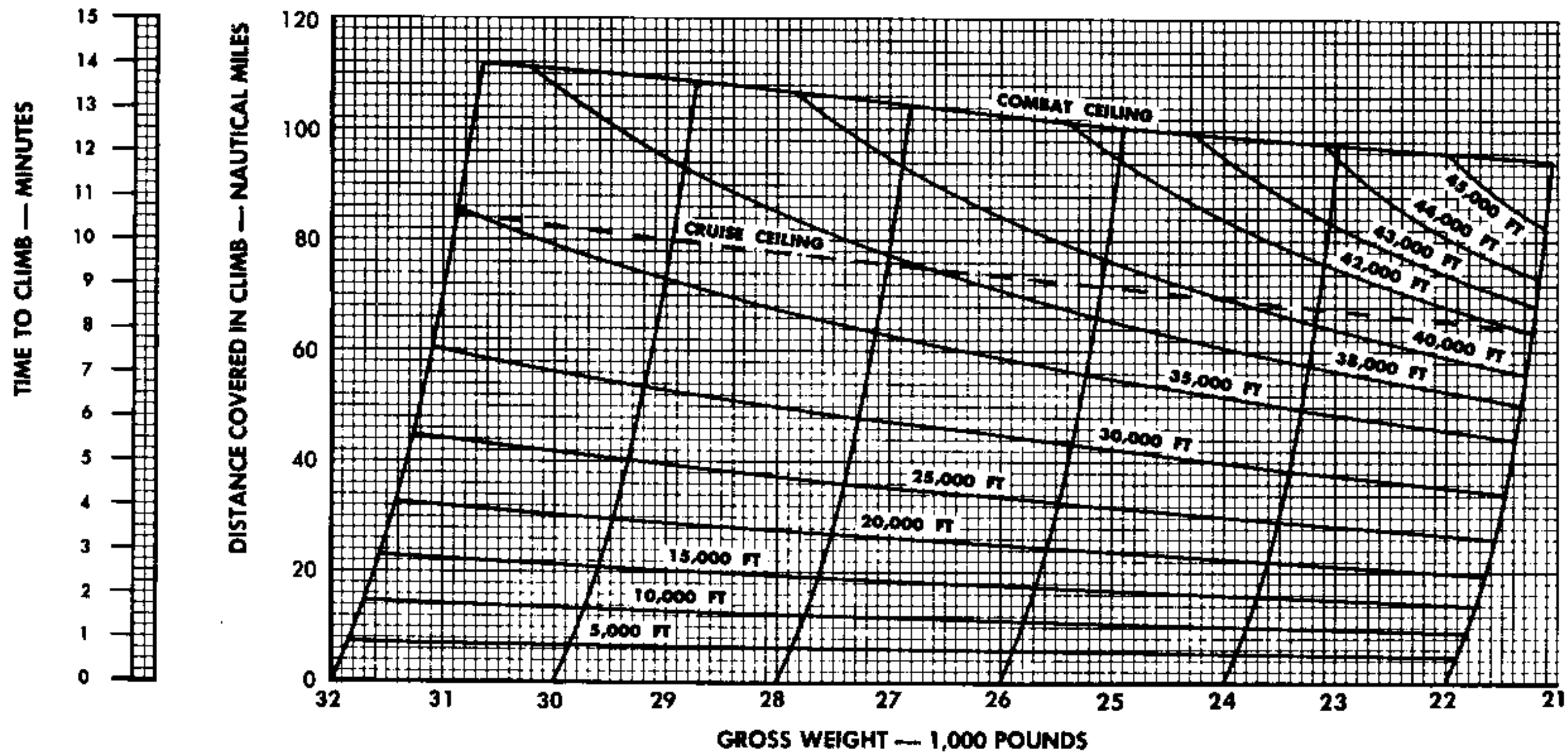
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEEDS

Altitude — Feet	CAS — Knots	Mach No.
S.L.	480	.73
10,000	421	.75
20,000	363	.78
30,000	312	.82
40,000	255	.84
50,000	202	.84

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:
   Distance — 4%
   Time — 4%
   Fuel — 2%
2. Maximum endurance altitude is 30,000 feet.
3. For field takeoff add 2 minutes and 300 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 480 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-82NA

Figure 11-38 (Sheet 1)

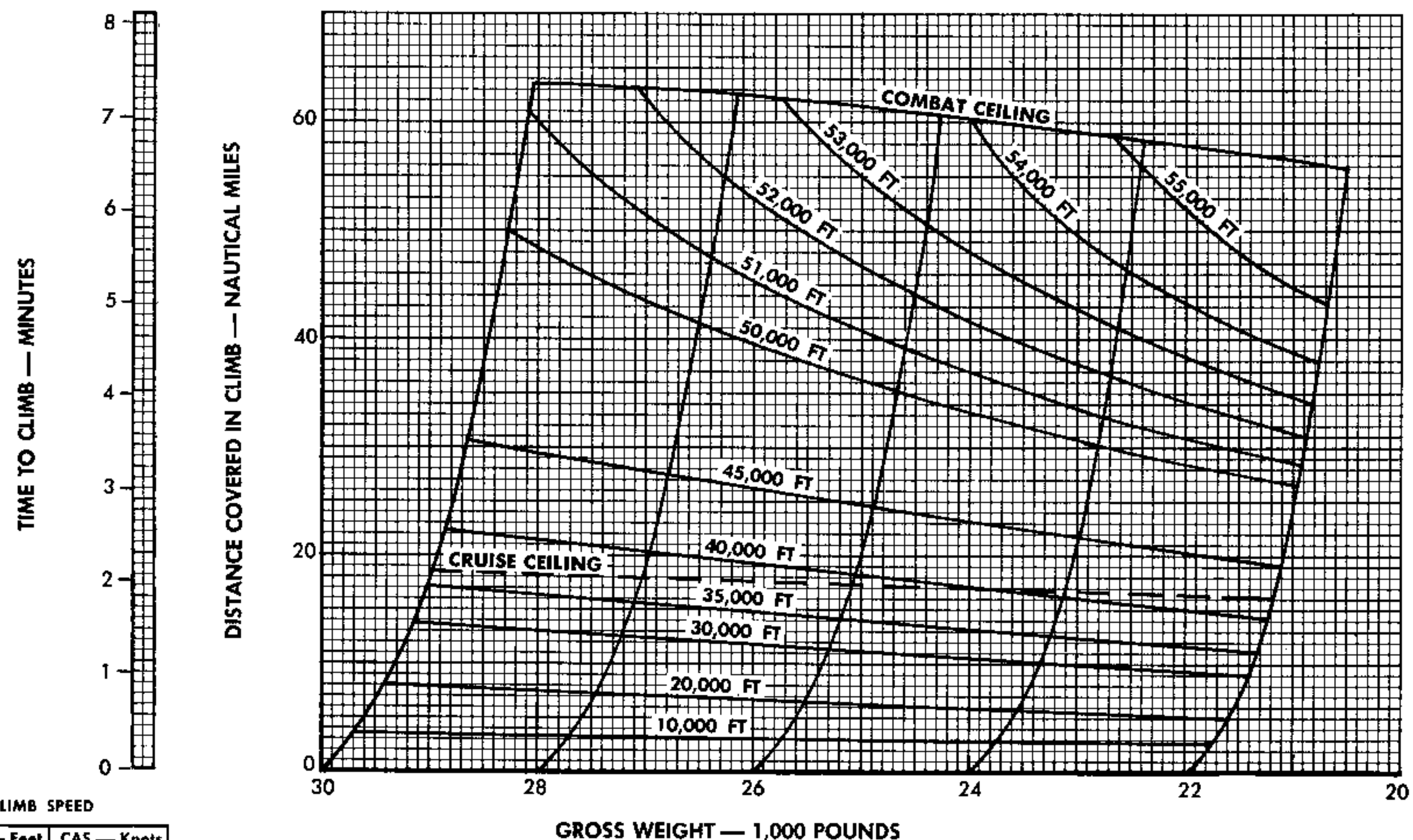
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
S.L.	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195
60,000	175

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:
   Distance — 2%
   Time — 2.5%
   Fuel — 1%
2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 30,000 feet.
4. For field takeoff add 1.0 min. and 500 lb for time and fuel from release of brakes.

63802-A-83NA

Figure 11–38 (Sheet 2)

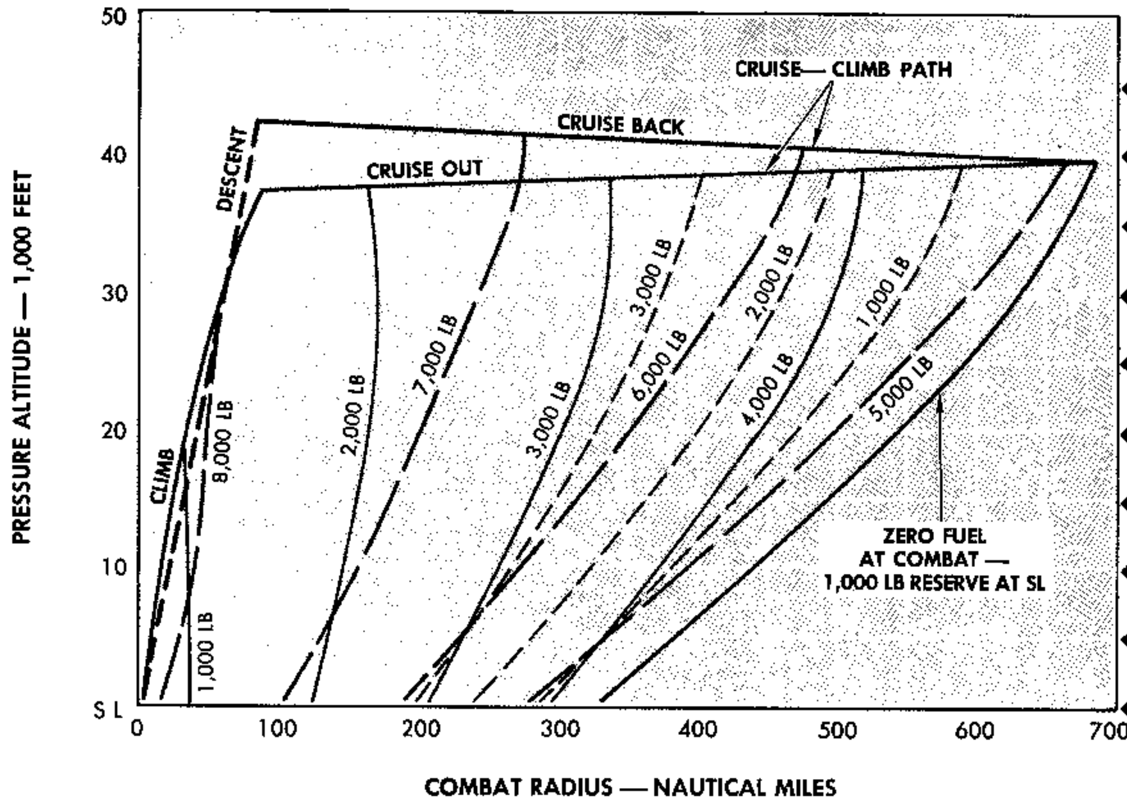
COMBAT RADIUS PROFILE

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 29,822 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

IDLE THRUST DESCENT — CONSTANT 240 KNOTS CAS

CRUISE SCHEDULE

ALTITUDE-FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.78	295
20,000	0.65	300
10,000	0.56	312
S L	0.51	337

63802-A-79NA

LEGEND

- ——— CLIMB AND CRUISE-CLIMB PATHS
- — — — - DESCENT PATH
- - — — — COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- —— —— TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

Figure 11–39

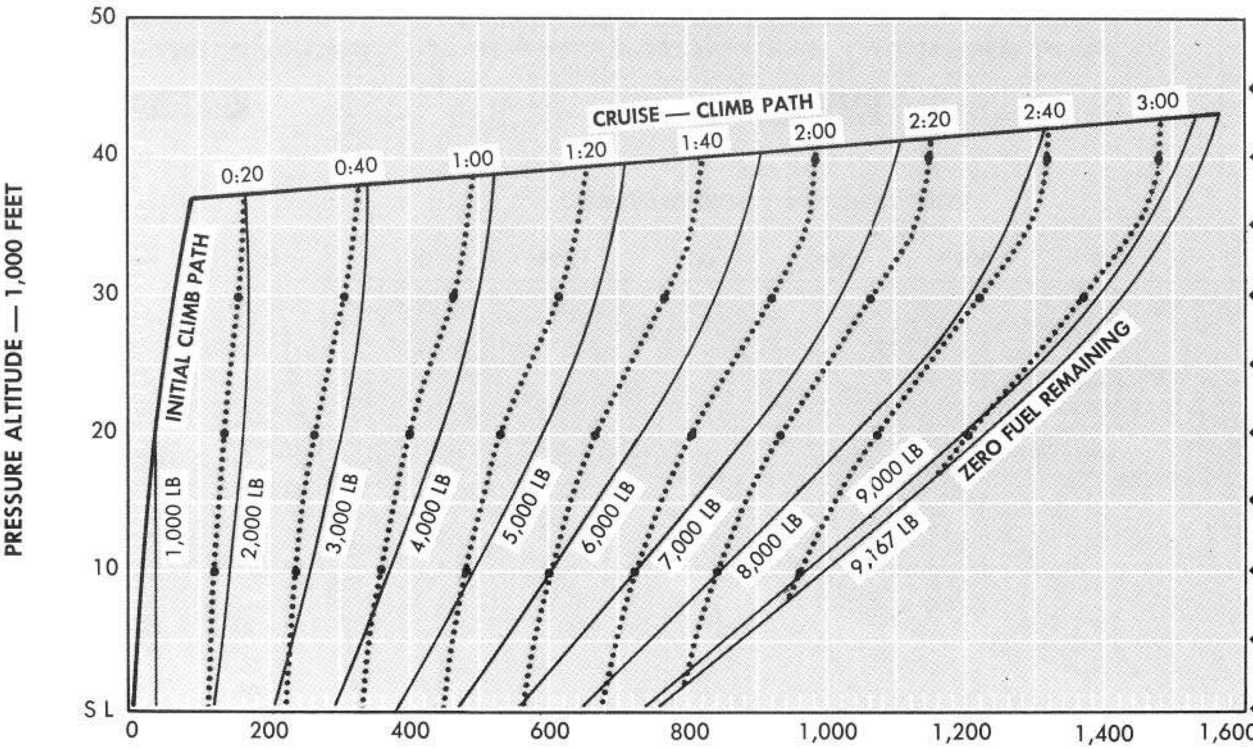
MISSION PROFILE

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 29,822 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- FLIGHT PATH (solid line)
- TIME TO CLIMB AND CRUISE (dotted line)
- FUEL USED (thin solid line)

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No cllowance is made for loiter, decent, landing, or reserve fuel.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.78	295
20,000	0.65	300
10,000	0.56	312
S L	0.51	337

63802—A—77NA

Figure 11—40

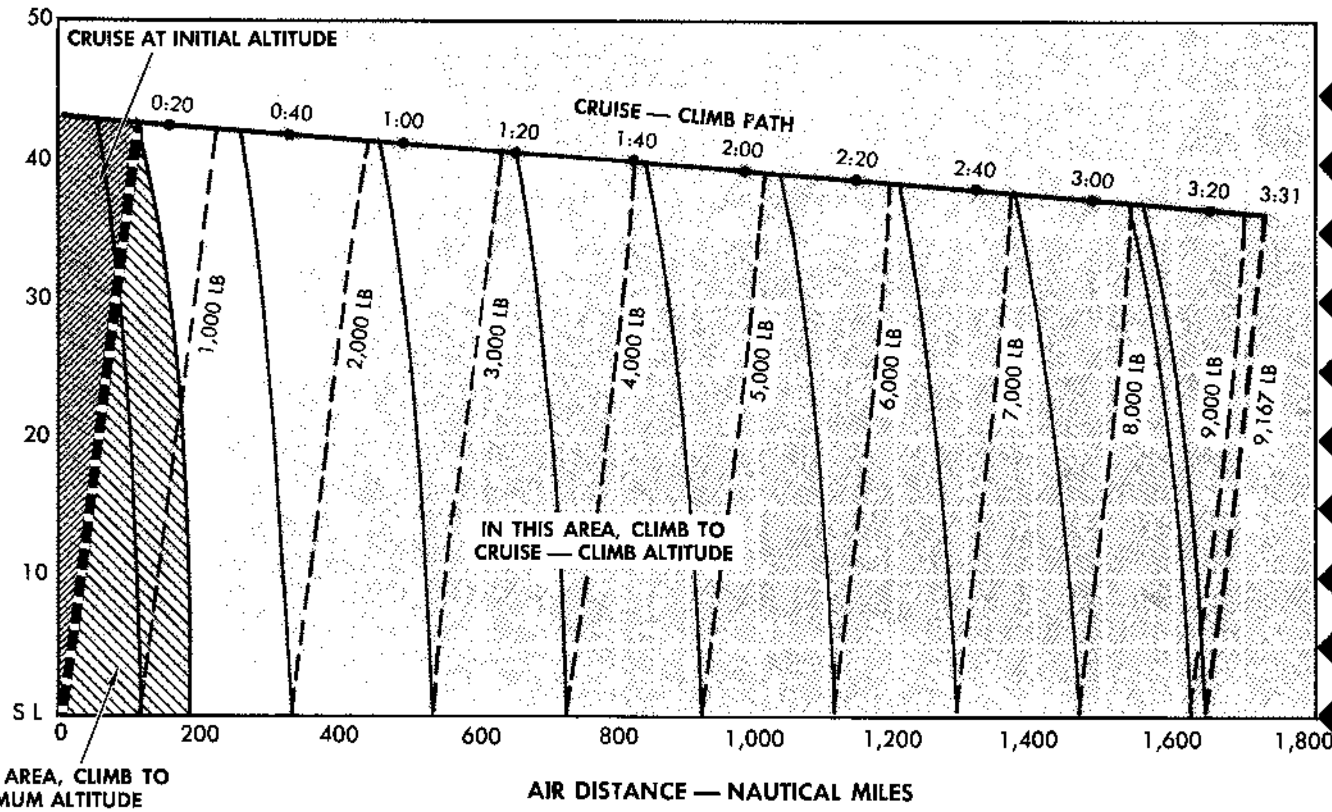
OPTIMUM RETURN PROFILE

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Initial Gross Weight —29,822 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

- CRUISE–CLIMB PATH (WITH TIME AT CRUISE–CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE		
ALTITUDE-FT	MACH NO.	CAS
Cruise-Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.78	295
20,000	0.65	300
10,000	0.56	312
S.L.	0.51	337

63802-A-73NA

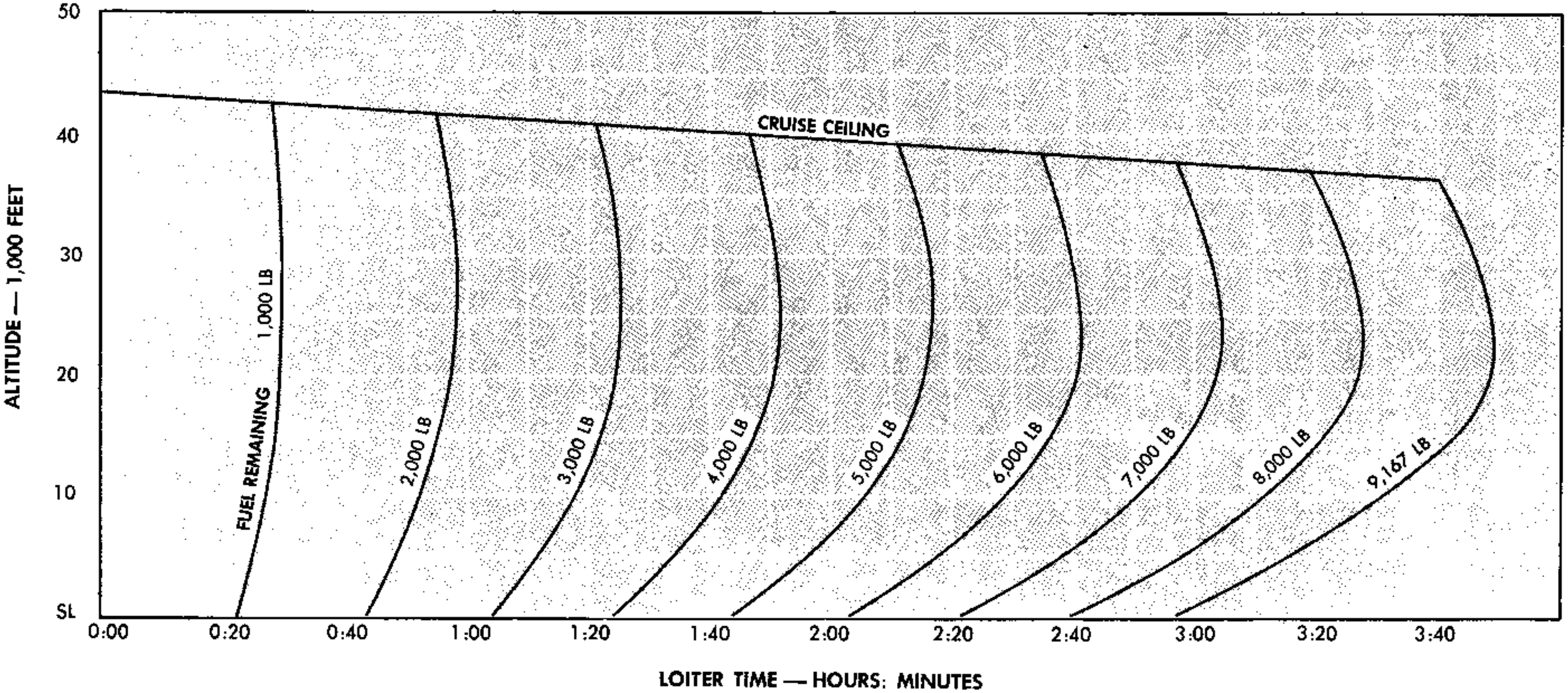
Figure 11–41

MAXIMUM ENDURANCE PROFILE

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION III
Standard Day
Cruise Condition
Initial Gross Weight —29,822 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240

63802-A-75NA

Figure 11–42

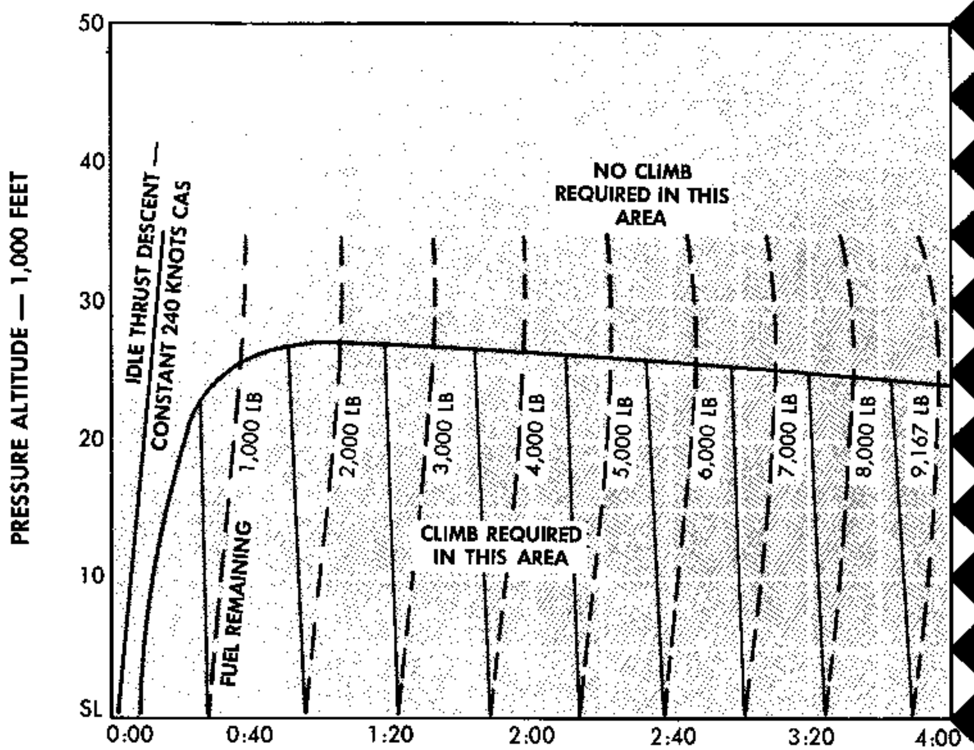
OPTIMUM ENDURANCE PROFILE

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 29,822 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
50	—	—
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S L	480	.73

LEGEND

——— OPTIMUM ENDURANCE ALTITUDE
——— CLIMB GUIDE LINES
— — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. Total time includes time to climb, loiter and descend to sea level.
3. No allowance is made for landing or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240

63802-A-71NA

Figure 11–43

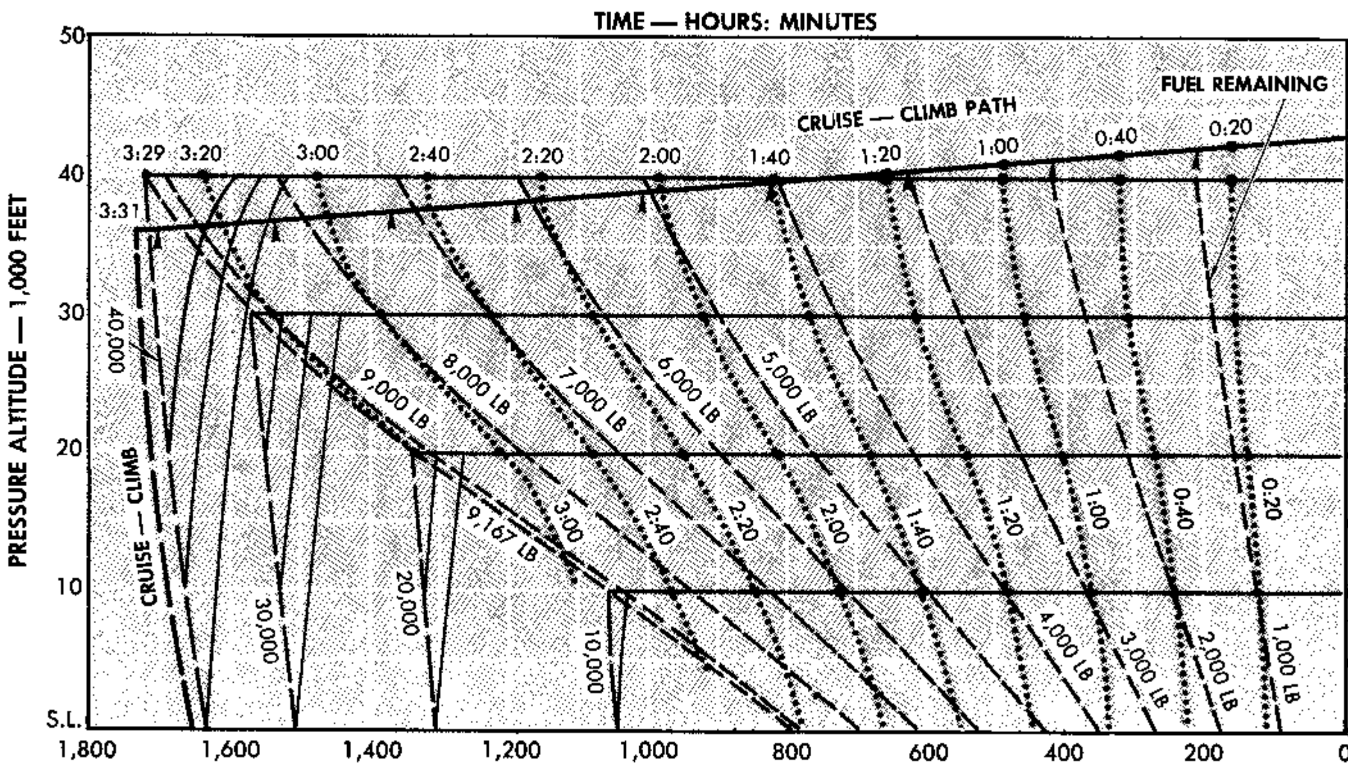
AIR REFUELING PROFILE

CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 29,822 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	228	.84
40	255	.84
35	285	.84
30	312	.82
25	337	.80
20	363	.78
15	392	.77
10	421	.75
5	450	.74
S.L	480	.73

LEGEND

- – – –FUEL REMAINING
- ——CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- •·····•TIME TO CRUISE
- ——CRUISE TO ZERO FUEL REMAINING
- ——CONSTANT ALTITUDE CRUISE PATH
- ——CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to non-standard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise Climb	0.86	—
45,000	0.86	236
40,000	0.86	264
30,000	0.78	295
20,000	0.65	300
10,000	0.56	312
S L	0.51	337

63802-A-69NA

Figure 11-44

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50MN

ENGINES: J57-P-20, -P-20A

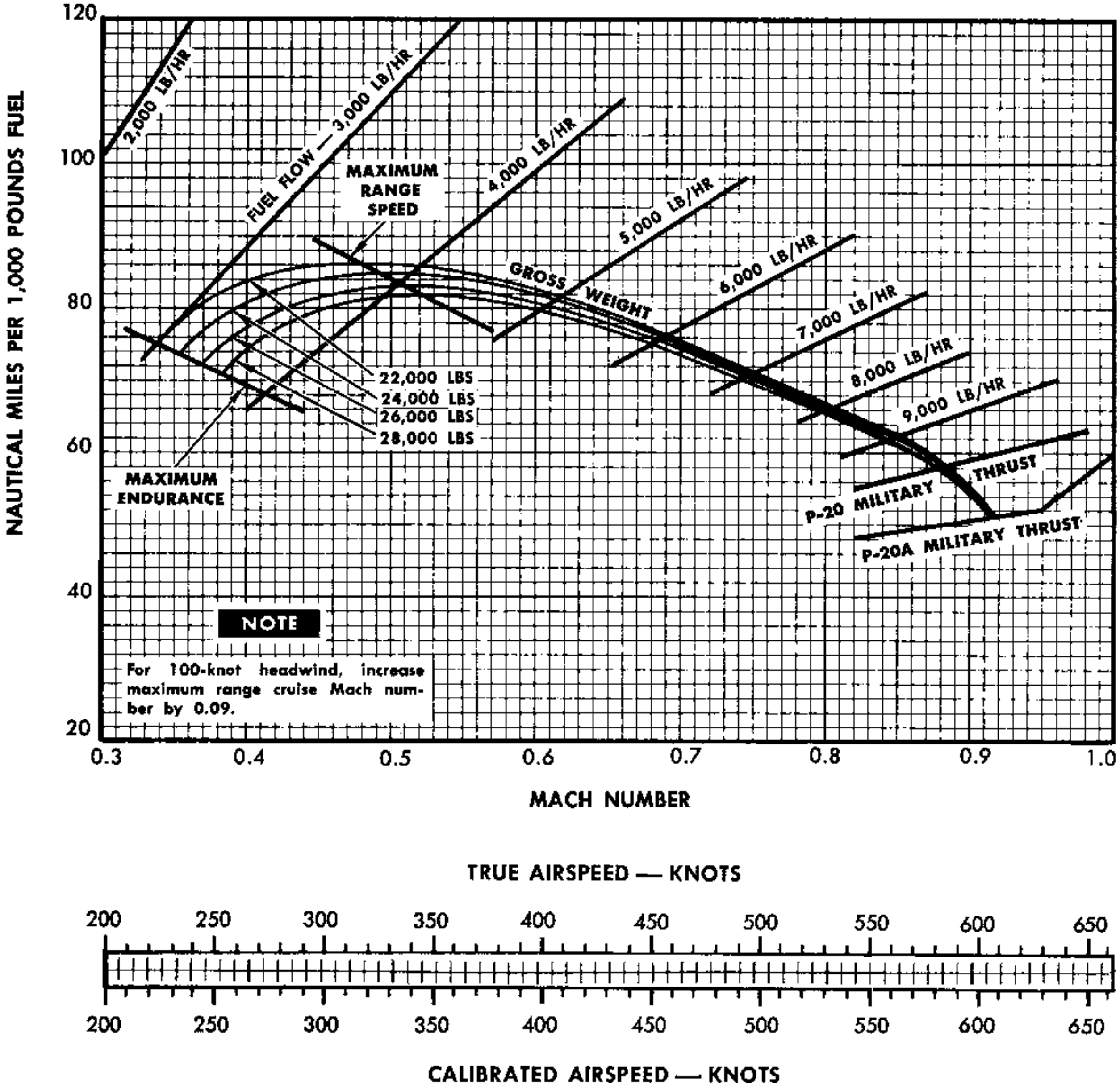


Figure 11—45 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

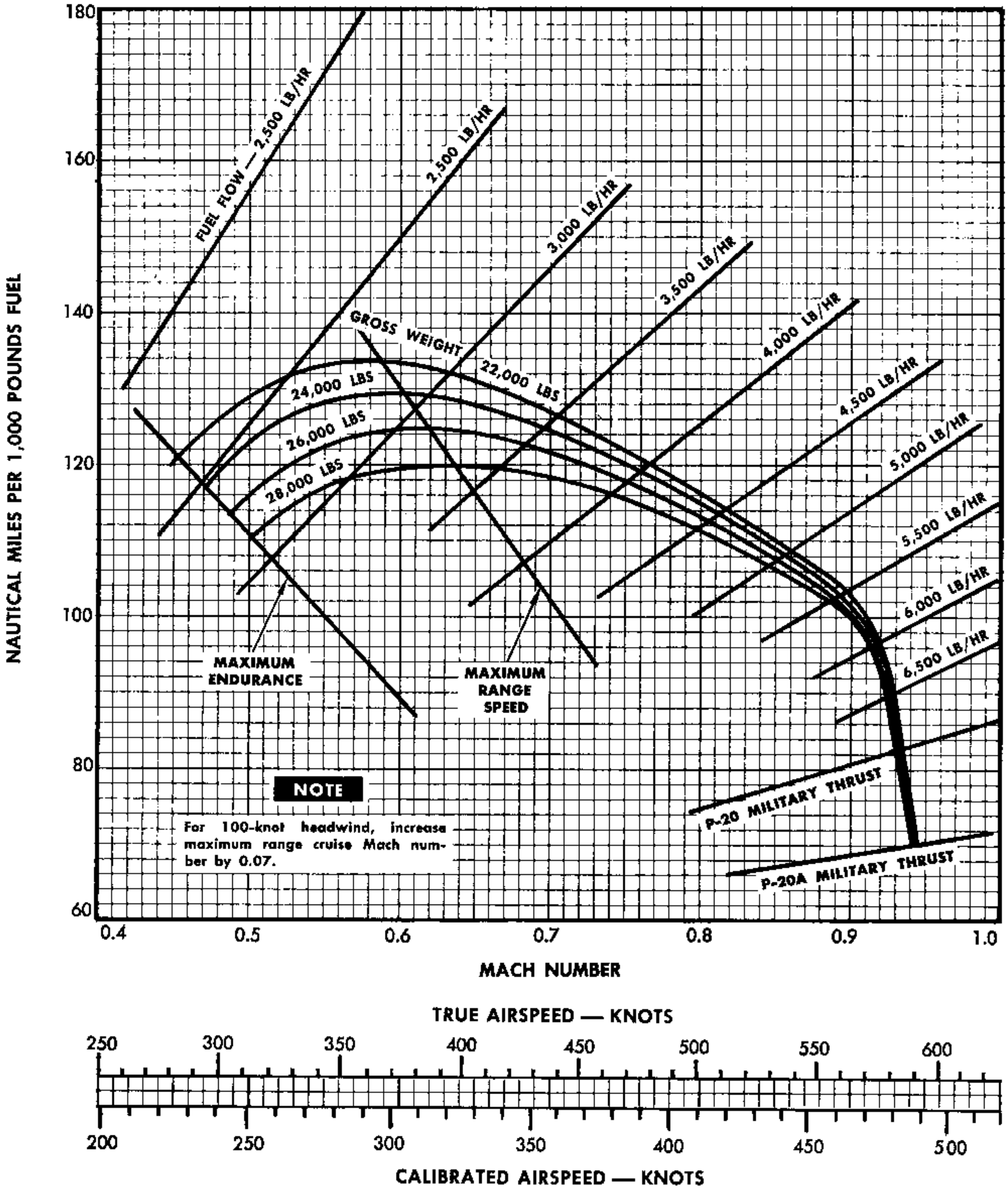


Figure 11–45 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.83 MN

ENGINES: J57-P-20, -P-20A

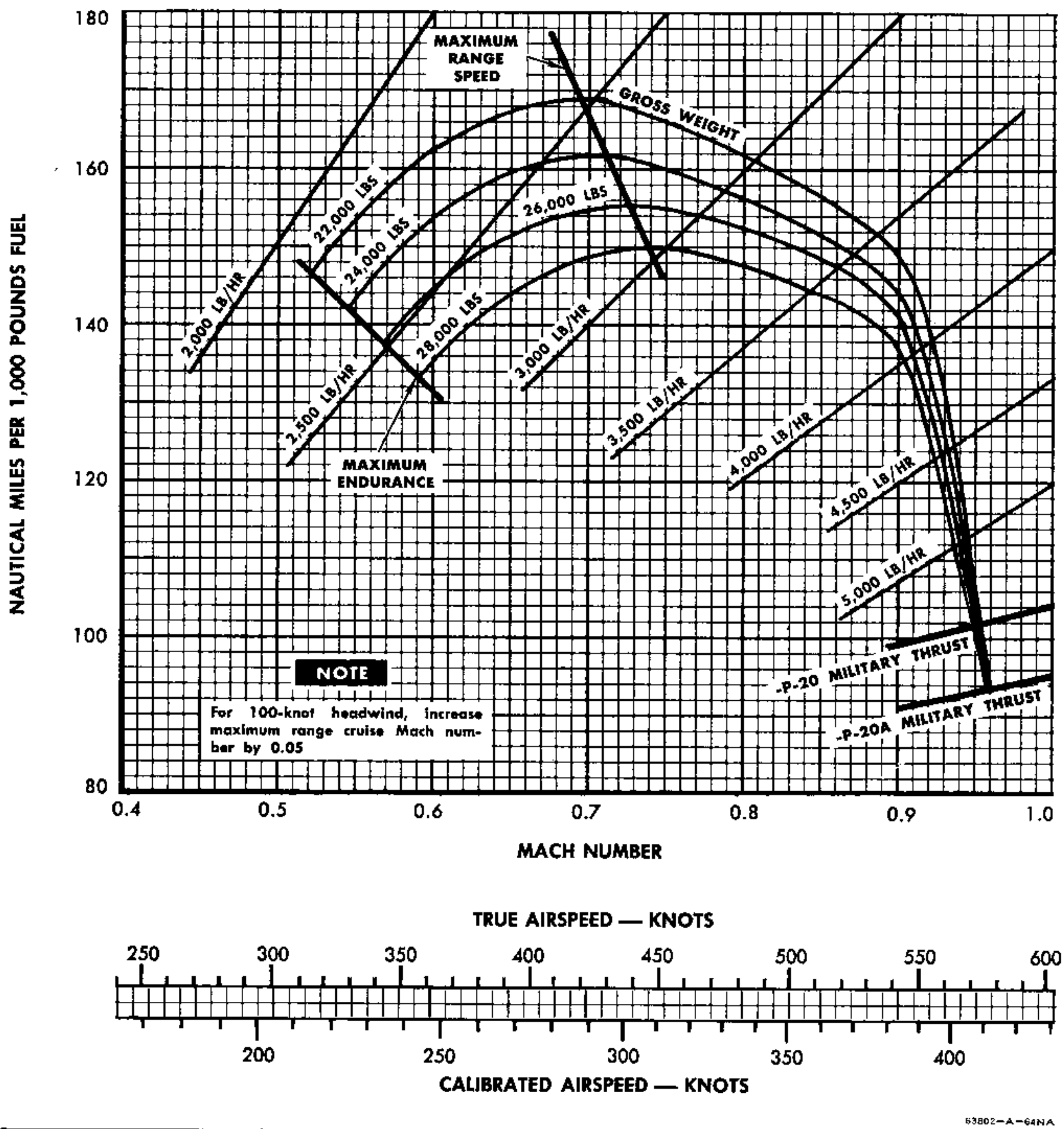


Figure 11–45 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

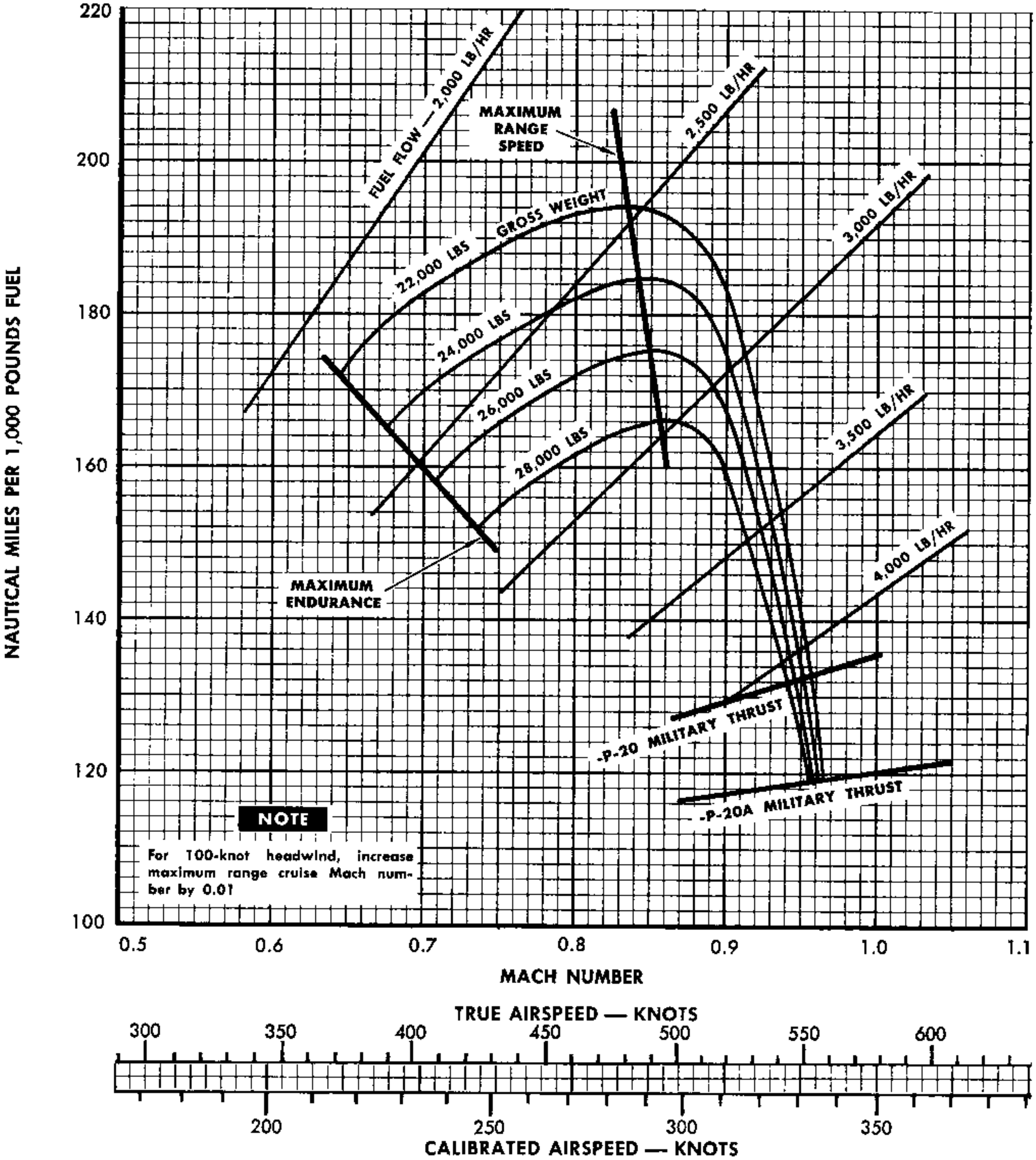


Figure 11–45 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

40,000 FEET — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.93 MN

ENGINES: J57-P-20, -P-20A

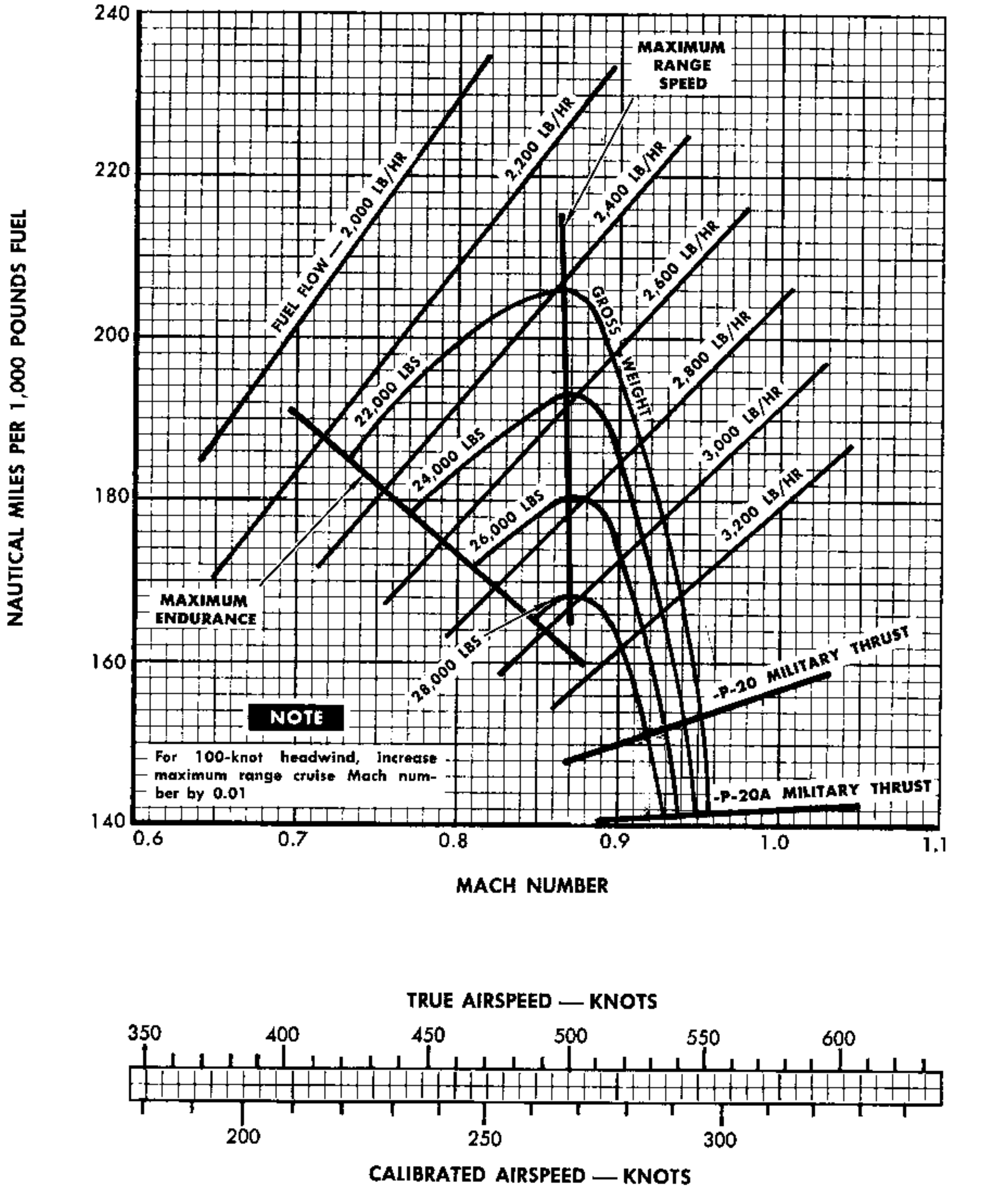


Figure 11–45 (Sheet 5)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

45,000 FEET — CONFIGURATION III

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition at All Speeds

ENGINES: J57-P-20, -P-20A

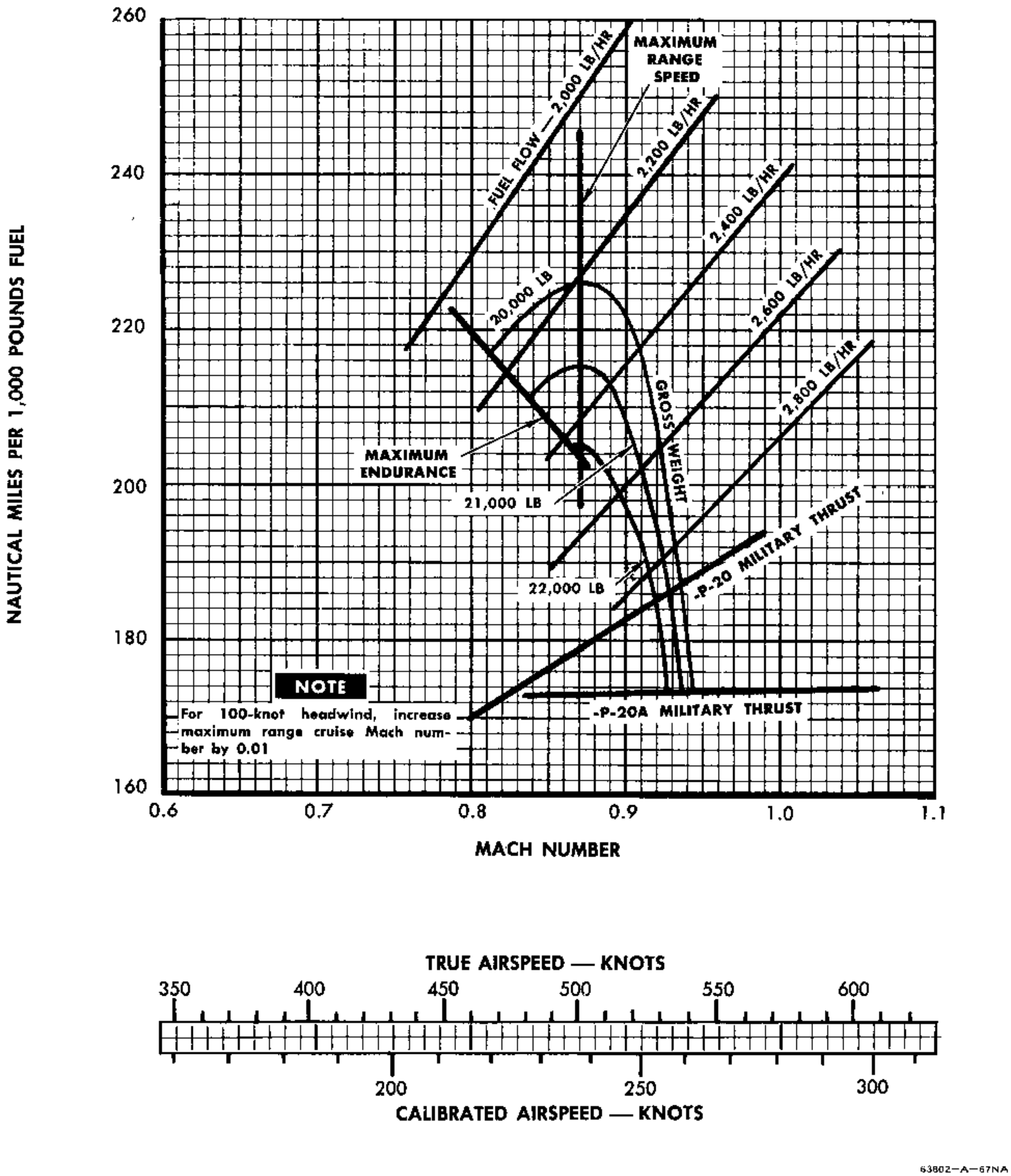
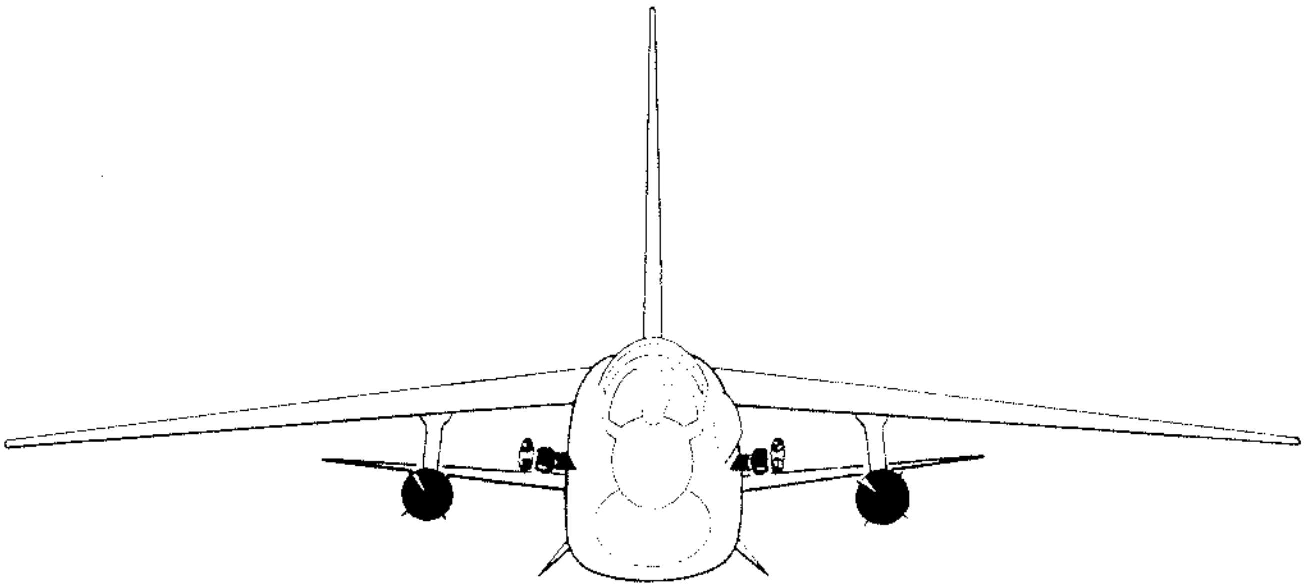


Figure 11–45 (Sheet 6)

CONFIGURATION IV

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading — Two 500-pound (MK 82) bombs and two (short-nose) Zuni packs

Note

Refer to figure 11–1 for other Configuration IV stores arrangements.

