FLIGHT MANUAL

USAF SERIES

F-100D F-100F

(HIGH WIRE) (HIGH WIRE)

AIRCRAFT

CONTRACT AF04(606)-8533

CONTRACT AF04(607)-6776

Commanders are responsible for bringing this publication to the attention of all personnel cleared for operation of subject aircraft.

PUBLISHED UNDER AUTHORITY OF THE SECRETARY OF THE AIR FORCE

THIS PUBLICATION REPLACES CLASSIFIED T.O. 1F-100D(I)-1A AND CLASSIFIED T.O. 1F-100F(I)-1A BOTH DATED 12 OCTOBER 1962 WHICH SHOULD BE DESTROYED IN ACCORDANCE WITH AFR 205-1.

This publication replaces Sections I through IX of T.O. 1F-100D(I)-1 and 1F-100F(I)-1 both dated 12 October 1962. (Retain the Appendix portion of T.O. 1F-100D(I)-1 or T.O. 1F-100F(I)-1 until receipt of Performance Data Manual, T.O. 1F-100A-1-1.) This publication replaces F-100D(I) and F-100F(I) Safety Supplements SF-1-1, -3, and -4, SS-1-5 through -7, -9 through -16, 1SS-17 through -19, -21, and -22.

See Safety Supplement Index, T.O. 0-1-1A, for current status of Flight Manuals, Safety Supplements, and Flight Crew Checklists. This publication is incomplete without Performance Data Manual, T.O. 1F-100A-1-1.

F-100F-1-A00-1A

AF SMAMA AUG 64, 6M

15 MAY 1964

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES.

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page.

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 342, CONSISTING OF THE FOLLOWING:

Page No.	*Issue*
Title	Original
A	Original
i thru vii	Original
viii Blank	Original
1-1 thru 1-78	Original
2-1 thru 2-32	Original
3-1 thru 3-34	Original
4-1 thru 4-88	Original
5-1 thru 5-35	Original
5-36 Blank	Original
6-1 thru 6-22	Original
7-1 thru 7-13	Original
7-14 Blank	Original
8-1 thru 9-10	Original
X-1 thru X-18	Original

CURRENT FLIGHT CREW CHECKLIST

T.O. 1F-100D(I)-1CL-1

15 May 1964

* The asterisk indicates pages changed, added, or deleted by the current change.

ADDITIONAL COPIES OF THIS PUBLICATION MAY BE OBTAINED AS FOLLOWS:

USAF ACTIVITIES.—In accordance with T.O. 00-5-2.

B

USAF

T.C.T.O. IDENTIFICATION

The following T.C.T.O.'s, affecting F-100D and F-100F Airplanes, are covered in this Flight Manual. This is not a complete T.O. listing and does not include rescinded T.C.T.O.'s. Refer to the Basic Index (T.O. 0-1-1) for the complete listing of T.C.T.O.'s for these airplanes.

T.O. NUMBER	SUBJECT
1F-100D-572	Modification of pylons and ejector assemblies
-575	Modification of pylons and ejector assemblies
1F-100-721	Installation of special stores emergency release switch, Type VII, VIII, and VIIIA pylons
-750	Improvements to Type VIII pylon and VIIIA pylon
-823	Provisions for MN-1A trainer on centerline pylon
-882	Modification of speed brake
-905	Modification of landing gear warning system

38' 9" Span
54' 3" Length
16' 3" Height

F-100D-1-A00-4

TABLE OF CONTENTS

NOTE

PERFORMANCE DATA NORMALLY INCLUDED IN APPENDIX I IS CONTAINED IN T.O. 1F-100A-1-1 FOR THE F-100 SERIES AIRPLANES.

F-100D-1-0-23B

"C" NOTES

COMMAND REVIEW PRODUCT

This Flight Manual reflects decisions made by the using commands at the Command Review Conference. If you have any question concerning its content, especially regarding procedures, your inquiry should be directed to your Command Headquarters. Remember, this Flight Manual has not been tailored to the requirements of one command. It must reflect some compromises in order to satisfy the maximum possible requirements of all commands involved.

As a result of the F-100 Series Flight Manual Command Review, a major overhaul of the F-100 Flight Manual program was adopted. When this program is completed, the following publications will cover the flight operation of the F-100 Series Airplanes.

T. O. 1F-100A-1-1. This publication contains all performance data for F-100 Series Airplanes, and replaces Appendix I in the individual Flight Manuals for each model. All data is presented in the ASD drag format.

T. O. 1F-100D-1 and 1F-100D-1CL-1. These publications cover all F-100D and F-100F-1 through F-100F-15 Airplanes that did not go through "Project High Wire."

T. O. 1F-100D(I)-1 and 1F-100D(I)-1CL-1. These publications cover all F-100D and F-100F Airplanes that went through "Project High Wire."

T. O. 1F-100F-1-1. This publication is a supplement to T. O. 1F-100D(I)-1 and covers F-100F-20 Airplanes.

In addition, T. O. 1F-100A-1, 1F-100A-1CL-1, 1F-100A(I)-1, 1F-100A(I)-1CL-1, 1F-100C-1, 1F-100C-CL-1-1, 1F-100C(I)-1, and 1F-100C(I)-1CL-1 cover the F-100A and F-100C Series Airplanes. Since all F-100C Airplanes are scheduled through "Project High Wire," T. O. 1F-100C-1 and 1F-100C-CL-1-1 will be eliminated when "Project High Wire" is completed.

"PROJECT HIGH WIRE"

"Project High Wire" was a modernization program for selected F-100 Airplanes. The program consisted of two simultaneous operations: an electrical rewiring operation, and a heavy-maintenance and IRAN operation.

The rewire operation replaced the old wiring in each airplane with new wiring, including certain design and maintenance improvements.

The heavy-maintenance and IRAN operation consisted of accomplishing all outstanding prime airplane T. C. T. O.'s published before 1 January 1962 and subsequent T. C. T. O.'s for which kits and material were available, modifications to standardize airplane configuration, repair and/or replacement of unserviceable parts or components, and complete refurbishment of each airplane.

Changes to the Airplanes which have gone through "Project High Wire" were extensive enough to require a separate set of Flight Manuals, Systems Maintenance Manuals, and Illustrated Parts Breakdown Manuals. These manuals are identifiable by the addition of the Roman numeral I in parentheses following the model designation letter in the number; i. e., T. O. 1F-100D(I)-1. The USAF designation number has not been changed; i. e., all F-100 Airplanes are still designated as F-100A, F-100C, F-100D, or F-100F Airplanes. However, to identify "Project High Wire" airplanes, the existing block numbers were advanced one digit; i. e., F-100D block 20 became F-100D block 21, F-100D block 25 became F-100D block 26, F-100F block 1 became F-100F block 2, etc.

Additional changes have been added to "Project High Wire." Since some airplanes have already been modified prior to inclusion of these changes, differences appear throughout this manual. Airplanes that went through this program before the additional changes were added will eventually be brought up to the later configuration.

SCOPE

This manual contains the necessary information for safe and efficient operation of the F-100 airplane. These instructions provide you with a general knowledge of the airplane, its characteristics, and specific normal and emergency operating procedures. Your flying experience is recognized, and therefore, basic flight principles are avoided.

SOUND JUDGMENT

This manual provides the best possible operating instructions under most circumstances, but it is a poor substitute for sound judgment. Multiple emergencies, adverse weather, terrain, etc, may require modification of the procedures.

STANDARDIZATION AND ARRANGEMENT

Standardization assures that the scope and arrangement of all Flight Manuals are identical. The manual is divided into nine fairly independent sections to simplify reading it straight through or using it as a reference manual.

NOTE

Performance data normally included in Appendix I is contained in T. O. 1F-100A-1-1 for the F-100 Series Airplanes.

The first three sections must read thoroughly and fully understood before attempting to fly the airplane. The remaining sections provide important information for safe and efficient mission accomplishment.

F-100D-1-A0-4

PERMISSIBLE OPERATIONS

The Flight Manual takes a "positive approach" and normally states only what you can do. Unusual operations or configurations (such as asymmetrical loading) are prohibited unless specifically covered herein. Clearance must be obtained from SMAMA before any questionable operation is attempted which is not specifically permitted in this manual.

HOW TO BE ASSURED OF HAVING LATEST DATA

Refer to T.O. 0-1-1A, which is issued weekly and devoted solely to the listing of all current Flight Manuals, Safety Supplements, and Checklists. Its frequency of issue and brevity ensures an accurate, up-to-date listing of these publications.

SAFETY SUPPLEMENTS

Information involving safety will be promptly forwarded to you by Safety Supplements. Supplements covering loss of life will get to you in 48 hours by TWX, and those concerning serious damage to equipment within 10 days by mail. The current status of each Safety Supplement affecting your airplane can be determined by referring to the Safety Supplement (T. O. 0-1-1A). The title page of the Flight Manual and the title block of each Safety Supplement should also be checked to determine the effect they may have on existing supplements. You must remain constantly aware of the status of all supplements - current supplements must be complied with but there is no point in restricting your operation by complying with a replaced or rescinded supplement. Upon receiving each Safety Supplement, file it in the front of your Flight Manual, preceding the title page. A note should then be written in the margin of the page, opposite the affected write-up, referencing the applicable Safety Supplement.

CHECKLISTS

The Flight Manual contains only amplified checklists. Abbreviated checklists have been issued as separate technical orders. (Refer to back of the title page for the T. O. number and date of your latest checklist.) Line items in the Flight Manual and checklists are identical with respect to arrangement and item number. Whenever a Safety Supplement affects the abbreviated checklist, write in the applicable change on the affected checklist page. As soon as possible, a new checklist page, incorporating the supplement will be issued. This will keep handwritten entries of Safety Supplement information in your checklist to a minimum.

HOW TO GET PERSONAL COPIES

Each pilot is entitled to his personal copy of the Flight Manual, Safety Supplements, and Checklists. The required quantities should be ordered before you need them to assure their prompt receipt. Check with your supply personnel; it is their job to fulfill your Technical Order requests. Basically, you must order the required quantities on the Publication Requirements Table (T.O. 0-3-1). Technical Orders 00-5-1 and 00-5-2 give detailed information for properly ordering these publications. Make sure a system is established at your base to deliver these publications to the flight crews immediately upon receipt.

FLIGHT MANUAL AND CHECKLIST BINDERS

Loose-leaf binders and sectionalized tabs are available for use with your manual. These are obtained through local purchase procedures. Binders are also available for carrying your abbreviated checklist. These binders contain plastic envelopes into which individual checklist pages are inserted. They are available in three capacities: 15, 25, and 40 envelopes. Check with your supply personnel for assistance in securing these items.

WARNINGS, CAUTIONS, AND NOTES

The following definitions apply to "Warnings," "Cautions," and "Notes" found throughout the manual.

Warning Operating procedures, techniques, etc, which can result in personal injury or loss of life if not carefully followed.

Caution Operating procedures, techniques, etc, which can result in damage to equipment if not carefully followed.

NOTE An operating procedure, technique, etc, which is considered essential to emphasize.

YOUR RESPONSIBILITY —TO LET US KNOW

Every effort is made to keep the Flight Manual current. Review conferences with operating personnel and a constant review of accident and flight test reports assure inclusion of the latest data in the manual. However, we cannot correct an error unless we know of its existence. In this regard, it is essential that you do your part. Comments, corrections, and questions regarding this manual or any phase of the Flight Manual program are welcomed. AF form 847 will be used for this purpose in accordance with the instructions in Section VII of T.O. 00-5-1. These should be forwarded through command headquarters to SMAMA, McClellan AFB, California, Attention: SMNEO.

F-100D-1-A0-5

SAFETY SUPPLEMENT SUMMARY

Safety Supplements are numbered as follows: SS-1-1, SS-1-2, etc. The supplements you receive should follow in sequence, and if you find you are missing one, check the weekly Safety Supplement Index (T.O. 0-1-1A) to see whether the supplement was issued and, if so, is still in effect. It may have been replaced or rescinded before you received your copy. If it is still active, see your Publication Distribution Officer and get your copy. It should be noted that a supplement number will never be used more than once.

F-100D/F

SAFETY SUPPLEMENTS REPLACED BY THIS CHANGE OR RESCINDED

NUMBER	DATE	SHORT TITLE	DISPOSITION
SF-1-1	5 JAN 1963	CARTRIDGE STARTER PROCEDURES	REPLACED BY SF-1-3
SF-1-3	19 MAR 1963	CARTRIDGE STARTER PROCEDURES	SECTION II AND VII
SF-1-4	26 MAR 1963	TOW-TARGET TAKE-OFF TECHNIQUES	REPLACED BY 1SS-19
SS-1-5	1 MAY 1963	GEAR-UP, BELLY LANDING PROCEDURES	REPLACED BY SS-1-
SS-1-6	14 MAY 1963	GEAR-UP, BELLY LANDING PROCEDURES	SECTION III
SS-1-7	13 JUN 1963	LOW SPEED PENETRATION PROCEDURES	SECTION IX
SS-1-9	15 JUL 1963	M-65A-1, M-64 BOMB LIMITS	SECTION V
SS-1-10	18 JUL 1963	LOW ALTITUDE EJECTION	SECTION III
SS-1-11	30 JUL 1963	SUU-7A/A (CBU) INFORMATION	REPLACED BY SS-1-12
SS-1-12	5 AUG 1963	SUU-7A/A (CBU) INFORMATION	SECTION V
SS-1-13	7 AUG 1963	LOW ALTITUDE EJECTION	REPLACED BY SS-1-14
SS-1-14	10 SEP 1963	LOW ALTITUDE EJECTION	SECTION III
SS-1-15	28 NOV 1963	QRC-160 ECM INFORMATION	SECTION V
SS-1-16	1 NOV 1963	AFCS ENGAGE SWITCH	SECTION II
1SS-17	22 JAN 1964	MLU-10/B AND BLU-1/B LIMITS	SECTION V
1SS-18	27 JAN 1964	AUTOPILOT PROCEDURES	REPLACED BY 1SS-21
1SS-19	11 FEB 1964	REVISED TAKE-OFF TECHNIQUES	SECTION II AND T. O. 1F-100A-1-1
1SS-21	11 MAR 1964	AUTOPILOT PROCEDURES	SECTION IV
1SS-22	9 APR 1964	REVISED EPR SETTINGS	SECTION II

NOTE

F-100D(I) & F-100F(I) SAFETY SUPPLEMENTS -SF-1-2, -SS-1-8, AND -1SS-20 ARE STILL ACTIVE.

F-100D-1-A00-3A

243-0-41

F-100F-1-A00-21B

DESCRIPTION

section I

F-100D-1-0-87

TABLE OF CONTENTS

AIRPLANE.

The F-100D Super Sabre, built by North American Aviation, Inc, is a single-place, supersonic fighter-bomber with secondary use as a limited air superiority fighter. The F-100F is a two-place, supersonic fighter-bomber with secondary use as a limited air superiority fighter or pilot trainer. Both airplanes are powered by an axial-flow turbojet engine with an afterburner. The 45-degree swept-back wing has automatic slats on the leading edge, and flaps on the inboard trailing edge. An aerodynamic fence on each wing improves airflow over the wing at high speeds and altitudes, resulting in an increase in lateral stability. The horizontal stabilizer is a one-unit control surface designed for positive longitudinal control at high Mach numbers. All control surfaces are actuated by irreversible hydraulic systems. Desired aerodynamic pilot feel is simulated by an artificial-feel system. A maneuvering autopilot is installed. A hydraulically actuated speed brake is on the lower surface of the fuselage and a drag chute in the lower surface of the aft fuselage is used to reduce the landing roll. Fuel is carried internally in the fuselage and wings. Drop tanks can be installed on the lower surface of the wings to increase the total fuel supply. The internal tanks and some drop tanks are serviced by single-point refueling, and the airplane can be refueled in flight by probe-and-drogue air refueling. Late F-100D Airplanes are equipped for zero-length launch (ZEL). Some F-100D Airplanes have lightweight navigation equipment (AN/APN-102 and ASN-25) installed and are designated as (NAVS) airplanes.

AIRPLANE DIMENSIONS.

The over-all dimensions of the airplane (airplane on landing gear at normal weight and at normal ground attitude, with specified tire and gear strut inflation) are as follows:

F-100D:

Span	38 feet 9 inches
Length (pitot boom extended)	54 feet 3 inches

GENERAL ARRANGEMENT

F-100D AIRPLANES

1. FOLDING PITOT-STATIC BOOM
2. LANDING LIGHTS
3. LOWER FUSELAGE RECOGNITION LIGHT
4. SPEED BRAKE
5. EXTERNAL POWER RECEPTACLES (ELECTRICAL AND STARTER AIR SUPPLY)
6. ARRESTING HOOK
7. RETRACTABLE TAIL SKID
8. FORWARD ELECTRONIC EQUIPMENT COMPARTMENT
9. A-4 SIGHT
10. GUN CAMERA
11. EJECTION SEAT
12. BATTERY
13. UPPER FUSELAGE RECOGNITION LIGHT

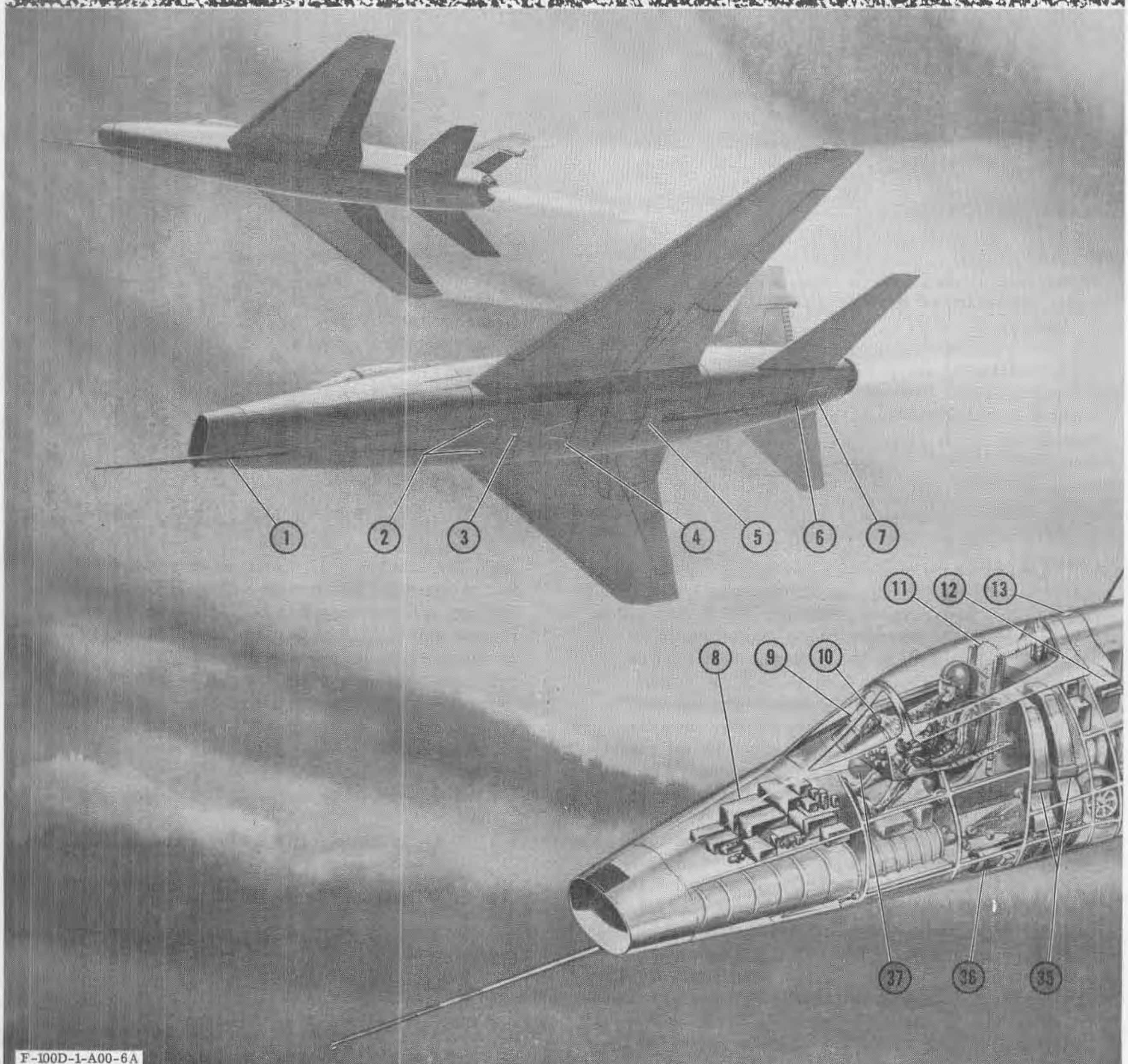
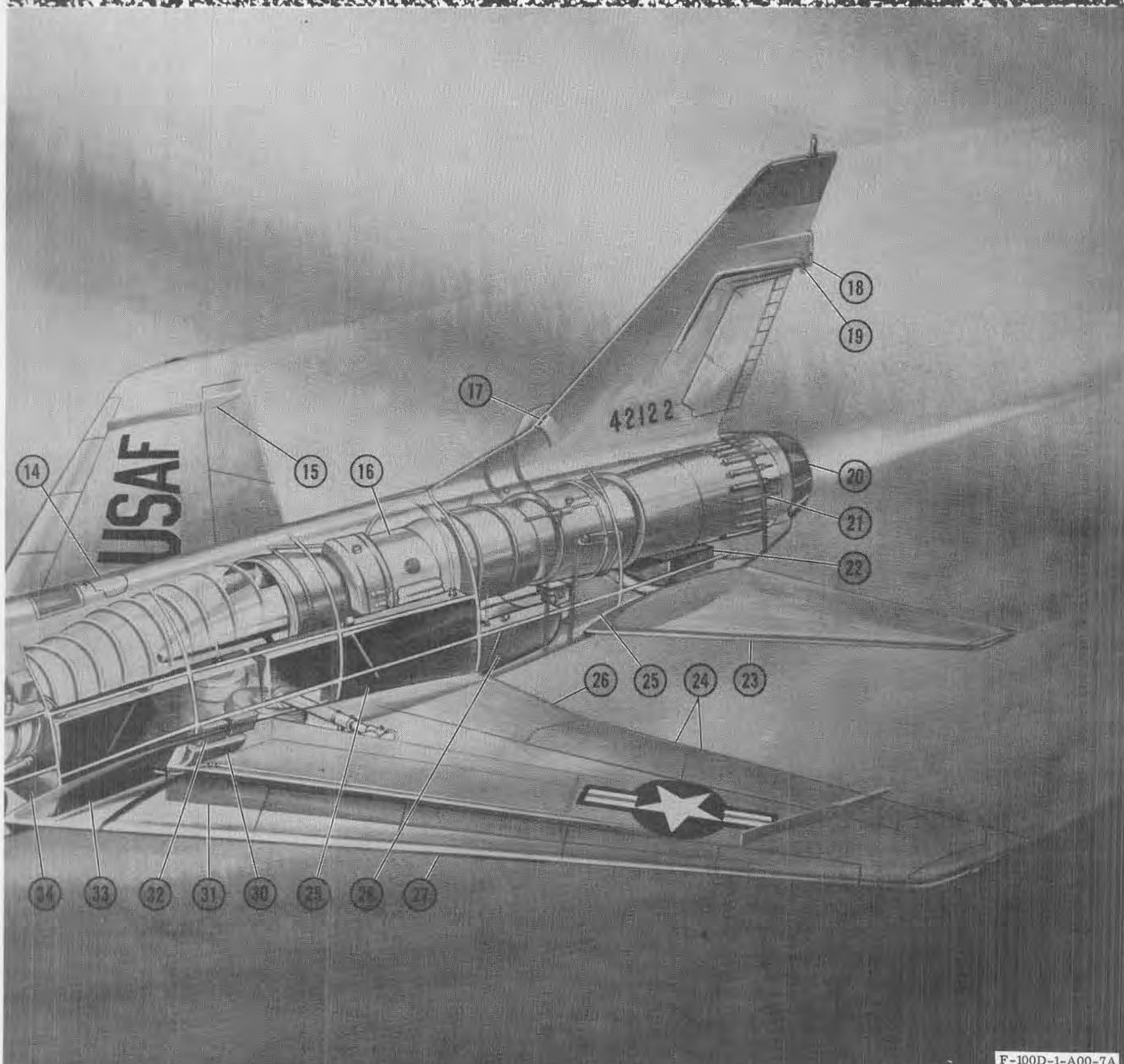


Figure 1-1

14. RAM-AIR TURBINE EXHAUST DOOR
15. WING FENCE
16. J57 ENGINE WITH AFTERBURNER
17. AFT ELECTRONIC EQUIPMENT COMPARTMENT COOLING DUCT (NAVS AIRPLANES)
18. NAVIGATION LIGHTS
19. FUEL VENT OUTLET
20. TWO-POSITION EXHAUST NOZZLE
21. DRAG CHUTE CABLE STOWAGE RECESS
22. DRAG CHUTE STOWAGE COMPARTMENT
23. CONTROLLABLE HORIZONTAL STABILIZER
24. AILERONS
25. AFT ELECTRONIC EQUIPMENT COMPARTMENT (NAVS AIRPLANES)
26. WING FLAP
27. WING SLATS
28. AFT FUEL TANK
29. INTERMEDIATE FUEL TANK
30. FORWARD FUEL TANK (LOWER CELL)
31. WING FUEL TANK
32. FORWARD FUEL TANK (CENTER CELLS)
33. FORWARD FUEL TANK (UPPER CELL)
34. AFT ELECTRONIC EQUIPMENT COMPARTMENT (MIDSHIP ON NAVS AIRPLANES)
35. AMMUNITION BOXES
36. M-39 20 MM GUNS
37. LIQUID OXYGEN CONVERTER



F-100D-1-A00-7A

GENERAL ARRANGEMENT F-100F AIRPLANES

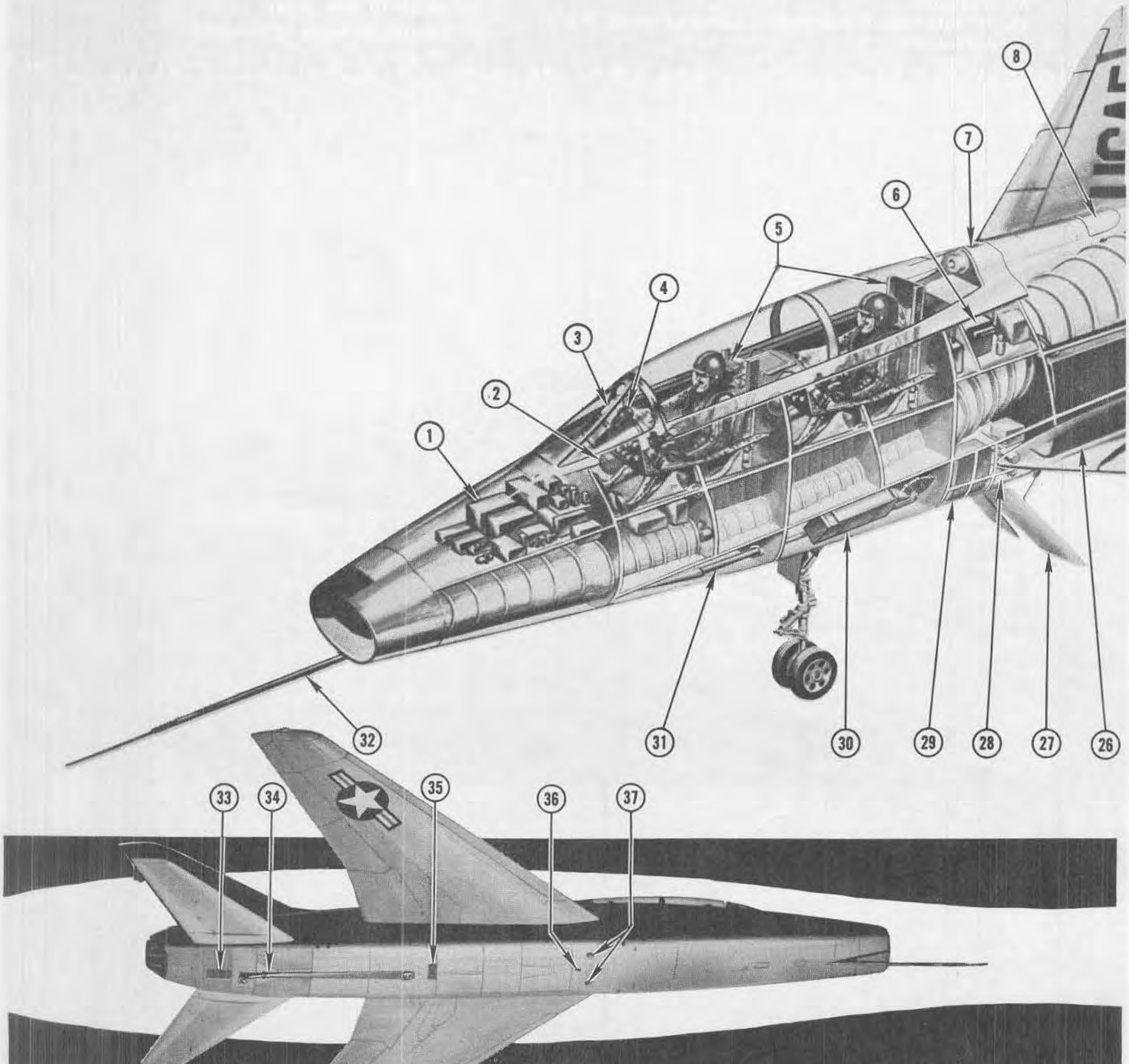
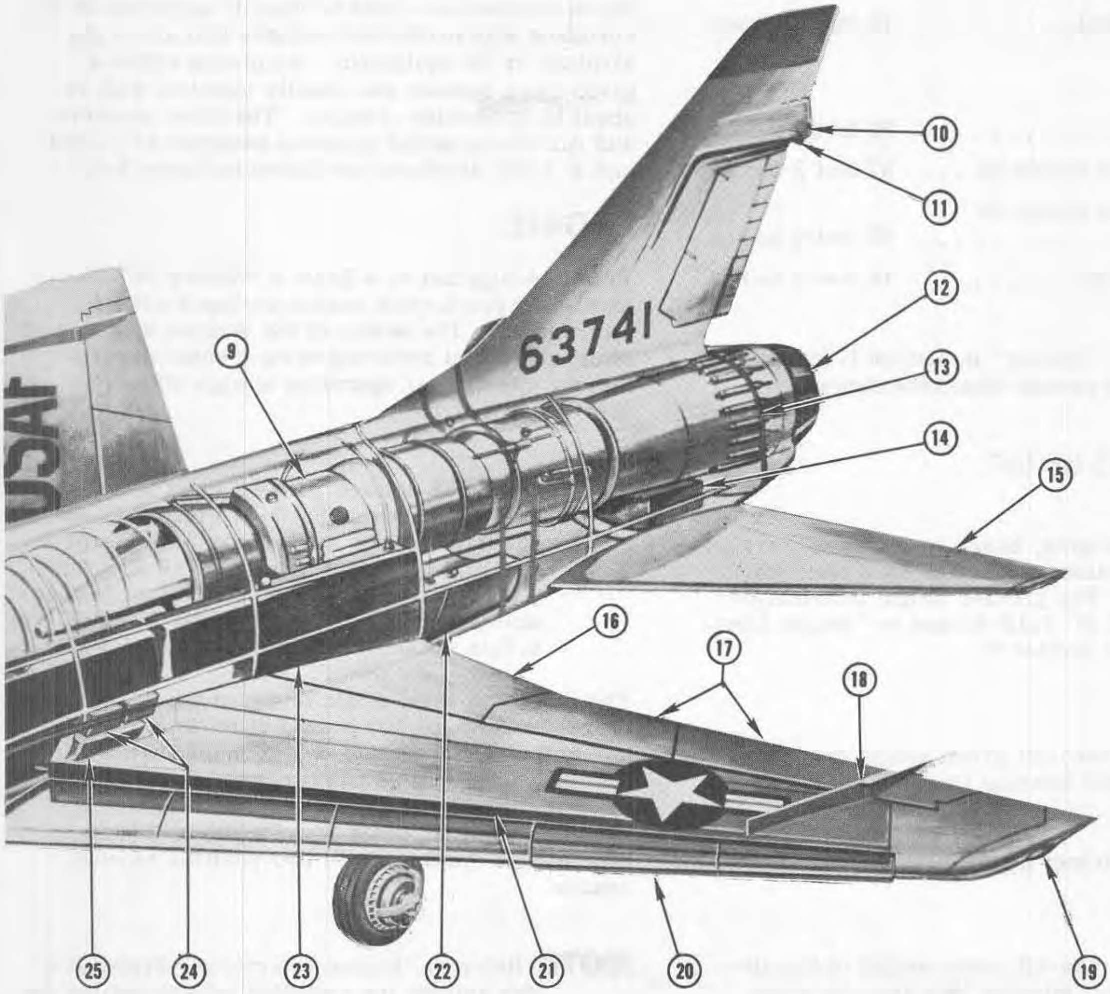


Figure 1-2



1. FORWARD ELECTRONIC EQUIPMENT COMPARTMENT
2. LIQUID OXYGEN CONVERTERS
3. A-4 SIGHT
4. GUN CAMERA
5. EJECTION SEATS
6. BATTERY
7. UPPER RECOGNITION LIGHT
8. RAM-AIR TURBINE EXHAUST DOOR
9. J57 ENGINE WITH AFTERBURNER
10. POSITION LIGHTS
11. FUEL VENT OUTLET
12. TWO-POSITION EXHAUST NOZZLE
13. DRAG CHUTE CABLE STOWAGE RECESS
14. DRAG CHUTE STOWAGE COMPARTMENT
15. CONTROLLABLE HORIZONTAL STABILIZER
16. WING FLAP
17. AILERONS
18. WING FENCE
19. WING TIP POSITION LIGHT (TYPICAL)
20. WING SLATS
21. WING FUEL TANK
22. AFT FUEL TANK
23. INTERMEDIATE FUEL TANK
24. FORWARD FUEL TANK (CENTER CELL)
25. FORWARD FUEL TANK (LOWER CELL)
26. FORWARD FUEL TANK (UPPER CELL)
27. SPEED BRAKE
28. AFT ELECTRONIC EQUIPMENT COMPARTMENT
29. LINK COMPARTMENT
30. AMMUNITION BOXES
31. M-39 20 MM GUNS
32. FOLDING PITOT-STATIC BOOM
33. RETRACTABLE TAIL SKID
34. ARRESTING HOOK
35. EXTERNAL POWER RECEPTACLES (ELECTRICAL AND STARTER AIR SUPPLY)
36. LOWER RECOGNITION LIGHT
37. LANDING LIGHTS

F-100F-1-A00-5A

Length (pitot boom folded for ground handling)	49 feet 4 inches
Height (to top of fin)	16 feet 3 inches

F-100F:

Span	38 feet 9 inches
Length (pitot boom extended) . . .	57 feet 2 inches
Length (pitot boom folded for ground handling)	52 feet 6 inches
Height (to top of fin)	16 feet 3 inches

NOTE Refer to "Taxiing" in Section II for turning radius and ground clearance dimensions.

AIRPLANE GROSS WEIGHT.

NOTE These weights, based on JP-4 fuel, are an approximation and may be used for flight planning. For precise weight information, refer to T. O. 1-1B-40 and to "Weight Limitations" in Section V.

F-100D:

The approximate take-off gross weight of the airplane (including full internal load and pilot) is as follows:

No external load (clean airplane) . . .30,425 pounds

F-100F:

The approximate take-off gross weight of the airplane (including full internal load and both crew members) is as follows

No external load (clean airplane) . . .30,750 pounds

ARMAMENT.

The basic armament installation consists of four 20 mm automatic guns (two only on the F-100F) mounted in the lower, forward section of the fuselage, outboard of the nose wheel well. Bombs, rockets, chemical tanks, and missiles can be carried on jettisonable pylons on the lower surface of the wings. There is also an external store mounting station on the fuselage at the airplane centerline. An automatic lead-computing sight, coupled with a radar ranging system, is used for gun, bomb, and rocket aiming.

NOTE Refer to "Armament Equipment" in Section IV for complete armament information.

BLOCK NUMBERS.

Block numbers are used to identify airplanes in accordance with production changes that affect the airplane or its equipment. Airplanes within a given block number are usually identical with respect to production changes. The block numbers and Air Force serial numbers assigned to F-100D and F-100F Airplanes are listed in figure 1-3.

ENGINE.

Power is supplied by a Pratt & Whitney J57-21A axial-flow gas turbine engine equipped with an afterburner. The design of the ignition system and afterburner fuel metering system ensures satisfactory afterburner operation at high altitudes. (See figure 1-5.)

NOTE J57-21A engines built by Pratt & Whitney are identified as J57-P-21A engines, and J57-21A engines built by the Ford Motor Company are identified as J57-F-21A engines. These engines are identical in operation, and all references to the J57-P-21A in this manual also apply to the J57-F-21A.

The rated sea-level static thrust of the -21A series engine is about 10,200 pounds at Military Thrust and about 16,000 pounds at Maximum Thrust (afterburning). The engine has two multistage ("two-spool") compressors, an eight-unit combustion chamber, a split, three-stage turbine, and an afterburner system with a two-position exhaust nozzle.

NOTE Refer to "Engine Afterburner System" in this section for complete information on the afterburner system.

The two-spool compressor section consists of a nine-stage low-pressure unit and a seven-stage high-pressure unit. The rotor assembly of each unit is mechanically independent of the other. The high-pressure compressor rotor is driven by the first-stage turbine wheel and the low-pressure compressor rotor by the second- and third-stage turbine wheels. The low-pressure compressor rotor drives the nose section accessories. The accessories at the bottom of the engine are driven by the high-pressure compressor rotor through a bevel gear and shaft system which also serves as the input system during starting. An automatic compressor air bleed system directs part of the low-pressure compressor air overboard at low engine rpm to provide stall-free, fast engine accelerations and decelerations. An anti-icing system protects the engine guide vanes from ice formation. (Refer to "Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal Systems" in Section IV.)

BLOCK NUMBERS

F-100D-21-NA
55-3502 thru -3601

F-100D-26-NA
55-3602 thru -3701

F-100D-31-NA
55-3702 thru -3814

F-100D-46-NH
55-2784 thru -2863

F-100D-51-NH
55-2864 thru -2908

F-100D-56-NH
55-2909 thru -2954

F-100D-61-NA
56-2903 thru -2962

F-100D-66-NA
56-2963 thru -3022

F-100D-71-NA
56-3023 thru -3142

F-100D-76-NA
56-3143 thru -3198

F-100D-81-NH
56-3351 thru -3378

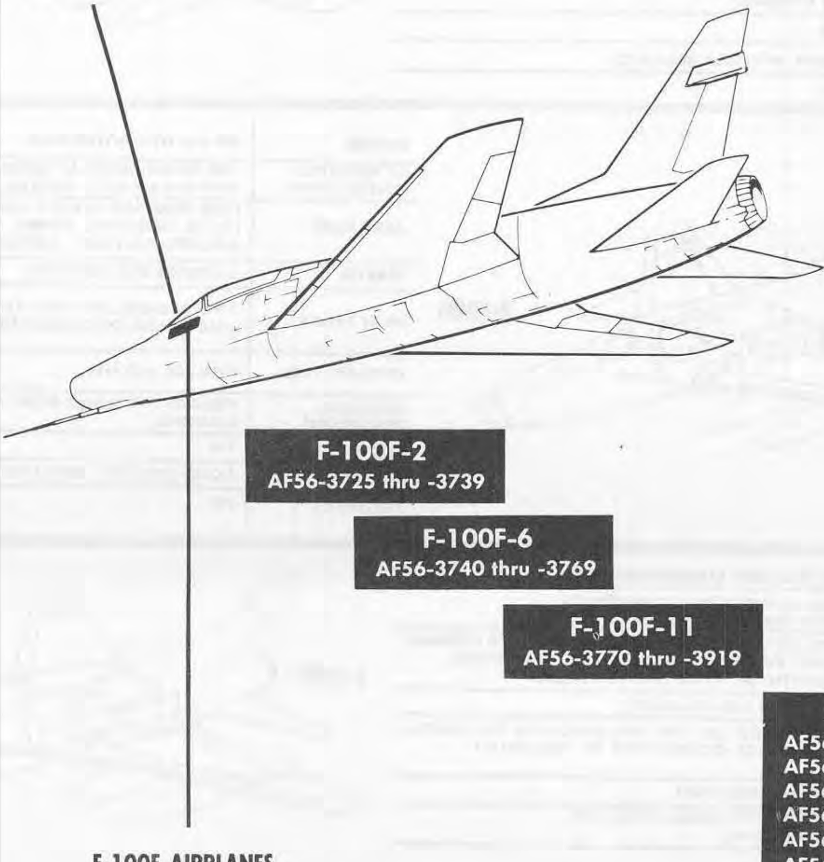
F-100D-86-NH
56-3379 thru -3463

F-100D-91-NA
56-3199 thru -3346

F-100D AIRPLANES

NOTE

- The AF serial numbers for later block numbers may be lower than the serial numbers for an early block number. (Compare serial numbers of blocks -31 and -46.) Therefore, the airplane coding throughout this manual should be interpreted as follows: "and later airplanes" applies to all later block numbers (not necessarily later serial numbers).
- F-100D Airplanes with manufacturer's code letters "NA" are built by North American Aviation at Los Angeles, California.
- F-100D Airplanes with manufacturer's code letters "NH" are built by North American Aviation at Columbus, Ohio.



F-100F-2
AF56-3725 thru -3739

F-100F-6
AF56-3740 thru -3769

F-100F-11
AF56-3770 thru -3919

F-100F-16
AF56-3920 thru -3934
AF56-3942 thru -3966
AF56-3970 thru -3975
AF56-3980 thru -3986
AF56-3990 thru -3996
AF56-4000 thru -4005
AF56-4010 thru -4012
AF56-4016

F-100F AIRPLANES

F-100D-1-A00-8A

Figure 1-3

MAIN DIFFERENCES TABLE

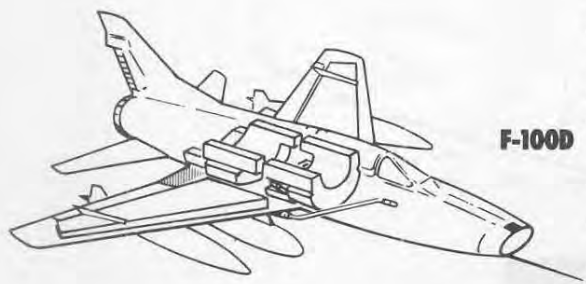
F-100 SERIES

F-100A

ENGINE	J57-21A WITH AFTERBURNER
AC ELECTRICAL POWER SOURCE	THREE INVERTERS
ARMAMENT	FOUR GUNS AND MISSILES
STARTER	PNEUMATIC
DROP TANKS	TWO 275-GALLON
INTERNAL FUEL	FUSELAGE
REFUELING PROVISIONS	GRAVITY TANK FILLING
FLAPS	NO
OXYGEN SYSTEM	GASEOUS, WITH D-2 REGULATOR
AUTOPILOT	NO

ENGINE	J57-21A WITH AFTERBURNER
AC ELECTRICAL POWER SOURCE	THREE INVERTERS
ARMAMENT	FOUR GUNS AND VARIOUS COMBINATIONS OF EXTERNAL LOADS INCLUDING BOMBS, ROCKETS AND MISSILES MOUNTED ON REMOVABLE PYLONS.
STARTER	PNEUMATIC
DROP TANKS	TWO 275-GALLON AND/OR COMBINATION OF 200-GALLON (TWO 335-GALLON ON SOME AIRPLANES)
INTERNAL FUEL	FUSELAGE AND WING
REFUELING PROVISIONS	PRESSURE TYPE (SINGLE-POINT AND AIR REFUELING)
FLAPS	NO
OXYGEN SYSTEM	LIQUID, WITH D-2A REGULATOR
AUTOPILOT	NO

F-100C

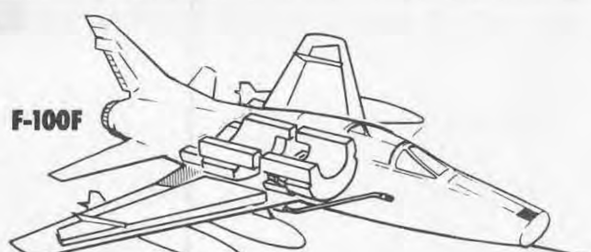


F-100D

ENGINE	J57-21A WITH AFTERBURNER
AC ELECTRICAL POWER SOURCE	ONE ENGINE-DRIVEN AC GENERATOR WITH ONE STAND-BY INVERTER
ARMAMENT	FOUR GUNS AND VARIOUS COMBINATIONS OF EXTERNAL LOADS INCLUDING BOMBS, ROCKETS, AND MISSILES MOUNTED ON FORCE EJECTION PYLONS.
STARTER	CARTRIDGE AND PNEUMATIC
DROP TANKS	TWO 275-GALLON, TWO 450-GALLON OR TWO 335-GALLON AND/OR COMBINATION OF 200-GALLON.
INTERNAL FUEL	FUSELAGE AND WING
REFUELING PROVISIONS	PRESSURE-TYPE (SINGLE-POINT AND AIR REFUELING)
FLAPS	YES
OXYGEN SYSTEM	LIQUID WITH MD-1 REGULATOR
AUTOPILOT	YES

ENGINE	J57-21A WITH AFTERBURNER
AC ELECTRICAL POWER SOURCE	ONE ENGINE-DRIVEN AC GENERATOR WITH ONE STAND-BY INVERTER
ARMAMENT	TWO GUNS AND VARIOUS COMBINATIONS OF EXTERNAL LOADS INCLUDING BOMBS, ROCKETS, AND MISSILES MOUNTED ON FORCE EJECTION PYLONS
STARTER	CARTRIDGE AND PNEUMATIC
DROP TANKS	TWO 275-GALLON TWO 450-GALLON OR TWO 335-GALLON AND/OR COMBINATION OF 200-GALLON.
INTERNAL FUEL	FUSELAGE AND WING
REFUELING PROVISIONS	PRESSURE-TYPE (SINGLE-POINT AND AIR REFUELING)
FLAPS	YES
OXYGEN SYSTEM	LIQUID WITH MD-1 REGULATOR
AUTOPILOT	YES

F-100F



F-100-1-00-1

Figure 1-4

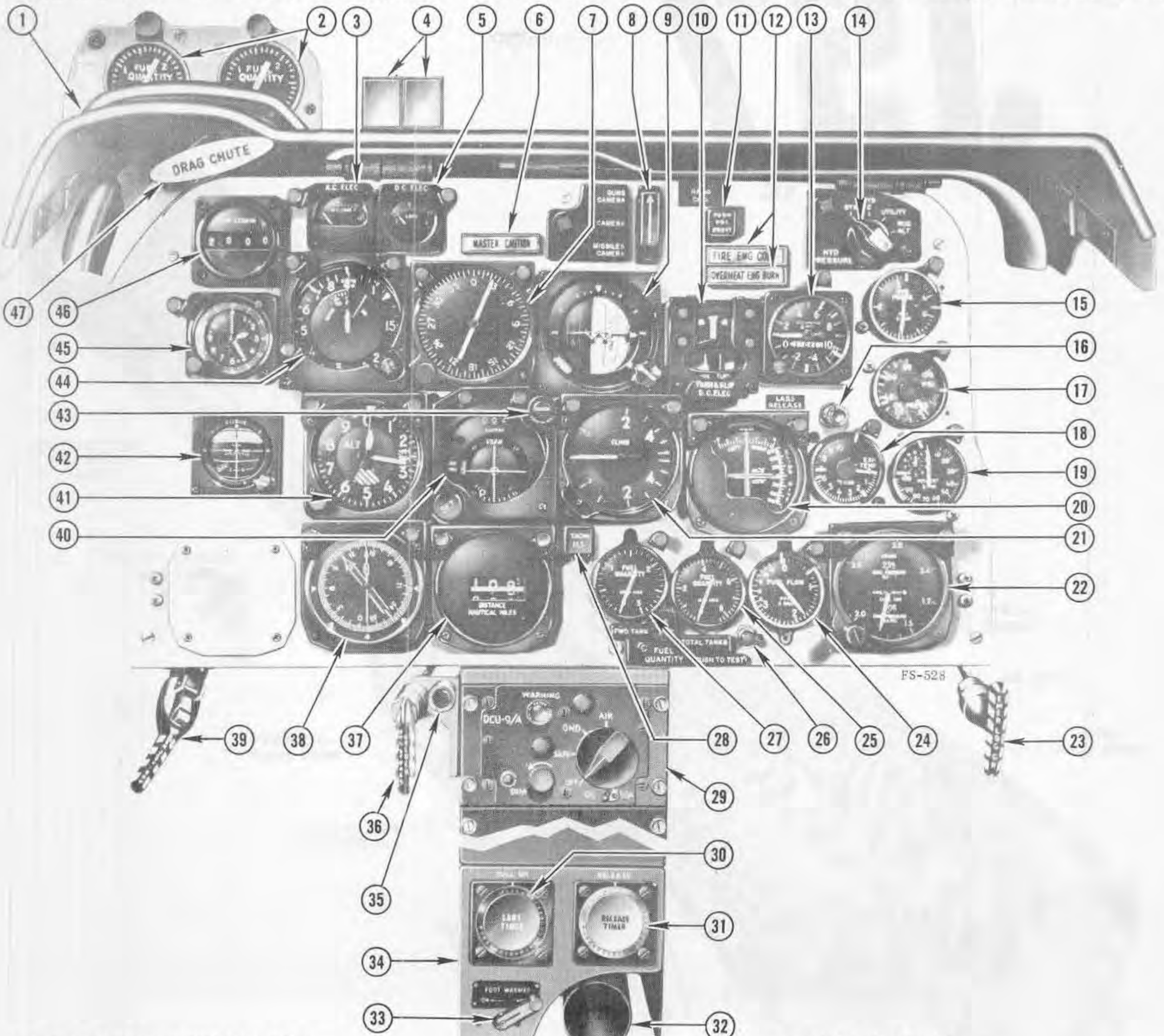
J57 ENGINE

WITH AFTERBURNER

F-100D-1-40-1A

Figure 1-5

INSTRUMENT PANEL (F-100D AIRPLANES AND FRONT COCKPIT OF F-100F AIRPLANES)



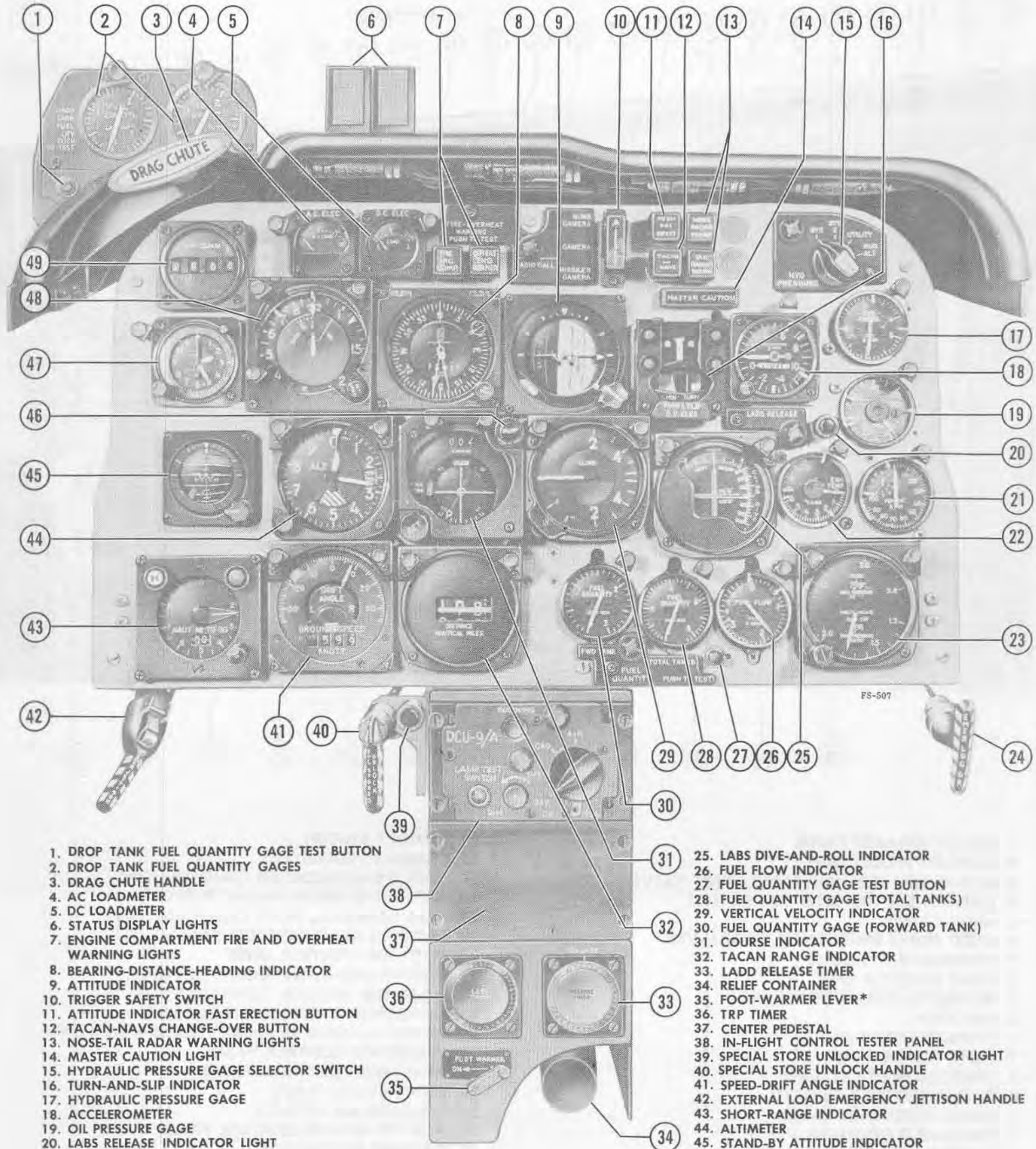
1. DROP TANK FUEL QUANTITY GAGE TEST BUTTON
2. DROP TANK FUEL QUANTITY GAGES
3. AC LOADMETER
4. STATUS DISPLAY LIGHTS
5. DC LOADMETER
6. MASTER CAUTION LIGHT
7. HEADING INDICATOR
8. TRIGGER SAFETY SWITCH
9. ATTITUDE INDICATOR
10. TURN-AND-SLIP INDICATOR
11. ATTITUDE INDICATOR FAST ERECTION BUTTON
12. FIRE- AND OVERHEAT-WARNING LIGHTS
13. ACCELEROMETER
14. HYDRAULIC PRESSURE GAGE SELECTOR SWITCH
15. HYDRAULIC PRESSURE GAGE
16. LABS RELEASE INDICATOR LIGHT
17. OIL PRESSURE GAGE
18. EXHAUST TEMPERATURE GAGE
19. TACHOMETER
20. LABS DIVE-AND-ROLL INDICATOR
21. VERTICAL VELOCITY INDICATOR
22. ENGINE PRESSURE RATIO GAGE
23. LANDING GEAR EMERGENCY LOWERING HANDLE
24. FUEL FLOW INDICATOR
25. FUEL QUANTITY GAGE (TOTAL TANKS)
26. FUEL QUANTITY GAGE TEST BUTTON
27. FUEL QUANTITY GAGE (FORWARD TANK)
28. TACAN ILS CHANGEOVER LIGHT (F-100F)
29. IN-FLIGHT CONTROL TESTER PANEL
30. TRP TIMER
31. LADD RELEASE TIMER
32. RELIEF CONTAINER
33. FOOT WARMER LEVER *
34. CENTER PEDESTAL
35. SPECIAL STORE UNLOCKED INDICATOR LIGHT
36. SPECIAL STORE UNLOCK HANDLE
37. TACAN RANGE INDICATOR
38. RADIO MAGNETIC INDICATOR
39. EXTERNAL LOAD EMERGENCY JETTISON HANDLE
40. COURSE INDICATOR
41. ALTIMETER
42. STAND-BY ATTITUDE INDICATOR
43. MARKER BEACON INDICATOR LIGHT
44. AIRSPEED/MACH INDICATOR
45. CLOCK
46. COMMAND RADIO REMOTE CHANNEL INDICATOR
47. DRAG CHUTE HANDLE

*** Some airplanes**

F-100F-1-A00-8A

Figure 1-6

F-100D INSTRUMENT PANEL NAVS AIRPLANES



1. DROP TANK FUEL QUANTITY GAGE TEST BUTTON
2. DROP TANK FUEL QUANTITY GAGES
3. DRAG CHUTE HANDLE
4. AC LOADMETER
5. DC LOADMETER
6. STATUS DISPLAY LIGHTS
7. ENGINE COMPARTMENT FIRE AND OVERHEAT WARNING LIGHTS
8. BEARING-DISTANCE-HEADING INDICATOR
9. ATTITUDE INDICATOR
10. TRIGGER SAFETY SWITCH
11. ATTITUDE INDICATOR FAST ERECTION BUTTON
12. TACAN-NAVS CHANGE-OVER BUTTON
13. NOSE-TAIL RADAR WARNING LIGHTS
14. MASTER CAUTION LIGHT
15. HYDRAULIC PRESSURE GAGE SELECTOR SWITCH
16. TURN-AND-SLIP INDICATOR
17. HYDRAULIC PRESSURE GAGE
18. ACCELEROMETER
19. OIL PRESSURE GAGE
20. LABS RELEASE INDICATOR LIGHT
21. TACHOMETER
22. EXHAUST TEMPERATURE GAGE
23. ENGINE PRESSURE RATIO GAGE
24. LANDING GEAR EMERGENCY LOWERING HANDLE
25. LABS DIVE-AND-ROLL INDICATOR
26. FUEL FLOW INDICATOR
27. FUEL QUANTITY GAGE TEST BUTTON
28. FUEL QUANTITY GAGE (TOTAL TANKS)
29. VERTICAL VELOCITY INDICATOR
30. FUEL QUANTITY GAGE (FORWARD TANK)
31. COURSE INDICATOR
32. TACAN RANGE INDICATOR
33. LADD RELEASE TIMER
34. RELIEF CONTAINER
35. FOOT-WARMER LEVER*
36. TRP TIMER
37. CENTER PEDESTAL
38. IN-FLIGHT CONTROL TESTER PANEL
39. SPECIAL STORE UNLOCKED INDICATOR LIGHT
40. SPECIAL STORE UNLOCK HANDLE
41. SPEED-DRIFT ANGLE INDICATOR
42. EXTERNAL LOAD EMERGENCY JETTISON HANDLE
43. SHORT-RANGE INDICATOR
44. ALTIMETER
45. STAND-BY ATTITUDE INDICATOR
46. TACAN INDICATOR LIGHT
47. CLOCK
48. AIRSPEED / MACH INDICATOR
49. COMMAND RADIO REMOTE CHANNEL INDICATOR

* Some Airplanes

F-100D-1-A00-10A

Figure 1-7

F-100D COCKPIT ....LEFT SIDE

1. CIRCUIT-BREAKER PANEL
2. CONSOLE FLOODLIGHT
3. ANTI-G SUIT PRESSURE-REGULATING VALVE
4. CAMERA SHUTTER SELECTOR SWITCH
5. SPARE LAMPS
6. SPEED BRAKE EMERGENCY DUMP LEVER
7. CONSOLE FLOODLIGHT
8. SIGHT SELECTOR UNIT
9. ALTIMETER CORRECTION CARD
10. THROTTLE
11. THUNDERSTORM LIGHT
12. WING FLAP HANDLE
13. THROTTLE FRICTION LEVER
14. FLAP EMERGENCY SWITCH
15. RADIO FREQUENCY CARD
16. CONSOLE FLOODLIGHT
17. THROTTLE ZEL GRIP*
18. INSTRUMENT PANEL FLOODLIGHT
19. CANOPY SWITCH
20. CONSOLE FLOODLIGHT
21. CANOPY-NOT-LOCKED CAUTION LIGHT
22. ARRESTING HOOK RELEASE BUTTON
23. LABS YAW-ROLL GYRO CHECK BUTTON
24. LANDING GEAR CONTROL PANEL
25. FOOT AIR CONTROL LEVER
26. ENGINE AND FLIGHT CONTROL PANEL
27. AGM-12B MISSILE CONTROL PANEL
28. COMMAND RADIO CONTROL PANEL
29. EXTERNAL LOAD AUXILIARY RELEASE BUTTONS
30. AUTOPILOT CONTROL PANEL
31. ARMAMENT CONTROL PANEL
32. GUN CAMERA TIMER
33. CONSOLE AIR OUTLETS
34. AIM-9B MISSILE CONTROL PANEL
35. GROUND FIRE SWITCH
36. PYLON LOADING SELECTOR SWITCHES

*SOME AIRPLANES

F-100D-1-A00-11A

Figure 1-8

F-100D COCKPIT....RIGHT SIDE

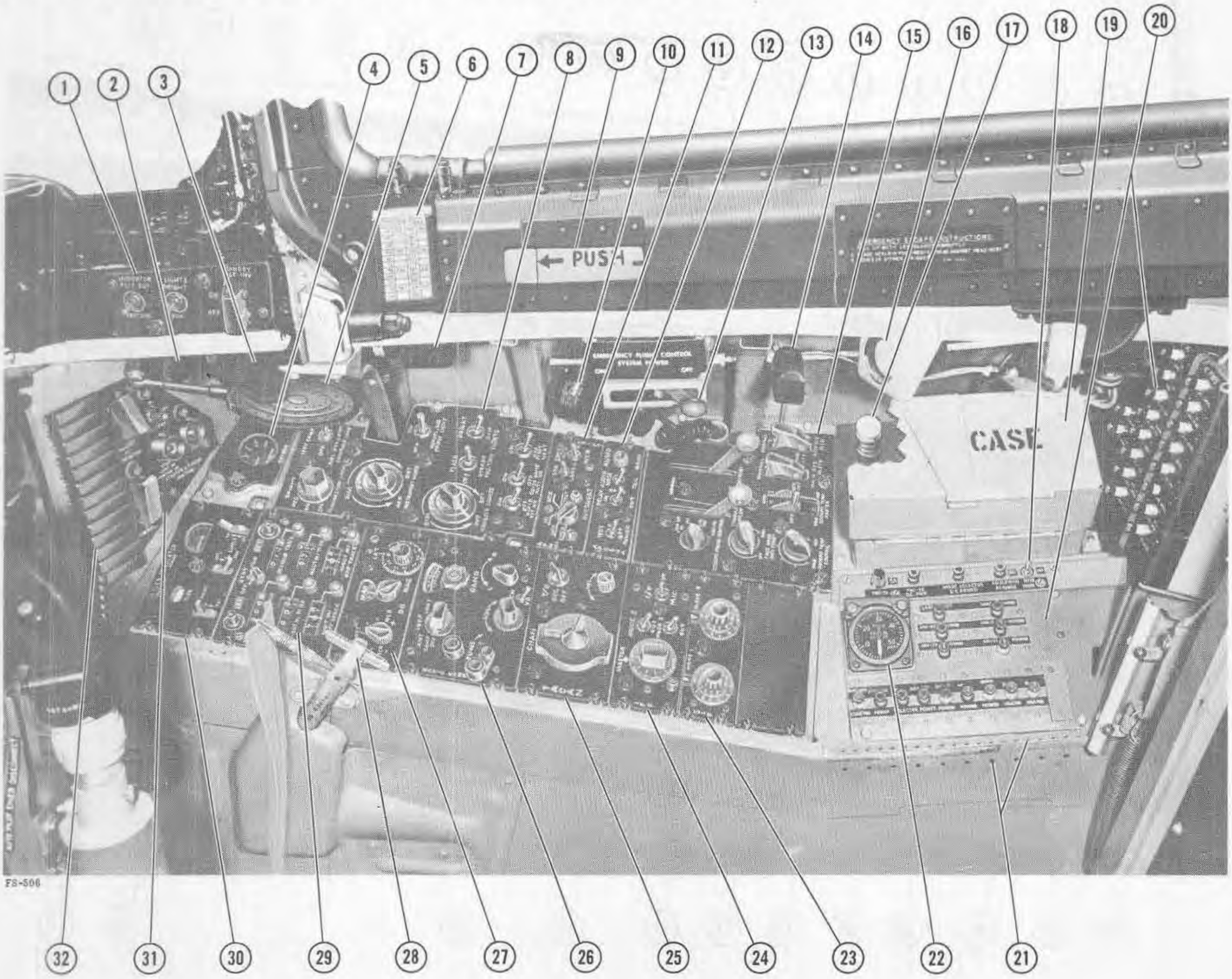
1. STAND-BY INSTRUMENT INVERTER SWITCH
2. CONSOLE FLOODLIGHT
3. INSTRUMENT PANEL FLOODLIGHT
4. LIQUID OXYGEN QUANTITY GAGE
5. NAVIGATION COMPUTER
6. MAGNETIC COMPASS CORRECTION CARD
7. CONSOLE FLOODLIGHT
8. LIGHTING CONTROL PANEL
9. CANOPY INTERNAL MANUAL EMERGENCY RELEASE HANDLE
10. COCKPIT UTILITY LIGHT
11. FLIGHT CONTROL EMERGENCY HYDRAULIC PUMP LEVER
12. AIR CONDITIONING CONTROL PANEL
13. GUN SIGHT GROUND TEST PLUG
14. THUNDERSTORM LIGHT
15. MAP CASE
16. INTERPHONE SWITCH
17. CIRCUIT-BREAKER PANELS
18. CONSOLE AIR OUTLETS
19. COCKPIT PRESSURE ALTITUDE INDICATOR
20. J-4 COMPASS CONTROL PANEL
21. IFF CONTROL PANEL
22. SIF CONTROL PANEL
23. TACAN CONTROL PANEL
24. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE
25. RADIO COMPASS CONTROL PANEL
26. OXYGEN REGULATOR CONTROL PANEL
27. ELECTRICAL CONTROL PANEL
28. INDICATOR AND CAUTION LIGHT PANEL

F-100D-1-A00-12A

Figure 1-9

F-100D COCKPIT ....RIGHT SIDE

NAVS AIRPLANES

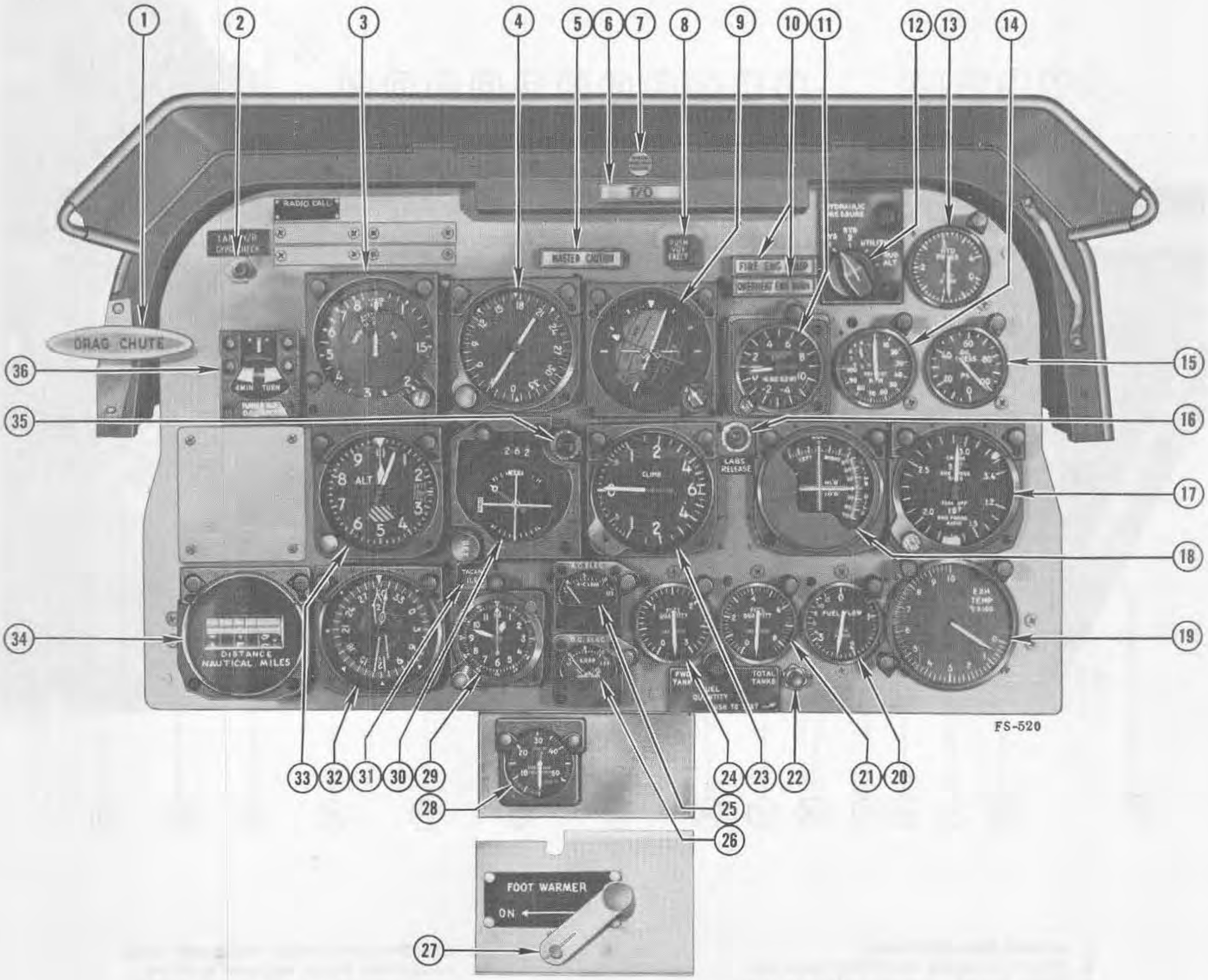


1. STAND-BY INSTRUMENT INVERTER SWITCH PANEL
2. CONSOLE FLOODLIGHT
3. INSTRUMENT PANEL FLOODLIGHT
4. LIQUID OXYGEN QUANTITY GAGE
5. NAVIGATION COMPUTER
6. MAGNETIC COMPASS CORRECTION CARD
7. CONSOLE FLOODLIGHT
8. LIGHTING CONTROL PANEL
9. CANOPY INTERNAL MANUAL EMERGENCY RELEASE HANDLE
10. COCKPIT UTILITY LIGHT
11. AN/APN-102 CONTROL PANEL
12. NOSE-TAIL RADAR WARNING CONTROL PANEL
13. FLIGHT CONTROL EMERGENCY HYDRAULIC PUMP LEVER
14. CONSOLE FLOODLIGHT
15. AIR CONDITIONING CONTROL PANEL
16. THUNDERSTORM LIGHT
17. GUN SIGHT GROUND TEST PLUG
18. INTERPHONE SWITCH
19. MAP CASE
20. CIRCUIT-BREAKER PANELS
21. CONSOLE AIR OUTLETS
22. COCKPIT PRESSURE ALTITUDE INDICATOR
23. SIF CONTROL PANEL
24. IFF CONTROL PANEL
25. TACAN CONTROL PANEL
26. RADIO COMPASS CONTROL PANEL
27. J-4 COMPASS CONTROL PANEL
28. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE
29. NAVS COMPUTER CONTROL INDICATOR
30. OXYGEN REGULATOR CONTROL PANEL
31. ELECTRICAL CONTROL PANEL
32. INDICATOR AND CAUTION LIGHT PANEL

F-100D-1-A00-26A

Figure 1-10

F-100F INSTRUMENT PANEL ....REAR COCKPIT



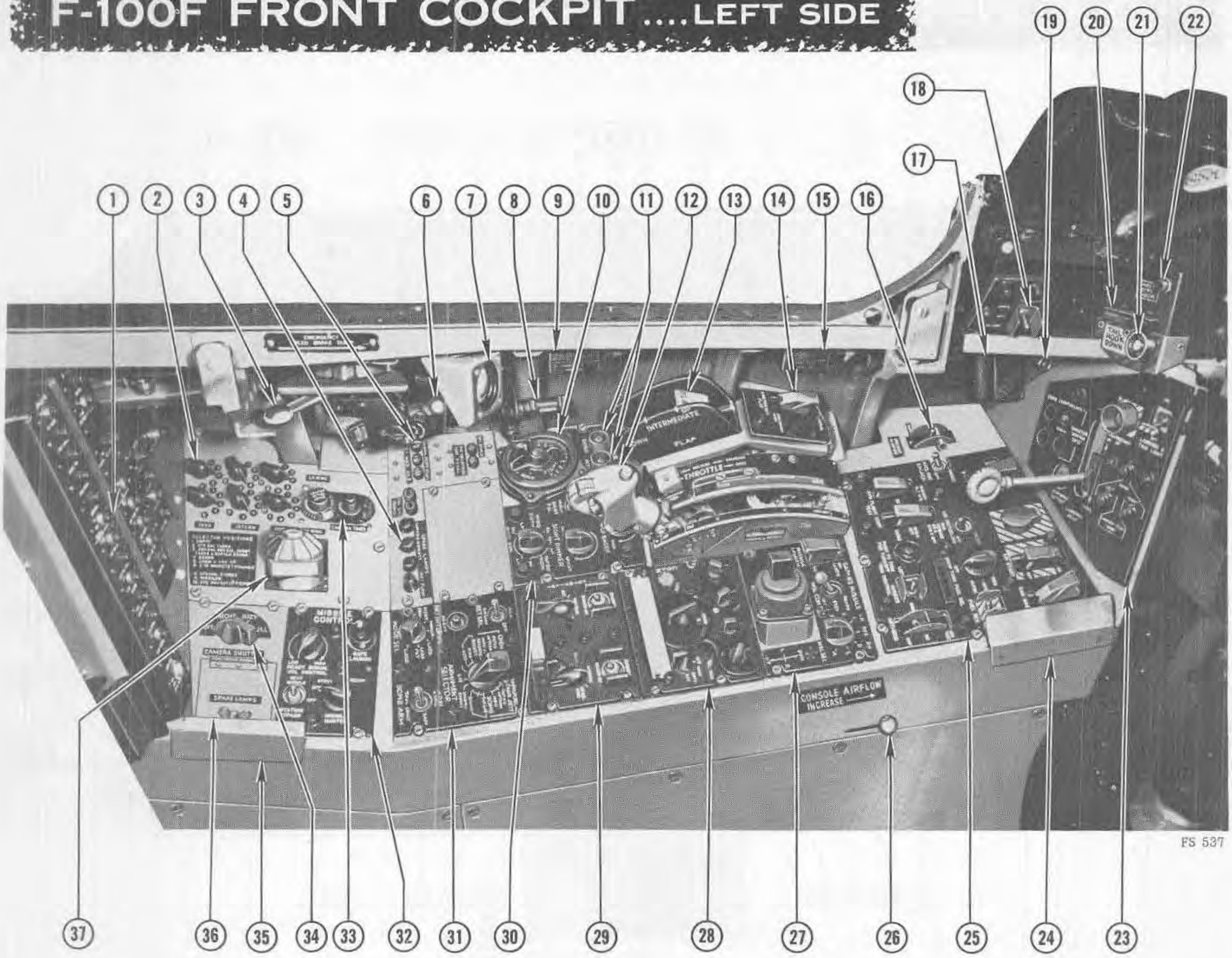
1. DRAG CHUTE HANDLE
2. LABS YAW-ROLL GYRO CHECK BUTTON
3. AIRSPEED/MACH INDICATOR
4. HEADING INDICATOR
5. MASTER CAUTION LIGHT
6. SPECIAL STORE INDICATOR LIGHT
7. WINDSCREEN MANUAL EMERGENCY RELEASE KNOB
8. ATTITUDE INDICATOR FAST-ERECTION BUTTON
9. ATTITUDE INDICATOR
10. FIRE- AND OVERHEAT-WARNING LIGHTS
11. ACCELEROMETER
12. HYDRAULIC PRESSURE GAGE SELECTOR SWITCH
13. HYDRAULIC PRESSURE GAGE
14. TACHOMETER
15. OIL PRESSURE GAGE
16. LABS RELEASE INDICATOR LIGHT
17. ENGINE PRESSURE RATIO GAGE
18. LABS DIVE-AND-ROLL INDICATOR
19. EXHAUST TEMPERATURE GAGE
20. FUEL FLOW INDICATOR
21. FUEL QUANTITY GAGE (TOTAL TANKS)
22. FUEL QUANTITY GAGE TEST BUTTON
23. VERTICAL VELOCITY INDICATOR
24. FUEL QUANTITY GAGE (FORWARD TANK)
25. AC LOADMETER
26. DC LOADMETER
27. FOOT WARMER LEVER*
28. COCKPIT PRESSURE ALTITUDE INDICATOR
29. CLOCK
30. COURSE INDICATOR
31. TACAN ILS CHANGEOVER BUTTON
32. RADIO MAGNETIC INDICATOR
33. ALTIMETER
34. TACAN RANGE INDICATOR
35. MARKER BEACON INDICATOR LIGHT
36. TURN-AND-SLIP INDICATOR

*Some airplanes

F-100F-1-A00-9A

Figure 1-11

F-100F FRONT COCKPIT....LEFT SIDE



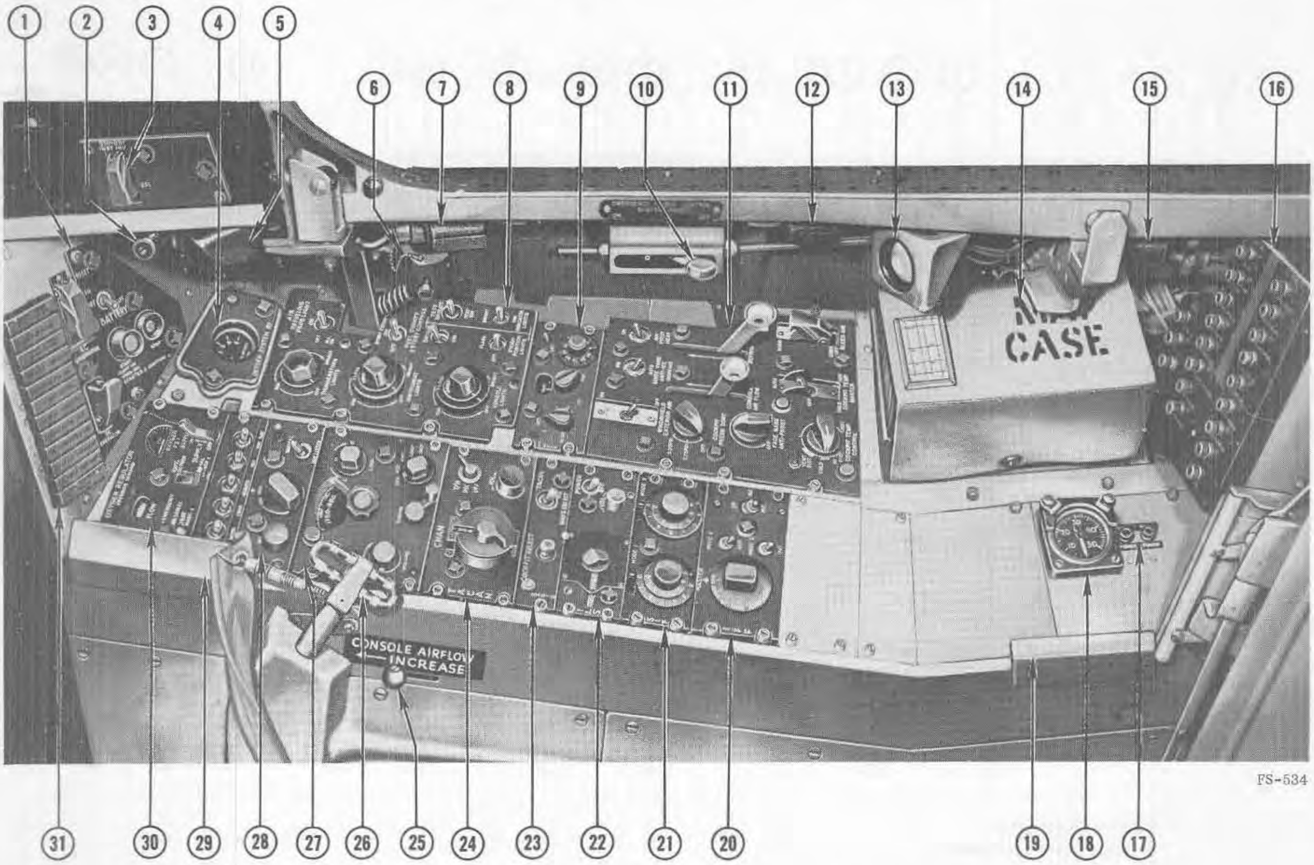
1. CIRCUIT-BREAKER PANEL
2. PYLON LOADING SELECTOR SWITCHES
3. SPEED BRAKE EMERGENCY DUMP LEVER
4. SPARE LAMP PANEL
5. SPECIAL STORE CIRCUIT-BREAKER PANEL
6. EMERGENCY RAM-AIR LEVER
7. THUNDERSTORM LIGHT
8. SIGHT SELECTOR UNIT FLOODLIGHT
9. CONSOLE FLOODLIGHT
10. SIGHT SELECTOR UNIT
11. EXTERNAL LOAD AUXILIARY RELEASE BUTTONS
12. THROTTLE
13. WING FLAP HANDLE
14. WING FLAP EMERGENCY SWITCH
15. CONSOLE FLOODLIGHT
16. GROUND GUNFIRE SWITCH
17. INSTRUMENT PANEL FLOODLIGHT
18. CANOPY SWITCH
19. CONSOLE FLOODLIGHT
20. CANOPY-NOT-LOCKED WARNING LIGHT
21. ARRESTING HOOK RELEASE BUTTON
22. LABS YAW-ROLL GYRO CHECK BUTTON
23. LANDING GEAR CONTROL PANEL
24. CONSOLE AIR DEFLECTOR
25. ENGINE AND FLIGHT CONTROL PANEL
26. CONSOLE AIRFLOW KNOB*
27. AGM-12B MISSILE CONTROL PANEL
28. COMMAND RADIO CONTROL PANEL
29. AUTOPILOT CONTROL PANEL
30. SIGHT AND AUXILIARY RELEASE PANEL
31. ARMAMENT CONTROL PANEL
32. AIM-9B MISSILE CONTROL PANEL
33. CAMERA TIMER
34. CAMERA SHUTTER SELECTOR SWITCH
35. CONSOLE AIR DEFLECTOR
36. SPARE LAMP CONTAINER
37. ANTI-G SUIT PRESSURE-REGULATING VALVE

*** Some airplanes.**

F-100F-1-A00-10A

Figure 1-12

F-100F FRONT COCKPIT ....RIGHT SIDE



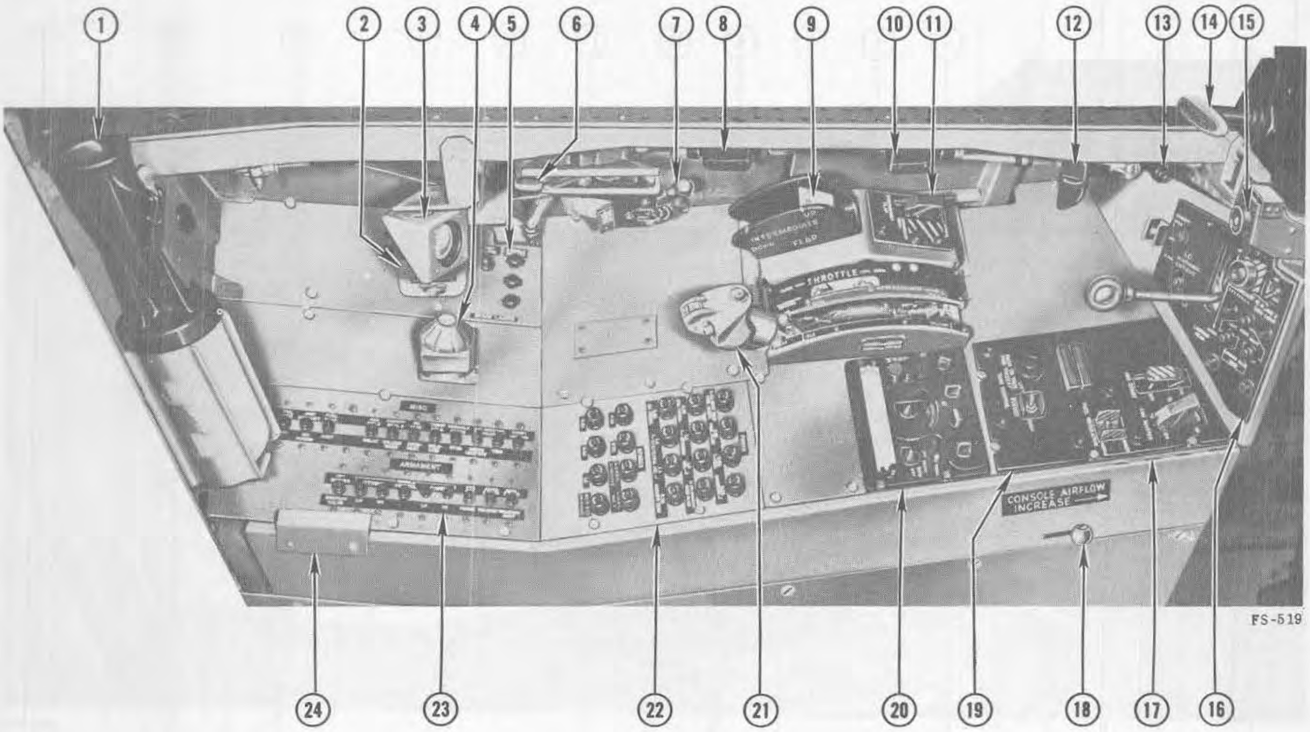
1. ELECTRICAL CONTROL PANEL
2. ELECTRICAL CONTROL PANEL FLOODLIGHT
3. STAND-BY INSTRUMENT INVERTER SWITCH
4. LIQUID OXYGEN QUANTITY GAGE
5. INSTRUMENT PANEL FLOODLIGHT
6. COCKPIT UTILITY LIGHT
7. CONSOLE FLOODLIGHT
8. LIGHTING CONTROL PANEL
9. J-4 COMPASS CONTROL PANEL
10. FLIGHT CONTROL EMERGENCY HYDRAULIC PUMP LEVER
11. AIR CONDITIONING CONTROL PANEL
12. CONSOLE FLOODLIGHT
13. THUNDERSTORM LIGHT
14. MAP CASE
15. CONSOLE FLOODLIGHT
16. CIRCUIT-BREAKER PANEL
17. CIRCUIT-BREAKER PANEL
18. COCKPIT PRESSURE ALTITUDE INDICATOR
19. CONSOLE AIR DEFLECTOR
20. IFF CONTROL PANEL
21. SIF CONTROL PANEL
22. ILS CONTROL PANEL
23. RADIO CONTROL TRANSFER PANEL
24. TACAN CONTROL PANEL
25. CONSOLE AIRFLOW KNOB*
26. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE
27. RADIO COMPASS CONTROL PANEL
28. COMMUNICATION AMPLIFIER CONTROL PANEL
29. CONSOLE AIR DEFLECTOR
30. OXYGEN REGULATOR CONTROL PANEL
31. INDICATOR AND CAUTION LIGHT PANEL

* Some airplanes

F-100F-1-A00-11A

Figure 1-13

F-100F REAR COCKPIT ....LEFT SIDE



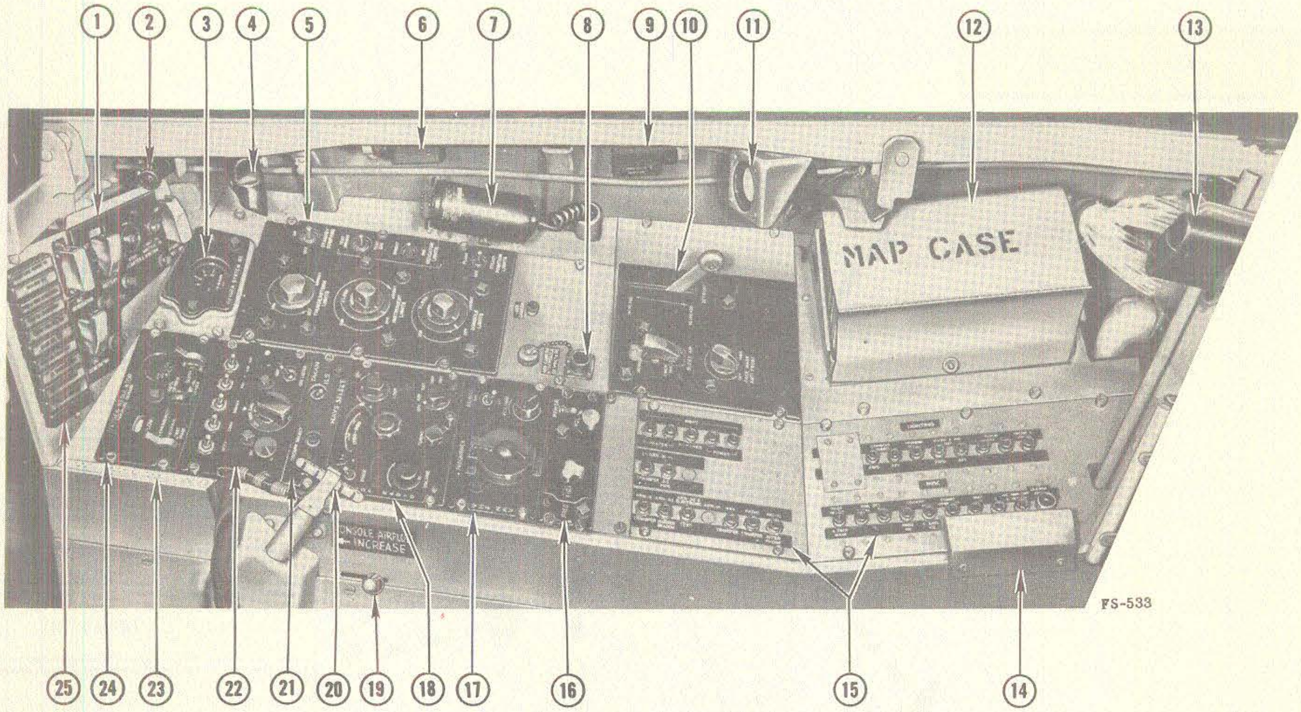
1. RELIEF CONTAINER
2. SPARE LAMP CONTAINER
3. THUNDERSTORM LIGHT
4. ANTI-G SUIT PRESSURE-REGULATING VALVE
5. SPARE LAMP PANEL
6. SPEED BRAKE EMERGENCY DUMP LEVER
7. EMERGENCY RAM-AIR LEVER
8. CONSOLE FLOODLIGHT
9. WING FLAP HANDLE
10. CONSOLE FLOODLIGHT
11. WING FLAP EMERGENCY SWITCH
12. INSTRUMENT PANEL FLOODLIGHT
13. LANDING GEAR CONTROL PANEL FLOODLIGHT
14. DRAG CHUTE HANDLE
15. ARRESTING HOOK RELEASE BUTTON
16. LANDING GEAR CONTROL PANEL
17. CONSOLE AIR OUTLETS
18. CONSOLE AIRFLOW KNOB *
19. ENGINE AND FLIGHT CONTROL PANEL
20. COMMAND RADIO CONTROL PANEL
21. THROTTLE
22. FUSE PANEL
23. CIRCUIT-BREAKER PANEL
24. CONSOLE AIR DEFLECTOR

* Some airplanes

F-100F-1-A00-12A

Figure 1-14

F-100F REAR COCKPIT ....RIGHT SIDE



1. ELECTRICAL CONTROL PANEL
2. ELECTRICAL CONTROL PANEL FLOODLIGHT
3. LIQUID OXYGEN QUANTITY GAGE
4. INSTRUMENT PANEL FLOODLIGHT
5. LIGHTING CONTROL PANEL
6. CONSOLE FLOODLIGHT
7. COCKPIT UTILITY LIGHT
8. AUXILIARY CAMERA RECEPTACLE
9. CONSOLE FLOODLIGHT
10. AIR CONDITIONING CONTROL PANEL
11. THUNDERSTORM LIGHT
12. MAP CASE
13. CONSOLE FLOODLIGHT
14. CONSOLE AIR DEFLECTOR
15. CIRCUIT-BREAKER PANELS
16. ILS CONTROL PANEL
17. TACAN CONTROL PANEL
18. RADIO COMPASS CONTROL PANEL
19. CONSOLE AIRFLOW KNOB *
20. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE
21. RADIO CONTROL TRANSFER PANEL
22. COMMUNICATION AMPLIFIER CONTROL PANEL
23. CONSOLE AIR OUTLETS
24. OXYGEN REGULATOR CONTROL PANEL
25. INDICATOR AND CAUTION LIGHT PANEL

* Some airplanes.

F-100F-1-A00-13A

Figure 1-15

INDICATOR, CAUTION, AND

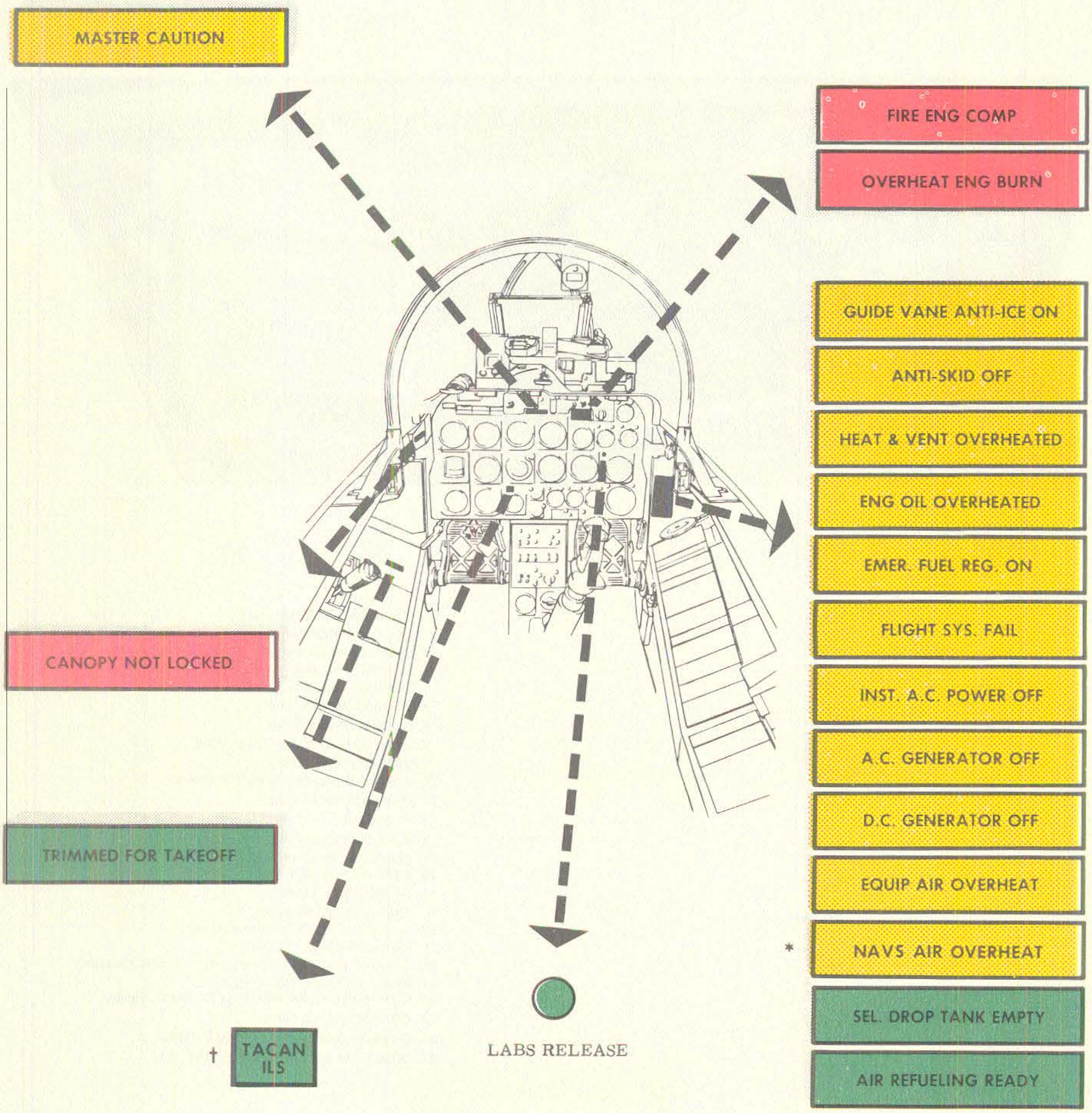
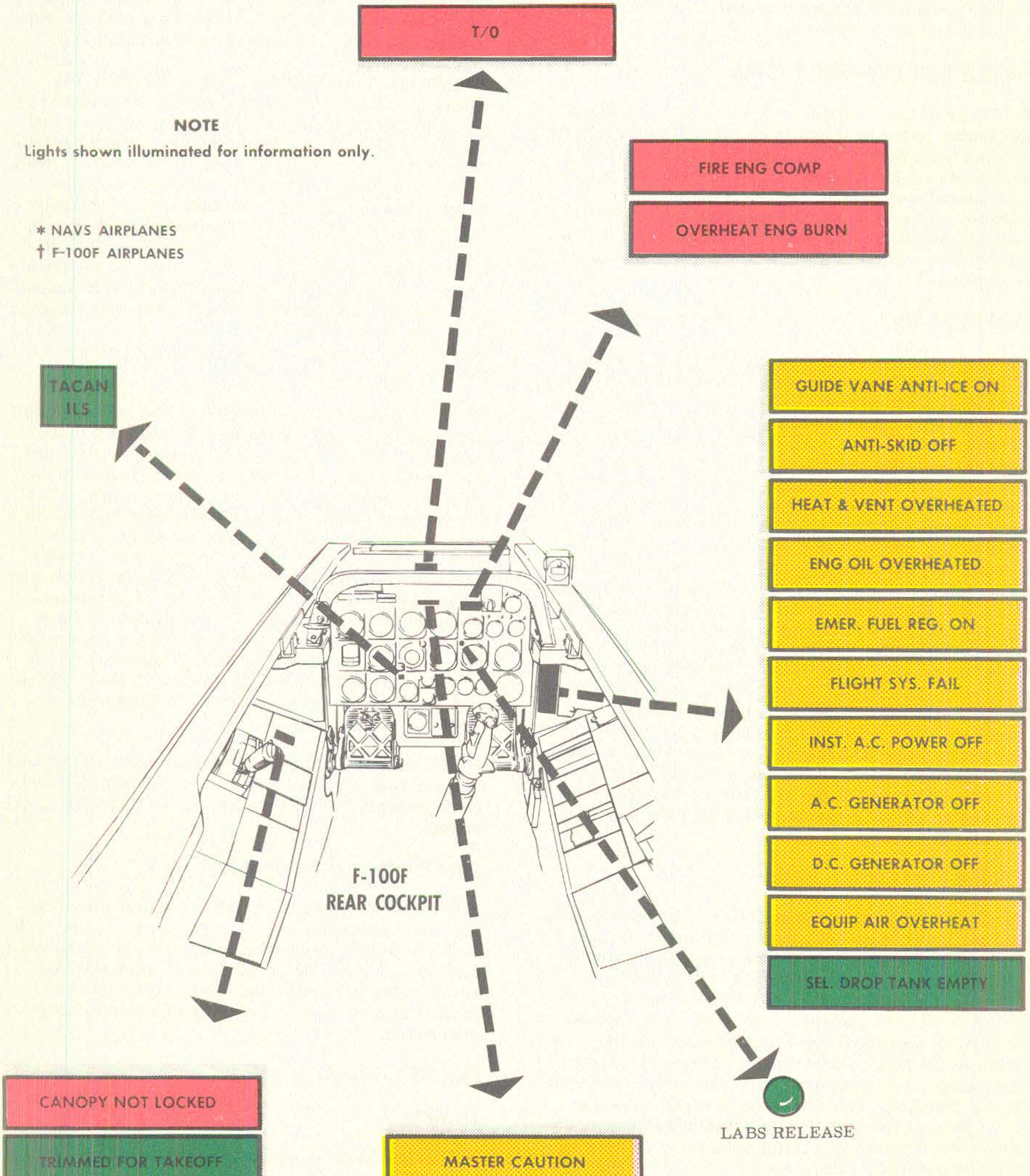


Figure 1-16

WARNING LIGHTS



F-100F-1-A73-2A

ENGINE COMPARTMENT.

The engine compartment is divided into two sections. The forward section encloses the compressor and accessory sections of the engine; the aft section houses the engine combustion and turbine sections and the afterburner.

ENGINE FUEL CONTROL SYSTEM.

Fuel flow to the engine is mechanically controlled by throttle movement and is delivered and regulated by the engine fuel control system. This system includes the engine-driven fuel pump unit, the hydromechanical fuel control unit, and the afterburner system. (For details of the afterburner, refer to "Engine Afterburner System" in this section.) The engine fuel control system is shown schematically in figure 1-17.

Fuel Pump Unit.

The engine-driven fuel pump unit (figure 1-17) supplies the high fuel pressure required by the engine and afterburner systems. The unit has three individual pump elements and includes the afterburner system shuttle valve. All the fuel from the tanks goes through the centrifugal element and fuel discharged from the centrifugal element goes to both the engine and afterburner elements of the pump unit. When the afterburner is not engaged, the afterburner shuttle valve in the fuel pump unit is closed, and the total output of the afterburner element returns to the centrifugal element discharge. When the afterburner is selected, the shuttle valve opens to supply fuel from the afterburner element to the afterburner system. If the engine element fails, a transfer valve in the pump unit opens automatically to send part of the afterburner element output to the engine fuel control unit. During this condition, only a limited fuel flow is available for the afterburner, the fuel from the afterburner element permits Military Thrust or partial afterburner thrust. However, if the afterburner element fails, the engine element cannot supply fuel for afterburner operation.

Engine Fuel Control Unit.

An engine-driven hydromechanical fuel control unit (figure 1-17), with both the normal and emergency fuel control systems, regulates fuel flow to the engine. During normal operation, the fuel flow is controlled by a variable-orifice main metering valve in the fuel control. The valve is positioned by control signals from a mechanical computer (also in the fuel control unit) which senses flight operating conditions and is mechanically controlled by the throttle. The computer sets the metering valve so that the fuel flow is automatically compensated for variations in flight conditions by sensing throttle position, engine speed, engine burner pressure, and compressor inlet temperature.

NORMAL FUEL CONTROL SYSTEM. The normal fuel control system adjusts the fuel flow for altitude changes and, during rapid engine accelerations, schedules the fuel flow to protect the engine from overspeed and overtemperature conditions and to prevent compressor stall or engine flameout. Excess fuel is bypassed to the discharge side of the centrifugal element of the fuel pump unit.

EMERGENCY FUEL CONTROL SYSTEM. The emergency fuel control system must be selected by the pilot, to regulate fuel flow to the engine if the normal system fails. When the emergency system is engaged, the normal system is disengaged. Fuel flow is then metered by the emergency throttle valve in the fuel control unit that is mechanically connected to the throttle. The emergency system is compensated for airspeed changes and for altitude changes up to about 30,000 feet. At higher altitudes, the throttle must be successively retarded to prevent engine overspeed and overtemperature. The emergency bypass valve routes excess fuel back to the discharge of the centrifugal element of the fuel pump unit.

BURNER PRESSURE LIMITER. The burner pressure limiter in the engine fuel control unit automatically reduces fuel flow when burner pressure approaches the maximum safe limit, based on engine case strength. Limiter action occurs only at low altitude and produces a slight rpm loss which may be accompanied by an engine surge. This surge, which should not be confused with a compressor stall, is not harmful and can be eliminated by a slight reduction in engine rpm or airspeed. Under extreme cold-weather conditions, limiter action may occur just after take-off and before initial climb. At outside air temperatures of 60°F and above, the limiter will operate at about .80 to .85 Mach at sea level. (Refer to "Compressor Stall" in Section VII.)

FUEL CUTOFF VALVE. A cutoff valve in the fuel control unit is closed mechanically when the throttle is retarded to OFF, shutting off all fuel to the engine.

Fuel Pressurizing and Dump Valve.

The engine fuel pressurizing and dump valve (figure 1-17) automatically directs fuel to one or both fuel manifolds, depending on engine operating conditions. During engine shutdown, when the fuel cutoff valve is closed, the dump valve opens to permit fuel remaining in both manifolds to drain overboard.

ENGINE CONTROLS.

Throttle.

Engine thrust is controlled by a throttle (figure 1-18), which is mechanically linked to the fuel con-

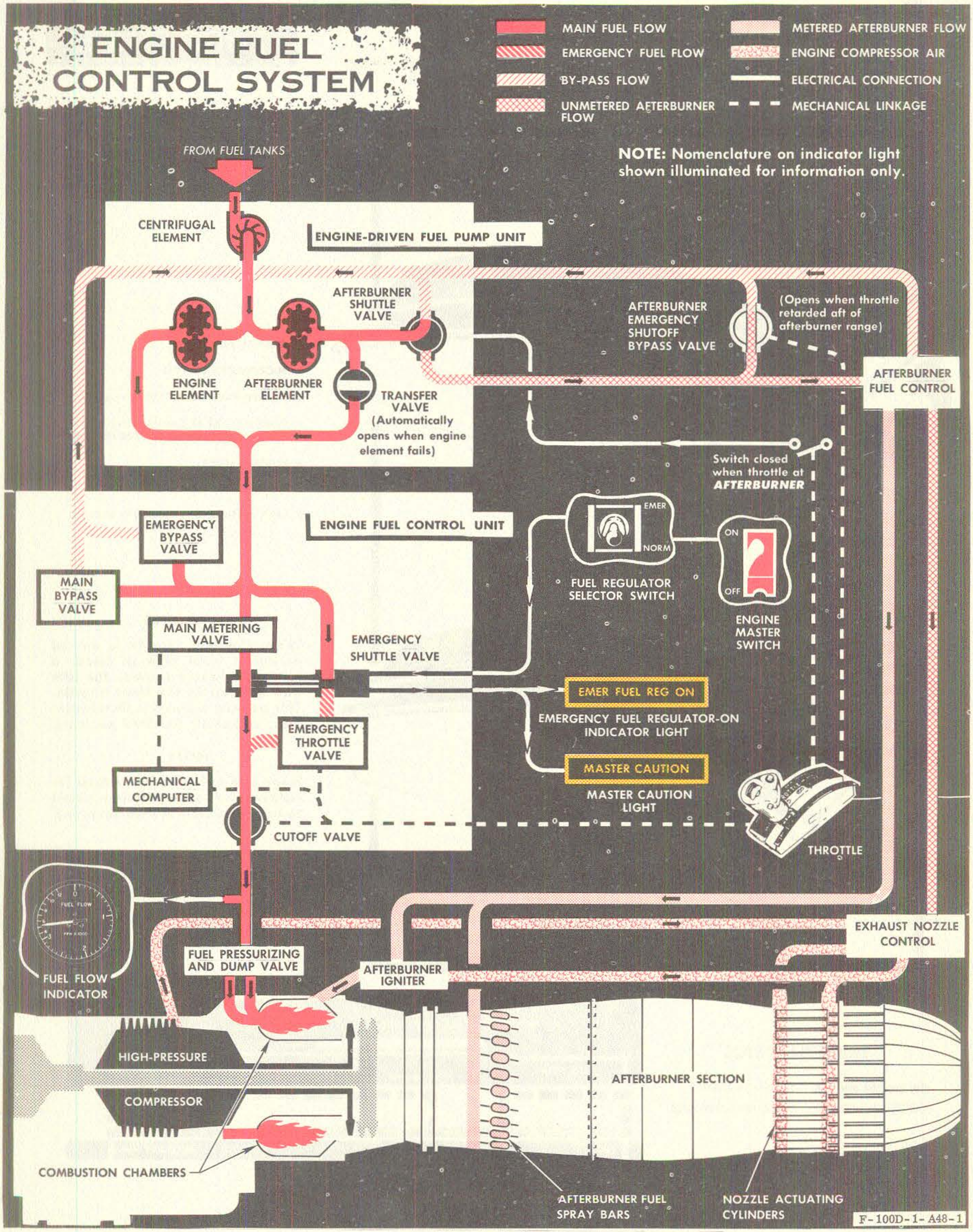
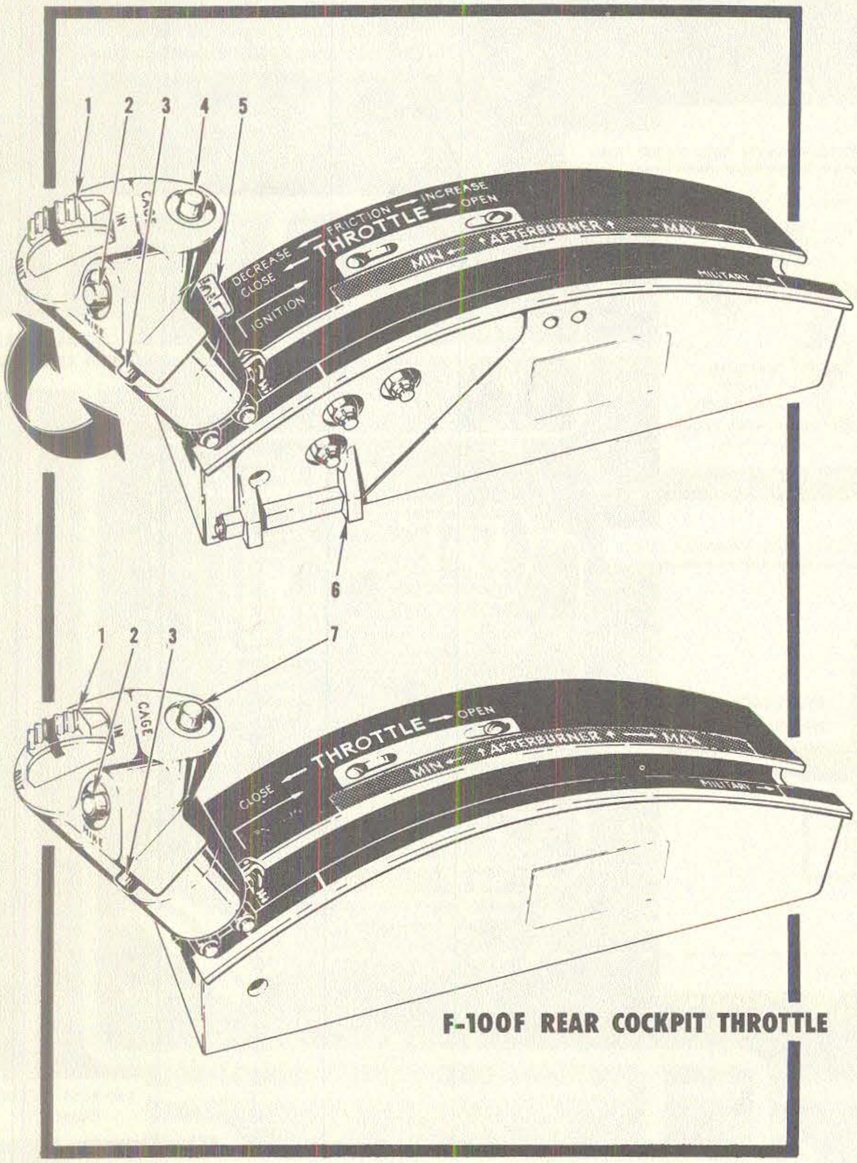

ENGINE FUEL CONTROL SYSTEM
MAIN FUEL FLOW
EMERGENCY FUEL FLOW
BY-PASS FLOW
UNMETERED AFTERBURNER FLOW
METERED AFTERBURNER FLOW
ENGINE COMPRESSOR AIR
ELECTRICAL CONNECTION
MECHANICAL LINKAGE
NOTE: Nomenclature on indicator light shown illuminated for information only.
FROM FUEL TANKS
CENTRIFUGAL ELEMENT
ENGINE-DRIVEN FUEL PUMP UNIT
AFTERBURNER SHUTTLE VALVE
ENGINE ELEMENT
AFTERBURNER ELEMENT
TRANSFER VALVE (Automatically opens when engine element fails)
AFTERBURNER EMERGENCY SHUTOFF BYPASS VALVE
(Opens when throttle retarded aft of afterburner range)
AFTERBURNER FUEL CONTROL
Switch closed when throttle at AFTERBURNER
ENGINE FUEL CONTROL UNIT
EMERGENCY BYPASS VALVE
MAIN BYPASS VALVE
MAIN METERING VALVE
EMERGENCY SHUTTLE VALVE
EMER
NORM
FUEL REGULATOR SELECTOR SWITCH
ON
OFF
ENGINE MASTER SWITCH
EMER FUEL REG ON
EMERGENCY FUEL REGULATOR-ON INDICATOR LIGHT
MASTER CAUTION
MASTER CAUTION LIGHT
EMERGENCY THROTTLE VALVE
MECHANICAL COMPUTER
CUTOFF VALVE
THROTTLE
FUEL FLOW
PPH X 1000
FUEL FLOW INDICATOR
FUEL PRESSURIZING AND DUMP VALVE
AFTERBURNER IGNITER
EXHAUST NOZZLE CONTROL
HIGH-PRESSURE
COMPRESSOR
AFTERBURNER SECTION
COMBUSTION CHAMBERS
AFTERBURNER FUEL SPRAY BARS
NOZZLE ACTUATING CYLINDERS
F-100D-1-A48-1

Figure 1-17

THROTTLES



F-100F REAR COCKPIT THROTTLE

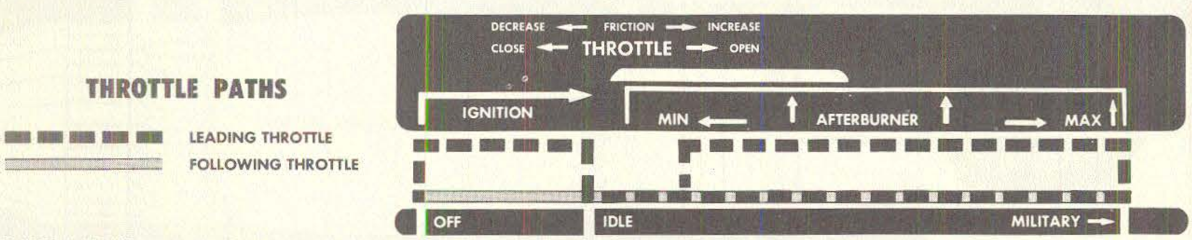
1. SPEED BRAKE SWITCH
2. MICROPHONE BUTTON
3. INTERPHONE CALL BUTTON (F-100F)
4. SIGHT ELECTRICAL CAGING BUTTON AND LABS VERTICAL GYRO CAGING BUTTON
5. FRICTION LEVER
6. IDLE AND OFF STOP
7. LABS VERTICAL GYRO CAGING BUTTON

WARNING

When the rear throttle is moved outboard from *OFF* or *IDLE*, a release solenoid retracts the idle and off stop on the front throttle. This permits moving both throttles into, or out of, the *OFF* position.

NOTE

Front grip only can be rotated for sight manual ranging (spring-loaded to full counterclockwise position).



F-100F-1-A43-1A

Figure 1-18

trol unit for regulating engine output. The throttles on F-100F Airplanes are interconnected by cables, and any movement of one throttle is duplicated by the other; however, each is independent in outboard-inboard travel. A retractable solenoid-operated idle stop on the front throttle prevents the rear cockpit occupant from inadvertently moving the throttles to OFF. If the rear throttle is moved outboard from OFF or IDLE, the release solenoid retracts the idle stop. This permits both throttles to be moved to OFF or ON from the rear cockpit.

The throttle also controls various engine and fuel system units. When the engine master switch is ON, the first outboard and forward movement of the throttle from OFF (stopcock) starts the tank-mounted, electrical fuel booster pumps, partially opens the fuel cutoff valve, and sets up the power circuit to the float-controlled wing tank scavenge pumps. In addition, if the starter and ignition button has been pressed, this initial throttle movement energizes the engine ignition circuit. Additional forward and inboard movement of the throttle to IDLE fully opens the fuel cutoff valve, and the fuel control system then automatically meters fuel to the engine according to throttle setting.

When the throttle is moved outboard in the forward part of the quadrant from MILITARY to AFTERBURNER, the afterburner system is actuated. (Refer to "Engine Afterburner System," in this section.) An override spring prevents the throttle from being moved inadvertently into the afterburner range and holds the throttle outboard in the quadrant when the afterburner has been selected. When the throttle is moved inboard, the afterburner is shut down. About 9 pounds of force is normally required to move the throttle into afterburner, and about 18 pounds to come out. Excessive forces resulting from improper adjustment can cause the throttle lever to fail inside the throttle quadrant. (Refer to "Throttle Failure" in Section III.)

NOTE On F-100F Airplanes, when the throttle (that was moved outboard to initiate afterburning) is moved inboard, the afterburner is shut down. (The throttle that was not used to initiate afterburning cannot be used to shut down the afterburner except by being moved aft. This requires a firm pull aft, to force the other throttle against a cam to move it inboard, out of afterburning.)

When the throttle is retarded to OFF, the fuel booster pumps are de-energized, the wing tank scavenge pump circuit is opened, and the fuel cutoff valve is closed. Also, the ac generator is taken "off the line" when the throttle is OFF.

NOTE To stopcock the throttle, it is necessary to move the throttle outboard to clear the IDLE stop, then straight back to the limit of rearward motion, and then inboard to OFF.

The throttle grip contains various switches. Rotating the grip supplies manual range data to the gun sight. (On F-100F Airplanes, the front throttle grip only supplies manual range data to the gun sight.)

THROTTLE FRICTION LEVER. Adjustment of throttle travel friction is controlled by a lever. (See figure 1-18.) Moving the lever forward increases the friction on throttle travel. On F-100F Airplanes, the rear throttle friction lever is preset and nonadjustable.

THROTTLE ZEL GRIP - F-100D-91 AIRPLANES. The spring-loaded swing-out handgrip (17, figure 1-8) helps the pilot maintain full throttle during high accelerations of zero-length launching. (Use of this grip is not necessary during normal take-offs.)

Engine Master Switch.

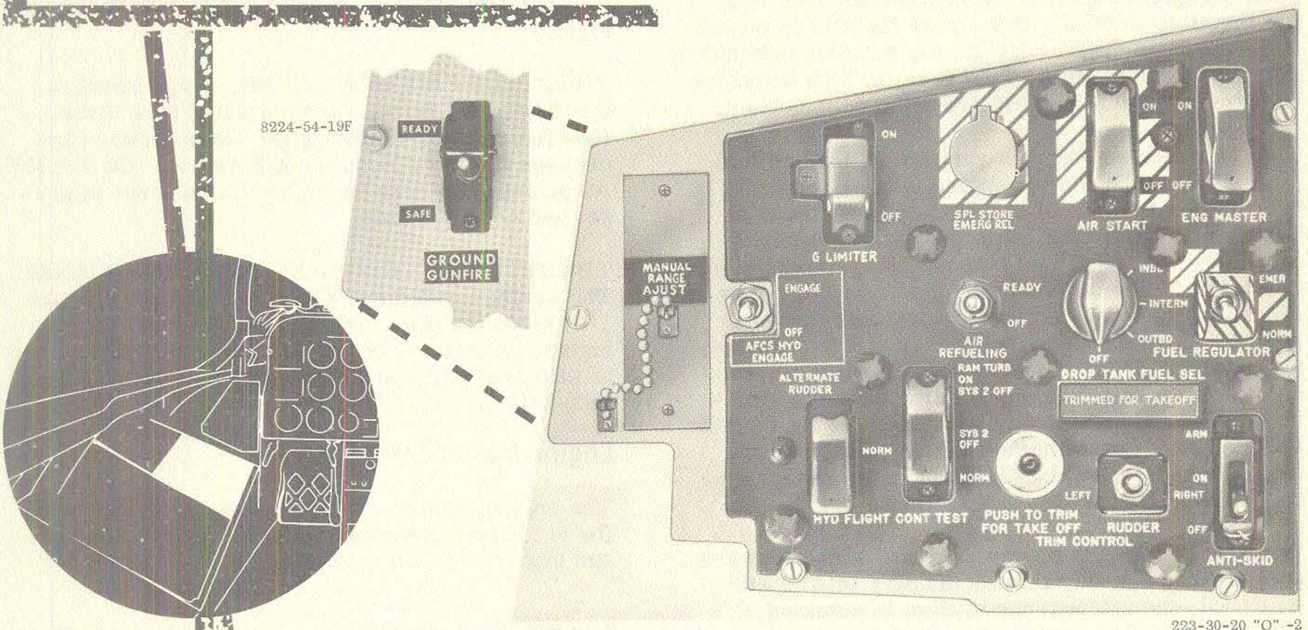
The engine master switch (figure 1-19) controls (by primary bus power) electrical power for various engine and fuel system units.

NOTE On F-100F Airplanes the engine master switch in the rear cockpit is safetied at ON. The safety wire can be broken in an emergency.

- Both switches must be ON for the circuits controlled by the master switch to be operable.

When the switch is ON, the fuel system shutoff valve is opened and the tank-mounted fuel transfer pumps are actuated if main ac bus power is available. Moving the switch to ON also completes the circuits to the starter and ignition button, to the fuel regulator selector switch, and to the throttle-actuated limit switch, so that the tank-mounted fuel booster pumps will operate when the throttle is moved from OFF. The power circuit to the wing tank scavenge pumps is also completed when the engine master switch is ON (if the throttle is not OFF) to permit these pumps to function when actuated by float switches in the fuselage forward tank. When the engine master switch is moved to OFF (switch guard raised), the fuel system shutoff valve is closed, the fuel booster, transfer, and scavenge pumps are shut off, and the ignition circuit is interrupted. If the master switch is used in an emergency to shut down the engine, the effective thrust decreases rapidly. However, the time required for thrust to decrease to idle at sea level varies between about 13 seconds from Military Thrust and about 10 seconds from 70% rpm. (These times are altered slightly by altitude and by temperatures that differ from Standard Day conditions.)

ENGINE AND FLIGHT CONTROL PANEL



NOTE

- Nomenclature on indicator light shown illuminated for information only.

F-100F REAR COCKPIT

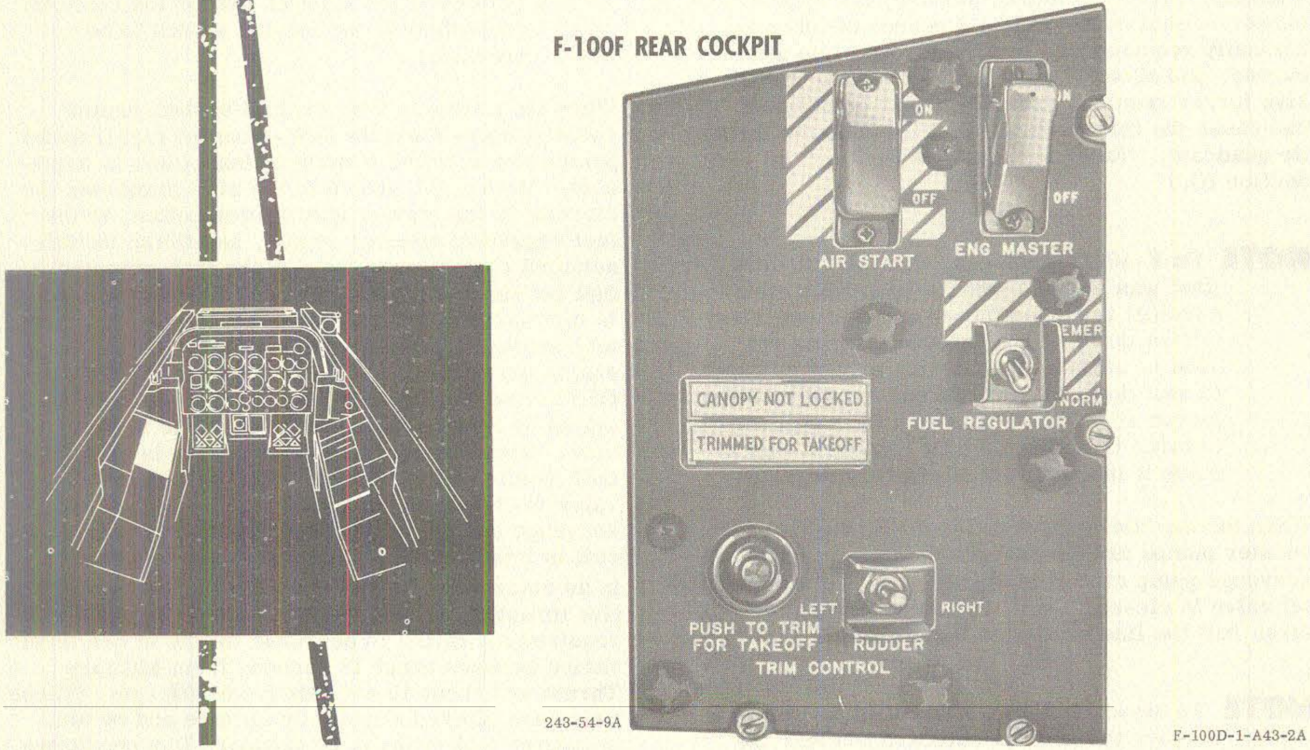


Figure 1-19

This use of the engine master switch is not comparable to throttle action.

Fuel Regulator Selector Switch.

The primary-bus-powered fuel regulator selector switch (figure 1-19) positions the emergency shuttle valve in the fuel control unit, to select either the normal or the emergency fuel control system and is effective only when the engine master switch is ON. When the switch is at NORM, the shuttle valve is positioned so that fuel flow is controlled by the normal fuel control system. (On F-100F Airplanes, the fuel regulator switches in both cockpits must be at NORM to permit normal operation of the fuel control system.) If the normal fuel control fails or does not function properly, moving the switch to EMER positions the valve so that fuel flow is regulated by the emergency fuel control system. (The normal fuel control system is inoperative when the emergency system is engaged.) The fuel regulator selector switch is effective only when the engine master switch is ON.

ENGINE INDICATORS.

Engine Pressure Ratio Gage.

The engine pressure ratio gage (22, figure 1-6; 23, figure 1-7; 17, figure 1-11) shows the ratio of engine turbine discharge pressure to pitot pressure. The gage is used to determine whether engine thrust at full throttle is acceptable for take-off. (Refer to "Thrust-RPM Relationship" in Section VII.) Windows in the dial face show the take-off pressure ratio and the cruise pressure ratio, which are adjustable by the index marker adjustment knob. Pushing in and turning the knob sets the take-off pressure ratio (figure 2-5) and moves the take-off index marker to the dial setting that corresponds to the figures in the "TAKE-OFF" window. Pulling out and turning the knob sets the cruise pressure ratio and moves the cruise index marker to correspond with the figures in the "CRUISE" window. Because of the lag in the instrument, the indicating pointer may be slow to respond to throttle movements and is not satisfactory for cruise use. The pressure ratio gage is powered by single-phase power from the main ac bus.

NOTE If main ac bus power fails, the gage becomes inoperative and the indicating pointer remains fixed at the setting prevailing at the time of power failure.

Exhaust Temperature Gage.

The exhaust temperature gage (18, figure 1-6; 22, figure 1-7; 19, figure 1-11) shows engine exhaust temperature in degrees centigrade. Gage indications are received from thermocouples in the tail pipe. The temperature indicator system is of the self-generating type and, therefore, does not require power from the airplane electrical system.

Oil Pressure Gage.

The engine oil pressure gage (17, figure 1-6; 19, figure 1-7; 15, figure 1-11) indicates oil pump discharge pressure above the gear case pressure in pounds per square inch. The gage is electrically operated and is powered by the single-phase ac instrument bus. (Refer to "Oil Pressure" in Section VII.)

Tachometer.

The tachometer (19, figure 1-6; 21, figure 1-7; 14, figure 1-11) registers engine speed in percentage of the approximate maximum rpm (9980) of the high-pressure compressor rotor. The tachometer receives its power from a tachometer generator that is geared to the engine accessory section driven by the high-pressure compressor rotor, and is therefore independent of the airplane electrical system.

NOTE Refer to "Thrust-RPM Relationship" in Section VII.

Fuel Flow Indicator.

The fuel flow indicator (24, figure 1-6, 26, figure 1-7; 20, figure 1-11) shows the rate of fuel flow from the fuel control unit to the engine in pounds per hour. The flow indicator is electrically operated by power from the single-phase ac instrument bus.

NOTE The flow indicator does not show fuel flow to the afterburner system.

- The fuel flow indicator indicates approximate fuel flow and is not for exact in-flight planning.

Emergency Fuel Regulator-on Indicator Light.

The placard-type emergency fuel regulator-on indicator light (figure 1-16) comes on when the emergency fuel control system is engaged by the fuel regulator selector switch. The light is powered by the primary bus, and operation of the bulbs in the light may be tested by the indicator light test circuit.

ENGINE STARTER AND IGNITION SYSTEMS.

Cartridge-Pneumatic Starter System.

The cartridge-pneumatic, turbine-type starter is a self-contained unit that requires no ground support equipment when the cartridge mode is used.

The starter turbine is driven by hot high-pressure gases from a replaceable cartridge with a slow-burning propellant that is electrically fired when the starter and ignition button is pressed. (On F-100D Airplanes, a spare cartridge is carried in the left ammunition can bay.) The cartridge starter loading breech is within an access panel near the external air receptacle. (See figure 1-37.) Near the breech is a warning light to indicate electrical power to the cartridge firing circuit. If a cartridge start is not required, a normal pneumatic start can be accomplished using an external source of compressed air. (The receptacle for connecting the air supply line is within an access door on the lower surface of the fuselage, behind the main gear wheel wells.) However, before a pneumatic start is made, the cartridge must be removed from the starter breech and stored.

NOTE A switch, actuated by the external air source hose, makes the cartridge firing circuit inoperative when the hose is connected for a pneumatic start.

- For cartridge malfunctions, refer to "Engine Starter Cartridge Malfunctions" in Section VII.

CARTRIDGE POWER-ON WARNING LIGHT. The cartridge power-on warning light (figure 1-37), in the cartridge starter bay, is powered by the primary bus and comes on to warn that the firing circuit is energized. This red push-to-test light should always be checked and/or tested before a cartridge is inserted or removed.

Ignition System.

The engine ignition system is used only during engine starting, because combustion is continuous after the engine is operating. The system has two high-frequency ignition units (which convert dc power from the primary bus to high-tension ac) and two igniter plugs. If the engine fails to start and the starter is shut off, the ignition circuit is de-energized at the same time. A separate switch permits the ignition circuit to be engaged for air starts.

Engine Starter and Ignition System Controls and Indicators.

THROTTLE. Refer to "Engine Controls" in this section.

ENGINE MASTER SWITCH. Refer to "Engine Controls" in this section.

STARTER AND IGNITION BUTTON. The starter and ignition button (figure 1-26), not in the rear cockpit, controls pneumatic and cartridge ground starts. With the engine master switch on, pressing the starter and ignition button energizes the starter control relay and directs power to the starter cartridge igniter when a cartridge start is made. When the throttle is moved outboard from OFF, after the button is pressed, primary bus power energizes the engine ignition circuit. (If the engine master switch is ON and the throttle is OFF, pressing the starter and ignition button fires the cartridge. The starter control relay keeps the starter and ignition circuits energized until engine rpm reaches about 50%. Both circuits are then opened automatically by centrifugal switches. An engine ignition-on indicator light is in the cap of the starter and ignition button.

AIR START SWITCH. The two-position air start switch (figure 1-19) is used to energize the ignition circuit for in-flight engine starts. Moving the switch to ON, when the engine master and battery switches are ON and the throttle is moved from OFF, directs primary bus power to the ignition units. While the air start switch is ON, the dc generator is automatically cut out of the electrical system and the power source for the ac instrument busses is transferred from the ac generator to the standby instrument inverter. DC generator output is automatically restored when the air start switch is moved to OFF.

STARTER AND IGNITION STOP BUTTON. The starter and ignition stop button (figure 1-26) is used during ground starting to shut off the starter and ignition circuits if the engine fails to start, or whenever it is necessary to abort a ground start. Pressing the button cuts off primary bus power to the ignition and starter control circuits so that the ignition circuit is de-energized. It is not necessary to use the button after normal starts or after an air start.

ENGINE IGNITION-ON INDICATOR LIGHT. The ignition-on indicator light (figure 1-26) in the cap of the starter and ignition button, is illuminated by primary bus power whenever the engine ignition circuit is energized. The bulb in the ignition-on light may be tested for operation by the indicator light test circuit. On F-100F Airplanes, the rear cockpit light is a separate push-to-test type.

ENGINE AFTERBURNER SYSTEM.

Afterburning increases exhaust temperature, which increases the exhaust velocity for additional thrust. Because of its high fuel consumption, the afterburner is intended to be operated for short operational periods only. Afterburner operation is controlled by inboard and outboard movement of the throttle.

AFTERBURNER FUEL CONTROL.

Fuel flow to the afterburner system is controlled and regulated by the afterburner fuel control. (See figure 1-17.) When the throttle is moved outboard, the afterburner shuttle valve in the engine-driven fuel pump unit is opened electrically to send fuel from the afterburner element of the pump to the afterburner fuel control. The control supplies metered fuel to the afterburner igniter, and the afterburner fuel spray bars. Unmetered fuel from the control actuates the exhaust nozzle control unit to open the nozzle.

Fuel flow from the afterburner fuel control is controlled by compressor discharge pressure. Because this pressure is governed by airspeed, altitude, and engine speed, the pilot has no direct control over afterburner fuel flow. However, during afterburner operation, a thrust variation, ranging between the maximum available thrust and the equivalent of about 50 percent afterburning, can be obtained by advancing or retarding the throttle (in the AFTERBURNER range) to change engine speed. The afterburner range extends from Military Thrust to about 13 percent below Military Thrust rpm. When the throttle is moved inboard, the afterburner shuttle valve shuts off all fuel flow to the afterburner fuel control. The control assumes a full bypass condition so that afterburner fuel pressure drops enough to shut down the afterburner system and close the exhaust nozzle.

EXHAUST NOZZLE.

The two-position, multiple-segment type exhaust nozzle, at the end of the tail pipe provides the proper exhaust nozzle area for either normal (minimum nozzle area) or afterburner engine operation (fully opened). Positioning of the nozzle segments is done automatically by the exhaust nozzle control unit. A series of short-iris nozzle seal fingers, between the afterburner nozzle and the tail pipe, prevents the leakage of exhaust gases into the aft fuselage area. If five or more seal fingers are broken or missing, or if two are broken or missing which are adjacent, the airplane should not be flown.

Exhaust Nozzle Control Unit.

The exhaust nozzle position is controlled by pressure of the unmetered fuel from the afterburner fuel control through the exhaust nozzle control unit. (See figure 1-17) When the afterburner is selected, this pressure moves a valve in the nozzle control which directs compressor discharge air pressure to the nozzle actuators to open the nozzle segments. Moving the throttle inboard shuts off unmetered afterburner fuel pressure to the nozzle control unit. The valve in the control unit then routes engine compressor air to the "close" side of the nozzle actuators to close the nozzle segments.

AFTERBURNER IGNITER.

Metered fuel from the afterburner fuel control fills the igniter unit discharge chamber and is injected into one burner can of the engine. (See figure 1-17.) This excessively rich fuel-air mixture forms a longer than normal flame front which continues to burn past the turbines. The extended flame provides "hot-streak" ignition to ignite the fuel being discharged from the afterburner fuel spray bars. The igniter is actuated only when full pressure is built up in the afterburner manifold. A recirculating-type afterburner igniter and associated afterburner improvements ensure satisfactory afterburner ignition above 45,000 feet, and blowout-free operation up to the service ceiling of the airplane. No repeater mechanism is incorporated in the igniter, and the unit does not recycle until the afterburner fuel pressure is shut off and then restored (throttle moved inboard, then outboard).

AFTERBURNER EMERGENCY SHUTOFF.

The afterburner is shut off mechanically by the throttle if the normal electrical control fails. This shutoff also permits pilot selection of in-flight cruise thrust settings that offer low fuel consumption in case of an afterburner electrical shutoff failure. The emergency shutoff shuts down the afterburner indirectly by a bypass valve that is opened mechanically when the throttle has been moved inboard and then retarded to a setting that gives about 1/2% rpm less than that at minimum afterburner. (See figure 1-17.) If the afterburner did not shut down electrically, the open bypass valve will bypass all fuel entering the afterburner system and return it to the discharge of the centrifugal element of the engine-driven fuel pump. This shuts down afterburner operation and closes the exhaust nozzle. (If the afterburner had shut off normally, the open bypass valve would not affect the system.) Whenever the throttle is advanced through the afterburner cutoff range, the bypass valve is closed to permit afterburner operation.

NOTE If normal electrical control of the afterburner has failed and the system has been shut down mechanically, readvancing the throttle closes the bypass valve, causing the exhaust nozzle to open and the afterburner to relight.

OIL SYSTEM.

The dry-sump, recirculating, pressure-type engine oil system is supplied from a 5.5 US gallon tank on the left side of the engine compressor section. (Total usable oil supply is 3 US gallons.) Oil flows from the tank to a gear-type pump which supplies oil under pressure to lubricate and cool bearings and gears within the engine. (A separate, independent oil system supplies oil for the ac generator constant-speed drive unit.) Scavenged oil is picked up by six gear-type pumps and sent through a fuel-cooled oil cooler and is then returned to the tank to repeat the oil flow cycle. The fuel-cooled oil cooler has a conventional regulator valve that allows the oil to bypass or go through the cooler, depending on oil temperature. (See figure 1-37 for oil specification.)

FUEL QUANTITY DATA

POUNDS AND US GALLONS

BASED ON: CALIBRATED DATA
DATA AS OF: FEBRUARY 1958

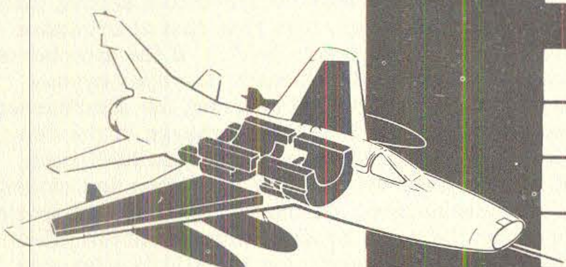
NOTE

- Weights given are for JP-4 based on a on a Standard Day fuel weight of 6.5 pounds per gallon.
- These values are based on optimum airplane attitude, including strut inflation. Under operational conditions, usable fuel totals will be somewhat less.

	USABLE FUEL IN LEVEL FLIGHT		FULLY SERVICED	
	POUNDS	GALLONS	POUNDS	GALLONS
FORWARD FUSELAGE TANK	2912	448	2932	451
INTERMEDIATE FUSELAGE TANK	1391	214	1424	219
AFT FUSELAGE TANK	702	108	715	110
INTEGRAL WING TANKS	2723	419	2750	423
DROP TANKS (450 GAL EACH)	2925	450	2938	452
DROP TANKS (335 GAL EACH)	2178	335	2197	338
DROP TANKS (275 GAL EACH)	1787	275	1800	277
DROP TANKS (200 GAL EACH)	1300	200	1313	202

TOTAL USABLE FUEL

WITHOUT DROP TANKS	7728 POUNDS	1189 GALLONS
WITH TWO 275-GALLON DROP TANKS	11,302 POUNDS	1739 GALLONS
WITH TWO 335-GALLON DROP TANKS	12,084 POUNDS	1859 GALLONS
WITH TWO 450-GALLON DROP TANKS	13,578 POUNDS	2089 GALLONS
WITH TWO 275-GALLON AND TWO 200-GALLON DROP TANKS	13,902 POUNDS	2139 GALLONS



F-100D-1-A48-2A

Figure 1-20

OIL OVERHEAT CAUTION LIGHT.

The placard-type oil overheat caution light (figure 1-16) comes on by primary bus power when engine oil temperature is higher than about 127°C (260°F), and may indicate an engine malfunction as well as a malfunction of the oil cooling system. Bulbs in the light can be checked by the indicator light test circuit.

AIRPLANE FUEL SYSTEM.

The airplane fuel system includes three tanks in the fuselage and a tank in each wing. Drop tanks may be installed on the underside of the wings. All internal fuel is sequenced automatically by gravity and electrical fuel transfer pumps to maintain the fuel distribution within the CG limits of the airplane. Fuel is transferred from all internal tanks and drop tanks to the fuselage forward tank. (Refer to "Fuel Transfer" in Section VII.) All fuel to the engine passes through an inverted-flight tank in the right cell of the intermediate tank. The inverted-flight tank retains about 1.6 gallons, for brief periods of flight at negative G. The internal tanks are serviced by single-point pressure refueling and can be refueled in flight by the probe-and-drogue method. (Refer to "Pressure Refueling System" in Section IV.) Fuel tank capacities are listed in figure 1-20; fuel specifications are given in figure 1-37.

FUEL TANK VENTING.

The fuselage tanks are vented by manifold lines through the vent outlet, above the rudder. The integral wing tanks are climb-vented through the fuselage forward tank and are dive-vented through inlet valves in the lower surface of each wing.

DROP TANKS.

Each wing has three drop tank mounting stations: inboard, intermediate, and outboard. Each inboard and outboard station can carry a 200-gallon drop tank; the intermediate drop tank station, however, has two individual mounting locations, one for a 200-gallon drop tank and the other for a 275- or 335-gallon drop tank. A 450-gallon drop tank can be hung on the 200-gallon drop tank intermediate mounting station.

NOTE Because of tank structural differences, drop tanks are classified in one of four types: Type I, II, III, or IV. Types II and IV drop tanks are limited-service tanks which are generally identified by stencil markings that can be seen from the cockpit. Because of their construction, these tanks (Type II and IV) have lower operating limitations than the Type I and III tanks of corresponding size.

The 200-gallon and 450-gallon drop tanks are hung on jettisonable pylons; the 275- or 335-gallon drop tanks have integral-type mounting pylons which are released with the tanks. (Refer to Section V for approved drop tank installations.) When drop tank fuel supply is selected, engine compressor air pressurizes the selected drop tanks and forces fuel into the fuselage forward tank upper cell. Drop tank fuel transfer is controlled automatically by a fuel level control valve in the forward tank. The 200- or 275-gallon drop tanks must be filled individually through their conventional filler openings. The 450- and 335-gallon drop tanks can be filled on the ground by single-point pressure refueling and in flight by the probe-and-drogue method. (Refer to "Pressure Refueling System" in Section IV.) Electrical and mechanical jettison systems are provided for drop tank release.

FUEL TRANSFER PUMPS.

Fuel is transferred from the aft and intermediate fuselage tanks into the fuselage forward tank by two main ac bus powered, tank-mounted pumps. (One transfer pump is in the aft tank, and one is in the left cell of the intermediate tank.) The transfer pumps run continuously, when the engine master switch is ON, but do not transfer fuel until the fuselage forward tank fuel level control valves open and admit fuel.

NOTE If the aft tank transfer pump fails, fuel from this tank is transferred to the intermediate tank by gravity flow.

- If the intermediate tank transfer pump fails, suction feed of the engine-driven fuel pump opens the suction-feed valve in the inverted flight tank to supply fuel to the engine from the intermediate tank.

FUEL BOOSTER PUMPS.

Fuel is supplied, under pressure, from the fuselage forward tank through the fuel manifold and inverted-flight tank to the engine by three electrically driven, tank-mounted booster pumps in the forward tank (two in the upper cell and one in the lower cell). Operation of these pumps is continuous when the engine master switch is ON and the throttle is moved from OFF. The two booster pumps in the upper cell of the fuselage forward tank are powered by the main ac bus. The booster pump in the forward tank lower cell is energized by dc power from the primary bus.

NOTE If booster pump failure occurs, the check valves in the fuel manifold and in the inverted-flight tank permit the engine-driven fuel pump to supply fuel to the engine by suction feed.

WING TANK FUEL SCAVENGE PUMPS.

Fuel that does not transfer from the integral wing tanks to the fuselage forward tank upper cell by gravity flow is transferred by two electrically driven fuel scavenge pumps, one in each wing. Both scavenge pumps are powered and controlled by dc power from the primary bus. The pumps are energized (if the engine master switch is ON and the throttle is moved from OFF) by float switches in the forward tank upper cell, and are operated by the lowering of the fuel level in this cell. If the control power for the scavenge pumps is not available, the pumps are energized regardless of the fuel level, provided the primary bus power is available.

NOTE Operation of the scavenge pumps can be checked on the ground by a test switch in the left main gear wheel well.

FUEL SYSTEM SHUTOFF VALVE.

The electric-motor-actuated shutoff valve, in the fuel line between the tanks and the engine-driven fuel pump unit, is controlled by the engine master switch when primary bus power is available. The shutoff valve closes when the engine master switch is moved to OFF, and opens when the switch is ON.

AIRPLANE FUEL SYSTEM CONTROLS AND INDICATORS.

Drop Tank Fuel Selector Switch.