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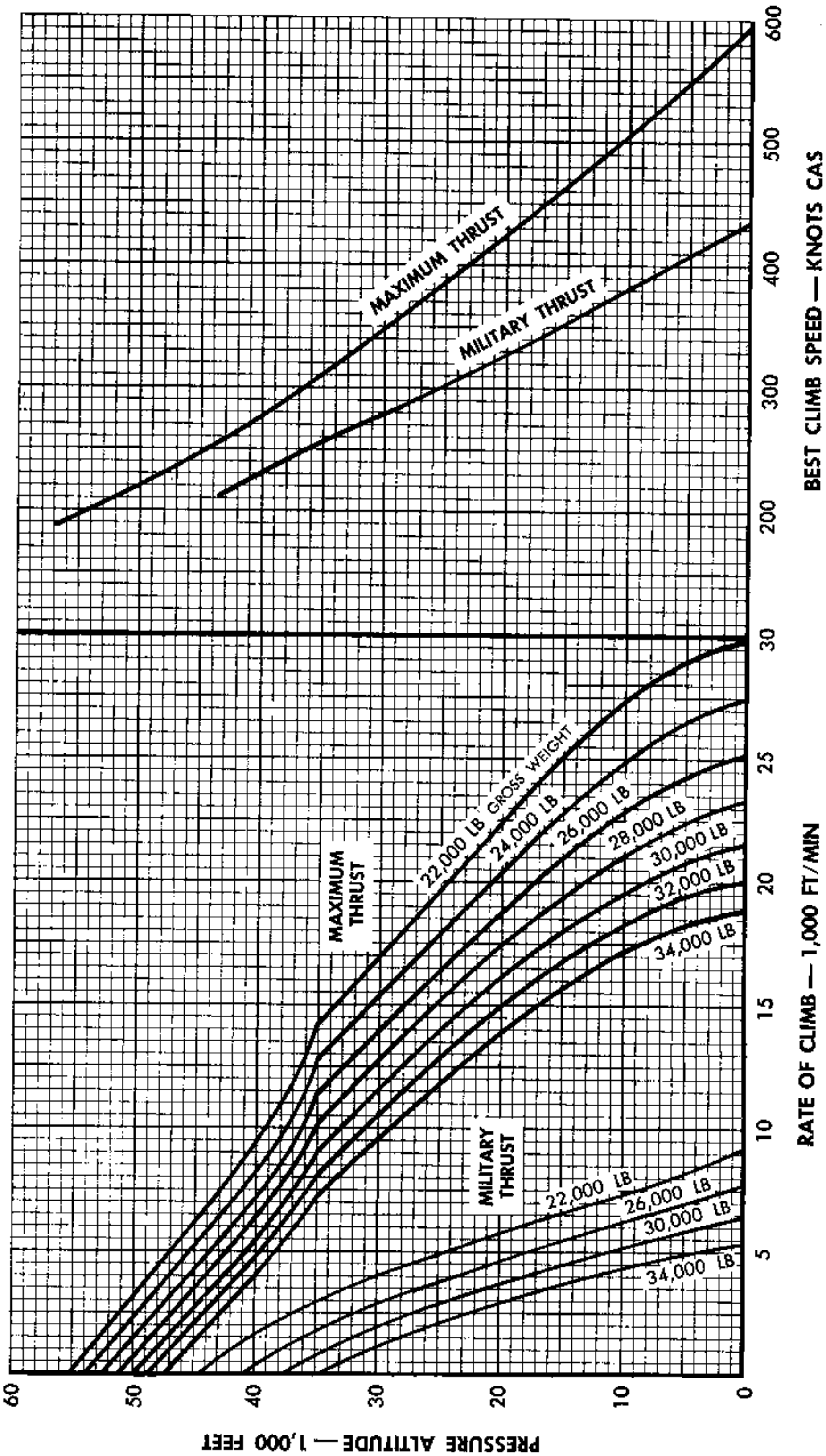
BEST CLIMB

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION IV

Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

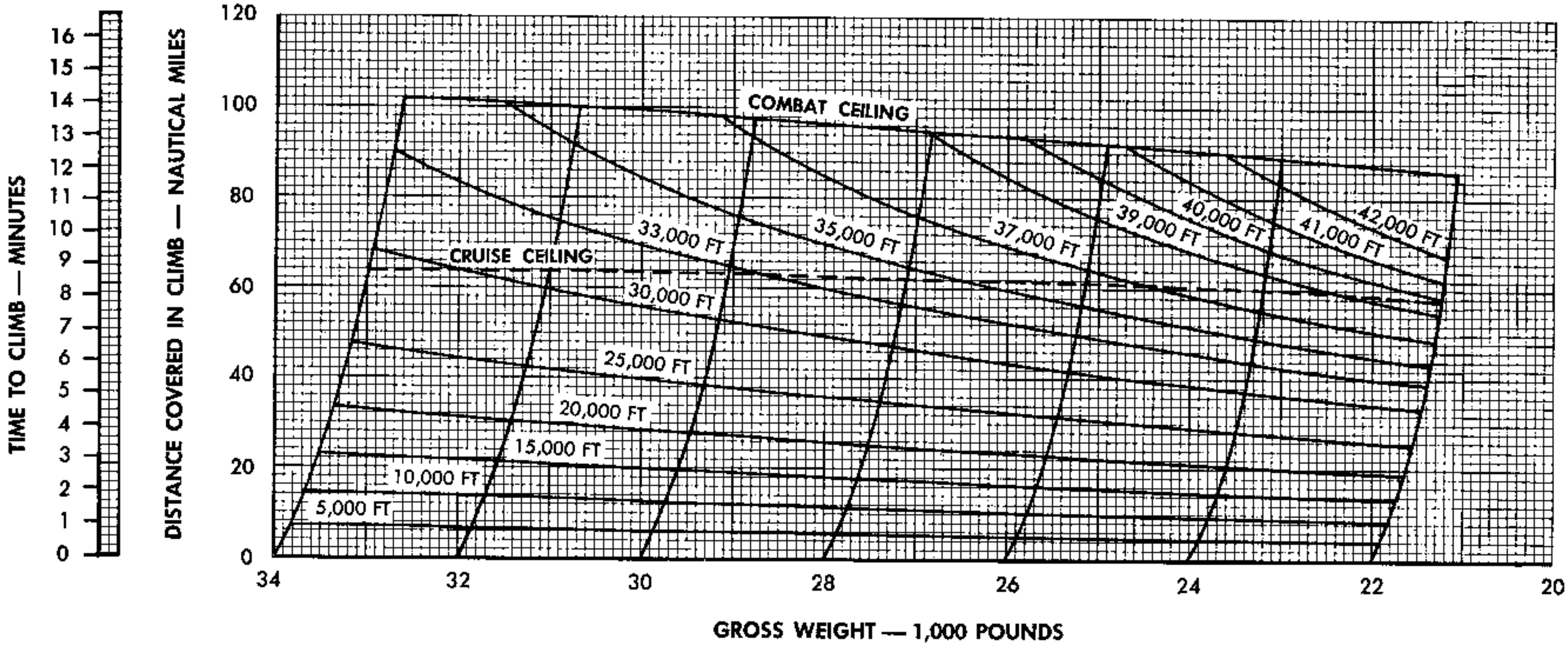
Figure 11-46

CLIMB CONTROL

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

MILITARY THRUST — CONFIGURATION IV
Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude — Feet	CAS — Knots	Mach No.
SL	431	0.65
10,000	379	0.68
20,000	323	0.70
30,000	272	0.73
40,000	227	0.75

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude is 25,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 431 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-173NA

Figure 11-47 (Sheet 1)

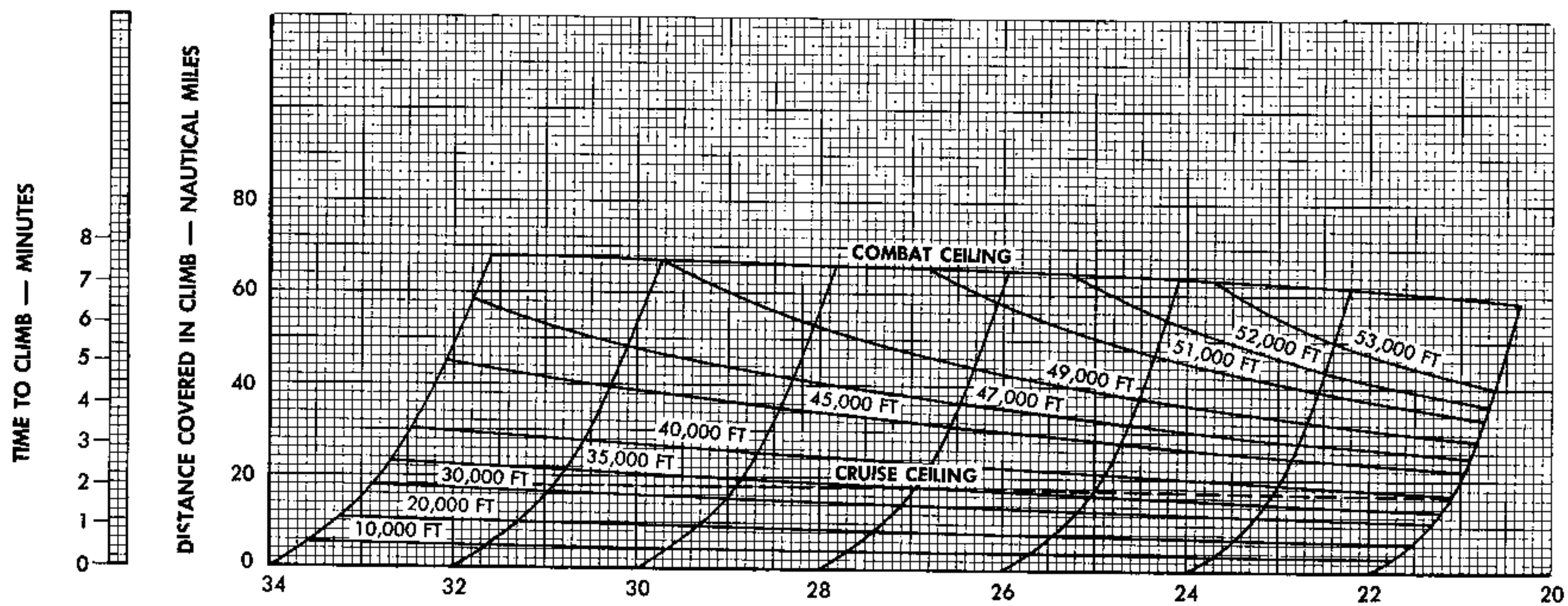
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
SL	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195

NOTES

1. For each 1°C above standard day temperature increase value obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 25,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes.

63802-A-174NA

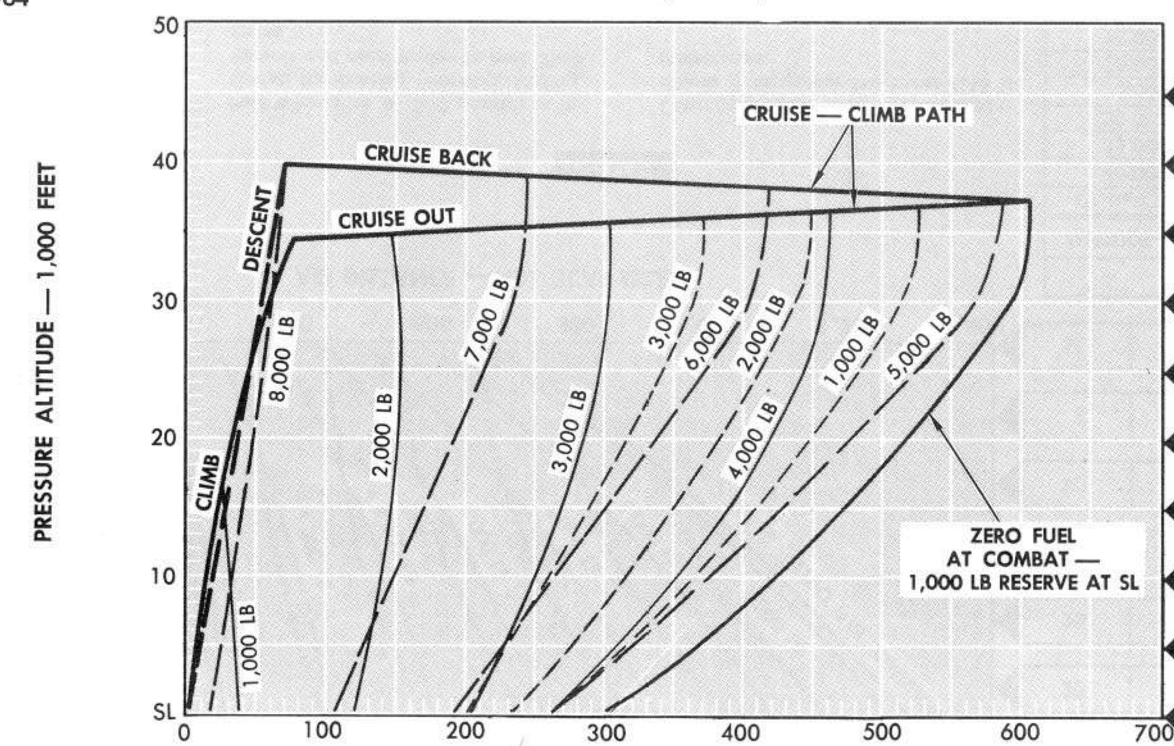
Figure 11-47 (Sheet 2)

COMBAT RADIUS PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION IV
Cruise Condition At All Altitudes
Takeoff Gross Weight — 30,740 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	251	.75
30	272	.73
25	299	.72
20	323	.70
15	351	.69
10	379	.68
5	403	.66
SL	431	.65

IDLE THRUST DESCENT
CONSTANT 242 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.84	—
40,000	0.84	256
35,000	0.83	279
30,000	0.77	290
25,000	0.71	297
20,000	0.64	293
15,000	0.58	297
10,000	0.55	306
5,000	0.53	320
SL	0.51	334

63802-A-175NA

LEGEND

- ——— CLIMB AND CRUISE — CLIMB PATHS
- —·— DESCENT PATH
- – – – COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED— CRUISE OUT
- — — TOTAL FUEL USED— CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise back altitude must be same as or above cruise-out altitude.

Figure 11-48

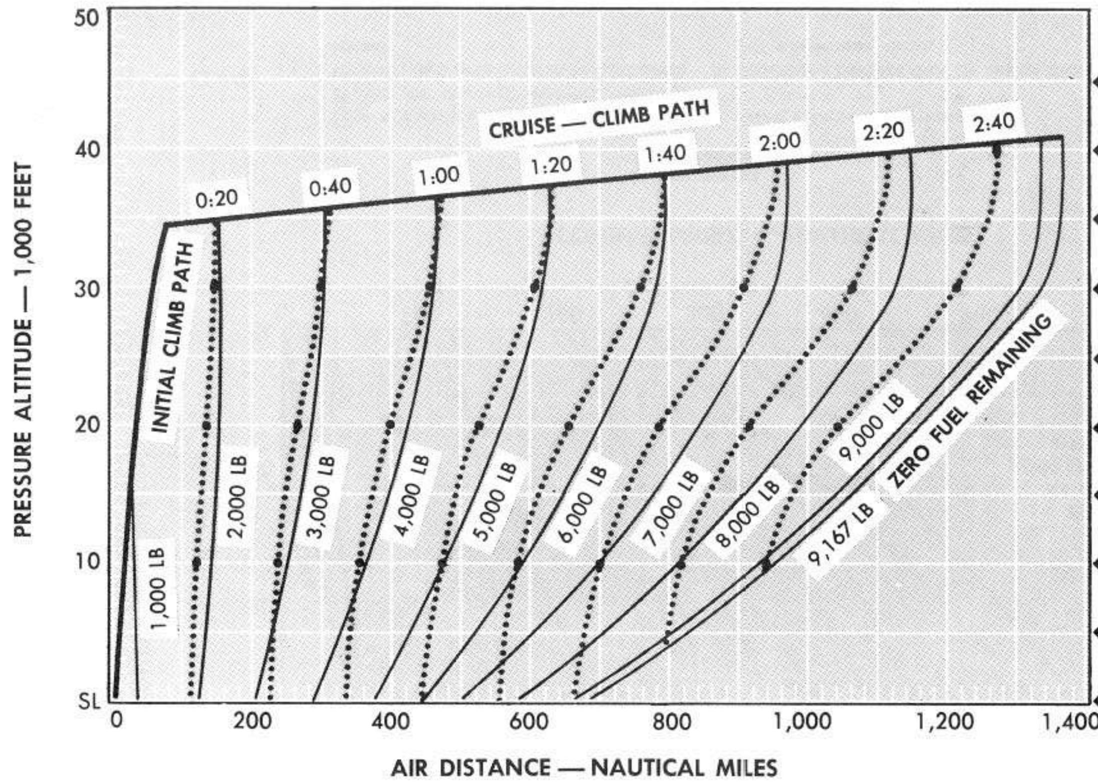
MISSION PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION IV

Cruise Condition At All Altitudes
Takeoff Gross Weight — 30,740 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	251	.75
30	272	.73
25	299	.72
20	323	.70
15	351	.69
10	379	.68
5	403	.66
SL	431	.65

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.84	—
40,000	0.84	256
35,000	0.83	279
30,000	0.77	290
25,000	0.71	297
20,000	0.64	293
15,000	0.58	297
10,000	0.55	306
5,000	0.53	320
SL	0.51	334

LEGEND

——— FLIGHT PATH
··•·····•·· TIME TO CLIMB AND CRUISE
——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day.

Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.

4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802—A—176NA

Figure 11-49

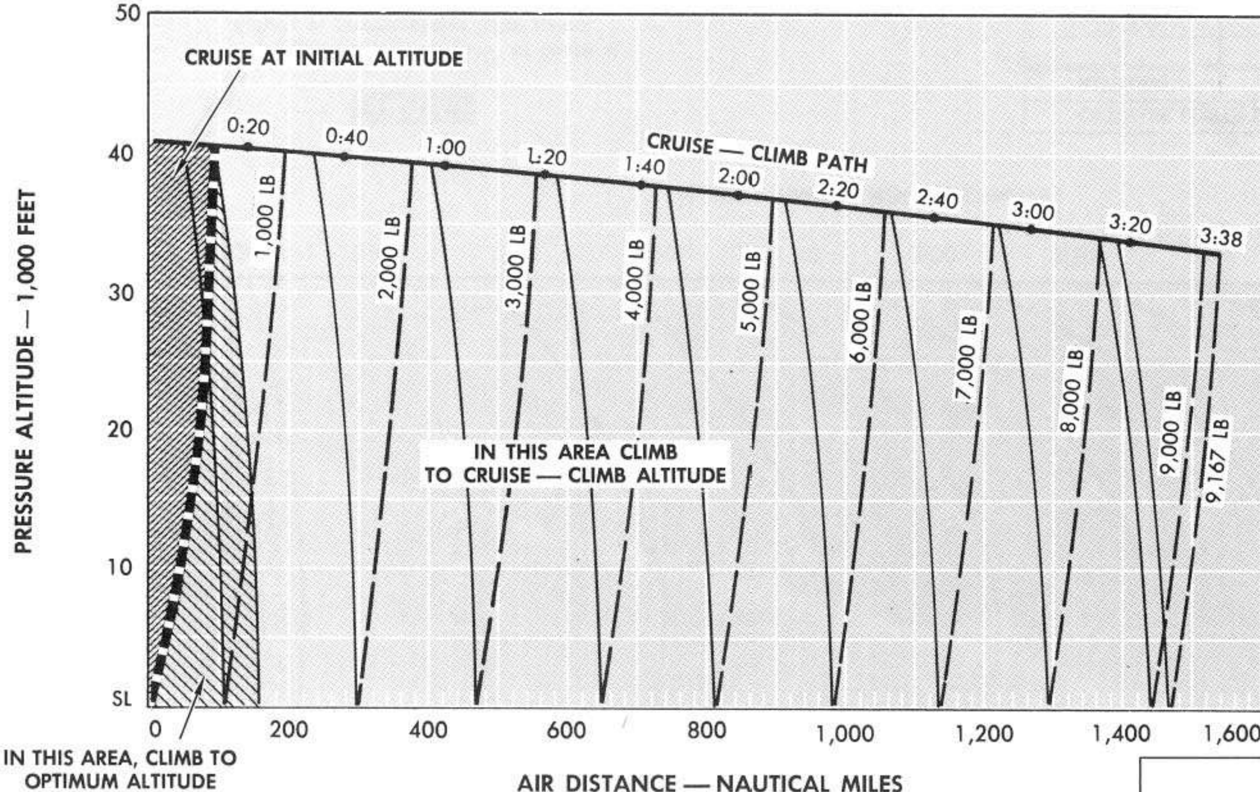
OPTIMUM RETURN PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION IV

Cruise Condition At All Altitudes
Initial Gross Weight—30,740 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	251	.75
30	272	.73
25	299	.72
20	323	.70
15	351	.69
10	379	.68
5	403	.66
SL	431	.65

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.84	—
40,000	0.84	256
35,000	0.83	279
30,000	0.77	290
25,000	0.71	297
20,000	0.64	293
15,000	0.58	297
10,000	0.55	306
5,000	0.53	320
SL	0.51	334

LEGEND

- CRUISE — CLIMB PATH (WITH TIME AT CRUISE CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of climb path guide lines with lines of best range.

63802-A-177NA

Figure 11-50

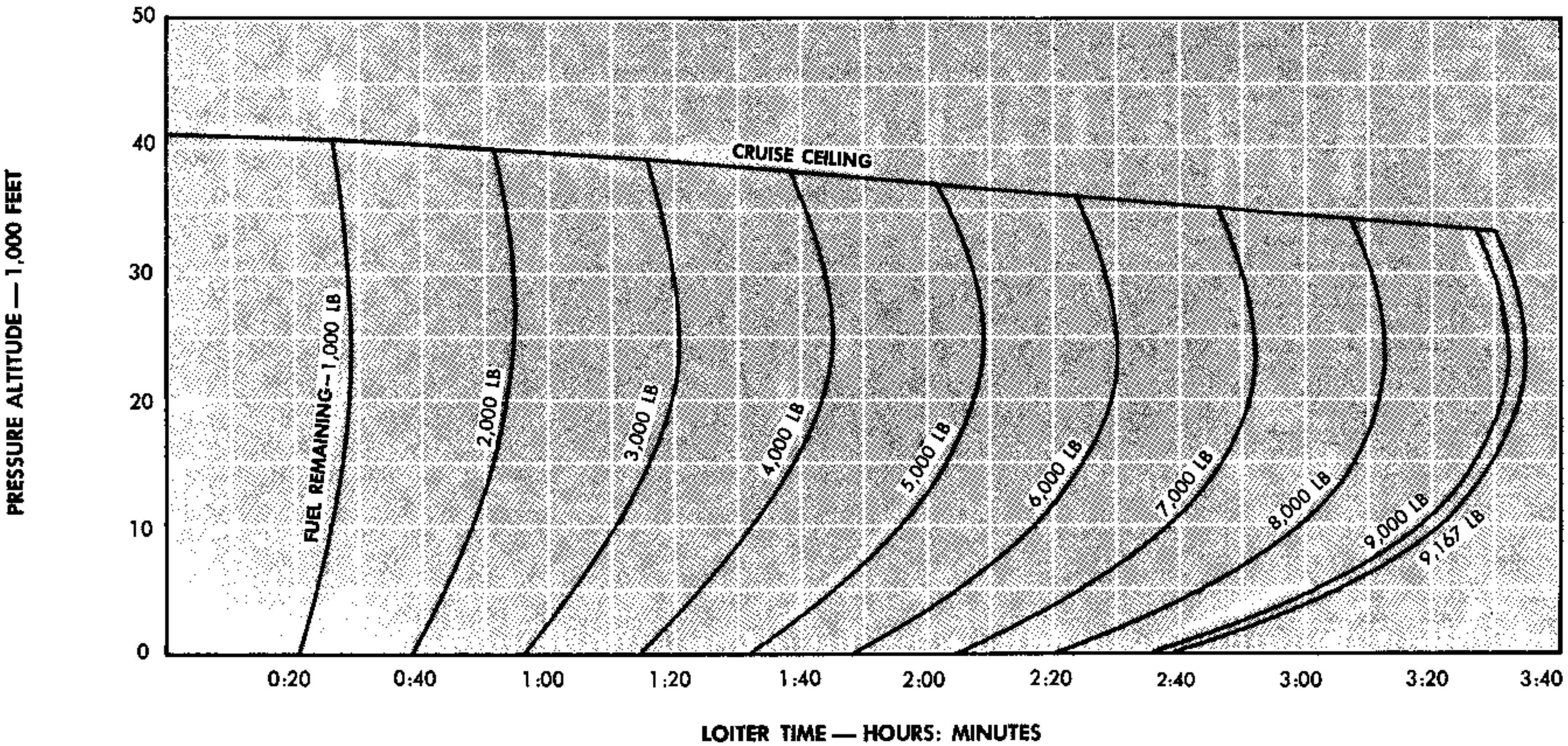
MAXIMUM ENDURANCE PROFILE

CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 30,740 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240

63802-A-178NA

Figure 11-51

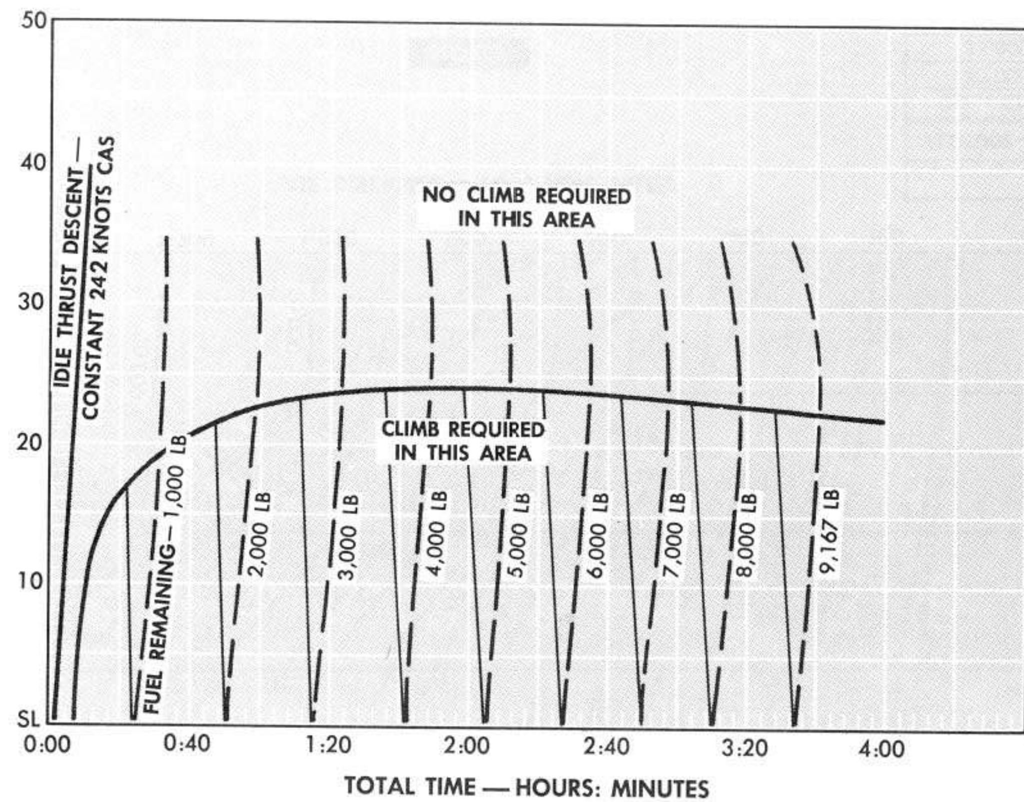
OPTIMUM ENDURANCE PROFILE

CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 30,740 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	251	.75
30	272	.73
25	299	.72
20	323	.70
15	351	.69
10	379	.68
5	403	.66
SL	431	.65

LEGEND

- OPTIMUM ENDURANCE ALTITUDE
- CLIMB GUIDE LINES
- FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE-FT	CAS
SL	230
10,000	230
20,000	230
30,000	230
35,000	235
40,000	240

63802-A-179NA

Figure 11-52

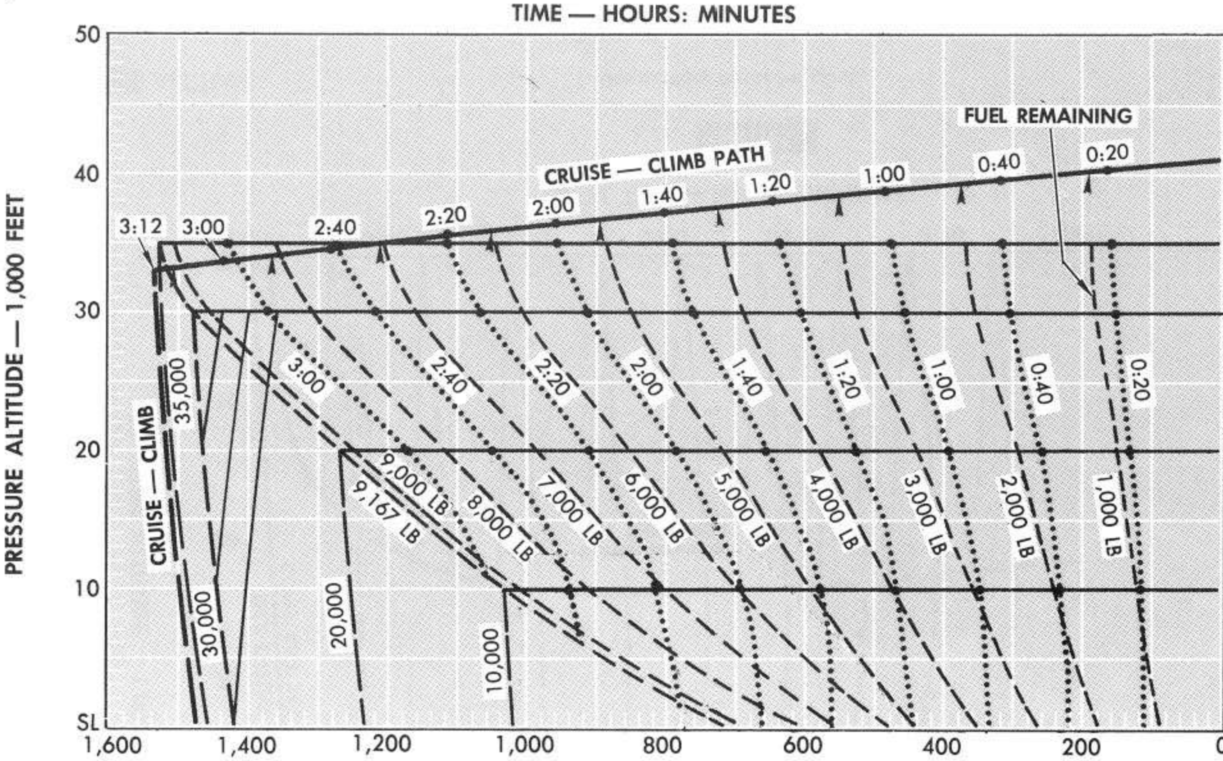
AIR REFUELING PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION IV

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 30,740 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	—	—
35	251	.75
30	272	.73
25	299	.72
20	323	.70
15	351	.69
10	379	.68
5	403	.66
SL	431	.65

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.84	—
40,000	0.84	256
35,000	0.83	279
30,000	0.77	290
25,000	0.71	297
20,000	0.64	293
15,000	0.58	297
10,000	0.55	306
5,000	0.53	320
SL	0.51	334

LEGEND

- — — — FUEL REMAINING
- ——— CRUISE — CLIMB PATH
- •····• TIME TO CRUISE
- —— —— CRUISE TO ZERO FUEL REMAINING
- ——— CONSTANT ALTITUDE CRUISE PATH
- ——— CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

63802—A—180NA

Figure 11-53

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

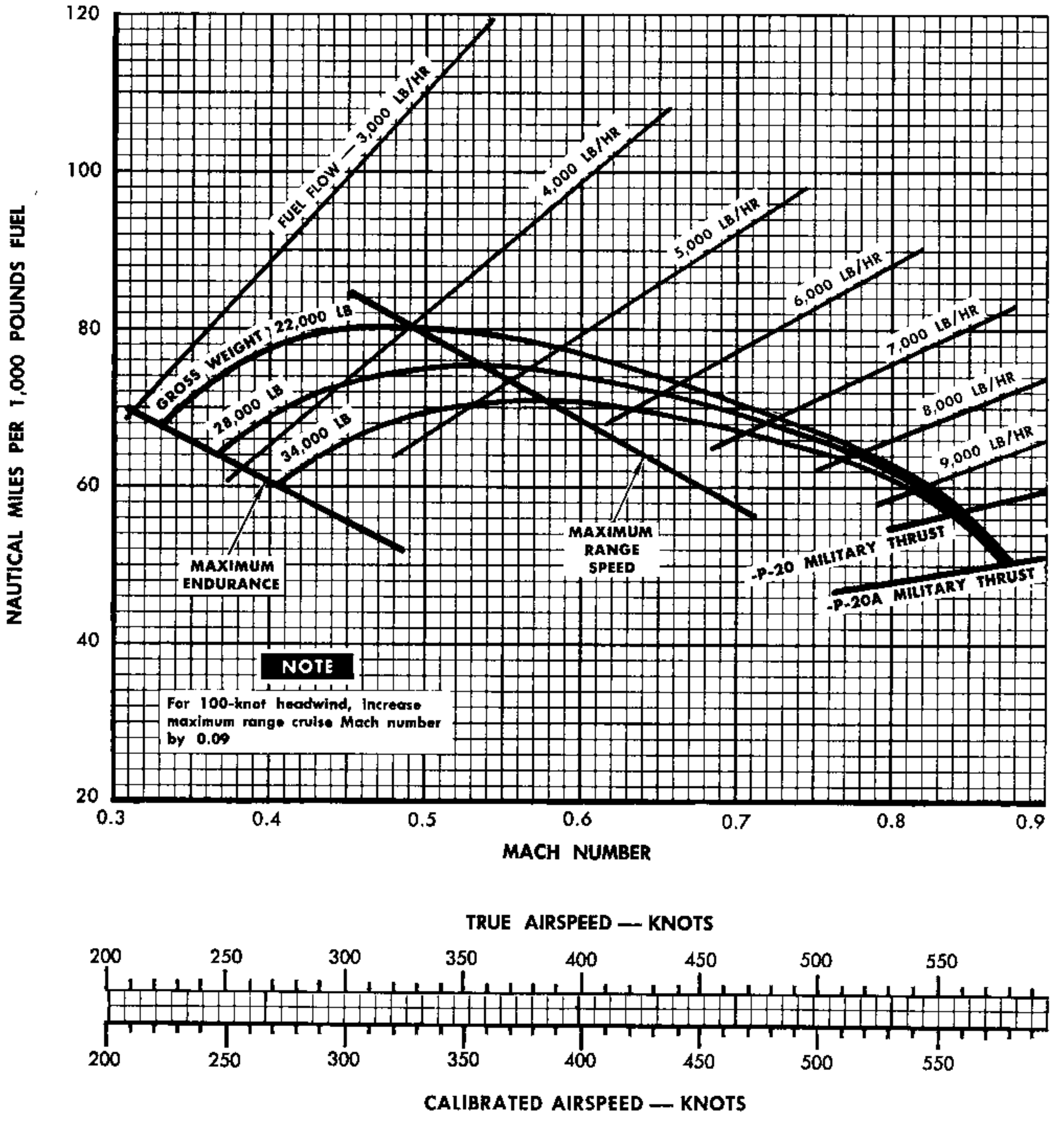


Figure 11-54 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET – CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

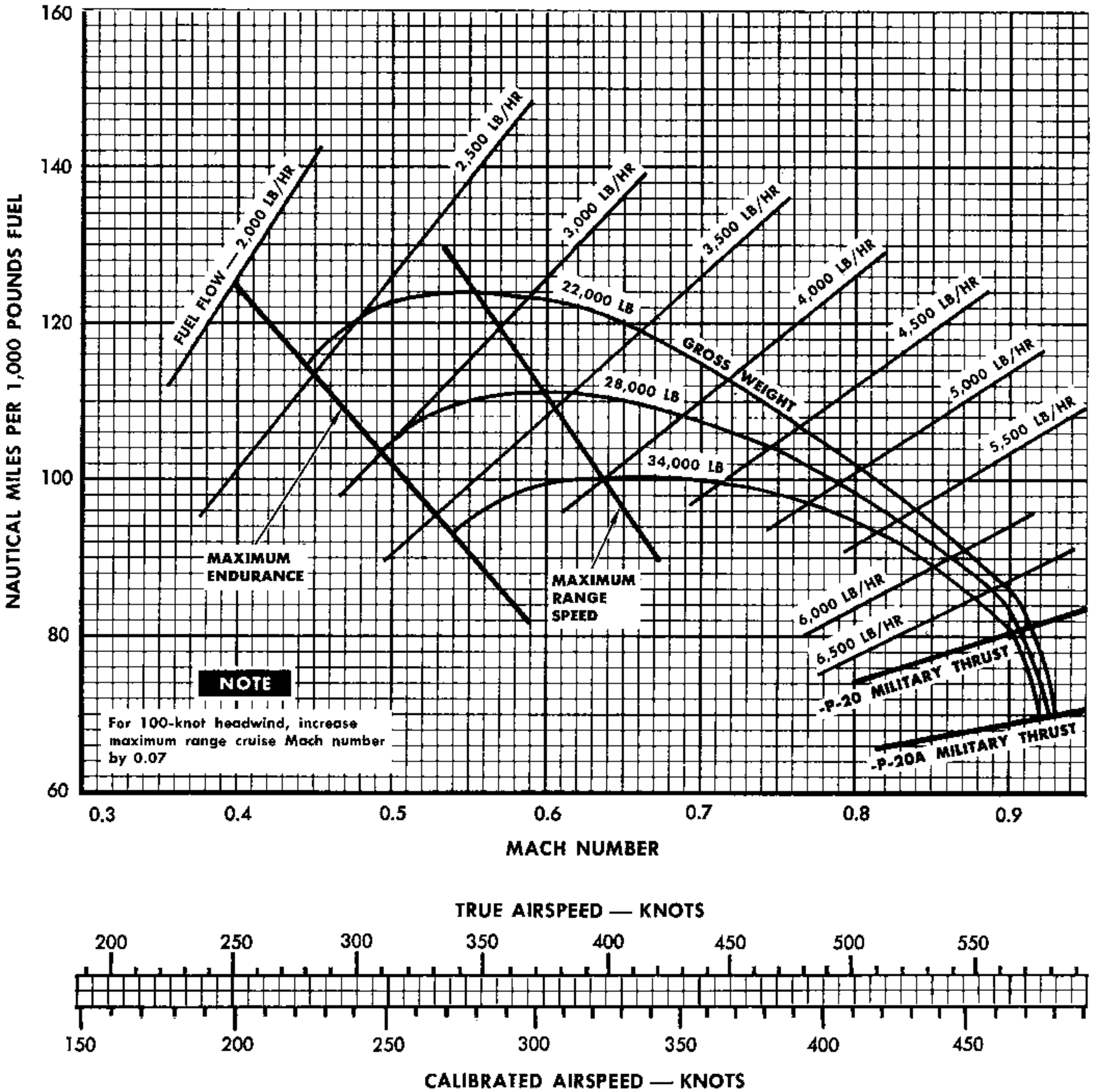


Figure 11-54 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.89 MN

ENGINES: J57-P-20, -P-20A

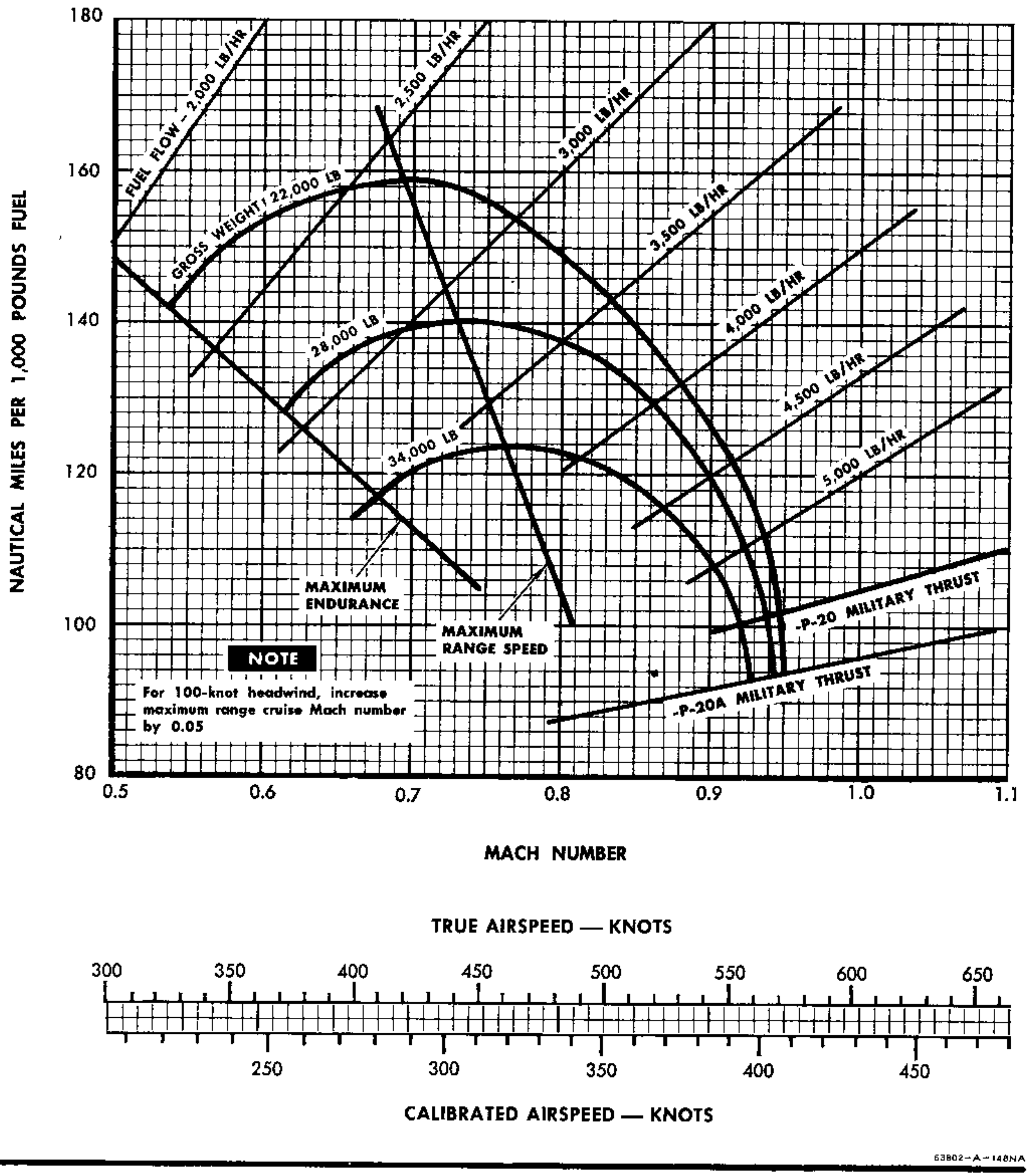


Figure 11-54 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.90 MN

ENGINES: J57-P-20, -P-20A

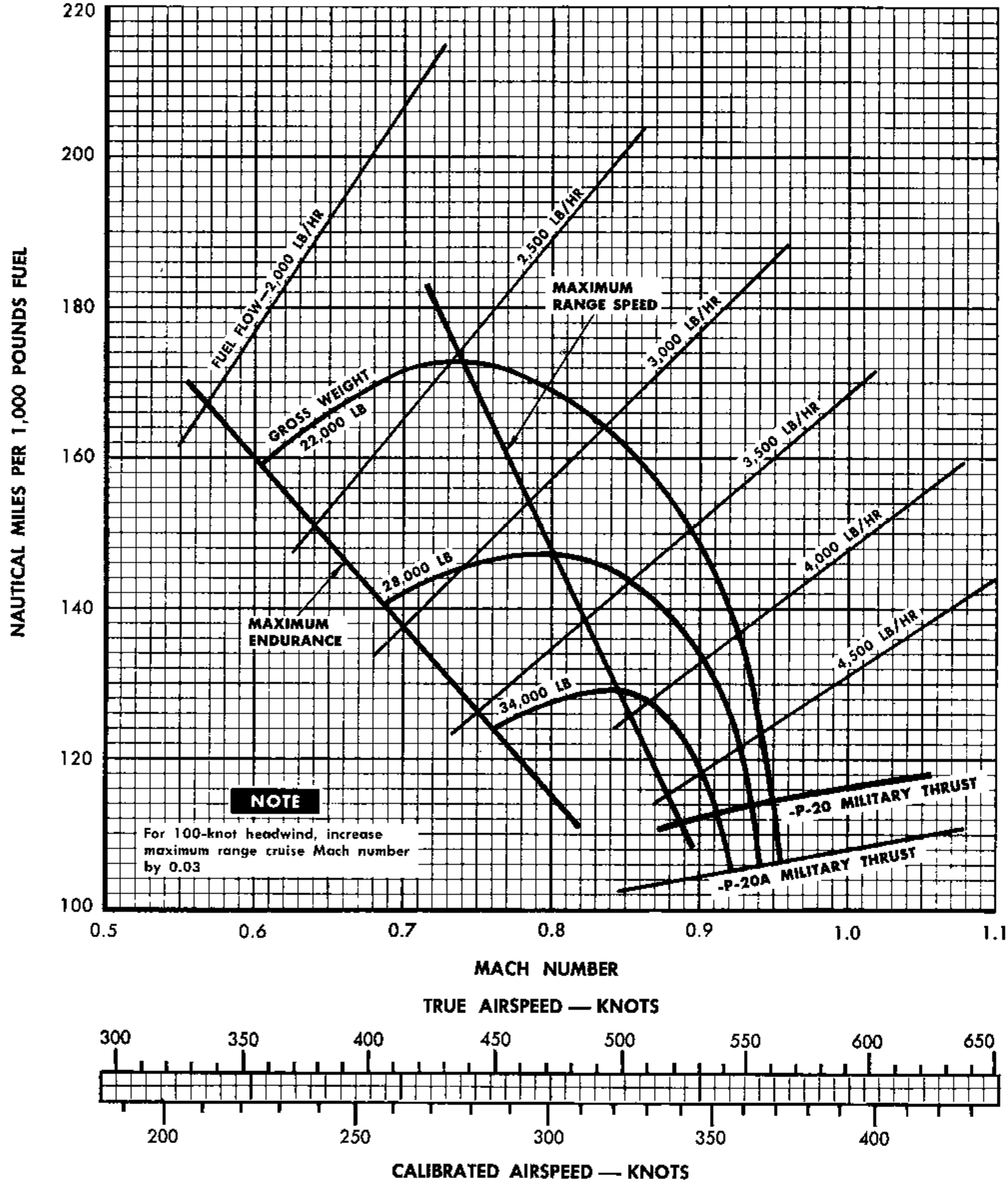


Figure 11-54 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET — CONFIGURATION IV

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

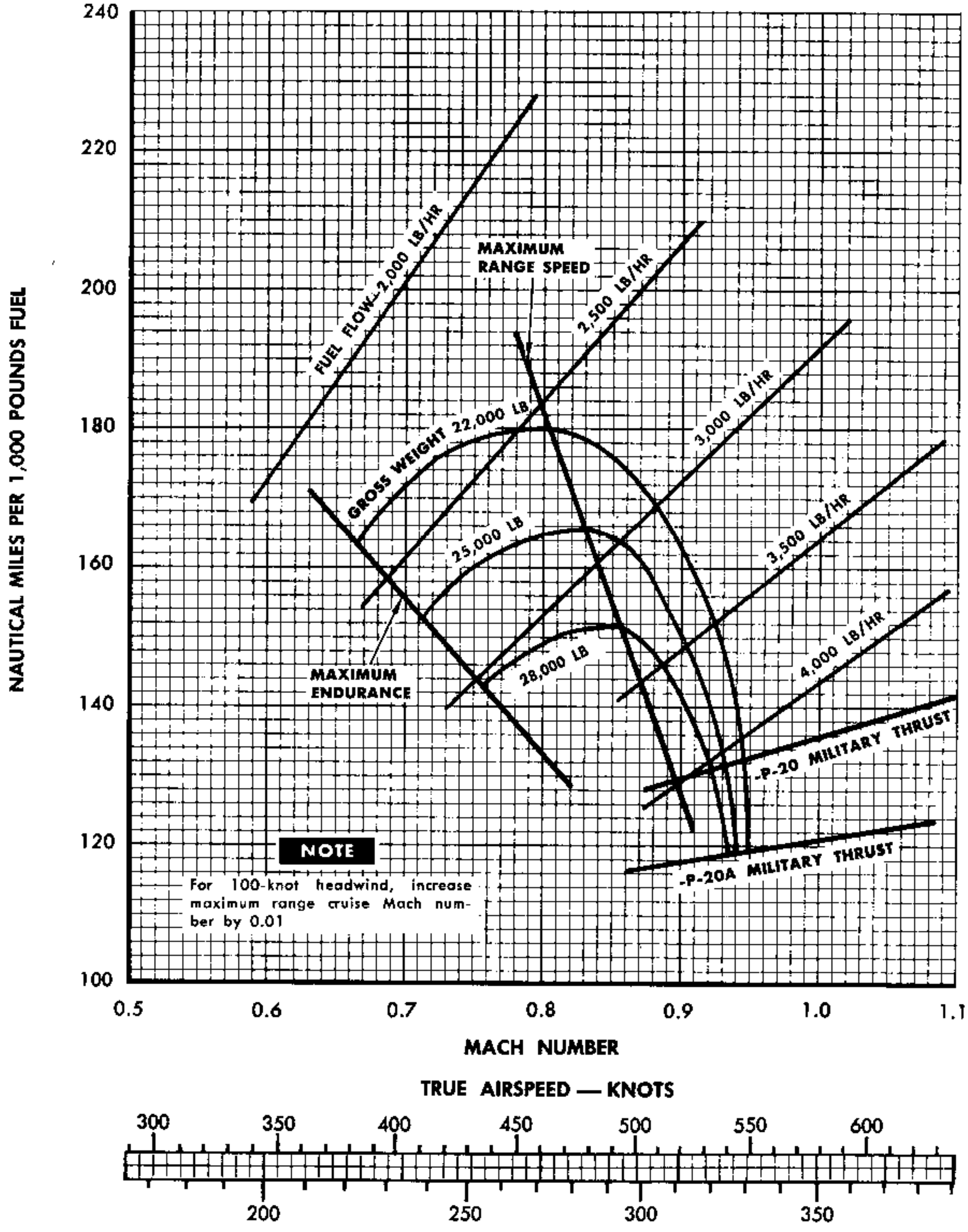
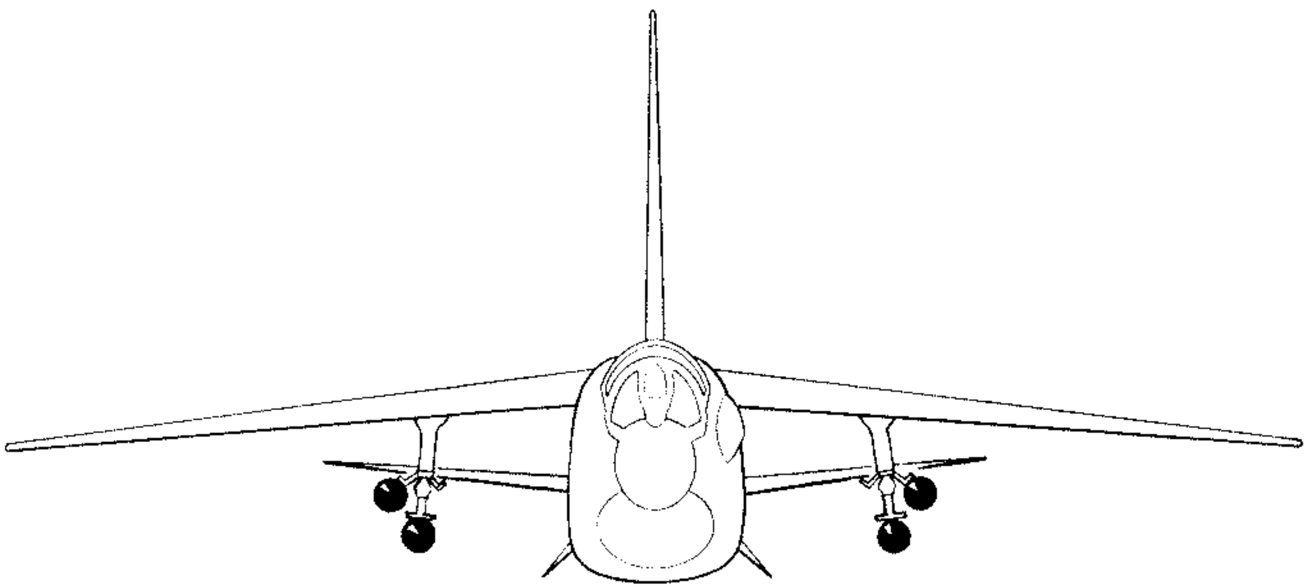


Figure 11-54 (Sheet 5)

CONFIGURATION V

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading—Eight 250-pound (MK 81) bombs

Note

Refer to figure 11-1 for other Configuration V stores arrangements.

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Mission Profile 166
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Optimum Endurance Profile 169
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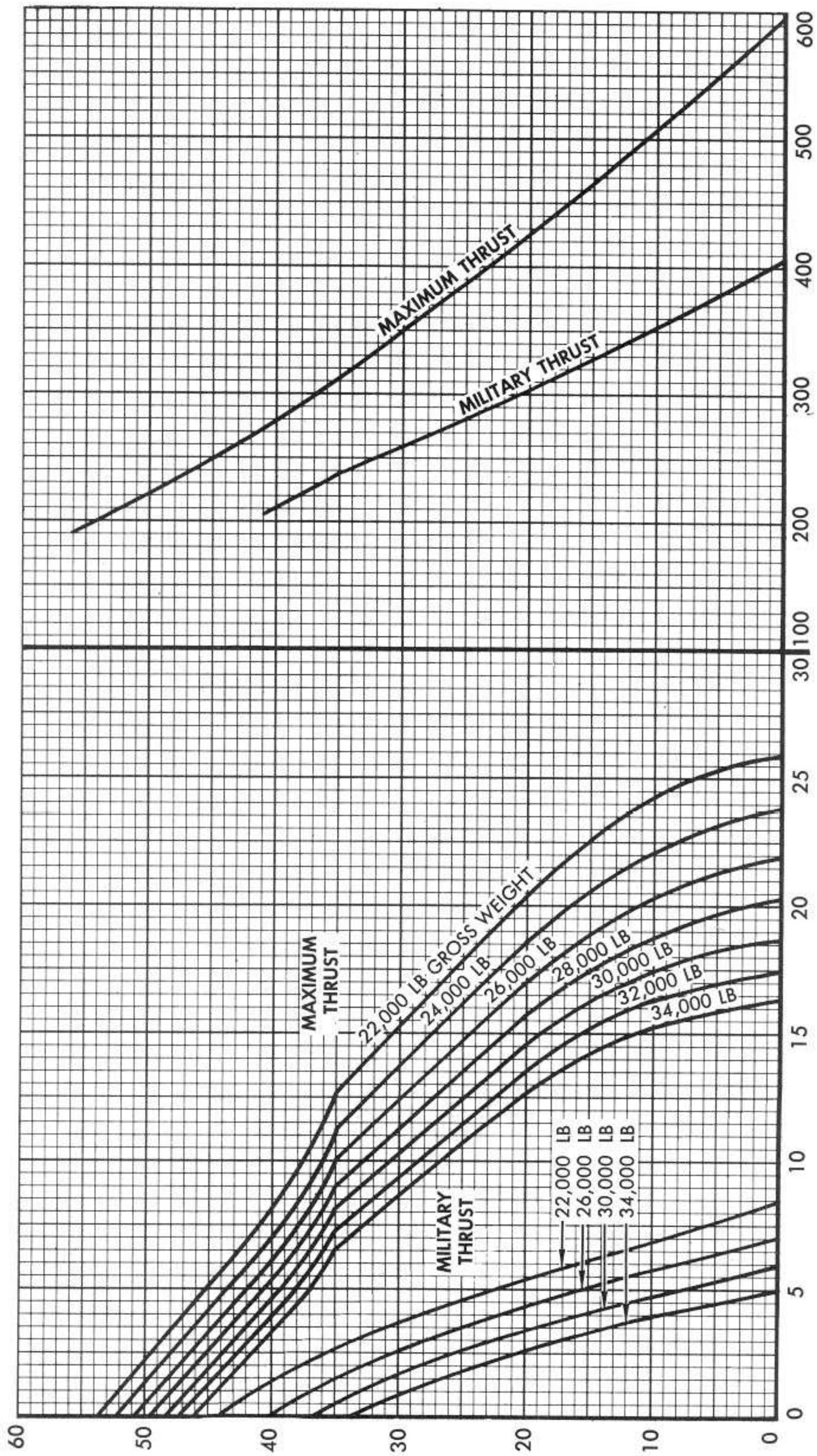
BEST CLIMB

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION V
Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

Figure 11-55

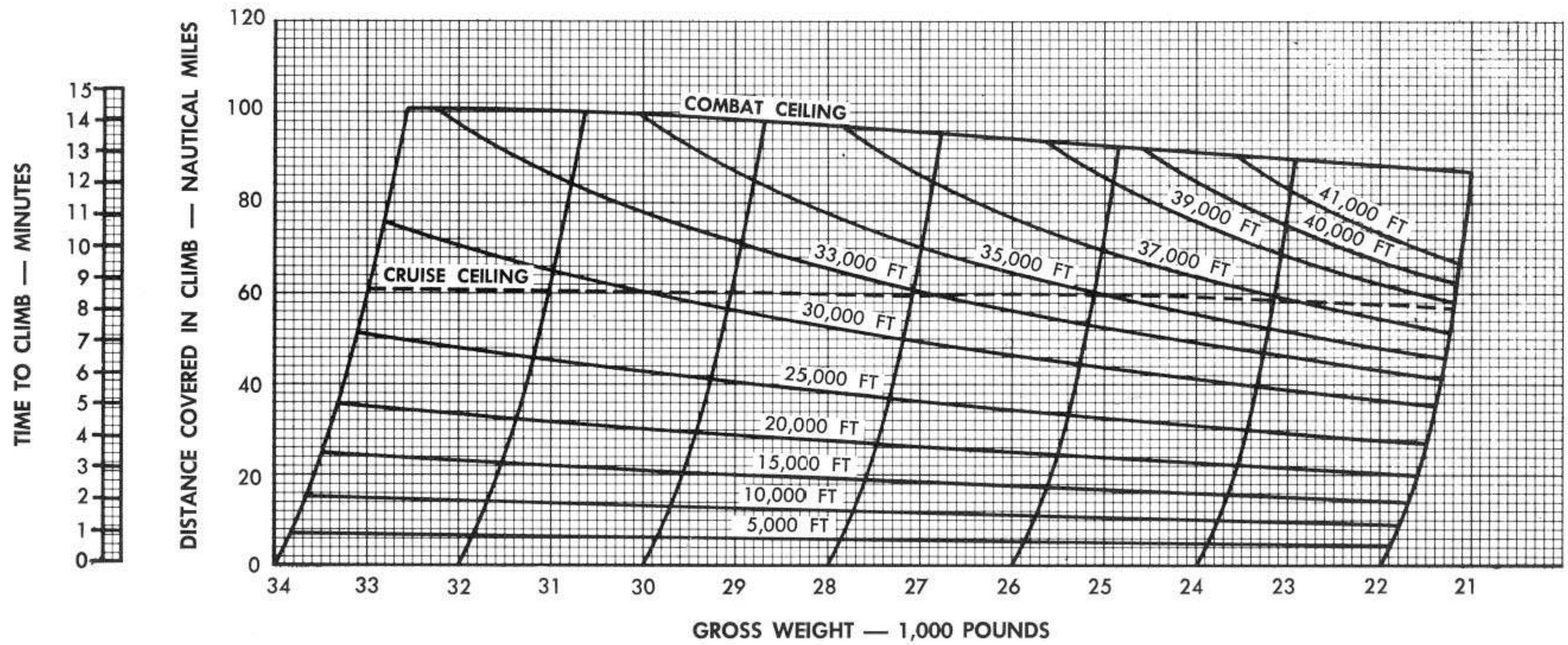
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude—Feet	CAS—Knots	Mach No.
SL	407	0.62
10,000	366	0.64
20,000	306	0.66
30,000	259	0.69
40,000	210	0.71

NOTES

1. For each 1 C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude is 20,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 407 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802—A—182NA

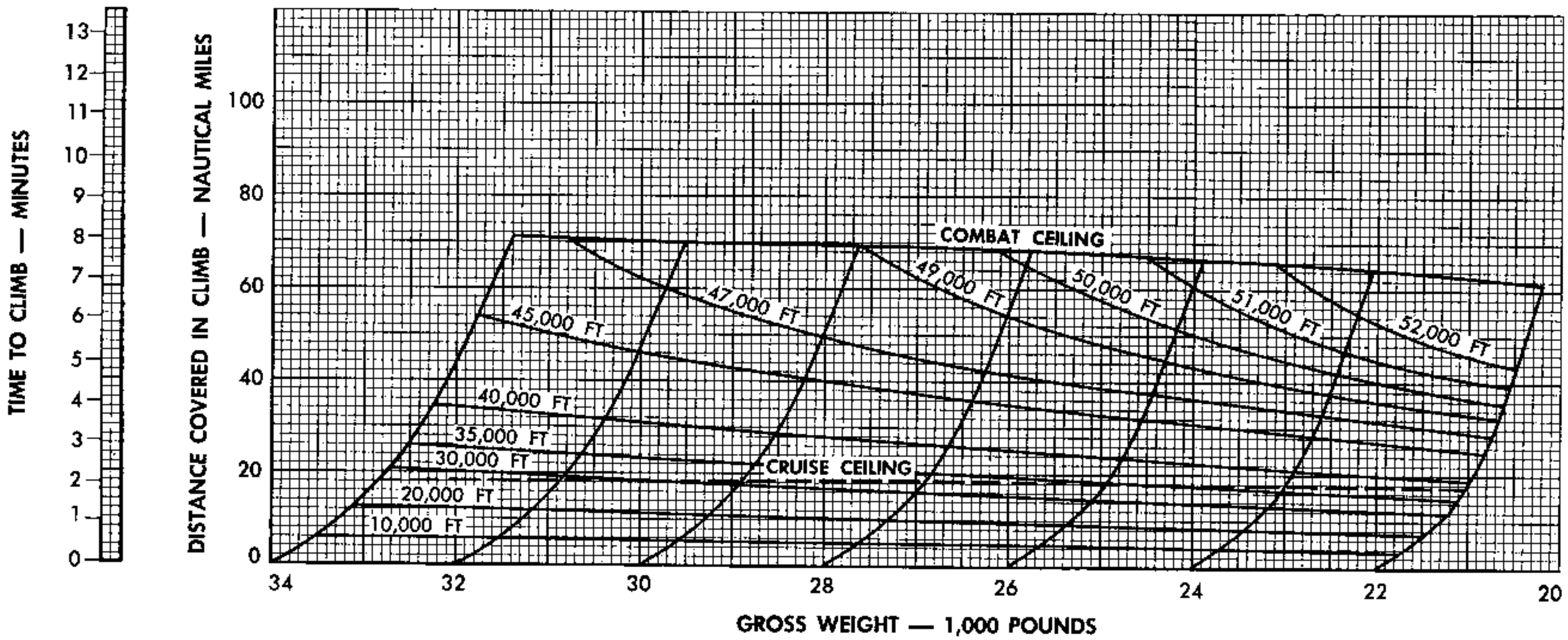
Figure 11-56 (Sheet 1)

MAXIMUM THRUST — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
SL	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 20,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes

63802—A—183NA

Figure 11-56 (Sheet 2)

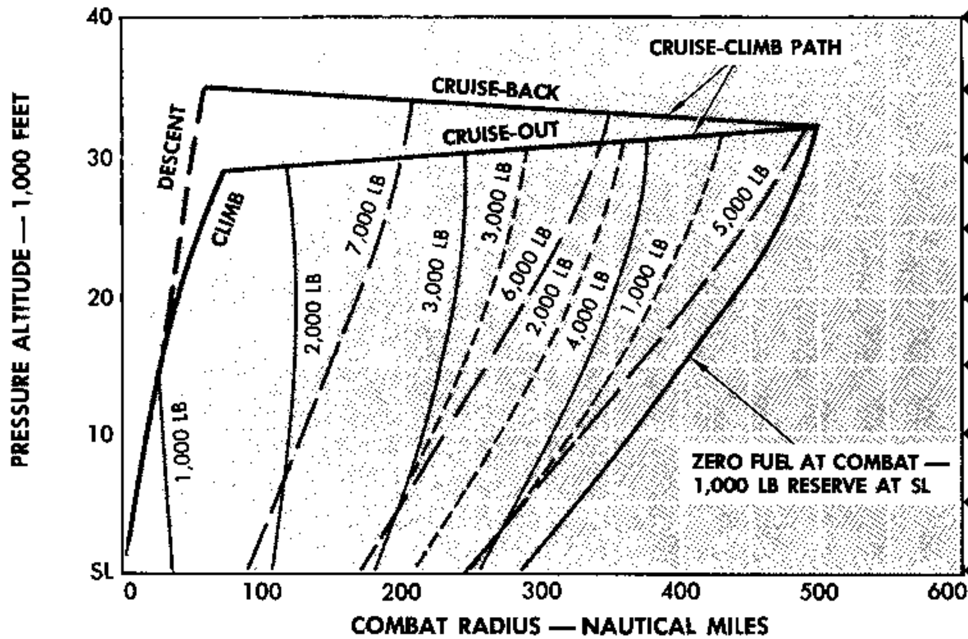
COMBAT RADIUS PROFILE

CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight 31,354 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	210	.71
35	238	.71
30	259	.69
25	280	.68
20	306	.66
15	330	.65
10	366	.64
5	381	.63
SL	407	.62

IDLE THRUST DESCENT — CONSTANT 244 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.82	—
30,000	0.81	307
25,000	0.75	315
20,000	0.69	317
15,000	0.63	320
10,000	0.59	326
5,000	0.55	335
SL	0.53	349

LEGEND

- ——— CLIMB AND CRUISE — CLIMB PATHS
- — — — DESCENT PATH
- – – – – COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- — — — TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802-A-184NA

Figure 11-57

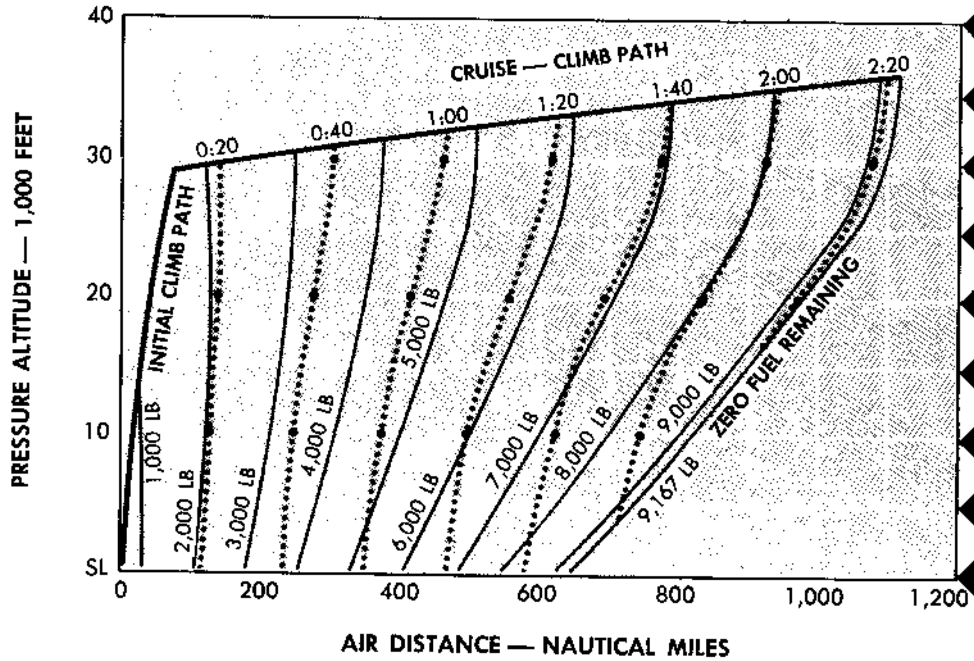
MISSION PROFILE

CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 31,354 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
40	210	.71
35	238	.71
30	259	.69
25	280	.68
20	306	.66
15	330	.65
10	366	.64
5	381	.63
SL	407	.62

LEGEND

- ——— FLIGHT PATH
- ••••••••• TIME TO CLIMB AND CRUISE
- ——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

CRUISE SCHEDULE		
ALTITUDE	MACH NO.	CAS
Cruise Climb	0.82	—
30,000	0.81	307
25,000	0.75	312
20,000	0.68	313
15,000	0.62	314
10,000	0.57	316
5,000	0.53	321
SL	0.49	325

63802—A—185NA

Figure 11-58

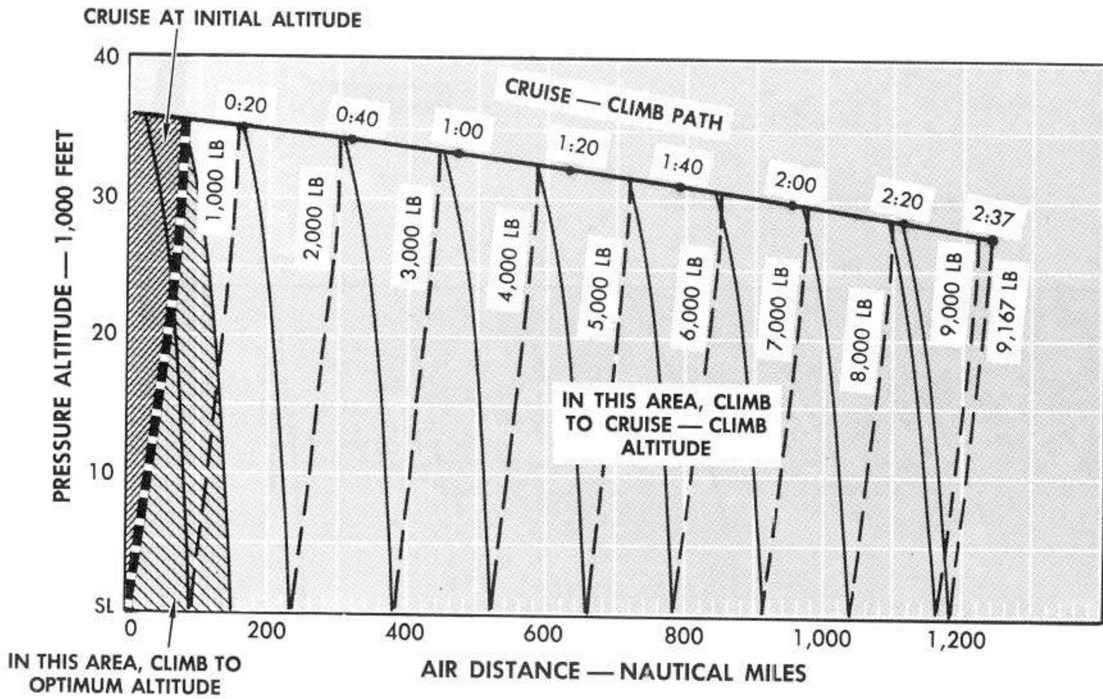
OPTIMUM RETURN PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION V

Cruise Condition At All Altitudes
Initial Gross Weight — 31,354 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
40	210	.71
35	238	.71
30	259	.69
25	280	.68
20	306	.66
15	330	.65
10	366	.64
5	381	.63
SL	407	.62

CRUISE SCHEDULE		
ALTITUDE	MACH NO.	CAS
Cruise Climb	0.82	—
30,000	0.81	307
25,000	0.75	312
20,000	0.68	313
15,000	0.62	314
10,000	0.57	316
5,000	0.53	321
SL	0.49	325

LEGEND

- CRUISE — CLIMB PATH (WITH TIME AT CRUISE CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of climb path guide lines with lines of best range.

63802-A-186NA

Figure 11-59

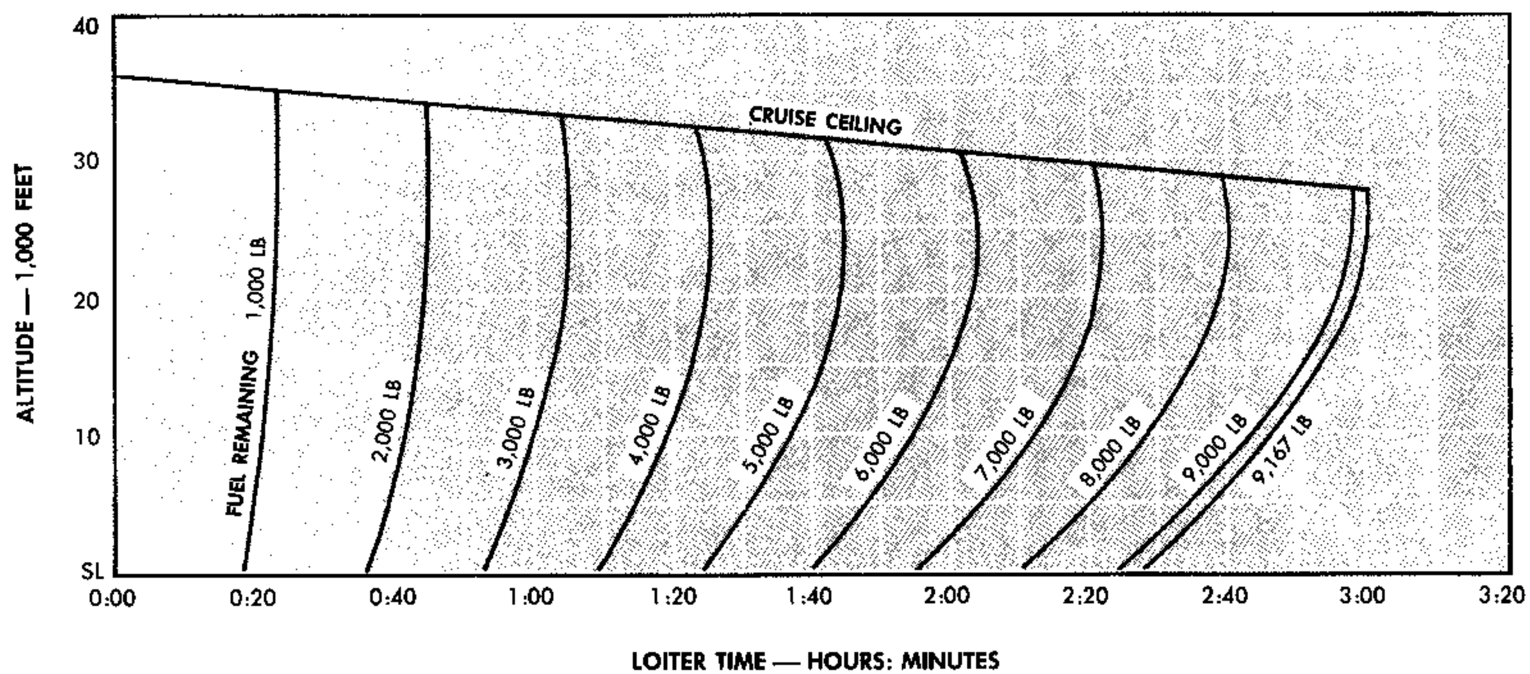
MAXIMUM ENDURANCE PROFILE

CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 31,354 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802—A—187NA

Figure 11-60

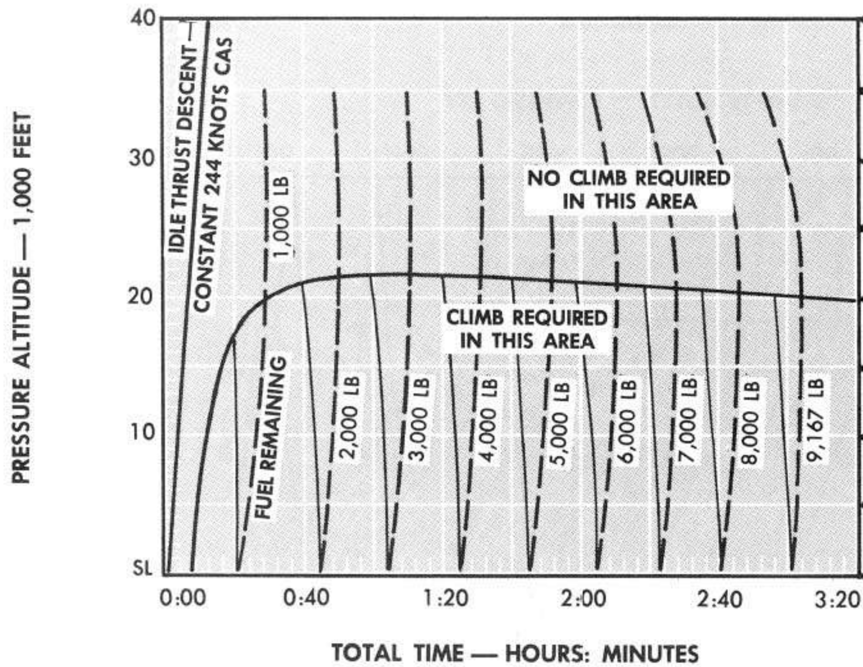
OPTIMUM ENDURANCE PROFILE

CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 31,354 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	210	.71
35	238	.71
30	259	.69
25	280	.68
20	306	.66
15	330	.65
10	366	.64
5	381	.63
SL	407	.62

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter, and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802—A—188NA

Figure 11-61

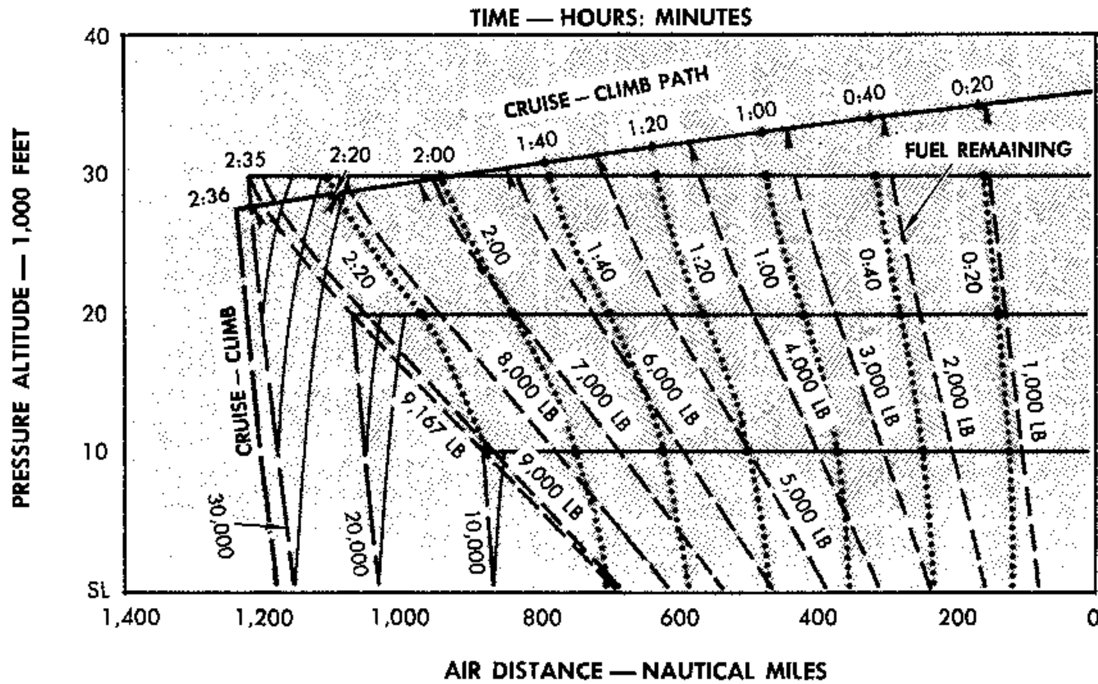
AIR REFUELING PROFILE

CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 31,354 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	210	.71
35	238	.71
30	259	.69
25	280	.68
20	306	.66
15	330	.65
10	366	.64
5	381	.63
SL	407	.62

LEGEND

- FUEL REMAINING
- CRUISE — CLIMB PATH (WITH FUEL REMAINING INTERSECTION)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.82	—
30,000	0.81	307
25,000	0.75	312
20,000	0.68	313
15,000	0.62	314
10,000	0.57	316
5,000	0.53	321
SL	0.49	325

63802-A-189NA

Figure 11-62

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION V

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

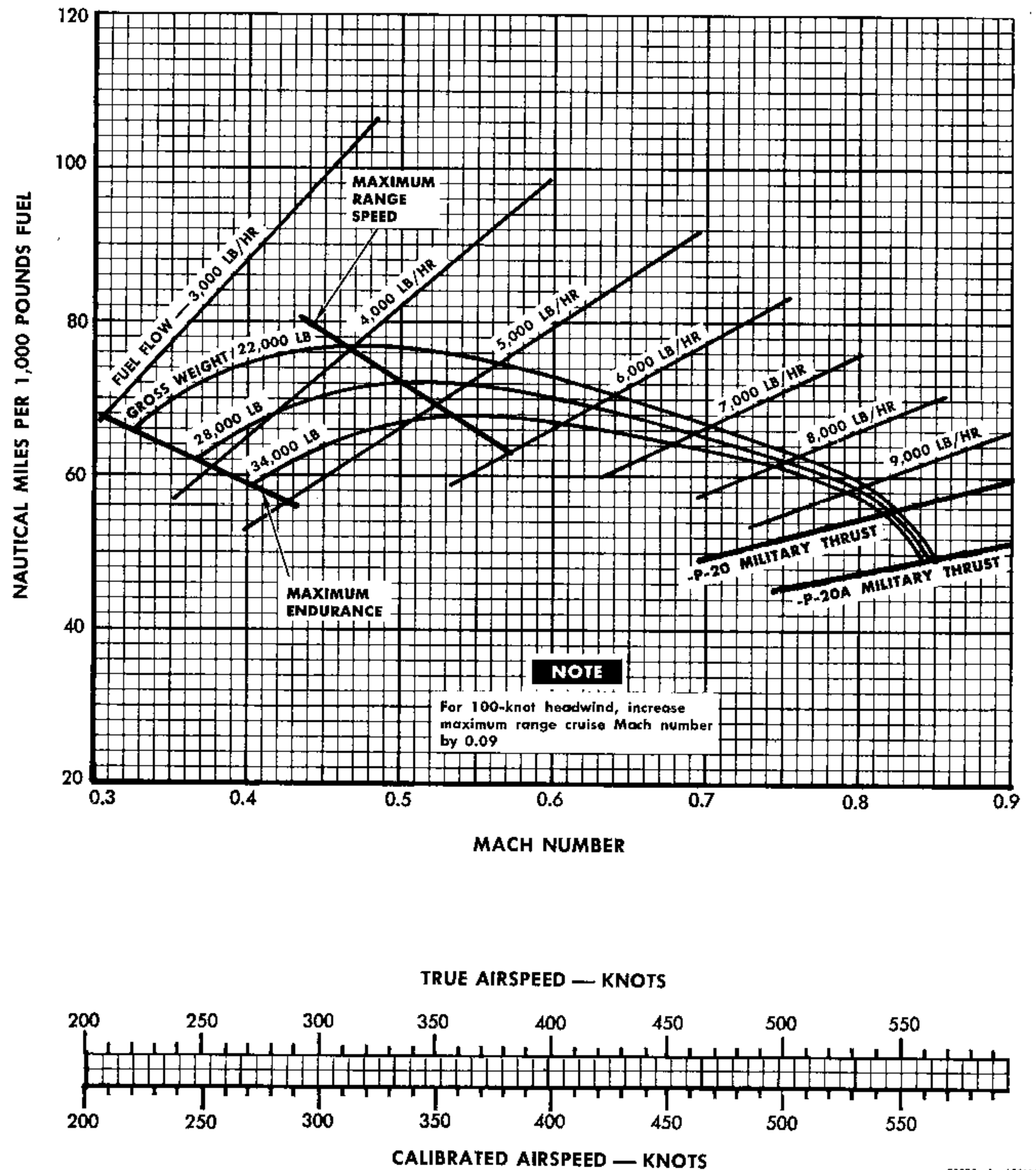


Figure 11-63 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

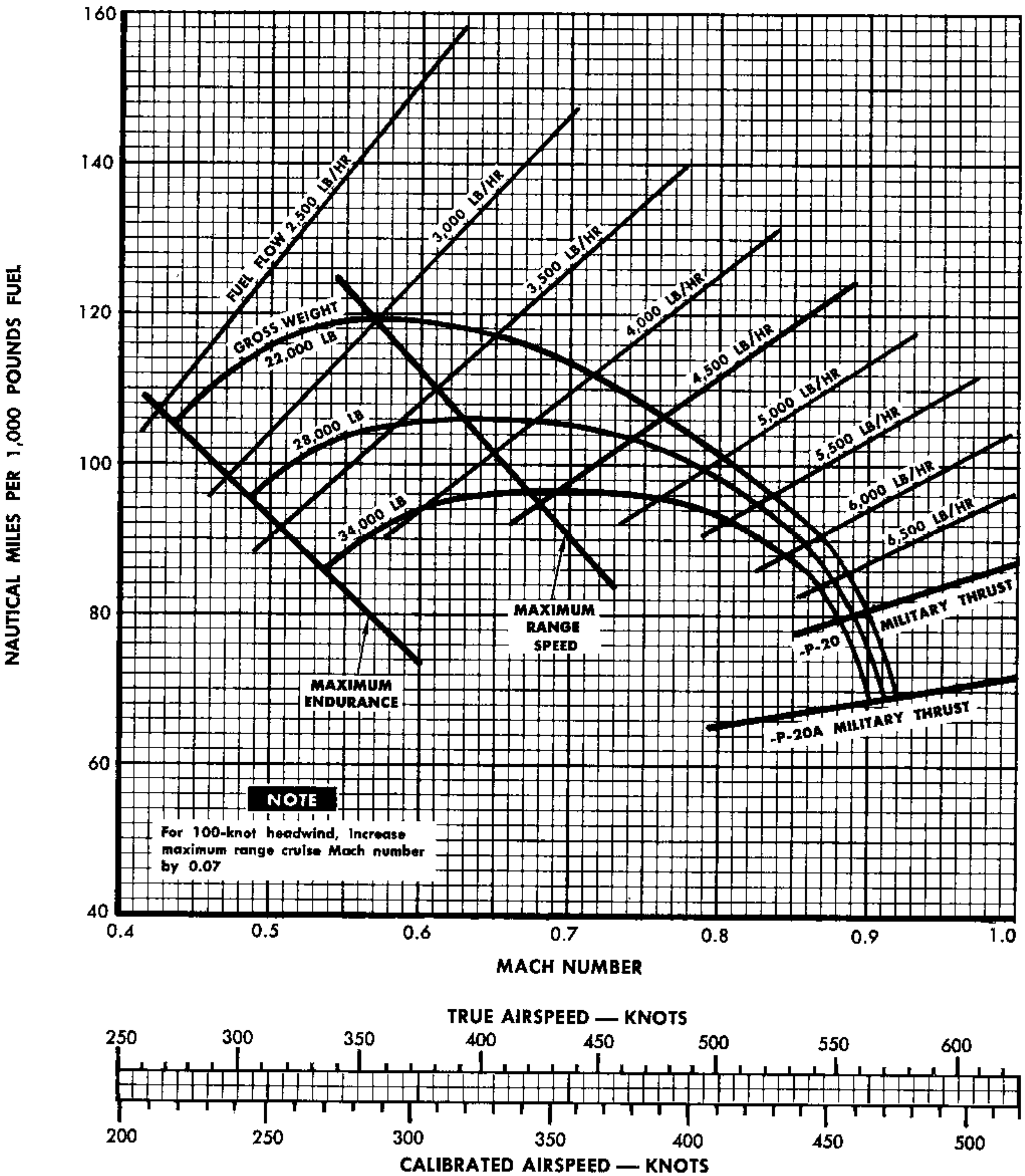


Figure 11-63 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.89 MN

ENGINES: J57-P-20, -P-20A

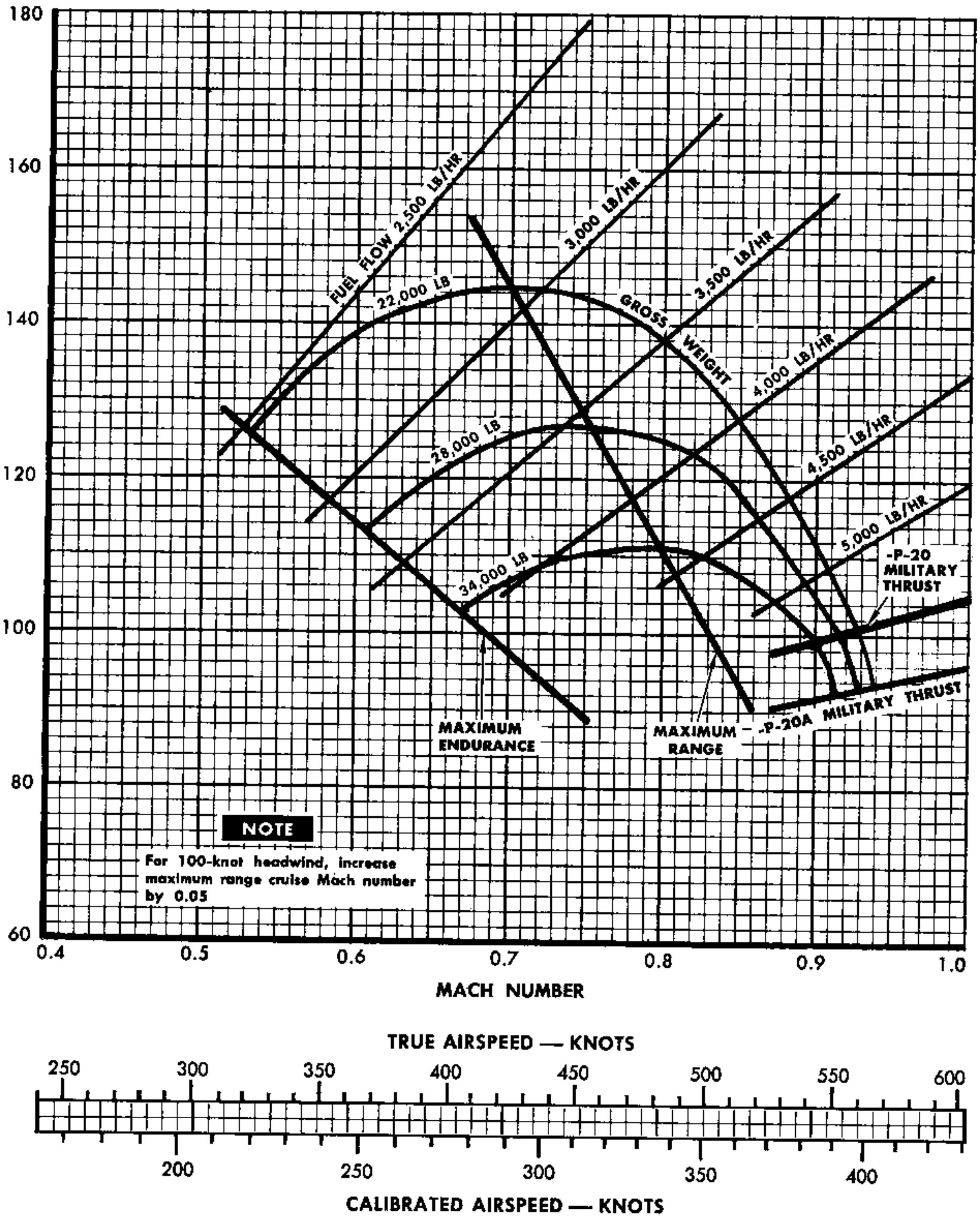


Figure 11-63 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.90 MN

ENGINES: J57-P-20, -P-20A

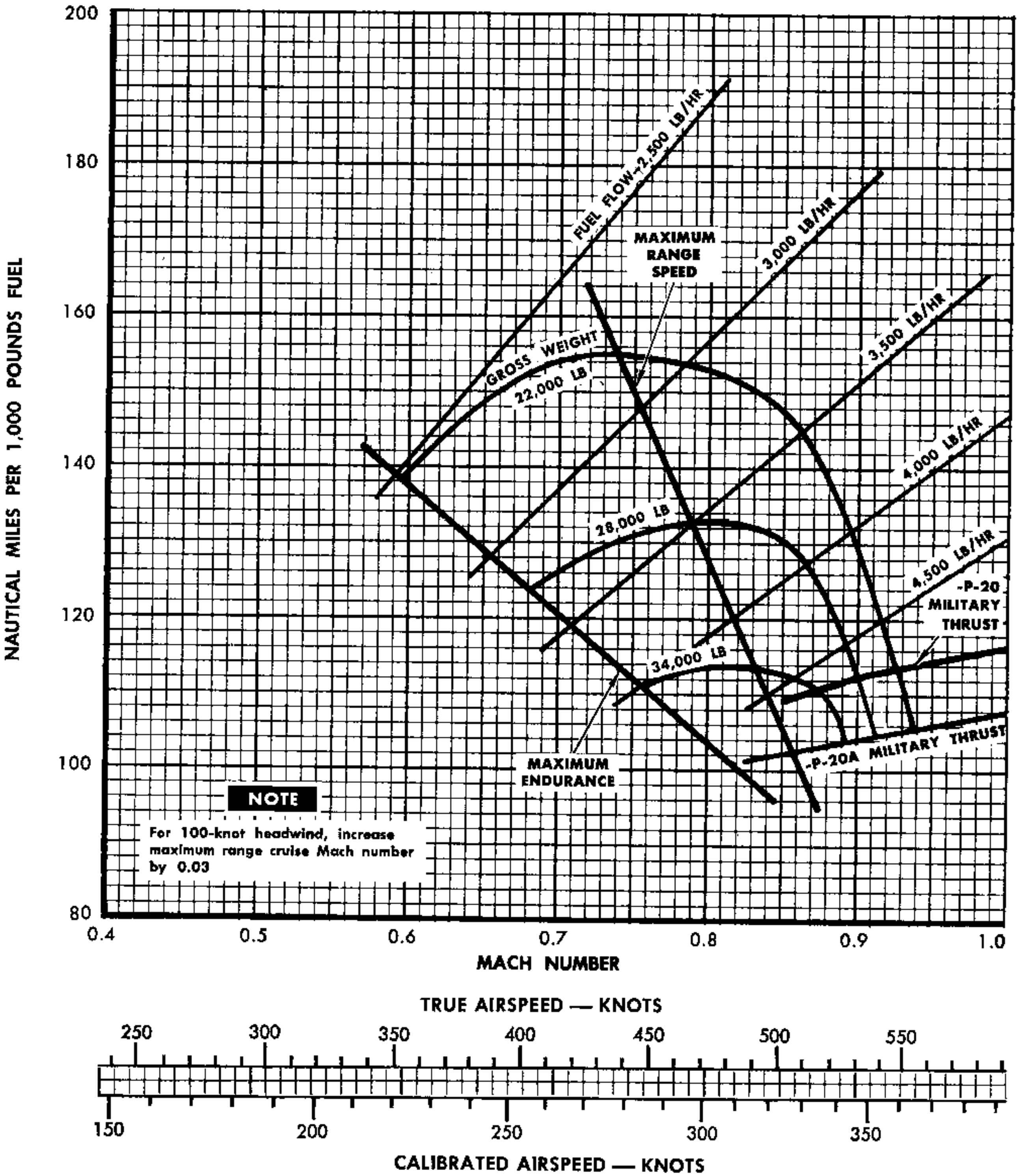


Figure 11-63 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET — CONFIGURATION V

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

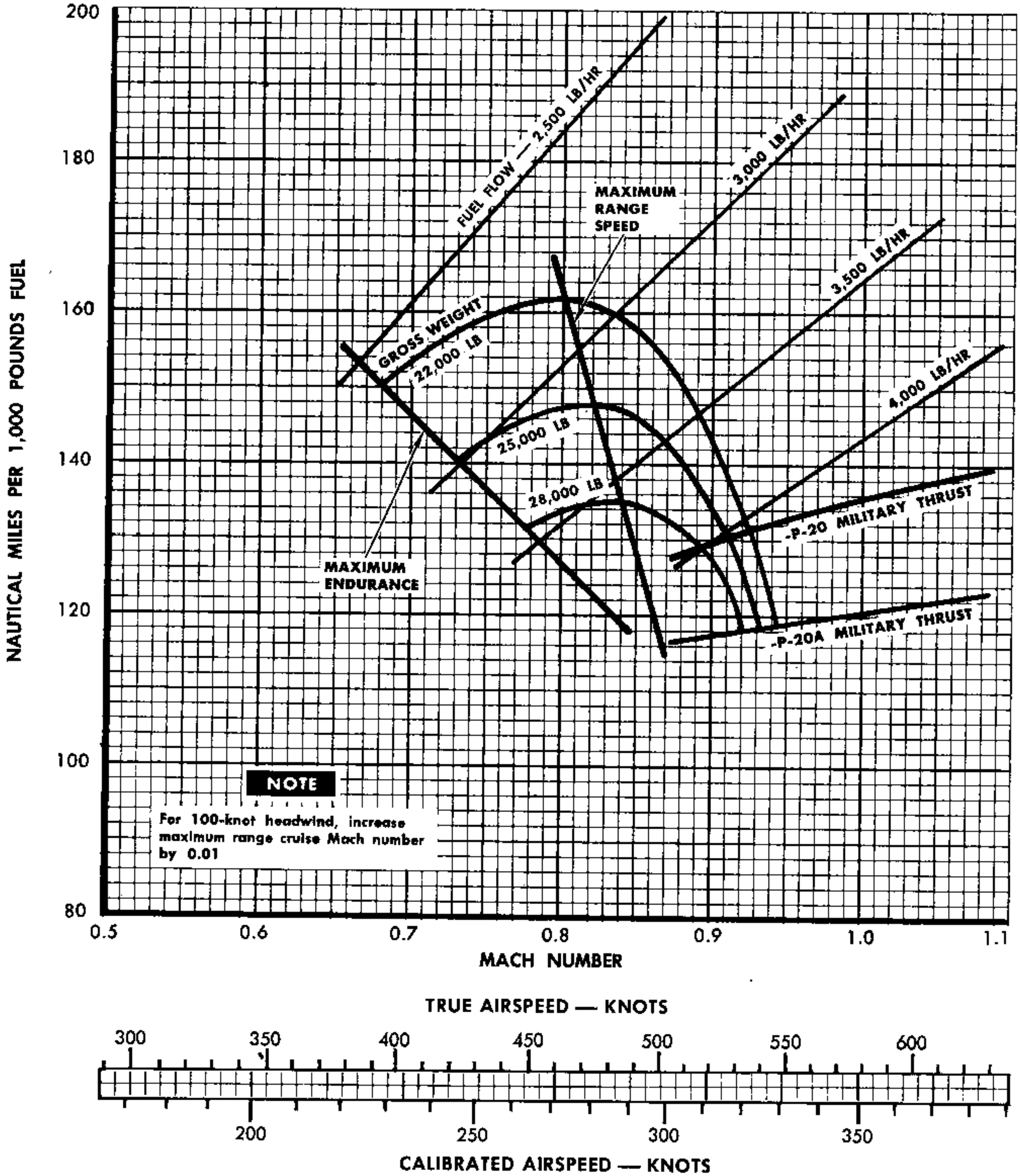
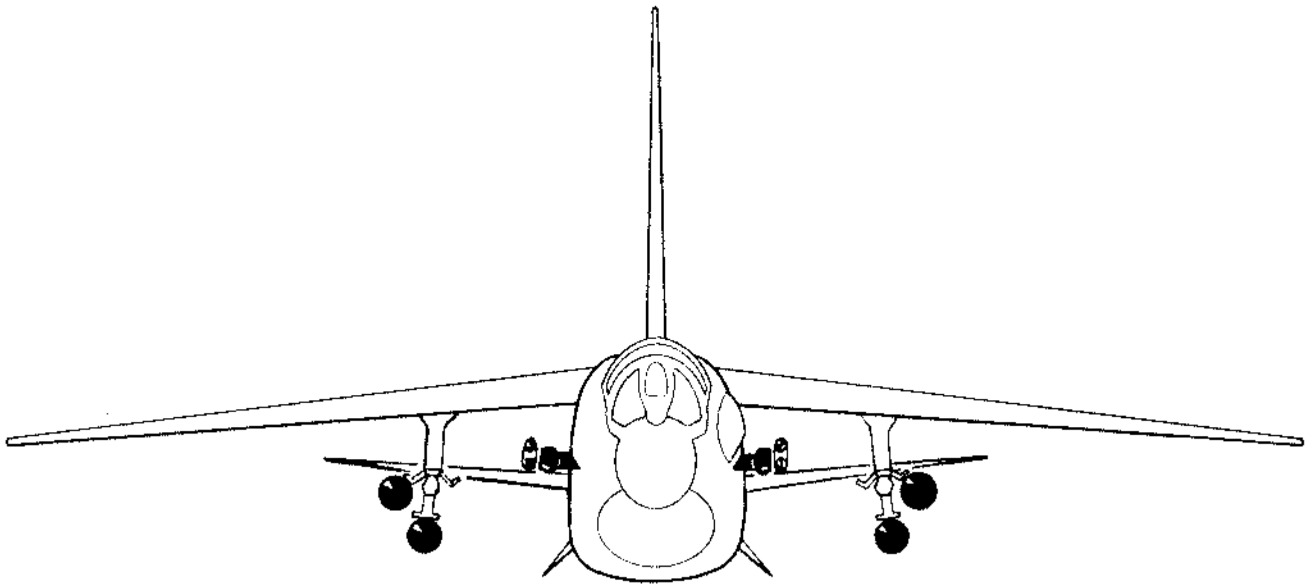


Figure 11-63 (Sheet 5)

CONFIGURATION VI

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading — Six 250-pound (MK 81) bombs and two (short-nose) Zuni packs

Note

Refer to figure 11–1 for other Configuration VI stores arrangements.