Drop tank fuel is controlled by a four-position selector switch (not in the rear cockpit). (See figure 1-19.) When the selector is OFF, tertiary bus power closes all the normally open solenoid-operated shutoff valves that control airflow from the engine compressor to the drop tanks. When a drop tank station is selected, the shutoff valves for the selected drop tanks are de-energized and open

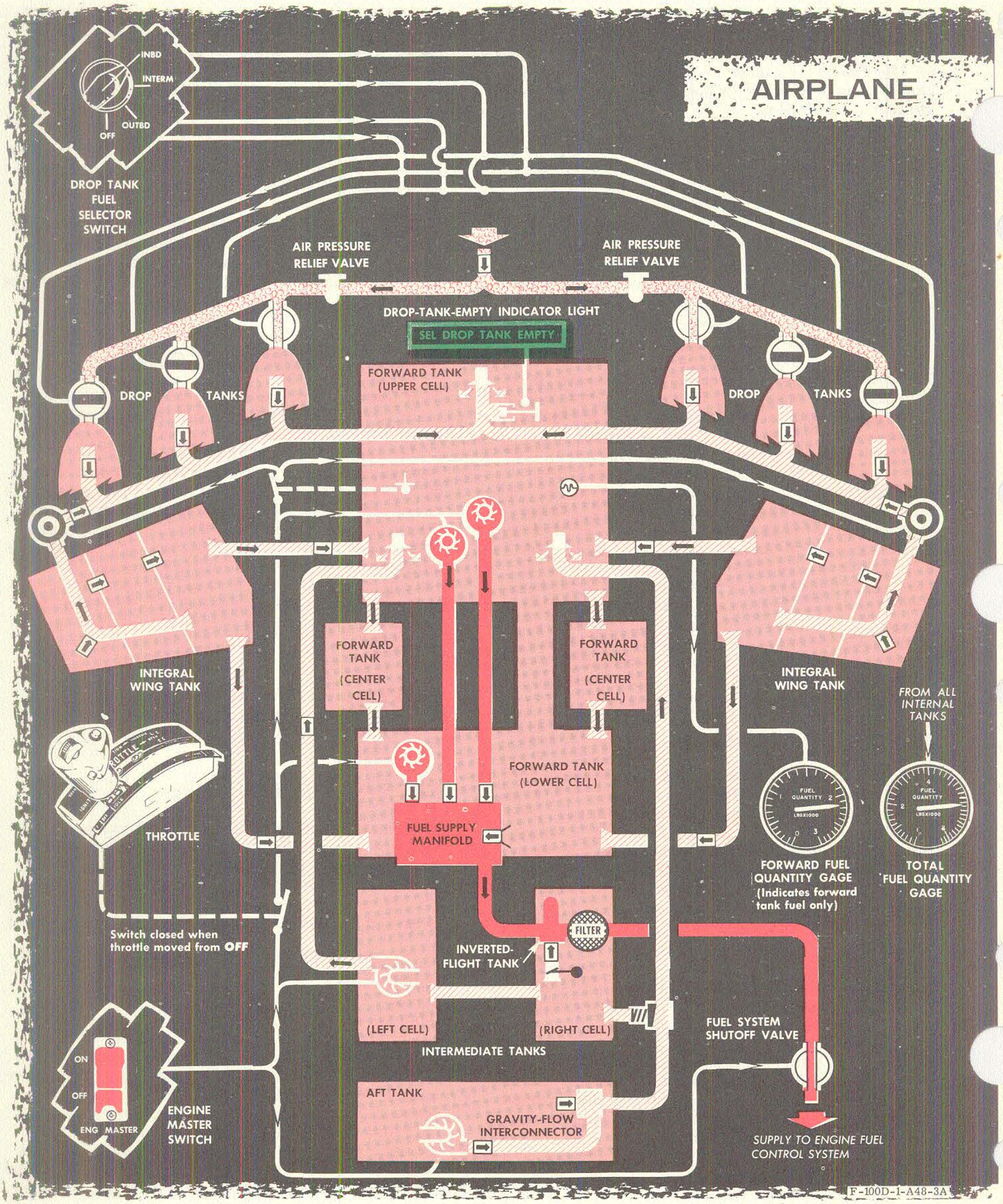
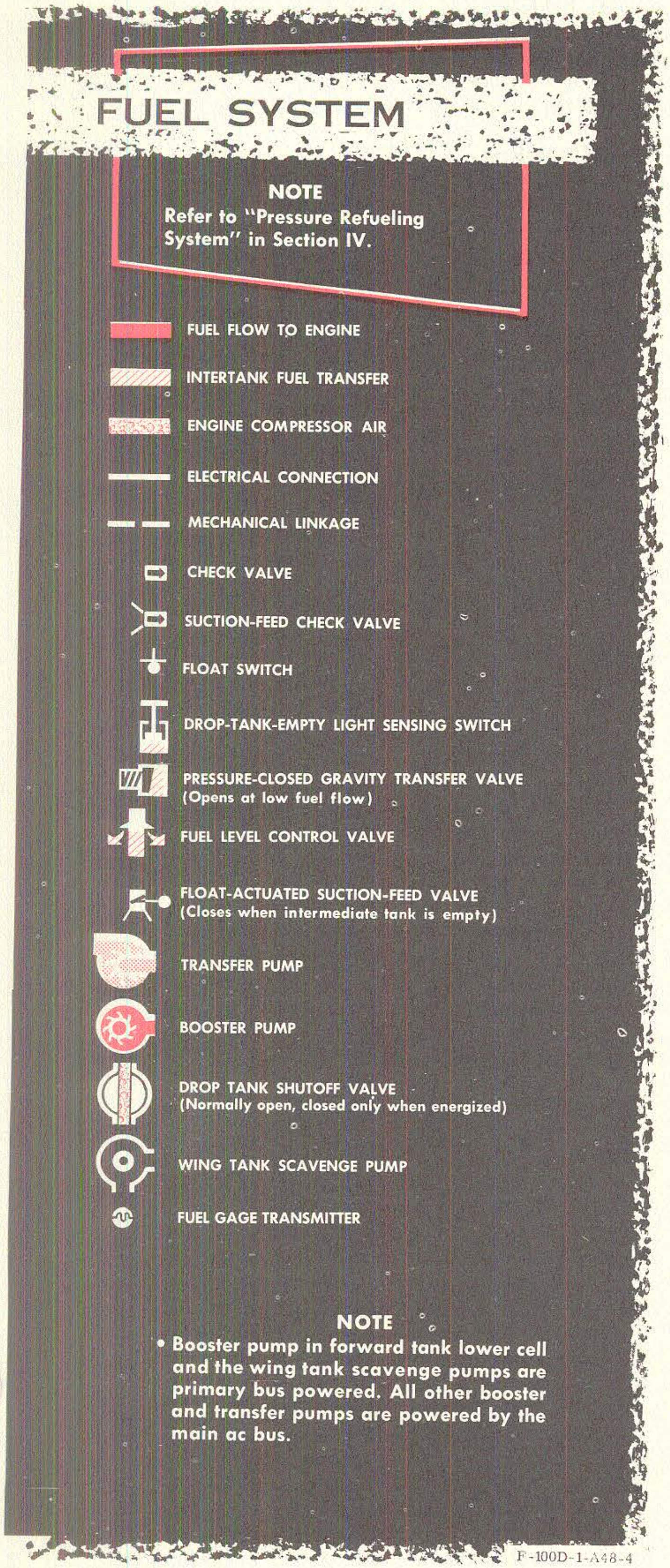

AIRPLANE
INBD
INTERM
OUTBD
OFF
DROP TANK FUEL SELECTOR SWITCH
AIR PRESSURE RELIEF VALVE
AIR PRESSURE RELIEF VALVE
DROP-TANK-EMPTY INDICATOR LIGHT
SEL DROP TANK EMPTY
FORWARD TANK (UPPER CELL)
DROP TANKS
DROP TANKS
INTEGRAL WING TANK
INTEGRAL WING TANK
FORWARD TANK (CENTER CELL)
FORWARD TANK (CENTER CELL)
FORWARD TANK (LOWER CELL)
FUEL SUPPLY MANIFOLD
THROTTLE
FROM ALL INTERNAL TANKS
FORWARD FUEL QUANTITY GAGE (Indicates forward tank fuel only)
TOTAL FUEL QUANTITY GAGE
Switch closed when throttle moved from OFF
FILTER
INVERTED-FLIGHT TANK
(LEFT CELL)
(RIGHT CELL)
INTERMEDIATE TANKS
FUEL SYSTEM SHUTOFF VALVE
ON
OFF
ENG MASTER
ENGINE MASTER SWITCH
AFT TANK
GRAVITY-FLOW INTERCONNECTOR
SUPPLY TO ENGINE FUEL CONTROL SYSTEM
F-100D-1-A48-3A

Figure 1-21



F-100D-1-A48-4

to allow engine compressor air to pressurize these tanks and force fuel into the fuselage forward tank.

NOTE If tertiary bus power fails, all drop tank shutoff valves open and fuel is transferred from all drop tanks simultaneously.

Warning To maintain proper CG conditions and desirable lateral control when symmetrically or asymmetrically mounted external loads are carried, drop tank fuel must be used in the manner prescribed in "Drop Tank Fuel Sequencing Limitations" in Section V.

Armament Selector Switch.

Refer to "Bombing Equipment Controls" in Section IV.

External Load Emergency Jettison Button.

Refer to "Bombing Equipment Controls" in Section IV.

External Load Auxiliary Release Button.

Refer to "Bombing Equipment Controls" in Section IV.

External Load Emergency Jettison Handle.

Refer to "Bombing Equipment Controls" in Section IV.

Fuel Quantity Gages.

The fuel quantity gages (25, figure 1-6; 28, figure 1-7; 21, figure 1-11) indicate the total internal fuel supply. In addition to the total quantity gage, the airplane has a fuel quantity gage (27, figure 1-6; 30, figure 1-7; 24, figure 1-11) that indicates the amount of fuel in the fuselage forward tank. Because all fuel is transferred to the fuselage forward tank, this gage gives an indication of the proper operation of the fuel transfer system. It also prevents possible misinterpretation, based solely on the total quantity gage reading, of fuel available to the engine. (Refer to "Fuel Quantity Gages" in Section VII.) The fuel quantity indicating system, powered by the 3-phase ac instrument bus, is of the capacitor type. The system automatically compensates for changes in fuel density so that the quantity gage readings indicate the actual number of pounds of fuel, regardless of the type of fuel used or regardless of fuel expansion or contraction caused by temperature changes.

NOTE When drop tank fuel is used before internal fuel, the fuel quantity gage shows a continuous decrease in fuel supply only after the drop tanks have been emptied and the engine begins to use fuel from the internal tanks.

- Because of the high rate of fuel flow to the engine during afterburner operation at low altitudes, the transfer rate of fuel from the drop tanks will not be sufficient to maintain a constant fuel level in the internal tanks, and use of internal fuel may occur before drop tank fuel is exhausted.

Drop Tank Fuel Quantity Gages.

Fuel quantity gages (2, figures 1-6 and 1-7) may be installed to indicate the amount of fuel in the 335- or 450-gallon drop tanks. Refer to "Pressure Refueling System" in Section IV.

Fuel Quantity Gage Test Button.

Operation of the total and forward tank fuel quantity gages can be checked by a test button. When the test button is held down, the pointers of both gages move counterclockwise toward "0." When the button is released, the pointers should return to their former positions. If either pointer fails to move or does not return to its previous setting, the fuel quantity gage or gage system is faulty.

NOTE Rate of pointer movement does not indicate proper operation of the gage or gage system.

Drop-tank-empty Indicator Light.

A tertiary-bus-powered placard-type light (figure 1-16), comes on when the selected drop tanks become empty. Bulbs within the light can be checked by the indicator light test circuit. The drop-tank-empty indicator light is inoperative when the drop tank fuel selector is OFF.

NOTE The drop-tank-empty indicator light may blink before the selected drop tanks are empty. The light will come on when an asymmetrically mounted tank is empty or a draining condition exists.

ELECTRICAL POWER SUPPLY SYSTEM.

The 28-volt dc system is powered by an engine-driven generator, and has a 24-volt, 24-ampere-hour battery for a stand-by power source. Power for the ac system is furnished by an engine-driven ac generator with a standby inverter. A transformer-rectifier permits the ac generator to power part of the dc system if the dc generator fails. During ground operation, ac and dc power can also be supplied by an external source.

DC ELECTRICAL POWER DISTRIBUTION.

Direct-current power is distributed from the four electrical busses: battery, primary, secondary, and tertiary. (See figures 1-22 and 1-23.)

Battery Bus.

The battery bus is connected directly to the battery, so that the essential equipment powered by this bus is operable as long as battery power is available, regardless of the battery switch position. The battery bus can also be powered by the primary bus or a dc external power source when the battery switch is ON (if enough battery power is available to energize the bus tie-in relay that joins the battery bus to the primary bus).

Primary Bus

The primary bus is powered directly by the dc generator or dc external power source, and can be energized by the battery when the battery switch is ON. If the dc generator fails, the primary bus becomes energized automatically by dc power supplied by the ac generator through the transformer-rectifier.

Secondary Bus.

The secondary bus is powered by the primary bus, when dc generator power, transformer-rectifier power, or dc external power is available to energize the secondary bus tie-in relay.

Tertiary Bus.

The tertiary bus is energized by the primary bus, when dc generator power or external dc power is available to energize the tertiary bus tie-in relay. There is no emergency means of energizing the tertiary bus.

Transformer-Rectifier.

The transformer-rectifier, powered by the main 3-phase ac bus, permits dc power to be supplied to the primary and secondary busses by the ac generator, if power is not available from the dc generator. The unit is engaged automatically only upon failure of dc generator power, provided the ac generator is still operating and regardless of the position of the dc generator switch. The transformer-rectifier reduces the voltage of the main 3-phase ac bus and converts it to dc power. The dc output of the transformer-rectifier is shown on the dc loadmeter. The transformer-rectifier is de-energized when ac external power is connected.

NOTE A transformer-rectifier lockout relay disconnects ac power to the transformer-rectifier whenever the dc busses are energized by the dc generator. This prevents the transformer-rectifier from supplying dc power when dc generator output is available.

AC ELECTRICAL POWER DISTRIBUTION.

Alternating current power is normally supplied by an engine-driven ac generator. The ac generator supplies power to the 115/200-volt, 400-cycle, 3-phase main ac bus, and is driven by a constant-speed unit. The 3-phase 115-volt instrument ac bus is normally powered by the main ac bus through an instrument power transformer. A single-phase 26-volt instrument ac bus for ac instruments (and a single-phase, 36-volt radio instrument ac bus on F-100F Airplanes only) is powered through a step-down transformer by one phase of the 3-phase instrument bus. If the ac generator or instrument transformer power fails, the 3-phase instrument ac bus can be energized by the primary dc bus-powered stand-by instrument inverter. (See figures 1-22 and 1-23.)

AC Generator Constant-speed Drive Unit.

The ac generator constant-speed drive (CSD) unit drives the ac generator at a constant speed to maintain a steady frequency rate of ac power output. An independent pressure-type oil system for the drive unit has a 1.6 US gallon tank on the upper right side of the engine compressor section. (See figure 1-37 for oil specification.)

Stand-by Instrument Inverter.

The stand-by instrument inverter powers the 3-phase and single-phase instrument busses, if the ac generator is not supplying power. The inverter is powered by the dc primary bus and is energized when the stand-by inverter switch is ON. When the air start switch is ON, ac generator power is removed from the instrument busses and the stand-by instrument inverter is energized automatically to power these busses for instrument operation during an air start. When the stand-by instrument inverter is operating, the instrument busses are disconnected from the main 3-phase ac bus.

ELECTRICALLY OPERATED EQUIPMENT.

See figures 1-22 and 1-23.

EXTERNAL ELECTRICAL POWER RECEPTACLES.

The ac and dc external electrical power receptacles (figure 1-37) are within access doors on the lower surface of the fuselage, behind the main gear wells. All dc busses except the battery bus are energized automatically when a dc external power source is connected to the receptacle. (The battery bus can be energized by external power when the battery switch is ON, provided there is enough battery power to close the tie-in relay that connects the battery bus to the primary bus.) All ac busses are energized by the ac external source, provided the ac generator is not "on the line."

NOTE To make ac external power effective, the primary bus must be hot if the ac external power source does not supply its own dc power.

CIRCUIT BREAKERS AND FUSES.

All the dc electrical distribution circuits are protected by push-to-reset type, trip-free circuit breakers which cannot be reset as long as the overload condition exists. (Refer to "Circuit-breaker Use" in Section VII.) All the ac distribution circuits are equipped with fuses. The power supply circuits to the dc and ac busses are not protected. Circuit breakers and fuses that are accessible in the cockpit are on panels at each side of the cockpit. Circuit breakers and fuses are not duplicated in each cockpit on F-100F Airplanes. (See figures 1-24 and 1-25.)

ELECTRICAL POWER SUPPLY SYSTEM CONTROLS.

Battery Switch.

With the battery switch (figure 1-26) ON, the primary bus is connected to the battery bus and is powered by the battery, provided no other source (dc generator or external power) is supplying the electrical system. (On F-100F Airplanes, the rear cockpit switch is safetied ON to place complete control of the battery in the front cockpit. Both battery switches must be ON for the circuits controlled by these switches to be effective.) The battery bus can be energized by the primary bus when the battery switch is ON if enough battery power is available to close the battery-to-primary-bus tie-in relay. When the battery switch is OFF, the primary bus is disconnected from the battery bus and battery power is furnished only to those units connected to the battery bus.

DC Generator Switch.

A three-position switch (figure 1-26) controls the dc generator. (On F-100F Airplanes, the rear cockpit switch is safetied ON to place complete control of the dc generator in the front cockpit, as both switches must be at ON for generator operation. The safety wire must be broken to move the rear cockpit generator switch to OFF or RESET.) When engine speed is above about 40% rpm, and the switch is ON, generator output is supplied to the dc system. If a malfunction cuts out the generator, the dc generator switch should be held momentarily at RESET and then returned to ON to restore normal generator operation. The dc generator is "off the line" when the switch is OFF.

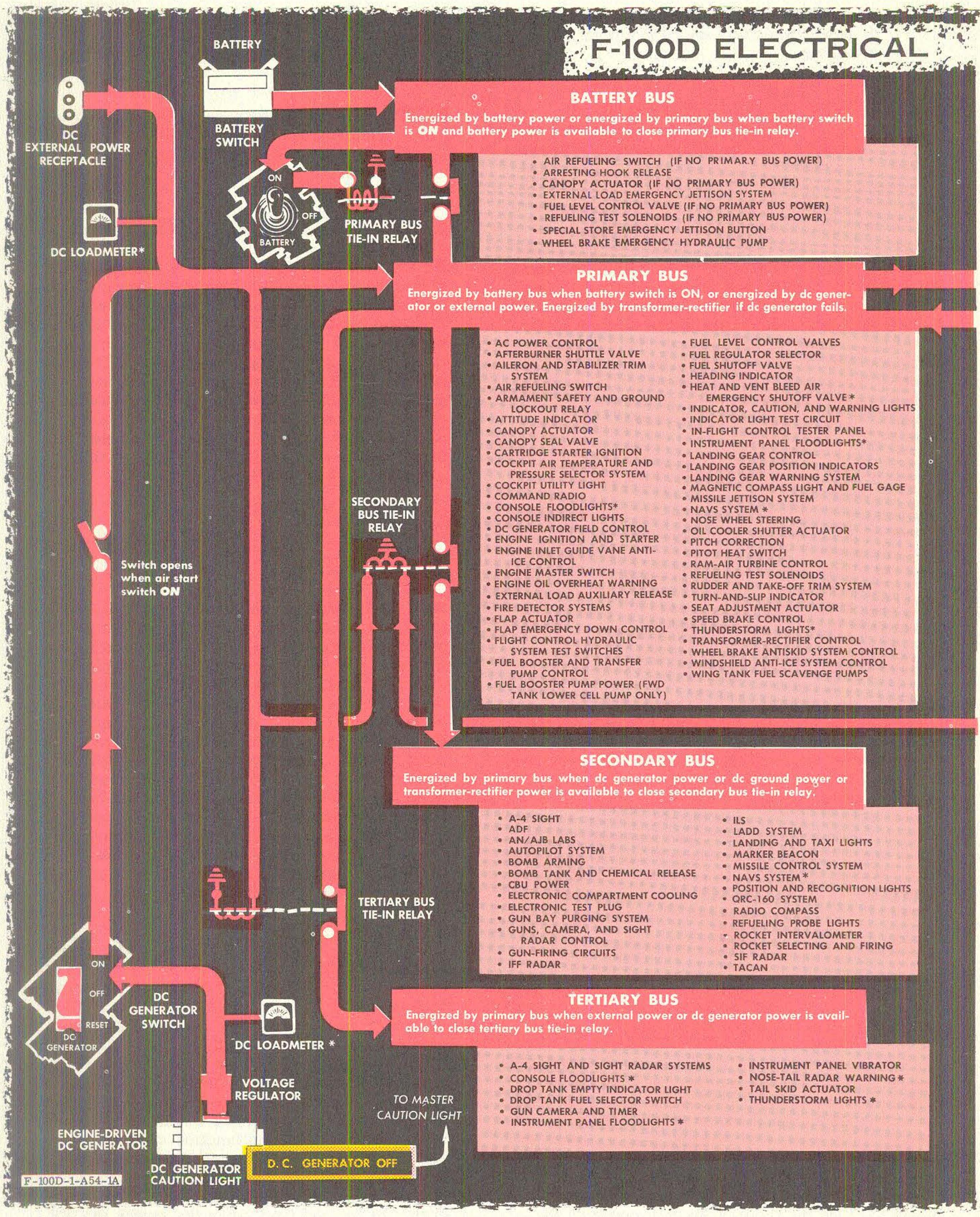
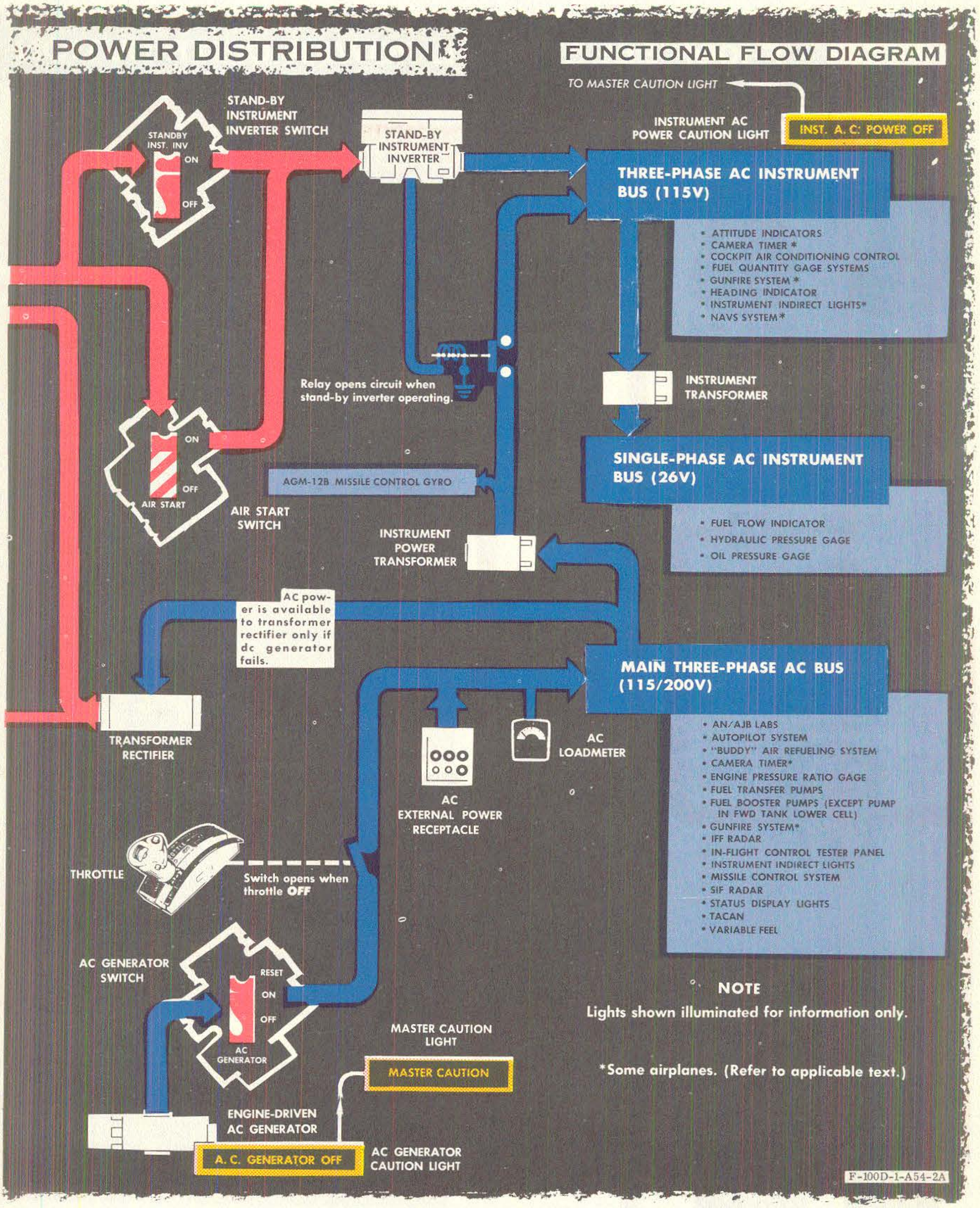

F-100D ELECTRICAL
BATTERY
DC EXTERNAL POWER RECEPTACLE
BATTERY SWITCH
ON
OFF
BATTERY
PRIMARY BUS TIE-IN RELAY
DC LOADMETER*
BATTERY BUS
Energized by battery power or energized by primary bus when battery switch is ON and battery power is available to close primary bus tie-in relay.
• AIR REFUELING SWITCH (IF NO PRIMARY BUS POWER)
• ARRESTING HOOK RELEASE
• CANOPY ACTUATOR (IF NO PRIMARY BUS POWER)
• EXTERNAL LOAD EMERGENCY JETTISON SYSTEM
• FUEL LEVEL CONTROL VALVE (IF NO PRIMARY BUS POWER)
• REFUELING TEST SOLENOIDS (IF NO PRIMARY BUS POWER)
• SPECIAL STORE EMERGENCY JETTISON BUTTON
• WHEEL BRAKE EMERGENCY HYDRAULIC PUMP
PRIMARY BUS
Energized by battery bus when battery switch is ON, or energized by dc generator or external power. Energized by transformer-rectifier if dc generator fails.
• AC POWER CONTROL
• AFTERBURNER SHUTTLE VALVE
• AILERON AND STABILIZER TRIM SYSTEM
• AIR REFUELING SWITCH
• ARMAMENT SAFETY AND GROUND LOCKOUT RELAY
• ATTITUDE INDICATOR
• CANOPY ACTUATOR
• CANOPY SEAL VALVE
• CARTRIDGE STARTER IGNITION
• COCKPIT AIR TEMPERATURE AND PRESSURE SELECTOR SYSTEM
• COCKPIT UTILITY LIGHT
• COMMAND RADIO
• CONSOLE FLOODLIGHTS*
• CONSOLE INDIRECT LIGHTS
• DC GENERATOR FIELD CONTROL
• ENGINE IGNITION AND STARTER
• ENGINE INLET GUIDE VANE ANTI-ICE CONTROL
• ENGINE MASTER SWITCH
• ENGINE OIL OVERHEAT WARNING
• EXTERNAL LOAD AUXILIARY RELEASE
• FIRE DETECTOR SYSTEMS
• FLAP ACTUATOR
• FLAP EMERGENCY DOWN CONTROL
• FLIGHT CONTROL HYDRAULIC SYSTEM TEST SWITCHES
• FUEL BOOSTER AND TRANSFER PUMP CONTROL
• FUEL BOOSTER PUMP POWER (FWD TANK LOWER CELL PUMP ONLY)
• FUEL LEVEL CONTROL VALVES
• FUEL REGULATOR SELECTOR
• FUEL SHUTOFF VALVE
• HEADING INDICATOR
• HEAT AND VENT BLEED AIR EMERGENCY SHUTOFF VALVE*
• INDICATOR, CAUTION, AND WARNING LIGHTS
• INDICATOR LIGHT TEST CIRCUIT
• IN-FLIGHT CONTROL TESTER PANEL
• INSTRUMENT PANEL FLOODLIGHTS*
• LANDING GEAR CONTROL
• LANDING GEAR POSITION INDICATORS
• LANDING GEAR WARNING SYSTEM
• MAGNETIC COMPASS LIGHT AND FUEL GAGE
• MISSILE JETTISON SYSTEM
• NAVS SYSTEM *
• NOSE WHEEL STEERING
• OIL COOLER SHUTTER ACTUATOR
• PITCH CORRECTION
• PITOT HEAT SWITCH
• RAM-AIR TURBINE CONTROL
• REFUELING TEST SOLENOIDS
• RUDDER AND TAKE-OFF TRIM SYSTEM
• TURN-AND-SLIP INDICATOR
• SEAT ADJUSTMENT ACTUATOR
• SPEED BRAKE CONTROL
• THUNDERSTORM LIGHTS*
• TRANSFORMER-RECTIFIER CONTROL
• WHEEL BRAKE ANTISKID SYSTEM CONTROL
• WINDSHIELD ANTI-ICE SYSTEM CONTROL
• WING TANK FUEL SCAVENGE PUMPS
SECONDARY BUS TIE-IN RELAY
Switch opens when air start switch ON
SECONDARY BUS
Energized by primary bus when dc generator power or dc ground power or transformer-rectifier power is available to close secondary bus tie-in relay.
• A-4 SIGHT
• ADF
• AN/AJB LABS
• AUTOPILOT SYSTEM
• BOMB ARMING
• BOMB TANK AND CHEMICAL RELEASE
• CBU POWER
• ELECTRONIC COMPARTMENT COOLING
• ELECTRONIC TEST PLUG
• GUN BAY PURGING SYSTEM
• GUNS, CAMERA, AND SIGHT RADAR CONTROL
• GUN-FIRING CIRCUITS
• IFF RADAR
• ILS
• LADD SYSTEM
• LANDING AND TAXI LIGHTS
• MARKER BEACON
• MISSILE CONTROL SYSTEM
• NAVS SYSTEM*
• POSITION AND RECOGNITION LIGHTS
• QRC-160 SYSTEM
• RADIO COMPASS
• REFUELING PROBE LIGHTS
• ROCKET INTERVALOMETER
• ROCKET SELECTING AND FIRING
• SIF RADAR
• TACAN
TERTIARY BUS TIE-IN RELAY
ON
OFF
RESET
DC GENERATOR
DC GENERATOR SWITCH
DC LOADMETER *
TERTIARY BUS
Energized by primary bus when external power or dc generator power is available to close tertiary bus tie-in relay.
• A-4 SIGHT AND SIGHT RADAR SYSTEMS
• CONSOLE FLOODLIGHTS *
• DROP TANK EMPTY INDICATOR LIGHT
• DROP TANK FUEL SELECTOR SWITCH
• GUN CAMERA AND TIMER
• INSTRUMENT PANEL FLOODLIGHTS *
• INSTRUMENT PANEL VIBRATOR
• NOSE-TAIL RADAR WARNING *
• TAIL SKID ACTUATOR
• THUNDERSTORM LIGHTS *
VOLTAGE REGULATOR
TO MASTER CAUTION LIGHT
ENGINE-DRIVEN DC GENERATOR
D. C. GENERATOR OFF
DC GENERATOR CAUTION LIGHT
F-100D-1-A54-1A

Figure 1-22


POWER DISTRIBUTION
FUNCTIONAL FLOW DIAGRAM
TO MASTER CAUTION LIGHT
INSTRUMENT AC POWER CAUTION LIGHT
INST. A. C. POWER OFF
STAND-BY INSTRUMENT INVERTER SWITCH
STANDBY INST. INV
ON
OFF
STAND-BY INSTRUMENT INVERTER
THREE-PHASE AC INSTRUMENT BUS (115V)
• ATTITUDE INDICATORS
• CAMERA TIMER *
• COCKPIT AIR CONDITIONING CONTROL
• FUEL QUANTITY GAGE SYSTEMS
• GUNFIRE SYSTEM *
• HEADING INDICATOR
• INSTRUMENT INDIRECT LIGHTS*
• NAVS SYSTEM*
Relay opens circuit when stand-by inverter operating.
INSTRUMENT TRANSFORMER
SINGLE-PHASE AC INSTRUMENT BUS (26V)
• FUEL FLOW INDICATOR
• HYDRAULIC PRESSURE GAGE
• OIL PRESSURE GAGE
AIR START
AIR START SWITCH
AGM-12B MISSILE CONTROL GYRO
INSTRUMENT POWER TRANSFORMER
AC power is available to transformer rectifier only if dc generator fails.
MAIN THREE-PHASE AC BUS (115/200V)
• AN/AJB LABS
• AUTOPILOT SYSTEM
• "BUDDY" AIR REFUELING SYSTEM
• CAMERA TIMER*
• ENGINE PRESSURE RATIO GAGE
• FUEL TRANSFER PUMPS
• FUEL BOOSTER PUMPS (EXCEPT PUMP IN FWD TANK LOWER CELL)
• GUNFIRE SYSTEM*
• IFF RADAR
• IN-FLIGHT CONTROL TESTER PANEL
• INSTRUMENT INDIRECT LIGHTS
• MISSILE CONTROL SYSTEM
• SIF RADAR
• STATUS DISPLAY LIGHTS
• TACAN
• VARIABLE FEEL
TRANSFORMER RECTIFIER
AC EXTERNAL POWER RECEPTACLE
AC LOADMETER
THROTTLE
Switch opens when throttle OFF
AC GENERATOR SWITCH
RESET
ON
OFF
AC GENERATOR
MASTER CAUTION LIGHT
MASTER CAUTION
ENGINE-DRIVEN AC GENERATOR
A. C. GENERATOR OFF
AC GENERATOR CAUTION LIGHT
NOTE
Lights shown illuminated for information only.
*Some airplanes. (Refer to applicable text.)
F-100D-1-A54-2A

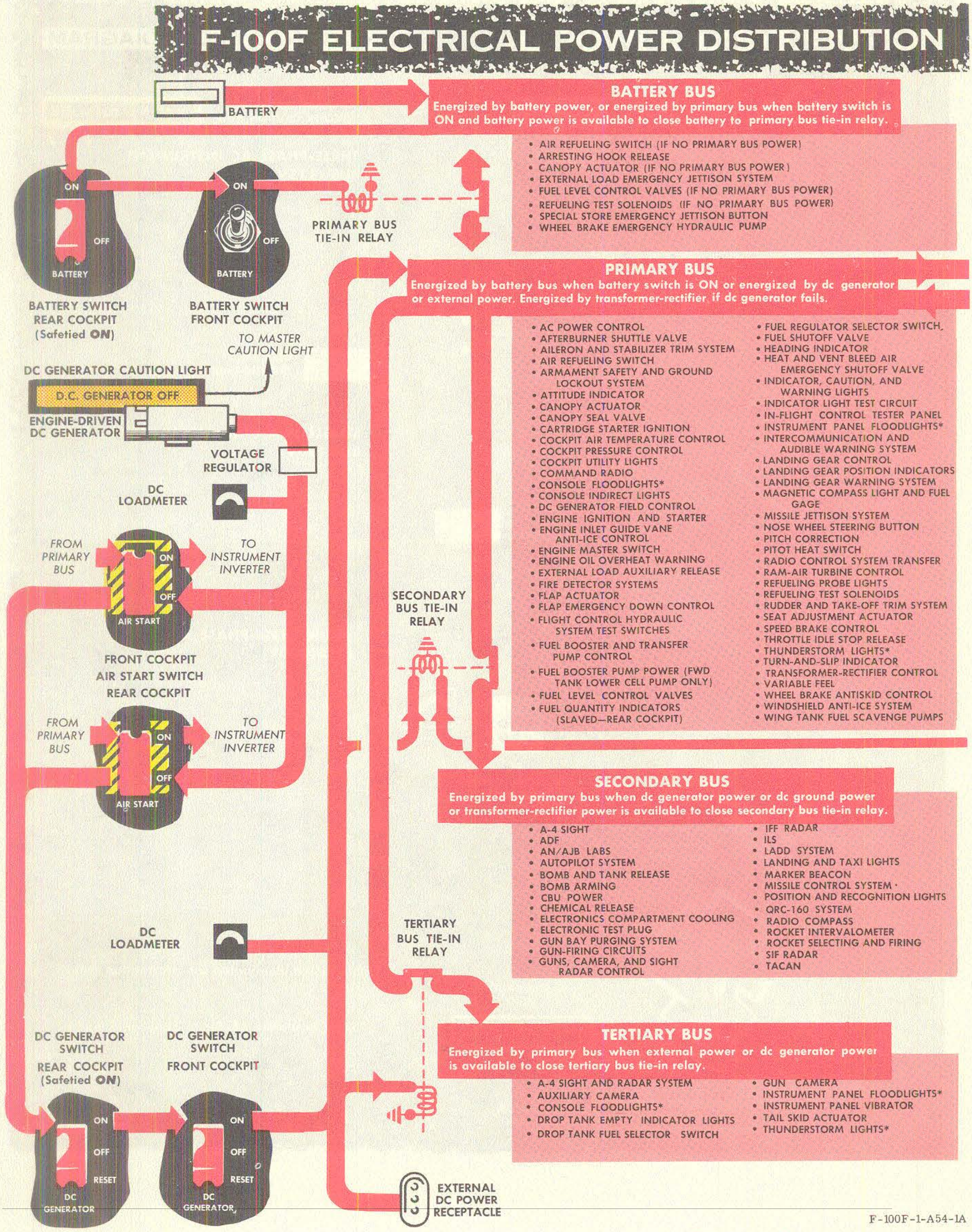
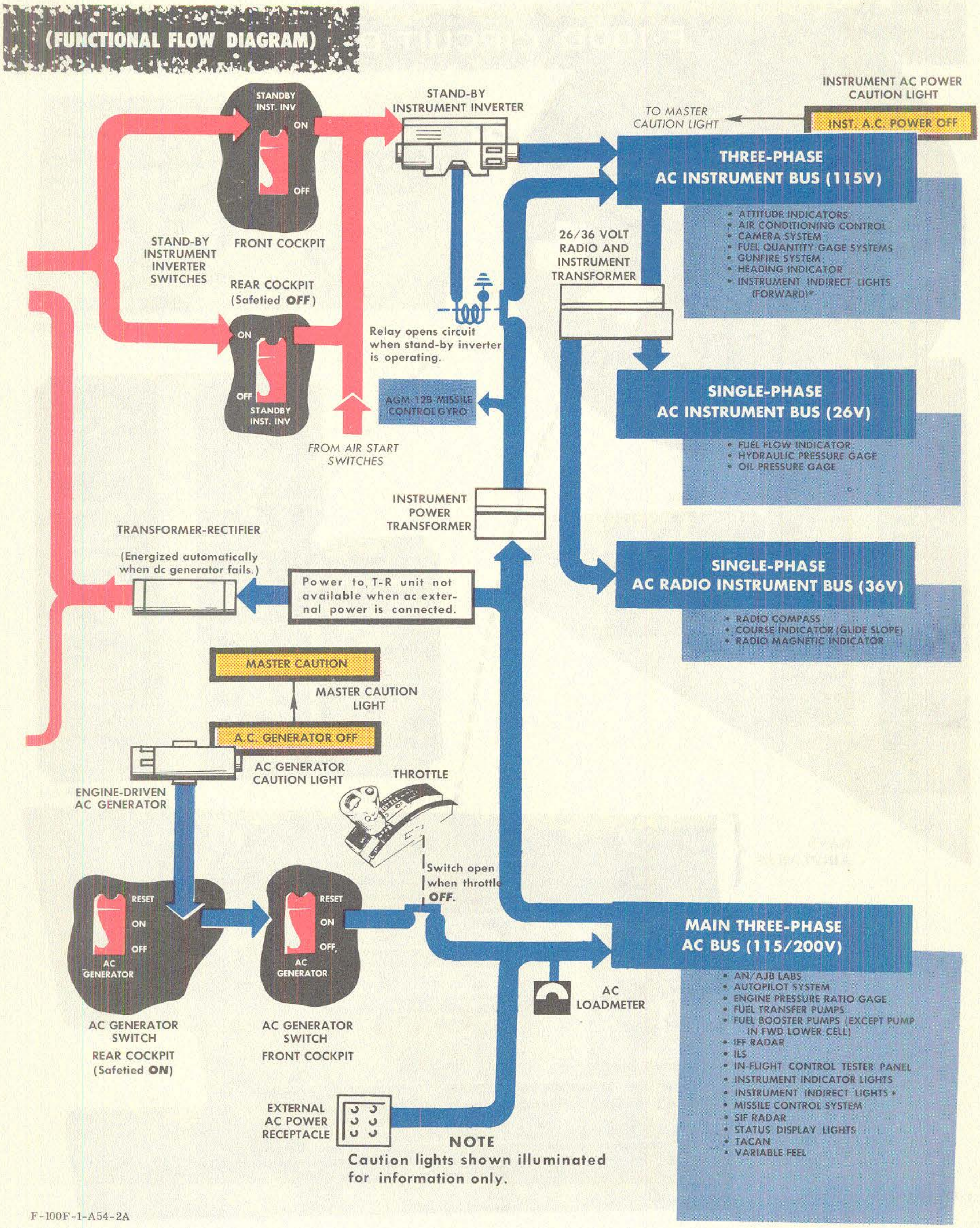

F-100F ELECTRICAL POWER DISTRIBUTION
BATTERY
BATTERY BUS
Energized by battery power, or energized by primary bus when battery switch is ON and battery power is available to close battery to primary bus tie-in relay.
• AIR REFUELING SWITCH (IF NO PRIMARY BUS POWER)
• ARRESTING HOOK RELEASE
• CANOPY ACTUATOR (IF NO PRIMARY BUS POWER)
• EXTERNAL LOAD EMERGENCY JETTISON SYSTEM
• FUEL LEVEL CONTROL VALVES (IF NO PRIMARY BUS POWER)
• REFUELING TEST SOLENOIDS (IF NO PRIMARY BUS POWER)
• SPECIAL STORE EMERGENCY JETTISON BUTTON
• WHEEL BRAKE EMERGENCY HYDRAULIC PUMP
ON
OFF
BATTERY
BATTERY SWITCH REAR COCKPIT (Safetied ON)
BATTERY SWITCH FRONT COCKPIT
PRIMARY BUS TIE-IN RELAY
PRIMARY BUS
Energized by battery bus when battery switch is ON or energized by dc generator or external power. Energized by transformer-rectifier if dc generator fails.
• AC POWER CONTROL
• AFTERBURNER SHUTTLE VALVE
• AILERON AND STABILIZER TRIM SYSTEM
• AIR REFUELING SWITCH
• ARMAMENT SAFETY AND GROUND LOCKOUT SYSTEM
• ATTITUDE INDICATOR
• CANOPY ACTUATOR
• CANOPY SEAL VALVE
• CARTRIDGE STARTER IGNITION
• COCKPIT AIR TEMPERATURE CONTROL
• COCKPIT PRESSURE CONTROL
• COCKPIT UTILITY LIGHTS
• COMMAND RADIO
• CONSOLE FLOODLIGHTS*
• CONSOLE INDIRECT LIGHTS
• DC GENERATOR FIELD CONTROL
• ENGINE IGNITION AND STARTER
• ENGINE INLET GUIDE VANE ANTI-ICE CONTROL
• ENGINE MASTER SWITCH
• ENGINE OIL OVERHEAT WARNING
• EXTERNAL LOAD AUXILIARY RELEASE
• FIRE DETECTOR SYSTEMS
• FLAP ACTUATOR
• FLAP EMERGENCY DOWN CONTROL
• FLIGHT CONTROL HYDRAULIC SYSTEM TEST SWITCHES
• FUEL BOOSTER AND TRANSFER PUMP CONTROL
• FUEL BOOSTER PUMP POWER (FWD TANK LOWER CELL PUMP ONLY)
• FUEL LEVEL CONTROL VALVES
• FUEL QUANTITY INDICATORS (SLAVED—REAR COCKPIT)
• FUEL REGULATOR SELECTOR SWITCH,
• FUEL SHUTOFF VALVE
• HEADING INDICATOR
• HEAT AND VENT BLEED AIR EMERGENCY SHUTOFF VALVE
• INDICATOR, CAUTION, AND WARNING LIGHTS
• INDICATOR LIGHT TEST CIRCUIT
• IN-FLIGHT CONTROL TESTER PANEL
• INSTRUMENT PANEL FLOODLIGHTS*
• INTERCOMMUNICATION AND AUDIBLE WARNING SYSTEM
• LANDING GEAR CONTROL
• LANDING GEAR POSITION INDICATORS
• LANDING GEAR WARNING SYSTEM
• MAGNETIC COMPASS LIGHT AND FUEL GAGE
• MISSILE JETTISON SYSTEM
• NOSE WHEEL STEERING BUTTON
• PITCH CORRECTION
• PITOT HEAT SWITCH
• RADIO CONTROL SYSTEM TRANSFER
• RAM-AIR TURBINE CONTROL
• REFUELING PROBE LIGHTS
• REFUELING TEST SOLENOIDS
• RUDDER AND TAKE-OFF TRIM SYSTEM
• SEAT ADJUSTMENT ACTUATOR
• SPEED BRAKE CONTROL
• THROTTLE IDLE STOP RELEASE
• THUNDERSTORM LIGHTS*
• TURN-AND-SLIP INDICATOR
• TRANSFORMER-RECTIFIER CONTROL
• VARIABLE FEEL
• WHEEL BRAKE ANTISKID CONTROL
• WINDSHIELD ANTI-ICE SYSTEM
• WING TANK FUEL SCAVENGE PUMPS
TO MASTER CAUTION LIGHT
DC GENERATOR CAUTION LIGHT
D.C. GENERATOR OFF
ENGINE-DRIVEN DC GENERATOR
VOLTAGE REGULATOR
DC LOADMETER
FROM PRIMARY BUS
TO INSTRUMENT INVERTER
ON
OFF
AIR START
FRONT COCKPIT
AIR START SWITCH
REAR COCKPIT
FROM PRIMARY BUS
TO INSTRUMENT INVERTER
ON
OFF
AIR START
SECONDARY BUS TIE-IN RELAY
SECONDARY BUS
Energized by primary bus when dc generator power or dc ground power or transformer-rectifier power is available to close secondary bus tie-in relay.
• A-4 SIGHT
• ADF
• AN/AJB LABS
• AUTOPILOT SYSTEM
• BOMB AND TANK RELEASE
• BOMB ARMING
• CBU POWER
• CHEMICAL RELEASE
• ELECTRONICS COMPARTMENT COOLING
• ELECTRONIC TEST PLUG
• GUN BAY PURGING SYSTEM
• GUN-FIRING CIRCUITS
• GUNS, CAMERA, AND SIGHT RADAR CONTROL
• IFF RADAR
• ILS
• LADD SYSTEM
• LANDING AND TAXI LIGHTS
• MARKER BEACON
• MISSILE CONTROL SYSTEM
• POSITION AND RECOGNITION LIGHTS
• QRC-160 SYSTEM
• RADIO COMPASS
• ROCKET INTERVALOMETER
• ROCKET SELECTING AND FIRING
• SIF RADAR
• TACAN
DC LOADMETER
TERTIARY BUS TIE-IN RELAY
TERTIARY BUS
Energized by primary bus when external power or dc generator power is available to close tertiary bus tie-in relay.
• A-4 SIGHT AND RADAR SYSTEM
• AUXILIARY CAMERA
• CONSOLE FLOODLIGHTS*
• DROP TANK EMPTY INDICATOR LIGHTS
• DROP TANK FUEL SELECTOR SWITCH
• GUN CAMERA
• INSTRUMENT PANEL FLOODLIGHTS*
• INSTRUMENT PANEL VIBRATOR
• TAIL SKID ACTUATOR
• THUNDERSTORM LIGHTS*
DC GENERATOR SWITCH REAR COCKPIT (Safetied ON)
DC GENERATOR SWITCH FRONT COCKPIT
ON
OFF
RESET
DC GENERATOR
EXTERNAL DC POWER RECEPTACLE
F-100F-1-A54-1A

Figure 1-23

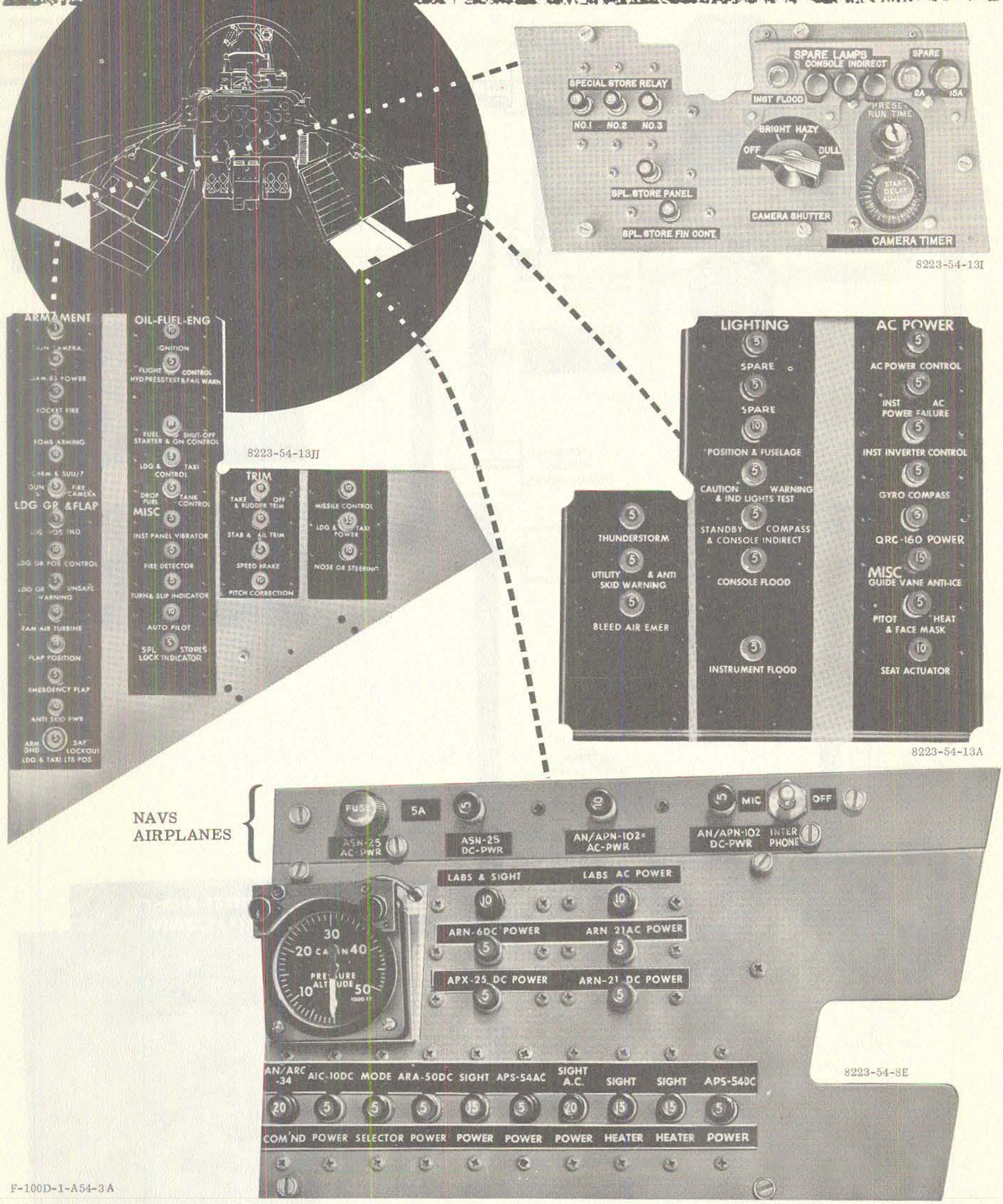


NOTE

Caution lights shown illuminated for information only.

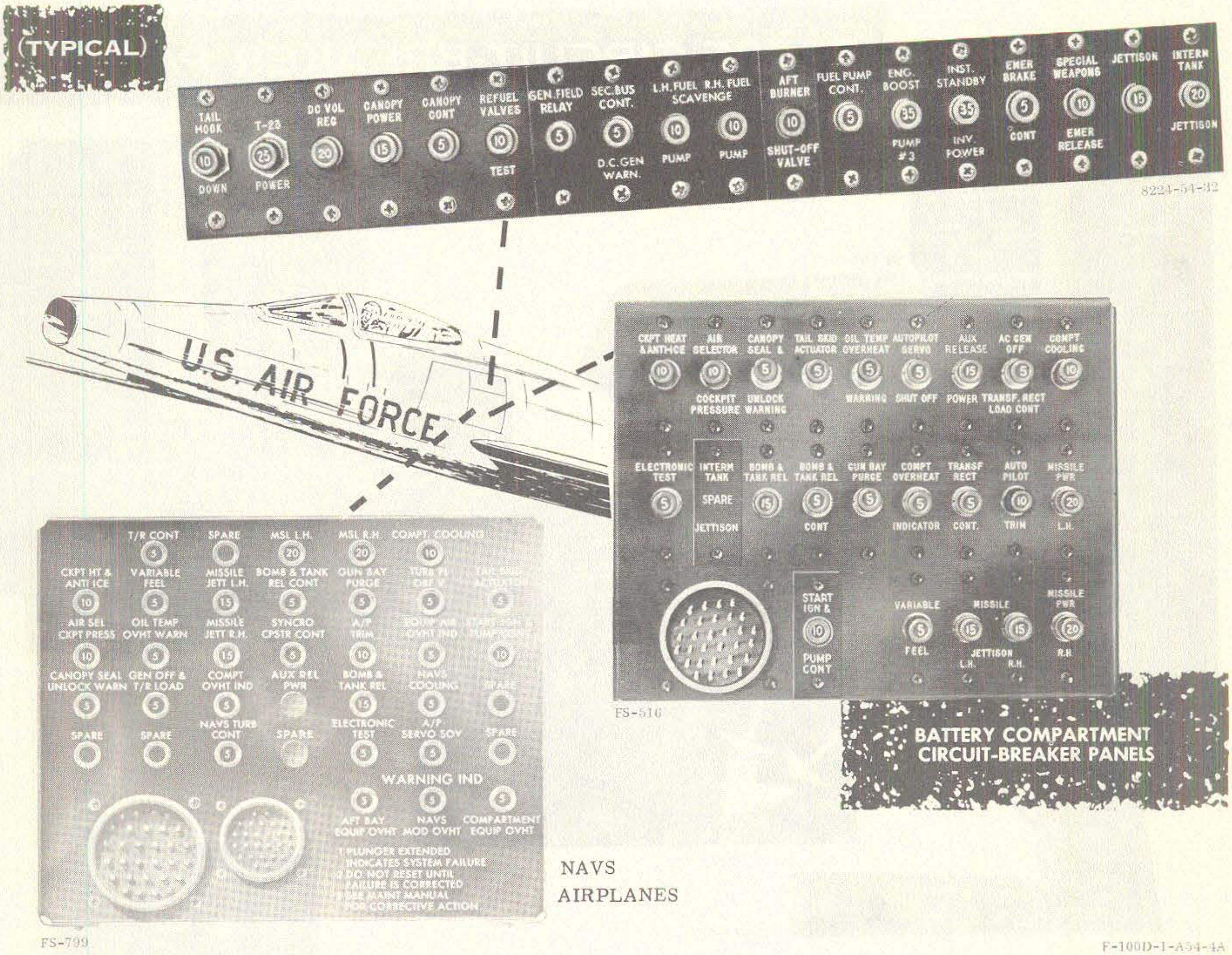
F-100F-1-A54-2A

F-100D CIRCUIT-BREAKER PANELS



F-100D-1-A54-3A

Figure 1-24



The switch is spring-loaded from RESET to OFF.

NOTE When the air start switch is turned ON to supply ignition for an air start, the dc generator is automatically cut out of the electrical system. If dc generator switch is ON, generator output is automatically restored when the air start switch is returned to OFF.

AC Generator Switch.

A three-position switch (figure 1-26) controls the ac generator by means of primary bus power. (On F-100F Airplanes, the rear cockpit switch is safetied ON to place complete control of the generator in the front cockpit because both switches must be ON for generator operation. The safety wire must be broken to move the rear cockpit generator switch to OFF or RESET.) When the ac generator switch is ON, the ac generator powers the main ac bus, provided the throttle is advanced from OFF. The ac generator is "off the line" when the ac generator switch is OFF.

NOTE The ac generator is automatically taken "off the line" whenever the throttle is moved to OFF.

To restore ac generator output after it has been taken "off the line" by the generator switch being placed to OFF, generator switch should be held at RESET momentarily and released to ON. The RESET position is also used in an attempt to return the generator to the circuit, if a temporary malfunction has interrupted generator output. If it is desired to have ac external power when the engine is running, the ac generator switch must be OFF. The switch is spring-loaded from RESET to ON.

F-100F CIRCUIT-BREAKER PANELS

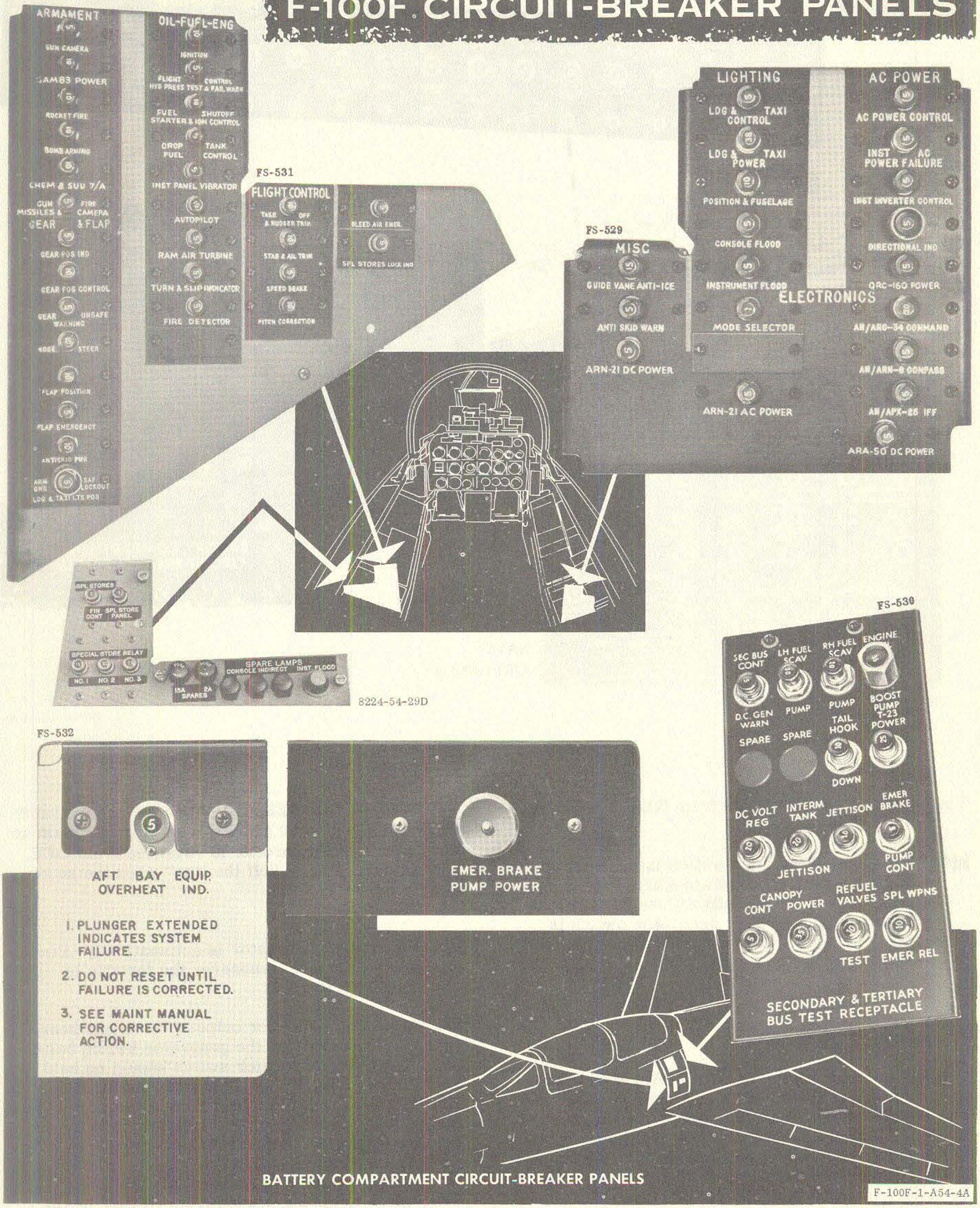
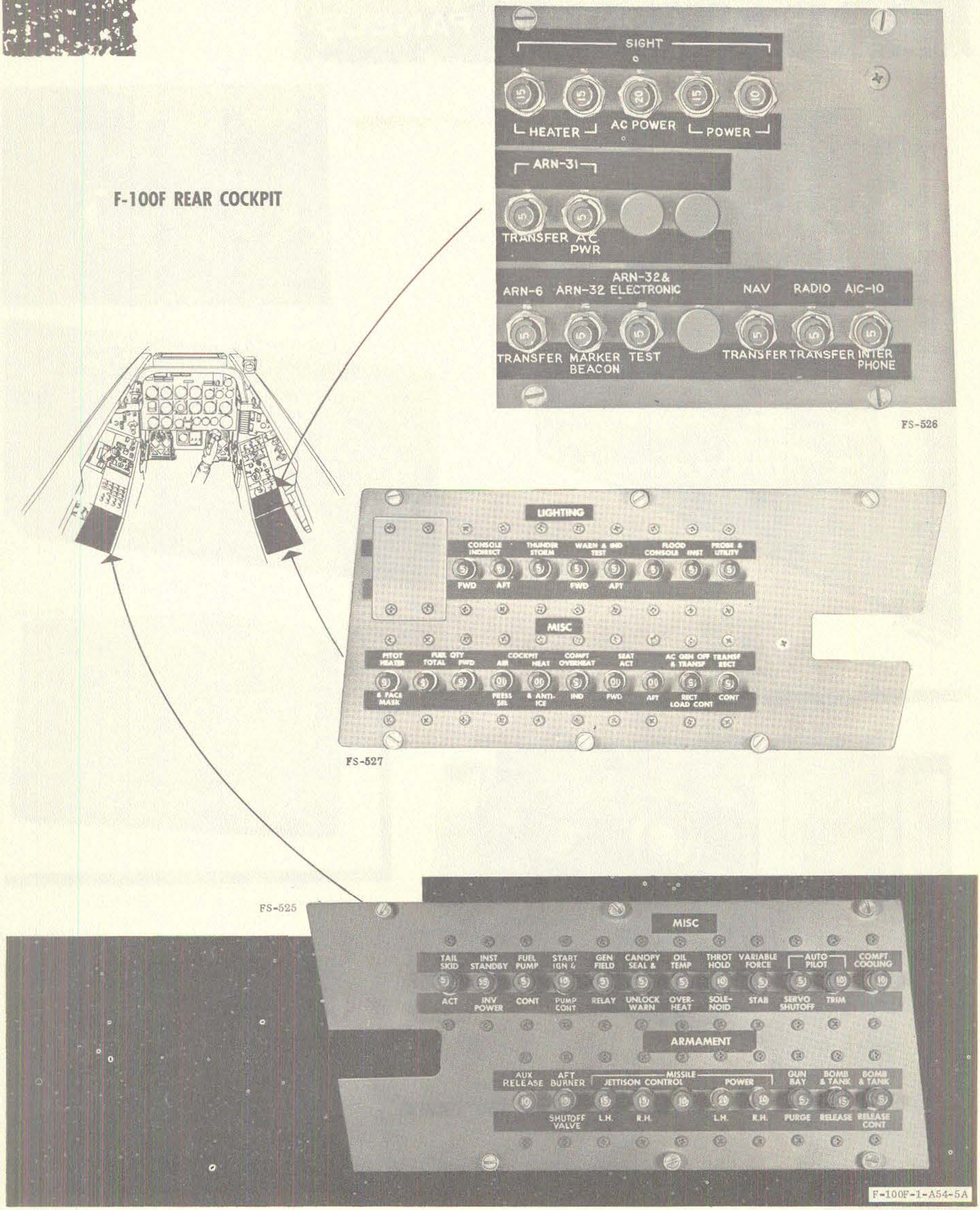


Figure 1-25

[redacted]

F-100F REAR COCKPIT



ELECTRICAL CONTROL PANELS

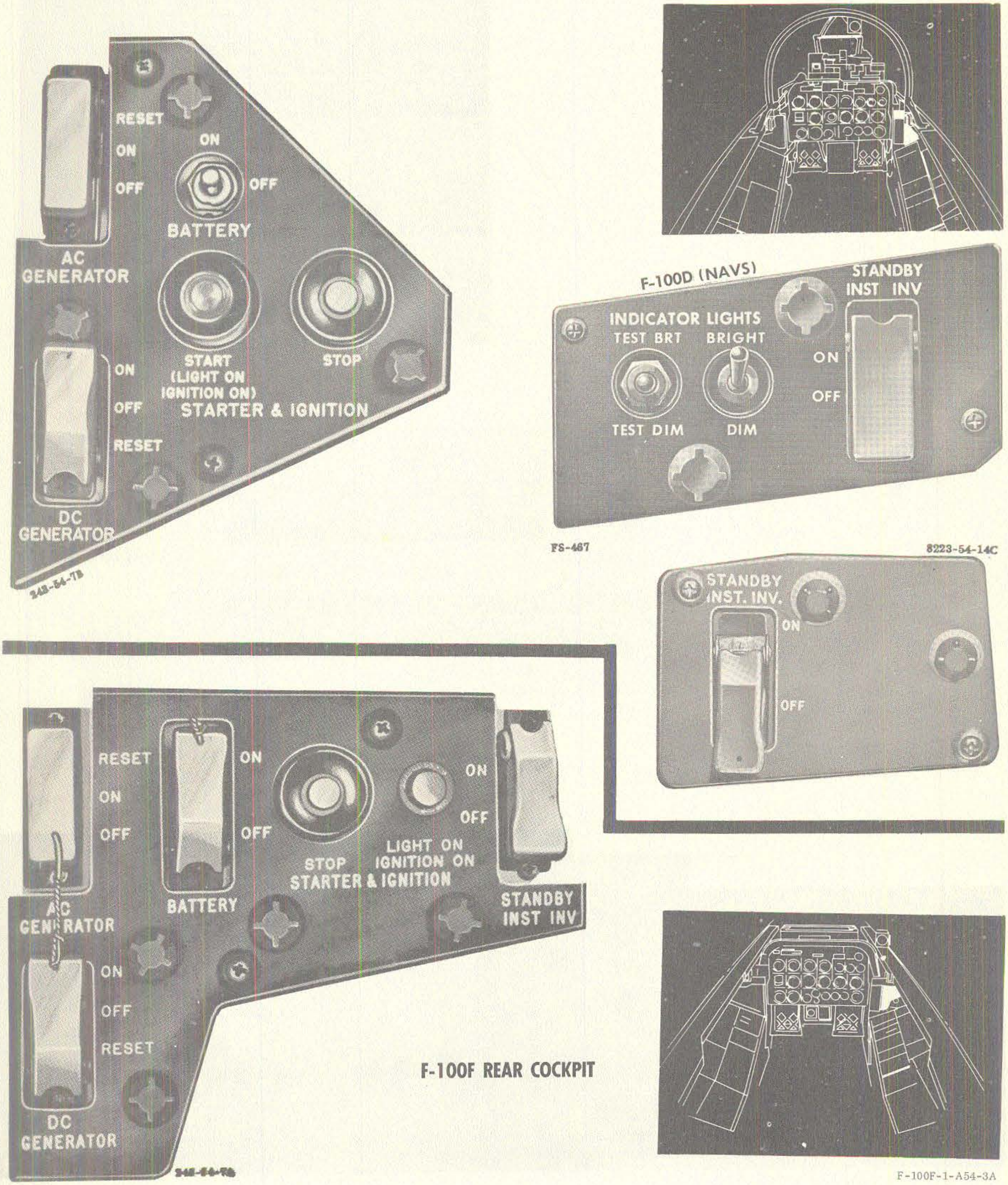


Figure 1-26

Stand-by Instrument Inverter Switch.

The stand-by instrument inverter switch (figure 1-26) controls primary bus power to energize the stand-by instrument inverter. The switch must be moved to ON to energize the instrument busses if the ac generator is not supplying power. (On F-100F Airplanes, to shut down the inverter, the stand-by instrument inverter switches in both cockpits must be OFF. The switch in the rear cockpit is safetied at OFF.)

NOTE When the air start switch is ON, the power source for the ac instrument busses are transferred automatically from the ac generator to the stand-by inverter, even though the inverter switch is OFF.

ELECTRICAL POWER SUPPLY SYSTEM INDICATORS.

DC Generator Loadmeter.

The dc loadmeter (5, figure 1-6; 5, figure 1-7; 26, figure 1-11) shows the electrical load being drawn from the dc generator in terms of percentage of total generator output. The loadmeter also shows the dc load being drawn whenever the transformer-rectifier (stand-by dc system) is in operation.

AC Generator Loadmeter.

The ac loadmeter (3, figure 1-6; 4, figure 1-7; 25, figure 1-11) shows the electrical load being drawn from the ac generator in terms of percentage of total generator output.

DC Generator Caution Light.

The placard-type dc generator caution light (figure 1-16), is illuminated by primary bus power whenever the reverse-current relay is open. This shows a relay or generator failure or generator undervoltage (generator voltage less than battery voltage). Should generator voltage output become excessive (over 31 volts), the generator is automatically cut out of the circuit and the dc generator caution light comes on. Illumination of this light shows that the tertiary bus is inoperative and that the primary and secondary busses are being powered from the main ac bus through the transformer-rectifier. Bulbs within the dc generator caution light can be checked by the indicator light test circuit.

AC Generator Caution Light.

The placard-type caution light (figure 1-16) is illuminated by power from the primary bus, whenever the ac generator is "off the line." Illumination of the light shows that the main 3-phase ac bus is inoperative. Bulbs within the ac generator caution light can be checked by the indicator light test circuit.

Instrument AC Power-off Caution Light.

This placard-type caution light (figure 1-16) is powered by the primary bus. The light comes on when the 3-phase instrument bus voltage is less than 90-95 volts, or when the bus is not energized. If the stand-by instrument inverter is engaged because of ac generator failure, illumination of this light shows inverter failure. Bulbs within the caution light can be checked by the indicator light test circuit.

NOTE When the air start switch is moved to ON to provide ignition for an air start, the stand-by instrument inverter is engaged automatically. The instrument ac power-off caution light blinks during this condition as the inverter comes up to speed.

HYDRAULIC POWER SYSTEMS.

The airplane has three separate, constant-pressure-type hydraulic systems; the utility hydraulic system, and two flight control hydraulic systems (identified as flight control system No. 1 and flight control system No. 2). Each system is independently pressurized by an engine-driven, 3000 psi hydraulic pump. In addition, flight control system No. 2 has a ram-air turbine-driven hydraulic pump for emergency power. The hydraulic fluid specification and hydraulic system ground test panel are shown in figure 1-37.

UTILITY HYDRAULIC SYSTEM.

The utility hydraulic system (figure 1-27) is a 3000 psi, pressure-type (closed center) system. It supplies hydraulic pressure to the following units: rudder, landing gear and fairing doors, wheel brakes, wing flaps, nose wheel steering, speed brake, automatic flight control system, gun and ammunition compartment purge doors, and the air doors of the ram-air-driven turbine that powers the flight control hydraulic system emergency pump. Fluid is supplied to the system from a 2.7-gallon reservoir (usable fluid supply is 2.7 gallons), and system pressure is maintained by a variable-volume, engine-driven hydraulic pump. On F-100F Airplanes, fluid is supplied to the system from a 4.2-gallon reservoir with a usable fluid supply of 3.8 gallons. The rudder is powered by the utility hydraulic system. If this pressure fails or becomes too low, No. 2 flight control hydraulic system pressure is automatically supplied to the rudder.

FLIGHT CONTROL HYDRAULIC SYSTEMS.

Refer to "Flight Control System" in this section.

UTILITY HYDRAULIC

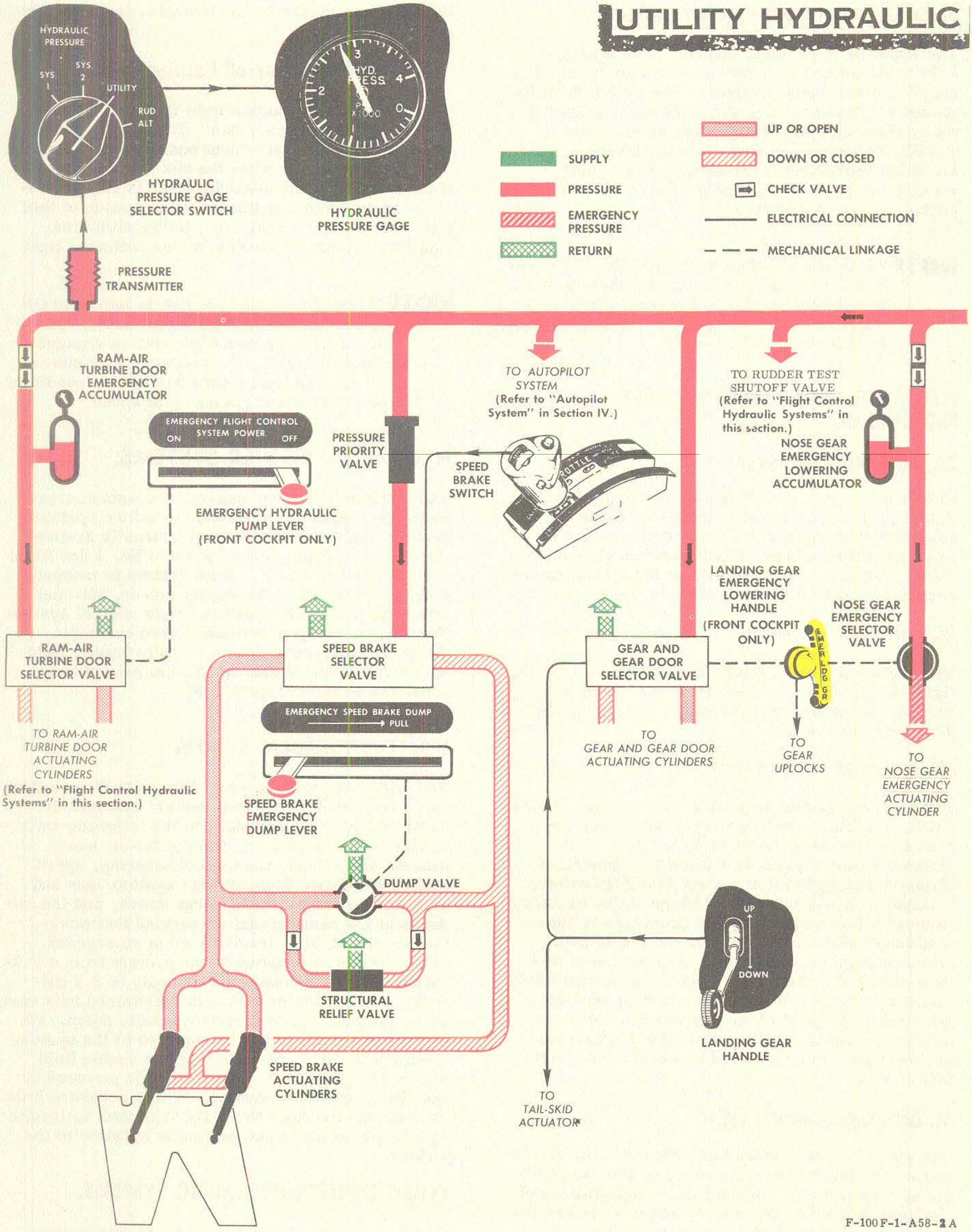
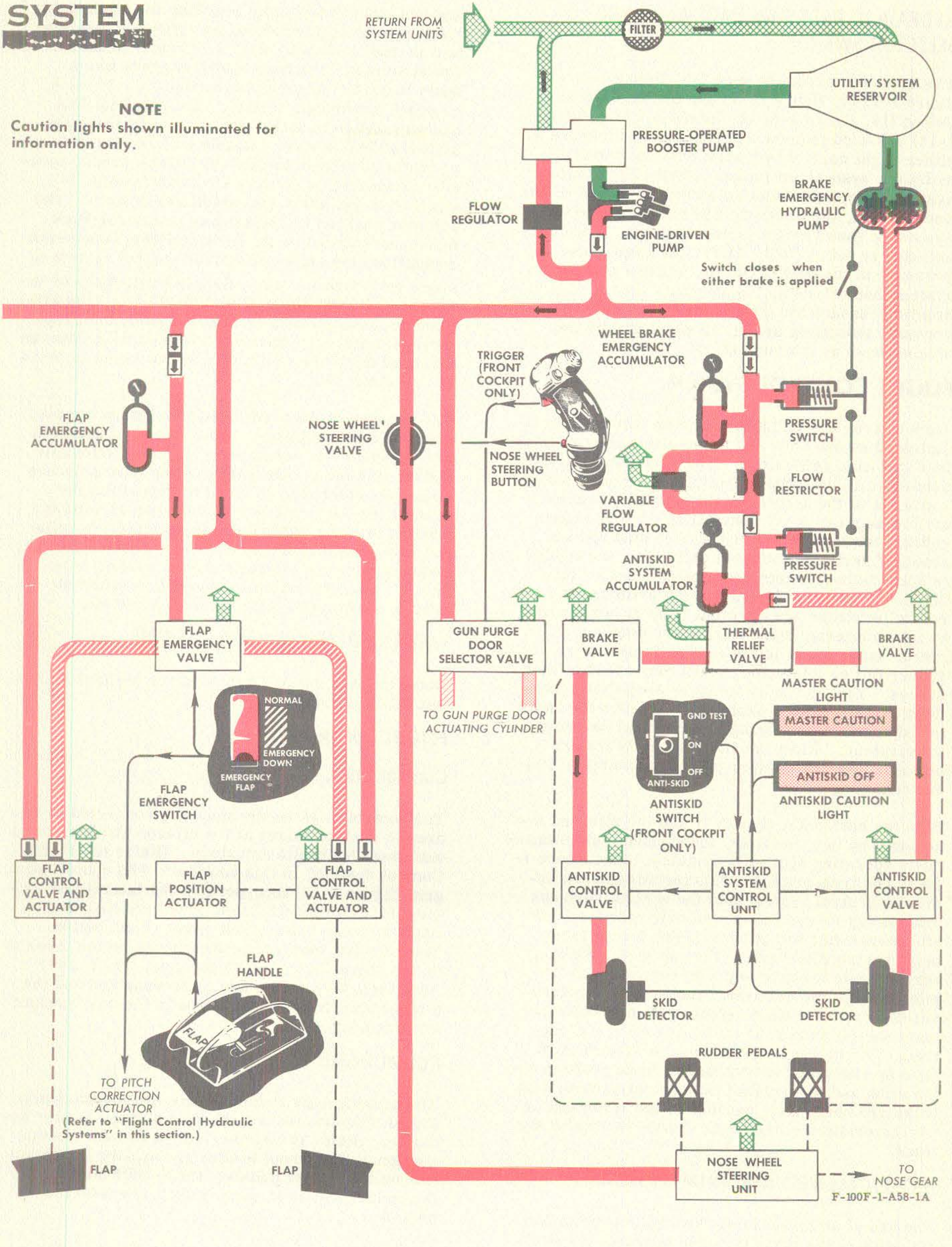


Figure 1-27

SYSTEM
[redacted]

NOTE

Caution lights shown illuminated for information only.



F-100F-1-A58-1A

HYDRAULIC PRESSURE GAGE AND GAGE SELECTOR SWITCH.

The hydraulic pressure gage (15, figure 1-6; 17, figure 1-7; 13, figure 1-11) and the gage selector switch (14, figure 1-6; 15, figure 1-7; 12, figure 1-11) are used to show selectively the pressure in either flight control hydraulic system, the utility hydraulic system, or rudder alternate pressure system. When the selector switch is moved to any one position, the pressure within the respective system is shown by the pressure gage. When the selector is set at RUD. ALT., the gage shows pressure in the part of the No. 2 flight control system that serves as the alternate source of hydraulic pressure for the rudder. The hydraulic pressure indicating system is energized by the single-phase ac instrument bus.

FLIGHT CONTROL SYSTEM.

Each aileron has an inboard and an outboard panel (actuated as one unit) and is not affected by normal in-flight wing deflections. The horizontal tail assembly is a controllable one-piece surface, and the rudder is of the splitter-plate type which controls airflow separation off the trailing edge to reduce rudder flutter. To prevent rudder binding as a result of vertical stabilizer deflection, the rudder is split chordwise into two sections, joined by a hinge. (On F-100F Airplanes, the primary flight control surfaces are operated from either cockpit by interconnected stick and rudder pedals.) A flutter damper unit in the rudder dampens any rudder flutter (vibration) which may occur at high speeds. Yaw and pitch dampers of the automatic flight control system (autopilot) improve the basic aerodynamic direction and longitudinal damping of the airplane. When the autopilot dampers are engaged, the yaw damper provides automatic rudder trimming.

Both the horizontal stabilizer and the ailerons are actuated by two complete, independent, simultaneously operating hydraulic systems. (See figure 1-29.) The irreversible characteristics of the hydraulic control system hold the control surfaces against any forces that do not originate from control movements and prevent these forces from being transmitted back to the controls. Thus, aerodynamic loads of any kind cannot reach the pilot through the controls. Because of this irreversibility, an artificial-feel system is built into each control system to simulate feel at the controls. There are no trim tabs, as trimming is done by changing the neutral (no-load) position of the stick and the pedals. No control surface gust locks are necessary, because of the irreversible characteristics of the flight control hydraulic systems.

ARTIFICIAL-FEEL AND TRIM SYSTEMS.

The use of an irreversible hydraulic system for actuation of the flight controls prevents air loads and resultant "feel" from reaching the stick and rudder pedals. Therefore, an artificial-feel system is used. Normal stick and rudder pedal forces are simulated by spring-loaded bungees which apply loads to the controls in proportion to stick or pedal movement; however, the resultant feel has no relation to actual air loads. To make the artificial-feel system variable with Mach number, an electronically controlled gradient-changer actuator (identified as the XV-A control system) is attached to the horizontal stabilizer system. The actuator changes the resistance to control stick movement offered by the artificial-feel bungee and repositions the entire stabilizer control system to a new trim position when airspeed increases or decreases between Mach .8 and Mach .94. The airplane is automatically trimmed nose up as airspeed increases and automatically trimmed nose down as airspeed decreases within the speed range of Mach .8 and Mach .94.

The bungees of the artificial-feel system are also used for trim purposes. When autopilot dampers are engaged, the yaw damper provides automatic rudder trimming. Operation of the trim switches causes an electrical actuator to reposition the neutral (no-load) position of the bungees until the desired stick or pedal force is obtained. A trim impulse actuator, in the stabilizer control system, reduces trim system lag and trim system overshoot. A single switch in the cockpit trims all control surfaces to their take-off positions.

YAW AND PITCH DAMPER SYSTEMS.

Refer to "Automatic Flight Control (Autopilot) System" in Section IV.

FLIGHT CONTROLS.

Control Stick.

The control stick is mechanically connected to hydraulic control valves at the aileron and horizontal stabilizer hydraulic actuators. (Refer to "Flight Control System" in this section.) The control stick grip (figure 1-28) incorporates the lateral and longitudinal trim switch, nose wheel steering button, trigger, bomb button, and radar reject button. The autopilot emergency disconnect switch lever is on the control stick below the grip. On F-100F Airplanes, both sticks are interconnected and the trigger and radar reject button in the rear cockpit are inoperative.

Rudder Pedals.

The hanging-type rudder pedals are mechanically linked to hydraulic control valves at the rudder actuator. (Refer to "Flight Control System" in this section.) The wheel brakes are applied by toe action on the rudder pedals. On F-100F Airplanes, the rudder pedals in each cockpit are interconnected.

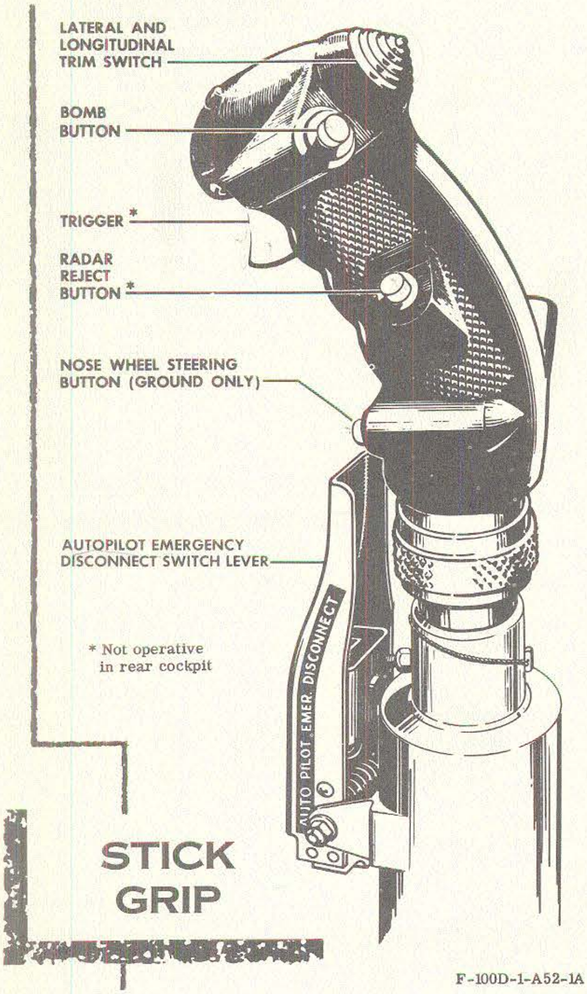


Figure 1-28

Rudder pedal movement also controls nose wheel steering. (Refer to "Nose Wheel Steering System" in this section.)

PEDAL ADJUSTMENT. The rudder pedals can be individually adjusted fore and aft by an adjustment lever outboard of each pedal. Coordinated pedal alignment during adjustment is obtained by index numbers on each pedal adjustment ratchet. When the index numbers at each pedal correspond, the pedals are evenly adjusted.

Lateral and Longitudinal Trim Switch.

Lateral and longitudinal trim is controlled by a five-position, thumb-actuated switch. (See figure 1-28.) The trim circuit is powered by the primary bus. Holding the trim switch to the right or left energizes the electrical lateral trim actuator; holding the switch forward or aft energizes the longitudinal trim actuator. When a trim actuator is energized, it repositions its respective artificial-feel bungee to a new neutral or no-load position. The trim impulse actuator, in the stabilizer trim system to reduce trim system lag and overshoot, is actuated by the longitudinal trim switch. When the stabilizer trim circuit is energized, pressure from flight control hydraulic system No. 2 causes the impulse actuator to move the stabilizer control valve before the trim actuator motor responds to the trim switch.

NOTE When the switch is positioned for longitudinal trim, a slight jolt in the stick may be noticed. This is normal and is caused by action of the trim impulse actuator.

The trim switch is spring-loaded to OFF (center). When the switch is released, the trim action stops, and the trim impulse actuator returns to its normal position. This reduces overtravel of the stabilizer electrical trim actuator. The control stick trim switch is inoperative when the automatic flight control system (autopilot) is engaged.

NOTE There is no alternate trim system.

Rudder Trim Switch.

Rudder trim operation is controlled by primary bus power through a three-position switch. (See figure 1-19.) When the switch is held at either LEFT or RIGHT, the rudder trim actuator is energized accordingly and repositions the rudder system artificial-feel bungee to a new neutral (no-load) position. The rudder trim switch is spring-loaded to OFF (center), and trim action stops when the switch is released. The rudder trim switch remains operative when the autopilot is engaged, but the switch should not be used, because an undesirable flight attitude may result when the autopilot is disengaged.

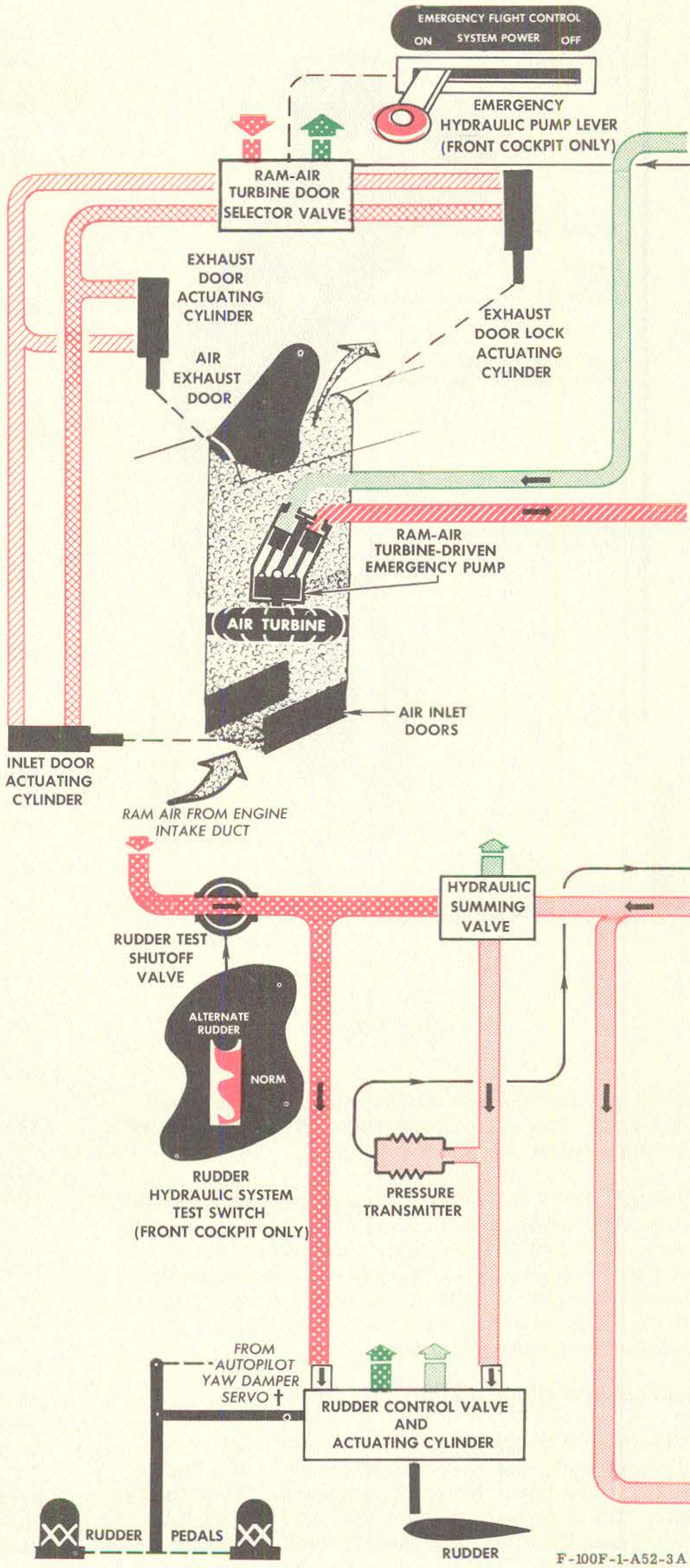
Take-off Trim Button.

All control surfaces can be trimmed at the same time to proper position for take-off by a push-button switch. (See figure 1-19.) Pressing the button supplies primary bus power to the trim actuators, which reposition the artificial-feel bungees to obtain the correct control surface settings for take-off. (The take-off trim position of the ailerons and rudder is within ±1 degree of neutral; the leading edge of the horizontal stabilizer is set down about 4-1/2 degrees (5-1/2 degrees*) from neutral to give an airplane nose-up condition.) The airplane is then trimmed for about 260 knots IAS. This speed is for a clean airplane of about 29,000 pounds (27,000 pounds*) gross weight. (The trim speed can vary considerably with changes in gross weight, center of gravity, altitude, external store

*F-100F Airplanes

FLIGHT CONTROL HYDRAULIC SYSTEM

- SYSTEM NO. 1 PRESSURE
- SYSTEM NO. 2 PRESSURE
- UTILITY PRESSURE
- EMERGENCY HYDRAULIC PRESSURE
- SYSTEM NO. 1 RETURN
- SYSTEM NO. 2 RETURN
- UTILITY RETURN
- UP OR OPEN
- DOWN OR CLOSED
- ELECTRICAL CONNECTION
- MECHANICAL LINKAGE
- CHECK VALVE

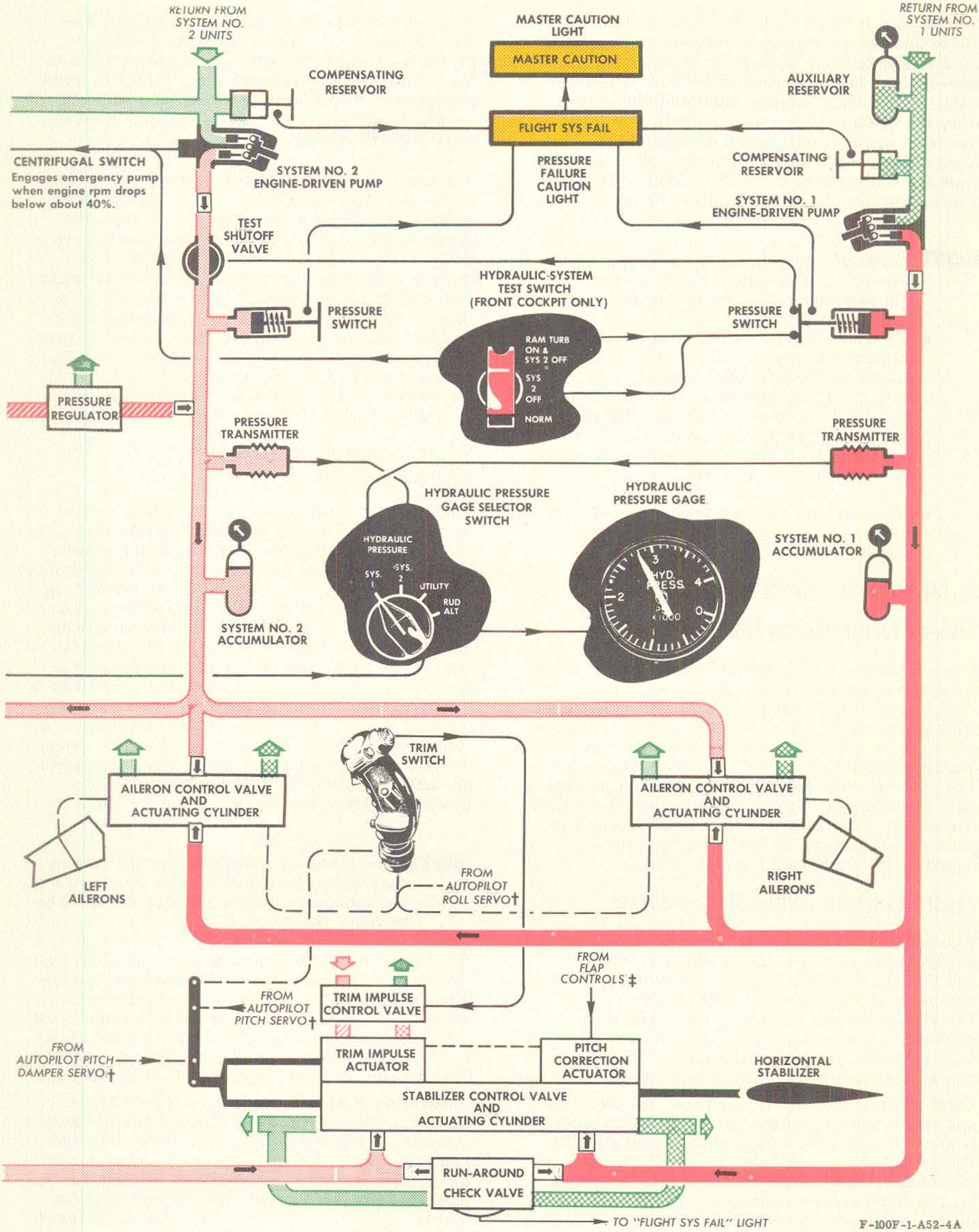


NOTE

- Emergency hydraulic pump shown in operation for information only.
- Caution lights shown illuminated for information only.

† Refer to "Autopilot System" in Section IV.
‡ Refer to "Utility Hydraulic System" in this section.

Figure 1-29



F-100F-1-A52-4A

loading, and friction within the control system.) Above this speed, it may be necessary to retrim the airplane because of the trim tolerance. The take-off trim button is inoperative with the automatic flight control system (autopilot) engaged. When the button is held down, an indicator light comes on when all the control surfaces have reached the proper position for take-off if the wing flaps are full up or at INTERMEDIATE. To stop trim operation, the button must be released.

NOTE To ensure proper surface positioning for take-off, the automatic flight control system (autopilot) must not be engaged.

- The take-off trim setting of the horizontal stabilizer is identified by a white triangle painted on the left side of the fuselage, just forward of the stabilizer. During preflight check of trim system, have ground crew check that leading edge of stabilizer is aligned with aft apex of triangle when take-off trim button is pressed.
- Normally, the take-off trim button should not be used in flight, because an undesirable flight attitude may result.

FLIGHT CONTROL SYSTEM INDICATORS.

Take-off Trim Indicator Light.

When the take-off trim button is held down to trim the controls for take-off, a placard-type indicator light (figure 1-19) comes on steady when all controls are properly trimmed, provided the flaps are full up or at INTERMEDIATE. However, before coming on steady, the light may flash a few times. The take-off trim indicator light does not remain on if the automatic flight control system (autopilot) is engaged. The indicator light is illuminated by primary bus power. Bulbs in the light can be tested by the indicator light test circuit.

FLIGHT CONTROL HYDRAULIC SYSTEMS.

Two complete, independent, simultaneously operating hydraulic systems (identified as systems No. 1 and No. 2) actuate both the controllable horizontal stabilizer and the ailerons. (See figure 1-29.) The systems are of the constant-pressure type, powered by a separate engine-driven pump, and each system supplies half the demand of the control surface actuators. There is a run-around check valve in each system between the pressure and return lines to prevent lockup of the system, if for any reason the return side becomes blocked. Failure of one system does not affect operation of the other system, which then assumes the entire load of flight control operation. Under such a condition, maximum force output is limited to half that of normal dual system operation. With a frozen engine, or if No. 2 engine-driven pump failure occurs, power in this system can be maintained by a ram-air turbine-driven emergency pump. The No. 2 flight control hydraulic system supplies pressure through the hydraulic summing valve to the rudder actuator to supplement the utility system power. Flight control hydraulic system No. 2 pressure is also used for the horizontal stabilizer trim impulse system.

The control surface hydraulic control valves are positioned mechanically by stick or rudder pedal movement. These valves then direct hydraulic power to the actuating cylinders to move the control surfaces. (The dual control valves, and tandem-type actuating cylinders are hydraulically independent of each other.) When the control surface moves, a follow-up mechanism returns the control valve to a neutral position, so that hydraulic flow to the actuating cylinder is shut off. The pressure in the actuating cylinder serves to hold the control surface in the desired position, and maintains irreversibility by means of check valves.

Flight Control Hydraulic System Emergency Pump.

The emergency hydraulic pump in flight control system No. 2 provides pressure for this system in case of engine failure or if failure of the system No. 2 engine-driven pump occurs. The emergency pump is powered by a ram-air driven turbine, in the upper part of the fuselage, behind the canopy. (See figure 7-1.) the ram-air turbine is automatically engaged in flight when engine rpm falls below about 40% rpm or can be engaged manually by a lever in the cockpit. When the emergency pump is selected, utility hydraulic system pressure opens air inlet doors in the engine intake duct, and an air outlet door on top of the fuselage. Ram air from the engine inlet duct then flows through and drives the turbine. (Refer to "Flight Control System Emergency Hydraulic Pump" in Section VII.)

NOTE The manual control actuates the turbine door hydraulic selector valve mechanically; the automatic system actuates the valve by primary bus power.

When the ram-air turbine doors are open, an audible warning sounds in the pilot's headset, and the warning light in the landing gear handle comes on when the airplane is below 10,000 feet with landing gear up. (Refer to "Landing Gear Warning Light" and "Landing Gear Audio Warning Signal - F-100D-61 and Later F-100D Airplanes, F-100D Airplanes Changed by T.O. 1F-100-905, and F-100F Airplanes" in this section.) If utility hydraulic system pressure is not available to open the doors, the ram-air turbine door emergency accumulator in the system provides positive door opening. If the pump is no longer needed, it must be shut down manually, at which time utility hydraulic pressure closes the ram-air inlet and outlet doors to stop the turbine. The pump can be shut down only when engine rpm is above 45% rpm for sufficient output from the engine-driven pump in flight control hydraulic system No. 2. The nose gear load switch prevents automatic operation of the emergency pump when the airplane is on the ground. However, an externally mounted switch button permits the load switch to be overridden for a postflight operational check of the pump automatic starting system during engine shutdown.

Flight Control Emergency Hydraulic Pump Lever.

The flight control emergency hydraulic pump can be controlled manually by a lever (11, figure 1-9; 13, figure 1-10; figure 1-13), not in the rear cockpit. Pushing the lever forward to ON mechanically positions a hydraulic selector valve, so that the utility hydraulic system power opens the ram-air turbine air inlet and air outlet doors. This allows ram air from the engine air intake duct to drive the turbine for operation of the emergency pump. (When the flight control hydraulic system test switch is held at its RAM TURB ON & SYS 2 OFF position for in-flight test of the pump or the test button is pushed, the lever moves automatically to the ON position.) To shut down the pump, the lever must be manually returned to OFF. When the lever is moved aft to OFF, utility hydraulic pressure closes the inlet and exhaust outlet doors to stop the turbine and shut down the pump.

Rudder Hydraulic System Test Switch.

A preflight operational check of the summing valve in the rudder hydraulic control system can be made by means of the two-position test switch (not in the rear cockpit). (See figure 1-19.) When the switch is held at ALTERNATE RUDDER (RUDDER ALT SYS), primary bus power closes the test valve in the utility system pressure line to the rudder actuator. This shuts off normal hydraulic power to the rudder and allows the summing valve to direct alternate (No. 2 flight control) hydraulic system power to the rudder. Check of rudder operation can then be made. The switch is spring-loaded to NORM; when it is released, the test valve returns to its normal position, allowing the primary system to take over.

Ram-air Turbine Test Button.

The automatic starting system of the ram-air turbine-driven flight control emergency hydraulic pump can be tested during engine shutdown by means of a pushbutton type switch. The button is flush-mounted externally on the left side of the fuselage, below the ram-air turbine air outlet door. During engine shutdown deceleration, the button should be held down by a ground crew member. This overrides the nose gear load switch which normally prevents the pump automatic starting system from operating at low-speed engine operation when the airplane is on the ground. With the button pressed, the air inlet and outlet doors open to start the ram-air turbine-driven flight control emergency pump as engine speed drops below 40% rpm. (The emergency hydraulic pump lever in the cockpit automatically moves forward to ON when the air inlet and outlet doors open.) Releasing the button restores the ground safety circuit. (The emergency hydraulic pump lever must be moved to OFF to close the doors.)

Flight Control Hydraulic System Test Switch.

This primary-bus-powered, three-position switch (figure 1-19), not in the rear cockpit, is used only for making an in-flight operational test of the ram-air turbine-driven emergency hydraulic pump after certain periodic inspections, or after maintenance has been performed on the ram-air turbine system. The switch is spring-loaded to NORM, and when it is held at SYS 2 OFF, the test valve in flight control hydraulic system No. 2 closes, shutting off hydraulic pressure in this system.

NOTE A pressure switch prevents system No. 2 from being shut off if system No. 1 fails or does not have enough pressure (less than about 65 psi).

- A nose gear load switch prevents system No. 2 from being shut off for test purposes while the airplane is on the ground.

When the switch is held at RAM TURB ON SYS 2 OFF, the test valve in system No. 2 remains closed, and a selector valve opens that allows utility hydraulic system pressure to open the ram-air turbine air inlet and air outlet doors. (The emergency hydraulic pump lever in the cockpit automatically moves to ON when the doors open.) When the switch is at NORM, the test valve is de-energized for normal operation of both flight control hydraulic systems. Releasing the test switch to NORM does not shut down the emergency pump; the pump must be stopped by moving the emergency pump lever to OFF.

Hydraulic Pressure Gage and Gage Selector Switch.

Refer to "Hydraulic Power Systems" in this section.

Flight Control Hydraulic Systems Failure Caution Light.

The placard-type caution light, labeled "FLIGHT SYS. FAIL" (figure 1-16), powered by the primary bus, comes on when one or more of the following conditions exist.

a. Whenever a blockage occurs in return line of either the No. 1 or No. 2 flight control hydraulic system.

NOTE When a blockage occurs in either return line, a differential pressure switch in the line senses pressure build-up and turns on the light. The fluid in the blocked line will be automatically relieved through a run-around check valve into the pressure side of the respective system, equalizing the pressure and preventing a flight control lockup.

b. When pressure in either or both flight control hydraulic systems drops below 650 psi.

c. When the fluid level is low in either flight control system compensating reservoir, provided the pressures in both systems are above 650 psi, and the weight of the airplane is on the nose gear.

The indicator light test circuit provides a test of bulbs in the pressure failure caution light.

WING SLATS.

The movable wing slats, consisting of five sections, extend spanwise along the wing leading edge. The slats are actuated automatically by aerodynamic forces. An increase in airspeed closes the slats; the slats extend when airspeed is reduced. When the slats extend, the slot formed along the leading edge changes airflow characteristics to reduce stalling speeds in both accelerated and unaccelerated flight. Depending on the angle of attack, the slats float to either closed, partly open, or full open positions. Except at extreme altitudes, the slats remain mostly closed in climbing or cruising flight to offer minimum drag for maximum flight performance. The slats do not have an interconnection between the two outboard slat sections and the three inboard sections. This allows independent operation of the outboard and inboard sections. In addition, the outboard section remains open 2 degrees when the inboard sections are fully closed, providing a slot which improves lateral stability.

WING FLAP SYSTEM.

The wing flaps are electrically controlled and hydraulically operated and cover a spanwise area from the fuselage to the inboard aileron on each wing. The flap hydraulic actuator valves are interconnected for proper synchronization of the flaps. The flaps extend full down (45 degrees) in about 10 seconds, and retract in about 14 seconds. Flap extension varies with the airspeed at which the flaps are operated. There is a preset 20-degree intermediate flap position to improve air refueling and take-off capabilities. Change in airplane attitude due to fully lowering or raising of the flaps is compensated for by a pitch correction actuator which changes the horizontal stabilizer position relative to control stick position during flap operation. There is no flap position indicator.

NOTE Pitch correction actuation depends upon full DOWN flap handle movement and not on actual wing flap operation.

WING FLAP HANDLE.

The airfoil-shaped wing flap handle (12, figure 1-8; 13, figure 1-12; 9, figure 1-14) controls flap operation. On F-100F Airplanes, the wing flap handles are interconnected mechanically so that positioning the handle in either cockpit has a corresponding movement on the other. To position the flaps full up, intermediate, or full down, the flap lever is moved to UP, INTERMEDIATE, or DOWN. This directs primary bus power to the flap position actuator which mechanically positions hydraulic actuator valves to permit utility hydraulic pressure to position the flaps. When the flap handle is moved into or out of DOWN, the pitch correction actuator is energized by the primary bus to provide pitch trim change by altering the position of the horizontal stabilizer. Pitch trim change occurs when the handle is moved to or from DOWN even if a malfunction prevents flap operation. The INTERMEDIATE position does not energize the pitch correction actuator.

WING FLAP EMERGENCY SWITCH.

A two-position switch (14, figure 1-8; 14, figure 1-12; 11, figure 1-14) permits the flaps to be lowered if use of the flap handle does not lower the flaps. The switch controls primary bus power to the solenoid-operated flap emergency hydraulic valve. When the switch is at NORMAL, the emergency valve is de-energized and the flaps operate in the normal manner. If the flaps fail to lower when the flap handle is moved to DOWN, because of utility system failure or electrical failure in the normal flap control system, the flap emergency switch should be placed at EMERGENCY DOWN. The emergency valve then opens, permitting pressure from the flap emergency accumulator to lower the flaps if the airspeed is below about 180 knots IAS. (On F-100F Airplanes, the cockpit initiating action must complete the action.) The flap emergency accumulator is sufficient to lower the flaps only once. Pitch correction remains operative when the flaps are lowered by the emergency switch.

SPEED BRAKE SYSTEM.

NOTE Airplane performance is not affected by speed brake cutout on airplanes changed by T.O. 1F-100-882.

A hydraulically operated, electrically controlled speed brake is on the lower surface of the fuselage, behind the nose gear well. During normal operation, the speed brake opens in about 2-1/2 seconds and closes in about 1-3/4 seconds.

A pressure priority valve, in the speed brake hydraulic pressure line, prevents speed brake operation if utility hydraulic system pressure drops below 1300 psi. (This is the minimum pressure needed for wheel brake and nose wheel steering systems.) Speed brake operation when utility hydraulic pressure is 1300 to 1850 psi is slow; at pressures above 1850 psi, speed brake operation is normal.

Caution If the speed brake operates when utility hydraulic system pressure is below 1300 psi, the pressure priority valve is faulty and should be replaced before the next flight.

The speed brake system has an emergency control to close the speed brake to trail position in flight, in case of utility hydraulic system failure. There is no speed brake position indicator.

NOTE Although the speed brake can be used at any speed, a relief valve in the speed brake hydraulic system prevents speed brake extension or allows speed brake to retract, as necessary, under excessive aerodynamic loads, to prevent structural damage. It is possible at extremely high speeds that the speed brake may not open sufficiently to be effective.

SPEED BRAKE GROUND SAFETY LOCKS.

A removable ground safety lock may be installed on each of the two speed brake actuating cylinders to keep the speed brake in the out position when the airplane is on the ground. (See figure 1-30.) The lock assemblies, which have conventional red warning streamers, must be removed before flight.

SPEED BRAKE SWITCH.

A serrated switch (figure 1-18) controls speed brake operation. The OFF (center) position is indicated by a white alignment mark on the switch guide. Moving the switch to IN or OUT supplies primary bus power to position the speed brake control valve accordingly so that utility hydraulic system pressure actuates the speed brake. After the speed brake has been opened or closed, the switch must be returned to OFF (center) to preclude loss of fluid, in case of line failure.

On F-100F Airplanes, either switch in the out position overrides the other switch. The speed brake switch in the rear cockpit is spring-loaded to OFF (center). When both switches are in OFF (center), the control valve is in neutral, which holds the brake in the desired position. The emergency dump lever overrides both speed brake switches. Failure to return the forward cockpit speed brake switch to OFF (center) after the OUT position has been selected also removes electrical control of the brake from the rear cockpit.

NOTE On airplanes not changed by T. O. 1F-100-882, the centerline store interferes with speed brake operation. Therefore, when the store is attached, the speed brake control circuit is opened automatically to prevent use of the speed brake.

- On airplanes changed by T. O. 1F-100-882, the cutout area in the speed brake surface is enlarged and the control circuit is modified to allow speed brake operation when a fuselage centerline store is carried.

SPEED BRAKE EMERGENCY DUMP LEVER.

The speed brake can be retracted in flight, if normal operation fails, by means of a dump lever. (See 6, figure 1-8; 3, figure 1-12; 6, figure 1-14.) Moving the lever forward mechanically opens a dump valve, which relieves hydraulic pressure from the speed brake actuating cylinders. Air loads then return the speed brake to a trail position. This occurs regardless of speed brake switch position, because the emergency dump lever overrides the speed brake switch. The speed brake system is reset for normal operation when the emergency dump lever is returned to the off position. No emergency method for opening the brake is provided.

LANDING GEAR SYSTEM.

The retractable tricycle landing gear is electrically controlled and hydraulically actuated. The main gear retracts inboard into the lower surface of the wing and fuselage and the dual-wheel nose gear retracts aft into the fuselage. An electrically actuated retractable tail skid operates simultaneously with the landing gear. The wheel well doors are closed after the gear is down and locked. A load switch on each main gear shock strut prevents the landing gear from being retracted when the weight of the airplane is on the gear. An emergency gear lowering system is provided. During normal or emergency operation, gear lowering time is about 6 to 8 seconds (it should not exceed 10 seconds); normal gear retraction requires about the same time. A steering unit on the nose gear serves as a conventional shimmy damper when the steering is not engaged. The main gear wheels have hydraulically operated, multiple-disk type brakes with an antiskid system.

LANDING GEAR GROUND SAFETY LOCKS.

Removable ground safety locks may be installed in the main and nose gear assemblies to prevent possible collapsing of the gear while the airplane is on the ground. (See figure 1-30.) Ground safety locks are also provided for the open position of the main and nose gear wheel well doors. The locks

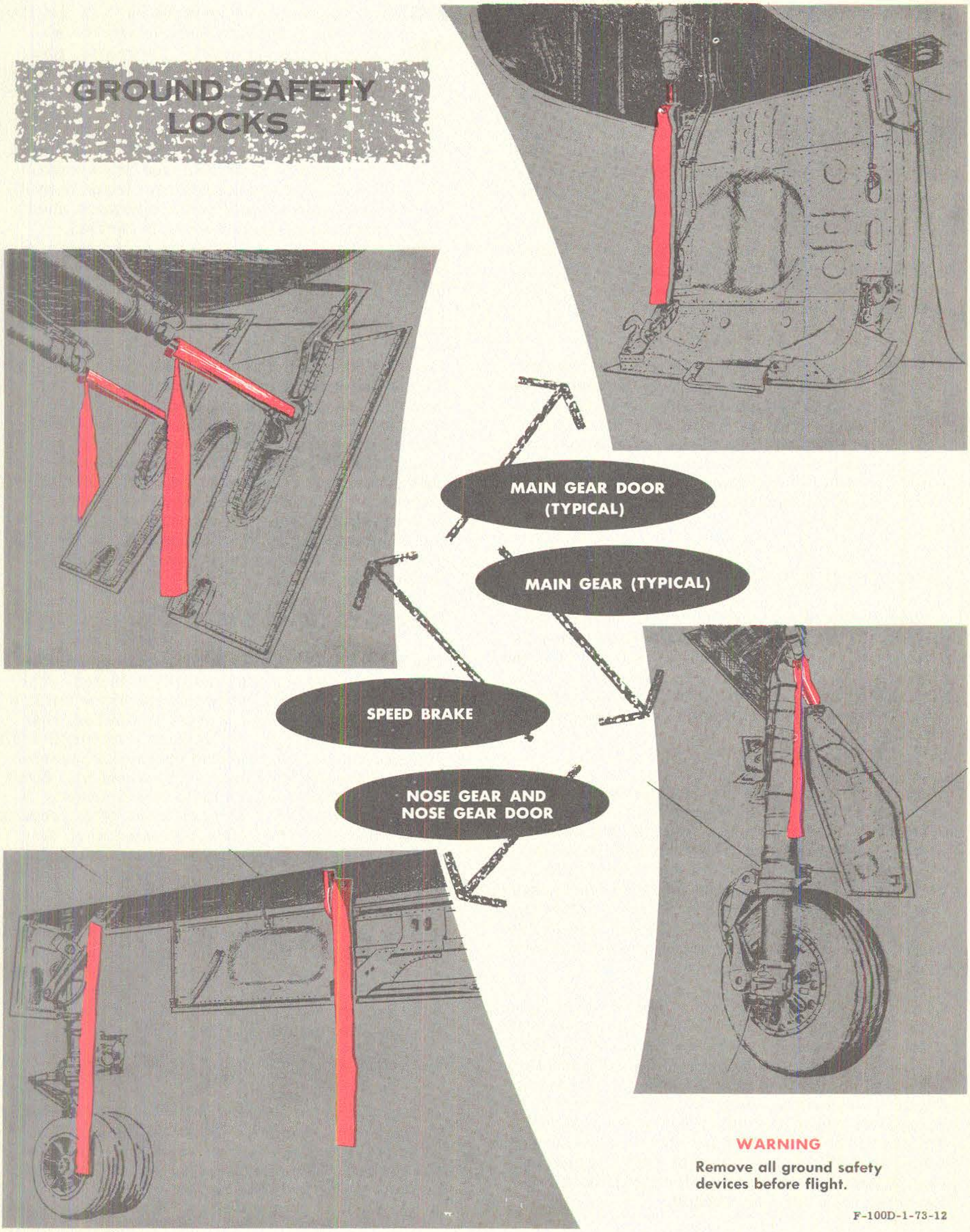

GROUND SAFETY LOCKS
MAIN GEAR DOOR (TYPICAL)
MAIN GEAR (TYPICAL)
SPEED BRAKE
NOSE GEAR AND NOSE GEAR DOOR
WARNING
Remove all ground safety devices before flight.
F-100D-1-73-12

Figure 1-30

have regulation red warning streamers. All gear ground safety locks must be removed before flight.

Caution The nose gear ground safety pin must be in until after engine start, to prevent possible nose gear retraction when hydraulic pressure is applied at the start.

LANDING GEAR CONTROLS AND INDICATORS.

Landing Gear Handle.

The landing gear handle (figure 1-31) controls the gear, the gear door hydraulic selector valves, and the tail skid actuator, by primary bus power. On F-100F Airplanes, the handles in each cockpit are mechanically interconnected. When the airplane is air-borne, moving the handle to UP positions the door selector valve so that utility hydraulic pressure opens the wheel well doors. After the doors are open, the gear selector valve applies pressure to retract the gear. When the gear is up and locked, the door selector valve is repositioned, to close the doors. After the doors are closed and locked, the landing gear system is automatically depressurized. When the landing gear handle is moved to DOWN, both the door and gear selector valves are energized to permit hydraulic pressure to open the wheel well doors and lower the gear. After the gear is down and locked, the door selector valve is repositioned to close and lock the doors. At the completion of the lowering cycle, the gear and door selector valves remain energized, maintaining hydraulic pressure against the down side of the gear actuating cylinder and the closed side of the door actuating cylinders.

Landing Gear Emergency Lowering Handle.

The landing gear emergency lowering handle (23, figure 1-6; 24, figure 1-7; figure 1-11), not in the rear cockpit, is used to lower the gear in case of failure of the normal lowering system. Pulling the handle full out (after the landing gear handle has been moved to DOWN) mechanically unlocks all gear and wheel well door uplocks, and positions the hydraulic selector valves to open the doors and lower the gear. To provide positive nose gear lowering, pulling the emergency lowering handle also directs hydraulic pressure from the nose gear emergency lowering accumulator to lower and lock the nose gear. If the gear fails to lower because of a malfunction in the electrical system, and the hydraulic system is operating, pulling the emergency lowering handle lowers and locks the gear by hydraulic pressure as in a normal extension cycle. (The handle must be held fully extended until the gear is down and locked.) If utility hydraulic system failure prevents normal gear lowering, pulling the emergency lowering handle allows the main gear to fall free and lock by gravity while the nose gear lowers and locks by pressure from the nose gear emergency lowering accumulator. The nose gear emergency accumulator provides enough pressure for one emergency lowering only. The emergency accumulator selector valve must be reset on the ground before normal gear operations can continue. A red rod protrudes from the fuselage at the left of the nose wheel well when the landing gear emergency lowering handle has been pulled. The selector valve is reset by pushing on the rod until it is in flush with the fuselage skin.

Caution The nose gear cannot be retracted in flight after being lowered by the emergency lowering handle. The emergency accumulator selector valve must be reset manually (on the ground) before the next flight, if the gear has been lowered by the emergency handle.

Landing Gear Position Lights.

The down-and-locked position of the gear is indicated by three green push-to-test indicator lights. (See figure 1-31.) These lights are powered by the primary bus, and are on only when the gear is in the down-and-locked position. There is no tail skid position indicator. The lights may be dimmed by the indicator light dimmer switch.

Landing Gear Warning Light.

A primary-bus-powered red light in the plastic knob of the landing gear handle (figure 1-31) warns of an unsafe condition of the landing gear or wheel well door. When the landing gear handle is moved to UP, the light comes on immediately and remains on until the gear is up and locked and the wheel well doors are closed and locked. When the landing gear handle is moved to DOWN, the light remains on until the gear is down and locked. The light also comes on when the airplane is at any altitude below 10,000 feet and below an airspeed of 205 knots with the gear not down and locked. This light may be dimmed by the indicator light dimmer switch when the instrument panel indirect lights are turned on. The bulb of the landing gear warning light can be tested by the indicator light test circuit.

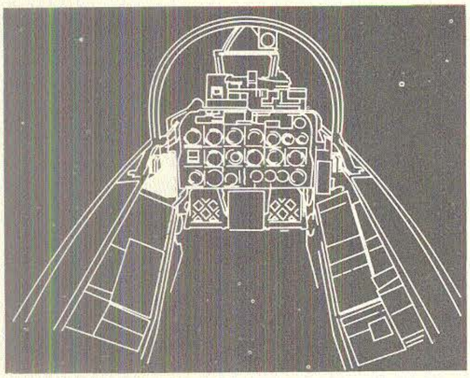
NOTE The landing gear warning light comes on when the ram-air turbine door is open, regardless of airspeed, when the airplane is below 10,000 feet and the gear is up.

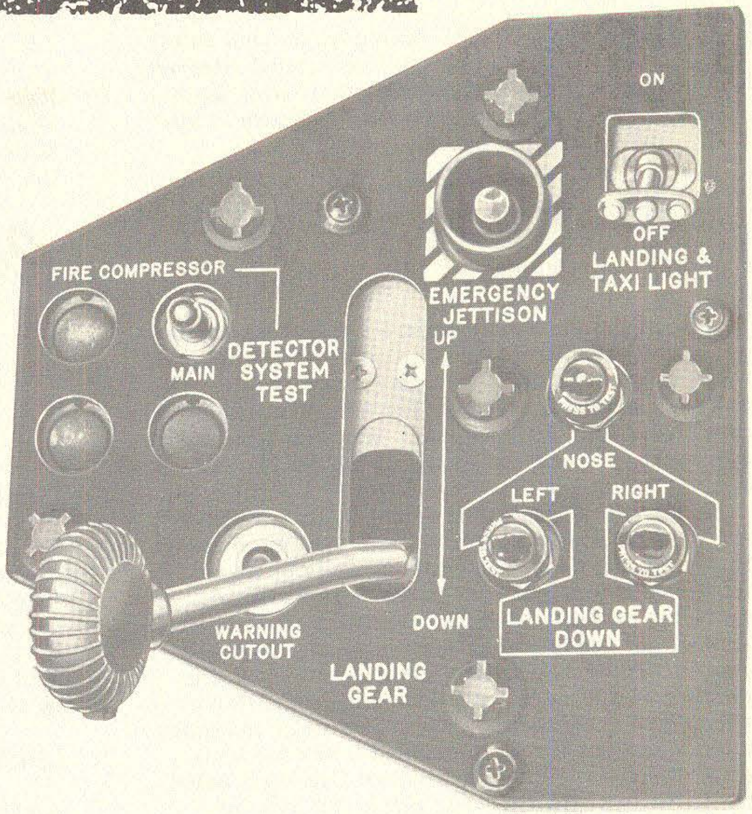
Landing Gear Warning Horn - F-100D-21 Through F-100D-31 and F-100D-46 Through F-100D-56 Airplanes Not Changed by T.O. 1F-100-905.

A warning horn, on the canopy deck, behind the seat, sounds if any gear is not down and locked when the throttle is retarded below cruising rpm.

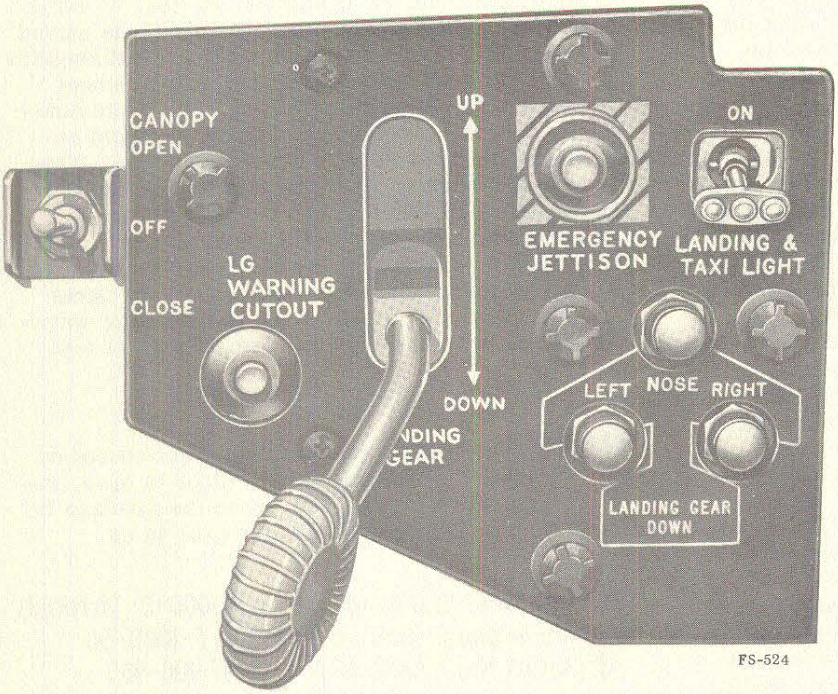
LANDING GEAR CONTROL PANELS

(TYPICAL)

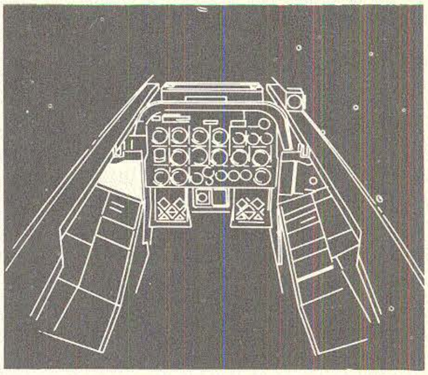




8223-54-13K



FS-524



F-100F REAR COCKPIT

F-100F-1-A33-1

Figure 1-31

The horn can be silenced by pressing the warning cutout button. (See figure 1-31.) The horn circuit, powered by the primary bus, is automatically reset when the throttle is advanced.

Landinq Gear Audio Warning Signal - F-100D-61 and Later F-100D Airplanes, F-100D Airplanes Changed by T.O. 1F-100-905, and F-100F Airplanes.

An audio warning in the headset provides an indication of unsafe landing gear condition when the landing gear is not down and locked, the altitude is below 10,000 feet, the airspeed is below 205 knots IAS, and the throttle is not in AFTERBURNER or the throttle is retarded below 85% rpm.* The primary-bus-powered warning signal sounds until the landing gear handle is placed DOWN and the gears reach their downlocked position.

NOTE If the gear is lowered in the speed range of 210 to 200 knots IAS, it is possible that there will be no audio warning signal given. The warning light in the gear handle and the gear position lights are used for the down-and-locked indication in this speed range.

The gear audible warning signal system also operates with the ram-air turbine door open, when the landing gear is up and the airplane is below 10,000 feet, regardless of airspeed. If a Military Thrust take-off is made, the warning signal sounds as the first gear leaves its down-locked position and continues to sound until an airspeed of 220 knots IAS is reached.

Warning System Cutout Button.

A warning system cutout button (figure 1-31) is used to disconnect the signal at any time and under any condition. An increase in airspeed above 220 knots IAS or an increase in altitude above 10,000 feet automatically recloses the signal circuit for the landing gear. An increase in altitude above 10,000 feet recloses the signal circuit for the ram-air turbine door-open position.

NOSE WHEEL STEERING SYSTEM.

The nose wheel steering system affords directional control of the airplane during taxiing, take-off, and landing. It is engaged by primary bus power and actuated by utility hydraulic pressure. Steering is mechanically controlled by the rudder pedals and is engaged or disengaged by a push-button on the stick grip. The irreversible hydraulic steering unit permits the nose wheels to be turned 35 degrees each side of center. A nose gear load switch prevents engagement of the steering system when the weight of the airplane is off the nose gear. As the gear retracts, a mechanically operated valve depressurizes the steering unit so that it cannot remain engaged upon gear retraction if the nose gear load switch or hydraulic shutoff valve fails. When the steering system is not engaged, the steering unit serves as a conventional shimmy damper.

NOSE GEAR TORQUE LINK.

The nose gear shock strut and nose wheel assembly are connected by a torque link (scissors), which keeps the strut and wheel assemblies aligned. (See figure 1-32.) The torque link has a quick-release pivot pin, to disconnect the link for towing the airplane. When the link is disconnected, the nose wheels can free-swivel. The torque link is disconnected by pulling out on the spring-loaded safety pin and then unscrewing the pivot pin. The pivot pin should be replaced in the upper section of the torque link when the link is disconnected. The torque link is connected by pulling out on the safety pin and inserting the pivot pin through both sections of the link. The pivot pin is then tightened finger-tight, to the nearest safety pin hole and safetied by releasing the spring-loaded safety pin into the hole.

NOSE WHEEL STEERING BUTTON.

The nose wheel steering system is engaged or disengaged by a push-button switch. (See figure 1-28.) Momentarily pressing the button energizes the steering shutoff valve which directs utility hydraulic pressure to the nose wheel steering unit. A clutch is then engaged hydraulically to link the rudder pedal cables with the steering unit.

NOTE If rudder pedals are not at neutral when button is pressed, the steering may or may not engage (depending on engagement of clutch in steering unit) and move the nose wheels to agree with the pedal position. If the steering does not engage, the pedals must be moved in the direction of the nose wheel setting to obtain steering.

After the system is engaged, it remains engaged until the button is depressed and released a second time.

NOTE The nose wheel steering button is operable only if primary bus power is available and the weight of the airplane is on the nose gear.

*F-100D-21 through F-100D-31 and F-100D-46 through F-100D-56 Airplanes and F-100D Airplanes changed by T.O. 1F-100-905

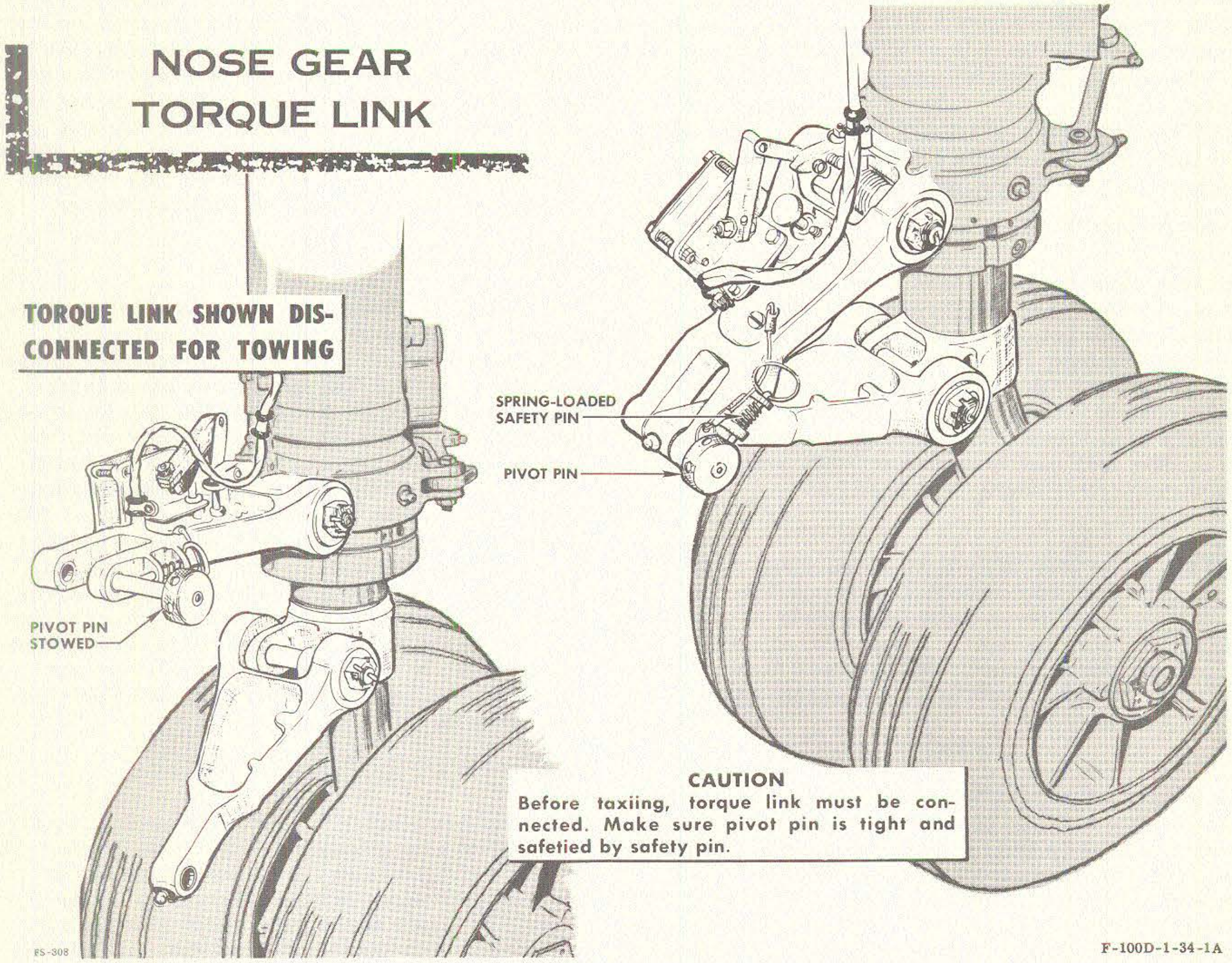


Figure 1-32

WHEEL BRAKE SYSTEM.

The multiple-disk type hydraulically operated brakes are on the outboard side of the main wheels. The braking action on each wheel is independently controlled by the respective rudder pedal. Toe action on the rudder pedals actuates the brake valves, which meter utility hydraulic pressure to apply the brakes. The hydraulic pressure applied to the brakes is proportional to the force applied at the pedal, up to the maximum pressure admitted through the brake valve, and an increase in pedal pressure does not increase the pressure to the brakes. The wheel brake emergency accumulator furnishes power for the brake valves in case of a pressure drop in the brake system or utility hydraulic system failure. The wheel brake system includes an antiskid system which automatically prevents excessive wheel skidding. If the pressure to the brake valves drops below 500 psi, a variable-flow regulator ("run-around valve") opens to permit additional pressure (flow) to bypass the flow restrictor and maintain pressure to the brake valves.

An electrically driven emergency hydraulic pump, powered from the battery bus, provides brake operating pressure (for power braking) in case of utility system failure, as long as fluid is available from the utility reservoir. Emergency pump operation is controlled by pressure switches in the brake system which sense low brake operating pressures. If, because of antiskid cycling, repeated application of brakes or utility system failure, the wheel brake emergency accumulator pressure drops to 750 psi and the antiskid system accumulator pressure drops to 450 psi, the pressure switches close. With the pressure switches closed and with either brake pedal depressed (so that either or both pedal switches are actuated), the emergency pump operates to supply brake pressure. The pump shuts off when pressure is again built up to 750 psi in the antiskid system accumulator. A time-delay relay in the emergency brake system enables the emergency pump to operate if the modulating restrictor and/or variable flow regulator becomes clogged because of contamination. (Refer to Section VII for wheel brake operation.)

NOTE An operational check of the emergency pump can be made before the engine is started, by operating the brake pedals and listening for pump operation.

- There are no parking brakes on these airplanes.

WHEEL BRAKE ANTISKID SYSTEM.

An electrically controlled, hydraulically operated antiskid system in the wheel brake system detects the start of a skid condition or a near-locked condition and automatically releases hydraulic pressure at the brakes. The system is not an automatic braking system, and, therefore, maximum brake pedal pressure should not be applied at touchdown and maintained throughout the landing roll during a normal landing. The system functions automatically, when engaged, to release the brakes as the wheels approach a skid. A skid detector unit, on each main gear, senses the rate of change of wheel speed as well as rotation of the wheel. These detectors supply electrical signals to the system control unit, which controls the antiskid control valves in the brake lines. The control valves regulate the hydraulic pressure applied by the pilot to the brakes. (See figure 1-27.) If either wheel approaches a skid condition after the brakes are applied, the detector sends a "skid" signal to the control unit. The control unit actuates the antiskid control valve to release the brakes by shutting off pressure to both brakes and dumping the pressure to return. As the skid condition is corrected by this automatic brake release, the detector stops sending a "skid" signal. This causes the control valves to open and restore pressure to the brake. The antiskid system maintains this "on-off" cycling of the brakes as long as the brakes are applied and skid conditions prevail.

The detector units are sensitive within a speed range from the highest possible landing speed to about 10 knots. Below this speed, the system should not be depended upon to give antiskid protection. An "arming" circuit in the antiskid system, that keeps the brake system inoperative until the wheels touch down and start to rotate, prevents landing with the brakes on. The arming circuit gives locked-wheel protection for 4 to 16 seconds after the wheels are first accelerated on landing. At touchdown, as the wheels begin to rotate, simultaneous wheel rotation or a recovery signal generated from the acceleration of either wheel will disarm the locked wheel protection phase of the antiskid system and permit brake application within 0.6 second maximum on landing. When the locked-wheel protection has dropped out, it is not available until the system has been rearmed by moving the landing gear handle to UP. If either brake is released by the system for a continuous period of 3 seconds, the antiskid control unit automatically shuts off the antiskid and normal braking technique is necessary.

Antiskid Switch.

Primary bus power to the antiskid system is controlled by a three-position switch (not in rear cockpit). (See figure 1-19.) When the switch is ON, antiskid protection is available. In addition, with the switch ON, moving the landing gear handle to UP after take-off engages the arming circuit that prevents landing with the brakes on. This gives locked-wheel protection for about 4 to 16 seconds after the first recovery signal on landing. Moving the switch to OFF shuts off the antiskid system and normal braking is available immediately. However, the antiskid caution light may not come on until 1-1/2 to 4 seconds later. (Power braking is still available when the switch is OFF.) The ARM (GRD TEST) position is used to "arm" the system for maintenance and adjustment purposes only. The switch is spring-loaded from ARM (GRD TEST) to ON.

Antiskid Caution Light.

When the skid protection has been lost on either wheel, the antiskid caution light (figure 1-16) is illuminated by primary bus power. The bulbs in the light can be tested by the indicator light test circuit.

DRAG CHUTE SYSTEM.

The 16-foot, ring-slot type parachute, packed in a deployment bag, is stowed in a compartment in the lower surface of the aft fuselage, outboard of the tail skid. A riser cable (stowed externally in a faired recess on the left side of the fuselage) joins the drag chute to a coupling in the trailing edge of the vertical stabilizer, below the rudder. The drag chute is mechanically controlled and can be jettisoned, if desired, after being deployed. The drag chute release mechanism has a safe arming device that automatically releases the chute from the airplane if it is deployed by any action other than movement of the drag chute handle.

DRAG CHUTE HANDLE.

A drag chute handle (47, figure 1-6; 3, figure 1-7) is used to control the drag chute. (On F-100F Airplanes, the cockpit initiating the action has primary control of the drag chute handle.) When the handle is pulled straight back about 3 inches to deploy the chute, the spring-loaded to open drag chute compartment doors are mechanically unlocked. A pilot chute springs from the compartment when the doors open, and pulls the drag chute out of the deployment bag into the air stream, where it is inflated. To jettison the drag chute at any time after it has been deployed, the handle should be rotated 90 degrees counterclockwise and then pulled back another 2 inches from the deploy position. A release mechanism is mechanically unlatched to release the chute and riser cable.

ARRESTING HOOK.

The externally mounted arresting hook, forward of the tail skid, is used to stop the airplane during take-off or landing emergencies. It is held against the fuselage in a cocked (stowed) position by a solenoid latch that is ground-safetied by a red streamered safety pin. A hook point guard is installed on the rear fuselage to prevent a rebounding barrier cable from engaging the stowed arresting hook. When released, the flat spring steel hook is held against the runway by spring tension.

Warning Stay clear of the hook travel arc, as it is always cocked when stowed and inadvertent release could cause serious injuries.

A push-button switch releases the hook. Once the hook is released, it must be manually cocked by ground personnel.

ARRESTING HOOK RELEASE BUTTON.

The arresting hook release button (22, figure 1-8; 21, figure 1-12; 15, figure 1-14) is powered by the battery bus. The release button has a light which illuminates when the arresting hook is released. Pushing this button actuates the solenoid latch that releases the hook.

INSTRUMENTS.

Most of the instruments are powered by the airplane electrical systems. The exhaust temperature gage and tachometer systems, however, are of the self-generating type. An instrument panel vibrator, energized automatically by the tertiary bus, prevents instrument lag or sticky pointer indications.

NOTE For information regarding instruments that are an integral part of a particular system, refer to applicable paragraphs in this section and in Section IV.

PITOT-STATIC BOOM.

Pitot and static pressures for various flight instruments are obtained from the pitot-static boom. (See figures 1-1 and 1-2.) Because the length of the boom makes it vulnerable during towing or other ground operations, the boom is hinged forward of its attachment point to allow it to be folded upward. Anti-icing protection is provided for the boom. (Refer to "Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal Systems" in Section IV.)

ACCELEROMETER.

The three-pointer accelerometer (13, figure 1-6; 18, figure 1-7; 11, figure 1-11) shows positive and negative G-loads and has two recording pointers (one for positive G-loads and one for negative G-loads) which follow the indicating pointer to its maximum attained travel. The recording pointers remain at the maximum travel positions reached by the indicating pointer, giving a record of maximum G-loads encountered. Pressing the knob on the instrument ring returns the recording pointers to the normal (1G) position.

ALTIMETER.

The altimeter (41, figure 1-6; 44, figure 1-7; 33, figure 1-11) has the standard 1000- and 100-foot pointers, and a 10,000-foot pointer which extends from a center disk to the edge of the dial, so that it cannot be obscured by the other pointers. The center disk has a wedge-shaped cutout through which a set of warning stripes appear at altitudes below 16,000 feet. This altimeter offers improved readability and gives warning when an altitude of less than 16,000 feet is entered.

Altimeter Correction Card.

An altimeter correction card is provided on the canopy frame. (Refer to "Altimeter Correction" in T.O. 1F-100A-1-1.)

AIRSPEED/MACH INDICATOR.

The airspeed/Mach indicator (44, figure 1-6; 48, figure 1-7; 3, figure 1-11) shows indicated airspeed within a range of 80 to 850 knots. The indicator airspeed/Mach pointer is fixed to a rotating plate. The pointer also indicates Mach number when the airspeed is above 250 knots. The Mach scale rotates under the airspeed/Mach pointer plate and is visible through a cutout in the plate at airspeeds above 250 knots. The Mach scale rotates with altitude changes so that the airspeed/Mach pointer will show the Mach number that equals the indicated airspeed for the particular flight altitude. For example, at sea level, the Mach 1.0 graduation on the Mach scale might be opposite the 650-knot graduation of the IAS dial. If a climb were made to 40,000 feet, the Mach dial would rotate counterclockwise so that the Mach 1.0 graduation would then be opposite the 312-knot graduation. The indicator has an adjustable airspeed marker that is moved to the desired position by knurled airspeed marker set knob at the lower right corner of the instrument ring. The airspeed marker can be used for referencing any desired inflight speed as well as landing speed. A maximum allowable airspeed/Mach pointer (painted red and black) is ground-set to indicate 700 knots EAS. As altitude is increased, changes in outside air density cause the pointer to move to a higher IAS reading. Since this pointer will always indicate a speed greater than the IAS that is clean airplane limit airspeed, it should be ignored.

MAGNETIC COMPASS.

A conventional magnetic compass, suspended from the windshield bow, provides stand-by heading indication for navigation in case of instrument or electrical system failure. The magnetic compass light is independently controlled. (Refer to "Lighting Equipment" in Section IV.) The compass correction card is on the right canopy rail.

HEADING INDICATOR.

Refer to "Navigation Equipment, " in Section IV.

ATTITUDE INDICATOR.

The MM-3 type attitude indicator (9, figure 1-6; 9, figure 1-7; 9, figure 1-11) is a pictorial-type instrument. The indicator is operated by a common MD-1 gyro control and MC-1 rate gyro. The MD-1 gyro senses pitch and bank angles and incorporates a pitch and bank erection system. The MC-1 rate gyro senses rate of turn. The airplane attitude is shown accurately through 360 degrees of roll and plus or minus 82 degrees of pitch. The pitch and bank erection system reduces turning errors to a minimum and prevents the accumulation of pitch errors during multiple acrobatic maneuvers. Acceleration and deceleration will cause slight errors in pitch indications which will be most noticeable on take-off. Pitch and roll attitudes are shown by the circular motion of a universally mounted sphere displayed as the background for a miniature reference airplane. The miniature reference airplane is always in proper physical relationship to the simulated earth, horizon, and sky areas of the background sphere. On the sphere, the horizon is represented by a solid fluorescent line, the sky by a light gray area, and the earth by a dull black area. Horizontal markings with 5 degrees of separation on the face of the sphere show accurate airplane attitudes up to 82 degrees of climb or dive. The 5-degree scale is slightly expanded for greater accuracy. This provides quick readability to within one degree of climb or dive. Used for this purpose, the attitude indicator is an accurate aid in radar and ILS approaches. Bank angles are read on a semicircular bank scale on the upper half of the instrument. A bank pointer on the face of the instrument moves in the direction opposite to which the airplane is banked, to indicate the amount of bank angle. The pitch trim knob on the lower right side of the instrument electrically rotates the sphere to the proper position in relation to the fixed miniature reference airplane to correct for pitch attitude changes. This adjustment is necessary, since the level-flight attitude of the airplane varies with weight and speed. The window in the lower left corner of the instrument shows "OFF" whenever the instrument is not operating. The system starts operating. The system starts operating as soon as power from the 3-phase ac instrument bus is available, but "OFF" will not be covered until after a warm-up period of approximately 60 seconds. "OFF" also will appear in case of a complete failure of 3-phase ac instrument bus power.

Warning A slight reduction in this ac power, or failure of certain electrical components within the system will not cause OFF to appear even though the system is not functioning properly. Therefore, periodically in flight, the attitude indications given should be checked against other flight instruments, such as the magnetic compass or the turn-and-slip and vertical velocity indicators.

Gyro caging provisions are not required in this system. If the pitch limit of 82 degrees is exceeded, the sphere will rotate 180 degrees but will not reverse the normal position of the sky and earth reference area. It will still provide an accurate indication of airplane attitude. As soon as the airplane returns below the 82-degree limit, the sphere rotates back to its normal or near normal position. A slight error will accumulate during maneuvers but will be corrected by the system at a rate of 0.8 to 1.8 degrees per minute. However, if a faster rate of correction is desired, pushing an attitude indicator fast erection button will provide an erection rate of 20 to 30 degrees per minute. This fast erection rate is also fed into the system momentarily, when electrical power is first applied.

NOTE If power is applied while the gyro is still running, it will not erect as fast as if the gyro has stopped. Use of the fast erection button is permissible at this time.

STAND-BY ATTITUDE INDICATOR.

The stand-by attitude indicator, a 2-inch vertical gyro indicator (VGI), is a pictorial-type instrument. (See 42, figure 1-6; 45, figure 1-7.) Operation of the 2-inch VGI and MM-3 type attitude indicator is identical. Refer to "Attitude Indicator" in this section for attitude indicator operation.

ATTITUDE INDICATOR FAST ERECTION BUTTON.

The square attitude indicator fast erection push button (11, figures 1-6 and 1-7; 8, figure 1-11) is marked "PUSH VGI ERECT." The button is powered by the 3-phase ac bus and permits fast erection of the vertical gyro in the attitude indicator during flight. The button must be held in until the gyro has erected. A light in the button comes on when the instrument panel indirect lights are on.

NOTE Do not use the fast erection button in flight until the airplane is in a wings-level, unaccelerated condition.

- Do not hold the fast erection button in longer than 2 minutes without a one-minute cooling period between applications.

TURN-AND-SLIP INDICATOR.

The conventional turn-and-slip indicator (10, figure 1-6; 16, figure 1-7; 36, figure 1-11) is electrically driven by the primary bus. Normally, the indicator is not used in banks exceeding 30 degrees. The instrument is calibrated so that one single needle-width turn will accomplish a 360-degree turn in 4 minutes (1-1/2 degree per second rate of turn). Because of the mounting tilt of the turn-and-slip indicator, the indicator will show a turn in the opposite direction to that of actual airplane attitude during a high rate of roll. When the attitude indicator is inoperative and the turn-and-slip indicator is being used as a primary flight instrument, observe the following instructions:

1. Avoid excessive rate of roll. The turnneedle indicates a turn in the opposite direction during all entries into turns, and the error increases as rate of roll increases. The turn needle indicates correctly only when no movement occurs around the longitudinal axis.

2. Maintain a constant bank angle during turn. The indicator will then show correct direction and rate of turn.

INDICATOR LIGHT TEST CIRCUIT.

The indicator light test circuit provides a means of testing the operation of the bulbs in the indicator, caution, and warning lights simultaneously. All indicator, caution, status display, and warning light bulbs (except those in the engine compartment fire- and overheat-warning lights) are included in this test circuit which is powered by the primary bus.

NOTE Use of the indicator light test circuit is not an operational check-out of any indicator, caution, status display, or warning system.

INDICATOR LIGHT TEST SWITCH.

A three-position switch (figures 1-26 and 4-14) permits testing the illumination and brilliancy of the indicator, caution, status display, and warning lights. When the switch is held at TEST BRIGHT or TEST DIM, primary bus power illuminates the lights at the selected brilliancy. The switch is spring-loaded to OFF (center).

NOTE Releasing the indicator light test switch from either position changes the indicator light circuit to bright.

INDICATOR LIGHT DIMMER SWITCH.

A three-position switch controls the brilliancy of the indicator, caution, status display, and warning lights when the instrument panel lights are on. Moving the switch from its spring-loaded center off position to BRIGHT or DIM sets up circuitry so that the indicator, caution, and warning lights will come on at the selected brilliancy when illuminated. (See figures 1-26 and 4-14.) All indicator, caution, and warning lights can be dimmed by means of the switch except those on the in-flight control tester panel, which have an integral control.

NOTE Use of the indicator light test switch changes the indicator light circuit to bright when released. To dim the indicator lights after using the indicator light test switch, move the indicator light dimmer switch to BRIGHT, then to DIM, and release to the center off position.

MASTER CAUTION LIGHT.

The master caution light (figure 1-16), powered by the primary bus, comes on whenever certain indicator or caution lights come on. This alerts the pilot to check the placard lights to determine in which system the trouble is occurring. To enable the master caution light to show the illumination of any additional lights, it must be put out each time it comes on. This is done by pressing the lighted indicator or caution light into its socket. The master caution light then goes out and it is readied to relight should another indicator or caution light come on. The lighted indicator or caution light does not go out when it is pressed. On F-100F Airplanes, duplicate indications are received in the front and rear cockpits; however, resetting the master caution light can only be done in the front cockpit. The bulbs in the master caution light can be tested by the indicator light test switch.

NOTE Illumination of the following lights does not illuminate the master caution light: take-off trim indicator light, ignition-on indicator light, engine compartment fire- and overheat-warning lights, landing gear warning light, canopy-not-locked warning light, radio control transfer system indicator light, * drop tank empty and air refueling indicator lights, status display lights, and the indicator lights on the in-flight control tester panel.

---

*F-100F Airplanes

EMERGENCY EQUIPMENT.

ENGINE COMPARTMENT FIRE AND OVERHEAT WARNING SYSTEMS.

Fire and overheat detector systems detect and indicate overheating and fire in the forward or aft engine compartment. One of four different configurations may be installed, which can be identified by the system test buttons. Airplanes with a single-wire system connected to single-terminal detectors have a single push-button switch for testing the circuits. Airplanes with a dual-wire system connected to dual-terminal detectors have four push-button switches for testing the circuits. Airplanes with a dual-wire system connected to single terminal detectors have two push-button switches for testing the circuits. NAVS airplanes have a single-wire system connected to single-terminal detectors. These airplanes have two combination push-button lights.

Engine Compartment Fire- and Overheat-warning Lights.

An abnormal rise in temperature in either engine compartment is shown by primary-bus-powered placard-type warning lights. (See figure 1-16.) Two lights, one for the forward and one for the aft compartment, come on to show an excessive temperature condition or fire in the respective engine compartment. The forward compartment light shows "FIRE ENG. COMP." when it comes on; the aft compartment light, "OVERHEAT ENG BURNER."

Engine Compartment Fire- and Overheat-warning System Test Buttons.

Some airplanes have a single primary-bus-powered test button. (See figure 1-31.) This button permits testing the continuity of the fire- and overheat-warning systems, and provides an operational test of the bulbs within the fire- and overheat-warning lights. Other airplanes have four primary-bus-powered test buttons. Pressing the "MAIN" or "AUX" test button for either the fire- or overheat-warning system tests the main or auxiliary circuit of the respective system. The fire- or overheat-warning light should come on as each circuit and system test button is pressed.