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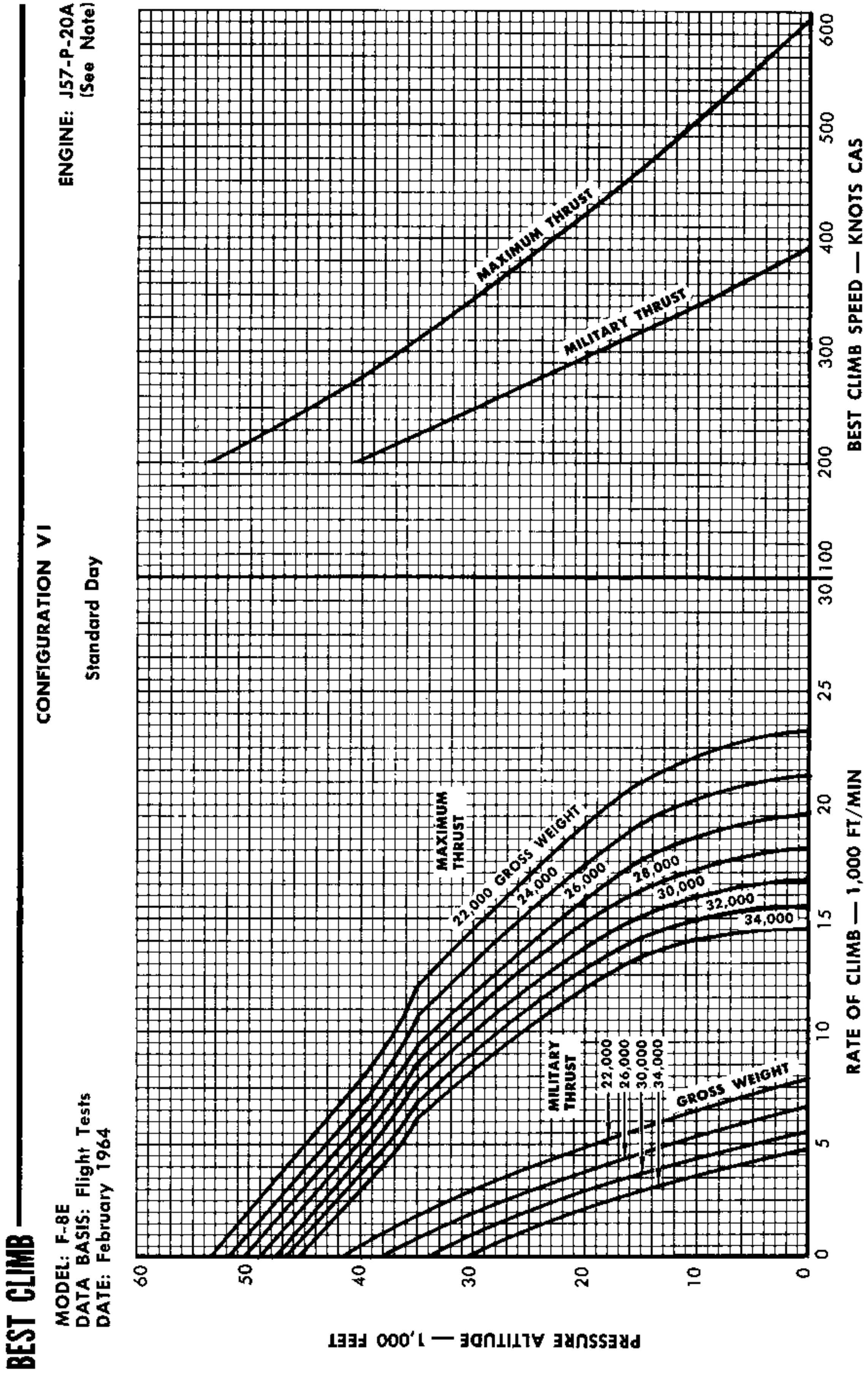


NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

Figure 11-64

63802-A-90NA

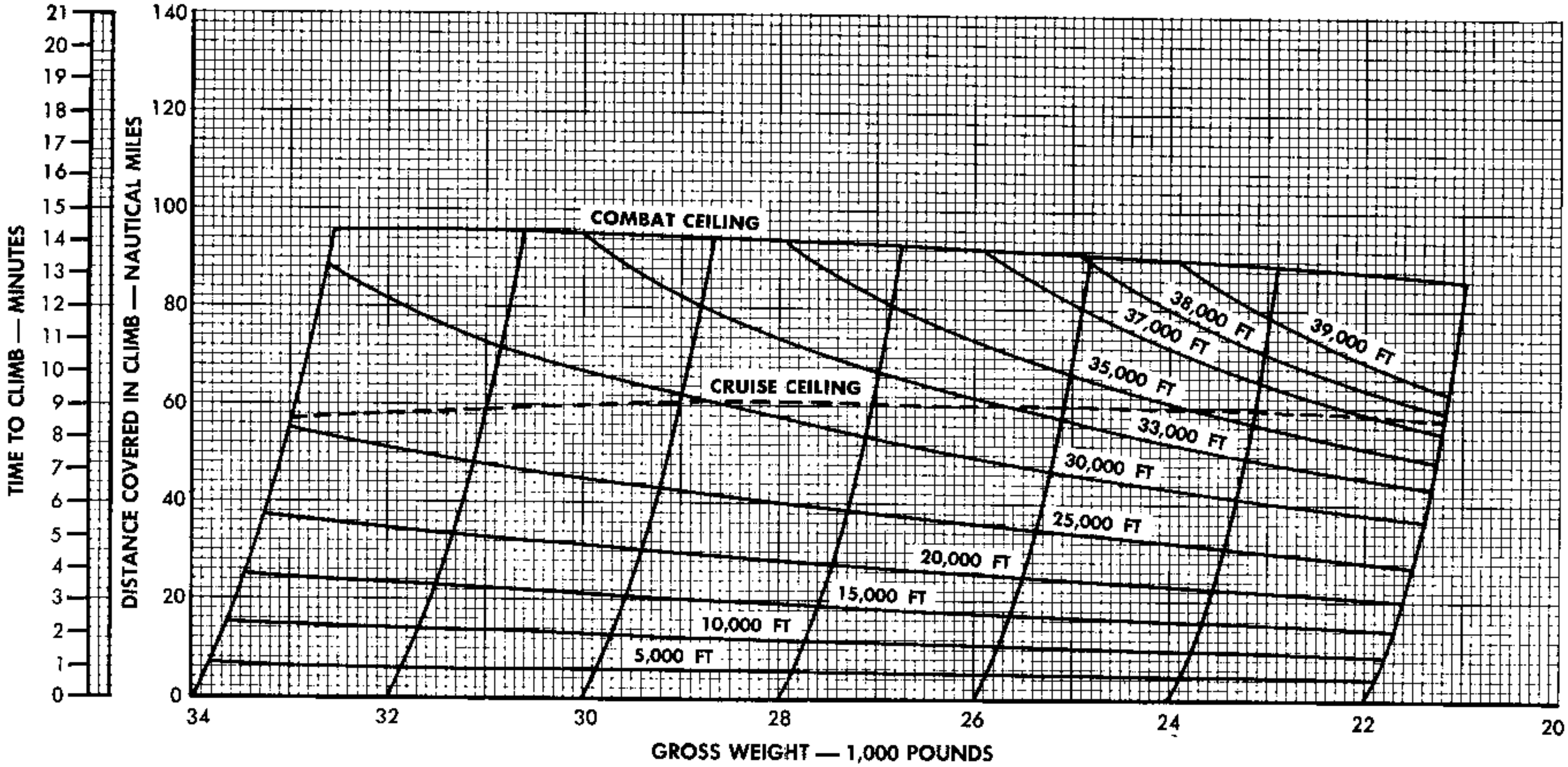
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEEDS

Altitude Feet	CAS Knots	Mach No.
S.L.	398	0.60
10,000	348	0.62
20,000	300	0.65
30,000	250	0.68
40,000	203	0.69

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude is 20,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 398 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-91NA

Figure 11-65 (Sheet 1)

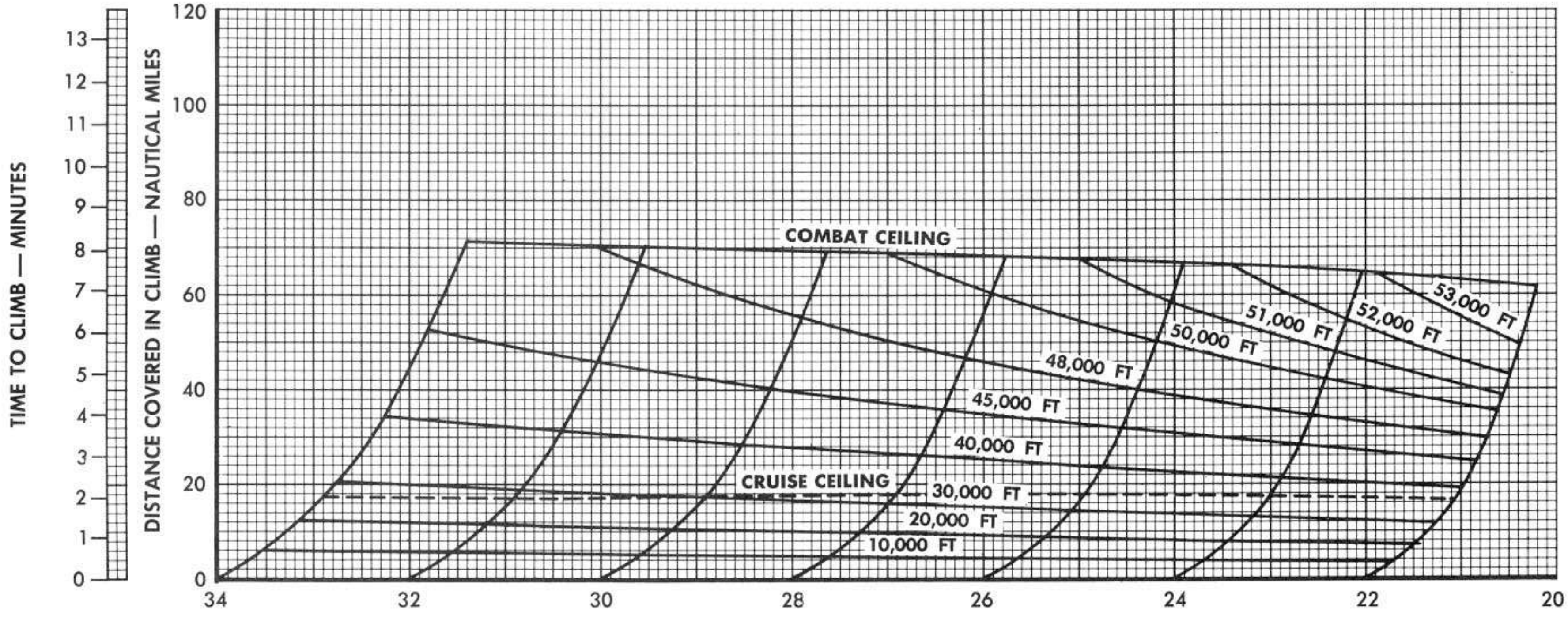
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude Feet	CAS Knots
S L	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195

NOTES

1. For each 1°C above standard day temperature increase value obtained as follows:

Distance — 2%
Time — 2.5%
Fuel — 1%

2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 22,000 feet.
4. For field takeoff add 1.0 minute and 620 pounds for time and fuel from release of brakes.

63802—A—92NA

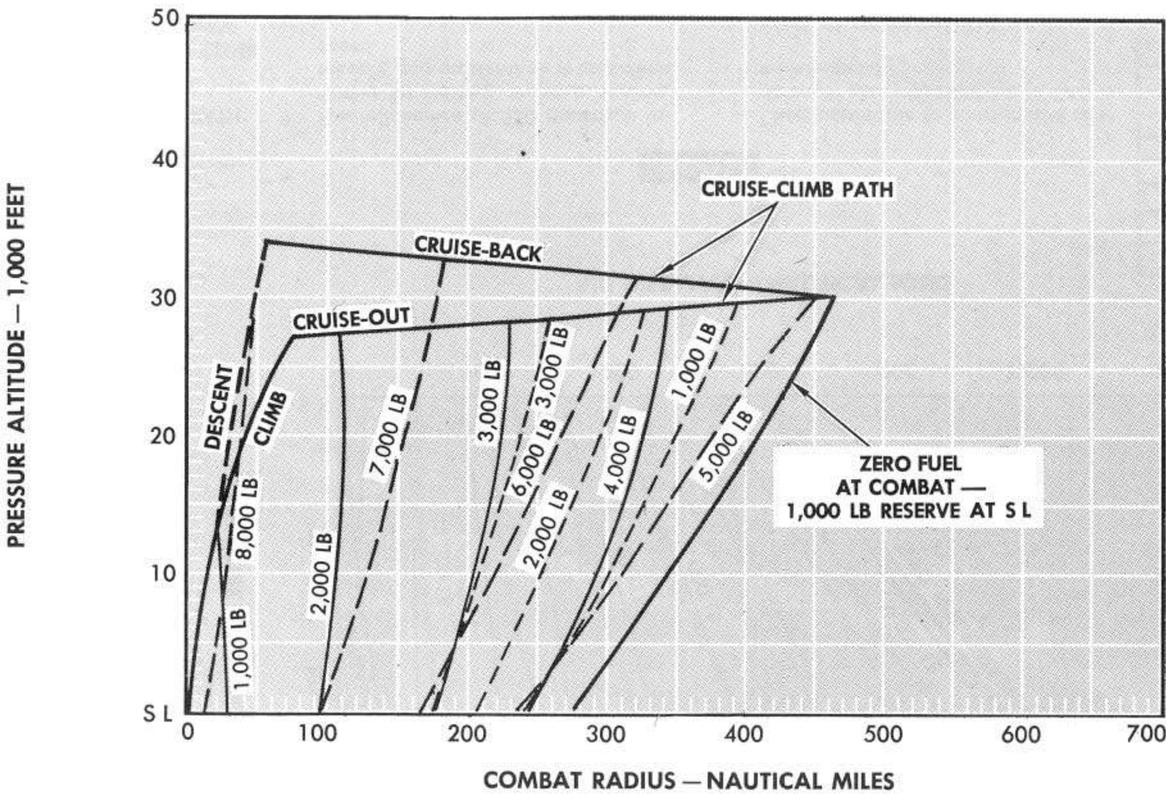
Figure 11-65 (Sheet 2)

COMBAT RADIUS PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION VI
Cruise Condition At All Altitudes
Takeoff Gross Weight — 31,564 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
45	—	—
40	203	.69
35	230	.69
30	250	.68
25	272	.66
20	300	.65
15	321	.64
10	348	.62
5	372	.61
S L	398	.60

IDLE THRUST DESCENT — CONSTANT 245 KNOTS CAS

CRUISE SCHEDULE

ALTITUDE–FT	MACH NO.	CAS
CRUISE-CLIMB	0.83	—
25,000	0.72	300
20,000	0.65	299
15,000	0.56	283
10,000	0.52	288
5,000	0.50	303
S L	0.48	318

LEGEND

- ——— CLIMB AND CRUISE— CLIMB PATH
- — — DESCENT PATH
- - - - COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- — — TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802—A—93NA

Figure 11-66

MISSION PROFILE

CONFIGURATION VI

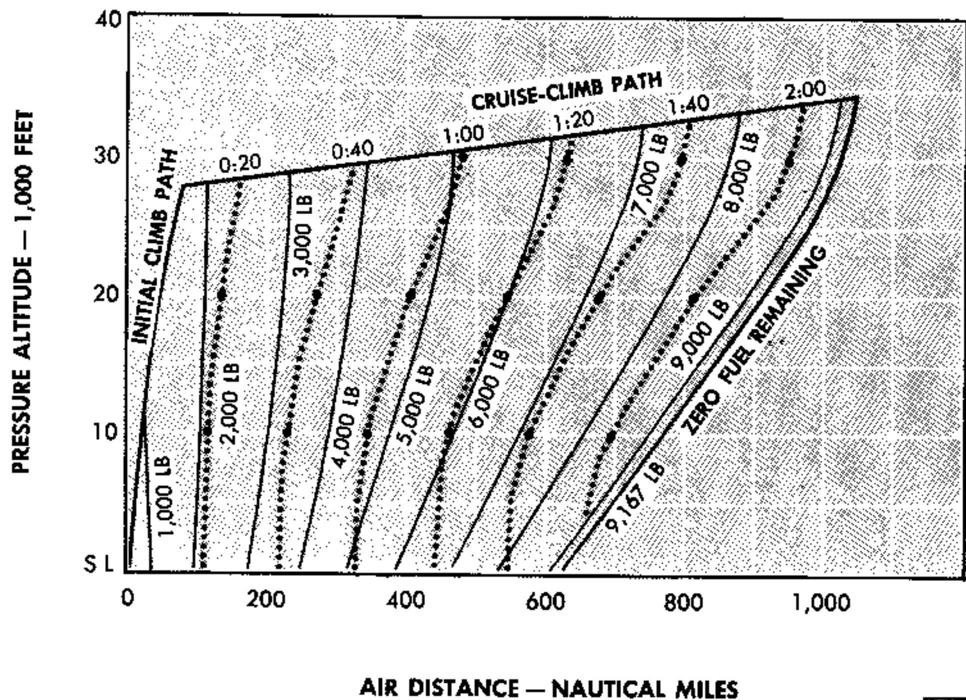
MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 31,564 Pounds

ENGINES: J57-P-20, -P-20A

MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	203	.69
35	230	.69
30	250	.68
25	272	.66
20	300	.65
15	321	.64
10	348	.62
5	372	.61
S L	398	.60



CRUISE SCHEDULE

ALTITUDE–FT	MACH NO	CAS
CRUISE-CLIMB	0.83	—
25,000	0.72	300
20,000	0.65	299
15,000	0.56	283
10,000	0.52	288
5,000	0.50	303
S L	0.48	318

LEGEND

——— FLIGHT PATH
– – – – TIME TO CLIMB AND CRUISE
——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day.

Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.

4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802-A-94NA

Figure 11-67

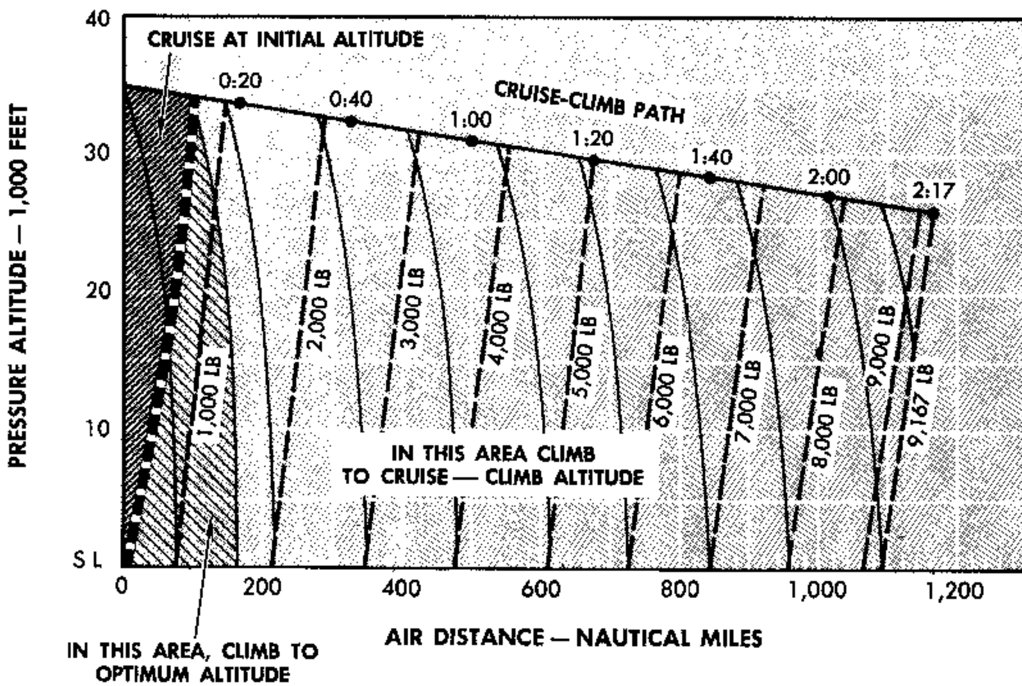
OPTIMUM RETURN PROFILE

CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Initial Gross Weight — 31,564 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	203	.69
35	230	.69
30	250	.68
25	272	.66
20	300	.65
15	321	.64
10	348	.62
5	372	.61
S L	398	.60

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb-path guide lines with lines of best range.

CRUISE SCHEDULE		
ALTITUDE—FT	MACH NO	CAS
CRUISE-CLIMB	0.83	—
25,000	0.72	300
20,000	0.65	299
15,000	0.56	283
10,000	0.52	288
5,000	0.50	303
S L	0.48	318

63802—A—95NA

Figure 11-68

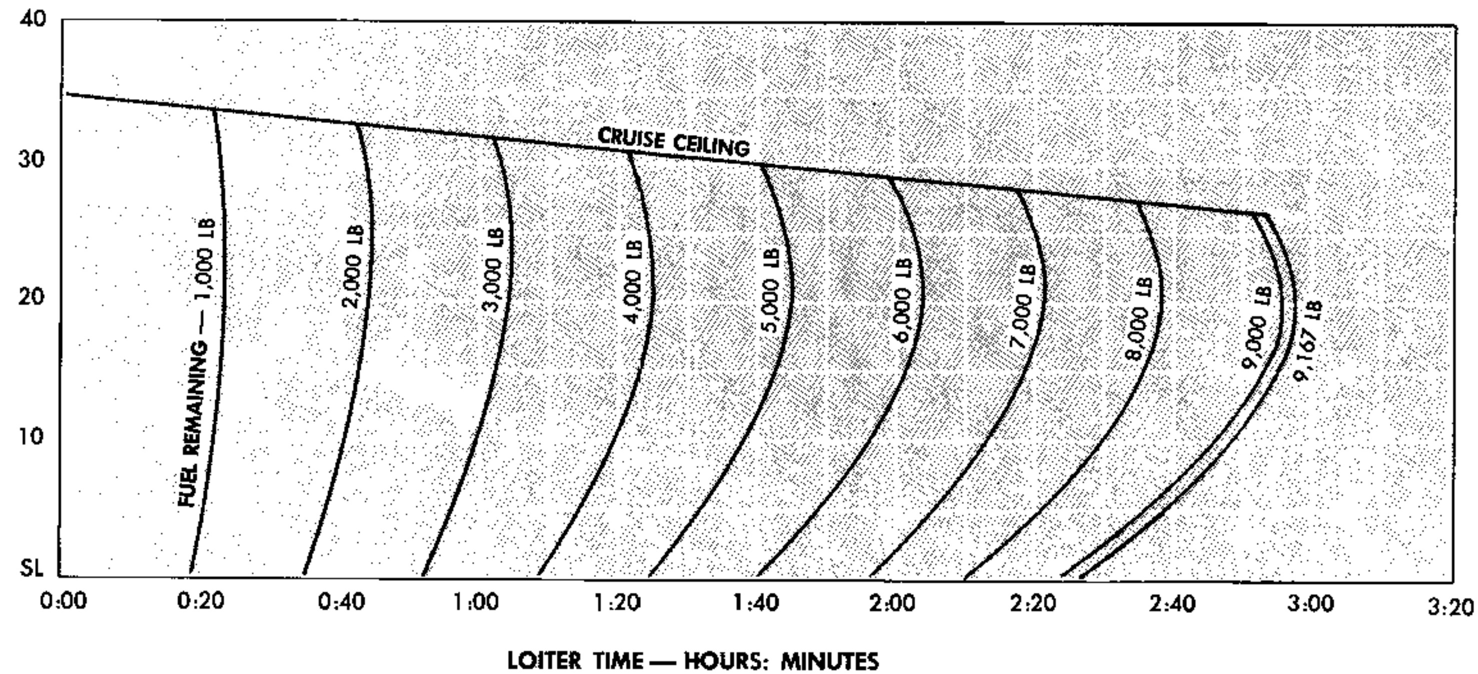
MAXIMUM ENDURANCE PROFILE

CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 31,564 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802-A-96NA

Figure 11-69

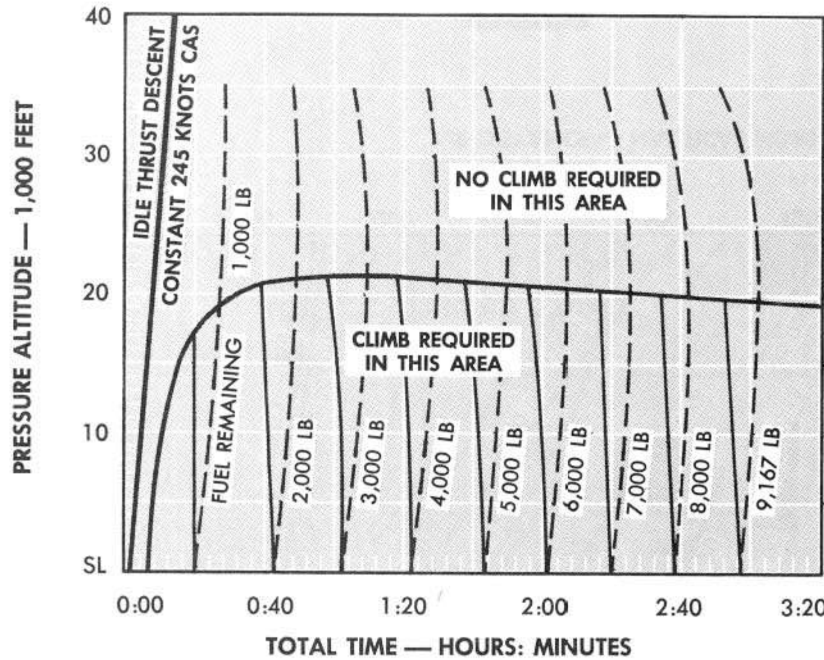
OPTIMUM ENDURANCE PROFILE

CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 31,564 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	203	.69
35	230	.69
30	250	.68
25	272	.66
20	300	.65
15	321	.64
10	348	.62
5	372	.61
SL	398	.60

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- — — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802—A—97NA

Figure 11-70

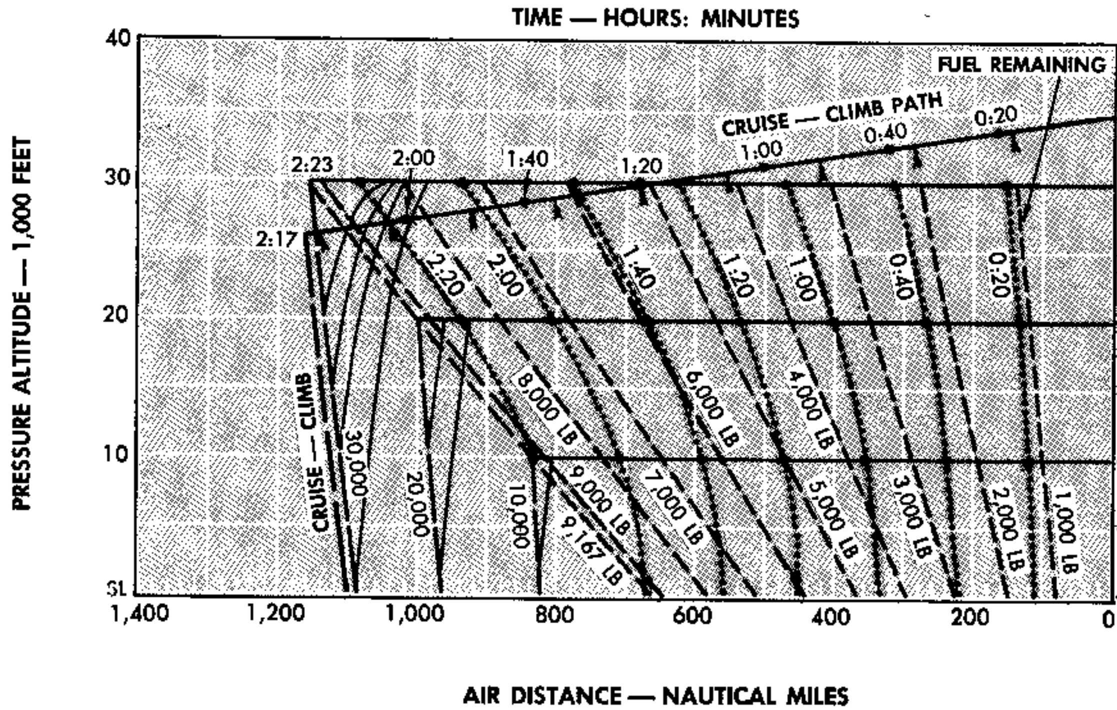
AIR REFUELING PROFILE

CONFIGURATION VI

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 31,564 Pounds

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
45	203	.69
35	230	.69
30	250	.68
25	272	.66
20	300	.65
15	321	.64
10	348	.62
5	372	.61
SL	398	.60

LEGEND

- FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE—FT	MACH NO.	CAS
Cruise Climb	0.83	—
25,000	0.72	300
20,000	0.65	299
15,000	0.56	283
10,000	0.52	288
5,000	0.50	303
SL	0.48	318

63802—A—98NA

Figure 11-71

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

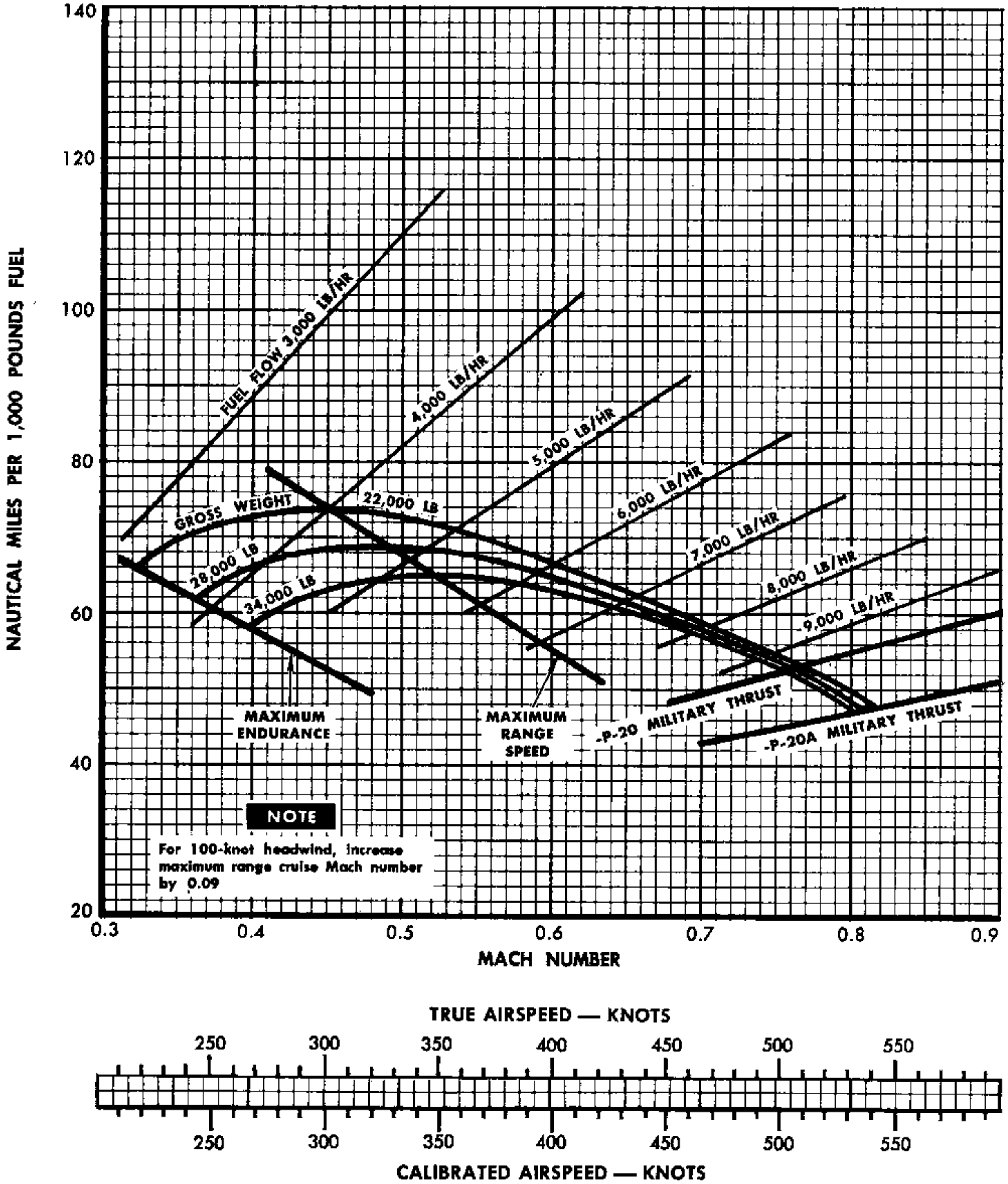


Figure 11-72 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

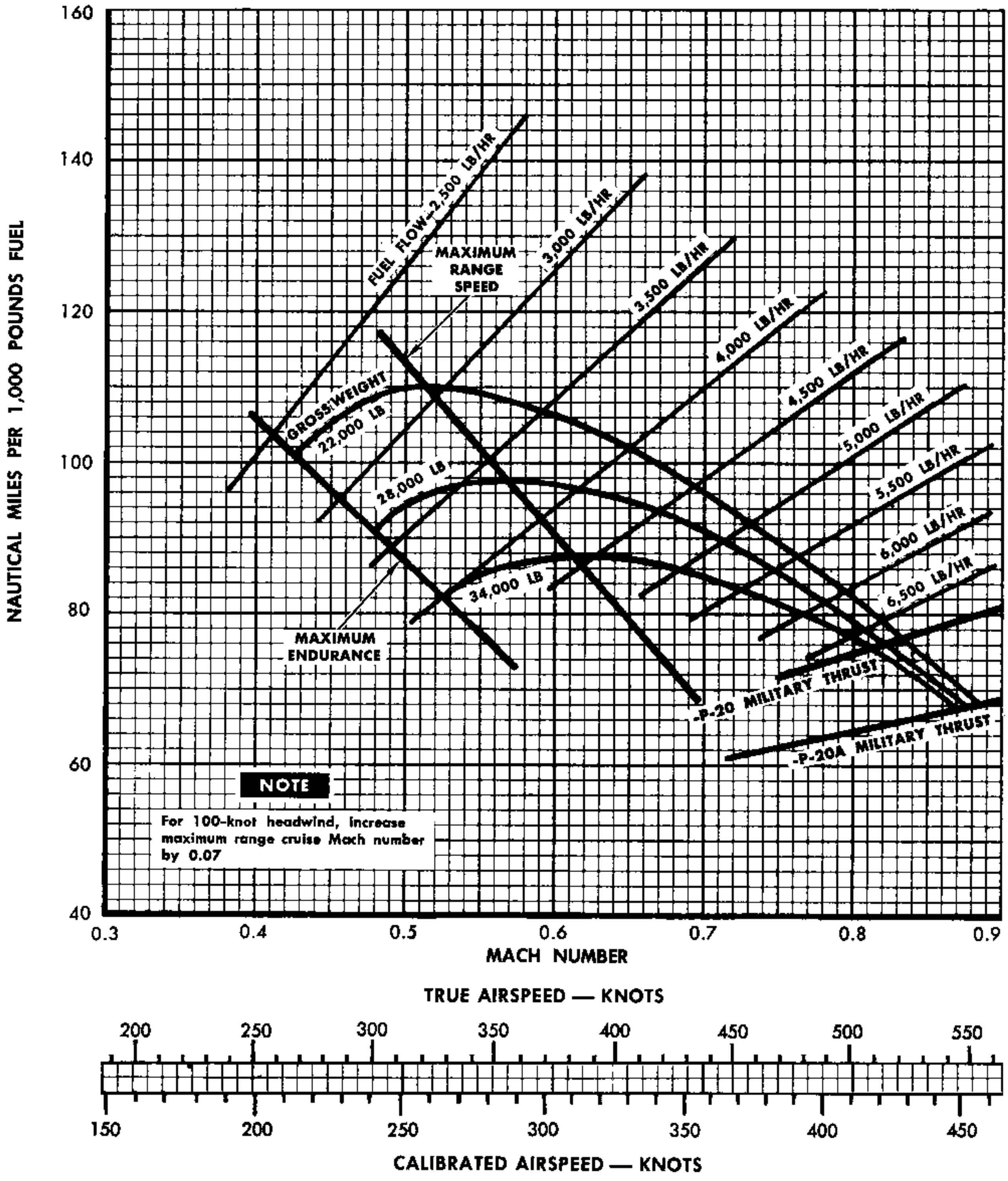


Figure 11-72 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.83 MN

ENGINES: J57-P-20, -P-20A

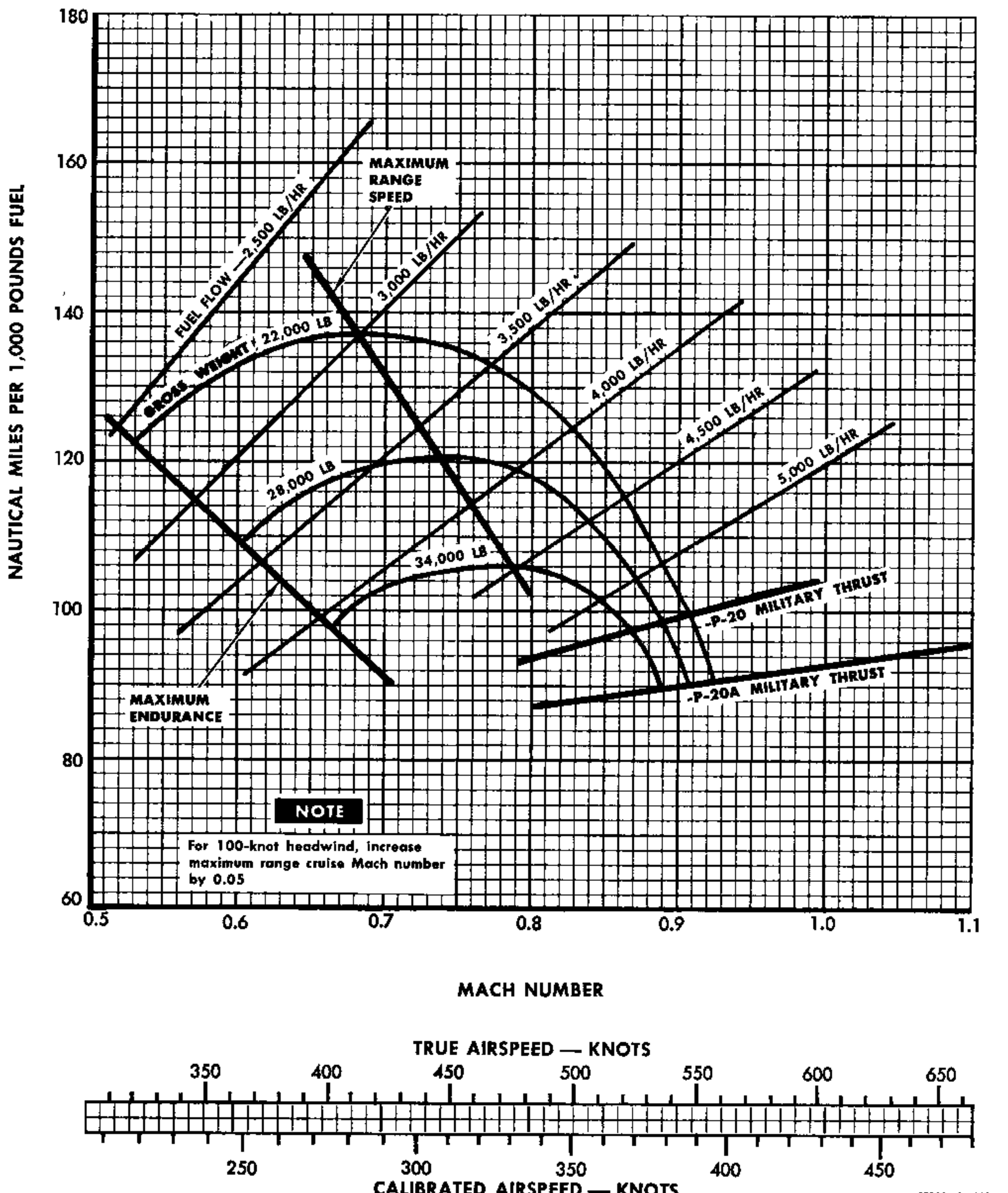


Figure 11–72 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION VI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.90 MN

ENGINES: J57-P-20, -P-20A

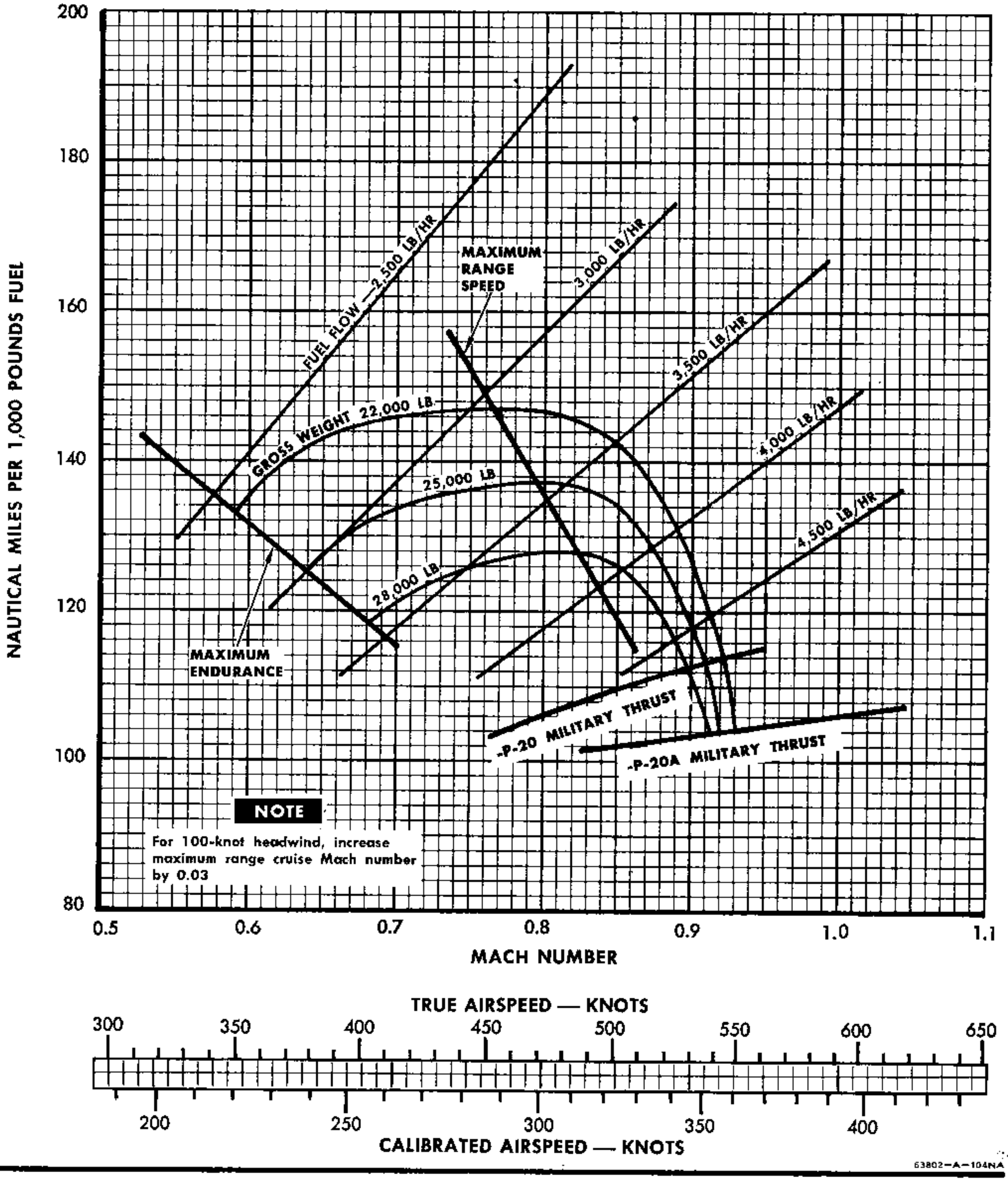


Figure 11–72 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET — CONFIGURATION VI

MODEL: F-8D, -8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition at All Speeds

ENGINES: J57-P-20, -P-20A

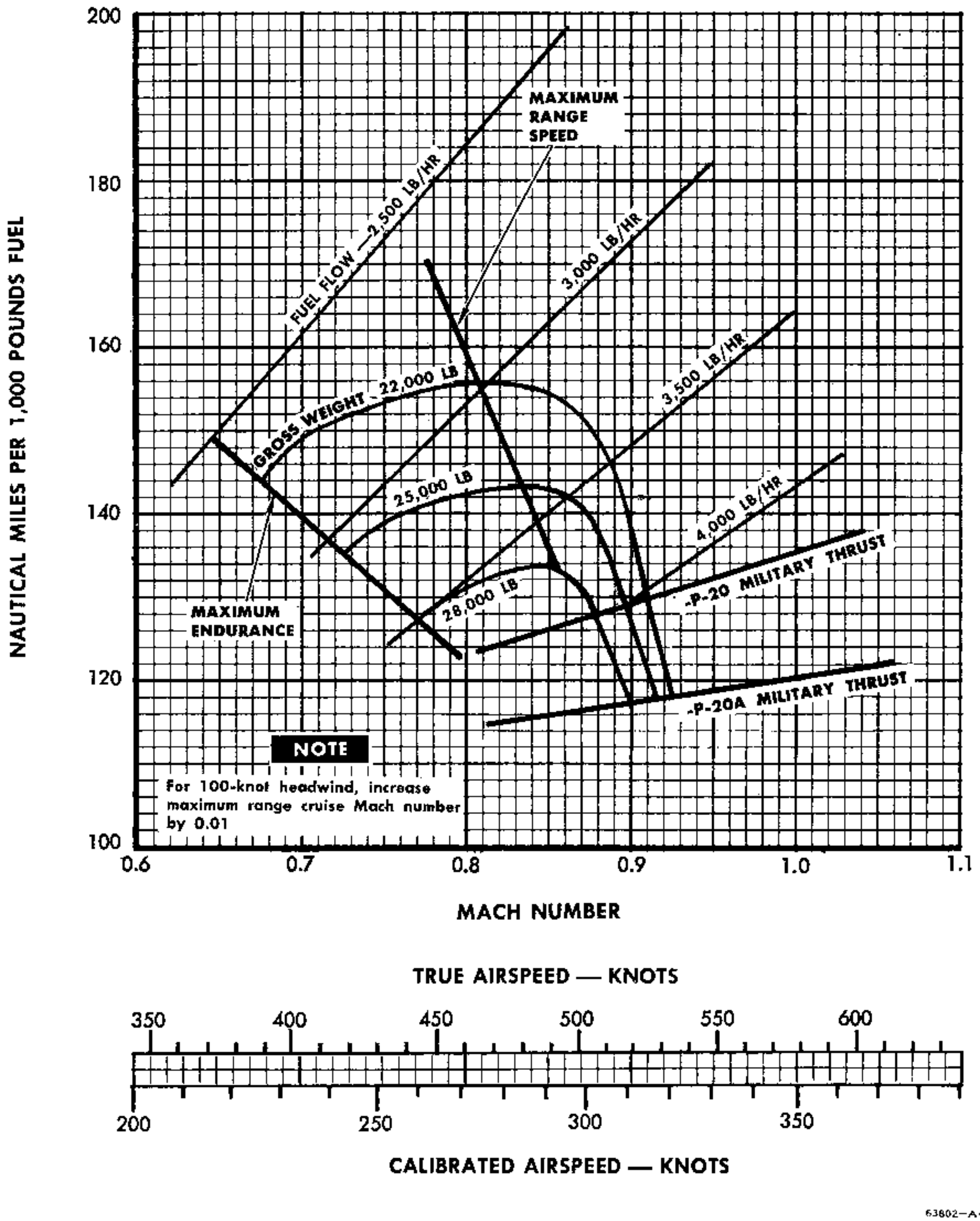
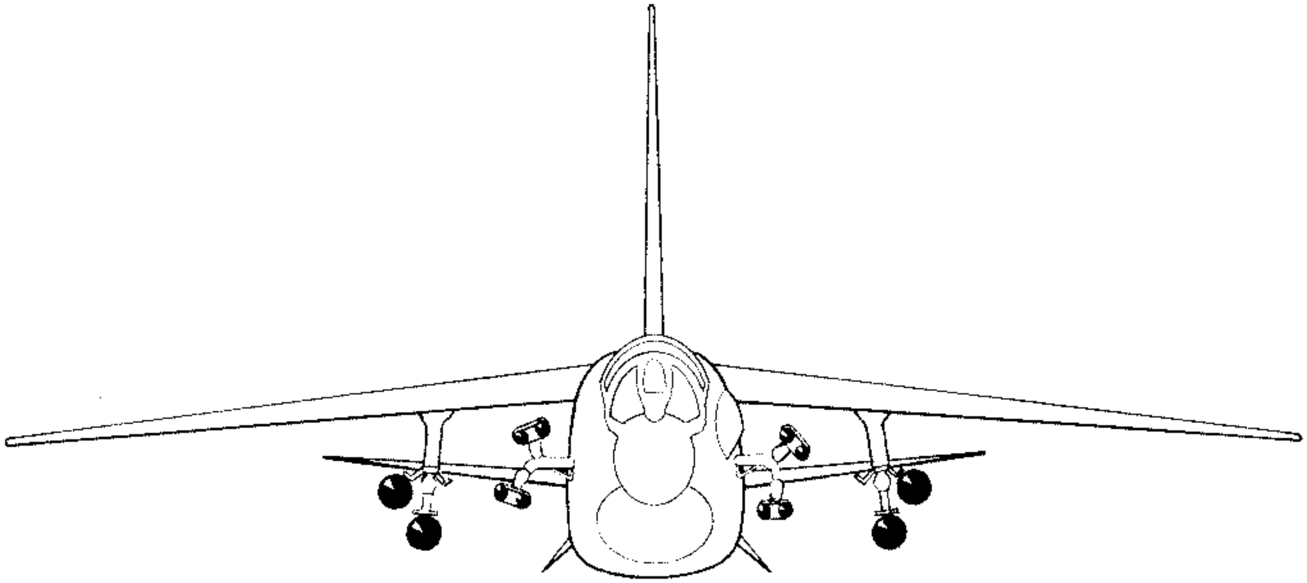


Figure 11–72 (Sheet 5)

CONFIGURATION VII

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading—Eight 250-pound (MK 81) bombs and four (long-nose) Zuni packs

Note

Refer to figure 11–1 for other Configuration VII stores arrangements.

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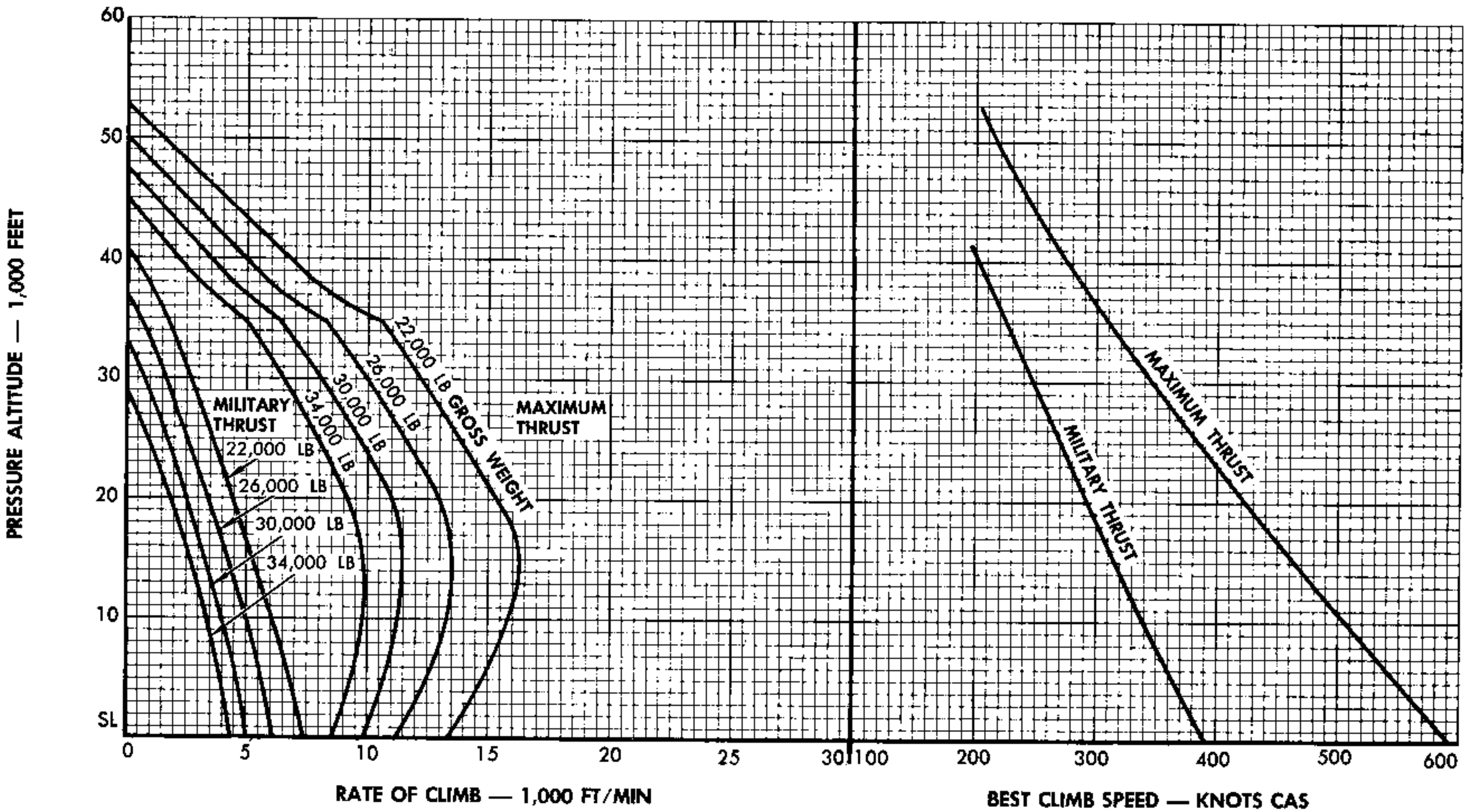
BEST CLIMB

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-190NA

Figure 11-73

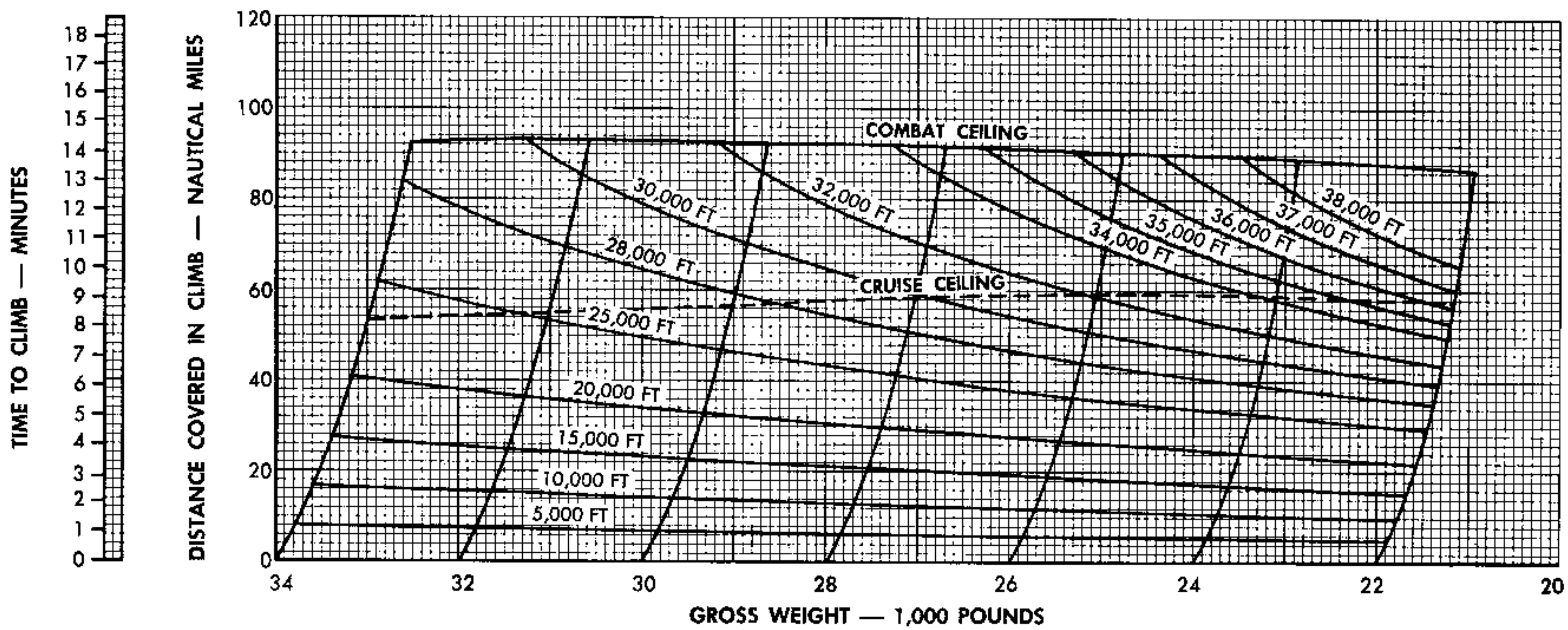
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude—Feet	CAS—Knots	Mach No.
SL	388	0.59
10,000	339	0.61
20,000	290	0.63
30,000	244	0.66
40,000	200	0.67

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance 4%
   Time 4%
   Fuel 2%

2. Maximum endurance altitude is 20,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 388 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802—A—191NA

Figure 11-74 (Sheet 1)

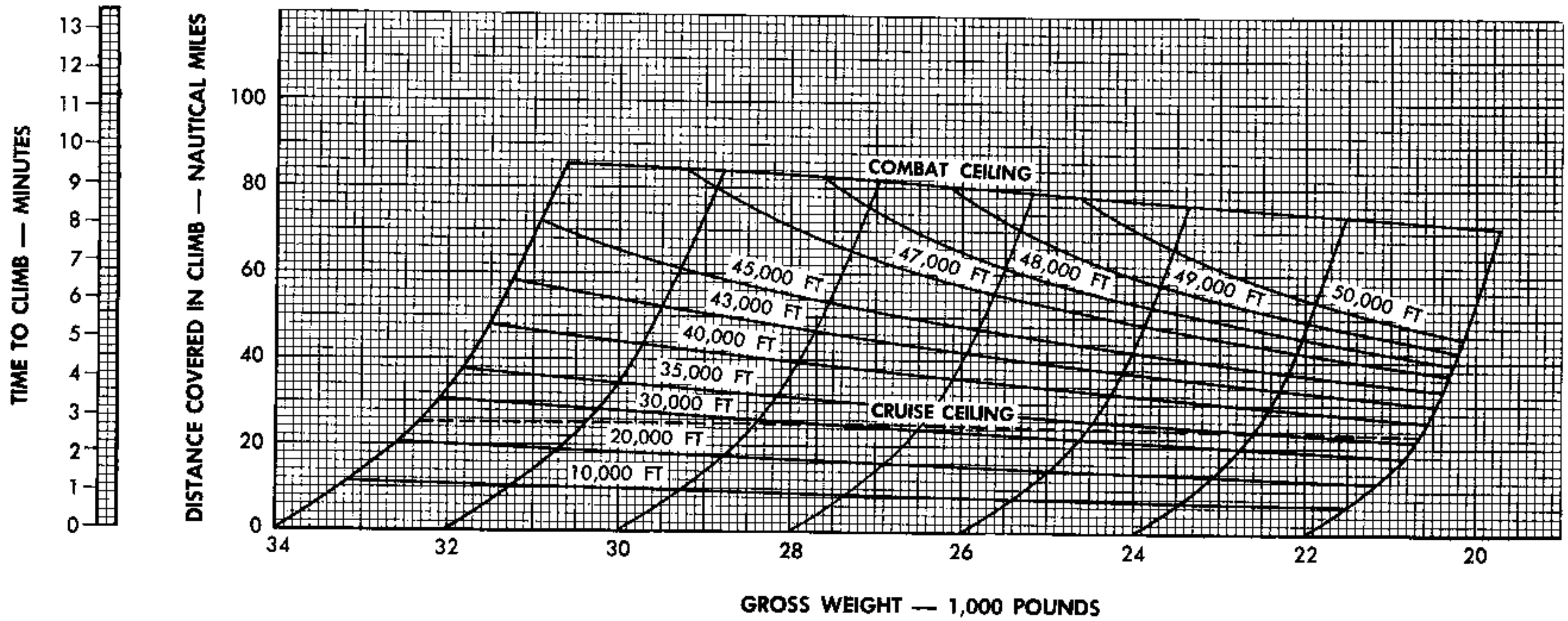
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
SL	595
10,000	505
20,000	425
30,000	345
40,000	275
50,000	220
55,000	195

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.90.
3. Maximum endurance altitude is 20,000 feet.
4. For field takeoff add 1.0 minutes and 620 pounds for time and fuel from release of brakes.

53802-A-192NA

Figure 11-74 (Sheet 2)

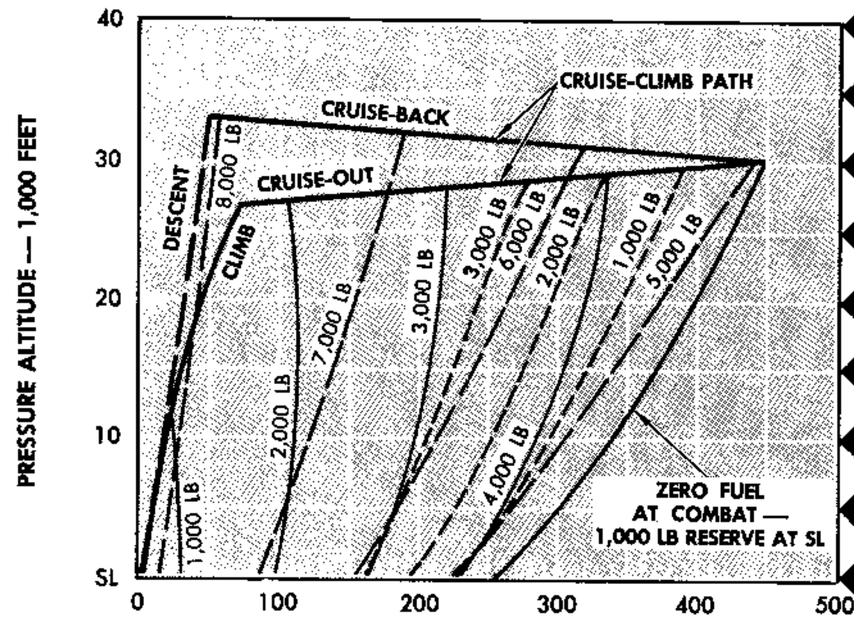
COMBAT RADIUS PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	200	.67
35	224	.67
30	244	.66
25	267	.65
20	290	.63
15	315	.62
10	339	.61
5	365	.60
SL	388	.59

IDLE THRUST DESCENT — CONSTANT 247 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.74	—
35,000	0.79	270
30,000	0.73	275
25,000	0.67	278
20,000	0.61	279
15,000	0.55	280
10,000	0.51	282
5,000	0.49	296
SL	0.47	312

LEGEND

- ———— CLIMB AND CRUISE-CLIMB PATHS
- — — DESCENT PATH
- - - - - COMBAT FUEL AVAILABLE
- ———— TOTAL FUEL USED — CRUISE OUT
- — - — TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802—A—193NA

Figure 11-75

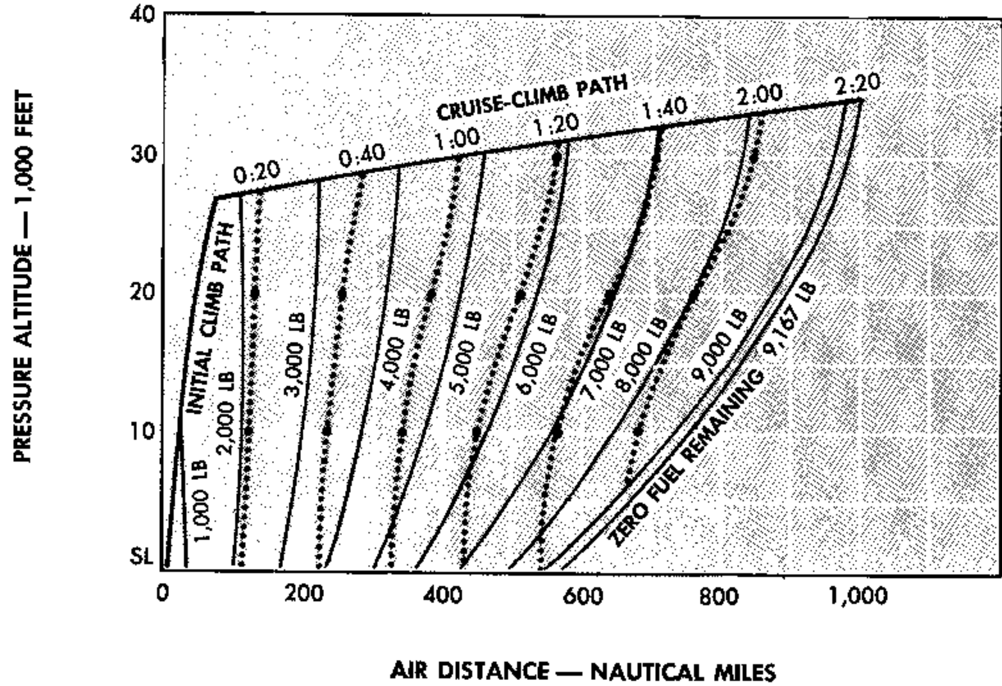
MISSION PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	200	.67
35	224	.67
30	244	.66
25	267	.65
20	290	.63
15	315	.62
10	339	.61
5	365	.60
SL	388	.59

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.74	—
35,000	0.79	270
30,000	0.73	275
25,000	0.67	278
20,000	0.61	279
15,000	0.55	280
10,000	0.51	282
5,000	0.49	296
SL	0.47	312

LEGEND

- FLIGHT PATH
- TIME TO CLIMB AND CRUISE
- FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802-A-194NA

Figure 11-76

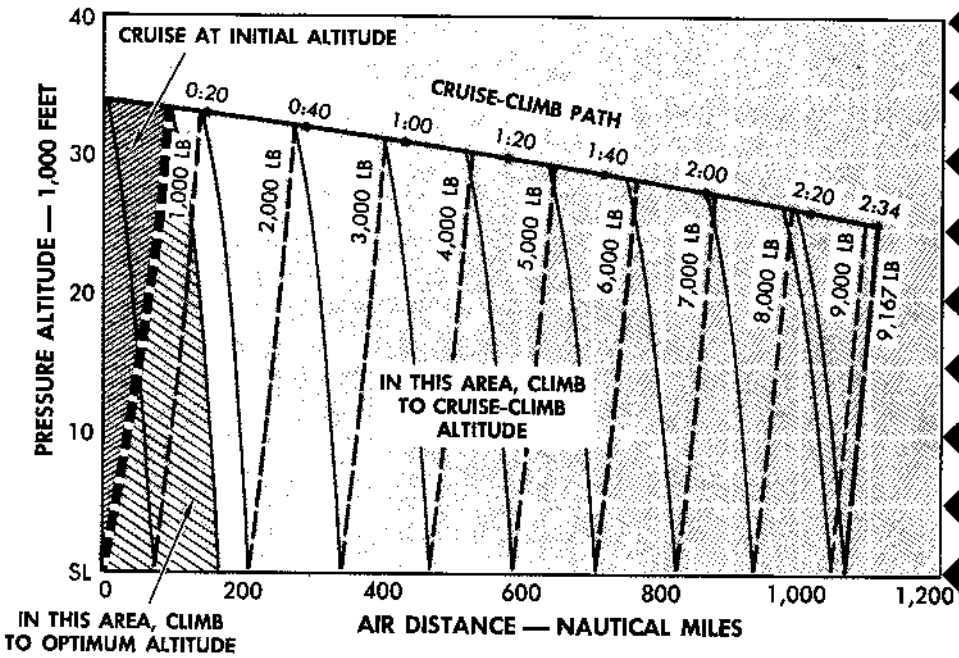
OPTIMUM RETURN PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	200	.67
35	224	.67
30	244	.66
25	267	.65
20	290	.63
15	315	.62
10	339	.61
5	365	.60
SL	388	.59

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.74	—
35,000	0.79	270
30,000	0.73	275
25,000	0.67	278
20,000	0.61	279
15,000	0.55	280
10,000	0.51	282
5,000	0.49	296
SL	0.47	312

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

63802-A-195NA

Figure 11-77

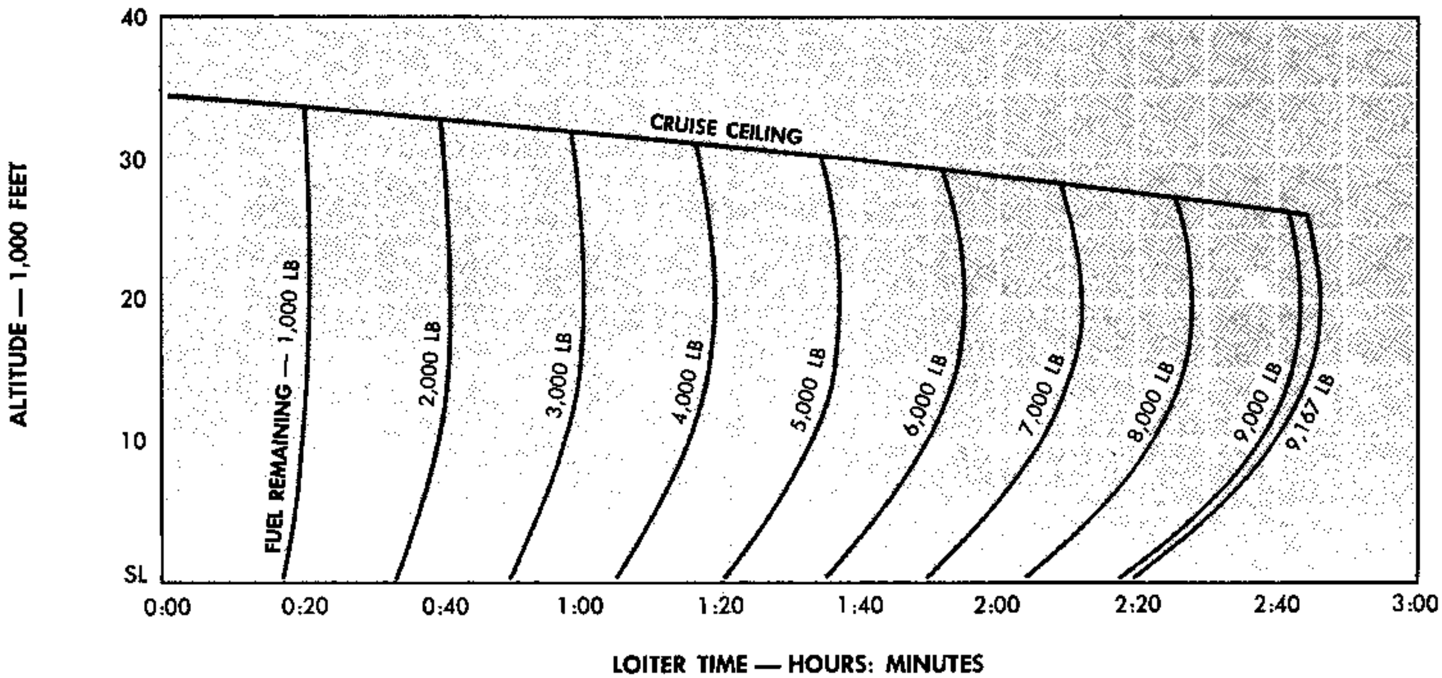
MAXIMUM ENDURANCE PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802-A-196NA

Figure 11-78

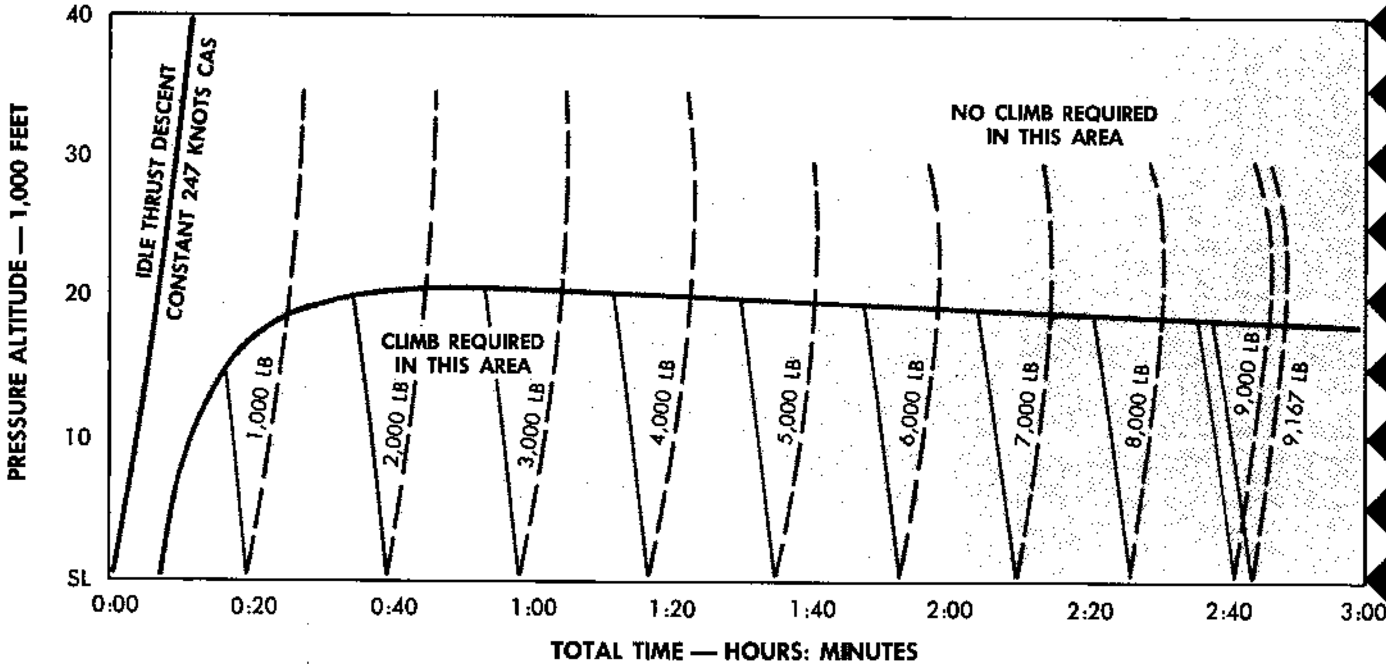
OPTIMUM ENDURANCE PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
40	200	.67
35	224	.67
30	244	.66
25	267	.65
20	290	.63
15	315	.62
10	339	.61
5	365	.60
SL	388	.59

LEGEND

- OPTIMUM ENDURANCE ALTITUDE
- CLIMB GUIDE LINES
- FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE	CAS
SL	240
10,000	240
20,000	245
30,000	255
35,000	260

63802-A-197NA

Figure 11-79

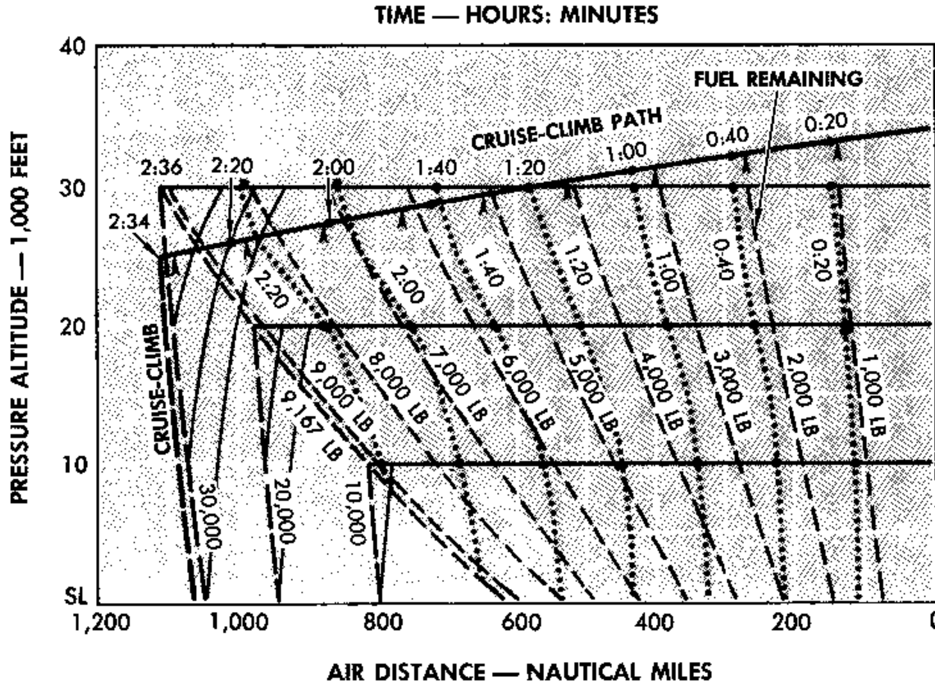
AIR REFUELING PROFILE

CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 32,902 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
40	200	.67
35	224	.67
30	244	.66
25	267	.65
20	290	.63
15	315	.62
10	339	.61
5	365	.60
SL	388	.59

LEGEND

- – – – FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- •······• TIME TO CRUISE
- — — CRUISE TO ZERO FUEL REMAINING
- —— CONSTANT ALTITUDE CRUISE PATH
- —— CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.74	—
35,000	0.79	270
30,000	0.73	275
25,000	0.67	278
20,000	0.61	279
15,000	0.55	280
10,000	0.51	282
5,000	0.49	296
SL	0.47	312

63802-A-198NA

Figure 11-80

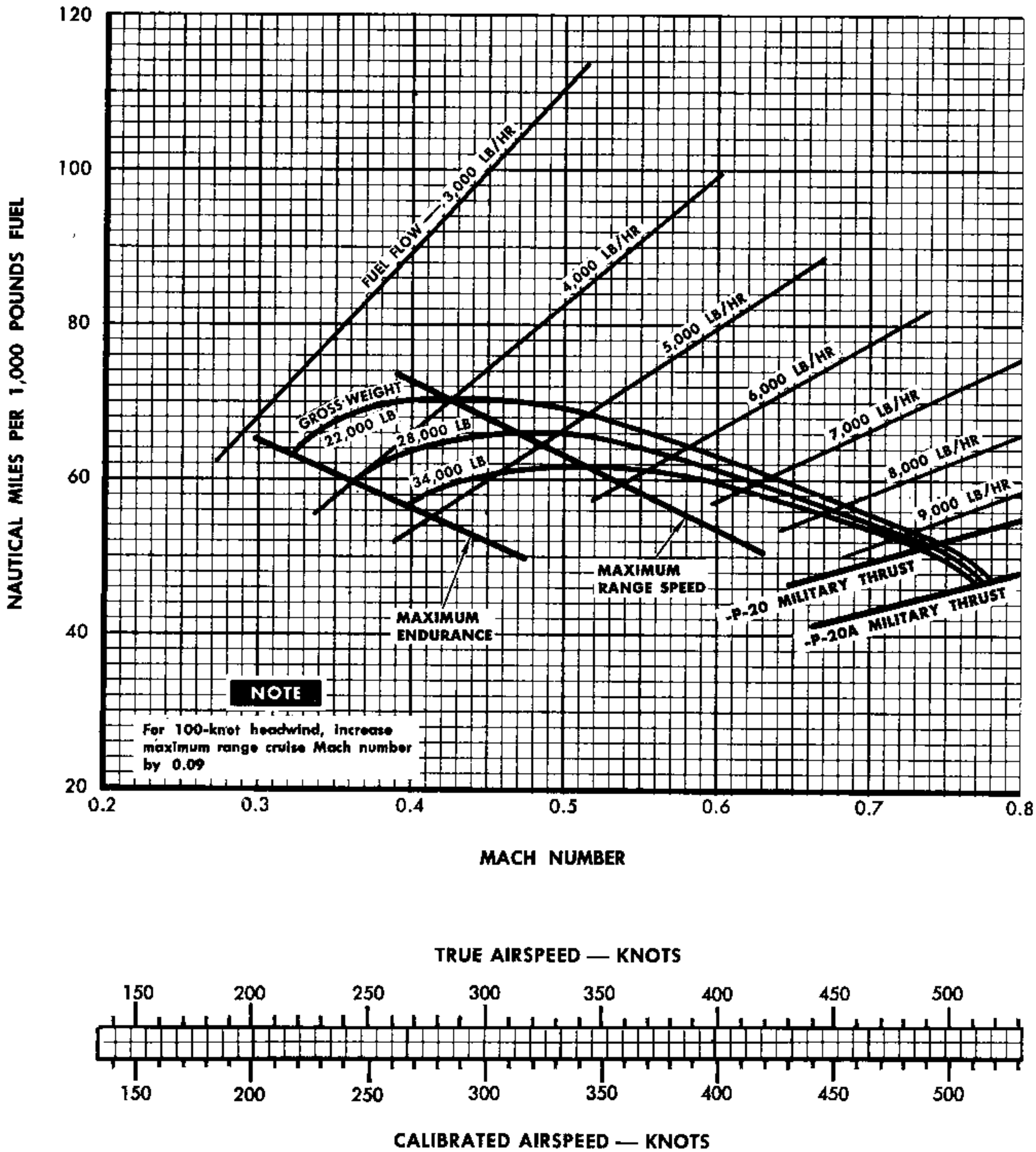
NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A



63802-A-157NA

Figure 11–81 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

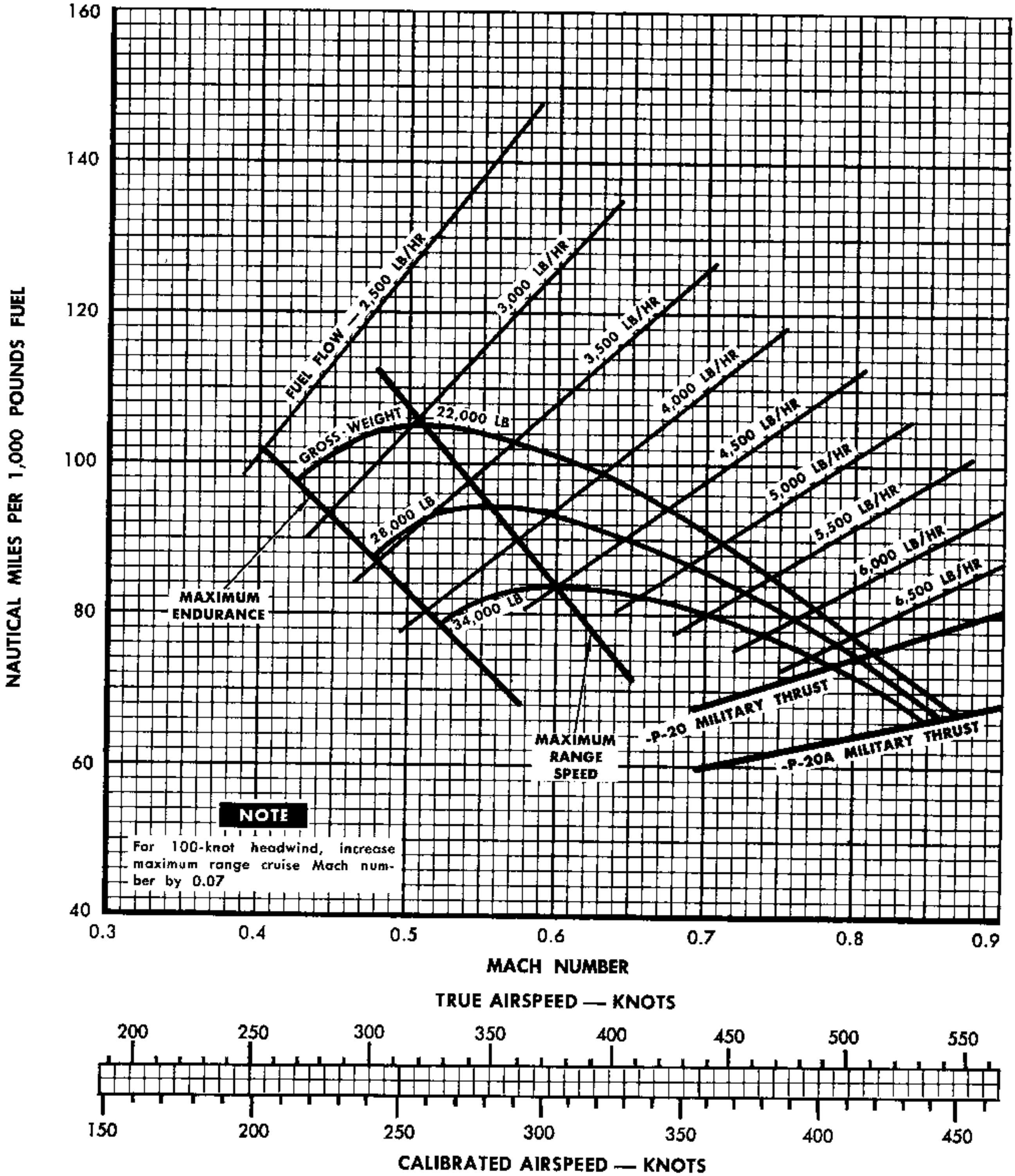


Figure 11-81 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.89 MN

ENGINES: J57-P-20, -P-20A

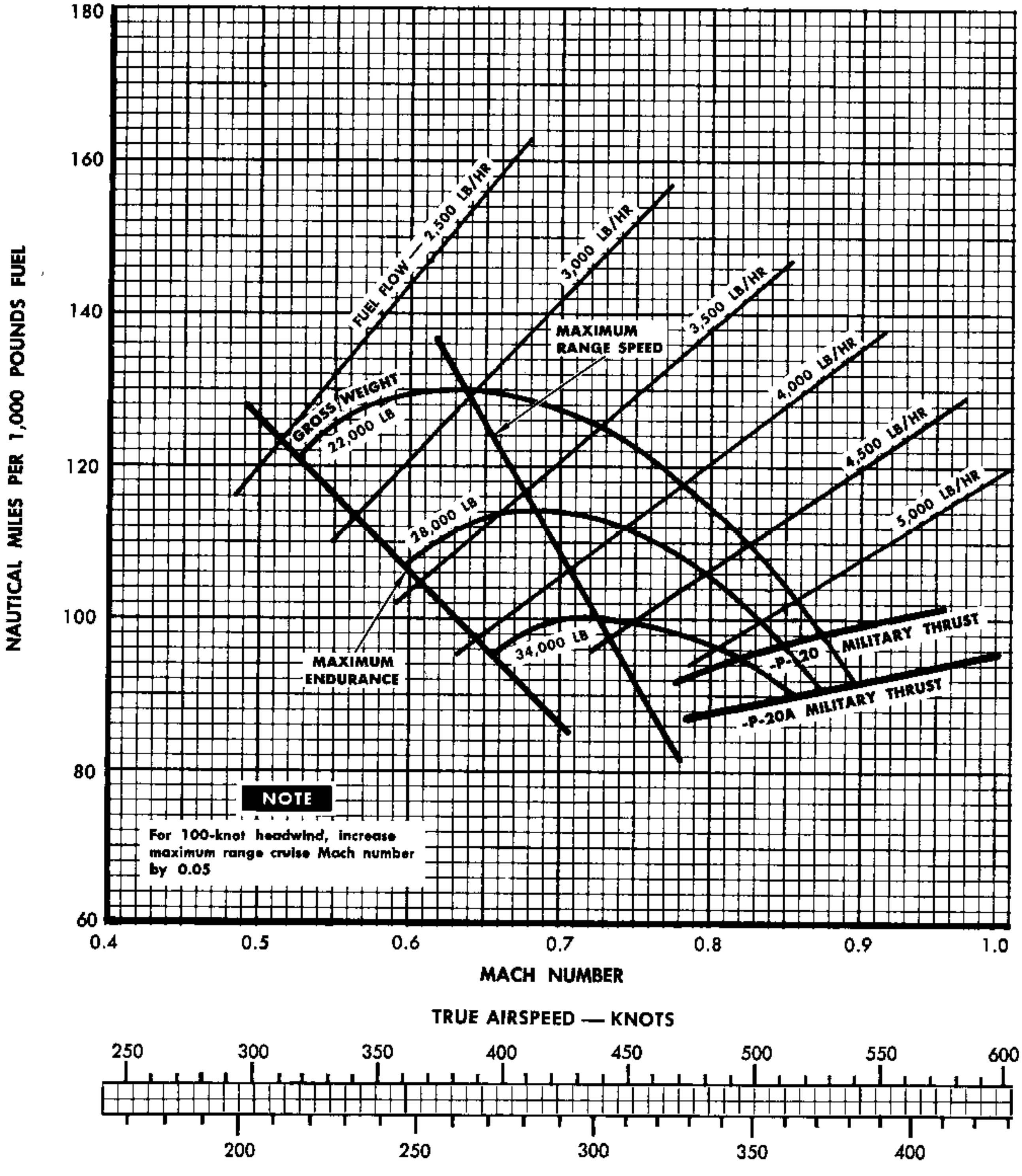


Figure 11-81 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.90 MN

ENGINES: J57-P-20, -P-20A

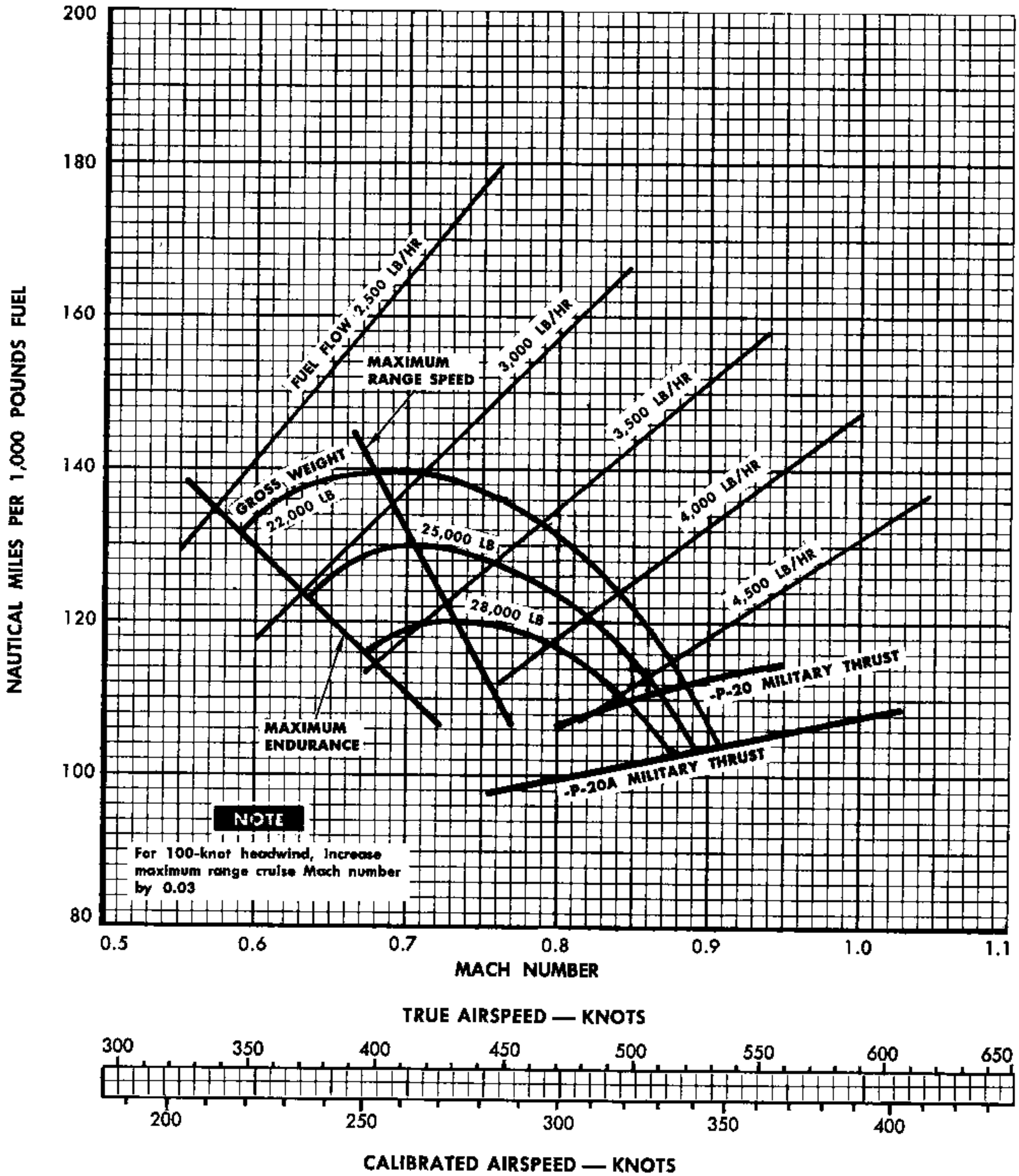


Figure 11-81 (Sheet 4)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

35,000 FEET — CONFIGURATION VII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.91 MN

ENGINES: J57-P-20, -P-20A

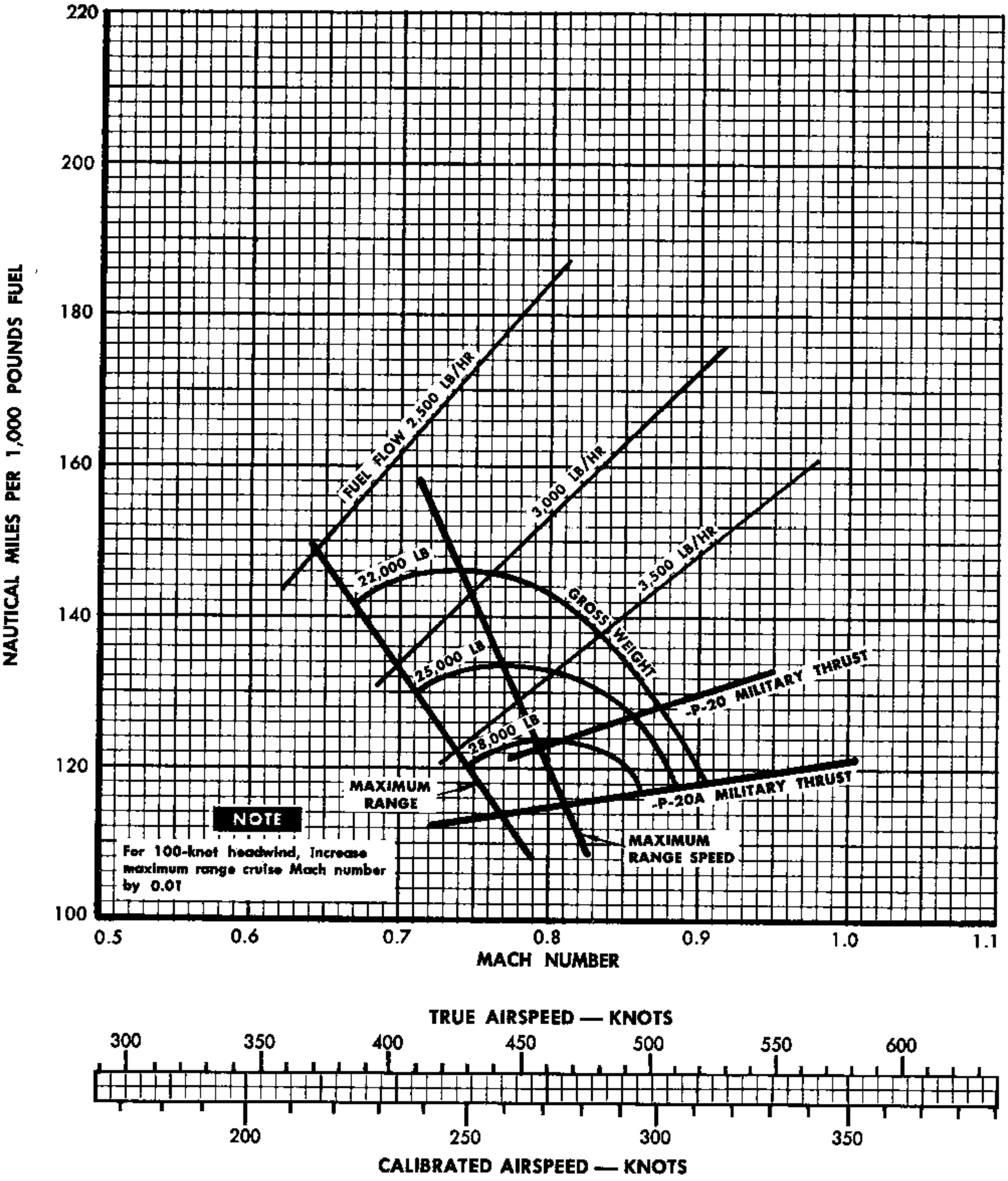
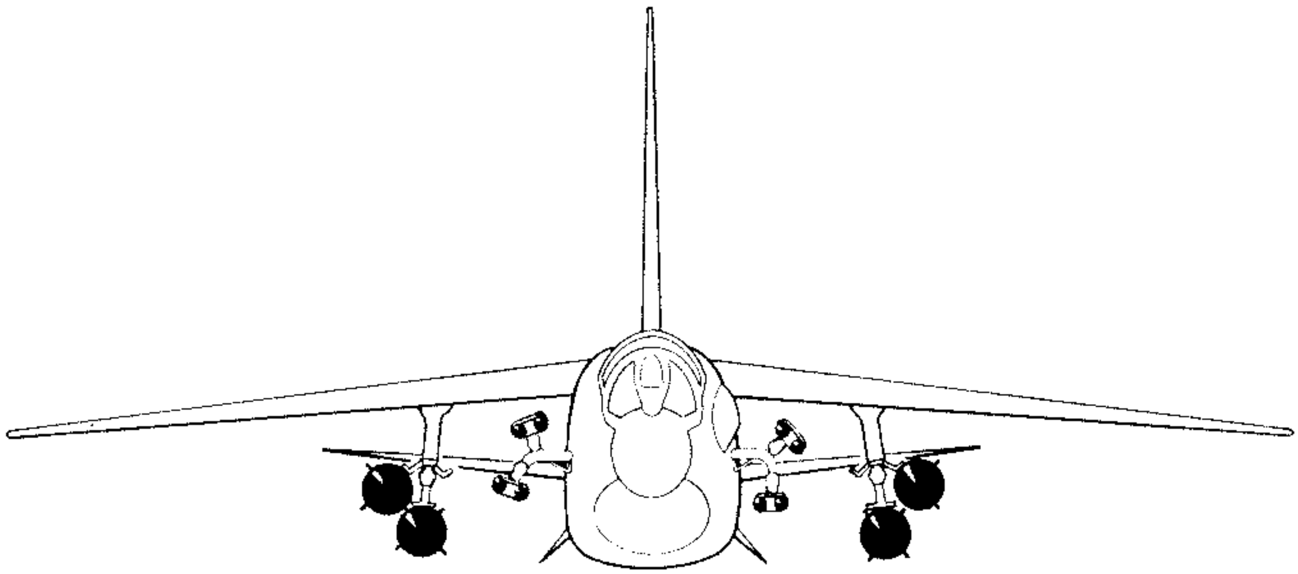


Figure 11–81 (Sheet 5)

CONFIGURATION VIII

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading—Eight 500-pound (MK 82) bombs and four (short-nose) Zuni packs

Note

Refer to figure 11–1 for other Configuration VIII stores arrangements.

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Climb Control 211
Combat Radius Profile 213
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Optimum Endurance Profile 217
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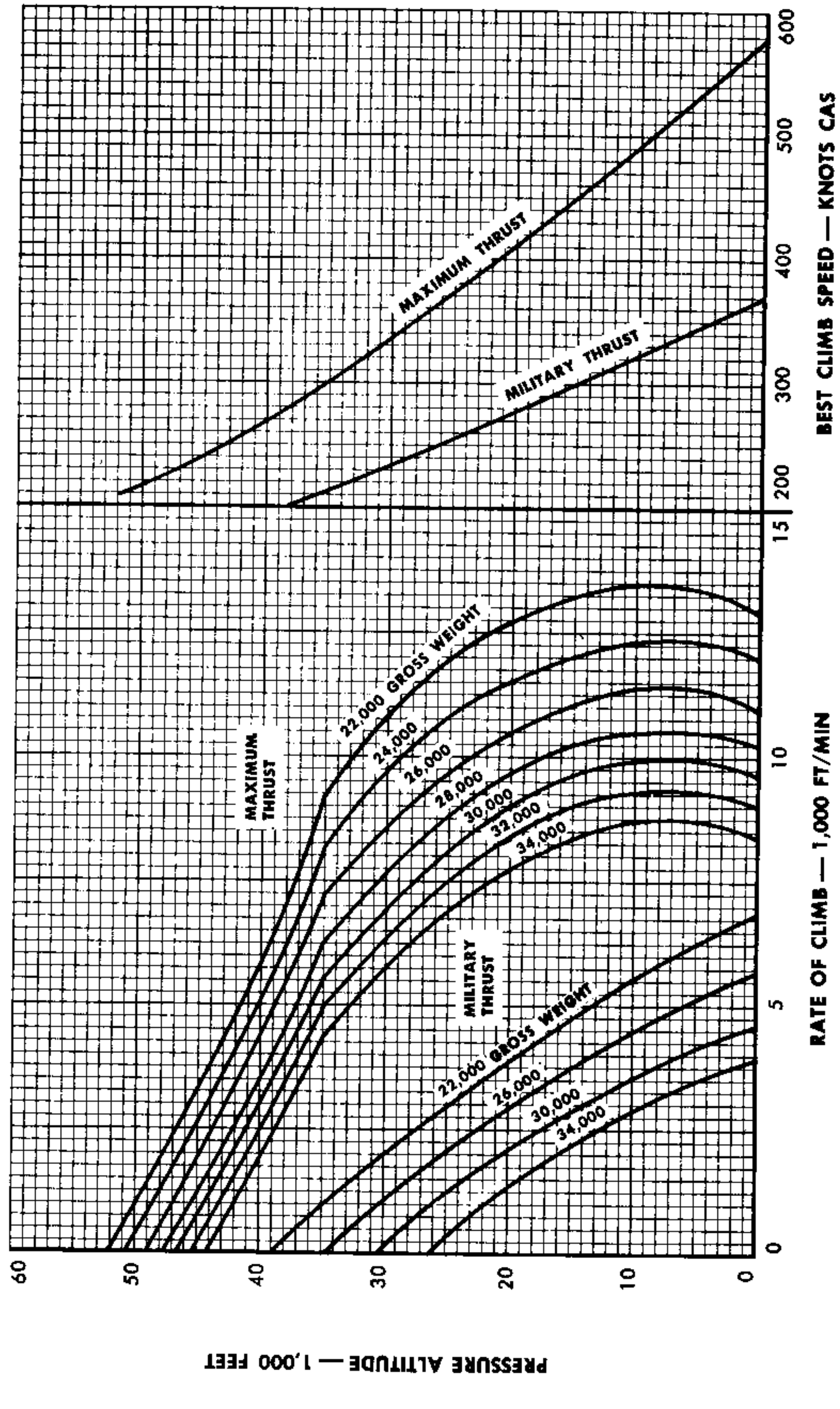
BEST CLIMB

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

CONFIGURATION VIII
Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-106NA

Figure 11-82

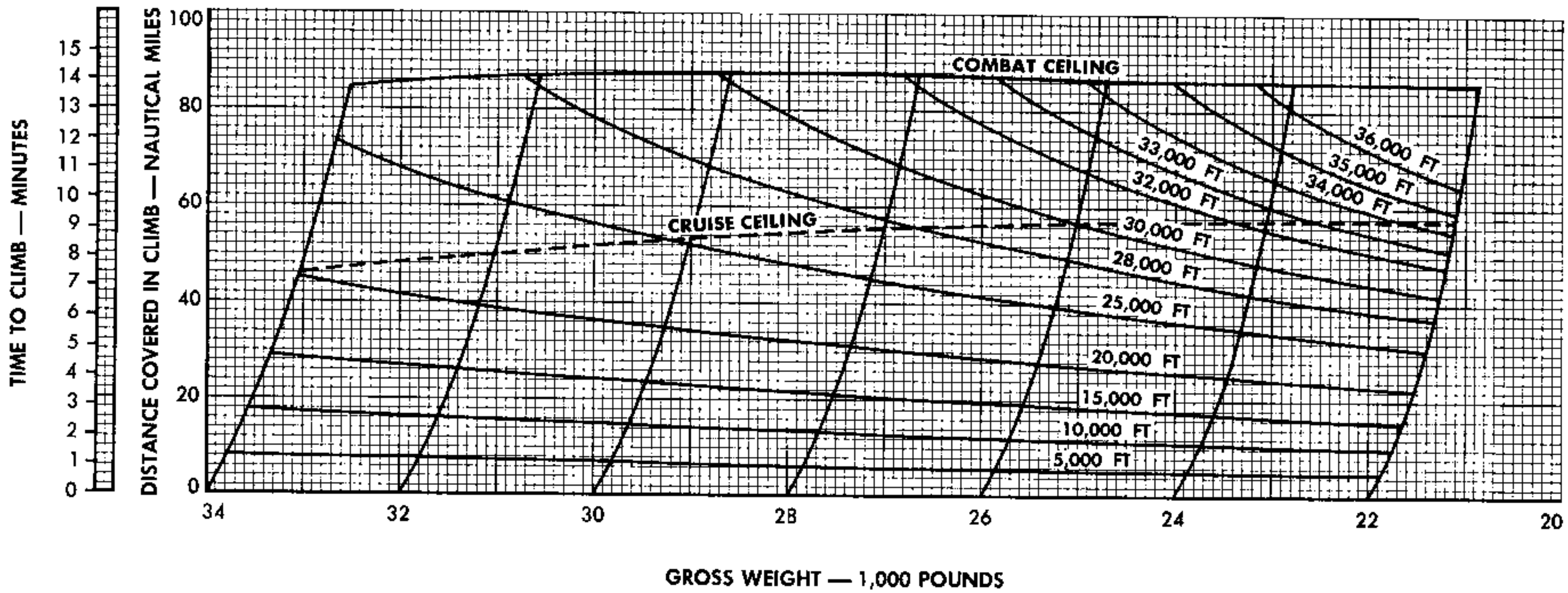
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude Feet	CAS Knots	Mach No.
S L	371	.56
10,000	323	.58
20,000	278	.60
30,000	235	.63
35,000	215	.65

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude in 20,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 371 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-107NA

Figure 11-83 (Sheet 1)

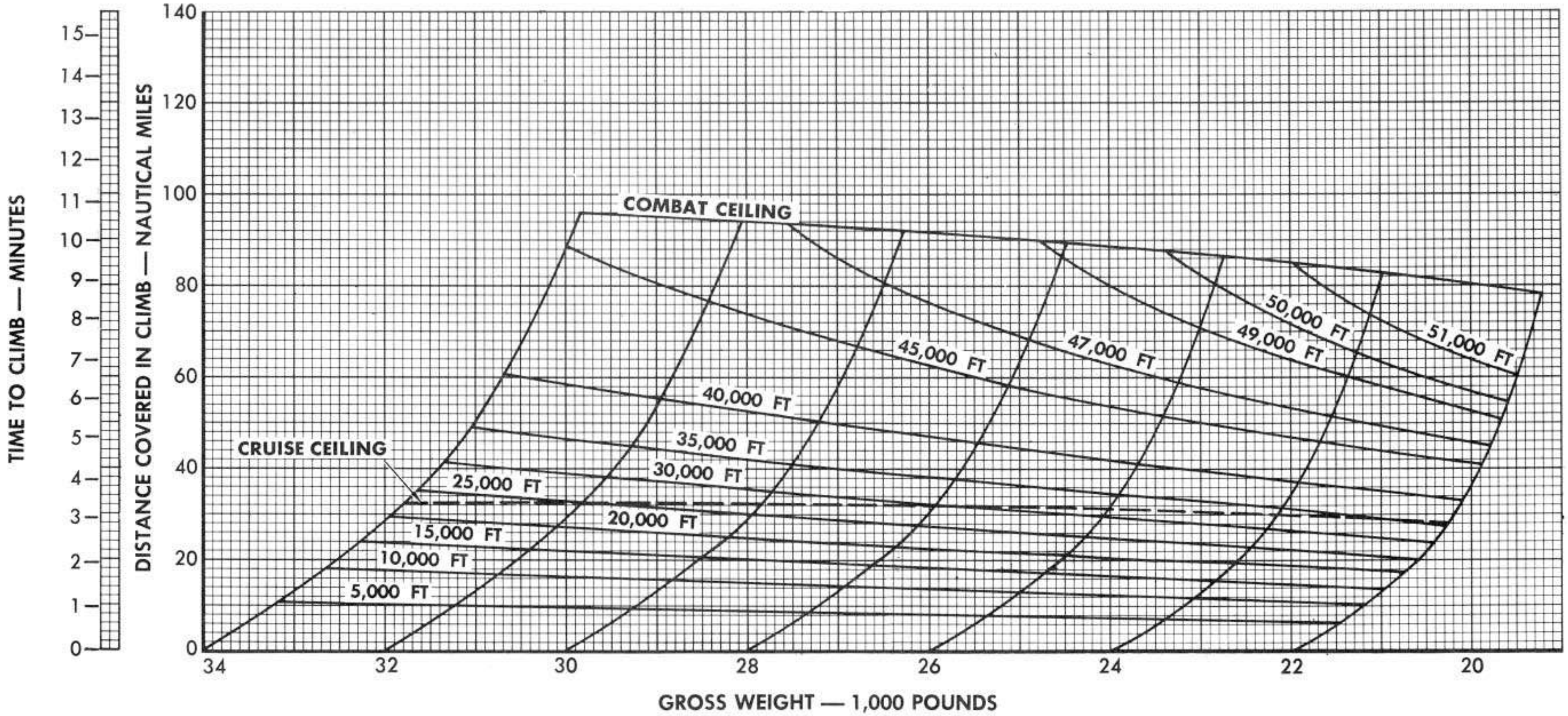
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude Feet	CAS Knots
S L	578
10,000	493
20,000	412
30,000	338
40,000	270
50,000	215

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.88.
3. Maximum endurance altitude is 20,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes.