NOTE Press the "MAIN" and "AUX" buttons separately in order to get an individual check of each circuit.

Failure of each bulb in either warning light to come on bright during these tests indicates a malfunction of the respective system, and the system should be checked before flight. On airplanes with the partial dual-wire system, both "AUX" push buttons are inoperative and are covered with a cap marked "INOP." The operation of the fire and overheat warning lights can only be tested by the engine compartment fire and overheat warning system test buttons. NAVS airplanes use combination push-button lights. (See 7, figure 1-7.) Pressing the FIRE ENG COMP or OHEAT ENG BURNER light will test the respective system.

CANOPY.

The one-piece clamshell-type canopy (figure 1-33) has an electromechanical mechanism for normal operation and a cartridge-type canopy remover for emergency force-jettisoning. The canopy is hinged at the rear; in opening, it moves directly back about one inch and then rises to about 30 (23*) degrees. Normal operation of the canopy is controlled by a switch in the cockpit and external switches on both sides of the fuselage. Emergency force-jettisoning of the canopy is accomplished when either of the ejection seat handgrips is raised, or when the canopy alternate emergency jettison handle is pulled. F-100D-61 and later airplanes and F-100F Airplanes also have an external handle that permits the canopy to be jettisoned by ground personnel for emergency entrance. If the canopy has been opened more than about 4 (8*)inches at the windshield bow, firing the canopy remover will not force-jettison the canopy. (On F-100F Airplanes, the canopy remover tube mechanically locks to the canopy structure whenever the canopy remover is fired, to prevent the possibility of air loads causing the remover tube to strike the rear seat occupant.) Handles in the canopy frame permit mechanical release of the canopy in emergencies, both from within the cockpit and externally. The mechanical release is independent of the ejector charge or the normal electrical actuator. A seal, in the rim of the canopy, contacts the airplane structure, allowing cockpit pressurization.

CANOPY SEAL.

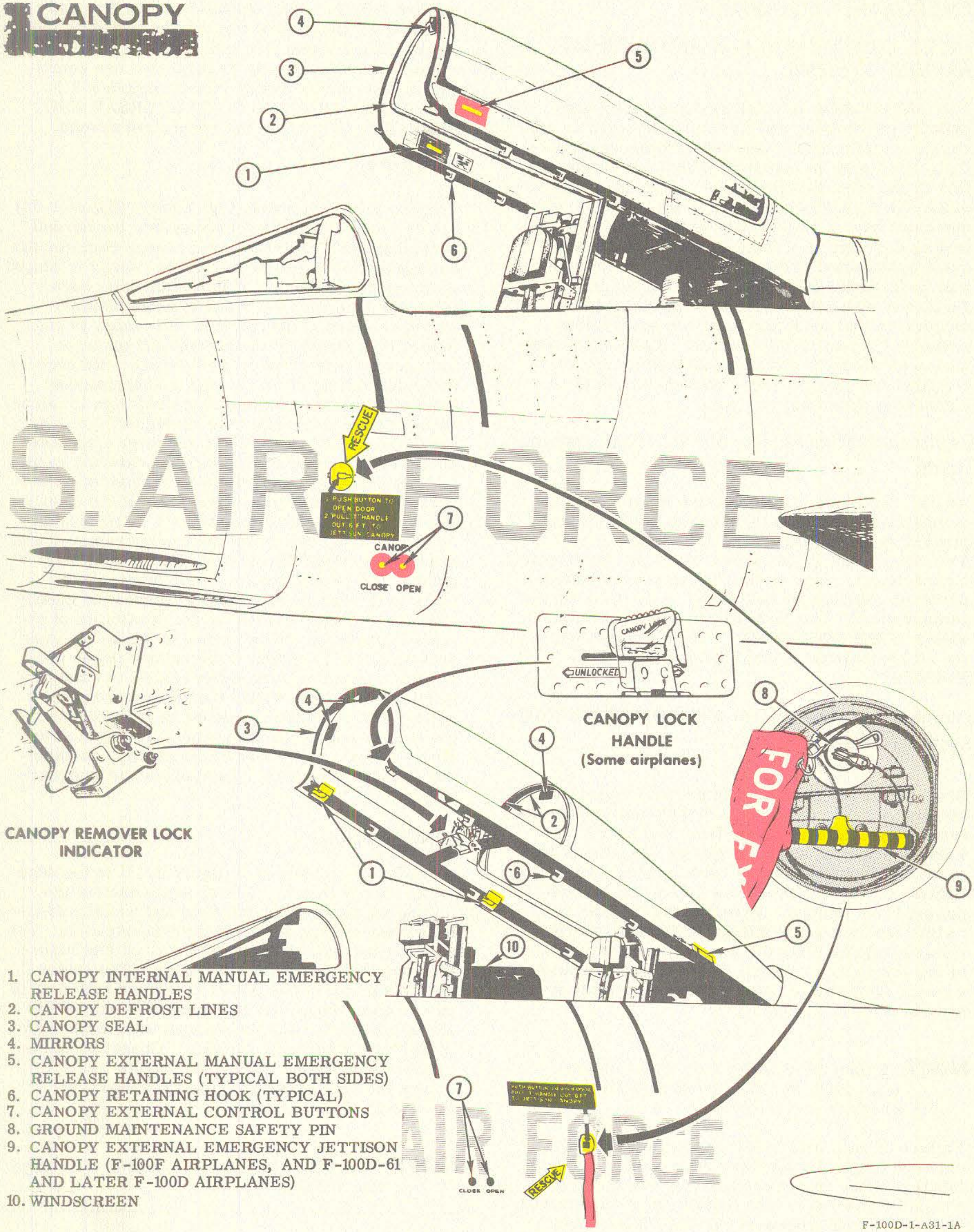
An inflatable rubber seal (figure 1-33) in the edge of the canopy frame and bow, seats against the mating surfaces of the fuselage and windshield bow to provide sealing for cockpit pressurization. The seal pressurization switch is actuated just before the complete locking of the canopy. The switch controls primary bus power to a valve that directs engine compressor air to inflate the seal. (This air is passed through the primary heat exchanger of the air conditioning system.) Operation of the canopy mechanism, during the opening cycle, dumps the seal pressure during the initial aft movement of the canopy.

NOTE If primary bus failure occurs, the canopy seal deflates.

---

*F-100F Airplanes

CANOPY



1. CANOPY INTERNAL MANUAL EMERGENCY RELEASE HANDLES
2. CANOPY DEFROST LINES
3. CANOPY SEAL
4. MIRRORS
5. CANOPY EXTERNAL MANUAL EMERGENCY RELEASE HANDLES (TYPICAL BOTH SIDES)
6. CANOPY RETAINING HOOK (TYPICAL)
7. CANOPY EXTERNAL CONTROL BUTTONS
8. GROUND MAINTENANCE SAFETY PIN
9. CANOPY EXTERNAL EMERGENCY JETTISON HANDLE (F-100F AIRPLANES, AND F-100D-61 AND LATER F-100D AIRPLANES)
10. WINDSCREEN

Figure 1-33

WINDSCREEN (REAR COCKPIT) - F-100F AIRPLANES.

A windscreen (figure 1-33) above the rear cockpit instrument panel shroud, protects the rear seat occupant from wind blast when the canopy is jettisoned in flight. A pip pin and hook that retain the windscreen in the stowed (lowered) position are released either by canopy remover firing or by a manual release after the canopy is manually jettisoned. The windscreen is then forced upward and into position by spring action. If the canopy bubble is broken, the windscreen will not rise enough to offer the rear seat occupant any protection unless the canopy is released. The windscreen will contact a roller on the canopy forward crossbeam, and will be held there, until the canopy is released. A windscreen ground safety pin is inserted through a bracket on the left side of the windscreen just ahead of the hinge line to prevent inadvertent release.

Windscreen Manual Emergency Release Knob.

The windscreen manual emergency release knob in the rear cockpit only, must be pulled if the canopy remover fails to release the windscreen, or if the canopy is manually released.

Warning Keep clear of windscreen, because forces exerted by the bungee and torsion spring are strong enough to cause serious injury.

CANOPY CONTROLS AND INDICATOR.

Canopy External Control Buttons.

Two push buttons (figure 1-33), on each side of the airplane, marked "OPEN" and "CLOSE," control electrical power to the canopy actuator.

NOTE The canopy actuator is normally powered by the primary bus. If primary bus power is not available, the battery bus automatically becomes the power source for the canopy actuator.

The selected button must be held down until the canopy reaches the desired position, then released. Limit switches in the canopy actuator automatically cut off power to the actuator when the canopy reaches the full open or full closed position.

Canopy Switch.

A three-position switch (19, figure 1-8; 18, figure 1-12; figure 1-31) controls canopy operation from the cockpit.

NOTE The canopy actuator is normally powered by the primary bus. If primary bus power is not available, the battery bus automatically becomes the power source for the canopy actuator.

The switch is spring-loaded to OFF from both OPEN and CLOSE positions. To fully open the canopy, the switch must be held at OPEN until canopy travel is completed, at which time electrical power is automatically cut off. Releasing the switch to OFF stops the canopy at any point. To obtain a full closed position, the switch is held at CLOSE until the canopy is fully closed and locked, at which time electrical power is automatically cut off. Should the canopy fail to jettison during in flight emergency procedures, it can be opened and blown off by the slipstream. However, at certain flight conditions, air loads may prevent canopy from opening by this method.

Canopy Lock Handle.*

The two-position canopy lock handle (figure 1-33), in the front cockpit, is used to mechanically lock and unlock the canopy. The canopy must be locked manually in the front cockpit after it is closed and manually unlocked before it is opened. Pushing the canopy lock handle forward to LOCKED disengages the canopy switches from the canopy actuating circuit and manually locks the canopy. A guard on the canopy lock handle prevents it from being moved unintentionally to UNLOCKED. When the lock handle is pulled aft to UNLOCKED, it is possible to open the canopy by selecting OPEN with the canopy switch in either cockpit. Actuating the canopy lock handle does not disturb the manual emergency release handles.

NOTE Emergency removal of the canopy by use of the canopy remover or manual emergency release handles automatically releases the canopy lock handle. Use of the manual emergency release handle to unlock the canopy does not render the electrical canopy actuator inoperative.

Canopy Emergency Release (Ejection Seat Handgrips).

Refer to "Ejection Seat" in this section.

Canopy Alternate Emergency Jettison Handle.

A canopy alternate emergency jettison handle (24, figure 1-9; 28, figure 1-10; 26, figure 1-13;

*F-100F-2 Airplanes AF56-3726 and -3727, and F-100F-11 and later airplanes

20, figure 1-15) jettisons the canopy without arming the seat catapult. This handle is either a "T" or "D" handle and has a spring clip over the top which must be released before the handle can be pulled. (See figure 3-8.) When this handle is pulled to its full extended position (about one inch), a mechanical linkage fires a cartridge in the canopy initiator. This causes the canopy remover to fire, jettisoning the canopy.

NOTE This handle is intended only as an alternate means of removing the canopy when it is desired to jettison the canopy only, as in case of a forced landing, or if ejection seat handgrips fail to jettison the canopy. It should not be used instead of the seat handgrip when ejection from the airplane is intended.

Canopy Internal Manual Emergency Release Handle.

The canopy internal manual emergency release handle (figure 1-33) is used to unlock and open the canopy manually when the airplane is on the ground, if the canopy cannot be opened electrically. Opening the canopy internal manual emergency release handle to its extended position unlocks the manual lock, * deflates the canopy seal, and allows the canopy to be pulled back manually (by means of the handle) to an unlocked position. The forward end of the canopy may then be raised manually or electrically.* Although this handle is intended for use while the airplane is on the ground, it may be used in an attempt to open the canopy if the canopy fails to jettison during emergency procedures.

Canopy External Manual Emergency Release Handles.

Two canopy external manual emergency release handles (figure 1-33), one flush-mounted outside on each side of the canopy frame, are used to gain access to the cockpit in case of an emergency when the airplane is on the ground. Releasing either handle to an extended position allows the canopy to be moved back manually about one inch, thereby unlocking it. The canopy may then be lifted at its forward end to allow entrance to the cockpit. It is possible to then latch the canopy in the open position, or to remove it from the airplane (as is recommended for emergency entrance) by lifting the canopy up and rotating it aft as far as possible.

Canopy External Emergency Jettison Handle - F-100D-61 and Later F-100D Airplanes, and F-100F Airplanes.

The canopy external emergency jettison handle (figure 1-33), housed within an access door on the left side of the fuselage below the windshield, permits ground rescue personnel to jettison the canopy from the airplane for emergency entrance. The circular access door is secured by a spring-loaded push-type latch, and is identified by an arrow on the fuselage labeled "RESCUE."

When the door is unlatched and removed, the jettison handle and 6 feet of cable are exposed. To jettison the canopy, the handle must be pulled until the slack is removed from the cable, and then pulled another inch. This causes the canopy remover to fire and jettison the canopy.

Canopy Remover Lock Indicator - F-100F Airplanes.

The canopy remover lock indicator (figure 1-33) is marked "OPEN" and "CLOSED." When "OPEN" is exposed, the remover lock will retain the canopy remover tube fitting when the canopy closes. If "CLOSED" is exposed on the indicator before the canopy is lowered, the canopy remover tube will not be locked to the canopy, and the tube will not be retained by the lock during canopy jettison.

Canopy-not-locked Warning Light.

A placard-type canopy-not-locked warning light (figure 1-16) is illuminated by primary bus power when the canopy is in any position other than full closed and locked. On some F-100F Airplanes, the canopy-not-locked warning lights come on the moment the canopy lock handle is placed at UNLOCKED. The bulbs can be checked by the indicator light test circuits.

Caution If canopy-not-locked warning light comes on during flight, do not actuate the canopy switch, as this may cause the canopy to leave the airplane. A landing should be made as soon as possible after the canopy-not-locked light comes on.

EJECTION SEAT.

The ejection seat (figure 1-34) permits ejection at any speed or flight attitude. A ballistic rocket ejection seat catapult ejects the seat and pilot from the airplane. The seat has an automatic opening safety belt and accommodates a back-type parachute. A quick-disconnect is incorporated to render the catapult inoperative during emergency rescue. If the quick-disconnect is not properly engaged, a red ring should be visible at the separation point.

NOTE The ballistic rocket ejection seat catapult provides the pilot with zero altitude ejection capability at minimum airspeed and additional vertical stabilizer clearance during ejection at speeds up to Mach 1; the forward component of rocket thrust decreases

* F-100F Airplanes

the abrupt deceleration upon ejection at subsonic speeds.

- On F-100F Airplanes, because of the tandem location of the pilots' seats, a time-delay system is installed which sequences the seat ejections so that the aft seat will always be fired before the front seat. This ensures that the pilot in the rear seat cannot be endangered by the rocket motor blast of the forward seat catapult.

The airplane has an automatic pilot-seat separator on the seat. One of the following items or combination of items may be placed in the seat bucket:

a. An MC-2 cushion, a parachute support shelf at the rear of the seat bucket, and a seat cushion stop at the front of the seat bucket.

b. An ML-4 (C-2A) life raft, which requires a wedge, furnished with the airplane, between the raft and the seat bucket, and parachute support shelf at the rear of the seat bucket.

c. A contractor-furnished cushion (223-53085).

d. A standard rectangular survival kit (such as an MD-1, with MA-1 contoured seat cushion), which requires a wedge between the kit and seat bucket and a parachute support shelf at the rear of the seat bucket.

Warning

The total height of any of the listed combinations should not exceed 7 inches, in orderthat aft stick movement will not be restricted. Use only the prescribed combinations of equipment to fill the seat bucket. If additional padding is used during ejection, the seat will gain considerable momentum while compressing the unusually thick cushion mass before exerting a direct force on the pilot. This could cause serious spinal injuries. Also, with additional padding, chance of injury during forced landing is increased.

- Do not stow loose equipment in the space between front of survival kit and seat bucket because it might become dislodged and restrict stick travel.

Vertical adjustment of the seat is done electrically. Each armrest can be raised or lowered by pushing a lever attached to it. The headrest and footrests are fixed to the seat assembly. F-100D-91 Airplanes have an ejection seat with a folding headrest to brace the pilot's head in a forward position for visibility during high acceleration zero-length launch take-offs. For all normal operations, the headrest should be flat (not folded). On F-100F Airplanes, the top half of the headrest on the front seat folds back to provide better visibility for the rear seat pilot, and springs up into position when either armrest on the front seat is raised. The headrest releases automatically when the handgrips are raised before ejection. The radio and face mask antifrost leads; the oxygen, ventilated suit, and anti-G suit hoses; and the seat adjustment electrical lead are fitted into a disconnect block at the center forward edge of the seat. The lines fitted into the lower disconnect block are separated automatically when the seat is ejected. During the ejection sequence, the canopy is jettisoned before the seat is ejected; however, if the canopy fails to release, the seat may be ejected through the canopy. A chaff dispenser box is automatically actuated during ejection to aid ground radar stations in locating the position of ejection.

SHOULDER HARNESS INERTIA REEL.

A shoulder harness inertia reel, on the back of the ejection seat, has a manual control to permit pilot selection of reel locking. The multidirectional-type reel automatically locks the shoulder harness when the harness cable is pulled from the reel with an acceleration of 2 G to 3 G in any direction. This locking depends only on the speed at which the cable is pulled from the reel, and not upon the inertia imposed on the reel. Movement of the pilot in any direction that pulls that cable from the reel at the preset speed locks the reel. The inertia reel is locked automatically when either ejection seat handgrip is raised during seat ejection sequence.

PILOT-SEAT SEPARATOR.

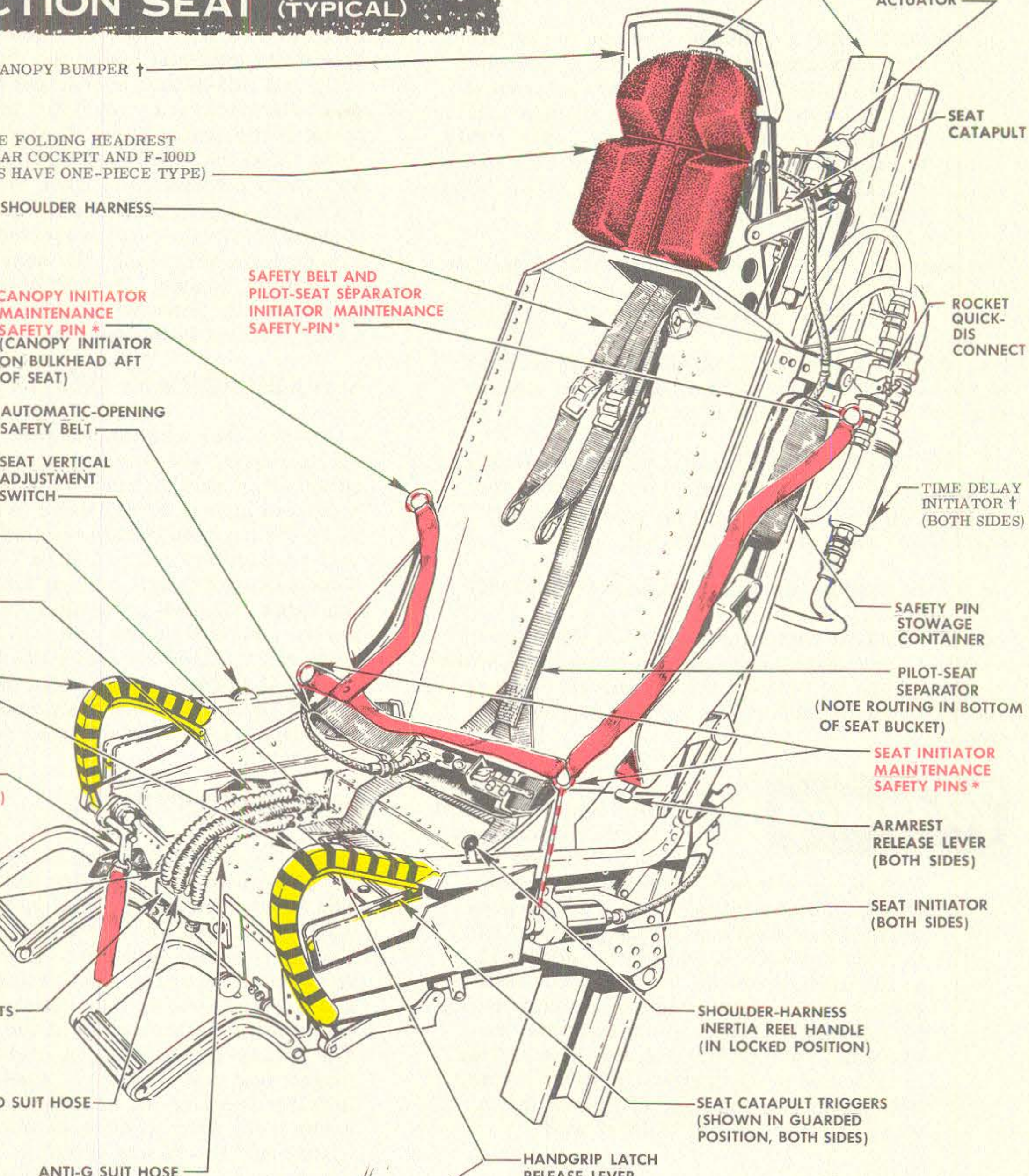
An A-shaped web harness automatically separates the pilot from the seat after the seat belt opens. The harness lies in the bottom of the ejection seat bucket, and extends up the back of the seat over a roller under the headrest. The forward ends of the webbing are attached to the front of the seat and the other end is attached to a rotary actuator under the parachute shelf at the rear of the seat. The rotary actuator is powered by gases from a larger seat belt initiator. When the seat belt initiator fires as the seat leaves the airplane, gas pressure is divided between the seat belt, which opens, and the rotary actuator, which starts reeling in the pilot-seat separator webbing. This pulls the webbing tight between the front edge of the seat bucket and the headrest roller, forcing the pilot from the seat.

EJECTION SEAT CONTROLS.

Ejection Seat Handgrips.

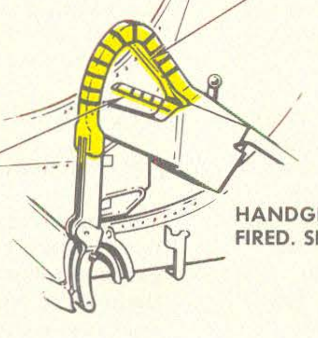
Raising either the right or the left handgrip on the seat (figure 1-34) jettisons the canopy. The handgrips are latched in the down position to prevent them from being raised accidentally. Since the seat handgrip assemblies are linked together by a torque tube, pulling up on either handgrip automatically raises the other to the full up position.

EJECTION SEAT (TYPICAL)



NOTE

After handgrips are raised, either or both ejection seat triggers may be squeezed to catapult seat from cockpit.



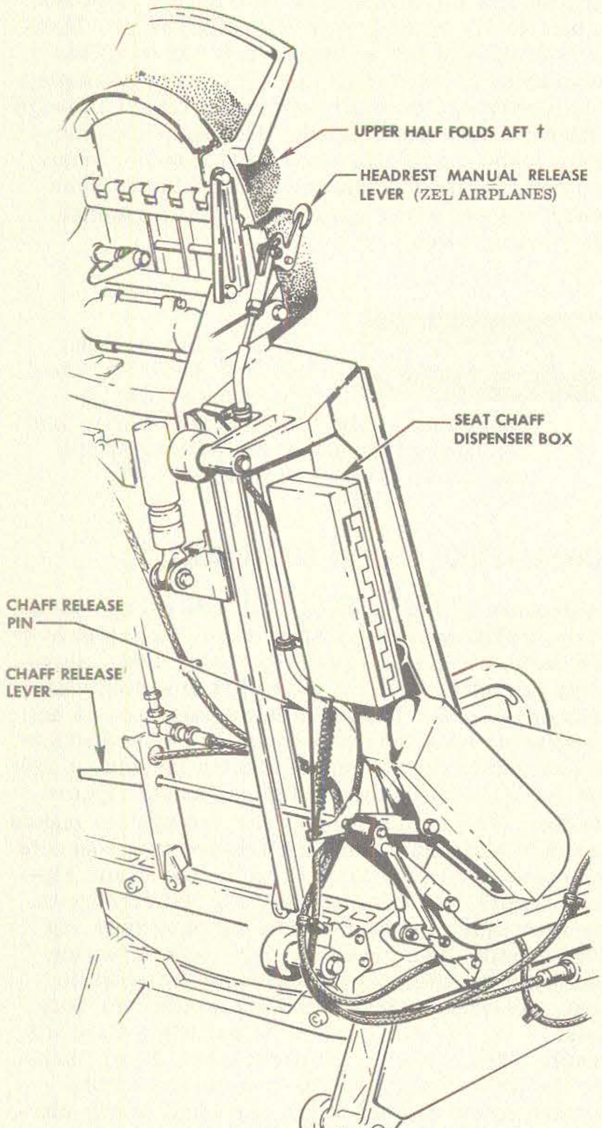
HANDGRIP RAISED TO FULL UP POSITION—CANOPY FIRED. SEAT EJECTION TRIGGER COCKED FOR FIRING.

*Check removal before flight

† F-100F FRONT COCKPIT ONLY

F-100F-1-A57-1A

Figure 1-34



F-100F-1-A57-2A

When either handgrip is raised to full up, it fires a cartridge in an initiator unit behind the seat. The expanding gases are discharged through a flexible hose to an exactor unit on the canopy remover. This gas pressure pulls the seat pin from the canopy remover, causing the remover to fire and jettison the canopy. When the ejection seat handgrips are in the stowed position, the triggers are guarded. When the ejection seat handgrips, are raised, the seat catapult triggers are exposed and armed, and the shoulder harness is automatically locked. In addition, the front seat canopy bumper on F-100F Airplanes is automatically raised into position by spring action.

HANDGRIP LATCH RELEASE LEVER. A spring-loaded handgrip latch release lever is in the upper portion of each handgrip. (See figure 1-34.)Either release lever must be squeezed upward into the handgrip to release the latch so that the handgrips can be raised.

Seat Catapult Triggers.

A seat catapult trigger (figure 1-34) is within a guard in the forward part of each handgrip. As the handgrips are raised, the triggers are exposed and armed. Squeezing either trigger fires a cartridge within an initiator. (One initiator is connected to each trigger, and each is independent of the other.) A flexible hose, capable of withstanding the pressures from both initiators if fired simultaneously, directs the gases from the initiator unit to the ejection seat catapult. The pressure of the expanding gases actuates the striker pin, which fires the ballistic rocket catapult, ejecting the seat. On F-100F Airplanes, ejection of the front and rear seats is normally controlled by their respective triggers. However, the rear seat can also be fired from the front cockpit. If the rear seat has not already been ejected, a time-delay system sequences ejections so that squeezing either front seat trigger will eject the rear seat first, followed 1/2 second later by the front seat. The rear seat can be ejected in this manner regardless of safety pin installation. The seat ejection system is independent of the canopy jettison system. If the canopy fails to jettison, the seat may be ejected through the canopy when either trigger is squeezed.

Seat Vertical Adjustment Switch.

The seat is vertically adjusted by primary bus power through a three-position switch (figure 1-34) which is spring-loaded to OFF (center). Moving the switch to UP raises the seat; moving the switch to DOWN or DWN lowers the seat. The seat may be stopped at the desired position by releasing the switch.

Shoulder Harness Inertia Reel Handle.

The shoulder harness inertia reel is manually controlled by a handle. (See figure 1-34.) Forward is INERTIA REEL LOCKED; aft is INERTIA REEL

UNLOCKED. It is recommended that the shoulder harness be locked manually during maneuvers and flight in rough air, or as a safety precaution in case of a forced landing. The shoulder harness locks automatically when the handle is in the INERTIA REEL UNLOCKED position. Whenever the reel is locked, any movement of the pilot toward the seat releases tension on the cable and it automatically retracts. As the cable retracts it locks at each 1/2 inch of retraction. Once the reel has been locked automatically, the handle must be moved forward to INERTIA REEL LOCKED and then back to INERTIA REEL UNLOCKED to unlock the reel and permit the pilot to move forward.

NOTE Adjust shoulder harness with inertia reel handle in the LOCKED position before placing handle at UNLOCKED; otherwise, it may become necessary to unfasten the safety belt in flight to unlock the shoulder harness reel.

AUTOMATIC-OPENING SAFETY BELT.

The ejection seat has an MA-6 automatic-opening safety belt. In high-altitude ejections (above 14,000 feet), use of the automatic belt, in conjunction with the automatic-opening parachute, avoids parachute deployment at an altitude where sufficient oxygen would not be available to permit safe parachute descent. In a low-altitude ejection, use of the automatic belt greatly reduces the time required for separation from the seat and full parachute deployment. Under no circumstances should the automatic belt be manually opened before ejection, regardless of altitude. (The M-32 automatic belt initiator opens the belt one second after ejection.) Since the drag-to-weight ratio of the seat is considerably greater than that of the pilot, immediate separation would result if the belt were opened manually before ejection. This could result in the parachute pack accidentally blowing open, and the high opening shock of the parachute could cause serious or fatal injuries.

MA-6 Automatic-opening Safety Belt.

The MA-6 automatic safety belt (figure 1-35) is a cartridge-operated device. Release of the MA-6 belt is accomplished either by manual operation by the pilot, or by gas pressure from a separate automatically controlled source (the M-32 initiator on the back of the seat). The initiator supplies gas pressure through a high-pressure hose which actuates the release mechanism inside the belt. The MA-6 belt is equipped with a swivel link which is designed to retain a ring-type anchor for actuating the automatic parachute. When the belt is fully locked, the swivel link is attached on one end to the manual release lever and on the other end to the automatic release. The swivel link is detached from the automatic release by actuation of the automatic release initiator. It is not mechanically necessary that the anchor, which slips over the manual release end of the swivel link, be used to close the belt. However, when the MA-6 belt is used in conjunction with an automatic parachute, the ring-type anchor must be attached to the parachute arming lanyard and then slipped over the swivel link in order for the parachute to function automatically when ejection is necessary. Figure 1-35 shows the MA-6 belt closed with shoulder harness and automatic parachute anchor attached, automatically opened, and manually opened. Manual operation of the automatic belt can override the automatic function at any time. For example, it is possible to manually open the belt even though initiator action has started. The parachute automatic feature may likewise be overriden by manually pulling the parachute ripcord handle, even though the automatic parachute ripcord release has been actuated.

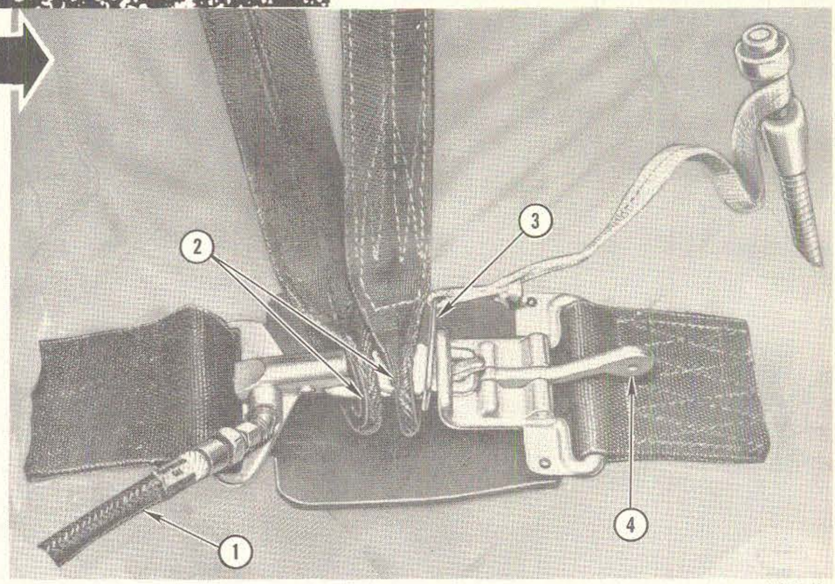
Warning If the safety belt is opened manually, the parachute must be opened manually. The aneroid-timer arming lanyard should be pulled to open the parachute if above 14,000 feet.

LOW-ALTITUDE ESCAPE EQUIPMENT.

To provide an improved low-altitude escape capability, a system incorporating a one-second safety-belt initiator, a pilot-seat separator, and a zero-delay parachute arming lanyard (1-0 system) has been developed. The zero-delay parachute is accomplished by means of a hook and lanyard which is attached to the parachute arming lanyard at one end and can be attached to the parachute ripcord handle. (See figure 1-36.) The 1-0 system makes use of a detachable hook and lanyard that connects the parachute timer lanyard to the parachute ripcord handle. At very low altitude and airspeeds, the hook must be connected to the parachute ripcord handle, thus providing parachute actuation immediately after separation from the ejection seat. At other altitudes and airspeeds, the hook must be disconnected from the parachute ripcord handle, thus allowing the parachute timer to actuate the parachute below the critical parachute opening speed and below the parachute timer altitude setting. A ring, attached to the parachute harness, is provided for stowage of the hook when it is not connected to the ripcord handle. This "hookup" must be done manually. The hook configuration shown in figure 1-36 is one of several which will be in service use. Although each configuration differs in appearance, the attaching positions are the same. Refer to "Ejection" in Section III for maximum safe ejection speeds and emergency minimum ejection altitudes for ejection equipment. Figures 3-4 and 3-5 show ejection procedure and zero-delay lanyard connection requirements.

MA-6 AUTOMATIC-OPENING SAFETY BELT

LOCKED



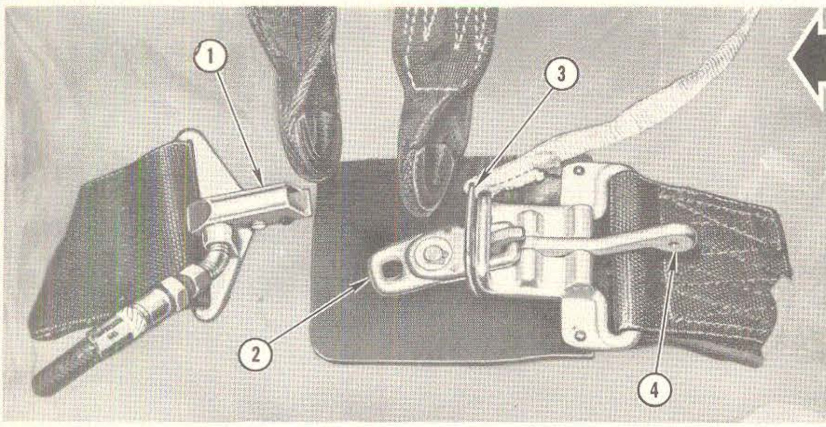
1. Initiator hose to automatic release mechanism.
2. Shoulder harness loops over swivel link.
3. Anchor (from automatic parachute arming lanyard) slipped over swivel link.

WARNING

- Although not necessary for closing the belt, the anchor must be installed, so that the parachute will function automatically if ejection is necessary.
- Lanyard must be outside parachute harness and not fouled on any equipment, to permit clean separation from seat.

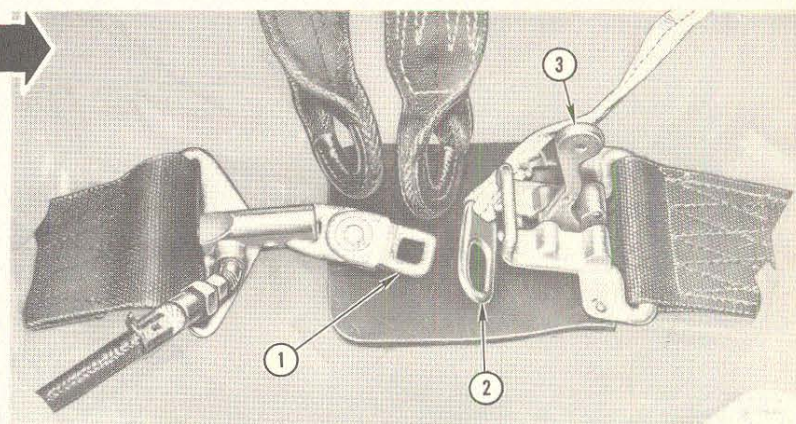
4. Manual release lever closed.

AUTOMATICALLY OPENED



1. Automatic release mechanism actuated by gas pressure from initiator, detaching swivel link on automatic release side.
2. Swivel link retained by manual release lever.
3. Anchor (from automatic parachute arming lanyard) retained by swivel link.
4. Manual release lever closed.

MANUALLY OPENED



1. Swivel link released by manual release lever (automatic release mechanism not actuated).
2. Anchor (from automatic parachute arming lanyard) freed from swivel link.

WARNING

If the belt is manually opened during ejection, the parachute will not open automatically upon separation from the seat.

3. Manual release lever opened. (A pull of 11-20 pounds is required)

NOTE

Manual release lever can be used to unlock belt at any time, even if automatic-opening sequence has been initiated.

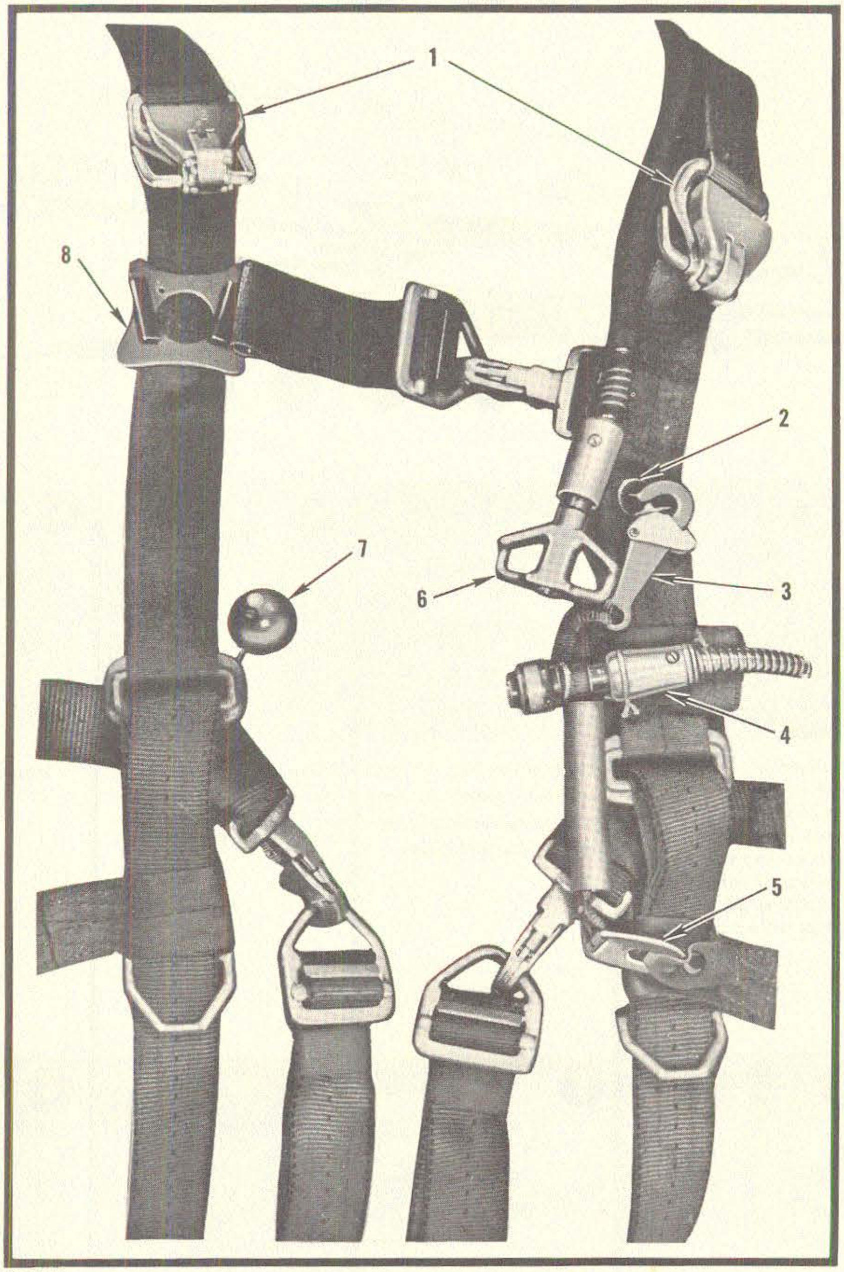
F-100D-1-73-19C

Figure 1-35

AUXILIARY EQUIPMENT.

Information concerning the following auxiliary equipment is supplied in Section IV: air conditioning, pressurization, defrosting, anti-icing, and rain removal systems; electronic equipment compartment cooling systems; communication and associated electronic equipment; lighting equipment; oxygen system; automatic flight control (autopilot) system; navigation equipment; armament equipment; pressure refueling system; and miscellaneous equipment.

PARACHUTE ARMING LANYARD AND RIPCORD HANDLE HOOKUP



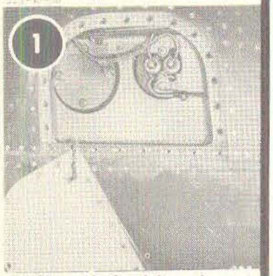
FS-800

1 CANOPY RELEASE SAFETY CLIPS
2 ZERO DELAY HOOK STOWAGE RING
3 ZERO DELAY LANYARD AND HOOK (SHOWN STOWED)
4 ANEROID TIMER ARMING LANYARD
5 ARMING LANYARD ANCHOR (SHOWN STOWED)
6 RIPCORD HANDLE
7 OXYGEN BAIL-OUT BOTTLE BALL-HANDLE
8 CRU-8/P CONNECTOR MOUNTING PLATE

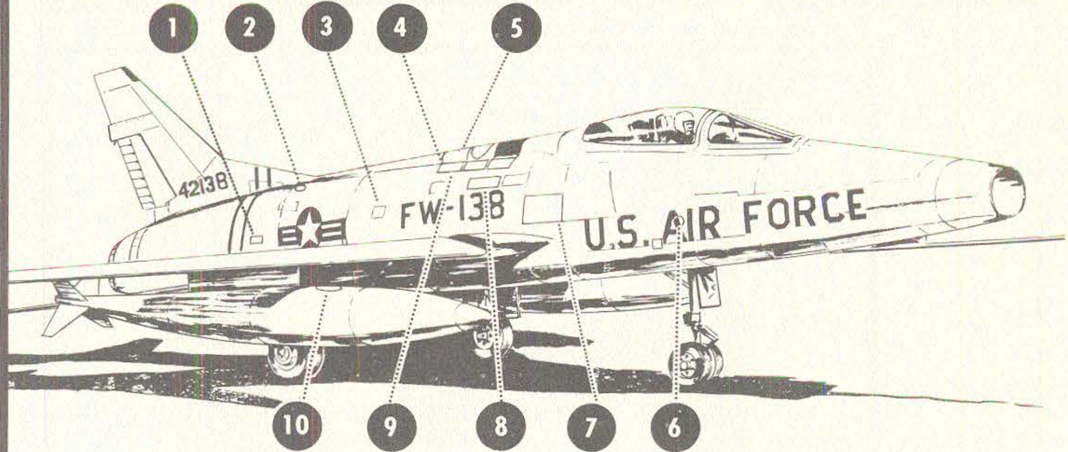
F-100-1-73-1A

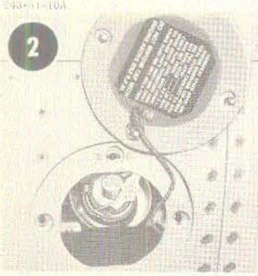
Figure 1-36

SERVICING DIAGRAM (TYPICAL)

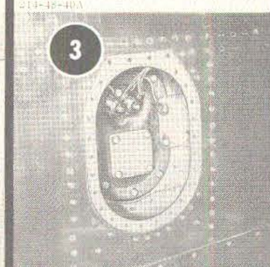


Aft tank fuel level control valve access door. (Remove access door and cover plate on tank to refuel internal tanks if single-point refueling equipment is not available.)

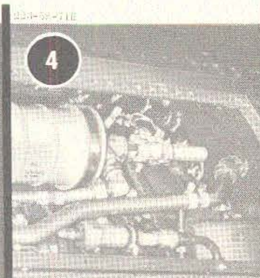




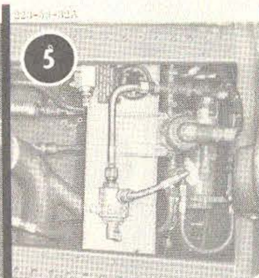
AC generator constant—speed drive unit oil tank filler.



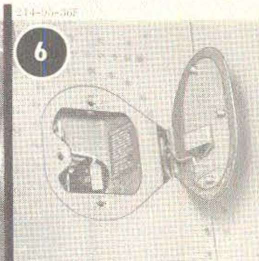
Intermediate tank fuel level control valve access door. (Remove access door and cover plate on tank to speed refueling if refueling is done through aft tank control valve access.)



Typical for No. 1 flight control hydraulic system compensating reservoir on left side.



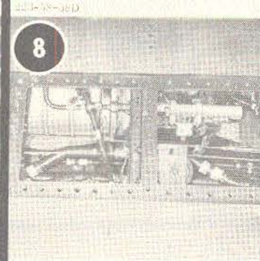
Wing flap emergency accumulator air pressure gage, air filler valve, and dump valve.



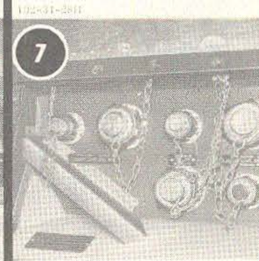
Liquid oxygen filler valve. (F-100D)

Drop tank filler. (Typical all drop tanks.)

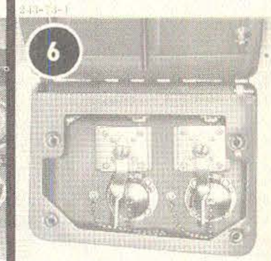
No. 2 flight control hydraulic system accumulator air pressure gage, air filler valve, and dump valve.



No. 2 flight control hydraulic system compensating reservoir.



Hydraulic system ground-test connections.



Liquid oxygen filler valves. (F-100F)

F-100D-1-A00-13A

RIGHT SIDE

Figure 1-37 (Sheet 1 of 3)

SPECIFICATION

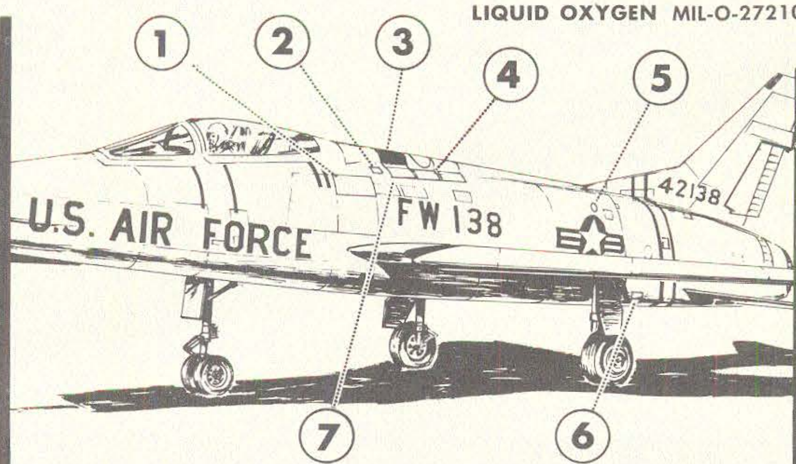
FUEL JP-4 (MIL-J-5624)

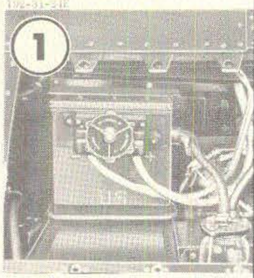
NOTE

For alternate and emergency fuels, refer to "Fuel Grade Properties and Limits" in Section VII.

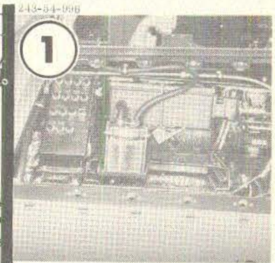
When using altenate or emergency fuels, refer to "Alternate and Emergency Fuel Limitations" in Section V and "Operation on Alternate or Emergency Fuel" in Section VII.

OIL MIL-L-7808
HYDRAULIC FLUID MIL-H-5606
LIQUID OXYGEN MIL-O-27210





Battery and battery compartment circuit-breaker panel. (F-100D)

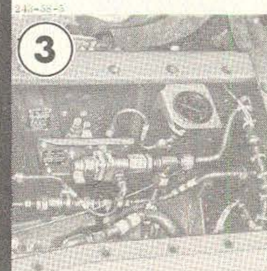


Battery and battery compartment circuit-breaker panel. (F-100F)

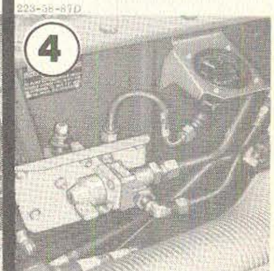
Cockpit pressure and canopy seal ground test, and pressure gage connections. (F-100D)

Cockpit pressure and canopy seal ground test, and pressure gage connections. (F-100F)

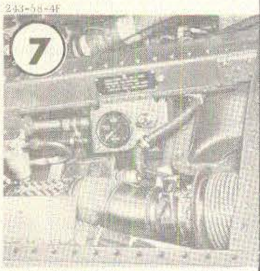
No. 1 flight control hydraulic system accumulator air pressure gage, air filler valve, and dump valve. (F-100D)



No. 1 flight control hydraulic system accumulator air pressure gage, air filler valve and dump valve. (F-100F)

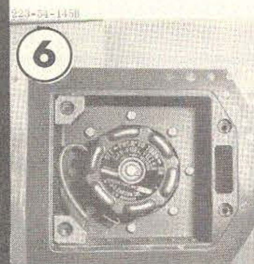


Ram-air turbine door emergency accumulator air pressure gage, air filler valve, and dump valve. (F-100D)



No. 1 flight control hydraulic system auxiliary reservoir air pressure gage and air filler valve. (F-100F)

No. 1 flight control hydraulic system auxiliary reservoir air pressure gage and air filler valve. (F-100D)



Single-point refueling receptacle.

Engine oil tank filler.

Ram-air turbine door emergency accumulator air pressure gage, air filler valve, and dump valve.

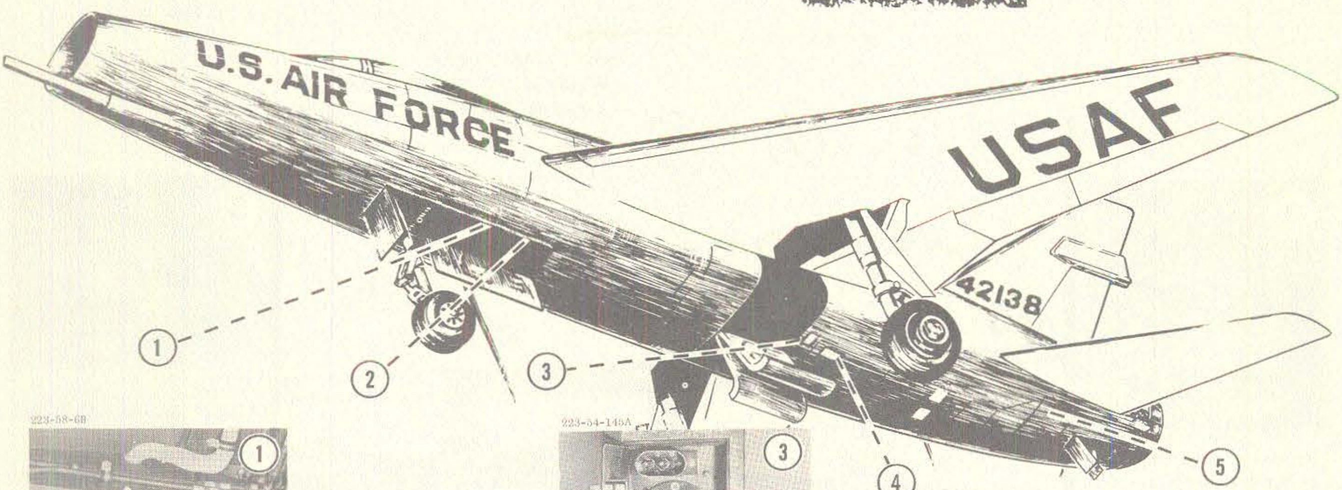
Hydraulic hand-pump and hand-pump selector valve. (F-100F)

LEFT SIDE

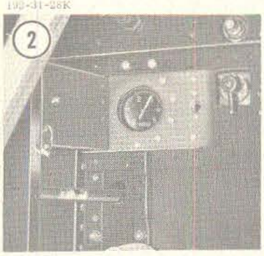
F-100D-1-00-45F

Figure 1-37 (Sheet 2 of 3)

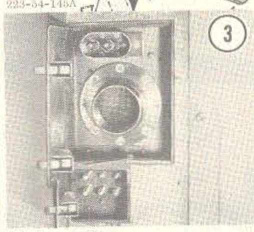
SERVICING DIAGRAM (TYPICAL)



Antiskid and wheel brake emergency accumulator air pressure gages, air filler valves, and dump valve. (in right side of nose wheel well.)



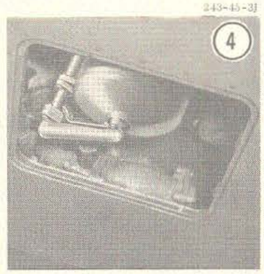
Nose gear emergency lowering accumulator air pressure gage, air filler valve, and dump valve.



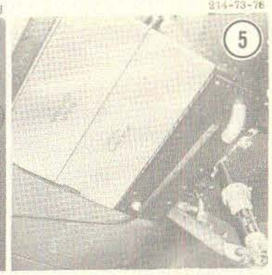
External power receptacles for starter air supply and ac and dc electrical power.

NOTE

Suitable external dc power units are A3, A4, C-21, C-22, C-26, C-27, and V1. NC-5, MA-1, MA-1A, or MA-2 power units can supply both ac and dc power.



Cartridge starter loading breech and cartridge power-on warning light



Drag chute compartment doors.

ACCUMULATOR PRECHARGE PRESSURE (PSI)

PLACARDED ACCUMULATOR PRECHARGE (70)

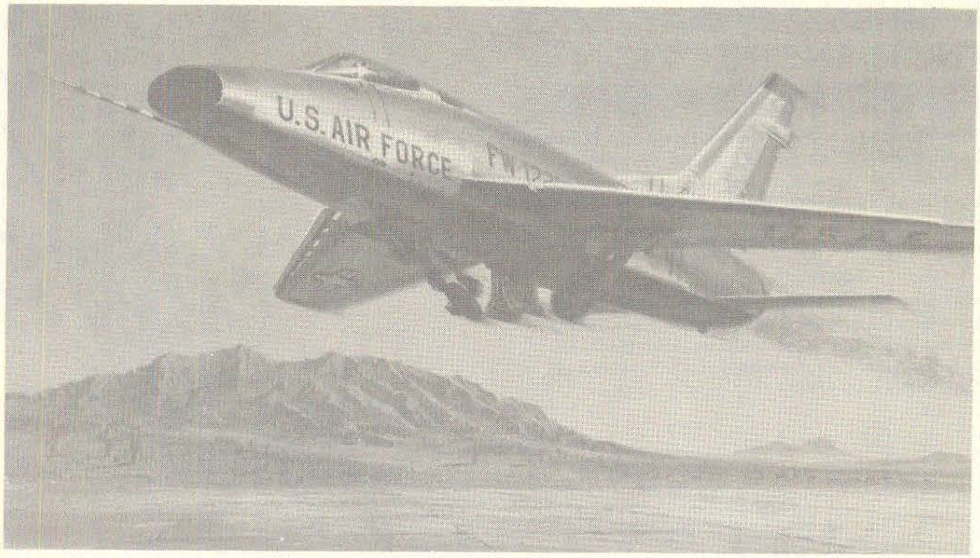
TEMPERATURE (°F)	−20	−10	0	10	20	30	40	50	60	70	80	90	100	110	120
WING FLAP EMERGENCY ACCUMULATOR	860	882	904	924	945	966	988	1010	1030	1050 (±50)	1072	1094	1114	1135	1155
NOSE GEAR EMERGENCY LOWERING ACCUMULATOR	980	1015	1025	1055	1080	1105	1130	1150	1175	1200 (±50)	1225	1250	1275	1300	1320
WHEEL BRAKE EMERGENCY ACCUMULATOR	415	420	430	440	450	460	470	480	485	500 (±50)	510	520	530	540	550
ANTISKID ACCUMULATOR	255	260	268	275	280	285	290	298	305	310 (±15)	315	322	330	335	340
RAM-AIR TURBINE DOOR EMERGENCY ACCUMULATOR	1480	1515	1550	1585	1620	1660	1695	1730	1765	1800 (±50)	1835	1870	1905	1945	1980
NO. 1 AND NO. 2 FLIGHT CONTROL HYDRAULIC SYSTEM ACCUMULATORS	495	510	520	530	545	555	565	580	590	600 (±50)	610	625	635	645	655

F-100D-1-A00-15A

Figure 1-37 (Sheet 3 of 3)

NORMAL PROCEDURES

section II



F-100D-1-0-86

TABLE OF CONTENTS

INTRODUCTION.

CODING.

To simplify coding within procedures, the following coding, preceding the text to which it applies, is used:

D F-100D Airplanes
F F-100F Airplanes
† Not in rear cockpit, or not to be performed in rear cockpit

PREPARATION FOR FLIGHT.

FLIGHT RESTRICTIONS.

Refer to Section V for detailed airplane and engine limitations.

FLIGHT PLANNING.

Refer to T. O. 1F-100A-1-1 to determine the fuel quantity, engine settings, and airspeeds required to complete the proposed mission.

TAKE-OFF AND LANDING DATA CARDS.

Refer to T. O. 1F-100A-1-1 for the information necessary to fill out a take-off and landing data card before each flight.

WEIGHT AND BALANCE.

Refer to Section V for weight and balance limitations. For loading information, refer to Weight and Balance Technical Manual, T. O. 1-1B-40. Before each flight, check take-off and anticipated landing gross weight. The Form 365F is the weight and balance clearance. Make sure that airplane is properly loaded (bombs, drop tanks, and ammunition) for intended mission.

CHECKLISTS.

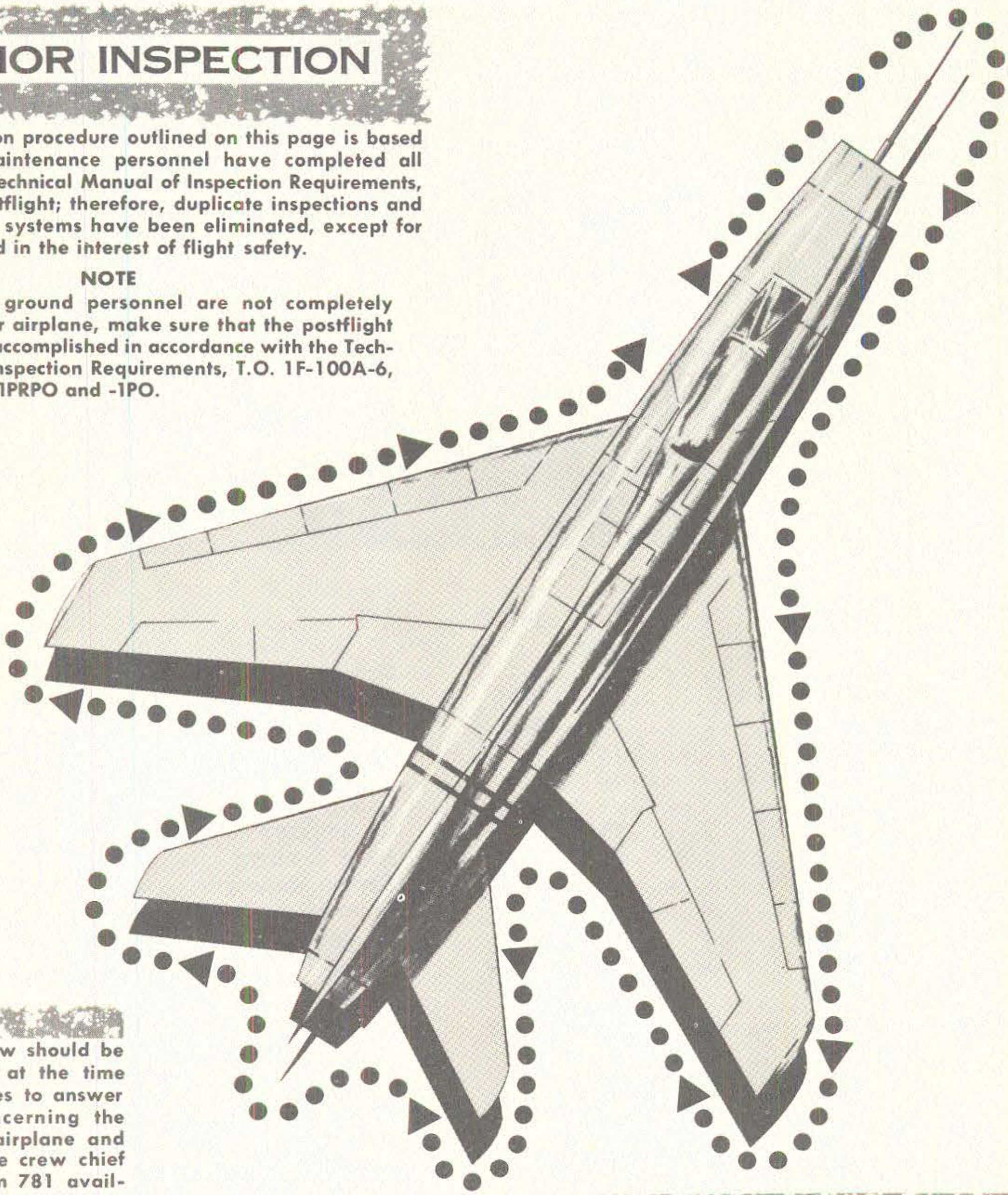
Refer to page iii for additional information on this

EXTERIOR INSPECTION

The exterior inspection procedure outlined on this page is based on the fact that maintenance personnel have completed all requirements of the Technical Manual of Inspection Requirements, for preflight and postflight; therefore, duplicate inspections and operational check of systems have been eliminated, except for certain items required in the interest of flight safety.

NOTE

At bases where ground personnel are not completely familiar with your airplane, make sure that the postflight and preflight are accomplished in accordance with the Technical Manual of Inspection Requirements, T.O. 1F-100A-6, or 1F-100D-WC6-1PRPO and -1PO.



The ground crew should be at the airplane at the time the pilot arrives to answer questions concerning the status of the airplane and its systems. The crew chief will have Form 781 available for the pilot, all dust covers and plugs removed, and the hydraulic systems depressurized.

AIRPLANE SAFETY CHECKS

Upon arrival at the airplane, the pilot should perform the Safety Checks outlined below.

CAUTION

Do not store miscellaneous items of clothing or equipment in the forward electronic compartment, as electronic equipment can be damaged.

1. **Nose gear ground safety pin—Installed.**
2. **Nose gear torque link pivot pin—Seated.**
3. **Intake duct—Clear of foreign objects.**
4. **Drag chute and cable stowed, doors locked, and maintenance safety pin removed.**
5. **Tires—Check for points and general condition.**
6. **External loads—Mounted securely.**

F-100D-1-00-65A

Figure 2-1

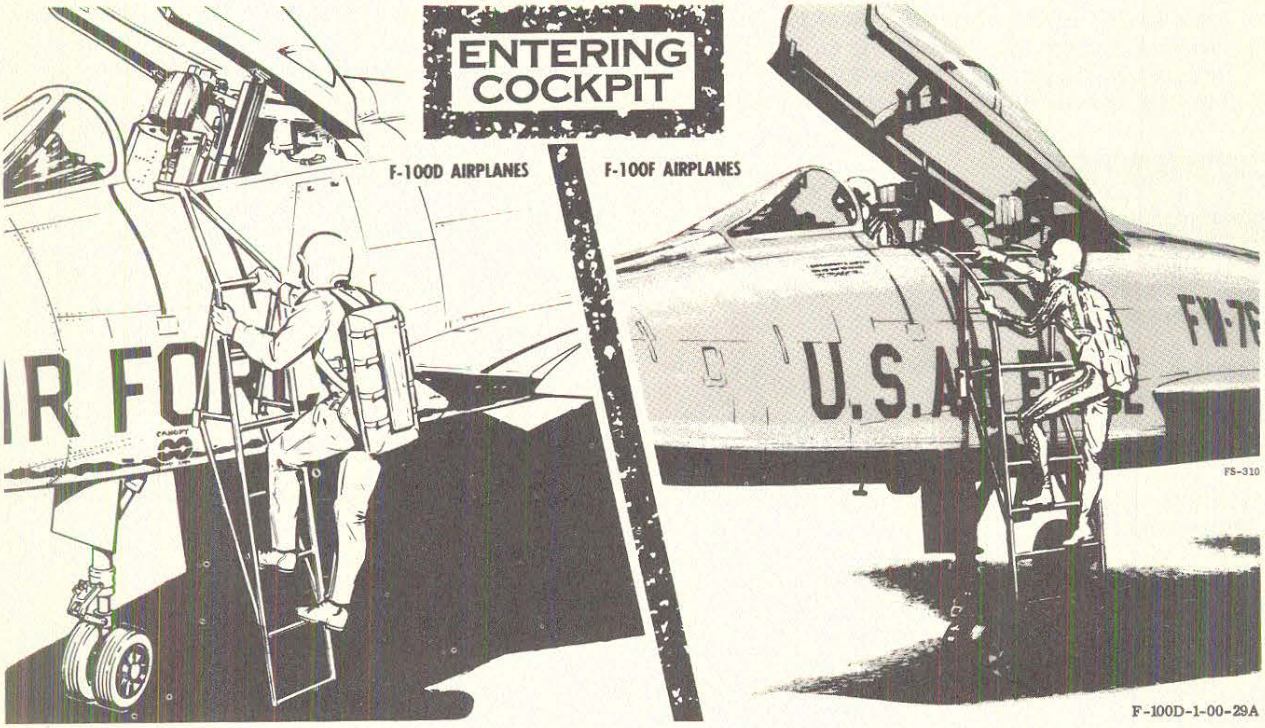


Figure 2-2

subject. Refer to applicable Air Force regulations concerning use of checklist.

ENTRANCE.

The cockpit can be entered from either side. (See figure 2-2.) A ladder hooks over the cockpit ledge for normal entry. There are kick-in steps and handgrips on the left side of the fuselage for leaving the cockpit if a ladder is not available.

PREFLIGHT CHECK.

BEFORE EXTERIOR INSPECTION.

1. Form 781 - Check.
2. [†] All electrical power - Check OFF.
3. [†] Pylon loading selector switches - Check.

   Make sure pylon loading selector switches are at the correct position for the particular external load configuration.

Warning Do not change setting of pylon loading selector switches when external loads are installed, because loads may release when switches are reset. If selector switch settings do not correspond to external load, have maintenance personnel check system.

4. Circuit breakers - In.

   All circuit breakers in unless otherwise directed.

5. Oxygen quantity - Check.
6. Map case - Check.

   Make sure necessary publications are in airplane.

EJECTION SEAT AND CANOPY CHECK.

Before entering cockpit, check canopy and ejection seat as follows:

1. Handgrips and triggers - Check.

   Both seat handgrips must be full down and latched.

2. Pilot-seat separator - Check.

   Check that the webbing is properly installed and in place.

3. Safety pins - Check.

   The single ground safety pin must be installed through the right handgrip, and the ground safety pin must be installed in the canopy alternate emergency jettison handle.

Warning If any ejection system maintenance safety pin is installed, do not remove it until you have checked the status of the ejection system with maintenance personnel.

4. Tubing and hose fittings - Check.

   Check tubing and hose fittings from initiators to canopy remover and seat ejection catapult.

5. Ballistic rocket ejection seat quick-disconnect - Pull-check.

   Apply a slight pull (2 to 8 pounds) to the upper disconnect hose to make sure that the disconnect is positively engaged. (If the quick-disconnect is not properly engaged, a red ring should be visible at the separation point.)

6. [F] Canopy remover lock - Check OPEN.
7. Canopy external emergency release handles - Check closed and latched.

EXTERIOR INSPECTION.

Perform exterior inspection as outlined in figure 2-1.

NOTE Check with the crew chief to determine whether a cartridge has been installed in the starter unit. If a cartridge has been installed, a cartridge start must be made or the cartridge removed before a pneumatic start is attempted.

[F] REAR COCKPIT CHECK (SOLO FLIGHTS).

For solo flight, the following inspection of the rear cockpit must be made before the airplane is entered.

1. Left console circuit breakers - Check.

   All circuit breakers in unless directed otherwise.

2. Emergency ram-air lever - CLOSED.
3. Throttle - OFF (inboard).
4. Wing flap emergency switch - NORMAL.
5. Fuel regulator selector switch - NORM.
6. Air start switch - OFF.
7. Engine master switch - Safetied ON.
8. Left console airflow knob* - DECREASE.
9. Landing gear handle - DOWN.
10. Landing and taxi light switch - OFF.
11. Drag chute handle - IN (stowed).
12. AC generator switch - Safetied ON.
13. DC generator switch - Safetied ON.
14. Battery switch - Safetied ON.
15. Stand-by instrument inverter switch - Safetied OFF.
16. Oxygen diluter lever - NORMAL.
17. Right console airflow knob* - DECREASE.
18. Intercom volume control - Full volume.
19. Cockpit lights - OFF.
20. Radio controls - OFF.
21. Radio compass controls - COMP., full volume.
22. Bleed-air emergency switch - NORM.
23. Right console circuit breakers - Check.

    All circuit breakers in unless directed otherwise.

24. All loose items - Secured.

    Secure safety belt, shoulder harness, and all personal equipment leads. On F-100F Airplanes, make sure rear cushion is strapped down and snap is secure.

COCKPIT CHECK (ALL FLIGHTS).

General.

1. Oxygen blowback check - Perform.
2. Wheel brake emergency hydraulic pump operation - Check.

   Pump brake pedals one at a time to determine whether electrically driven pump is

*Some airplanes

operating. The pump can be heard from the cockpit if the area is relatively quiet. Have crew chief listen for pump if noise level is too high to hear from cockpit.

3. Survival equipment, ventilated suit and anti-G suit - Connected.

   Route airplane anti-G suit hose under the leg and ensure it does not interfere with arm-rest handle. Route the pilot's anti-G suit hose under lap belt and along left thigh.

4. Safety belt and shoulder harness - Fasten and adjust.

Warning Make sure automatic-opening safety belt is properly fastened and chute arming lanyard is properly attached to safety belt latching mechanism.

NOTE To prevent possible interference caused by the position of the initiator hose leading to the automatic-opening safety belt, the hose length can be varied by pushing or pulling the hose through the clamp on the side of the ejection seat.

- If desired, a preflight operational check of the inertial locking feature of the shoulder harness inertia reel can be made after the handle has been set in the UNLOCKED (aft) position. Then pull rapidly on harness. The reel should lock. To make sure reel has not fully extended, move handle forward to LOCKED and then return it to the aft position. This should release the harness and it should be capable of further extension.

5. Zero-delay lanyard hook - Attach to parachute ripcord handle.

   Utilize zero-delay lanyard for all take-offs and landings.

Left Side.

1. Speed brake emergency dump lever - OFF (aft).
2. Emergency ram-air lever* - CLOSED.
3. [T] Armament switches - OFF or SAFE.
4. Wing flap handle - UP.
5. Wing flap emergency switch - NORMAL.
6. Throttle - OFF.
7. Speed brake switch - OFF (centered).
8. UHF control switch - BOTH.
9. [T] Ground gunfire switch - SAFE (safetied).
10. [T] Antiskid switch - OFF.
11. Fuel regulator switch - NORM.
12. Drop tank fuel selector switch - As required.

Warning Refer to "Drop Tank Fuel Sequencing Limitations" in Section V.

13. Air refueling switch - OFF.
14. [T] G-limiter switch - ON (safetied).
15. Air start switch - OFF.
16. Engine master switch - ON (safetied).
17. Landing gear handle - DOWN.
18. Landing and taxi light switch - OFF.

Front.

1. [T] A-4 sight mechanical caging lever - CAGED.
2. [T] Trigger safety switch - CAMERA.
3. Clock - Set and running; test stop watch.
4. [T] External load emergency jettison handle - IN (clip on).
5. [T] Special store unlock handle - IN.

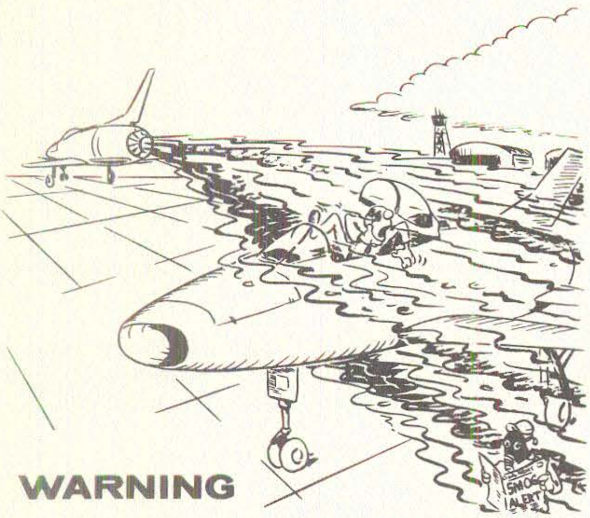
Right Side.

1. AC generator switch - ON (safetied ON).
2. DC generator switch - ON (safetied ON).
3. Stand-by instrument inverter switch - OFF (safetied OFF).
4. Interphone - As desired.

   Set the ground interphone switch on F-100D Airplanes, or the interphone control panel switches on F-100F Airplanes, as desired.

5. IFF and NAV aids - OFF.
6. [T] J-4 directional indicator function selector switch - MAG.

*Some airplanes



WARNING

If airplane is to be operated on the ground under conditions of possible carbon monoxide contamination (downwind or behind another jet engine), set oxygen regulator diluter lever to 100% oxygen. F-100D-1-0-41A

7. [T] Pitot boom heat switch - As required.
8. [T] Engine guide vane anti-ice switch - AUTO.
9. [T] Windshield exterior air switch - OFF.
10. [T] Cockpit pressures selector switch - As desired.
11. [T] Cockpit temperature master switch - AUTO.
12. Bleed-air emergency switch* - NORM.
13. [T] QRC controls - OFF (STBY if required.)
14. [T] Emergency hydraulic pump lever (RAT) - OFF.

[T] Electrical Power On.

1. Battery switch - ON (or dc external power plugged in).

Caution If immediate start is not anticipated with dc external power connected, delay turning the battery switch ON until just before making the start. This will prevent possible excessive charging or damage to the battery by the external power unit.

2. Caution and warning lights - Check on.

   The master caution light, flight control hydraulic pressure catuion light, canopy-not-locked warning light, and dc generator caution light should be on. To turn off master caution light, press all illuminated caution lights.

3. Special store unlocked indicator light - Check.
4. Stand-by instrument inverter switch - ON.
5. Fire and overheat warning lights - Test.
6. Fuel quantity gages - Check.

   Check fuel quantity and test fuel quantity gage operation.

7. [F] Radio control transfer switch - Check.
8. Indicator, caution, and warning lights - Test.
9. Interior and exterior lights - As required.

   Check operation of lights before flight which will begin or terminate during darkness.

   a. Indicator light dimmer switch - As desired.
   b. Thunderstorm lights - As desired.
   c. Instrument lights - As desired.
   d. Console lights - As desired.
   e. Stand-by compass light - As desired.
   f. Position lights - As desired.
   g. Refueling probe light switch - OFF.

Oxygen System Check.

Refer to "Oxygen System Preflight Check" in Section IV.

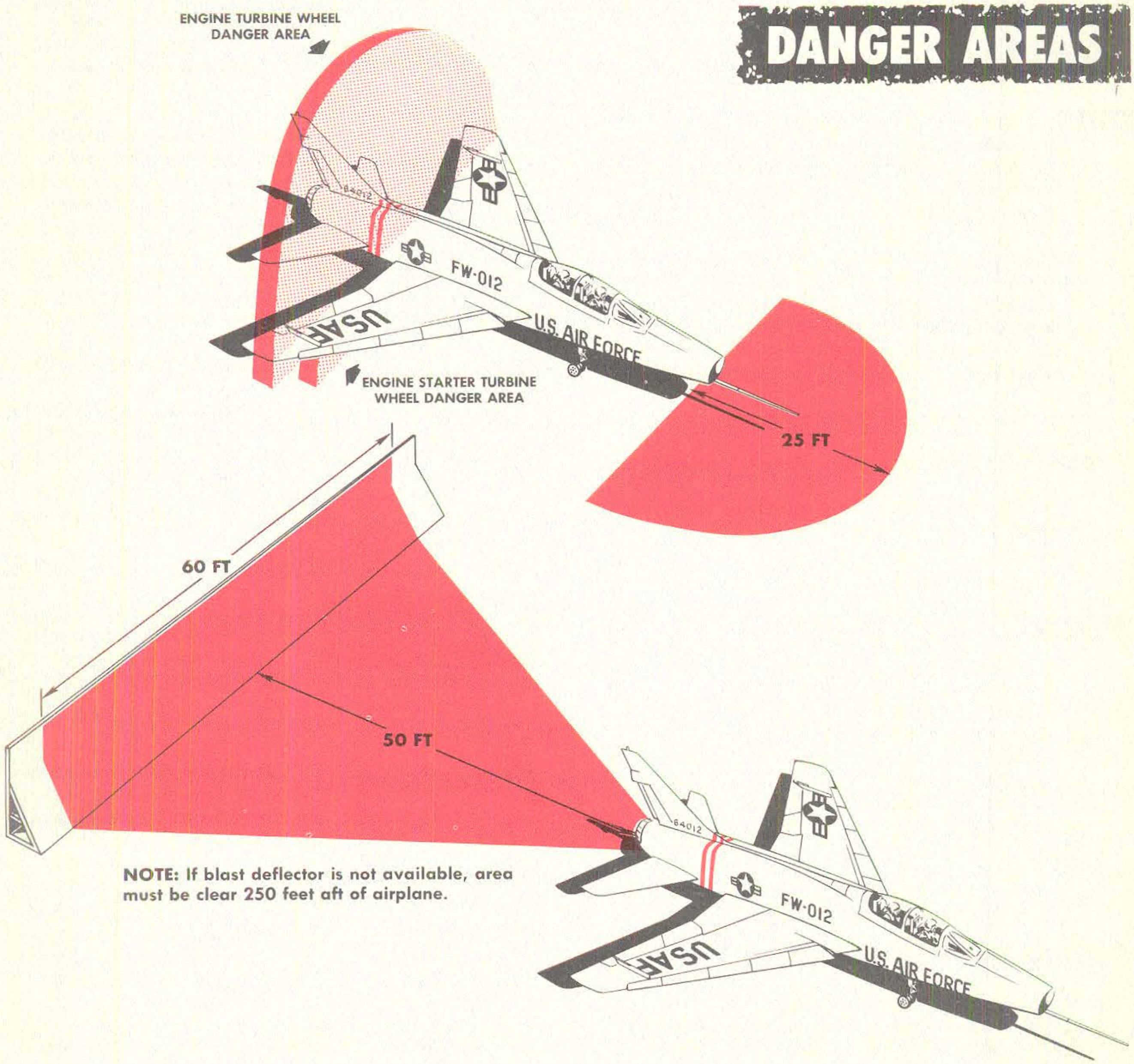
BEFORE STARTING ENGINE.

See figure 2-3 for danger areas.

Warning If the landing gear wheel well doors are open, make sure personnel are clear. The gear doors close as soon as hydraulic pressure is available during engine start.

*Some airplanes

DANGER AREAS



NOTE: If blast deflector is not available, area must be clear 250 feet aft of airplane.

DISTANCE AFT OF TAIL PIPE (FEET)	0	25	50	75	100	125	150
IDLE THRUST (DURING TAXIING)	238°C (400°F) 225	82°C (180°F) 105	52°C (125°F) 35				
MILITARY THRUST	590°C (1100°F) 1325	179°C (355°F) 530	107°C (225°F) 260	71°C (160°F) 135	43°C (110°F) 75	27°C (80°F) 15	15°C (60°F) 0
AFTERBURNER THRUST	1590°C (2900°F) 2050	704°C (1300°F) 1200	385°C (725°F) 580	260°C (500°F) 325	193°C (380°F) 205	154°C (310°F) 135	135°C (275°F) 115

Exhaust temperature in BLACK FIGURES
Exhaust velocity (mph) in RED FIGURES

F-100F-1-73-17C

Figure 2-3

STARTING ENGINE.

PNEUMATIC START.

NOTE A maximum of three pneumatic starts may be made in any 15-minute period; however, in case of an unsatisfactory start, a minimum waiting period of 5 minutes must be observed before a new start is attempted.

- Cartridge and pneumatic starts may be interspersed. The total number of starts is limited to three in any 15-minute period; however, the time limit of two cartridge starts in any 60-minutes period must be observed.

1. External air source - Connected.
2. Starter and ignition button - Press momentarily.

   The pilot must signal the operator of the external air unit to supply air when he is ready to start.

Caution The starter is limited to one minute of continuous operation during any 5-minute period.

- If there is no tachometer indication of engine rotation or rise in oil pressure within 5-10 seconds after air is applied, stop the starter cycle by pressing the starter and ignition stop button momentarily.

3. Throttle - IDLE at 12% to 16% rpm.

   Check ignition-on indicator light on.

4. Exhaust temperature - Check.

   Light-up should occur (as indicated by rising exhaust temperature) within 20 seconds after the throttle is moved to IDLE. See figure 5-1 for exhaust temperature limit and engine overspeed limit.

5. 40% to 45% rpm - Have external air power reduced and disconnected; dc external power disconnected.

Caution If ignition does not occur within 20 seconds after throttle is advanced to IDLE, if engine fails to accelerate to 55% to 60% (idle) rpm within one minute after light-up, or if exhaust temperature exceeds start limits, return throttle to OFF and continue to motor engine for 30 seconds; then press starter and ignition stop buttons momentarily to abort start. Except for exhaust overtemperature, another start may be attempted by allowing engine to stop rotating and waiting at least 30 seconds to permit fuel to drain from manifolds and engine burner section.

- If the ignition-on light fails to go out after idle rpm is obtained, the starter centrifugal cutout switch has failed and the starter and ignition stop button must be pressed momentarily to shut down the starter and de-energize the ignition circuit. (If the starter centrifugal cutout switch functions properly, it is not necessary to use the stop button after engine starting.)

6. Idle rpm - Engine instruments checked.

   Engine rpm should increase steadily, with the throttle at IDLE, to 55% to 60%, and oil pressure should increase steadily to a minimum of 35 psi; then check all engine instruments for proper indication.

CARTRIDGE START.

Warning Do not press the starter and ignition button until the crew chief signals that the starter exhaust area is clear of personnel.

Caution To avoid possible inhalation of toxic fumes during cartridge start, put oxygen mask in place and use 100% oxygen during starting cycle.

NOTE The minimum interval between cartridge starts is 5 minutes; however, no more than two cartridge starts can be made in any 60-minute period, regardless of the internal between starts.

- If external dc power is not available, place radio switch at OFF until start is completed.

1. Starter and ignition button - Press momentarily.

Caution If there is no tachometer indication of engine rotation or rise in oil pressure within 5 to 10 seconds after starter and ignition button is pressed, stop the starting cycle (ignition) by pressing the starter and ignition stop button momentarily. Refer to "Engine Starter Cartridge Malfunctions" in Section VII.

2. Throttle - IDLE at 2% to 4% rpm.

   Check engine ignition-on indicator light.

3. Exhaust temperature - Check.

Light-up should occur (as indicated by rising exhaust temperature) within 8 to 10 seconds after the starter and ignition button is pressed. (Cartridge burnout time is approximately 18 to 20 seconds.) See figure 5-1 for exhaust temperature limit and engine overspeed limit.

Caution If engine fails to accelerate to 55% to 60% (idle) rpm within one minute after light-up, or if exhaust temperature exceeds start limits, return throttle to OFF and allow engine to unwind; then press starter and ignition stop button to abort start. Except for exhaust overtemperature, another start may be attempted.

- If the ignition-on light fails to go out after idle rpm is obtained, the starter centrifugal cutout switch has failed and the starter and ignition stop button must be pressed momentarily to de-energize the ignition circuit.

4. Idle rpm - Engine instruments checked.

Engine rpm should increase steadily, with the throttle at IDLE, 55% to 60%, and oil pressure should increase steadily to a minimum of 35 psi; then check all engine instruments for proper indication.

CLEARING ENGINE.

To clear engine of trapped fuel during ground operation, check that battery switch is ON or external power is connected; then motor engine above 12% rpm for 30 seconds with throttle off and external air connected. Allow engine rotation to stop completely before attempting another start.

GROUND OPERATION.

Caution If the throttle is inadvertently retarded to OFF, a flame-out occurs immediately. Do not reopen throttle, because relight is impossible and resultant flow of unburned fuel into engine can create a fire hazard in afterburner section of tail pipe during ground operation.

FLIGHT CONTROL HYDRAULIC SYSTEM CHECK.

To ensure that the flight control systems are operating properly, perform the following checks with the throttle at IDLE.

1. Speed brake switch - IN.

2. Flight control hydraulic system servicing - Have ground crewman check.

Ground personnel must check servicing before first flight of the day. If, for any flight, the flight control hydraulic pressure failure caution light remains on after engine start, either or both flight control hydraulic system compensating reservoirs may be below refill level. Have systems checked before flight.

NOTE During the servicing check of the flight control hydraulic system, it will be necessary to assist the crew chief by operating the control stick. On a signal from the crew chief, bleed system No. 1 pressure down to 1500 psi and maintain this pressure until the crew chief signals that both system No. 1 and No. 2 compensator pins have been checked. After servicing check is completed, proceed with the remainder of the flight control system check.

3. Hydraulic pressure failure caution light - Check.

If light fails to go out after servicing and pressure is above 650 psi, a blocked system or run-around condition is indicated. Perform steps 5 and 6 to determine which system has malfunctioned. This condition must be corrected before flight.

4. Trim airplane for take-off.

5. Hydraulic pressure gage selector switch - SYS 1.

a. Move stick slowly full aft, check for freedom of movement, and visually check control surface for proper movement. Visually check ailerons neutral; after pressure stabilizes, release stick completely and allow to return to trim. Pressure must drop at least 500 psi from stabilized pressure. Check for a smooth rapid pressure build-up.

b. Move stick slowly full right, check for freedom of movement and visually check control surfaces for proper movement. After pressure has stabilized, release stick completely and allow to return to trim. Pressure must drop at least 500 psi from stabilized pressure. Check for a smooth, rapid pressure build-up.

NOTE Momentary pressure drops below 1500 psi are permissible while step 5 is being performed. The amount of pressure drop varies with outside air temperature and from airplane to airplane.

6. Hydraulic pressure gage selector switch - SYS 2.

a. Move stick slowly full forward, check for freedom of movement, and visually check control surfaces for proper movement. Visually check ailerons neutral; after pressure stabilizes, release stick completely and allow to return to trim. Pressure must drop at least 200 psi from stabilized pressure. Check for a smooth, rapid pressure build-up.

b. Move stick slowly full left, check for freedom of movement, and visually check control surfaces for proper movement. After pressure has stabilized, releast stick completely and allow to return to trim. Pressure must drop at least 200 psi from stabilized pressure. Check for a smooth, rapid pressure build-up.

NOTE Normally the flight control hydraulic pressure failure caution light will not come on during preceding steps. If light does illuminate, stop all control movement and see if both system pressures return to 2800-3200 psi before proceeding with further checks.

- Momentary overshoot above 3200 psi is allowed when pressure is bulding up.
- In steps 5 and 6, if little or no pressure drop is observed, the system is not functioning correctly or is connected improperly.

AC AND DC GENERATOR CHECK.

After the engine has idled for one minute bring the ac generator on the line and check as follows:

1. Throttle - Advance until ac generator cuts in (72% rpm maximum).

   Advance throttle until ac generator cuts in (72% maximum) as indicated by ac generator caution light going out.

Caution If ac generator caution light does not go out as engine rpm reaches 72%, return throttle to IDLE and move ac generator switch momentarily to RESET and then to ON to ensure that generator is on. Readvance throttle to ac generator cut-in speed. If the ac generator caution light still remains on, shut down engine at once, because generator drive unit is not functioning properly.

- Generator control units may be damaged if the ac generator switch is held longer than momentarily in the RESET position.

2. AC generator and instrument ac power caution lights - Out.
3. Loadmeters (ac and dc) - Check.

   Check loadmeters for proper readings (dc about 0.5 to 0.75; ac about 0.3 to 0.5).

4. Stand-by instrument inverter switch - OFF.

AIR START SYSTEM AND TRANSFORMER-RECTIFIER CHECK.

To ensure that the air start ignition system and transformer-rectifier unit are operating properly, the following check should be made:

1. Throttle - IDLE.

   AC generator power "on the line."

2. Air start switch - ON.

   Move air start switch to ON and check that ignition-on indicator light is on. The dc generator caution light and master caution light should come on. The dc loadmeter does not go to zero since it indicates load on the transformer-rectifier unit. The instrument ac power-off caution light should come on momentarily and then go out as the stand-by instrument inverter comes up to speed and the ac loadmeter shows an increase.

3. Battery switch - OFF.

   The transformer-rectifier unit should then power the primary bus.

4. Mode selector switch - SIGHT & RADAR.

   Check for the fixed reticle. This shows that the secondary bus is operating. The instrument ac power-off caution light should remain off, with the ac loadmeter showing a slight increase. If the sight is inoperative, place the radio compass function switch at LOOP and observe pointer movement corresponding to loop switch positioning.

Caution If these indications are not noted when the air start switch is ON and the battery switch is OFF, the air start switch or the transformer-rectifier is inoperative and the mission should be aborted.

5. Mode selector switch - OFF.
6. Air start switch - OFF.

   Return air start switch to OFF, to prevent damage to ignition units. The dc generator should then come back to normal, and the dc generator and master caution lights should go out. The dc loadmeter reading should also return to normal. (A lockout relay prevents the transformer-rectifier from powering the dc busses when the dc generator is "on the line.")

7. Battery switch - ON.

EMERGENCY FUEL SYSTEM CHECK.

Test the emergency fuel control system as follows: Move fuel regulator selector switch to EMER at idle rpm. The emergency fuel regulator-on indicator light should be on, indicating transfer from the normal to the emergency system. Then return full regulator selector switch to NORM; a slight fluctuation of fuel flow should be noted.

RUDDER HYDRAULIC SYSTEM CHECK.

Caution Ensure that all ground personnel are clear of saddle-back area before commencing check.

To ensure that rudder system is operating properly, proceed as follows:

1. Hydraulic pressure gage selector switch - UTILITY.

   Move rudder pedals through full travel. Check rudder operation. Slight drop in hydraulic pressure should be noted during rudder movement.

2. Hydraulic pressure gage selector switch - RUD, ALT.

   While slowly moving rudder pedals, pressure must read approximately 100 psi.

3. Rudder hydraulic system test switch - ALTERNATE RUDDER.

   Check pressure and operation. Move rudder pedals through full travel. Pressure should build up to 2700 psi or more. Release pedals to neutral. A slight drop in hydraulic pressure should be noted during rudder movement. Release test switch to NORM. Pressure should return to less than 500 psi. Move rudder pedals to ensure that system is operating.

4. Hydraulic pressure gage selector switch - UTILITY.

TRIM SYSTEM CHECK.

To ensure that trim system is operating properly, proceed as follows:

1. Trim operation - Check.

   Hold lateral and longitudinal trim switch on stick grip at each operative position, and hold rudder trim switch at RIGHT and LEFT to obtain full trim travel on all trim systems. Note that control and corresponding surface movements are correct. After completing full-travel trim check in both directions, release trim switches when stick is in full-travel position.

Warning The trim switch may be subject to occasional sticking in an actuated position, resulting in application of extreme trim. When this condition occurs in flight, the trim switch must be returned manually to OFF (center), after the desired amount of trim is obtained. If this is noted during preflight check, an entry should be made in Form 781 with a red cross. Do not fly the airplane.

2. Trim for take-off - Check.

   Before trimming for take-off, make sure autopilot is disengaged. Hold take-off trim button depressed until take-off trim indicator light remains on steadily for a minimum of 2 seconds. Determine ability to obtain take-off trim from either the full nose-down or nose-up psoition. Observe control centering and have ground crew check proper setting of horizontal stabilizer and rudder.

NOTE The trim for take-off light will not come on when the flap handle is full down or the autopilot is engaged.

- The ground crew check of the horizontal stabilizer setting is facilitated by a white triangle painted on the left side of the fuselage. When the stabilizer is at the proper take-off trim setting, the leading edge is aligned within ±5/16 inch of the aft apex of the triangle.

UTILITY HYDRAULIC SYSTEM CHECK.

To ensure that utility hydraulic system is operating correctly, proceed as follows:

1. Hydraulic pressure gage selector switch - UTILITY.

   Check pressure indication on gage.

2. Wheel brakes - Check.

   Check for proper brake pedal action.

TURNING RADIUS AND GROUND CLEARANCE

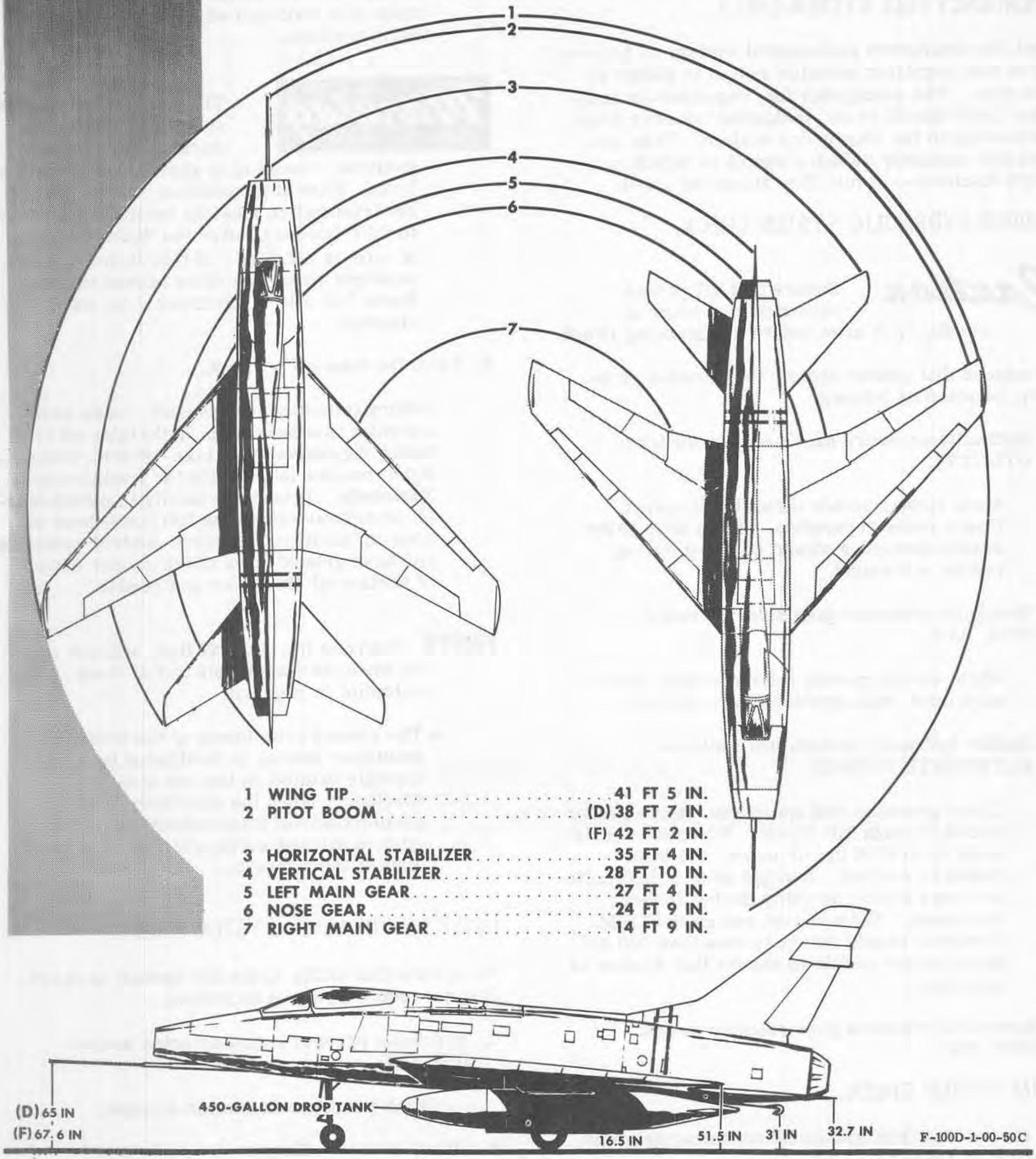


Figure 2-4

3. Speed brake switch - Cycle; then move switch to IN.

   Have ground crew check for proper operation. Note hydraulic pressure drop. If pressure drops below 1300 psi, the mission should be aborted because the priority valve in the speed brake hydraulic line may be faulty. However, if pressure drops below 1300 psi and remains there, check whether speed brake dump lever is at OFF (aft) position. Close speed brake and return switch to OFF (center) position.

4. Wing flap handle - Cycle; then set.

   Have ground crew check for proper operation of the flaps through full up and down cycle and that horizontal stabilizer repositions as necessary during flap operation. Set flaps for take-off.

AUTOPILOT GROUND CHECK.

Refer to "Ground Check" under "Normal Operation of Automatic Flight Control System (Autopilot)" in Section IV.

BEFORE TAXIING.

NOTE Before taxiing, be sure there is proper clearance for the airplane. See figure 2-4 for minimum turning radius and ground clearance.

WARNING

After ground safety pin is removed from canopy alternate emergency jettison handle, the handle is armed, and if pulled, jettisons the canopy.

F-100D-1-0-40A

1. Safety pins - Remove.

   With utility hydraulic pressure at 2800 psi and all gear doors closed, signal ground crewman to remove nose gear and arresting hook ground safety pins. The ground crewman should then show or present pins to pilot. In the cockpit, remove safety pins from right handgrip of ejection seat and from canopy alternate emergency jettison handle.

Warning After the ground safety pin is removed from the handgrip, the seat and canopy ejection systems are fully armed.

2. Navigation aids - Check.

3. IFF - STBY.

4. Oxygen regulator diluter lever - As required.

5. Engine pressure ratio gage - Set.

   Set engine pressure ratio gage take-off index marker according to outside air temperature. (See figure 2-5.)

6. Altimeter - Set and check.

   a. Set to current altimeter setting and note field elevation error.

Warning If altimeter error is in excess of 75 feet, do not accept airplane.

   - Make sure 10,000-foot pointer is correctly set.

   b. Set to field elevation and note difference between indicated and actual barometric pressures.

NOTE The difference in barometric pressure setting should be considered when setting the altimeter during flight.

7. Canopy - Check; Then as desired.

   Check that canopy closes and locks and that cockpit pressurizes; then position canopy as desired.

   During taxiing, when the canopy is open, the canopy should not be set within 6 inches of either full open or full close position. This prevents damage to the canopy mechanism and canopy seal as a result of bouncing. During taxiing, when the canopy is closed, it should be fully closed and locked to prevent possible damage to the canopy seal.

EPR GAGE SETTING

D INDEX SETTING	OUTSIDE AIR TEMPERATURE °F	OUTSIDE AIR TEMPERATURE °C	F INDEX SETTING
1.82	122	50	1.80
1.84	118	48	1.82
1.85	115	46	1.83
1.86	111	44	1.84
1.87	108	42	1.85
1.88	104	40	1.86
1.89	100	38	1.87
1.90	97	36	1.88
1.91	93	34	1.89
1.92	90	32	1.90
1.93	86	30	1.91
1.94	82	28	1.93
1.96	79	26	1.94
1.97	75	24	1.95
1.98	72	22	1.96
1.99	68	20	1.97
2.01	64	18	1.99
2.02	61	16	2.00
2.03	57	14	2.01
2.04	54	12	2.02
2.05	50	10	2.03
2.06	46	8	2.04
2.07	43	6	2.05
2.09	39	4	2.07
2.10	36	2	2.08
2.11	32	0	2.09
2.13	28	−2	2.11
2.14	25	−4	2.12
2.16	21	−6	2.14
2.17	18	−8	2.15
2.18	14	−10	2.16
2.20	10	−12	2.17
2.21	7	−14	2.19
2.22	3	−16	2.20
2.23	0	−18	2.21
2.25	−4	−20	2.22
2.27	−8	−22	2.24
2.28	−11	−24	2.25
2.29	−15	−26	2.26
2.30	−18	−28	2.27
2.32	−22	−30	2.29
2.34	−26	−32	2.32
2.35	−29	−34	2.33
2.37	−33	−36	2.35

F-100D-1-A51-9A

Figure 2-5

8. Nose wheel steering - Check.

   a. Nose wheel steering button - Press and move rudder pedals slightly.

      Check for airplane response to nose wheel steering. Determine which type of nose wheel steering button operation is available.

   b. Nose wheel steering button - Press to disengage.

9. Main wheel chocks - Removed.

NOTE If engine run-up is made, be sure main wheels are securely chocked, and hold wheel brakes on. The wheel brakes will not hold the airplane when the afterburner is operating.

TAXIING.

Observe the following instructions for taxiing:

Caution To prevent damage to canopy or engine, maintain a minimum distance of 150 feet from the exhaust blast of any other airplane.

1. Flight instruments - Check.

   Perform operational check of all flight instruments during taxiing. Check directional indicator (slaved) for incorrect or sluggish operation.

2. Antiskid switch - ON.

   While taxiing in a clear area, move antiskid switch to ON and test brake operation. If no brake action is received, return antiskid switch to OFF and abort the flight unless operational requirements dictate otherwise.

BEFORE TAKE-OFF.

PREFLIGHT AIRPLANE CHECK.

After taxiing to take-off area, complete the following checks:

1. Zero-delay lanyard hook - Check attached.
2. Flight controls - Check freedom of movement.
3. Hydraulic pressure gage selector switch - UTILITY.
4. Speed brake switch - IN, then OFF (center).

   Check speed brake switch IN, then move switch to OFF (center) position.

5. Canopy - Closed and locked.

   Hold switch in CLOSE position for an additional 2 or 3 seconds after the canopy-not-locked warning light goes out to ensure tight sealing. Make sure canopy-not-locked warning light goes out when canopy is closed and manual canopy lock handle* is pulled to the locked position.

6. Take-off trim - Recheck.

7. Special store unlock handle - UNLOCK, if required.

   If an inert special store training shape or an empty Type VII or VIIA pylon is installed and no special store is carried, unlock the special store unlock handle before take-off. The handle must be in and safetied when the MN-1 dispenser is carried.

NOTE The special store unlock handle should be pulled to the full stop position (about 2-3/4 inches). The special store unlock indicator light should come on just before the full stop position is reached.

8. Pitot heat - ON.

9. IFF/SIF - As required.

PREFLIGHT ENGINE CHECK.

1. Throttle - Military Thrust.

2. Engine instruments - Check.

   Check engine instruments for proper reading at Military Thrust.

   a. Oil pressure - 40 psi minimum.

   b. Exhaust temperature - 540°C minimum.

Caution The temperature and duration of any engine operation during which any exhaust limit temperature is exceeded should be entered in the Form 781. If 680°C is exceeded, shut down engine immediately. Overtemperature operation requires engine inspection.

- Should engine rpm reach or exceed overspeed limit either with or without overtemperature conditions, shut down engine immediately. The engine must be inspected for malfunction and possible damage when overspeed occurs.

   c. Engine pressure ratio gage - Check and reset.

   When engine speed (rpm) has stabilized, the pointer on the gage should fall within the entire arc (arc and triangle) of the take-off index marker. If Military Thrust check results in an acceptable reading and afterburner take-off is to be made, readjust take-off marker, while engine is operating at Military Thrust, so that lower edge of triangle of index marker aligns with gage indicating pointer.

Warning If the gage pointer does not fall within the prescribed limits, the thrust output is not correct and take-off should not be made.

NOTE Avoid making engine preflight check in jet wash of a preceding airplane; otherwise, a slightly low pressure ratio gage reading may occur.

3. Adjust heat and vent - As required.

Warning The cockpit temperature should be maintained at the highest possible heat consistent with pilot comfort during take-off, to prevent sudden fog or snow in the cockpit.

TAKE-OFF.

NORMAL TAKE-OFF.

NOTE Refer to take-off distance charts in T.O. 1F-100A-1-1 for take-off distances and speeds.

- Take-off at Military Thrust is not recommended because of the excessive ground roll and slow acceleration rates. In addition, no fuel saving is realized on tactical-type missions.

For normal take-off with or without external load, proceed as follows:

1. Wheel brakes - Release.

NOTE During take-off run, nose wheel steering should be used for directional control at speeds up to at least 100 knots, at which time rudder control is effective. If weight of airplane is on nose wheel, disengage nose wheel steering, with button on control

*F-100F Airplanes

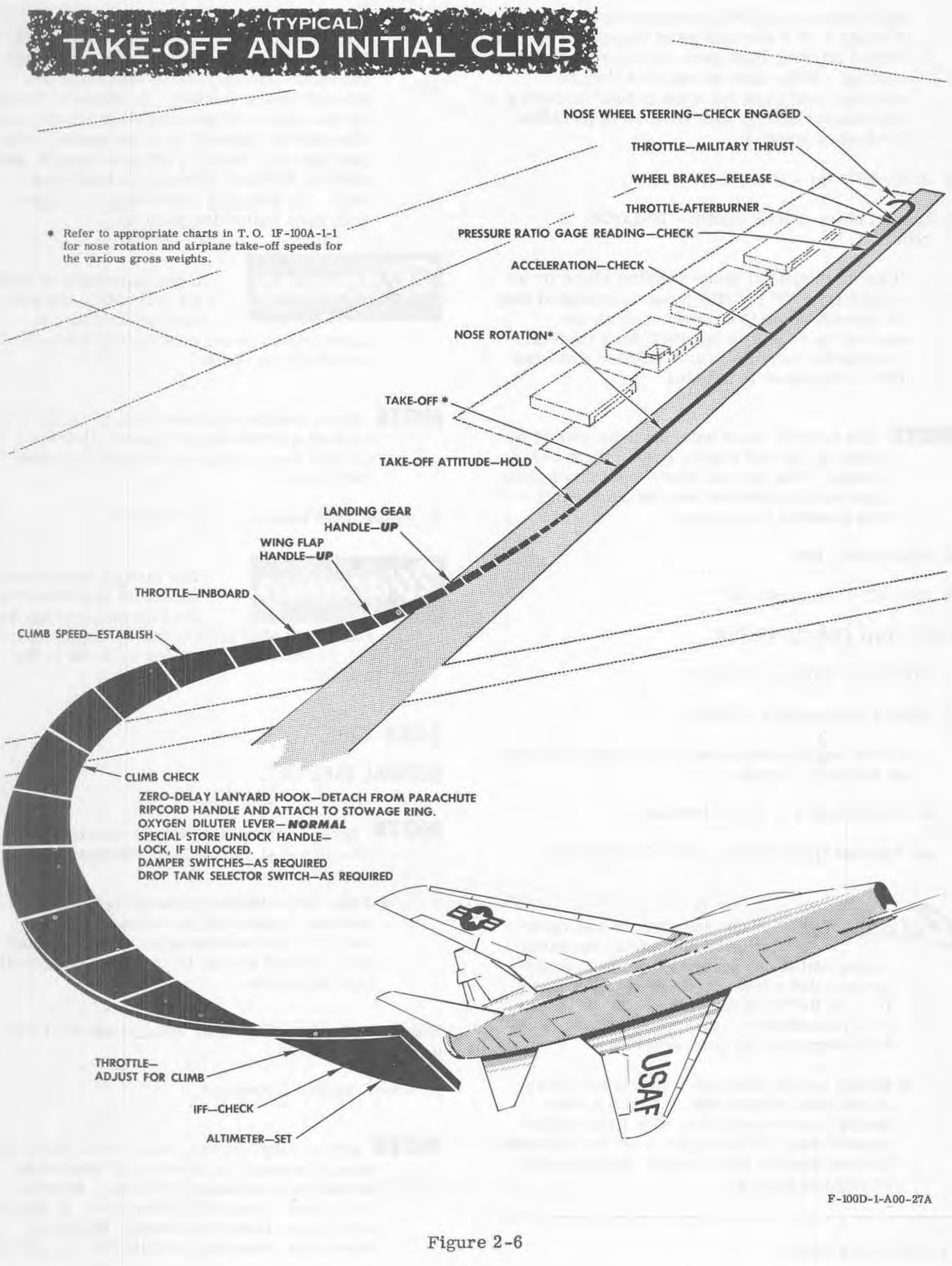

(TYPICAL)
TAKE-OFF AND INITIAL CLIMB
* Refer to appropriate charts in T. O. 1F-100A-1-1 for nose rotation and airplane take-off speeds for the various gross weights.
NOSE WHEEL STEERING—CHECK ENGAGED
THROTTLE—MILITARY THRUST
WHEEL BRAKES—RELEASE
THROTTLE-AFTERBURNER
PRESSURE RATIO GAGE READING—CHECK
ACCELERATION—CHECK
NOSE ROTATION*
TAKE-OFF *
TAKE-OFF ATTITUDE—HOLD
LANDING GEAR HANDLE—UP
WING FLAP HANDLE—UP
THROTTLE—INBOARD
CLIMB SPEED—ESTABLISH
CLIMB CHECK
ZERO-DELAY LANYARD HOOK—DETACH FROM PARACHUTE RIPCORD HANDLE AND ATTACH TO STOWAGE RING.
OXYGEN DILUTER LEVER—NORMAL
SPECIAL STORE UNLOCK HANDLE—LOCK, IF UNLOCKED.
DAMPER SWITCHES—AS REQUIRED
DROP TANK SELECTOR SWITCH—AS REQUIRED
THROTTLE—ADJUST FOR CLIMB
IFF—CHECK
ALTIMETER—SET
USAF
F-100D-1-A00-27A

Figure 2-6

stick. Avoid using brakes if at all possible, because excessive take-off distances will result.

2. Throttle - AFTERBURNER.

Afterburner should be selected immediately. Ignition should occur within 2 seconds and is indicated by a definite increase in thrust. The exhaust temperature should not exceed the acceleration limit.

Caution If the exhaust nozzle fails to open when the afterburner is selected, a loud explosion and violent surging occur, accompanied by an rpm reduction and an increase in exhaust temperature. If these conditions are noted, shut down afterburner immediately to prevent possible damage to engine and exhaust nozzle.

NOTE If afterburner is selected repeatedly, ignition will take place before the nozzle opens, at which time pressure ratio will increase momentarily, then drop back as the nozzle opens.

- Wheel brakes will not hold the airplane when the afterburner is operating.

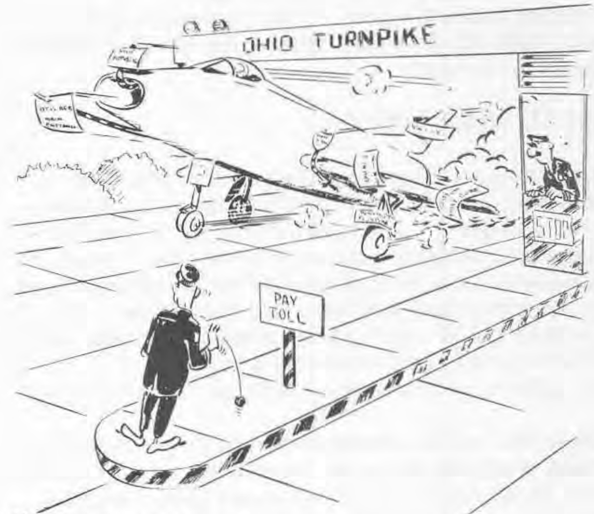
3. Pressure ratio gage - Check.

Immediately after afterburner light-up, check engine pressure ratio gage. The pointer should fall within the arc of the take-off index marker. It is important to check the gage before take-off roll has progressed too far, because the pointer will continue to rise as the airspeed increases.

Caution Take-off should be aborted if the pressure ratio is not correct. However, if committed to a take-off, continue in normal manner, then shut down afterburner as soon as airplane is safely airborne. Land as soon as practical. Whenever the engine pressure ratio gage readings are not within limits, the airplane must be returned to maintenance for corrective action.

4. Nose rotation.

At the computed rotation speed for the gross weight and configuration, apply back stick pressure to initiate airplane rotation. The actual rate of rotation will vary with the difference between rotation speed and take-off speed. A take-off with a 25-knot difference in speeds requires a slightly lower rate of rotation than one with a 15-knot difference. Rotate the airplane at such a rate that the



WARNING

Rapid nose rotation can result in premature nose wheel lift-off and excessive ground run.

F-100D-1-0-37 B

airplane will attain the required pitch angle for lift-off at the recommended take-off speed.

5. Take-off.

Maintain the take-off attitude after breaking ground until sufficient airspeed and altitude is attained, to prevent settling back onto the runway.

Warning Make certain proper airspeed has been attained before rotating the airplane to take-off attitude. Care must be taken to ensure that the airplane is not rotated to an excessively nose-high attitude. (In case of overrotation, allow the airplane to settle back to the runway and assume the proper take-off attitude.)

- Allowing airspeed to build up above recommended speeds before pulling back on the stick increases the take-off run considerably.

MINIMUM-RUN TAKE-OFF.

For a minimum-run take-off, use intermediate flaps and reduce take-off speed to 10 knots below that required for normal take-off. Nose rotation speed is not to be changed. At normal nose rotation speed, initiate rotation at a slightly faster than normal rate to attain take-off attitude at the reduced take-off speed. This technique will produce take-off distances approximately 10 percent less than normal.

CROSS-WIND TAKE-OFF.

In addition to the procedures used in a normal take-off, be prepared to exert rudder pressure after releasing nose wheel steering, to keep airplane on a straight path until air-borne. Also, be prepared to counteract drift after breaking ground, by lowering wing into wind or by crabbing. To compute the effective cross wind during take-off, refer to wind component chart in T.O. 1F-100A-1-1. There is no cross-wind limit for the airplane.

When take-off is accomplished in the presence of gusty winds or strong cross winds, rotation speeds may be increased to provide additional control margin. An increase in knots, equal to one-half the gust velocity or direct cross-wind component, will provide this control margin and reduce any tendency for "airplane skip." Any resulting increase in take-off speed will produce a proportionate increase in take-off distance.

TAKE-OFF WITH ASYMMETRICAL LOADS.

Refer to "Flight With External Loads" in Section VI.

AFTER TAKE-OFF—CLIMB.

When airplane is definitely air-borne, and there is no possibility of settling back onto the runway, proceed as follows:

1. Landing gear handle - UP.

   Check gear position indicators.

Caution Landing gear and doors should be completely up and locked before gear-down limit speed is reached; otherwise, excessive air loads may damage the doors and gear operating mechanism, and prevent subsequent operation.

- If landing gear handle has been moved to UP while weight of airplane was still on the gear, the handle must be placed in the DOWN position and then returned to UP (with weight off the gear) before gear can retract.

2. Wing flap handle - UP.
3. Throttle - Move inboard.

   As soon as added thrust is no longer needed, shut off afterburner by moving throttle inboard.

4. Climb speed - Establish.

   Accelerate to best climb speed while maintaining a shallow climb.

NOTE Refer to performance data in T.O. 1F-100A-1-1 for best climb speed.

- Slats become fully closed at about 290 knots IAS, with or without external loads.

5. Climb check (2000 to 5000 feet).

   a. Zero-delay lanyard hook - Detach from parachute ripcord handle and attach to stowage ring.

   The hook must be stowed as soon as possible after reaching 2000 feet above the terrain.

Warning The lanyard must be disconnected whenever operating outside of the optional area in order that the safety delay provided by the parachute timer-aneroid will not be overridden.

   b. Oxygen regulator diluter lever - NORMAL.

   Unless carbon monoxide contamination is suspected, position diluter lever at NORMAL.

   c. Special store unlock handle - LOCK, if unlocked.

   d. Damper switches - As required.

   Place the AFCS hydraulic engage switch at ENGAGE and then the yaw-pitch damper switch at DAMPER.

   e. Drop tank selector switch - As required.

   Move drop tank fuel selector switch as required when the drop-tank-empty indicator light comes on. (For proper fuel sequencing, refer to "Drop Tank Fuel Sequencing Limitations" in Section V.)

NOTE The drop-tank-empty indicator light may blink before the selected tanks are completely empty. To ensure complete use of drop tank fuel, the selector switch should not be repositioned until the light stays on steadily for about 2 minutes.

- When all drop tanks are empty, the drop tank selector switch should be moved to INTERM. The drop-tank-empty indicator light will remain on until the wing scavenge pumps start to feed at about 4000 pounds total fuel remaining. Scavenge pump operation may be monitored until the light comes on again with about 1500 pounds total fuel remaining. The light will go out when the selector switch is positioned at OFF.
- When drop tank fuel is used before internal fuel, the total internal fuel quantity gage shows a continuous decrease in fuel supply only after the drop tanks have been emptied and the engine begins to use fuel from the internal tanks.

6. Throttle - Adjust for climb.

Adjust throttle setting as necessary, to prevent engine overtemperature during climb.

Caution Careful attention to exhaust temperature indications is necessary throughout the climb. Retard the throttle as necessary to prevent engine overtemperature.

7. IFF - Check.

If positive operation of the normal mode of IFF has not been established during departure with an air traffic control facility, a check should be made with such a facility as soon after take-off as flight conditions will permit.

NOTE If operating on radar controlled airways or through positive controlled airspace, this check must be performed before entering these regions. If IFF is inoperative, consult the appropriate navigation publication before entering controlled areas.

8. Altimeter - Set.

Set 29.92 at transition flight level.

CLIMB.

Military Thrust is recommended for climb for maximum range conditions when minimum climbing time to altitude is not important. For mimimum time to altitude, such as in a point-interception mission, Maximum Thrust (afterburner) should be used. Refer to climb charts in T.O. 1F-100A-1-1 for recommended indicated airspeeds to be used during climb, and for estimated rates of climb and fuel consumption. During climb to altitude, a drop of 2% to 4% rpm will normally occur.

CRUISE.

For cruise data, refer to **T.O.** 1F-100A-1-1.

AUTOPILOT IN-FLIGHT CHECK.

Refer to "In-flight Check" under "Normal Operation of Automatic Flight Control System (Autopilot)" in Section IV.

AFTERBURNER (AB) OPERATION DURING FLIGHT.

NOTE During AB operation at low altitudes, the fuel transfer rate from the drop tanks may not be sufficient to maintain a constant level in the internal tanks, and use of internal fuel may occur before drop tank fuel is exhausted.

The AB can be operated at any engine speed between that obtained at Military Thrust and about 13% rpm less than Military Thrust. During AB operation, the least fuel consumption per pound of thrust output is obtained when the engine is operating at maximum rpm. A momentary drop in pressure ratio when the throttle is moved outboard into AB indicates that the exhaust nozzle is open. However, if AB ignition occurs before the exhaust nozzle opens, a momentary increase in pressure ratio will occur. If AB light-up is not obtained within 2 seconds at sea level (5 seconds at altitude) after throttle is moved into AB, the throttle should be moved inboard and then, after 3 to 5 seconds, returned outboard to recycle the Ab igniter.

1. Throttle - Outboard into AFTERBURNER range.

Move throttle outboard. An increase in thrust indicates AB light-up. During light-up, rapid acceleration may cause inadvertent aft pull on the stick, causing mild longitudinal porpoising. The AB ignition, fuel metering, and flame holder incorporated in the J57-21A engines provide satisfactory AB operation up to the service ceiling of the airplane.

Caution If the exhaust nozzle fails to open when the AB is selected, a loud explosion and violent surge will probably occur, accompanied by an rpm reduction and an increase in exhaust temperature. If these conditions appear, shut down AB immediately to prevent possible damage.

2. Throttle - Inboard, to shut down AB.

Caution If AB is selected within one minute after AB shutdown, AB ignition relative to nozzle opening may be faster than normal. This causes a "hard" light-up and jolting of the airplane, and a rise in the engine pressure ratio gage reading. In extreme cases, compressor stall may result.

- [F] A slight outboard pressure on the throttle by the rear cockpit occupant may make it impossible for the pilot in the front cockpit to shut down the afterburner. If the front cockpit throttle cannot be moved inboard out of afterburning, verbally check with rear cockpit pilot that throttle is clear.

FLIGHT CHARACTERISTICS.

Refer to Section VI for information regarding flight characteristics.

Warning The autopilot damper switch should be at STANDBY (off) during all close-formation flights, as certain failures can cause hard-over rudder signals.

DESCENT.

The windshield and canopy defrosting system should be operated through the flight at the highest flow possible (as consistent with pilot comfort) so that a sufficiently high temperature is maintained to preheat certain canopy and windshield areas to keep the glass temperature above cockpit dew point. It is necessary that preheating be done because there is not enough time during rapid descents to heat these areas to temperatures which prevent the formation of frost and fog. Engine speed should be at, or above 85% rpm.

NOTE [F] If the rear cockpit is occupied, the defrost lever should be moved to INCREASE during descent, to eliminate the possibility of fog.

1. IFF - Check.

   Within one hour before estimated time of landing a positive IFF check should be made with an air traffic control facility.

2. Altimeter - Set.

   Set to current altimeter setting.

3. Descent check (2000 feet minimum).

   a. Zero-delay lanyard hook - Attach to parachute ripcord handle.

      Hook must be attached to the parachute ripcord handle before descending below 2000 feet above the terrain.

   b. Oxygen regulator diluter lever - As required.

   c. Special store unlock handle - UNLOCK, if required.

      If an empty Type VII or VIIA pylon is installed and no special store is carried, unlock the special store unlock handle before landing.

NOTE The special store unlock handle should be pulled to the full stop position (about 2-3/4 inches). The special store unlock indicator light should come on just before the full stop position is reached.

   d. Damper switches - STANDBY (off).

      The AFCS engage, autopilot engage, and damper switches must be positioned at STANDBY or OFF for landing.

   e. Fuel quantity - Check.

BEFORE LANDING.

During approach to the field, make the following checks:

1. Hydraulic pressures - Check.

   Monitoring utility system during approach and landing.

2. Safety belt and shoulder harness - Tightened.

3. Antiskid switch - Check ON.

4. Speed brake switch - As desired.

5. Landing gear handle - DOWN.

   Lower gear and check for a down-and-locked indication.

6. Wing flap handle - DOWN.

   Flaps alone provide sufficient drag. However, speed brake may be used during landing.

NOTE If the flaps are lowered to the intermediate position and the airplane is trimmed for this condition, lowering of flaps full down will then cause the pitch correction of the horizontal stabilizer to tend to overtrim the airplane. Stick forces required to counteract the overtrim condition will be slight (5 pounds or less of back stick).

LANDING.

NORMAL LANDING.

1. Throttle - IDLE.

   Retard throttle to IDLE during flare or at touchdown.

2. Touchdown.
3. Wing flap handle - UP.
4. Nose wheel steering - Engage.

NOTE To prevent disengagement of nose wheel steering because of pitching, which could occur on a rough runway, hold forward stick pressure during landing roll to minimize pitching.

5. Drag chute - Deploy.

NOTE To prevent inadvertent jettisoning of drag chute during deployment, grasp drag chute handle with palm up.

6. Employ normal braking technique.
7. Speed brake switch - Check IN.

NORMAL LANDING TECHNIQUE.

Assume that the landing gross weight is 23,200 pounds. (Speeds quoted will vary with gross weight.) Following entry into the pattern, slow the airplane below 230 knots IAS and lower landing gear and wing flaps. When the flaps are extended, the speed brake should be raised but may be used as a speed control in the pattern. Fly the base leg at 190 knots IAS and adjust pattern and thrust to control rate of descent to about 1500 feet per minute. This will require about 83% to 87% rpm. After rolling out of turn onto final, adjust speed to 165 knots IAS for this landing gross weight and reduce rate of descent to a minimum value. Fly a smooth, flat final. Adjust speed, thrust, and rate of descent as necessary to arrive at touchdown point at desired speed. Reduce thrust to idle. Immediately after touchdown, lower the nose wheel to the runway, raise the wing flaps, engage nose wheel steering, deploy the drag chute, and check brakes for operation.

Smooth, Flat Approach.

Several factors influence the recommendation for using a smooth, flat approach, First. if an approach is smooth and flat, airspeed control is generally improved. Great emphasis must be given to the use of proper touchdown [illegible]s; thus, airspeed control during approach is important. Second, by using a relatively flat approach, the rate of descent is held to a reasonable value. Relatively low rates of sink, coupled with good speed control, ensure an approach with sufficient speed and power to flare the airplane. Flight tests have shown that the recommended power-on approach speeds are more than sufficient to flare the airplane from a 1000-foot-per-minute rate of sink. Flat approaches also minimize the necessity of demanding excessive airplane rotation to flare and generally make judging the flare easier. If a smooth approach is made, the necessity for abrupt last-minute corrections is minimized. This is an important factor in avoiding "stick stiffening" and illumination of the flight control system hydraulic pressure caution light. Another obvious advantage of the smooth, flat approach is that because higher power is required, greater flexibility in playing the approach is afforded the pilot. The engine is in its best acceleration range; therefore, rapid engine response is available if it is necessary to correct sink rates or to go around.

Speed Brake Operation.

If the speed brake is used during the landing approach in conjunction with the flaps or alone, the airplane buffet level is increased. The flaps alone provide sufficient drag for a flat approach at relatively high powers so that the use of the speed brake in the approach is not necessary except as a speed control; therefore, speed brake use is left to the pilot's discretion. The speed brake must be retracted in case of a barrier engagement.

Flap Technique.

Raising the flaps immediately after touchdown will increase the load on the landing gear, allowing the brakes to develop more torque before the tires skid, which in turn allows more effective operation of the braking system and provides a higher airplane deceleration.

Braking Technique.

Be prepared to start braking immediately after toughdown. This eliminates any time lag in decelerating the airplane if the drag chute fails. The brakes should, of course, be used as necessary. Maximum braking as achieved by smoothly applying brake pressure until antiskid cycling is felt and then relaxing pedal pressure slightly. The maximum pressure that does not result in antiskid cycling should then be held until the airplane is stopped. This requires an increase in brake pedal pressure as speed decreases.

Drag Chute Operation.

Drag chutes have been flight-tested at touchdown speeds up to 180 knots without failure; however, operational reliability is greatly increased at lower speeds. Whenever runway conditions permit, slow airplane to 150 knots IAS before deploying the drag chute. The effects of service usage (i. e., runway abrasion and aft fuselage heat effects) can lower the chute strength to the point where failures may be encountered at speeds below 180 knots. However, with properly inspected chutes, no failures of this type should occur at normal landing speed or if a take-off is aborted. "Snapping" the chute handle out sometimes causes accidental chute jettisoning.

Tail Skid.

Some pilots hesitate to use recommended touchdown speeds for fear of touching the tail skid. The tail skid is installed for the express purpose of protecting the airplane from serious damage in the tail area during normal landing. Occasional contact of the tail skid is to be expected when the airplane is operated in the prescribed manner. However, the tail skid is not expected to protect the airplane from damage during landings which involve excessively high sink rates.

Other Landing Pointers.

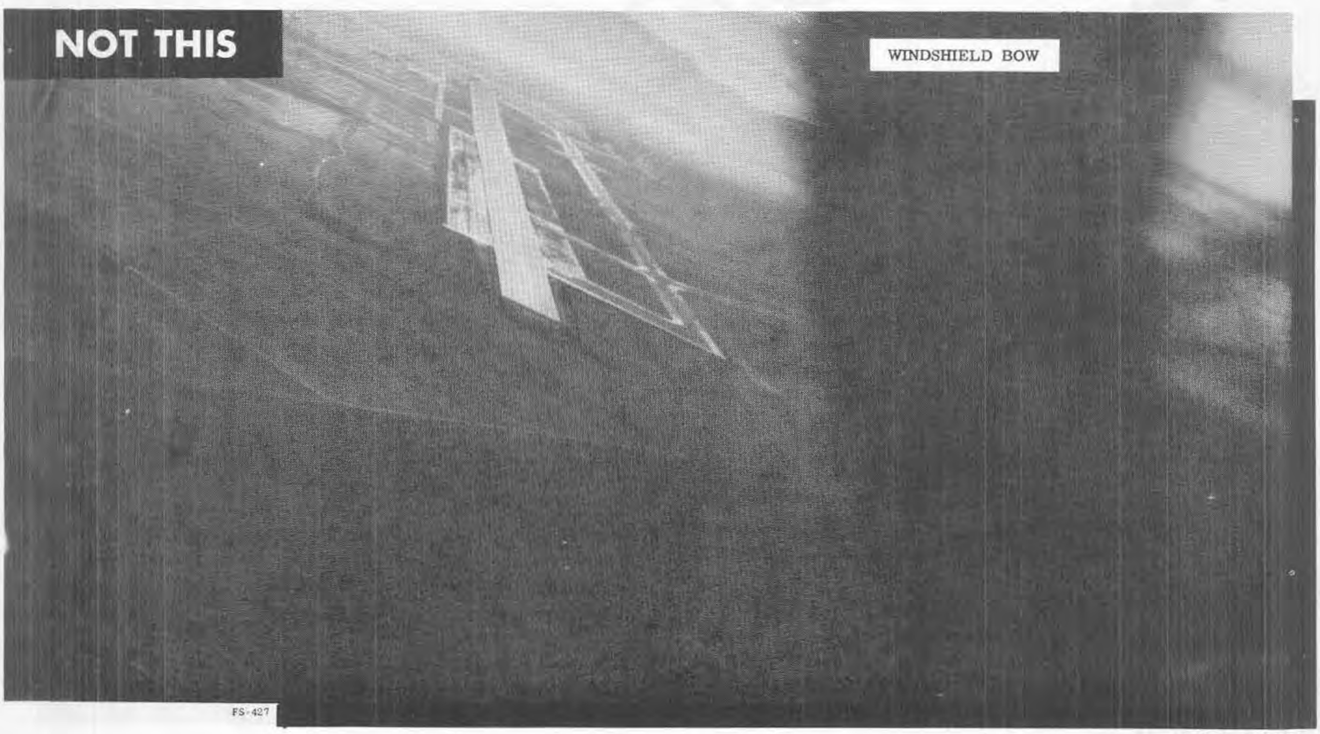
At landing airspeeds, airplane response is sluggish, and more stabilizer deflection is required for the same airplane reaction. Therefore, because of the sluggish airplane response, it is possible to overcontrol the stabilizer without overcontrolling the airplane. Overcontrolling the stabilizer under these conditions can make demands on the stabilizer actuator which are close to the maximum stabilizer rate available. When an instantaneous demand is higher than maximum available rate, the control stick feels as though it "stiffens" or "locks up" momentarily. This does not mean that the stabilizer has stopped moving, but rather that it is moving at maximum rate and yet the pilot is demanding an even higher rate. Recovery from this condition is instantaneous. "Stick stiffening" or "lockup" can be avoided by flying a smooth, flat final approach. Overcontrolling the flight control systems can also cause illumination of the flight control hydraulic system pressure failure caution light. While it is possible to experience stick stiffening and illumination of the caution light simultaneously, the two occurrences are independent of each other and can also occur independently. The caution light comes on because hydraulic system No. 1 pressure has been bled down low enough to actuate the caution light. This is not serious, since flight control hydraulic system No. 2 provides ample control. It is, however, disconcerting to the pilot when it happens. Flight tests have demonstrated that at low engine rpm, flight control hydraulic system No. 2 displaces more fluid from the control surface actuators than the No. 1 pump is supplying. This results in system No. 1 pressure bleed-off. Under these conditions, the system No. 2 pump still supplies the necessary flow and pressures to provide the maximum stabilizer rate. These complaints generally disappear as pilots learn to make smoother approaches in the airplane. A stick-force lightening occurs about 5 knots IAS below the recommended touchdown speed for the 1 G condition. If stick-force lightening is encountered, normal flying techniques should be used, as the occurrence is not dangerous. Simply continue flying the airplane. Do not under any circumstance "jam" the nose of the airplane down, as this can cause porpoising. Porpoising also can be induced by excessive touchdown speed, excessive rate of descent, misuse of flight controls, or a combination of all three. If touchdown speed is too high, the nose wheel can strike the ground first, bounding the airplane into a nose-high attitude. If the pilot then pushes forward abruptly, driving the nose gear into the runway again, the entire cycle will be repeated. On landing from an excessive rate of descent, a bounce landing on the main gear can change airplane pitch attitude abruptly and can set off a porpoise. Again, porpoising will not be encountered if the recommended touchdown speeds and techniques are observed. However, if a porpoise is encountered, position the stick slightly aft of neutral and hold it, while simultaneously advancing the throttle to Military Thrust. Attempts to counteract the bounce with opposite control movement should be avoided, as pilot reaction

Note

All hard landings must be recorded in FORM 781, so that the airplane will be inspected for signs of structural damage before the next flight.

F-100D-1-0-51A

LANDING APPROACH

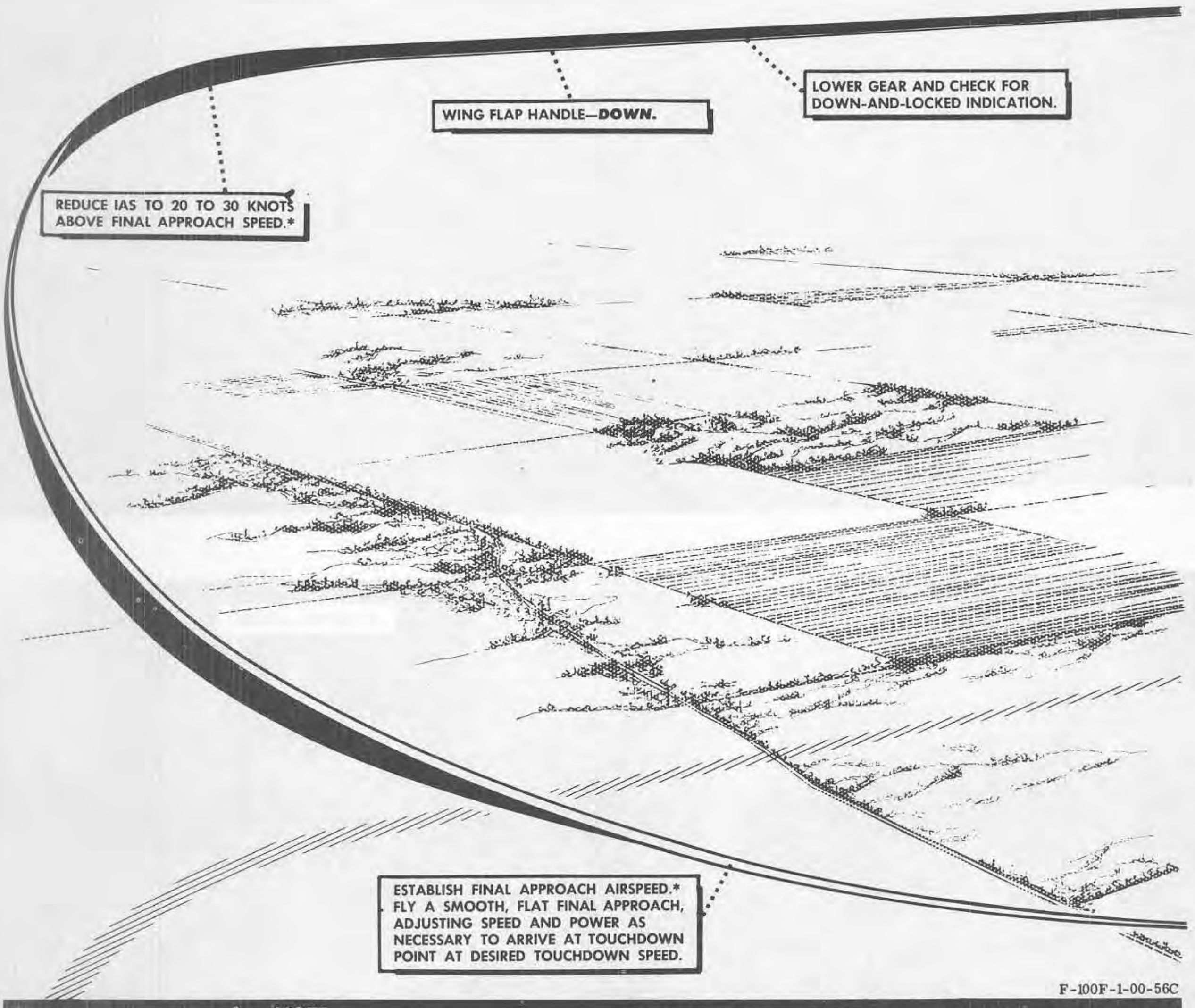


F-100D-1-00-63A

Figure 2-7

LANDING PATTERN

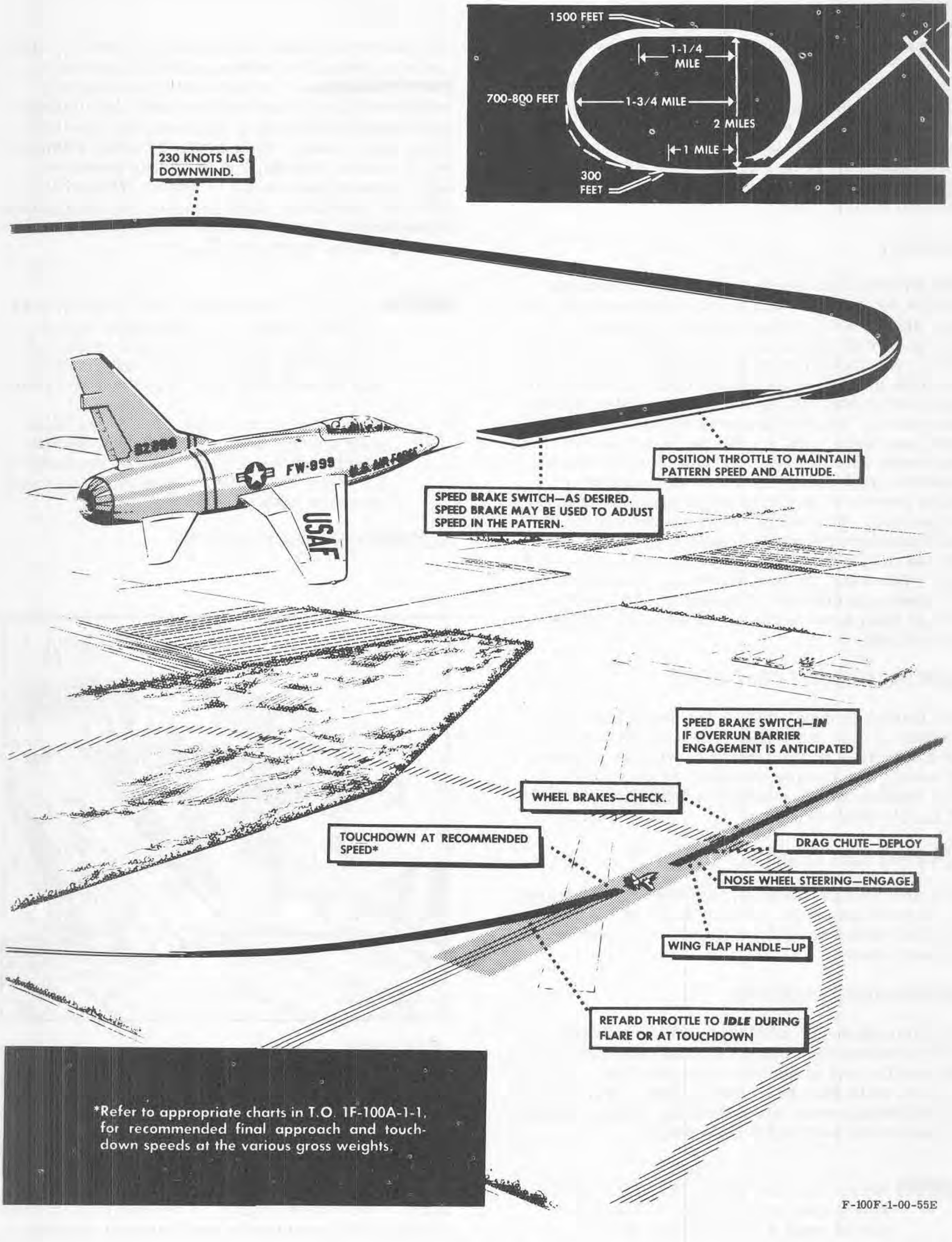
(TYPICAL)



NOTE

- To avoid stick force lightening, do not exceed a 50-degree bank turn or 1.6 G at recommended pattern speed.
- Control rate of descent with power to less than 1000 feet per minute before flare. Do not exceed 1500 feet per minute on final approach.
- Use caution during the flare in the presence of gusty winds or jet wash. These factors can cause stick force lightening.
- The drag chute may be deployed up to 180 knots IAS; however, operational reliability is greatly increased at lower speeds. When runway conditions permit, slow airplane to 150 knots IAS before drag chute is deployed.
- Yaw can occur immediately after deploying drag chute. Counteract yaw with rudder, nose wheel steering, and brakes.
- If drag chute fails, additional braking will be needed to stop.
- Avoid taxiing over previously jettisoned drag chutes.

Figure 2-8



F-100F-1-00-55E

time combined with airplane response to control movement will aggravate the porpoising. Holding a constant control position minimizes the oscillation and allows the airplane to become air-borne again so as to reduce possible damage by further bouncing on the landing gear. After eliminating the porpoising, the pilot must immediately decide whether to maintain Military Thrust and execute a go-around or make a normal landing on the remaining runway. This decision will depend on such conditions as fuel quantity, weather, length and condition of the runway, availability of runway overrun barrier, etc.

Summary.

The smooth, flat approach at the recommended speeds and rates of descent will provide better engine accelerations and go-around characteristics, will ensure an ample speed and power margin for flare, will minimize stick stiffening, and will give the pilot more precise control over his touchdown point and speed. Using the recommended landing procedures, landing distances of less than 4000 feet, and under ideal conditions less than 3000 feet, have been demonstrated. Flight test data shows, however, that an increase in landing speed of 10 knots results in an increased ground roll of 20 to 25 percent. The use of recommended approach and touchdown speeds is based on practical conditions and, if used, will prevent unnecessary tire and brake wear, as well as reduce the number of barrier engagements. Remember: 10 knots too fast at touchdown means an additional 1000 feet of ground roll.

LANDING WITHOUT DRAG CHUTE.

If a landing is made without the drag chute, use normal landing technique. Adequate braking will be available on a dry runway to stop the airplane. However, the landing distance will be increased. For landing distance without a drag chute, refer to T.O. 1F-100A-1-1.

HEAVYWEIGHT LANDING.

For heavyweight landings, increase approach and touchdown speeds as listed in T.O. 1F-100A-1-1. Landing distances will be longer, as shown in the landing charts.

MINIMUM-RUN LANDING.

On a minimum-run landing, touch down at the recommended speed for weight and configuration, as near the end of the runway as possible. As soon as main gear touchdown is felt, lower nose wheel, engage nose wheel steering, retract flaps immediately, and deploy drag chute.

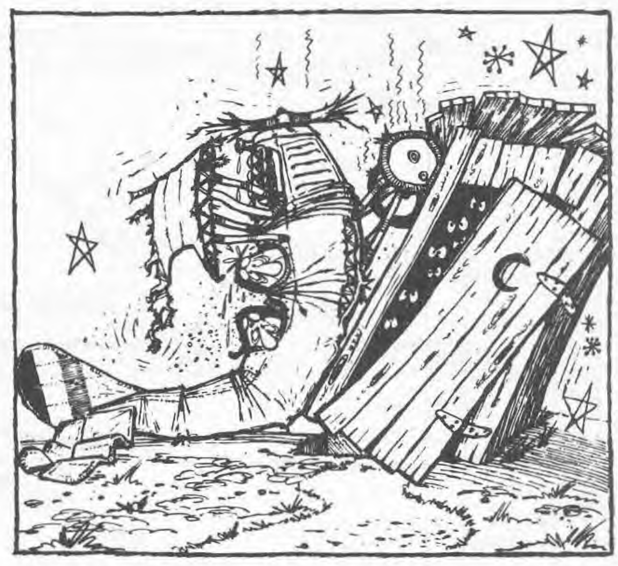
NOTE When flaps are down, the weight on the landing gear at touchdown is about one-third of what it is when flaps are up. Therefore, the antiskid system does not operate as effectively when the flaps are down.

Use brakes as required by applying a steady, light force on pedals and increase force slowly as airplane slows down. Do this until flaps are fully retracted (10 to 15 seconds) or until the airplane has slowed to 110 knots, whichever occurs first. Then, fairly heavy braking may be used, attempting to remain just short of the brake pressure which causes the antiskid to cycle. This will require an increasing brake pressure as the airplane slows down. If antiskid does cycle, brake pressure should be decreased slightly.

NOTE Cycling of the antiskid can be recognized by slight changes in longitudinal deceleration. No harm is done by the cycling of the antiskid; however, stopping distance will be increased 5 to 10 percent by cycling.

- With antiskid on, if full brakes are held until a complete stop is reached, abrupt pitching of the airplane may be encountered just before stopping. When pitching occurs, decrease pedal pressure.

SLIPPERY-RUNWAY LANDING.



CAUTION

The Speed Brake Must Be Retracted For Successful Barrier Engagement With Main Gear.

F-100F-1-0-83A

On a slippery runway (wet or icy), braking effectiveness varies greatly. The conditions of the runway (rough or smooth surface) must be determined by ground personnel and the pilot must be advised accordingly so that the smooth- or rough-surface technique can be used. It is imperative on either smooth- or rough-surface landings that the drag chute and immediate antiskid braking be used on all slippery runway landings.

Caution If the drag chute fails, raising the nose of the airplane will increase aerodynamic braking; however, care should be taken not to become air-borne again at the higher speeds.

Rudder should be used for directional control, as brakes and nose wheel steering are relatively ineffective. Rudder control will be effective to about 60 knots IAS on a slippery runway. The rudder deflection required when asymmetrical loads are carried reduces the available control.

Rough Surface Technique.

On rough ice or a wet, rough surface, lowering the nose and raising the flaps increases the weight on the gear and will result in a braking coefficient increase that is more effective than aerodynamic braking.

Smooth Surface Technique.

On smooth ice or a wet, slick surface it is imperative that drag chute deployment and immediate antiskid braking be used in addition to aerodynamic braking (by holding the nose off and full flaps), which is more effective in reducing landing roll than the technique for a rough surface. Increasing weight on the wheels by raising the flaps will not effectively increase the braking coefficient on a slick, slippery surface.

NOTE When it is considered that the magnitude of the cross-wind component is such that maintaining runway alignment becomes the primary consideration, with deceleration secondary, and a barrier engagement is probable, the cross-wind landing procedure should be used.

LANDING WITH ASYMMETRICAL LOADS.

Refer to "Flight With External Loads" in Section VI.

LANDING IN TURBULENCE OR JET WASH.

For landing in turbulence or jet wash, approach and touchdown speeds should be increased slightly to provide additional control margin. When winds are gusty, add one-half the gust factor to approach speed. For example, if the wind were 10 knots, gusts to 20 knots, the gust factor would be 10 knots. In this case, add one-half of 10, or 5 knots, to approach speed.

CROSS-WIND LANDING.

In addition to the procedures used for a normal landing, the following steps should be accomplished: On final approach, crab or drop wing to keep lined up with runway. However, if crabbing, the airplane must be aligned with the runway just before touchdown. When the direct cross-wind component exceeds 25 knots, a no-flap landing should be made. At touchdown, lower nose wheel to runway as soon as possible.

NOTE There is no cross-wind limit for the airplane; however, approach and touchdown speeds should be increased with increase in cross-wind velocity. Touchdown speed should be increased by one-half the velocity of direct cross-wind component. Refer to wind component chart in T.O. 1F-100A-1-1 for direct cross-wind component.

After nose wheels touch down and nose wheel steering is engaged, deploy drag chute. Because of the weather-cocking tendencies of the airplane with the drag chute deployed, care must be taken to ensure that nose wheel steering is engaged and operating before the drag chute is deployed on a cross-wind landing. However, if adverse yaw is encountered to the point that directional control is lost, the drag chute should be jettisoned and directional control should be maintained with nose wheel steering and brakes.