63802—A—108NA

Figure 11-83 (Sheet 2)

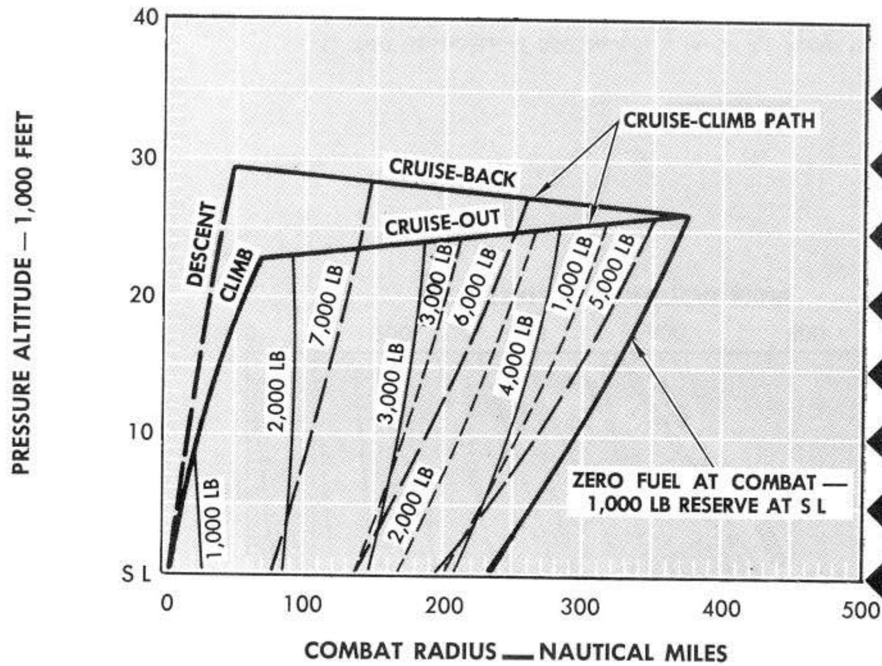
COMBAT RADIUS PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.61
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

IDLE THRUST DESCENT — CONSTANT 250 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE–FT	MACH NO.	CAS
Cruise-Climb	0.70	—
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
S L	0.46	306

LEGEND

- ——— CLIMB AND CRUISE — CLIMB PATHS
- — — DESCENT PATH
- - - - - COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- — — TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802–A–109NA

Figure 11-84

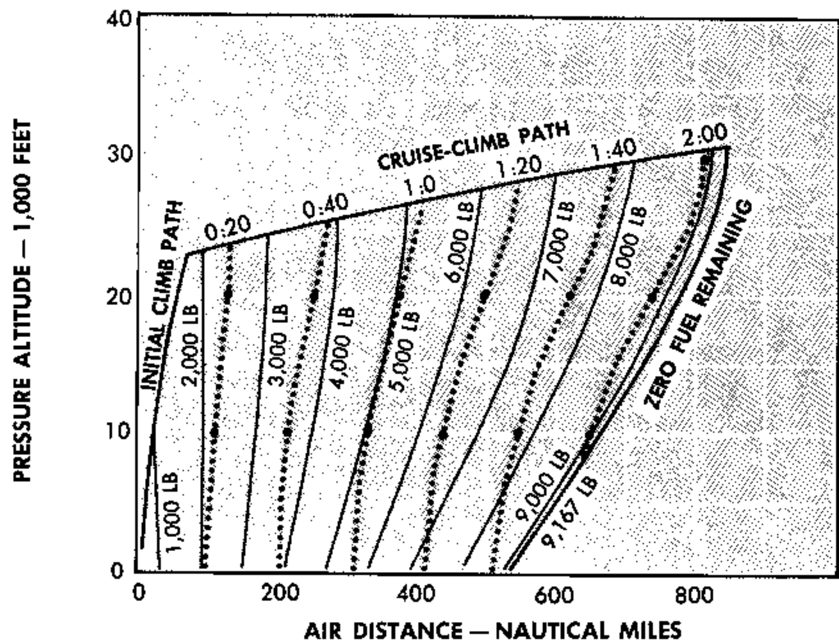
MISSION PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.61
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.70	—
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
S L	0.46	306

LEGEND

——— FLIGHT PATH
•·······• TIME TO CLIMB AND CRUISE
——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802-A-110NA

Figure 11-85

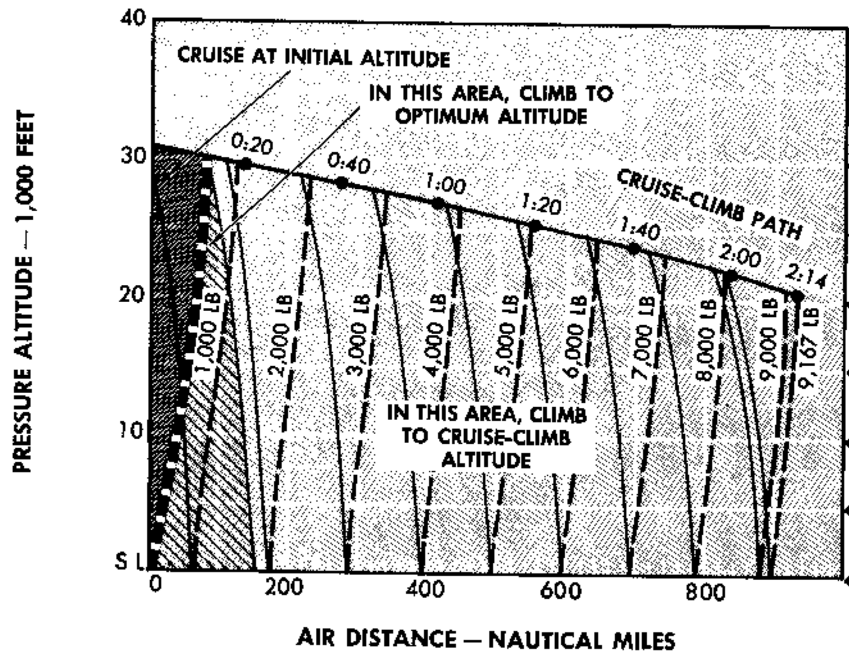
OPTIMUM RETURN PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT— 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.61
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

CRUISE SCHEDULE

ALTITUDE—FT	MACH NO.	CAS
Cruise-Climb	0.70	—
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
S L	0.46	306

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB-PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

63802—A—111NA

Figure 11-86

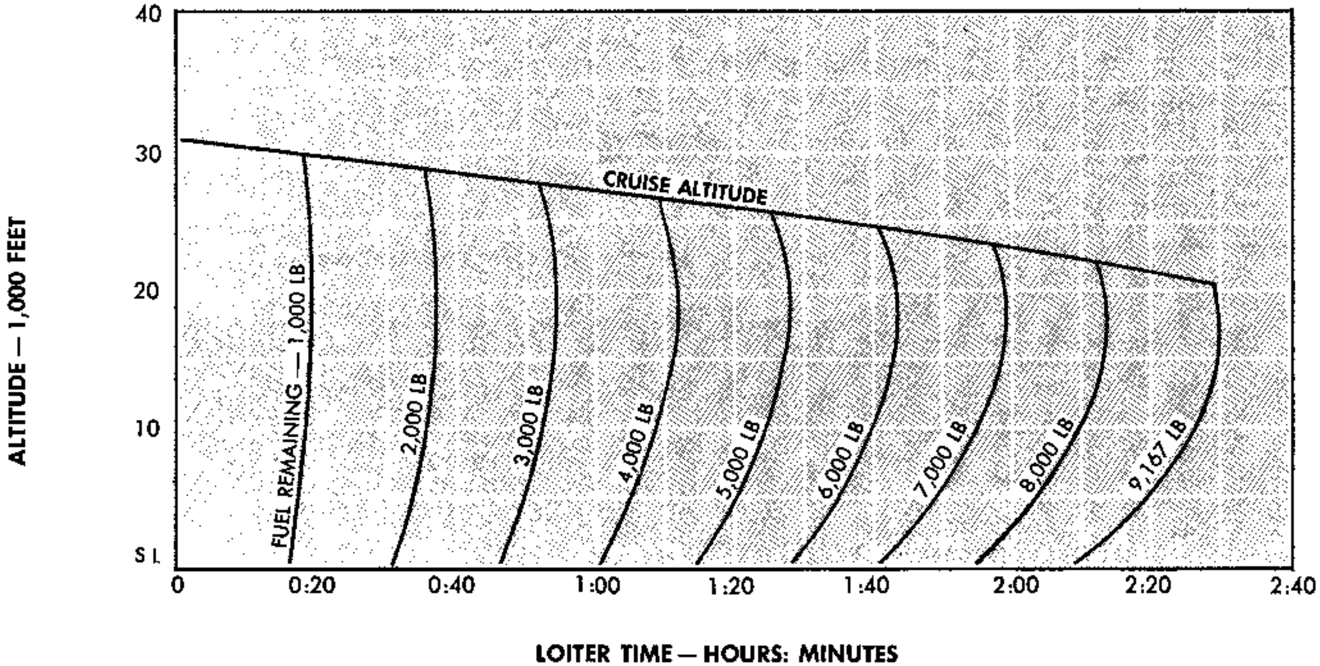
MAXIMUM ENDURANCE PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE — FT	CAS
30,000	248
20,000	245
10,000	242
S L	238

63802-A-112NA

Figure 11-87

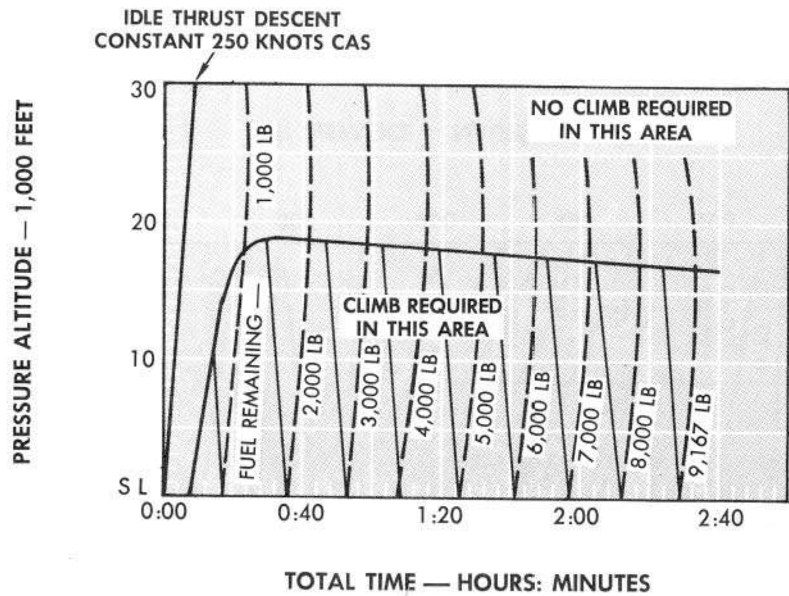
OPTIMUM ENDURANCE PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- — — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE — FT	CAS
30,000 FT	255
20,000 FT	245
10,000 FT	240
S L	240

63802-A-113NA

Figure 11-88

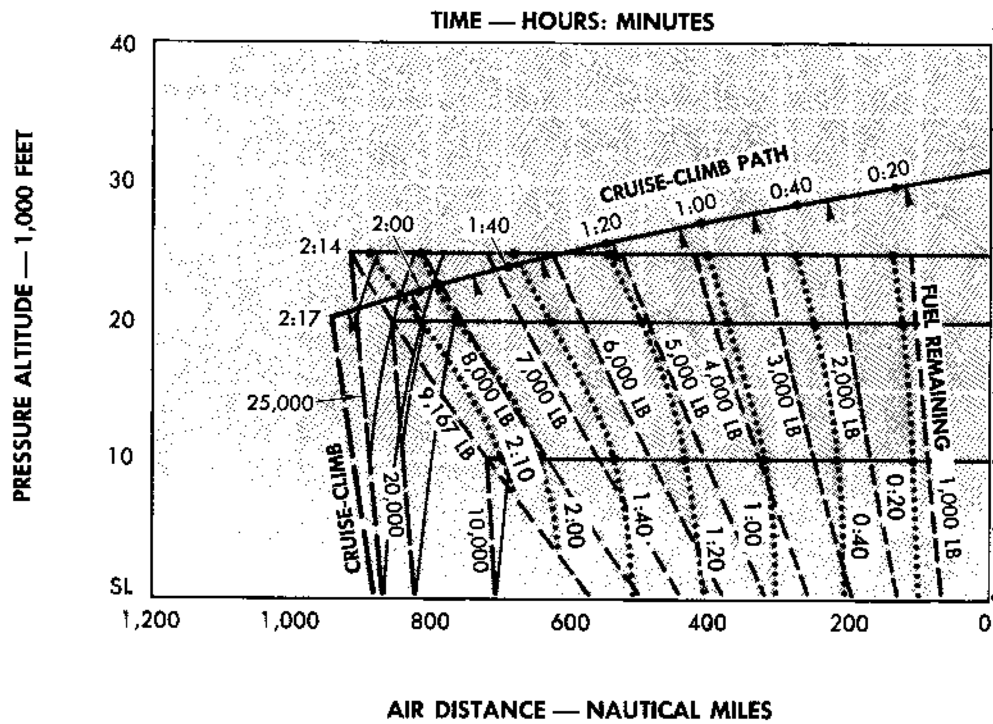
AIR REFUELING PROFILE

CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
SL	371	.56

LEGEND

- – – – FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- •······• TIME TO CRUISE
- — – — CRUISE TO ZERO FUEL REMAINING
- ——— CONSTANT ALTITUDE CRUISE PATH
- ——— CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.70	—
25,000	0.66	274
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
SL	0.46	306

63802-A-114NA

Figure 11-89

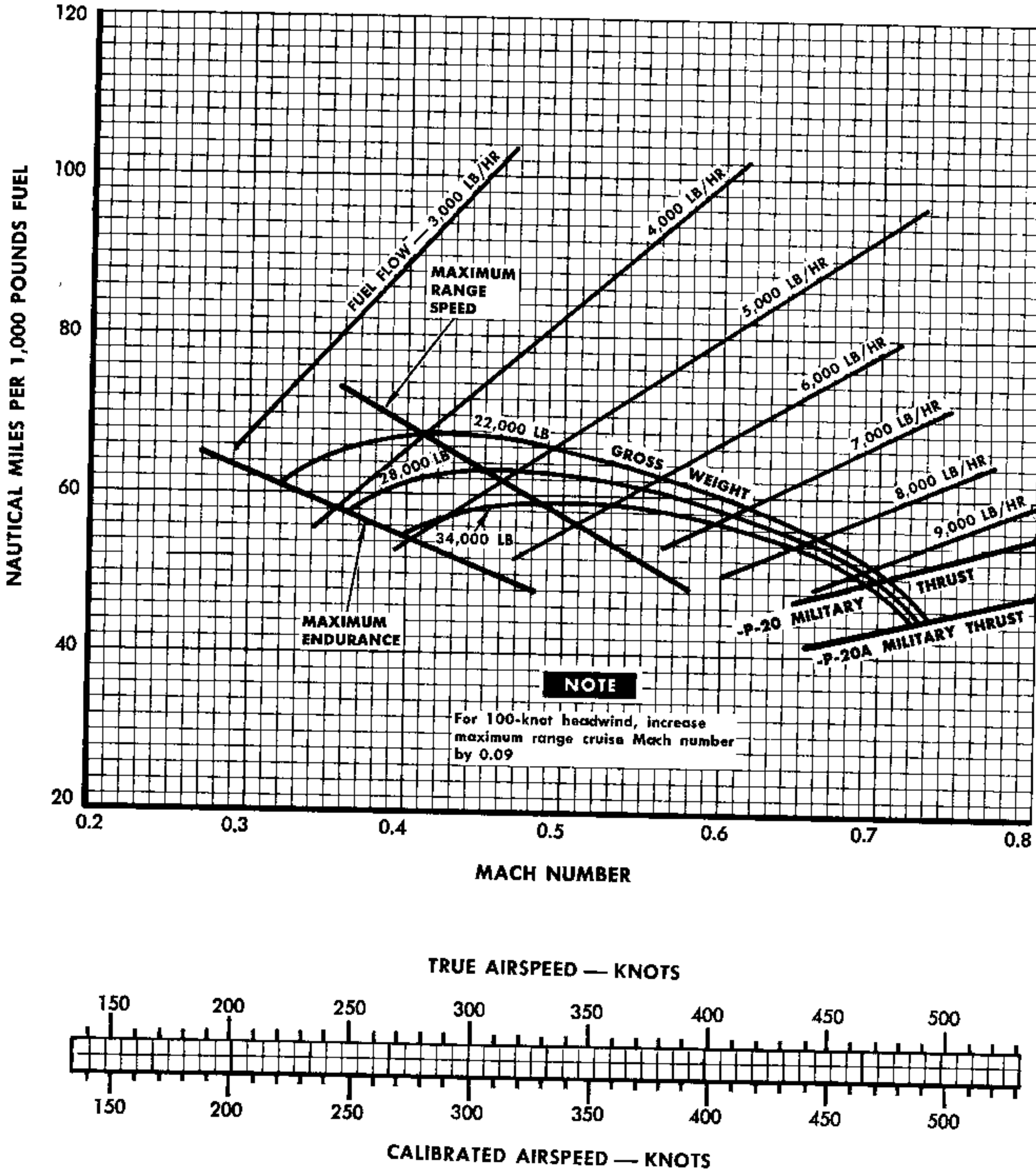
NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL – CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A



63802-A-117NA

Figure 11-90 (Sheet 1)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

15,000 FEET — CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

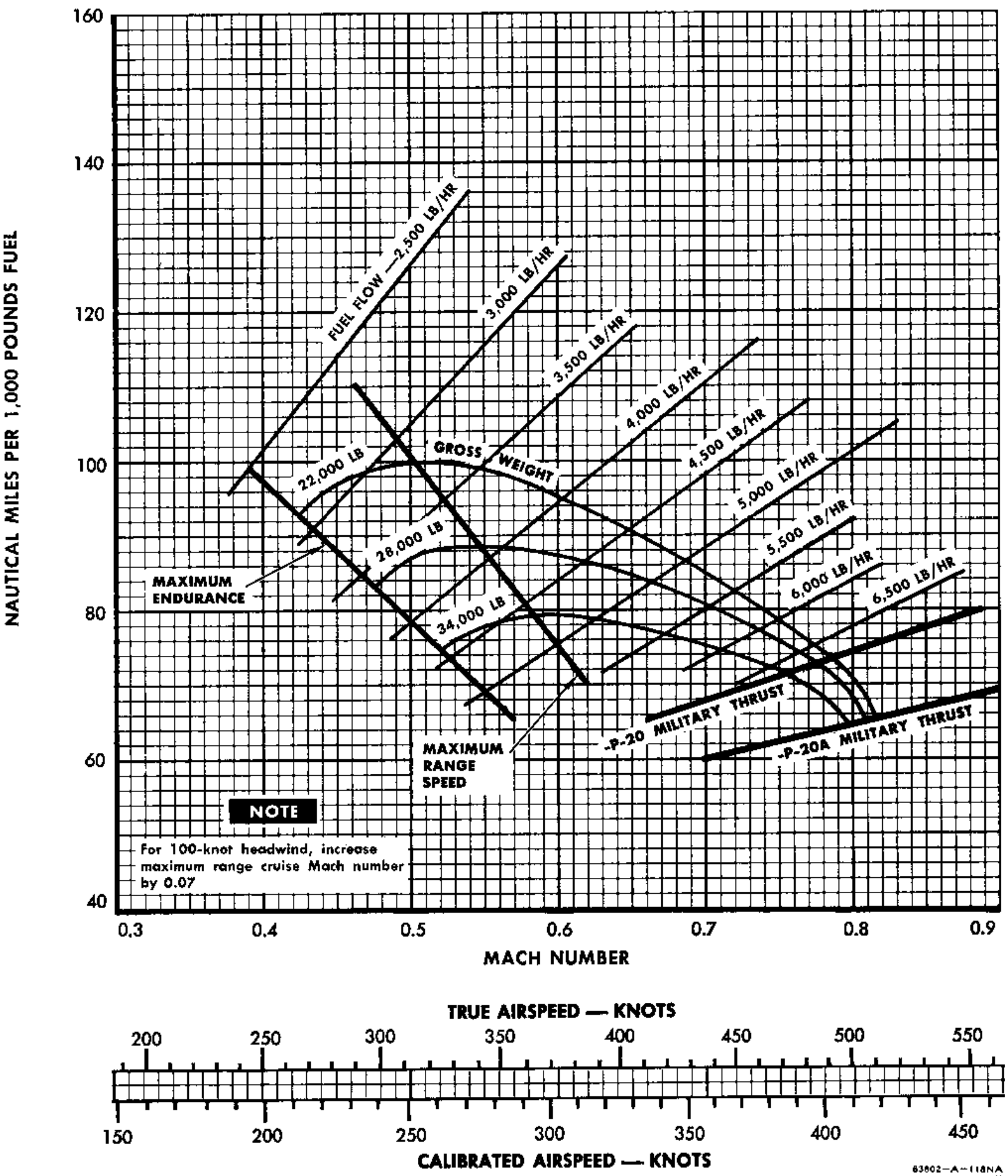


Figure 11-90 (Sheet 2)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET — CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition At All Speeds

ENGINES: J57-P-20, -P-20A

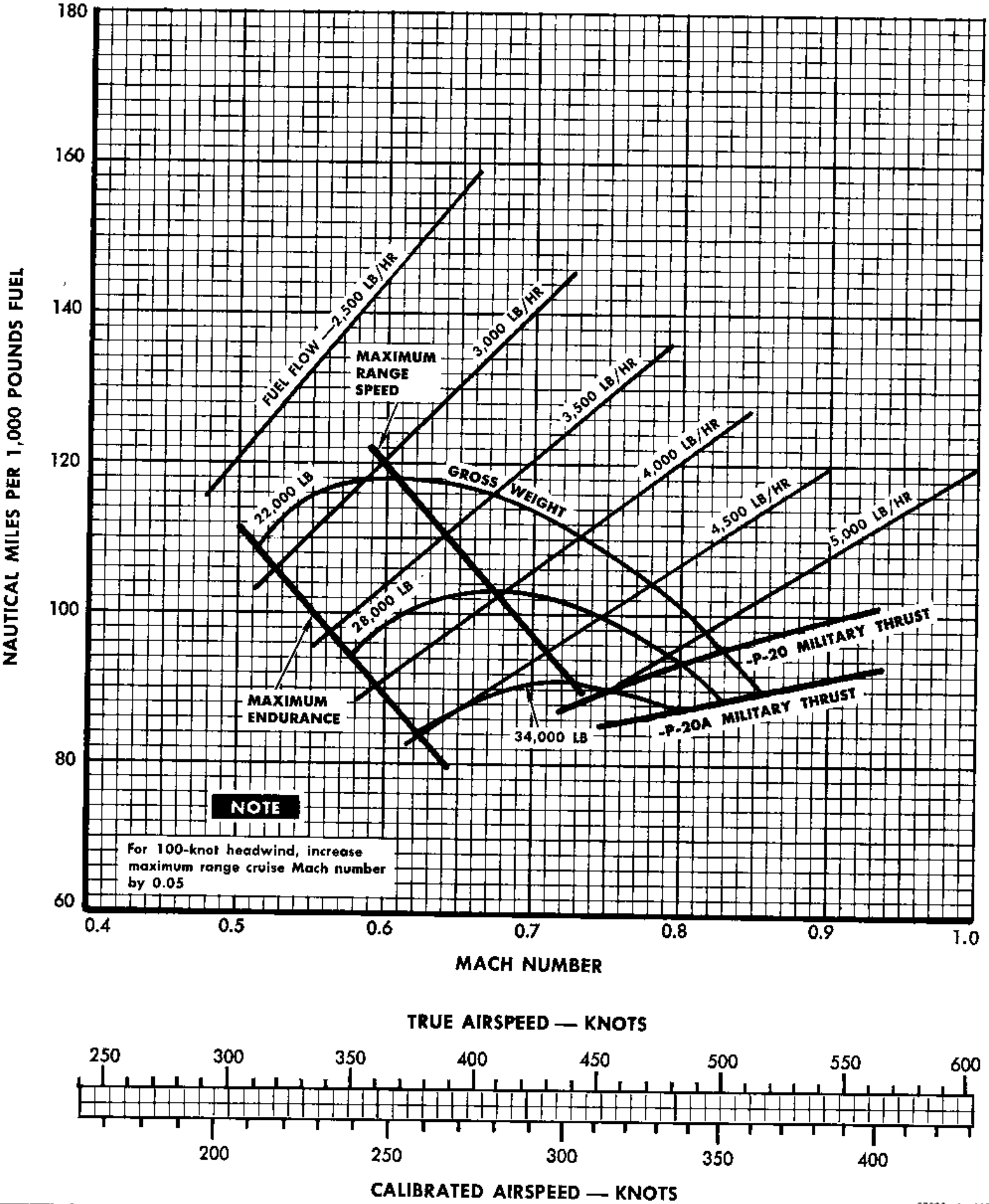


Figure 11-90 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION VIII

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: February 1964

Standard Day
Cruise Condition at All Speeds

ENGINES: J57-P-20, -P-20A

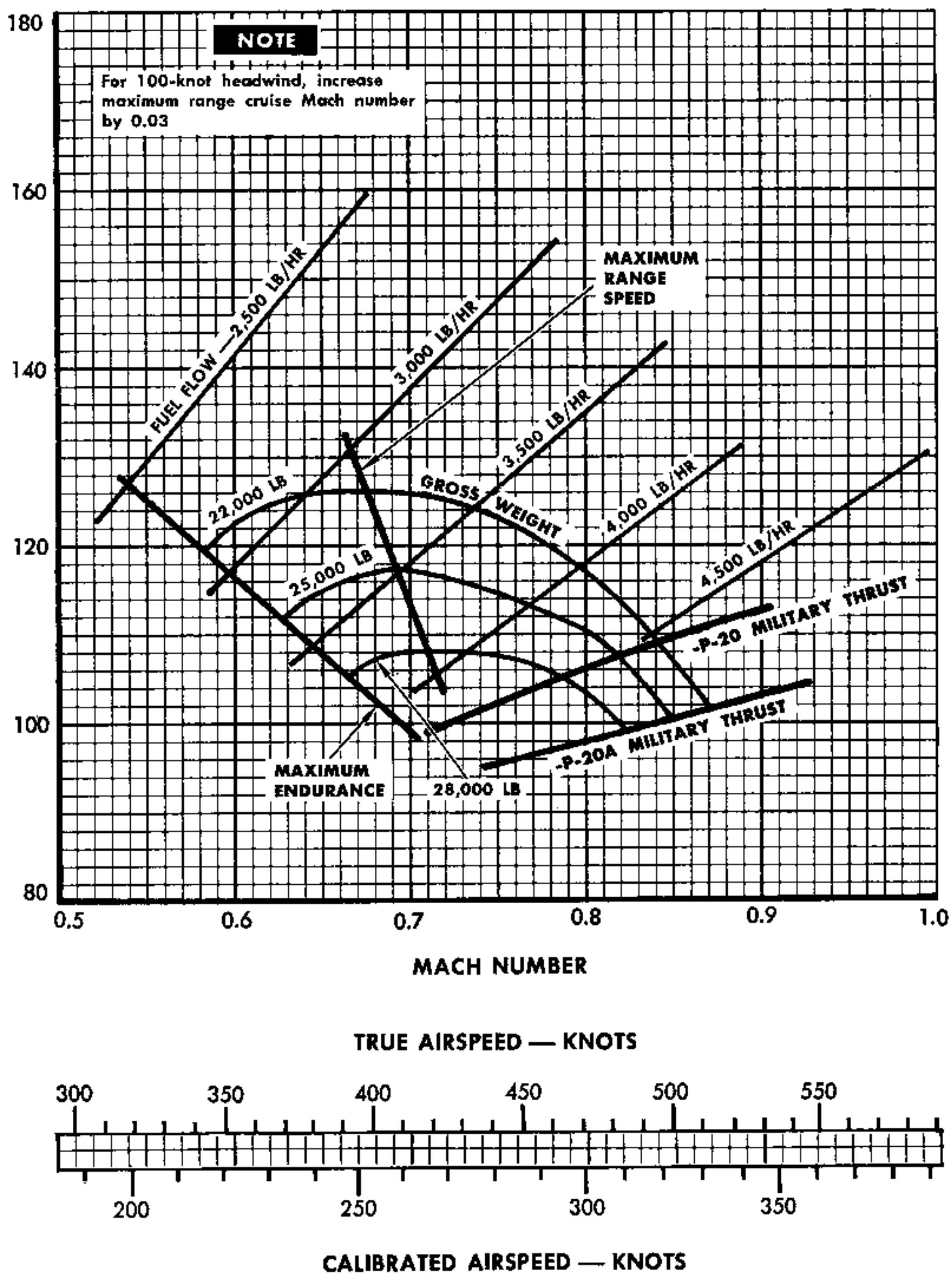
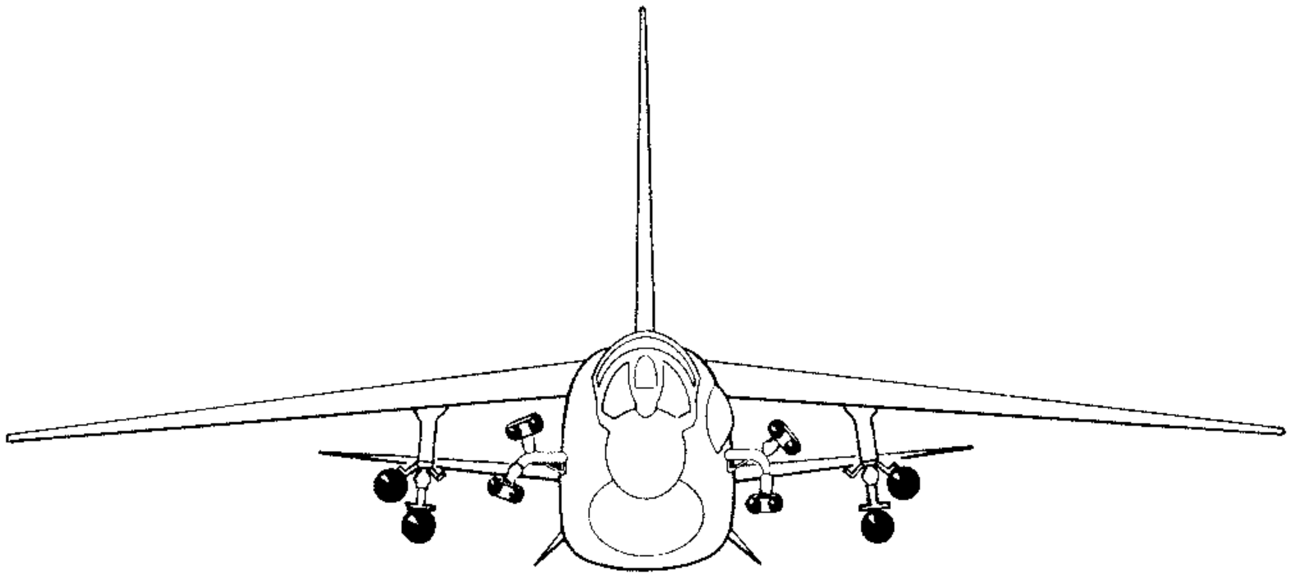


Figure 11-90 (Sheet 4)

CONFIGURATION IX

CLIMB, CRUISE AND SPECIFIC RANGE DATA



Typical loading — Eight 500-pound (MK82) Snakeye bombs and four (short-nose) Zuni packs

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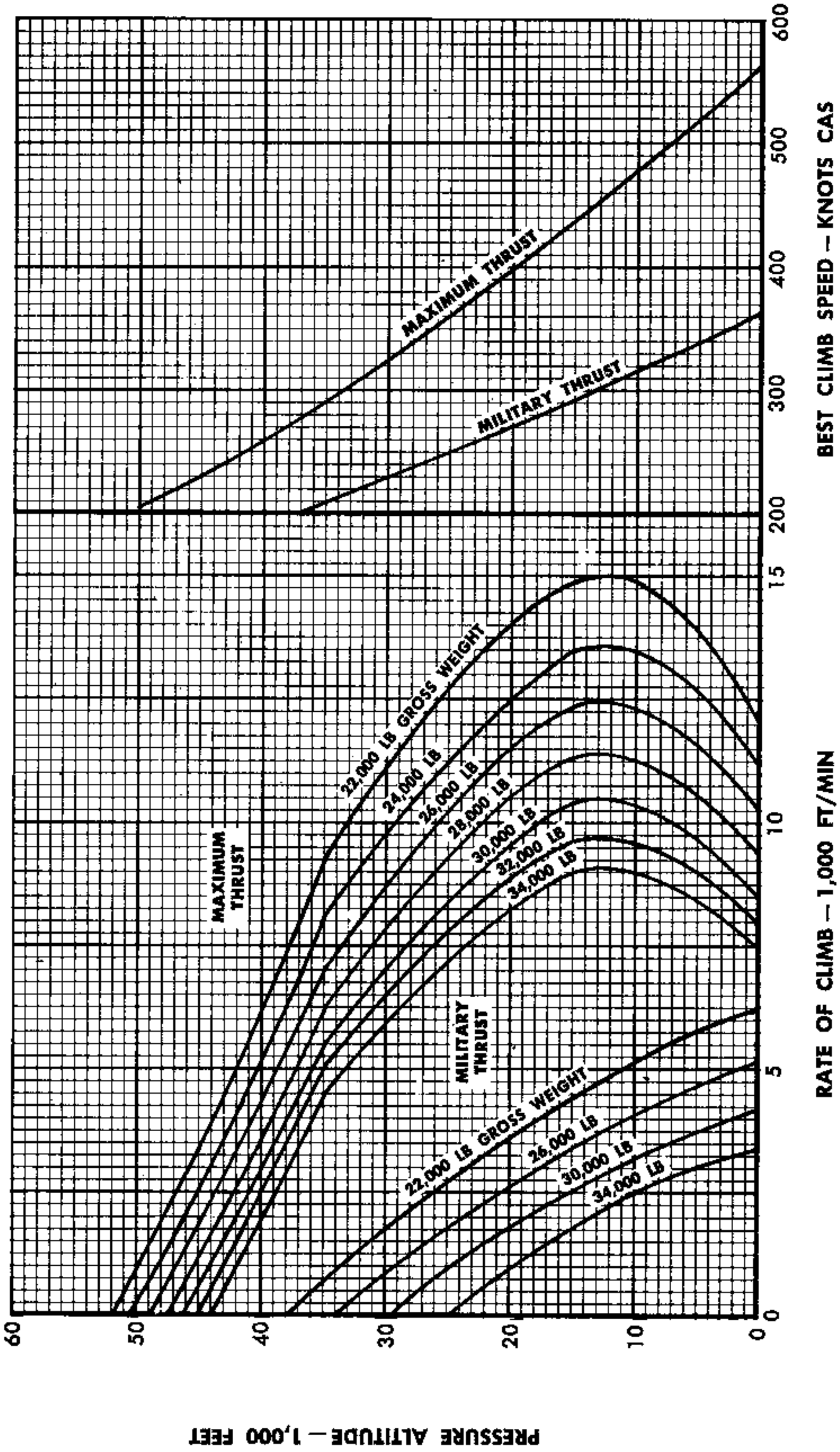
BEST CLIMB

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

CONFIGURATION IX
Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-228NB

Figure 11-97

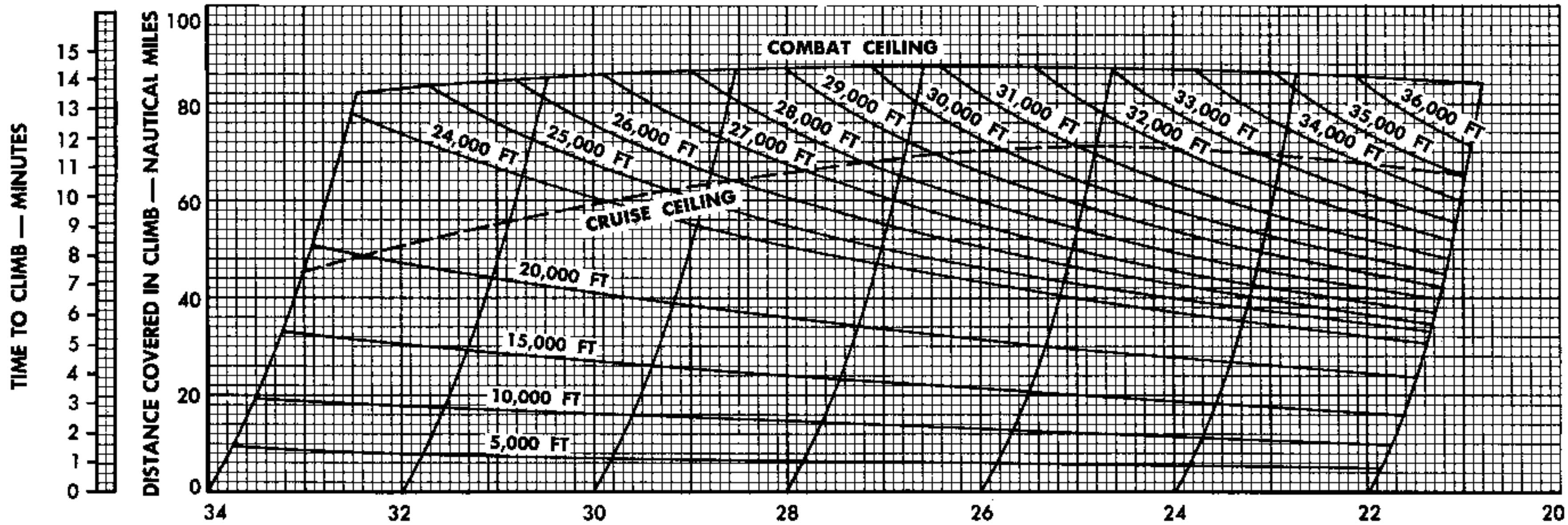
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINE: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude Feet	CAS Knots	Mach No.
SL	362	0.55
10,000	315	0.57
20,000	270	0.59
30,000	230	0.62
35,000	210	0.63

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude in 15,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 362 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63B02-A-229NB

Figure 11-92 (Sheet 1)

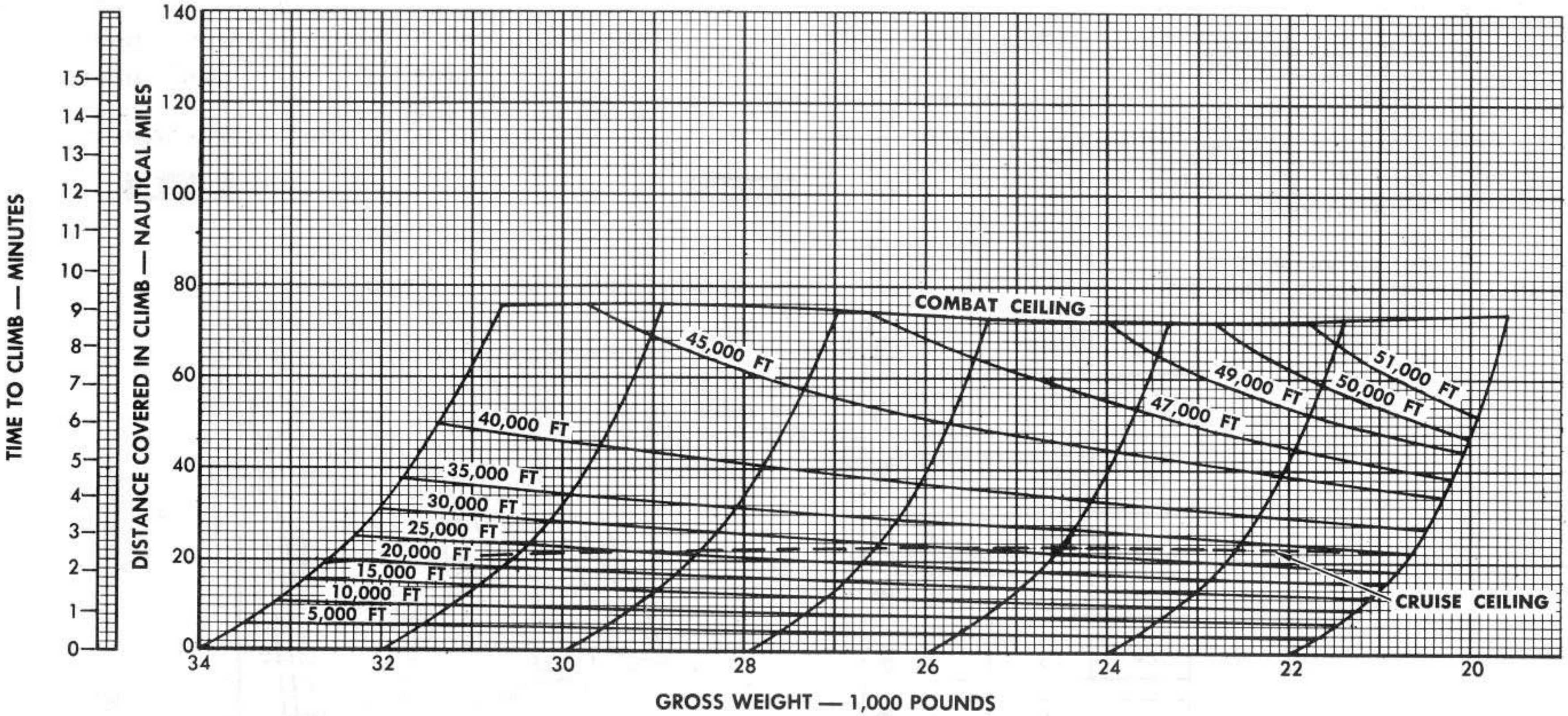
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude Feet	CAS Knots
S L	562
10,000	477
20,000	397
30,000	326
40,000	260
50,000	205

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.85.
3. Maximum endurance altitude is 15,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes.

63802—A—230NB

Figure 11-92 (Sheet 2)

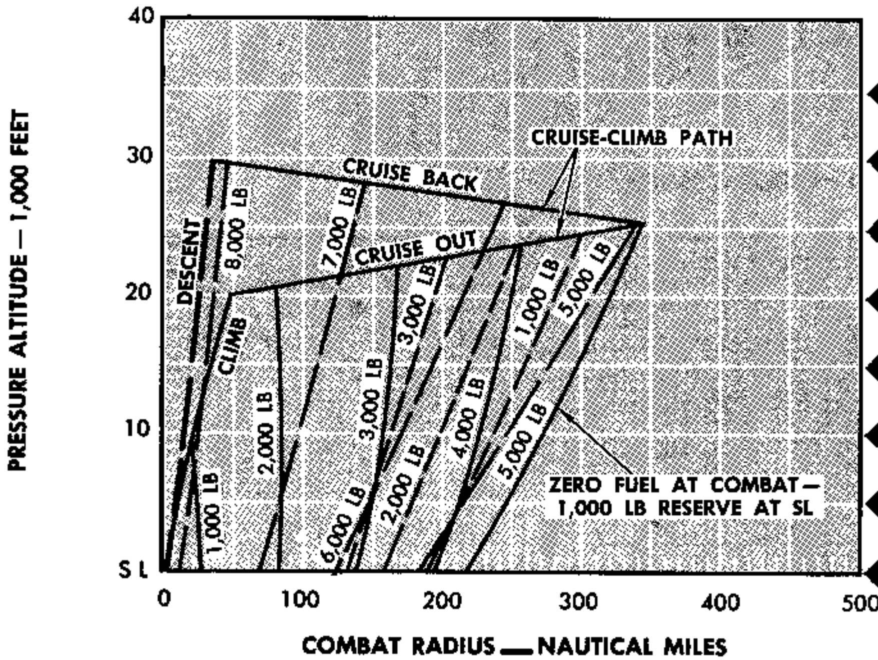
COMBAT RADIUS PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
SL	371	.56

IDLE THRUST DESCENT — CONSTANT
252 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.70	—
25,000	0.66	274
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
SL	0.46	306

LEGEND

- CLIMB AND CRUISE — CLIMB PATHS (solid line)
- DESCENT PATH (long dash)
- COMBAT FUEL AVAILABLE (short dash)
- TOTAL FUEL USED — CRUISE OUT (solid line)
- TOTAL FUEL USED — CRUISE BACK (dash)

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

63802-A-231NB

Figure 11-93

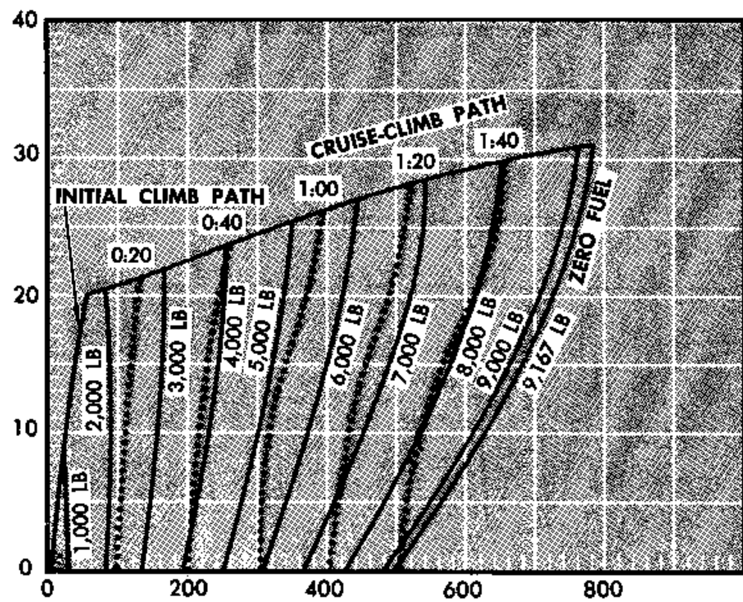
MISSION PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Cruise Condition At All Altitudes
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.70	—
25,000	0.66	274
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
SL	0.46	306

LEGEND

- ——— FLIGHT PATH
- •••••••• TIME TO CLIMB AND CRUISE
- ——— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802—A—232NB

Figure 11-94

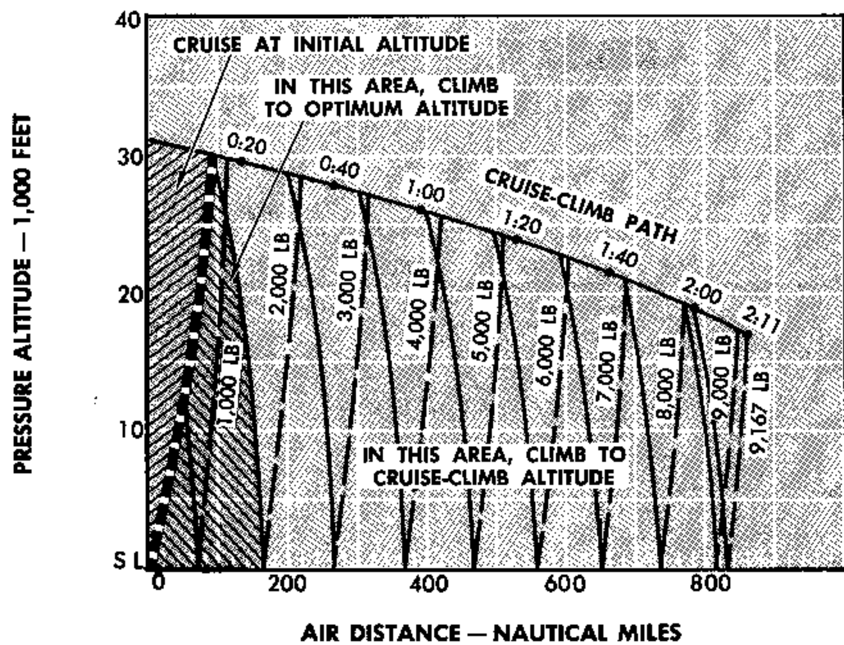
OPTIMUM RETURN PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Cruise Condition At All Altitudes
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT— 1,000 FT	CAS	MACH NO.
35	—	—
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB-PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.70	—
25,000	0.66	274
20,000	0.61	276
15,000	0.55	279
10,000	0.51	283
5,000	0.48	291
SL	0.46	306

63802-A-233NB

Figure 11–95

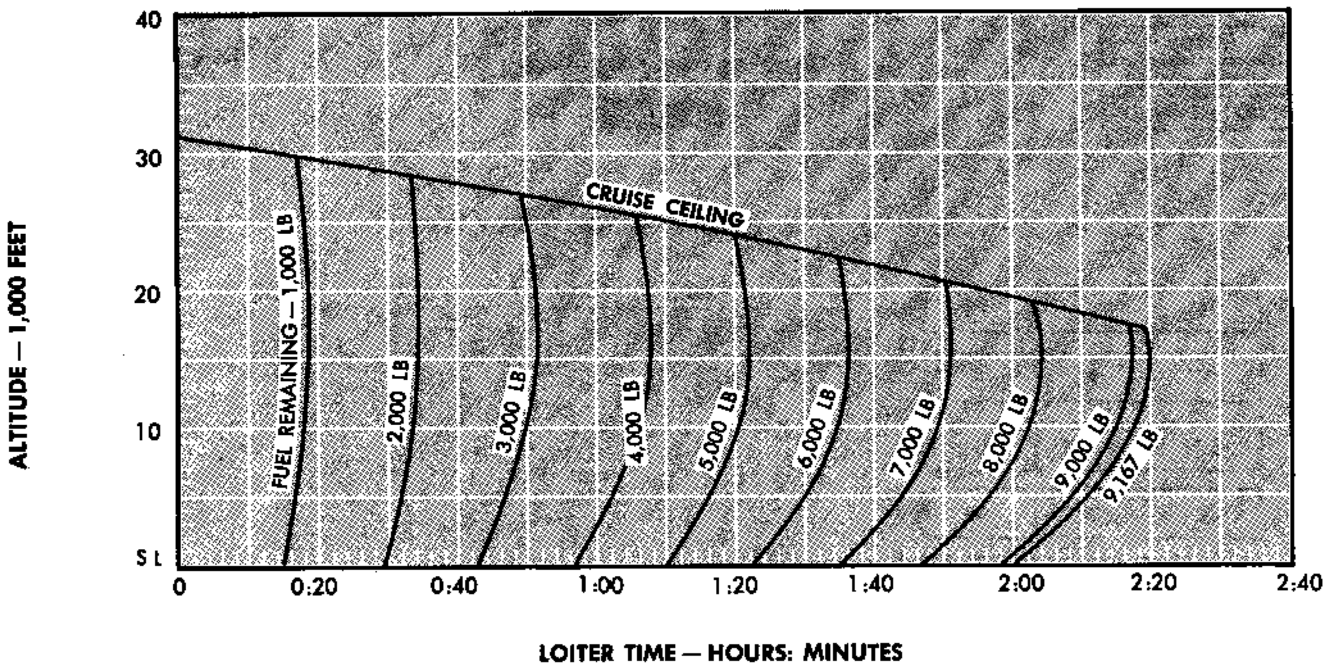
MAXIMUM ENDURANCE PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE — FT	CAS
SL	230
10,000	234
20,000	237
30,000	240