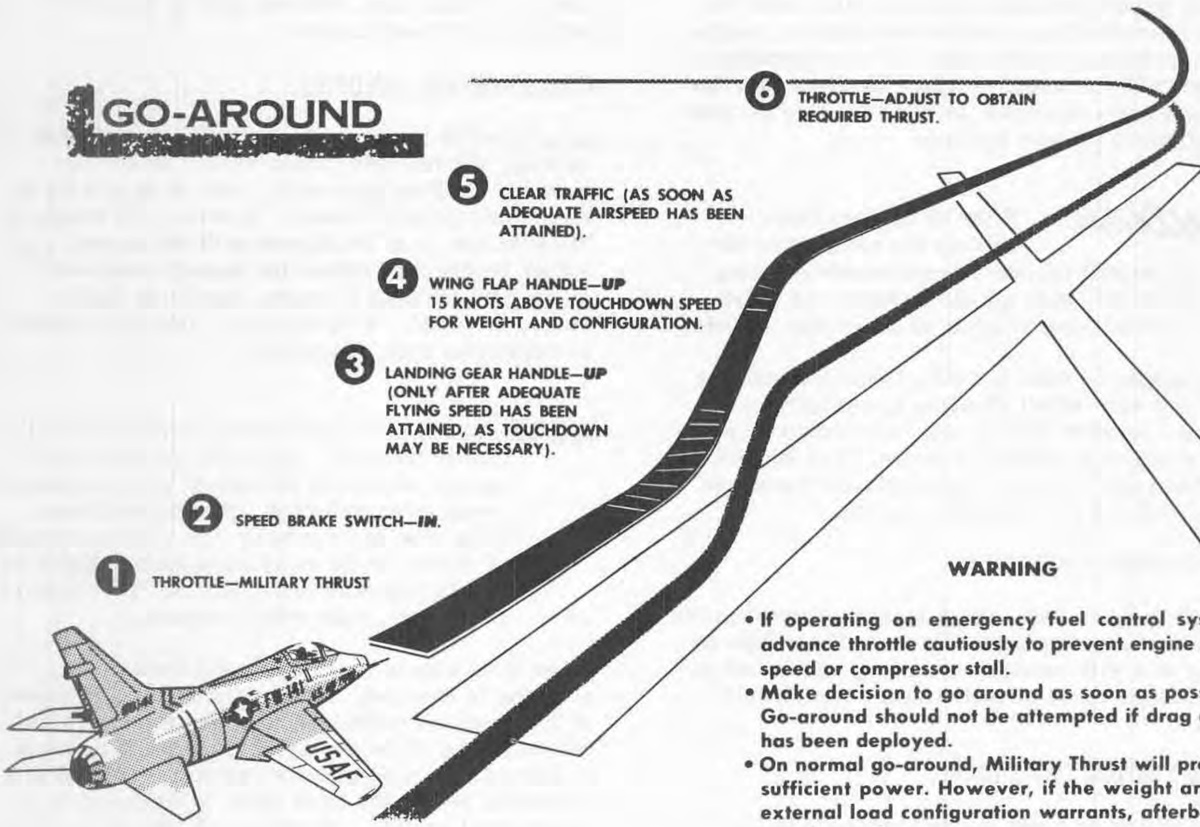
Caution If rudder pedals are displaced from neutral, and nose wheels are centered when nose wheel steering button is depressed to engage steering, nose wheel assembly may or may not align with the pedals.

- Jettison drag chute when taxiing in cross winds greater than 15 knots, to prevent collapsing and dragging chute where exhaust may burn the shroud lines.

TOUCH-AND-GO LANDING.

Touch-and-go landings may be practiced when authorized using the procedures outlined for a normal landing followed by a go-around. Care must be used during touch-and-go landings as a significant element of danger exists because of the procedure which must be performed on the runway or in close proximity to the ground.

NOTE Touch-and-go landing should not be practiced with less than 1000 pounds of fuel reserve.



WARNING

- If operating on emergency fuel control system, advance throttle cautiously to prevent engine overspeed or compressor stall.
- Make decision to go around as soon as possible. Go-around should not be attempted if drag chute has been deployed.
- On normal go-around, Military Thrust will provide sufficient power. However, if the weight and/or external load configuration warrants, afterburner may be used.
- If afterburner is selected during go-around and light is not received, considerably less than Military Thrust will be available. Return throttle inboard immediately to close afterburner nozzle and regain Military Thrust.

NOTE

During go-around in Military Thrust, approximately 250 pounds of fuel will be required. If afterburner is used, approximately 300 pounds of fuel will be required.

F-100D-1-00-31C

Figure 2-9

For touch-and-go landings, proceed as follows:

1. Normal touchdown.
2. Throttle - Military Thrust.
3. Speed brake - IN.
4. Wing flap handle - INTERMEDIATE.
5. Trim.

   Trim airplane for approximate take-off attitude with the stick grip trim switch.

6. Nose rotation.

   At computed nose rotation speed for the gross weight and configuration, begin to slowly rotate the airplane at such a rate that the airplane will assume the pitch angle required for lift-off at the recommended take-off speed.

Warning Make certain proper airspeed has been attained before rotating the airplane to take-off attitude. Care must be taken to ensure that the airplane is not rotated to an excessively nose-high attitude. (In case of overrotation, allow the airplane to settle back to the runway and assume the proper take-off attitude.)

7. Take-off.

   Maintain the take-off attitude after breaking ground until sufficient airspeed and altitude is attained to prevent settling back onto the runway.

8. Landing gear handle - UP.

9. Wing flap handle - UP.

   Increase pitch angle during flap retraction, to prevent settling.

GO-AROUND.

For making a go-around, see figure 2-9 for complete procedure.

AFTER LANDING.

CAUTION

Do not make sharp turns during taxiing with the drag chute deployed, because the chute will collapse and be damaged.

F-100D-1-0-58

Caution Do not stop during taxiing, or the nylon riser will be severely damaged by exhaust heat. Use extreme care when taxiing for long distances with drag chute deployed, to prevent it from dragging on the ground or touching the hot exhaust nozzle area.

1. IFF and navigation aids - OFF.

   Turn IFF off as soon after landing as possible. This will eliminate signals from taxiing or parked airplanes which would otherwise block the controller's scope and interfere with the control of air-borne airplanes.

2. Antiskid switch - OFF.

   Before entering parking area, place antiskid switch OFF.

3. Canopy - As desired.

4. Drag chute - Jettison.

   To obtain the best drag chute service life, it is recommended that the drag chute be jettisoned immediately after taxiing off the runway onto the taxiway at the lowest possible taxi speed with the drag chute still inflated.

5. Special store unlock handle - LOCK, if unlocked.

6. Pitot heat - OFF.

7. Parking area.

   After parking the airplane but before shutdown, perform a postflight check with the crew chief, if required.

NOTE T.O. 1F-100A-6 requires the crew chief to perform certain airplane checks while the engine is operating.

ENGINE SHUTDOWN.

The engine must be operated for 5 minutes below 85% rpm before shutdown, to stabilize engine temperatures (Taxi time below 85% rpm may be included.) When the engine has been operated above 85% rpm for periods exceeding one minute during the last 5 minutes before shutdown, it must be operated at IDLE for 5 minutes. At parking area, proceed as follows:

1. Wheel brakes - On.

2. Stand-by inverter - On.

3. Throttle - 70% rpm for 30 seconds.

   A scavenging run just before shutdown is necessary to ensure that oil in the sumps has been returned to the oil tank.

4. Speed brake switch - As desired.

5. Throttle - OFF.

   Make sure throttle is moved fully aft and then inboard to OFF.

Caution [F] When the throttle in the rear cockpit is moved to OFF, it should be moved inboard to prevent damage to the throttle release solenoid in the front cockpit. (The rear throttle should not be in the outboard ignition range over 30 seconds.)

6. Engine master switch - OFF.

Caution To prevent damage to the fuel system, make sure throttle is at OFF before moving engine master switch to OFF.

7. Stand-by inverter - OFF.

8. Battery switch - OFF.

NOTE The engine master switch must be turned off before the battery switch, so that power is available to close the fuel shutoff valve.

- Check that engine decelerates freely, and listen for any unusual engine noises during shutdown.

9. Control stick - Rotate.

   Immediately after engine has stopped turning, check that areas around control surfaces are clear; then rotate stick to bleed off flight control hydraulic system pressure.

10. Landing gear doors - Open.

    Pull landing gear emergency lowering handle to open landing gear wheel well doors.

Warning Make sure ground personnel are clear of door area before pulling emergency lowering handle.

RAM-AIR TURBINE AUTOMATIC STARTING SYSTEM TEST.

During engine shutdown on the last flight of the day, an operational check of the ram-air turbine-driven flight control emergency hydraulic pump should be made. Have ground crew member depress and hold the ram-air turbine test button in. (The button is flush-mounted on the left side of the fuselage, above the wing.)

NOTE When engine speed drops to about 46% to 34% rpm, the ram-air turbine door opens and the pump starts. The emergency pump lever in the cockpit moves forward automatically to the ON position.

After the ground crew member has determined that operation is satisfactory, he will signal the pilot to place the emergency hydraulic pump lever to OFF.

BEFORE LEAVING AIRPLANE.

Make following checks before leaving airplane:

1. Wheel chocks - In place.

2. Electrical switches - OFF.

   All electrical switches off, except ac and dc generator switches.

3. Seat handgrips - Check.

   Check that seat handgrips are full down and latches, by applying a moderate downward force on each handgrip.

4. Safety pins - Installed.

   Install ground safety pin through right handgrip of ejection seat, and in canopy alternate emergency jettison handle.

5. Form 781 - Complete.

Caution Make appropriate entries in the Form 781 covering any limits in the Flight Manual that have been exceeded during the flight. Entries must also be made if the airplane has been operated in visible moisture for extended periods of time, whenever unusual strains are encountered during air refueling, if any engine compressor stalls were encountered, or when, in the pilot's judgment, the airplane has been exposed to unusual or excessive operations such as hard landings, refueling drouges has contacted the canopy, excessive braking action during aborted take-offs, long and fast landings, and long taxi runs at high speeds, etc.

TRANSFER OF FUEL FROM PARTIALLY FULL UNBAFFLED 450-GALLON DROP TANKS.

If unbaffled 450-gallon drop tanks are installed, they must be full or empty for take-off. If they have not been serviced, they will contain a partial fuel load as a result of single-point refueling or dribbling of internal system fuel, or both. This partial fuel load must be transferred out of the drop tanks before take-off. To transfer this fuel in the least possible time and without unnecessarily depleting the internal system fuel, do the following:

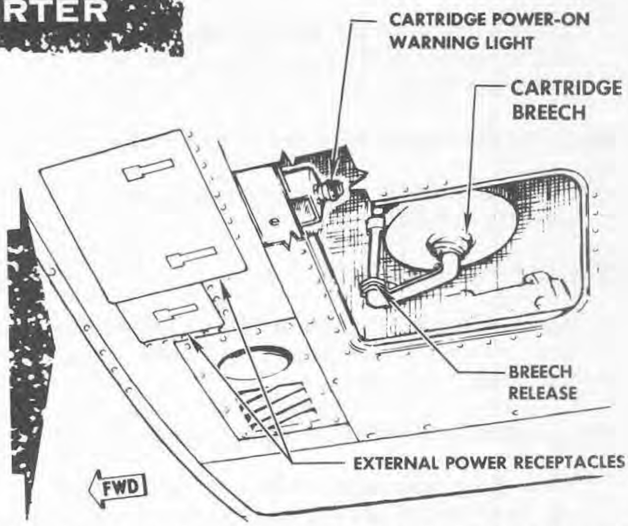
NOTE If internal fuel system has been "topped off" before flight, or advancing the throttle in the start area will jeopardize personnel or equipment, or if extended taxi time will be required, do steps 1 through 7 during taxiing and before beginning the preflight airplane check.

LOADING CARTRIDGE STARTER

1. Remove access door and check cartridge power-on warning light out.
2. Remove cartridge breech from starter by squeezing breech release and rotating breech clockwise.

WARNING

- Do not remove cartridge breech from starter if a start has been made within 5 minutes, as injury could occur.
- Asbestos gloves and a plastic face shield should be worn when a cartridge that has been recently fired is being removed.

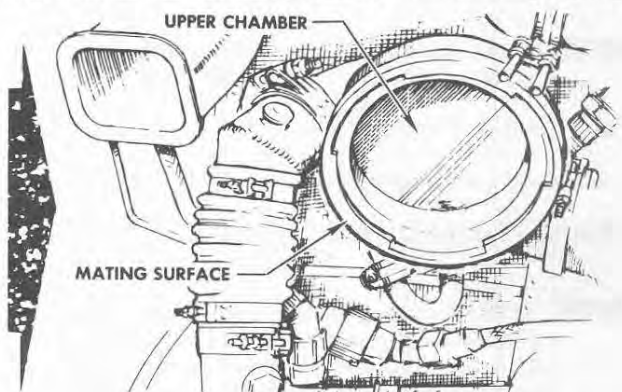


3. Clean deposits from upper cartridge chamber and around mating surface of chamber.
4. Remove cartridge from breech and clean inside of breech.

NOTE

Clean and inspect the dome of breech cap to ensure good electrical contact with grounding clip of cartridge.

5. Remove cartridge from can.



6. Remove safety clip from grounding clip. Bend grounding clip up about 30 degrees and insert into breech. Force cartridge against surface of breech cap dome and rotate about 90 degrees.
7. Test cartridge power-on warning light; then check OUT.

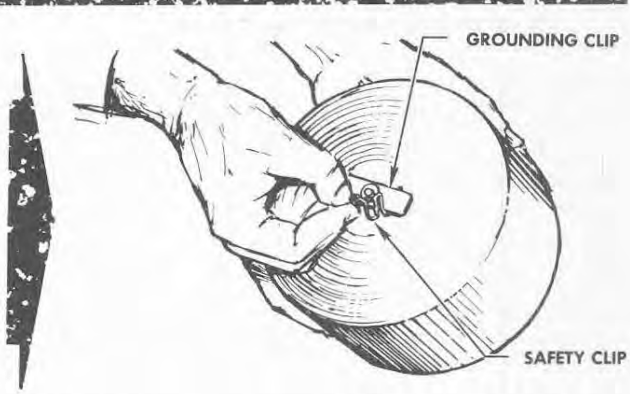
WARNING

During loading of the starter, the engine master and battery switches must be off and external electrical power disconnected.

NOTE

The starter exhaust port area must be clear of fuel, oil, and foreign objects.

8. Install breech into breech cap, engage locking threads, squeeze breech release, rotate breech counterclockwise until seated, and allow breech to seat.



9. During start, have fire guard stand by just forward of the horizontal stabilizer, about 6 feet out from the left side.

F-100D-1-A40-2A

Figure 2-10

1. Drop tank fuel selector switch - Check at INTERM.

2. AC generator switch - OFF.

   Aft and intermediate tank transfer pumps will be inoperative, preventing transfer of fuel from these tanks to the forward tank.

3. Stand-by instrument inverter switch - ON.

   This will provide ac power to the fuel quantity indicating system.

4. Throttle - Advance.

   Advance throttle to obtain 75% to 80% engine rpm. This will accelerate transfer of drop tank fuel.

5. Drop tank empty indicator light - Check.

   When drop tank empty indicator light comes on, the 450-gallon drop tanks are empty. Then proceed to step 6.

NOTE Cross-check 450-gallon drop tank fuel quantity gages for empty indication.

6. AC generator switch - ON.

7. Stand-by instrument inverter switch - OFF.

STRANGE-FIELD PROCEDURE.

NOTE At bases where ground personnel are not completely familiar with your airplane, make sure that postflight and preflight inspections are accomplished in accordance with the Technical Manual of Inspection Requirements, T.O. 1F-100A-6 or 1F-100D-6WC-1PRPO and -1PO.

LOADING CARTRIDGE STARTER.

See figure 2-10 for the procedure for loading the cartridge starter.

BLEEDING WING FLAP ACCUMULATOR.

The wing flap accumulator is serviced from the top of the airplane, aft of the ram-air turbine door. To bleed wing flap accumulator pressure, proceed as follows:

1. Remove access door F71A for F-100D Airplanes, or F58A for F-100F Airplanes.

2. Hold flap accumulator dump valve open until hydraulic pressure is discharged.

3. Indicated pressure on accumulator gage should be 1050 (±50) psi at 70° F. If service is not needed, install access door.

BLEEDING RAM-AIR TURBINE ACCUMULATOR.

The ram-air turbine accumulator is serviced from the left side of the fuselage. To bleed ram-air turbine accumulator pressure, proceed as follows:

1. Remove access door F68 for F-100D Airplanes or F53 for F-100F Airplanes.

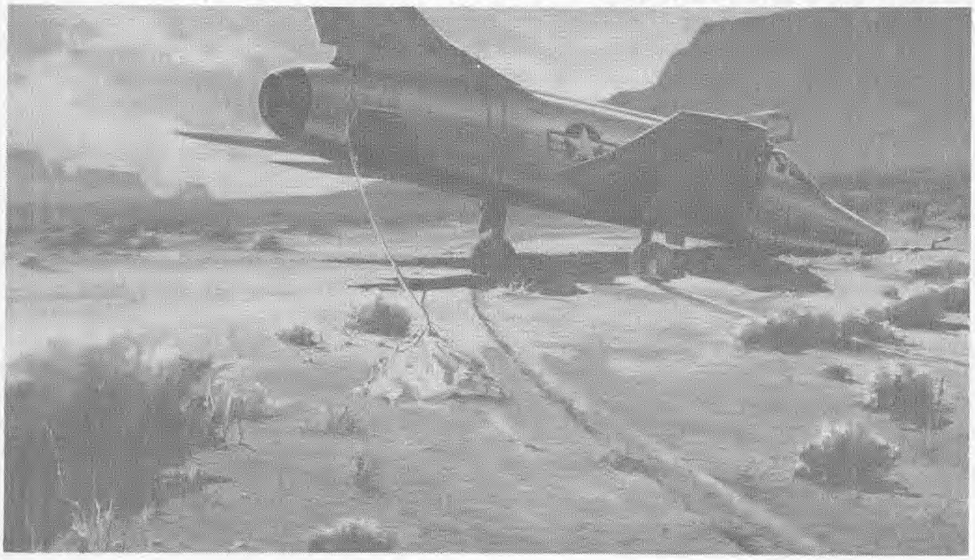
2. Hold ram-air turbine door accumulator dump valve open until hydraulic pressure is discharged.

3. Indicated pressure on accumulator gage should be 1800 (±50) psi at 70° F. If service is not needed, install access door.

ABBREVIATED CHECKLIST.

Your abbreviated checklist is in T.O. 1F-100D(I)-1CL-1.

EMERGENCY PROCEDURES



F-100D-1-0-85

section III

TABLE OF CONTENTS

INTRODUCTION.

The procedures contained in this section are considered the best for coping with the various emergencies that may be encountered during operation of this airplane. Only single failures are considered; however, each failure presents a different problem. The procedures presented in **BOLDFACE TYPE** are the procedures that must be committed to memory, as the time factor in an emergency of this type will not allow use of a check list except as a cleanup reference. A pilot with a thorough knowledge of these procedures will be better able to cope with the problems encountered. Even though the procedures are considered the best possible, the pilot must use sound judgment when confronted with multiple emergencies, adverse weather, terrain clearance, etc.

CODING.

To simplify coding within procedures, the following coding preceding the text to which it applies, is used:

[D] F-100D Airplanes

[F] F-100F Airplanes

ENGINE FAILURE.

Failures of jet engines may be the result of improper fuel scheduling, caused by a malfunction of the fuel control system or incorrect operating techniques. Information on this type of failure is given in "Engine Fuel System Failure" in this section. Engine instruments often provide advance warning of failures before the engine actually flames out. If engine failure is due to a malfunction of the fuel control system or improper operating technique, an air start can usually be made to restore engine operation, provided time and altitude permit. In case of obvious mechanical failure within the engine, air starts should not be attempted. When a frozen engine is suspected because of zero rpm indication but no obvious mechanical failure within the engine, air starts should not be attempted. When a frozen engine is suspected because of zero rpm indication but no obvious mechanical failure has occurred, normal utility hydraulic pressure and engine oil pressure will indicate the engine is rotating and the accessory drive is operating, and an air start should be attempted. If there is no indication of utility pressure or of oil pressure, an air start probably cannot be accomplished.

ENGINE FAILURE DURING TAKE-OFF.

If engine failure occurs on take-off before the landing gear handle is raised and a barrier engagement is feasible, abort. If barrier engagement is not feasible or the landing gear handle has been raised, eject.

ENGINE FAILURE DURING FLIGHT.

If engine failure occurs during flight, and an immediate restart is not feasible, proceed as follows:

1. Throttle - OFF.

NOTE The ac generator is taken "off the line" automatically when the throttle is moved to OFF. Power can be restored to the 3-phase instrument bus by moving the standby instrument inverter switch to ON.

2. Flight control emergency hydraulic pump lever (RAT) - ON.

   The emergency pump must be started to power flight control system No. 2 if the engine is frozen. If the engine is windmilling, the engine-driven pump output is sufficient for control during air start procedures. If an emergency landing is necessary, the emergency pump must be engaged during landing approach. If the engine is frozen, the emergency pump is the only source of flight control hydraulic power; however, its output is sufficient to provide adequate control action for making an emergency landing. Because of the reduced total output, control movement must be kept to a minimum, whether the engine is windmilling or frozen, during operation on the emergency pump.

NOTE Although the emergency pump is started automatically when engine rpm drops to about 40% rpm, the emergency hydraulic pump lever should be actuated upon engine failure (engine frozen).

3. Autopilot emergency disconnect lever - Depress.
4. Glide - 220 knots IAS.

   Refer to "Maximum Glide" in this section.

5. Nonessential electrical equipment - Off.

   Turn off all nonessential electrical equipment to reduce battery load.

Caution Do not turn engine master switch OFF if an air start is to be made, because the fuel shutoff valve will close and may remain closed, even if switch is returned to ON. In this case, an air start will be impossible.

- At engine speeds below about 40% rpm, dc generator output is not available, and the battery becomes the only source of electrical power. Usable battery power is available for about 6 to 22 minutes.

6. Attempt air start.

   (Refer to "Engine Air Start" in this section.) If air start is not successful, and a suitable landing area is within gliding distance, follow procedures listed under "Forced Landing (Dead Engine)" in this section. If a suitable landing area is not within gliding range, eject.

Engine Failure During Flight at Low Altitude.

If engine failure occurs during flight at low altitude and with sufficient airspeed available, the airplane should be pulled up (zoom-up) to exchange airspeed for an increase in altitude. This will allow more time for accomplishing subsequent emergency procedures (air start, establishing forced landing pattern, ejection, etc).

NOTE The point at which climb should be terminated will depend on whether the decision is to eject or attempt an air start, establish a forced landing pattern, etc. In any event, it is recommended that air start be attempted immediately upon detection of engine flame-out and during the zoom-up. If the decision is to eject, the airplane should be allowed to climb as far as possible. For this condition, the optimum zoom-up technique is to pull the airplane up with wings level until light buffet is encountered. Hold this condition until the speed drops to 140 knots IAS or the rate of climb reaches zero, then eject. If the decision is to continue attempting air starts, the climb should be terminated before dropping below best glide speed, in order to obtain maximum glide distance and maintain adequate engine windmilling rpm for air start.

Maximum altitude can be achieved by jettisoning external loads before zoom-up. The further up the climbing flight path that external loads are jettisoned, the less additional altitude will be gained. However, when external loads are jettisoned, consideration must be given to such factors as sufficient airspeed to allow time for pilot reaction and jettisoning external loads; the terrain where external loads will fall (populated areas, friendly or enemy territory, etc); the type of stores to be jettisoned (special store, conventional bombs, full or empty drop tanks, etc); controllability of the airplane if one or more stores fail to release resulting in a dangerous asymmetrical condition at low altitude. Also of prime importance are the external load release limits outlined in Section V. These limits should be observed to prevent damage to the airplane. It is impossible to predict the extent of damage which may occur if the external loads are released outside the established limits because of the number of factors involved. Depending on the emergency, it may be advisable to jettison the external loads outside the release limits and risk some damage to the airplane in order to increase the probability of being able to accomplish subsequent emergency procedures. In any event, the decision to jettison or retain external loads must be made by the pilot on the basis of his evaluation of these factors and conditions existing at the time of the emergency.

ENGINE AIR START.

Immediate Restart.

At the first indication of a flame-out, attempt to catch the fire. Restarts are generally easier to accomplish while the engine is still hot and contains vapors. Immediate restarts should be attempted at all altitudes but are of prime importance during low-altitude flame-out.

1. THROTTLE—CHECK INBOARD.

2. AIR START SWITCH—ON.

3. FUEL REGULATOR SELECTOR SWITCH—EMER.

Adjust throttle setting to match actual engine rpm as closely as possible. Do not make transfer at or near full throttle, because the emergency fuel flow may exceed engine requirements and produce compressor stall or engine overtemperature. This should be done first, in an attempt to restore engine operation, unless an obvious mechanical failure has occurred which emergency fuel flow might further aggravate or fail to correct.

Caution If the throttle setting and actual engine rpm are seriously mismatched, flame-out, compressor stall, or overtemperature may occur during transfer to the emergency fuel control system. Be prepared to reduce or advance power immediately, as required.

Air Start.

Successful air starts can be made at altitudes below 40,000 feet within a wide range of airspeeds. When starts are made above 30,000 feet on the normal fuel control system, minor compressor stalls may occur when the engine speed is about 55% to 60% rpm. However, if the engine is accelerating, it is recommended that the start be continued. If severe stalls are encountered when the normal fuel control system is used, the engine should be shut down and the start be made on the emergency fuel control system. See figure 3-1 for airspeed-altitude ranges for air starts. The recommended air start procedure is as follows:

NOTE Initial procedures essential to setting up an air start will have to be accomplished as a result of engine failure. (Refer to "Engine Failure During Flight.")

- Air starts should be accomplished carefully and deliberately, allowing sufficient time for engine to start.

1. Throttle - OFF.

2. Air start switch - ON.

Move air start switch to ON. (Ignition is not available until the throttle is moved outboard and forward from OFF.)

NOTE If during an air start the ignition-on and dc generator caution lights do not come on, the air start switch may be defective. Start attempt should then be made using the starter and ignition button to provide engine ignition. However, if this button is used, the dc generator switch should be turned OFF during ignition to prevent possible premature discharge of the battery.

- All nonessential electrical equipment should be turned off to conserve battery power after the flame-out occurs. DC generator power (which controls the secondary and tertiary bus output) is not available at engine speeds below 40% rpm. When the air start switch is ON, the dc generator is cut out of the electrical system. This prevents the battery from powering the generator at low engine rpm if the reverse-current relay

AIRSPEED AND ALTITUDE FOR ENGINE AIR START

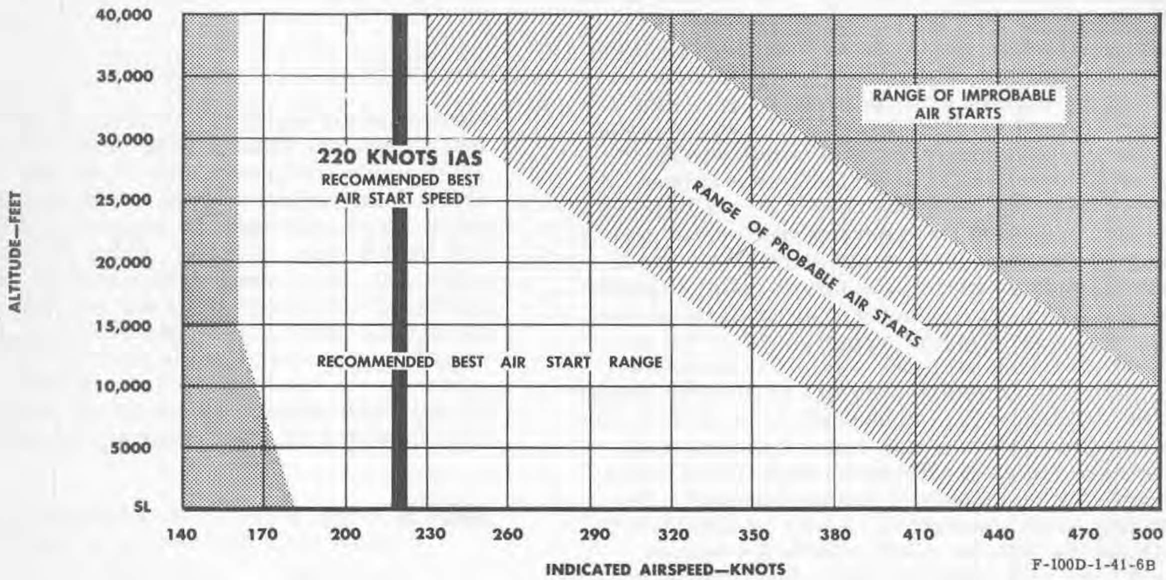


Figure 3-1

operation is faulty. DC generator output is restored when the air start switch is returned to OFF.

- AN/ARC-34 communication equipment is powered by the primary bus and is operative when the dc generator or battery is on.
- The stand-by instrument inverter is engaged automatically when the air start switch is ON, to power the 3-phase instrument bus.

3. Throttle - IDLE.

As soon as possible after these conditions are met, move throttle to IDLE, if start attempt is made on the normal fuel control system. Fuel flow should be about 640 to 850 pounds per hour. Slowly advance throttle to point where positive thrust is indicated by a pronounced increase in fuel flow and a corresponding increase in exhaust temperature. Then adjust throttle to desired rpm. If start attempt is to be made on emergency fuel control system, move fuel regulator selector switch to EMER and advance throttle to IDLE. When engine rpm reaches 60%, advance throttle slowly. This procedure is recommended at altitudes above 30,000 feet to prevent compressor stalls and engine overtemperature.

Caution If the emergency fuel control system has been used during an air start, retard the throttle to IDLE or 80%, whichever is lower, before returning to the normal fuel control. Transfer from the emergency to the normal fuel control at higher rpm settings can produce high fuel pressure surges that could repture certain types of fuel-cooled oil coolers.

NOTE Light-up is indicated by the rpm following the throttle, and a slow rise in exhaust temperature.

- Successful air starts can be made with an undamaged engine if the airspeed-altitude combinations in figure 3-1 are used. Actual engine windmilling speeds will vary with airspeed and altitude. At the recommended 220 IAS for air starts, the engine will windmill between 12% and 40% with the higher speed being noted at high altitude.

4. Air start switch - OFF.

   Return air start switch to OFF to de-energize ignition system and restore normal generator operation as soon as air start is completed (engine at flight idle rpm).

Caution Because the igniter units of the ignition system can be damaged if operated continuously for more than 5 minutes, they should not be energized any longer than is necessary to complete a start.

5. Flight control emergency hydraulic pump lever (RAT) - OFF.

IF ENGINE FAILS TO START.

1. Start attempt - Repeat. (Use emergency system if first attempt was made on the normal fuel system.)

   Retard throttle to OFF if there is no indication of light-up within 20 seconds after throttle has been moved to IDLE.

2. Air start - Unsuccessful.

   a. Throttle - OFF.

   b. Air start switch - OFF.

3. Execute forced landing (dead engine) procedure, or eject.

   If terrain is unknown, or unsuitable for forced landing, eject.

MAXIMUM GLIDE.

For maximum glide distances with a windmilling or frozen engine, the best gliding speed is 220 knots IAS for a clean airplane, with landing gear and flaps up and speed brake in. (See figure 3-2.) When speed is maintained at 220 knots IAS, the glide ratio of the clean airplane is about 11 to 1. Thus, for every 10,000 feet of sink, the airplane glides about 18 nautical miles. The glide ratio and glide distances of the airplane without drop tanks but with landing gear down are about half those obtainable with the gear up.

EJECTION VS FORCED LANDING.

Normally, ejection is the best course of action with a windmilling or frozen engine, or failure of both the No. 1 and No. 2 flight control hydraulic systems. However, because of the many variables encountered, the final decision to attempt a flame-out landing or to eject must remain with the pilot. It is impossible to establish a predetermined set of rules and instructions which would provide a ready-made decision applicable to all emergencies of this nature. The basic conditions listed, combined with the pilot's analysis of the condition of the airplane, type of emergency, and his proficiency are of prime importance in determining whether to attempt a flame-out landing, or to eject. These variables make a quick and accurate decision difficult. If the decision is made to eject, before ejection, if possible, attempt to turn the airplane toward an area where injury or damage to persons or property on the ground or water is least likely to occur.

Before a decision is made to attempt a flame-out landing, the following basic conditions should exist.

a. Flame-out landings should only be attempted by pilots who have satisfactorily completed simulated flame-out approaches in this airplane.

b. Flame-out landings should only be attempted on a prepared or designated suitable surface of at least 8000 feet.

c. Approaches to the runway should be clear and should not present a problem for a flame-out approach.

NOTE No attempt should be made to land flamed-out at any field with approaches over heavily populated areas, if a suitable area is available to abandon the airplane. If possible, before ejection, attempt to turn the airplane toward an area where injury or damage to persons or property on the ground or water is least likely to occur.

d. Weather and terrain conditions must be favorable. Cloud cover, ceiling, visibility, turbulence, surface wind, etc, must not impede in any manner the establishment of a proper flame-out landing pattern.

NOTE Night flame-out landings, or flame-out landings under poor lighting conditions such as at dusk or dawn, should not be contemplated, regardless of weather or field lighting.

e. Flame-out landings should only be attempted when either a satisfactory "High Key" or "Low Key" position can be achieved.

f. If at any time during the flame-out approach, conditions do not appear ideal for successful completion of the landing, ejection should be accomplished. EJECT no later than the "Low Key" altitude.

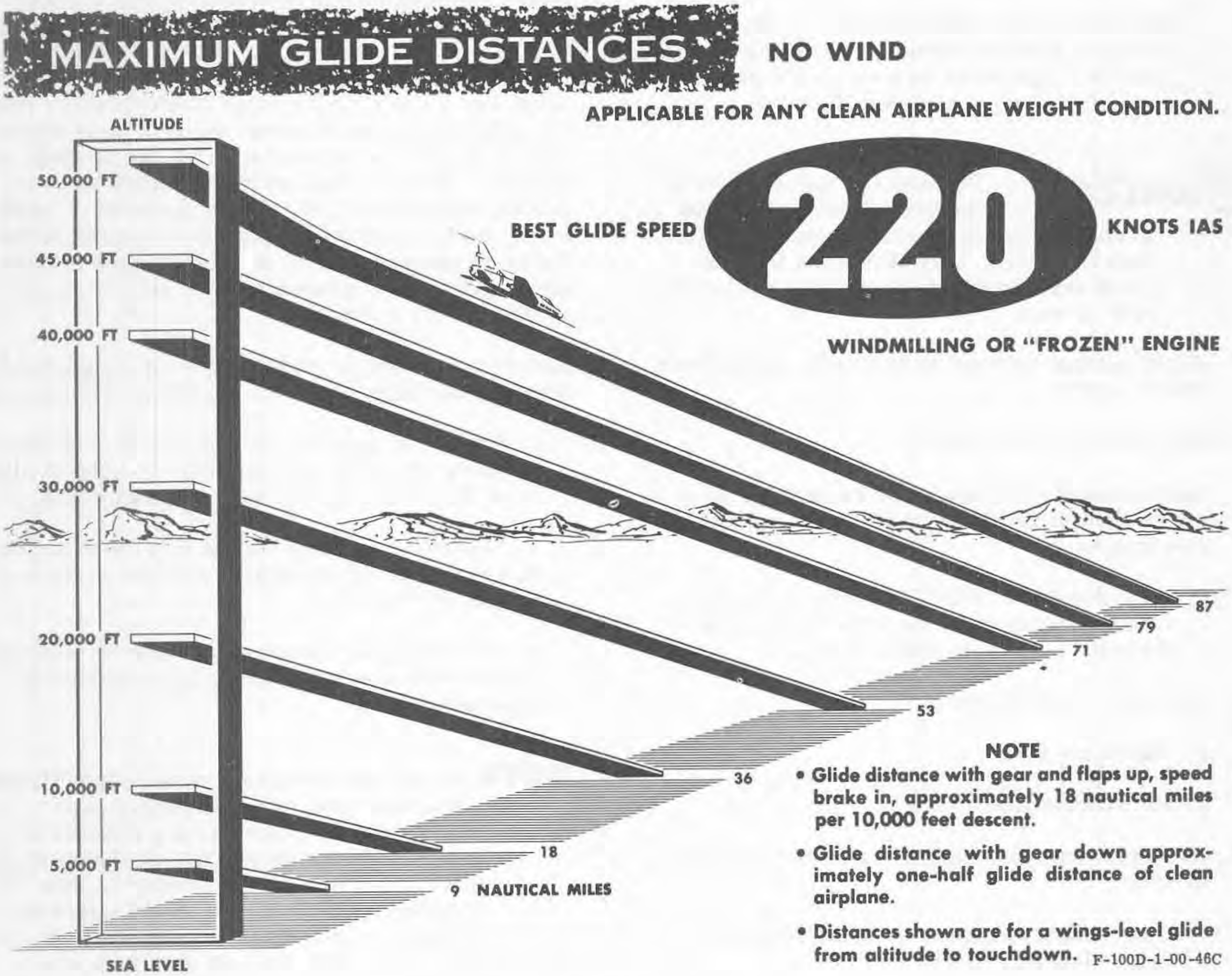


Figure 3-2

AIR START ATTEMPTS DURING FORCED-LANDING PATTERN.

It is suspected that the distraction resulting from attempting air starts after the "High Key" point was reached has been a contributing factor in some unsuccessful forced landings. It would be misleading to infer that air start attempts should be abandoned at any specific time. Regaining power must be given a high priority in view of the hazards associated with forced landings. However, the decision to abandon air start attempts and concentrate on the forced landing depends on the circumstances of the emergency. If several air starts have been attempted or the nature of the flame-out indicates air start attempts would be futile, then obviously no further air start attempts would be futile, then obviously no further air start attempts should be made, even long before the "High Key" point is reached. If flame-out occurs near the "High Key" point, air start attempts should be made only if they will not dangerously distract you from executing the forced landing. In view of the preceding, observe the following instructions:

a. In the event of a flame-out, attempt to complete all air start efforts before the "High Key" is reached, so that full attention may be devoted to accomplishing a successful forced landing.

b. If the circumstances of the flame-out have prevented conclusive air start attempts before the "High Key," further air start attempts may be made, but primary attention should be devoted to proper execution of the forced landing.

c. Do not attempt air starts after the "Low Key" is reached.

NOTE This does not prohibit air start attempts when flame-out occurs below the "Low Key" point altitude.

d. These instructions in no way alter the requirements outlined under "Ejection VS Forced Landing" in this section.

FORCED LANDING (DEAD ENGINE).

For forced landing procedures, see figure 3-3 and refer to "Ejection VS Forced Landing" and "Air Start Attempts During Forced-landing Pattern" in this section.

NOTE At engine speeds below about 40% rpm, dc generator power is not available. Output of the ac generator is not available after the throttle has been moved to OFF.

- To prevent loss of the drag chute or slowing of the airplane to below landing speed, the drag chute should not be deployed in flight, except when there are specific instructions to do so.

PRACTICE FORCED LANDING.

Because the engine continues to produce thrust with the throttle at IDLE, the speed brake must be used to simulate the drag of a windmilling engine when forced landings are being practiced. The drag of the speed brake, however, is greater than that of a windmilling engine and a certain amount of thrust is needed to accurately simulate a flame-out condition. Maintaining an engine rpm of 80% with the speed brake out produces flight conditions very similar to those encountered with the engine windmilling when gear and flaps are up and speed brake in. The speed brake should not be used for actual forced landings unless it is necessary to prevent overshooting. When forced landings are being practiced at 80% rpm, the effect of the speed brake on the gliding airplane can be closely simulated by retarding the throttle from 80% rpm to IDLE.

NOTE It is recommended that the applicable forced landing techniques and procedures (figure 3-3) should be followed during practice forced landings.

FIRE OR EXPLOSION.

In case of a fire or explosion, the procedures given in the following paragraphs should be accomplished. However, an important factor in determining the course of action to be taken depends on the effect the fire or explosion may have had on the flight control system. Since a flight control system failure could occur as a result of the fire or explosion, a careful check of the flight control system should be made to determine if a safe landing can be made.

Warning Do not re-engage afterburner if fire, explosion, or unusual thump, vibration, or noise was encountered during afterburner operation.

ENGINE FIRE DURING STARTING.

If a fire- or overheat-warning light comes on, or if there are other indications of fire during engine start, proceed as follows:

1. THROTTLE—OFF.

If fire continues, proceed with step 2.

NOTE If fire- or overheat-warning lights go out, or fire indications cease, clear the engine by pressing the starter and ignition button, and motor the engine (above 12% rpm for 30 seconds).

2. STARTER AND IGNITION STOP BUTTON—PRESS.
3. ENGINE MASTER SWITCH—OFF.
4. BATTERY SWITCH—OFF.
5. Leave airplane.

FIRE DURING TAKE-OFF.

Illumination of the fire- or overheat-warning light indicates a fire or overheat condition in the engine compartment or aft section. If either light comes on during take-off, immediate action is required. The exact procedure to follow varies with each set of circumstances and depends upon altitude, airspeed, length of runway, and overrun remaining, location of populated areas, etc. The decisions to be made depend upon these factors. The following procedures are recommended as a guide in making a decision.

Fire During Ground Roll.

If the fire- or overheat-warning light comes on during ground roll, and sufficient runway or overrun is available, abort the take-off. Refer to abort procedures under "Take-off or Landing Emergencies" in this section.

Fire After Lift-off.

If the fire- or overheat-warning light comes on after the airplane is air-borne and it is not feasible to abort the take-off, the following is recommended:

1. EXTERNAL LOAD—JETTISON.

FORCED LANDING (TYPICAL)

(WINDMILLING OR "FROZEN" ENGINE)

Speeds given are for any clean airplane weight condition.

NOTE

Refer to "Ejection VS Forced Landing" in this section.

WARNING

If terrain is unknown or unsuitable for forced landing, eject.

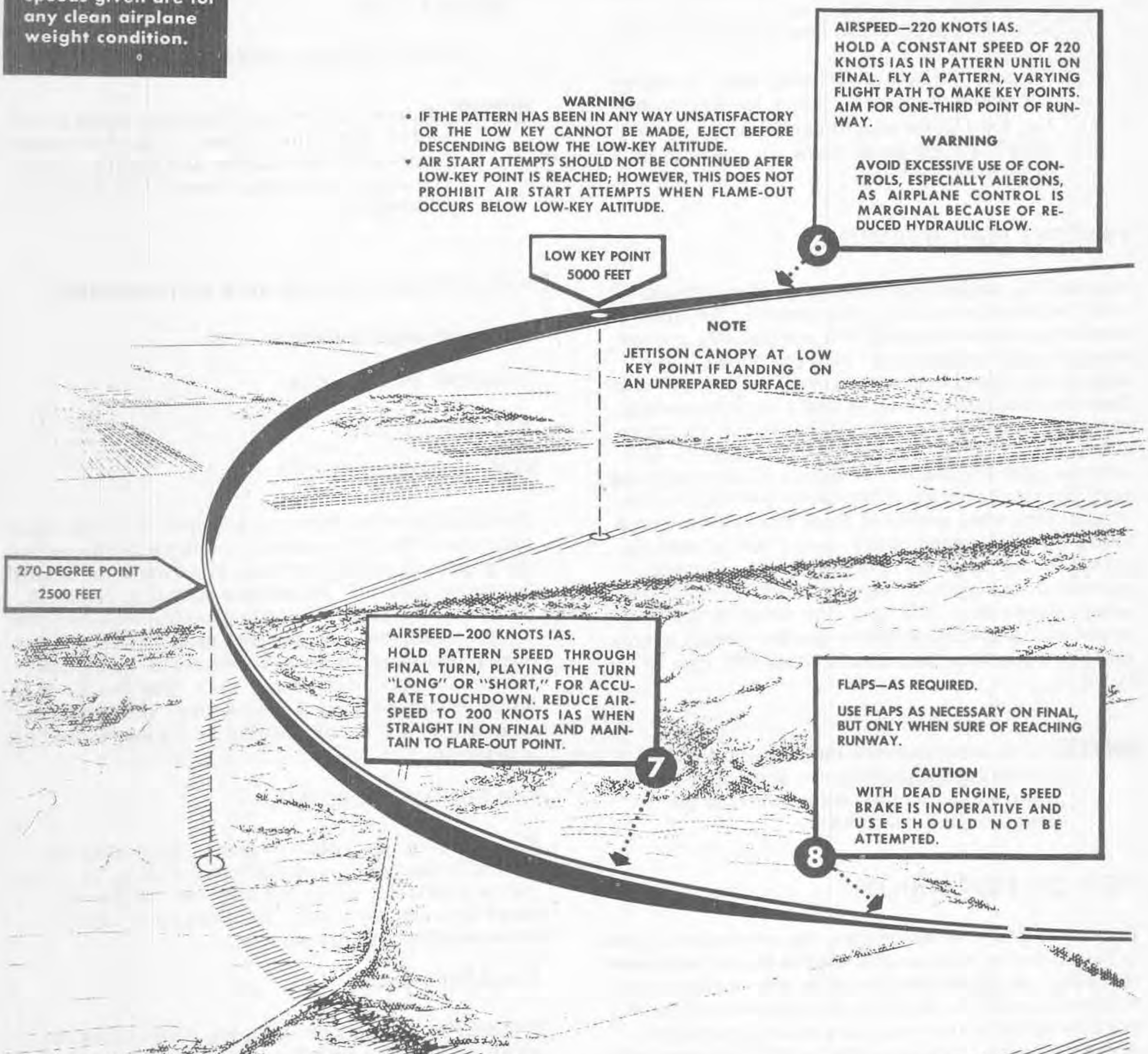
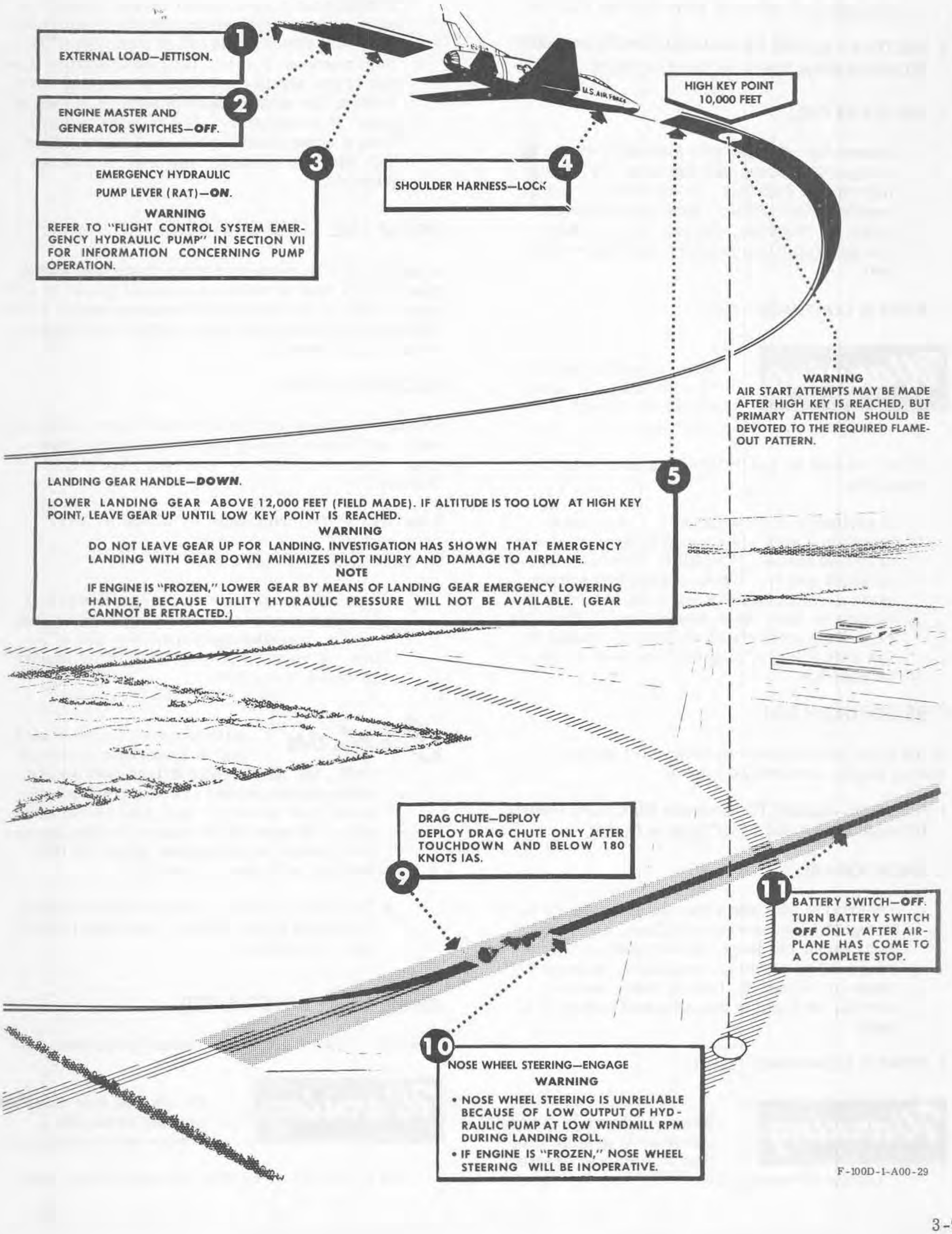


Figure 3-3



F-100D-1-A00-29

2. MAXIMUM CLIMB.

Maintain thrust used for take-off and begin immediate climb to a safe ejection altitude.

3. THROTTLE—ADJUST TO MINIMUM PRACTICAL THRUST TO MAINTAIN A SAFE EJECTION ALTITUDE.

4. CHECK FOR FIRE.

Determine whether a fire actually exists by a report from another airplane, abnormal instrument readings, or airplane or engine response to controls, explosion, unusual noise or vibration, fumes, heat, cockpit smoke or trailing smoke noted following a turn.

5. IF FIRE IS CONFIRMED—EJECT.

Warning When existence of fire is confirmed, prompt ejection will ensure greatest chance for survival.

6. If fire cannot be confirmed - Land as soon as possible.

If existence of fire cannot be confirmed, maintain a safe ejection altitude at minimum practical thrust. Establish controllability of airplane and try to obtain assistance from other aircraft in the area in determining existence of fire. If no assistance is available, reconfirm controllability before descent below safe ejection altitude, and land as soon as possible.

FIRE DURING FLIGHT.

If the fire- or overheat-warning light comes on during flight, proceed as follows:

1. THROTTLE—ADJUST TO MINIMUM PRACTICAL THRUST TO MAINTAIN A SAFE EJECTION ALTITUDE.

2. CHECK FOR FIRE.

Determine whether a fire actually exists by a report from another airplane, abnormal instrument readings, or airplane or engine response to controls, explosion, unusual noise or vibration, fumes, heat, cockpit smoke, or trailing smoke noted following a turn.

3. IF FIRE IS CONFIRMED—EJECT.

Warning When existence of fire is confirmed, prompt ejection will ensure greatest chance for survival.

4. If fire cannot be confirmed - Land as soon as possible.

If existence of fire cannot be confirmed, maintain a safe ejection altitude at minimum practical thrust. Establish controllability of airplane en route to nearest available base and try to obtain assistance from other aircraft in the area in determining existence of fire. If no assistance is available, reconfirm a controllability before descent below safe ejection altitude, and land as soon as possible.

ENGINE FIRE AFTER SHUTDOWN.

If engine fire is suspected after shutdown, check that battery switch is ON or external power is connected; then clear engine by motoring engine above 12% rpm for 30 seconds with throttle OFF and external air connected.

ELECTRICAL FIRE.

Circuit breakers and fuses protect most of the circuits and tend to isolate electrical fires. However, if an electrical fire occurs, proceed as follows:

1. BATTERY AND GENERATOR SWITCHES — OFF.

2. Land as soon as possible.

If a suitable air base is not available or if the mission cannot be aborted, turn on electrically operated equipment one unit at a time, in an attempt to determine or isolate the cause of the fire.

Caution With battery, ac generator, and dc generator switches OFF, the electrically driven fuel booster and transfer pumps are inoperative and about 1300 pounds of fuel will not be available. Without these pumps, engine operation cannot be maintained above 25,000 feet and a flame-out results.

- The battery switch must be ON to operate the speed brake, flaps, nose wheel steering, or antiskid.

WHEEL BRAKES OVERHEATED.

Refer to "Wheel Brake Operation" in Section VII.

Warning Do not taxi into crowded parking areas when brakes are overheated.

- If immediate cooling is impossible, warn all personnel to remain clear of the wheel areas because of the danger of possible explosion.

ELIMINATION OF SMOKE OR FUMES.

Warning The bleed-air emergency switch* should not be positioned in EMER OFF, except in an emergency, as this shuts off all compressor bleed air. However, if smoke or fumes impair safe operation during lift-off or at low altitude, the bleed-air emergency switch should be moved to EMER OFF until safe altitude is reached.

If smoke or fumes enter the cockpit, proceed as follows:

NOTE When it is necessary to depressurize, first descend to 25,000 feet or below, if conditions permit.

1. OXYGEN REGULATOR DILUTER LEVER—100%.
2. [D] Cockpit pressure selector switch - RAM AIR ON.
3. Pitot heat switch - OFF.
4. Windshield exterior air switch - OFF.
5. Emergency ram-air lever* - OPEN.

   The emergency ram-air lever permits selection of increasing amounts of ram air as the lever is moved from CLOSED to OPEN. This air is discharged through the cockpit dump valve. If the cockpit becomes unbearably hot, or cold, positioning the emergency ram-air lever at RAM PRESS closes the cockpit dump valve and considerably reduces the airflow through the cockpit while increasing cockpit pressure. Positioning the emergency ram-air lever at CLOSED and the cockpit pressure selector switch at OFF cuts off all ventilating air to the cockpit.

NOTE At low altitudes and high speeds (especially with high outside air temperatures), the emergency ram-air lever "open" position can introduce air of excessively high temperatures into the cockpit.

6. Windshield and canopy defrost air lever - Full DECREASE.

   If smoke does not clear up within 2 minutes, proceed with step 7.

7. Bleed-air emergency switch* - EMER OFF (if necessary).

Caution All systems using bleed air (air conditioning, pressurization, defrosting, and anti-icing) become inoperative when the bleed-air emergency switch* is at EMER OFF.

8. Land as soon as possible.

Warning If the smoke and fumes cannot be cleared and visibility is restricted to the point that safe flight cannot be maintained, it may become necessary to jettison the canopy so that a landing can be made.

- When the pressure selector switch is at OFF and the emergency ram-air lever is at CLOSED, make sure that 100% oxygen is being used. This is a no-ventilation condition.

SURVIVAL EQUIPMENT.

NOTE The following information is general and not intended as specific instructions. Because of the many differences in equipment, each crew member must determine application of different or omitted items.

The survival kit should be deployed only after the parachute has stabilized and altitude is below that requiring the use of supplemental oxygen. With the kit deployed, the rate of descent at touchdown is reduced. In addition to this reduced rate of descent, the crewmember is not encumbered with a heavy, bulky kit, thus reducing the possibility of landing injuries. Deploying the kit over water permits faster boarding of the raft after entering the water. During an overwater descent, time permitting, the raft and life preserver can be checked for proper inflation. If necessary, one or both items may be reinflated orally.

After a water landing, retrieve the raft, using the lanyard attached to the survival kit or seat pan. Board the raft after closing the canopy release safety clips and releasing one side of the seat pan. Adjust life preserver. (This may be accomplished before boarding the raft, depending on perference and boarding technique). Retrieve survival kit. Do not handle contents carelessly and risk losing equipment that is not properly secured.

*Some airplanes

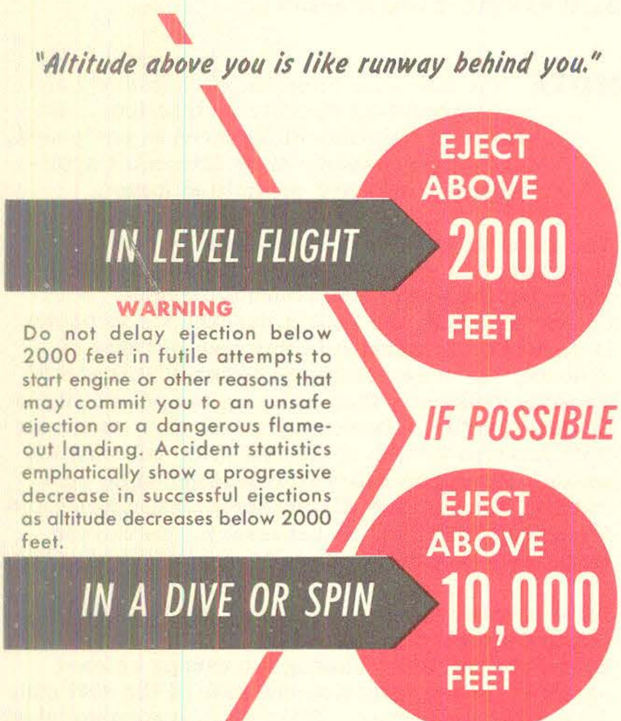
EJECTION.

If the decision has been made to abandon the airplane in flight, escape should be made with the ejection seat.

[F] Because of the tandem location of the seats, a time-delay system is installed which sequences the seat ejections so that the aft seat will always be fired before the front seat. This ensures that the pilot in the rear cockpit cannot be endangered by the rocket motor blast of the forward seat catapult. Initiation of ejection in the front seat fires the rear seat regardless of safety pins or armrest position. The 1/2-second delay is incorporated in the front seat sequence and applies whether the rear seat has or has not been previously fired.

The basic ejection procedure is shown in figure 3-4. Connection requirements for the zero-delay parachute lanyard are shown in figure 3-5.

NOTE Refer to "Ejection VS Forced Landing" in this section for additional information.



F-100D-1-0-100

The following information should be observed, when ejection must be accomplished:

a. Under level-flight conditions, eject at least 2000 feet above the terrain if possible.

b. Eject at the lowest practical airspeed at which level flight can be maintained.

c. If recovery from a spin has not been completed by the time the airplane passes through 10,000 feet above the terrain, or ejection must be accomplished during an uncontrollable dive, eject 10,000 feet above the terrain, if possible.

d. If the airplane is not controllable, ejection must be accomplished at whatever speed exists, as this offers the only opportunity of survival. At sea level, wind blast will exert minor forces on the body up to about 525 knots IAS, appreciable forces from about 525 to 600 knots IAS, and excessive forces above about 600 knots IAS. As altitude is increased, these speed ranges will be proportionately slightly lower.

e. The automatic safety belt must not be opened manually before ejection, regardless of altitude, for several reasons. If the automatic seat belt is opened manually, the automatic-opening feature of the parachute is eliminated and seat separation will be too rapid at high speeds.

NOTE Care must be taken to ensure that flight clothing, such as sleeves, will not catch and release the lap belt during separation.

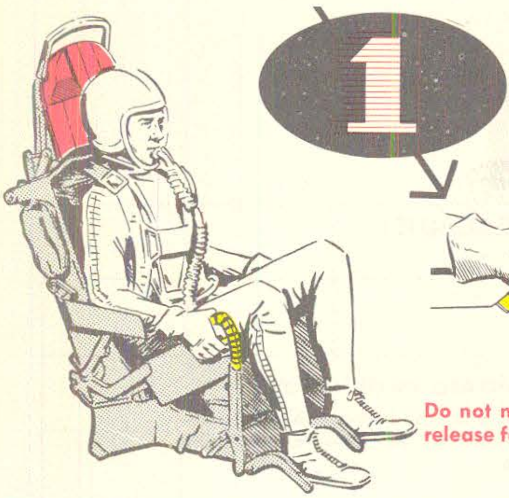
f. With the pilot-seat-separator, seat separation is automatically ensured when the automatic safety belt initiator fires.

LOW-ALTITUDE EJECTION.

During any low-altitude ejection (below 2000 feet above the terrain), the chances for successful ejection can be greatly increased by zooming the airplane (if airspeed permits) to exchange airspeed for altitude. Ejection should be accomplished while the airplane is in a positive climb. This will result in a more vertical trajectory for the seat and the pilot, thus providing more altitude and time for seat separation and parachute deployment. (Refer to "Engine Failure During Flight at Low Altitude" in this section for information on the zoom-up maneuver.)

Warning The following information is based on numerous rocket-sled tests using the ballistic rocket ejection catapult. No safety factor is provided for equipment malfunction. Since survival from an extremely low altitude depends primarily on the airplane attitude and altitude, the decision to eject under this condition must be left to the discretion of the pilot. Factors such as G-loads, high sink rate, and airplane attitudes other than level or slightly nose-high will decrease chances for sur-

EJECTION PROCEDURES



WARNING

Do not mistake handgrip latch release for ejection seat trigger.

Steps 1 and 2 are all that are necessary for ejection. If time and conditions permit, do as much of the following as possible.

- Stow all loose equipment.
- Actuate bail-out bottle.
- Jettison tow target.
- Stopcock throttle.
- Lower helmet visor.
- Brace for ejection:
  - Heels hooked firmly in footrests.
  - Arms braced in armrests.
  - Body erect.
  - Head hard against headrest.

WARNING

If overwater ejection is made, remove oxygen mask before hitting water, to prevent sucking water into the mask.

PULL UP EITHER RIGHT OR LEFT HANDGRIP TO JETTISON CANOPY. (SHOULDER HARNESS LOCKS AUTOMATICALLY WHEN HANDGRIPS ARE RAISED.)

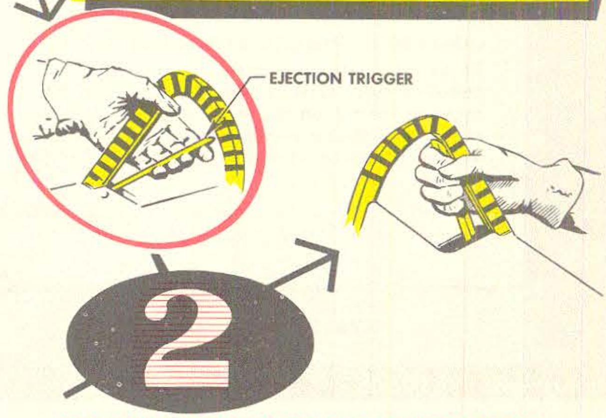
IF CANOPY FAILS TO JETTISON, ATTEMPT TO RELEASE CANOPY AS FOLLOWS . . .

1. Pull canopy alternate emergency jettison handle.
2. Hold canopy switch at ***OPEN*** until canopy breaks away from airplane.
3. Use canopy internal manual emergency release handle to pull canopy aft so that air stream can break it free.

WARNING

Manual opening of canopy may cause handle to inflict serious injury when canopy releases. (Canopy breakaway is extremely rapid.) Grasp handle with palm of hand upward and with thumb under handle.

- As a last resort, if canopy will not release, or if time or conditions do not permit, tuck chin in firmly, press head hard against headrest and eject through canopy.



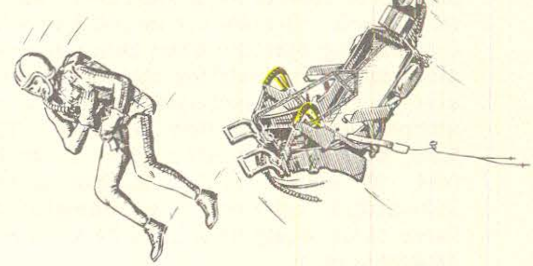
SQUEEZE EITHER OR BOTH TRIGGERS TO EJECT SEAT.

WARNING

If one trigger fails to fire seat, attempt to fire seat with the other trigger, as each trigger has an independently operated initiator.

RELEASE HANDGRIPS IMMEDIATELY AFTER SEAT EJECTS . . . . BELT WILL OPEN ONE SECOND AFTER SEAT EJECTS.

- Immediately after ejection, attempt to manually open the safety belt, as a precaution against the belt failing to open automatically.
- As soon as the belt releases, a determined effort must be made to separate from the seat as a precaution against pilot-seat separator failure. This will result in maximum terrain clearance and maximum available time for parachute deployment. This is extremely important for low-altitude ejections.
- If the safety belt has been opened manually during ejections above 14,000 feet, immediately pull parachute arming lanyard to permit automatic opening of the parachute at the preset altitude.
- Manually pull the parachute ripcord handle for all ejections below 14,000 feet.



AS A PRECAUTION, ATTEMPT TO KICK FREE OF SEAT.

F-100D-1-A73-9A

Figure 3-4

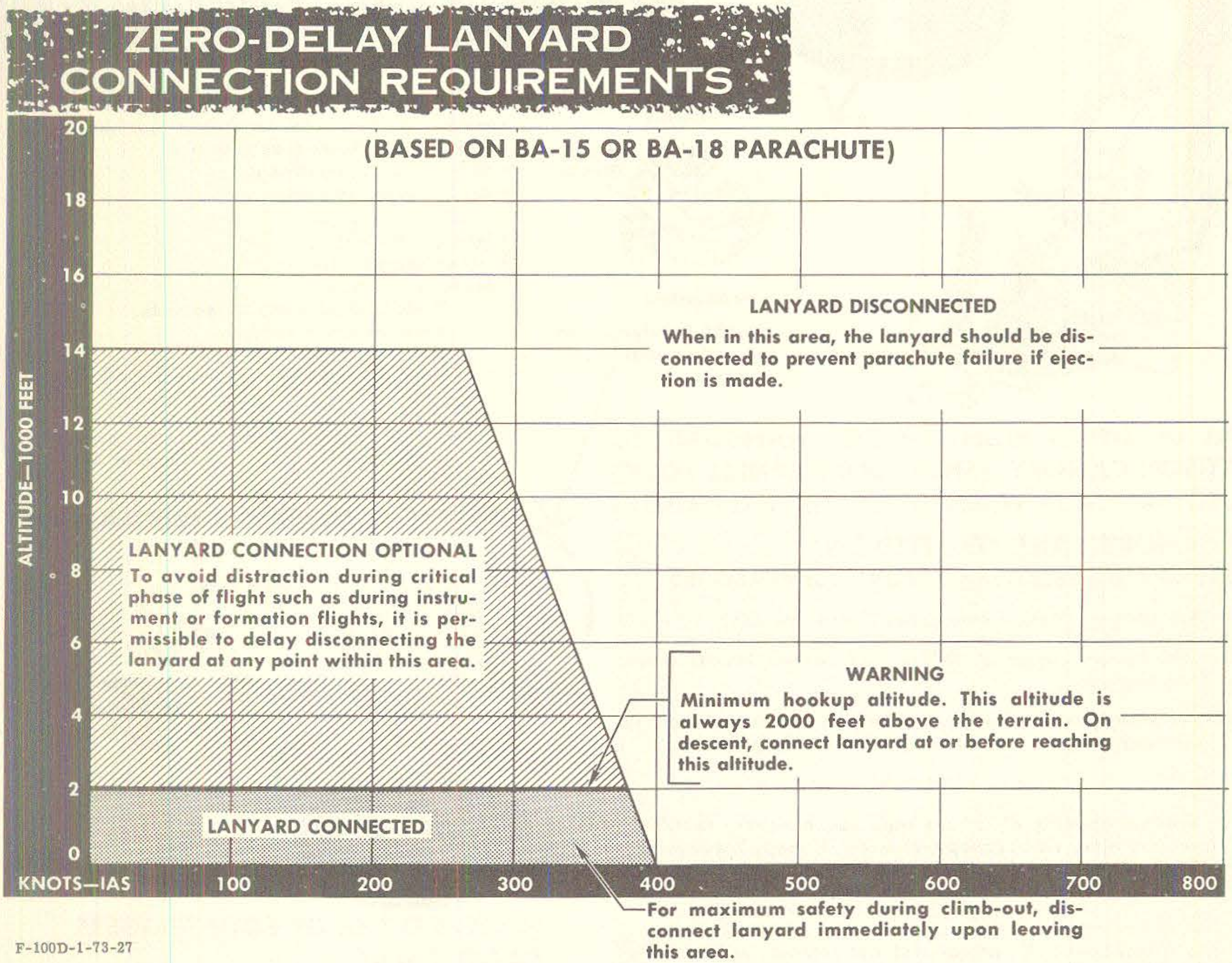


Figure 3-5

vival. The emergency minimum of 120 knots at ground level is given only to show that zero-altitude ejection can be accomplished in case of such emergency as fire on take-off. It must not be used as a basis for delaying ejection when above 2000 feet, since accident statistics show a progressive decrease in successful ejections as altitude decreases below 2000 feet. Therefore, whenever possible, eject above 2000 feet. To ensure survival during extremely low-altitude ejections, the automatic features of the equipment must be used and depended upon.

Ballistic Rocket Ejection Seat Catapult.

The emergency minimum ejection conditions, based on a level attitude and use of the BA-15 or BA-18 parachute, are as follows:

Zero-delay lanyard connected, zero altitude, 120 knots IAS minimum.

IF SEAT FAILS TO EJECT.

If seat does not eject when triggers are squeezed, proceed as follows:

1. BAIL-OUT BOTTLE—ACTUATE.
2. PERSONAL EQUIPMENT LEADS—DISCONNECT.
3. TRIM—NOSE-DOWN.
4. INVERT AIRPLANE.
5. SAFETY BELT—UNFASTEN AND RELEASE STICK.

NOTE Keep positive-G load until inverted; then sharply release stick and push free of seat.

- If airplane is not controllable, slow airplane as much as possible and bail out over the side.

6. PARACHUTE ARMING LANYARD—PULL.

   If at low altitude, pull parachute ripcord handle.

TAKE-OFF OR LANDING EMERGENCIES.

ABORT AND/OR BARRIER ENGAGEMENT.

If it appears there is insufficient runway for a normal stop, accomplish the following steps, as necessary, in addition to using brakes.

1. THROTTLE—IDLE.
2. SPEED BRAKE—IN.
3. DRAG CHUTE—DEPLOY.
4. EXTERNAL LOAD—JETTISON (IF NECESSARY).

   If only an MA-1 type barrier is available, or if there is no barrier, jettison external loads. The centerline pylon and missile pylons or launchers are the only pylons that must be jettisoned if a main gear engagement is to be made. The prone cable striking these loads or pylons can be deflected under the main gear tires.

5. ARRESTING HOOK—RELEASE.

   If time and conditions permit, raise wing flaps and turn engine master and battery switches off (if engine has been shut down). Use wheel brake and nose wheel steering to maintain directional control. Avoid locking brakes. Retard throttle to **OFF** just before engagement if an MA-1 type barrier is to be engaged. Also apply brakes after engaging barrier.

Warning If the airplane is stopped with the engine running and tail hook extended, do not place throttle at OFF until fire-fighting equipment has arrived and/or tail hook has cooled. This action will decrease the possibility of igniting fuel dumped during engine shutdown.

BARRIER TECHNIQUE.

Warning If the canopy has been lost and a barrier engagement of a MA-1A or modified MA-1A barrier is imminent, with any landing gear configuration other than all gear down and locked, there is a possibility of the upper barrier strap entering the cockpit. To prevent injury if this should occur, lean as far forward as possible, so that the windshield covers the head and shoulders.

Flight tests using the MA-1A runway overrun barrier with various airplane configurations indicate that the desirable speed for successful engagement is 40 to 90 knots IAS. All engagements tested in this range with the airplane in a clean configuration were successful.

Tests using an arresting hook and a modified MA-1A (with supported cable) or BAK-6 were successful for speeds up to 150 knots IAS. As the need for barrier engagement usually cannot be predicted in flight (except in the case of a flame-out), the procedure given is for an airplane on the ground, either during landing or take-off roll. Some of the steps in the following procedure may already be part of a normal procedure, but are repeated for purposes of continuity. In a take-off or landing emergency, if the airplane cannot be stopped or slowed to a safe taxiing speed and the runway has an overrun barrier, the foregoing steps should be taken to ensure a clean catch.

Warning If the arresting hook is inadvertently released in flight, it will not introduce any problem while air-borne, and a safe landing can be made with the hook extended. However, it can engage such obstacles as a prone barrier or lip of the runway during landing and severely damage the airplane.

APPROACH END ARRESTMENTS.

In certain emergencies, the use of approach end arresting gear should be considered. An early arrestment greatly reduces pilot risk and airplane damage by reducing the uncontrolled skid distance. BAK-6 and BAK-9 are acceptable units for approach end arrestments. MA-1 type barriers are not acceptable for wrong-way engagements and most likely will cause hook and/or structural failure with little or no change in forward speed. The MA-1 type gear should be removed from the runway if it is in a position that could interfere with BAK-6 or -9 engagement or runout.

The BAK-6 has a maximum engaging speed of 165 knots, regardless of airplane weight. This speed approximates the touchdown speed for a 33,000-pound airplane. Airplane weight must be below this to ensure successful arrestment.

The BAK-9 will successfully arrest a near-maximum weight F-100 Airplane at speeds up to 170 knots. It is recommended, however, that external fuel tanks be jettisoned to reduce gross weight and touchdown speed.

The landing pattern, precise location of cable, and intended touchdown point should be checked with a dry run whenever possible. When the barrier is on or near the runway overrun, the condition of the overrun should be determined as sufficient to withstand the landing. The touchdown point must be at least 200 feet before the cable. This distance is required to permit tail hook bouncing to dampen and to get the airplane in a three-point attitude for engagement. In-flight and nose-high engagements must be avoided in all cases. BAK-6 and BAK-9 systems produce similar, mild deceleration forces; however, the shoulder harness should be locked. Proper runway line-up, speed, and weight, with near-center engagement, will produce a successful landing with minimum possibility of additional airplane damage.

TIRE FAILURE.

Nose Gear Tire Failure.

NOSE GEAR TIRE FAILURE ON TAKE-OFF. Nose gear tire failure is serious if either tire fails on the take-off or landing roll. If one tire has failed or lost pressure, the remaining tire is definitely overloaded and it is much more likely to fail, especially at high gross weights. In case of complete nose gear tire failure on the take-off run and if speed is too slow to continue take-off, the take-off should be aborted. Refer to "Abort and/or Barrier Engagement" under "Take-off or Landing Emergencies" in this section.

NOTE

- If nose gear tire failure occurs at or near nose rotation speed, the pilot may elect to continue the take-off in order to reduce the gross weight of the airplane. Control on the ground is much easier at lighter gross weights.
- Even though heavy braking increases the load on the nose gear, it is considered more important that the airplane be stopped as quickly as possible than to attempt to lighten nose wheel loading at the expense of a longer roll. However, holding the stick full back during braking may reduce some of the load from the nose wheels.

LANDING WITH NOSE GEAR TIRE FAILURE. When landing is to be made with flat nose gear tire, lower gear in the normal manner and proceed as follows:

1. Normal touchdown.
2. Nose wheels - Hold off.

   Hold the nose wheels off as long as practical.
3. Drag chute - Deploy.

   The drag chute should be deployed while the nose wheels are still in the air.
4. Nose wheel steering - Engage.

   As soon as the nose wheels touch down, engage nose wheel steering.
5. Wheel brakes - Maintain directional control.

Main Gear Tire Failure.

Caution Avoid extreme rudder pedal deflections when nose wheel steering is engaged, since this may cause nose wheels to skid or skip sideways, and steering effectiveness will be lost.

MAIN GEAR TIRE FAILURE ON TAKE-OFF. Tire failure on take-off may present more problems then tire failure on landing. Directional control is more difficult and braking efficiency is greatly reduced at higher gross weights with failure of one or both main gear tires. Therefore, under certain conditions, the take-off should be continued rather than aborted. If main gear tire failure occurs during take-off, the following instructions must be observed:

SPEED IS LESS THAN 150 KNOTS IAS:

1. **ABORT TAKE-OFF.**
2. **ANTISKID SWITCH—OFF.**

SPEED IS GREATER THAN 150 KNOTS IAS:

1. **CONTINUE TAKE-OFF.**
2. **EXTERNAL LOAD—JETTISON (IF NECESSARY).**

Warning If take-off is continued, the landing gear should not be retracted if tire has failed or is suspected to have failed until the tire has been visually checked for fire by a report from another airplane or the tower. After the tire is checked and if the gear is retracted, the wheel brakes should be applied to stop wheel rotation before retraction, to prevent tire fragments from damaging equipment in the wheel well. Landing should be made in accordance with the instructions in "Landing With Main Gear Tire Failure."

LANDING WITH MAIN GEAR TIRE FAILURE.

When landing with a flat main gear tire, lower gear in the normal manner and proceed as follows:

1. Antiskid switch - OFF.
2. Normal approach.

   Land on side of runway that is away from flat tire. This will reduce the need for differential braking if the airplane pulls toward the low tire.

3. Normal touchdown.
4. Nose wheel steering - Engage.
5. Drag chute - Deploy.
6. Wheel brakes - Maintain direction control.

   Use maximum brake away from swerve. Deliberately blowing the good tire may, or may not, be helpful in keeping the airplane on the runway. The airplane will tend to roll straighter with both main gear tires blown, but it is very difficult to turn under this condition. Braking efficiency is greatly reduced with both main gear tires blown.

LANDINGS ON UNPREPARED SURFACES.

Landings on unprepared surfaces are not recommended. However, if an emergency landing on an unprepared surface is unavoidable, it should be made with as many landing gear down as possible. Investigation has shown that landings made on unprepared surfaces with the landing gear down have resulted in less pilot injury and less damage to the airplane that those made with gear up. Empty drop tanks should be retained to cushion impact loads and minimize airplane damage as much as possible.

LANDING GEAR UNSAFE INDICATIONS.

If an unsafe gear indication exists after moving the gear handle down, recycle the gear. If an unsafe condition still exists, use the landing gear emergency lowering procedures (figure 3-7). Attempt to obtain a positive confirmation of the gear condition from the tower or chase plane. If an unsafe main gear condition is positively confirmed, attempt to retract both main gears and land on nose gear and aft fuselage. If gear appears to be down and locked, make normal landing and stop straight ahead. Do not taxi until gear ground safety pins have been installed.

LANDING WITH ANY ONE GEAR UP OR UNLOCKED.

If nose gear does not extend or lock down, or if one main gear does not extend and lock down (and the other cannot be retracted), proceed as follows:

1. External load - Jettison.

NOTE If landing on a prepared surface, retain empty drop tanks to cushion landing shock. If time and conditions permit, fire all ammunition and expend excess fuel to lighten airplane and minimize fire hazard.

2. Landing gear handle - DOWN.
3. Shoulder harness - Lock.
4. Speed brake - IN.
5. Wing flap handle - DOWN.
6. Throttle - OFF when landing is ensured.
7. Engine master switch - OFF.

Caution Turn engine master switch OFF before battery switch is turned OFF, so that battery power is available to close the fuel shutoff valve.

8. Touch down on extended gear.

   Hold opposite wing, or nose, off ground as long as possible, but lower while control is available.

9. Drag chute - Deploy.
10. Battery switch - OFF.

Caution Battery switch must be ON, if nose wheel steering or antiskid is required.

Main Gear Up or Belly Landing (Prepared Surface Only).

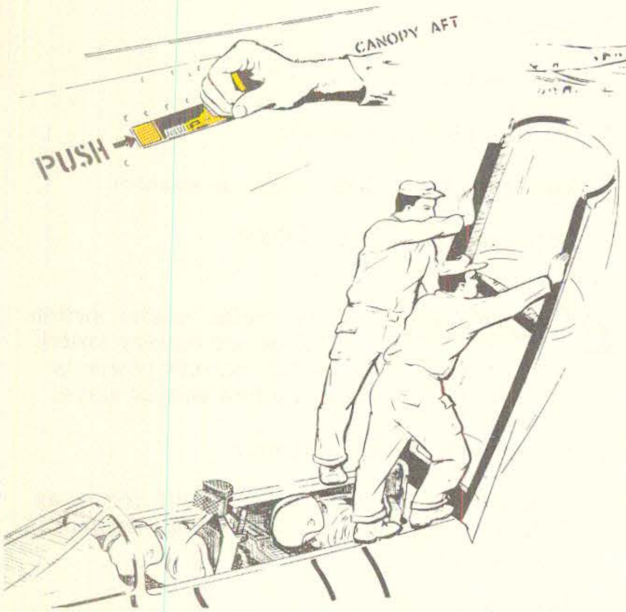
NOTE Whenever the gear cannot be lowered by the normal system, the emergency procedure will be used. (See figure 3-7.) However, once the emergency lowering procedure is used, the nose gear is extended and locked down and cannot be retracted.

If an unsafe condition is confirmed for the main gear after the emergency lowering procedure is used or a belly landing is unavoidable, the following procedure should be used:

1. Landing gear control circuit breaker - Check in.
2. Landing gear handle - UP.

   Retract main gear so that landing can be made on nose gear and aft fuselage (or empty drop tanks).

EMERGENCY ENTRANCE



1 Unlatch canopy external emergency release handle and move canopy aft about one inch to release canopy locks. (Handles are on both sides of canopy.)

2 Lift canopy at forward end; then push up and over until canopy completely separates from airplane. Proceed with step 3.

NOTE

If canopy cannot be opened, use alternate emergency entrance§ or break canopy glass aft of seat with a heavy implement. Strike canopy glass at shear point (in corner or along stiffener). Because of the thickness of the canopy glass, CO_2 may not be effective as a cooling agent to harden or crystallize the glass. Its use is recommended, however, as a final effort.

WARNING

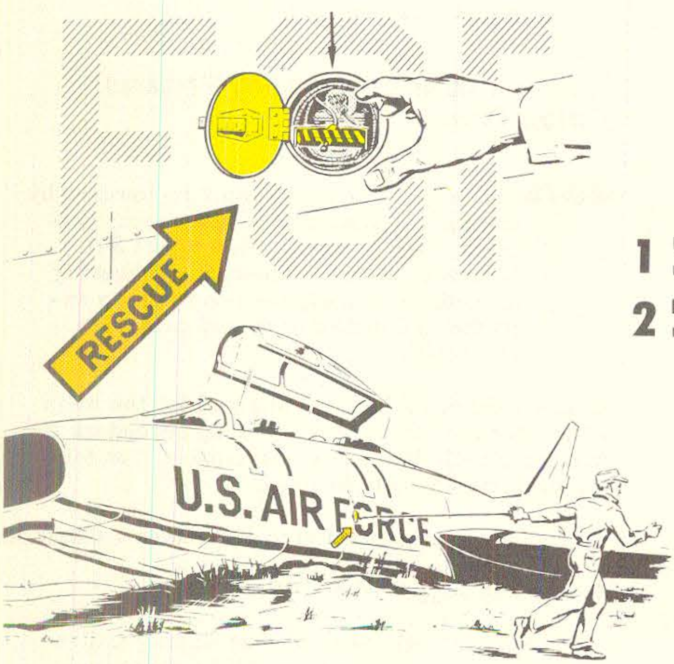
Remain clear of canopy ejection path. Avoid unnecessary handling of canopy and seat ejection mechanism.

WARNING

- Canopy opening by the explosive remover is considered an extreme emergency measure because of fire hazard. If the airplane is already on fire and time is of the utmost importance, or if fire-fighting equipment has arrived at the scene of the crash, the canopy may be jettisoned by the explosive remover.
- If canopy has been partially opened [more than 4 inches (8 inches¶) at the forward canopy bow], do not use the external emergency jettison handle. The canopy may not be removed, and injury or fire may be caused by the canopy remover.

ALTERNATE EMERGENCY ENTRANCE

F-100D-61 AND LATER, AND F-100F AIRPLANES



1 Unlatch cover door on left side of forward fuselage, and remove external canopy jettison handle.

2 Pull external canopy jettison handle out to full length (approximately 6 feet). Proceed with step 3.

NOTE

If canopy cannot be jettisoned or opened, break canopy glass aft of seat with a heavy implement. Strike canopy glass at shear point (in corner or along stiffener). Because of the thickness of the canopy glass, CO_2 may not be effective as a cooling agent to harden or crystallize the glass. Its use is recommended, however, as a final effort.

WARNING

Keep all personnel clear of canopy ejection path. Watch canopy path after ejection and remain clear.

F-100F-1-73-14C

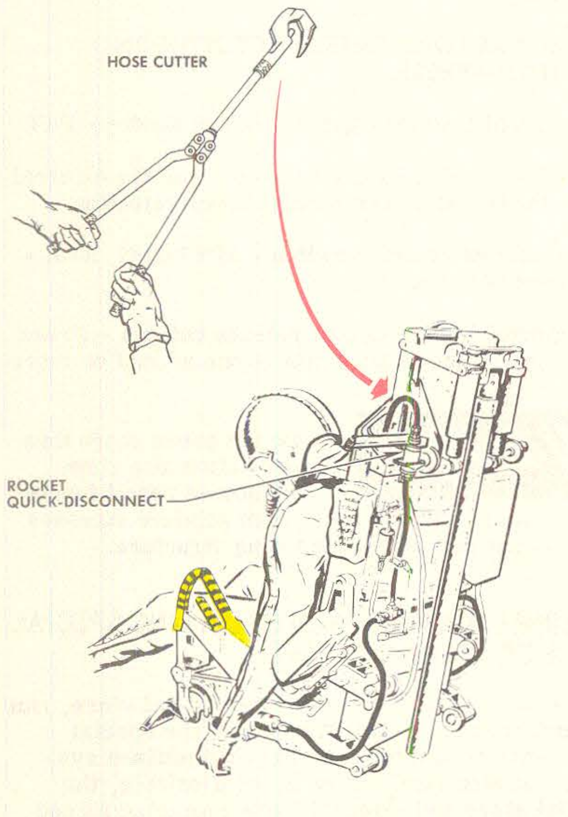
Figure 3-6

3 When access to cockpit is gained, check position of ejection seat handgrips.

If pilot jettisoned canopy in preparation for crash landing, seat handgrips will be up or canopy alternate emergency jettison handle will be pulled. (Raising either handgrip or pulling canopy alternate emergency jettison handle jettisons canopy.) Movement of either trigger fires seat catapult and ejects seat from airplane.

4 If handgrips are up, disarm seat catapult by cutting or disconnecting**hose leading from "T" fitting at back of seat to seat catapult, or uncouple the rocket quick-disconnect. Make sure loose hose ends are not aligned; otherwise, if seat initiators fire accidentally, expanding gases may actuate seat catapult and cause seat to eject.

If handgrips are down in normal position, be careful not to foul or raise handgrips. (Handgrips are interconnected and move at the same time.)



§ F-100D-61 AND LATER AND F-100F AIRPLANES
¶ F-100F AIRPLANES

** USE 9/16-INCH OPEN-END WRENCH.

F-100F-1-A73-8A

3. External load - Jettison (if necessary).

NOTE Retain empty drop tanks to cushion landing shock and minimize airplane damage.

4. Shoulder harness - Lock.
5. Drag chute - Deploy.
6. Normal touchdown.
7. Throttle - OFF.

   When landing is ensured, move throttle to OFF.

8. Nose wheel steering - Engage.

   Engage nose wheel steering if nose gear is extended.

9. Engine master switch - OFF.
10. Battery switch - OFF.

LANDING WITH NOSE WHEELS IN FULL SWIVEL.

If a landing is to be made with the nose wheels in full swivel, the possibility is very remote that the wheels will be cocked from center, because the nose wheel centering cam should automatically center the nose wheels. During this type of landing, the nose wheels should be allowed to touch down lightly, the drag chute should be deployed, and the rudder and brakes should be used for directional control.

NO-FLAP LANDING.

No special technique is required for landing without wing flaps. Speed during turn onto final, and speeds during final approach and touchdown should be increased 10 percent over recommended speed for load and configuration.

EMERGENCY GROUND ESCAPE.

In any situation which develops unexpectedly into a crash landing with the canopy still in place, the following three methods of removing the canopy, each with certain advantages and disadvantages, must be considered: manual opening, electrical opening, and jettisoning. (Refer to "Canopy Jettison" in this section.)

If the canopy must be removed on the ground, proceed as follows:

1. If time is not of prime importance or no fire exists, the canopy should be opened electrically.

Warning If the cockpit contains fumes, manual opening is recommended to prevent possible fire.

2. If time is critical or fire exists, the canopy should be jettisoned.

Warning The parachute should be removed and all personal equipment leads disconnected before the canopy is jettisoned, to aid in leaving the airplane as rapidly as possible.

EMERGENCY ENTRANCE.

The procedure to be used by rescue personnel when assisting the pilot from the airplane following a crash landing is outlined in figure 3-6.

DITCHING.

Ditch only as a last resort. All emergency survival equipment is carried by the pilot at ejection; consequently, there is no advantage in riding the airplane down. However, if altitude is not sufficient for ejection and ditching is unavoidable, proceed as follows:

1. Radio - Distress procedure.
2. Oxygen regulator - 100%.
3. External load - Jettison.
4. Personal equipment leads - Disconnect all except oxygen hose.
5. Shoulder harness - Lock.
6. Speed brake - Out.
7. Wing flap handle - DOWN.
8. Canopy - Jettison.
9. Normal approach - Keep nose high.

Caution Unless wind is high or sea is rough, plan approach heading parallel to any uniform swell pattern, and try to touch down along wave crest or just after crest passes. If wind is as high as 25 knots or surface is irregular, the best procedure is to approach into the wind and touch down on the falling side of a wave.

10. Throttle - OFF.
11. When stopped - Release safety belt.
12. Oxygen make - Off.

NOTE If, for some reason, you are unable to escape from the cockpit of a sinking airplane after ditching, you can use the airplane oxygen equipment for temporary underwater survival. The MD-1 diluter-demand type oxygen regulator is a suitable underwater breathing device when the regulator is set at 100%. It is essential that the mask be in place and tightly strapped, and that the regulator be set at 100%. Remember, the bail-out bottle cannot be used under water.

EMERGENCY JETTISON.

EXTERNAL LOAD JETTISON (RETAINING SPECIAL STORE OR TRAINING SHAPE).

All external loads, except the special weapon, can be jettisoned electrically by use of the external load emergency jettison button. If electrical power is not available or the external load emergency jettison handle is used, only loads not requiring forced ejection can be jettisoned. External loads (conventional weapons) are jettisoned in a safe condition.

1. **EXTERNAL LOAD EMERGENCY JETTISON BUTTON—PRESS.**
2. External load emergency jettison handle - Pull.

   Pulling this handle jettisons only the external loads that do not require forced ejection.

3. Armament selector switch - JETTISON ALL - Press bomb button.
4. External load auxiliary release buttons - Press one at a time at intervals of one second or more.

Warning Do not press more than one button at a time. Combined recoil forces of the ejector cartridges produce stresses that can damage the wing structure.

EXTERNAL LOAD JETTISON (RELEASING SPECIAL STORE OR TRAINING SHAPE).

All external loads, including the special store, can be jettisoned electrically by use of the special store jettison and the external load jettison systems. If electrical power is not available, the special store and external loads requiring forced ejection cannot be jettisoned.

Warning Refer to the applicable Aircrew Weapon Delivery Manual for instructions on permissible jettisoning of special weapons.

External loads (conventional weapons) are jettisoned in a safe condition, but the arming of the special store is determined by the special store control panel.

1. **SPECIAL STORE UNLOCK HANDLE—UNLOCK.**

   Rotate the special store unlock handle approximately 30 degrees clockwise to break the safety wire, and pull handle aft to the full stop position to ensure that the special store unlock system is unlocked. Then rotate the handle counterclockwise to lock the handle in the extended position.

Warning The special store unlock handle should be pulled to the full stop position (about 2-3/4 inches). The special store unlock indicator light should come on just before the full stop position is reached.

2. **SPECIAL STORE EMERGENCY JETTISON BUTTON —LIFT GUARD AND PRESS.**
3. **EXTERNAL LOAD EMERGENCY JETTISON BUTTON—PRESS.**
4. External load emergency jettison handle - Pull.

   Pulling this handle jettisons only the external loads that do not require forced ejection.

5. Armament selector switch - JETTISON ALL - Press bomb button.
6. External load auxiliary release buttons - Press one at a time at intervals of one second or more.

Warning Do not press more than one button at a time. Combined recoil forces of the ejector cartridges produce stresses that can damage the wing structure.

EXTERNAL LOAD JETTISON (NO SPECIAL STORE OR TRAINING SHAPE).

Certain conventional stores or pylons require actuation of the special store unlock handle. (Refer to "Bombing Equipment" and "Special Store" in Section IV for specific loads that require the use of the special store unlock handle for jettisoning.) However, in extreme emergencies which require jettisoning of all external loads, there would not be time to analyze if the special store unlock handle need be pulled. Therefore, in order to standardize the procedure, the special store unlock handle must be UNLOCKED (if a special store is not carried) before use of the external load emergency jettison button. If electrical power is not available or the external load emergency jettison handle is used, only loads not requiring forced ejection can be jettisoned. External loads (conventional weapons) are jettisoned safe.

1. **SPECIAL STORE UNLOCK HANDLE—UNLOCK.**

   Rotate the special store handle approximately 30 degrees clockwise to break safety wire, and pull handle aft to the full stop position to ensure that the special store unlock system is unlocked. Then rotate the handle counterclockwise to lock the handle in the extended position.

Warning The special store unlock handle should be pulled to the full stop position (about 2-3/4 inches). The special store unlock indicator light should come on just before the full stop position is reached.

2. **EXTERNAL LOAD EMERGENCY JETTISON BUTTON—PRESS.**
3. External load emergency jettison handle - Pull.

   Pulling this handle jettisons only the external loads that do not require forced ejection.

4. Armament selector switch - JETTISON ALL - Press bomb button.
5. External load auxiliary release buttons - Press one at a time at intervals of one second or more.

Warning Do not press more than one button at a time. Combined recoil forces of the ejector cartridges produces stresses that can damage the wing structure.

THROTTLE FAILURE.

As a result of improper adjustment, excessive forces may be required to move the throttle in or out of afterburner. On some airplanes, these forces may cause the throttle lever to fail inside of the throttle quadrant so that it may be impossible to retard the throttle.

Caution If the throttle has failed, do not rotate the throttle grip counterclockwise, as this may prevent retarding the throttle below about 85% rpm.

If attempts to move or retard the throttle fail, set up the recommended forced landing pattern. When the landing is ensured, move the engine master switch to OFF to reduce the thrust.

Warning When the engine master switch is turned OFF, the effective thrust decreases rapidly. However, at sea level, the time required for the thrust to decrease from Military to idle is about 13 seconds, and from 70% rpm to idle is about 10 seconds. (These times are altered slightly by altitude and by temperatures that differ from Standard Day conditions.) Use of the engine master switch for shutdown is not comparable with thrust reduction by throttle action.

Should the throttle breakage require an aborted take-off, immediately move the engine master switch to OFF if the throttle cannot be retarded; then deploy the drag chute and apply the brakes as required.

AFTERBURNER FAILURE.

AFTERBURNER FAILURE DURING TAKE-OFF.

IF RUNWAY AND BARRIER PERMIT:

1. ABORT.

Warning Inadvertent drag chute deployment may be mistaken for an afterburner failure. Therefore, before taking action to abort, check that drag chute is not deployed.

IF RUNWAY AND BARRIER DO NOT PERMIT STOPPING, OR IF AIRPLANE IS AIR-BORNE:

1. THROTTLE—INBOARD (CONTINUE TAKE—OFF).

   Immediately move throttle inboard out of AFTERBURNER range to MILITARY to ensure exhaust nozzle closing.

Warning If the exhaust nozzle fails to close, considerably less than Military Thrust will be available.

Caution If the afterburner has failed, do not attempt to relight.

2. EXTERNAL LOAD—JETTISON (IF NECESSARY).

   If the airplane starts to decelerate or altitude cannot be maintained, it must be assumed that either the exhaust nozzle failed to close or that the gross weight is too great to continue. In either case, jettison external loads to lighten airplane gross weight.

NOTE In most cases, if external loads are jettisoned at the time of afterburner failure, the take-off can be successfully completed in Military Thrust. The actual performance under these conditions can be determined from T.O. 1F-100A-1-1.

LOSS OF AFTERBURNER DURING FLIGHT.

NOTE If AB blowout is encountered in the lower afterburner range, return throttle inboard to close exhaust nozzle; then relight AB at a higher thrust setting.

If loss of afterburner occurs during flight, proceed as follows:

1. THROTTLE—INBOARD.

   Immediately move throttle inboard out of the AFTERBURNER range.

NOTE This closes the electrically operated afterburner shutoff valve in the engine-driven fuel pump unit, so that the fuel flow to the afterburner spray bars is shut off and the exhaust nozzle closes.

2. Overheat-warning light - Check light out.

   If the engine burner compartment overheat-warning light was not on when failure of the afterburner occurred, attempt to relight the afterburner watching for any indications of abnormal operation.

3. Relight afterburner - Check afterburner operation.

   If all cockpit indication of afterburner operation are normal after relight, continue afterburner operation.

Warning Do not attempt to relight afterburner if fire, explosion, or unusual thump, vibration, or noise was encountered during afterburner operation.

NOTE If afterburner light-up is not obtained within 5 seconds after the throttle is moved outboard to the AFTERBURNER range, the throttle should be moved inboard from this position and then, after 3 to 5 seconds, returned outboard to AFTERBURNER, to recycle the afterburner igniter.

AFTERBURNER NOZZLE FAILURE.

On the ground or at altitudes below 50,000 feet, if the exhaust nozzle fails to open as soon as afterburning takes place, a loud explosion and a violent surging of the engine occurs, together with a rapid rise in exhaust temperature and an rpm reduction. Above 50,000 feet, failure of the nozzle to open may be indicated only by a rise in exhaust temperature. If these condition are noted when the afterburner has been selected, the throttle should be moved inboard immediately, to shut down the afterburner and prevent possible damage to the engine and the engine air inlet duct. No emergency override control is provided for the exhaust nozzle.

NOTE If the exhaust nozzle fails to close in case of afterburner failure or shutdown, a drop of approximately 0.3 to 0.4 will show on the pressure ratio gage.

- If the exhaust nozzle fails to close when the afterburner is shut down, a loss in normally available thrust is evident throughout the entire speed range of the engine. The most appreciable thrust loss occurs at Military Thrust throttle settings.

ENGINE OIL SYSTEM FAILURE.

OIL PRESSURE (35 TO 40 PSI).

If oil pressure during steady flight drops to the 35 to 40 psi range, or fluctuates below 40 psi, proceed as follows:

1. Throttle - Reduce.
2. Altitude - Reduce.

   Reducing altitude increases the fuel flow through the oil cooler and aids in increasing oil pressure. Reduce altitude as necessary, maintaining safe ejection altitude.

3. Land as soon as practical.

OIL PRESSURE (BELOW 35 PSI).

If oil pressure drops to, or fluctuates below, 35 psi proceed as follows:

1. Throttle - Reduce.
2. Altitude - Reduce.

   Reducing altitude increases the fuel flow through the oil cooler and aids in increasing oil pressure. Reduce altitude as necessary, maintaining safe ejection altitude.

3. Land as soon as possible.

   Land as soon as possible using a flame-out pattern.

NOTE Refer to "Oil Pressure" in Section VII for information concerning thrust reduction and oil pressure failure.

- Fluctuations within the normal range of 40 to 50 psi are acceptable. Flight with oil pressure above, or fluctuating above, 50 psi is permissible but corrective action must be taken before the next flight.
- During maneuvers of less than 1 G, oil pressure may fall to as low as zero. Such pressures are permissible, provided these maneuvers do not exceed 15 seconds.

ENGINE OIL OVERHEAT.

The oil temperature regulator has a thermal lag which may cause a transient increase in oil temperature under some conditions. The engine oil overheat caution light comes on when oil temperature exceeds 127°C (260°F). Although oil temperature above 127°C (260°F) can be encountered under normal operating conditions when a combination of these factors exist, illumination of the caution light may indicate an engine or oil system malfunction. If the engine oil overheat caution light comes on:

Caution If the engine oil overheat caution light comes on within 5 minutes after take-off or within 2 minutes after a thrust reduction, and if there is no evidence of engine malfunction, a transient overtemperature condition is indicated. A precautionary landing is recommended even though the light goes out.

1. Check for evidence of malfunction.

   If the light is accompanied by evidence of a malfunction such as engine roughness, smoke compressor stalls, or loss of oil pressure, engine failure is indicated.

2. Throttle - Reduce.
3. Altitude - Reduce.

   Reducing altitude increases the fuel flow through the oil cooler and aids in reducing oil temperature. Reduce altitude as necessary, maintaining safe ejection altitude.

4. Land as soon as possible.

   Land as soon as possible using a flame-out pattern.

ENGINE FUEL SYSTEM FAILURE.

NORMAL FUEL CONTROL FAILURE.

If the normal fuel control system fails, as shown by abnormal reduction of engine rpm, thrust, or temperature, or by inability to reduce rpm, transfer to the emergency fuel control system by moving the fuel regulator selector switch to EMER. However, when time and conditions permit, avoid such as immediate transfer to the emergency system and make the transfer as follows:

1. Throttle setting - Adjust to engine rpm.

   Adjust throttle setting to match actual engine rpm as closely as possible. Do not make transfer at or near full throttle, because the emergency fuel flow may exceed engine requirements and produce compressor stall or engine overtemperature.

Caution If the throttle setting and actual engine rpm are seriously mismatched, flame-out, compressor stall, or overtemperature may occur during transfer to the emergency fuel control system. Be prepared to reduce or advance power immediately, as required.

2. Fuel regulator selector switch - EMER.

3. Throttle - Slowly reposition to desired setting.

Caution Careful and constant checking of engine rpm, fuel flow, and exhaust temperature is mandatory when operating on the emergency system. Move throttle cautiously to avoid compressor stall, engine surge, or overtemperature, because the emergency system cannot prevent these reactions.

- If the emergency fuel system was selected because of in-flight failure of the normal system, <u>do not transfer back to normal system.</u>

ENGINE FUEL PUMP FAILURE.

If the engine element of the engine-driven fuel pump unit fails, the fuel output of the afterburner element is then directed automatically to both the engine and the afterburner. When the engine element fails, full afterburner operation cannot be obtained below 15,000 feet.

AFTERBURNER FUEL PUMP FAILURE.

If the afterburner element of the engine-driven fuel pump unit fails, the afterburner cannot operate and the exhaust nozzle closes because of low fuel pressure; however, the engine element of the fuel pump permits full Military Thrust operation.

AIRPLANE FUEL SYSTEM FAILURE.

If a fuel transfer or booster pump fails, fuel may not be transferred to the forward tank or supplied to the engine at the required rate, and power loss or flame-out can occur. Critical fuel pump failures are indicated by abnormal depletion of forward tank fuel on some airplanes.

NOTE Afterburner should not be used when fuel in forward tank is less than 250 pounds.

FORWARD GAGE INDICATES FUEL.

Above 25,000 Feet.

If the forward tank contains fuel, no <u>single</u> fuel pump failure (transfer pump or <u>booster pump</u>) above 25,000 feet can affect engine operation at any thrust setting. However, descend to 25,000 feet or below to prevent pump cavitation.

Below 25,000 Feet.

If the forward tank contains fuel, no possible combination of airplane system fuel pump failures below 25,000 feet can affect engine operation at any thrust setting, including Military Thrust.

FORWARD GAGE APPROACHES OR INDICATES ZERO.

During operation at fuel flow rates of 4000 pounds per hour or less, when the forward gage indicates over 200 pounds less than the <u>total</u> gage (nonafterburning) at total fuel reading <u>of 1500</u> pounds or less, a failure of the fuel transfer system is indicated and a part of the total fuel may not be available.

Above 25,000 Feet.

Flight above 25,000 feet can be maintained at Military Thrust or less, with the most critical single fuel transfer system malfunction (failure of the intermediate tank transfer pump), until the total fuel remaining is 1700 pounds.

NOTE Afterburner operation can be maintained under these conditions as long as the total fuel remaining is above 3100 pounds.

If flame-out occurs because of this failure, it is necessary to descend to 20,000 feet to make a successful air start. After the air start, normal operation through Military Thrust can be sustained up to 25,000 feet.

Below 25,000 Feet.

Flight below 25,000 feet can be maintained at Military Thrust or less, with the most critical single fuel transfer system malfunction (failure of one wing tank scavenge pump), until the total fuel remaining is 600 pounds.

NOTE Afterburner operation can be maintained under these conditions as long as the total fuel remaining is above 1700 pounds.

- Transfer of fuel by gravity from the wing tank can be increased by decelerations, yaws, and slips.

If flame-out occurs under these conditions, attempt an air start if altitude and fuel remaining permit.

NOTE If above 25,000 feet, it may be necessary to descend to below 20,000 feet to accomplish an air start.

DROP TANK FUEL TRANSFER FAILURE.

If the drop tank fuel selector switch fails in flight (such as internal failure of the switch or loss of the knob) and if there is not sufficient internal system fuel to abort the mission, pull the drop tank fuel control circuit breaker (on the left circuit breaker panel). Pulling this circuit breaker deenergizes the tank pressurizing air shutoff valves to the open position and results in simultaneous transfer of fuel from all drop tanks. The circuit breaker is to be reset after fuel has been transferred, to prevent pressurization of the forward fuselage tank with resulting possible fuel loss out the vent system and to ensure that no difficulty will be encountered in accomplishing in-flight refueling if attempted.

Warning For loading configurations which include a full drop tank at an outboard station, simultaneous transfer of drop tank fuel may cause the airplane CG to exceed the aft stability limit. If the limit is exceeded, longitudinal control will be extremely sensitive. In addition, a lateral control problem can develop. Therefore, maneuvering should be held to a minimum. If necessary to maintain adequate control, the outboard drop tank should be jettisoned. This action will return the CG within limits and will also reduce lateral control requirements.

- If the drop tank fuel control circuit breaker has been pulled, outboard drop tank should be jettisoned before landing, to ensure that the airplane CG will be within the landing limit.

ELECTRICAL POWER SYSTEM FAILURES.

COMPLETE ELECTRICAL SYSTEM FAILURE.

If a complete electrical system failure occurs, or if for any reason it becomes necessary to turn off the battery switch and the ac generator and the dc generator switches, only those systems powered by the battery bus are operable and are dependent on battery output. Flight under these conditions is limited. The following precautions, however, should be observed.

NOTE In case of complete electrical failure, the cockpit pressurization system will be inoperative.

1. Reduce airspeed and readjust trim.

   If possible, reduce airspeed and readjust trim before turning off electrical power, because trim cannot be accomplished without electrical power.

2. Electrical power - OFF.

3. Descend - To below 25,000 feet.

   With all electrically driven fuel booster and transfer pumps inoperative, normal engine operation can be sustained in most cases below 25,000 feet by suction feed. However, about 1300 pounds of fuel will be unavailable to the engine, unless this fuel is in the forward tank at time of failure.

Caution Under certain conditions, the fuel manifold suction input can become uncovered, and a flame-out could occur. Therefore, the descent attitude should not exceed 20 degrees nose down, and prolonged deceleration should be avoided.

NOTE If complete electrical failure occurs while operating in afterburner, the afterburner can be shut off by retarding the throttle to below the emergency afterburner shutoff (about 1/2 to 1% rpm below minimum afterburner). This thrust setting may not sustain flight for the airplane load configuration and altitude. If additional thrust is needed for short periods, the use of full afterburner thrust is recommended. Approximate Military Thrust can be obtained from combined engine and afterburner thrust with a throttle setting just above the emergency afterburner shutoff. However, operation at this thrust condition results in excessive fuel consumption for the thrust output.

4. External load (bombs and 335- or 275-gallon drop tanks) - Jettison manually (if necessary).

   Bombs and 335- or 275-gallon drop tanks can be jettisoned mechanically by pulling the external load emergency jettison handle.

NOTE Failure of the electrical power does not allow rocket pods, chemical or napalm tanks, missiles, and 450-gallon or 200-gallon drop tanks to be jettisoned by any method, because these loads must be forcibly ejected by electrically fired ejectors.

5. Land as soon as possible.

GENERATOR FAILURE.

DC Generator Failure.

When the dc generator is cut out of the circuit, as shown by illumination of the dc generator caution light, dc power is automatically supplied by the ac generator through the transformer-rectifier (provided ac generator output is available). The primary and secondary busses are energized by the transformer-rectifier, but the terriary bus remains de-energized after dc generator failure.

Caution If the ac generator fails after dc generator failure has occurred, all equipment powered by the secondary, tertiary, and main 3-phase ac busses is inoperative. The primary bus is then dependent on the battery. All nonessential equipment should be turned off to reduce the load on the battery. If the airplane has an electrically driven wheel brake emergency hydraulic pump, do not inadvertently apply wheel brakes in flight when the battery is the only source of electrical power. Actuation of brakes could turn on the emergency brake hydraulic pump if utility hydraulic pressure is low, and pump operation could cause excessive battery discharge. Land as soon as practical, because the time that usable battery power is available for continued operation is from 6 to 22 minutes.

DC Generator Reset Procedure.

When dc generator irregularity occurs, as shown by the dc generator caution light coming on, try to bring generator back into circuit as follows:

1. DC generator switch - To RESET momentarily; then ON.

   Hold dc generator switch at RESET momentarily; then return switch to ON. If caution light remains out, the failure was temporary.

2. DC generator caution light - Check (repeat reset procedure if necessary).

   If vaution light is still on when dc generator switch is returned to ON, repeat reset procedure several times. If dc generator light remains on after several reset attempts, check dc loadmeter to determine generator output. Then proceed to step 3.

3. If dc loadmeter is normal - Continue flight (leave generator switch ON).

NOTE A transformer-rectifier lockout relay prevents the transformer-rectifier from powering the dc busses when the dc generator is "on the line."

- The dc generator loadmeter shows the output of transformer-rectifier unit, and it should not be assumed that the dc generator is operating unless the tertiary bus is back "on the line."

4. If dc loadmeter shows that generator is not charging - Abort flight.

   a. DC generator switch - OFF.

   b. Reduce battery load.

   c. Land as soon as practical.

AC Generator Failure.

Any actual generator failure or generator overvoltage causes the generator to be removed from the ac system until the condition is corrected. Failure of the ac generator, shown by the ac generator-off caution light coming on, causes loss of all ac power.

NOTE If a flame-out occurs under these conditions, attempt an air start if remaining altitude and fuel permit.

The instrument ac power-off caution light also comes on to show loss of the 3-phase instrument bus. Following ac generator failure, the stand-by instrument inverter switch should be moved to ON, to restore power to the 3-phase instrument bus (and to the single-phase instrument ac bus which is powered by the 3-phase instrument bus). Once power is restored to these busses, the instrument ac power-off caution light goes out. There is no alternate means of powering the main 3-phase bus.

AC Generator Reset Procedure.

If the ac generator fails, try to return the generator to service as follows:

1. Stand-by instrument inverter switch - ON.
2. AC generator switch - To RESET momentarily; then ON.
3. If caution light goes out, stand-by instrument inverter switch - OFF.

   If ac generator caution light goes out, showing that ac generator is again "on the line," move stand-by instrument inverter switch to OFF.
4. Land as soon as practical.
5. If caution light remains on - Repeat reset procedure twice.

Caution If the ac generator drive unit fails in such a manner as to break the case, oil in the unit will be pumped overboard or into the engine intake duct. Such loss of oil may result in smoke or fumes in the cockpit.

If generator light remains on after three reset attempts, assume that ac generator drive unit has failed. Proceed as follows:

6. AC generator switch - OFF.
7. Reduce engine thrust.

   Maintain altitude and establish a flame-out landing pattern in case of early loss of engine thrust.
8. Land as soon as possible.

NOTE Military Thrust is available below 40,000 geet with all ac, tank-mounted fuel pumps inoperative, as long as any fuel remains in the forward fuselage tank.

- Military Thrust can be sustained below 25,000 feet as long as total fuel remaining exceeds 600 pounds.

UTILITY HYDRAULIC SYSTEM FAILURE.

There is no emergency utility hydraulic system. If the utility hydraulic system fails, the speed brake, nose wheel steering, and autopilot are inoperative. However, emergency accumulators provide pressure for nose gear lowering, wheel braking, and wing flap lowering. An accumulator also supplies pressure, if the utility system fails, to open the air inlet-outlet doors for operation of the ram-air turbine-driven flight control emergency hydraulic pump.

NOTE The rudder is normally actuated by hydraulic power from the utility hydraulic system. If this system fails or pressure drops below 2900 psi, the summing valve in the rudder system admits enough flight control system No. 2 pressure to the rudder actuating cylinder to build the total pressure back to 3000 psi.

- Refer to "Low-speed Penetrations" in Section IX for penetration without speed brake.

In case of a utility hydraulic system failure, proceed as follows:

NOTE Nose wheel steering and speed brake will be inoperative; however, wheel brakes will be available for directional control.

1. Speed brake switch - Check center (off).
2. Landing gross weight - Reduce.

   If conditions permit, remain air-borne in immediate vicinity of base to burn fuel down to normal landing weight.
3. Land as soon as practical.
4. Landing gear handle - DOWN.
5. Landing gear emergency lowering handle - Pull.
6. Wing flap handle - DOWN.
7. Wing flap emergency switch - EMERGENCY DOWN.

   If wing flap actuation is not obvious, emmediately place wing flap emergency switch to EMERGENCY DOWN.
8. Throttle - OFF (if necessary).

   Move throttle to OFF in case of a drag chute failure.

Caution No attempt should be made to taxi or park the airplane. Clear runway if possible and shut down.

BRAKING WITH UTILITY SYSTEM FAILURE.

If the utility hydraulic system has failed, leave the antiskid switch ON and apply the brakes smoothly, with gradually increasing pedal force. With the brake emergency hydraulic pump, power braking action will be available as long as there is hydraulic fluid in the utility system, and electrical power (battery bus) is available.

FLIGHT CONTROL HYDRAULIC SYSTEM FAILURE.

Failure of one flight control hydraulic system does not affect the operation of the other system, which assumes the entire load of flight control operation. (Refer to "Flight Control Hydraulic Systems" in Section I.) The mission should be aborted and a landing made as soon as possible; however, under such a condition, flight control operation may be somewhat slower because of reduction of hydraulic flow. If either system fails, the flight system failure warning light will come on. Proceed as follows:

1. Determine which system has failed.

    Check each system hydraulic pressure to determine the nature of the failure. Low pressure indicates a pump or line failure with resultant loss of pressure. Normal pressure but with no fluctuation in response to fore-and-aft control movement indicates a blocked or run-around condition. The emergency hydraulic pump will not supplement the No. 1 system in case of a No. 2 system block.

    a. If system No. 1 failed - System No. 2 will operate flight control system.

    b. If system No. 2 failed - System No. 1 will operate flight control system.

During landing approach:

2. Emergency hydraulic pump lever (RAT) - ON.

    Place emergency hydraulic pump lever in ON position to supplement output of the engine-driven hydraulic pump during landing. Keep control movements to a minimum during entry onto final approach and on final.

3. Monitor the good system.

4. Fly long final approach.

    A long, straight-in, final approach should be used, and rate of descent should be between 1000 and 1500 feet per minute (remaining above safe ejection altitude as long as practical). Reduce rate of descent to below 1000 feet per minute just before flare.

5. Use minimum throttle movements.

Caution Except for emergency landing approaches, do not turn on ram-air turbine while either flight control hydraulic system pressure is above 2000 psi. If the ram-air turbine is turned on while the No. 2 flight control hydraulic system pressure is above 2000 psi, the ram-air turbine bearing seals may be damaged if used for extended periods of time.

- To prevent airflow reversal through the emergency pump ram-air turbine and to ensure adequate pump output, it is necessary to reduce power settings when airspeed is low. If emergency pump pressure drops, retard throttle or increase airspeed until pressure is restored.

NOTE The emergency pump will automatically come on when engine rpm drops below 40% rpm. Otherwise it must be turned on manually.

6. Use minimum control movements.

In case of engine failure, the ram-air, turbine-driven flight control emergency pump must be started during the landing approach to supplement the output of the engine-driven hydraulic pumps, to ensure effective control action while landing. (Refer to "Flight Control System Emergency Hydraulic Pump" in Section VII.) Should the engine freeze, preventing operation of the engine-driven pumps, or if failure of both engine-driven pumps occurs, power in flight control system No. 2 can be supplied by the emergency hydraulic pump. When the emergency hydraulic pump lever is moved forward to ON, utility hydraulic pressure (or pressure from an emergency accumulator) opens the air turbine inlet-outlet doors so that ram air drives the turbine for emergency pump operation. (The pump lever must be returned to OFF manually, to shut down the pump, if it is no longer needed.)

Warning Because of the reduced total output, unnecessary control movement should be kept to a minimum when the emergency pump is the only source of flight control power. This is an emergency system which will not provide normal maneuvering capability, but is considered adequate for a proficient pilot flying under normal conditions of visibility and turbulence, with adequate runways to permit a well-planned approach. Under other circumstances, the pilot's judgment must prevail.

NOTE The rudder is normally actuated by hydraulic power from the utility hydraulic system. If this system fails, or pressure drops below 2900 psi, the summing valve in the rudder system admits enough flight control system No. 2 pressure to the rudder actuating cylinder to build the total pressure back to 3000 psi.

Warning If complete flight control hydraulic system failure occurs (that is, pressure cannot be maintained by the emergency pump upon loss of the engine-driven pumps, or because of malfunctions in the systems), stick forces become extremely high. As a result, control of the airplane in cruising flight is very difficult, and control at high speeds or during maneuvers is impossible. Therefore, if such a failure is encountered, try to reduce airspeed to about 200 knots, and try to maintain control by steady push or pull force on the stick and by varying thrust settings. If control cannot be maintained, eject. If some control is available, however, and altitude and other conditions permit, attempt to return to a suitable area. Then eject, because extended flight and a landing with such high stick forces should not be attempted under any circumstances.

FLIGHT CONTROL ARTIFICIAL-FEEL SYSTEM FAILURE.

The artificial-feel system failure can be indicated by a lightening of stick forces (resulting in overcontrol), lack of trim response, and poor stick-centering characteristics. If failure of flight control artificial feel is encountered, proceed as follows:

1. Airspeed - Reduce.

   Reduction of airspeed may relieve severe oscillation of the airplane.

2. If adequate control cannot be maintained - Eject.

   Ejection is recommended whenever failure of the artificial-feel system is evident by loss of adequate control.

TRIM FAILURE.

If any one of the three trim systems (rudder, aileron, or horizontal stabilizer) should fail in either extreme-travel position, the maximum force required by the pilot to move the control surface to the opposite extreme is not beyond physical capabilities. If trim failure occurs in the trim switch on the stick grip, proceed as follows:

1. REDUCE AIRSPEED TO ABOUT 260 KNOTS IAS.

2. TAKE-OFF TRIM BUTTON—PRESS FOR TAKE-OFF TRIM.

   The take-off trim setting provides trim adjustments for level flight at a nominal speed of about 260 knots.

Caution The trim switch may be subject to occasional sticking in an actuated position, resulting in application of extreme trim. When this condition occurs, the trim switch must be returned manually to the OFF center position, after the desired amount of trim is obtained. Comments on trim switch malfunction must be entered in Form 781 with a red cross.

NOTE There is no alternate trim control. If the 260-knot trim provides a more satisfactory attitude than the "failed" trim position, the take-off trim button should be used. The take-off trim position for the ailerons and rudder is neutral, and for the horizontal stabilizer it is about 4 degrees (5-1/2 degrees, F-100F Airplanes) down from neutral to induce a nose-up condition.

WING FLAP SYSTEM FAILURE.

WING FLAP EMERGENCY LOWERING.

If the flaps fail to extend when the flap handle is moved to DOWN, the flap emergency switch should be moved from NORMAL to EMERGENCY DOWN. This opens the flap emergency valve by primary bus power, and pressure from the flap emergency accumulator lowers the flaps. If it should be necessary to raise the flaps in flight, when they have been lowered by the emergency system, place the flap handle in the UP position and return the emergency switch to NORMAL. Air loads will cause the flaps to retract.

Caution The flap emergency accumulator has only sufficient pressure to lower the flaps once. If the utility hydraulic system has failed, and flaps are lowered by the emergency switch, then subsequently raised, they cannot again be lowered in flight.

- If flaps have been lowered by the emergency switch (because of utility hydraulic system failure) the flaps will stay down as long as the flap handle remains at DOWN.

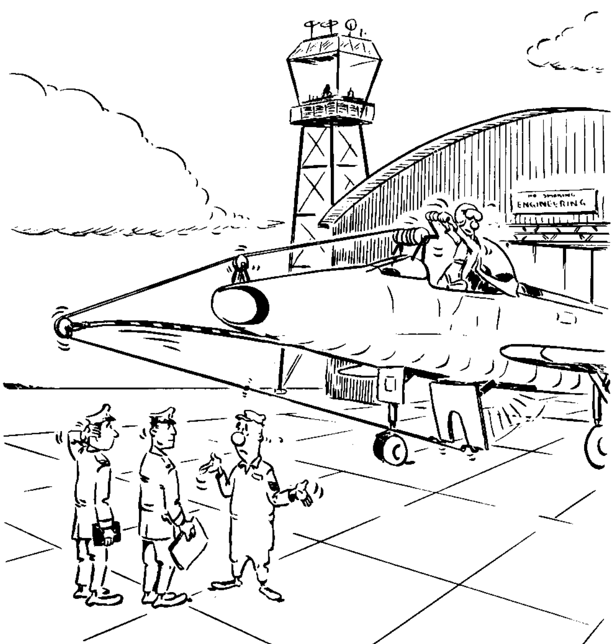
- If the flaps are lowered by the emergency switch (because of electrical failure in the normal flap control system), do not return the emergency switch to NORMAL, regardless of position of flap handle. Otherwise, hydraulic pressure is removed from the flaps and air loads will cause them to retract.

Single Flap Failure.

Flight tests have been conducted with one flap extended and one flap retracted. The airplane does not have a rolling tendency in this condition (ailerons neutral); however, yaw is encountered. The yaw can be trimmed out at all speeds within normal flap extension speed range (160 to 230 knots IAS); below 140 knots IAS, control cannot be maintained. In case of a single flap failure, lower the other flap by using emergency system and land with flaps down. If the other flap will not lower, retract the flap and land with flaps up. If the flap cannot be retracted, land with flap configuration as is, utilizing touchdown speed of 10 knots IAS above computed speed.

SPEED BRAKE SYSTEM FAILURE.

To close speed brake in flight, in case of electrical or hydraulic failure, move speed brake emergency dump lever forward and increase airspeed to above 300 knots IAS. This dumps the hydraulic pressure and allows air loads to return the speed brake to a trail position. Then return the emergency dump lever to OFF (aft). This creates a hydraulic lock that prevents the speed brake from lowering during landing.



Note

There is no emergency system for extending the speed brake.

F-100D-1-0-46

Caution The speed brake will probably be extended at touchdown, with any failure, if the emergency dump lever is left in the DUMP position.

- With the loss of utility hydraulic system fluid while the speed brake is extended, the speed brake can be retracted by the emergency dump lever but cannot be locked in the retracted position. Therefore, the speed brake will start extending at about 200 knots IAS and will be full down by 150 knots IAS.

The speed brake cannot be opened if utility hydraulic system pressure has failed.

HEAT AND VENT EMERGENCY.

Refer to "Emergency Depressurization (Intentional)," "Emergency Depressurization (Accidental)," "Excessive Cockpit Temperature," "Heat and Vent System Overheated," and "Emergency Operation of Electronic Equipment Compartment Cooling System" in Section IV.

OXYGEN SYSTEM EMERGENCY.

Refer to "Emergency Operation of Oxygen System" in Section IV.

LANDING GEAR EMERGENCY OPERATION.

LANDING GEAR IN-FLIGHT EMERGENCY OPERATION.

If the landing gear warning light (enclosed in the landing gear handle knob) remains on after the gear has been retracted, proceed as follows:

1. Landing gear handle - Leave in UP position.

Caution Do not move landing gear handle when landing gear warning light is on and speed is above gear-down limit airspeed (230 knots IAS). Landing gear doors could be torn off when hydraulic pressure is removed from the door actuating cylinders.

2. Reduce airspeed.

   Slow airplane to speed below gear-down limit airspeed (230 knots IAS).

3. Fly-by check of gear and door position.

   Have a gear and door position check made by the tower on a fly-by, or by another airplane in flight.

4. Cycle gear.

   If warning light remains on, after gear has been cycled, proceed to step 5.

5. Lower gear, and land.

LANDING GEAR EMERGENCY LOWERING.

The landing gear emergency lowering procedure is shown in figure 3-7.

WHEEL BRAKE ANTISKID SYSTEM FAILURE.

If antiskid system failure is suspected (no braking action when pedals are held full down or braking action causes excessive skidding), the pedals should be released and the antiskid switch moved to OFF. If braking action is regained, the brakes should be used cautiously to prevent skidding, since skid protection is not available. Use brakes as required by feeling out braking action with a light pedal force and a tapping action, releasing brakes completely on each tapping cycle down to 110 knots. Below this speed, the pedal force should be increased as the airplane slows down.

NOTE At speeds above 110 knots IAS, locked wheels may not be detected before tire failure occurs. Caution must be used during brake operation at high speed.

If braking action is not regained after the antiskid switch is turned OFF, apply and hold a steady force on the brake pedals. By holding a steady pedal force, the return port of each brake valve remains closed and any hydraulic flow through the variable flow regulator ("run-around valve") or the flow restrictor will build up hydraulic pressure, and braking action may be regained.

CANOPY JETTISON.

During an emergency when the canopy must be jettisoned, but ejection is not contemplated, it is recommended that the canopy alternate emergency jettison handle be used. (See figure 3-8.) If the canopy fails to jettison or cannot be jettisoned in this manner, raise either seat handgrip to jettison the canopy. (The shoulder harness locks automatically when either handgrip is raised.) Before jettisoning canopy, pull helmet visor down. (Refer to "Flight Without Canopy" in Section VI.)

Certain factors regarding canopy jettisoning should be considered in case it becomes necessary to make a forced landing. Provided the initial contact with the runway or terrain is survivable, the following information is offered to further the chances for survival.

Initially, with the canopy in place, the pilot is able to fly the best approach possible and is not subjected to an environment to which he is unaccustomed. After touchdown and during the ensuing slide, a closed canopy protects the crew against barrier straps and splashing of flaming fuel into the cockpit and will affort definite temporary protection against explosion, heat, and fire. For on-field crashes, this protection may allow an alerted crash crew to suppress the fire and assist in evacuation of the airplane. In any case, on- or off-field, the time afforded is sufficient to free personal leads and evaluate the situation. Do not, in any case, remain in a burning airplane longer than required, anticipating assistance.

Removal of the canopy can be accomplished at any time the pilot feels he has obtained maximum benefit and further retention may be detrimental. Each method of removal has its own advantages and disadvantages. Manual removal is the most time-consuming but has no fire hazard involved. Manual removal should not be attempted if structural damage is suspected, as partial opening could render the jettison feature ineffective. Electrical opening is faster than manual but could initiate a fire. Jettisoning the canopy with the alternate jettison handle is the fastest and should be used whenever fire is present and immediate escape is required.

Warning When the canopy has been jettisoned by means of ejection seat handgrips, the ejection seat is armed and movement of either trigger will eject one or both (F-100F Airplanes) seats.

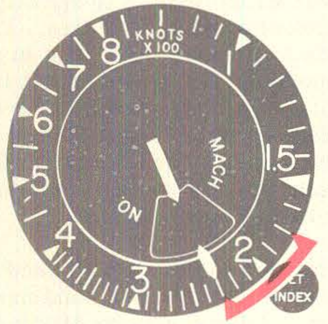
Some airplanes have a canopy breakaway tool installed which can be used as a last resort to remove the canopy.

FLIGHT WITHOUT CANOPY.

Airplane stability and control during flight without a canopy are satisfactory up to an airspeed of 400 knots. With canopy removed, one or both pilots will be subjected to wind blast and noise in proportion to airplane speed. The higher the speed, the greater the noise and the greater the possibility of damage by wind blast whipping any loose items such as shoulder harness straps, oxygen hoses and connections, and radio leads.

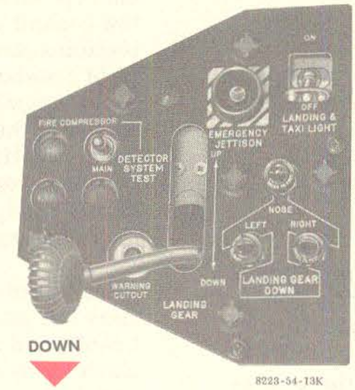
[F] If the rear cockpit is occupied, the occupant will be extremely uncomfortable. Interphone communication cannot be relied upon. At speeds above approximately 225 knots IAS, the rear occupant may lose his helmet and suffer injury. Depending on the situation, it may be advantageous to have the rear occupant eject, rather than be

LANDING GEAR EMERGENCY LOWERING

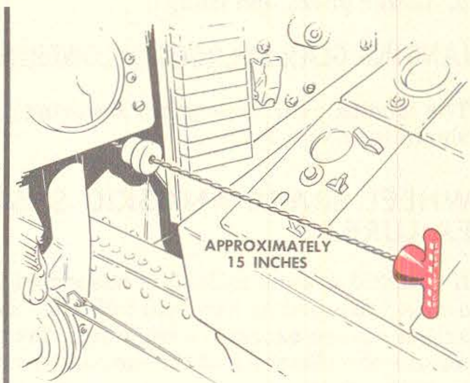


1 **Airspeed—BETWEEN 230 AND 180 KNOTS IAS.**

Reduce airspeed to between 230 and 180 knots IAS. Otherwise, air loads may hold gear doors closed. Below 180 knots, gear may not lock down.

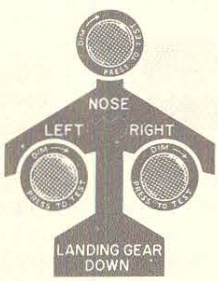


2 **Landing gear handle—DOWN.**



3 **Landing gear emergency handle—PULL.**

Pull to full extension to ensure release of all uplocks; hold handle extended until gear is down and locked.



4 **Landing gear position indicators—CHECK SAFE.**

The red warning light in the landing gear control handle should go out when the gear is down and locked, and landing gear position indicators should show safe indication. If these conditions are not present, proceed to step 5.

5 **Circuit breaker—PULL.**

Pull gear position control circuit breaker on left circuit-breaker panel and repeat steps 1 through 4.

CAUTION

Failure of the landing gear handle control switch may cause immediate gear retraction when the emergency lowering handle is released, regardless of the landing gear handle position. If this type of failure is encountered, pull the gear position control circuit breaker and repeat the emergency lowering procedure.

NOTE

- Yaw airplane to lock main gear if gear down-and-locked indication does not appear after 15 seconds.
- Nose gear cannot be retracted in flight after being lowered by means of the landing gear emergency lowering handle.

CAUTION

Do not pull G in attempt to aid in locking gear down, as use of G increases gear lowering time and may cause damage to gear mechanism.

F-100D-1-A73-7

Figure 3-7

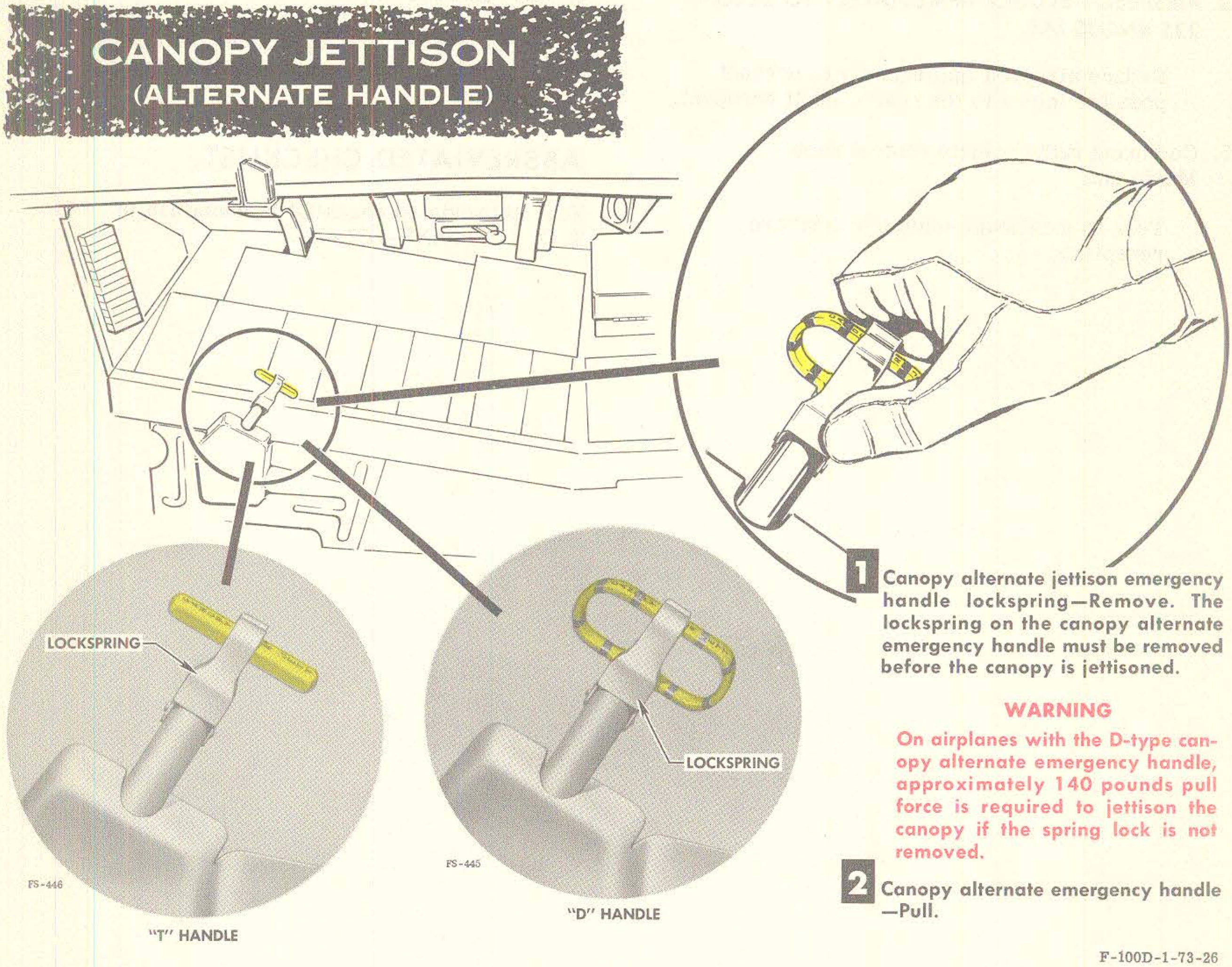


Figure 3-8

subjected to continued flight at higher than recommended speeds.

NOTE If the canopy is broken rather than completely removed, the recommended speed of 225 knots IAS or less may not be the best. The pilot, in this case, must determine the best speed for the specific condition.

While radio reception is poor in any case, reception is possible with the radio volume control turned to maximum.

DURING SOLO FLIGHT.

If canopy loss occurs in flight while only the front cockpit is occupied, proceed as follows:

1. Airspeed - Reduce to about 225 knots IAS.
2. Command radio volume control knob - Maximum.

   Turn to maximum volume to improve reception.

3. Land as soon as practical.

   Use normal final approach and touchdown speeds for the weight and configuration being flown.

[F] DURING DUAL FLIGHT.

If canopy loss occurs in flight while both cockpits are occupied, proceed as follows:

1. WINDSCREEN MANUAL EMERGENCY RELEASE KNOB—PULL.

2. **AIRSPEED—REDUCE IMMEDIATELY TO BELOW 225 KNOTS IAS.**

   Reduce airspeed immediately to prevent possible injury to the rear cockpit occupant.

3. Command radio volume control knob - Maximum.

   Turn to maximum volume to improve reception.

4. Land as soon as practical.

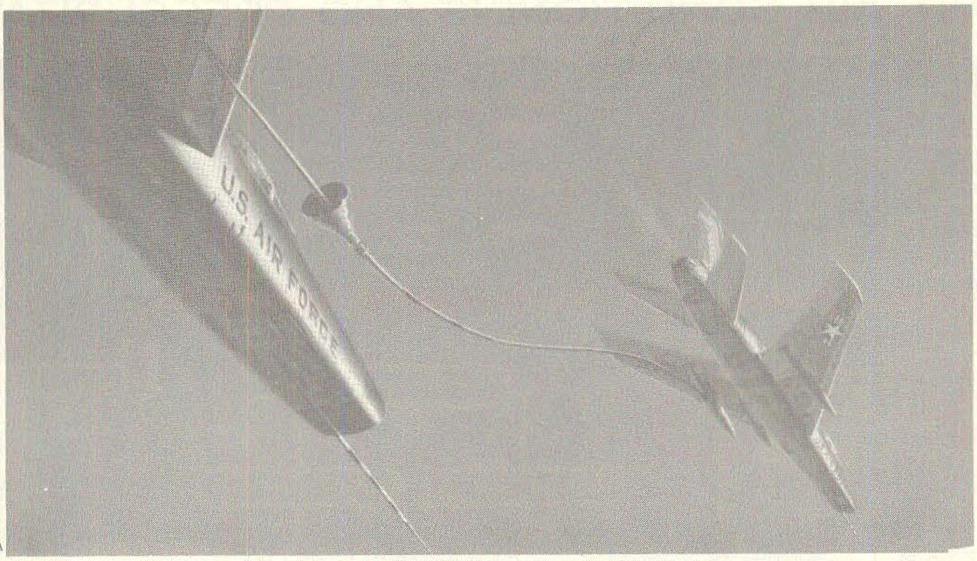
   Use normal final approach and touchdown speeds for the weight and configuration being flown.

ABBREVIATED CHECKLIST.

Your abbreviated checklist is contained in T.O. 1F-100D(I)-1CL-1.

AUXILIARY EQUIPMENT

section IV



F-100D-1-0-29A

TABLE OF CONTENTS

AIR CONDITIONING, PRESSURIZATION, DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEMS.

Hot compressed air, bled from the final stage of the engine compressor, is used by the air conditioning and pressurization system to maintain the desired cockpit temperature and pressure, and to supply the air demanded by the defrosting, anti-icing, and rain removal systems. (See figures 4-1 and 4-3.) The air conditioning and pressurization system provides air for pressurization of the drop tanks, canopy seal, and anti-G suit, and is used for the pilot's ventilated suit and for cooling the electronic equipment compartments. (Refer to "Electronic Equipment Compartment Cooling System" in this section.) An external pressure source may be connected to the system for testing or for cockpit air conditioning during ground operation.

COCKPIT AIR CONDITIONING.

The temperature of the air supplied to the cockpit is regulated by an automatic control system. The system directs the hot, engine compressor bleed air through the ram-air-cooled primary and secondary heat exchangers to a mixing chamber.

(Refer to "Heat Exchanger Cooling Airflow Circuits" in Section VII.) Both the primary heat exchanger bypass valve and the cockpit hot-air bypass valve are positioned by the cockpit temperature control box to provide the selected temperature. Emergency cockpit ventilation is obtained from the manually operated ram-air scoop.

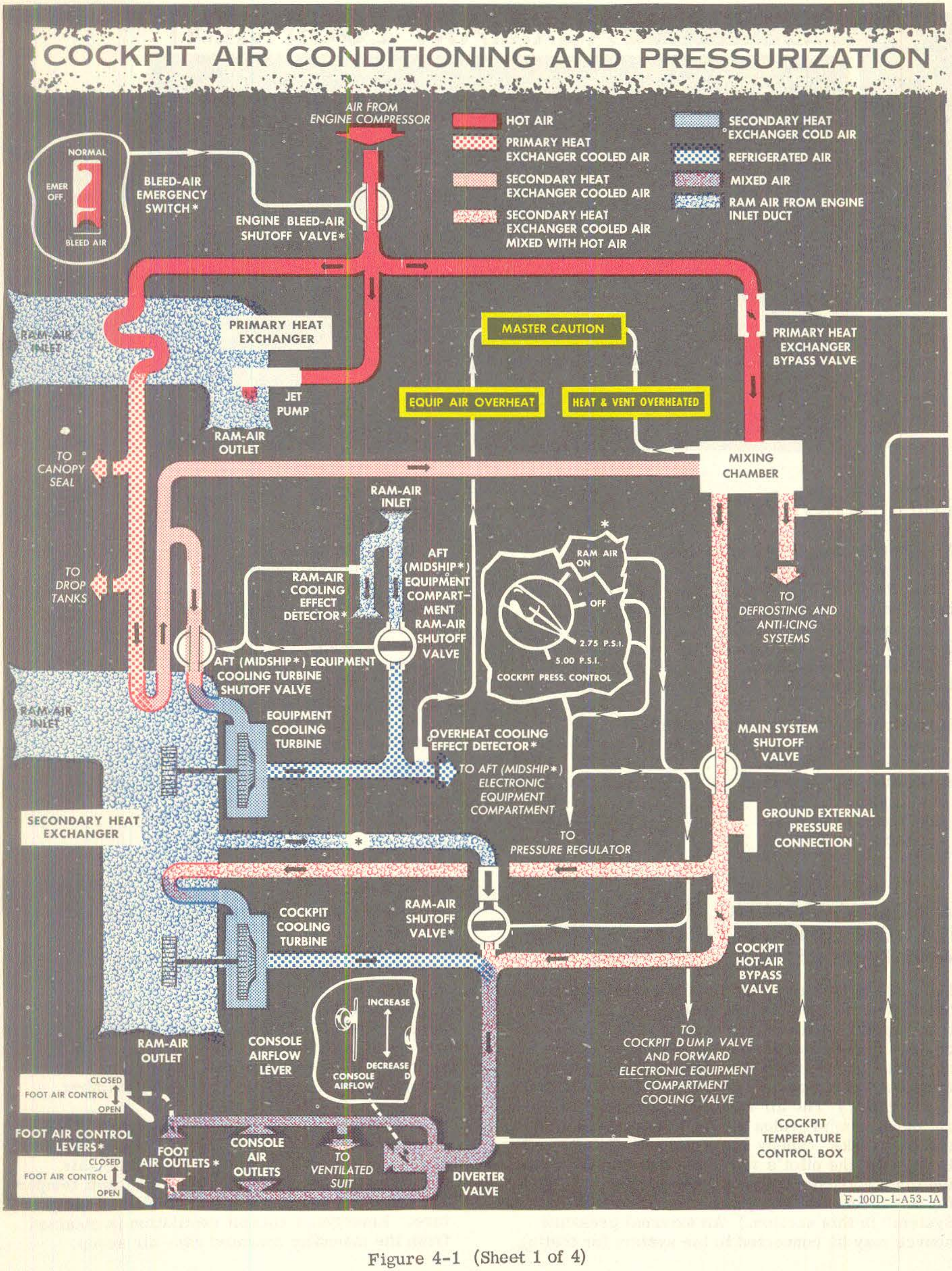


Figure 4-1 (Sheet 1 of 4)

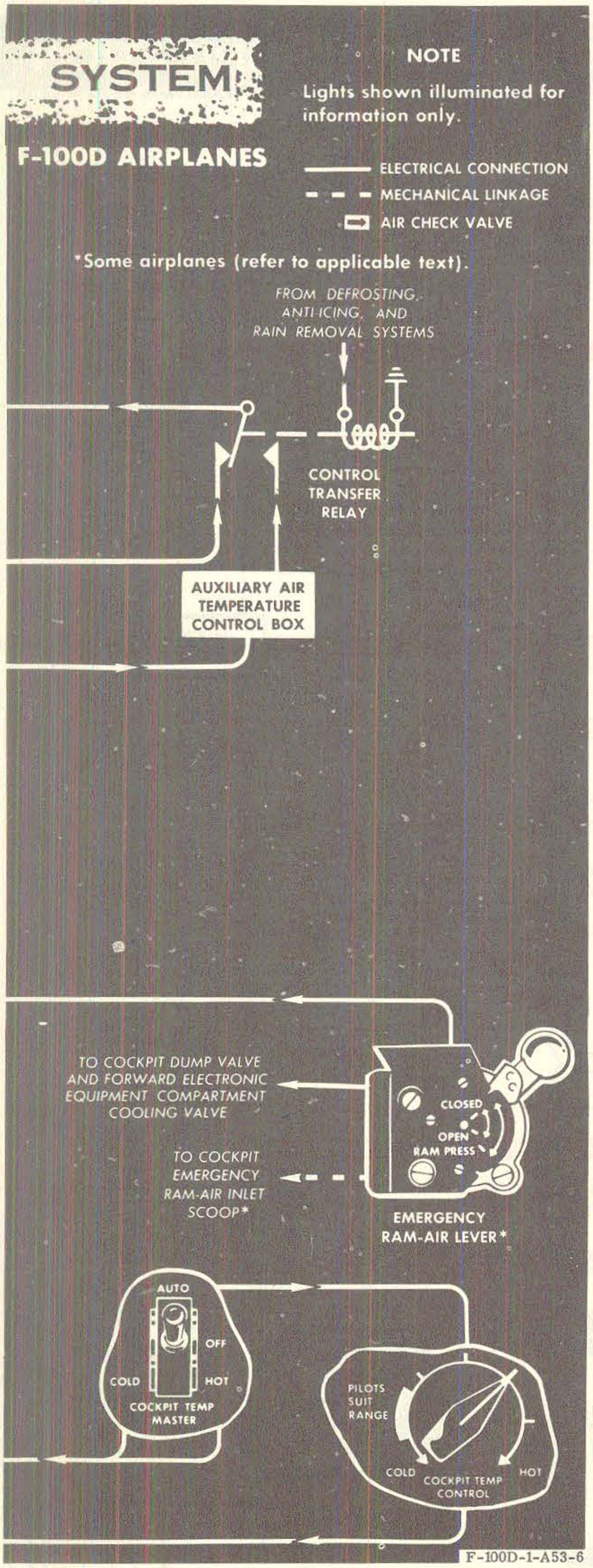


Figure 4-1 (Sheet 2 of 4)

COCKPIT PRESSURIZATION.

Cockpit pressure is maintained above 12,000 feet at a pilot-selected schedule (2.75 psi or 5 psi) by a pressure regulator, which controls the discharge of air conditioning air from the cockpit. When the 2.75 psi schedule is used, a cockpit pressure equal to that at 12,500 feet is maintained to a flight altitude of 21,200 feet, and a constant 2.75 psi differential between cockpit and atmospheric pressure provides a cockpit pressure equal to that at 12,500 feet up to about 31,000 feet and maintains a constant 5 psi pressure differential at altitudes above 31,000 feet. (A comparison of flight altitude to cockpit altitude for the selected pressure schedule is shown in figure 4-2.) If the cockpit pressure regulator fails, the cockpit dump valve automatically relieves any pressure above 5.4 psi. On F-100D-91 Airplanes and F-100F Airplanes, the dump valve can be opened manually by operation of the emergency ram-air lever.

NOTE The minimum engine rpm needed to maintain cockpit pressurization is about 85% to 100%, depending on altitude and selected cockpit pressure schedule.

DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEMS.

Hot engine compressor bleed air for the defrosting, anti-icing, and rain removal systems is taken from the mixing chamber of the air conditioning and pressurization system. (See figures 4-1 and 4-3.) This air is supplied to the canopy and windshield for defrosting, and to the outer surface of the windshield for anti-icing and rain removal. Air from this system is also used for the anti-G suit valve(s), pitot boom anti-icing, and on some airplanes, foot warmers. The engine guide vanes are anti-iced by hot air taken directly from the engine compressor. Whenever the defrosting or anti-icing and rain removal hot-air systems are used, the auxiliary air temperature control regulates the primary heat exchanger bypass valve to maintain the temperature of the mixing chamber at 275°F.

AIR CONDITIONING, PRESSURIZATION, DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEM CONTROLS.

Cockpit Pressure Selector Switch.

The desired cockpit pressure is selected by a primary-bus-powered rotary switch (not in the rear cockpit). (See figure 4-1.) When the switch is at 2.75 P.S.I. or 5.00 P.S.I., the main system shutoff valve is open to direct air to some cockpit air outlets, the ram-air shutoff valve is closed*

* F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

COCKPIT AIR CONDITIONING AND PRESSURIZATION

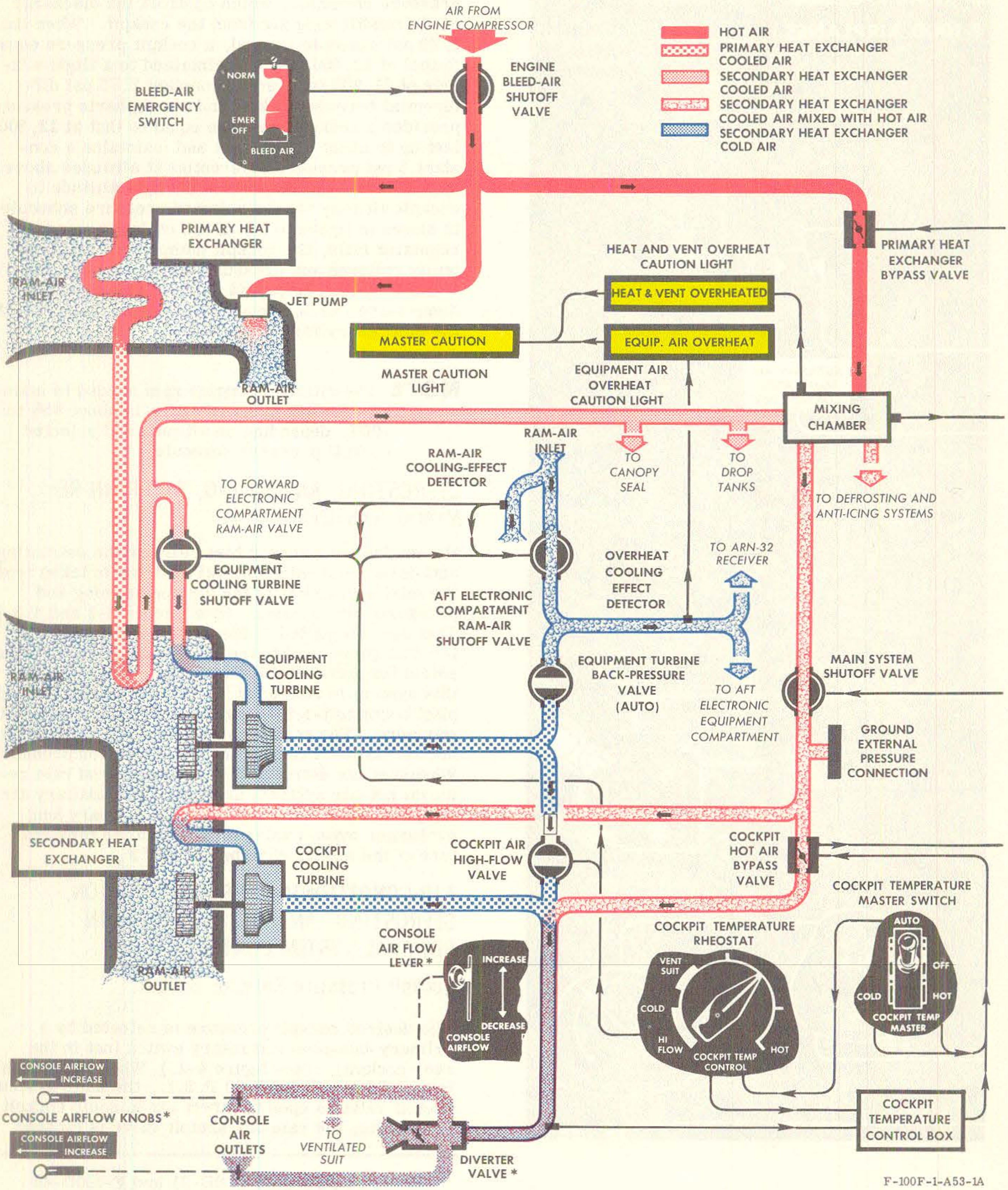
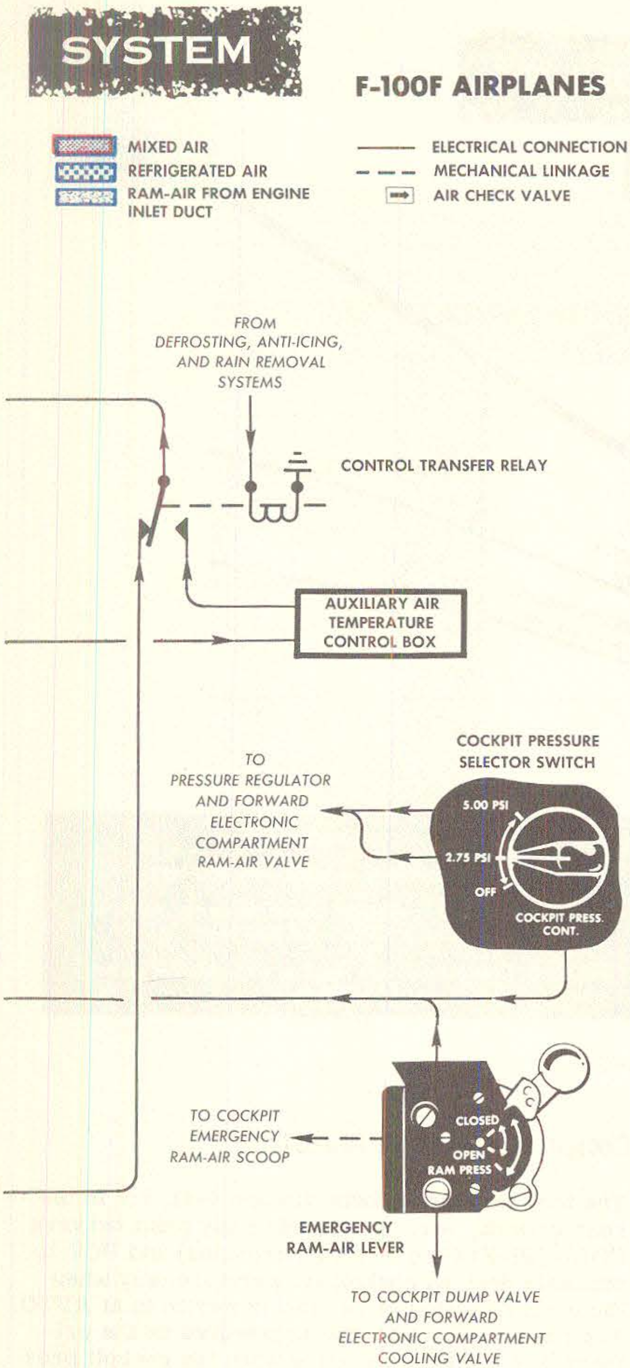


Figure 4-1 (Sheet 3 of 4)



* Some airplanes (refer to applicable text).

NOTE

Lights shown illuminated for information only.

F-100F-1-A53-2A

Figure 4-1 (Sheet 4 of 4)

and the pressure regulator maintains the selected pressure differential in the cockpit. When the selector is at the RAM AIR ON* position, the main system shutoff valve closes, the emergency ram-air valve opens, the dump valve opens to depressurize the cockpit, and the forward electronic equipment compartment cooling valve opens. The RAM AIR ON* position is used in emergencies to eliminate smoke or fumes from the cockpit, or if the pressure or temperature systems do not function correctly.

NOTE When the cockpit pressure selector switch is at RAM AIR ON* or OFF, the cockpit automatic temperature control is inoperative.

Moving the pressure selector switch to OFF closes the system shutoff valve, the ram-air valve, and the cockpit dump valve, and the cockpit pressure regulator is set to 2.75 P.S.I. position. The OFF position is used in emergencies if the cockpit becomes too cold with the cockpit pressure selector at the RAM AIR ON* position. The OFF position is also used to prevent rapid decompression of the cockpit when the cockpit system is shut off at altitude. When the selector is at OFF, cockpit pressure can be maintained by using the defrost system.

NOTE To minimize danger to the pilot resulting from sudden decompression, the cockpit pressure selector should be set at 2.75 P.S.I. during combat.

Warning When the cockpit pressure selector switch is at OFF, 100% oxygen should be used to offset the effects of possible cockpit contamination caused by poor ventilation of the cockpit.

When the cockpit pressure selector switch is at RAM AIR ON* or OFF, the forward electronic equipment compartment ram-air shutoff valve is opened; the pressure selector must be at 2.75 P.S.I. or 5.00 P.S.I. for automatic control of the valve.

Cockpit Temperature Master Switch.

Cockpit air temperature is controlled by primary bus power through a four-position switch (not in the rear cockpit). (See figure 4-4.) For automatic temperature control, the master switch must be at AUTO and the cockpit temperature rheostat must be adjusted to the desired temperature. For selective temperature control, the

* F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

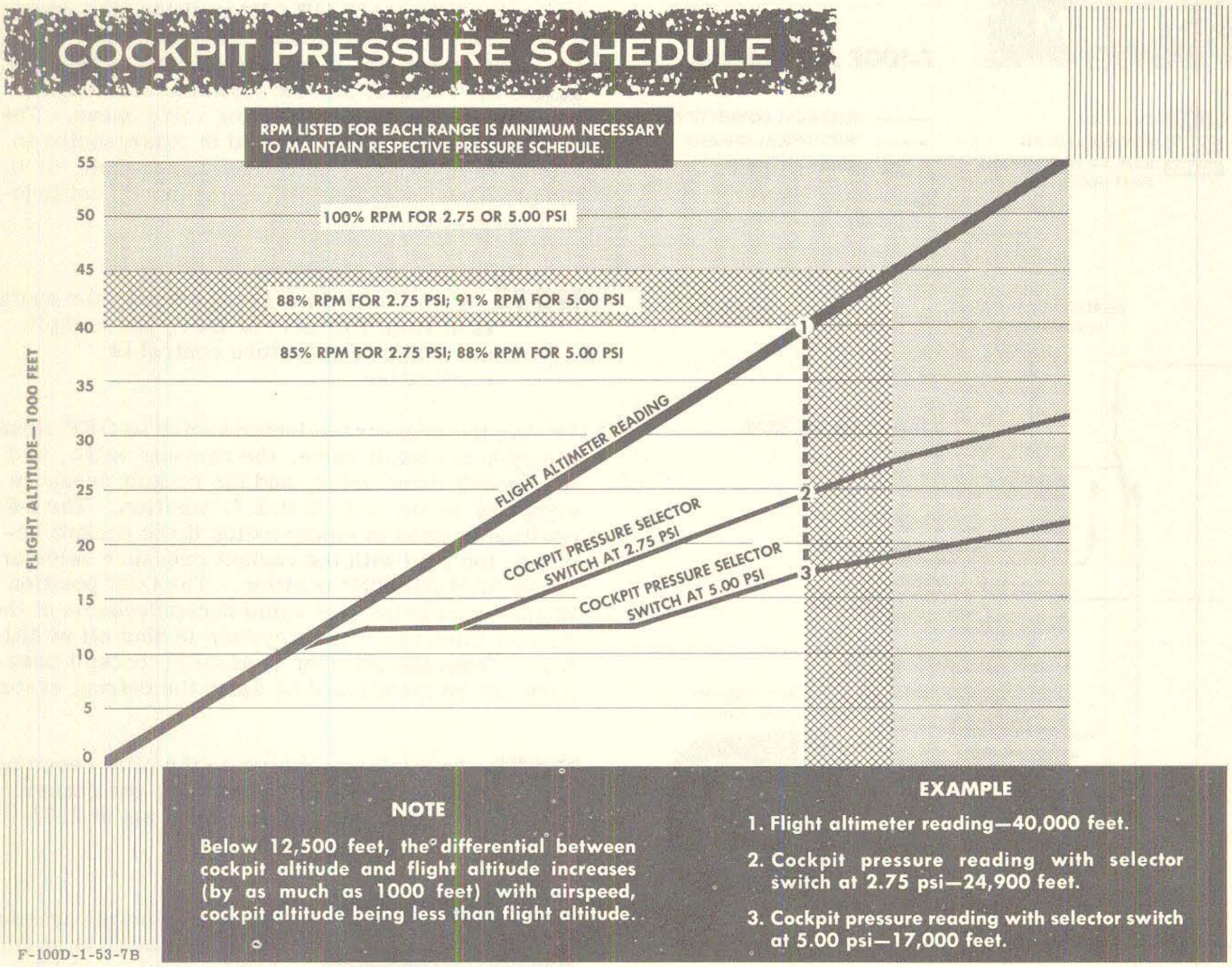


Figure 4-2

temperature master switch should be moved to HOT or COLD. When the switch is moved to HOT, one or both bypass valves are opened to supply hotter air to the cockpit. Moving the switch to COLD closes both bypass valves so that all incoming air is directed through the heat exchangers and the cockpit cooling turbine. However, if the defrosting, anti-icing, or rain removal system is on, only the cockpit hot-air bypass valve responds to the temperature master switch. The combined cycle time for both valves, from full hot to full cold, is about 16 seconds; therefore, the desired temperature can be obtained by momentarily placing the master switch at HOT or COLD, and then moving it to OFF. When the temperature master switch is OFF, the automatic temperature control system is inoperative, and both bypass valves remain in the position they were in at the time the switch was shut off.

Cockpit Temperature Rheostat.

The temperature rheostat (figure 4-4), not in the rear cockpit, may be rotated to any point between COLD (HI-FLO on F-100F Airplanes) and HOT to maintain desired cockpit temperature only when the cockpit temperature master switch is at AUTO. The temperature rheostat is powered by the primary bus and is inoperative when the cockpit pressure selector switch is at OFF or at RAM AIR ON.* The arc of the rheostat marked "PILOT'S SUIT RANGE" (VENT SUIT on F-100F Airplanes) indicates a comfortable temperature zone for the ventilated suit. The rheostat should be within this range when the suit is used. Rotating the rheostat controls temperature of the air entering the suit. On F-100F Airplanes, moving the rheostat range 55 degrees from the full counterclockwise position disengages the automatic control of electronic com-

*F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

DEFROSTING AND ANTI-ICING SYSTEMS

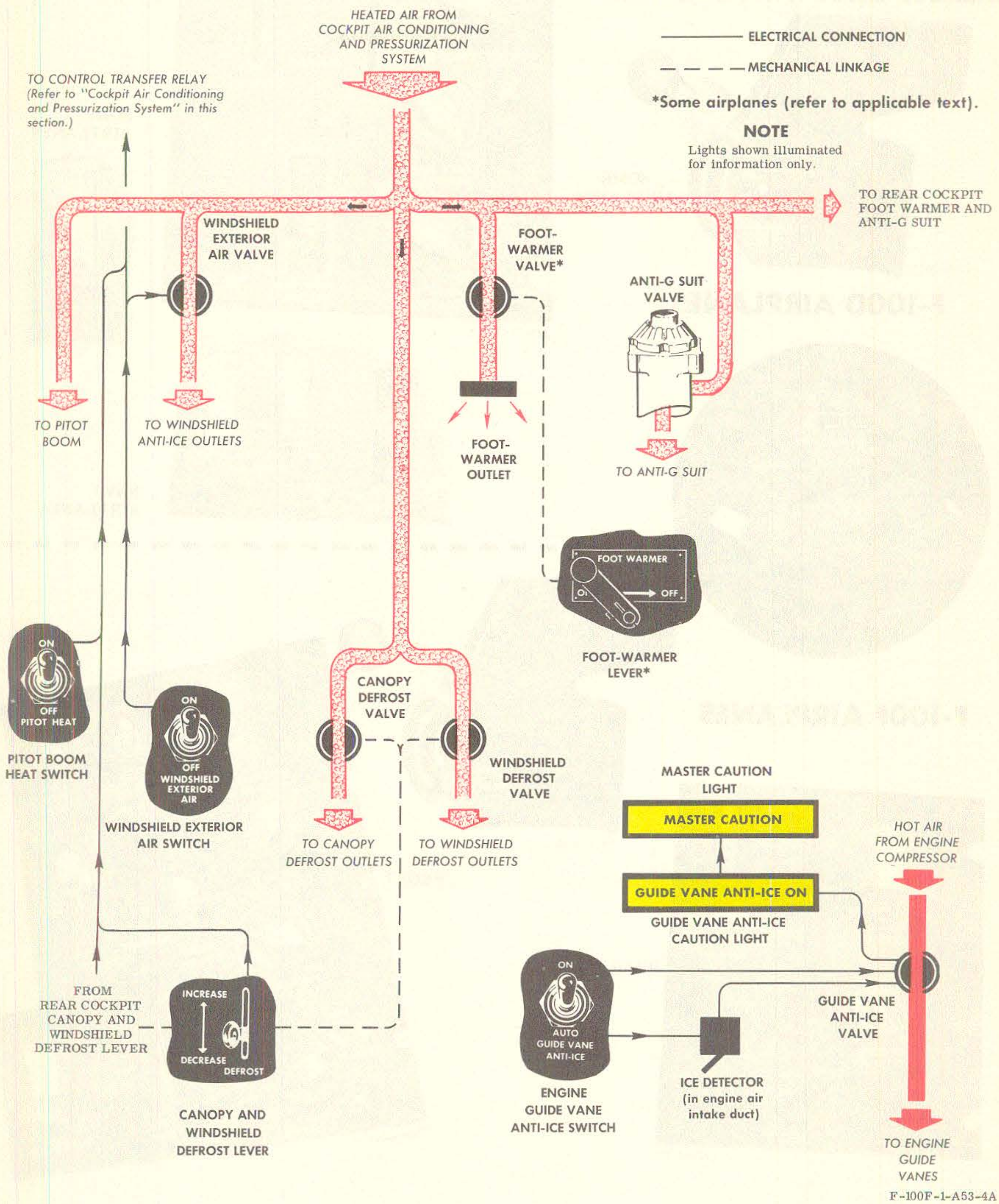
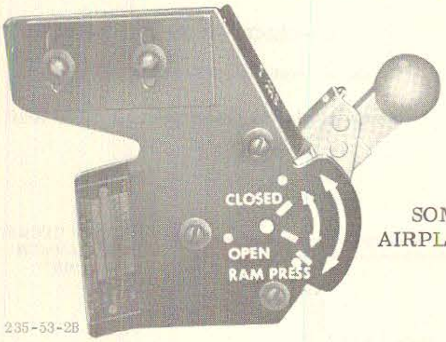


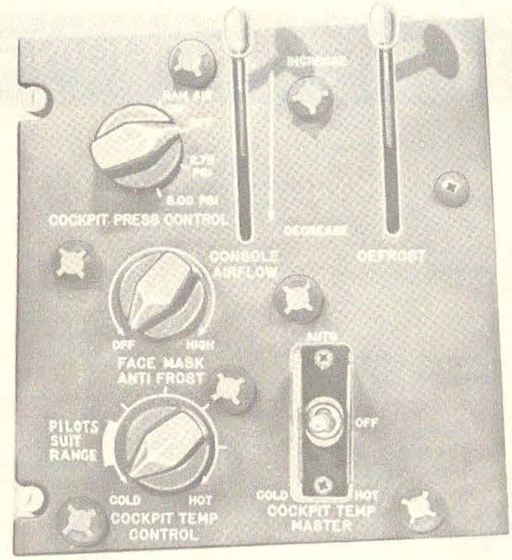
Figure 4-3

AIR CONDITIONING CONTROLS



SOME AIRPLANES

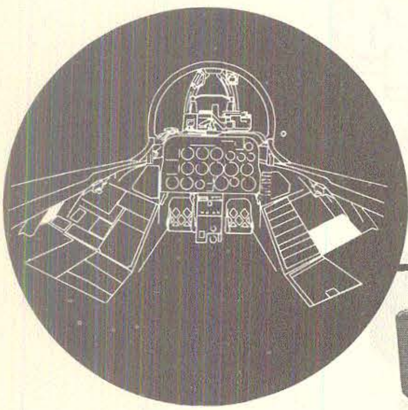
235-53-2B



223-51-20

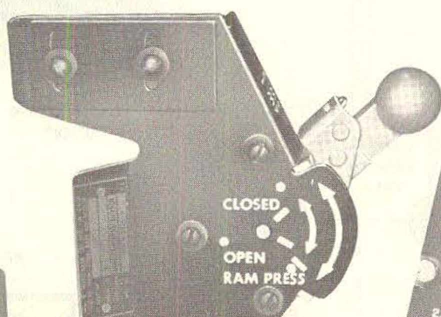
SOME AIRPLANES

F-100D AIRPLANES

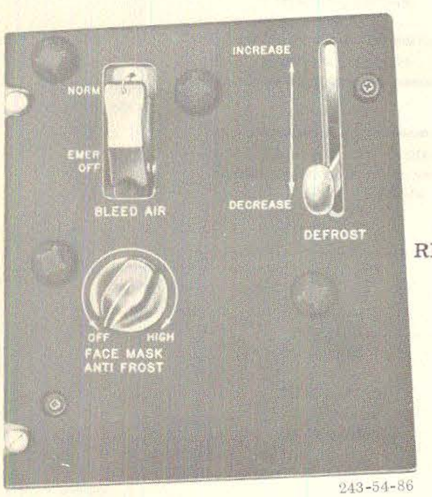


NAVS AIRPLANES

F-100F AIRPLANES



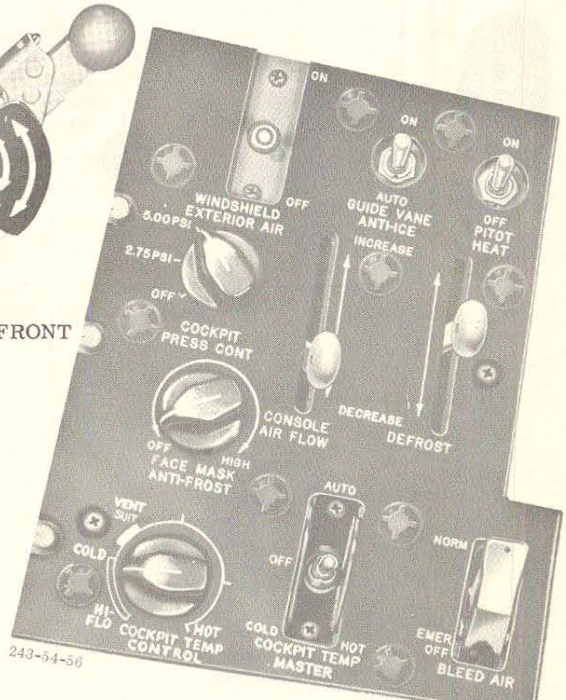
235-53-2B



REAR

243-54-86

FRONT



243-54-56

F-100D-1-A53-3A

Figure 4-4

partment cooling airflow, and opens the cockpit air high-flow valve. Ram air to the forward and aft electronics compartments is shut off when the automatic control is disengaged and the equipment cooling turbine is engaged. About 60 percent of the output of the equipment turbine goes through the cockpit high-flow valve for additional cockpit cooling.

Caution The rheostat must be rotated in small increments to prevent sudden temperature changes which will crack the canopy and rapidly change the temperature of the ventilated suit.

Refer to "Miscellaneous Equipment" in this section for additional information on the ventilated suit.

Bleed-air Emergency Switch.*

A bleed-air emergency switch (figure 4-4) controls the flow of engine compressor bleed air to the air conditioning, pressurization, defrosting, anti-icing, rain removal, canopy seal, and drop tank pressure systems. This switch is powered by the primary bus. The bleed-air switch must be at NORMAL (NORM on F-100F Airplanes) to supply bleed air for normal operation of the systems, and to permit automatic control of electronic equipment compartment cooling. Moving the switch to EMER OFF closes the bleed-air shutoff valve to shut off all engine bleed air, and disengages the electronic compartment automatic airflow control. Ram air to the forward and aft compartment is turned on, and the equipment cooling turbine is shut down.

Warning Moving the bleed-air emergency switch to EMER OFF shuts off engine compressor air and renders inoperative, or shuts off, the following: fuel transfer from the drop tanks, canopy seal, cockpit air conditioning and pressurization, ventilated suit, canopy and windshield defrost, anti-G suit, pitot boom anti-ice, windshield ice and rain removal, and cooling of the aft electronic equipment by refrigerated air.

NOTE On F-100D NAVS airplanes, this switch is identified as the main system bleed-air switch.

Foot-warmer Lever - F-100D-91 Airplanes, and F-100F-11 and Later Airplanes.

Airflow to the foot warmer is controlled by a two-position lever. (See 33, figure 1-6; 35, figure 1-7; 27, figure 1-11; and figure 4-1.) When the lever is at ON, warm air flows through the slots of the cockpit floor shields under the rudder pedals. When the lever is at OFF, the airflow to the foot warmer is shut off.

Foot Air Control Lever.†

The flow of air to the foot outlets is controlled by a foot air control lever (25, figure 1-8) on the forward end of each console. Moving the lever to CLOSED decreases or stops airflow. When the lever is at OPEN, the airflow through the outlet is increased.

Console Airflow Lever.‡

Console airflow is controlled by a lever (figure 4-4), not in the rear cockpit, that directs the flow of air to the outlets along the console and to the outlet behind the seat. Moving the lever forward toward INCREASE mechanically positions a diverter valve, so that more of the air supplied to the cockpit is directed to the ventilated suit, to the console air outlets, and to the foot air outlets.† It is recommended that the console airflow lever be placed at INCREASE when cooling or heating is desired around the upper part of the body.

NOTE With the console airflow lever at full INCREASE, maximum air is available to the ventilated suit.

Moving the lever aft toward DECREASE directs more of the air through the outlet behind the seat, reducing cockpit air circulation but still retaining the same airflow for pressurization.

Console Airflow Knobs.§

A console airflow knob (26, figure 1-12; 25, figure 1-13; 18, figure 1-14; figure 1-15), on each side of both cockpits, controls airflow from the outlets in the respective console. Moving a knob toward INCREASE or DECREASE mechanically positions a sliding panel in the console to provide a corresponding amount of airflow from the outlets.

---

*F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes, and F-100F Airplanes
†F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes
‡F-100D Airplanes, F-100F-2 through F-100F-11 Airplanes, and F-100F-16 Airplanes AF56-3920 through -3984
§ F-100F-16 Airplane AF56-3985 and all later Airplanes

Emergency Ram-air Lever - F-100D-91 Airplanes and F-100F Airplanes.

Emergency ram-air for the cockpit is selected by a ram-air lever. (See figure 4-4.) The lever has three labeled positions, CLOSED, OPEN, and RAM PRESS, with six intermediate positions between CLOSED and RAM PRESS. The lever must be at CLOSED to permit normal pressurization of the cockpit. On F-100F Airplanes, the levers are not interconnected and each lever must be at CLOSED to permit normal pressurization. When the lever (either lever on F-100F Airplanes) is moved from CLOSED to OPEN, the ram-air scoop (respective cockpit scoop on F-100F Airplanes) is mechanically opened into the air stream, allowing ram air into the cockpit. This position of the lever also closes the main system shutoff valve, shutting off the cockpit air conditioning and pressurization system, and opens the dump valve to further depressurize the cockpit. When the lever (either lever on F-100F Airplanes) is moved to RAM PRESS, the main system shutoff valve remains closed and the dump valve closes. Partial pressurization of the cockpit is available in this position (depending on airspeed and altitude) by ram-air pressure. The OPEN position is used to eliminate smoke or fumes from the cockpit, or if the pressurization or temperature systems do not function correctly. When the lever (either lever on F-100F Airplanes) is at OPEN or RAM PRESS, the automatic control of the forward electronic equipment compartment ram-air shutoff valve is bypassed and the valve is open.

Canopy and Windshield Defrost Lever.

Defrosting of canopy and windshield is selected by a defrost lever (fore and aft levers are mechanically interconnected on F-100F Airplanes). (See figure 4-4.) When this lever is moved forward to INCREASE, valves in the system are opened mechanically to distribute heated air to the inner surfaces of the canopy and windshield. Defrost airflow is shut off when the lever is moved aft to DECREASE.

Windshield Exterior Air Switch.

Windshield anti-icing and rain removal airflow is controlled by primary bus power through the exterior air switch (not in the rear cockpit). (See figure 4-16.) When the switch is at ON, the windshield exterior air shutoff valve is open allowing air to flow from the discharge nozzle at the base of the windshield. The exterior air shutoff valve is closed when the switch is at OFF. (Operation of the motor-driven shutoff valve takes about 7 seconds.)

NOTE Refer to "Ice and Rain" in Section IX for information on the effectiveness of the anti-icing and rain removal system during various flight and weather conditions.

On F-100F Airplanes, moving the windshield exterior air switch to ON also bypasses the automatic control of the electronic equipment compartment cooling airflow. Ram air to the forward and aft electronic equipment compartments is then shut off and the equipment cooling turbine is engaged. This prevents air used by the windshield exterior air system from getting too hot.

Engine Guide Vane Anti-icing Switch.

Engine guide vane and anti-icing is controlled by a two-position switch, (not in the rear cockpit). (See figure 4-16.) When the switch is at AUTO, primary bus power arms the ice detector unit, which automatically controls the engine guide vane anti-icing valves. Whenever icing is encountered, the ice detector sends an impulse to the anti-icing valves which open and direct hot air from the engine compressor to deice the guide vanes and accessory nose strut. The valves remain open as long as impulses are being received from the ice detector unit, but close automatically one minute after the last impulse has been sent. The detector unit clears itself of ice in about 17 seconds after sending the impulse to the anti-icing valves, thus preparing itself to detect additional icing and send the ice-presence impulse to the anti-icing valves before the one-minute closing cycle expires. The ON position of the switch bypasses the automatic ice detector and opens the anti-icing valves.

Face Mask Antifrost Rheostat.

The face mask antifrost system is deactivated.

Pitot Boom Heat Switch.

Heat to the pitot boom is continuous while the engine is running, regardless of the position of the pitot boom heat switch (not in the rear cockpit). (See figure 4-4.) When the switch is at OFF, pitot boom heat is provided through the secondary heat exchanger. When the switch is at ON, air from the air conditioning and pressurization system mixing chamber is automatically controlled to 275°F without operating the defrosting or anti-icing system. The switch should be at ON during all take-offs to ensure accurate instrument indications and operation of electronic equipment. After take-off, the switch should be turned OFF unless ice or rain is anticipated. During flight, the switch should be turned ON when ice or rain is anticipated or when icing conditions or areas of visible moisture are encountered.

NOTE Continuous operation of pitot heat over an extended period can cause illumination of the heat and vent system overheat caution light.

The pitot boom heat switch is powered by the primary bus.

AIR CONDITIONING, PRESSURIZATION, DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEM INDICATORS.

Cockpit Pressure Altitude Indicator.

The pressure altitude of the cockpit is shown by an indicator (19, figure 1-9; 22, figure 1-10; 28, figure 1-11; 18, figure 1-13) vented only to pressure within the cockpit.

Heat and Vent System Overheat Caution Light.

A placard-type caution light (figure 1-16) comes on when the temperature of the air in the mixing chamber exceeds 345°F (400°F on F-100F Airplanes). The overheat caution lights are powered by the primary bus, and bulbs in the lights can be tested by use of the indicator light test circuit. (Refer to "Emergency Operation of Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal Systems" in this section.)

NOTE The heat and vent system overheat caution lights may come on on the ground when the battery switch is ON, if external power is not used and if the engine is not running. No overheating is involved during these conditions, and corrective action is not needed unless the lights stay on after engine start.

Engine Guide Vane Anti-ice Caution Lights.

The guide vane anti-ice caution lights (figure 1-16) come on whenever the engine guide vane anti-ice valves are open. These lights are powered by the primary bus, and operation of the bulbs in the lights can be checked by means of the indicator light test circuit.

NOTE Compressor stalls that occur during taxiing and during engine acceleration from low engine speeds may actuate the guide vane anti-ice detector and cause the anti-ice caution lights to come on for about 60 seconds.

NORMAL OPERATION OF AIR CONDITIONING, PRESSURIZATION, DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEMS.

1. Emergency ram-air lever* - CLOSED.

2. Bleed-air emergency switch† - NORM.

3. Cockpit pressure selector switch - Desired pressure schedule.

4. Cockpit temperature master switch - AUTO.

5. Canopy and windshield defrost lever - Toward INCREASE.

NOTE Just before the first flight of the day, the defrosting and anti-icing systems should be operated at full on for a few seconds to eliminate any moisture in the system.

- Fogging and frosting of the windshield or canopy can occur if the cockpit air temperature is lowered, the cockpit air distribution is changed, the cockpit airflow is reduced, or a rapid descent is made. Therefore, before any of these changes is selected, the defrost lever should be moved further toward INCREASE to ensure visibility.

Warning The defrosting system should be operated for take-offs and landings and throughout the flight at the highest possible heat consistent with pilot comfort, to preheat the canopy and windshield and to maintain the glass temperature above cockpit dew point.

6. Cockpit temperature rheostat - Toward HOT.

If cockpit air supply becomes fogged or contains snow, gradually turn cockpit temperature rheostat toward HOT.

Warning The cockpit temperature should be maintained at the highest possible heat consistent with pilot comfort, during take-off, in the landing pattern, and during a go-around, to prevent sudden fog or snow in the cockpit.

7. Console airflow lever (or console airflow knobs) - Desired air distribution.

8. Foot-warmer lever‡ - As desired.

9. Pitot boom heat switch - ON.

The engine thrust setting should be at, or above, 83% rpm.

Warning Under some icing conditions, particularly at high altitude, sufficient

---

*F-100D-91 Airplanes and F-100F Airplanes
†F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes, and F-100F Airplanes
‡F-100D-91 Airplanes, and F-100F-11 and later Airplanes

pitot boom heat may still be unavailable to do the anti-icing. If the boom becomes iced with the pitot heat on, increasing engine power and airspeed and decreasing altitude will assist in ice removal.

10. Windshield exterior air switch - ON, if snow, ice, or rain forms on outer surface of windshield.

Caution To prevent overheating, windshield anti-icing should not be used during ground operations at power settings greater than required for taxiing.

NOTE Improper use of the windshield anti-icing system can cause the heat and vent system overheat caution light to come on. The system is designed to be used only when there is actual rain or ice, or when rain or ice is expected. The overheat condition may occur if the windshield anti-icing system is used during warm, fair weather. If the heat and vent overheat caution light comes on and stays on more than 30 seconds, the emergency operation in this section should be followed.

- During take-off, the overheat caution light may come on temporarily as the airplane passes through the null point. However, if the light remains on for more than 30 seconds, the emergency procedures should be followed.

Cockpit Vapor Dissipation - Rear Cockpit.

During high humidity conditions, the rear cockpit may become filled with water vapor, to the extent that visibility is impaired. This is most likely to occur when the console airflow control is at DECREASE and the cockpit temperature rheostat is within the first one third of its travel. To dissipate, or prevent, the possible formation of water vapor in the rear cockpit, proceed as follows:

1. Move cockpit temperature rheostat to a higher setting if fog continues.

2. Increase defrost lever.

3. Increase console airflow.

4. Cockpit pressure selector switch - OFF before take-off.

   Before take-off, move cockpit pressure selector switch to OFF.

5. Cockpit pressure selector switch - As desired after take-off.

   After take-off, when visual reference from the rear cockpit is no longer critical, the selector switch should be set at the desired pressure schedule. In flight, the cockpit temperature rheostat should be rotated to increase cockpit temperature until the water vapor is dissipated.

EMERGENCY OPERATION OF AIR CONDITIONING, PRESSURIZATION, DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEMS.

NOTE The symptoms of a cooling turbine bearing failure can be smoke entering the cockpit, a vibration, and a screeching noise. These symptoms are similar to those of an engine bearing failure; therefore, the engine instruments should be checked to isolate the failure. (Refer to "Engine Oil System Failure" in Section III.)

Emergency Depressurization (Intentional).

If sudden depressurization of the cockpit is necessary, proceed as follows:

1. Oxygen regulator diluter lever - 100%.

2. Descend to 25,000 feet or below, if circumstances permit.

3. Emergency ram-air lever* - Between CLOSED and OPEN.

4. Emergency ram-air lever* - OPEN (cockpit pressure selector switch - RAM AIR ON†), if resultant temperature is too cold or too hot.

NOTE The cockpit is decompressed rapidly when the cockpit pressure selector switch is moved to RAM AIR ON† or the emergency ram-air lever* is moved from the CLOSED position.

- On F-100D-91 Airplanes and F-100F Airplanes, partial pressurization of the cockpit is available (depending on airspeed and altitude) when the emergency ram-air lever is at RAM PRESS, and the small amount of ventilation depends on how tight the canopy is sealed against leakage.

5. Cockpit pressure selector switch - OFF, and emergency ram-air lever* - CLOSED, if no airflow or pressurization is necessary.

---

* F-100D-91 Airplanes, and F-100F Airplanes

† F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

Warning During this no-ventilation condition, use 100 percent oxygen to offset the effects of possible cockpit contamination.

6. Land as soon as practical.

NOTE After the cockpit has been depressurized, the emergency ram-air lever* must be at CLOSED (cockpit pressure selector switch moved out of RAM AIR ON position on other airplanes), to permit normal operation of the pressurization system.

Emergency Depressurization (Accidental).

If sudden depressurization occurs because of a sudden stoppage of airflow to the cockpit, proceed as follows:

1. Oxygen regulator diluter lever - 100%.

2. Descend to 25,000 feet or below, if circumstances permit.

3. Canopy and windshield defrost lever - INCREASE momentarily.

   This will determine whether normal defrost airflow is available and will offer an indication of where a possible malfunction has occurred.

4. Normal defrost air available.

   If normal defrost air is available, the malfunction has probably occurred downstream of the main system shutoff valve. To minimize possible damage to equipment:

   a. Cockpit pressure selector switch - OFF, or emergency ram-air lever* - OPEN OR RAM PRESS.

      Either of these actions will close the main system shutoff valve.

   b. Cockpit temperature rheostat (F-100F Airplanes) - Move out of HI-FLO.

      This will prevent possible overspeed with resultant damage to the equipment cooling turbine.

   c. Canopy and windshield defrost lever - As needed to help maintain desired cockpit pressurization.

   d. Defrosting, anti-icing, pressurization (except cockpit), and equipment cooling - Use as necessary.

5. Normal defrost air not available.

   If normal defrost air is not available, the malfunction has probably taken place upstream of the main system shutoff valve. To minimize fire hazard due to possible leakage of hot air:

   a. Bleed-air emergency switch† - EMER OFF.

Warning Moving the bleed-air emergency switch to EMER OFF shuts off engine compressor air and renders inoperative, or shuts off, the following: fuel transfer from the drop tanks, canopy seal, cockpit air conditioning and pressurization, ventilated suit, canopy and windshield defrost, anti-G suit, pitot boom anti-ice, windshield ice and rain removal, and cooling of the aft electronic equipment.

   b. Emergency ram-air lever* - OPEN OR RAM PRESS.

      This will allow ram air to enter the cockpit.

6. Land as soon as practical.

Excessive Cockpit Temperature.

If the cockpit temperature control system does not function properly, and if the cockpit temperature is too high, proceed as follows:

1. Canopy and windshield defrost lever - DECREASE.

2. Cockpit temperature rheostat - COLD.

3. Cockpit temperature master switch - COLD.

4. Oxygen regulator diluter lever - 100%.

5. Anti-G suit - Check for excessively hot airflow.

6. If this does not provide cold air, then:

   a. Cockpit pressure selector switch - RAM AIR ON, or emergency ram-air lever* - OPEN.

NOTE This can cause excessively high cockpit air temperature at low altitudes and high

*F-100D-91 Airplanes and F-100F Airplanes
†F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes, and F-100F Airplanes

airspeed (especially at high outside air temperatures). Cockpit temperatures can be lowered by reducing airspeed and/or increasing altitude.

b. Cockpit pressure selector switch - RAM AIR ON, or emergency ram-air lever* - RAM PRESS, if the resultant temperature is not satisfactory.

c. Descend to 25,000 feet or below if circumstances permit.

7. If cockpit heat remains too high:

a. Throttle - Retard to maintain loiter airspeed, and/or increase altitude.

b. Bleed-air emergency switch† - EMER OFF, to shut off all engine compressor bleed air.

Warning Moving the bleed-air emergency switch to EMER OFF shuts off engine compressor air and renders inoperative, or shuts off, the following: fuel transfer from the drop tanks, canopy seal, cockpit air conditioning and pressurization, ventilated suit, canopy and windshield defrost, anti-G suit, pitot boom anti-ice, windshield ice and rain removal, and cooling of the aft electronic equipment.

c. Canopy - Jettison if heat continues or if cockpit becomes hot enough to cause physical injury.

8. If cockpit heat cannot be reduced enough to continue safe flight.

a. External load - Jettison.

b. Land as soon as possible.

Heat and Vent System Overheated.

If the heat and vent system overheat caution light comes on:

1. Cockpit temperature rheostat - COLD, and if light does not go out, cockpit temperature master switch - COLD.

2. Defrosting and anti-icing systems - Turn off, if conditions permit.

3. Oxygen regulator diluter lever - 100%.

4. If light remains on, increase airspeed and/or altitude.

This increases airflow and/or reduces the temperature of ram air to the heat exchangers.

5. Throttle - Retard to lower temperature of engine compressor bleed air.

6. Cockpit pressure selector switch - OFF or RAM AIR ON,‡ if light remains on.

Warning When the cockpit pressure selector switch is at OFF, 100% oxygen should be selected to offset effects of possible cockpit contamination under this no-ventilation condition.

7. Bleed-air emergency switch† - EMER OFF, if light remains on.

This shuts off all engine compressor bleed air. (The engine guide vane anti-icing system will continue operating.)

Warning Moving the bleed-air emergency switch to EMER OFF shuts off engine compressor air and renders inoperative, or shuts off, the following: fuel transfer from the drop tanks, canopy seal, cockpit air conditioning and pressurization, ventilated suit, canopy and windshield defrost, anti-G suit, pitot boom anti-ice, windshield ice and rain removal, and cooling of the aft electronic equipment by refrigerated air.

NOTE When the heat and vent system overheat caution light comes on during landing under icy, rainy, or frosty conditions, the applicable defrosting, anti-icing, or bleed-air switches should not be turned off. The hazard of a completely iced or fogged windshield outweighs any damage resulting from system overheating.

8. Land as soon as practical.

ELECTRONIC EQUIPMENT COMPARTMENT COOLING SYSTEM.

The forward electronic equipment compartment is cooled by air discharged from the cockpit and by

---

*F-100D-91 Airplanes, and F-100F Airplanes
†F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes, and F-100F Airplanes
‡F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

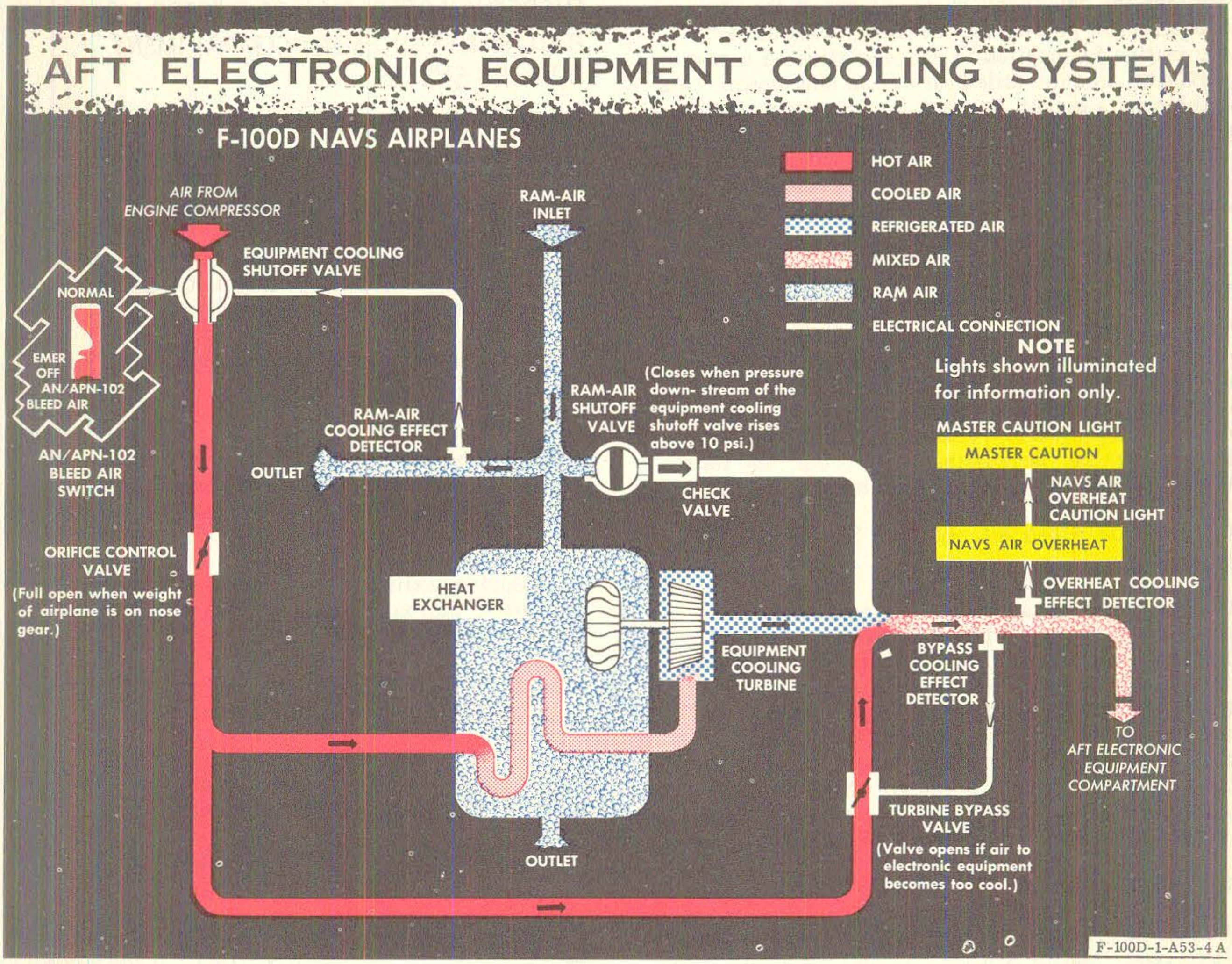


Figure 4-5

ram air from the engine inlet duct. The aft electronic compartment (identified as the midship compartment on F-100D NAVS airplanes) is cooled by ram air from the engine inlet duct or by engine compressor bleed air supplied through the equipment cooling turbine. Air to the aft (midship) equipment compartment is regulated automatically by a cooling-effect detector that controls ram air and the operation of the equipment cooling turbine. When the combination of ram-air temperature and flow (sensed by the cooling-effect detector) is capable of keeping the electronic equipment cool enough for normal operation, ram air is supplied to the compartment. However, whenever the volume and temperature of the ram air do not provide proper cooling for the forward and aft (midship) compartments, the cooling-effect detector shuts off ram air and opens the equipment cooling turbine shutoff valve to engage the turbine. During this condition, the forward compartment is cooled only by cockpit discharge air, and the aft (midship) compartment is cooled by air from the equipment cooling turbine.

The aft compartment, on F-100D NAVS airplanes, has a separate cooling system. (See figure 4-5.) This compartment is cooled either by ram air from a flush scoop at the leading edge of the vertical stabilizer or by engine compressor bleed air that has passed through the aft compartment heat exchanger and cooling turbine. If ram-air cooling is not adequate for the aft compartment, on F-100D NAVS Airplanes, the aft compartment ram-air cooling-effect detector opens the equipment-cooling shutoff valve, provided that the AN/APN-102 bleed-air switch is at NORMAL. When pressure in the line downstream of the equipment-cooling shutoff valve rises above 10 psi, the ram-air shutoff valve closes. The aft compartment is then cooled by the output of the aft compartment turbine. The aft compartment turbine, on F-100D NAVS airplanes, also has an automatic control circuit to shut down the turbine in case of overspeeding.

If either the equipment compartment or the aft compartment cooling turbine fails, ram air is automatically supplied to cool the affected compartment, and the failed turbine is shut down. This also opens a circuit breaker (can be reset on the ground only) to give ground personnel an indication of turbine failure. A caution light indicates an overheat condition of the electronic equipment cooling system.

ELECTRONIC EQUIPMENT COMPARTMENT COOLING SYSTEM CONTROLS AND INDICATOR.

The cockpit pressure selector switch, cockpit temperature rheostat, emergency ram-air lever, windshield exterior air switch, and bleed-air emergency switches affect the equipment compartment cooling system. (Refer to "Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal System Controls" in this section.)

AN/APN-102 Bleed-air Switch - F-100D NAVS Airplanes.

Cooling air to the aft electronic equipment compartment is controlled by the guarded AN/APN-102 bleed-air switch. (See figure 4-4.) Powered by the secondary bus, the switch must be at NORMAL for normal operation of the aft compartment cooling system. Moving the switch to EMER OFF closes the equipment cooling shutoff valve to shut off engine compressor bleed air to the aft compartment cooling turbine. Aft compartment cooling is then supplied by ram air only.

Equipment Air Overheat Caution Lights.

A placard-type caution light (figure 1-16) comes on to read "EQUIP AIR OVERHEAT" when an overheat condition exists in the aft (midship on F-100D NAVS airplanes) electronic equipment compartment. F-100D NAVS airplanes have an additional placard-type caution light (figure 1-16) that comes on to read "NAVS AIR OVERHEAT" when an overheat condition exists in the aft electronic equipment compartment. Illumination of these lights indicates possible failure of the equipment cooling or compartment turbines, failure of the turbine control system, or that the ram air is not capable of cooling the compartments. The caution lights are powered by the primary bus, and bulbs within the lights can be tested by the indicator light test circuit.

NORMAL OPERATION OF ELECTRONIC EQUIPMENT COMPARTMENT COOLING SYSTEM.

Cooling air for the electronic equipment is supplied automatically during normal operation of the cockpit air conditioning and pressurization system. In addition, on F-100D NAVS airplanes, the AN/APN-102 bleed-air switch must be at NORMAL for normal (automatic) operation of the aft electronic equipment cooling system.

EMERGENCY OPERATION OF ELECTRONIC EQUIPMENT EQUIPMENT COMPARTMENT COOLING SYSTEM.

NOTE The symptoms of a cooling turbine bearing failure can be smoke entering the cockpit, a vibration, and a screeching noise. These symptoms are similar to those of an engine bearing failure; therefore, the engine instruments should be checked to isolate the failure. (Refer to "Engine Oil System Failure" in Section III.)

If the equipment air overheat caution lights come on, proceed as follows:

NOTE The equipment air overheat caution lights stay on until ram-air temperature is reduced and airflow is increased for adequate cooling.

1. During taxiing or idle thrust on F-100D NAVS airplanes, increase thrust or turn AN/APN-102 selector switch to EMER OFF.

   If the light remains on, shut off all unnecessary electronic equipment and abort the mission.

2. Cockpit temperature rheostat - Other than COLD or HI-FLO (F-100F Airplanes).

3. Change altitude and/or airspeed.

Caution On F-100D Airplanes, when in level flight, if the equipment air overheat caution light comes on, it is possible that the electronic equipment cooling ("piggy back") turbine has failed. Limiting airspeeds must be followed to prevent overheating damage to the electronic equipment. (Refer to "Airspeed Limitations Due to Electronic Equipment Cooling Turbine Failure - F-100D Airplanes" in Section V.)

4. If equipment air overheat caution lights remain on:

   a. Increase altitude to 25,000 feet or above and airspeed to Mach 0.7 or greater. (This provides ram air to the equipment.)

   b. Shut off all unnecessary electronic equipment.

   c. Land as soon as practical.

NOTE If lights remain on for 15 seconds or more, it should be noted in Form 781.

COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT.

TABLE OF COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT.

See figure 4-6. See figure 4-7 for antenna locations.

RADIO CONTROL TRANSFER SYSTEM - F-100F AIRPLANES.

A radio transfer system permits transfer of all radio control (except the AN/ARN-6 radio compass, which has a self-contained transfer system) between cockpits.

Transfer Buttons.

Momentarily pressing this button (23, figure 1-13; 21, figure 1-15) in either cockpit transfers radio control to that cockpit. A green indicator light within the cap of each button comes on in the cockpit that is in control of the radio equipment. The buttons are powered by the primary bus.

NOTE Transfer of the AN/ARN-6 radio compass control is accomplished by momentarily moving the function selector switch on either radio compass control panel to CONT.

COMMUNICATION AMPLIFIER - AN/AIC-10 - F-100D AIRPLANES.

The AN/AIC-10 communication amplifier system is connected electrically to the AN/ARC-34 command radio, AN/ARN-6 receiver, AN/ARN-21 receiver, landing gear audible warning system, and AIM-9B missile system. The amplifier system amplifies radio signals sent by and received by the pilot. This system incorporates an interphone that provides the pilot and a ground crew member with intercommunications when the airplane is on the ground.

Interphone Switch.

The interphone switch (16, figure 1-9; 18, figure 1-10) is spring-loaded at OFF. When held at MIC, the switch allows the pilot and crew chief to be in direct communication during preflight or postflight operations. A radio jack in the nose wheel well provides the ground crew member with a place to connect the maintenance headset into the system.

COMMUNICATION AMPLIFIER - AN/AIC-10 - F-100F AIRPLANES.

This amplifier is connected electrically to the AN/ARC-34 command radio, AN/ARN-21 receiver, AN/ARN-31 ILS localizer receiver, AN/ARN-6 receiver, AN/ARN-32 receiver, AIM-9B missile system,and landing gear audible warning system. The AN/AIC-10 amplifier system amplifies radio signals sent and received and is controlled by a panel in each cockpit. In addition, it furnishes interphone service between cockpits and interphone service to maintenance personnel through a jack in the nose wheel well.

Communication Amplifier Controls.

MIXER SWITCHES. Five switches (28, figure 1-13; 22, figure 1-15; figure 4-8) control the mixed-signal facility of the amplifier system. When any switch or switches are moved forward, the selected signal or signals can be monitored. When any switch or switches are moved aft, the corresponding receiver signal is cut out for that cockpit only. The only exception to this is that when the function selector switch is at either COMM INTER or COMM, the command radio signals are still received, regardless of the position of the "COMM" mixer switch. Also, when the function selector switch is in the INTER position, the mixer switch marked "INTER" is ineffective. The switch marked "INTER" permits interphone operation when the function selector switch is at COMM INTER; the switch marked "COMM" permits reception of the command radio signals when the function selector switch is at other than COMM INTER or COMM; the switch marked "TACAN" permits reception of the TACAN signals; the switch marked "ADF" permits reception of radio compass signals; and the switch marked "ILS" permits reception of localizer signals.

FUNCTION SELECTOR SWITCH. The communication amplifier function selector switch (figure 4-8) has four positions. The spring-loaded CALL position is used to call the other occupant, regardless of the switch positions on his amplifier control panel. At this position, the volume control is ineffective and it is not necessary to press the mike button on the throttle. Turning the function selector switch in both cockpits to INTER permits communication between occupants by pressing the mike button on the throttle. If the function selector switch is at COMM INTER, command radio signals are received, and the transmissions are heard by both occupants. Selecting the mixer switch marked "INTER" while the function selector switch is at COMM INTER provides a "hot mike" condition for interphone operation that does not require pressing the mike or call button. Turning the function selector switch to COMM permits transmission and reception of command radio signals, regardless of the position of the "COMM" mixer switch, and also permits any function selected by the other mixer switches to be received. The COMM position precludes "hot mike" transmission from that cockpit.

NOTE When COMM INTER or COMM positions are selected, command radio signals are

COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT

TYPE	DESIGNATION (AN)	FUNCTION	RANGE	LOCATION
UHF COMMAND RADIO	ARC-34	TWO-WAY VOICE COMMUNICATION	LINE OF SIGHT	LEFT CONSOLE
RADIO COMPASS	ARN-6	RECEPTION OF VOICE AND CODE COMMUNICATION; POSITION FINDING; HOMING	20 TO 200 MILES, DEPENDING ON FREQUENCY AND TIME OF DAY	RIGHT CONSOLE
AUTOMATIC DIRECTION FINDING §	ARA-25	RECEIVES HOMING SIGNALS FOR AIR REFUELING RENDEZVOUS	LINE OF SIGHT	CONTROLLED BY AN/ARC-34 CONTROL PANEL
TACAN	ARN-21	DISPLAYS AZIMUTH AND RANGE	LINE OF SIGHT UP TO 195 NAUTICAL MILES	RIGHT CONSOLE
COMMUNICATION AMPLIFIER	AIC-10	AMPLIFIES RADIO COMMUNICATION SIGNALS	—	NO CONTROLS—F-100D RIGHT CONSOLE—F-100F
IFF	APX-6A	AUTOMATIC IDENTIFICATION	LINE OF SIGHT	RIGHT CONSOLE
SIF	APX-25	SELECTIVE IDENTIFICATION	LINE OF SIGHT	RIGHT CONSOLE
INSTRUMENT LANDING §	ARN-31	RECEPTION OF GLIDE SLOPE AND LOCALIZER SIGNALS	30 MILES	RIGHT CONSOLE
MARKER BEACON RECEIVER §	ARN-32	RECEIVES MARKER SIGNALS	—	—
ECM	QRC-160A	RADAR COUNTERMEASURES	—	RIGHT CONSOLE

F-100D-1-A71-1A

§ Some airplanes. (Refer to applicable text.)

Figure 4-6

heard, regardless of the position of the "COMM" mixer switch.

"NORMAL - AUX-LISTEN" SWITCH. This communication amplifier switch (figure 4-8) is normally safety-wired at NORMAL. It provides emergency listening in case of interphone amplifier failure. If the amplifier fails, indicated by the loss of interphone communications, break safety wire and move switch to AUX LISTEN. When the switch is at this position, the only signal heard is that of the farthest left (inboard) mixer switch that is in the forward(on) position. The switches to the left of the selected mixer switch must be in the aft (off) position. If all mixer switches are aft (off), the function selector switch becomes the primary control.

NOTE The volume control is not effective when this switch is at AUX LISTEN.

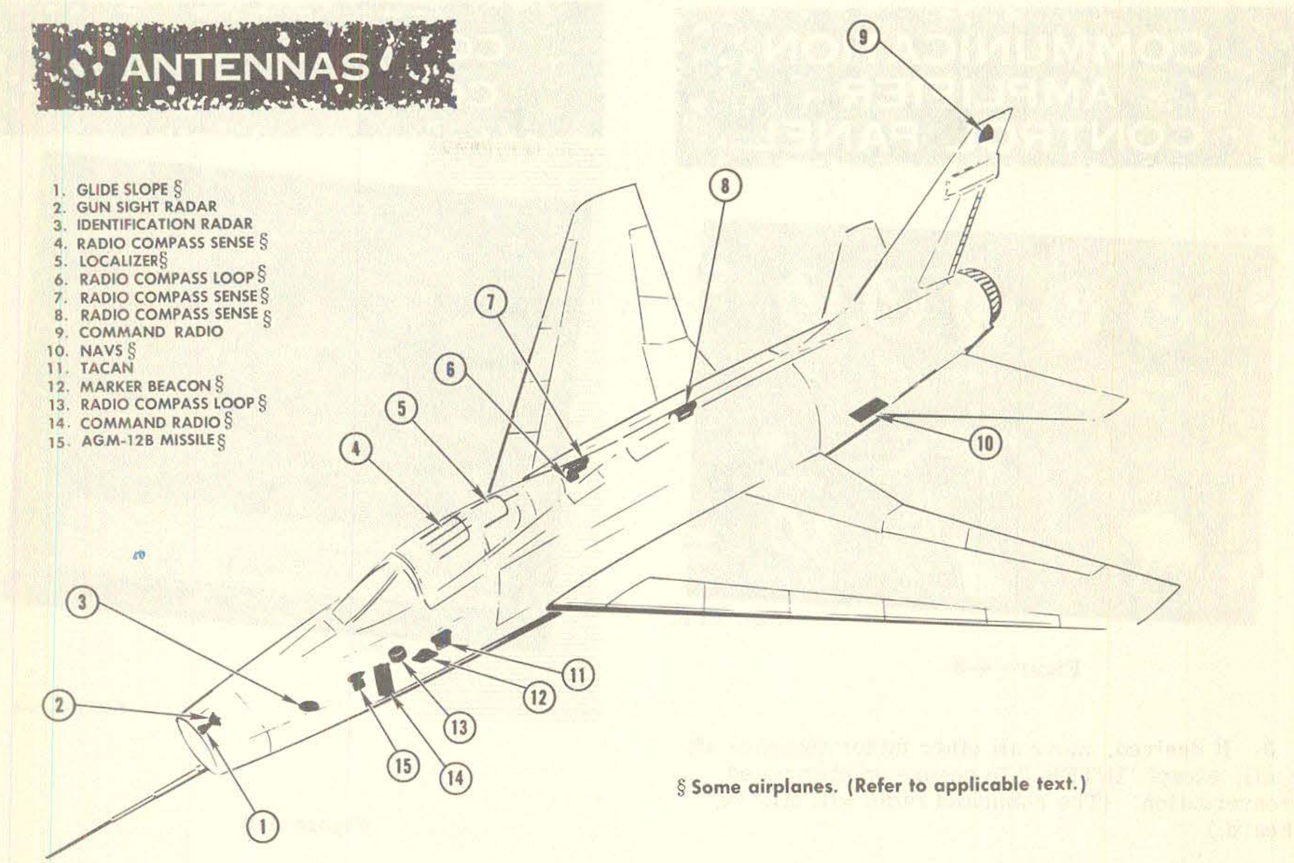


Figure 4-7

- The warning signal for the landing gear and the headset tone for the AIM-9B missiles are not audible when this switch is at AUX LISTEN.

VOLUME CONTROL KNOB. Turning the communication amplifier volume control knob (figure 4-8) counterclockwise reduces the volume of the selected signal. When the knob is turned clockwise, volume is increased. The volume control knob should be set to a position to give the desired interphone communication before adjusting the volume of the radio receivers, as it controls the volume of all receivers, provided the volume level of the individual receiver is adjusted above the volume level of the AN/AIC-10.

INTERPHONE CALL BUTTON. The interphone call button on each throttle (figure 1-18) permits either occupant to call the other, regardless of the position of the amplifier control panel switches.

Operation of AN/AIC-10 Amplifier.

For selective interphone operation only:

1. Rotate function selector switch to INTER.

2. Move all mixer switches, except "INTER," aft (off).

3. Press mike button on throttle, and talk.

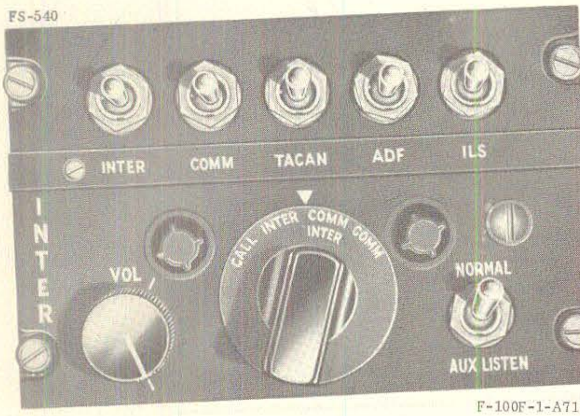
NOTE The mike button must be released to allow the other occupant to reply.

For continuous interphone operation only ("hot mike" condition):

1. Rotate function selector switch to COMM INTER.

2. Move mixer switch marked "INTER" forward (on), and talk.

COMMUNICATION AMPLIFIER CONTROL PANEL



F-100F-1-A71-6A

Figure 4-8

3. If desired, move all other mixer switches aft (off), except "INTER," to ensure uninterrupted conversation. (The command radio will still be heard.)

NOTE It is not necessary to press the mike button before talking.

- If the mike button is pressed, transmission will be outside of the airplane.

For interphone call operation:

1. Rotate and hold function selector switch at CALL, or press and hold call button on throttle to talk to other pilot.

NOTE The other occupant will receive the message, regardless of the position of his function selector switch or mixer switches.

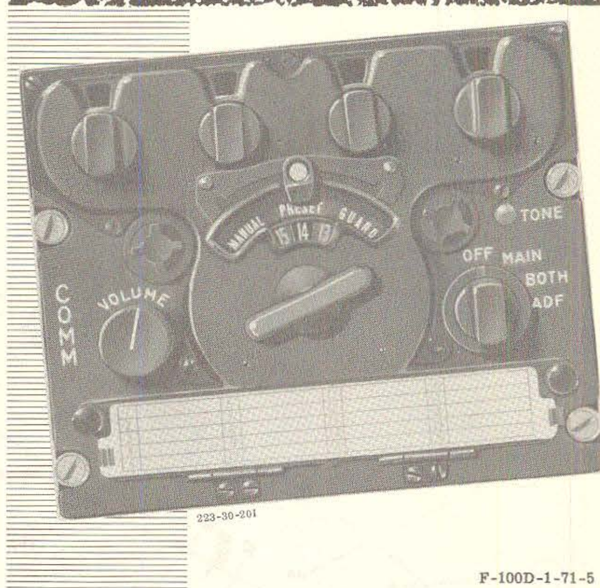
- Whenever the call function is used, it overrides the mike button. This prevents transmission of interphone conversation over the command radio.
- No signal mixing is possible during call operation.

To monitor other radio signals:

1. Rotate function selector switch to INTER, COMM INTER, or COMM.

2. Push desired mixer switches forward (on).

COMMAND RADIO CONTROL PANEL



F-100D-1-71-5

Figure 4-9

NOTE This permits monitoring several different signals simultaneously.

3. Adjust volume as desired.

For command radio transmission:

1. Rotate function selector switch to either COMM INTER or COMM.

2. Press mike button on throttle.

3. Release mike button when transmission is completed to permit receiving reply.

UHF COMMAND RADIO - AN/ARC-34.

This radio, powered by the primary bus, provides voice transmission and reception in the frequency range of 225.0 to 399.9 megacycles. The audio signal is directed through the AN/AIC-10 communication amplifier. The control panel (figure 4-9) permits selection of 20 preset channels. In addition, operating frequencies can be selected manually without disturbing the preset channel frequencies. On F-100F Airplanes, the radio control transfer system selects which cockpit can operate the command radio. Two receivers are used in this equipment. The main receiver normally carries out all reception functions. The guard receiver is ground-tuned to a guard frequency, and may not be changed without removing the remote-control unit from the airplane. Whenever a new frequency is selected, an automatic tuning mechanism tunes the transmitter and receiver to the new frequency. This tuning cycle requires about 4 seconds.

Command Radio Controls and Indicator.

CHANNEL SELECTOR SWITCH. The channel selector switch (figure 4-9) controls the selection of 20 preset frequencies by channel number. When the switch is rotated, channel numbers from 1 through 20 appear in the channel indicator window, above the selector. This window is masked when the sliding selector control is placed in any position other than PRESET.

FUNCTION SWITCH. Rotating the command radio function switch (figure 4-9) from OFF turns the command radio on. (A warm-up period of about one to 2 minutes is required.) When the switch is at MAIN, only the main receiver is audible in the headphones. In the BOTH position, the guard receiver and the main receiver are heard simultaneously. The ADF position is used only with the AN/ARA-25 ADF system. For further information on the ADF position, refer to "AN/ARA-25 Automatic Direction Finding System - Some F-100D NAVS Airplanes" in this section. On F-100F and some F-100D Airplanes, when the switch is placed at ADF, the No. 1 pointer of the radio magnetic indicator will be disconnected from the AN/ARN-6 and will rotate freely.

TONE BUTTON. When the command radio is operating, a continuous tone signal may be transmitted by pressing the tone button. (See figure 4-9.) This occurs on the frequency that is set on the transmitter, and it interrupts reception. A side tone is audible in the headphones while the button is depressed. This feature may be used for direction-finding operations in conjunction with other airplanes and ground stations.

VOLUME CONTROL. The volume control (figure 4-9) regulates the sound level of the signal being heard in the headphones from both command receivers. Adequate control of volume is provided, but the volume may not be reduced below a fixed level. On F-100F Airplanes, if the volume level is above that of the AN/AIC-10 volume, the AN/AIC-10 volume adjustment will control the volume level of the AN/ARC-34.

MANUAL-PRESET-GUARD SLIDING SELECTOR CONTROL AND FREQUENCY KNOBS. The sliding selector control (figure 4-9) controls the method of command radio frequency selection. It is operated by sliding the control through a limited arc across the face of the panel. This control has three positions, MANUAL, PRESET, and GUARD, and is arranged so that when it is in any one position, the other two positions are masked by a semitransparent green glass. When the sliding selector control is placed at MANUAL, the preset channel is deactivated and a mask is removed from in front of the four small windows across the top of the panel, revealing the numerals that make up an operating frequency. On some airplanes, the mask is permanently removed from the four frequency windows. This allows the sliding selector control to be left at PRESET while adjusting the frequency setting knobs. Thus, the operating frequency may be changed while the preset frequency is being monitored.

Caution The frequency windows reveal only manual frequency digits, and do not represent preset frequencies.

Beneath each window is a small frequency knob which, when rotated, changes the numeral and the frequency. This makes it possible to manually select 1750 frequencies within the range of 225.0 to 399.9 megacycles. The frequency range of 329.0 through 335.0 megacycles is reserved for glide-slope frequencies, and 243.0 megacycles is reserved for a guard frequency. Sliding the control to PRESET masks the four small windows, on some airplanes, and deactivates the manually selected frequency. This activates the 20 preset channels controlled by the channel selector switch. Any time a frequency is changed, about 4 seconds is required for the tuning mechanism to complete the cycle. Placing the sliding selector control at GUARD automatically tunes the transmitter and main receiver to the guard frequency set up before the installation of the equipment.

REMOTE CHANNEL INDICATOR. A command radio remote channel indicator (46, figure 1-6; 49, figure 1-7), not in the rear cockpit, is synchronized to the channel selector indicator on the command radio control panel and is controlled by the channel selector switches. The face of the indicator has four windows for display of channel number and frequency. When the selector control is set at PRESET, two of the indicator windows are used to display the number of the preset command radio channel. When the selector control is set at MANUAL, all four indicator windows display the frequency (in megacycles) of the selected channel. When the selector control is set at GUARD, only one window is used to show the letter "G." All indicator windows are blanked when power is off.

Normal Operation of Command Radio.

A complete operational check of the command radio may be made as follows:

1. Before take-off, check frequencies to be used against those listed on frequency card.

2. Check settings of buttons on frequency control drum with frequency card. (To do this, open door to which frequency card is attached. The channel number which corresponds to the preset frequency appears in a window at the left of the buttons. The frequency numbers of this channel are listed above the buttons.)

3. On F-100F Airplanes, press radio control transfer button.

4. Check operation of transmitter and main receiver with sliding selector control in each position.

5. Check operation of guard receiver, using BOTH position of function switch.

6. For initial channel selection, select a channel other than the one to be used until warm-up is completed, or after warm-up, switch to another channel and then back to the one desired. If the desired channel is selected before warm-up is completed, reduced performance due to mistuning may result.

7. Adjust volume as desired. On F-100F Airplanes, coordinate volume adjustment with AN/AIC-10 volume control.

8. For manual selection of a frequency that is not included in the preset channels, move sliding selector control to MANUAL. Use frequency knobs across top of panel to establish desired frequency. (The function switch must be at MAIN or BOTH for this operation.)

NOTE Do not manually select a frequency of less than 225.0 mc. The transmitter will attempt to tune to this frequency, and after 90 seconds the transmitter will shut down. To restore transmission, turn function switch to OFF, wait 30 seconds, and then select a higher frequency.

9. To obtain transmission and reception of guard frequency only, move sliding selector control to GUARD.

NOTE Transmission should not be made on emergency (distress) frequency channels except for emergency purposes. For test, demonstration, or drill purposes, the radio equipment should be operated in a shielded room to prevent transmission of messages that could be construed as actual emergency messages.

- This procedure places the equipment in condition to receive. Transmission on the same frequency is obtained by depressing the microphone button; however, if it is desired to change the transmitter frequency, the microphone button should be released before the frequency is changed. If transmission is attempted before completion of channelization cycle, reduced performance may result.

10. Turn off receiver-transmitter by moving function switch to OFF.

Emergency Operation of Command Radio.

SUDDEN LOSS OF TRANSMISSION AND RECEPTION. If the command radio will not transmit or receive satisfactorily within the range of the equipment, change airplane attitude or heading to obtain line-of-sight range for antenna.

CHANNEL SELECTION AFTER ENGINE SHUTDOWN OR ENGINE FAILURE. If it is necessary to select another frequency channel, selection should be done as soon as possible after engine shutdown or engine failure, so that electrical power is available to complete selection.

Caution The channel selector system will hang up between channels when battery voltage is low.

RADIO NOT OPERATING. In the case of apparent failure of command radio, attempt operation in alternate positions of sliding selector control and/or alternate positions of function switch. Turn equipment off for several minutes; then turn function switch to type of operation desired. If the protective relay in the tuning mechanism was responsible, this action will restore operation. Check circuit-breaker panel for tripped condition of the AN/AIC-10 amplifier.

Under certain command radio malfunctions, operation may be restored by transferring control to the other cockpit.

Under certain command radio malfunctions, the tone signal will function properly when either the transmitter fails or both the transmitter and receiver fail. Emergency signal or acknowledgment may then be accomplished.

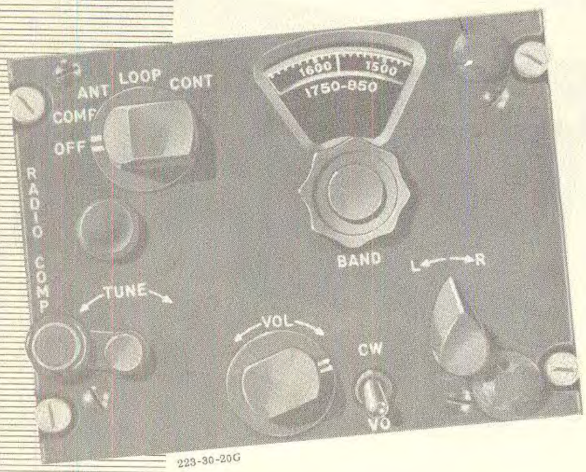
AN/ARA-25 AUTOMATIC DIRECTION FINDING SYSTEM - SOME F-100D NAVS AIRPLANES.

The airplane has provisions only for an AN/ARA-25 automatic direction finding system.

RADIO COMPASS - AN/ARN-6.

The AN/ARN-6 radio compass is a navigational aid that drives the No. 1 (ADF bearing) pointer of the radio magnetic or bearing-distance-heading indicator. (Refer to "Radio Magnetic Indicator" or "Bearing-Distance-Heading Indicator - F-100D

RADIO COMPASS CONTROL PANEL



F-100D-1-72-4

Figure 4-10

NAVS Airplanes" in this section.) Four separate frequency bands are provided: band one, 100 to 200 kilocycles; band two, 200 to 410 kilocycles; band three, 410 to 850 kilocycles; and band four, 850 to 1750 kilocycles. The controls (figure 4-10) permit receiver frequency selection, volume control, selection of automatic or manual loop direction finding, and range reception. On F-100F Airplanes, transfer of the radio compass controls is obtained by moving the selector switch on either control panel momentarily to CONT. On F-100D Airplanes, the CONT position is inoperative. The sense antenna is in the canopy on F-100D-21 through F-100D-76 Airplanes and F-100F-2 and F-100F-6 Airplanes; and in the dorsal fairing on F-100D-81 and later airplanes and F-100F-11 and later airplanes. The loop antenna is in the dorsal fairing on F-100D Airplanes, and in the lower fuselage forward of the nose wheel door on F-100F Airplanes. (See figure 4-7.) The radio compass controls are powered by the secondary bus.

Operation of Radio Compass.

Refer to Pilot's Instrument Handbook, AFM 51-37, for information on operation of radio compass.

COURSE INDICATOR.

Signals from the TACAN receiver, glide slope or localizer receiver, or NAVS system are directed into the course indicator (40, figure 1-6; 31, figure 1-7; 30, figure 1-11; figure 4-23). A small heading pointer shows angular difference between the airplane heading and the selected course up to 45 degrees left or right with reference to a selected radial, both "to" and "from" the selected station. A course deviation indicator (vertical pointer), when used with TACAN (or localizer on F-100F Airplanes), shows positional deviation of the airplane from a selected radial, up to a maximum deflection of about 10 degrees either side of center in the TACAN system, and about 2-1/2 degrees either side of center in the localizer system. On F-100D NAVS airplanes, when operating in the NAVS mode, the course deviation indicator is used as a remote off-track indicator where minimum deflection indicates 250 feet off track and maximum deflection indicates 7 miles off track. A glide slope indicator (horizontal pointer) is operated by the glide slope receiver on F-100F Airplanes for descent guidance during ILS operations. On F-100D Airplanes, the horizontal pointer is inoperative. A "SET" knob on the lower left corner of the instrument is used to select a desired radial, the magnetic value of which appears in a window at the top of the instrument. A window in the upper left corner of the instrument display a "TO" or a "FROM" indication. If the selected course is intersected and flown, the window will display whether flight is toward or away from the station. An amber light in the upper right corner of the instrument is inoperative on F-100D Airplanes without NAVS. On F-100D NAVS airplanes, this light comes on to read "TACAN" when operating in that mode. On F-100F Airplanes, this light is connected to the marker beacon receiver and comes on whenever the receiver detects a 75-megacycle signal. The light is the press-to-test type. The course indicator is provided with "OFF" flags that become visible at any time a received signal is unreliable, and when the equipment is shut off, either intentionally or because of electrical power failure.

RADIO MAGNETIC INDICATOR.

The radio magnetic indicator (38, figure 1-6; 32, figure 1-11) is a dual-pointer instrument which receives heading information from the J-4 compass system. This results in the operation of a rotating compass card, providing a magnetic heading displayed against a fixed reference marker at the 12 o'clock position on the dial. Signals from the AN/ARN-6 radio compass receiver and from the AN/ARN-21 TACAN receiver are fed into the instrument to drive a set of pointers; this provides radio bearing information, which is read directly from the instrument as magnetic bearing to the station. The single-barred, No. 1 (ADF bearing) pointer is driven by the radio compass receiver, and the double-barred, No. 2 (TACAN bearing) pointer is driven by the TACAN receiver.

BEARING-DISTANCE-HEADING INDICATOR - F-100D NAVS AIRPLANES.

Refer to "NAVS System - F-100D Airplanes" in this section.

TACAN - AN/ARN-21.

The TACAN system is a navigational aid, capable of providing bearing and slant range in nautical miles to a surface beacon. It transmits an interrogation signal from the airplane to the surface station beacon, which receives the same signal and retransmits it back to the airplane. The equipment in the airplane accepts only the answer to its interrogation signal. Slant range in nautical miles from the airplane to the surface beacon is computed by electronic measurement of elapsed time and is shown on a range indicator. The surface beacon also transmits a Morse code identification signal every 38 or 75 seconds. This system has a line-of-sight range of about 195 nautical miles. On F-100F Airplanes, the radio control transfer system determines which cockpit has control of the TACAN system.

Caution Do not select channels above 126 or below 01 because of possible damage to the equipment.

TACAN Controls and Indicators.

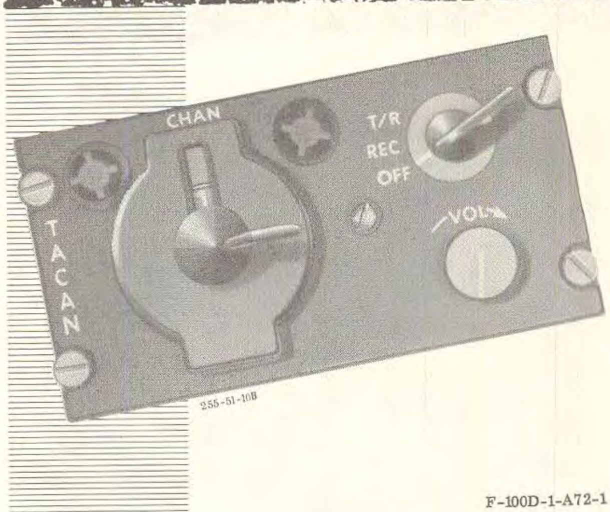
TACAN-NAVS CHANGE-OVER BUTTON - F-100D NAVS AIRPLANES. Refer to "NAVS System - F-100D Airplanes" in this section.

ILS-TACAN SWITCH. Refer to "Instrument Landing System (ILS) - AN/ARN-31 - F-100F Airplanes" in this section.

FUNCTION SWITCH. When the function switch (figure 4-11) is at T/R, the system transmits an interrogation signal to the surface beacon for range information and receives bearing information from the surface beacon. Moving the function switch to REC stops the transmitting of the interrogation signal and only bearing information is received from the surface beacon. When the function switch is moved to OFF, the TACAN equipment is shut off and a red bar drops across the range indicator. The function switch is powered by the secondary bus and the main ac bus.

CHANNEL SELECTOR SWITCH. The channel selector switch (figure 4-11) permits selection of any of the 126 channels for air-to-ground transmissions. These channels cover 1025 to 1150 megacycles with a one-megacycle separation. The switch consists of a large circular knob and a small handle. The circular knob selects the first two digits, and the handle selects the third digit of a desired channel; thus, any combination of chan-

TACAN CONTROL PANEL



F-100D-1-A72-1

Figure 4-11

nels up to 126 can be set up in the channel window. Power for the channel selector switch is from the main ac bus.

NOTE Allow about 12 seconds after channel selection for the TACAN bearing pointer and the range indicator to correctly indicate the new information.

VOLUME CONTROL KNOB. The volume control knob (figure 4-11) adjusts the audio signal strength of the surface beacon identification tone. Rotating the knob clockwise increases the tone. Power for the volume control is from the main ac bus.

BEARING POINTER. The TACAN bearing pointer (radio magnetic indicator or bearing-distance-heading indicator) indicates the relative bearing to the surface beacon from the airplane position. The pointer provides radio bearing information that is read directly from the indicator as magnetic bearing to the beacon. The indicator operates when the function switch is at either REC or T/R. If the bearing signal is lost or interfered with, such as a steep bank which might place the antenna away from the surface beacon, a memory circuit in the receiver maintains the last bearing received for about 3 seconds. If the signal is still disrupted after the time limit, the bearing pointer spins counterclockwise until the signal is picked up again. If the airplane is above a 40-degree angle from the surface beacon, the TACAN bearing pointer keeps spinning until the airplane is back within this limit. During a channel change or when the equipment is first turned on, the bearing pointer may falsely lock on momentarily to a bearing, but as the correct data is fed into the system, the pointer will swing to the correct bearing. Therefore, wait a few seconds after a lock-on before relying on the bearing indicated.

RANGE INDICATOR. The range indicator (37, figure 1-6; 32, figure 1-7; 34, figure 1-11) shows in nautical miles the slant range from the airplane to the surface beacon by means of figures displayed in a small window in the center of the instrument. The indicator operates only when the function switch is at T/R. When the indicator is inoperative or when the channel is being changed, a red bar drops down and covers the figures. If the return signal from the surface beacon is lost because of interference or because the airplane is beyond range of the station, a memory circuit retains for about 10 seconds the last distance before the interruption; then the red bar drops across the figures. When the airplane is back within range, the indicator corrects itself and the red bar disappears automatically. There will be a momentary false indication when the equipment is first turned on or when changing channels. However, wait a few seconds to ensure that the indication can be relied upon.

NOTE On F-100F Airplanes, the range indicator in the front cockpit becomes inoperative when radio control is transferred to the rear cockpit. Likewise, when radio control is transferred to the front cockpit, the rear cockpit range indicator becomes inoperative.

COURSE INDICATOR. Refer to "Course Indicator in this section.

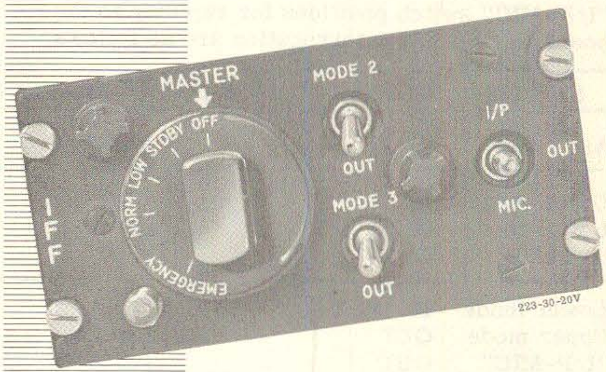
Operation of TACAN.

Refer to Pilot's Instrument Handbook, AFM 51-37, for information on operation of TACAN.

IDENTIFICATION RADAR - AN/APX-6A.

The AN/APX-6A identification radar (IFF) is used to identify automatically the airplane in which it is installed, whenever it is properly challenged by suitably equipped air or surface forces. The set also has provisions for identifying the airplane in which it is installed as a specific friendly airplane within a group of other airplanes. It has means of transmitting a special distress code when challenged. This set receives challenges and transmits replies to the source of the challenges. These replies are displayed, together with the associated radar targets, on the radar indicators of the challengers. When a radar target is accompanied by a proper reply from the IFF set, the target is considered friendly. Controls for the set are on the

IFF CONTROL PANEL



F-100D-1-74-6

Figure 4-12

IFF control panel (figure 4-12) on the right console (not in the rear cockpit). These controls consist of a rotary-type master switch, two mode switches, and an "I/P-MIC" switch. The master switch has five positions: EMERGENCY, NORM, LOW, STDBY, and OFF. The upper mode switch has two positions: MODE 2 and OUT. The lower mode switch has two positions: MODE 3 and OUT. The "I/P-MIC" switch has three positions: I/P (identification position), OUT, and MIC. The switch is spring-loaded to OUT.

An AN/APX-25 SIF (selective identification feature) is formed when a coder and an SIF control panel are connected to the AN/APX-6A system. Since the transponder is the main unit of both the IFF and SIF systems, the transponder must be adapted to the system in use. This is accomplished by a two-position switch in the transponder. The switch positions are NORM and MOD. The switch determines whether or not the coder and the SIF control panel are connected into the transponder. When the switch is at NORM, the system operates as an AN/APX-6A system. When the system is at MOD, the system operates as an SIF system. Refer to "Identification Radar - AN/APX-25" in this section. The AN/APX-6A system is powered by the secondary bus and main three-phase ac bus.

Operation of Identification Radar - AN/APX-6A.

IFF replies are specific to the limit of replying to any of three modes of interrogation. Mode 1 operation is established when the master switch is at either LOW or NORM and both mode switches and the "I/P-MIC" switches are at OUT. In the LOW position, the sensitivity of the receiver is reduced and it replies only to strong interrogation from nearby equipment. Full sensitivity is established with the master switch at NORM. Mode and "I/P-MIC" switch positions for replying to the possible modes of interrogation are as follows:

SWITCH	POSITION	MODE OF OPERATION
All	OUT	1
Upper mode Lower mode "I/P-MIC"	MODE 2 OUT OUT	1 and 2
Lower mode Upper mode "I/P-MIC"	MODE 3 OUT OUT	1 and 3
Upper mode Lower mode "I/P-MIC"	MODE 2 MODE 3 OUT	1,2, and 3

The "I/P-MIC" switch allows ground control to single out, by radio request for identification, an individual airplane from a high air traffic density. Operation on I/P can be established in three ways: by moving the "I/P-MIC" switch to the momentary I/P position (a holding circuit provides a continuous signal transmission for 30 seconds), or by moving the switch to MIC and pressing the microphone button on the throttle or the tone button on the command radio control panel (command radio must be on). The I/P reply is the same as the mode 2 reply and is transmitted in response to each mode 2 interrogation. Perform the following steps for operation of the AN/APX-6A system.

NOTE The IFF frequency counters must be set to proper frequency channels and the transponder switch must be at NORM.

1. Rotate IFF master switch to STDBY for a 3-minute warm-up period.

2. Rotate IFF master switch to NORM for full sensitivity and maximum performance.

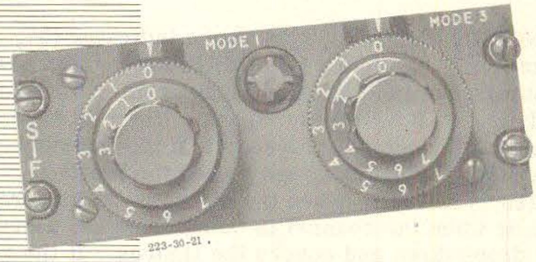
NOTE The LOW position (partial sensitivity) of the master switch should not be used except on proper authorization.

3. Set mode switches and "I/P-MIC" switches at OUT, unless otherwise directed.

4. For emergency operation, press dial stop and rotate master switch to EMERGENCY, so that set will automatically transmit distress signals when challenged.

5. To turn set off, rotate master switch to OFF.

SIF CONTROL PANEL



F-100D-1-A74-1

Figure 4-13

IDENTIFICATION RADAR - AN/APX-25.

The AN/APX-25 SIF (selective identification feature) is formed when a coder and a control panel, marked "SIF," are added to the AN/APX-6A system. The SIF system has more comprehensive identification capability than does the IFF system. It is through an improvement of the replying code that the AN/APX-25 provides a more rapid and absolute identification of the airplane. However, with the exception of the reply coding, their operation is similar. The SIF control panel (figure 4-13) is on the right console adjacent to the IFF control panel. The SIF control panel has two coder dials. These dials are used with the IFF control panel to provide control of the AN/APX-6A system. The dials, marked "MODE 1" and MODE 3," can be rotated to set in the reply code for the respective modes of operation that have been selected on the IFF control panel. The SIF system is powered by the secondary bus and main 3-phase ac bus.

Operation of Identification Radar - AN/APX-25.

Perform the following steps for operation of the SIF system:

NOTE The IFF frequency counters must be set to proper frequency channels and the transponder switch must be at MOD.

1. Rotate IFF master switch to STDBY for a 3-minute warm-up period.

2. Rotate IFF master switch to NORM for full sensitivity and maximum performance.

NOTE The LOW position of the master switch should not be used except on proper authorization.

3. On IFF control panel, set mode switches as required and "I/P-MIC" switch at OUT, unless otherwise directed. (Refer to "Operation of Identification Radar - AN/APX-6A" in this section for switch settings in reply to the possible modes of interrogation.)

4. On SIF control panel, set coder dials as required.

5. For emergency operation, press dial stop, rotate IFF master switch to EMERGENCY, move lower mode switch to MODE 3, and set mode 3 coder dial as briefed.

6. To turn equipment off, rotate IFF master switch to OFF.

INSTRUMENT LANDING SYSTEM (ILS) AN/ARN-31 - F-100F AIRPLANES

ILS provides visual guidance signals on the course indicator during instrument approaches and landings. To have ILS capabilities with TACAN, a glide slope receiver and a localizer receiver must be utilized. Twenty glide slope channels are available in the frequency range of 329.3 through 335 megacycles. ILS frequency pairings are available on a 1-for-1 basis. The glide slope receiver is tuned automatically when a localizer frequency is selected on the ILS control panel. The glide slope receiver supplies signals to the glide slope indicator of the course indicator. The localizer receiver operates in a frequency range of 108.1 through 111.9 megacycles and supplies signals to the course deviation indicator of the course indicator. The ILS system is powered by the secondary bus and the main 3-phase ac bus. The radio control transfer system selects which cockpit can operate the instrument landing system.

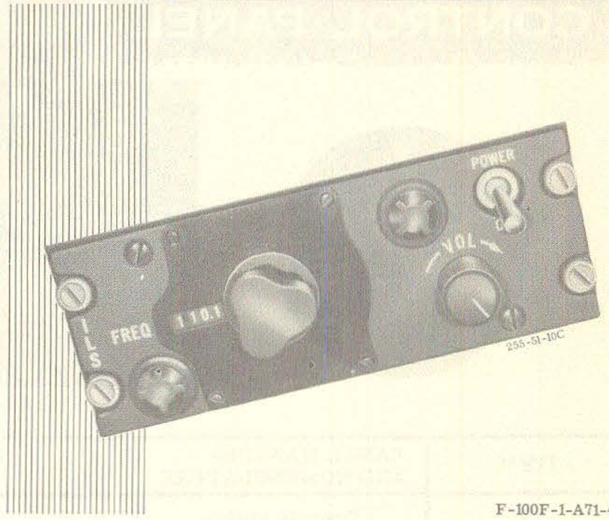
ILS Control Panel.

The ILS frequency is selected by rotating the frequency selector knob on the ILS control panel (22, figure 1-13; 16, figure 1-15; figure 4-14) until the desired localizer frequency appears in the indicator window to the left of the selector knob. The selector knob may be rotated in either direction. The volume control knob regulates the volume of the audible signal. The power switch controls power to the system.

TACAN-ILS Change-over Button.

The "TACAN-ILS" change-over button (28, figure 1-6; 31, figure 1-11) determines which of the two systems will furnish information to the course deviation indicator on the course indicator. The TACAN-ILS selector relay is energized by secondary bus power when the "TACAN-ILS" button is at TACAN. This ensures ILS capabilities in case of electrical power loss to the TACAN-ILS selector relay.

ILS CONTROL PANEL



F-100F-1-A71-4

Figure 4-14

Course Indicator.

Refer to "Course Indicator" in this section.

Operation of ILS.

Refer to Pilot's Instrument Handbook, AFM 51-37, for information on operation of ILS.

MARKER BEACON RECEIVER - AN/ARN-32 - F-100F AIRPLANES.

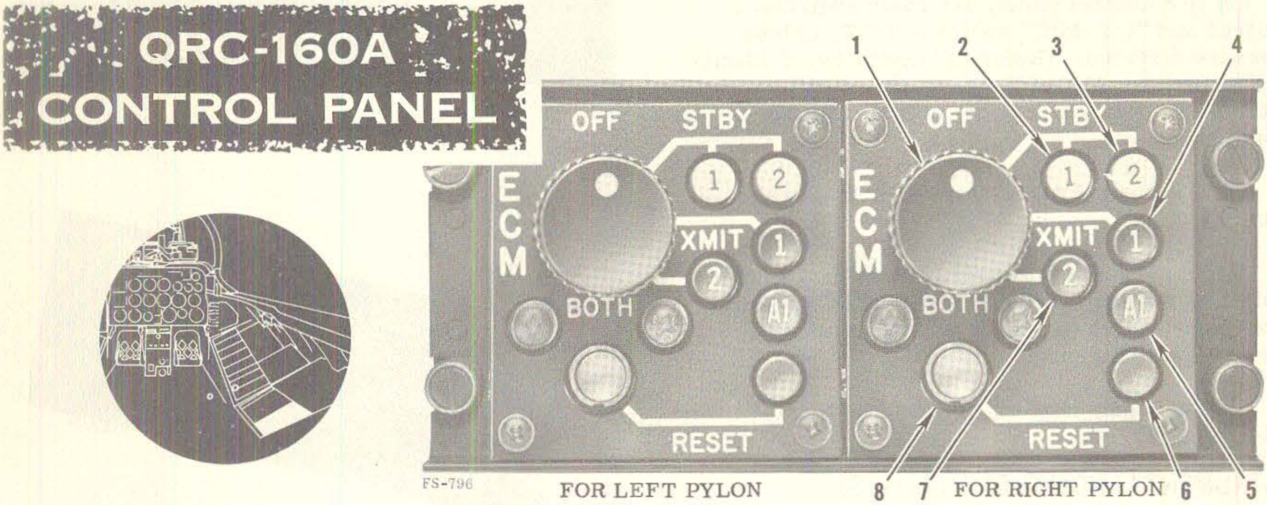
The marker beacon receiver is used as a navigation and landing aid. The receiver provides a signal while the airplane is passing over a 75-megacycle marker beacon transmitter. The presence of such a signal is indicated by an audio tone, and a marker beacon light (43, figure 1-6; 35, figure 1-11) on the course indicator. The marker beacon receiver is automatically turned on when the secondary bus is energized.

NOSE-TAIL RADAR WARNING - AN/ARN-54- F-100D NAVS AIRPANES.

This equipment is deactivated.

QRC-160A SYSTEM.

The QRC-160A is an electronic countermeasure system stored in either one or two pods mounted on a Type III series pylon at each outboard wing station. The system includes a QRC-160A-1(T) pod and a QRC-160A-2(T) pod. Each pod serves a specific function in the system and includes system components, a generator to provide electrical



ITEM	PANEL MARKING AND NOMENCLATURE	FUNCTION
1	Operate switch	Selects mode of operation of system
	OFF	Turns system off
	STBY	Places system or systems in standby mode
	XMIT	Turns applicable transmitter on
	BOTH	Turns two transmitting systems on
2	STBY 1 light (white)	Indicates System 1 is in standby
3	STBY 2 light (white)	Indicates System 2 is in standby
4	XMIT 1 light (green)	Indicates System 1 is transmitting
5	A1 light	Not applicable to QRC-160A-1(T)
6	Overload light (red)	Indicates overcurrent, overvoltage, undervoltage or underpressure conditions. Flashing indicates overheat warning.
7	XMIT 2 light (green)	Indicates System 2 is transmitting
8	RESET button	Places all systems in standby until major faults in system are cleared

F-100D-1-A71-3

Figure 4-15

power for the components, a ram-air turbine for driving the generator, and antennas.

QRC-160A System Controls and Indicators.

The QRC-160A system controls and indicators and their function are shown in figure 4-15. The control panel is on the right console (not in the rear cockpit). All controls and indicators are powered by the secondary bus.

Operation of QRC-160A System.

QRC-160A-1(T) POD. Operate system as follows:

1. Turn operate switch to STBY. This places both system 1 and 2 (assuming two systems are attached to the pylon) in the stand-by mode. The stand-by lights should come on after one minute.

2. Turn operate switch to XMIT 1, XMIT 2, or

BOTH, depending on desired number of transmitting systems.

3. If the system is operating correctly, the corresponding "XMIT" light or lights come on. If a major fault is detected in either of the operating systems, the overload light comes on.

4. If overload light comes on, proceed as follows:

a. Press "RESET" button. The overload light should go out, and the system should return to stand-by (the "STBY" light will not come on).

b. If the overload light does not go out when the "RESET" button is pressed and held, the system has an underpressure condition (below 9 psia) and the operate switch should be turned OFF.

c. Flashing of the overload light when the "RESET" button is pressed and held, or when the system is turned off, indicates an overheat condition in the system. If this condition exists, the operate switch should be turned OFF.

QRC-160-2(T) POD. Operate system as follows:

1. Turn operate switch to STBY. This places both system 1 and 2 (assuming two systems are attached to the pylon) in the standby mode. The stand-by lights should come on after approximately 3 minutes.

2. Turn operate switch to XMIT 1, XMIT 2, or BOTH, depending on desired number of transmitting systems.

3. If the system is operating in the normal mode (track or sequential), the "XMIT" light comes on only after the transmitter is locked on and tuned to an enemy radar signal by the receiver. The "A1" light comes on when the system is jamming the enemy radar signal. If the system is operating in the active mode (track or sequential), the "XMIT" light comes on when the operate switch is at XMIT and the "A1" light comes on when the system is jamming the enemy radar signal.

4. If a major fault is detected in either of the operating systems, the overload light comes on.

5. If the overload light comes on, proceed as follows:

a. Press "RESET" button. The overload light should go out, and the system should return to stand-by (the "STBY" light will not come on).

Caution If the system does not reset after the "RESET" button is released, the operate switch should be turned OFF.

b. If the overload light does not go out when the "RESET" button is pressed and held, the system has an underpressure condition (below 9 psia) and the operate switch should be turned OFF.

c. Flashing of the overload light when the "RESET" button is pressed and held, or when the system is turned off, indicates an overheat condition (above 157°C) in the system. If this condition exists, the operate switch should be turned OFF.

QRC-160A Emergency Jettison.

To jettison the QRC-160A pods complete with adapters, or the combined pod, adapter, and pylon assembly, use one or more of the following procedures:

1. Turn armament selector switch to ROCKET - JETT and press bomb button. (This jettisons only the pods and adapters.)

2. Press "OUTBOARD" ("OUTBD") external load auxiliary release button. (This jettisons only the pods and adapters.)

NOTE To jettison QRC-160A pods and pylons with other external loads, refer to "External Load Emergency Jettison Button" in this section.

- If no electrical power is available, the pods and/or pylons cannot be jettisoned by any method.

LIGHTING EQUIPMENT.

EXTERIOR LIGHTING.

A position light is on each wing tip, and two in the trailing edge of the fuel vent outlet fairing, above the rudder. One recognition light is on top of the dorsal fairing, behind the canopy; the other is on the lower surface of the fuselage, forward of the speed brake. The retractable landing-taxi lights are in the lower surface of the fuselage. The lights extend for use as landing lights until the weight of the airplane is on the nose gear; then the lights extend farther to provide taxi lighting.

Position Light Switch.

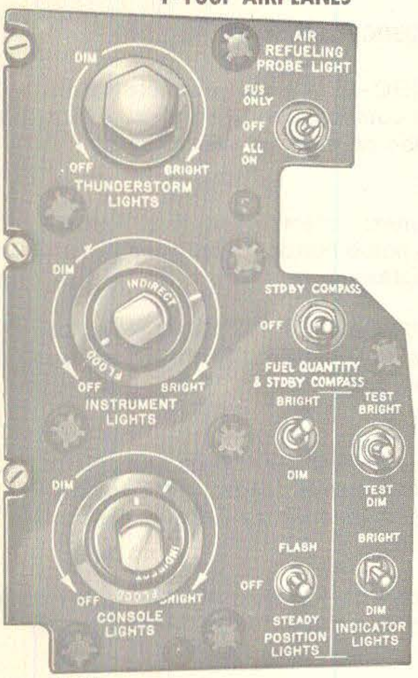
Illumination of the position and recognition lights is controlled by a secondary-bus-powered switch. (See figure 4-16.) When the switch is moved from the OFF (center) position to STEADY, the position and recognition lights come on. When the switch is moved to FLASH, the position lights automatically flash at the rate of 40 cycles per minute; however, the recognition lights remain on steady. (The position lights flash alternately, in sequence; the wing tip lights and the white taillight flash together, and the amber taillight flashes separately.)

LIGHTING CONTROL PANEL

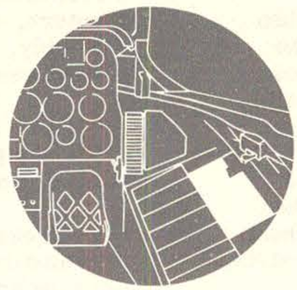
NOTE

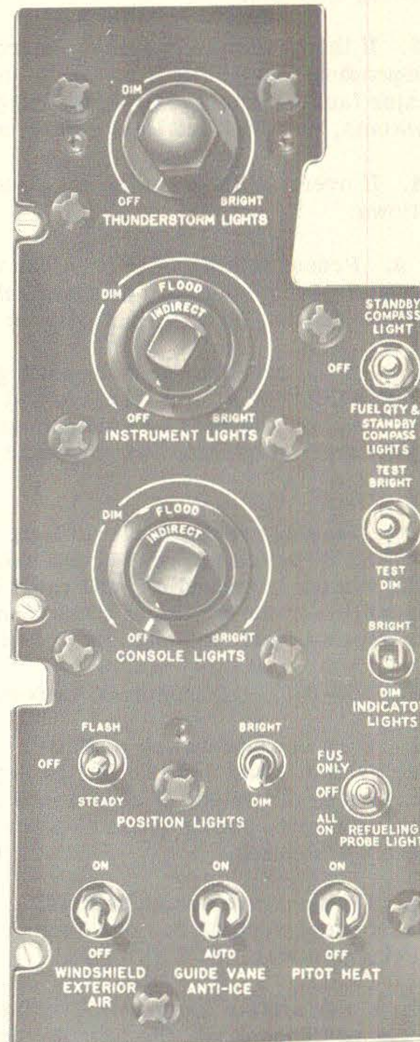
On F-100D NAVS airplanes, the indicator light test switch and the indicator light dimmer switch are on the stand-by instrument inverter switch panel.

F-100F AIRPLANES



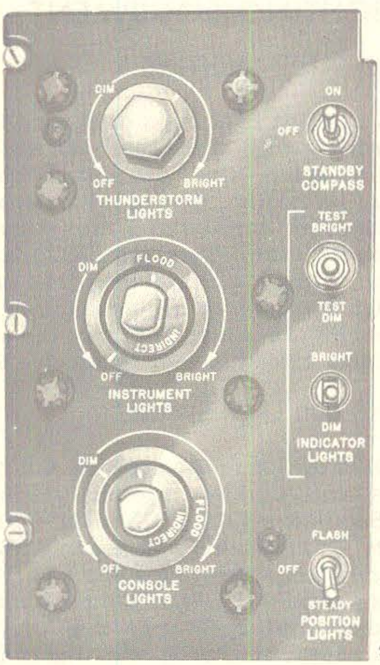
FS-522



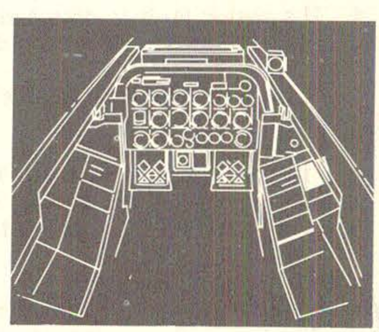


F-100D AIRPLANES

FS-515



F-100F REAR COCKPIT



F-100D-1-A54-7A

243-54-9V

Figure 4-16

Position Light Dimmer Switch.

Brilliance of the position and recognition lights is controlled by a secondary-bus-powered dimmer switch (not in rear cockpit). (See figure 4-16.) The switch has two positions, BRIGHT and DIM.

Landing-Taxi Light Switch.

The retractable landing-taxi lights are controlled by a two-position, secondary-bus-powered switch. (See figure 1-31.) The lights are extended to the landing position and come on when the switch is turned to ON. Upon landing, when the weight of the airplane is on the nose gear, the lights automatically extend farther to the taxi position, providing properly directed beams for taxiing. If a touch-and-go landing is made and the switch is left in the ON position, the lights return to the landing position as the weight of the airplane is removed from the nose gear. The lights go out and retract when the switch is turned to OFF. Limit switches automatically cut off power to the light actuation motors when the lights reach the fully retracted or extended positions.

INTERIOR LIGHTING.

Most instruments receive indirect lighting from individual fixtures of either the ring or the post type, while some instruments are integrally lighted. The position markings and names of the controls and switches on the consoles and instrument panel are lighted indirectly by edge lighting transmitted through the control panels. Direct lighting of the consoles and instrument panel is supplied by floodlights on the undersurface of the instrument panel shroud and canopy sills. (The indirect lights and floodlights furnish conventional red light.) Floodlighting can be reduced or completely closed off by turning a knob at the end of each lamp. The floodlights are adjustable, and can be directed toward any spot on the instrument panel. A thunderstorm light on each side of the cockpit provides intense white light to reduce the blinding effects of lightning. A standard (Type G-4A) utility light fits into a socket above the right console for general cockpit lighting. The utility light can be removed from its socket to light areas of the cockpit not normally lighted by other interior lights. Spare lamps for console and instrument lights are stored in a compartment above the right console.

Console Light Rheostats.

The lighting and brilliance of the console indirect lights and floodlights are controlled by dual rheostats. (See figure 4-16.) Rotation of the oblong upper knob, marked "INDIRECT," through OFF, DIM, and BRIGHT, regulates the edge lighting that lights the position markings on the control panels and markings on the instrument panel. The disk-shaped lower rheostat, marked "FLOOD," controls the console floodlights. The console indirect lights are powered by the primary bus. The console floodlights are powered by the primary bus (tertiary bus on some airplanes).

Instrument Panel Light Rheostats.

Instrument panel lighting (both the indirect individual lights and the instrument panel floodlights) is controlled by dual rheostats. (See figure 4-16.) These rheostats rotate independently, and rotating the inner knob marked "INDIRECT" through OFF, DIM, and BRIGHT turns on and controls the briliancy of the indirect individual instrument panel lights. (The caution, warning, and indicator lights may be dimmed by the indicator light dimmer, if the instrument panel indirect lights are on.) When the knob is rotated from OFF to turn on the instrument panel indirect lights, the landing gear warning light dims (if it is on). When the instrument panel indirect lights are off, the landing gear warning light remains bright. Rotating the outer ring, marked "FLOOD," through OFF, DIM, and BRIGHT turns on and controls the brilliancy of the instrument panel floodlights. The inner rheostat, on some F-100D Airplanes, and in the front cockpit on some F-100F Airplanes, is powered by the 3-phase ac instrument bus. The inner rheostat on other airplanes (and in the rear cockpit of F-100F Airplanes) is powered by the main 3-phase ac bus. The rheostat steps power down for indirect instrument lighting. The outer rheostat controls primary bus power (tertiary bus power on some airplanes) to the instrument panel floodlights.

Thunderstorm Light Rheostat.

The two white thunderstorm lights, powered by the primary bus (tertiary bus on some airplanes), are controlled by an on-off rheostat. (See figure 4-16.) For identification of the thunderstorm light control, the rheostat has a hexagonal knob, rather than the oblong knob used on the other lighting control panel rheostats.

Fuel Quantity Gage and Magnetic Compass Light Switch.

Lighting of the magnetic compass is controlled by a three-position switch (not in the rear cockpit). Lighting of the magnetic compass in the rear cockpit is controlled by a two-position switch. The three-position switch also controls the light for the 335- or 450-gallon drop tank fuel quantity gages (not in the rear cockpit). With the switch at STANDBY COMPASS (STDBY COMPASS), the light within the magnetic compass comes on. With the switch at FUEL QTY & STANDBY COMPASS LIGHTS (FUEL QUANTITY & STDBY COMPASS), the magnetic compass light and the light for the 335- or 450-gallon drop tank fuel quantity gages are on. With the switch at OFF, the lights are turned off. The switch is powered by the primary bus.

Cockpit Utility Light Controls.

The cockpit utility light rheostat is attached to the side of, and is an integral part of, the cockpit utility light. (See 10, figure 1-9; 10, figure 1-10; 6, figure 1-13; 7, figure 1-15.) The rheostat controls the lighting and brilliance of the cockpit utility light; however, a push-button switch on the light housing provides full brilliance of the light, regardless of the rheostat setting. A detachable lens cover is supplied for changing from white to red light. A round knob on the side of the utility light is used to obtain the desired focus. This light is powered by the primary bus.

OXYGEN SYSTEM.

The liquid-type oxygen system converts the oxygen from a liquid to a gas to make it suitable for breathing. The gaseous oxygen is supplied at normal temperature by a Type MD-1 oxygen regulator. On F-100D Airplanes, liquid oxygen is stored in an insulated "Thermos-bottle" type converter-storage tank forward of the cockpit on the right side of the fuselage. On F-100F Airplanes, liquid oxygen is stored in two insulated "Thermos-bottle" type converter-storage tanks in the right side of the fuselage, outboard and below the cockpit. Each cockpit has its own complete oxygen system. An auxiliary distribution system, through interconnecting lines and check valves, can supply gaseous oxygen to both regulators so that both crew members may use oxygen from either or both tanks.

Oxygen is delivered to the regulator at a pressure of about 70 psi and is supplied to the crew member at a rate that depends on altitude and demand. (Oxygen duration is shown in figure 4-17.) Each tank has a capacity of about 5 liters (1.3 gallons), but because of the boiling of the liquid oxygen and the shape of the tank, it is not possible to fill each system beyond 4.5 liters. A full supply of liquid oxygen completely boils off in about 5 days when the airplane is on the ground and no demands are made on the system. The liquid oxygen system is serviced through a single-point filler and a build-up and vent valve (two fillers and two build-up and vent valves, one for each system, on F-100F Airplanes) within an access door on the right side of the fuselage, below the cockpit. (See figure 1-37.) The build-up and vent valve controls oxygen pressure build-up in its respective system. The valve handle must be at VENT during system filling, and at BLD. UP to pressurize the system for normal operation. (See figure 1-37 for oxygen specification.)

OXYGEN REGULATOR.

The pressure-breathing, diluter-demand oxygen regulator (figure 4-18) mixes air with oxygen in varying amounts, according to altitude, and makes available a quantity of the mixture each time the pilot inhales. At high altitudes, the regulator supplies oxygen at continuous positive pressure. The delivery pressure automatically changes with cockpit altitude. The regulator control panel includes a supply lever, a diluter lever, a pressure gage, a flow indicator, and an emergency lever.

NOTE Above 30,000 feet, a vibration or wheezing sound may sometimes be noticed in the mask. This noise is a normal characteristic of regulator operation and should be overlooked.

Diluter Lever.

The diluter lever (figure 4-18) should be at NORMAL, for normal oxygen use, or at the 100% position for emergency oxygen use. With the lever at NORMAL, the regulator supplies a mixture of air and oxygen up to about 30,000 feet which is equivalent to normal breathing at sea level. Beyond 30,000 feet, 100 percent oxygen is supplied on either setting. These operating characteristics are related to the cockpit altitude only.

Emergency Lever.

The emergency lever (figure 4-18) should be in the center position at all times, unless an unscheduled oxygen pressure increase is desired. Moving the lever to EMERGENCY provides continuous positive pressure to the mask. When the lever is held at TEST, oxygen at positive pressure is provided to test the mask for leaks. (On some regulators, the emergency lever requires about four times the pressure to move it to TEST position than on other regulators.)

Warning When positive pressures are required, it is mandatory that the oxygen mask be well fitted to the face. Unless special precautions are taken to ensure that there is no leakage, continued use of positive pressure under these conditions will result in the rapid depletion of the oxygen supply, and could also result in extremely cold oxygen flowing to the mask.

Supply Lever.

The supply lever (figure 4-18) is safety-wired to the ON position. It also has an OFF position.

Pressure Gage and Flow Indicator.

The pressure gage (figure 4-18) shows oxygen pressure available to the regulator. The flow indicator (blinker) consists of an oblong opening which shows black and white alternately during the breathing cycle.

OXYGEN DURATION

(EACH CREW MEMBER)

- Black figures indicate diluter lever ***NORMAL***
- White figures indicate diluter lever ***100%***
- White figures in parentheses indicate diluter lever **100%** oxygen, emergency lever at ***EMERGENCY***, and pressure suit used.
- Oxygen regulator gage pressure constant 70 psi.

HOURS

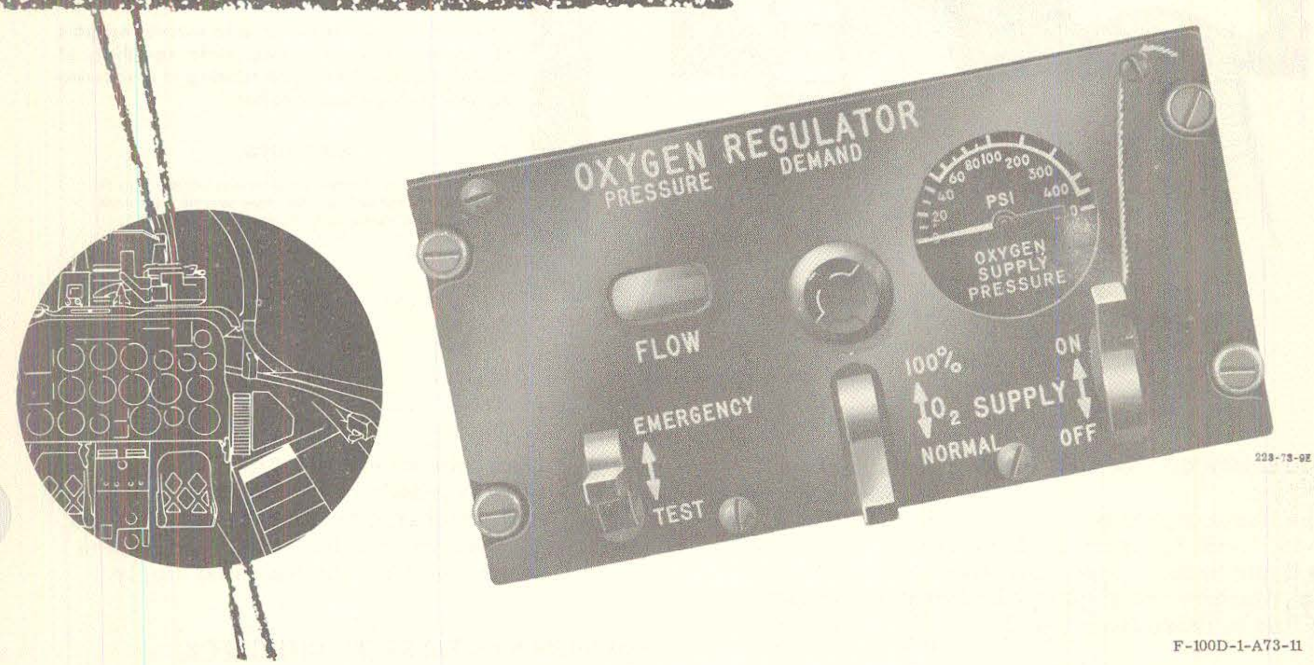
COCKPIT ALTITUDE—FEET	5	4	3	2	1	BELOW 1
35,000 AND ABOVE	31.4 / 31.4 / (12.8)	25.2 / 25.2 / (10.2)	18.9 / 18.9 / (7.7)	12.6 / 12.6 / (5.1)	6.3 / 6.3 / (2.6)	EMERGENCY — DESCEND TO ALTITUDE NOT REQUIRING OXYGEN
30,000	23.3 / 22.7 / (12.8)	18.7 / 18.1 / (10.2)	14.0 / 13.6 / (7.7)	9.3 / 9.0 / (5.1)	4.7 / 4.5 / (2.6)	
25,000	22.0 / 17.5 / (9.8)	17.6 / 14.0 / (7.8)	13.2 / 10.5 / (5.9)	8.8 / 7.0 / (3.9)	4.4 / 3.5 / (2.0)	
20,000	25.0 / 13.3 / (7.6)	20.0 / 10.7 / (6.1)	15.0 / 8.0 / (4.6)	10.0 / 5.3 / (3.0)	5.0 / 2.7 / (1.5)	
15,000	30.2 / 10.7 / (6.0)	24.2 / 8.6 / (4.8)	18.1 / 6.4 / (3.6)	12.1 / 4.3 / (2.4)	6.0 / 2.2 / (1.2)	
10,000	30.2 / 8.6 / (4.8)	24.2 / 6.9 / (3.8)	18.1 / 5.2 / (2.9)	12.1 / 3.4 / (1.9)	6.0 / 1.7 / (1.0)	
5000	30.2 / 6.8 / (3.9)	24.2 / 5.4 / (3.1)	18.1 / 4.1 / (2.3)	12.1 / 2.7 / (1.6)	6.0 / 1.4 / (0.8)	
0	30.2 / 5.5 / (3.2)	24.2 / 4.4 / (2.6)	18.1 / 3.3 / (1.9)	12.1 / 2.2 / (1.3)	6.0 / 1.1 / (0.7)	

LIQUID OXYGEN QUANTITY — LITERS

F-100D-1-A73-10

Figure 4-17

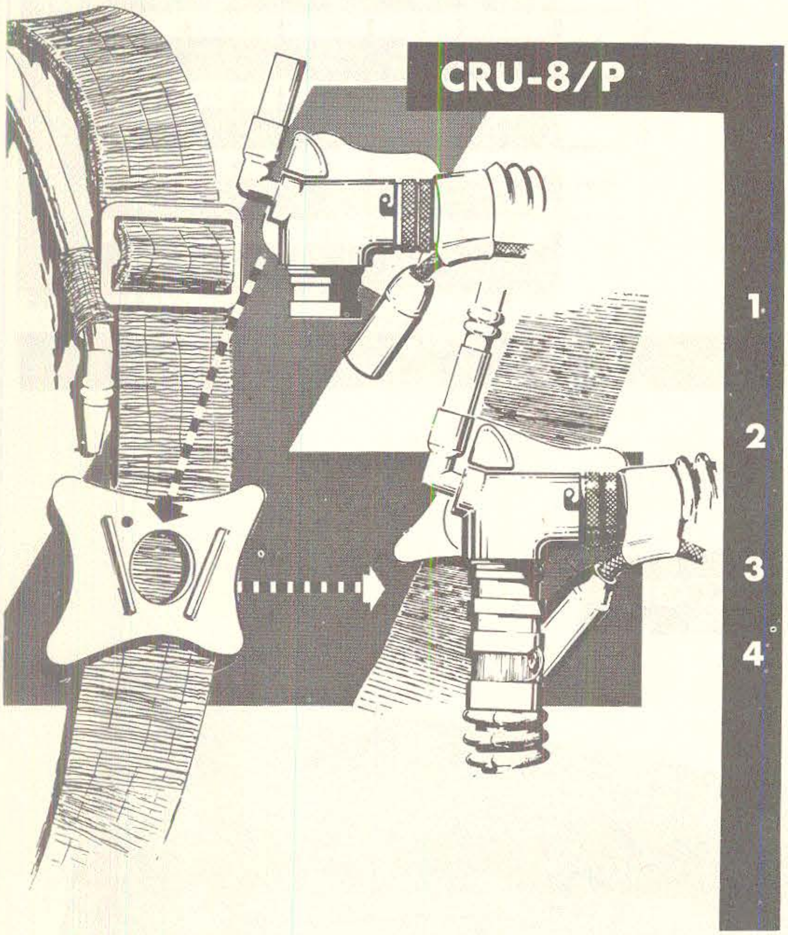
MD-1 OXYGEN REGULATOR



F-100D-1-A73-11

Figure 4-18

OXYGEN HOSE HOOKUP



1. **Insert connector into connector mounting plate attached to parachute harness. Check that connector is firmly attached and that lockpin is locked.**

2. **Insert male bayonet connector, on end of oxygen mask hose, into female receiving port of connector, and turn connector to lock its prongs into recesses in lip of receiving port.**

3. **Couple seat oxygen hose to lower port of connector.**

4. **Attach bail-out bottle hose to swiveling port of connector by inserting male coupling of bail-out bottle hose and turning it clockwise against spring-loaded collar.**

WARNING

Do not attach stowage strap on seat oxygen hose to the connector because this may prevent pilot-seat separation during ejection sequence.

F-100D-1-A73-12

Figure 4-19

Liquid Oxygen Quantity Gage.

The liquid oxygen quantity gage (4, figures 1-9, 1-10, 1-13; 3, figure 1-15) measures the quantity of liquid in the oxygen converter (respective oxygen converter on F-100F Airplanes) and is calibrated in liters from 0 to 5.

NOTE The liquid oxygen quantity gage should read between 4 and 4-1/2 liters when the system is fully charged, since it is impossible to charge the converter to 5 liters. Use oxygen duration table to determine oxygen duration for indicated supply.

OXYGEN SYSTEM PREFLIGHT CHECK.

Before take-off, the oxygen system should be checked as follows:

1. Oxygen supply lever - Safetied ON.

2. Oxygen pressure gage - Check at 55 to 145 psi.

3. Liquid quantity gage - Check at 4 liters minimum.

NOTE For training and special type flights only, the minimum quantity of oxygen may be 2-1/2 liters (the sum of 2-1/2 liters per crew member on F-100F Airplanes), to avoid undue delay in turn-around time.

4. Oxygen regulator - Check, with diluter lever first at NORMAL and then at 100% as follows:

a. Blow gently into end of oxygen regulator hose as during normal exhalation.

There should be resistance to blowing. Little or no resistance to blowing indicates a leak or faulty operation.

5. Oxygen hose - Fasten as shown in figure 4-19.

6. Diluter lever - 100%.

7. Breathe normally into mask and conduct following checks:

a. Flow blinker - Observe for proper operation.

b. Emergency lever - EMERGENCY. Positive pressure should be supplied to mask.

c. Hold breath to check leakage around mask.

d. Emergency lever - Return to center position.

Positive pressure should cease.

Caution Do not leave the emergency lever at TEST or EMERGENCY position for more than 5 to 10 seconds unless the oxygen mask is connected to the system, because the regulator may be damaged by frosting.

8. Diluter lever - As required.

NORMAL OPERATION OF OXYGEN SYSTEM.

1. Diluter lever - As required.

2. Emergency lever - Center (OFF).

EMERGENCY OPERATION OF OXYGEN SYSTEM.

If symptoms of hypoxia develop, or if smoke or fumes enter the cockpit, use one or more of following procedures until satisfactory conditions are obtained:

1. Diluter lever - 100%.

2. Emergency lever - EMERGENCY.

3. If oxygen regulator becomes inoperative, pull ball handle on H-2 emergency oxygen bail-out bottle (which contains about a 10-minute oxygen supply).

4. Descend to a cockpit altitude below 10,000 feet as soon as possible.

AUTOMATIC FLIGHT CONTROL (AUTOPILOT) SYSTEM.

The automatic flight control system (AFCS or autopilot) provides the following functions: pitch and yaw stability augmentation (damping), attitude "hold," control stick steering, altitude "hold," heading "hold," and tie-in to the LABS. The control surfaces are deflected by the autopilot by means of four electrically controlled, hydraulically actuated servo cylinders. These servo cylinders automatically position the hydraulic control valves, causing deflection of the control surfaces in proportion to autopilot electrical signals. The servo cylinders receive hydraulic pressure from the utility hydraulic system and are operated by signals supplied by gyros, accelerometers, transducers, amplifiers, and relays electrically powered from the dc secondary bus and the main 3-phase ac bus. The autopilot can be used as a pitch and yaw damper or as a full three-axis autopilot. The pitch and yaw damper system provides automatic rudder control in turns as well as stability increased in the airplane pitch and yaw axis. The damper system can be operated independently, but the autopilot cannot be engaged unless the damper system is in operation. The autopilot altitude range is from sea level to 60,000 feet, and the Mach range is from Mach .2 to Mach 1.7. The control range is 360 degrees in pitch, roll, and heading. An acceleration limiting circuit (G-limiter) prevents the autopilot from applying any control that would cause the airplane to exceed structural acceleration limits. The maximum limits of the G-limiter for a clean airplane, or airplane with missiles or special stores, are +6.5 G and -2 G; however, by rapid stick movement or high pitch rates, these limits are reduced to a minimum of +4.5 G and 0 G. In certain external load configurations, a decreased G-protection is provided automatically by the selection of the pylon loading switches. Autopilot controls are not provided in the rear cockpit except for the emergency disconnect switch lever. The autopilot system is shown schematically in figure 4-20.

YAW AND PITCH DAMPERS.

The yaw and pitch dampers control the yaw and pitch oscillations of the airplane. They increase stability of the airplane about its yaw and pitch axes, automatically coordinate all turns, and

AUTOPILOT SYSTEM

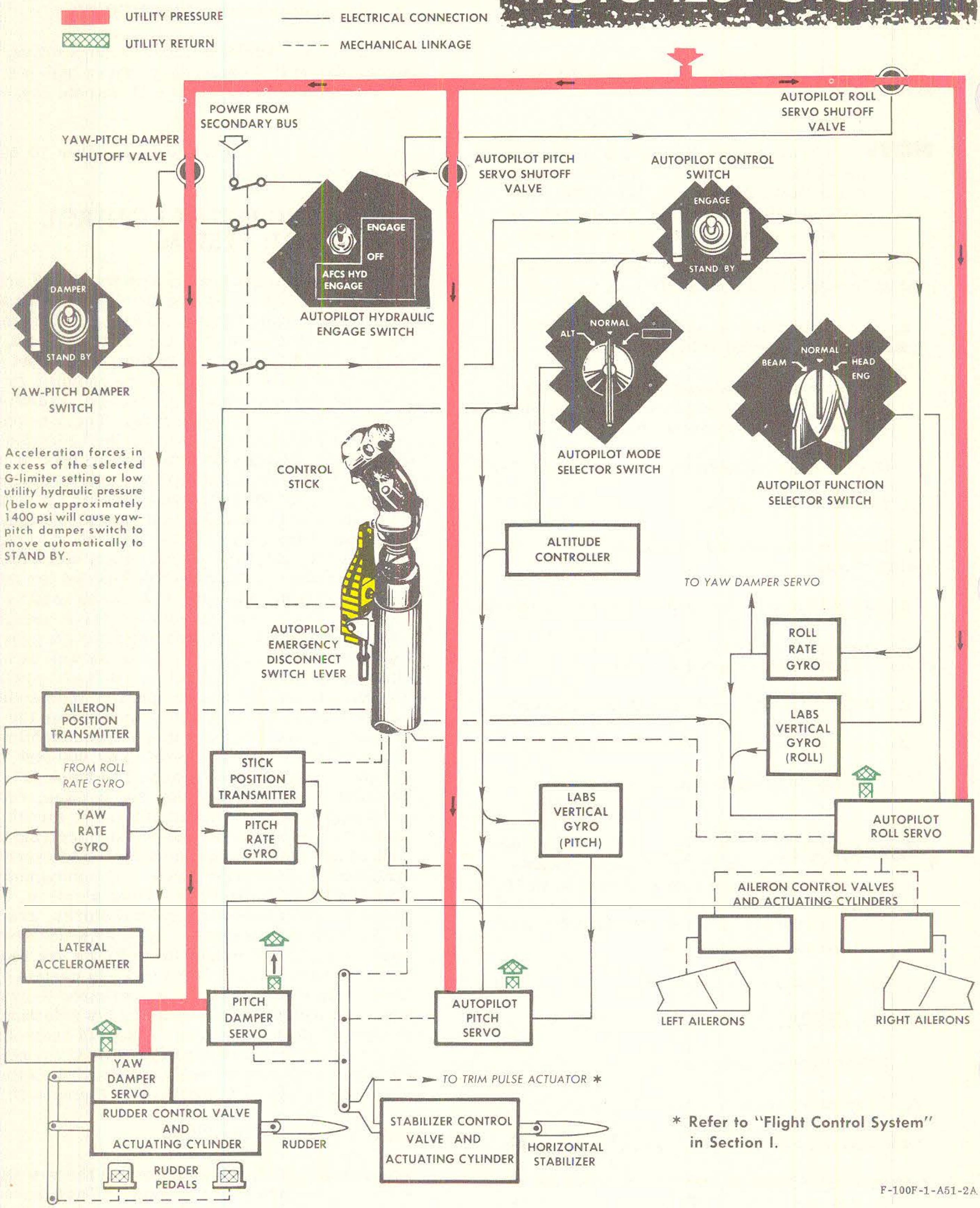


Figure 4-20

compensate for asymmetrical store loading. The damper system consists of two control channels, one controlling the yaw damper servo and the other controlling the pitch damper servo. The yaw damper servo, connected differentially to the rudder control system, controls the rudder in response to yaw signals initiated by the yaw rate gyro. It provides control response without corresponding movement of the rudder pedals. The yaw damper servo also controls the rudder to provide turn coordination in response to signals from the lateral accelerometer. However, the yaw damper system can be overridden by moving the rudder pedals to provide an intentional sideslip. The pitch damper servo is connected differentially to the horizontal stabilizer control system and controls the stabilizer in response to pitch signals initiated by the pitch rate gyro. It provides control response without a corresponding movement of the control sticks. The control stick position transmitter also supplies signals to the pitch damper. This signal is provided to prevent the damper from opposing stick pressure during pilot-initiated maneuvers. When the dampers are engaged, normal rudder trimming is not required. The rudder trim switches should not be used with dampers engaged. Pitch and roll trimming when only the dampers are engaged is accomplished in the normal manner by use of the lateral and longitudinal trim switch on the stick grip.

Caution If any mistrim in yaw or pitch attitude change occurs when the dampers are engaged, the dampers are not operating normally and should be disengaged.

A check valve in the utility hydraulic system return port of the pitch damper servo prevents excessive return pressure surges that could cause a pitch control system malfunction.

AUTOPILOT ROLL AND PITCH.

The roll servo is connected in parallel to the aileron control system and actuates the ailerons in response to autopilot roll signals. In controlling the ailerons, the roll servo causes corresponding movement of the control stick. The pitch servo is connected in parallel in the horizontal stabilizer control system and deflects the stabilizer in accordance with autopilot pitch signals. In controlling the stabilizer, the pitch servo causes corresponding movement of the control stick. With the autopilot in operation and the autopilot mode selector switch at NORMAL, the autopilot holds the airplane attitude, provided the airplane attitude is less than 60 degrees in roll and less than 50 degrees in pitch.

AUTOMATIC PITCH TRIM.

An automatic pitch trim provision is incorporated in the autopilot. When the autopilot is engaged, the pitch trim is operative, except when maneuvering by control stick steering or when in the altitude "hold" mode. As long as the autopilot is engaged, the manual horizontal stabilizer trim system is inoperative.

CONTROL STICK STEERING.

With the autopilot engaged, change of heading, attitude, or alititude can be effected by moving the control stick in the direction required. This is called "control stick steering"; that is, the airplane control stick is used for maneuvering or repositioning the airplane attitude by means of the autopilot. (Control stick steering in the pitch axis is inoperative while in the altitude "hold" mode of operation.) Application of force to the control stick causes portions of the attitude "hold" feature to be temporarily bypassed. Release of force on the control stick causes all attitude "hold" features to be reinstated at the new attitude. When the airplane is flown by use of the control stick steering function of the autopilot, occasional small kicks and low-amplitude vibration of the stick are normal; abrupt kicks of the stick or a high-amplitude vibration indicates improper operation of the autopilot. Small changes in the attitude of the airplane resulting from control stick steering require stick forces which are about the same as flying the airplane with the autopilot disengaged. However, in attempting to obtain high rates of roll or normal accelerations in excess of 2. 5 G through control stick steering, stick forces much higher than those encountered in normal manual maneuvering are required. For tactical maneuvering such as that performed for gunnery, dive bombing, and evasive action, the autopilot should be disengaged.

AUTOPILOT MODE OPERATION.

There are two basic modes of autopilot operation: altitude "hold" and attitude "hold." In the attitude "hold" mode, control stick steering and automatic pitch trim are operative and the heading "hold" function can be engaged. In the altitude "hold" mode the heading "hold" function can be engaged and stick steering is operative in the roll axis. These modes are controlled by the autopilot mode selector switch. The altitude control is an extremely sensitive device which measures absolute barometric pressure. With the altitude "hold" mode in operation, airplane pitch attitude is determined by the altitude control. In addition, control stick steering in the pitch axis is inoperative, and the stick resists any attempts to maneuver in pitch. Changes in altitude can be made manually by overriding the autopilot by exerting a force greater than normal on the control stick. When the force is released, the airplane returns to the reference altitude. Change of bank attitude while

AUTOPILOT CONTROLS

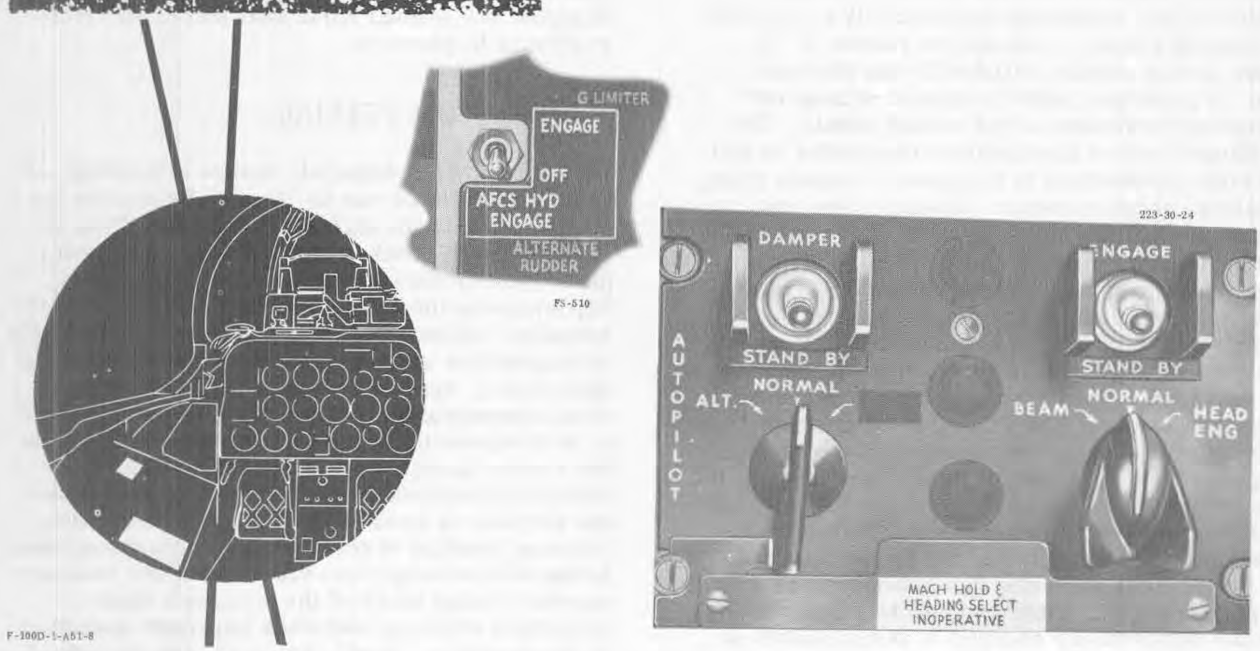


Figure 4-21

retaining the altitude "hold" mode can be made by control stick steering.

NOTE If the autopilot is engaged with the angle of bank less than 60 degrees, the airplane will hold that angle of bank and continue to turn. If the angle of bank is more than 60 degrees, the autopilot will engage and the airplane will remain in the turn without attitude stabilization. If the pitch attitude is less than ±50 degrees, the autopilot will cause the airplane to hold that pitch attitude. If the pitch attitude is more than ±50 degrees, the autopilot will engage and provide attitude stabilization but will not hold pitch attitude.

AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT) CONTROLS.

Autopilot Hydraulic Engage Switch.

The autopilot hydraulic engage switch (figure 4-21) simultaneously controls hydraulic and electrical power for the pitch and yaw damper and autopilot system. Moving the switch to ENGAGE permits selection of pitch and yaw damper or full autopilot system operation. If system power fails, or the autopilot system is turned off through the emergency disconnect switch lever, the autopilot hydraulic engage switch automatically moves to OFF. The autopilot system cannot be re-engaged until the switch is again moved to ENGAGE. The hydraulic engage switch is powered by the secondary bus.

Yaw-Pitch Damper Switch.

The yaw-pitch damper switch (figure 4-21) controls simultaneously both the yaw and the pitch dampers. The switch is powered from the secondary bus. Moving the switch to DAMPER (autopilot hydraulic engage switch at ENGAGE) provides power to the autopilot control switch and opens the yaw-pitch damper shutoff valve, allowing utility hydraulic pressure to engage the yaw and pitch damper servos. The yaw and pitch dampers damp oscillations, increase stability of the airplane about its pitch and yaw axes, and automatically coordinate all turns. With the switch at STAND BY, the yaw-pitch damper shutoff valve is closed and the yaw and pitch dampers are inoperative, but the electrical components are warmed up ready for immediate use. An electrical power failure deenergizes the dampers and automatically returns the autopilot yaw-pitch damper switch to STAND BY. With the switch in this position, the dampers and autopilot are inoperative. The dampers also become inoperative if utility hydraulic pressure drops below a minimum of about 1400 psi. Pressure below this minimum is sensed by a low-pressure switch which opens the electrical circuits and automatically positions the yaw-pitch damper switch to STAND BY. After momentary electrical or hydraulic failure, the yaw and pitch dampers may be restored by resetting the yaw-pitch damper switch to DAMPER 1-1/2 minutes after electrical power has been restored or immediately after utility hydraulic pressure returns to about 1900 psi. If complete electrical or hydraulic failure occurs in the yaw and pitch dampers, the yaw and pitch damper servos recenter automatically and lock mechanically. The servos are then fixed and serve as conventional control links to allow directional control for continued flight. The yaw and pitch dampers can be disengaged at any time by placing the yaw-pitch damper switch at STAND BY, or by use of the autopilot emergency disengage switch on the control stick.

Caution If any mistrim in yaw or pitch attitude change occurs when the dampers are engaged, the dampers are not operating normally and should be disengaged.

Autopilot Control Switch.

The autopilot control switch (figure 4-21) is used to engage the complete autopilot. The switch, when actuated, uses secondary bus power through the yaw-pitch damper switch. With the autopilot control switch at STAND BY, the units for the autopilot warm up, although the autopilot does not function. When the switch is at ENGAGE, and the yaw and pitch dampers are in operation, the autopilot functions according to the mode selector switch or function selector switch setting. The autopilot control switch engages the autopilot roll and pitch servos. The autopilot can be disengaged at any time by placing the autopilot control switch or the yaw-pitch damper switch at STAND BY. The complete autopilot can be disengaged by use of the autopilot emergency disengage switch on the control stick.

Autopilot Mode Selector Switch.

The autopilot mode selector switch (figure 4-21) allows selection of various modes of autopilot operation. The switch is powered by the secondary bus. Moving the switch to ALT. engages the altitude "hold" function of the autopilot to maintain the airplane at a constant altitude. When the mode selector switch is at NORMAL, the attitude "hold" function of the autopilot is engaged and the autopilot holds the airplane at the attitude it is in when the position is selected.

Autopilot Function Selector Switch.

The autopilot function selector switch (figure 4-21) allows selection of the functions tied in with the autopilot system. The switch, powered by the secondary bus, has BEAM, NORMAL, and HEAD ENG positions. The BEAM position is inoperative, and the switch returns to NORMAL when the BEAM position is selected. The NORMAL position disengages the heading "hold" function of the autopilot. The HEAD ENG position engages the heading "hold" function of the autopilot. This switch position controls the linking of the J-4 compass system with the heading "hold" function of the autopilot. During normal operations, the function selector switch is at HEAD ENG. If the LABS is engaged while the function selector switch is at HEAD ENG, the LABS will be tied in to the autopilot. Under this condition, the heading "hold" function will be disengaged from about 4 seconds after auto-LABS pull-up is initiated until after roll-out from the auto-LABS maneuver.

Warning It is desirable to perform auto-LABS maneuvers with the function selector switch at NORMAL. However, if such a maneuver is performed with the switch at HEAD ENG, be prepared to correct immediately any roll tendency which may develop as the pull-up is initiated.

Autopilot Emergency Disconnect Switch Lever.

The autopilot emergency disconnect switch lever (figure 1-28) is on the control stick. Pressing the lever causes the autopilot hydraulic engage switch to move to OFF and the yaw-pitch damper and autopilot control switches to move to STAND BY. The airplane then will be under pilot-controlled normal operation. The emergency disconnect switch lever may be used to disengage the autopilot and the damper systems during normal operations, if desired. If the autopilot system is disengaged in this manner, the autopilot hydraulic engage switch must be moved to ENGAGE before the autopilot or yaw and pitch dampers can be re-engaged.

G-limiter Control Switch.

The two-position autopilot G-limiter control switch (figure 1-19) is covered by a guard that is safety-wired and clipped down to hold the switch in the ON position at all times. When the switch is at OFF, it removes the G-limiting authority of the autopilot system. This is required only under combat LABS maneuvers. Maintenance required to place the G-limiter control switch in operation is left to the discretion of the base commander.

NOTE For normal autopilot operation and for training LABS maneuvers, the G-limiter control switch should be in the ON position. In rough air, some nuisance disengagements of the autopilot can be expected when the

G-limiter switch is ON. Therefore, in situations where completion of the LABS maneuver is mandatory, the switch should be placed at OFF just before the LABS run-in is initiated, and returned to ON immediately after completion of the maneuver.

Caution It is possible to exceed the G-limits of the airplane when the switch is at OFF.

NORMAL OPERATION OF AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT).

Ground Check.

With the engine running and flaps up, the autopilot should be ground checked by the pilot before the first flight of the day as follows:

NOTE The yaw and pitch dampers should engage after 1-1/2 minutes warm-up time.

1. Move autopilot hydraulic engage switch to ENGAGE, yaw-pitch damper switch to DAMPER, and autopilot control switch to ENGAGE. The switches should remain at these positions when released.

2. Press emergency disconnect switch lever. The autopilot hydraulic engage switch should move to OFF and the control and yaw-pitch damper switches should move to STANDBY.

3. Move control stick left and right. There should be no corresponding rudder movement.

4. Move autopilot hydraulic engage switch to ENGAGE and yaw-pitch damper switch to DAMPER. There should be no stabilizer movement. A slow rudder movement is normal.

5. Move control stick left and right. The rudder should follow left, then right.

6. Move autopilot control switch to ENGAGE. There should be no violent stick movement. Stick drift is normal (may be in any direction).

7. Move autopilot mode selector switch to ALT. Note that control stick is difficult to move in pitch.

8. Move autopilot control switch to STANDBY. Note that autopilot mode selector switch returns to NORMAL. Manually trim control stick full aft.

9. Move autopilot control switch to ENGAGE. There should be no violent control stick movement. Move control stick, using control stick steering, and note smooth response in roll and pitch.

10. Press emergency disconnect switch lever to disengage autopilot and damper systems.

Flight Check.

The autopilot should be flight-checked above 10,000 feet terrain clearance and 350 knots. This check should be made whenever mission requirements permit. Make flight check as follows:

NOTE During various checks, any abrupt, violent, or extreme attitude changes should be recorded and the flight check should be discontinued.

DAMPERS. Proceed as follows:

1. Cage LABS vertical gyro if gyro has precessed.

2. With autopilot hydraulic engage switch at ENGAGE and yaw-pitch damper switch at STANDBY, trim rudder to obtain 1/2-ball sideslip.

3. Move yaw-pitch damper switch to DAMPER. The ball should return to center ±1/8 ball. If ball does not return to center, tap rudder pedals.

4. In trimmed (1 G) flight, pull up (not to exceed 2.0 G) and release control stick. Resulting pitch oscillation should damp in approximately one cycle.

5. In trimmed (1 G) flight, kick rudder abruptly to obtain one-ball sideslip. Release control stick and rudder simultaneously. Resulting oscillation should damp within two cycles with no objectionable attitude change.

AUTOPILOT. Proceed as follows:

1. Move autopilot hydraulic engage switch to ENGAGE, yaw-pitch damper switch to DAMPER, and autopilot control switch to ENGAGE. There should be no objectionable attitude change or control transients. Autopilot should maintain a near wings-level attitude with no objectionable yaw or roll oscillations.

2. Using control stick steering, change pitch attitude approximately 5 degrees. There should be no objectionable pitch oscillations, or control stick vibration. Occasional light stick pulses and low-amplitude vibration is acceptable.

3. In level flight, move autopilot mode selector switch to ALT. The final reference altitude should approximate selected altitude with no objectionable pitch oscillations. Altitude deviations should not be excessive during any bank angle up to 30 degrees.

4. Move autopilot function selector to HEAD ENG. Airplane should maintain desired heading with only a very small heading oscillation.

NOTE To obtain heading "hold" mode, the LABS vertical gyro must be within 7-1/2 degrees of vertical when the wings are level (determined from vertical pointer on the LABS dive-and-roll indicator). If the gyro is not within 7-1/2 degrees of vertical, the gyro must be caged.

In-flight Operation.

ENGAGING PITCH AND YAW DAMPERS. The dampers can be engaged by first moving the autopilot hydraulic engage switch to ENGAGE and then moving the yaw-pitch damper switch to DAMPER. Pitch and yaw oscillations will be well damped, and rolls up to approximately 75 degrees of bank angle will be fully coordinated automatically. Uncoordinated maneuvers can be performed, using the rudder pedals in the conventional manner.

Warning The yaw-pitch damper switch should be at STANDBY during all close-formation flights to prevent the possibility of collision in case of a hard-over turn due to a malfunction of the yaw damper.

Caution If any mistrim in yaw or pitch attitude change occurs when the dampers are engaged, the dampers are not operating normally and should be disengaged.

NOTE As the bank angle approaches 90 degrees, the rudder and stabilizer lose their effectiveness, making it impossible to coordinate turns in very high bank angles.

ENGAGING AUTOPILOT. The autopilot can be engaged at any attitude by first moving the autopilot hydraulic engage switch to ENGAGE and then moving the autopilot control switch to ENGAGE.

NOTE The damper system must be engaged before the autopilot can be engaged.

TURNS. To achieve the desired bank angle, the control stick should be operated in the conventional manner. When the stick force is released, the autopilot automatically maintains bank angle up to 60 degrees, and the yaw damper automatically coordinates turns up to a 75-degree bank angle. When the bank angle exceeds 60 degrees, the autopilot provides roll damping without roll attitude stabilization. Any combination of climbing or diving turns can be made by applying longitudinal stick forces in the conventional manner. With the autopilot mode selector switch at ALT., control stick steering is inoperative in the pitch axis.

CLIMBS AND DIVES. To climb and dive, the control stick should be operated in the conventional manner. The autopilot automatically maintains pitch attitude up to 50 degrees from the horizontal. When pitch attitude exceeds 50 degrees, pitch stabilization is derived from lagged pitch rate signals only, and attitude control is less precise. The airplane cannot be maneuvered in pitch by means of control stick steering when the autopilot mode selector switch is at ALT. It is possible to maneuver in pitch by overpowering the autopilot (with approximately 35 pounds stick force); however, the airplane will return to the original altitude when the stick is released.

CONSTANT ALTITUDE CONTROL. Constant altitude control can be engaged in any attitude between the limits of ±50 degrees pitch and 60 degrees roll, but should not be engaged when the rate of climb or dive exceeds 1000 feet per minute. To engage altitude control, move autopilot mode selector switch to ALT. When altitude control is engaged in a climb or dive, the airplane levels out and maintains the altitude existing when the mode selector switch was moved to ALT. Level turns up to 60 degrees of bank angle can be made when the altitude control is engaged. When bank angle exceeds 60 degrees, the mode selector switch returns to NORMAL, disengaging altitude control. The altitude control is also disengaged in the speed range from Mach .96 to Mach 1.04 to prevent erratic operation due to pitot system error in this speed range. Altitude control can be re-engaged when the airplane has passed through this critical speed range. Pitch attitude control by means of the control stick is inoperative when altitude control is engaged. To change reference altitude, move the mode selector switch to NORMAL, maneuver to the new altitude, and move the switch to ALT.

NOTE Caging the LABS vertical gyro while the altitude control is engaged causes disengagement of the reference altitude hold. Upon releasing the caging button to complete the caging cycle, the altitude hold will automatically re-engage at the reference altitude of the airplane at the time of re-engagement.

HEADING CONTROL. Place the autopilot function selector switch at HEAD ENG. When the heading control is engaged, the airplane follows the magnetic heading indicated on the heading indicator, the radio magnetic indicator, or, on F-100D NAVS airplanes, the bearing-distance-heading indicator. Heading control can be changed by operating the control stick to turn the airplane. Objectionable rolling oscillations may be encountered at nose-high or nose-low attitudes. These oscillations may be eliminated by disengaging the heading control. Small heading changes during LABS operations or instrument approaches can be made using the rudder pedals. This allows the airplane to take a new heading without disturbing the wing-level attitude. Heading control in an auto-LABS maneuver becomes inoperative at initiation of pull-up if wings are level (±1/2 degree maximum bank angle) or 4 seconds after initiation of pull-up, if wings are not level.

NOTE It is desirable to perform auto-LABS maneuvers with heading control disengaged. However, if such a maneuver is performed with heading control engaged, be prepared to immediately correct any roll tendency which may develop within 4 seconds after pull-up is initiated.

MANEUVERING. The airplane is maneuvered in pitch and roll attitudes by using the control stick in the conventional manner. Lateral stick forces result in rolling rates proportional to stick force, and longitudinal stick forces result in pitch rates proportional to stick force.