63802—A—234NB

Figure 11–96

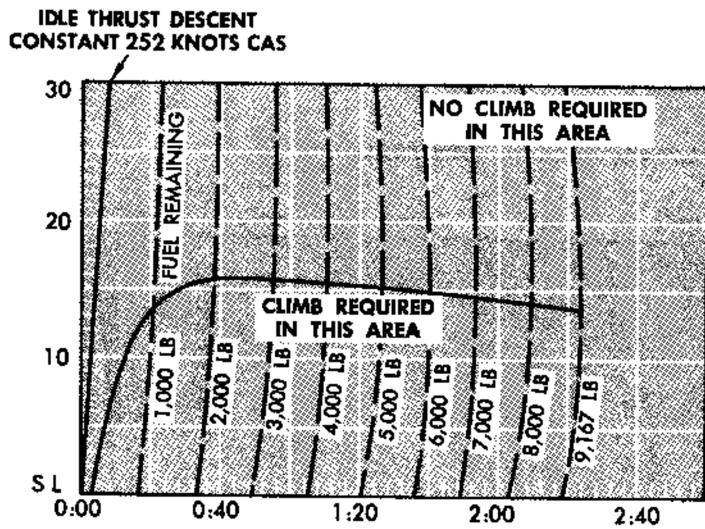
OPTIMUM ENDURANCE PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
30	235	.63
25	257	.62
20	278	.60
15	300	.59
10	323	.58
5	347	.57
S L	371	.56

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- – – – FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE — FT	CAS
30,000	248
20,000	245
10,000	242
S L	238

63802-A-235NB

Figure 11-97

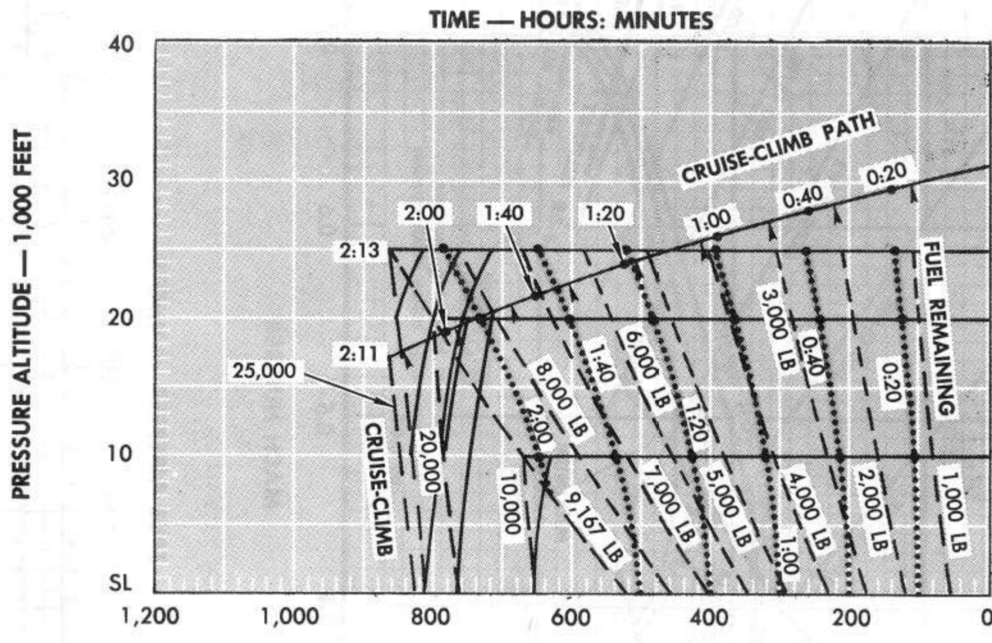
AIR REFUELING PROFILE

CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Cruise Condition At All Altitudes
Post-Refueling Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
35	210	0.63
30	230	0.62
25	250	0.60
20	270	0.59
15	293	0.58
10	315	0.57
5	338	0.56
SL	362	0.55

LEGEND

- – – FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- •······• TIME TO CRUISE
- — — CRUISE TO ZERO FUEL REMAINING
- —— CONSTANT ALTITUDE CRUISE PATH
- —— CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.65	—
25,000	0.65	270
20,000	0.60	272
15,000	0.54	275
10,000	0.50	279
5,000	0.48	287
SL	0.46	301

63802–A–236NB

Figure 11–98

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

SEA LEVEL — CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition

ENGINES: J57-P-20, -P-20A

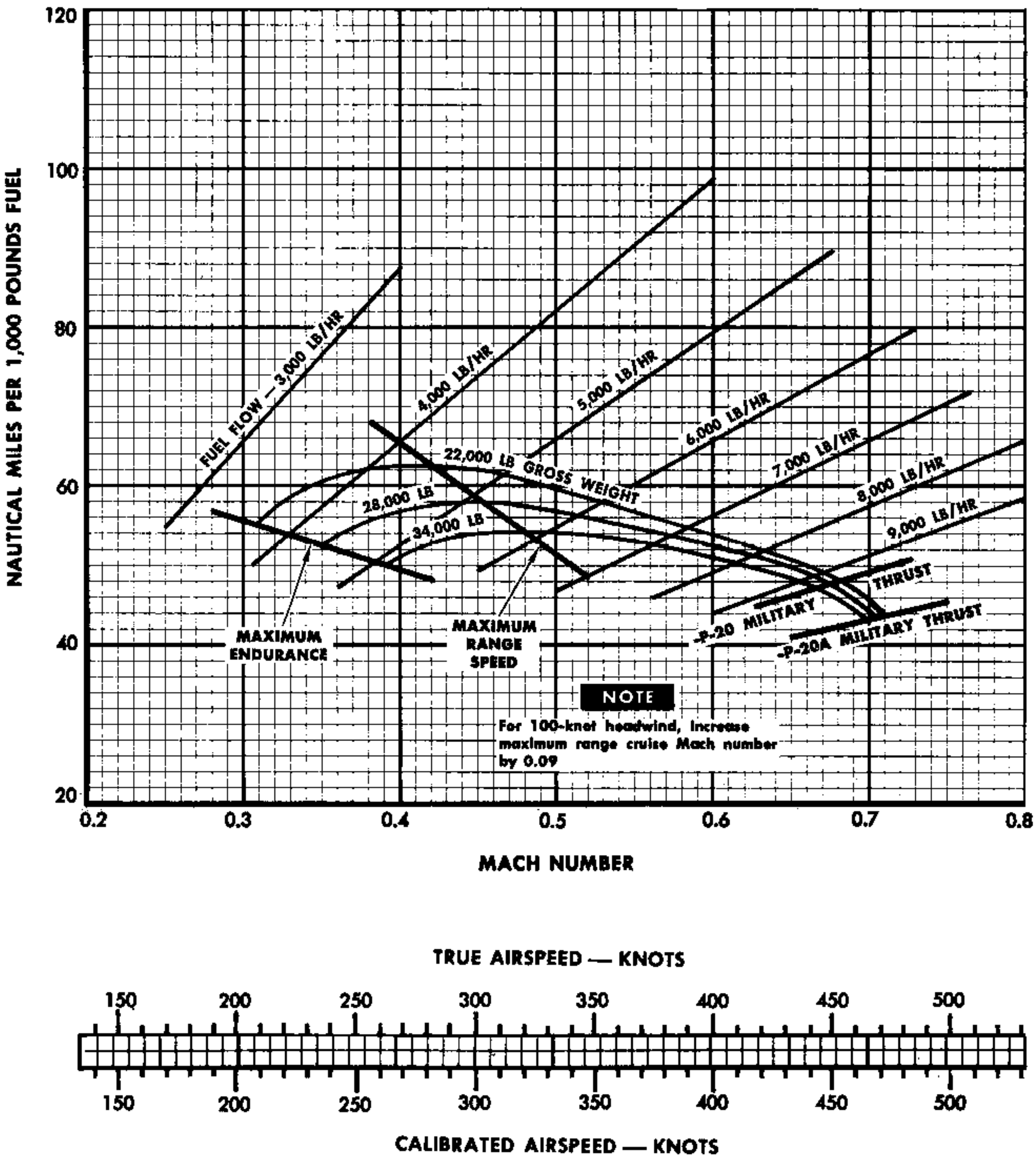


Figure 11-99 (Sheet 1)

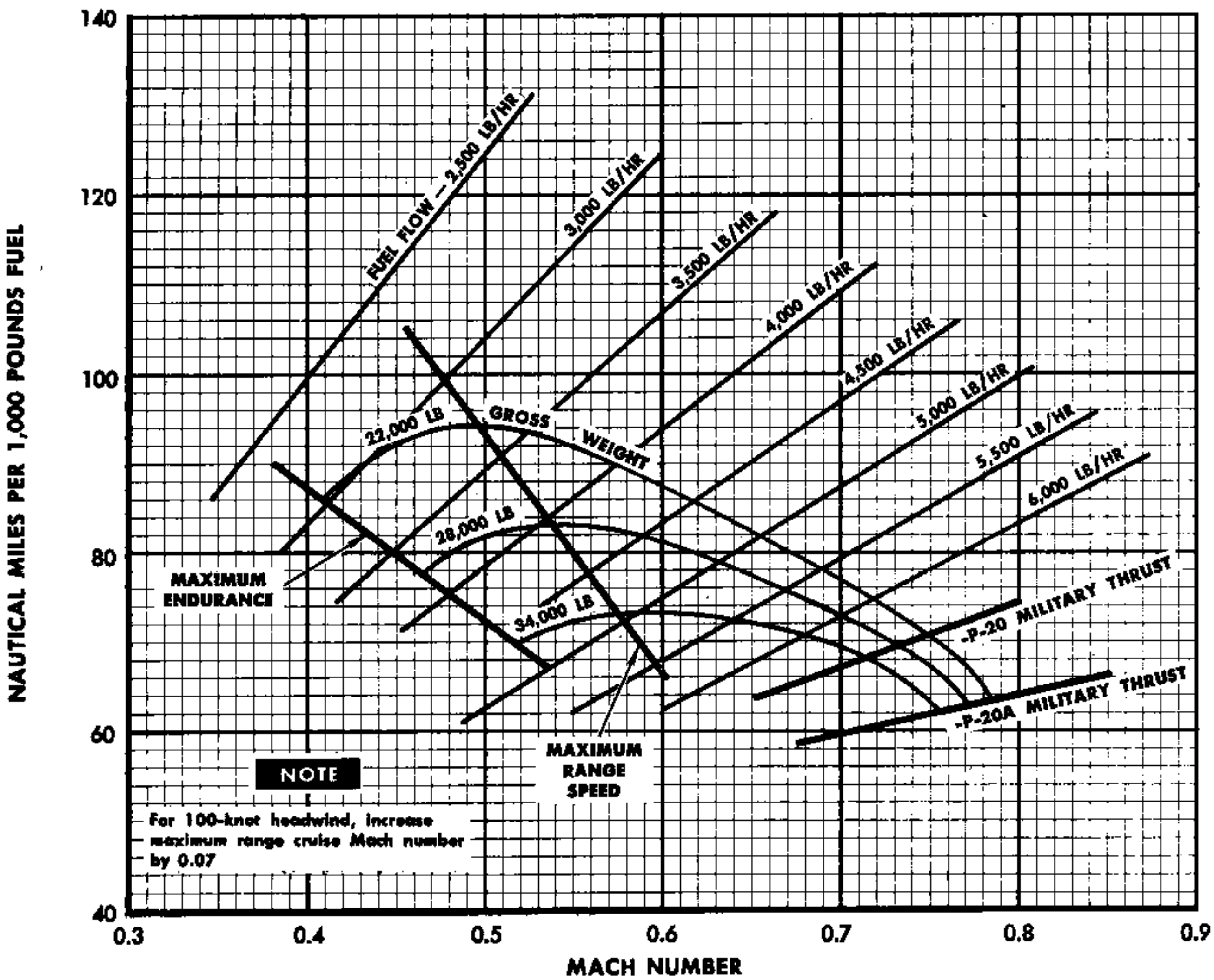
NAUTICAL MILES PER 1,000 POUNDS OF FUEL

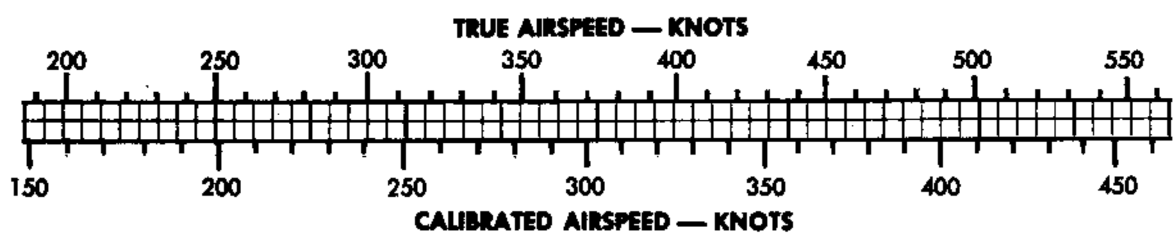
15,000 FEET — CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition

ENGINES: J57-P-20, -P-20A





63802—A—238NB

Figure 11–99 (Sheet 2)

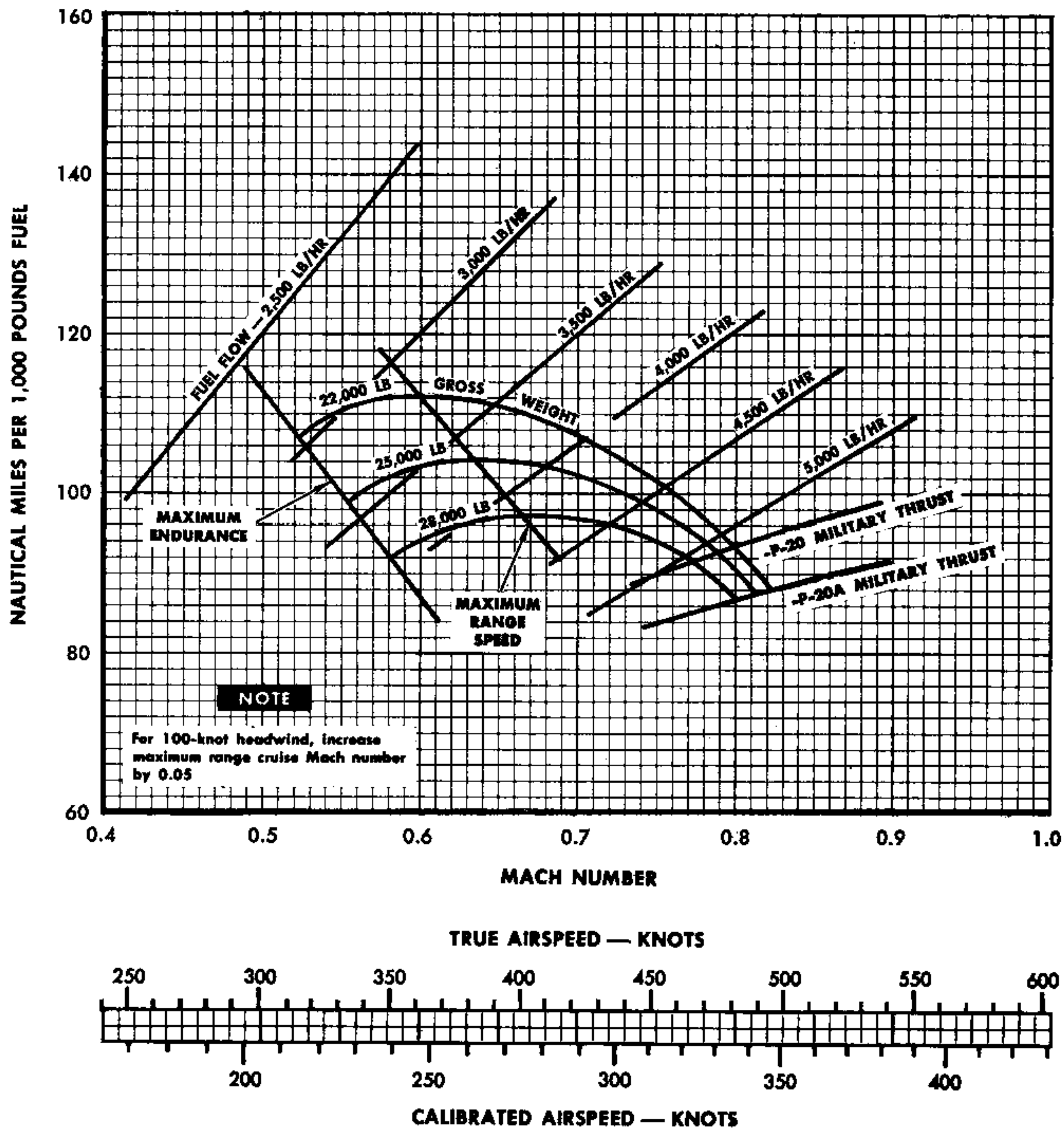
NAUTICAL MILES PER 1,000 POUNDS OF FUEL

25,000 FEET – CONFIGURATION IX

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition

ENGINES: J57-P-20, -P-20A



63802–A–239NB

Figure 11–99 (Sheet 3)

NAUTICAL MILES PER 1,000 POUNDS OF FUEL

30,000 FEET — CONFIGURATION IX

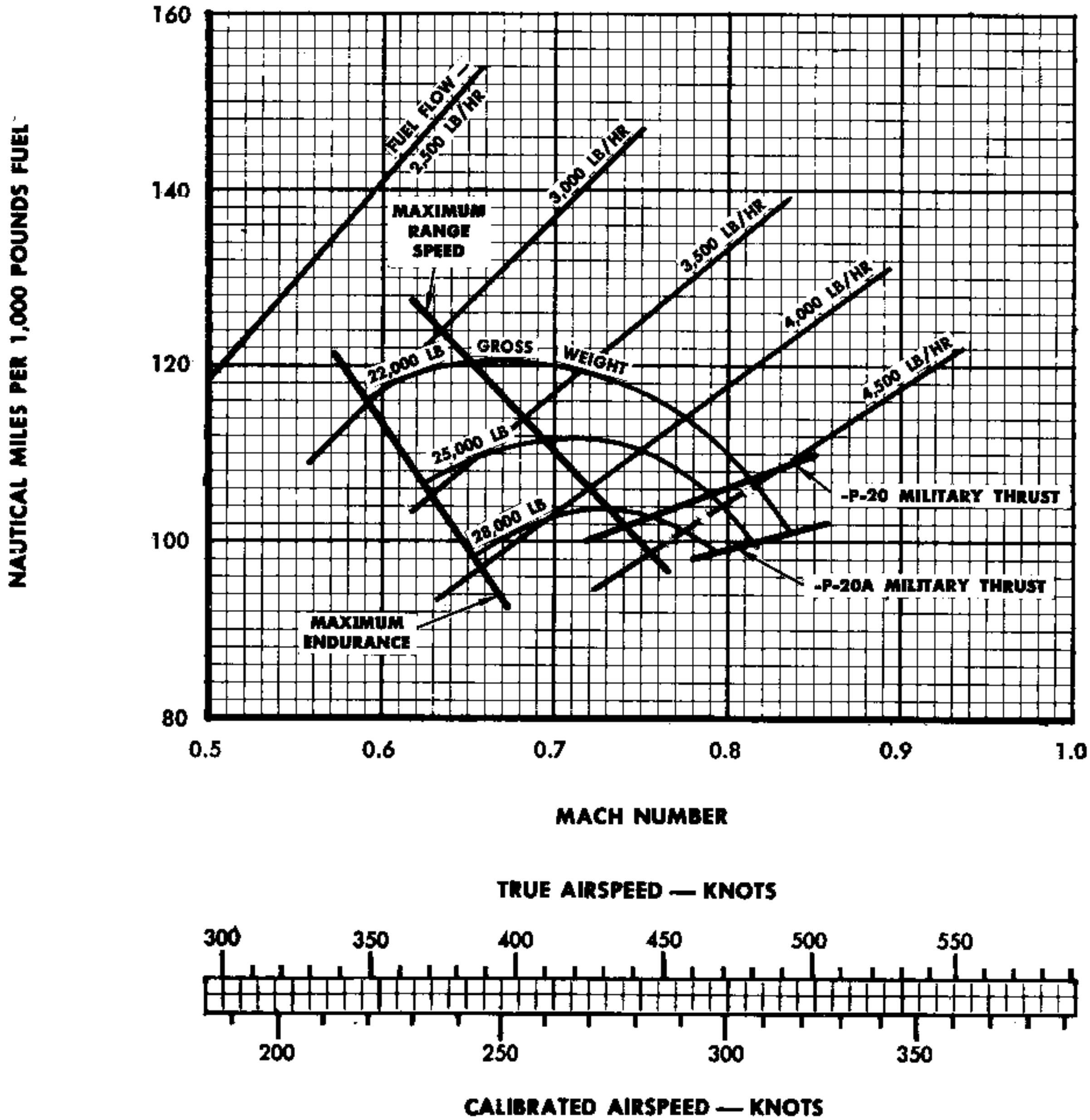
MODEL: F-8E
DATA BASIS: Flight Tests
DATE: June 1966

Standard Day
Cruise Condition

ENGINES: J57-P-20, -P-20A

NOTE

For 100-knot headwind, increase maximum range cruise Mach number by 0.03



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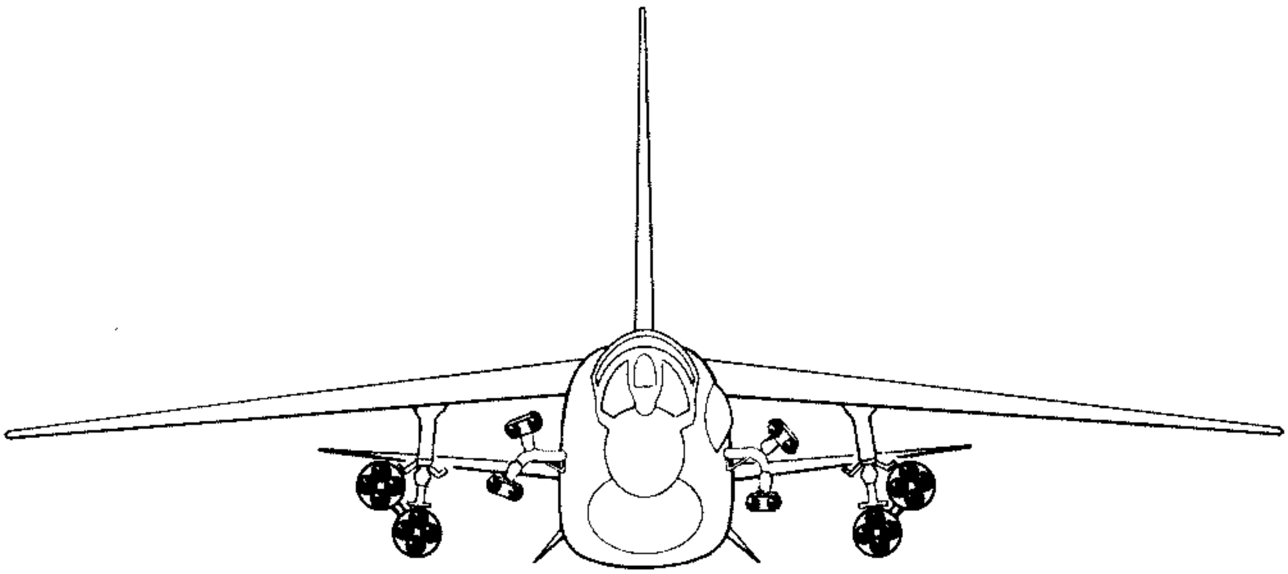
(Boldfaced Type Denotes Illustration)

CONFIGURATION X

CLIMB, CRUISE AND SPECIFIC RANGE DATA



CONFIGURATION X STORES ARRANGEMENTS

Typical Loading — Four LAU-10/A rocket packs (unfaired, with short-nose Zuni rockets) on multiple ejector rack and four (long-nose) Zuni fuselage packs.

Note

See figure 11-1 for asymmetrical stores loadings.

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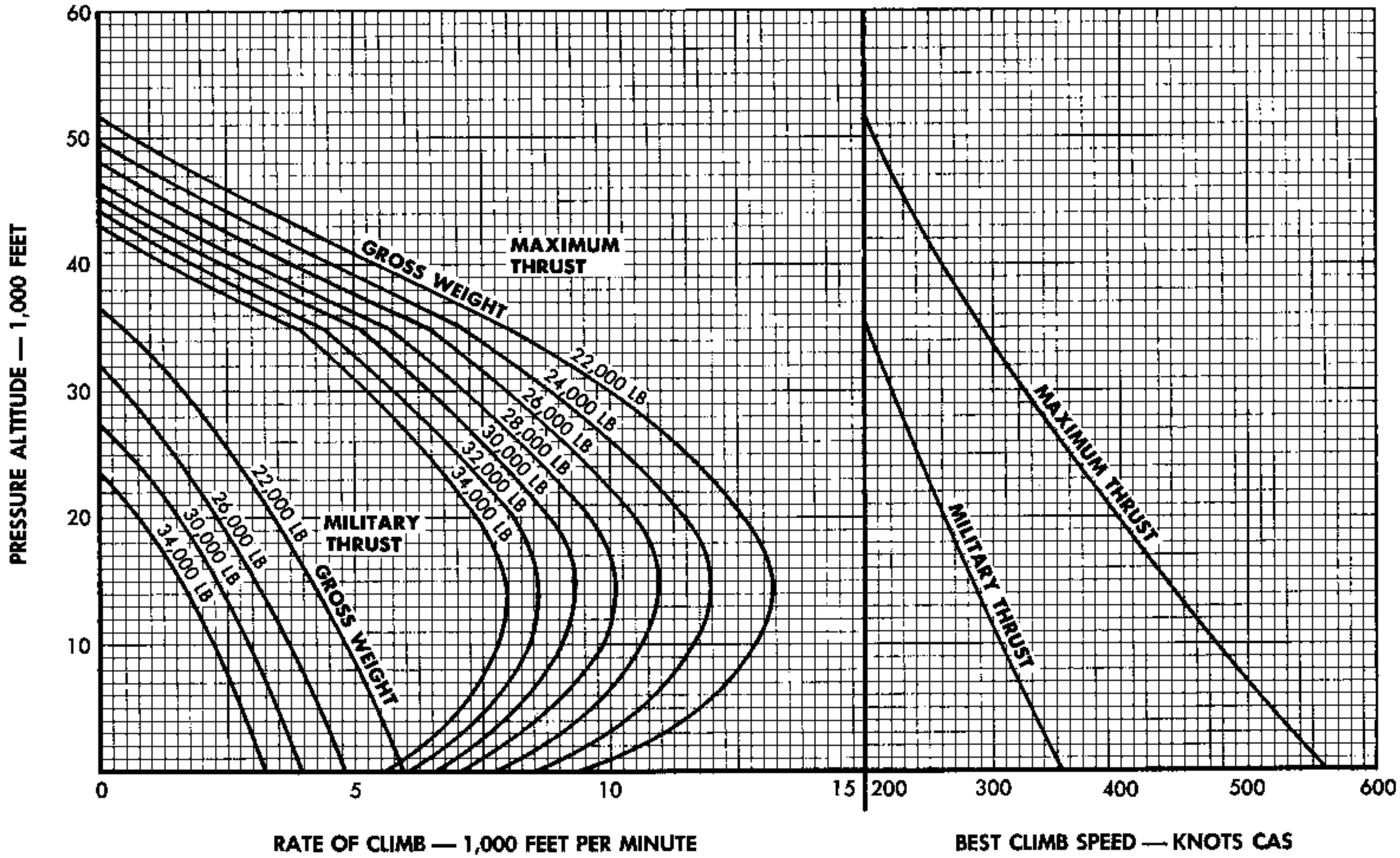
BEST CLIMB

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

CONFIGURATION X
Standard Day

ENGINES: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-241-11-66

Figure 11–100

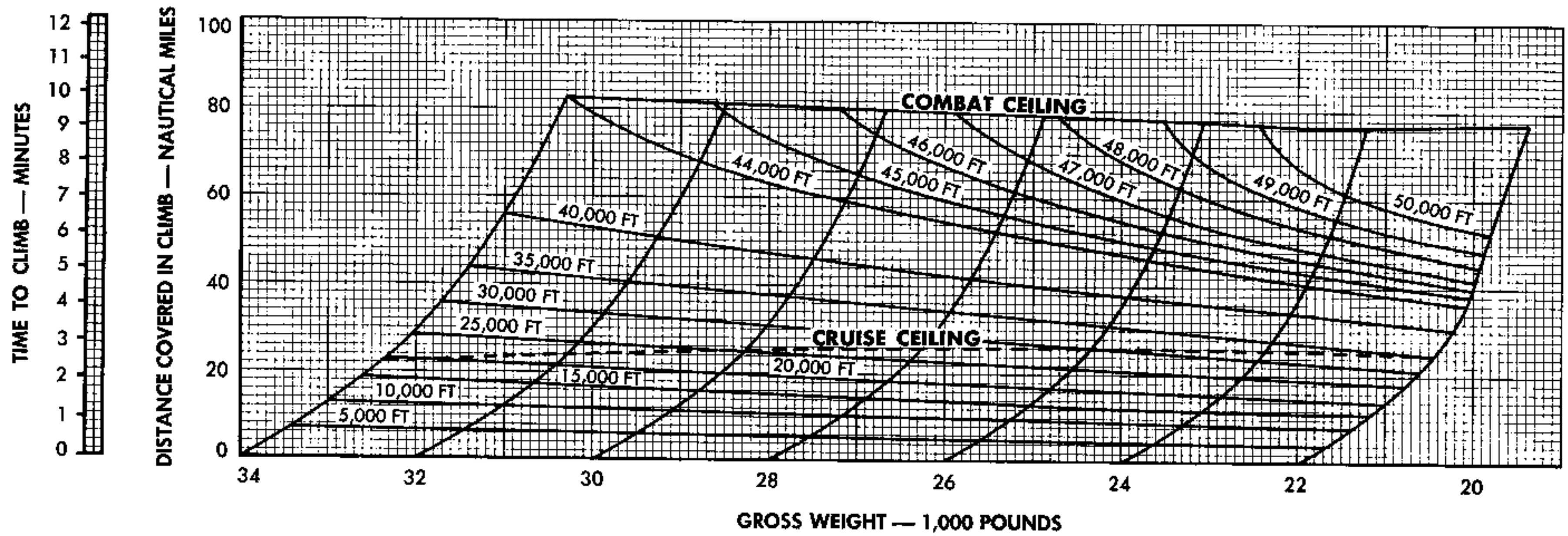
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
SL	560
10,000	475
20,000	396
30,000	324
40,000	260
50,000	205

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.88.
3. Maximum endurance altitude is 20,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes.

63602-A-242-11-66

Figure 11-101 (Sheet 1)

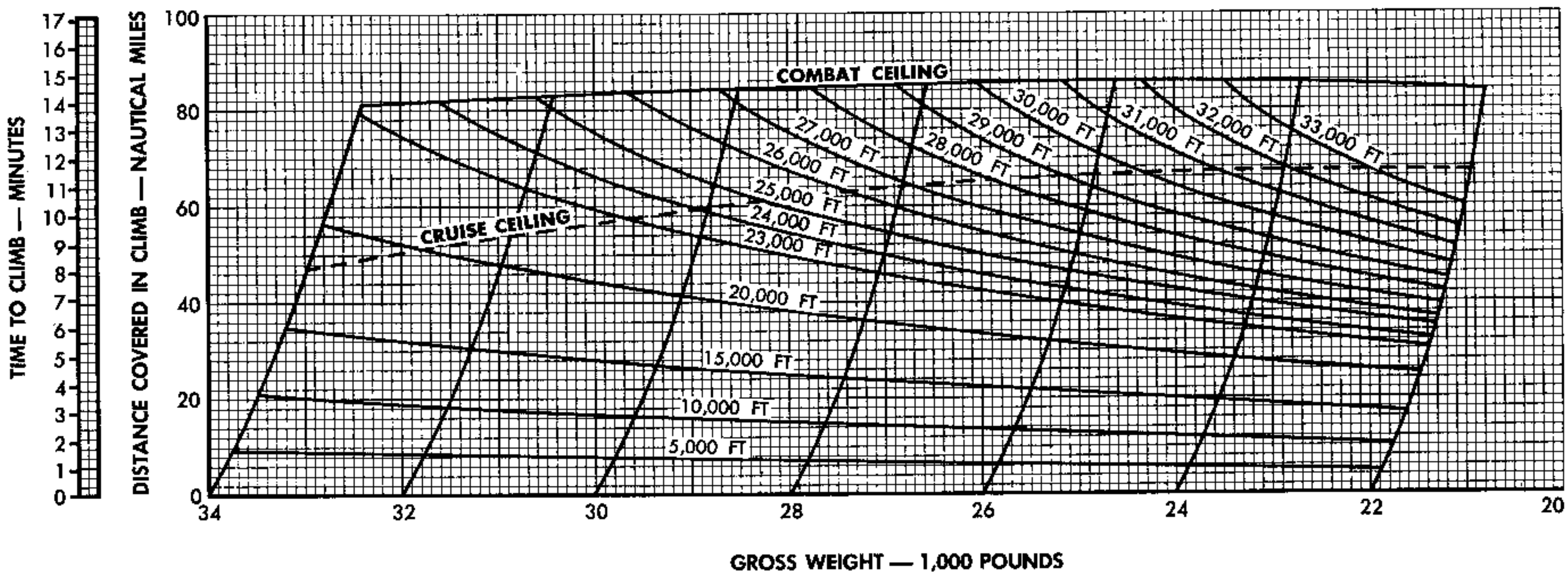
CLIMB CONTROL

MILITARY THRUST — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition — Airspeed Below 300 KIAS

Engine: J57-P-20A
(See Note 5)



CLIMB SPEED

Altitude Feet	CAS Knots	Mach No.
SL	354	.54
10,000	310	.56
20,000	265	.58
30,000	225	.60
35,000	207	.62

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 4%
   Time — 4%
   Fuel — 2%

2. Maximum endurance altitude is 15,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 354 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802—A—243—11—66

Figure 11–101 (Sheet 2)

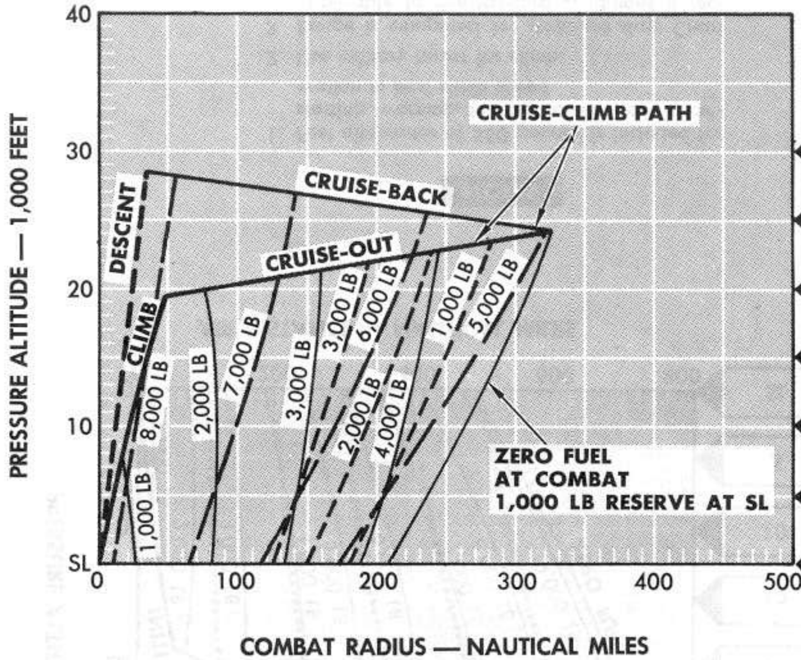
COMBAT RADIUS PROFILE

CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
30	225	0.60
25	245	0.59
20	265	0.58
15	285	0.57
10	310	0.56
5	330	0.55
SL	354	0.54

LEGEND

- ——— CLIMB AND CRUISE — CLIMB PATHS
- — — — DESCENT PATH
- - - - - COMBAT FUEL AVAILABLE
- ——— TOTAL FUEL USED — CRUISE OUT
- —— —— TOTAL FUEL USED — CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

IDLE THRUST DESCENT — CONSTANT 253 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE - FT	MACH NO.	CAS
Cruise - Climb	0.64	—
20,000	0.59	267
15,000	0.54	270
10,000	0.50	275
5,000	0.47	284
SL	0.45	296

63802-A-244-11-66

Figure 11-102

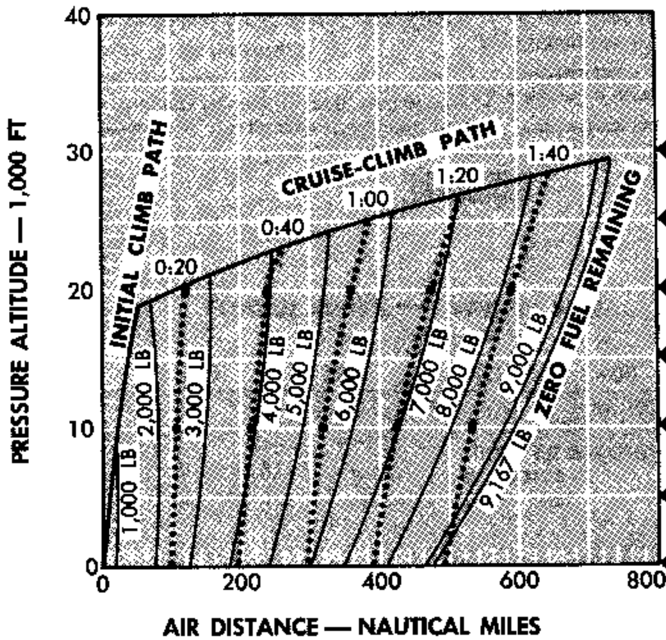
MISSION PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

CONFIGURATION X

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
30	225	0.60
25	245	0.59
20	265	0.58
15	285	0.57
10	310	0.56
5	330	0.55
SL	354	0.54

LEGEND

- FLIGHT PATH (solid line)
- TIME TO CLIMB AND CRUISE (dotted line)
- FUEL USED (thin solid line)

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise-Climb	0.64	—
20,000	0.59	267
15,000	0.54	270
10,000	0.50	275
5,000	0.47	284
SL	0.45	296

63802-A-245-11-66

Figure 11–103

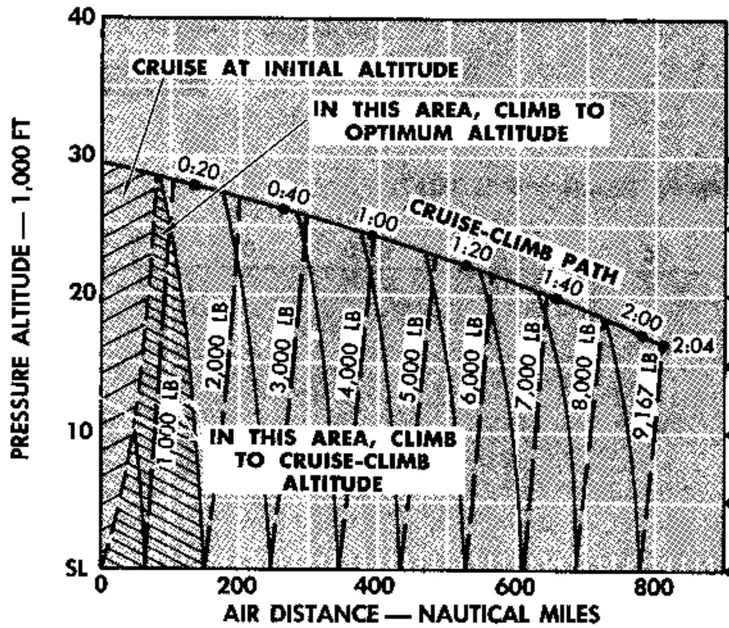
OPTIMUM RETURN PROFILE

CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Cruise Condition At All Altitudes
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
30	225	0.60
25	245	0.59
20	265	0.58
15	285	0.57
10	310	0.56
5	330	0.55
SL	354	0.54

LEGEND

- CRUISE-CLIMB PATH (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB-PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE		
ALTITUDE—FT	MACH NO.	CAS
Cruise–Climb	0.64	—
20,000	0.59	267
15,000	0.54	270
10,000	0.50	275
5,000	0.47	284
SL	0.45	296

63802–A–246–11–66

Figure 11–104

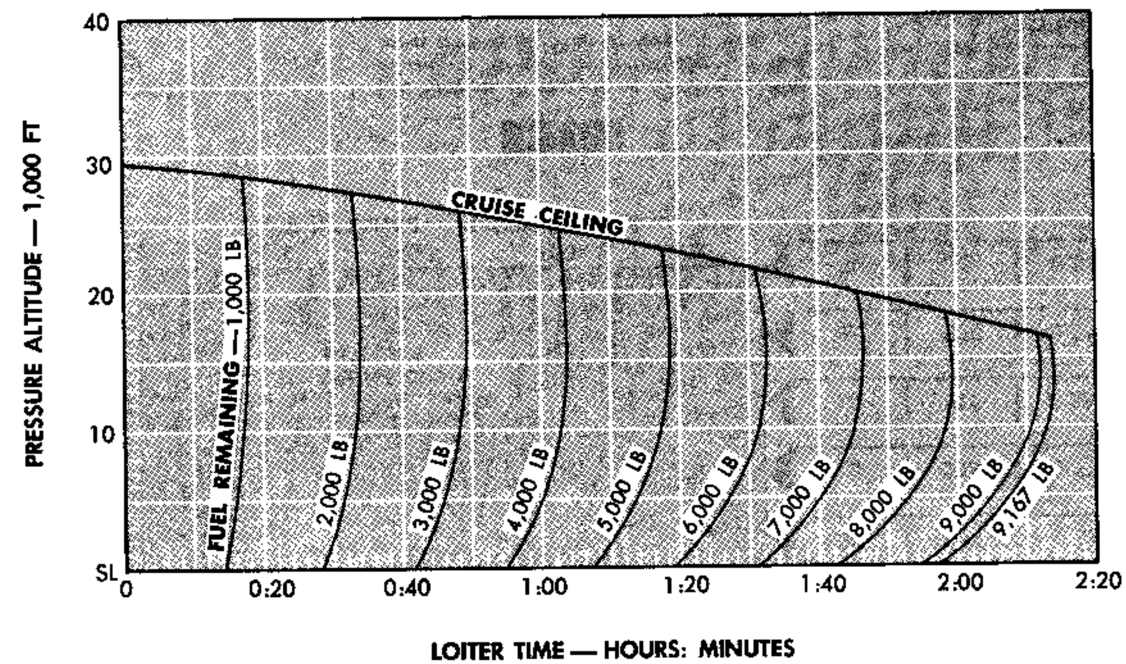
MAXIMUM ENDURANCE PROFILE

CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE — FT.	CAS
30,000	236
20,000	233
10,000	231
SL	230

63802-A-247-11-66

Figure 11–105

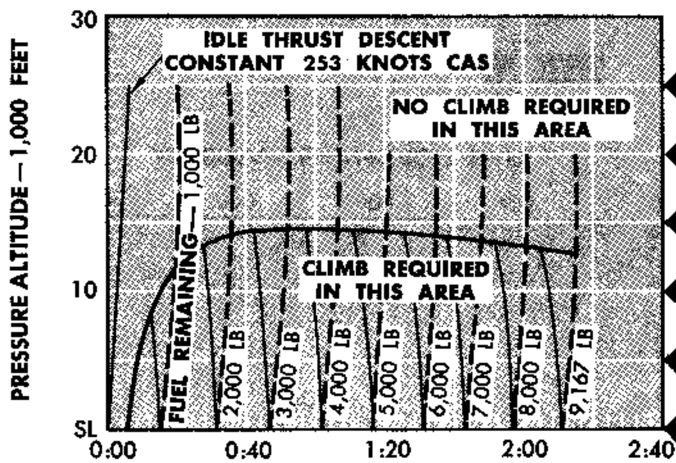
OPTIMUM ENDURANCE PROFILE

CONFIGURATION X

MODEL: F–8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition
Initial Gross Weight—34,000 Pounds

ENGINES: J57–P–20, –P–20A



MILITARY THRUST CLIMB

ALT—1,000 FT	CAS	MACH NO.
25	245	0.59
20	265	0.58
15	285	0.57
10	310	0.56
5	330	0.55
SL	354	0.54

LEGEND

——— OPTIMUM ENDURANCE ALTITUDE
——— CLIMB GUIDE LINES
— — — FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED	
ALTITUDE—FT	CAS
30,000	236
20,000	233
10,000	231
SL	230

63802–A–248–11–66

Figure 11–106

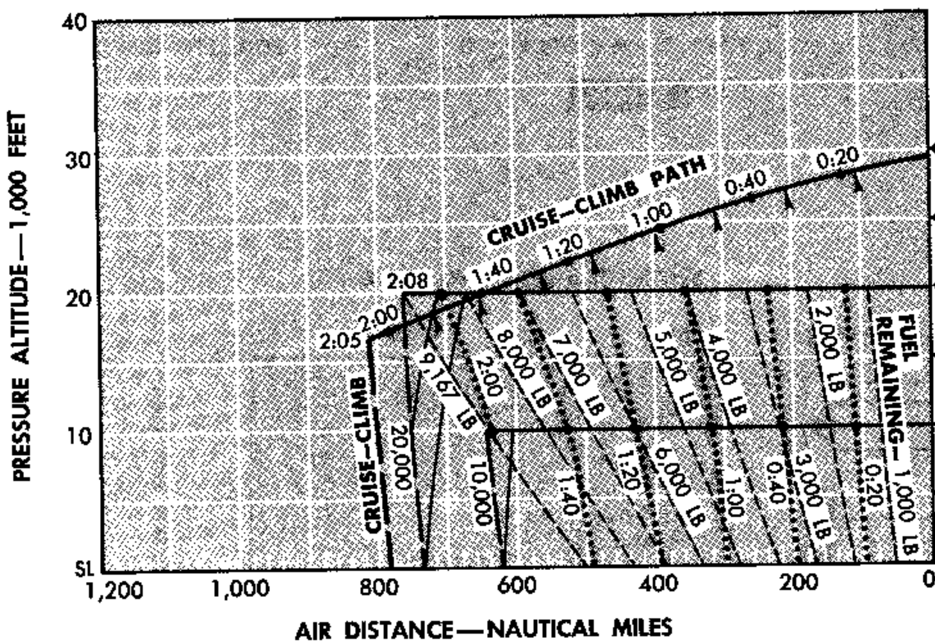
AIR REFUELING PROFILE

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

CONFIGURATION X

Cruise Condition At All Altitudes
Post-Refueling Gross Weight—34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT—1,000 FT	CAS	MACH NO.
30	225	0.60
25	245	0.59
20	265	0.58
15	285	0.57
10	310	0.56
5	330	0.55
SL	354	0.54

LEGEND

- FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE		
ALTITUDE-FT	MACH NO.	CAS
Cruise–Climb	0.64	—
25,000	0.64	265
20,000	0.59	267
15,000	0.54	270
10,000	0.50	275
5,000	0.47	284
SL	0.45	296

63802—A—249—11—66

Figure 11–107

NAUTICAL MILES PER 1,000 LB OF FUEL

SEA LEVEL — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

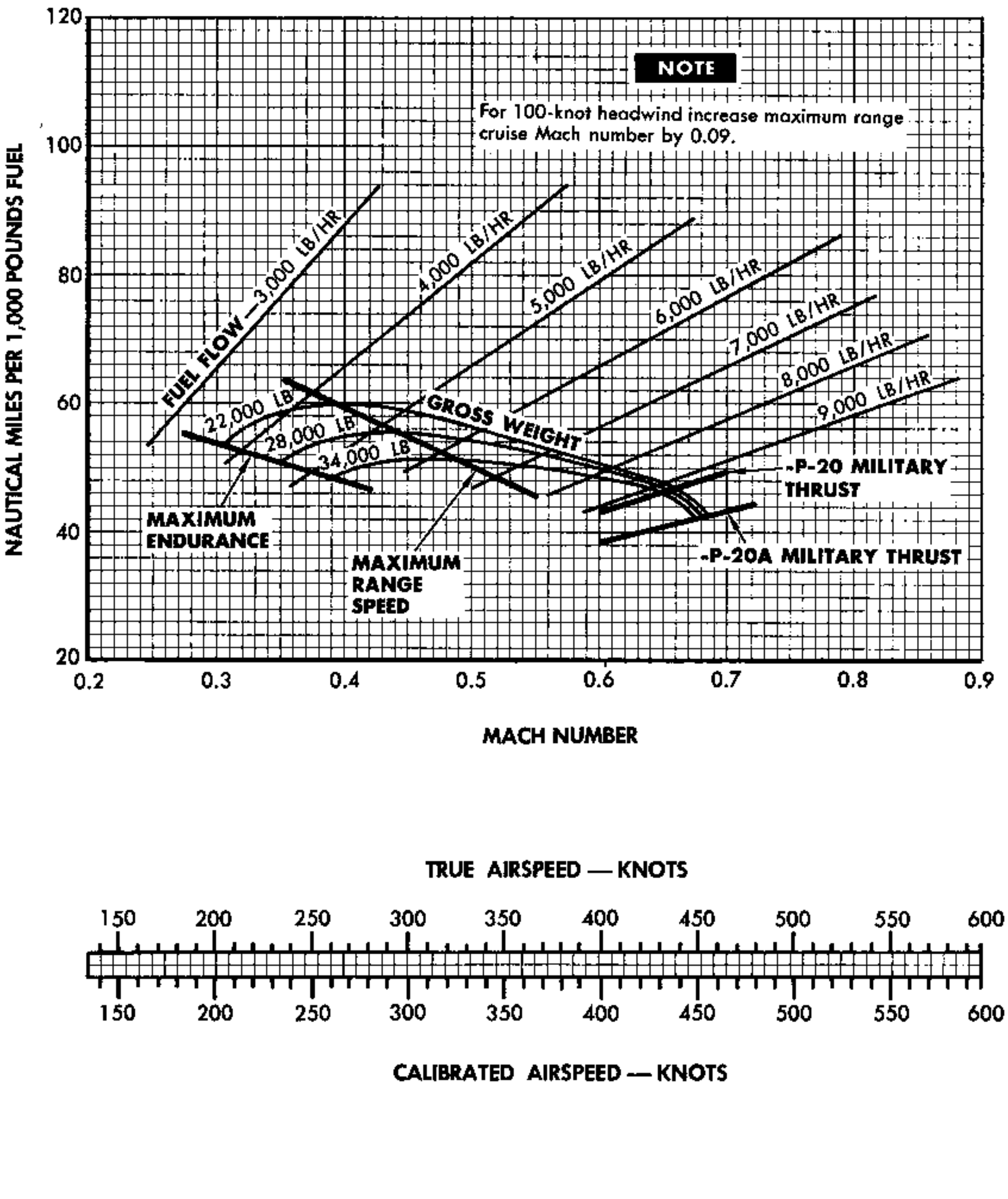


Figure 11–108 (Sheet 1)