DISENGAGING AUTOPILOT. To disengage the autopilot, the autopilot control switch should be moved to STAND BY. The yaw-pitch damper switch should be moved to STAND BY to disengage the dampers. If the yaw-pitch damper switch is moved to STAND BY with the autopilot still engaged, both the autopilot and the damper will disengage. The emergency disconnect switch lever, on the control stick, also disengages both the autopilot and the dampers.

EMERGENCY OPERATION OF AUTOMATIC FLIGHT CONTROL SYSTEM (AUTOPILOT).

In an emergency, the autopilot may be disengaged by pressing the emergency disconnect switch lever, on the control stick, or by moving the autopilot control switch to STAND BY. The autopilot can also be overpowered when engaged by exerting more than normal force on the control stick.

NAVIGATION EQUIPMENT.

MAGNETIC COMPASS.

Refer to "Magnetic Compass" under "Instruments" in Section I.

RADIO COMPASS - AN/ARN-6.

Refer to "Communication and Associated Electronic Equipment" in this section.

J-4 COMPASS CONTROL PANEL

F-100D-1-A72-2A

Figure 4-22

TACAN - AN/ARN-21

Refer to "Communication and Associated Electronic Equipment" in this section.

J-4 COMPASS SYSTEM.

Directional indication for flights at all longitudes and latitudes is presented on the instrument panel by the J-4 compass system. The system can be operated in either the magnetic mode or the directional gyro mode. When the magnetic mode is selected, the indicator pointer, or compass card, reflects the magnetic heading of the airplane. In the directional gyro mode, the system gyro is freed from the remote compass transmitter and the heading pointer, or compass card, reflects the directional gyro heading of the airplane. The system is powered by the dc primary bus and the 3-phase ac instrument bus. The J-4 compass control panel is not installed in the rear cockpit.

J-4 Compass System Controls and Indicators.

HEADING INDICATOR, RADIO MAGNETIC INDICATOR, AND ON F-100D NAVS AIRPLANES, BEARING-DISTANCE-HEADING INDICATOR. The heading indicator pointer, the radio magnetic indicator compass card, and the bearing-distance-heading indicator compass card, show the magnetic heading of the airplane. (See 7 and 38, figure 1-6; 8, figure 1-7; 4 and 32, figure 1-11, figure 4-23.) The dial on the heading indicator can be rotated as a reference index for the heading to be flown by turning the knob on the front of the indicator. For additional functions of the radio magnetic indicator, refer to "Communication and Associated Electronic Equipment" in this section. For additional information on the bearing-distance-heading indicator, refer to "NAVS System - F-100D Airplanes" in this section.

FUNCTION SELECTOR SWITCH. This two-position, primary-bus-powered switch (figure 4-22) is used for selection of the operating mode of the J-4 compass system. When the switch is at MAG. (magnetic), the system operates as a magnetic compass, and the indicator is synchronized to the remote compass transmitter in the wing. The MAG. position should not be used at high latitudes. An automatic turn cutout gyro turns off the slaving function of the gyro during some airplane attitudes, to reduce heading error. In the area of the magnetic poles, the direction of the earth's magnetic field changes to such an extent that the magnetic feature of the system is no longer reliable and the DG (directional gyro) position of the switch should be used. In this, a mode of operation is used that frees the gyro from the transmitter and allows the gyro to be corrected by the latitude correction controller.

NOTE The gyro reaches operating speed shortly after power is applied, but 2 minutes must be allowed for gyro stabilization. A rough check should be made to see that the magnetic compass and the indicator are on approximately the same headings.

The function selector switch is also used for fast-slaving the system after maneuvers or turns which create gyro gimbal errors. This is done by moving the switch from MAG. to DG and then back to MAG.

Caution Two minutes must elapse between each use of the function selector switch. This is for cooling of the thermal relay that controls the fast-slave cycle. If the relay is not cooled to permit another complete fast-slave cycle, the indicator may stop at an erroneous reading.

LATITUDE CORRECTION CONTROLLER. This rotary selector (figure 4-22) is powered by the primary bus. The correction controller must be set to the latitude of flight for accurate operation of the system in the directional gyro mode to compensate for imposed errors due to the earth's rotation.

HEMISPHERE SELECTOR SWITCH. When operation is in the directional gyro mode, the proper geographic hemisphere can be selected by a two-position, primary-bus-powered switch. (See figure 4-22.) The selector can be turned by a coin. Selection of either hemisphere is indicated by the appearance of a small letter within a window adjacent to the hemisphere selector switch. The N position should be selected during flight north of the equator, and the S position during flight south of the equator. Setting this switch at the N position produces a clockwise correction for gyro drift; setting it at the S position produces counterclockwise correction for apparent precession.

ANNUNCIATOR. The annunciator (figure 4-22), visible through a window in the control panel, indicates the amount of synchronization between the indicator and the remote compass transmitter when in the magnetic mode. When the system is not synchronized, the annunciator indicates in which direction the synchronizer control must be turned to remove the error. When the system is synchronized, the annunciator needle centers.

SYNCHRONIZER SWITCH. The primary-bus-powered synchronizer switch (figure 4-22) is spring-loaded to SET. Turning the switch toward DECR or INCR as required will slew the heading pointer (radio magnetic indicator compass card, or bearing-distance-heading indicator compass card) to any desired directional gyro (DG) heading, or to the magnetic (MAG.) heading signals from the remote compass transmitter. Slewing can be done at a slow or fast rate. When the switch is held at the first white index on either side of the

SET position, the indicator will slew at a slow rate; when the switch is held at the second white index, the indicator will slew at a fast rate.

Operation of J-4 Compass System.

DURING PREFLIGHT CHECK. After power is applied and one minute has been allowed for gyro warm-up, do the following:

1. Turn function selector switch to MAG.

2. Turn hemisphere selector switch to hemisphere of present position (DG operation only).

3. Turn latitude correction controller switch to latitude of present position (DG operation only).

4. Check that heading pointer (radio magnetic indicator compass card, or bearing-distance-heading indicator compass card) can be slewed at a slow rate when synchronizer switch is momentarily positioned at the first index on the plus side and on the minus side of SET position. Check slewing at a faster rate at the second index. The annunciator should indicate in which direction the switch must be turned to slew the heading pointer, or compass card, to airplane heading.

Caution Do not slew continuously for a period longer than 30 seconds without a 2-minute cooling period before further slewing.

5. Turn function selector switch to DG and check that pointer, or compass card, can be slewed in both directions by turning synchronizer switch.

6. Leave heading pointer, or compass card, about 45 degrees off airplane heading and then turn function selector switch to MAG. Observe that annunciator centers and pointer, or card, aligns to airplane heading.

NOTE If it is necessary to repeat this check, allow at least 2 minutes between checks for thermal relay cycle.

7. Turn function selector switch to desired mode of operation (MAG. or DG).

AFTER TAKE-OFF. After take-off, do the following:

1. When operating in magnetic mode, cycle function selector switch to DG and back to MAG. whenever annunciator is not centered. (The annunciator should center, and the heading pointer, or compass card, should show the airplane magnetic heading.)

NOTE This procedure may be used to fast-slave heading pointer (which has become erroneous as a result of airplane maneuvering) back to the actual airplane heading.

- On F-100D NAVS airplanes, the annunciator must be closely monitored to provide correct heading signals to the NAVS system.

2. When operating in directional gyro mode, reset hemisphere selector switch to hemisphere of flight and adjust latitude correction controller to present latitude, as changes occur during flight.

3. If the NAVS system and a grid overlay chart are to be used for navigation in the directional gyro mode, slew bearing-distance-heading indicator compass card to airplane heading.

NAVS SYSTEM - F-100D AIRPLANES.

The NAVS system is a rhumb line flight navigation system that can accommodate great circle or grid navigation, depending on the type of heading input. Independent of ground aids, the system is equally effective from pole to pole, in all weather, and over all terrain. Speed and altitude limits are from 70 knots and 200 feet terrain clearance to more than the airplane capabilities. The NAVS system is composed of an AN/APN-102 Doppler radar subsystem that provides ground speed and drift information, and an AN/ASN-25 dead-reckoning computing subsystem that performs the actual dead-reckoning problems based on the data received from the Doppler radar, J-4 compass system, and information manually inserted. The AN/APN-102 subsystem consists of a radar antenna, a receiver-transmitter, a speed-drift indicator, and a frequency tracker. The antenna (figure 4-7), servo-stabilized to maintain alignment with ground track, directs four beams of pulsed microwave energy in diagonal pairs (left-front, right-rear; then right-front, left-rear) toward the ground. A switching mechanism causes the beams to switch back and forth between these positions at a one-cycle-per-second rate. The total Doppler shift, produced by mixing the front and back beam frequencies, is directly proportional to the speed of the airplane, and therefore provides a continuous and accurate measurement of ground speed. For determining drift angle, the total Doppler shift of one of the diagonal pairs is compared with the total Doppler shift of the other pair. The difference, if any, generates an error voltage to actuate the antenna servo that rotates the antenna in a horizontal plane until the difference is eliminated, the error voltage is nulled, and the antenna is aligned with ground track. This ground speed-drift angle information is fed to, and displayed on, the indicator in the cockpit. Here the drift-angle information is combined with heading information from the J-4 compass system, and is then fed to the AN/ASN-25 subsystem as magnetic ground track. The AN/ASN-25 computer will continue to operate (memory mode) using this ground speed and drift angle information in case of Doppler system malfunction or desired radar silence. Speed-drift information may be brought up-to-date, however, by manual insertion as desired.

The AN/ASN-25 dead-reckoning subsystem consists of a computer amplifier, a computer control indicator, and a short-range indicator in the cockpit. Two displays function alternately on the computer control indicator. Each display consists of three counter-type indicators that provide track and distance information. While one display is showing precise navigation information for a current flight leg (RUN mode), data for the next leg may be set into the computer (SET mode). Maximum distance (without resetting) for each leg to be flown is 999 miles. Upon arrival at the end of a leg, automatic transfer to the second leg takes place. Transfer can also be effected manually, if desired. While flying the second leg, third leg data can be inserted into the "SET" display. This procedure is followed for as many legs as are necessary to complete the mission. The computing system also includes provisions for return to a desired track, should a deviation from the track occur. Accumulated errors can be corrected if a known check point can be anticipated. The NAVS system is powered by the primary and secondary busses, and 3-phase ac instrument bus.

AN/ASN-25 System Controls and Indicators.

DESIRED TRACK INDICATORS. The desired track indicators (29, figure 1-10; figure 4-23) are four-digit counters having a range of 0 to 360 degrees. The last digit reads in tenths of degrees. Each indicator has a dual-speed slew knob. Pulling the knob outward engages the counters for fine adjustment. When the knob is pressed, coarse adjustment is obtained.

NAUTICAL-MILES-TO-GO INDICATORS. The nautical-miles-to-go indicators (29, figure 1-10; figure 4-23), labeled "NAUT MI TO GO," are three-digit counters with a range of 0 to 999 miles. The right-hand digit has a quarter-mile scale to facilitate readability. On an active ("RUN") display, when the nautical-miles-to-go counter counts down to zero, automatic transfer from that display to the inactive ("SET") display occurs. However, if the counters on the "SET" display are at zero, transfer will be made back to the active display and it will continue to count through the maximum 999 toward zero. Each indicator has a slew knob that must be pressed to engage the counters. Clockwise rotation increases miles-to-go.

NAUTICAL-MILES-OFF-TRACK INDICATORS. The nautical-miles-off-track indicators (29, figure 1-10; figure 4-23), labeled "NAUT MI OFF TRACK," are tape counters with a range of 0-99 miles left, to 0-99 miles right, and display the letters "L" and "R" appropriately. The tape has a quarter-mile scale just below the numbers. Pressing the off-track slew knob on either indicator and rotating it clockwise engages the tape counter and turns it toward an increase in miles off track to the left. Increase in miles off track to the right is obtained when the knob is pressed and turned counterclockwise.

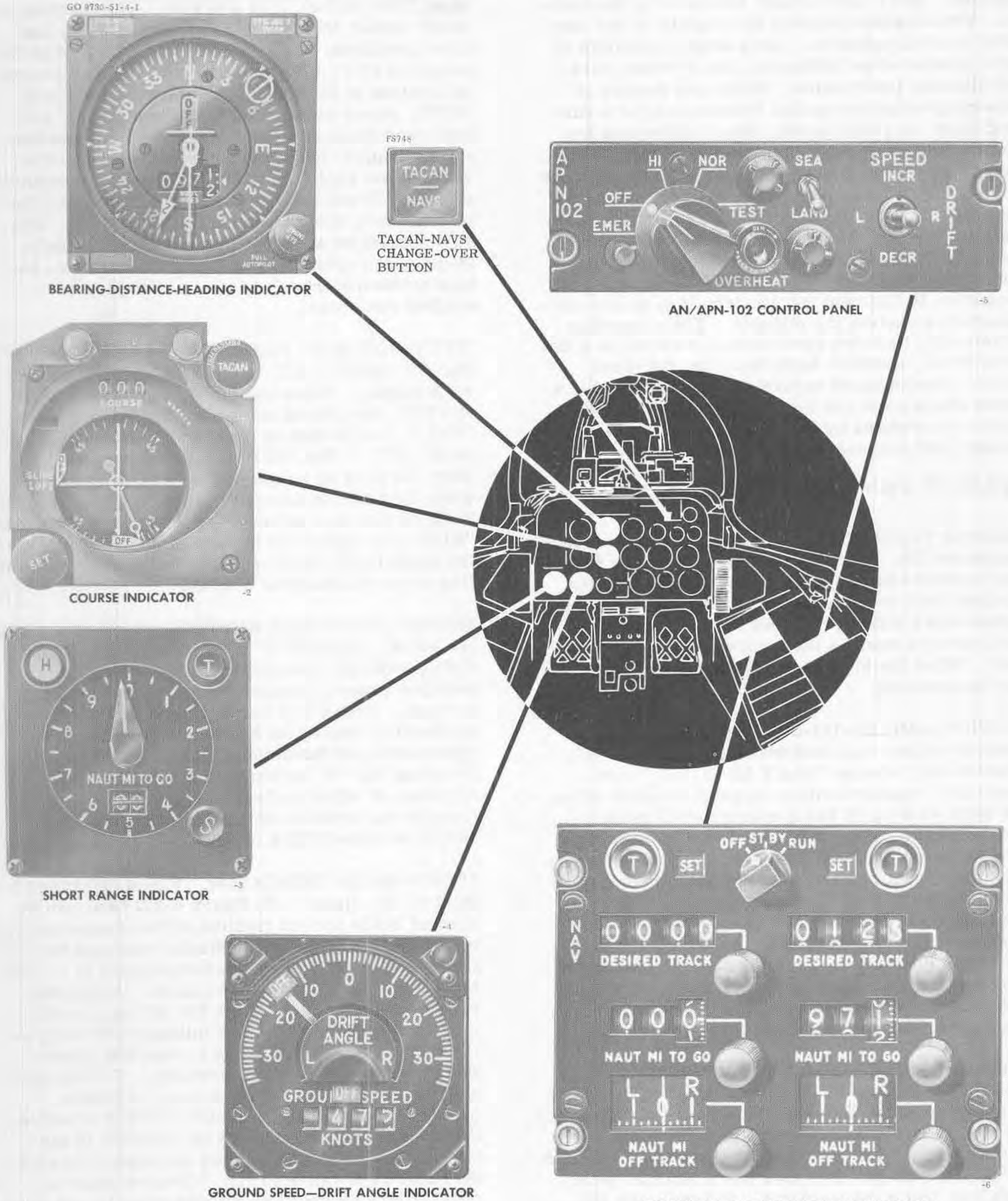
FUNCTION SELECTOR SWITCH. The function selector switch (29, figure 1-10; figure 4-23) has three positions: OFF, STBY, and RUN. With the switch at OFF, all electrical power to the computing system is disconnected. With the switch at ATBY, power is supplied to the equipment, and track and distance information may be slewed into either display, but all counters remain inactive. Turning the switch to RUN activates the computing system. Track and distance information may be inserted only into the display reading SET. The switch must be at RUN and the active nautical-miles-to-go counter must count down to zero before automatic transfer from one display to another can occur.

"STBY-RUN-SET" FLAGS. A "STBY-RUN-SET" flag (29, figure 1-10; figure 4-23) is provided for each display. When the function selector switch is at STBY, the flag of the active display will read "STBY," while that of the inactive display will read "SET." The "STBY" indication is used to alert the pilot as to which display will operate when the function selector switch is turned to RUN. With the function selector switch at RUN, the word "RUN" will appear on the active display flag. At the same time, the word "SET" will appear on the flag above the inactive display.

MANUAL TRANSFER BUTTONS. A manual transfer button, marked "T" (29, figure 1-10; figure 4-23), adjacent to each "RUN-SET" flag, makes possible manual transfer from one display to another. Pressing a button that is associated with an inactive display (at SET) initiates transfer of operation from the display that is active (at RUN). Pressing the "T" button on a display that is at RUN has no effect on transfer action. Manual transfer is possible with the function selector switch at either STBY or RUN.

SHORT-RANGE INDICATOR. The short-range indicator (43, figure 1-7; figure 4-23) is a remote vernier scale for the nautical-miles-to-go counters on the computer control indicator and may be used to check and/or correct the termination of a flight leg when a check point is available. A two-digit counter, labeled "NAUT MI TO GO" on the dial face, has a range of 0 to 99 miles in one-mile increments. A red bar drops across the counter when the indicator is not operating. To indicate precise readings of distance to go, a pointer moves around the dial marked in tenths of miles. Clockwise movement shows an increase in distance to go; counterclockwise movement shows a decrease in distance to go. When the nautical-miles-to-go counter has counted down to one mile, two alert lights come on simultaneously. One light, on the instrument face, comes on to read

NAVS SYSTEM CONTROLS AND INDICATORS



F-100D-1-A72-3A

Figure 4-23

"MI TO GO"; the other, a status display light (6, figure 1-7; and figure 4-34), comes on to read "ONE MILE TO GO." The lights go out at zero miles. The lights can be dimmed by use of the indicator light dimmer switch. For additional information on the status display lights, refer to "Miscellaneous Equipment" in this section. Pressing the manual slew "S" knob, on the front of the indicator, engages the miles-to-go counter. Clockwise rotation increases miles to go, while counterclockwise rotation decreases miles to go. A hold button, identified by the letter "H," is on the front of the indicator. Pressing this button deactivates automatic transfer in the computer control indicator if any mileage remains on the short-range indicator counters. A light in the button comes on when the button is pressed, and stays on until the manual transfer "T" button on the indicator is pressed. The light can be dimmed by use of the indicator light dimmer switch. Pressing the "T" button transfers desired track and nautical-miles-off-track information from one display to another while transferring nautical-miles-to-go operation from the computer control indicator to the short-range indicator. The indicator is powered by the secondary bus.

AN/APN-102 System Controls and Indicators.

SELECTOR SWITCH. The five-position selector switch (11, figure 1-10; figure 4-23) is powered by the secondary bus. When the switch is at OFF, all power to the system is disconnected. The switch should be turned to HI for operation of the system from 200 feet to 5000 feet terrain clearance and above 30,000 feet terrain clearance. The switch should be turned to NOR from 5000 feet to 30,000 feet terrain clearance. The TEST position is for ground check and trouble shooting; however, if Doppler accuracy is suspected, the system may be checked in flight by turning the switch to TEST and reading 600 (±6) knots. Rotating the switch to EMER allows emergency operation whenever the system shuts off because of an overheated condition as indicated by the AN/APN-102 equipment overheat caution light. A button latch on the switch must be pressed before the switch can be rotated to EMER.

Caution Damage to system components will result if the system is operated in the emergency condition for more than 5 minutes.

"SEA-LAND" SWITCH. This switch (11, figure 1-10; figure 4-23) calibrates the system for operation over land or sea, and is powered by the secondary bus.

NOTE Make sure the "SEA-LAND" switch is placed at the terrain setting corresponding with that over which the airplane is being flown. This will prevent the possibility of a variance in calibration that could affect accuracy of the system. When the switch is moved from LAND to SEA, ground speed indication will increase approximately 6 knots.

SPEED AND DRIFT SWITCH. The speed and drift switch (11, figure 1-10; figure 4-23) is used to manually insert speed and drift information in the ground speed - drift angle indicator. Holding the switch at L will slew the drift angle pointer to the left; holding the switch at R will slew the pointer to the right. To increase or decrease the ground speed indication value, the switch, powered by the secondary bus, is held at INCR or DECR, respectively.

EQUIPMENT OVERHEAT CAUTION LIGHT. This amber secondary-bus-powered caution light (11, figure 1-10; figure 4-23) comes on when thermal cutout switches in the AN/APN-102 system have tripped because of an overheat condition. This can be caused either by the system itself overheating or by improper equipment compartment cooling. The light goes out when the selector switch is turned to EMER. The light is a dimmable, press-to-test type.

GROUND SPEED - DRIFT ANGLE INDICATOR. The ground speed of the airplane in knots and the number of degrees of airplane drift are shown on the ground speed - drift angle indicator (41, figure 1-7; figure 4-23). A pointer moves on a dial marked in one-degree increments to show left or right drift to a maximum of 15 degrees. Ground speed to a maximum of 999 knots is displayed on a three-digit counter. Two "OFF" flags, one for ground speed and one for drift angle, appear on the indicator when the system is turned off or when radar signals are interrupted. Power to the indicator is supplied by the secondary and main 3-phase ac busses.

TACAN-NAVS Change-over Button - F-100D NAVS Airplanes.

This button (12, figure 1-7; figure 4-23), on the instrument panel, is used to select some instrument panel indications between the TACAN and NAVS systems. Pressing the button energizes a system change-over relay through secondary bus power. Releasing and pressing the button again de-energizes this relay to transfer from the TACAN to the NAVS system and vice versa. A light in the button can be dimmed by use of the indicator light dimmer switch.

When the change-over button is pressed, the TACAN mode is indicated by the following conditions:

a. Course indicator TACAN light on.

b. Distance counters on the bearing-distance-heading indicator inoperative (returned to zero).

c. No. 2 (TACAN bearing) pointer on the bearing-distance-heading indicator provides TACAN bearing information.

d. "TO-FROM" displayed on the course indicator provides inbound-outbound information to TACAN station.

e. Heading pointer on the course indicator shows airplane relative heading with reference to the selected radial shown in the course window.

f. Course deviation indicator on the course indicator shows airplane positional deviation from a selected TACAN radial.

g. TACAN range indicator shows slant range to TACAN surface beacon.

When the change-over button is again pressed, the NAVS mode is indicated by the following conditions:

a. Course indicator TACAN light out.

b. Distance counters on the bearing-distance-heading indicator shows NAVS system miles to go in the active display.

c. TACAN bearing pointer on the bearing-distance-heading indicator provides TACAN bearing information.

d. "TO-FROM" displayed on the course indicator provides inbound-outbound information in the NAVS mode.

e. Heading pointer on the course indicator shows airplane relative heading with reference to the selected radial shown in the course window.

f. Course deviation indicator on the course indicator provides NAVS system remote off-track information.

g. TACAN range indicator shows slant range to TACAN surface beacon.

Bearing-Distance-Heading Indicator - F-100D NAVS Airplanes.

This indicator (8, figure 1-7; figure 4-23) powered by the primary bus and the 3-phase ac instrument bus, consists of a rotating compass card, two pointers, a miles-to-go counter (distance indicator), and an index. The compass card receives heading information from the J-4 compass system and displays this magnetic heading against a fixed reference marker at the 12 o'clock position on the dial. The memory index is a small ring that is moved clockwise or counterclockwise about the compass card by the turn of a set-index knob on the face of the instrument. Signals from the AN/ARN-6 radio compass receiver drive the No. 1 (ADF bearing) pointer to provide radio compass bearing information. The TACAN bearing pointer provides TACAN radio bearing information, received from the AN/ARN-21 receiver. On the outer edges of the instrument are three placards, labeled "PTR NO. 1 ADF," "PTR NO. 2 TACAN," and "PULL AUTOPILOT." The latter serves no function in this system. On the face of the instrument is a counter-type distance indicator. Synchronized to the nautical-miles-to-go indicator on the NAVS computer control indicator, the counters range from 0 to 999 and provide a remote miles-to-go reference in the NAVS mode. The counters are inoperative and remain at zero during operation of the NAVS system short-range indicator. The counters also remain at zero when operating in the TACAN mode. An "OFF" flag appears on the face of the indicator when power is interrupted.

Course Indicator.

Refer to "Course Indicator" in this section.

Operation of F-100D NAVS System.

NOTE The J-4 compass system must be operating and closely monitored while the NAVS system is being used for navigation.

PREFLIGHT CHECK OF AN/APN-102 SYSTEM. For preflight check of the AN/APN-102 system, proceed as follows:

Caution Cooling air (engine running and AN/APN-102 bleed-air switch at NORMAL, or external cooling air on) must be provided and the area under the airplane must be clear of all metallic objects when the AN/APN-102 system is in operation.

1. Turn selector switch to NOR and allow one minute warm-up time. The system is ready when ground speed and drift angle can be slewed.

2. Move "SEA-LAND" switch to LAND.

3. Hold speed and drift switch at INCR or DECR, to slew in 600 knots on ground speed counters; then slew in zero degrees of drift angle. Release switch.

4. Hold selector switch at TEST. Ground speed - drift angle indicator "OFF" flags should disappear, and ground speed indicator should read 600 (±6) knots.

NORMAL OPERATION OF AN/APN-102 SYSTEM. For normal operation of AN/APN-102 system, proceed as follows:

1. Turn selector switch to HI for operation from 200 feet to 5000 feet terrain clearance and above 30,000 feet terrain clearance.

2. Position "SEA-LAND" switch to same as operational area.

3. Hold speed and drift switch at L or R until drift angle pointer indicates zero.

4. Hold speed and drift switch at INCR or DECR until 225 knots (or desired lock-on speed) is shown on ground speed - drift angle indicator counter. Hold this speed after take-off until AN/APN-102 locks on (ground speed - drift angle indicator "OFF" flags disappear.)

5. Turn selector switch to NOR from 5000 feet to 30,000 feet terrain clearance.

NOTE The "OFF" flags on the ground speed - drift angle indicator may appear briefly during abrupt flight maneuvers, sustained high bank angles, flights below 200 feet terrain clearance, and when flying over mountains or smooth water. This is normal; however, if either flag disappears for an extended period of time, rock wings slightly. If flags do not reappear, slew the ground speed counter and/or drift angle pointer to restore lock-on.

EMERGENCY OPERATION OF AN/APN-102 SYSTEM. For emergency operation of AN/APN-102 system, proceed as follows:

1. If the ground speed - drift angle indicator "OFF" flags appear and the AN/APN-102 equipment overheat caution light is on, it is possible that the system cutout switches have tripped because of an overheat condition. To read the ground speed - drift angle indicator:

a. Turn AN/APN-102 selector switch to EMER.

Caution Damage to system components will result if the system is operated in the emergency condition for more than 5 minutes.

b. When "OFF" flags disappear, turn selector switch to OFF.

2. Repeat steps a. and b., if airplane heading or airspeed is changed appreciably.

3. If equipment air overheat caution light comes on, follow the procedures given under "Emergency Operation of Electronic Equipment Compartment Cooling System" in this section.

PREFLIGHT CHECK OF AN/ASN-25 SYSTEM. For preflight check of the AN/ASN-25 system, proceed as follows:

1. Check that course indicator "TACAN" light is out.

2. Turn function selector switch to STBY.

"STBY-RUN-SET" flat on one display reads STBY, "STBY-RUN-SET" flag on the other display reads SET.

3. Press manual transfer "T" button on display to be used for first leg of flight.

"STBY-RUN-SET" flag reads "STBY" for that display.

4. For first leg of flight on "STBY" display, slew desired track, nautical-miles-to-go, and nautical-miles-off-track counters as required.

NOTE Magnetic variation should be averaged over the entire length of each leg to be flown, for computation of the desired magnetic heading.

5. For second leg of flight, on "SET" display, slew desired track, nautical-miles-to-go, and nautical-miles-off-track counters as required.

6. If short-range indicator is to be used, slew nautical-miles-to-go counter as desired.

NORMAL OPERATION OF AN/ASN-25 SYSTEM. For normal operation of AN/ASN-25 system, proceed as follows:

1. After take-off, and while over departure point, turn function selector switch to RUN.

"STBY-RUN-SET" flag reads "RUN" on the active display. Departure point may be the end of the runway or any other known point.

2. At completion of first leg, the "RUN" and "SET" displays will automatically interchange ("RUN" will become "SET"; "SET" will become "RUN").

3. Slew third-leg-of-flight information into display reading "SET."

4. Repeat steps 2 and 3 for as many legs as necessary to complete mission.

5. If a known check point can be anticipated, any errors that have accumulated in the system can be corrected in either of the following ways:

a. Turn function selector switch to STBY before visual check point is reached, to stop all counters on "RUN" display. Slew counters as necessary to match check point. At check point, return function selector switch to RUN.

b. For small corrections, slew nautical-miles-to-go counter on "RUN" display to actual miles at check point.

c. Before end of leg, press "H" button on short-range indicator, to prevent automatic transfer from "RUN" display. When over visual transfer point, press "T" button on "SET" display.

6. The short-range indicator may be used during any portion of a flight leg as follows:

a. On short-range indicator, slew nautical-miles-to-go counter for first portion of leg.

NOTE This step may be done during the preflight check, but in any case, it must be done during the leg before that on which the short-range indicator is to be used.

b. On "SET" display, slew nautical-miles-to-go counter as desired; slew magnetic heading for total leg into desired track counter; and slew nautical-miles-off-track counter as desired.

c. Press "H" button on short-range indicator to prevent automatic transfer from "RUN" display.

d. At end of "RUN" leg or at a visual check point, press "T" button on short-range indicator.

The "RUN" and "SET" displays will interchange, the nautical-miles-to-go function will transfer to the short-range indicator, and desired track and off-track information will transfer to the new "RUN" display.

e. The short-range indicator will count down, and the desired track and off-track indications will function on the "RUN" display.

f. The alert lights on the short-range indicator and instrument panel shroud will come on when the short-range indicator counter has counted down to one mile.

g. When the short-range indicator counter counts down to zero, the miles-to-go information will be transferred to the "RUN" display.

NOTE If the nautical-miles-to-go counter on the "RUN" display is at zero, the system will transfer to the "SET" display. If the nautical-miles-to-go counters on both displays are at zero, the system will transfer to the right-hand (outboard) display, and the alert lights will go out.

NAVIGATION COMPUTER (B-26).

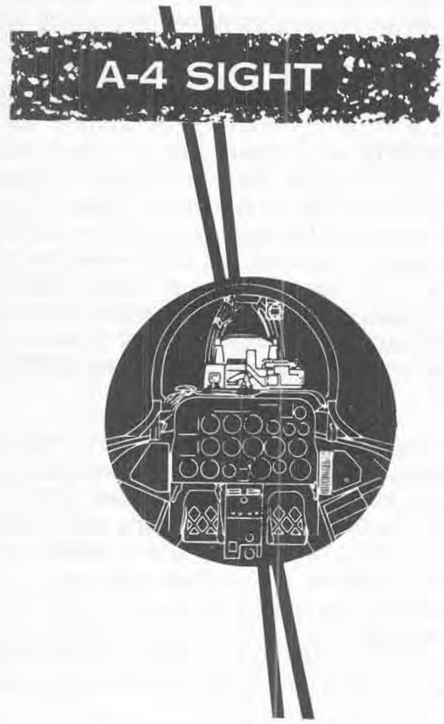
Some airplanes have a B-26 navigation computer (5, figure 1-9; 5, figure 1-10) mounted on a swivel arm above the right console (not in the rear cockpit). With this computer, the pilot can solve problems of time, rate, distance, true airspeed, and density altitude. When it is not in use, the computer can be stowed under the canopy sill.

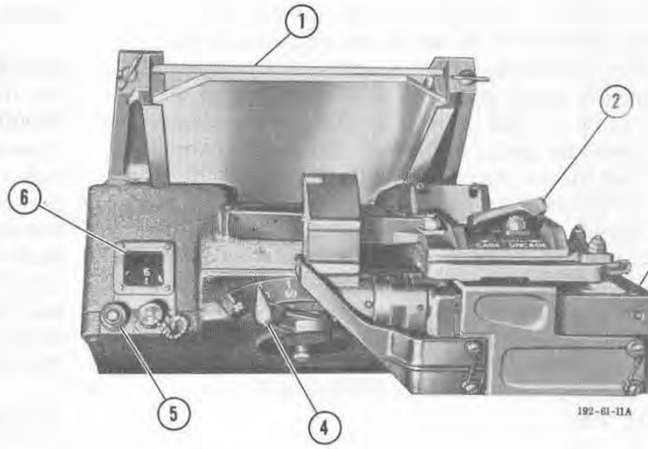
ARMAMENT EQUIPMENT.

The basic armament installation consists of 20 mm guns and provisions for various external stores on jettisonable pylons fitted under each wing and fuselage centerline. A gun-bomb-rocket sight is coupled with a radar ranging system for sighting. A gun camera on the sight records gun, rocket, and missile firing. Armament controls and indicators are not provided in the rear cockpit except for the following: bomb button, external load emergency jettison button, LABS vertical gyro caging button, LABS yaw-roll gyro check button, LABS dive and roll indicator, LABS release indicator light, and special store indicator light. Refer to "External Loading Configuration Limitations" in Section V for information on approved loading configurations.

A-4 SIGHT.

The Type A-4 gyro computing sight (figure 4-24) automatically computes leads for gunnery, rocketry, or bombing. It compensates for the required lead for gun and rocket firing. The sight computation is entirely automatic, requiring only that the pilot keep the reticle center dot on the target and track the target smoothly. The reticle image is projected on the reflector glass aft of the windshield. Range data for gunnery is supplied by the radar ranging system or the fire control subsystem with a stand-by manual range control. The sighting system is calibrated to automatically compute leads for ranges between 600 and 6000 feet. When the sight is used as an automatic bombsight, the line of sight is depressed about 10 degrees. This requires that the approach be made so that the flight path becomes tangent to the proper bomb release point, which is indicated by automatic extinction of the sight reticle. Bombs may be released either automatically at the proper release point by an accelerometer mechanism within the sight or manually. The sight reticle light goes out during the caging cycle of the LABS yaw-roll gyro and remains out until gyro caging is complete; then the sight reticle light again comes on. (Refer to "LABS Yaw-Roll Gyro Check Button" in this section.) The electrical power for the sight system is supplied by the tertiary bus, and the sight reticle light is powered by the secondary bus.





1. REFLECTOR GLASSES
2. SIGHT MECHANICAL CAGING LEVER
3. GUN CAMERA
4. WINGSPAN LEVER
5. RADAR LOCK-ON LIGHT
6. SIGHT RANGE DIAL

F-100D-1-A60-1

Figure 4-24

Sight Ranging Radar.

The AN/ASG-17 fire control radar subsystem is powered by the tertiary bus and the main ac bus. It supplies range data to the A-4 sight. The radar subsystem has a search range of 2000 to 9000 feet. Some systems have a track range of about 2000 to 9000 feet, while others have a track range of about 700 to 9000 feet. An indicator light on the A-4 sight shows when the sight radar has locked on a target. The sight reticle becomes brilliant at the time of lock-on regardless of the reticle dim control position. A manual range control supplements the radar sight and should be used if the radar ranging fails. Manual ranging should also be used for overland targets below 6000 feet, because ground return effects (ground clutter) usually cause radar ranging below that altitude to be erratic. With the fire control radar subsystem, it is necessary to use manual ranging to overcome the effects of ground clutter below 3000 feet for overland targets. The radar subsystem antenna is in the upper leading edge of the engine air intake duct fairing.

A-4 Sight Controls and Indicators.

TRIGGER SAFETY SWITCH. Refer to "Gunnery System Controls" in this section.

SIGHT DIMMER RHEOSTAT. The sight dimmer rheostat (figure 4-26) adjusts the brightness of the sight reticle. When the sight is not in use, the rheostat should be at DIM to prevent damage to the reticle bulb in case of voltage surge. Turning the rheostat clockwise to BRIGHT increases reticle brightness. The sight reticle on the sight reflector glass is dimmed before lock-on (independent of the reticle dim control), and at the time of lock-on the sight reticle increases in brilliancy. The sight dimmer rheostat requires secondary and tertiary bus power.

SIGHT FILAMENT SELECTOR SWITCH. The primary or secondary filament in the dual-filament sight reticle bulb can be selected by the sight filament selector switch (figure 4-26), which is normally at PRIMARY. It should be moved to SECONDARY if the primary filament fails. The switch requires secondary and tertiary bus power.

SIGHT SELECTOR UNIT. The sight selector unit (8, figure 1-8; 10, figure 1-12; figure 4-26) has the sight function selector lever, the target speed switch, and the rocket depression angle selector lever. The sight selector unit uses secondary and tertiary bus power. The sight function selector lever, when set at GUN, BOMB, or ROCKET, adjusts the sight system for the desired function. (This lever automatically returns to GUN if it is at

BOMB or ROCKET when the radar reject button, on the control stick grip, is pressed.)

The target speed switch is used to control lead angle in accordance with the speed ratio between the attacking airplane and its target. When a high-speed attack is being made on a slow-moving target, the switch should be at LO. The switch should be at HI when the speed of the target is about the same as that of the pursuing airplane. The TR position is for use during a low-speed training run on a low-speed target. Speed ranges (TAS) for the various settings are as follows: for the LO setting, 600 knots for the attacking airplane and 200 knots for the target airplane; for the HI setting, 600 knots for the attacking airplane and 500 knots for the target airplane; for the TR setting, 300 knots for the attacking airplane and 200 knots for the target airplane.

Movement of the rocket depression angle selector lever depresses the sight reticle image in increasing amounts through the full range of the mil scale according to the position (0 to 175) selected. The proper selector lever setting for varying rocket firing conditions can be determined from T. O. 11BA1-4-1. The pilot should determine, through test-firing runs, settings for various dive angles most suitable to his own technique. The desired depression setting should be set on the mil scale with the variable index markers provided. The index markers, numbered 1 through 4, are for reference only and have no function in the sight system. A tab, near the 50-mil mark on the circumference of the selector unit face, is pulled out to unlock the index markers for adjustment.

WINGSPAN LEVER. Setting the wingspan lever (figure 4-24) inserts target size data into the sight, varying the sight reticle diameter in proportion to range information signals received from the manual ranging control or the sight radar. Graduated markings (from 30 to 120) on the scale represent the size (in feet) of the target airplane. The wingspan lever should be set on the scale graduation that equals the anticipated size of the target.

MANUAL RANGING CONTROL. The twist control in the throttle grip (figure 1-18) permits range data to be supplied manually to the sight system. It is intended to be used during gunnery when radar ranging becomes inoperative or is erratic because of ground effects. Manual ranging is effective over a 1500-foot segment of the total range and covers the span between 1200 feet and 2700 feet. Ranges are shown on the sight range dial, and sight reticle diameter is controlled by the manual range control function of the throttle twist grip. Clockwise rotation of the throttle grip reduces range (increases reticle diameter); counterclockwise rotation increases range (decreases reticle diameter). The throttle grip is spring-loaded to the full counterclockwise position. This is the correct position for normal (automatic) operation of radar ranging. Manual radar ranging requires secondary and tertiary bus power.

RADAR REJECT BUTTON. The radar reject button (figure 1-28) powered by the tertiary bus, should be pressed momentarily to reject the range lock-on and shift the radar to another target. The radar can then lock on targets at ranges greater than the one rejected until the radar maximum sweep range is reached. Radar sweep then automatically recycles, starting to sweep again from minimum range. Pressing the radar reject button also automatically moves the sight function selector lever to GUN if the lever is at BOMB or ROCKET.

RADAR RANGE SWEEP RHEOSTAT. This rheostat (figure 4-26), powered by the secondary and tertiary busses, is used to decrease radar ranging distance and thus prevent the sight radar from locking on the ground or ground objects (when the airplane is making low-altitude attacks). Turning the rheostat toward MIN decreases radar sweep range; turning it toward MAX increases range. During normal operation at altitudes 6000 feet or more above the terrain, the rheostat should be at MAX.

SIGHT ELECTRICAL CAGING BUTTON (LABS VERTICAL GYRO CAGING BUTTON). Pressing the sight electrical caging button (figure 1-18) stabilizes the sight gyro reticle image by caging the sight gyros. When the button is released, the gyros uncage and become operable after a time-cycle delay, during which time the reticle image is extinguished. To eliminate gyro deflection that results from maneuvering on the initial approach to the target, and to provide a stabilized reticle image, the sight should be caged electrically until the approach run has stabilized. The sight electrical caging buton uses secondary and tertiary bus power, and also serves as the LABS vertical gyro caging button. Refer to "AN/AJB Low-altitude Bombing System (LABS)" in this section.

SIGHT MECHANICAL CAGING LEVER. Mechanical caging of the sight is done by a caging lever (figure 4-24) which should be at UNCAGE for normal automatic operation of the sight. The lever is for use during deliveries if desired or in case the sight fails. It must be moved to CAGE to provide a fixed reticle. The size of the fixed reticle depends upon the setting of the wing span lever. (When the lever is at 60, a 100-mil fixed reticle is produced when the sight is caged.)

Caution The sight must be mechanically caged during taxi, take-off, and landing, to prevent damage to the sight mechanism.

SIGHT RANGE DIAL. Target range is indicated by the sight range dial (figure 4-24) which is graduated in feet from 600 to 6000 and presents range distances as determined by the manual range control or the radar ranging system. Secondary and tertiary bus power is necessary for operation.

RADAR LOCK-ON LIGHT. The radar lock-on light (figure 4-24) comes on when the sight radar locks on the target. The light is powered by the secondary and tertiary busses. The light housing may be rotated to control light intensity.

BOMB RELEASE MODE SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

GUN CAMERA SYSTEM.

A Type N-9 or KB-3* gun camera, mounted on the sight, photographs the sight reticle and the target simultaneously during gun, rocket, and missile firing.

Gun Camera.

The gun sight aiming point camera (figure 4-24) is an electrically driven, magazine-type, 16 mm motion picture camera. The camera can be adjusted for various light conditions from the cockpit; however, frame speed, lens aperture, and camera overrun time (0 to 3 seconds) are preset on the ground. Thermostatically controlled camera and magazine heaters are provided. An automatic recycling counter on the camera body, indicates the amount of unexposed film remaining in the magazine. Camera operation is automatic when the trigger is pressed, or, on some airplanes, the bomb button is pressed to fire the rockets, and the camera shutter selector switch is at any position other than OFF. During gunnery operation, the camera operates only as long as the trigger is held depressed (plus preset overrun of 0 to 3 seconds). During missile firing, camera operation time after release of the trigger can be controlled by an adjustable timer.

Command Camera Recorder.

A command camera recorder adapter may be installed on either the N-9 or the KB-3* gun camera to automatically record the command signals that are transmitted to the AGM-12B missile during flight.

Auxiliary Camera.

The auxiliary camera receptacle (8, figure 1-15), in the rear cockpit only, provides a power source (tertiary bus) for operation of a hand-held camera.

Camera Controls.

TRIGGER SAFETY SWITCH. Refer to "Gunnery System Controls" in this section.

CAMERA SHUTTER SELECTOR SWITCH. The shutter setting of the camera is adjusted through a tertiary-bus-powered rotary selector switch (4, figure 1-8; 34, figure 1-12). Turning the switch to OFF disconnects power to the camera, camera heaters, and shutter control. Turning the switch to BRIGHT, HAZY, or DULL, depending on lighting conditions, positions the shutter aperture of the gun camera and turns on the camera heaters.

NOTE For extremely low-temperature operation, the camera heaters should be on for a minimum warm-up period of 1/2 hour.

CAMERA TIMER. When the gun camera is used during missile firing, a camera timer (32, figure 1-8; 33, figure 1-12), with two adjustable time intervals, controls continued camera operation after the trigger is released. The first time interval, set before missile launch with the large timer knob, labeled "START DELAY ADJUST," represents camera running time in seconds from trigger release to start of the second time interval. The second time interval represents camera running time in seconds after completion of the first time interval, and must be set by the ground crew with the small timer knob, labeled "PRESET RUN TIME." Total camera run time after release of the trigger is the total of both time interval settings plus the preset overrun time (0 to 3 seconds).

Operation of Gun Camera.

NOTE The camera shutter selector switch must be at either BRIGHT, HAZY, or DULL to permit operation of the gun camera.

To photograph the approach and tracking during gun-firing operations, the trigger safety switch should be at GUNS CAMERA. When the trigger is pressed to the first detent, gun camera operation starts and continues when the trigger is pressed to the second detent to fire the guns. On some airplanes, if gun camera operation is desired during rocket firing, the trigger safety switch should be at CAMERA. During rocket firing, the gun camera is actuated when the bomb button is pressed, and the camera continues to operate for the preset overrun time following release of the bomb button. If only the camera is to be used, the trigger safety switch should be at CAMERA so that only the gun camera will be actuated by either detent of the

*F-100D-91 Airplanes AF56-3250 through -3346 and F-100F-16 Airplane AF56-3968 and all later airplanes trigger. Upon release of the trigger, the gun camera continues to operate only for the preset overrun time.

Warning The missile master (control) switch should be correctly positioned to prevent unintentional firing of missiles when only gun camera operation is desired. Refer to "AIM-9B Missile System" and "AGM-12B Missile System" in this section for information on correct switch positions.

If gun camera operation is desired during missile firing, the trigger safety switch should be at MISSILES CAMERA, and the camera timer should be set as desired for the mission. The camera begins to operate when the trigger is pressed to the first detent (or second detent to fire the missile) and will continue to operate, as determined by the settings of the camera timer, when the trigger is released.

GUNNERY SYSTEM.

On F-100D Airplanes, four type M-39 20 mm guns are mounted in the lower, forward section of the fuselage, two on each side, outboard of the nose wheel well. On F-100F Airplanes, two Type M-39 or M-39A1 20 mm guns are in the lower section of the fuselage, one on each side, outboard of the nose wheel well. The guns are gas-operated and use electrically detonated ammunition. A maximum of 200 rounds per gun (175 rounds per gun on F-100F Airplanes) is carried, and the rate of fire is about 1500 rounds per minute.

All guns are manually charged on the ground. Ammunition is belt-fed to the guns from two compartments behind the cockpit. Expended ammunition links are retained to prevent impact injury to fuselage and tail surfaces. The expended cases, however, are ejected overboard (through tubes having outlets in the fuselage bottom) with sufficient velocity to clear the airplane. The gun, ammunition, and expended link compartments have a purging system for removing explosive gases resulting from gun firing. The purging system uses air from the engine air intake duct and is actuated automatically during gun firing. The sight is coupled with a radar ranging set for gun sighting and a gun camera is mounted on the sight to photograph the sight reticle and target.

CAUTION

When the guns are fired on the ground, all gun, ammunition, and expended link compartments must be open, as there is not enough airflow to adequately purge the compartments.

F-100D-1-0-50

Gunnery System Controls.

TRIGGER SAFETY SWITCH. Electrical power (ac and dc) for operation of the gun camera, guns, and missiles is controlled by secondary bus power through a guarded trigger safety switch. (See 8, figure 1-6; 10, figure 1-7.) When the switch is at GUNS CAMERA, power is provided to actuate the gun camera, guns, and gun purging system when the trigger is pressed to the second detent. With the switch at MISSILES CAMERA, power is supplied to the missiles and gun camera when the trigger is pressed to second detent. Power to both the guns and missiles is disconnected when the switch is at CAMERA, but power is continuously supplied to the gun camera which may then be operated by pressing the trigger to the first or second detent, or, on some airplanes, pressing the bomb button to fire the rockets.

NOTE The gun-firing circuit is inoperative when the weight of the airplane is on the nose gear.

TRIGGER. The gun-firing, missile, and gun camera circuits are energized by the trigger (figure 1-28) which has two detent positions and is powered by the secondary bus. With the trigger safety switch at GUNS CAMERA, the first detent of the trigger energizes the gun camera and the gun purge door selector valve so that utility hydraulic pressure can open the purge door for gun bay purging. At the second trigger detent, gun camera operation continues and high-voltage ac power is supplied from the gun-firing transformers to detonate the cartridges.

NOTE If the purge door fails to open, thereby prohibiting the flow of air to the compartments requiring ventilation, a microswitch prevents gun-firing circuits from being energized.

As the second trigger detent is released, the guns stop firing and a time-delay unit in the purging system circuit keeps the purging system functioning for 5 seconds after the first trigger detent is released. When the trigger safety switch is at CAMERA, only the gun camera will be actuated by either detent of the trigger. Missiles are fired with the trigger pressed to the second detent when the trigger safety switch is at MISSILES CAMERA and the additional required switches are properly positioned. Refer to "AIM-9B Missile System" and "AGM-12B Missile System" in this section for additional missile-firing information.

GROUND FIRE SWITCH. The ground fire switch (35, figure 1-8; 16, figure 1-12) allows guns to be fired on the ground, or AIM-9B missile circuitry to be checked by maintenance personnel. This switch is channel-guarded with a safety pin fastened through holes in the guard. The switch is powered by the secondary bus and is spring-loaded to SAFE. When held at ON, the switch overrides the nose gear safety switch and the purge door circuits.

Caution This switch should not be used in flight, because a gun gas explosion in the gun bay can result.

Firing Guns (Radar Ranging).

To fire guns using A-4 sight with radar ranging, proceed as follows:

1. Move trigger safety switch to CAMERA and bomb release mode selector switch to SIGHT & RADAR. Allow a warm-up period of 5 to 15 minutes, depending on outside air temperature, for the sight and radar.

2. Move sight filament switch to PRIMARY. If primary filament is inoperative, move switch to SECONDARY.

3. Set sight dimmer rheostat to desired image brilliance.

4. Sight selector unit: set sight function selector lever at GUN, and target speed switch at TR, HI, or LO, depending on speed of attacking airplane and speed of target.

5. Move sight mechanical caging lever to UNCAGE.

6. Turn camera shutter selector switch to BRIGHT, HAZY, or DULL, as required.

7. Move trigger safety switch to GUNS CAMERA.

8. Set wingspan lever to size of target airplane. (This provides a sight reticle of a size corresponding to the expected target, and allows manual ranging to be set up in a minimum of time, should radar ranging fail.)

9. Press electrical caging button to stabilize sight reticle, and begin tracking. Hold caging button down and continue to track ahead of target with a lead estimated to be that for which sight will compensate upon release of caging button.

NOTE If more than one target is within range along airplane flight path, make sure radar is tracking desired target. As range is decreased, reticle should grow larger. Check range dial against estimated range of target. If radar has locked on undesired target, reject it by pressing radar reject button on stick grip.

10. Release electrical caging button as soon as radar target indicator light comes on showing radar lock-on. (As the caging button is released, the reticle image drifts down and then back to the target.)

11. Continue to track target smoothly, without slipping or skidding, for about one second after releasing caging button.

12. Begin firing as soon as target is within firing range (as indicated by the sight range dial).

Caution If it is necessary to nose the airplane down immediately after firing the guns at speeds above Mach 1, do not maintain the same heading at which the guns were fired. Instead, turn to one side or the other and, when possible, pull up slightly. This prevents the airplane from intercepting its own projectiles.

Firing Guns (Manual Ranging).

To fire the guns if radar ranging fails (as shown by radar target indicator light going out or other indications of improper range) or at any other time it is necessary or desirable to use manual ranging, proceed as follows:

1. Check wingspan lever for correct target span setting.

2. Rotate throttle grip clockwise until sight reticle is reduced to minimum diameter.

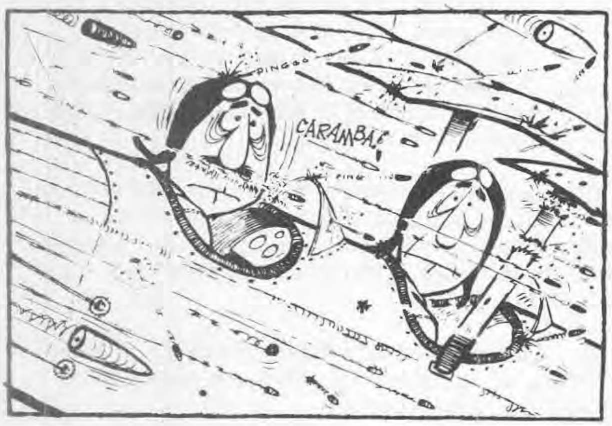
3. Press electrical caging button to stabilize sight reticle, and begin tracking. Track ahead of target with a lead estimated to be that for which the sight will compensate upon release of the caging button.

4. Rotate throttle grip as necessary to maintain size of sight reticle same as span of target.

5. Release caging button and make necessary changes to correct aim. (The reticle should now be completely on target.)

6. Continue to track target smoothly, without slipping or skidding, for about one second after releasing caging button.

7. Begin firing as soon as target is within firing range (as shown by the sight range dial).



CAUTION

If it is necessary to nose the airplane down immediately after firing the guns at speeds above Mach 1, do not maintain the same heading at which the guns were fired. Instead, turn to one side or the other, and when possible pull up slightly. This will prevent the airplane from intercepting its own projectiles.

F-100F-1-0-76

BOMBING EQUIPMENT.

Six bomb-mounting stations are on the lower surface of the wing, and a special store can be carried on a pylon on the bottom of the fuselage, at the centerline. Bombing equipment includes a detachable, forced-ejection type pylon for each pylon station and the necessary manual and electrical controls. The bombs can be armed and released singly (except from the outboard station), in pairs, or salvoed, either manually or automatically. They can be jettisoned (safe) electrically or mechanically.

Ejector-type Pylon.

The jettisonable ejector-type pylon differs from the conventional bomb rack in its method of releasing the load. The load, depending on the type carried, is forcibly ejected or is released and "free-falls." Two electrically ignited cartridges in the pylon jettison the load. Two separate and complete igniter circuits are provided: a normal and an emergency circuit, each terminating in igniter contacts in different cartridge cavities. When the first cartridge is fired by either igniter circuit, the other is simultaneously fired by heat and pressure generated by explosion of the first cartridge. If the first cartridge fails to fire because of a defective primer or a dead circuit, the second cartridge is fired by the jettison circuits or auxiliary release circuits. The expanding gases, resulting from detonation of the cartridges, open both ejector rack hooks and blast the forced ejection stores from the pylon. The ejection force is applied directly to the support lugs of the load, this being the most heavily reinforced area.

When drop tanks, rocket pods, AIM-9B missiles, napalm bombs, fire bombs, CBU dispensers, chemical tanks, or other loads, which are not readily separable from the airplane on release, are carried, a valve in the pylon is held closed and the full force of the exploding cartridges is applied to the load. (The 275- or 335-gallon drop tanks have integral pylons which do not force-jettison.) When bombs are carried, a bypass valve is held open, allowing most of the ejection pressure to dump overboard so that bombs are dropped in a manner closely approximating a "free-fall" trajectory. A manual release permits jettison and "free-fall" of loads (bombs and 275- or 335-gallon drop tanks) which do not require force ejection.

Pylons can be forcibly ejected from the wing only when emergency jettison circuits are energized and will not jettison until after all loads have been released. The pylons are jettisoned by two additional electrically detonated cartridges that are identical to those used to force the loads from the pylons. If, because of a faulty circuit, any load does not jettison from its pylon, both load and pylon jettison when the intervalometer jettisons the pylons. Pylons and loads are ejected at 1/2-second delay between symmetrical pairs to reduce recoil loads on wing structure. A multipurpose pylon (Type VIII, VIIIA, or VIIIB) can be carried at the left intermediate wing station to increase the capability of the airplane for carrying a special store or the 450-gallon drop tank. An additional 450-gallon drop tank can be carried at the right intermediate wing station.

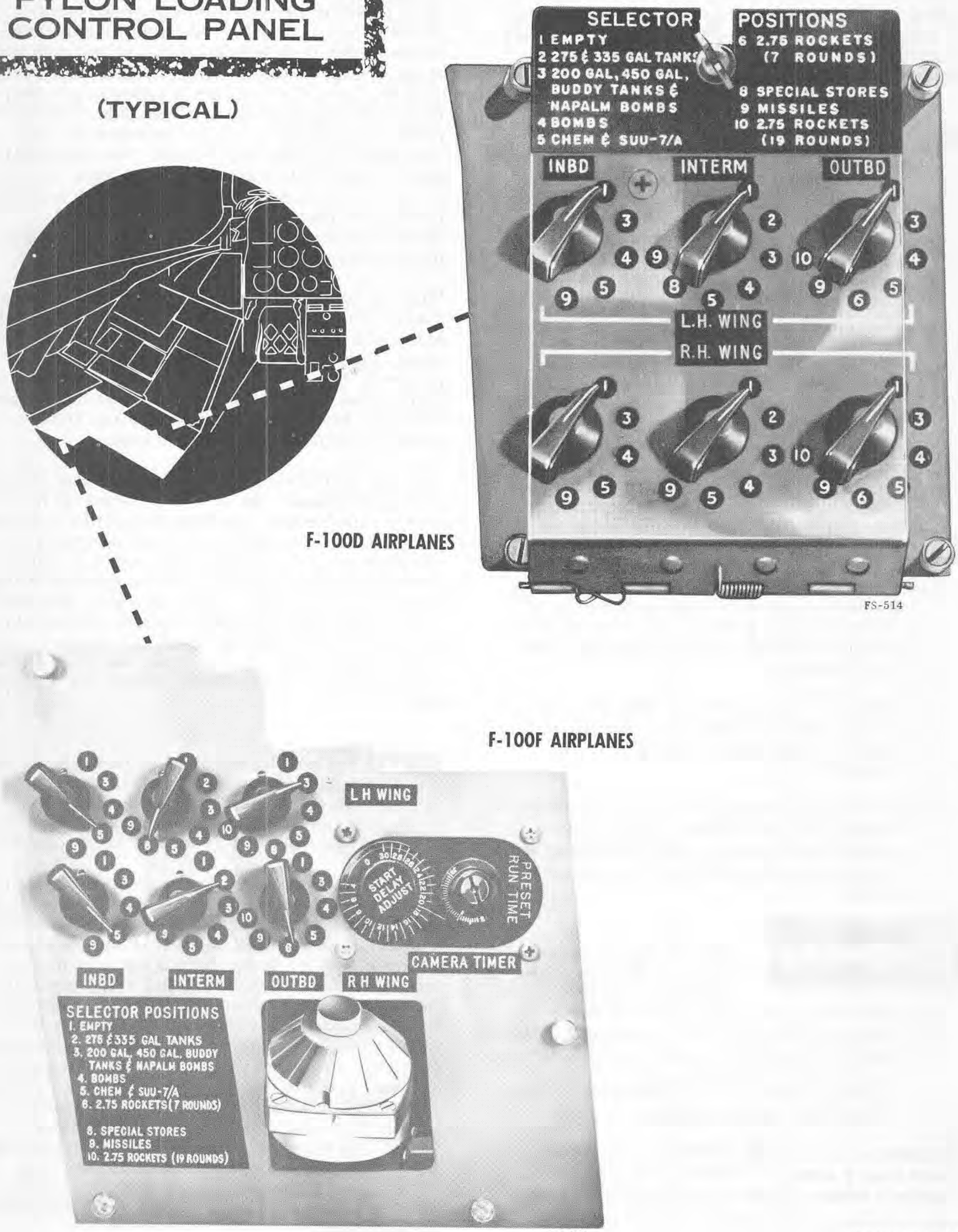
Bombing Equipment Controls.

NOTE The information on the bombing equipment controls in the following paragraphs does not apply to special stores. For this information, refer to "Special Store" in this section.

PYLON LOADING SELECTOR SWITCHES. These multiple position switches (figure 4-25) powered by the secondary bus, ensure that correct circuitry has been established to the particular loads being carried. They also ensure that the desired type of action takes place when loads are being controlled

PYLON LOADING CONTROL PANEL

(TYPICAL)



F-100D-1-A63-1A

Figure 4-25

through switches on the armament control panel. At preflight, the pilot should check that the pylon loading switches are set at the correct position for the individual load on each pylon. All switches are safetied by a hinged plastic cover that should be locked closed during flight.

NOTE On some airplanes,* when WADD 200-gallon or Type II 275-gallon drop tanks are installed at the intermediate stations, the intermediate station pylon loading switches should be at 200 GAL, 450 GAL, BUDDY TANKS & NAPALM BOMBS position. With the pylon loading switches in this position, the autopilot G-limiter settings will be within the allowable G-limits for Type II drop tanks.

- To best utilize the autopilot G-limiter capabilities of the airplane, the switch should be at EMPTY only when no load is carried at the respective station. (EMPTY does not refer to empty drop tank, but to an empty load station.) When the pitch damper or autopilot is engaged and the mission requires higher G-limits, if Type III 275- or 335-gallon drop tanks are carried at the intermediate stations, the intermediate station pylon loading switches should be at EMPTY. However, if selective jettisoning (armament selector switch positioning and bomb button) is desired, the pylon loading selector switches must be returned to the No. 2 position.
- When the MN-1 or MN-1A dispenser is carried, the applicable wing station pylon loading switch must be set at SPECIAL STORES.
- Although the missile circuitry does not go through the pylon loading selector switches, the switches should be set at MISSILES for consistency with other armament procedures.

Warning Do not change setting of pylon loading selector switches, because loads may release when selectors are reset. If selector setting does not correspond to the load on the respective wing station, maintenance personnel must make a check of applicable electrical circuits before selector switches are repositioned.

ARMAMENT SELECTOR SWITCH. This rotary switch (figure 4-26), powered by the primary and secondary busses, determines the external load release when the bomb button is used. Regardless of the release method used, external loads leave the airplane in various fixed and preset sequences as shown in figure 4-27. When the armament selector switch is at BOMB - SINGLE, a single bomb drops (except outboard station bombs, which drop as a pair) each time the bomb button is pressed. When the armament selector switch is at BOMB - PAIRS, symmetrical pairs of bombs drop each time the bomb button is pressed. When the BOMB - SALVO position is selected and the bomb button pressed, all bombs drop simultaneously; however, loads other than bombs stay on the airplane. Bombs can be salvoed armed or safe, depending on the position of the bomb-arming switch.

With the selector switch at either NAPALM REL & TANK JETT - OUTBD, - INTERM, or - INBD, the selected pair of drop tanks, napalm bombs, or fire bombs is jettisoned when the bomb button is pressed. The 200-gallon drop tanks (and 450-gallon drop tanks, carried at the intermediate station only) are jettisoned by electrically fired ejector cartridges within the pylons.

The 275- and 335-gallon drop tanks and pylons are solenoid-released and "free-fall" from the airplane. The "buddy" refueling drop tanks and pylons are jettisoned by electrically fired ejection cartridges or are solenoid released and "free-fall" from the airplane depending on the quantity of fuel remaining in the tank. When the switch is at JETT ALL (switch must be lifted to obtain this position), and the bomb button is pressed, all external loads and pylons, except special stores and their pylons, are jettisoned. The ordnance stores are jettisoned safe.

NOTE The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released.

External loads requiring force ejection are jettisoned at a 1/2-second delay between symmetrical pairs to reduce recoil loads on the wing structure. The SPECIAL STORES position is used to release the special store in the various bombing modes, armed or safe, depending on the switch settings of the in-flight control tester panel. The SPECIAL STORES position is also used when cycling the MN-1 or MN-1A dispenser. When the switch is at OFF, the circuits are de-energized. Pylons are retained by all of these methods of release except JETT ALL. Refer to "Special Store," "Rocket System Controls," "AIM-9B Missile System," "AGM-12B Missile System," "CBU Dispenser System," "Chemical Tank System Controls," and "Tow-target System Controls" in this section for details of armament selector positions applicable to these systems.

*F-100D-56 and F-100D-61 Airplanes

BOMB-ARMING SWITCH. Bombs (except when carried within the MN-1 or MN-1A dispenser), napalm bombs, and fire bombs are armed by means of secondary bus power through the bomb-arming switch. (See figure 4-26.) When the switch is at TAIL ONLY, bombs are armed for delayed detonation. For bombs to explode instantly upon impact, the switch must be at NOSE & TAIL. Bombs are released safe if the switch is at SAFE. Bomb arming is not effective except when the armament selector switch is at any BOMB or NAPALM REL & TANK JETT position, and the external load emergency jettison handle is in the normal (in) position.

BOMB BUTTON. The napalm bomb, fire bomb, drop tank, bomb, AGM-12B missile, tow target, rocket, and CBU dispenser release circuits and chemical tank discharge circuits are energized (after the armament selector switch is properly positioned) by primary bus power when the bomb button (figure 1-28) on the control stick grip is pressed. If desired, all external loads and pylons, except special stores and their pylons, can be jettisoned by pressing the bomb button with the armament selector switch at JETT ALL. The ordnance stores are jettisoned safe.

Caution The special store unlock handle must be stowed when the MN-1A dispenser is carried at the fuselage centerline station. If the special store unlock handle is in the unlocked position when the bomb button is pressed, the dispenser will be released from the pylon and may strike the airplane.

NOTE The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no special store or that carried a special store which had previously been released.

On some airplanes, the gun camera circuit is energized when the bomb button is pressed if the armament selector switch is at ROCKET - FIRE. The bomb button must be held down when bombs are being released automatically by means of automatic bombing systems.

Warning Before pressing bomb button, make sure armament selector switch is positioned correctly for desired release function. Failure to check switch position could cause accidental bomb or rocket release or failure of desired load to release.

BOMB RELEASE MODE SELECTOR SWITCH. A selector switch (figure 4-26) is used to select the mode of bombing release desired and controls the operation of the radar ranging system and the A-4 sight by means of primary bus power. When the switch is at SIGHT & RADAR, power is supplied to the radar ranging system and the sight. When the selector switch is at MANUAL, bombs are released by the bomb button. With the selector switch at LABS, the bombs are released at an automatically computed point on the bomb run. With the selector switch at LABS ALT, bombs are released at an automatically computed alternate point on the bomb run. The LADD position is used in the low-altitude drogue delivery system. Power to all units of the fire control system is disconnected when the switch is at OFF.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. The three external load auxiliary release buttons (29, figure 1-8; 11, figure 1-12; figure 4-26) provide separate release circuits to fire the second cartridge in the pylons. Powered by the primary bus and enclosed in individual ring guards, these buttons should be used if loads are not released by the normal electrical release circuits. Pressing the "OUTBD," "INTER," or "INBD" button releases the pair of external loads (except AIM-9B missiles, MN-1 or MN-1A dispenser, and special stores) carried at the respective stations. Loads (except special stores) are released armed or safe (depending on the position of the bomb-arming switch) and are either forcibly ejected or gravity-released as required for clean separation. The pylons are not released by the auxiliary release buttons.

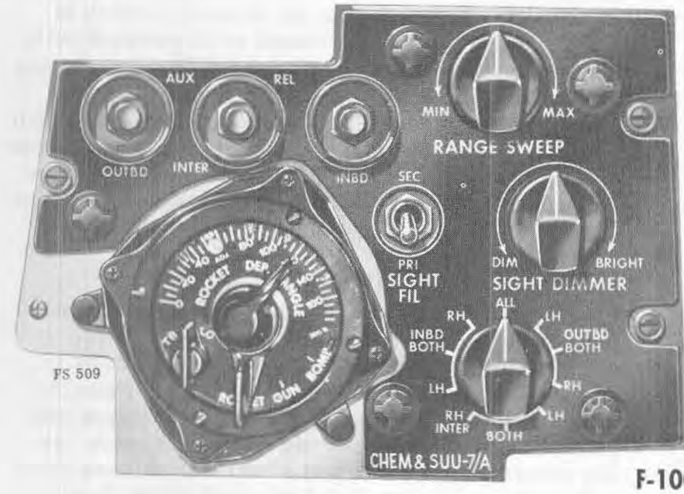
NOTE A ground safety feature prevents release of external loads by use of the auxiliary release buttons, under any conditions, while the weight of the airplane is on the landing gear.

Caution Do not press more than one auxiliary release button at a time. The combined recoil of ejector cartridges for stores that require the full force of the ejector cartridges produces stresses that can damage the wing structure. This does not include general-purpose bombs, since they do not require the full force of the ejector cartridge for release.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. All external loads and pylons (except special stores and their pylons) are jettisoned by pressing the external load emergency jettison button (figure 1-31).

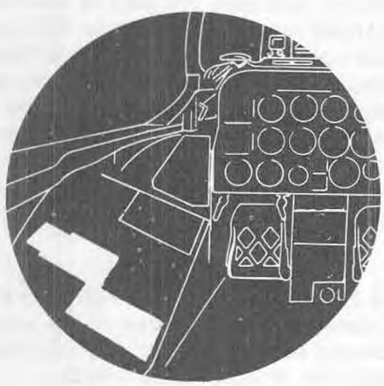
NOTE The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released.

ARMAMENT CONTROL PANELS



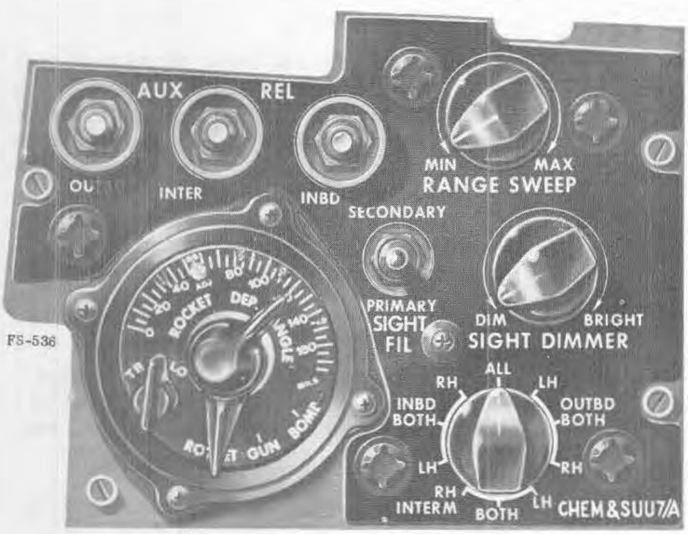
FS 509

F-100D AIRPLANES

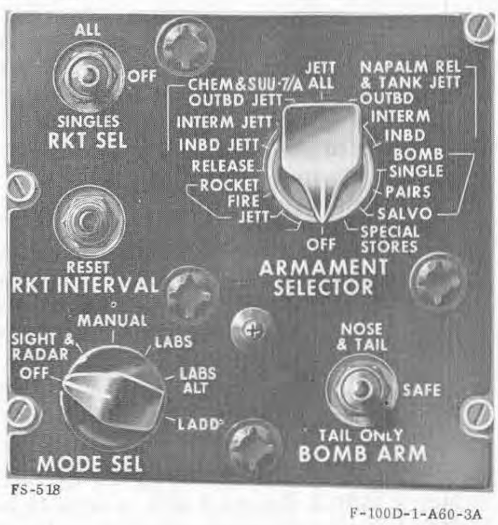


FS 508

F-100F AIRPLANES



FS-536



FS-518

F-100D-1-A60-3A

Figure 4-26

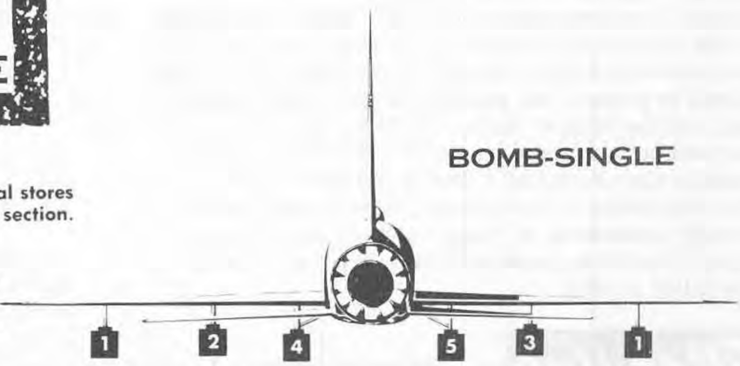
EXTERNAL LOAD RELEASE SEQUENCE

NOTE

This information does not cover release of special stores and their pylons. Refer to "Special Store" in this section.

ARMAMENT SELECTOR AT *BOMB-SINGLE*: Releases both outboard bombs at the same time and then releases remaining bombs in a fixed dropping order each time the bomb button is pressed. Pylons are retained.

BOMB-SINGLE



BOMB PAIRS, AUXILIARY, AND SELECTIVE RELEASE

ARMAMENT SELECTOR AT *BOMB-PAIRS*: Releases symmetrical pairs of bombs in a fixed dropping order each time the bomb button is pressed. Pylons are retained.

AUXILIARY RELEASE: Recommended release sequence for all loads, using the auxiliary release buttons. Pylons are retained.

SELECTIVE RELEASE: Recommended sequence when the pilot chooses station and load with the armament selector switch (such as *NAPALM REL & TANK JETT OUTBD*) and presses the bomb button. Pylons are retained.

JETTISON-ALL AND EMERGENCY JETTISON

ARMAMENT SELECTOR AT *JETT ALL*: Jettisons all loads at 1/2-second intervals between symmetrical pairs when bomb button is pressed.

EMERGENCY JETTISON: Emergency jettison button jettisons all loads with same time delay and sequence as *JETT ALL* method. Emergency jettison handle mechanically releases conventional "free-fall" type stores.

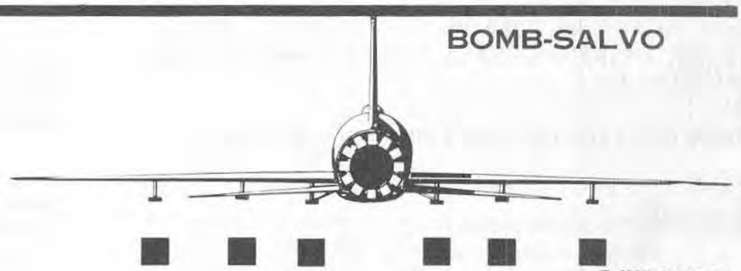
Pylons also jettison after loads are released by any jettison method except external load emergency jettison handle. Pylons jettison in the same order and with the same time delay as loads.

NOTE

The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store, or that carried a special store which had previously been released.

ARMAMENT SELECTOR AT *BOMB-SALVO*: Releases all bombs at the same time when bomb button is pressed. Pylons are retained.

BOMB-SALVO



F-100D-1-A63-2 A

Figure 4-27

Regardless of the position of the bomb-arming switch, all ordnance loads jettison safe. The bomb release sequence is shown in figure 4-27. The external load emergency jettison button is powered by the battery bus; however, primary bus power is required to energize relays in the Type VIII series pylons to jettison the pylons. If the engine is running and the battery switch is OFF, the primary bus will be energized by the dc generator, or the transformer-rectifier if the dc generator fails. The armament circuit wiring prevents the inadvertent jettisoning of "hung" stores after the release circuit has been actuated, but the cartridge has failed to fire.

Warning Pylons and external loads can be jettisoned electrically by use of the external load emergency jettison button when the airplane is on the ground, because these jettison circuits are not safetied through the nose gear.

EXTERNAL LOAD EMERGENCY JETTISON HANDLE. Pulling the external load emergency jettison handle (39, figure 1-6; 42, figure 1-7) mechanically releases all bombs (except the special store and the MN-1, MN-1A, and CBU dispensers) and/or the 275- or 335-gallon drop tanks. The emergency jettison handle must be pulled to its full extension of about 10 inches. Bomb-arming circuits are interrupted automatically when the emergency jettison handle is pulled, and bombs jettison safe, regardless of the position of the bomb-arming switch.

SPECIAL STORE UNLOCK HANDLE. Although the primary function of the special store unlock handle (36, figure 1-6; 40, figure 1-7) is to control release of the special store, the handle must also be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released. For additional description and operation of this handle, refer to "Special Store Unlock Handle," under "Special Store," in this section.

Bomb Release - A-4 Sight.

Refer to Aircrew Operational Procedures, AFM 55-100, for information on bomb release using the A-4 sight.

Bomb and External Load Emergency Jettison.

NOTE The following procedure does not cover special store or missile jettisoning. For this information, refer to "Special Store," "AIM-9B Missile System," and "AGM-12B Missile System" in this section.

- If no electrical power is available, only bombs and/or the 275- or 335-gallon drop tanks can be released, regardless of the jettison or release method used.
- If an ejector cartridge is not installed in the ejector rack breech, the store cannot be forcibly jettisoned from the pylon; however, the store-pylon combination will jettison when the pylon jettison circuits are energized.

To jettison other loads (safe) and pylons (in some cases), use one or more of the following procedures:

1. To jettison all external loads and pylons, press external load emergency jettison button.

NOTE With electrical power available, external loads jettison safe, regardless of the position of the armament selector switch and bomb-arming switch, followed by jettison of the pylons when the jettison button is pressed.

- The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released.

Warning External loads and pylons can be jettisoned electrically (by pressing the external load emergency jettison button) when the airplane is on the ground, because this jettison circuit is not safetied through the nose gear.

2. To jettison all external loads and pylons, place armament selector switch at JETT ALL, and hold bomb button down for one second.

NOTE The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released.

3. To jettison only bombs and retain drop tanks, place armament selector switch at BOMB - SALVO (bomb-arming switch at SAFE), and press bomb button.

4. To jettison only CBU dispensers, turn armament selector switch to CHEM & SUU-7/A - OUTBD JETT and press bomb button.

5. To jettison only chemical tanks, place armament selector switch at CHEM & SUU-7/A -

OUTBD JETT, - INTERM JETT, or - INBD JETT, and press bomb button.

6. To jettison only drop tanks, napalm bombs, or fire bombs , place armament selector switch at NAPALM REL & TANKS JETT - INBD, - INTERM, or - OUTBD, and press bomb button.

7. Press external load auxiliary release buttons (one at a time) to jettison symmetrical pairs of loads from inboard, intermediate, and outboard pylons. (Bombs will jettison armed or safe, depending on the position of the bomb-arming switch.)

Caution Do not press more than one auxiliary release button at a time. The combined recoil of ejector cartridges for stores that require the full force of the ejector cartridges produces stress that can damage the wing structure. This does not include general-purpose bombs, since they do not require the full force of the ejector cartridge for release.

8. To jettison only pylons, after all other loads have been released, press external load emergency jettison button.

NOTE Electrical power must be available to jettison the pylons.

- The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons that carried no store or that carried a special store which had previously been released.

9. To mechanically drop bombs or 275- or 335-gallon drop tanks, pull external load emergency jettison handle straight out to its fully extended position (10 inches).

AN/AJB LOW-ALTITUDE BOMBING SYSTEM (LABS).

F-100D Airplanes have an AN/AJB-1B LABS, and F-100F Airplanes have an AN/AJB-5A LABS. This electromechanical low-altitude bombing system (LABS) is used with the A-4 sight reticle to provide proper bomb aim and release for toss bombing operations. The LABS equipment receives power from the secondary bus (and tertiary bus on F-100D Airplanes) and the main ac bus. The erection motor for the LABS vertical gyro is energized when the main ac bus is energized. In the LABS, if the autopilot is turned off while the bomb release mode selector switch is at LABS or LABS ALT, the autopilot cannot be reengaged until the bomb release mode selector switch is positioned to other than LABS or LABS ALT, eliminating the possibility of entering an unusual flight condition or maneuver.

AN/AJB Low-altitude Bombing System Controls and Indicators.

BOMB RELEASE MODE SELECTOR SWITCH. With the bomb release mode selector switch (figure 4-26) at LABS or LABS ALT, the units of the low-altitude bombing system are operable and the desired release angle is selected. The switch should be placed at LABS or LABS ALT just before a LABS run-in (minimum of 14 seconds before reaching IP). Following the selection of LABS or LABS ALT, care should be taken not to climb the airplane at angles exceeding the LABS release angle; otherwise, the LABS maneuver may be aborted without the pilot's knowledge. For other functions of this switch, refer to "Bombing Equipment Controls" in this section.

LABS VERTICAL GYRO CAGING BUTTON (SIGHT ELECTRICAL CAGING BUTTON). When the bomb release mode selector switch is at LABS or LABS ALT, pressing the LABS vertical gyro caging button (figure 1-18) erects the gyro to a vertical position. The button need not be held down after being pressed. The LABS vertical gyro requires about 13 seconds to complete the caging cycle, during which time the sight reticle light will be out. A wings-level attitude should be maintained until the reticle light comes back on. Optionally, the switch can be held until the reticle light comes on, and then released at any time.

NOTE The LABS gyro should not be caged after roll-out during an auto-LABS maneuver until after the bomb release mode selector switch has been placed in a position other than LABS or LABS ALT.

After the caging cycle, the gyro becomes operable, ensuring that accurate vertical reference data is transmitted to the dive-and-roll indicator. The LABS vertical gyro caging button is powered by the secondary bus and also functions as the sight electrical caging button (not in the rear cockpit) when the bomb release mode selector switch is at MANUAL or SIGHT & RADAR.

TIME REFERENCE POINT (TRP) TIMER. The TRP timer (30, figure 1-6; 36, figure 1-7) sequences the operation of certain timing units in the system. This dial is graduated in increments of 0.2 second from 0.2 to 28 seconds. To turn the dial from one setting to another, the dial knob must be pulled upward from the lock detents. The TRP timer is powered by the tertiary bus on some airplanes.* On other airplanes,† the timer is pow-

*F-100D-21 Airplanes, and F-100D-46 Airplanes AF55-2784 through -2838
†F-100D-26 and F-100D-31 Airplanes, F-100D-46 Airplanes AF55-2839 through -2863, F-100D-51 and later airplanes, and F-100F Airplanes

ered by the secondary bus. The timer is marked "PULL UP" and is also used in conjunction with the LADD system.

LABS YAW-ROLL GYRO CHECK BUTTON. A push-button type switch (23, figure 1-8; 22, figure 1-12; 2, figure 1-11) enables the pilot to obtain an indication from the vertical needle of the LABS dive-and-roll indicator of proper yaw-roll gyro caging before starting a LABS maneuver. When the bomb release mode selector switch is at LABS or LABS ALT, the sight reticle goes off during the caging cycle and remains off until gyro caging is complete. The check button is powered by the secondary bus.

LABS DIVE-AND-ROLL INDICATOR. The LABS dive-and-roll indicator (20, figure 1-6; 25, figure 1-7; 18, figure 1-11) is a dual-movement, zero-centered unit. The vertical pointer shows airplane roll attitude; the horizontal pointer shows airplane pitch attitude and positive and negative G. The dive-and-roll indicator is operable when the bomb release selector switch is at LABS or LABS ALT. When the LABS vertical gyro caging button is pressed, both indicators should rest at zero as the vertical gyro cages.

LABS RELEASE INDICATOR LIGHT. A green light (16, figure 1-6; 20, figure 1-7; 16, figure 1-11) provides certain indications during either a manual or an auto-LABS maneuver. The LABS release indicator light is in parallel with the A-4 sight reticle light and operates simultaneously with the reticle light. This light, powered by the secondary bus, can be tested by the indicator light test circuit.

Operation of AN/AJB Low-altitude Bombing System

Refer to Aircrew Weapon Delivery Manuals, T. O. 1F-100D-25 Series, for this information.

LOW-ALTITUDE DROGUE DELIVERY SYSTEM (LADD).

The low-altitude drogue delivery system (LADD) is an electromechanical system used with the A-4 sight reticle to provide proper bomb release for low-altitude drogue delivery operations. This system is similar to the LABS system, except that bomb release is determined by means of time from pull-up instead of airplane pitch angle. The sight is maintained electrically caged for this type of bomb delivery. The LADD system receives power from the secondary bus (and tertiary bus on F-100D Airplanes).

LADD System Controls and Indicators.

BOMB RELEASE MODE SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

Warning

Turn autopilot control switch to STAND BY before switching to the LADD mode, otherwise, during the pull-up the autopilot will take over and attempt to perform an auto-LABS maneuver.

TIME REFERENCE POINT (TRP) TIMER. The TRP timer (30, figure 1-6; 36, figure 1-7) is used in the LADD system to set pull-up time into the system during the bomb run. The timer is marked "PULL UP." Refer to "AN/AJB Low-altitude Bombing System (LABS)" in this section for description of the TRP timer.

LADD RELEASE TIMER. THE LADD release timer (31, figure 1-6; 33, figure 1-7), marked "RELEASE," sequences the operation of certain timing units in the LADD system. The dial is graduated in increments of 0. 2 second from 0. 2 to 28 seconds. To turn the dial from one setting to another, the dial knob must be pulled outward from the lock detents. The LADD release timer is powered by the tertiary bus on some airplanes. * On other airplanes, † the timer is powered by the secondary bus.

LABS RELEASE INDICATOR LIGHT. A green light (16, figure 1-6; 20, figure 1-7; 16, figure 1-11) provides certain indications during a LADD maneuver. The light is in parallel with the A-4 sight reticle light and operates simultaneously with the reticle light. The LABS release indicator light is powered by the tertiary bus and can be tested by the indicator light test circuit.

Operation of Low-altitude Drogue Delivery System (LADD).

Refer to Aircrew Weapon Delivery Manuals, T.O. 1F-100D-25 Series for this information.

ROCKET SYSTEM.

The airplane can carry six MA-3 rocket launchers, each of which contains seven 2.75-inch FFA rockets, or two LAU-3/A rocket launchers, each containing nineteen 2.75-inch FFA rockets. The airplane can also carry three MA-2A rocket training launchers, each of which contains two 2.75-

*F-100D-21 Airplanes, and F-100D-46 Airplanes AF56-2784 through -2838
†F-100D-26 and F-100D-31 Airplanes, F-100D-46 Airplanes AF55-2839 through -2863, F-100D-51 and later airplanes, and F-100F Airplanes

ROCKET-FIRING ORDER

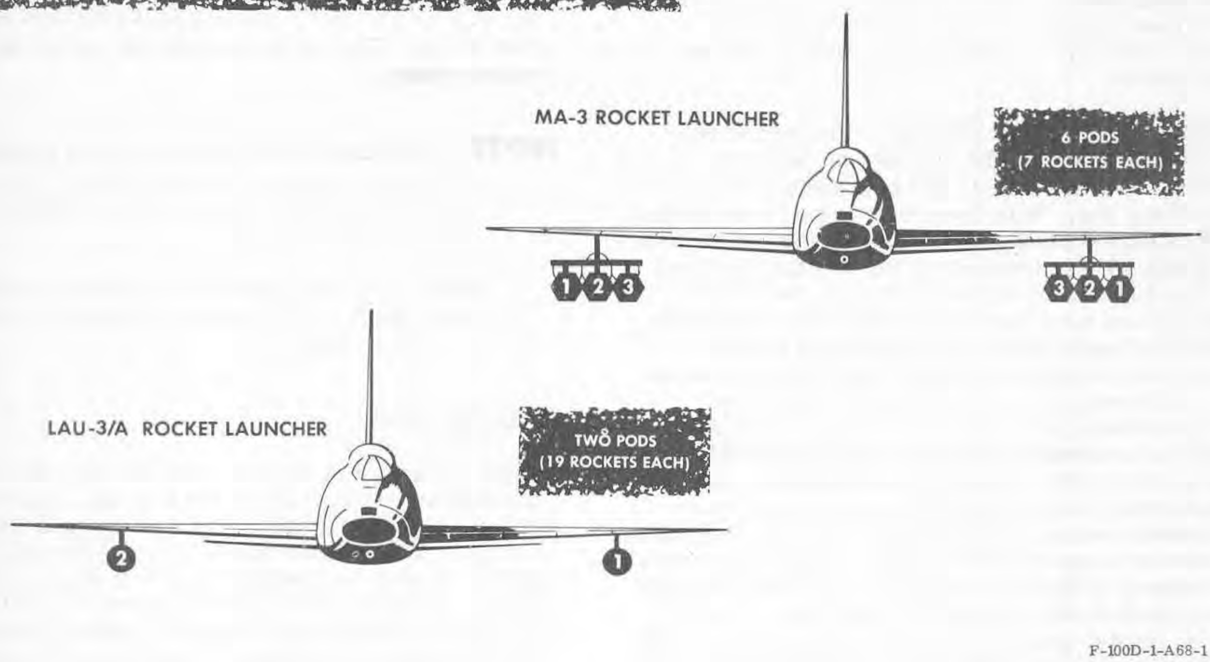


Figure 4-28

inch FFA rockets on one pylon adapter at each outboard wing station (total 12 rockets). The MA-3 launchers (total 42 rockets) are hung in three launcher units from a pylon adapter at each outboard wing station. The two LAU-3/A launchers can be attached directly to the outboard wing pylons without the use of adapters. Controls are provided for normal or emergency rocket release. The A-4 sight is used for aiming the rockets. Although the rockets are an air-to-air type, they can presently be used only for air-to-ground purposes because the sight system is not designed for air-to-air functions. On some airplanes, the gun camera operates automatically (camera shutter selector switch away from OFF) when the rockets are fired. See figure 4-28 for rocket firing order.

Rocket Intervalometer.

During automatic firing of rockets, the rocket-firing order between launchers is controlled by a rocket intervalometer. The intervalometer is in the fuselage and is powered by the secondary bus. When the armament selector switch is at ROCKET - FIRE and the rocket selector switch is at SINGLES, the total contents of one symmetrical pair of MA-3 launchers or one LAU-3/A launcher is fired each time the bomb button is pressed. With the armament selector switch at ROCKET - FIRE and the rocket selector switch at ALL, the intervalometer fires all rockets from symmetrical pairs of MA-3 launchers or all rockets from both LAU-3/A launchers as long as the bomb button is held down. The intervalometer automatically maintains a fixed firing order with 1/10-second delay between launchers.

Angle-of-Attack Relationship.

Refer to T. O. 11BA1-4-1 for angle-of-attack relationship and rocket depression angle selector setting.

Rocket System Controls.

SIGHT SELECTOR UNIT. Refer to "A-4 Sight Controls and Indicators" in this section.

BOMB BUTTON. Refer to "Bombing Equipment Controls" in this section.

BOMB RELEASE MODE SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

ARMAMENT SELECTOR SWITCH. This multiple-position switch (figure 4-26), in addition to its use with other armament systems, is used to select the rocket function desired. With the armament selector switch at ROCKET - FIRE, and the rocket selector switch properly positioned, the rockets can be fired by pressing the bomb button. When the armament selector switch is at ROCKET - JETT, all launchers and adapters (pylons remain) force-jettison when the bomb button is pressed. For other functions of the armament selector switch, refer to "Bombing Equipment Controls" in this section.

ROCKET SELECTOR SWITCH. The rocket selector switch (figure 4-26) provides a choice of rocket-firing operation, and is powered by the secondary bus. With the armament selector switch at ROCKET - FIRE and the rocket selector switch at SINGLES, the contents of one symmetrical pair of MA-3 launchers or one LAU-3/A launcher is ripple-fired each time the bomb button is pressed. When the bomb button is released and pressed again, the contents of another pair of MA-3 launchers or the second LAU-3/A launcher is fired. This continues until all of the rockets are fired. With the armament selector switch at ROCKET - FIRE, the rocket selector switch at ALL, and the bomb button pressed and held, the rocket intervalometer supplies 1/10-second delayed firing impulses to all symmetrical pairs of MA-3 launchers or between LAU-3/A launchers. Rockets continue firing in this manner until all are fired. Rocket firing between pairs of MA-3 launchers or between each LAU-3/A launcher may be interrupted by releasing the bomb button.

ROCKET INTERVALOMETER RESET BUTTON. The intervalometer reset button (figure 4-26) is powered by the secondary bus. When the button is pressed, it resets the rocket intervalometer. In addition to reindexing the rocket-firing circuits, the intervalometer reset button may also be used to reset circuits for further attempts to fire any misfired rockets. (During landing, the intervalometer is automatically reindexed to the starting position as the nose gear touches down.)

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. Refer to "Bombing Equipment Controls" in this section.

Firing Rockets.

Refer to Aircrew Operational Procedures, AFM 55-100, for information on rocket firing.

Rocket Emergency Jettison.

The rocket emergency jettison system provides for jettison of rocket launchers, complete with adapters (rockets safe), or the combined rocket launcher, adapter, and pylon assembly. To jettison these units singly or collectively, use one or more of the following procedures:

1. Turn armament selector switch to ROCKET - JETT, and press bomb button. This jettisons only rocket launchers and adapters.

2. Press "OUTBD" external load auxiliary release button. This jettisons only the rocket launchers and adapters.

NOTE To jettison rocket launchers and pylons with other external loads, refer to "External Load Emergency Jettison Button" in this section.

- If no electrical power is available, rocket launchers and/or pylons cannot be jettisoned by any method.

SPECIAL STORE.

A special store can be carried at the left wing intermediate station and on the fuselage centerline. Either a T-249, a T-270, a DCU-9/A, or a T-1517 in-flight control tester panel (figure 4-29) may be used to control the special store. On some airplanes, stowage space is provided for the panels on the shelf behind the ejection seat. Special store circuit breakers are shown in figures 1-24 and 1-25. Refer to Aircrew Weapon Delivery Manuals, T.O. 1F-100D-25 Series, for additional information on special store controls and indicators.

T-270 Panel.

F-SEL SWITCH. This switch (figure 4-29) is primary-bus-powered, and has positions 1 through 7.

A/S SWITCH. This switch (figure 4-29) is powered by the primary bus.

IFI CONTROL AND IFI POWER SWITCHES. These switches (figure 4-29) are powered by the primary bus.

FIN CONTROL AND FIN POWER SWITCHES. These switches (figure 4-29) are powered by the primary bus.

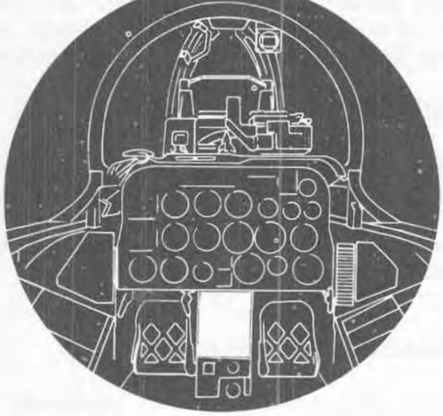
HEATER POWER SWITCH. This circuit-breaker switch (figure 4-29), labeled "HTR," is powered by the primary bus.

F SWITCH. This circuit-breaker switch (figure 4-29), is powered by the primary bus.

AC POWER SWITCH. The ac power switch (figure 4-29), labeled "AC," controls main 3-phase ac power to the special store.

NULL LIGHT. This light (figure 4-29) is powered by the main 3-phase ac bus through the ac power switch.

IN-FLIGHT CONTROL TESTER PANELS



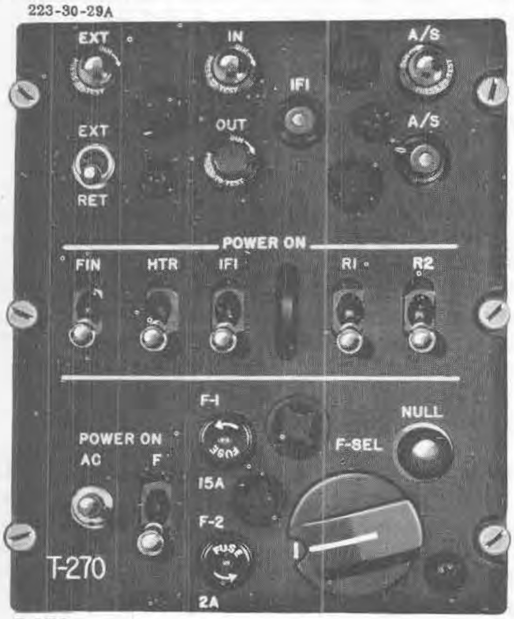
223-54-90C

T-249

FS-798

DCU-9/A

223-30-29A



T-270

FS-797

T-1517

F-100D-1-A60-4A

Figure 4-29

T-249 Panel.

POWER SWITCH. The power switch (figure 4-29) controls primary bus power to the special store.

OPTION SELECTOR SWITCH. This three-position selector switch (figure 4-29) is powered by the primary bus.

WARNING LIGHT. The warning light (figure 4-29) is powered by the primary bus.

DCU-9/A Panel.

OPTION SELECTOR SWITCH. The four-position option selector switch (figure 4-29) is powered by the primary bus. When the lock lever on the switch is at OS, the selector switch is limited to the OFF and SAFE positions. The switch may be moved to GND or AIR only when the lever is moved to SGA. Position of the lock lever may be changed only when the option selector switch is at SAFE.

LAMP TEST SWITCH. This switch (figure 4-29) is powered by the primary bus.

WARNING LIGHT. The warning light (figure 4-29) is powered by the primary bus.

T-1517 Panel.

OPTION SELECTOR SWITCH. This mechanically locked switch (figure 4-29) controls the application of primary bus power to the special store circuits. A lock lever on the switch limits movement of the switch so that only the OFF and SAFE positions can be obtained when the lever is at OS. Moving the lever to SGA allows the selector switch to be moved to GND and AIR. The position of the lock lever may be changed only when the option selector switch is at SAFE.

CODE SELECTOR SWITCHES. The four code selector switches (figure 4-29) control a mechanism in the special store that enables certain arming circuits. These switches must be properly positioned to affect arming of the special store. The code selector switches are powered by the primary bus.

ENABLE SELECTOR SWITCH. The enable selector switch (figure 4-29) introduces the enabling code (set on the code selector switches) to the special store. Moving the switch from OFF to EN initiates the enabling cycle. After the special store is enabled, it remains so regardless of subsequent positioning of the enable selector switch. This switch is powered by the primary bus.

LAMP TEST SWITCH. The lamp test switch (figure 4-29) is used to test the filaments in the warning and status lights. If both filaments are intact, both lights come on when the switch is pressed, provided the option selector switch is not OFF.

STATUS LIGHT. This light (figure 4-29) indicates the enabled or disenabled condition of the special store. When the enable selector switch is moved to EN, the status light comes on. If the code set on the code selector switches is correct, the status light goes out in approximately 30 seconds. If the code is not correct, the status light remains on. If the status light goes out (indicating the code is correct), enabling of the special store is verified by noting that the light comes on when pressed. The status light is powered by the primary bus.

WARNING LIGHT. The primary-bus-powered warning light (figure 4-29) comes on steadily when the circuits have not responded to provide a safe or armed condition, or to provide the burst option as commanded by the position of the option selector switch. If the malfunction detection circuitry in the special store and in the associated airplane wiring is in order, pressing the light will cause it to come on.

Armament Selector Switch.

The SPECIAL STORE position is used to obtain normal release of the special store. With the switch (figure 4-26) at JETT ALL, the special store pylon can be jettisoned after the special store is released, by actuating the special store unlock handle and pressing the bomb button. For other functions of the armament selector switch, refer to "Bombing Equipment Controls" in this section.

Bomb Button.

With related controls in their proper positions, pressing the bomb button (figure 1-28) will permit release of the special store in the various bombing modes or will jettison the special store pylon. For other functions of the bomb button, refer to "Bombing Equipment Controls" in this section.

Bomb Release Mode Selector Switch.

This switch (figure 4-26) must be positioned to conform to the type of special store bombing mode release to be made. For other functions of the bomb release mode selector switch, refer to "Bombing Equipment Controls" in this section.

External Load Emergency Jettison Button.

The external load emergency jettison button (figure 1-31) can be used to jettison the special store pylon. Actuating the special store unlock handle and pressing the external load emergency jettison button will jettison the special store pylon after the special store is released. For other functions of the external load emergency jettison button, refer to "Bombing Equipment Controls" in this section.

Special Store Unlock Handle.

To actuate the special store unlock handle (36, figure 1-6; 40, figure 1-7), it must be rotated about 30 degrees clockwise to break a sealed safety wire and to clear a locking detent; then the handle must be pulled aft to the full-stop position (about 2-3/4 inches). The special store unlocked indicator light should come on just before the full-stop position is reached. The handle should then be rotated counterclockwise straight down. If not rotated counterclockwise straight down, the spring-loaded handle will snap forward to the stowed position. When the handle is actuated, the special store safety lock in the Type VII, VIIA, or VIII series pylon is unlocked.

Warning

The handle must be fully extended to ensure unlocking the pylon.

At the same time, a switch in the special store normal and jettison release circuits is closed so that the special store will release when a special store bombing release signal or jettison signal is applied. The special store pylon can be released through conventional jettison circuits only after the special store has been released, provided that the special store unlock handle is actuated. To return the handle to the stowed position, it must be rotated about 90 degrees clockwise, pushed full forward, and then rotated straight down.

NOTE If the special store has not been released, stowing the handle will lock the special store lock in the pylon and will interrupt the special store normal and jettison release circuits and the special store pylon jettison circuits.

Caution The special store unlock handle must be stowed when the MN-1A dispenser is carried at the centerline station. If the special store unlock handle is in the unlocked position when the bomb button or the special store emergency jettison button is pressed, the dispenser will be released from the pylon and may strike the airplane.

Special Store Emergency Jettison Button.

The special store emergency jettison button (figure 1-19) provides an independent means of jettisoning the special store from its pylon at either the fuselage centerline or left intermediate wing station. The button, labeled "SPL STORE EMERG REL," is powered by the battery bus and is guarded by a ring and a cap that is safetied at the hinge. Raising the cap breaks the safety wire and exposes the button, which is pressed to jettison the special store from its pylon. The special store unlock handle must be actuated before the special store can be jettisoned in this manner.

Caution The special store unlock handle must be stowed when the MN-1A dispenser is carried at the centerline station. If the special store unlock handle is in the unlocked position when the bomb button or the special store emergency jettison button is pressed, the dispenser will be released from the pylon and may strike the airplane.

Special Store Indicator Light.

This light is a status display light (figure 4-34) and a placard-type indicator light (figure 1-16) in the rear cockpit. It shows "T/0" when on. The indicator light test circuit provides an operational test of the lights. The indicator light in the rear cockpit is powered by the primary bus. For additional information on the status display lights, refer to "Miscellaneous Equipment in this section.

Special Store Unlocked Indicator Light.

An amber press-to-test, primary-bus-powered indicator light (35, figure 1-6; 39, figure 1-7) is adjacent to the special store unlock handle. Illumination of this light indicates that the safety lock in the special store pylon is unlocked. The light comes on just before the special store unlock handle reaches the full-stop position in its outward travel. The light goes out after the special store is released or jettisoned.

NOTE The special store pylon must be cocked (shackles closed) if no store is carried; otherwise, the indicator light will remain on, regardless of the position of the special store unlock handle. To ensure that the safety lock is open when no store is carried, the pylon should be cocked before take-off.

Special Store Mission.

For procedures to be observed when a special store mission is to be flown, refer to Aircrew Weapon Delivery Manuals, T.O. 1F-100D-25 Series.

Special Store Jettison.

The special store and special store pylon can be jettisoned as follows:

1. Actuate special store unlock handle.

2. Press special store emergency jettison button.

   Special store will jettison armed or safe, depending on the switch settings on the inflight control tester panel.

3. Press external load emergency jettison button.

   Special store pylon will jettison in the normal jettison sequence.

NOTE When the external load emergency jettison button is pressed, all external loads and pylons will be jettisoned.

- If the special store does not jettison when the special store emergency jettison button is pressed, the store-pylon combination cannot be jettisoned.

4. Move armament selector switch to JETT ALL and press bomb button.

Special store pylon will jettison in the normal jettison sequence.

NOTE All other external loads and pylons also will be jettisoned.

- If the special store does not jettison when the special store emergency jettison button is pressed, the store-pylon combination cannot be jettisoned.

AIM-9B MISSILE SYSTEM.

Two AIM-9B (GAR-8) guided missiles can be carried on a special pylon at each inboard wing station (total of four missiles). This air-to-air type missile operates on the passive infrared homing principle. The missile is approximately 9 feet long and 5 inches in diameter. It weighs about 155 pounds and consists of four sections: guidance and control, warhead, fuze, and rocket motor. While the missile is attached to the airplane, power is supplied to operate its seeking feature through an umbilical cord. A gas-driven generator supplies electrical power during missile flight. Gas for driving the generator and operating the control fins is produced by a slow-burning chemical grain that is ignited by a squib to which voltage is applied when the missile is fired. When this grain is burned out, the missile is no longer powered or guided, but flies like a ballistic rocket. The warhead is detonated by action of either a contact or an influence fuze. The motor section carries four fixed stabilizing fins. On some missiles, each of these fins is fitted with a small movable surface containing a gyro. This is a rolleron and is a roll-rate limiting device. The missile is aimed by using the A-4 sight with a fixed reticle (mechanically caged). A headset tone generated by the missile and monitored through the communication amplifier informs the pilot that the missile to be launched has detected the target and is receiving an adequate homing signal. This on-target signal does not necessarily indicate the target is in range.

A TDU-11/B 5-inch HVA rocket, used as a practice target for the AIM-9B missile, can be installed on either left or right missile pylon. The TDU-11/B contains no warhead or explosives. Four tracking flares are attached to the rocket aft section. The TDU target rocket and AIM-9B missiles must be installed at the proper wing stations and on the proper "Y" of the pylon. This is essential to obtain a correct firing sequence (TDU, followed by AIM-9B) with a minimum manipulation of controls.

AIM-9B Missile System Controls and Indicators.

MISSILE MASTER SWITCH. The three-position missile master switch (figure 4-30) is powered by the secondary bus. When the switch is at STBY, warm-up power is supplied to the electronic components and gyros of the missiles. With the missile master switch at READY, the missiles are armed and ready to fire. When the switch is at RESET, the system is reset to position 1.

STATION BYPASS SWITCH. The station bypass switch (figure 4-30) is powered by the secondary bus. When the switch is held at NEXT MISSILE, a faulty missile can be bypassed and the next missile in a preset sequence can be selected for launching. If the switch is used for each missile, down to the last missile, the launching circuits cycle back to the first missile so that a second attempt may be made to launch any misfired missiles. The switch is spring-loaded to OFF.

READY SIGNAL VOLUME CONTROL. This rheostat (figure 4-30) provides a volume control for the audio signal generated by the missile.

SAFE-LAUNCH BUTTON. When the ring-guarded safe-launch button (figure 4-30) is pressed, all missiles are salvo-launched unarmed and unguided, with enough delay to give physical separation. Pressing this button bypasses the firing circuit of the missile control gas generator without arming the fuze and applies power directly to the missile motor to launch the missile as a ballistic rocket. Pressing the safe-launch button also launches the TDU target rocket. The safe-launch button, powered by the primary bus, is inoperable when the weight of the airplane is on the landing gear.

TRIGGER SAFETY SWITCH. Refer to "Gunnery System Controls" in this section.

TRIGGER. Refer to "Gunnery System Controls" in this section.

GROUND FIRE SWITCH. Refer to "Gunnery System Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

ARMAMENT SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

BOMB RELEASE MODE SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

STATUS DISPLAY LIGHTS. Four status display lights (figure 4-34) are reserved for AIM-9B mis-

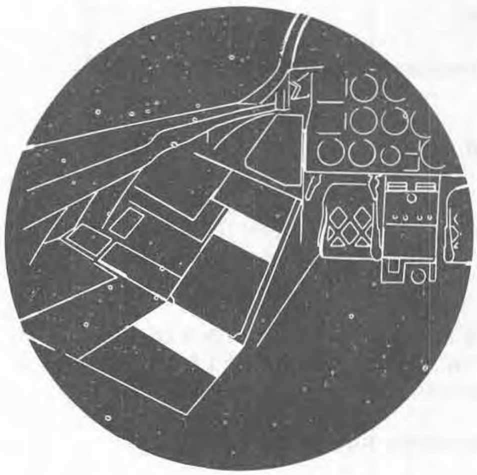
MISSILE CONTROLS

F-513

AIM-9B

FS-517

AGM-12B



F-100D-1-A68-2A

Figure 4-30

siles, and come on to show that a missile (or target rocket) that remains unfired has been selected. When the missile master switch is turned to READY, the "GAR-8 1" light comes on. As the missile is fired, the light goes out. When a TDU is fired, the light remains on until the trigger is again pressed to fire the missile. As each light goes out, the next light in fixed numerical sequence comes on, indicating the number of the missile (or target rocket) selected for launching. The light sequence/firing order is as follows:

"GAR-8 1," left inboard
"GAR-8 2," left outboard
"GAR-8 3," right outboard
"GAR-8 4," right inboard

For additional information on the status display lights, refer to "Miscellaneous Equipment" in this section.

AIM-9B Missile System Check.

EXTERIOR INSPECTION. Check that missile umbilical cords (under nose cap of launcher rail) are connected and that the launcher rail safety pins are installed. On any missile launcher carrying a TDU, check that shorting plug is installed.

INTERIOR INSPECTION. Upon entering cockpit, check the following:

1. Missile master switch at STBY.
2. Pylon loading switches at MISSILES.
3. Trigger safety switch at CAMERA.
4. Ground fire switch at SAFE (safetied).
5. Check "PRESET RUN TIME" camera timer knob setting.

BEFORE TAXIING. Check missile master switch at STBY.

NOTE When the missile master switch is at STBY, the missile is operating except for the firing circuit. The missiles should be in stand-by during taxi and take-off operations.

BEFORE TAKE-OFF. Before take-off, point the airplane away from personnel or from inhabited areas and proceed as follows:

1. Signal ground crew to conduct stray-voltage checks, and to remove launcher rail safety pins.

NOTE Hold both hands in full view of the crew chief while personnel are performing these operations.

2. Turn bomb release mode selector switch to SIGHT & RADAR.

Firing AIM-9B Missiles.

NOTE Missiles (and TDU's) cannot be fired when the weight of the airplane is on the landing gear.

1. Turn camera shutter selector switch to BRIGHT, HAZY, or DULL, and set "START DELAY ADJUST" camera timer knob as desired.

2. Move trigger safety switch to MISSILES CAMERA.

3. Move sight mechanical caging lever to CAGED.

4. When approaching target area, rotate missile master switch to READY. Note that "GAR 8 1" status display light comes on.

5. Place signal volume control so that background signal is at a low audio level.

6. Use A-4 sight to track target.

7. Listen for missile "ready" tone in headset. Care must be used in determining that the "ready" signal is due to radiation from the intended target and not from infrared background. Readjust "ready" signal volume as desired.

NOTE The missile can distinguish the target from an infrared background under conditions the pilot may not distinguish with the "ready" tone. However, firings during these conditions must be made from within the missile firing envelope.

- The missile can detect targets which may be outside of its effective maximum range.

- If target is within range, but no "ready" tone is heard and there is doubt as to proper missile operation, hold station bypass switch momentarily at NEXT MISSILE and release switch. (This cycles the launching circuit to the next available missile.) Note that next missile status display light comes on and the previous display light goes out.

8. Press trigger to second detent and hold until missile is seen leaving the airplane. (Note that status display light goes out.) If missile fails to fire after 2 seconds, release and press again to fire next missile.

NOTE The missile has a minimum range of about 3000 feet. The minimum range (R_m) can be determined by the formula $R_m = 3000 + 3000 (\Delta M)$, where ΔM is the Mach number advantage of the attacking airplane over the target. If the missile is fired at shorter ranges, it may not guide or arm in time to be effective. Therefore, it is recommended that firings close to the minimum missile range be avoided except for emergencies.

9. Release trigger, and press it again to fire next missile after it has detected a target.

10. When all missiles have been fired or jettisoned, return missile master switch to STBY.

Firing TDU-11/B - AIM-9B.

For TDU-11/B and AIM-9B firing order, see figure 4-31.

1. Turn camera shutter selector switch to BRIGHT, HAZY, or DULL, and set "START DELAY ADJUST" camera timer knob as desired.

2. Move trigger safety switch to MISSILES CAMERA.

3. Move sight mechanical caging lever to CAGE.

4. Rotate missile master switch to READY. Note that appropriate status display light comes on for TDU to be fired.

5. Place "ready" signal volume control so that background signal is at low audio level.

6. Press trigger to second detent and hold until TDU is seen leaving the airplane. Listen for missile "ready" tone in headset.

7. As soon as missile "ready" tone is heard, press trigger to second detent and hold until missile is seen leaving the airplane.

TDU-11/B—AIM-9B FIRING ORDER

WING STATION
(LOOKING FROM AFT TO FORWARD)

LEFT INBOARD	RIGHT INBOARD	STATUS DISPLAY LIGHT	TRIGGER	ACTION
AIM-9B 2 1 TDU		1 2	Press once Release, Press again	Fire TDU Fire missile
	AIM-9B 4 3 TDU	3 4	Press once Release, Press again	Fire TDU Fire missile
AIM-9B 2 1 TDU	AIM-9B 4 3 TDU	1 2 3 4	Press once Release, Press again Release, Press again Release, Press again	Fire TDU Fire missile Fire TDU Fire missile
TDU 2	3 AIM-9B	2 3	Press once Release, Press again	Fire TDU Fire missile

NOTE

- For firing procedure, refer to "Firing TDU-11/B—AIM-9B in this section.
- Circled numbers show missile lights that correspond to launcher stations.

F-100D-1-A08-4A

Figure 4-31

NOTE The possibility of the missile missing the target rocket increases with elapsed time between missile "ready" tone and missile firing. Therefore, the missile should be fired as soon as the "ready" tone is heard.

- If missile "ready" tone is not heard, do not fire the missile. If a second TDU and a missile are carried, bypass the first missile and initiate another firing sequence with the second TDU.

8. When all missiles and TDU's have been fired or jettisoned, return missile master switch to STBY.

Missile Malfunction.

A possible cause for missile malfunction is that the gas generator required from one to 1-1/2 seconds to obtain operating speed before energizing the rocket-firing squib, and if the trigger is released during this time interval, a misfire will result. This problem does not exist when the missile is carried on a Type IX A pylon.

MISFIRE. Failure of a rocket motor to fire, for any reason, after completion of the firing circuit.

HANGFIRE. Failure of a rocket motor in which the igniter fires, but propellant ignition is delayed for periods up to 15 minutes, after completion of the firing circuit. During this hangfire period, the propellant may partially ignite, or smolder.

MISSILE MALFUNCTION IN-FLIGHT PROCEDURE. When all switches are properly set and the missile fails to fire after the trigger is pressed to the second detent, it should first be considered a hangfire and the following procedure should be used:

1. Turn missile master switch to STBY and trigger safety switch to CAMERA.

2. Consider a potential hangfire period for 15 minutes from the time step 1 is accomplished, and fly a course or courses to minimize the missile hazard if firing occurs.

3. After 15 minutes during which no smoldering occurred, consider the missile a misfire and resume normal operations or return to base.

4. If smoldering (hangfire) is evident and firing does not occur, jettison the missile in a safe direction and area.

Warning Do not return a hangfire missile to base.

5. If it is not practical to remain in flight in a safe area for the 15-minute hangfire period, jettison the missile in a safe, clear, and unpopulated area.

AIM-9B Missile Emergency Launch and Missile Pylon Emergency Jettison.

NOTE The safe-launch button is inoperable when the weight of the airplane is on the landing gear.

MISSILE EMERGENCY LAUNCH DURING FLIGHT. To launch missiles (and target rockets) in an emergency during flight, press missile safe-launch button.

Warning Missiles should be safe-launched into a safe area because of their range as unguided ballistic rockets.

MISSILE PYLON EMERGENCY JETTISON DURING FLIGHT. To jettison missile pylons during flight, use either of the following procedures:

NOTE For missile pylon jettison restrictions, refer to "External Load Release Limits" in section V.

- If no electrical power is available, missile pylons cannot be jettisoned by any method.

1. Press external load emergency jettison button. (This jettisons the missile pylons or missile pylons with missiles attached in sequence with other pylons.)

2. Turn armament selector switch to JETT ALL, and hold bomb button down for one second. (This jettisons all loads and pylons.)

MISSILE AND PYLON EMERGENCY JETTISON DURING GROUND OPERATION. To jettison missile pylons with or without missiles attached when the weight of the airplane is on the landing gear, press external load emergency jettison button.

During Landing.

The missile master switch should be at STBY during landing.

After Landing.

As soon as possible after landing, point the airplane away from personnel or any inhabited area, and signal ground crew to insert launcher rail safety pins in any launchers still holding missiles.

NOTE Hold both hands in full view of the crew chief while the ground crew performs these operations.

After Parking.

Check missile master switch at STBY.

AGM-12B MISSILE SYSTEM.

One AGM-12B (GAM-83A) missile can be carried on a Type X launcher at each of two inboard wing stations. The airplane also has provisions for carrying the missile at the intermediate and outboard stations. The AGM-12B is an air-to-surface, rocket-propelled, pilot-guided missile. It may be launched between 250 knots IAS and the maximum allowable airspeed for the airplane-missile combination. Refer to Maximum Allowable Airspeeds" in Section V. The missile weighs approximately 570 pounds and is 10-1/2 feet long and one foot in diameter. The warhead, contained in the center section, is capable of carrying a variety of high-explosive or fragmentation-type bombs. The nose section contains a missile guidance system, a battery, a bomb fuze initiator, an air bottle, and two pairs of movable control fins (guidance canards). The canards are actuated by servo units powered by pneumatic pressure from the air bottle. The aft section holds a solid- or liquid-propellant rocket motor, four fixed stabilizing fins, and two pyrotechnic tracking flares. The trailing edge of each fin is cambered at the tip to impart an average roll of 500 degrees per second to the missile after launch. The rocket motor has a maximum burning time of approximately 2 seconds and produces a peak thrust of 10, 500 pounds. The tracking flares are ignited by the rocket motor exhaust and burn with increasing brilliance so that visual contact may be maintained after rocket motor burnout. The guidance system in the airplane consists of a controller, a pulse control unit, a transmitter, a power booster, and an antenna. Electrical power for missile guidance control after launch is provided by a battery that is activated by a squib when the missile is fired.

AGM-12B Missile System Controls and Indicators.

TRIGGER SAFETY SWITCH. Refer to "Gunnery System Controls" in this section.

TRIGGER. Refer to "Gunnery System Controls" in this section.

MISSILE CONTROL SWITCH. The missile control switch (figure 4-30) has three labeled positions, OFF, STBY, and READY. With the switch at OFF, the missile system is electrically de-energized. With the switch at STBY, the secondary bus and the 3-phase ac instrument bus furnish warm-up power to the missile gyro and the transmitter filaments in the airplane. All components that receive power in the stand-by mode are powered when the switch is at READY. (The switch toggle must be lifted to obtain this position.) In addition, the transmitter receives "transmit power," and power is made available to the trigger for the firing of the rocket motor.

MISSILE SELECTOR SWITCH. The missile selector switch (figure 4-30) determines which of the missiles will be fired or safe-launched. The switch has a center OFF position and is marked "1," "2," "3," on the left side, and "4," "5," "6," on the right side. The numbered positions correspond to the wing stations as follows:

SWITCH POSITION	WING STATION
1	Left outboard
2	Left intermediate
3	Left inboard
4	Right inboard
5	Right intermediate
6	Right outboard

NOTE Only switch positions 3 and 4 are operative at present.

The switch receives power from the secondary bus through the trigger. The missiles cannot be fired or safe-launched when the switch is at OFF.

MISSILE LAUNCH MODE SWITCH. After firing, the missile may be guided in its flight to the target or it may be safe-launched, unarmed and unguided, as a ballistic rocket, depending upon the setting of the guarded launch mode switch. (See figure 4-30.) The switch is powered by the secondary bus. When the switch is moved to GUIDE, and the trigger pressed to the second detent, the missile battery is activated. This, in turn, energizes a firing relay in the missile launcher to complete the circuit from the airplane electrical supply to the rocket motor, tracking flares, missile guidance system, and bomb fuze setting. When the trigger is pressed to the second detent with the switch at UNGUIDE, the missile battery is bypassed, the missile guidance is not activated, and the missile warhead is unarmed. In this safe-launch mode, the missile cannot be guided by the pilot after launch. Only the rocket motor and the tracking flares are activated.

MISSILE CONTROLLER. The missile is guided through a self-centering, miniature control stick called a controller (figure 4-30). Guidance command is initiated when the controller is displaced from center. The controller is labeled "MSL CONT" and has four marked positions, DWN, UP, L, and R. Any intermediate position of the controller transmits simultaneously horizontal and vertical directional signals to the missile to correct its flight path to coincide with the line of sight of the target. Movement of the controller causes the pulse control unit to emit corresponding command pulses to the transmitter and RF booster amplifier through the airplane transmitter antenna to four receiver antennas, one on each missile stabilizing fin. The pulse control unit provides proportional response to the duration and magnitude of controller deflection. These pulses are then passed to the missile receiver where they are decoded and converted to the missile reference axis by a roll-reference gyro, and forwarded to the appropriate canard to alter the flight path of the missile either up or down or left or right. The canards are actuated by servo units powered by pneumatic pressure from an air bottle in the nose of the missile. When the controller is centered (no signal), the canards are spring-loaded to the center position. The degree of turn (corrective maneuver, not missile rotation) is controlled by the duration of control signal pulse.

ARMAMENT SELECTOR SWITCH. Refer to "Bombing Equipment Controls" in this section.

BOMB BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

STATUS DISPLAY LIGHTS. Six status display lights (figure 4-34) are reserved for AGM-12B missile indication. When on, each light reads "GAM-83" accompanied by a large numeral that indicates the wing station selected. The applicable light comes on only when the airplane is air-borne with an unlaunched missile at the selected station and the switches are set as follows:

SWITCH	POSITION
Trigger safety	MISSILES CAMERA

SWITCH	POSITION
Missile selector	L or R (one numbered position)
Missile launch mode	GUIDE or UNGUIDE
Missile control	READY

As the missile is fired or safe-launched, the related light goes out. For additional information on the status display lights, refer to "Miscellaneous Equipment" in this section.

Missile System Check.

EXTERIOR INSPECTION. During the exterior inspection, check the following:

1. Check with crew chief that airplane transmitter crystal unit is matched with missile receiver crystal units.
2. Shorting plugs inserted into missile.
3. Launcher retention pawls engaged into missile.
4. Missile fore and aft umbilical cords disconnected.
5. Stabilizing fins locked on missile body.
6. Tracking flares and rocket motor tail cone properly installed in missile aft section.
7. Canards locked in place. Check canards for security.
8. Missile attached firmly to launcher. Shake missile to check security of attachment.

INTERIOR INSPECTION. Upon entering the cockpit, check the following:

1. Missile control switch at OFF.
2. Missile selector switch at OFF.
3. Pylon loading switches at MISSILES.
4. Trigger safety switch at CAMERA.
5. Check "PRESET RUN TIME" camera timer knob setting.

BEFORE TAKE-OFF. Point airplane away from personnel or from inhabited areas and proceed as follows:

NOTE Missiles cannot be fired or safe-launched when the weight of the airplane is on the landing gear.

1. Turn missile control switch to STBY, and signal ground crew to conduct stray-voltage checks.
2. After stray-voltage check is completed, turn missile control switch to OFF; then proceed to step 3.

NOTE Hold both hands in full view of the crew chief while personnel are performing the following operations.

3. Ejector cartridges installed in launcher.
4. Missile fore and aft umbilical cords connected.
5. Missile jettison gun primer inserted in missile jettison gun, and gun plug connected.
6. Shorting plugs removed from missiles.

AFTER TAKE-OFF. After take-off, perform the following:

1. Missile control switch at STBY when the airplane is about 5 minutes from the target area, to allow adequate warm-up of the missile guidance system.
2. Missile selector switch as desired.
3. Missile launch mode switch at GUIDE (UNGUIDE, if missile is to be safe-launched).

Firing Missiles.

1. Turn camera shutter selector switch to BRIGHT, HAZY, or DULL, and set "START DELAY ADJUST" camera timer knob as desired.
2. Sight mechanical caging lever at CAGE.
3. Missile control switch at READY just before firing missile.

NOTE With the missile control switch at READY, the missile transmitter is "on the air." To minimize countermeasures, this "time on the air" should be held to a minimum.

4. The A-4 sight with fixed reticle may aid in the initial phase (target line-up) of the firing run.
5. Trigger safety switch at MISSILES CAMERA.
6. Check selected status display light on.
7. If light is not on, test the light and recheck all missile switch positions.
8. If light is still out, move missile selector switch to other missile.

NOTE Proper missile firing cannot be ensured if the accompanying display light is not on.

9. Be sure wings are level when firing missile, to provide a vertical reference axis for the missile roll-reference gyro.

10. Press trigger to second detent and hold until missile is first sighted in front of airplane.

11. Move controller as required to guide missile to target. Do not attempt to send control commands to the missile until the rocket motor burns out (approximately 2 seconds), because smoke from the rocket motor will probably obscure the tracking flares.

12. Missile control switch at STBY as soon as missile hits target, or airplane is out of missile impact area.

13. Missile control and missile selector switches to OFF when all missiles have been fired.

14. Trigger safety switch at CAMERA.

Missile Malfunction.

MISFIRE. Failure of a rocket motor to fire, for any reason, after completion of the firing circuit.

HANGFIRE. Failure of a rocket motor in which the igniter fires, but propellant ignition is delayed for periods up to 15 minutes, after completion of the firing circuit. During this hangfire period, the propellant may partially ignite, or smolder.

MISSILE MALFUNCTION IN-FLIGHT PROCEDURE. When all switches are properly set and the missile fails to fire after the trigger is pressed to the second detent, it should first be considered a hangfire and the following procedure should be used:

1. Turn missile control and missile selector switches to OFF and trigger safety switch to CAMERA.

2. Consider a potential hangfire period for 15 minutes from the time step 1 is accomplished, and fly a course or courses to minimize the missile hazard if firing occurs.

3. After 15 minutes during which no smoldering occurred, consider the missile a misfire and resume normal operations or return to base.

4. If smoldering (hangfire) is evident and firing does not occur, jettison the missile in a safe direction and area.

Warning Do not return a hangfire missile to base.

5. If it is not practical to remain in flight in a safe area for the 15-minute hangfire period, jettison the missile in a safe, clear, and unpopulated area.

Missile Emergency Launch and Missile Launcher Emergency Jettison.

MISSILE EMERGENCY LAUNCH DURING FLIGHT. To launch missiles in an emergency during flight, proceed as follows:

1. Trigger safety switch at MISSILES CAMERA.

2. Missile selector switch as desired.

3. Missile control switch at READY just before launching missile.

4. Missile launch mode switch at UNGUIDE.

NOTE Proper missile launch cannot be ensured if the accompanying status display light is not on.

5. Press trigger to second detent and hold until missile is first sighted in front of airplane.

Warning Missiles should be safe-launched into a safe area because of their range as unguided ballistic rockets.

6. Missile control and missile selector switches at OFF when all missiles have been launched.

7. Trigger safety switch at CAMERA.

MISSILE EMERGENCY JETTISON DURING FLIGHT. To jettison missiles during flight, use any of the following procedures:

Warning To minimize the hazard involved in jettisoning the missile during flight, jettison missile at or above 1 G.

NOTE When an external load emergency jettison control is actuated, electrical power fires a primer in each missile launcher. The gases thus produced actuate a jettison gun that releases a retention pawl and forces the missile rearward where it falls free of the launcher rails in an unarmed condition.

- If no electrical power is available, the missile and/or launcher cannot be jettisoned.

1. Press external load emergency jettison button. This jettisons all loads and launchers.

2. Turn armament selector switch to JETT ALL, and hold bomb button down for one second. This jettisons all loads and launchers.

3. Press "INBD" external load auxiliary release button. This jettisons the missiles; the launchers are retained.

MISSILE AND LAUNCHER EMERGENCY JETTISON DURING GROUND OPERATION. To jettison missiles and launchers when the nose wheel is on the ground, press external load emergency jettison button.

After Landing.

As soon as possible after landing, do the following:

1. Point airplane away from personnel or any inhabited area and signal ground crew to insert shorting plugs in missiles still on airplane.

NOTE Hold both hands in full view of the crew chief while personnel are performing these operations.

2. Check missile control and missile selector switches at OFF.

3. Check trigger safety switch at CAMERA.

CBU DISPENSER SYSTEM.

NOTE CBU-1A/A and CBU-2A/A are designations for the SUU-7/A dispenser with different internal loads. SUU-7/A is the designation for the empty dispenser. In the interest of brevity, the terminology CBU will apply to all three. Cockpit controls labeled "SUU-7/A" apply to all of these CBU loading configurations. For ferry missions that require carrying an empty dispenser, a nose cone (plug) fairing can be installed in the SUU-7/A to reduce frontal drag.

One CBU dispenser can be carried on a Type III or IIIA pylon at each outboard wing station. Release of the contents of the dispenser is selective, and the dispensers can be jettisoned simultaneously by the bomb release and jettison systems. The system utilizes the existing chemical tank system circuitry.

CBU Dispenser System Controls and Indicators.

ARMAMENT SELECTOR SWITCH. The armament selector switch (figure 4-26), in addition to its other functions, is used to set up the CBU release and jettison circuits. When the armament selector switch is at CHEM & SUU-7/A - RELEASE, a signal is applied to the contents of a selected dispenser with each depression of the bomb button. With the switch at CHEM & SUU-7/A - OUTBD JETT, both dispensers are jettisoned when the bomb button is pressed. For other functions of the armament selector switch, refer to "Bombing Equipment Controls" in this section.

CHEMICAL TANK AND CBU SELECTOR SWITCH. The chemical tank and CBU selector switch (figure 4-26) is labeled "CHEM & SUU-7/A." This switch provides selection of the dispensers to be emptied by means of secondary bus power. When the armament selector switch is at CHEM & SUU-7/A - RELEASE, and the chemical tank and CBU selector switch is at OUTBD - RH, - BOTH, or - LH, a release signal is applied to the contents of a selected dispenser with each depression of the bomb button. For other functions of the chemical tank and CBU selector switch, refer to "Chemical Tank System Controls" in this section.

NOTE If no electrical power is available, CBU dispensers cannot be jettisoned by any method.

BOMB BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD AUXILIARY RELEASE BUTTON. Refer to "Bombing Equipment Controls" in this section.

STATUS DISPLAY LIGHTS. Two status display lights (4, figure 1-6; 6, figure 1-7; figure 4-34) read "SUU-7/A EMPTY" when on. One light shows the dispenser at the left outboard wing station, the other, the dispenser at the right outboard wing station. The lights come on to indicate that all contents of the selected dispenser have been released and will go out only if the armament selector switch is moved to any position other than CHEM & SUU-7/A - RELEASE. For additional information on the status display lights, refer to "Miscellaneous Equipment" in this section.

Operation of CBU Dispenser System.

For information on operation of the CBU dispenser system, refer to classified T.O. 11A1-5-6-1.

CHEMICAL TANK SYSTEM.

A chemical tank may be carried on any wing pylon station. The release of chemicals from the tanks is selective, and the tanks can be jettisoned by the bomb release and jettison systems.

Chemical Tank System Controls.

ARMAMENT SELECTOR SWITCH. In addition to its function of selecting other loads, the armament selector switch (figure 4-26) is used to set up the chemical tank discharge and jettison circuits. When the armament selector switch is at CHEM & SUU-7/A - RELEASE, the contents of the particular chemical tanks selected by the chemical tank and CBU selector switch are discharged when the bomb button is pressed. With armament selector switch at CHEM & SUU-7/A - OUTBD JETT, - INTERM JETT, or - INBD JETT, the selected pair of chemical tanks jettison when the bomb button is pressed. For other functions of the armament selector switch, refer to "Bombing Equipment Controls" in this section.

CHEMICAL TANK AND CBU SELECTOR SWITCH. The switch (figure 4-26) provides selection of the tank to be emptied, by means of secondary bus power. When the armament selector switch is at CHEM & SUU-7/A - RELEASE, and the chemical tank and CBU selector switch is at one of its 10 positions, the contents of the selected tanks are discharged when the bomb button is pressed. The selected tanks empty completely once the discharge circuit has been energized. For other functions of this switch, refer to CBU Dispenser System Controls and Indicators" in this section.

NOTE If no electrical power is available, chemical tanks cannot be jettisoned by any method.

BOMB BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. Refer to "Bombing Equipment Controls" in this section.

TOW-TARGET SYSTEM.

A Type A/A37U-5 or a Type A/A37U-15 tow-target system can be installed to permit carrying, launching, and towing TDU-10/B dart target for high-speed gunnery practice.

Type A/A37U-5 Tow Target.

The A/A37U-5 system consists of a pylon and launcher at the left outboard wing station, and a reel assembly on the right wing outboard pylon. The reel is wound with a tow line of steel cable and nylon rope, to which the target is attached. Existing chemical tank and CBU dispenser system circuitry and bomb button provide the necessary operational control. The target and launcher, and the reel assembly, can be jettisoned if necessary. When the tow line is released from the reel, a 14-foot recovery parachute is deployed to slow the descent of the target and tow line, and prevent further damage. The tow-target system uses primary bus power for tow line release and secondary bus power for launching target or jettisoning. In case of an electrical failure, the launcher and target, and reel assembly, can be manually released. Flight patterns for tow targets are designated by local directives. For towing limitations, refer to Section V.

Type A/A37U-15 Tow Target.

This information will be supplied when available.

Tow-Target System Controls.

BOMB BUTTON. Refer to "Bombing Equipment Controls" in this section.

ARMAMENT SELECTOR SWITCH. The armament selector switch (figure 4-26) must be at CHEM & SUU-7/A - RELEASE to supply power to launch the tow target when the bomb button is pressed and the chemical tank and CBU selector switch is properly set. For other functions of the armament selector switch, refer to "Bombing Equipment Controls" in this section.

CHEMICAL TANK AND CBU SELECTOR SWITCH. In addition to its other functions, the chemical tank and CBU selector switch (figure 4-26) is used in launching and releasing the tow target. When the switch is at OUTBD - LH, with the armament selector switch properly set, pressing the bomb button launches the tow target. Turning the chemical tank and CBU selector switch to OUTBD - RH (armament selector switch properly set) and pressing the bomb button releases the tow line from the reel. For other functions of the chemical tank and CBU selector switch, refer to "CBU Dispenser System Controls and Indicators" or "Chemical Tank System Controls" in this section.

PYLON LOADING SELECTOR SWITCHES. The left wing and right wing outboard pylon loading selector switches (figure 4-25) must be at CHEM & SUU-7/A to complete the circuitry for operation of the tow-target system. For additional functions of the pylon loading selector switches, refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON BUTTON. Refer to "Bombing Equipment Controls" in this section.

EXTERNAL LOAD EMERGENCY JETTISON HANDLE. Refer to "Bombing Equipment Controls" in this section.

Tow-target System Operation.

Refer to Aircrew Operational Procedures, AFM 55-100, for additional information on tow-target operation.

The main landing gear struts should be checked to see that they are inflated to 15 inches.

Caution The ground safety feature of the landing gear load switches is eliminated when the landing gear struts are inflated to 15 inches. Therefore, if the landing gear handle is inadvertently moved to UP, a ground retraction will probably result.

TAKE-OFF. Refer to "Normal Asymmetrical Loading Configurations in Section VI for take-off procedures.

Caution To prevent damage to the target during taxi and take-off, rough runway should be avoided.

1. Nose rotation and take-off airspeeds with the A/A37U-5 tow-target installed are 10 knots IAS greater than listed in T.O. 1F-100A-1-1 for the corresponding gross weight.

2. When clear of runway, retract gear and establish a steep climb to keep airspeed below the limit airspeed with the tow target in the stowed position.

Caution If there is good reason to believe that the tow target has been damaged during take-off, do not attempt to launch the target. Burn fuel down to normal landing gross weight and land with the target attached to the airplane.

BEFORE LAUNCH. The armament switches must be set as follows:

1. Armament selector switch at CHEM & SUU-7/A - RELEASE.

2. Chemical tank and CBU selector switch at OUTBD - LH.

Emergency Proceaures.

TOW-TARGET EMERGENCY JETTISON. To jettison the tow-target launcher and reel assembly, proceed as follows:

1. Press "OUTBD" external load auxiliary release button, or

2. Turn armament selector switch to CHEM & SUU-7/A - OUTBD JETT and press bomb button, or

3. Pull external load emergency jettison handle if there are no cartridges in ejector racks.

NOTE 275-gallon drop tanks will also be jettisoned when the external load emergency jettison handle is pulled.

LANDING WITH TARGET ON PYLON. If an electrical malfunction prevents launching the target, do not jettison it. Landing is possible by using the following procedure:

1. Keep airspeed below 250 knots IAS.

2. Fly rectangular landing pattern, adding 10 knots IAS to the normal speeds.

3. Touch down at 160 knots IAS.

LANDING WITH TARGET IN TOW. If an electrical malfunction occurs after target has been launched, there is no means of releasing the tow line. A landing is possible, using the following procedure:

1. Maintain terrain clearance of at least 3000 feet until final approach.

2. Add 10 knots IAS to final approach speed.

Warning The target will strike the ground about 3000 feet short of the runway because it flies well below the airplane. Make sure that no buildings or electrical wires obstruct the approach used.

NOTE The target will fail and separate upon ground contact.

PRESSURE REFUELING SYSTEM.

The pressure refueling system permits all internal fuel tanks to be filled on the ground by single-point refueling and in flight by probe-and-drogue refueling. The two 450- or 335-gallon drop tanks can be refueled through the pressure refueling system in flight or on the ground, except as stated in "Single-point Refueling" in this section. The pressure refueling system is shown in figure 4-32.

GROUND REFUELING.

Single-point Refueling.

The internal fuel tanks are normally filled through the single-point refueling system. The single-point refueling receptacle is behind an access door on the left side of the fuselage, just below the flap trailing edge. (See figure 1-37.)

NOTE Loss of the access door from the single-point refueling receptacle in flight, or a malfunction of the drop tank fuel transfer valve switch will cause a critical fuel problem by preventing transfer of fuel from the drop tanks or from the wing scavenge pumps to the forward fuselage tank.

All internal fuel tanks can be filled in about 4 minutes by using the pressure refueling system. Drop tanks should be refueled through the individual drop tank fillers; however, the two 450- or 335-gallon drop tanks can be refueled by using the pressure refueling system if the engine is running.

Caution Do not refuel 450- or 335-gallon drop tanks using single-point refueling unless engine is running, because internal fuel system will be overfilled and fuel will spill from vent outlet on vertical stabilizer, causing a fire or an explosion hazard.

When these drop tanks are included in the single-point refueling operation, the complete system will fill in about 11 minutes. The internal fuel tanks and the 450- or 335-gallon drop tanks can be topped off by using single-point refueling, whether the engine is running or not. However, during filling and topping off, the 450- or 335-gallon drop tank filler caps should be loosened by raising the lever on the caps.

NOTE When the 450- or 335-gallon drop tanks are being refueled, the internal tanks are full when a sudden decrease in the single-point refueling flow rate is noted. This is caused by the slower filling rate of the 450- or 335-gallon drop tanks.

Starting with an empty airplane and using single-point refueling with the 450- or 335-gallon drop tanks installed and the engine shut down, a certain amount of fuel will be transferred to the drop tanks during the refueling process. If the 450- or 335-gallon drop tanks are installed after the internal tanks have been refueled by single-point refueling, and the airplane is allowed to stand with the engine shut down, about 100 gallons of fuel will seep to the drop tanks in the first 2 hours. There will be about 130 gallons in each drop tank after a time lapse of 16 hours. If the airplane has been refueled with the 450- or 335-gallon drop tanks installed, and allowed to stand over the same period of time, there will be about 230 gallons in each drop tank. When the mission requires that the airplane be flown with empty 450- or 335-gallon drop tanks, the tanks should be installed on the airplane just before take-off. If this cannot be done, the excess fuel in the 450- or 335-gallon drop tanks can be transferred to the forward fuselage tank immediately after the engine has been started. (The transfer rate of fuel from the drop tanks to the fuselage tank is about 25 gallons per minute per tank.) Tank-mounted fuel level control valves automatically shut off fuel to each fuselage tank and to the 450- or 335-gallon drop tanks when the tanks become full. The automatic shutoff operation of the fuel level control valves must be tested during the first few seconds of refueling. Failure of a valve to shut off fuel flow could allow refueling pressure to rupture fuel tanks and damage the airplane structure. (Refer to "Fuel Level Control Valve Test Buttons" in this section.)

FUEL LEVEL CONTROL VALVE TEST BUTTONS. Two push buttons (figure 4-32), on the left side of the fuselage above the single-point refueling receptacle access door, must be used to test the closing of the fuel level control valves, which shut off the flow of fuel to each tank (including the 450- or 335-gallon drop tanks). Within the first seconds of the single-point refueling operation, these valves should be tested for closing, because some tanks full early. (When a tank is filled, an individual check of the primary and secondary operation of the valve cannot be made.) When either button is held down, the respective solenoid (primary or secondary) in each control valve is energized by power from the tertiary bus (battery bus power if tertiary bus power is not available) and closes the valve. Satisfactory valve operation is indicated by the shutoff of the fuel flow accompanied by the stopping of vibration and the stiffening of the refueling hose, which occurs when fuel flow through the nozzle stops. A more positive indication of fuel shutoff can be obtained by observing the counter on the ground refueling equipment. If fuel flow continues when either or both of the test switches are pressed, refueling operations must be stopped immediately to prevent possible damage, and the cause must be determined and corrected.

Caution It is necessary to have the fuel level control valve (primary and secondary) operation checked, because failure of a valve to close could cause refueling pressure to rupture the fuel tanks and damage the airplane structure.

SINGLE-POINT REFUELING DOOR SWITCH. This spring-loaded switch (figure 4-32), located inside the single-point refueling access door, controls the

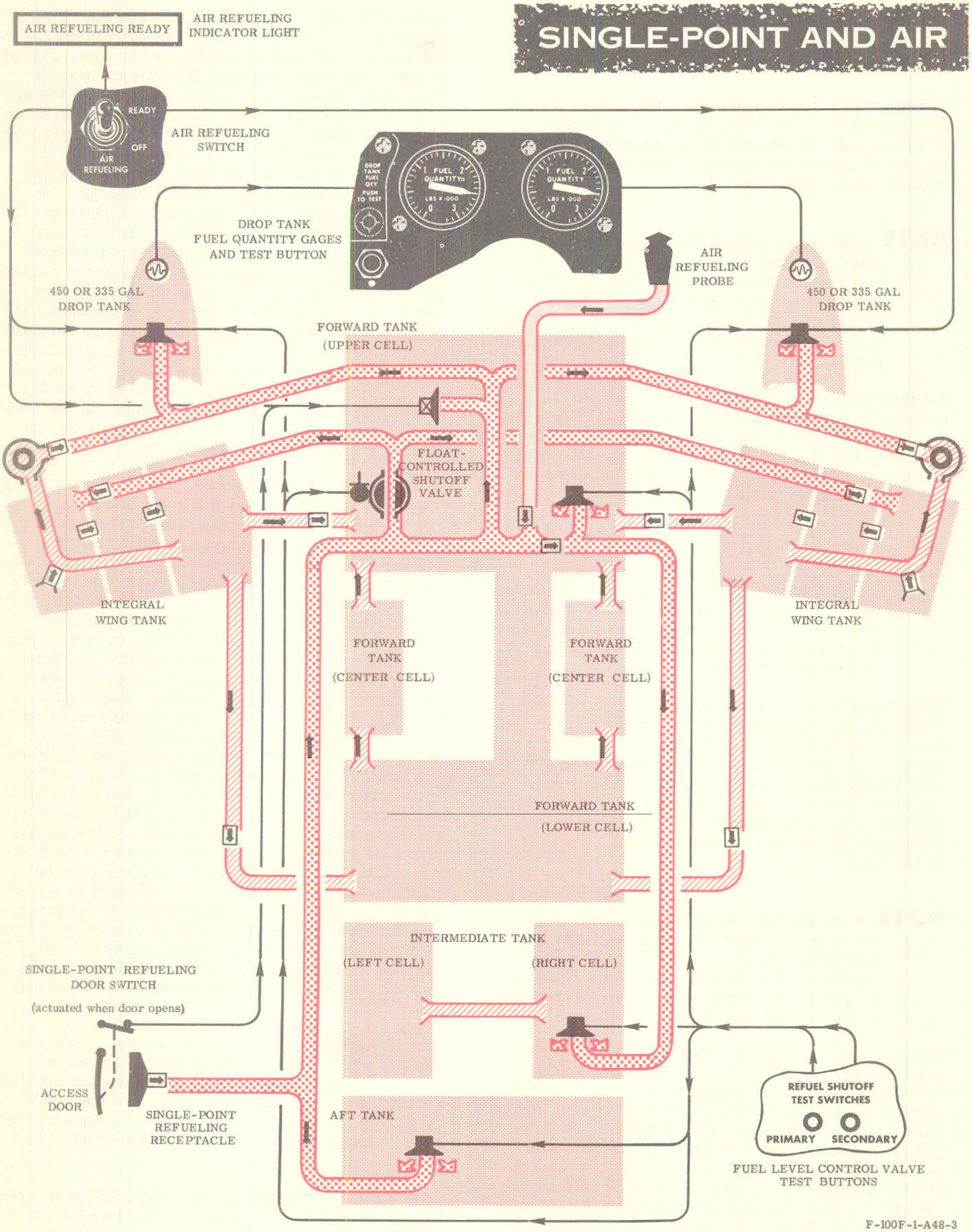
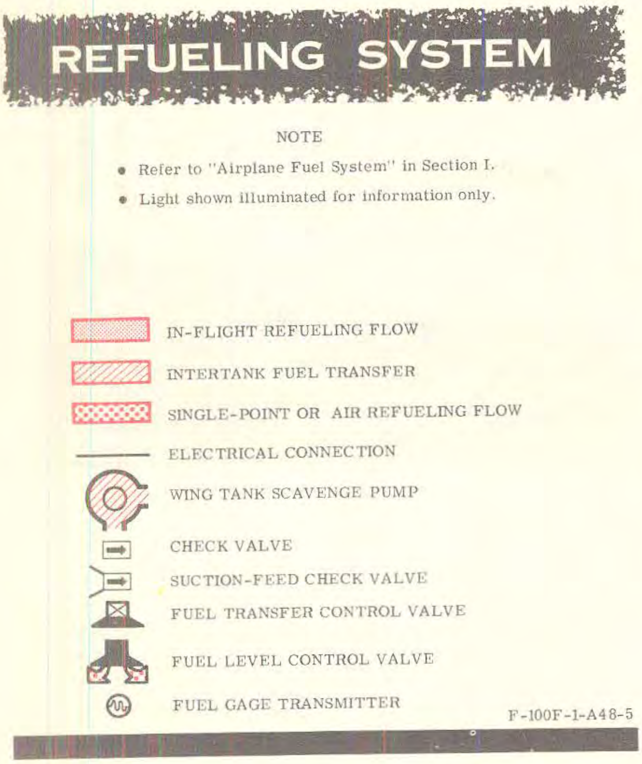

SINGLE-POINT AND AIR
AIR REFUELING READY
AIR REFUELING INDICATOR LIGHT
READY
OFF
AIR REFUELING
AIR REFUELING SWITCH
DROP TANK FUEL QTY PUSH TO TEST
FUEL QUANTITY
LBS X 1000
DROP TANK FUEL QUANTITY GAGES AND TEST BUTTON
AIR REFUELING PROBE
450 OR 335 GAL DROP TANK
450 OR 335 GAL DROP TANK
FORWARD TANK (UPPER CELL)
FLOAT-CONTROLLED SHUTOFF VALVE
INTEGRAL WING TANK
INTEGRAL WING TANK
FORWARD TANK (CENTER CELL)
FORWARD TANK (CENTER CELL)
FORWARD TANK (LOWER CELL)
INTERMEDIATE TANK
(LEFT CELL)
(RIGHT CELL)
SINGLE-POINT REFUELING DOOR SWITCH
(actuated when door opens)
ACCESS DOOR
SINGLE-POINT REFUELING RECEPTACLE
AFT TANK
REFUEL SHUTOFF TEST SWITCHES
PRIMARY
SECONDARY
FUEL LEVEL CONTROL VALVE TEST BUTTONS
F-100F-1-A48-3

Figure 4-32



sequence of tank refueling. When the access door is opened, the switch is automatically actuated and primary bus power (battery bus power if primary bus power is not available) closes the fuel transfer control valve to prevent fuel from entering the forward tank through this valve. Closing the valve will ensure that the wing tanks will be completely filled before the forward tank is full. This sequence must occur; otherwise, the float-controlled shutoff valve will stop the fuel flow to the wing tanks when the forward tank is full. After refueling, the switch is repositioned by closing the access door to open the fuel transfer control valve and restore normal fuel system operation.

NOTE Make sure the single-point refueling access door is closed as soon as refueling is completed, to prevent drain on battery power.

Alternate Method Ground Refueling.

When single-point refueling equipment is not available, the internal tanks can be refilled with conventional refueling equipment, if an ac external power source is available. To fill the tanks by use of conventional equipment, it is necessary to remove the access door to the aft tank fuel control valve on the right side of the fuselage and remove the cover plate on the aft fuselage tank. This allows the nozzle to be inserted at this point. (See figure 1-37.) External ac power must be connected to the airplane to energize the transfer pumps in the aft fuselage tank. Fuel introduced into the aft tank is transferred to the forward and intermediate tanks until the airplane is full, except that the forward tank will lack 42 gallons of being full, because this is the level at which the aft tank transfer level control valve is located. Because fuel transfers from the forward tank to the wing tanks by gravity through the balance vent system, the forward tank fills before the wing tanks are filled. Therefore, it is necessary to allow fuel to transfer into the wing tanks before continuing to fill. It may take 2 hours or more to fill the wing tanks completely by this method. If refueling is stopped when it becomes necessary to allow fuel to transfer into the wing tanks, only about 4800 pounds of fuel will be in the airplane. Fuel quantity gages can be used to check refueling progress when this method of refueling is used. Fuel tank capacities are listed in figure 1-20; fuel specifications are given in figure 1-37.

AIR REFUELING.

Air refueling permits all internal fuel tanks to be filled from a tanker airplane. The two 450- or 335-gallon drop tanks, carried at the intermediate wing mounting stations, can also be serviced by air refueling. The refueling equipment consists of a probe and drogue, with the probe on the receiver airplane and the drogue on the tanker. The 12-foot probe mast and probe (figure 4-33) are a detachable unit. Two lights (figure 4-33), one at the probe mast fairing and one flush-mounted in the fuselage right side, light the probe and the tanker drogue for night refueling. The probe is connected by a fuel line to the single-point refueling system. (See figure 4-32.) Hookup to the tanker is made by flying the probe into a conical drogue trailed by the tanker. During the refueling operation, the receiver airplane must maintain a position forward of the hookup point and fly formation with the tanker. The air refueling sequence is completed in 3 to 4 minutes when all internal tanks are filled. When the 450- or 335-gallon tanks are installed, the time required to take maximum fuel aboard is approximately 11 minutes. Each internal fuel tank and the 450- or 335-gallon drop tanks have a fuel level control valve that automatically shuts off incoming fuel as the tank becomes full. When the refueling operation is completed, the receiver airplane reduces power and falls directly behind the tanker so that the hose unwinds to its limit and automatically shuts off fuel flow. When the tanker hose reels out to its limiting stop, the probe pulls from the drogue.

Air Refueling Controls and Indicators.

NOTE There are no air refueling controls and indicators in the rear cockpit.

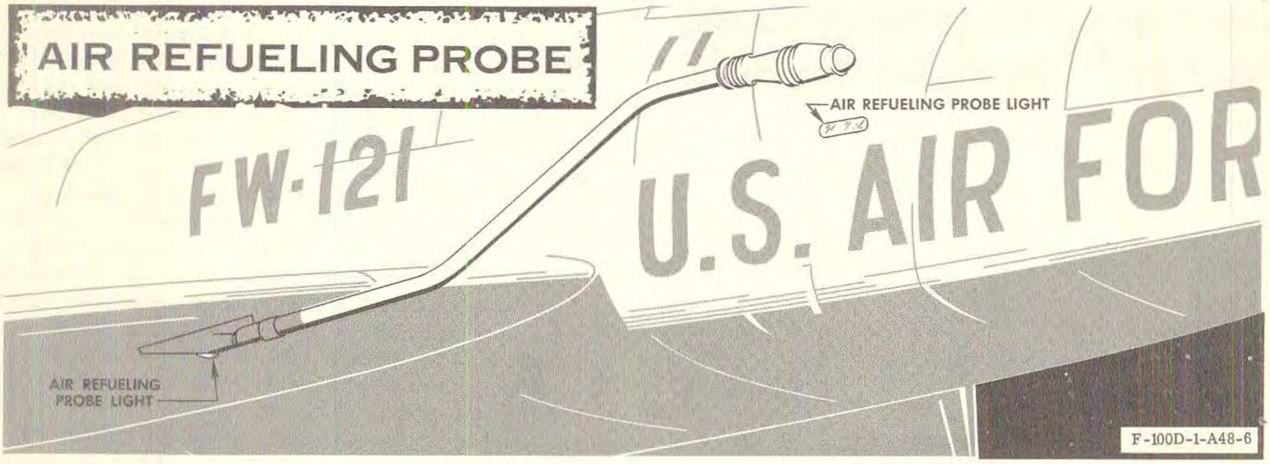


Figure 4-33

AIR REFUELING SWITCH. This two-position switch (figures 1-19 and 4-32) controls the operation of the fuel transfer control valve in the forward fuselage tank, and the fuel level control valve in each of the 450- or 335-gallon drop tanks. With the switch at READY, the fuel transfer control valve is closed by primary bus power (battery bus power if primary bus power is not available) and the level control valves in the drop tanks are deenergized, allowing them to open. The closing of the fuel transfer control valve ensures that the wing tanks will be completely filled before the forward tank is full. This sequence must occur; otherwise, the float-controlled shutoff valve will stop fuel flow to the wing tanks when the forward tank is full. Incoming fuel from the refueling probe can then flow into the 450- or 335-gallon drop tanks. When the 450- or 335-gallon drop tanks are full, the fuel level control valve in each drop tank shuts off the flow of fuel to each drop tank. The air refueling switch should be moved to READY just before hookup for air refueling, and at the latest, before any fuel is taken on after hookup.

NOTE Do not position air refueling switch to READY too soon, since this prevents about 25 pounds per minute from transferring from the integral wing tanks for the period that the switch is at READY. If the fuel is low, the switch may be positioned to READY after hookup, before taking on any fuel.

With the air refueling switch at OFF, the drop tank fuel transfer control valve in the forward fuselage tank opens and the fuel level control valves in each of the 450- or 335-gallon drop tanks are energized closed by power from the secondary bus (tertiary bus power on F-100F Airplanes). This allows fuel from the 450- or 335-gallon drop tanks, and wing tank fuel that is transferred by the wing scavenge pumps, to transfer into the fuselage forward tank.

NOTE Failure to return the air refueling switch to OFF after refueling is completed prevents use of the fuel normally available from the 450- or 335-gallon drop tanks and the wing scavenge pumps.

REFUELING PROBE LIGHT SWITCH. The refueling probe light in the fuselage and the refueling probe light in the probe mast fairing are controlled by a switch (figure 4-16) labeled "REFUELING PROBE LIGHT" ("AIR REFUELING PROBE LIGHT" on F-100F Airplanes). Moving the switch to FUS ONLY turns on the fuselage probe light. With the switch at ALL ON, the fuselage probe light and the mast fairing probe light are both turned on. The refueling probe lights are turned off when the switch is moved to OFF. The switch is powered by the secondary bus (primary bus on F-100F Airplanes).

AIR REFUELING INDICATOR LIGHT. This green placard-type indicator light (figures 1-16 and 4-32) comes on to read "AIR REFUELING READY" when the air refueling switch is at READY; it is not an indication that all items in the system are operating. The light is battery-bus-powered. The bulbs in the light can be tested by the indicator light test circuit.

DROP TANK FUEL QUANTITY GAGES. Fuel quantity gages (2, figures 1-6 and 1-7; 4-32) that indicate the quantity of fuel in each of the two 450- or 335-gallon drop tanks can be installed on a removable panel that attaches to the instrument panel shroud. This indicating system is independent of the normal internal fuel quantity indicating system and is of the capacitor type powered by the 3-phase ac instrument bus. The system automatically compensates for the contraction or expansion of fuel caused by temperature changes. When the drop tanks are jettisoned, the fuel gage pointers rotate counterclockwise momentarily, then stop just below zero. Lighting of the fuel gages is controlled by the switch that also controls the magnetic compass light. (Refer to "Lighting Equipment" in this section.)

DROP TANK FUEL QUANTITY GAGE TEST BUTTON. Gage operation can be checked by a test button on the removable fuel quantity gage panel. When the test button (1, figures 1-6 and 1-7; figure 4-32) is held down, the gage pointer should move counterclockwise toward "0" (empty), and when the button is released, the pointer should return to its former position. If the pointer fails to move or does not return to its previous setting, the drop tank fuel quantity gage system is faulty.

"BUDDY" AIR REFUELING SYSTEM.

The airplane has provisions only for a "Buddy" air refueling system.

MISCELLANEOUS EQUIPMENT.

STATUS DISPLAY LIGHTS.

Two multiple-light display units (figure 4-34), (not in rear cockpit) contain necessary information as to the status of a particular system. Each unit houses several lamps and lenses and one film plate containing a group of symbols that make up the total display. When the required system controls are actuated, the associated lamp comes on to project a light through a lens to the related image on the film plate, and through another lens that projects the image forward, where it is displayed on a screen on the face of the display unit. Each display includes a small airplane (looking from aft to forward) and a large numeral that shows the wing station selected.

On some airplanes, every display is accompanied by a small number within an arc above or below the display that represents the individual lamp number for the display. On other airplanes, individual lamps are indicated by a notch that allows a shaft of the light to show in the periphery of the display. These notches of light are measured clockwise from the vertical centerline with each notch representing an individual lamp number corresponding to a clock position. For example, lamp No. 2 is represented by a notch at the 2 o'clock position, etc.

Brilliance of the lights in both units is controlled by the indicator light dimmer switch, and the lights can be tested by the indicator light test switch. When the test switch is held at TEST BRIGHT or TEST DIM, all lamp numbers (2, 4, 5, 6, 7, 8, 9, and 11) or all notches in each display appear simultaneously while the center area appears as a garbled pattern. Failure of a lamp number or notch to appear when the test switch is actuated indicates a malfunction of that light. Although the film plate housed in each unit can contain as many as 12 symbols, only those symbols corresponding to systems presently in use in these airplanes will appear in the display. Since each unit contains 12 lamps, there are plenty of spares available. For replacement, see figure 4-35. Light units that show lamp numbers in the display can be removed by pushing in on the face of the display unit. This releases the spring-locking clip and allows the body to be removed from the housing. On light units having the lamp notches, the spring-locking clip must be pressed to release the body from the housing. After the lamps are replaced, the body should be reinserted (locking clip up) into the housing until a click is felt. It is not necessary to alter the position of any switch in the cockpit when removing and installing the light body. The status display lights are powered by the main 3-phase ac bus. For additional information on operation of these lights, refer to the associated systems in this section.

ANTI-G SUIT SYSTEM.

Air pressure for the anti-G suit is supplied by engine compressor air through the cockpit air conditioning and pressurization system. (See figure 4-1.) This air is sent through a pressure-regulating valve to the anti-G suit attachment fitting. The line from the regulating valve to the attachment fitting passes through the quick-disconnect fitting on the front of the seat so that the line severs automatically upon ejection.

Anti-G Suit Pressure-regulating Valve.

The pressure-regulating valve (3, figure 1-8; 37, figure 1-12; 4, figure 1-14; figure 4-1) regulates air pressure to the anti-G suit and permits automatic inflation of the suit only when positive G is encountered. The valve operates automatically and begins to function at about 1.75 G. Some valves have marked HI and LO positions at the top of the valve. When the valve is at LO (counterclockwise), one psi of air pressure is exerted in the suit for each additional 1 G increase; with the valve at HI (clockwise), 1.5 psi is delivered per G increase. Other valves are the nonadjustable, nonlabeled type. These valves are preset to exert an average air pressure of 1.5 psi for each added 1 G increase. Pressing the button on top of either type valve checks valve operation and also allows the suit to be inflated when desired. If this valve malfunctions in flight, the anti-G suit should be immediately disconnected.

VENTILATED SUIT SYSTEM.

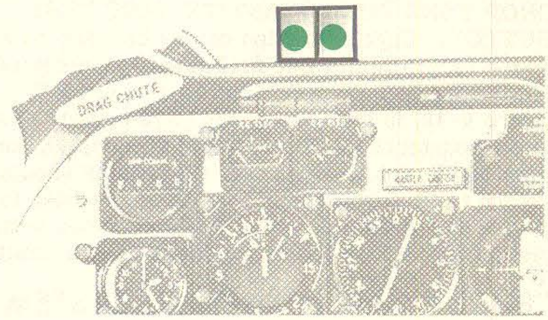
The ventilated suit provides air circulation around the pilot's body and is normally worn under an anti-exposure suit to aid in the elimination of perspiration. Air for the ventilated suit is taken from the console air duct (figure 4-1) of the cockpit air conditioning and pressurization system and directed

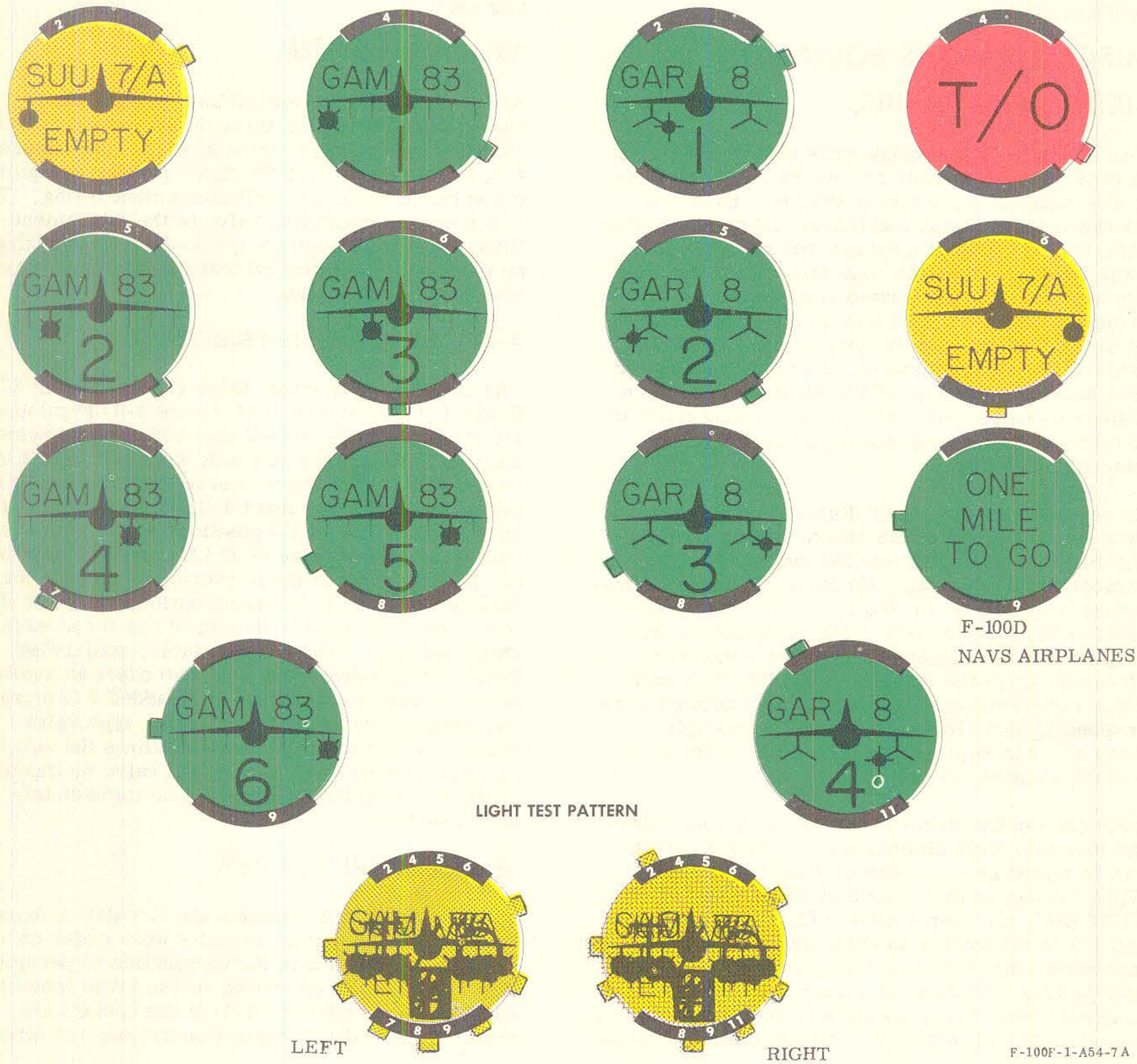
STATUS DISPLAY LIGHTS

NOTE

Lights shown illuminated simultaneously for information only.

Light notches shown superimposed for illustrative purposes only.





F-100F-1-A54-7 A

Figure 4-34

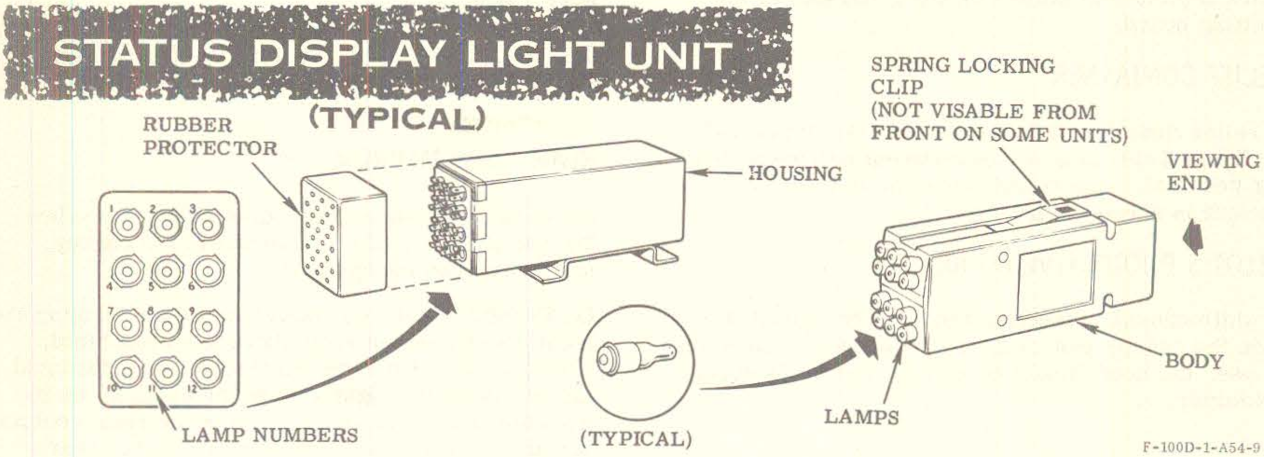


Figure 4-35

through a hose leading to the personal-lead quick-disconnect on the front of the ejection seat. A short section of hose, attached to the suit, is connected to the hose from the personal-lead disconnect. A manually operated flow control valve in this hose permits adjustment of the airflow into the suit. The console air lever (not in the rear cockpit) must be at full INCREASE to supply air to the ventilated suit. The temperature of the air to the suit is controlled by the cockpit temperature rheostat knob (not in the rear cockpit).

Ventilated Suit Flow Control Valve.

The ventilated suit flow control valve (figure 1-34) controls the flow of air to the unit. The flow control valve is manually operated, and is located where the suit hose section joins the hose from the personal-lead quick-disconnect on the ejection seat. This valve should always be closed before the two hoses are connected, to prevent sudden temperature changes.

Console Airflow Lever.

Refer to "Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal System Controls" in this section.

Cockpit Temperature Rheostat.

Refer to "Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal System Controls" in this section.

Operation of Ventilated Suit System.

After the engine is started, and before connecting the suit, check out the system as follows:

1. Move console airflow lever to full INCREASE.
2. Move cockpit temperature master switch to AUTO.
3. Rotate cockpit pressure selector switch to 2.75 PSI or 5.00 PSI.
4. Feel for airflow from hose coming from personal-lead quick-disconnect by opening flow control valve.
5. Check for a decrease in airflow when flow control valve is turned from open to closed.
6. Rotate cockpit temperature rheostat from HOT to COLD and notice that there is a change in temperature of air coming from hose, and then rotate rheostat so that it is in center of "PILOT'S SUIT RANGE" (VENT SUIT") marking.
7. Close flow control valve and connect suit hose to hose from personal-lead disconnect.
8. Slowly open flow control valve for desired airflow into suit.
9. Adjust cockpit temperature rheostat for desired temperature in ventilated suit.

NOTE Always adjust the temperature in small increments to prevent sudden temperature changes in the suit.

PLOTTING BOARD.

A plotting board may be fastened into the right console (not in rear cockpit). It is stowed in the map case when not in use, or can be folded up against the canopy sill while it is in place on the console. Several transparent envelopes are stowed in the plotting board. Erasable calculations or flight lines may be plotted on these envelopes. A

Mark II plotter is stowed on the underside of the plotting board.

RELIEF CONTAINER.

A relief container (32, figure 1-6; 34, figure 1-7; 1, figure 1-14) is in a compartment below the center pedestal. The relief container in the rear cockpit is above the left console.

PILOT'S PROTECTIVE HOOD.

A white canvas protective hood can be installed inside the canopy (not in the rear cockpit). When not in use, the hood should be kept stored in its special container.

NOTE Lower seat before opening or closing the canopy or placing the protective hood in position, to prevent the hood from being damaged.

- To relieve interference between the circuit-breaker panels and pilot's head movements, the sagging fabric should be tucked in place.

INSTRUMENT FLYING HOOD - F-100F AIRPLANES.

An instrument flying hood is provided for the rear cockpit for use in instrument flying training.

Caution Lower seat before using instrument flying hood, to prevent hood from being damaged.

MAP CASE.

The map case (15, figure 1-9; 19, figure 1-10; 14, figure 1-13; 12, figure 1-15) is on the right console.

REAR-VIEW MIRROR.

On F-100D Airplanes, an adjustable, rear-view mirror (figure 1-33) is attached to the canopy, just behind the canopy bow.

On F-100F Airplanes, the rear-view mirror in the front cockpit is centered above the windshield armor glass. On some airplanes,* an additional mirror is on the right side of the cockpit, on the windshield bow, to aid in viewing the rear-cockpit occupant. The rear-view mirror, in the rear cockpit, is on the upper centerline of the canopy.

MOORING EQUIPMENT.

A plugged, threaded hole into which an eye can be screwed for mooring the airplane is in the bottom of each wing and on the lower surface of the fuselage, near the nose and tail. Four mooring eyes in a canvas container are included as a kit. (Three jack pads are also supplied in the kit.) All mooring-eye threaded holes and jack pad attachment points are identified by markings on the wings and fuselage.

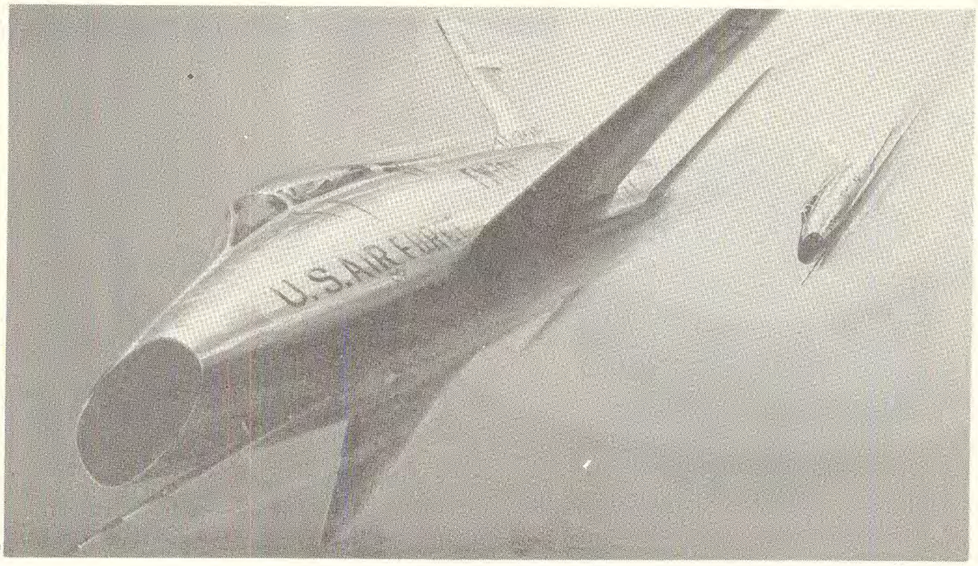
PROTECTIVE COVERS.

Removable covers include wing and horizontal stabilizer covers, an air refueling probe cover, a canopy cover, a cover for the forward section of the fuselage, an air intake duct cover, and a tailpipe cover. A pitot boom cover is also provided.

---

*F-100F-6 Airplanes and F-100F-11 Airplanes AF56-3770 through -3829

OPERATING LIMITATIONS



F-100D-1-0-89

section V

TABLE OF CONTENTS

INSTRUMENT MARKINGS.

Careful attention must be given to the instrument markings (figure 5-1), because the limitations shown on these instruments and noted in the captions are not necessarily repeated in the text of this or any other section.

ENGINE LIMITATIONS.

All normal engine limitations are based on JP-4 fuel and are shown in figure 5-1.

THRUST DEFINITIONS AND TIME LIMITS.

Maximum Thrust.

Maximum Thrust is defined as the thrust obtained at full afterburner and is limited to 5 minutes continuous operation on the ground and 15 minutes continuous operation in flight.

NOTE The time limits for operation at Maximum Thrust apply to the full range of afterburner operation.

Military Thrust.

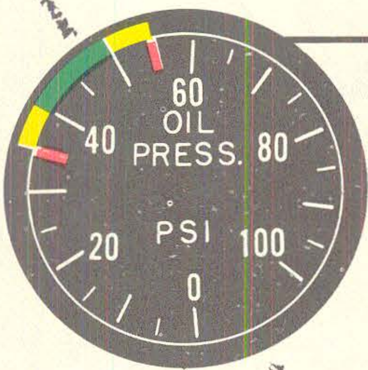
Military Thrust is defined as the thrust obtained at full throttle without afterburner and is limited to 15 minutes continuous operation on the ground and 30 minutes continuous operation in flight.

NOTE When operating requirements dictate, Military Thrust may be used for periods of time longer than 30 minutes; however, engine life will be shortened.

Maximum Continuous Thrust.

Maximum Continuous Thrust is defined as the thrust obtained at approximately 3% engine rpm below Military Thrust rpm. There is no time limit for operation at this thrust.

INSTRUMENT MARKINGS
BASED ON JP-4 FUEL

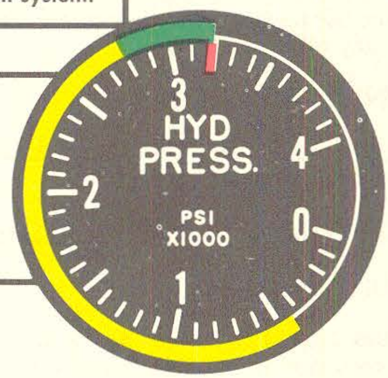


OIL PRESSURE GAGE

- (red) 35 psi MINIMUM FOR IDLE
  Above idle, oil pressure must be 40 psi minimum.
- (yellow) 35-40 psi CAUTION
- (green) 40-50 psi NORMAL
- (yellow) 50-55 psi CAUTION
- (red) 55 psi MAXIMUM

HYDRAULIC PRESSURE GAGE

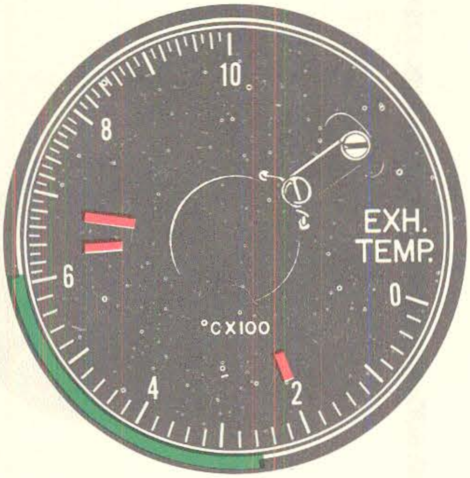
	FLIGHT CONTROL SYSTEM NO. 1	FLIGHT CONTROL SYSTEM NO. 2	UTILITY
(yellow) 450-2800 psi	Permissible with rapid control surface movement.		Permissible with high flow demands on system.
	Shows malfunction with control surface static.		Shows malfunction with no flow demands on system.
(green) 2800-3200 psi	NORMAL		
(red) 3200 psi	MAXIMUM **NOTE:** Momentary operation above 3200 psi is permissible when hydraulic pump overrun occurs during transient conditions, such as engine start and accelerations and large demands by the various hydraulically operated systems.		



F-100D-1-51-1F

Figure 5-1 (Sheet 1 of 3)

EXHAUST TEMPERATURE GAGE



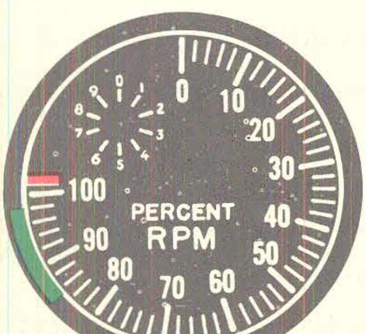
NOTE

- Stabilized exhaust temperature at engine idle rpm normally will not exceed 340°C at 60°F ambient temperature. However, at higher ambient temperatures, stabilized exhaust temperature at engine idle rpm may go as high as 400°C with the engine operating properly.
- Minimum exhaust temperature for take-off is 540°C.
- Maximum Continuous Thrust is the thrust obtained at approximately 3% engine rpm below Military Thrust rpm.

(red)	200°C	Minimum
(green)	260°C-610°C	Continuous **NOTE** Below 30,000 feet, maximum is 580°C.
(red)	630°C	Maximum during start. Maximum at Military Thrust on ground (15 min) and during flight below 30,000 feet (30 min). **NOTE** • Maximum at Military Thrust during flight above 30,000 feet (30 min) is 660°C. • Maximum in afterburner on ground (5 min) and during flight below 30,000 feet (15 min) is 640°C. • Maximum in afterburner during flight above 30,000 feet (15 min) is 670°C.
(red)	680°C	Maximum during engine acceleration

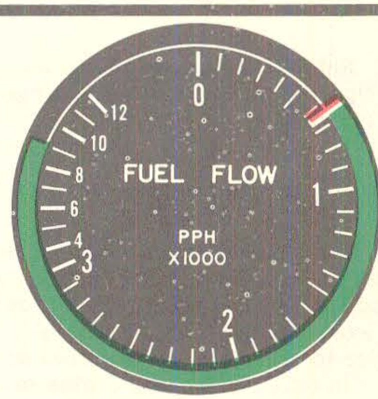
NOTE

Acceleration time is 2 minutes and is defined as the period between initial advancement of the throttle and when the exhaust temperature begins to drop after reaching its peak. Exhaust temperature must constantly fluctuate toward the stabilized limit after peaking. Two additional minutes is allowed for the exhaust temperature to reach the stabilized limit. Exhaust temperature should stabilize at or near the normal operating temperature within 5 minutes after initial throttle advance.



TACHOMETER

(green)	85%-98%	Normal operating range
(red)	102%	Maximum overspeed



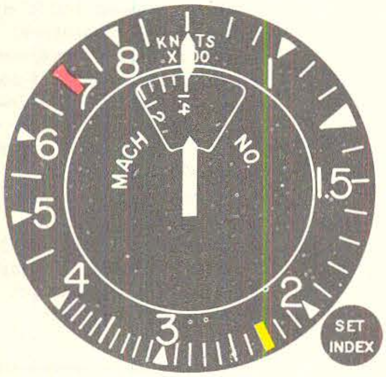
FUEL FLOW INDICATOR

(red)	650 lb/hr	Minimum
(green)	650-9000 lb/hr	Continuous

F-100D-1-A51-5A

Figure 5-1 (Sheet 2 of 3)

INSTRUMENT MARKINGS



AIRSPEED AND MACH NUMBER INDICATOR

(red) 700 knots IAS maximum allowable airspeed with no external load.

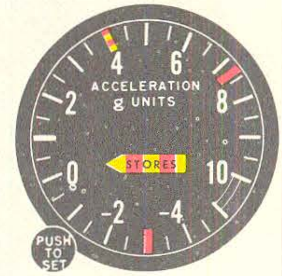
NOTE

The black and red pointer must not be used as a limiting speed reference, since it will show airspeeds greater than the 700 knots IAS limit.

(yellow) 230 knots IAS maximum gear and full flaps extension.

NOTE

- With intermediate flaps position selected do not exceed 350 knots IAS.
- For airspeed limits with external loads, refer to "External Loading Configuration Limitations" in this section.



ACCELEROMETER

(red)	7.33G	Maximum clean (combat condition)
(red/yellow)	4.0 G	Maximum for take-off condition with average external load
(red)	−3.0 G	Maximum clean (combat condition)

NOTE

For specific G-limits for all external loading configurations, refer to "External Loading Configuration Limitations" in this section.

F-100D-1-A51-6A

Figure 5-1 (Sheet 3 of 3)

NOTE Refer to "Maximum Continuous Thrust Operation" in Section VII for additional information.

ENGINE OVERSPEED.

The maximum allowable engine speed is 102% rpm. If this speed is exceeded while the airplane is on the ground, the engine must be shut down. If this speed is exceeded in flight, if possible, use minimum power to sustain flight and land as soon as possible. In either case, the engine must be inspected for damage.

NOTE The amount and duration of any engine over-speed must be entered in the Form 781, so that the prescribed engine inspection can be performed.

EXHAUST TEMPERATURE LIMITS.

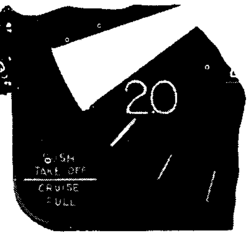
Exhaust temperature gage markings are shown in figure 5-1.

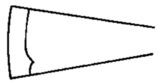
NOTE The amount and duration of any engine over-temperature must be entered in the Form 781, so that the prescribed engine inspection can be performed.

ENGINE PRESSURE RATIO GAGE TAKE-OFF LIMITS.

The permissible ranges of engine pressure ratio gage readings for Military Thrust and Maximum Thrust checks before take-off are shown in figure 5-2. The permissible ranges are based on proper initial setting of the gage take-off index marker for the prevailing outside air temperature.

PRESSURE RATIO GAGE TAKE-OFF LIMITS




Allowable pointer range within arc of the take-off index marker.

TYPE OF CHECK	ALLOWABLE PRESSURE RATIO GAGE SETTING	REMARKS
MILITARY THRUST CHECK (Made during preflight engine check)	Within arc of the take-off index marker. (Marker set according to outside air temperature.)	Tolerance shown is for stabilized rpm, but does not require stabilization of exhaust temperature.
MAXIMUM THRUST CHECK (Made at start of take-off roll)	Within arc of the take-off index marker after the marker has been readjusted so that the lower edge lines up with the indicator reading obtained at Military Thrust check.	Because brakes will not hold the airplane during Maximum Thrust operation, this check must be made during the initial part of the take-off roll.

NOTE

During take-off roll and at lift-off, gage reading may rise as much as 0.15 above the reading observed during Maximum Thrust check. This rise is acceptable.

F-100D-1-41-9

Figure 5-2

ALTERNATE AND EMERGENCY FUEL LIMITATIONS.

Alternate fuel is JP-5, and, when operational necessity requires, aviation gasoline in the lowest grade available may be used for emergency fuel. Refer to "Operation on Alternate and Emergency Fuel" in Section VII.

Certain precautions and limitations must be observed when operating on these fuels.

When using alternate fuel, operation should not be attempted if the temperature of the fuel on board before engine start is within 5 degrees above the fuel freezing point.

When using aviation gasoline:

a. Add 3 percent by volume Specification MIL-L-6082 Grade 1100 or Grade 1065 oil for fuel pump lubrication.

b. Make certain engine pressure ratio is within limits.

c. Do not exceed 5000-feet-per-minute rate of climb above 1500-foot altitude when fuel temperature is above 80°F.

d. Aviation gasoline should not be used for successive flights.

NOTE The engine instrument markings shown in figure 5-1 also are applicable when alternate and emergency fuels are used.

AIRSPEED LIMITATIONS.

MAXIMUM ALLOWABLE AIRSPEEDS.

Refer to "External Loading Configuration Limitations" in this section.

AGM-12B Missile Firing Speed.

Refer to "External Loading Configuration Limitations" in this section.

LANDING GEAR LOWERING SPEED.

Limit airspeed for landing gear operation is 230 knots IAS. Flight with gear extended at speeds greater than 230 knots IAS is likely to cause damage to gear doors or gear operating mechanisms.

WING FLAP LOWERING SPEEDS.

Limit airspeed with the wing flaps full down is 230 knots IAS.

Limit airspeed with the wing flaps at the intermediate position is 350 knots IAS.

LANDING LIGHT EXTENSION SPEED.

The landing lights should not be extended at speeds above 250 knots IAS. If the lights are extended at speeds greater than 250 knots IAS, damage to the units is likely to result.

CANOPY OPERATING SPEED.

The canopy is not designed to be opened in flight. Any partial opening of the canopy could cause air loads to tear it off the airplane. During taxiing, however, the canopy may be opened safely at speeds below 50 knots IAS.

DRAG CHUTE OPERATING SPEED.

The drag chute should be deployed only after touchdown with the nose wheel on the runway, and only at speeds below about 180 knots IAS. If the drag chute is deployed above 180 knots IAS, the chute may be damaged or structural damage will occur if the chute tears away from the airplane.

Caution To prevent slowing airplane to below landing speed, the drag chute must not be deployed before touchdown.

AIRSPEED LIMITATIONS DUE TO ELECTRONIC EQUIPMENT COOLING TURBINE FAILURE - F-100D AIRPLANES.

When the airplane must be flown with a known or suspected failure of the electronic equipment cooling turbine, certain airspeed limitations must be observed to prevent overheat and resultant damage to electronic equipment. These airspeed limitations for sustained flight conditions, based on an Air Force Summer Day, are:

ALTITUDE	MAXIMUM AIRSPEED
Sea level	465 knots IAS
5000 feet	500 knits IAS
10,000 to 17,000 feet	520 knots IAS

NOTE Normal operation of the airplane may be resumed above 17,000 feet.

- For short-duration maneuvers below 17,000 feet which are required to accomplish an authorized mission, the airspeed limitation is 550 knots IAS for a period not to exceed 3 minutes.

PROHIBITED MANEUVERS.

NOTE Refer to Section VI for information on flight characteristics under varying flight conditions and external loading configurations.

The airplane is restricted from performing the following maneuvers:

1. Spins.

2. Snap rolls or snap maneuvers.

3. Abrupt rudder maneuvers and extreme yaw angles.

4. With inboard pylons or any combination of stores other than only NAA Type III 275 gallon drop tanks, roll rates exceeding 120 degrees per second. (For a given aileron deflection, roll rate will vary with speed, 120 degrees per second is equivalent to approximately one-half aileron deflection at cruise speed.)

Caution With stores or pylons at the inboard wing stations, do not perform aileron rolls using more than two-thirds aileron deflection or rolls exceeding 360 degrees bank angle change when using two-thirds aileron deflection.

NOTE Full aileron deflection may be used below landing gear limit speed during take-off and landing.

5. For F-100F Airplanes with no external load or with only NAA Type III 275-gallon drop tanks installed, full aileron deflection rolls exceeding 360 degrees and aileron deflections of more than about two-thirds on continuous rolls.

Caution Under conditions of full aileron deflection rolls with high roll rate, reduce aileron angle early to avoid exceeding 360 degrees.

6. Maneuvers not essential for accomplishing a tow target mission when a dart target is installed and in the stowed position.

AUTOPILOT LIMITATIONS.

The autopilot system (dampers or autopilot) must not be used below 200-foot minimum terrain clearance during training missions. This limitation is necessary to preclude possible accidents which could result from a hard-over failure of the autopilot system (dampers or autopilot). The 200-foot terrain clearance has been established as the minimum recovery altitude in the event of a hard-over failure of the differential servo in the autopilot system.

ACCELERATION LIMITATIONS.

NOTE Refer to "External Loading Configuration Limitations" in this section for load factor limits for the airplane with no external load and for the airplane in all approved external loading configurations.

NEGATIVE-G FLIGHT LIMITS.

Fuel System Limits.

Based on the capacity of the inverted-flight tank and on required engine fuel flows, the time limits for sustained negative-G flight before flame-out can be expected are:

ALTITUDE (FEET)	MILITARY THRUST TIME LIMIT (SECONDS)	AFTERBURNER THRUST TIME LIMIT (SECONDS)
5,000	6	1.5
10,000	7	1.5
20,000	8	1.5
30,000	9	2.0
40,000	12	3.0
45,000	15	4.0
Above 45,000	Negative-G flight may result in flame-out, because suction feed cannot be ensured.	

Oil System Limits.

Under sustained zero-G or negative-G flight conditions, complete loss of engine oil pressure may occur. Therefore, do not maintain zero or negative G for more than 15 seconds.

EXTERNAL LOADING CONFIGURATION LIMITATIONS.

FACTORS AFFECTING ACCEPTABILITY OF LOADING CONFIGURATIONS.

Several thousand external loading configurations are approved for this airplane and can be selected from the applicable charts in this section. They have been determined as safe for flight before being approved. Without knowing all the factors which affect the acceptability of a loading configuration, one could assume that two apparently similar configurations should be acceptable when one of them already is listed as approved. Such an assumption, however, is dangerous. The subject of effects of externally carried stores on aircraft is complex, especially for a high swept wing airplane of this type. All factors which can affect acceptability of loading configurations and limitations for the airplane, such as structural, flutter, aerodynamic, and CG limitations, and controllability requirements, must be considered in determining acceptability of any loading configuration. The following discussion considers only those factors affecting the airplane flying qualities.

a. First, every configuration must possess satisfactory airplane longitudinal stability and control characteristics. For this, each configuration considered must be carefully examined to see that the airplane in-flight CG travel due to expenditure of internal and external fuel, external stores, pylons, and ammunition stays within the established CG limits of the configuration throughout the flight envelope. Airplane control requirements usually establish forward CG limits on take-off, maneuvering, and landing. Airplane longitudinal stability requirements determine the aft CG limit for a store loading configuration differs from the clean airplane in that it shifts forward because of destabilizing effects of the stores on the airplane longitudinal stability. Destabilizing effects of stores of the same weight vary with their sizes, shapes, whether the stores have fins or not, and fore-and-aft, lateral, and vertical locations with respect to the airplane wing or fuselage. Even the same store could vary its destabilizing effect, depending on its location on the wing. For instance, a store such as a 200-gallon tank mounted at an inboard station destabilizes the airplane more than the same tank at an intermediate or outboard wing station. In addition, CG position is affected by store location. Stores mounted inboard always move the CG forward. Stores at the intermediate station have the least effect on CG but do move it slightly aft. Stores outboard always move the CG aft. Particular attention is given to the airplane aft CG shift due to surging external and internal fuel during the take-off acceleration. A certain configuration with external fuel tanks (full or partially full) may appear to have acceptable CG conditions at the initiation of take-off ground roll; however, during the acceleration and take-off phase before assuming the climb attitude, the airplane CG can shift considerably aft of the established aft CG limit.

b. The analysis required to determine acceptability of loading configurations must consider the desired sequence for releasing stores and selecting the drop tank fuel; in addition, the analysis considers single-failure conditions, such as failure of the store to release or of drop tank fuel to transfer. These effects on configuration acceptability must also be examined to determine if any special limitation or operational procedure is necessary to keep the airplane CG within the limits at any time.

c. Every loading configuration under consideration must be examined for satisfactory level of airplane directional stability. Destabilizing effects of external stores will reduce the directional stability margin of the airplane. This effect is most pronounced at the inboard wing stations; it usually varies with store sizes, shapes, and fore-and-aft and vertical locations with respect to the airplane wing. Also, in some asymmetrical loading configurations, the demand on directional trim control

STATION LOADING CAPABILITIES

STATION WHERE STORE CAN BE CARRIED AND PYLON REQUIREMENTS

STORE		CENTERLINE	INBOARD (WING STA 55)	INTERMEDIATE (WING STA 106 or 108-3/8)	OUTBOARD (WING STA 155)
1000 LB BOMBS	M-65A-1*		Series I	Series III	
750 LB BOMBS	M-117		Series I	Series III	Series III
	M-129		Series I	Series III	Series III
	MC-1 Toxic		Series I	Series III	Series III
500 LB BOMBS	M-64*		Series I	Series III	Series III
25 LB BOMBS	M-76				IIIA, IIIA MOD 1 (with AF/B37K-1 adapter)
FUEL TANKS	Type II unbaffled 450 gal			VIII, † VIIIA, † or VIIIB	
	NAA-TYPE III 335 gal			Integral pylon	
	Type II ‡ or NAA Type III 275 gal			Integral pylon	
	200 gal USAF Type IV (Modified for F-100)		Series I	Series III	Series III
ROCKETS	MA-2A Launcher				Series III
	MA-3 Launcher				Series III
	LAU-3/A Launcher				Series III §
PRACTICE DISPENSERS	MN-1 or MN-1A			VIII, ¶ VIIIA, ¶ or VIIIB (LH station only)	
	MN-1A	VII **			
MISCELLANEOUS	QRC-160-1(T) or -2(T) ECM Pod				III or IIIA (with MA-3 adapter) ††
	CBU Dispenser ‡‡				III Mod O, III Mod R, IIIA Mod 1
	M116A2 Napalm bomb		Series I	Series III	Series III
	BLU-1/B Fire Bomb		Series I	Series III	Series III
	MLU-10/B Land Mine or BLU-14/B Skip Bomb §§		Series I	Series III	Series III
	AIM-9B Missiles		IX or IXA		
	TDU-11/B target rocket		IX or IXA		
	AGM-12B missile		X (launcher)		
	A/A37U-5 Tow Target System				Target—Series III with launcher (LH station only) / Reel assembly—Series III (RH station only)
	A/A37U-15 Tow Target System				Series III (LH station only)
SPECIAL STORES (and equivalent practice shapes)	MK-43	Refer to T.O. 1F-100D-16 for permissible special store—pylon and practice bomb—pylon combinations.			
	MK-28 Series				
	MK-57				
	MK-7				

F-100D-1-A93-1A

Figure 5-3

AND PYLON REQUIREMENTS

WARNING

Pylon ejector cartridges must be installed in all pylons so provisioned, to ensure that all stores and pylons can be jettisoned when required by an emergency such as a spin.

NOTE

- Items listed in station column are pylon requirements. Where no pylon requirement is given, store cannot be carried.
- Type II 450-gallon tank is equivalent to Class I (restricted).

* Use conical fin. Do not use M-43 or M-44 demolition bombs in place of M-65A-1 or M-64 bombs.

† Type VIII or VIIIA pylon must have T.O. 1F-100-721 stamped near the name plate.

‡ Type II 275-gallon tanks must be changed by T.O. 6J14-2-5-509.

§ For F-100D Airplanes, Type III pylon must be changed by T.O. 1F-100D-572 or 1F-100D-575. (Pylon part number must be followed by the letters "MO" or "MR.")

¶ For the MN-1A dispenser, pylon must have T.O. 1F-100-750 stamped near the name plate.

** Pylon must have T.O. 1F-100-823 stamped near the name plate.

†† Pods, pylon, and adapter must be changed by T.O. 11B81-2-502. If only one pod is carried at a station, it must be installed directly on the pylon.

‡‡ CBU dispenser may be in any of the following internal load configurations: SUU-7A/A (empty), CBU-1A/A or CBU-2A/A.

§§ All limitations and loading configurations for the MLU-10/B land mine also apply to the BLU-14/B skip bomb.

F-100D-1-A93-2P

PERMISSIBLE LOADING

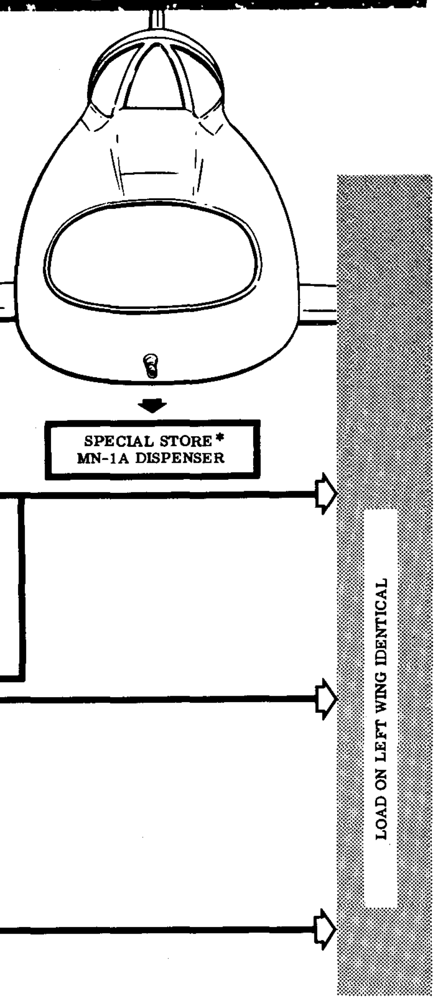
1 AND 2 STORE SYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the 335-, 275-, and 200-gallon drop tanks.
- Empty pylons to accommodate other authorized loads may be carried, if desired.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots IAS for each 1000 pounds of total inboard store weight.

WARNING

Unbaffled 450-gallon tanks must be full or empty for take-off. If the tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.



SPECIAL STORE *
MN-1A DISPENSER

200 GAL TANK †
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB
AIM-9B MISSILES
AGM-12B MISSILE

450 GAL TANK
335 GAL TANK
275 GAL TANK
200 GAL TANK
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB

CBU DISPENSER ‡
NAPALM BOMB ‡
750 LB BOMB ‡
MLU-10/B MINE ‡
BLU-1/B FIRE BOMB ‡
ROCKETS ‡
500 LB BOMB
QRC-160 ECM PODS
25 LB BOMBS

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

7.0 G and -3.0 G	6.0 G and -2.0 G	5.0 G and -2.0 G	4.0 G and -2.0 G
SPECIAL STORE * AIM-9B MISSILES AGM-12B MISSILES NOTE Limits are 6.0 G and -2.0 G when internal fuel is more than 4200 pounds.	TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) NAPALM BOMB MN-1A DISPENSER 750 LB BOMB CBU DISPENSER MLU-10/B MINE BLU-1/B FIRE BOMB QRC-160 ECM PODS 25 LB BOMB	TYPE III 275 GAL TANK (WITH FUEL) TYPE II 450 GAL TANK (EMPTY)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS
		4.5 G and -2.0 G	**2.0 G and -2.0 G**
		TYPE III 335 GAL TANK (WITH FUEL)	1000 LB BOMB

* Or equivalent practice shape.
† F-100D Airplanes only.
‡ For F-100D Airplanes, ammunition must not be fired if these stores are to be retained.

F-100D-1-A93-3A

Figure 5-4 (Sheet 1 of 9)

CONFIGURATIONS AND G-LIMITS

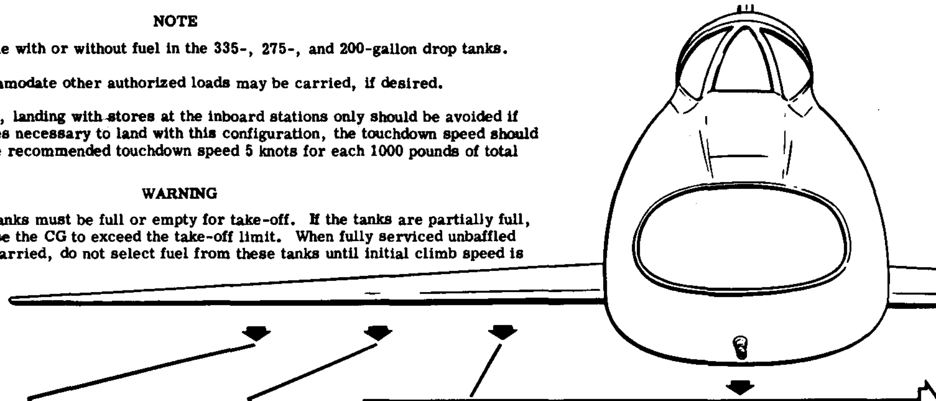
3 STORE SYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the 335-, 275-, and 200-gallon drop tanks.
- Empty pylons to accommodate other authorized loads may be carried, if desired.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

WARNING

Unbaffled 450-gallon tanks must be full or empty for take-off. If the tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.



LOAD ON LEFT WING IDENTICAL

Inboard station:
200 GAL TANK *
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB
AIM-9B MISSILES
AGM-12B MISSILE

Centerline: SPECIAL STORE †
MN-1A DISPENSER

Intermediate station:
450 GAL TANK
335 GAL TANK
275 GAL TANK
200 GAL TANK
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB

Centerline: SPECIAL STORE †
MN-1A DISPENSER

Outboard station:
CBU DISPENSER ‡
NAPALM BOMB ‡
750 LB BOMB ‡
MLU-10/B MINE ‡
BLU-1/B FIRE BOMB ‡
ROCKETS ‡
500 LB BOMB
QRC-160 ECM PODS
25 LB BOMBS

Centerline: SPECIAL STORE †
MN-1A DISPENSER

G-LIMITS
(STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 G and -2.0G	5.0 G and -2.0 G	4.5 G and -2.0 G	4.0 G and -2.0G
SPECIAL STORE † TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) MN-1A DISPENSER 25 POUND BOMB AIM-9B MISSILES AGM-12B MISSILES QRC-160 ECM POD	TYPE II 450 GAL TANK (EMPTY) TYPE III 275 GAL TANK (WITH FUEL) NAPALM BOMB CBU DISPENSER 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB	TYPE III 335 GAL TANK (WITH FUEL)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS **2.0 G and -2.0 G** 1000 LB BOMB

* F-100D airplanes only.
† Or equivalent practice shape.
‡ Ammunition must not be fired if these stores are to be retained for landing.

F-100D-1-A93-4A

Figure 5-4 (Sheet 2 of 9)

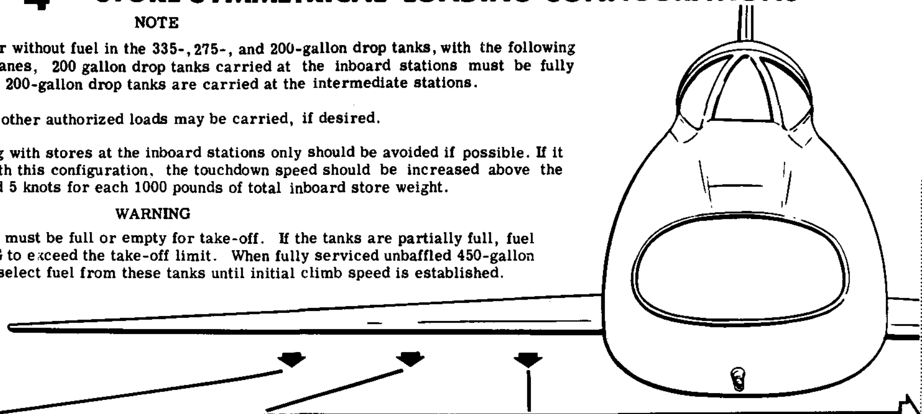
4 STORE SYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the 335-, 275-, and 200-gallon drop tanks, with the following exceptions: For F-100D airplanes, 200 gallon drop tanks carried at the inboard stations must be fully serviced if full 335-, 275-, or 200-gallon drop tanks are carried at the intermediate stations.
- Empty pylons to accommodate other authorized loads may be carried, if desired.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

WARNING

Unbaffled 450-gallon tanks must be full or empty for take-off. If the tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.



LOAD ON LEFT WING IDENTICAL

Outboard	Intermediate	Inboard
	335 GAL TANK * 275 GAL TANK 200 GAL TANK 1000 LB BOMB NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB 500 LB BOMB	200 GAL TANK * 1000 LB BOMB NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB 500 LB BOMB AIM-9B MISSILES AGM-12B MISSILE
	450 GAL TANK 335 GAL TANK 275 GAL TANK 200 GAL TANK 1000 LB BOMB NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB 500 LB BOMB	1000 LB BOMB NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB 500 LB BOMB AIM-9B MISSILES AGM-12B MISSILE
CBU DISPENSER † NAPALM BOMB † 750 LB BOMB † MLU-10/B MINE † BLU-1/B FIRE BOMB † ROCKETS † 500 LB BOMB † QRC-160 ECM PODS 25 LB BOMBS		200 GAL TANK 1000 LB BOMB NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB 500 LB BOMB AIM-9B MISSILES AGM-12B MISSILE
25 LB BOMBS ‡	335 GAL TANK ‡ 275 GAL TANK ‡ 200 GAL TANK ‡ 1000 LB BOMB ‡ NAPALM BOMB ‡ MLU-10/B MINE ‡ BLU-1/B FIRE BOMB ‡ 750 LB BOMB ‡ 500 LB BOMB ‡	

G- LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 G and -2.0 G	5.0 G and -2.0 G	4.5 G and -2.0 G	4.0 G and -2.0 G
TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) NAPALM BOMB 750 LB BOMB CBU DISPENSER MLU-10/B MINE BLU-1/B FIRE BOMB QRC-160 ECM PODS AIM-9B MISSILES AGM-12B MISSILES 25 LB BOMB	TYPE II 450 GAL TANK (EMPTY) TYPE III 275 GAL TANK (WITH FUEL)	TYPE III 335 GAL TANK (WITH FUEL)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS

2.0 G and -2.0 G
1000 LB BOMB

* For F-100D airplanes, when 335- and 200-gallon drop tanks are carried, do not fire ammunition if all four tanks are to be retained when empty. Dropping either pair of tanks will permit firing of ammunition.

† For F-100D airplanes, if drop tanks are carried inboard and retained when empty, ammunition must not be fired before these outboard stores are dropped.

‡ F-100F Airplanes only.

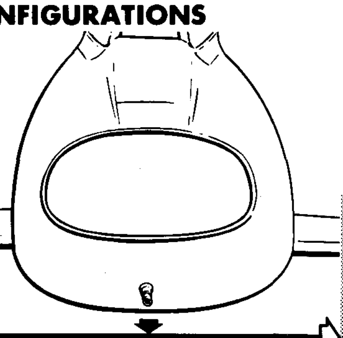
F-100D-1-A93-5A

Figure 5-4 (Sheet 3 of 9)

5 STORE SYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the drop tanks, with the following exception: For F-100D Airplanes, tanks carried at the inboard stations must be fully serviced if full tanks are carried at the intermediate stations.
- Empty pylons to accommodate other authorized loads may be carried, if desired.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.



LOAD ON LEFT WING IDENTICAL

Configuration 1

Intermediate station:
335 GAL TANK *
275 GAL TANK
200 GAL TANK
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB

Inboard station:
200 GAL TANK *
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB
AIM-9B MISSILES
AGM-12B MISSILE

Centerline:
SPECIAL STORE †
MN-1A DISPENSER

Configuration 2

Outboard station:
CBU DISPENSER ‡
NAPALM BOMB ‡
750 LB BOMB ‡
MLU-10/B MINE ‡
BLU-1/B FIRE BOMB ‡
ROCKETS ‡
500 LB BOMB ‡
QRC-160 ECM PODS
25 LB BOMBS

Inboard station:
200 GAL TANK
1000 LB BOMB
NAPALM BOMB
750 LB BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
500 LB BOMB
AIM-9B MISSILES
AGM-12B MISSILE

Centerline:
SPECIAL STORE †
MN-1A DISPENSER

Configuration 3 (F-100F ONLY)

Outboard station:
500 LB BOMB
25 LB BOMBS

Intermediate station:
335 GAL TANK
275 GAL TANK
200 GAL TANK
1000 LB BOMB
NAPALM BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
750 LB BOMB
500 LB BOMB

Centerline:
SPECIAL STORE †
MN-1A DISPENSER

Configuration 4 (F-100F ONLY)

Outboard station:
CBU DISPENSER
NAPALM BOMB
750 LB BOMB
ROCKETS
MLU-10/B MINE
BLU-1/B FIRE BOMBS
500 LB BOMB
25 LB BOMBS

Intermediate station:
1000 LB BOMB
NAPALM BOMB
MLU-10/B MINE
BLU-1/B FIRE BOMB
750 LB BOMB
500 LB BOMB

Centerline:
SPECIAL STORE †
MN-1A DISPENSER

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 G and -2.0 G	5.0 G and -2.0 G	4.5 G and -2.0 G	4.0 G and -2.0 G
SPECIAL STORE † MN-1A DISPENSER TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) AIM-9B MISSILES AGM-12/B MISSILES 25 LB BOMB	TYPE III 275 GAL TANK (WITH FUEL) CBU DISPENSER 750 LB BOMB NAPALM BOMB MLU-10/B MINE BLU-1/B FIRE BOMB QRC-160 ECM PODS	TYPE III 335 GAL TANK (WITH FUEL)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS
			2.0 G and -2.0 G
			1000 LB BOMB

* For F-100D Airplanes, when 335- and 200-gallon drop tanks are carried, do not fire ammunition if all four tanks are to be retained when empty. Dropping either pair of tanks will permit firing of ammunition.

† Or equivalent practice shape.

‡ For F-100D Airplanes, if drop tanks are carried inboard and retained when empty, ammunition must not be fired before these outboard stores are dropped.

F-100D-1-A93-11A

Figure 5-4 (Sheet 4 of 9)

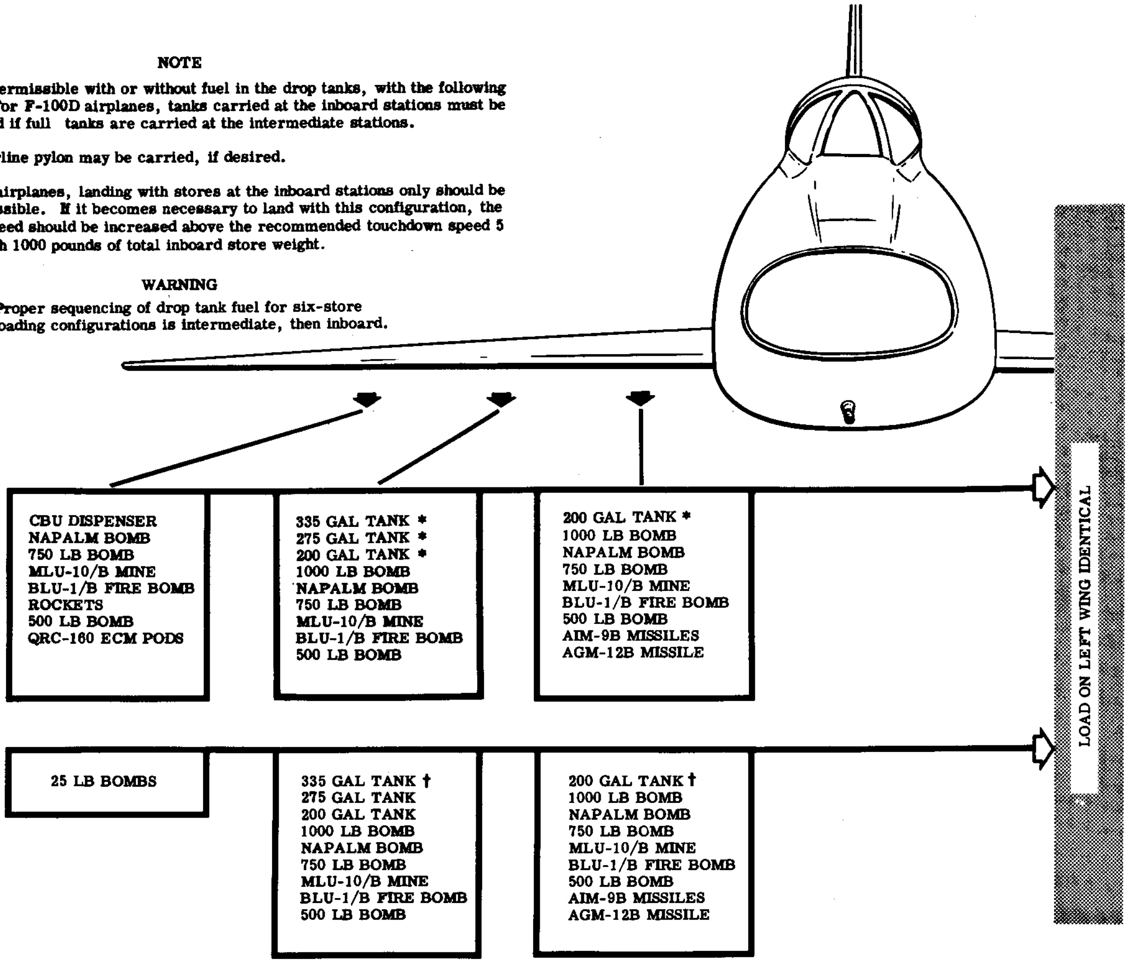
6 STORE SYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the drop tanks, with the following exception: For F-100D airplanes, tanks carried at the inboard stations must be fully serviced if full tanks are carried at the intermediate stations.
- Empty centerline pylon may be carried, if desired.
- For F-100F airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

WARNING

Proper sequencing of drop tank fuel for six-store loading configurations is intermediate, then inboard.



G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 G and -2.0G	5.0 G and -2.0 G	4.5 G and -2.0 G	4.0 G and -2.0 G
TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) CBU DISPENSER NAPALM BOMB 750 LB BOMB MLU-10/B MINE BLU-1/B FIRE BOMB QRC-160 ECM PODS AIM-9B MISSILES AGM-12B MISSILES 25 LB BOMB NOTE Limits are 5.0 G and -2.0 G when internal fuel is more than 5400 pounds.	TYPE III 275 GAL TANK (WITH FUEL)	TYPE III 335 GAL TANK (WITH FUEL)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS **2.0 G and -2.0 G** 1000 LB BOMB

* Drop tanks may be carried only on F-100F airplanes and then a maximum of one pair of drop tanks.

† For F-100D Airplanes, when 335- and 200-gallon drop tanks are carried, do not fire ammunition if all four tanks are to be retained when empty. Dropping either pair of tanks will permit firing of ammunition.

F-100D-1-A93-12A

Figure 5-4 (Sheet 5 of 9)

ASYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off is permitted with or without fuel in the 335-, 275-, and 200-gallon drop tanks, with the following exception: 200-gallon drop tanks carried at the inboard stations must be fully serviced if full tanks are carried at intermediate or outboard stations.
- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.
- For F-100F airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

WARNING

Unbaffled 450-gallon tanks must be full or empty for take-off. If the tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.

NO LOAD 25 LB BOMBS	NO LOAD 275 GAL TANK †				NO LOAD SPECIAL STORE * 275 GAL TANK † 1000 LB OR LIGHTER BOMB ‡	
NO LOAD 25 LB BOMBS	275 GAL TANK †	200 GAL TANK §		200 GAL TANK §	NO LOAD SPECIAL STORE * 275 GAL TANK † 1000 LB OR LIGHTER BOMB ‡	
NO LOAD 25 LB BOMBS	275 GAL TANK †	200 GAL TANK			NO LOAD ¶ SPECIAL STORE * 275 GAL TANK † 1000 LB OR LIGHTER BOMB ‡	200 GAL TANK **
	275 GAL TANK †	200 GAL TANK §		200 GAL TANK §	NO LOAD SPECIAL STORE * 275 GAL TANK † 1000 LB OR LIGHTER BOMB ‡	200 GAL TANK ††
	450 GAL TANK				SPECIAL STORE *	
	1000 LB BOMB	NO LOAD 1000 LB OR OR LIGHTER BOMB ‡		NO LOAD 1000 LB OR LIGHTER BOMB ‡	NO LOAD SPECIAL STORE * 275 GAL TANK † 1000 LB OR LIGHTER BOMB ‡	
	275 GAL TANK † 450 GAL TANK	AIM-9B MISSILES AGM-12B MISSILE			275 GAL TANK † 450 GAL TANK	
	275 GAL TANK † 450 GAL TANK			AIM-9B MISSILES AGM-12B MISSILE	275 GAL TANK † 450 GAL TANK	
	275 GAL TANK †	200 GAL TANK		AIM-9B MISSILES AGM-12B MISSILE	275 GAL TANK †	
	275 GAL TANK †	AIM-9B MISSILES AGM-12B MISSILE		200 GAL TANK	275 GAL TANK †	

G-LIMITS
(STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

7.0 G and -3.0 G	6.0 G and -2.0G	5.0 G and -2.0 G	4.0 G and -2.0G
SPECIAL STORE ‡‡ AIM-9B MISSILES AGM-12B MISSILES NOTE Limits are 6.0 G and -2.0 G when internal fuel is more than 4200 pounds.	TYPE III 275 GAL TANK (EMPTY) TANK III 335 GAL TANK (EMPTY) MN-1 DISPENSER MN-1A DISPENSER	TYPE III 275 GAL TANK (WITH FUEL) TYPE II 450 GAL TANK (EMPTY) 750 LB OR LIGHTER BOMB	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB
		4.5 G and -2.0 G	2.0G and -2.0 G
		TYPE III 335 GAL TANK (WITH FUEL)	1000 LB BOMB

* Or equivalent practice shape or MN-1 or MN-1A dispenser.

† Or 335-gallon drop tank.

‡ Includes MLU-10/B mine but not napalm and fire bombs.

§ For F-100D Airplanes, if 335- and 200-gallon drop tanks are carried and are to be retained when empty, do not fire ammunition. Dropping either pair of empty tanks will permit firing of ammunition.

¶ If no load is carried at left intermediate station, drop tank fuel should be sequenced inboard, outboard, then intermediate, to provide increased lateral control.

** For F-100D Airplanes, if load is carried at left intermediate station and outboard tank fails to feed, this tank must be dropped before any fuel is used from inboard 200-gallon tank. (On all airplanes, outboard tank may be omitted if load is carried at left intermediate station.)

†† If outboard tank is to be retained when empty, ammunition must not be fired. If tank fails to feed, it must be dropped before any fuel is used from inboard 200-gallon tanks.

‡‡ Or equivalent practice shape.

F-100D-1-A93-6A

Figure 5-4 (Sheet 6 of 9)

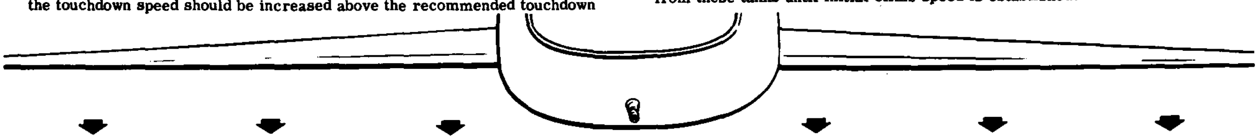
ASYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Take-off with fewer stores installed (with or without pylons for the omitted stores) is permissible, provided the configuration is one that would normally result from proper sequencing of drop tank fuel and release of stores.
- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.
- Take-off is permitted with or without fuel in the 335-, 275-, and 200-gallon drop tanks.

WARNING

Unbaffled 450-gallon tanks must be full or empty for take-off. If the tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.



25 LB BOMBS ROCKETS						25 LB BOMBS ROCKETS
		200 GAL TANK		200 GAL TANK		NO LOAD 25 LB BOMB * ROCKETS *
		200 GAL TANK		NO LOAD 1000 LB OR LIGHTER BOMB †		25 LB BOMBS * ROCKETS *
	275 GAL TANK 335 GAL TANK					25 LB BOMBS ROCKETS
	NO LOAD 275 GAL TANK 335 GAL TANK			200 GAL TANK		25 LB BOMBS * ROCKETS *
25 LB BOMBS ROCKETS	NO LOAD 1000 LB OR LIGHTER BOMB †	NO LOAD 1000 LB OR LIGHTER BOMB †		NO LOAD 1000 LB OR LIGHTER BOMB †		25 LB BOMBS ROCKETS
25 LB BOMBS * ROCKETS *			SPECIAL STORE ‡ MN-1A DISPENSER			
	275 GAL TANK 335 GAL TANK	NO LOAD 1000 LB OR LIGHTER BOMB †		NO LOAD 1000 LB OR LIGHTER BOMB †	1000 LB BOMB	
	1000 LB BOMB	200 GAL TANK		NO LOAD 750 LB OR LIGHTER BOMB †	1000 LB BOMB	NO LOAD 750 LB OR LIGHTER BOMB †
NO LOAD 500 LB OR LIGHTER BOMB		200 GAL TANK		200 GAL TANK	NO LOAD SPECIAL STORE § 275 GAL TANK 335 GAL TANK 1000 LB OR LIGHTER BOMB †	

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

7.0 G and -3.0 G	6.0 G and -2.0 G	5.0 G and -2.0 G	4.0 G and -2.0 G
SPECIAL STORE ‡ NOTE Limits are 6.0 G and -2.0 G when internal fuel is more than 4200 pounds.	TYPE III 275 GAL TANK (EMPTY) TYPE III 335 GAL TANK (EMPTY) 750 LB BOMB MN-1 DISPENSER MN-1A DISPENSER 25 LB BOMB	TYPE III 275 GAL TANK (WITH FUEL) TYPE II 450 GAL TANK (EMPTY)	TYPE IV 200 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) 500 LB BOMB ROCKETS
		4.5 G and -2.0 G	**2.0 G and -2.0 G**
		TYPE III 335 GAL TANK (WITH FUEL)	1000 LB BOMB

* Selected load may be carried at opposite outboard station instead of noted station, if desired.

† Includes MLU-10/B mine but not napalm or fire bombs.

‡ Or equivalent practice shape.

§ Or equivalent practice shape or MN-1 or MN-1A dispenser.

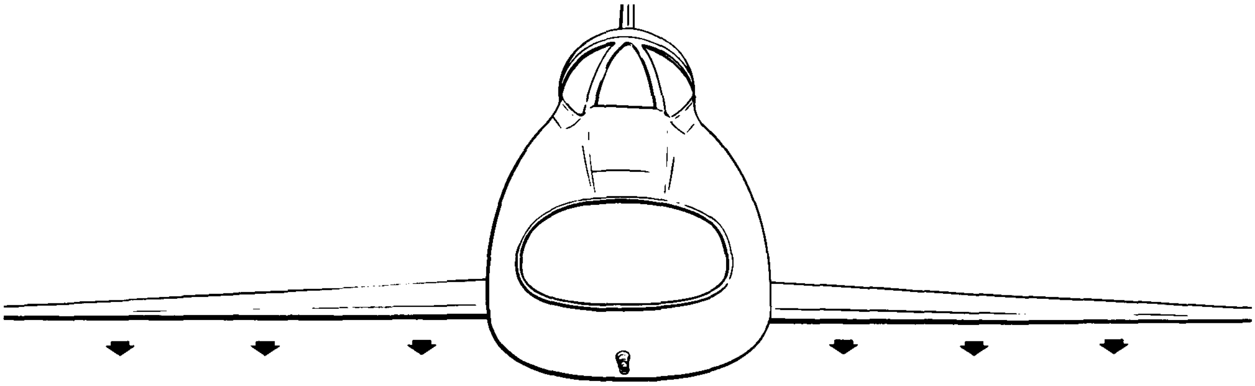
F-100D-1-A93-7B

Figure 5-4 (Sheet 7 of 9)

A/A37U-5 TOW TARGET AND AIM-9B-TDU TRAINING CONFIGURATIONS

NOTE

- Take-off is permissible with or without fuel in the drop tanks.
- Number in missile and target symbols are station numbers corresponding to firing sequence.



A/A37U-5 TARGET REEL ASSEMBLY					NO LOAD 275 GAL TANK 335 GAL TANK *	A/A37U-5 TARGET
A/A37U-5 TARGET REEL ASSEMBLY	275 GAL TANK 335 GAL TANK *				275 GAL TANK 335 GAL TANK *	A/A37U-5 TARGET
	275/335 GAL TANK †			(1) (2) TDU-11/B AIM-9B	275/335 GAL TANK †	
	275/335 GAL TANK †	(3) (4) TDU-11/B AIM-9B			275/355 GAL TANK †	
	275/335 GAL TANK †	(3) (4) TDU-11/B AIM-9B		(1) (2) TDU 11/B AIM-9B	275/335 GAL TANK †	
	275/335 GAL TANK †	(3) AIM-9B		(2) TDU-11/B	275/335 GAL TANK †	

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration.

7.0 G and -3.0 G	6.0 G and -2.0 G	6.0 G and 0 G	5.0 G and -2.0 G	4.0 G and -2.0 G
AIM-9B MISSILE TDU-11/B TARGET ROCKET	TYPE III 275 GAL TANK (EMPTY) TYPE III 335 GAL TANK (EMPTY)	TARGET (FULLY LAUNCHED) TARGET REEL AND LAUNCHER (TARGET RELEASED)	TYPE III 275 GAL TANK (WITH FUEL)	TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL)
			4.5 G and -2.0 G	2.0 G and 0 G
			TYPE III 335 GAL TANK (WITH FUEL)	TARGET (STOWED)

* If 335-gallon tanks are installed on F-100D Airplanes, full ammunition or equivalent ballast must be carried and the ammunition must not be fired.

† Drop tanks may be omitted from both intermediate stations.

F-100D-1-A93-8A

Figure 5-4 (Sheet 8 of 9)

ASYMMETRICAL LOADING CONFIGURATIONS

NOTE

- Empty pylons to accommodate other authorized loads may be carried, if desired.
- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

RIGHT OUTBD	RIGHT INTERM	RIGHT INBD	CENTER LINE	LEFT INBD	LEFT INTERM	LEFT OUTBD
LAU-3A (6 ROCKETS)	275 GAL TANK* 335 GAL TANK*	750 LB BOMB		750 LB BOMB	275 GAL TANK* 335 GAL TANK*	
LAU-3A (6 ROCKETS)	275 GAL TANK* 335 GAL TANK*	NAPALM BOMB FIRE BOMB		NAPALM BOMB FIRE BOMB	275 GAL TANK* 335 GAL TANK*	
ROCKETS						
MA-2A ROCKETS	NAPALM BOMB FIRE BOMB				NAPALM BOMB FIRE BOMB	
MA-2A ROCKETS	750 LB BOMB				750 LB BOMB	
ROCKETS					MN-1A DISPENSER	NO LOAD ROCKETS
	NO LOAD 275 GAL TANK 335 GAL TANK		SPECIAL STORE		MN-1A DISPENSER	

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 and -2.0G	5.0 and -2.0G	4.0 and -2.0G
SPECIAL STORE TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) 750 LB BOMB MN-1A DISPENSER NAPALM BOMB BLU-1/B FIRE BOMB NOTE Limits are 5.0G and -2.0G when internal fuel is more than 5400 pounds.	TYPE III 275 GAL TANK (WITH FUEL) **4.5 and -2.0G** TYPE III 335 GAL TANK (WITH FUEL)	TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) ROCKETS

* For F-100D Airplanes, drop tanks must be fully serviced or empty. If drop tanks are fully serviced, do not select drop tank fuel until initial climb schedule is established. Also, for F-100D Airplanes, ammunition requirement may be reduced to 400 rounds without adding ballast.

F-100D-1-A93-19

Figure 5-4 (Sheet 9 of 9)

may become excessive at certain flight conditions. In these, analysis must be made to determine necessary flight restrictions.

d. In some asymmetrically loaded configurations, excessive weight on one wing requires an unusual amount of aileron control to hold the wings level. If lateral controllability is marginal for any phase of the flight, the configuration cannot be approved. Here, too, the effect of single failures must be considered in analyzing the configuration.

In summary, all the preceding must be considered individually and collectively in analyzing loading configurations. It is not in the interest of safe flight to assume that because two loading configurations appear to be similar, both are safe to fly.

LOADING CHARTS.

The external loading capabilities of this airplane, coupled with the large variety of individual stores which may be carried, make it impractical to list individually each external loading configuration the airplane may safely carry. A practical method of listing approved external loading configurations must first permit determination of the particular types of stores which can be carried and operated (released, fired, discharged, etc) and the loading stations at which these stores can be carried. Figure 5-3 shows this information in the form of station loading capabilities and pylon requirements. Note that general categories of stores are listed and that specific stores are listed for each category.

NOTE Part numbers for the pylon designations given in figure 5-3 are as follows:

PYLON DESIGNATION	PART NUMBER
I	223-63026-1 & -2
IA	223-63026-51 & -52
I Mod 1	235-63026-1 & -2
I Mod II	235-63026-51 & -52
III	223-63051
III Mod 0	223-63051 M0-51
III Mod R	223-63051 MR-51
IIIA	235-63051
IIIA Mod 1	235-63051-51
V	223-63151
VA	223-63151-51
VII	235-63451
VIIA	255-630451
VIII	235-63101
VIIIA	235-630101
VIIIB	255-630101
IX	223-68327
IXA	223-68327-10
X (launcher)	235-640103-1 & -2

Once it has been determined which stores can be carried, and the stations at which they can be carried, the next step is to determine the loading combinations in which these stores can be carried. All approved external loading configurations are presented in figures 5-4 and 5-5 in the form of graphs for symmetrical configurations and tables principally for asymmetrical configurations. For the configuration desired, a check of the applicable graph or table in figures 5-4 and 5-5 will show if such a configuration is permissible. The graphs and tables are based on the structural integrity of the airplane for the weight and arrangement of the stores installed, on adequate aerodynamic stability for the configuration, and on the ability of the airplane to operate the stores.

Warning The permissible loading configurations in figure 5-4 are based on a clean airplane take-off center of gravity within the range of 29% to 32% MAC for F-100D Airplanes and 26% to 29% MAC for F-100F Airplanes. If the clean airplane CG is outside this range, because of improper ballasting or unauthorized modification, the airplane CG can move beyond the limits when external loads are installed. The permissible loading configurations in figure 5-5 require restricted clean airplane take-off CG ranges; the acceptable range accompanies each configuration listing. In addition, some configurations list specific instructions to be observed.

NOTE All factors which can affect the acceptability of the loading configurations and limitations for these airplanes, such as structural, aerodynamic, and CG limitations, and controllability requirements, have been considered. In addition, the many combinations of approved loading configurations presented satisfy the largest practical percentage of operational and training requirements.

The graphs, which cover symmetrical configurations, make use of horizontal lines with one or more boxes of store listings attached to each line under the various loading stations. The lines and boxes are used to indicate the limiting combination of stores which can be carried.

NOTE The graphs for symmetrical loadings show only the centerline and right-hand wing stations. However, the loading conditions shown for the right-hand stations also apply to the left-hand stations. For example, the one- and two-store symmetrical loading graph lists the 200-gallon tank at the right inboard station; consequently, the 200-gallon tank must also be considered as listed at the left inboard station.

PERMISSIBLE LOADING CONFIGURATIONS

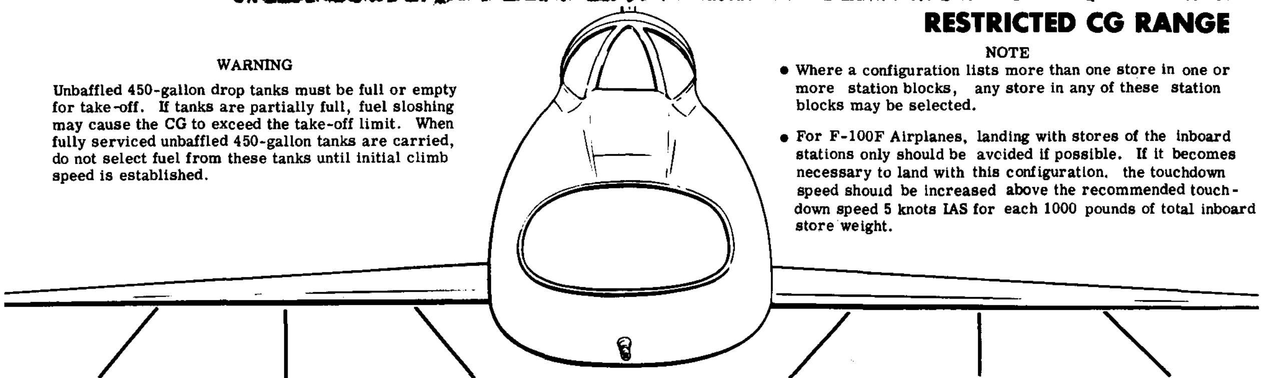
RESTRICTED CG RANGE

WARNING

Unbaffled 450-gallon drop tanks must be full or empty for take-off. If tanks are partially full, fuel sloshing may cause the CG to exceed the take-off limit. When fully serviced unbaffled 450-gallon tanks are carried, do not select fuel from these tanks until initial climb speed is established.

NOTE

- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.
- For F-100F Airplanes, landing with stores of the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots IAS for each 1000 pounds of total inboard store weight.



CBU DISPENSER	335 GAL TANK 275 GAL TANK	750 LB BOMB		750 LB BOMB	335 GAL TANK 275 GAL TANK	CBU DISPENSER
CBU DISPENSER	335 GAL TANK 275 GAL TANK	NAPALM BOMB BLU-1/B FIRE BOMB		NAPALM BOMB BLU-1/B FIRE BOMB	335 GAL TANK 275 GAL TANK	CBU DISPENSER
CBU DISPENSER	335 GAL TANK 275 GAL TANK	AGM-12B MISSILE		AGM-12B MISSILE	335 GAL TANK 275 GAL TANK	CBU DISPENSER
CBU DISPENSER	335 GAL TANK 275 GAL TANK	NO LOAD		NO LOAD	335 GAL TANK 275 GAL TANK	CBU DISPENSER
	335 GAL TANK 275 GAL TANK				335 GAL TANK 275 GAL TANK	25 LB BOMBS ROCKETS
	450 GAL TANK				450 GAL TANK	25 LB BOMBS ROCKETS
NAPALM BOMB BLU-1/B FIRE BOMB 750 LB BOMB	335 GAL TANK 275 GAL TANK	NAPALM BOMB BLU-1/B FIRE BOMB		NAPALM BOMB BLU-1/B FIRE BOMB	335 GAL TANK 275 GAL TANK	NAPALM BOMB BLU-1/B FIRE BOMB 750 LB BOMB
ROCKETS	335 GAL TANK 275 GAL TANK	NAPALM BOMB BLU-1/B FIRE BOMB		NAPALM BOMB BLU-1/B FIRE BOMB	335 GAL TANK 275 GAL TANK	ROCKETS

G-LIMITS
(STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE
MAXIMUM ALLOWABLE G-LIMIT FOR A GIVEN CONFIGURATION IS THE LOWEST LISTED FOR THE INDIVIDUAL STORES CARRIED IN THAT PARTICULAR CONFIGURATION ONLY

6.0G AND -2.0G	5.0G AND -2.0G	4.5 G AND -2.0 G	4.0G AND -2.0G
AGM-12B MISSILES TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) 750 LB BOMB NAPALM BOMB BLU-1/B FIRE BOMB CBU DISPENSER 25 LB BOMB NOTE LIMITS ARE 5.0G AND -2.0G WHEN INTERNAL FUEL IS MORE THAN 4200 POUNDS	TYPE III 275 GAL TANK (WITH FUEL) TYPE II 450 GAL TANK (EMPTY)	TYPE III 335 GAL TANK (WITH FUEL)	TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 450 GAL TANK (WITH FUEL) ROCKETS

F-100D-1-A93-15

Figure 5-5 (Sheet 1 of 8)

AND G-LIMITS

LOADING CONFIGURATIONS

PERMISSIBLE CLEAN AIRPLANE TAKE-OFF CG RANGE FOR CONFIGURATION	WARNING TO ENSURE AIRPLANE STABILITY AND CONTROL REQUIREMENTS ARE MET FOR EACH CONFIGURATION LISTED, THE CLEAN AIRPLANE TAKE-OFF CG MUST BE WITHIN THE STATED RANGE AND THE FOLLOWING ADDITIONAL RESTRICTIONS OBSERVED:
F-100D 29.0 TO 30.4% MAC F-100F 26.0 TO 28.0% MAC	FULL AMMUNITION OR EQUIVALENT BALLAST IS REQUIRED, AND, FOR F-100F AIRPLANES, BOTH COCKPITS MUST BE OCCUPIED. FOR F-100D AIRPLANES, DROP TANKS MUST BE FULLY SERVICED OR EMPTY PRIOR TO ENGINE START. IF DROP TANKS ARE FULL DO NOT SELECT FUEL FROM THESE TANKS UNTIL INITIAL CLIMB SPEED IS ESTABLISHED. FOR F-100F AIRPLANES, TAKE-OFF IS PERMISSIBLE WITH OR WITHOUT FUEL IN THE 335- AND 275- GALLON DROP TANKS. FOR F-100D AIRPLANES, OUTBOARD STORES SHOULD BE RELEASED OR EMPTIED FIRST. IF FOR ANY REASON INBOARD STORES ARE RELEASED FIRST (OR WHERE NO INBOARD STORES ARE INSTALLED), DO NOT FIRE AMMUNITION UNTIL OUTBOARD STORES ARE RELEASED OR EMPTIED. IF ONLY OUTBOARD STORES AND DROP TANKS WITH OR WITHOUT FUEL ARE INSTALLED. THE OUTBOARD STORES MUST BE RELEASED OR EMPTIED BEFORE LANDING. FOR F-100F AIRPLANES, OUTBOARD STORES MUST BE RELEASED OR EMPTIED BEFORE INBOARD STORES ARE RELEASED.
F-100D 29.0 TO 30.9% MAC F-100F 26.0 TO 28.5% MAC	
F-100D 29.0 TO 30.4% MAC F-100F 26.0 TO 28.0% MAC	
F-100D 29.0 TO 30.0% MAC F-100F 26.0 TO 27.7% MAC	
F-100D 29.0 TO 31.2% MAC F-100F 26.0 TO 29.0% MAC	FOR F-100D AIRPLANES, IF THE DROP TANKS ARE OF EQUAL CAPACITY, THE BOMBS OR ROCKETS MAY BE CARRIED AT EITHER OUTBOARD STATION. IF THE DROP TANKS ARE OF UNEQUAL CAPACITY, THE BOMBS OR ROCKETS MUST BE CARRIED AT THE OUTBOARD STATION ADJACENT TO THE TANK WITH THE LEAST CAPACITY, TO ENSURE LATERAL CONTROLLABILITY. ALL DROP TANKS MUST BE FULL OR EMPTY FOR TAKE-OFF. FOR F-100F AIRPLANES, TAKE-OFF IS PERMISSIBLE WITH OR WITHOUT FUEL IN THE 335- AND 275-GALLON DROP TANKS. BOMBS OR ROCKETS MAY BE CARRIED AT EITHER OUTBOARD STATION.
F-100D 29.0 TO 31.2% MAC F-100F 26.0 TO 27.5% MAC	
F-100D 29.0 TO 31.2% MAC F-100F 26.0 TO 27.4% MAC	FOR F-100D AIRPLANES, DROP TANKS MUST BE FULL OR EMPTY FOR TAKE-OFF; DROP TANK FUEL MUST NOT BE SELECTED UNTIL INITIAL CLIMB SPEED IS ESTABLISHED; AND AMMUNITION MUST NOT BE EXPENDED IF ONLY THE OUTBOARD STORES AND DROP TANKS ARE TO BE RETAINED FOR LANDING.
F-100D 29.0 TO 31.0% MAC F-100F 26.0 TO 27.6% MAC	TAKE-OFF IS PERMISSIBLE WITH OR WITHOUT FUEL IN THE DROP TANKS. FOR F-100D AIRPLANES DO NOT EXPEND AMMUNITION IF ONLY THE OUTBOARD STORES AND DROP TANKS ARE TO BE RETAINED FOR LANDING.

F-100D-1-A93-16

Figure 5-5 (Sheet 2 of 8)

RESTRICTED CG RANGE

NOTE

- Empty pylons to accommodate other authorized loads may be carried, if desired.

RIGHT OUTBD	RIGHT INTERM	RIGHT INBD	CENTER LINE	LEFT INBD	LEFT INTERM	LEFT OUTBD
25 LB BOMBS MA-2A ROCKETS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	25 LB BOMBS MA-2A ROCKETS
25 LB BOMBS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	MA-3 (3 PODS, 9 ROCKETS) MA-3 (1 POD, 7 ROCKETS)
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	NO LOAD MA-2A ROCKETS
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK		MN-1A DISPENSER		275 GAL TANK 335 GAL TANK	MA-2A ROCKETS
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK		MN-1A DISPENSER		275 GAL TANK 335 GAL TANK	
MA-3 ROCKETS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	MA-3 ROCKETS
ROCKETS	275 GAL TANK 335 GAL TANK		MN-1A DISPENSER		275 GAL TANK 335 GAL TANK	ROCKETS
LAU-3A ROCKETS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	LAU-3A ROCKETS
ROCKETS	275 GAL TANK 335 GAL TANK	NAPALM OR FIRE BOMB		NAPALM OR FIRE BOMB	275 GAL TANK 335 GAL TANK	ROCKETS
ROCKETS	275 GAL TANK 335 GAL TANK	AGM-12B MISSILE		AGM-12B MISSILE	275 GAL TANK 335 GAL TANK	ROCKETS
ROCKETS	275 GAL TANK 335 GAL TANK	750 LB BOMB		750 LB BOMB	275 GAL TANK 335 GAL TANK	ROCKETS
ROCKETS	275 GAL TANK 335 GAL TANK	500 LB BOMB		500 LB BOMB	275 GAL TANK 335 GAL TANK	ROCKETS
25 LB BOMBS	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	ROCKETS

G - LIMITS
(STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 and -2.0G	5.0 and -2.0G	4.5 and -2.0G
TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) 750 LB BOMB NAPALM BOMB FIRE BOMB MN-1A DISPENSER AGM-12B MISSILE 25 LB BOMB NOTE Limits are 5.0 G and -2.0G when internal fuel is more than 5400 pounds.	TYPE III 275 GAL TANK (WITH FUEL)	TYPE III 335 GAL TANK (WITH FUEL) **4.0 and -2.0G** TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) ROCKETS 500 LB BOMB

F-100D-1-A93-20

Figure 5-5 (Sheet 3 of 8)

LOADING CONFIGURATIONS

- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.
- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.

CLEAN AIRPLANE TAKE-OFF CG REQUIREMENTS-% MAC		SPECIFIC INSTRUCTIONS	
F-100 D	F-100F	F-100D	F-100F
29.0 to 30.9	26.0 to 27.5	1	1
29.0 to 30.9	26.0 to 27.5	1	1
29.0 to 30.9	26.0 to 27.9	1	1
29.0 to 30.3	26.0 to 27.2	1	1
29.0 to 31.5	26.0 to 28.3	1	1
29.0 to 30.3	26.0 to 27.5	1	1
-	26.0 to 27.4	CONFIGURATION NOT ACCEPTABLE	1, 2
29.0 to 30.4	26.0 to 27.5	1	1
29.0 to 31.2	26.0 to 28.0	1. 3	1
29.0 to 31.1	26.0 to 27.9	1. 3	1
29.0 to 30.7	26.0 to 27.4	1. 3	1
-	26.0 to 27.6	CONFIGURATION NOT ACCEPTABLE	1, 2
29.0 to 30.6	26.0 to 27.5	1	1

SPECIFIC INSTRUCTIONS:

1 Drop tanks must be fully serviced or empty. If drop tanks are fully serviced, do not select drop tank fuel until initial climb schedule is established.

2 Full ammunition or equivalent ballast must be installed for take-off.

3. Outboard stores should be emptied or released before inboard stores. If for any reason inboard stores are expended first. do not fire ammunition until outboard stores are emptied or released.

F-100D-1-A93-21

Figure 5-5 (Sheet 4 of 8)

NOTE

- Empty pylons to accommodate other authorized loads may be carried, if desired.
- Where a configuration lists more than one store in one or more station blocks, any store in any of these station blocks may be selected.
- For F-100F Airplanes, landing with stores at the inboard stations only should be avoided if possible. If it becomes necessary to land with this configuration, the touchdown speed should be increased above the recommended touchdown speed 5 knots for each 1000 pounds of total inboard store weight.

RESTRICTED CG RANGE

Four of the configurations shown are acceptable on F-100F Airplanes for the normal clean airplane take-off CG range of 26 to 29% MAC.

RIGHT OUTBD	RIGHT INTERM	RIGHT INBD	CENTER LINE	LEFT INBD	LEFT INTERM	LEFT OUTBD
LAU-3A (6 ROCKETS)	275 GAL TANK 335 GAL TANK	500 LB BOMB		500 LB BOMB	275 GAL TANK 335 GAL TANK	
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK	NAPALM BOMB FIRE BOMB		NAPALM BOMB FIRE BOMB	275 GAL TANK 335 GAL TANK	
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK	750 LB BOMB		750 LB BOMB	275 GAL TANK 335 GAL TANK	
MA-2A ROCKETS	275 GAL TANK 335 GAL TANK	500 LB BOMB		500 LB BOMB	275 GAL TANK 335 GAL TANK	
25 LB BOMBS	450 GAL TANK				450 GAL TANK	MA-3 (3 PODS, 9 ROCKETS) MA-3 (1 POD, 7 ROCKETS)
ROCKETS	275 GAL TANK 335 GAL TANK				MN-1A DISPENSER	

G-LIMITS (STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 and -2.0G	5.0 and -2.0G	4.0 and -2.0G
TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY) 750 LB BOMB MN-1A DISPENSER NAPALM BOMB FIRE BOMB 25 LB BOMB NOTE Limits are 5.0G and -2.0G when internal fuel is more than 5400 pounds.	TYPE III 275 GAL TANK (WITH FUEL) **4.5 and -2.0G** TYPE III 335 GAL TANK (WITH FUEL)	TYPE II 450 GAL TANK (WITH OR WITHOUT FUEL) TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL) ROCKETS 500 LB BOMB

F-100D-1-A93-22A

Figure 5-5 (Sheet 5 of 8)

The principle of the graphs makes it imperative that, to determine if a given configuration is permissible, it must be checked in a specific sequence, beginning generally with the inboard station (or centerline, if applicable), and proceeding through intermediate to outboard. In addition, when a graph is entered on a certain horizontal line, only the stores listed in the boxes attached to that particular line can be considered. If the desired loading configuration cannot be established on one horizontal line, check the other lines individually until it is determined that the loading configuration can or cannot be carried. Asymmetrical and restricted CG range configurations can be read directly from the charts. Any asymmetrical or restricted CG range configuration not shown on the charts cannot be flown.

NOTE Stores are generally listed by category in the loading charts. If a specific store is to be carried, it must also be listed in

LOADING CONFIGURATIONS

CLEAN AIRPLANE TAKE-OFF CG REQUIREMENTS — % MAC		SPECIFIC INSTRUCTIONS	
F-100D	F-100F	F-100D	F-100F
29.0 to 31.0	26.0 to 29.0	1, 3	1, 2
29.0 to 31.8	26.0 to 29.0	1, 3	NONE
29.0 to 31.8	26.0 to 29.0	1, 3	NONE
29.0 to 31.0	26.0 to 29.0	1, 3	1
29.0 to 30.9	26.0 to 27.7	1	1
29.0 to 31.9	26.0 to 28.9	1	1

SPECIFIC INSTRUCTIONS:

1 Drop tanks must be fully serviced or empty. If drop tanks are fully serviced, do not select drop tank fuel until initial climb schedule is established.

2 Full ammunition or equivalent ballast must be installed for take-off.

3 Ammunition requirement may be reduced to 400 rounds without adding ballast.

F-100D-1-A93-23A

Figure 5-5 (Sheet 6 of 8)

the breakdown for that category, as shown in figure 5-3.

G-limit tables also accompany each graph and table. Information on use of these G-limit tables is presented in a later paragraph, "Acceleration Limitations." The following paragraphs present sample problems which shown how to determine whether a desired loading configuration is acceptable.

HOW TO DETERMINE APPROVED LOADING CONFIGURATIONS.

The following sequence of steps is necessary to determine whether any combination of stores can be carried on this airplane.

1. Check figure 5-3 to determine whether all desired stores can be carried and the stations at which they can be carried. If all desired stores

RESTRICTED CG RANGE
(A/A37U-15 TOW TARGET

RIGHT OUTBD	RIGHT INTERM	RIGHT INBD		LEFT INBD	LEFT INTERM	LEFT OUTBD
						A/A37U-15 TOW TARGET SYSTEM
	275 GAL TANK 335 GAL TANK					A/A37U-15 TOW TARGET SYSTEM
	275 GAL TANK 335 GAL TANK				275 GAL TANK 335 GAL TANK	A/A37U-15 TOW TARGET SYSTEM

G - LIMITS
(STRAIGHT PULL-OUTS AND PUSH-DOWNS)

NOTE

Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that particular configuration only.

6.0 and -2.0G	5.0 and -2.0G	4.0 and -2.0G	2.5 and OG
TYPE III 335 GAL TANK (EMPTY) TYPE III 275 GAL TANK (EMPTY)	TYPE III 275 GAL TANK (WITH FUEL)	TYPE II 275 GAL TANK (WITH OR WITHOUT FUEL)	A/A37U-15 TARGET (TARGET LAUNCHED)
	4.5 and -2.0G	4.0 and O G	1.5 and O G
	TYPE III 335 GAL TANK (WITH FUEL)	A/A37U-15 TARGET (TARGET RELEASED)	A/A37U-15 TARGET POD (TARGET STOWED)

F-100D-1-A93-24

Figure 5-5 (Sheet 7 of 8)

can be carried and will result in a symmetrical loading configuration, proceed to step 2.

NOTE If the desired stores in an asymmetrical loading configuration simply check the asymmetrical and restricted CG range loading tables in figures 5-4 and 5-5 to determine whether the stores can be carried and the stations at which they can be carried.

- It is desirable, although not mandatory, that the heaviest stores be placed at the most inboard stations, graduating to the lightest stores at the outboard stations.

- If a desired configuration contains only one pair of drop tanks, it is desirable, although not mandatory, that these tanks be placed at the intermediate stations. This is because drop tanks mounted at the intermediate stations and transfer of fuel

LOADING CONFIGURATIONS
CONFIGURATIONS)

CLEAN AIRPLANE TAKE-OFF CG REQUIREMENTS—% MAC		SPECIFIC INSTRUCTIONS	
F-100D	F-100F	F-100D	F-100F
29.0 to 32.0	26.0 to 29.0	NONE	NONE
29.0 to 31.7	26.0 to 28.8	1, 2	1, 3
29.0 to 30.2	26.0 to 27.2	1, 2	1, 3

SPECIFIC INSTRUCTIONS:

1. Drop tanks must be fully serviced or empty. If drop tanks are fully serviced, do not select drop tank fuel until initial climb schedule is established.
2. If ammunition is carried, it must not be fired as long as the target pod is installed.
3. Full ammunition or equivalent ballast is required. If ammunition is carried, it must not be fired as long as the target pod is installed.

F-100D-1-A93-25

Figure 5-5 (Sheet 8 of 8)

from these tanks have less effect on moving the CG toward the limits than tanks at inboard or outboard stations. In addition, directional stability is better with tanks at the intermediate stations than with tanks at inboard or outboard stations.

2. Select the loading graph corresponding to the total number of stores to be carried.

3. Starting with the heaviest stores desired, select the most inboard station at which these stores can be carried.

4. From the remaining stores, select the next heaviest pair and place it at the most inboard station remaining at which it can be carried

5. Check the remaining stores against the approved loadings for the remaining stations.

6. After placing the desired stores at the appropriate stations, check to see that all stores lie in the boxes attached to a common horizontal line.

NOTE If all of the desired stores cannot be accounted for by following the preceding procedure, then the combination of stores cannot be carried.

ACCELERATION LIMITATIONS.

The load factor limits shown in figure 5-1 are for the airplane with no external load and for an average external loading configuration. The operating flight limits diagram (figure 5-8) graphically shows combat condition G-limits for the airplane with no external load.

No External Load or Empty Pylons.

Load factor limits for the airplane with no external load or with empty pylons are as follows:

TAKE-OFF CONDITION (Internal fuel exceeds 5500 lb)		COMBAT CONDITION (Internal fuel less than 5500 lb)	
Straight pull-outs	6.0 G	Straight pull-outs	7.33 G
Straight push-downs	-2.0 G	Straight push-downs	-3.0 G
Rolling pull-outs	4.0 G	Rolling pull-outs	4.8 G
Rolling push-downs	0 G	Rolling push-downs	0 G

With External Loads.

G-limits for straight pull-outs and push-downs when external loads are carried are presented in the G-limit tables accompanying the loading graphs and tables in figures 5-4 and 5-5. The G-limit tables are based on the total number of stores installed and the structural integrity of each individual store and mounting. To determine the G-limit for straight pull-outs and push-downs when the airplane is carrying certain stores, first select the G-limit table accompanying the loading graph for the total number of stores carried. Determine the G-limit for each store carried. The lowest limit so determined is the over-all limit for the configuration, as long as the low-limit store is carried. As stores are released, the G-limits for the resulting loading configuration must be obtained from

AIRSPEED LIMITATIONS

WHEN CARRYING EXTERNAL STORES

600 KNOTS IAS WHEN CARRYING:

a. BOMBS - DOES NOT INCLUDE NAPALM or M-65A-1 or M-64 BOMBS

Do not exceed Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, or Mach 1.0 above 25,000 feet.

b. SPECIAL STORES (AND EQUIVALENT PRACTICE SHAPES)

Do not exceed Mach .95 below 30,000 feet if carried on wing.

NOTE

Fence must be installed on inboard side of pylon when MK-7 special store of M-21 practice store is installed. If fence is not installed, do not exceed Mach .84 below 20,000 feet.

c. ONE, TWO, OR THREE EMPTY TANKS

NAA Type III 335 gal
NAA Type III 275 gal
Type II 275 gal
Type IV 200 gal at other than inboard station

d. MN-1 OR MN-1A DISPENSER

e. AIM-9B MISSILES

CAUTION

Some AIM-9B missiles (those with Mod 3 guidance and control heads) may encounter buffeting at speeds of 375 to 425 knots IAS; therefore, if buffeting is encountered, airspeed should be changed as rapidly as possible to get out of the critical speed region.

f. TDU-11/B TARGET ROCKETS

g. TYPE X LAUNCHER AT EACH INBOARD STATION (WITH OR WITHOUT AGM-12B MISSILE ON EITHER OR BOTH LAUNCHERS.)

Do not exceed Mach 1.4.

NOTE

With only Type X launcher installed (with or without a missile on the launcher), do not exceed Mach .95.

h. ROCKETS

- When MA-3 rocket launchers are installed and contain rockets, it is recommended that Mach .8 below 20,000 feet or Mach .9 above 20,000 feet not be exceeded. If these speeds are exceeded, launcher nose fairings will fail, which results in decreased cruise range, but is not hazardous.
- When LAU-3/A rocket launchers are installed and contain rockets, it is recommended that Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet not be exceeded.

i. ONE OR TWO QRC-160 ECM PODS AT EACH OUTBOARD STATION

Do not exceed Mach 1.4.

CAUTION

With one pod at one outboard station only do not exceed Mach 1.2.

With two pods at one outboard station only do not exceed 450 knots IAS or Mach .95.

j. MLU-10/B MINE OR BLU-14/B SKIP BOMB

Do not exceed Mach .95 for symmetrical store loading configurations or Mach .90 for asymmetrical store loading configurations.

550 KNOTS IAS WHEN CARRYING:

a. EMPTY TANKS

Type II 450 gal

b. M-65A-1 BOMB and M-64 BOMB

Do not exceed Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, or Mach 1.0 above 25,000 feet.

500 KNOTS IAS WHEN CARRYING:

a. TANKS WITH FUEL

NAA Type III 275 gal

b. FOUR EMPTY TANK CONFIGURATION

c. THREE EMPTY TANKS AND SPECIAL STORE (OR EQUIVALENT PRACTICE SHAPE)

d. EMPTY TANKS

Type IV 200 gal at inboard station

e. NAPALM BOMBS OR BLU - 1/B FIRE BOMBS

Do not exceed Mach .95 below 25,000 feet or Mach 1.0 above 25,000 feet.

f. CBU DISPENSER (LOADED OR EMPTY)

Do not exceed Mach .95 below 25,000 feet or Mach 1.0 above 25,000 feet.

475 KNOTS IAS WHEN CARRYING:

a. A/A37U-15 TOW TARGET (TARGET LAUNCHED OR RELEASED)

CAUTION

Do not exceed Mach .95 with target launched or Mach 1.1 with target released.

450 KNOTS IAS WHEN CARRYING:

a. TANKS WITH FUEL

Type II 275 gal
Type IV 200 gal

b. A/A37U-5 TOW TARGET (TARGET FULLY LAUNCHED OR RELEASED)

390 KNOTS IAS WHEN CARRYING:

a. TANKS WITH FUEL

Type III 335 gal

375 KNOTS IAS WHEN CARRYING:

a. TANKS WITH FUEL

Type II 450 gal

350 KNOTS IAS WHEN CARRYING:

a. A/A37U-15 TOW TARGET (TARGET STOWED)

250 KNOTS IAS WHEN CARRYING:

a. A/A37U-5 TOW TARGET (TARGET STOWED) *

NOTE

- If external tanks contain fuel and internal fuel is less than 4000 pounds, do not exceed 450 knots IAS for NAA type III 275-gallon tanks, 400 knots IAS for Type II 275-gallon tanks, 370 knots IAS for Type III 335-gallon tanks, and 340 knots IAS for Type II 450-gallon tanks.
- Do not exceed Mach .95 with Type II or IV tanks.

* Refer to "Tow-target Limitations" in this section for additional limitations for specific flight conditions.

F-100D-1-A93-9A

Figure 5-6

the loading graph for the remaining number of stores. For example, assume take-off were made with a six-store configuration. The initial G-limits would be obtained from the six-store symmetrical loading configuration graph. After the first symmetrical pair of stores was released, the configuration G-limits would be those determined from the four-store symmetrical loading configuration graph. After the second pair of symmetrical stores was released, the configuration G-limits would be those determined from the two-store symmetrical loading configuration graph. In all cases, the configuration G-limits would be those for the low-limit store installed at the time.

NOTE The airplane G-limit resulting from a given type of store is not necessarily the same in all loading graphs. For example, the airplane G-limit for a 750-pound bomb is 5. 0 and -2. 0 in the three-store symmetrical loading configuration graph, while it is 6. 0 and -2. 0 in the four-store symmetrical loading configuration graph.

When asymmetrical or restricted CG range loading configurations are carried, G-limits must be obtained from the applicable table, even for configuration changes due to release of stores.

Positive G-limits for rolling pull-outs are two-thirds of the limits for straight pull-outs. Negative G-limit for rolling push-downs is 0 G.

MAXIMUM ALLOWABLE AIRSPEEDS.

No External Load or Empty Pylons.

The maximum allowable airspeed for the airplane with no external load or with empty pylons (other than Type X launchers installed) is 700 knots IAS. The limit shown in figure 5-1 is for the airplane with no external load.

NOTE See figure 5-6 for airspeed limits with Type X launchers installed.

With External Loads.

Four major factors affect the maximum airspeed which the airplane may attain when carrying external loads: they are the aerodynamic stability of the airplane with various external loading configurations installed, the structural integrity of the individual stores carried, the structural integrity of the mounting, and the flutter characteristics of the configuration. Any one, or combination, of these factors may determine the maximum allowable airspeed. The maximum allowable airspeeds for the airplane when carrying external loads are presented in figure 5-6, and are based on the most limiting combination of factors. If more than one type of store is carried at the same time, the maximum allowable airspeed is the most limiting airspeed shown in figure 5-6 for the individual stores carried. For example, if M-65A-1 bombs and NAA Type III 275-gallon drop tanks with fuel are carried, the maximum allowable airspeed is 500 knots IAS. If the bomb Mach limit (Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet) is lower than 500 knots IAS, it must be observed.

NOTE For this configuration, if the drop tanks contain fuel and internal fuel is less than 4000 pounds, the maximum allowable airspeed is 450 knots IAS. This is denoted in the qualifying notes of figure 5-6. Again, if the stated bomb Mach limit is lower than 450 knots IAS, it must be observed.

Assuming the same configuration as previously outlined, when the drop tanks are emptied or released, the maximum allowable airspeed becomes 550 knots IAS or the stated bomb Mach limit, if lower.

AGM-12B Missile Firing Speed.

The maximum allowable airspeed for firing a AGM-12B missile is 600 knots IAS, imposed to prevent damage due to aerodynamic heating during free powered flight. This speed will not be exceeded as long as the configuration limits shown in figure 5-6 are observed.

USE OF LOADING AND LIMITATIONS CHARTS.

The use of the loading and airspeed and G-limits charts is explained in the following sample problems.

Sample Problem No. 1.

Assume that it is desired to carry a five-store symmetrical configuration which consists of a special store and the most fuel possible in four drop tanks.

1. From figure 5-3, it is determined that the MK-28 is the only special store which can be carried at the centerline station. Also, it is determined that 200-gallon tanks can be carried at the inboard stations and either 450-gallon or 335-gallon tanks can be carried at the intermediate stations.

NOTE Although figure 5-3 indicates that 450-gallon tanks are listed for the intermediate station, figure 5-4 prohibits the use of these tanks in the five-store configuration.

2. Using the five-store symmetrical loading configuration graph in figure 5-4, proceed along the upper horizontal line, beginning with the centerline station. It can be seen that the MK-28 is listed

under the centerline station, that 200-gallon tanks are listed under the inboard station, and that 335-gallon tanks are listed under the intermediate station.

3. Therefore, the acceptable symmetrical configuration, which will include the MK-28 special store and the most fuel possible in four drop tanks, consists of the MK-28 at the centerline station, 200-gallon tanks at the inboard stations, and 335-gallon tanks at the intermediate stations.

4. Using the G-limits associated with the five-store configuration, it will be seen that the Type IV 200-gallon tanks are in the 4.0 G column the Type III 335-gallon tanks are listed as 4.5 G, and the special store is listed as 6.0 G. Therefore, the configuration G-limit is 4.0 G and -2.0 G.

5. Airspeed limits obtained from figure 5-6 show the following limits:

Type IV 200-gallon tanks (with fuel): 450 knots IAS or Mach .95

Type III 335-gallon tanks (with fuel): 390 knots IAS

MK-28 on the centerline station: 600 knots IAS

Therefore, the airspeed limit is 390 knots IAS or Mach .95 for the five-store configuration with fuel in the drop tanks.

6. When the Type IV 200-gallon tanks are emptied and jettisoned, the three-store symmetrical loading chart should be used to obtain the G-limits. Since the Type III 335-gallon tank is listed at 4.5 G and the MK-28 at 6.0 G, the available G-limit is now 4.5 G and -2.0 G. A check of the airspeed limits in figure 5-6 indicates that the airspeed limit still is 390 knots IAS.

NOTE If internal fuel is less than 4000 pounds and fuel remains in the 335-gallon tanks, the airspeed limit is 370 knots IAS.

7. When the Type III 335-gallon tanks are emptied and jettisoned, the one- and two-store loading chart should be used to obtain G-limits. Inspection of the one- and two-store loading chart in figure 5-4 shows the G-limits to be 7.0 G and -3.0 G for the MK-28 when internal fuel is less than 4200 pounds, and 6.0 G and -2.0 G when internal fuel is greater than 4200 pounds. Figure 5-6 gives the airspeed limit at 600 knots IAS.

8. When the MK-28 is released, the clean airplane airspeed and G-limits apply.

Sample Problem No. 2.

Assume that a training bombing mission is to be flown wherein 25-pound bombs and two of the heaviest bombs possible are to be dropped. In addition, 500 gallons of external fuel will be required to complete the mission with adequate fuel reserves. An added advantage for the training mission will be to improve proficiency in symmetrical heavyweight take-off. These mission requirements, considered together, will necessitate a six-store loading configuration which includes 275-gallon drop tanks.

1. From figure 5-3, it is determined that 1000-pound M-65A-1 bombs can be carried at the inboard and intermediate stations, 275-gallon drop tanks at the intermediate stations only, and 25-pound bombs at the outboard stations only. The 1000-pound bombs obviously must be considered for the inboard station only.

2. Using the six-store symmetrical loading configuration graph in figure 5-4, proceed along the upper horizontal line, beginning with the inboard station. It can be seen that the 1000-pound M-65 A-1 bombs are listed at the inboard station but 275-gallon tanks are not listed at the intermediate station. Now proceed along the next lower horizontal line, beginning with the inboard station. The 1000-pound M-65A-1 bombs may be carried at the inboard stations, 275-gallon tanks at the intermediate stations, and 25-pound bombs at the outboard stations.

3. Therefore, the acceptable symmetrical configuration, which will include two 275-gallon drop tanks, 25-pound bombs, and two of the heaviest bombs possible, consists of 1000-pound M-65A-1 bombs at the inboard stations, 275-gallon drop tanks at the intermediate stations, and 25-pound bombs at the outboard stations.

4. Assume Type III 275-gallon drop tanks will be carried. Using the G-limits associated with the six-store graph, it will be seen that the Type III 275-gallon tanks are in the 5.0 G column, the M-65A-1 bombs in the 2.0G column, and the 25-pound bombs in the 6.0 G column. Therefore, the configuration G-limits will be 2.0 G and -2.0 G.

5. Airspeed limits obtained from figure 5-6 are:

Type III 275-gallon tanks (with fuel): 500 knots IAS.

M-65A-1 Bombs: 550 knots IAS or Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet, whichever is lower.

25-pound bombs: 600 knots IAS or Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet.

Therefore, the airspeed limit is 500 knots IAS or Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet, whichever is lower. (In addition, if the 275- gallon tanks contain fuel, and if internal fuel is less than 4000 pounds, do not exceed 450 knots IAS.)

6. If the drop tanks are retained when empty, the G-limits will remain 2.0 G and -2.0 G; the airspeed limit will become 550 knots IAS or Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet, whichever is lower.

7. If the drop tanks are released and the M-65A-1 bombs are dropped, the two-store symmetrical loading graph indicates that the G-limits are 6.0 G and -2.0 G. A check of figure 5-6 shows the airspeed limit is 600 knots IAS or Mach .90 below 10,000 feet, Mach .95 between 10,000 and 25,000 feet, and Mach 1.0 above 25,000 feet, whichever is lower.

8. When the 25-pound bombs are released, the clean airplane airspeed and G-limits apply.

EXTERNAL LOAD RELEASE LIMITS.

Limitations which must be observed when releasing external loads are shown in figure 5-7.

TOW-TARGET LIMITATIONS.

Refer to "External Loading Configuration Limitations" in this section for permissible loading configurations which include the A/A37U-5 or A/A37U-15 tow targets, and for maximum allowable airspeed and acceleration limitations for the target installations. The following paragraphs present additional limitations which should be observed when the A/A37U-5 target is carried.

TAKE-OFF AND LANDING - A/A37U-5 SYSTEM.

Take-off with the target installed should not be made:

a. From rough runways.

b. During conditions of heavy turbulence.

The target should be launched and released before landing. If conditions prohibit such action, a landing is possible with the target in the stowed or tow position. (Refer to "Emergency Procedures" under "Tow-target System" in Section IV.)

LAUNCHING (UNREELING) TARGET - A/A37U-5 SYSTEM.

During the time the target is being launched (unreeled), airspeed must be between 190 and 200 knots IAS, and the airplane should be in straight and level (1 G) flight between 3000 and 5000 feet above the terrain. In addition, the target should not be launched in any known turbulent or crosswind condition.

RETURNING TO DROP AREA - A/A37U-5 SYSTEM.

To prevent damage to, or loss of, the target when returning to the drop area, do not exceed 300 knots IAS if the target has been hit by gunfire.

RELEASE - A/A37U-5 SYSTEM.

Normal release of the dart target (at the designated drop area) must be accomplished at 175 knots IAS in straight and level (1 G) flight at no less than 2000 feet above the terrain.

NOTE Speed should be stabilized at 175 knots IAS for a minimum of one minute before release, to ensure that the target has stabilized at the speed of the tow airplane.

CENTER-OF-GRAVITY LIMITATIONS.

Since there is no in-flight control of CG position (other than normal expenditure of ammunition, release of external loads, and consumption of drop tank fuel), major factors affecting CG position must be checked before flight; for example, the installation of guns and ammunition. For external loading configurations shown in figure 5-4, full ammunition or equivalent ballast is required only if necessary to bring the clean airplane take-off CG within the range of 29 to 32% MAC for F-100D Airplanes and 26 to 29% MAC for F-100F Airplanes. A few of the configurations shown in figure 5-4 require that ammunition, if carried, not be fired under certain conditions. This restriction must be observed in order to ensure adequate stability and control. Some external loading configurations shown in figure 5-5 require full ammunition or equivalent ballast for take-off. Also, some of these configurations require that ammunition, if carried, not be fired under certain conditions. Here, again, these restrictions must be observed in order to ensure adequate stability and control. (Refer to Weight and Balance Technical Manual, T.O. 1-1B-40.) To maintain the CG within limits when carrying external loads, drop tank fuel must be transferred in the prescribed sequence. (Refer to "Drop Tank Fuel Sequencing Limitations" in this section.) Also, external armament must be released in the sequence described under "Armament Equipment" in Section IV.

DROP TANK FUEL SEQUENCING LIMITATIONS.

The sequence in which drop tank fuel is transferred will affect the airplane CG position and, consequently, longitudinal and directional stability, and lateral controllability requirements. Improper sequencing of drop tank fuel can cause hazardous flight conditions to develop. Consequently, the following instructions must be observed:

EXTERNAL LOAD RELEASE LIMITS

STORE	RELEASE LIMITS
PYLONS (includes Type X launcher)	Unrestricted
BOMBS, Napalm, BLU-1/B FIRE BOMB, MLU-10/B MINE, AND BLU-14/B SKIP BOMB (Does not include 25-pound bombs)	Any airspeed and between 0 G and 4 G. WARNING Do not salvo bombs in the armed condition, as the bombs may collide and detonate, and damage the airplane.
25-POUND BOMBS	Any airspeed and between 1 G and 5 G.
DROP TANKS	Full drop tanks . . . . Any airspeed in level flight (1 G) Partially full drop tanks . . . . Not recommended for drop, because partially full drop tanks may tumble and strike the airplane when released. NOTE If the risk involved in retaining partially full tanks is considered greater than that due to possible collision of the tanks and the airplane, the tanks should be jettisoned as near 350 knots IAS as possible and in level unaccelerated flight. Empty 335-gallon drop tanks . . . . . Any altitude between 5000 and 40,000 feet and any airspeed between 250 knots IAS and Mach 1.0 in level flight (1 G). Empty 200-, 275-, and 450-gallon drop tanks . . . . Any airspeed above 200 knots IAS in level flight (1 G). CAUTION • Do not drop an empty 335- or 275-gallon tank if the adjoining outboard station is carrying a store; otherwise, the tank may strike the store. • The 335-gallon drop tanks tend to move laterally outboard after release, especially at speeds near the low speed limit of 250 knots IAS. Use caution if tanks are to be released during formation flight.
SPECIAL STORES (and equivalent practice shapes)	Any airspeed and above 0 G.
CBU DISPENSER	Full dispenser . . . . Any airspeed and between zero G and 4.0 G. Empty or partially loaded dispenser . . . . Utmost care must be taken in jettisoning the empty or partially loaded dispenser, because the CG of the dispenser is forward of the mean ejection force and, since the dispenser is not aerodynamically stable, it will tumble upon separation from the airplane. However, the dispenser can be expected to clear the airplane satisfactorily if dropped in or near the region of 300 to 350 knots IAS in straight and level (1.0 G) flight.
MN-1 DISPENSER and MN-1A DISPENSER	Not recommended for release under any flight condition, because the dispenser will tumble and may strike the airplane when released. NOTE To prevent accidental release of the dispenser from the Type VIII Series pylons, ejector cartridges will not be installed in the store ejector rack breeches. WARNING Do not actuate special store unlock handle if MN-1A dispenser is carried at centerline station. This restriction is necessary to prevent accidental release of the dispenser from the pylon if the bomb-rocket release button or special store emergency jettison button is depressed.
ROCKET LAUNCHERS	Any airspeed between 200 knots IAS and Mach .85 in level flight (1 G).
QRC-160 ECM PODS	Any airspeed between 200 knots IAS and Mach .85 in level flight (1 G).
AIM-9B MISSILES and TDU-11/B TARGET ROCKETS	Any airspeed and between 0 G and 4 G. CAUTION When only one AIM-9B missile or one TDU-11/B target rocket is installed on a pylon, the missile or target rocket must be safe-launched before the pylon is jettisoned; otherwise, the loaded pylon may strike and damage the airplane.
AGM-12B MISSILES	Any airspeed and at 1 G or higher.
TOW TARGET SYSTEMS	Not recommended for release.

NOTE

- Any airspeed limitation which is more restrictive than those shown above should prevail for normal store release.
- In extreme emergencies which require jettisoning of all external stores, this action should be taken even if the recommended release conditions cannot be attained or if release of a store is not recommended.
- Refer to "Tow-target Limitations" in this section for target release limits.

F-100D-1-A93-10A

Figure 5-7

NOTE The following instructions are general and are to be followed in most cases where drop tanks are included in the various loading configurations. However, certain exceptions or additional instructions are denoted in the graphs and tables in figures 5-4 and 5-5. These exceptions or additional instructions must take precedence over the following general instructions.

1. Normally, drop tank fuel must be sequenced outboard, inboard, then intermediate.

2. Normally, transfer of drop tank must be initiated at engine start, in order to ensure maximum use of drop tank fuel before the drop tanks are jettisoned.

Warning The graphs and tables in figures 5-4 and 5-5 instruct that unbaffled 450-gallon drop tanks must be full or empty for take-off. If any internal system fuel has drained into unserviced (empty) unbaffled 450-gallon tanks, this fuel must be transferred out before take-off. (Refer to "Transfer of Fuel From Partially Full Unbaffled 450-gallon Drop Tanks" in Section II.)

3. Some configurations in figures 5-4 and 5-5 show a choice of two or three drop tank sizes at each intermediate station. However, for airplanes which can carry all three sizes, it is not recommended that tanks of mixed sizes be carried at the intermediate stations. Use of the same size tank at each intermediate station will ensure maximum lateral controllability and, in the case of the 335- and 450-gallon tanks, full utilization of in-flight refueling capability when required.

WEIGHT LIMITATIONS.

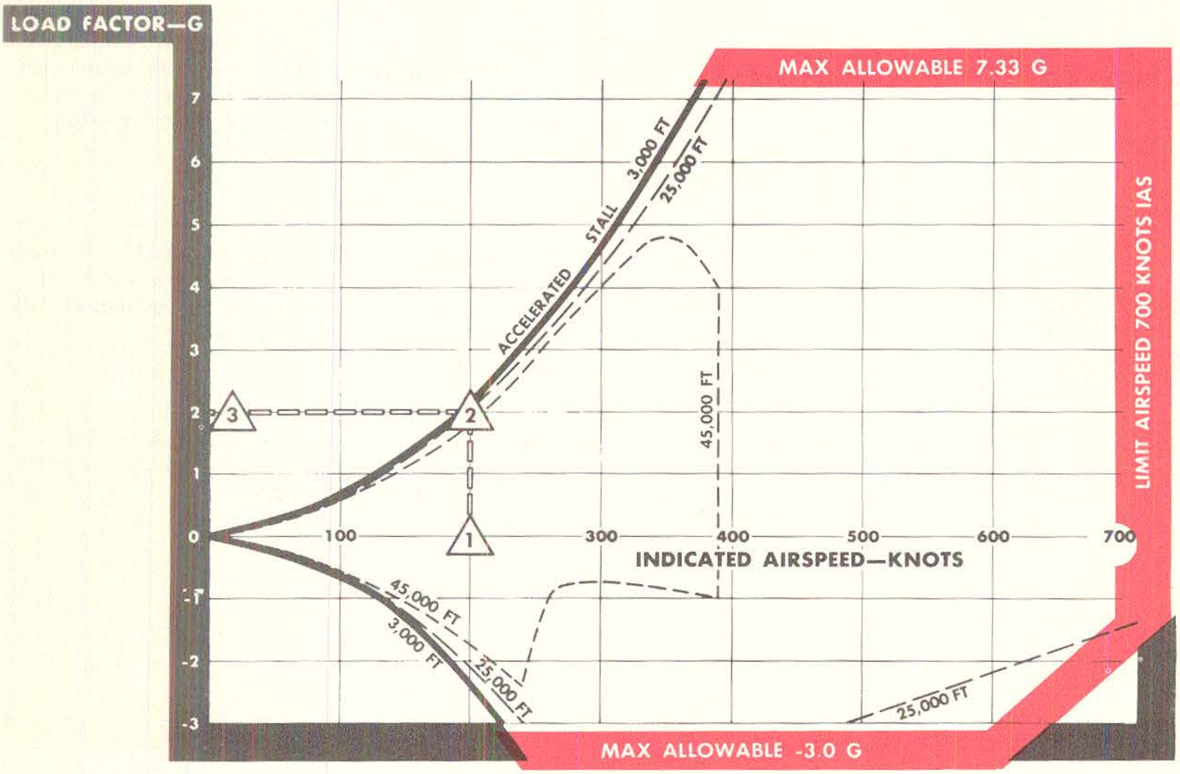
The design of the airplane precludes the possibility of overloading as long as only approved external loading configurations are flown. (See figures 5-4 and 5-5 for approved external loading configurations.)

NOTE There is no maximum landing weight; consequently, it is not necessary to burn out fuel before landing.

OPERATING FLIGHT

NO EXTERNAL LOAD
GROSS WEIGHT 28,100 LB
(COMBAT CONDITION)

F-100D AIRPLANES



HOW TO USE CHART:

1. Select your indicated airspeed: 200 knots IAS.
2. Trace vertically to your flight altitude: 25,000 feet.
3. Move horizontally to the left and find the maximum G you can pull before stalling: 2.0 G.

NOTE

Accelerated stall speeds increase with an increase in gross weight.

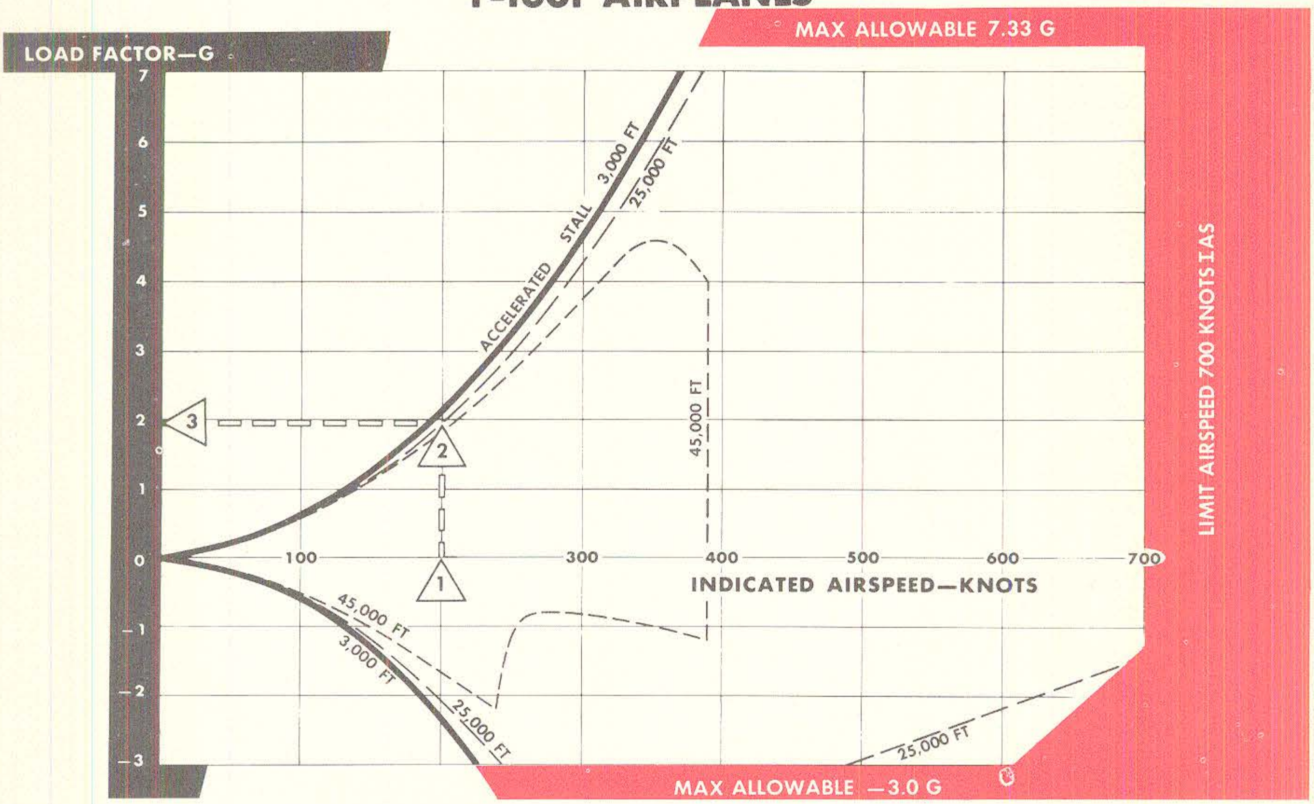
F-100D-1-A93-17

Figure 5-8

NO EXTERNAL LOAD:
GROSS WEIGHT 28,700 LB
(COMBAT CONDITION)

LIMITS
[redacted]

F-100F AIRPLANES



HOW TO USE CHART

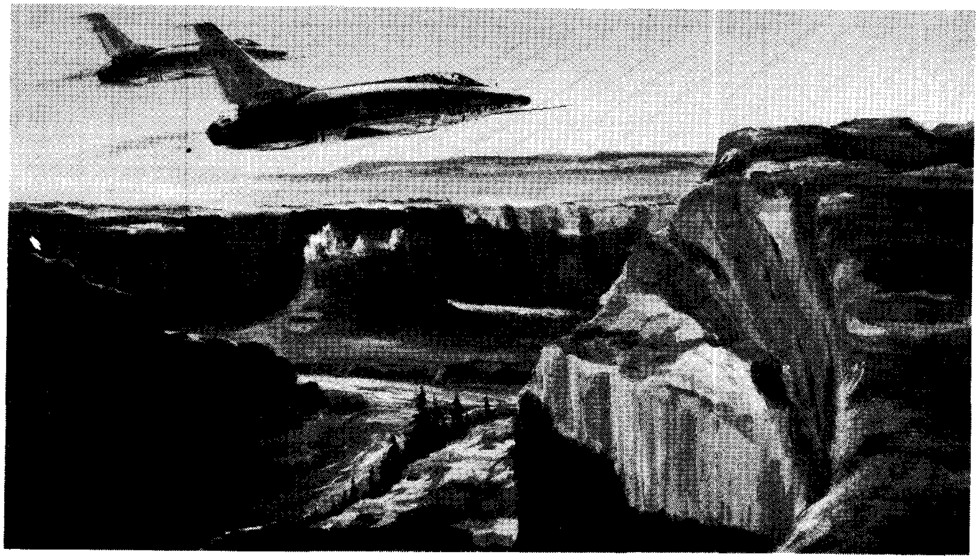
1. Select your indicated airspeed—200 knots IAS.
2. Trace vertically to your flight altitude—25,000 feet.
3. Move horizontally to the left and find the maximum G you can pull before stalling—1.9 G.

NOTE
Accelerated stall speeds increase with an increase in gross weight.

F-100F-1-A93-18

FLIGHT CHARACTERISTICS

section VI



F-100D-1-0-84

TABLE OF CONTENTS

INTRODUCTION.

The airplane handles satisfactorily throughout its speed range. At normal operating speeds, the airplane provides a stable platform for gunnery and bombing in the various modes. However, it may exhibit a tendency known as "adverse yaw" during low-speed flight.

MACH NUMBER.

Mach number provides a convenient speed index of flight characteristics and eliminates the need of remembering a long series of indicated airspeeds for altitudes. A given flight characteristic appears at the same Mach number at any altitude and varies only in intensity. The lower the altitude, the higher the indicated airspeed for a given Mach number. This higher indicated airspeed is an indication of the greater pressure force that air exerts at lower altitudes. As a result, you notice that, although a specific handling quality occurs at the same Mach number at all altitudes, the effect on the airplane and on the controls is more pronounced at the low altitude. Figure 6-1 shows the relationship of altitude, indicated airspeed, and Mach number. For airspeed conversions from indicated to true airspeeds for a standard atmosphere at the range of altitudes and Mach numbers in which you fly, refer to T.O. 1F-100A-1-1.

NOTE The airspeed and Mach number indicator and altimeter readings are affected by position error (because of compressibility effects) which is greatest between Mach .90 and Mach 1.04.

MINIMUM CONTROL SPEEDS AND STALLS.

Airplanes with highly swept-back wings do not, in general, have a clearly defined stall. Instead, an airspeed is reached where mild stick force lightening and mild buffet occur, the flight characteristics begin to deteriorate, rate of descent increases, and the airplane requires an excessive amount of control effort by the pilot to maintain level flight. This is due to the wing tips stalling out, resulting in a forward movement of the center of pressure. The speed at which control requirements become excessive has been defined as minimum control speed. At an airplane gross weight of 24,000

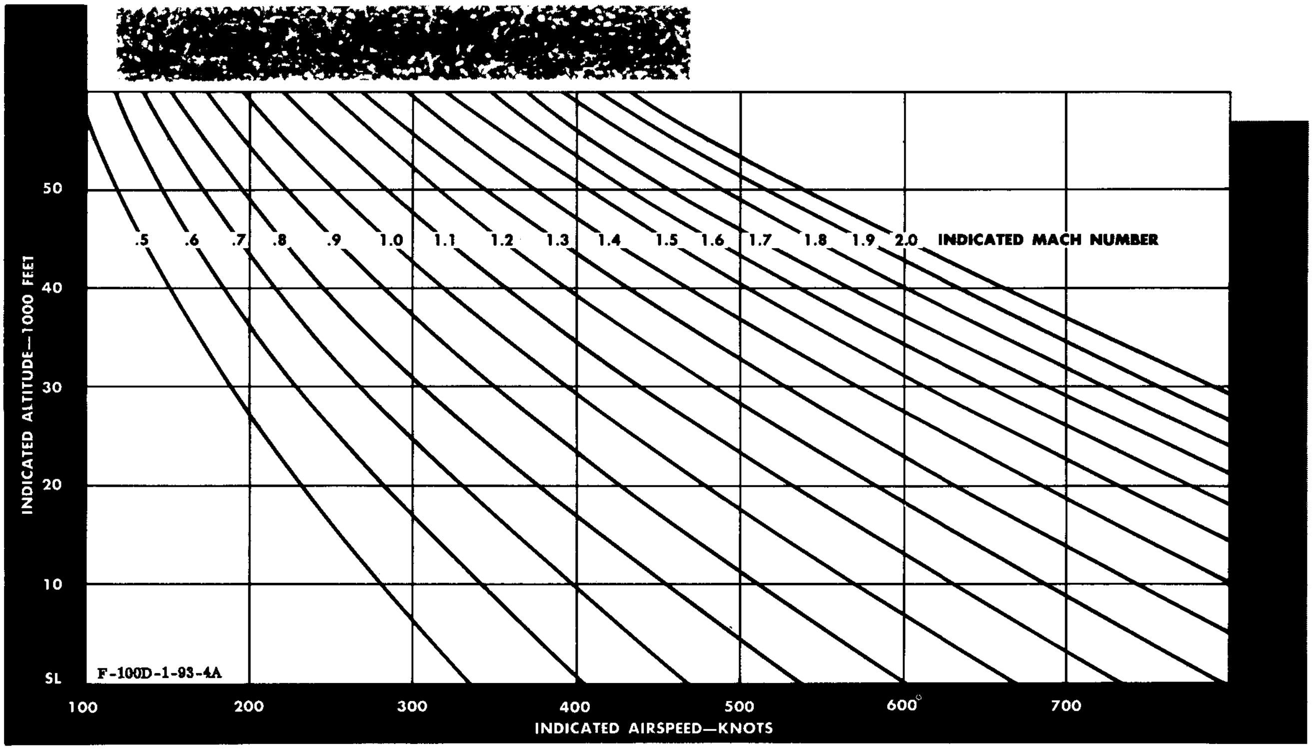


Figure 6-1

pounds, the power-off minimum control speed with gear and flaps down in unaccelerated flight is 134 knots IAS. As airspeed is further reduced, there occurs a yawing and rolling tendency coupled with an increase in buffet intensity. These roll-off tendencies require progressively more control action until, at stall, full back stick is required and the rate of descent becomes extremely high. The fact that buffet will occur well above stall, coupled with a roll-off tendency, might prematurely imply a stall condition. At an airplane gross weight of 24,000 pounds, the power-off stall speed with gear and flaps down in unaccelerated flight is 124 knots IAS. Minimum control speeds and stall speeds are shown in figure 6-2.

STALLS WITH GEAR AND FLAPS DOWN.

Because control movement is necessarily excessive in order to control the airplane at stall speeds and because of the increased rate of descent associated with stall, you should not touch down at speeds below the recommended minimum for a particular gross weight. (Refer to T.O. 1F-100A-1-1 for recommended approach and touchdown speeds at various gross weights.)

Warning

Because of the extremely powerful longitudinal response, excessive use of the stabilizer can rotate the airplane to extreme attitudes, thereby increasing the drag, rate of descent, and altitude required to recover.

Extending the speed brake at low airspeeds causes a slight nose-down trim change.

STALLS WITH GEAR AND FLAPS UP

Stall characteristics of the airplane with gear and flaps up are generally the same as with gear and flaps down. Yawing and rolling tendencies occur at speeds comparable to those for gear and flaps down at the same gross weights.

STALLS WITH GEAR DOWN AND FLAPS UP.

The effect of the gear-down and flaps-up condition compared to the gear-down and flaps-down condition is twofold. First, although handling characteristics are not materially affected by the gear-down and flaps-up condition, the airplane angle of attack and, hence, the airplane attitude for a given airspeed is increased. Second, rate of descent characteristics with flaps up are changed in such a manner that minimum rate of descent occurs at a higher airspeed than with flaps down. With these considerations in mind, it is evident that if a landing with flaps up is necessary, the touchdown speeds should be raised 10 percent (approximately 15 knots IAS) above those for a flaps-down condition, depending on the gross weight.

MINIMUM CONTROL SPEEDS AND STALL SPEEDS.......KNOTS IAS

GEAR AND FLAPS DOWN

NOTE

Stall speeds are shown in parentheses.

	GROSS WT-LB	ANGLE OF BANK 0° / LOAD FACTOR 1.0 G	30° / 1.2 G	45° / 1.4 G	60° / 2.0 G
POWER OFF	24,000	134 (124)	143 (132)	157 (147)	184 (173)
	28,000	144 (134)	154 (143)	169 (159)	197 (188)
	32,000	153 (143)	164 (153)	180 (170)	212 (201)
	36,000	160 (151)	172 (162)	189 (179)	223 (212)
	40,000	164 (158)	178 (170)	196 (188)	233 (223)
POWER ON (MILITARY THRUST)	24,000	128 (116)	137 (124)	150 (137)	175 (163)
	28,000	139 (126)	148 (135)	162 (149)	190 (178)
	32,000	148 (136)	159 (146)	172 (161)	203 (192)
	36,000	156 (144)	167 (155)	182 (171)	215 (205)
	40,000	162 (151)	173 (163)	190 (181)	224 (216)

Based on: flight test data
Data as of: 8 November 1957

F-100D-1-93-80B

Figure 6-2

ACCELERATED STALLS.

An accelerated stall can occur at high speed when pulling into a tight turn and increasing G through the buffet region to the stall point. A low-speed accelerated stall with or without flaps down is preceded by a very mild amount of general airplane buffet and by a mild tendency of the airplane to roll off and yaw.

Recovery can most easily be made by releasing back pressure on the stick, and, if necessary, increasing power and diving to accelerate out of the stalling speed range.

Warning To avoid entering inadvertent spins out of accelerated maneuvers, you should develop an awareness of the accelerated stall characteristics of the airplane and utilize the turning performance of the airplane to a point short of these stalls.

If an accelerated stall is encountered, the airplane will ordinarily roll "over the top," although with some external loading configurations, it may roll "under." When the roll occurs, do not fight it with opposite aileron; keep the ailerons neutral, apply forward stick, and maintain directional control with rudder. If this procedure is followed, the airplane will have no tendency to spin out of a turn from an accelerated stall.

Warning If airspeed is near stall in either accelerated or unaccelerated flight, do not use ailerons, because this can induce a spin.

STALL RECOVERY.

Stall recovery is made by releasing back pressure on the stick and increasing power to regain flying speed. Slight forward stick pressure may be required to break a stall.

Caution If landing gear or flaps are down, do not exceed gear-and flap-down limit airspeed, because excessive air loads may result in structural damage.

PRACTICE STALLS.

Flight at low airspeeds to determine airplane characteristics should be limited to familiarization and test flights. In order to fly below minimum control speed, excessive control movement is necessary to maintain control of the airplane, and it would be extremely easy to cross-control. This condition, if aggravated, could result in a spin.

SPINS.

The spin characteristics and recovery techniques of the F-100D and F-100F airplanes are essentially the same. However, some differences and additional precautions must be noted and understood for each model of airplane. These are discussed in the following paragraphs.

Warning

Intentional spins in these airplanes are prohibited.

F-100D AIRPLANES.

The airplane has been spin-tested in the clean configuration, with landing gear down and speed brake extended, and with 275-gallon drop tanks installed. Tests in these varying configurations have been conducted at medium and high altitudes. The tests reveal that the airplane will not spin in the direction of applied aileron. The aileron is a much more powerful yaw device near the stall than is the rudder, and this yaw is opposite in direction to the applied aileron (adverse yaw). With ailerons held at neutral, the airplane will not enter a true spin. With stick full aft and full rudder in the direction of the intended spin, but with ailerons neutral, the nose of the airplane pitches up and over slightly and then drops through a 60- to 70-degree nose-down attitude while maintaining a slow rotation rate. The airplane maintains this attitude while yawing slowly in the direction of deflected rudder. Any time back pressure on the stick is released, the airplane flies right out. If moderate amounts of opposite aileron are added at spin entry, the airplane reacts the same as with ailerons neutral for the first half turn, then yaws up to an attitude of about 20 to 30 degrees nose down and half-heartedly spins, with the nose oscillating between this attitude and about 60 degrees nose down. Any time neutral aileron is resumed, the nose falls back to 60 to 70 degrees below the horizon.

As a spin is entered, the nose of the airplane pitches up and over in the direction of the spin, then drops to 50 or 60 degrees below the horizon at the end of one-half turn. Yaw then builds up rapidly, as does rotation rate, and the nose swings back up until it is at least level with the horizon at the end of one turn. In high-altitude spins, the nose definitely is 10 to 20 degrees above the horizon at this point. You may have the impression that the spin is going flat. The nose then drops back down to an attitude of about 30 to 40 degrees below the horizon at the end of 1 1/2 turns, then starts to swing back up again. At the end of the second turn, the nose is slightly below the horizon; at 2 1/2 turns, it is about 20 degrees below the horizon; and, from then on, it is fairly stable at about 20 degrees below the horizon. Rotation rate builds up so that the airplane completes the third turn at the rate of one turn in 4 seconds.

Rate of descent after the spin has stabilized is between 1500 and 2000 feet per turn. From entry altitude to recovery in straight-and-level flight, a three-turn, ailerons-against spin usually requires between 14,000 and 16,000 feet. One-turn spins require about 10,000 feet for recovery to straight-and-level flight. Because of this minimum clearance necessary for recovery, eject if a spin is entered below 10,000 feet above the terrain or if recovery from a spin entered at a higher altitude is not imminent at 10,000 feet.

With minor exceptions, spins in any combination of the following conditions demonstrate the same characteristics as spins in a clean configuration: out of accelerated turns, with landing gear down, with speed brake extended, or with 275-gallon drop tanks installed. Spins in other than the clean configuration at high altitude (above 45,000 feet) appear flatter, with the nose of the airplane higher at the end of the first turn. It is possible to put the airplane into a violent spin by holding full or almost full ailerons against the spin for several turns and then popping the stick forward while still holding ailerons against the spin.

Mild, rapid engine compressor stalls are often encountered in spins in this airplane, accompanied by a drop from the normal engine idle rpm. However, in no case did flame-out occur during the tests.

If a yawing turn is attempted near the stall, opposite aileron to hold the wings level will very likely start a spin. Large aileron deflections at the top of Immelmanns should be avoided where speed is low. It is interesting to note that this airplane can cross the top of a loop at very low airspeeds successfully, as long as aileron is not used. Therefore, if airspeed should become lower than expected at the top of an Immelmann, the maneuver should be continued as a loop until sufficient airspeed is attained to use ailerons to roll out.

If a spin is inadvertently entered, some confusion may exist as to what is happening. Generally, fighting a stalled condition causes a spin entry and the tendency may be to continue fighting, not realizing that a spin is developing. Fighting the stall will only aggravate the spin. Only a small amount of opposite aileron is necessary to cause a spin, so, unless the direction of the spin is definitely known, release all controls. If this is done in time, the spin will stop by itself. If the spin continues, make sure of the spin direction; then apply recovery controls. Proper recovery controls are full opposite rudder, full ailerons with the spin, and full aft stick. Forces on the pilot during a spin may make it necessary to use both hands on the stick to obtain full recovery controls. Experience has shown that once you are in a spin and have applied correct recovery controls, it is of no value to return to "pro-spin" controls and then go back to recovery controls. Recovery controls should be held until rotation stops (observing, of course, the safe minimum altitude for recovery - 10, 000 feet above the terrain). Flight test data shows that the yaw rate begins to drop as soon as recovery controls are applied, even though this may not always be apparent. The maximum number of turns required to halt spin rotation in the test program was two turns after recovery controls were applied. However, under some aggravated spin conditions, several additional turns may be necessary for recovery.

Figure 6-3 graphically illustrates spin characteristics from a clean configuration entry at 35, 000 feet.

F-100F AIRPLANES.

Warning Intentional spins in these airplanes are prohibited.

The elongated fuselage results in higher aerodynamic yawing moments on the airplane while it is in a spin condition. Consequently, it may take longer than normal to stop spin rotation after recovery controls are applied. Because of this adverse condition, it is extremely important to take immediate corrective action if the airplane is inadvertently allowed to approach or enter a spin condition. The aileron is a much more powerful yaw device near the stall than is the rudder, and this yaw is opposite in direction to the applied aileron (adverse yaw). The most probable way to enter a spin, then, is with crossed controls - ailerons against and rudder with the spin. However, it requires only a small amount of opposite aileron to cause a spin to develop, and, in a spin, forces on your body are such that some aileron against the spin may be inadvertently added.