NAUTICAL MILES PER 1,000 LB OF FUEL

15,000 FEET — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A

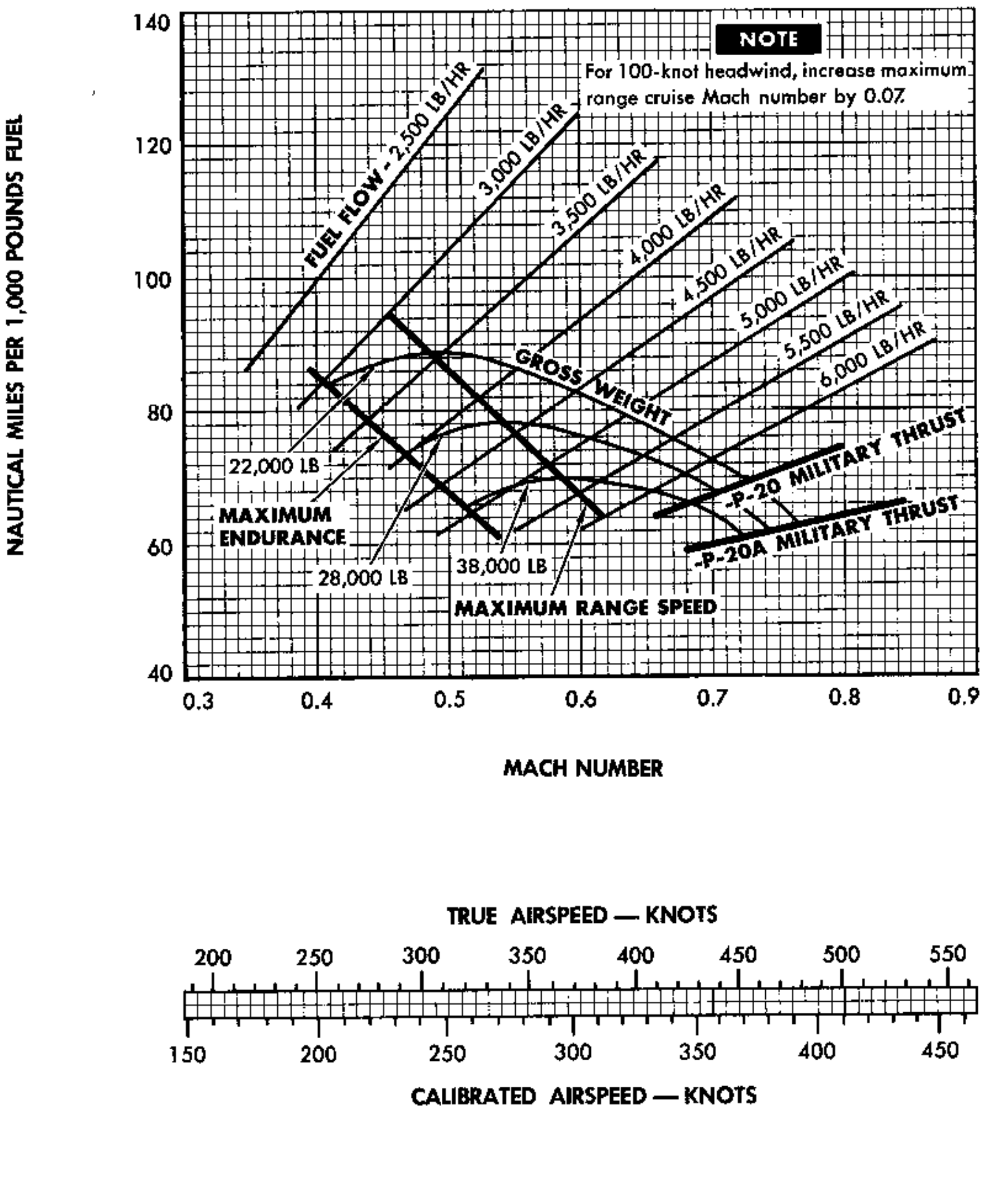


Figure 11–108 (Sheet 2)

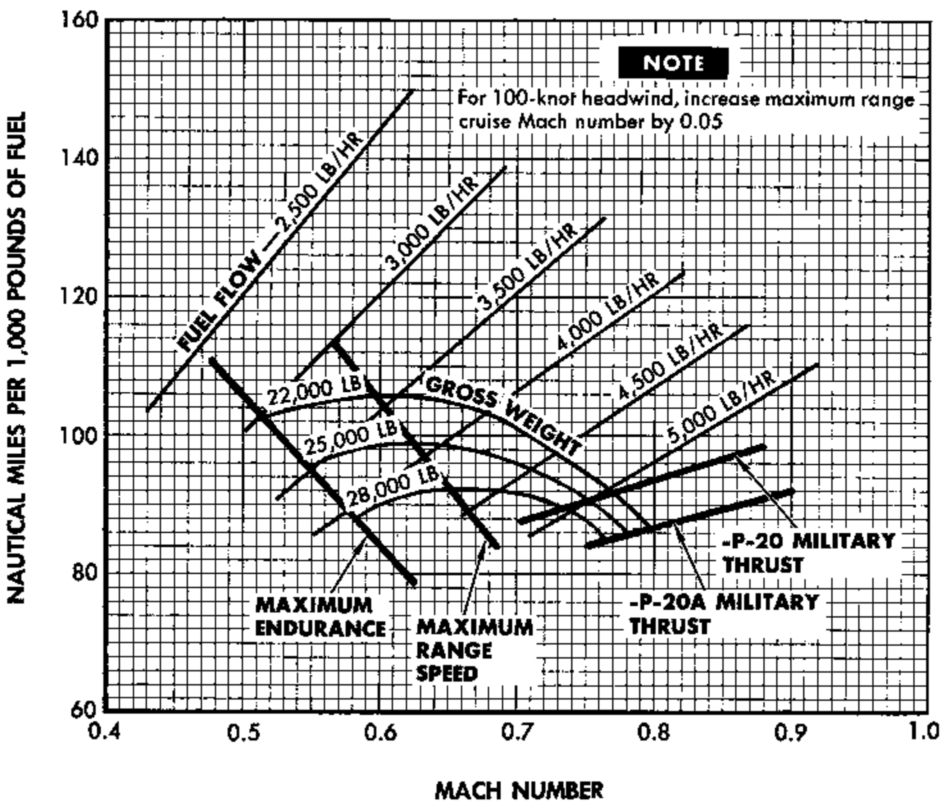
NAUTICAL MILES PER 1,000 LB OF FUEL

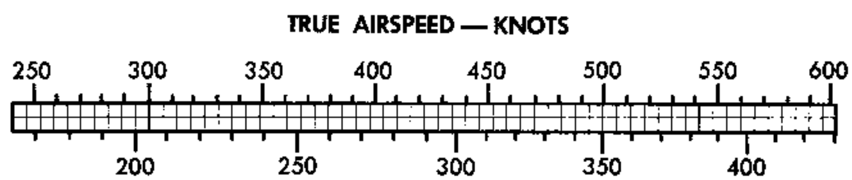
25,000 FEET — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition At All Speeds

ENGINES: J57-P-20, -P-20A





63802-A-252-11-66

Figure 11–108 (Sheet 3)

NAUTICAL MILES PER 1,000 LB OF FUEL

30,000 FEET — CONFIGURATION X

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition at All Speeds

ENGINES: J57-P-20, -P-20A

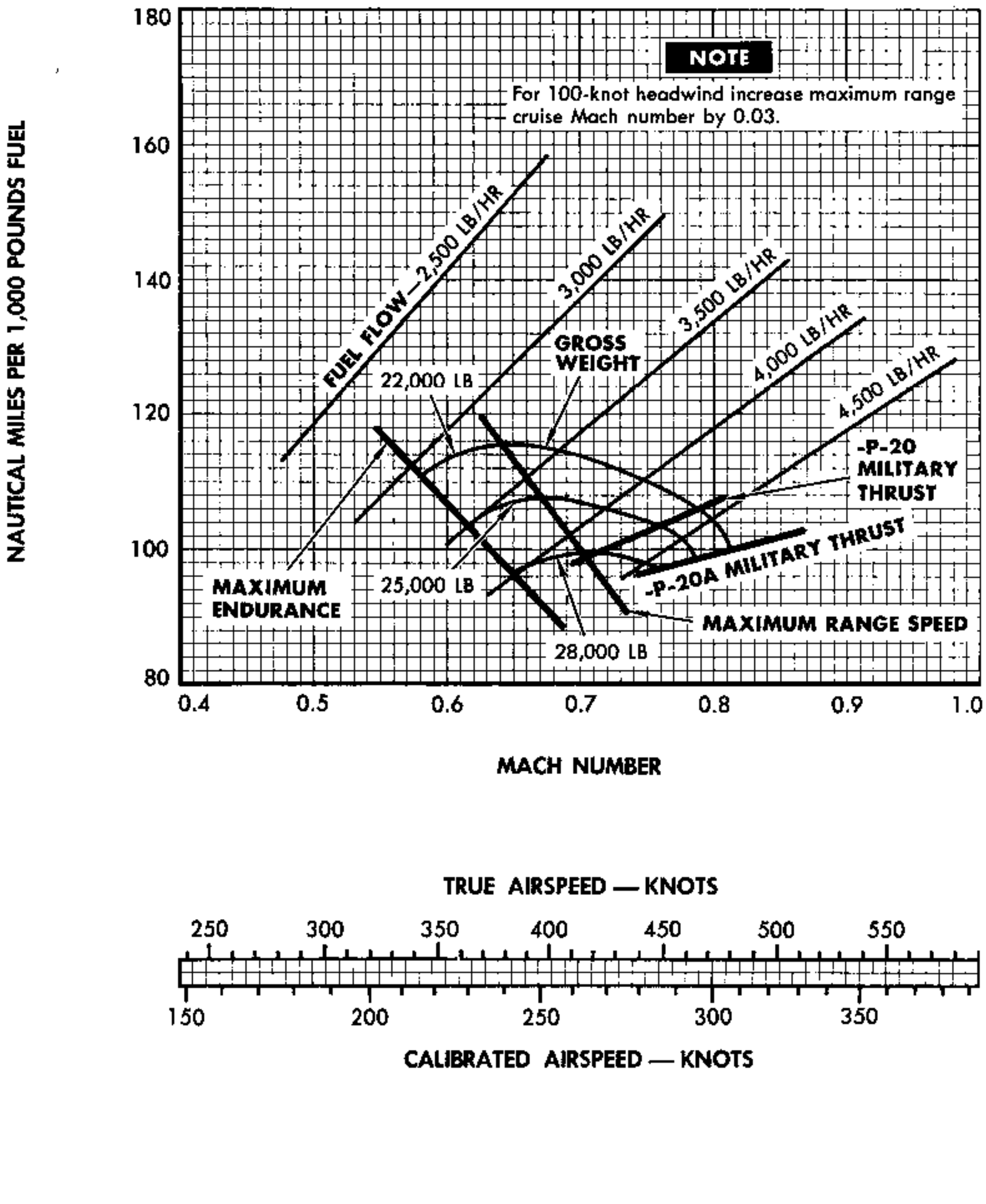
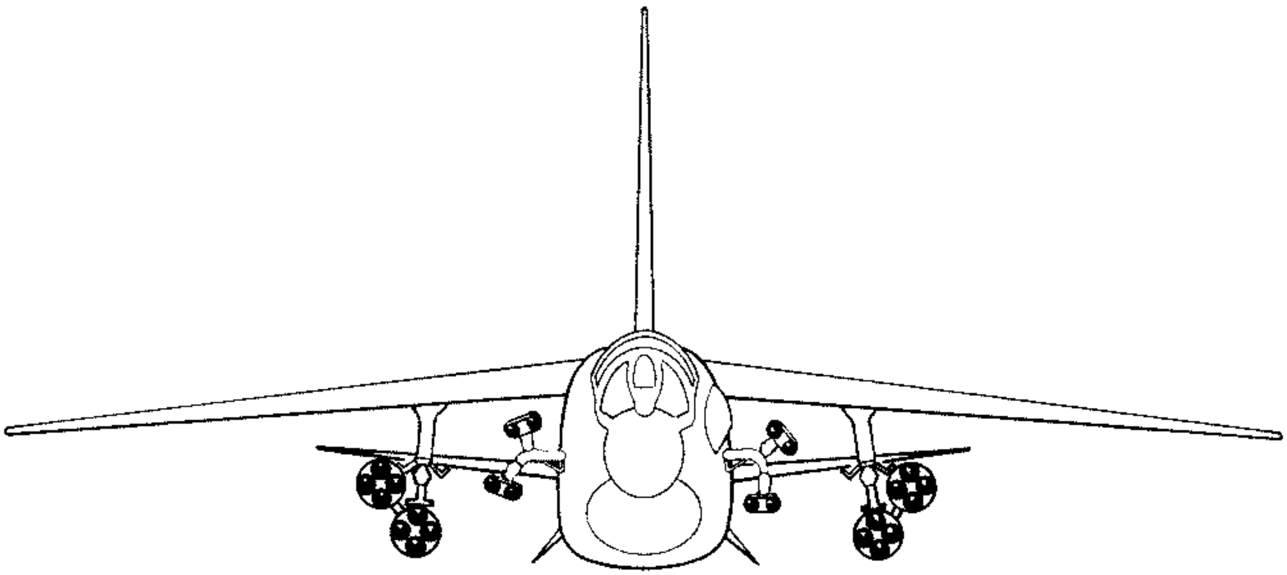


Figure 11–108 (Sheet 4)

CONFIGURATION XI

CLIMB, CRUISE AND SPECIFIC RANGE DATA



CONFIGURATION XI STORES ARRANGEMENTS

Typical Loading — Four LAU-10/A rocket packs (unfaired, with short-nose Zuni rockets) on multiple ejector racks and four (short-nose) Zuni fuselage packs.

Note

See figure 11–1 for asymmetrical stores loadings.

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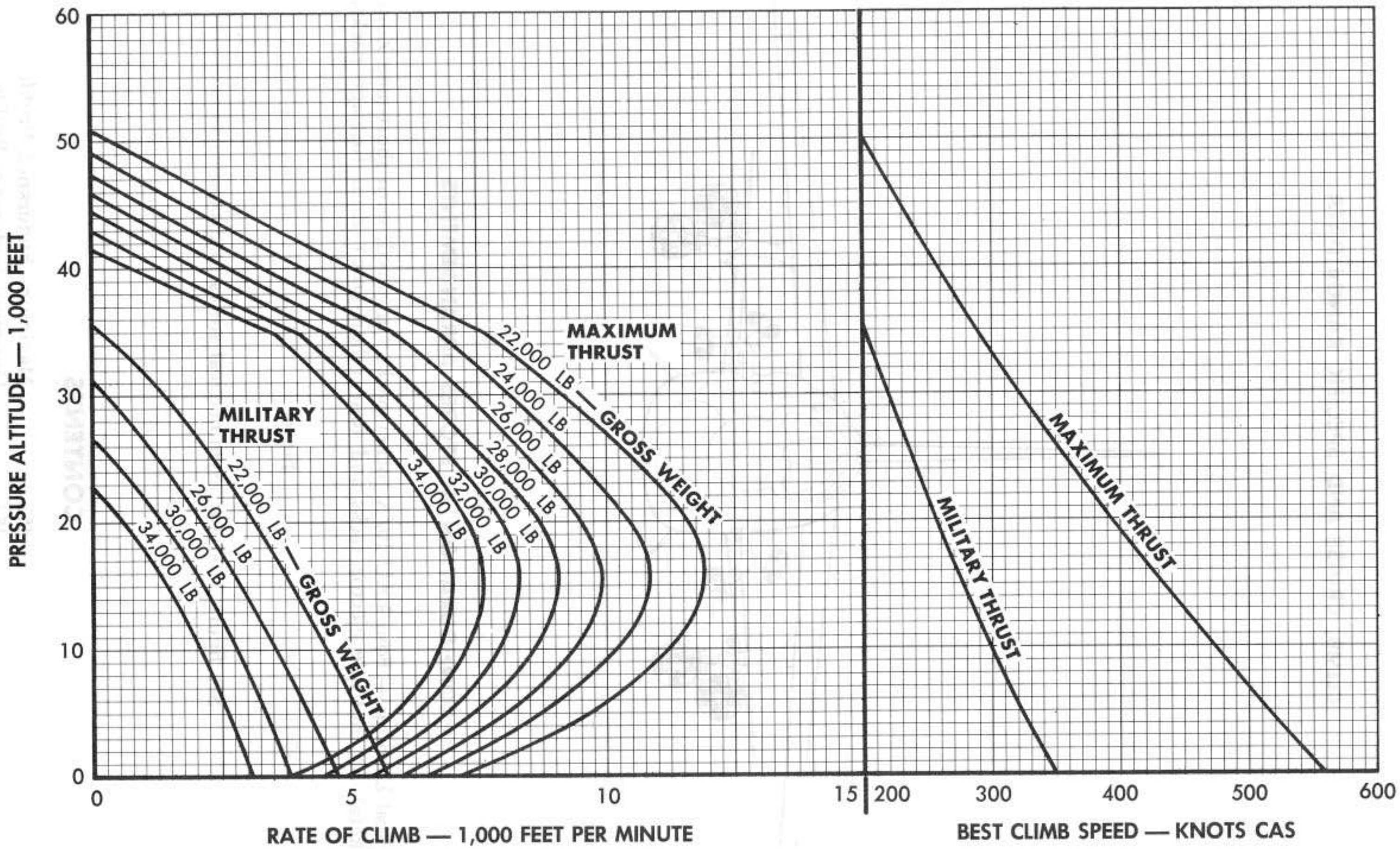
BEST CLIMB

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day

ENGINE: J57-P-20A
(See Note)



NOTE

Chart also applicable for J57-P-20 engine installations if correction factors are applied. These correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802-A-254-11-66

Figure 11–109

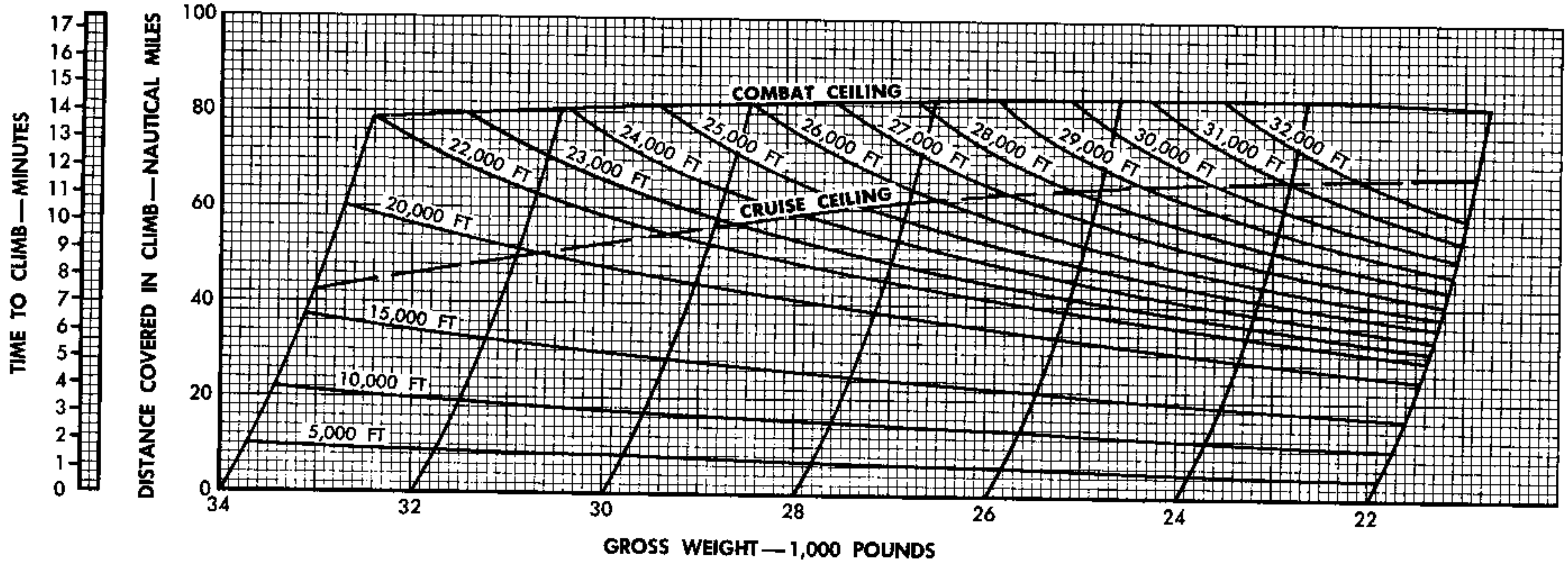
CLIMB CONTROL

MODEL F–8E
DATA BASIS: Flight Tests
Date: October 1966

MILITARY THRUST—CONFIGURATION XI

Standard Day
Cruise Condition—Airspeed Below 300 KIAS

ENGINES: J57–P–20A
(See Note 5)



CLIMB SPEED

Altitude Feet	CAS Knots	Mach No.
S.L.	345	.52
10,000	300	.54
20,000	255	.56
30,000	220	.59
35,000	200	.60

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:
   - Distance — 4%
   - Time — 4%
   - Fuel — 2%
2. Maximum endurance altitude is 15,000 feet.
3. For field takeoff add 2.0 minutes and 350 pounds for time and fuel from release of brakes.
4. Climb at constant true airspeed of 345 knots.
5. Chart also applicable for J57-P-20 engine installations if correction factors are presented under ENGINE PERFORMANCE DIFFERENCES at the beginning of part 2.

63802–A–255–11–66

Figure 11–110 (Sheet 1)

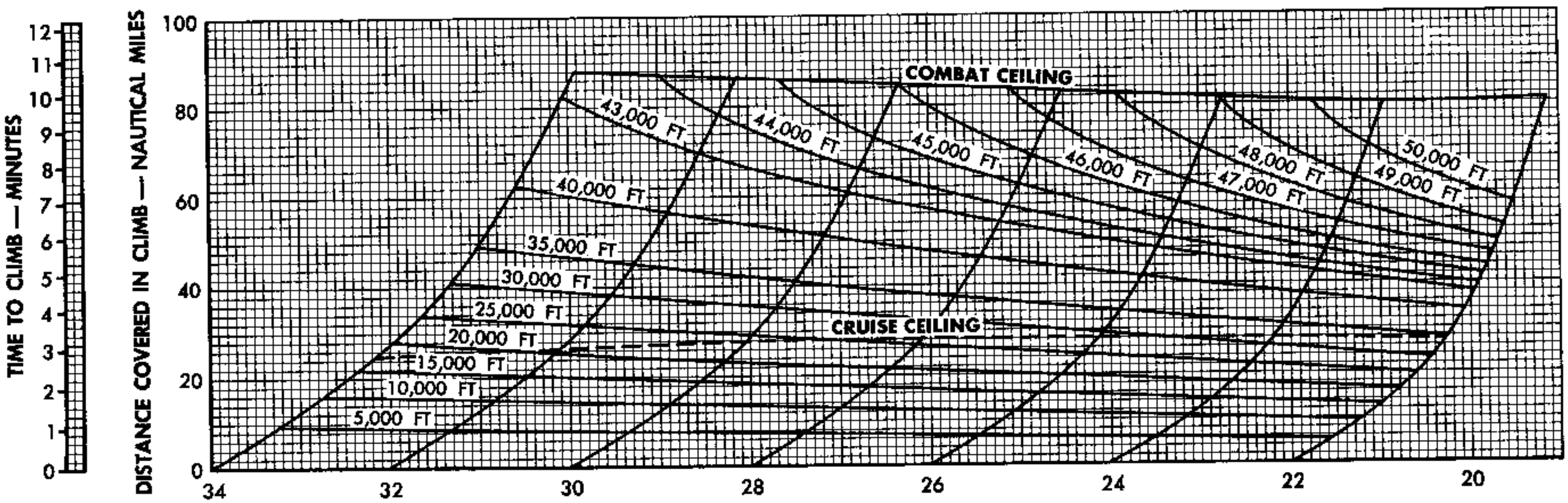
CLIMB CONTROL

MAXIMUM THRUST — CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition —Airspeed Below 300 KIAS

ENGINES: J57-P-20, -P-20A



CLIMB SPEED

Altitude — Feet	CAS — Knots
SL	555
10,000	471
20,000	393
30,000	321
40,000	258
50,000	203

NOTES

1. For each 1°C above standard day temperature increase values obtained as follows:

   Distance — 2%
   Time — 2.5%
   Fuel — 1%

2. Climb at constant true Mach number of 0.84.
3. Maximum endurance altitude is 15,000 feet.
4. For field takeoff add 1.0 min. and 620 lb for time and fuel from release of brakes.

63802-A-256-11-66

Figure 11-110 (Sheet 2)

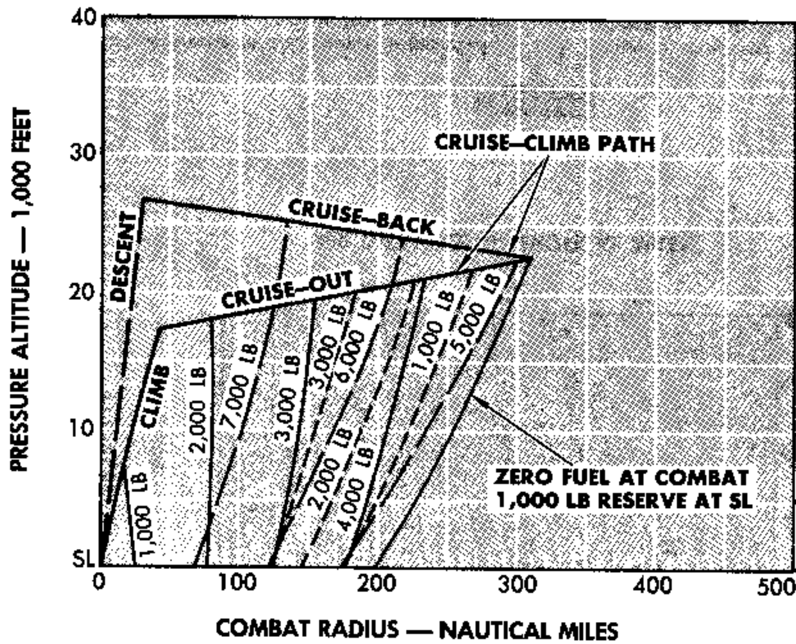
COMBAT RADIUS PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
30	220	0.59
25	240	0.57
20	255	0.56
15	280	0.55
10	300	0.54
5	320	0.53
SL	345	0.52

LEGEND

- CLIMB AND CRUISE—CLIMB PATHS
- DESCENT PATH
- COMBAT FUEL AVAILABLE
- TOTAL FUEL USED—CRUISE OUT
- TOTAL FUEL USED—CRUISE BACK

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. Determine combat time by use of combat allowance chart.
6. Combat fuel includes all maneuvers from end of cruise-out to start of cruise-back.
7. Cruise-back altitude must be same as or above cruise-out altitude.

IDLE THRUST DESCENT — CONSTANT 254 KNOTS CAS

CRUISE SCHEDULE		
ALTITUDE–FT	MACH NO.	CAS
Cruise–Climb	0.63	—
20,000	0.58	263
15,000	0.53	266
10,000	0.49	271
5,000	0.46	279
SL	0.44	290

63802–A–257–11–66

Figure 11–111

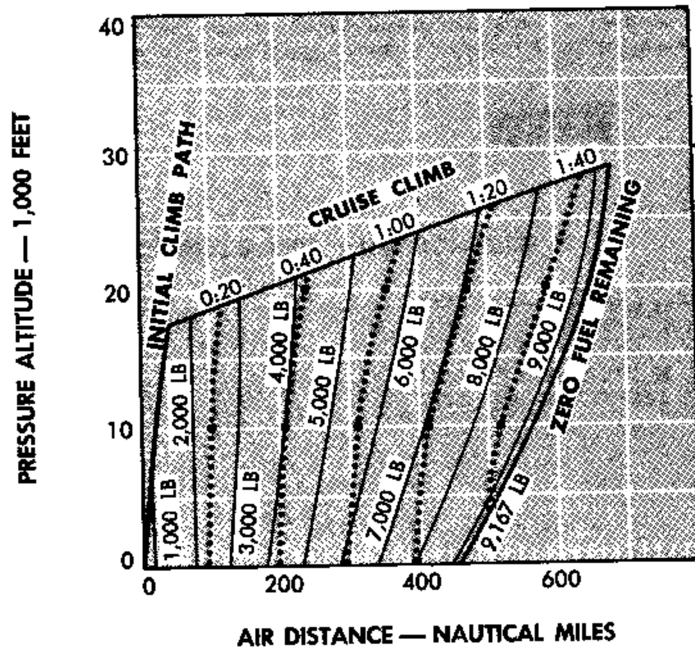
MISSION PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Cruise Condition At All Altitudes
Takeoff Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB		
ALT — 1,000 FT	CAS	MACH NO.
30	220	0.59
25	240	0.57
20	255	0.56
15	280	0.55
10	300	0.54
5	320	0.53
SL	345	0.52

CRUISE SCHEDULE		
ALTITUDE — FT	MACH NO.	CAS
Cruise — Climb	0.63	—
20,000	0.58	263
15,000	0.53	266
10,000	0.49	271
5,000	0.46	279
SL	0.44	290

LEGEND

- ———— FLIGHT PATH
- ••••••••••• TIME TO CLIMB AND CRUISE
- ———— FUEL USED

NOTES

1. Fuel allowance of 550 pounds is included for starting, warmup, taxiing, takeoff, and acceleration to best climb speed.
2. Use military thrust for climb.
3. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
4. Wind effects not included.
5. No allowance is made for loiter, descent, landing, or reserve fuel.

63802-A-258-11-66

Figure 11–112

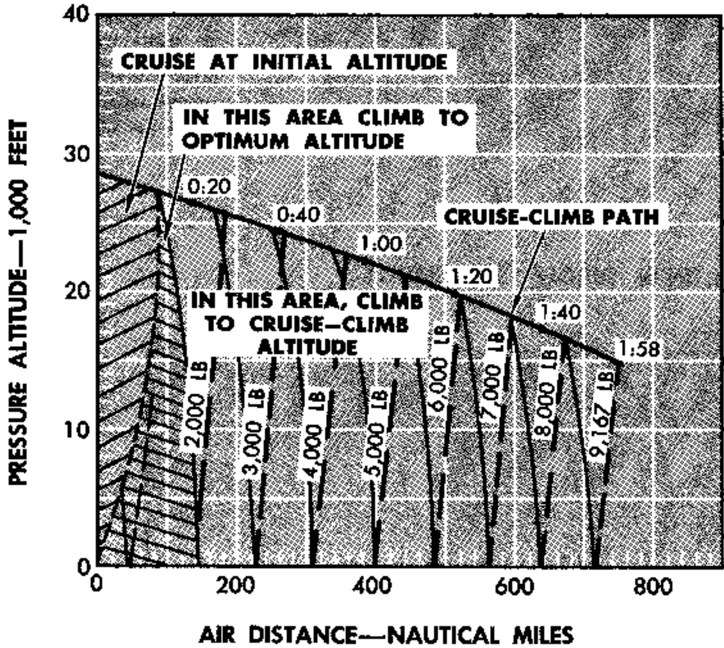
OPTIMUM RETURN PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Cruise Condition At All Altitudes
Initial Gross Weight—34,000 Pounds

ENGINES: J57-P-20, -P20A



MILITARY THRUST CLIMB

ALT—1,000 FT	CAS	MACH. NO.
30	220	0.59
25	240	0.57
20	255	0.56
15	280	0.55
10	300	0.54
5	320	0.53
SL	345	0.52

LEGEND

- CRUISE-CLIMB (WITH TIME AT CRUISE-CLIMB ALTITUDE)
- FUEL REQUIRED
- LINE OF BEST RANGE FOR CONSTANT ALTITUDE FLIGHT
- CLIMB-PATH GUIDE LINES

NOTES

1. Fuel required at any known distance includes allowance for military thrust climb to best cruise altitude (if initial altitude is lower).
2. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
3. Wind effects not included.
4. No allowance is made for loiter, descent, landing, or reserve fuel.
5. Best cruise altitude is determined by intersection of the climb path guide lines with lines of best range.

CRUISE SCHEDULE

ALTITUDE—FT	MACH NO.	CAS
Cruise—Climb	0.63	—
20,000	0.58	263
15,000	0.53	266
10,000	0.49	271
5,000	0.46	279
SL	0.44	290

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Figure 11-113

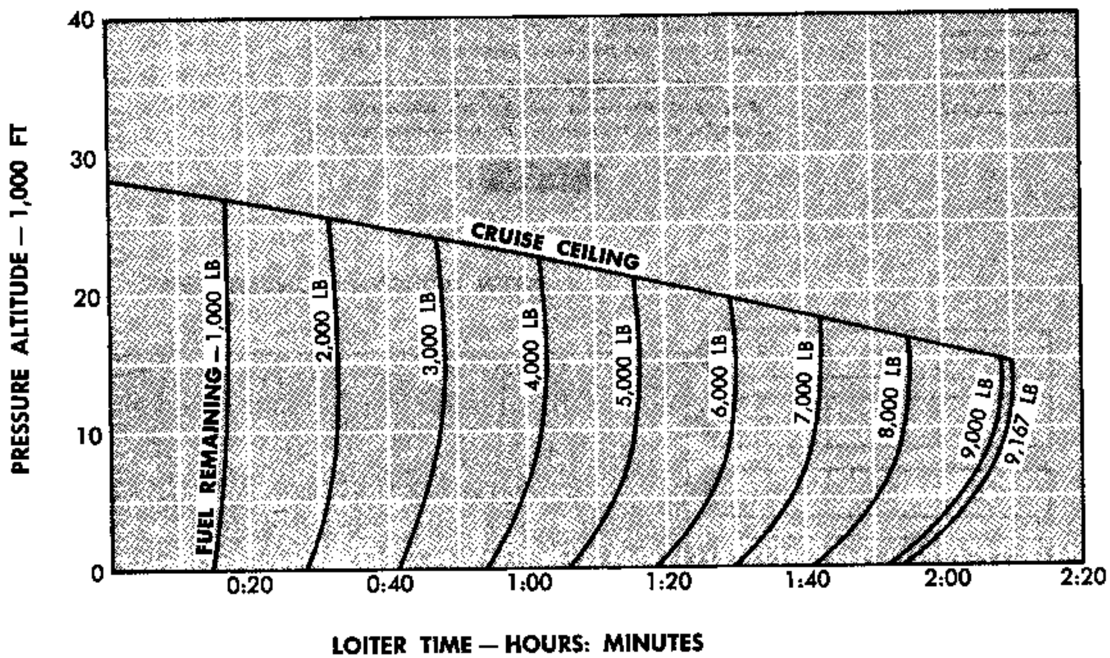
MAXIMUM ENDURANCE PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINE: J57-P-20, -P20A



NOTES

1. Chart applies only for loiter at constant altitude at recommended loiter speed.
2. Applicable only to standard conditions.
3. No allowance is made for climb, descent, landing, or reserve fuel.

OPTIMUM LOITER SPEED	
ALTITUDE — FT	CAS
30,000	227
20,000	229
10,000	227
SL	227

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Figure 11–114

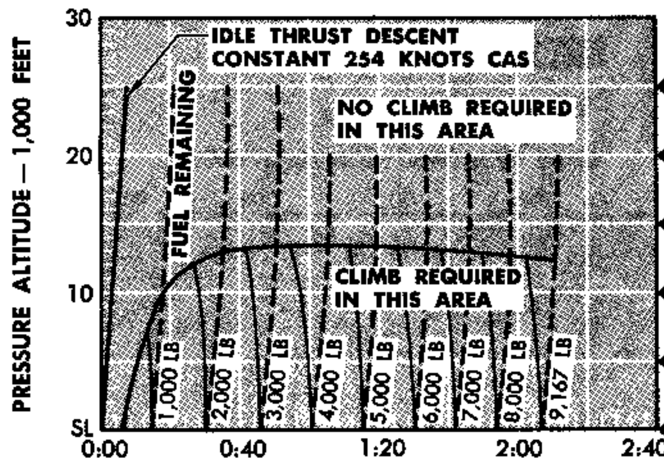
OPTIMUM ENDURANCE PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition
Initial Gross Weight — 34,000 Pounds

ENGINES: J57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
25	240	0.57
20	255	0.56
15	280	0.55
10	300	0.54
5	320	0.53
SL	345	0.52

LEGEND

- ——— OPTIMUM ENDURANCE ALTITUDE
- ——— CLIMB GUIDE LINES
- – – – FUEL REMAINING

NOTES

1. Use military thrust for climb.
2. No allowance is made for landing or reserve fuel.
3. Total time includes time to climb, loiter and descend to sea level.

OPTIMUM LOITER SPEED

ALTITUDE — FT	CAS
30,000	227
20,000	229
10,000	227
SL	227

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Figure 11–115

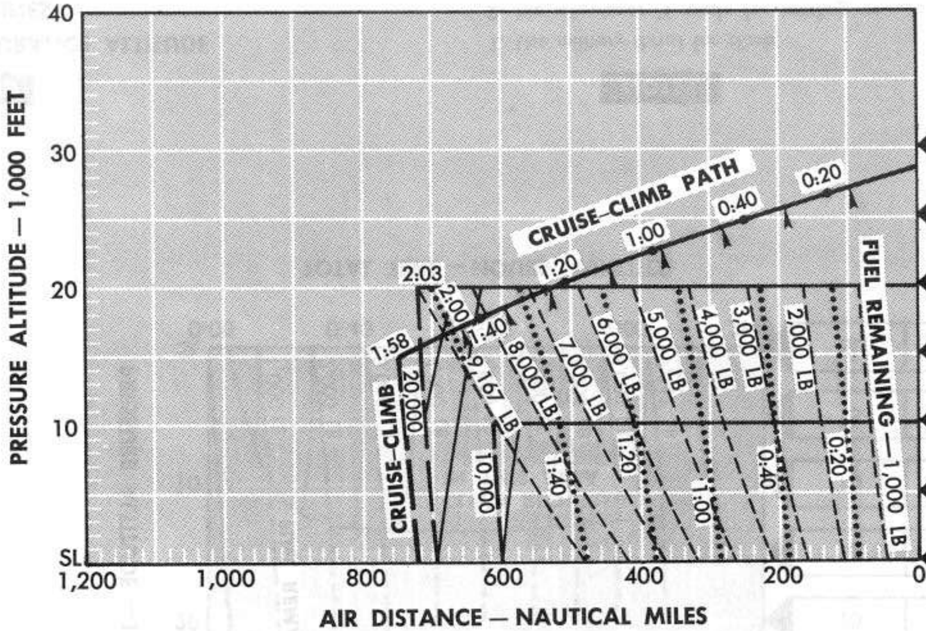
AIR REFUELING PROFILE

CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October, 1966

Cruise Condition at All Altitudes
Post-Refueling Gross Weight — 34,000 Pounds

ENGINES: J-57-P-20, -P-20A



MILITARY THRUST CLIMB

ALT — 1,000 FT	CAS	MACH NO.
30	220	0.59
25	240	0.57
20	255	0.56
15	280	0.55
10	300	0.54
5	320	0.53
SL	345	0.52

LEGEND

- FUEL REMAINING
- CRUISE-CLIMB PATH (WITH FUEL REMAINING INTERSECTIONS)
- TIME TO CRUISE
- CRUISE TO ZERO FUEL REMAINING
- CONSTANT ALTITUDE CRUISE PATH
- CLIMB PATH GUIDE LINES

NOTES

1. Chart does not include fuel, time, and distance to accelerate to best climb speed from formating speed.
2. No allowance is included for descent, landing or reserve fuel.
3. Use military thrust for climb.
4. Range is computed for standard day. Chart applicable to nonstandard conditions if recommended cruise CAS is maintained.
5. Wind effects not included.

CRUISE SCHEDULE

ALTITUDE — FT	MACH NO.	CAS
Cruise–Climb	.63	—
25,000	0.63	262
20,000	0.58	263
15,000	0.53	266
10,000	0.49	271
5,000	0.46	279
SL	0.44	290

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Figure 11–116

NAUTICAL MILES PER 1,000 LB OF FUEL

SEA LEVEL—CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition Below 0.50 MN

ENGINES: J57-P-20, -P-20A

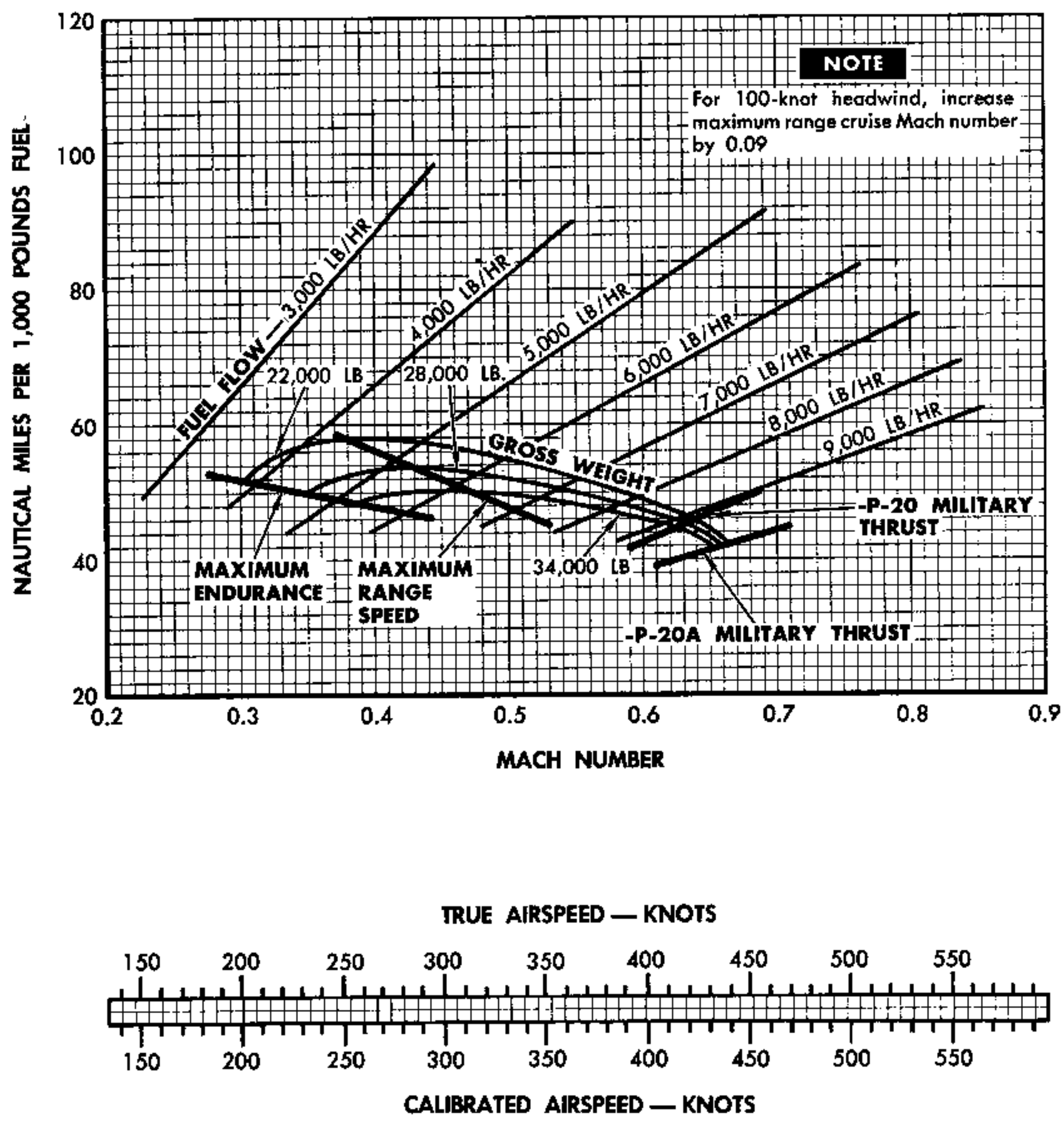

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Figure 11–117 (Sheet 1)

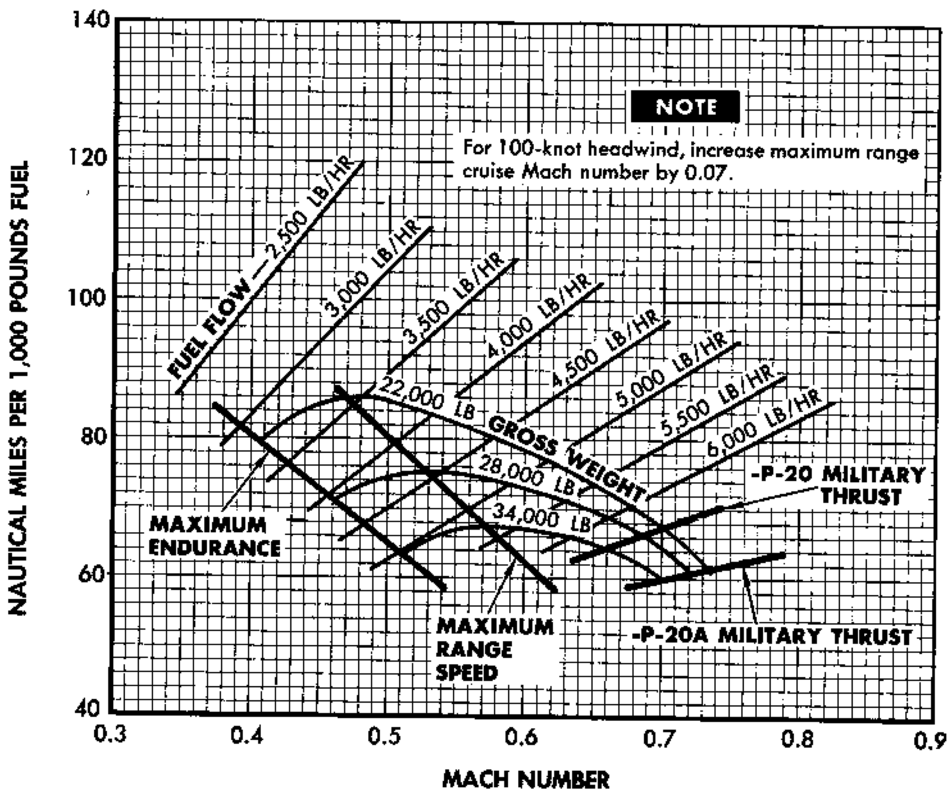
NAUTICAL MILES PER 1,000 LB OF FUEL

15,000 FEET — CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition Below 0.68 MN

ENGINES: J57-P-20, -P-20A



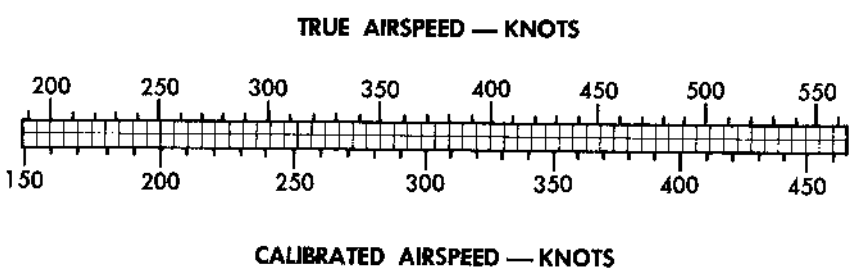


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Figure 11-117 (Sheet 2)

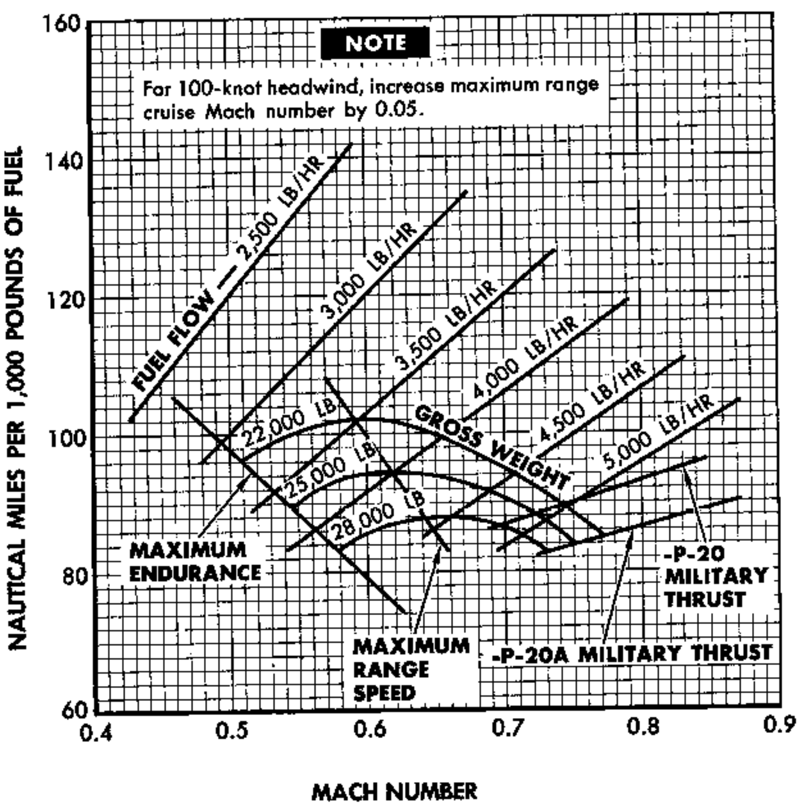
NAUTICAL MILES PER 1,000 LB OF FUEL

25,000 FEET — CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition At All Speeds

ENGINES: J57-P-20, -P-20A



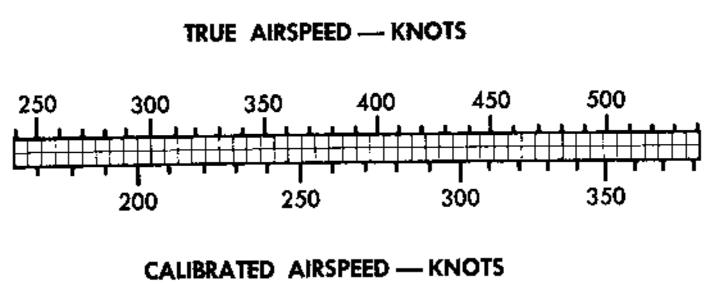


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Figure 11-117 (Sheet 3)

NAUTICAL MILES PER 1,000 LB OF FUEL

30,000 FEET — CONFIGURATION XI

MODEL: F-8E
DATA BASIS: Flight Tests
DATE: October 1966

Standard Day
Cruise Condition At All Speeds

ENGINES: J57-P-20, -P-20A

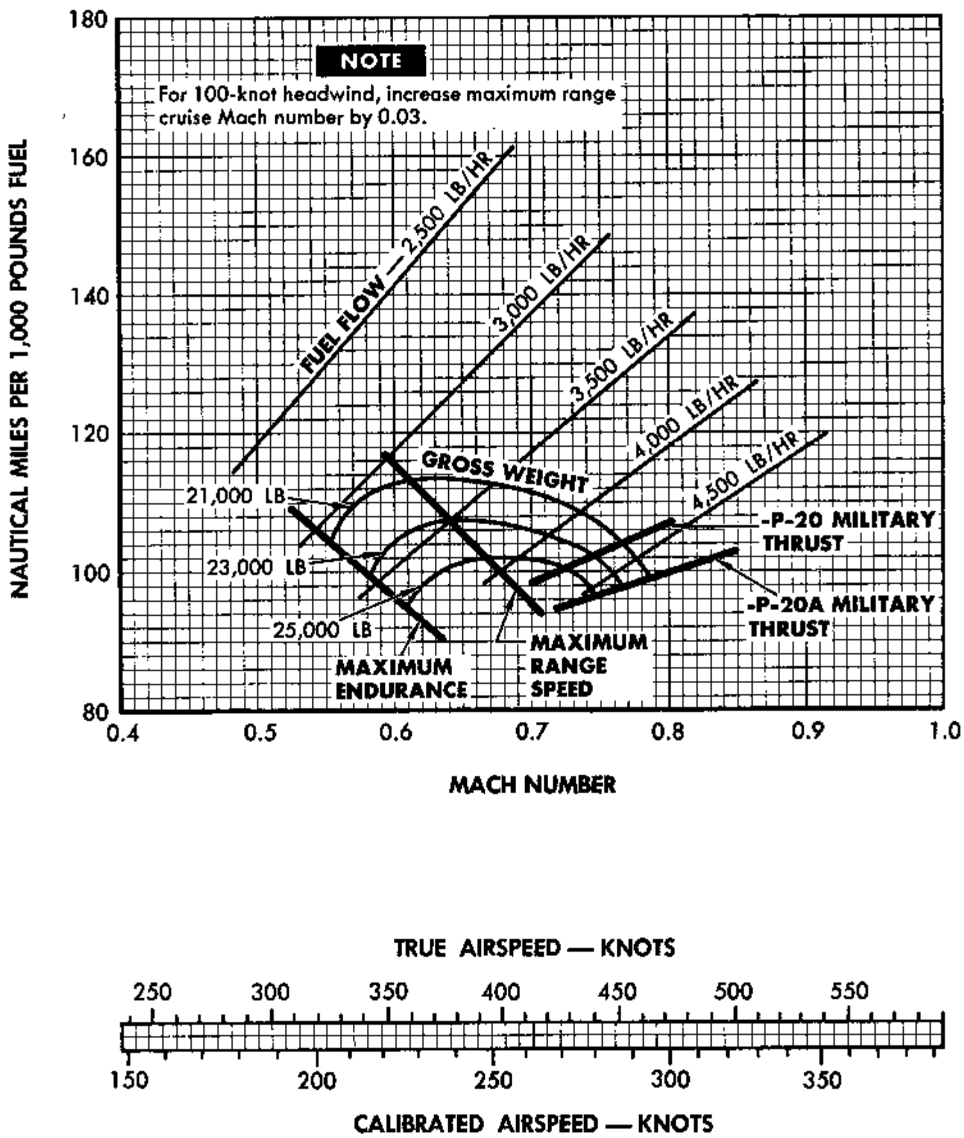

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Figure 11–117 (Sheet 4)

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