Recovery was demonstrated from one- and two-turn spins, left and right, in which full crossed controls were held until recovery was initiated.

Warning If the spin progresses beyond two turns before recovery controls are applied, recovery is improbable.

It is not recommended to use afterburner or deploy the drag chute, because experience has shown that the afterburner often will not light and the drag chute is ineffective. Mild, rapid engine compressor stalls are often encountered in spins in this airplane, accompanied by a drop from the normal engine idle rpm. In no case, however, did flame-out occur during the tests.

To avoid spins, avoid uncoordinated flight at low speeds or under accelerated flight conditions where the airplane is near a stalled condition. Near the stall, the ailerons produce considerable adverse yaw, so it is important to be able to recognize the approach to the stall and minimize the use of aileron in this region.

Figure 6-3 illustrates spin characteristics from a clean configuration entry at 35, 000 feet.

SPINS VS SPIRALS.

Spins differ from spirals in rotation rate and pitch oscillations. Spirals exhibit slower, steadier rotation rates and no pitch oscillation. In a spin, you will observe the airspeed drop below 100 knots IAS, while in a spiral, the airspeed remains above stall speed and increases as the spiral progresses.

SPIN RECOVERY.

If a spin is inadvertently entered, proceed as follows:

1. Retard throttle to IDLE to prevent severe compressor stall.

2. Release all controls and determine spin direction.

3. Apply full opposite rudder, full ailerons with the spin, and full aft stick.

4. Jettison external loads.

Warning If only pylons are installed, jettison the pylons.

5. Landing gear, wing flaps, and speed brake - UP.

If landing gear, wing flaps, and speed brake are extended when spin is entered, immediately move landing gear and wing flap handles up and speed brake switch in. This action is to preclude structural damage in the event airspeed limits are exceeded during recovery.

6. When rotation stops, airplane will be in a stall attitude; therefore, use prescribed stall recovery technique.

TYPICAL SPIN CHARACTERISTICS

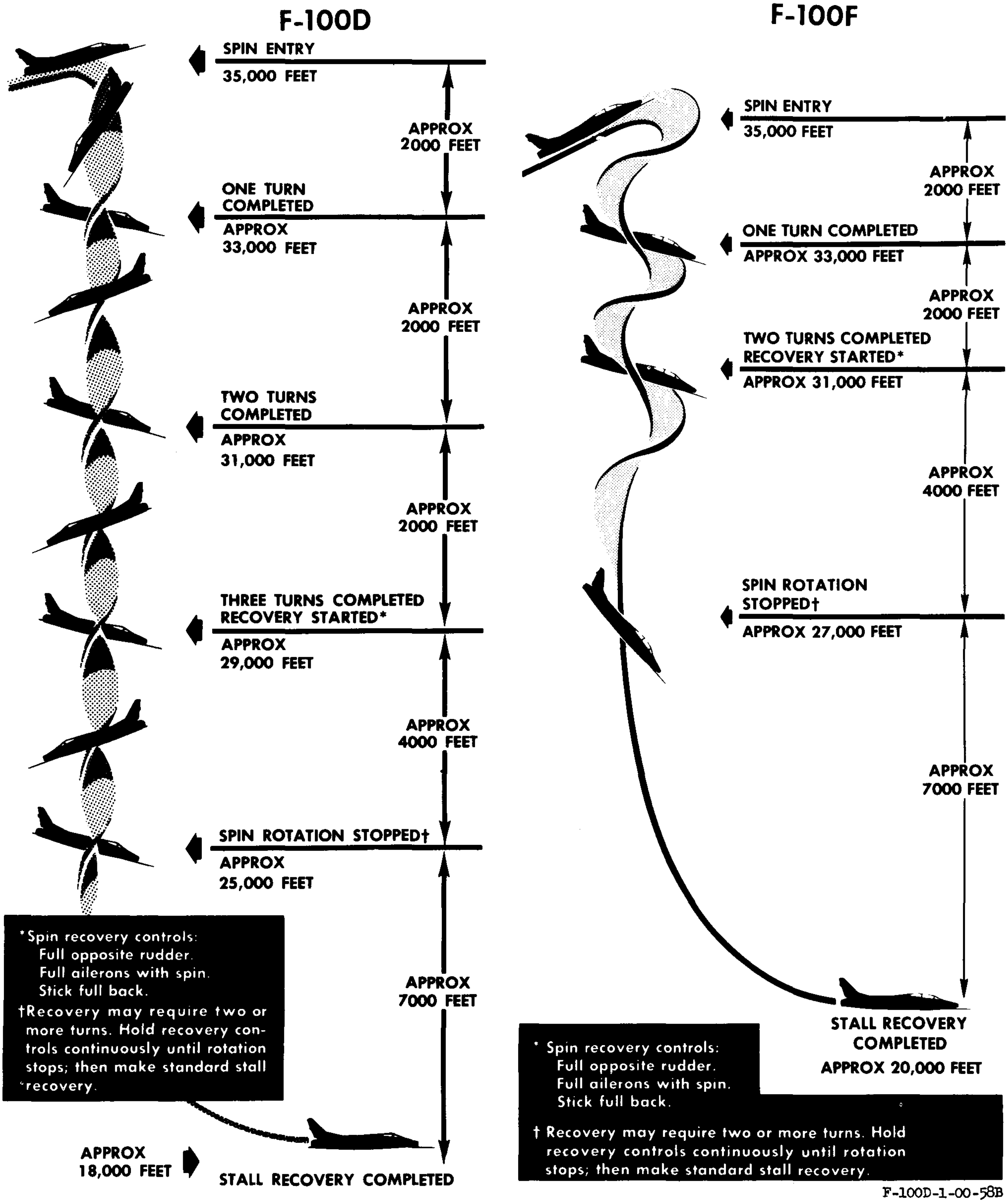


Figure 6-3

Warning Do not hold recovery controls after rotation stops; otherwise, the airplane will spin in the opposite direction.

- In attempting recovery from a spin, do not hold ailerons against the spin, because a flat spin may result. If a flat spin is entered, hold normal recovery controls until rotation stops.
- If a spin is entered at less than 10, 000 feet above the terrain or if recovery from a spin entered at a higher altitude has not been completed by the time you pass through 10, 000 feet above the terrain, eject. There will not be enough terrain clearance if spin recovery is not completed by 10, 000 feet.

FLIGHT CONTROL EFFECTIVENESS.

CONTROLLABLE HORIZONTAL STABILIZER.

The one-unit controllable horizontal stabilizer provides good over-all maneuvering characteristics at both subsonic and supersonic speeds. The use of this type control permits operation at all flight conditions with rapid airplane response. The increased response over conventional elevator-type controls should be most noticeable at low altitudes and high speeds; therefore, you should use caution when flying in these conditions in order to avoid excessive G that results from overcontrolling. The airplane can be inadvertently rotated to extreme pitch angles at low airspeeds, because of the relatively large amount of horizontal stabilizer control available.

Airplane response is sluggish during low-speed flight, or at landing speeds, and more stabilizer deflection is required for airplane reaction. Therefore, because of the sluggish airplane response, it is possible to overcontrol the stabilizer without overcontrolling the airplane. Overcontrolling the stabilizer under these conditions can make demands on the stabilizer actuator which are close to the maximum stabilizer rate available. When an instantaneous demand is higher than maximum available rate, the control stick "stiffens" momentarily. This does not mean that the stabilizer has stopped moving, but rather that it is moving at maximum rate, but the pilot is demanding an even higher rate. Response to this condition is instantaneous. "Stick stiffening" can be avoided by smooth coordinated handling of the flight controls, and by anticipating conditions during slow flight or landing approaches that otherwise may cause overcontrolling.

The artificial feel system changes the stick-to-bungee gearing as a function of Mach number between . 80 and . 94 indicated Mach number. As the stick-to-bungee gearing is changed with Mach number, the trim setting is shifted in a direction to correct the stick force reversal at transonic speeds. Maneuvering forces are relatively unaffected by Mach number. Increasing altitude at constant Mach number will, however, still result in maneuvering forces becoming somewhat heavier. An electrical failure will not affect pilot control of the horizontal stabilizer but will result in the trim position remaining fixed throughout the flight range.

AILERON CONTROL.

Because the ailerons are mounted farther inboard than conventional aileron installations, the loss in rate of roll due to the wing twisting under high air loads is minimized. Very high rates of roll can be obtained; therefore, use the ailerons cautiously until thoroughly familiar with their effectiveness. Yaw due to aileron deflection is noticeable in this airplane. Adverse yaw (yaw in the direction opposite to aileron application) occurs at subsonic speeds, and small increments of favorable yaw (yaw in the direction of aileron application) occur in the transonic and supersonic speed ranges. Therefore, when coordinated turns are made at subsonic speeds, the standard practice of applying small amounts or rudder in the same direction as the turn should be followed; whereas, in the transsonic and supersonic speed ranges, it may be necessary to hold small amounts of opposite rudder for coordinated maneuvers. Large adverse yaw angles can be developed at low to medium airspeeds if aileron is reversed abruptly following high rate aileron rolls. If aileron is reduced smoothly, the adverse yaw will not develop.

Warning If airspeed is near stall in either accelerated or unaccelerated flight, do not use ailerons, because this can induce a spin.

RUDDER CONTROL.

The rudder gives effective directional control at all normal flight speeds. Because of the high dihedral-effect (roll due to yaw) common to swept-wing designs, the rudder is very effective in picking up a low wing at low airspeeds. Sufficient rudder is available throughout the flight range for all normal purposes. Abrupt maximum rudder deflections at subsonic speeds should be avoided because of high rudder effectiveness. Sudden application of full rudder at speeds near Mach . 8 results in large yaw angles. Resulting high side forces are imposed on the pilot's body, leading to pilot-induced pitching and rolling oscillations. These pitching and rolling oscillations can be avoided by releasing or returning all controls to neutral.

FLAPS.

The wing flaps extend the useful low-speed flight range of the airplane. They provide for reduced approach and touchdown speeds, improved vision during landing approach because of the lesser nose-up attitude, and shorter landings rolls because of reduced touchdown speeds. Automatic pitch trim correction occurs when the flaps are lowered full down or raised full up from the full-down position. However, there will be no automatic pitch correction when the flaps are lowered to the intermediate position or raised from the intermediate position. If the flaps are lowered to the intermediate position and the airplane is trimmed for this condition, lowering of the flaps full down will then cause the pitch correction of the horizontal stabilizer to tend to overtrim the airplane. Stick forces required to counteract the overtrim condition will be slight (5 pounds or less of back stick). Flap lowering full down is accompanied by buffet which is moderate in magnitude but may give the false impression in turning flight that the airplane is approaching a stall. The buffet due to flap extension is similar to the buffet experienced with only the speed brake extended at low speeds. If the speed brake is fully extended when the flaps are full down, the buffet increases to a level which may be considered objectionable. This buffet may be reduced to a more acceptable level by partial retraction of the speed brake.

SPEED BRAKE.

The speed brake is very effective and creates a considerable amount of drag with little objectionable buffeting. It may be used at any time to slow the airplane with small trim changes required. When the speed brake is full out at low speeds, it creates a mild buffet which could give a false impression that the airplane is nearing stall. Heavier buffet is encountered when the speed brake and flaps are both extended to the full-down position. Speed brake extension at high indicated airspeeds and at supersonic speeds may cause the airplane to yaw slightly, because of some asymmetry in shock wave formation on the speed brake. In addition, when stores or pylons only are installed at the inboard stations, extension of the speed brake near the limit airspeed causes directional and longitudinal trim changes. The smaller the loads or pylons, the less the trim changes.

NOTE Although the speed brake may be used at any speed, a relief valve in the hydraulic line allows the speed brake to retract when aerodynamic loads become excessive. The speed where air loads will cause the speed brake to start to retract varies from about 500 knots IAS at 10,000 feet to about 580 knots IAS at 30,000 feet.

SLAT OPERATION.

Wing leading edge slats are installed to improve airplane stability at high angles of attack, to decrease airplane drag in maneuvering flight, and to delay the onset of buffet. The slats are designed to operate at both low and high Mach numbers. Slat operation is automatic, and depends on airspeed and the angle of attack of the airplane. The slats normally are open at low speeds and fully closed for climb, cruise, and high-speed flight. To delay the onset of buffet and to increase the lift available, the slats open at high Mach number when nearing the airplane ceiling, or when pulling moderate G. Opening of the slats under these conditions is normal and beneficial to over-all performance.

LEVEL-FLIGHT CHARACTERISTICS.

LOW SPEED.

Recommended speeds for take-off, approach, and landing phases of flight are given in T.O. 1F-100A-1-1. Handling characteristics at low speeds are influenced by the basic drag and angle-of-attack variations. As a result, essentially two speed ranges exist: one, speeds above touchdown speed; and two, speeds from touchdown to stall.

Above Touchdown Speed.

Above the touchdown speed, flight characteristics are conventional, with normal control effectiveness and airplane response. The high wing loading of the airplane requires high engine thrust settings for flight in this speed range.

Below Touchdown Speed.

At speeds below touchdown, airplane behavior is greatly influenced by the angle of attack required. Longitudinally, the airplane can be flown down to the minimum speeds using about one-half to three-fourths stabilizer travel. Since the available stabilizer control has been primarily provided for high Mach number maneuverability, more than adequate control is available at low speed. Thus, it is possible to fly the airplane to angles of attack well above the normal touchdown angle. In this nose-high attitude, however, airplane response is slow; drag is high, with resulting high rates of decent; or, to maintain constant altitude, very high engine thrust is required. The high dihedral-effect associated with high angles of attack (roll due to yaw) requires that sideslip be kept at a minimum to avoid any roll-off tendency. If sideslip is allowed to progress at speeds close to stall, the ailerons alone cannot overcome the resulting roll due to sideslip. However, zero sideslip can easily be maintained with the rudder at speeds down to and including stall. It is also doubly important to consider the rate-of-descent variation with speed during the landing approach. At speeds below the recommended minimum touchdown speed, the rate of descent for a given power setting increases rapidly as the speed is reduced. In view of the higher rates of descent and inability of the airplane to flare at these low speeds, the airplane should not be flown below the recommended minimum speeds, except at altitude during familiarization and test flights. In addition, touchdown at airspeeds under the recommended minimum would require such a high angle of attack that the tail skid would contact the runway before the main gear.

NOTE Approach and touchdown speeds, which vary with gross weight, are shown on the landing distance charts in T.O. 1F-100A-1-1.

CRUISE SPEEDS.

At moderate speeds, the airplane handling characteristics and control effectiveness are excellent. A large amount of power is available for rapid airplane acceleration.

HIGH SPEEDS.

An outstanding feature of the airplane is its ability to attain high speeds and Mach numbers. Little or no lateral or directional trim changes are encountered, and control is effective and positive. Stick force gradient reversal in the transonic speed range is essentially eliminated by the gradient changer in the artificial feel system. Because of the excellent aileron effectiveness at high speeds, large aileron movement should not be attempted until you are thoroughly familiar with the response. No wing drop in the transonic Mach number range is encountered.

FORMATION.

Longitudinal sensitivity is increased in the vicinity of trim. When the airplane center of gravity is near the aft limit, such as when ammunition has been expended, difficulty may be experienced in maintaining good formation. This will generally be noticed only in turbulent air in the speed range around Mach .8. A light grip on the control stick alleviates overcontrol tendencies resulting from turbulence, since the tendency for forces on the pilot's body to be transmitted to the control stick are reduced.

MANEUVERING-FLIGHT CHARACTERISTICS.

MANEUVERABILITY.

Maneuvering flight stick force gradients are essentially linear with G and remain relatively constant with changes in Mach number and altitude. Increasing altitude at constant Mach number will, however, result in maneuvering forces becoming somewhat heavier.

DIVES.

In high Mach number dives and maneuvers, stability and control characteristics are very good. The stick forces remain at a comfortable level and no adverse airplane or control characteristics prevail. To obtain the maximum dive Mach numbers, you should use a shallow dive angle at high altitudes in order to gain the utmost speed from the engine thrust available; then, push over into successively steeper dive angles, holding as closely to a zero G condition as is practicable. Caution must be used to maintain fuel flow and oil pressure within limits.

DIVE RECOVERY.

Stabilizer stick forces for recovery are reasonable and well within pilot capabilities. Because of the ease of control, you should take care not to develop excessive G by overcontrolling.

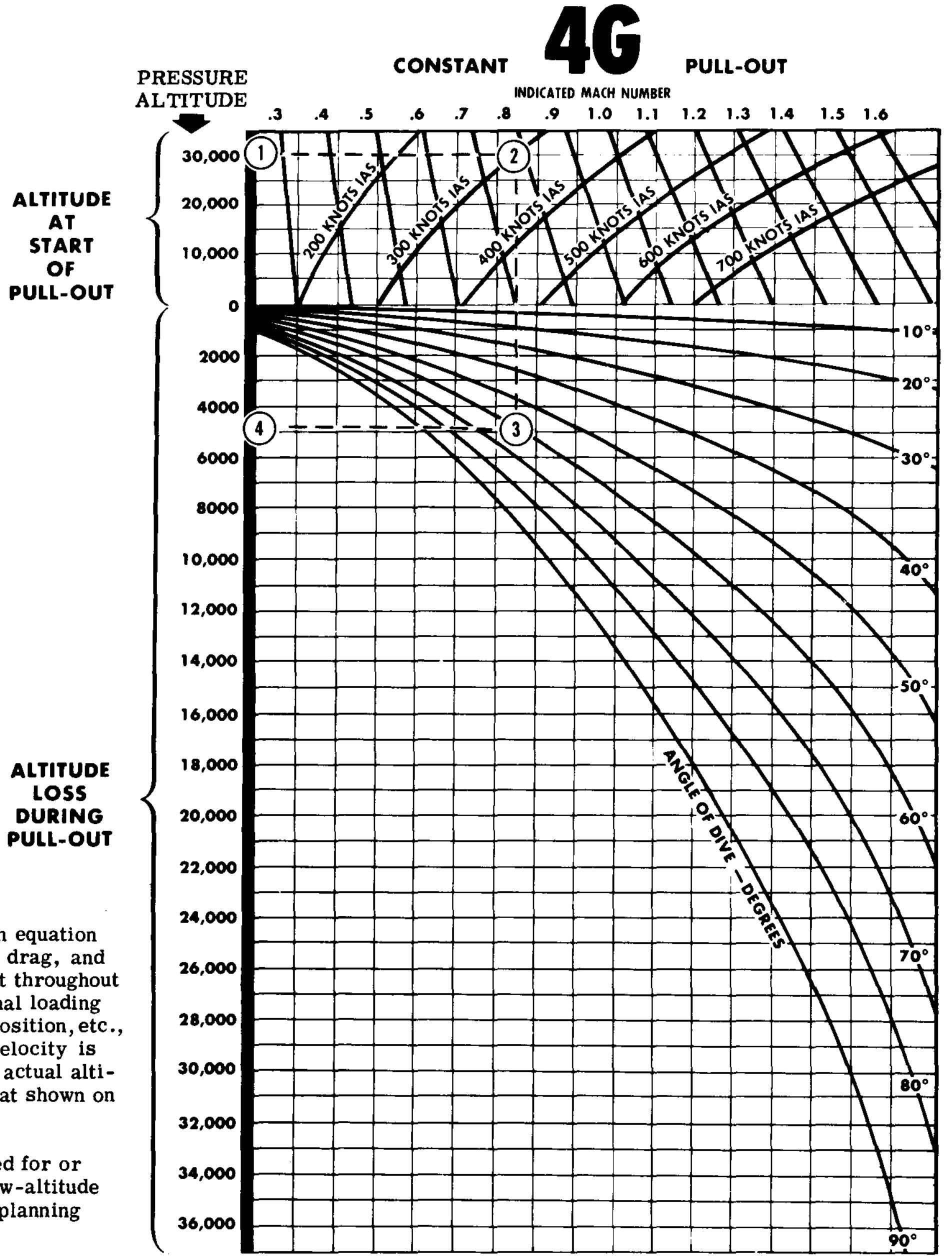
Altitude Loss in Dive Recovery.

The altitude lost during dive recovery is determined by four interdependent factors: (1) angle of dive, (2) altitude at start of pull-out, (3) airspeed at start of pull-out, and (4) the G maintained during pull-out. Because these factors must be considered collectively in estimating the altitude required for recovery from any dive, their relationship is best presented in chart form, as shown in figure 6-4. Note that one of the charts is based on a 4 G pull-out, and the other on a 6 G pull-out. Compare the altitude lost during recovery from a 4 G pull-out with the altitude lost during recovery from a 6 G pull-out; also, compare the effects of variations in the other three factors. Remember that a value obtained from either chart is the altitude lost during recovery - not the altitude at which recovery is completed. Therefore, in planning maneuvers that involve dives, consider first the altitude of the terrain, and then use the charts to determine the altitude at which recovery must be started for a pull-out with adequate terrain clearance. In using the charts, you should allow for the fact that, without considerable experience in this airplane, you cannot determine exactly what your dive angle and speed are going to be at the start of a pull-out. If you come out of a split "S" or other high-speed maneuver in a nearly vertical dive, speed builds up rapidly. Consequently, until you know the airplane well, go into the chart at the highest speed and dive angle you might expect to reach after completing your maneuvers. Maneuvers should be planned so that if they terminate in a near-vertical dive, the airplane may be pulled on through to a more shallow dive angle before the speed becomes excessive.

ROLLING PULL-OUT.

When rolling pull-outs are performed at supersonic speeds, sudden reduction in G coupled with large changes in aileron deflection may produce moderately high yaw angles. Therefore, the proper technique for recovery from a rolling pull-out at supersonic speed is to neutralize the ailerons while holding constant G. After the roll has stopped, acceleration force may be reduced to 1 G flight condition. Abrupt use of the horizontal stabilizer should be avoided.

ALTITUDE LOSS IN



WARNING

- These charts are based on an equation which assumes thrust equals drag, and therefore velocity is constant throughout the maneuver. Thus, external loading configuration, speed brake position, etc., need not be considered. If velocity is reduced during the pull-out, actual altitude loss will be less than that shown on the charts.
- These charts are not designed for or considered safe for use in low-altitude tactical planning. For such planning refer to T.O. 11BA1-4.

HOW TO USE CHART

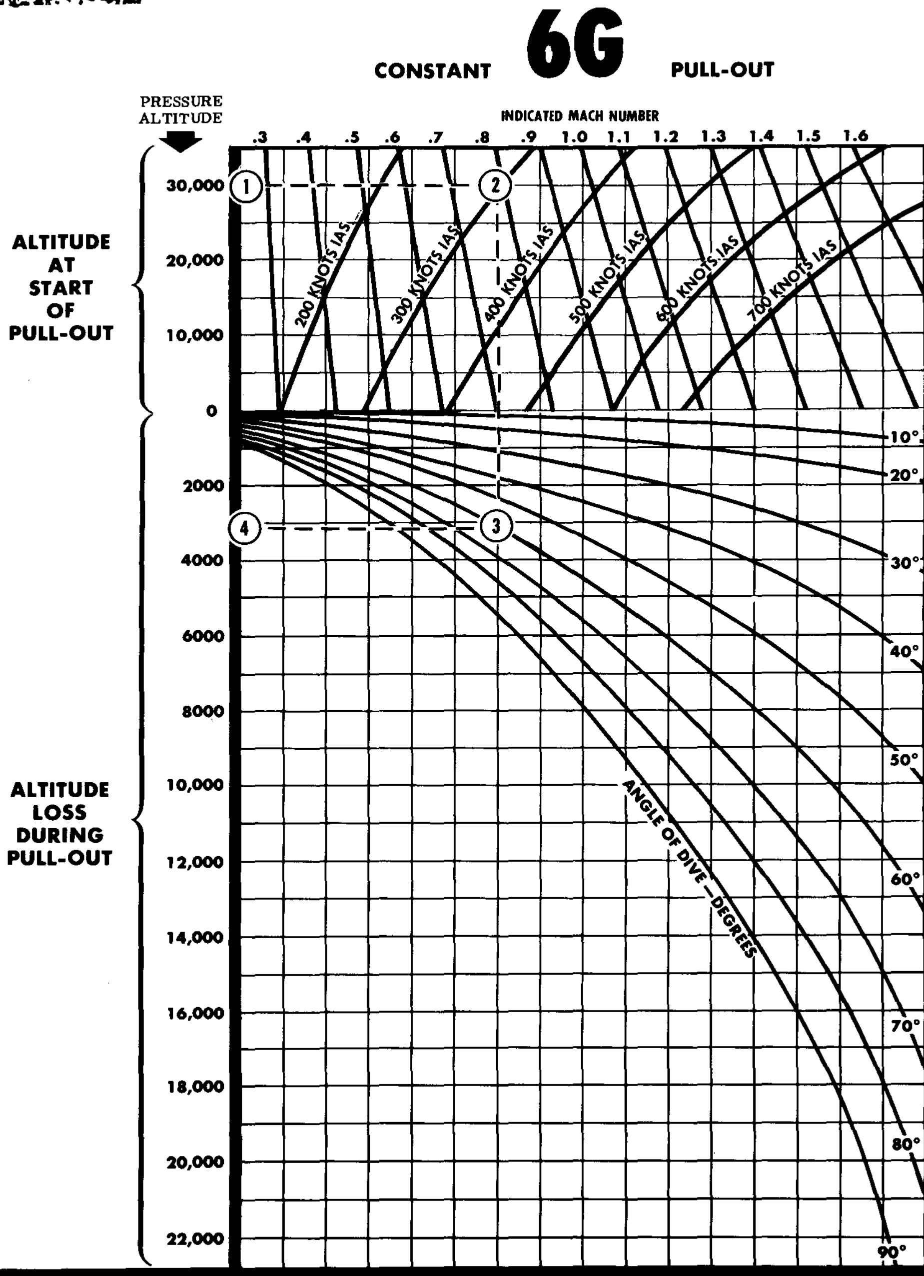
NOTE

Altitude loss may be computed by use of either indicated airspeed or Mach number

F-100D-1-93-176B

Figure 6-4

DIVE RECOVERY



Select appropriate chart, depending on acceleration (4 G or 6 G) to be held in pull-out; then—

1. Enter chart at altitude line nearest actual altitude at start of pull-out (for example, 30,000 feet).
2. Move horizontally along altitude line to the indicated airspeed at which pull-out is started (300 knots IAS).
3. Move vertically down to point on curve of dive angle (60°).
4. Move horizontally to left to altitude scale to read altitude lost during pull-out (constant 4 G pull-out 4900 feet; constant 6 G pull-out 3200 feet).

F-100D-1-93-175C

ROLLS.

The aileron system is designed to produce adequate roll rate at maximum dive speed; therefore, roll rate can be expected to be quite high at lower speeds when full aileron deflection is used. Because of several aerodynamic effects, rolling is accompanied by a tendency to yaw. Through an effect known as inertial coupling, any yaw that does develop is accompanied by pitching. The tendency to yaw is opposed by the vertical stabilizer. As long as established roll limits are observed, the airplane exhibits only minor yawing tendencies. Refer to "Prohibited Maneuvers" in Section V for roll limits. High roll rates are available with considerably less than full aileron deflection under most operational flight conditions, and inertial coupling will not be encountered as long as roll rates are kept at a level that is comfortable to the pilot. In addition, use of the dampers reduces the inertial coupling effect somewhat. If inertial coupling is encountered during high-rate rolls, smoothly reduce aileron deflection until the roll rate is normal and the pitching motions cease.

ANGLE OF ATTACK.

Airplane angle of attack is a function of airspeed, dive angle, altitude, gross weight, and load factor. It varies inversely with change in airspeed and dive angle and directly with change in altitude, gross weight, and load factor. The effect of angle of attack must be considered in rocket firing and bombing missions. For additional information, refer to "Angle-of-attack Relationship" in Section IV.

SHOCK-INDUCED BUFFET.

Airplane buffet is encountered at transonic speeds at high altitude. This buffet is induced by a spanwise shock wave which occurs on the wing at these flight conditions. Turbulent separation occurs behind the shock, and it is this separation of the airflow that produces the shock-induced buffet. Since this condition can occur in 1 G flight, it has been popularly called "1 G buffet" to differentiate it from stall buffet. However, shock-induced buffet can occur in maneuvering flight when the wing shock appears before the stall buffet is reached. On this airplane, the shock is sufficiently far forward on the wing in 1 G flight condition to affect the two outboard slat segments. The pressure disturbances resulting from the shock cause these two slat segments to work out and in. This erratic slat operation produces roll, yaw, and pitch oscillations (wallowing). This buffeting and wallowing problem is minimized by a wing fence on the upper surface of each wing panel and by blocking the two outboard slat segments on each wing panel 2 degrees open. Regions in which buffet and wallowing are encountered are shown graphically in figure 6-5. Buffet is mild as the buffet region is entered. It grows in intensity to a general airplane buffet as the region is penetrated. It should be noted that the air-

REGIONS OF BUFFET AND EFFECTS ON MANEUVERABILITY

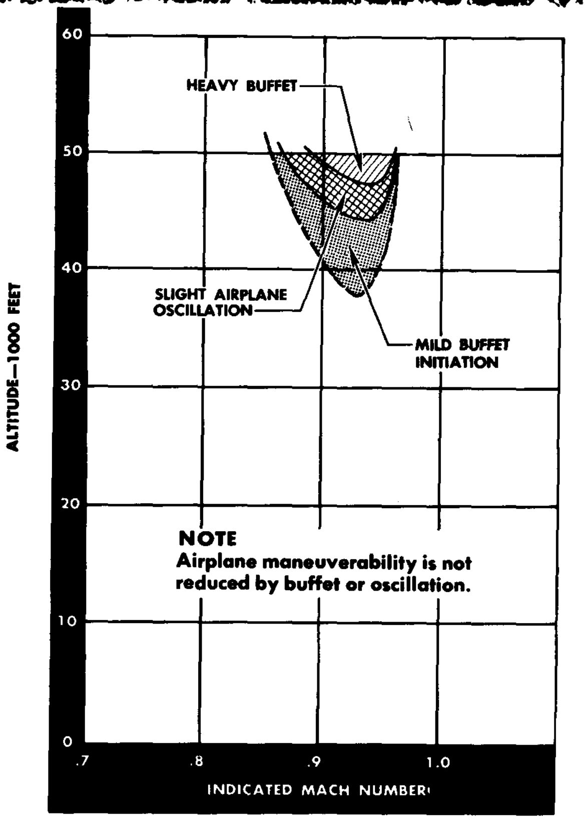


Figure 6-5

plane will not encounter shock-induced buffet in the cruise condition. Buffet is only encountered mildly at very high altitude when climbing on recommended climb schedule.

FLIGHT WITHOUT CANOPY.

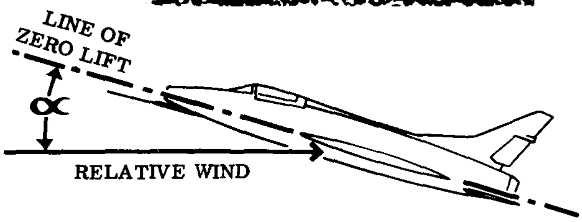
If unintentional release of the canopy occurs in flight, no adverse flight characteristics result. Wind noise in the cockpit is high, and the wind blast may cause the eyes to water even with the helmet visor down. Leaning forward in the cockpit reduces these discomforting conditions. Approach and touchdown speeds remain unchanged.

SUMMARY OF LOW-SPEED HANDLING CHARACTERISTICS.

AERODYNAMIC CONSIDERATIONS.

Angle of attack is illustrated in figure 6-6. This is the parameter to keep in mind. Angle of attack is

ANGLE OF ATTACK

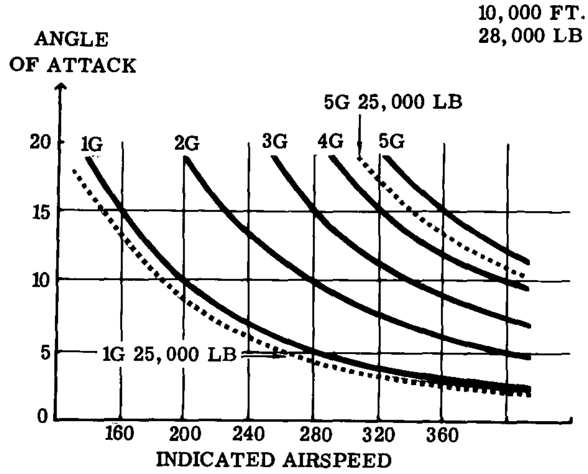


- ANGLE OF ATTACK IS THE ANGLE BETWEEN THE ZERO LIFT LINE AND THE RELATIVE WIND LINE
- IT IS INDEPENDENT OF ATTITUDE
- ANGLE OF ATTACK AT 160 KNOTS INDICATED AT 10,000 FT, 28,000 LB AT ONE "G" IS APPROXIMATELY 15 DEGREES
- ANGLE OF ATTACK AT 320 KNOTS INDICATED AT 10,000 FT, 28,000 AT 4 "G"S IS ALSO APPROXIMATELY 15 DEGREES

F-100-1-93-576

Figure 6-6

INDICATED AIR SPEED AND G EFFECTS



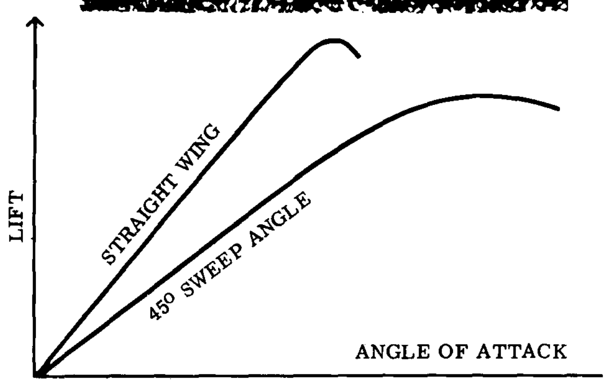
F-100-1-93-578

Figure 6-8

the most important item affecting the stability and control characteristics of the airplane, and it is important to remember that the airplane can be at a high angle of attack in any attitude.

Figure 6-7 illustrates that, with a sharply swept wing, an airplane must be at an appreciably higher angle of attack in order to produce the same lift as a straight-winged airplane. Furthermore, the graph demonstrates that the stall characteristics are not sharply defined. Note that as the wing assumes higher and higher angles, the lift gradually ceases to increase and eventually declines with no distinct break.

LIFT VS ANGLE OF ATTACK



F-100-1-93-577

Figure 6-7

AIRSPEED AND G-EFFECTS.

The important question is "What conditions produce a given angle of attack?" In the landing condition, the ground gives a handy reference to judge angle of attack. In the last part of the final approach, the airplane is beginning to handle sluggishly. Control response is slow. Proximity to the ground accents awareness the airplane's behavior. Now, referring to figure 6-8, note that at higher speeds, when pulling G, the airplane will be at the same angle of attack as for 1 G at a slow speed. The example in figure 6-6 illustrates this point: In 1 G flight at 160 knots IAS, the angle of attack is the same as in 3 G flight at 320 knots IAS, and the handling qualities are about the same. Figure 6-8 also illustrates the effect of weight. Note that the airplane requires less angle of attack to pull 5 G at a given airspeed at 25,000 pounds than at 28,000 pounds.

CONTROL RESPONSE.

Now that high angles of attack have been mentioned, examine control response under these conditions. Figure 6-9 illustrates the relative effectiveness of aileron and rudder as the angle of attack increases. Note that the rolling moment produced by maximum aileron drops rapidly at higher angles of attack,

LATERAL-DIRECTIONAL CONTROL RESPONSE

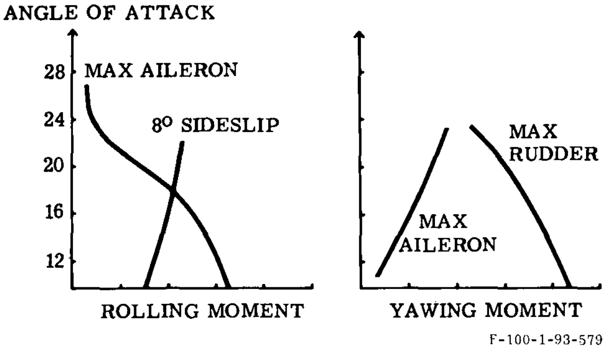


Figure 6-9

while concurrently the adverse yawing moment is increasing rapidly. At the same time, the yawing moment which maximum rudder can produce is declining so that a situation can be reached where the ailerons produce as much adverse yawing moment as the rudder can correct. At high angles of attack, sideslipping produces more rolling moment than the ailerons. Thus, a situation develops where the most effective way to roll is by use of the rudder. This phenomenon is called "dihedral effect" and is illustrated in figure 6-10.

LOW-SPEED DESIGN REQUIREMENTS.

Some of the characteristics of F-100D and F-100F

DIHEDRAL EFFECT (ROLL DUE TO SIDESLIP)

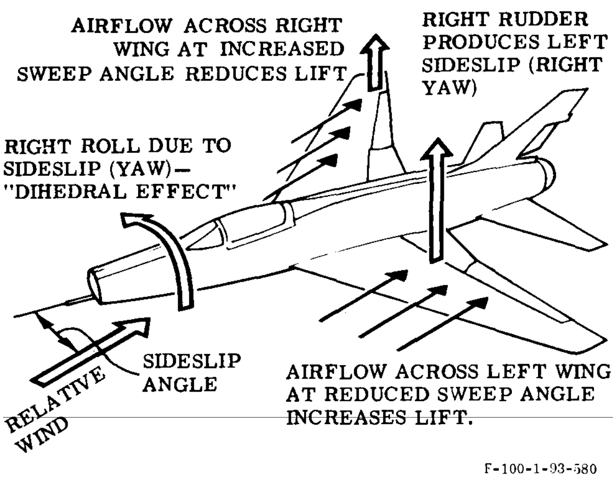


Figure 6-10

Airplanes are better understood if the requirements to which the airplanes were built are known.

Longitudinal Control.

For subsonic airplanes, the most critical requirement for stabilizer or elevator angle is the landing requirement. If the elevator or stabilizer angle is sufficient to stall the airplane in ground effect at the forward center-of-gravity position, there is generally sufficient longitudinal control to accomplish all the maneuvering required of the airplane.

For the F-100D and F-100F supersonic fighter-bomber type airplanes, higher stabilizer angles are required in supersonic maneuvering flight at high altitude than are needed for landing. The airplane has a 25-degree leading edge down horizontal stabilizer, but only approximately 15 degrees is needed for landing.

Coupled with the indefinite stall previously described, the airplane has the ability to reach and fly at very high angles of attack.

Lateral Control.

The design requirement which was most critical with respect to lateral control was, in simplified form, 30 degrees per second roll rate at 140 knots. To achieve this requires large aileron deflection, which in turn results in extremely high roll rates at high speeds.

Any airplane which rolls has a certain amount of yaw in the opposite direction due to rolling velocity. The downgoing wing has an increased angle of attack, which has the effect of tilting the lift vector forward. The upgoing wing has the opposite situation. This results in a yawing moment away from the direction of the roll.

At high angle of attack in aileron-equipped air-

ADVERSE YAW-SHOWING DIFFERENTIAL DRAG ON AILERONS

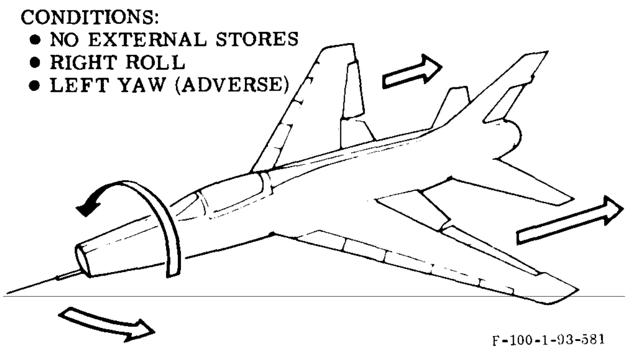


Figure 6-11

planes, the down aileron has more effect in contributing to the roll. It also has considerably more drag. Added to the yaw due to rolling velocity and some secondary effects, the total adverse yaw is a major factor in the high angle-of-attack flight regime of this airplane. Figure 6-11 illustrates the forces producing this adverse yaw.

Directional Control.

Twenty degrees of rudder deflection in each direction is provided. The principal design criteria, again simplified, was to be able to achieve a 10-degree sideslip at 130 knots and to land in a 90-degree crosswind of 35 knots velocity. Abrupt rudder deflections should be avoided at high subsonic indicated airspeeds, as there is enough rudder power to cause excessive sideslip angles and this can result in pilot-induced rolling and pitching oscillations.

LOW-SPEED FLIGHT CHARACTERISTICS.

Minimum Control Speed.

It is easier to describe an airplane's high angle-of-attack handling characteristics by reference to its reactions to a gradual 1 G deceleration, because the various phenomena can be described as they are encountered. Mild stick-force lightening and buffet caused by the stalling of the wing tips is the first warning of approaching high angle-of-attack conditions. This is termed minimum control speed, because as the airplane is slowed further, increasing buffet and gradual lateral control deterioration occur, making controlled flight more and more difficult.

The rate of descent will increase, but the airplane can be controlled down to as low as 105 to 110 knots before the stick reaches the aft stop.

In accelerated flight, these characteristics occur at essentially the same angle of attack as they do in 1 G flight. However, high-altitude buffet, plus the more rapid onset of the various warnings, may give a different impression. This is particularly true with rapid changes in angle of attack, where it is possible to pass through the various symptoms so rapidly that there is no time to react to their warning.

When entering a high-G turn, the usual tendency in this airplane is to be slipping (ball low). Because of dihedral effect, the airplane tends to roll out. This is counteracted with bottom aileron. As angle of attack is increased, this aileron deflection begins to produce yaw in the opposite direction (adverse yaw) which increases the slip, increasing the tendency to roll out. As this situation builds up, it is possible to roll against a considerable amount of aileron deflection.

With variations in pilot technique, it is also possible that a particular airplane will roll "under" in a high angle-of-attack turn.

Smooth, coordinated flying with extra attention to sideslip will minimize the effects of this characteristic. When the airplane begins to respond in this way, it is a warning that the angle of attack is reaching a critically high value, and a slight forward stick movement to reduce this angle of attack will restore good control.

Stores and Pylons.

Pylons mounted at the inboard stations, particularly the larger type, have the same effect as removing some of the vertical stabilizer area. These pylons will decrease directional stability, causing the airplane to be difficult to trim directionally. A yawing oscillation will be present under many conditions when the yaw damper is inoperative, and sometimes at high angles of attack when the yaw damper is operative but the gain is not sufficient to meet the high demands imposed by decreased directional stability.

Stores mounted at the intermediate station have very little effect on directional stability but generally do decrease longitudinal stability slightly. Stores mounted at the outboard station increase directional stability but, by moving the center of gravity rearward, they cause deteriorated longitudinal handling characteristics.

In addition to the static stability effects, the increased inertia of the airplane with external stores causes response to be reduced, resulting in an increased requirement for smooth flying. The heavier the load, the more pronounced is the effect.

The characteristics described in the preceding paragraphs apply to both symmetrical and asymmetrical configurations. (Obviously, one inboard pylon is less destabilizing than two.) When the air-

ASYMMETRIC CONFIGURATION (TRIMMED FOR LEVEL FLIGHT)

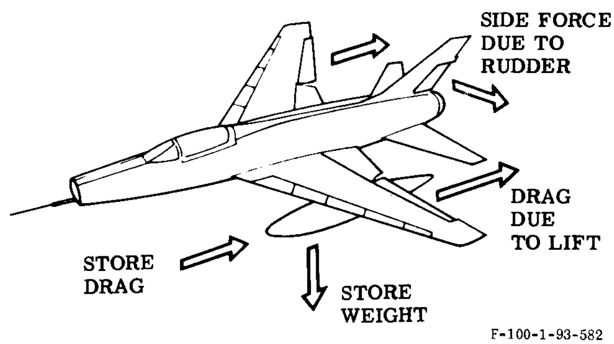


Figure 6-12

plane carries an asymmetrical load, even simply pylons, additional deteriorating effects are noted. Lateral and directional trim changes continuously with speed and angle-of-attack changes. Figure 6-12 illustrates the forces on the airplane in level flight. It should be noted that the aileron deflection for level flight is similar to that establishing a right roll with the clean airplane. Since this airplane will not spin unless aileron deflection is present, it is logical that if the airplane is asymmetrically configured, it is more susceptible to spins.

SPINS AND SPIRALS.

Spin VS Spiral.

It is possible to get this airplane into a high angle-of-attack descending turn which some pilots have mistaken for a spin. During the spin test program, this maneuver was entered from 1 G flight with the stick full back, without aileron, and full rudder applied either left or right. The airplane rolled over slowly in the direction of applied rudder and entered a vertically descending roll with very slowly increasing airspeed. The airplane will do essentially the same thing with some aileron applied, turning or rolling in the opposite direction from the applied aileron. It must be emphasized that the amount of aileron which can be used without entering a spin depends on many variables, including the rigging of the particular airplane, the Mach number, angle of attack, pitch attitude, weight, etc. Recovery from this type of maneuver is immediate upon application of forward stick. Generally, releasing back stick will be sufficient, but if full aft trim has been applied, some forward pressure may be necessary. Obtaining approximately neutral horizontal stabilizer is the objective, and pushing the "PUSH TO TRIM FOR TAKE OFF" button is one way to ensure this.

It is possible to be in a high angle-of-attack descent without roll with stick full back. It is the same basic maneuver as the spiral, and recovery is effected in the same way.

Spin Characteristics.

During the spin test programs for these airplanes, most spins were entered from 1 G flight with full back stick, full aileron, and full opposite rudder. The airplane initially rolls in the direction of applied rudder for up to a quarter turn and then rather abruptly begins to yaw in this same direction. At one-half turn, the nose is low (approximately vertical) and the yaw rate momentarily slows. It then picks up and the nose comes up so that at one turn the airplane again hesitates and the nose is on or slightly above the horizon. As the spin progresses, the yaw rate smooths out and the pitch attitude begins to stabilize with the nose about 20 to 30 degrees below the horizon (the angle of attack is 60 to 70 degrees since the airplane's flight path is vertical). A turn will be completed in about 4 to 5 seconds, and the most obvious characteristic from the cockpit is the horizon rapidly going by. The airspeed will oscillate between zero and minimum control speed.

One of the reasons for the large difference in pitch attitudes at the various headings of the first turn or two is that the axis about which the airplane is spinning is initially near horizontal. As the dynamic oscillations of the entry damp out and the spin axis becomes vertical, the spin becomes essentially steady.

Entries from high-G turns were also performed in the spin programs and resulted in the same type spins, Because of the additional speed, the initial gyrations were more violent, and more time was required for the spin axis to become vertical.

All these test spins were aggravated by holding full "pro-spin" controls for three full turns, by which time the airplane had generally settled into a steady, relatively flat spin. It should be emphasized again that, although full aileron was used during the spin tests, spins can be encountered with aileron deflections less than full. A very limited number of spins with the flaps full down in the F-100D Airplane indicated that aileron deflections of considerably less than half could cause a spin. For this reason, it is strongly recommended that high angle-of-attack maneuvering be limited to a flaps-up configuration.

The only external store configuration spin-tested was with two 275-gallon tanks (air superiority - take-off). Results indicated an increased number of turns for recovery, which led to the recommendation that all external stores and pylons be jettisoned as part of the recovery procedure.

Because of the longer nose of the F-100F Airplane, the forces tending to keep the airplane in a spin are increased, and if a fully stabilized spin is developed, it is unlikely that recovery can be effected. However, recovery should always be attempted in both F-100D and F-100F Airplanes and recovery controls continuously applied until recovery occurs or 10,000 feet is reached. Each spin is different, and a pilot who has not been in a spin in this airplane before cannot judge the severity of a particular spin.

Spin Prevention.

If spin accidents are to be avoided, some common sense rules must be followed. The first and most obvious is "know your airplane." Practice low-speed flight in a clean configuration. As previously noted, inboard pylons with or without stores decrease directional stability. All stores have some adverse effect on general handling qualities.

Practice with plenty of altitude; the minimum should be at least 20,000 feet above the terrain.

Know the 1 G characteristics thoroughly; then work on smooth accelerated maneuvers.

Recognize warnings with respect to angle of attack. Remember that at high altitude your Mach number is higher for the same airspeed, so buffet can occur at or near 1 G.

Avoid abrupt control motions. The proficient pilot can get maximum response with smooth application of controls. If yaw, pitch, and roll rates build up sharply, you can get past the warnings before you recognize them.

Stay off the ailerons. Ailerons are the critical factor at high angles of attack. Use "dihedral effect" to roll the airplane.

Remember the airplane responds to angle of attack. Ease off on angle of attack, and you will regain control.

ACM PRACTICE.

ACM practice is necessary to achieve and maintain proficiency in offensive and defensive air tactics. Maximum performance maneuvering is important, but there are other factors which are equally important.

Recognition of enemy aircraft and armament is vital. If the opponent has missiles, his tactics, and yours, will be different than when he is pressing a gun attack. Know the enemy's capabilities and his limitations. Develop effective teamwork within your flight.

In practice, you are generally pitting one F-100 against another. Your capabilities are the same; so there is a powerful tendency to progress rapidly to minimum speed with the winner generally determined by which one is willing to take the most chances.

In general, no airplane should be flown at minimum speed. The best maneuvering speed is well above minimum. If you can entice a faster enemy into maneuvering at your best speed, you will have him. On the other hand, you should never tangle with a slower adversary at his best maneuvering speed.

In general, the only cases where maximum performance maneuvering in the critical angle-of-attack regime may be required are when you, for some reason, find yourself too slow and need a last-ditch maneuver to survive, or when the adversary has a missile and you have to take drastic action to get out of the launch envelope.

FLIGHT WITH EXTERNAL LOADS.

NORMAL LOADING CONFIGURATIONS.

NOTE Normal loading configurations are approved configurations, including those resulting from proper sequencing of drop tank fuel and release of external loads.

In general, both longitudinal and directional stability are slightly decreased in the various combinations of normal symmetrical and asymmetrical external loading configurations. The amount of decrease varies with the shape and weight of the loads and their locations on the wing. The cleaner the load, the less its effect on the flight characteristics of the airplane. For example, the 275-gallon drop tanks have a negligible effect on the handling characteristics of the airplane. By comparison, the 450-gallon drop tanks cause a noticeable reduction in longitudinal and directional stability. In addition, when the 450-gallon drop tanks are empty and the airplane is flown in the speed region above 500 knots IAS, longitudinal sensitivity is increased and maneuvering stick forces are relatively light. The heavier the loads carried, the more sluggishly the airplane handles. The stabilizing forces on the vertical and horizontal stabilizers are unchanged, but increased inertia makes return to trim following a disturbance slower and increases overshoot tendencies. Location of the loads on the wing affects longitudinal airflow characteristics and directional stability, in addition to changing the center of gravity. When the 275-gallon drop tanks are installed at the intermediate stations, and 1000-pound bombs at the inboard stations, directional stability is somewhat decreased because of the inboard pylons, and dampers should be used to reduce the lateral-directional oscillations which may occur at high speeds.

NOTE During take-off and landing, the dampers should not be engaged.

Loads mounted at the inboard stations, although they move the center of gravity forward, decrease directional stability of the airplane because they are forward of the center of gravity, thus detracting from the stabilizing effects of the vertical stabilizer. The cleaner and smaller the load at this station, the less this effect and the less the change in airflow over the horizontal stabilizer. For example, the directional destabilization which occurs with the Type X launcher - AGM-12A series missile combination inboard is only about one-half of that with the Type I Mod II pylon and launcher - AGM-12A series missile combination installed.

NOTE Deterioration of flying qualities due to external stores and pylons is greatest when the stores or pylons are at the inboard stations. Therefore, if operational conditions permit, do not carry pylons at the inboard stations.

In the external loading configuration that includes 275-gallon drop tanks at the intermediate stations, 200-gallon drop tanks at the inboard stations, and the MK-28 store on the airplane centerline, take-off speeds naturally are high, and the airplane handles somewhat sluggishly immediately after take-off. Again, the inboard tanks and pylons, principally, affect directional stability. Wallowing, experienced in rough air as a result of this decreased stability, can be largely reduced by use of dampers. However, even without the dampers, the airplane is safe up to the limit airspeed. With only the MK-28 store installed, there is virtually no effect on airplane stability. However, with the inboard pylons retained along with the MK-28, a lateral-directional oscillation can be experienced at supersonic Mach numbers at high altitude. Use of the dampers reduces this oscillation. Without the dampers, the frequency of oscillation is such that the pilot cannot stop the oscillation and he actually makes it worse by use of aileron and rudder. The dampers should always be used to minimize the oscillations, and the pilot should attempt to avoid using the ailerons while this oscillation is present. A similar oscillation occurs in rough air at low altitudes and high subsonic speeds when the inboard pylons are installed.

Normal Asymmetrical Loading Configurations.

The installation of asymmetrical loading configurations has certain deteriorating effects on flight characteristics beyond those encountered with symmetrical loading configurations. The following paragraphs present information on normal asymmetrical loading configurations. The most extreme normal asymmetrical loading configuration is that of only the MK-28 (or MK-7) special store installed at the left intermediate station. The following procedures and information pertain generally to this extreme configuration. For less extreme normal asymmetrical loading configurations, the deviation from normal techniques and flight characteristics is proportionately less.

TAXIING. In general, ground handling is influenced by the asymmetrical weight distribution between the left and right wings and requires more-than-usual nose wheel steering during taxiing.

TAKE-OFF. At start of take-off roll, maintain heading by use of nose wheel steering up to at least 135 knots IAS. Upon release of nose wheel steering, simultaneously apply right rudder to prevent airplane from skidding. (This is particularly necessary in gusty wind conditions.)

NOTE As airspeed increases, the amount of right rudder deflection required decreases proportionately.

At 10 knots IAS above computed nose rotation speed, slowly apply back pressure. More right rudder will be needed as the nose is raised. The attitude should be established so that the airplane will lift off the runway at about 10 knots IAS above computed take-off speed. Be prepared to correct for a possible yawing tendency as the airplane becomes air-borne. Do not pull the airplane off. If you do, the tendency of the airplane to yaw to the left and then roll to the left will be increased.

NOTE If the airplane is allowed to yaw at lift-off, a moderate left-wing roll is encountered. This can be corrected by use of the rudder and aileron.

- A small amount of aileron trim is desirable, but optional, for take-off. If it is used, set left aileron so that its trailing edge is about 3/4 inch below the wing trailing edge.

Instrument take-off with asymmetrical loading configurations is not recommended. Directional control during take-off and initial climb is critical. If such a take-off must be made, the airplane should be trimmed out after take-off before entering the overcast.

CRUISE FLIGHT. With asymmetrical loading configurations, any change of airspeed causes the airplane to yaw. This must be trimmed out.

SPEED BRAKE OPERATION. When the special store is installed at the left intermediate station and when drop tanks or pylons are installed at the inboard stations, a right yawing moment is experienced when the speed brake is extended. To minimize the effect of the yaw condition, open the speed brake in small increments and apply left rudder as necessary to maintain heading. The magnitude of the yaw is proportional to airspeed.

AFTERBURNER OPERATION. When the afterburner is ignited in flight with an asymmetrical load, a nose-down pitching moment is encountered because the axis of thrust is above the center of gravity of the airplane. (Center of gravity is lowered vertically with the addition of heavy external loads.) This trim change due to thrust can easily be corrected. When the afterburner is shut down, a nose-up moment is encountered. A slight directional disturbance may also be encountered with use of the afterburner.

HOLDING OR LOITERING. Holding or loitering with asymmetrical loads above 30,000 feet is not practical because of power requirements. If holding or loitering is required, it should be accomplished at maximum endurance speed.

HIGH-SPEED FLIGHT. With asymmetrical loads, the airplane encounters store buffet at about Mach .85 to .90. This increases in intensity up to the limiting Mach number. At Mach .93, wing roll is encountered but is controllable with ailerons. The airplane encounters a change in directional trim as airspeed is increased.

MANEUVERING FLIGHT. Asymmetrical loading configurations will present lateral-directional control problems in maneuvering flight near limit load factor or stall speed. The weight of the asymmetrical load produces a rolling moment which increases in direct proportion to airplane load factor. Thus, the aileron required to balance this rolling moment increases with increasing G. At high load factor or near stall speed, the aileron effectiveness deteriorates, and greater aileron deflections are required to overcome the wing-heavy condition caused by the asymmetrical loading. In a rolling maneuver where G is pulled, it is possible to reach a condition of speed and G where full aileron control will not overcome the rolling moment caused by the asymmetrical load. If this occurs, lateral control can be regained only by relaxing back stick pressure and reducing angle of attack or G.

A directional control problem is also produced by the yawing moment due to store drag and the yawing moment induced by the aileron deflections required to hold up the heavy wing. These yawing moments tend to be additive as airplane load factors is increased or speed reduced, resulting in an increased tendency for the airplane to yaw toward the wing with the higher store drag. The net effect of these yawing moments may be favorable (into the turn) or adverse (out of the turn), depending on the direction of the turn and the amount of aileron required to balance the asymmetrical load in the accelerated maneuver.

Warning When asymmetrical loading configurations are flown, avoid maneuvering near limit load factor or stall speed. If it is necessary to fly near stall speed, use extra care in keeping the maneuver coordinated (ball centered). If the airplane does stall, the yawing moments caused by the asymmetrical load and the aileron required to balance the load may tend to induce a spin.

LANDING. When normal asymmetrical loading configurations are installed, sufficient rudder and aileron effectiveness is available to use the approach and touchdown speeds presented in T.O. 1F-100A-1-1 for the airplane gross weight involved.

NOTE Lowering the landing gear causes yaw. When performing an instrument approach, this yaw should be trimmed out before turning on final approach. Use of the speed brake is not recommended on final during an instrument approach, because of the yaw produced when the speed brake is extended.

ABNORMAL LOADING CONFIGURATIONS.

NOTE Abnormal loading configurations are defined as those which develop from approved landings as a result of system failures or pilot error, or both (such as failure of a drop tank to feed and failure of that tank to jettison, or improper sequencing of drop tank fuel).

Abnormal Symmetrical Loading Configurations.

FORWARD CG PROBLEMS - F-100D AIRPLANES. For airplanes with a clean airplane take-off center of gravity between 29 to 30 percent MAC, landing with full 200-gallon drop tanks at the inboard stations (and no stores at intermediate or outboard stations) can result in a longitudinal control problem when using the touchdown speeds given in T.O. 1F-100A-1-1. Since the configuration outlined in an abnormal symmetrical loading configuration which will occur only as a result of system failures or mission aborts, and in order to standardize procedures, the following instructions shall apply to all airplanes regardless of clean airplane take-off CG location.

a. If a single failure occurs, it can be possible that none, or only part, of the fuel in the inboard 200-gallon drop tanks will be transferred. If transfer of all fuel from inboard 200-gallon drop tanks cannot be ensured (by illumination of the drop-tank-empty indicator light), it should be presumed that the drop tanks are full. If a landing must be made with presumably full 200-gallon drop tanks at inboard stations (and no stores at intermediate or outboard stations), increase touchdown speed 5 knots IAS above that recommended in T.O. 1F-100A-1-1 for gross weight involved. This increase in touchdown speed will ensure adequate longitudinal control.

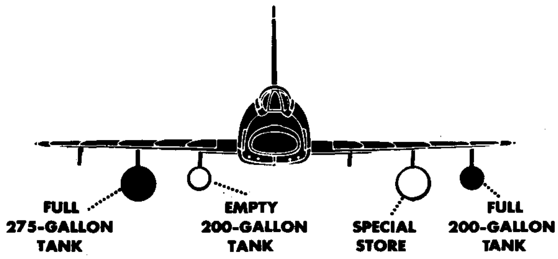
b. For airplanes with a clean airplane take-off center of gravity between 29 to 30 percent MAC, the touchdown speeds recommended in T.O. 1F-100A-1-1 provide a reduced margin of safety for adequate longitudinal control when landing with inboard stores (other than 200-gallon drop tanks) whose total weight is 1500 pounds or more but with no intermediate or outboard station stores installed. Therefore, if a landing is to be made in this loading configuration in any airplane, the recommended touchdown speeds must be strictly observed.

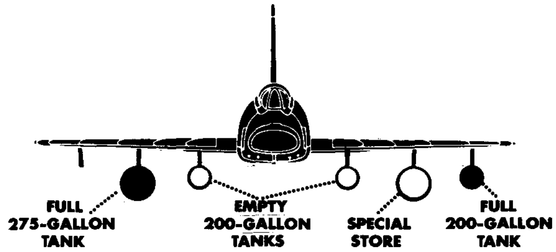
NOTE The preceding information must not be construed to mean that landing below the recommended speeds will be tolerated in other configurations.

FORWARD CG PROBLEMS - F-100F AIRPLANES. For airplanes with a clean take-off center of gravity of 26 to 29 percent MAC, certain abnormal symmetrical loading configurations will cause the airplane center of gravity to exceed aerodynamic limits, thus producing longitudinal stability and control problems. Heavy stores (500 pounds or

LONGITUDINAL CONTROL PROBLEMS... F-100D AIRPLANES WITH ABNORMAL ASYMMETRICAL LOADING CONFIGURATIONS

CONFIGURATION





RECOMMENDED ACTION

If contrary to existing instructions, the inboard 200-gallon tank (or tanks) is emptied first and retained, burn fuel from the outboard 200-gallon tank to return the CG to a satisfactory position. If the outboard tank fails to feed and cannot be jettisoned, dropping the inboard tank (or tanks) or the special store or retaining ammunition will provide improved longitudinal handling characteristics. If a full outboard tank must be retained, do not burn fuel from the 275-gallon tank as a lateral control problem will result. If a 275-gallon tank is carried in place of the special store, empty both 275-gallon tanks. Dropping these tanks will provide a further improvement in handling characteristics.

F-100D-1-A93-14A

Figure 6-13

more) at the inboard stations only will cause the airplane CG to exceed the forward landing limits. Consequently, landing with such stores at the inboard stations only should be avoided. If it becomes necessary to land with such a configuration, the touchdown speed should be increased (above the speeds recommended in T.O. 1F-100A-1-1) 5 knots IAS for each 1000 pounds of total inboard store weight.

AFT CG PROBLEMS. Certain abnormal symmetrical loading configurations for F-100D Airplanes, will cause the airplane center of gravity to exceed aerodynamic limits, thus producing longitudinal stability and control problems. The airplane will exceed the aft stability limits if ammunition is fired and the stores are retained for the following configurations only:

a. Rockets or bombs other than 25-pound bombs at the outboard stations and empty drop tanks inboard.

b. Rockets or bombs heavier than 500 pounds at the outboard stations only.

c. Rockets or bombs other than 25-pound bombs at the outboard stations and bombs at the intermediate stations.

Longitudinal control becomes sensitive in these configurations, particularly in the speed region of Mach .75 to .85 at low altitude. The resulting overcontrol problems will demand greatly increased pilot attention at the time of these flight conditions; however, the airplane can be flown safely and a safe landing can be made at the approach and touchdown speeds presented in T.O. 1F-100A-1-1. For configuration a., where empty drop tanks are carried inboard, dropping the tanks will increase both the longitudinal and directional stability and thus provide improved handling characteristics.

For the F-100F Airplane, the center of gravity will not exceed any aft stability limit for abnormal

LATERAL CONTROL PROBLEMS... WITH ABNORMAL ASYMMETRICAL LOADING CONFIGURATIONS

CONFIGURATION (Assumes stores on one wing only with or without empty tanks or pylons on other wing)	RECOMMENDED INCREASE IN LANDING DISTANCES CHART APPROACH SPEED—KNOTS IAS*
ONE FULL 450-GALLON TANK AT INTERMEDIATE STATION†	0
ONE FULL 200-GALLON TANK OUTBOARD PLUS ONE FULL 275-GALLON TANK INTERMEDIATE	7
ONE FULL 450-GALLON TANK INTERMEDIATE PLUS ROCKETS OUTBOARD	7
ONE FULL 200-GALLON TANK OUTBOARD PLUS ONE FULL 335-GALLON TANK INTERMEDIATE	10

* No additional increment for experience level should be added to approach speeds for abnormal asymmetrical loading configuration when the flat, straight-in approach is used.

WARNING
No more than 10 knots should be lost from the approach speed in accomplishing the flare and touchdown, to ensure lateral control speed.

† No increase in approach or touchdown speed is required for any permissible single store loading at either the inboard or outboard wing stations, or for any store lighter than a full 450-gallon tank at the intermediate station.

F-100D-1-A93-13A

Figure 6-14

symmetrical loading configurations which develop from approved loadings.

Abnormal Asymmetrical Loading Configurations.

Abnormal asymmetrical loading configurations can present longitudinal stability and control problems on F-100D Airplanes or lateral control problems on F-100D and F-100F Airplanes. These problems are discussed in the following paragraphs.

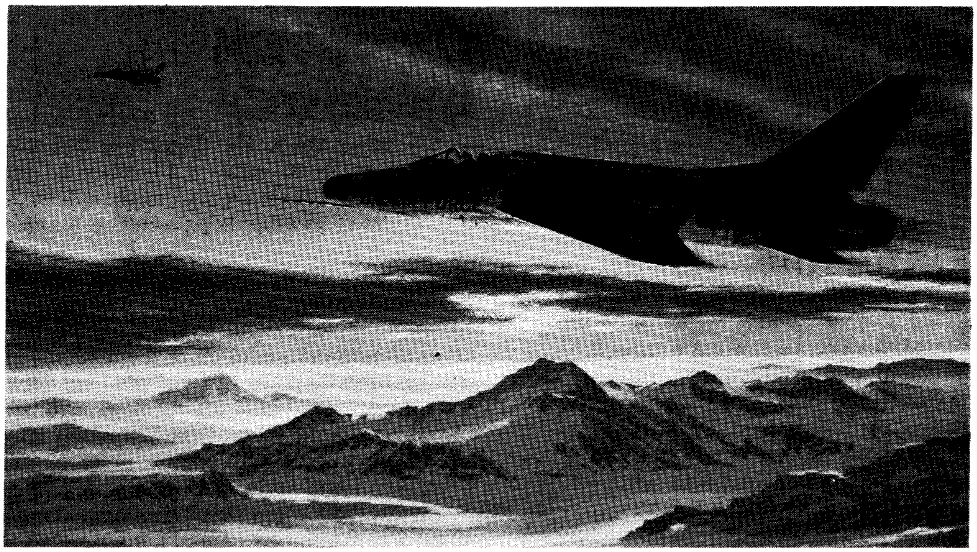
LONGITUDINAL STABILITY AND CONTROL PROBLEMS. The configuration shown in figure 6-13 will result in an airplane center of gravity aft of the aft stability limit. In each configuration, the unsatisfactory CG conditions results from an asymmetrical 4- or 5-store loading with a store at an outboard station wherein (contrary to existing instructions) the inboard 200-gallon drop tank (or tanks) was emptied first and retained. The recommended action listed for each configuration will provide improved longitudinal handling characteristics either through a CG shift or by an increase in airplane stability due to dropping stores. If the recommended action is not taken, the airplane CG will remain behind the aft stability limit. This will result in longitudinal control sensitivity, particularly in the speed region of Mach .75 to .85 at low altitude. The resulting overcontrol problems will demand greatly increased pilot attention at the time of these flight conditions; however, the airplane can be flown safely and a safe landing can be made.

LATERAL CONTROL PROBLEMS. Certain abnormal asymmetrical loading configurations will present lateral control problems at low speeds where the ailerons are least effective. For some of these configurations, full aileron deflection will not overcome the rolling moment caused by the stores at the touchdown speeds presented in T.O. 1F-100A-1-1; however, an increase in touchdown speed will provide adequate lateral control for landing. Figure 6-14 lists some of the most critical abnormal asymmetrical loading configurations and shows the recommended increases in T.O. 1F-100A-1-1 approach speeds required to provide adequate lateral control through touchdown when following the approach and touchdown procedures recommended in paragraphs a. and b. It is, of course, impractical to list each possible abnormal asymmetrical loading configuration which requires increased landing speed; other abnormal configurations will present lateral control problems in direct proportion to the lateral imbalance in weight.

a. Since maneuvering the airplane in the landing pattern increases the speed required for adequate lateral control of asymmetrical loading configurations, a very flat, straight-in approach should be made for landing with abnormal asymmetrical loading configurations. The approach should be sufficiently flat that very little flare will be required to accomplish a smooth touchdown. Because of the flatness of this approach, approach power must be carried closer to the point of intended touchdown. No more than 10 knots should be lost from the approach speed in accomplishing the touchdown. No attempt should be made to hold the airplane off the runway once the end of the runway has been passed.

b. It should be emphasized that any substantial increase in touchdown speed over that recommended in T.O. 1F-100A-1-1 will require extreme care in planning the landing and in handling the airplane during the landing to ensure that a safe stop can be made within the available runway length, and to avoid porpoising at touchdown. It is recommended that before attempting a landing in an extreme asymmetrical loading configuration, the pilot should familiarize himself with the airplane handling characteristics at the planned approach speed while at a safe altitude.

SYSTEMS OPERATION



F-100D-1-0-83

section VII

TABLE OF CONTENTS PAGE

THRUST-RPM RELATIONSHIP.

The J57 engine has a split ("two-spool"), 16-stage, axial-flow compressor. The compressor section consists of a nine-stage, low-speed, low-pressure rotor unit and a seven-stage, high-speed, high-pressure rotor unit. The rotor assemblies are mechanically independent and, therefore, do not rotate at the same rpm. The tachometer, however, shows the rpm of the high-pressure compressor rotor only. A tachometer reading of 100% rpm for the J57 engine, unlike that for other jet engines, is not intended to show proper thrust output. In fact, on these engines, 100% rpm is considerably above the rpm at which rated thrust is obtained. During the factory calibration run of the engine, high-pressure rotor rpm for Military Rated Thrust is determined for an outside temperature of 60°F, and this speed is stamped on the engine fire-wall speed data plate. This original trim speed varies from engine to engine from 93.5% rpm to 96.5% rpm. However, as engine operating time increases, some loss of performance results, and the engine speed may be increased progressively above the original trim speed by adjustments (retrimming) to restore Military Rated Thrust. It is apparent, then, that each engine must be treated individually with respect to the rpm at which Military Thrust is obtained. Because of the maximum speed variations between engines, the large variation between engine speed and thrust (1% change in rpm changes thrust about 5%), and the inherent inaccuracies of tachometers, the engine is trimmed and power-checked according to turbine discharge pressure, which does not vary as much with thrust as does rpm. The ratio of turbine discharge pressure to pitot pressure is shown by the engine pressure ratio gage. This gage gives a more accurate indicator of take-off thrust than the tachometer or exhaust temperature gage. The desired pressure ratio gage reading at Military Thrust depends upon outside air temperature; therefore, the gage must be adjusted just before take-off, to compensate for temperature. (Refer to "Engine Pressure Ratio Gage" in Section I.)

When the engine preflight check is made, the engine is unstabilized. During this transient period, thrust may be higher than the stabilized rated thrust. The pressure ratio gage pointer will also indicate thrust "overshoot" by exceeding the position of the index marker on the gage. This engine thrust "overshoot" is acceptable for take-off if the pointer falls within the limits listed under "Engine Limitations" in Section V. Take-off should not be made if the pointer is not within the allowable limits.

MAXIMUM CONTINUOUS THRUST OPERATION.

Some pilots have misinterpreted the maximum continuous exhaust temperature limits as the maximum continuous engine thrust operation limits. This procedure will often result in using thrust that is above the continuous rating. The maximum continuous exhaust temperature limit was not intended to be used as a means of setting up continuous thrust, but only as a cross check.

Operation at Maximum Continuous Thrust requires a reduced thrust setting of about 3% rpm below that noted for Military Thrust. After selecting the Maximum Continuous Thrust setting, using the tachometer, cross-check with the exhaust temperature gage to be sure it remains within limits of 580°C below 30,000 feet and 610°C above 30,000 feet. For review, Maximum Continuous Thrust is forst a thrust reduction of about 3% rpm below the indicated Military Thrust and secondly, observance of exhaust temperature limits.

Disregarding this method of setting up the Maximum Continuous Thrust will shorten the service life of the engine and cause unnecessary fuel consumption.

AIR TEMPERATURE VS THRUST.

Air density, and therefore engine performance, of all air-breathing jet engines is affected by inlet air pressure and temperature. When inlet air density is increased by either a lower air temperature or a higher ram pressure, the engine, at a constant rpm, "pumps" an increased quantity of fuel and air (by weight), resulting in an increase in thrust.

HOT START.

During a hot start, the engine lights up but the exhaust temperature continues to rise and exceed the start limits given in Section V. This is not common, but it is usually caused by an overrich fuel and air ratio entering the combustion chamber. A hot start can be anticipated by observing the exhaust temperature and fuel flow gages. If the exhaust temperature reaches 500°C and is still rising rapidly during a ground start, a hot start will almost invariably result if preventive action (throttle retarded to OFF) is not initiated immediately.

ENGINE STARTER CARTRIDGE MALFUNCTIONS.

Warning

When a misfire, or hangfire, is encountered during an attempted engine start, the breech of the starter will not be opened until a 15-minute time period has elapsed, provided no smoke can be observed emitting from the starter exhaust.

When operational necessity requires it, the Tactical Commander responsible for mission requirements may order the waiting period before cartridge removal reduced to 5 minutes. Reducing the 15-minute time limit should be done only after it is determined that no smoke is emitting from the starter exhaust, the starter breech cover is not hot to the bare hand, and there is no evidence of pressure inside the chamber. (Chamber pressure is evidenced by encountering undue resistance when attempting to remove the breech cover.)

Caution

The cartridge screen end must not be pointed toward aircraft equipment or personnel during removal, and should be treated as a potential hangfire and fire hazard for a period of 10 minutes after removal.

HANGFIRE.

A hangfire is recognized by time (as much as 5 minutes) between pressing the start button and the full burning pressure of the cartridge propellant and is caused by an abnormal firing of the cartridge. A hangfire usually is indicated by black smoke coming from the starter exhaust port and ineffective operation of the starter. There usually will be a gradual increase in chamber pressure to a normal or almost normal level which results in the acceleration of the starter. However, a start will be improbable.

MISFIRE.

A misfire occurs if the cartridge fails to ignite. It usually is caused by either a faulty cartridge or an electrical malfunction. If the starter holding relay is at fault, pushing the starter and ignition stop button will sometimes cause the relay to make momentary contact and fire the cartridge. If the cartridge does fire at this time, the starter and ignition button must be pressed again so engine ignition will occur when the throttle is moved outboard to IDLE. The malfunction should be corrected as soon as possible. Also, the misfire could be caused by having the external air connected.

Protective equipment, such as asbestos gloves and a face shield, must be worn for removing the cartridge after a misfire or hangfire. Electrical power must be disconnected from the airplane and the power-on cartridge warning light must be off before the cartridge is removed.

OIL PRESSURE.

When oil pressure is normal (between 40 and 50 psi), adequate oil flow for lubrication and for cooling is indicated. When oil pressure falls below or fluctuates to below 40 psi, oil flow may not be adequate for cooling, and bearing temperatures can rise. High bearing temperatures can lead to relatively rapid bearing failures. For this reason, power must be reduced when low oil pressures are noted. Power reduction reduces bearing loads, particularly in thrust bearings; reduces internal friction in the bearing when rpm is reduced; and reduces heat transfer into the bearing from the engine. Power reduction thus will permit normal bearing operation for a longer time under adverse conditions compared with high power operation. After a complete loss of lubricating oil, it is possible that the engine may continue to run for 10 to 30 minutes, provided the throttle was retarded upon the first indication of oil pressure difficulty. Bearing failure caused by oil starvation is generally characterized by a slight vibration which rapidly increases and very quickly results in an engine seizure. In some types of turbojet engines, high oil pressures indicate oil system potential failures. However, this is not likely in the case of the J57 engine. If oil pressure fluctuates above 50 psi at any power setting or exceeds 50 psi at high power settings and does not return to the normal range, a malfunction of the oil system or of the oil pressure gaging system is indicated and should be corrected before future flights. A temporary rise in oil pressure to a maximum of 55 psi is tolerable and will not harm the engine, provided there is not substantial oil pressure fluctuation, and provided the stabilized pressure returns to the normal range.

COMPRESSOR BLEED SYSTEM.

During acceleration and deceleration of engine speed, one or more stages of the compressor may reach the stalling point. Engine operation becomes unstable when stall occurs, with surging flow and fluctuating compressor discharge pressures. The stall condition is partially relieved by bleeding part of the low-pressure compressor discharge air overboard at low engine speeds. A duct carries the bleed air from the discharge area of the low-pressure compressor to an exhaust port on the fuselage skin. Operation of the compressor bleed system is completely automatic, and no manual override is provided. Opening and closing of the bleed valve is automatically controlled by a governor that senses engine inlet temperature and pressure and the speed of the low-pressure compressor rotor. (The system does not use electrical controls.) A slide valve in the governor ports air from the high-pressure compressor to the bleed valve actuator. The actuator opens or closes the butterfly-type bleed valve, exhausting the low-pressure bleed air overboard. The governor control is adjusted to open and close the bleed valve according to the low-pressure compressor speed and engine inlet temperature-pressure schedule.

COMPRESSOR STALL.

An undersirable but inherent characteristic of most air compressors, including those of the axial-flow multistage turbojet design, is that airflow instability may occur as a result of adverse compressor inlet or exit conditions. This characteristic is more pronounced in high-performance compressors of the type used in the J57 engine. This unstable condition has been referred to as surge, pulsation, chugging, "choo-choo," or explosions, but is usually described as compressor stall in a turbojet engine because it results from separation of airflow from the surfaces of the compressor blades just as separation of airflow from a wing surface results in an airplane stall. Compressor stalls may vary in severity, and may occur momentarily or be cyclic. J57 engine compressor stalls may occur during certain adverse operating conditions, or because of an engine accessory malfunction.

Caution Severe compressor stalls in this airplane are usually the result of improper and abnormal operation, and must be recorded on Form 781 because of possible engine case damage or malfunction of the engine fuel control unit.

During night flight, flame may be seen coming out of the engine bleed-air door on the side of the fuselage, or out of the intake duct when a severe compressor stall is experienced. A discussion of compressor stalls sometimes encountered as a result of adverse conditions during normal operation follows:

a. Low airspeed maneuvering may induce stalls because of distortion of intake duct airflow. However, stalls will not usually occur under these conditions unless throttle movement is also used. During spins, continuous mild stalls will probably be encountered with a steady increase in exhaust temperature because of severe engine airflow distortion.

b. During high-altitude, low-airspeed flight conditions, the engine compressor is operating closer to the stall region because low-density air has a greater tendency to separate from the compressor blades. Consequently, engine acceleration stalls may be induced at high altitude with low airspeeds. The engine is expected to be stall-free above .8 Mach at high altitude.

c. On the ground, acceleration stalls (sometime referred to as off-idle stalls) may occur as a single boom or a "choo-choo" from idle to 80% rpm. These stalls are acceptable unless severe to the degree that more than 15 seconds is required to accelerate from idle to Military Thrust.

d. During high-altitude air starts (above 30,000 feet) using the normal fuel control system, mild compressor stalls may occur as the engine accelerates to idle. If persistent stalls occur, they can be eliminated by descending to increase airspeed.

e. Erratic throttle movements can induce compressor stalls. An example of this is when the throttle is retarded and then advanced while the engine is still decelerating.

f. The emergency fuel control system does not provide automatic fuel scheduling to meet engine acceleration requirements. Consequently, compressor stalls may be experienced whenever rapid throttle movements are made using the emergency fuel system.

If the stall condition was not induced by adverse operating conditions or erratic throttle movement, a severe stall or a series of severe stalls is usually the result of one of the following malfunctions:

a. Excessive fuel scheduling by the fuel control unit can cause stalls during engine acceleration.

b. Unsatisfactory operation of the intercompressor bleed valve may result in stalls during engine acceleration or deceleration or steady-state fixed-throttle stalls.

c. Failure of the fuel control to reduce engine rpm with colder inlet air temperatures or engine operation at thrust settings above rated thrust can cause steady-state fixed-throttle stalls. Generally, this type of stall occurs only at high altitude.

d. If the exhaust nozzle is slow acting or will not open, an extremely violent compressor stall will occur when afterburner is selected.

Experience has shown that engine compressor stalls have not resulted in any engine or airplane damage, provided corrective action is taken by the pilot to eliminate the continuous type of compressor stalls. The following procedure is recommended for recovering from severe compressor stalls:

1. Retard throttle and correct any unusual attitude of the airplane.

2. Then slowly advance throttle to the desired thrust setting.

3. If stall presists, reduce altitude and increase airspeed.

4. If stall occurs upon afterburner selection, shut down afterburner immediately.

Exhaust temperature should be monitored during compressor stalls and any overtemperature condition recorded in Form 781. An engine surge, unlike that associated with a compressor stall, may occur during low-altitude high-speed flight. This is usually the resuly of the normal automatic operation of the burner pressure limiter in the engine fuel control unit. The limiter automatically reduces fuel flow, when required, to prevent burner pressure from exceeding the maximum safe value. This surge is not harmful and can be eliminated by a slight reduction of the airspeed or rpm. Under extreme cold-weather conditions, limiter action can occur just after take-off and before initial climb. At outside air temperatures of 60°F and above, the limiter operates at about .8 to .85 Mach at sea level.

FLAME-OUT.

Flame-out can result from rapid throttle movement and is most likely to occur at extremely high altitudes. Acceleration flame-out, like compressor stall, occurs when more fuel is injected into the combustion chambers than the engine can use for acceleration at the existing rpm. But, unlike the compressor stall condition, this mixture is so excessively rich that it cannot burn, so the flame goes out. Flame-out, which can also occur during rapid engine deceleration, will result when the amount of fuel injected into the combustion chambers is reduced to too low a level to sustain combustion at the existing rpm. Acceleration flame-out can be avoided by accelerating engine rpm at a slower rate. Since flame-out conditions are more severe during compressor stall, the throttle should not be "chopped" to eliminate stall, as flame-out will result. Flame-outs are indicated by loss in thrust, drop in exhaust temperature and rpm, and airplane deceleration. When flame-out occurs, an engine air start is necessary. (Refer to "Engine Air Start" in Section III.)

NEGATIVE-G FLAME-OUT.

The inverted-flight tank in the right cell of the intermediate tank traps about 1.6 gallons of fuel to permit limited negative-G operation. If the limitations of the fuel system are exceeded by negative-G, fuel starvation leading to possible flame-out can occur in a relatively short time. There are two conditions that can cause engine flane-out during negative-G operation. In the first of these, flame-out can occur when the fuel supply of the inverted-flight tank is exhausted. Fuel is then not available until positive-G flight is resumed. The second negative-G condition that can cause flame-out occurs any time the suction-feed capabilities of the engine are exceeded. Negative-G operation uncovers the inlets of the tank-mounted fuel booster pumps so that fuel is supplied to the engine from the inverted-flight tank by suction feed. Depending on fuel condition, suction feed cannot sustain engine operation long enough to empty the inverted-flight tank (because of cavitation of the engine-driven fuel pump) above 45,000 feet at Maximum Thrust or at Military Thrust. Thus, negative-G operation is time-limited (by the capacity of the inverted-flight tank) and altitude-limited (by the suction-feed limitations of the engine).

NOTE The time limits of negative-G operation at Military and Maximum Thrust, based on the capacity of the inverted-flight tank and the required fuel flows, are given in Section V.

The suction-feed characteristics depend on fuel temperature, fuel pressure, pump performance, etc. These factors, in turn, are influenced by flight duration, speed, and outside air temperature. The altitude limits on suction-feed operation are based on a fuel temperature of 110°F. If fuel temperature is lower, suction feed might be sustained to higher altitudes.

NOTE There are no inverted-flight fuel system restrictions as long as positive-G is maintained.

AFTERBURNER IGNITION.

The engine afterburner ignition system incorporates a recirculating fuel afterburner igniter which ensures more positive light-ups at all altitudes. Continuous circulation of fuel through the igniter when the afterburner is not in operation cools the igniter casting, lessening the possibility of fuel vaporization, cooking, and resultant igniter valve seizure. The continuously circulating fuel also ensures a full igniter fuel charge when afterburner is selected.

Normally, afterburner fuel ignition occurs just after the nozzle opens. However, if afterburner power is selected and terminated repeatedly over a short period of time, fuel ignition may occur before or during exhaust nozzle opening resulting in a "jolting" hard light-up. Under this condition chances of a hard light-up may be lessened by slightly retarding the throttle when afterburner selection is made.

Afterburner ignitions that are attempted following Military Power climbs are sometimes unsuccessful on the first attempt, but ignition is ensured on the second try.

TURBINE NOISE DURING SHUTDOWN.

The light scraping or squealing noise sometimes heard during engine shutdown results from interference between the rotating and stationary parts of the engine that have dissimilar cooling rates. The scraping is undesirable and may damage parts. To minimize scraping, it is necessary to operate the engine at reduced power (below 85% rpm) for at least 5 minutes before shutdown after any high-power operation (either ground or flight).

NOTE After flight, operation during approach and taxi can be included as reduced-power time.

If, despite this precaution, heavy scraping still occurs on shutdown, no attempt to restart the engine should be made until the turbine temperature has dropped enough to provide adequate clearance between the affected parts, since a starting attempt might result in destruction of the starter. If a start must be made when interference is suspected, a check should be made to find out if the engine begins to turn as soon as air is supplied to the starter. This is done by listening and by taking tachometer readings. If the engine does not begin turning when air is supplied to the starter, the starter and ignition stop button must be pressed immediately to stop the starting cycle.

SMOKE FROM TAIL PIPE DURING SHUTDOWN.

During engine shutdown, oil or fuel fumes may be noticed coming from the tail pipe or inlet duct, depending on ground wind conditions. These fumes show the presence of fuel or oil in the hot section of the engine. Boiling fuel, shown by the appearance of white vapor, will not damage the engine, but is a hazard to personnel, since the vapor may ignite with explosive violence if allowed to collect within the engine or fuselage. Therefore, all personnel should keep clear of the tail pipe for at least 3 minutes after engine shutdown and at all times when fuel vapors or smoke comes from the tail pipe. The appearance of black smoke from the tail pipe, after shutdown, shows burning oil or fuel which will damage the engine. Vapor or smoke should be eliminated by motoring the engine. (Refer to "Clearing Engine" in Section II.)

OPERATION ON ALTERNATE OR EMERGENCY FUEL.

Alternate fuel is defined as fuel which may be substituted for the recommended fuel with possible restriction to airplane performance. Alternate fuel does not cause permanent damage to the engine or fuel systems; however, its use may require engine retrim.

NOTE Aviation gasoline and JP-4 fuel mixed in any proportion are suitable for continuous operation from an engine performance standpoint. However, the use of aviation gasoline must be restricted to emergency

FUEL GRADE PROPERTIES AND LIMITS

USE	FUEL TYPE	GRADE	NATO SYMBOL	US MILITARY SPECIFI-CATION	FREEZE POINT (°F)	LIMITS
RECOMMEND-ED FUEL	WIDE CUT GASOLINE	JP-4	F-40	MIL-J-5624	-76	
ALTERNATE FUEL	WIDE CUT GASOLINE	COM JET B	NONE	ASTM	-60	1, 2
	KEROSENE	COM JET A-1	NONE	ASTM	-58	1, 2
		COM JET A	NONE	ASTM	-40	1, 2
			F-34	NONE	-58	1
		JP-5	F-44	MIL-J-5624	-55	1
EMERGENCY FUEL	AVIATION GASOLINE (AVGAS) PLUS 3% GRADE 1100 OIL	80/87	F-12	MIL-G-5572	-76	3
		91/96	F-15	MIL-G-5572	-76	3
		100/130	F-18	MIL-G-5572	-76	3
		115/145	F-22	MIL-G-5572	-76	3

1 Avoid flying at altitudes where OAT is below the freeze point of the fuel.

2 Before using commercial fuel, obtain freeze point from vendor or airline supplying the fuel; then follow limit 1. If there is any indication of improper fuel handling procedures, or that cleanness is not up to standard, a fuel sample should be taken in a glass container and observed for fogginess, presence of water, or rust.

3 Follow climb restrictions given in "Alternate and Emergency Fuel Limitations" in Section V.

F-100-1-93-607A

Figure 7-1

evacuation or one-time ferry-type missions to minimize undesirable lead deposits in the engines and to avoid damage to the engine-driven fuel pump due to the poor lubricating properties of aviation gasoline.

Use of approved kerosene-type alternate fuel does not adversely affect engine performance. Generally the full take-off rating is more readily available with the denser kerosene-type fuel, while airplane range performance will be at least as good or slightly better than with JP-4 fuel. With cold fuel, ground starts and restarts at high altitude may be slower and less consistent with the denser fuel such as JP-5. With JP-5 fuel, hard starts in cold temperatures are due to negligible fuel vapor pressure (0 psi). Only during use of aviation gasoline (AVGAS) will it generally by necessary to retrim engines to obtain the full take-off rating. It is recommended that, if a landing is made at a base having only aviation gasoline available and no facilities for engine retrimming, only enough fuel be loaded to accomplish a one-time flight to a base where JP-4 fuel is available. The engine operating limitations under "Engine Limitations" in Section V also apply to alternate and emergency fuels.

Gasoline and JP-4 fuel mixtures that contain less than 10 percent gasoline in all fueled tanks have no climb rate limitations. When fuel mixtures containing more than 10 percent gasoline are used, do not exceed 5000 feet per minute rate of climb above 1500 feet altitude when fuel temperature is above 80°F. The fuel tank and vent system is not designed to handle high vapor pressure fuel. As a result, excessive fuel venting will occur, coupled with the build-up of high internal tank pressures which may cause damage to the fuel system.

After 5 or 6 hours of flight, the wing fuel temperature, regardless of fuel temperature when loaded, may be assumed to be equal to the free air temperature. T.O. 42B-1-14 prohibits airplane operation at temperatures below the freezing point of -55°F while using JP-5 fuel. However, to ensure proper engine operation, it is recommended that engine operation be restricted to no lower temperature than 5°F above the freeze point of the fuel being used. Operation at temperatures colder than these recommended limits may cause fuel screen and filter clogging by ice particles as well as fuel pump cavitation and resultant flame-out. (See figure 7-1.)

JP-4 fuel is the only fuel which presently contains an anti-icing additive to prevent fuel filter icing due to moisture in the fuel.

The F-100 fuel flow indicator measures volume-per-hour indication. The use of the higher density fuel results in a fuel flow indication that is somewhat lower than the actual flow; however, speed and range are not affected. Conversely, lower density fuel (AVGAS) presents a fuel flow indication that is somewhat higher than the actual flow; however, in this case, speed is not affected, but range is reduced by a factor of approximately 7 percent because of the lower heating value of the fuel on a volume basis. The fuel quantity gage system will read approximately one percent higher when aviation gasoline is used. Fuel quantity gage system error is negligible when other alternate grade fuels are used.

Caution When operating on alternate or emergency fuel, check Military Power setting, and have engine trimmed if necessary.

- Refer to T.O. 1F-100A-1-1 for fuel specific weight differences.

FUEL SYSTEM MANAGEMENT.

INTERNAL FUEL SEQUENCING.

Sequencing of internal fuel is entirely automatic.

DROP TANK FUEL SEQUENCING.

To maintain the most favorable CG conditions and adequate lateral control when drop tanks are installed, the fuel from the drop tanks must be used in the sequence described under "Drop Tank Fuel Sequencing Limitations" in Section V. However, some fuel may be transferred from nonselected drop tanks because of any one or combination of the following circumstances which could pressurize the nonselected drop tanks:

a. Climbing from a low altitude to a high altitude

b. Pausing at a "full" position when rotating the drop tank fuel selector switch to the next desired position. Fuel will be used from the nonselected drop tanks until the pressure within these tanks has been dissipated.

c. Ram air entering the dive vent port on the drop tanks. (This is considered negligible.)

Pressurizing of the drop tanks can also be caused by certain mechanical or electrical failures or malfunctions.

a. Loss of tertiary bus power, by any means, will de-energize all the drop tank shutoff valves. The valves open and all drop tanks are pressurized, causing simultaneous feeding from all drop tanks.

b. Failure of a drop tank shutoff valve causes this drop tank to also feed when other drop tanks are selected.

c. If the stop in the drop tank fuel selector switch has been removed, lost, or indexed wrong, the selector switch can be moved past the inboard tank position, which opens all of the drop tank shutoff valves, pressurizing all the drop tanks.

FUEL TRANSFER.

Fuel is transferred to the fuselage forward tank from all other internal fuel tanks and the drop tanks. Internal fuel is transferred by means of gravity flow, by electrically driven transfer pumps in the aft and intermediate tanks, and by scavenge pumps in the integral wing tanks. Normal transfer of fuel is in this order: drop tanks (if carried), aft tank, intermediate tank, and finally the wing tanks. Transfer of fuel is automatically controlled by float-operated fuel transfer control valves mounted at different levels in the forward tank. The transfer pumps run continuously, but fuel is not transferred until the fuel transfer control valves open as the fuel level drops below each one. For example, when the forward tank fuel level drops about 35 pounds from full, the drop tank fuel starts transferring. At about 275 pounds from full, the aft tank fuel starts transferring. When the fuel level in the forward tank is about 1185 pounds from full, the intermediate tank transfers its fuel. After the intermediate tank is empty, fuel flows by gravity from the wing tanks until the forward tank has only about 1535 pounds of fuel remaining. At this time, the wing tank scavenge pumps are started by float switches to complete the transfer of the wing tank fuel not transferred by gravity. During all of the transfer operations, if the fuel transfer rate exceeds the consumption rate, the transfer of fuel stops when the fuel level raises the floats in the fuel transfer control valve. On the other hand, if fuel transfer rate is slower than the consumption rate, the transfer pump transfers fuel until the transferring tank is empty.

FUEL QUANTITY GAGES.

The two fuel quantity indicating systems show the total internal fuel quantity and the amount of fuel in the forward fuselage tank which is directly available to the engine. Normally, the fuel transfer rate to the forward tank exceeds the fuel flow rate to the engine, resulting in a nearly full forward fuel tank, provided the total fuel exceeds the forward tank capacity. The exception to this is during afterburner operation at low altitudes, or in case of a fuel system component malfunction. After extended afterburner operation at low altitudes when the forward fuel tank gage has shown a decrease, an increase in the forward tank quantity should occur when engine requirements are reduced. However, if a fuel system component malfunction has occurred, the forward fuel tank gage indication may not rise. The comparative gage readings of the forward fuel tank gage and the total internal fuel quantity gage may, if correctly interpreted, indicate failure of fuel system components when deviation from normal readings is observed. For example, a failure of the fuel transfer system is indicated if the forward tank gage shows a faster-than-normal fuel consumption (nonafterburning) while the total gage shows a less-than-normal consumption rate. (Refer to "Fuel Transfer" in this section.) Familiarization with fuel gage readings for normal missions (that is, for average power settings, altitudes, and properly functioning equipment) will give greater flexibility and utility to the airplane, because the limitations of the fuel system are then reduced to the amount of fuel remaining in the forward fuel tank. When the two fuel quantity gages have the same reading, it is an indication that all remaining fuel has transferred to the forward tank, and the forward tank reading indicates the total fuel remaining. Therefore, if all fuel remaining is in the forward tank, the only fuel quantity limitation is that set by the practical minimum landing fuel reserves which may be established by the using organization.

HEAT EXCHANGER COOLING AIRFLOW CIRCUITS.

PRIMARY HEAT EXCHANGER.

Cooling air for the primary heat exchanger is normally obtained from the engine air inlet duct. It passes through the primary heat exchanger and is then ducted overboard. The amount of cooling airflow available depends on the pressure differential between the engine inlet duct and the overboard discharge. The greater the pressure differential, the greater the available cooling airflow. During normal level flight, the pressure in the inlet duct is higher than the pressure at the overboard discharge, and the cooling air from the duct goes through the primary heat exchanger and out the overboard discharge. This is known as positive flow. During ground operation and some flight conditions, the pressure in the engine air inlet duct is less than the pressure at the overboard discharge. This causes a reverse (negative) airflow through the primary heat exchanger. However, to prevent negative flow, the source of the cooling air for the primary heat exchanger automatically changes from the engine air inlet duct to the equipment compartment, whenever the inlet duct pressure is less than overboard discharge pressure. The air is then drawn from the forward electronics equipment compartment, through the primary heat exchanger, and discharged overboard. Also, a jet pump, using air from the engine air bleed manifold, produces a positive airflow through the primary heat exchanger. This produces a low-pressure condition at the heat exchanger discharge duct which draws cooling air through the primary heat exchanger. The jet pump operates constantly during engine operation.

SECONDARY HEAT EXCHANGER.

Cooling air for the secondary heat exchanger is not dependent upon the pressure differential between the engine air inlet duct and that outside the duct. Therefore, positive flow is not required for operation. (See figure 7-2.) Air for this heat exchanger is drawn from the intake duct by two fans within the heat exchanger and exhausted back into

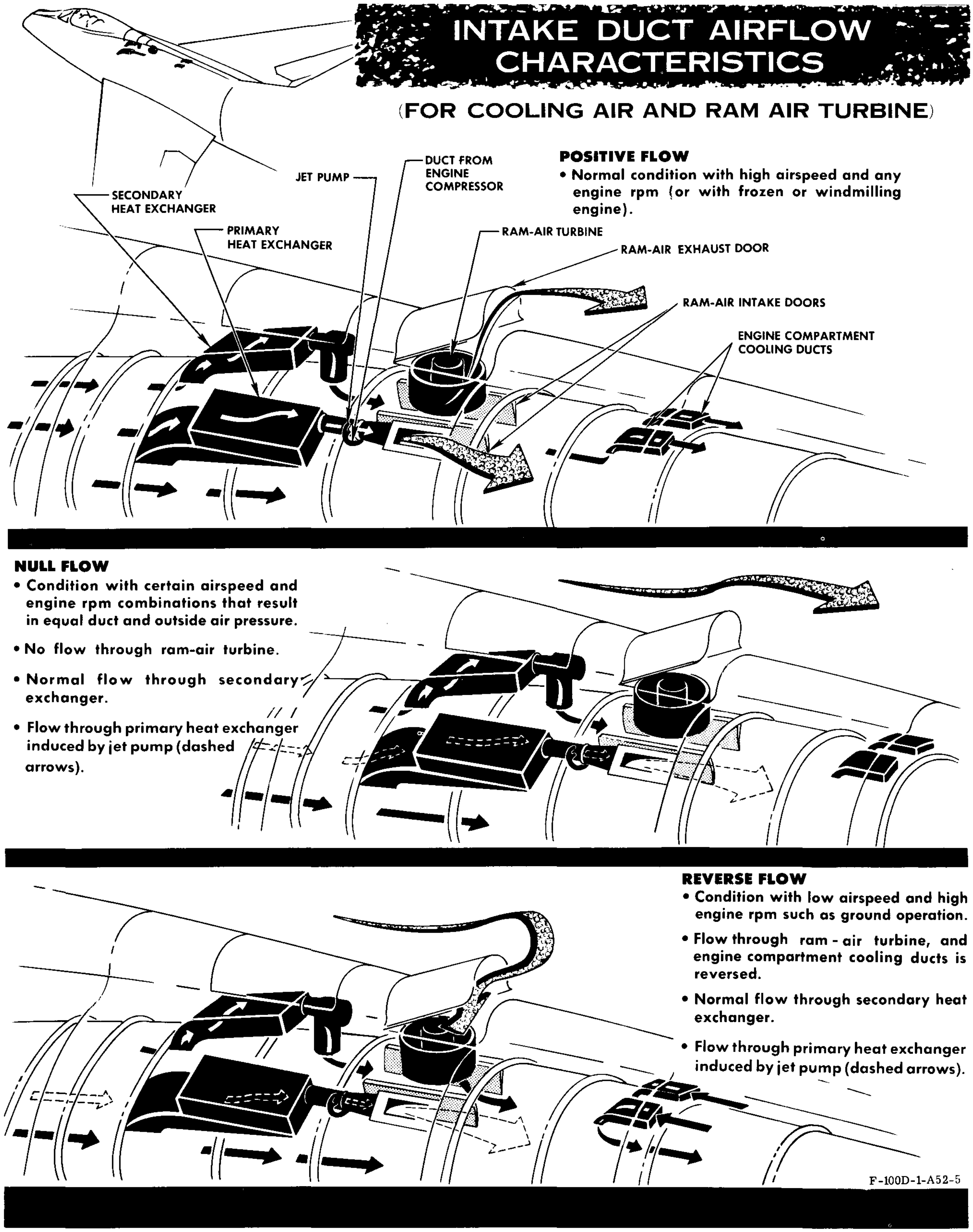

INTAKE DUCT AIRFLOW CHARACTERISTICS
(FOR COOLING AIR AND RAM AIR TURBINE)
SECONDARY HEAT EXCHANGER
PRIMARY HEAT EXCHANGER
JET PUMP
DUCT FROM ENGINE COMPRESSOR
RAM-AIR TURBINE
RAM-AIR EXHAUST DOOR
RAM-AIR INTAKE DOORS
ENGINE COMPARTMENT COOLING DUCTS
POSITIVE FLOW
• Normal condition with high airspeed and any engine rpm (or with frozen or windmilling engine).
NULL FLOW
• Condition with certain airspeed and engine rpm combinations that result in equal duct and outside air pressure.
• No flow through ram-air turbine.
• Normal flow through secondary exchanger.
• Flow through primary heat exchanger induced by jet pump (dashed arrows).
REVERSE FLOW
• Condition with low airspeed and high engine rpm such as ground operation.
• Flow through ram - air turbine, and engine compartment cooling ducts is reversed.
• Normal flow through secondary heat exchanger.
• Flow through primary heat exchanger induced by jet pump (dashed arrows).
F-100D-1-A52-5

Figure 7-2

the duct. These fans are driven by a cockpit cooling turbine and an electronic equipment cooling turbine. Air from the engine compressor, after passing through the primary and secondary heat exchangers, drives these two turbines before going to their respective systems. (See figure 4-1.)

FLIGHT CONTROL SYSTEM EMERGENCY HYDRAULIC PUMP.

The ram-air turbine-driven emergency hydraulic pump in the No. 2 flight control hydraulic system supplies pressure to this system in case of engine or engine-driven pump failure. The emergency pump is designed to maintain adequate system pressure with either a frozen or a windmilling engine at altitudes from sea level to the service ceiling of the airplane and airspeeds down to about 150 knots IAS (160 knots with engine at idle). The turbine and the emergency pump (which is mounted on the turbine hub) are in the upper part of the fuselage, aft of the cockpit. When the emergency pump is selected, utility hydraulic system pressure opens the ram-air inlet doors in the engine air intake duct, below the turbine, and the ram-air exhaust door in the upper fuselage fairing, above the turbine. In case the utility system pressure is depleted, the ram-air turbine door emergency accumulator provides pressure to open the ram-air inlet doors and the ram-air exhaust door. The ram air from the intake duct rotates the turbine and is exhausted overboard. (See figure 7-2.) Rotation of the turbine drives the emergency pump, which builds up and maintains pressure in the No. 2 flight control hydraulic system. A governor is used to control the speed of the turbine so that the speed of the pump remains within design limits. When the pump is engaged and the turbine is suddenly exposed to high-velocity ram air, the governor automatically increases the pitch of the turbine blades to decrease turbine rpm, thus preventing the turbine and pump from overspeeding. As the speed of the incoming ram air decreases, the rpm of the turbine decreases and the pitch of the turbine blades is decreased. This lower pitch setting causes an increase in turbine rpm, to maintain the proper pump output. The changes in turbine blade pitch continue as long as the system is engaged, to compensate for variations in ram-air flow. When the airplane is flown at low airspeeds using high engine rpm, airflow through the turbine may reach a null (no airflow) or completely reverse direction. (As airflow approaches the null point, hydraulic power from the ram-air turbine-driven emergency pump is proportionately lowered until a zero output is reached at the null point.)

NOTE This region of insufficient airflow to drive the ram-air turbine fast enough to maintain system hydraulic pressure should not be referred to as "null flow." Null flow means no airflow.

The turbine cannot be damaged by reverse airflow. During reverse airflow conditions, pump output is not available. If the ram-air turbine-driven emergency pump is used when the engine is operating, it is necessary to vary the throttle setting to avoid a reduction of pump output.

The ram-air turbine-driven pump is an emergency system which does not provide normal maneuvering capability, but is considered adequate for a proficient pilot, flying under near-normal conditions of visibility and turbulence, with adequate runways to permit a well-planned approach. Under other circumstances, the pilot's judgment must prevail.

NULL FLOW.

Null flow will occur in low-Mach-number, high-power flight, when the engine duct pressure is equal to the ambient air pressure. The result is no airflow through the ram-air turbine or around the engine. During normal in-flight operations, null flow conditions may be encountered for short periods of time. However, tests have proved that all temperatures are contained within their operational limitations. Null flow will occur only under specified combinations of engine rpm, indicated airspeed, altitude, and ambient air temperature. Increasing or decreasing any of these will correct a null flow condition. The specific null flow point in relation to these functions can be determined if mission requirements dictate. (See figure 7-3.)

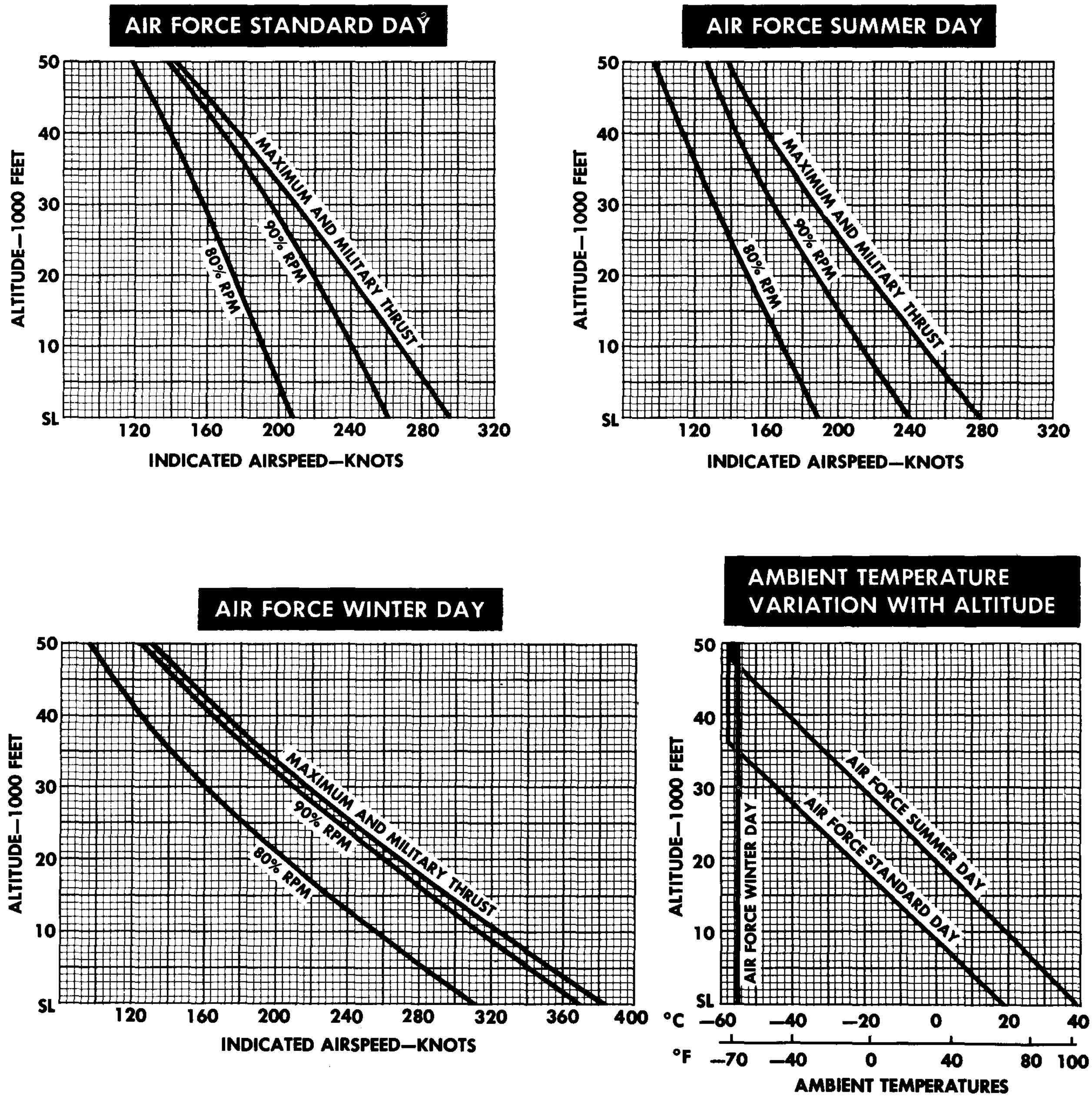
CIRCUIT-BREAKER USE.

A circuit breaker is designed to protect the operating units within a particular electrical circuit from overloads or short circuits, and is capable of automatically breaking the circuit under specified conditions of current flow. The length of time a circuit is subjected to an overload before the breaker trips to open the circuit depends on the amount of overload, and the rate (fast or slow) of overload build-up. Trip-free circuit breakers are used on this airplane. After being tripped by an overload in the circuit, the trip-free circuit breaker cannot be reset immediately. Because of its internal construction, this type of circuit breaker, when tripped, needs a cooling period before it can be reset. A small, normally curved metal bar or disk in the breaker, for example, is straightened by heat of the increased current drain of an overload. As the bar straightens, spring-loaded contacts are released and the circuit is broken. Pressing the button on the circuit breaker in an attempt to reset the circuit is ineffective until the metal bar cools enough to return to its normal position and lock the contacts closed.

The practice of using circuit breakers as switches should be avoided. Circuit breakers should not be pulled in flight, as this could easily create a more dangerous condition than already exists. Many of

NULL FLOW CONDITIONS
J57 ENGINE

F-100 SERIES



F-100-1-93-544A

Figure 7-3

the systems in the airplane are hydraulically operated and electrically actuated. Interruption of the electrical sequence could cause complete system malfunction. Also, there is always the danger of pulling the wrong circuit breaker, causing failure of another system. Resetting circuit breakers can be entirely safe, provided circuit-breaker operation and the individual circuit involved are thoroughly understood. It is necessary to analyze the condition which caused the breaker to trip, and then determine whether the unit is one of continuous operation, or if motor-operated, if it is reversible, and the position of the control switch in the cockpit. If a circuit breaker cannot be reset and the circuit is one of major systems, prepare to land as soon as possible.

WHEEL-BRAKE OPERATION.

To reduce airplane accidents and maintenance problems caused by tire, wheel, and wheel brake failure, the following precautions must be observed when practical:

a. Use the brakes as little and as lightly as possible by taking full advantage of the length of the runway.

b. To prevent skidding the tires, use extreme care when applying brakes immediately after touchdown, or any time there is considerable lift on the wings. Heavy brake pressure will lock the wheels more easily immediately after touchdown than when the same pressure is applied after the full weight of the airplane is on the tires. As long as brake pressure is maintained, a wheel once locked in this manner immediately after touchdown will not become unlocked as load increases. Brakes can stop the wheels from turning, but stopping the airplane depends on the frictional force between the tires and the runway. As the load on the tires increases, the frictional force increases giving better braking action. During a skid, the frictional force is reduced thus requiring more distance to stop.

c. If maximum wheel braking is required, lift should be decreased as much as possible by lowering the nose gear and raising the flaps before applying brakes. This procedure improves braking action since the load on the tires will be increased thus increasing the frictional force between the tires and the runway.

d. The antiskid system is intended to prevent skidding at high speed under light wheel loads. Therefore, the brakes may be applied immediately after touchdown, but only when absolutely necessary. The antiskid system is not designed to perform as a completely automatic braking system. Continuous heavy brake pedal deflection from touchdown which would cause the antiskid system to cycle continuously will overwork the antiskid system beyond design limits.

e. When a short landing roll is required, a single smooth application of the brakes with constantly increasing pedal pressure will result in optimum braking. (Refer to "Braking Technique" in Section II for information on optimum braking technique.) This procedure is also applicable when operating on emergency braking systems.

f. During a series of successive landings, a minimum of 15 minutes should elapse between landings where the landing gear remains in the slip stream, and a minimum of 30 minutes with the gear retracted between landings, to allow adequate cooling time between brake applications. This time restriction is not applicable to touch-and-go landings when no brake application is involved.

g. The brakes should not be dragged while taxiing, and should be used as little as possible for turning the airplane on the ground.

h. At the first indication of brake malfunction, or if brakes are suspected to be overheated after excessive use, the airplane should be maneuvered off the active runway and stopped. The airplane should not be taxied into a crowded parking area. Overheated wheels and brakes must be cooled before the airplane is subsequently towed or taxied. Peak temperatures in the wheel and brake assembly are not attained until 5 to 15 minutes after a maximum braking operation is completed. In extreme cases, heat build-up can cause the wheel and tire to fail with explosive force or be destroyed by fire if proper cooling is not effected. Taxiing at low speeds to obtain air cooling of overheated brakes will not reduce temperatures adequately and can actually cause additional heat build-up.

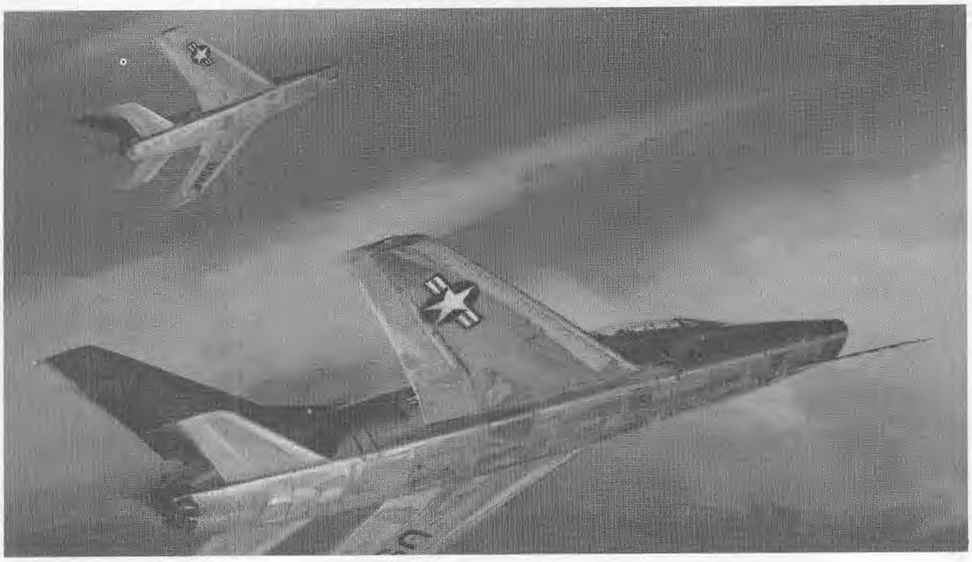
SONIC BOOM.

When the airplane is flown at supersonic speeds, it can cause a phenomenon known as sonic boom. This can result from level- or diving-flight speeds that are great enough to build up a compressibility or shock wave. The collision of this shock wave with the ground or any object in the air will be accompanied by sufficient impact pressure to be startling or even dangerous. Sonic booms have been known to break windows or rip fabric from the wings of light aircraft. The destructive force of these waves is usually more concentrated straight ahead or in a line-of-flight direction. But, like all sound waves, they radiate in all directions from their source, and thus are likely to cover a wide area and possibly be deflected by temperature changes or unusual atmospheric conditions. The intensity of the boom depends upon the size and speed of the airplane creating it, as well as the distance of the airplane from the observer. Usually, the explosion sound is very loud at distances up to one mile.

Section VIII
CREW DUTIES

Not applicable to this airplane

ALL-WEATHER OPERATION



F-100D-1-0-82

section IX

TABLE OF CONTENTS

The procedures set forth in this section may be repetitious, different from, or in addition to, the normal operating procedures in Section II. Particular emphasis should be placed upon the recommendations shown in the instrument flight procedures of this section, because these steps and procedures are the minimum requirements whenever you are operating in IFR conditions.

INSTRUMENT FLIGHT PROCEDURES

This airplane has all the basic flight instruments and radio-navigation equipment for IFR flights, as well as the UHF command radio required to control the flight. The automatic flight control system (autopilot) enables the pilot to fly IFR for longer periods with a minimum of fatigue. The airplane can be flown on instruments at speeds in excess of Mach 1, and, though it is not ordinarily practical because of high fuel consumption, it can be flown at such speeds in cases of military or tactical necessity. The characteristic of the airplane in any asymmetric external load configuration presents somewhat of a problem during instrument flight. The use of the dampers will improve this characteristic. Refer to "Flight With External Loads" in Section VI for recommended flight procedures with an asymmetrical configuration.

Warning

Instrument flight in case of failure or suspected unreliability of the attitude indicators should be considered as an emergency situation. All available alternatives should be considered before partial panel techniques for weather penetration are attempted.

BEFORE INSTRUMENT TAKE-OFF.

1. Line up visually with centerline of runway.

2. Heading indicator — Rotate course index until runway heading is aligned with top of dial.

3. Attitude indicator — Align pitch trim knob with index marker. The miniature airplane should indicate approximately 4 degrees nose-high. This method will permit establishing proper airplane attitude for take-off.

4. Windshield exterior air switch — ON if ice has accumulated on windshield, or if forward visibility

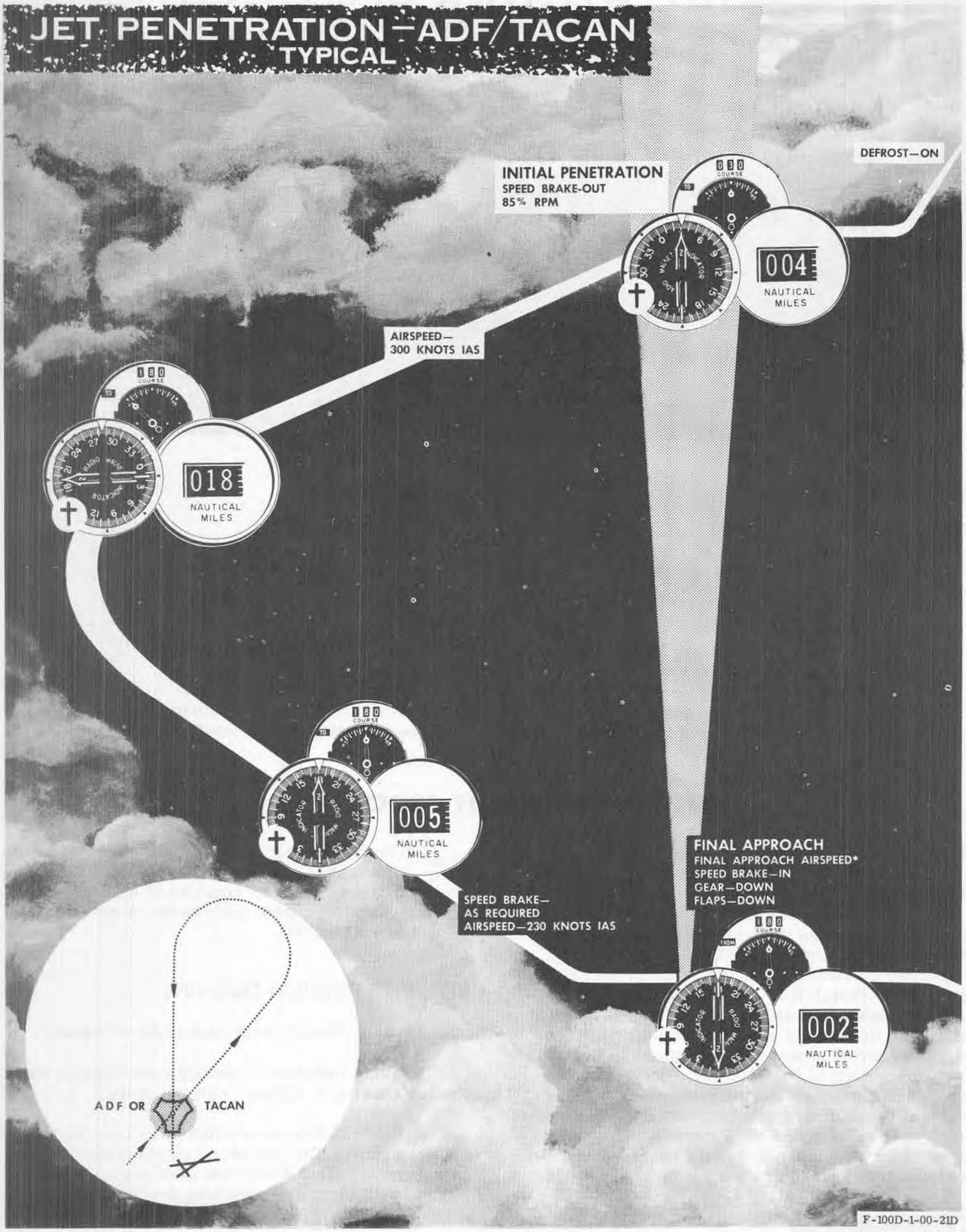
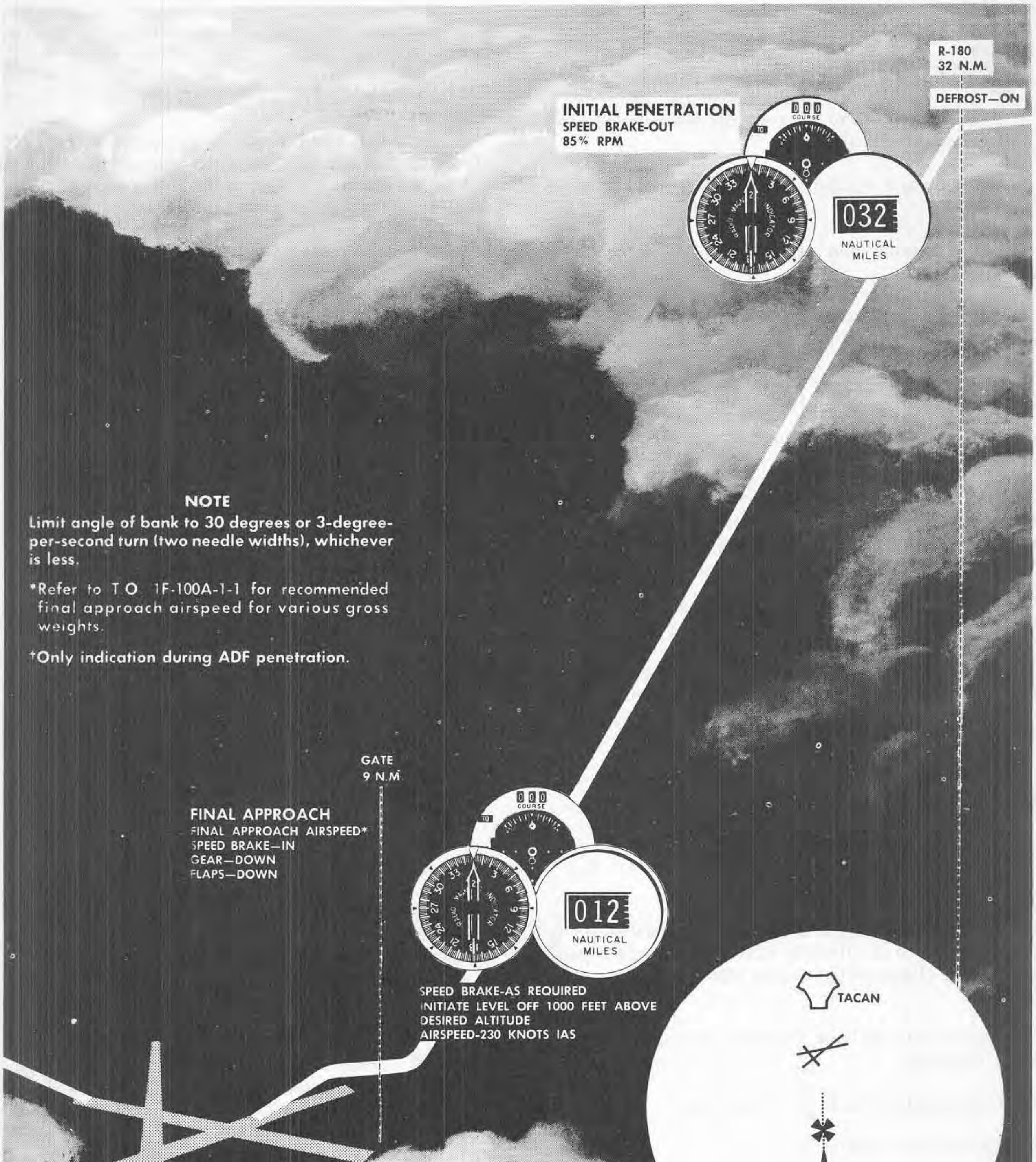

JET PENETRATION—ADF/TACAN
TYPICAL
INITIAL PENETRATION
SPEED BRAKE-OUT
85% RPM
DEFROST—ON
AIRSPEED—
300 KNOTS IAS
COURSE
NAUTICAL MILES
004
018
005
002
SPEED BRAKE—
AS REQUIRED
AIRSPEED—230 KNOTS IAS
FINAL APPROACH
FINAL APPROACH AIRSPEED*
SPEED BRAKE—IN
GEAR—DOWN
FLAPS—DOWN
ADF OR
TACAN
F-100D-1-00-21D

Figure 9-1



F-100D-1-00-22D

is restricted by rain. (Refer to "Ice and Rain" in this section.)

Caution To prevent windshield glass breakage, use anti-ice system only to the degree required to ensure visibility.

5. Canopy and windshield defrost lever — INCREASE.

6. Hold brakes, and advance throttle to full MILITARY.

7. Check engine instruments and recheck all flight instruments.

INSTRUMENT TAKE-OFF AND CLIMB.

1. Release brakes and move throttle to AFTERBURNER.

2. Maintain zero net runway heading error with nose wheel steering. Use whatever outside reference is available, and use heading indicator for heading reference.

3. Initiate nose rotation at normal VFR nose rotation speed.

4. Rotate airplane to establish a pitch attitude of 12 degrees as indicated by attitude indicator.

5. Landing gear and wing flaps up.

NOTE Because of the reversal errors in the altimeter and vertical velocity indicator, do not retract the landing gear and wing flaps until a definite climb indication is established.

6. Maintain heading and attitude until 1000-feet-per-minute rate of climb is reached; then maintain this rate of climb until desired climb speed is reached.

7. Do not turn or bank airplane until 250 knots IAS is reached.

8. Limit angle of bank to 30 degrees.

9. Throttle as required.

NOTE Continuous climbs using the afterburner should be avoided whenever possible because of the difficulty in detecting small pitch changes on the attitude indicator at steep climb angles. During afterburner climbs at low altitudes, the range of the vertical velocity indicator is exceeded.

INSTRUMENT CRUISING FLIGHT.

Use normal techniques and procedures for instrument cruising flight.

RADIO-NAVIGATION EQUIPMENT.

The AN/ARN-6 radio compass, the AN/ARN-21 TACAN, and the NAVS system are provided for en route navigation. Because the radio compass is highly susceptible to precipitation and electrical static, its reliability is considerably reduced by thin overcasts, haze, dust, and thunderstorm activity. Because of these characteristics, the automatic features of the radio compass should not be depended upon during flight under these weather conditions. When flying through areas of interference-type weather, the TACAN should be used because of clearer reception and a more stable heading indication of the visual features of the system.

HOLDING OR LOITERING ON INSTRUMENTS.

Ease of handling and minimum fuel consumption are major factors to be considered in determining loitering or holding speed. The maximum endurance speeds are based on these factors. For the recommended holding or loitering speed which varies with altitude, gross weight, and drag, refer to T. O. 1F-100A-1-1.

NOTE When air traffic procedures require holding at a specific airspeed not compatible with maximum endurance speed, fuel consumption will be higher.

- Holding above 30,000 feet with asymmetrically mounted loads is not practical because of thrust requirements.

INSTRUMENT LETDOWNS.

On IFR cross-country flights, the letdown procedures at the destination should be checked and fuel allowances made as part of preflight planning.

NOTE Because precipitation impairs forward visibility during approach, turn on windshield anti-icing and rain removal system for landing.

Descents on instruments can be made without difficulty at any speed, though care should be taken not to get into too steep a descent.

Jet Penetration and Low Approaches.

Jet penetrations have been set up to provide a high-speed and high-rate-of-descent letdown from altitudes to a point where a VFR approach or an

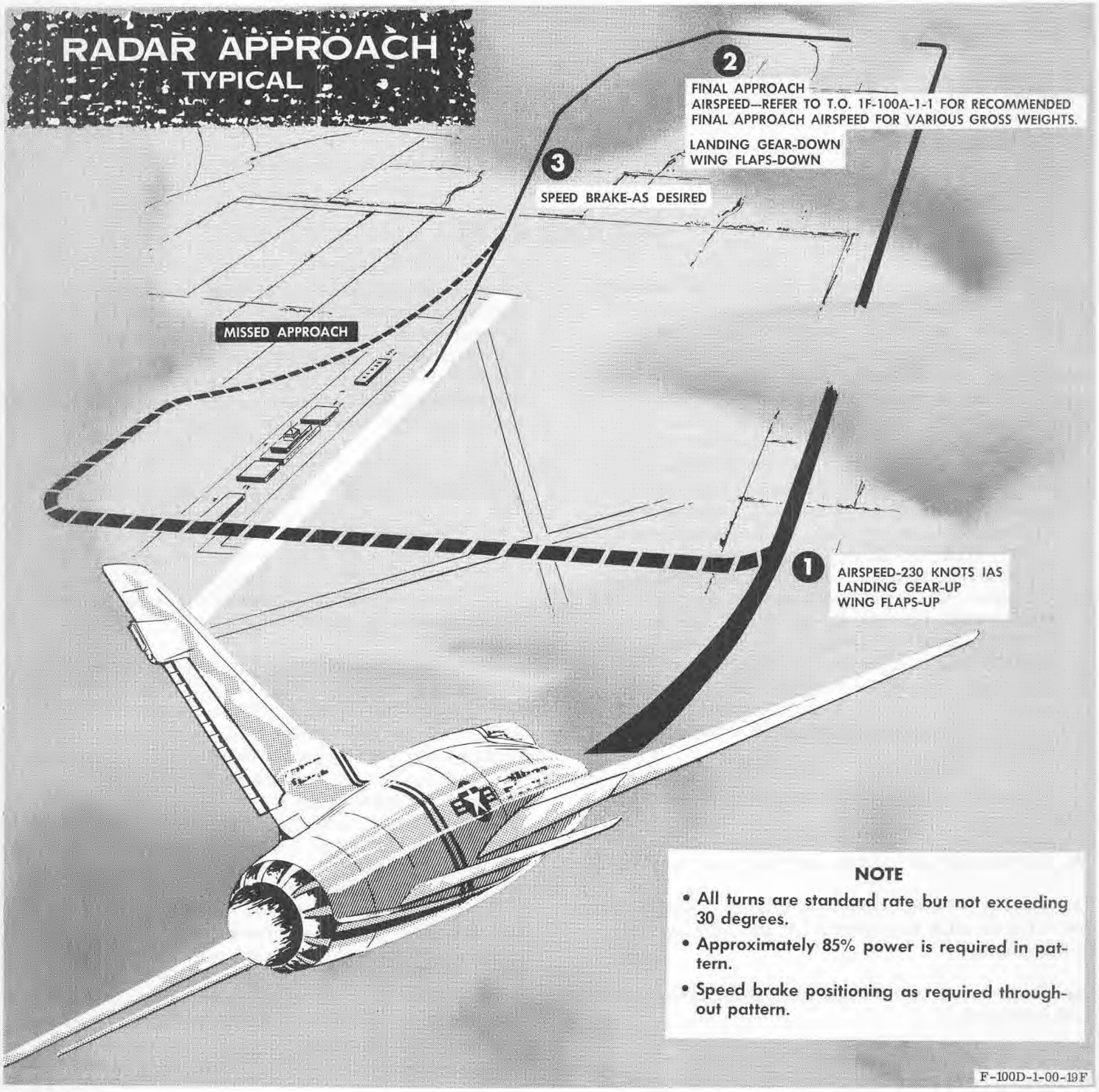


Figure 9-2

instrument approach (radio range, ADF, TACAN, radar, or ILS) can be made. (See figures 9-1 and 9-2, for typical penetrations and approaches.)

Low-speed Penetrations.

If the speed brake is unusable for any reason, a low-speed penetration will provide a rate of descent similar to a normal speed brake extended penetration. The initial penetration is accomplished at 220 knots IAS with landing gear and wing flaps down, and 85% rpm. Before final approach, the landing gear and wing flaps may be positioned as desired.

NOTE If utility hydraulic system failure has occurred, leave landing gear and wing flaps down.

On final approach, lower landing gear and wing flaps, and adjust power to maintain airspeed as specified in T.O. 1F-100A-1-1 for airplane gross weight.

Missed Approach.

1. Advance throttle as required and check speed brake in.

2. Establish a climb attitude.

3. Retract landing gear and wing flaps after vertical velocity indicator and altimeter show level flight or a slight climb.

4. Accelerate to 230 knots IAS or as desired.

5. Execute missed approach.

ICE AND RAIN

This airplane does not have a wing and tail surface anti-icing system. Flights under icing conditions may be made, provided a speed of Mach .85 to Mach .90 (depending on outside air conditions) is maintained. At slower speeds, in case of ice formation on the airplane, airspeed should be increased, altitude should be changed, or the icing region should be left. The windshield anti-icing outlets are capable of anti-icing the windshield and removing rain of moderate intensity. However, under certain conditions in the rain, visibility will be affected. If mist or light rain is encountered, visibility will not be affected. In moderate rain, use of the windshield anti-icing system will improve vision. The windshield will be streaked, but reasonable visibility will be retained. In heavy rain, visibility will be completely obscured except for a small area next to the outlets of the anti-icing system. The anti-icing and rain removal system should be turned on only to the degree required to ensure visibility under the following circumstances:

1. Ice accumulation on the windshield in normal flight.

2. In rain during normal approach and landing.

3. During letdown when it is known or suspected that icing or rain may prevail at low altitudes or on the ground.

4. Removal of ice or rain when the airplane is on the ground.

5. During take-off into anticipated icing conditions or when forward visibility is restricted because of rain.

6. When approaching a thunderstorm.

The cockpit temperature should be set as cold as practical for operation of the airplane in conditions where it is necessary to use the windshield anti-icing or rain removal system.

NOTE If the heat and vent caution light comes on, or if the cockpit pressure selector switch is in the OFF or RAM AIR ON position, the windshield anti-icing and rain removal system should not be operated unless a clear windshield is absolutely necessary.

Icing of the engine air inlet area is always possible during operation in weather with temperatures at or near the freezing point. An engine surge with a loss of thrust (no mechanical difficulties present) can indicate engine icing. A major rise in exhaust temperature will normally not be experienced with engine icing on this type of engine.

Caution If engine icing occurs, the throttle should be retarded immediately to about 85% rpm until the engine stabilizes, and an effort should be made to leave the icing area. Low airspeed and high engine rpm are most conducive to engine icing.

During take-off into fog or low clouds, when temperatures are at, or near freezing, the engine could be subject to icing. When these conditions exist, the airplane should be accelerated to 275 knots IAS as rapidly as possible. Avoid atmospheric icing conditions whenever feasible. Many areas of probable icing conditions can be avoided be careful flight planning, using available weather information. The following are conditions under which engine icing can occur without wing icing when the temperature is between -10°C (14°F) and 5°C (41°F), if fog is present, or if the dew point is within 4°C (7°F) of the outside temperature. If the outside air temperature is in the range of 0°C (32°F) to 5°C (41°F), the speed of the airplane should be maintained at 275 knots IAS or above to prevent inlet duct icing. If engine icing conditions are encountered at freezing atmospheric temperatures, immediate action should be taken as follows:

1. Change altitude rapidly, or vary course to avoid cloud formations.

2. Establish 275 knots IAS to minimize rate of ice build-up.

3. Maintain a close watch of exhaust temperature, and reduce engine rpm as necessary to prevent excessive exhaust temperature.

Another serious form of engine icing that should be avoided, if possible, is that of ice going into the engine. Flight tests have proved that engine flameouts can occur because of heavy ice accumulating around the inlet duct, dislodging, and entering the engine. Flame-outs due to this condition can occur within 4 to 5 minutes after entering an area of severe icing conditions. To reduce this hazard, avoid flight conditions that are conducive to the rapid accumulation of ice. Flame-out from this type of weather hazard is recognized by a pronounced compressor stall, followed by a drop in rpm and exhaust temperature. When a flame-out has occurred from ice entering the engine and an air start has been successful, maintain the lowest rpm permissible to make a safe landing. After landing, make a notation in the Form 781 to request an engine damage inspection.

Warning Heavy ice accumulations can cause wing slats to function incorrectly and/or stall speeds to be greatly increased; therefore, extreme caution must be used when landing under such conditions, and increased approach speed may be necessary.

TURBULENCE AND THUNDERSTORMS

Before entering an area of turbulence and thunderstorms, throttle and pitch attitude required for the desired penetration airspeed should be established, for they are the keys to proper flight technique in turbulent air. Throttle setting and pitch attitude, if maintained throughout the storm, must result in constant airspeed, regardless of any false readings of the airspeed Mach indicator.

BEST PENETRATION SPEED

275

KNOTS IAS

F-100D-1-0-96

ENGINE SURGE AND FLAME-OUT CAUSED BY ADVERSE WEATHER CONDITIONS.

The following factors, singly or in combination, can cause engine flame-out:

a. Penetration of cumulus build-ups with associated high liquid content.

b. Engine icing of either nose accessory section cover or inlet guide vanes.

c. Turbulence associated with penetration can result in excessive nose-up angles of attack, causing marginal engine performance.

d. Above 40,000 feet, the surge margin of the engine is reduced and there is poor air distribution across the face of the compressor.

Caution Flying in turbulence or hail may increase inlet duct distortion. At higher altitudes, this distortion can result in engine surge and possible flame-out. However, normal air starts may be accomplished, as outlined in Section III.

Areas of turbulent air, hail storms, or thunderstorms should be avoided whenever possible, because of the increased danger of engine flame-out. Exhaust temperature gage and engine pressure ratio gage should be monitored continuously during weather penetration. Exhaust temperature indication alone may come too late to enable the pilot to take timely corrective action. The engine guide vane anti-icing system prevents the formation of ice and is not a deicer. Whenever possible, icing conditions should be anticipated in advance and the engine guide vane anti-icing switch should be turned ON to warm up the engine air inlet. If ice has already begun to build up before the engine guide vane anti-icing system is turned on, reduce the throttle setting to minimize the danger of internal engine damage until all ice has broken off and been ingested by the engine. When the presence of ice is no longer evident, check the engine at IDLE, then advance the throttle to any desired setting.

NIGHT FLYING

There are no specific techniques for flying this airplane at night that differ from those for day flight.

NOTE Landing and taxi lights should not be used during take-off, as the moving light beams may cause disorientation.

- [F] During night operation, refraction of light through the canopy to the rear cockpit may cause what appears to be a shift of runway lights. Caution must be used during night landing to accurately align with the runway.

COLD-WEATHER PROCEDURES

Cold-weather procedures differ from normal procedures in that additional precautions are required during ground operation. Flight operations are identical for the most part, and over-all problems are considerably reduced with jet engines. Icing conditions are not covered here, but are covered under "Ice and Rain." Because cold-weather procedure is concerned primarily with extreme low-temperature operation, the procedures set forth are additions or exceptions to the normal operating procedures in Section II.

NOTE When using the alternate fuel (JP-5), refer to "Alternate and Emergency Fuel Limitations" in Section V and "Operation on Alternate or Emergency Fuel" in Section VII.

BEFORE ENTERING AIRPLANE.

1. Check that all surfaces, ducts, struts, drains, and vents are free of snow and ice.

Caution Remove all snow and ice from the wings, fuselage, and tail before flight. Depending on the weight and distribution of the snow and ice, take-off distances and climb-out performance can be adversely affected. The roughness, pattern, and location of the snow and ice can affect stall speeds and handling characteristics to a dangerous degree. In-flight structural damage also may result, due to the vibrations induced by unbalanced loads of accumulated ice and snow.

2. Make sure airplane has been carefully inspected for fuel or hydraulic leaks caused by contraction of fittings or by shrinkage of packings.

3. Inspect area behind airplane to make sure water or snow will not be blown onto personnel or equipment during start.

STARTING ENGINE.

JP-4 fuel has good starting characteristics for low-temperature starts and permits normal starting procedures.

Caution To prevent possible damage to the ac generator drive unit, the engine should not be started following "cold-soaking" at temperatures below -40°C (-40°F), unless generator drive unit has been preheated to -40°C (-40°F) or warmer.

HUNG OR SLOW START.

A hung start is indicated by failure of rpm to increase steadily to idle. If rpm becomes static, or continues very slowly, at some value between 25% rpm and idle, move the fuel regulator switch to emergency. Monitor exhaust gas temperature and rpm. It may be necessary to advance the throttle slightly past IDLE while using emergency fuel, to obtain idle rpm. When engine acceleration stabilizes and rpm approaches idle, return fuel regulator switch to normal and continue starting procedure.

Caution Do not place fuel regulator switch to emergency if engine rpm is below 25%, this could introduce excess fuel into the engine and cause the exhaust gas temperature to exceed limits.

WARM-UP AND GROUND CHECK.

Normally, engine warm-up is unnecessary. However, when the outside air temperature is below -35°C (-31°F) and the engine is started cold, it should be warmed up at idle rpm for about 2 minutes. Use firmly anchored wheel chocks for engine run-up.

Caution To prevent possible damage to ac-powered electronic equipment, the following starting procedures should be observed: When outside air temperature is between -29°C (-20°F) and -34°C (-30°F,) leave throttle at IDLE for 2 minutes before advancing to 72% rpm. When air temperatures are between -34°C (-30°F) and -40°C (-40°F), leave throttle at IDLE for 4 minutes before advancing to 72% rpm; however, during a start and warm-up following "cold soak" at -34°C (-30°F) to -30°C (-40°F), the ac generator caution light may go out at idle speed. In this event, no additional warm-up is required and the throttle may be advanced as desired. Operation of the ac generator drive unit should be normal on subsequent starts after it has been warmed up.

1. If there has been heavy rain, turn on canopy and windshield defrosting immediately after engine start.

2. Cycle flight controls four to six times. Check hydraulic pressure and control reaction.

TAXIING.

1. Avoid taxiing in deep snow, as taxiing and steering are extremely difficult, and the brakes may freeze.

CAUTION

Make sure all instruments have warmed up sufficiently to ensure normal operation. Check flight instruments for sluggishness during taxiing.

F-100D-1-0-42

2. Increase distance between airplanes while taxiing at subfreezing temperatures to ensure safe stopping distance and to prevent icing of airplane surfaces by melted snow and ice in the jet blast of a preceding airplane.

3. Minimize taxi time to reduce amount of ice fog produced by engine.

BEFORE TAKE-OFF.

Make normal full-power engine check. However, if field conditions make this impossible, final checks must be made during the first part of the take-off run.

AFTER TAKE-OFF.

NOTE Under extreme cold-weather conditions, action of the burner pressure limiter in the engine fuel control unit could cause thrust surge or slight loss of rpm just after take-off and before initial climb. (Refer to "Engine Fuel Control Unit" in Section I.)

1. After take-off from a wet snow-covered or slush-covered field, operate landing gear through several complete cycles to prevent gear freezing in retracted position. (Expect considerably slower operation of landing gear in cold weather due to stiffening of all lubricants.) Also, cycle wing slats by varying airspeed or applying G, to prevent their freezing in position.

2. Cross-check flight instruments continuously, as they may become unreliable during cold-weather operation.

DESCENT.

The windshield and canopy defrosting system should be operated throughout the flight at the highest possible heat, consistent with pilot comfort, to preheat the canopy and windshield and maintain the glass temperature above the cockpit dew point in case circumstances required a rapid descent from altitude.

BEFORE LEAVING AIRPLANE.

1. Leave canopy partially open to allow air circulation within cockpit to prevent canopy cracking and to decrease windshield and canopy frosting.

2. Whenever possible, leave airplane parked with full fuel tanks.

3. Check that battery is removed when airplane is parked outside at temperatures below -29°C (-20°F) for more than 4 hours.

4. Check that proper protective covers are installed on airplane.

HOT-WEATHER AND DESERT PROCEDURES

Hot-weather and desert procedures differ from normal procedures mainly in that additional precautions must be taken to protect the airplane from damage due to high temperatures and dust. Particular care should be taken to prevent the entrance of sand into the various airplane parts and systems (engine, fuel system, pitot-static system, etc). Filters should be checked more frequently than under normal conditions. Units with plastic or rubber parts should be protected as much as possible from windblown sand and excessive temperatures. Tires should be checked frequently for signs of blistering, etc.

BEFORE ENTERING AIRPLANE.

1. Check exposed portions of shock strut pistons for dust and sand, and have them cleaned if necessary.

2. Check inflation of shock struts and tires which may have become overinflated because of temperature increases.

3. Check tires carefully for blistering or cord separation, and be sure all protective covers are removed from airplane.

4. Check intake duct for accumulations of dust or sand.

5. Make sure all filters have been cleaned, and that the airplane has been thoroughly inspected for fuel or hydraulic leaks caused by the swelling of packings or expanding of fittings.

6. Inspect area behind airplane to make sure sand or dust will not be blown onto personnel or equipment during starting operations.

ON ENTERING AIRPLANE.

1. Check cockpit for excessive accumulation of dust or sand.

2. Check instruments and controls for moisture from high humidity, and ground-heat them if necessary to dry them.

3. Cockpit temperature rheostat – COLD.

4. Console air lever – INCREASE.

5. Cockpit temperature master switch – AUTO.

6. Complete as much of preflight cockpit check as possible before starting, to avoid prolonged ground running.

BEFORE TAKE-OFF.

Limit use of brakes as much as possible, because brake cooling is reduced when outside air temperatures are high.

TAKE-OFF.

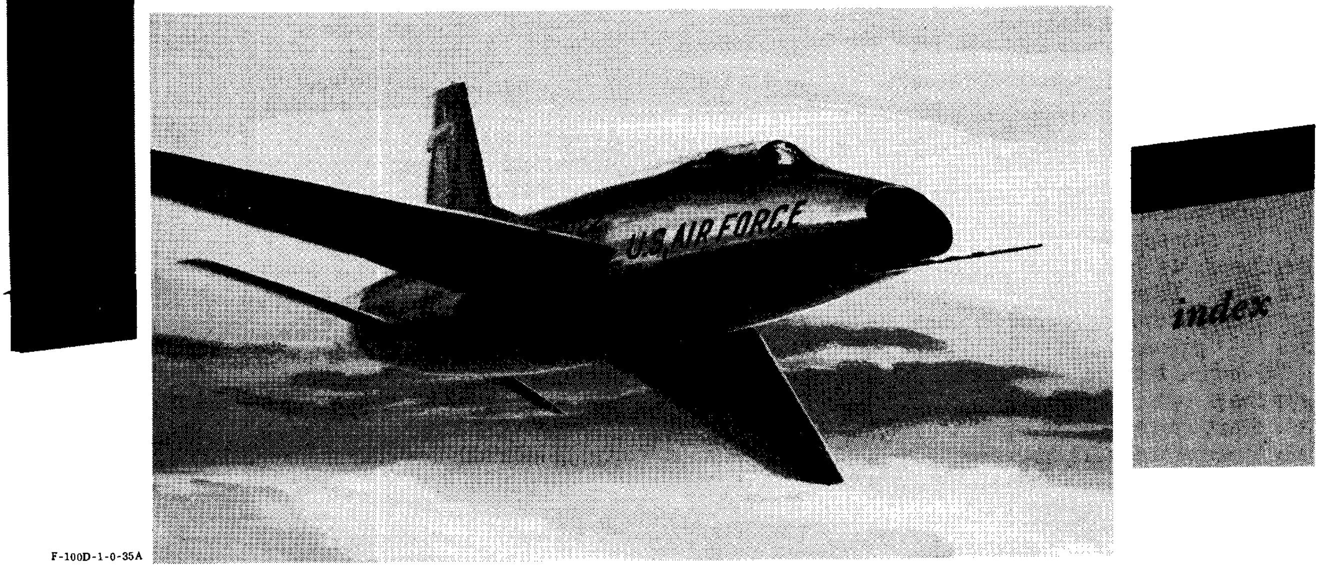
NOTE It is imperative that take-off be made at recommended speeds. When outside air temperature is high, do not lift from runway too soon, because more than the usual take-off run will be required to obtain recommended take-off speed.

BEFORE LEAVING AIRPLANE.

1. Make sure that protective covers are installed immediately on pitot boom, canopy, and intake and exhaust ducts.

2. Before covering, the canopy should be opened slightly to permit air circulation within the cockpit.

ALPHABETICAL INDEX



F-100D-1-0-35A

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

A

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

B

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

C

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

S

PAGE NUMBERS UNDERSCORED DENOTE ILLUSTRATIONS

T